



**KOGANEI**

X904391

**Monitor for Electrostatic Potential Sensor  
(DTY-EPU01)**

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**Instruction Manual** (Ver. 1.0)



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\* For details about the electrostatic potential sensor (DTY-EPS01), refer to the Electrostatic Potential Sensor Instruction Manual (X904366).

## Chapter 1. Safety Precautions

Thank you for purchasing Koganei **Monitor for electrostatic potential sensor**.

Please read this instruction manual carefully before using the device, so that you can use it safely and correctly.

In addition, keep this manual in a safe place.

### 1-1 About safety

Always follow the safety precautions and instructions in this manual. If necessary safety measures are neglected or incorrectly applied, it could do more than just damage or break the product; it could also lead to an accident or injury to the user (installer, operator, adjuster, or inspector).

### 1-2 Safety warnings and cautions

#### WARNING

This product was designed and manufactured for use in general industrial machinery.

Do not use the product for the purposes listed below:

1. Medical equipment related to maintenance or management of human lives or bodies
2. Machines or equipment designed for the purpose of moving or transporting people
3. Critical safety components in mechanical devices

This product has not been standardized or designed for purposes that require high levels of safety. Using the product in any of the ways described above creates the risk of loss of human life.

#### CAUTION

The product is an industrial sensor. It is not a meter for measuring absolute electric potential. Its measurement accuracy is not 100% guaranteed.

Always apply a ground. Not doing so can lead to malfunctions or degraded measurement accuracy.

When using a switching regulator obtained on the market for the power supply, always ground the frame ground (F.G.) terminal.

When the product can no longer be used or is no longer necessary, dispose of it appropriately as industrial waste.

Installs a circuit breaker or a switches that workers can use to quickly cut off the power and label it appropriately.

Do the wiring correctly. Incorrect or inappropriate wiring, can lead to malfunctions.

For DC power source, use a power source that has a 24 VDC output voltage with double or reinforced insulation between the input and output. For the power supply, use DC24V/4A (100W) or below.

Wiring should be within 30m on the EN standard.

Shaking or vibrations can lead to degraded measurement accuracy. Installs it in a location that is not subject to shaking or vibrations.

Notes that anything near the sensor or between the sensor and the object being measured that disrupts the magnetic field (such as relays, solenoids, metal scraps, ionizers, etc.) affects the measured values.

Notes that there is an inrush current when the power is turned on.

Checks power supply fluctuations to ensure that power input does not exceed the rated value.

Avoids use during the transient period (0.5s) when the power is switched on.

Pulling forcefully on the cables damages them. Do not subject cables to stress, such as pulling or bending them excessively. The minimum bending radius is Power and signal cables 45 mm / Connecting cable 40mm.

Do not use needle tips or other sharp points to perform key operation.

Do not use the product outdoors (in direct sunlight or extreme heat). Do not use the product in locations that are very humid, dusty, dirty, or exposed to corrosive or flammable gases.

\*For any other items of danger, warning, or caution, please refer to "Safety Precautions" in the Catalog for "Static Electricity Removing Unit; IONIZER".

(Be sure to refer to the Latest Version of the Catalog.)

## Chapter 2. Product overview

### 2-1 Product description

Confirms that nothing is missing from the package. If anything is missing, contact your retailer (agent) or our nearest sales office.

Monitor	1/Instruction manual	1
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The mounting parts, protective front cover for the front side, and cables can be ordered as accessories.

### 2-2 Overview

- This product is a monitor specialized for electrostatic potential sensors that can do non-contact measurement of potential in objects that have an electrostatic potential caused by static electricity.
- You can connect two electrostatic potential sensors (DTY-EPS01 Series) to one monitor.
- The electrostatic charge is displayed in LCD on the front side.
- You can do the various settings by using the keys on the front side. You can also do the various settings for communications.  
The various set values are saved in the non-volatile memory.
- You can use specialized communications cables to connect a maximum of 16 monitors in a daisy-chain configuration.  
It is possible to communicate with external devices, such as programmable controllers, so you can centralize controls.

