# Quick Start Guide
# RSi "SW" Series VFD
# Using the 7-segment (4 digit LED) Keypad/Display

## Contents

This guide contains basic parameter settings for control and protection of a standard induction motor when using the 7-segment (4 digit LED) keypad that comes mounted on the drive. The default settings are used for a standard induction motor controlled with a linear (fixed) V/Hz. pattern with a base frequency of 60 Hz.

# 1. Display and Keypad Buttons - Operation



Display

Keys
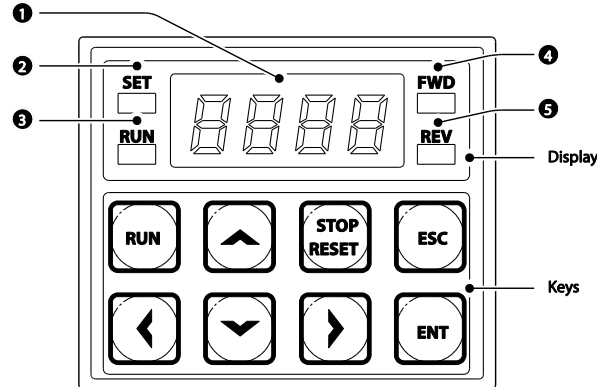
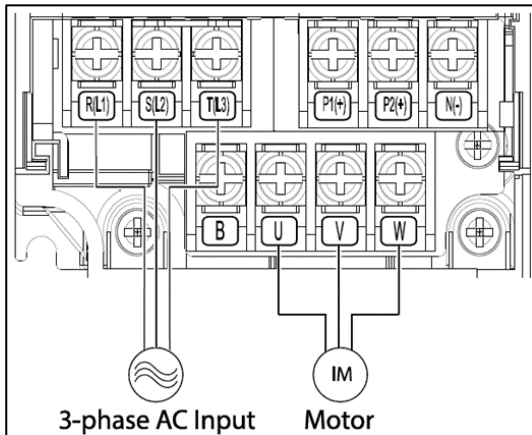| No. | Name | Description |
|---|---|---|
| ❶ | 7-Segment (LED) Display | Displays running speed (Hz. default), operational status, parameters (codes), parameter choices and Fault Codes. |
| ❷ | SET Indicator | LED turns on (steady) when in program (set) mode (see ENT button). Flashes when the ESC key operates as the multi-function key. |
| ❸ | RUN Indicator | LED turns on (steady) during running. Flashes during speed changes (acceleration and deceleration). |
| ❹ | FWD Indicator | LED turns on during forward operation. |
| ❺ | REV Indicator | LED turns on during reverse operation. |

| Pushbutton | Name | Description |
|---|---|---|
| [RUN] | [RUN] button | Press to start/run the inverter when set to Keypad control. |
| [STOP/RESET] | [STOP/RESET] button | STOP: Stops the inverter when set to Keypad control. Note: When using remote keypad (LCD), the Stop button is not active. RESET: Resets the inverter following fault condition. |
| [▲], [▼] | [▲] Up button, [▼] Down button | Move between parameters (codes) within a group. When in program (set) mode, increase or decrease parameter values/settings. |
| [◀], [▶] | [◀] Left button [▶] Right button | Move between parameter groups. Move the cursor when in program (set) mode. |
| [ENT] | [ENT] button | Press ENT to enter the program (set) mode of the displayed parameter. After making changes, Press ENT twice to confirm parameter changes. |
| [ESC] | [ESC] button | A multi-function button used to configure different functions, such as:<br>• Cancellation of a parameter setting<br>• Jog operation<br>• Local/Remote mode switching |

