Driving efficiency and sustainability

Frequency Inverter

MVW3000 V3.02.XX

Programming Manual

Programming Manual

MVW3000

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SUMMARY OF REVISIONS

The information below describes the reviews made in this manual.

Version	Revision	Description
3.02.XX	R00	First edition

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2 FAULTS AND ALARMS

Faults and Alarms are a functionality of the MVW3000 that allows viewing events, helping troubleshooting or identifying improvements in the inverter parameter settings.

Actuation of Faults and Alarms:

- Faults actuate by disabling the motor and indicating on the HMI, in the MVW3000 status word (S1.1.1) and in the diagnosis of actual fault (D1.1) the reason for its occurrence. They are only removed by resetting or turning off the inverter.
- The alarms actuate by displaying an indication on the HMI, in the MVW3000 status word (S1.1.1) and the actual alarm diagnostics (D2.1). They are removed automatically after exiting the alarm condition.

Faults and Alarms are presented to the user through codes. The codes are made up of three or four numbers preceded by the letters F (for fault) and A (for alarm), as shown in Table 2.1 on page 2-1. In this table it is also possible to obtain more details about its causes and possible solutions.

NOTE!
The cause of most of the faults and alarms can be checked and solved following the instructions in this chapter; otherwise, contact WEG technical support or a representative.

2.1 FAULT AND ALARM TABLE

Fault/Alarm	Description	Possible Causes
F003: Under voltage / Phase loss	Inverter input voltage less than 70 %.	- Undervoltage in the power supply network. - Incorrect adjustment of the transformer primary taps.
F006: Mains unbalance/ Phase loss	Voltage difference between phases greater than 10 % of the nominal value.	- Lack of phase in the power supply network.
A008: Timeout in the synchronism with the input line	It was not possible to synchronize the inverter output voltage with the grid voltage.	
F009: Incorrect status of the input circuit breaker	Incoherent wiring of DI3 and/or DI4 inputs on the PIC board.	- Improper maneuvering of the input circuit breaker. - Faulty input circuit breaker. - Faulty wiring.
F013: Output contactor feedback	Output contactor failed to close or open.	- Defect in the DI6/DO8 connections of the output contactor drive and feedback function.
F014: Input circuit breaker closing failure	Input circuit breaker does not close when commanded.	- Defective circuit breaker. - Wiring of the DI3 input of the PIC board (XC7:3) open (does not return +24 V) when closing the cubicle.
F015: Input circuit breaker opening failure	Input circuit breaker does not open when commanded.	- Defective circuit breaker. - Wiring of the DI4 input of the PIC board (XC7:4) open (does not return +24 V) in the circuit breaker opening.
F016: Shutdown by input circuit breaker protection	Actuation of the input circuit breaker protection related to the inverter main transformer.	- Wiring at input DI5 of the PIC board (XC7:5) open (does not return +24 V).
F017: Inverter not ready to energize	Input circuit breaker not ready when commanded to close.	- Defective circuit breaker. - Attempt to turn on the circuit breaker via DI1, while the inverter is indicating via DO1 that it is not able to close the circuit breaker.
A018: Inverter main transformer alarm	Alarm on the inverter main transformer.	- Wiring of input DI11 of the PIC board (XC7:16) open (does not return +24 V).

Fault/Alarm	Description	Possible Causes
F019: Inverter main transformer fault	Inverter main transformer failure.	- Wiring of the DI12 input of the PIC board (XC8:1) open (does not return +24 V).
F020: Pre-charge fault	Voltages on the DC link did not rise to the level necessary to complete the pre-charge process within the specified time.	- Incorrect adjustment of the primary tap of the auxiliary transformer. - Low voltage or lack of phase in the auxiliary power supply. - Fault in the pre-charge circuit contactors. - Optical fiber communication of one of the cells not connected, broken or defective.
F025: Inverter door locking fault	Attempt to energize the inverter with the panel doors unlocked.	- Unlocking the doors with the inverter enabled or with the DC link energized. - Wiring at DI16 input of PIC board (XC8:10) open (does not return +24 V with doors closed).
F026: Input circuit breaker not ready fault	Input circuit breaker indicating via DI2 that it is not available for operation.	- Faulty input circuit breaker. - Wiring of the DI2 input of the PIC board (XC7:2) open (does not return +24 V).
F027: Improper opening of the input circuit breaker	Command to open the input circuit breaker with the inverter enabled.	- Wiring of the DI1 input of the PIC board (XC7:1) open (does not return +24 V).
F034: Sensor 1 - Electrical arcing detection fault	Arc flash detection by panel sensor 1.	- Optical fiber RX 26 of the CIB board of CN1 not connected, broken or defective.
F035: Sensor 2 - Electrical arcing detection fault	Arc flash detection by panel sensor 2.	- Optical fiber RX 26 of the CN2 CIB board not connected, broken or defective.
F036: Sensor 3 - Electrical arcing detection fault	Arc detection by sensor 3 on the panel.	- Optical fiber RX 25 of the CN2 CIB board not connected, broken or defective.
F037: Sensor 4 - Electrical arcing detection fault	Arc flash detection by panel sensor 4.	- Optical fiber RX 24 of the CIB board of CN2 not connected, broken or defective.
F038: Sensor 5 - Electrical arcing detection fault	Arc flash detection by panel sensor 5.	- Optical fiber RX 23 of the CN2 CIB board not connected, broken or defective.
F041: Sensor C - Electrical arcing detection fault	Arc flash detection by panel sensor C.	- Optical fiber OPTO IN (3) of the CCE board not connected, broken or defective.
F042: Sensor B - Electrical arcing detection fault	Arc flash detection by panel sensor B.	- Optical fiber OPTO IN (2) of the CCE board not connected, broken or defective.
F043: Sensor A - Electrical arcing detection fault	Arc flash detection by sensor A on the panel.	- Optical fiber OPTO IN (1) of the CCE board not connected, broken or defective.
A046: Motor ixt function overload	Motor shaft load too high.	- P0156, P0157 and P0158 settings too low for the motor used. - P0159 setting too low for the motor used. - P0136 and P0137 setting too high (valid for low speed operation).
F048: Forced ventilation fault	Forced ventilation failure.	- Blocked fans. - Clogged air intake filters.
F069: Calibration fault		
F070: Overcurrent/short circuit	Instantaneous current at the inverter output greater than twice the nominal current (Hardware detection).	- Short circuit between two motor phases or power cables (hardware detection). - Load inertia too high or acceleration ramp too fast. - Incorrect regulation and/or configuration parameter(s). - Protection parameters set too high. - Cell IGBT modules short circuited.

Fault/Alarm	Description	Possible Causes
F071: Overcurrent at output	Ixt function output overload.	- Short circuit between two phases of the motor or power cables (software detection). - Load inertia too high or acceleration ramp too fast. - Incorrect regulation and/or configuration parameter(s). - Protection parameters set too high.
F072: Output over load Ixt function	Imbalance in output currents	- Bad contact or cable disconnected from the motor. - Current feedback circuit failure. - Difference between output currents greater than 12.5 % of the nominal current for a time longer than permitted.
F073: Iu overcurrent	Instantaneous current value above the permissible limit.	- Inverter output overload. - Sudden load variation. - Inadequate acceleration or deceleration ramp. - Defect in current sensors.
F074: Iv overcurrent	Instantaneous current value above the permissible limit.	- Inverter output overload. - Sudden load variation. - Inadequate acceleration or deceleration ramp. - Defect in current sensors.
F075: Iw overcurrent	Instantaneous current value above the permissible limit.	- Inverter output overload. - Sudden load variation. - Inadequate acceleration or deceleration ramp. - Defect in current sensors.
F076: Output current unbalanced	Difference between output currents greater than 12.5 % of the nominal current for a time longer than permitted.	- Bad contact or cable disconnected from the motor. - Current feedback circuit failure.
F078: Motor over temperature	Motor temperature higher than the fault level programmed in the thermal protection relay.	- Digital input signal, coming from the protection relay, programmed for "Motor failure" at low level.
F079: Speed sensor	Faulty motor speed sensor signals.	- Defective wiring between motor speed sensor and inverter interface board. - Cable length greater than the specified maximum limit. - Motorspeed sensor mounting error. - Incorrect parameterization of the number of pulses per encoder revolution.
A080: Speed sensor	Faulty motor speed sensor signals.	- Defective wiring between motor speed sensor and inverter interface board. - Cable length greater than the specified maximum limit. - Motorspeed sensor mounting error. - Incorrect parameterization of the number of pulses per encoder revolution.
F085: Electronic power supply fault	Source monitoring signal remains indicating electronic sources not OK.	
F087: Watchdog protection between control boards	Watchdog protection detected a break in the communication link between the control boards and restarted the system.	- Damaged communication cable and/or connector between control boards. - Cable disconnected or broken.
F088: Watchdog protection on the control board	Watchdog protection detected an error and restarted the system.	
F092: Pre-charge power supply	PIC board DI7 input wiring (XC7:16) open (does not return +24 V).	- Short circuit in the pre-charge system. - Defective pre-charge capacitors and/or resistors. - Pre-charge circuit breaker open. - Problems with the auxiliary pre-charge inverter.

Fault/Alarm	Description	Possible Causes
A094: Cooling system supply fault	Power alarm in the refrigeration system.	- Short circuit in the ventilation system. - Fan blocked. - Circuit breakers supplying the inverter ventilation assembly open. - Wiring of the DI10 input of the PIC board (XC7:15) open (does not return +24 V).
F099: Invalid output current offset	Output current measurement offset outside the allowable range.	- Defect in the output current measurement circuit.
F100: Control board self-diagnosis	The control board application had execution problems.	
F101: Communication failure with AUI board	Communication with the AUI user interface board was not performed correctly.	- AUI user interface board disconnected from CCE control board. - Defective connection cable between AUI and CCE.
F102: Communication timeout with the AUI board	The CCE control board detected a loss of telegrams in communication with the AUI user interface board.	- AUI user interface board disconnected from CCE control board. - Problem with the power supply of the control boards. - Defective connection cable between AUI and CCE.
A110: Motor overtemperature alarm	Motor temperature higher than the alarm level programmed in the thermal protection relay.	- Digital input signal, coming from the protection relay, programmed for ”Motor alarm” at low level.
F112: Motor over speed	Motorspeed above programmed limit.	- High mechanical acceleration torque under load.
A118: Pre-charge power supply	PIC board DI7 input wiring (XC7:16) open (does not return +24 V).	- Short circuit in the pre-charge system. - Defective pre-charge capacitors. - Defective pre-charge resistors. - Pre-charge circuit breaker open. - Problems with the auxiliary pre-charge inverter.
F256: Output transformer fault	Digital input programmed for ”Transformer OK” Open (does not return +24 V).	- For more details on the function of this DI, consult the inverter design.
F257: Pressurization system fault	Digital input programmed for ”Pressurization system OK” Open (does not return +24 V).	- For more details on the function of this DI, consult the inverter design.
F258: Output filter fault	Digital input programmed for ”Output Filter OK” Open (does not return +24 V).	- For more details on the function of this DI, consult the inverter design.
F259: Exciter fault	Digital input programmed for ”Exciter OK” Open (does not return +24 V).	- For more details on the function of this DI, consult the inverter design.
F260: Communication with the position sensor	Faulty speed sensor.	- Defective wiring between motor speed sensor and inverter interface board. - Cable length greater than the specified maximum limit. - Motorspeed sensor mounting error. - Incorrect encoder parameterization.
A261: Direction of rotation between input voltage and current is inverted	Inverted connections between the terminals of the transformer auxiliary windings and the input voltage measuring ISOC2.	- Input CTs mounted on the wrong phases of the transformers. - Incorrect connection of the current transformers of the transformers in ISOC2. - Inverted measurement fibers between the input ISOC2 and the control rack. - See parameter D4.1.1.1 to check the direction of rotation identified by the software for the measurements.

Fault/Alarm	Description	Possible Causes
A262: Direction of rotation between the output current and voltage is inverted	Inverted connections between the output terminals and the electronic output voltage measurement board.	- Output CTs mounted on the wrong output phases. - Incorrect connection of the output current transformers on the PIC board. - Inverted measurement fibers between the output voltage measurement electronic board and the control rack. - See parameter D4.1.1.1 to check the direction of rotation identified by the software for the measurements.
F263: Timeout on output contactor activation	The condition for commanding the closing of the output contactor was not met.	- If configured to drive PM motors, the terminal voltage was higher than that supported by the DC link.
A301: Input undervoltage	Inverter input voltage less than 75.0 %.	- Undervoltage in the power supply network. - Incorrect adjustment of the transformer primary taps.
A302: Input overvoltage	Inverter input voltage greater than 114 %.	- Overvoltage in the power supply network. - Incorrect adjustment of the transformer primary taps.
F303: Input undervoltage	Inverter input voltage less than 70 %.	- Undervoltage in the power supply network. - Incorrect adjustment of the transformer primary taps.
F304: Input overvoltage	Inverter input voltage greater than 117 %.	- Overvoltage in the power supply network. - Incorrect adjustment of the transformer primary taps.
F305: Input unbalance/phase loss	Voltage difference between phases greater than 40 % of the nominal value. Voltage in any phase less than 30 % of nominal value.	- Lack of phase in the power supply network.
F309: Timeout in Ride-Through state waiting line	Network return time greater than scheduled time. Voltage in any phase less than 30 % of nominal value.	- Inverter input voltage less than 80 %. - Undervoltage in the power supply network. - Incorrect adjustment of the transformer primary taps.
F310: Short circuit on the transformer 1 secondary	Short circuit in the input transformer secondary cables.	- Short circuit in the input transformer secondary coils. - Defect in the transformer current measurement circuit. - Defect in the input voltage measurement circuit. - Incorrect configuration of input transformer parameters. - Inversion of the inverter input cables (RTS or 132 phase sequence).
A315: Ground fault for neutral shift	Voltage between the motor virtual neutral and the system ground greater than 25 % of the motor phase voltage value.	- Failure in the ground insulation of the connection cables or the load driven by the inverter.
F316: Ground fault for neutral shift	Voltage between the motor’s virtual neutral and the system ground greater than 50 % of the motor’s phase voltage value for a time greater than 0.5 s.	- Failure in the ground insulation of the connection cables or the load driven by the inverter.
F317: Ground fault for current leak	The sum of the three output currents is greater than 12.5 % of the inverter’s rated current.	- Failure of the ground insulation in the connection cables or in the load driven by the inverter with the presence of current leakage. - Defective output current measurement sensors.

Fault/Alarm	Description	Possible Causes
F320: Vab measurement feedback fault	Fault in the line voltage feedback circuit between phases A and B at the inverter input.	- Vab optical fiber not connected, inverted or defective.
F321: Vbc measurement feedback fault	Fault in the line voltage feedback circuit between phases B and C at the inverter input.	- Vbc optical fiber not connected, inverted or defective.
F323: Ib_1 measurement feedback fault	Fault in the B phase current feedback circuit at the inverter input.	- Optical fiber Ib_1 not connected, inverted or defective.
F324: Ic_1 measurement feedback fault	Fault in the C phase current feedback circuit at the inverter input.	- Optical fiber Ic_1 not connected, inverted or defective.
F325: Vuv measurement feedback fault	Fault in the feedback circuit of the line voltage measured between phases U and V at the inverter output.	- Vuv optical fiber not connected, inverted or defective.
F326: Vvw measurement feedback fault	Fault in the feedback circuit of the line voltage measured between phases V and W at the inverter output.	- Vvw optical fiber not connected, inverted or defective.
F327: Vn_gnd measurement feedback fault	Fault in the voltage feedback circuit between the motor's virtual neutral and the system ground.	- Optical fiber N_GND not connected, inverted or defective.
F328: Ib_2 measurement feedback fault	Fault in the B phase current feedback circuit at the inverter input.	- Optical fiber Ib_2 not connected, inverted or defective.
F329: Ic_2 measurement feedback fault	Fault in the C phase current feedback circuit at the inverter input.	- Optical fiber Ic_2 not connected, inverted or defective.
F330: Ib_3 measurement feedback fault	Fault in the B phase current feedback circuit at the inverter input.	- Optical fiber Ib_3 not connected, inverted or defective.
F331: Ic_3 measurement feedback fault	Fault in the C phase current feedback circuit at the inverter input.	- Optical fiber Ic_3 not connected, inverted or defective.
F333: Feedback failure in the Vab measurement of the connection to the output	Fault in the line voltage feedback circuit between phases A and B at the inverter output.	- Vab optical fiber not connected, inverted or defective.
F334: Feedback failure in the Vbc measurement of the connection to the output	Fault in the line voltage feedback circuit between phases B and C at the inverter output.	- Vab optical fiber not connected, inverted or defective.
F343: Short circuit on the transformer 2 secondary	Short circuit in the input transformer secondary cables.	- Short circuit in the input transformer secondary coils. - Defect in the transformer current measurement circuit. - Defect in the input voltage measurement circuit. - Incorrect configuration of input transformer parameters. - Inversion of the inverter input cables (RTS or 132 phase sequence).

Fault/Alarm	Description	Possible Causes
F346: Short circuit on the transformer 3 secondary	Short circuit in the input transformer secondary cables.	- Short circuit in the input transformer secondary coils. - Defect in the transformer current measurement circuit. - Defect in the input voltage measurement circuit. - Incorrect configuration of input transformer parameters. - Inversion of the inverter input cables (RTS or 132 phase sequence).
F349: Disabled cell connected	A cell that should be deactivated and disconnected is connected to the inverter.	- Cell connected improperly. - Incorrect parameterization of the inverter nominal voltage. - Cell configured for mechanical bypass remains connected.
F350: Invalid setting for the Bypass	Bypass situation where the arrangement of the operating power arms represents a combination that is not valid for operation.	- It is not possible to obtain a combination to supply a balanced three-phase voltage to the motor with the operational power arms available in the system. - The invalid arrangement condition occurs when the bypass function chosen is the option with neutral displacement.
F351: Number of programmed cells exceeds the inverter capacity	The total number of cells resulting from the inverter configuration exceeds the communication capacity of the control rack, this number must be less than 36 cells.	- Invalid inverter configuration considering parameter setting: C13.1.1, C13.1.4 e C13.1.3.
F352: Insufficient voltage for operation as an electronic dynamometer	According to C13.1.1 and P1572 the grid voltage is greater than the inverter output voltage.	- Invalid inverter configuration considering parameter setting: C13.1.1, C13.1.4 e C13.1.3.
F353: Late response failure of CN1 connector cells	Cells linked to the CIB are showing inappropriate responses.	
F354: Late response failure of CN2 connector cells	Cells linked to the CIB are showing inappropriate responses.	
F355: CIB card incorrect response failure	The CIB board is responding inappropriately.	
F356: Communication failure between CIB 1 and CCE	The CIB interface board's self-diagnosis routines detected communication problems with the CCE control board.	- Problems in the connection between the CIB and the CCE control board.
F357: Communication failure between CIB 2 and CCE	The CIB interface board's self-diagnosis routines detected communication problems with the CCE control board.	- Problems in the connection between the CIB and the CCE control board.
F358: CIB execution failure of CN1 connector	The CIB interface board's self-diagnosis routines have detected a critical problem.	
F359: CIB execution failure of CN2 connector	The CIB interface board's self-diagnosis routines have detected a critical problem.	
F360: Communication failure between CCE and CIB	The CCE control board's self-diagnosis routines have detected a critical problem in communication with the CIB board.	
F361: Connection failure with CIB board 1	The connection to the CIB interface board is not working properly.	- CIB interface board disconnected. - Problems with the connector between the CIB board and the CCE.

Fault/Alarm	Description	Possible Causes
F362: Connection failure with CIB board 2	The connection to the CIB interface board is not working properly.	- CIB interface board disconnected. - Problems with the connector between the CIB board and the CCE. - Incorrect parameterization of the inverter's nominal voltage.
F363: Self-diagnosis of cell voltages	Voltage levels incompatible with the inverter model.	- Firmware programming incompatible with hardware. - Incorrect parameterization of the inverter's nominal voltage.
F400: Cell U1 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F401: Cell U2 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F402: Cell U3 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F403: Cell U4 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F404: Cell U5 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F405: Cell U6 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F406: Cell U7 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.

Fault/Alarm	Description	Possible Causes
F407: Cell U8 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F408: Cell U9 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F409: Cell U10 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F410: Cell U11 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F411: Cell U12 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F412: Cell V1 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F413: Cell V2 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F414: Cell V3 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F415: Cell V4 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.

Fault/Alarm	Description	Possible Causes
F416: Cell V5 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F417: Cell V6 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F418: Cell V7 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F419: Cell V8 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F420: Cell V9 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F421: Cell V10 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F422: Cell V11 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F423: Cell V12 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F424: Cell W1 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.

Fault/Alarm	Description	Possible Causes
F425: Cell W2 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F426: Cell W3 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F427: Cell W4 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F428: Cell W5 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F429: Cell W6 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F430: Cell W7 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F431: Cell W8 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F432: Cell W9 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F433: Cell W10 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.

Fault/Alarm	Description	Possible Causes
F434: Cell W11 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F435: Cell W12 DC link overvoltage	Cell DC link voltage greater than 1200 V.	- Incorrect adjustment of the Taps of the inverter's main transformer. - Voltage at the inverter input supply too high. - Load inertia too high or deceleration ramp too low. - Adjustment of the ratio between the primary voltage and the auxiliary output transformer too high.
F436: Cell U1 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F437: Cell U2 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F438: Cell U3 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F439: Cell U4 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F440: Cell U5 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F441: Cell U6 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F442: Cell U7 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F443: Cell U8 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F444: Cell U9 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F445: Cell U10 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F446: Cell U11 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F447: Cell U12 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F448: Cell V1 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F449: Cell V2 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.

Fault/Alarm	Description	Possible Causes
F450: Cell V3 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F451: Cell V4 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F452: Cell V5 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F453: Cell V6 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F454: Cell V7 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F455: Cell V8 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F456: Cell V9 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F457: Cell V10 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F458: Cell V11 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F459: Cell V12 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F460: Cell W1 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F461: Cell W2 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F462: Cell W3 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F463: Cell W4 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F464: Cell W5 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F465: Cell W6 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F466: Cell W7 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.
F467: Cell W8 DC link undervoltage	Cell DC link voltage less than 745 V or less than 652 V for vector control operation.	- Voltage at the inverter input supply too low. - Incorrect adjustment of the Taps of the main transformer of the inverter.

<table>
<tr><th>Fault/Alarm</th><th>Description</th><th>Possible Causes</th></tr>
<tr><td>F468:
Cell W9 DC link undervoltage</td><td>Cell DC link voltage less than 745 V or less than 652 V for vector control operation.</td><td>- Voltage at the inverter input supply too low.
- Incorrect adjustment of the Taps of the main transformer of the inverter.</td></tr>
<tr><td>F469:
Cell W10 DC link undervoltage</td><td>Cell DC link voltage less than 745 V or less than 652 V for vector control operation.</td><td>- Voltage at the inverter input supply too low.
- Incorrect adjustment of the Taps of the main transformer of the inverter.</td></tr>
<tr><td>F470:
Cell W11 DC link undervoltage</td><td>Cell DC link voltage less than 745 V or less than 652 V for vector control operation.</td><td>- Voltage at the inverter input supply too low.
- Incorrect adjustment of the Taps of the main transformer of the inverter.</td></tr>
<tr><td>F471:
Cell W12 DC link undervoltage</td><td>Cell DC link voltage less than 745 V or less than 652 V for vector control operation.</td><td>- Voltage at the inverter input supply too low.
- Incorrect adjustment of the Taps of the main transformer of the inverter.</td></tr>
<tr><td>A472:
Overtemperature on cell U1 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A473:
Overtemperature on cell U2 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A474:
Overtemperature on cell U3 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A475:
Overtemperature on cell U4 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
</table>

<table>
<tr><th>Fault/Alarm</th><th>Description</th><th>Possible Causes</th></tr>
<tr><td>A476:
Overtemperature on cell U5 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A477:
Overtemperature on cell U6 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A478:
Overtemperature on cell U7 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A479:
Overtemperature on cell U8 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A480:
Overtemperature on cell U9 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
</table>

<table>
<tr><th>Fault/Alarm</th><th>Description</th><th>Possible Causes</th></tr>
<tr><td>A481:
Overtemperature on cell U10 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A482:
Overtemperature on cell U11 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A483:
Overtemperature on cell U12 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
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Overtemperature on cell V1 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A485:
Overtemperature on cell V2 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
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<table>
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Overtemperature on cell V3 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A487:
Overtemperature on cell V4 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A488:
Overtemperature on cell V5 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A489:
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A490:
Overtemperature on cell V7 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
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<table>
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Overtemperature on cell V8 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A492:
Overtemperature on cell V9 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A493:
Overtemperature on cell V10 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A494:
Overtemperature on cell V11 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A495:
Overtemperature on cell V12 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
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<table>
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A497:
Overtemperature on cell W2 IGBT module</td><td>Cell heatsink temperature higher than alarm level.
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A498:
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A500:
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
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<table>
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A502:
Overtemperature on cell W7 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A503:
Overtemperature on cell W8 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A504:
Overtemperature on cell W9 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A505:
Overtemperature on cell W10 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
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<table>
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Overtemperature on cell W11 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>A507:
Overtemperature on cell W12 IGBT module</td><td>Cell heatsink temperature higher than alarm level.<table><tr><th>Cell model</th><th>Alarm level</th></tr><tr><td>70 A</td><td>85 °C</td></tr><tr><td>140 A</td><td>85 °C</td></tr><tr><td>200 A</td><td>85 °C</td></tr><tr><td>265 A</td><td>85 °C</td></tr><tr><td>340 A</td><td>85 °C</td></tr><tr><td>450 A</td><td>90 °C</td></tr><tr><td>600 A</td><td>90 °C</td></tr><tr><td>800 A</td><td>100 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F508:
Overtemperature on cell U1 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F509:
Overtemperature on cell U2 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F510:
Overtemperature on cell U3 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
</table>

<table>
<tr><th>Fault/Alarm</th><th>Description</th><th>Possible Causes</th></tr>
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F512:
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F513:
Overtemperature on cell U6 IGBT module</td><td>Cell heatsink temperature higher than fault level.
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
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Overtemperature on cell U7 IGBT module</td><td>Cell heatsink temperature higher than fault level.
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- Clogged air intake filters.</td></tr>
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Overtemperature on cell U8 IGBT module</td><td>Cell heatsink temperature higher than fault level.
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Overtemperature on cell U9 IGBT module</td><td>Cell heatsink temperature higher than fault level.
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<tr><td>F517:
Overtemperature on cell U10 IGBT module</td><td>Cell heatsink temperature higher than fault level.
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F519:
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- Clogged air intake filters.</td></tr>
<tr><td>F520:
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- Clogged air intake filters.</td></tr>
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F522:
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- Clogged air intake filters.</td></tr>
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- Clogged air intake filters.</td></tr>
<tr><td>F524:
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F525:
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
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Overtemperature on cell V8 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
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<tr><td>F528:
Overtemperature on cell V9 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
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- Clogged air intake filters.</td></tr>
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- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F530:
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<table>
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- Blocked or defective fans.
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- Clogged air intake filters.</td></tr>
<tr><td>F533:
Overtemperature on cell W2 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
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<tr><td>F534:
Overtemperature on cell W3 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
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- Clogged air intake filters.</td></tr>
<tr><td>F535:
Overtemperature on cell W4 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
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<tr><th>Fault/Alarm</th><th>Description</th><th>Possible Causes</th></tr>
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Overtemperature on cell W5 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
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Overtemperature on cell W6 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
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<tr><td>F538:
Overtemperature on cell W7 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
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<tr><td>F539:
Overtemperature on cell W8 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
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<tr><td>F540:
Overtemperature on cell W9 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
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<tr><th>Fault/Alarm</th><th>Description</th><th>Possible Causes</th></tr>
<tr><td>F541:
Overtemperature on cell W10 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F542:
Overtemperature on cell W11 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F543:
Overtemperature on cell W12 IGBT module</td><td>Cell heatsink temperature higher than fault level.<table><tr><th>Cell model</th><th>Fault level</th></tr><tr><td>70 A</td><td>90 °C</td></tr><tr><td>140 A</td><td>90 °C</td></tr><tr><td>200 A</td><td>90 °C</td></tr><tr><td>265 A</td><td>90 °C</td></tr><tr><td>340 A</td><td>90 °C</td></tr><tr><td>450 A</td><td>95 °C</td></tr><tr><td>600 A</td><td>95 °C</td></tr><tr><td>800 A</td><td>105 °C</td></tr></table></td><td>- Very high ambient temperature (> 40 °C) and high output current.
- Blocked or defective fans.
- Clogged air intake filters.</td></tr>
<tr><td>F544:
Undertemperature on cell U1 IGBT</td><td>Cell heatsink temperature less than -10°C.</td><td>- Defect in the cell temperature measurement sensor.
- Cell temperature sensor disconnected.</td></tr>
<tr><td>F545:
Undertemperature on cell U2 IGBT</td><td>Cell heatsink temperature less than -10°C.</td><td>- Defect in the cell temperature measurement sensor.
- Cell temperature sensor disconnected.</td></tr>
<tr><td>F546:
Undertemperature on cell U3 IGBT</td><td>Cell heatsink temperature less than -10°C.</td><td>- Defect in the cell temperature measurement sensor.
- Cell temperature sensor disconnected.</td></tr>
<tr><td>F547:
Undertemperature on cell U4 IGBT</td><td>Cell heatsink temperature less than -10°C.</td><td>- Defect in the cell temperature measurement sensor.
- Cell temperature sensor disconnected.</td></tr>
<tr><td>F548:
Undertemperature on cell U5 IGBT</td><td>Cell heatsink temperature less than -10°C.</td><td>- Defect in the cell temperature measurement sensor.
- Cell temperature sensor disconnected.</td></tr>
<tr><td>F549:
Undertemperature on cell U6 IGBT</td><td>Cell heatsink temperature less than -10°C.</td><td>- Defect in the cell temperature measurement sensor.
- Cell temperature sensor disconnected.</td></tr>
<tr><td>F550:
Undertemperature on cell U7 IGBT</td><td>Cell heatsink temperature less than -10°C.</td><td>- Defect in the cell temperature measurement sensor.
- Cell temperature sensor disconnected.</td></tr>
</table>

Fault/Alarm	Description	Possible Causes
F551: Undertemperature on cell U8 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F552: Undertemperature on cell U9 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F553: Undertemperature on cell U10 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F554: Undertemperature on cell U11 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F555: Undertemperature on cell U12 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F556: Undertemperature on cell V1 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F557: Undertemperature on cell V2 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F558: Undertemperature on cell V3 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F559: Undertemperature on cell V4 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F560: Undertemperature on cell V5 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F561: Undertemperature on cell V6 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F562: Undertemperature on cell V7 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F563: Undertemperature on cell V8 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F564: Undertemperature on cell V9 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F565: Undertemperature on cell V10 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F566: Undertemperature on cell V11 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F567: Undertemperature on cell V12 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F568: Undertemperature on cell W1 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.

Fault/Alarm	Description	Possible Causes
F569: Undertemperature on cell W2 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F570: Undertemperature on cell W3 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F571: Undertemperature on cell W4 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F572: Undertemperature on cell W5 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F573: Undertemperature on cell W6 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F574: Undertemperature on cell W7 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F575: Undertemperature on cell W8 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F576: Undertemperature on cell W9 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F577: Undertemperature on cell W10 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F578: Undertemperature on cell W11 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F579: Undertemperature on cell W12 IGBT	Cell heatsink temperature less than -10°C.	- Defect in the cell temperature measurement sensor. - Cell temperature sensor disconnected.
F580: Cell U1 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F581: Cell U2 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F582: Cell U3 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.

Fault/Alarm	Description	Possible Causes
F583: Cell U4 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F584: Cell U5 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F585: Cell U6 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F586: Cell U7 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F587: Cell U8 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F588: Cell U9 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F589: Cell U10 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F590: Cell U11 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F591: Cell U12 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.

Fault/Alarm	Description	Possible Causes
F592: Cell V1 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F593: Cell V2 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F594: Cell V3 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F595: Cell V4 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F596: Cell V5 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F597: Cell V6 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F598: Cell V7 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F599: Cell V8 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F600: Cell V9 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.

Fault/Alarm	Description	Possible Causes
F601: Cell V10 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F602: Cell V11 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F603: Cell V12 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F604: Cell W1 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F605: Cell W2 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F606: Cell W3 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F607: Cell W4 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F608: Cell W5 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F609: Cell W6 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.

Fault/Alarm	Description	Possible Causes
F610: Cell W7 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F611: Cell W8 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F612: Cell W9 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F613: Cell W10 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F614: Cell W11 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F615: Cell W12 phase IGBT	Failure in the IGBT of the respective cell phase.	- Short circuit at the inverter output. - Cell phase arm IGBT firing board disconnected. - Cell phase arm IGBTs operating outside the saturation region. - Defective IGBTs or cell phase arm firing board. - Failure in the desaturation signal feedback or gate driver source.
F616: Cell U1 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F617: Cell U2 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F618: Cell U3 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.

Fault/Alarm	Description	Possible Causes
F619: Cell U4 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F620: Cell U5 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F621: Cell U6 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F622: Cell U7 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F623: Cell U8 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F624: Cell U9 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F625: Cell U10 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F626: Cell U11 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F627: Cell U12 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.

Fault/Alarm	Description	Possible Causes
F628: Cell V1 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F629: Cell V2 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F630: Cell V3 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F631: Cell V4 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F632: Cell V5 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F633: Cell V6 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F634: Cell V7 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F635: Cell V8 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F636: Cell V9 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.

Fault/Alarm	Description	Possible Causes
F637: Cell V10 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F638: Cell V11 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F639: Cell V12 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F640: Cell W1 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F641: Cell W2 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F642: Cell W3 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F643: Cell W4 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F644: Cell W5 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F645: Cell W6 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.

Fault/Alarm	Description	Possible Causes
F646: Cell W7 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F647: Cell W8 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F648: Cell W9 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F649: Cell W10 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F650: Cell W11 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F651: Cell W12 neutral IGBT	Failure in the neutral IGBT of the respective cell.	- Short circuit at the inverter output. - Cell neutral arm IGBT trigger card disconnected. - IGBTs of the neutral arm of the cell operating outside the saturation region. - Faulty IGBTs or neutral cell spleen firing card. - Failure in the desaturation signal feedback or gate driver source.
F652: Cell U1 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F653: Cell U2 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F654: Cell U3 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F655: Cell U4 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F656: Cell U5 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.

Fault/Alarm	Description	Possible Causes
F657: Cell U6 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F658: Cell U7 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F659: Cell U8 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F660: Cell U9 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F661: Cell U10 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F662: Cell U11 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F663: Cell U12 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F664: Cell V1 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F665: Cell V2 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F666: Cell V3 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F667: Cell V4 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F668: Cell V5 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F669: Cell V6 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F670: Cell V7 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.

Fault/Alarm	Description	Possible Causes
F671: Cell V8 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F672: Cell V9 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F673: Cell V10 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F674: Cell V11 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F675: Cell V12 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F676: Cell W1 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F677: Cell W2 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F678: Cell W3 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F679: Cell W4 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F680: Cell W5 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F681: Cell W6 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F682: Cell W7 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F683: Cell W8 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F684: Cell W9 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.

Fault/Alarm	Description	Possible Causes
F685: Cell W10 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F686: Cell W11 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F687: Cell W12 phase pulse feedback	Failure to confirm switching of the cell phase arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the phase arm IGBTs disconnected or defective. - Defective IGBTs or spleen cell phase firing plate.
F1000: Cell U1 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1001: Cell U2 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1002: Cell U3 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1003: Cell U4 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1004: Cell U5 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1005: Cell U6 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1006: Cell U7 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1007: Cell U8 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1008: Cell U9 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1009: Cell U10 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1010: Cell U11 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1011: Cell U12 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1012: Cell V1 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1013: Cell V2 electronics power supply	Voltages of the cell’s internal electronic circuits outside the operating level.	- Defect in the cell power supply.

Fault/Alarm	Description	Possible Causes
F1014: Cell V3 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1015: Cell V4 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1016: Cell V5 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1017: Cell V6 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1018: Cell V7 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1019: Cell V8 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1020: Cell V9 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1021: Cell V10 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1022: Cell V11 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1023: Cell V12 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1024: Cell W1 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1025: Cell W2 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1026: Cell W3 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1027: Cell W4 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1028: Cell W5 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1029: Cell W6 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1030: Cell W7 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1031: Cell W8 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.

Fault/Alarm	Description	Possible Causes
F1032: Cell W9 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1033: Cell W10 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1034: Cell W11 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1035: Cell W12 electronics power supply	Voltages of the cell's internal electronic circuits outside the operating level.	- Defect in the cell power supply.
F1036: Cell U1 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1037: Cell U2 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1038: Cell U3 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1039: Cell U4 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1040: Cell U5 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1041: Cell U6 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1042: Cell U7 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1043: Cell U8 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1044: Cell U9 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1045: Cell U10 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1046: Cell U11 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1047: Cell U12 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1048: Cell V1 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1049: Cell V2 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	

Fault/Alarm	Description	Possible Causes
F1050: Cell V3 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1051: Cell V4 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1052: Cell V5 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1053: Cell V6 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1054: Cell V7 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1055: Cell V8 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1056: Cell V9 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1057: Cell V10 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1058: Cell V11 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1059: Cell V12 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1060: Cell W1 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1061: Cell W2 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1062: Cell W3 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1063: Cell W4 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1064: Cell W5 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1065: Cell W6 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1066: Cell W7 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1067: Cell W8 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	

Fault/Alarm	Description	Possible Causes
F1068: Cell W9 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1069: Cell W10 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1070: Cell W11 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1071: Cell W12 modulation synchronism	Failure in synchronization between the cell control board and the inverter main control.	
F1072: Cell U1 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1073: Cell U2 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1074: Cell U3 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1075: Cell U4 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1076: Cell U5 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1077: Cell U6 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1078: Cell U7 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1079: Cell U8 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1080: Cell U9 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1081: Cell U10 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1082: Cell U11 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1083: Cell U12 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1084: Cell V1 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1085: Cell V2 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1086: Cell V3 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1087: Cell V4 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1088: Cell V5 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1089: Cell V6 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.

Fault/Alarm	Description	Possible Causes
F1090: Cell V7 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1091: Cell V8 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1092: Cell V9 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1093: Cell V10 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1094: Cell V11 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1095: Cell V12 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1096: Cell W1 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1097: Cell W2 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1098: Cell W3 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1099: Cell W4 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1100: Cell W5 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1101: Cell W6 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1102: Cell W7 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1103: Cell W8 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1104: Cell W9 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1105: Cell W10 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1106: Cell W11 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1107: Cell W12 Bypass system	Cell bypass system operation failure.	- Bypass system not connected or faulty.
F1108: Communication with cell U1	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1109: Communication with cell U2	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1110: Communication with cell U3	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1111: Communication with cell U4	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.

Fault/Alarm	Description	Possible Causes
F1112: Communication with cell U5	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1113: Communication with cell U6	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1114: Communication with cell U7	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1115: Communication with cell U8	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1116: Communication with cell U9	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1117: Communication with cell U10	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1118: Communication with cell U11	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1119: Communication with cell U12	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1120: Communication with cell V1	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1121: Communication with cell V2	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1122: Communication with cell V3	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1123: Communication with cell V4	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1124: Communication with cell V5	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1125: Communication with cell V6	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1126: Communication with cell V7	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1127: Communication with cell V8	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1128: Communication with cell V9	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1129: Communication with cell V10	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.

Fault/Alarm	Description	Possible Causes
F1130: Communication with cell V11	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1131: Communication with cell V12	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1132: Communication with cell W1	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1133: Communication with cell W2	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1134: Communication with cell W3	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1135: Communication with cell W4	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1136: Communication with cell W5	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1137: Communication with cell W6	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1138: Communication with cell W7	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1139: Communication with cell W8	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1140: Communication with cell W9	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1141: Communication with cell W10	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1142: Communication with cell W11	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1143: Communication with cell W12	Cell does not establish communication with the CIB board.	- Processor firmware update process failed. - Cell PLD reconfiguration failed.
F1144: Incompatible cell U1 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1145: Incompatible cell U2 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1146: Incompatible cell U3 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1147: Incompatible cell U4 firmware	Cell control board firmware version incompatible with that of the inverter main control.	

Fault/Alarm	Description	Possible Causes
F1148: Incompatible cell U5 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1149: Incompatible cell U6 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1150: Incompatible cell U7 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1151: Incompatible cell U8 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1152: Incompatible cell U9 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1153: Incompatible cell U10 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1154: Incompatible cell U11 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1155: Incompatible cell U12 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1156: Incompatible cell V1 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1157: Incompatible cell V2 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1158: Incompatible cell V3 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1159: Incompatible cell V4 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1160: Incompatible cell V5 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1161: Incompatible cell V6 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1162: Incompatible cell V7 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1163: Incompatible cell V8 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1164: Incompatible cell V9 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1165: Incompatible cell V10 firmware	Cell control board firmware version incompatible with that of the inverter main control.	

Fault/Alarm	Description	Possible Causes
F1166: Incompatible cell V11 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1167: Incompatible cell V12 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1168: Incompatible cell W1 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1169: Incompatible cell W2 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1170: Incompatible cell W3 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1171: Incompatible cell W4 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1172: Incompatible cell W5 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1173: Incompatible cell W6 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1174: Incompatible cell W7 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1175: Incompatible cell W8 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1176: Incompatible cell W9 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1177: Incompatible cell W10 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1178: Incompatible cell W11 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1179: Incompatible cell W12 firmware	Cell control board firmware version incompatible with that of the inverter main control.	
F1180: Incompatible cell U1 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1181: Incompatible cell U2 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1182: Incompatible cell U3 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1183: Incompatible cell U4 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.

Fault/Alarm	Description	Possible Causes
F1184: Incompatible cell U5 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1185: Incompatible cell U6 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1186: Incompatible cell U7 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1187: Incompatible cell U8 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1188: Incompatible cell U9 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1189: Incompatible cell U10 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1190: Incompatible cell U11 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1191: Incompatible cell U12 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1192: Incompatible cell V1 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1193: Incompatible cell V2 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1194: Incompatible cell V3 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1195: Incompatible cell V4 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1196: Incompatible cell V5 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1197: Incompatible cell V6 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1198: Incompatible cell V7 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1199: Incompatible cell V8 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1200: Incompatible cell V9 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1201: Incompatible cell V10 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.

Fault/Alarm	Description	Possible Causes
F1202: Incompatible cell V11 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1203: Incompatible cell V12 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1204: Incompatible cell W1 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1205: Incompatible cell W2 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1206: Incompatible cell W3 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1207: Incompatible cell W4 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1208: Incompatible cell W5 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1209: Incompatible cell W6 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1210: Incompatible cell W7 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1211: Incompatible cell W8 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1212: Incompatible cell W9 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1213: Incompatible cell W10 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1214: Incompatible cell W11 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1215: Incompatible cell W12 model	Cell model incompatible or invalid with inverter model.	- Cell identifier code (MCC1 DIP) not configured.
F1216: Cell U1 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1217: Cell U2 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1218: Cell U3 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.

Fault/Alarm	Description	Possible Causes
F1219: Cell U4 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1220: Cell U5 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1221: Cell U6 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1222: Cell U7 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1223: Cell U8 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1224: Cell U9 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1225: Cell U10 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1226: Cell U11 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1227: Cell U12 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1228: Cell V1 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1229: Cell V2 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1230: Cell V3 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1231: Cell V4 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1232: Cell V5 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.

Fault/Alarm	Description	Possible Causes
F1233: Cell V6 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1234: Cell V7 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1235: Cell V8 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1236: Cell V9 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1237: Cell V10 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1238: Cell V11 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1239: Cell V12 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1240: Cell W1 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1241: Cell W2 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1242: Cell W3 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1243: Cell W4 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1244: Cell W5 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1245: Cell W6 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1246: Cell W7 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.

Fault/Alarm	Description	Possible Causes
F1247: Cell W8 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1248: Cell W9 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1249: Cell W10 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1250: Cell W11 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1251: Cell W12 insulation defective	Failure in the internal insulation of the cell.	- Contact between any energized point of the circuit and the housing. - Failure in the discharge resistors of the cell's DC link capacitors.
F1252: Firmware update or PLD cell U1	Processor firmware update process or cell PLD reconfiguration failed.	
F1253: Firmware update or PLD cell U2	Processor firmware update process or cell PLD reconfiguration failed.	
F1254: Firmware update or PLD cell U3	Processor firmware update process or cell PLD reconfiguration failed.	
F1255: Firmware update or PLD cell U4	Processor firmware update process or cell PLD reconfiguration failed.	
F1256: Firmware update or PLD cell U5	Processor firmware update process or cell PLD reconfiguration failed.	
F1257: Firmware update or PLD cell U6	Processor firmware update process or cell PLD reconfiguration failed.	
F1258: Firmware update or PLD cell U7	Processor firmware update process or cell PLD reconfiguration failed.	
F1259: Firmware update or PLD cell U8	Processor firmware update process or cell PLD reconfiguration failed.	
F1260: Firmware update or PLD cell U9	Processor firmware update process or cell PLD reconfiguration failed.	
F1261: Firmware update or PLD cell U10	Processor firmware update process or cell PLD reconfiguration failed.	
F1262: Firmware update or PLD cell U11	Processor firmware update process or cell PLD reconfiguration failed.	

Fault/Alarm	Description	Possible Causes
F1263: Firmware update or PLD cell U12	Processor firmware update process or cell PLD reconfiguration failed.	
F1264: Firmware update or PLD cell V1	Processor firmware update process or cell PLD reconfiguration failed.	
F1265: Firmware update or PLD cell V2	Processor firmware update process or cell PLD reconfiguration failed.	
F1266: Firmware update or PLD cell V3	Processor firmware update process or cell PLD reconfiguration failed.	
F1267: Firmware update or PLD cell V4	Processor firmware update process or cell PLD reconfiguration failed.	
F1268: Firmware update or PLD cell V5	Processor firmware update process or cell PLD reconfiguration failed.	
F1269: Firmware update or PLD cell V6	Processor firmware update process or cell PLD reconfiguration failed.	
F1270: Firmware update or PLD cell V7	Processor firmware update process or cell PLD reconfiguration failed.	
F1271: Firmware update or PLD cell V8	Processor firmware update process or cell PLD reconfiguration failed.	
F1272: Firmware update or PLD cell V9	Processor firmware update process or cell PLD reconfiguration failed.	
F1273: Firmware update or PLD cell V10	Processor firmware update process or cell PLD reconfiguration failed.	
F1274: Firmware update or PLD cell V11	Processor firmware update process or cell PLD reconfiguration failed.	
F1275: Firmware update or PLD cell V12	Processor firmware update process or cell PLD reconfiguration failed.	
F1276: Firmware update or PLD cell W1	Processor firmware update process or cell PLD reconfiguration failed.	
F1277: Firmware update or PLD cell W2	Processor firmware update process or cell PLD reconfiguration failed.	
F1278: Firmware update or PLD cell W3	Processor firmware update process or cell PLD reconfiguration failed.	
F1279: Firmware update or PLD cell W4	Processor firmware update process or cell PLD reconfiguration failed.	
F1280: Firmware update or PLD cell W5	Processor firmware update process or cell PLD reconfiguration failed.	

Fault/Alarm	Description	Possible Causes
F1281: Firmware update or PLD cell W6	Processor firmware update process or cell PLD reconfiguration failed.	
F1282: Firmware update or PLD cell W7	Processor firmware update process or cell PLD reconfiguration failed.	
F1283: Firmware update or PLD cell W8	Processor firmware update process or cell PLD reconfiguration failed.	
F1284: Firmware update or PLD cell W9	Processor firmware update process or cell PLD reconfiguration failed.	
F1285: Firmware update or PLD cell W10	Processor firmware update process or cell PLD reconfiguration failed.	
F1286: Firmware update or PLD cell W11	Processor firmware update process or cell PLD reconfiguration failed.	
F1287: Firmware update or PLD cell W12	Processor firmware update process or cell PLD reconfiguration failed.	
F1288: Cell U1 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1289: Cell U2 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1290: Cell U3 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1291: Cell U4 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1292: Cell U5 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1293: Cell U6 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1294: Cell U7 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.

Fault/Alarm	Description	Possible Causes
F1295: Cell U8 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1296: Cell U9 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1297: Cell U10 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1298: Cell U11 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1299: Cell U12 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1300: Cell V1 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1301: Cell V2 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1302: Cell V3 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1303: Cell V4 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1304: Cell V5 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1305: Cell V6 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1306: Cell V7 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.

Fault/Alarm	Description	Possible Causes
F1307: Cell V8 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1308: Cell V9 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1309: Cell V10 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1310: Cell V11 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1311: Cell V12 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1312: Cell W1 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1313: Cell W2 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1314: Cell W3 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1315: Cell W4 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1316: Cell W5 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1317: Cell W6 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1318: Cell W7 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.

Fault/Alarm	Description	Possible Causes
F1319: Cell W8 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1320: Cell W9 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1321: Cell W10 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1322: Cell W11 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
F1323: Cell W12 neutral pulse feedback	Failure to confirm the switching of the cell neutral arm IGBTs.	- Circuit for measuring the confirmation signal for switching of the disconnected or defective neutral arm IGBTs. - Defective IGBTs or neutral cell spleen firing plate.
A1388: Thermal protection relay 1 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.
A1389: Thermal protection relay 2 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.
A1390: Thermal protection relay 3 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.
A1391: Thermal protection relay 4 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.
A1392: Thermal protection relay 5 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.
A1393: Thermal protection relay 6 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.

Fault/Alarm	Description	Possible Causes
F1394: Thermal protection relay 1 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.
F1395: Thermal protection relay 2 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.
F1396: Thermal protection relay 3 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.
F1397: Thermal protection relay 4 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.
F1398: Thermal protection relay 5 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.
F1399: Thermal protection relay 6 Communication timeout	Lack of communication for more than 10 seconds.	- Communication cable with protection relay disconnected or defective. - Incorrect protection relay communication parameters. - Relay in PRG (programming) or VIS (programming display) modes.
A1400: Thermal protection relay 1 - CH1 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1401: Thermal protection relay 1 - CH2 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1402: Thermal protection relay 1 - CH3 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1403: Thermal protection relay 1 - CH4 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1404: Thermal protection relay 1 - CH5 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1405: Thermal protection relay 1 - CH6 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.

Fault/Alarm	Description	Possible Causes
A1406: Thermal protection relay 1 - CH7 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1407: Thermal protection relay 1 - CH8 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
F1408: Thermal protection relay 1 - Overtemperature detected on CH1	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1409: Thermal protection relay 1 - Overtemperature detected on CH2	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1410: Thermal protection relay 1 - Overtemperature detected on CH3	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1411: Thermal protection relay 1 - Overtemperature detected on CH4	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1412: Thermal protection relay 1 - Overtemperature detected on CH5	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1413: Thermal protection relay 1 - Overtemperature detected on CH6	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1414: Thermal protection relay 1 - Overtemperature detected on CH7	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1415: Thermal protection relay 1 - Overtemperature detected on CH8	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1416: Thermal protection relay 1 - Overtemperature detected on CH1	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1417: Thermal protection relay 1 - Overtemperature detected on CH2	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.

Fault/Alarm	Description	Possible Causes
A1418: Thermal protection relay 1 - Overtemperature detected on CH3	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1419: Thermal protection relay 1 - Overtemperature detected on CH4	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1470: Thermal protection relay 1 - Overtemperature detected on CH5	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1471: Thermal protection relay 1 - Overtemperature detected on CH6	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1472: Thermal protection relay 1 - Overtemperature detected on CH7	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1473: Thermal protection relay 1 - Overtemperature detected on CH8	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1474: Thermal protection relay 2 - CH1 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1475: Thermal protection relay 2 - CH2 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1476: Thermal protection relay 2 - CH3 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1477: Thermal protection relay 2 - CH4 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1478: Thermal protection relay 2 - CH5 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1479: Thermal protection relay 2 - CH6 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1480: Thermal protection relay 2 - CH7 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.

Fault/Alarm	Description	Possible Causes
A1481: Thermal protection relay 2 - CH8 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
F1482: Thermal protection relay 2 - Overtemperature detected on CH1	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1483: Thermal protection relay 2 - Overtemperature detected on CH2	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1484: Thermal protection relay 2 - Overtemperature detected on CH3	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1485: Thermal protection relay 2 - Overtemperature detected on CH4	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1486: Thermal protection relay 2 - Overtemperature detected on CH5	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1487: Thermal protection relay 2 - Overtemperature detected on CH6	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1488: Thermal protection relay 2 - Overtemperature detected on CH7	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1489: Thermal protection relay 2 - Overtemperature detected on CH8	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1490: Thermal protection relay 2 - Overtemperature detected on CH1	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1491: Thermal protection relay 2 - Overtemperature detected on CH2	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1492: Thermal protection relay 2 - Overtemperature detected on CH3	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.

Fault/Alarm	Description	Possible Causes
A1493: Thermal protection relay 2 - Overtemperature detected on CH4	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1494: Thermal protection relay 2 - Overtemperature detected on CH5	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1495: Thermal protection relay 2 - Overtemperature detected on CH6	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1496: Thermal protection relay 2 - Overtemperature detected on CH7	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1497: Thermal protection relay 2 - Overtemperature detected on CH8	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1498: Thermal protection relay 3 - CH1 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1499: Thermal protection relay 3 - CH2 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1500: Thermal protection relay 3 - CH3 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1501: Thermal protection relay 3 - CH4 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1502: Thermal protection relay 3 - CH5 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1503: Thermal protection relay 3 - CH6 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1504: Thermal protection relay 3 - CH7 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1505: Thermal protection relay 3 - CH8 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.

Fault/Alarm	Description	Possible Causes
F1506: Thermal protection relay 3 - Overtemperature detected on CH1	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1507: Thermal protection relay 3 - Overtemperature detected on CH2	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1508: Thermal protection relay 3 - Overtemperature detected on CH3	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1509: Thermal protection relay 3 - Overtemperature detected on CH4	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1510: Thermal protection relay 3 - Overtemperature detected on CH5	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1511: Thermal protection relay 3 - Overtemperature detected on CH6	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1512: Thermal protection relay 3 - Overtemperature detected on CH7	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1513: Thermal protection relay 3 - Overtemperature detected on CH8	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1514: Thermal protection relay 3 - Overtemperature detected on CH1	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1515: Thermal protection relay 3 - Overtemperature detected on CH2	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1516: Thermal protection relay 3 - Overtemperature detected on CH3	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1517: Thermal protection relay 3 - Overtemperature detected on CH4	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.

Fault/Alarm	Description	Possible Causes
A1518: Thermal protection relay 3 - Overtemperature detected on CH5	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1519: Thermal protection relay 3 - Overtemperature detected on CH6	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1520: Thermal protection relay 3 - Overtemperature detected on CH7	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1521: Thermal protection relay 3 - Overtemperature detected on CH8	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1522: Thermal protection relay 4 - CH1 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1523: Thermal protection relay 4 - CH2 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1524: Thermal protection relay 4 - CH3 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1525: Thermal protection relay 4 - CH4 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1526: Thermal protection relay 4 - CH5 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1527: Thermal protection relay 4 - CH6 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1528: Thermal protection relay 4 - CH7 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1529: Thermal protection relay 4 - CH8 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
F1530: Thermal protection relay 4 - Overtemperature detected on CH1	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.

Fault/Alarm	Description	Possible Causes
F1531: Thermal protection relay 4 - Overtemperature detected on CH2	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1532: Thermal protection relay 4 - Overtemperature detected on CH3	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1533: Thermal protection relay 4 - Overtemperature detected on CH4	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1534: Thermal protection relay 4 - Overtemperature detected on CH5	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1535: Thermal protection relay 4 - Overtemperature detected on CH6	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1536: Thermal protection relay 4 - Overtemperature detected on CH7	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1537: Thermal protection relay 4 - Overtemperature detected on CH8	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1538: Thermal protection relay 4 - Overtemperature detected on CH1	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1539: Thermal protection relay 4 - Overtemperature detected on CH2	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1540: Thermal protection relay 4 - Overtemperature detected on CH3	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1541: Thermal protection relay 4 - Overtemperature detected on CH4	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1542: Thermal protection relay 4 - Overtemperature detected on CH5	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.

Fault/Alarm	Description	Possible Causes
A1543: Thermal protection relay 4 - Overtemperature detected on CH6	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1544: Thermal protection relay 4 - Overtemperature detected on CH7	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1545: Thermal protection relay 4 - Overtemperature detected on CH8	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1546: Thermal protection relay 5 - CH1 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1547: Thermal protection relay 5 - CH2 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1548: Thermal protection relay 5 - CH3 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1549: Thermal protection relay 5 - CH4 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1550: Thermal protection relay 5 - CH5 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1551: Thermal protection relay 5 - CH6 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1552: Thermal protection relay 5 - CH7 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1553: Thermal protection relay 5 - CH8 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
F1554: Thermal protection relay 5 - Overtemperature detected on CH1	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1555: Thermal protection relay 5 - Overtemperature detected on CH2	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.

Fault/Alarm	Description	Possible Causes
F1556: Thermal protection relay 5 - Overtemperature detected on CH3	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1557: Thermal protection relay 5 - Overtemperature detected on CH4	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1558: Thermal protection relay 5 - Overtemperature detected on CH5	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1559: Thermal protection relay 5 - Overtemperature detected on CH6	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1560: Thermal protection relay 5 - Overtemperature detected on CH7	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1561: Thermal protection relay 5 - Overtemperature detected on CH8	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1562: Thermal protection relay 5 - Overtemperature detected on CH1	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1563: Thermal protection relay 5 - Overtemperature detected on CH2	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1564: Thermal protection relay 5 - Overtemperature detected on CH3	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1565: Thermal protection relay 5 - Overtemperature detected on CH4	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1566: Thermal protection relay 5 - Overtemperature detected on CH5	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1567: Thermal protection relay 5 - Overtemperature detected on CH6	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.

Fault/Alarm	Description	Possible Causes
A1568: Thermal protection relay 5 - Overtemperature detected on CH7	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1569: Thermal protection relay 5 - Overtemperature detected on CH8	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1570: Thermal protection relay 6 - CH1 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1571: Thermal protection relay 6 - CH2 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1572: Thermal protection relay 6 - CH3 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1573: Thermal protection relay 6 - CH4 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1574: Thermal protection relay 6 - CH5 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1575: Thermal protection relay 6 - CH6 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1576: Thermal protection relay 6 - CH7 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
A1577: Thermal protection relay 6 - CH8 temperature sensor failure	Open circuit or short circuit in the temperature sensor.	- Broken wire on temperature sensor. - PT100 accessory connectors disconnected. - Active temperature channel without sensor connected to the PT100 accessory.
F1578: Thermal protection relay 6 - Overtemperature detected on CH1	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1579: Thermal protection relay 6 - Overtemperature detected on CH2	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1580: Thermal protection relay 6 - Overtemperature detected on CH3	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.

Fault/Alarm	Description	Possible Causes
F1581: Thermal protection relay 6 - Overtemperature detected on CH4	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1582: Thermal protection relay 6 - Overtemperature detected on CH5	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1583: Thermal protection relay 6 - Overtemperature detected on CH6	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1584: Thermal protection relay 6 - Overtemperature detected on CH7	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F1585: Thermal protection relay 6 - Overtemperature detected on CH8	Temperature higher than the fault level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1586: Thermal protection relay 6 - Overtemperature detected on CH1	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1587: Thermal protection relay 6 - Overtemperature detected on CH2	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1588: Thermal protection relay 6 - Overtemperature detected on CH3	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1589: Thermal protection relay 6 - Overtemperature detected on CH4	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1590: Thermal protection relay 6 - Overtemperature detected on CH5	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1591: Thermal protection relay 6 - Overtemperature detected on CH6	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
A1592: Thermal protection relay 6 - Overtemperature detected on CH7	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.

Fault/Alarm	Description	Possible Causes
A1593: Thermal protection relay 6 - Overtemperature detected on CH8	Temperature higher than the alarm level programmed in the thermal protection relay.	- Motor shaft load too high. - Very high load cycle (large number of starts and stops per minute). - High ambient temperature around the motor. - Motor shaft locked.
F2201: Timeout when energizing the inverter	The energization command was executed and the inverter did not energize within the predetermined time.	- Problem in the wiring between the inverter and the input cubicle.
F2203: Start command	The Start command was performed and the motor did not start.	- Incorrect parameterization.
F2205: Synchronization timeout reached	The Inverter was unable to synchronize the motor and grid voltages within the predetermined time.	
F2207: Disable command	The Inverter was not disabled after the motor synchronous transfer.	- Incorrect parameterization, check the electrical project.
F2209: Closing of the inverter output contactor	The inverter output contactor closing command was sent and the closed status was not received.	- Problem in the wiring between the inverter and the output contactor.
F2211: Opening of the inverter output contactor	The inverter output contactor opening command was sent and the open status was not received.	- Problem in the wiring between the inverter and the output contactor.
F2213: Incorrect state of inverter output contactor	The inverter output contactor status is neither open nor closed.	- Problem in the wiring between the inverter and the output contactor.
F2215: Inverter output contactor failure	The inverter output contactor is in fault state.	- Check the integrity of the inverter output contactor.
F2217: Closing of the transfer contactor to the grid	The transfer contactor close command to the mains was sent and the closed status was not received.	- Problem in the wiring between the inverter and the output contactor.
F2219: Opening of the transfer contactor to the grid	The transfer contactor open command to the mains was sent and the open status was not received.	- Problem in the wiring between the inverter and the output contactor.
F2221: Incorrect state of the transfer contactor to the grid	The status of the transfer contactor to the mains is neither open nor closed.	- Problem in the wiring between the inverter and the output contactor.
F2223: Fault in the transfer contactor to the grid	The transfer contactor to the mains is in a fault state.	- Problem in the wiring between the inverter and the output contactor.
F2225: Inverter is not ready to enable	PWM enable command received by the inverter with general enable inactive and/or the input circuit breaker open.	- Improper maneuvering of the input circuit breaker. - Faulty input circuit breaker. - Faulty wiring.
F2227: Emergency stop	Emergency button pressed while inverter is operating.	
F2229: Timeout in FIELDBUS communication	Loss of communication with the FIELDBUS communication network.	- Check the status of the network master. - Check the network installation, broken cable or poor contact in the network connections.
F2231: Incorrect parameterization	The inverter parameter setting is invalid.	- Check the incorrect parameter in the application HMI and parameterize as indicated in the electrical project.

Fault/Alarm	Description	Possible Causes
F2233: Open doors	The inverter doors are open.	- Incorrect opening of the inverter doors. - Faulty wiring.
F2300: Grid unbal./Phase loss	Phase unbalance or phase loss in the power supply. **Note:** - In case the motor has no load or a low load on the shaft, this fault may not take effect. - Actuation time set to C7.1.2. When C7.1.2=0, the fault is disabled.	- Phase loss at the inverter input. - Input voltage unbalance >5 %. - Loss of one phase in the power supply.
A2301: Low battery voltage	Low battery voltage.	- Replace the battery.
A2302: 24 Vdc power supply overvoltage	Overvoltage in the 24 Vdc power supply.	- Voltage of the 24 Vdc power supply that feeds the control above the maximum value of 26.4 Vdc.
F2322: Encoder/Motor wiring reversed	Fault related to the phase relation of the encoder signals, if C3.1.1 = 2 and C3.3.2.6.1 = 0 or 2. Note: - It is not possible to reset this fault during the self-tuning. - In this case, de-energize the inverter, solve the problem and then energize it.	- U, V, W wiring to the motor is reversed. - Encoder channels A and B are reversed. - Error in the encoder assembly position. - Motor with locked rotor or being dragged at the start.
F2328: Motor overtemp.	Overtemperature related to the PTC-type sensor installed in the motor. **Note:** - The fault can be disabled by setting C7.5.2 = 2 or 3. - It is necessary to program the analog input and output of Slot X for PTC function.	- Load on the motor shaft is too high. - Load cycle is too short (high number of starts and stops per minute). - High ambient temperature around the motor. - Poor contact or short circuit (resistance < 100 Ω) on the wiring connected to the motor thermistor. - Motor thermistor not installed. - Motor shaft locked.
F2329: Encoder signals fault	Fault related to missing encoder signals.	- Wiring between encoder and encoder interface accessory interrupted. - Defective encoder. - Encoder accessory is defective or poorly installed on the product when the control is set to vector with encoder.
F2330: Self-diagnosis fault	Self-Diagnosis Fault.	- Defect on the inverter internal circuits.
A2331: External alarm	-External alarm via DI. **Note:** - Necessary to set the DI in C7.10.1.	- DI input wiring (set in C7.10.1 to generate external alarm) open.
F2332: External fault	External fault via DI. **Note:** - Necessary to set the DI in C7.10.2.	- DI input wiring (set in C7.10.2 to actuate external fault) open.
F2333: Communication failure with the CCE board	Communication with the CCE control board was not performed correctly.	- Defective connection cable between AUI and CCE.
A2334: High motor temperature	Alarm related to the PTC temperature sensor installed on the motor. **Note:** - The alarm can be disabled by setting C7.5.2. - It is necessary to program the analog input and output of Slot X for PTC function.	- Load on the motor shaft is too high. - Load cycle is too short (high number of starts and stops per minute). - High ambient temperature around the motor. - Poor contact or short circuit (resistance < 100 Ω) on the wiring connected to the motor thermistor. - Motor thermistor not installed. - Motor shaft locked.

Fault/Alarm	Description	Possible Causes
A2335: Serial communication timeout	It indicates that the MVW3000 stopped receiving telegrams on the serial interface for a period longer than the setting programmed in C9.3.5. **Note:** - Ensure that the master always sends telegrams to the equipment in a shorter time than that set in C9.3.5. - It can be disabled by setting C9.3.5=0.0 s.	- Check network installation, broken cable or fault/poor contact on the connections with the network, and grounding.
A2337: Anybus Module access error	Alarm that indicates error of access to the Anybus communication module.	- Faulty Anybus module, not recognized or incorrectly installed.
A2338: No power supply on the CAN interface	It actuates when the CAN interface is powered and lack of power supply to the interface is detected. **Note:** - Measure if there is voltage within the allowed range between pins 1 and 5 of the CAN interface connector.	- CAN interface without power supply between pins 1 and 5 of the connector. - Power cables mixed up or reversed. - Poor contact on the CAN interface cable or connector.
A2339: Bus Off	Bus off error detection on the CAN interface. If the number of reception or transmission errors detected by the CAN interface is too high, the CAN controller can be taken to the bus off state, where it interrupts the communication and disables the CAN interface. In order to restore communication, it is necessary to turn the product off and on again, or to remove and reconnect the power to the CAN interface, so that communication can be restarted.	- Short circuit in the CAN circuit transmission cables. - Changed or reversed cables. - Network devices with different baud rates. - Termination resistors with incorrect values. - Termination resistors installed at one end of the main bus only. - CAN network installation done improperly.
A2340: CANopen off-line	It occurs if the state of the CANopen node changes from operational to pre-operational. **Note:** - Check the operation of the error control mechanisms (Heartbeat/Node Guarding).	- The master is not sending the guarding/heartbeat telegrams at the programmed time. - Communication problems caused by lost telegrams or transmission delays.
A2341: Master in Idle	It actuates when communicating with the network master in Run mode, and transition to Idle mode is detected.	- Set the switch that controls the master operation of the master to Run or the corresponding bit on the configuration word of the master software. For further explanations, see the documentation of the master in use.
A2342: DeviceNet connection timeout	It indicates that one or more DeviceNet I/O connections has expired. It occurs when the cyclic communication between the master and the product is interrupted.	- Check the status of the network master. - Check the network installation, broken cable or poor contact on the connections with the network.
A2347: SNTP connection timeout	It indicates that the inverter tried to connect to the NTP server and got no response. It occurs after starting connection with the NTP server and the server has not returned the response requested by the inverter.	- Check the configuration and IP address. - Check if the NTP server is active.
A2349: EtherNet/IP Communication Offline	It indicates communication error with EtherNet/IP master. It occurs when, for any reason, after the cyclic communication of the master with the product is started, this communication is interrupted. This is detected if the I/O Exclusive Owner connection times out.	- Check the status of the network master. - Check the network installation, broken cable or failed/bad contact in the network connections.

Fault/Alarm	Description	Possible Causes
A2350: Modbus TCP Timeout	It indicates that the equipment stopped receiving valid telegrams for a period longer than the setting in C9.6.3. The time counting starts after the first valid telegram is received.	- Check the network installation, broken cable or poor contact on the connections with the network, grounding. - Ensure that the Modbus TCP client always sends telegrams to the equipment in a shorter time than the set in C9.6.3. - Disable the Timeout function in C9.6.3.
F2351: Motor overspeed	Overspeed. **Note:** - Activated when the actual speed exceeds the value of C4.3.1.1.2 x (100 % + C7.7.1) for more than 20 ms.	- Incorrect setting of C3.3.2.1.2 and/orC3.3.2.1.3. - Crane-type load trips.
F2358: Corrupted settings	Inverter settings are invalid. **Note:** - Restore the factory default in parameter C12.1. If the problem persists, contact WEG's technical support or representative.	- Parameter settings file cannot be restored correctly.
F2373: Serial communication timeout	It indicates that the MVW3000 stopped receiving telegrams on the serial interface for a period longer than the setting programmed in C9.3.5. **Note:** - Ensure that the master always sends telegrams to the equipment in a shorter time than that set in C9.3.5. - It can be disabled by setting C9.3.5=0.0 s.	- Check network installation, broken cable or fault/poor contact on the connections with the network, and grounding.
F2374: Bus Off	Bus off error detection on the CAN interface. If the number of reception or transmission errors detected by the CAN interface is too high, the CAN controller can be taken to the bus off state, where it interrupts the communication and disables the CAN interface. In order to restore communication, it is necessary to turn the product off and on again, or to remove and reconnect the power to the CAN interface, so that communication can be restarted.	- Short circuit in the CAN circuit transmission cables. - Changed or reversed cables. - Network devices with different baud rates. - Termination resistors with incorrect values. - Termination resistors installed at one end of the main bus only. - CAN network installation done improperly.
F2376: CANopen Off-line	It occurs if the state of the CANopen node changes from operational to pre-operational. **Note:** - Check the operation of the error control mechanisms (Heartbeat/Node Guarding).	- The master is not sending the guarding/heartbeat telegrams at the programmed time. - Communication problems caused by lost telegrams or transmission delays.
F2378: No power supply on the CAN interface	It actuates when the CAN interface is powered and lack of power supply to the interface is detected. **Note:** - Measure if there is voltage within the allowed range between pins 1 and 5 of the CAN interface connector.	- CAN interface without power supply between pins 1 and 5 of the connector. - Power cables mixed up or reversed. - Poor contact on the CAN interface cable or connector.
F2379: Master in Idle	It actuates when communicating with the network master in Run mode, and transition to Idle mode is detected.	- Set the switch that controls the master operation of the master to Run or the corresponding bit on the configuration word of the master software. For further explanations, see the documentation of the master in use.
F2380: DeviceNet connection timed out	It indicates that one or more DeviceNet I/O connections has expired. It occurs when the cyclic communication between the master and the product is interrupted.	- Check the status of the network master. - Check the network installation, broken cable or poor contact on the connections with the network.

Fault/Alarm	Description	Possible Causes
F2385: EtherNet/IP communication offline	It indicates communication error with EtherNet/IP master. It occurs when, for any reason, after the cyclic communication of the master with the product is started, this communication is interrupted. This is detected if the I/O Exclusive Owner connection times out.	- Check the status of the network master. - Check the network installation, broken cable or failed/bad contact in the network connections.
F2386: Modbus TCP Timeout	It indicates that the equipment stopped receiving valid telegrams for a period longer than the setting in C9.6.3. The time counting starts after the first valid telegram is received.	- Check the network installation, broken cable or poor contact on the connections with the network, grounding. - Ensure that the Modbus TCP client always sends telegrams to the equipment in a shorter time than the set in C9.6.3. - Disable the Timeout function in C9.6.3.
A2430: PID PV low level	It indicates that the control process variable (A2.1.3) is at a low level.	- Control process variable (A2.1.3) remained for 150 ms with the value lower than the value set in A2.3.6.2.
F2431: PID PV low level	It indicates the motor was switched off due to the low level of the control process variable	- Control process variable (A2.1.3) remained for a certain amount of time (A2.3.6.3) with the value lower than the value set in A2.3.6.2.
A2432: PID PV high level	It indicates that the control process variable (A2.1.3) is at a high level.	- Control process variable (A2.1.3) remained for 150 ms with the value higher than the value set in A2.3.6.5.
F2433: PID PV high level	It indicates the motor was switched off due to the high level of the control process variable	- Control process variable (A2.1.3) remained for a certain amount of time (A2.3.6.6) with the value higher than the value set in A2.3.6.5.
F2605: Power circuit Off	Communication with the power module was interrupted while the output was enabled.	- Power board turned off while the output was enabled. - Defect on the inverter internal circuits.
F2608: Code flow failure	Internal fault during inverter operation. **Note:** Reset the inverter. - Load the factory default.	- If the problem persists, please contact technical support.
A2610: Parameter storage full	There is no more space in memory to store new user parameters. **Note:** - Any parameter changes made while this alarm is active may not be kept after restarting the inverter. - During the next power-up of the product, a routine indicated by the memory usage optimization screen frees up memory space to allow new settings.	- Many changes in configuration parameters (regardless of whether via HMI, WPS, networks or application) without restarting the product. - Many user parameter downloads via SoftPLC without restarting the product.
A2706: SPLC refer. not progr.	Indicates that the softPLC reference has not been programmed.	- It occurs when a movement block is enabled and the speed reference is not set for SoftPLC (check C4.3.1.2.1 or C4.3.1.2.2).
A2708: SoftPLC not running	Indicates that the SoftPLC application is not running.	- Check the SoftPLC status in S6.1.1 and the action configuration for application not running in C10.1.3.
F2709: SoftPLC not running	Indicates that the SoftPLC application is not running.	- Check the SoftPLC status in S6.1.1 and the action configuration for application not running in C10.1.3.
F3000: Error during accessory update	Error during accessory firmware update.	- Outdated inverter firmware version.

Fault/Alarm	Description	Possible Causes
A3012: Slot X AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3013: Slot X AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3014: Slot X AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3015: Slot X AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3100: Slot A incompatible accessory	Error during accessory firmware update.	- Outdated inverter firmware version.
F3101: Slot A initialization error	A resource required for the operation of the accessory could not be initialized.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F3103: Slot A accessory connection	Loss of communication with the accessory.	- Electromagnetic noise above the limit. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A3104: Slot A high temperature	High temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F3105: Slot A overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60 °C.
A3106: Slot A enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3107: Slot A enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3108: Slot A enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3109: Slot A enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.

Fault/Alarm	Description	Possible Causes
A3110: Slot A enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where "n" is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3111: Slot A enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where "n" is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3112: Slot A AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3113: Slot A AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3114: Slot A AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3115: Slot A AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3116: Slot A AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3117: Slot A AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3125: Slot A temp. sensor wrong HW config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the MVW3000-TEMP-01 accessory guide. - "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A3126: Slot A temperature sensor 1 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3127: Slot A temperature sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3128: High temperature on Slot A sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3129: Slot A sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.

Fault/Alarm	Description	Possible Causes
A3130: Slot A temperature sensor 2 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3131: Slot A temperature sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3132: High temperature on Slot A sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3133: Slot A sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3134: Slot A temperature sensor 3 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3135: Slot A temperature sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3136: High temperature on Slot A sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3137: Slot A sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3138: Slot A temperature sensor 4 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3139: Slot A temperature sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3140: High temperature on Slot A sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3141: Slot A sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3142: Slot A temperature sensor 5 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3143: Slot A temperature sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3144: High temperature on Slot A sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3145: Slot A sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.

