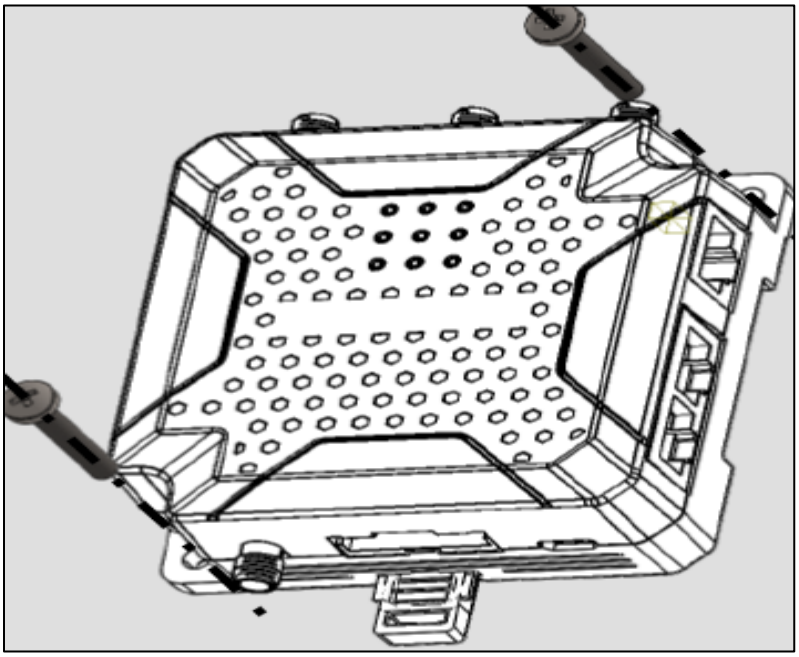
Irrigation IOT User Manual

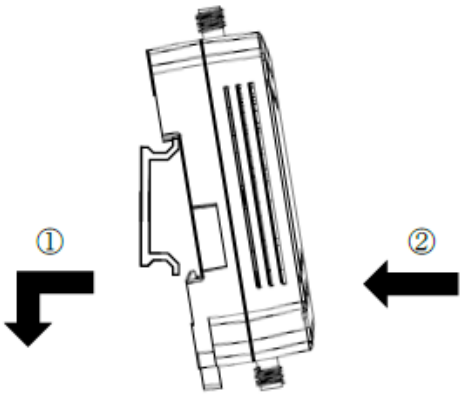
Contents

Mounting the CPTrans

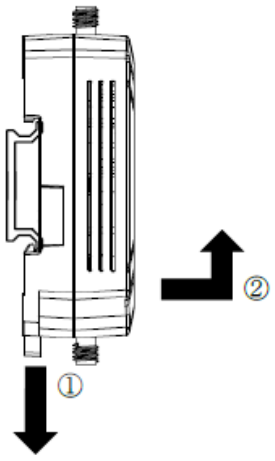
The CPTrans has multiple mounting options; there are mounting holes on two of the corners for easy installation on a wall or mounting plate.



The CPTrans can also be attached to din rail, using the spring-loaded din mount on the back of the CPTrans device.



Mounting to the DIN rail



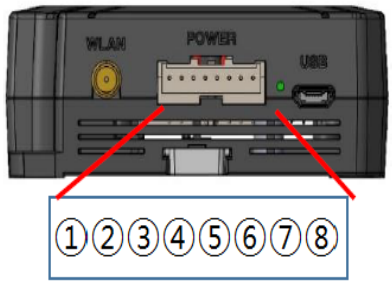
Removing from the DIN rail

Installing the SIM card into the CPTrans

The SIM card is pre-installed in the Micro card slot at the factory. However, the SIM card can be accessed if necessary. The Micro card slot is protected by the cover and can be removed by removing the screw holding the cover. The SIM card must be programmed to work with the CPTrans. Hitachi typically handles this programming, but customers can also program if needed.

Powering the CPTrans

The CPTrans is powered using 24V DC. The 24V DC power is wired into the 8-pin connector on pins 7 and 8. The other terminals are all marked for future use. Please use the CPTransPowerCable, that is included with the kit, to connect power to the CPTrans.

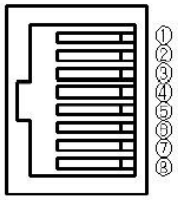
Item		Details
S08B-XASK-1(JST)	Pin No.	8-pin、2.5mm pitch
	(1)	NC
	(2)	NC
	(3)	NC
	(4)	GND
	(5)	NC
	(6)	NC
	(7)	GND
	(8)	VCC (5 to 24 VDC wide range)
Input Voltage		5 to 24 VDC (In current loading condition)

***Caution* Do not connect pins 1 through 7 to positive DC voltage.**

Hitachi has the 8-pin connector with 18 inch leads available, please use part number:
CPTransPowerCable

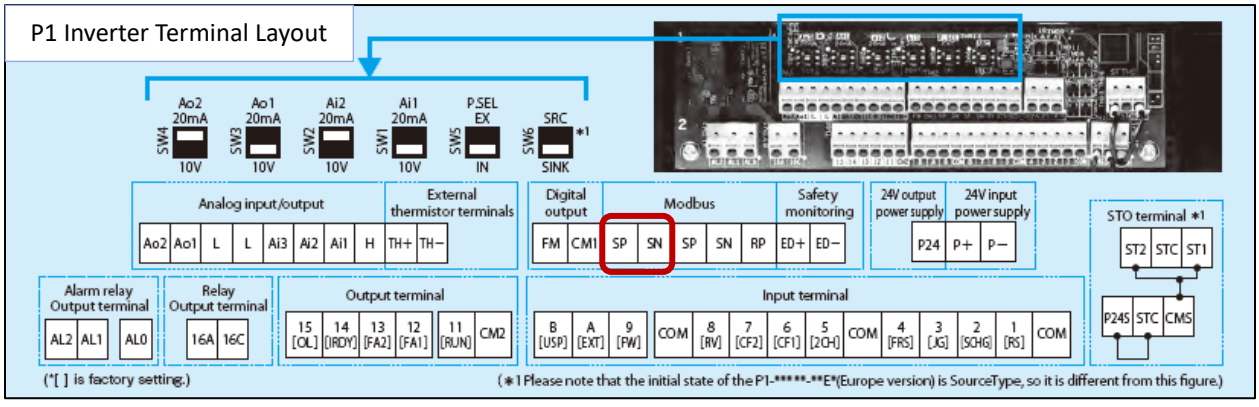
Terminating the Modbus Communication between the CPTrans and P1 Inverter

The CPTrans uses serial Modbus for communication with the Hitachi P1 Inverter. Please connect the RJ45 port on the CPTrans to the Hitachi Inverter on the SP and SN terminals. The P1 terminal layout is located below. The CPTrans KIT includes an 18-inch Modbus cable. The cable has an RJ45 connector on one end, to connect the CPTrans. The other end has flying leads to connect to the P1 Inverter. Please use the T568B cable and connect the Green/White wire to SP and the Orange wire to SN.

Item	Pin	Signal	Note
 (RJ－45)	(1)	SG	Ground for signal
	(2)	485-	485(-) signal
	(3)	485+	485(+) signal
	(4)	NC	Not used
	(5)	232SD	Data sending
	(6)	232RD	Data receiving
	(7)	485-	Terminating
	(8)	RT	Termination resistor

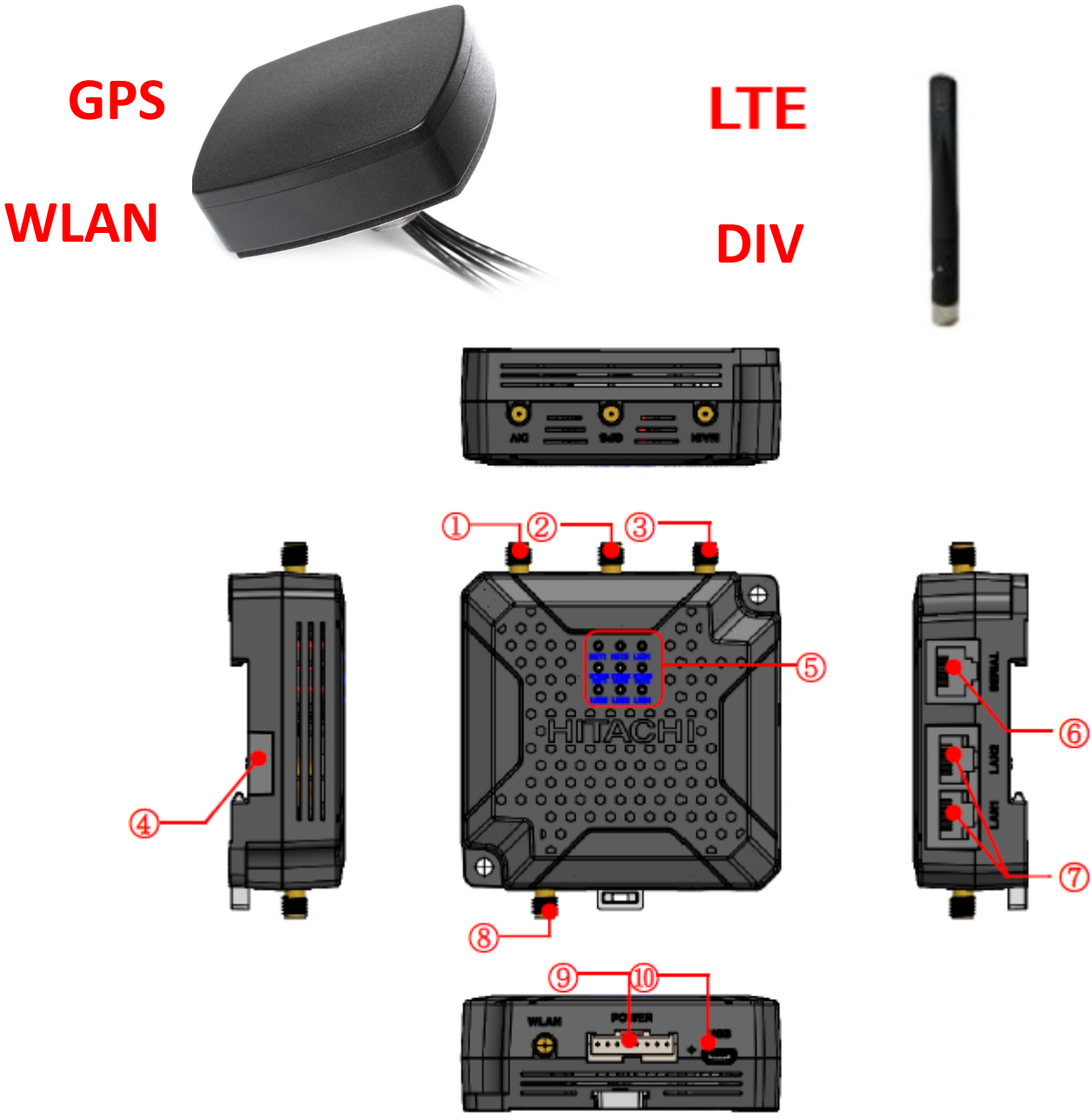
Note: If a termination resistor is necessary, please use the internal resistor connection by shorting pin 7 (485-) to pin 8 (RT).

Hitachi has the 8-pin connector with 18 inch leads available, please use part number:
CPTransModbusCable



Connecting the Antennas to the CPTrans

The CPTrans KIT includes three separate antennas that must be connected. First, the hockey puck style GPS antenna should be connected to the GPS connection post with the blue-labeled wire, and the WLAN connection post with the yellow-labeled wire, as shown below. The stick style antennas should connect to the MAIN (LTE), and the DIV connection posts.

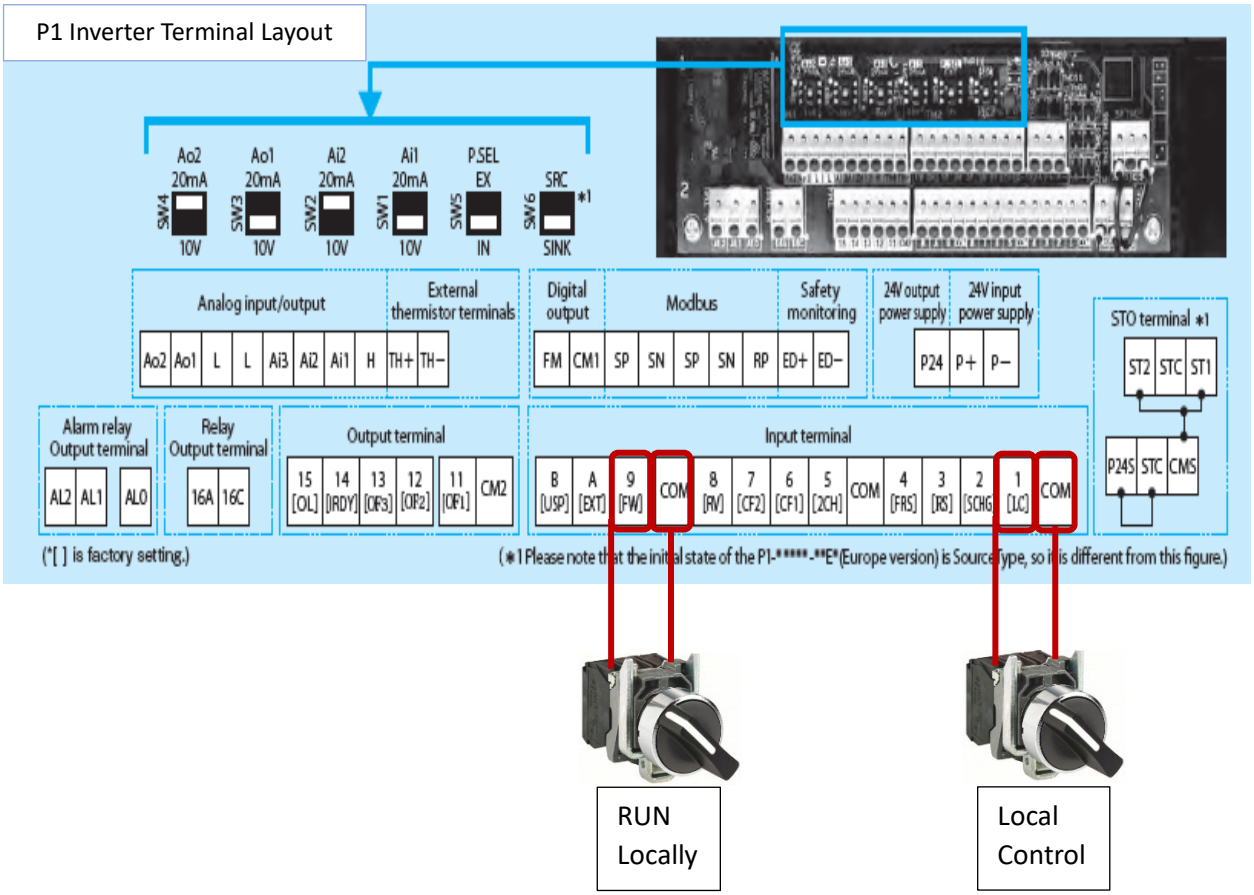


No.	Item	Detail
(1)	DIV(LTE)	Sub connection for LTE antenna.
(2)	GPS	Connection for GPS antenna.
(3)	MAIN(LTE)	Main connection for LTE antenna.
(4)	Micro SIM / SD Card slot	Insert Micro SIM／SD card by taking off its protection cover.
(5)	LED	Show LED status of this CPTrans-MGW
(6)	SERIAL	Serial connector for RS232C and RS485
(7)	LAN1, LAN2	Connection for Ethernet cable
(8)	WLAN	Connection for wireless LAN antenna
(9)	POWER	DC power will be collected from this 8Pin socket.
(10)	USB	Not supported

*1 : In case of connecting LTE, please attach both MAIN & DIV antenna

Connecting the Digital Inputs to the P1 Inverter

Using an industrial selector switch, the drive can be taken out of remote control and set to run locally at a preset pressure setpoint. This requires the P1 Inverter to have two digital inputs; one that activates local control and one for the run command. Please wire an industrial style selector switch to the COM and Input #1 terminals, as shown below. This input is used by the P1 Inverter's program to change the inverter to local control. Please wire the COM terminal to an industrial style selector switch then back from the switch to the Input #9 terminal for forward Run.

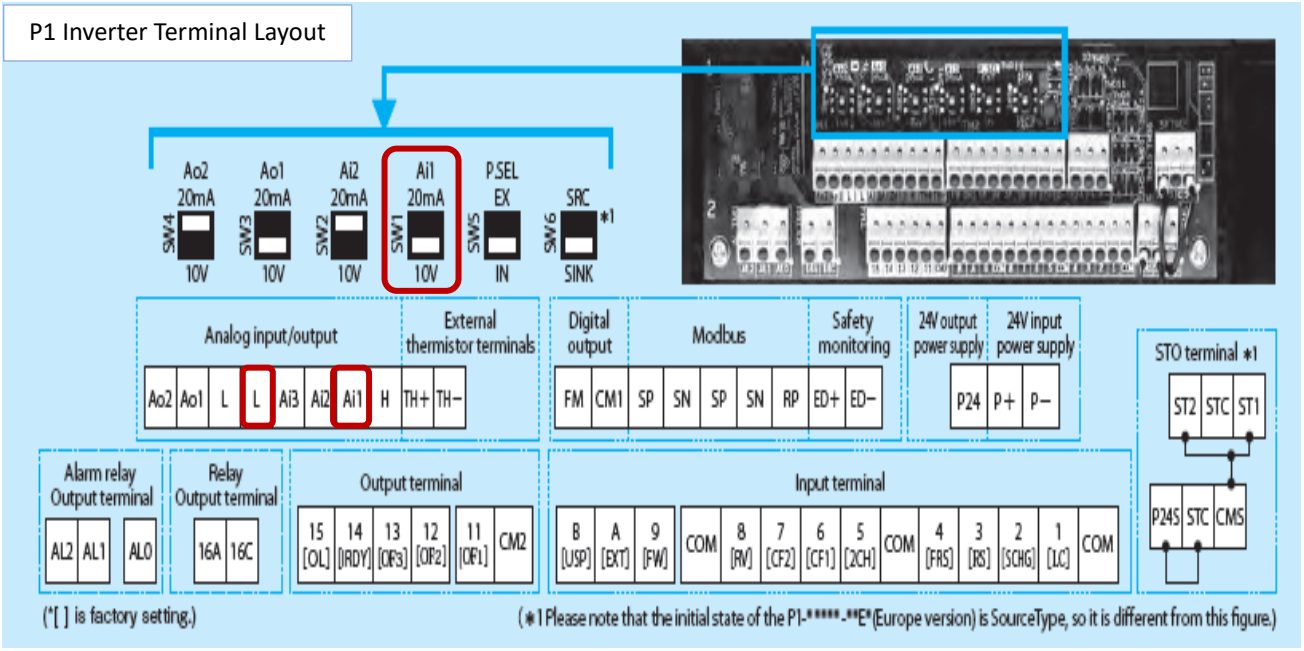


Connecting the Pressure Feedback to the P1 Inverter

The pressure feedback is used by the inverter to regulate the pressure in the system by adjusting the speed of the pump. The pressure feedback will be an externally powered device with an output in the form of an analog signal that will be wired into the drive. This analog signal can be either 0-10V DC or 4-20mA; the dip switch SW1 can be used to change the configuration from voltage to current. The pressure feedback should be connected on to the Ai1 and L terminals. If the pressure feedback is to be 4-20mA, please move the SW1 dip switch and set parameter Cb-05 to 20%.