## 2. Wiring
### A. Power Terminals

**0.5 - 1 HP, (0.4-0.8kW)**



3-phase AC Input    Motor

**5.0 - 5.4 HP (3.7 - 4.0kW)**



3-phase AC Input    Motor

**2 - 3 HP, (1.5 - 2.2kW)**



3-phase AC Input    Motor
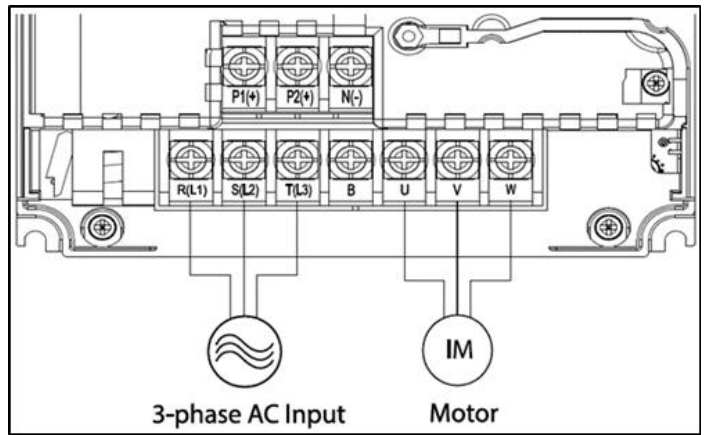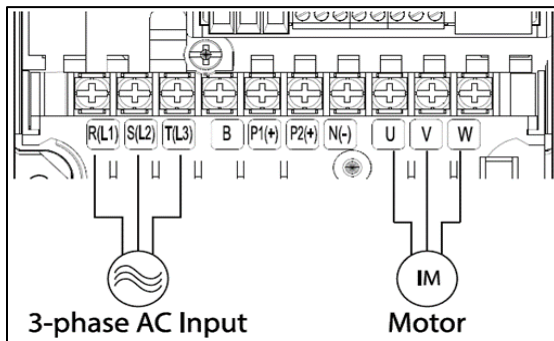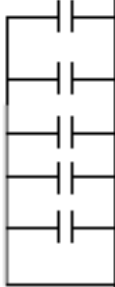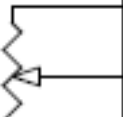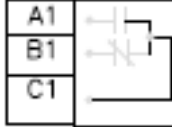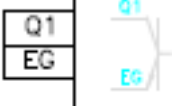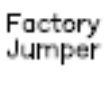
**230V, 7.5 - 20 HP (5.5–15kW)**
**460V, 7.5 HP - 30 HP (5.5 - 22kW)**



3-phase AC input    Motor
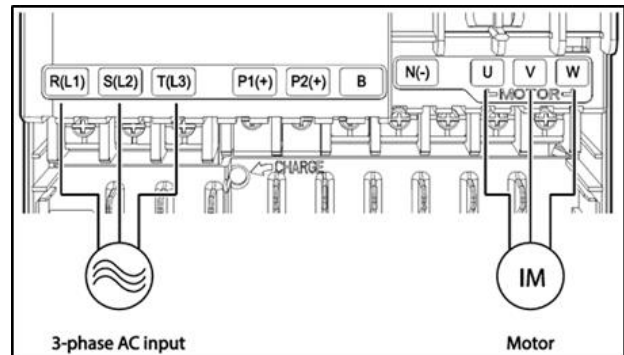
| Terminal Labels | Name | Description |
|---|---|---|
| R(L1)/S(L2)/T(L3) *Use R(L1) and T(L3) for single phase power. | AC Power Input Terminals | AC Supply Power Connections |
| P1(+)/N(-) | DC Bus Terminals | DC Voltage Terminals |
| P1(+)/P2(+) | DC Reactor Terminals | DC Reactor Wiring Connection (When using a DC reactor, the shorting bar must be removed.) |
| P2(+)/B | Brake Resistor Terminals | Brake Resistor Wiring Connection |
| U/V/W | Motor Output Terminals | 3-Phase Induction Motor Wiring Connections |