Fault/Alarm	Description	Possible Causes
A3146: Slot A temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3147: Slot A temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3148: High temperature on Slot A sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3149: Slot A sensor 6 overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F3200: Slot B incompatible accessory	Error during accessory firmware update.	- Outdated inverter firmware version.
F3201: Slot B initialization error	A resource required for the operation of the accessory could not be initialized.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F3203: Slot B accessory connection	Loss of communication with the accessory.	- Electromagnetic noise above the limit. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A3204: Slot B high temperature	High temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F3205: Slot B overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60 °C.
A3206: Slot B enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3207: Slot B enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3208: Slot B enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3209: Slot B enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3210: Slot B enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.

Fault/Alarm	Description	Possible Causes
F3211: Slot B enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3212: Slot B AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3213: Slot B AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3214: Slot B AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3215: Slot B AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3216: Slot B AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3217: Slot B AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3225: Slot B temp. sensor wrong HW config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the MVW3000-TEMP-01 accessory guide. - ”Sensor Type” parameter incorrectly configured. Check the description in C5.2.6.1.
A3226: Slot B temperature sensor 1 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3227: Slot B temperature sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3228: High temperature on Slot B sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3229: Slot B sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3230: Slot B temperature sensor 2 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.

Fault/Alarm	Description	Possible Causes
F3231: Slot B temperature sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3232: High temperature on Slot B sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3233: Slot B sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3234: Slot B temperature sensor 3 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3235: Slot B temperature sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3236: High temperature on Slot B sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3237: Slot B sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3238: Slot B temperature sensor 4 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3239: Slot B temperature sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3240: High temperature on Slot B sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3241: Slot B sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3242: Slot B temperature sensor 5 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3243: Slot B temperature sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3244: High temperature on Slot B sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3245: Slot B sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3246: Slot B temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.

Fault/Alarm	Description	Possible Causes
F3247: Slot B temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3248: High temperature on Slot B sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3249: Slot B sensor 6 overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F3300: Slot C incompatible accessory	Error during accessory firmware update.	- Outdated inverter firmware version.
F3301: Slot C initialization error	A resource required for the operation of the accessory could not be initialized.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F3303: Slot C accessory connection	Loss of communication with the accessory.	- Electromagnetic noise above the limit. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A3304: Slot C high temperature	High temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F3305: Slot C overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60 °C.
A3306: Slot C enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3307: Slot C enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3308: Slot C enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3309: Slot C enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3310: Slot C enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3311: Slot C enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.

Fault/Alarm	Description	Possible Causes
A3312: Slot C AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3313: Slot C AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3314: Slot C AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3315: Slot C AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3316: Slot C AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3317: Slot C AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3325: Slot C temp. sensor wrong HW config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the MVW3000-TEMP-01 accessory guide. - ”Sensor Type” parameter incorrectly configured. Check the description in C5.2.6.1.
A3326: Slot C temperature sensor 1 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3327: Slot C temperature sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3328: High temperature on Slot C sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3329: Slot C sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3330: Slot C temperature sensor 2 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3331: Slot C temperature sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3332: High temperature on Slot C sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.

Fault/Alarm	Description	Possible Causes
F3333: Slot C sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3334: Slot C temperature sensor 3 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3335: Slot C temperature sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3336: High temperature on Slot C sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3337: Slot C sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3338: Slot C temperature sensor 4 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3339: Slot C temperature sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3340: High temperature on Slot C sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3341: Slot C sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3342: Slot C temperature sensor 5 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3343: Slot C temperature sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3344: High temperature on Slot C sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3345: Slot C sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3346: Slot C temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3347: Slot C temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3348: High temperature on Slot C sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.

Fault/Alarm	Description	Possible Causes
F3349: Slot C sensor 6 overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F3400: Slot D incompatible accessory	Error during accessory firmware update.	- Outdated inverter firmware version.
F3401: Slot D initialization error	A resource required for the operation of the accessory could not be initialized.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F3403: Slot D accessory connection	Loss of communication with the accessory.	- Electromagnetic noise above the limit. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A3404: Slot D high temperature	High temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F3405: Slot D overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60 °C.
A3406: Slot D enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3407: Slot D enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3408: Slot D enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3409: Slot D enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3410: Slot D enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3411: Slot D enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3412: Slot D AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.

Fault/Alarm	Description	Possible Causes
F3413: Slot D AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3414: Slot D AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3415: Slot D AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3416: Slot D AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3417: Slot D AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3425: Slot D temp. sensor wrong HW config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the MVW3000-TEMP-01 accessory guide. - ”Sensor Type” parameter incorrectly configured. Check the description in C5.2.6.1.
A3426: Slot D temperature sensor 1 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3427: Slot D temperature sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3428: High temperature on Slot D sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3429: Slot D sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3430: Slot D temperature sensor 2 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3431: Slot D temperature sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3432: High temperature on Slot D sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3433: Slot D sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.

Fault/Alarm	Description	Possible Causes
A3434: Slot D temperature sensor 3 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3435: Slot D temperature sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3436: High temperature on Slot D sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3437: Slot D sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3438: Slot D temperature sensor 4 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3439: Slot D temperature sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3440: High temperature on Slot D sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3441: Slot D sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3442: Slot D temperature sensor 5 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3443: Slot D temperature sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3444: High temperature on Slot D sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3445: Slot D sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3446: Slot D temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3447: Slot D temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3448: High temperature on Slot D sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3449: Slot D sensor 6 overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.

Fault/Alarm	Description	Possible Causes
F3500: Slot E incompatible accessory	Error during accessory firmware update.	- Outdated inverter firmware version.
F3501: Slot E initialization error	A resource required for the operation of the accessory could not be initialized.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F3503: Slot E accessory connection	Loss of communication with the accessory.	- Electromagnetic noise above the limit. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A3504: Slot E high temperature	High temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F3505: Slot E overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60 °C.
A3506: Slot E enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where "n" is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3507: Slot E enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where "n" is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3508: Slot E enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where "n" is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3509: Slot E enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where "n" is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3510: Slot E enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where "n" is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3511: Slot E enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where "n" is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3512: Slot E AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3513: Slot E AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.

Fault/Alarm	Description	Possible Causes
A3514: Slot E AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3515: Slot E AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3516: Slot E AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3517: Slot E AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3525: Slot E temp. sensor wrong HW config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the MVW3000-TEMP-01 accessory guide. - "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A3526: Slot E temperature sensor 1 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3527: Slot E temperature sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3528: High temperature on Slot E sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3529: Slot E sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3530: Slot E temperature sensor 2 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3531: Slot E temperature sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3532: High temperature on Slot E sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3533: Slot E sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3534: Slot E temperature sensor 3 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.

Fault/Alarm	Description	Possible Causes
F3535: Slot E temperature sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3536: High temperature on Slot E sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3537: Slot E sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3538: Slot E temperature sensor 4 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3539: Slot E temperature sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3540: High temperature on Slot E sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3541: Slot E sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3542: Slot E temperature sensor 5 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3543: Slot E temperature sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3544: High temperature on Slot E sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3545: Slot E sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3546: Slot E temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3547: Slot E temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3548: High temperature on Slot E sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3549: Slot E sensor 6 overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F3600: Slot F incompatible accessory	Error during accessory firmware update.	- Outdated inverter firmware version.

Fault/Alarm	Description	Possible Causes
F3601: Slot F initialization error	A resource required for the operation of the accessory could not be initialized.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F3603: Slot F accessory connection	Loss of communication with the accessory.	- Electromagnetic noise above the limit. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A3604: Slot F high temperature	High temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F3605: Slot F overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60 °C.
A3606: Slot F enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3607: Slot F enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3608: Slot F enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3609: Slot F enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3610: Slot F enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3611: Slot F enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3612: Slot F AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3613: Slot F AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.

Fault/Alarm	Description	Possible Causes
A3614: Slot F AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3615: Slot F AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3616: Slot F AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3617: Slot F AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3625: Slot F temp. sensor wrong HW config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the MVW3000-TEMP-01 accessory guide. - "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A3626: Slot F temperature sensor 1 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3627: Slot F temperature sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3628: High temperature on Slot F sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3629: Slot F sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3630: Slot F temperature sensor 2 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3631: Slot F temperature sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3632: High temperature on Slot F sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3633: Slot F sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3634: Slot F temperature sensor 3 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.

Fault/Alarm	Description	Possible Causes
F3635: Slot F temperature sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3636: High temperature on Slot F sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3637: Slot F sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3638: Slot F temperature sensor 4 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3639: Slot F temperature sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3640: High temperature on Slot F sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3641: Slot F sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3642: Slot F temperature sensor 5 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3643: Slot F temperature sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3644: High temperature on Slot F sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3645: Slot F sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3646: Slot F temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3647: Slot F temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3648: High temperature on Slot F sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3649: Slot F sensor 6 overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F3700: Slot G incompatible accessory	Error during accessory firmware update.	- Outdated inverter firmware version.

Fault/Alarm	Description	Possible Causes
F3701: Slot G initialization error	A resource required for the operation of the accessory could not be initialized.	- Resource already in use by another accessory. Only one communication network accessory can be used at a time.
F3703: Slot G accessory connection	Loss of communication with the accessory.	- Electromagnetic noise above the limit. - Vibration above supported limits causing connector problems. - Corrupted accessory firmware.
A3704: Slot G high temperature	High temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F3705: Slot G overtemperature	Accessory overtemperature.	- Temperature around the inverter above 60 °C.
A3706: Slot G enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3707: Slot G enc. A cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3708: Slot G enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3709: Slot G enc. B cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3710: Slot G enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
F3711: Slot G enc. Z cable disconnection	Encoder signal not detected. **Note:** It can be disabled by setting C5.n.5.2, where “n” is the number of the slot where the accessory is installed.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
A3712: Slot G AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3713: Slot G AI1 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.

Fault/Alarm	Description	Possible Causes
A3714: Slot G AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3715: Slot G AI2 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
A3716: Slot G AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3717: Slot G AI3 Cable disconnection	Analog input signal configured in current mode is outside the 4 to 20 mA range.	- AI cable broken (the read value was less than 2 mA for 5 seconds). - Poor contact on the signal connection at the terminals.
F3725: Slot G temp. sensor wrong HW config.	Sensor type selected by the accessory DIP switches other than the sensor type configured by the parameters.	- DIP switch configured incorrectly. Check the MVW3000-TEMP-01 accessory guide. - ”Sensor Type” parameter incorrectly configured. Check the description in C5.2.6.1.
A3726: Slot G temperature sensor 1 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3727: Slot G temperature sensor 1 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3728: High temperature on Slot G sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3729: Slot G sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3730: Slot G temperature sensor 2 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3731: Slot G temperature sensor 2 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3732: High temperature on Slot G sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3733: Slot G sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3734: Slot G temperature sensor 3 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.

Fault/Alarm	Description	Possible Causes
F3735: Slot G temperature sensor 3 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3736: High temperature on Slot G sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3737: Slot G sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3738: Slot G temperature sensor 4 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3739: Slot G temperature sensor 4 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3740: High temperature on Slot G sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3741: Slot G sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3742: Slot G temperature sensor 5 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3743: Slot G temperature sensor 5 Error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3744: High temperature on Slot G sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3745: Slot G sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
A3746: Slot G temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
F3747: Slot G temperature sensor 6 error	The value measured by the temperature sensor is out of the expected range.	- Sensor cable is broken. - Short-circuited sensor. - Sensor located in an extremely low temperature environment.
A3748: High temperature on Slot G sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the alarm actuation level.
F3749: Slot G sensor 6 overtemperature	The temperature measured by the sensor is above the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.

3 SAFETY INSTRUCTIONS

This manual contains the information necessary for setting the MVW3000 frequency inverter. To commission the product correctly, it is necessary to follow the instructions described in this manual and to have proper training or technical qualification.

3.1 SAFETY WARNINGS IN THE MANUAL

The manual contains the following safety warnings:

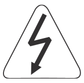
DANGER!
This warning informs the user of the risk of death, serious injury or considerable property damage.

ATTENTION!
This warning informs the user of possible considerable property damage.

NOTE!
The information in this warning is important for the correct understanding and proper operation of the product.

3.2 SAFETY WARNINGS ON THE PRODUCT

The following symbols are attached to the product as safety warnings:


High voltages are present.


Components sensitive to electrostatic discharge. Do not touch them.


Mandatory connection to the protective earth (PE).


Connection of the shield to the ground.


Hot surface. Do not touch.

3.3 PRELIMINARY RECOMMENDATIONS

DANGER!
Only qualified personnel, familiar with the MVW3000 inverter and related equipment must plan or perform the installation, commissioning, operation and maintenance of this equipment.
All safety instructions contained in this manual and/or defined by local regulations must be followed.
Failure to comply with the safety instructions may result in death, serious injury and/or equipment damage.

NOTE!
Read the whole MVW3000 frequency inverter user manual before installing or operating the MVW3000.

NOTE!
For the purposes of this manual, qualified personnel are those trained and able to:
1. Install, ground, energize and operate the MVW3000 in accordance with this manual and the legal safety procedures in force.
2. Use the protective equipment in accordance with the relevant standards.
3. Provide first aid.

DANGER!
Always disconnect the general power supply before touching any electrical component associated with the MVW3000 inverter.
Several components may remain charged with high voltages and/or in movement (fans) even after the AC power supply has been disconnected or turned off.
Wait at least 10 minutes to ensure complete discharge of the capacitors.
Always connect the frame of the equipment to the protection grounding (PE) at the proper point.

ATTENTION!
Electronic boards have components that are sensitive to electrostatic discharges. Do not directly touch components or connectors. If necessary, first touch the grounded metallic frame or use a suitable grounding strap.

Do not perform any high pot tests with the MVW3000 inverter!
If it is necessary consult WEG.

NOTE!
Frequency inverters can interfere with other electronic equipment. Follow the precautions recommended in the Installation and Connection Chapter of the user manual to minimize these effects.

4 ABOUT THE MANUAL

This manual presents the information required to configure the functions and parameters of the MVW3000 frequency inverter. It must be used together with the MVW3000 User Manual. It is prohibited the reproduction of the contents of this manual, in whole or in part, without the written permission of the manufacturer.

Due to the wide variety of functions of this product, it is possible to apply it in ways different from those presented hereby. It is not the purpose of this manual to exhaust all the MVW3000 application possibilities. The manufacturer cannot assume any responsibility for the use of the MVW3000 not based in this manual.

NOTE!
The text is intended to provide additional information in order to facilitate the use and programming of MVW3000 in certain applications.

4.1 TERMINOLOGY AND DEFINITIONS

4.1.1 Terms and Definitions Used in the Manual

Normal duty (ND): *Normal duty* (ND) is the inverter operating rate that sets the maximum current values for continuous operation I_{nom-ND} and overload of 110 % for 1 minute. It is selected by programming C1.2.1 = 0 (Normal Duty (ND)). It must be used to drive motors that are not subject to high torques in relation to their rated torque when operating in steady state at start, acceleration or deceleration.

I_{nom-ND}: Inverter rated current for use under normal overload rating (ND= *Normal duty*). Overload: 1.1 x I_{nom-ND} / 1 minute.

Heavy duty (HD): *Heavy duty* (HD) is the inverter operating rate that sets the maximum current values for continuous operation I_{nom-HD} and overload of 150 % for 1 minute. It is selected by programming C1.2.1 = 1 (Heavy Duty (HD)). It must be used to drive motors that are subject to high overload torques in relation to their rated torque when operating under constant speed at start, acceleration, or deceleration.

I_{nom-HD}: Inverter rated current for use under heavy overload rating (HD= *Heavy duty*). Overload: 1.5 x I_{nom-HD} / 1 minute.

Rectifier: Input circuit of the inverters that transforms the input AC voltage into DC. It is formed by power diodes.

Pre-Charge Circuit: It charges the DC Link capacitors with limited current, reducing the current peaks when powering up the inverter.

IGBT: *Insulated Gate Bipolar Transistor*: it is a basic component of the output inverter bridge. It works as an electronic switch in the saturated (closed switch) and cut-off (open switch) modes.

PTC: Resistor whose resistance value in ohms increases proportionally with temperature; used as a temperature sensor in motors.

NTC: Resistor whose resistance value in ohms decreases proportionally to the increase of the temperature; it is used as a temperature sensor in power packs.

HMI: Human-Machine Interface; device that allows the control of the motor, the visualization and the modification of the inverter parameters. It presents keys for motor control, navigation keys and a graphic LCD display.

RAM Memory: *Random Access Memory* (volatile memory).

FLASH Memory: Nonvolatile memory.

RFI Filter: *Radio Frequency Interference Filter*. It is a filter that avoids interference in the radiofrequency range.

PWM: *Pulse Width Modulation*. It is a pulsing voltage that supplies the motor.

Switching frequency: Frequency of the PWM modulation carrier to generate the triggering pulses of the inverter bridge IGBTs, usually given in kHz.

General enable: When activated, it accelerates the motor with the acceleration ramp provided Run/Stop = Run. When deactivated, the PWM pulses are immediately locked. It can be commanded through digital input programmed for that function, via communication networks or via SoftPLC.

Run/Stop: Inverter function that when activated (Run) accelerates the motor by acceleration ramp to the reference speed, and when deactivated (Stop) decelerates the motor by deceleration ramp until it stops. It can be commanded via HMI keys (I = Run and O = Stop), through digital input programmed for that function, via communication networks or via SoftPLC.

WPS: *WEG Programming Suite* (software).

Forward: Direction of rotation with positive speed reference.

Reverse: Direction of rotation opposite to forward.

SM: Synchronous Machine.

PM: Permanent-Magnet Synchronous Machine.

IPSM: Interior Permanent-Magnet Synchronous Machine.

SPSM: Surface Permanent-Magnet Synchronous Machine.

HSRM: Hybrid Synchronous Reluctance Machine.

5 ABOUT O MVW3000

The MVW3000 may be motor.red to meet the needs and technical specifications of our customers. Sizes, technical recommendations, performance data and optional items can be changed in relation to the information contained in this document.

In addition to the manual, the inverter detailed design is part of the documentation delivered to the customer. This design contains all the electrical, mechanical and setting information, as well as instructions for the interface/installation with other equipment.

The MVW3000, as well as other WEG products, is in constant evolution in relation to both internal parts (hardware) and programming (software/firmware). Any further explanation about the equipment and its documentation can be obtained by means of WEG communication channels.

WEG is not liable for the improper use of the information contained in this manual.

5.1 AVAILABLE MODELS

The MVW3000 line of Medium Voltage inverters offers different models, classified according to their power cell rated voltage and current levels. Different models of the MVW3000 may have different frames and codes. For constructive aspects of the available frames, check in chapter 4 TECHNICAL SPECIFICATIONS of the User's Manual, Figure 4.3, page 4-3 and tables 4.1 to 4.12 on pages 4-3 and 4-4. For models with rated voltage above 8000 V, contact WEG.

Figure 5.1: *General illustration of the panel (Frame B10)*

ATTENTION!
It is very important to check that the inverter software version is the same as indicated on the first page of this manual.

6 SOFTWARE VERSIONS

Software versions define the functions and programming of the MVW3000 inverter. All software versions installed on the product are available for viewing. The set of all software versions is called a package. The package, according to (S1.2.1), identifies the set of software versions of all microcontrollers in the product, and should be used as a reference to identify the software version of the product. This manual is updated according to the software version of the package (indicated on the back cover).

The software versions have the format 00.00.00, and follow the following evolution rules:

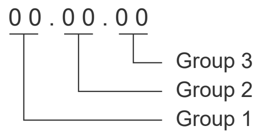


Figure 6.1: *Software version format*

- Group 1: The first two digits are updated when it is necessary to define an important change, such as a change in the drive hardware that brings about some incompatibility with the software.
- Group 2: The middle two digits are updated when the software is updated with new functionality, such as a new function or new parameter.
- Group 3: The last two digits are updated when the software is updated with corrections or ”*Bug Fix*”, for example corrections to a certain functionality or errors in the drive’s behavior in general.

7 S STATUS

This menu contains the status information of the inverter, motor, control accessories and networks. It is also possible to access information related to the functional safety of the inverter. It allows viewing the reading variables of the MVW3000.

NOTE!
All parameters present in this menu can only be seen on the HMI display and cannot be changed by the user unless they are linked to the parameters of the **Configurations** menu.

S1 INVERTER

It allows viewing the characteristics and status of the MVW3000.

S1.1 Status

It allows viewing the operating status of the MVW3000.

S1.1 Status	
.1 Inverter	0 ... 10
.4 Config	0 ... 33

.1 Inverter It indicates one of the possible inverter status. The following table contains the description of each status.

Indication	Description
0 = Ready	It indicates that the inverter is ready to drive the motor Precharge OK, general enable active.
1 = Run	It indicates that the inverter is driving the motor
2 = Undervoltage	It indicates that the inverter has insufficient supply voltage for operation (undervoltage) and will not accept a command to start the motor
3 = Fault	It indicates that the inverter has a fault active
4 = Configuration	It indicates that the inverter is running a wizard or with incompatible parameter programming
5 = Not used	Not used
6 = Booting	It indicates that communication with the power board has not been established
7 = Disabled	It indicates that the inverter is disabled Precharge OK, general enable inactive.
8 = Not used	Not used
9 = Self-tuning	It indicates that the inverter is executing the Self-tuning routine
10 = Sleep	It indicates that the sleep mode of the inverter PID controller is active

.4 Config It indicates if the MVW3000 is in CONFIG status and, if so, which input condition is leading to this situation.

Indication	Description
0 = No Config	It indicates that the MVW3000 is not in the CONFIG status
1 = Run/Stop DIx	It indicates that the Run/Stop command source of Remote 1 and/or Remote 2 mode has been set to Run/Stop via DI mode, but no DI has been specified
2 = Forward R1	It indicates that the Run/Stop command source of Remote 1 mode has been set to Forward/Reverse mode via DI, but no forward DI has been specified or the Direction of Rotation command source is not set to Forward/Reverse via DI mode
3 = Forward R2	It indicates that the Run/Stop command source of Remote 2 mode has been set to Forward/Reverse mode via DI, but but the forward DI was not specified
4 = Reverse R1	It indicates that the Run/Stop command source of Remote 1 mode has been set to Forward/Reverse mode via DI, but but the reverse DI was not specified
5 = Reverse R2	It indicates that the Run/Stop command source of Remote 2 mode has been set to Forward/Reverse mode via DI, but but the reverse DI was not specified
6 = 3-wire Start/Stop	It indicates that the Run/Stop command source of Remote 1 and/or Remote 2 mode has been set to 3-wire Start/Stop via DI mode, but no DI has been specified

Indication	Description
7 = Direction of Rotation DIx	It indicates that the Direction of Rotation command source of Remote 1 and/or Remote 2 mode has been set to “Direction of Rotation DI”, but no DI has been specified in C4.2.3.8
8 = JOG DIx	It indicates that the JOG command source of Remote 1 and/or Remote 2 mode has been set to Digital Input (DI) mode, but no DI has been specified
9 = R1/R2 DIx	It indicates that the selection command source between Remote 1 and Remote 2 modes has been set to Digital Input (DI) mode, but no DI has been specified
10 = Ramp selection DIx	It indicates that the ramp selection command source has been set to Digital Input (DI) mode, but no DI has been specified
11 = Oriented Startup	It indicates that the Oriented Startup is running
12 = Backup	It indicates that the Parameter Copy functions are running
13 = Not used	Not used
14 = SS1 configuration	It indicates that the SS1 is not properly set
15 = Switching Frequency	It indicates that the user and/or minimum switching frequencies are not properly set
16 = Undefined model	It indicates that there is an incompatibility in the drive model recorded. Perform a factory default to fix this problem
17 = Encoder Vector Control	It indicates that the Vector Control with Encoder type has been selected, but there is no Encoder accessory defined in any slot
18 = ENC Acc. not configured	It indicates that the Encoder accessory was selected for one of the slots, but it is not connected or set to in the corresponding slot
19 = AIx/FIx Speed Ref.	It indicates that the speed reference source for Remote 1 and/or Remote 2 mode has been set to Analog Input (AI) or Frequency Input (FI) mode, but no AI or FI has been specified
20 = PM Motor Control	Indicates that Motor Type has been set to PM Motor but the Control Type is not set to VVW+.
21 = General Enable DIx	It indicates that the General Enable command source for Remote 1 and/or Remote 2 mode has been set to Digital Input (DI) mode, but no DI has been specified
22 = Multispeed	It indicates that the speed reference source of Remote 1 and/or Remote 2 mode has been set to Multispeed mode, but no DI has been specified
23 = Not used	Not used
24 = Electronic Potentiometer	It indicates that the speed reference source of Remote 1 and/or Remote 2 mode has been set to Electronic Potentiometer mode, but no DI has been specified
25 = FI used as DI	This status occurs when the user tries to configure some command that requires a DI with one that was previously configured to be an FI, and vice versa
26 = AIx/FIx Torque Ref.	It indicates that the torque reference source for Remote 1 and/or Remote 2 mode has been set to Analog Input (AI) or Frequency Input (FI) mode, but no AI or FI has been specified
27 = SP Source PID	It indicates that the PID Controller Setpoint source has been set to Analog Input (AI) mode, but no AI has been specified
28 = PV Source PID	It indicates that the PID Controller Process Variable source was set to Analog Input (AI) mode, but no AI was specified
29 = DI Source PID	It indicates that the Manual/Auto command source has been set to Digital Input (DI) mode, but no DI has been specified
30 = Supply Voltage	It indicates that the inverter supply voltage setting (type or rated voltage) is inappropriate for the model used
31 ... 33 = Not used	Not used

S1.2 Software version

It indicates the software versions contained in all microcontrollers installed on the MVW3000.

S1.2 Software version	
.1 AUI	
.2 CCE CPU	
to	
.4 HMI	
.8 CIB connector 1	
.9 CIB connector 2	
.10 Cell U1 CPU	0 ... 65535
to	
.45 Cell W12 CPU	0 ... 65535
.46 PLD of the cell U1	0 ... 65535
to	
.81 PLD of the cell W12	0 ... 65535

.1 AUI It indicates the version of the software package, which is formed by the set of program files saved in the MVW3000 microcontrollers.

.2 CCE CPU to **.4 HMI** Indicates the software version.

.8 CIB connector 1 to **.9 CIB connector 2**

.10 Cell U1 CPU to **.45 Cell W12 CPU** Indicates the software version of the CPU of the control board of the respective cell.

.46 PLD of the cell U1 to **.81 PLD of the cell W12** Indicates the PLD software version of the control board of the respective cell.

S1.4 Accessory data

It presents the control accessories that are installed in the MVW3000.

S1.4.1 Backplane

It allows viewing the model of the Backplane that is connected to the MVW3000.

S1.4.1 Backplane	
.1 Model	0 ... 2

.1 Model Model of the Backplane installed.

Indication	Description
0 = Disconnected	It indicates that there is no Backplane connected to the MVW3000
1 = 4 SLOTS	It indicates that the 4-position (Slot) Backplane is connected to the MVW3000
2 = 7 SLOTS	It indicates that the 7-position (Slot) Backplane is connected to the MVW3000

S1.4.2 Slot A to S1.4.8 Slot G

It allows viewing Slot accessory information.

S1.4.2 Slot A S1.4.3 Slot B S1.4.4 Slot C S1.4.5 Slot D S1.4.6 Slot E S1.4.7 Slot F S1.4.8 Slot G	
.1 Accessory identified	0 ... 9

.1 Accessory identified Model of the accessory installed.

Indication	Description
0 = Unknown	The accessory installed in the Slot is not recognized by this firmware version
1 = No Accessory	It indicates that the Slot has no accessories
2 = IOAI-01	Accessory with analog inputs and outputs
3 = IOD-01	Accessory with digital inputs and outputs
4 = REL-01	Accessory with digital relay outputs
5 = TEMP-01	Accessory with isolated inputs for PTC/PT100/PT1000 sensors
6 = ENC-01	Accessory for incremental encoder connection
7 = Not used	Not used
8 = CCAN-W	Communication accessory for CAN interface
9 = C...-N (Anybus)	Communication accessory for Anybus-CC module

NOTE!
Control accessories can be installed in any available slot. It is only possible to use one communication module of each type. Except for explicitly listed cases, up to 7 accessories of the same type can be used.

S1.4.9 Control board

Allows you to view the status of the digital inputs and outputs used by the inverter control.

S1.4.9 Control board	
.1 Accessory identified	0 ... 3 Bit

.1 Accessory identified Model of the accessory installed.

Bit	Value/Description
Bit 0 … 1 Slot XC7	**0 = Unknown**: The accessory installed in the Slot is not recognized by this firmware version **1 = No Accessory**: It indicates that the Slot has no accessories **2 = Encoder**: Accessory for incremental encoder connection
Bit 2 … 3 Slot XC8	**0 = Unknown**: The accessory installed in the Slot is not recognized by this firmware version **1 = No Accessory**: It indicates that the Slot has no accessories **2 = Encoder**: Accessory for incremental encoder connection
Bit 4 … 5 Slot XC9	**0 = Unknown**: The accessory installed in the Slot is not recognized by this firmware version **1 = No Accessory**: It indicates that the Slot has no accessories **2 = Encoder**: Accessory for incremental encoder connection
Bit 6 … 7 Slot XC10	**0 = Unknown**: The accessory installed in the Slot is not recognized by this firmware version **1 = No Accessory**: It indicates that the Slot has no accessories **2 = Encoder**: Accessory for incremental encoder connection

S1.5 Date/Hour

It allows viewing the date and time setting of the MVW3000.

S1.5 Date/Hour	
.1 Actual	YYYY-MM-DD HH:MM:SS
.2 Time zone	0 ... 52

.1 Actual It indicates the actual date (YYYY-MM-DD) and time (HH:MM:SS) of the MVW3000.

.2 Time zone Setting of the time zone where the product is applied.

The options are shown in the table below.

Time Zone Options					
0 = UTC-12:00	9 = UTC-07:30	18 = UTC-03:00	27 = UTC+01:30	36 = UTC+06:00	45 = UTC+10:30
1 = UTC-11:30	10 = UTC-07:00	19 = UTC-02:30	28 = UTC+02:00	37 = UTC+06:30	46 = UTC+11:00
2 = UTC-11:00	11 = UTC-06:30	20 = UTC-02:00	29 = UTC+02:30	38 = UTC+07:00	47 = UTC+11:30
3 = UTC-10:30	12 = UTC-06:00	21 = UTC-01:30	30 = UTC+03:00	39 = UTC+07:30	48 = UTC+12:00
4 = UTC-10:00	13 = UTC-05:30	22 = UTC-01:00	31 = UTC+03:30	40 = UTC+08:00	49 = UTC+12:30
5 = UTC-09:30	14 = UTC-05:00	23 = UTC-00:30	32 = UTC+04:00	41 = UTC+08:30	50 = UTC+13:00
6 = UTC-09:00	15 = UTC-04:30	24 = UTC+00:00	33 = UTC+04:30	42 = UTC+09:00	51 = UTC+13:30
7 = UTC-08:30	16 = UTC-04:00	25 = UTC+00:30	34 = UTC+05:00	43 = UTC+09:30	52 = UTC+14:00
8 = UTC-08:00	17 = UTC-03:30	26 = UTC+01:00	35 = UTC+05:30	44 = UTC+10:00	

Table 7.5: *Time zone where the product is applied*

S1.6 Control words

It allows viewing the status of the HMI, DI and global control words. Each bit of this word represents a command that can be executed on the inverter.

S1.6 Control words	
.1 Global	0 ... 7 Bit
.2 HMI	0 ... 7 Bit
.3 DI	0 ... 7 Bit

.1 Global Indicates the status of the MVW3000 global control word.

This is the effective command word for the MVW3000.

The global control word bits are generated from the specific control words of each source according to the command mode (Local/Remote) and the settings in the C4.2.1 and C4.2.2 menus.

NOTE!
The general enable command may contain a digital input that acts together with the chosen command source. Both must be active/inactive simultaneously for the command to take place. When parameter is set C4.2.3.1to "Inactive", the general enable command is assigned only by the source set (C4.2.1.1 or C4.2.2.1).

NOTE!
The quick stop command may contain a digital input that acts together with the chosen command source. Both must be active/inactive simultaneously for the command to take place. When parameter C4.2.3.7 is set to "Inactive", the fast stop command is assigned only by the source set (C4.2.1.2 or C4.2.2.2).

NOTE!
The fault reset command occurs through any command source, regardless of the command mode (Local/Remote 1/Remote 2) or source set.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: it stops the motor by deceleration ramp **1 = Yes**: the motor turns according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: it disables the inverter completely, interrupting the motor power supply **1 = Yes**: it enables the inverter completely, allowing the operation of the motor
Bit 2 Run Reverse	**0 = No**: turn the motor in the direction of the reference signal (forward direction) **1 = Yes**: run the motor in the opposite direction of the reference signal (reverse direction)
Bit 3 Enable JOG	**0 = No**: it disables the JOG function **1 = Yes**: it enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: it selects the Remote 1 command mode **1 = R2**: it selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1st Ramp acceleration and deceleration according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: it enables quick stop **1 = Yes**: it disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if a fault is active, it resets the fault

.2 HMI It indicates the status of the control word via HMI.

For the commands of this parameter to be executed, the inverter must be programmed to be controlled via HMI. This programming is done through the menuC4.

HMI Control Word:

- When pressing the HMI I key, the command Enable Ramp is set to 1.
- When pressing the HMI O key, the command Enable Ramp is set to 0.
- The General Enable command can be disabled when the key O of the HMI is pressed and the parameter C4.2.4.1 is set to coast to stop.
- When pressing the HMI key, the Run Reverse command is alternated.
- As long as the HMI JOG key is pressed, the Enable JOG command is kept at 1.
- When pressing the HMI key LOC REM the command mode is changed from local to remote or vice versa.
- The 2nd Ramp command is always kept at 0 (always 1st Ramp).
- The Quick Stop command can be activated when the key O of the HMI is pressed and the parameter C4.2.4.1 is set to quick stop.
- When there is an fault active, by pressing the HMI O key the Fault Reset command is set to 1.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: it stops the motor by deceleration ramp **1 = Yes**: the motor turns according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: it disables the inverter completely, interrupting the motor power supply **1 = Yes**: it enables the inverter completely, allowing the operation of the motor
Bit 2 Run Reverse	**0 = No**: turn the motor in the direction of the reference signal (forward direction) **1 = Yes**: run the motor in the opposite direction of the reference signal (reverse direction)
Bit 3 Enable JOG	**0 = No**: it disables the JOG function **1 = Yes**: it enables the JOG function
Bit 4 LOC/REM Mode	**0 = REM**: it selects the Remote command mode **1 = LOC**: it selects the Local command mode
Bit 5 2nd Ramp	**0 = No**: 1st Ramp acceleration and deceleration according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: it enables quick stop **1 = Yes**: it disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if a fault is active, it resets the fault

.3 DI It indicates the status of the control word via digital inputs.

For the commands written in this parameter to be executed, the inverter must be programmed to be controlled via Digital Input. This programming is done through the menus C4 and C4.2.3.

Control Word via DI:

- The Enable Ramp command depends on the configuration of parameters C4.2.1.2 or C4.2.2.2, according to options 7, 8 and 9 below.
  - For option 7: Run/Stop DI, the Enable Ramp command reflects the status of the digital input set in C4.2.3.2. Active DI means Enable Ramp and inactive DI means Disable Ramp.
  - For option 8: Forward/Reverse DI, the behavior of the Enable Ramp command is determined by a combination of the status of the digital inputs set in C4.2.3.5 and C4.2.3.6.
  - For option 9: 3-Wire Start/Stop DI, the Enable Ramp command has its behavior given by a combination of the status of the digital inputs set in C4.2.3.3 and C4.2.3.4.
- The General Enable command reflects the status of the digital input set in C4.2.3.1. Active DI means General Enabled and Inactive DI means General Disabled.
- The Run Reverse command depends on the settings made in parameters C4.2.1.3 and C4.2.2.3, according to options 7 and 8 below.
  - For option 7: Direction of Rotation DI, the Run Reverse command reflects the status of the digital input set in C4.2.3.8. Active DI means Reverse Direction and inactive DI means Forward Direction.
  - For option 8: Forward/Reverse DI, the behavior of the Run Reverse command is determined by a combination of the status of the digital inputs set in C4.2.3.5 and C4.2.3.6.
- The Enable JOG command reflects the status of the digital input set in C4.2.3.9. DI active means Enable JOG and DI inactive means Disable JOG.
- The 2nd Ramp command reflects the status of the digital input set in C4.2.3.10. Active DI means 2nd Ramp and inactive DI means 1st Ramp.
- The Fast Stop command reflects the status of the digital input set in C4.2.3.7. Active DI means No Fast Stop and Inactive DI means With Fast Stop.
- The Fault Reset command reflects the status of the digital input set in C4.2.3.11. Active DI means Reset of Fault and inactive DI means No Action.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: it stops the motor by deceleration ramp **1 = Yes**: the motor turns according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: it disables the inverter completely, interrupting the motor power supply **1 = Yes**: it enables the inverter completely, allowing the operation of the motor
Bit 2 Run Reverse	**0 = No**: turn the motor in the direction of the reference signal (forward direction) **1 = Yes**: run the motor in the opposite direction of the reference signal (reverse direction)
Bit 3 Enable JOG	**0 = No**: it disables the JOG function **1 = Yes**: it enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: it selects the Remote 1 command mode **1 = R2**: it selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1st Ramp acceleration and deceleration according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: it enables quick stop **1 = Yes**: it disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if a fault is active, it resets the fault

S1.8 Cells

S1.8 Cells	
.1 Bypass status of fase U	0 ... 11 Bit
.2 Bypass status of fase V	0 ... 11 Bit
.3 Bypass status of fase W	0 ... 11 Bit
.4 Status of U1...U4 cells	0 ... 3 Bit
.5 Status of U5...U8 cells	0 ... 3 Bit
.6 Status of U9...U12 cells	0 ... 3 Bit
.7 Status of V1...V4 cells	0 ... 3 Bit
.8 Status of V5...V8 cells	0 ... 3 Bit
.9 Status of V9...V12 cells	0 ... 3 Bit
.10 Status of W1...W4 cells	0 ... 3 Bit
.11 Status of W5...W8 cells	0 ... 3 Bit
.12 Status of W9...W12 cells	0 ... 3 Bit

.1 Bypass status of fase U to **.3 Bypass status of fase W** Indicates the bypass status of the cells.

Bit	Value/Description
Bit 0 Cell 1	**0 = Off**: Inactive. **1 = On**: Active.
Bit 1 Cell 2	**0 = Off**: Inactive. **1 = On**: Active.
Bit 2 Cell 3	**0 = Off**: Inactive. **1 = On**: Active.
Bit 3 Cell 4	**0 = Off**: Inactive. **1 = On**: Active.
Bit 4 Cell 5	**0 = Off**: Inactive. **1 = On**: Active.
Bit 5 Cell 6	**0 = Off**: Inactive. **1 = On**: Active.
Bit 6 Cell 7	**0 = Off**: Inactive. **1 = On**: Active.
Bit 7 Cell 8	**0 = Off**: Inactive. **1 = On**: Active.
Bit 8 Cell 9	**0 = Off**: Inactive. **1 = On**: Active.
Bit 9 Cell 10	**0 = Off**: Inactive. **1 = On**: Active.
Bit 10 Cell 11	**0 = Off**: Inactive. **1 = On**: Active.
Bit 11 Cell 12	**0 = Off**: Inactive. **1 = On**: Active.

.4 Status of U1...U4 cells to **.12 Status of W9...W12 cells** Shows the status of the cells according to the inverter configuration and the status of the bypass system of each cell.

Cells marked as inactive are those that, according to the inverter configuration, are not part of the panel. The inverter settings that determine whether a cell is inactive or not are the nominal voltage C13.1.1, number of redundant cells C13.1.4 and the number of cells in parallel C13.1.3.

For active cells, the status depends on whether the cell is operational or on bypass. To return a cell to operation after appropriate repairs and checks, or to enforce manual activation of the bypass system, check the parameters C3.12.3 to C3.12.8.

Bit	Value/Description
Bit 0 … 2 Cell 9	**0 = Inactive**: The cell is not part of the panel **1 = Operational**: Operational cell **2 = Automatic bypass due to manageable fault**: The bypass system came into operation after a manageable fault occurred in the cell, removing it from the phase circuit **3 = Automatic bypass by parallel association**: The bypass system has entered the activation of the cell’s bypass system in parallel, removing it from the phase circuit **4 = Bypass manual**: The cell bypass system was controlled by the user through the respective parameter, removing it from the phase circuit **5 = Mechanical bypass**: The cell was removed from the panel and replaced with a mechanical bypass system
Bit 3 … 5 Cell 10	**0 = Inactive**: The cell is not part of the panel **1 = Operational**: Operational cell **2 = Automatic bypass due to manageable fault**: The bypass system came into operation after a manageable fault occurred in the cell, removing it from the phase circuit **3 = Automatic bypass by parallel association**: The bypass system has entered the activation of the cell’s bypass system in parallel, removing it from the phase circuit **4 = Bypass manual**: The cell bypass system was controlled by the user through the respective parameter, removing it from the phase circuit **5 = Mechanical bypass**: The cell was removed from the panel and replaced with a mechanical bypass system
Bit 6 … 8 Cell 11	**0 = Inactive**: The cell is not part of the panel **1 = Operational**: Operational cell **2 = Automatic bypass due to manageable fault**: The bypass system came into operation after a manageable fault occurred in the cell, removing it from the phase circuit **3 = Automatic bypass by parallel association**: The bypass system has entered the activation of the cell’s bypass system in parallel, removing it from the phase circuit **4 = Bypass manual**: The cell bypass system was controlled by the user through the respective parameter, removing it from the phase circuit **5 = Mechanical bypass**: The cell was removed from the panel and replaced with a mechanical bypass system
Bit 9 … 11 Cell 12	**0 = Inactive**: The cell is not part of the panel **1 = Operational**: Operational cell **2 = Automatic bypass due to manageable fault**: The bypass system came into operation after a manageable fault occurred in the cell, removing it from the phase circuit **3 = Automatic bypass by parallel association**: The bypass system has entered the activation of the cell’s bypass system in parallel, removing it from the phase circuit **4 = Bypass manual**: The cell bypass system was controlled by the user through the respective parameter, removing it from the phase circuit **5 = Mechanical bypass**: The cell was removed from the panel and replaced with a mechanical bypass system

S2 MEASUREMENTS

It allows viewing the variables measured by the MVW3000.

S2.1 Motor speed

It indicates the variables related to the motor speed.

S2.1 Motor speed	
.1 Reference	0 ... 60000 rpm
.3 Motor speed	0 ... 60000 rpm
.4 Encoder	0 ... 65535 rpm
.5 Estimated value	0 ... 60000 rpm

.1 Reference It indicates the speed reference value in RPM.

.3 Motor speed It indicates the actual motor speed value in RPM used by the controller module.

This value considers the control type selected in C3.1.1 to use either the estimated value in S2.1.5 or the speed measured by the encoder in S2.1.4.

.4 Encoder It indicates the actual encoder speed in RPM.

.5 Estimated value It indicates the estimated motor speed value in RPM.

The estimation is based on the control type selected in C3.1.1, presenting the theoretical speed defined by the V/f curve or the value estimated by the speed observers.

S2.2 Motor torque

It indicates the variables related to the motor torque.

S2.2 Motor torque	
.1 Reference	-400.0 ... 400.0 %
.2 Total reference	-400.0 ... 400.0 %
.3 Motor torque	-400.0 ... 400.0 %

.1 Reference It indicates the electrical torque reference on the motor in % based on the motor rated torque.

.2 Total reference It indicates the value of the motor torque reference after the ramp.

.3 Motor torque It indicates the estimated electrical torque on the motor in % based on the rated motor torque.

S2.3 Inverter output

It indicates the MVW3000 output variables applied to the motor.

S2.3 Inverter output	
.1 Motor current	0.0 ... 6553.5 A
.2 Iu current	0.0 ... 6553.5 A
to	
.4 Iw current	0.0 ... 6553.5 A
.5 Output voltage	0.00 ... 655.35 kV
.6 Output voltage Vuv	0.00 ... 655.35 kV
to	
.8 Output voltage Vwu	0.00 ... 655.35 kV
.9 Frequency	0.0 ... 1020.0 Hz
.10 cos phi	-1.00 ... 1.00
.11 Power	0 ... 65535 kW
.12 Energy GWh	0 ... 999 GWh
.13 Energy MWh	0 ... 999 MWh
.14 Energy kWh	0.0 ... 999.9 kWh
.17 Voltage between the virtual neutral of the motor and the GND	0.0 ... 6553.5 %
.18 Use of the modulation index	0.0 ... 100.0 %

.1 Motor current It indicates the RMS value of the fundamental component of the inverter output current, in Amperes (A).

.2 Iu current to **.4 Iw current** Indicates the effective value of the current of the respective output phase of the inverter, in Amperes (A).

.5 Output voltage It indicates the inverter output voltage in Volts (V).

.6 Output voltage Vuv to **.8 Output voltage Vwu** Indicates the line voltage measured at the inverter input, in kV effective value, of the respective phase.

.9 Frequency It indicates the motor synchronous frequency in Hz.

.10 cos phi It indicates the motor cos phi value.

.11 Power It indicates the electrical power at the inverter output in kW.

.12 Energy GWh It indicates the energy consumed by the motor in GWh.

.13 Energy MWh It indicates the energy consumed by the motor in MWh.

.14 Energy kWh It indicates the energy consumed by the motor in kWh.

> **NOTE!**
> The total energy consumed by the motor is the sum of the values given in GWh, MWh and kWh. However, these parameters are calculated indirectly and should not be used to measure energy consumption.

.17 Voltage between the virtual neutral of the motor and the GND It indicates the value of the voltage between the virtual motor neutral and the ground (GND) of the inverter, as a percentage of the nominal effective phase voltage of the inverter.

.18 Use of the modulation index Indicates the ratio between the current modulation index and the maximum allowed modulation index.

S2.4 Temperatures

Indicates the temperatures of the inverter, motor and transformer.

S2.4.1 Temperature accessory

S2.4.1 Temperature accessory	
.3 Sensor measured value	-100.0 ... 250.0 °C

.3 Sensor measured value It indicates the value of the motor temperature measured by the temperature accessory.

The value indicated considers the highest temperature measured by the first temperature accessory identified by the inverter. If no temperature accessory is identified, this parameter will remain hidden from view by the HMI.

S2.4.2 Thermal protection relay

S2.4.2 Thermal protection relay	
.1 Relay 1 Temperature CH1	-10 ... 250 °C
to	
.48 Relay 6 Temperature CH8	-10 ... 250 °C

.1 Relay 1 Temperature CH1 to **.48 Relay 6 Temperature CH8** Indicates the value of the motor temperature measured by the thermal protection relay.

S2.4.3 Air temperature

It indicates the temperature of the inverter internal air.

S2.4.3 Air temperature	
.2 Control	-50.0 ... 250.0 °C

.2 Control Indicates the temperature at the user interface board sensor.

This temperature is used, together with other measurements, in falha de sobretemperatura da placa de controle.

The user’s temperature offset adjustment impacts this temperature value.

S2.4.4 Cells

S2.4.4 Cells	
.1 Temperature - lowest value	-200.0 ... 200.0 °C
.2 Temperature - highest value	-200.0 ... 200.0 °C
.3 Temperature on the power module of cell U1	-200.0 ... 200.0 °C
to	
.38 Temperature on the power module of cell W12	-200.0 ... 200.0 °C

.1 Temperature - lowest value Indicates the lowest temperature value among all the cells IGBT modules.

.2 Temperature - highest value Indicates the highest value among all IGBT module temperatures of the cells.

.3 Temperature on the power module of cell U1 to **.38 Temperature on the power module of cell W12** Indicates the temperature of the IGBT module, in degrees Celsius (°C), of the respective cell.

S2.6 Inverter input

It indicates the current and voltage value of the inverter power supply.

S2.6 Inverter input	
.4 Input current	0.0 ... 6553.5 A
.5 Input voltage	0.00 ... 655.35 kV
.6 Input voltage Vab	0.00 ... 655.35 kV
to	
.8 Input voltage Vca	0.00 ... 655.35 kV
.9 Transformer 1 current	0.0 ... 6553.5 A
to	
.11 Transformer 3 current	0.0 ... 6553.5 A
.12 Apparent power	-32768 ... 32767 kVA
.13 Active power	-32768 ... 32767 kW
.14 Reactive power	-32768 ... 32767 kVAr
.15 FP	0.00 ... 1.00
.16 Frequency	0.00 ... 100.00 Hz

.4 Input current It indicates the current reading at the inverter input, in amperes (A) effective value.

.5 Input voltage It indicates the voltage effective value at the inverter input, in kV.

.6 Input voltage Vab to **.8 Input voltage Vca** Indicates the line voltage measured at the inverter input, in kV effective value, of the respective phase.

.9 Transformer 1 current to **.11 Transformer 3 current** It indicates the current measured at the inverter input, in amps (A) effective value, of the respective transformer.

.12 Apparent power Indicates the apparent power in the inverter input, in kVA.

.13 Active power Indicates the real power in the inverter input, in kW.

.14 Reactive power Indicates the reactive power in the inverter input, in kVAr.

.15 FP It indicates the cosine of the angle between the voltage and current at the inverter input.

.16 Frequency Indicates the input frequency of the inverter, in hertz (Hz).

S2.7 DC link

It allows viewing the DC Link voltage value.

S2.7 DC link	
.1 Voltage - average value	0 ... 2000 V
.2 Voltage - lowest value	0 ... 2000 V
.3 Voltage - highest value	0 ... 2000 V
.4 Voltage of cell U1	0 ... 2000 V
to	
.39 Voltage of cell W12	0 ... 2000 V

.1 Voltage - average value Indicates the calculated value across all currently active cells.

.2 Voltage - lowest value Indicates the lowest value among all the DC link voltages of the cells.

.3 Voltage - highest value Indicates the highest value among all the DC link voltages of the cells.

.4 Voltage of cell U1 to **.39 Voltage of cell W12** It indicates the DC link voltage, in volts, of the respective cell.

S2.8 Torque current limitation

It allows viewing the parameters related to the motor torque limiter via Analog Input.

S2.8 Torque current limitation	
.1 AIx global torque	0.0 ... 400.0 %

.1 AIx global torque It defines the maximum torque value in the four quadrants of motor operation via Analog Input (selected in parameter C3.3.5.1.6). If it is necessary to control the torque in the four motor operation quadrants, parameters C3.3.5.1.2 to C3.3.5.1.5 must be used.

S3 I/OS

It allows viewing the status of the I/O accessories installed on the MVW3000.

S3.1 Slot X status

Allows you to view the status of the slot status parameters.

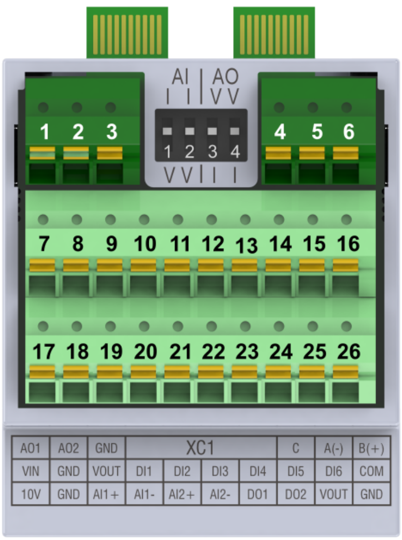


Figure 7.1: *IOS Accessory, Slot X*

S3.1.1 Analog inputs

It allows viewing the value of the analog inputs of the accessory connected to the slot.

S3.1.1 Analog inputs	
.1 AI1	-100.00 ... 100.00 %
.2 AI2	-100.00 ... 100.00 %

.1 AI1, .2 AI2 Value of the analog input in percentage according to the type of signal configured.

Where 0 % = minimum value of the configured signal - includes gain and offsets (e.g. 4 mA for 4...20 mA signal) and 100 % = maximum value of the configured signal.

S3.1.2 Analog outputs

It allows viewing the value of the analog outputs of the accessory connected to the slot.

The data source for each output is independently configured through specific parameters described in C5.1.2. The status indication may have percentage values relative to the full scale values. Such values depend on the function selected for the analog output and are also described in detail in item C5.1.2.

S3.1.2 Analog outputs	
.1 AO1	-100.00 ... 100.00 %
.2 AO1 Network	-100.00 ... 100.00 %
.3 AO1 SoftPLC	-100.00 ... 100.00 %
.4 AO2	-100.00 ... 100.00 %
.5 AO2 Network	-100.00 ... 100.00 %
.6 AO2 SoftPLC	-100.00 ... 100.00 %

.1 AO1 , .4 AO2 Value of the analog output in percentage according to the type of signal configured.

.2 AO1 Network, .5 AO2 Network Value of the analog output, when controlled by communication network, in percentage according to the type of signal configured.

.3 AO1 SoftPLC, .6 AO2 SoftPLC Value of the analog output, when controlled by SoftPLC, in percentage according to the type of signal configured.

S3.1.3 Digital inputs

It allows viewing the value of the digital inputs of the accessory connected to the slot.

S3.1.3 Digital inputs	
.1 DI	0 ... 5 Bit
.2 FI5	-100.00 ... 100.00 %
.3 FI5 (Hz)	0 ... 32000 Hz
.4 FI6	-100.00 ... 100.00 %
.5 FI6 (Hz)	0 ... 32000 Hz

.1 DI It indicates the status of digital inputs.

Bit	Value/Description
Bit 0 DI1	It indicates the status of Digital Input DI1. **0 = Inactive**: It indicates that Digital Input DI1 is inactive **1 = Active**: It indicates that Digital Input DI1 is active
Bit 1 DI2	It indicates the status of Digital Input DI2. **0 = Inactive**: It indicates that Digital Input DI2 is inactive **1 = Active**: It indicates that Digital Input DI2 is active
Bit 2 DI3	It indicates the status of Digital Input DI3. **0 = Inactive**: It indicates that Digital Input DI3 is inactive **1 = Active**: It indicates that Digital Input DI3 is active
Bit 3 DI4	It indicates the status of Digital Input DI4. **0 = Inactive**: It indicates that Digital Input DI4 is inactive **1 = Active**: It indicates that Digital Input DI4 is active
Bit 4 DI5	It indicates the status of Digital Input DI5. **0 = Inactive**: It indicates that Digital Input DI5 is inactive **1 = Active**: It indicates that Digital Input DI5 is active
Bit 5 DI6	It indicates that Digital Input DI6 is inactive. **0 = Inactive**: It indicates that Digital Input DI6 is inactive **1 = Active**: It indicates that Digital Input DI6 is active

.2 FI5, .4 FI6 It indicates (in percentage of the full scale) the actual value of frequency input.

.3 FI5 (Hz), .5 FI6 (Hz) It indicates (in Hz) the actual value of frequency input.

S3.1.4 Digital outputs

It allows viewing the value of the digital outputs of the accessory connected to the slot.

S3.1.4 Digital outputs	
.1 DO	0 ... 1 Bit
.4 FO1	-100.00 ... 100.00 %
.5 FO1 (Hz)	0 ... 32000 Hz
.6 FO1 Network	-100.00 ... 100.00 %
.7 FO1 SoftPLC	-100.00 ... 100.00 %
.8 FO2	-100.00 ... 100.00 %
.9 FO2 (Hz)	0 ... 32000 Hz
.10 FO2 Network	-100.00 ... 100.00 %
.11 FO2 SoftPLC	-100.00 ... 100.00 %

.1 DO It indicates the status of digital outputs.

Bit	Value/Description
Bit 0 DO1	It indicates the status of Digital Output DO1. **0 = Inactive**: It indicates that Digital Output DO1 is inactive **1 = Active**: It indicates that Digital Output DO1 is active
Bit 1 DO2	It indicates the status of Digital Output DO2. **0 = Inactive**: It indicates that Digital Output DO2 is inactive **1 = Active**: It indicates that Digital Output DO2 is active

.4 FO1, .8 FO2 It indicates (in percentage of the full scale) the actual value of frequency output.

.5 FO1 (Hz), .9 FO2 (Hz) It indicates (in Hz) the actual value of frequency output.

.6 FO1 Network, .10 FO2 Network It indicates (in percentage of the full scale) the actual value supplied via Networks to frequency output.

.7 FO1 SoftPLC, .11 FO2 SoftPLC It indicates (in percentage of the full scale) the actual value supplied via SoftPLC to frequency output.

S3.1.5 Encoder

It allows viewing the actual status of the encoder signal measurements carried out by the accessory.

S3.1.5 Encoder	
.1 Number of revolutions	0 ... 65535
.2 Revolution fraction	0 ... 65535
.3 Speed	-60000 ... 60000 rpm

.1 Number of revolutions Number of full revolutions measured by the encoder.

This parameter is reset to 0 during power up. When the zero search is completed this parameter is reset.

It increases when one complete revolution is measured in the forward direction and decreases when one complete revolution is measured in the reverse direction.

For example, for a 1024-pulse encoder (set in C5.1.5.1) that has rotated 3.5 revolutions in the forward direction (3584 pulses), this parameter will indicate 3 revolutions. If the encoder shaft rotates 0.75 revolution in the reverse direction, totaling 2.75 revolutions (2816 pulses), the parameter will indicate 2 revolutions.

.2 Revolution fraction Value proportional (from 0 to 65535) to the fraction of a revolution (incomplete revolution) measured by the encoder.

This parameter is reset to 0 during power up. When the zero search is completed this parameter is reset.

It increases when pulses are measured in the forward direction and decreases when pulses are measured in the reverse direction.

For example, for a 1024-pulse encoder that has rotated 3.5 revolutions in the forward direction (3584 pulses), this parameter will indicate 32768 (0.5 revolutions). If the encoder shaft rotates 0.75 revolutions in the reverse direction, totaling 2.75 revolutions (2816 pulses) the parameter will indicate 49152 (0.75 revolutions).

.3 Speed It indicates the speed, in rpm, measured by the encoder.

The speed indicated in this parameter is calculated by counting the encoder pulses occurred in a time frame of 1 ms. This parameter is updated every 1 ms.

Positive values indicate forward rotation, and negative values indicate reverse rotation.

The value of this parameter is presented without filters.

S3.2 Slot A status

S3.3 Slot B status

S3.4 Slot C status

S3.5 Slot D status

S3.6 Slot E status

S3.7 Slot F status

S3.8 Slot G status

It allows viewing the state of the slot status parameters.

S3.2.1 Analog inputs to S3.8.1 Analog inputs

It allows viewing the value of the analog inputs of the accessory connected to the slot.

S3.2.1 Analog inputs S3.3.1 Analog inputs S3.4.1 Analog inputs S3.5.1 Analog inputs S3.6.1 Analog inputs S3.7.1 Analog inputs S3.8.1 Analog inputs	
.1 AI1	-100.00 ... 100.00 %
to	
.3 AI3	-100.00 ... 100.00 %

.1 AI1, .2 AI2, .3 AI3 Value of the analog input in percentage according to the type of signal configured.

Where 0 % = minimum value of the configured signal - includes gain and offsets (e.g. 4 mA for 4...20 mA signal) and 100 % = maximum value of the configured signal.

S3.2.2 Analog outputs to S3.8.2 Analog outputs

It allows viewing the value of the analog outputs of the accessory connected to the slot.

The data source for each output is independently configured through specific parameters described in the configuration menu for the analog outputs of the accessory connected to the slot. Using Slot A as an example, the menu can be found in item C5.2. The status indication may have percentage values relative to the full scale values. Such values depend on the function selected for the analog output and are also described in detail in the menu of analog outputs of the accessory connected to the slot.

S3.2.2 Analog outputs S3.3.2 Analog outputs S3.4.2 Analog outputs S3.5.2 Analog outputs S3.6.2 Analog outputs S3.7.2 Analog outputs S3.8.2 Analog outputs	
.1 AO1	-100.00 ... 100.00 %
.2 AO1 Network	-100.00 ... 100.00 %
.3 AO1 SoftPLC	-100.00 ... 100.00 %
.4 AO2	-100.00 ... 100.00 %
.5 AO2 Network	-100.00 ... 100.00 %
.6 AO2 SoftPLC	-100.00 ... 100.00 %

.1 AO1 , .4 AO2 Value of the analog output in percentage according to the type of signal configured.

.2 AO1 Network, .5 AO2 Network Value of the analog output, when controlled by communication network, in percentage according to the type of signal configured.

.3 AO1 SoftPLC, .6 AO2 SoftPLC Value of the analog output, when controlled by SoftPLC, in percentage according to the type of signal configured.

S3.2.3 Digital inputs to S3.8.3 Digital inputs

It allows viewing the value of the digital inputs of the accessory connected to the slot.

S3.2.3 Digital inputs S3.3.3 Digital inputs S3.4.3 Digital inputs S3.5.3 Digital inputs S3.6.3 Digital inputs S3.7.3 Digital inputs S3.8.3 Digital inputs	
.1 DI	0 ... 7 Bit

.1 DI It indicates the status of digital inputs.

Bit	Value/Description
Bit 0 DI1	It indicates the status of Digital Input DI1. **0 = Inactive**: It indicates that Digital Input DI1 is inactive **1 = Active**: It indicates that Digital Input DI1 is active
Bit 1 DI2	It indicates the status of Digital Input DI2. **0 = Inactive**: It indicates that Digital Input DI2 is inactive **1 = Active**: It indicates that Digital Input DI2 is active
Bit 2 DI3	It indicates the status of Digital Input DI3. **0 = Inactive**: It indicates that Digital Input DI3 is inactive **1 = Active**: It indicates that Digital Input DI3 is active
Bit 3 DI4	It indicates the status of Digital Input DI4. **0 = Inactive**: It indicates that Digital Input DI4 is inactive **1 = Active**: It indicates that Digital Input DI4 is active
Bit 4 DI5	It indicates the status of Digital Input DI5. **0 = Inactive**: It indicates that Digital Input DI5 is inactive **1 = Active**: It indicates that Digital Input DI5 is active
Bit 5 DI6	It indicates the status of Digital Input DI6. **0 = Inactive**: It indicates that Digital Input DI6 is inactive **1 = Active**: It indicates that Digital Input DI6 is active
Bit 6 DI7	It indicates the status of Digital Input DI7. **0 = Inactive**: It indicates that Digital Input DI7 is inactive **1 = Active**: It indicates that Digital Input DI7 is active
Bit 7 DI8	It indicates the status of Digital Input DI8. **0 = Inactive**: It indicates that Digital Input DI8 is inactive **1 = Active**: It indicates that Digital Input DI8 is active

S3.2.4 Digital outputs to S3.8.4 Digital outputs

It allows viewing the value of the digital outputs of the accessory connected to the slot.

S3.2.4 Digital outputs S3.3.4 Digital outputs S3.4.4 Digital outputs S3.5.4 Digital outputs S3.6.4 Digital outputs S3.7.4 Digital outputs S3.8.4 Digital outputs	
.1 DO	0 ... 7 Bit
.2 DO network	0 ... 7 Bit
.3 DO SoftPLC	0 ... 7 Bit

.1 DO It indicates the status of digital outputs.

.2 DO network It indicates the Network command status to the digital outputs.

.3 DO SoftPLC It indicates the SoftPLC command status to the digital outputs.

Bit	Value/Description
Bit 0 DO1	It indicates the status of Digital Output DO1. **0 = Inactive**: It indicates that Digital Output DO1 is inactive **1 = Active**: It indicates that Digital Output DO1 is active
Bit 1 DO2	It indicates the status of Digital Output DO2. **0 = Inactive**: It indicates that Digital Output DO2 is inactive **1 = Active**: It indicates that Digital Output DO2 is active
Bit 2 DO3	It indicates the status of Digital Output DO3. **0 = Inactive**: It indicates that Digital Output DO3 is inactive **1 = Active**: It indicates that Digital Output DO3 is active
Bit 3 DO4	It indicates the status of Digital Output DO4. **0 = Inactive**: It indicates that Digital Output DO4 is inactive **1 = Active**: It indicates that Digital Output DO4 is active
Bit 4 DO5	It indicates the status of Digital Output DO5. **0 = Inactive**: It indicates that Digital Output DO5 is inactive **1 = Active**: It indicates that Digital Output DO5 is active
Bit 5 DO6	It indicates the status of Digital Output DO6. **0 = Inactive**: It indicates that Digital Output DO6 is inactive **1 = Active**: It indicates that Digital Output DO6 is active
Bit 6 DO7	It indicates the status of Digital Output DO7. **0 = Inactive**: It indicates that Digital Output DO7 is inactive **1 = Active**: It indicates that Digital Output DO7 is active
Bit 7 DO8	It indicates the status of Digital Output DO8. **0 = Inactive**: It indicates that Digital Output DO8 is inactive **1 = Active**: It indicates that Digital Output DO8 is active

S3.2.5 Encoder to S3.8.5 Encoder

It allows viewing the actual status of the encoder signal measurements carried out by the accessory.

S3.2.5 Encoder **S3.3.5 Encoder** **S3.4.5 Encoder** **S3.5.5 Encoder** **S3.6.5 Encoder** **S3.7.5 Encoder** **S3.8.5 Encoder**	
.1 Number of revolutions	0 ... 65535
.2 Revolution fraction	0 ... 65535
.3 Speed	-60000 ... 60000 rpm
.4 Search zero	0 ... 1

.1 Number of revolutions Number of complete revolutions measured by the encoder.

This parameter is reset to 0 during power up. When the zero search is completed this parameter is reset.

It increases when one complete revolution is measured in the forward direction and decreases when one complete revolution is measured in the reverse direction.

For example, for a 1024-pulse encoder (set in C5.2.5.1) that has rotated 3.5 revolutions in the forward direction (3584 pulses), this parameter will indicate 3 revolutions. If the encoder shaft rotates 0.75 revolution in the reverse direction, totaling 2.75 revolutions (2816 pulses), the parameter will indicate 2 revolutions.

.2 Revolution fraction Value proportional (from 0 to 65535) to the fraction of a revolution (incomplete revolution) measured by the encoder.

This parameter is reset to 0 during power up. When the zero search is completed this parameter is reset.

It increases when pulses are measured in the forward direction and decreases when pulses are measured in the reverse direction.

For example, for a 1024-pulse encoder that has rotated 3.5 revolutions in the forward direction (3584 pulses), this parameter will indicate 32768 (0.5 revolutions). If the encoder shaft rotates 0.75 revolutions in the reverse direction, totaling 2.75 revolutions (2816 pulses) the parameter will indicate 49152 (0.75 revolutions).

.3 Speed It indicates the speed, in rpm, measured by the encoder.

The speed indicated in this parameter is calculated by counting the encoder pulses occurred in a time frame of 1 ms. This parameter is updated every 1 ms.

Positive values indicate forward rotation, and negative values indicate reverse rotation.

The value of this parameter is presented without filters.

.4 Search zero It indicates whether the zero search function of the encoder has completed.

Indication	Description
0 = Inactive	It indicates that the search zero function has not been started or is in progress
1 = Completed	It indicates that the zero search function is complete

S3.2.6 Temperatures to S3.8.6 Temperatures

It allows viewing the temperature of the sensors connected to the slot accessory in °C.

S3.2.6 Temperatures S3.3.6 Temperatures S3.4.6 Temperatures S3.5.6 Temperatures S3.6.6 Temperatures S3.7.6 Temperatures S3.8.6 Temperatures	
.1 Sensor 1	-100.0 ... 250.0 °C
to	
.6 Sensor 6	-100.0 ... 250.0 °C

.1 Sensor 1, .2 Sensor 2, .3 Sensor 3, .4 Sensor 4, .5 Sensor 5, .6 Sensor 6 It indicates the temperature at the Slot sensor (°C).

S3.9 Control board

Allows you to view the status of the digital inputs and outputs used by the inverter control.

S3.9.1 Analog outputs

It allows viewing the value of the analog outputs of the accessory connected to the slot.

The data source for each output is independently configured through specific parameters described in C5.1.2. The status indication may have percentage values relative to the full scale values. Such values depend on the function selected for the analog output and are also described in detail in item C5.1.2.

S3.9.1 Analog outputs	
.1 Value of AO1 from the control board	-100.00 ... 100.00 %
to	
.4 Value of AO4 from the control board	-100.00 ... 100.00 %

.1 Value of AO1 from the control board to **.4 Value of AO4 from the control board** It indicates the value of the respective analog output of the control board.

S3.9.2 Digital inputs

It allows viewing the value of the digital inputs of the accessory connected to the slot.

S3.9.2 Digital inputs	
.1 Control board DI	0 ... 15 Bit

.1 Control board DI Digital inputs located on the PIC board.

Bit	Value/Description
Bit 0 DI16 State of doors	**0 = Inactive**: Not mechanically locked **1 = Active**: Mechanically locked
Bit 1 DI15	**0 = Inactive** **1 = Active**
Bit 2 DI14 Exhaust	**0 = Inactive** **1 = Active**
Bit 3 DI13 General enable	**0 = Inactive**: Enable signal OFF **1 = Active**: Enable signal ON
Bit 4 DI12 Transformer fault	**0 = Inactive**: Inactive fault **1 = Active**: Active fault
Bit 5 DI11 Transformer alarm	**0 = Inactive**: Alarm inactive **1 = Active**: Alarm active
Bit 6 DI10 Cooling system supply fault	**0 = Inactive**: Alarm inactive **1 = Active**: Alarm active
Bit 7 DI9	**0 = Inactive** **1 = Active**
Bit 8 DI8	**0 = Inactive** **1 = Active**
Bit 9 DI7 Pre-charge power supply	**0 = Inactive**: Precharge power failure **1 = Active**: Precharge supply OK
Bit 10 DI6 RL8 Function	**0 = Inactive**: Signal inactive **1 = Active**: Signal inactive
Bit 11 DI5 Input protection	**0 = Inactive**: Active protection **1 = Active**: Normal operation
Bit 12 DI4 Circuit breaker OFF	**0 = Inactive**: Input circuit breaker ON **1 = Active**: Input circuit breaker OFF
Bit 13 DI3 Circuit breaker ON	**0 = Inactive**: Input circuit breaker OFF **1 = Active**: Input circuit breaker ON
Bit 14 DI2 Circuit breaker ready	**0 = Inactive**: Input circuit breaker is not ready **1 = Active**: Input circuit breaker ready
Bit 15 DI1 Power ON	**0 = Inactive**: Power ON signal off **1 = Active**: Power ON signal on

S3.9.3 Digital outputs

It allows viewing the value of the digital outputs of the accessory connected to the slot.

S3.9.3 Digital outputs	
.1 Control board DO	0 ... 7 Bit

.1 Control board DO Digital outputs located on the PIC board.

Bit	Value/Description
Bit 0 RL8	**0 = Inactive**: Ventilation off **1 = Active**: Inverter ventilation on
Bit 1 RL7 Inverter ventilation	**0 = Inactive**: Inverter ventilation off **1 = Active**:
Bit 2 RL6 Circuit break	**0 = Inactive**: Input circuit breaker open **1 = Active**: Input circuit breaker closed
Bit 3 RL5 2nd stage pre-charge	**0 = Inactive**: Second stage of precharge turned off **1 = Active**: Second stage of precharge on
Bit 4 RL4 Turns off input circuit breaker	**0 = Inactive**: Input circuit breaker opening command off **1 = Active**: Input circuit breaker opening command on
Bit 5 RL3 Closes input circuit breaker	**0 = Inactive**: Input circuit breaker closing command off **1 = Active**: Input circuit breaker closing command on
Bit 6 RL2 1st stage pre-charge	**0 = Inactive**: First stage of precharge turned off **1 = Active**: First stage of precharge on
Bit 7 RL1 Inverter Ready	**0 = Inactive**: Inverter not ready to drive motor **1 = Active**: Inverter is ready to drive the motor

S3.9.4 Encoder

It allows viewing the actual status of the encoder signal measurements carried out by the accessory.

S3.9.4 Encoder	
.1 Number of revolutions	0 ... 65535
.2 Revolution fraction	0 ... 65535
.3 Search zero	0 ... 1
.4 Speed	-60000 ... 60000 rpm

.1 Number of revolutions Number of whole turns measured by the encoder.

This parameter is initialized to 0 during power-up. When the zero search is complete this parameter is reset to zero.

It increases when a full turn is measured in the forward direction, and decreases when a full turn is measured in the reverse direction.

For example, for a 1024-pulse encoder (configured in C5.11.4.1), which rotated 3.5 turns in the forward direction (3584 pulses), this parameter will indicate 3 turns. If the encoder shaft rotated 0.75 turns in the reverse direction, totaling 2.75 turns (2816 pulses), the parameter will indicate 2 turns.

.2 Revolution fraction Value proportional (from 0 to 65535) to the fraction of a revolution (incomplete revolution) measured by the encoder.

This parameter is reset to 0 during power up. When the zero search is completed this parameter is reset.

It increases when pulses are measured in the forward direction and decreases when pulses are measured in the reverse direction.

For example, for a 1024-pulse encoder that has rotated 3.5 revolutions in the forward direction (3584 pulses), this parameter will indicate 32768 (0.5 revolutions). If the encoder shaft rotates 0.75 revolutions in the reverse direction, totaling 2.75 revolutions (2816 pulses) the parameter will indicate 49152 (0.75 revolutions).

.3 Search zero It indicates whether the zero search function of the encoder has completed.

Indication	Description
0 = Inactive	It indicates that the search zero function has not been started or is in progress
1 = Completed	It indicates that the zero search function is complete

.4 Speed It indicates the speed, in rpm, measured by the encoder.

The speed indicated in this parameter is calculated by counting the encoder pulses occurred in a time frame of 1 ms. This parameter is updated every 1 ms.

Positive values indicate forward rotation, and negative values indicate reverse rotation.

The value of this parameter is presented without filters.

S5 COMMUNICATIONS

It allows viewing the parameters used for monitoring and controlling the MVW3000 inverter using communication interfaces.

S5.1 Status and commands

It allows viewing the MVW3000 logical status and commands.

S5.1 Status and commands	
.1 Status word 1	0 ... 15 Bit
.2 Speed	-200.00 ... 200.00 %
.3 Status word 2	0 ... 15 Bit
.4 Status word 3	0 ... 2 Bit

.1 Status word 1 It indicates the operating status of the inverter. Each bit represents a status.

Bit	Value/Description
Bit 0 Not used	Not used
Bit 1 Run Command	**0 = No**: no run command active **1 = Yes**: run command active
Bit 2 Local	**0 = No**: inverter in Remote command mode **1 = Yes**: inverter in Local command mode (via HMI)
Bit 3 Not used	Not used
Bit 4 No Quick Stop	**0 = No**: quick stop command active **1 = Yes**: no quick stop command active
Bit 5 2nd Ramp	**0 = No**: 1st Ramp acceleration and deceleration by C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration by C6.1.4 and C6.1.5
Bit 6 Config. Mode	**0 = No**: inverter in normal operation **1 = Yes**: inverter in configuration status. It indicates a special condition in which the inverter cannot be enabled
Bit 7 Alarm	**0 = No**: without alarm **1 = Yes**: with alarm active
Bit 8 Running	**0 = No**: motor is stopped **1 = Yes**: motor is running according to reference and command
Bit 9 Enabled	**0 = No**: inverter is general disabled **1 = Yes**: inverter is general enabled
Bit 10 Reverse	**0 = No**: motor running in the forward direction **1 = Yes**: motor running in the reverse direction
Bit 11 JOG	**0 = No**: no JOG command active **1 = Yes**: JOG command is active
Bit 12 Remote 2	**0 = No**: inverter in Remote 1 command mode **1 = Yes**: inverter in Remote 2 command mode
Bit 13 Not used	Not used
Bit 14 Not used	Not used
Bit 15 Fault	**0 = No**: normal operation **1 = Yes**: fault acting

.2 Speed It indicates the actual speed of the motor driven by the inverter in percentage of the maximum speed.

