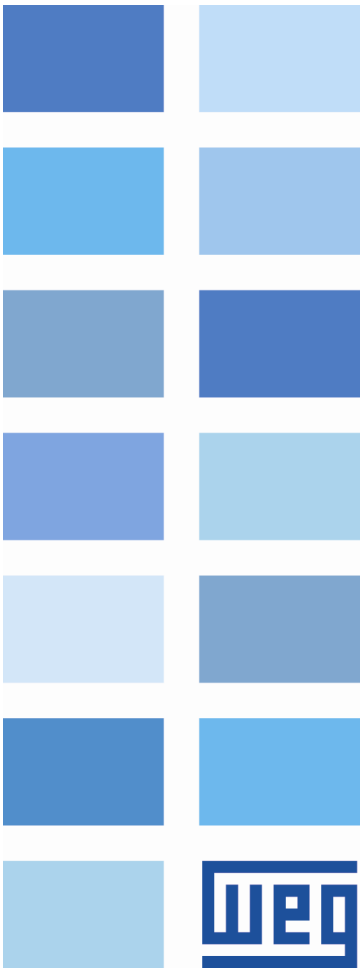
Frequency Inverter

CFW900

Programming Manual



Frequency Inverter Programming Manual

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The information below describes the reviews made in this manual.

Version	Revision	Description
1.00.XX	R00	First edition.
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.
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.
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.

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2 FAULTS AND ALARMS

The **Faults and Alarms**are a functionality of the CFW900 that allows viewing events, helping troubleshooting and identifying improvements in the inverter parameter settings.

Actuation of Faults and Alarms:

- The faults act by disabling the motor and indicating the reason for their occurrence on the HMI, in the CFW900 status word (S1.1.1) and in the actual fault diagnosis (D1.1) the reason for its occurrence. They are only removed after resetting or de-energizing the inverter.

- The alarms act by indicating the event on the HMI, in the CFW900 status word (S1.1.1) and in the actual alarm diagnosis (D2.1). They are automatically removed after the alarm condition has been cleared.

Faults and Alarms are presented to the user through codes. The codes are formed by three or four numbers preceded by the letters F (for fault) and A (for alarm), as shown in the Table 2.1. In this table you can also see more details about the causes and possible solutions.

NOTE!
The cause of the actuation of most faults and alarms can be checked and solved via the instructions in this chapter, otherwise, please contact WEG's technical support or representative.

2.1 FAULTS AND ALARMS TABLE

Fault/Alarm	Description	Possible Causes
F006: Grid Phase Unbal./Loss	Fault against phase unbalance or phase loss in the power supply. **Note:** - In case the motor has no load or a low load on the shaft, this fault may not take effect. - Actuation time set to C7.1.1. When C7.1.1=0, the fault is disabled.	- Phase loss at the inverter input. - Input voltage unbalance >5 %. - Loss of one phase in the power supply.
A010: Rectifier Overtemp.	Alarm of high temperature measured in the temperature sensors (NTC) of the rectifier modules. **Note:** - It can be disabled by changing the IGBT Overtemp. setting to fault only, in parameter C7.5.1.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F011: Rectifier Overtemp.	Fault of overtemperature measured in the temperature sensors (NTC) of the rectifier modules.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
A018: Low Battery Voltage	Low battery voltage alarm.	- Replace the battery.
A019: 24 Vdc Power Supply Overvoltage	24 Vdc power supply overvoltage fault.	- Voltage of the 24 Vdc power supply that feeds the control above the maximum value of 26.4 Vdc.
A020: 24 Vdc Power Supply Undervoltage	Undervoltage fault in the 24 Vdc power supply.	- Voltage of the 24 Vdc power supply that feeds the control below the minimum value of 21.6 Vdc.

Fault/Alarm	Description	Possible Causes
F021: DC Link Undervoltage	Undervoltage fault in 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 on the pre-charge circuit. - Parameter C1.1.2 with a value above the rated grid voltage.
F022: DC Link Overvoltage	Overvoltage fault in 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. - Driven load inertia too high or deceleration ramp too fast. - Setting of C3.5.2.1 or C3.5.3.2 or C3.6.1 too high.
F025: PWM Signal Fault	Failure to compare the PWM pulses generated by the control and the output voltages measured by the inverter. **Note:** - Reset inverter and try again.	- Motor is disconnected or the rated current of the motor connected at the output is less than 1/3 of the rated current of the inverter. - Possible defect in the internal circuits of the inverter. - Problems in the circuit of the STO safety inputs (XC2).
F030: IGBT U Desat.	Desaturation fault in the U arm IGBTs.	- Short circuit between the motor phases U and V or U and W.
F034: IGBT V Desat.	Desaturation fault in the V arm IGBTs.	- Short circuit between motor phases V and U or V and W.
F038: IGBT W Desat.	Desaturation fault in the W arm IGBTs.	- Short circuit between motor phases W and U or W and V.
F042: Braking IGBT Desat.	Desaturation fault in the Dynamic Braking IGBT.	- Short circuit on the connecting cables of the Dynamic Braking.
A046: High Load on the Motor	Motor overload alarm. **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 alarm	- High current at the inverter output.
F048: Overload on the IGBTs	Overload fault on the IGBTs.	- High current at the inverter output.
A050: IGBT1 U Overtemp.	High temperature alarm measured at the temperature sensors (NTC) of the IGBTs. **Note:** - It can be disabled by C7.5.1.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
A051: IGBT1 V Overtemp.	High temperature alarm measured at the temperature sensors (NTC) of the IGBTs. **Note:** - It can be disabled by C7.5.1.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.

Fault/Alarm	Description	Possible Causes
A052: IGBT1 W Overtemp.	High temperature alarm measured at the temperature sensors (NTC) of the IGBTs. **Note:** - It can be disabled by C7.5.1.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F053: IGBT1 U Overtemp.	High overtemperature fault measured at the temperature sensors (NTC) of the IGBTs.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F054: IGBT1 V Overtemp.	High overtemperature fault measured at the temperature sensors (NTC) of the IGBTs.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F055: IGBT1 W Overtemp.	High overtemperature fault measured at the temperature sensors (NTC) of the IGBTs.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
A060: IGBT/DRL Junction Overtemp.	High temperature alarm at the junction of the IGBTs or diodes.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F061: IGBT/DRL Junction Overtemp.	Overtemperature fault at the junction of the IGBTs or diodes.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F062: Thermal Unbalance	Temperature unbalance fault of the power modules.	- The temperature difference between IGBT modules of the same phase (U, V, W) is greater than 15 °C. - The temperature difference between IGBT modules of different phases (U and V, U and W, V and W) is greater than 20 °C. - The difference between rectifier modules of different phases (R and S, R and T, S and T) is greater than 20 °C.
F070: DC Link Short Circuit	Short circuit fault at the output, DC link, or braking resistor.	- Short circuit between two motor phases. - Short circuit on the connecting cables of the Dynamic Braking. - Short-circuited IGBT modules.
F071: Overcur. at the Output	Overcurrent fault at the output.	- 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 fault. **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.
F074: Ground Fault	Overcurrent fault to the ground. **Note:** - The fault can be disabled by setting C7.2.1 = 0 or 3.	- Short circuit to the ground at one or more output phases. - Motor cable capacitance too high, causing current peaks at the output.
F078: Motor Overtemp.	Overtemperature fault, related to the PTC-type temperature sensor installed in the motor. **Note:** - The fault can be disabled by setting C7.5.2 = 2 or 3. - It is necessary to program the analog input and output of Slot X for PTC function.	- Load on the motor shaft is too high. - Load cycle is too short (high number of starts and stops per minute). - High ambient temperature around the motor. - Poor contact or short circuit (resistance < 100 Ω) on the wiring connected to the motor thermistor. - Motor thermistor not installed. - Motor shaft locked.

Fault/Alarm	Description	Possible Causes
F080: CPU fault (Watchdog)	Watchdog fault in the inverter microcontroller.	- Electrical noise.
F084: Self-Diagnosis Fault	Self-Diagnosis Fault.	- Defect 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.	- Defect on the inverter internal circuits.
F104: A/D Converter Fault	Fault in the A/D converter reading that measures the inverter currents and voltages.	- Defect on the inverter internal circuits. - Electromagnetic interference above the level supported by the inverter.
A110: High Motor Temperature	Alarm related to the PTC temperature sensor installed on the motor. **Note:** - The alarm can be disabled by setting C7.5.2. - It is necessary to program the analog input and output of Slot X for PTC function.	- Load on the motor shaft is too high. - Load cycle is too short (high number of starts and stops per minute). - High ambient temperature around the motor. - Poor contact or short circuit (resistance < 100 Ω) on the wiring connected to the motor thermistor. - Motor thermistor not installed. - Motor shaft locked.
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 network installation, broken cable or fault/poor contact on the connections with the network, and grounding.
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 if there is voltage within the allowed range between pins 1 and 5 of the CAN interface connector.	- CAN interface without power supply between pins 1 and 5 of the connector. - Power cables mixed up or reversed. - Poor contact on the CAN interface cable or connector.
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 in the CAN circuit transmission cables. - Changed or reversed cables. - Network devices with different baud rates. - Termination resistors with incorrect values. - Termination resistors installed at one end of the main bus only. - CAN network installation done improperly.
A135: CANopen Off-line	It occurs if the state of the CANopen node changes from operational to pre-operational. **Note:** - Check the operation of the error control mechanisms (Heartbeat/Node Guarding).	- The master is not sending the guarding/heartbeat telegrams at the programmed time. - Communication problems caused by lost telegrams or transmission delays.
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 of the master to Run or the corresponding bit on the configuration word of the master software. For further explanations, see the documentation of the master in use.

Fault/Alarm	Description	Possible Causes
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: EtheNet/IP Communication Offline	It indicates communication error with EtherNet/IP master. It occurs when, for any reason, after the cyclic communication of the master with the product is started, this communication is interrupted. This is detected if the I/O Exclusive Owner connection times out.	▪ Check the status of the network master. ▪ Check the network installation, broken cable or failed/bad contact in the network connections.
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 fault. **Note:** - Activated when the actual speed exceeds the value of C4.3.1.1.2 x (100 % + C7.7.1) for more than 20 ms.	- Incorrect setting of C3.3.2.1.2 and/orC3.3.2.1.3. - Crane-type load trips.
A152: Pow.Int. Air Overtemp.	High internal air temperature alarm. **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 (when applicable).
F153: Pow.Int. Air Overtemp.	Internal air overtemperature fault.	- High ambient temperature around the inverter (>50 °C) and high output current. - Defective internal fan (when applicable).
A154: Cont.Int.Air Overtemp.	High temperature alarm in the control circuit. **Note:** - The alarm can be disabled by setting C7.5.1.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
F155: Cont. Int. Air Overtemp.	Overtemperature fault in the control circuit.	- High ambient temperature around the inverter (>50 °C) and high output current. - Locked or defective fan. - Inverter heatsink too dirty.
A156: Inverter Undertemperature	Undertemperature alarm measured at the temperature sensors of the IGBTs, rectifier, power and/or control below -30 °C. **Note:** - The alarm can be disabled by setting C7.5.1.	- Ambient temperature around the inverter ≤ -30 °C.
F157: Inverter Undertemperature	Undertemperature fault measured at the temperature sensors of the IGBTs, rectifier, power and/or control below -30 °C.	- Ambient temperature around the inverter ≤ -30 °C.
F158: Corrupted Settings	Inverter settings are invalid. **Note:** - Restore the factory default in parameter C12.1. If the problem persists, contact WEG's technical support or representative.	- Parameter settings file cannot be restored correctly.

Fault/Alarm	Description	Possible Causes
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.
F171: Pow. Fan 1 Speed	Speed reading fault for fan 1 of the heatsink (measured value outside the expected value).	- Dirt on the fan blades and rolling bearings. - Defective fan. - Defective fan power supply connection.
F172: Pow. Fan 2 Speed	Speed reading fault for fan 2 of the heatsink (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 heatsink (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 heatsink (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.
A181: Clock with invalid value.	Clock with wrong time.	- Need to set date and time in C11.1.2. - Battery low, defective or not installed.
F185: Pre-charge Fault	Pre-charge circuit fault.	- Defective pre-charge contactor. - Command fuse open. - Phase loss at input L1/R or L2/S.
A186: Pow. Fan 1 Speed	Heatsink fan low speed alarm.	- Dirt on the fan blades and bearings. - Defective fan. - Defective fan power supply connection.
A187: Pow. Fan 2 Speed	Heatsink fan low speed alarm.	- Dirt on the fan blades and bearings. - Defective fan. - Defective fan power supply connection.
A188: Pow. Fan 3 Speed	Heatsink fan low speed alarm.	- Dirt on the fan blades and bearings. - Defective fan. - Defective fan power supply connection.
A189: Pow. Fan 4 Speed	Heatsink fan low speed alarm.	- Dirt on the fan blades and bearings. - Defective fan. - Defective fan power supply connection.

Fault/Alarm	Description	Possible Causes
A190: Int. Fan 1 Speed	Internal fan low speed alarm.	- Dirt on the fan blades and bearings. - Defective fan. - Defective fan power supply connection.
A191: Int. Fan 2 Speed	Internal fan low speed alarm.	- 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 network installation, broken cable or fault/poor contact on the connections with the network, and grounding.
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 if there is voltage within the allowed range between pins 1 and 5 of the CAN interface connector.	- CAN interface without power supply between pins 1 and 5 of the connector. - Power cables mixed up or reversed. - Poor contact on the CAN interface cable or connector.
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 in the CAN circuit transmission cables. - Changed or reversed cables. - Network devices with different baud rates. - Termination resistors with incorrect values. - Termination resistors installed at one end of the main bus only. - CAN network installation done improperly.
F235: CANopen Off-line	It occurs if the state of the CANopen node changes from operational to pre-operational. **Note:** - Check the operation of the error control mechanisms (Heartbeat/Node Guarding).	- The master is not sending the guarding/heartbeat telegrams at the programmed time. - Communication problems caused by lost telegrams or transmission delays.
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 of the master to Run or the corresponding bit on the configuration word of the master software. For further explanations, see the documentation of the master in use.
F237: 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.
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 the network installation, broken cable or failed/bad contact in 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.

Fault/Alarm	Description	Possible Causes
A345: IGBT P.U B1 High Load	Overload alarm on IGBT 1 of the phase U.	- High current at the inverter output.
F346: IGBT P.U B1 Overload	Overload fault on IGBT 1 of the phase U.	- High current at the inverter output.
A348: IGBT P.V B1 High Load	Overload alarm on IGBT 1 of the phase V.	- High current at the inverter output.
F349: IGBT P.V B1 Overload	Overload fault on IGBT 1 of the phase V.	- High current at the inverter output.
A351: IGBT P.W B1 High Load	Overload alarm on IGBT 1 of the phase W.	- High current at the inverter output.
F352: IGBT P.W B1 Overload	Overload fault on IGBT 1 of the phase W.	- High current at the inverter output.
A354: IGBT P.U B2 High Load	Overload alarm on IGBT 2 of the phase U.	- High current at the inverter output.
F355: IGBT P.U B2 Overload	Overload fault on IGBT 2 of the phase U.	- High current at the inverter output.
A357: IGBT P.V B2 High Load	Overload alarm on IGBT 2 of the phase V.	- High current at the inverter output.
F358: IGBT P.V B2 Overload	Overload fault on IGBT 2 of the phase V.	- High current at the inverter output.
A360: IGBT P.W B2 High Load	Overload alarm on IGBT 2 of the phase W.	- High current at the inverter output.
F361: IGBT P.W B2 Overload	Overload fault on IGBT 2 of the phase W.	- High current at the inverter output.
F600: Pulse Update Fault	Failed to update PWM pulses.	- Defect on the inverter internal circuits.
F605: Power Circuit Off	Fault that indicates that the communication with the power module was interrupted while the output was enabled.	- Power board turned off while the output was enabled. - Defect on the inverter internal circuits.
F606: Power Monitor Comm Lost	Fault indicating that the interface module is unable to exchange information with the power monitoring module.	- Defect on the inverter internal circuits. - Electromagnetic interference above the level supported by the inverter. - Power board turned off.
F607: SMM Comm Lost	Fault indicating that the interface module is unable to exchange information with the safety module.	- Defect on the inverter internal circuits. - Electromagnetic interference above the level supported by the inverter. - 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.
F609: Model Version Incompatible	Inverter model data is incompatible with actual firmware. **Note:** - Contact technical support to arrange the model update.	- Model data incompatible with firmware version.
A700: HMI Disconnected	Alarm related to the HMI disconnection.	- Commands configured via HMI or the HMI is not connected to the inverter.
F701: HMI Disconnected	Fault related to the HMI disconnection.	- Commands configured via HMI or the HMI is not connected to the inverter.

Fault/Alarm	Description	Possible Causes
A702: Inverter Disabled	Alarm 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.	Alarm indicating 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	Alarm indicating 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	Fault indicating 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.	- Outdated inverter firmware version.
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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at the terminals.
F1100: Slot A Incompatible Accessory	Error during accessory firmware update.	- Outdated inverter firmware version.
F1101: Slot A Initialization Error	The fault indicates that 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.
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	This alarm indicates a high temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F1105: Slot A overtemperature	Accessory overtemperature is indicated by the fault.	- 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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.

Fault/Alarm	Description	Possible Causes
A1128: High Temperature at Slot A Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1129: Slot A Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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.
A1132: High Temperature at Slot A Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1133: Slot A Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot A Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1137: Slot A Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot A Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1141: Slot A Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot A Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.

Fault/Alarm	Description	Possible Causes
F1145: Slot A Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot A Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1149: Slot A Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1200: Slot B Incompatible Accessory	Error during accessory firmware update.	- Outdated inverter firmware version.
F1201: Slot B Initialization Error	The fault indicates that 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.
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	This alarm indicates a high temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F1205: Slot B Overtemperature	Accessory overtemperature is indicated by the fault.	- 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.

Fault/Alarm	Description	Possible Causes
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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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.
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 at Slot B Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1229: Slot B Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot B Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1233: Slot B Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.

Fault/Alarm	Description	Possible Causes
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 at Slot B Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1237: Slot B Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot B Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1241: Slot B Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot B Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1245: Slot B Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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.
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 at Slot B Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1249: Slot B Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1300: Slot C Incompatible Accessory	Error during accessory firmware update.	- Outdated inverter firmware version.

Fault/Alarm	Description	Possible Causes
F1301: Slot C Initialization Error	The fault indicates that 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.
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	This alarm indicates a high temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F1305: Slot C Overtemperature	Accessory overtemperature is indicated by the fault.	- 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at the terminals.

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 on the signal connection at 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 on the signal connection at 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 at Slot C Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1329: Slot C Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot C Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1333: Slot C Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot C Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1337: Slot C Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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.

Fault/Alarm	Description	Possible Causes
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 at Slot C Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1341: Slot C Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
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 at Slot C Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1345: Slot C Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot C Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1349: Slot C Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1400: Slot D Incompatible Accessory	Error during accessory firmware update.	- Outdated inverter firmware version.
F1401: Slot D Initialization Error	The fault indicates that 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.
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	This alarm indicates a high temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F1405: Slot D Overtemperature	Accessory overtemperature is indicated by the fault.	- 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.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.

Fault/Alarm	Description	Possible Causes
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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
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.	- Broken or disconnected signal cable. - 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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.

Fault/Alarm	Description	Possible Causes
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 at Slot D Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1429: Slot D Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot D Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1433: Slot D Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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.
A1436: High Temperature at Slot D Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1437: Slot D Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot D Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1441: Slot D Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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.

Fault/Alarm	Description	Possible Causes
A1444: High Temperature at Slot D Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1445: Slot D Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot D Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1449: Slot D Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1500: Slot E Incompatible Accessory	Error during accessory firmware update.	- Outdated inverter firmware version.
F1501: Slot E Initialization Error	The fault indicates that 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.
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	This alarm indicates a high temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F1505: Slot E Overtemperature	Accessory overtemperature is indicated by the fault.	- 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.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.
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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - Encoder connection error. - Encoder without power supply.

Fault/Alarm	Description	Possible Causes
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.	- Broken or disconnected signal cable. - 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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 at Slot E Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1529: Slot E Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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.
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.

Fault/Alarm	Description	Possible Causes
A1532: High Temperature at Slot E Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1533: Slot E Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot E Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1537: Slot E Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot E Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1541: Slot E Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot E Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1545: Slot E Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot E Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.

Fault/Alarm	Description	Possible Causes
F1549: Slot E Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1600: Slot F Incompatible Accessory	Error during accessory firmware update.	- Outdated inverter firmware version.
F1601: Slot F Initialization Error	The fault indicates that 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.
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	This alarm indicates a high temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F1605: Slot F Overtemperature	Accessory overtemperature is indicated by the fault.	- 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at the terminals.

Fault/Alarm	Description	Possible Causes
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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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.
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 at Slot F Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1629: Slot F Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot F Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1633: Slot F Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot F Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1637: Slot F Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.

Fault/Alarm	Description	Possible Causes
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 at Slot F Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1641: Slot F Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot F Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1645: Slot F Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
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 at Slot F Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1649: Slot F Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1700: Slot G Incompatible Accessory	Error during accessory firmware update.	- Outdated inverter firmware version.
F1701: Slot G Initialization Error	The fault indicates that 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.
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	This alarm indicates a high temperature in the accessory.	- Temperature around the inverter close to 60 °C.
F1705: Slot G Overtemperature	Accessory overtemperature is indicated by the fault.	- Temperature around the inverter above 60 °C.

Fault/Alarm	Description	Possible Causes
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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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.	- Broken or disconnected signal cable. - 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 on the signal connection at 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 on the signal connection at 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 on the signal connection at the terminals.
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 on the signal connection at 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 on the signal connection at 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 on the signal connection at 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.

Fault/Alarm	Description	Possible Causes
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 at Slot G Sensor 1	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1729: Slot G Sensor 1 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot G Sensor 2	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1733: Slot G Sensor 2 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot G Sensor 3	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1737: Slot G Sensor 3 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot G Sensor 4	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1741: Slot G Sensor 4 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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.

Fault/Alarm	Description	Possible Causes
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 at Slot G Sensor 5	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1745: Slot G Sensor 5 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation 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 at Slot G Sensor 6	The temperature measured by the sensor is close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.
F1749: Slot G Sensor 6 Overtemperature	Temperature measured by the sensor close to the threshold level.	- Monitored equipment with high temperature. - Configuration error of the fault actuation level.

3 SAFETY INSTRUCTIONS

This manual contains the necessary information for the correct programming of the CFW900 frequency inverter. It has been written to be used by qualified personnel with suitable training or technical qualification for operating this type of equipment.

3.1 SAFETY WARNINGS IN THIS MANUAL

The following safety warnings are used in this manual:

DANGER!
The procedures recommended in this type of warning have the purpose of protecting the user against dead, serious injuries and considerable material damage.

WARNING!
The procedures recommended in this warning have the purpose of avoiding material damage.

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

3.2 SAFETY WARNINGS ON THE PRODUCT

The following symbols are attached to the product, serving as safety notices:

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.

3.3 PRELIMINARY RECOMMENDATIONS

DANGER!
Only qualified personnel familiar with the CFW900 frequency inverter and associated equipment should plan or implement the installation, startup and subsequent maintenance of this equipment.
All safety instructions contained in this manual and/or defined by local regulations must be followed.
Failure to comply with these instructions may result in life threatening and/or equipment damage.

NOTE!
Read the CFW900 Frequency Inverter User Manual completely before installing or operating the CFW900.

NOTE!
For the purposes of this manual, qualified personnel are those trained to be able to:
1. Install, ground, energize and operate the CFW900 according to this manual and the effective legal safety procedures.
2. Use protection equipment according to the established standards.
3. Give first aid services.

DANGER!
Always disconnect the input power before touching any electrical component associated to the CFW900 inverter.
Many components can remain charged with high voltages or remain in movement (fans) even after that AC power is disconnected or switched off.
Wait at least 10 minutes before handling the equipment to assure a total discharge of the capacitors.
Always connect the equipment frame to the protection earth (PE) at the suitable connection point.

WARNING!
Electronic boards have components sensitive to electrostatic discharges. Do not touch directly on components or connectors. If necessary, touch the grounded metallic frame before or use an adequate grounded wrist strap.

Do not perform any high pot tests with the CFW900 inverter!
If it is necessary consult WEG.

NOTE!
Frequency inverter may interfere with other electronic equipment. In order to reduce these effects, take the precautions recommended in the Chapter Installation and Connections, of the user's manual.

4 ABOUT THIS 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

Indication	Description
Normal duty (ND)	Normal duty (ND) is the inverter operating rate that sets the maximum current values for continuous operation I_{nom-ND} and overload of 110% for 1 minute. It is selected by programming C1.2.1 = 0 (Normal Duty (ND)). It must be used to drive motors that are not subject to high torques in relation to their rated torque when operating in steady state at start, acceleration or deceleration.
I_{nom-ND}	Inverter rated current for use under normal overload rating (ND= Normal duty). Overload: 1.1 x I_{nom-ND} / 1 minute.
Heavy duty (HD)	Heavy duty (HD) is the inverter operating rate that sets the maximum current values for continuous operation I_{nom-HD} and overload of 150% for 1 minute. It is selected by programming C1.2.1 = 1 (Heavy Duty (HD)). It must be used to drive motors that are subject to high overload torques in relation to their rated torque when operating under constant speed at start, acceleration, or deceleration.
I_{nom-HD}	Inverter rated current for use under heavy overload rating (HD= Heavy duty). Overload: 1.5 x I_{nom-HD} / 1 minute.
Rectifier	Input circuit of the inverters that transforms the input AC voltage into DC. It is formed by power diodes.
Pre-Charge Circuit	It charges the DC Link capacitors with limited current, reducing the current peaks when powering up the inverter.
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.

Indication	Description
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 (= Gira e = Stop), through digital input programmed for that function, via communication networks or via SoftPLC.
WPS	WEG Programming Suite (software).
Foward	Direction of rotation with positive speed reference.
Reverse	Direction of rotation opposite to the foward.

5 ABOUT THE CFW900

The CFW900 is a high performance frequency inverter that makes it possible the control of speed and torque of low voltage three-phase motors. The key features of this product are the on-board technology, which allows it to flexibly solve different types of applications, and its connectivity. To this end, it has the following functionalities:

- Vector control (Sensorless and Encoder) for induction motors, VVW+ and scalar control for induction motors and VVW+ control for permanent magnet (PM) motors.
- Built-in Ethernet and RS485 communication interfaces. Other communication interfaces available via accessories.
- Advanced Energy Saving Function that reduces motor losses and improves the system performance.
- Thermal Management Function that acts on the inverter to protect the equipment integrity and functionality.
- Specific PWM Modulation function for use with Long Cables at the inverter output to the motor.
- DC Braking function to optimize the inverter start and stop. It can also be used as a motor warm-up function in specific cases.
- Dynamic Braking function and for Optimal Braking vector control. The Optimal Braking enables the controlled braking of the motor, eliminating the braking resistor in some applications.
- Flying Start function that allows driving a motor on the fly, accelerating it from the speed at which it is running.
- Ride-Through function that allows recovering the inverter, without undervoltage locking, when a power failure occurs for a short time.
- Oriented Startup (Wizard) function that groups and allows setting the main parameters for the inverter operation.
- Self-Tuning function (Wizard) for vector control that allows the automatic setting of control parameters and regulators based on the identification (also automatic) of the motor parameters and load.

Navigation through the CFW900 HMI is intuitive, allowing the user to easily set up the inverter. The main navigation groups are: Status, Diagnostics and Configurations. From these three groups, you can access the product identification, measurements (voltages, currents, temperatures etc.), fault and alarm actuation diagnostics (active fault/alarm, time control etc.) and the inverter configurations (supply voltage, motor data, control used, commands, references etc.).

6 SOFTWARE VERSIONS

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 versions is called a package. The package, according to (S1.2.1), identifies the set of software versions of all microcontrollers in the product, and should be used as a reference to identify the software version of the product. This manual is updated according to the software version of the package (indicated on the back cover).

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

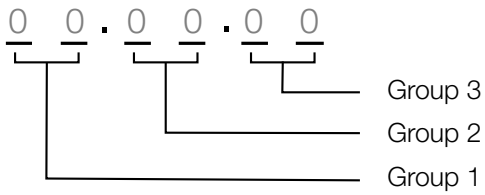


Figure 6.1: *Software version format.*

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

7 HMI

The product graphic interface allows viewing and programming the CFW900 frequency inverter. The key navigation provides access to all data by means of groups (Menus).

Figure 7.1: *HMI Keys*


USB connector for communication with PC.


"Esc": Cancel programming or go back to menu.


"Help": Shows help text for the marked content.


Increment and Decrement values. Navigate the menus.


Switch between screens. Move selection for editing values. Navigate the menus.


Enter key: Save changes. Enter the menus.


Control the motor Direction of Rotation if, programmed for HMI.

Select 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 LOC/REM 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 HMI USE

All the HMI operation is based on menus, containing the reading and writing variables. The menus are divided into levels, where menus and submenus are arranged.

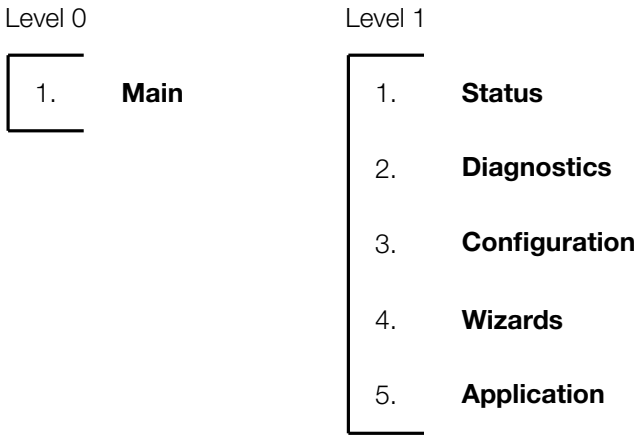


Figure 8.1: *HMI Screens and Menus*

Level 0:
Here is the main screen, where you can select which reading variables (**Status**) you want to see.

Level 1:
The main menus to access the variables are located here. These, in turn, are divided into reading variables (**Status** and **Diagnostics**), and writing or programming variables (**Configurations**, **Wizards** and **Application**).

NOTE!
The **Status** parameters cannot be changed through the HMI. Some of these parameters may be a reading variable from a **Configuration** for a given communication network and thus can be changed by it.

8.1 MAIN SCREEN - LEVEL 0

After powering up the CFW900, the HMI starts up on the **Main** screen, where you can see some reading variables (**Status**).

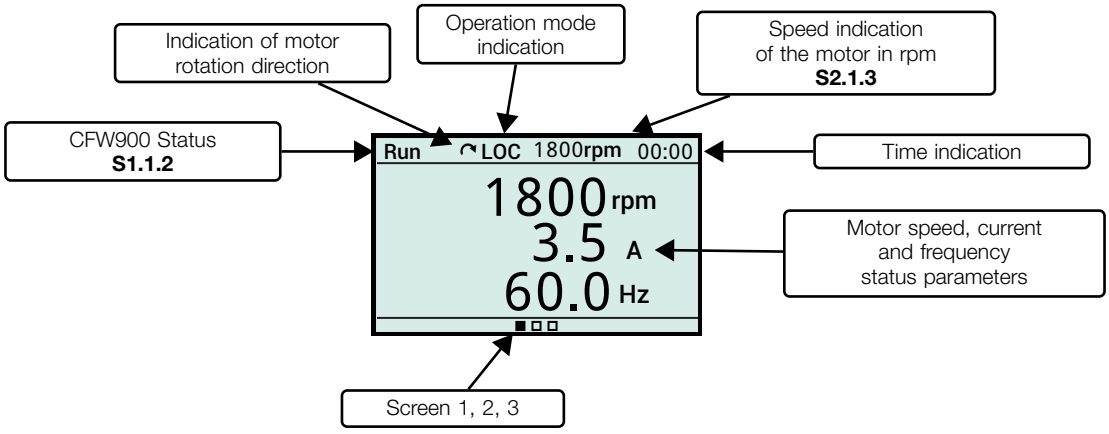


Figure 8.2: *Main screen data*

There are three main screens, which can be set to display up to nine variables each. To customize these main screens, see the section 8.6 of this chapter.

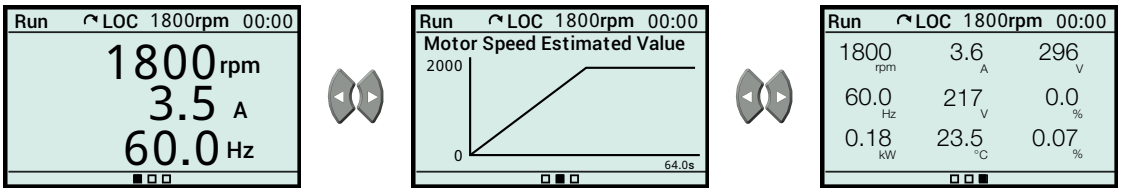


Figure 8.3: *Default main screens*

To access the menus, just press the ”Enter” key.

8.2 MENU ACCESS MODE - MENU LEVELS

When you press the ”Enter” key on a main screen, you access the menus. In the menus it is possible to navigate through groups and subgroups to access the variables.

Each variable has its own coding, containing its location in the menu structure (see Chapter 1) and its identification. Digits are separated by periods.

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	440V

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.

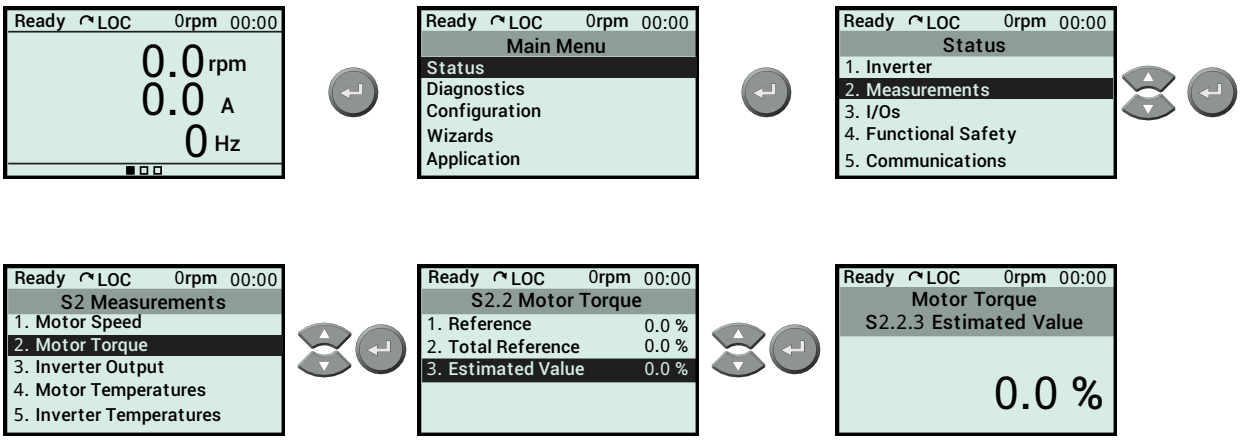


Figure 8.4: *Reading of estimated motor torque value.*

Diagnostics Menu: It has reading variables with values saved due to events: activation of faults, alarms, start and others. For more details see Chapter 10.

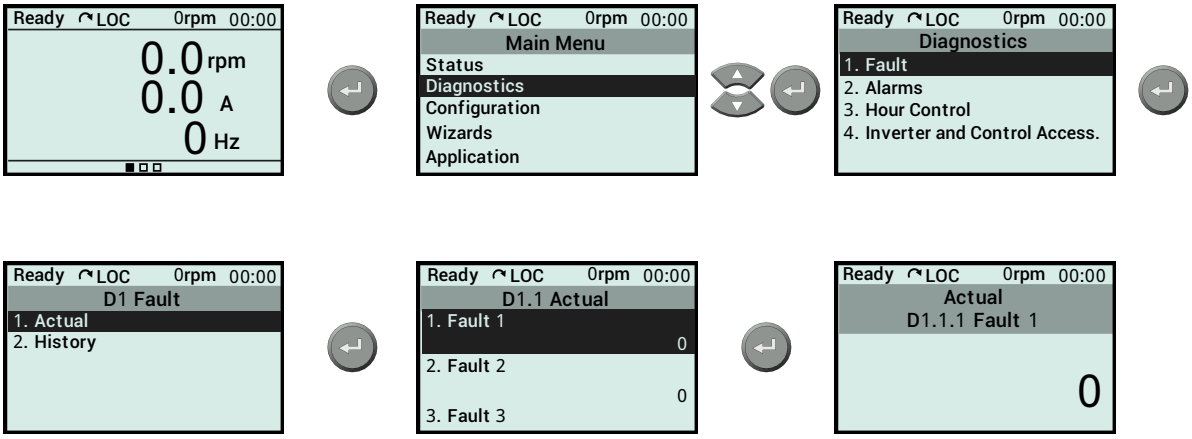


Figure 8.5: *Reading of active faults.*

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.