## B. Control Terminals
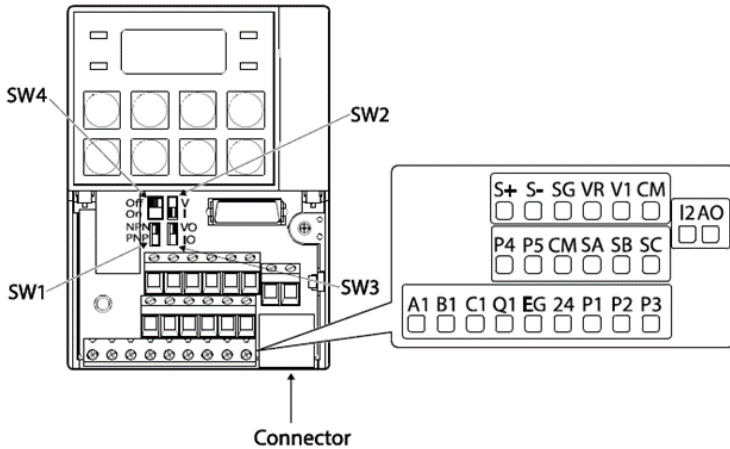


| Control Terminals | | | |
|---|---|---|---|
| Terminal | Function | Parameter | Setting |
| P1 | Start Forward | In.65 | 1:Fx |
| P2 | Start Reverse | In.66 | 2:Rx |
| P3 | Output Disable | In.67 | 5:BX |
| P4 | Reset | In.68 | 3:RST |
| P5 | Low Speed | In.69 | 7:Sp—L |
| CM | Common | — | — |
| VR | 10VDC Supply | — | — |
| V1 | 0—10VDC Speed Ref. | dr.07 | 2:V1 |
| CM | Common | — | — |
| I2 | 4—20mA Speed Ref. | dr.07 | 5:I2 |
| A1 | Relay NO | Ou.31 | 29:Trip |
| B1 | Relay NC | | |
| C1 | Common | | |
| 24 | 24VDC Supply | For Q1 | — |
| Q1 | Open Collector Output | Ou.33 | 14:Run |
| EG | Ground | For Q1 | — |
| S+ | Communications RS—485 (Modbus) | CM.01 — CM.05 | 0: Modbus RTU |
| S— | | | |
| SG | | | |
| AO | Analog Output | Ou.01 | 0:Freq |
| CM | | | |
| SA | STO Safe Torque Off | — | — |
| SB | | — | — |
| SC | | — | — |

## 3. Quick Start Parameters

**A. Cmd Source (Start/Stop)**

**B. Freq Ref Src (Speed Reference)**

**C. Motor Parameters**

**D. Protection Parameters**

| | Function | Group | Parameter | Settings Option # | Desc. Range | Default |
|---|---|---|---|---|---|---|
| **A** | Cmd Source (Control-Start/Stop) | Operations (Main) | drv | 0 | Keypad | 0: Keypad |
| | | | | 1 | Fx/Rx-1 | |
| | | | | 2 | Fx/Rx-2 | |
| | | | | 3 | Int 485 | |
| **B** | Freq Ref Src (Speed Reference) | Operations (Main) | Frq | 0 | Keypad-1 | 0: Keypad-1 |
| | | | | 1 | Keypad-2 | |
| | | | | 2 | V1 | |
| | | | | 4 | V2 | |
| | | | | 5 | I2 | |
| | | | | 6 | Int 485 | |
| **C** | *Motor Parameters* | | | | | |
| | Load Duty (Normal/Heavy) | Pr | 04 | 0 | Normal Duty | 1: Heavy Duty |
| | | | | 1 | Heavy Duty | |
| | Motor Capacity | dr | 14 | 0 | 0.3 HP | Varies with Drive Rating |
| | | | | 1 | 0.5 HP | |
| | | | | 2 | 1.0 HP | |
| | | | | 3 | 1.5 HP | |
| | | | | 4 | 2.0 HP | |
| | | | | 5 | 3.0 HP | |
| | | | | 6 | 4.0 HP | |
| | | | | 7 | 5.0 HP | |
| | | | | 8 | 5.5 HP | |
| | | | | 9 | 7.5 HP | |
| | | | | 10 | 10 HP | |
| | | | | 11 | 15 HP | |
| | | | | 12 | 20 HP | |
| | | | | 13 | 25 HP | |
| | | | | 14 | 30 HP | |
| | Pole Number | | 11 | 2 ~ 48 | | Dependent on motor setting |
| | Rated Slip | | 12 | 0-3000(Rpm) | | |
| | Rated Curr (Motor FLA) | | 13 | 1.0-1000.0(A) | | |
| | Noload Curr | bA | 14 | 0.0-1000.0(A) | | |
| | Motor Volt | | 15 | 170-480(V) | | 230/460 |
| | Efficiency | | 16 | 64-100(%) | | Dependent on motor setting |
| | AC Input Volt | | 19 | 170-480(V) | | 240/480 |
| | Run Prevent (Motor Direction) | Ad | 09 | 0 | None | 0: None |
| | | | | 1 | Forward Prev | |
| | | | | 2 | Reverse Prev | |
| **D** | *Protection Parameters* | | | | | |
| | Phase Loss Chk (Input/Output Phase Loss) | | 05 | In-Out | | 11 Displayed as: / 00 as: |
| | | | | 00 | Off Off | |
| | | | | 11 | On On | On On / Off Off |
| | OL Trip Select (Motor Overload) | | 20 | 0 | None | 1: Free-Run |
| | | | | 1 | Free-Run | |
| | | | | 2 | Dec | |
| | OL Trip Level | Pr | 21 | 30-200(%) | | 150 |
| | OL Trip Time | | 22 | 0.0-60.0(s) | | 60 |
| | ETH Trip Sel (Electronic Thermal Motor Overload) | | 40 | 0 | None | 1:Free-Run |
| | | | | 1 | Free-Run | |
| | | | | 2 | Dec | |
| | Motor Cooling | | 41 | 0 | Self-cool | 0:Self-cool |
| | | | | 1 | Forced-cool | |
| | ETH 1 min | | 42 | 120-200(%) | | 150 |
| | ETH Cont | | 43 | 50-150(%) | | 115 |