- S5.1.2 = 0.00 % ⇒ motor speed = 0 rpm

- S5.1.2 = 100.00 % ⇒ motor speed = C4.3.1.1.2

Intermediate or higher speed values can be obtained by using this scale. For example, if the value read is 25.0 %, considering C4.3.1.1.2 = 1800 rpm, to obtain the value in rpm you must calculate:

100.00 % : 1800 rpm
25.00 % : Speed

$$\text{Speed} = \frac{25.00 \times 1800}{100.00}$$

Speed = 450 rpm

Negative values indicate motor rotating in the reverse direction of rotation.

.3 Status word 2 It indicates other status of the inverter functions. Each bit represents a status.

Bit	Value/Description
Bit 0 Self-tuning	**0 = No**: inverter is not running the Self-tuning routine **1 = Yes**: inverter is running the Self-tuning routine for estimating motor parameters
Bit 1 Field Weakening	**0 = No**: Control is not in the field weakening region **1 = Yes**: Control is in the field weakening region
Bit 2 Pre-Charge OK	**0 = No**: pre-charge of the DC link capacitors not completed **1 = Yes**: pre-charge of the DC link capacitors completed
Bit 3 Not used	Not used
Bit 4 Zero Speed	**0 = No**: Sleep mode inactive **1 = Yes**: Sleep mode active
Bit 5 Decel. Ramp	**0 = No**: no deceleration **1 = Yes**: inverter decelerating
Bit 6 Acc. Ramp	**0 = No**: no acceleration **1 = Yes**: inverter accelerating
Bit 7 Freeze Ramp	**0 = No**: ramp in normal operation **1 = Yes**: the path of the ramp is frozen by some command source or internal function
Bit 8 Setpoint OK	**0 = No**: motor speed has not reached the reference yet **1 = Yes**: motor speed has reached the reference
Bit 9 DC Voltage Limitation	**0 = No**: DC link limitation or current limitation inactive **1 = Yes**: DC link limitation or current limitation active
Bit 10 Current Limitation	**0 = No**: current limitation inactive **1 = Yes**: current limitation active
Bit 11 Torque Limitation	**0 = No**: torque limitation inactive **1 = Yes**: torque limitation active
Bit 12 Ride-Through	**0 = No**: Ride-through not running **1 = Yes**: running Ride-through
Bit 13 Flying Start	**0 = No**: Flying start not running **1 = Yes**: running Flying start
Bit 14 DC Braking	**0 = No**: DC breaking inactive **1 = Yes**: DC breaking active
Bit 15 PWM pulses	**0 = No**: PWM voltage pulses at the output disabled **1 = Yes**: PWM voltage pulses at the output enabled

.4 Status word 3 Indicates other states of the inverter functions. Each bit represents a state.

Bit	Value/Description
Bit 0 SD Card	SD card is only detected during the inverter initialization, so the inverter will not detect SD card disconnection during operation. **0 = No**: SD card not connected **1 = Yes**: SD card connected
Bit 1 Not used	Not used
Bit 2 Param. Storage	Indicates the status of the storage memory for user parameter setting. When the memory reaches its maximum capacity, new parameter changes may not be retained after the inverter is restarted. The next time the product is powered on, a message will be displayed on the HMI, and memory space will be freed up to allow new parameter settings. The inverter operation is not affected when storage space is exhausted. **0 = Free**: There is space available in the memory to store user parameters **1 = Limit**: The memory for storing user parameters has reached its maximum capacity

S5.2 Serial RS485

It allows viewing the status of the RS485 serial interface and the commands received by this interface.

S5.2 Serial RS485	
.1 Interface status	0 ... 2
.2 Control word	0 ... 7 Bit
.3 Speed reference	-200.00 ... 200.00 %
.5 Received telegrams	0 ... 65535
.6 Transmitted telegrams	0 ... 65535
.7 Telegrams with error	0 ... 65535
.8 Reception errors	0 ... 65535

.1 Interface status It indicates the status of the RS485 serial interface.

Indication	Description
0 = Inactive	Not used
1 = Active	Serial interface active
2 = Timeout Error	It indicates that the MVW3000 did not receive valid telegrams for a time longer than the limit set

.2 Control word It indicates the status of the control word via RS-485 serial interface. This parameter can only be changed via RS485 serial interface. For other sources, only read access is allowed.

For the commands written in this parameter to be executed, the inverter must be programmed to be commanded via Serial. This programming is done through menu C4.

Each bit of this word represents a command that can be executed on the inverter.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: it stops the motor by deceleration ramp **1 = Yes**: the motor turns according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: it disables the inverter completely, interrupting the motor power supply **1 = Yes**: it enables the inverter completely, allowing the operation of the motor
Bit 2 Run Reverse	**0 = No**: turn the motor in the direction of the reference signal (forward direction) **1 = Yes**: run the motor in the opposite direction of the reference signal (reverse direction)
Bit 3 Enable JOG	**0 = No**: it disables the JOG function **1 = Yes**: it enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: it selects the Remote 1 command mode **1 = R2**: it selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1st Ramp acceleration and deceleration according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: it enables quick stop **1 = Yes**: it disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if a fault is active, it resets the fault

.3 Speed reference It indicates the speed reference sent via RS-485 Serial interface to the motor driven by the inverter in percentage of the maximum speed. This parameter can only be changed via RS485 serial interface. For other sources, only read access is allowed.

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via Serial. This programming is done through menu C4.

- S5.2.3 = 0.00 % ⇒ speed reference = 0 rpm
- S5.2.3 = 100.00 % ⇒ speed reference = C4.3.1.1.2

Intermediate or higher speed values can be obtained by using this scale. For example, if the desired value for the reference is 900 rpm, considering C4.3.1.1.2 = 1800 rpm, it should be calculated:

100.00 % : 1800 rpm
Reference % : 900 rpm

$$\text{Reference \%} = \frac{900 \times 100.00}{1800}$$

Reference % = 50 %

Negative values can be used to reverse the direction of rotation of the motor. The direction of rotation of the motor, however, also depends on the value of the rotation direction command bit in S1.6.1:

- Bit Rotation Direction = 1 and S5.2.3 > 0: reference for the forward direction
- Bit Rotation Direction = 1 and S5.2.3 < 0: reference for the reverse direction
- Bit Rotation Direction = 0 and S5.2.3 > 0: reference for the reverse direction
- Bit Rotation Direction = 0 and S5.2.3 < 0: reference for the forward direction

.5 Received telegrams It indicates the number of telegrams received.

.6 Transmitted telegrams It indicates the number of telegrams transmitted.

.7 Telegrams with error It indicates the number of telegrams received with errors (CRC, Checksum).

.8 Reception errors It indicates the number of bytes received with errors.

The counters are cyclic, that is, when it reaches 65535, it returns to 0.

NOTE!
These counters start at 0 whenever the product is powered on. They also return to 0 whenever the maximum limit of the parameter is reached.

S5.3 Ethernet

It allows viewing the status of the Ethernet network interface and the commands received by this interface.

S5.3 Ethernet	
.1 Interface status	0 ... 1 Bit
.2 Control word	0 ... 7 Bit
.3 Speed reference	-200.00 ... 200.00 %
.5 Actual IP address	0.0.0.0 ... 255.255.255.255
.6 MQTT status	0 ... 2
.7 Last public. MQTT	YYYY-MM-DD HH:MM:SS
.8 SNTP - Status	0 ... 2
.9 SNTP - Last update	YYYY-MM-DD HH:MM:SS
.10 SymbiNet: Groups status	0 ... 7 Bit

.1 Interface status It indicates the status of the Ethernet network interface. Each bit represents a state.

Bit	Value/Description
Bit 0 Link 1	**0 = No**: Link active at port 1 **1 = Yes**: Link active at port 1
Bit 1 Link 2	**0 = No**: No link at port 2 **1 = Yes**: Link active at port 2

.2 Control word It indicates the status of the control word via Ethernet network interface. This parameter can only be changed via Ethernet network interface. For other sources, only read access is allowed.

For the commands written in this parameter to be executed, the inverter must be programmed to be commanded via Ethernet. This programming is done through menu C4.

Each bit of this word represents a command that can be executed on the inverter.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: it stops the motor by deceleration ramp **1 = Yes**: the motor turns according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: it disables the inverter completely, interrupting the motor power supply **1 = Yes**: it enables the inverter completely, allowing the operation of the motor
Bit 2 Run Reverse	**0 = No**: turn the motor in the direction of the reference signal (forward direction) **1 = Yes**: run the motor in the opposite direction of the reference signal (reverse direction)
Bit 3 Enable JOG	**0 = No**: it disables the JOG function **1 = Yes**: it enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: it selects the Remote 1 command mode **1 = R2**: it selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1st Ramp acceleration and deceleration according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: it enables quick stop **1 = Yes**: it disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if a fault is active, it resets the fault

.3 Speed reference It indicates the speed reference sent via Ethernet network interface to the motor driven by the inverter in percentage of the maximum speed. This parameter can only be changed via Ethernet network interface. For other sources, only read access is allowed.

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via Ethernet. This programming is done through menu C4.

- S5.3.3 = 0.00 % ⇒ speed reference = 0 rpm
- S5.3.3 = 100.00 % ⇒ speed reference = C4.3.1.1.2

Intermediate or higher speed values can be obtained by using this scale. For example, if the desired value for the reference is 900 rpm, considering C4.3.1.1.2 = 1800 rpm, it should be calculated:

100.00 % : 1800 rpm
Reference % : 900 rpm

$$\text{Reference \%} = \frac{900 \times 100.00}{1800}$$

Reference % = 50 %

Negative values can be used to reverse the direction of rotation of the motor. The direction of rotation of the motor, however, also depends on the value of the rotation direction command bit in S5.3.2 or S1.6.1:

- Bit Rotation Direction = 0 and S5.3.3 > 0: reference for the forward direction
- Bit Rotation Direction = 0 and S5.3.3 < 0: reference for the reverse direction
- Bit Rotation Direction = 1 and S5.3.3 > 0: reference for the reverse direction
- Bit Rotation Direction = 1 and S5.3.3 < 0: reference for the forward direction

.5 Actual IP address It allows viewing the IP address in use by the device.

.6 MQTT status It indicates the status of the MQTT communication, regarding settings and the sending of data to the server.

Indication	Description
0 = Inactive	It indicates that the Embedded Drive Scan function is not set; it is disabled
1 = No Connection	It indicates that the Embedded Drive Scan function has been set and is enabled, but there is currently no active connection to the configured Broker
2 = Connected	It indicates that the Embedded Drive Scan function has been set up and is enabled, and has an active connection to the configured Broker

.7 Last public. MQTT It indicates the date and time of the last successful sending of collected data to the MQTT communication.

.8 SNTP - Status It indicates the status of the NTP server, regarding configuration and receiving data from the server.

Indication	Description
0 = Inactive	It indicates that the NTP server is not configured; it is disabled
1 = No Connection	It indicates that the NTP server has been set up and is enabled, but currently has no active connection
2 = Connected	It indicates that the NTP server has been set up and is enabled, and has active connection

.9 SNTP - Last update It indicates the date and time of the last NTP server update.

.10 SymbiNet: Groups status Indicates the communication status for the groups programmed for SymbiNet communication. Each bit represents the state of one group, where bit 0 indicates the state of group 1, and bit 7 indicates the state of group 8.

Bit	Value/Description
Bit 0 Group 1 Status	**0 = Inactive**: Indicates the group for SymbiNet communication is inactive (no data received within the programmed period), or the group is not programmed **1 = Active**: Indicates the group for SymbiNet communication is active, meaning the group data has been received and is update
Bit 1 Group 2 Status	**0 = Inactive**: Indicates the group for SymbiNet communication is inactive (no data received within the programmed period), or the group is not programmed **1 = Active**: Indicates the group for SymbiNet communication is active, meaning the group data has been received and is update
Bit 2 Group 3 Status	**0 = Inactive**: Indicates the group for SymbiNet communication is inactive (no data received within the programmed period), or the group is not programmed **1 = Active**: Indicates the group for SymbiNet communication is active, meaning the group data has been received and is update
Bit 3 Group 4 Status	**0 = Inactive**: Indicates the group for SymbiNet communication is inactive (no data received within the programmed period), or the group is not programmed **1 = Active**: Indicates the group for SymbiNet communication is active, meaning the group data has been received and is update
Bit 4 Group 5 Status	**0 = Inactive**: Indicates the group for SymbiNet communication is inactive (no data received within the programmed period), or the group is not programmed **1 = Active**: Indicates the group for SymbiNet communication is active, meaning the group data has been received and is update
Bit 5 Group 6 Status	**0 = Inactive**: Indicates the group for SymbiNet communication is inactive (no data received within the programmed period), or the group is not programmed **1 = Active**: Indicates the group for SymbiNet communication is active, meaning the group data has been received and is update
Bit 6 Group 7 Status	**0 = Inactive**: Indicates the group for SymbiNet communication is inactive (no data received within the programmed period), or the group is not programmed **1 = Active**: Indicates the group for SymbiNet communication is active, meaning the group data has been received and is update
Bit 7 Group 8 Status	**0 = Inactive**: Indicates the group for SymbiNet communication is inactive (no data received within the programmed period), or the group is not programmed **1 = Active**: Indicates the group for SymbiNet communication is active, meaning the group data has been received and is update

S5.4 EtherNet/IP

It allows viewing information about the EtherNet/IP protocol.

S5.4 EtherNet/IP	
.1 EIP master status	0 ... 1
.2 Communication status	0 ... 4
.3 DLR topology	0 ... 1
.4 DLR status	0 ... 2

.1 EIP master status It indicates the status of the EtherNet/IP network master. It may be in operation mode (Run) or in configuration mode (Idle).

Indication	Description
0 = Run	Reading and writing telegrams are processed and updated normally by the master
1 = Idle	Only reading telegrams from the slaves are updated by the master. Writing, in this case, is disabled

.2 Communication status It indicates the status of the Ethernet/IP network interface.

Indication	Description
0 = Inactive	Not used
1 = No Connection	It indicates that the EtherNet/IP network interface has been initialized, but is not communicating with the network master
2 = Connected	It indicates that communication with the network master has been established, and I/O data is being successfully communicated
3 = I/O Connection Timeout	I/O type connection has expired
4 = Duplicate IP	Not used

.3 DLR topology Indicates the network topology.

Indication	Description
0 = Linear	Indicates linear topology
1 = Ring	Indicates ring topology

.4 DLR status Indicates the status of the network.

Indication	Description
0 = Idle State	Ring Node is in Idle state
1 = Normal State	Ring Node is in Normal state
2 = Fault State	Ring Node is in Fault state

S5.5 Modbus TCP

It allows viewing information about the Modbus TCP protocol.

S5.5 Modbus TCP	
.1 Communication status	0 ... 3
.2 Received telegrams	0 ... 65535
.3 Transmitted telegrams	0 ... 65535
.4 Active connections	0 ... 8

.1 Communication status It allows to identify the communication status with Modbus TCP server.

Indication	Description
0 = Inactive	Not used
1 = No Connection	Communication enabled, but no Modbus TCP connection active
2 = Connected	At least one active Modbus TCP connection
3 = Timeout Error	The equipment detected timeout in the Modbus TCP communication

.2 Received telegrams It indicates the number of telegrams received by the device as a server in the Modbus TCP network.

.3 Transmitted telegrams It indicates the number of telegrams sent by the device as a server in the Modbus TCP network.

NOTE!
These counters start at 0 whenever the product is powered on. They also return to 0 whenever the maximum limit of the parameter is reached.

.4 Active connections It indicates the number of Modbus TCP connections active in the product.

S5.6 Anybus

It allows viewing the status of the Anybus interface, the accessory model and the commands sent to the MVW3000.

S5.6 Anybus	
.1 Identification	0 ... 5
.2 Communication status	0 ... 4
.3 Control word	0 ... 7 Bit
.4 Speed reference	-200.00 ... 200.00 %

.1 Identification It identifies the model of the Anybus communication accessory connected to the MVW3000.

Indication	Description
0 = Inactive	No Anybus communication accessory installed
1 = PROFIBUS DP-V1	PROFIBUS DP accessory installed
2 = EtherCAT	EtherCAT accessory installed
3 = PROFINET IRT	PROFINET IRT active accessory installed

Indication	Description
4 ... 5 = Not used	Not used

.2 Communication status It informs the status of the communication accessory.

Indication	Description
0 = Inactive	No Anybus communication accessory detected
1 = Not Supported	Anybus accessory detected is not supported by the MVW3000 inverter
2 = Access Error	Problem detected in data access between the inverter and the Anybus communication accessory
3 = Offline	Anybus accessory reporting problems. There is no cyclical data exchange with the master
4 = Online	Normal Anybus accessory communication. Effective cyclic and acyclic data exchange between the MVW3000 and the network master

.3 Control word It indicates the status of the control word via Anybus. This parameter can only be changed via Anybus. For other sources, only read access is allowed.

For the commands written in this parameter to be executed, the inverter must be programmed to be commanded via Anybus. This programming is done through the menu C4.

Each bit of this word represents a command that can be executed on the inverter.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: it stops the motor by deceleration ramp **1 = Yes**: the motor turns according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: it disables the inverter completely, interrupting the motor power supply **1 = Yes**: it enables the inverter completely, allowing the operation of the motor
Bit 2 Run Reverse	**0 = No**: turn the motor in the direction of the reference signal (forward direction) **1 = Yes**: run the motor in the opposite direction of the reference signal (reverse direction)
Bit 3 Enable JOG	**0 = No**: it disables the JOG function **1 = Yes**: it enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: it selects the Remote 1 command mode **1 = R2**: it selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1st Ramp acceleration and deceleration according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: it enables quick stop **1 = Yes**: it disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if a fault is active, it resets the fault

.4 Speed reference It indicates the speed reference sent via Anybus interface to the motor driven by the inverter in percentage of the maximum speed. This parameter can only be changed via Anybus interface. For other sources, only read access is allowed.

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via Anybus. This programming is done through the menu C4.

- S5.6.4 = 0,00 % $\rightarrow$ speed reference = 0 rpm
- S5.6.4 = 100,00 % $\rightarrow$ speed reference = C4.3.1.1.2

Intermediate or higher speed values can be obtained using this scale. For example, if the desired value for the reference is 900 rpm, considering C4.3.1.1.2 = 1800 rpm, the following should be calculated:

100.00 % $\Rightarrow$ 1800 rpm
Reference % $\Rightarrow$ 900 rpm

$$\text{Reference \%} = \frac{900 \times 100.00}{1800}$$

Reference % = 50 %

Negative values can be used to reverse the direction of motor rotation. The direction of motor rotation, however, also depends on the value of the direction of rotation command bit in S1.6.1:

- Rotation Direction Bit = 1 and S5.6.4 > 0: reference to the forward direction
- Rotation Direction Bit = 1 and S5.6.4 < 0: reference for reverse direction
- Rotation Direction Bit = 0 and S5.6.4 > 0: reference for reverse direction
- Rotation Direction Bit = 0 and S5.6.4 < 0: reference for the direct direction

S5.7 CAN/CANopen/DNet

Status of the CAN communication accessory and the protocols that use this interface.

S5.7 CAN/CANopen/DNet	
.1 CAN controller status	0 ... 6
.2 Control word	0 ... 7 Bit
.3 Speed reference	-200.00 ... 200.00 %
.5 Received telegrams	0 ... 65535
.6 Transmitted telegrams	0 ... 65535
.7 Bus off Counter	0 ... 65535
.8 Lost messages	0 ... 65535
.9 CANopen comm. status	0 ... 5
.10 CANopen node status	0 ... 4
.11 DNet network status	0 ... 5
.12 DNet master status	0 ... 1

.1 CAN controller status It allows identifying whether the CAN interface is properly installed, and whether the communication presents errors.

Indication	Description
0 = Inactive	CAN interface inactive. It occurs when the equipment does not have a CAN protocol programmed in C9.8.1
1 = Auto-Baud	Running function for automatic baud rate detection (only for DeviceNet protocol)
2 = CAN Active	CAN interface active and without error
3 = Warning	CAN controller has reached the warning status
4 = Error Passive	CAN controller has reached error passive status
5 = Bus Off	CAN controller has reached bus off status
6 = No Bus Power	The CAN interface has no power supply between pins 1 and 5 of the connector

.2 Control word It indicates the status of the control word via CAN interface. This parameter can only be changed via CAN interface. For other sources, only read access is allowed.

For the commands written in this parameter to be executed, the inverter must be programmed to be commanded via CAN/CO/DN. This programming is done through menu C4.

Each bit of this word represents a command that can be executed on the inverter.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: it stops the motor by deceleration ramp **1 = Yes**: the motor turns according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: it disables the inverter completely, interrupting the motor power supply **1 = Yes**: it enables the inverter completely, allowing the operation of the motor
Bit 2 Run Reverse	**0 = No**: turn the motor in the direction of the reference signal (forward direction) **1 = Yes**: run the motor in the opposite direction of the reference signal (reverse direction)
Bit 3 Enable JOG	**0 = No**: it disables the JOG function **1 = Yes**: it enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: it selects the Remote 1 command mode **1 = R2**: it selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1st Ramp acceleration and deceleration according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: it enables quick stop **1 = Yes**: it disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if a fault is active, it resets the fault

.3 Speed reference It indicates the speed reference sent via CAN interface to the motor driven by the inverter in percentage of the maximum speed. This parameter can only be changed via CAN interface. For other sources, only read access is allowed.

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via CAN/CO/DNET. This programming is done through menu C4.

- S5.7.3 = 0.00 % $\Rightarrow$ speed reference = 0 rpm
- S5.7.3 = 100.00 % $\Rightarrow$ speed reference = C4.3.1.1.2

Intermediate or higher speed values can be obtained by using this scale. For example, if the desired value for the reference is 900 rpm, considering C4.3.1.1.2 = 1800 rpm, it should be calculated:

100.00 % : 1800 rpm
Reference % : 900 rpm

$$\text{Reference \%} = \frac{900 \times 100.00}{1800}$$

Reference % = 50 %

Negative values can be used to reverse the direction of rotation of the motor. The direction of rotation of the motor, however, also depends on the value of the rotation direction command bit in S1.6.1:

- Bit Rotation Direction = 1 and S5.7.3 > 0: reference for the forward direction
- Bit Rotation Direction = 1 and S5.7.3 < 0: reference for the reverse direction
- Bit Rotation Direction = 0 and S5.7.3 > 0: reference for the reverse direction
- Bit Rotation Direction = 0 and S5.7.3 < 0: reference for the forward direction

.5 Received telegrams This parameter works as a cyclic counter that is incremented every time a CAN telegram is received. It provides feedback to the operator if the device is able to communicate with the network.

.6 Transmitted telegrams This parameter works as a cyclic counter that is incremented every time a CAN telegram is transmitted. It provides feedback to the operator if the device is able to communicate with the network.

.7 Bus off Counter Cyclic counter that indicates the number of times the equipment went into the bus off state on the CAN network.

.8 Lost messages It is a cyclic counter that indicates the number of messages the CAN interface received but could not be processed. In case the number of lost messages frequently increases, it is recommended to reduce the baud rate used in the CAN network.

> **NOTE!**
> These counters are reset to zero whenever the equipment is turned off, reset or reach the maximum limit set in the parameter.

.9 CANopen comm. status It indicates the status of the CAN accessory in relation to the CANopen network, informing if the protocol has been enabled and if the error control service is active (*Node Guarding* or *Heartbeat*).

Indication	Description
0 = Inactive	CANopen protocol disabled
1 = Not used	
2 = Comm. Enabled	Communication enabled
3 = Error Ctrl. Enab.	Communication enabled and error control enabled (Node Guarding/Heartbeat)
4 = Guarding Error	Node Guarding error occurred
5 = Heartbeat Error	Heartbeat error occurred

.10 CANopen node status Each slave in the CANopen network has a state machine that controls its behavior in relation to communication. This parameter indicates which state the device is in, according to the protocol specification.

Indication	Description
0 = Inactive	CANopen protocol disabled
1 = Initialization	Communication with the device is not possible during this stage, which is completed automatically
2 = Stopped	Only the NMT object is available
3 = Operational	All communication objects are available
4 = Pre-Operational	It is possible to communicate with the slave but the PDOs are not yet available for operation

.11 DNet network status It indicates the DeviceNet network status.

Indication	Description
0 = Offline	No power supply or not online. Communication cannot be established
1 = Online Not Connec.	Device online but not connected. Slave has successfully completed the MacID verification procedure. This means that the baud rate setting is correct (or correctly detected in case of using autobaud) and that there are no other nodes in the network with the same address. However, at this stage, there is still no communication with the master
2 = Online, Connected	Device operational and under normal conditions. Master allocated a set of I/O type connections with the slave. In this step, the data exchange takes place through I/O type connections
3 = Connection Timed Out	One or more I/O type connections timed out
4 = Link Failure	It indicates that the slave cannot enter the network due to address problems or due to bus off. Check if the address is not already being used by another device, if the baud rate selected is correct or if there are problems in the installation
5 = Auto-Baud	Equipment running routine of the autobaud mechanism

.12 DNet master status It indicates the status of the DeviceNet network master. It may be in “operation mode” (Run) or in “configuration mode” (Idle).

Indication	Description
0 = Run	Reading and writing telegrams are processed and updated normally by the master
1 = Idle	Only reading telegrams from the slaves are updated by the master. Writing, in this case, is disabled

> **NOTE!**
> When communication is disabled, this parameter does not represent the actual status of the master.

S6 SOFTPLC

The SoftPLC function provides the MVW3000 inverter with the functionalities of a PLC (Programmable Logic Controller), adding flexibility to the product and allowing the users to develop their own applications (user programs). See the WPS (WEG Programming Suite) manual for more details regarding the programming of the MVW3000 PLC functions, available at **www.weg.net**.

S6.1 Program execution

It allows viewing the status of the SoftPLC function status parameters.

S6.1 Program execution	
.1 Status	0 ... 4
.2 Time	0 ... 65535 ms

.1 Status It allows the user to view the SoftPLC status.

Indication	Description
0 = No Program	It indicates that there is no program saved in the SoftPLC memory area. User parameters will not be shown on the HMI
1 = Saving Program	It indicates that the program is being saved in the SoftPLC memory area
2 = Invalid Program	It indicates that the program is saved in the SoftPLC memory area and is not compatible with the firmware version (S1.2.1) of the MVW3000 In this case, the user must recompile the project in the WPS software considering the new firmware version of the MVW3000 and redo the “download”
3 = Program Stopped	It indicates that there is a valid program in the SoftPLC memory area, but it is not running, that is, it is stopped
4 = Program Running	It indicates that there is a valid program in the SoftPLC memory area and it is running

.2 Time It indicates the program runtime in milliseconds. The larger the program, the longer the runtime (scan) tends to be.

S6.2 Control and references

It allows viewing the control and reference parameter status of the SoftPLC function.

S6.2 Control and references	
.1 Control word	0 ... 7 Bit
.3 Speed reference	-200.00 ... 200.00 %

.1 Control word It indicates the status of the control word via the SoftPLC function. This parameter can only be changed via SoftPLC function. For other sources, only read access is allowed.

For the commands written in this parameter to be executed, the inverter must be programmed to be commanded via SoftPLC. This programming is done through menu C4.

Each bit of this word represents a command that can be executed on the inverter.

Bit	Value/Description
Bit 0 Enable Ramp	**0 = No**: it stops the motor by deceleration ramp **1 = Yes**: the motor turns according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: it disables the inverter completely, interrupting the motor power supply **1 = Yes**: it enables the inverter completely, allowing the operation of the motor
Bit 2 Run Reverse	**0 = No**: turn the motor in the direction of the reference signal (forward direction) **1 = Yes**: run the motor in the opposite direction of the reference signal (reverse direction)
Bit 3 Enable JOG	**0 = No**: it disables the JOG function **1 = Yes**: it enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: it selects the Remote 1 command mode **1 = R2**: it selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1st Ramp acceleration and deceleration according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: it enables quick stop **1 = Yes**: it disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if a fault is active, it resets the fault

.3 Speed reference It indicates the speed reference via SoftPLC function for the motor driven by the inverter in percentage of the maximum speed. This parameter can only be changed via SoftPLC function. For other sources, only read access is allowed.

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via SoftPLC. This programming is done through menu C4.

- S6.2.3 = 0.00 % ⇒ speed reference = 0 rpm
- S6.2.3 = 100.00 % ⇒ speed reference = C4.3.1.1.2

Intermediate or higher speed values can be obtained by using this scale. For example, if the desired value for the reference is 900 rpm, considering C4.3.1.1.2 = 1800 rpm, it should be calculated:

100.00 % : 1800 rpm
Reference % : 900 rpm

$$\text{Reference \%} = \frac{900 \times 100.00}{1800}$$

Reference % = 50 %

Negative values can be used to reverse the direction of rotation of the motor. The direction of rotation of the motor, however, also depends on the value of the rotation direction command bit in S1.6.1:

- Bit Rotation Direction = 1 and S6.2.3 > 0: reference for the forward direction
- Bit Rotation Direction = 1 and S6.2.3 < 0: reference for the reverse direction
- Bit Rotation Direction = 0 and S6.2.3 > 0: reference for the reverse direction
- Bit Rotation Direction = 0 and S6.2.3 < 0: reference for the forward direction

8 D DIAGNOSTICS

It allows viewing variables and events that can help diagnose problems or improve the MVW3000 operation.

D1 FAULTS

It allows viewing fault activation occurrences on the MVW3000.

D1.1 Current

It allows viewing the faults occurred on the MVW3000. If any fault is active, its number is displayed. If it is not active, 0 is displayed.

The faults act by disabling the motor. They are removed only with a reset or de-energizing command from the MVW3000 control.

The fault occurrences are placed in a row following the sequence of the cause that generated them. In this menu the activation of up to 5 faults can be indicated simultaneously. Whenever a fault acts, it enters the first empty position and so on. The reset command will only reset Fault 1.

Visually on the HMI, if only one fault is activated, it will be in the first position (Fault 1).

D1.1 Current	
.1 Fault 1	0 ... 4095
.2 Fault 2	0 ... 4095
.3 Fault 3	0 ... 4095
.4 Fault 4	0 ... 4095
.5 Fault 5	0 ... 4095

.1 Fault 1 First position of active fault indication.

.2 Fault 2 Second position of active fault indication.

.3 Fault 3 Third position of active fault indication.

.4 Fault 4 Fourth position of active fault indication.

.5 Fault 5 Fifth position of active fault indication.

D1.3 History

It indicates the code, date and time of the last 10 faults.

D1.3 History		
.1 Last fault	0 ... 9999	
.2 Date and time last fault	YYYY-MM-DD	HH:MM:SS
.3 Second fault	0 ... 9999	
.4 Date and time second fault	YYYY-MM-DD	HH:MM:SS
.5 Third fault	0 ... 9999	
.6 Date and time third fault	YYYY-MM-DD	HH:MM:SS
.7 Fourth fault	0 ... 9999	
.8 Date and time fourth fault	YYYY-MM-DD	HH:MM:SS
.9 Fifth fault	0 ... 9999	
.10 Date and time fifth fault	YYYY-MM-DD	HH:MM:SS
.11 Sixth fault	0 ... 9999	
.12 Date and time sixth fault	YYYY-MM-DD	HH:MM:SS
.13 Seventh fault	0 ... 9999	
.14 Date and time seventh fault	YYYY-MM-DD	HH:MM:SS
.15 Eighth fault	0 ... 9999	
.16 Date and time eighth fault	YYYY-MM-DD	HH:MM:SS
.17 Ninth fault	0 ... 9999	
.18 Date and time ninth fault	YYYY-MM-DD	HH:MM:SS
.19 Tenth fault	0 ... 9999	
.20 Date and time tenth fault	YYYY-MM-DD	HH:MM:SS

.1 Last fault It indicates the code of the last fault that happened.

.2 Date and time last fault It indicates the date and time of the last fault that happened.

.3 Second fault It indicates the code of the second fault that happened.

.4 Date and time second fault It indicates the date and time of the second fault that happened.

.5 Third fault It indicates the code of the third fault that happened.

.6 Date and time third fault It indicates the date and time of the third fault that happened.

.7 Fourth fault It indicates the code of the fourth fault that happened.

.8 Date and time fourth fault It indicates the date and time of the fourth fault that happened.

.9 Fifth fault It indicates the code of the fifth fault that happened.

.10 Date and time fifth fault It indicates the date and time of the fifth fault that happened.

.11 Sixth fault It indicates the code of the sixth fault that happened.

.12 Date and time sixth fault It indicates the date and time of the sixth fault that happened.

.13 Seventh fault It indicates the code of the seventh fault that happened.

.14 Date and time seventh fault It indicates the date and time of the seventh fault that happened.

.15 Eighth fault It indicates the code of the eighth fault that happened.

.16 Date and time eighth fault It indicates the date and time of the eighth fault that happened.

.17 Ninth fault It indicates the code of the ninth fault that happened.

.18 Date and time ninth fault It indicates the date and time of the ninth fault that happened.

.19 Tenth fault It indicates the code of the tenth fault that happened.

.20 Date and time tenth fault It indicates the date and time of the tenth fault that happened.

D2 ALARMS

It allows viewing the alarms occurred in the MVW3000.

D2.1 Actual

It allows viewing the alarms occurred in the MVW3000. If any alarm is active, the alarm number is displayed; otherwise, 0 is displayed.

The alarms are displayed on the HMI and on the MVW3000 status word. They are automatically removed after leaving the alarm condition.

Alarms are placed in a line, which can display up to 5 alarms simultaneously. Whenever an alarm occurs, it goes to the first empty position (if there is no indication of any previous alarm, it will be shown in Alarm 1).

Visually on the HMI, if only one alarm occurs, it will be in the first position (Alarm 1).

D2.1 Actual	
.1 Alarm 1	0 ... 4095
.2 Alarm 2	0 ... 4095
.3 Alarm 3	0 ... 4095
.4 Alarm 4	0 ... 4095
.5 Alarm 5	0 ... 4095

.1 Alarm 1 First position of alarm indication (Actual alarm).

.2 Alarm 2 Second position of alarm indication.

.3 Alarm 3 Third position of alarm indication.

.4 Alarm 4 Fourth position of alarm indication.

.5 Alarm 5 Fifth position of alarm indication.

D2.3 History

It indicates the code, date and time of the last 10 alarms.

D2.3 History		
.1 Last alarm	0 ... 9999	
.2 Date and time last alarm	YYYY-MM-DD	HH:MM:SS
.3 Second alarm	0 ... 9999	
.4 Date and time second alarm	YYYY-MM-DD	HH:MM:SS
.5 Third alarm	0 ... 9999	
.6 Date and time third alarm	YYYY-MM-DD	HH:MM:SS
.7 Fourth alarm	0 ... 9999	
.8 Date and time fourth alarm	YYYY-MM-DD	HH:MM:SS
.9 Fifth alarm	0 ... 9999	
.10 Date and time fifth alarm	YYYY-MM-DD	HH:MM:SS
.11 Sixth alarm	0 ... 9999	
.12 Date and time sixth alarm	YYYY-MM-DD	HH:MM:SS
.13 Seventh alarm	0 ... 9999	
.14 Date and time seventh alarm	YYYY-MM-DD	HH:MM:SS
.15 Eighth alarm	0 ... 9999	
.16 Date and time eighth alarm	YYYY-MM-DD	HH:MM:SS
.17 Ninth alarm	0 ... 9999	
.18 Date and time ninth alarm	YYYY-MM-DD	HH:MM:SS
.19 Tenth alarm	0 ... 9999	
.20 Date and time tenth alarm	YYYY-MM-DD	HH:MM:SS

.1 Last alarm It indicates the code of the last alarm that happened.

.2 Date and time last alarm It indicates the date and time of the last alarm that happened.

.3 Second alarm It indicates the code of the second alarm that happened.

.4 Date and time second alarm It indicates the date and time of the second alarm that happened.

.5 Third alarm It indicates the code of the third alarm that happened.

.6 Date and time third alarm It indicates the date and time of the third alarm that happened.

.7 Fourth alarm It indicates the code of the fourth alarm that happened.

.8 Date and time fourth alarm It indicates the date and time of the fourth alarm that happened.

.9 Fifth alarm It indicates the code of the fifth alarm that happened.

.10 Date and time fifth alarm It indicates the date and time of the fifth alarm that happened.

.11 Sixth alarm It indicates the code of the sixth alarm that happened.

.12 Date and time sixth alarm It indicates the date and time of the sixth alarm that happened.

.13 Seventh alarm It indicates the code of the seventh alarm that happened.

.14 Date and time seventh alarm It indicates the date and time of the seventh alarm that happened.

.15 Eighth alarm It indicates the code of the eighth alarm that happened.

.16 Date and time eighth alarm It indicates the date and time of the eighth alarm that happened.

.17 Ninth alarm It indicates the code of the ninth alarm that happened.

.18 Date and time ninth alarm It indicates the date and time of the ninth alarm that happened.

.19 Tenth alarm It indicates the code of the tenth alarm that happened.

.20 Date and time tenth alarm It indicates the date and time of the tenth alarm that happened.

D3 HOUR CONTROL

It allows viewing the total running hours of some MVW3000 conditions.

D3 Hour control	
.1 Time powered	0 ... 65536 h
.2 Hours enabled	0 ... 65536 h

.1 Time powered It indicates the total hours that the inverter has been powered.

This value is kept even when the inverter is shut down.

.2 Hours enabled It indicates the total number of hours that the inverter remained enabled.

It indicates up to 65536 hours, and then it returns to zero.

Setting parameter C1.6.2 option 3, the value of parameter D3.2 goes to zero.

This value is kept even when the inverter is shut down.

D4 INVERTER AND ACCESS.

It allows viewing the measurement of the MVW3000 operating conditions.

D4.1 Inverter

It allows viewing the measurement of operating conditions related to the inverter.

D4.1.1 Measurements

It indicates the speeds of the MVW01 fans.

D4.1.1 Measurements	
.1 Rotation direction of voltage and current measurements	0 ... 5 Bit

.1 Rotation direction of voltage and current measurements It displays the direction of rotation of the inverter voltage and current measurements.

For the input and output power measurements to operate correctly, the voltages and currents involved must be rotating in the same direction of rotation. Parameter C1.8.16 can be used to activate the alarms of reverse rotation between voltage and current of the same point.

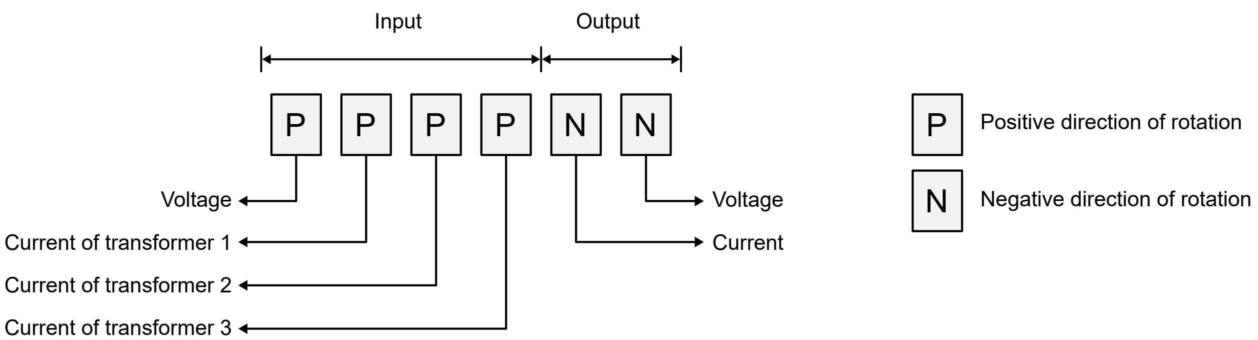


Figure 8.1: *Direction of rotation of the measurements*

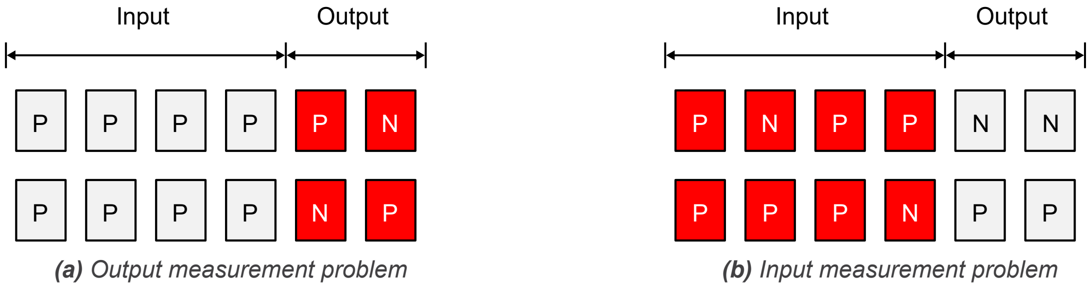


Figure 8.2: *Examples of measurement problems*

Bit	Value/Description
Bit 0 Output - Voltage	**0 = Negative** **1 = Positive**
Bit 1 Output - Current	**0 = Negative** **1 = Positive**
Bit 2 Input - Transformer 3 current	**0 = Negative** **1 = Positive**
Bit 3 Input - Transformer 2 current	**0 = Negative** **1 = Positive**
Bit 4 Input - Transformer 1 current	**0 = Negative** **1 = Positive**
Bit 5 Input - Voltage	**0 = Negative** **1 = Positive**

D4.1.4 Control voltages

It indicates the voltage of the MVW3000 control board power supplies.

D4.1.4 Control voltages	
.1 Voltage 24V IO	0.00 ... 655.35 V
.2 Battery voltage	0.00 ... 655.35 V
.3 Voltage 3.3V control	0.00 ... 655.35 V
.4 Voltage 24V control	0.00 ... 655.35 V
.5 Voltage 3.3V IO	0.00 ... 655.35 V
.6 Voltage 5V AUI	0.00 ... 655.35 V

.1 Voltage 24V IO It indicates the voltage value of the 24 V source for IO accessories (V).

.2 Battery voltage It indicates the battery voltage value (V).

.3 Voltage 3.3V control It indicates the 3.3 V source voltage value for the control board (V).

.4 Voltage 24V control It indicates the 24 V source voltage value for the control board (V).

.5 Voltage 3.3V IO It indicates the voltage value of the 3.3 V source for IO accessories (V).

.6 Voltage 5V AUI It indicates the AUI 5V voltage value (V).

D4.1.5 Motor overl. fault

It indicates the control variable of the motor overload fault function.

D4.1.5 Motor overl. fault	
.1 Ixt Motor Level	0 ... 100 %

.1 Ixt Motor Level It indicates the actual status of the motor overload.

D4.1.11 Configuration

It allows viewing the status of the user settings storage system.

D4.1.11 Configuration	
.1 Last backup operation	0 ... 12

.1 Last backup operation Indicates the last backup operation performed.

Operations that are not completed successfully, such as operations with an SD card without the card being inserted in the product or loading settings that have not been previously saved, return the value of this parameter to "Not Used".

Indication	Description
0 = Not Used	Not used
1 = Default 60 Hz	It loads the MVW3000 settings with the default content of the parameters
2 = Default 50 Hz	It loads the MVW3000 settings with the default content of the parameters All parameters are loaded with the default value of 60 Hz, with the exception of the following cases: ■ C4.3.2.1 set at 125 rpm ■ C4.3.1.3.1 set at 75 rpm ■ C4.3.1.5.1 set at 75 rpm ■ C4.3.1.5.2 set at 250 rpm ■ C4.3.1.5.3 set at 500 rpm ■ C4.3.1.5.4 set at 750 rpm ■ C4.3.1.5.5 set at 1000 rpm ■ C4.3.1.5.6 set at 1250 rpm ■ C4.3.1.5.7 set at 1500 rpm ■ C4.3.1.5.8 set at 1375 rpm ■ C4.3.1.1.1 set at 75 rpm ■ C4.3.1.1.2 set at 1500 rpm ■ C5.9.3 set at 15 rpm ■ C5.9.4 set at 100 rpm ■ C5.9.5 set at 1500 rpm ■ C5.9.8 set at 15 rpm ■ C2.1.8 set at 1458 rpm ■ C2.1.6 set at 50 Hz ■ C3.3.4.1.1 set at 1500 rpm ■ C3.3.4.1.2 set at 1500 rpm
3 = Param. Set 1 -> MVW	It loads the MVW3000 settings with the content of parameter set 1
4 = Param. Set 2 -> MVW	It loads the MVW3000 settings with the content of parameter set 2
5 = Param. Set 3 -> MVW	It loads the MVW3000 settings with the content of parameter set 3
6 = MVW -> Param. Set 1	It saves the content of the MVW3000 current settings for parameter set 1
7 = MVW -> Param. Set 2	It saves the content of the MVW3000 current settings for parameter set 2
8 = MVW -> Param. Set 3	It saves the content of the MVW3000 current settings for parameter set 3
9 = SD Card -> MVW	It loads the MVW3000 settings with the content of parameter set imported from the SD card Additionally, it imports the settings of parameter sets 1, 2 and 3 from the SD card to the inverter memory
10 = MVW -> SD Card	It saves the content of the actual MVW3000 settings on the SD card Additionally, it exports the settings from parameter sets 1, 2 and 3 to the SD card
11 ... 12 = Not used	Not used

D4.1.12 Advanced

Allows viewing parameters with advanced information to aid the inverter diagnosis.

D4.1.12 Advanced	
.1 Last assert	0 ... 4294967295
.2 Code flow 1 Date time	YYYY-MM-DD HH:MM:SS
.3 Last reset reason (AUI)	0 ... 4294967295
.4 Code flow 2 Date time	YYYY-MM-DD HH:MM:SS

.1 Last assert It indicates the code related to the last assert that happened.

8-digit hexadecimal number arranged as follows:

0xABBBBCCC

A = 0[none]; 1[AUI]; 2[PWC]; 3[PMON] B = File name identification C = Line number identification

.2 Code flow 1 Date time Indicates the date and time at which parameter D4.1.12.1 was last updated.

.3 Last reset reason (AUI) It indicates the code related to the reason of the last CPU reset that happened.

8-digit hexadecimal number arranged as follows:

0xABBCCCCC

A = 0[none]; 1[AUI]; 2[PWC]; 3[PMON] B = Reset reason identification C = Additional information

.4 Code flow 2 Date time Indicates the date and time at which parameter D4.1.12.3 was last updated.

D4.2 Accessories

It allows viewing the data for diagnosing the control accessories installed in the MVW3000.

D4.2.1 Diag. Slot A to D4.2.7 Diag. Slot G

It allows viewing the diagnostics data of the accessory connected to the slot.

D4.2.1 Diag. Slot A D4.2.2 Diag. Slot B D4.2.3 Diag. Slot C D4.2.4 Diag. Slot D D4.2.5 Diag. Slot E D4.2.6 Diag. Slot F D4.2.7 Diag. Slot G	
.1 Status	0 ... 3
.3 Temperature	-100.0 ... 250.0 °C

.1 Status It shows the accessory status.

Indication	Description
0 = Not Connected	There is no accessory connected
1 = Initializing	There is an accessory connected, and it is initializing
2 = Active	There is an accessory connected, and it is communicating properly
3 = Error	There is an accessory connected, and it is presenting some error in the communication with the MVW3000

.3 Temperature It indicates the control temperature measured by the accessory.

9 C CONFIGURATIONS

It allows changing the MVW3000 configuration parameters. Depending on the parameter property, it is possible to set its value according to the table below.

Property	Description
Stopped	Parameter can only be changed with the motor stopped.
Model	Default value may change according to inverter model.

NOTE!
Parameter options with the description ”Not used” are for WEG’s exclusive use.

C1 INVERTER AND POWER SUPPLY

Configuration of inverter parameters related to power supply, utilization, switching frequency, fans and general settings.

C1.2 Inverter use

It allows setting the inverter operating duty.

C1.2 Inverter use		
C1.2.1 Overload type		
Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
It selects the inverter duty cycle between normal duty (ND) or heavy duty (HD).

This parameter directly influences the inverter rated current value (C13.1.2) used as a reference for the IGBTs overload and output overcurrent faults.

Indication	Description
0 = Normal Duty (ND)	It operates at 110 % of ND rated current for 1 minute
1 = Heavy Duty (HD)	It operates at 150 % of HD rated current for 1 minute

C1.2 Inverter use		
C1.2.2 Inverter test mode		
Range:	0 ... 3	**Default:** 0
Properties:		

Description:
Enables and configures the inverter operation to operate in test mode.

Indication	Description
0 = Inactive	Test mode inactive. All communications, protections and inverter functions are enabled.
1 = No cells and no measurements	Test mode active. The inverter operates with cell communications and measurements disabled.
2 = Cellless	Test mode active. The inverter operates with cell communications disabled.
3 = No measurements	Test mode active. The inverter operates with measurements disabled.

C1.2 Inverter use		
C1.2.3 Fixed frequency operating mode		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
Selects the operating strategy that the inverter uses to modulate the output voltage frequency when PWM is enabled.

In fixed frequency mode, the output frequency is set by the nominal motor frequency value, configured in C2.1.6. The voltage amplitude varies according to the speed ramp and meets the U/f curve settings.

> **NOTE!**
> Fixed frequency operation mode must be enabled when testing the inverter with purely reactive loads.

Indication	Description
0 = Inactive	Inverter operates with variable frequency at the output.
1 = Active	Inverter operates with constant frequency at the output.

C1.2 Inverter use

C1.2.4 Injected frequency

Range: 0 ... 2 **Default:** 0
Properties:

Description:
Programs dual frequency injection into the motor in scalar control.

Indication	Description
0 = Inactive	Function disabled
1 = Active	The second frequency is constantly injected to stress the motor.
2 = Active during deceleration	The second frequency is used during deceleration

C1.2 Inverter use

C1.2.5 Order of injected frequency

Range: 0.10 ... 10.00 **Default:** 1.20
Properties:

Description:
Determines the order of the frequency injected into the inverter in relation to the fundamental.

$$f_{injected} = Order \times f_{fundamental}$$

If the value of the second frequency exceeds the maximum that the inverter can inject, it will be limited to the maximum possible value.

C1.2 Inverter use

C1.2.6 Amplitude of the injected frequency

Range: 0.0 ... 50.0 % **Default:** 0.0 %
Properties:

Description:
Determines the amplitude of the second frequency injected into the inverter in relation to the amplitude of the fundamental.

$$V_{injetada} = Amplitude \times V_{fundamental}$$

C1.6 Other inverter settings

It allows reversing the inverter output phase sequence, resetting the inverter counters and setting the inverter rated current reduction.

C1.6 Other inverter settings

C1.6.2 Reset counters

Range: 0 ... 3 **Default:** 0

Properties:

Description:
It allows reseting the values for the parameters of energy, fan running hours and inverter enabled hours.

Indication	Description
0 = Disabled	Disable function
1 = Energy	Reset energy parameters S2.3.12, S2.3.13 and S2.3.14
2 = Not used	Not used
3 = Inverter Enabled	Reset enabled inverter hours parameter D3.2

C1.8 Measurements

C1.8 Measurements

C1.8.2 Delay between Iin and Vin measurements

Range: -99.99 ... 99.99 ms **Default:** 0.00 ms

Properties:

Description:
Delay between inverter input current and voltage measurements.

This parameter affects the measurement of input powers, acting directly on the relationship between active power and apparent power.

ATTENTION!
Incorrect setting will cause error in inverter input transformer protection actuation.

C1.8 Measurements

C1.8.16 Alarm for voltage and current measurements

Range: 0 ... 1 **Default:** 0

Properties:

Description:
Configures inverted direction of rotation alarms between input and output voltages and currents.

Incorrect assembly can result in:

- Problems in measuring output power.
- Instability in scalar control.
- Inability to operate vector control.
- Input power and PF measurement problems.
- Improper faults in input transformer protection.

See D4.1.1.1.

Indication	Description
0 = Disable	Alarm disabled
1 = Enable	Alarms A261 or A262 will be generated when an anomaly is detected in the measurements

C1.9 Precharge

During the first and second stages of pre-charge, all active cells should reach 50 and 90 % of the nominal DC link voltage, respectively.

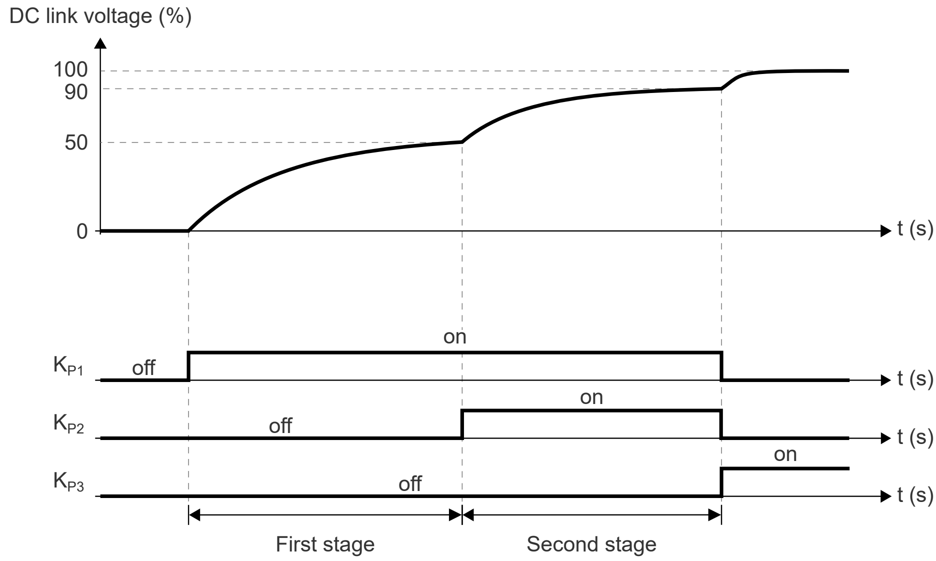


Figure 9.1: *Precharge stages*

C1.9 Precharge			
C1.9.1 Maximum time for the first stage			
C1.9.2 Maximum time for the second stage.			
Range:	0 ... 40 s	**Default:**	10 s (C1.9.1)
			15 s (C1.9.2)
Properties:			

Description:
Time limits for precharge stages to complete.

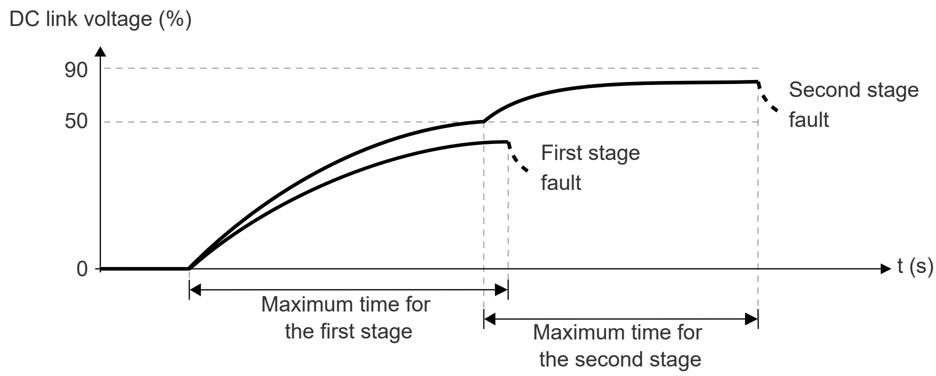


Figure 9.2: *Example of time-out in precharge*

C1.9 Precharge			
C1.9.3 Maximum time for closing feedback			
C1.9.4 Maximum time for opening feedback			
Range:	0.0 ... 20.0 s	**Default:**	0.5 s
Properties:			

Description:
Time limits for receiving input cubicle closing confirmations before faults are triggered F014 e F015.

C1.10 Calibrations

C2 MOTOR

Definition of the characteristics of the motor to be driven by the MVW3000 inverter.

C2.1 Motor data

Definition of motor rated data.

NOTE!
The motor data set in C2.1 (from C2.1.1 to C2.1.12) must be exactly as shown on the motor nameplate.

C2.1 Motor data		
C2.1.1 Motor type		
Range:	0 ... 4	**Default:** 0
Properties:	Stopped	

Description:
Sets the type of motor to be driven by the MVW3000 inverter.

Indication	Description
0 = Induction	It selects that it is an induction motor
1 = Synchronous - IPSM	Selects a permanent magnet motor.
2 = Synchronous - SPSM	It select synchronous motor with surface permanent magnet
3 ... 4 = Not used	Not used

C2.1 Motor data		
C2.1.3 Rated power		
Range:	0 ... 65000 kW	**Default:** 0 kW
Properties:	Stopped	

Description:
It sets the value of the motor rated power as per the motor nameplate data.

C2.1 Motor data		
C2.1.4 Rated voltage		
Range:	1 ... 19999 V	**Default:** 6600 V
Properties:	Stopped	

Description:
It sets the motor rated voltage value.

C2.1 Motor data		
C2.1.5 Rated current		
Range:	0.0 ... 3705.0 A	**Default:** 140.0 A
Properties:	Stopped	

Description:
It sets the motor rated current value. The value must be set according to the motor nameplate data.

C2.1 Motor data			
C2.1.6 Rated frequency			
Range:	0.1 ... 500.0 Hz	**Default:**	60.0 Hz
Properties:	Stopped		

Description:
It sets the motor rated frequency value.

C2.1 Motor data			
C2.1.7 Number of poles			
Range:	2 ... 180	**Default:**	4
Properties:	Stopped		

Description:
It sets the number of poles of the motor.

NOTE!
Parameter available only for synchronous motor.

C2.1 Motor data			
C2.1.8 Rated speed			
Range:	0 ... 32000 rpm	**Default:**	1750 rpm
Properties:	Stopped		

Description:
It sets the motor rated speed value.

C2.1 Motor data			
C2.1.9 Rated efficiency			
Range:	50.0 ... 99.9 %	**Default:**	99.9 %
Properties:	Stopped		

Description:
It sets the motor rated efficiency.

C2.1 Motor data			
C2.1.10 Rated cos phi			
Range:	0.50 ... 0.99	**Default:**	0.82
Properties:	Stopped		

Description:
It sets the motor rated cos φ.

C2.1 Motor data			
C2.1.11 Service factor			
Range:	1.00 ... 1.50	**Default:**	1.15
Properties:	Stopped		

Description:
It sets the motor rated service factor (SF).

C2.1 Motor data		
C2.1.12 Ventilation		
Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
It defines the motor ventilation system arrangement.

Indication	Description
0 = Self-ventilated	Motor uses its own ventilation
1 = Independent	Motor uses external ventilation

The value set in C2.1.12 automatically modifies the parameters related to the motor overload fault as follows:

Table 9.10: *Change of the motor overload fault*

C2.1.12	C7.4.3 (100 %)	C7.4.4 (50 %)	C7.4.5 (5 %)
0	1.00 x C2.1.5	0.86 x C2.1.5	0.62 x C2.1.5
1	1.00 x C2.1.5	1.00 x C2.1.5	1.00 x C2.1.5

C2.2 Motor model

It allows viewing and changing the motor electrical parameters estimated by the Self-Tuning routine. The user can manually set the data if they have the motor data sheet.

C2.2 Motor model		
C2.2.1 Stator resistance		
Range:	0.000 ... 30.000 Ω	**Default:** 1.000 Ω
Properties:		

Description:
It sets the motor stator resistance value.

C2.2 Motor model		
C2.2.2 Magnetizing reactance		
Range:	0.0 ... 800.0 Ω	**Default:** 1.0 Ω
Properties:		

Description:
It defines the motor magnetization reactance value.

C2.2 Motor model		
C2.2.3 Leakage reactance		
Range:	0.00 ... 100.00 Ω	**Default:** 1.00 Ω
Properties:		

Description:
It sets the motor leakage reactance value.

C2.2 Motor model		
C2.2.4 Rotor resistance		
Range:	0.000 ... 30.000 Ω	**Default:** 1.000 Ω
Properties:		

Description:
It sets the motor rotor resistance value.

C2.2 Motor model		
C2.2.5 Rotor reactance		
Range:	0.00 ... 100.00 Ω	**Default:** 1.00 Ω
Properties:		

Description:
It sets the motor rotor reactance value.

C2.2 Motor model		
C2.2.10 Ke constant		
Range:	0.0 ... 2000.0	**Default:** 0.0
Properties:		

Description:
It sets the value of the Ke voltage constant generated by the motor. The engineering unit used is V/krpm (Volts/1000 rpm).

C3 CONTROL

The inverter supplies the motor with variable voltage, current and frequency, which enables the motor speed and torque control. The values applied to the motor follow a control strategy, depending on the selected control type and the inverter parameter settings.

In this menu, choose the control type according to the static and dynamic torque and speed demands of the driven load.

Control Types:

Scalar: scalar control; simpler control type by imposed voltage/frequency; speed regulation in open loop or with slip compensation (programmable); it allows multiple motor operation.

Sensorless vector: field-oriented control; no motor speed sensor; able to drive standard motors; speed control in the range of 1:100; 0.5 % static accuracy of rated speed in speed control; high control dynamics.

Vector with encoder: field-oriented control; requires encoder on the motor and interface module for encoder on the inverter (ENC-01); speed control up to 0 rpm; 0.01 % static accuracy of rated speed in speed control; high static and dynamic performance of speed and torque control.

C3.1 Configuration

It allows setting the control type used to drive the motor.

C3.1 Configuration		
C3.1.1 Control type		
Range:	0 ... 3	**Default:** 0
Properties:	Stopped	

Description:
Defines the type of control that will be used to control the motor speed or torque.

NOTE!
The VVW+ option is also available for PM motors.

Indication	Description
0 = Scalar	Voltage/frequency scalar control
1 = Not used	Not used
2 = Encoder Vector	Vector control with encoder (with speed sensor)
3 = Sensorless Vector	Sensorless vector control (without speed sensor)

C3.2 Scalar control

SCALAR CONTROL FOR INDUCTION MOTOR

This is the classic control for a three-phase induction motor, based on a curve that relates output frequency and voltage. The inverter works as a variable voltage and frequency source, generating frequency and voltage values according to this curve. Figure 9.3 shows the scalar control block diagram.

The scalar control is recommended for the following cases:

- Drive of several motors with the same inverter (multiple motor drive).
- Energy saving in the drive of loads with quadratic torque/speed relationship.
- Motor rated current below 1/3 of the inverter rated current.
- For test purposes, the inverter is turned on without motor or with a small motor with no load.
- Applications where the load connected to the inverter is not a three-phase induction motor.

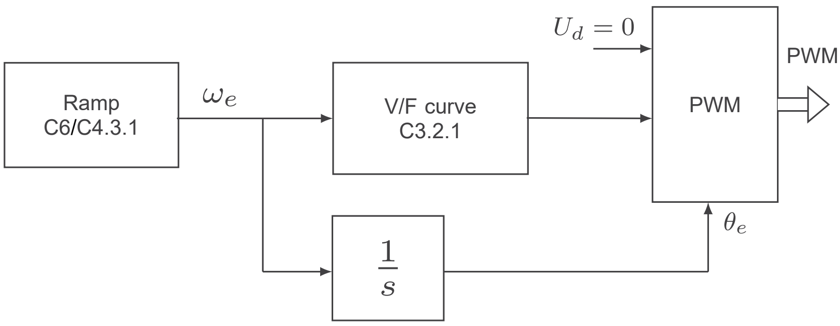


Figure 9.3: *Block diagram of scalar control for induction motors*

C3.2.1 V/f curve

It allows adjusting the curve defined by the inverter output voltage and frequency. Example of using this resource: when a transformer is used between the inverter and the motor, and you want to compensate the voltage drop in the cable used to connect the motor.

C3.2.1 V/f curve		
C3.2.1.1 Manual torque boost		
Range:	0.0 ... 20.0 %	**Default:** 0.0 %
Properties:		

Description:
It acts at low frequencies, that is, in the range from 0 to C3.2.1.5, increasing the inverter output voltage to compensate for the voltage drop in the motor stator resistance in order to maintain a constant torque .

The optimum setting is the smallest value of C3.2.1.1 which allows the motor satisfactory start. A value greater than necessary will excessively increase the motor current at low speeds, which may lead the inverter to a fault condition (F070, F071 or F072), as well as to the motor heating. Figure 9.4 shows the Torque Boost action region between points P_0 and P_1.

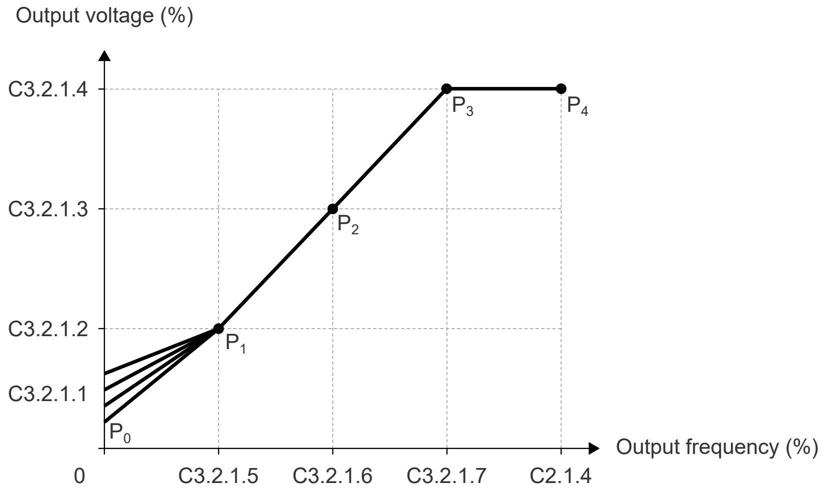


Figure 9.4: *Torque boost region*

C3.2.1 V/f curve		
C3.2.1.2 Low output voltage		
Range:	0.0 ... 100.0 %	**Default:** 33.3 %
Properties:	Stopped	

Description:
It sets the voltage value of point P_1 to adjust the inverter V/F curve together with its pair C3.2.1.5.

C3.2.1 V/f curve		
C3.2.1.3 Intermediate output voltage		
Range:	0.0 ... 100.0 %	**Default:** 66.7 %
Properties:	Stopped	

Description:
It sets the voltage value of point P_2 to adjust the inverter V/F curve together with its pair C3.2.1.6.

C3.2.1 V/f curve		
C3.2.1.4 Maximum output voltage		
Range:	0.0 ... 100.0 %	**Default:** 100.0 %
Properties:	Stopped	

Description:
It sets the voltage value of point P_3 to adjust the inverter V/F curve together with its pair C3.2.1.7.

NOTE!
The maximum output voltage C3.2.1.4 at 100 % corresponds to the motor rated voltage C2.1.4. In cases where the inverter is being supplied with a line voltage above the motor rated voltage, the output voltage the inverter applies remains the value set in C2.1.4.

C3.2.1 V/f curve		
C3.2.1.5 Low speed		
Range:	0.0 ... 200.0 %	**Default:** 33.3 %
Properties:	Stopped	

Description:
It sets the speed value of point P_1 to adjust the inverter V/F curve together with its pair C3.2.1.2.

C3.2.1 V/f curve		
C3.2.1.6 Intermediate speed		
Range:	0.0 ... 200.0 %	**Default:** 66.7 %
Properties:	Stopped	

Description:
It sets the speed value of point P_2 to adjust the inverter V/F curve together with its pair C3.2.1.3.

C3.2.1 V/f curve		
C3.2.1.7 Field weakening start speed		
Range:	0.0 ... 200.0 %	**Default:** 100.0 %
Properties:	Stopped	

Description:
It sets the speed value of point P_3 to adjust the inverter V/F curve together with its pair C3.2.1.4.

C3.2.1 V/f curve		
C3.2.1.8 Rated flux		
Range:	0.0 ... 120.0 %	**Default:** 100.0 %
Properties:		

Description:
For scalar control, it allows to adjust a percentage of the motor stator flux in relation to the nominal stator flux.

NOTE!
In the scalar control type, the parameter C3.2.1.8 allows for regulation of the inverter output voltage after setting the V/F curve. This can be useful in applications that require output voltage compensation or field weakening.

C3.2.2 Optimization

It allows adjustments to the VVW+ control dynamics. The VVW+ control is factory set to suit most applications. If an improvement in the dynamic behavior of the control is required for induction and PM motors, the parameters below are available.

C3.2.2.1 Induction motor

It allows setting the VVW+ control parameters for induction motors.

C3.2.2.1 Induction motor		
C3.2.2.1.1 Slip compensator gain		
Range:	0.00 ... 10.00	**Default:** 1.00
Properties:		

Description:
It allows applying a gain to the slip estimator of the VVW+ control.

NOTE!
This value should be adjusted gradually when there is a speed error in the system.

C3.2.2.1 Induction motor		
C3.2.2.1.2 Voltage compensator gain		
Range:	0.00 ... 5.00	**Default:** 1.00
Properties:		

Description:
It allows applying a gain to the VVW+ scalar control voltage compensator.

> **NOTE!**
> This value should be adjusted gradually when there is a voltage error in the system.

C3.2.2.1 Induction motor		
C3.2.2.1.3 Filter		
Range:	1 ... 100 ms	**Default:** 32 ms
Properties:		

Description:
This parameter sets the low-pass filter used in the speed slip signal.

C3.2.2.2 Synchronous motor

The MTPA function determines the high efficiency region of the PM motor operation. This function guides the motor voltage vector so that it operates with the ratio between the maximum torque applied to the PM motor and its lowest possible current.

> **NOTE!**
> Function available only for PM motor.

C3.2.2.2 Synchronous motor		
C3.2.2.2.1 MTPA function		
Range:	0 ... 1	**Default:** 1
Properties:		

Description:
It enables the MTPA function for VVW+ control of synchronous machines.

Indication	Description
0 = Disable	Disable function
1 = Enable	It enables function

C3.2.2.2 Synchronous motor		
C3.2.2.2.2 MTPA optimizer		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
It enables the MTPA function optimizer to allow determining the point of greatest efficiency.

Indication	Description
0 = Disable	Disable function
1 = Enable	It enables function

C3.2.2.2 Synchronous motor		
C3.2.2.2.3 MTPA minimum speed		
Range:	0 ... 100 %	**Default:** 2 %
Properties:		

Description:
It sets a percentage of the motor rated speed to activate the MTPA function. If S2.1.1 is greater than C3.2.2.2.3 x C2.1.8, the motor MTPA function will be activated.

C3.2.2.2 Synchronous motor		
C3.2.2.2.4 Efficiency adjustment gain		
Range:	0.000 ... 4.000	**Default:** 1.000
Properties:		

Description:
It allows adjusting the MTPA function for better efficiency. This setting can be checked by the ratio of cos phi and the motor output current.

The setting can be performed according to the application requirement. It is possible to obtain a reactive power reduction setting, increasing the motor cos phi and reducing the output current.

C3.2.2.2 Synchronous motor		
C3.2.2.2.5 Kp MTPA gain		
Range:	0.000 ... 1.000	**Default:** 0.010
Properties:		

Description:
It sets the proportional gain value of the MTPA regulator.

NOTE!
The gain values of this controller are automatically adjusted by the inverter.

C3.2.2.2 Synchronous motor		
C3.2.2.2.6 Ki MTPA gain		
Range:	0.000 ... 1.000	**Default:** 0.002
Properties:		

Description:
It sets the integral gain value of the MTPA regulator.

NOTE!
The gain values of this controller are automatically adjusted by the inverter.

C3.2.2.2 Synchronous motor		
C3.2.2.2.7 MTPA reference		
Range:	0 ... 100 %	**Default:** 100 %
Properties:		

Description:
It allows adjusting the reference of the MTPA operating point.

C3.2.2.2 Synchronous motor		
C3.2.2.2.8 MTPA minimum voltage		
Range:	0 ... 100 %	**Default:** 100 %
Properties:		

Description:
It defines the minimum voltage value at a given speed that will be applied to the motor when the MTPA function is active.

The minimum voltage value in Volts (V) is the percentage of the ratio (C2.2.10 * S2.1.1)/1000.

E.g.:

C2.2.10: Motor model - Ke constant = 120 V/kRPM.

S2.1.1: Motor speed - Reference = 900 RPM.

C3.2.2.2.8: Synchronous motor - MTPA minimum voltage = 50.0 %.

Minimum MTPA Voltage (V) = (C3.2.2.2.8 / 100) * (C2.2.10 * S2.1.1) / 1000 = 54 V.

C3.2.2.2 Synchronous motor		
C3.2.2.2.9 Voltage comp. gain		
Range:	0.00 ... 5.00	**Default:** 1.00
Properties:		

Description:
It allows applying a gain to the VVW+ scalar control voltage compensator.

> **NOTE!**
> This value should be adjusted gradually when there is a voltage error in the system.

C3.2.2.3 Synchronous motor with external excitation

Allows you to adjust the parameters related to the field regulation of the synchronous motor with external excitation, both with brushes and with a brushless AC exciter.

C3.2.2.3 Synchronous motor with external excitation		
C3.2.2.3.1 Synchronous machine field controller		
Range:	0 ... 1	**Default:** 1
Properties:		

Description:
Enables the field controller of the synchronous machine with external excitation.

Indication	Description
0 = Inactive	
1 = Reactive controller	The field reference comes from the stator reactive controller, which seeks to maintain the reactive reference configured by the user While the reactive regulator acts in the field, the stator follows the V/f ratio according to the motor data and the configured curve.

C3.2.2.3 Synchronous motor with external excitation		
C3.2.2.3.2 Stator reactive reference		
Range:	-2.00 ... 2.00	**Default:** 0.00
Properties:		

Description:
Reactive current reference as a function of the motor's nominal current.

A negative reference value should result in a current lagging behind the voltage.

C3.2.2.3 Synchronous motor with external excitation		
C3.2.2.3.3 Initial field reference		
Range:	0.00 ... 1.00	**Default:** 0.20
Properties:		

Description:
Defines the initial value of the field reference, which is applied before the field regulation step.

When enabling PWM, the field reference varies in a ramp, starting from zero, reaching the value configured in the initial reference parameter after the ramp time.

After the ramp is completed, the field reference value remains at the initial value until the frequency condition for starting regulation is met and the reactive controller starts regulating the field.

C3.2.2.3 Synchronous motor with external excitation		
C3.2.2.3.4 Field entry ramp time		
Range:	0.00 ... 200.00 s	**Default:** 3.00 s
Properties:		

Description:
Defines the ramp time applied to the field reference input.

During the ramp time the field reference varies from zero to the initial field reference.

The field input occurs when the PWM is ENABLED or when the RUN command occurs, according to the motor magnetization mode configuration.

C3.2.2.3 Synchronous motor with external excitation		
C3.2.2.3.5 Minimum value of the field reference		
C3.2.2.3.6 Maximum field reference value		
Range:	0.00 ... 1.00	**Default:** 0.01 (C3.2.2.3.5)
		1.00 (C3.2.2.3.6)
Properties:		

Description:
Defines the range of the field reference, limiting the action of the reactive controller.

If the initial field reference exceeds the defined range, this will be used as the initial reference.

C3.2.2.3 Synchronous motor with external excitation		
C3.2.2.3.7 Field regulation starting point		
Range:	0.00 ... 2.00	**Default:** 0.05
Properties:		

Description:
Defines the starting frequency of the closed-loop control of the field reference in relation to the nominal motor frequency.

Below the frequency defined by this parameter, the field reference is defined by the ramp. Even if the frequency condition is satisfied, regulation only starts after the input ramp is completed.

When the motor frequency drops below 90 % of the value set to start regulation, the ramp assumes the field reference, imposing the initial value again. This method seeks to ensure the proper behavior of the currents in stopping and reversing and motor speed.

C3.2.2.3 Synchronous motor with external excitation		
C3.2.2.3.8 Field regulator gain		
Range:	0.000 ... 9.999	**Default:** 0.070
Properties:		

Description:
Sets the gain of the field reference regulator.

C3.2.2.3 Synchronous motor with external excitation		
C3.2.2.3.9 Field regulator full time		
Range:	0.000 ... 50.000 s	**Default:** 0.030 s
Properties:		

Description:
Sets the integral time of the field regulator.

C3.2.3 Current stabilization

The Current Stabilization function is used to dampen electromechanical oscillations present in the motor when it is operating with a low load level and at low frequencies. These oscillations cause instability in the system that, in some occasions, can cause the overcurrent fault.

