

Frequency Inverter

CFW900 V1.11.XX

Programming Manual



Programming Manual

CFW900

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SUMMARY OF REVISIONS

The information below describes the reviews made in this manual.

Version	Revision	Description	Date
1.00.XX	R00	First edition	01/2022
1.04.XX	R01	General review and addition of new parameters for new features. New features: Electronic Potentiometer (E.P.); Frequency Input (FI); Frequency Output (FO); Stop Mode via HMI keypad	07/2022
1.06.XX	R02	General review and addition of new parameters for new features. New features: Torque Control; Detailed History of Alarms and Faults; Skip Speed; Access Control	11/2022
1.07.XX	R03	General review and addition of new parameters for new features. New features: Changed Parameters Menu; I/F Control; S Ramp; EtherNet/IP Communication Protocol; Settings Backup on the HMI; Application Menu	06/2023
1.08.XX	R04	General review and addition of new parameters for new features. New features: PID Controller; Anybus Accessory; Vector Control for PM Motor	08/2023
1.08.XX	R05	General review	08/2023
1.08.XX	R06	General review	12/2023
1.09.XX	R07	General review and addition of new parameters for new features. New features: VVW+ control for magnet-assisted reluctance synchronous motor (HSRM); French, Italian and Dutch languages; Delay of digital outputs; Programming user parameters and setpoints on the HMI monitoring screen; Braking Resistor protection; Inverted encoder protection	04/2024
1.09.XX	R08	General review	06/2024
1.09.XX	R09	General review and addition of fault indication F1764	08/2024
1.10.XX	R10	General review and addition of new parameters for new features. New features: Require Accessory Identification; Limiting Protection; Zero Speed Disable; Speed Reference Source as Sum of AIs; Option to Enable or Disable Fault History; Setting for Run Command when Exiting STO State; Digital Input to Load Parameter Sets	12/2024
1.10.XX	R11	General review	08/2025
1.11.XX	R12	General review and addition of new parameters for new features. New features: Sensorless Vector Control for SPSM and HSRM motors; Polish language	09/2025
1.11.XX	R13	General review.	01/2026

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2 FAULTS AND ALARMS

Faults and Alarms are a functionality of the CFW900 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 CFW900 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 CFW900 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
F006: Grid Unbal./Phase Loss	Unbalance or phase loss in the power supply. Note: ■ In case the motor has no load on the shaft or the load is low, this fault may not take effect. ■ Actuation time set in C7.1.1. When C7.1.1=0, the fault is disabled.	■ Phase loss at the inverter input. ■ Input voltage imbalance >5 %. ■ Loss of one phase in the power supply.
A018: Low Battery Voltage	Low battery voltage.	■ Replace the battery.
A019: 24 Vdc Power Supply Overvoltage	24 Vdc Power Supply Overvoltage.	■ Voltage of the 24 Vdc power supply that feeds the control exceeds the maximum value of 26.4 Vdc.
A020: 24 Vdc Power Supply Undervoltage	24 Vdc power supply undervoltage.	■ Voltage of the 24 Vdc power supply that feeds the control below the minimum value of 21.6 Vdc.
F021: DC Link Undervoltage	Undervoltage on the DC link.	■ Supply voltage too low, producing voltage on the DC link (S2.7.1) below the minimum value: Ud < 203 V - Supply voltage 200 V. Ud < 210 V - Supply voltage 208-240 V. Ud < 385 V - Supply voltage 380 V. Ud < 405 V - Supply voltage 400-415 V. Ud < 446 V - Supply voltage 440-460 V. Ud < 487 V - Supply voltage 480 V. Ud < 507 V - Supply voltage 500-525 V. Ud < 557 V - Supply voltage 550-600 V. Ud < 669 V - Supply voltage 660-690 V. ■ Input phase loss. ■ Fault in the pre-charge circuit. ■ Parameter C1.1.2 with a value above the rated grid voltage.
F022: DC Link Overvoltage	Overvoltage on the DC link.	■ Supply voltage too high, producing voltage on the DC link (S2.7.1) above the maximum value: Ud > 400 V - Models 200-240 V. Ud > 800 V - Models 380-480 V. Ud > 1000 V - Models 500-600 V. Ud > 1200 V - Models 660-690 V. ■ Inertia of the driven load too high or deceleration ramp too fast. ■ Setting of C3.5.2.1 or C3.5.3.2 or C3.6.1 too high.

FAULTS AND ALARMS

Fault/Alarm	Description	Possible Causes
F025: PWM Signal Fault	Failure to compare the PWM pulses generated by the control and the output voltages measured by the inverter. Note: ■ Reset the inverter and try again.	■ Motor disconnected or rated current of the motor connected to the output lower than 1/3 of the inverter rated current. ■ Possible defect in the inverter's internal circuits. ■ Problems in the circuit of the STO safety inputs (XC2).
F030: IGBT U Desat.	Desaturation on the IGBTs of U leg.	■ Short circuit between the U and V or U and W phases of the motor.
F034: IGBT V Desat.	Desaturation on the IGBTs of V leg.	■ Short circuit between the V and U or V and W phases of the motor.
F038: IGBT W Desat.	Desaturation on the IGBTs of W leg.	■ Short circuit between the W and U or W and V phases of the motor.
F042: Braking IGBT Desat.	Desaturation on the Dynamic Braking IGBT.	■ Short circuit in the Dynamic Braking resistor cables.
A046: High Load on the Motor	Motor overload. Note: ■ It can be disabled by setting C7.4.1 = 0 or 2.	■ Setting of C7.4.3, C7.4.4 and C7.4.5 low for the motor used. ■ Overload on the motor shaft.
A047: High Load on the IGBTs	IGBT overload.	■ High current at the inverter output. ■ For low output frequency ($f_o < 5\text{Hz}$): ■ Power heatsink temperature too high during motor acceleration/deceleration. ■ Adjustment of C3.2.1.1 too low. ■ Load inertia too high or acceleration ramp too slow.
F048: Overload on the IGBTs	IGBT overload.	■ High current at the inverter output. ■ For low output frequency ($f_o < 5\text{Hz}$): ■ Power heatsink temperature too high during motor acceleration/deceleration. ■ Adjustment of C3.2.1.1 too low. ■ Load inertia too high or acceleration ramp too slow.
A050: IGBT1 U Overtemp.	High temperature measured in the sensors (NTC) of the IGBTs. Note: ■ It can be disabled by C7.5.1.	■ High ambient temperature around the inverter ($>50\text{ }^{\circ}\text{C}$) and high output current. ■ Blocked or defective fan. ■ Inverter heatsink dirty.
A051: IGBT1 V Overtemp.	High temperature measured in the sensors (NTC) of the IGBTs. Note: ■ It can be disabled by C7.5.1.	■ High ambient temperature around the inverter ($>50\text{ }^{\circ}\text{C}$) and high output current. ■ Blocked or defective fan. ■ Inverter heatsink dirty.
A052: IGBT1 W Overtemp.	High temperature measured in the sensors (NTC) of the IGBTs. Note: ■ It can be disabled by C7.5.1.	■ High ambient temperature around the inverter ($>50\text{ }^{\circ}\text{C}$) and high output current. ■ Blocked or defective fan. ■ Inverter heatsink dirty.
F053: IGBT1 U Overtemp.	Overtemperature measured in sensors (NTC) of the IGBTs.	■ High ambient temperature around the inverter ($>50\text{ }^{\circ}\text{C}$) and high output current. ■ Blocked or defective fan. ■ Inverter heatsink too dirty.
F054: IGBT1 V Overtemp.	Overtemperature measured in sensors (NTC) of the IGBTs.	■ High ambient temperature around the inverter ($>50\text{ }^{\circ}\text{C}$) and high output current. ■ Blocked or defective fan. ■ Inverter heatsink too dirty.
F055: IGBT1 W Overtemp.	Overtemperature measured in sensors (NTC) of the IGBTs.	■ High ambient temperature around the inverter ($>50\text{ }^{\circ}\text{C}$) and high output current. ■ Blocked or defective fan. ■ Inverter heatsink too dirty.
A060: IGBT/DRL Junction Overtemp.	High temperature at the junction of the IGBTs or diodes.	■ High ambient temperature around the inverter ($>50\text{ }^{\circ}\text{C}$) and high output current. ■ Blocked or defective fan. ■ Inverter heatsink too dirty.
F061: IGBT/DRL Junction Overtemp.	Overtemperature at the junction of the IGBTs or diodes.	■ High ambient temperature around the inverter ($>50\text{ }^{\circ}\text{C}$) and high output current. ■ Blocked or defective fan. ■ Inverter heatsink too dirty.

Fault/Alarm	Description	Possible Causes
F067: Encoder/Motor Wiring Reversed	Fault related to the phase relationship of the encoder signals if C3.1.1 = 2 (Vector Control with Encoder). Note: ■ During Self-Tuning spinning (W2 = 2), detection of fault cannot be disabled (regardless of the value set in parameter C7.12.1).	■ U, V, W wiring to the motor is reversed. ■ Encoder channels A and B are reversed. ■ Incorrect parameter setting C1.6.1. ■ Incorrect setting of parameters C5.2.5.2, C5.3.5.2, C5.4.5.2, C5.5.5.2, C5.6.5.2, C5.7.5.2 or C5.8.5.2 depending on the slot used by the encoder accessory. ■ Error in the encoder mounting position. ■ Motor with locked rotor or being dragged at the start.
F069: Low Overcurr. Output Freq.	Overcurrent for low output frequency. Note: ■ Such protection only operates on some inverter models when the output frequency (S2.3.3) is below 5 Hz.	■ Load inertia too high or acceleration ramp too fast. ■ Setting of C3.4.1 or C3.3.5.1.1 too high. ■ Power heatsink temperature too high during motor acceleration/deceleration.
F070: DC Link Short Circuit	Short circuit at the output, DC link or braking resistor.	■ Short circuit between two motor phases. ■ Short circuit in the Dynamic Braking resistor cables. ■ Short-circuited IGBT modules.
F071: Overcur. at the Output	Output overcurrent.	■ Load inertia too high or acceleration ramp too fast. ■ Setting of C3.4.1 or C3.3.5.1.1 too high.
F072: Motor Overload	Motor overload. Note: ■ The fault can be disabled by setting C7.4.1 = 0 or 3.	■ Setting of C7.4.3, C7.4.4 and C7.4.5 too low for the motor. ■ Load on the motor shaft is too high.
F073: Overcurrent via Software	Motor overcurrent. Protection only available for HSRM motors. For further details, see C3.4.5.	■ Load inertia too high or acceleration ramp too fast. ■ Setting of C3.4.1 or C3.3.5.1.1 too high.
F074: Ground Fault	Ground overcurrent. Note: ■ The fault can be disabled by setting C7.2.1 = 0 or 3.	■ Short circuit to the ground in one or more output phases. ■ Motor cable capacitance too high, causing current peaks at the output.
F076: Motor Current Unbal.	Imbalance of motor currents.	■ Poor contact or broken wiring in the connection between the inverter and the motor.
F077: Brak. Res. Overload	Overload on the dynamic braking resistor fault. Note: ■ Refer to the User Manual for the correct sizing and selection of the braking resistor to be used.	■ Load inertia too high or deceleration ramp too fast. ■ Load on the motor shaft is too high. ■ Values of C3.6.2 and C3.6.3 programmed incorrectly. ■ Incorrect sizing of the resistor used.
F078: Motor Overtemp.	Overtemperature related to the PTC-type sensor installed on the motor. Note: ■ The fault can be disabled by setting C7.5.2. ■ It is necessary to program analog input and output for the PTC function.	■ Load on the motor shaft is too high. ■ Very high load cycle (large number of starts and stops per minute). ■ High ambient temperature around the motor. ■ Poor contact or short circuit (resistance < 60 Ω) on the wiring connected to the motor thermistor. ■ Motor thermistor not installed. ■ Locked motor shaft.
F084: Self-diagnosis Fault	Self-diagnosis fault.	■ Failure on the inverter internal circuits.
A090: 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.
F091: 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.
F099: Invalid Curr. Offset	Current measurement circuit has a non-standard value for zero current.	■ Failure on the inverter internal circuits.
F104: A/D Converter Fault	Fault in the A/D converter reading that measures the inverter currents and voltages.	■ Failure on the inverter internal circuits. ■ Electromagnetic interference above the level the inverter withstands.
A110: High Motor Temperature	Alarm related to PTC temperature sensor installed on the motor. Note: ■ The alarm can be disabled by setting C7.5.2. ■ It is necessary to program analog input and output for the PTC function.	■ Load on the motor shaft is too high. ■ Very high load cycle (large number of starts and stops per minute). ■ High ambient temperature around the motor. ■ Poor contact or short circuit (resistance < 60 Ω) on the wiring connected to the motor thermistor. ■ Motor thermistor not installed. ■ Locked motor shaft.

FAULTS AND ALARMS

Fault/Alarm	Description	Possible Causes
A128: Serial Communication Timeout	It indicates that the CFW900 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 the network installation for broken cables, faults, poor contact in the network connections and grounding.
A129: Anybus Module Offline	Alarm that indicates interruption in the Anybus communication.	■ PLC entered the idle state. ■ Programming error. Number of I/O words set on the slave differs from the setting on the master. ■ Loss of communication with the master (broken cable, disconnected connector, etc.).
A130: Anybus Module access error	Alarm that indicates error of access to the Anybus communication module.	■ Anybus module defective, not recognized or incorrectly installed.
A133: 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 whether there is voltage within the permitted range between pins 1 and 5 of the CAN interface connector.	■ CAN interface without power supply between pins1 and 5 of the connector. ■ Power cables mixed up or reversed. ■ Poor contact on the CAN interface cable or connector.
A134: 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 on the CAN circuit transmission cable. ■ 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. ■ Incorrect installation of the CAN network.
A135: CANopen Offline	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 configured time. ■ Communication problems caused by lost telegrams or transmission delays.
A136: 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 mode 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.
A137: 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.
A145: 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.
A147: 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 network installation, broken cable or failed/poor contact on the network connections.
A149: 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.
F150: 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/or C3.3.2.1.3. ■ Crane-type load trips.

Fault/Alarm	Description	Possible Causes
A152: Power Circ. Overtemp.	High temperature in the power circuits. Note: ■ The alarm can be disabled by setting C7.5.1.	■ High ambient temperature around the inverter (>50 °C) and high output current. ■ Defective internal fan (if present).
F153: Power Circ. Overtemp.	Overtemperature in the power circuits.	■ High ambient temperature around the inverter (>50 °C) and high output current. ■ Defective internal fan (if present).
A154: Cont. Circ. Overtemp.	High temperature in the control circuits. Note: ■ The alarm can be disabled by setting C7.5.1.	■ High ambient temperature around the inverter (>50 °C) and high output current. ■ Blocked or defective fan. ■ Inverter heatsink dirty.
F155: Cont. Circ. Overtemp.	Overtemperature in the control circuits.	■ High ambient temperature around the inverter (>50 °C) and high output current. ■ Blocked or defective fan. ■ Inverter heatsink too dirty.
A156: Inverter Undertemperature	Temperature measured at one of the inverter sensors below -15 °C. Note: ■ The alarm can be disabled by setting C7.5.1.	■ Ambient temperature around the inverter $\leq$ -15 °C.
F157: Inverter Undertemperature	Temperature measured at one of the inverter sensors below -20 °C.	■ Ambient temperature around the inverter $\leq$ -20 °C.
F158: Corrupted Settings	Inverter settings are invalid. Note: ■ Restore the factory default through parameter C12.1. If the problem persists, contact WEG's technical support or representative.	■ Parameter settings file cannot be restored correctly.
F160: STO90 Fault	It indicates to the user that STO90 is in a fault state.	■ Incorrect installation of the safety inputs circuit (STO1 and STO2). ■ Actuation time between the safety inputs (STO1 and STO2) greater than 1 s. ■ Incorrect setting of the safety input type (dry contact or OSSD) on DIP switches S1. ■ DIP switches S2 activated in a state other than the STO state. ■ Incorrect programming of the safety function or programming timeout (2 min). ■ Damage in the electronic circuit of STO90.
F161: STO90 Offline	It indicates to the user that CFW900 central control has lost communication with STO90.	■ Poor contact between STO90 and CFW900 central control. ■ Damage in the electronic circuit of STO90 or CFW900 central control.
A164: DC Link Limitation	Indicates that the inverter has been under DC voltage limitation for a time longer than that specified in C7.14.2. Note: ■ If the application operates with the inverter in limitation, this alarm can be disabled by C7.14.1.	■ Parameter settings in menu C3.5 not suitable for the application. ■ Supply voltage set to C1.1.2 lower than the effective voltage that powers the inverter. ■ Very short deceleration ramp. ■ Motor being dragged by the load.
F165: DC Link Limitation	Indicates that the inverter has been under DC voltage limitation for a time longer than that specified in C7.14.2. Note: ■ If the application operates with the inverter under limitation, this protection can be disabled through C7.14.1.	■ Parameter settings in menu C3.5 not suitable for the application. ■ Supply voltage set to C1.1.2 lower than the effective voltage that powers the inverter. ■ Very short deceleration ramp. ■ Motor being dragged by the load.
A166: Current Limitation	Indicates that the inverter has been under current limitation for a time longer than that specified in C7.14.2. Note: ■ If the application operates with the inverter in limitation, this alarm can be disabled by C7.14.1.	■ Parameter settings in menu C3.4 not suitable for the application. ■ Very short acceleration and deceleration ramps. ■ Motor overload.
F167: Current Limitation	Indicates that the inverter has been under current limitation for a time longer than that specified in C7.14.2. Note: ■ If the application operates with the inverter under limitation, this protection can be disabled through C7.14.1.	■ Parameter settings in menu C3.4 not suitable for the application. ■ Very short acceleration and deceleration ramps. ■ Motor overload.

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Fault/Alarm	Description	Possible Causes
A168: Torque Limitation	Indicates that the inverter has been under torque limitation for a time longer than that specified in C7.14.2. Note: ■ If the application operates with the inverter in limitation, this alarm can be disabled by C7.14.1.	■ Parameter settings in menu C3.3.5.1 not suitable for the application. ■ Motor being dragged by the load. ■ Motor overload.
F169: Torque Limitation	Indicates that the inverter has been under torque limitation for a time longer than that specified in C7.14.2. Note: ■ If the application operates with the inverter under limitation, this protection can be disabled through C7.14.1.	■ Parameter settings in menu C3.3.5.1 not suitable for the application. ■ Motor being dragged by the load. ■ Motor overload.
F171: Pow. Fan 1 Speed	Speed reading fault for fan 1 of the heat sink (measured value outside the expected value).	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
F172: Pow. Fan 2 Speed	Speed reading fault for fan 2 of the heat sink (measured value outside the expected value).	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
F173: Pow. Fan 3 Speed	Speed reading fault for fan 3 of the heat sink (measured value outside the expected value).	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
F174: Pow. Fan 4 Speed	Speed reading fault for fan 4 of the heat sink (measured value outside the expected value).	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
F175: Int. Fan 1 Speed	Speed reading fault for internal fan 1 (measured value outside the expected value).	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
F176: Int. Fan 2 Speed	Speed reading fault for internal fan 2 (measured value outside the expected value).	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
A177: Power Fan Replacement	Alarm to replace the heatsink fan. Note: ■ It is recommended to replace the fan and reset the counter in D3.3 through parameter C1.6.2.	■ 95% of the maximum hours of the heatsink fan operation has been exceeded.
F185: Pre-charge Fault	Pre-charge circuit fault.	■ Defective pre-charge contactor. ■ Open command fuse. ■ Phase loss at input L1/R or L2/S.
A186: Pow. Fan 1 Speed	Heat sink fan low speed.	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
A187: Pow. Fan 2 Speed	Heat sink fan low speed.	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
A188: Pow. Fan 3 Speed	Heat sink fan low speed.	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
A189: Pow. Fan 4 Speed	Heat sink fan low speed.	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
A190: Int. Fan 1 Speed	Internal fan low speed.	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
A191: Int. Fan 2 Speed	Internal fan low speed.	■ Dirt on the fan blades and bearings. ■ Defective fan. ■ Defective fan power supply connection.
F228: Serial Communication Timeout	It indicates that the CFW900 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 the network installation for broken cables, faults, poor contact in the network connections and grounding.
F229: Anybus Module Offline	Fault that indicates interruption in the Anybus communication.	■ PLC entered the idle state. ■ Programming error. Number of I/O words set on the slave differs from the setting on the master. ■ Loss of communication with the master (broken cable, disconnected connector, etc.).

Fault/Alarm	Description	Possible Causes
F230: Anybus Module access error	Fault that indicates error of access to the Anybus communication module.	Anybus module defective, not recognized or incorrectly installed.
F233: 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 whether there is voltage within the permitted 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.
F234: 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 on the CAN circuit transmission cable. - 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. - Incorrect installation of the CAN network.
F235: CANopen Offline	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 configured time. - Communication problems caused by lost telegrams or transmission delays.
F236: 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 mode 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.
F237: 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.
F247: 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 network installation, broken cable or failed/poor contact on the network connections.
F249: 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.
A430: 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.
F431: 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 specific time (A2.3.6.3) with the value lower than the value set in A2.3.6.2.
A432: 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.
F433: 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 specific time (A2.3.6.6) with the value higher than the value set in A2.3.6.5.
F600: Pulse Update Fault	Update of PWM pulses failed.	Failure on the inverter internal circuits.
F605: Power Circuit Off	Communication with the power module was interrupted while the output was enabled.	- Power board turned off while the output was enabled. - Failure on the inverter internal circuits.
F606: Power Monitor Comm Lost	Interface module is unable to exchange information with the power monitoring module.	- Failure on the inverter internal circuits. - Electromagnetic interference above the level the inverter withstands. - Power board turned off.

FAULTS AND ALARMS

Fault/Alarm	Description	Possible Causes
F607: SMM Comm Lost	Interface module is unable to exchange information with the safety module.	■ Failure on the inverter internal circuits. ■ Electromagnetic interference above the level the inverter withstands. ■ Safety interface board turned off.
F608: Code Flow Failure	Internal fault during inverter operation. Note: ■ Reset the inverter. ■ Load the factory default.	■ If the problem persists, please contact technical support. You may be asked to read the parameters present in menu D4.1.12 to aid in the diagnosis of this Fault.
F609: Model Version Incompatible	Inverter model data is incompatible with actual firmware. Note: ■ Contact technical support to obtain the model update.	■ Model data incompatible with firmware version.
A702: Inverter Disabled	It indicates that the General Enable command is Inactive.	■ Run/Stop command of the SoftPLC application equal to Run, or the movement block was enabled with the "General Enable" command disabled.
A706: SPLC Refer. Not Progr.	It 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).
A708: SoftPLC Not Running	It 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.
F709: SoftPLC Not Running	It 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.
F1000: Error During Accessory Update	Error during accessory firmware update.	■ Inverter firmware version does not support the accessory. ■ Accessory disconnected or communication lost during firmware update.
A1012: 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 in the connection of the signal to the terminals.
F1013: 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 in the connection of the signal to the terminals.
A1014: 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 in the connection of the signal to the terminals.
F1015: 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 in the connection of the signal to the terminals.
F1101: 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.
F1102: Slot A Required Accessory	The type of accessory that should be connected to the slot does not match the connected accessory.	■ Incorrect accessory connected to the slot. ■ Parameter C1.7.1.1 incorrectly set.
F1103: 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.
A1104: Slot A High Temperature	High temperature in the accessory.	■ Temperature around the inverter close to 60 °C.
F1105: Slot A Overtemperature	Accessory overtemperature.	■ Temperature around the inverter above 60 °C.
A1106: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1107: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.

Fault/Alarm	Description	Possible Causes
A1108: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1109: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1110: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1111: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1112: 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 in the connection of the signal to the terminals.
F1113: 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 in the connection of the signal to the terminals.
A1114: 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 in the connection of the signal to the terminals.
F1115: 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 in the connection of the signal to the terminals.
A1116: 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 in the connection of the signal to the terminals.
F1117: 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 in the connection of the signal to the terminals.
F1125: 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 CFW900-TEMP-01 accessory guide. ■ “Sensor Type” parameter incorrectly configured. Check the description in C5.2.6.1.
A1126: 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.
F1127: 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.
A1128: High Temperature on Slot A Sensor 1	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1129: Slot A Sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1130: 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.
F1131: 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.

FAULTS AND ALARMS

Fault/Alarm	Description	Possible Causes
A1132: High Temperature on Slot A Sensor 2	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1133: Slot A Sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1134: 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.
F1135: 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.
A1136: High Temperature on Slot A Sensor 3	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1137: Slot A Sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1138: 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.
F1139: 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.
A1140: High Temperature on Slot A Sensor 4	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1141: Slot A Sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1142: 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.
F1143: 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.
A1144: High Temperature on Slot A Sensor 5	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1145: Slot A Sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1146: 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.
F1147: 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.
A1148: High Temperature on Slot A Sensor 6	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1149: Slot A Sensor 6 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
F1201: 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.
F1202: Slot B Required Accessory	The type of accessory that should be connected to the slot does not match the connected accessory.	■ Incorrect accessory connected to the slot. ■ Parameter C1.7.2.1 incorrectly set.

Fault/Alarm	Description	Possible Causes
F1203: 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.
A1204: Slot B High Temperature	High temperature in the accessory.	■ Temperature around the inverter close to 60 °C.
F1205: Slot B Overtemperature	Accessory overtemperature.	■ Temperature around the inverter above 60 °C.
A1206: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1207: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1208: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1209: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1210: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1211: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1212: 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 in the connection of the signal to the terminals.
F1213: 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 in the connection of the signal to the terminals.
A1214: 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 in the connection of the signal to the terminals.
F1215: 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 in the connection of the signal to the terminals.
A1216: 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 in the connection of the signal to the terminals.
F1217: 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 in the connection of the signal to the terminals.
F1225: 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 CFW900-TEMP-01 accessory guide. ■ “Sensor Type” parameter incorrectly configured. Check the description in C5.2.6.1.
A1226: 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.

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Fault/Alarm	Description	Possible Causes
F1227: 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.
A1228: High Temperature on Slot B Sensor 1	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1229: Slot B Sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1230: 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.
F1231: 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.
A1232: High Temperature on Slot B Sensor 2	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1233: Slot B Sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1234: 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.
F1235: 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.
A1236: High Temperature on Slot B Sensor 3	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1237: Slot B Sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1238: 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.
F1239: 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.
A1240: High Temperature on Slot B Sensor 4	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1241: Slot B Sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1242: 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.
F1243: 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.
A1244: High Temperature on Slot B Sensor 5	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1245: Slot B Sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1246: 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
F1247: 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.
A1248: High Temperature on Slot B Sensor 6	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1249: Slot B Sensor 6 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
F1301: 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.
F1302: Slot C Required Accessory	The type of accessory that should be connected to the slot does not match the connected accessory.	■ Incorrect accessory connected to the slot. ■ Parameter C1.7.3.1 incorrectly set.
F1303: 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.
A1304: Slot C High Temperature	High temperature in the accessory.	■ Temperature around the inverter close to 60 °C.
F1305: Slot C Overtemperature	Accessory overtemperature.	■ Temperature around the inverter above 60 °C.
A1306: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1307: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1308: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1309: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1310: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1311: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1312: 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 in the connection of the signal to the terminals.
F1313: 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 in the connection of the signal to the terminals.
A1314: 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 in the connection of the signal to the terminals.
F1315: 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 in the connection of the signal to the terminals.

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Fault/Alarm	Description	Possible Causes
A1316: 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 in the connection of the signal to the terminals.
F1317: 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 in the connection of the signal to the terminals.
F1325: 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 CFW900-TEMP-01 accessory guide. ■ "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A1326: 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.
F1327: 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.
A1328: High Temperature on Slot C Sensor 1	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1329: Slot C Sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1330: 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.
F1331: 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.
A1332: High Temperature on Slot C Sensor 2	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1333: Slot C Sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1334: 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.
F1335: 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.
A1336: High Temperature on Slot C Sensor 3	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1337: Slot C Sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1338: 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.
F1339: 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.
A1340: High Temperature on Slot C Sensor 4	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1341: Slot C Sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.

Fault/Alarm	Description	Possible Causes
A1342: 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.
F1343: 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.
A1344: High Temperature on Slot C Sensor 5	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1345: Slot C Sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1346: 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.
F1347: 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.
A1348: High Temperature on Slot C Sensor 6	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1349: Slot C Sensor 6 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
F1401: 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.
F1402: Slot D Required Accessory	The type of accessory that should be connected to the slot does not match the connected accessory.	■ Incorrect accessory connected to the slot. ■ Parameter C1.7.4.1 incorrectly set.
F1403: 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.
A1404: Slot D High Temperature	High temperature in the accessory.	■ Temperature around the inverter close to 60 °C.
F1405: Slot D Overtemperature	Accessory overtemperature.	■ Temperature around the inverter above 60 °C.
A1406: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1407: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1408: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1409: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1410: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.

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Fault/Alarm	Description	Possible Causes
F1411: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1412: 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 in the connection of the signal to the terminals.
F1413: 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 in the connection of the signal to the terminals.
A1414: 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 in the connection of the signal to the terminals.
F1415: 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 in the connection of the signal to the terminals.
A1416: 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 in the connection of the signal to the terminals.
F1417: 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 in the connection of the signal to the terminals.
F1425: 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 CFW900-TEMP-01 accessory guide. ■ “Sensor Type” parameter incorrectly configured. Check the description in C5.2.6.1.
A1426: 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.
F1427: 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.
A1428: High Temperature on Slot D Sensor 1	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1429: Slot D Sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1430: 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.
F1431: 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.
A1432: High Temperature on Slot D Sensor 2	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1433: Slot D Sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1434: 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.
F1435: 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.

Fault/Alarm	Description	Possible Causes
A1436: High Temperature on Slot D Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Equipment monitored at high temperature. - Configuration error of the alarm actuation level.
F1437: Slot D Sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Equipment monitored at high temperature. - Configuration error of the fault tripping level.
A1438: 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.
F1439: 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.
A1440: High Temperature on Slot D Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Equipment monitored at high temperature. - Configuration error of the alarm actuation level.
F1441: Slot D Sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Equipment monitored at high temperature. - Configuration error of the fault tripping level.
A1442: 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.
F1443: 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.
A1444: High Temperature on Slot D Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Equipment monitored at high temperature. - Configuration error of the alarm actuation level.
F1445: Slot D Sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Equipment monitored at high temperature. - Configuration error of the fault tripping level.
A1446: 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.
F1447: 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.
A1448: High Temperature on Slot D Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Equipment monitored at high temperature. - Configuration error of the alarm actuation level.
F1449: Slot D Sensor 6 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Equipment monitored at high temperature. - Configuration error of the fault tripping level.
F1501: 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.
F1502: Slot E Required Accessory	The type of accessory that should be connected to the slot does not match the connected accessory.	- Incorrect accessory connected to the slot. - Parameter C1.7.5.1 incorrectly set.
F1503: 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.
A1504: Slot E High Temperature	High temperature in the accessory.	Temperature around the inverter close to 60 °C.
F1505: Slot E Overtemperature	Accessory overtemperature.	Temperature around the inverter above 60 °C.
A1506: 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.	- Signal cable broken or disconnected. - Encoder connection error. - Encoder without power supply.

FAULTS AND ALARMS

Fault/Alarm	Description	Possible Causes
F1507: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1508: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1509: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1510: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1511: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1512: 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 in the connection of the signal to the terminals.
F1513: 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 in the connection of the signal to the terminals.
A1514: 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 in the connection of the signal to the terminals.
F1515: 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 in the connection of the signal to the terminals.
A1516: 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 in the connection of the signal to the terminals.
F1517: 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 in the connection of the signal to the terminals.
F1525: 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 CFW900-TEMP-01 accessory guide. ■ “Sensor Type” parameter incorrectly configured. Check the description in C5.2.6.1.
A1526: 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.
F1527: 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.
A1528: High Temperature on Slot E Sensor 1	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1529: Slot E Sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1530: 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.

Fault/Alarm	Description	Possible Causes
F1531: 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.
A1532: High Temperature on Slot E Sensor 2	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1533: Slot E Sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1534: 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.
F1535: 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.
A1536: High Temperature on Slot E Sensor 3	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1537: Slot E Sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1538: 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.
F1539: 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.
A1540: High Temperature on Slot E Sensor 4	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1541: Slot E Sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1542: 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.
F1543: 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.
A1544: High Temperature on Slot E Sensor 5	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1545: Slot E Sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1546: 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.
F1547: 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.
A1548: High Temperature on Slot E Sensor 6	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1549: Slot E Sensor 6 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
F1601: 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.

FAULTS AND ALARMS

Fault/Alarm	Description	Possible Causes
F1602: Slot F Required Accessory	The type of accessory that should be connected to the slot does not match the connected accessory.	- Incorrect accessory connected to the slot. - Parameter C1.7.6.1 incorrectly set.
F1603: 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.
A1604: Slot F High Temperature	High temperature in the accessory.	Temperature around the inverter close to 60 °C.
F1605: Slot F Overtemperature	Accessory overtemperature.	Temperature around the inverter above 60 °C.
A1606: 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.	- Signal cable broken or disconnected. - Encoder connection error. - Encoder without power supply.
F1607: 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.	- Signal cable broken or disconnected. - Encoder connection error. - Encoder without power supply.
A1608: 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.	- Signal cable broken or disconnected. - Encoder connection error. - Encoder without power supply.
F1609: 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.	- Signal cable broken or disconnected. - Encoder connection error. - Encoder without power supply.
A1610: 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.	- Signal cable broken or disconnected. - Encoder connection error. - Encoder without power supply.
F1611: 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.	- Signal cable broken or disconnected. - Encoder connection error. - Encoder without power supply.
A1612: 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 in the connection of the signal to the terminals.
F1613: 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 in the connection of the signal to the terminals.
A1614: 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 in the connection of the signal to the terminals.
F1615: 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 in the connection of the signal to the terminals.
A1616: 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 in the connection of the signal to the terminals.
F1617: 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 in the connection of the signal to the terminals.
F1625: 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 CFW900-TEMP-01 accessory guide. “Sensor Type” parameter incorrectly configured. Check the description in C5.2.6.1.

Fault/Alarm	Description	Possible Causes
A1626: 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.
F1627: 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.
A1628: High Temperature on Slot F Sensor 1	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1629: Slot F Sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1630: 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.
F1631: 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.
A1632: High Temperature on Slot F Sensor 2	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1633: Slot F Sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1634: 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.
F1635: 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.
A1636: High Temperature on Slot F Sensor 3	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1637: Slot F Sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1638: 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.
F1639: 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.
A1640: High Temperature on Slot F Sensor 4	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1641: Slot F Sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1642: 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.
F1643: 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.
A1644: High Temperature on Slot F Sensor 5	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1645: Slot F Sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.

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Fault/Alarm	Description	Possible Causes
A1646: 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.
F1647: 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.
A1648: High Temperature on Slot F Sensor 6	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1649: Slot F Sensor 6 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
F1701: 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.
F1702: Slot G Required Accessory	The type of accessory that should be connected to the slot does not match the connected accessory.	■ Incorrect accessory connected to the slot. ■ Parameter C1.7.7.1 incorrectly set.
F1703: 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.
A1704: Slot G High Temperature	High temperature in the accessory.	■ Temperature around the inverter close to 60 °C.
F1705: Slot G Overtemperature	Accessory overtemperature.	■ Temperature around the inverter above 60 °C.
A1706: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1707: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1708: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1709: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1710: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
F1711: 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.	■ Signal cable broken or disconnected. ■ Encoder connection error. ■ Encoder without power supply.
A1712: 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 in the connection of the signal to the terminals.
F1713: 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 in the connection of the signal to the terminals.
A1714: 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 in the connection of the signal to the terminals.

Fault/Alarm	Description	Possible Causes
F1715: 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 in the connection of the signal to the terminals.
A1716: 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 in the connection of the signal to the terminals.
F1717: 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 in the connection of the signal to the terminals.
F1725: 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 CFW900-TEMP-01 accessory guide. "Sensor Type" parameter incorrectly configured. Check the description in C5.2.6.1.
A1726: 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.
F1727: 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.
A1728: High Temperature on Slot G Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Equipment monitored at high temperature. - Configuration error of the alarm actuation level.
F1729: Slot G Sensor 1 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Equipment monitored at high temperature. - Configuration error of the fault tripping level.
A1730: 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.
F1731: 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.
A1732: High Temperature on Slot G Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Equipment monitored at high temperature. - Configuration error of the alarm actuation level.
F1733: Slot G Sensor 2 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Equipment monitored at high temperature. - Configuration error of the fault tripping level.
A1734: 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.
F1735: 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.
A1736: High Temperature on Slot G Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Equipment monitored at high temperature. - Configuration error of the alarm actuation level.
F1737: Slot G Sensor 3 Overtemperature	The temperature measured by the sensor is above the threshold level.	- Equipment monitored at high temperature. - Configuration error of the fault tripping level.
A1738: 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.
F1739: 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.
A1740: High Temperature on Slot G Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Equipment monitored at high temperature. - Configuration error of the alarm actuation level.

FAULTS AND ALARMS

Fault/Alarm	Description	Possible Causes
F1741: Slot G Sensor 4 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1742: 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.
F1743: 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.
A1744: High Temperature on Slot G Sensor 5	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1745: Slot G Sensor 5 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1746: 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.
F1747: 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.
A1748: High Temperature on Slot G Sensor 6	The temperature measured by the sensor is close to the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the alarm actuation level.
F1749: Slot G Sensor 6 Overtemperature	The temperature measured by the sensor is above the threshold level.	■ Equipment monitored at high temperature. ■ Configuration error of the fault tripping level.
A1763: Maximum inverter frequency reached	Maximum inverter output frequency alarm has been reached. Vector control will have a performance loss when operated at a frequency of 599.0 Hz.	■ The maximum output frequency of the inverter is 599 Hz. ■ Contact WEG for operation above 599 Hz.
F1764: Maximum inverter frequency reached	The inverter maximum output frequency has been reached. Fault F1764 occurs 5 seconds after the electrical frequency exceeds the value of 599 Hz.	■ The maximum output frequency of the inverter is 599 Hz. ■ Contact WEG for operation above 599 Hz.

3 SAFETY INSTRUCTIONS

This manual contains the information necessary for setting the CFW900 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 CFW900 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 CFW900 frequency inverter user manual before installing or operating the CFW900.

SAFETY INSTRUCTIONS



NOTE!

For the purposes of this manual, qualified personnel are those trained and able to:

1. Install, ground, energize and operate the CFW900 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 CFW900 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 CFW900 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 CFW900 frequency inverter. It must be used together with the CFW900 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 CFW900 application possibilities. The manufacturer cannot assume any responsibility for the use of the CFW900 not based in this manual.



NOTE!

The text is intended to provide additional information in order to facilitate the use and programming of CFW900 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: $1.1 \times I_{nom-ND} / 1 \text{ minute}$.

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: $1.5 \times I_{nom-HD} / 1 \text{ minute}$.

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.

DC Link: Intermediate circuit of the inverter. Direct current voltage obtained by the rectification of the alternating supply voltage or through an external source. It supplies the output inverter bridge with IGBTs.

U, V and W Leg: Set of two IGBTs of the inverter output phases U, V, and W.

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.

Braking IGBT: It operates as a switch to activate the braking resistors. It is controlled by the DC Link voltage level.

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 (● = Run and ● = 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.

ABOUT THE MANUAL

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 THE CFW900

The CFW900 frequency inverter is a high performance product that allows controlling the speed and torque of low voltage three-phase motors. The main features of this product are the onboard technology, which flexibly allows for different types of applications, and its connectivity.

Functionalities:

- Scalar, VVW+, Sensorless Vector and Vector with Encoder controls for induction motors.
- VVW+, Sensorless Vector and Encoder Vector controls for permanent magnet synchronous motors (IPSM).
- VVW+ and Sensorless Vector controls for permanent magnet synchronous motors (SPSM) and reluctance synchronous motors assisted by magnets (HSRM).
- Built-in Ethernet and RS485 communication interfaces. Other communication interfaces available through accessories.
- Advanced Energy Saving Function that reduces motor losses and improves the system performance.
- Thermal Management function acts on the inverter to protect the integrity of the equipment and its functionalities.
- Specific PWM Modulation function for use with long cables from the inverter output to the motor.
- DC Braking function optimizes the inverter stop. It can also be used as a motor pre-warm-up function in specific cases.
- Dynamic Braking function, and Optimal Braking for vector control. Optimal Braking allows controlled motor braking, eliminating the braking resistor in some applications.
- Flying Start function allows starting the motor that is in free rotation, accelerating it from the rotation at which it is.
- Ride-Through function makes allows recovering the inverter without locking due to undervoltage, when there is a drop in the power supply for a short period of time.
- Oriented Startup function (Wizard) groups and allows setting the main parameters for the inverter operation.
- Self-tuning function (Wizard) for vector control automatically sets the control regulators based on the identification of the motor parameters and the load used.
- PID controller available on the Application menu with the possibility of using the Sleep Mode to save energy when the motor is not required to be working on the process variable.

Navigation through the CFW900 HMI is intuitive, allowing the user to set the inverter easily. The navigation groups are: Status, Diagnostics, Settings, Wizards and Application. From these groups, you can access the product identification, measurements taken (voltages, currents, temperatures etc.), fault and alarm diagnostics (present fault/alarm, time control etc.), inverter settings (supply voltage, motor data, control used, commands and references etc.) and assistance and application functions.

6 SOFTWARE VERSIONS

The software versions define the functions and programming of the CFW900 inverter. All software versions installed on the product are available for viewing. The set of all software applications is called a package. The package, as per (S1.2.1), identifies the set of software versions of all microcontrollers in the product, and they 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).

Software versions are in the format 00.00.00 and follow the evolution rules below:

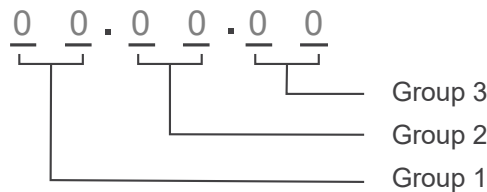


Figure 6.1: Software Version Format

- Group 1: The first two digits are updated when it is necessary to define an important change, such as a change in the inverter hardware that causes some incompatibility with the software.
- Group 2: The middle two digits are updated when the software is updated with new resources, such as a new function or a new parameter.
- Group 3: The last two digits are updated when the software is updated with *bug fixes*, such as corrections to a specific resource or errors in the inverter behavior in general.

7 HMI

Through the graphic HMI available on the product, it is possible to view and program the CFW900 frequency inverter. Navigation is done via keys with access to all data through groups (Menus).



Figure 7.1: HMI Keys



USB connector for communication with PC.



“Esc”: Cancel programming or go back to menu.



“Help”: Show help text for the marked content.



Increment and decrement values and navigate through the menus.



Change between screens. Move selection to edit values and navigate menus.



Enter: Save changes and access menus.



Control of the motor direction of rotation if programmed for HMI.



Selects LOCAL or REMOTE control if programmed for HMI.



Run JOG if programmed for HMI.



Stop motor if programmed for HMI or fault reset.



Run motor if programmed for HMI.

**NOTE!**

The key  when pressed allows you to switch between Local (HMI) control mode and the mode defined according to the configuration made in C4.1.1 (Remote 1 or Remote 2). When the command mode selected is Local, all commands and references will be made via HMI.

8 USE OF THE HMI

All HMI navigation is based on and structured in levels of menus and submenus, where read and write variables are present.