## 4. Parameter Setting - Example "Frequency Reference (Cmd Freq)"

After entering the Quick Start parameters, when Frq (Freq Ref Src) is set to Keypad-1 (default), press the ESC button to return to the main display in the Operations Group. Program the running speed (Hz.) per the below table.
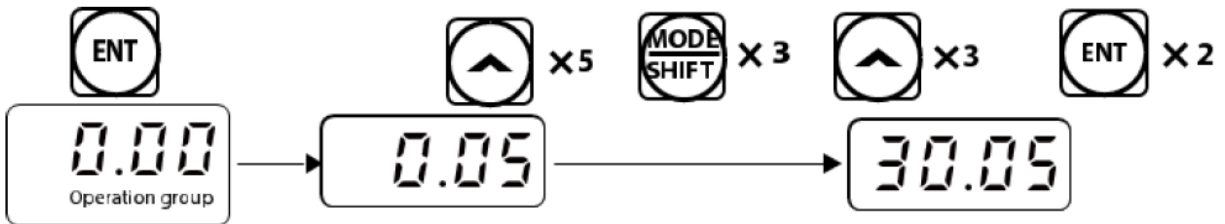


| Step | Instruction | Keypad Display |
|---|---|---|
| 1 | Ensure that the first code of the Operation group is selected, and code 0.00 (Reference frequency) is displayed. | 0.00 |
| 2 | Press the [ENT] key. The default value "0.00" will be displayed and "0" in the second decimal place will flash. | 0.00 |
| 3 | Press the [MODE/SHIFT] key 3 times to move to the tens' place value. "0" in the tens' place will flash. | 00.00 |
| 4 | To make the target value "30.05", press the [▲] key to change the tens' place value to "3." | 30.00 |
| 5 | Press the [MODE/SHIFT] key 2 times. The "0" in the second decimal place will flash. | 30.00 |
| 6 | To make the target value "30.05", press the [▲] key to change the second decimal place value to "5", and then press the [ENT] key. The selected value will flash on the display. | 30.05 |
| 7 | Press the [ENT] key again to save the changes. Flashing stops. The frequency reference has been configured to 30.05 Hz. | 30.05 |

## 5. Control and Speed Reference Settings - Detail

| Start/Stop | | | | |
|---|---|---|---|---|
| **Keypad** | | | | |
| Terminal | Function | Parameter | Setting | |
| – | Command Source | drv | 0 | Keypad |
| Press RUN button (green) to start. Press STOP/RESET button (red) to stop. See parameter drC to change direction. | | | | |

| 2–Wire Start/Stop Control | | | | |
|---|---|---|---|---|
| Terminal | Function | Parameter | Setting | |
| | Command Source | drv | 1 | Fx/Rx–1 |
| P1 | Start Forward | In.65 | 1 | Fx |
| P2 | Start Reverse | In.66 | 2 | Rx |
| CM | Common | – | – | – |