C3.2.3 Current stabilization		
C3.2.3.1 Configuration		
Range:	0 ... 5	**Default:** 4
Properties:		

Description:
It defines whether the motor current stabilization function will be active or not.

This function eliminates oscillations in the motor currents resulting from operation at low speeds and with little load.

Indication	Description
0 = Disable	Disable function
1 = PI	
2 = HPF method 1	
3 = HPF method 2	
4 = HPF method 3	
5 = Classic	

C3.2.3 Current stabilization		
C3.2.3.2 Stabilization Kp gain		
C3.2.3.3 Stabilization Ki gain		
Range:	0.000 ... 1.999	**Default:** 0.150 (C3.2.3.2)
		0.020 (C3.2.3.3)
Properties:		

Description:
Defines the values of the respective Current Stabilizer gains. The gain values of this controller are automatically adjusted by the inverter, requiring no adjustment for general-purpose applications.

NOTE!
If you need to modify the earnings of this controlled entity, it is suggested that you first gradually increase the value of C3.2.3.3.

C3.2.3 Current stabilization		
C3.2.3.4 Stab. PI saturation		
Range:	0.0 ... 10.0 %	**Default:** 5.0 %
Properties:		

Description:
It sets the saturation level of the motor current stabilization regulator output.

C3.2.3 Current stabilization		
C3.2.3.5 High-pass filter gain		
Range:	0.000 ... 9.999 ms	**Default:** 0.050 ms
Properties:		

Description:
Defines the values of the gain and time constant of the current stabilization loop through the high-pass filter.

> **NOTE!**
> Active only when current stabilization is configured to operate via the active current high-pass (C3.2.3.1>1).

C3.2.3 Current stabilization		
C3.2.3.6 High-pass filter Tc		
Range:	0 ... 9999 ms	**Default:** 318 ms
Properties:		

Description:
Defines the values of the gain and time constant of the current stabilization loop through the high-pass filter.

> **NOTE!**
> Active only when current stabilization is configured to operate via the active current high-pass (C3.2.3.1>1).

C3.2.3 Current stabilization		
C3.2.3.7 Maximum operating frequency		
Range:	0 ... 300 %	**Default:** 0 %
Properties:		

Description:
It disables the Current Stabilization function after the speed exceeds the value set in this parameter. When the value is set to zero, this functionality is disabled. This parameter is only available for induction motors.

C3.2.4 Pre-magnetization

The Pre-Magnetization function improves the dynamic behavior of the motor start when subjected to a very high load.

Figure 9.5 shows the operation flow of the Pre-Magnetization function together with the motor drive. In this activation, before the motor accelerates, the stator is magnetized so that it has energy for starting with load. Magnetization is performed by injecting a direct current (C3.2.4.2) for a programmed time (C3.2.4.3). The voltage boost during motor acceleration can be controlled by setting C3.2.4.4.

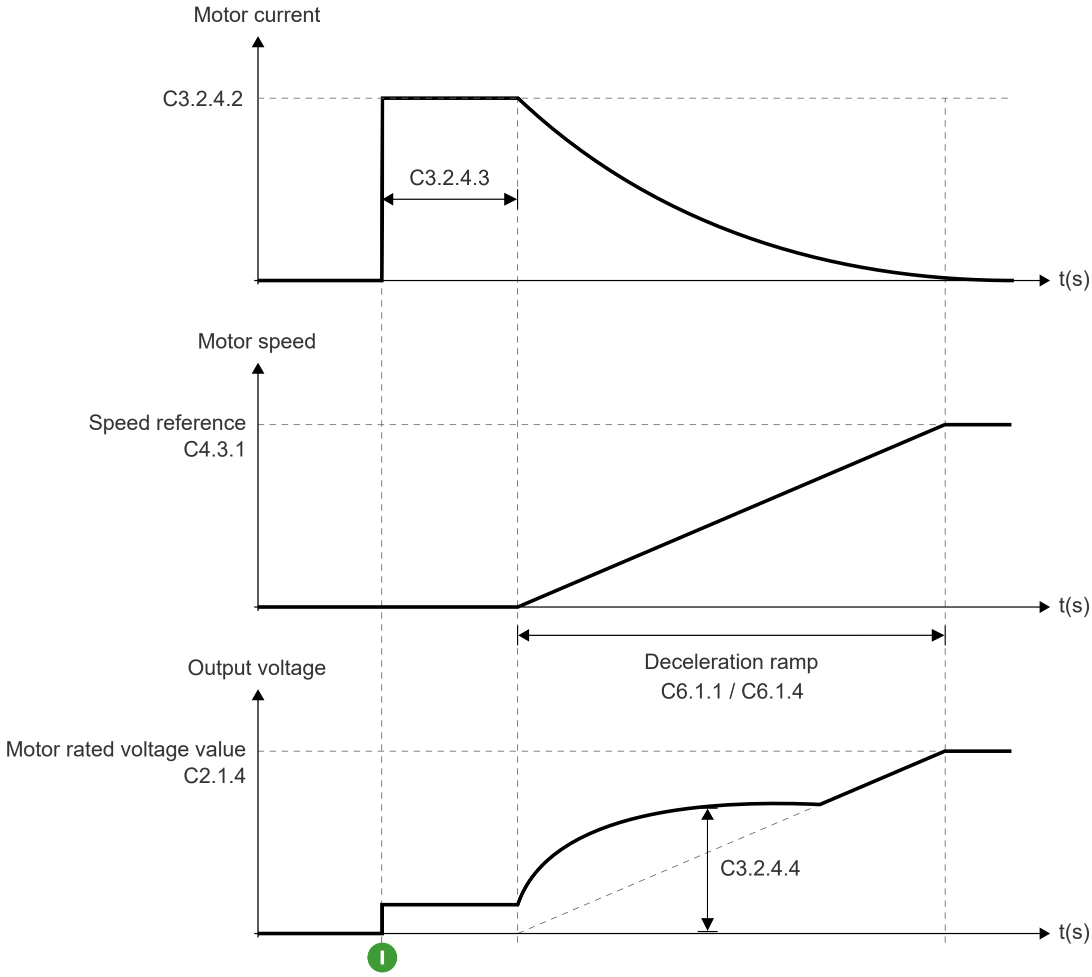


Figure 9.5: *Illustrative diagram of the operation of the pre-magnetization function*

C3.2.4 Pre-magnetization		
C3.2.4.1 Enable function		
Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
It enables the motor pre-magnetization function.

Indication	Description
0 = Disable	Disable function
1 = Enable	It enables function

C3.2.4 Pre-magnetization		
C3.2.4.2 Current		
Range:	0 ... 350 %	**Default:** 100 %
Properties:		

Description:
It allows setting the current level applied during the motor pre-magnetization process. The full scale is the rated motor current set in C2.1.5.

NOTE!
If the value set in C3.2.4.2 is greater than the inverter current, it will be automatically limited to the inverter maximum current capacity.

C3.2.4 Pre-magnetization		
C3.2.4.3 Time		
Range:	0 ... 5000 ms	**Default:** 2000 ms
Properties:		

Description:
It allows setting the motor pre-magnetization time, which is the time that the inverter considers to indicate that the motor is general enabled (or magnetized) after receiving the general enable command.

C3.2.4 Pre-magnetization		
C3.2.4.4 Gain		
Range:	1.0 ... 7.0	**Default:** 3.5
Properties:		

Description:
It allows setting the voltage boost applied during the motor acceleration. See Figure 9.5 for further details.

C3.2.5 I/F control

The I/F function improves the dynamic behavior of the motor start when subjected to a very high load.
The I/F function accelerates the machine by controlling the current level at the value set in C3.2.5.3. When the motor speed is higher than the value set in C3.2.5.4, the transition from I/F strategy to scalar or VVW+ control will occur. The I/F function will only be active during the machine acceleration. Thus, if a reduction in motor speed is performed after the strategies transition, the I/F strategy will not be activated. The I/F function will only be activated when the motor is stopped and the inverter is in the Ready state. It is possible to enable the automatic operation of the function after a speed reversal process from C3.2.5.2. During the start, the motor will run at a constant speed equal to the value set in C3.2.5.6 for an instant of C3.2.5.5. The I/F function is suitable for both induction motors and synchronous machines.

The I/F function will be disabled when the Pre-Magnetization function is enabled.

C3.2.5 I/F control		
C3.2.5.1 Enable		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
Enables the I/F control for the scalar control e VVW+ modes.

Indication	Description
0 = Disable	Disable function
1 = Enable	It enables function

C3.2.5 I/F control		
C3.2.5.2 Enable at reversal		
Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
Enables the I/F control function to operate after speed reversal.

Indication	Description
0 = Disable	Disable function
1 = Enable	It enables function

C3.2.5 I/F control		
C3.2.5.3 Current		
Range:	0 ... 200 %	**Default:** 100 %
Properties:		

Description:
Sets the injected current level during the I/F control process. The full scale is the rated motor current set in C2.1.5.

> **NOTE!**
> If the value set in C3.2.5.3 is greater than the inverter current, it will be automatically limited to the inverter maximum current capacity.

C3.2.5 I/F control		
C3.2.5.4 Transition speed		
Range:	0 ... 100 %	**Default:** 95 %
Properties:		

Description:
Sets the speed level to transition from I/F control mode to scalar or VVW+ control. The base value is the speed reference set in S2.1.1.

C3.2.5 I/F control		
C3.2.5.5 Drag time		
Range:	0 ... 10 s	**Default:** 2 s
Properties:		

Description:
Sets the time the speed will remain at the drag speed during I/F control operation.

C3.2.5 I/F control		
C3.2.5.6 Drag speed		
Range:	0 ... 50 %	**Default:** 2 %
Properties:		

Description:
Sets the creep speed level that the motor will remain during I/F control operation. The base value is the rated motor speed set in C2.1.8.

C3.3 Vector control

VECTOR CONTROL FOR INDUCTION MOTOR

It is the type of control based on the separation of the motor current in two components:

- Direct current I_d (oriented with the electromagnetic flux vector of the motor);
- Quadrature current I_q (perpendicular to the flux vector of the motor).

The direct current is related to the motor electromagnetic flux, while quadrature current is directly related to the electromagnetic torque produced in the motor shaft. With this strategy you have the so-called decoupling, that is, you can independently control the flux and torque in the motor by controlling the currents I_d and I_q, respectively.

As these currents are represented by vectors that spin at synchronous speed, when viewed from a stationary frame of reference, the frame is transformed to change them for a synchronous frame of reference. In the synchronous frame, these vectors are turned into DC values proportional to the amplitude of the respective vectors. This considerably simplifies the control circuit.

When vector I_d is aligned with the motor flux, we can say said that the vector control is oriented. To that end, it is necessary that the motor parameters be correctly set. These parameters must be set according to the motor nameplate data and other information obtained automatically by the Self-Tuning, or through the motor data sheet provided by the manufacturer.

Figures 9.6 and 9.7, on the page 9-21, show the block diagram for the vector control with encoder and sensorless in the speed and torque operating modes, respectively. The speed information, as well as the currents measured by the inverter, will be used to obtain the correct direction of the vectors. In the case of vector control with encoder, the speed is obtained directly from the encoder signal, while in sensorless vector control there is an algorithm that estimates the speed based on the output currents and voltages.

The vector control measures the currents, separates the components into direct and quadrature portions and transforms these variables for the synchronous frame of reference. The motor is controlled by imposing the desired currents and comparing them to the actual values.

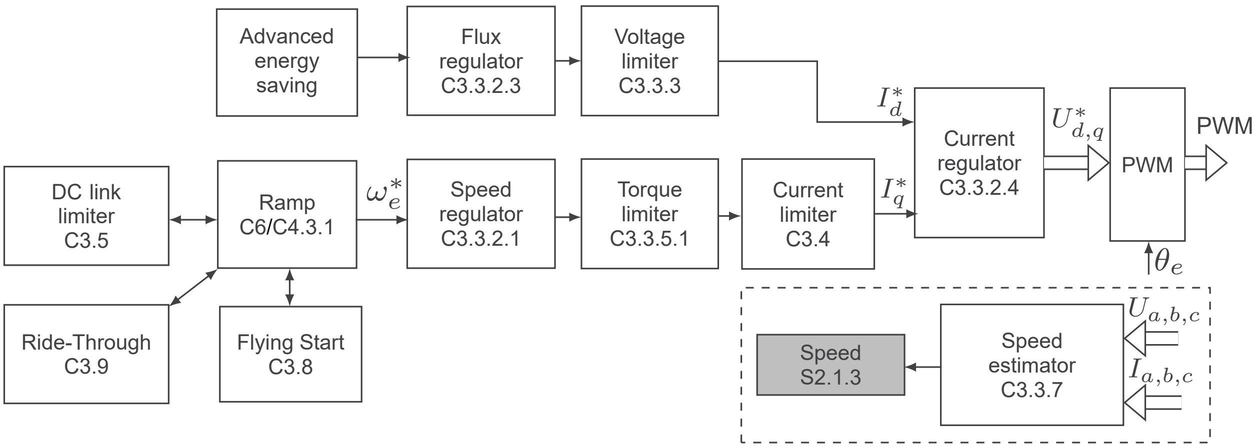


Figure 9.6: *Block diagram of induction motor vector control in speed mode*

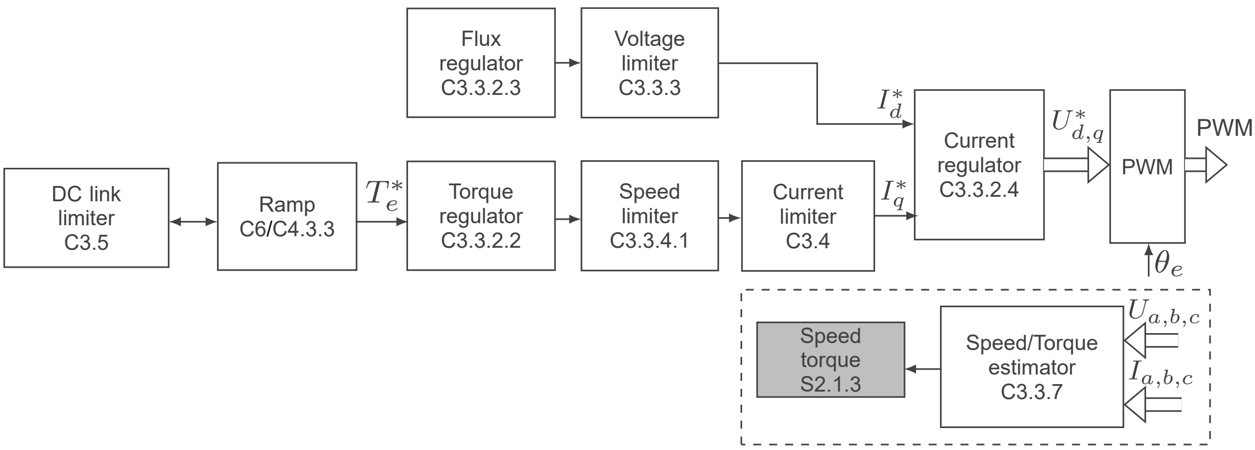


Figure 9.7: *Block diagram of induction motor vector control in torque mode*

SENSORLESS VECTOR CONTROL

The Sensorless Vector Control is recommended for most applications as it allows operation in a 1:100 speed range, 0.5 % speed control accuracy of the rated speed, high starting torque and fast dynamic response.

Another advantage of this kind of control is greater robustness against sudden voltage variations of the power supply and load, preventing unnecessary shutdowns by overcurrent.

The necessary settings for the proper operation of the sensorless control are made automatically. To that end, the motor to be used must be connected to the MVW3000.

VECTOR CONTROL WITH ENCODER

The Vector Control with Encoder on the motor presents the same advantages as those of the sensorless previously mentioned with the following additional benefits:

- Speed and torque control up to 0 (zero) rpm.
- Precision of 0.01 % in the speed control (if digital references are used, for example, via HMI, Profibus DP, DeviceNet, etc.).

Vector control with encoder requires accessory for interfacing with incremental encoder (E.g. ENC-01). For more installation and connection details, refer to the accessory manual.

In order to perform the Self-tuning in the Running mode, it is necessary that the rotor shaft is free to spin (without application of load on the shaft). During this process, the motor will spin up to half the motor rated speed set in C2.1.8.

During the Self-tuning process in Stop mode, there may be small movements in the rotor during the identification of parameter T_r (rotor time constant). Therefore, if the application is sensitive to these small movements, it is recommended that the Self-tuning process be carried out with the motor disconnected from the system.

VECTOR CONTROL FOR SYNCHRONOUS MOTOR

Permanent magnet synchronous motors are alternating current machines with a three-phase stator winding, similar to an induction motor, and a permanent magnet rotor. Machines for industrial applications have sinusoidal supply current and CEMF (induced voltage) so that the developed torque is smooth. The MVW3000 is prepared to drive synchronous machines with permanent magnets, having in mind that the type of synchronous machine to be used must be previously configured. Configuration options can be seen in C2.1.1:

- IPSM: Synchronous machine with internal permanent magnet (Inductance L_q bigger than L_d).
- SPSM: Synchronous machine with surface permanent magnet (Inductance L_q equal to L_d).

If you do not know the type of synchronous machine that will be used, select the IPSM option. The MVW3000 contains a self-tuning routine for parametric identification of the synchronous machine. The Self-Tuning options are presented in section C3.3.2.6.1:

- Stopped Mode - Parameter estimation: R_s, L_d, L_q.
- Running Mode - Parameter estimation: R_s, L_d, L_q and K_e.

In order to perform the Self-Tuning in Running mode, it is necessary that the rotor shaft be free to spin (without application of load on the shaft). During this process, the motor will spin up to 1000 rpm. If the motor rated speed is less than 1000 rpm, the motor will spin up to the motor rated speed, set in C2.1.8.

During the Self-Tuning process in Stopped mode, there may be small movements in the rotor during parameter identification L_q. Therefore, if the application is sensitive to these small movements, it is recommended that the Self-Tuning process be performed with the motor disconnected from the system.

During the Oriented Start-up routine, you will be asked to set the value of parameter K_e. If the Self-Tuning method is Running, you must, at this moment, enter the value of $K_e = 0$. However, if you want to select the Stopped Self-Tuning option, you must set parameter K_e (C2.2.10) manually.

NOTE!
It is recommended that the motor rated current be greater than 1/3 of the inverter rated current.

Figures 9.8 and 9.9 show, respectively, the block diagram for vector control with encoder and sensorless in the speed and torque operating modes for synchronous machines. The speed information, as well as the currents measured by the inverter, will be used to obtain the correct direction of the vectors. In the case of vector control with encoder, the speed is obtained directly from the encoder signal, while in sensorless vector control there is an algorithm that estimates the speed based on the output currents and voltages.

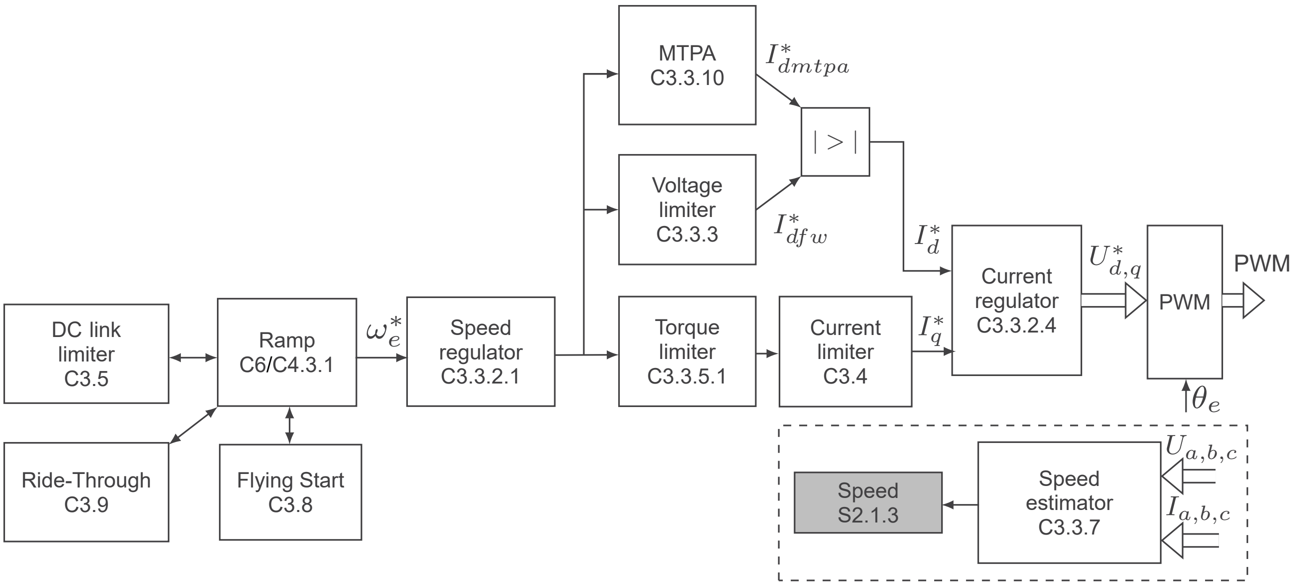


Figure 9.8: *Synchronous motor (PM) vector control block diagram in the speed mode*

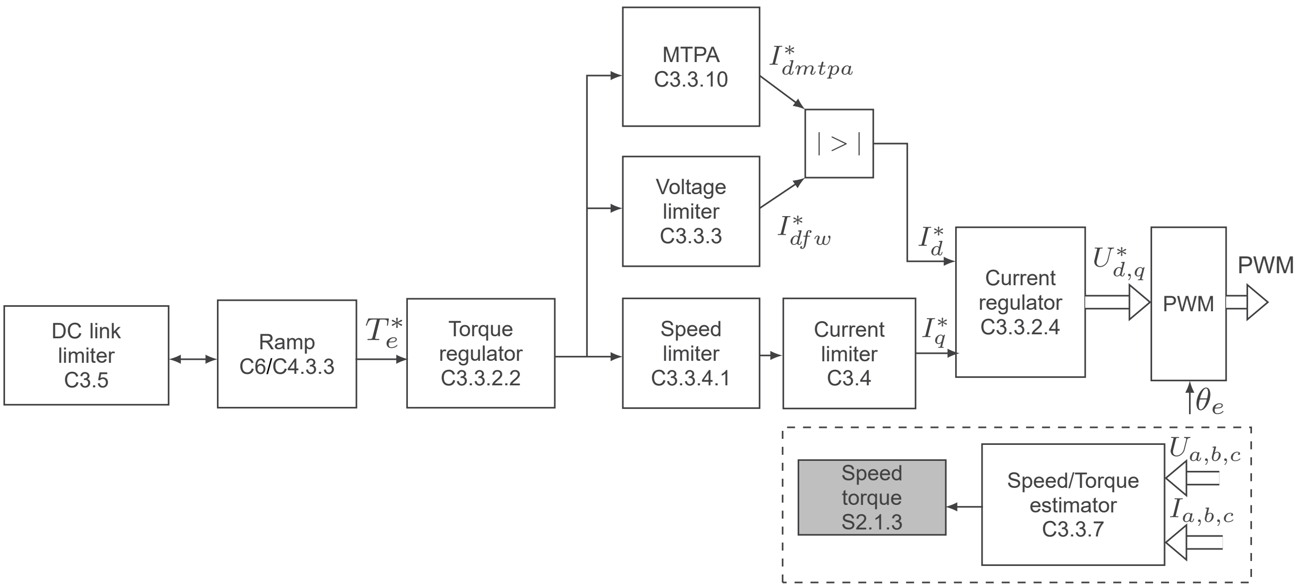


Figure 9.9: *Synchronous motor (PM) vector control block diagram in torque mode*

C3.3.1 Configuration

It defines some settings of the vector control.

C3.3.1 Configuration		
C3.3.1.1 Control mode		
Range:	0 ... 2	**Default:** 0
Properties:		

Description:
Sets the control mode for the motor.

Synchronous Machines - Torque Mode:
It is important that the first motor start-up is carried out with the motor stopped, due to the identification of the initial position of the rotor. However, for applications where it is not possible to perform the first actuation with the motor stopped, the Flying-Start function must be enabled.

Indication	Description
0 = Speed	Enable control in Speed mode
1 = Torque	Enable control in Torque mode
2 = Defined by DI	The control mode is defined by the status of the digital input set in (C3.3.1.2). Inactive input selects Speed mode and active input selects Torque mode

NOTE!
The torque mode only works when the control type is Vector w/ Encoder (C3.1.1 = 2).

C3.3.1 Configuration

C3.3.1.2 Control mode DI config.

Range: 0 ... 62 **Default:** 0
Properties: Stopped

Description:
It defines which digital input makes the transition from Speed mode to Torque mode or vice versa.

Table 9.20: *Values assigned to the Digital Inputs of X and A...G Slots for defining the Control Mode*

Digital Inputs options for X and A...G Slots								
Indication	**Slot X**	**Slot A**	**Slot B**	**Slot C**	**Slot D**	**Slot E**	**Slot F**	**Slot G**
Inactive	0							
DI1	X-1 (1)	A-1 (7)	B-1 (15)	C-1 (23)	D-1 (31)	E-1 (39)	F-1 (47)	G-1 (55)
DI2	X-2 (2)	A-2 (8)	B-2 (16)	C-2 (24)	D-2 (32)	E-2 (40)	F-2 (48)	G-2 (56)
DI3	X-3 (3)	A-3 (9)	B-3 (17)	C-3 (25)	D-3 (33)	E-3 (41)	F-3 (49)	G-3 (57)
DI4	X-4 (4)	A-4 (10)	B-4 (18)	C-4 (26)	D-4 (34)	E-4 (42)	F-4 (50)	G-4 (58)
DI5	X-5 (5)	A-5 (11)	B-5 (19)	C-5 (27)	D-5 (35)	E-5 (43)	F-5 (51)	G-5 (59)
DI6	X-6 (6)	A-6 (12)	B-6 (20)	C-6 (28)	D-6 (36)	E-6 (44)	F-6 (52)	G-6 (60)
DI7	–	A-7 (13)	B-7 (21)	C-7 (29)	D-7 (37)	E-7 (45)	F-7 (53)	G-7 (61)
DI8	–	A-8 (14)	B-8 (22)	C-8 (30)	D-8 (38)	E-8 (46)	F-8 (54)	G-8 (62)

C3.3.1 Configuration

C3.3.1.3 Control encoder

Range: 0 ... 8 **Default:** 8
Properties: Stopped

Description:
It defines which accessory Slot will be used for reading the encoder signals.

Indication	Description
0 = Slot X	Reading of the encoder signals via IO1 and IO2 of the Slot X accessory
1 = Slot A	Reading of the encoder signals via ENC-01 accessory in Slot A
2 = Slot B	Reading of the encoder signals via ENC-01 accessory in Slot B
3 = Slot C	Reading of the encoder signals via ENC-01 accessory in Slot C
4 = Slot D	Reading of the encoder signals via ENC-01 accessory in Slot D
5 = Slot E	Reading of the encoder signals via ENC-01 accessory in Slot E

Indication	Description
6 = Slot F	Reading of the encoder signals via ENC-01 accessory in Slot F
7 = Slot G	Reading of the encoder signals via ENC-01 accessory in Slot G
8 = None	There is no accessory for reading the encoder signals installed on the MVW3000

C3.3.1 Configuration

C3.3.1.6 Magnetization mode

Range: 0 ... 1 **Default:** 1

Properties:

Description:
Defines which command will be used to initiate motor magnetization.

In the Run/Stop option:

For synchronous machines, the process of identifying the initial rotor position will be performed whenever the RUN command is executed with the motor stopped. There will be no voltage or current signal applied to the motor when the motor is stopped or the inverter is in the READY state.

For induction machines, there will be no magnetizing current with the motor stopped. When the RUN command is executed, the motor will be magnetized and then the speed or torque reference ramp will be released.

In the General Enable option:

For synchronous machines, a high-frequency signal will be applied when the motor is stopped. The process The initial rotor position identification test will be performed only once.

For induction machines, a direct current (magnetizing current) will be applied to the motor when it is stopped.

NOTE!
For applications with on-load starts, the General-enabled option is recommended.

Indication	Description
0 = General Enable	Applies magnetizing current after General Enable ON.
1 = Run/Stop	It applies magnetizing current after Run/Stop = Run

C3.3.2 Regulators

It allows viewing and changing the parameters related to the vector control flux, current and speed regulators.

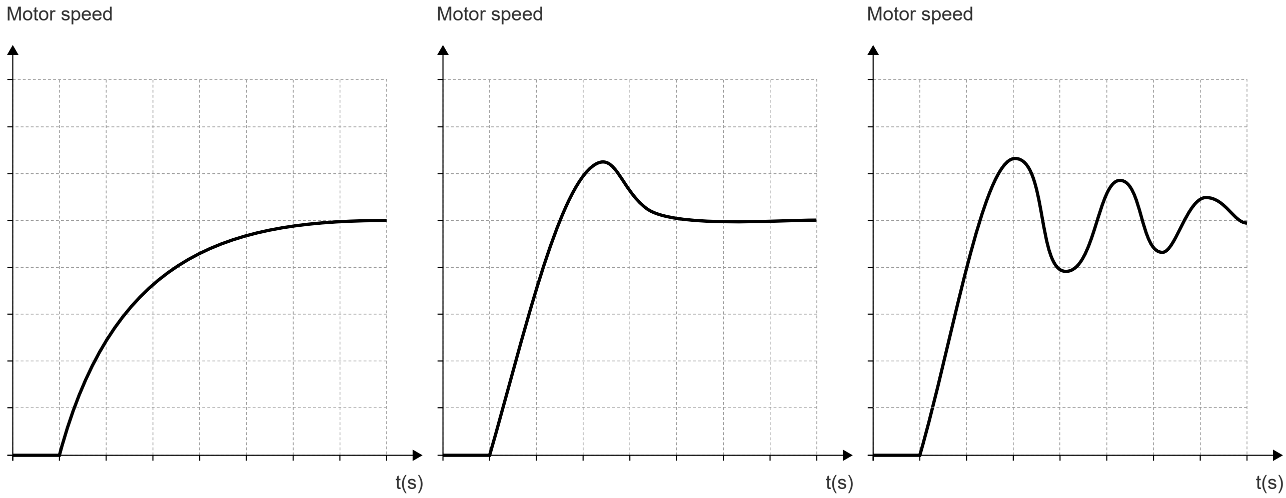
C3.3.2.1 Speed regulator

Regulator responsible for setting the motor speed dynamics. The speed regulator gains are automatically calculated according to parameter C2.2.5. Changing C2.2.5, parameters C3.3.2.1.2 and C3.3.2.1.3 are modified proportionally; however, these gains can be manually set to optimize the dynamic speed response.

The proportional gain (C3.3.2.1.2) stabilizes sudden changes in speed or reference, while the Integral gain (C3.3.2.1.3) corrects the error between reference and speed and improves torque response at low speeds. The Differential gain (C3.3.2.1.4) helps minimize variations in the motor speed produced by sudden load changes.

Manual Adjustment Procedure for Speed Regulator Optimization:

1. Select the acceleration (C6.1.1 or C6.1.4) and/or deceleration (C6.1.2 or C6.1.5) time according to the application.
2. Set the speed reference to 75 % of the maximum value.
3. Using the WPS software, set a trend to the ”Effective Speed” variable.
4. Lock the speed ramp (Run/Stop = Stop) and wait for the motor to stop.
5. Release the speed ramp (Run/Stop = Run). Observe the motor speed signal with the WPS trend.
6. Check among the options in Figure 9.10 which waveform best represents the read signal.



(a) Small integral gain (C3.3.2.1.3) and/or high proportional gain (C3.3.2.1.2)

(b) Optimized speed regulator

(c) High integral gain (C3.3.2.1.3) and/or small proportional gain (C3.3.2.1.2)

Figure 9.10: *(a), (b) and (c) - Types of speed regulator response*

7. Set C3.3.2.1.2 and C3.3.2.1.3 according to the type of response shown in Figure 9.10.

a. Decrease the proportional gain (C3.3.2.1.2) and/or increase the integral gain (C3.3.2.1.3).
b. Speed regulator optimized.
c. Increase the proportional gain (C3.3.2.1.2) and/or decrease the integral gain (C3.3.2.1.3).

In sensorless vector control the maximum typical value of the proportional gain C3.3.2.1.2 must not be greater than 9.0. Otherwise, strange behaviors can be observed in the motor, such as: motor remains still or spins at low speed, despite the output current being different from zero. It is recommended to reduce the setting in C3.3.2.1.2 until the motor behaves correctly.

C3.3.2.1 Speed regulator

C3.3.2.1.1 Adaptive gain

Range: 0 ... 1 **Default:** 0

Properties:

Description:
Allows to automatically adjust the speed regulator gains according to the speed and torque level of the application.. The calculation routine is performed from the values set in C3.3.2.1.2 e C3.3.2.1.3.

Indication	Description
0 = Disable	Disable function
1 = Enable	It enables function

C3.3.2.1 Speed regulator

C3.3.2.1.2 Proportional gain

Range: 0.0 ... 50.0 **Default:** 5.0

Properties:

Description:
It sets the value of the Speed Regulator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.1.3.

C3.3.2.1 Speed regulator		
C3.3.2.1.3 Integral gain		
Range:	0.001 ... 1.000	**Default:** 0.100
Properties:		

Description:
It sets the value of the Speed Regulator integral gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.1 Speed regulator		
C3.3.2.1.4 Differential gain		
Range:	0.00 ... 7.99	**Default:** 0.00
Properties:		

Description:
It sets the value of the Speed Regulator differential gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.1 Speed regulator		
C3.3.2.1.5 Filter		
Range:	1 ... 1000 ms	**Default:** 12 ms
Properties:		

Description:
It sets the low-pass filter time constant value of the speed signal used in the Speed Regulator.

NOTE!
In general, this parameter must not be changed. Increasing its value makes the system response slower.

C3.3.2.1 Speed regulator		
C3.3.2.1.6 Speed observer full time		
C3.3.2.1.7 Speed observer gain		
Range:	0.000 ... 9.999	**Default:** 0.942 (C3.3.2.1.6)
		0.165 (C3.3.2.1.7)
Properties:		

Description:
Induction motor speed observer PI regulator parameters.

C3.3.2.1 Speed regulator		
C3.3.2.1.8 Motor model speed time constant		
Range:	0.5 ... 12.0 ms	**Default:** 2.0 ms
Properties:		

Description:
Time constant of the filter used in the speed feedback of the current model.

C3.3.2.2 Torque regulator

C3.3.2.2 Torque regulator		
C3.3.2.2.1 Proportional gain		
Range:	0.00 ... 5.00	**Default:** 1.00
Properties:		

Description:
It sets the value of the Torque Regulator proportional gain.

The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.

> **NOTE!**
> If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.4.2.2.

C3.3.2.2 Torque regulator		
C3.3.2.2.2 Integral gain		
Range:	0.000 ... 1.000	**Default:** 0.010
Properties:		

Description:
It sets the value of the Torque Regulator integral gain.

The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.

C3.3.2.2 Torque regulator		
C3.3.2.2.3 Differential gain		
Range:	0.00 ... 7.99	**Default:** 0.00
Properties:		

Description:
It sets the value of the Torque Regulator differential gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.2 Torque regulator		
C3.3.2.2.4 Filter		
Range:	12 ... 10000 ms	**Default:** 12 ms
Properties:		

Description:
It allows setting the low-pass filter time constant value of the torque signal.

C3.3.2.3 Flux regulator

It allows viewing and changing the parameters related to the vector control flux regulator.

C3.3.2.3 Flux regulator		
C3.3.2.3.1 Proportional gain		
Range:	0.0 ... 999.9	**Default:** 50.0
Properties:		

Description:
It sets the value of the Flux Regulator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

> **NOTE!**
> If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.3.2.

C3.3.2.3 Flux regulator		
C3.3.2.3.2 Integral time		
Range:	0.001 ... 50.000 s	**Default:** 0.900 s
Properties:		

Description:
It sets the value of the Flux Regulator integral gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.3 Flux regulator		
C3.3.2.3.3 Minimum flux		
Range:	0 ... 120 %	**Default:** 0 %
Properties:	Stopped	

Description:
It sets the value of flow reference for vector control. This value is a reference in percentage of the motor rated flux value.

C3.3.2.3 Flux regulator		
C3.3.2.3.4 Rated flux		
Range:	0 ... 120 %	**Default:** 100 %
Properties:	Stopped	

Description:
It sets the value of flow reference for vector control. This value is a reference in percentage of the motor rated flux value.

C3.3.2.3 Flux regulator		
C3.3.2.3.5 Maximum flux		
Range:	0 ... 200 %	**Default:** 120 %
Properties:	Stopped	

Description:
It sets the value of flow reference for vector control. This value is a reference in percentage of the motor rated flux value.

C3.3.2.3 Flux regulator		
C3.3.2.3.6 Magnetization time		
Range:	0.01 ... 10.00	**Default:** 1.00
Properties:		

Description:
Adjusts the motor magnetization time. This value is proportional to the rotor time constant of the motor.

C3.3.2.4 Current regulator

It allows viewing and changing the parameters related to the vector control current regulator.

C3.3.2.4 Current regulator		
C3.3.2.4.1 Id prop. gain		
Range:	0.00 ... 5.00	**Default:** 1.00
Properties:		

Description:
It sets the value of the Current Regulator proportional gain (D axis of the synchronous reference frame). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.4.2.

C3.3.2.4 Current regulator		
C3.3.2.4.2 Id integral gain		
Range:	0.001 ... 1.000	**Default:** 0.050
Properties:		

Description:
It sets the value of the Current Regulator integral gain (D axis of the synchronous reference frame). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.4 Current regulator		
C3.3.2.4.3 Iq prop. gain		
Range:	0.00 ... 5.00	**Default:** 1.00
Properties:		

Description:
It sets the value of the Current Regulator proportional gain (Q axis of the synchronous reference frame). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.4.4.

C3.3.2.4 Current regulator		
C3.3.2.4.4 Iq integral gain		
Range:	0.001 ... 1.000	**Default:** 0.050
Properties:		

Description:
It sets the value of the Current Regulator integral gain (Q axis of the synchronous reference frame). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.4 Current regulator		
C3.3.2.4.5 Proportional gain		
Range:	0.000 ... 9.999	**Default:** 0.080
Properties:		

Description:

C3.3.2.4 Current regulator		
C3.3.2.4.6 Integral gain		
Range:	0.001 ... 65.535 s	**Default:** 0.123 s
Properties:		

Description:

C3.3.2.6 Regulators self-tuning

Before executing the Self-tuning function it is recommended to program an emergency option such a digital input programmed for general enable.

During the execution of the Self-tuning function, no other operations must be performed on the inverter, such as: setting, copying and loading the factory default parameters, downloading parameters via WPS, executing commands, etc.

C3.3.2.6 Regulators self-tuning		
C3.3.2.6.1 Regulators self-tuning		
Range:	0 ... 2	**Default:** 0
Properties:	Stopped	

Description:
Defines the motor parameter identification mode. After selected the identification method, self-tuning starts executing the steps automatically.

Indication	Description
0 = No	Function disabled.
1 = Stopped	Self-tuning with the motor stopped
2 = Running	Self-tuning with the motor running

C3.3.3 Output voltage limiter

It allows viewing and changing the parameters related to the output voltage limiter for proper control in the field weakening region.

The Output Voltage Limiter prevents the voltage imposed by the inverter from exceeding a preset value set in C3.3.3.1. This will prevent electrical damage to the motor stator. This region of operation is commonly known as the field weakening region, because, in this region, the motor magnetic field is weakened to ensure that the voltage imposed on the stator be limited to the value C3.3.3.1. This will occur whenever the value set in C3.3.3.1 is equal to or greater than the value of the motor rated voltage (C2.1.4).

C3.3.3 Output voltage limiter		
C3.3.3.1 Maximum output voltage		
Range:	0.0 ... 120.0 %	**Default:** 100.0 %
Properties:		

Description:
Allows setting the value of the maximum output voltage. The value set in this parameter corresponds to a percentage in relation to the motor rated voltage set in C2.1.4.

C3.3.3 Output voltage limiter		
C3.3.3.2 Proportional gain		
Range:	0.00 ... 5.00	**Default:** 1.00
Properties:		

Description:
It sets the proportional gain value of the Voltage Limiter regulator. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.3.3.

C3.3.3 Output voltage limiter		
C3.3.3.3 Integral gain		
Range:	0.00 ... 100.00	**Default:** 1.00
Properties:		

Description:
It sets the integral gain value of the Voltage Limiter regulator. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.3 Output voltage limiter		
C3.3.3.4 Field weakening starting point		
Range:	0 ... 120 %	**Default:** 90 %
Properties:		

Description:
Expresses the percentage of the modulation index from which the motor field weakening occurs.

C3.3.3 Output voltage limiter		
C3.3.3.5 Speed for MTPV		
Range:	0 ... 600 %	**Default:** 250 %
Properties:		

Description:
It allows defining the transition speed from field weakening mode to MTPV (Maximum Torque per Voltage). The value set in this parameter corresponds to a percentage in relation to the motor rated speed, which is set in C2.1.8.

NOTE!
Function available only for induction motor (C2.1.1 = 0).

C3.3.3 Output voltage limiter		
C3.3.3.6 field weakening feedback		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:

Indication	Description
0 = Voltage reference	The current regulators output itself is fed back to field weakening
1 = Highest modulation index	The field weakening regulator receives the highest modulation rate among the phases, directly from the modulator This value already takes into account the maximum modulation index and the saturations that may occur within the modulator.

C3.3.4 Torque mode

Settings for torque control mode in vector control.

C3.3.4.1 Speed limiter

Allows viewing and changing the parameters related to the motor speed limiters. These limiters prevent motor overspeed.

The Speed Limiter is enabled when in torque control mode (C3.3.1.1 = 1). The motor speed is monitored to prevent it from exceeding the values set in C3.3.4.1.1 and C3.3.4.1.2 (Figure 9.11). If the motor speed exceeds these values, the torque reference is decreased to keep the motor speed limited.

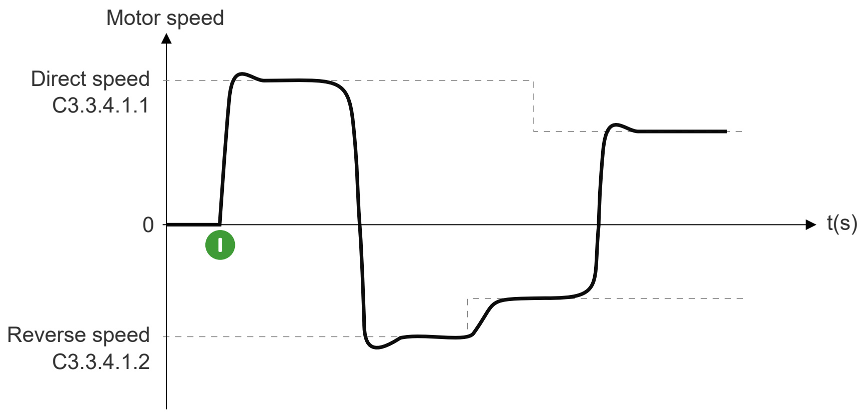


Figure 9.11: *Speed behavior limited according to the settings*

C3.3.4.1 Speed limiter		
C3.3.4.1.1 Forward speed		
Range:	0 ... 32000 rpm	**Default:** 1800 rpm
Properties:		

Description:
It sets the value of the maximum motor speed when running in the forward direction.

C3.3.4.1 Speed limiter		
C3.3.4.1.2 Reverse speed		
Range:	0 ... 32000 rpm	**Default:** 1800 rpm
Properties:		

Description:
It sets the value of the maximum motor speed when running in the reverse direction.

C3.3.4.1 Speed limiter		
C3.3.4.1.3 Proportional gain		
Range:	0.00 ... 5.00	**Default:** 0.50
Properties:		

Description:
It sets the proportional gain value of the Speed Limiter regulator.
The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.

> **NOTE!**
> If you need to change the gains of this controller, It is suggested that you first gradually increase the value of C3.3.4.1.4.

C3.3.4.1 Speed limiter		
C3.3.4.1.4 Integral gain		
Range:	0.000 ... 1.000	**Default:** 0.010
Properties:		

Description:
It sets the integral gain value of the Speed Limiter regulator.
The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.

C3.3.5 Speed mode

Settings for the speed mode in vector control.

C3.3.5.1 Torque limiter

It allows viewing and changing the parameters related to the motor torque limiter.

The Torque Limiter is enabled when the selected control mode is the speed mode (C3.3.1.1). The torque limiter contains five parameters that enable operation in the four quadrants.

Parameters C3.3.5.1.2 (Torque Q1), C3.3.5.1.3 (Torque Q2), C3.3.5.1.4 (Torque Q3) and C3.3.5.1.5 (Torque Q4) limit the torque independently in each motor operating quadrant (Fig. 9.12).

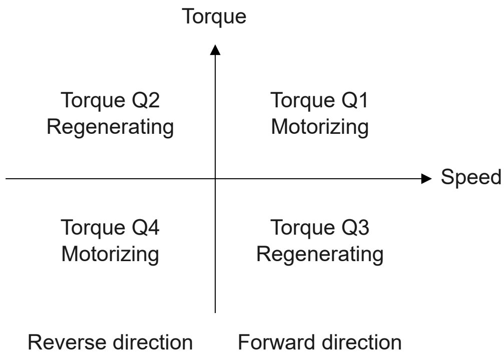
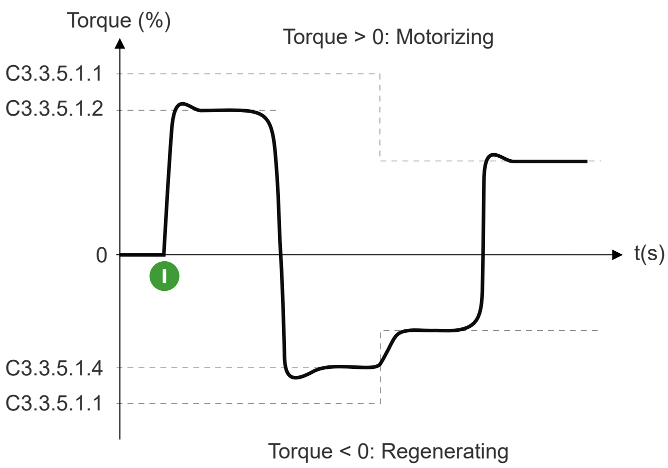
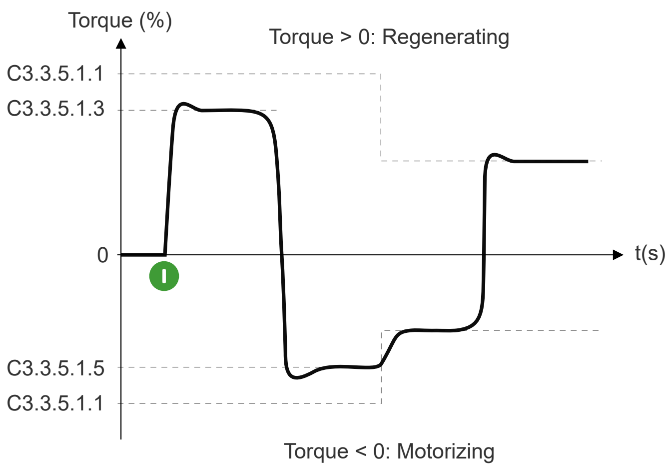


Figure 9.12: *Convention of the motor torque limiters in the four motor operation quadrants*

It is also possible to limit the motor torque with parameter C3.3.5.1.1 (Global Torque). This parameter has priority over the others and acts in all four quadrants simultaneously. Figure 9.13 shows the torque of the monitored motor to prevent it from exceeding the values set in C3.3.5.1.1 to C3.3.5.1.5. If the motor is in torque limitation, the motor speed will be reduced.



(a) *Forward speed*



(b) *Reverse speed*

Figure 9.13: *Torque behavior limited according to the settings*

C3.3.5.1 Torque limiter		
C3.3.5.1.1 Global torque		
Range:	0.0 ... 400.0 %	**Default:** 125.0 %
Properties:		

Description:
It sets the maximum torque in the four motor operating quadrants. If it is necessary to control the torque in the four motor operating quadrants, parameters C3.3.5.1.2 to C3.3.5.1.5 must be used.

C3.3.5.1 Torque limiter		
C3.3.5.1.2 Torque Q1		
Range:	0.0 ... 400.0 %	**Default:** 400.0 %
Properties:		

Description:
It sets the maximum torque of the motor running in the forward direction and in the 'motoring' operating condition.

C3.3.5.1 Torque limiter		
C3.3.5.1.3 Torque Q2		
Range:	0.0 ... 400.0 %	**Default:** 400.0 %
Properties:		

Description:
It sets the maximum torque of the motor running in the reverse direction and in the regenerating operating condition.

C3.3.5.1 Torque limiter		
C3.3.5.1.4 Torque Q3		
Range:	0.0 ... 400.0 %	**Default:** 400.0 %
Properties:		

Description:
It sets the maximum torque of the motor running in the forward direction and in the regenerating operating condition.

C3.3.5.1 Torque limiter		
C3.3.5.1.5 Torque Q4		
Range:	0.0 ... 400.0 %	**Default:** 400.0 %
Properties:		

Description:
It sets the maximum torque of the motor running in the reverse direction and in the 'motoring' operating condition.

C3.3.5.1 Torque limiter		
C3.3.5.1.6 Global torque AI config.		
Range:	0 ... 30	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the analog input that will be used to limit the motor maximum torque. Table 9.26 on page 9-36 shows the options.

Table 9.26: Values assigned to the Analog Inputs of X and A...G Slots

Analog Inputs options for X and A...G Slots								
Indication	**Slot X**	**Slot A**	**Slot B**	**Slot C**	**Slot D**	**Slot E**	**Slot F**	**Slot G**
Inactive	0							
AI1	X-1 (1)	A-1 (3)	B-1 (7)	C-1 (11)	D-1 (15)	E-1 (19)	F-1 (23)	G-1 (27)
AI2	X-2 (2)	A-2 (4)	B-2 (8)	C-2 (12)	D-2 (16)	E-2 (20)	F-2 (24)	G-2 (28)
AI3	–	A-3 (5)	B-3 (9)	C-3 (13)	D-3 (17)	E-3 (21)	F-3 (25)	G-3 (29)

NOTE!
Example: To choose Analog Input AI3 from Slot D, select D-3 (17) option.

C3.3.5.1 Torque limiter

C3.3.5.1.7 Proportional gain

Range: 0.00 ... 5.00 **Default:** 1.00

Properties:

Description:
It sets the proportional gain value of the Torque Limiter regulator. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.5.1.8.

C3.3.5.1 Torque limiter

C3.3.5.1.8 Integral gain

Range: 0.00 ... 100.00 **Default:** 1.00

Properties:

Description:
It sets the integral gain value of the Torque Limiter regulator.

The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.7 Speed steady state estimator

It allows viewing and changing the parameters related to the vector control steady state speed estimator.

C3.3.7 Speed steady state estimator

C3.3.7.1 Speed setting

Range: 0.10 ... 10.00 **Default:** 1.00

Properties:

Description:
It allows correcting the estimated speed error.

C3.3.7 Speed steady state estimator		
C3.3.7.2 Regenerative compensator		
Range:	0.00 ... 2.00	**Default:** 1.00
Properties:		

Description:
It allows to correct the estimated speed in regenerative mode application. This parameter must be increased in starting applications with load in regenerative mode. This parameter must be changed only when it is not possible to perform start under load or speed reversal in regenerative mode operation.

C3.3.7 Speed steady state estimator		
C3.3.7.3 Proportional gain		
Range:	0.00 ... 10.00	**Default:** 1.00
Properties:		

Description:
It sets the proportional gain value of the Steady State Speed Estimator. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.7.4.

C3.3.7 Speed steady state estimator		
C3.3.7.4 Integral gain		
Range:	0.00 ... 10.00	**Default:** 1.00
Properties:		

Description:
It sets the integral gain value of the Steady Speed Observer. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.7 Speed steady state estimator		
C3.3.7.5 Synchronous angle filter		
Range:	1 ... 15 ms	**Default:** 2 ms
Properties:		

Description:
Set the Low Pass Filter frequency of the speed observer .

This parameter has functionality only when using the encoder vector control. In case of small oscillations present in the electrical torque signal, gradually increase the parameter value.

C3.3.7 Speed steady state estimator		
C3.3.7.6 Observer transition speed		
Range:	0 ... 50 %	**Default:** 10 %
Properties:		

Description:
This parameter sets the transition speed of the speed observers.

The value of this parameter refers to the transition speed between the low-speed observer (high-frequency method) and the medium- and high-speed observer (linear method) for synchronous machines. This parameter is recalculated at the end of the Oriented Start-up. For PM motors, the calculation is given by:

$$RPM_{transition} = \frac{10\ \% \times 1000 \times C2.1.4}{C2.2.10}$$

A hysteresis (30 %) is used around the adjusted value so that unwanted transitions between observers will not occur.

C3.3.7 Speed steady state estimator		
C3.3.7.7 Home position displacement		
Range:	-50 ... 50 °	**Default:** 0 °
Properties:		

Description:
This parameter sets the estimated rotor initial position value.

This parameter is only available for vector control with encoder for synchronous machines.

C3.3.10 Maximum torque per ampere

It allows changing the parameters related to the Maximum Torque per Ampere (MTPA) function.

C3.3.10 Maximum torque per ampere		
C3.3.10.1 MTPA manual setting		
Range:	0.00 ... 2.00	**Default:** 1.00
Properties:		

Description:
It allows manually setting the system MTPA operating point.

C3.4 Current limiter

It allows viewing and changing the parameters related to the motor current limiter.

The current limiting function prevents failures, avoiding the actuation of the overcurrent fault in the inverter, during starts or stops with very short ramps. The function is also important to protect the motor in case of an overload, when it is operating at constant speed.

1 - Characteristics of the current limiting function when the motor is accelerating or decelerating:

The current limiting function always operates when the motor current exceeds the value set in C3.4.1. During the acceleration or deceleration process, the current limiting function controls the motor acceleration or deceleration rate to prevent the motor current from exceeding the value of C3.4.1. Figure 9.14 illustrates the function operation process during the motor acceleration and deceleration process.

2 - Current limitation characteristics when the motor is operating at constant speed:

During the steady state, in which the motor is operating at constant speed, the current limiting function acts on the speed reference to prevent the motor current from exceeding the value set in C3.4.1. Thus, when the system is operating under overload and the motor current exceeds the value set in C3.4.1, the motor goes into a controlled deceleration process to prevent the motor current from exceeding the value of C3.4.1. When the overload process ends, the motor accelerates up to its reference speed. Figure 9.15 shows the current limiting function actuation process when the motor is running at constant speed.

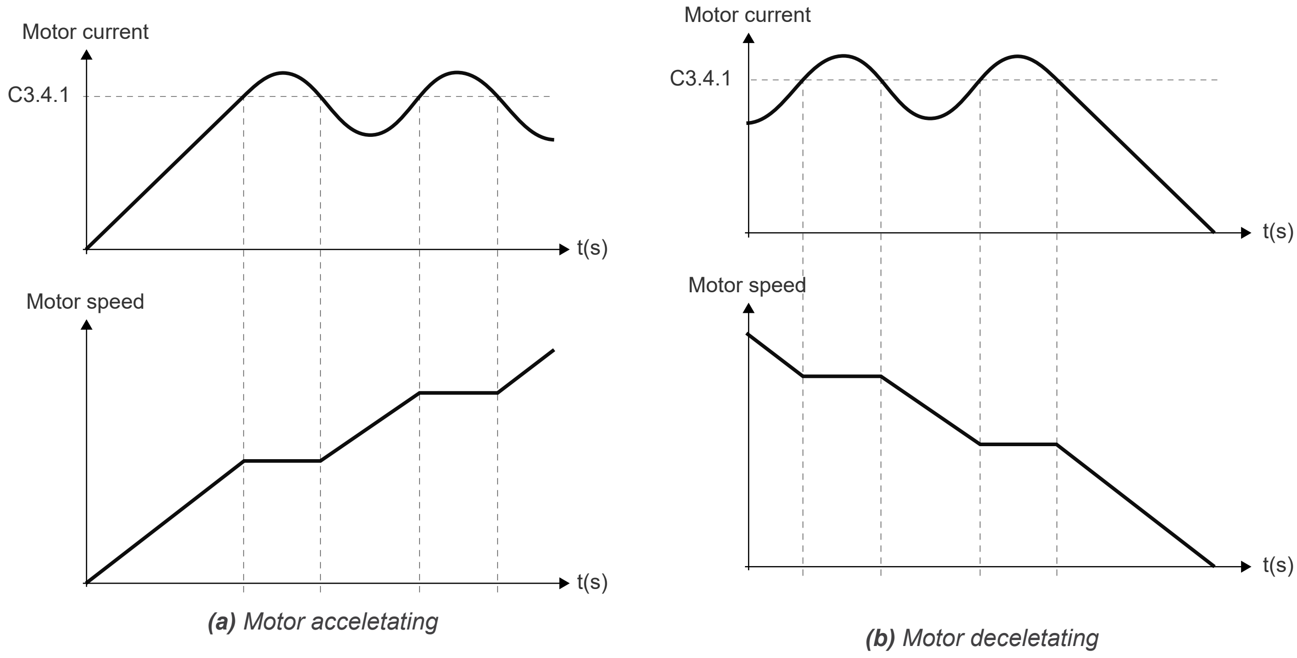


Figure 9.14: *Current limitation during the acceleration and deceleration process*

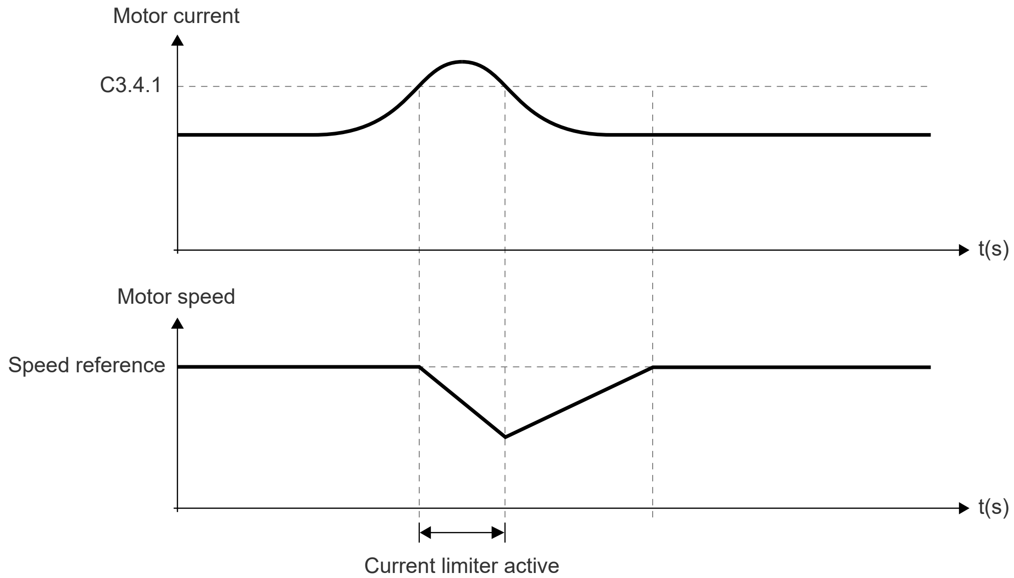


Figure 9.15: *Current limitation when the motor is running at constant speed*

C3.4 Current limiter		
C3.4.1 Actuation level		
Range:	0 ... 300 %	**Default:** 125 %
Properties:		

Description:
This parameter defines the maximum value of current in the motor during system operation. The full-scale is the nominal current of the motor defined in C2.1.5.

NOTE!
If the value set in C3.4.1 is greater than the inverter current, it will be automatically limited to the maximum current capacity of the inverter.

C3.4 Current limiter		
C3.4.3 Proportional gain		
Range:	0.00 ... 5.00	**Default:** -
Properties:	Model	

Description:
This parameter sets the Proportional Gain of the controller present in the current limiting function. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications. For applications with very short acceleration or deceleration ramps, the gains must be set to improve the controllers response, if necessary. In this case, it is recommended to gradually increase C3.4.3.

For applications with very short acceleration or deceleration ramps, there may be a need for a small adjustment in the gains.

In this case, it is recommended that the value be gradually increased.

C3.4 Current limiter		
C3.4.4 Integral gain		
Range:	0.00 ... 100.00	**Default:** 1.00
Properties:		

Description:
This parameter defines the Integral Gain of the controller existing in the current limiting function. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications. For applications with very short acceleration or deceleration ramps, the gains must be set to improve the controllers response, if necessary. In this case, it is recommended to gradually increase C3.4.4.

C3.4 Current limiter		
C3.4.5 Overcurrent fault level		
Range:	100 ... 250 %	**Default:** 175 %
Properties:		

Description:
It sets the current level to generate the software overcurrent fault - F073. Thus, when the motor current is greater than the value set in (C3.4.5), an overcurrent fault will be enabled. The full scale is the rated motor current set in C2.1.5.

NOTE!
Function available only for HSRM motor (C2.1.1 = 3).

C3.5 DC link

It allows viewing and changing the parameters related to the DC link limiting function.

During very short stops, in systems with high inertia, it is natural that the load regenerates a great amount of energy to the DC link, causing an increase in the DC voltage level. The DC link limiting function prevents the bus voltage from exceeding the value set in C3.5.2.1 for scalar and VVW+ control or C3.5.3.2 for vector control and causing overvoltage on the inverter.

1 - Characteristics of the DC link limiting function when the motor is decelerating:

The DC link limiting function changes the motor deceleration rate to control the increase in the bus voltage during the motor deceleration. Figure 9.16 illustrates the behavior of the function during the motor deceleration.

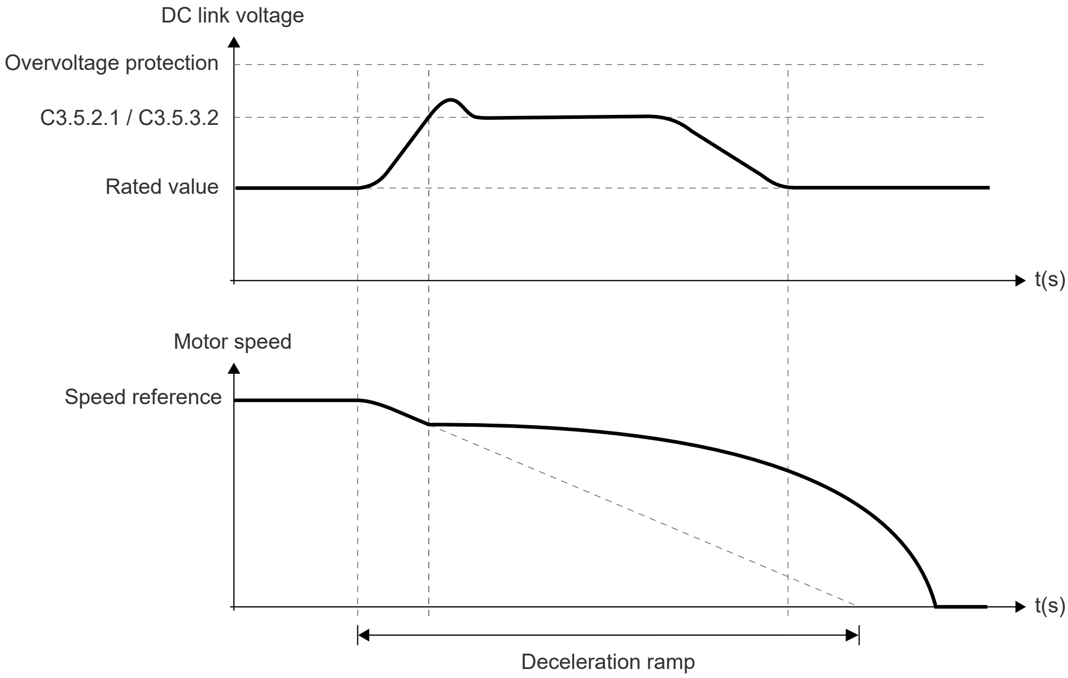


Figure 9.16: *DC link limitation during deceleration process*

2 - Characteristics of the DC link limiting function when the motor is operating at constant speed:

In certain applications, it is common for the load to operate in regenerative mode and the motor to be operating at constant speed. In this case, the DC link limiting function protects the inverter against bus overvoltage. Figure 9.17 illustrates the behavior of the function when the motor is operating at constant speed and the load in regenerative mode. In this situation, the DC link limiting function decelerates the motor in a controlled manner to prevent the bus voltage from exceeding the value set in C3.5.2.1 for scalar and VVW+ control or C3.5.3.2 for vector control. After the DC link voltage level returns to its rated value, the function accelerates the motor so that it returns to the speed set in S2.1.1.

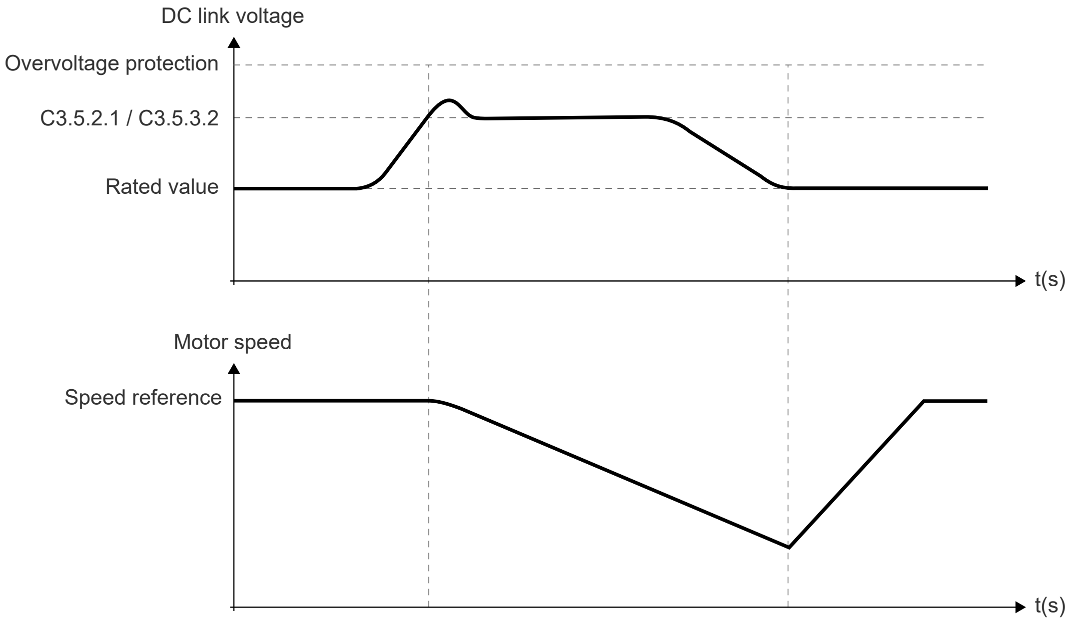


Figure 9.17: *DC link limitation when the motor is operating at constant speed*

C3.5.1 Voltage limit

It allows setting the DC link voltage limiting function for all control types.

C3.5.1 Voltage limit		
C3.5.1.1 Enable function		
Range:	0 ... 1	**Default:** 1
Properties:		

Description:
It enables the DC Link Limiting function.

Indication	Description
0 = Disable	Disable function
1 = Enable	It enables function

C3.5.2 Scalar control

It allows viewing and changing the parameters related to the scalar and VVW+ control of the DC link voltage limiting function.

C3.5.2 Scalar control		
C3.5.2.1 DC link voltage limit - Level		
Range:	114.0 ... 130.0 %	**Default:** 120.0 %
Properties:		

Description:
Defines the actuation level of the DC link limitation function in scalar and VVW+ control types.

Adjustment of the value of C3.5.2.1:

The value of C3.5.2.1 corresponds to a percentage of the Nominal DC Bus Voltage.

The nominal DC link voltage of the cells is given by $690V \times 1.35 = 931V$.

If the inverter continues to block due to overvoltage on the DC link during deceleration, gradually reduce the value of C3.5.2.1 or increase the deceleration ramp time C6.1.2 or C6.1.5.

If the power supply is permanently at such a voltage level that it results in a DC link voltage value greater than the setting of C3.5.2.1, it will not be possible to decelerate the motor. In this case, reduce the mains voltage or increase the value of C3.5.2.1.

C3.5.2 Scalar control		
C3.5.2.2 DC link voltage limit - Kp gain		
Range:	0.00 ... 9.99	**Default:** 0.15
Properties:		

Description:
It sets the value of the DC link voltage regulator proportional gain.

The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications. In the case of applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase its value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.5.2.3.

C3.5.2 Scalar control		
C3.5.2.3 DC link voltage limitation-Ki gain		
Range:	0.000 ... 5.000	**Default:** 1.000
Properties:		

Description:
It sets the integral gain value of the DC link voltage regulator.

The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications. In the case of applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase its value.

C3.5.2 Scalar control		
C3.5.2.4 DC link voltage limitation-Stabilizer gain		
Range:	0.000 ... 9.999	**Default:** 0.000
Properties:		

Description:
Sets the DC link oscillation stabilizer gain.

This function works together with the controller used in the DC link limiting function. In applications where the deceleration ramp is very short, and the system inertia is high, it is common to have consistent oscillations in the DC link. bus In this case, this parameter adjusts the stabilizer gain to dampen DC link oscillations.

Its value must be gradually increased when the system presents sustained oscillations on the DC link. If there is no consistent effect, you must increase the value of the deceleration ramp C6.1.2 or C6.1.5.

C3.5.3 Vector control

It allows viewing and changing parameters related to vector control.

C3.5.3 Vector control		
C3.5.3.1 Optim. braking func. enable		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
It selects the type of braking used in the vector control for induction machines. Braking with losses (Optimal Braking) increases the stator current in the motor to increase losses during the deceleration period.

> **NOTE!**
> The process carried out by this type of braking increases the acoustic noise in the environment.

Indication	Description
0 = No	Disable function
1 = Yes	It enables function

C3.5.3 Vector control		
C3.5.3.2 DC link limitation - Level		
Range:	114.0 ... 160.0 %	**Default:** 120.0 %
Properties:		

Description:
It sets the DC link limiting function actuation level in the vector control.

If the inverter keeps locking due to DC link overvoltage during deceleration, gradually reduce the value of C3.5.3.2 or increase the deceleration ramp time C6.1.2 or C6.1.5.

If the power supply is permanently at a voltage level so that it results in a DC link voltage value above the setting of C3.5.3.2, it will not be possible to decelerate the motor. In this case, reduce the supply voltage or increase the value of C3.5.3.2.

C3.5.3 Vector control		
C3.5.3.3 DC link limitation - Kp gain		
Range:	0.00 ... 6.39	**Default:** 0.30
Properties:		

Description:
It sets the value of the DC link voltage regulator proportional gain.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.5.3.4.

C3.5.3 Vector control		
C3.5.3.4 DC link limitation - Ki gain		
Range:	0.000 ... 1.000	**Default:** 0.030
Properties:		

Description:
It sets the integral gain value of the DC link voltage regulator.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

C3.5.4 Modulation compensation

Allows you to view and change parameters related to modulation compensation.

C3.5.4 Modulation compensation		
C3.5.4.1 Output voltage compensation		
Range:	0 ... 2	**Default:** 1
Properties:		

Description:
Output voltage compensation applied to the motor as a function of the DC link voltages.

Indication	Description
0 = Inactive	Function inactive
1 = Active (method 1)	Compensation executed considering the total voltage of each phase independently; when there is parallelism of arms, the associated phases in parallel are treated individually.
2 = Active (method 2)	Phases in parallel are treated as if they were just one phase, with the busbar voltage added.

C3.5.4 Modulation compensation		
C3.5.4.2 DC link filter time constant		
Range:	0.0 ... 999.9 ms	**Default:** 13.3 ms
Properties:		

Description:
Adjusts the time constant of the first order filter applied to the total DC-link voltage signal.

Each phase has an individual DC-link; consequently, there will be three filters - one for each phase.

If the parameter value is null, the DC-link voltage will no longer be filtered, that is, its instant value will be used in the compensation.

Not used if parameter C3.5.4.1 = Inative.

C3.8 Flying Start

The Flying Star function allows driving a motor that is in free spinning, accelerating it from the speed in which it is. This function is suitable for applications in which the system inertia is very high, and the time for the motor to stop is very high. In this case, if the motor is started, there may be a high energy regeneration to the DC link. Such energy regeneration may cause overcurrent and thus the actuation of the overcurrent fault at the start. Thus, the Flying Start function must be used to identify the actual rotor speed and, from that, start the motor from the actual rotor speed. Figure 9.18 illustrates the Flying Start function actuation process in a simplified way.

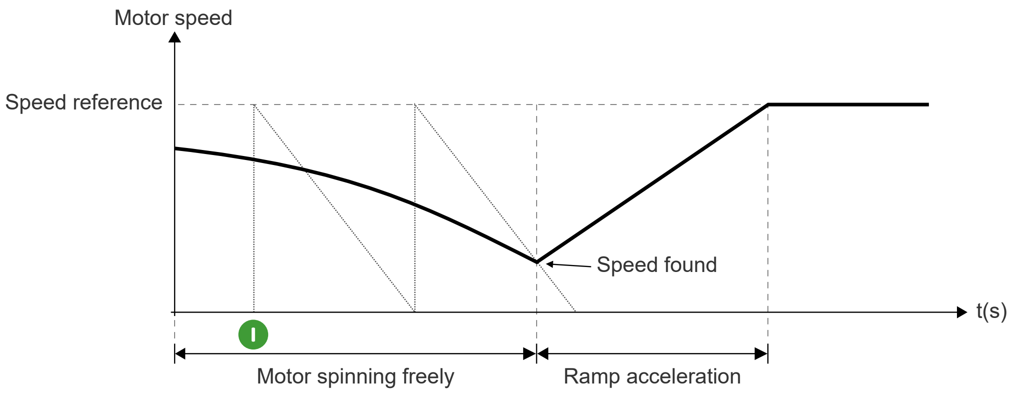


Figure 9.18: *Illustrative scheme of the Flying Start function*

The Flying Start function performs a scan by applying a speed reference to determine the rotor speed. Figure 9.19 illustrates the method that the Flying Start function uses to determine the rotor speed. The scan starts from the value defined in C4.3.1.1.2 (maximum speed) and ends at zero. The first scan is carried out in the same direction as the motor direction of rotation command. If the rotor speed is not determined, a second scan is performed in the opposite direction of the direction of rotation command. At the end of this process, if the rotor speed is not determined, the function considers that the motor is stopped and ends the determination process.

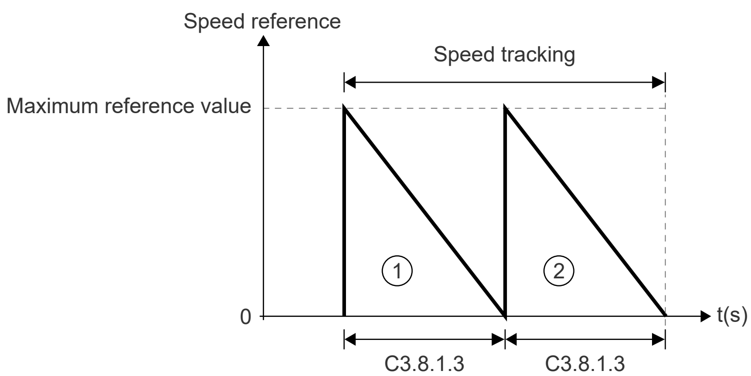


Figure 9.19: *Illustrative scheme of the rotor speed determination by the Flying Start function*

C3.8.1 Configuration

It allows configuring the Flying Start function according to the system application type.

C3.8.1 Configuration		
C3.8.1.1 Function reset		
Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
It selects the type of Reset for the Flying Start function. Reset = Start/Stop causes the Flying Start function to act whenever the motor is started. Reset = General Enable causes the Flying Start function to act only when the inverter is general enabled.