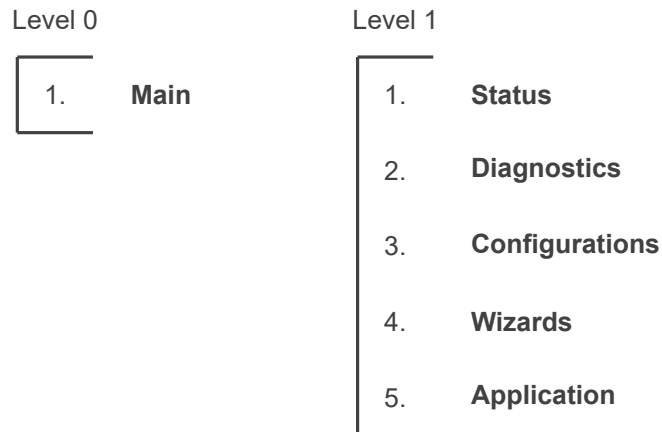


Figure 8.1: HMI Screens and Menus

Level 0:

Main screen, HMI location where it is possible to choose the reading variables (**status**) you want to view.

Level 1:

The main variable access menus are divided into reading variables (**Status** and **Diagnostics**), and writing or programming variables (**Settings**, **Wizards** and **Application**).



NOTE!

Status parameters cannot be changed directly via HMI. Some of these parameters can represent the value of a variable that can be changed via communication network.

8.1 MAIN SCREEN - LEVEL 0

When the CFW900 is powered up, it is possible to see on the HMI **Main** screen some reading variables (**Status**).

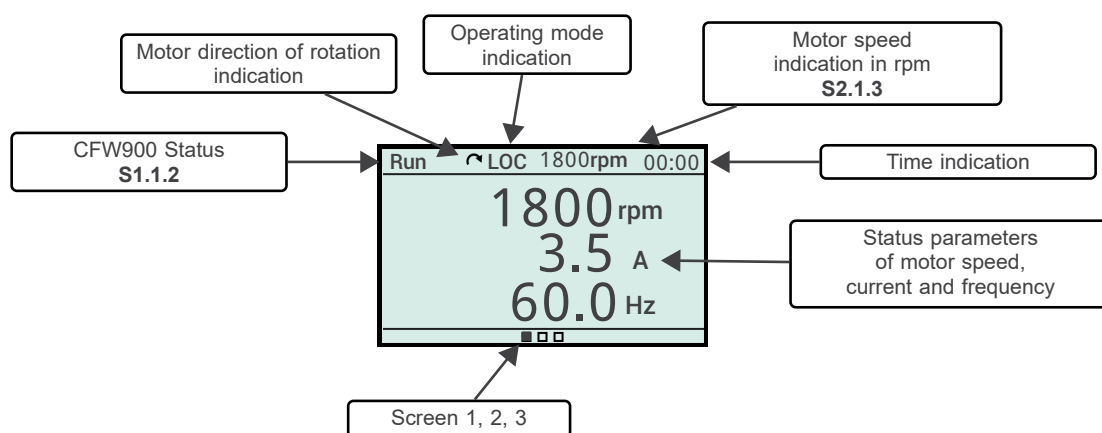


Figure 8.2: Main screen data

There are three main screens which can be configured to show up to nine variables on each screen. To customize these screens, see [Section 8.6 MAIN SCREENS SETTINGS on page 8-5](#) in this chapter.

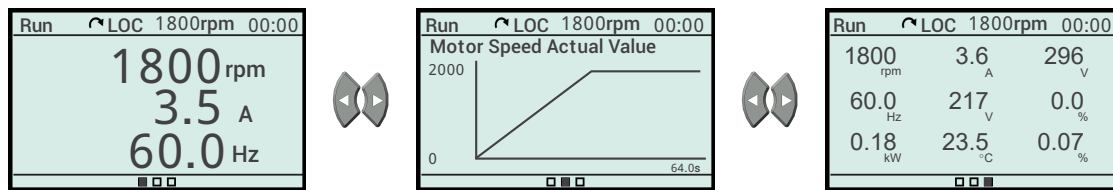


Figure 8.3: Default main screens

Additionally, keys  allow setting the parameter configured in C11.1.6. By default, these keys set the value of C4.3.1.3.1.

To access the menus, press the "Enter" key.

8.2 MENU ACCESS MODE - MENU LEVELS

Pressing the "Enter" key on the main screen gives access to the menus and allows navigating between the groups and subgroups for accessing the variables.

Each variable has its own coding that makes it possible to find its location and identification in the menu structure (see [Chapter 1 Parameter structure on page 1-1](#)). Digits are separated by a dot.

For example:

C2.1.4 = Motor rated voltage value.

C2.1.4 = Configurations → Motor → Motor Data → Rated Voltage

Level 1	Level 2	Level 3	Level 4	Edition
C	C2	C2.1	C2.1.4	
Configurations	Motor	Motor Data	Rated Voltage	440 V

8.2.1 Reading Variables - Status and Diagnostics Menus

All reading variables for the HMI are available in two main menus: **Status** and **Diagnostics**.

Status Menu: It has reading variables with updated values: current, voltage and others. For more details, see [Chapter 9 S STATUS on page 9-1](#).



Figure 8.4: Estimated motor torque reading

Diagnostics Menu: It has reading variables with values saved as a result of events: actuation of faults, alarms, start and others. For more details, see [Chapter 10 D DIAGNOSTICS on page 10-1](#).

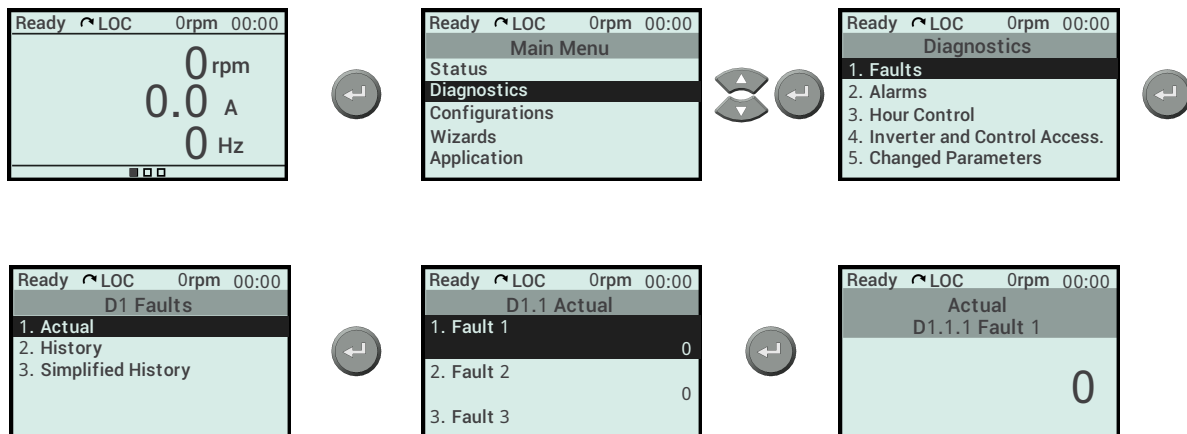


Figure 8.5: Reading of active faults

8.2.2 Writing Variables - Configurations Menu

All programming or configuration of the CFW900 is carried out through this menu, which is divided into programming submenus, groups or subgroups.

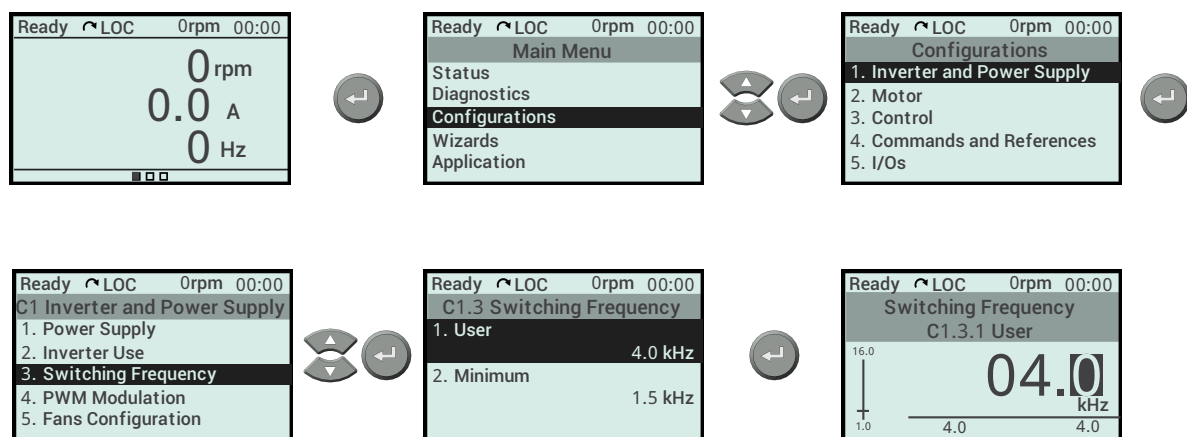


Figure 8.6: Switching frequency configuration

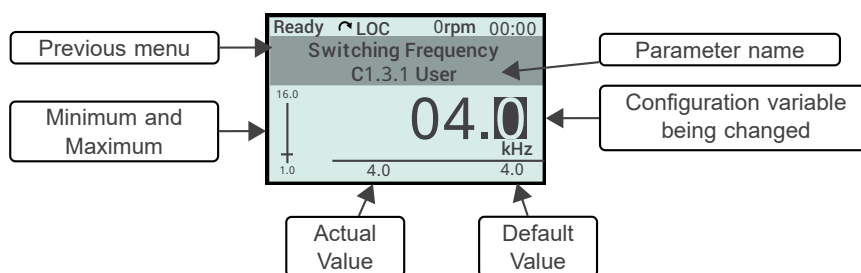


Figure 8.7: Configuration screen data

8.2.3 Writing Variables - Wizards Menu

In the **Wizards** menu, some of the most used programs are available sequentially to simplify the CFW900 commissioning. For more details, see [Chapter 12 W WIZARDS on page 12-1](#).

8.3 HELP KEY

Help key

USE OF THE HMI

The help key helps the user obtain information about the selected text. This key can be used at any time while navigating the menus, parameters or main screens. For example, if the selected text is a parameter, when the help key is pressed, a text about this parameter will be displayed; if it is pressed on a main screen, the coding of the parameters on this screen will be displayed.

The figures below show some examples of help key use.

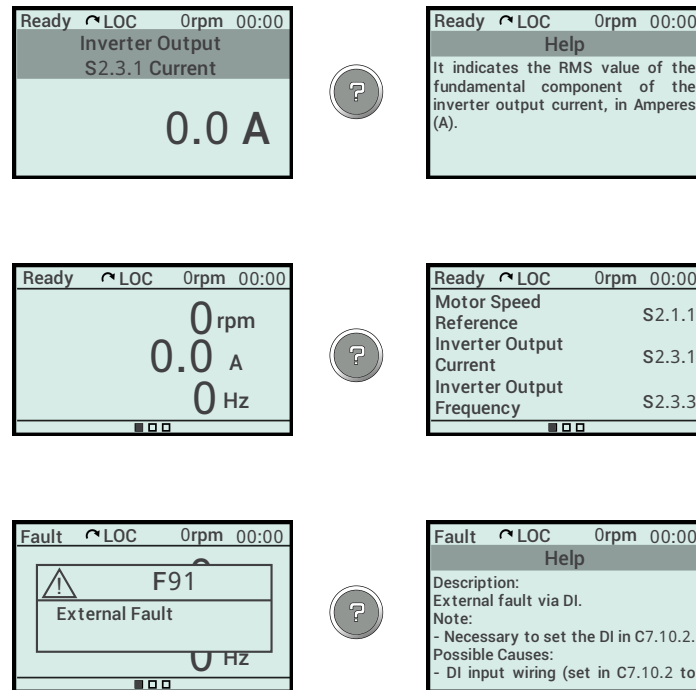


Figure 8.8: Example of the use of the help key

8.4 DATE AND TIME SETTING

The date and time setting must be started from the settings menu, as illustrated below.



Figure 8.9: Date and time setting

8.5 ACCESS CONTROL

It is possible to lock parameter setting via HMI through the login function. The lock is activated when logging in for a user who does not have permission to set parameters, such as the operator. To unlock, simply log in to a user who has permission, such as the administrator. User setting must be started from the settings menu, as illustrated below.

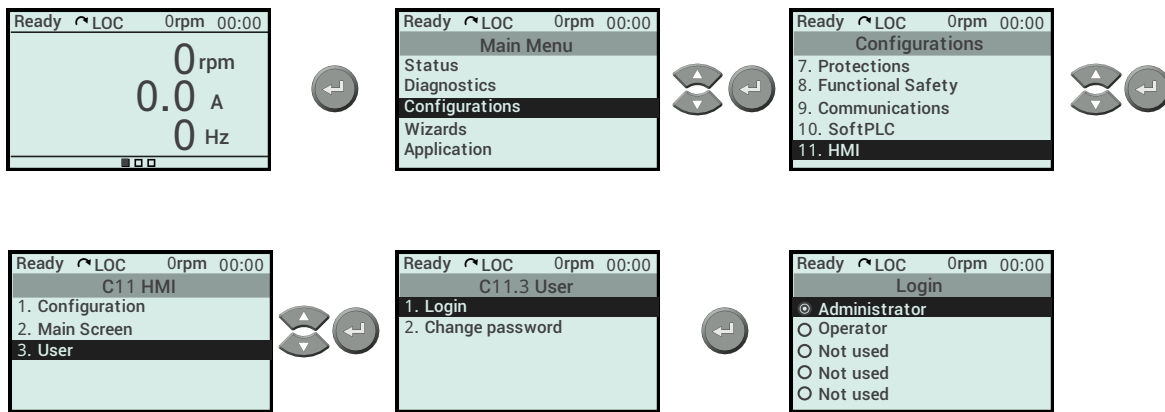


Figure 8.10: Access to the login screen

It is possible to enter a password for a certain user, except for operators. This aims at increasing the security of the configured parameters. Password setting must be started from the settings menu as illustrated below.

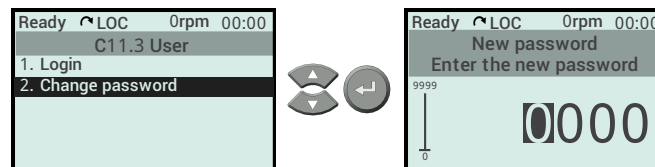


Figure 8.11: Password setting

When the active user has a saved password, the sleep function is activated. When no HMI command is detected for more than 15 minutes, the function logs out. Logout also occurs when the inverter is turned off with a user whose password has been saved. In order to be able to change parameters again, it is necessary to login by entering the saved password.

To disable a user's password, you must set the new password to zero. When this is executed, any login attempt for this user will succeed.



NOTE!

Performing factory default causes all saved passwords to be reset.

8.6 MAIN SCREENS SETTINGS

Customizing the main screens allows you to define what will be shown when the CFW900 is powered up. Three main screens are available for easy access. Each of the screens can be configured between three display modes.

8.6.1 Display Modes

- **Line:** It is possible to display a reading variable in the format **text, value or bar**. Figure 8.12 on page 8-5 presents an example with the 3 formats.

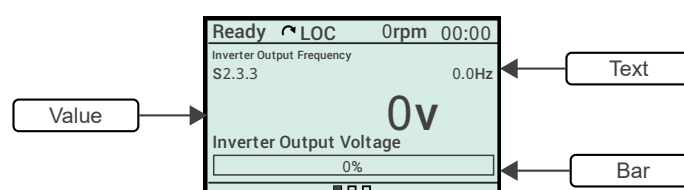


Figure 8.12: Line view

USE OF THE HMI

- **Full screen:** It covers an entire main screen and allows the display of reading variables in the format **text**, **bar** or **graph**. Figure 8.13 on page 8-6 presents an example with the 3 formats.

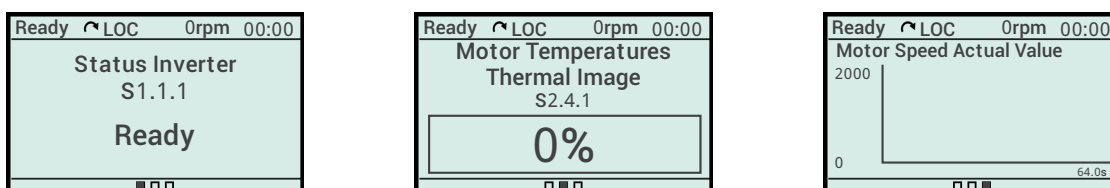


Figure 8.13: View in (a) text, (b) bar and (c) graphic

- **Slot:** The HMI screen is divided into 9 parts, each part is called a Slot which allows the display of reading variables in the **value** format. Figure 8.14 on page 8-6 shows an example display.

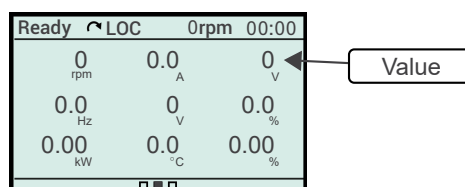


Figure 8.14: Slot View



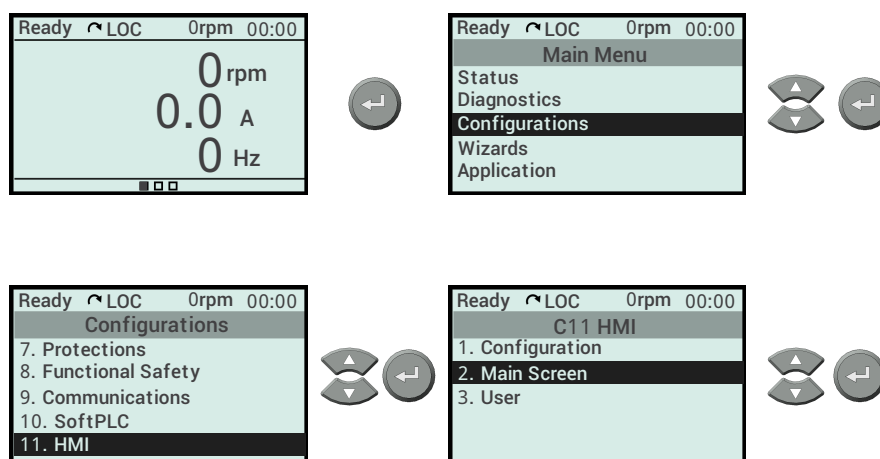
NOTE!

The **Line** and **Slot** view modes can be merged if there is space in the line.

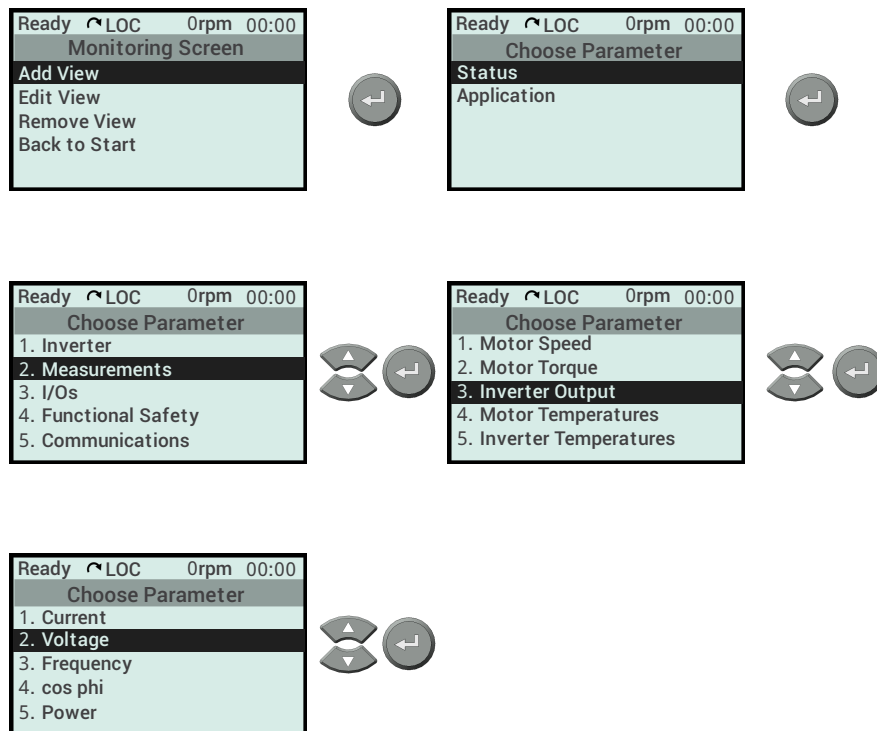
8.6.2 Modification of the Main Screen

To modify the main screens, follow the steps below:

1. Go to the HMI main screen configuration menu (C11.2).



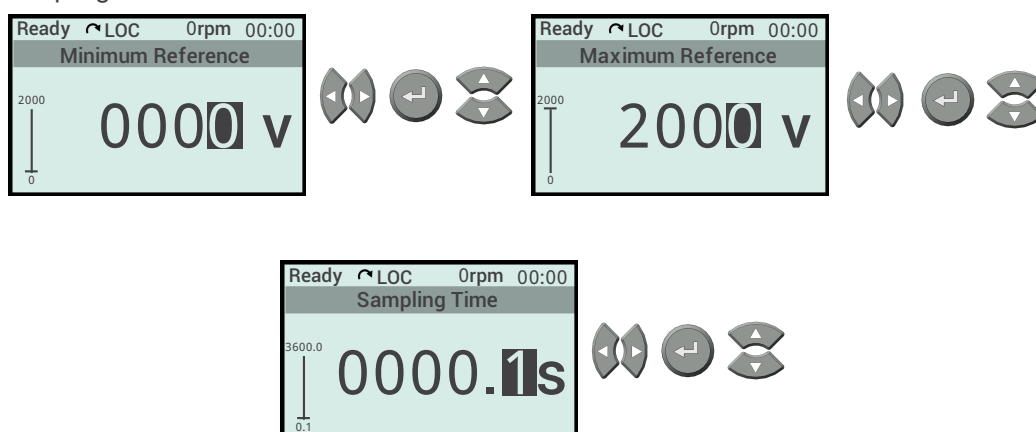
2. Select **Add View** and choose the reading variable you want to add to the **Main** screen.



3. After selecting the view format of the reading variable and its location on the main screens. In this example, the full screen mode in graphic format will be chosen. Use the navigation keys to move between screens.



4. Configure the display format. In the case of this example, choose the amplitude range of the graph and the sampling rate.

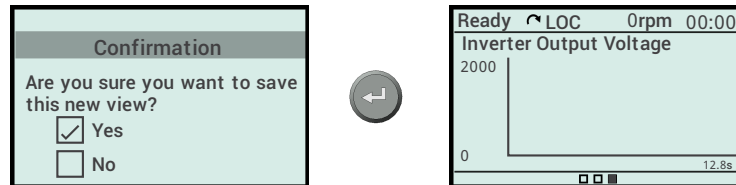




NOTE!

The *Edit View* option is applied to the bar and graph mode, where you can set the minimum and maximum values for existing views.

5. Confirm the new view.



8.6.3 Screen Examples

Other screens examples are shown below:

Example 1

The Figure 8.15 on page 8-8 is an example of a main screen with parameter readings displayed in the **Slot** and **Line** mode, showing:

- in the first line, the temperatures of the motor stator windings in the **Slot** mode, **value** format;
- in the second line, the thermal image of the motor in the **Line** mode, **text** format;
- in the third line, the power internal air temperature in the **Line** mode, **bar** format.

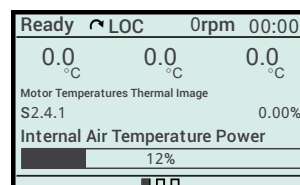


Figure 8.15: Main screen examples

Example 2

The Figure 8.16 on page 8-8 is an example of a main screen with parameter readings displayed in the **Line** mode, showing:

- in the first line, the inverter output current in the **Line** mode, **text** format;
- in the second line, the inverter output voltage in the **Line** mode, **text** format;
- in the third line, the inverter output power in the **Line** mode, **bar** format.

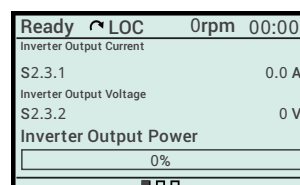


Figure 8.16: Main screen examples

8.7 USB Mode

The CFW900 HMI has a USB port for connecting the inverter to a computer with the WPS software installed. This software allows, among other things, reading variables, setting parameters and updating the inverter firmware. For more details, see the WPS (WEG Programming Suite) manual, available at www.weg.net.

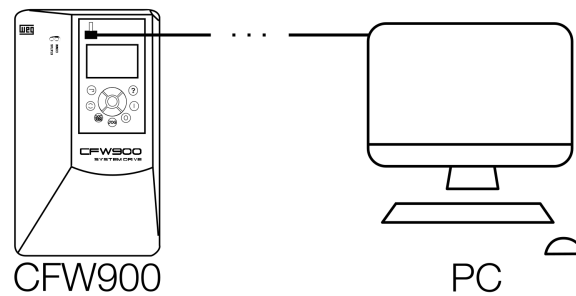


Figure 8.17: CFW900 USB connection to a computer

When the inverter is not powered or is not connected to an external 24 Vdc source, the control circuit is powered by the USB port, which imposes some restrictions. Only the control circuit will be enabled, and other circuits, control accessories and networks will be disabled.

The USB power supply allows reading and writing parameters via HMI and connection with the WPS software, but the parameters of I/Os and connected accessories will be unavailable, as well as parameters linked to regulation functions (which depend on the operation of other parts of the inverter). Functions that use the MicroSD card will also be unavailable and the SoftPLC will not be executed.

**ATTENTION!**

In USB mode, the HMI cannot be used remotely. It must be connected directly to the inverter.

**NOTE!**

Once powered by the USB port, when making changes to the inverter parameters via HMI, wait for the confirmation screen to ensure the saving of the parameter.

**ATTENTION!**

If the inverter control circuit is powered by the USB, and another power supply is connected, the inverter will reset.

9 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 CFW900.



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 CFW900.

S1.1 Status

It allows viewing the operating status of the CFW900.

S1.1 Status

.1 Inverter	0 ... 10
.2 HMI	0 ... 10
.3 Pre-Charge	0 ... 1
.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.
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 an active fault.
4 = Configuration	It indicates that the inverter is running a wizard or with incompatible parameter programming.
5 = STO	It indicates that the STO safety function is acting.
6 = Power Off	It indicates that communication with the power board has not been established.
7 = Disabled	It indicates that the inverter is disabled.
8 = SS1	It indicates that the SS1-t safety function is running.
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.

.2 HMI It indicates one of the possible inverter status shown in abbreviated form on the upper left corner of the HMI. The following table contains the description of each status.

Indication	Description
0 = Ready	It indicates that the inverter is ready to drive the motor.
1 = Run	It indicates that the inverter is driving the motor.
2 = Sub	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 an active fault.
4 = Config	It indicates that the inverter is running a wizard or with incompatible parameter programming.
5 = STO	It indicates that the STO safety function is acting.
6 = P.Off	It indicates that communication with the power board has not been established.
7 = Disab.	It indicates that the inverter is disabled.
8 = SS1	It indicates that the SS1-t safety function is running.
9 = SelfTun	It indicates that the inverter is executing the Self-tuning routine.

Indication	Description
10 = Sleep	It indicates that the sleep mode of the inverter PID controller is active.

.3 Pre-Charge It indicates the inverter pre-charge status.

Indication	Description
0 = Running	Running the inverter pre-charge.
1 = Completed	Inverter pre-charge completed.

.4 Config It indicates if the CFW900 is in CONFIG status and, if so, which input condition is leading to this situation.

Indication	Description
0 = No Config	It indicates that the CFW900 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 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 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 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.
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	Indicates that the setting of minimum switching frequency (C1.3.2) and/or user-define value (C1.3.1) is not properly configured.
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 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 = SM Motor Control	Indicates that the motor type has been set to one of the synchronous machines (SM): IPSPM, SPSM, or HSRM, but the control type is not available. For information on the type of control available for each type of motor, see C3.1.1 or C2.1.1.
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.

Indication	Description
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 = Motor Frequency	Indicates that the motor rated frequency (C2.1.6) was set to an invalid value (0 Hz). If during the oriented start-up the motor rated frequency, suggested through the number of poles and motor rated speed previously set throughout the wizard, is greater than the maximum limit of the parameter, C2.1.6 is set to invalid value (0 Hz) to indicate possible inconsistency in settings or incompatibility between motor and inverter.
32 = Incorrect Ld and Lq values	Indicates that the inductances Ld C2.2.6 and Lq C2.2.7 have values incompatible with type C3.1.1 synchronous machine. The following condition must be met: IPSM: Ld must be different from Lq when vector control is used (either with encoder or sensorless).
33 = Invalid Num. Poles	Indicates that the number of motor poles (C2.1.7) is set to an invalid value.

S1.2 Software Version

It indicates the software versions contained in all microcontrollers installed on the CFW900.

S1.2 Software Version

.1 Package

.1 Package It indicates the version of the software package, which is formed by the set of program files saved on the CFW900 microcontrollers.

S1.2.2 Details

It indicates details of the software versions contained in all microcontrollers installed on the CFW900.



NOTE!

This parameter is exclusive for WEG's use.

S1.3 Inverter Data

It allows viewing the identification codes of the CFW900.

S1.3 Inverter Data

.1 Model	1 ... 40
.2 Inverter Serial No.	0 ... 4294967295
.3 Power Board Serial No.	0 ... 4294967295
.4 Power - Options/Voltages	0 ... 12 Bit
.5 Rated Current	0.0 ... 6553.0 A
.6 Effective Rated Current	0.0 ... 6553.0 A
.7 Inverter Model Version	0 ... 4294967295

.1 Model It indicates the CFW900 inverter smart code/model.

.2 Inverter Serial No. It indicates the CFW900 inverter serial number.

.3 Power Board Serial No. It indicates the CFW900 inverter power board serial number.

.4 Power - Options/Voltages It indicates the range and type (single-phase, three-phase, via DC link) of the supply voltage of the CFW900 inverter model.

Bit	Value/Description
Bit 0 200 V	It indicates if the inverter supports operation at 200 V AC rated voltage. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 1 208/220/230/240 V	It indicates if the inverter supports operation at 208V, 220V, 230V and 240V AC rated voltage. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 2 380 V	It indicates if the inverter supports operation at 380 V AC rated voltage. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 3 400/415 V	It indicates if the inverter supports operation at 400 V and 415 V AC rated voltage. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 4 440/460 V	It indicates if the inverter supports operation at 440 V and 460 V AC rated voltage. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 5 480 V	It indicates if the inverter supports operation at 480 V AC rated voltage. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 6 500/525 V	It indicates if the inverter supports operation at 500 V and 525 V AC rated voltage. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 7 550/575/600 V	It indicates if the inverter supports operation at 550 V, 575 V and 600 V AC rated voltage. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 8 660/690 V	It indicates if the inverter supports operation at 660 V and 690 V AC rated voltage. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 9 DC Link Power Supply	It indicates if the inverter supports operation with power supply via DC link. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 10 Single-phase Power Supply	It indicates if the inverter supports operation with single-phase power supply. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 11 Three-phase Power Supply	It indicates if the inverter supports operation with three-phase power supply. 0 = No: It does not support operation. 1 = Yes: It supports operation.
Bit 12 Not used	Not used.

.5 Rated Current It indicates the inverter rated current.

It takes into account the supply voltage (C1.1.2) and the application (C1.2.1).

.6 Effective Rated Current It indicates the rated current of the inverter considering additional derates.

It takes into account the supply voltage (C1.1.2), the application (C1.2.1), the switching frequency (C1.3.1 and C7.11.2) the user's manual setting (C1.6.4).

.7 Inverter Model Version It indicates the database version of the inverter model.

S1.4 Control Accessory Data

It presents the control accessories that are installed in the CFW900.

S1.4.1 Backplane

It allows viewing the model of the Backplane that is connected to the CFW900.

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 CFW900.
1 = CFW900-4SLOTS	It indicates that the 4-position (Slot) backplane is connected to the CFW900.
2 = CFW900-7SLOTS	It indicates that the 7-position (Slot) backplane is connected to the CFW900.

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 ... 10

.1 Accessory Identified Model of the accessory installed.

Indication	Description
0 = Unknown	It indicates that the accessory installed in the Slot is not recognized by this CFW900 version.
1 = No Accessory	It indicates that the Slot has no accessories.
2 = CFW900-IOAI-01	Accessory with analog inputs and outputs.
3 = CFW900-IOD-01	Accessory with digital inputs and outputs.
4 = CFW900-REL-01	Accessory with digital relay outputs.
5 = CFW900-TEMP-01	Accessory with isolated inputs for PTC/PT100/PT1000 sensors.
6 = CFW900-ENC-01	Accessory for incremental encoder connection.
7 = Not used	Not used.
8 = CFW900-CCAN-W	Communication accessory for CAN interface.
9 = CFW900-C...-N (Anybus)	Communication accessory for Anybus module.
10 = Not used	Not used.



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.

S1.5 Date/Hour

It allows viewing the date and time setting of the CFW900.

S1.5 Date/Hour

.1 Actual YYYY-MM-DD HH:MM:SS

.1 Actual It indicates the actual date (YYYY-MM-DD) and time (HH:MM:SS) of the CFW900.

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 It indicates the status of the CFW900 global control word.

This is the effective command word for the CFW900.

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 C4.2.3.1 is set to "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 quick 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: 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: disables the inverter completely, interrupting the motor power supply. 1 = Yes: enables the inverter completely, allowing the operation of the motor.
Bit 2 Run Reverse	0 = No: runs the motor in the direction of the reference signal (forward). 1 = Yes: runs the motor in the opposite direction of the reference signal (reverse).
Bit 3 Enable JOG	0 = No: disables the JOG function. 1 = Yes: enables the JOG function.
Bit 4 R1/R2 Mode	0 = R1: selects the Remote 1 command mode. 1 = R2: 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: enables quick stop. 1 = Yes: disables quick stop.
Bit 7 Fault Reset	0 = No: not used. 1 = Yes: in the transition, if in a fault state, 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 C4 menu.

HMI Control Word:

- When pressing the HMI key , the Enable Ramp command is set to 1.
- When pressing the HMI key , the Enable Ramp command is set to 0.

- The General Enable command can be disabled when key  of the HMI is pressed, and parameter C4.2.4.1 is set to stop by general disable.
- When pressing the HMI key , the Run Reverse command is alternated.
- As long as the HMI key  is pressed, the Enable JOG command is kept at 1.
- When pressing the HMI key , 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  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 key  the Fault Reset command is set to 1.

Bit	Value/Description
Bit 0 Enable Ramp	0 = No: 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: disables the inverter completely, interrupting the motor power supply. 1 = Yes: enables the inverter completely, allowing the operation of the motor.
Bit 2 Run Reverse	0 = No: runs the motor in the direction of the reference signal (forward). 1 = Yes: runs the motor in the opposite direction of the reference signal (reverse).
Bit 3 Enable JOG	0 = No: disables the JOG function. 1 = Yes: enables the JOG function.
Bit 4 LOC/REM Mode	0 = REM: selects the Remote command mode. 1 = LOC: 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: enables quick stop. 1 = Yes: disables quick stop.
Bit 7 Fault Reset	0 = No: not used. 1 = Yes: in the transition, if in a fault state, 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 and 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 behaves according to 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.

S STATUS

- 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 C4.2.3.10. Active DI means 2nd Ramp and inactive DI means 1st Ramp.
- The Quick Stop command reflects the status of the digital input set in C4.2.3.7. Active DI means No Quick Stop and Inactive DI means With Quick 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: 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: disables the inverter completely, interrupting the motor power supply. 1 = Yes: enables the inverter completely, allowing the operation of the motor.
Bit 2 Run Reverse	0 = No: runs the motor in the direction of the reference signal (forward). 1 = Yes: runs the motor in the opposite direction of the reference signal (reverse).
Bit 3 Enable JOG	0 = No: disables the JOG function. 1 = Yes: enables the JOG function.
Bit 4 R1/R2 Mode	0 = R1: selects the Remote 1 command mode. 1 = R2: 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: enables quick stop. 1 = Yes: disables quick stop.
Bit 7 Fault Reset	0 = No: not used. 1 = Yes: in the transition, if in a fault state, it resets the fault.

S2 Measurements

It allows viewing the variables measured by the CFW900.

S2.1 Motor Speed

It indicates the variables related to the motor speed.

S2.1 Motor Speed

.1 Reference	0 ... 60000 rpm
.2 Total Reference	0 ... 60000 rpm
.3 Actual Value	0 ... 60000 rpm
.4 Encoder	0 ... 65535 rpm
.5 Estimated Value	0 ... 60000 rpm

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

.2 Total Reference It indicates the speed reference value in RPM.

.3 Actual Value 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 Estimated Value	-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 Estimated Value It indicates the estimated electrical torque on the motor in % based on the rated motor torque.

S2.3 Inverter Output

It indicates the CFW900 output variables applied to the motor.

S2.3 Inverter Output

.1 Current	0.0 ... 4500.0 A
.2 Voltage	0 ... 2000 V
.3 Frequency	0.0 ... 1020.0 Hz
.4 cos phi	-1.00 ... 1.00
.5 Power	0.00 ... 655.35 kW
.6 Energy GWh	0 ... 999 GWh
.7 Energy MWh	0 ... 999 MWh
.8 Energy kWh	0.0 ... 999.9 kWh
.9 Current Switc. Freq.	0.00 ... 16.00 kHz

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

.2 Voltage It indicates the inverter output voltage in Volts (V).

.3 Frequency It indicates the motor frequency in Hz.

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

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

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

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

.8 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.

.9 Current Switc. Freq. It indicates the switching frequency of the PWM signals applied to the inverter circuit (IGBTs) in kHz.

S STATUS

S2.4 Motor Temperatures

It indicates the motor overload fault variables.

S2.4 Motor Temperatures

.1 Thermal Image	0.00 ... 655.35 %
.3 Sensor Measured Value	-100.0 ... 250.0 °C

.1 Thermal Image It indicates the estimated thermal image of the motor. The value of this parameter is not reset to zero when the inverter is powered off.

.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.

S2.5 Inverter Temperatures

Indication of IGBT and internal air temperatures.

S2.5.1 IGBT Temperature

It indicates the temperature of the inverter IGBT modules.

S2.5.1 IGBT Temperature

.1 Phase U/T1 IGBT1	-50.0 ... 250.0 °C
.2 Phase V/T2 IGBT1	-50.0 ... 250.0 °C
.3 Phase W/T3 IGBT1	-50.0 ... 250.0 °C

.1 Phase U/T1 IGBT1 It indicates the actual temperature of phase U IGBT 1 module (°C).

.2 Phase V/T2 IGBT1 It indicates the actual temperature of phase V IGBT 1 module (°C).

.3 Phase W/T3 IGBT1 It indicates the actual temperature of phase W IGBT 1 module (°C).

S2.5.3 Internal Air Temperature

It indicates the temperature of the inverter internal air.

S2.5.3 Internal Air Temperature

.1 Power	-50.0 ... 250.0 °C
.2 Control	-50.0 ... 250.0 °C

.1 Power It indicates the actual temperature of the power unit internal air (°C).

.2 Control It indicates the actual temperature of the internal air on the main control board (°C).

This temperature is used, in conjunction with other measurements, in the overtemperature fault of the control board.

The user's temperature offset setting affects this temperature value.

S2.7 DC Link

It allows viewing the DC Link voltage value.

S2.7 DC Link

.1 Voltage 0 ... 2000 V

.1 Voltage It indicates the actual voltage on the inverter DC Link in Volts (V).

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 Alx Global Torque 0.0 ... 400.0 %

.1 Alx 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.

S2.9 Estimate Parameter

Allows viewing the estimated electrical parameters of the motor during the system operation.

S2.9 Estimate Parameter

.1 Estimated Mag. Reactance 0.0 ... 800.0 Ω

.1 Estimated Mag. Reactance Indicates the value of the motor magnetization reactance estimated during the system operation. The estimation occurs when the motor is spinning without load. In such condition, it is possible to obtain the value of the magnetization reactance more accurately. The value shown in C2.2.2 can be updated by the amount indicated in S2.9.1. To that end, it is recommended to set the motor to operate at 50% of the rated speed without load. Then update the value of C2.2.2 to S2.9.1. This operation will correct any estimation error during the Self-tuning process.

S3 I/Os

It allows viewing the status of the I/O accessories installed on the CFW900.

S3.1 Slot X Status

It allows viewing the state of the slot status parameters.

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.

S STATUS

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 the 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.

.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
.2 DO Network	0 ... 1 Bit
.3 DO SoftPLC	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 the 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.

.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 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.

S STATUS

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 the 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	Value/Description
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 the 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	Value/Description
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 encoder zero search function has been 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.

S STATUS

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).

S4 Functional Safety

It displays information related to the functional safety of the CFW900.

S4 Functional Safety

.1 Status 0 ... 5

.2 SS1-t Delay Time 0 ... 999 s

.1 Status It indicates the state of the STO90.

Indication	Description
0 = Not used	Not used.
1 = STO	It indicates that the STO90 is in the STO (Safe Torque Off) state.
2 = Operational	It indicates that the STO90 is in operational state (torque enabled).
3 = Programming	It indicates that the STO90 is in programming mode (delay time).
4 = SS1-t	It indicates that the STO90 is executing the SS1-t function (Safe Stop 1 - time controlled).
5 = Fault	Indicates that the STO90 is in fault state.

.2 SS1-t Delay Time It indicates the delay time of the SS1-t safety function set in STO90.

S5 Communications

It allows viewing the parameters used for monitoring and controlling the CFW900 inverter using communication interfaces.

S5.1 Status and Commands

It allows viewing the CFW900 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 ... 4 Bit

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

Bit	Value/Description
Bit 0 STO	0 = No: STO function is inactive (inverter operational). 1 = Yes: STO function is active (inverter locked).
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 acceleration and deceleration ramp by C6.1.1 and C6.1.2. 1 = Yes: 2nd acceleration and deceleration ramp by C6.1.4 and C6.1.5.
Bit 6 Config. Mode	0 = No: inverter in normal operation. 1 = Yes: inverter in configuration state. 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 Undervoltage	0 = No: without undervoltage. 1 = Yes: with undervoltage.
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 running 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 to estimate the 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.

S STATUS

Bit	Value/Description
Bit 3 Not used	Not used.
Bit 4 Zero Speed	0 = No: the inverter is not disabled by zero speed. 1 = Yes: the inverter is disabled by zero speed.
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 Ramp Hold	0 = No: ramp operating in normal conditions. 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 Dynamic Braking inactive. 1 = Yes: DC link limitation or Dynamic Braking 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: Ride-through running.
Bit 13 Flying Start	0 = No: Flying start not running. 1 = Yes: Flying start running.
Bit 14 DC Braking	0 = No: DC braking inactive. 1 = Yes: DC braking 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 It indicates other status of the inverter functions. Each bit represents a status.

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.
Bit 3 Not used	Not used.
Bit 4 Max. Freq. Limit	0 = Limited (599 Hz): The maximum output frequency of the inverter is limited to 599 Hz. 1 = Not Limited: No limitation on the maximum output frequency of the inverter.



NOTE!

Excessive changes to configuration parameters via HMI, WPS, communication networks, SoftPLC application or downloads of SoftPLC user parameter settings may lead to the storage limit exhaustion. To avoid that, it is recommended to use cyclical writing methods via communication networks, as such methods write the values in a non-retentive way. Additionally, configure SoftPLC user parameters as non-retentive and use retentive markers to copy data to these parameters.