| 3–Wire Start Stop Control | | | | |
|---|---|---|---|---|
| Terminal | Function | Parameter | Setting | |
| | Command Source | drv | 1 | Fx/Rx–1 |
| P1 | Start Forward | In.65 | 1 | Fx |
| P2 | Start Reverse | In.66 | 2 | Rx |
| P3 | 3–Wire | In.67 | 14 | 3–Wire |
| CM | Common | – | – | – |

| Hand - Off - Auto | | | | |
|---|---|---|---|---|
| **Local - Off - Remote** | | | | |
| Terminal | Function | Parameter | Setting | |
| P3 | Hand/Auto | In.67 | 15 | 2nd Source |
| CM | Common | | | |
| ***Hand Mode*** | | | | |
| - | Command Source | drv | 0 | Keypad |
| | | | 1 | Fx/Rx-1 |
| | | | 2 | Fx/Rx-2 |
| - | Speed Reference | Frq | 0 | Keypad-1 |
| | | | 1 | Keypad-2 |
| | | | 2 | V1 |
| | | | 4 | V2 |
| | | | 5 | I2 |
| ***Auto Mode*** | | | | |
| - | Cmd Aux (2nd) source | bA.01 | 0 | Keypad |
| | | | 1 | Fx/Rx-1 |
| | | | 2 | Fx/Rx-2 |
| - | Frq Aux (2nd) source | bA.02 | 0 | Keypad-1 |
| | | | 1 | Keypad-2 |
| | | | 2 | V1 |
| | | | 4 | V2 |
| | | | 5 | I2 |
| With P3 Input Open - VFD uses drv and Frq setings | | | | |
| With P3 Input Closed - VFD uses bA.01 and bA.02 settings | | | | |

| Speed Reference | | | | |
|---|---|---|---|---|
| **Keypad** | | | | |
| Terminal | Function | Parameter | Setting | |
| – | Freq. Ref. Source | Frq | 0 | Keypad–1 |
| Program the speed (frequency) at the main screen (0.00) | | | | |

| Speed Reference | | | | |
|---|---|---|---|---|
| **4 – 20 mA Input** | | | | |
| Terminal | Function | Parameter | Setting | |
| I2 | 4–20mA Speed Ref. | Frq | 5 | I2 |
| CM | Common | – | – | – |
| | View Input Signal | In.50 | View Only | |
| | Filter Time | In.52 | 10 | msec |
| | Min. Input | In.53 | 4.0 | mA |
| Scaling of 4–20mA signal | Output (%) at Min. Input | In.54 | 0.0 | % |
| | Max. Input | In.55 | 20.00 | mA |
| | Output (%) at Max. Input | In.56 | 100 | % |
| | I2 Inverting | In.61 | 0 | No |

| Speed Reference | | | | |
|---|---|---|---|---|
| **0 – 10 VDC (Potentiometer)** | | | | |
| Terminal | Function | Parameter | Setting | |
| VR | VDC Supply | – | – | – |
| V1 | 0–10VDC Input | Frq | 2 | V1 |
| CM | Common | – | – | – |
| | View Input Signal | In.05 | View Only | |
| | Filter Time | In.07 | 10 | msec |
| | Min. Input | In.08 | 0 | V |
| Scaling of 0–10V signal | Output (%) at Min. Input | In.09 | 0 | % |
| | Max. Input | In.10 | 10 | V |
| | Output (%) at Max. Input | In.11 | 100 | % |
| | V1 Inverting | In.16 | 0 | No |

## 6. Faults and Warnings

There are 3 levels of **Fault** conditions in addition to **Warning** messages.

- **Non-Latched Faults:** Do not require a Reset. When the fault is corrected, the fault or warning message disappears. The fault is not saved in the fault history.
- **Latched Faults:** Require a reset (keypad or external). When the fault is corrected and reset, the fault disappears. The fault is saved in the fault history.
- **Fatal:** Drive requires power to be cycled Off then On.

Faults are stored and can be viewed at Pr.91 through Pr.95. When more than 1 fault occurs at the same time, the keypad displays the higher priority fault.

- **Warnings:** To be displayed, all warning messages have to enabled with the associated parameters, except IOLW (Inverter Overload Warning). The most recent warning message can be viewed at Pr.90.