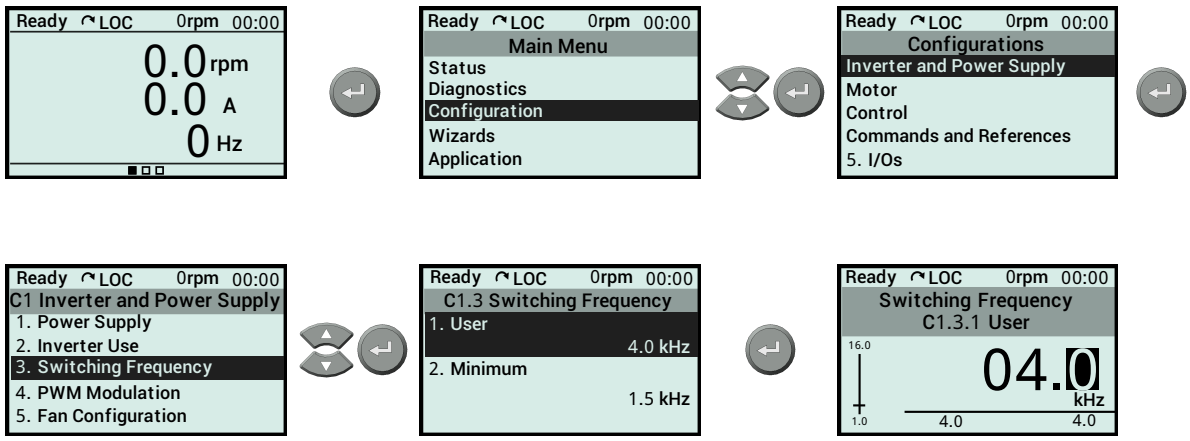


Figure 8.6: *Switching frequency configuration.*

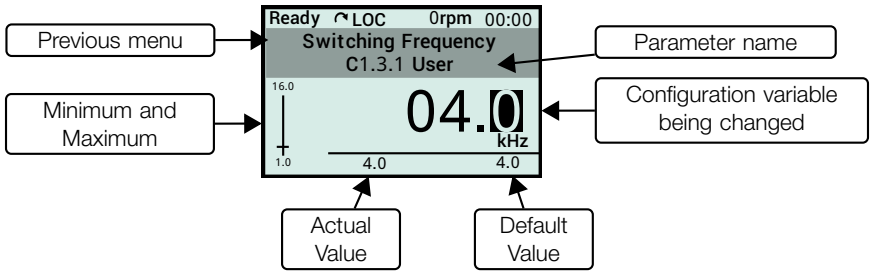


Figure 8.7: *Configuration screen data*

8.2.3 Writing Variables - Wizards Menu

The menu **Wizards** contains some of the most used settings arranged sequentially to facilitate the CFW900 startup. For more details see Chapter 12.

8.3 HELP KEY

Help key

The help key provides more information about the selected text. This key can be used at any time while navigating the menus, parameters or main screens. If, for example, 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 present in this screen will be displayed.

The figures below show some examples of the use of the help key.

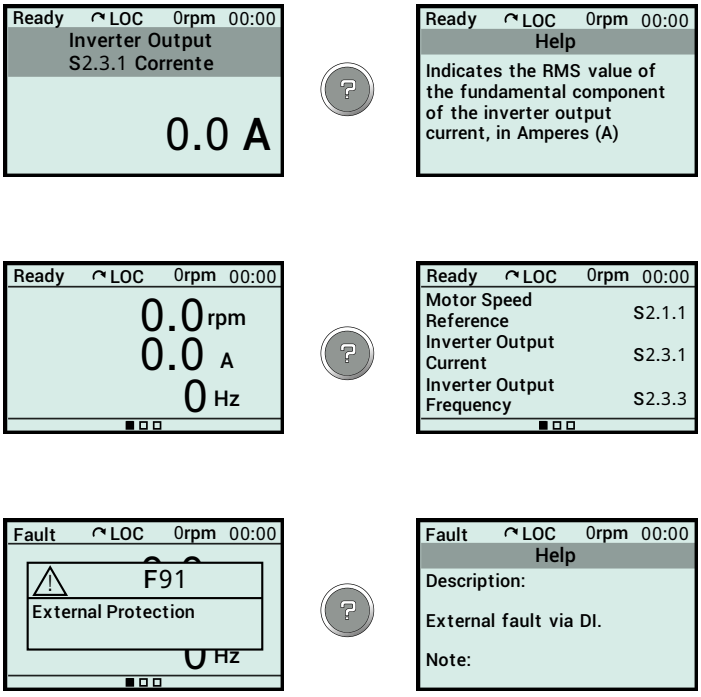


Figure 8.8: *Example of the use of the help key*

8.4 DATE AND TIME SETTING

Set the date and time in the configurations menu, as illustrated below.

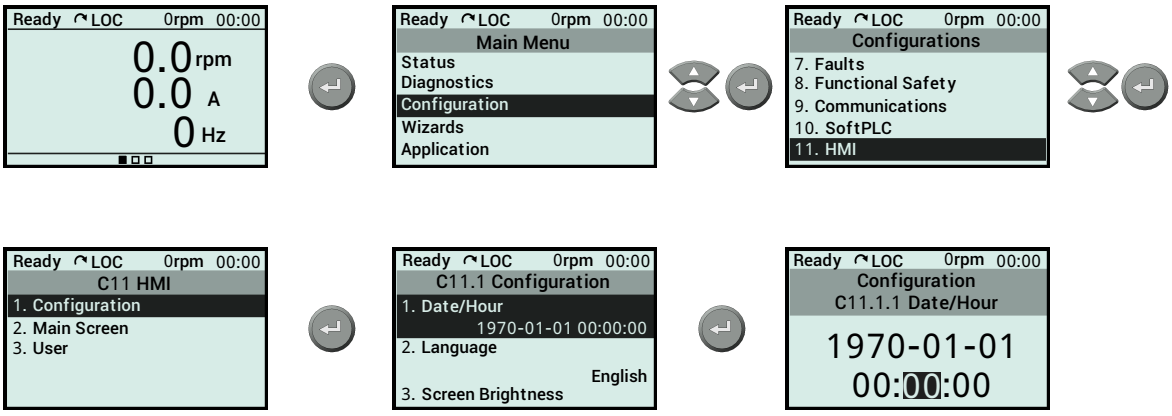


Figure 8.9: *Date and time setting*

8.5 ACCESS CONTROL

It is possible to block the parameter adjustment from the HMI using the login function. The block is activated when a user who does not have permission to set parameters, such as the operator, is logged in. To unblock, simply login for a user that has permission, such as the administrator. User adjustment must be started from the configuration menu as illustrated below.

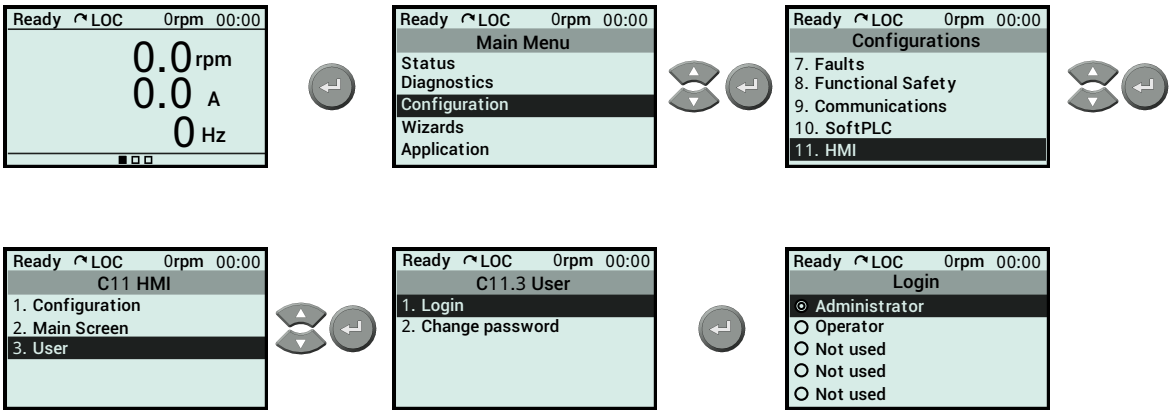


Figure 8.10: *Accessing login screen*

It is possible to enter a password for a certain user, with the exception of the operator, to prevent him from logging in. This is intended to increase the security of the configured parameters. The password setting should be initiated from the setting menu as illustrated below.

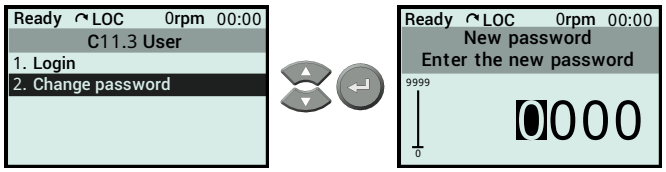


Figure 8.11: *Password setting*

When the active user has a saved password, the inactivity function is enabled. When no command via HMI is detected for more than 15 minutes, the function logs out. Logout also occurs when the inverter is powered down with a user that has a saved password. In order to change the parameters again, it is necessary to login, where the insertion of the saved password will be requested.

For disable a user's password, it must set the new password to zero. When this is executed, any login attempt for this user will be successful.

NOTE!
Restoring the factory default resets all saved passwords.

8.6 MAIN SCREEN SETTING

Customizing the main screens allows you to define what will always be displayed when powering up the CFW900. Three easy-to-access main screens are provided. Each of the screens can be set among 3 visualization modes.

8.6.1 Visualization Modes

- **Line**: In one line, it is possible to display a reading variable in the format **text, value or bar**. The Figure 8.12 shows an example with the 3 formats.

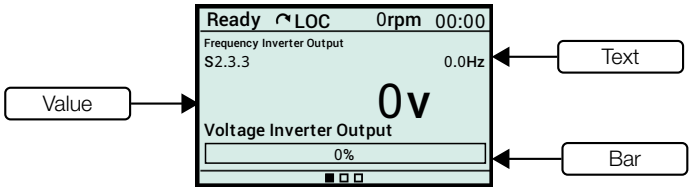


Figure 8.12: *Inline visualization*

- **Full screen**: It covers an entire main screen and allows the display of reading variables in **text, bar or graphic** format. The Figure 8.13 shows an example with the 3 formats.

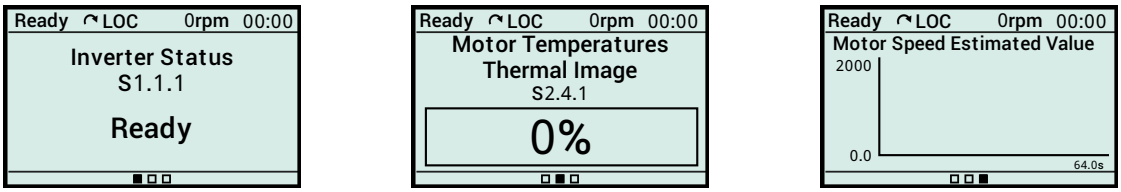


Figure 8.13: *Visualization in (a) text, (b) bar and (c) graphic.*

- **Slot**: The HMI screen is divided into 9 parts called Slots and allows the display of reading variables in **value** format. Figure 8.14 shows a visualization example.

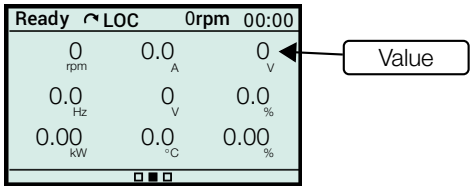


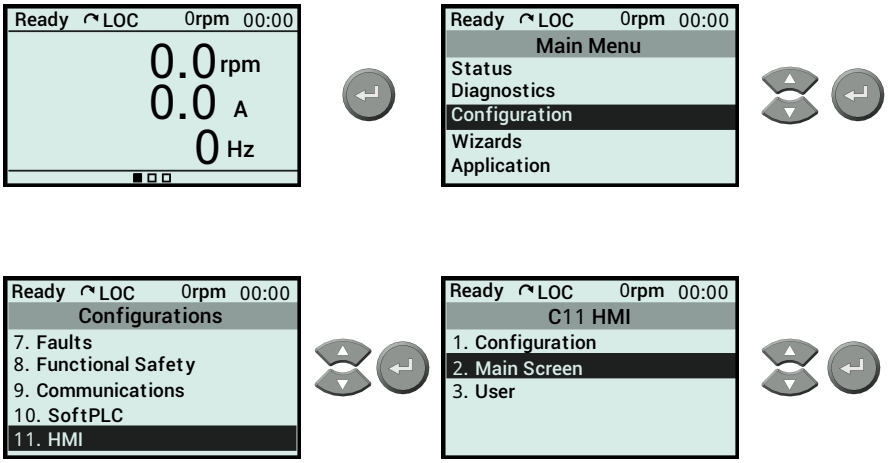
Figure 8.14: *Slot visualization.*

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

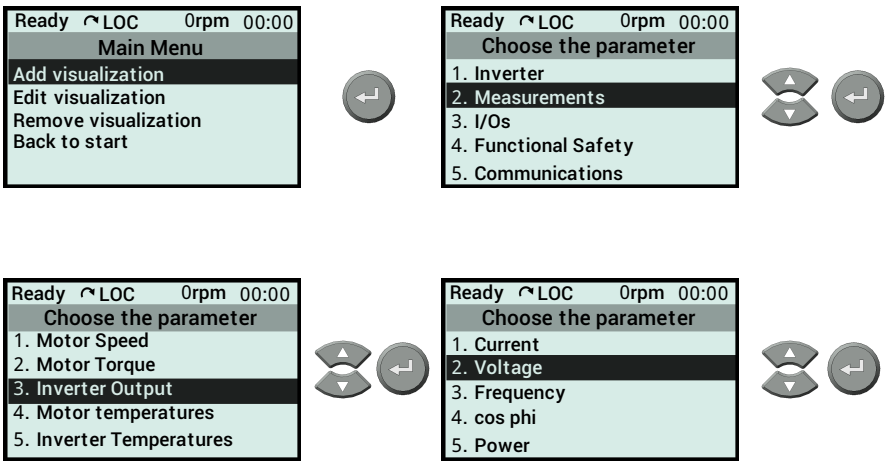
8.6.2 Main Screen Modification

The main screens can be modified following the steps below:

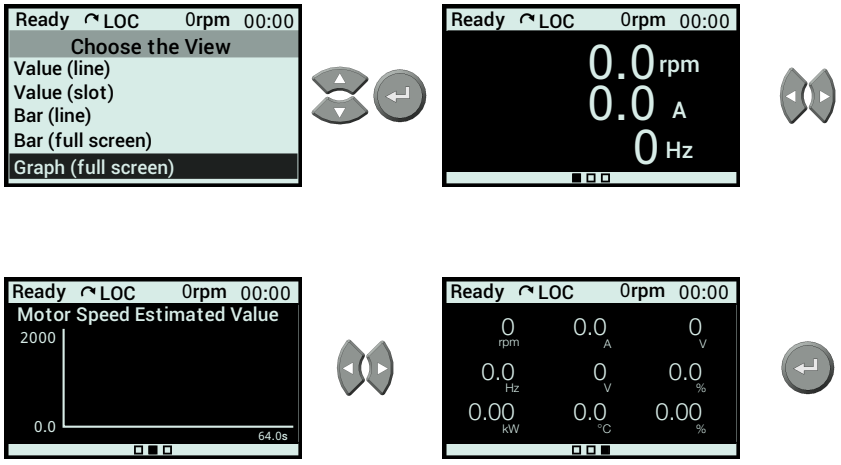
1. Navigate to the HMI main screen's configuration menu (C11.2).



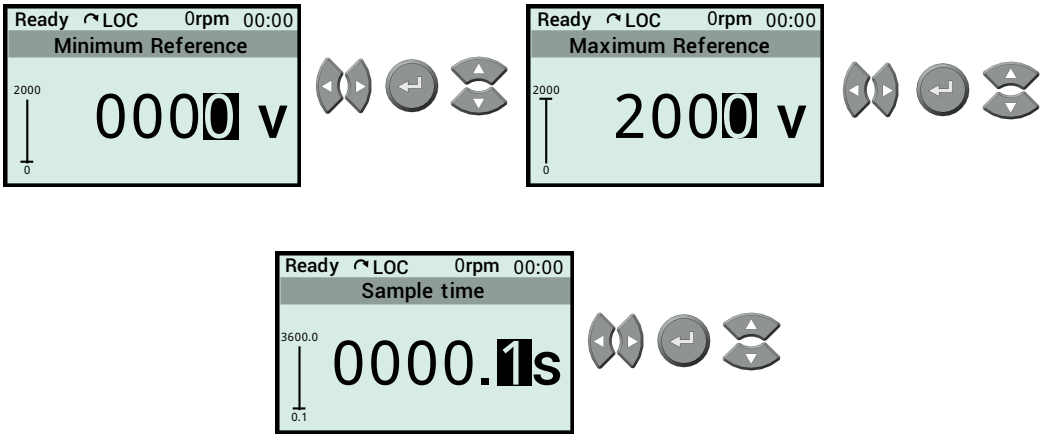
2. Select *Add Visualization* and choose the reading variable to be added to the**Main** screen.



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

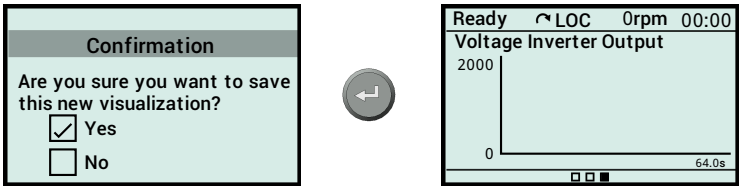


4. Set the visualization format. In this example, choose the amplitude range of the graph and the sampling rate.



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

5. Confirm the new visualization.



8.6.3 Screen Examples

Other screens examples are shown below:

Example 1

Figure 8.15 is an example of a main screen with parameter readings displayed in **Slot** and **Line**mode, which shows:

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

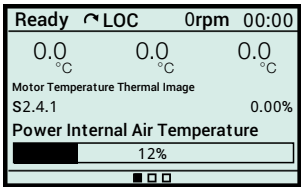


Figure 8.15: *Main screen examples*

Example 2

Figure 8.16 is an example of a main screen with parameter readings displayed in **Line** mode, which shows:

- in the first line, the inverter output current in **Line** mode and **text** format;

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

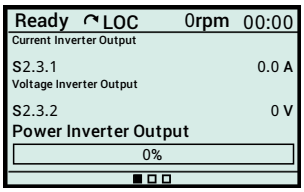


Figure 8.16: *Main screen examples*

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 application allows, among other things, reading variables, configuring parameters and updating the inverter firmware. For more details, consult the WPS (WEG Programming Suite) manual, available at **www.weg.net**.

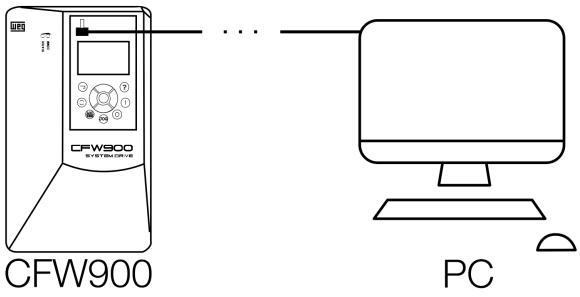


Figure 8.17: *CFW900 USB connection to a computer.*

When the inverter is not powered or 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 through the HMI and connection to the WPS software, but the I/O parameters and connected accessories will not be available, as well as the parameters related to regulation functions (which depend on the operation of other parts of the inverter). Functions that use the MicroSD card will also be unavailable.

WARNING!
In the USB mode, the HMI cannot be used remotely. It must be directly connected 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 that the parameter is saved.

WARNING!
If the inverter control circuit is powered by the USB, and another power supply is connected, the drive 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 in this menu can only be viewed on the HMI display, and cannot be changed by the user, unless they are linked to the parameters in the **Configuration** 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 ... 9
.2 HMI	0 ... 9
.3 Pre-Charge	0 ... 1
.4 Config	0 ... 26

.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 a fault active.
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.

.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 a fault active.
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.

Indication	Description
9 = SelfTun	It indicates that the inverter is executing the Self-tuning routine.

.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 but the forward DI was not specified.
4 = Reverse R1	It indicates that the Run/Stop command source of Remote 1 mode has been set to Forward/Reverse mode via DI, but but the reverse DI was not specified.
5 = Reverse R2	It indicates that the Run/Stop command source of Remote 2 mode has been set to Forward/Reverse mode via DI, but but the reverse DI was not specified.
6 = 3-wire Start/Stop	It indicates that the Run/Stop command source of Remote 1 and/or Remote 2 mode has been set to 3-wire Start/Stop via DI mode, but no DI has been specified.
7 = Direction of Rotation DIx	It indicates that the Direction of Rotation command source of Remote 1 and/or Remote 2 mode has been set to “Direction of Rotation DI”, but no DI has been specified in C4.2.3.8.
8 = JOG DIx	It indicates that the JOG command source of Remote 1 and/or Remote 2 mode has been set to Digital Input (DI) mode, but no DI has been specified.
9 = R1/R2 DIx	It indicates that the selection command source between Remote 1 and Remote 2 modes has been set to Digital Input (DI) mode, but no DI has been specified.
10 = Ramp selection DIx	It indicates that the ramp selection command source has been set to Digital Input (DI) mode, but no DI has been specified.
11 = Oriented Startup	It indicates that the Oriented Startup is running.
12 = Backup	It indicates that the Parameter Copy functions are running.
13 = Not used	Not used.
14 = SS1 configuration	It indicates that the SS1 is not properly set.
15 = Switching Frequency	It indicates that the user and/or minimum switching frequencies are not properly set.
16 = Undefined model	It indicates that there is an incompatibility in the drive model recorded. Perform a factory default to fix this problem.
17 = Encoder Vector Control	It indicates that the Vector Control with Encoder type has been selected, but there is no Encoder accessory defined in any slot.
18 = ENC Acc. not configured	It indicates that the Encoder accessory was selected for one of the slots, but it is not connected or set to in the corresponding slot.
19 = AIx/FIx Speed Ref.	It indicates that the speed reference source for Remote 1 and/or Remote 2 mode has been set to Analog Input (AI) or Frequency Input (FI) mode, but no AI or FI has been specified.
20 = PM Motor Control	It indicates that Motor Type has been set to PM Motor but the Control Type is not set to VVW+.
21 = General Enable DIx	It indicates that the General Enable command source for Remote 1 and/or Remote 2 mode has been set to Digital Input (DI) mode, but no DI has been specified.
22 = Multispeed	It indicates that the speed reference source of Remote 1 and/or Remote 2 mode has been set to Multispeed mode, but no DI has been specified.
23 = Not used	Not used.
24 = Electronic Potentiometer	It indicates that the speed reference source of Remote 1 and/or Remote 2 mode has been set to Electronic Potentiometer mode, but no DI has been specified.
25 = FI used as DI	This status occurs when the user tries to configure some command that requires a DI with one that was previously configured to be an FI, and vice versa.
26 = AIx/FIx Torque Ref.	It indicates that the torque reference source for Remote 1 and/or Remote 2 mode has been set to Analog Input (AI) or Frequency Input (FI) mode, but no AI or FI has been specified.

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 in 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 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 208 V, 220 V, 230 V, and 240 V 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 to view 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 ... 9

.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 = 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 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 is set C4.2.3.1to ”Inactive”, the general enable command is assigned only by the source set (C4.2.1.1 or C4.2.2.1).

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

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

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

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

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

HMI Control Word:

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

- The General Enable command can be disabled when the key of the HMI is pressed and the parameter C4.2.4.1 is set to coast to stop.
- When pressing the HMI key , the Run Reverse command is alternated.
- As long as the HMI 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**: it stops the motor by deceleration ramp **1 = Yes**: the motor turns according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: it disables the inverter completely, interrupting the motor power supply **1 = Yes**: it enables the inverter completely, allowing the operation of the motor
Bit 2 Run Reverse	**0 = No**: turn the motor in the direction of the reference signal (forward direction) **1 = Yes**: run the motor in the opposite direction of the reference signal (reverse direction)
Bit 3 Enable JOG	**0 = No**: it disables the JOG function **1 = Yes**: it enables the JOG function
Bit 4 LOC/REM Mode	**0 = REM**: it selects the Remote command mode **1 = LOC**: it selects the Local command mode
Bit 5 2nd Ramp	**0 = No**: 1st Ramp acceleration and deceleration according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: it enables quick stop **1 = Yes**: it disables quick stop
Bit 7 Reset Fault	**0 = No**: not used **1 = Yes**: in the transition, if a fault is active, it resets the fault

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

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

Control Word via DI:

- The Enable Ramp command depends on the configuration of parameters C4.2.1.2 or C4.2.2.2, according to options 7, 8 and 9 below.
  - For option 7: Run/Stop DI, the Enable Ramp command reflects the status of the digital input set in C4.2.3.2. Active DI means Enable Ramp and inactive DI means Disable Ramp.
  - For option 8: Forward/Reverse DI, the behavior of the Enable Ramp command is determined by a combination of the status of the digital inputs set in C4.2.3.5 and C4.2.3.6.
  - For option 9: 3-Wire Start/Stop DI, the Enable Ramp command has its behavior given by a combination of the status of the digital inputs set in C4.2.3.3 and C4.2.3.4.
- The General Enable command reflects the status of the digital input set in C4.2.3.1. Active DI means General Enabled and Inactive DI means General Disabled.
- The Run Reverse command depends on the settings made in parameters C4.2.1.3 and C4.2.2.3, according to options 7 and 8 below.
  - For option 7: Direction of Rotation DI, the Run Reverse command reflects the status of the digital input set in C4.2.3.8. Active DI means Reverse Direction and inactive DI means Forward Direction.
  - For option 8: Forward/Reverse DI, the behavior of the Run Reverse command is determined by a combination of the status of the digital inputs set in C4.2.3.5 and C4.2.3.6.

- The Enable JOG command reflects the status of the digital input set in C4.2.3.9. DI active means Enable JOG and DI inactive means Disable JOG.
- The 2nd Ramp command reflects the status of the digital input set in C4.2.3.10. Active DI means 2nd Ramp and inactive DI means 1st Ramp.
- The Fast Stop command reflects the status of the digital input set in C4.2.3.7. Active DI means No Fast Stop and Inactive DI means With Fast Stop.
- The Fault Reset command reflects the status of the digital input set in C4.2.3.11. Active DI means Reset of Fault and inactive DI means No Action.

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

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 synchronous 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.

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 drive 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 AIx Global Torque	0.0 ... 400.0 %

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

S3 I/OS

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

S3.1.2 Analog Outputs

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

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

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

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

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

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

S3.1.3 Digital Inputs

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

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

.1 DI It indicates the status of digital inputs.

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

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

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

S3.1.4 Digital Outputs

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

S3.1.4 Digital Outputs	
.1 DO	0 ... 1 Bit
.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 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 to view the actual status of the encoder signal measurements carried out by the accessory.

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

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

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

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

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

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

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

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

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

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

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

This parameter is updated every 1 ms.

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

The value of this parameter is presented without filters.

S3.2 Slot A Status
S3.3 Slot B Status
S3.4 Slot C Status
S3.5 Slot D Status
S3.6 Slot E Status
S3.7 Slot F Status
S3.8 Slot G Status

It allows viewing the state of the slot status parameters.

S3.2.1 Analog Inputs to S3.8.1 Analog Inputs

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

S3.2.1 Analog Inputs **S3.3.1 Analog Inputs** **S3.4.1 Analog Inputs** **S3.5.1 Analog Inputs** **S3.6.1 Analog Inputs** **S3.7.1 Analog Inputs** **S3.8.1 Analog Inputs**	
.1 AI1 to .3 AI3	-100.00 ... 100.00 % -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 analog outputs configuration menu of the accessory connected to the slot. Using Slot A as an example, the menu can be found in the item C5.2. The status indication may have percentage values relative to the full scale values. Such values depend on the function selected for the analog output and are also described in detail in the menu of analog outputs of the accessory connected to the slot.

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

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

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

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

S3.2.3 Digital Inputs to S3.8.3 Digital Inputs

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

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

.1 DI It indicates the status of digital inputs.

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

S3.2.4 Digital Outputs to S3.8.4 Digital Outputs

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

S3.2.4 Digital Outputs
S3.3.4 Digital Outputs
S3.4.4 Digital Outputs
S3.5.4 Digital Outputs
S3.6.4 Digital Outputs
S3.7.4 Digital Outputs
S3.8.4 Digital Outputs

.1 DO	0 ... 7 Bit
.2 DO Network	0 ... 7 Bit
.3 DO SoftPLC	0 ... 7 Bit

.1 DO It indicates the status of digital outputs.

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

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

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

S3.2.5 Encoder to S3.8.5 Encoder

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

S3.2.5 Encoder
S3.3.5 Encoder
S3.4.5 Encoder
S3.5.5 Encoder
S3.6.5 Encoder
S3.7.5 Encoder
S3.8.5 Encoder

.1 Number of Revolutions	0 ... 65535
.2 Revolution Fraction	0 ... 65535
.3 Speed	-60000 ... 60000 rpm
.4 Search Zero	0 ... 1

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

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

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

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

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

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

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

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

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

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

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

The value of this parameter is presented without filters.

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

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

S3.2.6 Temperatures to S3.8.6 Temperatures

It allows to view 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 to .6 Sensor 6	-100.0 ... 250.0 °C -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 CFW900.

S4 Functional Safety	
.1 Status	0 ... 5
.2 SS1-t Delay Time	0 ... 999 s

.1 Status It indicates the state of STO90.

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

.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 ... 1 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 Ramp acceleration and deceleration by C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration by C6.1.4 and C6.1.5
Bit 6 Config. Mode	**0 = No**: inverter in normal operation **1 = Yes**: inverter in configuration status. It indicates a special condition in which the inverter cannot be enabled
Bit 7 Alarm	**0 = No**: without alarm **1 = Yes**: with alarm active
Bit 8 Running	**0 = No**: motor is stopped **1 = Yes**: motor is running according to reference and command
Bit 9 Enabled	**0 = No**: inverter is general disabled **1 = Yes**: inverter is general enabled
Bit 10 Reverse	**0 = No**: motor running in the forward direction **1 = Yes**: motor running in the reverse direction
Bit 11 JOG	**0 = No**: no JOG command active **1 = Yes**: JOG command is active
Bit 12 Remote 2	**0 = No**: inverter in Remote 1 command mode **1 = Yes**: inverter in Remote 2 command mode
Bit 13 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 rotating in the reverse direction of rotation.

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

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

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

Bit	Value/Description
Bit 0 SD Card	SD card detection is performed only during the inverter initialization, so the inverter does not detect SD card disconnection during operation. **0 = No**: SD card not connected **1 = Yes**: SD card connected
Bit 1 Not used	Not used.

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

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

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via Serial. This programming is done through menu C4.
- S5.2.3 = 0.00 % ⇒ speed reference = 0 rpm
- S5.2.3 = 100.00 % ⇒ speed reference = C4.3.1.1.2

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

100.00 % : 1800 rpm
Reference % : 900 rpm

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

Reference % = 50 %

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

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

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

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

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

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

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

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

S5.3 Ethernet

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

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

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

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

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

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

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

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

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

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via Ethernet. This programming is done through menu C4.
- S5.3.3 = 0.00 % ⇒ speed reference = 0 rpm
- S5.3.3 = 100.00 % ⇒ speed reference = C4.3.1.1.2

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

100.00 % : 1800 rpm
Reference % : 900 rpm

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

Reference % = 50 %

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

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

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

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

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

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

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

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

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

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

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

S5.4 EtherNet/IP

It allows viewing information about the EtherNet/IP protocol.

S5.4 EtherNet/IP	
.1 EIP Master Status	0 ... 1
.2 Communication Status	0 ... 4
.3 DLR Topology	0 ... 1
.4 DLR Status	0 ... 2

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

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

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

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

.3 DLR Topology Indicates the network topology.

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

.4 DLR Status Indicates the status of the network.

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

S5.5 Modbus TCP

It allows viewing information regarding 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 to identify the communication status with Modbus TCP server.

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

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

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

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

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

S5.7 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 = Disabled	CAN interface inactive. It occurs when the equipment does not have a CAN protocol programmed in C9.8.1.
1 = Auto-Baud	Running function for automatic baud rate detection (only for DeviceNet protocol).
2 = CAN Active	CAN interface active and without error.
3 = Warning	CAN controller has reached the warning status.
4 = Error Passive	CAN controller has reached error passive status.
5 = Bus Off	CAN controller has reached bus off status.
6 = No Bus Power	The CAN interface has no power supply between pins 1 and 5 of the connector.

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

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

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

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

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

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via CAN/CO/DNET. This programming is done through menu C4.
- S5.7.3 = 0.00 % ⇒ 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 Rotation Direction = 1 and S5.7.3 > 0: reference for the forward direction
- Bit Rotation Direction = 1 and S5.7.3 < 0: reference for the reverse direction
- Bit Rotation Direction = 0 and S5.7.3 > 0: reference for the reverse direction
- Bit Rotation Direction = 0 and S5.7.3 < 0: reference for the forward direction

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

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

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

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

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

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

Indication	Description
0 = Inactive	CANopen protocol disabled.
1 = Reserved	
2 = Comm. Enabled	Communication enabled.
3 = Enab. Error Ctrl.	Communication enabled and error control enabled (Node Guarding/Heartbeat).
4 = Guarding Error	Node Guarding error occurred.
5 = Heartbeat Error	Heartbeat error occurred.

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

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

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

Indication	Description
0 = Offline	No power supply or not online. Communication cannot be established.
1 = Online Not Conn.	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 = Conn. Timed Out	One or more I/O type connections timed out.
4 = Link Failure	It indicates that the slave cannot enter the network due to address problems or due to bus off. Check if the address is not already being used by another device, if the baud rate selected is correct or if there are problems in the installation.
5 = Auto-Baud	Equipment running routine of the autobaud mechanism.

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

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

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

S5.9 Bluetooth

The following configurations 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 The MAC address of the Bluetooth device is a unique 48-bit identifier assigned to each Bluetooth device by the manufacturer.

S6 SOFTPLC

The SoftPLC function adds to the CFW900 inverter 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**: it stops the motor by deceleration ramp **1 = Yes**: the motor turns according to the acceleration ramp until reaching the speed reference value
Bit 1 General Enable	**0 = No**: it disables the inverter completely, interrupting the motor power supply **1 = Yes**: it enables the inverter completely, allowing the operation of the motor
Bit 2 Run Reverse	**0 = No**: turn the motor in the direction of the reference signal (forward direction) **1 = Yes**: run the motor in the opposite direction of the reference signal (reverse direction)
Bit 3 Enable JOG	**0 = No**: it disables the JOG function **1 = Yes**: it enables the JOG function
Bit 4 R1/R2 Mode	**0 = R1**: it selects the Remote 1 command mode **1 = R2**: it selects the Remote 2 command mode
Bit 5 2nd Ramp	**0 = No**: 1st Ramp acceleration and deceleration according to parameters C6.1.1 and C6.1.2 **1 = Yes**: 2nd Ramp acceleration and deceleration according to parameters C6.1.4 and C6.1.5
Bit 6 No Quick Stop	**0 = No**: it enables quick stop **1 = Yes**: it disables quick stop
Bit 7 Fault Reset	**0 = No**: not used **1 = Yes**: in the transition, if a fault is active, it resets the fault

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

For the reference written in this parameter to be used, the inverter must be programmed to use the speed reference via SoftPLC. This programming is done through menu C4.
- S6.2.3 = 0.00 % ⇒ speed reference = 0 rpm
- S6.2.3 = 100.00 % ⇒ speed reference = C4.3.1.1.2

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

100.00 % : 1800 rpm
Reference % : 900 rpm

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

Reference % = 50 %

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

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

S7 USER

It allows viewing the actual user informations.