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 CFW900 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: 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: disables the inverter completely, interrupting the motor power supply. 1 = Yes: enables the inverter completely, allowing the operation of the motor.
Bit 2 Run Reverse	0 = No: runs the motor in the direction of the reference signal (forward). 1 = Yes: runs the motor in the opposite direction of the reference signal (reverse).
Bit 3 Enable JOG	0 = No: disables the JOG function. 1 = Yes: enables the JOG function.
Bit 4 R1/R2 Mode	0 = R1: selects the Remote 1 command mode. 1 = R2: 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: enables quick stop. 1 = Yes: disables quick stop.
Bit 7 Fault Reset	0 = No: not used. 1 = Yes: in the transition, if in a fault state, 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 % $\Rightarrow$ speed reference = 0 rpm
- S5.2.3 = 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

S STATUS

$$\text{Reference \%} = \frac{900 \times 100,00}{1800}$$

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



NOTE!

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 SybiNet: 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: No link on port 1. 1 = Yes: Link active on port 1.
Bit 1 Link 2	0 = No: No link on port 2. 1 = Yes: Link active on 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: 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: disables the inverter completely, interrupting the motor power supply. 1 = Yes: enables the inverter completely, allowing the operation of the motor.
Bit 2 Run Reverse	0 = No: runs the motor in the direction of the reference signal (forward). 1 = Yes: runs the motor in the opposite direction of the reference signal (reverse).
Bit 3 Enable JOG	0 = No: disables the JOG function. 1 = Yes: enables the JOG function.
Bit 4 R1/R2 Mode	0 = R1: selects the Remote 1 command mode. 1 = R2: 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: enables quick stop. 1 = Yes: disables quick stop.
Bit 7 Fault Reset	0 = No: not used. 1 = Yes: in the transition, if in a fault state, 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 Direction of Rotation = 0 and S5.3.3 > 0: reference for the forward direction
- Bit Direction of Rotation = 0 and S5.3.3 < 0: reference for the reverse direction
- Bit Direction of Rotation = 1 and S5.3.3 > 0: reference for the reverse direction
- Bit Direction of Rotation = 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.

S STATUS

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 It 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 It indicates the network topology.

Indication	Description
0 = Linear	It indicates linear topology.
1 = Ring	It indicates ring topology.

.4 DLR Status It indicates the network status.

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 ... 4

.1 Communication Status It allows identifying the status of communication with the Modbus TCP client.

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 from the Modbus TCP client.

.3 Transmitted Telegrams It indicates the number of telegrams sent to the Modbus TCP client.

S STATUS



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 CFW900.

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 CFW900.

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 accessory installed.
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 CFW900 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 CFW900 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 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: 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: disables the inverter completely, interrupting the motor power supply. 1 = Yes: enables the inverter completely, allowing the operation of the motor.
Bit 2 Run Reverse	0 = No: runs the motor in the direction of the reference signal (forward). 1 = Yes: runs the motor in the opposite direction of the reference signal (reverse).
Bit 3 Enable JOG	0 = No: disables the JOG function. 1 = Yes: enables the JOG function.
Bit 4 R1/R2 Mode	0 = R1: selects the Remote 1 command mode. 1 = R2: 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	Value/Description
Bit 6 No Quick Stop	0 = No: enables quick stop. 1 = Yes: disables quick stop.
Bit 7 Fault Reset	0 = No: not used. 1 = Yes: in the transition, if in a fault state, 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 menu C4.

- S5.6.4 = 0,00 % → speed reference = 0 rpm
- S5.6.4 = 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 Direction of Rotation = 1 and S5.6.4 > 0: reference for the forward direction
- Bit Direction of Rotation = 1 and S5.6.4 < 0: reference for the reverse direction
- Bit Direction of Rotation = 0 and S5.6.4 > 0: reference for the reverse direction
- Bit Direction of Rotation = 0 and S5.6.4 < 0: reference for the forward 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 CAN protocol programmed in C9.8.1.
1 = Auto-Baud	Executing the function for automatic detection of the baud rate (only for the DeviceNet protocol).
2 = CAN Active	CAN interface active and without errors.
3 = Warning	The CAN controller reached the warning state.
4 = Error Passive	The CAN controller reached the passive error state.
5 = Bus Off	The CAN controller reached the bus off state.
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: 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: disables the inverter completely, interrupting the motor power supply. 1 = Yes: enables the inverter completely, allowing the operation of the motor.
Bit 2 Run Reverse	0 = No: runs the motor in the direction of the reference signal (forward). 1 = Yes: runs the motor in the opposite direction of the reference signal (reverse).
Bit 3 Enable JOG	0 = No: disables the JOG function. 1 = Yes: enables the JOG function.
Bit 4 R1/R2 Mode	0 = R1: selects the Remote 1 command mode. 1 = R2: 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: enables quick stop. 1 = Yes: disables quick stop.
Bit 7 Fault Reset	0 = No: not used. 1 = Yes: in the transition, if in a fault state, 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 % ⇒ speed reference = 0 rpm
- S5.7.3 = 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 Direction of Rotation = 1 and S5.7.3 > 0: reference for the forward direction
- Bit Direction of Rotation = 1 and S5.7.3 < 0: reference for the reverse direction
- Bit Direction of Rotation = 0 and S5.7.3 > 0: reference for the reverse direction
- Bit Direction of Rotation = 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 Cyclic counter that indicates the number of messages the CAN interface received but could not be processed by the device. In case the number of lost messages frequently increases, it is recommended to reduce the baud rate used for 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	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 in which state the device is, according to the protocol specification.

Indication	Description
0 = Inactive	CANopen protocol disabled.
1 = Initialization	Communication with the device is not possible during this step, 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 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.

S STATUS

Indication	Description
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.

S5.9 Bluetooth

The following settings are available for products that have an HMI interface with integrated Bluetooth technology.

S5.9 Bluetooth

.1 MAC Address 00:00:00:00:00:00 ... FF:FF:FF:FF:FF:FF

.1 MAC Address Bluetooth device MAC Address is a unique 48-bit identifier assigned to each Bluetooth device by the manufacturer.

S6 SoftPLC

The SoftPLC function provides the CFW900 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 CFW900 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 CFW900. In this case, the user must recompile the project in the WPS software considering the new firmware version of the CFW900 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: 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: disables the inverter completely, interrupting the motor power supply. 1 = Yes: enables the inverter completely, allowing the operation of the motor.
Bit 2 Run Reverse	0 = No: runs the motor in the direction of the reference signal (forward). 1 = Yes: runs the motor in the opposite direction of the reference signal (reverse).
Bit 3 Enable JOG	0 = No: disables the JOG function. 1 = Yes: enables the JOG function.
Bit 4 R1/R2 Mode	0 = R1: selects the Remote 1 command mode. 1 = R2: 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: enables quick stop. 1 = Yes: disables quick stop.
Bit 7 Fault Reset	0 = No: not used. 1 = Yes: in the transition, if in a fault state, 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 %

S STATUS

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

S7 User

It allows viewing the actual user information.

S7 User

.1 Login Active 0 ... 5

.1 Login Active It indicates the currently logged user.

Indication	Description
0 = Administrator	Enabled to change any user configuration parameter.
1 = Operator	Enabled to change only the commands available by HMI key.
2 ... 5 = Not used	Not used.

10 D DIAGNOSTICS

It allows viewing variables and events that can help diagnose problems or improve the CFW900 operation.

D1 Faults

It allows viewing fault activation occurrences on the CFW900.

D1.1 Actual

It allows viewing the performance of faults occurred on the CFW900. If any fault is active, its number is displayed. If not active, 0 is displayed.

The faults act by disabling the motor. They are only removed with the reset or de-energization command from the CFW900 control.

The fault occurrences are placed in a queue following the sequence of the cause that generated them. In this menu, the actuation of up to five faults can be indicated simultaneously. Whenever a fault acts, it enters the first empty place 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 Actual

.1 Fault 1	0 ... 9999
.2 Fault 2	0 ... 9999
.3 Fault 3	0 ... 9999
.4 Fault 4	0 ... 9999
.5 Fault 5	0 ... 9999

.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.

D1.2 History

It shows the history of the faults occurred, with an indication of the value of some parameters at the time of the fault.

The indication of the history by the CFW900 HMI is limited to the instantaneous value of some parameters at the time of the 10 most recent faults.

Viewing more information, older faults (guaranteed the 50 most recent) and/or parameter graphs from moments preceding the fault is available in the history view tool in WPS.

Below is the list of parameters and variable graphs monitored in the fault history.

List of parameters visible on HMI and WPS:

- Fault code.
- Occurrence date and time [S1.5.1].
- Motor current [S2.3.1].
- Output voltage [S2.3.2].

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- Output frequency [S2.3.3].
- Speed reference [S2.1.1].
- Motor speed [S2.1.3].
- DC link voltage [S2.7.1].

List of parameters visible only on WPS:

- Speed read by the encoder [S2.1.4].
- Actual switching frequency [S2.3.9].
- Motor torque [S2.2.3].
- Status of Slot X digital inputs [S3.1.3.1].
- Status of Slot X digital outputs [S3.1.4.1].
- Motor temperature [S2.4.3].
- Temperature of phase U IGBT [S2.5.1.1].
- Temperature of phase V IGBT [S2.5.1.2].
- Temperature of phase W IGBT [S2.5.1.3].
- Internal air temperature of the power unit [S2.5.3.1].
- Internal air temperature of the main control board [S2.5.3.2].
- Speed of heat sink fan 1 [D4.1.1.1].
- Speed of heat sink fan 2 [D4.1.1.2].
- Speed of heat sink fan 3 [D4.1.1.3].
- Speed of heat sink fan 4 [D4.1.1.4].
- Speed of internal fan 1 [D4.1.1.5].
- Speed of internal fan 2 [D4.1.1.6].
- IGBT overload [D4.1.6.2].
- IGBT junction temperature [D4.1.6.4].

List of graphs visible on the WPS:

- Motor current [S2.3.1], graphs with 1-second and 10-millisecond sampling period.
- Output frequency [S2.3.3], graphs with 1-second and 10-millisecond sampling period.
- DC-link voltage [S2.7.1], graphs with 1-second and 10-millisecond sampling period.
- Output voltage [S2.3.2], graphs with 1-second and 10-millisecond sampling period.
- IGBT junction temperature [D4.1.6.4], graphs with 1-second and 10-millisecond sampling period.
- Motor speed [S2.1.3], graphs with 1-second and 10-millisecond sampling period.
- Motor torque [S2.2.3], graphs with 1-second and 10-millisecond sampling period.
- Total speed reference [S2.1.2], graphs with 1-second and 10-millisecond sampling period.
- IGBT U current, amplitude normalized in relation to the output current full scale (information from the inverter model), sampled at the switching frequency rate.

- IGBT current V, amplitude normalized in relation to the output current full scale (information from the inverter model), sampled at the switching frequency rate.
- IGBT current W, amplitude normalized in relation to the output current full scale (information from the inverter model), sampled at the switching frequency rate.
- Modulation index of phase U, normalized amplitude from -1 to +1, sampled at the switching frequency rate.
- Modulation index of phase V, normalized amplitude from -1 to +1, sampled at the switching frequency rate.
- Modulation index of phase W, normalized amplitude from -1 to +1, sampled at the switching frequency rate.
- Feedback voltage of phase U, normalized amplitude relative to half the link voltage, sampled at the switching frequency.
- Feedback voltage of phase V, normalized amplitude relative to half the link voltage, sampled at the switching frequency.
- Feedback voltage of phase W, normalized amplitude relative to half the link voltage, sampled at the switching frequency.
- Command flags, graph sampled at 2 kHz.
- Motor speed in RPM, graph sampled at 2 kHz.
- Total speed reference in RPM, graph sampled at 2 kHz.

**NOTE!**

Critical faults have fast inverter action on the output (interruption of PWM signal generation to trigger the IGBTs), guaranteeing the integrity of the product and of the application. In these cases, the instantaneous value of the parameters may not faithfully represent the exact situation at the moment of the fault. In cases where the observed values are inconsistent with the fault presented, it is recommended to use the WPS to view the recent operating history at the time of the fault.

**NOTE!**

Some graphs may differ from the value indicated in the respective parameter. Parameter S2.7.1 has its value filtered in relation to the samples indicated in the graph. Parameters S2.1.3 and S2.1.2 indicate the absolute value of the actual value indicated in the respective graphs.

D1.3 Simplified History

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

D1.3 Simplified 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.

.2 Date and Time Last Fault It indicates the date and time of the last fault.

.3 Second Fault It indicates the code of the second fault.

.4 Date and Time Second Fault It indicates the date and time of the second fault.

.5 Third Fault It indicates the code of the third fault.

.6 Date and Time Third Fault It indicates the date and time of the third fault.

.7 Fourth Fault It indicates the code of the fourth fault.

.8 Date and Time Fourth Fault It indicates the date and time of the fourth fault.

.9 Fifth Fault It indicates the code of the fifth fault.

.10 Date and Time Fifth Fault It indicates the date and time of the fifth fault.

.11 Sixth Fault It indicates the code of the sixth fault.

.12 Date and Time Sixth Fault It indicates the date and time of the sixth fault.

.13 Seventh Fault It indicates the code of the seventh fault.

.14 Date and Time Seventh Fault It indicates the date and time of the seventh fault.

.15 Eighth Fault It indicates the code of the eighth fault.

.16 Date and Time Eighth Fault It indicates the date and time of the eighth fault.

.17 Ninth Fault It indicates the code of the ninth fault.

.18 Date and Time Ninth Fault It indicates the date and time of the ninth fault.

.19 Tenth Fault It indicates the code of the tenth fault.

.20 Date and Time Tenth Fault It indicates the date and time of the tenth fault.

D2 Alarms

It allows viewing the alarms occurred in the CFW900.

D2.1 Actual

It allows viewing the alarms occurred in the CFW900. If any alarm is active, the alarm number is displayed. If not active, 0 is displayed.

When alarms actuate, they are indicated on the HMI and in the CFW900 status word. They are automatically cleared after the alarm condition ceases.

Alarms are placed in a queue, in which up to five alarms can be displayed simultaneously. Whenever an alarm is activated, it enters the first empty place (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 ... 9999
.2 Alarm 2	0 ... 9999
.3 Alarm 3	0 ... 9999
.4 Alarm 4	0 ... 9999
.5 Alarm 5	0 ... 9999

.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.

D2.2 History

It shows the history of the alarms occurred, with an indication of the value of some parameters at the time of the alarm.

The indication of the history by the CFW900 HMI is limited to the instantaneous value of some parameters at the time of the 10 most recent alarms.

Viewing more information, older alarms (guaranteed the 50 most recent) and/or parameter graphs from moments preceding the alarm is available in the history view tool in the WPS.

Below is the list of parameters and variable graphs monitored in the alarm history.

List of parameters visible on HMI and WPS:

- Alarm code.
- Occurrence date and time [S1.5.1].
- Motor current [S2.3.1].
- Output voltage [S2.3.2].
- Output frequency [S2.3.3].

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- Speed reference [S2.1.1].
- Motor speed [S2.1.3].
- DC link voltage [S2.7.1].

List of parameters visible only on WPS:

- Speed read by the encoder [S2.1.4].
- Actual switching frequency [S2.3.9].
- Motor torque [S2.2.3].
- Status of Slot X digital inputs [S3.1.3.1].
- Status of Slot X digital outputs [S3.1.4.1].
- Motor temperature [S2.4.3].
- Temperature of phase U IGBT [S2.5.1.1].
- Temperature of phase V IGBT [S2.5.1.2].
- Temperature of phase W IGBT [S2.5.1.3].
- Internal air temperature of the power unit [S2.5.3.1].
- Internal air temperature of the main control board [S2.5.3.2].
- Speed of heat sink fan 1 [D4.1.1.1].
- Speed of heat sink fan 2 [D4.1.1.2].
- Speed of heat sink fan 3 [D4.1.1.3].
- Speed of heat sink fan 4 [D4.1.1.4].
- Speed of internal fan 1 [D4.1.1.5].
- Speed of internal fan 2 [D4.1.1.6].
- IGBT overload [D4.1.6.2].
- IGBT junction temperature [D4.1.6.4].

List of graphs visible on the WPS:

- Motor current [S2.3.1], graphs with 1-second and 10-millisecond sampling period.
- Output frequency [S2.3.3], graphs with 1-second and 10-millisecond sampling period.
- DC-link voltage [S2.7.1], graphs with 1-second and 10-millisecond sampling period.
- Output voltage [S2.3.2], graphs with 1-second and 10-millisecond sampling period.
- IGBT junction temperature [D4.1.6.4], graphs with 1-second and 10-millisecond sampling period.
- Motor speed [S2.1.3], graphs with 1-second and 10-millisecond sampling period.
- Motor torque [S2.2.3], graphs with 1-second and 10-millisecond sampling period.
- Total speed reference [S2.1.2], graphs with 1-second and 10-millisecond sampling period.
- IGBT U current, amplitude normalized in relation to the output current full scale (information from the inverter model), sampled at the switching frequency rate.
- IGBT current V, amplitude normalized in relation to the output current full scale (information from the inverter model), sampled at the switching frequency rate.

- IGBT current W, amplitude normalized in relation to the output current full scale (information from the inverter model), sampled at the switching frequency rate.
- Modulation index of phase U, normalized amplitude from -1 to +1, sampled at the switching frequency rate.
- Modulation index of phase V, normalized amplitude from -1 to +1, sampled at the switching frequency rate.
- Modulation index of phase W, normalized amplitude from -1 to +1, sampled at the switching frequency rate.
- Feedback voltage of phase U, normalized amplitude relative to half the link voltage, sampled at the switching frequency.
- Feedback voltage of phase V, normalized amplitude relative to half the link voltage, sampled at the switching frequency.
- Feedback voltage of phase W, normalized amplitude relative to half the link voltage, sampled at the switching frequency.
- Command flags, graph sampled at 2 kHz.
- Motor speed in RPM, graph sampled at 2 kHz.
- Total speed reference in RPM, graph sampled at 2 kHz.

**NOTE!**

Some graphs may differ from the value indicated in the respective parameter. Parameter S2.7.1 has its value filtered in relation to the samples indicated in the graph. Parameters S2.1.3 and S2.1.2 indicate the absolute value of the actual value indicated in the respective graphs.

D2.3 Simplified History

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

D2.3 Simplified 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.

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- .2 Date and Time Last Alarm** It indicates the date and time of the last alarm.
- .3 Second Alarm** It indicates the code of the second alarm.
- .4 Date and Time Second Alarm** It indicates the date and time of the second alarm.
- .5 Third Alarm** It indicates the code of the third alarm.
- .6 Date and Time Third Alarm** It indicates the date and time of the third alarm.
- .7 Fourth Alarm** It indicates the code of the fourth alarm.
- .8 Date and Time Fourth Alarm** It indicates the date and time of the fourth alarm.
- .9 Fifth Alarm** It indicates the code of the fifth alarm.
- .10 Date and Time Fifth Alarm** It indicates the date and time of the fifth alarm.
- .11 Sixth Alarm** It indicates the code of the sixth alarm.
- .12 Date and Time Sixth Alarm** It indicates the date and time of the sixth alarm.
- .13 Seventh Alarm** It indicates the code of the seventh alarm.
- .14 Date and Time Seventh Alarm** It indicates the date and time of the seventh alarm.
- .15 Eighth Alarm** It indicates the code of the eighth alarm.
- .16 Date and Time Eighth Alarm** It indicates the date and time of the eighth alarm.
- .17 Ninth Alarm** It indicates the code of the ninth alarm.
- .18 Date and Time Ninth Alarm** It indicates the date and time of the ninth alarm.
- .19 Tenth Alarm** It indicates the code of the tenth alarm.
- .20 Date and Time Tenth Alarm** It indicates the date and time of the tenth alarm.

D3 Hour Control

It allows viewing the total running hours of some CFW900 conditions.

D3 Hour Control

.1 Time Powered	0 ... 65536 h
.2 Hours Enabled	0 ... 65536 h
.3 Fan Running Hours	0 ... 65536 h

- .1 Time Powered** It indicates the total number of hours that the inverter remained powered up.

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

- .3 Fan Running Hours** It indicates the number of hours that the heat sink fan remained powered up.

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

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

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

D4 Inverter and Control Access.

It allows viewing the measurement of the CFW900 operating conditions.

D4.1 Inverter

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

D4.1.1 Fan Speed

It indicates the speeds of the CFW900 fans.

D4.1.1 Fan Speed

.1 Power Fan 1 Speed	0 ... 30000 rpm
.2 Power Fan 2 Speed	0 ... 30000 rpm
.3 Power Fan 3 Speed	0 ... 30000 rpm
.4 Power Fan 4 Speed	0 ... 30000 rpm
.5 Int. Fan 1 Speed	0 ... 30000 rpm
.6 Int. Fan 2 Speed	0 ... 30000 rpm

.1 Power Fan 1 Speed It indicates the heat sink fan 1 speed (rpm).

.2 Power Fan 2 Speed It indicates the heat sink fan 2 speed (rpm).

.3 Power Fan 3 Speed It indicates the heat sink fan 3 speed (rpm).

.4 Power Fan 4 Speed It indicates the heat sink fan 4 speed (rpm).

.5 Int. Fan 1 Speed It indicates the internal fan 1 speed (rpm).

.6 Int. Fan 2 Speed It indicates the internal fan 2 speed (rpm).

D4.1.2 Temperatures

It indicates the temperatures of the inverter air.

D4.1.2 Temperatures

.2 Control Temperature 2	-50.0 ... 250.0 °C
.3 Control Temperature 3	-50.0 ... 250.0 °C
.4 Power Temp. 2	-50.0 ... 250.0 °C

.2 Control Temperature 2 It indicates the control temperature measured by the SMM UC1 board (°C).

This temperature is used in the control overtemperature fault in conjunction with the measurements of the SMM UC2 board, AUI and PWC. Furthermore, this temperature is subjected to the user's temperature offset.

.3 Control Temperature 3 It indicates the control temperature measured by the SMM UC2 board (°C).

This temperature is used in the control overtemperature fault in conjunction with the measurements of the SMM UC1 board, AUI and PWC. Furthermore, this temperature is subjected to the user's temperature offset.

.4 Power Temp. 2 It indicates the internal air temperature in °C on the power board, sensor 2.

D4.1.3 DC Link

It indicates the variables related to the DC link voltage.

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D4.1.3 DC Link

.1 100 Hz Harmonic	0.0 ... 999.9 V
.2 120 Hz Harmonic	0.0 ... 999.9 V

.1 100 Hz Harmonic Indicates the 100 Hz harmonic amplitude in the DC link voltage signal.

.2 120 Hz Harmonic Indicates the 120 Hz harmonic amplitude in the DC link voltage signal.

D4.1.4 Control Voltages

It indicates the voltage of the CFW900 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.

D4.1.6 Thermal Management

It indicates the control variables of the inverter thermal management function.

D4.1.6 Thermal Management

.1 IGBT Overload Status	0 ... 2
.2 IGBT Overload Counter	0.00 ... 100.00 %
.3 Heat Sink Temp.	-327.68 ... 327.67 °C
.4 IGBT Junction Temp.	-327.68 ... 327.67 °C
.5 Diode Junction Temp.	-327.68 ... 327.67 °C

.1 IGBT Overload Status It indicates the status of the IGBT overload fault through the overload curve that is active.

The overload curve is active when the output current is greater than the rated current. At this point, the active curve is determined as a function of the overload class chosen by the user and the ratio between the two currents.

Indication	Description
0 = No Overload	IGBTs are not operating under overload. The ratio between the output current and rated current is below 1. The overload fault counter is decreased until it reaches 0.
1 = Light Overload	IGBTs are operating under light overload. The ratio between the output current and rated current is between 1 and 1.4 for ND, and 1 and 1.5 for HD.
2 = Heavy Duty	IGBTs are operating under heavy overload. The ratio between the output current and rated current is above 1.4 for ND and above 1.5 for HD.

.2 IGBT Overload Counter It indicates the IGBT overload fault counter value (%).

The high load alarm on the IGBTs is activated with the counter at 90% and the fault with the counter at 100%. The counter value increases as a function of the ratio between the output current and the rated current.

.3 Heat Sink Temp. It indicates the inverter heat sink temperature (°C).

.4 IGBT Junction Temp. It indicates the estimated inverter IGBT junction temperature (°C).

.5 Diode Junction Temp. It indicates the estimated inverter diode junction temperature (°C).

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 CFW900 settings with the default content of the parameters.
2 = Default 50 Hz	It loads the CFW900 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 to 125 rpm; ■ C4.3.1.1.2 set to 1500 rpm; ■ C4.3.1.3.1 set to 75 rpm; ■ C5.9.3 set to 15 rpm; ■ C4.3.1.5.1 set to 75 rpm; ■ C5.9.4 set to 100 rpm; ■ C4.3.1.5.2 set to 250 rpm; ■ C5.9.5 set to 1500 rpm; ■ C4.3.1.5.3 set to 500 rpm; ■ C5.9.8 set to 15 rpm; ■ C4.3.1.5.4 set to 750 rpm; ■ C2.1.8 set to 1458 rpm; ■ C4.3.1.5.5 set to 1000 rpm; ■ C2.1.6 set to 50 Hz; ■ C4.3.1.5.6 set to 1250 rpm; ■ C2.1.2 set in kW; ■ C4.3.1.5.7 set to 1500 rpm; ■ C3.3.4.1.1 set to 1500 rpm; ■ C4.3.1.5.8 set to 1375 rpm; ■ C3.3.4.1.2 set to 1500 rpm; ■ C4.3.1.1.1 set to 75 rpm;
3 = Param. Set 1 -> CFW	It loads the CFW900 settings with the content of parameter set 1.

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Indication	Description
4 = Param. Set 2 -> CFW	It loads the CFW900 settings with the content of parameter set 2.
5 = Param. Set 3 -> CFW	It loads the CFW900 settings with the content of parameter set 3.
6 = CFW -> Param. Set 1	It saves the content of the CFW900 current settings to parameter set 1.
7 = CFW -> Param. Set 2	It saves the content of the CFW900 current settings to parameter set 2.
8 = CFW -> Param. Set 3	It saves the content of the CFW900 current settings to parameter set 3.
9 = SD Card -> CFW	It loads the CFW900 settings with the content of the parameter set 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 = CFW -> SD Card	It saves the content of the actual CFW900 settings on the SD card. Additionally, it exports the settings from parameter sets 1, 2 and 3 to the SD card.
11 = HMI -> CFW	It loads the CFW900 settings with the content of the parameter set from the HMI.
12 = CFW -> HMI	It saves the content of the actual CFW900 settings on the HMI.

D4.1.12 Advanced

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

D4.1.12 Advanced

.1 Code Flow 1	0 ... 4294967295
.2 Code Flow 1 Date Time	YYYY-MM-DD HH:MM:SS
.3 Code Flow 2	0 ... 4294967295
.4 Code Flow 2 Date Time	YYYY-MM-DD HH:MM:SS
.5 Code Flow 3	0 ... 4294967295
.6 Code Flow 3 Date Time	YYYY-MM-DD HH:MM:SS
.7 Code Flow 4	0 ... 4294967295
.8 Code Flow 4 Date Time	YYYY-MM-DD HH:MM:SS

.1 Code Flow 1 Indicates a numeric code to aid in fault diagnosis F608. The value of this parameter is coded, for WEG's exclusive use, and it may be requested by technical support.

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

.3 Code Flow 2 Indicates a numeric code to aid in fault diagnosis F608. The value of this parameter is coded, for WEG's exclusive use, and it may be requested by technical support.

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

.5 Code Flow 3 Indicates a numeric code to aid in fault diagnosis F608. The value of this parameter is coded, for WEG's exclusive use, and it may be requested by technical support.

.6 Code Flow 3 Date Time Indicates the date and time at which parameter D4.1.12.5 was last updated.

.7 Code Flow 4 Indicates a numeric code to aid in fault diagnosis F608. The value of this parameter is coded, for WEG's exclusive use, and it may be requested by technical support.

.8 Code Flow 4 Date Time Indicates the date and time at which parameter D4.1.12.7 was last updated.

D4.2 Control Accessories

It allows viewing the data for diagnosing the control accessories installed in the CFW900.

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
.2 Error Cause	0 ... 8
.3 Temperature	-100.0 ... 250.0 °C

.1 Status It displays the status of the accessory.

Indication	Description
0 = Not Connected	No accessory connected.
1 = Initializing	An accessory is connected, and it is initializing.
2 = Active	An accessory is connected, and it is communicating properly.
3 = Error	An accessory is connected, and it is presenting some error in the communication with the CFW900.

.2 Error Cause Last accessory communication error.

Indication	Description
0 = No Error	No error events.
1 ... 2 = Not used	Not used.
3 = Initialization Error	A resource required for the operation of the accessory could not be initialized.
4 = Not used	Not used.
5 = Incorrect Accessory	The identified accessory is different from the required one.
6 = Disconnected	The accessory is not correctly connected to the CFW900.
7 = Data Error 1	There was an error communicating with the accessory.
8 = Not used	Not used.

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

D5 Changed Parameters

All parameters with content different from the factory default can be viewed in sequence in this menu. Parameters and submenus of the changed parameters menu are no longer displayed as the user changes the parameter to its default value, and the submenu becomes empty.

Some parameters have value depending on the inverter model data, or they vary according to the power supply standard (50 or 60 Hz), such as:

- C1.1.1: Power Supply - Type.
- C1.1.2: Power Supply - Rated Voltage.
- C1.3.1: Switching Frequency - User.
- C1.3.2: Switching Frequency - Minimum.
- C2.1.3: Motor Data - Rated Power.
- C2.1.4: Motor Data - Rated Voltage.
- C2.1.5: Motor Data - Rated Current.
- C2.1.9: Motor Data - Rated Efficiency.
- C2.1.10: Motor Data - Rated cos phi.

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■ C9.9.3: Bluetooth - Device Name.

In these cases, the default value does not necessarily coincide with the value indicated at the bottom of the parameter editing screen. Therefore, it may remain shown in the navigation of changed parameters even if the user changes its value to the one indicated on the editing screen.

For information on the default value of parameters that depend on the grid frequency, see the description of parameter C12.1: Backup - Load Parameters.

D5.1 Configurations

It displays the configuration menu parameters with contents different from the factory default.

D5.2 Application

It displays the application menu parameters with contents different from the factory default.

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It allows changing the CFW900 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.

C1.1 Power Supply

It allows configuring the type (three-phase, single-phase, DC) of the CFW900 main power supply.

C1.1 Power Supply

C1.1.1 Type

Range:	0 ... 2	Default: -
Properties:	Stopped, Model	

Description:

It determines the type of the inverter power supply.

Selects whether the inverter power supply is 3-phase AC, single-phase AC or DC.

Indication	Description
0 = Three-phase AC	Power supply with three phases in alternating current.
1 = Single-phase AC	Power supply with phase and neutral or two phases in alternating current.
2 = DC	Power supply via DC link in direct current.

C1.1 Power Supply

C1.1.2 Rated Voltage

Range:	1 ... 1200 V	Default: -
Properties:	Stopped, Model	

Description:

It indicates the inverter rated supply voltage.

The voltage value complies with the type of power supply selected by the user (C1.1.1), being a value in alternating voltage (Vac) if the type of power supply is three-phase or single-phase AC, and a value in direct voltage (Vdc) if the power supply is DC.

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	

C CONFIGURATIONS

Description:

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

This parameter directly influences the rated current value of the inverter (S1.3.5) used as a reference for the IGBT 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.

C1.3 Switching Frequency

It allows setting the inverter Switching Frequency values.

C1.3 Switching Frequency

C1.3.1 User

Range:	1.0 ... 16.0 kHz	Default: -
Properties:	Stopped, Model	

Description:

It sets the inverter switching frequency value.

The C1.3.1 parameter has some maximum value restrictions based on the type of motor (C2.1.1) and control (C3.1.1) set, as shown in [Table 11.4 on page 11-2](#).

Table 11.4: Maximum switching frequency (in kHz)

Motor type C2.1.1	Control type C3.1.1			
	Scalar	VVW+	Encoder Vector	Sensorless Vector
Induction	16.0	16.0	12.0	12.0
Synchronous - IPSPM	-	8.0	6.0	6.0
Synchronous - SPSM	-	8.0	-	6.0
Synchronous - HSRM	-	8.0	-	6.0



NOTE!

For the operation of synchronous motors, the value of C1.3.1 ≥ 2.0 kHz should be used.

C1.3 Switching Frequency

C1.3.2 Minimum

Range:	1.00 ... 16.00 kHz	Default: -
Properties:	Stopped, Model	

Description:

It sets the minimum value that the switching frequency may have depending on the setting of the thermal management functions.

C1.4 PWM Modulation

It allows configuring the PWM modulation modes.

C1.4 PWM Modulation

C1.4.1 Type

Range:	0 ... 2	Default: -
Properties:	Model	

Description:

It sets the PWM modulation type. The models of frames A, B, C, D and E have SVM as default value, while the other models ePWM.

Indication	Description
0 = SVM	Space Vector Modulation - Type of PWM modulation to have output voltage close to power supply voltage with low harmonic distortion.
1 = ePWM	Modulation used to reduce inverter switching losses.
2 = Long Cable Modulation	Modulation suitable for long cable applications. It is recommended to use from 100 meters of cable between inverter and motor.

**NOTE!**

ePWM modulation is not recommended for applications with Sensorless Vector control. During Oriented Start-up, if the selected control type is Sensorless Vector and the programmed modulation type is ePWM, it will be automatically set to SVM modulation.

C1.4 PWM Modulation**C1.4.4 PMW Wid. Adj. Long Cab.**

Range: 0.00 ... 1.00

Default: 0.15

Properties:

Description:

It sets the minimum duty cycle value allowed in the switching of the inverter. This parameter must only be changed when it is observed that the voltage peaks reflected in the motor stator are exceeding twice value of the DC link. In this case, it is suggested that you gradually increase this value.

**NOTE!**

This parameter is only functional when C1.4.1 = 2 (Long Cable Modulation).

C1.4 PWM Modulation**C1.4.5 Dead Time Compensation**

Range: 0 ... 1

Default: 1

Properties: Stopped

Description:

It enables the dead time compensation algorithm.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

C1.4 PWM Modulation**C1.4.6 Low-Pass Cutoff Freq.**

Range: 0.0 ... 50.0 Hz

Default: 5.0 Hz

Properties:

Description:

Determines the cutoff frequency of the low-pass filter used in DC link compensation.

C1.5 Fans Configuration

It allows setting the activation of the power and internal fans of the CFW900.

C CONFIGURATIONS

C1.5 Fans Configuration

C1.5.1 Power Fan Setting

Range: 0 ... 3

Default: 2

Properties:

Description:

It sets the inverter method for the inverter heat sink fan.

Indication	Description
0 = Off	Fan always off.
1 = On	Fan always running.
2 = Temp. Control w/ Init.Test	Software-controlled fan with initial test.
3 = Control by Temperature	Software-controlled fan without initial test.



NOTE!

The initial test consists of keeping the fans running for 1 minute after the inverter is powered up.

C1.5 Fans Configuration

C1.5.2 Internal Fan Setting

Range: 0 ... 3

Default: 2

Properties:

Description:

It sets the drive method for the inverter internal fan.

Indication	Description
0 = Not used	Not used.
1 = On	Fan always running.
2 = Temp. Control w/ Init.Test	Software-controlled fan with initial test.
3 = Control by Temperature	Software-controlled fan without initial test.



NOTE!

The initial test consists of keeping the fans running for 1 minute after the inverter is powered up.



NOTE!

For inverter models with a 660/690 V supply (S1.3.4 bit 8 = Yes) configured in options 2 or 3 in the table, the internal fans can also be switched on depending on the DC link voltage (greater than 1000 V) or if the power fans are switched on.

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

C1.6.1 Invert Output Phase Seq.

Range: 0 ... 1

Default: 0

Properties: Stopped

Description:

It sets the direction of rotation of the motor.

Indication	Description
0 = U(T1)/V(T2)/W(T3)	Direction of rotation according to the direction of rotation command.
1 = W(T3)/V(T2)/U(T1)	Direction of rotation opposite the direction of the run command.

C1.6 Other Inverter Settings

C1.6.2 Reset Counters

Range:	0 ... 3	Default: 0
Properties:		

Description:

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

Indication	Description
0 = Disabled	Disable function.
1 = Energy	It resets energy parameters S2.3.6, S2.3.7 and S2.3.8.
2 = Fan On	It resets fan ON hours parameter D3.3.
3 = Inverter Enabled	It resets inverter enabled hours parameter D3.2.

C1.6 Other Inverter Settings

C1.6.4 Manual Inom Derating

Range:	0.0 ... 100.0 %	Default: 0.0 %
Properties:		

Description:

It determines the manual derating value to be applied to the rated current.

Additionally applied to the rated current value after the settings relating to the inverter power supply and switching frequency.

C1.7 Control Accessories

General settings of the accessories installed on the CFW900.

C1.7.1 Slot A to C1.7.7 Slot G

It allows viewing the status of the configuration parameters of the Slot.

C1.7.1 Slot A

C1.7.2 Slot B

C1.7.3 Slot C

C1.7.4 Slot D

C1.7.5 Slot E

C1.7.6 Slot F

C1.7.7 Slot G

.1 Request Identification

Range:	0 ... 10	Default: 0
Properties:	Stopped	

Description:

It allows forcing the use of a certain accessory. If the accessory is not installed a fault will be generated.

Indication	Description
0 = Automatic	Automatic identification. It does not require using a certain accessory.
1 = No Accessory	This Slot must not contain any accessory.
2 = CFW900-IOAI-01	Accessory with analog inputs and outputs.
3 = CFW900-IOD-01	Accessory with digital inputs and outputs.

C CONFIGURATIONS

Indication	Description
4 = CFW900-REL-01	Accessory with digital relay outputs.
5 = CFW900-TEMP-01	Accessory with isolated inputs for PTC/PT100/PT1000 sensors.
6 = CFW900-ENC-01	Accessory for incremental encoder connection.
7 = Not used	Not used.
8 = CFW900-CCAN-W	Communication accessory for CAN interface.
9 = CFW900-C...-N (Anybus)	Communication accessory for Anybus module.
10 = Not used	Not used.

C2 MOTOR

Definition of the characteristics of the motor to be driven by the CFW900 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:

It sets the type of motor to be driven by the CFW900 inverter.

Indication	Description
0 = Induction	It selects induction motor.
1 = Synchronous - IPSM	It select synchronous motor with internal permanent magnet.
2 = Synchronous - SPSM	It select synchronous motor with surface permanent magnet.
3 = Synchronous - HSRM	It selects magnet-assisted synchronous reluctance motor.
4 = Not used	Not used.



NOTE!

[Table 11.17 on page 11-11](#) shows the control types available for each motor type.

C2.1 Motor Data

C2.1.2 Motor Power Unit

Range:	0 ... 1	Default: 0
Properties:	Stopped	

Description:

It sets the unit used to specify the motor power.

Indication	Description
0 = HP/cv	It sets the power unit to horsepower.
1 = kW	It sets the power unit to kilowatts.

C2.1 Motor Data**C2.1.3 Rated Power**

Range:	0.0 ... 2000.0	Default: -
Properties:	Stopped, Model	

Description:

It sets the value of the motor rated power (according to the unit defined in C2.1.2) as per the motor nameplate data.

C2.1 Motor Data**C2.1.4 Rated Voltage**

Range:	1 ... 690 V	Default: -
Properties:	Stopped, Model	

Description:

It sets the motor rated voltage. This value cannot be above the rated power supply voltage set in C1.1.2.

C2.1 Motor Data**C2.1.5 Rated Current**

Range:	0.0 ... 2223.0 A	Default: -
Properties:	Stopped, Model	

Description:

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

C2.1 Motor Data**C2.1.6 Rated Frequency**

Range:	0.0 ... 1000.0 Hz	Default: 60.0 Hz
Properties:	Stopped	

Description:

It sets the motor rated frequency.

**NOTE!**

The maximum output frequency of the inverter is limited to 1/8 of the rated switching frequency. For example, with a switching frequency of 4.0kHz, the maximum output frequency will be 500Hz. For more information, see the User Manual.

C2.1 Motor Data**C2.1.7 Number of Poles**

Range:	2 ... 180	Default: 4
Properties:	Stopped	

Description:

Defines the number of motor poles.

**NOTE!**

Parameter available only for synchronous motor.

C2.1 Motor Data**C2.1.8 Rated Speed**

Range:	0 ... 30000 rpm	Default: 1750 rpm
Properties:	Stopped	

C CONFIGURATIONS

Description:

It sets the motor rated speed.

C2.1 Motor Data		
C2.1.9 Rated Efficiency		
Range:	50.0 ... 99.9 %	Default: -
Properties:	Stopped, Model	

Description:

It sets the motor rated efficiency.

C2.1 Motor Data		
C2.1.10 Rated cos phi		
Range:	0.50 ... 0.99	Default: -
Properties:	Stopped, Model	

Description:

It defines the rated $\cos \varphi$ of the motor.

C2.1 Motor Data		
C2.1.11 Service Factor		
Range:	1.00 ... 1.50	Default: 1.00
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.

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

In the Oriented Start-Up routine, the value set in C2.1.12 automatically modifies the parameters related to the motor overload fault as follows:

Table 11.15: 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 Parameters

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 Parameters**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 Parameters**C2.2.2 Magnetizing Reactance**Range: 0.0 ... 800.0 Ω Default: 1.0 Ω

Properties:

Description:

It sets the motor magnetizing reactance value.

C2.2 Motor Model Parameters**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 Parameters**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 Parameters**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 Parameters**C2.2.6 Ld Inductance**

Range: 0.00 ... 10000.00 mH

Default: 0.00 mH

Properties:

Description:

It sets the value of the motor shaft Ld inductance.

C2.2 Motor Model Parameters**C2.2.7 Lq Inductance**

Range: 0.00 ... 10000.00 mH

Default: 0.00 mH

Properties:

Description:

It sets the value of the motor shaft Lq inductance.

C CONFIGURATIONS

C2.2 Motor Model Parameters

C2.2.8 Ke Constant

Range: 0.0 ... 3200.0

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). Voltage V represents the phase-to-phase voltage.

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; it allows multiple motor operation.

VVW+: Voltage Vector WEG Plus; a static speed control method that is more accurate than scalar control; it automatically adjusts to the input supply line fluctuations as well as load variations, but it does not provide fast dynamic response; speed regulation with programmable slip compensation.

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:

It defines the type of control that will be used to control the motor speed or torque.

Indication	Description
0 = Scalar	Voltage/frequency scalar control.
1 = VVW+	Voltage Vector WEG Plus Control.
2 = Encoder Vector	Vector control with encoder (with speed sensor).
3 = Sensorless Vector	Sensorless vector control (without speed sensor).

Table 11.17 on page 11-11 shows the control types available for each motor type. More information can be found in the menu C3.

Table 11.17: Control type available for each motor type

Motor type C2.1.1	Control type C3.1.1			
	Scalar	VVW+	Encoder Vector	Sensorless Vector
Induction	Available	Available	Available	Available
Synchronous - IPSPM	Not available	Available	Available	Available
Synchronous - SPSM	Not available	Available	Not available	Available
Synchronous - HSRM	Not available	Available	Not available	Available

**NOTE!**

When vector control (encoder or sensorless) is used, the maximum switching frequency that can be set in the parameter C1.3.1 is reduced and the inverter can go into the Config state. For more information on this restriction, see [Table 11.4 on page 11-2](#).

C3.2 Scalar and VVW+ Control

This chapter covers the types of scalar and VVW+ control. A brief explanation of how each control works will be presented, as well as recommendations for applications where each control can perform best.

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 11.1 on page 11-11](#) 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.