***Caution* Do not move the SW1 dip switch until power is completely removed from the inverter.**

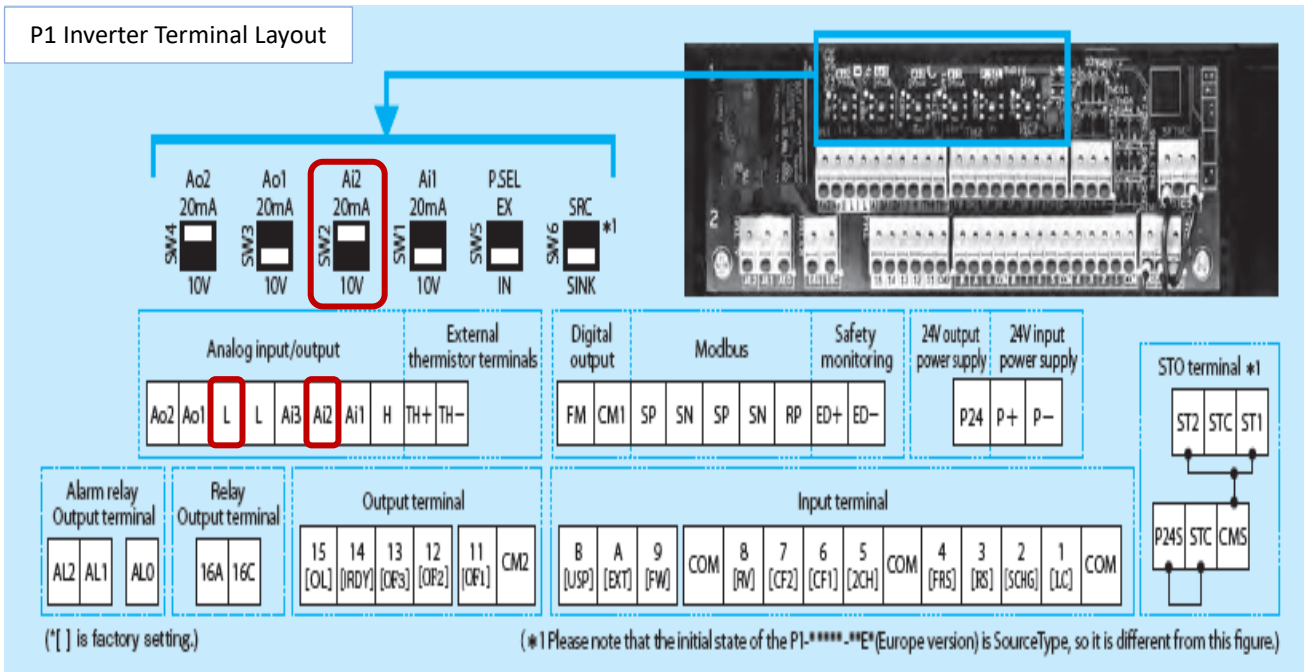
P1 Inverter Terminal Layout



Connecting the 1st Moisture Sensor to the P1 Inverter

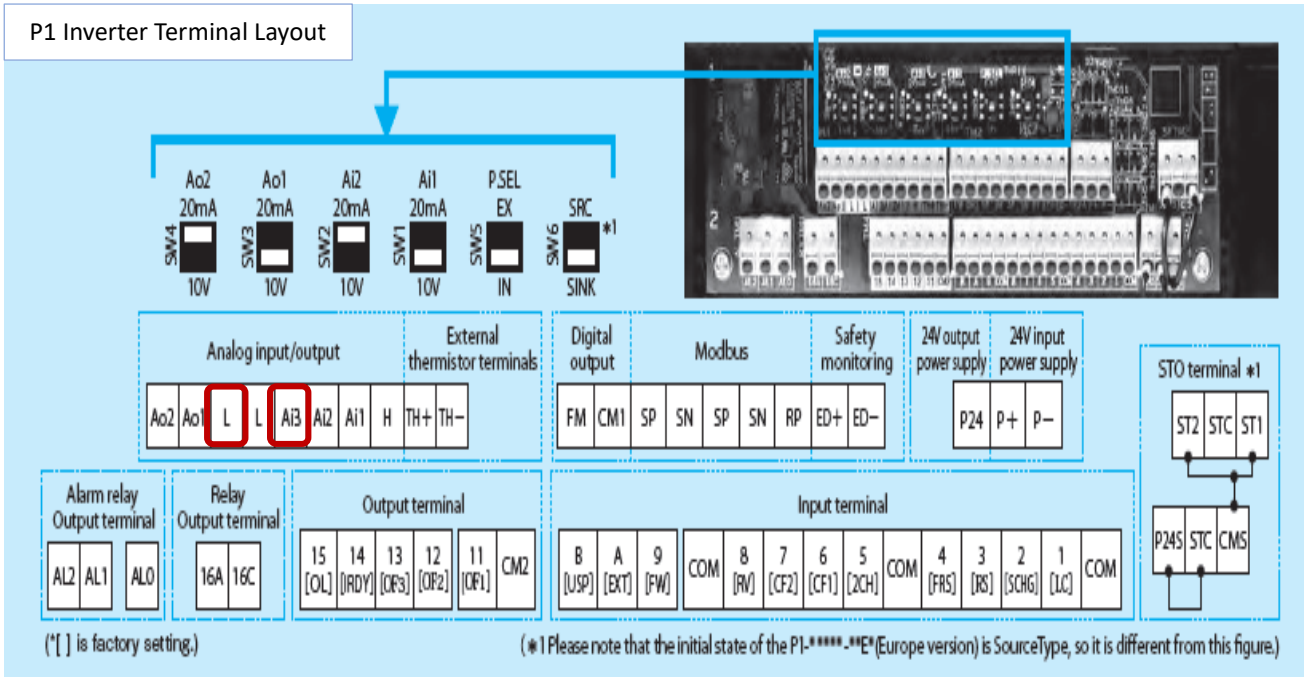
The moisture sensor will be an externally powered device, that when wired into the P1 Inverter, will be used to display the moisture on the Irrigation GUI webpage. This moisture sensor will be used for the moisture charting feature available on the Irrigation IOT GUI webpage; please see below for more information on the moisture charting feature. The moisture sensor device will be an analog sensor with either a 0-10V DC or 4-20mA output signal; the dip switch SW2 can be used to change the configuration. The sensor should be connected to the Ai2 and L terminals. If the moisture feedback is to be 0-10V DC, please move the SW2 dip switch and set parameter Cb-15 to 0%.

***Caution* Do not move the SW2 dip switch until power is completely removed from the inverter.**



Connecting the Humidity Sensor to the P1 Inverter

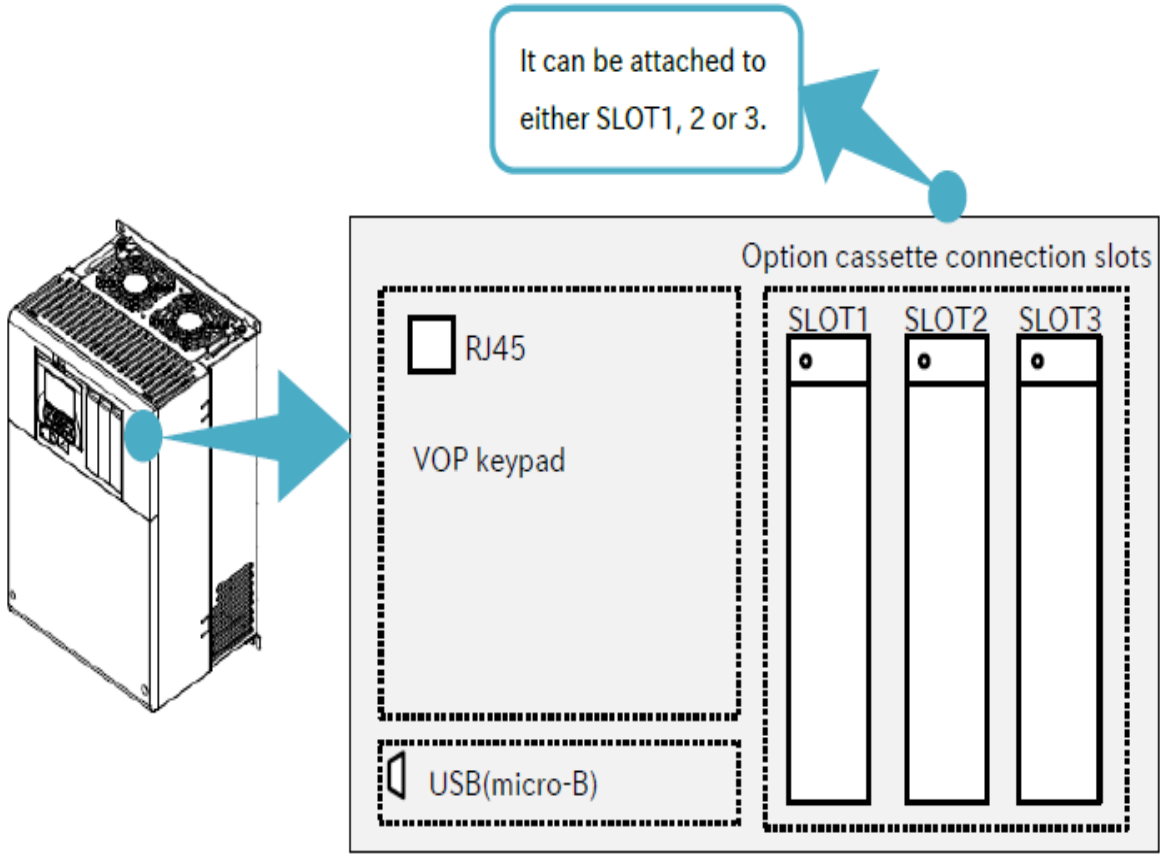
The Humidity sensor will be an externally powered device, that when wired into the P1 Inverter, will be used to display the humidity on the Irrigation GUI webpage. The humidity sensor device will be an analog sensor that can output either a -10V DC to +10V DC or 0 to 10V DC. The sensor should be connected to the Ai3 and L terminals.



Instructions for the expanded kit that includes the P1-AG analog input card which allows the addition of multiple sensors.

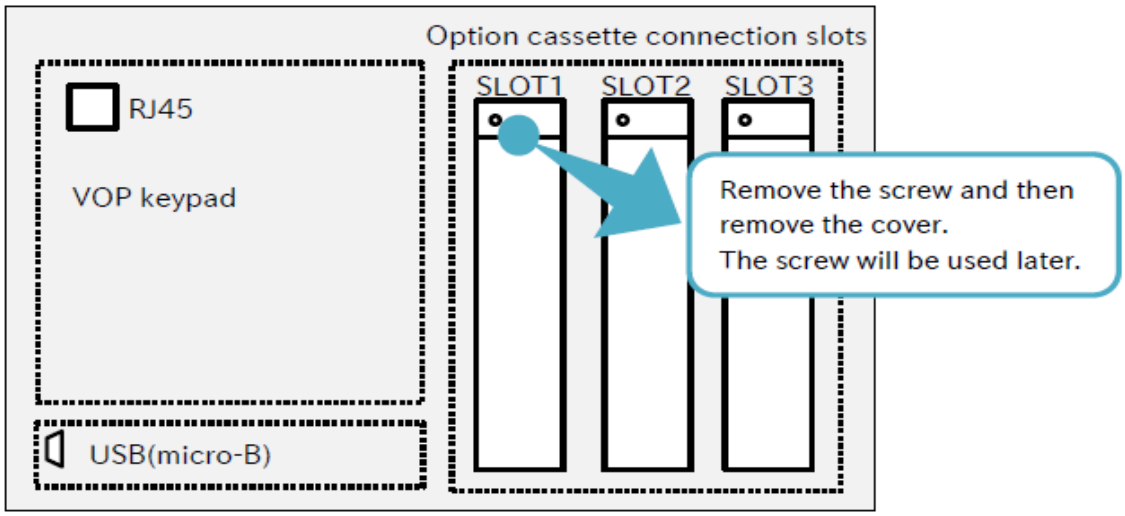
With the optional P1-AG analog input card, the system can be configured to have a temperature sensor, a 2nd moisture sensor, and a Soil pH sensor. Please follow the instructions below for the additional P1-AG card.

Installing and Wiring the P1-AG

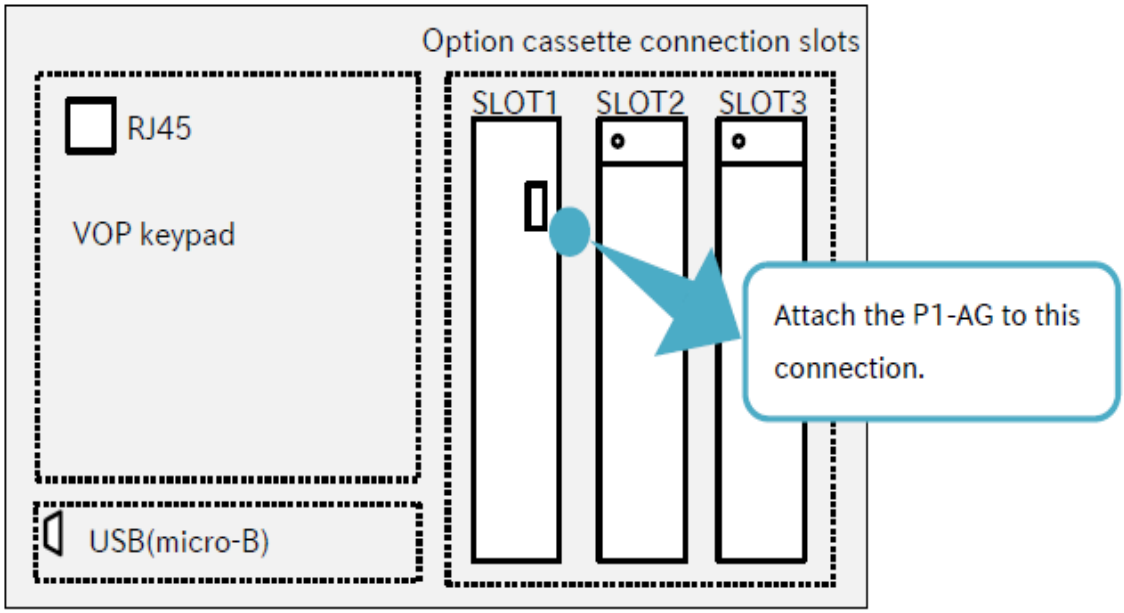


For explanation purposes, it will be assumed that the P1-AG is going to be installed in the SLOT1.

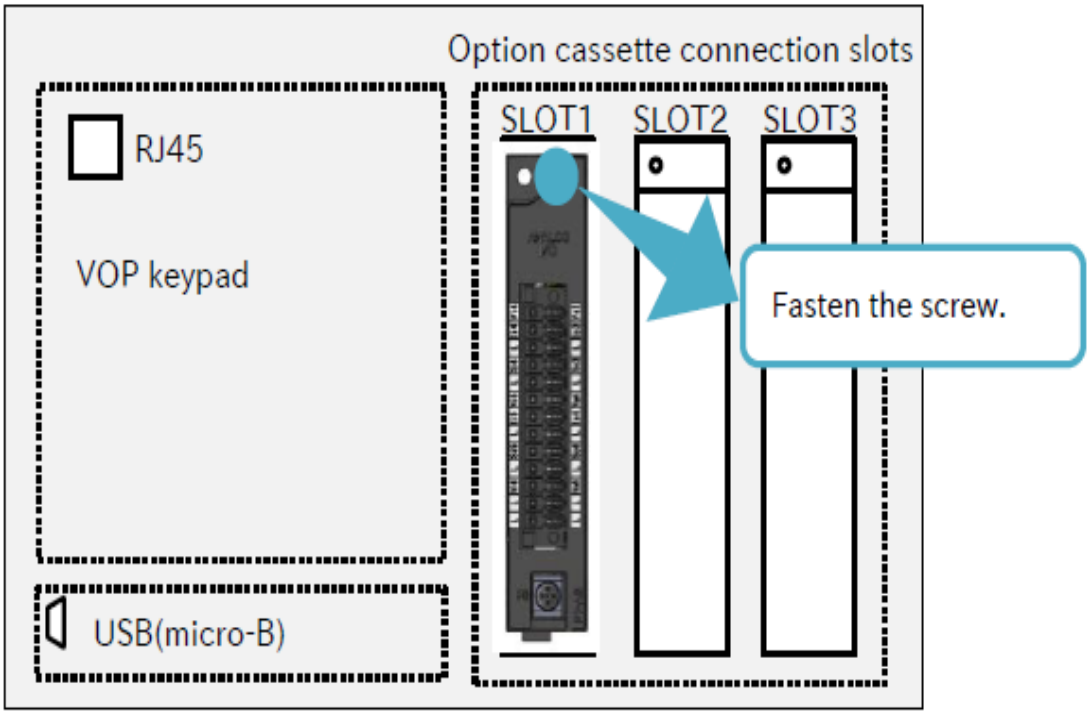
(1) Remove the cover of the option cassette connection slot. Despite the removed cover will no longer be needed, it is recommended to keep it in a safe place. However the screw that secured the cover will be used to secure the P1-AG.



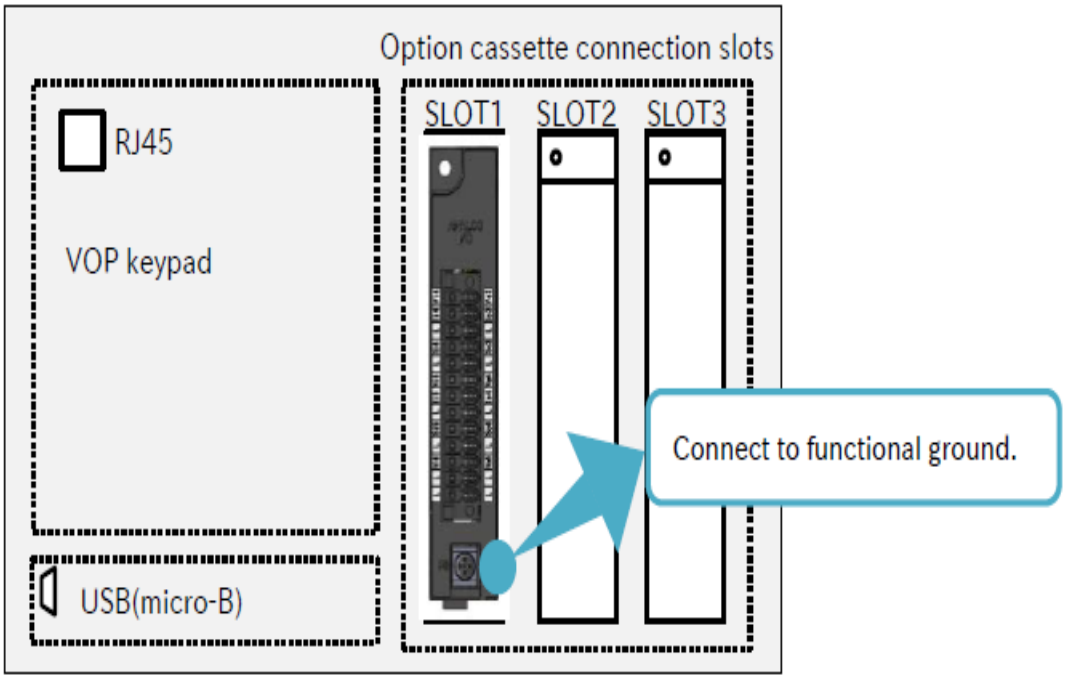
(2) Attach this device. The slots 2 and 3 have one more connection in the lower side. However, the P1-AG will not need that connection.



(3) Secure the P1-AG with the screw removed in procedure (1).