S7 User	
.1 Login Active	0 ... 5

.1 Login Active It indicates the currently logged in 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 faults activation occurrences in the CFW900.

D1.1 Actual

It allows viewing the faults performed on the CFW900. If any fault is active, its number is displayed. If it is not active, 0 is displayed.

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

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

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

D1.1 Actual	
.1 Fault 1	0 ... 1999
.2 Fault 2	0 ... 1999
.3 Fault 3	0 ... 1999
.4 Fault 4	0 ... 1999
.5 Fault 5	0 ... 1999

.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.

The graphics are available in two samples: one slower (1 second) and one faster (10 milliseconds) to allow higher resolution in the final instants preceding the failure.

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].
- 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:

- Encoder speed [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 heatsink fan 1 [D4.1.1.1].
- Speed of heatsink fan 2 [D4.1.1.2].
- Speed of heatsink fan 3 [D4.1.1.3].
- Speed of heatsink 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 WPS:

- Motor current [S2.3.1].
- Output frequency [S2.3.3].
- DC link voltage [S2.7.1].
- Output voltage [S2.3.2].
- IGBT junction temperature [D4.1.6.4].

- Motor speed [S2.1.3].
- Motor torque [S2.2.3].
- Total speed reference [S2.1.2].

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. The S2.7.1 parameter has its value filtered in relation to the samples indicated in the graph. The S2.1.3 and S2.1.2 parameters indicate the absolute value of the actual value indicated in the respective graphs.

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.

The alarms are displayed on the HMI and on the CFW900 status word. They are automatically removed after leaving the alarm condition.

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

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

D2.1 Actual	
.1 Alarm 1	0 ... 1999
.2 Alarm 2	0 ... 1999
.3 Alarm 3	0 ... 1999
.4 Alarm 4	0 ... 1999
.5 Alarm 5	0 ... 1999

.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 WPS.

The graphics are available in two samples: one slower (1 second) and one faster (10 milliseconds) to allow higher resolution in the final instants preceding the alarm.

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

List of parameters visible only on WPS:

- Encoder speed [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 heatsink fan 1 [D4.1.1.1].
- Speed of heatsink fan 2 [D4.1.1.2].
- Speed of heatsink fan 3 [D4.1.1.3].
- Speed of heatsink 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 WPS:

- Motor current [S2.3.1].
- Output frequency [S2.3.3].
- DC link voltage [S2.7.1].
- Output voltage [S2.3.2].
- IGBT junction temperature [D4.1.6.4].
- Motor speed [S2.1.3].
- Motor torque [S2.2.3].
- Total speed reference [S2.1.2].

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

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 Enabled Hours	0 ... 65536 h

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

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

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

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

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

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

.3 Fan Enabled Hours It indicates the total number of hours that the heatsink 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 shut 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 fan speeds of the CFW900.

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 heatsink fan 1 speed (rpm).

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

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

.4 Power Fan 4 Speed It indicates the heatsink 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 voltage on the DC link.

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 It indicates the 100 Hz harmonic amplitude in the DC link voltage signal.

.2 120 Hz Harmonic It 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 ... 3
.2 IGBT Overload Counter	0.00 ... 100.00 %
.3 Heatsink Temp.	0.00 ... 655.35 °C
.4 IGBT Junction Temp.	0.00 ... 655.35 °C
.5 Diode Junction Temp.	0.00 ... 655.35 °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 = Slow Curve Overload	IGBTs are operating under light overload. The ratio between the output current and rated current is between 1 and 1.15 for ND, and 1 and 1.5 for HD.
2 = Fast Curve 1 Overload	IGBTs are operating under heavy overload. The ratio between the output current and rated current is between 1.15 and 1.3 for ND and 1.5, and 1.9 for HD.
3 = Fast Curve 2 Overload	IGBTs are operating under very heavy overload. The ratio between the output current and rated current is above 1.3 for ND and above 1.9 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 Heatsink Temp. It indicates the inverter heatsink 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).

D4.2 Control Accessories

It allows viewing the diagnostics data of 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 shows the accessory status.

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

.2 Error Cause Last accessory communication error.

Indication	Description
0 = No Error	No occurrence of errors
1 = Recognition Error	There was an error in the recognition of the accessory
2 = Accessory Not Supported	The CFW900 does not support the accessory
3 = Initialization Error	The accessory is not compatible with the CFW900 firmware version
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 a communication error 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 contents different from the factory default can be viewed in this menu. The parameters and submenus from 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 dependent on inverter model data or vary depending on whether the power supply standard is 50 or 60 Hz, for example:

- 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.
- C9.10.3: Bluetooth - Device Name.

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

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

D5.1 Configuration

Display the parameters from the configuration menu whose contents are different from the factory default.

D5.2 Application

Display the parameters from the application menu whose contents are different from the factory default.

11 C CONFIGURATION

It allows changing the setting parameters of CFW900. Depending on the property of the parameter, it is possible to adjust its value according to the table below.

Property	Description
Stopped	Parameter can only be changed when the motor is stopped.
Model	Default value may change depending on the inverter model.

NOTE!
Parameter options with the description ”Reserved” 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.

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

Indication	Description
0 = Three-phase AC	Three-phase power supply 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	

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

This parameter directly influences the inverter rated current value (S1.3.5) used as a reference for the IGBTs overload and output overcurrent faults.

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

C1.3 Switching Frequency

It allows adjusting the values of the inverter Switching Frequency.

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.

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:** 0
Properties:		

Description:
It sets the vector modulation type.

Indication	Description
0 = Standard	Modulation suitable for general applications.
1 = Not used	Not used.
2 = Modulation for Long Cable	Modulation suitable for applications with long cable. It is recommended to use starting from 100 meters of cable between the inverter and the motor.

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 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	It enables function

C1.5 Fans Configuration

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

C1.5 Fans Configuration
C1.5.1 Power Fan Setting
Range: 0 ... 3 **Default:** 2
Properties:

Description:
It defines the method by which the inverter heatsink fan is driven.

NOTE!
Options 2 and 3 in the table below, with and without initial test, mean that the fans will or will not be running for 1 min after the inverter is powered up.

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.

C1.5 Fans Configuration
C1.5.2 Internal Fan Setting
Range: 0 ... 3 **Default:** 2
Properties:

Description:
It defines the method by which the internal fan is driven.

NOTE!
Options 2 and 3 in the table below, with and without initial test, mean that the fans will or will not be running for 1 min after the inverter is powered up.

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.

C1.6 Other Inverter Config.

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

C1.6 Other Inverter Config.
C1.6.1 Invert Output Phase Seq.
Range: 0 ... 1 **Default:** 0
Properties: Stopped

Description:
It defines the motor direction of rotation.

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

C1.6 Other Inverter Config.
C1.6.2 Reset Counters
Range: 0 ... 3 **Default:** 0
Properties:

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

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

C1.6 Other Inverter Config.
C1.6.3 User Delta Temp.
Range: 0.0 ... 100.0 °C **Default:** 0.0 °C
Properties:

Description:
User temperature offset.

It applies an offset over all temperature measurements relating to the inverter, not including measurements from accessory temperature sensors.

C1.6 Other Inverter Config.		
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.

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 ... 1	**Default:** 0
Properties:	Stopped	

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

Indication	Description
0 = Induction	It selects that it is an induction motor.
1 = Permanent Magnet (PM)	It selects that is a permanent magnet motor.

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 in horsepower.
1 = kW	It sets the power unit in 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 value This value cannot be higher than 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 value. The value must be set according to the motor nameplate data.

C2.1 Motor Data

C2.1.6 Rated Frequency

Range:	1 ... 500 Hz	**Default:** 60 Hz
Properties:	Stopped	

Description:
It sets the motor rated frequency value.

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 Pole Pairs

Range:	1 ... 48	**Default:** 3
Properties:	Stopped	

Description:
It sets the number of the motor pole pairs.

For example, the default setting of this parameter is 3 pole pairs, this means that the motor has 6 poles.

NOTE!
Parameter available only for PM motor.

C2.1 Motor Data

C2.1.8 Rated Speed

Range:	0 ... 18000 rpm	**Default:** 1750 rpm
Properties:	Stopped	

Description:
It sets the motor rated speed value.

C2.1 Motor Data
C2.1.9 Rated Efficiency

Range:	50.0 ... 99.9 %	**Default:** -
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 sets the motor rated cos φ.

C2.1 Motor Data
C2.1.11 Service Factor

Range:	1.00 ... 1.50	**Default:** 1.15
Properties:	Stopped	

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

C2.1 Motor Data
C2.1.12 Ventilation

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

Description:
It defines the motor ventilation system arrangement.

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

In the Oriented Startup routine, the value set in C2.1.12 automatically changes the parameters related to the motor overload fault as follows:

C2.1.12	C7.4.3 (100%)	C7.4.4 (50%)	C7.4.5 (5%)
0	1.05 x C2.1.5	0.9 x C2.1.5	0.65 x C2.1.5
1	1.05 x C2.1.5	1.05 x C2.1.5	1.05 x C2.1.5

Table 11.13: *Change of the motor overload fault as a function of* C2.1.12

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 in case of having the motor data sheet.

C2.2 Motor Model Parameters
C2.2.1 Stator Resistance

Range:	0.000 ... 10.000 Ω	**Default:** 1.000 Ω
Properties:		

Description:
It sets the motor stator resistance value.

C2.2 Motor Model Parameters
C2.2.2 Magnetization Reactance
Range: 0.0 ... 500.0 Ω **Default:** 1.0 Ω
Properties:

Description:
It defines the motor magnetization reactance value.

C2.2 Motor Model Parameters
C2.2.3 Leakage Reactance
Range: 0.00 ... 50.00 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 ... 10.000 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 ... 50.00 Ω **Default:** 1.00 Ω
Properties:

Description:
It sets the motor rotor reactance value.

C2.2 Motor Model Parameters
C2.2.8 Ke Constant
Range: 0.0 ... 2000.0 **Default:** 0.0
Properties:

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

C3 CONTROL

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

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

Control Types:

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

VVW+: Voltage Vector WEG Plus; static speed control more accurate than the scalar control; automatic adjustment to the input supply line and load variations, but dynamic response is not fast.

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 the 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 the rated speed in speed control; high static and dynamic performance of speed and torque control.

C3.1 Configuration

It allows to set 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.

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

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).

C3.2 Scalar (V/F) and VVW+ Control

In this chapter the scalar control and VVW+ control types will be discussed. A brief explanation of how each control works will be presented, as well as recommendations for applications where each control can achieve the best performance.

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 shows the block diagram of the scalar control.

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.

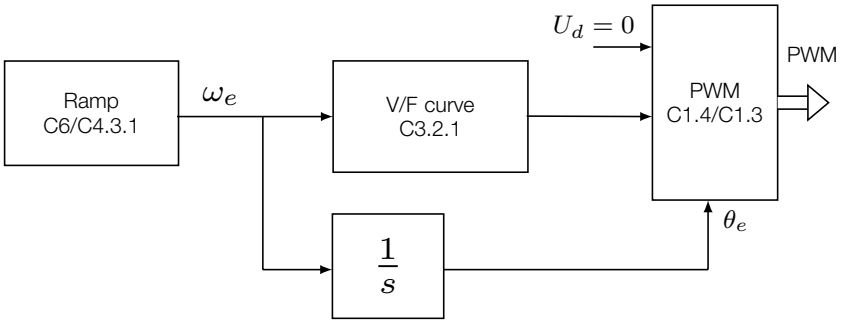


Figure 11.1: *Block diagram of scalar control for induction motor*

VVW+ CONTROL FOR INDUCTION MOTOR

The VVW+ control is an improvement of the classic scalar control structure. In the former, 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 shows the VVW+ control in a block diagram.

The main advantage, compared to the scalar control, is the better speed regulation with higher torque capacity at low speeds (frequencies below 5 Hz), allowing a significant improvement in the drive performance in permanent duty. Is simpler and easier to adjust in relation to the sensorless vector control.

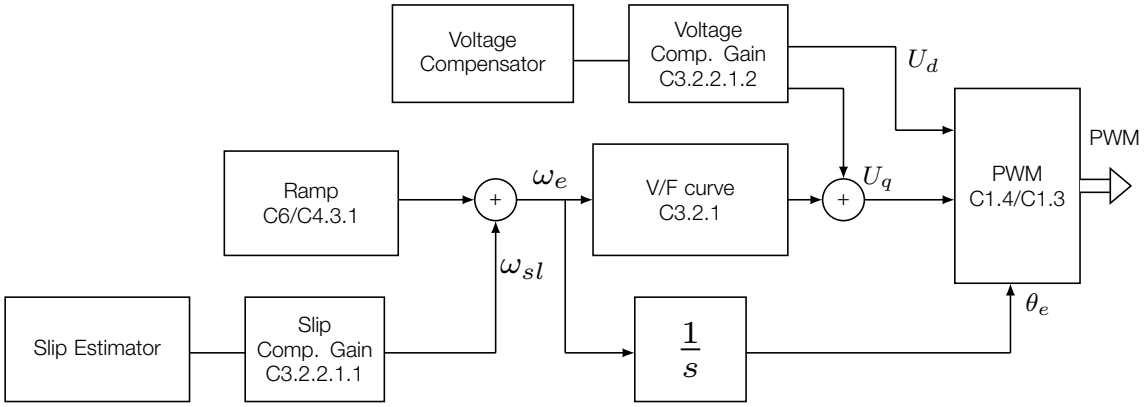


Figure 11.2: *Block diagram of VVW+ control for induction motor*

In this control strategy the Self-tuning is required or it is necessary to know the motor Stator Resistance previously and set it in C2.2.1 parameter. However, to achieve a good regulation, the motor nameplate data must be entered into the Oriented Startup before performing the Self-Tuning.

VVW+ CONTROL FOR PM MOTOR

The VVW+ PM control type (Voltage Vector WEG for Permanent Magnet motor) uses a control method based on the voltage-oriented vector control technique for permanent magnet motors with good performance for systems with slow dynamics. This control is easy to use and has high performance reducing losses and saving energy due to the tracking of the maximum torque per ampere and current stability, as shown in Figure 11.3.

In this control strategy no self-tuning is required, however, to achieve a good regulation, the motor nameplate data must be entered into the Oriented Startup.

This type of control is ideal for medium and high speed applications which do not require a fast dynamic response, focused on energy efficiency such as:

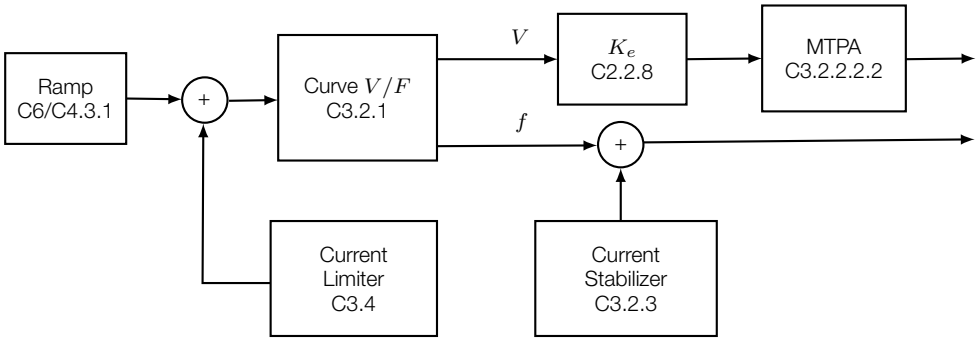


Figure 11.3: *Block diagram of VVW+ control for permanent magnet (PM) motor*

- Fans.
- Pumps.
- Compressors.

On the other hand, the VVW+ PM is not recommended for applications requiring fast dynamic response or precise torque control, focused on dynamic performance such as:

- Dynamometers.
- Cargo handling (such as overhead cranes, hoists, elevators).
- Applications requiring performance similar to servomotors, such as CNC machines and machine tools (positioning and high dynamics required).

AUXILIARY FUNCTIONS

At Figure 11.4, the block diagram of the scalar controls for induction motor and VVW+ for induction motor and PM is shown, with all the auxiliary functions presented.

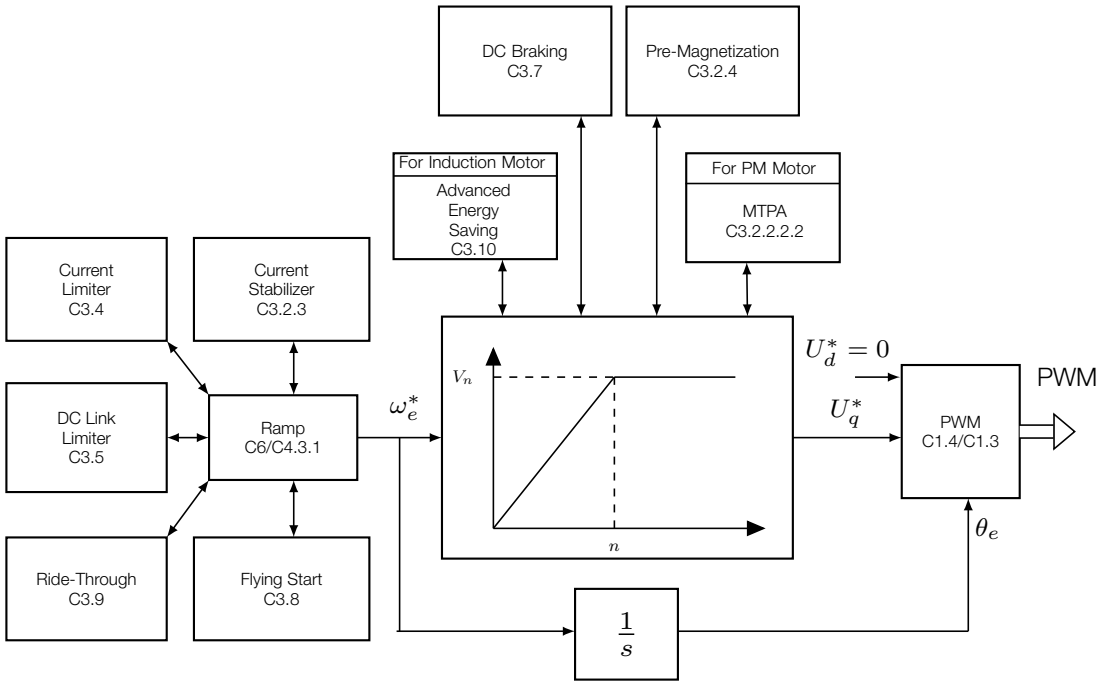


Figure 11.4: *Scalar control block diagram for induction motor and VVW+ for induction motor and PM*

In the items C3.2.1, C3.2.3 and C3.2.4, details regarding the V/F Curve, Current Stabilization and Pre-Magnetization functions, which are common to both scalar and VVW+ control types, are presented. In the item C3.2.2 additional information unique to VVW+ control is presented, and in the items C3.4 to C3.10 information about the functions common to all control types (including vector control).

C3.2.1 V/F Curve

It allows to adjust the curve defined by the output voltage and frequency of the inverter. Example using this feature: when a transformer is used between the inverter and the motor and it is desired to compensate the voltage drop of the cable used to connect the motor.

C3.2.1 V/F Curve		
C3.2.1.1 Manual Torque Boost		
Range:	0.0 ... 20.0 %	**Default:** 2.0 %
Properties:		

Description:
For the scalar and VVW+ control, it acts at low frequencies, that is, in the range from 0 to C3.2.1.5, increasing the inverter output voltage to compensate the voltage drop in the motor stator resistance so as to keep the torque constant.

The optimum setting is the smallest value of C3.2.1.1 which allows the motor to start satisfactorily. A value greater than necessary will excessively increase the motor current at low speeds, which may lead the inverter to activate faults (F048, F053 or F071) or alarms (A046, A047 or A110), as well as cause motor heating. Figure 11.5 shows the Torque Boost actuation region between points P_0 and P_1.

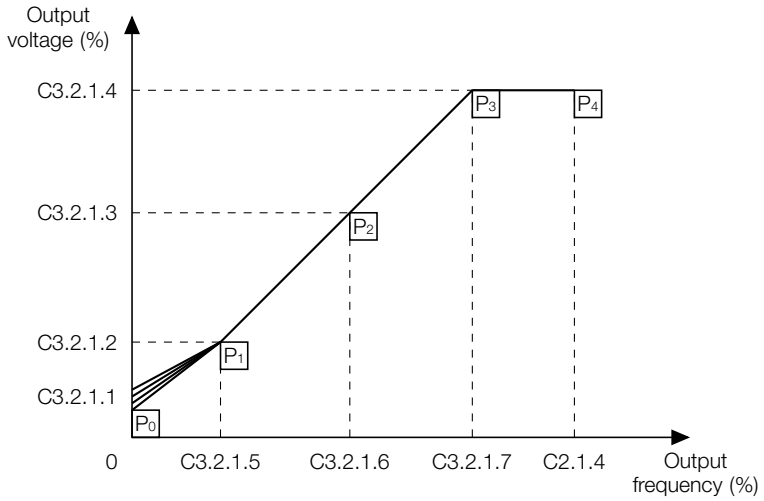


Figure 11.5: *Torque boost region*

C3.2.1 V/F Curve		
C3.2.1.2 Low Output Voltage		
Range:	0.0 ... 100.0 %	**Default:** 33.3 %
Properties:	Stopped	

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

C3.2.1 V/F Curve		
C3.2.1.3 Interm. Output Voltage		
Range:	0.0 ... 100.0 %	**Default:** 66.7 %
Properties:	Stopped	

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

C3.2.1 V/F Curve

C3.2.1.4 Maximum Output Voltage

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

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

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

C3.2.1 V/F Curve

C3.2.1.5 Low Speed

Range:	0.0 ... 200.0 %	**Default:** 33.3 %
Properties:	Stopped	

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

C3.2.1 V/F Curve

C3.2.1.6 Intermediate Speed

Range:	0.0 ... 200.0 %	**Default:** 66.7 %
Properties:	Stopped	

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

C3.2.1 V/F Curve

C3.2.1.7 Field Weakening Start Speed

Range:	0.0 ... 200.0 %	**Default:** 100.0 %
Properties:	Stopped	

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

C3.2.1 V/F Curve

C3.2.1.8 Rated Flux

Range:	0.0 ... 120.0 %	**Default:** 100.0 %
Properties:		

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

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

C3.2.2 VVW+ Optimization

It allows adjustments to the dynamics of the VVW+ control. The VVW+ control is factory configured to meet most applications, if an improvement in the dynamic behavior of the control for induction and PM motors is required, the following parameters are available.

C3.2.2.1 VVW+ Induction Motor

It allows setting the parameters of the VVW+ control for induction motor.

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 for further details.

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 for further details.

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 Cut freq. of Slip Filter		
Range:	1 ... 100 Hz	**Default:** 5 Hz
Properties:		

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

C3.2.2.2 VVW+ PM Motor

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

NOTE!
This function is only available for PM motors.

C3.2.2.2 VVW+ PM Motor		
C3.2.2.2.1 MTPA Function		
Range:	0 ... 1	**Default:** 1
Properties:		

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

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

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.2 MTPA Optimizer

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

Properties:

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

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

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.3 MTPA Minimum Speed

Range: 0 ... 100 % **Default:** 2 %

Properties:

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

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.4 Efficiency Adjustment Gain

Range: 0.000 ... 4.000 **Default:** 0.500

Properties:

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

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

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.5 Kp MTPA Gain

Range: 0.000 ... 1.000 **Default:** 0.010

Properties:

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

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

C3.2.2.2 VVW+ PM Motor

C3.2.2.2.6 Ki MTPA Gain

Range: 0.000 ... 1.000 **Default:** 0.002

Properties:

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

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

C3.2.2.2 VVW+ PM Motor
C3.2.2.2.7 MTPA Reference
Range: 0 ... 100 % **Default:** 100 %
Properties:

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

C3.2.2.2 VVW+ PM Motor
C3.2.2.2.8 MTPA Minimum Voltage
Range: 0 ... 100 % **Default:** 100 %
Properties:

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

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

E.g.:

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+ PM 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 attenuate electromechanical oscillations present in the motor when it is operating at low load levels and low frequencies. These oscillations cause instability in the system that, in some cases, can cause the overcurrent fault to be activated.

C3.2.3 Current Stabilization
C3.2.3.1 Enable Function
Range: 0 ... 1 **Default:** 1
Properties:

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

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

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

C3.2.3 Current Stabilization
C3.2.3.2 Stabilization Kp Gain
Range: 0.000 ... 1.999 **Default:** 0.150
Properties:

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

NOTE!
If you need to change the gains of this controller, first gradually increase the value of C3.2.3.3.

C3.2.3 Current Stabilization
C3.2.3.3 Stabilization Ki Gain
Range: 0.000 ... 1.999 **Default:** 0.020
Properties:

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

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

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

C3.2.3 Current Stabilization
C3.2.3.5 Max. Operation Freq.
Range: 0 ... 300 % **Default:** 0 %
Properties:

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

C3.2.4 Pre-Magnetization

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

Figure 11.6 shows the operation flow of the Pre-Magnetization function together with the motor drive. In this activation, before the motor accelerates, the stator is magnetized so that it has energy for starting with load. The magnetization is performed with the injection of a direct current (C3.2.4.2) for a programmed time interval (C3.2.4.3). The voltage boost during motor acceleration can be controlled by setting C3.2.4.4.

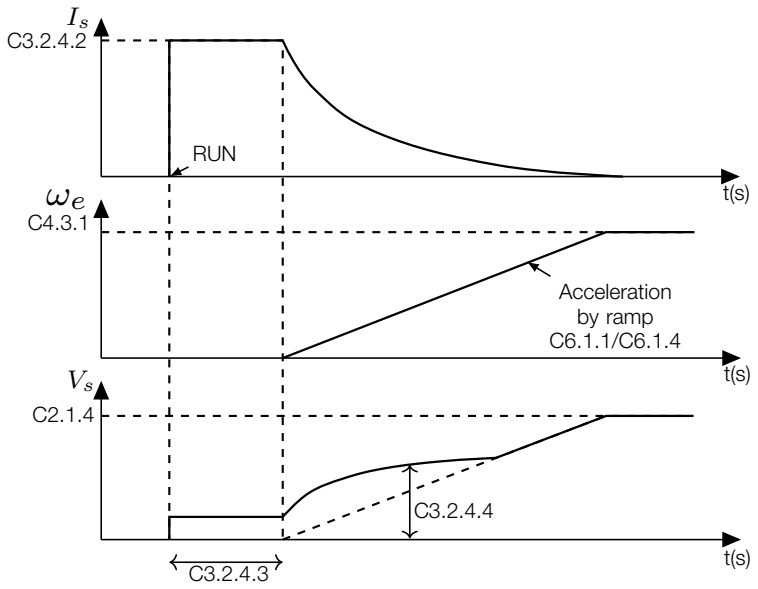


Figure 11.6: *Illustrative diagram of the operation of the pre-magnetization function.*

C3.2.4 Pre-Magnetization

C3.2.4.1 Enable Function

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

Description:
It enables the motor pre-magnetization function.

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

C3.2.4 Pre-Magnetization

C3.2.4.2 Current

Range:	0 ... 350 %	**Default:** 100 %
Properties:		

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

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

C3.2.4 Pre-Magnetization

C3.2.4.3 Time

Range:	0 ... 5000 ms	**Default:** 2000 ms
Properties:		

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

C3.2.4 Pre-Magnetization

C3.2.4.4 Gain

Range: 1.0 ... 7.0 **Default:** 3.5

Properties:

Description:

It allows setting the voltage boost applied during the motor acceleration. See Figure 11.6 for further details.

C3.2.5 I/F Control

The I/F function aims to improve the dynamic behavior of the motor start when it is subjected to a very high load level. The I/F function accelerates the machine by controlling the current level at the value set in C3.2.5.3. When the motor speed is greater than the value set in C3.2.5.4, the transition from the I/F strategy to scalar control or VVW+ will be performed. The I/F function will be active only during 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 Ready state. It is possible to enable automatic operation of the function after a speed reversal process from C3.2.5.2. During starting, the motor will remain at a constant speed equal to the value set in C3.2.5.6 for an instant of time of C3.2.5.5. The I/F function is suitable for both induction motors and synchronous machines.

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

C3.2.5 I/F Control

C3.2.5.1 Enabled

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

Properties: Stopped

Description:

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

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

C3.2.5 I/F Control

C3.2.5.2 Enable on Reversal

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

Properties: Stopped

Description:

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

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

C3.2.5 I/F Control

C3.2.5.3 Current

Range: 0 ... 200 % **Default:** 100 %

Properties:

Description:

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

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

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

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

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

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

C3.2.5 I/F Control
C3.2.5.6 Kick-off Speed
Range: 0 ... 50 % **Default:** 2 %
Properties:

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

C3.3 Vector Control

This is the type of control based on the separation of the motor current into two components:

- Direct current I_d (oriented with the motor electromagnetic flux vector).
- Quadrature current I_q (perpendicular to the motor flux vector).

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, it can be said that the vector control is oriented. Therefore, 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 and 11.8, on page 115, shows the block diagram for vector control with encoder and sensorless in speed mode and torque mode, respectively. The speed information and the currents measured by the inverter will be used to obtain the correct direction of the vectors. For 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.

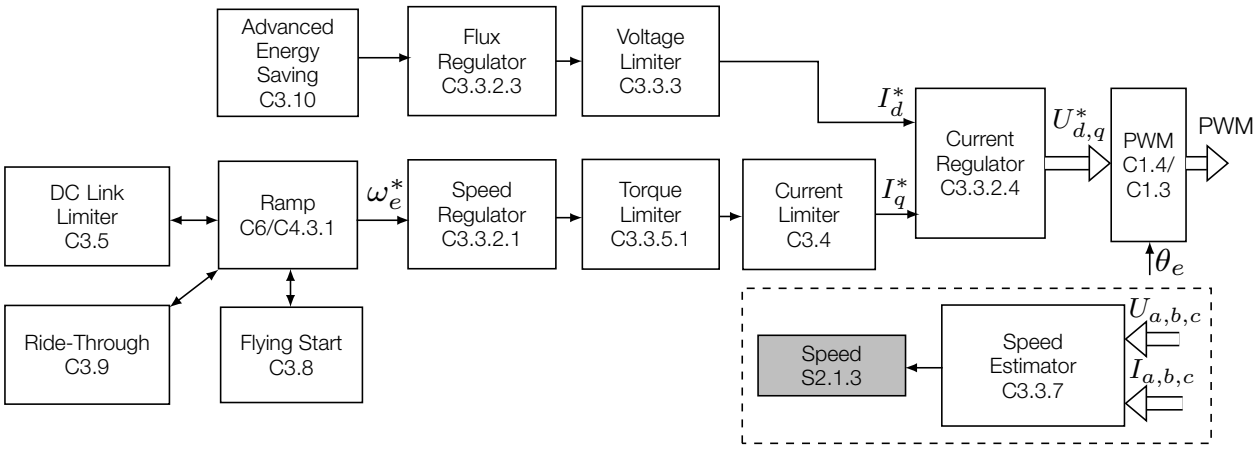


Figure 11.7: *Block diagram of the induction motor vector control in speed mode.*

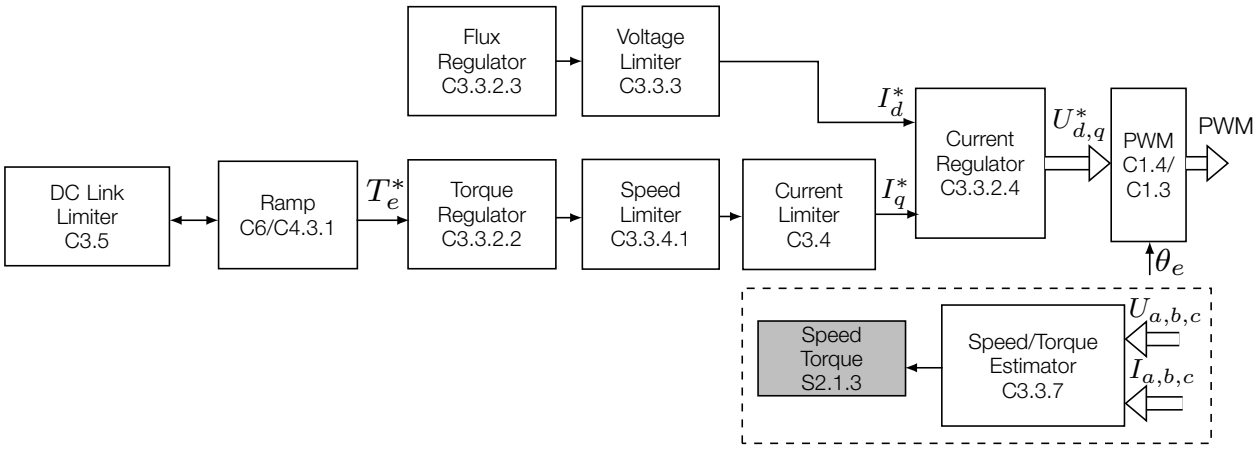


Figure 11.8: *Block diagram of the induction motor vector control in torque mode.*

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

SENSORLESS VECTOR CONTROL

Sensorless Vector Control is recommended for most applications, as it allows operation over a speed range of 1:100, speed control accuracy of 0.5 % of 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.

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	Enable control in Speed mode.
1 = Torque	Enable control in Torque mode.
2 = Defined by DI	The control mode is defined by the status of the digital input set in (C3.3.1.2). Inactive input selects Speed mode and active input selects Torque mode.

NOTE!
The Torque mode is only active when the control type is set to Vector with Encoder (C3.1.1 = 2).

C3.3.1 Configuration
C3.3.1.2 Control Mode DI Config.
Range: 0 ... 62 **Default:** 0
Properties: Stopped

Description:
It defines which digital input makes the transition from Speed mode to Torque mode or vice versa. Table 11.22 on page 116 shows the options.

Digital Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
DI1	X-1 (1)	A-1 (7)	B-1 (15)	C-1 (23)	D-1 (31)	E-1 (39)	F-1 (47)	G-1 (55)
DI2	X-2 (2)	A-2 (8)	B-2 (16)	C-2 (24)	D-2 (32)	E-2 (40)	F-2 (48)	G-2 (56)
DI3	X-3 (3)	A-3 (9)	B-3 (17)	C-3 (25)	D-3 (33)	E-3 (41)	F-3 (49)	G-3 (57)
DI4	X-4 (4)	A-4 (10)	B-4 (18)	C-4 (26)	D-4 (34)	E-4 (42)	F-4 (50)	G-4 (58)
DI5	X-5 (5)	A-5 (11)	B-5 (19)	C-5 (27)	D-5 (35)	E-5 (43)	F-5 (51)	G-5 (59)
DI6	X-6 (6)	A-6 (12)	B-6 (20)	C-6 (28)	D-6 (36)	E-6 (44)	F-6 (52)	G-6 (60)
DI7	–	A-7 (13)	B-7 (21)	C-7 (29)	D-7 (37)	E-7 (45)	F-7 (53)	G-7 (61)
DI8	–	A-8 (14)	B-8 (22)	C-8 (30)	D-8 (38)	E-8 (46)	F-8 (54)	G-8 (62)

Table 11.22: *Values assigned to the Digital Inputs of X and A...G Slots for defining the Control Mode.*

C3.3.1 Configuration

C3.3.1.3 Control Encoder

Range: 0 ... 8 **Default:** 8

Properties: Stopped

Description:

It defines which accessory Slot will be used for reading the encoder signals.

Indication	Description
0 = Slot X	Reading of the encoder signals via IO1 and IO2 of the Slot X accessory.
1 = Slot A	Reading of the encoder signals via ENC-01 accessory in Slot A.
2 = Slot B	Reading of the encoder signals via ENC-01 accessory in Slot B.
3 = Slot C	Reading of the encoder signals via ENC-01 accessory in Slot C.
4 = Slot D	Reading of the encoder signals via ENC-01 accessory in Slot D.
5 = Slot E	Reading of the encoder signals via ENC-01 accessory in Slot E.
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:

It defines with which command the motor magnetization will be started.

NOTE!
For applications with starts with load, it is recommended that the motor be already magnetized.

NOTE!
This parameter is for induction motors only.