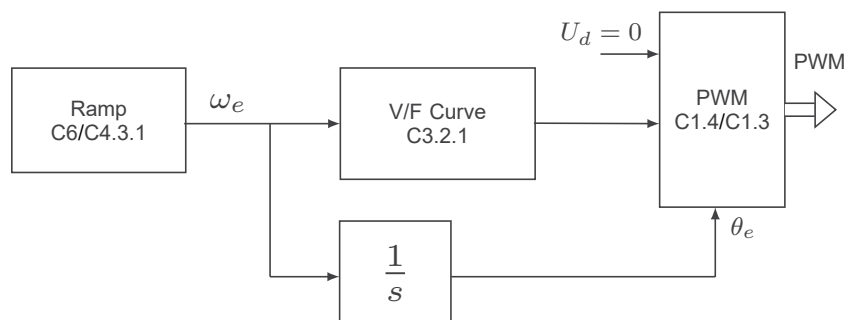


Figure 11.1: Block diagram of scalar control for induction motors

VVW+ Control for Induction Motor

The VVW+ control is an improvement on the classic scalar control structure. In this one, two additional loops are integrated to improve control performance at low frequencies. The first one is the speed loop, in which the motor slip is calculated, and it is fed back into the speed reference. The second one is the voltage loop, in which the voltage drop of the stator resistance is calculated, and it is fed back into the voltage reference. [Figure 11.2 on page 11-12](#) shows the VVW+ control in a block diagram.

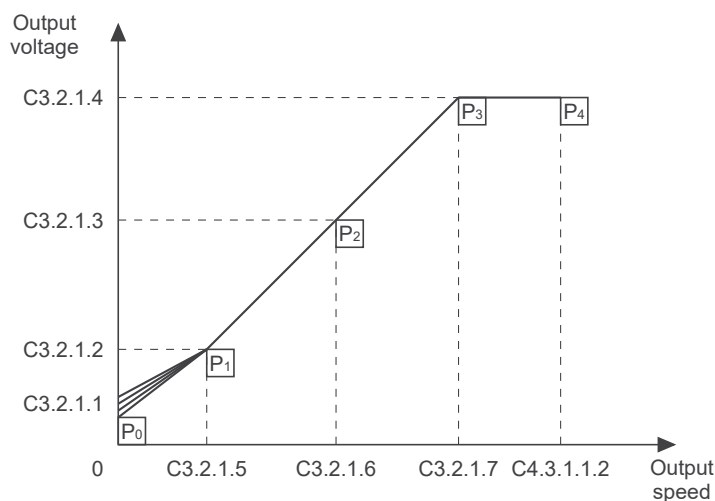


Figure 11.5: Torque boost region



NOTE!

This functionality is not used when the VVW+ control and induction motor are selected.



NOTE!

This feature is not used during the motor deceleration process.

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 P₁ to adapt the V/F curve of the inverter together with its pair C3.2.1.5.

C3.2.1 V/F Curve

C3.2.1.3 Intern. Output Voltage

Range: 0.0 ... 100.0 %

Default: 66.7 %

Properties: Stopped

Description:

It sets the voltage value of point P₂ to adapt the V/F curve of the inverter 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 P₃ to adapt the V/F curve of the inverter together with its pair C3.2.1.7.



NOTE!

The value of the maximum output voltage C3.2.1.4 in 100% corresponds to the rated voltage of the motor C2.1.4. For cases where the inverter is being powered by a line voltage higher than the rated motor voltage, the output voltage applied by the inverter continues to be 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 adapt the V/F curve of the inverter 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 adapt the V/F curve of the inverter 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 adapt the V/F curve of the inverter 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 and VVW+ control, it allows setting a percentage of the motor stator flux in relation to the rated stator flux.

**NOTE!**

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

C3.2.2 VVW+ 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 synchronous motors, the parameters below are available.

C3.2.2.1 VVW+ Induction Motor

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

C3.2.2.1 VVW+ 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. See [Figure 11.2 on page 11-12](#) for more details.

C CONFIGURATIONS

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.



NOTE!

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

C3.2.2.1 VVW+ Induction Motor

C3.2.2.1.2 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. See [Figure 11.2 on page 11-12](#) for more details.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.



NOTE!

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

C3.2.2.1 VVW+ Induction Motor

C3.2.2.1.3 Filter

Range: 1 ... 100 ms

Default: 32 ms

Properties:

Description:

It sets the low-pass filter time constant value of the motor slip signal.

C3.2.2.2 VVW+ Synchronous Motor

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



NOTE!

Function available only for synchronous machines.

C3.2.2.2 VVW+ 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	Function enable.

C3.2.2.2 VVW+ 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 most efficient point.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

C3.2.2.2 VVW+ Synchronous Motor**C3.2.2.2.4 Efficiency Adjustment Gain****Range:** 0.000 ... 4.000**Default:** 1.000**Properties:****Description:**

It allows setting the MTPA function for the best efficiency. This setting can be checked by the value of the motor output current (S2.3.1) and motor torque (S2.2.3).

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.2.2.2 VVW+ Synchronous Motor**C3.2.2.2.5 Proportional Gain****Range:** 0.000 ... 10.000**Default:** 1.000**Properties:****Description:**

It sets the value of the MTPA regulator proportional gain.

**NOTE!**

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

**NOTE!**

Function available only for SPSM and IPSM motor (C2.1.1 = 1 or 2).

C3.2.2.2 VVW+ Synchronous Motor**C3.2.2.2.6 Integral Gain****Range:** 0.000 ... 10.000**Default:** 1.000**Properties:****Description:**

It sets the value of the MTPA regulator integral gain.

**NOTE!**

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

**NOTE!**

Function available only for SPSM and IPSM motor (C2.1.1 = 1 or 2).

C CONFIGURATIONS

C3.2.2.2 VVW+ 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. For HSRM synchronous machine, the default value is 80%.

For HSRM:

The minimum voltage applied by the MTPA function will always be the value from the V/F curve (shown in [Figure 11.5 on page 11-14](#)) multiplied by the value set in (C3.2.2.2.8). Therefore, if the voltage applied to the motor by the V/F curve is 100 V, the minimum voltage value will be 80 V.

For IPSM and SPSM:

The minimum voltage value in Volts (V) is the ratio percentage (C2.2.8 * S2.1.1)/1000.

Example:

C2.2.8: Motor Model Parameters - Ke Constant = 120 V/kRPM.

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

C3.2.2.2.8: VVW+ Synchronous Motor - MTPA Minimum Voltage = 50.0 %.

Minimum MTPA Voltage (V) = (C3.2.2.2.8 / 100) * (C2.2.8 * S2.1.1) / 1000 = 54 V.

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 Enable Function

Range: 0 ... 1

Default: 1

Properties:

Description:

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

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 = Enable	Function enable.

C3.2.3 Current Stabilization

C3.2.3.2 Proportional Gain

Range: 0.000 ... 10.000

Default: 0.150

Properties:

Description:

It sets the value of the Current Stabilizer proportional gain. The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.

**NOTE!**

If the motor current fluctuates at constant speed, it is suggested to reduce C3.2.3.2.

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 output saturation level of the motor current stabilization regulator.

C3.2.3 Current Stabilization**C3.2.3.7 Low-Pass Cutoff Freq.**

Range: 100.0 ... 2000.0 Hz

Default: 1000.0 Hz

Properties:

Description:

Determines the cutoff frequency of the low-pass filter.

C3.2.3 Current Stabilization**C3.2.3.8 High-Pass Cutoff Freq.**

Range: 0.0 ... 10.0 Hz

Default: 1.0 Hz

Properties:

Description:

Determines the cutoff frequency of the high-pass filter.

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 11.6 on page 11-19 illustrates 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.

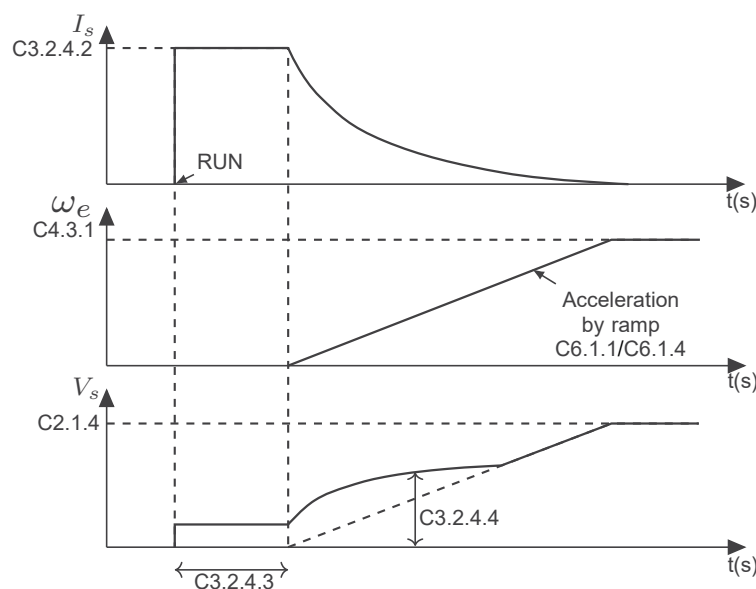


Figure 11.6: Illustrative diagram of the operation of the pre-magnetization function

C CONFIGURATIONS

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	Function enable.

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 11.6 on page 11-19](#) for more details.

C3.2.6 Voltage Stabilization

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

C3.2.6 Voltage Stabilization

C3.2.6.1 Operating Freq.

Range:	0 ... 1000 Hz	Default: 275 Hz
Properties:		

Description:

Determines the frequency at which the voltage stabilizer function starts operating.

C3.2.6 Voltage Stabilization**C3.2.6.2 Low-Pass Filter Cutoff Freq.**

Range: 0.0 ... 50.0 Hz

Default: 2.0 Hz

Properties:

Description:

Determines the cutoff frequency of the low-pass filter.

C3.2.6 Voltage Stabilization**C3.2.6.3 Stab. PI Saturation**

Range: 0.0 ... 10.0 %

Default: 2.0 %

Properties:

Description:

Sets the output saturation level of the motor voltage stabilization regulator.

C3.2.6 Voltage Stabilization**C3.2.6.4 Reg. PI Response Time**

Range: 0.0 ... 50.0 ms

Default: 5.0 ms

Properties:

Description:

Sets the response time of the voltage stabilizer. It is used to calculate the gains of the Proportional-Integral regulator. Setting this parameter allows you to more accurately determine the proportional and integral gains of the regulator. If you need a faster dynamic response, you should gradually decrease the value of this parameter.

The factory default value may change after performing the Oriented Start-up.

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 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.

Figure 11.7 on page 11-22 and Figure 11.8 on page 11-22 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

C CONFIGURATIONS

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.

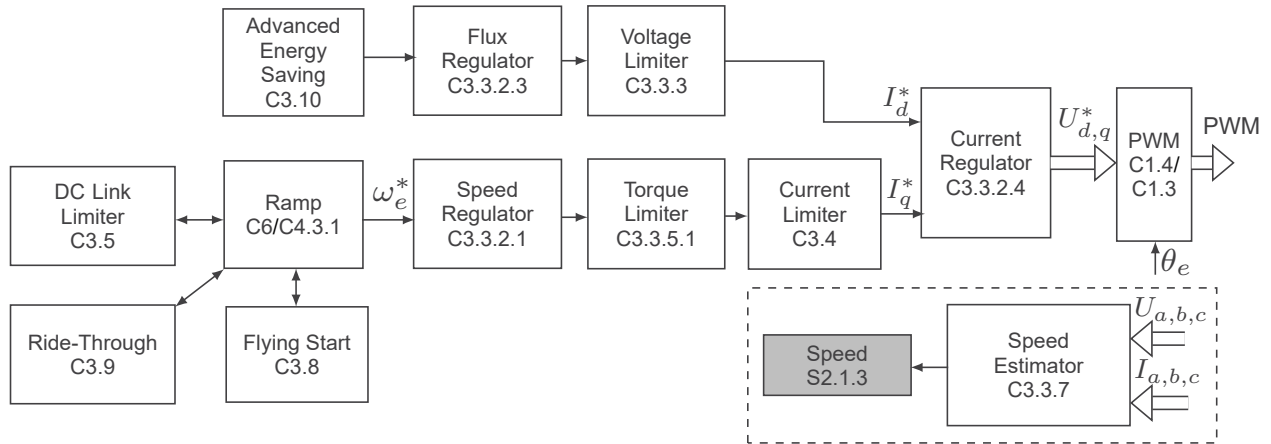


Figure 11.7: Block diagram of induction motor vector control in speed mode

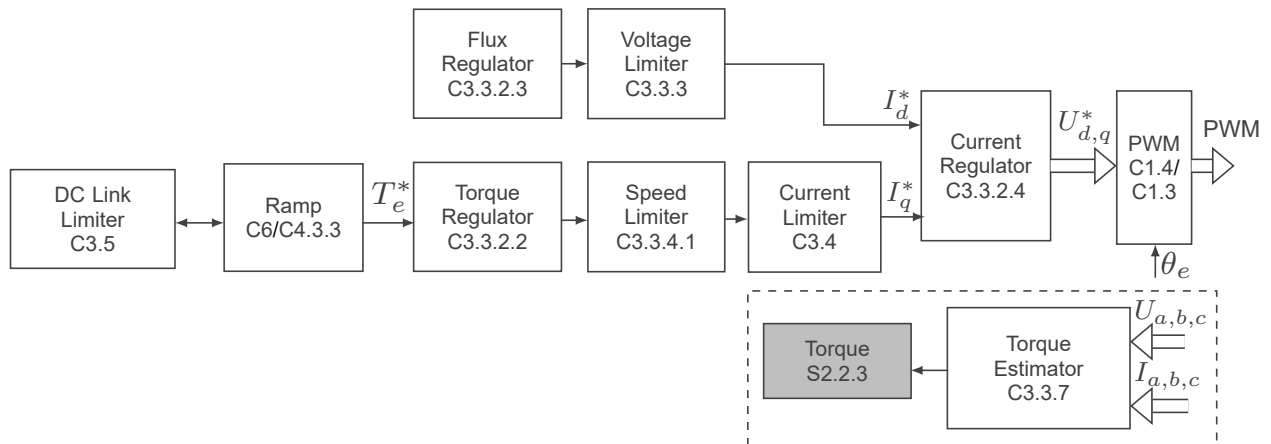


Figure 11.8: Block diagram of induction motor vector control in torque mode

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 CFW900.

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 (PM) 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 CFW900 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).
- HSRM: Permanent magnet assisted synchronous machine (Inductance L_d greater than L_q).

Vector control has particularities according to the type of machine selected. Therefore, it is extremely important to know the type of machine that will be used in the application.

The CFW900 contains an Self-Tuning routine for parameter identification of the synchronous machine. Self-Tuning options are described in section W2:

- 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 (C2.2.8) manually.



NOTE!

It is recommended that the motor rated current be greater than 1/3 of the inverter rated current.

Figure 11.9 on page 11-24 shows the block diagram for vector control with encoder and sensorless operation in speed mode 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.

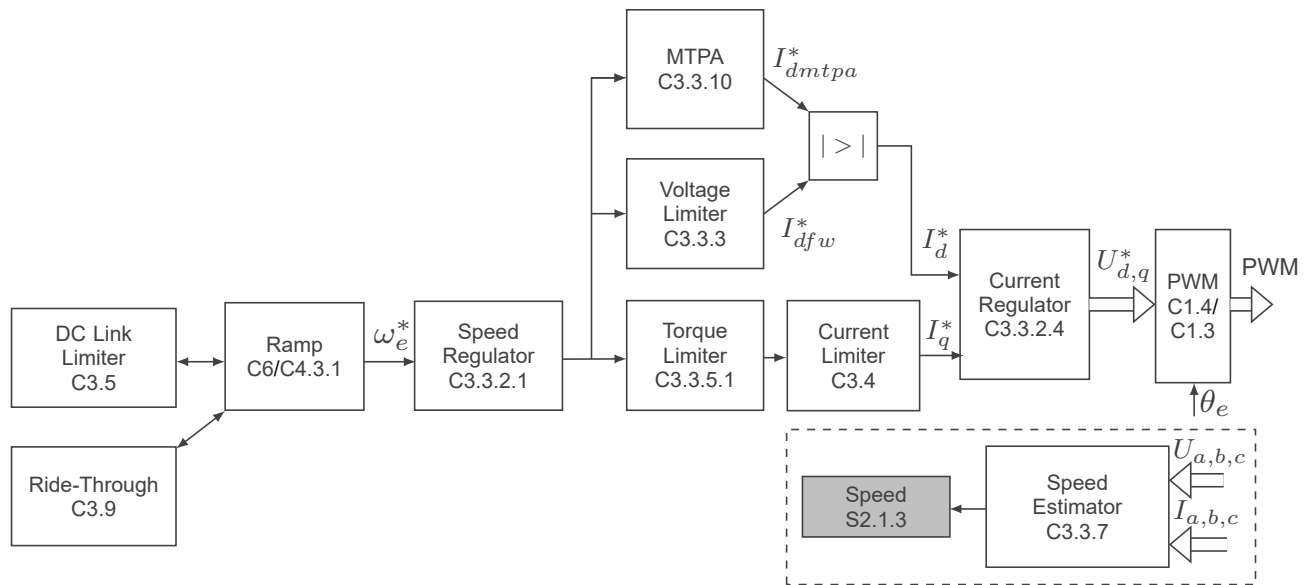


Figure 11.9: Synchronous motor vector control block diagram in the speed mode.

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:

It sets the control mode for the motor.

Indication	Description
0 = Speed	It enables control in Speed mode.
1 = Torque	It enables control in Torque mode.
2 = Defined by DI	The control mode is defined by the state of the digital input programmed 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

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. The options are shown in [Table 11.23 on page 11-25](#).

Table 11.23: Values assigned to the Digital Inputs of Slots X and A...G to define the Control Mode

Digital Input 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							
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 DI5 and DI6 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.
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 CFW900.

C3.3.1 Configuration**C3.3.1.6 Magnetization Mode**

Range:	0 ... 1	Default: 1
Properties:	Stopped	

Description:

Defines which command will start the motor magnetization.

Indication	Description
0 = General Enable	Applies magnetizing current after General Enable = ON.
1 = Run/Stop	Applies magnetizing current after Run/Stop = Run.

In the Run/Stop option:

For synchronous machines, the process to identify the rotor initial 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 is magnetized and then the speed or torque reference ramp is released.

In the General Enable option:

For synchronous machines: A high-frequency signal will be applied when the motor is stopped and the inverter

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is in the READY state. The process to identify the initial position of the rotor will only be performed once. This functionality is only valid for sensorless vector control. Thus, for vector control with encoder, the General Enable option and the Run/Stop option have the same dynamic behavior.

For induction machines: A direct current (magnetizing current) will be applied to the motor when it is stopped.



NOTE!

Induction Motor: For applications with on-load starts, the General Enable option is recommended.

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.

Procedure for Manual Optimization of the Speed Regulator:

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, configure a trend with the "Motor 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 11.10 on page 11-26](#) which waveform best represents the read signal.

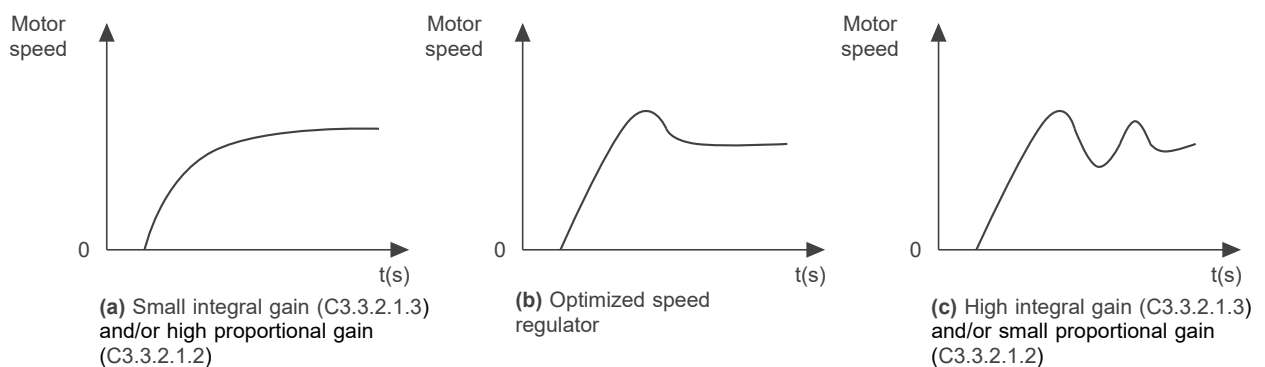


Figure 11.10: (a), (b) and (c) - Types of speed regulator response

7. Set C3.3.2.1.2 and C3.3.2.1.3 according to the type of response shown in [Figure 11.10 on page 11-26](#).

- 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 automatically setting the speed regulator gains according to the application speed and torque level. The calculation routine is performed based on the values set in C3.3.2.1.2 and C3.3.2.1.3.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

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 Low Pass Filter Time Constant****Range:** 12 ... 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.

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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 adjusted 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 C3.3.2.2.2.

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 adjusted 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 Torque Regulator differential gain value. 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 Reg. PI Response Time

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 Rated Flux

Range: 0.0 ... 120.0 %

Default: 100.0 %

Properties:

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**C3.3.2.3.2 Proportional Gain**

Range: 0.00 ... 5.00

Default: 1.00

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.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

**NOTE!**

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.3.3.

C3.3.2.3 Flux Regulator**C3.3.2.3.3 Integral Gain**

Range: 0.00 ... 100.00

Default: 1.00

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.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.3.2.3 Flux Regulator**C3.3.2.3.4 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.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

**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: 0.01 ... 100.00

Default: 1.00

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.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

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.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

**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: 0.01 ... 100.00

Default: 1.00

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.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.3.2.4 Current Regulator

C3.3.2.4.5 Reg. PI - Id Response Time

Range: 0.0 ... 50.0 ms

Default: 1.0 ms

Properties:

Description:

Sets the response time of axis d current control. It is used to calculate the gains of the Proportional-Integral regulator. Setting this parameter allows you to more accurately determine the proportional and integral gains of the regulator. If you need a faster dynamic response, you should gradually decrease the value of this parameter. It is recommended to first set the value of this parameter before setting gains C3.3.2.4.1 and C3.3.2.4.2.

The factory default value may change after performing the Oriented Start-up.

C3.3.2.4 Current Regulator**C3.3.2.4.6 Reg. PI - Iq Response Time****Range:** 0.0 ... 50.0 ms**Default:** 1.0 ms**Properties:****Description:**

Sets the response time of axis q current control. It is used to calculate the gains of the Proportional-Integral regulator. Setting this parameter allows you to more accurately determine the proportional and integral gains of the regulator. If you need a faster dynamic response, you should gradually decrease the value of this parameter. It is recommended to first set the value of this parameter before setting gains C3.3.2.4.3 and C3.3.2.4.4.

The factory default value may change after performing the Oriented Start-up.

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:**

It 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.

For Synchronous Machines:

The default value of this parameter is changed after the Oriented Start-up routine, depending on the selected vector control type in C3.1.1. For vector control with encoder (C2.1.4 = 2), the default value is changed to 96 %. For sensorless vector control (C2.1.4 = 3), the default value is changed to 92 %.

These values are selected to prevent the synchronous machine from operating in the overmodulation region. To avoid operating in the overmodulation region, if the DC link voltage is detected to exceed $1.35 \cdot C1.1.1$, it is possible to gradually increase the value of C3.3.3.1 in steps of 0.01.

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 value of the Voltage Limiter regulator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

**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.

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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 value of the Voltage Limiter regulator integral gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.3.3 Output Voltage Limiter

C3.3.3.4 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

C3.3.3.5 Field Weakening Gain

Range: 0.0 ... 5.0

Default: 1.0

Properties:

Description:

This parameter sets the field weakening current gain for synchronous machines. It is recommended to gradually increase the value of this parameter when the motor is operating at speeds greater than and equal to the rated speed, and the system is experiencing loss of synchronism during step load application. Loss of synchronism in these speed ranges (under load conditions) may manifest as a decrease in the motor speed. Not observing the desired speed reference for the system. Before changing this parameter, make sure that current limitation or torque limitation is not operating during load application.

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 11.11 on page 11-33](#)). If the motor speed exceeds these values, the torque reference is decreased to keep the motor speed limited.

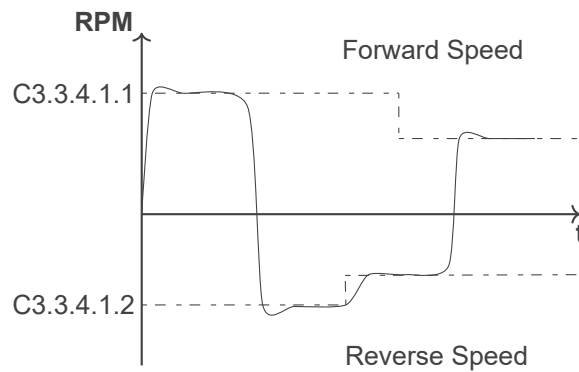


Figure 11.11: Speed behavior limited according to the settings

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 value of the Speed Limiter regulator proportional gain.

The gain values of this controller are automatically adjusted by the inverter. No settings are required for general purpose applications.

This parameter can be modified after performing the Self-Tuning.



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 value of the Speed Limiter regulator integral gain.

The gain values of this controller are automatically adjusted by the inverter. No settings are required for general purpose applications.

This parameter can be modified after performing the Self-Tuning.

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 ([Figure 11.12 on page 11-34](#)).

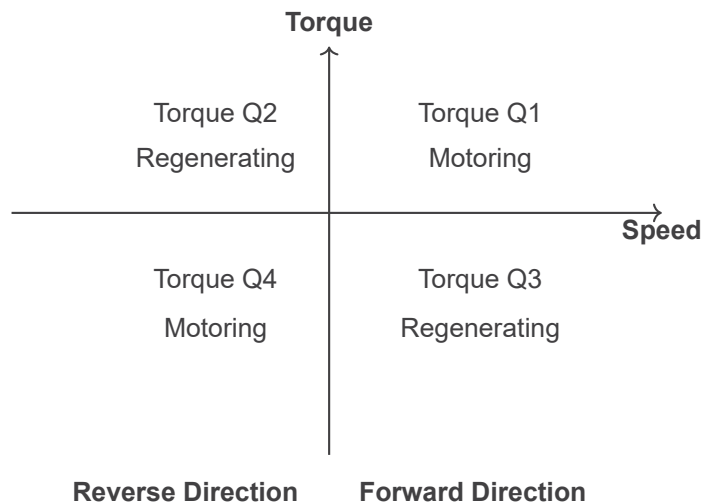


Figure 11.12: Convention of the motor torque limiters in the four motor operation quadrants

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 11.13 on page 11-34](#) 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.

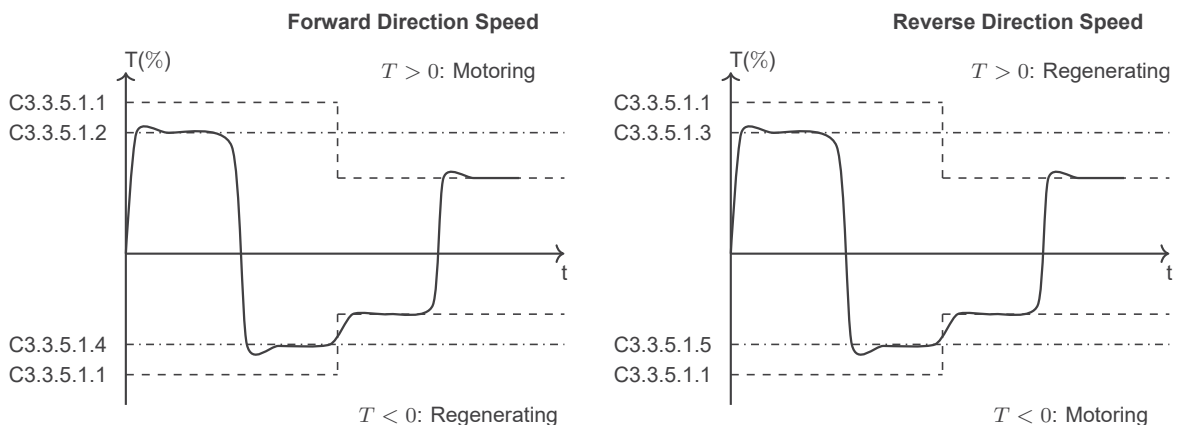


Figure 11.13: Torque behavior limited according to the settings

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 operation quadrants. 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.

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**

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. The options are shown in [Table 11.27 on page 11-35](#).

Table 11.27: Values assigned to the Analog Inputs of Slots X and A...G

Analog Input 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							
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 option D-3 (17).

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 value of the Torque Limiter regulator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

**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 value of the Torque Limiter regulator integral gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

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 correcting 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 value of the Steady State Speed Estimator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

**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 value of the Steady Speed Observer integral gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.3.7 Speed Steady State Estimator**C3.3.7.5 Synchronous Angle Filter****Range:** 1 ... 15 ms**Default:** 2 ms**Properties:****Description:**

It sets the cutoff frequency of the speed observer low-pass filter.

This low pass filter is used to filter the encoder speed signal used to determine the synchronous angle. This parameter only works when using vector control with encoder. In case of small oscillations in the electrical torque signal, gradually increase the value of this parameter.

C3.3.7 Speed Steady State Estimator**C3.3.7.6 Observer transition speed****Range:** 0 ... 2000 rpm**Default:** 300 rpm**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:

$$\text{RPM}_{\text{transition}} = \frac{10\% \times 1000 \times \text{C2.1.4}}{\text{C2.2.8}}$$

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.

C3.3.7 Speed Steady State Estimator

C3.3.7.8 Reg. PI Response Time

Range: 0.0 ... 50.0 ms

Default: 2.5 ms

Properties:

Description:

Sets the response time of the speed estimator for permanent duty. It is used to calculate the gains of the Proportional-Integral regulator. Setting this parameter allows you to more accurately determine the proportional and integral gains of the regulator. If you need a faster dynamic response, you should gradually decrease the value of this parameter. It is recommended to first set the value of this parameter before setting gains C3.3.7.3 and C3.3.7.4.

The factory default value may change after performing the Oriented Start-up.

C3.3.8 Low Speed Estimator

HIGH-FREQUENCY SPEED OBSERVER

It allows viewing and changing the parameters related to the vector control High-Frequency Speed Observer.

The High-Frequency Speed Observer estimates the motor rotor speed without the need for prior knowledge of the motor electrical parameters. As a result, it is more robust and reliable than the Linear observer, which depends on parameters. This function applies a high-frequency signal to the motor stator to identify the rotor speed. This high-frequency signal causes an acoustic noise of greater intensity in the environment.

The High-Frequency Observer is available for applications using induction motor and synchronous machines. In induction machines, its operation is restricted to speeds below 100 rpm. Above these critical speeds, the High-Frequency Observer is automatically turned off.

Driving synchronous machines using the sensorless vector control is only possible with the High-Frequency Observer. However, it is possible to drive induction machines without this observer. Even so, to improve the performance of the sensorless vector control of induction machines, it is recommended to use this observer in applications such as: operation with rated load below 100 rpm, torque reversal, speed reversal and operation at 0 rpm with rated load.



NOTE!

For Synchronous Machines: The initial position identification process is conducted using a switching frequency of 6.0 kHz regardless of the value set in C1.3.1.



NOTE!

For Synchronous Machines: The high-frequency speed observer is performed using a switching frequency of at least 4.0 kHz regardless of the value set in C1.3.1.



NOTE!

Before enabling the High-Frequency Observer to drive induction machines, try increasing the Speed Regulator gains: C3.3.4.1.3 and C3.3.4.1.4.

C3.3.8 Low Speed Estimator**C3.3.8.1 Enable Function****Range:** 0 ... 1**Default:** 1**Properties:****Description:**

It allows enabling the High-Frequency Speed Observer.

**NOTE!**

This parameter is automatically enabled in the Oriented Start-up when synchronous motor and vector control are selected.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

C3.3.8 Low Speed Estimator**C3.3.8.2 Carrier Amplitude****Range:** 0.00 ... 50.00**Default:** 0.30**Properties:****Description:**

It allows setting the amplitude of the high-frequency signal injected into the motor. The high-frequency signal is removed when the transition from the speed observer methods occurs.

C3.3.8 Low Speed Estimator**C3.3.8.3 Carrier Frequency****Range:** 0 ... 5000 Hz**Default:** 850 Hz**Properties:****Description:**

It allows setting the frequency of the high-frequency signal injected into the motor. The value of this parameter changes during Oriented Start-up according to the motor type (C2.1.1) and the rated frequency of the motor (C2.1.6).

For IPSPM motors, the value of C3.3.8.3 will be set to 450 Hz.

C3.3.8 Low Speed Estimator**C3.3.8.4 Proportional Gain****Range:** 0.00 ... 10.00**Default:** 1.00**Properties:****Description:**

It sets the value of the High-Frequency Observer proportional gain.

The gain values of this controller are automatically adjusted by the inverter. No settings are required for general purpose applications.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

**NOTE!**

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.8.5.

C CONFIGURATIONS

C3.3.8 Low Speed Estimator

C3.3.8.5 Integral Gain

Range:	0.00 ... 10.00	Default: 1.00
Properties:		

Description:

It sets the value of the High-Frequency Speed Observer integral gain. The gain values of this controller are automatically adjusted by the inverter. No settings are required for general purpose applications.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.3.8 Low Speed Estimator

C3.3.8.6 Identification of the Magnetic Pole

Range:	0.00 ... 0.50	Default: 0.25
Properties:		

Description:

This parameter sets the voltage level applied to the motor to identify the permanent magnet magnetic pole. Gradually increase the value of this parameter when identification of the magnetic pole fails. The value of this parameter must be gradually decreased if the occurrence of overcurrent protection is recurrent. The default value will be modified during the Oriented Startup routine according to the rated power of the motor, which is set in C2.1.3.

C3.3.8 Low Speed Estimator

C3.3.8.7 Reg. PI Response Time

Range:	0.0 ... 50.0 ms	Default: 2.0 ms
Properties:		

Description:

Sets the speed estimator response time for low speeds. It is used to calculate the gains of the Proportional-Integral regulator. Setting this parameter allows you to more accurately determine the proportional and integral gains of the regulator. If you need a faster dynamic response, you should gradually decrease the value of this parameter. It is recommended to first set the value of this parameter before setting gains C3.3.8.4 and C3.3.8.5.

The factory default value may change after performing the Oriented Start-up.

C3.3.9 Online Parameters Estimator

ONLINE ELECTRICAL PARAMETER ESTIMATOR

It allows viewing and changing the configuration of the functions responsible for estimating, online, the electrical parameters of the motor.

The Xm Estimator determines the magnetic impedance of the induction motor according to the system load level. The Taus Estimator determines the stator time constant of the induction motor according to the system load level. These functions are essential for the proper operation of the sensorless vector control at low frequencies.

The Taur Estimator determines the rotor time constant of the induction motor according to the system load level. This function is exclusive to vector control with encoder.

C3.3.9 Online Parameters Estimator

C3.3.9.1 Estimator Configuration

Range:	0 ... 2 Bit	Default: 3
Properties:		

Description:

It allows configuring specific function modules for online parameter estimation. The Xm Online Estimator determines the magnetic impedance of the induction motor. Actuation occurs only for operating frequency above 15% of the rated frequency set in C2.1.6. The Online Taus Estimator determines the stator time constant of the induction motor. Actuation occurs only for operating frequency below 15% of the rated frequency set in C2.1.6. The online Taur Estimator determines the rotor time constant of the induction motor. Actuation takes place only in vector control with encoder.

**NOTE!**

This online parametric estimation module is only enabled for induction motors.

Bit	Value/Description
Bit 0 Enable Xm Estimator	It enables the online magnetization impedance (Xm) estimator of the three-phase induction motor. 0 = Disabled: Loop disabled. 1 = Enabled: Loop enabled.
Bit 1 Enable Taus Estimator	It enables the online estimator of the stator time constant (Taus) of the three-phase induction motor. 0 = Disabled: Loop disabled. 1 = Enabled: Loop enabled.
Bit 2 Enable Taur Estimator	It enables the online estimator of the stator time constant (Taur) of the three-phase induction motor. 0 = Disabled: Loop disabled. 1 = Enabled: Loop enabled.

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 ... 10.00

Default: 1.00

Properties:

Description:

It allows manually setting the system MTPA operating point.

C3.3.10 Maximum Torque per Ampere**C3.3.10.2 MTPA Automatic Setting**

Range: 0 ... 1

Default: 1

Properties:

Description:

It enables the online estimator that identifies the optimal MTPA according to the load level and motor speed.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

C3.3.10 Maximum Torque per Ampere**C3.3.10.3 Adjustment Level Minimum Flux**

Range: 0 ... 120 %

Default: 80 %

Properties:

C CONFIGURATIONS

Description:

Allows adjusting the minimum stator flux level during low speed operation. This functionality will be enabled only during the speed observer operation with high-frequency signal injection. It is recommended to decrease the value of C3.3.10.3 in step 5% to reduce the stator current. This modification will slow down the dynamic response and may result in reduced dynamic performance during load step response or start with rated load. If it is necessary to improve the control dynamic response in this speed range, it is recommended to increase the value of C3.3.10.3 in step 5%.

C3.3.10 Maximum Torque per Ampere

C3.3.10.4 Minimum Idref MTPA

Range: 0 ... 100 %

Default: 40 %

Properties:

Description:

Allows adjusting the minimum d-axis reference current value (Idref) imposed by the MTPA function.

C3.3.11 Self-Tuning

The Self-Tuning estimates the electrical and mechanical parameters of the motor. These parameters will be used in vector control structures to control the speed, current and electrical torque of the motor. Estimated motor parameters can be viewed in C2.2.

C3.3.11 Self-Tuning

C3.3.11.1 PI Regulator Response Id

Range: 0.0 ... 100.0 ms

Default: 10.0 ms

Properties:

Description:

Allows adjusting the response time of the current regulator that estimates the direct axis inductance Ld. It is recommended to increase the value of C3.3.11.1 in the event of an overcurrent fault during the estimation of the inductance Ld or during the estimation of the stator resistance Rs.

C3.3.11 Self-Tuning

C3.3.11.2 PI Regulator Response Lq

Range: 0.0 ... 100.0 ms

Default: 1.0 ms

Properties:

Description:

Allows adjusting the response time of the current regulator that estimates the quadrature axis inductance Lq. It is recommended to increase the value of C3.3.11.2 in the event of an overcurrent fault during the inductance estimation.

C3.3.11 Self-Tuning

C3.3.11.3 Current Amplitude for Estimation Lq

Range: 0 ... 100 %

Default: 100 %

Properties:

Description:

Adjusts the current level imposed on the motor during the estimation of inductance Lq.



NOTE!

If F071 occurs during the estimation of Lq, gradually decrease the value of this parameter.

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 11.14 on page 11-43](#) illustrates the function operation during the motor acceleration and deceleration process.

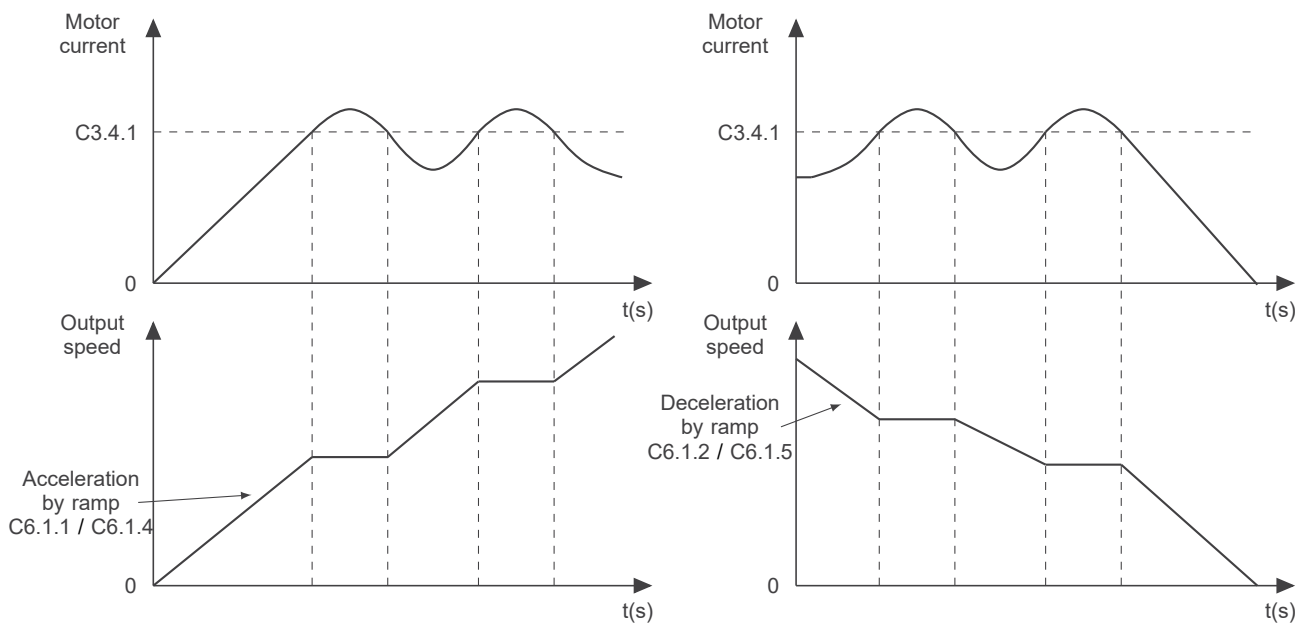


Figure 11.14: Current limitation during the acceleration and deceleration process

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 11.15 on page 11-44](#) shows the operation of the current limitation function when the motor is running at constant speed.

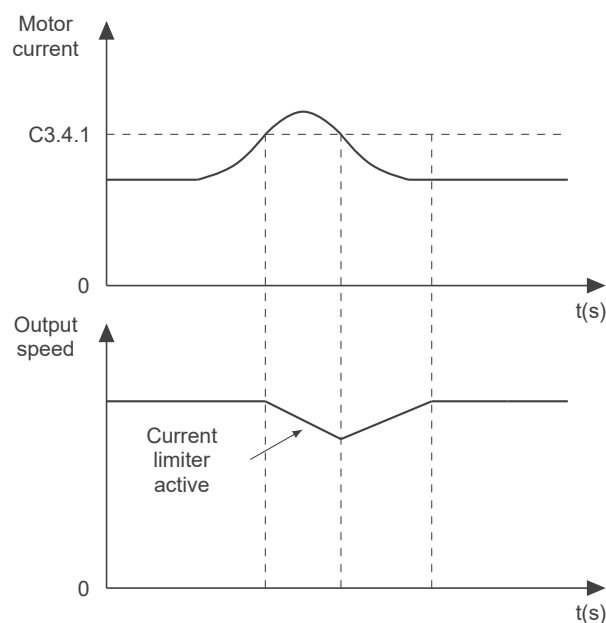


Figure 11.15: Current limitation when the motor is running at constant speed

C3.4 Current Limiter

C3.4.1 Actuation Level

Range: 0 ... 300 %

Default: 125 %

Properties:

Description:

This parameter sets the maximum current in the motor during the system operation. The full scale is the rated motor current set 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 inverter maximum current capacity.

C3.4 Current Limiter

C3.4.3 Proportional Gain

Range: 0.00 ... 5.00

Default: 1.00

Properties:

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.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.4 Current Limiter

C3.4.4 Integral Gain

Range: 0.00 ... 100.00

Default: 1.00

Properties:

Description:

This parameter sets the Integral 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 C3.4.4.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.4 Current Limiter**C3.4.5 Overcurrent Fault Level**

Range: 100 ... 250 %

Default: 150 %

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).