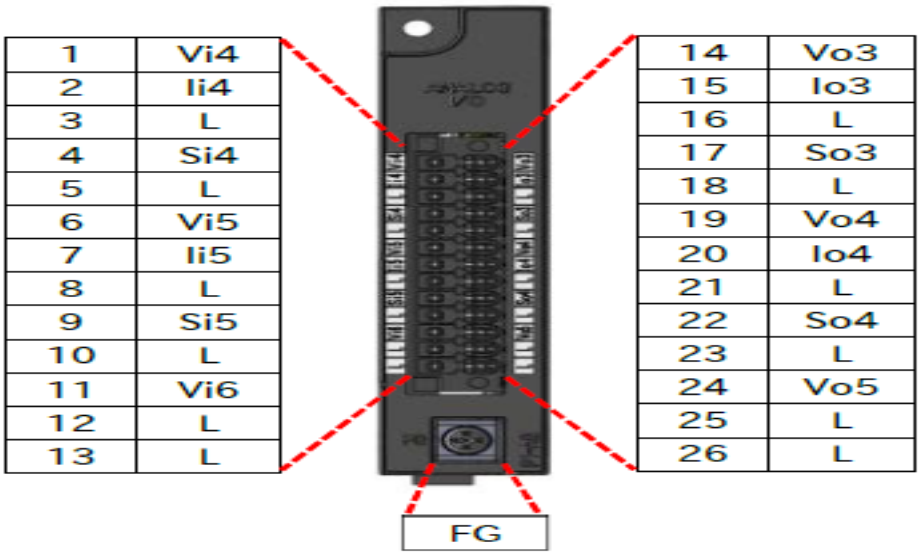
(4) Connect the FG terminal to functional ground.



Terminal block and wiring

Terminal arrangement, symbols and specifications of P1-AG are shown the followings.

■Terminal arrangement



■Terminal specifications

Terminal Name		Symbol	Description	Electrical Characteristic
Analog Input	Analog Input Terminal 4	Vi4	Voltage input 4: 0 to 10V	Input impedance: 10kΩ(approximately) Allowable range of input: -0.3 to 12V
		Ii4	Current input 4: 0 to 20mA	Input impedance: 100Ω(approximately) Allowable range of input: 0 to 24mA
	Analog Input 4 Switch	Si4	Select input 4: voltage or current	Shorted Si4 to L: Vi4 enabled(initial condition) Opened Si4: Ii4 enabled
	Analog Input Terminal 5	Vi5	Voltage input 5: 0 to 10V	Input impedance: 10kΩ(approximately) Allowable range of input: -0.3 to 12V
		Ii5	Current input 5: 0 to 20mA	Input impedance: 100Ω(approximately) Allowable range of input: 0 to 24mA
	Analog Input 5 Switch	Si5	Select input 5: voltage or current	Shorted Si5 to L: Vi5 enabled(initial condition) Opened Si5: Ii5 enabled
	Analog Input Terminal 6	Vi6	Voltage 6: -10 to 10V	Input impedance: 10kΩ(approximately), allowable range of input: -12 to 12V
Analog Output	Analog Output Terminal 3	Vo3	Voltage output 3: 0 to 10V	Maximum output current: 2mA Allowable range: 0 to 10V(±10% accuracy)
		Io3	Current output 3: 0 to 20mA	Allowable load impedance: 250Ω or less Allowable range : 0 to 20mA(±20% accuracy)
	Analog Output 3 Switch	So3	Select output 3: voltage or current	Shorted So3 to L: Vo3 enabled(initial condition) Opened So3: Io3 enabled
	Analog Output Terminal 4	Vo4	Voltage: 0 to 10V	Maximum output current: 2mA Allowable range: 0 to 10V(±10% accuracy)
		Io4	Current: 0 to 20mA	Allowable load impedance: 250Ω or less Allowable range : 0 to 20mA(±20% accuracy)
	Analog Output 4 Switch	So4	Select output 4: voltage or current	Shorted So4 to L: Vo4 enabled(initial condition) Opened So4: Io4 enabled
	Analog Output Terminal 5	Vo5	Voltage output 5: -10 to 10V	Maximum output current: ±2mA Allowable range: -10 to 10V(±10% accuracy)
Input/Output Common		L	Reference potential(signal ground)	
Functional Ground		FG	Connect to the functional ground (the screw size: M3)	

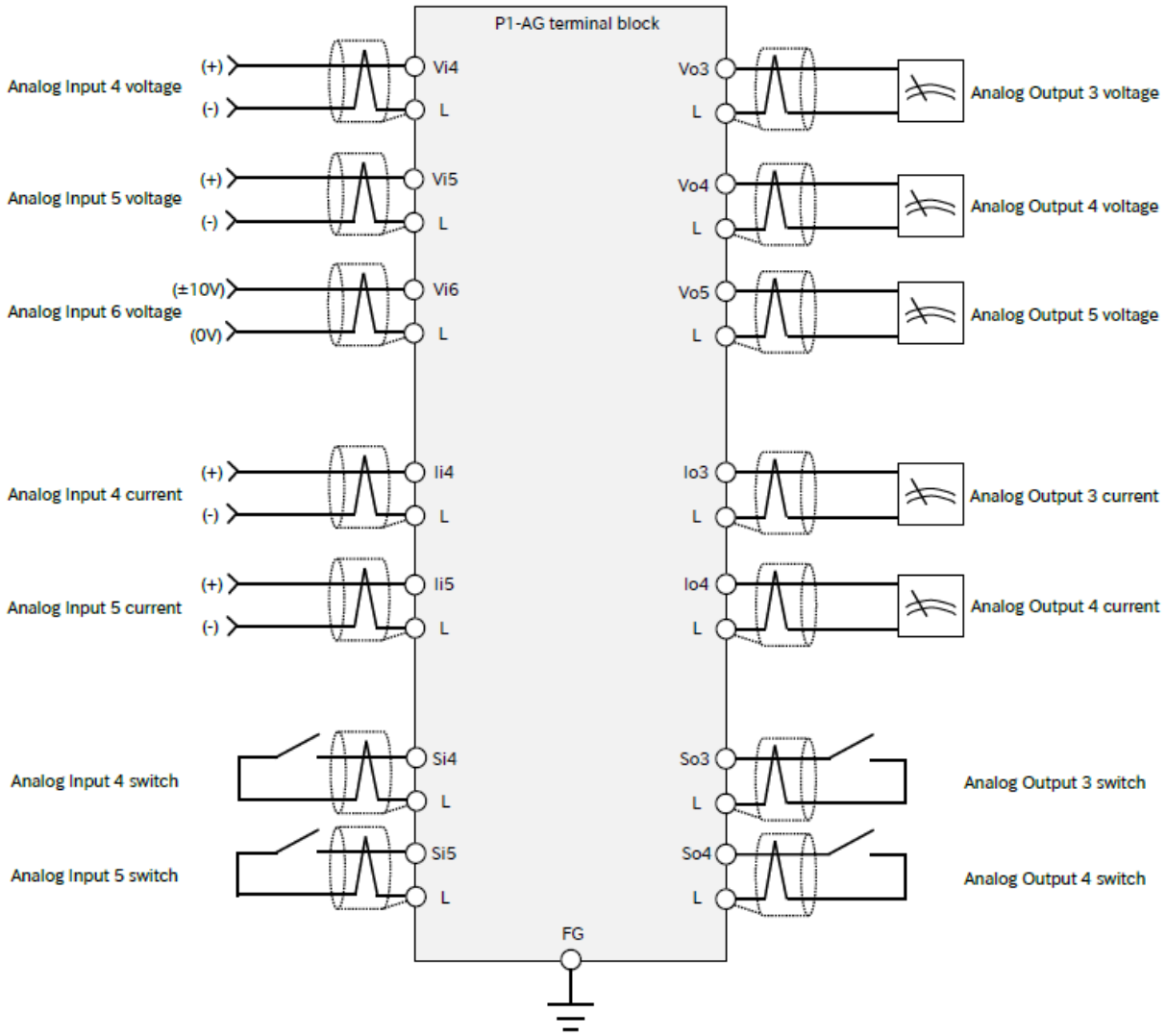
It cannot work the following terminal combinations simultaneously.

- Combination of Vi4 and Ii4 terminal
- Combination of Vi5 and Ii5 terminal

Besides, redundant terminals need to be opened, do not wire or connect them.

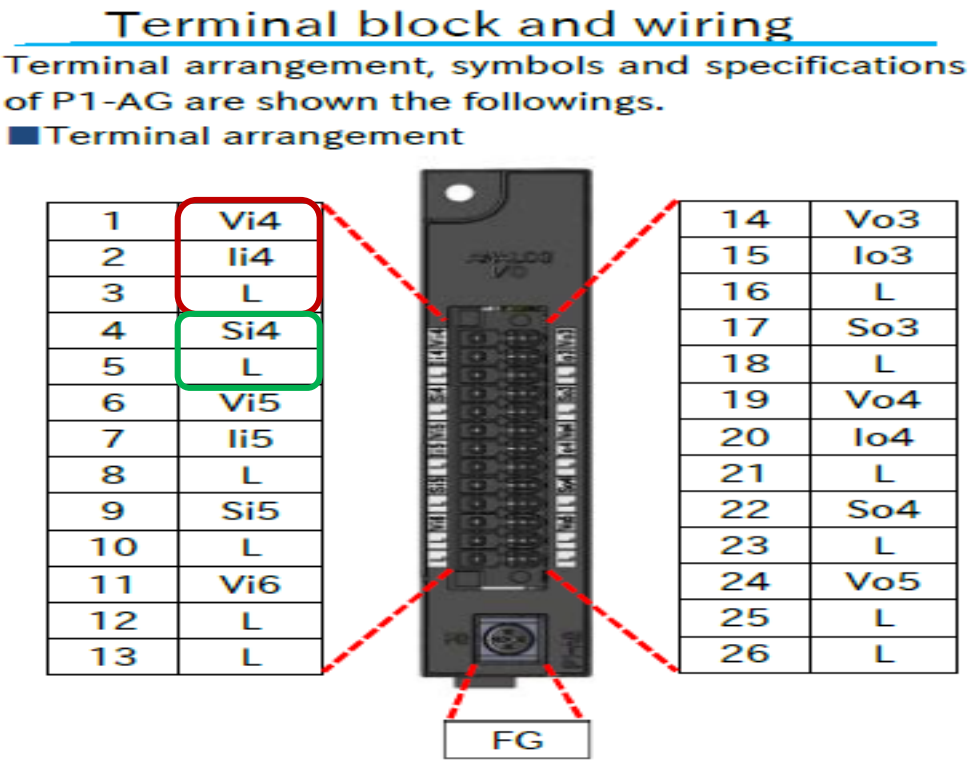
- Combination of Vo3 and Io3 terminal
- Combination of Vo4 and Io4 terminal

An example of terminal connection of P1-AG is as follows.



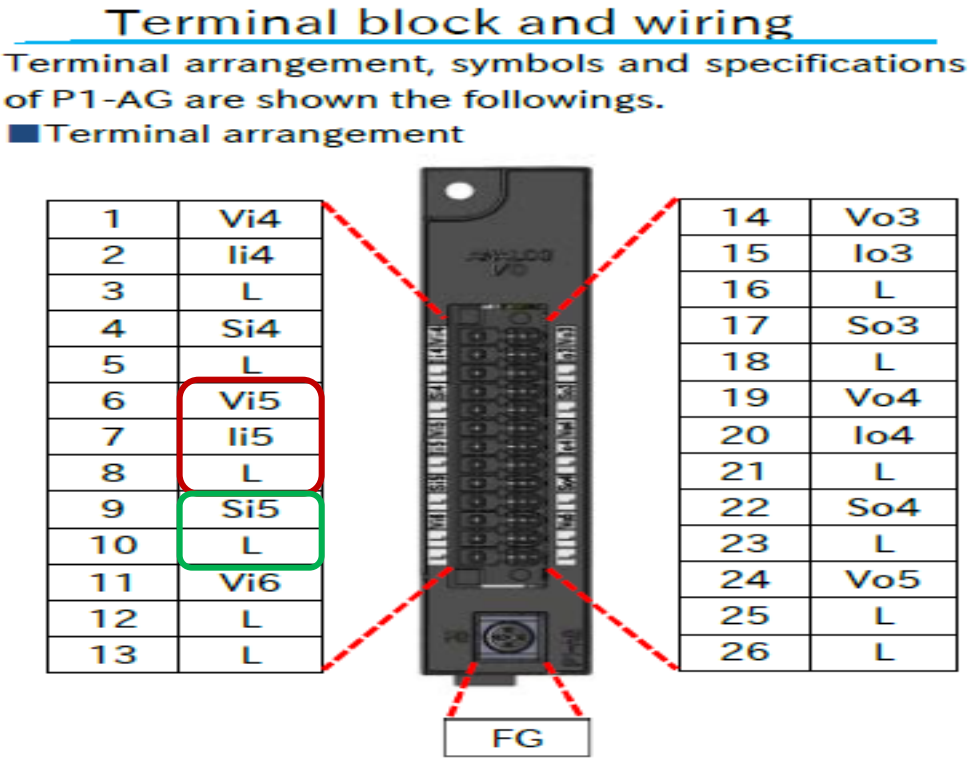
Connecting the Temperature Measuring Device to the P1 Inverter

The temperature measuring device will be used to accurately display the temperature on the Irrigation GUI webpage. The temperature measuring device will be mounted separately of the inverter and wired directly into the P1-AG option card that is installed in the P1 Inverter. The temperature measuring device will accurately detect the temperature and output a 0-10V DC or 4-20mA signal. The output from the temperature measuring device should be wired into the Vi4(Voltage Input) or Ii4(Current Input) and L(Common) terminals. If the current input is to be used, the Si4 terminal to L terminal jumper must be removed, otherwise leave the Si4 terminal connected to the L terminal. Please see below.



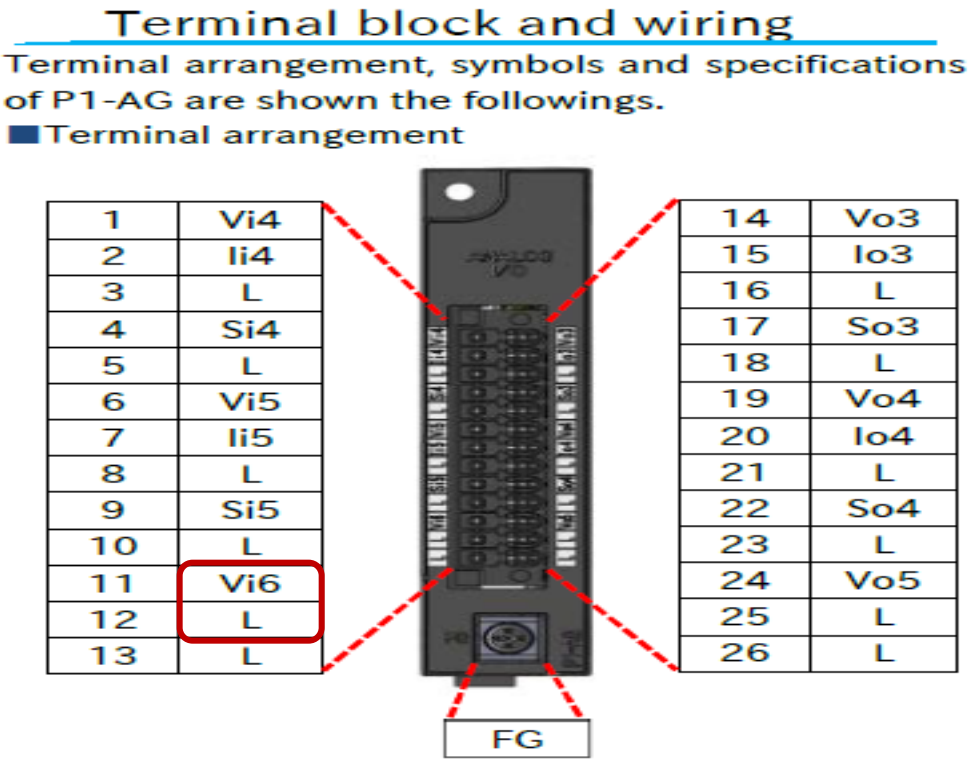
Connecting the 2nd Moisture Sensor to the P1 Inverter

The 2nd moisture sensor will be an externally powered device, that when wired into the P1-AG option card that is installed in the P1 Inverter, will be used to display the moisture on the Irrigation GUI webpage. The moisture sensor device will be an analog sensor with either a 0-10V DC or 4-20mA output signal. If the 2nd Moisture sensor is 0-10V DC, then the sensor will terminate on the Vi5 (Voltage Input) and L (Common) terminals. If the 2nd Moisture Sensor will use 4-20mA, please connect the sensor to the Ii5 (Current Input) and L (Common) terminals. To activate the 4-20mA configuration, remove the jumper between the Si5 to L terminals, otherwise leave the Si5 terminal connected. Please see below.



Connecting the Soil pH Sensor to the P1 Inverter

The Soil pH sensor will be an externally powered device, that when wired into the P1 Inverter, will be used to display the moisture on the Irrigation GUI webpage. The Soil pH sensor will be an analog sensor with either a -10 to +10V DC or 0 to 10V DC output signal. The Soil pH sensor should be wired to the P1-AG analog expansion card that is installed in the P1 Inverter. The Soil pH sensor should terminate on the Vi6 (voltage input) and L (common) terminals.