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

C3.3.2 Regulators

It allows viewing and changing the parameters related to the vector control flux, current and speed regulators.

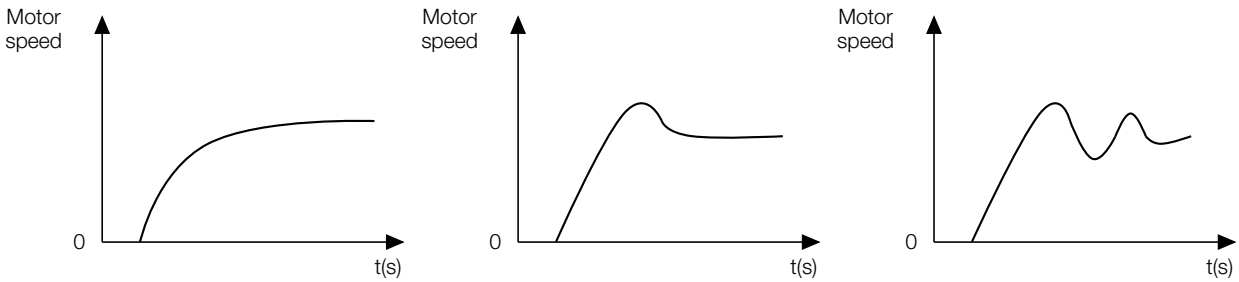
C3.3.2.1 Speed Regulator

Regulator responsible for adjusting the dynamics of the motor speed. The gains of the speed regulator are calculated automatically as a function of parameter C2.2.5. By changing C2.2.5, the parameters C3.3.2.1.2 and C3.3.2.1.3 are modified proportionally, however, these gains can be adjusted manually to optimize the dynamic speed response.

The Proportional gain (C3.3.2.1.2) stabilizes sudden speed or reference changes, while the Integral gain (C3.3.2.1.3) corrects the error between reference and speed and improves the torque response at low speeds. Differential gain (C3.3.2.1.4) helps minimize variations in the motor speed produced by sudden load changes.

Manual Adjustment Procedure for Speed Regulator Optimization:

1. Select the acceleration time (C6.1.1 or C6.1.4) and/or deceleration time (C6.1.2 or C6.1.5) according to the application.
2. Set the speed reference to 75 % of the maximum value.
3. Using the WPS software, set a trend to the ”Effective Speed” variable.
4. Lock the speed ramp (Run/Stop = Stop) and wait for the motor to stop.
5. Release the speed ramp (Run/Stop = Run). Observe the motor speed signal with the WPS trend.
6. Check among the options in Figure 11.9 which waveform best represents the signal read.



(a) Small integral gain (C3.3.2.1.3) and/or high proportional gain (C3.3.2.1.2)

(b) Optimized speed regulator

(c) High integral gain (C3.3.2.1.3) and/or small proportional gain (C3.3.2.1.2)

Figure 11.9: *(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 11.9.

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 the 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 value set in C3.3.2.1.2 until the motor behavior is correct.

C3.3.2.1 Speed Regulator
C3.3.2.1.1 Adaptive Gain
Range: 0 ... 1 **Default:** 0
Properties:

Description:
It allows to automatically adjust the speed regulator gains according to the speed and torque level of the application. 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	It enables function

C3.3.2.1 Speed Regulator
C3.3.2.1.2 Proportional Gain
Range: 0.0 ... 50.0 **Default:** 5.0
Properties:

Description:
It sets the value of the Speed Regulator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.1.3.

C3.3.2.1 Speed Regulator
C3.3.2.1.3 Integral Gain
Range: 0.001 ... 1.000 **Default:** 0.100
Properties:

Description:
It sets the value of the Speed Regulator integral gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.1 Speed Regulator
C3.3.2.1.4 Differential Gain
Range: 0.00 ... 7.99 **Default:** 0.00
Properties:

Description:
It sets the value of the Speed Regulator differential gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.1 Speed Regulator
C3.3.2.1.5 Filter
Range: 0.012 ... 1.000 s **Default:** 0.012 s
Properties:

Description:
It sets the low-pass filter time constant value of the speed signal used in the Speed Regulator.

NOTE!
In general, this parameter must not be changed. Increasing its value makes the system response slower.

C3.3.2.2 Torque Regulator

TORQUE REGULATOR

C3.3.2.2 Torque Regulator
C3.3.2.2.1 Proportional Gain
Range: 0.00 ... 5.00 **Default:** 1.00
Properties:

Description:
It sets the value of the Torque Regulator proportional gain.

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

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.4.2.2.

C3.3.2.2 Torque Regulator
C3.3.2.2.2 Integral Gain
Range: 0.000 ... 1.000 **Default:** 0.010
Properties:

Description:
It sets the value of the Torque Regulator integral gain.

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

C3.3.2.2 Torque Regulator
C3.3.2.2.3 Differential Gain
Range: 0.00 ... 7.99 **Default:** 0.00
Properties:

Description:
It sets the value of the Torque Regulator differential gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.2 Torque Regulator
C3.3.2.2.4 Filter
Range: 0.012 ... 10.000 **Default:** 0.012
Properties:

Description:
It allows setting the low-pass filter time constant value of the torque signal.

C3.3.2.3 Flux Regulator

It allows viewing and changing the parameters related to the vector control flux regulator.

C3.3.2.3 Flux Regulator
C3.3.2.3.1 Proportional Gain
Range: 0.0 ... 5.0 **Default:** 3.0
Properties:

Description:
It sets the value of the Flux Regulator proportional gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.3.2.

C3.3.2.3 Flux Regulator
C3.3.2.3.2 Integral Gain
Range: 0.000 ... 1.000 **Default:** 0.010
Properties:

Description:
It sets the value of the Flux Regulator integral gain. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.3 Flux Regulator

C3.3.2.3.3 Rated Flux

Range:	0.0 ... 120.0 %	**Default:** 100.0 %
Properties:	Stopped	

Description:
It sets the value of flow reference for vector control. This value is a reference in percentage of the motor rated flux value.

C3.3.2.4 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 ... 1.99	**Default:** 0.20
Properties:		

Description:
It sets the value of the Current Regulator proportional gain (D axis of the synchronous reference frame). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.4.2.

C3.3.2.4 Current Regulator

C3.3.2.4.2 Id Integral Gain

Range:	0.001 ... 1.000	**Default:** 0.050
Properties:		

Description:
It sets the value of the Current Regulator integral gain (D axis of the synchronous reference frame). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.2.4 Current Regulator

C3.3.2.4.3 Iq Prop. Gain

Range:	0.00 ... 1.99	**Default:** 0.30
Properties:		

Description:
It sets the value of the Current Regulator proportional gain (Q axis of the synchronous reference frame). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.2.4.4.

C3.3.2.4 Current Regulator

C3.3.2.4.4 Iq Integral Gain

Range:	0.001 ... 1.000	**Default:** 0.050
Properties:		

Description:
It sets the value of the Current Regulator integral gain (Q axis of the synchronous reference frame). The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications.

C3.3.3 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 is 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.

C3.3.3 Output Voltage Limiter
C3.3.3.2 Proportional Gain
Range: 0.00 ... 5.00 **Default:** 0.20
Properties:

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

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.3.3.

C3.3.3 Output Voltage Limiter
C3.3.3.3 Integral Gain
Range: 0.000 ... 1.000 **Default:** 0.120
Properties:

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

C3.3.4 Torque Mode

Settings for torque control mode in vector control.

C3.3.4.1 Speed Limiter

SPEED LIMITER

It 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 C3.3.5.2.1 e C3.3.5.2.2 (Figura 11.10). If the motor speed exceeds these values, the torque reference is decreased to keep the motor speed limited.

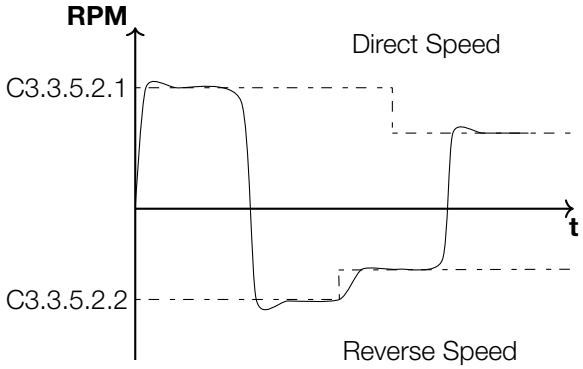


Figure 11.10: *Speed behavior limited according to the settings [C3.3.5.3.1 - C3.3.5.3.5].*

C3.3.4.1 Speed Limiter		
C3.3.4.1.1 Direct Speed		
Range:	0 ... 32000 rpm	**Default:** 1800 rpm
Properties:		

Description:
It sets the value of the maximum motor speed when running in the forward direction.

C3.3.4.1 Speed Limiter		
C3.3.4.1.2 Reverse Speed		
Range:	0 ... 32000 rpm	**Default:** 1800 rpm
Properties:		

Description:
It sets the value of the maximum motor speed when running in the reverse direction.

C3.3.4.1 Speed Limiter		
C3.3.4.1.3 Proportional Gain		
Range:	0.00 ... 5.00	**Default:** 0.50
Properties:		

Description:
It sets the proportional gain value of the Speed Limiter regulator.
The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.
This parameter can be changed after the SELF-TUNING process.

NOTE!
If you need to change the gains of this controller, It is suggested that you first gradually increase the value of C3.3.4.1.4.

C3.3.4.1 Speed Limiter		
C3.3.4.1.4 Integral Gain		
Range:	0.000 ... 1.000	**Default:** 0.010
Properties:		

Description:
It sets the integral gain value of the Speed Limiter regulator.
The gain values of this controller are automatically set by the inverter. No settings are required for general purpose applications.
This parameter can be changed after the SELF-TUNING process.

C3.3.5 Speed Mode

Settings for speed mode in vector control.

C3.3.5.1 Torque Limiter

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) independently limit the torque in each motor operation quadrant (Fig. 11.11).

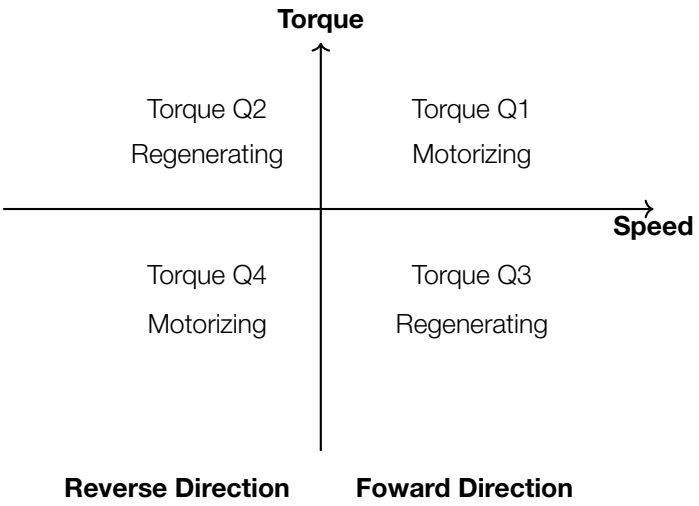


Figure 11.11: *Convention of the motor torque limiters in the four motor operation quadrants.*

It is also possible to limit the motor torque with the parameter C3.3.5.1.1 (Global Torque). This parameter has priority over the others and acts on all four quadrants simultaneously. Figure 11.12 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.

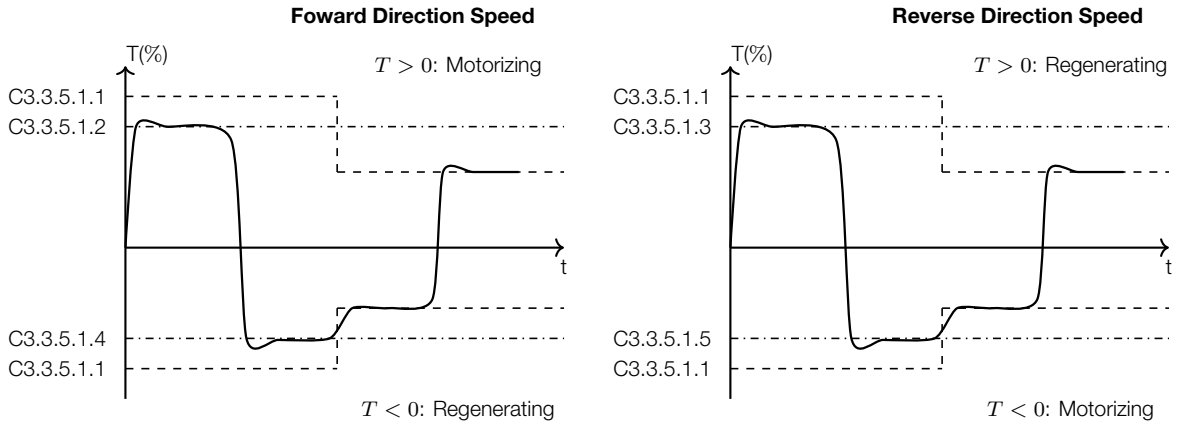


Figure 11.12: *Torque behavior limited according to the settings [C3.3.5.3.1 - C3.3.5.3.5].*

C3.3.5.1 Torque Limiter

C3.3.5.1.1 Global Torque

Range: 0.0 ... 400.0 % **Default:** 125.0 %

Properties:

Description:

It sets the maximum torque in the four motor operating quadrants. If it is necessary to control the torque in the four motor operating quadrants, parameters C3.3.5.1.2 to C3.3.5.1.5 must be used.

C3.3.5.1 Torque Limiter

C3.3.5.1.2 Torque Q1

Range: 0.0 ... 400.0 % **Default:** 400.0 %

Properties:

Description:

It sets the maximum torque of the motor running in the forward direction and in the 'motoring' operating condition.

C3.3.5.1 Torque Limiter

C3.3.5.1.3 Torque Q2

Range: 0.0 ... 400.0 % **Default:** 400.0 %

Properties:

Description:

It sets the maximum torque of the motor running in the reverse direction and in the regenerating operating condition.

C3.3.5.1 Torque Limiter

C3.3.5.1.4 Torque Q3

Range: 0.0 ... 400.0 % **Default:** 400.0 %

Properties:

Description:

It sets the maximum torque of the motor running in the forward direction and in the regenerating operating condition.

C3.3.5.1 Torque Limiter

C3.3.5.1.5 Torque Q4

Range: 0.0 ... 400.0 % **Default:** 400.0 %

Properties:

Description:

It sets the maximum torque of the motor running in the reverse direction and in the 'motoring' operating condition.

C3.3.5.1 Torque Limiter

C3.3.5.1.6 Global Torque AI Config.

Range: 0 ... 30 **Default:** 0

Properties: Stopped

Description:

It enables the use and defines the analog input that will be used to limit the motor maximum torque. Table 11.26 on page 126 shows the options.

Analog Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
AI1	X-1 (1)	A-1 (3)	B-1 (7)	C-1 (11)	D-1 (15)	E-1 (19)	F-1 (23)	G-1 (27)
AI2	X-2 (2)	A-2 (4)	B-2 (8)	C-2 (12)	D-2 (16)	E-2 (20)	F-2 (24)	G-2 (28)
AI3	–	A-3 (5)	B-3 (9)	C-3 (13)	D-3 (17)	E-3 (21)	F-3 (25)	G-3 (29)

Table 11.26: *Values assigned to the Analog Inputs of X and A...G Slots*

NOTE!
Example: To choose Analog Input AI3 from Slot D, select D-3 (17) option.

C3.3.5.1 Torque Limiter

C3.3.5.1.7 Proportional Gain

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

Properties:

Description:

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

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.5.1.8.

C3.3.5.1 Torque Limiter

C3.3.5.1.8 Integral Gain

Range: 0.00 ... 100.00 **Default:** 1.00

Properties:

Description:

It sets the integral gain value of the Torque Limiter regulator.

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

C3.3.7 Speed Steady State Estimator

It allows viewing and changing the parameters related to the vector control steady state speed estimator.

C3.3.7 Speed Steady State Estimator

C3.3.7.1 Speed Setting

Range: 0.10 ... 10.00 **Default:** 1.00

Properties:

Description:
It allows correcting the estimated speed error.

C3.3.7 Speed Steady State Estimator
C3.3.7.2 Regenerative Compensator
Range: 0.00 ... 2.00 **Default:** 1.00
Properties:

Description:
It allows to correct the estimated speed in regenerative mode application. This parameter must be increased in starting applications with load in regenerative mode. This parameter must be changed only when it is not possible to perform start under load or speed reversal in regenerative mode operation.

C3.3.7 Speed Steady State Estimator
C3.3.7.3 Proportional Gain
Range: 0.00 ... 10.00 **Default:** 1.00
Properties:

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

NOTE!
If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.3.7.4.

C3.3.7 Speed Steady State Estimator
C3.3.7.4 Integral Gain
Range: 0.00 ... 10.00 **Default:** 1.00
Properties:

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

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

Description:
It sets the cutoff frequency of the low pass filter for the speed observer.

This parameter has functionality only when using the encoder vector control. In case of small oscillations present in the electrical torque signal, gradually increase the value of this parameter.

C3.3.9 Online Parameter Estimation

ON-LINE ELECTRICAL PARAMETER ESTIMATOR

It allows viewing and changing the parameters related to the on-line electrical parameter estimator.

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

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

C3.3.9 Online Parameter Estimation

C3.3.9.1 Estimator Configuration

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

Properties:

Description:

It allows to configure specific function modules for online parametric estimation. The Xm Online Estimator determines the magnetic impedance of the induction motor. This function is enabled only for operating frequency above 15% of the rated frequency set in C2.1.6. The Taus Online Estimator determines the stator time constant of the induction motor. This function is enabled 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. This function is enabled only for encoder vector control.

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

Bit	Value/Description
Bit 0 Enable Xm Estimator	It enables the online estimator of the magnetizing impedance (Xm) 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.

C3.4 Current Limiter

It allows viewing and changing the parameters related to the motor current limiter.

The current limiting function prevents inverter overcurrent faults 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 11.13 illustrates the function operation process during the motor acceleration and deceleration process.

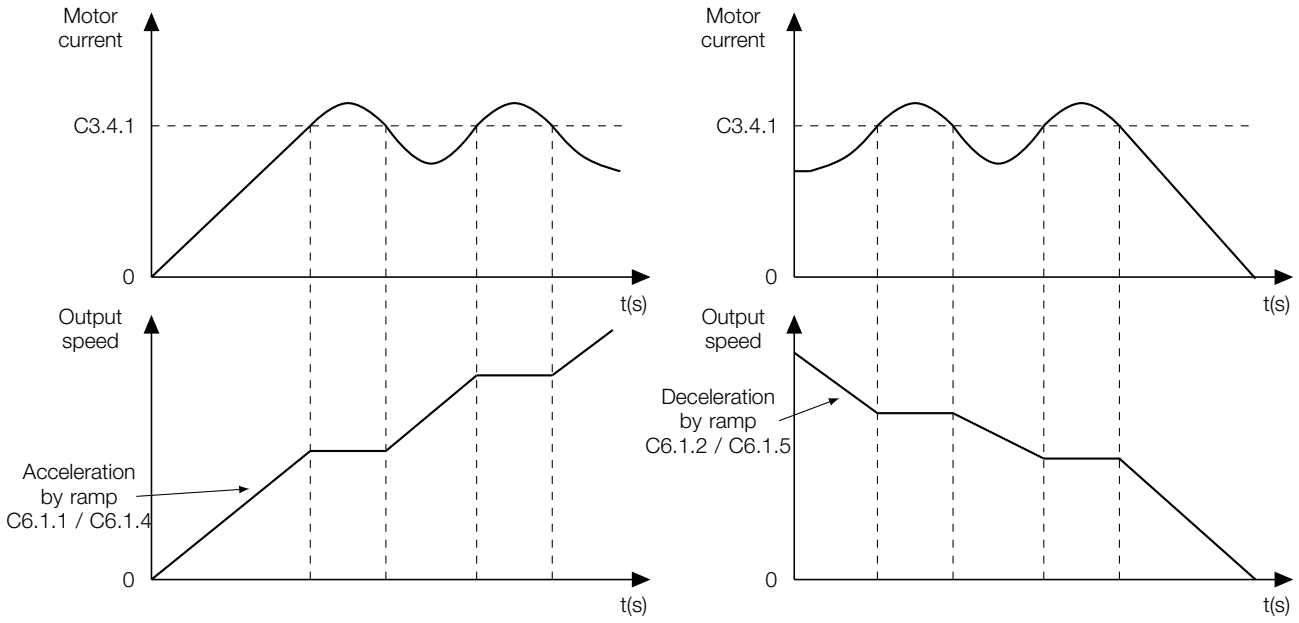


Figure 11.13: *Current limitation during the acceleration and deceleration process.*

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 enters 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 11.14 shows the current limiting function operation process when the motor is running at constant speed.

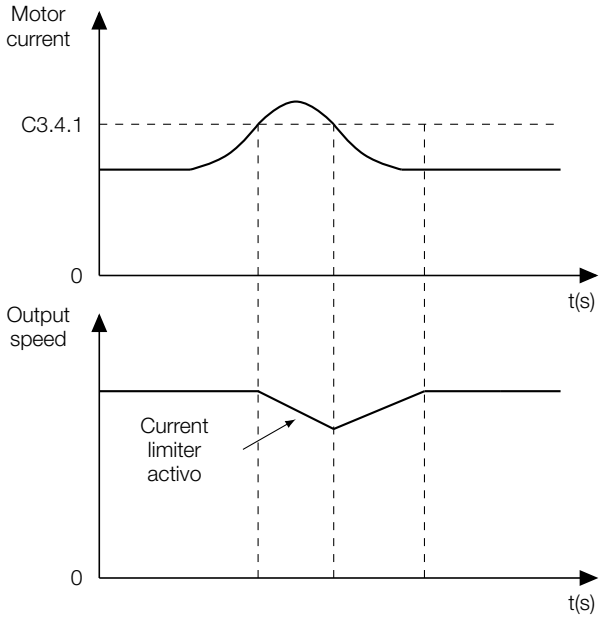


Figure 11.14: *Current limitation when the motor is running at constant speed.*

C3.4 Current Limiter		
C3.4.1 Actuation Level		
Range:	0 ... 300 %	**Default:** 125 %
Properties:		

Description:
This parameter defines the maximum value of current in the motor during system operation. The full-scale is the nominal current of the motor defined in C2.1.5.

NOTE!
If the value set in C3.4.1 is greater than the inverter current, it will be automatically limited to the maximum current capacity of the inverter.

C3.4 Current Limiter		
C3.4.3 Proportional Gain		
Range:	0.0 ... 5.0	**Default:** -
Properties:	Model	

Description:
This parameter sets the Proportional Gain of the controller present in the current limiting function. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications. For applications with very short acceleration or deceleration ramps, the gains must be set to improve the controllers response, if necessary. In this case, it is recommended to gradually increase C3.4.3.

For applications with very short acceleration or deceleration ramps, there may be a need for a small adjustment in the gains.

In this case, it is recommended that the value be gradually increased.

C3.4 Current Limiter		
C3.4.4 Integral Gain		
Range:	0.0 ... 5.0	**Default:** 1.0
Properties:		

Description:
This parameter defines the Integral Gain of the controller existing in the current limiting function. The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications. For applications with very short acceleration or deceleration ramps, the gains must be set to improve the controllers response, if necessary. In this case, it is recommended to gradually increase C3.4.4.

C3.5 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 inverter overvoltage faults.

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 11.15 illustrates the behavior of the function during the motor deceleration.

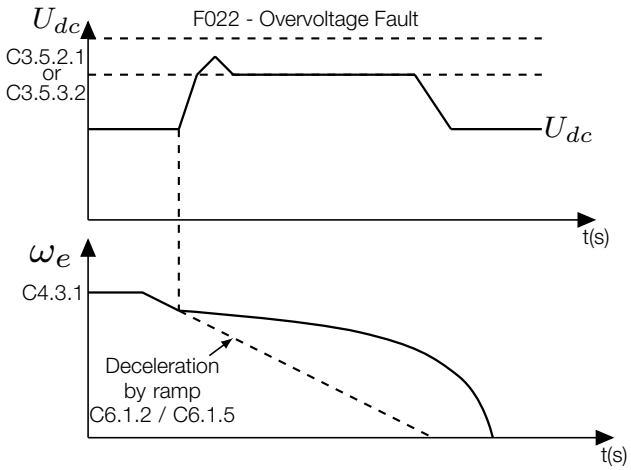


Figure 11.15: *DC link limitation during deceleration process.*

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 11.16 illustrates the behavior of the function when the motor is operating at constant speed and the load in regenerative mode. In this situation, the DC link limiting function decelerates the motor in a controlled manner to prevent the bus voltage from exceeding the value set in C3.5.2.1 for scalar and VVW+ control or C3.5.3.2 for vector control. After the DC link voltage level returns to its rated value, the function accelerates the motor so that it returns to the speed set in S2.1.1.

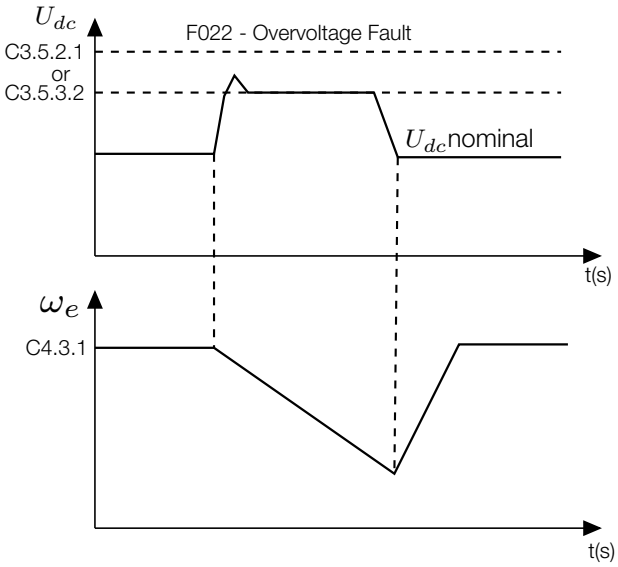


Figure 11.16: *DC link limitation when the motor is operating at constant speed.*

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 Limiting function.

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

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 DC Link Volt. Lim.-Level
Range: 114.0 ... 160.0 % **Default:** 120.0 %
Properties:

Description:
It sets the DC link limiting function actuation level 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 $V_{power\ supply}$*1.35. Some typical values, according to the inverter model, are shown in Table 11.28.

Table 11.28: *DC Link Rated Voltage*

$V_{power\ supply}$ (C1.1.2)	DC Link Nominal 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

If the inverter keeps locking due to DC link overvoltage (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 a voltage level so that it results in a DC link voltage value above 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 in 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 DC Link Volt.Lim.-Kp Gain
Range: 0.00 ... 9.99 **Default:** 0.15
Properties:

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

The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications. In the case of applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase its value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.5.2.3.

C3.5.2 Scalar and VVW+ Control
C3.5.2.3 DC Link Volt.Lim.-Ki Gain
Range: 0.000 ... 1.000 **Default:** 0.050
Properties:

Description:
It sets the integral gain value of the DC link voltage regulator.

The gain values of this controller are automatically set by the inverter, not requiring adjustment for general purpose applications. In the case of applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase its value.

C3.5.2 Scalar and VVW+ Control
C3.5.2.4 DC Link Volt.Lim.-Est.Gain
Range: 0.000 ... 9.999 **Default:** 0.000
Properties:

Description:
Sets the DC link oscillation stabilizer gain.

This function works together with the controller used in the DC link limiting function. In applications where the deceleration ramp is very short, and the system inertia is high, it is common to have consistent oscillations in the DC link. bus In this case, this parameter adjusts the stabilizer gain to dampen DC link oscillations.

Its value must be gradually increased when the system presents sustained oscillations on the DC link. If there is no consistent effect, you must increase the value of the deceleration ramp C6.1.2 or C6.1.5.

C3.5.3 Vector Control

It allows viewing and changing parameters related to vector control.

C3.5.3 Vector Control
C3.5.3.1 Optim. Braking Func. Enable
Range: 0 ... 1 **Default:** 0
Properties:

Description:
It selects the type of braking used in the vector control for induction machines. Braking with losses (Optimal Braking) increases the stator current in the motor to increase losses during the deceleration period.

NOTE!
The process carried out by this type of braking increases the acoustic noise in the environment.

Indication	Description
0 = No	Disable function.
1 = Yes	It enables function.

C3.5.3 Vector Control
C3.5.3.2 DC Link Volt.Lim.-Level
Range: 114.0 ... 160.0 % **Default:** 120.0 %
Properties:

Description:
It sets the DC link limiting function actuation level 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 $V_{power\ supply}$*1.35. Some typical values, according to the inverter model, are shown in Table 11.30.

Table 11.30: *DC Link Rated Voltage*

$V_{power\ supply}$ (C1.1.2)	DC Link Nominal 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

If the inverter keeps locking due to DC link overvoltage (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 a voltage level so that it results in a DC link voltage value above the setting of C3.5.3.2, it will not be possible to decelerate the motor. In this case, reduce the supply voltage or increase the value of C3.5.3.2.

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

C3.5.3 Vector Control

C3.5.3.3 DC Link Volt.Lim.-Kp Gain

Range: 0.00 ... 6.39 **Default:** 0.30

Properties:

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

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.5.3.4.

C3.5.3 Vector Control

C3.5.3.4 DC Link Volt.Lim.-Ki Gain

Range: 0.000 ... 1.000 **Default:** 0.030

Properties:

Description:
It sets the integral gain value of the DC link voltage regulator.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

C3.6 Dynamic Braking

The braking torque that can be obtained through the application of frequency inverters, without Dynamic 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 out of the inverter.

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

For the vector control, it is possible to use Optimal Braking (C3.5.3.1), eliminating, in many cases, 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 operation, and it must be compatible with the inverter supply voltage.

If the setting is very close to the overvoltage operation 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 capacity available on the DC link (level at which the Overvoltage fault trips).

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

Table 11.31: *Overvoltage operating levels (F022)*

C1.1.2	F022
200-240 V	400 V
380-480 V	800 V

NOTE!
If the level is lower than ($V_{power\ supply}$*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.

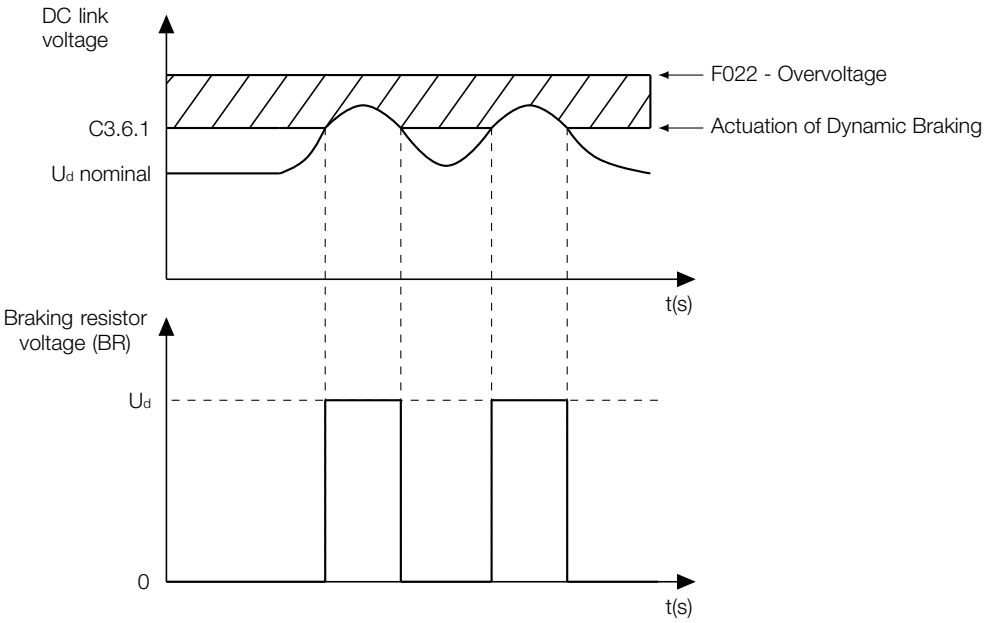


Figure 11.17: *Operating curve of the Dynamic Braking*

Steps to enable the Dynamic Braking:

1. Connect the braking resistor (See User Manual in item 3.2.3.2 - Dynamic Braking).
2. Set C3.5.2.1 or C3.5.3.2 to the maximum value, as appropriate, to prevent the DC Link Voltage Regulation from operating before the Dynamic Braking.

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

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 run.

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 11.18 shows an illustrative scheme of DC braking at start.

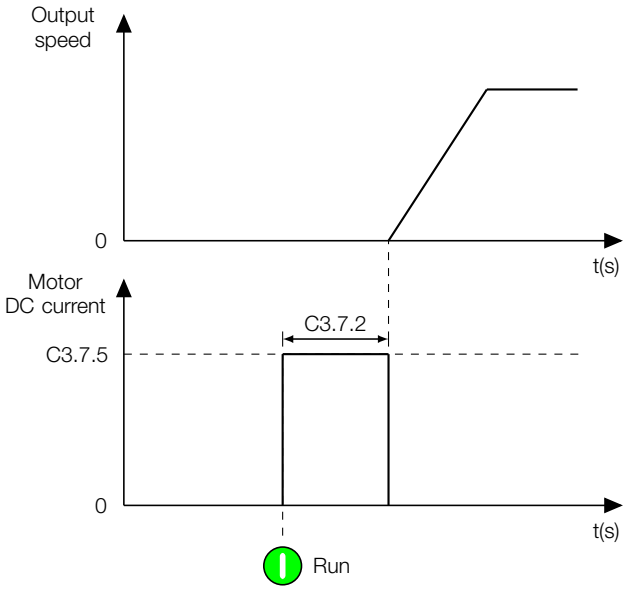


Figure 11.18: *DC braking operation at start*

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 11.19 shows an illustrative diagram of the DC braking at stop.

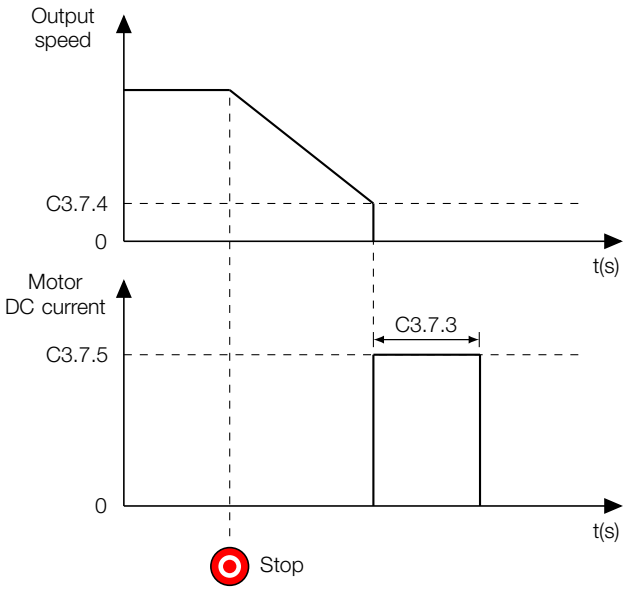


Figure 11.19: *Operation of the DC braking in the ramp locking (via ramp disable)*

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

WARNING!
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 the stop. See Figure 11.19 for better understanding.

C3.7 DC braking		
C3.7.5 Current		
Range:	0.0 ... 100.0 %	**Default:** 20.0 %
Properties:		

Description:
It defines the level of current (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 running, accelerating it from the rotational 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. This

energy regeneration can lead to overcurrent, and thus the triggering of overcurrent fault at start. Thus, the Flying Start function should be used to identify the actual rotor speed and, from this, start the motor from the actual rotor speed. Figure 11.20 illustrates, in a simplified way, the operation process of the Flying Start function.