C3.4 Current Limiter**C3.4.6 Reg. PI Response Time**

Range: 0.0 ... 100.0 ms

Default: 10.0 ms

Properties:

Description:

Sets the response time of the current limiter. It is used to calculate the gains of the Proportional-Integral regulator. Setting this parameter allows you to more accurately determine the proportional and integral gains of the regulator. If you need a faster dynamic response, you should gradually decrease the value of this parameter. It is recommended to first set the value of this parameter before setting gains C3.4.3 and C3.4.4.

The factory default value may change after performing the Oriented Start-up.

C3.4 Current Limiter**C3.4.7 Low Pass Filter Time Constant**

Range: 0 ... 100 ms

Default: 5 ms

Properties:

Description:

Adjusts the time constant of the low-pass filter used to filter the motor current used in the detection of the protection F73. This parameter is only available for synchronous motors with ferrite magnets in the option C2.1.1 = 3.

**NOTE!**

The filter will be disabled when set to C3.4.7 = 0.

C3.5 DC Link Voltage Limiter

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 11.16 on page 11-46](#) illustrates the behavior of the function during the motor deceleration.

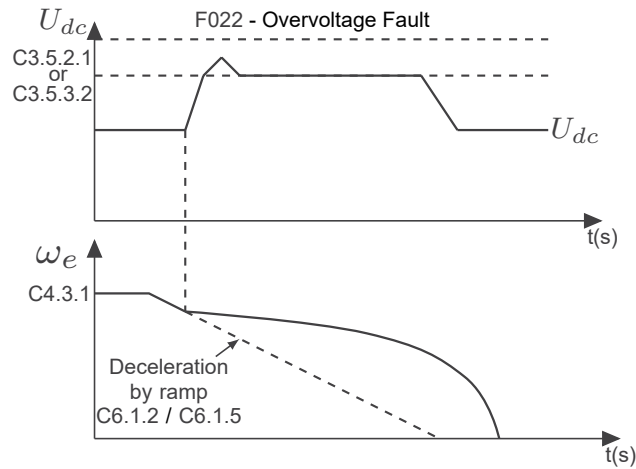


Figure 11.16: DC link limitation during deceleration process

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 11.17 on page 11-46](#) illustrates the behavior of the function when the motor is operating at constant speed and the load in the 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.

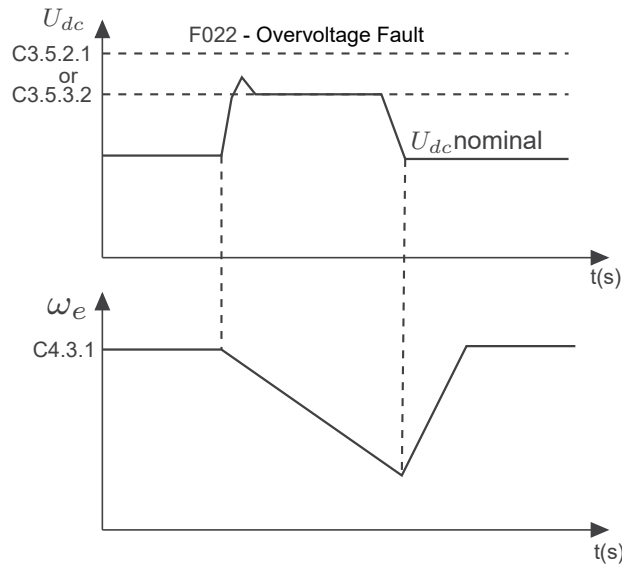


Figure 11.17: DC link limitation when the motor is operating at constant speed

C3.5.1 DC Link Volt. Limit. Config.

It allows setting the DC link voltage limiting function for all control types.

C3.5.1 DC Link Volt. Limit. Config.**C3.5.1.1 Enable Function****Range:** 0 ... 1**Default:** 1**Properties:****Description:**

It enables the DC Link Limitation function.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

C3.5.2 Scalar and VVW+ 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 and VVW+ Control**C3.5.2.1 Level****Range:** 114.0 ... 160.0 %**Default:** 120.0 %**Properties:****Description:**

It sets the actuation level of the DC link limiting function in the scalar and VVW+ control types.

Setting of the value of C3.5.2.1:

The value of C3.5.2.1 corresponds to a percentage of the DC Link Rated Voltage.

The DC Link Rated Voltage is typically given by $V_{\text{power supply}} * 1.35$. Some typical values, according to the inverter model, are shown in [Table 11.32 on page 11-47](#).

Table 11.32: DC Link Rated Voltage

$V_{\text{power supply}}$ (C1.1.2)	DC Link Rated Voltage	Recommended levels (120.0 %)
200 V	270 V	324 V
208/220/230/240 V	281/297/311/324 V	337/356/373/389 V
380 V	513 V	616 V
400/415 V	540/560 V	648/672 V
440/460 V	594/621 V	713/745 V
480 V	648 V	778 V
500/525 V	675/709 V	810/851 V
550/575/600 V	743/776/810 V	892/931/972 V
660/690 V	891/932 V	1069/1118 V

If the inverter keeps being blocked due to overvoltage on the DC link (F022) 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 supply voltage or increase the value of C3.5.2.1.

If, even with the above procedures, it is not possible to decelerate the motor within the necessary time, use the Dynamic Braking function. For more information see C3.6.

C3.5.2 Scalar and VVW+ Control**C3.5.2.2 Proportional Gain****Range:** 0.00 ... 5.00**Default:** 1.00**Properties:**

C CONFIGURATIONS

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.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.5.2 Scalar and VVW+ Control

C3.5.2.3 Integral Gain

Range: 0.000 ... 5.000

Default: 1.000

Properties:

Description:

It sets the value of the DC link voltage regulator integral 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.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.5.2 Scalar and VVW+ Control

C3.5.2.4 Speed Reference Hold Level

Range: 0.000 ... 9.999

Default: 0.950

Properties:

Description:

Defines the actuation level of the Speed Reference Hold function.

This function works together with the controller used in the DC link limiting function. When the DC link voltage level exceeds C3.5.2.4 times the value of the maximum rated DC link voltage, the speed ramp will enter a holding state. This state will be disabled when the DC link voltage value is lower than C3.5.2.1 or C3.5.3.2. [Table 11.35 on page 11-51](#) shows the values for the maximum DC link voltage rating.

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.

Its value must be gradually decreased if the system presents sustained DC link faults. If it does not have a consistent effect, 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	Function enable.

C3.5.3 Vector Control**C3.5.3.2 Level**

Range: 114.0 ... 160.0 % **Default:** 120.0 %

Properties:**Description:**

It sets the actuation level of the DC link limiting function in the vector control.

Setting of the value of C3.5.3.2:

The value of C3.5.3.2 corresponds to a percentage of the DC Link Rated Voltage.

The DC Link Rated Voltage is typically given by $V_{\text{power supply}} \cdot 1.35$. Some typical values, according to the inverter model, are shown in [Table 11.34 on page 11-49](#).

Table 11.34: DC Link Rated Voltage

$V_{\text{power supply}}$ (C1.1.2)	DC Link Rated Voltage	Recommended levels (120.0 %)
200 V	270 V	324 V
208/220/230/240 V	281/297/311/324 V	337/356/373/389 V
380 V	513 V	616 V
400/415 V	540/560 V	648/672 V
440/460 V	594/621 V	713/745 V
480 V	648 V	778 V
500/525 V	675/709 V	810/851 V
550/575/600 V	743/776/810 V	892/931/972 V
660/690 V	891/932 V	1069/1118 V

If the inverter keeps being blocked due to overvoltage on the DC link (F022) 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 such a voltage level that it results in a DC link voltage value greater than 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.

If, even with the above procedures, it is not possible to decelerate the motor within the necessary time, use the Dynamic Braking function. For more information see C3.6.

C3.5.3 Vector Control**C3.5.3.3 Proportional Gain**

Range: 0.00 ... 5.00 **Default:** 1.00

Properties:**Description:**

It sets the value of the DC link voltage regulator proportional gain.

C CONFIGURATIONS

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.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.5.3 Vector Control

C3.5.3.4 Integral Gain

Range: 0.000 ... 5.000

Default: 1.000

Properties:

Description:

It sets the value of the DC link voltage regulator integral 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.

This parameter works as a multiplier of an internal gain that is calculated during the Oriented Start-up process.

C3.6 Dynamic Braking

The braking torque that may be obtained by applying frequency inverters, without rheostatic braking resistors, varies from 10 % to 35 % of the motor rated torque.

To obtain higher braking torques, resistors are used for Dynamic Braking. In this case, the regenerated energy is dissipated in the resistor mounted outside the inverter.

This kind of braking is used in cases where short deceleration times are desired or when high-inertia loads are driven.

For vector control type, it is possible to use the Optimal Braking (C3.5.3.1), often eliminating the need for Dynamic Braking.

The Dynamic Braking function can only be used if a braking resistor is connected to the CFW900, and the parameters related to it are properly set.



NOTE!

All models of frames A, B, C, D and E with fixed suffix DB have internal braking IGBT, which is available in the standard version of frames A, B and C and as an optional item in frames D and E.

C3.6 Dynamic Braking

C3.6.1 DC Link Voltage Level

Range: 0.1 ... 100.0 %

Default: 95.0 %

Properties:

Description:

It allows viewing and changing the voltage level for the braking IGBT actuation, and it must be compatible with the inverter supply voltage.

If the setting is very close to the overvoltage actuation level (F022), it may occur before the braking resistor can dissipate the regenerated energy.

The value of C3.6.1 corresponds to a percentage of the maximum voltage capacity of the DC link (level at which the overvoltage fault actuates).

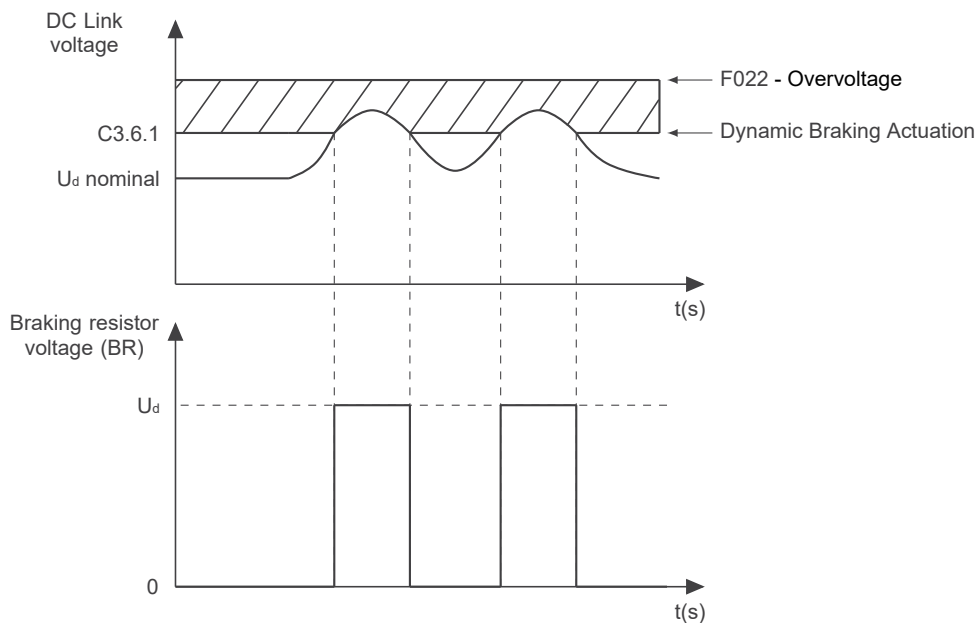
The following table shows the overvoltage actuation level according to the inverter model:

Table 11.35: Overvoltage actuation levels (F022)

C1.1.2	F022
200-240 V	400 V
380-480 V	800 V
500-600 V	1000 V
660-690 V	1200 V

**NOTE!**

If the level is lower than ($V_{\text{power supply}} * 1.35$), the system will try to regulate the DC link at a voltage lower than the one that the network is imposing, that is, it will not succeed and will remain activated forever.

**Figure 11.18:** Actuation curve of the Dynamic Braking**Steps to enable the Rheostatic Braking:**

1. It connects the braking resistor (see the User Manual in the section related to Rheostatic Braking).
2. Set C3.6.2 and C3.6.3 according to the braking resistor used.
3. Disable the DC Link Limiting function in C3.5.1.1.

C3.6 Dynamic Braking**C3.6.2 Resistor****Range:** 0.0 ... 500.0 Ω **Default:** 0.0 Ω **Properties:****Description:**

It sets the braking resistor value. It must be set equal to the ohmic resistance of the braking resistor used.

If C3.6.2 = 0.0, the overload fault on the braking resistor is disabled.

**NOTE!**

When the braking resistor is not used, it is recommended to disable the overload fault in the braking resistor.

C CONFIGURATIONS

C3.6 Dynamic Braking

C3.6.3 Power

Range: 0.02 ... 650.00 kW

Default: 0.02 kW

Properties:

Description:

It sets the actuation level of the Braking Resistor Overload fault. It must be set according to the braking resistor rated power (in kW) used.

If the average power in the braking resistor exceeds the value set in C3.6.3 for two minutes, the inverter will be locked by the Braking Resistor Overload fault (F077).

See the User Manual in the section related to Rheostatic Braking for more details regarding the selection of the braking resistor.

C3.7 DC Braking

It allows viewing and changing the parameters related to the DC Braking Function. This function injects a direct current into the motor.



NOTE!

For Synchronous Machines: There is no initial position identification when DC Braking is enabled in the modes: Start Only and Start-Stop.



NOTE!

The DC braking at start does not work when the Flying Start function is enabled (C3.8.1.1 = 1).



NOTE!

If during the Oriented Startup the Sensorless Vector Control and HSRM motor are selected, the DC Braking settings will be overwritten as follows:

- C3.7.1 = Only Start.
- C3.7.2 = 2.0 seconds.
- C3.7.5 = 50.0%.

C3.7 DC Braking

C3.7.1 Enable Function

Range: 0 ... 4

Default: 0

Properties: Stopped

Description:

It sets the moment the DC current is applied to the motor.



NOTE!

In mode C3.7.1 = 4, the DC Braking function acts continuously and the motor will never spin.

Indication	Description
0 = Disable	It disables the DC Braking.
1 = Only Start	It enables the DC current injection only at the motor start.
2 = Only Stop	It enables the DC current injection only at the motor stop.
3 = Start and Stop	It enables the DC current injection at the motor start and stop.
4 = Always Enabled	It keeps the DC current injection into the motor always enabled.

C3.7 DC Braking

C3.7.2 DC-Braking Start Time

Range: 0.0 ... 15.0 s

Default: 0.0 s

Properties:

Description:

It defines the time that direct current will be applied at the motor start.

Figure 11.19 on page 11-53 shows an illustrative diagram of DC braking at start.

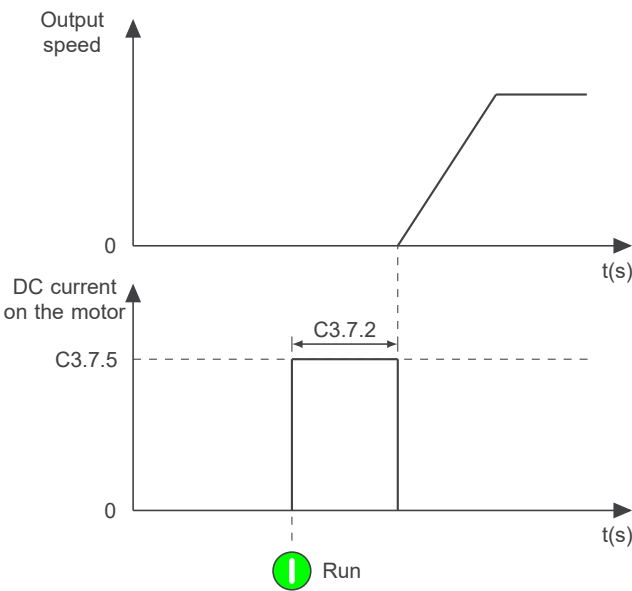


Figure 11.19: DC braking operation at start

C3.7 DC Braking

C3.7.3 DC-Braking Stop Time

Range: 0.0 ... 15.0 s

Default: 0.0 s

Properties:

Description:

It defines the time that direct current will be applied at the motor stop.

Figure 11.20 on page 11-54 shows an illustrative diagram of DC braking at stop.

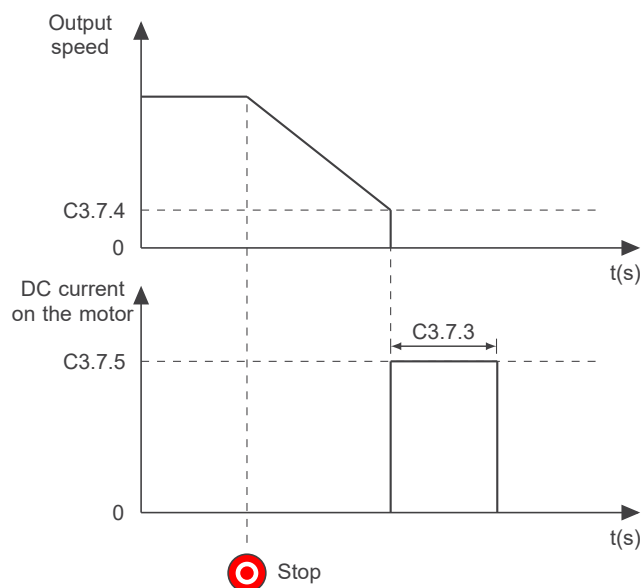


Figure 11.20: Operation of the DC braking in the ramp locking (via ramp disable)

During the DC braking process, if the inverter is enabled, the braking is interrupted and the inverter will start operating normally.



ATTENTION!

The DC Braking can continue acting even if the motor has already stopped. Be careful with the thermal dimensioning of the motor for short-period cyclic braking.

C3.7 DC Braking

C3.7.4 Starting Speed

Range: 0 ... 450 rpm

Default: 30 rpm

Properties:

Description:

It defines the starting point (speed) for applying DC braking at stop. See [Figure 11.20 on page 11-54](#) for a better understanding.

C3.7 DC Braking

C3.7.5 Current

Range: 0.0 ... 100.0 %

Default: 20.0 %

Properties:

Description:

It sets the current level (DC braking torque) applied to the motor during braking. The full scale is the rated motor current set in C2.1.5.



NOTE!

If the value set in C3.7.5 is greater than the inverter current, it will be automatically limited to the inverter maximum current capacity.

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 11.21 on page 11-55](#) illustrates the operation of the Flying Start function in a simplified way.

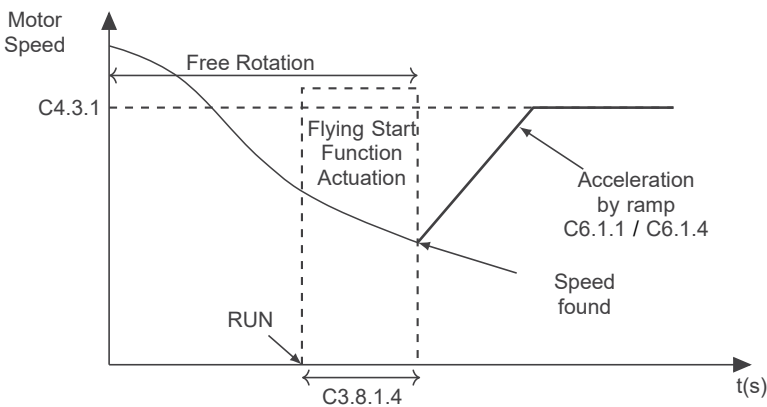


Figure 11.21: Illustrative scheme of the Flying Start function

The Flying Start function performs a scan by applying a speed reference to determine the rotor speed. [Figure 11.22 on page 11-55](#) 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.

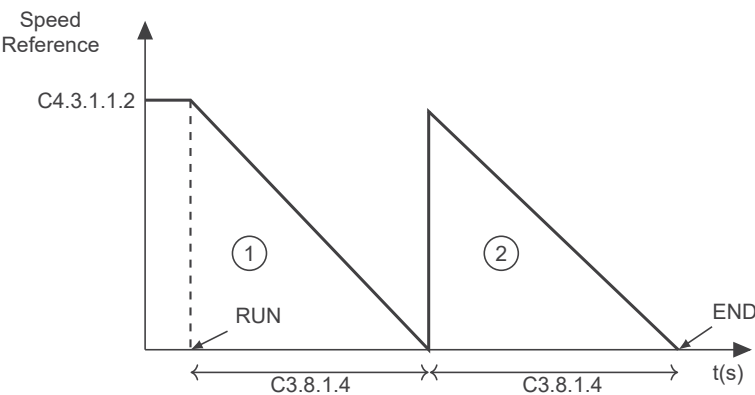


Figure 11.22: Illustrative scheme of the rotor speed determination by the Flying Start function

C3.8.1 Flying Start Setting

It allows configuring the Flying Start function according to the system application type.

C3.8.1 Flying Start Setting		
C3.8.1.1 Enable Function		
Range:	0 ... 1	Default: 0
Properties:		

Description:
It enables the Flying Start function.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

C CONFIGURATIONS

C3.8.1 Flying Start Setting

C3.8.1.2 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	Enables Reset by Run/Stop.

C3.8.1 Flying Start Setting

C3.8.1.3 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 11.23 on page 11-56](#) for more details.

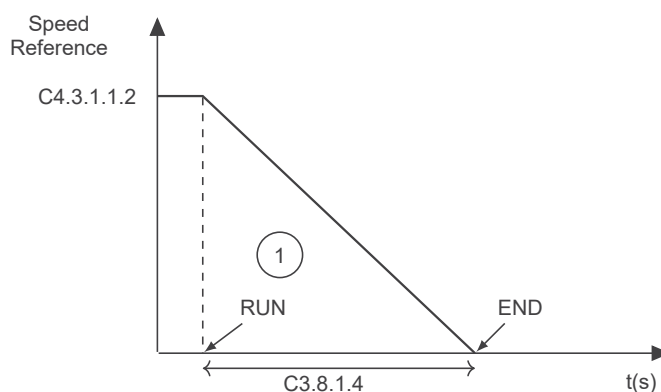


Figure 11.23: Illustrative scheme of the rotor speed determination by the Flying Start function

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 Flying Start Setting

C3.8.1.4 Ramp

Range:	0.2 ... 60.0 s	Default: 10.0 s
Properties:		

Description:

It sets the rotor speed determination time. See [Figure 11.22 on page 11-55](#) for more details.

C3.8.1 Flying Start Setting

C3.8.1.5 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. The options are shown in [Table 11.23 on page 11-25](#).

C3.8.1 Flying Start Setting**C3.8.1.6 Magnetization Time**

Range:	0 ... 1000 ms	Default: 500 ms
Properties:		

Description:

Allows adjusting the motor magnetization time before starting motor speed tracking.

C3.8.2 Scalar and VVW+ Control

Flying Start function settings for scalar and VVW+ control.

C3.8.2 Scalar and VVW+ Control**C3.8.2.1 Current**

Range:	0.0 ... 100.0 %	Default: 35.0 %
Properties:		

Description:

It defines the current level that the Flying Start function will impose on the motor during the determination process. The current level is a percentage of the motor rated current defined in C2.1.5.

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 11.24 on page 11-58](#) 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.

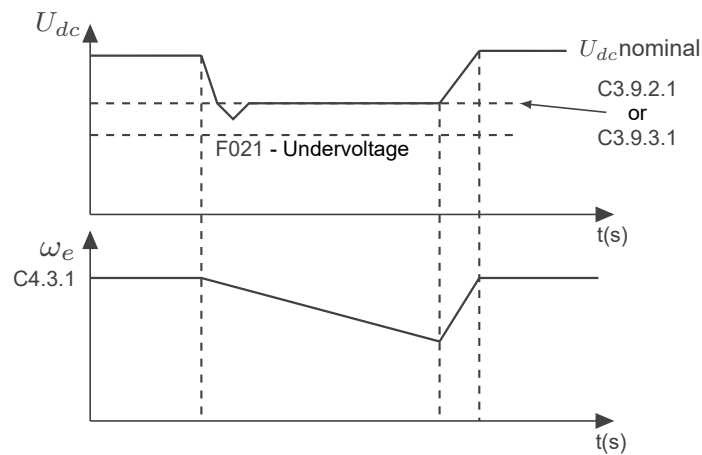


Figure 11.24: Illustrative diagram of the Ride-Through function operation

C3.9.1 Ride-Through Config.

Settings of the Ride-Through function for all control types.

C3.9.1 Ride-Through Config.

C3.9.1.1 Enable Function

Range: 0 ... 1

Default: 0

Properties:

Description:

It allows enabling the Ride-Through function.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

C3.9.2 Scalar and VVW+ Control

Settings of the Ride-Through function for scalar and VVW+ control.

C3.9.2 Scalar and VVW+ Control

C3.9.2.1 DC Link Voltage

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.

The DC Link Rated Voltage is typically given by $V_{\text{power supply}} \cdot 1.35$. Some typical values, according to the inverter model, are shown in [Table 11.41 on page 11-59](#).

Table 11.41: DC Link Rated Voltage

V _{power supply} (C1.1.2)	DC Link Rated Voltage
200 V	270 V
208/220/230/240 V	281/297/311/324 V
380 V	513 V
400/415 V	540/560 V
440/460 V	594/621 V
480 V	648 V
500/525 V	675/709 V
550/575/600 V	743/776/810 V
660/690 V	891/932 V

**NOTE!**

The undervoltage fault on the DC link actuates at 75% of the DC Link Rated Voltage.

C3.9.2 Scalar and VVW+ Control**C3.9.2.2 Proportional Gain**

Range: 0.00 ... 2.00

Default: 0.50

Properties:

Description:

It sets the proportional 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 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 and VVW+ Control**C3.9.2.3 Integral Gain**

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**

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.

C CONFIGURATIONS

The value of C3.9.3.1 corresponds to a percentage of the DC Link Rated Voltage.

The DC Link Rated Voltage is typically given by $V_{\text{power supply}} \cdot 1.35$. Some typical values, according to the inverter model, are shown in [Table 11.42 on page 11-60](#).

Table 11.42: DC Link Rated Voltage

$V_{\text{power supply}}$ (C1.1.2)	DC Link Rated Voltage
200 V	270 V
208/220/230/240 V	281/297/311/324 V
380 V	513 V
400/415 V	540/560 V
440/460 V	594/621 V
480 V	648 V
500/525 V	675/709 V
550/575/600 V	743/776/810 V
660/690 V	891/932 V



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 undervoltage fault on the DC link actuates at 75% of the DC Link Rated Voltage.

C3.9.3 Vector Control

C3.9.3.2 Proportional Gain

Range: 0.00 ... 2.00

Default: 0.10

Properties:

Description:

It sets the proportional 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 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 Integral Gain

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.

C3.10 Advanced Energy Saving

The Advanced Energy Saving function controls the motor stator flux so that it operates in a region of maximum

energy saving. In this way, the flux ratio delivered to the motor is changed to reduce the motor losses and improve the system efficiency.

The function will be active when the load level is below the value set in (C3.10.4) and the speed is above the minimum value set in (C3.10.6). Furthermore, to prevent the motor from stalling, the reduced value of the voltage applied to the motor is limited to a minimum acceptable value (C3.10.5).

**NOTE!**

The Advanced Energy Saving function is only available for induction machines. For synchronous machines the MTPA function is used. For more information see C3.2.2.2.1.

C3.10 Advanced Energy Saving**C3.10.1 Enable Function**

Range: 0 ... 1

Default: 0

Properties:

Description:

It enables the Advanced Energy Saving function.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

C3.10 Advanced Energy Saving**C3.10.2 Adv. Optimum Flux Config.**

Range: 0 ... 1

Default: 1

Properties:

Description:

It enables the online estimator that determines the maximum energy saving point according to the load level and speed of the motor.

**NOTE!**

When this parameter is disabled, the control of the Advanced Energy Saving function will be performed using only the motor $\cos \varphi$ control loop, that is, a control loop with parameter C3.10.3 ($\cos \varphi$ reference) as the reference will be used. By enabling the parameter C3.10.2, parameter C3.10.3 is not used.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

C3.10 Advanced Energy Saving**C3.10.3 Cos phi Reference**

Range: 0.50 ... 0.99

Default: 0.82

Properties:

Description:

It defines the $\cos \varphi$ value that the Advanced Energy Saving function will impose on the system. However, if C3.10.2 = 1, the value set in this parameter will not be considered.

**NOTE!**

It is recommended to set this parameter equal to the value of $\cos \varphi$ indicated in the motor nameplate C2.1.10.

C CONFIGURATIONS

C3.10 Advanced Energy Saving

C3.10.4 Maximum Torque

Range: 0 ... 150 %

Default: 125 %

Properties:

Description:

It sets the motor torque to activate the Advanced Energy Saving function. If the motor electric torque (S2.2.3) is greater than the value defined in this parameter, the function will be disabled.

It is recommended to set this parameter to 75%, but it can be set according to the application requirements.



NOTE!

Value at 0% disables the Advanced Energy Saving function.

C3.10 Advanced Energy Saving

C3.10.5 Minimum Voltage

Range: 40 ... 80 %

Default: 40 %

Properties:

Description:

It sets the minimum value for the voltage that will be applied to the motor when the Energy Saving function is active. This minimum value is relative to the voltage the control imposes (S2.3.2) for a given speed.

C3.10 Advanced Energy Saving

C3.10.6 Minimum Speed

Range: 0 ... 100 %

Default: 20 %

Properties:

Description:

It sets the minimum speed value, in relation to the rated speed, at which the Advanced Energy Saving function will remain active.

C3.10 Advanced Energy Saving

C3.10.7 Torque Hysteresis

Range: 0 ... 30 %

Default: 10 %

Properties:

Description:

It sets the torque hysteresis value used to enable and disable the Advanced Energy Saving function. If the function is active and the output current oscillates, it is necessary to increase the hysteresis value.

C3.12 Zero Speed Disable

Allows configuring the inverter zero speed disable function.

C3.12 Zero Speed Disable

C3.12.1 Blocking Settings

Range: 0 ... 2

Default: 0

Properties:

Description:

Selects the inverter zero speed disable function to be used.

Indication	Description
0 = Inactive	Without zero speed disable.
1 = Active (N*)	Zero speed disable is allowed to act when S2.1.2: Motor Speed - Total Reference is less than zero speed.
2 = Active (N)	Zero speed disable is allowed to act when S2.1.3: Motor Speed - Actual Value is less than zero speed.

When active, this function disables the inverter output when the speed reference or motor speed falls below the value set in C3.12.2 in the following cases:

- When the stop command is applied;
- During the execution of the quick stop ramp;
- During the execution of the SS1-t safety ramp;
- During the release of the JOG command;
- When the speed reference S2.1.1 is set to a value below zero speed.

Figure 11.25 on page 11-63 exemplifies the behavior of the motor speed and total reference with the zero speed disable function during the change of the speed reference and motor stop command.

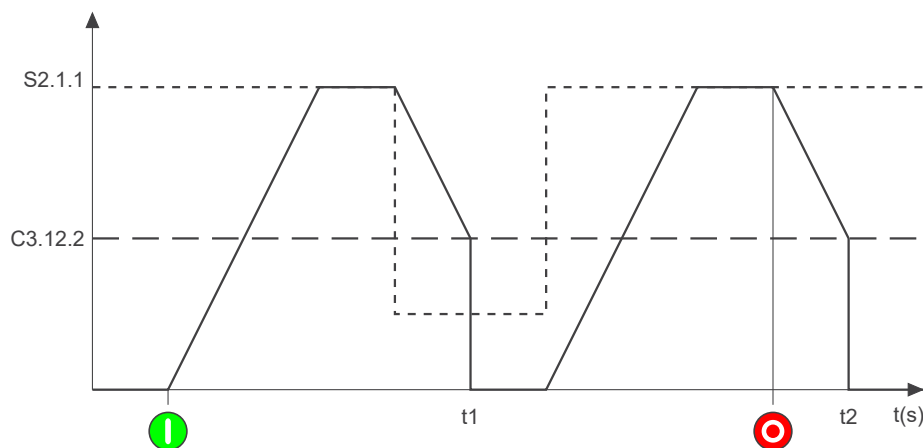


Figure 11.25: Zero speed disable

At time t1, the inverter is disabled because the speed reference has been set to a value lower than C3.12.2. The inverter remains in the Run state, and in this situation just the readjustment of the reference to a value greater than C3.12.2 is enough for the motor to start spinning without the need for new commands.

At time t2, the inverter is disabled due to a stop command (making a new command necessary for the motor to start spinning), and the inverter goes into the Disabled state.



DANGER!

When the CFW900 inverter is disabled by zero speed, the motor can spin at any time depending on the locking conditions.

C3.12 Zero Speed Disable

C3.12.2 Zero Speed

Range: 0 ... 60000 rpm

Default: 18 rpm

Properties:

Description:

Selects the reference speed to disable the inverter output during the zero speed disable function.

C CONFIGURATIONS

A hysteresis of 1% in relation to the maximum speed reference (C4.3.1.1.2) is set so that the inverter leaves the disabled state.

C3.12 Zero Speed Disable

C3.12.3 Zero Speed Time

Range: 0.0 ... 999.9 s

Default: 0.0 s

Properties:

Description:

Sets the timing of the Zero Speed Disable function.

If C3.12.3 = 0, the function will work without timing.

If C3.12.3 > 0, the function will be configured with timing, and the time set in this parameter will start counting after S2.1.2 or S2.1.3 is below the value set in C3.12.2. When the count reaches the time set in C3.12.3, zero speed disable will occur. If during the time count any of the conditions that cause disable are no longer met, the time count will reset and the inverter will remain enabled.

C3.13 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 C3.13.3. When the motor speed is higher than the value set in C3.13.4, 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. During the start, the motor will run at a constant speed equal to the value set in C3.13.6 for an instant of C3.13.5. 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.

C3.13 I/F Control

C3.13.1 Enable Function

Range: 0 ... 1

Default: 0

Properties: Stopped

Description:

Enables the I/F control function. The I/F function will be automatically enabled after the Oriented Start-up when the motor type is set to (C2.1.1= 1, 2, or 3) and control type (C3.1.1=1).

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

C3.13 I/F Control

C3.13.3 Current

Range: 0 ... 200 %

Default: 70 %

Properties:

Description:

It sets the level of current injected during the actuation of the I/F control. The full scale is the rated motor current set in C2.1.5.



NOTE!

If the value set in C3.13.3 is greater than the inverter current, it will be automatically limited to the inverter maximum current capacity.

This parameter can be set during the Oriented Start-up depending on the control type and motor type selected.

C3.13 I/F Control**C3.13.4 Transition Speed**

Range:	0 ... 100 %	Default: 30 %
Properties:		

Description:

It sets the speed level to transition from I/F control mode to scalar or VVW+ control. The base value is the rated speed of the motor set in C2.1.8.

C3.13 I/F Control**C3.13.5 Drag Time**

Range:	0.0 ... 10.0 s	Default: 2.0 s
Properties:		

Description:

Sets the auxiliary speed ramp time used during start with I/F control.

C3.13 I/F Control**C3.13.6 Drag Speed**

Range:	0 ... 30 %	Default: 8 %
Properties:		

Description:

Sets the speed level for the auxiliary speed ramp during start with I/F control. If the value of C3.13.6 is 0%, the start ramp will be disabled. The base value is the rated speed of the motor set in C2.1.8.

C3.13 I/F Control**C3.13.7 Pre-magnetization time**

Range:	0.0 ... 10.0 s	Default: 2.0 s
Properties:		

Description:

Allows setting the motor pre-magnetization time. During this time, the inverter will apply a direct current to the motor.

C3.13 I/F Control**C3.13.8 I/F Max. Speed**

Range:	0 ... 30 %	Default: 0 %
Properties:		

Description:

Sets the maximum speed level at which the I/F control will remain enabled. Therefore, the I/F control mode will remain active as long as the speed reference is lower than the value set in this parameter. The base value is the rated speed of the motor set in C2.1.8.

C3.13 I/F Control**C3.13.9 Reg. PI Response Time**

Range:	0.0 ... 100.0 ms	Default: 5.0 ms
Properties:		

Description:

Sets the response time of the regulator used to control the d-axis current component. It is used to calculate the gains of the Proportional-Integral regulator. Setting this parameter allows you to more accurately determine the proportional and integral gains of the regulator. If you need a faster dynamic response, you should gradually decrease the value of this parameter.

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The factory default value may change after performing the Oriented Start-up.

C3.13 I/F Control

C3.13.10 Reg. PI Response Time

Range: 0.0 ... 100.0 ms

Default: 25.0 ms

Properties:

Description:

Sets the response time of the regulator used to control the q-axis current component. It is used to calculate the gains of the Proportional-Integral regulator. Setting this parameter allows you to more accurately determine the proportional and integral gains of the regulator. If you need a faster dynamic response, you should gradually decrease the value of this parameter.

The factory default value may change after performing the Oriented Start-up.

C4 COMMANDS AND REFERENCES

It allows configuring the source of the frequency inverter commands and references in Local or Remote control mode.

The CFW900 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, it is possible to set the origin sources of the inverter commands and references among the following options: communication networks, HMI, digital input and/or analog/frequency input, SoftPLC, Electronic Potentiometer, Multispeed and PID Controller.

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 Control Word.
5 = CAN/CO/DN	Change via R1/R2 Mode command 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 between R1/R2 mode via digital input command 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:

It defines which digital input will transition between Remote 1 or Remote 2 mode or vice versa. The options are shown in [Table 11.23 on page 11-25](#).

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  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  key is disabled.
1 = Enable	The  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 R1 Command Config.**C4.2.2 R2 Command Config.**

It allows setting the source to the command mode.

C4.2.1 R1 Command Config.**C4.2.2 R2 Command Config.****.1 General Enable**

Range:	0 ... 8	Default: 1 (C4.2.1.1) 0 (C4.2.2.1)
Properties:	Stopped	

Description:

It sets the source to the general enable command.

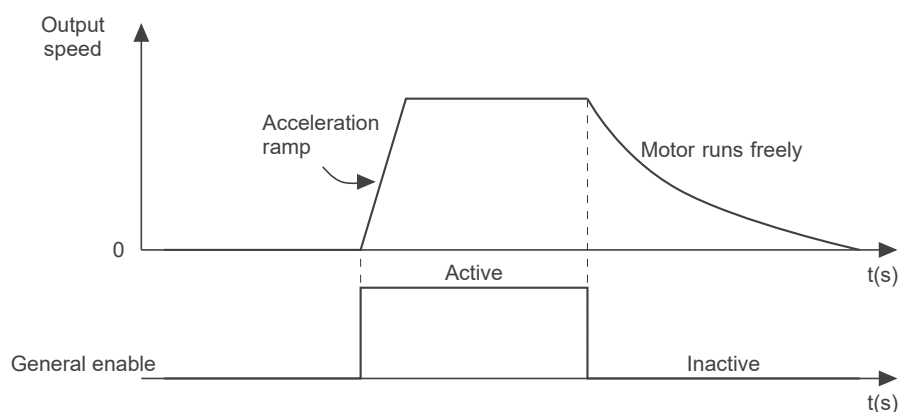


Figure 11.26: Operation of the general enable command



ATTENTION!

The general enable command can contain a digital input (C4.2.3.1) that actuates 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 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. The digital input can be configured in C4.2.3.1.

C4.2.1 R1 Command Config.

C4.2.2 R2 Command Config.

.2 Run/Stop

Range:	0 ... 9	Default: 0 (C4.2.1.2) 7 (C4.2.2.2)
Properties:	Stopped	

Description:

It sets the source for the start and stop commands, which encompass run/stop and quick stop.

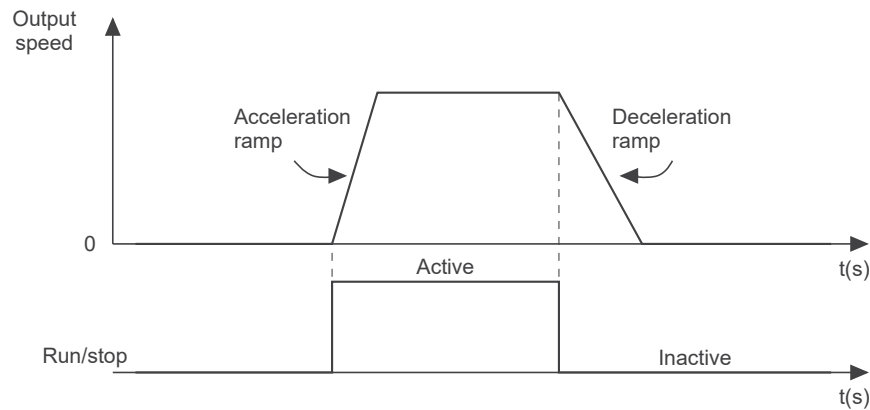


Figure 11.27: Operation of the run/stop command

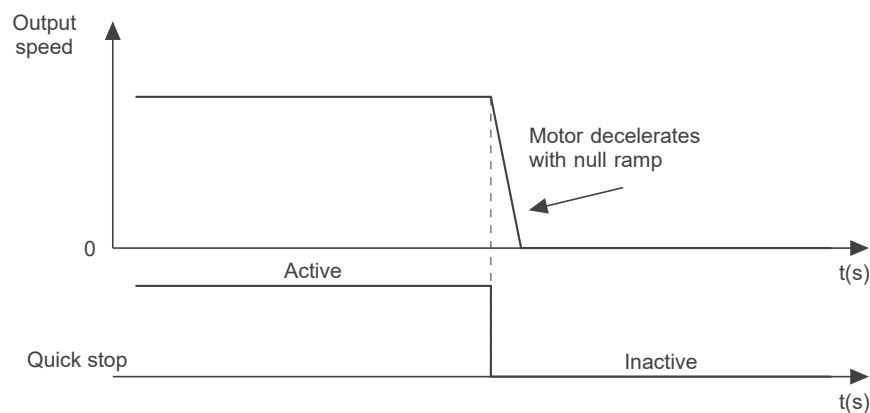


Figure 11.28: Operation of the Quick Stop command



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  and  . 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 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.
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 configured in C4.2.3.2.
8 = Forward/Reverse DI	Run/Stop 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.
9 = 3-Wire Start/Stop DI	Run/Stop command selected when using the 3-Wire Start/Stop function. The digital inputs can be configured in C4.2.3.3 and C4.2.3.4.

C4.2.1 R1 Command Config.

C4.2.2 R2 Command Config.

.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.

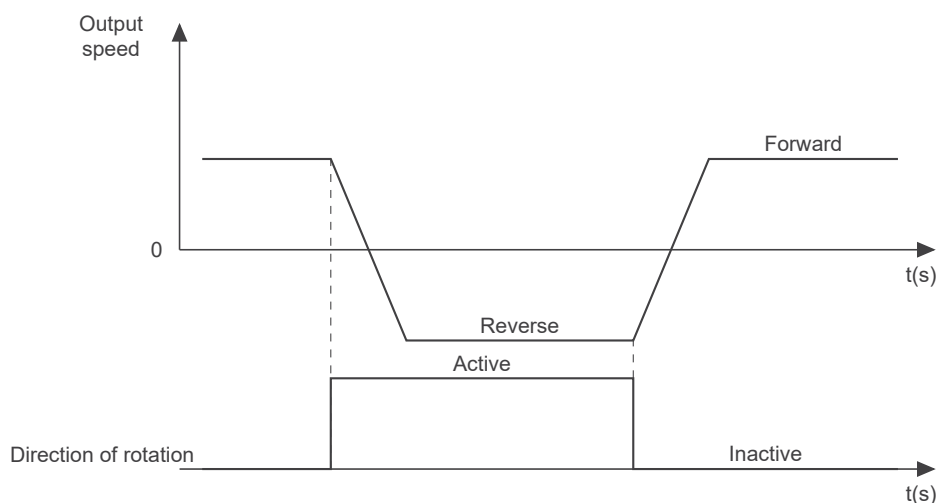


Figure 11.29: Operation of the direction of rotation command

Indication	Description
0 = Forward	Forward direction of rotation only. It is not possible to reverse the direction of rotation.
1 = HMI DR Key	Direction of Rotation Command via HMI key  . Forward Direction is selected at power up.
2 = Serial	Reverse command via RS-485 Serial Control Word.
3 = Anybus	Reverse command via Anybus Control Word.
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 digital input chosen by the user. The digital input can be configured in 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 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. It is possible to change the forward direction of rotation through parameter defined in C1.6.1.