### 2-3 Functions

- Changing the display cycle  
You can change the display cycle to 100 ms, 200 ms, 500 ms, or 1000 ms.  
The cycling data is averaged and then displayed.
- Display modes  
You can select from the normal display, peak-hold display, bottom-hold display, or absolute value display.
  - Normal display: The measured electrostatic charge is updated and displayed at each cycle that was set for the display cycle.
  - Peak-hold display: The measured electrostatic charge is updated and displayed if it is higher than the previous one.
  - Bottom-hold display: The measured electrostatic charge is updated and displayed if it is lower than the previous one.
  - Absolute-hold display: The measured electrostatic charge is updated and displayed if it is a higher absolute value than the previous one.
- Auto scan display  
When 2 electrostatic potential sensors are connected, the electrostatic charges are shown alternately in the display.  
You can confirm which electrostatic charge is being displayed in the display according to CH LED (yellow) on the front side.
- Key-protect  
Deactivates operation of the keys. You can cancel the key protection by disabling key-protect.
- Error output  
There are 3 points output as I/O output. Notification is also done via LCD and LED (red) displays on the front side.
  - Electrostatic potential sensor errors (ERR1/ERR2)  
Memory error detection: If there is an error in the data in the non-volatile memory  
Sensor error detection: If there is an error in the sensor
  - Monitor error (ERR3)  
Memory error detection: If there is an error in the data in the non-volatile memory  
I/O output error (overcurrent): If I/O output has an overcurrent
- Zero calibration  
You can use the currently measured electrostatic charge as zero (reference) so it is used and displayed for judgment output.  
Points the sensor at an empty space, away from the metal plate to which the ground is attached, where there are no charged objects.  
Sets it when the electrostatic charge is within  $\pm 200$  V. An error will occur if it is over  $\pm 200$  V. ( $\pm 2000$  V in high voltage mode)  
The setting are set through operations using the settings keys on the front side, I/O zero calibration input (ZC1/ZC2), and settings via communications.

- Measured potential judgment output
  - Detailed judgment
    - <High/Low modes>
      - If the measured potential exceeds threshold H or threshold L, output turns on.
      - Judgment output can be output for a maximum of two positions (CP1/CP2) for each sensor channel.
      - You can set hysteric values for the thresholds.
    - <Inside/Outside mode>
      - Output is on while the measured potential is within (Inside mode) threshold H and threshold L or when it is outside (Outside mode).
      - Judgment output can be output for a maximum of two positions (CP1/CP2) for each sensor channel.
      - You can set hysteric values for the thresholds.
  - Simple judgment
    - <Easy.High.Low mode>
      - Judgment output CP1 is automatically set to High mode and CP2 to Low mode.
      - You can set just one threshold, using a base of 0 V, so the positive charge side and the negative charge side are symmetric.
    - <Easy.Inside mode>
      - Judgment output CP1 is automatically set to Inside mode. Judgment output CP2 is in Off mode and is not output.
      - You can set just one threshold, using a base of 0 V, so the positive charge side and the negative charge side are symmetric.
    - <Easy.Outside mode>
      - Judgment output CP1 is automatically set to Outside mode. Judgment output CP2 is in Off mode and is not output.
      - You can set just one threshold, using a base of 0 V, so the positive charge side and the negative charge side are symmetric.
  - Stop judgment
    - <Off mode>
      - If you do not want to output judgment, set Off mode and it will not be output.  
You can set this individually for CP1 and CP2.

## 2-4 Specifications

Model		DTY-EPU01
Power	Power supply voltage	DC24V±10%
	Consumption current	100 mA max <sup>Note 1</sup>
Sensor input	Number of inputs	Channel 2
	I/F	RS485 communications compliant
Input/output	Output	Judgment output, 4 contacts (2 contacts for each sensor channel) Error output, 3 contacts (1 monitor contact, 1 contact for each sensor channel) (NPN open collector output) (DC24±10%/max50mA) (Internal voltage drop max 0.3 V @ 5 mA/max 1.0 V @ 50 mA)
	Input	Zero calibration, 2 contacts input (1 contact for each sensor channel) (Shared 24 VDC input voltage power source, input current 4.8 mA @ 24 VDC, input impedance 4.7 kΩ) * Given zero calibration is within ±200 V (for high-voltage motor at ±2000 V)
Static charge potential display	Display	LCD, signed 4-digit display, units are V or kV (with decimal point)
	Display cycle	Select from 100, 200, 500, and 1000 ms
	Display mode	Normal display: Displays measured values for each display cycle Peak hold: Displays maximum value Bottom hold: Displays minimum value Absolute value hold: Displays maximum value as an absolute value
LED indicator	Judgment output display	Green LED: Flashes when CP1/CP2 judgment output is on
	Shown to confirm displayed channel	Yellow LED: The channel currently showing the electrostatic charge lights
	Error display	Red LED: The channel on which an error occurs lights
Setting keys		3 push buttons (UP, DOWN, and MODE)
Address setting key		Rotary DIP switch (from 0 to F)
Communications I/F		RS485 communications compliant
Number of monitor connections		16 (daisy chain connection)
Resistance to environment	Operating temperature range	-10 to 50°C [-50 to 122°F] (non-condensation, non-freezing)
	Operating humidity range	35 to 85%RH
	Storage temperature range	-20 to 80°C [-68 to 176°F] (non-condensation, non-freezing)
Case material		Case: PBT
External dimensions		40(W)mm×40(H)mm×32(D)mm [1.575(W)in.×1.575(H)in.×1.260(D)in.]
Mass		50 g (excluding cables)

Note 1: While an electrostatic potential sensor is not connected

## 2-5 System configuration

This configuration is for when you connect the electrostatic potential sensor to the monitor, and then connect PLC or something else via the monitor.