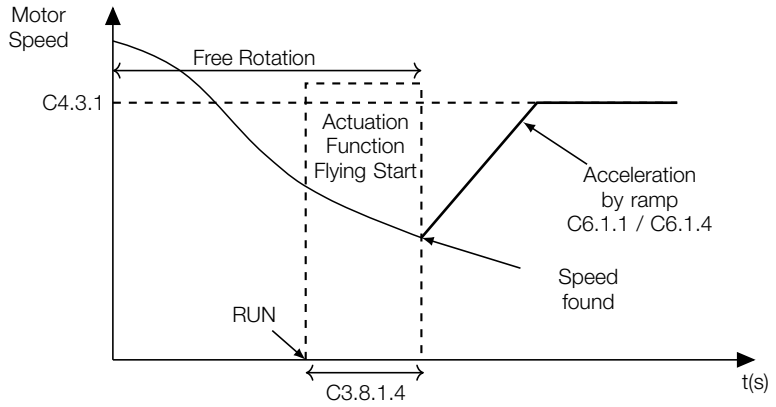


Figure 11.20: *Illustrative scheme of the Flying Start function.*

The Flying Start function performs a scan by applying a speed reference to determine the rotor speed. Figure 11.21 illustrates the Flying Start function method 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.

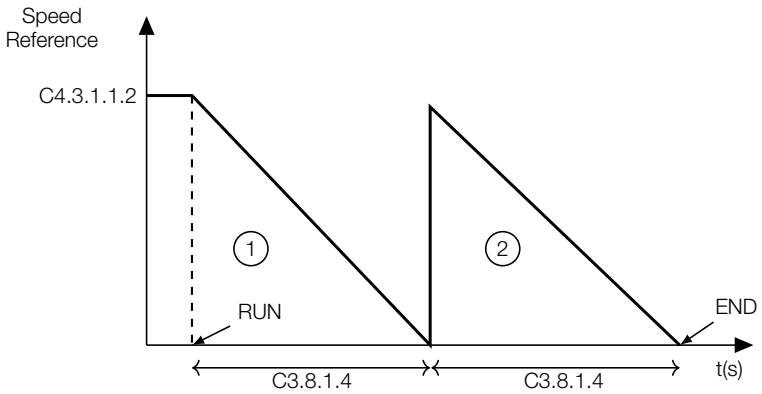


Figure 11.21: *Illustrative scheme of the rotor speed identification by the Flying Start function.*

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	It enables function.

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	It 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 11.22 for further details.

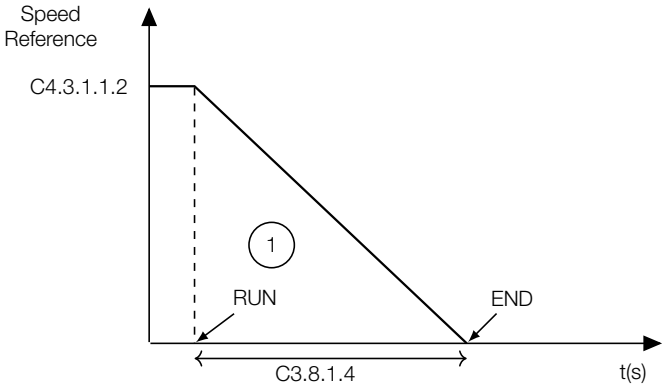


Figure 11.22: *Illustrative scheme of the rotor speed identification by the Flying Start function.*

Indication	Description
0 = Two Trackings	It tracks the speed in both directions of rotation.
1 = One Tracking	It tracks the speed in only one direction of rotation.

C3.8.1 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 11.21 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. Table 11.48 on page 152 shows the options.

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 11.23 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.

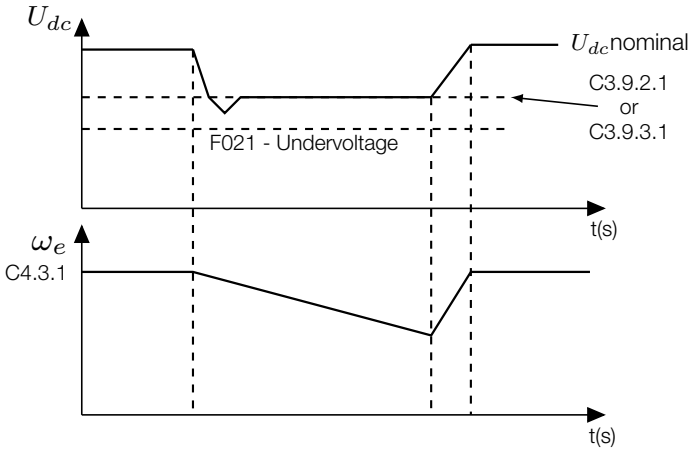


Figure 11.23: *Illustrative diagram of the Ride-Through function operation.*

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 Function Enable

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

Properties:

Description:
It allows enabling the Ride-Through function.

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

C3.9.2 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 Volt.-Ride-Through

Range: 76.0 ... 95.0 % **Default:** 82.5 %

Properties:

Description:
It sets the voltage regulation level on the DC link for the Ride-Through function, which allows the inverter to keep running.

The value of C3.9.2.1 corresponds to a percentage of the DC Link Rated Voltage.

The DC Link Rated Voltage is typically given by $V_{power\ supply}$*1.35. Some typical values, according to the inverter model, are shown in Table 11.37.

Table 11.37: *DC Link Rated Voltage*

$V_{power\ supply}$ (C1.1.2)	DC Link Nominal 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

NOTE!
The DC link undervoltage fault occurs at 75% of the DC Link Rated Voltage.

C3.9.2 Scalar and VVW+ Control

C3.9.2.2 Ride-Through-Gain Kp

Range: 0.00 ... 2.00 **Default:** 0.50

Properties:

Description:
I sets the proportional gain value of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.9.2.3.

C3.9.2 Scalar and VVW+ Control

C3.9.2.3 Ride-Through-Gain Ki

Range: 0.000 ... 1.000 **Default:** 0.050

Properties:

Description:

This parameter sets the integral gain of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short acceleration or deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

C3.9.3 Vector Control

Settings of the Ride-Through function for vector control.

C3.9.3 Vector Control

C3.9.3.1 DC Link Volt.-Ride-Through

Range: 76.0 ... 95.0 % **Default:** 82.5 %

Properties:

Description:

It sets the voltage regulation level on the DC link for the Ride-Through function, which allows the inverter to keep running.

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

The DC Link Rated Voltage is typically given by $V_{power\ supply}$*1.35. Some typical values, according to the inverter model, are shown in Table 11.38.

Table 11.38: *DC Link Rated Voltage*

$V_{power\ supply}$ (C1.1.2)	DC Link Nominal 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

NOTE!
This parameter works together with parameters C3.9.3.2 and C3.9.3.3 for the Ride-Through function in vector control.

NOTE!
The DC link undervoltage fault occurs at 75% of the DC Link Rated Voltage.

C3.9.3 Vector Control

C3.9.3.2 Ride-Through-Gain Kp

Range: 0.00 ... 2.00 **Default:** 0.10

Properties:

Description:

I sets the proportional gain value of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

If you need to change the gains of this controller, it is suggested that you first gradually increase the value of C3.9.3.3.

C3.9.3 Vector Control
C3.9.3.3 Ride-Through-Gain Ki
Range: 0.000 ... 1.000 **Default:** 0.050
Properties:

Description:
This parameter sets the integral gain of the DC link voltage regulator of the Ride-Through function.

The gain values of this controller are automatically adjusted by the inverter and do not need to be adjusted for general purpose applications. For applications with very short acceleration or deceleration ramps, a small adjustment in the gains may be necessary. In this case, it is recommended that you gradually increase their value.

C3.10 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 applied potential 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	It enables function

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 I 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 φ control loop, i.e. a control loop with parameter C3.10.3 (cos φ reference) as the reference. By enabling the parameter C3.10.2 the parameter C3.10.3 is not used.

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

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 φ 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 φ indicated in the motor nameplate C2.1.10.

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 Advanced 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, relative to the rated speed, that 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.

C4 COMMANDS AND REFERENCES

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

CFW900 has two control modes:

- Local Mode: When the drive is operating in local control mode, all commands and reference are made via HMI (see S1.6.2 and C4.3.1.3.1).The HMI LOC/REM key allows switching between Local and Remote 1 / Remote 2 control modes. It can be set in C4.1.3.
- Remote 1 / Remote 2 Mode: In Remote 1 or Remote 2 mode you can configure the inverter reference and command sources from the following options: communication networks, HMI, digital input and/or analog input.

C4.1 LOC/REM Mode Config.

It allows configuring what will define the local and remote operating mode. If set via digital input, you can choose the specific digital input for this function.

Options that do not depend on operating modes will be detailed 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 = Not used	Not used.
5 = CAN/CO/DN	Change via R1/R2 Mode commandtrol of the CAN/CANop/DNet Control Word (S5.7.2)
6 = SoftPLC	Change via SoftPLC command
7 = Not used	Not used.
8 = Ethernet	Change via R1/R2 Mode command of the Ethernet Control Word (S5.3.2)
9 = Digital Input (DI)	Change via commandtrol of the digital input chosen by the user The digital input can be configured in C4.1.2 The digital input can be set 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.

Digital Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
DI1	X-1 (1)	A-1 (7)	B-1 (15)	C-1 (23)	D-1 (31)	E-1 (39)	F-1 (47)	G-1 (55)
DI2	X-2 (2)	A-2 (8)	B-2 (16)	C-2 (24)	D-2 (32)	E-2 (40)	F-2 (48)	G-2 (56)
DI3	X-3 (3)	A-3 (9)	B-3 (17)	C-3 (25)	D-3 (33)	E-3 (41)	F-3 (49)	G-3 (57)
DI4	X-4 (4)	A-4 (10)	B-4 (18)	C-4 (26)	D-4 (34)	E-4 (42)	F-4 (50)	G-4 (58)
DI5	X-5 (5)	A-5 (11)	B-5 (19)	C-5 (27)	D-5 (35)	E-5 (43)	F-5 (51)	G-5 (59)
DI6	X-6 (6)	A-6 (12)	B-6 (20)	C-6 (28)	D-6 (36)	E-6 (44)	F-6 (52)	G-6 (60)
DI7	–	A-7 (13)	B-7 (21)	C-7 (29)	D-7 (37)	E-7 (45)	F-7 (53)	G-7 (61)
DI8	–	A-8 (14)	B-8 (22)	C-8 (30)	D-8 (38)	E-8 (46)	F-8 (54)	G-8 (62)

Table 11.42: *Values assigned to the Digital Inputs of X and A...G Slots for Remote 1 / Remote 2 mode setting.*

NOTE!
Example: To choose digital input 2 of Slot B to switch between Remote 1 / Remote 2 mode, the parameter must be assigned the value B-2 (16).

C4.1 LOC/REM Mode Config.
C4.1.3 HMI LOC/REM key
Range: 0 ... 1 **Default:** 1
Properties: Stopped

Description:
It sets the function for the HMI LOC/REM key. The LOC/REM key, when pressed, allows switching between Local (HMI) control mode and the mode defined according to the setting made in C4.1.1 (Remote 1 or Remote 2). When the selected command mode is Local, all commands and references will be performed via the HMI.

Indication	Description
0 = Disable	The LOC/REM key is disabled.
1 = Enable	The LOC/REM key, toggles between Local and Remote command mode.

C4.2 Commands

It allows setting the command source of the frequency inverter in Remote 1 or Remote 2 mode.

C4.2.1 R1 Config. Commands
C4.2.2 R2 Config. Commands

It allows setting the source to the command mode.

C4.2.1 R1 Config. Commands
C4.2.2 R2 Config. Commands
.1 General Enable

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

Description:
It sets the source for the general enable command.

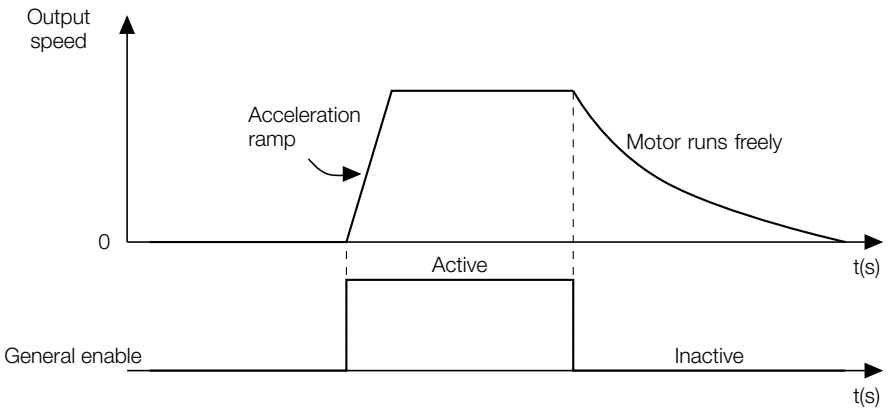


Figure 11.24: *Operation of the general enable command.*

WARNING!
The general enable command can contain a digital input (C4.2.3.1) that works together with the command source chosen in this menu. Both must be active/inactive simultaneously for the command to take place. For example, when you choose the command source as serial in the Remote 1 situation and any digital input, for the inverter to be enabled, the digital input and the serial input must be active. If either input (digital or serial) is inactive, the inverter will be general disabled. See S1.6.1.

Indication	Description
0 = Always enabled	General Enable command is always active. Regardless of the digital input configured in C4.2.3.1
1 = HMI	General Enable command via HMI is always active
2 = Serial	General Enable command via RS-485 Serial Control Word
3 = Not used	Not used.
4 = CAN/CO/DN	General Enable command via CAN/CANop/DNet Control Word
5 = SoftPLC	General Enable command via SoftPLC function
6 = Not used	Not used.
7 = Ethernet	General Enable command via Ethernet Control Word
8 = Digital Input (DI)	General Enable command via digital input chosen by the user. Digital input can be configured in C4.2.3.1

C4.2.1 R1 Config. Commands
C4.2.2 R2 Config. Commands
.2 Run/Stop

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

Description:
Sets the source for the start and stop commands, which encompass run/stop and quick stop.

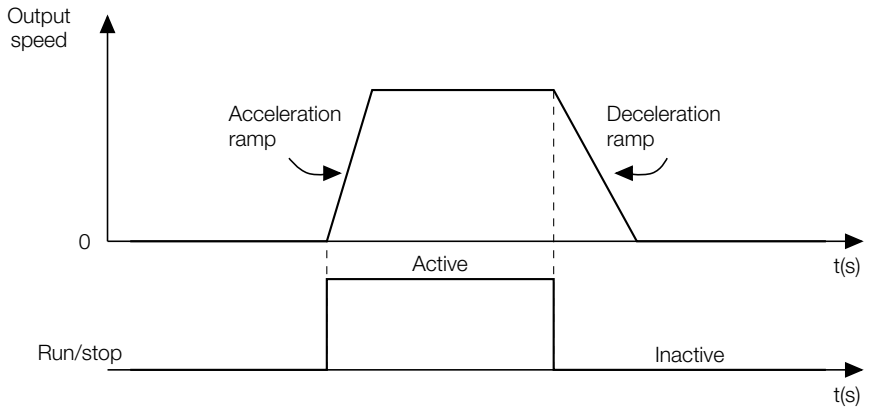


Figure 11.25: *Operation of the run/stop command.*

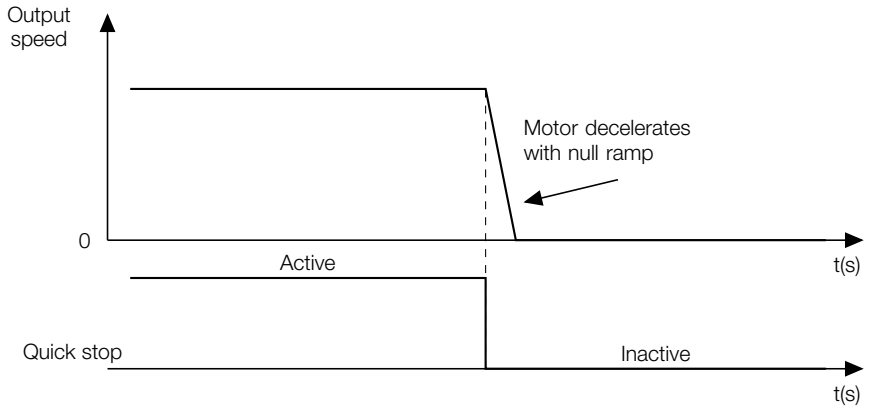


Figure 11.26: *Operation of the quick stop command.*

WARNING!
The quick stop command may contain a digital input (C4.2.3.7) which acts in conjunction with the command source chosen in this menu. Both must be active/inactive simultaneously for the command to take place. For example, when you choose the command source as serial in Remote 1 mode and any digital input, for the inverter to be without quick stop, the digital input and the serial input must be active. If either input (digital or serial) is inactive, the quick stop command is executed. See S1.6.1.

Indication	Description
0 = HMI I/O Keys	Run/Stop command via HMI keys I e O In this case, the stop mode is always by ramp
1 = Serial	Enable Ramp and Quick Stop Command via RS-485 Serial Control Word
2 = Not used	Not used.
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 set in C4.2.3.2
8 = Forward/Reverse DI	Run/Stop command selected when using the Forward/Reverse function via digital inputs. Digital inputs can be set in C4.2.3.5 and C4.2.3.6
9 = 3-Wire Start/Stop DI	Run/Stop command selected when using the 3-Wire Start/Stop function. Digital inputs can be set in C4.2.3.3 and C4.2.3.4

C4.2.1 R1 Config. Commands
C4.2.2 R2 Config. Commands
.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.

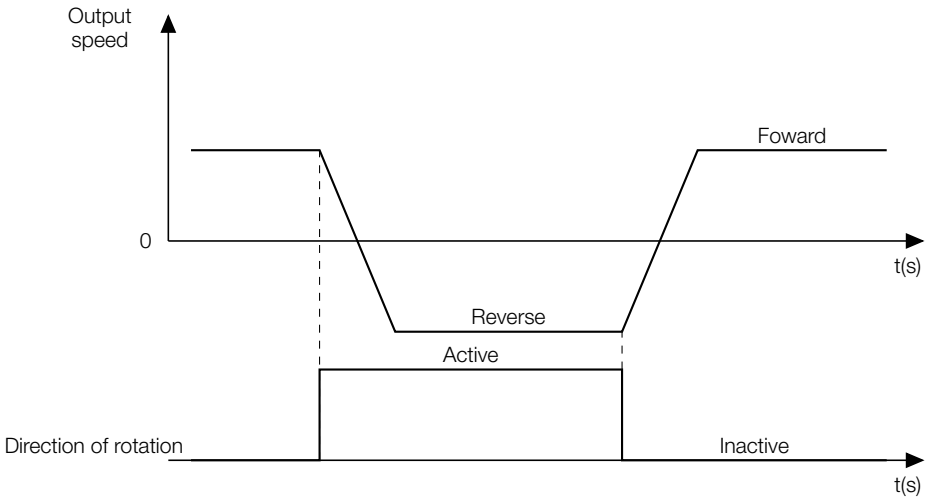


Figure 11.27: *Operation of the direction of rotation command.*

Indication	Description
0 = Forward	Forward direction of rotation only. It is not possible to reverse the direction of rotation.
1 = HMI DR key	Rotation Direction control via HMI key . Forward Direction is selected at power up
2 = Serial	Reverse Command via RS-485 Serial Control Word
3 = Not used	Not used.
4 = CAN/CO/DN	Reverse Command via CAN/CANop/DNet Control Word
5 = SoftPLC	Direction of Rotation Command via SoftPLC function
6 = Not used	Not used.
7 = Ethernet	Reverse Command via Ethernet Control Word
8 = Direction of Rotation DI	Direction of Rotation command via user-selected digital input. The digital input can be configured at C4.2.3.8
9 = Forward/Reverse DI	Direction of Rotation command selected when using the Forward/Reverse function via digital inputs. The digital inputs can be configured in C4.2.3.5 and C4.2.3.6
10 = Speed Reference	Direction of Rotation command defined by the polarity of the speed reference.

NOTE!
When set to forward, if there is an attempt to set the speed reference to a negative value, the reference is limited to zero. It is possible to change the forward direction of rotation through parameter defined in C1.6.1.

C4.2.1 R1 Config. Commands
C4.2.2 R2 Config. Commands
.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.

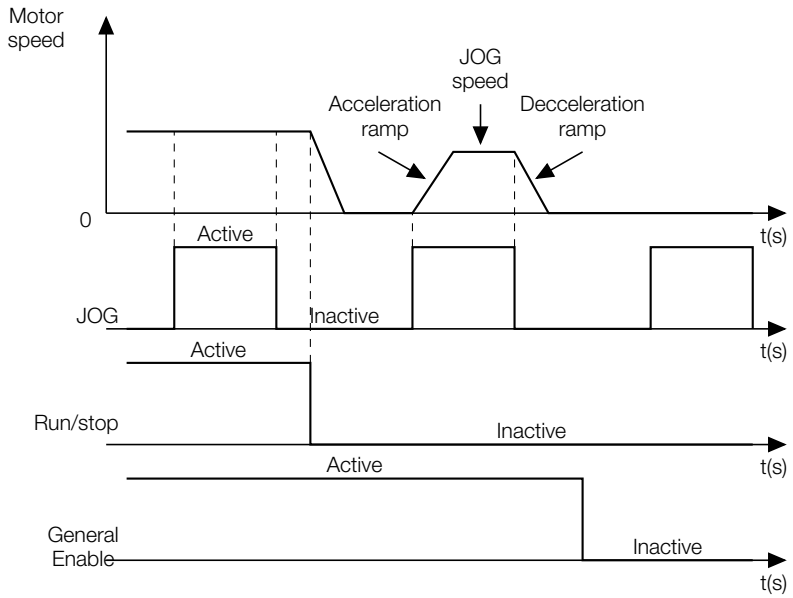


Figure 11.28: *Operation of the JOG command.*

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 = Not used	Not used.
4 = CAN/CO/DN	JOG command via CAN/CANop/DNet Control Word
5 = SoftPLC	JOG command via SoftPLC function
6 = Not used	Not used.
7 = Ethernet	JOG command via Ethernet Control Word
8 = Digital Input (DI)	JOG command via digital input chosen by the user. The digital input can be set in C4.2.3.9

C4.2.3 DIs Config. for Commands

It allows defining the digital input used for each command with source via digital input. For more information about the control word via DI see S1.6.3.

C4.2.3 DIs Config. for Commands		
C4.2.3.1 General Enable		
Range:	0 ... 62	**Default:** 0
Properties:	Stopped	

Description:
It enables use and defines the digital input that will be used to enable the inverter to run. Table 11.48 on page 152 shows the options.

Digital Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
DI1	X-1 (1)	A-1 (7)	B-1 (15)	C-1 (23)	D-1 (31)	E-1 (39)	F-1 (47)	G-1 (55)
DI2	X-2 (2)	A-2 (8)	B-2 (16)	C-2 (24)	D-2 (32)	E-2 (40)	F-2 (48)	G-2 (56)
DI3	X-3 (3)	A-3 (9)	B-3 (17)	C-3 (25)	D-3 (33)	E-3 (41)	F-3 (49)	G-3 (57)
DI4	X-4 (4)	A-4 (10)	B-4 (18)	C-4 (26)	D-4 (34)	E-4 (42)	F-4 (50)	G-4 (58)
DI5	X-5 (5)	A-5 (11)	B-5 (19)	C-5 (27)	D-5 (35)	E-5 (43)	F-5 (51)	G-5 (59)
DI6	X-6 (6)	A-6 (12)	B-6 (20)	C-6 (28)	D-6 (36)	E-6 (44)	F-6 (52)	G-6 (60)
DI7	–	A-7 (13)	B-7 (21)	C-7 (29)	D-7 (37)	E-7 (45)	F-7 (53)	G-7 (61)
DI8	–	A-8 (14)	B-8 (22)	C-8 (30)	D-8 (38)	E-8 (46)	F-8 (54)	G-8 (62)

Table 11.48: *Values assigned to the Digital Inputs of X and A...G Slots for defining command activation.*

NOTE!
E.g.: To choose digital input 4 of Slot C to activate a command, the parameter must be set to value C-4 (26).

C4.2.3 DIs 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 commands. The options are shown in Table 11.48 on page 152.

C4.2.3 DIs 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 11.48 on page 152.

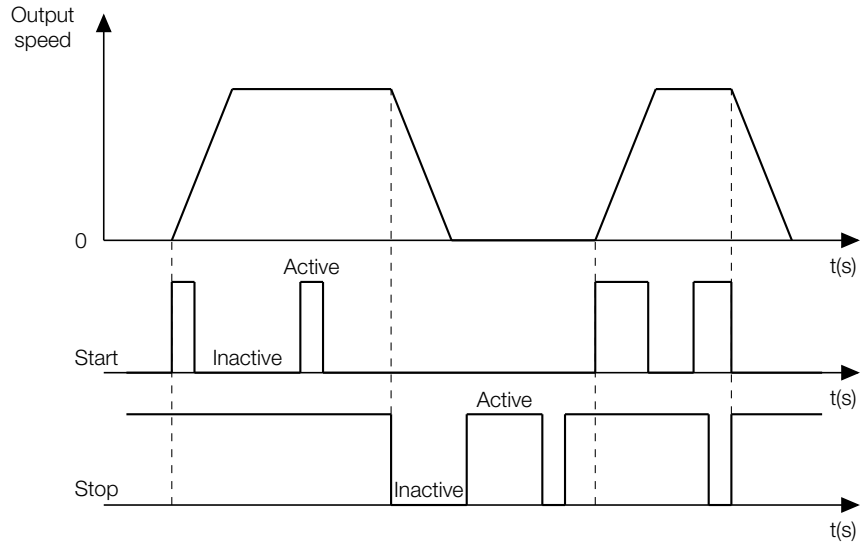


Figure 11.29: *3-wire Start/Stop function via digital input*

C4.2.3 DIs 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 11.48 on page 152.

Figure 11.29 on page 152 illustrates the operation of the Start/Stop function.

C4.2.3 DIs 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.

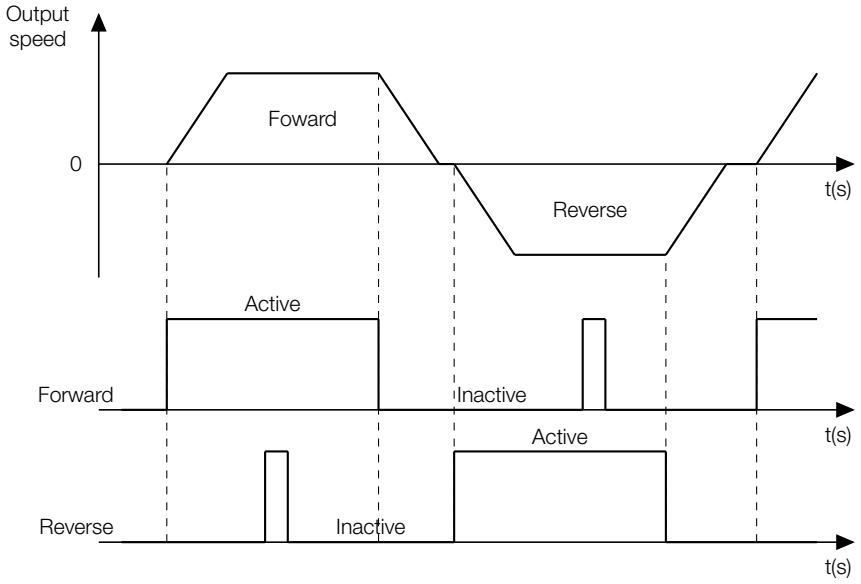


Figure 11.30: *Forward and Reverse function via digital input*

C4.2.3 DIs 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. Table 11.48 on page 152 shows the options.

Figure 11.30 on page 153 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 DIs Config. for Commands

C4.2.3.7 Quick Stop

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

Description:
It enables the use and defines the digital input that will be used to execute the inverter quick stop. Table 11.48 on page 152 shows the options.

The Quick Stop consists of executing the "Stop" with null deceleration ramp command (C6.1.6 = 0s) or close to this value, regardless of the setting in C6.1.2 or C6.1.5. It is not recommended to use it in scalar and VVW+ control types.

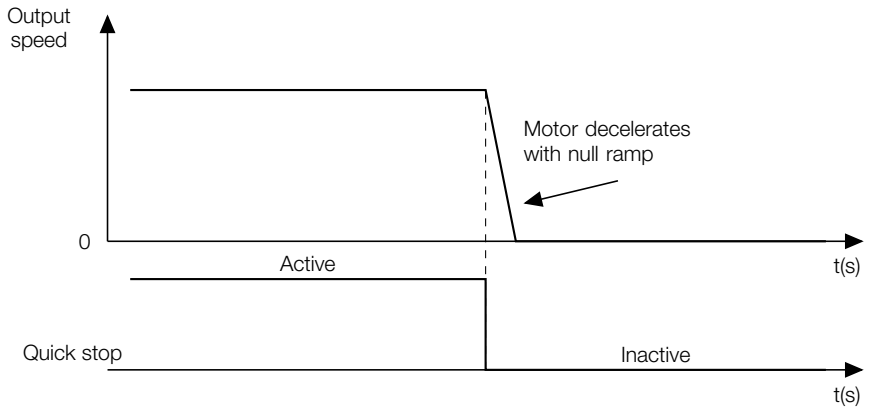


Figure 11.31: *Operation of the Quick Stop command*

C4.2.3 DIs 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. Table 11.48 on page 152 shows the options.

C4.2.3 DIs 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. Table 11.48 on page 152 shows the options.

C4.2.3 DIs 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. Table 11.48 on page 152 shows the options.

C4.2.3 DIs 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. Table 11.48 on page 152 shows the options.

When a transition from 0 to 1 occurs on the digital input programmed for Fault Reset, the present fault reset command is executed. If the fault condition is still present, the reset will not be performed. Figure 11.32 on page 155 illustrates that.

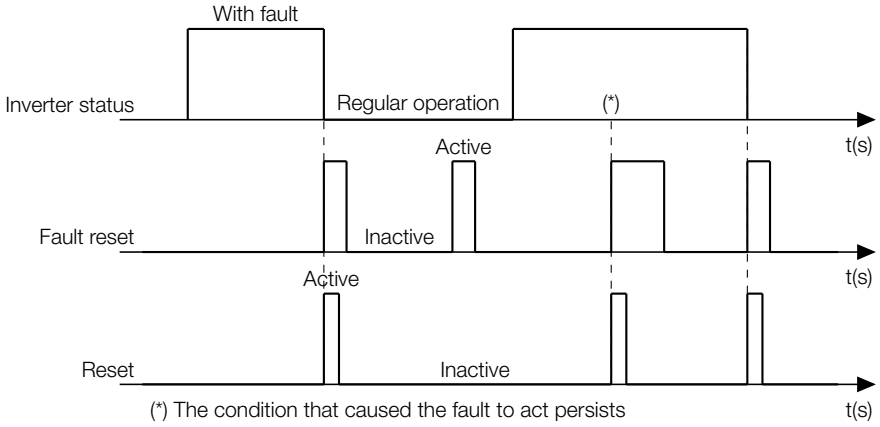


Figure 11.32: *Operation of the Fault Reset command.*

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 setting the speed and torque source and 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 smaller than the minimum reference set in C4.3.1.1.1, the inverter will limit to C4.3.1.1.1. If the reference signal set to be followed by the inverter is greater than the maximum reference set 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 ... 10 **Default:** 0
Properties: Stopped

Description:
It sets the source for the speed reference for Remote 1 mode.

Indication	Description
0 = Keypad	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 = Not used	Not used.
5 = CAN/CO/DN	Reference via CAN/CANop/DNet speed reference parameter (S5.7.3)
6 = Ethernet	Reference via Ethernet speed reference parameter (S5.3.3)
7 = Not used	Not used.
8 = SoftPLC	Reference via SoftPLC function
9 = Analog Input (AI)	Reference via analog input chosen by the user. The analog input can be set in C4.3.1.3.2
10 = Frequency Input (FI)	Reference via frequency input chosen by the user. The frequency input can be set in C4.3.1.3.3

C4.3.1.2 Speed Ref. Source

C4.3.1.2.2 Remote 2 Mode

Range: 0 ... 10 **Default:** 9

Properties: Stopped

Description:

It sets the source for the speed reference for Remote 2 mode.

Indication	Description
0 = Keypad	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 = Not used	Not used.
5 = CAN/CO/DN	Reference via CAN/CANop/DNet speed reference parameter (S5.7.3)
6 = Ethernet	Reference via Ethernet speed reference parameter (S5.3.3)
7 = Not used	Not used.
8 = SoftPLC	Reference via SoftPLC function
9 = Analog Input (AI)	Reference via analog input chosen by the user. The analog input can be set in C4.3.1.3.2
10 = Frequency Input (FI)	Reference via frequency input chosen by the user. The frequency input can be set in C4.3.1.3.3

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!

You can change it by pressing keys while the main screen is being displayed.

C4.3.1.3 Ref. HMI, AIs and FIs

C4.3.1.3.2 Speed Ref. AI Config.

Range: 0 ... 30 **Default:** 1

Properties: Stopped

Description:

It defines the analog input that will be used as the motor speed reference when the reference source is the Analog Input (AI).

Analog Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
AI1	X-1 (1)	A-1 (3)	B-1 (7)	C-1 (11)	D-1 (15)	E-1 (19)	F-1 (23)	G-1 (27)
AI2	X-2 (2)	A-2 (4)	B-2 (8)	C-2 (12)	D-2 (16)	E-2 (20)	F-2 (24)	G-2 (28)
AI3	–	A-3 (5)	B-3 (9)	C-3 (13)	D-3 (17)	E-3 (21)	F-3 (25)	G-3 (29)

Table 11.51: *Values assigned to the Analog Inputs of X and A...G Slots*

NOTE!
Example: To choose Analog Input AI3 from Slot D, select D-3 (17) option.

C4.3.1.3 Ref. HMI, AIs and FIs		
C4.3.1.3.3 Speed Ref. FI Config.		
Range:	0 ... 2	**Default:** 1
Properties:	Stopped	

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

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

The Electronic Potentiometer (E.P.) function allows the speed reference to be set via 2 digital inputs (one to increment it and the other 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 command “DECREASE” 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 commands “INCREASE” or “DECREASE” 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 commands “INCREASE” or “DECREASE” are effective only when the Run/Stop command is active.

Figure 11.33 on page 159 illustrates the operation of this function. The reference increment is done with the application of 24 V on the “INCREASE” digital input, while the decrement is done with the application of 0 V on 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 “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.

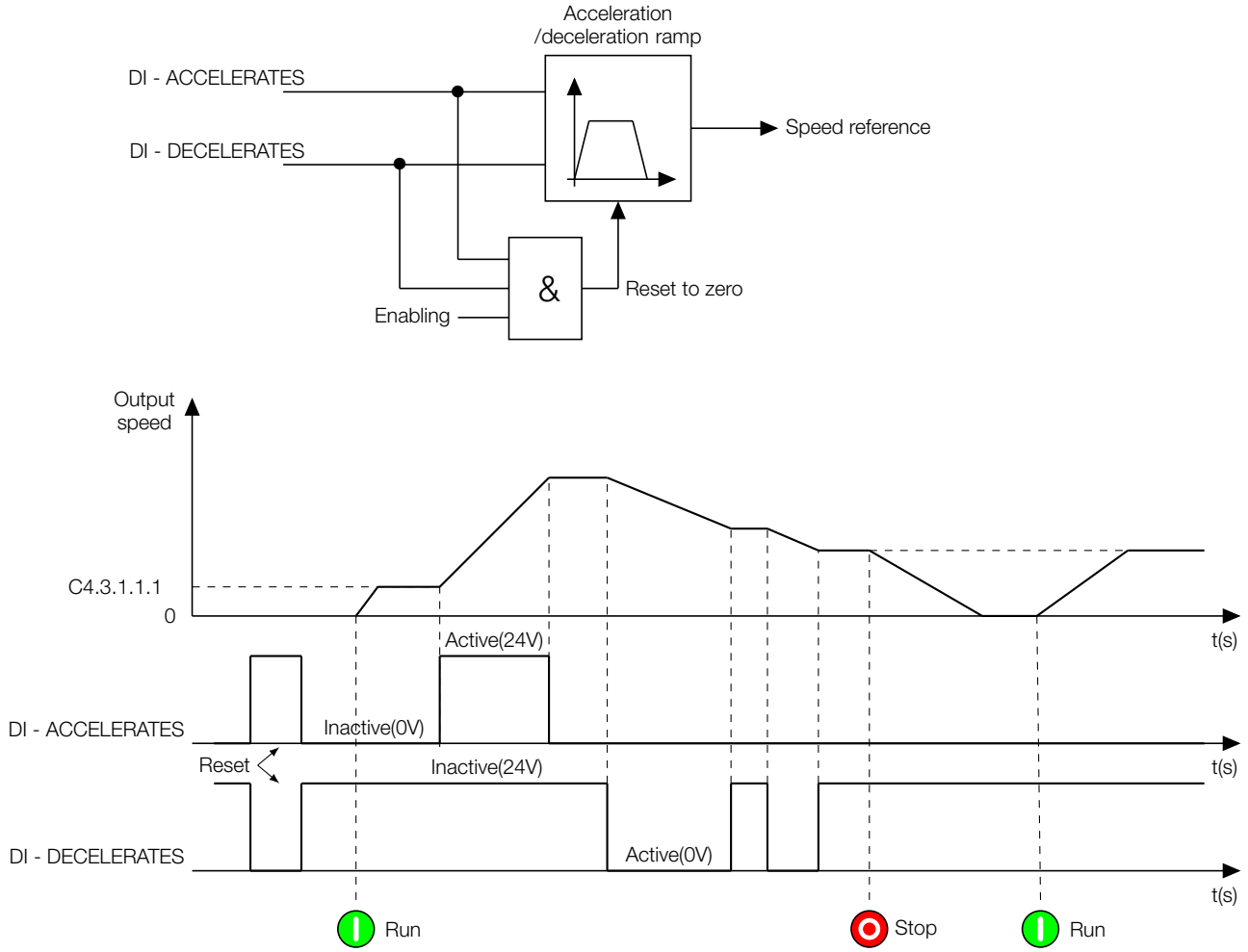


Figure 11.33: *Electronic Potentiometer (E.P.) function*

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 “INCREASE” command by the Electronic Potentiometer. Table 11.48 on page 152 shows the options.