Indication	Description
0 = General Enable	Enable Reset by General Enable
1 = Run/Stop	It enables Reset by Run/Stop

C3.8.1 Configuration		
C3.8.1.2 Tracking		
Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
It allows locking the Flying Start function to track the rotor speed in the opposite direction to that defined in the motor direction of rotation command. See Figure 9.20 for further details.

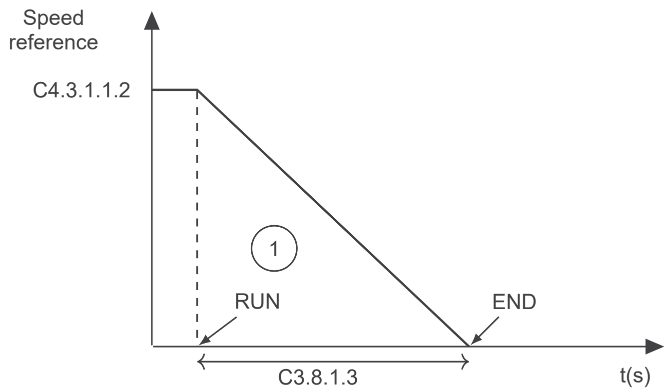


Figure 9.20: *Illustrative scheme of the rotor speed identification by the Flying Start function*

Indication	Description
0 = Two Trackings	It tracks the speed in both directions of rotation
1 = One Tracking	It tracks the speed in only one direction of rotation

C3.8.1 Configuration		
C3.8.1.3 Ramp		
Range:	0.2 ... 60.0 s	**Default:** 10.0 s
Properties:		

Description:
It sets the rotor speed determination time. See Figure 9.19 for more details.

C3.8.1 Configuration		
C3.8.1.4 Dead time		
Range:	1.0 ... 40.0 s	**Default:** 10.0 s
Properties:		

Description:
Sets the dead time, or coast time, of the motor.

This time represents the period in which the motor rotor remains magnetized after the power supply ceases.

For a flying start, the coast time is counted before the motor can be started again after PWM is disabled.

C3.8.1 Configuration		
C3.8.1.5 Enable function		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
It enables the Flying Start function.

Indication	Description
0 = Disable	Disable function
1 = Enable	It enables function

C3.8.1 Configuration		
C3.8.1.6 Disable Flying Start		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used to disable the Flying Start function. Table 9.43 on page 9-66 shows the options.

C3.8.2 Scalar control

Flying Start function settings for scalar control.

C3.8.2 Scalar control		
C3.8.2.1 Current		
Range:	0.0 ... 100.0 %	**Default:** 70.0 %
Properties:		

Description:
Inverter current limitation during execution of the flying start function.

The current is expressed as a percentage of the motor's nominal current, defined in C2.1.5.

If the motor's rated current is greater than the inverter's rated current, the inverter's rated current will be used as a basis, seeking to avoid the occurrence of overcurrent faults.

C3.8.3 Vector control

Flying Start function settings for vector control.

C3.8.3 Vector control		
C3.8.3.1 Flux reference		
Range:	0.0 ... 100.0 %	**Default:** 85.0 %
Properties:		

Description:
It defines the reference flux level that the Flying Start function will impose on the motor during the determination process. The flux level is a percentage of the motor rated flux.

C3.9 Ride-Through

The Ride-Through function makes it possible to recover the inverter, without undervoltage lockout, when there is a drop in the power supply for a short time.

Figure 9.21 illustrates the behavior of the Ride-Through function during a period of voltage drop in the power supply. At this moment, the inverter DC link voltage starts to decrease. Thus, the Ride-Through function starts decelerating the motor in a controlled way to regenerate energy to the DC link and keep the inverter active for a short period of time. After the power supply is restored, the motor is accelerated to the value set in C4.3.1.

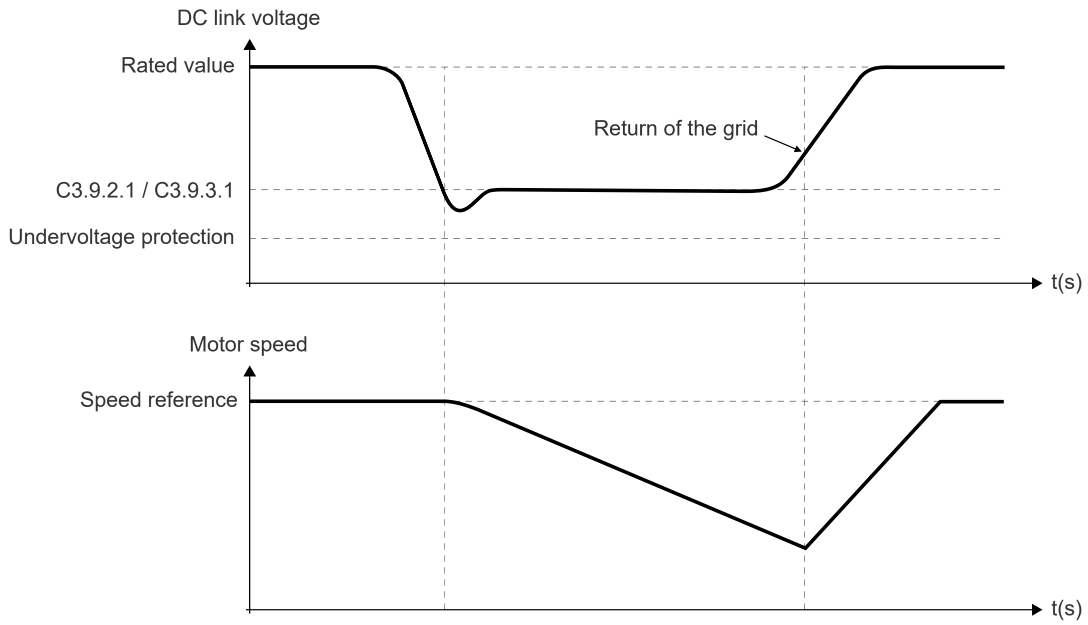


Figure 9.21: *Illustrative diagram of the Ride-Through function operation*

C3.9.1 Configuration

Settings of the Ride-Through function for all control types.

C3.9.1 Configuration		
C3.9.1.1 Function enable		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
It allows enabling the Ride-Through function.

Indication	Description
0 = Disable	Disable function
1 = Enable	It enables function

C3.9.1 Configuration		
C3.9.1.3 Maximum Ride-Through time		
Range:	0.5 ... 100.0 s	**Default:** 20.0 s
Properties:		

Description:
Defines the maximum time that the inverter can remain in ride-through condition before the fault occurs F309.

The time count starts when there is a condition to enter the ride-through (see C3.9.1.1 and C3.9.1.3).

If the maximum time is reached during a pre-charge, while the inverter is performing the ride-through with interruption, the timeout will be extended until after the grid return check at the end of the pre-charge.

C3.9.2 Scalar control

Settings of the Ride-Through function for scalar and VVW+ control.

C3.9.2 Scalar control		
C3.9.2.1 DC link voltage - Ride-Through		
Range:	76.0 ... 95.0 %	**Default:** 82.5 %
Properties:		

Description:
It sets the voltage regulation level on the DC link for the Ride-Through function, which allows the inverter to keep running.

The value of C3.9.2.1 corresponds to a percentage of the DC Link Rated Voltage.

NOTE!
The DC link undervoltage fault occurs at 70 % of the DC Link Rated Voltage.

C3.9.2 Scalar control		
C3.9.2.2 Ride-Through - Gain Kp		
Range:	0.00 ... 2.00	**Default:** 0.50
Properties:		

Description:
I sets the proportional gain value of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.9.2.3.

C3.9.2 Scalar control		
C3.9.2.3 Ride-Through - Gain Ki		
Range:	0.000 ... 1.000	**Default:** 0.050
Properties:		

Description:
This parameter sets the integral gain of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short acceleration or deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

C3.9.3 Vector control

Settings of the Ride-Through function for vector control.

C3.9.3 Vector control		
C3.9.3.1 DC link voltage - Ride-Through		
Range:	76.0 ... 95.0 %	**Default:** 82.5 %
Properties:		

Description:
It sets the voltage regulation level on the DC link for the Ride-Through function, which allows the inverter to keep running.

The value of C3.9.3.1 corresponds to a percentage of the DC Link Rated Voltage.

NOTE!
This parameter works together with parameters C3.9.3.2 and C3.9.3.3 for the Ride-Through function in vector control.

NOTE!
The DC link undervoltage fault occurs at 70 % of the DC Link Rated Voltage.

C3.9.3 Vector control		
C3.9.3.2 Ride-Through-Gain Kp		
Range:	0.00 ... 2.00	**Default:** 0.10
Properties:		

Description:
I sets the proportional gain value of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.9.3.3.

C3.9.3 Vector control		
C3.9.3.3 Ride-Through-Gain Ki		
Range:	0.000 ... 1.000	**Default:** 0.050
Properties:		

Description:
This parameter sets the integral gain of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short acceleration or deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

C3.11 Synchronous transfer

The synchronous transfer function enables the motor to be accelerated via the inverter to the nominal operating frequency, and then transferred to the power supply network.

In this way, it is possible to eliminate the effects of the starting current related to a direct start from the network.

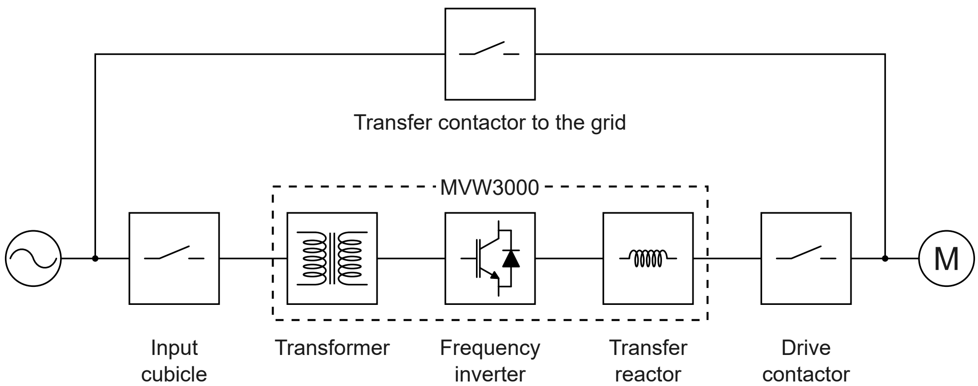


***Figure 9.22:** Synchronous transfer diagram*

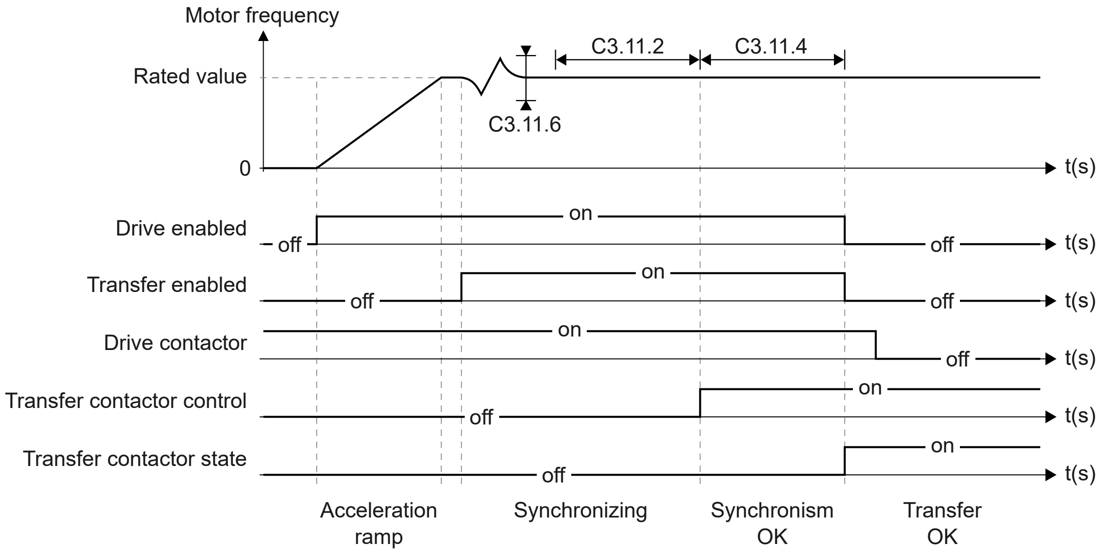


***Figure 9.23:** Operation diagram of the synchronous transfer function*

C3.11 Synchronous transfer		
C3.11.1 Enable function		
Range:	0 ... 2	**Default:** 0
Properties:		

Description:
Allows you to enable the synchronous transfer function.

Indication	Description
0 = Disable	Disable function
1 = Enable	It enables function
2 = Enable with regulation	Enables function with speed regulation.

C3.11 Synchronous transfer		
C3.11.2 Synchronism time		
Range:	0.0 ... 20.0 s	**Default:** 1.0 s
Properties:		

Description:
Minimum time that the inverter must keep the phase error between the grid voltage and the inverter output voltage lower than the programmed time to signal OK synchronization.

C3.11 Synchronous transfer		
C3.11.3 Synchronism timeout		
Range:	20 ... 240 s	**Default:** 60 s
Properties:		

Description:
Grid synchronization timeout.

C3.11 Synchronous transfer		
C3.11.4 Delay		
Range:	20 ... 3000 ms	**Default:** 170 ms
Properties:		

Description:
Delay to disable the inverter after the transfer command to the grid, preventing the motor from remaining without voltage for a period of time.

C3.11 Synchronous transfer		
C3.11.5 Maximum phase error		
Range:	0.0 ... 60.0 °	**Default:** 5.0 °
Properties:		

Description:
Phase error between grid and inverter voltage used in conjunction with synchronization time to indicate OK synchronization.

C3.11 Synchronous transfer		
C3.11.6 Speed limit		
Range:	0 ... 400	**Default:** 18
Properties:		

Description:
Sets the maximum speed for synchronous transfer search based on the motor nominal frequency.

C3.11 Synchronous transfer		
C3.11.7 Kp		
Range:	1 ... 500	**Default:** 200
Properties:		

Description:
Proportional gain of the output voltage synchronization regulator with the mains voltage.

C3.11 Synchronous transfer		
C3.11.8 Ti		
Range:	0.01 ... 20.00	**Default:** 0.20
Properties:		

Description:
Integral time of the output voltage synchronization regulator with the mains voltage.

C3.11 Synchronous transfer		
C3.11.9 Phase adjustment		
Range:	-180.0 ... 180.0 °	**Default:** 0.0 °
Properties:		

Description:
It compensates for the phase error between the voltage that the inverter uses as a reference for synchronization and the actual voltage at the point where the transfer will occur.

C3.11 Synchronous transfer		
C3.11.10 Minimum angle error to start the search		
Range:	0 ... 360 °	**Default:** 10 °
Properties:		

Description:

C3.11 Synchronous transfer		
C3.11.11 Status		
Range:	0 ... 4 Bit	**Default:** 0
Properties:		

Description:

Bit	Value/Description
Bit 0 Function enabled	**0 = No**: Synchronous transfer disabled. **1 = Yes**: Synchronous transfer enabled.
Bit 1 Synchronization command	**0 = Not used**: Not used **1 = Not used**: Not used
Bit 2 … 4 Synchronization status	**0 = Inactive**: Function disabled or missing synchronization command **1 = Checking synchronization**: Waiting for minimum conditions for synchronization, minimum speed and in the same direction between input and output **2 = Pre-speed regulation**: Adjusting the output frequency to reduce error relative to the input **3 = Pre-angular position regulation**: Perturbing the output frequency to reduce the absolute error of the angle between output and input **4 = Angular position regulation**: Perturbing the output frequency to reduce the absolute error of the angle between output and input **5 = Synchronized**: Output angular position equal to input **6 = Timeout**: Unable to adjust angle within maximum configured time

C3.12 Bypass

Allows damaged cells to be removed and/or isolated while keeping the inverter operating at reduced power.

Depending on the type of fault, low voltage cells must be removed from the motor power supply circuit.

ATTENTION!
Only cells with the bypass system installed will be able to enter bypass mode. Contact WEG for more details.

C3.12 Bypass		
C3.12.1 Bypass configuration		
Range:	0 ... 6 Bit	**Default:** 0
Properties:		

Description:
Sets the action to be taken by the inverter when it is necessary to take one of the cells out of operation.

Bit	Value/Description
Bit 0 … 1 Automatic Bypass	The Bypass function will automatically reorganize the array, removing the damaged cells and putting the system back into operation. **0 = Inactive**: In any situation of cell failure, the entire system is blocked **1 = Active with Flying Start**: The restart method used is Flying Start, the time for closing the bypass contactor is half the dead time of Flying Start **2 = Active with fast re-entry** : Monitors the output terminals to know when to close the cell bypass contactor and resume operation in sync with the motor
Bit 2 Balancing method	Defines the method of balancing line voltages when the inverter is operating with an unequal number of cells between phases. **0 = Amplitude readjustment**: It keeps the phase voltages always balanced, with the same amplitude and 120°out of phase, with the amplitude limitation being the phase with the smallest number of cells **1 = Angles readjustment**: Keeps line voltages balanced by readjusting the phase angles to a value other than 120°
Bit 3 … 6 Bypassed cells limit	Defines the maximum number of cells per phase that can be placed on automatic bypass. **0 = 0 cell** **1 = 1 cell** **2 = 2 cells** **3 = 3 cells** **4 = 4 cells** **5 = 5 cells** **6 = 6 cells** **7 = 7 cells** **8 = 8 cells** **9 = 9 cells** **10 = 10 cells** **11 = 11 cells** **12 = 12 cells**

C3.12 Bypass		
C3.12.3 Bypass command for cells U1...U6		
Range:	0 ... 11 Bit	**Default:** 0
Properties:		

Description:
Defines the power cell bypass system command.

The command can be assigned to the inverter control system or set manually.

This parameter must also be used to reset the command of a cell that has automatically entered bypass, allowing it to return to operation.

The state of a cell can be checked through the parameters S1.8.4 to S1.8.12.

ATTENTION!
The mechanical bypass option must only be configured after the user checks whether the cell in question is mounted in the set and whether it has the bypass system.

Bit	Value/Description
Bit 0 … 1 Cell U1	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 2 … 3 Cell U2	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 4 … 5 Cell U3	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 6 … 7 Cell U4	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 8 … 9 Cell U5	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 10 … 11 Cell U6	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass

C3.12 Bypass		
C3.12.4 Bypass command for cells U7...U12		
Range:	0 ... 11 Bit	**Default:** 0
Properties:		

Description:
Defines the power cell bypass system command.

The command can be assigned to the inverter control system or set manually.

This parameter must also be used to reset the command of a cell that has automatically entered bypass, allowing it to return to operation.

The state of a cell can be checked through the parameters S1.8.4 to S1.8.12.

ATTENTION!
The mechanical bypass option must only be configured after the user checks whether the cell in question is mounted in the set and whether it has the bypass system.

Bit	Value/Description
Bit 0 … 1 Cell U7	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 2 … 3 Cell U8	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 4 … 5 Cell U9	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 6 … 7 Cell U10	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 8 … 9 Cell U11	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 10 … 11 Cell U12	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass

C3.12 Bypass

C3.12.5 Bypass command for cells V1...V6

Range: 0 ... 11 Bit **Default:** 0

Properties:

Description:
Defines the power cell bypass system command.

The command can be assigned to the inverter control system or set manually.

This parameter must also be used to reset the command of a cell that has automatically entered bypass, allowing it to return to operation.

The state of a cell can be checked through the parameters S1.8.4 to S1.8.12.

ATTENTION!
The mechanical bypass option must only be configured after the user checks whether the cell in question is mounted in the set and whether it has the bypass system.

Bit	Value/Description
Bit 0 … 1 Cell V1	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 2 … 3 Cell V2	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 4 … 5 Cell V3	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 6 … 7 Cell V4	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 8 … 9 Cell V5	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 10 … 11 Cell V6	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass

C3.12 Bypass

C3.12.6 Bypass command for cells V7...V12

Range: 0 ... 11 Bit **Default:** 0

Properties:

Description:
Defines the power cell bypass system command.

The command can be assigned to the inverter control system or set manually.

This parameter must also be used to reset the command of a cell that has automatically entered bypass, allowing it to return to operation.

The state of a cell can be checked through the parameters S1.8.4 to S1.8.12.

ATTENTION!
The mechanical bypass option must only be configured after the user checks whether the cell in question is mounted in the set and whether it has the bypass system.

Bit	Value/Description
Bit 0 … 1 Cell V7	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 2 … 3 Cell V8	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 4 … 5 Cell V9	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 6 … 7 Cell V10	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 8 … 9 Cell V11	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 10 … 11 Cell V12	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass

C3.12 Bypass

C3.12.7 Bypass command for cells W1...W6

Range: 0 ... 11 Bit **Default:** 0

Properties:

Description:
Defines the power cell bypass system command.

The command can be assigned to the inverter control system or set manually.

This parameter must also be used to reset the command of a cell that has automatically entered bypass, allowing it to return to operation.

The state of a cell can be checked through the parameters S1.8.4 to S1.8.12.

ATTENTION!
The mechanical bypass option must only be configured after the user checks whether the cell in question is mounted in the set and whether it has the bypass system.

Bit	Value/Description
Bit 0 … 1 Cell W1	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 2 … 3 Cell W2	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 4 … 5 Cell W3	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 6 … 7 Cell W4	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 8 … 9 Cell W5	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 10 … 11 Cell W6	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass

C3.12 Bypass

C3.12.8 Bypass command for cells W7...W12

Range: 0 ... 11 Bit **Default:** 0

Properties:

Description:

Defines the power cell bypass system command.

The command can be assigned to the inverter control system or set manually.

This parameter must also be used to reset the command of a cell that has automatically entered bypass, allowing it to return to operation.

The state of a cell can be checked through the parameters S1.8.4 to S1.8.12.

ATTENTION!
The mechanical bypass option must only be configured after the user checks whether the cell in question is mounted in the set and whether it has the bypass system.

Bit	Value/Description
Bit 0 … 1 Cell W7	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 2 … 3 Cell W8	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 4 … 5 Cell W9	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 6 … 7 Cell W10	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 8 … 9 Cell W11	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass
Bit 10 … 11 Cell W12	**0 = Defined by control**: The cell bypass system is managed by the inverter control **1 = Mechanical bypass**: Cell replaced by a mechanical bypass cell (*dummy*) **2 = Manual activation**: Keeps the cell bypass system permanently commanded while the cell is energized and communicating with the control **3 = Automatic bypass reset**: Resets the bypass system status and command of a cell that has entered automatic bypass

C3.14 Zero speed disable

The zero speed condition determines whether the drive is at zero speed based on the RUN command, speed ramp status, speed reference, and measured speed, according to the function settings.

C3.14 Zero speed disable

C3.14.1 Configuration

Range: 0 ... 2 **Default:** 1

Properties:

Description:
Allows you to configure the zero speed condition to enable the inverter PWM.

Indication	Description
0 = Inactive	PWM is enabled according to the user's PWM enable commands..
1 = Reference and speed detection	The condition to enable PWM depends on the user's ENABLE command and the zero speed condition based on the RUN command, the reference and the measured speed
2 = Detection by reference	The condition to enable PWM depends on the user's ENABLE command and the zero speed condition based on the RUN command and the speed reference

C3.14 Zero speed disable

C3.14.2 Level for zero speed

Range: 0.0 ... 100.0 % **Default:** 1.0 %

Properties:

Description:
Determines the reference level and measured speed for detecting the zero speed condition.

The value is expressed as a percentage of the motor's synchronous speed.

C3.14 Zero speed disable		
C3.14.3 Time to block		
Range:	0.00 ... 600.00 s	**Default:** 0.00 s
Properties:		

Description:
Determines the time that the zero speed condition must remain active for PWM to be disabled.

If the condition is broken, the count restarts at the moment the configured conditions are met again.

C4 COMMANDS AND REFERENCES

It allows configuring the source of the frequency inverter commands and references in Local or Remote control mode.

The MVW3000 has two control modes:

- Local Mode: When the inverter is operating in local control mode, all commands and reference are made via HMI (see S1.6.2 and C4.3.1.3.1). The HMI LOC/REM key allows switching between Local and Remote 1 / Remote 2 control modes. It can be set in C4.1.3.
- Remote 1 / Remote 2 Mode: In Remote 1 or Remote 2 mode, you can configure the inverter reference and command sources from the following options: communication networks, HMI, digital input and/or analog input.

C4.1 LOC/REM mode config.

It allows configuring what will define the local and remote operating mode. If set via digital input, you can choose the specific digital input for this function.

Options that do not depend on operating modes will be explained later.

C4.1 LOC/REM mode config.		
C4.1.1 Command mode		
Range:	0 ... 9	**Default:** 9
Properties:	Stopped	

Description:
It defines a fixed command mode (Local, Remote 1 or Remote 2) or the source that can change between Remote 1 and Remote 2 modes. Local mode can be only accessed through this parameter when it is set to Always Local. All other sources can only switch between Remote 1 and Remote 2 modes.

Indication	Description
0 = Always Local	Fixed in Local command mode
1 = Remote 1	Fixed in Remote 1 command mode
2 = Remote 2	Fixed in Remote 2 command mode
3 = Serial	Change via R1/R2 Mode command of the RS-485 Serial Control Word (S5.2.2)
4 = Anybus	Change via R1/R2 Mode command of the Anybus-CC Control Word
5 = CAN/CO/DN	Change via R1/R2 Mode commandtrol of the CAN/CANop/DNet Control Word (S5.7.2)
6 = SoftPLC	Change via SoftPLC command
7 = Not used	Not used
8 = Ethernet	Change via R1/R2 Mode command of the Ethernet Control Word (S5.3.2)

Indication	Description
9 = Digital Input (DI)	Change via commandtrol of the digital input chosen by the user The digital input can be configured in C4.1.2

NOTE!
Example: By selecting the command source of this parameter as Serial, the Mode R1/R2 bit of the RS-485 Serial command word in S5.2.2 will cause the inverter to transition between Remote 1 and Remote 2.

C4.1 LOC/REM mode config.		
C4.1.2 DI remote 1/Remote 2		
Range:	0 ... 62	**Default:** 2
Properties:	Stopped	

Description:
Defines which digital input will transition between Remote 1 or Remote 2 mode or vice versa.

Table 9.37: Values assigned to the Digital Inputs of X and A...G Slots for Remote 1 / Remote 2 mode setting

Digital Inputs options for X and A...G Slots								
Indication	**Slot X**	**Slot A**	**Slot B**	**Slot C**	**Slot D**	**Slot E**	**Slot F**	**Slot G**
Inactive	0							
DI1	X-1 (1)	A-1 (7)	B-1 (15)	C-1 (23)	D-1 (31)	E-1 (39)	F-1 (47)	G-1 (55)
DI2	X-2 (2)	A-2 (8)	B-2 (16)	C-2 (24)	D-2 (32)	E-2 (40)	F-2 (48)	G-2 (56)
DI3	X-3 (3)	A-3 (9)	B-3 (17)	C-3 (25)	D-3 (33)	E-3 (41)	F-3 (49)	G-3 (57)
DI4	X-4 (4)	A-4 (10)	B-4 (18)	C-4 (26)	D-4 (34)	E-4 (42)	F-4 (50)	G-4 (58)
DI5	X-5 (5)	A-5 (11)	B-5 (19)	C-5 (27)	D-5 (35)	E-5 (43)	F-5 (51)	G-5 (59)
DI6	X-6 (6)	A-6 (12)	B-6 (20)	C-6 (28)	D-6 (36)	E-6 (44)	F-6 (52)	G-6 (60)
DI7	–	A-7 (13)	B-7 (21)	C-7 (29)	D-7 (37)	E-7 (45)	F-7 (53)	G-7 (61)
DI8	–	A-8 (14)	B-8 (22)	C-8 (30)	D-8 (38)	E-8 (46)	F-8 (54)	G-8 (62)

NOTE!
Example: To choose digital input 2 of Slot B to switch between Remote 1 / Remote 2 mode, the parameter must be assigned the value B-2 (16).

C4.1 LOC/REM mode config.		
C4.1.3 HMI LOC/REM key		
Range:	0 ... 1	**Default:** 1
Properties:	Stopped	

Description:
It sets the function for the HMI LOC/REM key. The LOC/REM key, when pressed, allows switching between Local (HMI) control mode and the mode defined according to the setting made in C4.1.1 (Remote 1 or Remote 2). When the selected command mode is Local, all commands and references will be performed via the HMI.

Indication	Description
0 = Disable	The LOC/REM key is disabled
1 = Enable	The LOC/REM key, toggles between Local and Remote command mode.

C4.2 Commands

It allows setting the command source of the frequency inverter to Remote 1 or Remote 2 mode.

C4.2.1 Remote R1

C4.2.2 Remote R2

It allows setting the source to the command mode.

C4.2.1 Remote R1		
C4.2.2 Remote R2		
.1 General enable		
Range:	0 ... 8	**Default:** 1 (C4.2.1.1)
		0 (C4.2.2.1)
Properties:	Stopped	

Description:
It sets the source for the general enable command.

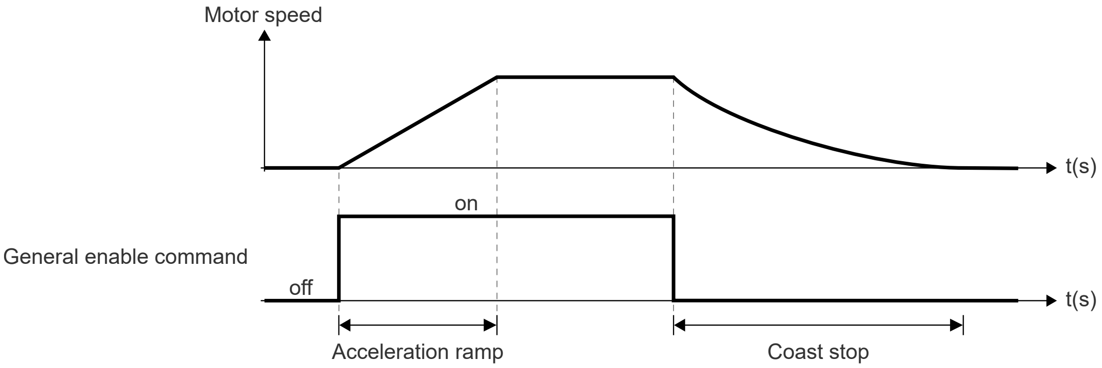


Figure 9.24: *Operation of the general enable command*

ATTENTION!
The general enable command can contain a digital input (C4.2.3.1) that works together with the command source chosen in this menu. Both must be active/inactive simultaneously for the command to take place. For example, when you choose the command source as serial in the Remote 1 situation and any digital input, for the inverter to be enabled, the digital input and the serial input must be active. If either input (digital or serial) is inactive, the inverter will be general disabled. See S1.6.1.

Indication	Description
0 = Always enabled	General Enable command is always active Regardless of the digital input configured in C4.2.3.1
1 = HMI	General Enable command via HMI is always active
2 = Serial	General Enable command via RS-485 Serial Control Word
3 = Anybus	General Enable command via Anybus-CC Control Word
4 = CAN/CO/DN	General Enable command via CAN/CANop/DNet Control Word
5 = SoftPLC	General Enable command via SoftPLC function
6 = Not used	Not used
7 = Ethernet	General Enable command via Ethernet Control Word
8 = Digital Input (DI)	General Enable command via digital input chosen by the user Digital input can be configured in C4.2.3.1

C4.2.1 Remote R1		
C4.2.2 Remote R2		
.2 Run/Stop		
Range:	0 ... 9	**Default:** 0 (C4.2.1.2)
		7 (C4.2.2.2)
Properties:	Stopped	

Description:
Sets the source for the start and stop commands, which encompass run/stop and quick stop.

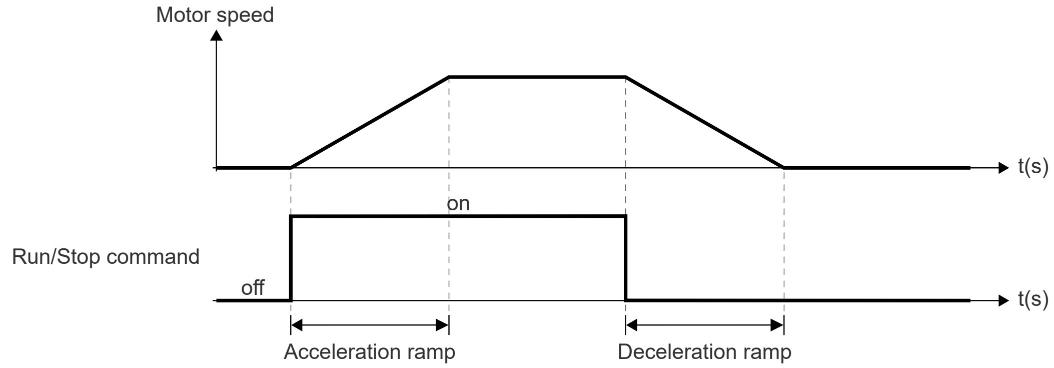


***Figure 9.25:** Operation of the run/stop commanda*

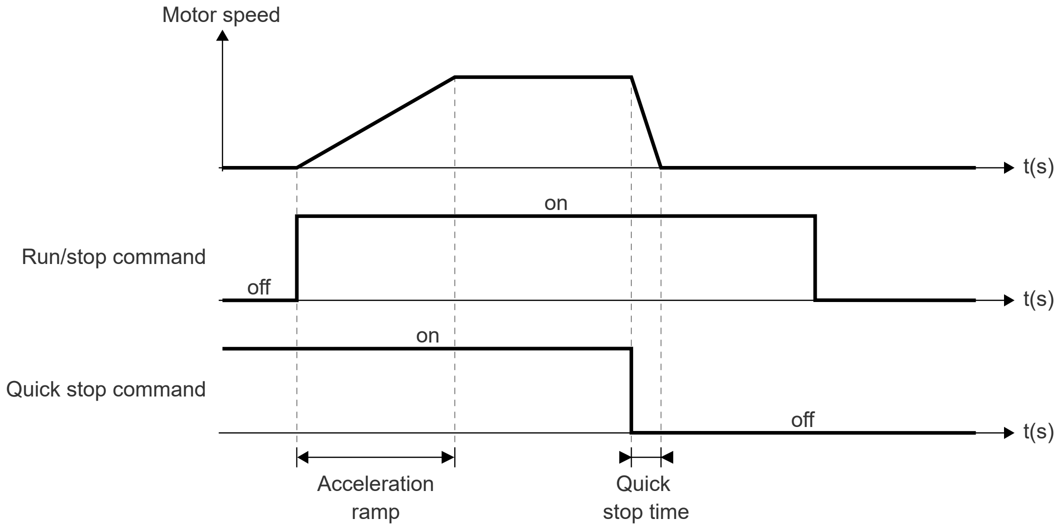


***Figure 9.26:** Operation of the quick stop command*

ATTENTION!
The quick stop command may contain a digital input (C4.2.3.7) which acts in conjunction with the command source chosen in this menu. Both must be active/inactive simultaneously for the command to take place. For example, when you choose the command source as serial in Remote 1 mode and any digital input, for the inverter to be without quick stop, the digital input and the serial input must be active. If either input (digital or serial) is inactive, the quick stop command is executed. See S1.6.1.

Indication	Description
0 = HMI I/O Keys	Run/Stop command via HMI keys I and O In this case, the stop mode is always by ramp
1 = Serial	Enable Ramp and Quick Stop Command via RS-485 Serial Control Word
2 = Anybus	Enable Ramp and Quick Stop Command via Anybus-CC Control Word
3 = CAN/CO/DN	Enable Ramp and Quick Stop Command via CAN/CANop/DNet Control Word
4 = SoftPLC	Enable Ramp and Quick Stop Command via SoftPLC function

Indication	Description
5 = Not used	Not used
6 = Ethernet	Enable Ramp and Quick Stop Command via Ethernet Control Word
7 = Run/Stop DI	Run/Stop command via digital input chosen by the user The digital input can be set in C4.2.3.2
8 = Forward/Reverse DI	Run/Stop command selected when using the Forward/Reverse function via digital inputs Digital inputs can be set in C4.2.3.5 and C4.2.3.6
9 = 3-Wire Start/Stop DI	Run/Stop command selected when using the 3-Wire Start/Stop function Digital inputs can be set in C4.2.3.3 and C4.2.3.4

C4.2.1 Remote R1
C4.2.2 Remote R2
.3 Direction of rotation

Range:	0 ... 10	**Default:**	1 (C4.2.1.3)
			0 (C4.2.2.3)
Properties:	Stopped		

Description:
It sets the source for the direction of rotation command.

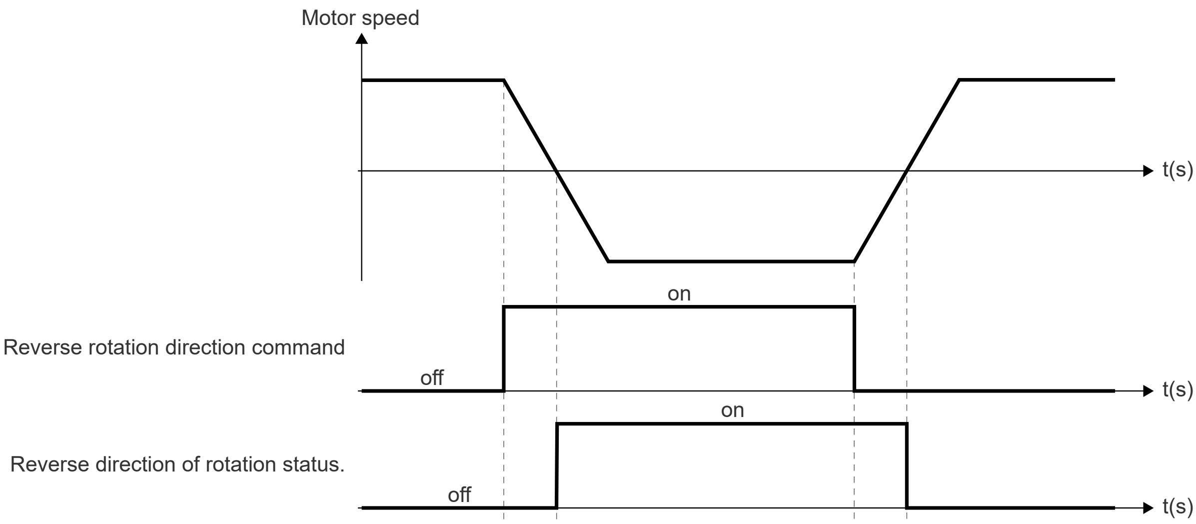


Figure 9.27: *Operation of the direction of rotation command*

Indication	Description
0 = Forward	Forward direction of rotation only. It is not possible to reverse the direction of rotation
1 = HMI DR Key	Rotation Direction control via HMI key Forward Direction is selected at power up
2 = Serial	Reverse Command via RS-485 Serial Control Word
3 = Anybus	
4 = CAN/CO/DN	Reverse Command via CAN/CANop/DNet Control Word
5 = SoftPLC	Direction of Rotation Command via SoftPLC function
6 = Not used	Not used
7 = Ethernet	Reverse Command via Ethernet Control Word
8 = Direction of Rotation DI	Direction of Rotation command via user-selected digital input The digital input can be configured at C4.2.3.8
9 = Forward/Reverse DI	Direction of Rotation command selected when using the Forward/Reverse function via digital inputs The digital inputs can be configured in C4.2.3.5 and C4.2.3.6
10 = Speed Reference	Direction of Rotation command defined by the polarity of the speed reference

NOTE!
When set to forward, if there is an attempt to set the speed reference to a negative value, the reference is limited to zero.

C4.2.1 Remote R1		
C4.2.2 Remote R2		
.4 JOG		
Range:	0 ... 8	**Default:** 1 (C4.2.1.4)
		0 (C4.2.2.4)
Properties:	Stopped	

Description:
It sets the source for the JOG command.

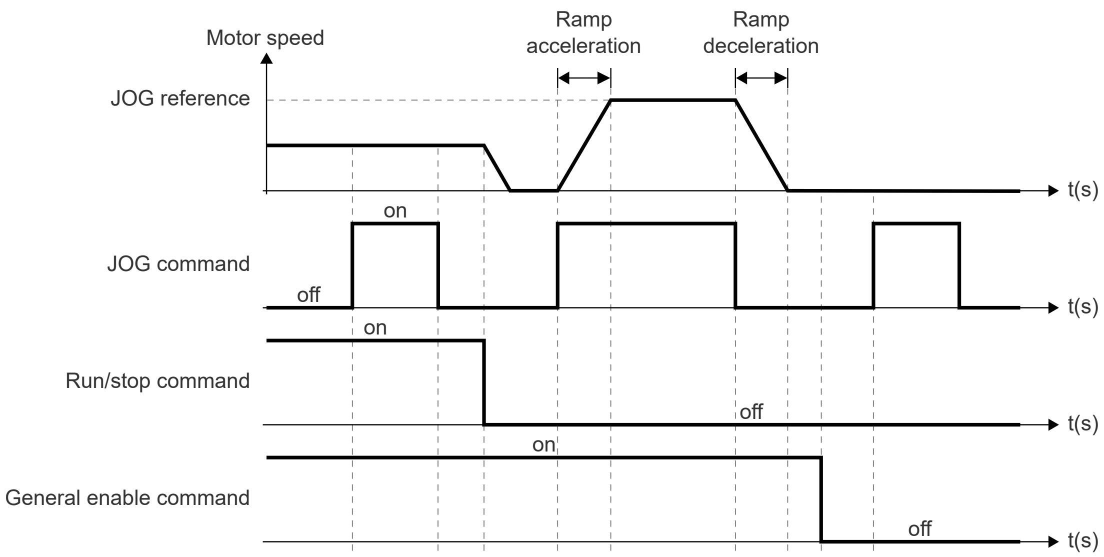


Figure 9.28: *Operation of the JOG command*

Indication	Description
0 = Inactive	JOG command disabled
1 = HMI JOG Key	JOG command via HMI key JOG
2 = Serial	JOG command via RS-485 Serial Control Word
3 = Anybus	JOG command via Anybus-CC Control Word
4 = CAN/CO/DN	JOG command via CAN/CANop/DNet Control Word
5 = SoftPLC	JOG command via SoftPLC function
6 = Not used	Not used
7 = Ethernet	JOG command via Ethernet Control Word
8 = Digital Input (DI)	JOG command via digital input chosen by the user The digital input can be set in C4.2.3.9

C4.2.3 DI for commands

It allows defining the digital input used for each command with source via digital input. For further information on the control word via DI, see S1.6.3.

C4.2.3 DI for commands		
C4.2.3.1 General enable		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables use and defines the digital input that will be used to enable the drive to run.

Table 9.43: *Values assigned to the Digital Inputs of X and A...G Slots for defining command activation*

Digital Inputs options for X and A...G Slots								
Indication	**Slot X**	**Slot A**	**Slot B**	**Slot C**	**Slot D**	**Slot E**	**Slot F**	**Slot G**
Inactive	0							
DI1	X-1 (1)	A-1 (7)	B-1 (15)	C-1 (23)	D-1 (31)	E-1 (39)	F-1 (47)	G-1 (55)
DI2	X-2 (2)	A-2 (8)	B-2 (16)	C-2 (24)	D-2 (32)	E-2 (40)	F-2 (48)	G-2 (56)
DI3	X-3 (3)	A-3 (9)	B-3 (17)	C-3 (25)	D-3 (33)	E-3 (41)	F-3 (49)	G-3 (57)
DI4	X-4 (4)	A-4 (10)	B-4 (18)	C-4 (26)	D-4 (34)	E-4 (42)	F-4 (50)	G-4 (58)
DI5	X-5 (5)	A-5 (11)	B-5 (19)	C-5 (27)	D-5 (35)	E-5 (43)	F-5 (51)	G-5 (59)
DI6	X-6 (6)	A-6 (12)	B-6 (20)	C-6 (28)	D-6 (36)	E-6 (44)	F-6 (52)	G-6 (60)
DI7	–	A-7 (13)	B-7 (21)	C-7 (29)	D-7 (37)	E-7 (45)	F-7 (53)	G-7 (61)
DI8	–	A-8 (14)	B-8 (22)	C-8 (30)	D-8 (38)	E-8 (46)	F-8 (54)	G-8 (62)

> **NOTE!**
> Example: To choose digital input 4 of Slot C to trigger a command, the parameter must be assigned the value C-4 (26).

C4.2.3 DI for commands		
C4.2.3.2 Run/Stop		
Range:	0 ... 62	**Default:** 1
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used to execute the start and stop commands. The options are shown in Table 9.43 on page 9-66.

C4.2.3 DI for commands		
C4.2.3.3 3-Wire start		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used to execute the ”Start” command of the 3-wire Start/Stop function. The options are shown in Table 9.43 on page 9-66.

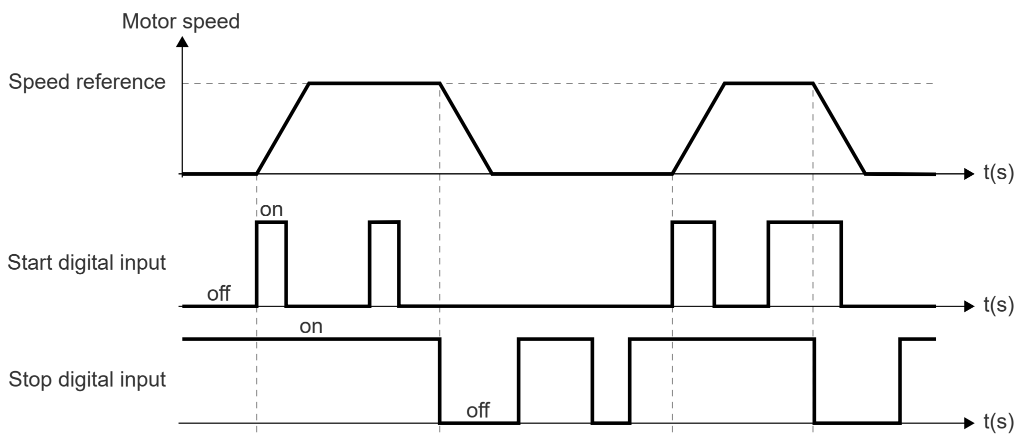


Figure 9.29: *3-wire Start/Stop function via digital input*

C4.2.3 DI for commands		
C4.2.3.4 3-Wire stop		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used to execute the "Stop" command of the 3-wire Start/Stop function. The options are shown in Table 9.43 on page 9-66.

Figure 9.29 on page 9-66 illustrates the operation of the Start/Stop function.

C4.2.3 DI for commands		
C4.2.3.5 Forward		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used to execute the "Forward" command of the Forward/Reverse function.

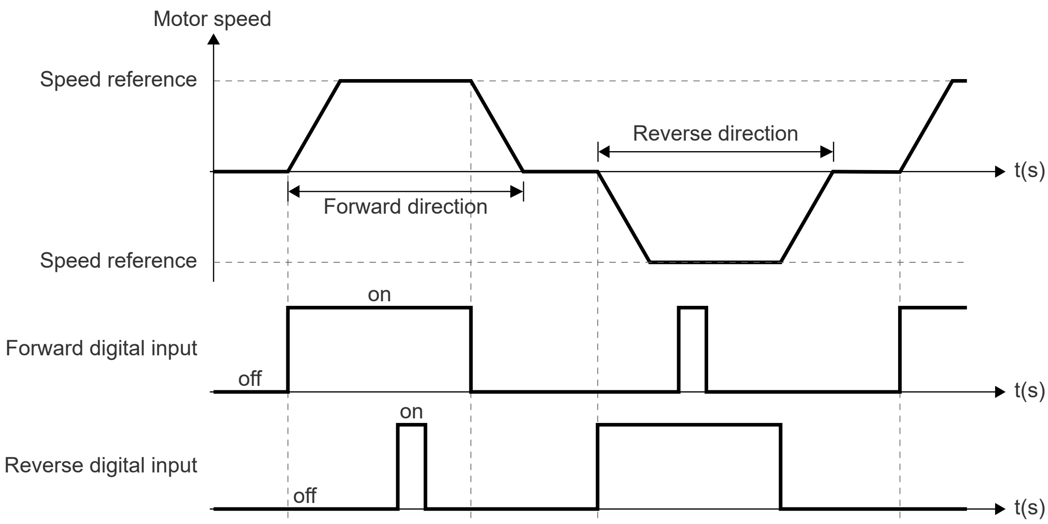


***Figure 9.30:** Forward and Reverse function via digital input*

C4.2.3 DI for commands		
C4.2.3.6 Reverse		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used to execute the "Reverse" command of the Forward/Reverse function. Table 9.43 on page 9-66 shows the options.

Figure 9.30 on page 9-67 illustrates the operation of the Forward/Reverse function.

> **NOTE!**
> When using the Forward/Reverse function, set C4.2.1.2 and C4.2.1.3= 8 or C4.2.2.2 and C4.2.2.3 = 8.

C4.2.3 DI for commands		
C4.2.3.7 Quick stop		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used to execute the inverter quick stop. Table 9.43 on page 9-66 shows the options.

The Quick Stop consists of executing the "Stop" with null deceleration ramp command (C6.1.6 = 0s) or close to this value, regardless of the setting in C6.1.2 or C6.1.5. It is not recommended to use this function in scalar and VVW+ control types.

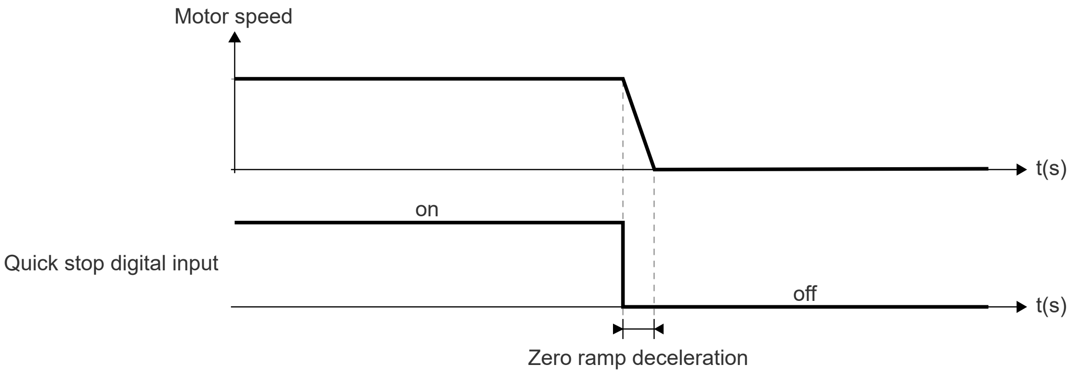


Figure 9.31: *Operation of the Quick Stop command*

C4.2.3 DI for commands		
C4.2.3.8 Direction of rotation		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used to execute the direction of rotation command. Table 9.43 on page 9-66 shows the options.

C4.2.3 DI for commands		
C4.2.3.9 JOG		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used to execute the JOG command. Table 9.43 on page 9-66 shows the options.

C4.2.3 DI for commands		
C4.2.3.10 Ramp selection		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used to execute the Second Ramp command. Table 9.43 on page 9-66 shows the options.

C4.2.3 DI for commands		
C4.2.3.11 Fault reset		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used for the Fault Reset command. Table 9.43 on page 9-66 shows the options.

When a transition from 0 to 1 occurs on the digital input programmed for Fault Reset, the present fault reset command is executed. If the fault condition is still present, the reset will not be performed. Figure 9.32 on page 9-69 illustrates that.

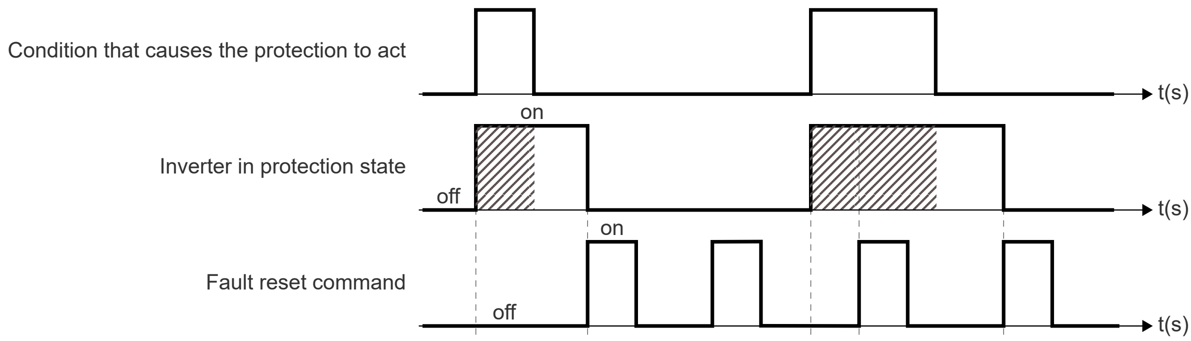


***Figure 9.32:** Operation of the Fault Reset command*

C4.2.4 Local HMI

It allows defining the behavior of commands via HMI.

C4.2.4 Local HMI		
C4.2.4.1 Stop key function		
Range:	0 ... 2	**Default:** 0
Properties:	Stopped	

Description:
It sets the motor stop mode for the HMI stop key.

This parameter indicates the method to be performed to stop the motor when the inverter is programmed to be commanded via HMI key.

The available stop modes are:

- Ramp to stop: the inverter uses the time defined in parameter C6.1.2 or C6.1.5 to perform the deceleration ramp.
- General Enable to Stop: the inverter instantly deactivates the general enable. In this mode, there is no set time for the motor to stop.
- Quick stop: the inverter uses the time set in parameter C6.1.6 to perform the deceleration ramp.

> **NOTE!**
> The general enable to stop mode works only if the general enable parameter (C4.2.1.1 for R1 mode and C4.2.2.1 for R2 mode) is set to HMI.

C4.3 References

It allows configuring the source and the speed and torque reference values for Remote 1 and Remote 2 modes. In Local mode, the speed reference via HMI will always be used.

C4.3.1 Speed

It allows setting the reference values for the motor speed.

C4.3.1.1 Reference range

It allows setting minimum and maximum speed reference values for any reference signal. If the reference signal set to be followed by the inverter is less than the minimum reference setting in C4.3.1.1.1, the inverter will limit to C4.3.1.1.1. If the reference signal set to be followed by the inverter is greater than the maximum reference setting in C4.3.1.1.2, the inverter will limit to C4.3.1.1.2.

C4.3.1.1 Reference range		
C4.3.1.1.1 Minimum reference value		
Range:	0 ... 60000 rpm	**Default:** 90 rpm
Properties:		

Description:
It sets the minimum motor speed reference limit value when the inverter is enabled. Valid for any type of reference signal.

C4.3.1.1 Reference range		
C4.3.1.1.2 Maximum reference		
Range:	1 ... 60000 rpm	**Default:** 1800 rpm
Properties:		

Description:
It sets the maximum motor speed reference limit value when the inverter is enabled. Valid for any type of reference signal.

C4.3.1.2 Reference source

It allows setting the source for the speed reference in the Remote 1 and Remote 2 modes.

C4.3.1.2 Reference source		
C4.3.1.2.1 Remote 1 Mode		
Range:	0 ... 13	**Default:** 0
Properties:	Stopped	

Description:
It sets the source for the speed reference for Remote 1 mode.

Indication	Description
0 = HMI	Reference via HMI speed reference parameter (C4.3.1.3.1)
1 = E.P.	Reference via Electronic Potentiometer function
2 = Multispeed	Reference via Multispeed function
3 = Serial	Reference via RS-485 Serial speed reference parameter (S5.2.3)
4 = Anybus	Reference via Anybus-CC speed reference parameter (S5.6.4)
5 = CAN/CO/DN	Reference via CAN/CANop/DNet speed reference parameter (S5.7.3)
6 = Ethernet	Reference via Ethernet speed reference parameter (S5.3.3)
7 = Not used	Not used
8 = SoftPLC	Reference via SoftPLC function
9 = Analog Input (AI)	Reference via analog input chosen by the user The analog input can be set in C4.3.1.3.2

Indication	Description
10 = Frequency Input (FI)	Reference via frequency input chosen by the user The frequency input can be set in C4.3.1.3.3
11 = PID Controller	Reference via PID controller output parameter (A2.1.5)
12 = Sum AIs	Reference via sum of analog inputs AI X-1 and AI X-2
13 = Sum AIs > 0	Reference via sum of analog inputs AI X-1 and AI X-2 Negative results are stapled to 0.0 %

C4.3.1.2 Reference source

C4.3.1.2.2 Remote 2 Mode

Range: 0 ... 13 **Default:** 9

Properties: Stopped

Description:

It sets the source for the speed reference for Remote 2 mode.

Indication	Description
0 = HMI	Reference via HMI speed reference parameter (C4.3.1.3.1)
1 = E.P.	Reference via Electronic Potentiometer function
2 = Multispeed	Reference via Multispeed function
3 = Serial	Reference via RS-485 Serial speed reference parameter (S5.2.3)
4 = Anybus	Reference via Anybus-CC speed reference parameter (S5.6.4)
5 = CAN/CO/DN	Reference via CAN/CANop/DNet speed reference parameter (S5.7.3)
6 = Ethernet	Reference via Ethernet speed reference parameter (S5.3.3)
7 = Not used	Not used
8 = SoftPLC	Reference via SoftPLC function
9 = Analog Input (AI)	Reference via analog input chosen by the user The analog input can be set in C4.3.1.3.2
10 = Frequency Input (FI)	Reference via frequency input chosen by the user The frequency input can be set in C4.3.1.3.3
11 = PID Controller	Reference via PID controller output parameter (A2.1.5)
12 = Sum AIs	Reference via sum of analog inputs AI X-1 and AI X-2
13 = Sum AIs > 0	Reference via sum of analog inputs AI X-1 and AI X-2 Negative results are stapled to 0.0 %

C4.3.1.3 Reference HMI, AIs and FIs

It allows setting the speed reference value when the reference is HMI or analog input (AI) or frequency input (FI).

C4.3.1.3 Reference HMI, AIs and FIs

C4.3.1.3.1 Speed reference via HMI

Range: 0 ... 60000 rpm **Default:** 90 rpm

Properties:

Description:

Sets the motor speed reference value when the reference source is the HMI.

C4.3.1.3 Reference HMI, AIs and FIs

C4.3.1.3.2 R1 Speed ref. AI config.

Range: 0 ... 30 **Default:** 1

Properties: Stopped

Description:

Defines the analog input that will be used as the motor speed reference when the reference source is the Analog Input (AI).

Table 9.46: Values assigned to the Analog Inputs of X and A...G Slots

Analog Inputs options for X and A...G Slots								
Indication	**Slot X**	**Slot A**	**Slot B**	**Slot C**	**Slot D**	**Slot E**	**Slot F**	**Slot G**
Inactive	0							
AI1	X-1 (1)	A-1 (3)	B-1 (7)	C-1 (11)	D-1 (15)	E-1 (19)	F-1 (23)	G-1 (27)
AI2	X-2 (2)	A-2 (4)	B-2 (8)	C-2 (12)	D-2 (16)	E-2 (20)	F-2 (24)	G-2 (28)
AI3	–	A-3 (5)	B-3 (9)	C-3 (13)	D-3 (17)	E-3 (21)	F-3 (25)	G-3 (29)

NOTE!
Example: To choose Analog Input AI3 from Slot D, select D-3 (17) option.

C4.3.1.3 Reference HMI, AIs and FIs		
C4.3.1.3.3 Speed ref. FI config.		
Range:	0 ... 2	**Default:** 1
Properties:	Stopped	

Description:
It defines the frequency input that will be used as the motor speed reference when the reference source is the Frequency Input (FI).

C4.3.1.3 Reference HMI, AIs and FIs		
C4.3.1.3.4 R2 Speed ref. AI config.		
Range:	0 ... 30	**Default:** 1
Properties:	Stopped	

Description:
It defines the analog input that will be used as a motor speed reference in Remote 2 mode when the reference source is the Analog Input (AI). The options are shown in Table 9.26 on page 9-36.

C4.3.1.4 Electronic potentiometer reference

The Electronic Potentiometer function (E.P.) allows the speed reference to be set by means of two digital inputs (one to increment it and another to decrement it).

To enable this function, you must first configure the speed reference via Electronic Potentiometer by setting C4.3.1.2.1 = E.P. and/or C4.3.1.2.2 = E.P. Next, you must also program which digital inputs will act as the “INCREASE” and “DECREASE” commands in parameters C4.3.1.4.1 and C4.3.1.4.2 respectively.

During the “INCREASE” command, the motor accelerates following the acceleration ramp until reaching the maximum speed reference defined in C4.3.1.1.2 if the command is not removed before. During “DECREASE” command, the motor decelerates following the deceleration ramp until reaching the minimum speed reference defined in C4.3.1.1.1 if the command is not removed before. If the “INCREASE” or “DECREASE” commands are removed before reaching the maximum or minimum speed reference, the new speed reference will be the instantaneous value of the output speed at the instant the command is removed.

The “INCREASE” or “DECREASE” commands are effective only when the Run/Stop command is active.

Figure 9.33 on page 9-73 illustrates the operation of this function. The reference increment is done by applying 24 V to the “INCREASE” digital input, while the decrement is done by applying 0 V to the “DECREASE” digital input.

To reset the reference to zero, apply 24 V to the “INCREASE” digital input and 0 V to the “DECREASE” digital input simultaneously with the MVW3000 disabled.

If no digital inputs are set to the “INCREASE” and/or “DECREASE” function and the reference source selection is set to Electronic Potentiometer (C4.3.1.2.1 = E.P. and/or C4.3.1.2.2 = E.P.), the MVW3000 will go to CONFIG status. See parameter S1.1.4.

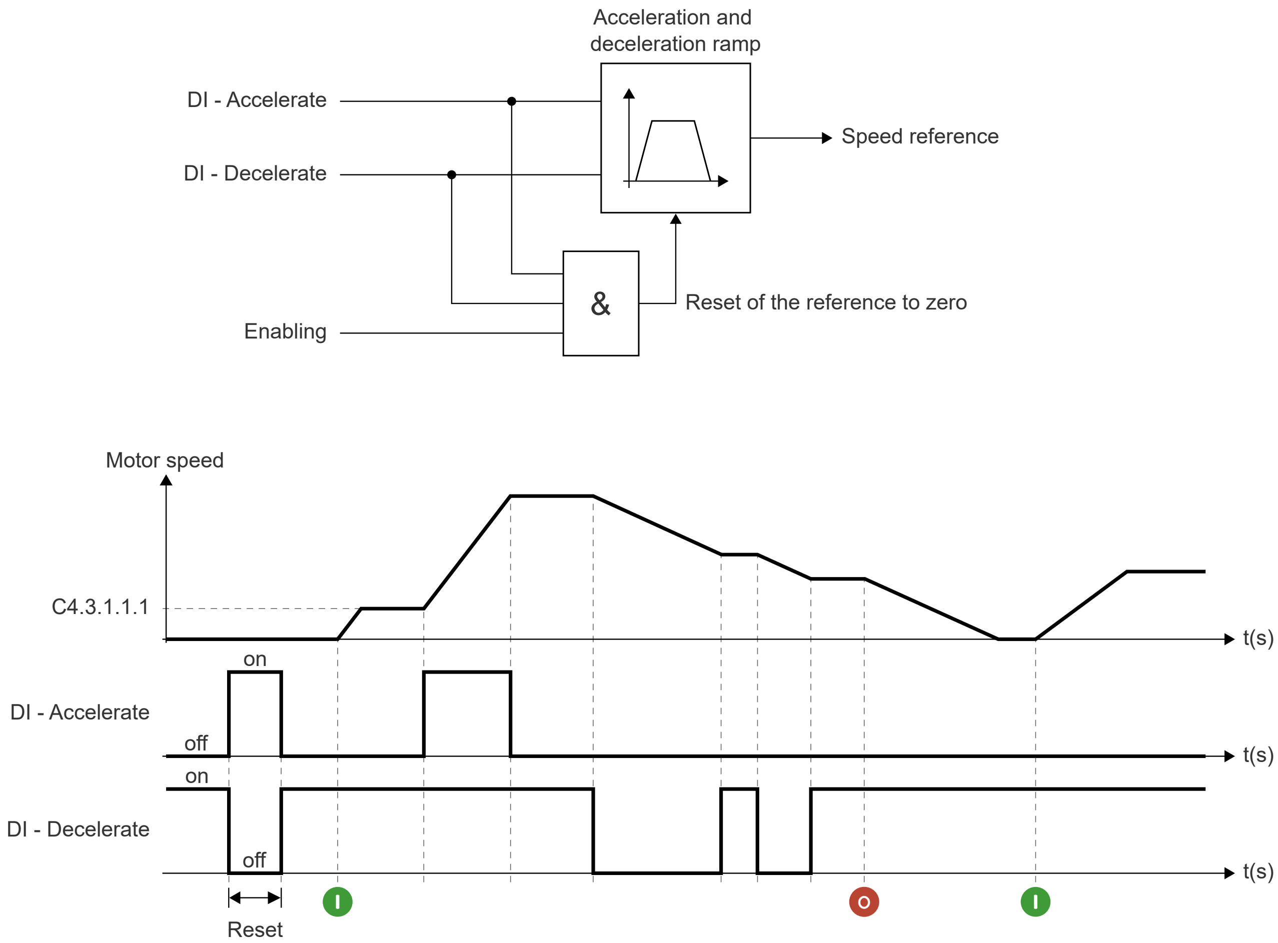


Figure 9.33: *Electronic Potentiometer (E.P.) function*

C4.3.1.4 Electronic potentiometer reference		
C4.3.1.4.1 DI increase E.P.		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used as "INCREASE" command by the Electronic Potentiometer. Table 9.43 on page 9-66 shows the options.

C4.3.1.4 Electronic potentiometer reference		
C4.3.1.4.2 DI decrease E.P.		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used as "DECREASE" command by the Electronic Potentiometer. Table 9.43 on page 9-66 shows the options.

C4.3.1.5 Multispeed reference

With the Multispeed function it is possible to select one of up to eight preset fixed speed references. The selection of one of the references is made according to the logical combination of the status of up to three digital inputs. This behavior can be seen in Figure 9.34 and in Table 9.47 on page 9-74.

To activate the Multispeed function it is necessary to configure parameter C4.3.1.2.1 = Multispeed and/or C4.3.1.2.2 = Multispeed (reference source selection).

It is possible to use only one or two digital inputs and thus select between up to two or four Multispeed references respectively. Digital inputs not configured for the Multispeed function are considered as 0 V in Table 9.47.

If no digital inputs are set to the Multispeed function and the reference source selection is set to Multispeed (C4.3.1.2.1 = Multispeed and/or C4.3.1.2.2 = Multispeed), the MVW3000 will go to the CONFIG status. See parameter S1.1.4.

The Multispeed function provides the advantages of stability of the fixed preset references and immunity against electric noises (isolated digital inputs).

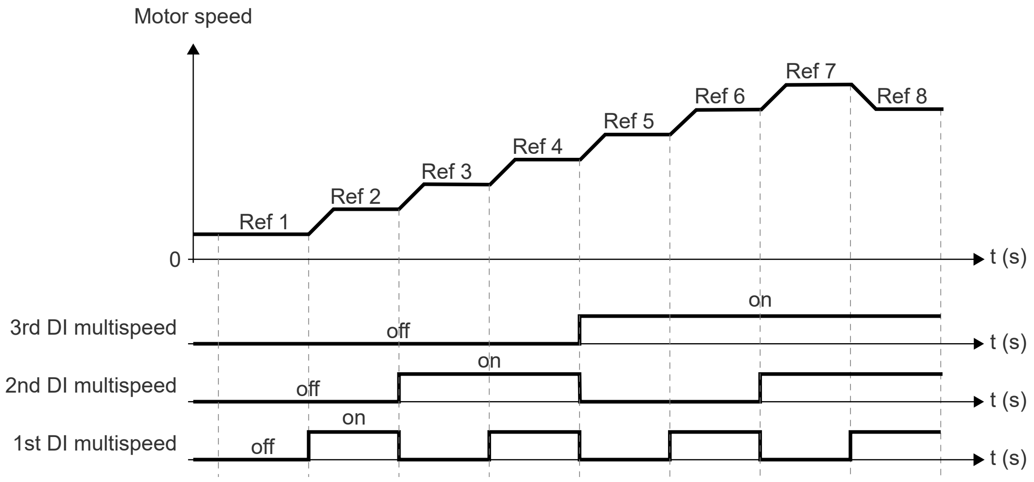


Figure 9.34: *Multispeed*

Below is a table with the selection of the speed reference according to the logical state of the digital inputs:

Table 9.47: *Multispeed Reference*

8 speed references			
	4 speed references		
		2 speed references	
3rd DI	**2nd DI**	**1st DI**	**Speed Reference**
0 V	0 V	0 V	C4.3.1.5.1
0 V	0 V	24 V	C4.3.1.5.2
0 V	24 V	0 V	C4.3.1.5.3
0 V	24 V	24 V	C4.3.1.5.4
24 V	0 V	0 V	C4.3.1.5.5
24 V	0 V	24 V	C4.3.1.5.6
24 V	24 V	0 V	C4.3.1.5.7
24 V	24 V	24 V	C4.3.1.5.8

C4.3.1.5 Multispeed reference		
C4.3.1.5.1 Multispeed ref. 1		
C4.3.1.5.2 Multispeed ref. 2		
C4.3.1.5.3 Multispeed ref. 3		
C4.3.1.5.4 Multispeed ref. 4		
C4.3.1.5.5 Multispeed ref. 5		
C4.3.1.5.6 Multispeed ref. 6		
C4.3.1.5.7 Multispeed ref. 7		
C4.3.1.5.8 Multispeed ref. 8		
Range:	0 ... 60000 rpm	**Default:** 90 rpm (C4.3.1.5.1)
		300 rpm (C4.3.1.5.2)
		600 rpm (C4.3.1.5.3)
		900 rpm (C4.3.1.5.4)
		1200 rpm (C4.3.1.5.5)
		1500 rpm (C4.3.1.5.6)
		1800 rpm (C4.3.1.5.7)
		1650 rpm (C4.3.1.5.8)
Properties:		

Description:
It sets the value of the multispeed speed reference according to the logical combination of the digital inputs. The digital inputs logics are presented in the Table 9.47.

C4.3.1.5 Multispeed reference		
C4.3.1.5.9 Multispeed 1 DI config.		
C4.3.1.5.10 Multispeed 2 DI config.		
C4.3.1.5.11 Multispeed 3 DI config.		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used for selecting the multispeed speed reference. Table 9.43 on page 9-66 shows the options.

C4.3.1.6 Skip speed

It allows setting up to three speed ranges in which the motor cannot operate continuously; for example, in a mechanical system that goes into resonance (causing excessive vibration or noise). Figure 9.35 on page 9-76 details the operation of this function.

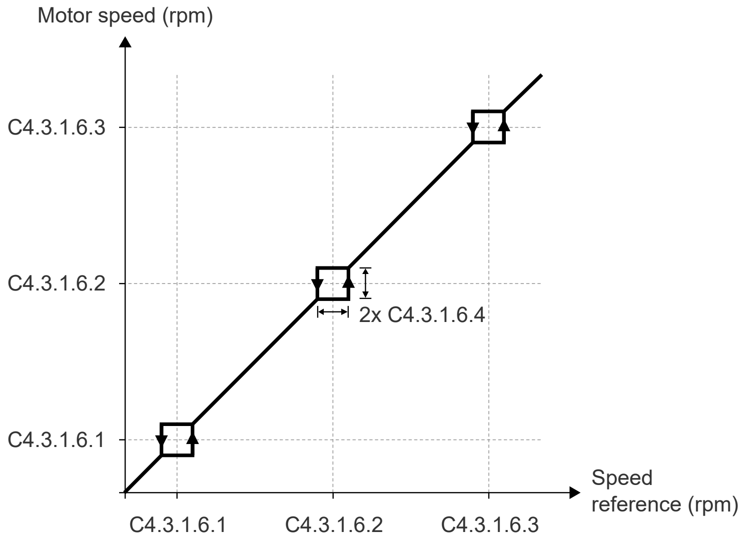


Figure 9.35: *Operation curve of the "Skip Speeds"*

The function is disabled for C4.3.1.6.4=0.

The passage through the skip speed range (2 x C4.3.1.6.4) is done following the acceleration or deceleration ramp.

If the speed reference is within the range to be skipped, the new reference will go to the lower limit of the range in question.

In case of overlapping ranges, a single range will be considered, with limits defined by the smallest lowest limit and the highest upper limit.

If the range limits exceed the minimum and/or maximum reference values (C4.3.1.1.1 and C4.3.1.1.2), these limits will be saturated in the values of C4.3.1.1.1 and/or C4.3.1.1.2.

NOTE!
If only one or two of the skip speed ranges are to be used, two or one of the ranges must be overlapped. For example, to use only one skip speed range, set parameters C4.3.1.6.1, C4.3.1.6.2 and C4.3.1.6.3 to the same value (overlapping ranges 1, 2 and 3).

C4.3.1.6 Skip speed			
C4.3.1.6.1 Speed 1			
Range:	0 ... 60000 rpm	**Default:**	600 rpm
Properties:			

Description:
It sets the value of skip speed 1.

C4.3.1.6 Skip speed			
C4.3.1.6.2 Speed 2			
Range:	0 ... 60000 rpm	**Default:**	900 rpm
Properties:			

Description:
It sets the value of skip speed 2.

C4.3.1.6 Skip speed		
C4.3.1.6.3 Speed 3		
Range:	0 ... 60000 rpm	**Default:** 1200 rpm
Properties:		

Description:
It sets the value of skip speed 3.

C4.3.1.6 Skip speed		
C4.3.1.6.4 Skip range		
Range:	0 ... 750 rpm	**Default:** 0 rpm
Properties:		

Description:
Sets the value of the speed range that should be skipped. This value is subtracted and added to the value of the skipped speed, thus setting a range around the defined speed.

C4.3.2 JOG speed

It allows setting the speed reference for the JOG command.

C4.3.2 JOG speed		
C4.3.2.1 JOG reference		
Range:	0 ... 60000 rpm	**Default:** 150 rpm
Properties:		

Description:
It sets the motor speed reference value when the JOG command is executed.

During the JOG command, the motor accelerates following the acceleration ramp set until reaching the speed defined in this reference. The JOG command is only effective when the Run/Stop command is inactive.

C4.3.3 Torque

It allows setting the torque reference to operate in Torque Control mode.

NOTE!
The torque reference is only active when the control type is set to Vector with Encoder (C3.1.1 = 2) and the control mode is set to Torque (C3.3.1.1 = 1).

C4.3.3 Torque		
C4.3.3.1 Torque reference via HMI		
Range:	-400.0 ... 400.0 %	**Default:** 0.0 %
Properties:		

Description:
It sets the torque reference value when the reference source is the HMI.

C4.3.3 Torque		
C4.3.3.2 Maximum torque		
Range:	0.0 ... 400.0 %	**Default:** 400.0 %
Properties:		

Description:
It allows you to set maximum torque reference value for any reference signal. If the reference signal configured to be followed by the inverter is greater than the maximum reference set in C4.3.3.2, the inverter will limit in C4.3.3.2.

C4.3.3 Torque		
C4.3.3.3 Minimum torque		
Range:	0.0 ... 400.0 %	**Default:** 0.0 %
Properties:		

Description:
It allows you to set minimum torque reference value for any reference signal. If the reference signal configured to be followed by the inverter is less than the minimum reference set in C4.3.3.3, the inverter will limit in C4.3.3.3.

C4.3.3 Torque		
C4.3.3.4 Torque ref. source		
Range:	0 ... 2	**Default:** 0
Properties:	Stopped	

Description:
It defines which source will determine the reference for torque control.