C4.2.1 R1 Command Config.**C4.2.2 R2 Command Config.****.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.

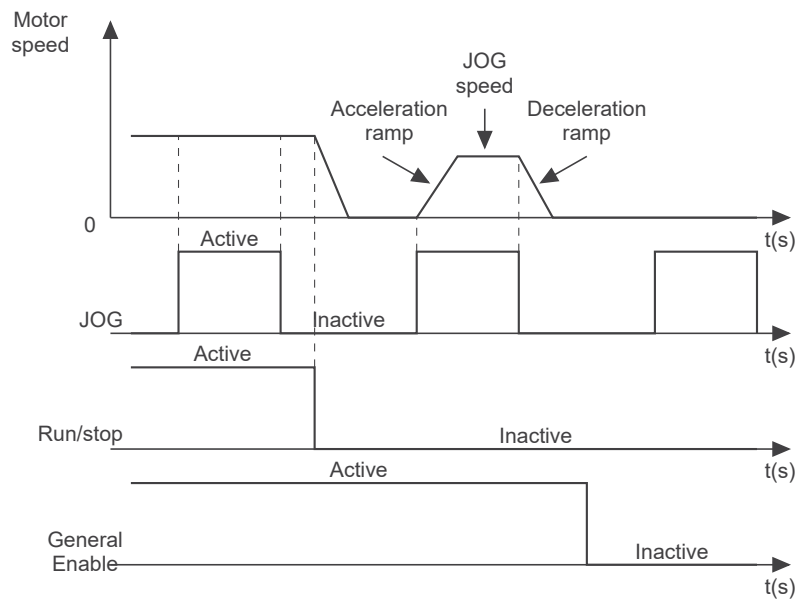


Figure 11.30: Operation of the JOG command

Indication	Description
0 = Inactive	JOG command disabled.
1 = HMI JOG Key	JOG command via HMI key  .
2 = Serial	JOG command via RS-485 Serial Control Word.
3 = Anybus	JOG command via Anybus 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 configured in C4.2.3.9.

C4.2.3 DI Config. 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 Config. for Commands**C4.2.3.1 General Enable**

Range: 0 ... 62 **Default:** 0
Properties: Stopped

Description:

It enables the use and defines the digital input that will be used to enable the inverter to run. The options are shown in [Table 11.23 on page 11-25](#).

C4.2.3 DI Config. 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 command. The options are shown in [Table 11.23 on page 11-25](#).

C4.2.3 DI Config. 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 11.23 on page 11-25](#).

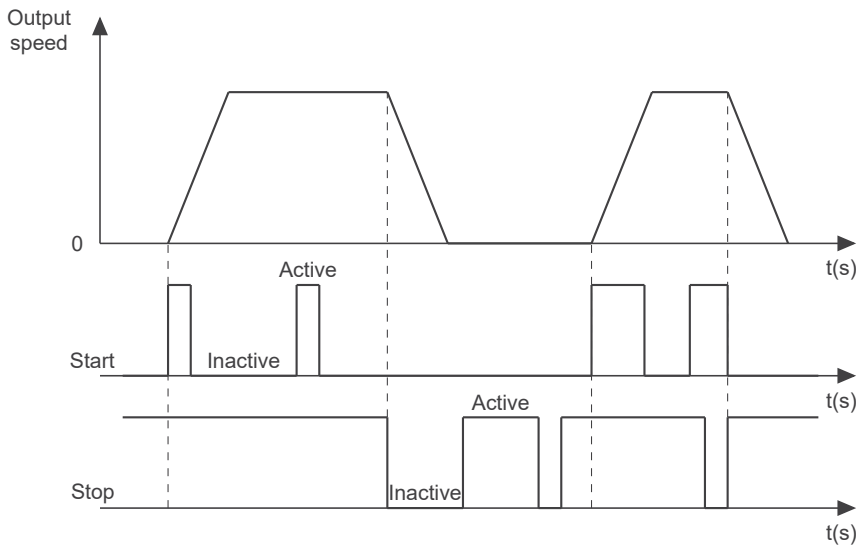


Figure 11.31: 3-wire Start/Stop function via digital input

C4.2.3 DI Config. 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 11.23 on page 11-25](#).

[Figure 11.31 on page 11-72](#) illustrates the operation of the Start/Stop function.

C4.2.3 DI Config. 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.

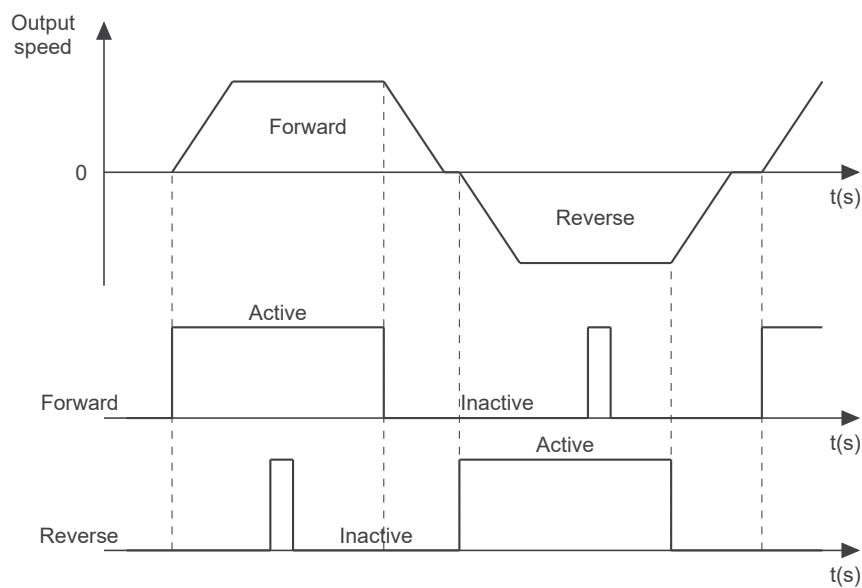


Figure 11.32: Forward and Reverse function via digital input

C4.2.3 DI Config. 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. The options are shown in [Table 11.23 on page 11-25](#).

[Figure 11.32 on page 11-73](#) 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 Config. for Commands		
C4.2.3.7 Quick Stop		
Range:	0 ... 62	Default: 0
Properties:	Stopped	

Description:
It enables the use and sets the digital input that will be used to execute the inverter quick stop. The options are shown in [Table 11.23 on page 11-25](#).

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 it in scalar and VVW+ control types.

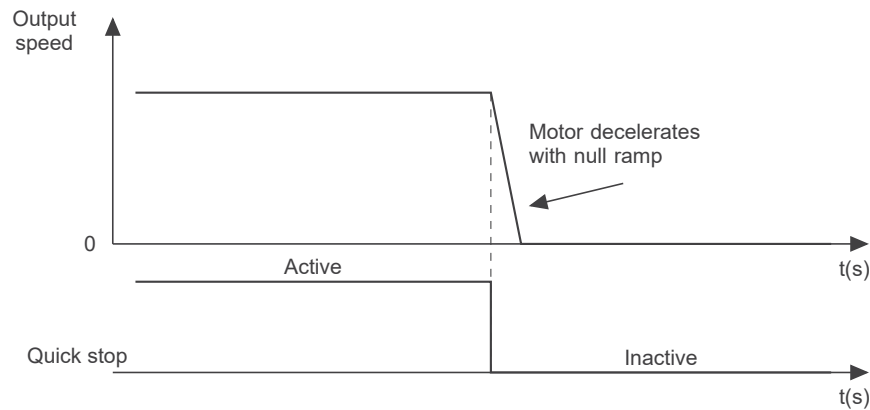


Figure 11.33: Operation of the Quick Stop command

C4.2.3 DI Config. 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. The options are shown in [Table 11.23 on page 11-25](#).

C4.2.3 DI Config. 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. The options are shown in [Table 11.23 on page 11-25](#).

C4.2.3 DI Config. 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. The options are shown in [Table 11.23 on page 11-25](#).

C4.2.3 DI Config. 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. The options are shown in [Table 11.23 on page 11-25](#).

When a transition from 0 to 1 occurs on the digital input configured for Fault Reset, the reset command for the current fault is executed. If the fault condition is still present, the reset will not be performed. This is illustrated in [Figure 11.34 on page 11-75](#).

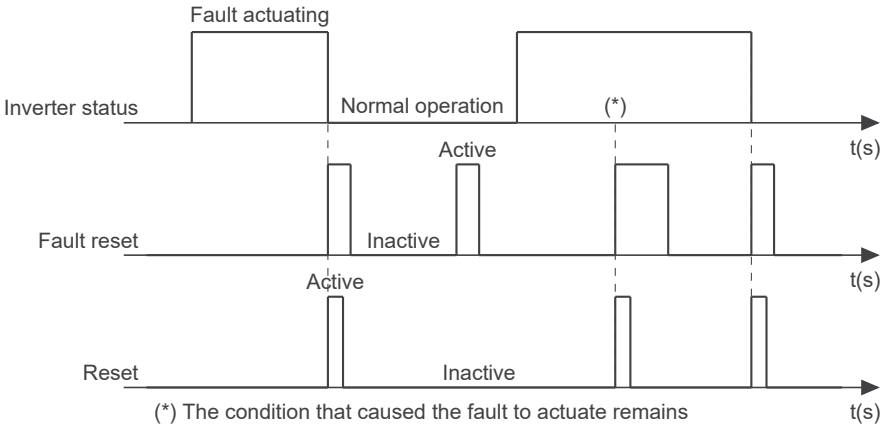


Figure 11.34: Operation of the Fault Reset command

C4.2.4 HMI Config. for Commands

It allows defining the behavior of commands via HMI.

C4.2.4 HMI Config. for Commands		
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 Speed Ref. 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

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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 Speed Ref. Range

C4.3.1.1.1 Minimum Reference

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 Speed Ref. 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 Speed Ref. Source

It allows setting the source for the speed reference in the Remote 1 and Remote 2 modes.

C4.3.1.2 Speed Ref. 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 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 and C4.3.1.3.4.
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 Speed Ref. 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 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 and C4.3.1.3.4.
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 Ref. 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 Ref. HMI, AIs and FIs**C4.3.1.3.1 Speed Ref. via HMI**

Range:	0 ... 60000 rpm	Default: 90 rpm
Properties:		

Description:

It sets the motor speed reference value when the reference source is the HMI.

**NOTE!**

It can be changed by pressing the  keys while the main screen is displayed. For further details, see C11.1.6.

C4.3.1.3 Ref. HMI, AIs and FIs**C4.3.1.3.2 Speed Ref. R1 AI**

Range:	0 ... 30	Default: 1
Properties:	Stopped	

Description:

It defines the analog input that will be used as a motor speed reference in Remote 1 mode when the reference source is the Analog Input (AI). The options are shown in [Table 11.27 on page 11-35](#).

C4.3.1.3 Ref. HMI, AIs and FIs

C4.3.1.3.3 Speed Reference FI

Range:	0 ... 2	Default: 1
Properties:	Stopped	

Description:

It defines the frequency input that will be used as motor speed reference when the reference source is Frequency Input (FI).

C4.3.1.3 Ref. HMI, AIs and FIs

C4.3.1.3.4 Speed Ref. R2 AI

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 11.27 on page 11-35](#).

C4.3.1.4 E.P. Ref.-DIs Config.

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 11.35 on page 11-79](#) illustrates the operation of this function. The reference is increased by applying 24 V to the "INCREASE" digital input, while it is decreased 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 CFW900 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 CFW900 will go to CONFIG status. See parameter S1.1.4.

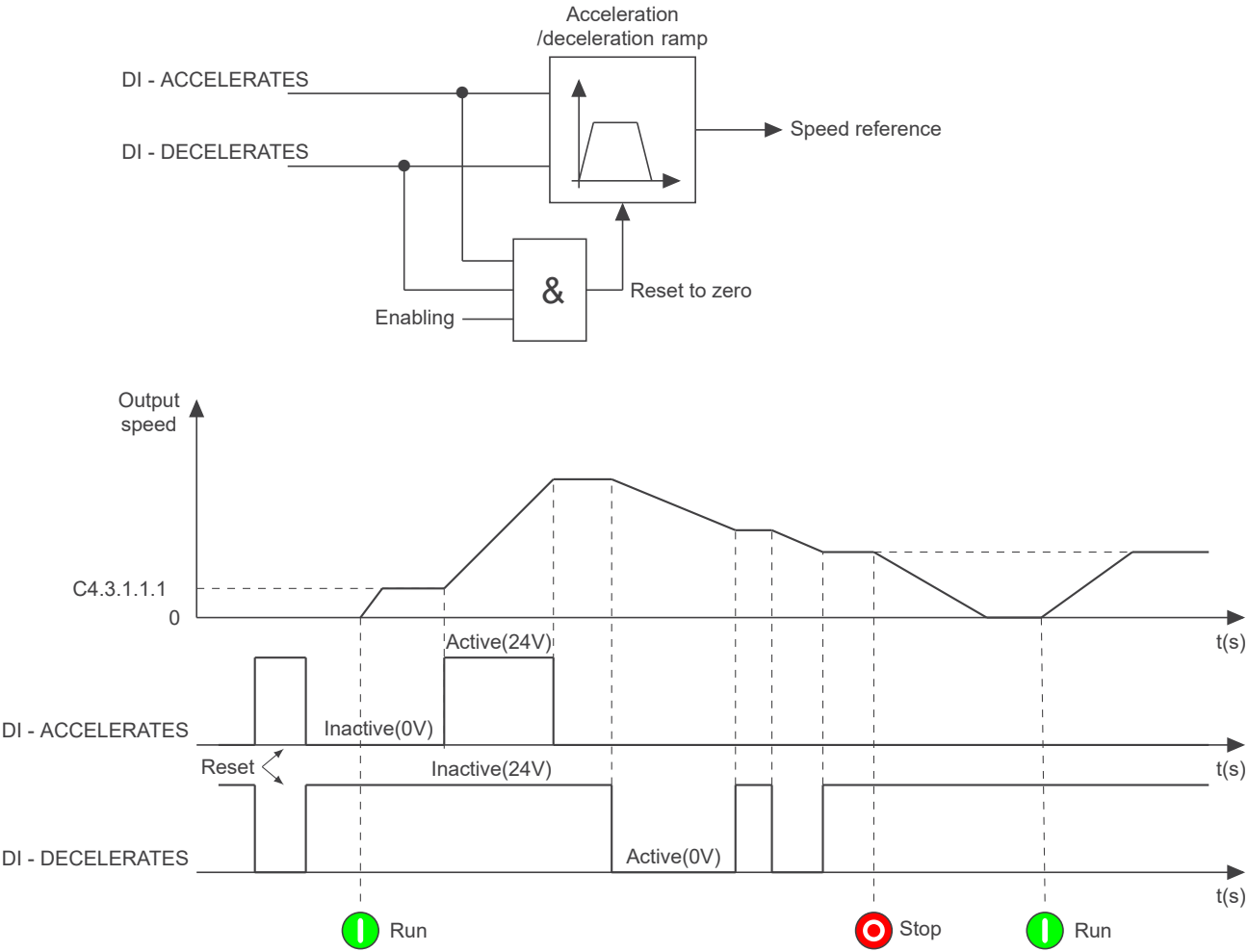


Figure 11.35: Electronic Potentiometer (E.P.) function

C4.3.1.4 E.P. Ref.-DIs Config.		
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 the “INCREASE” command by the Electronic Potentiometer. The options are shown in [Table 11.23 on page 11-25](#).

C4.3.1.4 E.P. Ref.-DIs Config.		
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 the “DECREASE” command by the Electronic Potentiometer. The options are shown in [Table 11.23 on page 11-25](#).

C4.3.1.5 Multispeed Ref.

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 11.36 on page 11-80](#) and in [Table 11.55 on page 11-80](#).

C CONFIGURATIONS

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 11.55 on page 11-80](#).

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 CFW900 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).

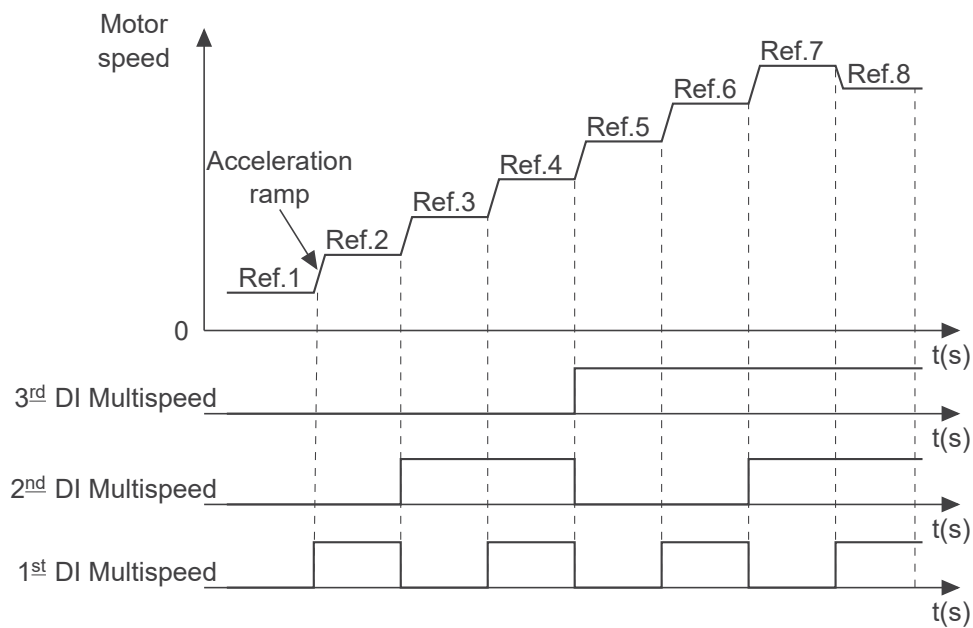


Figure 11.36: Multispeed

Below is a table with the selection of the speed reference according to the logical state of the digital inputs:

Table 11.55: 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 Ref.**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 logic of the digital inputs is shown in [Table 11.55 on page 11-80](#).

C4.3.1.5 Multispeed Ref.**C4.3.1.5.9 Multispeed 1 DI****C4.3.1.5.10 Multispeed 2 DI****C4.3.1.5.11 Multispeed 3 DI****Range:** 0 ... 62**Default:** 0**Properties:** Stopped**Description:**

It enables the use and defines the digital input that will be used to select the Multispeed speed reference. The options are shown in [Table 11.23 on page 11-25](#).

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 11.37 on page 11-82](#) details the operation of this function.

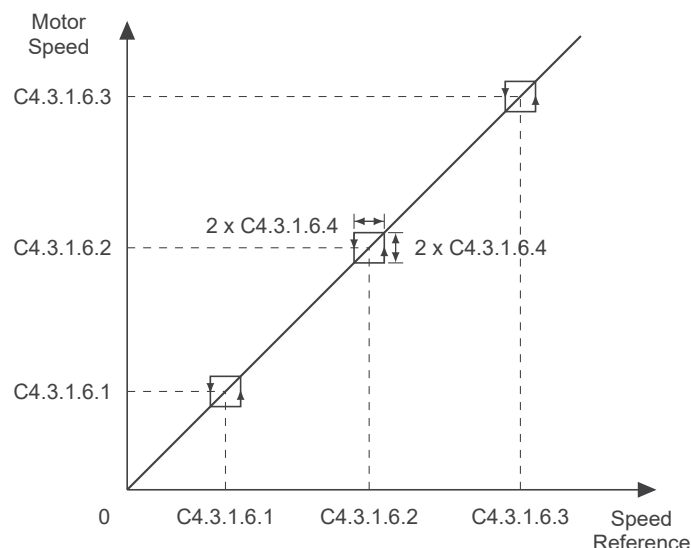


Figure 11.37: Operation curve of the "Skip Speeds"

The function is disabled for $C4.3.1.6.4=0$.

The passage through the skip speed range ($2 \times C4.3.1.6.4$) 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:**

It sets the value of the speed range that should be skipped. This value is decreased and added to the value of the skip 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:** 0.1 ... 400.0 %**Default:** 400.0 %**Properties:****Description:**

It allows setting the 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 to C4.3.3.2.

C CONFIGURATIONS

C4.3.3 Torque

C4.3.3.3 Minimum Torque

Range:	0.0 ... 400.0 %	Default: 0.0 %
Properties:		

Description:

It allows setting the minimum torque reference value for any reference signal. If the reference signal configured to be followed by the inverter is smaller than the minimum reference set in C4.3.3.3, the inverter will limit to 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

Range:	0 ... 30	Default: 0
Properties:	Stopped	

Description:

It defines which analog input will be used as reference for torque control. The options are shown in [Table 11.27 on page 11-35](#).

C4.3.3 Torque

C4.3.3.6 Torque Ref. FI

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 FI5 frequency input from Slot X.
2 = FI X-6	It enables the use of FI6 frequency input from Slot X.

C5 I/OS

It allows configuring the I/O accessories installed on the CFW900.

C5.1 Slot X

It allows viewing the status of the configuration parameters of the Slot.

C5.1.1 Slot X - Analog Inputs

It allows setting the analog inputs of the accessory connected to the corresponding slot.

The [Figure 11.38 on page 11-85](#) illustrates the operation of the analog input.

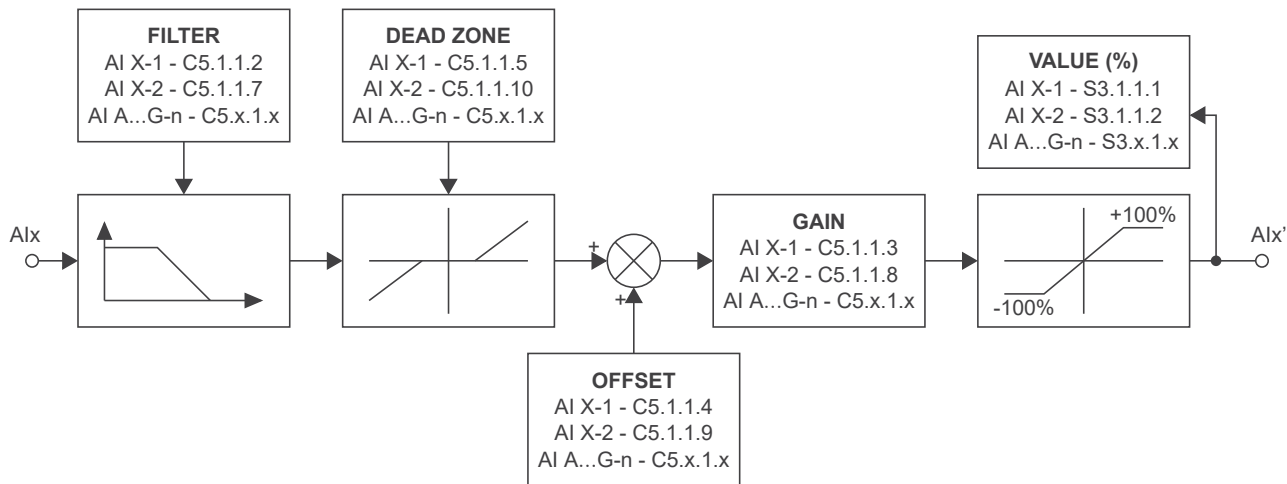


Figure 11.38: Block diagram of the analog input

[Figure 11.39 on page 11-85](#) 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.

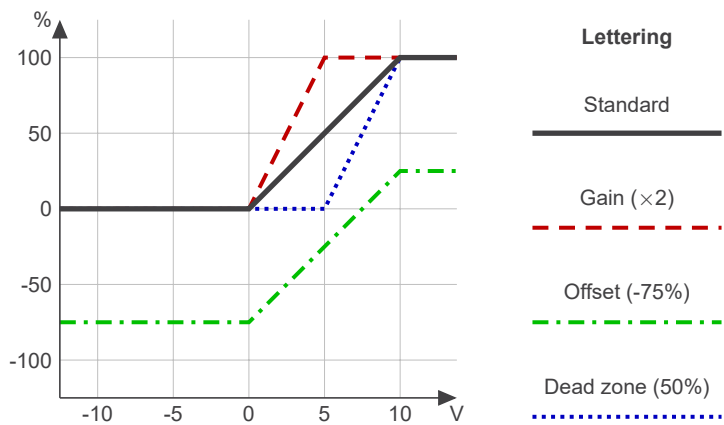


Figure 11.39: Analog input signal types

C5.1.1 Slot X - Analog Inputs		
C5.1.1.1 AI1 Settings		
C5.1.1.6 AI2 Settings		
Range:	0 ... 5 Bit	Default: 16
Properties:		

Description:
It allows setting the action to be taken in case of a broken wire and also the type of signal that is expected at the terminals.

C CONFIGURATIONS

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: Faults enabled. 1 = Alarm: Alarm enabled. 2 = Inactive: Faults 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.

C5.1.1 Slot X - 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 setting 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 Slot X - 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 Slot X - 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 Slot X - 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 Slot X - Analog Outputs

It allows setting the analog outputs of the accessory connected to the slot.

The [Figure 11.40 on page 11-87](#) illustrates the operation of the analog output.

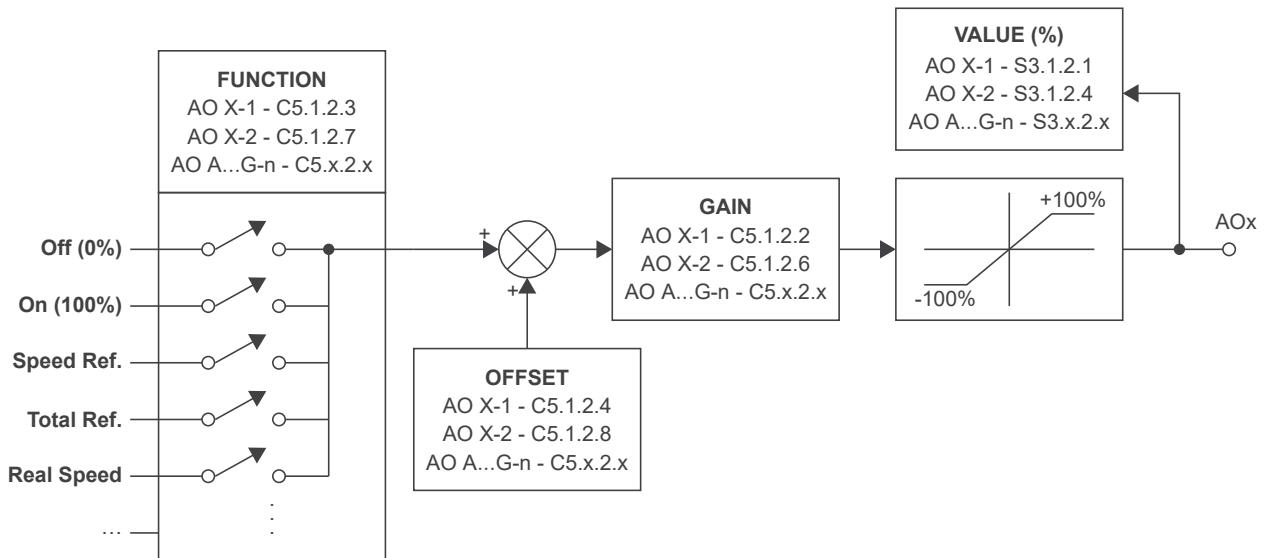


Figure 11.40: Block diagram of the analog output

C5.1.2 Slot X - 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 setting 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 type.
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 Slot X - 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 Slot X - 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.

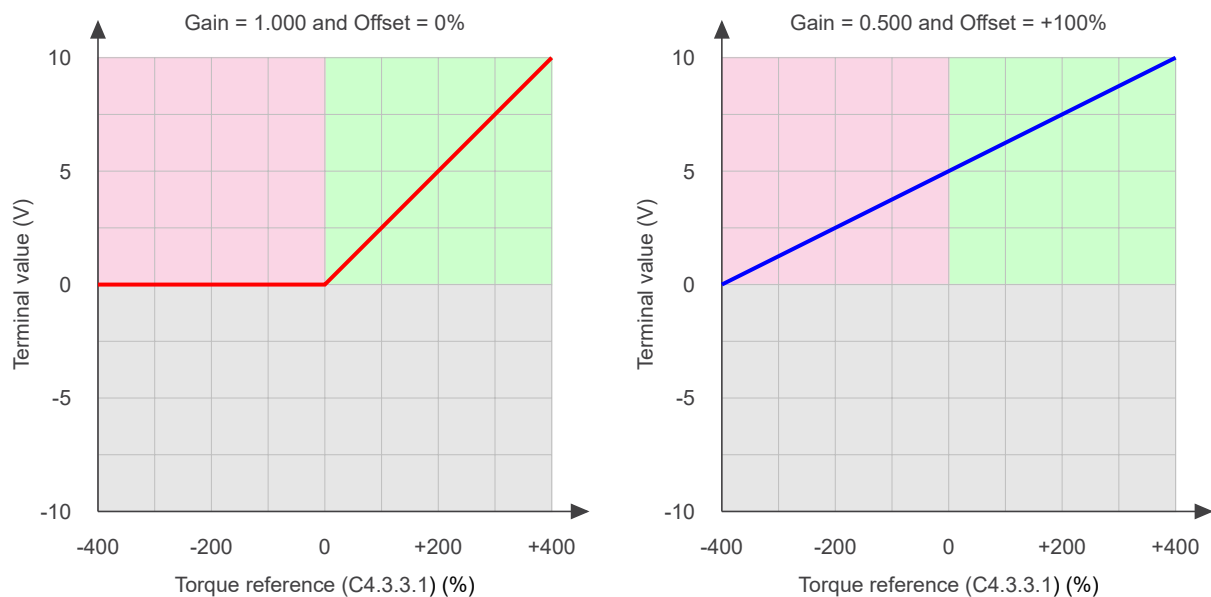
Indication	Description
0 = Off (0 %)	It imposes 0% on the output, regardless of the gain and offset values set.
1 = On (100 %)	It imposes 100% on the output, regardless of the gain and offset values set.
2 = Speed Ref.	It imposes on the output a value proportional to the speed reference (S2.1.1).
3 = Total Speed Ref.	It imposes on the output a value proportional to the motor reference speed after the ramp (S2.1.2).
4 = Real Speed	It imposes on the output a value proportional to the actual 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.	It imposes on the output a value proportional to the process variable of the PID controller (A2.1.3).
9 = Not used	Not used.
10 = Output Power	It imposes on the output a value proportional to the electrical power at the inverter output (S2.3.5).
11 = PID Setpoint	It imposes on the output a value proportional to the setpoint of the PID controller (A2.1.1).
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 lxt	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 actual 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 11.61 on page 11-89 illustrates the full scale of analog output functions.

Table 11.61: 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	$2.0 \times [\text{Maximum Speed Reference (C4.3.1.1.2)}]$
Output Current	$1.5 \times [\text{Rated Current (S1.3.5)}]$
Output Power	$1.5 \times \sqrt{3} \times [\text{Rated Current (S1.3.5)}] \times [\text{Rated Voltage (C1.1.2)}]$
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 these 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 be possible to differentiate positive from negative values. [Figure 11.41 on page 11-89](#) 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 11.41:** AO configurations to represent negative values**C5.1.2 Slot X - Analog Outputs****C5.1.2.4 AO1 Offset****C5.1.2.8 AO2 Offset****Range:** -100.00 ... 100.00 %**Default:** 0.00 %**Properties:****Description:**

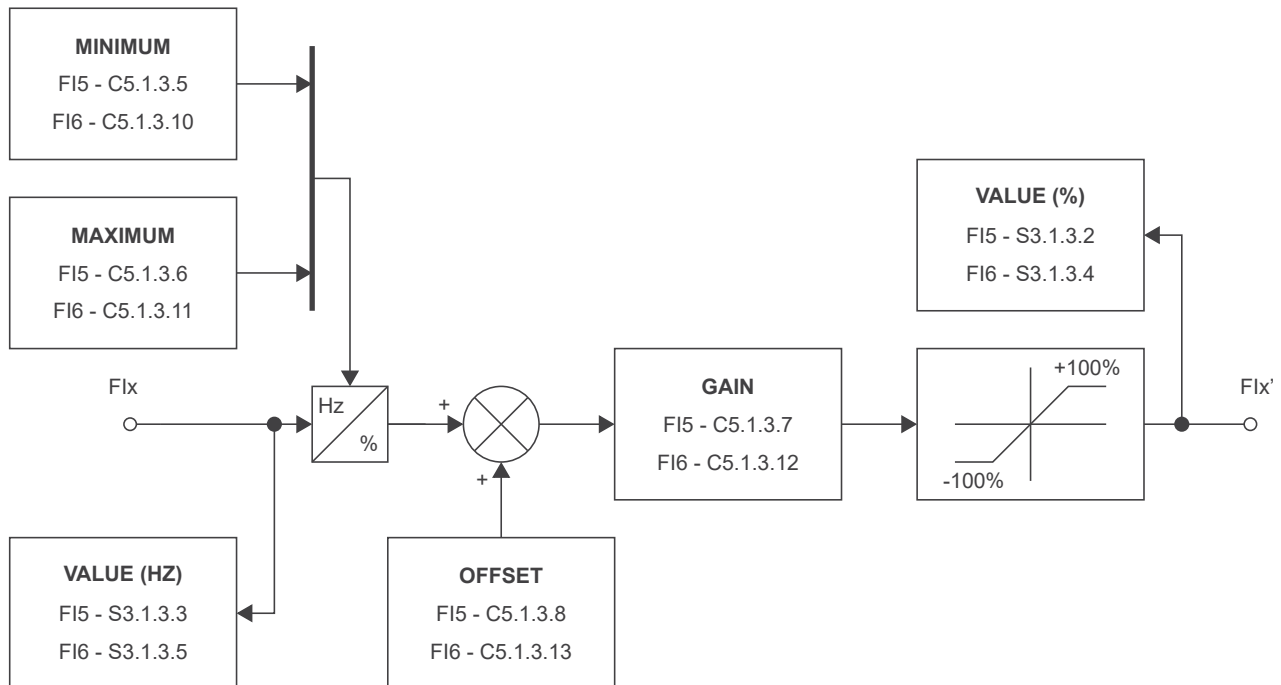
Offset setting for analog output.

C CONFIGURATIONS

C5.1.3 Slot X - Digital Inputs

It allows configuring the digital inputs of the accessory connected to the slot.

The [Figure 11.42 on page 11-90](#) illustrates how frequency input works.



C5.1.3 Slot X - 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 configuring 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 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 scan.
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 Slot X - 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 configuring the zero scale of the frequency input.

C5.1.3 Slot X - 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 configuring the full scale of the frequency input.

C5.1.3 Slot X - 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 Slot X - 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 Slot X - Digital Outputs

It allows configuring the digital outputs of the accessory connected to the slot.

The [Figure 11.43 on page 11-91](#) illustrates how frequency output works.

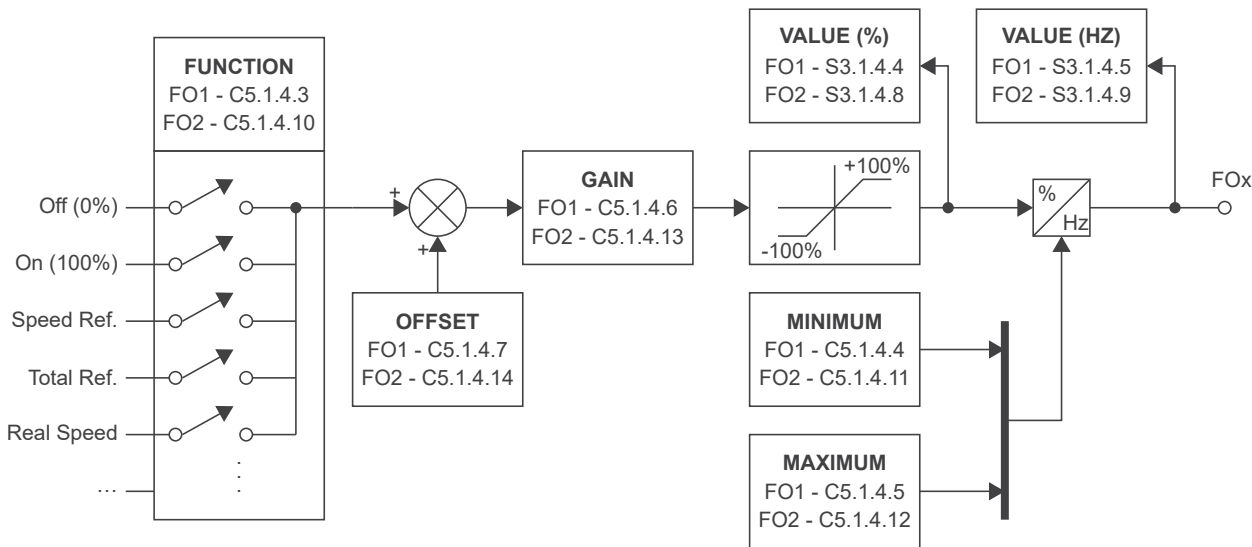


Figure 11.43: Frequency output block diagram

C5.1.4 Slot X - Digital Outputs

C5.1.4.1 DO1 Operation Mode

C5.1.4.8 DO2 Operation Mode

Range:	0 ... 1	Default: 0
Properties:	Stopped	

Description:

It allows configuring 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 Slot X - Digital Outputs

C5.1.4.2 DO1 Function

C5.1.4.9 DO2 Function

Range:	0 ... 30	Default: 22 (C5.1.4.2) 19 (C5.1.4.9)
--------	----------	---

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 = $N^* > N_x$	The Digital Output will go to the active status when the speed reference (N^*) is greater than the value set in N_x .
3 = $N > N_x$	The Digital Output will go to the active status when the motor speed (N) is greater than the value set in N_x .
4 = $N < N_y$	The Digital Output will go to the active status when the motor speed (N) is smaller than the value set in N_y .
5 = $N = N^*$	The Digital Output will go to the active status when the motor speed (N) is equal to the speed reference value (N^*).
6 = Zero Speed	The Digital Output will go into the active state when the inverter is disabled by Zero Speed.
7 = Not used	Not used.
8 = $F > F_x$	The Digital Output will go to the active status when the motor frequency (F) is greater than the value set in F_x .
9 = $I_s > I_x$	The Digital Output will go to the active status when the output current (I_s) is greater than the value set in I_x .
10 = $I_s < I_x$	The Digital Output will go to the active status when the output current (I_s) is smaller than the value set in I_x .
11 = Torque > T_x	The Digital Output will go to the active status when the motor torque (Torque) is greater than the value set in T_x .
12 = Torque < T_x	The Digital Output will go to the active status when the motor torque (Torque) is smaller than the value set in T_x .
13 = Hours Enabled > H_x	The Digital Output will go to the active status when the enabled hour counter is greater than the value set in H_x .
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 status when the inverter is in the Ready status.
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 an alarm is not being indicated on 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 to the active state when the Pre-charge function indicates that it was executed successfully.

C5.1.4 Slot X - Digital Outputs

C5.1.4.3 FO1 Function

C5.1.4.10 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 gain and offset values set.
1 = On (100 %)	It imposes 100% on the output, regardless of the gain and offset values set.
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 motor reference speed after the ramp (S2.1.2).
4 = Real Speed	It imposes on the output a value proportional to the actual 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.	It imposes on the output a value proportional to the process variable of the PID controller (A2.1.3).
9 = Not used	Not used.
10 = Output Power	It imposes on the output a value proportional to the electrical power at the inverter output (S2.3.5).
11 = PID Setpoint	It imposes on the output a value proportional to the setpoint of the PID controller (A2.1.1).
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 actual 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 11.66 on page 11-94 illustrates the full scale of frequency output functions.

Table 11.66: 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	$2.0 \times [\text{Maximum Speed Reference (C4.3.1.1.2)}]$
Output Current	$1.5 \times [\text{Rated Current (S1.3.5)}]$
Output Power	$1.5 \times \sqrt{3} \times [\text{Rated Current (S1.3.5)}] \times [\text{Rated Voltage (C1.1.2)}]$
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 these 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 be possible to differentiate positive from negative values. Figure 11.44 on page 11-94 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.

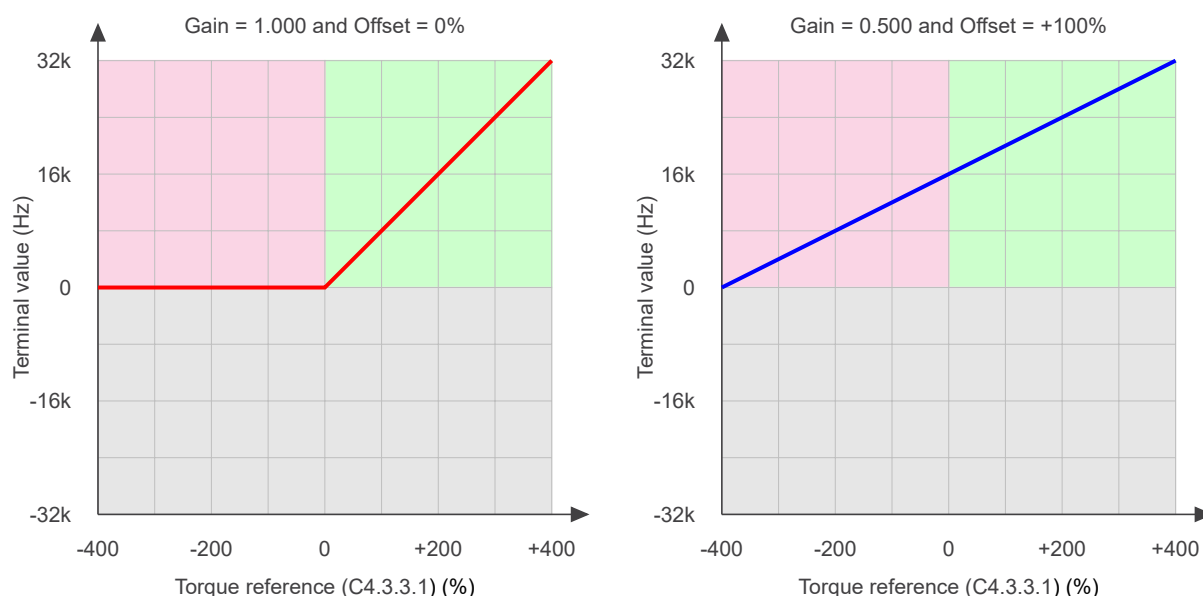


Figure 11.44: FO configurations to represent negative values

C5.1.4 Slot X - Digital Outputs

C5.1.4.4 FO1 Min Frequency

C5.1.4.11 FO2 Min Frequency

Range: 0 ... 32000 Hz

Default: 0 Hz

Properties: Stopped

Description:

It allows configuring the zero scale of the frequency output.

C5.1.4 Slot X - Digital Outputs**C5.1.4.5 FO1 Max Frequency****C5.1.4.12 FO2 Max Frequency**

Range: 0 ... 32000 Hz

Default: 32000 Hz

Properties: Stopped

Description:

It allows configuring the full scale of the frequency output.

C5.1.4 Slot X - Digital Outputs**C5.1.4.6 FO1 Gain****C5.1.4.13 FO2 Gain**

Range: 0.000 ... 9.999

Default: 1.000

Properties: Stopped

Description:

Frequency output gain setting.