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 ”DECREASE” command by the Electronic Potentiometer. Table 11.48 on page 152 shows the options.

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 the Figure 11.34 and in the Table 11.52 on page 160.

To activate the Multispeed function it is necessary to configure the 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 the Table 11.52.

If no digital inputs are set to 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 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).

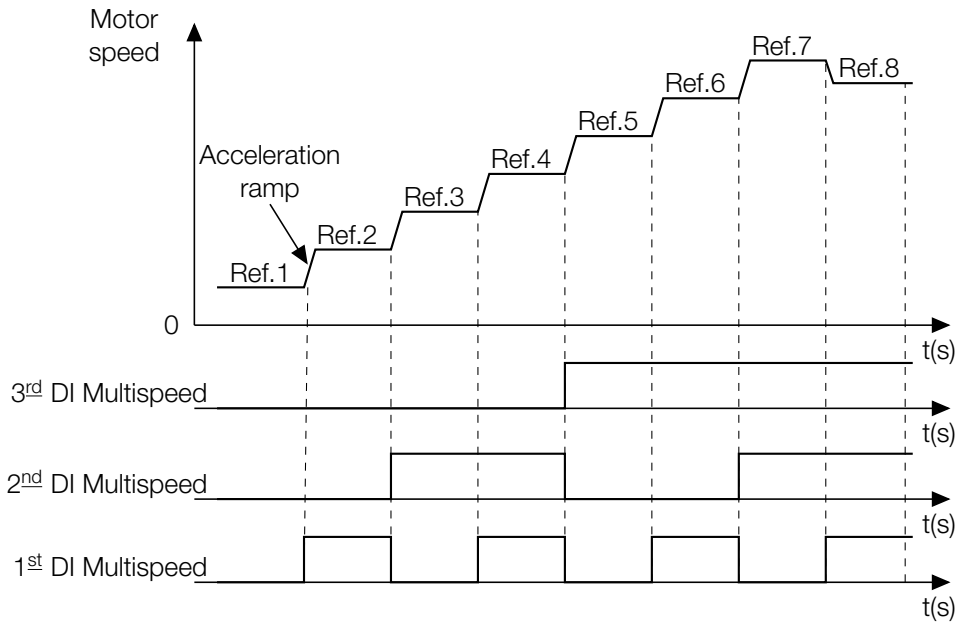


Figure 11.34: *Multispeed*

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

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

Table 11.52: *Multispeed Reference*

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 digital inputs logics are presented in the Table 11.52.

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

Description:
It enables the use and defines the digital input that will be used for selecting the multispeed speed reference. Table 11.48 on page 152 shows the options.

C4.3.1.6 Skip Speed

It allows setting up to three speed ranges in which the motor cannot operate continuously, such as in a mechanical system that goes into resonance (causing excessive vibration or noise), for example. Figure 11.35 on page 161 details the operation of this function.

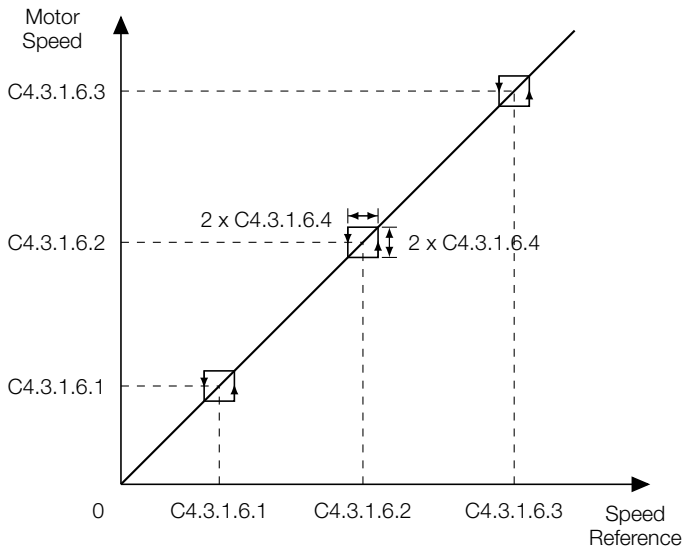


Figure 11.35: *Operation curve of the "Skip Speeds"*

The function is disabled for C4.3.1.6.4=0.

The passage through the skip speed range (2 x C4.3.1.6.4) is done following the acceleration or deceleration ramp.

If the speed reference is within the range to be avoided, 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 lowest lower 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 avoided speed ranges are to be used, two or one of the ranges must be overlapped. For example, to use only one avoided speed range, set parameters C4.3.1.6.1, C4.3.1.6.2 and C4.3.1.6.3 to the same value (overlapping ranges 1, 2 and 3).

C4.3.1.6 Skip Speed
C4.3.1.6.1 Speed 1
Range: 0 ... 60000 rpm **Default:** 600 rpm
Properties:

Description:
It sets the value of skip speed 1.

C4.3.1.6 Skip Speed
C4.3.1.6.2 Speed 2
Range: 0 ... 60000 rpm **Default:** 900 rpm
Properties:

Description:
It sets the value of skip speed 2.

C4.3.1.6 Skip Speed
C4.3.1.6.3 Speed 3
Range: 0 ... 60000 rpm **Default:** 1200 rpm
Properties:

Description:
It sets the value of skip speed 3.

C4.3.1.6 Skip Speed
C4.3.1.6.4 Skip Range
Range: 0 ... 750 rpm **Default:** 0 rpm
Properties:

Description:
Sets the value of the speed range that should be skipped. This value is subtracted and added to the value of the skipped speed, thus setting a range around the defined speed.

C4.3.2 JOG Speed

It allows setting the speed reference for the JOG command.

C4.3.2 JOG Speed

C4.3.2.1 JOG Reference

Range: 0 ... 60000 rpm **Default:** 150 rpm
Properties:

Description:
It sets the motor speed reference value when the JOG command is executed.

During the JOG command, the motor accelerates following the acceleration ramp set until reaching the speed defined in this reference. The JOG command is only effective when the Run/Stop command is inactive.

C4.3.3 Torque

It allows the torque reference configuration for operation in Torque Control mode.

NOTE!
The torque reference is only active when the control type is set to Vector with Encoder (C3.1.1 = 2) and the control mode is set to Torque (C3.3.1.1 = 1).

C4.3.3 Torque

C4.3.3.1 Torque Reference via HMI

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

Description:
It sets the torque reference value when the reference source is the HMI.

C4.3.3 Torque

C4.3.3.2 Maximum Torque

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

Description:
It allows you to set maximum torque reference value for any reference signal. If the reference signal configured to be followed by the inverter is greater than the maximum reference set in C4.3.3.2, the inverter will limit in C4.3.3.2.

C4.3.3 Torque

C4.3.3.3 Minimum Torque

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

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

C4.3.3 Torque

C4.3.3.4 Torque Ref. Source

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

Description:
It defines which source will determine the reference for torque control.

Indication	Description
0 = Keypad	Torque Reference via HMI parameter (C4.3.3.1)
1 = Analog Input (AI)	Torque Reference via analog input chosen by the user. The analog input can be set in C4.3.3.5
2 = Frequency Input (FI)	Torque Reference via frequency input chosen by the user. The frequency input can be set in C4.3.3.6

NOTE!
If it is necessary to set the torque reference via Communication Networks or SoftPLC, this parameter must be set to HMI and the reference value set in C4.3.3.1.

C4.3.3 Torque
C4.3.3.5 Torque Ref. AI Config.
Range: 0 ... 30 **Default:** 0
Properties: Stopped

Description:
It defines which analog input will be used as reference for torque control. Table 11.54 on page 164 shows the options.

Analog Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
AI1	X-1 (1)	A-1 (3)	B-1 (7)	C-1 (11)	D-1 (15)	E-1 (19)	F-1 (23)	G-1 (27)
AI2	X-2 (2)	A-2 (4)	B-2 (8)	C-2 (12)	D-2 (16)	E-2 (20)	F-2 (24)	G-2 (28)
AI3	–	A-3 (5)	B-3 (9)	C-3 (13)	D-3 (17)	E-3 (21)	F-3 (25)	G-3 (29)

Table 11.54: *Values assigned to the Analog Inputs of X and A...G Slots*

NOTE!
Example: To choose Analog Input AI3 from Slot D, select D-3 (17) option.

C4.3.3 Torque
C4.3.3.6 Torque Ref. FI Config.
Range: 0 ... 2 **Default:** 0
Properties: Stopped

Description:
It defines which frequency input will be used as reference for torque control.

Indication	Description
0 = Inactive	It disables the use of the frequency input in this function
1 = FI X-5	It enables the use of frequency input FI5 of Slot X
2 = FI X-6	It enables the use of frequency input FI6 of Slot X

C5 I/OS

It allows to set 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 to configure the analog inputs of the accessory connected to the slot.

Figure 11.36 on page 165 illustrates how the analog input works.

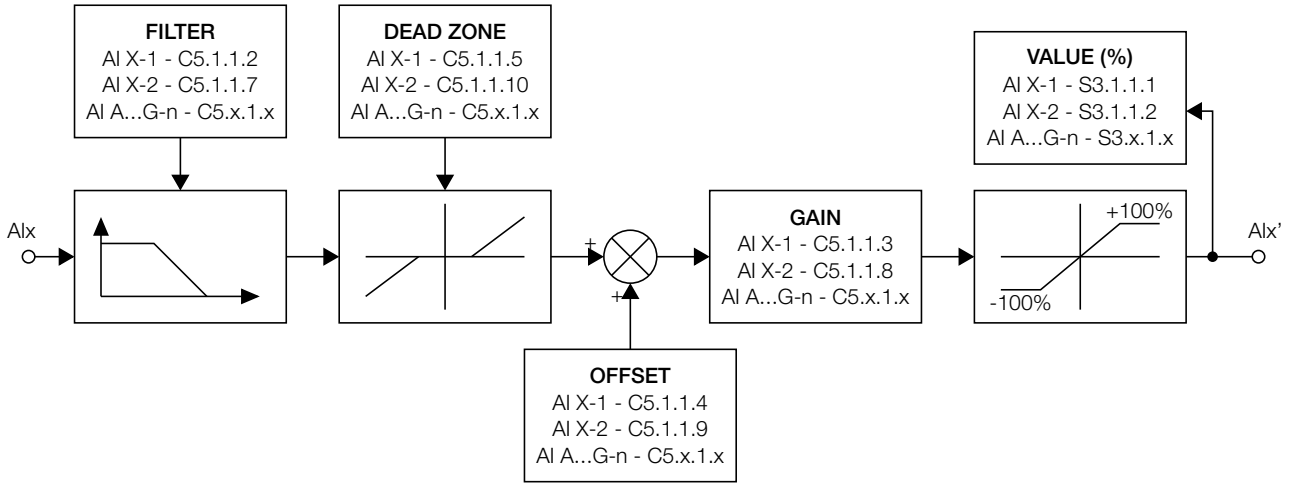


Figure 11.36: *Block diagram of the analog input*

Figure 11.37 on page 165 illustrates the analog input behavior for different configurations of gain, offset and deadzone 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.

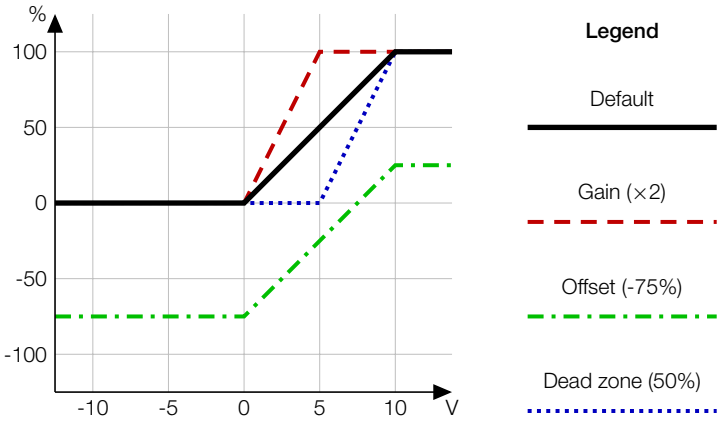


Figure 11.37: *Analog input signal types*

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

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

Bit	Value/Description
Bit 0 … 1 Detect Disconnection	Enabling broken wire detection when the analog input signal type is 4 to 20 mA or 20 to 4 mA. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Fault and alarms disabled.
Bit 2 … 5 Signal Config.	Selection of the analog input signal type. **0 = 0 to 20 mA**: It indicates that the analog input signal is of 0 to 20 mA type. **1 = 4 to 20 mA**: It indicates that the analog input signal is of 4 to 20 mA type. **2 = 20 to 0 mA**: It indicates that the analog input signal is of 20 to 0 mA type. **3 = 20 to 4 mA**: It indicates that the analog input signal is of 20 to 4 mA type. **4 = 0 to 10 V**: It indicates that the analog input signal is of 0 to 10 mA type. **5 = 10 to 0 V**: It indicates that the analog input signal is of 10 to 0 V type. **6 = -10 to 10 V**: It indicates that the analog input signal is of -10 to 10 V type. **7 = 10 to -10 V**: It indicates that the analog input signal is of 10 to -10 V type. **8 = PTC**: It indicates that the analog input signal is of the PTC type.

C5.1.1 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 to configure the RC constant of the low-pass filter present at the analog input.

NOTE!
The analog input signal is filtered before applying gain and offset to the signal.

C5.1.1 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 to configure the analog outputs of the accessory connected to the slot.

The Figure 11.38 on page 167 illustrates how the analog output works.

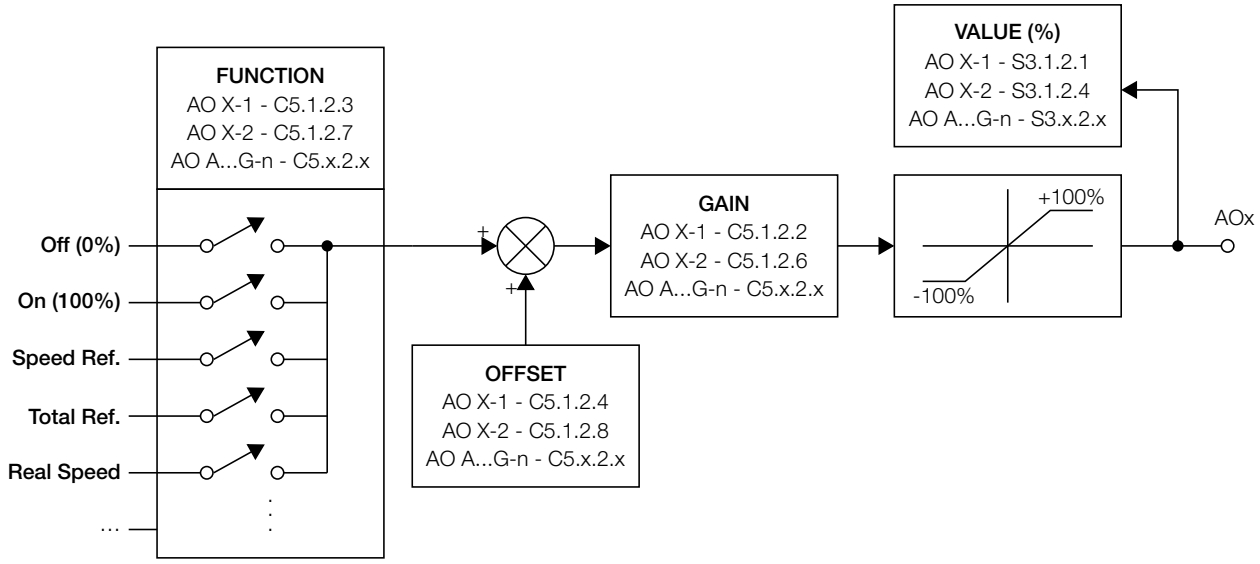


Figure 11.38: *Block diagram of the analog output*

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 to configure the signal type of analog output.

To set the type of output, it is also necessary to correctly position the ”DIP switches” present on the accessory. For further details, refer to the specific accessory manual.

Indication	Description
0 = 0 to 20 mA	It indicates that the Analog Output signal of Slot X is 0 to 20 mA.
1 = 4 to 20 mA	It indicates that the Analog Output signal of Slot X is 4 to 20 mA type.
2 = 20 to 0 mA	It indicates that the Analog Output signal of Slot X is 20 to 0 mA type.
3 = 20 to 4 mA	It indicates that the Analog Output signal of Slot X is 20 to 4 mA type.
4 = 0 to 10 V	It indicates that the Analog Output signal of Slot X is 0 to 10 V type.
5 = 10 to 0 V	It indicates that the Analog Output signal of Slot X is 10 to 0 V type.

C5.1.2 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 set gain and offset values.
1 = On (100%)	It imposes 100% on the output, regardless of the set gain and offset values.
2 = Speed Ref.	It imposes on the output a value proportional to the speed reference (S2.1.1).
3 = Total Speed Ref.	It imposes on the output a value proportional to the motor reference speed after the ramp (S2.1.2).
4 = Real Speed	It imposes on the output a value proportional to the current motor speed used by the control module (S2.1.3).
5 ... 6 = Not used	Not used.
7 = Output Current	It imposes on the output a value proportional to the RMS value of the fundamental component of the inverter output current (S2.3.1).
8 ... 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 ... 12 = Not used	Not used.
13 = Motor Torque	It imposes on the output a value proportional to the estimated electrical torque on the motor based on the nominal torque (S2.2.3).
14 = SoftPLC	It imposes on the output the value sent by SoftPLC. Gain and offset values do not affect the output.
15 = PTC	It imposes on the output the recommended value for powering a PTC temperature sensor (10%). Gain and offset values do not affect the output.
16 = Motor Ixt	It imposes on the output a value proportional to the motor overload level (D4.1.5.1).
17 = Encoder Speed	It imposes on the output a value proportional to the encoder current speed (S2.1.4).
18 = Network	It imposes on the output the value sent by the network. Gain and offset values do not affect the output.
19 = Not used	Not used.
20 = Torque Ref.	It imposes on the output a value proportional to the electrical torque reference on the motor based on the nominal torque (S2.2.1).
21 = Total Torque Ref.	It imposes on the output a value proportional to the electrical torque reference of the motor after the ramp (S2.2.2).

The Table 11.58 on page 168 illustrates the full scale of the analog output functions.

Scale of the analog outputs indications	
Variable	**Full scale**
Speed Ref. Total Speed Ref.	Maximum Speed Reference (C4.3.1.1.2)
Real Speed Encoder Speed	2.0 × [Maximum Speed Reference (C4.3.1.1.2)]
Output Current	1.5 × [Rated Current (S1.3.5)]
Output Power	1.5 × $\sqrt{3}$ × [Rated Current (S1.3.5)] × [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

Table 11.58: *Full Scale of AO functions*

The analog outputs cannot reproduce negative values at their terminals even if the HMI status shows negative values. This is because all analog output signal types are not bipolar. If it is necessary to represent theses negative values using analog outputs, it is possible to set an offset of +100% and a gain of 0.500. The analog output will remain to reproduce only non-negative values, but it will possible to differentiate positive from negative values. The Figure 11.39 on page 169 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.

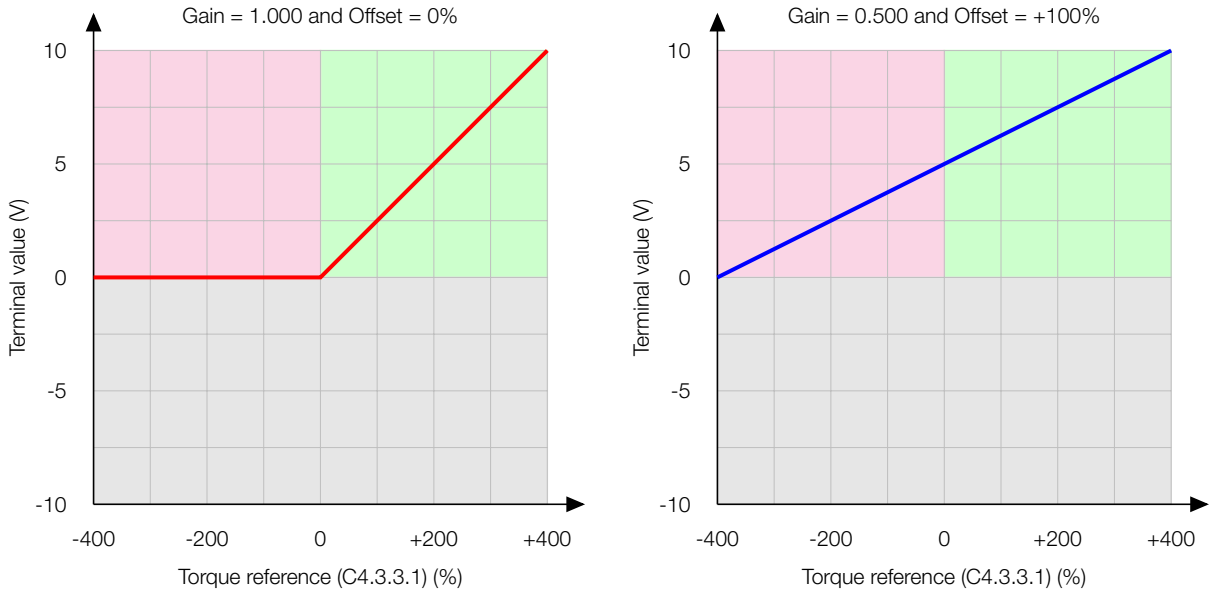


Figure 11.39: *AO configurations to represent negative values*

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.

C5.1.3 Slot X - Digital Inputs

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

The Figure 11.40 on page 169 illustrates how the frequency input works.

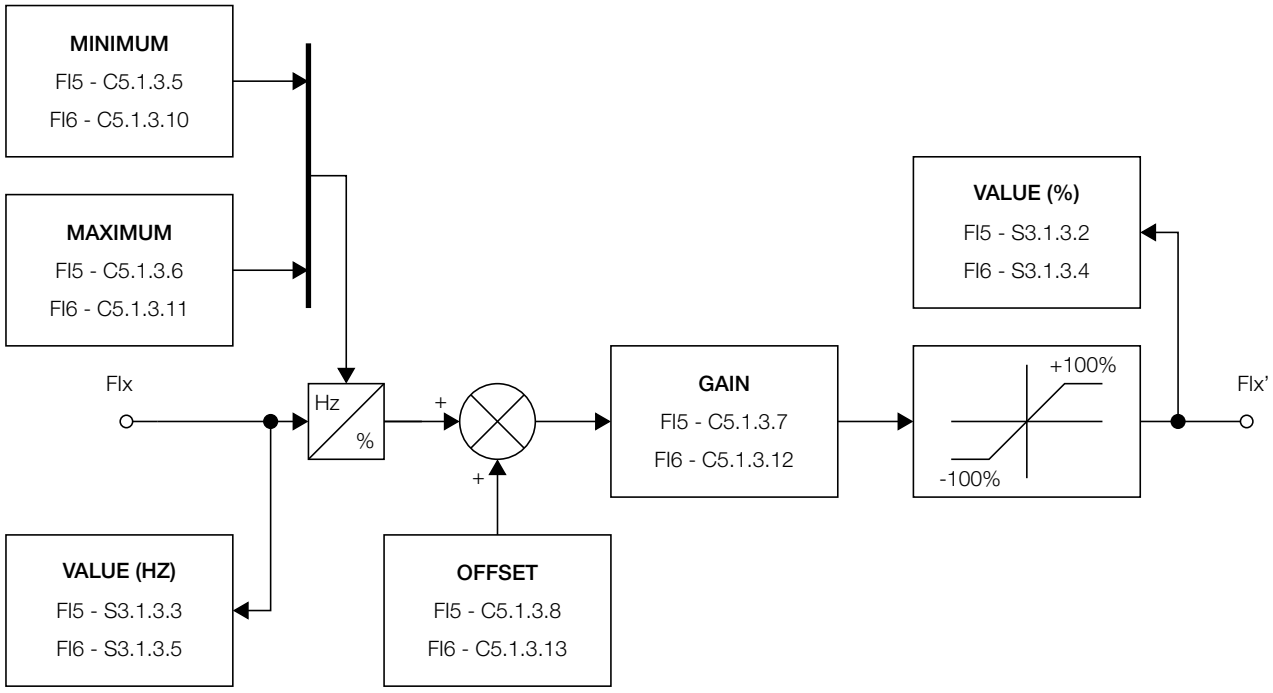


Figure 11.40: *Frequency input block diagram*

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 to configure the operating mode of the digital input.

NOTE!
When the digital input is configured as a frequency input, it must be ensured that no command via DI is configured to use this same input. An example of a configuration that should be avoided would be to set the DI5 parameter of the Slot-X (C5.1.3.4) as frequency input and then set the general enable command parameter via DI (C4.2.3.1) to use this same input.

Indication	Description
0 = Polling	It indicates that the Digital Input is set for reading via scanning.
1 = Not used	Not used.
2 = Frequency	It indicates that the Digital Input is set to frequency input.
3 = Encoder	It indicates that the Digital Input is set for reading the input signal frequency.

C5.1.3 Slot X - Digital Inputs

C5.1.3.5 FI5 Min Frequency
C5.1.3.10 FI6 Minimum Frequency

Range:	0 ... 32000 Hz	**Default:** 0 Hz
Properties:	Stopped	

Description:
It allows to configure the zero scale of the frequency input.

C5.1.3 Slot X - Digital Inputs

C5.1.3.6 FI5 Maximum Frequency
C5.1.3.11 FI6 Maximum Frequency

Range:	0 ... 32000 Hz	**Default:** 32000 Hz
Properties:	Stopped	

Description:
It allows to configure the full scale of the frequency input.

C5.1.3 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 to configure the digital outputs of the accessory connected to the slot.

The Figure 11.41 on page 171 illustrates how the frequency output works.

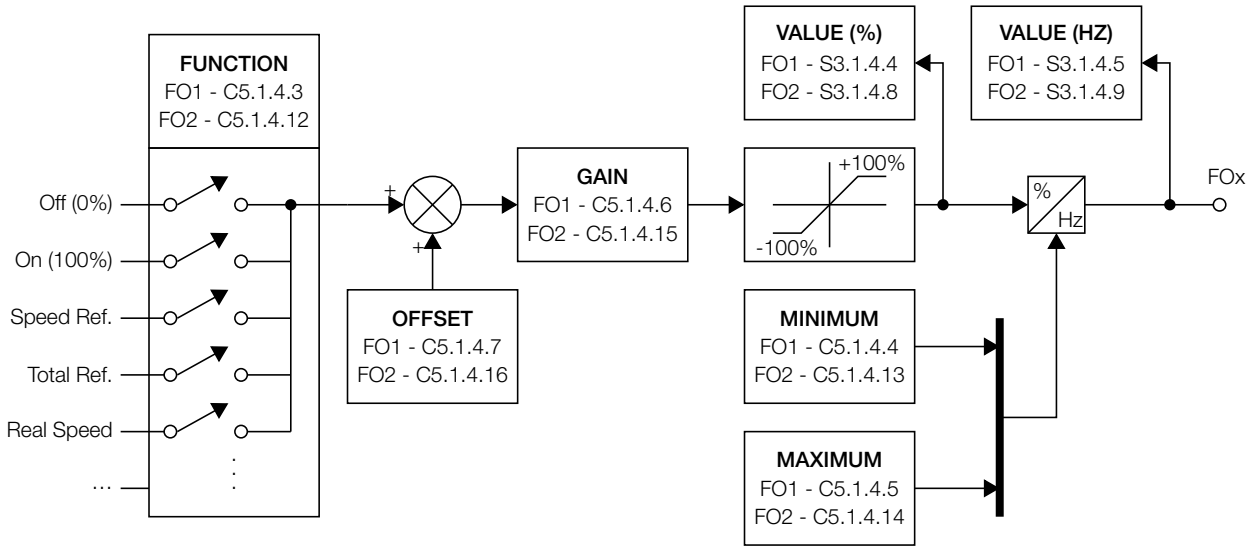


Figure 11.41: *Frequency output block diagram*

C5.1.4 Slot X - Digital Outputs
C5.1.4.1 DO1 Operation Mode
C5.1.4.10 DO2 Operation Mode

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

Description:
It allows to configure the operating mode of the digital output.

Indication	Description
0 = Polling	It indicates that the Digital Output is set to the ON/OFF mode.
1 = Frequency	It indicates that the Digital Output is set to the Frequency Output mode.

C5.1.4 Slot X - Digital Outputs
C5.1.4.2 DO1 Function
C5.1.4.11 DO2 Function

Range: 0 ... 30 **Default:** 22 (C5.1.4.2)
19 (C5.1.4.11)
Properties:

Description:
Setting of the function to be used for the digital output.

Indication	Description
0 = Off	The Digital Output will always go to the inactive status.
1 = On	The Digital Output will always go to the active status.
2 = N* > Nx	The Digital Output will go to the active status when the speed reference (N*) is greater than the value set in Nx.
3 = N > Nx	The Digital Output will go to the active status when the motor speed (N) is greater than the value set in Nx.
4 = N < Ny	The Digital Output will go to the active status when the motor speed (N) is smaller than the value set in Ny.

Indication	Description
5 = N = N*	The Digital Output will go to the active status when the motor speed (N) equals the speed reference value (N*).
6 ... 7 = Not used	Not used.
8 = F > Fx	The Digital Output will go to the active status when the motor frequency (F) is greater than the value set in Fx.
9 = Is > Ix	The Digital Output will go to the active status when the output current (Is) is greater than the value set in Ix.
10 = Is < Ix	The Digital Output will go to the active status when the output current (Is) is smaller than the value set in Ix.
11 = Torque > Tx	The Digital Output will go to the active status when the motor torque (Torque) is greater than the value set in Tx.
12 = Torque < Tx	The Digital Output will go to the active status when the motor torque (Torque) is smaller than the value set in Tx.
13 = Hours Enabled > Hx	The Digital Output will go to the active status when the enabled hour counter is greater than the value set in Hx.
14 ... 15 = Not used	Not used.
16 = Local Mode	The Digital Output will go to the active status when the commands and references are defined by the Local mode.
17 = Remote 1 Mode	The Digital Output will go to the active status when the commands and references are defined by the Remote 1 mode.
18 = Remote 2 Mode	The Digital Output will go to the active status when the commands and references are defined by the Remote 2 mode.
19 = Run	The Digital Output will go to the active status when the inverter is in the Run status.
20 = Ready	The Digital Output will go to the active 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 is not indicating an alarm in the inverter.
26 = Network	The Digital Output will go to the active status when the command received via Network is active.
27 = SoftPLC	The Digital Output will go to the active status when the command received via SoftPLC is active.
28 = Forward Direction	The Digital Output will go to the active state when the inverter is running in the forward direction.
29 = Ride-Through	The Digital Output will go to the active status when the Ride-Through function is acting.
30 = Pre-Charge OK	The Digital Output will go into the active state when the Pre-charge function indicates that it has been successfully executed.

C5.1.4 Slot X - Digital Outputs

C5.1.4.3 FO1 Function
C5.1.4.12 FO2 Function

Range: 0 ... 21 **Default:** 0
Properties: Stopped

Description:
Setting of the function to be used for the frequency output.

Indication	Description
0 = Off (0 %)	It imposes 0% on the output, regardless of the set gain and offset values.
1 = On (100%)	It imposes 100% on the output, regardless of the set gain and offset values.
2 = Speed Ref.	It imposes on the output a value proportional to the speed reference (S2.1.1).
3 = Total Speed Ref.	It imposes on the output a value proportional to the motor reference speed after the ramp (S2.1.2).
4 = Real Speed	It imposes on the output a value proportional to the current motor speed used by the control module (S2.1.3).
5 ... 6 = Not used	Not used.

Indication	Description
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 ... 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 ... 12 = Not used	Not used.
13 = Motor Torque	It imposes on the output a value proportional to the estimated electrical torque on the motor based on the nominal torque (S2.2.3).
14 = SoftPLC	It imposes on the output the value sent by SoftPLC. Gain and offset values do not affect the output.
15 = Not used	Not used.
16 = Motor Ixt	It imposes on the output a value proportional to the motor overload level (D4.1.5.1).
17 = Encoder Speed	It imposes on the output a value proportional to the encoder current speed (S2.1.4).
18 = Network	It imposes on the output the value sent by the network. Gain and offset values do not affect the output.
19 = Not used	Not used.
20 = Torque Ref.	It imposes on the output a value proportional to the electrical torque reference on the motor based on the nominal torque (S2.2.1).
21 = Total Torque Ref.	It imposes on the output a value proportional to the electrical torque reference of the motor after the ramp (S2.2.2).

The Table 11.63 on page 173 illustrates the full scale of the frequency output functions.

Scale of the 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 × [Maximum Speed Reference (C4.3.1.1.2)]
Output Current	1.5 × [Rated Current (S1.3.5)]
Output Power	1.5 × $\sqrt{3}$ × [Rated Current (S1.3.5)] × [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

Table 11.63: *Full Scale of FO functions*

Frequency outputs cannot reproduce negative values on its terminals even if the HMI status shows negative values. It happens because all frequency outputs respect their minimum value and this value is reached at 0%. If it is necessary to represent theses negative values using frequency outputs, it is possible to set an offset of +100% and a gain of 0.500. The frequency output will remain to reproduce only non negative values, but it will possible to differentiate positive from negative values. The Figure 11.42 on page 174 illustrates this behavior for the torque reference function. The minimum and maximum frequency limits are set according to the default value setting. This setup can be useful when frequency output function is set to any function that can return negative value, such as motor torque and torque reference.