Indication	Description
0 = HMI	Torque Reference via HMI parameter (C4.3.3.1)
1 = Analog Input (AI)	Torque Reference via analog input chosen by the user The analog input can be set in C4.3.3.5
2 = Frequency Input (FI)	Torque Reference via frequency input chosen by the user The frequency input can be set in C4.3.3.6

NOTE!
If it is necessary to set the torque reference via Communication Networks or SoftPLC, this parameter must be set to HMI and the reference value set in C4.3.3.1.

C4.3.3 Torque		
C4.3.3.5 Torque ref. AI config.		
Range:	0 ... 30	**Default:** 0
Properties:	Stopped	

Description:
Defines which analog input will be used as reference for torque control. Table 9.49 on page 9-78 shows the options.

Analog Inputs options for X and A...G Slots

Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
AI1	X-1 (1)	A-1 (3)	B-1 (7)	C-1 (11)	D-1 (15)	E-1 (19)	F-1 (23)	G-1 (27)
AI2	X-2 (2)	A-2 (4)	B-2 (8)	C-2 (12)	D-2 (16)	E-2 (20)	F-2 (24)	G-2 (28)
AI3	–	A-3 (5)	B-3 (9)	C-3 (13)	D-3 (17)	E-3 (21)	F-3 (25)	G-3 (29)

Table 9.49: *Values assigned to the Analog Inputs of X and A...G Slots*

NOTE!
Example: To choose Analog Input AI3 from Slot D, select D-3 (17) option.

C4.3.3 Torque		
C4.3.3.6 Torque ref. FI config.		
Range:	0 ... 2	**Default:** 0
Properties:	Stopped	

Description:
It defines which frequency input will be used as reference for torque control.

Indication	Description
0 = Inactive	It disables the use of the frequency input in this function
1 = FI X-5	It enables the use of frequency input FI5 of Slot X
2 = FI X-6	It enables the use of frequency input FI6 of Slot X

C5 I/OS

It allows configuring the I/O accessories installed on the MVW3000.

C5.1 Slot X

Allows you to view the status of the slot configuration parameters.

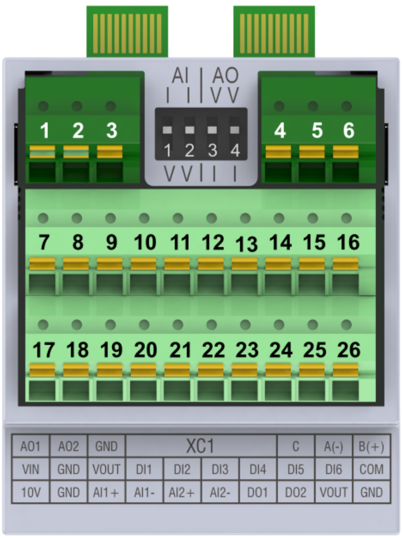


Figure 9.36: *IOS Accessory, Slot X*

C5.1.1 Analog inputs

It allows setting the analog inputs of the accessory connected to the corresponding slot.

Figure 9.37 on page 9-80 illustrates how the analog input works.

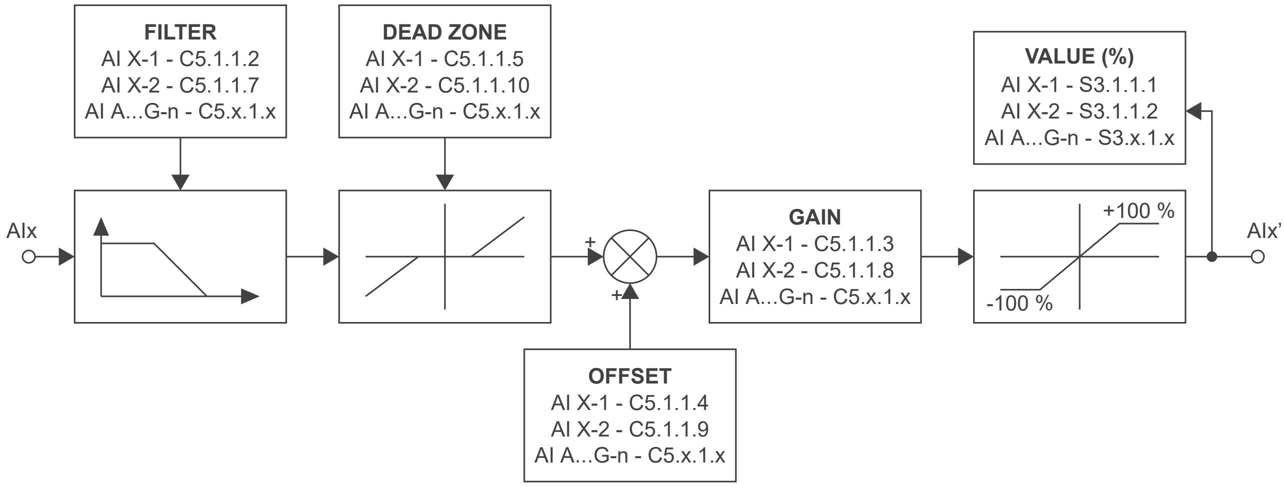


Figure 9.37: *Block diagram of the analog input*

Figure 9.38 on page 9-80 illustrates the analog input behavior for different configurations of gain, offset and dead zone with signal type set to 0 to 10 V. In addition, it is presented how saturation works for each configuration. The behavior of the signal may change slightly according to the signal type selected, but the effects of the settings shown remain the same.

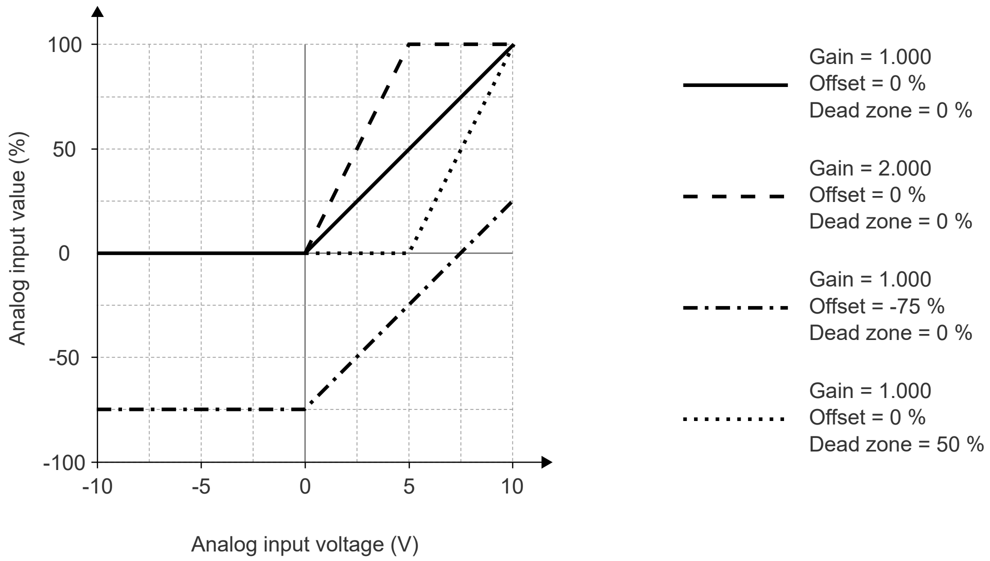


Figure 9.38: *Analog input signal types*

C5.1.1 Analog inputs		
C5.1.1.1 AI1 Settings		
C5.1.1.6 AI2 Settings		
Range:	0 ... 5 Bit	**Default:** 16
Properties:		

Description:
It allows to configure the action to be taken in case of a broken wire and also the type of signal that is expected at the terminals.

Bit	Value/Description
Bit 0 … 1 Detect Disconnection	Enabling broken wire detection when the analog input signal type is 4 to 20 mA or 20 to 4 mA. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Inactive**: Fault and alarms disabled
Bit 2 … 5 Signal Config.	Selection of the analog input signal type. **0 = 0 to 20 mA**: It indicates that the analog input signal is of 0 to 20 mA type **1 = 4 to 20 mA**: It indicates that the analog input signal is of 4 to 20 mA type **2 = 20 to 0 mA**: It indicates that the analog input signal is of 20 to 0 mA type **3 = 20 to 4 mA**: It indicates that the analog input signal is of 20 to 4 mA type **4 = 0 to 10 V**: It indicates that the analog input signal is of 0 to 10 mA type **5 = 10 to 0 V**: It indicates that the analog input signal is of 10 to 0 V type **6 = -10 to 10 V**: It indicates that the analog input signal is of -10 to 10 V type **7 = 10 to -10 V**: It indicates that the analog input signal is of 10 to -10 V type **8 = PTC**: It indicates that the analog input signal is of the PTC type

C5.1.1 Analog inputs

C5.1.1.2 AI1 Filter

C5.1.1.7 AI2 Filter

Range: 0.00 ... 16.00 s **Default:** 0.10 s

Properties:

Description:
It allows to configure the RC constant of the low-pass filter present at the analog input.

NOTE!
The analog input signal is filtered before applying gain and offset to the signal.

C5.1.1 Analog inputs

C5.1.1.3 AI1 Gain

C5.1.1.8 AI2 Gain

Range: 0.000 ... 9.999 **Default:** 1.000

Properties:

Description:
Gain setting for analog input.

C5.1.1 Analog inputs

C5.1.1.4 AI1 Offset

C5.1.1.9 AI2 Offset

Range: -100.00 ... 100.00 % **Default:** 0.00 %

Properties:

Description:
Offset setting for analog input.

C5.1.1 Analog inputs

C5.1.1.5 AI1 Dead zone

C5.1.1.10 AI2 Dead zone

Range: 0.00 ... 100.00 % **Default:** 0.00 %

Properties:

Description:
Dead zone setting for analog input.

C5.1.2 Analog outputs

It allows setting the analog outputs of the accessory connected to the slot.

Figure 9.39 on page 9-82 illustrates how the analog output works.

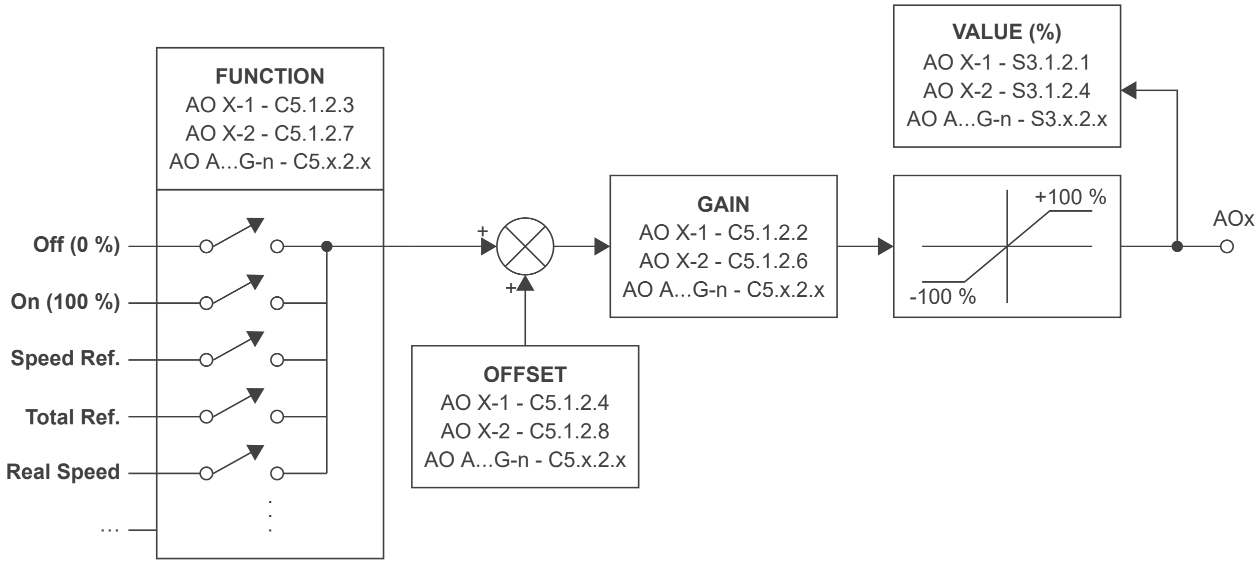


Figure 9.39: *Block diagram of the analog output*

C5.1.2 Analog outputs		
C5.1.2.1 AO1 Signal type		
C5.1.2.5 AO2 Signal type		
Range:	0 ... 5	**Default:** 4
Properties:		

Description:
It allows to configure the signal type of analog output.

To set the type of output, it is also necessary to correctly position the ”DIP switches” present on the accessory. For further details, refer to the specific accessory manual.

Indication	Description
0 = 0 to 20 mA	It indicates that the Analog Output signal of Slot X is 0 to 20 mA
1 = 4 to 20 mA	It indicates that the Analog Output signal of Slot X is 4 to 20 mA type
2 = 20 to 0 mA	It indicates that the Analog Output signal of Slot X is 20 to 0 mA type
3 = 20 to 4 mA	It indicates that the Analog Output signal of Slot X is 20 to 4 mA type
4 = 0 to 10 V	It indicates that the Analog Output signal of Slot X is 0 to 10 V type
5 = 10 to 0 V	It indicates that the Analog Output signal of Slot X is 10 to 0 V type

C5.1.2 Analog outputs		
C5.1.2.2 AO1 Gain		
C5.1.2.6 AO2 Gain		
Range:	0.000 ... 9.999	**Default:** 1.000
Properties:		

Description:
Gain setting for analog output.

C5.1.2 Analog outputs		
C5.1.2.3 AO1 Function		
C5.1.2.7 AO2 Function		
Range:	0 ... 21	**Default:** 4 (C5.1.2.3)
		7 (C5.1.2.7)
Properties:		

Description:

Setting of the function to be used for the analog output.

Indication	Description
0 = Off (0%)	It imposes 0 % on the output, regardless of the set gain and offset values
1 = On (100%)	It imposes 100 % on the output, regardless of the set gain and offset values
2 = Speed Ref.	It imposes on the output a value proportional to the speed reference (S2.1.1)
3 = Inverter temperature	It imposes on the output a value proportional to the highest temperature value between the inverter cells, see S2.4.4.2
4 = Real Speed	It imposes on the output a value proportional to the current motor speed used by the control module (S2.1.3)
5 ... 6 = Not used	Not used
7 = Output Current	It imposes on the output a value proportional to the RMS value of the fundamental component of the inverter output current (S2.3.1)
8 = Process Var.	Process Variable
9 = Not used	Not used
10 = Output Power	It imposes on the output a value proportional to the electrical power at the inverter output (S2.3.11)
11 = PID Setpoint	PID Setpoint
12 = Not used	Not used
13 = Motor Torque	It imposes on the output a value proportional to the estimated electrical torque on the motor based on the nominal torque (S2.2.3)
14 = SoftPLC	It imposes on the output the value sent by SoftPLC. Gain and offset values do not affect the output
15 = PTC	It imposes on the output the recommended value for powering a PTC temperature sensor (10 %). Gain and offset values do not affect the output
16 = Motor Ixt	It imposes on the output a value proportional to the motor overload level (D4.1.5.1)
17 = Encoder Speed	It imposes on the output a value proportional to the encoder current speed (S2.1.4)
18 = Network	It imposes on the output the value sent by the network. Gain and offset values do not affect the output
19 = Not used	Not used
20 = Torque Ref.	It imposes on the output a value proportional to the electrical torque reference on the motor based on the nominal torque (S2.2.1)
21 = Total Torque Ref.	It imposes on the output a value proportional to the electrical torque reference of the motor after the ramp (S2.2.2)

Table 9.53 on page 9-84 illustrates the full scale of analog output functions.

Table 9.53: Full scale of AO functions

Scale of the analog outputs indications	
Variable	**Full scale**
Speed Ref. Total Speed Ref.	Maximum Speed Reference (C4.3.1.1.2)
Real Speed Encoder Speed	2.0 × [Maximum Speed Reference (C4.3.1.1.2)]
Output Current	1.5 × [Rated Current (C13.1.2)]
Output Power	1.5 × $\sqrt{3}$ × [Rated Current (C13.1.2)] × [Rated Voltage (C13.1.1)]
Torque Ref. Total Torque Ref.	Maximum Torque Reference (C4.3.3.2)
Motor Torque	400 %
Motor Ixt Network	100 %
SoftPLC	32767
Process Var. PID Setpoint	Process Variable Maximum Level (A2.3.3.5)

The analog outputs cannot reproduce negative values at their terminals even if the HMI status shows negative values. This is because all analog output signal types are not bipolar. If it is necessary to represent theses negative values using analog outputs, it is possible to set an offset of +100 % and a gain of 0.500. The analog output will keep reproducing only non-negative values, but it will possible to differentiate positive from negative values. Figure 9.40 on page 9-84 illustrates this behavior for torque reference function and signal type set to 0 to 10 V. This setting can be useful when the analog output function is set to any function that can return a negative value, such as motor torque and torque reference.

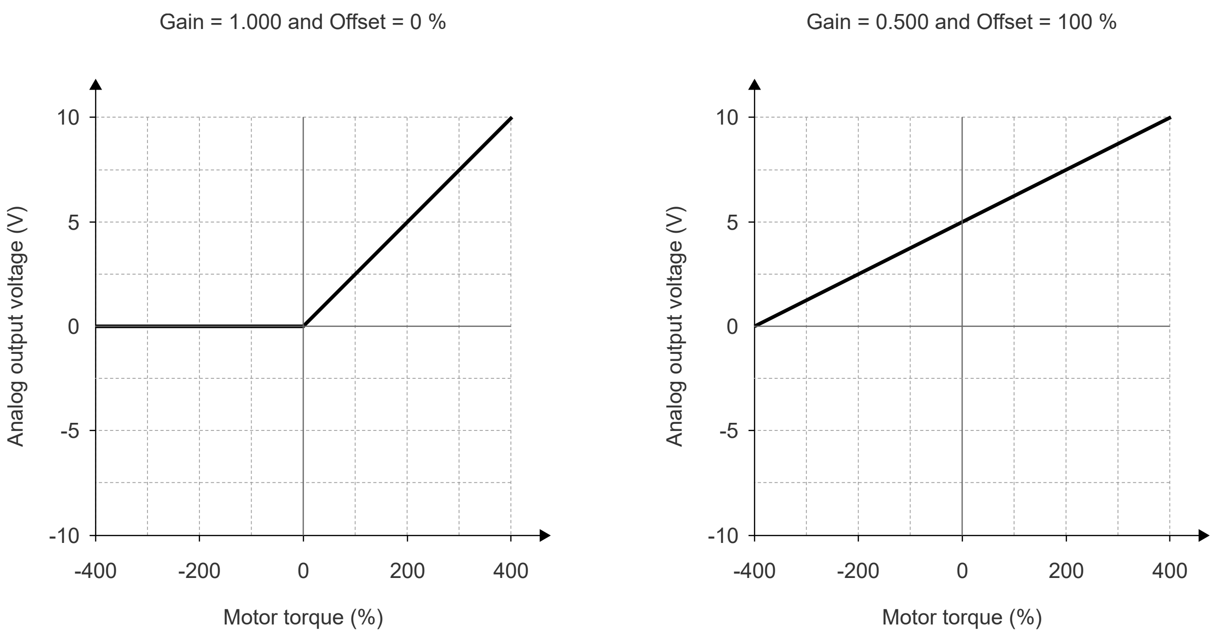


Figure 9.40: AO configurations to represent negative values

C5.1.2 Analog outputs		
C5.1.2.4 AO1 Offset		
C5.1.2.8 AO2 Offset		
Range:	-100.00 ... 100.00 %	**Default:** 0.00 %
Properties:		

Description:
Offset setting for analog output.

C5.1.3 Digital inputs

It allows configuring the digital inputs of the accessory connected to the slot.

Figure 9.41 on page 9-85 illustrates how the frequency input works.

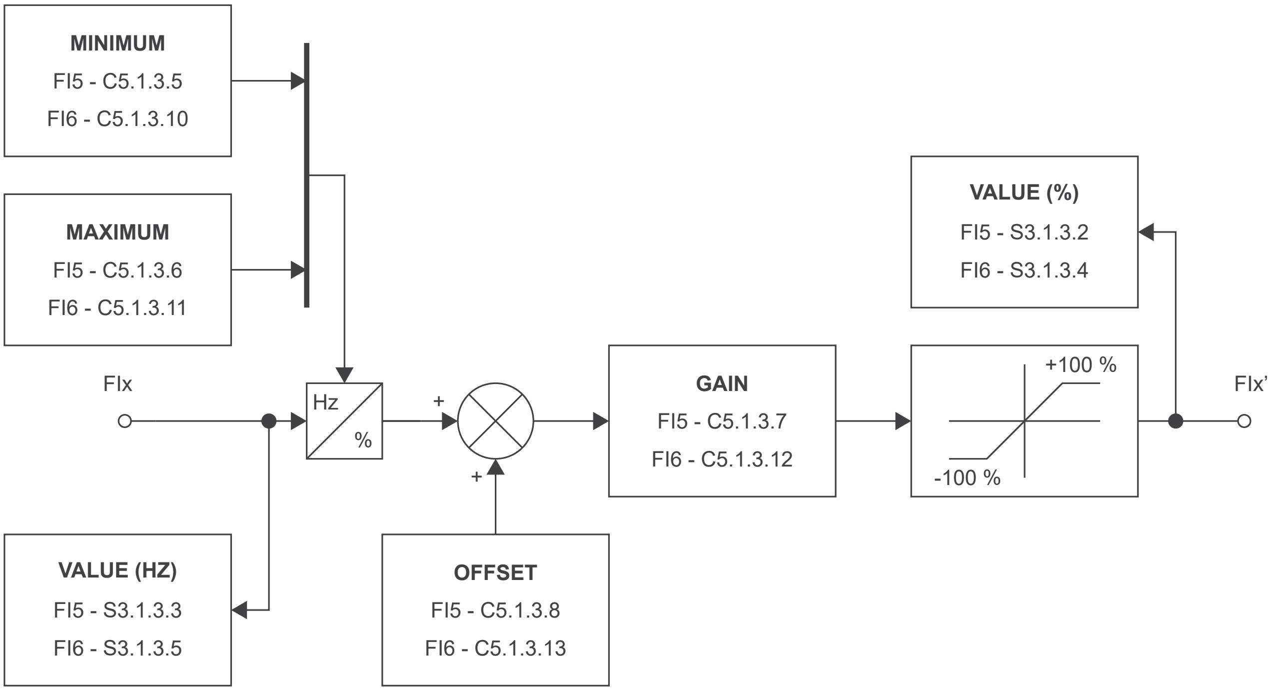


***Figure 9.41:** Frequency input block diagram*

C5.1.3 Digital inputs		
C5.1.3.4 DI5 Operation mode		
C5.1.3.9 DI6 Operation mode		
Range:	0 ... 3	**Default:** 0
Properties:	Stopped	

Description:
It allows to configure the operating mode of the digital input.

> **NOTE!**
> When the digital input is configured as a frequency input, it must be ensured that no command via DI is configured to use this same input. An example of a configuration that should be avoided would be to set the DI5 parameter of the Slot-X (C5.1.3.4) as frequency input and then set the general enable command parameter via DI (C4.2.3.1) to use this same input.

Indication	Description
0 = Polling	It indicates that the Digital Input is set for reading via scanning
1 = Not used	Not used
2 = Frequency	It indicates that the Digital Input is set to frequency input
3 = Encoder	It indicates that the Digital Input is set for reading the input signal frequency

C5.1.3 Digital inputs		
C5.1.3.5 FI5 Min frequency		
C5.1.3.10 FI6 Min frequency		
Range:	0 ... 32000 Hz	**Default:** 0 Hz
Properties:	Stopped	

Description:
It allows to configure the zero scale of the frequency input.

C5.1.3 Digital inputs		
C5.1.3.6 FI5 Max frequency		
C5.1.3.11 FI6 Max frequency		
Range:	0 ... 32000 Hz	**Default:** 32000 Hz
Properties:	Stopped	

Description:
It allows to configure the full scale of the frequency input.

C5.1.3 Digital inputs		
C5.1.3.7 FI5 Gain		
C5.1.3.12 FI6 Gain		
Range:	0.000 ... 9.999	**Default:** 1.000
Properties:	Stopped	

Description:
Frequency input gain setting.

C5.1.3 Digital inputs		
C5.1.3.8 FI5 Offset		
C5.1.3.13 FI6 Offset		
Range:	-100.00 ... 100.00 %	**Default:** 0.00 %
Properties:	Stopped	

Description:
Frequency input offset setting.

C5.1.4 Digital outputs

It allows configuring the digital outputs of the accessory connected to the slot.

Figure 9.42 on page 9-86 illustrates how the frequency output works.

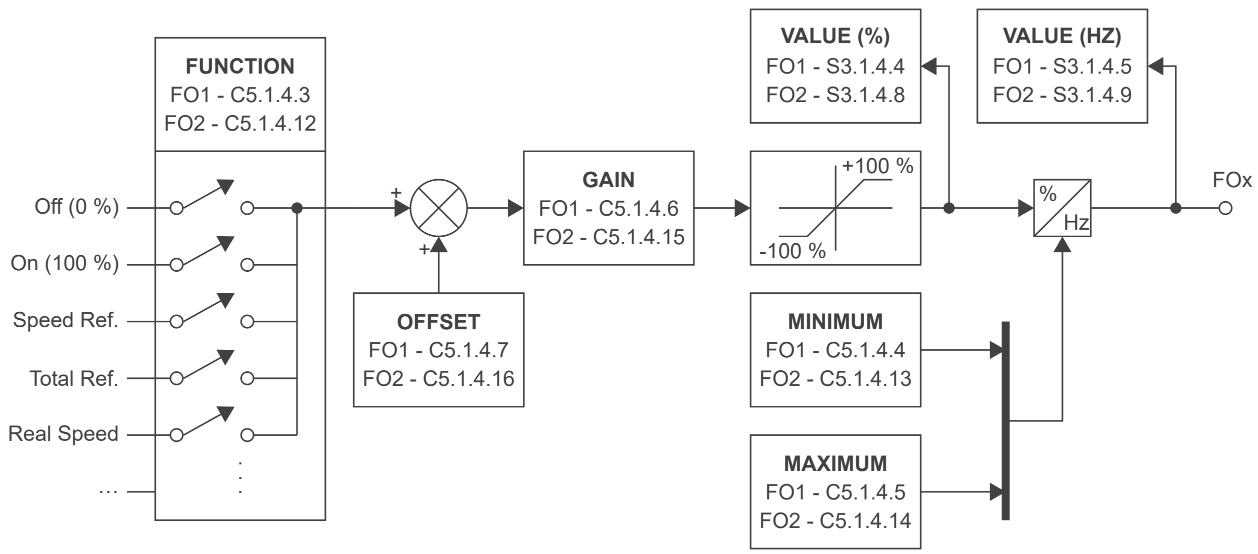


Figure 9.42: *Frequency output block diagram*

C5.1.4 Digital outputs		
C5.1.4.1 DO1 Operation mode		
C5.1.4.10 DO2 Operation mode		
Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
It allows to configure the operating mode of the digital output.

Indication	Description
0 = Polling	It indicates that the Digital Output is set to the ON/OFF mode
1 = Frequency	It indicates that the Digital Output is set to the Frequency Output mode

C5.1.4 Digital outputs		
C5.1.4.2 DO1 Function		
C5.1.4.11 DO2 Function		
Range:	0 ... 30	**Default:** 22 (C5.1.4.2)
		19 (C5.1.4.11)
Properties:		

Description:
Setting of the function to be used for the digital output.

Indication	Description
0 = Off	The Digital Output will always go to the inactive status
1 = On	The Digital Output will always go to the active status
2 = N* > Nx	The Digital Output will go to the active status when the speed reference (N*) is greater than the value set in Nx
3 = N > Nx	The Digital Output will go to the active status when the motor speed (N) is greater than the value set in Nx
4 = N < Ny	The Digital Output will go to the active status when the motor speed (N) is smaller than the value set in Ny
5 = N = N*	The Digital Output will go to the active status when the motor speed (N) equals the speed reference value (N*)
6 = Zero Speed	The Digital Output will go to the active status when the motor speed (N) is smaller than the value set in Zero Speed
7 = Not used	Not used
8 = F > Fx	The Digital Output will go to the active status when the motor frequency (F) is greater than the value set in Fx
9 = Is > Ix	The Digital Output will go to the active status when the output current (Is) is greater than the value set in Ix
10 = Is < Ix	The Digital Output will go to the active status when the output current (Is) is smaller than the value set in Ix
11 = Torque > Tx	The Digital Output will go to the active status when the motor torque (Torque) is greater than the value set in Tx
12 = Torque < Tx	The Digital Output will go to the active status when the motor torque (Torque) is smaller than the value set in Tx
13 = Hours Enabled > Hx	The Digital Output will go to the active status when the enabled hour counter is greater than the value set in Hx
14 ... 15 = Not used	Not used
16 = Local Mode	The Digital Output will go to the active status when the commands and references are defined by the Local mode
17 = Remote 1 Mode	The Digital Output will go to the active status when the commands and references are defined by the Remote 1 mode
18 = Remote 2 Mode	The Digital Output will go to the active status when the commands and references are defined by the Remote 2 mode
19 = Run	The Digital Output will go to the active status when the inverter is in the Run status
20 = Ready	The Digital Output will go to the active state when the inverter is in the Ready state, indicating that the pre-charge has been completed, the inverter is enabled and ready to receive the RUN command.
21 = STO	The Digital Output will go to the active status when the inverter is in the STO status

Indication	Description
22 = No Fault	The Digital Output will go to the active status when the inverter does not have a fault acting
23 = With Fault	The Digital Output will go to the active status when any fault acts on the inverter
24 = No Alarm	The Digital Output will go to the active status when the inverter is not indicating an alarm
25 = No Fault and Alarm	The Digital Output will go to the active status when a fault is not acting and is not indicating an alarm in the inverter
26 = Network	The Digital Output will go to the active status when the command received via Network is active
27 = SoftPLC	The Digital Output will go to the active status when the command received via SoftPLC is active
28 = Forward Direction	The Digital Output will go to the active state when the inverter is running in the forward direction
29 = Ride-Through	The Digital Output will go to the active status when the Ride-Through function is acting
30 = Pre-Charge OK	The Digital Output will go into the active state when the Pre-charge function indicates that it has been successfully executed

C5.1.4 Digital outputs

C5.1.4.3 FO1 Function

C5.1.4.12 FO2 Function

Range: 0 ... 21 **Default:** 0

Properties: Stopped

Description:

Setting of the function to be used for the frequency output.

Indication	Description
0 = Off (0%)	It imposes 0 % on the output, regardless of the set gain and offset values
1 = On (100%)	It imposes 100 % on the output, regardless of the set gain and offset values
2 = Speed Ref.	It imposes on the output a value proportional to the speed reference (S2.1.1)
3 = Total Speed Ref.	It imposes on the output a value proportional to the highest temperature value between the inverter cells, see S2.4.4.2
4 = Real Speed	It imposes on the output a value proportional to the current motor speed used by the control module (S2.1.3)
5 ... 6 = Not used	Not used
7 = Output Current	It imposes on the output a value proportional to the RMS value of the fundamental component of the inverter output current (S2.3.1)
8 = Process Var.	Process Variable
9 = Not used	Not used
10 = Output Power	It imposes on the output a value proportional to the electrical power at the inverter output (S2.3.11)
11 = PID Setpoint	PID Setpoint
12 = Not used	Not used
13 = Motor Torque	It imposes on the output a value proportional to the estimated electrical torque on the motor based on the nominal torque (S2.2.3)
14 = SoftPLC	It imposes on the output the value sent by SoftPLC. Gain and offset values do not affect the output
15 = Not used	Not used
16 = Motor Ixt	It imposes on the output a value proportional to the motor overload level (D4.1.5.1)
17 = Encoder Speed	It imposes on the output a value proportional to the encoder current speed (S2.1.4)
18 = Network	It imposes on the output the value sent by the network. Gain and offset values do not affect the output
19 = Not used	Not used
20 = Torque Ref.	It imposes on the output a value proportional to the electrical torque reference on the motor based on the nominal torque (S2.2.1)
21 = Total Torque Ref.	It imposes on the output a value proportional to the electrical torque reference of the motor after the ramp (S2.2.2)

Table 9.58 on page 9-89 illustrates the full scale of frequency output functions.

Table 9.58: *Full scale of FO functions*

Scale of frequency output indications	
Variable	**Full scale**
Speed Ref. Total Speed Ref.	Maximum Speed Reference (C4.3.1.1.2)
Real Speed Encoder Speed	2.0 $\times$ [Maximum Speed Reference (C4.3.1.1.2)]
Inverter temperature	200°C
Output Current	1.5 $\times$ [Rated Current (C13.1.2)]
Output Power	1.5 $\times$ $\sqrt{3}$ $\times$ [Rated Current (C13.1.2)] $\times$ [Rated Voltage (C13.1.1)]
Torque Ref. Total Torque Ref.	Maximum Torque Reference (C4.3.3.2)
Motor Torque	400 %
Motor Ixt Network	100 %
SoftPLC	32767
Process Var. PID Setpoint	Process Variable Maximum Level (A2.3.3.5)

The frequency outputs cannot reproduce negative values at their terminals even if the HMI status shows negative values. That happens because all frequency outputs respect their minimum value, and this value is reached at 0 %. If it is necessary to represent theses negative values using frequency outputs, it is possible to set an offset of +100 % and a gain of 0.500. The frequency output will keep reproducing only non-negative values, but it will possible to differentiate positive from negative values. Figure 9.43 on page 9-89 illustrates this behavior for torque reference function. The minimum and maximum frequency limits are set according to the default value setting. This setting can be useful when the frequency output function is set to any function that can return a negative value, such as motor torque and torque reference.

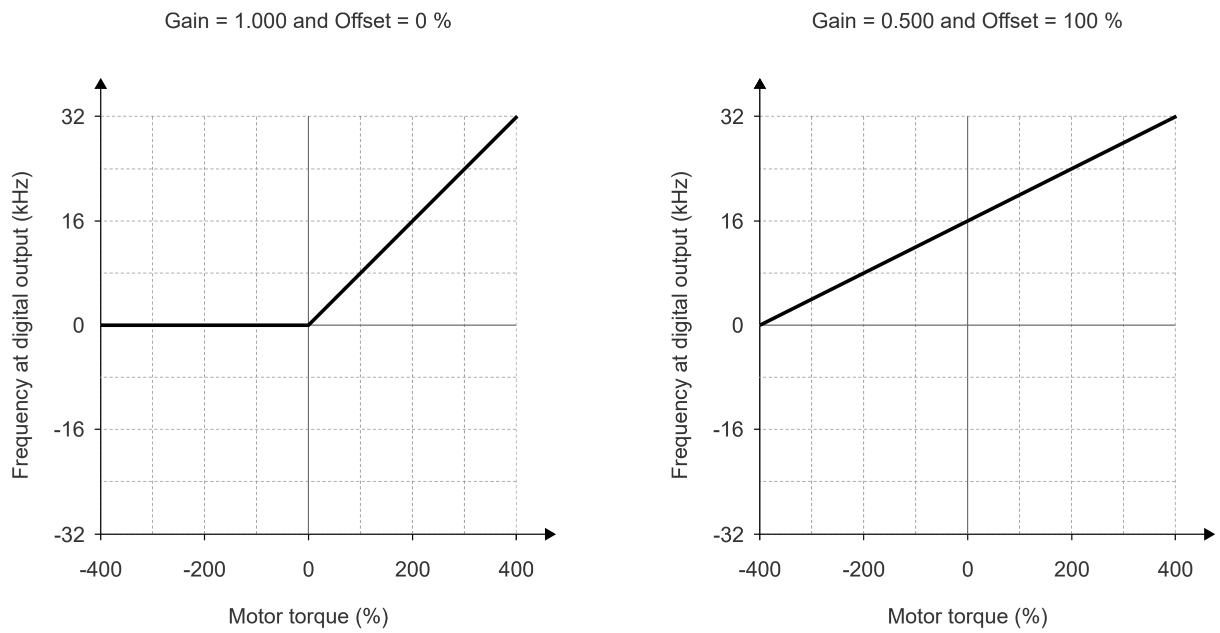


Figure 9.43: *FO configurations to represent negative values*

C5.1.4 Digital outputs		
C5.1.4.4 FO1 Min frequency		
C5.1.4.13 FO2 Min frequency		
Range:	0 ... 32000 Hz	**Default:** 0 Hz
Properties:	Stopped	

Description:
It allows to configure the frequency output zero scale.

C5.1.4 Digital outputs		
C5.1.4.5 FO1 Max frequency		
C5.1.4.14 FO2 Max frequency		
Range:	0 ... 32000 Hz	**Default:** 32000 Hz
Properties:	Stopped	

Description:
It allows to configure the full scale for frequency output.

C5.1.4 Digital outputs		
C5.1.4.6 FO1 Gain		
C5.1.4.15 FO2 Gain		
Range:	0.000 ... 9.999	**Default:** 1.000
Properties:	Stopped	

Description:
Frequency output gain setting.

C5.1.4 Digital outputs		
C5.1.4.7 FO1 Offset		
C5.1.4.16 FO2 Offset		
Range:	-100.00 ... 100.00 %	**Default:** 0.00 %
Properties:	Stopped	

Description:
Frequency output offset setting.

C5.1.5 Encoder

C5.1.5 Encoder		
C5.1.5.1 Number of pulses		
Range:	1 ... 65535 ppr	**Default:** 1024 ppr
Properties:	Stopped	

Description:
Setting of the number of pulses that the connected encoder generates during one complete revolution.

C5.2 Slot A

It allows viewing the status of the configuration parameters of the Slot.

C5.2.1 Analog inputs to C5.8.1 Analog inputs

It allows setting the analog inputs of the accessory connected to the corresponding slot.

C5.2.1 Analog inputs
C5.3.1 Analog inputs
C5.4.1 Analog inputs
C5.5.1 Analog inputs
C5.6.1 Analog inputs
C5.7.1 Analog inputs
C5.8.1 Analog inputs

1 AI1 Settings
6 AI2 Settings
11 AI3 Settings

Range: 0 ... 5 Bit **Default:** 16
Properties:

Description:
It allows to configure the action to be taken in case of a broken wire and also the type of signal that is expected at the terminals.

Bit	Value/Description
Bit 0 … 1 Detect Disconnection	Enabling broken wire detection when the analog input signal type is 4 to 20 mA or 20 to 4 mA. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Inactive**: Fault and alarms disabled
Bit 2 … 5 Signal Config.	Selection of the analog input signal type. **0 = 0 to 20 mA**: It indicates that the analog input signal is of 0 to 20 mA type **1 = 4 to 20 mA**: It indicates that the analog input signal is of 4 to 20 mA type **2 = 20 to 0 mA**: It indicates that the analog input signal is of 20 to 0 mA type **3 = 20 to 4 mA**: It indicates that the analog input signal is of 20 to 4 mA type **4 = 0 to 10 V**: It indicates that the analog input signal is of 0 to 10 V type **5 = 10 to 0 V**: It indicates that the analog input signal is of 10 to 0 V type **6 = -10 to 10 V**: It indicates that the analog input signal is of -10 to 10 V type **7 = 10 to -10 V**: It indicates that the analog input signal is of 10 to -10 V type **8 = PTC**: It indicates that the analog input signal is of the PTC type

C5.2.1 Analog inputs
C5.3.1 Analog inputs
C5.4.1 Analog inputs
C5.5.1 Analog inputs
C5.6.1 Analog inputs
C5.7.1 Analog inputs
C5.8.1 Analog inputs

.2 AI1 Filter
.7 AI2 Filter
.12 AI3 Filter

Range: 0.00 ... 16.00 s **Default:** 0.10 s
Properties:

Description:
It allows to configure the RC constant of the low-pass filter present at the analog input.

> **NOTE!**
> The analog input signal is filtered before applying gain and offset to the signal.

C5.2.1 Analog inputs C5.3.1 Analog inputs C5.4.1 Analog inputs C5.5.1 Analog inputs C5.6.1 Analog inputs C5.7.1 Analog inputs C5.8.1 Analog inputs		
.3 AI1 Gain .8 AI2 Gain .13 AI3 Gain		
Range:	0.000 ... 9.999	**Default:** 1.000
Properties:		

Description:
Gain setting for analog input.

C5.2.1 Analog inputs C5.3.1 Analog inputs C5.4.1 Analog inputs C5.5.1 Analog inputs C5.6.1 Analog inputs C5.7.1 Analog inputs C5.8.1 Analog inputs		
.4 AI1 Offset .9 AI2 Offset .14 AI3 Offset		
Range:	-100.00 ... 100.00 %	**Default:** 0.00 %
Properties:		

Description:
Offset setting for analog input.

C5.2.1 Analog inputs C5.3.1 Analog inputs C5.4.1 Analog inputs C5.5.1 Analog inputs C5.6.1 Analog inputs C5.7.1 Analog inputs C5.8.1 Analog inputs		
.5 AI1 Dead zone .10 AI2 Dead zone .15 AI3 Dead zone		
Range:	0.00 ... 100.00 %	**Default:** 0.00 %
Properties:		

Description:
Dead zone setting for analog input.

C5.2.2 Analog outputs to C5.8.2 Analog outputs

It allows setting the analog outputs of the accessory connected to the slot.

C5.2.2 Analog outputs
C5.3.2 Analog outputs
C5.4.2 Analog outputs
C5.5.2 Analog outputs
C5.6.2 Analog outputs
C5.7.2 Analog outputs
C5.8.2 Analog outputs

.1 AO1 Signal type
.5 AO2 Signal type

Range: 0 ... 7 **Default:** 4
Properties:

Description:
It allows to configure the signal type of analog output.

To set the type of output, it is also necessary to correctly position the "DIP switches" present on the accessory. For further details, refer to the specific accessory manual.

Indication	Description
0 = 0 to 20 mA	It indicates that the Analog Output signal is 0 to 20 mA type
1 = 4 to 20 mA	It indicates that the Analog Output signal is 4 to 20 mA type
2 = 20 to 0 mA	It indicates that the Analog Output signal is 20 to 0 mA type
3 = 20 to 4 mA	It indicates that the Analog Output signal is 20 to 4 mA type
4 = 0 to 10 V	It indicates that the Analog Output signal is 0 a 10 V type
5 = 10 to 0 V	It indicates that the Analog Output signal is 10 a 0 V type
6 ... 7 = Not used	Not used

C5.2.2 Analog outputs
C5.3.2 Analog outputs
C5.4.2 Analog outputs
C5.5.2 Analog outputs
C5.6.2 Analog outputs
C5.7.2 Analog outputs
C5.8.2 Analog outputs

.2 AO1 Gain
.6 AO2 Gain

Range: 0.000 ... 9.999 **Default:** 1.000
Properties:

Description:
Gain setting for analog output.

C5.2.2 Analog outputs
C5.3.2 Analog outputs
C5.4.2 Analog outputs
C5.5.2 Analog outputs
C5.6.2 Analog outputs
C5.7.2 Analog outputs
C5.8.2 Analog outputs

.3 AO1 Function
.7 AO2 Function

Range: 0 ... 21 **Default:** 0
Properties:

Description:
Setting of the function to be used for the analog output.

Indication	Description
0 = Off (0%)	It imposes 0 % on the output, regardless of the set gain and offset values
1 = On (100%)	It imposes 100 % on the output, regardless of the set gain and offset values
2 = Speed Ref.	It imposes on the output a value proportional to the speed reference (S2.1.1)
3 = Inverter temperature	It imposes on the output a value proportional to the highest temperature value between the inverter cells, see S2.4.4.2
4 = Real Speed	It imposes on the output a value proportional to the current motor speed used by the control module (S2.1.3)
5 ... 6 = Not used	Not used
7 = Output Current	It imposes on the output a value proportional to the RMS value of the fundamental component of the inverter output current (S2.3.1)
8 = Process Var.	Process Variable
9 = Not used	Not used
10 = Output Power	It imposes on the output a value proportional to the electrical power at the inverter output (S2.3.11)
11 = PID Setpoint	PID Setpoint
12 = Not used	Not used
13 = Motor Torque	It imposes on the output a value proportional to the estimated electrical torque on the motor based on the nominal torque (S2.2.3)
14 = SoftPLC	It imposes on the output the value sent by SoftPLC. Gain and offset values do not affect the output
15 = PTC	It imposes on the output the recommended value for powering a PTC temperature sensor (10 %). Gain and offset values do not affect the output
16 = Motor Ixt	It imposes on the output a value proportional to the motor overload level (D4.1.5.1)
17 = Encoder Speed	It imposes on the output a value proportional to the encoder current speed (S2.1.4)
18 = Network	It imposes on the output the value sent by the network. Gain and offset values do not affect the output
19 = Not used	Not used
20 = Torque Ref.	It imposes on the output a value proportional to the electrical torque reference on the motor based on the nominal torque (S2.2.1)
21 = Total Torque Ref.	It imposes on the output a value proportional to the electrical torque reference of the motor after the ramp (S2.2.2)

C5.2.2 Analog outputs
C5.3.2 Analog outputs
C5.4.2 Analog outputs
C5.5.2 Analog outputs
C5.6.2 Analog outputs
C5.7.2 Analog outputs
C5.8.2 Analog outputs

.4 AO1 Offset
.8 AO2 Offset

Range: -100.00 ... 100.00 % **Default:** 0.00 %
Properties:

Description:
Offset setting for analog output.

C5.2.4 Digital outputs to C5.8.4 Digital outputs

It allows configuring the digital outputs of the accessory connected to the slot.

C5.2.4 Digital outputs		
C5.3.4 Digital outputs		
C5.4.4 Digital outputs		
C5.5.4 Digital outputs		
C5.6.4 Digital outputs		
C5.7.4 Digital outputs		
C5.8.4 Digital outputs		
.1 DO1 Function		
.4 DO2 Function		
.7 DO3 Function		
.10 DO4 Function		
.13 DO5 function		
.16 DO6 function		
.19 DO7 function		
.22 DO8 function		
Range:	0 ... 30	**Default:** 22 (C5.2.4.1)
		3 (C5.2.4.4)
		2 (C5.2.4.7)
		0 (Others)
Properties:	Stopped	

Description:

Setting of the function to be used for the digital output.

Indication	Description
0 = Off	The Digital Output will always go to the inactive status
1 = On	The Digital Output will always go to the active status
2 = N* > Nx	The Digital Output will go to the active status when the speed reference (N*) is greater than the value set in Nx
3 = N > Nx	The Digital Output will go to the active status when the motor speed (N) is greater than the value set in Nx
4 = N < Ny	The Digital Output will go to the active status when the motor speed (N) is smaller than the value set in Ny
5 = N = N*	The Digital Output will go to the active status when the motor speed (N) equals the speed reference value (N*)
6 = Zero Speed	The Digital Output will go to the active status when the motor speed (N) is smaller than the value set in Zero Speed
7 = Not used	Not used
8 = F > Fx	The Digital Output will go to the active status when the motor frequency (F) is greater than the value set in Fx
9 = Is > Ix	The Digital Output will go to the active status when the output current (Is) is greater than the value set in Ix
10 = Is < Ix	The Digital Output will go to the active status when the output current (Is) is smaller than the value set in Ix
11 = Torque > Tx	The Digital Output will go to the active status when the motor torque (Torque) is greater than the value set in Tx
12 = Torque < Tx	The Digital Output will go to the active status when the motor torque (Torque) is smaller than the value set in Tx
13 = Hours Enabled > Hx	The Digital Output will go to the active status when the enabled hour counter is greater than the value set in Hx
14 ... 15 = Not used	Not used
16 = Local Mode	The Digital Output will go to the active status when the commands and references are defined by the Local mode
17 = Remote 1 Mode	The Digital Output will go to the active status when the commands and references are defined by the Remote 1 mode
18 = Remote 2 Mode	The Digital Output will go to the active status when the commands and references are defined by the Remote 2 mode
19 = Run	The Digital Output will go to the active status when the inverter is in the Run status

Indication	Description
20 = Ready	The Digital Output will go to the active state when the inverter is in the Ready state, indicating that the pre-charge has been completed, the inverter is enabled and ready to receive the RUN command.
21 = STO	The Digital Output will go to the active status when the inverter is in the STO status
22 = No Fault	The Digital Output will go to the active status when the inverter does not have a fault acting
23 = With Fault	The Digital Output will go to the active status when any fault acts on the inverter
24 = No Alarm	The Digital Output will go to the active status when the inverter is not indicating an alarm
25 = No Fault and Alarm	The Digital Output will go to the active status when a fault is not acting and is not indicating an alarm in the inverter
26 = Network	The Digital Output will go to the active status when the command received via Network is active
27 = SoftPLC	The Digital Output will go to the active status when the command received via SoftPLC is active
28 = Forward Direction	The Digital Output will go to the active state when the inverter is running in the forward direction
29 = Ride-Through	The Digital Output will go to the active status when the Ride-Through function is acting
30 = Pre-Charge OK	The Digital Output will go into the active state when the Pre-charge function indicates that it has been successfully executed

C5.2.5 Encoder to C5.8.5 Encoder

It allows configuring the encoder accessory connected to the slot.

C5.2.5 Encoder
C5.3.5 Encoder
C5.4.5 Encoder
C5.5.5 Encoder
C5.6.5 Encoder
C5.7.5 Encoder
C5.8.5 Encoder

.1 Number of pulses

Range:	1 ... 65535 ppr	**Default:** 1024 ppr
Properties:	Stopped	

Description:
Setting of the number of pulses that the connected encoder generates during one complete revolution.

C5.2.5 Encoder
C5.3.5 Encoder
C5.4.5 Encoder
C5.5.5 Encoder
C5.6.5 Encoder
C5.7.5 Encoder
C5.8.5 Encoder

.2 Settings

Range:	0 ... 7 Bit	**Default:** 0
Properties:		

Description:
It allows to configure the broken cable detection, zero search function, and encoder signal direction.

Bit	Value/Description
Bit 0 … 1 Broken Cable A	It allows setting the fault action and alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 2 … 3 Broken Cable B	It allows setting the fault action and alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 4 … 5 Broken Cable Z	It allows setting the fault action and alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 6 Search Zero	It allows starting the execution of the search zero function. When the search zero function is activated, the number of revolutions and the fraction of revolution measured will be zeroed at the next occurrence of a pulse in the encoder Z signal. This bit will be changed to 0 after the function has been completed. **0 = Disabled**: Function disabled **1 = Enabled**: Function enabled
Bit 7 Signal Direction	It allows selecting the sequence of signals A and B that represent the forward direction of rotation **0 = A/B**: Forward direction when rising edge of A occurs before the rising edge of B **1 = B/A**: Forward direction when rising edge of B occurs before the rising edge of A

C5.2.6 Temperatures to C5.8.6 Temperatures

It allows configuring the temperature accessory connected to the slot.

C5.2.6 Temperatures
C5.3.6 Temperatures
C5.4.6 Temperatures
C5.5.6 Temperatures
C5.6.6 Temperatures
C5.7.6 Temperatures
C5.8.6 Temperatures

.1 Sensor type

Range: 0 ... 3 **Default:** 0
Properties: Stopped

Description:
It sets the sensor type that will be connected to the accessory.

NOTE!
Individual selection by sensor is not possible. All sensors connected to the same accessory must be of the same type.

Indication	Description
0 = PT100	PT100 Sensor
1 = PT1000	PT1000 Sensor
2 = Single PTC	Single PTC Sensor
3 = Triple PTC	Triple PTC Sensor

C5.2.6 Temperatures
C5.3.6 Temperatures
C5.4.6 Temperatures
C5.5.6 Temperatures
C5.6.6 Temperatures
C5.7.6 Temperatures
C5.8.6 Temperatures

.2 Overtemperature config.

Range:	0 ... 11 Bit	**Default:** 0
Properties:	Stopped	

Description:
It enables the overtemperature faults for each temperature sensor.

Bit	Value/Description
Bit 0 … 1 S1 Sensor F/A	It enables the overtemperature faults for temperature sensor 1. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Alarm and Fault**: Alarm and fault enabled **3 = Inactive**: Faults and alarms disabled
Bit 2 … 3 S2 Sensor F/A	It enables the overtemperature faults for temperature sensor 2. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Alarm and Fault**: Alarm and fault enabled **3 = Inactive**: Faults and alarms disabled
Bit 4 … 5 S3 Sensor F/A	It enables the overtemperature faults for temperature sensor 3. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Alarm and Fault**: Alarm and fault enabled **3 = Inactive**: Faults and alarms disabled
Bit 6 … 7 S4 Sensor F/A	It enables the overtemperature faults for temperature sensor 4. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Alarm and Fault**: Alarm and fault enabled **3 = Inactive**: Faults and alarms disabled
Bit 8 … 9 S5 Sensor F/A	It enables the overtemperature faults for temperature sensor 5. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Alarm and Fault**: Alarm and fault enabled **3 = Inactive**: Faults and alarms disabled
Bit 10 … 11 S6 Sensor F/A	It enables the overtemperature faults for temperature sensor 6. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Alarm and Fault**: Alarm and fault enabled **3 = Inactive**: Faults and alarms disabled

C5.2.6 Temperatures
C5.3.6 Temperatures
C5.4.6 Temperatures
C5.5.6 Temperatures
C5.6.6 Temperatures
C5.7.6 Temperatures
C5.8.6 Temperatures

.3 Measurement error config.

Range:	0 ... 11 Bit	**Default:** 0
Properties:	Stopped	

Description:
It enables measurement error faults (broken sensor cable, short-circuit sensor) for each temperature sensor.

NOTE!
Faults and alarms will occur when the temperature read on the sensors is less than or equal to -20 °C during a 5 minute interval. Resetting of faults and alarms is enabled for temperature values greater than -15 °C.

Bit	Value/Description
Bit 0 … 1 S1 Sensor F/A	It enables measurement error faults in the temperature sensor 1. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Inactive**: Fault and alarms disabled
Bit 2 … 3 S2 Sensor F/A	It enables measurement error faults of temperature sensor 2. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Inactive**: Fault and alarms disabled
Bit 4 … 5 S3 Sensor F/A	It enables measurement error faults of temperature sensor 3. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Inactive**: Fault and alarms disabled
Bit 6 … 7 S4 Sensor F/A	It enables measurement error faults of temperature sensor 4. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Inactive**: Fault and alarms disabled
Bit 8 … 9 S5 Sensor F/A	It enables error faults in the measurement of temperature sensor 5. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Inactive**: Fault and alarms disabled
Bit 10 … 11 S6 Sensor F/A	It enables error faults in the measurement of temperature sensor 6. **0 = Fault**: Fault enabled **1 = Alarm**: Alarm enabled **2 = Inactive**: Fault and alarms disabled

C5.2.6 Temperatures
C5.3.6 Temperatures
C5.4.6 Temperatures
C5.5.6 Temperatures
C5.6.6 Temperatures
C5.7.6 Temperatures
C5.8.6 Temperatures

.4 Sensor 1 Temp. setpoint
.5 Sensor 2 Temp. setpoint
.6 Sensor 3 Temp. setpoint
.7 Sensor 4 Temp. setpoint
.8 Sensor 5 Temp. setpoint
.9 Sensor 6 temp. setpoint

Range:	-100.0 ... 250.0 °C	**Default:** 0.0 °C
Properties:	Stopped	

Description:
It allows to configure the sensor overtemperature fault setpoint.

C5.3 Slot B

It allows viewing the status of the configuration parameters of the Slot.

C5.4 Slot C

It allows viewing the status of the configuration parameters of the Slot.

C5.5 Slot D

It allows viewing the status of the configuration parameters of the Slot.

C5.6 Slot E

It allows viewing the status of the configuration parameters of the Slot.

C5.7 Slot F

It allows viewing the status of the configuration parameters of the Slot.

C5.8 Slot G

It allows viewing the status of the configuration parameters of the Slot.

C5.9 DO operation levels

It allows viewing and configuring the operation conditions of the digital outputs (DOs).

C5.9 DO operation levels			
C5.9.1 Fx frequency			
Range:	0.0 ... 300.0 Hz	**Default:**	4.0 Hz
Properties:			

Description:
It allows viewing and setting the frequency level (Fx) used in function (F > Fx) for Digital Outputs.

C5.9 DO operation levels			
C5.9.2 Fx hysteresis			
Range:	0.0 ... 15.0 Hz	**Default:**	2.0 Hz
Properties:			

Description:
It allows viewing and setting the frequency hysteresis level used in function (F > Fx) for Digital Outputs.

C5.9 DO operation levels			
C5.9.3 Nx/Ny hysteresis			
Range:	0 ... 900 rpm	**Default:**	18 rpm
Properties:			

Description:
It allows viewing and setting the speed hysteresis level used in functions (N* > Nx), (N > Nx), (N < Ny) and (N > Nx and Nt > Nx) for Digital Outputs.

C5.9 DO operation levels			
C5.9.4 Nx speed			
Range:	0 ... 30000 rpm	**Default:**	120 rpm
Properties:			

Description:
It allows viewing and setting the speed level (Nx) used in function (N > Nx) for Digital Outputs.

C5.9 DO operation levels			
C5.9.5 Ny speed			
Range:	0 ... 30000 rpm	**Default:**	1800 rpm
Properties:			

Description:
It allows viewing and setting the speed level (Ny) used in function (N < Ny) for Digital Outputs.

C5.9 DO operation levels		
C5.9.6 Ix current		
Range:	0.0 ... 200.0 %	**Default:** 100.0 %
Properties:		

Description:
It allows viewing and setting the current level (Ix) used in functions (I > ix) and (I < ix) for Digital Outputs.

C5.9 DO operation levels		
C5.9.8 N = N* Band		
Range:	0 ... 30000 rpm	**Default:** 18 rpm
Properties:		

Description:
It allows viewing and setting the speed range within which the reference and speed will be considered to be at the same value. Used in function (N* = N) for Digital Outputs.

C5.9 DO operation levels		
C5.9.9 Tx torque		
Range:	0.0 ... 200.0 %	**Default:** 100.0 %
Properties:		

Description:
It allows viewing and setting the torque level (Tx) used in functions (T > Tx) and (T < Tx) for Digital Outputs.

C5.9 DO operation levels		
C5.9.10 Hx hours		
Range:	0 ... 65536 h	**Default:** 4320 h
Properties:		

Description:
It allows viewing and setting the number of hours (Hx) used in function (Hours enabled > Hx) for Digital Outputs.

C5.10 DOs delay

It allows setting a delay in the change of state of the digital outputs.

When the timing function is enabled, and the digital output function source undergoes a transition, the digital output will be enabled/disabled according to the time set in the timer.

Figure 9.44 on page 9-101 illustrates this behavior.

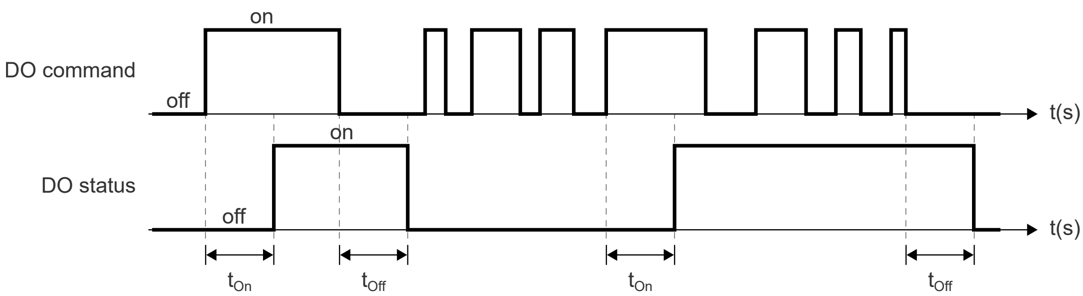


Figure 9.44: *Example of digital output timer actuation*

> **NOTE!**
> If more than one timer is set for the same digital output, only the first timer will actuate.

C5.10 DOs delay		
C5.10.1 Timer 1 DO		
C5.10.4 Timer 2 DO		
C5.10.7 Timer 3 DO		
Range:	0 ... 58	**Default:** 0
Properties:		

Description:
It defines on which digital output the timer will be used. The options are shown in Table 9.63 on page 9-102.

Table 9.63: *Selection of Digital Outputs from Slots X and A...G to set the timer*

Digital Output Options for Slots X and A...G								
Indication	**Slot X**	**Slot A**	**Slot B**	**Slot C**	**Slot D**	**Slot E**	**Slot F**	**Slot G**
Inactive	0							
DO1	X-1 (1)	A-1 (3)	B-1 (11)	C-1 (19)	D-1 (27)	E-1 (35)	F-1 (43)	G-1 (51)
DO2	X-2 (2)	A-2 (4)	B-2 (12)	C-2 (20)	D-2 (28)	E-2 (36)	F-2 (44)	G-2 (52)
DO3	–	A-3 (5)	B-3 (13)	C-3 (21)	D-3 (29)	E-3 (37)	F-3 (45)	G-3 (53)
DO4	–	A-4 (6)	B-4 (14)	C-4 (22)	D-4 (30)	E-4 (38)	F-4 (46)	G-4 (54)
DO5	–	A-5 (7)	B-5 (15)	C-5 (23)	D-5 (31)	E-5 (39)	F-5 (47)	G-5 (55)
DO6	–	A-6 (8)	B-6 (16)	C-6 (24)	D-6 (32)	E-6 (40)	F-6 (48)	G-6 (56)
DO7	–	A-7 (9)	B-7 (17)	C-7 (25)	D-7 (33)	E-7 (41)	F-7 (49)	G-7 (57)
DO8	–	A-8 (10)	B-8 (18)	C-8 (26)	D-8 (34)	E-8 (42)	F-8 (50)	G-8 (58)

C5.10 DOs delay		
C5.10.2 T1 Delay ON		
C5.10.5 T2 Delay ON		
C5.10.8 T3 Delay ON		
Range:	0.0 ... 300.0 s	**Default:** 0.0 s
Properties:		

Description:
It defines the time in seconds for activation of the digital output after a positive transition of the command (depending on the function of the digital output).

After a positive command transition, for the programmed output to be enabled, the command must remain active for at least the time set in this parameter. Otherwise, the timer will be reset and the output will not be enabled. See Figure 9.44 on page 9-101.

C5.10 DOs delay		
C5.10.3 T1 Delay OFF		
C5.10.6 T2 Delay OFF		
C5.10.9 T3 Delay OFF		
Range:	0.0 ... 300.0 s	**Default:** 0.0 s
Properties:		

Description:
It defines the time in seconds for disabling the digital output after a negative transition of the command (depending on the function of the digital output).

After a negative transition of the command, for the programmed output to be disabled, the command must remain inactive for at least the time set in this parameter. Otherwise, the timer will be reset and the output will remain enabled. See Figure 9.44 on page 9-101.

C5.11 Control board

Allows you to configure the analog outputs and inputs of the control board.

C5.11.1 Analog inputs

C5.11.1 Analog inputs

C5.11.1.1 AI1 function
C5.11.1.4 AI2 function

Range: 0 ... 3 **Default:** 0
Properties:

Description:
Setting the function to be used for analog input.

Indication	Description
0 = Not used	
1 = Torque reference	
2 = Limit current	
3 = Field current	

C5.11.1 Analog inputs

C5.11.1.2 AI1 Gain
C5.11.1.5 AI2 Gain

Range: 0.000 ... 9.999 **Default:** 1.000
Properties:

Description:
Gain setting for analog input.

C5.11.1 Analog inputs

C5.11.1.3 AI1 Offset
C5.11.1.6 AI2 Offset

Range: -100.00 ... 100.00 % **Default:** 0.00 %
Properties:

Description:
Offset setting for analog input.

C5.11.2 Analog outputs

C5.11.2 Analog outputs

C5.11.2.1 AO1 function
C5.11.2.4 AO2 function
C5.11.2.7 AO3 function
C5.11.2.10 AO4 function

Range: 0 ... 254 **Default:** 0
Properties:

Description:
Setting the function to be used for the analog output.

Indication	Description
0 = 0 V	Constant 0 V
1 = 5 V	Constant 5 V
2 = -5 V	Constant -5 V
3 = 10 V	Constant 10 V
4 = -10 V	Constant -10 V
5 = Modulation index	Modulation index
6 = Frequency	Inverter output frequency
7 = Iout	Amplitude of output currents
8 = Ramp	Ramp exit
12 = Speed	Speed do motor
23 = Lower Vcc	Lower DC voltage of cells
24 = Highest Vcc	Higher DC voltage of cells
34 = Ib	Phase B input current
35 = Ic	C-phase input current
42 = Vab	AB input line voltage
43 = Vbc	BC input line voltage
45 = Ixt	Motor thermal overload protection value
86 = Pout (kW)	Active output power
88 = Pout (kVAr)	Output reactive power
89 = Pout (kVA)	Apparent output power
90 = FPout	Output power factor
91 = Torque	Torque do motor
93 = Pin (kW)	Active input power
94 = Pin (kVAr)	Input reactive power
95 = Pin (kVA)	Apparent input power
96 = FPin	Input power factor
100 = Vout RMS	RMS value of output voltage
101 = Vin RMS	RMS value of input voltage
107 = Iout RMS	RMS value of output current
111 = Iin RMS	RMS value of input current

C5.11.2 Analog outputs

C5.11.2.2 AO1 gain

C5.11.2.5 AO2 gain

C5.11.2.8 AO3 gain

C5.11.2.11 AO4 gain

Range: 0.000 ... 9.999 **Default:** 1.000

Properties:

Description:
Gain setting for analog output.

C5.11.2 Analog outputs

C5.11.2.3 AO1 offset

C5.11.2.6 AO2 offset

C5.11.2.9 AO3 offset

C5.11.2.12 AO3 offset

Range: -100.00 ... 100.00 % **Default:** 0.00 %

Properties:

Description:
Offset setting for analog output.

C5.11.3 Digital outputs

C5.11.3 Digital outputs		
C5.11.3.1 RL8 Function		
Range:	0 ... 3	**Default:** 0
Properties:		

Description:
The state of the digital outputs can be monitored in the parameter S3.9.3.1.

> **NOTE!**
> When options 1 and 2 are selected to control the output contactor, DI6 on the control board is used to monitor the contactor, and its status can be checked in parameter S3.9.2.1.

Indication	Description
0 = Inactive	Function inactive
1 = Operation with filter type 2	
2 = Operation with permanent magnet machine	The opening of the output contactor is commanded whenever the PWM is disabled Closing is commanded when the inverter is enabled and the contactor is open.
3 = Inverter doors lock	In option 3, the relay controls the locking of the doors when the DC link voltage of the cells is greater than 50V and the opening when all cells reach 0V

C5.11.4 Encoder

C5.11.4 Encoder		
C5.11.4.1 Number of pulses		
Range:	1 ... 65535 ppr	**Default:** 1024 ppr
Properties:	Stopped	

Description:
Setting of the number of pulses that the connected encoder generates during one complete revolution.

C5.11.4 Encoder		
C5.11.4.2 Settings		
Range:	0 ... 7 Bit	**Default:** 0
Properties:		

Description:
It allows to configure the broken cable detection, zero search function, and encoder signal direction.

Bit	Value/Description
Bit 0 … 1 Broken Cable A	It allows setting the fault action and alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 2 … 3 Broken Cable B	It allows setting the fault action and alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 4 … 5 Broken Cable Z	It allows setting the fault action and alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 6 Search Zero	It allows starting the execution of the search zero function. When the search zero function is activated, the number of revolutions and the fraction of revolution measured will be zeroed at the next occurrence of a pulse in the encoder Z signal. This bit will be changed to 0 after the function has been completed. **0 = Disabled**: Function disabled **1 = Enabled**: Function enabled
Bit 7 Signal Direction	It allows selecting the sequence of signals A and B that represent the forward direction of rotation **0 = A/B**: Forward direction when rising edge of A occurs before the rising edge of B **1 = B/A**: Forward direction when rising edge of B occurs before the rising edge of A

C6 RAMPS

It allows setting the acceleration and deceleration times for the speed or torque reference, defining the command selection between “1st Ramp” and “2nd Ramp” and selecting the desired ramp profile.

C6.1 Speed control

Setting of the speed ramps.

C6.1 Speed control		
C6.1.1 Acceleration time		
Range:	0.1 ... 999.9 s	**Default:** 100.0 s
Properties:		

Description:
It sets the “1st Ramp” acceleration time for the speed reference. This value corresponds to the time that the ramp varies from 0 rpm to the maximum value C4.3.1.1.2.

C6.1 Speed control		
C6.1.2 Deceleration time		
Range:	0.1 ... 999.9 s	**Default:** 180.0 s
Properties:		

Description:
It sets the “1st Ramp” deceleration time for the speed reference. This value corresponds to the time that the ramp varies from the maximum value C4.3.1.1.2 to 0 rpm.

C6.1 Speed control		
C6.1.3 1st/2nd ramp selection		
Range:	0 ... 8	**Default:** 0
Properties:	Stopped	

Description:
It sets the source of the command for acceleration ramps that will select between the “1st Ramp” and the “2nd Ramp”.

- “1st Ramp” means that the acceleration and deceleration ramps are following the values set in C6.1.1 and C6.1.2 respectively.
- “2nd Ramp” means that the acceleration and deceleration ramps are following the values set in C6.1.4 and C6.1.5 respectively.

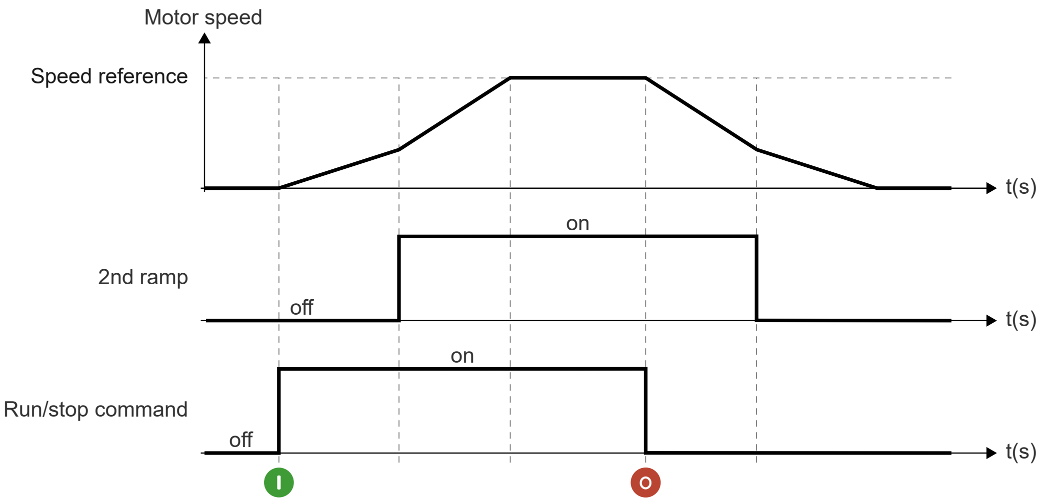


***Figure 9.45:** Command operation 1st/2nd ramp*

Indication	Description
0 = 1st Ramp	Fixed at 1st Ramp
1 = 2nd Ramp	Fixed at 2nd Ramp
2 = Serial	Change via 2nd Ramp command of the RS-485 Serial Control Word
3 = Not used	Not used
4 = CAN/CO/DN	Change via 2nd Ramp command of the CAN/CANop/DNet Control Word
5 = SoftPLC	Change via SoftPLC function command
6 = Not used	Not used
7 = Ethernet	Change via 2nd Ramp command of the Ethernet Control Word
8 = DI Ramp Selection	Change via digital input command chosen by the user The digital input can be set in C4.2.3.10

C6.1 Speed control

C6.1.4 2nd ramp acceleration time

Range: 0.1 ... 999.9 s **Default:** 100.0 s

Properties:

Description:
It sets the “2nd ramp” acceleration time for the speed reference. This value corresponds to the time that the ramp varies from 0 rpm to the maximum value C4.3.1.1.2.

C6.1 Speed control

C6.1.5 2nd ramp deceleration time

Range: 0.1 ... 999.9 s **Default:** 180.0 s

Properties:

Description:
It sets the “2nd ramp” deceleration time for the speed reference. This value corresponds to the time that the ramp varies from the maximum value C4.3.1.1.2 to 0 rpm.

C6.1 Speed control		
C6.1.6 Quick stop time		
Range:	0.1 ... 999.9 s	**Default:** 5.0 s
Properties:		

Description:
It sets the time to linearly decelerate from the maximum speed (defined in C4.3.1.1.2) to 0 when the "Quick Stop" command is activated.

C6.1 Speed control		
C6.1.7 Ramp type		
Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
It sets the reference ramp type: Linear or "S" Curve.

Indication	Description
0 = Linear	It selects the linear profile for the motor acceleration and deceleration ramps
1 = S Ramp	It selects the "S" profile for the motor acceleration and deceleration ramps The "S" ramp reduces mechanical shock during acceleration/deceleration

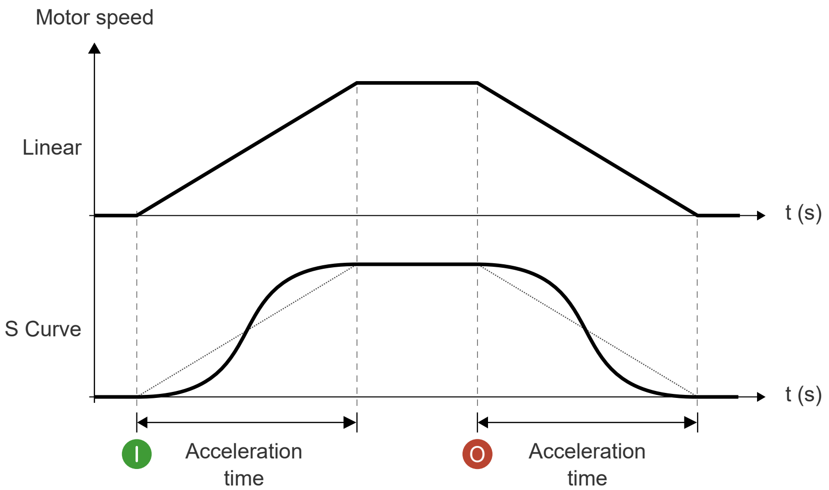


Figure 9.46: *"S" Curve or Linear*

C6.2 Torque control

It sets the acceleration and deceleration times of the torque reference signal.

C6.2 Torque control		
C6.2.1 Increment ramp		
Range:	0.1 ... 999.9 s	**Default:** 20.0 s
Properties:		

Description:
It sets the acceleration time for the torque reference ramp. This value corresponds to the time that the ramp varies from the minimum value C4.3.3.3 to the maximum value C4.3.3.2.

C6.2 Torque control		
C6.2.2 Decrement ramp		
Range:	0.1 ... 999.9 s	**Default:** 20.0 s
Properties:		

Description:
It sets the deceleration time for the torque reference ramp. This value corresponds to the time that the ramp varies from the maximum value C4.3.3.2 to the minimum value C4.3.3.3.

C7 PROTECTIONS

It allows configuring the operation, levels and tripping time of the MVW3000 and motor protections.

C7.1 Power supply

It allows configuring the Power Supply Phase Loss fault.

C7.1 Power supply		
C7.1.1 Line phase loss detection		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
Enables falha de falta de fase de rede.

The phase loss detector is authorized to operate when:

1. Inverter enabled.
2. Precharge complete.

Indication	Description
0 = Disable	
1 = Enable	

C7.1 Power supply		
C7.1.2 Phase failure detection time		
Range:	0.1 ... 60.0 s	**Default:** 0.1 s
Properties:		

Description:
Defines the time value for indicating phase failure in the MVW3000 power supply network (F2300).

C7.1 Power supply		
C7.1.3 Phase imbalance protection level		
Range:	10.0 ... 70.0 %	**Default:** 10.0 %
Properties:		

Description:
It sets the power supply phase loss fault tripping level.

C7.1 Power supply		
C7.1.4 Overvoltage level		
Range:	50.0 ... 150.0 %	**Default:** 117.0 %
Properties:		

Description:

C7.1 Power supply		
C7.1.5 Undervoltage level		
Range:	25.0 ... 100.0 %	**Default:** 70.0 %
Properties:		

Description:

C7.2 Ground fault

It allows setting the Ground Fault protection.