C5.1.4 Slot X - Digital Outputs**C5.1.4.7 FO1 Offset****C5.1.4.14 FO2 Offset**

Range: -100.00 ... 100.00 %

Default: 0.00 %

Properties: Stopped

Description:

Frequency output offset setting.

C5.1.5 Slot X - Encoder

It allows configuring the encoder accessory connected to the slot.

C5.1.5 Slot X - 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 full revolution.

C5.2 Slot A

It allows viewing the status of the configuration parameters of the Slot.

C5.2.1 Slot A - Analog Inputs to C5.8.1 Slot G - Analog Inputs

It allows setting the analog inputs of the accessory connected to the corresponding slot.

C5.2.1 Slot A - Analog Inputs

C5.3.1 Slot B - Analog Inputs

C5.4.1 Slot C - Analog Inputs

C5.5.1 Slot D - Analog Inputs

C5.6.1 Slot E - Analog Inputs

C5.7.1 Slot F - Analog Inputs

C5.8.1 Slot G - Analog Inputs

.1 AI1 Settings

.6 AI2 Settings

.11 AI3 Settings

Range: 0 ... 5 Bit

Default: 16

Properties:

Description:

It allows setting 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: Faults enabled. 1 = Alarm: Alarm enabled. 2 = Inactive: Faults 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 Slot A - Analog Inputs

C5.3.1 Slot B - Analog Inputs

C5.4.1 Slot C - Analog Inputs

C5.5.1 Slot D - Analog Inputs

C5.6.1 Slot E - Analog Inputs

C5.7.1 Slot F - Analog Inputs

C5.8.1 Slot G - 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 setting 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 Slot A - Analog Inputs
 C5.3.1 Slot B - Analog Inputs
 C5.4.1 Slot C - Analog Inputs
 C5.5.1 Slot D - Analog Inputs
 C5.6.1 Slot E - Analog Inputs
 C5.7.1 Slot F - Analog Inputs
 C5.8.1 Slot G - 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 Slot A - Analog Inputs
 C5.3.1 Slot B - Analog Inputs
 C5.4.1 Slot C - Analog Inputs
 C5.5.1 Slot D - Analog Inputs
 C5.6.1 Slot E - Analog Inputs
 C5.7.1 Slot F - Analog Inputs
 C5.8.1 Slot G - 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 Slot A - Analog Inputs
 C5.3.1 Slot B - Analog Inputs
 C5.4.1 Slot C - Analog Inputs
 C5.5.1 Slot D - Analog Inputs
 C5.6.1 Slot E - Analog Inputs
 C5.7.1 Slot F - Analog Inputs
 C5.8.1 Slot G - 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 Slot A - Analog Outputs to C5.8.2 Slot G - Analog Outputs

It allows setting the analog outputs of the accessory connected to the slot.

C CONFIGURATIONS

C5.2.2 Slot A - Analog Outputs

C5.3.2 Slot B - Analog Outputs

C5.4.2 Slot C - Analog Outputs

C5.5.2 Slot D - Analog Outputs

C5.6.2 Slot E - Analog Outputs

C5.7.2 Slot F - Analog Outputs

C5.8.2 Slot G - Analog Outputs

.1 AO1 Signal Type

.5 AO2 Signal Type

Range: 0 ... 7

Default: 4

Properties:

Description:

It allows setting 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 to 10 V type.
5 = 10 to 0 V	It indicates that the Analog Output signal is 10 to 0 V type.
6 ... 7 = Not used	Not used.

C5.2.2 Slot A - Analog Outputs

C5.3.2 Slot B - Analog Outputs

C5.4.2 Slot C - Analog Outputs

C5.5.2 Slot D - Analog Outputs

C5.6.2 Slot E - Analog Outputs

C5.7.2 Slot F - Analog Outputs

C5.8.2 Slot G - 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 Slot A - Analog Outputs

C5.3.2 Slot B - Analog Outputs

C5.4.2 Slot C - Analog Outputs

C5.5.2 Slot D - Analog Outputs

C5.6.2 Slot E - Analog Outputs

C5.7.2 Slot F - Analog Outputs

C5.8.2 Slot G - 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 gain and offset values set.
1 = On (100 %)	It imposes 100% on the output, regardless of the gain and offset values set.
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 motor reference speed after the ramp (S2.1.2).
4 = Real Speed	It imposes on the output a value proportional to the actual 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.	It imposes on the output a value proportional to the process variable of the PID controller (A2.1.3).
9 = Not used	Not used.
10 = Output Power	It imposes on the output a value proportional to the electrical power at the inverter output (S2.3.5).
11 = PID Setpoint	It imposes on the output a value proportional to the setpoint of the PID controller (A2.1.1).
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 lxt	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 actual 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 Slot A - Analog Outputs**C5.3.2 Slot B - Analog Outputs****C5.4.2 Slot C - Analog Outputs****C5.5.2 Slot D - Analog Outputs****C5.6.2 Slot E - Analog Outputs****C5.7.2 Slot F - Analog Outputs****C5.8.2 Slot G - 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 Slot A - Digital Outputs to C5.8.4 Slot G - Digital Outputs

It allows configuring the digital outputs of the accessory connected to the slot.

C CONFIGURATIONS

C5.2.4 Slot A - Digital Outputs

C5.3.4 Slot B - Digital Outputs

C5.4.4 Slot C - Digital Outputs

C5.5.4 Slot D - Digital Outputs

C5.6.4 Slot E - Digital Outputs

C5.7.4 Slot F - Digital Outputs

C5.8.4 Slot G - Digital Outputs

.1 DO1 Function

.2 DO2 Function

.3 DO3 Function

.4 DO4 Function

.5 DO5 Function

.6 DO6 Function

.7 DO7 Function

.8 DO8 Function

Range:	0 ... 30	Default: 22 (C5.2.4.1) 3 (C5.2.4.2) 2 (C5.2.4.3) 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 = $N^* > N_x$	The Digital Output will go to the active status when the speed reference (N^*) is greater than the value set in N_x .
3 = $N > N_x$	The Digital Output will go to the active status when the motor speed (N) is greater than the value set in N_x .
4 = $N < N_y$	The Digital Output will go to the active status when the motor speed (N) is smaller than the value set in N_y .
5 = $N = N^*$	The Digital Output will go to the active status when the motor speed (N) is equal to the speed reference value (N^*).
6 = Zero Speed	The Digital Output will go into the active state when the inverter is disabled by Zero Speed.
7 = Not used	Not used.
8 = $F > F_x$	The Digital Output will go to the active status when the motor frequency (F) is greater than the value set in F_x .
9 = $I_s > I_x$	The Digital Output will go to the active status when the output current (I_s) is greater than the value set in I_x .
10 = $I_s < I_x$	The Digital Output will go to the active status when the output current (I_s) is smaller than the value set in I_x .
11 = Torque > T_x	The Digital Output will go to the active status when the motor torque (Torque) is greater than the value set in T_x .
12 = Torque < T_x	The Digital Output will go to the active status when the motor torque (Torque) is smaller than the value set in T_x .
13 = Hours Enabled > H_x	The Digital Output will go to the active status when the enabled hour counter is greater than the value set in H_x .
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 status when the inverter is in the Ready status.
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 an alarm is not being indicated on 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 to the active state when the Pre-charge function indicates that it was executed successfully.

C5.2.5 Slot A - Encoder to C5.8.5 Slot G - Encoder

It allows configuring the encoder accessory connected to the slot.

C5.2.5 Slot A - Encoder
C5.3.5 Slot B - Encoder
C5.4.5 Slot C - Encoder
C5.5.5 Slot D - Encoder
C5.6.5 Slot E - Encoder
C5.7.5 Slot F - Encoder
C5.8.5 Slot G - 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 full revolution.

C5.2.5 Slot A - Encoder
C5.3.5 Slot B - Encoder
C5.4.5 Slot C - Encoder
C5.5.5 Slot D - Encoder
C5.6.5 Slot E - Encoder
C5.7.5 Slot F - Encoder
C5.8.5 Slot G - Encoder

.2 Settings

Range: 0 ... 7 Bit

Default: 0

Properties: Stopped

Description:

It allows setting the broken cable detection, zero search function and encoder signal direction.

Bit	Value/Description
-----	-------------------

C CONFIGURATIONS

Bit	Value/Description
Bit 0 ... 1 Broken Cable A	It allows setting the fault actuation and alarm generation if an encoder broken 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 activate the fault if an encoder broken cable is detected. 1 = Alarm: The Inverter will indicate an alarm if an encoder broken cable is detected. 2 = Inactive: The broken cable detection is disabled.
Bit 2 ... 3 Broken Cable B	It allows setting the fault actuation and alarm generation if an encoder broken 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 activate the fault if an encoder broken cable is detected. 1 = Alarm: The Inverter will indicate an alarm if an encoder broken cable is detected. 2 = Inactive: The broken cable detection is disabled.
Bit 4 ... 5 Broken Cable Z	It allows setting the fault actuation and alarm generation if an encoder broken 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 activate the fault if an encoder broken cable is detected. 1 = Alarm: The Inverter will indicate an alarm if an encoder broken cable is detected. 2 = Inactive: The broken cable detection is disabled.
Bit 6 Search Zero	It allows starting the execution of the zero search 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 represents 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 Slot A - Temperatures to C5.8.6 Slot G - Temperatures

It allows configuring the temperature accessory connected to the slot.

C5.2.6 Slot A - Temperatures

C5.3.6 Slot B - Temperatures

C5.4.6 Slot C-Temperatures

C5.5.6 Slot D-Temperatures

C5.6.6 Slot E-Temperatures

C5.7.6 Slot F - Temperatures

C5.8.6 Slot G - 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 Slot A - Temperatures**C5.3.6 Slot B - Temperatures****C5.4.6 Slot C-Temperatures****C5.5.6 Slot D-Temperatures****C5.6.6 Slot E-Temperatures****C5.7.6 Slot F - Temperatures****C5.8.6 Slot G - 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.

C CONFIGURATIONS

C5.2.6 Slot A - Temperatures

C5.3.6 Slot B - Temperatures

C5.4.6 Slot C-Temperatures

C5.5.6 Slot D-Temperatures

C5.6.6 Slot E-Temperatures

C5.7.6 Slot F - Temperatures

C5.8.6 Slot G - Temperatures

.3 Measurement Error Config.

Range: 0 ... 11 Bit

Default: 0

Properties: Stopped

Description:

It enables measurement error faults (sensor broken cable, short-circuited 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 for 5 minutes. 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 temperature sensor 1. 0 = Fault: Faults enabled. 1 = Alarm: Alarm enabled. 2 = Inactive: Faults and alarms disabled.
Bit 2 ... 3 S2 Sensor F/A	It enables measurement error faults in temperature sensor 2. 0 = Fault: Faults enabled. 1 = Alarm: Alarm enabled. 2 = Inactive: Faults and alarms disabled.
Bit 4 ... 5 S3 Sensor F/A	It enables measurement error faults in temperature sensor 3. 0 = Fault: Faults enabled. 1 = Alarm: Alarm enabled. 2 = Inactive: Faults and alarms disabled.
Bit 6 ... 7 S4 Sensor F/A	It enables measurement error faults in temperature sensor 4. 0 = Fault: Faults enabled. 1 = Alarm: Alarm enabled. 2 = Inactive: Faults and alarms disabled.
Bit 8 ... 9 S5 Sensor F/A	It enables measurement error faults in temperature sensor 5. 0 = Fault: Faults enabled. 1 = Alarm: Alarm enabled. 2 = Inactive: Faults and alarms disabled.
Bit 10 ... 11 S6 Sensor F/A	It enables measurement error faults in temperature sensor 6. 0 = Fault: Faults enabled. 1 = Alarm: Alarm enabled. 2 = Inactive: Faults and alarms disabled.

C5.2.6 Slot A - Temperatures**C5.3.6 Slot B - Temperatures****C5.4.6 Slot C-Temperatures****C5.5.6 Slot D-Temperatures****C5.6.6 Slot E-Temperatures****C5.7.6 Slot F - Temperatures****C5.8.6 Slot G - 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 configuring 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 the Digital Outputs.

C CONFIGURATIONS

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 ($F > F_x$) for the 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 ($N^* > N_x$), ($N > N_x$), ($N < N_y$) and ($N > N_x$ and $N_t > N_x$) for the 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 (N_x) used in function ($N > N_x$) for the 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 (N_y) used in function ($N < N_y$) for the 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 (I_x) used in functions ($I > I_x$) and ($I < I_x$) for the 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 the 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 ($T > T_x$) and ($T < T_x$) for the 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 the 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.

The [Figure 11.45 on page 11-107](#) illustrates this behavior.

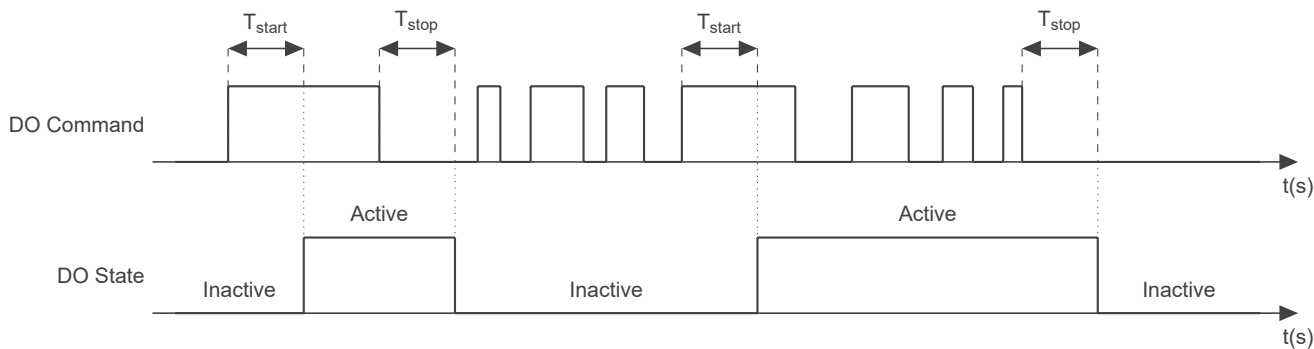


Figure 11.45: Example of digital output timer actuation



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 11.75 on page 11-108](#).

C CONFIGURATIONS

Table 11.75: 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 11.45 on page 11-107](#).

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 11.45 on page 11-107](#).

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 Ramps

Setting of the speed ramps.

C6.1 Speed Control Ramps**C6.1.1 Acceleration Time****Range:** 0.1 ... 999.9 s**Default:** 20.0 s**Properties:****Description:**

It sets the acceleration time of the “1st ramp” 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 Ramps**C6.1.2 Deceleration Time****Range:** 0.1 ... 999.9 s**Default:** 20.0 s**Properties:****Description:**

It sets the deceleration time of the “1st ramp” 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 Ramps**C6.1.3 1st/2nd Ramp Selection****Range:** 0 ... 8**Default:** 0**Properties:** Stopped**Description:**

It defines the source of the command that will select between the 1st and 2nd acceleration/deceleration 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;

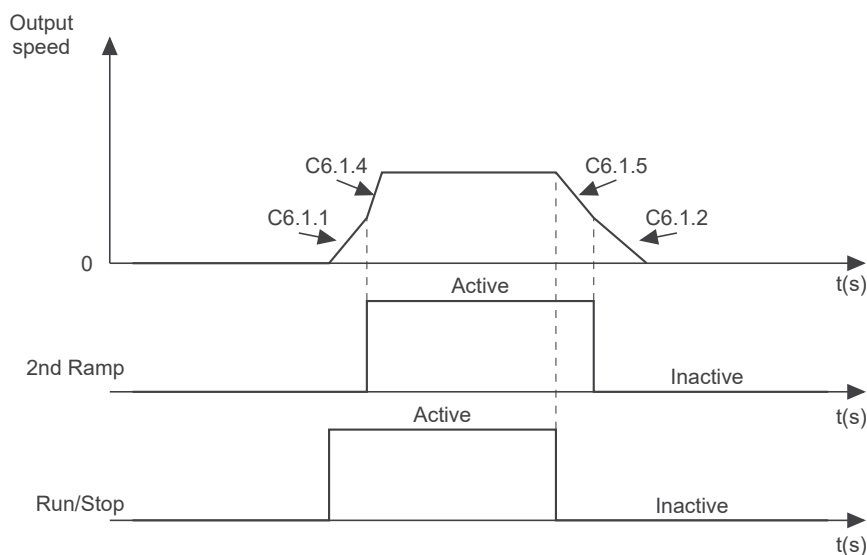


Figure 11.46: Operation of the 1st/2nd ramp command

Indication	Description
0 = 1st Ramp	Fixed in 1st Ramp.
1 = 2nd Ramp	Fixed in 2nd Ramp.
2 = Serial	Change via 2nd Ramp command of the RS-485 Serial Control Word.
3 = Not used	Not used.

C CONFIGURATIONS

Indication	Description
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 command of the digital input chosen by the user. The digital input can be configured in C4.2.3.10.

C6.1 Speed Control Ramps

C6.1.4 2nd Ramp Acceleration Time

Range:	0.1 ... 999.9 s	Default: 10.0 s
Properties:		

Description:

It sets the acceleration time of the “2nd ramp” 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 Ramps

C6.1.5 2nd Ramp Deceleration Time

Range:	0.1 ... 999.9 s	Default: 10.0 s
Properties:		

Description:

It sets the deceleration time of the “2nd ramp” 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 Ramps

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 Ramps

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 shocks during acceleration/deceleration.

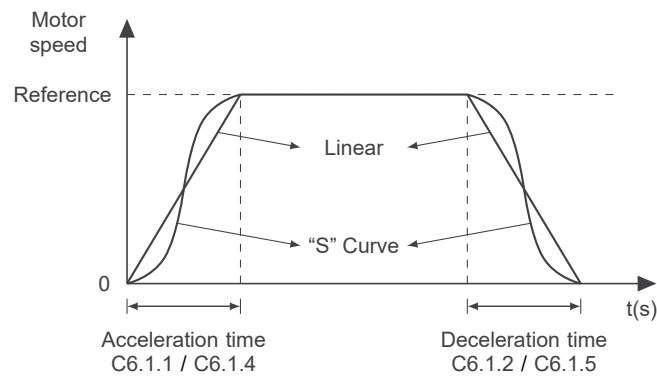


Figure 11.47: "S" Curve or Linear



NOTE!

Regardless of the ramp profile selected in C6.1.7, the ramp will always be Linear under the conditions below:

1. Activation of the SS1 Safety function;
2. Torque Reference.

C6.2 Torque Control Ramps

It sets the acceleration and deceleration times of the torque reference signal.

C6.2 Torque Control Ramps

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 Ramps

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 CFW900 and motor protections.

C7.1 Power Supply Phase Loss

It allows configuring the Power Supply Phase Loss fault.

C7.1 Power Supply Phase Loss

C7.1.1 Min. Detection Time

Range: 0 ... 60 s

Default: 3 s

Properties:

C CONFIGURATIONS

Description:

It defines the time value for the CFW900 power supply phase loss indication (F006). Parameter set to 0s disables the phase loss fault.

C7.1 Power Supply Phase Loss

C7.1.2 Level Fine Setting

Range: 0.1 ... 5.0 **Default:** 1.0

Properties:

Description:

It sets the tripping level of the power supply phase loss fault.

C7.2 Ground Fault

It allows setting the Ground Fault protection.

C7.2 Ground Fault

C7.2.1 Configuration

Range: 0 ... 2 **Default:** 1

Properties: Stopped

Description:

It disables or sets the current level for the ground fault protection (F074).

Indication	Description
0 = Inactive	Ground Fault protection disabled.
1 = Fault Enab.; Standard Level	Ground fault protection enabled with standard level.
2 = Fault Enab.; Extended Level	Ground fault protection enabled with extended level.

Once enabled, you can choose between two fault trip levels:

- Standard level: 50% of HD current;
- Extended level: 100% of HD current.



NOTE!

For some models the fault trip level may differ slightly from the HD current. For more information, contact WEG technical support.

C7.3 Motor Current Unbal.

It allows setting the motor current imbalance fault.

C7.3 Motor Current Unbal.

C7.3.1 Enable Fault

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

Properties: Stopped

Description:

It enables the actuation of the motor current imbalance fault (F076).

That fault is activated when the conditions below are met simultaneously for more than 2 seconds:

1. Speed reference above 3 %.
2. $|I_u - I_v|$ or $|I_u - I_w|$ or $|I_v - I_w|$ is greater than 12.5% of C2.1.5.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

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	The overload fault is disabled. The faults will not actuate and alarms will not be generated for the motor operation under overload condition.
1 = Fault and Alarm	The inverter will display an alarm (A046) when the motor overload reaches the programmed level in C7.4.2, and the fault will actuate (F072) when the overcurrent in the motor reaches the value set in the overload fault. Once the fault actuates, 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 set 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 sets the level for alarm actuation of the motor overload fault (A046); it is expressed in percentage of the limit value of the overload time.

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 motor rated 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 motor rated current C2.1.5.

C CONFIGURATIONS

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 motor rated 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 11.48 on page 11-114](#).

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.

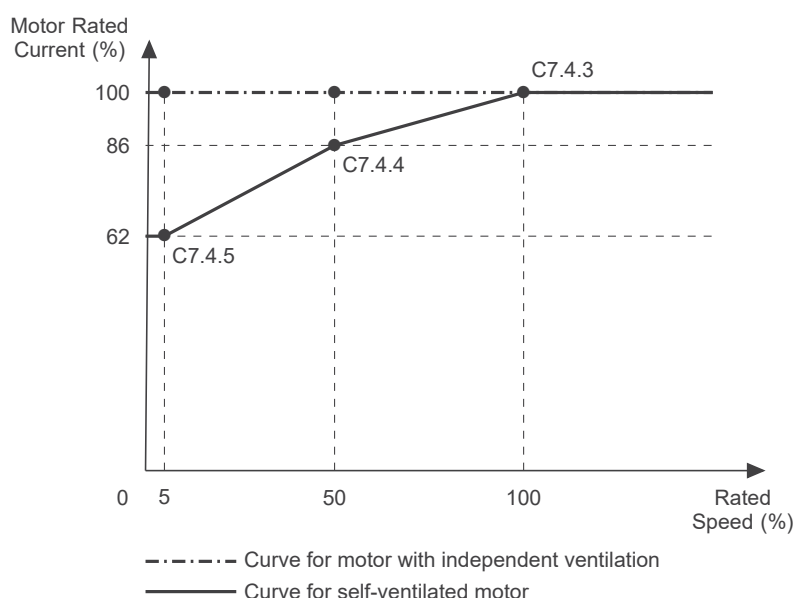


Figure 11.48: Overload fault levels



NOTE!

The greater the difference between the motor current and the overload current, the faster fault F072 is activated.

C7.4 Motor Overload Fault

C7.4.6 Motor Thermal Class

Range: 0 ... 8

Default: 1

Properties: Stopped

Description:

It sets the motor thermal class.

Indication	Description
0 = Class 5E	Class 5 Time x Current Curve.
1 = Class 10E	Class 10 Time x Current Curve.
2 = Class 15	Class 15 Time x Current Curve.
3 = Class 20E	Class 20 Time x Current Curve.
4 = Class 25	Class 25 Time x Current Curve.
5 = Class 30E	Class 30 Time x Current Curve.

Indication	Description
6 = Class 35	Class 35 Time x Current Curve.
7 = Class 40	Class 40 Time x Current Curve.
8 = Class 45	Class 45 Time x Current Curve.

**ATTENTION!**

Incorrect selection of the thermal fault class may cause the motor to burn out.

The data needed to choose the thermal class are the following:

- Motor rated current (I_n).
- Locked-rotor current (I_p).
- Locked rotor time (T_{RB}).
- Service factor (SF).

**NOTE!**

It must be checked whether the locked rotor time is set for the hot or cold motor, so that the corresponding thermal class curves are used.

With these values, the motor overload time and current must be calculated, determined by the following relationships:

$$\text{Overload Current} = \frac{I_p}{I_n \times FS} \times 100(\%)$$

$$\text{Overload Time} = T_{RB} \text{ (s)}$$

These equations provide the limit conditions to activate the fault, that is, the motor will not be able to work with an overload time greater than this, as it will run the risk of burning out. Therefore, a thermal class immediate below must be chosen to guarantee the motor fault.

E.g.: For a motor with the following characteristics,

$$I_n = 10.8 \text{ A}$$

$$T_{RB} = 4 \text{ s (locked rotor time with the motor hot)}$$

$$I_p / I_n = 7.8A \Rightarrow I_p = 7.8 \times 10.8A = 84.2A$$

$$FS = 1.15$$

we have,

$$\text{Overload Current} = \frac{I_p}{I_n \times FS} = \frac{84.2}{10.8 \times 1.15} \times 100(\%) = 678 \%$$

$$\text{Overload Time} = T_{RB} = 4 \text{ s}$$

Once this is done, just relate the calculated values in the motor overload chart ([Figure 11.49 on page 11-116](#) or [Figure 11.50 on page 11-117](#)), and select the thermal class curve immediately below the point found.

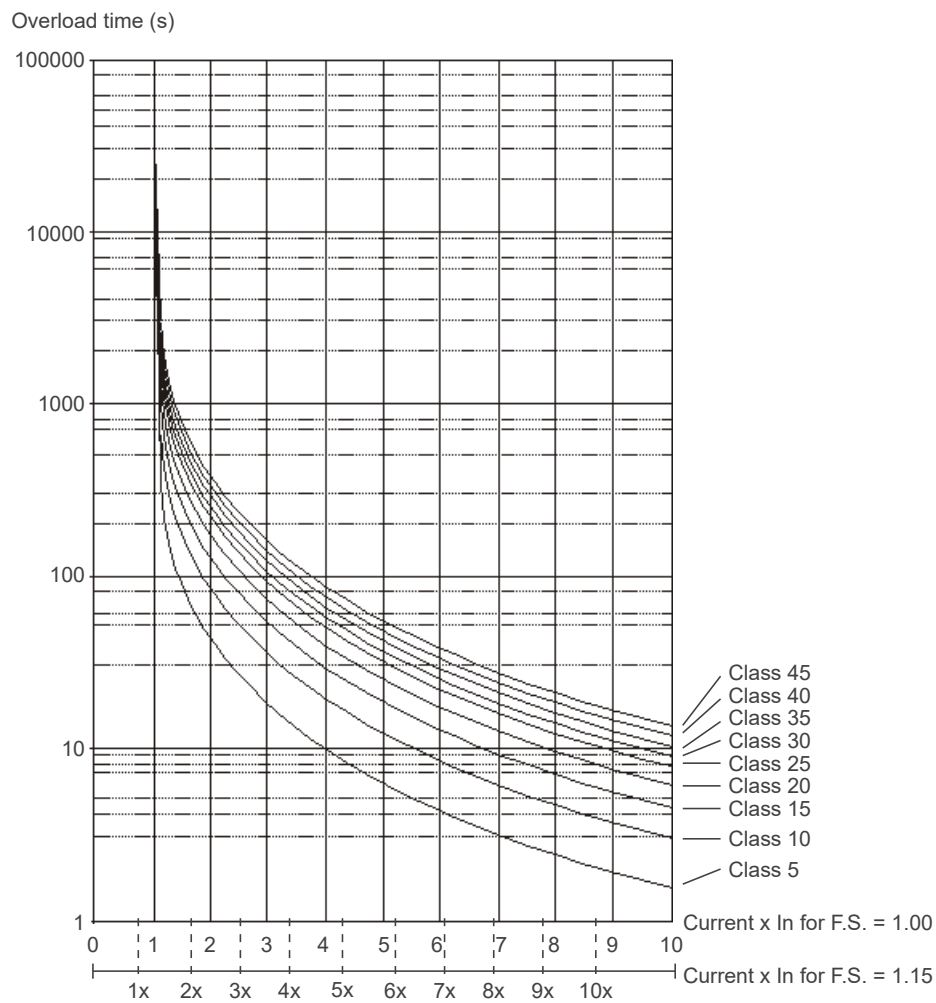


Figure 11.49: Cold motor overload curves for HD and ND loads

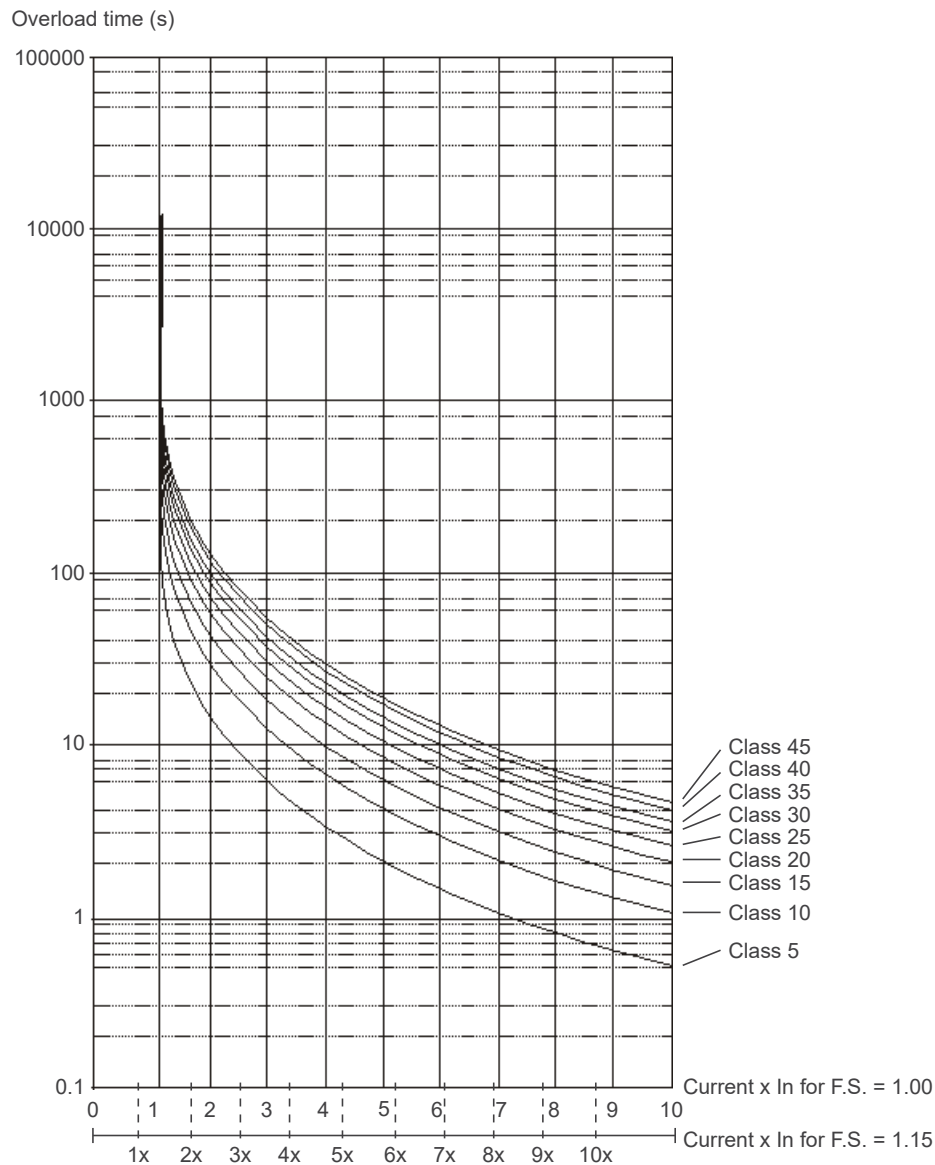


Figure 11.50: Hot motor overload curves for HD and ND loads

For the above example, by relating the value of 678 % (x-axis) of the Overload Current to the 4 seconds (y-axis) of the Overload Time on the graph of [Figure 11.50 on page 11-117](#), (hot motor), the thermal class to be selected will be class 15 (t15).

C7.5 Over/Undertemp. Prot.

It allows configuring the Overtemperature and Undertemperature faults.

C7.5 Over/Undertemp. Prot.

C7.5.1 Configuration

Range: 0 ... 5 Bit

Default: 0

Properties: Stopped

Description:

It configures the inverter overtemperature and undertemperature faults.

By default, both fault and alarm are enabled. Also, overtemperature faults cannot be disabled.

C CONFIGURATIONS

Bit	Value/Description
Bit 0 IGBT Overtemp.	It enables the IGBTs 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 fault. 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 Control 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/Undertemp. Prot.

C7.5.2 Motor Overtemp. Conf.

Range:	0 ... 3	Default: 3
Properties:	Stopped	

Description:

It defines the inverter behavior in motor overtemperature condition.

The configured behavior influences the performance of the motor overtemperature fault (F078) and of the alarm (A110), as shown in 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.

The motor must have a PTC sensor installed for the correct actuation of the fault and alarm.



ATTENTION!

The PTC must feature reinforced insulation of the live parts of the motor and installation.

For the correct operation, it is necessary to use an analog input and output. If you choose to use AI1 and AO1 from Slot X, for example, you must set, respectively, parameters C5.1.1.1 and C5.1.2.3 for the PTC function. Also, it is necessary to position the “DIP switches” of the input for voltage, and analog output for current, as shown in [Figure 11.51 on page 11-119](#).

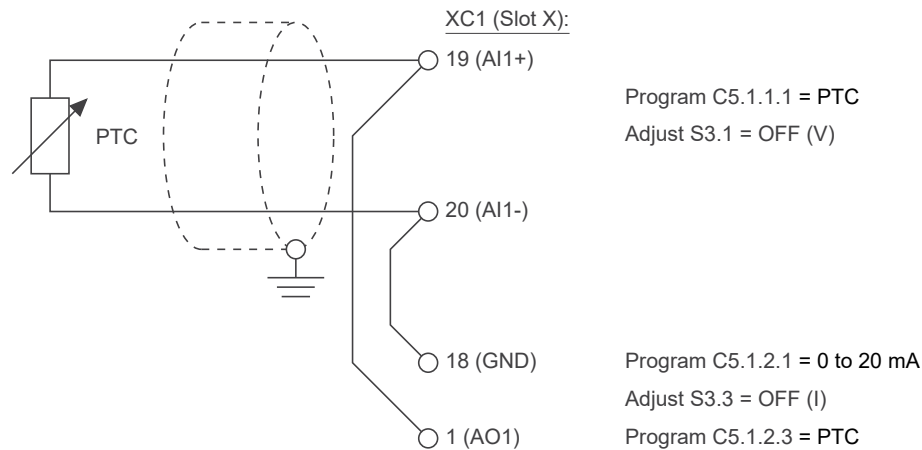


Figure 11.51: PTC connection example

Once the fault has been triggered, it will only stop working when the temperature reaches a certain level. The trigger and inactivation levels for the alarm and the fault can be seen in [Table 11.84 on page 11-119](#).

Table 11.84: Trip and inactivation levels of A110 and F078

Situation	PTC	Voltage at AI
It goes into alarm A110 in the temperature rise	$R_{PTC} = 3,5k\Omega$	$V_{AI} > 7,0V$
It goes into fault status F078 in the temperature rise	$R_{PTC} = 3,9k\Omega$	$V_{AI} > 7,8V$
It disables Alarm A110	$150\Omega < R_{PTC} < 1,6k\Omega$	$0,3 < V_{AI} < 3,2V$
It allows disabling fault F078	$150\Omega < R_{PTC} < 1,6k\Omega$	$0,3 < V_{AI} < 3,2V$
It goes into fault status F078 (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.

C7.6 Fan Speed Fault

It allows setting the Fan Speed faults.

C7.6 Fan Speed Fault

C7.6.1 Power Fan Setting

Range: 0 ... 1

Default: 0

Properties: Stopped

Description:

It enables the fault or alarm actuation for low speed on the inverter heat sink fan (power fan).

The low speed fault occurs when the fan speed is below 50% of the rated speed. The low speed alarm occurs when the fan speed is below 75% of the rated speed, and it is reset when above 80% of the rated speed.

Indication	Description
0 = Alarm/Fault	It enables fault and alarm. The inverter will be disabled when the fault occurs.
1 = Alarm	It enables only the alarm. The inverter will not be disabled, as the fault will be disabled.

C7.6 Fan Speed Fault

C7.6.2 Internal Fan Setting

Range: 0 ... 1

Default: 0

Properties: Stopped

C CONFIGURATIONS

Description:

It enables the fault or alarm actuation for low speed on the inverter internal fan.

The low speed fault occurs when the fan speed is below 10% of the rated speed. The low speed alarm occurs when the fan speed is below 15% of the rated speed, and it is reset when above 17.5% of the rated speed.

Indication	Description
0 = Alarm/Fault	It enables fault and alarm. The inverter will be disabled when the fault occurs.
1 = Alarm	It enables only the alarm. The inverter will not be disabled, as the fault will be disabled.

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 at which the motor can operate, and it 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 CFW900 will disable the PWM pulses and indicate fault (F150).

If you want this function to be disabled, set C7.7.1 = 100%.

C7.8 Pre-charge

It allows configuring the inverter pre-charge fault.

C7.8 Pre-charge

C7.8.1 Pre-charge Fault Config.

Range:	0 ... 3 Bit	Default: 15
Properties:		

Description:

It enables the pre-charge fault (F185) due to its possible causes.

Bit	Value/Description
Bit 0 Phase disconnected	It enables the phase disconnected detection for fault F185. 0 = Disabled: It disables the phase disconnected detection. 1 = Enabled: It enables phase disconnected detection.
Bit 1 Freq. out of range	It enables the frequency out of range detection for fault F185. 0 = Disabled: It disables the frequency out of range detection. 1 = Enabled: It enables the frequency out of range detection.
Bit 2 Input Voltage Unbalance	It enables the input voltage unbalance detection for fault F185. 0 = Disabled: It disables the input voltage unbalance detection. 1 = Enabled: It enables the input voltage unbalance detection.
Bit 3 Input Phase Unbalance	It enables the input phase unbalance detection for fault F185. 0 = Disabled: It disables the input phase unbalance detection. 1 = Enabled: It enables the input phase unbalance detection.

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. Therefore, if a fault actuates four consecutive times, the inverter will remain disabled (general disable) and the fault will continue to be actuated.

If $C7.9.1 \leq 2$, auto-reset will not 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:

It enables the use and defines the digital input that will be used for the External Alarm function.

When a transition from 1 to 0 occurs at the digital input programmed for the External Alarm function, alarm A090 will go off. On the transition from 0 to 1 at the programmed digital input, the alarm will be cleared. The motor keeps running normally, regardless the state of the digital input.

The options are shown in [Table 11.23 on page 11-25](#).

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 for the External Fault function. The options are shown in [Table 11.23 on page 11-25](#).

When a transition from 1 to 0 occurs on the digital input configured for External Fault, the inverter enters a fault state, indicating fault F091 as in [Figure 11.52 on page 11-121](#).

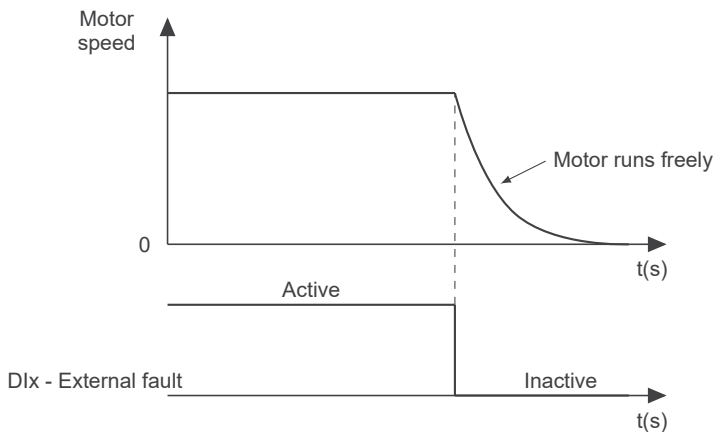


Figure 11.52: External fault via digital input

C CONFIGURATIONS

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

C7.11.2 Temperature Regulator Config.

Range: 0 ... 2 Bit

Default: 3

Properties: Stopped

Description:

It enables the inverter switching frequency regulation loops as a function of the IGBT junction and heat sink temperatures.

It also influences the inverter rated current setting as a function of the switching frequency. If at least one of the loops is enabled, meaning that the switching frequency is adjustable during the inverter operation and parameter C1.3.1: Switching Frequency - User has a value smaller than or equal to the rated switching frequency of the inverter in question, the rated current is corrected as a function of the minimum switching frequency. If no loop is enabled, the rated current is always corrected as a function of the rated switching frequency.

Bit	Value/Description
Bit 0 Heat sink Temp. Reg. with fsw Operation	It enables the switching frequency regulation loop as a function of the heat sink temperature. 0 = Disabled: Loop disabled. 1 = Enabled: Loop enabled.
Bit 1 Junction Temperature Regulator	It enables the switching frequency regulation loop as a function of the maximum junction temperature. 0 = Disabled: Loop disabled. 1 = Enabled: Loop enabled.
Bit 2 Heat sink Temp. Reg. w/ Power Fan Speed	It enables the heat sink fan speed regulation loop as a function of its temperature. 0 = Disabled: Loop disabled. 1 = Enabled: Loop enabled.

C7.12 Encoder

It allows setting the Encoder protections.

C7.12 Encoder

C7.12.1 Encoder Protection Config.

Range: 0 ... 1

Default: 1

Properties: Stopped

Description:

This parameter allows enabling or disabling the detection of the fault F067 (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 (W2 = 2) and with the motor running.



NOTE!

Some conditions must be observed:

- During Self-Tuning with the motor spinning (W2 = 2) and for any type of motor (C2.1.1), the protection will always be active (even if C7.12.1 = 0);
- With the motor running/spinning, the protection will only be active if C7.12.1 = 1 and C2.1.1 = 0 (Induction Motor), that is, it will not actuate for synchronous motors.

Indication	Description
0 = F67 inactive	The fault F067 is disabled.
1 = F67 active	The fault F067 is enabled.

C7.13 History

Allows configuring options related to the fault and alarm history.

C7.13 History

C7.13.1 Enable Alarm Hist.

Range: 0 ... 2

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.
2 = Limited	It indicates that the alarm history is enabled. Alarms that occur while the inverter is under-voltage or with the power switched off will not be recorded in the alarm history.

C7.13 History

C7.13.2 Enables Fault Hist.

Range: 0 ... 2

Default: 2

Properties:

Description:

Enables the recording of faults 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	Indicates that the fault history is disabled. New faults are not saved in memory, and only the entries already existing in the history are displayed on the HMI and read by the WPS.
1 = Enabled	Indicates that the fault history is enabled.
2 = Limited	Indicates that the fault history is enabled. Faults occurring while the inverter is under-voltage or with the power switched off will not be recorded in the fault history.

C7.14 Action Inv. in Limitation

It allows configuring alarms or protections to operate when the inverter is in limitation.

C CONFIGURATIONS

C7.14 Action Inv. in Limitation

C7.14.1 Action

Range: 0 ... 2

Default: 1

Properties:

Description:

Defines the action to be taken when the inverter is detected to be under DC link voltage limitation, current limitation, or torque limitation for a specific period.

Parameter S5.1.3 indicates which limitation is active.

Indication	Description
0 = Inactive	The detection of inverter under limitation is disabled.
1 = Alarm	The detection of inverter under limitation results in the indication of A164, A166 or A168.
2 = Fault	The detection of inverter under limitation results in the indication of F165, F167 or F169.

C7.14 Action Inv. in Limitation

C7.14.2 Detection Time

Range: 1 ... 60 s

Default: 10 s

Properties:

Description:

Defines the time period, in seconds, during which the inverter must remain under limitation for an alarm or protection to be triggered.