### A. Voltage and Current Faults

| Display | Fault | Type | Description | Related Parameters |
|---------|-------|------|-------------|--------------------|
| OLt | Over Load | Latch | **Motor Overload.** Motor current exceeds the set overload levels. Activated when Pr.20 is set to 1 or 2 and the output current has exceeded the Pr.21 level (%) for longer than the Pr.22 time (seces.). | Pr.04, bA.13, Pr.20, Pr.21, Pr.22 |
| ULt | Under Load | Latch | **Motor Underload.** Motor current is less than the set underload levels. Activated when Pr.27 is set to 1 or 2 and the output current is lower than the Pr.30 level (%) for longer than the Pr.28 time (secs.). Active when the motor speed above twice the motor slip speed (freq.) bA.12. | bA.13, Pr.27, Pr.28, Pr.29, Pr.30 |
| OCt | Over Current1 | Latch | **Inverter Over Current-1.** Output current exceeded 200% of the rated current. | - |
| OC2 | Over Current2 | Latch | **Inverter Over Current-2.** Excessive output current indicating a short circuit condition. | - |
| Out | Over Voltage | Latch | **Over Voltage.** Internal DC bus voltage exceeded the trip level. | - |
| Lut | Low Voltage | Non-Latched | **Low Voltage.** Internal DC bus voltage is less than the trip level. | bA.19, Pr.81 |
| Lu2 | Low Voltage2 | Latch | **Low Voltage-2.** Internal DC bus voltage is less than the trip level. | bA.19, Pr.82 |
| GFt | Ground Trip* | Latch | **Ground Fault.** Ground current exceeds a fixed value, varies with inverter capacity (~30% for 30 msecs.). | |
| EtH | E-Thermal | Latch | Electronic Thermal Overload. Inverter has predicted a rise in motor temperature. Activated when Pr.40 is set to 1 or 2 and the output current has exceeded the Pr.42 or Pr.43 levels (%). Common Fault during low speed (<20 Hz.) operation. | bA.13, Pr.40, Pr.41, Pr.42, Pr.43 |
| POt | Output Phase Open | Latch | Output Phase Open. Current in one or more phases is less than 15% of inverter rated current. Activated when Pr.05 is set to 01. | Pr.05 |
| IPO | Input Phase Open | Latch | **Input Phase Open.** DC Bus ripple voltage is higher than normal indicating a missing input phase.. Activated when Pr.05 is set to 10. | Pr.05, Pr.06 |
| IOL | Inverter OLT | Latch | **Inverter Overload.** Output current has exceeded the Inverter rated current. Overload ratings for the inverter are 150% for 1 min and 200% for 4 sec. | - |
| nMt | No Motor Trip | Latch | **Low Current Fault** .Activated when Pr.31 is set to 1 and the output current is below the Pr.32 level (%) for the Pr.33.time (secs.). | bA.13, Pr.31, Pr.32, Pr.33 |

\* Ground Fault monitoring is not supported inverters 5.0 HP and lower. An over voltage Fault (ovt) or over current Fault (OCT) will occur.

## B.  Drive Faults

| Display | Fault | Type | Description | Related Parameters |
|---|---|---|---|---|
| OHt | Over Heat | Latch | **Inverter Over Heat.** Inverter heat sink temperature exceeded 110°C. | - |
| HWt | H/W-Diag Trip | Fatal | Hardware diagnostic Fault. Error detected in the Inverter Control Board. Areas monitored are memory (EEPRom), analog-digital converter output (ADC Off Set), or CPU watchdog (Watch Dog-1, Watch Dog-2). <br> EEP Err: An error occurred in reading/writing parameters due to keypad or memory (EEPRom) Fault. <br> **ADC Off Set:** An error in the current sensing circuit (U/V/W terminal, current sensor, etc.). | - |
| FAn | Fan Trip | Latch | **Cooling Fan Fault.** Inverter detected an issue with the cooloig fan. Actiavted when Pr.79 is set to 0 (zero). | Pr.79 |