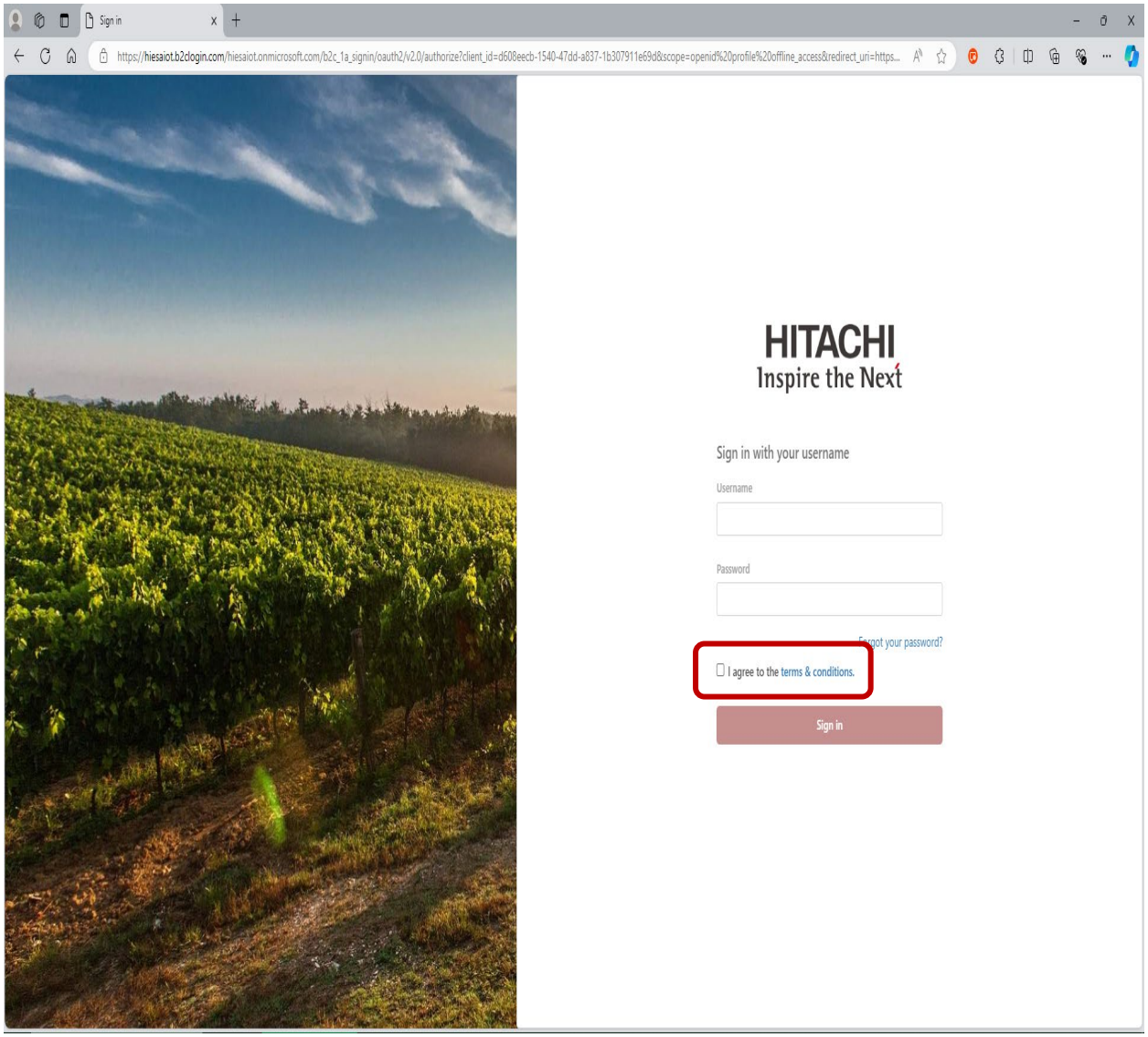


Using the IOT GUI WEB Portal to control the pump

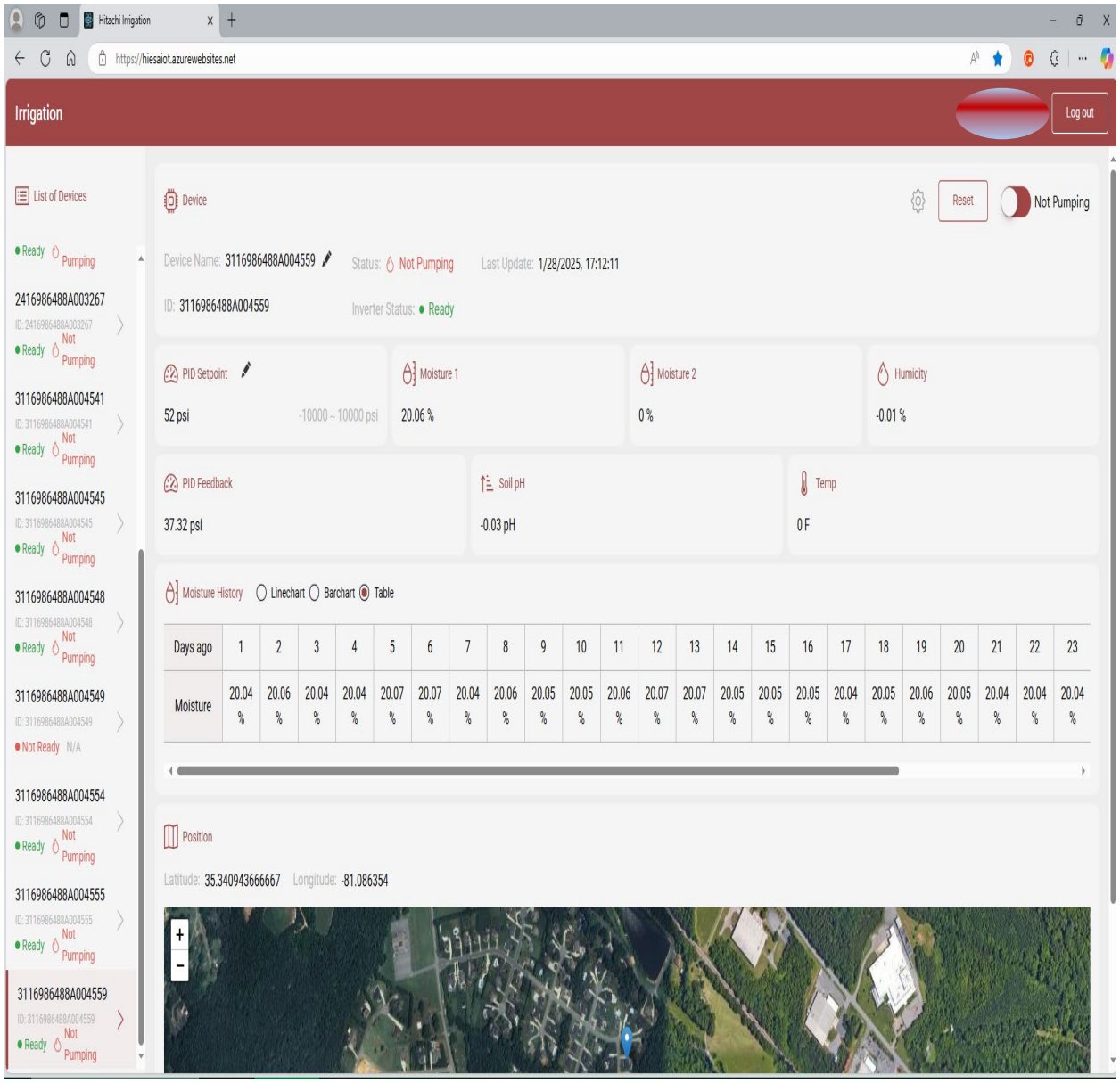
Please log into the Hitachi Irrigation GUI (Graphic User Interface) webpage using either a computer connected to the internet, tablet, or phone with internet access.

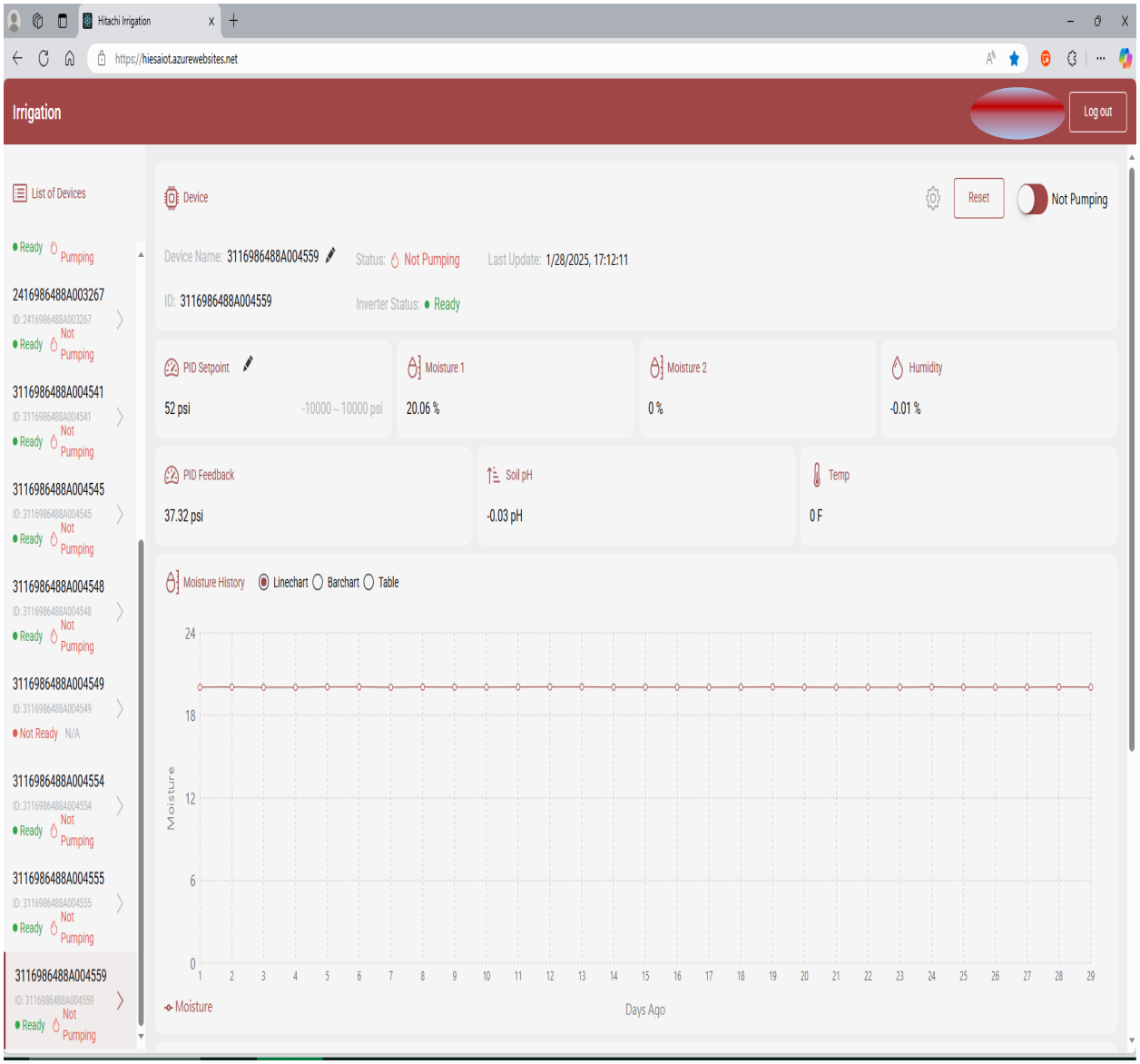
The Hitachi Irrigation GUI webpage is located at: https://hiesaiot.azurewebsites.net

Please enter the username and password assigned to the user. (This must be done in advance of accessing the IOT webpage. Please contact Hitachi directly to setup a username and password.) You are also required to accept the end user license agreement by checking the box below the user sign in.



After logging into the Irrigation GUI webpage, the Irrigation Dashboard will be displayed (please see below). From here, a list of assigned devices populates on the left side of the page. Once a device is selected, information from that device will be displayed. The Device Name field allows the user to set an identifier that is relevant to the application, such as “Field 1 Pump” or “Corn Field West Side”. The device’s serial number will be automatically populated in the ID field. The status indicator displays a “Not Pumping” or “Pumping” icon based on the output of the inverter. The inverter status indicator informs the user if the drive is “Ready” or “Not Ready/Faulted”. If faulted the inverter should be inspected for the root cause of the fault. Then the inverter can be reset using the Reset button on the Irrigation page or the physical Reset button on the inverter. If the drive is faulted, a fault code will be generated and displayed on the Irrigation webpage. The fault code will also be displayed on the inverter and stored in the inverter’s fault history. The date and time of the latest Irrigation webpage update will be stored in the Last Update field. From the Irrigation dashboard, the user will be able to view or change the PID setpoint, by clicking on the pencil icon by the PID Setpoint field name. The Moisture 1, Moisture 2, Humidity, Soil pH, and Temperature fields can be observed from this dashboard as well. The Moisture sensor data will be displayed as a 29-day historical table that can be viewed as a line or bar chart (please see the images below). The bottom of the page contains the CPTrans device’s GPS coordinates. The GPS coordinates will automatically be populated when using the GPS antenna. The coordinates can also be manually entered by clicking the pencil icon by the Position field name.


Hitachi Irrigation
https://hiesaiot.azurewebsites.net
Irrigation
Log out
List of Devices
Ready Pumping
2416986488A003267
ID: 2416986488A003267
Ready Not Pumping
3116986488A004541
ID: 3116986488A004541
Ready Not Pumping
3116986488A004545
ID: 3116986488A004545
Ready Not Pumping
3116986488A004548
ID: 3116986488A004548
Ready Not Pumping
3116986488A004549
ID: 3116986488A004549
Not Ready N/A
3116986488A004554
ID: 3116986488A004554
Ready Not Pumping
3116986488A004555
ID: 3116986488A004555
Ready Not Pumping
3116986488A004559
ID: 3116986488A004559
Ready Not Pumping
Device
Reset
Not Pumping
Device Name: 3116986488A004559
Status: Not Pumping
Last Update: 1/28/2025, 17:12:11
ID: 3116986488A004559
Inverter Status: Ready
PID Setpoint
52 psi
-10000 ~ 10000 psi
Moisture 1
20.06 %
Moisture 2
0 %
Humidity
-0.01 %
PID Feedback
37.32 psi
Soil pH
-0.03 pH
Temp
0 F
Moisture History
Linechart Barchart Table
Days ago 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Moisture 20.04 % 20.06 % 20.04 % 20.04 % 20.07 % 20.07 % 20.04 % 20.06 % 20.05 % 20.05 % 20.06 % 20.07 % 20.07 % 20.05 % 20.05 % 20.05 % 20.04 % 20.05 % 20.06 % 20.05 % 20.04 % 20.04 % 20.04 %
Position
Latitude: 35.340943666667
Longitude: -81.086354


Hitachi Irrigation
https://hiesaiot.azurewebsites.net
Irrigation
Log out
List of Devices
Device
Reset
Not Pumping
Device Name: 3116986488A004559
Status: Not Pumping
Last Update: 1/28/2025, 17:12:11
ID: 3116986488A004559
Inverter Status: Ready
PID Setpoint
52 psi
-10000 ~ 10000 psi
Moisture 1
20.06 %
Moisture 2
0 %
Humidity
-0.01 %
PID Feedback
37.32 psi
Soil pH
-0.03 pH
Temp
0 F
Moisture History
Linechart
Barchart
Table
Moisture
Days Ago
Ready
Pumping
2416986488A003267
Not Pumping
3116986488A004541
3116986488A004545
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3116986488A004549
Not Ready
N/A
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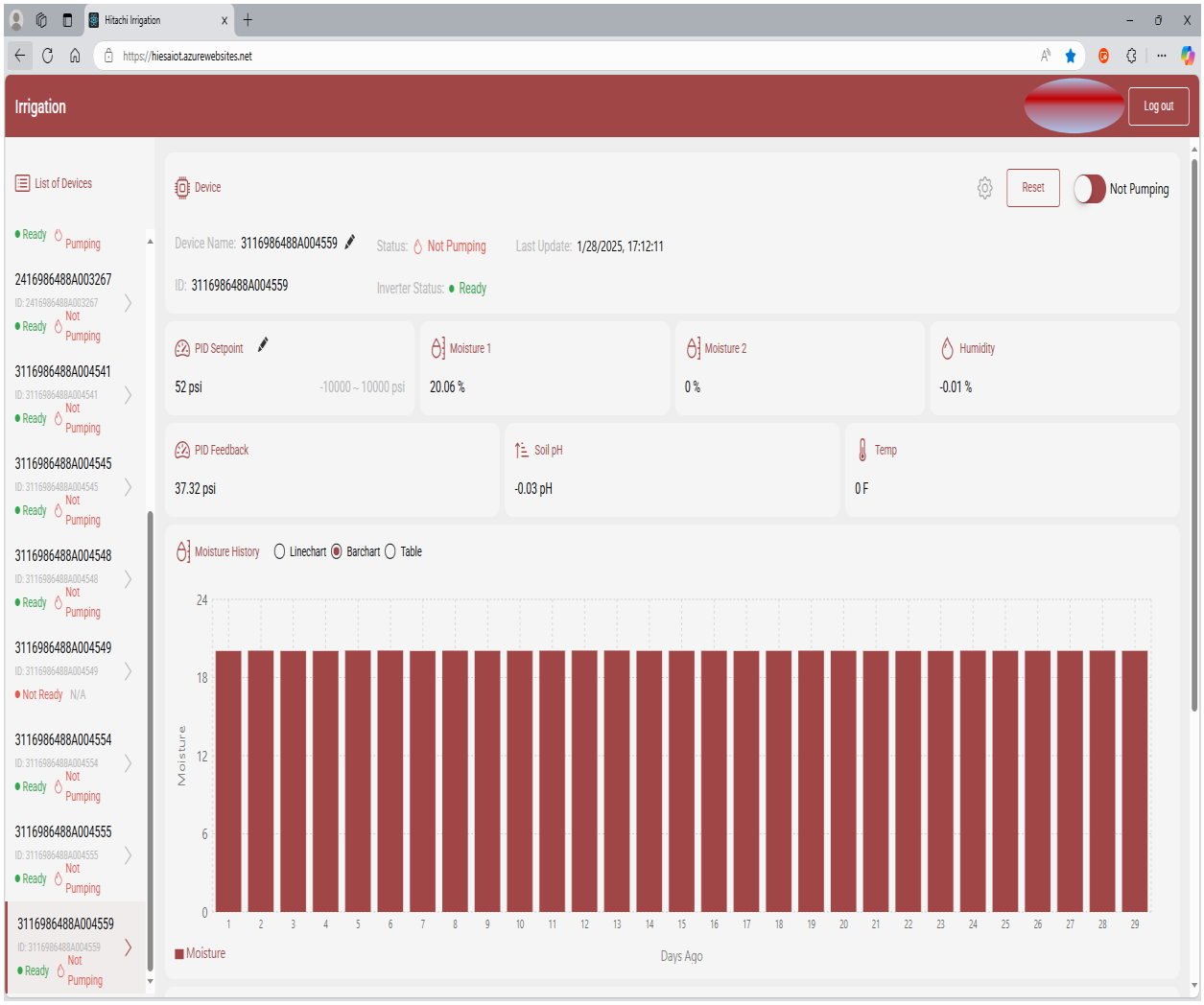
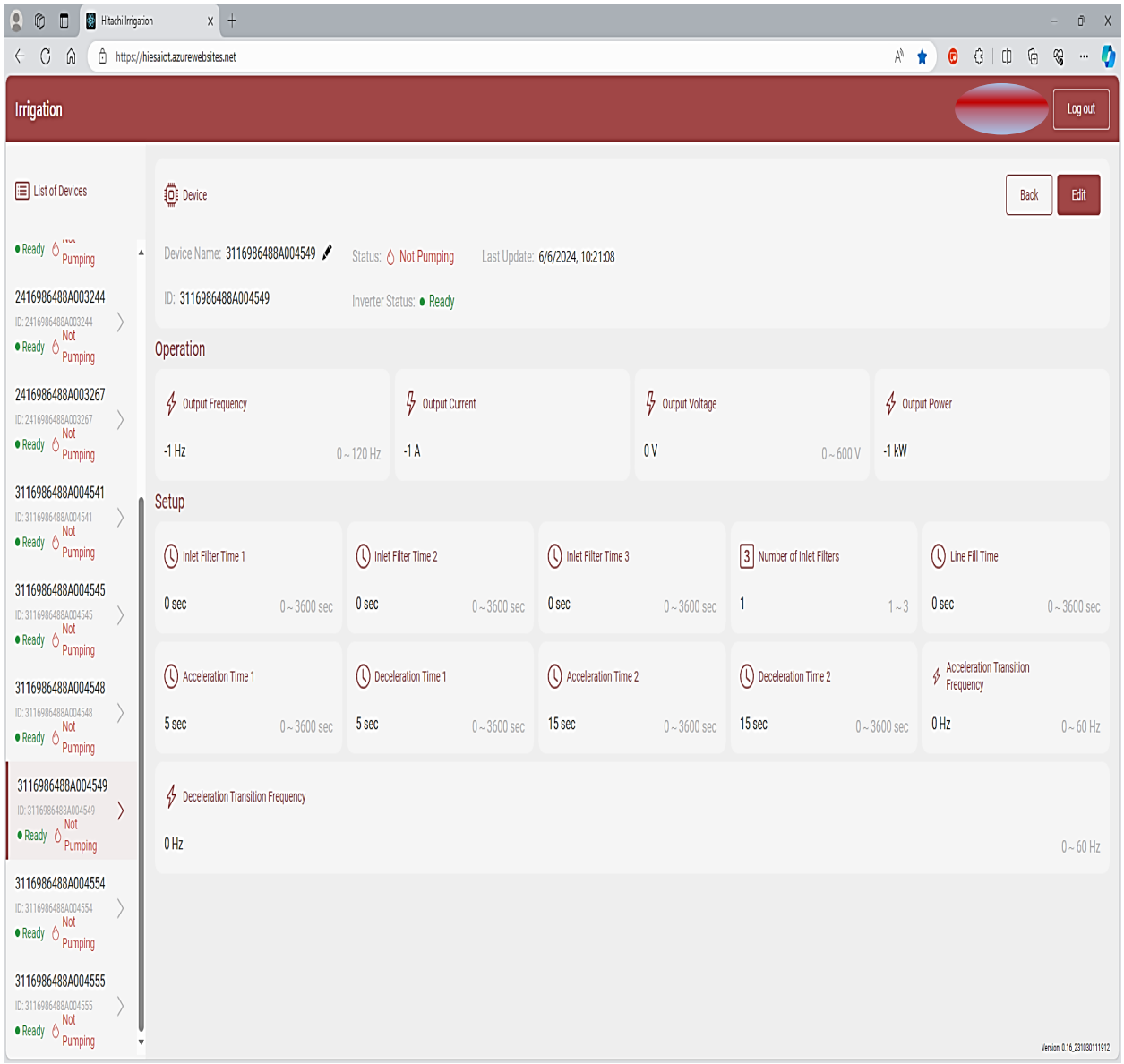
3116986488A004555
3116986488A004559