C7.2 Ground fault		
C7.2.2 Maximum operating time		
Range:	0.5 ... 60.0 s	**Default:** 0.5 s
Properties:		

Description:
Maximum time that the inverter will continue to operate after the value of S2.3.17 becomes greater than the value of C7.2.3.

If the value equal to 60.0 s is programmed, F316 will no longer be indicated.

C7.2 Ground fault		
C7.2.3 Voltage leakage alarm level		
C7.2.4 Voltage leakage fault level		
Range:	5.0 ... 50.0 %	**Default:** 25.0 % (C7.2.3)
		50.0 % (C7.2.4)
Properties:		

Description:
Comparison levels with the value of S2.3.17 for the indications of A315 and F316.

C7.2 Ground fault		
C7.2.5 Current leakage fault level		
Range:	1 ... 100 %	**Default:** 25 %
Properties:		

Description:
Comparison level with the sum value (with filter with time constant of 2 ms) of the three inverter output currents to indicate ground fault.

The fault current level is expressed as a percentage of the inverter's rated current.

See F317.

C7.3 Motor current

Allows you to configure overcurrent protection on the motor.

C7.3 Motor current		
C7.3.2 Motor overcurrent		
Range:	0 ... 1	**Default:** 1
Properties:		

Description:
Setting instantaneous overcurrent protection by software.

Indication	Description
0 = Inactive	Protection inactive
1 = Active	If the current in the motor reaches the set level, the fault (F073, F074 or F075) will actuate, disabling the inverter

C7.4 Motor overload fault

It allows setting the Motor Overload fault.

C7.4 Motor overload fault		
C7.4.1 Enable fault		
Range:	0 ... 3	**Default:** 1
Properties:	Stopped	

Description:
It enables the fault and alarm of the motor overload function.

Indication	Description
0 = Disable	Overload fault is disabled. No faults or alarms will be generated for the motor operation in the overload condition
1 = Fault and Alarm	The inverter will display an alarm (A046) when the motor overload reaches the level programmed in C7.4.2, and the fault will trip (F072) when the motor overcurrent reaches the value set in the overload fault. Once the fault activates, the inverter will be disabled
2 = Fault	The fault will be activated (F072) without generating alarms, when the motor overload reaches the level set in the overload fault and the inverter will be disabled
3 = Alarm	Only alarm (A046) will be generated when the motor current reaches the value programmed in C7.4.2; the inverter will continue operating

C7.4 Motor overload fault		
C7.4.2 Alarm level		
Range:	10 ... 100 %	**Default:** 70 %
Properties:	Stopped	

Description:
It defines the motor overload fault alarm tripping level (A046). It is expressed as a percentage of the Overload time limit value.

It will only be effective when C7.4.1 is set to 1 (Fault/Alarm)or 3 (Alarm).

C7.4 Motor overload fault		
C7.4.3 Factor @ 100% Rat. speed		
Range:	0 ... 200 %	**Default:** 100 %
Properties:		

Description:
It sets the value of the motor current used for the motor overload fault with 100 % of the rated speed. The full scale of this parameter is the rated motor current C2.1.5.

C7.4 Motor overload fault		
C7.4.4 Factor @ 50% Rat. speed		
Range:	0 ... 200 %	**Default:** 86 %
Properties:		

Description:
It sets the value of the motor current used for the motor overload fault with 50 % of the rated speed. The full scale of this parameter is the rated motor current C2.1.5.

C7.4 Motor overload fault		
C7.4.5 Factor @ 5% Rat, Speed		
Range:	0 ... 200 %	**Default:** 62 %
Properties:		

Description:
It sets the value of the motor current used for the motor overload fault with 5 % of the rated speed.The full scale of this parameter is the rated motor current C2.1.5.

The motor overload current is the current value at which the inverter will understand that the motor is operating under overload, and it is given as a function of the speed being applied to the motor. Parameters C7.4.3, C7.4.4 and C7.4.5 are the three points used to form this curve, as shown in Figure 9.47 on page 9-112.

By adjusting the overload current curve, it is possible to set an overload value that varies according to the motor operating speed (this is the factory default setting), improving the fault for self-ventilated motors. It is also possible to set a constant overload level for any speed applied to the motor for motors with independent ventilation.

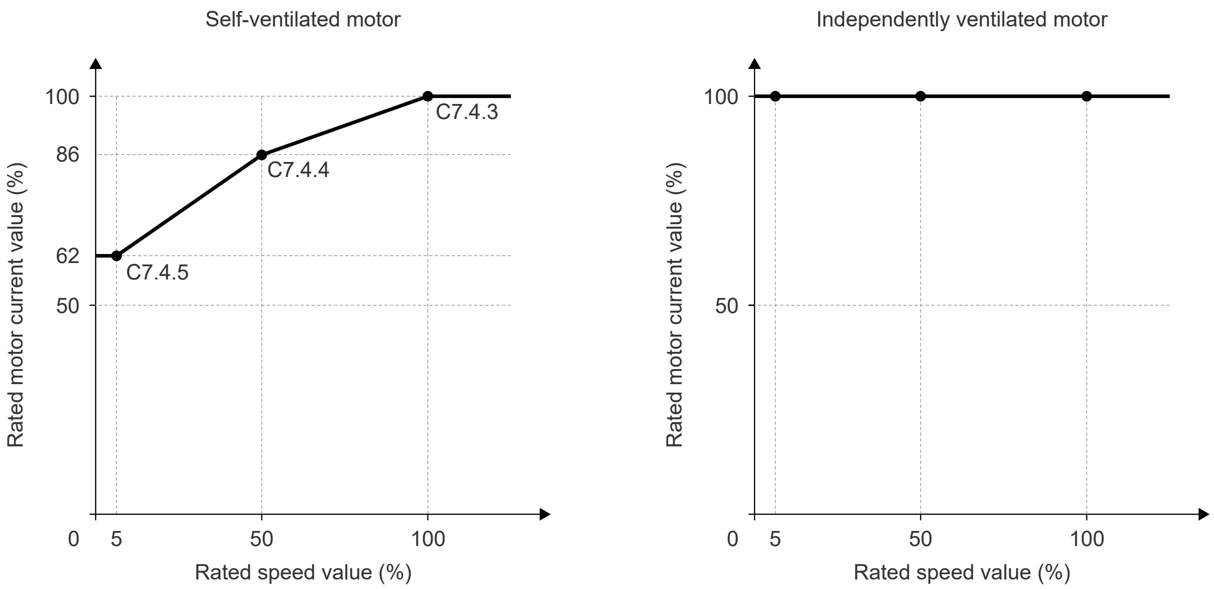


Figure 9.47: *Overload fault levels*

> **NOTE!**
> The greater the difference between the motor current and the overload current, the faster the fault is activated F072.

C7.5 Over/Undertemperature

It allows configuring the Overtemperature and Undertemperature faults.

C7.5 Over/Undertemperature		
C7.5.1 Configuration		
Range:	0 ... 5 Bit	**Default:** 0
Properties:	Stopped	

Description:
It sets the inverter overtemperature and undertemperature faults.

By default, both fault and alarm are enabled. Also, overtemperature faults cannot be disabled.

Bit	Value/Description
Bit 0 IGBT Overtemp.	It enables IGBT overtemperature faults. **0 = Alarm and Fault**: Overtemperature fault and alarm enabled **1 = Fault**: Only overtemperature fault enabled
Bit 1 Rectifier Overtemp.	It enables the rectifier overtemperature faults. **0 = Alarm and Fault**: Overtemperature fault and alarm enabled **1 = Fault**: Only overtemperature fault enabled
Bit 2 Power Circ. Overtemp.	It enables the power overtemperature faults. **0 = Alarm and Fault**: Overtemperature fault and alarm enabled **1 = Fault**: Only overtemperature fault enabled
Bit 3 Cont. Circ. Overtemp.	It enables the control overtemperature faults. **0 = Alarm and Fault**: Overtemperature fault and alarm enabled **1 = Fault**: Only overtemperature fault enabled
Bit 4 … 5 Undertemperature	It enables the undertemperature faults. **0 = Alarm and Fault**: Undertemperature fault and alarm enabled **1 = Fault**: Only undertemperature fault enabled **2 = Alarm**: Only undertemperature alarm enabled **3 = Disabled**: Undertemperature fault and alarm disabled

C7.5 Over/Undertemperature

C7.5.2 Motor overtemp. conf.

Range: 0 ... 3 **Default:** 3

Properties: Stopped

Description:
It defines the motor overtemperature fault behavior.

ATTENTION!
The PTC must feature reinforced insulation of the live parts of the motor and installation.

This function performs the motor overtemperature fault (F2328) and alarm generation (A2334). For the correct operation, the following items must be observed:

- Only the standard accessory (Slot X) can be used.
- Analog output AO1 set in the PTC function.
- Analog input AI1 set in PTC function.

Once the fault trips, it will be inactive only when the temperature reaches a certain level. The trip and inactivation levels of the alarm and fault can be seen in Table 9.72.

Table 9.72: *Trip and inactivation levels of A2334 and F2328*

Situation	PTC	Voltage at AI
Goes into alarm A2334 in the temperature rise	$R_{PTC} = 3.51k\Omega$	$V_{AI} > 7.0V$
Goes into fault status F2328 in the temperature rise	$R_{PTC} = 3.9k\Omega$	$V_{AI} > 7.8V$
It disables alarm A2334	$150\Omega < R_{PTC} < 1,6k\Omega$	$0.3 < V_{AI} < 3.2V$
It allows fault disabling F2328	$150\Omega < R_{PTC} < 1,6k\Omega$	$0.3 < V_{AI} < 3.2V$
Goes into fault status F2328 (minimum resistance detection)	$R_{PTC} < 60\Omega$	$V_{AI} < 0.12V$

NOTE!
For this function to work properly, it is important to keep the gain(s) and offset(s) values of the analog inputs and outputs at the factory setting values.

The fault can be disabled, generate only alarm, actuate fault only or actuate alarm and fault according to the table below.

Indication	Description
0 = Alarm and Fault	Alarm and fault enabled
1 = Fault	Fault enabled
2 = Alarm	Alarm enabled
3 = Disabled	Alarm and fault disabled

C7.6 DC link

Allows you to configure the fault of the inverter's DC link undervoltage.

C7.6 DC link		
C7.6.1 Undervoltage level		
Range:	50 ... 100 %	**Default:** 70 %
Properties:		

Description:
Sets the level for the DC link undervoltage fault to occur.

When the ride-through feature is enabled (see C3.9.1.1), this is the level for ride-through entry.

C7.7 Motor overspeed

It allows setting the Motor Overspeed fault.

C7.7 Motor overspeed		
C7.7.1 Maximum overspeed level		
Range:	0 ... 100 %	**Default:** 10 %
Properties:	Stopped	

Description:
It sets the highest speed value the motor can operate at, and should be set as a percentage of the maximum speed limit. The maximum speed limit can be set in C4.3.1.1.2.

When the effective speed exceeds the value of C4.3.1.1.2 + C7.7.1 for more than 20 ms, the MVW3000 will disable the PWM pulses and indicate fault (F2351).

If you want to disable this function, set C7.7.1 = 100 %.

C7.9 Auto-Reset

It allows configuring the inverter Auto-Reset function.

C7.9 Auto-Reset		
C7.9.1 Time		
Range:	0 ... 3600 s	**Default:** 0 s
Properties:		

Description:
It sets the time value for an automatic reset when a fault occurs.

After the auto-reset is performed, if the same fault actuates again for three consecutive times, the auto-reset function will be inhibited. The actuation of a fault is considered as recurrent if this same fault actuates again within 30 seconds after the auto-reset is performed. Therefore, if a fault operates four consecutive times, the inverter will remain disabled (general disable) and the fault will continue to be actuated.

If C7.9.1 $\leq$ 2, no auto-reset will occur.

C7.10 External fault/Alarm

It allows configuring the External Fault and Alarm functions activated via digital input.

C7.10 External fault/Alarm		
C7.10.1 External alarm DI		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables use and defines the digital input that will be used for the No External Alarm function.

When a transition from 1 to 0 occurs in the digital input programmed for the function No External Alarm, alarm A2331 will be indicated. On transition from 0 to 1 on the programmed digital input, the alarm will be cleared. The motor continues to run normally, regardless of the status of the digital input.

The options are shown in the Table 9.20 on page 9-24.

C7.10 External fault/Alarm		
C7.10.2 External fault DI		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables the use and defines the digital input that will be used to disable the External Fault function. Table 9.20 on page 9-24 shows the options.

When a transition from 1 to 0 occurs on the digital input programmed for External Fault, the inverter goes into fault indicating fault F2332 as shown in Figure 9.48 on page 9-115.

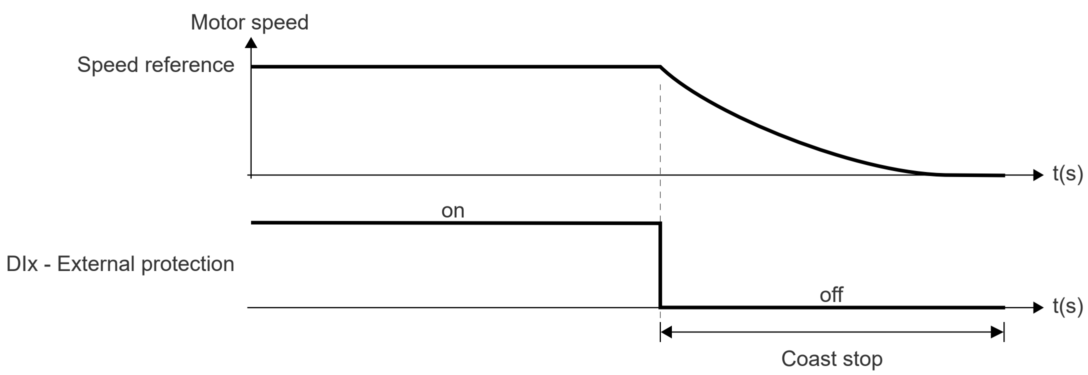


Figure 9.48: *External fault via digital input*

C7.11 Thermal management

The thermal management function is a set of faults and actions that the inverter performs as a function of measured and estimated temperatures of the IGBTs, rectifiers, heatsink and internal air to protect the equipment integrity and functionality.

C7.11 Thermal management		
C7.11.14 Thermal protection relay 1		
C7.11.15 Thermal protection relay 2		
C7.11.16 Thermal protection relay 3		
C7.11.17 Thermal protection relay 4		
C7.11.18 Thermal protection relay 5		
C7.11.19 Thermal protection relay 6		
Range:	0 ... 9 Bit	**Default:** 1021
Properties:		

Description:
This parameter enables communication with the relay and configures the inverter's action in case of overtemperature detection or failure in one of the sensors.

When a temperature rise is detected in the channels that reaches the limit pre-determined in the relay, the inverter can disable the motor according to the channel programming, indicating the fault and preventing overheating that could lead to degradation of the insulating materials, equipment failures and even fires.

Relays are an integral part of inverter protection systems and play a key role in the safety and reliability of industrial electrical installations.

The module serial configuration must be programmed as follows:

- Baudrate: 9600 bps
- Address: 1, 2 or 3
- Parity: Even
- Stop bits: 1

ATTENTION!
In the **PRG** (programming) and **VIS** (programming display) functions of the thermal protection relay, communication with the inverter is temporarily disabled and may cause a communication time-out.

Bit	Value/Description
Bit 0 Communication	Enables communication with the thermal protection relay. **0 = Disable**: Communication with relay disabled **1 = Enable**: Communication enabled, in case of overtemperature the inverter will protect the equipment according to the fault configuration of the respective channel
Bit 1 Communication lost action	**0 = Fault trip**: In case of loss of communication, it causes a fault in the inverter, requiring a fault reset to return to normal operation. **1 = Alarm**: In case of loss of communication, it signals an alarm.
Bit 2 CH1 faults	**0 = Inactive**: Overtemperature protection inactive **1 = Active**: In case of overtemperature or sensor failure, the inverter disables the PWM to protect the equipment
Bit 3 CH2 faults	**0 = Inactive**: Overtemperature protection inactive **1 = Active**: In case of overtemperature or sensor failure, the inverter disables the PWM to protect the equipment
Bit 4 CH3 faults	**0 = Inactive**: Overtemperature protection inactive **1 = Active**: In case of overtemperature or sensor failure, the inverter disables the PWM to protect the equipment
Bit 5 CH4 faults	**0 = Inactive**: Overtemperature protection inactive **1 = Active**: In case of overtemperature or sensor failure, the inverter disables the PWM to protect the equipment
Bit 6 CH5 faults	**0 = Inactive**: Overtemperature protection inactive **1 = Active**: In case of overtemperature or sensor failure, the inverter disables the PWM to protect the equipment
Bit 7 CH6 faults	**0 = Inactive**: Overtemperature protection inactive **1 = Active**: In case of overtemperature or sensor failure, the inverter disables the PWM to protect the equipment
Bit 8 CH7 faults	**0 = Inactive**: Overtemperature protection inactive **1 = Active**: In case of overtemperature or sensor failure, the inverter disables the PWM to protect the equipment
Bit 9 CH8 faults	**0 = Inactive**: Overtemperature protection inactive **1 = Active**: In case of overtemperature or sensor failure, the inverter disables the PWM to protect the equipment

C7.13 Input transformer

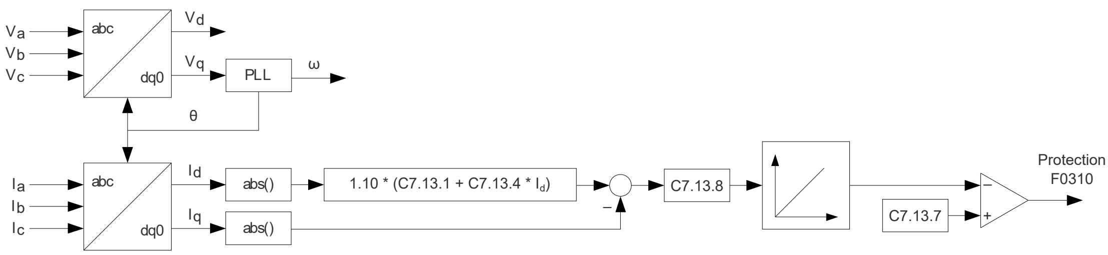


Figure 9.49: *Sets the failure protection level in the input transformer secondary*

C7.13 Input transformer

C7.13.1 Transformer 1 model constant

C7.13.2 Transformer 2 model constant

C7.13.3 Transformer 3 model constant

Range: 0.00 ... 1.00 **Default:** 0.09

Properties:

Description:

Adjusts the offset of the inverter input transformer model.

C7.13 Input transformer		
C7.13.4 Transformer 1 model constant		
C7.13.5 Transformer 2 model constant		
C7.13.6 Transformer 3 model constant		
Range:	0.00 ... 9.90	**Default:** 0.60
Properties:		

Description:
Adjusts the inverter input transformer model constant.

C7.13 Input transformer		
C7.13.7 Transformer fault protection level		
Range:	0.0 ... 1.0	**Default:** 0.5
Properties:		

Description:
Adjusts the protection level for faults in the secondary of the inverter input transformer.

C7.13 Input transformer		
C7.13.8 Transformer failure detection integrator gain		
Range:	0.00 ... 99.99	**Default:** 0.75
Properties:		

Description:
Adjusts the gain of the fault detection integrator in the secondary of the inverter input transformer.

C7.13 Input transformer		
C7.13.9 Transformer curve adjustment		
Range:	0 ... 2	**Default:** 0
Properties:		

Description:
Automatically adjusts the transformer protection curve parameters according to the selected option.

Indication	Description
0 = Disabled	Function inactive
1 = Offset - minimum load	Automatic adjustment of transformer model offset parameters This option must be used with pre-charging done and PWM disabled, a state in which the transformer has the lowest possible load.
2 = Constant - maximum load	Automatic adjustment of transformer model constant parameters This option must be used with the inverter operating at nominal output power.

C7.14 Encoder

It allows setting the Encoder protections.

C7.14 Encoder		
C7.14.1 Encoder protection config.		
Range:	0 ... 1	**Default:** 1
Properties:	Stopped	

Description:
This parameter allows enabling or disabling the detection of the fault F2322 (Reversed Encoder/Motor Wiring) and is only used for vector control with Encoder (C3.1.1 = 2). This protection identifies whether the direction of rotation of the motor is in accordance with the direction of the Encoder A and B pulses. The protection can operate in two conditions: during the Self-Tuning routine with the motor spinning (C3.3.2.6.1 = 2) and with the motor running.

> **NOTE!**
> Some conditions must be observed:
> - During Self-Tuning with the motor spinning (C3.3.2.6.1 = 2) and for any type of motor (C2.1.1), the protection will always be active (even if C7.14.1 = 0);
> - With the motor running/spinning, the protection will only be active if C7.14.1 = 1 and C2.1.1 = 0 (Induction Motor), that is, it will not work for synchronous motors.

Indication	Description
0 = Inactive fault	The fault is disabled
1 = Active fault	The fault is enabled

C7.15 History

It allows setting options related to alarm history.

C7.15 History		
C7.15.1 Enable alarm hist.		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
It enables the recording of alarms in the history.

If disabled, new entries will not be saved in the product memory.

> **NOTE!**
> Viewing the history captured before this parameter was disabled remains available for viewing via HMI or reading via WPS.

Indication	Description
0 = Disabled	It indicates that the alarm history is disabled New alarms are not saved in memory and only existing entries in the history are displayed on the HMI and read by the WPS
1 = Enabled	It indicates that the alarm history is enabled

C9 COMMUNICATIONS

It sets the MVW3000 to exchange information via communication network.

C9.1 Communication errors

It allows setting the operation of the fault for the communication interfaces and related protocols.

C9.1.1 Master offline

Communication interruption fault with the network master.

If for some reason the communication between the product and the network master is interrupted, a communication error will be issued, an alarm or fault will be displayed on the HMI, depending on the programming of this menu.

It only occurs after the device is online.

C9.1.1 Master offline		
C9.1.1.1 Mode		
Range:	0 ... 2	**Default:** 2
Properties:		

Description:
It allows configuring the fault tripping mode against interruption in the communication with the network master.

Indication	Description
0 = Inactive	Alarm and fault disabled
1 = Fault	Only fault enabled. It disables the motor
2 = Alarm	Alarm enabled. Acts as described in C9.1.1.2

C9.1.1 Master offline		
C9.1.1.2 Alarm action		
Range:	0 ... 4	**Default:** 2
Properties:		

Description:
Action for offline communication alarm for any network interface - A2335, A2339, A2337, A2338, A2339, A2340, A2342, A2349 and A2350.

The actions described in this parameter are performed by writing the respective bits in the control word of the communication/interface protocol. Thus, for the commands to take effect, the equipment must be programmed to be controlled by the network interface used. This programming is done through menu C4.

Indication	Description
0 = Off	No action is taken; the equipment remains in the current status
1 = Stop by Ramp	The ramp to stop command is executed, and the motor stops according to the programmed deceleration ramp
2 = General Disable	The equipment is general disabled and the motor stops by inertia
3 = Go to R1	The equipment is commanded to the remote 1 status
4 = Go to R2	The equipment is commanded to the remote 2 status

NOTE!
The alarm action will only have a function if the error tripping mode in C9.1.1.1 is programmed for Alarm.

C9.1.2 Master idle/Prog

Network master status fault.

If there is a transition of the network master status from the operation mode (Run) to the configuration mode (Idle/Prog), a communication error will be issued, an alarm or fault will be displayed on the HMI, depending on the programming made in this menu.

It only occurs after the network master Run mode is detected. The way to detect this condition depends on the communication protocol and the network master.

C9.1.2 Master idle/Prog		
C9.1.2.1 Mode		
Range:	0 ... 2	**Default:** 2
Properties:		

Description:
It allows configuring the fault tripping mode when the network master is placed in programming mode (Idle/Prog).

Indication	Description
0 = Inactive	Alarm and fault disabled
1 = Fault	Only fault enabled. It disables the motor
2 = Alarm	Acts as an alarm. Action described in C9.1.2.2

C9.1.2 Master idle/Prog

C9.1.2.2 Alarm action

Range: 0 ... 4 **Default:** 2

Properties:

Description:
Action for master alarm in programming mode (Idle/Prog) - A2341.

The actions described in this parameter are performed by writing the respective bits in the control word of the communication/interface protocol. Thus, for the commands to take effect, the equipment must be programmed to be controlled by the network interface used. This programming is done through menu C4.

Indication	Description
0 = Off	No action is taken; the equipment remains in the current status
1 = Stop by Ramp	The ramp to stop command is executed, and the motor stops according to the programmed deceleration ramp
2 = General Disable	The equipment is general disabled and the motor stops by inertia
3 = Go to R1	The equipment is commanded to the remote 1 status
4 = Go to R2	The equipment is commanded to the remote 2 status

NOTE!
The alarm action will only have a function if the error tripping mode in C9.1.2.1 is programmed for Alarm.

C9.2 I/O data

It sets the cyclic data exchange area of the communication networks.

C9.2.1 Reading data

It configures a set of 16-bit parameters to be read via communication network.

C9.2.1 Reading data

C9.2.1.1 Word #1

C9.2.1.1 to C9.2.1.100

C9.2.1 Reading data

C9.2.1.100 Word #100

Range: 0 ... 9999 **Default:** 0

Properties: Stopped

Description:
It selects the address (Net Id) of the parameter whose content should be provided in the reading area for the fieldbus interfaces (input: sent to the network master).

The size of the referenced parameter must be taken into account. If the data size is greater than 16 bits, the configuration parameter of the next programmable word must be set to the same address.

C9.2.2 Writing data

It configures a set of 16-bit parameters to be written via communication network.

C9.2.2 Writing data		
C9.2.2.1 Update delay		
Range:	0.0 ... 999.0 s	**Default:** 0.0 s
Properties:		

Description:
Whenever there is a transition from offline (without cyclic data) to online (with cyclic writing data), the data received via communication network (writing words) is ignored during this programmed time, remaining in the status it was before the beginning of the reception.

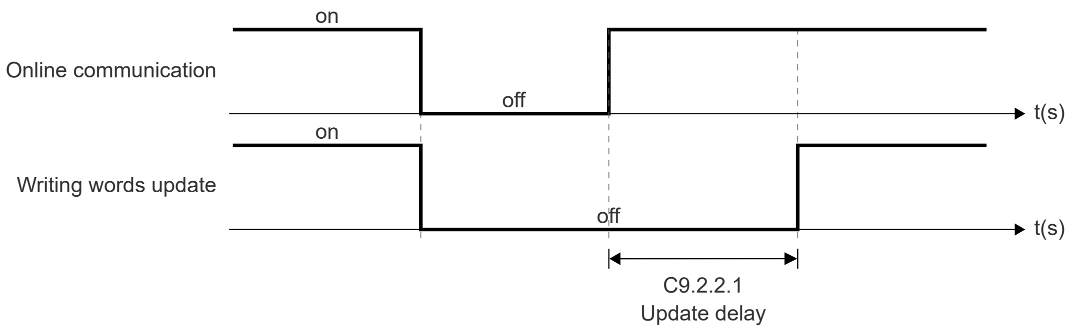


Figure 9.50: *Delay in the update of the I/O words*

C9.2.2 Writing data
C9.2.2.2 Word #1

C9.2.2.2 to C9.2.2.101

C9.2.2 Writing data		
C9.2.2.101 Word #100		
Range:	0 ... 9999	**Default:** 0
Properties:	Stopped	

Description:
It selects the address (Net Id) of the parameter whose content should be provided in the writing area for the fieldbus interfaces (output: received from the network master).

The size of the referenced parameter must be taken into account. If the data size is greater than 16 bits, the configuration parameter of the next programmable word must be set to the same address.

C9.3 Serial RS485

Configuration for the RS485 communication interface and the protocols that use this interface.

For a detailed description, refer to the MVW3000 Modbus-RTU Communication Manual, available in electronic format.

C9.3 Serial RS485		
C9.3.2 Address		
Range:	1 ... 247	**Default:** 1
Properties:	Stopped	

Description:
It select the address used for the serial communication.

It is necessary that each device on the network has a different address from all the others.

C9.3 Serial RS485		
C9.3.3 Baud rate		
Range:	0 ... 3	**Default:** 1
Properties:	Stopped	

Description:
Select the desired value for the baud rate of the serial interface in bit per second. This rate must be the same for all devices connected to the network.

Indication	Description
0 = 9600 bit/s	Rate of 9600 bits per second
1 = 19200 bit/s	Rate of 19200 bits per second
2 = 38400 bit/s	Rate of 38400 bits per second
3 = 57600 bit/s	Rate of 57600 bits per second

C9.3 Serial RS485		
C9.3.4 Bytes configuration		
Range:	0 ... 5	**Default:** 1
Properties:	Stopped	

Description:
Select the settings for the number of data bits, parity and stop bits in the serial interface bytes. This setting must be identical for all the devices connected to the network.

Indication	Description
0 = 8-bits, no, 1	8 bits, no parity, 1 stop bit
1 = 8-bits, even, 1	8 bits, with even parity, 1 stop bit
2 = 8-bits, odd, 1	8 bits, with odd parity, 1 stop bit
3 = 8-bits, no, 2	8 bits, no parity, 2 stop bit
4 = 8-bits, even, 2	8 bits, with even parity, 2 stop bit
5 = 8-bits, odd, 2	8 bits, with odd parity, 2 stop bit

C9.3 Serial RS485		
C9.3.5 RS485 Timeout		
Range:	0.0 ... 999.0 s	**Default:** 0.0 s
Properties:	Stopped	

Description:
Maximum time without communication.

C9.4 Ethernet

Settings for the product built-in Ethernet port.

For a detailed description, refer to the MVW3000 Modbus TCP Communication Manual, available in electronic format.

C9.4 Ethernet		
C9.4.1 IP address settings		
Range:	0 ... 1	**Default:** 1
Properties:	Stopped	

Description:
It allows setting the IP address for the built-in Ethernet interface.

Indication	Description
0 = Parameters	The IP address, subnet mask and gateway must be set through the product parameters
1 = DHCP	It enables the DHCP function. The IP address and other network settings are received from a DHCP server via network

C9.4 Ethernet

C9.4.2 IP address

Range: 0.0.0.0 ... 255.255.255.255 **Default:** 192.168.0.10

Properties: Stopped

Description:

It allows programming the IP address of the Ethernet interface. It only takes effect if the address was set via parameters.

C9.4 Ethernet

C9.4.3 Network mask

Range: 0 ... 31 **Default:** 24

Properties: Stopped

Description:

It allows programming the subnet mask used for the Ethernet interface. It only takes effect if the address was set via parameters.

The following table shows the allowable values for CIDR and the equivalent dot-separated notation for the subnet mask:

Indication	Description
0 = Not used	Subnet mask
1 = 128.0.0.0	Subnet mask
2 = 192.0.0.0	Subnet mask
3 = 224.0.0.0	Subnet mask
4 = 240.0.0.0	Subnet mask
5 = 248.0.0.0	Subnet mask
6 = 252.0.0.0	Subnet mask
7 = 254.0.0.0	Subnet mask
8 = 255.0.0.0	Subnet mask
9 = 255.128.0.0	Subnet mask
10 = 255.192.0.0	Subnet mask
11 = 255.224.0.0	Subnet mask
12 = 255.240.0.0	Subnet mask
13 = 255.248.0.0	Subnet mask
14 = 255.252.0.0	Subnet mask
15 = 255.254.0.0	Subnet mask
16 = 255.255.0.0	Subnet mask
17 = 255.255.128.0	Subnet mask
18 = 255.255.192.0	Subnet mask
19 = 255.255.224.0	Subnet mask
20 = 255.255.240.0	Subnet mask
21 = 255.255.248.0	Subnet mask
22 = 255.255.252.0	Subnet mask
23 = 255.255.254.0	Subnet mask
24 = 255.255.255.0	Subnet mask. Factory setting
25 = 255.255.255.128	Subnet mask
26 = 255.255.255.192	Subnet mask
27 = 255.255.255.224	Subnet mask

Indication	Description
28 = 255.255.255.240	Subnet mask
29 = 255.255.255.248	Subnet mask
30 = 255.255.255.252	Subnet mask
31 = 255.255.255.254	Subnet mask

C9.4 Ethernet

C9.4.4 Gateway

Range: 0.0.0.0 ... 255.255.255.255 **Default:** 0.0.0.0
Properties: Stopped

Description:
It allows programming the IP address of the default gateway used by the Ethernet interface. It only takes effect if the address was set via parameters.

C9.4 Ethernet

C9.4.5 SNTP - Server 1

Range: 0.0.0.0 ... 255.255.255.255 **Default:** 0.0.0.0
Properties: Stopped

Description:
It allows programming the IP address of the NTP primary server. If the value is zero, the NTP client is disabled.

C9.4 Ethernet

C9.4.6 SNTP - Server 2

Range: 0.0.0.0 ... 255.255.255.255 **Default:** 0.0.0.0
Properties: Stopped

Description:
It allows programming the IP address of the NTP secondary server.

C9.4 Ethernet

C9.4.7 SNTP - Update

Range: 0 ... 65535 **Default:** 0
Properties: Stopped

Description:
It indicates the NTP server date and time update interval. If the value is zero, the NTP client is disabled. The minimum interval is 15 seconds.

C9.4 Ethernet

C9.4.8 Enable protocols

Range: 0 ... 2 Bit **Default:** 3
Properties:

Description:
It allows enabling and disabling functionalities of some protocols, limiting the exposure of the inverter via network.

Bit	Value/Description
Bit 0 Web Server	**0 = Disabled**: Protocol disabled **1 = Enabled**: Protocol enabled
Bit 1 Not used	Not used
Bit 2 Not used	Not used

C9.5 EtherNet/IP

It allows programming how the EtherNet/IP network protocol writing and reading data exchange should be using the MVW3000 built-in Ethernet port.

C9.5 EtherNet/IP		
C9.5.1 EtherNet/IP I/O instances		
Range:	0 ... 10	**Default:** 0
Properties:	Stopped	

Description:
It allows selecting the Assembly class instance used during the exchange of I/O data with the network master.

The MVW3000 frequency inverter has eleven setting options. Four of them follow the standard defined in the ODVA AC/DC Drive Profile. The others represent specific words for the MVW3000 frequency inverter. The table below detail each of these control and status words.

Indication	Description
0 = 20/70 CIP	Basic Speed, these instances represent the simplest operation interface of a device according to the AC/DC Drive Profile
1 = 21/71 CIP	Extended Speed, these instances represent a slightly improved interface for operating the device that follows the AC/DC Device Profile
2 ... 3 = Not used	Not used
4 = 120/170 CIP + I/O data	They have the same data format as the 20/70 CIP Basic Speed Control instances In addition, it is possible to program up to 48 parameters of the equipment itself for reading and/or 48 for writing via network
5 = 121/171 CIP + I/O data	They have the same data format as the 21/71 CIP Extended Speed Control instances It is possible to program up to 48 parameters of the device itself for reading and/or 48 for writing via network
6 ... 7 = Not used	Not used
8 = 100/150 Manuf. + I/O data	These instances represent the operating interface of the device according to the MVW3000 frequency inverter profile Besides the control and status words, speed reference and effective value, it is possible to program up to 48 parameters of the device itself for reading and/or writing via network
9 = 101/151 Manuf. + I/O data	These instances represent an interface very similar to the 100/150 Manufacturer Speed Control + configurable I/O data, with the only difference being the possibility of sending the torque limit
10 = 102/152 Config I/O data	In these instances it is possible to program up to 50 parameters of the equipment itself for reading and/or 50 for writing via network

C9.5 EtherNet/IP		
C9.5.2 Readings 1st word		
Range:	1 ... 100	**Default:** 1
Properties:	Stopped	

Description:
Sets the index of the first programmable reading word for data exchange with the network (input to the network master).

C9.5 EtherNet/IP		
C9.5.3 Readings quantity		
Range:	0 ... 50	**Default:** 0
Properties:	Stopped	

Description:
Sets the number of programmable reading words for data exchange with the network (input to the network master), from the first word set in C8.4.1.

C9.5 EtherNet/IP		
C9.5.4 Writings 1st word		
Range:	1 ... 100	**Default:** 1
Properties:	Stopped	

Description:
Sets the index of the first programmable writing word for data exchange with the network (output to the network master).

C9.5 EtherNet/IP		
C9.5.5 Writings quantity		
Range:	0 ... 50	**Default:** 0
Properties:	Stopped	

Description:
Sets the number of programmable writing words for data exchange with the network (output to the network master), from the first word set in C8.4.3.

C9.6 Modbus TCP

It allows setting the Modbus TCP network protocol using the MVW3000 built-in Ethernet port.

C9.6 Modbus TCP		
C9.6.1 TCP port		
Range:	0 ... 65535	**Default:** 0
Properties:	Stopped	

Description:
It allows setting the number of the TCP port used for Modbus TCP connections.

Port 502 is the default TCP port for Modbus TCP connections, and it is always available. If you want an additional port to establish Modbus TCP connections, you can set the number of another TCP port in this parameter.

NOTE!
After changing this property, the device must be turned off and back on to effect the modifications.

C9.6 Modbus TCP		
C9.6.3 Timeout		
Range:	0.0 ... 999.0 s	**Default:** 0.0 s
Properties:	Stopped	

Description:
Time to detect interruption in Modbus TCP communication.

After the Modbus TCP communication is started, if the device stops receiving valid telegrams for a period longer than the one programmed in this parameter, it will consider that the communication has been interrupted, and will indicate alarm/fault. For the case of an alarm, the action for communication error will also be performed.

Time counting will start from the first valid telegram received. The value 0.0 disables this function.

C9.6 Modbus TCP		
C9.6.4 Connection timeout		
Range:	1 ... 65535 s	**Default:** 65 s
Properties:		

Description:
Time to detect interruption in Modbus TCP communication.

After the Modbus TCP communication is started, if the device stops receiving valid telegrams for a period longer than the one programmed in this parameter, it will consider that the communication has been interrupted, and will indicate alarm/fault. For the case of an alarm, the action for communication error will also be performed.

Time counting will start from the first valid telegram received. The value 0.0 disables this function.

C9.7 Anybus

Settings for the Anybus communication accessory and the protocols that use this interface.

For a detailed description, see the MVW3000 Anybus Communication Manual, provided in electronic format.

C9.7 Anybus		
C9.7.1 Readings 1st word		
Range:	1 ... 100	**Default:** 1
Properties:	Stopped	

Description:
It sets the index of the first programmable reading word for data exchange with the network (input to the network master).

C9.7 Anybus		
C9.7.2 Readings quantity		
Range:	2 ... 50	**Default:** 2
Properties:	Stopped	

Description:
It sets the number of programmable reading words for data exchange with the network (input to the network master), from the first word set in C8.6.2.

C9.7 Anybus		
C9.7.3 Writings 1st word		
Range:	1 ... 100	**Default:** 1
Properties:	Stopped	

Description:
It sets the index of the first programmable writing word for data exchange with the network (output to the network master).

C9.7 Anybus		
C9.7.4 Writings quantity		
Range:	2 ... 50	**Default:** 2
Properties:	Stopped	

Description:
It sets the number of programmable writing words for data exchange with the network (output to the network master), from the first word set in C8.6.4.

C9.7 Anybus

C9.7.5 Address

Range:	0 ... 255	**Default:** 0
Properties:	Stopped	

Description:
It selects the address used by the Anybus module on the network.

It is necessary that each device on the network have a different address from all the others. This setting is only used for Anybus PROFIBUS module. Allowed range of values is from 1 to 126.

NOTE!
After changing this configuration, for the change to take effect, the equipment must be turned off and on again, or the settings must be updated via C8.3.1.

C9.7 Anybus

C9.7.8 IP address settings

Range:	0 ... 1	**Default:** 1
Properties:	Stopped	

Description:
It allows setting the IP address configuration for the Anybus EtherNet/IP, Modbus TCP and PROFINET IO modules.

Indication	Description
0 = Parameters	The IP address, subnet mask and gateway must be set through the product parameters
1 = DHCP	It enables the DHCP function. The IP address and other network settings are received from a DHCP server via network

C9.7 Anybus

C9.7.9 IP address

Range:	0.0.0.0 ... 255.255.255.255	**Default:** 192.168.0.10
Properties:	Stopped	

Description:
It allows programming the IP address of the Anybus EtherCAT or PROFINET IRT module. It only takes effect if C9.7.9 = Parameters.

NOTE!
After changing this configuration, for the change to take effect, the equipment must be turned off and on again, or the settings must be updated via C9.7.1.

C9.7 Anybus

C9.7.10 CIDR Subnet

Range:	0 ... 31	**Default:** 24
Properties:	Stopped	

Description:
It allows programming the subnet mask used by the Anybus-CC EtherCAT or PROFINET IRT module. It only takes effect if C9.7.9 = Parameters.

Indication	Description
0 = Not used	Subnet mask
1 = 128.0.0.0	Subnet mask

Indication	Description
2 = 192.0.0.0	Subnet mask
3 = 224.0.0.0	Subnet mask
4 = 240.0.0.0	Subnet mask
5 = 248.0.0.0	Subnet mask
6 = 252.0.0.0	Subnet mask
7 = 254.0.0.0	Subnet mask
8 = 255.0.0.0	Subnet mask
9 = 255.128.0.0	Subnet mask
10 = 255.192.0.0	Subnet mask
11 = 255.224.0.0	Subnet mask
12 = 255.240.0.0	Subnet mask
13 = 255.248.0.0	Subnet mask
14 = 255.252.0.0	Subnet mask
15 = 255.254.0.0	Subnet mask
16 = 255.255.0.0	Subnet mask
17 = 255.255.128.0	Subnet mask
18 = 255.255.192.0	Subnet mask
19 = 255.255.224.0	Subnet mask
20 = 255.255.240.0	Subnet mask
21 = 255.255.248.0	Subnet mask
22 = 255.255.252.0	Subnet mask
23 = 255.255.254.0	Subnet mask
24 = 255.255.255.0	Subnet mask. Factory setting
25 = 255.255.255.128	Subnet mask
26 = 255.255.255.192	Subnet mask
27 = 255.255.255.224	Subnet mask
28 = 255.255.255.240	Subnet mask
29 = 255.255.255.248	Subnet mask
30 = 255.255.255.252	Subnet mask
31 = 255.255.255.254	Subnet mask

C9.7 Anybus

C9.7.11 Gateway

Range:	0.0.0.0 ... 255.255.255.255	**Default:** 0.0.0.0
Properties:	Stopped	

Description:
It allows programming the IP address of the default gateway used by the Anybus EtherCAT or PROFINET IRT module. It only takes effect if C9.7.9 = Parameters.

> **NOTE!**
> After changing this configuration, for the modification to be effective, the equipment must be turned off and on again, or the settings must be updated via C9.7.1.

C9.8 CAN/CANopen/DNet

It configures CAN communication accessory and protocols that use this interface.

C9.8 CAN/CANopen/DNet

C9.8.1 Protocol

Range:	0 ... 2	**Default:** 2
Properties:	Stopped	

Description:
It allows selecting the desired protocol for the CAN interface.

Indication	Description
0 = Disabled	It disables the CAN interface
1 = CANopen	It enables the CAN interface with CANopen protocol
2 = DeviceNet	It enables the CAN interface with DeviceNet protocol

C9.8 CAN/CANopen/DNet

C9.8.2 Address

Range:	0 ... 127	**Default:** 63
Properties:	Stopped	

Description:
It allows programming the address used for CAN communication of the device. It is necessary that each device on the network has a different address from the others. Valid addresses for this parameter depend on the protocol selected in C9.8.1:

- C9.8.1 = 1 (CANopen): valid addresses: 1 to 127.
- C9.8.1 = 2 (DeviceNet): valid addresses: 0 to 63.

NOTE!
After changing this configuration, the modification will only take effect if the CAN interface is not exchanging cyclical data with the network.

C9.8 CAN/CANopen/DNet

C9.8.3 Baud rate

Range:	0 ... 5	**Default:** 0
Properties:	Stopped	

Description:
It allows programming the desired value for the baud rate of the CAN interface in bit per second. This rate must be the same for all devices connected to the network. The supported baud rates for the device depend on the protocol set in C9.8.1:

- C9.8.1 = 1 (CANopen): any rate indicated in this parameter can be used, but it does not have the automatic rate detection function (autobaud).
- C9.8.1 = 2 (DeviceNet): Only rates of 500, 250 and 125 Kbit/s are supported. Other options enable the automatic rate detection function (autobaud).

For the autobaud function, after a successful detection, the baud rate parameter (C9.8.3) automatically changes to the detected rate. To run the autobaud function again, it is necessary to change the parameter C9.8.3 to one of the autobaud options.

Indication	Description
0 = 1 Mbps/Auto	CAN baud rate (automatic detection for DeviceNet)
1 = Not used/Auto	Automatic detection for DeviceNet
2 = 500 Kbps	CAN baud rate
3 = 250 Kbps	CAN baud rate
4 = 125 Kbps	CAN baud rate
5 = 100 Kbps/Auto	CAN baud rate (automatic detection for DeviceNet)

NOTE!
After changing this configuration, the modification will only take effect if the CAN interface is not exchanging cyclical data with the network.

C9.8 CAN/CANopen/DNet

C9.8.4 Bus off Reset

Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
It allows programming the behavior of the equipment when detecting a bus off error on the CAN interface.

Indication	Description
0 = Manual	If bus off occurs, A2134/F2234 will be displayed on the HMI and the communication will be disabled. In case of alarm, the action programmed in parameter C9.1.2.2 will be executed. For the equipment to communicate again via CAN interface, it will be necessary to disable and enable the interface, or restart the product
1 = Automatic	If bus off occurs, the communication will be automatically restarted, and the error will be ignored. In this case the alarm will not be displayed on the HMI and the device will not execute the action described in C9.1.2.2

C9.8 CAN/CANopen/DNet

C9.8.5 DeviceNet I/O instances

Range:	0 ... 10	**Default:** 0
Properties:	Stopped	

Description:
It allows selecting the Assembly class instance used during the exchange of I/O data with the network master.

The MVW3000 frequency inverter has eleven setting options. Four of them follow the standard defined in the ODVA AC/DC Drive Profile. The others represent specific words for the MVW3000 frequency inverter. The table below detail each of these control and status words.

Indication	Description
0 = 20/70 CIP	Basic Speed, these instances represent the simplest operation interface of a device according to the AC/DC Drive Profile
1 = 21/71 CIP	Extended Speed, these instances represent a slightly improved interface for operating the device that follows the AC/DC Device Profile
2 ... 3 = Not used	Not used
4 = 120/170 CIP + I/O data	They have the same data format as the 20/70 CIP Basic Speed Control instances In addition, it is possible to program up to 48 parameters of the equipment itself for reading and/or 48 for writing via network
5 = 121/171 CIP + I/O data	They have the same data format as the 21/71 CIP Extended Speed Control instances It is possible to program up to 48 parameters of the device itself for reading and/or 48 for writing via network
6 ... 7 = Not used	Not used
8 = 100/150 Manuf. + I/O data	These instances represent the operating interface of the device according to the MVW3000 frequency inverter profile Besides the control and status words, speed reference and effective value, it is possible to program up to 48 parameters of the device itself for reading and/or writing via network
9 = 101/151 Manuf. + I/O data	These instances represent an interface very similar to the 100/150 Manufacturer Speed Control + configurable I/O data, with the only difference being the possibility of sending the torque limit
10 = 102/152 Config I/O data	In these instances it is possible to program up to 50 parameters of the equipment itself for reading and/or 50 for writing via network

NOTE!
After changing this configuration, the modification will only take effect if the CAN interface is not exchanging cyclical data with the network.

C9.8 CAN/CANopen/DNet		
C9.8.6 DNet reading 1st word		
Range:	1 ... 100	**Default:** 1
Properties:	Stopped	

Description:
It sets the index of the first programmable reading word for data exchange with the network (input to the network master).

C9.8 CAN/CANopen/DNet		
C9.8.7 DNet reading quantity		
Range:	0 ... 50	**Default:** 0
Properties:	Stopped	

Description:
It sets the number of programmable reading words for data exchange with the network (input to the network master), from the first configured word.

C9.8 CAN/CANopen/DNet		
C9.8.8 DNet writing 1st word		
Range:	1 ... 100	**Default:** 1
Properties:	Stopped	

Description:
It sets the index of the first programmable writing word for data exchange with the network (output to the network master).

C9.8 CAN/CANopen/DNet		
C9.8.9 DNet writing quantity		
Range:	0 ... 50	**Default:** 0
Properties:	Stopped	

Description:
It sets the number of programmable writing words for data exchange with the network (output to the network master), from the first configured word.

C9.10 SymbiNet

SymbiNet is a communication protocol that enables information exchange directly between devices that support such protocol. For the MVW3000, the communication is performed vi Ethernet interface.

Characteristics:

- All data exchange is done directly between the devices in the network without the need of a master to manage communication.
- All the communication programming can be performed using parameters without the need of a configuration tool.
- Programming for data exchange is based on existing Modbus registers for the device. Therefore, the list of Modbus registers must be known for correct data addressing during programming.

- It uses the Publisher/Subscriber mechanism, where each device publishes its data so that one or more subscribers receive this information. Besides optimizing communication, it allows a decentralized communication control, allowing each device to identify problems and continue communication even if failures occur with one or more members of the network.

Typical applications:

- Load division.
- Pumping system with multiple pumps.
- Speed follower.

SymbiNet communication normally operates in conjunction with SoftPLC, or with product embedded applications, such as load sharing or multipump functions, which make use of this communication to exchange the necessary data between products.

Operation principle:

To program data exchange, each member of the network has a set of data groups. Each group represents a sequence of data that the local station must receive from another network member. It means, when programming these groups, the user must indicate which data the local station must receive from the other stations.

The programming must be made for each member of the network, indicating all the groups that this member needs to receive from the other participants, and where this data must be saved locally. Once the groups are programmed in all the members, the devices themselves are responsible for establishing connections and requests for data exchange.

Each programmed group has a status indication, informing if the data received by that group is up to date. If any member of the network is powered off or disconnected, it stops transmitting the published data, and the groups that should receive data from this member will be flagged as outdated. The local application can use this information to perform some action relevant to that indication.

Restrictions:

- For the Ethernet network, all the members of the network must belong to the same sub-net, since the address programming is done by indicating only the last octet of the IP address of the remote stations.
- Each equipment has 8 data groups that can be programmed to request data from other stations, and each equipment can also respond to up to 8 different data groups requested by other stations.
- Some product features and applications make use of this communication, and cannot operate in conjunction with the protocol itself, programmed through parameters.

C9.10 SymbiNet

C9.10.1 Enable protocol

Range: 0 ... 1 **Default:** 0

Properties: Stopped

Description:
Allows enabling SymbiNet protocol over Ethernet interface, for data exchange among SymbiNet devices.

Indication	Description
0 = Disable	Disable function
1 = Enable	It enables function

C9.10 SymbiNet		
C9.10.2 Publication time		
Range:	2 ... 100 ms	**Default:** 20 ms
Properties:		

Description:
Allows you to program, in milliseconds, the time of publication of the data requested by the remote stations.

This time is also used as a basis for timeout detection of locally programmed groups. If the data programmed for a group is no longer received for more than 10 times the time programmed in this parameter, the group status is marked as inactive.

It is recommended that all participants of the SymbiNet network have equal times.

C9.10 SymbiNet		
C9.10.3 Grp1: Source addr.		
Range:	0 ... 254	**Default:** 0
Properties:		

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.10 SymbiNet		
C9.10.4 Grp1: Source reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers to be published by the remote station.

C9.10 SymbiNet		
C9.10.5 Grp1: Dest. reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers where the received data will be saved locally.

C9.10 SymbiNet		
C9.10.6 Grp1: Num. of registers		
Range:	0 ... 8	**Default:** 0
Properties:		

Description:
Program the number of Modbus registers that are going to be published by the remote station and saved locally.

C9.10 SymbiNet		
C9.10.7 Grp2: Source addr.		
Range:	0 ... 254	**Default:** 0
Properties:		

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.10 SymbiNet		
C9.10.8 Grp2: Source reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers to be published by the remote station.

C9.10 SymbiNet		
C9.10.9 Grp2: Dest. reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers where the received data will be saved locally.

C9.10 SymbiNet		
C9.10.10 Grp2: Num. of registers		
Range:	0 ... 8	**Default:** 0
Properties:		

Description:
Program the number of Modbus registers that are going to be published by the remote station and saved locally.

C9.10 SymbiNet		
C9.10.11 Grp3: Source addr.		
Range:	0 ... 254	**Default:** 0
Properties:		

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.10 SymbiNet		
C9.10.12 Grp3: Source reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers to be published by the remote station.

C9.10 SymbiNet		
C9.10.13 Grp3: Dest. reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers where the received data will be saved locally.

C9.10 SymbiNet		
C9.10.14 Grp3: Num. of registers		
Range:	0 ... 8	**Default:** 0
Properties:		

Description:
Program the number of Modbus registers that are going to be published by the remote station and saved locally.

C9.10 SymbiNet		
C9.10.15 Grp4: Source addr.		
Range:	0 ... 254	**Default:** 0
Properties:		

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.10 SymbiNet		
C9.10.16 Grp4: Source reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers to be published by the remote station.

C9.10 SymbiNet		
C9.10.17 Grp4: Dest. reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers where the received data will be saved locally.

C9.10 SymbiNet		
C9.10.18 Grp4: Num. of registers		
Range:	0 ... 8	**Default:** 0
Properties:		

Description:
Program the number of Modbus registers that are going to be published by the remote station and saved locally.

C9.10 SymbiNet		
C9.10.19 Grp5: Source addr.		
Range:	0 ... 254	**Default:** 0
Properties:		

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.10 SymbiNet		
C9.10.20 Grp5: Source reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers to be published by the remote station.

C9.10 SymbiNet		
C9.10.21 Grp5: Dest. reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers where the received data will be saved locally.

C9.10 SymbiNet		
C9.10.22 Grp5: Num. of registers		
Range:	0 ... 8	**Default:** 0
Properties:		

Description:
Program the number of Modbus registers that are going to be published by the remote station and saved locally.

C9.10 SymbiNet		
C9.10.23 Grp6: Source addr.		
Range:	0 ... 254	**Default:** 0
Properties:		

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.10 SymbiNet		
C9.10.24 Grp6: Source reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers to be published by the remote station.

C9.10 SymbiNet		
C9.10.25 Grp6: Dest. reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers where the received data will be saved locally.

C9.10 SymbiNet		
C9.10.26 Grp6: Num. of registers		
Range:	0 ... 8	**Default:** 0
Properties:		

Description:
Program the number of Modbus registers that are going to be published by the remote station and saved locally.

C9.10 SymbiNet		
C9.10.27 Grp7: Source addr.		
Range:	0 ... 254	**Default:** 0
Properties:		

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.10 SymbiNet		
C9.10.28 Grp7: Source reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers to be published by the remote station.

C9.10 SymbiNet		
C9.10.29 Grp7: Dest. reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers where the received data will be saved locally.

C9.10 SymbiNet		
C9.10.30 Grp7: Num. of registers		
Range:	0 ... 8	**Default:** 0
Properties:		

Description:
Program the number of Modbus registers that are going to be published by the remote station and saved locally.

C9.10 SymbiNet		
C9.10.31 Grp8: Source addr.		
Range:	0 ... 254	**Default:** 0
Properties:		

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.10 SymbiNet		
C9.10.32 Grp8: Source reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers to be published by the remote station.

C9.10 SymbiNet		
C9.10.33 Grp8: Dest. reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers where the received data will be saved locally.

C9.10 SymbiNet		
C9.10.34 Grp8: Num. of registers		
Range:	0 ... 8	**Default:** 0
Properties:		

Description:
Program the number of Modbus registers that are going to be published by the remote station and saved locally.

C10 SOFTPLC

The SoftPLC provides the inverter with PLC functions (Programmable Logical Controller). For more details regarding the programming of these functions in the MVW3000, refer to the Help texts in the WPS software (WEG Programming Suite).

C10.1 Configuration

It allows setting parameters of the SoftPLC function.

C10.1 Configuration		
C10.1.1 Command		
Range:	0 ... 5	**Default:** 0
Properties:	Stopped	

Description:
Allow the user to execute commands for the application.

Indication	Description
0 = Stop	For the active application
1 = Run	It runs the active application
2 ... 4 = Not used	
5 = Erase	It deletes the active user application

C10.1 Configuration		
C10.1.2 Active application		
Range:	0 ... 6	**Default:** 0
Properties:	Stopped	

Description:
It allows the user to select the active application.

Indication	Description
0 = User Application 1	When selected, it is possible to download, stop, run or delete the user application configured in the WPS software
1 = User Application 2	When selected, it is possible to download, stop, execute or delete another user program
2 ... 6 = Not used	Not used

C10.1 Configuration		
C10.1.3 Application stopped action		
Range:	0 ... 2	**Default:** 0
Properties:		

Description:
Allow the user to set the action for when the SoftPLC application is not running.

Indication	Description
0 = Inactive	No action
1 = Generate Alarm	It generates the alarm A2708
2 = Trip Fault	It trips fault F2709.

C10.2 Engineering unit

C10.2 Engineering unit		
C10.2.1 Engineering unit 1		
Range:	0 ... 64	**Default:** 0
Properties:		

Description:
This parameter selects the engineering unit displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

The options are shown in the table below.

Engineering Unit Options					
0 = No Unit	11 = m^3/h	22 = gal/s	33 = kgf/m^2	44 = mca	55 = Nm
1 = A	12 = m^3/min	23 = H	34 = kl/h	45 = m	56 = Pa
2 = bar	13 = m^3/s	24 = Hz	35 = kPa	46 = m/h	57 = %
3 = °C	14 =°F	25 = HP	36 = kW	47 = m/min	58 = psi
4 = CPM	15 = ft	26 = h	37 = kWh	48 = m/s	59 = rpm
5 = CV	16 = ft/h	27 = in	38 = l	49 = mbar	60 = s
6 = ft^3	17 = ft/min	28 = InWC	39 = l/h	50 = ms	61 = V
7 = ft^3/h	18 = ft/s	29 = K	40 = l/min	51 = min	62 = W
8 = ft^3/min	19 = gal	30 = kg	41 = l/s	52 = MPa	63 = W/m^2
9 = ft^3/s	20 = gal/h	31 = kgf	42 = lbf	53 = mwc	64 = Wh/m^2
10 = m^3	21 = gal/min	32 = kgf/cm^2	43 = mA	54 = N	

Table 9.96: *Engineering Units associated with the SoftPLC user parameter*

C10.2 Engineering unit		
C10.2.2 Dec. point eng. unit 1		
Range:	0 ... 3	**Default:** 1
Properties:		

Description:
This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

C10.2 Engineering unit		
C10.2.3 Engineering unit 2		
Range:	0 ... 64	**Default:** 0
Properties:		

Description:
This parameter selects the engineering unit displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

Table 9.96 on page 9-141 shows the options.

C10.2 Engineering unit		
C10.2.4 Dec. point eng. unit 2		
Range:	0 ... 3	**Default:** 1
Properties:		

Description:
This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

C10.2 Engineering unit		
C10.2.5 Engineering unit 3		
Range:	0 ... 64	**Default:** 0
Properties:		

Description:
This parameter selects the engineering unit displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

Table 9.96 on page 9-141 shows the options.

C10.2 Engineering unit		
C10.2.6 Dec. point eng. unit 3		
Range:	0 ... 3	**Default:** 1
Properties:		

Description:
This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

C10.2 Engineering unit		
C10.2.7 Engineering unit 4		
Range:	0 ... 64	**Default:** 0
Properties:		

Description:
This parameter selects the engineering unit displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

Table 9.96 on page 9-141 shows the options.

C10.2 Engineering unit		
C10.2.8 Dec. point eng. unit 4		
Range:	0 ... 3	**Default:** 1
Properties:		

Description:
This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

C12 BACKUP

It allows to perform operations related to copying or restoring MVW3000 parameter sets. Among these operations are loading the factory default values and export of parameter sets via SD card and HMI.

C12 Backup		
C12.1 Load parameters		
Range:	0 ... 12	**Default:** 0
Properties:	Stopped	

Description:
It selects what to load or save in the MVW3000 settings.

It allows you to restore the factory default, as well as load or save parameter sets 1, 2, 3, SD card and HMI.

Indication	Description
0 = Not Used	Not used
1 = Default 60 Hz	It loads the MVW3000 settings with the default content of the parameters
2 = Default 50 Hz	It loads the MVW3000 settings with the default content of the parameters All parameters are loaded with the default value of 60 Hz, with the exception of the following cases: ■ C4.3.2.1 set at 125 rpm ■ C4.3.1.3.1 set at 75 rpm ■ C4.3.1.5.1 set at 75 rpm ■ C4.3.1.5.2 set at 250 rpm ■ C4.3.1.5.3 set at 500 rpm ■ C4.3.1.5.4 set at 750 rpm ■ C4.3.1.5.5 set at 1000 rpm ■ C4.3.1.5.6 set at 1250 rpm ■ C4.3.1.5.7 set at 1500 rpm ■ C4.3.1.5.8 set at 1375 rpm ■ C4.3.1.1.1 set at 75 rpm ■ C4.3.1.1.2 set at 1500 rpm ■ C5.9.3 set at 15 rpm ■ C5.9.4 set at 100 rpm ■ C5.9.5 set at 1500 rpm ■ C5.9.8 set at 15 rpm ■ C2.1.8 set at 1458 rpm ■ C2.1.6 set at 50 Hz ■ C3.3.4.1.1 set at 1500 rpm ■ C3.3.4.1.2 set at 1500 rpm
3 = Param. Set 1 -> MVW	It loads the MVW3000 settings with the content of parameter set 1
4 = Param. Set 2 -> MVW	It loads the MVW3000 settings with the content of parameter set 2
5 = Param. Set 3 -> MVW	It loads the MVW3000 settings with the content of parameter set 3
6 = MVW -> Param. Set 1	It saves the content of the MVW3000 current settings for parameter set 1
7 = MVW -> Param. Set 2	It saves the content of the MVW3000 current settings for parameter set 2
8 = MVW -> Param. Set 3	It saves the content of the MVW3000 current settings for parameter set 3
9 = SD Card -> MVW	It loads the MVW3000 settings with the content of parameter set imported from the SD card Additionally, it imports the settings of parameter sets 1, 2 and 3 from the SD card to the inverter memory
10 = MVW -> SD Card	It saves the content of the actual MVW3000 settings on the SD card Additionally, it exports the settings from parameter sets 1, 2 and 3 to the SD card
11 ... 12 = Not used	Not used

Figure 9.51 on page 9-144 illustrates the operation of copying and restoring parameters. The current configuration is represented by the inverter. Each of the arrows indicates a possible operation. The side without the arrowhead indicates the parameter set to be copied, and the side with the arrowhead indicates the destination for this set. The parameter set that is already saved in the destination is overwritten during the operation.

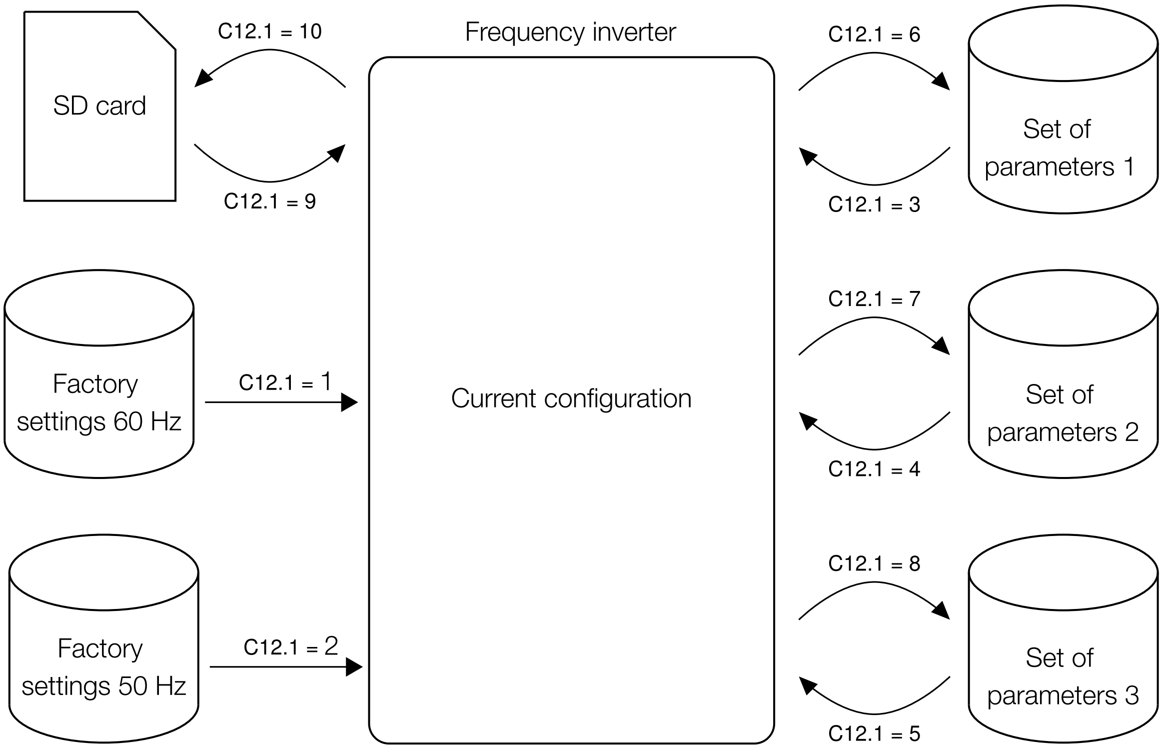


Figure 9.51: *Load settings*

NOTE!
If the parameter set to be loaded is incompatible with the inverter version, the parameters are not loaded. If the parameter set to be loaded is from a different inverter model, model-specific parameters are not loaded.

ATTENTION!
Do not turn off the inverter while the parameter copy or restore command is being executed. If this happens, it is recommended that the command be carried out again.

C12 Backup		
C12.5 Load sets 1/2 DI		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
Enables the use and defines the digital input that will be used to load the inverter settings with the contents of parameter group 1 or 2.

Parameter group 1 is loaded when the DIx state changes from low to high (0 to 24 V transition), while parameter group 2 is loaded when the DIx state changes from high to low (24 to 0 V transition). In both cases, loading is only performed if the contents of the current inverter settings have previously been transferred to the parameter group in question.

The options are shown in Table 9.20 on page 9-24.

NOTE!
If the digital input is powered by the IOS board voltage source, when the inverter is de-energized, the DI power supply will also be removed. A high-to-low transition can occur moments before the inverter is completely de-energized. The operation to load the parameter group will only be performed partially, resulting in unwanted parameter settings. Parameter D4.1.11.1 will indicate "Not Used". If this situation occurs, it is necessary to reload the desired parameter group.

Indication	Description
0 = Inactive	It disables the use of the digital input in this function
1 = DI X-1	Enable use of digital input DI1 of Slot X
2 = DI X-2	Enable use of digital input DI2 of Slot X
3 = DI X-3	Enable use of digital input DI3 of Slot X
4 = DI X-4	Enable use of digital input DI4 of Slot X
5 = DI X-5	Enable use of digital input DI5 of Slot X
6 = DI X-6	Enable use of digital input DI6 of Slot X
7 = DI A-1	Enable use of digital input DI1 of Slot A
8 = DI A-2	Enable use of digital input DI2 of Slot A
9 = DI A-3	Enable use of digital input DI3 of Slot A
10 = DI A-4	Enable use of digital input DI4 of Slot A
11 = DI A-5	Enable use of digital input DI5 of Slot A
12 = DI A-6	Enable use of digital input DI6 of Slot A
13 = DI A-7	Enable use of digital input DI7 of Slot A
14 = DI A-8	Enable use of digital input DI8 of Slot A
15 = DI B-1	Enable use of digital input DI1 of Slot B
16 = DI B-2	Enable use of digital input DI2 of Slot B
17 = DI B-3	Enable use of digital input DI3 of Slot B
18 = DI B-4	Enable use of digital input DI4 of Slot B
19 = DI B-5	Enable use of digital input DI5 of Slot B
20 = DI B-6	Enable use of digital input DI6 of Slot B
21 = DI B-7	Enable use of digital input DI7 of Slot B
22 = DI B-8	Enable use of digital input DI8 of Slot B
23 = DI C-1	Enable use of digital input DI1 of Slot C
24 = DI C-2	Enable use of digital input DI2 of Slot C
25 = DI C-3	Enable use of digital input DI3 of Slot C
26 = DI C-4	Enable use of digital input DI4 of Slot C
27 = DI C-5	Enable use of digital input DI5 of Slot C
28 = DI C-6	Enable use of digital input DI6 of Slot C
29 = DI C-7	Enable use of digital input DI7 of Slot C
30 = DI C-8	Enable use of digital input DI8 of Slot C
31 = DI D-1	Enable use of digital input DI1 of Slot D
32 = DI D-2	Enable use of digital input DI2 of Slot D
33 = DI D-3	Enable use of digital input DI3 of Slot D
34 = DI D-4	Enable use of digital input DI4 of Slot D
35 = DI D-5	Enable use of digital input DI5 of Slot D
36 = DI D-6	Enable use of digital input DI6 of Slot D
37 = DI D-7	Enable use of digital input DI7 of Slot D
38 = DI D-8	Enable use of digital input DI8 of Slot D
39 = DI E-1	Enable use of digital input DI1 of Slot E
40 = DI E-2	Enable use of digital input DI2 of Slot E
41 = DI E-3	Enable use of digital input DI3 of Slot E
42 = DI E-4	Enable use of digital input DI4 of Slot E
43 = DI E-5	Enable use of digital input DI5 of Slot E
44 = DI E-6	Enable use of digital input DI6 of Slot E
45 = DI E-7	Enable use of digital input DI7 of Slot E
46 = DI E-8	Enable use of digital input DI8 of Slot E
47 = DI F-1	Enable use of digital input DI1 of Slot F
48 = DI F-2	Enable use of digital input DI2 of Slot F
49 = DI F-3	Enable use of digital input DI3 of Slot F
50 = DI F-4	Enable use of digital input DI4 of Slot F
51 = DI F-5	Enable use of digital input DI5 of Slot F
52 = DI F-6	Enable use of digital input DI6 of Slot F
53 = DI F-7	Enable use of digital input DI7 of Slot F
54 = DI F-8	Enable use of digital input DI8 of Slot F

Indication	Description
55 = DI G-1	Enable use of digital input DI1 of Slot G
56 = DI G-2	Enable use of digital input DI2 of Slot G
57 = DI G-3	Enable use of digital input DI3 of Slot G
58 = DI G-4	Enable use of digital input DI4 of Slot G
59 = DI G-5	Enable use of digital input DI5 of Slot G
60 = DI G-6	Enable use of digital input DI6 of Slot G
61 = DI G-7	Enable use of digital input DI7 of Slot G
62 = DI G-8	Enable use of digital input DI8 of Slot G

C13 NOMINAL DATA

Permite configurar os dados nominais do inversor.

C13.1 Inverter

Dados nominais do inversor.

C13.1 Inverter

C13.1.1 Rated output voltage

Range: 0 ... 14 **Default:** 14

Properties:

Description:
It defines the inverter rated voltage according to the available models.

Indication	Description
0 = 1150 V	
1 = 2300 V	
2 = 3300 V	
3 = 4160 V	
4 = 5500 V	
5 = 6300 V	
6 = 6900 V	
7 = 7200 V	
8 = 8000 V	
9 = 9000 V	
10 = 10000 V	
11 = 11000 V	
12 = 12000 V	
13 = 13200 V	
14 = 13800 V	

C13.1 Inverter

C13.1.2 Rated current

Range: 24 ... 65530 A **Default:** 140 A

Properties: Stopped

Description:
It defines the inverter rated current.

C13.1 Inverter

C13.1.3 Cells in parallel

Range: 0 ... 2 **Default:** 0

Properties:

Description:
Defines the number of cells operating in parallel.

Indication	Description
0 = No parallelism	
1 = 2 cells in parallel	
2 = 3 cells in parallel	

C13.1 Inverter

C13.1.4 Number of redundant cells per phase

Range: 0 ... 11 **Default:** 0

Properties:

Description:
This parameter specifies the amount of redundant cells in each phase of the inverter.

C13.1 Inverter

C13.1.5 Assembly of input CTs

Range: 0 ... 2 **Default:** 0

Properties:

Description:
Assembly of the CTs of the inverter input phases.

In the case of transformers in parallel at the inverter input, it is necessary to follow the specification of the first transformer.

In products with multiple transformers at the input, the mounting configuration must be the same for all transformers.

Indication	Description
0 = Phases B and C	CT assembly on inverter input phases B and C
1 = Phases A and B	CT assembly on inverter input phases A and B
2 = Phases A and C	CT assembly on inverter input phases A and C

C13.2 Transformer

Nominal transformer data.

Adjust according to the nameplate data of the transformer used.

C13.2 Transformer

C13.2.1 Transformers at the input

Range: 0 ... 2 **Default:** 1

Properties:

Description:
Number of transformers at the inverter input.

Indication	Description
0 = 1 transformer	
1 = 2 transformers	
2 = 3 transformers	

C13.2 Transformer		
C13.2.2 Transformers rated voltage		
Range:	0.00 ... 99.99 kV	**Default:** 6.60 kV
Properties:		

Description:
Nominal line voltage of the input transformer.

C13.2 Transformer		
C13.2.3 Transformers rated frequency		
Range:	0 ... 100 Hz	**Default:** 60 Hz
Properties:		

Description:
Nominal frequency of the input transformer.

C13.2 Transformer		
C13.2.4 Ratio between the primary and the auxiliary of the transformer 1		
Range:	1.00 ... 50.00	**Default:** 18.14
Properties:		

Description:
Voltage ratio between the primary and auxiliary output of the input transformer.

C13.2 Transformer		
C13.2.5 Transformer 1 CT ratio		
C13.2.6 Transformer 2 CT ratio		
C13.2.7 Transformer 3 CT ratio		
Range:	1 ... 20000	**Default:** 200
Properties:		

Description:
Adjusts the ratio of the current transformers used in measuring the inverter input current.

Adjust according to the nameplate data of the current transformer.

Notes:

It is recommended that the CT primary current be greater than or equal to the transformer primary rated current.

The CT primary current must be less than 1.95 times the transformer primary rated current.

C13.2 Transformer		
C13.2.8 Taps of transformer 1		
C13.2.9 Taps of transformer 2		
C13.2.10 Taps of transformer 3		
Range:	-5.00 ... 5.00 %	**Default:** 0.00 %
Properties:		

Description:
Adjusts the modification made to the voltage supplied to the inverter cells.

C13.2 Transformer		
C13.2.11 Transformer 1 rated power		
C13.2.12 Transformer 2 rated power		
C13.2.13 Transformer 3 rated power		
Range:	0 ... 10000 kVA	**Default:** 1500 kVA
Properties:		

Description:
Nominal power of the input transformer.

C13.3 Encoder

Allows you to configure the encoder connected to the control board.

C13.3.1 Absoluto

The encoder baud rate is limited by the length of the cable connecting to the SSI encoder, or by the presence of other transducers on that communication line.

The longer the connection cable between the interface card and the encoder, the lower the baud rate should be.

C13.3.1 Absoluto		
C13.3.1.1 Measurement offset		
Range:	0.0 ... 360.0 °	**Default:** 0.0 °
Properties:		

Description:
Offset of the motor angular position measurement.

C13.3.1 Absoluto		
C13.3.1.2 Configuration		
Range:	0 ... 10 Bit	**Default:** 0
Properties:	Stopped	

Description:
Absolute encoder SSI interface configuration.