## C.  External Input Faults

| Display | Fault | Type | Description | Related Parameters |
|---|---|---|---|---|
| Ext | External Trip | Latch | External Fault. Input signal at terminal Px set to (4) External Trip is activated. | In.65 - In.69 |
| bx | Inverter Output disabled (blocked) | Non-Latched | **BX Fault, Inverter Disabled.** Input signal at terminal Px set to (5) BX is activated. | In.65 - In.69 |
| ntC | NTC Open | Latch | Internal Temperature Sensor Fault. Temperature sensor of the Insulated Gate Bipolar Transistor (IGBT) is open or sensing below 10°C. | - |
| Pid | Pre-PID Fail | Latch | In Pre-PID mode, PID feedback is measured below the AP.35 level (%) for longer than the AP.36 Pre-PID time (secs.). | AP.34, AP.35, AP.36 |
| xbr | Ext-Brake | Latch | When using External Brake Control, the Inverter output starting current remained below the value set at Ad.41, Brake Open Current. | Ad.41, Ad.42 |
| SFA/SFb | Safety A(B) Err | Latch | Safe Torque Off Fault. One of the two safety (STO) input terminlas (SA, SB, SC) is open. | - |

## D.  Communication Faults

| Display | Fault | Type | Description | Related Parameters |
|---|---|---|---|---|
| LOr | Lost Command or Reference | Non-Latched | **Lost Command Source** (Start/Stop control): Lost command over communcations (RS-485 and other network options). <br> **Lost Frequency Reference Source** (Speed control): Lost speed reference via analog or communications. | Pr.12, Pr.13, Pr.14, Pr.15 |
| IOt | | | Conbtrol board (I/O board) or external communication card is not connected to the inverter. | - |
| ErrC | IO Board Trip | Latch | Displayed when the error code continues for more than 5 sec. Displayed as: <br> ('Errc' -> '-rrc' -> E-rc' -> 'Er-c' -> 'Err-' -> '- -rc' -> 'Er- -' -> '- - - -' <br> -> 'Errc' -> …) | |
| PAr | ParaWrite Trip | Latch | Parameter Writing Error when using remote display (LCD). Displayed when communication fails during parameter writing due to a control cable Fault or a bad connection. | - |
| OPt | Option Trip-1 | Latch | **Option Board Fault.** Error is detected between the inverter and the communication board. | - |

### E. Warnings

| Display | Warning | Type | Description | Related Parameters |
|---|---|---|---|---|
| OLW | Over Load | Warning | **Motor Overload Warning.** Activated when Pr.17 (overload warning) is set to 1 and the motor current is above the Pr.18 level (%) for longer than the Pr.19 time (secs.). One of the digital output terminals (Relay 1 or Q1) can be set to 5 (Over Load) to output the warning. | Pr.04, Pr.17, Pr.18, Pr.19, OUT.31, OUT.33 |
| ULW | Under Load | Warning | **Motor Underload Warning.** Activated when Pr.25 is set to 1 and the output current is lower than the Pr.30 level (%) for longer than the Pr.26 time (secs.). One of the digital output terminals (Relay 1 or Q1) can be set to 7 (Under Load) to output the warning. | bA.13, Pr.04, Pr.25, Pr.26, OUT.31, OUT.33 |
| IOLW | INV Over Load | Warning | **Inverter Overload Warning.** Displayed after 36 secs. of a 150% overload. One of the digital output terminals (Relay 1 or Q1) can be set to 6 (IOL) to output the warning. | OUT.31, OUT.33 |
| LCW | Lost Command or Reference | Warning | **Lost Command Warning:** Lost RS-485 communications at the terminal block (Start/Stop or Speed Reference) or lost analog speed reference based on the conditions set at Pr.13- 15. Warning occurs even with Pr.12 set to 0. Applies to both Start/Stop control (when over communications) and Speed Reference via analog or communications. One of the digital output terminals (Relay 1 or Q1) can be set to 13 (Lost Command) to output the warning. | Pr.12, Pr.13, Pr.14, Pr.15 |
| FAnW | Fan Warning | Warning | **Cooling Fan Warning.** Activated when Pr.79 is set to 1. One of the digital output terminals (Relay 1 or Q1) can be set to 8 (Fan Warning) to output the warning. | Pr.79, OUT.31, OUT.33 |
| dbW | DB Warn %ED | Warning | **Dynamic Brake Warning.** DB resistor usage rate exceeds the set percentage. | Pr.66 |
| trtr | Retry Tr Tune | Warning | **Sensorless Auto Tuning warning.** The warning occurs when the motor's rotor time constant (Tr) is either too low or too high. | DRV.09, bA.20 |