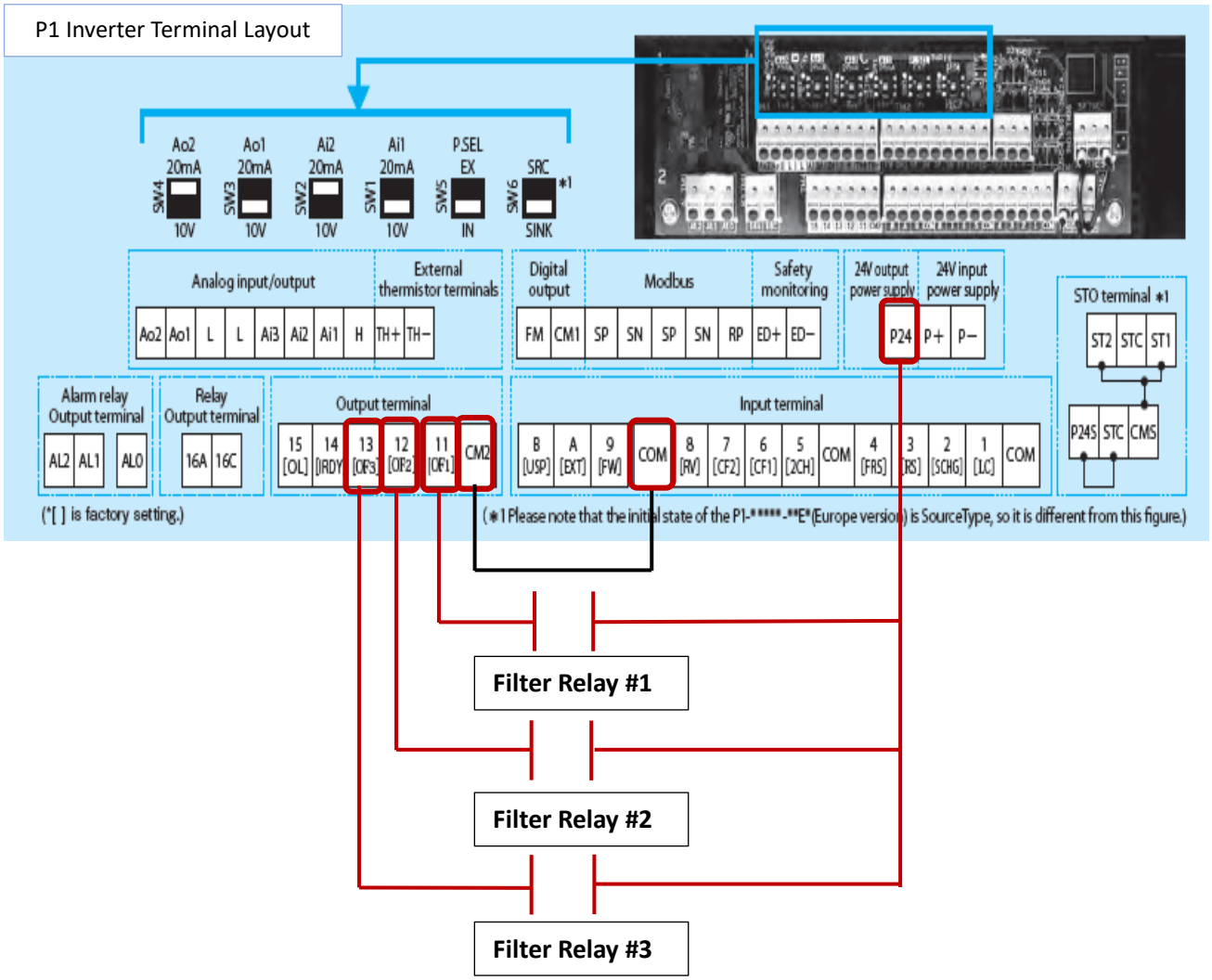
Clicking on the gear icon, from the dashboard, will bring up the P1 Inverter's operation tiles and the setup fields that can be edited by the user. The operation tiles display the P1 Inverter's Output Frequency, Output Current, Output Voltage, and Output Power. These information blocks are display only and cannot be changed. The next section of the webpage, "Setup", can be used to set values in the P1 Inverter. To edit these fields, click the Edit button in the top right. If using the filter sequence function, the "Number of Filters" field must be set, up to 3 filters can be used with the P1 Inverter outputs. If the filter sequence function is not going to be used, the "Number of Filters" field must be set to 0. The "Inlet Filter Time 1, 2, and 3" fields allow the user to set some time for the filters to rotate between them. The "Line Fill Time" field allows the user to set some time for line fill to avoid water hammer on the pipes. The user can also set the Acceleration and Deceleration times. These parameters have been preset to 2

seconds. The user also has the option to set a second Acceleration and Deceleration time. These parameters have been preset to 15 seconds. This allows the drive to power the pump up quickly then change to a slower rate at the Acceleration or Deceleration Transition Frequency. After all changes have been made, please click the Save button to write all the values to the P1 Inverter.

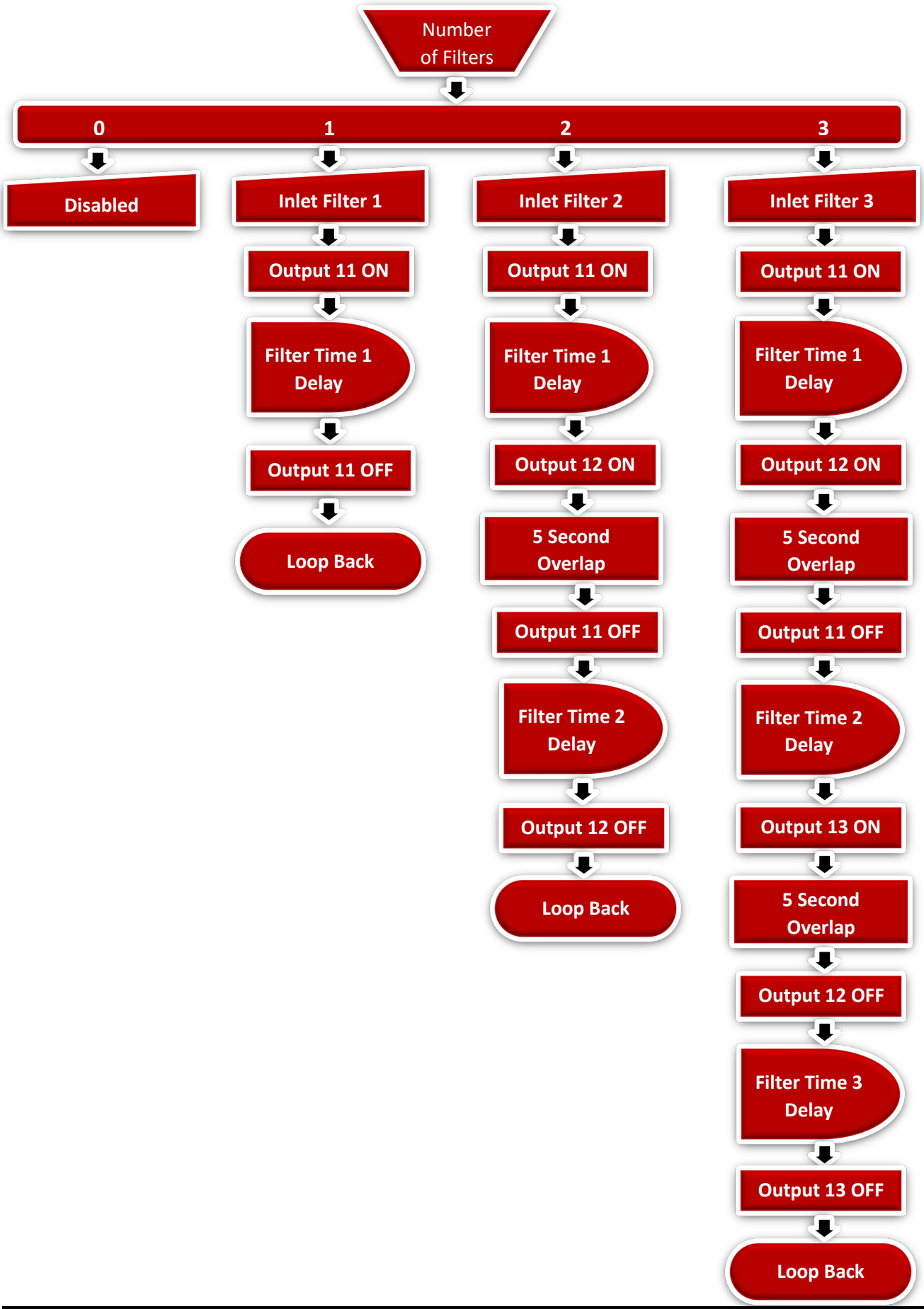


Filter Sequence Function

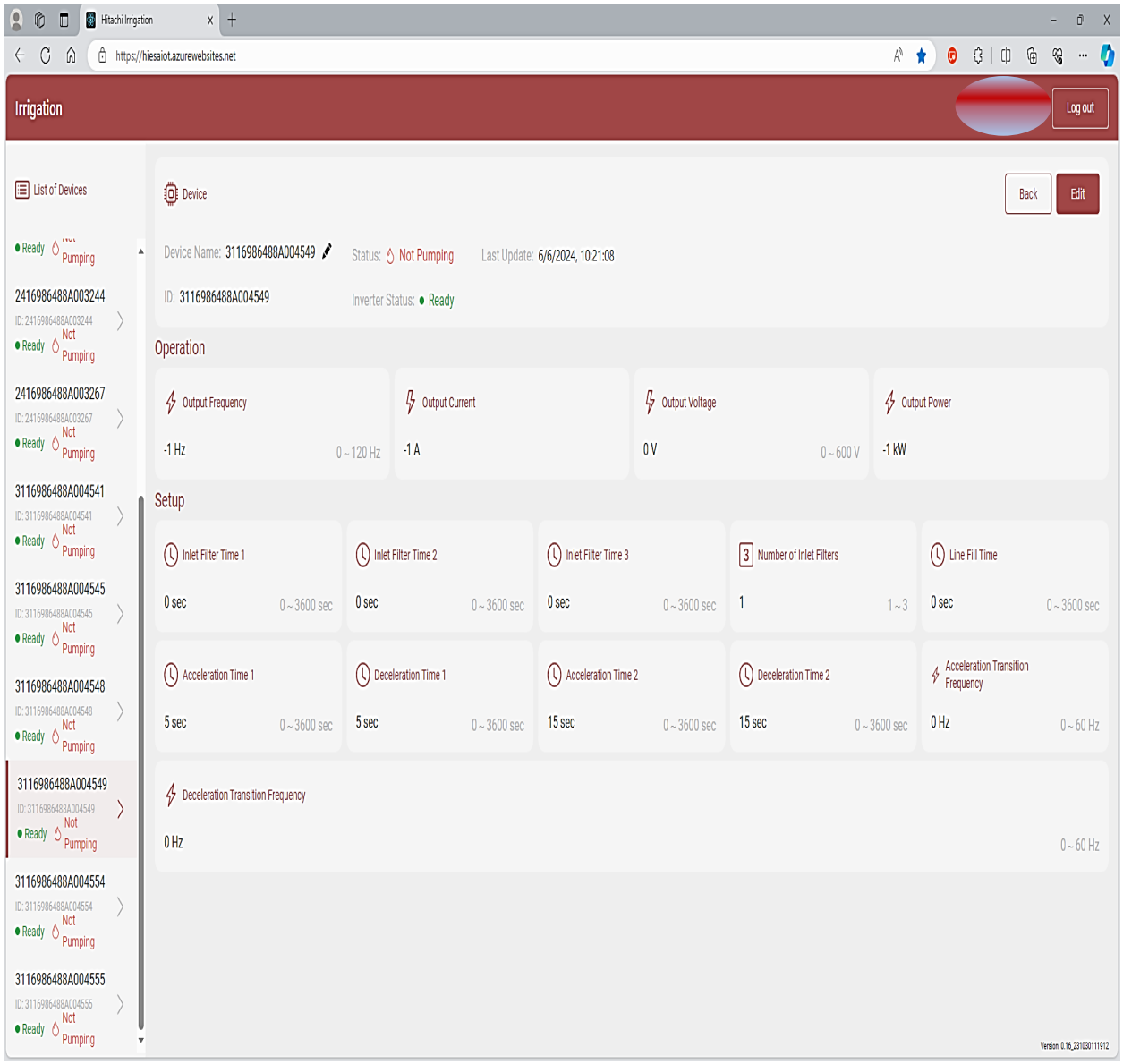
The filter sequence function rotates up to three of the P1 Inverter's outputs that will be wired to the filters for a configured amount of time. The outputs of the P1 Inverter will turn on and off based on the input settings from the GUI webpage. Outputs 11, 12, and 13 are programmed as general-purpose outputs and used by the filter program. These are 24V DC outputs and should be wired to relays to activate the filters if using 120V or different voltage filters. Please see the output wiring below.

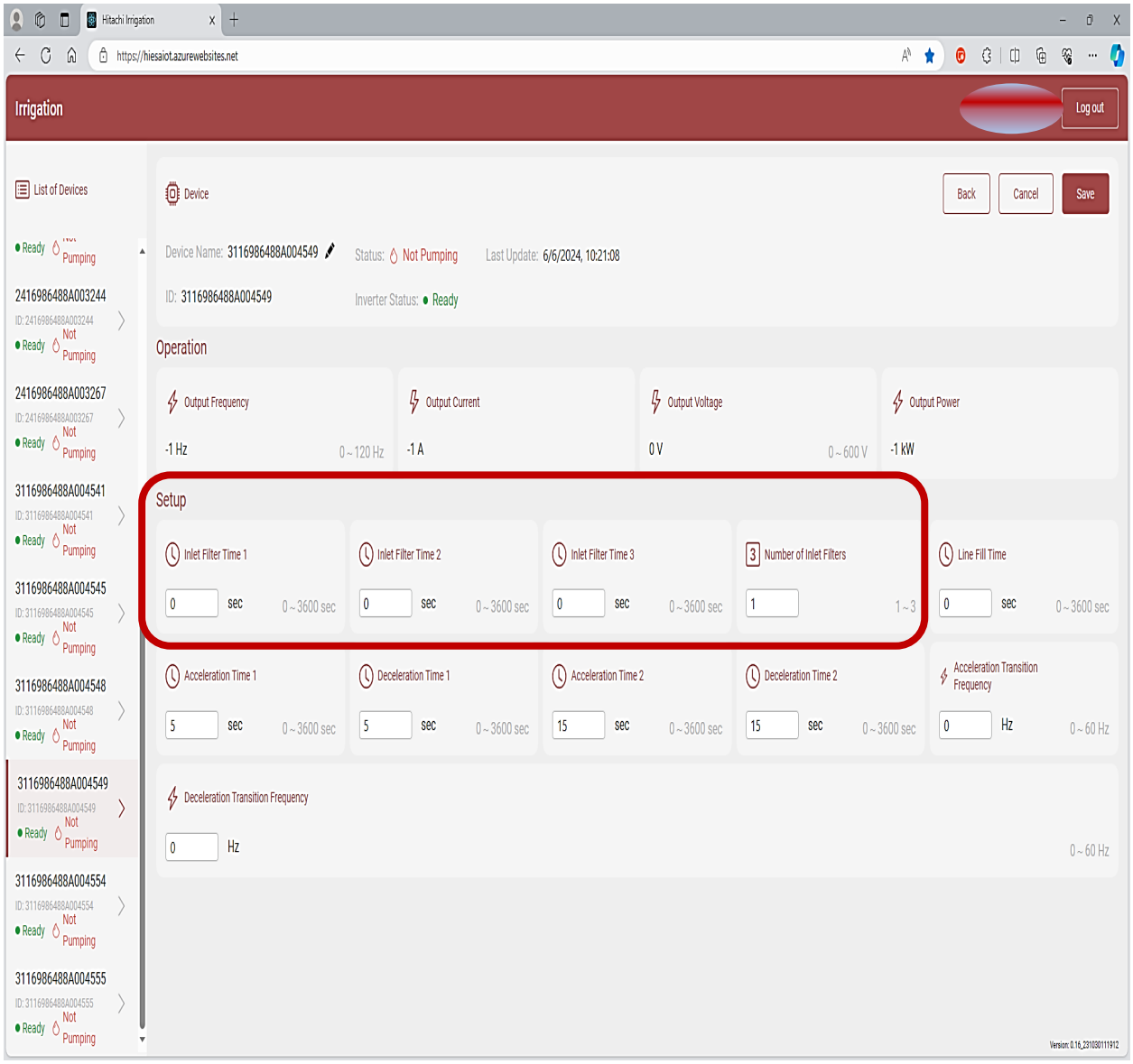


To activate the filter sequence function; first, set the "Number of Filters" field using the GUI webpage. Setting this field to 0 disables the filter sequence function. After setting the number of filters, please set the "Inlet Filter Times 1, 2, and 3" fields to the desired filtering time in seconds. Please see the filter function flow diagram below.


Number of Filters
0
1
2
3
Disabled
Inlet Filter 1
Output 11 ON
Filter Time 1 Delay
Output 11 OFF
Loop Back
Inlet Filter 2
Output 11 ON
Filter Time 1 Delay
Output 12 ON
5 Second Overlap
Output 11 OFF
Filter Time 2 Delay
Output 12 OFF
Loop Back
Inlet Filter 3
Output 11 ON
Filter Time 1 Delay
Output 12 ON
5 Second Overlap
Output 11 OFF
Filter Time 2 Delay
Output 13 ON
5 Second Overlap
Output 12 OFF
Filter Time 3 Delay
Output 13 OFF
Loop Back

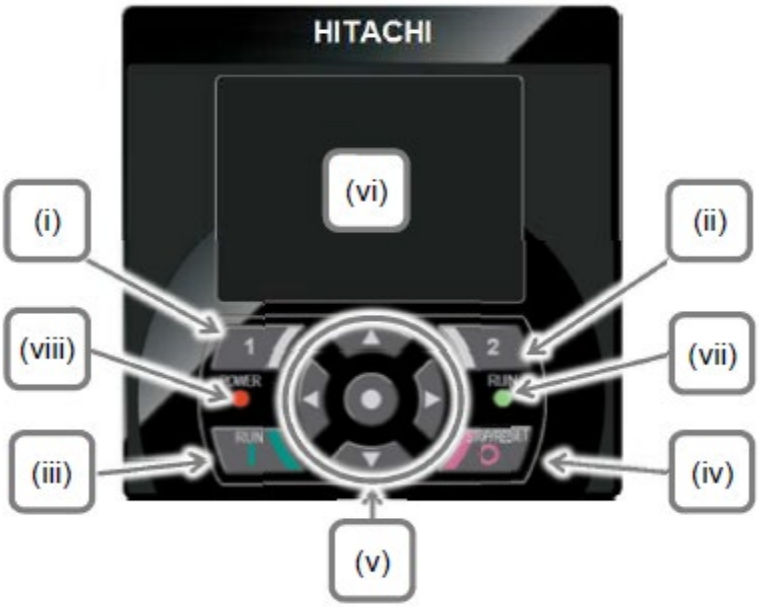
Filter Sequence Configuration Fields on the IOT Webpage




Hitachi Irrigation
https://hiesaiot.azurewebsites.net
Irrigation
Log out
List of Devices
Device
Back
Cancel
Save
Device Name: 3116986488A004549
Status: Not Pumping
Last Update: 6/6/2024, 10:21:08
ID: 3116986488A004549
Inverter Status: Ready
Operation
Output Frequency
-1 Hz
0 ~ 120 Hz
Output Current
-1 A
Output Voltage
0 V
0 ~ 600 V
Output Power
-1 kW
Setup
Inlet Filter Time 1
0
sec
0 ~ 3600 sec
Inlet Filter Time 2
0
sec
0 ~ 3600 sec
Inlet Filter Time 3
0
sec
0 ~ 3600 sec
Number of Inlet Filters
1
1 ~ 3
Line Fill Time
0
sec
0 ~ 3600 sec
Acceleration Time 1
5
sec
0 ~ 3600 sec
Deceleration Time 1
5
sec
0 ~ 3600 sec
Acceleration Time 2
15
sec
0 ~ 3600 sec
Deceleration Time 2
15
sec
0 ~ 3600 sec
Acceleration Transition Frequency
0
Hz
0 ~ 60 Hz
Deceleration Transition Frequency
0
Hz
0 ~ 60 Hz
2416986488A003244
2416986488A003267
3116986488A004541
3116986488A004545
3116986488A004548
3116986488A004549
3116986488A004554
3116986488A004555
Ready
Not Pumping

P1 Inverter Programming

The P1 Inverter will come programmed from the factory for submersible pump control, however, the settings can still be changed with the inverter's keypad.