C8 FUNCTIONAL SAFETY

It allows configuring parameters related to the functional safety of the CFW900.

C8 Functional Safety

C8.1 SS1-t Ramp Deceleration Time

Range: 0.1 ... 999.9 s

Default: 5.0 s

Properties: Stopped

Description:

It defines the time in seconds to linearly decelerate the motor from the maximum speed to zero during the execution of the SS1-t safety function.



NOTE!

This parameter should not be confused with the delay time of the SS1-t safety function. For programming the delay time, please refer to the safety function configuration in the safety manual.



NOTE!

If the SS1-t ramp deceleration time is set to a time value greater than the SS1-t delay time setting (S4.2), the STO state will be reached before the complete stop of the motor.

C8 Functional Safety

C8.2 Run command (STO)

Range: 0 ... 1

Default: 0

Properties:

Description:

Configures the handling of the run command to be applied when the inverter leaves the STO state.

Indication	Description
0 = Edge	A rising edge of the run command is required after the inverter leaves the STO state to allow the motor to start.
1 = Level	After the inverter leaves the STO state, the motor can start immediately if the run command is active, without the need for a new command.

C9 COMMUNICATIONS

It sets the CFW900 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 enable. It disables the motor.
2 = Alarm	Alarm enabled. It actuates 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 - A128, A129, A130, A133, A134, A135, A137, A147 and A149.

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 coasts to stop.
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.

C CONFIGURATIONS



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 enable. It disables the motor.
2 = Alarm	It 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 the master alarm in programming mode (Idle/Prog) - A136.

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 coasts to stop.
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 state it was before the beginning of the reception.

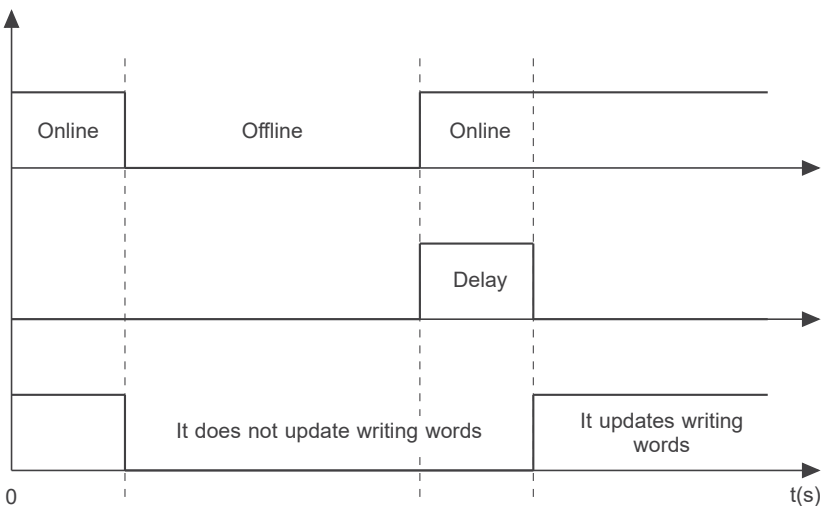


Figure 11.53: Delay in the update of the I/O words

C9.2.2 Writing Data		
C9.2.2.2 Word #1		

C9.2.2.2 to C9.2.2.101

C CONFIGURATIONS

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 CFW900 Modbus-RTU Communication Manual, available in electronic format.

C9.3 Serial RS485

C9.3.1 Protocol

Range:	0 ... 2	Default: 2
Properties:	Stopped	

Description:

It selects the desired protocol for the RS485 serial interface.

Indication	Description
0 ... 1 = Not used	Not used.
2 = Modbus RTU	Slave Modbus RTU serial protocol.

C9.3 Serial RS485

C9.3.2 Address

Range:	1 ... 247	Default: 1
Properties:	Stopped	

Description:

It selects the address used for the serial communication.

It is necessary that each device in the network have an address different from all the others.

C9.3 Serial RS485

C9.3.3 Baud Rate

Range:	0 ... 3	Default: 1
Properties:	Stopped	

Description:

It selects the desired value for the baud rate of the serial interface in bits 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:

It selects the settings for the number of data bits, parity and stop bits in the serial interface bytes. This configuration 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 bits.
4 = 8-bits, even, 2	8 bits, with even parity, 2 stop bits.
5 = 8-bits, odd, 2	8 bits, with odd parity, 2 stop bits.

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 CFW900 Modbus TCP Communication Manual, available in electronic format.

C9.4 Ethernet**C9.4.1 IP Address Settings**

Range:	0 ... 1	Default: 1
Properties:		

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	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:		

Description:

It allows programming the IP address of the Ethernet interface. It only takes effect if the address was set via parameters.

C CONFIGURATIONS

C9.4 Ethernet

C9.4.3 Network Mask

Range: 0 ... 31

Default: 24

Properties:

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.
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:

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:

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:

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:

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:** 0
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 CFW900 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 for the exchange of I/O data with the network master.

C CONFIGURATIONS

The CFW900 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 CFW900 frequency inverter. The table below details 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. In addition, it is possible to program up to 48 parameters of the equipment 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 equipment according to the CFW900 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 48 for 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:

It sets the index of the first programmable reading word for data exchange with the network (input to the network master), configured in C9.5.2.

C9.5 EtherNet/IP

C9.5.3 Readings 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 word set in C9.5.3.

C9.5 EtherNet/IP

C9.5.4 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), configured in C9.5.4.

C9.5 EtherNet/IP

C9.5.5 Writings 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 word set in C9.5.5.

C9.6 Modbus TCP

It allows setting the Modbus TCP network protocol using the CFW900 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.

C9.7 Anybus

Settings for the Anybus communication accessory and the protocols that use this interface.

For a detailed description, see the CFW900 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	

C CONFIGURATIONS

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 C9.7.1.

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 C9.7.3.

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 DP modules. The allowed adjustable range is from 1 to 126.



NOTE!

After changing this configuration, the equipment must be turned off and on again.

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 EtherCAT and PROFINET IRT modules.

Indication	Description
0 = Parameters	The IP address, subnet mask and gateway must be set through the product parameters.
1 = DHCP	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 setting the IP address of the Anybus EtherCAT or PROFINET IRT module. It only takes effect if C9.7.8 = Parameters.

**NOTE!**

After changing this configuration, the equipment must be turned off and on again.

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 EtherCAT or PROFINET IRT module. It only takes effect if C9.7.8 = Parameters.

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.
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.

C CONFIGURATIONS

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 C9.7.8 = Parameters.



NOTE!

After changing this configuration, the equipment must be turned off and on again.

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 have 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 bits 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 500, 250 and 125 Kbit/s rates 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 rerun the autobaud function, it is necessary to change 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, A134/F234 will be displayed on the HMI and the communication will be disabled. In case of alarm, the action set 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 for the exchange of I/O data with the network master.

The CFW900 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 CFW900 frequency inverter. The table below details 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.

C CONFIGURATIONS

Indication	Description
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. In addition, it is possible to program up to 48 parameters of the equipment 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 equipment according to the CFW900 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 48 for 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.

C9.9 Bluetooth

The following settings are available for products that have an HMI interface with integrated Bluetooth technology.

To use this product with another Bluetooth enabled device, both device should be paired.

C9.9 Bluetooth		
C9.9.1 Mode		
Range:	0 ... 1	Default: 0
Properties:		

Description:

Bluetooth settings are inactive by default. These settings must be enabled to use the Bluetooth wireless interface.

Indication	Description
0 = Inactive	Inactive.
1 = Active	Active.

C9.9 Bluetooth	
C9.9.2 PIN	
	Default: 123456
Properties:	

Description:

Before using the product with another Bluetooth enabled device for the first time, you should pair it using the six-digit PIN set in this parameter.

The PIN must be 6 digits from 0 to 9.

C9.9 Bluetooth	
C9.9.3 Device Name	
	Default: -
Properties:	Model

Description:

You can set the Bluetooth device name.

By default, the product Bluetooth name is CFW9x plus the product serial number (e.g., CFW9x0123456789).

The device name must have 1 to 15 alphanumeric digits.

C9.10 SymbiNet

SymbiNet is a communication protocol that enables information exchange directly between devices that support such protocol. For the CFW900, 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.

C CONFIGURATIONS

- 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:

It allows enabling SymbiNet protocol over Ethernet interface, for data exchange among SymbiNet devices.

Indication	Description
0 = Disable	Disable function.
1 = Enable	Function enable.

C9.10 SymbiNet**C9.10.2 Publication Time****Range:** 2 ... 100 ms**Default:** 20 ms**Properties:****Description:**

It allows programming, 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:**

It programs 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:**

It programs the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

C CONFIGURATIONS

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:

It programs 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:

It programs 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:

It programs 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.

C CONFIGURATIONS

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:

It programs 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:

It programs 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:

It programs 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:

C CONFIGURATIONS

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 CFW900, 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:

It allows the user to execute commands for the application.

Indication	Description
0 = Stop	It stops the active application.
1 = Run	It runs the active application.
2 ... 4 = Not used	
5 = Erase	It deletes the active user application.



NOTE!

When the command to erase the program is performed, all user parameters are loaded with the value 0.

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, you can stop, run or delete the user program downloaded as APP1 by the WPS software.
1 = User Application 2	When selected, you can stop, run or delete the user program downloaded as APP2 by the WPS software.
2 ... 6 = Not used	Not used.

**NOTE!**

When the active program is changed, the default values of the user parameters are loaded (Menu A1).

C10.1 Configuration**C10.1.3 Application Stopped Action**

Range: 0 ... 2

Default: 0

Properties:

Description:

It allows 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 alarm A708.
2 = Trip Fault	It trips fault F709.

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 that will be viewed on the HMI, that is, any SoftPLC user parameter which is associated to this parameter (engineering unit) will be viewed in this format.

The options are shown in the table below.

Table 11.116: Engineering Units associated with the SoftPLC user parameter

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 = lnWC	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	

C CONFIGURATIONS

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 that will be viewed on the HMI, that is, any SoftPLC user parameter which is associated to this parameter (engineering unit) will be viewed in this format.

The options are shown in [Table 11.116 on page 11-147](#).

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 that will be viewed on the HMI, that is, any SoftPLC user parameter which is associated to this parameter (engineering unit) will be viewed in this format.

The options are shown in [Table 11.116 on page 11-147](#).

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 that will be viewed on the HMI, that is, any SoftPLC user parameter which is associated to this parameter (engineering unit) will be viewed in this format.

The options are shown in [Table 11.116 on page 11-147](#).

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.

C11 HMI

It allows changing the parameters related to the presentation of information on the HMI display.

C11.1 Configuration

It allows changing the CFW900 HMI configuration parameters.

C11.1 Configuration		
C11.1.1 Time Zone		
Range:	0 ... 52	Default: 24
Properties:		

Description:

Setting of the time zone where the product is applied.

The options are shown in the table below.

Table 11.117: Time zone where the product is applied

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	

C11.1 Configuration		
C11.1.2 Date/Hour		
Range:	YYYY-MM-DD	HH:MM:SS
Properties:		

C CONFIGURATIONS

Description:

Setting of the CFW900 Real Time Clock (RTC) date and time.

It is important to set them with the correct date and time so that the fault and alarm records occur with actual date and time information.

C11.1 Configuration

C11.1.3 Language

Range: 0 ... 7

Default: 1

Properties:

Description:

It defines the language in which the information will be displayed on the HMI.

Indication	Description
0 = Português	Portuguese.
1 = English	English.
2 = Español	Spanish.
3 = Deutsch	German.
4 = Français	French.
5 = Italiano	Italian.
6 = Nederlands	Dutch.
7 = Polski	Polish.

C11.1 Configuration

C11.1.4 Display Brightness

Range: 0 ... 100 %

Default: 100 %

Properties:

Description:

It allows setting the brightness of the HMI display. Higher values set a higher brightness.

C11.1 Configuration

C11.1.5 Contrast

Range: 0 ... 100 %

Default: 40 %

Properties:

Description:

It allows setting the HMI display background contrast level. Higher values set a higher contrast.

C11.1 Configuration

C11.1.6 Inc./Dec. Parameter

Range: 0 ... 20

Default: 1

Properties:

Description:

It selects the parameter to be increased or decreased by pressing the up and down keys on the monitoring screens.

User parameter settings made using the HMI keys are not saved in non-volatile memory. When re-energizing the inverter, these parameters initialize to the last value configured via navigation in the HMI or application menus.

Indication	Description
0 = Disabled	No parameters changeable via up and down keys.
1 = Speed Ref. via HMI	The up and down keys on the monitoring screen change the speed reference value via HMI (C4.3.1.3.1).
2 = Torque Reference via HMI	The up and down keys on the monitoring screen change the torque reference value via HMI (C4.3.3.1).

Indication	Description
3 = PID Setpoint	The up and down keys on the monitoring screen change the value of the PID Setpoint in Automatic Mode (A2.2.1.1).
4 ... 10 = Not used	Not used.
11 = User Parameter 1	The up and down keys on the monitoring screen change the value of user parameter 1 (A1.1.1).
12 = User Parameter 2	The up and down keys on the monitoring screen change the value of user parameter 2 (A1.1.2).
13 = User Parameter 3	The up and down keys on the monitoring screen change the value of user parameter 3 (A1.1.3).
14 = User Parameter 4	The up and down keys on the monitoring screen change the value of user parameter 4 (A1.1.4).
15 = User Parameter 5	The up and down keys on the monitoring screen change the value of user parameter 5 (A1.1.5).
16 = User Parameter 6	The up and down keys on the monitoring screen change the value of user parameter 6 (A1.1.6).
17 = User Parameter 7	The up and down keys on the monitoring screen change the value of user parameter 7 (A1.1.7).
18 = User Parameter 8	The up and down keys on the monitoring screen change the value of user parameter 8 (A1.1.8).
19 = User Parameter 9	The up and down keys on the monitoring screen change the value of user parameter 9 (A1.1.9).
20 = User Parameter 10	The up and down keys on the monitoring screen change the value of user parameter 10 (A1.1.10).

**NOTE!**

Parameter C4.3.1.3.1 setting: Speed reference via HMI is restricted to the range delimited by C4.3.1.1.1 and C4.3.1.1.2.

Parameter C4.3.3.1 setting: Torque reference via HMI is restricted to the range delimited by +/- C4.3.3.2.

Parameter A2.2.1.1 setting: PID setpoint via HMI is restricted to the range delimited by A2.3.3.4 and A2.3.3.5.

C11.2 Main Screen

It allows programming what should be shown on the main monitoring screen. Options to add, edit and remove parameters are presented.

The setting is performed by directly selecting the menu whose content you want to show.

Only numerical reading parameters from the Status menu are shown. When a parameter is selected in which the content cannot be shown, its area will be shown empty.

For further details, see [Section 8.6 MAIN SCREENS SETTINGS on page 8-5](#).

C11.3 User

It allows to login and change the current user password.

For further details, see [Section 8.5 ACCESS CONTROL on page 8-4](#).

C11.3.1 Login

It allows to login for a specific user. A password is required if previously configured.

C11.3.2 Change password

It allows changing the user's password. If the user already has a previously configured password, the current password will be requested to allow changing the password. To disable the password, simply set the new value to zero.

C12 BACKUP

It allows to perform operations related to copying or restoring CFW900 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 CFW900 settings.

It allows you to restore the factory default and 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 CFW900 settings with the default content of the parameters.
2 = Default 50 Hz	It loads the CFW900 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 to 125 rpm; ■ C4.3.1.1.2 set to 1500 rpm; ■ C4.3.1.3.1 set to 75 rpm; ■ C5.9.3 set to 15 rpm; ■ C4.3.1.5.1 set to 75 rpm; ■ C5.9.4 set to 100 rpm; ■ C4.3.1.5.2 set to 250 rpm; ■ C5.9.5 set to 1500 rpm; ■ C4.3.1.5.3 set to 500 rpm; ■ C5.9.8 set to 15 rpm; ■ C4.3.1.5.4 set to 750 rpm; ■ C2.1.8 set to 1458 rpm; ■ C4.3.1.5.5 set to 1000 rpm; ■ C2.1.6 set to 50 Hz; ■ C4.3.1.5.6 set to 1250 rpm; ■ C2.1.2 set in kW; ■ C4.3.1.5.7 set to 1500 rpm; ■ C3.3.4.1.1 set to 1500 rpm; ■ C4.3.1.5.8 set to 1375 rpm; ■ C3.3.4.1.2 set to 1500 rpm; ■ C4.3.1.1.1 set to 75 rpm;
3 = Param. Set 1 -> CFW	It loads the CFW900 settings with the content of parameter set 1.
4 = Param. Set 2 -> CFW	It loads the CFW900 settings with the content of parameter set 2.
5 = Param. Set 3 -> CFW	It loads the CFW900 settings with the content of parameter set 3.
6 = CFW -> Param. Set 1	It saves the content of the CFW900 current settings to parameter set 1.
7 = CFW -> Param. Set 2	It saves the content of the CFW900 current settings to parameter set 2.
8 = CFW -> Param. Set 3	It saves the content of the CFW900 current settings to parameter set 3.
9 = SD Card -> CFW	It loads the CFW900 settings with the content of the parameter set 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 = CFW -> SD Card	It saves the content of the actual CFW900 settings on the SD card. Additionally, it exports the settings from parameter sets 1, 2 and 3 to the SD card.
11 = HMI -> CFW	It loads the CFW900 settings with the content of the parameter set from the HMI.
12 = CFW -> HMI	It saves the content of the actual CFW900 settings on the HMI.

Figure 11.54 on page 11-153 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.

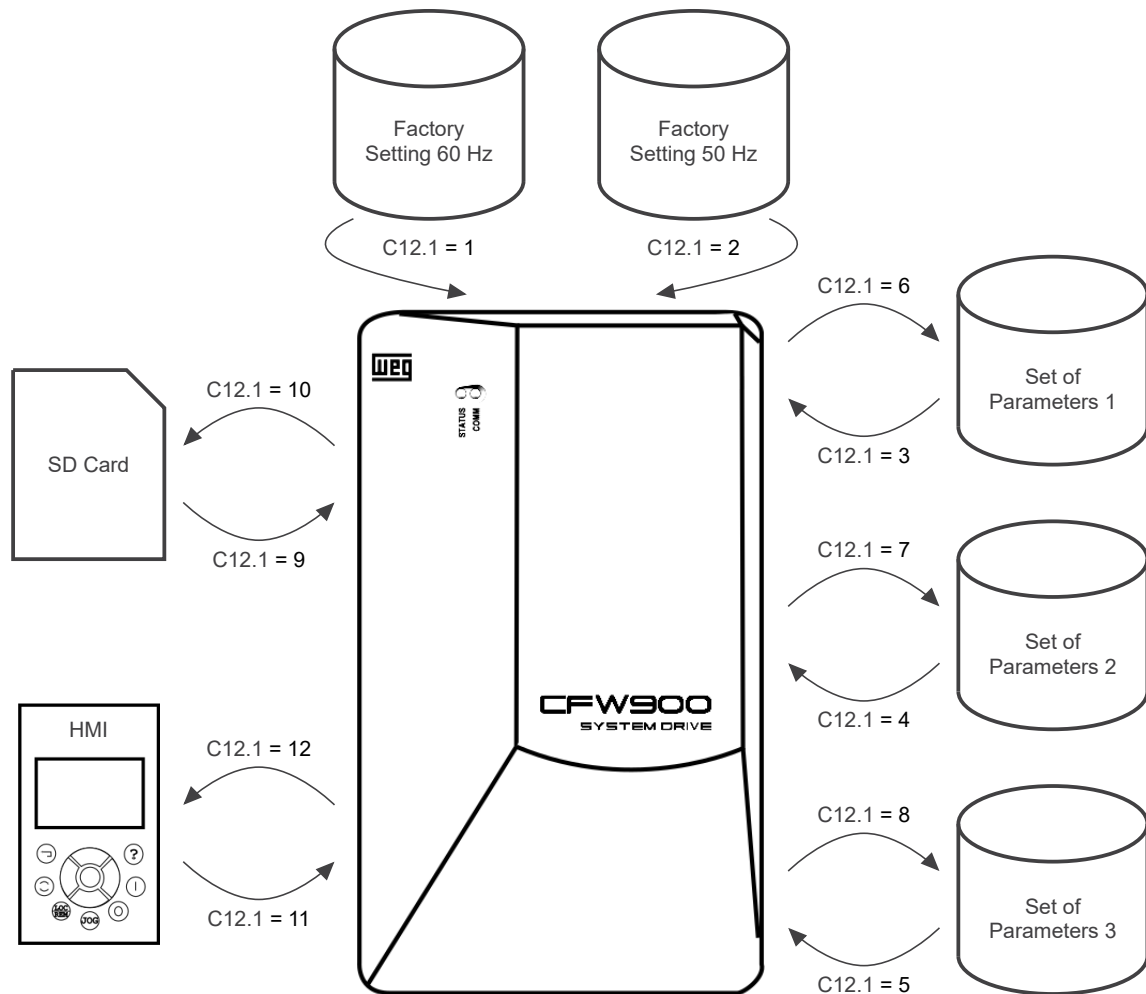


Figure 11.54: Load settings

**NOTE!**

The load commands of parameter C12.1 do not restore the values of the following parameters:

- C8.1: Functional Safety - SS1-t Ramp Deceleration Time
- C11.1.1: Configuration - Time Zone
- C11.1.2: Configuration - Date/Hour

In the case of the factory default 50/60 Hz (C12.1 = 1 or 2), these parameters are not restored either:

- C1.1.1: Power Supply - Type
- C1.1.2: Power Supply - Rated Voltage
- C3.2.3.1: Current Stabilization - Enable Function
- C11.1.3: Configuration - Language

**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**C12.2 Load Set 1 DI**

Range:	0 ... 62	Default: 0
Properties:	Stopped	

Description:

Enables the use and defines the digital input that will be used to load the CFW900 settings with the contents of parameter group 1.

The loading process is carried out when the DIx status changes from low level to high level (transition from 0 V to 24 V), provided that the content of the CFW900 current settings has been previously transferred to parameter group 1.

The options are shown in [Table 11.23 on page 11-25](#).

C12 Backup**C12.3 Load Set 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 CFW900 settings with the contents of parameter group 2.

The loading process is carried out when the DIx status changes from low level to high level (transition from 0 V to 24 V), provided that the content of the CFW900 current settings has been previously transferred to parameter group 2.

The options are shown in [Table 11.23 on page 11-25](#).

C12 Backup**C12.4 Load Set 3 DI**

Range:	0 ... 62	Default: 0
Properties:	Stopped	

Description:

Enables the use and defines the digital input that will be used to load the CFW900 settings with the contents of parameter group 3.

The loading process is carried out when the DIx status changes from low level to high level (transition from 0 V to 24 V), provided that the content of the CFW900 current settings has been previously transferred to parameter group 3.

The options are shown in [Table 11.23 on page 11-25](#).

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 CFW900 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 CFW900 settings have previously been transferred to the parameter group in question.

The options are shown in [Table 11.23 on page 11-25](#).

**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.

12 W WIZARDS

It allows setting the parameters related to the Oriented Start-up and Self-tuning processes.

The Wizard mode is intended to facilitate the process of configuring the inverter with the motor that will be driven. In this environment, the user can configure the inverter data, the motor data, the desired control method and the parametric identification process and present some application specifications.

The Oriented Startup is started during the first power-up of the CFW900 and allows you to make the initial settings required to drive the motor. If it is necessary to start the Start-up Assistant again, set parameter W1 to Yes, as shown in the following screens.

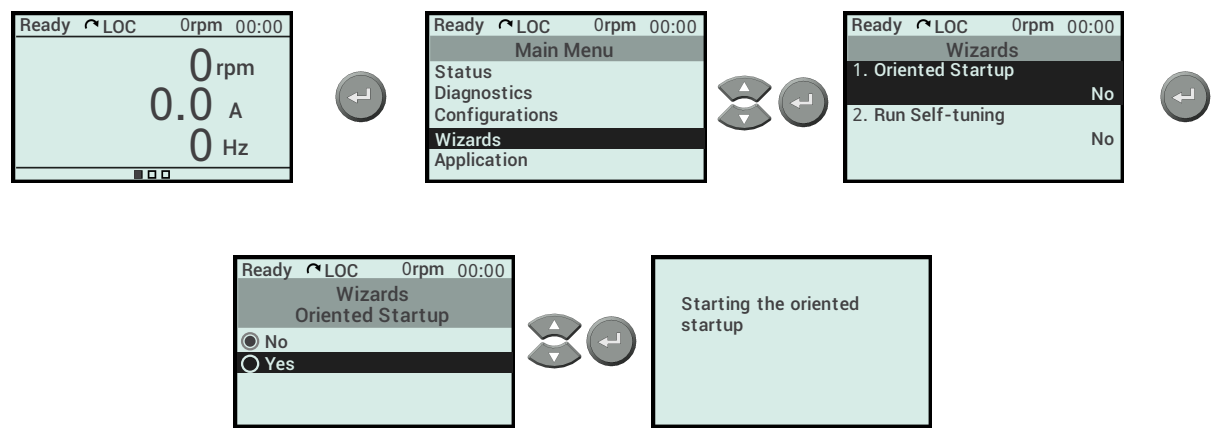


Figure 12.1: Oriented Startup

W Wizards		
W1 Oriented Startup		
Range:	0 ... 1	Default: 0
Properties:	Stopped	

Description:
When this parameter is changed to 1, the Oriented Startup routine starts. The CFW900 goes to the CONFIG status, which is indicated on the HMI. Within the Oriented Startup, the user only has access to important parameters to set the CFW900 and the motor for the control type to be used in the application.

Indication	Description
0 = No	It will not run.
1 = Yes	It will run.

During the execution of the Oriented Start-up, the user will be prompted to set some parameters according to the motor nameplate data. The [Figure 12.2 on page 12-2](#) and [Figure 12.3 on page 12-2](#) are examples of how information is obtained.

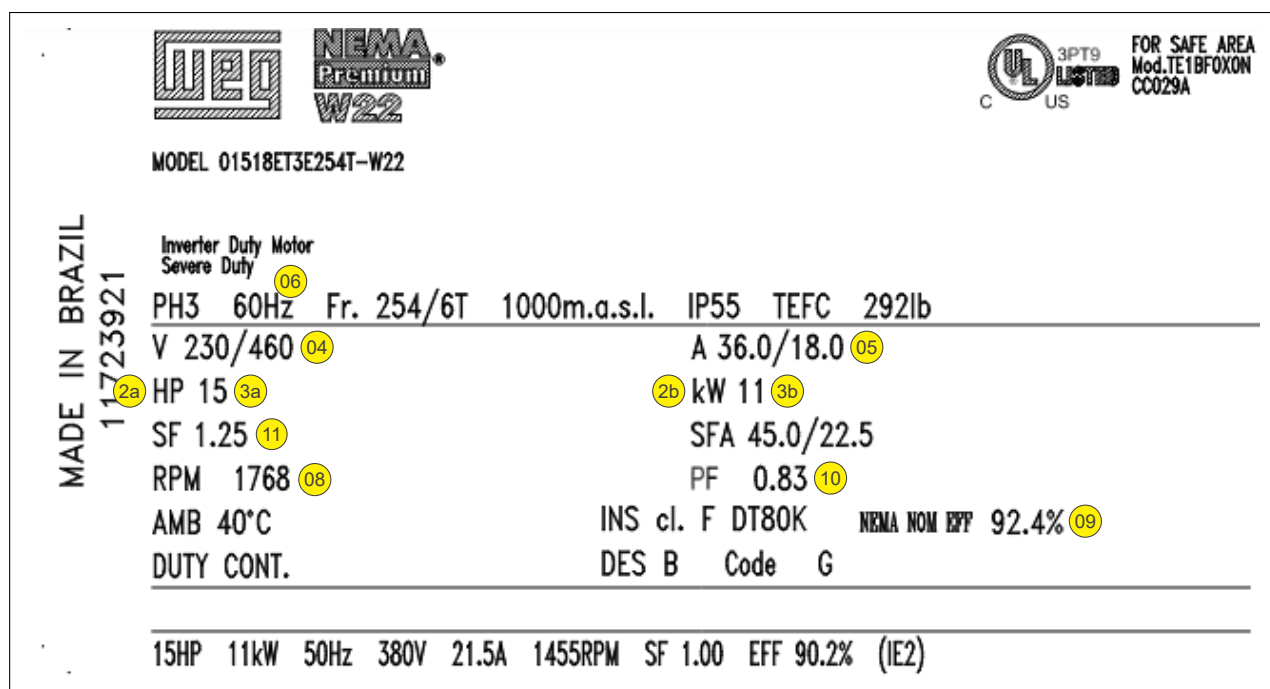


Figure 12.2: Obtaining data from an induction motor (Example of a WEG motor)

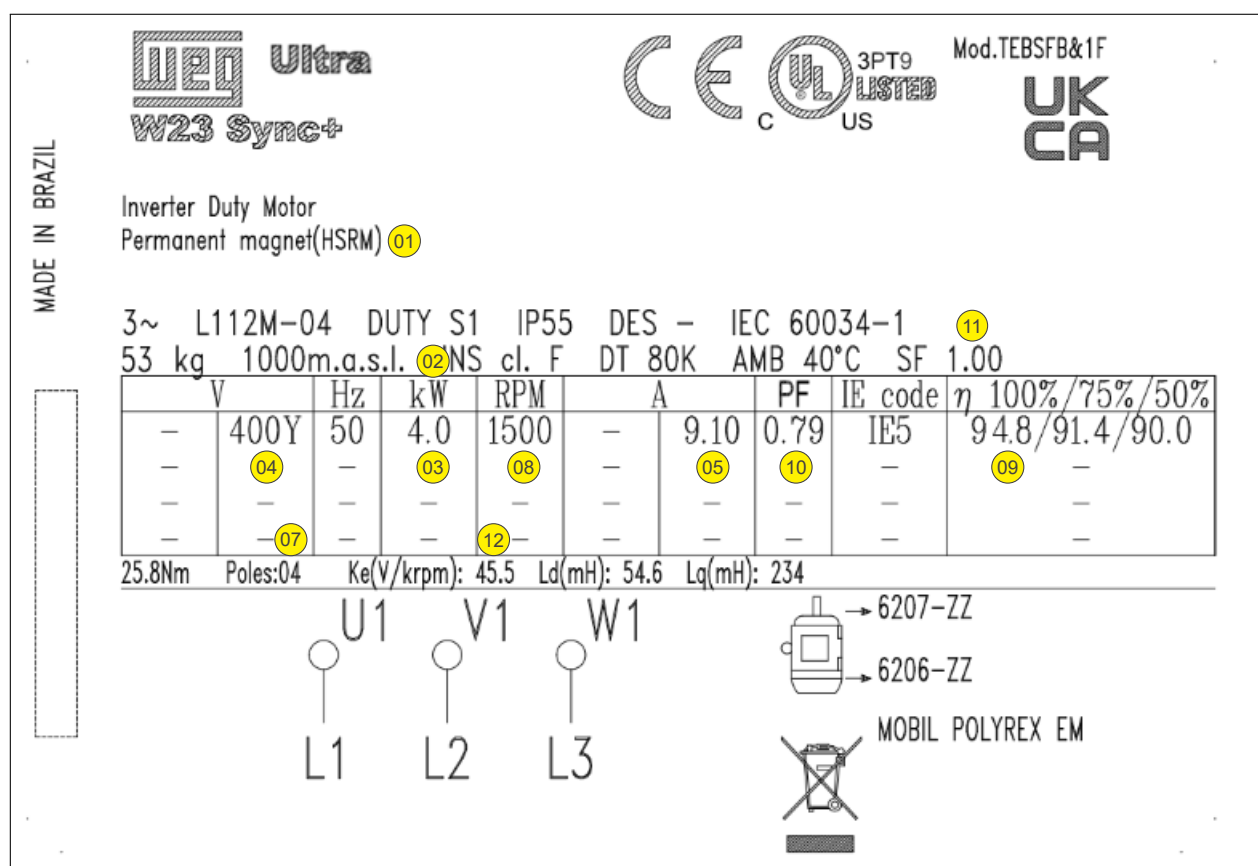


Figure 12.3: Obtaining data from an HSRM motor (Example of a WEG motor)

The following list indicates to which parameters each of the data highlighted in the figures relates.

- 01 C2.1.1: Motor Data - Motor Type¹.
- 02 C2.1.2: Motor Data - Motor Power Unit.
- 03 C2.1.3: Motor Data - Rated Power.
- 04 C2.1.4: Motor Data - Rated Voltage.
- 05 C2.1.5: Motor Data - Rated Current.
- 06 C2.1.6: Motor Data - Rated Frequency.
- 07 C2.1.7: Motor Data - Number of Poles.
- 08 C2.1.8: Motor Data - Rated Speed.
- 09 C2.1.9: Motor Data - Rated Efficiency.
- 10 C2.1.10: Motor Data - Rated cos phi.
- 11 C2.1.11: Motor Data - Service Factor.
- 12 C2.2.8: Motor Model Parameters - Ke Constant.

W Wizards

W2 Run Self-tuning

Range: 0 ... 2

Default: 0

Properties: Stopped

Description:



NOTE!

Before running the Self-tuning function, it is recommended to program an emergency option, such as STO or digital input programmed for general enable.



NOTE!

During the execution of the Self-tuning function, other operations must not be carried out on the inverter, such as: configuration, copying and loading parameter factory default, downloading parameters via WPS, executing commands etc.

It defines the motor parameter identification mode. After selecting the identification method, the self-tuning starts performing the steps automatically.

More information about the Self-Tuning routines according to the selected motor type can be found in the menu C3.3.

Indication	Description
0 = No	Function disabled.
1 = Stopped	Self-tuning with the motor stopped.
2 = Running	Self-tuning with the motor running.



NOTE!

For VVW+ control, regardless of the option selected in parameter W2, the self-tuning will always be performed with the motor stopped.

¹To identify the motor type, check whether it is explicitly described on the motor nameplate or whether there is an indication of different rated and synchronous speed values—which suggests an induction motor. In cases where this is not possible, contact the motor manufacturer to request such information.

**NOTE!**

It is necessary to perform Self-tuning for the VVW+ control when induction motor is selected.

**NOTE!**

During the Self-tuning process in stop mode, there may be small movements in the motor rotor. Therefore, if the application is sensitive to these small movements, it is recommended that the Self-Tuning process be run with the motor disconnected from the system.

13 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 CFW900, 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 13.1 on page 13-1](#) shows the block diagram of the PID controller.

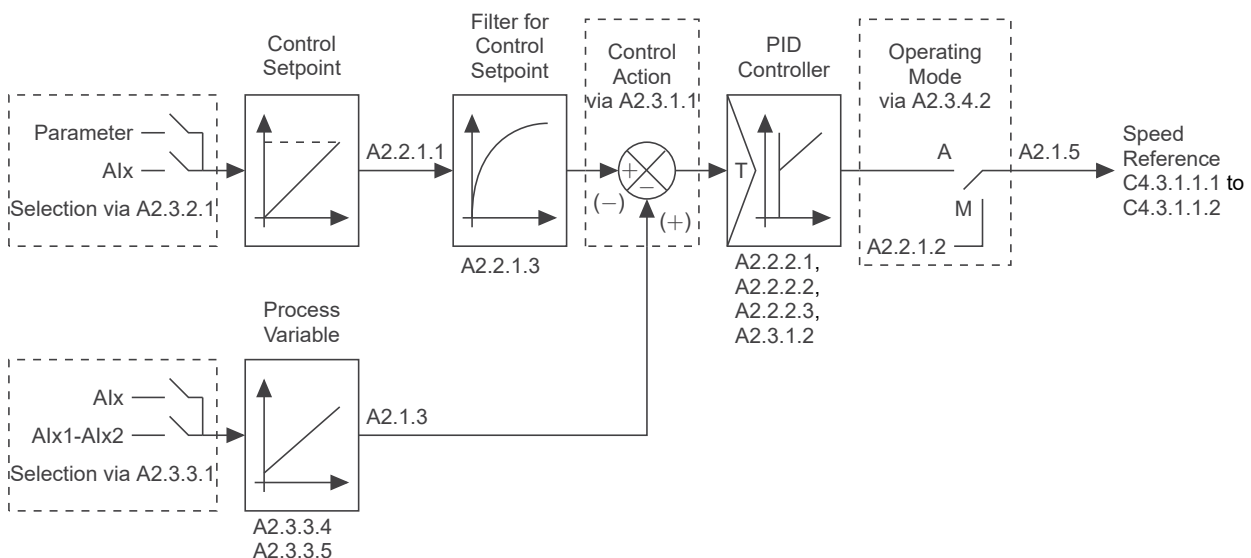


Figure 13.1: Block diagram of the PID controller

A APPLICATION

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 CFW900 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:

$$y(k) = i(k-1) + k_p \left[\left(1 + K_i \cdot T_a + \frac{K_d}{T_a} \right) \cdot e(k) - \left(\frac{K_d}{T_a} \right) \cdot e(k-1) \right]$$

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, engineering 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		
A2.1.3 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, engineering 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:

$$A2.1.3 = [AIValue(\%) \times (A2.3.3.5 - A2.3.3.4)] + [A2.3.3.4]$$

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 A430. 1 = Yes: Inverter is with alarm A430.
Bit 4 PV Low Level Fault	0 = No: Inverter is not with fault F431. 1 = Yes: Inverter is with fault F431.
Bit 5 PV High Level Alarm	0 = No: Inverter is not with alarm A432. 1 = Yes: Inverter is with alarm A432.
Bit 6 PV High Level Fault	0 = No: Inverter is not with fault F433. 1 = Yes: Inverter is with fault F433.

A2.2 Regulation

It allows setting the setpoint values and gains of the PID controller.

A2.2.1 Setpoint

It allows setting the setpoint values of the PID controller.

A2.2.1 Setpoint**A2.2.1.1 Automatic Mode**

Range:	-32768 ... 32767	Default: 0
Properties:		

A APPLICATION

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.

A2.2.2 Gains

It allows setting the gains of the PID controller.

A2.2.2 Gains

A2.2.2.1 Proportional

A2.2.2.2 Integral

A2.2.2.3 Derivative

Range: 0.00 ... 99.99

Default: 0.10 (A2.2.2.1)

5.00 (A2.2.2.2)

0.00 (A2.2.2.3)

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 13.3 on page 13-5](#) 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 Control

It allows configuring the PID controller control.

A2.3.1 Control

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 increase, it is necessary that the flow increase, which is accomplished by increasing the speed of the motor.

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 Control**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 13.3 on page 13-5](#) shows the suggestions of initial values of the sampling period for the PID controller according to the process to be controlled.

Table 13.3: 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 CFW900 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.

A APPLICATION

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

Properties:	Default:
-------------	----------

Description:

It defines the engineering 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 engineering 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 engineering 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 engineering 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 Operating Mode

It allows configuring the PID controller operating mode.

A2.3.4 Operating 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 Operating 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.

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A2.3.4 Operating 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 11.27 on page 11-35](#).

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 11.27 on page 11-35](#).

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 11.27 on page 11-35](#).

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 11.23 on page 11-25](#).

A2.3.6 Faults and Alarms

It allows configuring the performance of the PID controller faults and alarms.

A2.3.6 Faults and Alarms**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 Faults and Alarms**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 (A430).

A2.3.6 Faults and Alarms**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 Faults and Alarms**A2.3.6.4 Config. for PV High Level**

Range:	0 ... 3	Default: 0
Properties:		

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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.
3 = Alarm and Fault	It defines that the process variable fault and alarm should actuate when the limit is exceeded.

A2.3.6 Faults and Alarms

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 (A432).

A2.3.6 Faults and Alarms

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 CFW900 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 CFW900 inverter is in the sleep mode, the motor can spin at any moment because of the process conditions.

Figure 13.2 on page 13-11 shows an analysis of the operation of the PID controller programmed with direct control action and set to Sleep Mode.

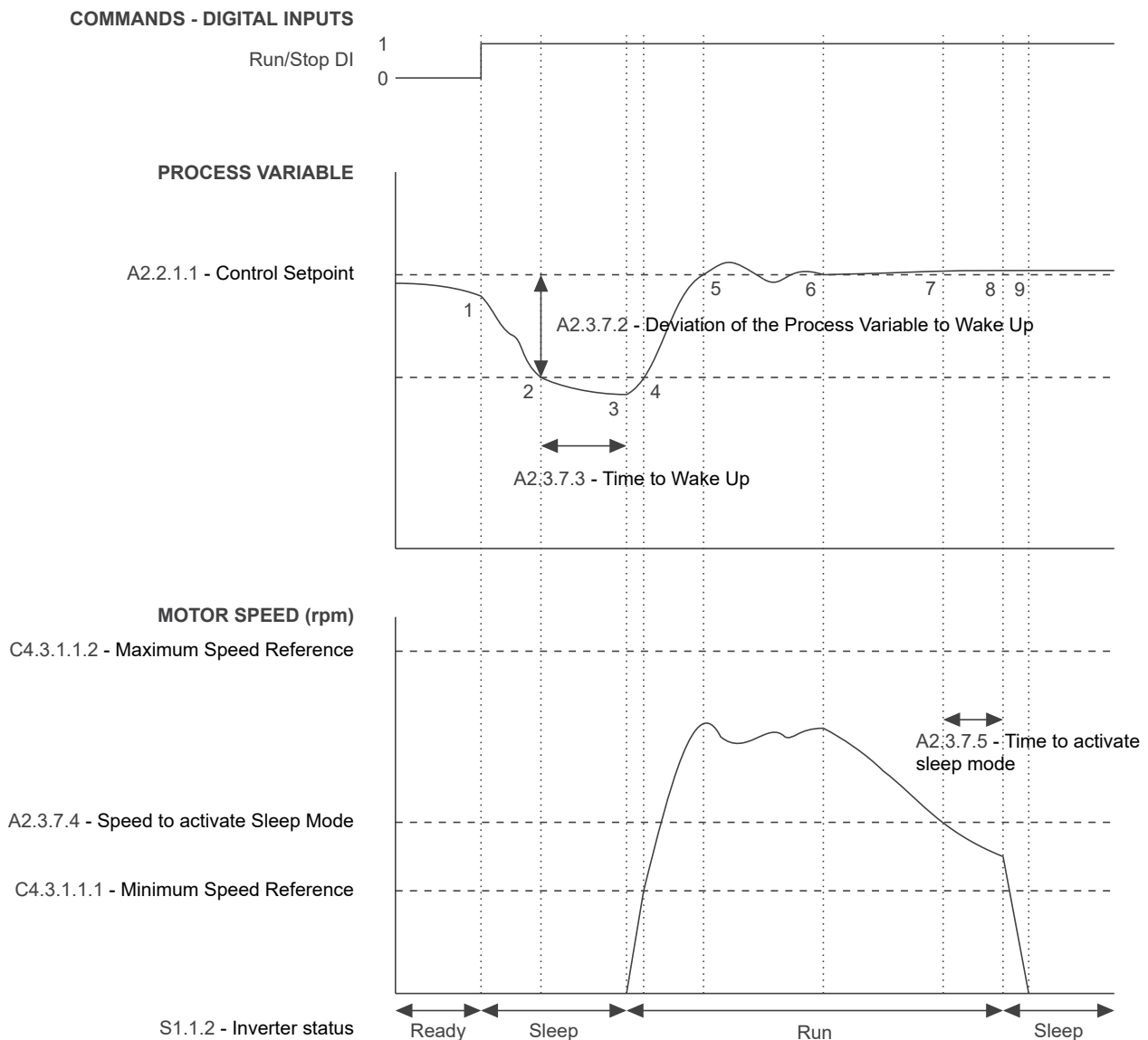


Figure 13.2: PID sleep mode

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;

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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:	Stopped	

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.

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FreeRTOS Kernel

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