Bit	Value/Description
Bit 0 … 2 Clock frequency	Sets the communication clock frequency. **0 = 100 kHz** **1 = 150 kHz** **2 = 200 kHz** **3 = 250 kHz** **4 = 500 kHz**
Bit 3 … 6 Data bits	Sets the number of bits in the data packets. **0 = 8 bits** **1 = 9 bits** **2 = 10 bits** **3 = 11 bits** **4 = 12 bits** **5 = 13 bits** **6 = 14 bits** **7 = 15 bits** **8 = 16 bits** **9 = 17 bits** **10 = 18 bits** **11 = 19 bits** **12 = 20 bits**
Bit 7 … 8 Parity	Sets the parity of telegram checks. **0 = None** **1 = Even** **2 = Odd**
Bit 9 Encoding	Configures the encoding of data packets. **0 = Binary** **1 = Gray**
Bit 10 Direction of rotation	Sets the rotation direction of the speed sensor. **0 = Reverse**: Sensor installed at the rear of the load **1 = Direct**: Sensor installed at the rear of the motor

C13.3.2 Incremental

C13.3.2 Incremental		
C13.3.2.1 Number of pulses		
Range:	1 ... 65535 ppr	**Default:** 1024 ppr
Properties:	Stopped	

Description:
Setting of the number of pulses that the connected encoder generates during one complete revolution.

C13.3.2 Incremental		
C13.3.2.2 Settings		
Range:	0 ... 3 Bit	**Default:** 8
Properties:	Stopped	

Description:
It allows to configure the broken cable detection, zero search function, and encoder signal direction.

Bit	Value/Description
Bit 0 … 1 Broken cable	It allows setting the fault action and alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 2 Not used	Not used
Bit 3 Direction of rotation	Sets the rotation direction of the speed sensor. **0 = Reverse**: Sensor installed at the rear of the load **1 = Direct**: Sensor installed at the rear of the motor

10 A APPLICATION

User applications.

Special functions for motor control, processes or user program.

A1 USER PARAMETERS

SoftPLC user parameter setting.

This menu is accessible on the HMI only if there is a program saved in the SoftPLC memory area with valid configuration of the user parameters.

NOTE!
Minimum, maximum, current and default values are not displayed on the HMI for user parameters whose value can exceed six digits.

A2 PID CONTROLLER

The PID CONTROLLER application can be used to control a process in closed loop. This application places a proportional, integral and derivative controller superimposed on the normal speed control of the MVW3000, with selection options for:

- Control setpoint source.
- Process variable source.
- Manual or automatic operation mode.
- Alarms due to low or high level of the process variable.
- Configuration of forward or reverse control action.
- Setting conditions to activate the sleep and wake mode.

Basically, the PID CONTROLLER application compares the control setpoint to the process variable and controls the motor speed to try to eliminate any errors so as to keep the process variable equal to the control setpoint required by the user. The setting of the gains P, I and D determine the speed at which the inverter will respond to eliminate that error. Figure 10.1 on page 10-1 shows the block diagram of the PID controller.

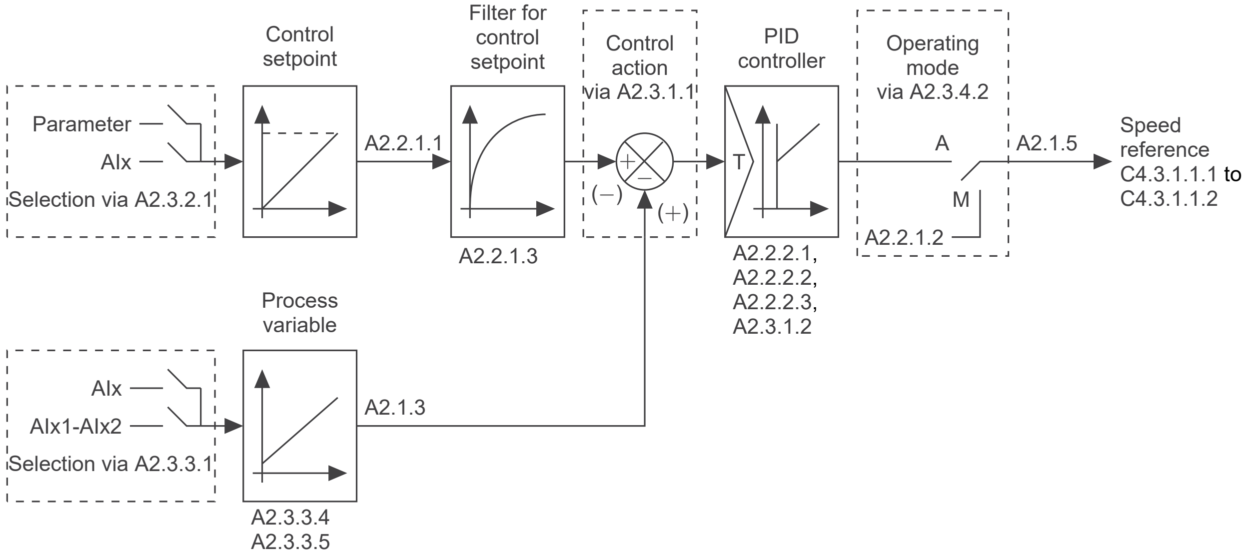


Figure 10.1: *Block diagram of the PID controller*

Application examples of the PID controller:

- Flow or pressure control in a pipe system.
- Temperature of a furnace or oven.
- Dosing of chemicals in tanks.

Academic PID Controller

The PID controller implemented on the MVW3000 is academic. See below the equations that characterize the Academic PID controller, which is the base of this function algorithm.

The transfer function in the frequency domain of the Academic PID controller is:

$$y(s) = k_p \times e(s) \times \left[1 + \frac{1}{sT_i} + sT_d\right]$$

Replacing the integrator by a sum and the derivative by the incremental quotient, we obtain the approximation for the discrete (recursive) transfer equation presented below:

$$y(k) = i(k-1) + k_p \left[\left(1 + K_i.T_a + \frac{K_d}{T_a}\right).e(k) - \left(\frac{K_d}{T_a}\right).e(k-1)\right]$$

where:

$y(k)$: PID controller actual output;

$i(k-1)$: integral value in the previous state of the PID controller;

k_p: Proportional gain = A2.2.2.1;

K_i: Integral gain = A2.2.2.2 = $\left[\frac{1}{T_i(s)}\right]$;

K_d: Differential Gain = A2.2.2.3 = $[T_d(s)]$;

T_a: PID controller sampling period = A2.3.1.2;

$e(k)$: actual error, being $[SP(k) - PV(k)]$ for forward action, and $[PV(k)] - SP(k)]$ for reverse action;

$e(k-1)$: previous error, being $[SP(k-1) - PV(k-1)]$ for forward action, and $[PV(k-1)] - SP(k-1)]$ for reverse action;

SP: actual control setpoint of the PID controller;

PV: PID controller process variable

A2.1 Monitoring

It allows viewing the reading parameters of the PID controller.

A2.1 Monitoring		
A2.1.1 Setpoint		
Range:	-32768 ... 32767	**Default:** 0
Properties:		

Description:
It indicates the PID controller setpoint value in automatic mode. Its source is defined by parameter A2.3.2.1, motor.ring unit by parameter A2.3.3.2, decimal place by parameter A2.3.3.3, and scale by parameters A2.3.3.4 and A2.3.3.5.

A2.1 Monitoring		
A2.1.2 Setpoint (%)		
Range:	0.00 ... 100.00 %	**Default:** 0.00 %
Properties:		

Description:
Indicates the control setpoint (reference) value of the PID Controller in %.

A2.1 Monitoring		
A2.1.3 Process variable		
Range:	-32768 ... 32767	**Default:** 0
Properties:		

Description:
It indicates the PID controller process variable value. Its source is defined by parameter A2.3.3.1, motor.ring unit by parameter A2.3.3.2, decimal place by parameter A2.3.3.3, and scale by parameters A2.3.3.4 and A2.3.3.5.

The conversion of the value read by the analog input in percentage into the value of the process variable shown in A2.1.3 according to the scale is done through the following formula:

$$A2.1.3 = [ValueAI(\%) \times (A2.3.3.5 - A2.3.3.4)] + [A2.3.3.4]$$

A2.1 Monitoring		
A2.1.4 Process variable		
Range:	0.00 ... 100.00 %	**Default:** 0.00 %
Properties:		

Description:
Indicates the value of the PID controller process variable in percentage and according to the source defined in A2.3.3.1.

A2.1 Monitoring		
A2.1.5 Controller output		
Range:	0 ... 60000 rpm	**Default:** 0 rpm
Properties:		

Description:
It indicates the output value of the PID controller. This value is applied to the speed reference when the PID controller is operating in both automatic or manual mode. The PID controller operates (active state) when the motor is running (Run) and the speed reference source defined in C4.3.1.2.1 or C4.3.1.2.2 is in PID Controller.

A2.1 Monitoring		
A2.1.6 Logical status		
Range:	0 ... 6 Bit	**Default:** 0
Properties:		

Description:
It allows monitoring the logical status of the PID Controller application. Each bit represents a status.

Bit	Value/Description
Bit 0 Operation State	**0 = Inactive**: It indicates that the PID controller is not controlling the process variable neither sending speed reference **1 = Active**: It indicates that the PID controller is controlling the process variable in automatic or manual mode and sending speed reference
Bit 1 Sleep Mode	**0 = No**: It indicates that the PID controller is not in the sleep mode **1 = Yes**: It indicates that the PID controller is in the sleep mode
Bit 2 Automatic Mode	**0 = No**: PID controller operating in manual mode **1 = Yes**: PID controller operating in automatic mode
Bit 3 PV Low Level Alarm	**0 = No**: Inverter is not with alarm A2430 **1 = Yes**: Inverter is with alarm A2430
Bit 4 PV Low Level Fault	**0 = No**: Inverter is not with fault F2431 **1 = Yes**: Inverter is with fault F2431
Bit 5 PV High Level Alarm	**0 = No**: Inverter is not with alarm A2432 **1 = Yes**: Inverter is with alarm A2432
Bit 6 PV High Level Fault	**0 = No**: Inverter is not with fault F2433 **1 = Yes**: Inverter is with fault F2433

A2.2 Regulation

It allows setting the setpoint values and gains of the PID controller.

A2.2.1 Setpoint

A2.2.1 Setpoint

A2.2.1.1 Automatic mode

Range: -32768 ... 32767 **Default:** 0

Properties:

Description:
It defines the PID controller setpoint value when it is in automatic mode, and the control source is programmed to be via parameter (A2.3.2.1 = 0).

A2.2.1 Setpoint

A2.2.1.2 Manual mode

Range: 0 ... 60000 rpm **Default:** 0 rpm

Properties:

Description:
It defines the value of the PID controller output when it is in the manual mode, that is, when the PID controller works in manual mode, the value defined as manual setpoint is transferred directly to the PID controller output.

A2.2.1 Setpoint

A2.2.1.3 Filter

Range: 0.000 ... 9.999 s **Default:** 0.150 s

Properties:

Description:
It sets the time constant of the 1st order filter to be applied to the PID controller control setpoint and has the purpose of reducing sudden changes in the setpoint value.

A2.2.1 Setpoint

A2.2.1.4 Multi setpoint 1

A2.2.1.4 to A2.2.1.7

A2.2.1 Setpoint		
A2.2.1.7 Multi setpoint 4		
Range:	-32768 ... 32767	**Default:** 0
Properties:		

Description:
It defines the setpoint value in automatic mode of the PID controller when the control source is programmed to be via the logic combination of the digital inputs.

A2.2.2 Ganhos

A2.2.2 Ganhos		
A2.2.2.1 Proportional		
Range:	0.00 ... 99.99	**Default:** 1.00
Properties:		

Description:
They define the gains of the PID controller and must be set according to the quantity or process that is being controlled. Table 10.2 on page 10-6 shows suggestions for initial gain setting values for the PID controller according to the process to be controlled.

A2.2.2 Ganhos		
A2.2.2.2 Integral		
Range:	0.00 ... 99.99	**Default:** 5.00
Properties:		

Description:
They define the gains of the PID controller and must be set according to the quantity or process that is being controlled. Table 10.2 on page 10-6 shows suggestions for initial gain setting values for the PID controller according to the process to be controlled.

A2.2.2 Ganhos		
A2.2.2.3 Derivative		
Range:	0.00 ... 99.99	**Default:** 0.00
Properties:		

Description:
They define the gains of the PID controller and must be set according to the quantity or process that is being controlled. Table 10.2 on page 10-6 shows suggestions for initial gain setting values for the PID controller according to the process to be controlled.

A2.3 Configuration

It allows configuring how the PID controller will act in the control of the process variable.

A2.3.1 Controle

It allows configuring the PID controller control.

A2.3.1 Controle		
A2.3.1.1 Action control selection		
Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
It defines how the control action of the PID controller will be.

Indication	Description
0 = Direct	It defines that the PID controller will be enabled and the control or regulation action will be direct. That is, the error will be the value of the control setpoint (A2.1.1) minus the value of the control process variable (A2.1.3)
1 = Reverse	It defines that the PID controller will be enabled and the control or regulation action will be reversed. That is, the error will be the value of the control process variable (A2.1.3) minus the control setpoint value (A2.1.1)

NOTE!
The control action of the PID controller must be direct when, in order to increase the value of the process variable, it is necessary to increase the output of the PID controller. E.g.: Pump driven by an inverter filling a tank. For the level of the tank (process variable) to rise, the flow rate must increase, which is achieved by increasing the motor speed.
The control action of the PID controller must be reversed when, to increase the value of the process variable, it is necessary to decrease the output of the PID controller. E.g.: Fan driven by an inverter cooling a cooling tower. When an increase in temperature is desired (process variable), it is necessary to reduce the ventilation by reducing the motor speed.

A2.3.1 Controle

A2.3.1.2 Sampling period

Range: 0.050 ... 9.999 s **Default:** 0.100 s

Properties: Stopped

Description:
It defines the PID controller sampling period. Table 10.2 on page 10-6 shows the suggestions of initial values of the sampling period for the PID controller according to the process to be controlled.

Table 10.2: *Suggestions of setting the PID controller gains and sampling period*

Quantity	Sampling Period A2.3.1.2	Gains		
		Proportional A2.2.2.1	Integral A2.2.2.2	Derivative A2.2.2.3
Pressure in pneumatic system	0,10 s	0,10	5,00	0,00
Flow in pneumatic system	0,10 s	0,10	5,00	0,00
Pressure in hydraulic system	0,10 s	0,10	5,00	0,00
Flow in hydraulic system	0,10 s	0,10	5,00	0,00
Temperature	0,50 s	0,20	0,50	0,10

A2.3.2 Setpoint

It allows setting the PID controller setpoint.

A2.3.2 Setpoint

A2.3.2.1 Source selection

Range: 0 ... 2 **Default:** 0

Properties: Stopped

Description:
It defines the control setpoint source in automatic mode of the PID controller.

Indication	Description
0 = Parameter	It defines that the PID controller control setpoint source in automatic mode will be the value set in parameter A2.2.1.1 through the MVW3000 frequency inverter HMI or written via communication networks or SoftPLC
1 = Analog Input	It defines that the PID controller control setpoint source in automatic mode will be the value read by the analog input configured in A2.3.5.1
2 = Not used	Not used

A2.3.3 Process variable

It allows setting the PID controller process variable.

A2.3.3 Process variable		
A2.3.3.1 Source selection		
Range:	0 ... 2	**Default:** 0
Properties:	Stopped	

Description:
It defines the source of the PID controller process variable.

Indication	Description
0 = Analog Input	It defines that the source of the process variable will be the value read by the analog input configured in A2.3.5.3 and displayed in parameter A2.1.3
1 = Not used	Not used
2 = AI Differential	It defines that the source of the process variable will be the value read by the analog input configured in A2.3.5.3 minus the value read by the analog input configured in A2.3.5.4 and displayed in parameter A2.1.3

A2.3.3 Process variable		
A2.3.3.2 Unit		
		Default: %
Properties:		

Description:
It defines the motor.ring unit of the PID controller process variable. It can have up to 7 ASCII characters.

A2.3.3 Process variable		
A2.3.3.3 Decimal places		
Range:	0 ... 3	**Default:** 0
Properties:		

Description:
It sets the number of decimal places for values with motor.ring unit of the PID controller.

Indication	Description
0 = wxyz	No decimal places
1 = wxy.z	One decimal place
2 = wx.yz	Two decimal places
3 = w.xyz	Three decimal places

A2.3.3 Process variable		
A2.3.3.4 Minimum level		
Range:	-32768 ... 32767	**Default:** 0
Properties:	Stopped	

Description:
It defines the minimum value of the process variable in motor.ring units of the PID controller.

A2.3.3 Process variable		
A2.3.3.5 Maximum level		
Range:	-32768 ... 32767	**Default:** 10000
Properties:	Stopped	

Description:
It defines the maximum value of the process variable in motor.ring units of the PID controller.

NOTE!
Example: If a temperature sensor, with an operating range between -20 and +70 °C and a signal between 4 and 20 mA, is used by an analog input also set to 4 to 20 mA for obtaining the value of the process variable, the values that must be set in these parameters are -20 °C and 70 °C respectively.

A2.3.4 Operation mode

It allows configuring the PID controller operating mode.

A2.3.4 Operation mode		
A2.3.4.1 MAN/AUTO source		
Range:	0 ... 1	**Default:** 0
Properties:	Stopped	

Description:
It defines the source of the PID controller operating mode.

- Manual mode: Speed reference defined directly by the manual setpoint set in A2.2.1.2.
- Automatic mode: Speed reference obtained through the PID controller based on the automatic setpoint displayed in A2.1.1.

Indication	Description
0 = Parameter	It defines that the PID controller operates in manual or automatic mode according to the parameter configured in A2.3.4.2
1 = Selection via DI	It defines that the PID controller operates in manual or automatic mode according to the state of the digital input configured in A2.3.5.6. That is, if the digital input is at logic level "0", the PID controller will operate in manual mode; if the digital input is at logic level "1", the PID controller will operate in automatic mode

NOTE!
The change from an operation mode to another with the motor running may cause disturbances on the system control. That can be optimized according to the automatic adjustment mode of the PID controller setpoint defined in parameter A2.3.4.3 together with the bumpless transfer characteristic from the manual mode to the automatic mode.
Bumpless transfer is merely making the transfer from the manual mode to the automatic mode without causing variation in the PID controller output. In other words, when the transition from the manual mode to the automatic mode occurs, the PID controller output value in manual mode is used to start the integral part of the PID controller in automatic mode. That ensures that the output will start from this value

A2.3.4 Operation mode		
A2.3.4.2 MAN/AUTO selection		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
It defines the PID controller operating mode in case A2.3.4.1 = 0.

Indication	Description
0 = Manual	It defines that the PID controller will operate in manual mode. In this mode, the manual mode setpoint value (A2.2.1.2) will be applied as the PID controller speed reference
1 = Automatic	It defines that the PID controller will operate in automatic mode. In this mode, the automatic mode setpoint value will be used as input to the PID controller to control the process variable

A2.3.4 Operation mode		
A2.3.4.3 SP automatic setting		
Range:	0 ... 3	**Default:** 0
Properties:		

Description:
It defines whether the PID controller setpoint in automatic mode (A2.2.1.1) and/or manual mode (A2.2.1.2) will be changed or set automatically when the PID controller operating mode changes.

Indication	Description
0 = Both SP Inactive	It defines that the setpoint values in manual and automatic mode will not be modified
1 = Active Automatic SP	It defines that when the PID controller operating mode transitions from manual to automatic, the control setpoint value will be loaded with the current value of the control process variable (A2.1.3)
2 = Active Manual SP	It defines that in the transition of the PID controller operation mode from automatic to manual, the value of the PID controller setpoint in manual mode (A2.2.1.2) will be loaded with the actual motor speed value (S2.1.3)
3 = Both SP Active	It defines that in the transition of the PID controller operation mode from manual to automatic, the control setpoint value (A2.2.1.1) will be loaded with the current value of the control process variable (A2.1.3); and that in the transition of the PID controller operating mode from automatic to manual, the PID controller setpoint value in manual mode (A2.2.1.2) will be loaded with the current motor speed value (S2.1.3)

NOTE!
Setting the control setpoint in automatic mode is only valid when the source of the control setpoint is parameters (A2.3.2.1 = 0). For other control setpoint sources, the automatic adjustment is not executed.

A2.3.5 Command sources

It allows defining the analog or digital input used for each PID controller command.

A2.3.5 Command sources		
A2.3.5.1 AI for setpoint		
Range:	0 ... 30	**Default:** 0
Properties:	Stopped	

Description:
It defines the analog input that will be used as a setpoint in the PID controller automatic mode. The options are shown in Table 9.26 on page 9-36.

Indication	Description
0 = Inactive	It disables the use of the analog input in this function
1 = AI X-1	Enable use of analog input AI1 of Slot X
2 = AI X-2	Enable use of analog input AI2 of Slot X
3 = AI A-1	Enable use of analog input AI1 of Slot A
4 = AI A-2	Enable use of analog input AI2 of Slot A
5 = AI A-3	Enable use of analog input AI3 of Slot A
6 = Not used	Not used
7 = AI B-1	Enable use of analog input AI1 of Slot B
8 = AI B-2	Enable use of analog input AI2 of Slot B
9 = AI B-3	Enable use of analog input AI3 of Slot B
10 = Not used	Not used
11 = AI C-1	Enable use of analog input AI1 of Slot C
12 = AI C-2	Enable use of analog input AI2 of Slot C
13 = AI C-3	Enable use of analog input AI3 of Slot C
14 = Not used	Not used
15 = AI D-1	Enable use of analog input AI1 of Slot D

Indication	Description
16 = AI D-2	Enable use of analog input AI2 of Slot D
17 = AI D-3	Enable use of analog input AI3 of Slot D
18 = Not used	Not used
19 = AI E-1	Enable use of analog input AI1 of Slot E
20 = AI E-2	Enable use of analog input AI2 of Slot E
21 = AI E-3	Enable use of analog input AI3 of Slot E
22 = Not used	Not used
23 = AI F-1	Enable use of analog input AI1 of Slot F
24 = AI F-2	Enable use of analog input AI2 of Slot F
25 = AI F-3	Enable use of analog input AI3 of Slot F
26 = Not used	Not used
27 = AI G-1	Enable use of analog input AI1 of Slot G
28 = AI G-2	Enable use of analog input AI2 of Slot G
29 = AI G-3	Enable use of analog input AI3 of Slot G
30 = Not used	Not used

A2.3.5 Command sources

A2.3.5.2 FI for setpoint

Range: 0 ... 2 **Default:** 0

Properties: Stopped

Description:

It defines the frequency input that will be used as a setpoint in PID controller automatic mode.

Indication	Description
0 = Inactive	It disables the use of the frequency input in this function
1 = FI X-5	It enables the use of frequency input FI5 of Slot X
2 = FI X-6	It enables the use of frequency input FI6 of Slot X

A2.3.5 Command sources

A2.3.5.3 AI for process var. 1

Range: 0 ... 30 **Default:** 1

Properties: Stopped

Description:

It defines the analog input that will be used as the PID controller process variable if the variable source selection is configured for analog input or difference between analog inputs (A2.3.3.1 = 0 or 2). The options are shown in Table 9.26 on page 9-36.

Indication	Description
0 = Inactive	It disables the use of the analog input in this function
1 = AI X-1	Enable use of analog input AI1 of Slot X
2 = AI X-2	Enable use of analog input AI2 of Slot X
3 = AI A-1	Enable use of analog input AI1 of Slot A
4 = AI A-2	Enable use of analog input AI2 of Slot A
5 = AI A-3	Enable use of analog input AI3 of Slot A
6 = Not used	Not used
7 = AI B-1	Enable use of analog input AI1 of Slot B
8 = AI B-2	Enable use of analog input AI2 of Slot B
9 = AI B-3	Enable use of analog input AI3 of Slot B
10 = Not used	Not used
11 = AI C-1	Enable use of analog input AI1 of Slot C
12 = AI C-2	Enable use of analog input AI2 of Slot C
13 = AI C-3	Enable use of analog input AI3 of Slot C
14 = Not used	Not used

Indication	Description
15 = AI D-1	Enable use of analog input AI1 of Slot D
16 = AI D-2	Enable use of analog input AI2 of Slot D
17 = AI D-3	Enable use of analog input AI3 of Slot D
18 = Not used	Not used
19 = AI E-1	Enable use of analog input AI1 of Slot E
20 = AI E-2	Enable use of analog input AI2 of Slot E
21 = AI E-3	Enable use of analog input AI3 of Slot E
22 = Not used	Not used
23 = AI F-1	Enable use of analog input AI1 of Slot F
24 = AI F-2	Enable use of analog input AI2 of Slot F
25 = AI F-3	Enable use of analog input AI3 of Slot F
26 = Not used	Not used
27 = AI G-1	Enable use of analog input AI1 of Slot G
28 = AI G-2	Enable use of analog input AI2 of Slot G
29 = AI G-3	Enable use of analog input AI3 of Slot G
30 = Not used	Not used

A2.3.5 Command sources

A2.3.5.4 AI for process var. 2

Range: 0 ... 30 **Default:** 0

Properties: Stopped

Description:

It defines the analog input that will be used for calculating the value of the PID controller process variable if the variable source selection is configured for differences between analog inputs (A2.3.3.1 = 2). The options are shown in Table 9.26 on page 9-36.

Indication	Description
0 = Inactive	It disables the use of the analog input in this function
1 = AI X-1	Enable use of analog input AI1 of Slot X
2 = AI X-2	Enable use of analog input AI2 of Slot X
3 = AI A-1	Enable use of analog input AI1 of Slot A
4 = AI A-2	Enable use of analog input AI2 of Slot A
5 = AI A-3	Enable use of analog input AI3 of Slot A
6 = Not used	Not used
7 = AI B-1	Enable use of analog input AI1 of Slot B
8 = AI B-2	Enable use of analog input AI2 of Slot B
9 = AI B-3	Enable use of analog input AI3 of Slot B
10 = Not used	Not used
11 = AI C-1	Enable use of analog input AI1 of Slot C
12 = AI C-2	Enable use of analog input AI2 of Slot C
13 = AI C-3	Enable use of analog input AI3 of Slot C
14 = Not used	Not used
15 = AI D-1	Enable use of analog input AI1 of Slot D
16 = AI D-2	Enable use of analog input AI2 of Slot D
17 = AI D-3	Enable use of analog input AI3 of Slot D
18 = Not used	Not used
19 = AI E-1	Enable use of analog input AI1 of Slot E
20 = AI E-2	Enable use of analog input AI2 of Slot E
21 = AI E-3	Enable use of analog input AI3 of Slot E
22 = Not used	Not used
23 = AI F-1	Enable use of analog input AI1 of Slot F
24 = AI F-2	Enable use of analog input AI2 of Slot F
25 = AI F-3	Enable use of analog input AI3 of Slot F
26 = Not used	Not used

Indication	Description
27 = AI G-1	Enable use of analog input AI1 of Slot G
28 = AI G-2	Enable use of analog input AI2 of Slot G
29 = AI G-3	Enable use of analog input AI3 of Slot G
30 = Not used	Not used

A2.3.5 Command sources

A2.3.5.5 FI for process var.

Range: 0 ... 2 **Default:** 0

Properties: Stopped

Description:

It defines the frequency input that will be used as the PID controller process variable if the variable source selection is configured for frequency input (A2.3.3.1 = 1).

Indication	Description
0 = Inactive	It disables the use of the frequency input in this function
1 = FI X-5	It enables the use of frequency input FI5 of Slot X
2 = FI X-6	It enables the use of frequency input FI6 of Slot X

A2.3.5 Command sources

A2.3.5.6 DI for manual/Automatic

Range: 0 ... 62 **Default:** 0

Properties: Stopped

Description:

It defines the digital input that will be used for manual and automatic mode selection of the PID controller if parameter A2.3.4.1 is so configured (A2.3.4.1 = 1). The options are shown in Table 9.20 on page 9-24.

Indication	Description
0 = Inactive	It disables the use of the digital input in this function
1 = DI X-1	Enable use of digital input DI1 of Slot X
2 = DI X-2	Enable use of digital input DI2 of Slot X
3 = DI X-3	Enable use of digital input DI3 of Slot X
4 = DI X-4	Enable use of digital input DI4 of Slot X
5 = DI X-5	Enable use of digital input DI5 of Slot X
6 = DI X-6	Enable use of digital input DI6 of Slot X
7 = DI A-1	Enable use of digital input DI1 of Slot A
8 = DI A-2	Enable use of digital input DI2 of Slot A
9 = DI A-3	Enable use of digital input DI3 of Slot A
10 = DI A-4	Enable use of digital input DI4 of Slot A
11 = DI A-5	Enable use of digital input DI5 of Slot A
12 = DI A-6	Enable use of digital input DI6 of Slot A
13 = DI A-7	Enable use of digital input DI7 of Slot A
14 = DI A-8	Enable use of digital input DI8 of Slot A
15 = DI B-1	Enable use of digital input DI1 of Slot B
16 = DI B-2	Enable use of digital input DI2 of Slot B
17 = DI B-3	Enable use of digital input DI3 of Slot B
18 = DI B-4	Enable use of digital input DI4 of Slot B
19 = DI B-5	Enable use of digital input DI5 of Slot B
20 = DI B-6	Enable use of digital input DI6 of Slot B
21 = DI B-7	Enable use of digital input DI7 of Slot B
22 = DI B-8	Enable use of digital input DI8 of Slot B
23 = DI C-1	Enable use of digital input DI1 of Slot C
24 = DI C-2	Enable use of digital input DI2 of Slot C
25 = DI C-3	Enable use of digital input DI3 of Slot C

Indication	Description
26 = DI C-4	Enable use of digital input DI4 of Slot C
27 = DI C-5	Enable use of digital input DI5 of Slot C
28 = DI C-6	Enable use of digital input DI6 of Slot C
29 = DI C-7	Enable use of digital input DI7 of Slot C
30 = DI C-8	Enable use of digital input DI8 of Slot C
31 = DI D-1	Enable use of digital input DI1 of Slot D
32 = DI D-2	Enable use of digital input DI2 of Slot D
33 = DI D-3	Enable use of digital input DI3 of Slot D
34 = DI D-4	Enable use of digital input DI4 of Slot D
35 = DI D-5	Enable use of digital input DI5 of Slot D
36 = DI D-6	Enable use of digital input DI6 of Slot D
37 = DI D-7	Enable use of digital input DI7 of Slot D
38 = DI D-8	Enable use of digital input DI8 of Slot D
39 = DI E-1	Enable use of digital input DI1 of Slot E
40 = DI E-2	Enable use of digital input DI2 of Slot E
41 = DI E-3	Enable use of digital input DI3 of Slot E
42 = DI E-4	Enable use of digital input DI4 of Slot E
43 = DI E-5	Enable use of digital input DI5 of Slot E
44 = DI E-6	Enable use of digital input DI6 of Slot E
45 = DI E-7	Enable use of digital input DI7 of Slot E
46 = DI E-8	Enable use of digital input DI8 of Slot E
47 = DI F-1	Enable use of digital input DI1 of Slot F
48 = DI F-2	Enable use of digital input DI2 of Slot F
49 = DI F-3	Enable use of digital input DI3 of Slot F
50 = DI F-4	Enable use of digital input DI4 of Slot F
51 = DI F-5	Enable use of digital input DI5 of Slot F
52 = DI F-6	Enable use of digital input DI6 of Slot F
53 = DI F-7	Enable use of digital input DI7 of Slot F
54 = DI F-8	Enable use of digital input DI8 of Slot F
55 = DI G-1	Enable use of digital input DI1 of Slot G
56 = DI G-2	Enable use of digital input DI2 of Slot G
57 = DI G-3	Enable use of digital input DI3 of Slot G
58 = DI G-4	Enable use of digital input DI4 of Slot G
59 = DI G-5	Enable use of digital input DI5 of Slot G
60 = DI G-6	Enable use of digital input DI6 of Slot G
61 = DI G-7	Enable use of digital input DI7 of Slot G
62 = DI G-8	Enable use of digital input DI8 of Slot G

A2.3.5 Command sources

A2.3.5.7 DI for increment SP

Range: 0 ... 62 **Default:** 0

Properties: Stopped

Description:
It defines the digital input that will be used to increase the value of the PID controller setpoint if parameter A2.3.2.1 is so configured. The options are shown in Table 9.20 on page 9-24.

Indication	Description
0 = Inactive	It disables the use of the digital input in this function
1 = DI X-1	Enable use of digital input DI1 of Slot X
2 = DI X-2	Enable use of digital input DI2 of Slot X
3 = DI X-3	Enable use of digital input DI3 of Slot X
4 = DI X-4	Enable use of digital input DI4 of Slot X
5 = DI X-5	Enable use of digital input DI5 of Slot X
6 = DI X-6	Enable use of digital input DI6 of Slot X

Indication	Description
7 = DI A-1	Enable use of digital input DI1 of Slot A
8 = DI A-2	Enable use of digital input DI2 of Slot A
9 = DI A-3	Enable use of digital input DI3 of Slot A
10 = DI A-4	Enable use of digital input DI4 of Slot A
11 = DI A-5	Enable use of digital input DI5 of Slot A
12 = DI A-6	Enable use of digital input DI6 of Slot A
13 = DI A-7	Enable use of digital input DI7 of Slot A
14 = DI A-8	Enable use of digital input DI8 of Slot A
15 = DI B-1	Enable use of digital input DI1 of Slot B
16 = DI B-2	Enable use of digital input DI2 of Slot B
17 = DI B-3	Enable use of digital input DI3 of Slot B
18 = DI B-4	Enable use of digital input DI4 of Slot B
19 = DI B-5	Enable use of digital input DI5 of Slot B
20 = DI B-6	Enable use of digital input DI6 of Slot B
21 = DI B-7	Enable use of digital input DI7 of Slot B
22 = DI B-8	Enable use of digital input DI8 of Slot B
23 = DI C-1	Enable use of digital input DI1 of Slot C
24 = DI C-2	Enable use of digital input DI2 of Slot C
25 = DI C-3	Enable use of digital input DI3 of Slot C
26 = DI C-4	Enable use of digital input DI4 of Slot C
27 = DI C-5	Enable use of digital input DI5 of Slot C
28 = DI C-6	Enable use of digital input DI6 of Slot C
29 = DI C-7	Enable use of digital input DI7 of Slot C
30 = DI C-8	Enable use of digital input DI8 of Slot C
31 = DI D-1	Enable use of digital input DI1 of Slot D
32 = DI D-2	Enable use of digital input DI2 of Slot D
33 = DI D-3	Enable use of digital input DI3 of Slot D
34 = DI D-4	Enable use of digital input DI4 of Slot D
35 = DI D-5	Enable use of digital input DI5 of Slot D
36 = DI D-6	Enable use of digital input DI6 of Slot D
37 = DI D-7	Enable use of digital input DI7 of Slot D
38 = DI D-8	Enable use of digital input DI8 of Slot D
39 = DI E-1	Enable use of digital input DI1 of Slot E
40 = DI E-2	Enable use of digital input DI2 of Slot E
41 = DI E-3	Enable use of digital input DI3 of Slot E
42 = DI E-4	Enable use of digital input DI4 of Slot E
43 = DI E-5	Enable use of digital input DI5 of Slot E
44 = DI E-6	Enable use of digital input DI6 of Slot E
45 = DI E-7	Enable use of digital input DI7 of Slot E
46 = DI E-8	Enable use of digital input DI8 of Slot E
47 = DI F-1	Enable use of digital input DI1 of Slot F
48 = DI F-2	Enable use of digital input DI2 of Slot F
49 = DI F-3	Enable use of digital input DI3 of Slot F
50 = DI F-4	Enable use of digital input DI4 of Slot F
51 = DI F-5	Enable use of digital input DI5 of Slot F
52 = DI F-6	Enable use of digital input DI6 of Slot F
53 = DI F-7	Enable use of digital input DI7 of Slot F
54 = DI F-8	Enable use of digital input DI8 of Slot F
55 = DI G-1	Enable use of digital input DI1 of Slot G
56 = DI G-2	Enable use of digital input DI2 of Slot G
57 = DI G-3	Enable use of digital input DI3 of Slot G
58 = DI G-4	Enable use of digital input DI4 of Slot G
59 = DI G-5	Enable use of digital input DI5 of Slot G
60 = DI G-6	Enable use of digital input DI6 of Slot G
61 = DI G-7	Enable use of digital input DI7 of Slot G

Indication	Description
62 = DI G-8	Enable use of digital input DI8 of Slot G

A2.3.5 Command sources

A2.3.5.8 DI for decrement SP

Range: 0 ... 62 **Default:** 0

Properties: Stopped

Description:
It defines the digital input that will be used to decrease the value of the PID controller setpoint if parameter A2.3.2.1 is so configured. The options are shown in Table 9.20 on page 9-24.

Indication	Description
0 = Inactive	It disables the use of the digital input in this function
1 = DI X-1	Enable use of digital input DI1 of Slot X
2 = DI X-2	Enable use of digital input DI2 of Slot X
3 = DI X-3	Enable use of digital input DI3 of Slot X
4 = DI X-4	Enable use of digital input DI4 of Slot X
5 = DI X-5	Enable use of digital input DI5 of Slot X
6 = DI X-6	Enable use of digital input DI6 of Slot X
7 = DI A-1	Enable use of digital input DI1 of Slot A
8 = DI A-2	Enable use of digital input DI2 of Slot A
9 = DI A-3	Enable use of digital input DI3 of Slot A
10 = DI A-4	Enable use of digital input DI4 of Slot A
11 = DI A-5	Enable use of digital input DI5 of Slot A
12 = DI A-6	Enable use of digital input DI6 of Slot A
13 = DI A-7	Enable use of digital input DI7 of Slot A
14 = DI A-8	Enable use of digital input DI8 of Slot A
15 = DI B-1	Enable use of digital input DI1 of Slot B
16 = DI B-2	Enable use of digital input DI2 of Slot B
17 = DI B-3	Enable use of digital input DI3 of Slot B
18 = DI B-4	Enable use of digital input DI4 of Slot B
19 = DI B-5	Enable use of digital input DI5 of Slot B
20 = DI B-6	Enable use of digital input DI6 of Slot B
21 = DI B-7	Enable use of digital input DI7 of Slot B
22 = DI B-8	Enable use of digital input DI8 of Slot B
23 = DI C-1	Enable use of digital input DI1 of Slot C
24 = DI C-2	Enable use of digital input DI2 of Slot C
25 = DI C-3	Enable use of digital input DI3 of Slot C
26 = DI C-4	Enable use of digital input DI4 of Slot C
27 = DI C-5	Enable use of digital input DI5 of Slot C
28 = DI C-6	Enable use of digital input DI6 of Slot C
29 = DI C-7	Enable use of digital input DI7 of Slot C
30 = DI C-8	Enable use of digital input DI8 of Slot C
31 = DI D-1	Enable use of digital input DI1 of Slot D
32 = DI D-2	Enable use of digital input DI2 of Slot D
33 = DI D-3	Enable use of digital input DI3 of Slot D
34 = DI D-4	Enable use of digital input DI4 of Slot D
35 = DI D-5	Enable use of digital input DI5 of Slot D
36 = DI D-6	Enable use of digital input DI6 of Slot D
37 = DI D-7	Enable use of digital input DI7 of Slot D
38 = DI D-8	Enable use of digital input DI8 of Slot D
39 = DI E-1	Enable use of digital input DI1 of Slot E
40 = DI E-2	Enable use of digital input DI2 of Slot E
41 = DI E-3	Enable use of digital input DI3 of Slot E
42 = DI E-4	Enable use of digital input DI4 of Slot E

Indication	Description
43 = DI E-5	Enable use of digital input DI5 of Slot E
44 = DI E-6	Enable use of digital input DI6 of Slot E
45 = DI E-7	Enable use of digital input DI7 of Slot E
46 = DI E-8	Enable use of digital input DI8 of Slot E
47 = DI F-1	Enable use of digital input DI1 of Slot F
48 = DI F-2	Enable use of digital input DI2 of Slot F
49 = DI F-3	Enable use of digital input DI3 of Slot F
50 = DI F-4	Enable use of digital input DI4 of Slot F
51 = DI F-5	Enable use of digital input DI5 of Slot F
52 = DI F-6	Enable use of digital input DI6 of Slot F
53 = DI F-7	Enable use of digital input DI7 of Slot F
54 = DI F-8	Enable use of digital input DI8 of Slot F
55 = DI G-1	Enable use of digital input DI1 of Slot G
56 = DI G-2	Enable use of digital input DI2 of Slot G
57 = DI G-3	Enable use of digital input DI3 of Slot G
58 = DI G-4	Enable use of digital input DI4 of Slot G
59 = DI G-5	Enable use of digital input DI5 of Slot G
60 = DI G-6	Enable use of digital input DI6 of Slot G
61 = DI G-7	Enable use of digital input DI7 of Slot G
62 = DI G-8	Enable use of digital input DI8 of Slot G

A2.3.5 Command sources

A2.3.5.9 DI for multi SP 1

Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It defines the digital input that will be used for the multisetpoint mode if parameter A2.3.2.1 is so configured. The options are shown in Table 9.20 on page 9-24.

Indication	Description
0 = Inactive	It disables the use of the digital input in this function
1 = DI X-1	Enable use of digital input DI1 of Slot X
2 = DI X-2	Enable use of digital input DI2 of Slot X
3 = DI X-3	Enable use of digital input DI3 of Slot X
4 = DI X-4	Enable use of digital input DI4 of Slot X
5 = DI X-5	Enable use of digital input DI5 of Slot X
6 = DI X-6	Enable use of digital input DI6 of Slot X
7 = DI A-1	Enable use of digital input DI1 of Slot A
8 = DI A-2	Enable use of digital input DI2 of Slot A
9 = DI A-3	Enable use of digital input DI3 of Slot A
10 = DI A-4	Enable use of digital input DI4 of Slot A
11 = DI A-5	Enable use of digital input DI5 of Slot A
12 = DI A-6	Enable use of digital input DI6 of Slot A
13 = DI A-7	Enable use of digital input DI7 of Slot A
14 = DI A-8	Enable use of digital input DI8 of Slot A
15 = DI B-1	Enable use of digital input DI1 of Slot B
16 = DI B-2	Enable use of digital input DI2 of Slot B
17 = DI B-3	Enable use of digital input DI3 of Slot B
18 = DI B-4	Enable use of digital input DI4 of Slot B
19 = DI B-5	Enable use of digital input DI5 of Slot B
20 = DI B-6	Enable use of digital input DI6 of Slot B
21 = DI B-7	Enable use of digital input DI7 of Slot B
22 = DI B-8	Enable use of digital input DI8 of Slot B
23 = DI C-1	Enable use of digital input DI1 of Slot C

Indication	Description
24 = DI C-2	Enable use of digital input DI2 of Slot C
25 = DI C-3	Enable use of digital input DI3 of Slot C
26 = DI C-4	Enable use of digital input DI4 of Slot C
27 = DI C-5	Enable use of digital input DI5 of Slot C
28 = DI C-6	Enable use of digital input DI6 of Slot C
29 = DI C-7	Enable use of digital input DI7 of Slot C
30 = DI C-8	Enable use of digital input DI8 of Slot C
31 = DI D-1	Enable use of digital input DI1 of Slot D
32 = DI D-2	Enable use of digital input DI2 of Slot D
33 = DI D-3	Enable use of digital input DI3 of Slot D
34 = DI D-4	Enable use of digital input DI4 of Slot D
35 = DI D-5	Enable use of digital input DI5 of Slot D
36 = DI D-6	Enable use of digital input DI6 of Slot D
37 = DI D-7	Enable use of digital input DI7 of Slot D
38 = DI D-8	Enable use of digital input DI8 of Slot D
39 = DI E-1	Enable use of digital input DI1 of Slot E
40 = DI E-2	Enable use of digital input DI2 of Slot E
41 = DI E-3	Enable use of digital input DI3 of Slot E
42 = DI E-4	Enable use of digital input DI4 of Slot E
43 = DI E-5	Enable use of digital input DI5 of Slot E
44 = DI E-6	Enable use of digital input DI6 of Slot E
45 = DI E-7	Enable use of digital input DI7 of Slot E
46 = DI E-8	Enable use of digital input DI8 of Slot E
47 = DI F-1	Enable use of digital input DI1 of Slot F
48 = DI F-2	Enable use of digital input DI2 of Slot F
49 = DI F-3	Enable use of digital input DI3 of Slot F
50 = DI F-4	Enable use of digital input DI4 of Slot F
51 = DI F-5	Enable use of digital input DI5 of Slot F
52 = DI F-6	Enable use of digital input DI6 of Slot F
53 = DI F-7	Enable use of digital input DI7 of Slot F
54 = DI F-8	Enable use of digital input DI8 of Slot F
55 = DI G-1	Enable use of digital input DI1 of Slot G
56 = DI G-2	Enable use of digital input DI2 of Slot G
57 = DI G-3	Enable use of digital input DI3 of Slot G
58 = DI G-4	Enable use of digital input DI4 of Slot G
59 = DI G-5	Enable use of digital input DI5 of Slot G
60 = DI G-6	Enable use of digital input DI6 of Slot G
61 = DI G-7	Enable use of digital input DI7 of Slot G
62 = DI G-8	Enable use of digital input DI8 of Slot G

A2.3.5 Command sources

A2.3.5.10 DI for multi SP 2

Range: 0 ... 62 **Default:** 0

Properties: Stopped

Description:

It defines the digital input that will be used for the multisetpoint mode if parameter A2.3.2.1 is so configured. The options are shown in Table 9.20 on page 9-24.

Indication	Description
0 = Inactive	It disables the use of the digital input in this function
1 = DI X-1	Enable use of digital input DI1 of Slot X
2 = DI X-2	Enable use of digital input DI2 of Slot X
3 = DI X-3	Enable use of digital input DI3 of Slot X
4 = DI X-4	Enable use of digital input DI4 of Slot X

Indication	Description
5 = DI X-5	Enable use of digital input DI5 of Slot X
6 = DI X-6	Enable use of digital input DI6 of Slot X
7 = DI A-1	Enable use of digital input DI1 of Slot A
8 = DI A-2	Enable use of digital input DI2 of Slot A
9 = DI A-3	Enable use of digital input DI3 of Slot A
10 = DI A-4	Enable use of digital input DI4 of Slot A
11 = DI A-5	Enable use of digital input DI5 of Slot A
12 = DI A-6	Enable use of digital input DI6 of Slot A
13 = DI A-7	Enable use of digital input DI7 of Slot A
14 = DI A-8	Enable use of digital input DI8 of Slot A
15 = DI B-1	Enable use of digital input DI1 of Slot B
16 = DI B-2	Enable use of digital input DI2 of Slot B
17 = DI B-3	Enable use of digital input DI3 of Slot B
18 = DI B-4	Enable use of digital input DI4 of Slot B
19 = DI B-5	Enable use of digital input DI5 of Slot B
20 = DI B-6	Enable use of digital input DI6 of Slot B
21 = DI B-7	Enable use of digital input DI7 of Slot B
22 = DI B-8	Enable use of digital input DI8 of Slot B
23 = DI C-1	Enable use of digital input DI1 of Slot C
24 = DI C-2	Enable use of digital input DI2 of Slot C
25 = DI C-3	Enable use of digital input DI3 of Slot C
26 = DI C-4	Enable use of digital input DI4 of Slot C
27 = DI C-5	Enable use of digital input DI5 of Slot C
28 = DI C-6	Enable use of digital input DI6 of Slot C
29 = DI C-7	Enable use of digital input DI7 of Slot C
30 = DI C-8	Enable use of digital input DI8 of Slot C
31 = DI D-1	Enable use of digital input DI1 of Slot D
32 = DI D-2	Enable use of digital input DI2 of Slot D
33 = DI D-3	Enable use of digital input DI3 of Slot D
34 = DI D-4	Enable use of digital input DI4 of Slot D
35 = DI D-5	Enable use of digital input DI5 of Slot D
36 = DI D-6	Enable use of digital input DI6 of Slot D
37 = DI D-7	Enable use of digital input DI7 of Slot D
38 = DI D-8	Enable use of digital input DI8 of Slot D
39 = DI E-1	Enable use of digital input DI1 of Slot E
40 = DI E-2	Enable use of digital input DI2 of Slot E
41 = DI E-3	Enable use of digital input DI3 of Slot E
42 = DI E-4	Enable use of digital input DI4 of Slot E
43 = DI E-5	Enable use of digital input DI5 of Slot E
44 = DI E-6	Enable use of digital input DI6 of Slot E
45 = DI E-7	Enable use of digital input DI7 of Slot E
46 = DI E-8	Enable use of digital input DI8 of Slot E
47 = DI F-1	Enable use of digital input DI1 of Slot F
48 = DI F-2	Enable use of digital input DI2 of Slot F
49 = DI F-3	Enable use of digital input DI3 of Slot F
50 = DI F-4	Enable use of digital input DI4 of Slot F
51 = DI F-5	Enable use of digital input DI5 of Slot F
52 = DI F-6	Enable use of digital input DI6 of Slot F
53 = DI F-7	Enable use of digital input DI7 of Slot F
54 = DI F-8	Enable use of digital input DI8 of Slot F
55 = DI G-1	Enable use of digital input DI1 of Slot G
56 = DI G-2	Enable use of digital input DI2 of Slot G
57 = DI G-3	Enable use of digital input DI3 of Slot G
58 = DI G-4	Enable use of digital input DI4 of Slot G
59 = DI G-5	Enable use of digital input DI5 of Slot G

Indication	Description
60 = DI G-6	Enable use of digital input DI6 of Slot G
61 = DI G-7	Enable use of digital input DI7 of Slot G
62 = DI G-8	Enable use of digital input DI8 of Slot G

A2.3.6 Falhas e alarmes

It allows configuring the performance of the PID controller faults and alarms.

A2.3.6 Falhas e alarmes		
A2.3.6.1 Config. for PV low level		
Range:	0 ... 3	**Default:** 0
Properties:		

Description:
It defines whether the alarm and protection should actuate when the process variable level is low (A2.1.3 < A2.3.6.2).

Indication	Description
0 = Inactive	It defines that the process variable fault and alarm should not actuate when the limit is exceeded
1 = Alarm	It defines that only the process variable alarm should actuated when the limit is exceeded
2 = Fault	It defines that the process variable fault should actuate when the limit is exceeded
3 = Alarm and Fault	It defines that the process variable fault and alarm should actuate when the limit is exceeded

A2.3.6 Falhas e alarmes		
A2.3.6.2 Value for PV low level		
Range:	-32768 ... 32767	**Default:** 0
Properties:		

Description:
It defines the value below which the control process variable low level alarm will be generated (A2430).

A2.3.6 Falhas e alarmes		
A2.3.6.3 Time for PV low level		
Range:	0.0 ... 999.9 s	**Default:** 0.0 s
Properties:		

Description:
Time for low level fault for the control process variable.

A2.3.6 Falhas e alarmes		
A2.3.6.4 Config. for PV high level		
Range:	0 ... 3	**Default:** 0
Properties:		

Description:
It defines whether the alarm and protection should actuate when the process variable level is high (A2.1.3 > A2.3.6.5).

Indication	Description
0 = Inactive	It defines that the process variable fault and alarm should not actuate when the limit is exceeded
1 = Alarm	It defines that only the process variable alarm should actuated when the limit is exceeded
2 = Fault	It defines that the process variable fault should actuate when the limit is exceeded

Indication	Description
3 = Alarm and Fault	It defines that the process variable fault and alarm should actuate when the limit is exceeded

A2.3.6 Falhas e alarmes		
A2.3.6.5 Value for PV high level		
Range:	-32768 ... 32767	**Default:** 0
Properties:		

Description:
It defines the value above which the control process variable high level alarm will be generated (A2432).

A2.3.6 Falhas e alarmes		
A2.3.6.6 Time for PV high level		
Range:	0.0 ... 999.9 s	**Default:** 0.0 s
Properties:		

Description:
Time for high level fault for the control process variable.

A2.3.7 Sleep mode

It allows setting the operating conditions of the PID controller sleep mode. This mode allows energy savings when the control action is not necessary to keep the process variable at the desired value.

Sleep Mode is a controlled system status in which the control demand is zero or almost zero, seeing that at this moment the motor driven by the MVW3000 frequency inverter may be stopped. That prevents the motor from remaining running at a low speed, which does little or nothing for the controlled system. Even if the motor is apparently OFF, the process variable continues to be monitored so that, when necessary, the controlled system can start the motor again according to the conditions of the wake up mode.

The Wake Up Mode switches on the motor when the difference between the control process variable and the control setpoint is greater than a certain programmed value.

NOTE!
The sleep mode only actuates if the PID controller is enabled and in the automatic mode.

DANGER!
When the MVW3000 inverter is in the sleep mode, the motor can spin at any moment because of the process conditions.

Figure 10.2 on page 10-21 shows an analysis of the operation of the PID controller programmed with direct control action and set to Sleep Mode.

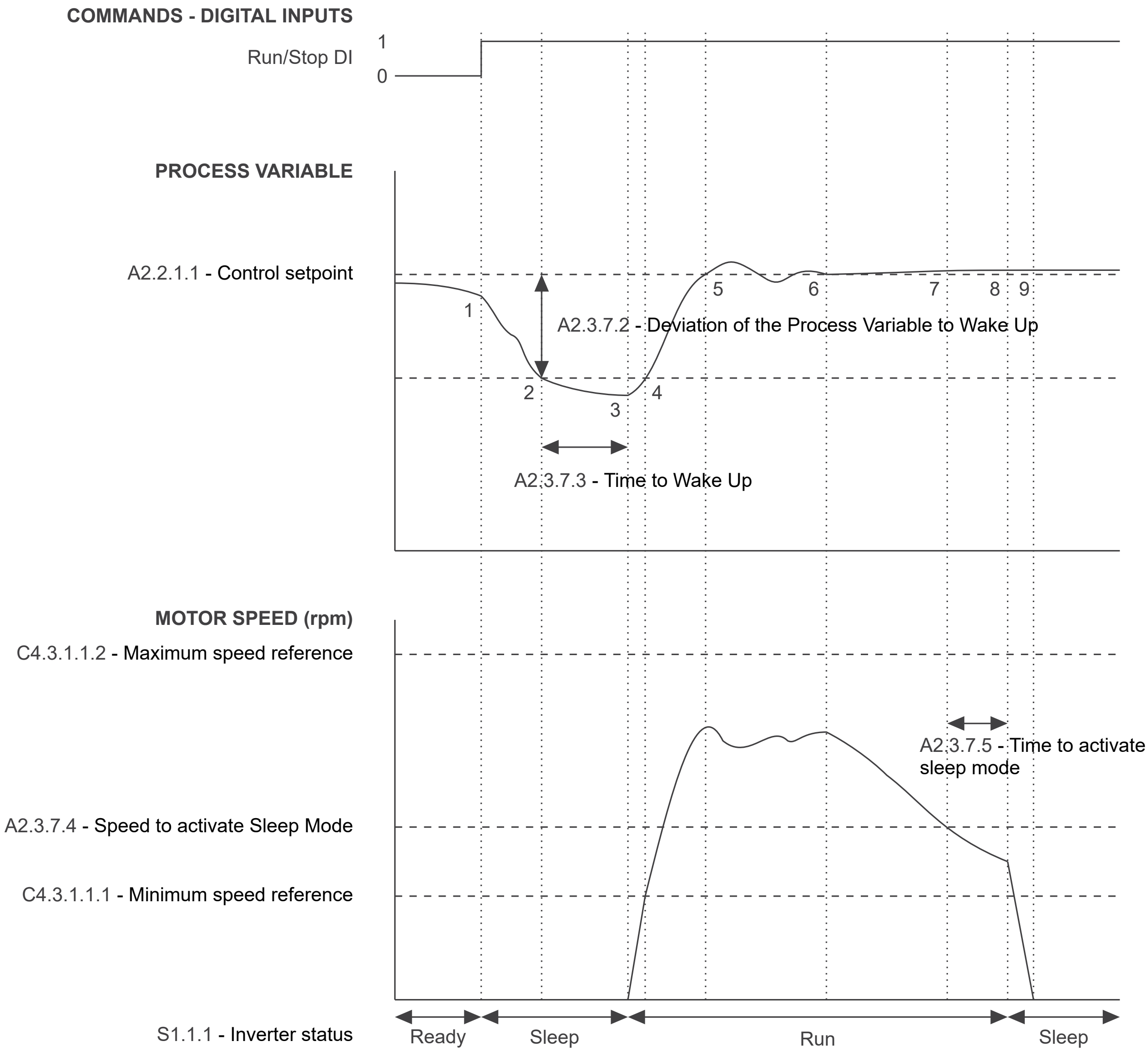


Figure 10.2: *PID sleep mode*

1 – The Run/Stop command via digital input DI1 enables starting the motor. As the condition to wake up was not detected, it remains in sleep mode and the motor remains stopped;

2 – The process variable starts to decrease and becomes smaller than the deviation of the process variable programmed to wake up (A2.3.7.2); at this moment the countdown time to wake up (A2.3.7.3) is started;

3 – The process variable remains smaller than the deviation of the process variable to wake up (A2.3.7.2), and the time to wake up (A2.3.7.3) has elapsed; at this moment the command is given to start the motor and control the system with the variation of its speed;

4 – The inverter accelerates the motor to the minimum speed (C4.3.1.1.1). After that, the PID controller is enabled and starts to control the motor speed;

5 – Then it is possible to control the process variable so that it reaches the control setpoint required by the user. To that end, the PID controller output is increased causing the motor speed to increase until the control stabilizes;

6 – The value of the process variable remains above the required control setpoint due to a decrease in demand and the motor speed starts to slow down;

7 – The motor speed value is lower than the sleep value (A2.3.7.4); the countdown time to activate sleep mode (A2.3.7.5) starts;

8 – The motor speed remains below the sleep value (A2.3.7.4) and the time to activate the sleep mode (A2.3.7.5) has elapsed; at this moment the command to turn off the motor is given;

9 – The motor decelerates to 0 rpm and stops; at this moment the PID controller goes into sleep mode.

A2.3.7 Sleep mode

A2.3.7.1 Sleep mode config.

Range: 0 ... 1 **Default:** 0

Properties:

Description:
It defines whether the control will operate in sleep mode.

Indication	Description
0 = Disabled	It sets the sleep mode to be inactive
1 = Enabled	It sets the sleep mode to be active

A2.3.7 Sleep mode

A2.3.7.2 PV deviation to wake up

Range: -32768 ... 32767 **Default:** 500

Properties:

Description:
It defines the value to be decreased (direct PID) or added (reverse PID) to the control setpoint to turn on the motor and return to system control (exiting the sleep mode). This value is compared to the control process variable, and, if the control process variable value is smaller (direct PID) or greater (reverse PID) than this value, the wake up condition is enabled.

A2.3.7 Sleep mode

A2.3.7.3 Time to wake up

Range: 0.0 ... 999.9 s **Default:** 5.0 s

Properties:

Description:
It sets the time to stay in the wake up mode condition to exit the sleep mode and allow control of the system by activating the motor. The control process variable must remain smaller (direct PID) or greater (reverse PID) than the deviation defined in A2.3.7.2 during the time set in A2.3.7.3 for the motor to be turned on and its speed controlled. If the condition to wake up (A2.3.7.3) is inactive for a while, the timer is reset and the time count is reinitialized.

NOTE!
If the “Run/Stop” command is active when the inverter is powered up and the Wake up condition is active, the time set in A2.3.7.3 will not be waited, and thus the motor starts instantly.

A2.3.7 Sleep mode

A2.3.7.4 Speed for sleep mode

Range: 0 ... 60000 rpm **Default:** 100 rpm

Properties:

Description:
It sets the motor speed value to go into the sleep mode.

A2.3.7 Sleep mode

A2.3.7.5 Time for sleep mode

Range: 0.0 ... 999.9 s **Default:** 10.0 s

Properties:

Description:
It defines the time for the motor speed to remain below the value set in A2.3.7.4 so that the motor will be switched off and go into the sleep mode.

A3 MILL

This section explains the starting and stopping process of mills controlled by WEG MVW3000 inverters.

To start the inverter operation, it must be in the *Ready* state and receive a *Start* command to accelerate the mill to the speed reference.

Due to the high torque required to move the mill, strategies are required for frozen charge detection (FCD), which is the result of the solidification of the ore mixture after a certain period of mill downtime.

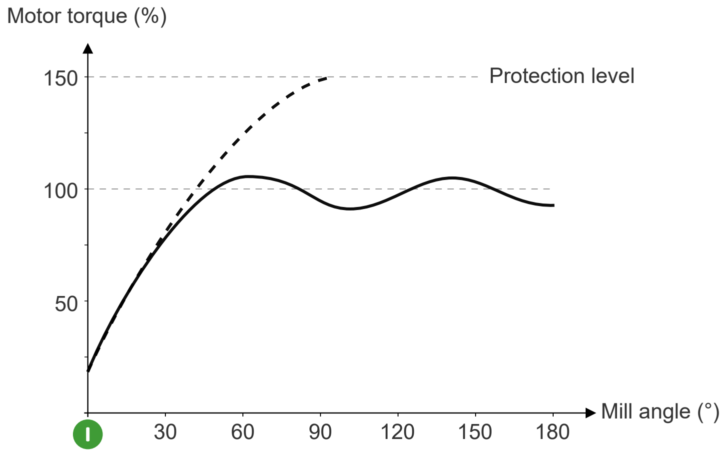


Figure 10.3: *Motor torque driving a frozen charge and a normal load*

Frozen charges affect the dynamics of the load, which may prevent it from sliding when the mill rotates.

The MVW3000's frozen charge release (FCR) function enables the load to be defrosted, restoring the correct dynamics to the system and enabling the mill to resume operation.

A3.1 Configurations

General system settings, such as speed ratio, command sources and references.

A3.1 Configurations		
A3.1.1 Reduction of the motor and mill assembly		
Range:	0.01 ... 200.00	**Default:** 64.85
Properties:		

Description:
Defines the final reduction value of the motor and mill assembly.

$$\text{Reduction} = \text{Gearbox reduction} + \frac{\text{Number of pinion teeth}}{\text{Number of crown teeth}}$$

A3.1 Configurations		
A3.1.3 HMI speed reference		
Range:	0.1 ... 100.0 %	**Default:** 80.0 %
Properties:		

Description:
Defines the speed reference value in remote mode 1, used when the reference source is parameterized for HMI in A3.1.4

A3.1 Configurations		
A3.1.4 Commands and references		
Range:	0 ... 2 Bit	**Default:** 0
Properties:		

Description:
Defines the source of speed commands and references.

Bit	Value/Description
Bit 0 REM 1 speed reference source	**0 = HMI**: The HMI reference value is parameterized in A3.1.3 **1 = Analog input**
Bit 1 REM 2 speed reference source	**0 = Fieldbus** **1 = Analog input**
Bit 2 REM 2 Start/Stop command source	**0 = Fieldbus** **1 = Digital input**

A3.1 Configurations		
A3.1.5 Remote 2 minimum speed reference		
A3.1.6 Maximum value of the remoto 2 speed reference		
Range:	0.1 ... 100.0 %	**Default:** 30.0 % (A3.1.5)
		100.0 % (A3.1.6)
Properties:		

Description:
Sets the speed reference range when operating in remote mode 2.

A3.2 Frozen charge detection

When the frozen charge detection function is enabled, when starting operation, the mill accelerates until it reaches the verification speed defined in A3.2.2.

Upon reaching the angular position A3.2.3 the maximum torque check is initiated up to position A3.2.4. The maximum torque value measured in this interval is stored and when the displacement angle reaches A3.2.5 it is compared with the current torque value.

$$\Delta\text{Torque} = (T_{max} - T_{\text{A3.2.5}})$$

$$\text{Load status} = \begin{cases} \text{Thawed}, & \text{if } \Delta\text{Torque} > \text{A3.2.6} \\ \text{Frozen}, & \text{if } \Delta\text{Torque} \leq \text{A3.2.6} \end{cases}$$

If no freezing of the load is detected, the mill continues to rotate until it reaches the angular position parameterized in A3.2.7 where it assumes the operating speed reference defined in A3.1.4.

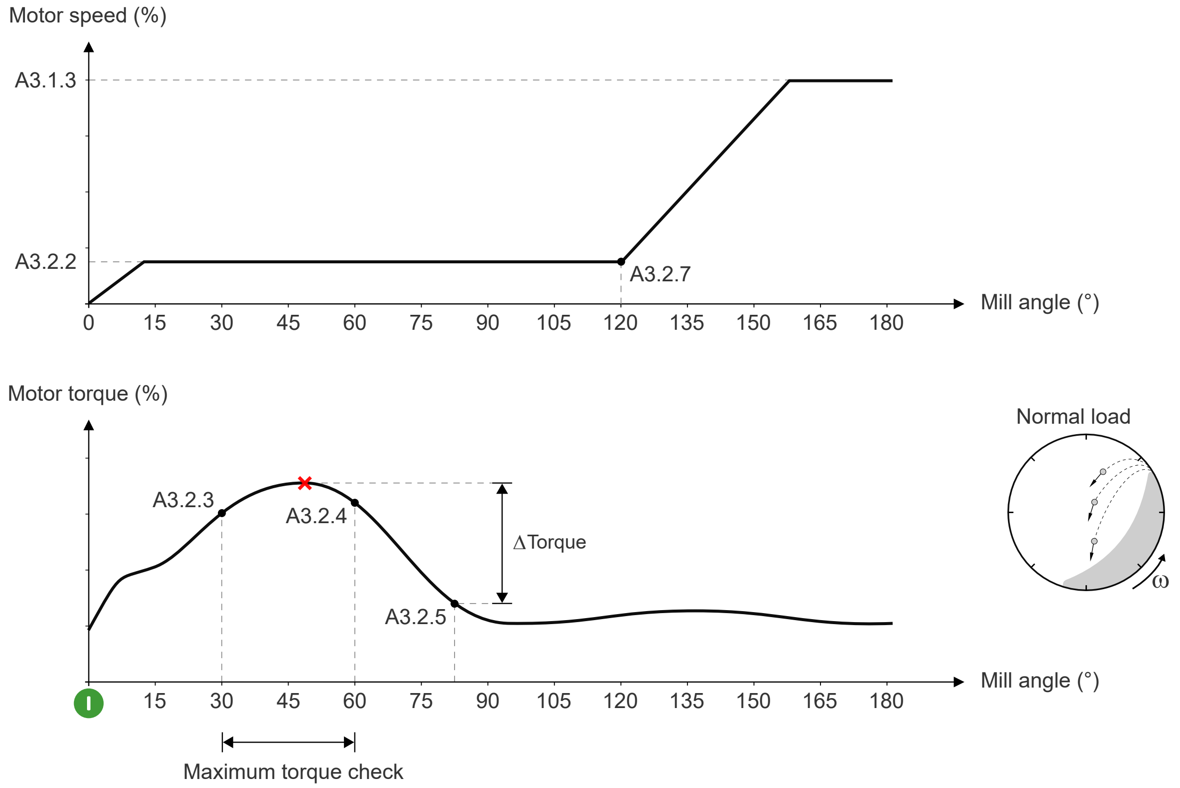


Figure 10.4: *Freeze no-load start, with FCD enabled*

If a frozen charge is detected, the direction of rotation of the motor will be reversed and the mill will be stopped when it reaches approximately 0°.

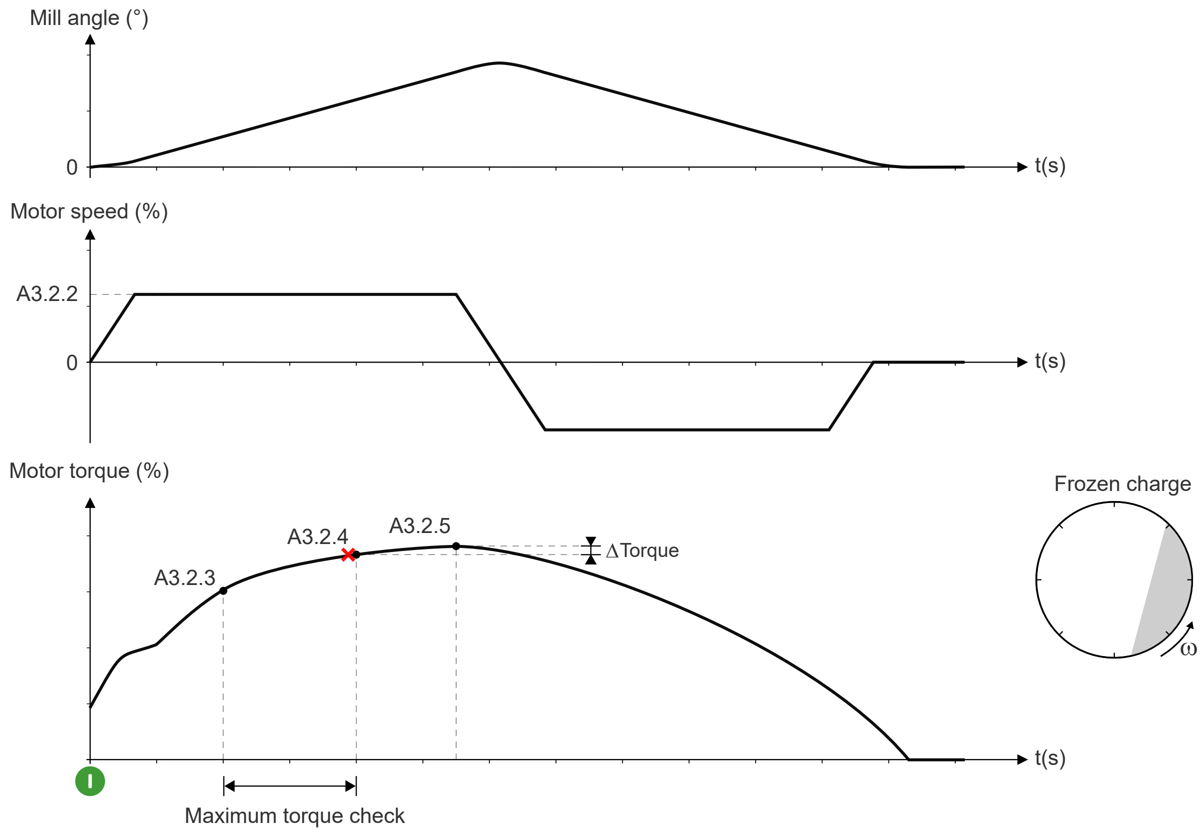


Figure 10.5: *Starting with frozen charge, with FCD enabled*

A3.2 Frozen charge detection		
A3.2.1 Enable function		
Range:	0 ... 1	**Default:** 1
Properties:		

Description:
Enable frozen charge detection function.

Indication	Description
0 = Disable	Disables the function.
1 = Enable	Enables the function.

A3.2 Frozen charge detection		
A3.2.2 Verification speed		
Range:	0.1 ... 10.0 %	**Default:** 10.0 %
Properties:		

Description:
Sets the desired speed reference for the frozen charge check.

A3.2 Frozen charge detection		
A3.2.3 Angle to enable maximum torque check		
A3.2.4 Angle to disable maximum torque check		
Range:	1 ... 90 °	**Default:** 30 ° (A3.2.3)
		60 ° (A3.2.4)
Properties:		

Description:
Sets the angle to activate/deactivate the maximum torque check.

A3.2 Frozen charge detection		
A3.2.5 Angle to perform torque comparison		
Range:	1 ... 90 °	**Default:** 80 °
Properties:		

Description:
Defines the angle to perform the comparison between the maximum torque value read between A3.2.3 and A3.2.4 and the current torque value.

This comparison determines whether the mill charge is frozen.

A3.2 Frozen charge detection		
A3.2.6 Minimum torque reduction rate		
Range:	1 ... 30 %	**Default:** 20 %
Properties:		

Description:
Sets the minimum torque reduction ratio required in the frozen charge check function.

This rate must be adjusted to detect load drop.

A3.2 Frozen charge detection		
A3.2.7 Angle to change speed		
Range:	1 ... 359 °	**Default:** 180 °
Properties:		

Description:
Sets the angle to release the mill operating speed after a frozen charge is not detected.

A3.3 Frozen charge release

When a frozen charge is detected, the system takes the mill to the zero angular position.

If the function is enabled in A3.3.1, the system is ready to receive the frozen charge release command.

When starting the defrosting process, the steps below are carried out:

- Start of mill movement from zero angle to the release angle parameterized in A3.3.3, at release speed A3.3.2;

- When the mill reaches the angle parameterized in A3.3.3, the system stops and holds the mill in position until time A3.3.5 has elapsed.

- The mill reverses the direction of rotation and positions it at the angle A3.3.3 in the other direction, holding it in this position for the time A3.3.5.

The parameter A3.3.4 defines the number of cycles that the inverter will perform to defrost the load, after this procedure the mill will go to zero degrees and the inverter will be disabled.

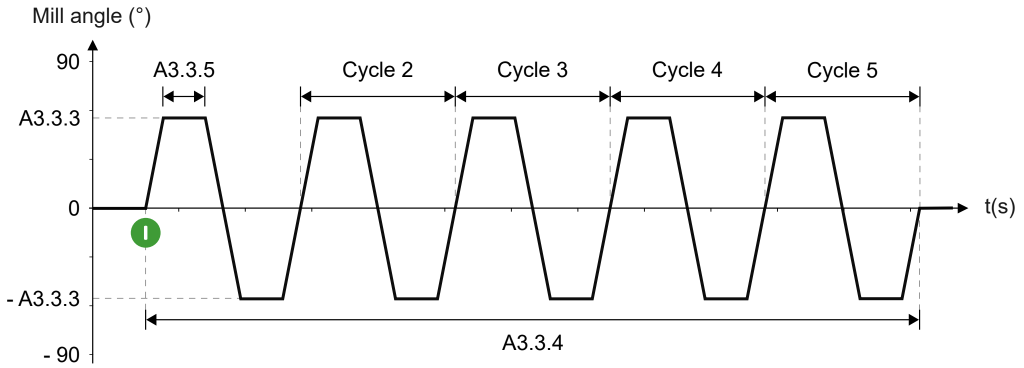


Figure 10.6: *Release of frozen cargo*

A3.3 Frozen charge release		
A3.3.1 Enable function		
Range:	0 ... 1	**Default:** 1
Properties:		

Description:
Enables the frozen charge release function.

Indication	Description
0 = Disable	Disables the function.
1 = Enable	Enables the function.

A3.3 Frozen charge release		
A3.3.2 Speed reference		
Range:	0.1 ... 10.0 %	**Default:** 10.0 %
Properties:		

Description:
Sets the speed reference for the motor during the freeze load release routine. This value is a percentage of the motor rating defined in C2.1.5.

A3.3 Frozen charge release		
A3.3.3 Position to release the frozen charge		
Range:	10 ... 90 °	**Default:** 80 °
Properties:		

Description:
Defines the angular position of the mill to release the frozen charge.

A3.3 Frozen charge release		
A3.3.4 Number of cycles		
Range:	1 ... 10	**Default:** 5
Properties:		

Description:
Sets the number of cycles to defrost the load.

A3.3 Frozen charge release		
A3.3.5 Time to release frozen cargo		
Range:	0 ... 60 s	**Default:** 5 s
Properties:		

Description:
Defines the time that the mill will remain stopped in the position defined in A3.3.3 and then reverse the direction of rotation.

A3.3 Frozen charge release		
A3.3.6 Enable automatic release		
Range:	0 ... 1	**Default:** 0
Properties:		

Description:
Defines whether frozen charge release cycles will be executed automatically.

NOTE!
Automatic release will only be performed if load release is enabled in A3.3.1.

Indication	Description
0 = Disable	After detecting a frozen charge, the inverter moves the mill to the 0° angular position and waits for the frozen charge release command
1 = Enable	Starts the defrost routine as soon as a frozen charge is detected

A3.3 Frozen charge release		
A3.3.7 Regenerative torque setpoint		
Range:	10 ... 120 %	**Default:** 100 %
Properties:		

Description:
Sets the percentage of regenerative torque applied to the motor when Freeze Load Release is activated.

NOTE!
Prevents inverter overvoltage problems when decelerating a frozen charge.
A gain must be set to prevent undervoltage from occurring on the inverter's DC link when it decelerates to release a frozen charge.

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