No.	Name	Setting
(i)	F1 key	Displays functions such as navigation to the home screen and cancellation at the bottom left of the screen.
(ii)	F2 key	Displays functions such as data storage at the bottom right of the screen.
(iii)	RUN key	The device runs when this key is enabled.
(iv)	STOP/RESET key	Performs deceleration stop and trip reset.
(v)	Arrow keys & SEL key (center)	Select data on the screen using arrow keys, and confirm by pressing the O key in the center.
(vi)	Display screen	Displays parameters and data.
(vii)	RUN lamp	Turns on when an operation command is sent.
(viii)	POWER lamp	Turns on when the operator keypad is ON. Turns on when R0 and T0 on the main circuit or P+ and P- on the terminal block are ON.

To access the parameters, press the number 1 Function key (Menu). Now, several options appear on the screen. Scroll mode can be used to display the parameter file groups. The P1 Inverter parameters are broken down into file groups that contain similar parameters. The file groups of parameters are:

D file group: This file group displays parameters used to show information about the drive such as the motor output speed, amperage, voltage, etc.

F file group: This is the reference and monitor parameters. Change important features quickly with this file group and the parameter acts as the monitor for that parameter.

A file group: The standard function parameters are used to set the inverter's control, such as the run command and speed command source. The PID function parameters are stored in the A file group. The multispeed settings are also located in the A file group.

B file group: The fine-tuning functions are stored in the B file group. This includes the upper and lower frequency limits, overload restriction parameters, automatic restart functions, carrier frequency, and the torque limit functions.

C file group: The C file group contains parameters for the digital and analog input / output functions. The RS 485 communication parameters and the EzCom parameters are stored in the C file group.

H file group: The H file group contains the motor parameters that need to be set to properly protect the motor.

O file group: The O file group stores parameters for the options that can be inserted into the P1 Inverter's 3 slots.

P file group: The P file group contains parameters for emergency force functions and simulation mode parameters.

U file group: The initialization, trace function, EzSq parameters, and the load setting parameters are stored in the U file group.

From the main menu, the motor menu can be accessed, here you will quickly find parameters to set the motor specifications. Keypad display options can also be accessed to configure your display to your specifications. There will also be options for user group parameters and a section to read/write parameter sets to the inverter. Please see the next section that explains the parameters that pertain to the IOT Irrigation P1 Inverter.

A - File Group (Standard parameters)

Speed Command Source – (parameter AA101) In normal pumping applications, this will be set to PID control. This allows the user to set a setpoint and the inverter will react by adjusting the speed of the pump based on feedback from the system. The parameter has been preset to option 15 (PID).

Run Command Source – **(parameter AA111)** For the pumping application to be controlled remotely, this parameter must be set to option 03 (RS485). Activating the digital input #1, assigned to the Hand/Auto switch, can change the run command to a locally terminated run command switch, input #9. The preset value stored in the parameter is option 03 (RS485).

Acceleration Time 1 – (parameter AC120) This parameter has been preset to 2 seconds for the submersible pump application, however it can be adjusted based on the specific needs of the application. This parameter can be changed from the keypad or the IOT Irrigation webpage.

Deceleration Time 1 – (parameter AC122) The deceleration time has been preset to 2 seconds for the submersible pump application, however it can also be adjusted based on the specific needs of the application. This parameter can be changed from the keypad or the IOT Irrigation webpage.

Acceleration Time 2 – (parameter AC124) The 2nd acceleration time becomes active after the pump motor reaches the assigned motor speed. This parameter has been preset to 15 seconds. This parameter can be changed from the keypad or the IOT Irrigation webpage.

Deceleration Time 2 – (parameter AC126) The 2nd deceleration time becomes active after the pump motor reaches the assigned motor speed. This parameter has been preset to 15 seconds. This parameter can be changed from the keypad or the IOT Irrigation webpage.

Acceleration 1 to Acceleration 2 Transition frequency – (parameter AC116) This parameter will set the transition frequency that will change the acceleration time from Acceleration Time 1 to Acceleration Time 2. This is especially useful in submersible pump applications to allow water to start flowing quickly. After this transition, the pump motor can ramp up more slowly and adapt to the changing pressure in the system. This parameter can be changed from the keypad or the IOT Irrigation webpage.

Deceleration 1 to Deceleration 2 Transition frequency – (parameter AC117) This parameter will set the transition frequency that will change the deceleration time from Deceleration Time 1 to Deceleration Time 2. This parameter can be changed from the keypad or the IOT Irrigation webpage.

PID Enable – (parameter AH-01) This parameter activates the PID control which allows the P1 Inverter to control the pressure of the pumping system. The parameter will be preset to 01: PID Enabled.

PID Engineering Units – (parameter AH-03) The PID engineering units can be set based on the type of application the P1 Inverter is installed. The parameter will be preset to option 57: PSI.

Input source selection of PID Setpoint – (parameter AH-07) This parameter sets the source of the setpoint for PID control. The parameter will be preset to 08: RS485 Modbus. When input #1 is active, this parameter will be changed to option 07: Keypad (parameter AH-10).

PID Setpoint – (Parameter AH-10) This parameter sets the pressure setpoint for the system when the P1 Inverter is placed in local control.

Input source selection of PID Feedback – (parameter AH-51) The parameter sets the source of the feedback for PID control. The parameter will be preset to option 01: Analog Input #1.

PID Soft Start Function Enable – (parameter AH-75) The soft start function allows the system to ramp up slowly and linearly and build up pressure before switching to PID control. This feature prevents water hammer on the system.

PID Soft Start Target Level – (parameter AH-76) This parameter sets the level at which the PID function will take control. The parameter will be preset to 50%, which allows the PID control to take over at 30Hz.

Acceleration time for PID soft start control – (Parameter AH-78) This parameter sets the acceleration time for PID soft start. The parameter will be preset to 2 seconds.

PID Soft Start – (Parameter AH-80) The overall soft start operation time is set with this parameter. The parameter will be preset to 15 seconds.

B - File Group (Fine Tuning Parameters)

Frequency Limit Source Selection – (parameter bA101) The upper and lower limits are set using the source set in this parameter. The preset value in parameter bA101 is 07, this allows the upper and lower limits to be set via the parameters.

Upper frequency limit – (parameter bA102) Sets the upper frequency limit.

Lower frequency limit – (parameter bA103) Sets the lower frequency limit.

C - File Group (Input/Output and Communication Parameters)

Input terminal 1 function – (parameter CA-01) Input 1 is used by the EzSq program for local control. This input parameter will be set to option 086: (MI1: General purpose input).

Input terminal 3 function – (parameter CA-03) Input 3 is programmed to be the reset function. This parameter will be set to option 028: (RS: Reset).

Input terminal 9 function – (parameter CA-09) Input 9 is the run forward function for local control. This parameter is set to option 001: (FW: Forward Run).

RS485 communication baud rate – (parameter CF-01) This parameter must be set to option 05 (9600bps) for the inverter to operate remotely.

RS485 communication node address – (parameter CF-02) This parameter must be set to 1 for the inverter to operate remotely. If multiple inverters are used in the application, please consult with Hitachi a representative.

RS485 communication parity selection – (parameter CF-03) This parameter must be set to option 00 (no parity) for the inverter to operate remotely.

RS485 communication stop bit selection – (parameter CF-04) This parameter must be set to option 01 (1 bit) for the inverter to operate remotely.

RS485 communication mode selection – (parameter CF-08) This parameter must be set to option 01 (Modbus-RTU) for the inverter to operate remotely.

H - File Group (Motor Information Parameters)

Motor capacity – (parameter Hb102) Please set the motor capacity in kilowatts.

Motor poles – (parameter Hb103) Please set the motor poles. If this information cannot be found on the motor's data information tag, please use the following equation to find the poles.

(Max Motor speed * 120) / motor synchronous speed

Motor base speed – (parameter Hb104) Set to the motor base frequency.

Motor maximum frequency – (parameter Hb105) Please set to the motor maximum frequency.

Motor rated voltage – (parameter Hb106) Set to the motor's rated voltage.

Motor rated current – (parameter Hb108) Set to the motor's rated current.

U File Group (Initialization (Factory Reset), EzSq parameters)

Initialization mode selection – (parameter Ub-01) Use this parameter to set the information to be reset. For a simple reset of the parameters, please choose option 02 (Data Initialization). *Only set this parameter if you intend to reset the drive back to factory parameter settings. If the P1 Inverter is reset to factory settings, the parameters will need to be reprogrammed for the inverter to work in the Irrigation IOT application. *

Enable Initialization – (parameter Ub-05) This is the trigger for the initialization. Please set to option 01 (Execute initialization) to reset the drive back to factory settings. *Only set this parameter if you intend to reset the drive back to factory parameter settings. *

EzSq enable setting – (parameter UE-02) This parameter starts the EzSq function, it has been preset to 02 (Always enabled). *Disabling this function may cause other features to stop functioning properly. *

Troubleshooting and Error Codes

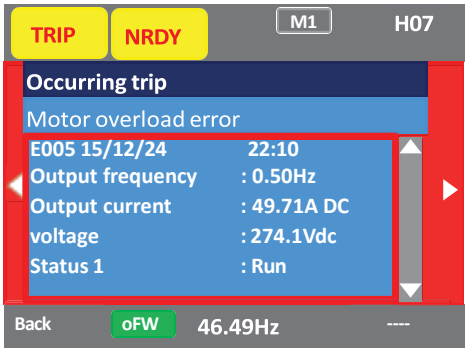
If the P1 Inverter has faulted, an error code will be displayed on the IOT Webpage and on the front keypad. Up to 10 previous faults will be stored in the inverter's fault history. The latest fault will be displayed in trip 1 monitor. The following data is stored on each fault that has occurred:

- The fault error code
- Output frequency at trip
- Output current at trip
- Main Circuit DC voltage at trip
- Operation state at trip
- Cumulative inverter operating time (hours) before trip
- Cumulative inverter power-on time (hours) before trip

Please keep in mind the following points about the P1 Inverter fault codes:

- The information of the moment of error occurrence may not be fetched properly if the inverter is forcibly turned OFF by its hardware.
- Values of respective data items may be reset to 0 when an error occurred, and the inverter entered the trip condition.
- For a ground fault or a momentary overcurrent event, the current may be recorded in a value lower than the actual value.
- The trip monitor and the trip count monitor can be cleared by initialization of the trip history.

■ Display of occurring trip

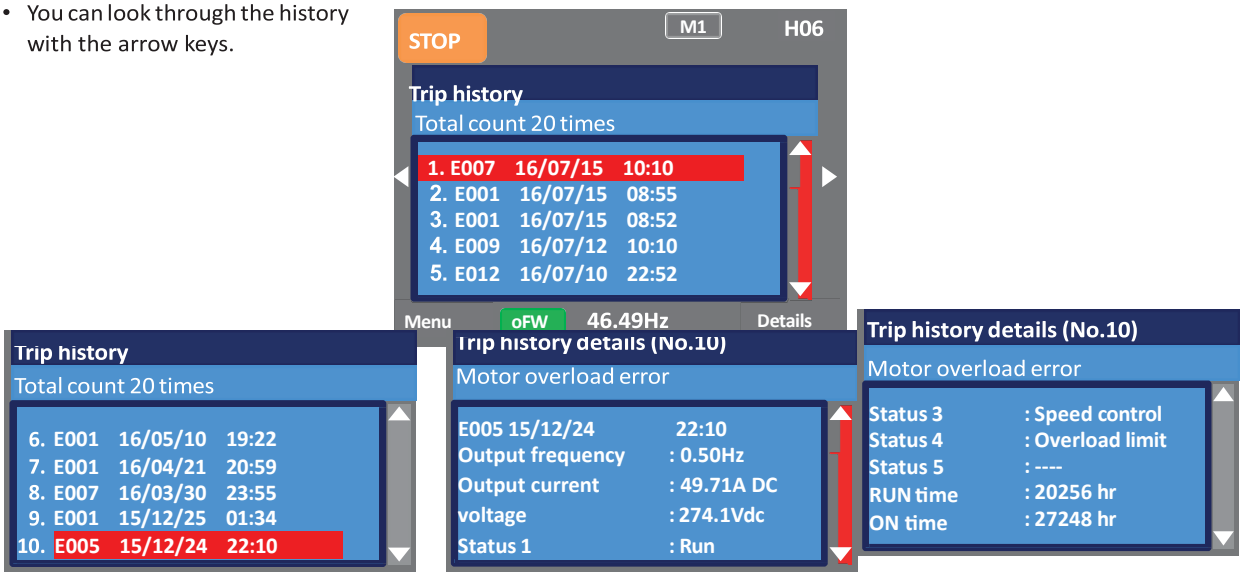


■ Parameter

Item	Parameter	Data	Description
Trip monitor 1 to 10	Detailed monitor	See above data items.	On the parameter monitor, you can view data items 1) to 7) in sequence by UP/DOWN keys.
Trip count monitor	Detailed monitor	0 - 65535 (Counts)	Trip count data is stored in the inverter.

■ “Detailed monitor” for checking the history

- You can look through the history with the arrow keys.



Protection-function Related Errors

Refer to the explanation pages of the User’s manual.

Error No.	Error Name	Explanation Page
E001	Overcurrent error	18-7
E005	Motor overload error *2)	18-8
E006	Braking resistor overload error	18-9
E007	Overvoltage error	18-10
E008	Memory error	18-11
E009	Undervoltage error	18-12
E010	Current detector error *1)	18-13
E011	CPU error *1)	18-13
E012	External trip error	18-14
E013	USP error	18-14
E014	Ground fault error *1)	18-15
E015	Incoming overvoltage error	18-15
E016	Instantaneous power failure error	18-16
E019	Temperature detector error *1)	18-16
E020	Cooling fan rotation speed reduction temperature error *1)	18-17
E021	Temperature error	18-17
E024	Input open-phase error	18-18
E030	IGBT error	18-18
E034	Output open-phase error	18-19

Error No.	Error Name	Explanation Page
E035	Thermistor error	18-19
E036	Brake error	18-20
E038	Low-speed range overload error	18-20
E039	Controller overload error *2)	18-21
E040	Operator keypad disconnection error	18-22
E041	RS485 communication error	18-22
E042	RTC error	18-23
E043	EzSQ illegal instruction error	18-23
E044	EzSQ nest count error	18-24
E045	Executive instruction error	18-24
E050	EzSQ user-assigned error 0	18-25
E051	EzSQ user-assigned error 1	18-25
E052	EzSQ user-assigned error 2	18-25
E053	EzSQ user-assigned error 3	18-25
E054	EzSQ user-assigned error 4	18-25
E055	EzSQ user-assigned error 5	18-25
E056	EzSQ user-assigned error 6	18-25
E057	EzSQ user-assigned error 7	18-25
E058	EzSQ user-assigned error 8	18-25
E059	EzSQ user-assigned error 9	18-25

*1) When a serious fault has occurred, it cannot be released by a reset operation.

*2) When a controller overload error has occurred, or a motor overload error has occurred in the condition that [bC112] had been set to 00, the inverter does not accept a reset input for 10 s. Wait for a while before performing a reset operation.

Error No.	Error Name	Explanation Page
E060	Option 1 error 0	18-25
E061	Option 1 error 1	18-25
E062	Option 1 error 2	18-25
E063	Option 1 error 3	18-25
E064	Option 1 error 4	18-25
E065	Option 1 error 5	18-25
E066	Option 1 error 6	18-25
E067	Option 1 error 7	18-25
E068	Option 1 error 8	18-25
E069	Option 1 error 9	18-25
E070	Option 2 error 0	18-26
E071	Option 2 error 1	18-26
E072	Option 2 error 2	18-26
E073	Option 2 error 3	18-26
E074	Option 2 error 4	18-26
E075	Option 2 error 5	18-26
E076	Option 2 error 6	18-26
E077	Option 2 error 7	18-26
E078	Option 2 error 8	18-26
E079	Option 2 error 9	18-26
E080	Option 3 error 0	18-26
E081	Option 3 error 1	18-26
E082	Option 3 error 2	18-26
E083	Option 3 error 3	18-26
E084	Option 3 error 4	18-26
E085	Option 3 error 5	18-26
E086	Option 3 error 6	18-26
E087	Option 3 error 7	18-26
E088	Option 3 error 8	18-26
E089	Option 3 error 9	18-26

Error No.	Error Name	Explanation Page
E090	STO shutoff error	18-27
E091	STO internal error	18-27
E092	STO path 1 error	18-27
E093	STO path 2 error	18-27
E094	FS option internal error	18-27
E095	FS option path 1 error	18-27
E096	FS option path 2 error	18-27
E097	FS option connection error	18-27
E100	Encoder disconnection error	18-27
E104	Position control range error	18-27
E105	Speed deviation error	18-27
E106	Position deviation error	18-27
E107	Over-speed error	18-27
E110	Contactor error	18-27
E112	FB option connection error	18-27

E001 Overcurrent error

A large current flowing in the inverter results in a failure. To prevent this, the inverter turns OFF its output. By setting the parameter, you can perform retries for a fixed number of times without generating an error. Overcurrent level can be set in the [bb160].

E001

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred abruptly during operation.	• A steep load change occurred.	• [bA120] Overcurrent suppression function and [bA122] Overload limit function are effective to suppress overcurrent. • When the vector control is used, the situation may be improved by adjusting the response to control in [HA115].
	• Hunting of motor	• The situation may be improved by setting the IM motor capacity in [Hb102], the number of IM poles in [Hb103], or the auto-tuning selection in [HA-01]. • The situation may be improved by adjusting stabilization control gain in [HA110].
Error occurred during acceleration.	• Insufficient acceleration time • Insufficient acceleration torque • Load inertia is large. • Friction torque is large.	• Setting longer acceleration time in [FA-10] can ease the insufficient acceleration torque. • When acceleration torque is required, the situation may be improved by adjusting the boost function in [Hb141], or by operating the inverter and making adjustments with control method in [AA121]. • Re-examination of load condition may improve the situation.
Error occurred during deceleration.	• Insufficient deceleration time • Insufficient regenerative torque • Load inertia is large.	• Setting longer deceleration time in [FA-12] can ease the insufficient regenerative torque. • When regenerative torque is required, the situation may be improved by adjusting the boost function in [Hb141], or by operating the inverter and making adjustments with control method in [AA121].
Error occurred right after an operation command input.	• A ground fault has occurred. • Output line is short-circuited or in open phase. • Output element failure	• The inverter may be broken if the error persists even when the power of inverter only is turned ON again after the power was turned OFF and the output line to the motor was removed. • If the issue is solved when the output line to the motor is removed, you need to check the wiring and/or motor.
	• Motor is locked. • Load inertia is large.	• Error may occur when the motor rotation is locked. • The situation may be improved by taking a measure for the case "Error occurred during acceleration".
Error occurred right after power was turned ON.	• Output element failure • Current detector failure	• Failure output element or current detector may be the cause. An investigation and repair are required.
Error occurred after long hours of use.	• System environment changes	• The situation may be improved by reducing the motor load, or performing a system maintenance (e.g., cleaning the fan to be driven and removing clogging in the duct).
	• Aging deterioration	• If the issue is not solved by reduction of the load and system maintenance, aging deterioration of a life-limited component may be the cause. A repair is required.