You can connect a maximum of 2 electrostatic potential sensors to a monitor.

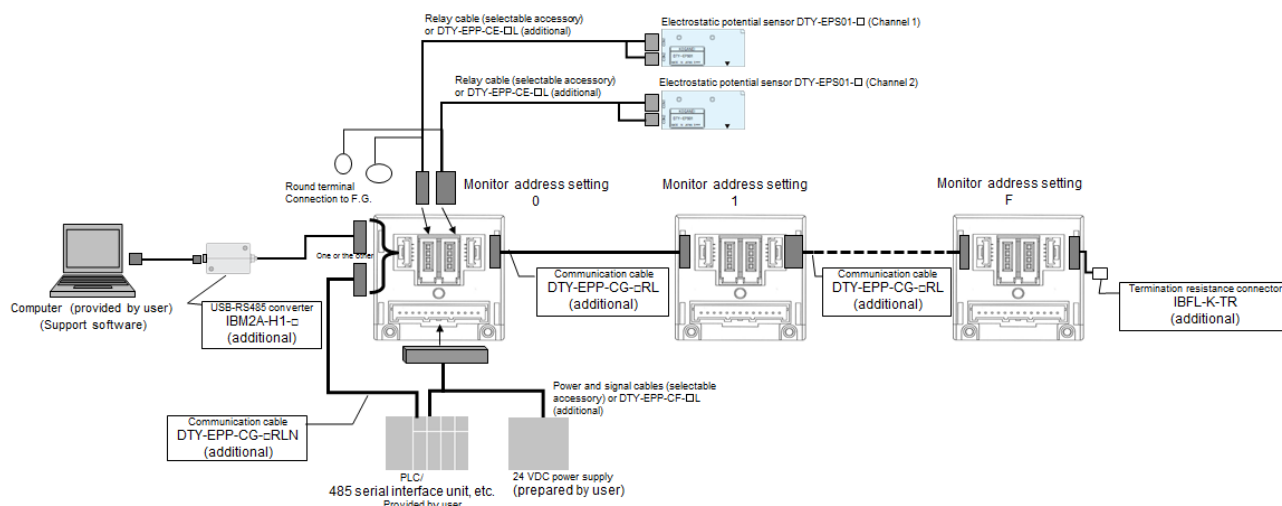
The monitor shows the electrostatic charge and you can use the keys to do various settings.

Doing settings externally is possible by connecting a computer (via USB-RS485 converter ), or a 485 unit, such as PLC, to the monitor.

You can connect a maximum of 16 monitors in a daisy-chain.

Addresses need to be set for the monitors. Use the address setting keys on the front side to set them.

Sets the addresses so there are no duplicates, and then connect the monitors in a daisy chain.



## 2-6 Additional parts (To be ordered separately)

Purchases the following options if you need them.

Parts	Models	Specifications	Description of product
Power and signal cables	DTY-EPP-CF-□L	Length 3 m [9.843 ft]	These cables are to connect the monitors, power sources, and control devices (such as PLCs).
		Length 10 m [32.808 ft]	
Connecting cable	DTY-EPP-CE-□L	Length 3 m [9.843 ft]	These cables are to connect the monitors and the electrostatic potential sensors.
		Length 10 m [32.808 ft]	
Communications cable	DTY-EPP-CG-□RL	Length 50 mm [0.164 ft]	These cables are to connect the monitors to other monitors.
		Length 1 m [3.281 ft]	
		Length 3 m [9.843 ft]	
		Length 10 m [32.808 ft]	
	DTY-EPP-CG-□RLN	Length 1 m [3.281 ft]	These cables are to connect the monitors and control devices (such as communication units). One end has loose wires with no connector.
		Length 3 m [9.843 ft]	
		Length 10 m [32.808 ft]	
Termination resistor connector	IBLF-K-TR	-	Attached to the last monitor when the monitors are connected in a daisy chain. Connect it even if there is only one monitor.
Mounting bracket	PSU-BR	-	These are brackets for mounting monitors. Two screws are supplied.
Panel mounting parts	PM100	-	These parts are for mounting the monitors on panels.
Protective front cover	KB100	-	Uses these if you want to protect the front side when using parts for mounting monitors on panel mounts. You cannot directly install them on the monitors. Attach them to the parts used for panel mounting.
Mini clamp wire mount plug	PSU-M	-	These connectors are to connect the monitors and the potential sensors. If you select relay cables, enough connectors for the cables are supplied.