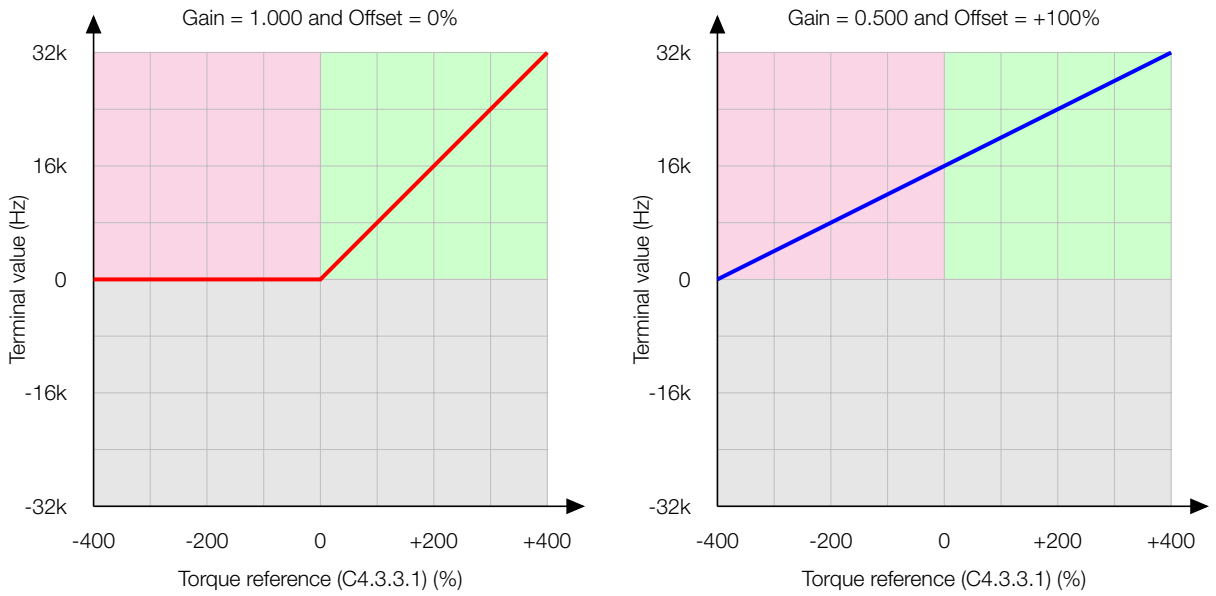


Figure 11.42: *FO configurations to represent negative values*

C5.1.4 Slot X - Digital Outputs		
C5.1.4.4 FO1 Minimum Frequency **C5.1.4.13 FO2 Minimum Frequency**		
Range:	0 ... 32000 Hz	**Default:** 0 Hz
Properties:	Stopped	

Description:
It allows to configure the frequency output zero scale.

C5.1.4 Slot X - Digital Outputs		
C5.1.4.5 FO1 Maximum Frequency **C5.1.4.14 FO2 Maximum Frequency**		
Range:	0 ... 32000 Hz	**Default:** 32000 Hz
Properties:	Stopped	

Description:
It allows to configure the full scale for frequency output.

C5.1.4 Slot X - Digital Outputs		
C5.1.4.6 FO1 Gain **C5.1.4.15 FO2 Gain**		
Range:	0.000 ... 9.999	**Default:** 1.000
Properties:	Stopped	

Description:
Frequency output gain setting.

C5.1.4 Slot X - Digital Outputs		
C5.1.4.7 FO1 Offset **C5.1.4.16 FO2 Offset**		
Range:	-100.00 ... 100.00 %	**Default:** 0.00 %
Properties:	Stopped	

Description:
Frequency output offset setting.

C5.1.5 Slot X-Encoder

It allows to configure 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 complete 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 to configure the analog inputs of the accessory connected to the 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 to configure the action to be taken in case of a broken wire and also the type of signal that is expected at the terminals.

Bit	Value/Description
Bit 0 … 1 Detect Disconnection	Enabling broken wire detection when the analog input signal type is 4 to 20 mA or 20 to 4 mA. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Fault and alarms disabled.
Bit 2 … 5 Signal Setting	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 to configure the RC constant of the low-pass filter present at the analog input.

NOTE!
The analog input signal is filtered before applying gain and offset to the signal.

C5.2.1 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 to configure the analog outputs of the accessory connected to the slot.

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 to configure the signal type of analog output.

To set the type of output, it is also necessary to correctly position the ”DIP switches” present on the accessory. For further details, refer to the specific accessory manual.

Indication	Description
0 = 0 to 20 mA	It indicates that the Analog Output signal is 0 to 20 mA type.
1 = 4 to 20 mA	It indicates that the Analog Output signal is 4 to 20 mA type.
2 = 20 to 0 mA	It indicates that the Analog Output signal is 20 to 0 mA type.
3 = 20 to 4 mA	It indicates that the Analog Output signal is 20 to 4 mA type.
4 = 0 to 10 V	It indicates that the Analog Output signal is 0 a 10 V type.
5 = 10 to 0 V	It indicates that the Analog Output signal is 10 a 0 V type.
6 ... 7 = Not used	Not used.

C5.2.2 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 set gain and offset values.
1 = On (100%)	It imposes 100% on the output, regardless of the set gain and offset values.
2 = Speed Ref.	It imposes on the output a value proportional to the speed reference (S2.1.1).
3 = Total Speed Ref.	It imposes on the output a value proportional to the motor reference speed after the ramp (S2.1.2).
4 = Real Speed	It imposes on the output a value proportional to the current motor speed used by the control module (S2.1.3).
5 ... 6 = Not used	Not used.
7 = Output Current	It imposes on the output a value proportional to the RMS value of the fundamental component of the inverter output current (S2.3.1).
8 ... 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 ... 12 = Not used	Not used.
13 = Motor Torque	It imposes on the output a value proportional to the estimated electrical torque on the motor based on the nominal torque (S2.2.3).
14 = SoftPLC	It imposes on the output the value sent by SoftPLC. Gain and offset values do not affect the output.
15 = PTC	It imposes on the output the recommended value for powering a PTC temperature sensor (10%). Gain and offset values do not affect the output.
16 = Motor Ixt	It imposes on the output a value proportional to the motor overload level (D4.1.5.1).
17 = Encoder Speed	It imposes on the output a value proportional to the encoder current speed (S2.1.4).
18 = Network	It imposes on the output the value sent by the network. Gain and offset values do not affect the output.
19 = Not used	Not used.
20 = Torque Ref.	It imposes on the output a value proportional to the electrical torque reference on the motor based on the nominal torque (S2.2.1).
21 = Total Torque Ref.	It imposes on the output a value proportional to the electrical torque reference of the motor after the ramp (S2.2.2).

C5.2.2 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 to configure the digital outputs of the accessory connected to the slot.

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		
.4 DO2 Function		
.7 DO3 Function		
.10 DO4 Function		
.13 DO5 Function		
.16 DO6 Function		
.19 DO7 Function		
.22 DO8 Function		
Range:	0 ... 30	**Default:** 22 (C5.2.4.1) 3 (C5.2.4.4) 2 (C5.2.4.7) 0 (Others)
Properties:	Stopped	

Description:
Setting of the function to be used for the digital output.

Indication	Description
0 = Off	The Digital Output will always go to the inactive status.
1 = On	The Digital Output will always go to the active status.
2 = N* > Nx	The Digital Output will go to the active status when the speed reference (N*) is greater than the value set in Nx.
3 = N > Nx	The Digital Output will go to the active status when the motor speed (N) is greater than the value set in Nx.
4 = N < Ny	The Digital Output will go to the active status when the motor speed (N) is smaller than the value set in Ny.
5 = N = N*	The Digital Output will go to the active status when the motor speed (N) equals the speed reference value (N*).
6 ... 7 = Not used	Not used.
8 = F > Fx	The Digital Output will go to the active status when the motor frequency (F) is greater than the value set in Fx.
9 = Is > Ix	The Digital Output will go to the active status when the output current (Is) is greater than the value set in Ix.

Indication	Description
10 = Is < Ix	The Digital Output will go to the active status when the output current (Is) is smaller than the value set in Ix.
11 = Torque > Tx	The Digital Output will go to the active status when the motor torque (Torque) is greater than the value set in Tx.
12 = Torque < Tx	The Digital Output will go to the active status when the motor torque (Torque) is smaller than the value set in Tx.
13 = Hours Enabled > Hx	The Digital Output will go to the active status when the enabled hour counter is greater than the value set in Hx.
14 ... 15 = Not used	Not used.
16 = Local Mode	The Digital Output will go to the active status when the commands and references are defined by the Local mode.
17 = Remote 1 Mode	The Digital Output will go to the active status when the commands and references are defined by the Remote 1 mode.
18 = Remote 2 Mode	The Digital Output will go to the active status when the commands and references are defined by the Remote 2 mode.
19 = Run	The Digital Output will go to the active status when the inverter is in the Run status.
20 = Ready	The Digital Output will go to the active 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 is not indicating an alarm in the inverter.
26 = Network	The Digital Output will go to the active status when the command received via Network is active.
27 = SoftPLC	The Digital Output will go to the active status when the command received via SoftPLC is active.
28 = Forward Direction	The Digital Output will go to the active state when the inverter is running in the forward direction.
29 = Ride-Through	The Digital Output will go to the active status when the Ride-Through function is acting.
30 = Pre-Charge OK	The Digital Output will go into the active state when the Pre-charge function indicates that it has been successfully executed.

C5.2.5 Slot A-Encoder to C5.8.5 Slot G-Encoder

It allows to configure 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 complete 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:

Description:
It allows to configure the broken cable detection, zero search function, and encoder signal direction.

Bit	Value/Description
Bit 0 … 1 Broken Cable A	It allows setting the fault action and alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 2 … 3 Broken Cable B	It allows setting the fault action and alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 4 … 5 Broken Cable Z	It allows setting the fault action and alarm generation if a broken encoder cable is detected. Refer to the Encoder Input Accessory Manual for details on the technique used to detect broken cable. **0 = Fault**: The Inverter will generate a fault if a broken encoder cable is detected **1 = Alarm**: The Inverter will indicate an alarm if a broken encoder cable is detected **2 = Inactive**: The broken cable detection is disabled
Bit 6 Search Zero	It allows starting the execution of the search zero function. When the search zero function is activated, the number of revolutions and the fraction of revolution measured will be zeroed at the next occurrence of a pulse in the encoder Z signal. This bit will be changed to 0 after the function has been completed. **0 = Disabled**: Function disabled **1 = Enabled**: Function enabled
Bit 7 Signal Direction	It allows selecting the sequence of signals A and B that represent the forward direction of rotation **0 = A/B**: Forward direction when rising edge of A occurs before the rising edge of B **1 = B/A**: Forward direction when rising edge of B occurs before the rising edge of A

C5.2.6 Slot A-Temperatures to C5.8.6 Slot G-Temperatures

It allows to configure 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.

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 (broken sensor cable, short-circuit sensor) for each temperature sensor.

NOTE!
Faults and alarms will occur when the temperature read on the sensors is less than or equal to -20 °C during a 5 minute interval. Resetting of faults and alarms is enabled for temperature values greater than -15 °C.

Bit	Value/Description
Bit 0 ... 1 S1 Sensor F/A	It enables measurement error faults in the temperature sensor 1. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Fault and alarms disabled.
Bit 2 ... 3 S2 Sensor F/A	It enables measurement error faults of temperature sensor 2. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Fault and alarms disabled.
Bit 4 ... 5 S3 Sensor F/A	It enables measurement error faults of temperature sensor 3. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Fault and alarms disabled.
Bit 6 ... 7 S4 Sensor F/A	It enables measurement error faults of temperature sensor 4. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Fault and alarms disabled.
Bit 8 ... 9 S5 Sensor F/A	It enables error faults in the measurement of temperature sensor 5. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Fault and alarms disabled.
Bit 10 ... 11 S6 Sensor F/A	It enables error faults in the measurement of temperature sensor 6. **0 = Fault**: Fault enabled. **1 = Alarm**: Alarm enabled. **2 = Inactive**: Fault and alarms disabled.

C5.2.6 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 Temp. 1 Sensor Setpoint
.5 Temp. 2 Sensor Setpoint
.6 Temp. 3 Sensor Setpoint
.7 Temp. 4 Sensor Setpoint
.8 Temp. 5 Sensor Setpoint
.9 Temp. 6 Sensor Setpoint

Range:	-100.0 ... 250.0 °C	**Default:** 0.0 °C
Properties:	Stopped	

Description:
It allows to configure the sensor overtemperature fault setpoint.

C5.3 Slot B

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

C5.4 Slot C

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

C5.5 Slot D

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

C5.6 Slot E

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

C5.7 Slot F

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

C5.8 Slot G

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

C5.9 DO Operation Levels

It allows viewing and configuring the operation conditions of the digital outputs (DOs).

C5.9 DO Operation Levels		
C5.9.1 Fx Frequency		
Range:	0.0 ... 300.0 Hz	**Default:** 4.0 Hz
Properties:		

Description:
It allows viewing and setting the frequency level (Fx) used in function (F > Fx) for Digital Outputs.

C5.9 DO Operation Levels		
C5.9.2 Fx Hysteresis		
Range:	0.0 ... 15.0 Hz	**Default:** 2.0 Hz
Properties:		

Description:
It allows viewing and setting the frequency hysteresis level used in function (F > Fx) for Digital Outputs.

C5.9 DO Operation Levels		
C5.9.3 Nx/Ny Hysteresis		
Range:	0 ... 900 rpm	**Default:** 18 rpm
Properties:		

Description:
It allows viewing and setting the speed hysteresis level used in functions (N* > Nx), (N > Nx), (N < Ny) and (N > Nx and Nt > Nx) for Digital Outputs.

C5.9 DO Operation Levels		
C5.9.4 Nx Speed		
Range:	0 ... 18000 rpm	**Default:** 120 rpm
Properties:		

Description:
It allows viewing and setting the speed level (Nx) used in function (N > Nx) for Digital Outputs.

C5.9 DO Operation Levels		
C5.9.5 Ny Speed		
Range:	0 ... 18000 rpm	**Default:** 1800 rpm
Properties:		

Description:
It allows viewing and setting the speed level (Ny) used in function (N < Ny) for Digital Outputs.

C5.9 DO Operation Levels		
C5.9.6 Ix Current		
Range:	0.0 ... 200.0 %	**Default:** 100.0 %
Properties:		

Description:
It allows viewing and setting the current level (Ix) used in functions (I > ix) and (I < ix) for Digital Outputs.

C5.9 DO Operation Levels		
C5.9.8 N = N* Range		
Range:	0 ... 18000 rpm	**Default:** 18 rpm
Properties:		

Description:
It allows viewing and setting the speed range within which the reference and speed will be considered to be at the same value. Used in function (N* = N) for Digital Outputs.

C5.9 DO Operation Levels		
C5.9.9 Torque Tx		
Range:	0.0 ... 200.0 %	**Default:** 100.0 %
Properties:		

Description:
It allows viewing and setting the torque level (Tx) used in functions (T > Tx) and (T < Tx) for Digital Outputs.

C5.9 DO Operation Levels		
C5.9.10 Hx Hours		
Range:	0 ... 65536 h	**Default:** 4320 h
Properties:		

Description:
It allows viewing and setting the number of hours (Hx) used in function (Hours enabled > Hx) for Digital Outputs.

C6 RAMPS

It allows setting the acceleration and deceleration times for the speed or torque reference, define the command selection between “1st Ramp” and “2nd Ramp” and select the desired ramp profile.

C6.1 Speed Control Ramps

Speed ramp settings.

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 “1st Ramp” acceleration time for the speed reference. This value corresponds to the time that the ramp varies from 0 rpm to the maximum value C4.3.1.1.2.

C6.1 Speed Control Ramps		
C6.1.2 Deceleration Time		
Range:	0.1 ... 999.9 s	**Default:** 20.0 s
Properties:		

Description:
It sets the “1st Ramp” deceleration time for the speed reference. This value corresponds to the time that the ramp varies from the maximum value C4.3.1.1.2 to 0 rpm.

C6.1 Speed Control Ramps		
C6.1.3 1st/2nd Ramp Selection		
Range:	0 ... 8	**Default:** 0
Properties:	Stopped	

Description:
It sets the source of the command for acceleration ramps that will select between the “1st Ramp” and the “2nd Ramp”.

- “1st Ramp” means that the acceleration and deceleration ramps are following the values set in C6.1.1 and C6.1.2 respectively;
- “2nd Ramp” means that the acceleration and deceleration ramps are following the values set in C6.1.4 and C6.1.5 respectively;

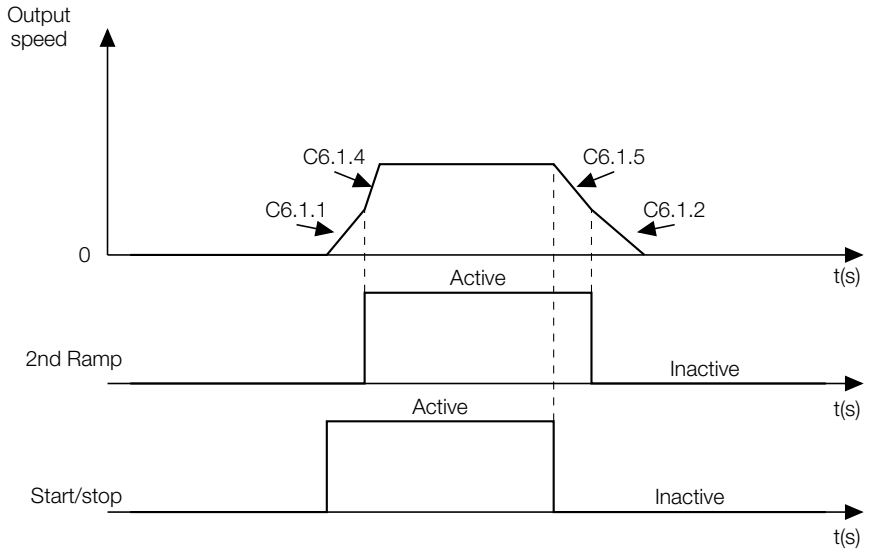


Figure 11.43: *Command operation 1st/2nd ramp*

Indication	Description
0 = 1st Ramp	Fixed at 1st Ramp
1 = 2nd Ramp	Fixed at 2nd Ramp
2 = Serial	Change via 2nd Ramp command of the RS-485 Serial Control Word
3 = Not used	Not used.
4 = CAN/CO/DN	Change via 2nd Ramp command of the CAN/CANop/DNet Control Word
5 = SoftPLC	Change via SoftPLC function command
6 = Not used	Not used.
7 = Ethernet	Change via 2nd Ramp command of the Ethernet Control Word
8 = DI Ramp Selection	Change via digital input command chosen by the user. The digital input can be set in C4.2.3.10

C6.1 Speed Control Ramps		
C6.1.4 2nd Ramp Acceleration Time		
Range:	0.1 ... 999.9 s	**Default:** 10.0 s
Properties:		

Description:
It sets the “2nd ramp” acceleration time for the speed reference. This value corresponds to the time that the ramp varies from 0 rpm to the maximum value C4.3.1.1.2.

C6.1 Speed Control Ramps
C6.1.5 2nd Ramp Deceleration Time

Range:	0.1 ... 999.9 s	**Default:** 10.0 s
Properties:		

Description:
It sets the “2nd ramp” deceleration time for the speed reference. This value corresponds to the time that the ramp varies from the maximum value C4.3.1.1.2 to 0 rpm.

C6.1 Speed Control 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 shock during acceleration/deceleration.

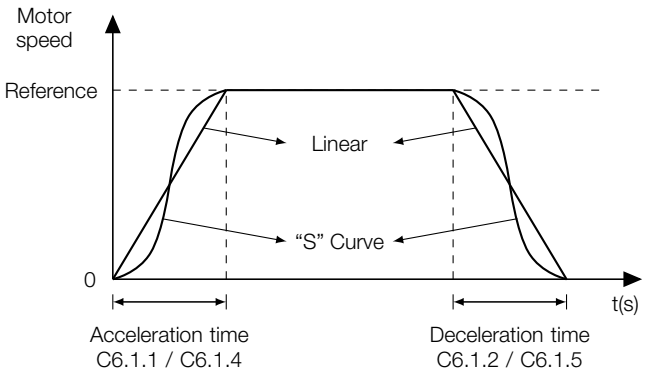


Figure 11.44: *“S” Curve or Linear*

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 for 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 activation 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:		

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 power supply phase loss fault tripping level.

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 ground fault protection (F074).

Once enabled, you can choose between two fault trip levels:

- Standard level: 50% of the HD current;
- Extended level: 150% of the HD current.

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.

C7.4 Motor Overload Fault

It allows setting the Motor Overload fault.

C7.4 Motor Overload Fault		
C7.4.1 Enable Fault		
Range:	0 ... 3	**Default:** 1
Properties:	Stopped	

Description:
It enables the fault and alarm of the motor overload function.

Indication	Description
0 = Disable	Overload fault is disabled. No faults or alarms will be generated for the motor operation in the overload condition.
1 = Fault and Alarm	The inverter will display an alarm (A046) when the motor overload reaches the level programmed in C7.4.2, and the fault will trip (F072) when the motor overcurrent reaches the value set in the overload fault. Once the fault activates, the inverter will be disabled.
2 = Fault	The fault will be activated (F072) without generating alarms, when the motor overload reaches the level set in the overload fault and the inverter will be disabled.
3 = Alarm	Only alarm (A046) will be generated when the motor current reaches the value programmed in C7.4.2; the inverter will continue operating.

C7.4 Motor Overload Fault		
C7.4.2 Alarm Level		
Range:	10 ... 100 %	**Default:** 70 %
Properties:	Stopped	

Description:
It defines the motor overload fault alarm tripping level (A046). It is expressed as a percentage of the Overload time limit value.

It will only be effective when C7.4.1 is set to 1 (Fault/Alarm)or 3 (Alarm).

C7.4 Motor Overload Fault		
C7.4.3 Factor @ 100% Rat. Speed		
Range:	0 ... 200 %	**Default:** 100 %
Properties:		

Description:
It sets the value of the motor current used for the motor overload fault with 100% of the rated speed. The full scale of this parameter is the rated motor current C2.1.5.

C7.4 Motor Overload Fault		
C7.4.4 Factor @ 50% Rat. Speed		
Range:	0 ... 200 %	**Default:** 86 %
Properties:		

Description:
It sets the value of the motor current used for the motor overload fault with 50% of the rated speed. The full scale of this parameter is the rated motor current C2.1.5.

C7.4 Motor Overload Fault		
C7.4.5 Factor @ 5% Rat, Speed		
Range:	0 ... 200 %	**Default:** 62 %
Properties:		

Description:
It sets the value of the motor current used for the motor overload fault with 5% of the rated speed.The full scale of this parameter is the rated motor current C2.1.5.

The motor overload current is the current value at which the inverter will understand that the motor is operating under overload, and it is given as a function of the speed being applied to the motor. Parameters C7.4.3, C7.4.4 and C7.4.5 are the three points used to form this curve, as shown in Figure 11.45 on page 190.

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.

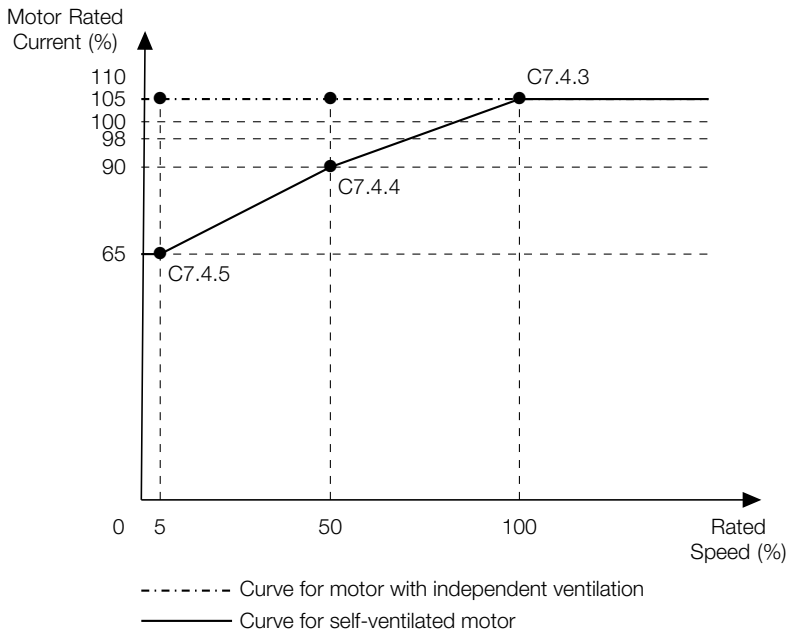


Figure 11.45: *Overload fault levels*

NOTE!
The greater the difference between the motor current and the overload current, the faster the fault is activated F072.

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	Time x Current Curve Class 5.
1 = Class 10E	Time x Current Curve Class 10.
2 = Class 15	Time x Current Curve Class 15.
3 = Class 20E	Time x Current Curve Class 20.
4 = Class 25	Time x Current Curve Class 25.
5 = Class 30E	Time x Current Curve Class 30.
6 = Class 35	Time x Current Curve Class 35.
7 = Class 40	Time x Current Curve Class 40.
8 = Class 45	Time x Current Curve Class 45.

WARNING!
Incorrect selection of 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:

Overload Current = $\frac{I_p}{I_n \times FS} \times 100(\%)$

Overload Time = T_{RB} (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 A
T_{RB} = 4 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,

Overload Current = $\frac{I_p}{I_n \times FS} = \frac{84.2}{10.8 \times 1.15} \times 100(\%)$ = 678 %

Overload Time = T_{RB} = 4 s

Once this is done, just relate the calculated values in the motor overload chart (Figure 11.46 on page 192 or Figure 11.47 on page 193), and select the thermal class curve immediately below the point found.

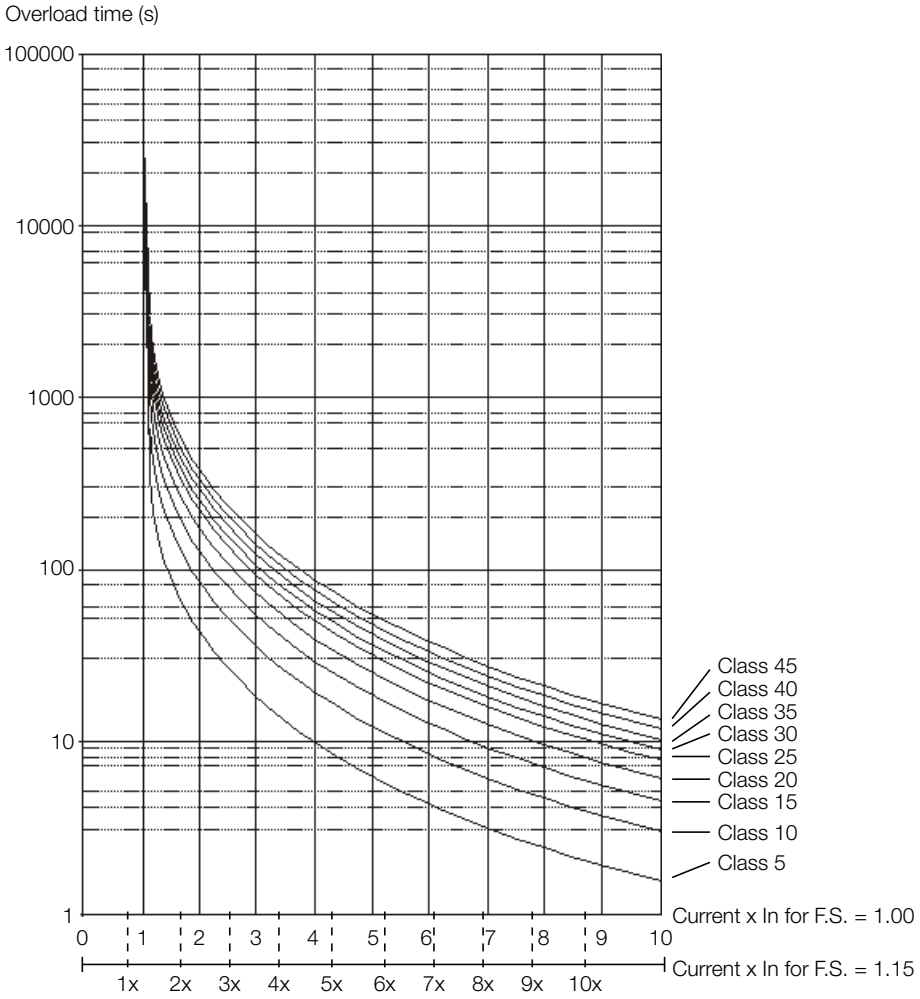


Figure 11.46: *Cold motor overload curves for HD and ND loads.*

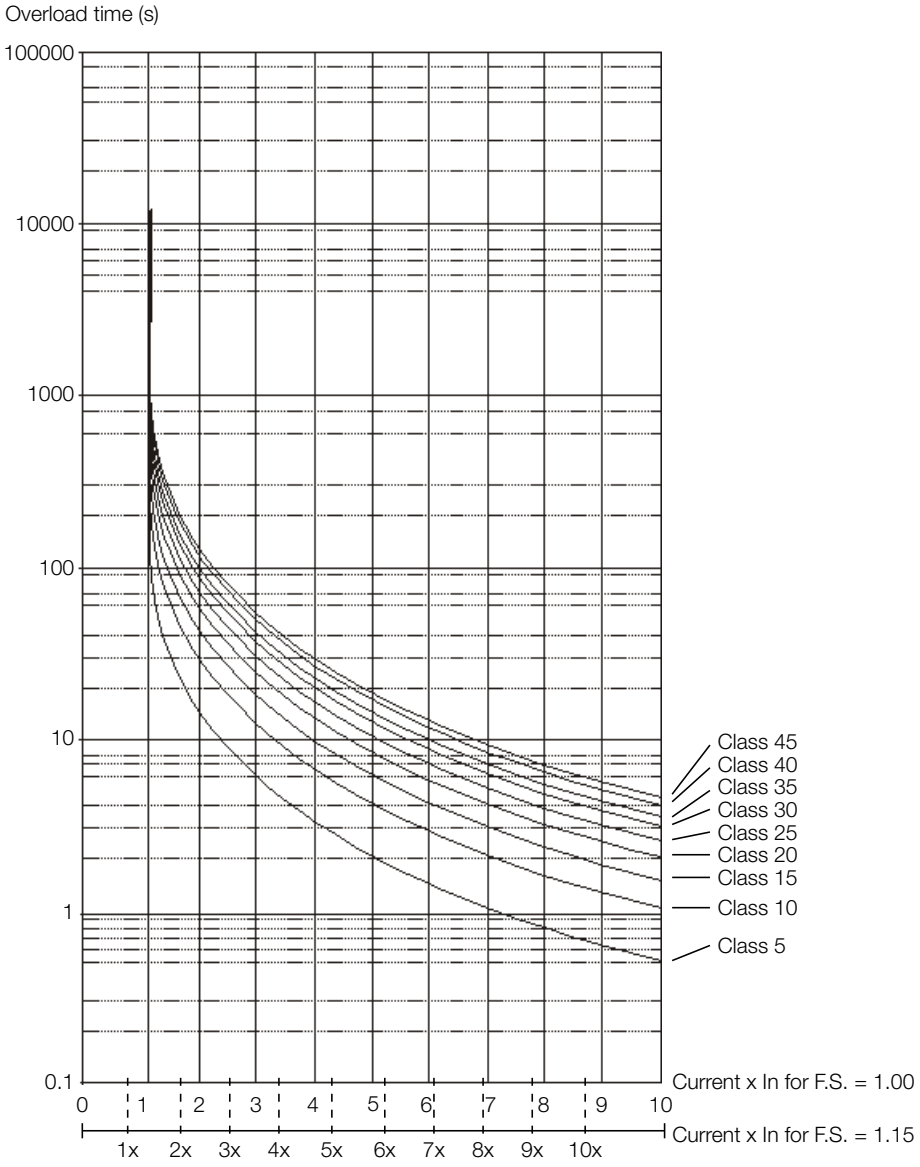


Figure 11.47: *Hot motor overload curves for HD and ND loads.*

For the previous example, relating the value of the Overload Current value 678 % (axis X) to the 4 seconds (axis Y) of the Overload Time in the chart in Figure 11.47 on page 193, (hot motor), the thermal class to be selected will be class 15 (t15).

C7.5 Over/Undertemp. Prot.

It allows setting the Overtemperature and Undertemperature faults.

C7.5 Over/Undertemp. Prot.		
C7.5.1 Configuration		
Range:	0 ... 5 Bit	**Default:** 0
Properties:	Stopped	

Description:
It sets the inverter overtemperature and undertemperature faults.

By default, both fault and alarm are enabled. Also, overtemperature faults cannot be disabled.

Bit	Value/Description
Bit 0 IGBT Overtemp.	It enables IGBT overtemperature faults. **0 = Alarm and Fault**: Overtemperature fault and alarm enabled. **1 = Fault**: Only overtemperature fault enabled.
Bit 1 Rectifier Overtemp.	It enables the rectifier overtemperature faults. **0 = Alarm and Fault**: Overtemperature fault and alarm enabled. **1 = Fault**: Only overtemperature fault enabled.
Bit 2 Power Internal Air 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 Internal Air 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 motor overtemperature fault behavior.

WARNING!
The PTC must feature reinforced insulation of the live parts of the motor and installation.

This function performs the motor overtemperature fault (F078) and alarm generation (A110). For the correct operation, the following items must be observed:

- Only the standard accessory (Slot X) can be used;
- Analog output AO1 set in the PTC function;
- Analog input AI1 set in PTC function.

Once the fault trips, it will be inactive only when the temperature reaches a certain level. The trip and inactivation levels of the alarm and fault can be seen in Table 11.73.

Table 11.73: *Trip and inactivation levels of A110 and F078.*

Situation	PTC	Voltage at AI
Goes into alarm A110 in the temperature rise	$R_{PTC} = 3.51k\Omega$	$V_{AI} > 7.0V$
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 fault disabling F078	$150\Omega < R_{PTC} < 1,6k\Omega$	$0.3 < V_{AI} < 3.2V$
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.

The fault can be disabled, generate only alarm, actuate fault only or actuate alarm and fault according to the table below.

Indication	Description
0 = Alarm and Fault	Alarm and fault enabled.
1 = Fault	Fault enabled.
2 = Alarm	Alarm enabled.
3 = Disabled	Alarm and fault disabled.

C7.6 Fan Speed Fault

It allows setting the Fan Speed faults.

C7.6 Fan Speed Fault

C7.6.1 Power Fan Config.

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

Properties: Stopped

Description:
It enables the fault or alarm actuation for low speed on the inverter heatsink 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 rated speed.

Indication	Description
0 = Alarm/Fault	It enables the fault and alarm. The inverter will be disabled when the fault actuation condition occurs.
1 = Alarm	It enables only the alarm. The inverter will not be disabled, since the fault is disabled.

C7.6 Fan Speed Fault

C7.6.2 Internal Fan Config.

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

Properties: Stopped

Description:
It enables the actuation of fault or alarms 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 rated speed.

Indication	Description
0 = Alarm/Fault	It enables the fault and alarm. The inverter will be disabled when the fault actuation condition occurs.
1 = Alarm	It enables only the alarm. The inverter will not be disabled, since the fault is disabled.

C7.7 Motor Overspeed

It allows setting the Motor Overspeed fault.

C7.7 Motor Overspeed

C7.7.1 Maximum Overspeed Level

Range: 0.0 ... 100.0 % **Default:** 10.0 %

Properties: Stopped

Description:
It sets the highest speed value the motor can operate at, and should be set as a percentage of the maximum speed limit. The maximum speed limit can be set in C4.3.1.1.2.

When the effective speed exceeds the value of C4.3.1.1.2 + C7.7.1 for more than 20 ms, the CFW900 will disable the PWM pulses and indicate fault (F150).

If you want to disable this function, set C7.7.1 = 100.0%.

C7.8 Pre-charge

It allows setting the inverter Pre-charge fault.

C7.8 Pre-charge		
C7.8.1 Pre-charge Fault Settings		
Range:	0 ... 3 Bit	**Default:** 15
Properties:		

Description:
It enables pre-charge fault (F185) due to its possible causes.

Bit	Value/Description
Bit 0 Phase disconnected	It enables the detection of disconnected phase for fault F185. **0 = Disabled**: It disables the phase disconnected detection. **1 = Enabled**: It enables the 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 Unb.	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 is performed. Therefore, if a fault operates four consecutive times, the inverter will remain disabled (general disable) and the fault will continue to be actuated.

If C7.9.1 $\leq$ 2, no auto-reset will occur.

C7.10 External Fault/Alarm

It allows configuring the Fault and External 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 to No External Alarm function.

When a transition from 1 to 0 occurs on the digital input programmed for the function External Alarm, alarm A090 will be indicated. On transition from 0 to 1 on the programmed digital input, the alarm will be cleared. The motor keeps running normally, regardless the state of the digital input.

Table 11.77 on page 197 shows the options.