E005 Motor overload error

E005

The built-in electronic thermal function monitors the output current of the inverter and when a motor overload is detected, the inverter turns OFF its output. The inverter trips according to the setting of the motor electronic thermal function.
When a motor overload error occurred, the inverter does not accept a reset input for 10 seconds.

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred after a fixed period of operation.	• Operation under heavy load condition has continued.	• Re-examination of operation condition or correction of load condition may improve the situation.
	• Thermal level is set high.	• When the motor thermal level setting in [bC110] is not appropriate, re-examination of the setting may improve the situation.
Error occurred during acceleration.	• Insufficient acceleration torque • Load inertia is large. • Friction torque is large.	• Setting longer acceleration time in [FA-10] can ease the insufficient acceleration torque. • When acceleration torque is required, the situation may be improved by adjusting the boost function in [Hb141], or by operating the inverter and making adjustments with control method in [AA121].
	• A function to suppress overcurrent is at work.	• A factor for overcurrent may have been occurred. Re-examination of acceleration time or load condition is required.
Error occurred during deceleration.	• Load inertia is large.	• Setting longer deceleration time in [FA-12] can ease the insufficient regenerative torque. • When regenerative torque is required, the situation may be improved by adjusting the boost function in [Hb141], or by operating the inverter and adjusting with control method in [AA121]. • Re-examination of load condition may improve the situation.
	• A function to suppress overvoltage is at work.	• Current may increase as a result of suppressing overvoltage. Re-examination of deceleration time or load condition in [FA-12] is required.
Error occurred after long hours of use.	• System environment changes	• The situation may be improved by reducing the motor load, or performing a system maintenance (e.g., cleaning the fan to be driven and removing clogging in the duct).
	• Aging deterioration	• If the issue is not solved by reduction of the load and system maintenance, aging deterioration of a life-limited component may be the cause. A repair is required.

E006 Braking resistor overload error

E006

When the use rate of inverter's braking resistor operation circuit (BRD) exceeds the use rate set beforehand in [bA-60], the inverter turns OFF its output.

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred during deceleration.	• Insufficient deceleration time • Load inertia is large. • Capacity of braking resistor is small.	• Setting longer deceleration time in [FA-12] may improve the situation that the motor is rapidly decelerated. If deceleration time cannot be shortened, choice of resistor must be re-examined.
Error occurred during operation.	• Continuous regenerative operation • Capacity of braking resistor is small.	• The resistor may not be able to fully consume the power because the regenerative power returned from the motor is high. Load condition or choice of resistor must be re-examined.
	• Rotsted by external force.	• The resistor may not be able to fully consume the power because the fan is rotated by a strong wind, or because the regenerative power returned from the motor increases when loads are lowered by a crane or the like. Load condition or choice of resistor must be re-examined.
Error occurred during repetitive operations.	• Repetition cycle of operation is high.	• Reduction of repetition cycle of operation may improve the situation. Adjustment of deceleration time in [FA-12] and re-examination of choice of resistor may also improve the situation.

E007 Overvoltage error

Too high P-N voltage results in a failure. To prevent this, the inverter turns OFF its output. When P-N voltage exceeds approx. 410Vdc (200V class) or approx. 820Vdc (400V class), the output is turned OFF. By setting the parameter, you can perform retries for a fixed number of times without generating an error.

E007

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred during deceleration.	• Insufficient deceleration time • Load inertia is large.	• Setting longer deceleration time in [FA-12] may improve the situation that the motor is rapidly decelerated. If deceleration time cannot be shortened, you need to re-examine load condition, enable overvoltage suppression function in [bA140] and [bA146], or use a braking resistor, braking unit, or regenerative converter.
Error occurred during operation.	• Load inertia is large.	• If load inertia is large, high regenerative power returns from the motor; hence an overvoltage is likely to occur. You need to re-examine load condition, enable overvoltage suppression function in [bA140] and [bA146], or use a braking resistor, braking unit, or regenerative converter.
	• Rotated by external force (fan, crane).	• An overvoltage is likely to occur if motor rotation speed exceeds the output frequency (rotation speed) of inverter. You need to re-examine load condition, enable overvoltage suppression function in [bA140] and [bA146], or use a braking resistor, braking unit, or regenerative converter.
Error occurred during stop.	• Abnormality of PS voltage	• Power supply voltage may be raised or fluctuated. Re-examination of power supply environment or use of an AC reactor may improve the situation.
Error occurred during drooping control	• Mutual interference caused by 2 inverters trying to control motors strictly.	• When 2 motors driving a same shaft are controlled by 2 inverters, both the inverters attempt to generate torques, which may result in control divergence. The situation may be improved by setting one of the inverters to P control. See "12.11.3 Perform Drooping Control".

E008 Memory error

If the built-in memory has problems, the inverter turns OFF its output. CPU error may be issued instead.

The inverter recovers by re-turning ON the power; however, you need to check that there is no problem in parameters. The data which has been backed up on the operator keypad beforehand may be restored.

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred some time after the power was turned ON.	• Noise is mixed	• A physical countermeasure such as placing a shielding plate may be required to avoid external noises.
Power has been unintentionally turned OFF before.	• Power-off during memory access	• You need to restore the data by using the data which has been backed up on the operator keypad beforehand. If the data cannot be restored, initialization is required. See "12.2.2 Initialization of inverter". If the data cannot be restored by initialization, a repair is required.

E009 Undervoltage error

A decrease of the main power supply of inverter results in a circuit breakage. To prevent this, the inverter turns OFF its output. When P-N voltage falls below approx. 160Vdc (200V class) or approx. 320VDC (400V class), the output is turned OFF. By setting the parameter, you can perform retries for a fixed number of times without generating an error. Furthermore, undervoltage error during stop can be disabled by setting.

E009

Occurrence	Estimated cause(s)	Exemplar measures to be taken
There was a power failure.	• PS voltage decreased.	• If the internal power supply hasn't been fully turned OFF, it is possible to re-start the inverter after the power supply is recovered, by setting the retry function while it is still on.
Error occurred with the start of operation.	• PS voltage decreased. • PS capacity is insufficient.	• When power supply voltage decreases or power supply capacity is insufficient, re-examination of power supply environment is required.
The inverter doesn't start.	• PS voltage is insufficient.	• Perform power supplying in accordance with the inverter voltage class.
Error occurred after long hours of use.	• System environment changes • Capacitor deterioration • Circuit failure	• If an undervoltage occurs frequently, the inverter may have reached its end of life or be broken down. A repair is required.

E010 Current detector error

If the built-in current detector has problems, the inverter turns OFF its output.

E010

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred after power was turned ON.	• Current detector circuit is broken.	• If the error recurs after a reset operation, the current detector circuit may be broken down. A repair is required.
	• A noise source is nearby.	• When there is a noise source nearby, the situation may be improved by taking a noise countermeasure such as keeping the noise source away or placing a shielding plate.
Error occurred after long hours of use.	• Current detector circuit is broken.	• If the error recurs after a reset operation, the current detector circuit may be broken down. A repair is required.

E011 CPU error

When a malfunction or problem occurs in the built-in CPU, the inverter turns OFF its output and then displays the error.
If the inverter doesn't recover by re-turning ON the power, the CPU is likely to be broken.

E011

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred abruptly.	• The internal CPU is broken.	• The inverter may recover by a reset operation, re-turning ON the power, or initialization operation. When the inverter recovered, an initialization must be executed. • If the inverter doesn't recover, the CPU may be broken down. A repair is required.
	• A noise source is nearby.	• Where there is a noise source nearby, the situation may be improved by taking a noise countermeasure such as keeping the noise source away or placing a shielding plate.
Error occurred during data writing.	• Data is inconsistent.	• The inverter may recover by a reset operation, re-turning ON the power, or initialization operation. When the inverter recovered, an initialization must be executed. See "12.2.2 Initialization of inverter".

E012 External trip error

When the inverter accepted a signal commanded by an external device or equipment, the inverter turns OFF its output. (When external trip function is selected.)

E012

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred unintentionally.	• Terminal logics are reversed. • Wiring is wrong.	• You need to check the state of operations related to external devices or external equipment, and re-examine the assignment of external trip terminal to the inverter input terminal, the setting of a/b contact, the external trip command via communication, etc. • A/b contact of terminal can be changed by inverter setting.

E013 USP error

This error occurs if an operation command has been input to the inverter when the power supply is turned ON. Operation command detection is carried out for 1 second after the power supply is turned ON. (When USP function is selected.)

E013

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred unintentionally.	• Operation command was entered too early.	• Re-examination of the sequence to enter operation command is required. You need to wait for 2 seconds or longer to enter operation command after turning ON the power supply.
	• Operation command isn't released.	• You need to release an operation command when turning ON the power supply.
	• You tried to operate with commands other than terminal commands.	• When USP is enabled, commands of the operator keypad and communication commands are treated as errors. You need to wait for 2 seconds or longer to enter operation command after turning ON the power supply.

E014 Ground fault error

This is a function to protect the inverter by the detection of ground faults between the inverter output and the motor at power-on.

The function doesn't work when there is a voltage induced in the motor due to idling or when the inverter trips.

When the control circuit power (R0, T0, or 24V power supply) has been turned ON prior to the main circuit power R, S, or T, the function is activated at the time the main circuit power is turned ON.

Setting the ground fault detection selection [bb-64] to 00 disables the ground fault function. Setting it to 01 enables the function.

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred as the power supply was turned ON.	• Ground faults of wires or the motor • Motor insulation deterioration	• Turn OFF the power, remove the wires connected to the motor, and then check the motor and the wires. A ground fault may have been occurred. • Turning ON the power supply in a ground fault state results in a failure. Do not turn ON the power when you check the motor and motor wires.

E015 Incoming overvoltage error

This error occurs if high incoming voltage level is held for 100 seconds continuously while the inverter output is stopped when incoming overvoltage level [bb-61] is set to 01. It occurs when the P-N voltage exceeds the voltage level set in the incoming overvoltage level selection [bb-62] due to incoming voltage.

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred after power was turned ON.	• Incoming voltage is high.	• Re-examination of the power supply environment is required.
Error occurred after long hours of use.	• Power supply has become unstable.	• The power supply environment may have been changed due to facility replacement or the like. Re-examination of the power supply environment is required.

E016 Instantaneous power failure error

At the time of an instantaneous power failure, the inverter turns OFF its output. If the power failure continues, the event is regarded as a normal power-off.

Decrease in the main power R, S, or T generates this error. Decrease in the voltage of control circuit power supply R0 or T0 doesn't generate the error if the J51 connector has been removed and the R0 and T0 are input via a separate system.

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred after long hours of use.	• PS voltage decreased.	• If the power is turned OFF due to an external factor such as power failure, the inverter can be restarted by using the retry function when the power is restored.
	• There was a contact fault in circuit breaker.	• Failure of magnetic contactor or earth-leakage breaker may be the cause. Although the inverter may recover, a repair is required.
Error occurred with the start of operation.	• PS voltage decreased.	• If an instantaneous power failure hasn't occurred, insufficient capacity of power supply may be the cause. Re-examination of the power supply environment is required.

E019 Temperature detector error

This error occurs if there is a problem in the temperature detector circuit such as disconnection.

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred after use.	• The temperature detector circuit is disconnected or broken down.	• The temperature detector circuit is broken down. A repair is required.

E020 Temperature error Cooling fan rotation speed reduction error

E020

If the temperature of inverter gets high due to deterioration of cooling ability resulted from decrease in fan rotation speed, the inverter turns OFF its output. Refer to E021 also.

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Cooling fan stopped.	• A foreign object is stuck.	• If there is a foreign object stuck in the fan, the inverter may recover by removing it.
	• It is the end of cooling fan life.	• The cooling fan needs to be replaced.
The cooling fan is working.	• Cooling fan is approaching the end of its life.	• The cooling ability has been deteriorated. The cooling fan needs to be replaced.

E021 Temperature error

E021

When the temperature of inverter gets high, the inverter turns OFF its output.

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred during operation.	• Carrier frequency is high.	• The higher the carrier frequency is, the more the temperature inside the inverter tends to increase. Lower the carrier frequency setting.
	• There is clogging in the fin.	• The cooling ability is deteriorated. Cleaning the fin may improve the situation.
	• Used in high temperature environment. • Cooling of the surroundings is insufficient.	• Enhancing the use environment or cooling environment may improve the situation.
	• The formal installation condition is not satisfied.	• Improper installation of the inverter may results in the inverter failure. Install the inverter properly in accordance with the instruction manual.
Error occurred during stop.	• The temperature detector circuit broke down.	• The temperature detector circuit is broken down if the error is generated consecutively even after a reset. A repair is required.

E024 Input open-phase error

When [bb-65] input phase loss selection is set to 01, when a missing phase is detected in input line, the inverter turns OFF its output.

E024

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred after power was turned ON.	• An input line or the motor has a loose connection or is disconnected.	• You need to turn OFF the power supply and check the input lines and the wiring condition of breaker. This error may also occur due to PS voltage defect, contact defect, screw tightening failure, etc.
	• Single-phase input is used.	• For input lines, use three-phase connection.
Error occurred after long hours of use.	• An input line or breaker has a loose connection or is disconnected.	• The situation may be improved by mending loose connections due to loosening of screws or the breaker problems.

E030 IGBT error

At the time of an instantaneous overcurrent or the main element failure, the inverter turns OFF its output to protect the main element.
Overcurrent error may be issued instead.

E030

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred right after the operation started.	• A ground fault has occurred. • Output line is short-circuited.	• After the power is turned OFF, you need to check the wires connected to the motor, motor disconnection, and the like. If the error occurs after removal of the motor wires, the inverter is broken down. It needs to be repaired.
	• Motor rotation is locked	• A large current may flow when the motor rotation is locked during operation. The cause needs to be removed.
	• Output element is broken down.	• If output element is broken down, it needs to be repaired.
Error occurred right after power was turned ON.	• Output element is broken down.	• If output element is broken down, it needs to be repaired.
Error occurred during operation.	• Motor rotation is locked	• A large current may flow when the motor rotation is locked during operation. The cause needs to be removed.

E034 Output open-phase error

E034

When the output phase loss selection [bb-66] is set to 01, when a loose connection or disconnection of output line, disconnection inside the motor, etc. is detected, the inverter turns OFF its output. Detection of phase loss state is executed in the section between 5Hz to 100Hz.

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred right after the operation started.	• An output line or the motor has a loose connection or is disconnected.	• You need to turn OFF the power supply and check the output lines and the wiring condition of motor. This error can also occur due to motor insulation breakdown or screw tightening failure.
	• Single-phase output is used.	• For output lines, use three-phase connection.
Error occurred after long hours of operation.	• An output line or the motor has a loose connection or is disconnected.	• You need to turn OFF the power supply and check the output lines and the wiring condition of motor. If there is a loosened screw, the situation may be improved by re-tightening the screw.

E035 Thermistor error

E035

If an abnormal temperature is observed during detection of resistor level change in an external thermistor, the inverter turns OFF its output. (When thermistor function is enabled.)

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Motor is heated.	• The motor hasn't been cooled sufficiently.	• The cooling environment needs to be improved.
	• Heavy load has been applied for a long time.	• The motor's driving environment needs to be re-examined.
Motor is not heated.	• Inadequate thermistor function setting	• Re-examination of the thermistor function setting may improve the situation.
	• The thermistor is broken down.	• The thermistor needs to be repaired.
	• Malfunction due to noise	• The situation may be improved by taking a noise countermeasure such as wiring separation.

E036 Brake error

This error occurs when the inverter can not detect whether the brake check signal is ON or OFF during waiting time after the inverter has output a brake releasing signal. (When brake function is enabled.)

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred after operation.	• Disconnection of signal line.	• Check the wiring of brake check signal and whether the signal is ON or OFF.
	• Brake function setting	• The situation may be improved by re-examination of brake check waiting time or input terminal logics according to the sequence of the signal.

E038 Low-speed range overload error

This error occurs to protect the main element if the inverter has output at a low frequency of 0.2Hz or below.

When such a low frequency is detected by the built-in electronic thermal function, the inverter turns OFF its output.

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred during output at low speed.	• The motor load is heavy.	• Load at low-speed range needs to be reduced. If the error occurs frequently, you need to select an inverter with a capacity large enough for the motor.

E039 Controller (inverter) overload error

E039

The built-in electronic thermal function monitors the output current of the inverter (controller) and when inverter overload is detected, the inverter turns OFF its output.

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred after a fixed period of operation.	• Operation under heavy load condition has continued.	• Re-examination of operation condition or correction of load condition may improve the situation.
Error occurred during acceleration.	• Insufficient acceleration torque • Load inertia is large. • Friction torque is large.	• Setting longer acceleration time in [FA-10] can ease the insufficient acceleration torque. • When acceleration torque is required, the situation may be improved by adjusting the boost function in [Hb141], or by operating the inverter and making adjustments with control method in [AA121].
	• A function to suppress overcurrent is at work.	• A factor for overcurrent may have been occurred. Re-examination of acceleration time or load condition is required.
Error occurred during deceleration.	• Load inertia is large.	• Insufficient rotation regeneration torque can be eased by setting longer deceleration time in [FA-12]. • When regenerative torque is required, the situation may be improved by adjusting the boost function in [Hb141], or by operating the inverter and adjusting with control method in [AA121]. • Re-examination of load condition may improve the situation.
	• A function to suppress overvoltage is at work.	• Current may increase as a result of suppressing overvoltage. Re-examination of deceleration time or load condition is required.
Error occurred after long hours of use.	• System environment changes	• The situation may be improved by reducing the motor load, or performing a system maintenance (e.g., cleaning the fan to be driven and removing clogging in the duct).
	• Aging deterioration	• If the issue is not solved by reduction of the load and system maintenance, aging deterioration of a life-limited component may be the cause. A repair is required.

E040 Operator keypad communication error

The inverter displays this error when timeout occurs because of a malfunction due to noises, loose connection or disconnection of circuit for communication with the operator keypad.

This error function can be enabled and disabled by setting of the operation selection at disconnection of operator keypad [UA-20].

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred after communication is started.	• Loose connectior • Disconnection	• Check the wiring to see whether the connection is properly made.
	• Noise is mixed.	• The situation may be improved by taking a noise countermeasure such as wiring separation.

E041 RS485 communication error

The inverter displays this error only when timeout occurs because of a malfunction due to noises, loose connection or disconnection of circuit for RS485 communication (such as Modbus-RTU).

This error function can be enabled and disabled by setting of the communication error selection [CF-05].

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred after communication is started.	• Loose connection • Disconnection	• Check the wiring to see whether or not the connection is properly made.
	• Noise is mixed.	• The situation may be improved by taking a noise countermeasure such as wiring separation.

E042 RTC error

The error is generated if the data of RTC incorporated in the operator keypad is returned to the initial data.

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred at power-on.	• A battery in the operator runs out.	• Replacement of the battery and setting of the date solve the issue. The error occurs when the power supply is turned ON with a dead battery.

E043 EzSQ illegal instruction error

This error is output when an invalid instruction is detected in operation of a program which is downloaded to the inverter while the programing function EzSQ is used.

The error is also output if the program is put into action in the condition that the program hasn't been written.

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred when the program was about to put into action.	• Writing error due to noise	• There is a possibility of EzSQ program writing error and if there is a noise source nearby, the situation may be improved by taking a noise countermeasure such as keeping the noise source away and writing the program.
	• Program hasn't been entered.	• EzSQ program needs to be written in the factory default setting condition and after initialization. Write in the program.

E044 EzSQ nest count error

This error is output when the nesting frequency of a subroutine, "for" statement, "next" statement, etc. on a program exceeds 8 times while the programing function EzSQ is used.