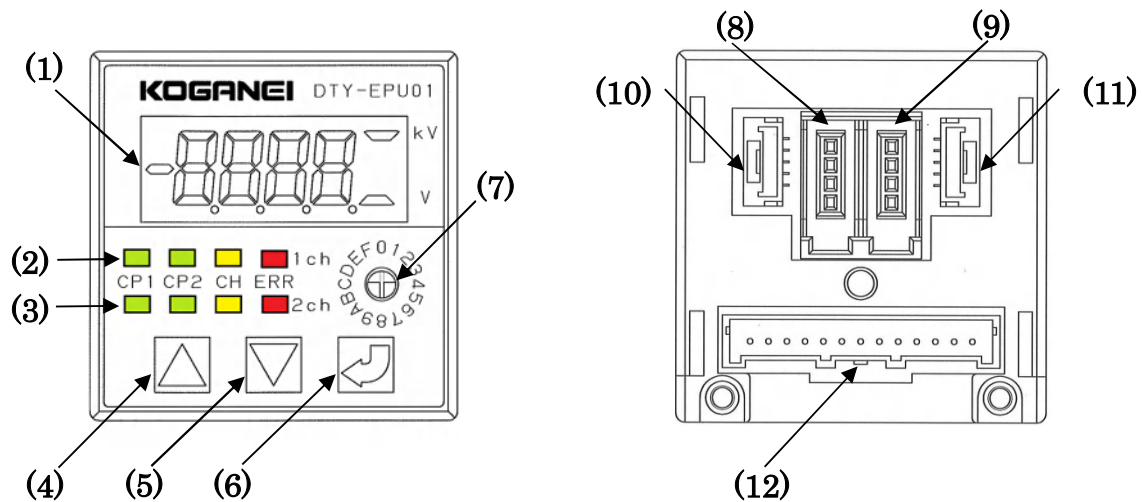
### ■USB-RS485 converter

Parts	Models	Specifications	Description of product
USB-RS485 converter	IBM2A-H1/ IBM2A-H1-N	With USB cable/without USB cable	Uses these to do the various settings from USB connector on a computer.

## Chapter 3. Procedures from preparations to measurements

	Procedure	Reference sections
Preparations	Names/functions	Confirms the names and functions of the parts of the monitors.
	Installation	Installs the monitor.
	Connections	Connects the power, external devices (PLC, etc.), computer, and communications devices.
	Power on	Supplies 24 VDC.
Settings	Settings	Do the settings according to the usage conditions. Uses the setting keys on the front side to do the settings. It is also possible to set up a computer (support software) or communication device.
	Zero calibration	Points the potential sensor at empty space that holds no electrostatic charge or at a conductor that is grounded, and then calibrate for zero.
Measurement	Start measurements	You can judge and display the electrostatic charge.

### 3-1 Nomenclature and functions



(1) LCD

Shows the electrostatic charge, settings, and errors.

(2) (3) LED indicators

Upper level shows status of channel 1 potential sensor and lower level shows status of channel 2 potential sensor.

CP1/CP2: Light when judgment output is on (green LED)

CH: The channel currently showing the electrostatic charge lights (yellow LED)

ERR: The channel on which an error occurs lights (red LED)

(4) UP key

Used to move setting values up.

(5) DOWN key

Used to move setting values down.

(6) MODE key

Used when doing various settings.

(7) Address setting key

Sets the address number of the monitors (0 to F).

Setting example) When monitor address is 0



(8) (9) Potential sensor connectors

Potential sensors are connected here. ((8): channel 1, (9): channel 2)

(10) (11) Communications connectors

Communications cables or USB-RS485 converters are connected here. ((10): serial in, (11): serial out)