Digital Inputs options for X and A...G Slots								
Indication	Slot X	Slot A	Slot B	Slot C	Slot D	Slot E	Slot F	Slot G
Inactive	0							
DI1	X-1 (1)	A-1 (7)	B-1 (15)	C-1 (23)	D-1 (31)	E-1 (39)	F-1 (47)	G-1 (55)
DI2	X-2 (2)	A-2 (8)	B-2 (16)	C-2 (24)	D-2 (32)	E-2 (40)	F-2 (48)	G-2 (56)
DI3	X-3 (3)	A-3 (9)	B-3 (17)	C-3 (25)	D-3 (33)	E-3 (41)	F-3 (49)	G-3 (57)
DI4	X-4 (4)	A-4 (10)	B-4 (18)	C-4 (26)	D-4 (34)	E-4 (42)	F-4 (50)	G-4 (58)
DI5	X-5 (5)	A-5 (11)	B-5 (19)	C-5 (27)	D-5 (35)	E-5 (43)	F-5 (51)	G-5 (59)
DI6	X-6 (6)	A-6 (12)	B-6 (20)	C-6 (28)	D-6 (36)	E-6 (44)	F-6 (52)	G-6 (60)
DI7	–	A-7 (13)	B-7 (21)	C-7 (29)	D-7 (37)	E-7 (45)	F-6 (53)	G-7 (61)
DI8	–	A-8 (14)	B-8 (22)	C-8 (30)	D-8 (38)	E-8 (46)	F-6 (54)	G-8 (62)

Table 11.77: *Values assigned to the Digital Inputs of X and A...G Slots for defining command activation.*

NOTE!
E.g.: To choose digital input 4 of Slot C to activate a command, the parameter must be set to value C-4 (26).

C7.10 External Fault/Alarm

C7.10.2 External Fault DI

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

Description:
It enables the use and defines the digital input that will be used to disable the External Fault function. Table 11.77 on page 197 shows the options.

When a transition from 1 to 0 occurs on the digital input programmed for External Fault, the inverter goes into fault indicating fault F091 as shown in Figure 11.48 on page 197.

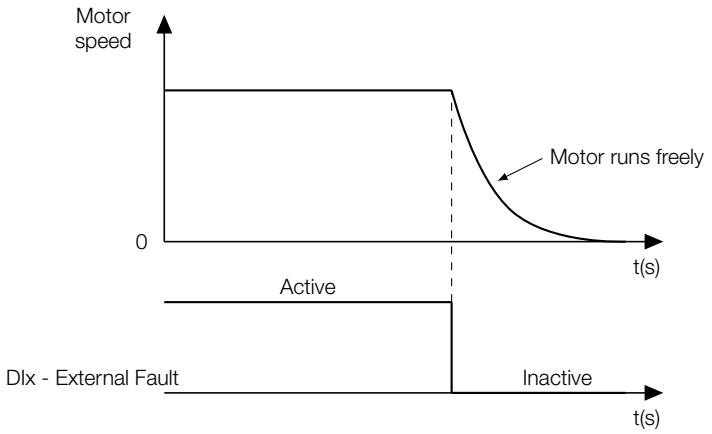


Figure 11.48: *External fault via digital input*

C7.11 Thermal Management

The thermal management function is a set of faults and actions that the inverter performs as a function of measured and estimated temperatures of the IGBTs, rectifiers, heatsink and internal air to protect the equipment integrity and functionality.

C7.11 Thermal Management
C7.11.1 Jt, min IGBT Overload Fast Curve
Range: -50 ... 200 °C **Default:** 120 °C
Properties:

Description:
It selects the temperature at which the overload fault of IGBTs can use the fast curve.

If the maximum junction temperature is below this temperature, only the slow curve is used for any ratio between the output current and rated current above 1. If the maximum junction temperature is above this value, the fast curve is used from ratio 1.15 for normal duty (ND) and 1.5 for heavy duty (HD).

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 heatsink and IGBT junction 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 less 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 Heatsink Temp. Reg. with fsw Operation	It enables the switching frequency regulation loop as a function of the heatsink 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 heatsink fan speed regulation loop as a function of its temperature. **0 = Disabled**: Loop disabled. **1 = Enabled**: Loop enabled.

C7.11 Thermal Management
C7.11.7 Junction Temp. Regul. - Proport. Gain
Range: 0.00 ... 20.00 **Default:** 1.00
Properties:

Description:
Proportional gain of the switching frequency regulation loop as a function of the maximum IGBT junction temperature.

C7.11 Thermal Management
C7.11.8 Junction Temp. Regul. - Integral Gain
Range: 0.00 ... 20.00 **Default:** 1.00
Properties:

Description:
Integral gain of the switching frequency regulation loop as a function of the maximum IGBT junction temperature.

C7.11 Thermal Management		
C7.11.9 NTC Temp. Regul. - Proport. Gain		
Range:	0.00 ... 20.00	**Default:** 1.00
Properties:		

Description:
Proportional gain of the switching frequency regulation loop as a function of the maximum NTC temperature.

C7.11 Thermal Management		
C7.11.10 NTC Temp. Regul. - Integral Gain		
Range:	0.00 ... 20.00	**Default:** 1.00
Properties:		

Description:
Integral gain of the switching frequency regulation loop as a function of the maximum NTC temperature.

C8 FUNCTIONAL SAFETY

It allows configuring parameters related to the functional safety of 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 programmed SS1-t delay time (S4.2), the STO state will be reached before the complete stop of the motor.

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 enabled. It disables the motor.
2 = Alarm	Alarm enabled. Acts as described in C9.1.1.2.

C9.1.1 Master Offline

C9.1.1.2 Alarm Action

Range: 0 ... 4 **Default:** 2

Properties:

Description:
Action for offline communication alarm for any network interface - A128, A133, A134, A135, A137 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 stops by inertia.
3 = Go to R1	The equipment is commanded to the remote 1 status.
4 = Go to R2	The equipment is commanded to the remote 2 status.

NOTE!
The alarm action will only have a function if the error tripping mode in C9.1.1.1 is programmed for Alarm.

C9.1.2 Master Idle/Prog

Network master status fault.

If there is a transition of the network master status from the operation mode (Run) to the configuration mode (Idle/Prog), a communication error will be issued, an alarm or fault will be displayed on the HMI, depending on the programming made in this menu.

It only occurs after the network master Run mode is detected. The way to detect this condition depends on the communication protocol and the network master.

C9.1.2 Master Idle/Prog

C9.1.2.1 Mode

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

Properties:

Description:
It allows configuring the fault tripping mode when the network master is placed in programming mode (Idle/Prog).

Indication	Description
0 = Inactive	Alarm and fault disabled.
1 = Fault	Only fault enabled. It disables the motor.
2 = Alarm	Acts as an alarm. Action described in C9.1.2.2.

C9.1.2 Master Idle/Prog

C9.1.2.2 Action Alarm

Range: 0 ... 4 **Default:** 2

Properties:

Description:

Action for 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 stops by inertia.
3 = Go to R1	The equipment is commanded to the remote 1 status.
4 = Go to R2	The equipment is commanded to the remote 2 status.

NOTE!
The alarm action will only have a function if the error tripping mode in C9.1.2.1 is programmed for Alarm.

C9.2 I/O Data

It sets the cyclic data exchange area of the communication networks.

C9.2.1 Reading Data

It configures a set of 16-bit parameters to be read via communication network.

C9.2.1 Reading Data

C9.2.1.1 Word #1

C9.2.1.1 to C9.2.1.100

C9.2.1 Reading Data

C9.2.1.100 Word #100

Range: 0 ... 9999 **Default:** 0

Properties: Stopped

Description:

It selects the address (Net Id) of the parameter whose content should be provided in the reading area for the fieldbus interfaces (input: sent to the network master).

The size of the referenced parameter must be taken into account. If the data size is greater than 16 bits, the configuration parameter of the next programmable word must be set to the same address.

C9.2.2 Writing Data

It configures a set of 16-bit parameters to be written via communication network.

C9.2.2 Writing Data		
C9.2.2.1 Update Delay		
Range:	0.0 ... 999.0 s	**Default:** 0.0 s
Properties:		

Description:
Whenever there is a transition from offline (without cyclic data) to online (with cyclic writing data), the data received via communication network (writing words) is ignored during this programmed time, remaining in the status it was before the beginning of the reception.

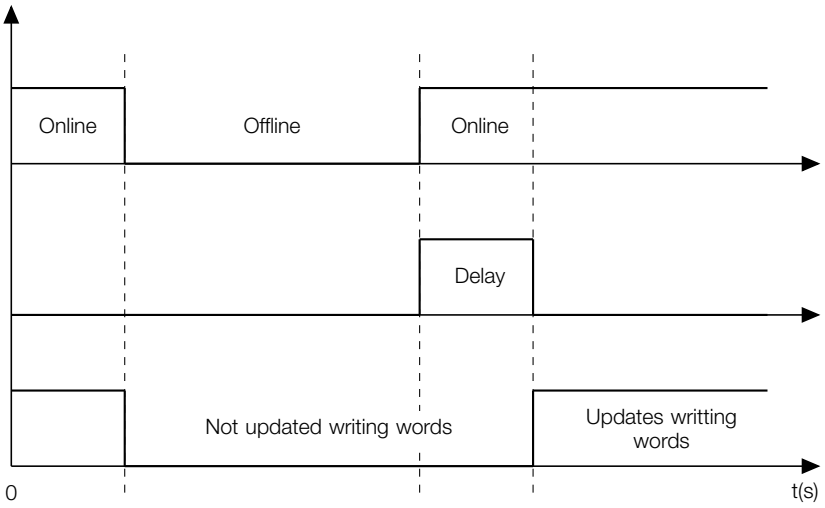


Figure 11.49: *Delay in the update of the I/O words*

C9.2.2 Writing Data
C9.2.2.2 Word #1

C9.2.2.2 to C9.2.2.101

C9.2.2 Writing Data		
C9.2.2.101 Word #100		
Range:	0 ... 9999	**Default:** 0
Properties:	Stopped	

Description:
It selects the address (Net Id) of the parameter whose content should be provided in the writing area for the fieldbus interfaces (output: received from the network master).

The size of the referenced parameter must be taken into account. If the data size is greater than 16 bits, the configuration parameter of the next programmable word must be set to the same address.

C9.3 Serial RS485

Configuration for the RS485 communication interface and the protocols that use this interface.

For a detailed description, refer to the 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 select the desired protocol for the RS485 serial interface.

Indication	Description
0 ... 1 = Reserved	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 select the address used for the serial communication.

It is necessary that each device on the network has a different address from all the others.

C9.3 Serial RS485

C9.3.3 Baud Rate

Range: 0 ... 3 **Default:** 1
Properties: Stopped

Description:
Select the desired value for the baud rate of the serial interface in bit per second. This rate must be the same for all devices connected to the network.

Indication	Description
0 = 9600 bit/s	Rate of 9600 bits per second.
1 = 19200 bit/s	Rate of 19200 bits per second.
2 = 38400 bit/s	Rate of 38400 bits per second.
3 = 57600 bit/s	Rate of 57600 bits per second.

C9.3 Serial RS485

C9.3.4 Bytes Config.

Range: 0 ... 5 **Default:** 1
Properties: Stopped

Description:
Select the settings for the number of data bits, parity and stop bits in the serial interface bytes. This setting must be identical for all the devices connected to the network.

Indication	Description
0 = 8-bits, no, 1	8 bits, no parity, 1 stop bit.
1 = 8-bits, even,1	8 bits, with even parity, 1 stop bit.
2 = 8-bits, odd, 1	8 bits, with odd parity, 1 stop bit.
3 = 8-bits, no, 2	8 bits, no parity, 2 stop bit.
4 = 8-bits, even,2	8 bits, with even parity, 2 stop bit.
5 = 8-bits, odd, 2	8 bits, with odd parity, 2 stop bit.

C9.3 Serial RS485

C9.3.5 RS485 Timeout

Range: 0.0 ... 999.0 s **Default:** 0.0 s
Properties: Stopped

Description:
Maximum time without communication.

C9.4 Ethernet

Settings for the product built-in Ethernet port.

For a detailed description, see the CFW900 Modbus TCP Communication Manual, available in electronic format.

C9.4 Ethernet

C9.4.1 IP Address Configuration

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	It enables the DHCP function. The IP address and other network settings are received from a DHCP server via network.

C9.4 Ethernet

C9.4.2 IP Address

Range: 0.0.0.0 ... 255.255.255.255 **Default:** 192.168.0.10
Properties:

Description:
It allows programming the IP address of the Ethernet interface. It only takes effect if the address was set via parameters.

C9.4 Ethernet

C9.4.3 Network Mask

Range: 0 ... 31 **Default:** 24
Properties:

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 = Reserved	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

Indication	Description
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.

C9.5 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 during 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 detail each of these control and status words.

Indication	Description
0 = 20/70 CIP	Basic Speed, these instances represent the simplest operation interface of a device according to the AC/DC Drive Profile
1 = 21/71 CIP	Extended Speed, these instances represent a slightly improved interface for operating the device that follows the AC/DC Device Profile
2 ... 3 = Not used	Not used.
4 = 120/170 CIP + I/O data	They have the same data format as the 20/70 CIP Basic Speed Control instances. In addition, it is possible to program up to 48 parameters of the equipment itself for reading and/or 48 for writing via network
5 = 121/171 CIP + I/O data	They have the same data format as the 21/71 CIP Extended Speed Control instances. In addition, it is possible to program up to 48 parameters of the device itself for reading and/or 48 for writing via network
6 ... 7 = Not used	Not used.
8 = 100/150 Manuf. + I/O data	These instances represent the operating interface of the device according to the 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 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 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).

C9.5 EtherNet/IP		
C9.5.3 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 word set in C8.4.1.

C9.5 EtherNet/IP		
C9.5.4 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).

C9.5 EtherNet/IP		
C9.5.5 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 word set in C8.4.3.

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.

C9.8 CAN/CANopen/DNet

It sets CAN communication accessory and protocols that use this interface.

C9.8 CAN/CANopen/DNet		
C9.8.1 Protocol		
Range:	0 ... 2	**Default:** 2
Properties:	Stopped	

Description:
It allows selecting the desired protocol for the CAN interface.

Indication	Description
0 = Disabled	It disables the CAN interface.
1 = CANopen	It enables the CAN interface with CANopen protocol.
2 = DeviceNet	It enables the CAN interface with DeviceNet protocol.

C9.8 CAN/CANopen/DNet		
C9.8.2 Address		
Range:	0 ... 127	**Default:** 63
Properties:	Stopped	

Description:
It allows programming the address used for CAN communication of the device. It is necessary that each device on the network has a different address from the others. Valid addresses for this parameter depend on the protocol selected in C9.8.1:

- C9.8.1 = 1 (CANopen): valid addresses: 1 to 127.
- C9.8.1 = 2 (DeviceNet): valid addresses: 0 to 63.

NOTE!
After changing this configuration, the modification will only take effect if the CAN interface is not exchanging cyclical data with the network.

C9.8 CAN/CANopen/DNet		
C9.8.3 Baud Rate		
Range:	0 ... 5	**Default:** 0
Properties:	Stopped	

Description:
It allows programming the desired value for the baud rate of the CAN interface in bit per second. This rate must be the same for all devices connected to the network. The supported baud rates for the device depend on the protocol set in C9.8.1:

- C9.8.1 = 1 (CANopen): any rate indicated in this parameter can be used, but it does not have the automatic rate detection function (autobaud).
- C9.8.1 = 2 (DeviceNet): Only rates of 500, 250 and 125 Kbit/s are supported. Other options enable the automatic rate detection function (autobaud).

For the autobaud function, after a successful detection, the baud rate parameter (C9.8.3) automatically changes to the detected rate. To run the autobaud function again, it is necessary to change the parameter C9.8.3 to one of the autobaud options.

Indication	Description
0 = 1 Mbps/Auto	CAN baud rate (automatic detection for DeviceNet).
1 = Reserved/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 programmed in parameter C9.1.2.2 will be executed. For the equipment to communicate again via CAN interface, it will be necessary to disable and enable the interface, or restart the product.
1 = Automatic	If bus off occurs, the communication will be automatically restarted, and the error will be ignored. In this case the alarm will not be displayed on the HMI and the device will not execute the action described in C9.1.2.2.

C9.8 CAN/CANopen/DNet

C9.8.5 DeviceNet I/O Instances

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

Description:
It allows selecting the Assembly class instance used during the exchange of I/O data with the network master.

The 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 detail each of these control and status words.

Indication	Description
0 = 20/70 CIP	Basic Speed, these instances represent the simplest operation interface of a device according to the AC/DC Drive Profile
1 = 21/71 CIP	Extended Speed, these instances represent a slightly improved interface for operating the device that follows the AC/DC Device Profile
2 ... 3 = Not used	Not used.
4 = 120/170 CIP + I/O data	They have the same data format as the 20/70 CIP Basic Speed Control instances. In addition, it is possible to program up to 48 parameters of the equipment itself for reading and/or 48 for writing via network
5 = 121/171 CIP + I/O data	They have the same data format as the 21/71 CIP Extended Speed Control instances. In addition, it is possible to program up to 48 parameters of the device itself for reading and/or 48 for writing via network
6 ... 7 = Not used	Not used.
8 = 100/150 Manuf. + I/O data	These instances represent the operating interface of the device according to the 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 writing via network

Indication	Description
9 = 101/151 Manuf. + I/O data	These instances represent an interface very similar to the 100/150 Manufacturer Speed Control + configurable I/O data, with the only difference being the possibility of sending the torque limit
10 = 102/152 Config I/O data	In these instances it is possible to program up to 50 parameters of the equipment itself for reading and/or 50 for writing via network

NOTE!
After changing this configuration, the modification will only take effect if the CAN interface is not exchanging cyclical data with the network.

C9.8 CAN/CANopen/DNet
C9.8.6 DNet Reading 1st Word
Range: 1 ... 100 **Default:** 1
Properties: Stopped

Description:
It sets the index of the first programmable reading word for data exchange with the network (input to the network master).

C9.8 CAN/CANopen/DNet
C9.8.7 DNet Reading Quantity
Range: 0 ... 50 **Default:** 0
Properties: Stopped

Description:
It sets the number of programmable reading words for data exchange with the network (input to the network master), from the first configured word.

C9.8 CAN/CANopen/DNet
C9.8.8 DNet Writing 1st Word
Range: 1 ... 100 **Default:** 1
Properties: Stopped

Description:
It sets the index of the first programmable writing word for data exchange with the network (output to the network master).

C9.8 CAN/CANopen/DNet
C9.8.9 DNet Writing Quantity
Range: 0 ... 50 **Default:** 0
Properties: Stopped

Description:
It sets the number of programmable writing words for data exchange with the network (output to the network master), from the first configured word.

C9.10 Bluetooth

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

To use this product with another device that is Bluetooth enabled, both devices need to be paired.

C9.10 Bluetooth
C9.10.1 Mode
Range: 0 ... 1 **Default:** 0
Properties:

Description:
The Bluetooth setting is inactive by default. This setting must be enabled to use the Bluetooth wireless interface.

Indication	Description
0 = Inactive	Inactive.
1 = Active	Active.

C9.10 Bluetooth
C9.10.2 PIN

Default: 123456

Properties:

Description:
Before using the product with another Bluetooth-enabled device for the first time, pair it using the six-digit PIN set in this parameter.

The PIN must have 6 digits from 0 to 9.

C9.10 Bluetooth
C9.10.3 Device Name

Default: -

Properties: Model

Description:
You can set the Bluetooth device name.

By default, the Bluetooth name of the product is CFW9x plus the product serial number (e.g. CFW9x0123456789).

The device name must have 1 to 15 alphanumeric digits.

C9.11 SymbiNet

SymbiNet is a communication protocol that enables information exchange directly among devices that support such protocol. For CFW900, communication uses 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.
- The programming for exchanging data is performed based on the existing Modbus registers for the device. One must then know the list of Modbus registers for the correct data addressing during programming.
- It uses the Publisher/Subscriber mechanism, where each device publishes its data so that one or more subscribers will 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 sharing
- 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 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 equipments 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.

C9.11 SymbiNet

C9.11.1 Enable Protocol

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

Properties: Stopped

Description:
Allows enabling SymbiNet protocol over Ethernet interface, for data exchange among SymbiNet devices.

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

C9.11 SymbiNet

C9.11.2 Publication Time

Range: 2 ... 100 ms **Default:** 20 ms

Properties:

Description:
Allows you to program, in milliseconds, the time of publication of the data requested by the remote stations.

This time is also used as a basis for timeout detection of locally programmed groups. If the data programmed for a group is no longer received for more than 10 times the time programmed in this parameter, the group status is marked as inactive.

It is recommended that all participants of the SymbiNet network have equal times.

C9.11 SymbiNet

C9.11.3 Grp1: Source Addr.

Range: 0 ... 254 **Default:** 0

Properties:

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.11 SymbiNet		
C9.11.4 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.

C9.11 SymbiNet		
C9.11.5 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.

C9.11 SymbiNet		
C9.11.6 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.

C9.11 SymbiNet		
C9.11.7 Grp2: Source Addr.		
Range:	0 ... 254	**Default:** 0
Properties:		

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.11 SymbiNet		
C9.11.8 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.

C9.11 SymbiNet		
C9.11.9 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.

C9.11 SymbiNet
C9.11.10 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.

C9.11 SymbiNet
C9.11.11 Grp3: Source Addr.
Range: 0 ... 254 **Default:** 0
Properties:

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.11 SymbiNet
C9.11.12 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.

C9.11 SymbiNet
C9.11.13 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.

C9.11 SymbiNet
C9.11.14 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.

C9.11 SymbiNet
C9.11.15 Grp4: Source Addr.
Range: 0 ... 254 **Default:** 0
Properties:

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.11 SymbiNet
C9.11.16 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.

C9.11 SymbiNet
C9.11.17 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.

C9.11 SymbiNet
C9.11.18 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.

C9.11 SymbiNet
C9.11.19 Grp5: Source Addr.
Range: 0 ... 254 **Default:** 0
Properties:

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.11 SymbiNet
C9.11.20 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.

C9.11 SymbiNet
C9.11.21 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.

C9.11 SymbiNet
C9.11.22 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.

C9.11 SymbiNet
C9.11.23 Grp6: Source Addr.
Range: 0 ... 254 **Default:** 0
Properties:

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.11 SymbiNet
C9.11.24 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.

C9.11 SymbiNet
C9.11.25 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.

C9.11 SymbiNet
C9.11.26 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.

C9.11 SymbiNet
C9.11.27 Grp7: Source Addr.
Range: 0 ... 254 **Default:** 0
Properties:

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.11 SymbiNet
C9.11.28 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.

C9.11 SymbiNet
C9.11.29 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.

C9.11 SymbiNet		
C9.11.30 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.

C9.11 SymbiNet		
C9.11.31 Grp8: Source Addr.		
Range:	0 ... 254	**Default:** 0
Properties:		

Description:
Program the address of a remote station, responsible for publishing the Modbus registers programmed in this group.

For Ethernet, this address represents the last octet of the IP address. The other three octets are the same to the IP address of localhost.

C9.11 SymbiNet		
C9.11.32 Grp8: Source Reg.		
Range:	0 ... 65535	**Default:** 0
Properties:		

Description:
Program the initial address of the Modbus registers to be published by the remote station.

C9.11 SymbiNet		
C9.11.33 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.

C9.11 SymbiNet		
C9.11.34 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 function allows the frequency inverter to assume PLC (Programmable Logic Controller) functions. For more details regarding the programming of these functions in the CFW900, consult the Help texts in the WPS software (WEG Programming Suite).

C10.1 Configuration

It allows setting parameters of the SoftPLC function.

C10.1 Configuration		
C10.1.1 Command		
Range:	0 ... 5	**Default:** 0
Properties:	Stopped	

Description:
Allow the user to execute commands for the application.

Indication	Description
0 = Stop	For the active application.
1 = Run	It runs the active application.
2 ... 4 = Not Used	
5 = Erase	It deletes the active user application.

C10.1 Configuration
C10.1.2 Active Application
Range: 0 ... 6 **Default:** 0
Properties: Stopped

Description:
It allows the user to select the active application.

Indication	Description
0 = User Application 1	When selected, it is possible to download, stop, run or delete the user application configured in the WPS software.
1 = User Application 2	When selected, it is possible to download, stop, execute or delete another user program.
2 ... 6 = Not used	Not used.

C10.1 Configuration
C10.1.3 Action Application Stopped
Range: 0 ... 2 **Default:** 0
Properties:

Description:
Allow the user to set the action for when the SoftPLC application is not running.

Indication	Description
0 = Inactive	No action.
1 = Generate Alarm	It generates the alarm 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 displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

The options are shown in the table below.

Engineering Unit Options					
0 = No Unit	11 = m^3/h	22 = gal/s	33 = kgf/m^2	44 = mca	55 = Nm
1 = A	12 = m^3/min	23 = H	34 = kl/h	45 = m	56 = Pa
2 = bar	13 = m^3/s	24 = Hz	35 = kPa	46 = m/h	57 = %
3 = °C	14 =°F	25 = HP	36 = kW	47 = m/min	58 = psi
4 = CPM	15 = ft	26 = h	37 = kWh	48 = m/s	59 = rpm
5 = CV	16 = ft/h	27 = in	38 = l	49 = mbar	60 = s
6 = ft^3	17 = ft/min	28 = InWC	39 = l/h	50 = ms	61 = V
7 = ft^3/h	18 = ft/s	29 = K	40 = l/min	51 = min	62 = W
8 = ft^3/min	19 = gal	30 = kg	41 = l/s	52 = MPa	63 = W/m^2
9 = ft^3/s	20 = gal/h	31 = kgf	42 = lbf	53 = mwc	64 = Wh/m^2
10 = m^3	21 = gal/min	32 = kgf/cm^2	43 = mA	54 = N	

Table 11.97: *Engineering Units associated with the SoftPLC user parameter.*

C10.2 Engineering Unit

C10.2.2 Dec. Point Eng. Unit 1

Range: 0 ... 3 **Default:** 1

Properties:

Description:

This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

C10.2 Engineering Unit

C10.2.3 Engineering Unit 2

Range: 0 ... 64 **Default:** 0

Properties:

Description:

This parameter selects the engineering unit displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

Table 11.97 on page 219 shows the options.

C10.2 Engineering Unit

C10.2.4 Dec. Point Eng. Unit 2

Range: 0 ... 3 **Default:** 1

Properties:

Description:

This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

C10.2 Engineering Unit

C10.2.5 Engineering Unit 3

Range: 0 ... 64 **Default:** 0

Properties:

Description:

This parameter selects the engineering unit displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

Table 11.97 on page 219 shows the options.

C10.2 Engineering Unit

C10.2.6 Dec. Point Eng. Unit 3

Range: 0 ... 3 **Default:** 1

Properties:

Description:
This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

C10.2 Engineering Unit		
C10.2.7 Engineering Unit 4		
Range:	0 ... 64	**Default:** 0
Properties:		

Description:
This parameter selects the engineering unit displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (engineering unit) will be displayed in this format.

Table 11.97 on page 219 shows the options.

C10.2 Engineering Unit		
C10.2.8 Dec. Point Eng. Unit 4		
Range:	0 ... 3	**Default:** 1
Properties:		

Description:
This parameter selects the decimal point displayed on the HMI, that is, any SoftPLC user parameter associated with this parameter (decimal point) will be displayed in this format.

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.

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

Table 11.98: *Time zone where the product is applied.*

C11.1 Configuration
C11.1.2 Date/Hour
Range: YYYY-MM-DD HH:MM:SS
Properties:

Description:
Setting of the CFW900 Real Time Clock (RTC) date and time.

It is important to set it to the correct date and time so that the faults and alarms logs occur with real date and time information.

C11.1 Configuration
C11.1.3 Language
Range: 0 ... 3 **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

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.

C11.2 Main Screen

It allows programming what should be shown on the main monitoring screen. Options to add, edit and remove parameters are presented.

Programming is performed by directly selecting the menu to which the content is to be displayed.

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.

More information see Chapter 8.6.

C11.3 User

It allows to login and change the current user password.

More information see Chapter 8.5.

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

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, as well as load or save parameter sets 1, 2, 3, SD card and HMI.

Indication	Description
0 = Not Used	Not used.
1 = Default 60 Hz	It loads the 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 at 125 rpm; ▪ C4.3.1.3.1 set at 75 rpm; ▪ C4.3.1.5.1 set at 75 rpm; ▪ C4.3.1.5.2 set at 250 rpm; ▪ C4.3.1.5.3 set at 500 rpm; ▪ C4.3.1.5.4 set at 750 rpm; ▪ C4.3.1.5.5 set at 1000 rpm; ▪ C4.3.1.5.6 set at 1250 rpm; ▪ C4.3.1.5.7 set at 1500 rpm; ▪ C4.3.1.5.8 set at 1375 rpm; ▪ C4.3.1.1.1 set at 75 rpm; ▪ C4.3.1.1.2 set at 1500 rpm; ▪ C5.9.3 set at 15 rpm; ▪ C5.9.4 set at 100 rpm; ▪ C5.9.5 set at 1500 rpm; ▪ C5.9.8 set at 15 rpm; ▪ C2.1.8 set at 1458 rpm; ▪ C2.1.6 set at 50 Hz; ▪ C2.1.2 set at kW; ▪ C3.3.4.1.1 set at 1500 rpm; ▪ C3.3.4.1.2 set at 1500 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 for parameter set 1.
7 = CFW -> Param. Set 2	It saves the content of the CFW900 current settings for parameter set 2.
8 = CFW -> Param. Set 3	It saves the content of the CFW900 current settings for parameter set 3.
9 = SD Card -> CFW	It loads the CFW900 settings with the content of parameter set imported from the SD card. Additionally, it imports the settings of parameter sets 1, 2 and 3 from the SD card to the inverter memory
10 = 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	Loads the settings saved on the HMI.

Indication	Description
12 = CFW -> HMI	Saves the present settings to the HMI.

The Figure 11.50 on page 223 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.

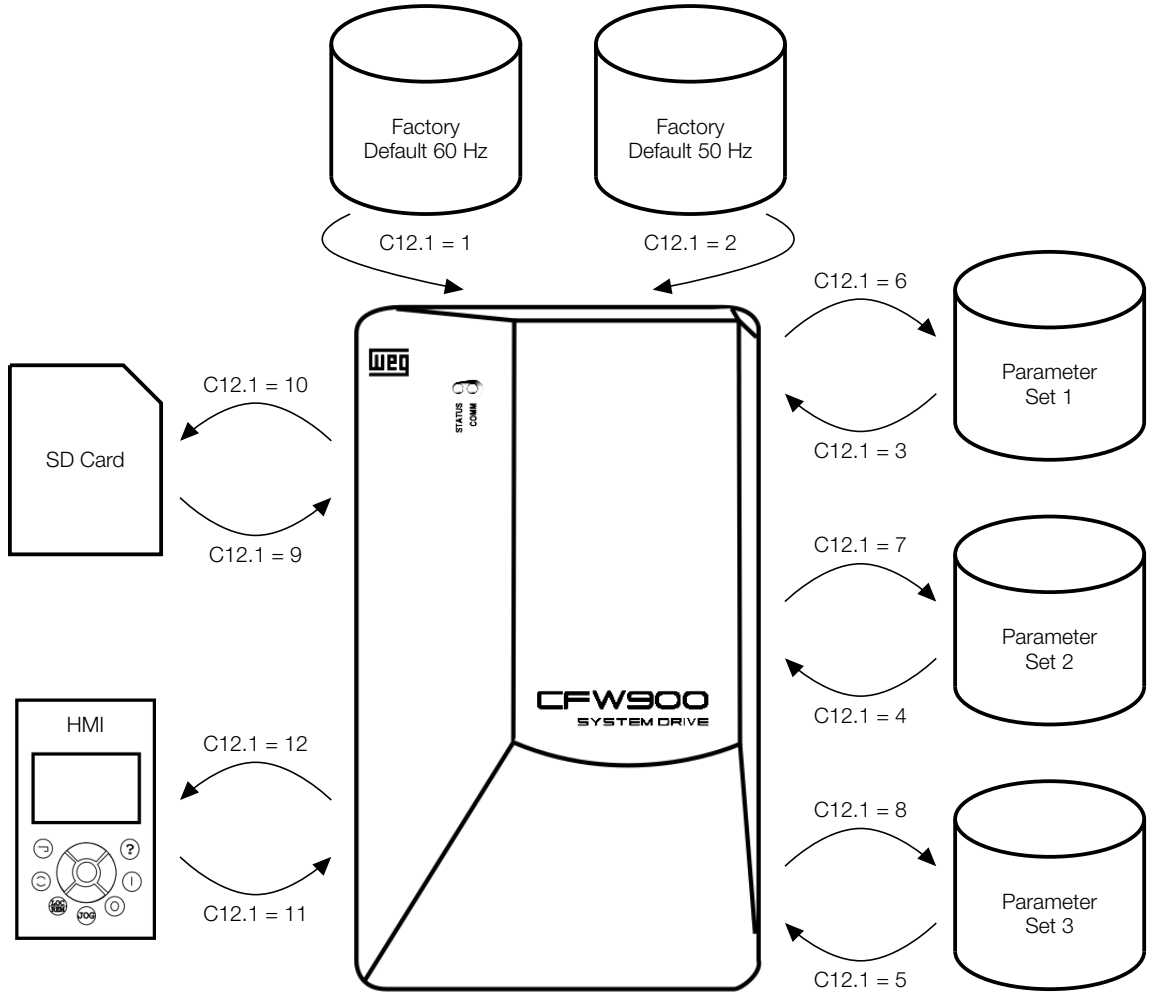


Figure 11.50: *Load settings.*

NOTE!
The load commands of parameter C12.1 does 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 also not restored:

- 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 drive version, the parameters are not loaded. If the parameter set to be loaded is from a different drive model, model-specific parameters are not loaded.

WARNING!
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.

12 W WIZARDS

It allows setting the parameters related to the Oriented Startup 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, 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 Startup Assistant again, set the parameter W1 = 1, as shown in the following screens.

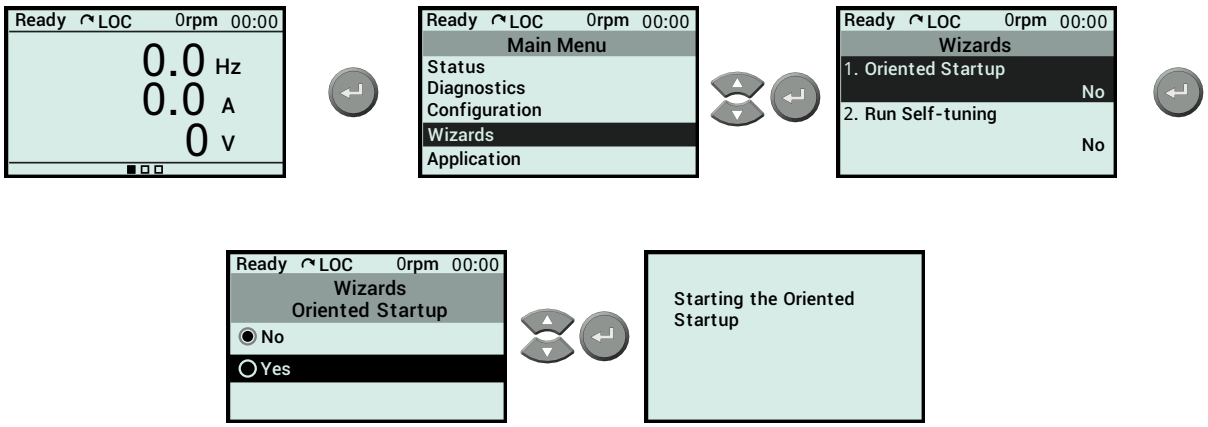


Figure 12.1: *Oriented Startup.*

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 type of control to be used in the application.

Indication	Description
0 = No	Does not run.
1 = Yes	Run.

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 a digital input programmed for general enable.

NOTE!
During the running of the Self-tuning function no other operations should be performed on the inverter, such as: setting, copying and loading factory default parameters, downloading parameters via WPS, executing commands, etc.

It defines the motor parameter identification mode. After selected the identification method, self-tuning starts performing the steps automatically.

Indication	Description
0 = No	Function disabled.
1 = Stopped	Self-tuning with the motor stopped.
2 = Running	Self-tuning with the motor running.

NOTE!
For the VVW+ control, regardless of the option selected in parameter W2, the self-tuning will always be performed with the motor stopped.

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.

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