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred when the program was put into action.	• Program structure is too complicated	• The program has deep nesting of a subroutine, "for" statement, "next" statement, etc., with its nesting frequency exceeding 8 times. Improvement of the program structure is required.

E045 EzSQ executive instruction error

During operation of a program which is downloaded to the inverter while the programing function EzSQ is used, if execution of the program is turned OFF due to an error, the inverter generates E045 error.

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred when the program was put into action.	• Program flow is inadequate.	• This error is output if there is no nest starting statement such as "for" at the point when "goto" statement refers to, or if a nest ending statement such as "next" precedes the nest starting statement. Check the structure of "for" statement and "next" statement and make amendments as needed.
	• There is a problem in the data.	• There may be an overflow, underflow, or division by zero in four arithmetic operations. Check the result of operations and amend the operations as needed.
		• This error is output if a non-existing parameter is referred to or a setting is made beyond the setting range in "chg param" or "mon param" instruction. Check the content of instruction and make amendments as needed.

E050 to E059
EzSQ user-assigned errors 0 to 9

E050~ E059

The inverter generates these errors when the corresponding user-assigned tripping programs are executed during operation of a program which is downloaded to the inverter while the programing function EzSQ is used.

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred when the program was put into action.	• The program has an error instruction.	• If a user-assigned error occurs unintentionally, check the content of trip instruction of the program and make amendments as needed.

E060 to E069
Option 1 errors 0 to 9

E060~ E069

Errors occurring in an option mounted in the option slot 1 (to the observer's left) are detected.

For details, refer to the instruction manual provided together with the option mounted.

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred when an option is mounted.	• The option isn't securely mounted.	• The option may not be securely mounted. Check the mounting state.
	• The option is used in the wrong way.	• The type of error varies depending on options. For details, refer to the instruction manuals provided together with the respective options.

E070 to E079
Option 2 errors 0 to 9

Errors occurring in an option mounted in the option slot 2 (to the observer's center) are detected.
For details, refer to the instruction manual provided together with the option mounted.

E070~ E079

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred when an option is mounted.	• The option isn't securely mounted.	• The option may not be securely mounted. Check the mounting state.
	• The option is used in the wrong way.	• The type of error varies depending on options. For details, refer to the instruction manuals provided together with the respective options.

E080 to E089
Option 3 errors 0 to 9

Errors occurring in an option mounted in the option slot 3 (to the observer's right) are detected.
For details, refer to the instruction manual provided together with the option mounted.

E080~ E089

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Error occurred when an option is mounted.	• The option isn't securely mounted.	• The option may not be securely mounted. Check the mounting state.
	• The option is used in the wrong way.	• The type of error varies depending on options. For details, refer to the instruction manuals provided together with the respective options.

E090 to E096
STO path error
FS option error

E090~ E096

This error is output when there is a problem in functional safety circuit path.

For details of E090 to E093, refer to the separate-volume "Functional Safety Guide". For details of E094 to E096, refer to the instruction manual provided together with the option P1-FS

Occurrence	Estimated cause(s)	Exemplar measures to be taken
The safety function is used.	• The safety function system has problems.	• Refer to the separate-volume "Functional Safety Guide" and "P1-FS Functional Safety Guide".

E100 Encoder
disconnection error

E100

This is an error related to feedback options.

For E100 (encoder disconnection error), see the P1-FB user's guide.

E104 Position control range error

E104

When the current position counter exceeds the position control ranges for normal/reverse rotation in the setting of [AE-52] position range (normal) or [AE-54] position range (reverse), the inverter turns OFF its output and displays the error.

Related pages found herein: 12-17-26

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred during operation.	• Recheck the setting of electronic gear.	• Re-examination of operation condition or correction of load condition may improve the situation.
	• A slip occurs due to improper encoder setting.	• Check the encoder mounting state. If any, re-examine factors for slipping.
	• Improper encoder setting	• Check the setting of encoder constant and the like.
	• Improper electronic gear setting	• Recheck the setting of electronic gear.

E105 Speed deviation error

E105

When the deviation between the frequency command and the feedback speed exceeds the [bb-83] speed deviation error detection level setting, the inverter judges it as an error. If "01: Error" is specified for [bb-82] Operation for speed deviation error, the inverter turns ON the output terminal function 041 [DSE] with a speed deviation error, turns OFF the inverter output, and displays this error.

Related pages found herein: 12-16-11

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred during operation.	• Recheck the setting of electronic gear.	• Re-examination of operation condition or correction of load condition may improve the situation.
	• A slip occurs due to improper encoder setting.	• Check the encoder mounting state. If any, re-examine factors for slipping.
	• Improper encoder setting	• Check the setting of encoder constant and the like.
	• Improper electronic gear setting	• Recheck the setting of electronic gear.

E106 Position deviation error

When the [bb-87] abnormal position deviation time passes with the deviation of the position feedback against the position command exceeding the [bb-86] abnormal position deviation detection level, it is determined to be abnormal. When the behavior of the abnormal position deviation [bb-85] has been set to 01, the output terminal [PDD] is turned ON, the output is turned OFF, and the error is displayed.

Related pages found herein: 12-17-18

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred during operation.	• Recheck the setting of electronic gear.	• Re-examination of operation condition or correction of load condition may improve the situation.
	• A slip occurs due to improper encoder setting.	• Check the encoder mounting state. If any, re-examine factors for slipping.
	• Improper encoder setting	• Check the setting of encoder constant and the like.
	• Improper electronic gear setting	• Recheck the setting of electronic gear.

E107 Over-speed error

When the speed has exceeded [bb-80] Over-speed error detection level and [bb-81] Over-speed error detection time has elapsed, the output is turned OFF and the error is displayed.

Related pages found herein: 12-16-12

Occurrence	Estimated cause(s)	Exemplar measures to be taken
Error occurred during operation.	• Recheck the setting of electronic gear.	• Re-examination of operation condition or correction of load condition may improve the situation.
	• Improper encoder setting	• Check the setting of encoder constant and the like.
	• Improper electronic gear setting	• Recheck the setting of electronic gear.

E110 Contactor error

When an error occurs in the contactor sequence, the output is turned OFF.

Related pages found herein: 12-17-10

Occurrence	Estimated cause(s)	Exemplar measures to be taken
[COK] was not turned ON within the contactor check time at start-up.	• Wiring defect	• Check the setting and wiring of intelligent input.
	• Contactor response defect	• Check the operation of contactor including its response time.
[COK] was not turned OFF within the contactor check time at stop.	• Wiring defect	• Check the setting and wiring of intelligent input.
	• Contactor response defect	• Check the operation of contactor including its response time.

E112 Feedback option connection error

This is an error related to feedback options.

For E112 (FB option connection error), see the P1-FB user's guide.

Troubleshooting for Warning-function Related Errors

Checking the warning display

Indication (A) Main Operating status display

No.	Indication	Description
A1	RUN FW	Icon shown during normal rotation operation. Some parameters cannot be changed while the inverter is running.
A2	RUN RV	Icon shown during reverse rotation operation. Some parameters cannot be changed while the inverter is running.
A3	RUN 0Hz	Icon shown during outputting under a zero-Hz command. It is also shown while DB, FOC, SON function is working. Some parameters cannot be changed while the inverter is running.
A4	TRIP	Icon shown when an error occurred and the inverter is in trip state. Releasable errors can be released by a reset operation. ⇒ 18.3.1 Checking trip information
A5	WARN	Icon shown when a setting inconsistency exists. Eliminate the inconsistency. ⇒ 18.5.2 Checking setting inconsistencies
A6	STOP	Icon shown while the inverter is forced stop by the following functions although operation command is entered. • An operation command was entered under 0Hz frequency command. • Operation command was entered from a source other than the operation keypad and the operation was stopped with STOP key on the operation keypad. • The inverter stops by instantaneous power failure non-stop function. RUN lamp flashes during this.
A7	STOP	Inverter is stopped because no operation command is given. The inverter cannot be operated if the stop terminal functions such as [RS] and [FRS] or the STO function is ON.

(Notes)

- When A6: STOP (in red) is indicated...

⇒ If the value shown in the indication (F): frequency command is 0.00Hz, the frequency command is 0Hz. Check whether a frequency command is entered or not.

⇒ For example, if the operation was stopped with STOP key while the inverter had been operated with [FW] terminal, turn OFF the [FW] terminal and then ON again to restart the operation.

Indication (B) Warning status display

No.	Indication	Description
B1	LIM	Icon shown while the following functions are working. [dC-37] • Under overload limit. • Under torque limit. • Under overcurrent suppression. • Under overvoltage suppression. • Under upper/lower limit operation. • Under jump frequency operation. • Under minimum frequency limit.
B2	ALT	Icon shown while the following functions are working. [dC-38] • Overload advance notice • Motor thermal advance notice • Inverter thermal advance notice • Motor overheat advance notice
B3	RETRY	Icon shown during retry standby or restart standby. [dC-39]
B4	NRDY	The inverter cannot be operated even when the operation command is entered. [dC-40] • The main power is under insufficient voltage supply. • The inverter is operating only with 24V power supply. • Under reset operation. • The inverter is OFF as the [REN] terminal function is enabled.
B5	FAN	Icon shown in fan life advance notice state.
B6	C	Icon shown in on-board capacitor life advance notice state.
B7	F/C	Icon shown in fan life advance notice and on-board capacitor life advance notice state.
B8	(None)	A state other than those above.

(Notes)

- B1:LIM and B2:ALT are indicated when the current or internal voltage has increased. If an error is generated, re-examination of load or other factors is required.
- The above-mentioned indications are shown when the cooling fan or capacitor on the board is determined to have reached its product life.
- **You can see the detailed warning by pressing UP key on the three-lined monitor screen.**

• (STOP in red) appears. • See below.

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
RUN key on the keypad was pressed. [FW] terminal was turned ON. Operation command was entered.	If LIM icon is lit, the command is below the minimum frequency and the following reasons are conceivable. • Operation command is entered but not frequency command. • Frequency command destination selection is wrong.	• Check that [FA-01] main speed command is not set to 0.00Hz. • Check whether the command is entered from the command destination indicated on the right of the main speed command [FA-01]. • Check [AA101] main speed command destination.
After STOP key on keypad is pressed, inverter doesn't operate with RUN key.	• STOP key on the operation keypad was pressed when the operation command had been entered from a source other than the operation keypad.	• Cancel the command entered to the operation command destination.
Instantaneous power failure occurred.	• The inverter stopped by the instantaneous power failure non-stop function [bA-30].	• To start operation, turn off the command entered to the operation command destination and turn on again.

• (WARN) appears. • See below.

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
A setting was configured.	• There is an inconsistency in the parameter setting	• Refer to 18.5.2 "Checking setting inconsistencies".

- The LIM icon is shown on the display.

- When LIM is shown, the inverter is in the following condition(s).
- You can see the status of LIM by pressing UP key on the three-lined monitor or on [dC-37].

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Output current was high, and [dC-37] LIM was set to 01.	• [bA120] overcurrent suppression function was enabled and the current increased due to the load or other factors.	• Remove the factor for the increased load. (E.g., by cleaning a clogged channel, re-examining the load)
	• The current was increased by the high ratio of motor rotation during DC braking that was caused by the selection of [DB] terminal or [AF101] DC braking.	• Reduce the DC braking force in [AF105] or [AF108]. • For stopping, set longer time for [AF108] DC braking delay time at the time of the stop. • For retry operation at the start, set longer delay time according to the factors. [bb-26] [bb-29] [bb-31]
	• [FA-10] acceleration time is too short.	• Make the acceleration time longer in [FA-10].
Output current was high, and [dC-37] LIM was set to 02.	• [bA122] overload limit function or similar function was enabled and the current increased due to the load or other factors.	• Remove the factor for the increased load. (E.g., by cleaning a clogged channel, re-examining the load)
	• [bA122] overload limit function or similar function was enabled and [FA-10] acceleration time was too short.	• Make the acceleration time longer in [FA-10].
Error occurred during deceleration. [dC-37] LIM was set to 03.	• [bA140] overvoltage suppression function was enabled and P-N voltage increased due to regenerative load or the like.	• Remove the factor for the increased regenerative load. (E.g., by re-examining the state of the motor being rotated by external force, and by re-examining the load)
	• [bA122] overload limit function or similar function was enabled and [FA-12] deceleration time was too short.	• Make the deceleration time longer in [FA-12].
Error occurred during sudden acceleration. [dC-37] LIM was set to 03.	• [bA140] overvoltage suppression function was enabled and P-N voltage increased due to regenerative load or the like.	• Remove the factor for the increased regenerative load. (E.g., by re-examining the state of the motor being rotated by external force, and by re-examining the load)
Output current was high, and [dC-37] LIM was set to 04.	• [bA110] torque limit function or similar function was enabled and the current increased due to the load or other factors.	• Remove the factor for the increased load. (E.g., by cleaning a clogged channel, re-examining the load)
	• [bA110] torque limit function or similar function was enabled and [FA-10] acceleration time was too short.	• Make the acceleration time longer in [FA-10].
Error occurred during operation. [dC-37] LIM was set to 05.	• The normal limiting was performed according to the settings of [bA102] upper limiter, [bA103] lower limiter, and [AG101] and other jump frequencies.	• Re-examine the settings of the upper/lower limiter or jump frequencies if necessary.
Error occurred during operation. [dC-37] LIM was set to 06.	• The frequency command at below the minimum frequency [Hb130] has been input.	• Set the frequency command at the minimum frequency or higher in [FA-01].

- The ALT icon is shown on the display.

- When ALT is shown, the inverter is in the following condition(s).
- You can see the status of ALT by pressing UP key on the three-lined monitor or on [dC-38].

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Output current was high, and [dC-38] ALT was set to 01.	• The current increased due to load or other factors, exceeding the overload prewarning levels set in [CE106] or the similar parameter.	• Remove the factor for the increased load. (E.g., by cleaning a clogged channel) • Enable [bA122] overload limit function or similar function.
Output current was high, and [dC-38] ALT was set to 02.	• The electronic thermal function of motor was activated due to increase in current and the load exceeded the electronic thermal warning level (MTR) set in [CE-30].	• Remove the factor for the increased load. (E.g., by cleaning a clogged channel) • Re-examine the electric thermal settings in [bC110] or the similar parameter.
Output current was high, and [dC-38] ALT was set to 03.	• The electronic thermal function of inverter was activated due to increase in current and the load exceeded the electronic thermal warning level (CTL) set in [CE-31].	• Remove the factor for the increased load. (E.g., by cleaning a clogged channel)

- The RETRY icon is shown on the display.

- When RETRY is shown, the inverter is in the following condition(s).
- You can see the status of RETRY by pressing UP key on the three-lined monitor or on [dC-39].

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Output was turned OFF and [dC-39] RETRY was set to 01.	• The inverter is in the waiting mode after a trip retry operation due to increased current or P-N voltage fluctuation.	• If the wait time become longer, the following delay time become shorter. [bb-26] [bb-29] [bb-31] • If this error is generated consecutively, make the wait time longer. [bb-26] [bb-29] [bb-31]
Output was turned OFF and [dC-39] RETRY was set to 02.	• The inverter is in the waiting mode before restart after power-off by [RS], [FRS], or [CS] terminal.	• If the wait time become longer, the following delay time become shorter. [bb-26]

- The NRDY icon is shown on the display.

- When NRDY is shown, the inverter is in the following condition(s).
- You can see the status of NRDY by pressing UP key on the three-lined monitor or on [dC-40].

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
TRIP display was shown and [dC-40] NRDY was set to 01.	• There was an error factor, which caused the inverter to trip.	• Remove the error factor. Consult this chapter.
The CTRL icon was shown and [dC-40] NRDY was set to 02.	• The control power supply (R0, T0) has been input, whereas the main circuit power supply R-S-T hasn't been input.	• Check the input of main circuit power supply and examine the breaker, wiring, and so on.
The 24V icon was shown and [dC-40] NRDY was set to 02.	• Only 24V has been input to the backup power supply P+-P-.	• Check the input of main circuit power supply and the control power supply, and examine the breaker, wiring, and so on.
[dC-40] NRDY was set to 03.	• [RS] terminal is ON and the inverter is under reset operation.	• Check the wiring and operation state of [RS] terminal.
[dC-40] NRDY was set to 04.	• The STO circuit is turned OFF or broken.	• Check ST1/ST2 terminals.
[dC-40] NRDY was set to 05.	• The inverter is checking the internal circuit, operator keypad, options, etc.	• If this error is not released, check the operator keypad for contact failure or other problem.
[dC-40] NRDY was set to 06.	• There is an inconsistency in the setting	• Although [AA121] is set to 10 (Vector control with sensor), the option P1-FB is not attached. • Refer to 18.5.2 "Checking setting inconsistencies".
[dC-40] NRDY was set to 07.	• There is a sequence operation problem in the brake control.	• Check the setting and signal operation of [AF130] brake control or the similar parameter.
[dC-40] NRDY was set to 08.	• [FRS] terminal or [CS] terminal was turned ON. • [FRS] or [CS] command was entered from the communication.	• Check the signal operation of input terminal for [FRS] or [CS].
[dC-40] NRDY was set to 09.	• Operation command isn't permitted.	• The [REN] terminal has been assigned and is turned OFF.
	• Forced stop is being issued. (Deceleration stop behavior)	• STOP key was pressed when commands had been entered from a source other than the operation keypad.

· Checking setting inconsistencies

- A warning was generated. You want to identify the cause and troubleshoot the warning.

- You need to take a measure according to the warning number and the type of warning. Refer to the table below.
- The induction motor (IM) control and synchronous motor (permanent magnetic motor) (SM (PMM)) control can be switched in [AA121].

Occurrence▶	Estimated cause(s)▶	Exemplar measures to be taken
Warning was generated - 102	(First Max. frequency) < (first upper limiter) IM: [Hb105] < [bA102] SM (PMM): [Hd105] < [bA102]	• Increase the Max. frequency [Hb105]/[Hd105]. • Decrease the upper limiter [bA102].
Warning was generated - 103	(First Max. frequency) < (first lower limiter) IM: [Hb105] < [bA103] SM (PMM): [Hd105] < [bA103]	• Increase the Max. frequency [Hb105]/[Hd105]. • Decrease the lower limiter [bA103].
Warning was generated - 106	(First Max. frequency) < (first main speed command) IM: [Hb105] < [Ab110] SM (PMM): [Hd105] < [Ab110]	• Increase the Max. frequency [Hb105]/[Hd105]. • Decrease the main speed command [Ab110].
Warning was generated - 107	(First Max. frequency) < (first auxiliary speed command) IM: [Hb105] < [AA104] SM (PMM): [Hd105] < [AA104]	• Increase the Max. frequency [Hb105]/[Hd105]. • Decrease the auxiliary speed command [AA104].
Warning was generated - 202	(Second Max. frequency) < (second upper limiter) IM: [Hb205] < [bA202] SM (PMM): [Hd205] < [bA202]	• Increase the Max. frequency [Hb205]/[Hd205]. • Decrease the upper limiter [bA202].
Warning was generated - 203	(Second Max. frequency) < (second lower limiter) IM: [Hb205] < [bA203] SM (PMM): [Hd205] < [bA203]	• Increase the Max. frequency [Hb105]/[Hd105]. • Decrease the lower limiter [bA103].
Warning was generated - 206	(Second Max. frequency) < (second main speed command) IM: [Hb205] < [Ab210] SM (PMM): [Hd205] < [Ab210]	• Increase the Max. frequency [Hb205]/[Hd205]. • Decrease the main speed command [Ab210].
Warning was generated - 207	(Second Max. frequency) < (second auxiliary speed command) IM: [Hb205] < [AA204] SM (PMM): [Hd205] < [AA204]	• Increase the Max. frequency [Hb205]/[Hd205]. • Decrease the auxiliary speed command [AA204].

For a complete list of parameters and functions of the P1 Inverter, please see the P1 Inverter manuals, guides, application notes, and videos found at Hitachi Industrial Equipment and Solutions of America Website www.hitachi-iesa.com.

Please contact Hitachi Industrial Equipment & Solutions America, LLC for questions or concerns.

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