(12) Power and signal connectors

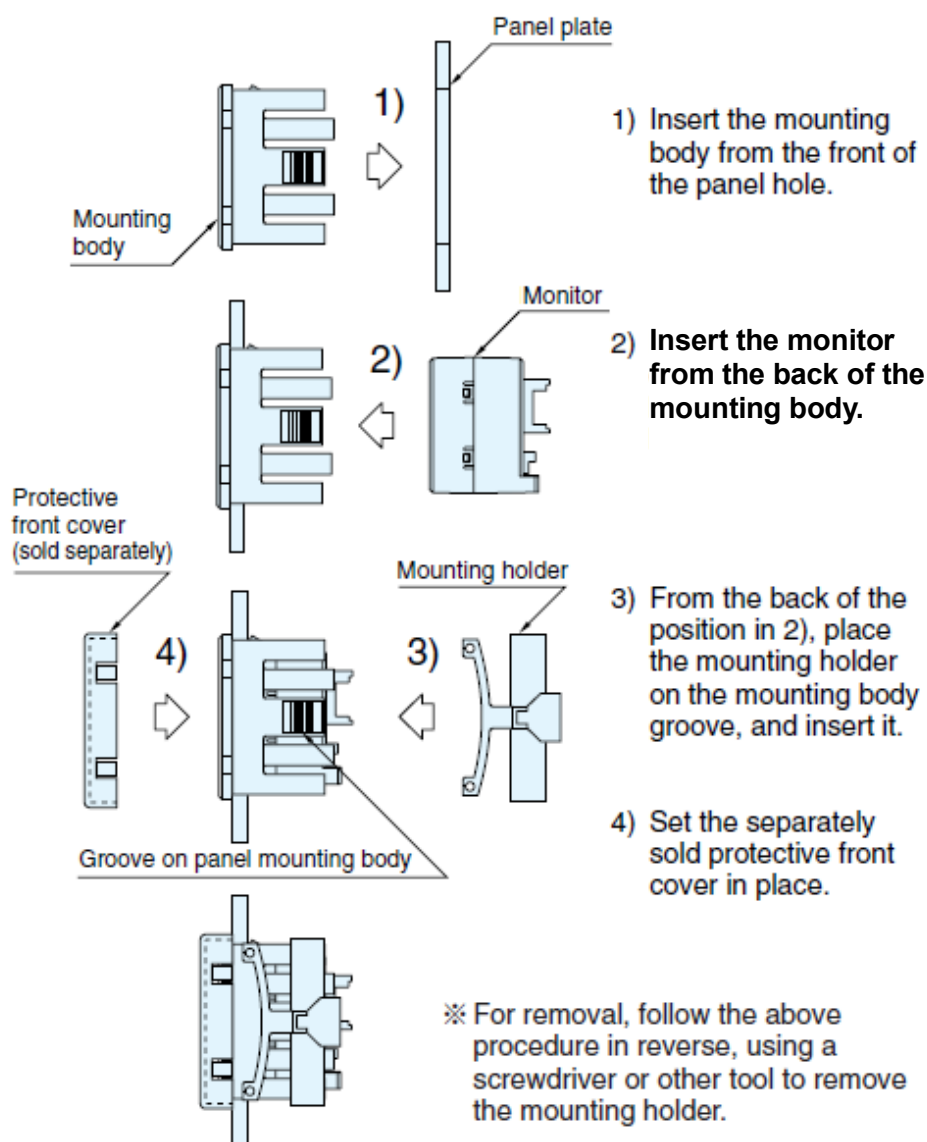
Power and signal cables are connected here.



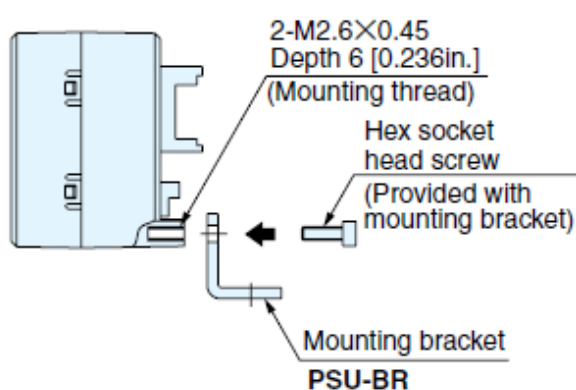
### 3-2 Installation

- \* An installation location that is subject to vibrations could damage or impair the product. Install the sensor where there are no vibrations.
- \* Be careful to not overtighten the mounting screws when using mounting brackets. Doing so could damage or break the product.  
(Recommended tightening torque for the mounting screws: 0.32 N·m [2.832 in·lbf])

#### Attaching the panel mounting parts and protective front cover



#### Attaching the mounting bracket



Use the hex socket head screws (M2.6×0.45, length 5mm [0.197in.]) to mount the mounting bracket into the mounting holes on the back of the **monitor**.

The tightening torque should be 0.32N·m [2.83in·lbf].

### 3-3 Connections

#### 3-3-1 Connecting the power/connecting external devices

Connects power and signal cables to the power and signal connectors.

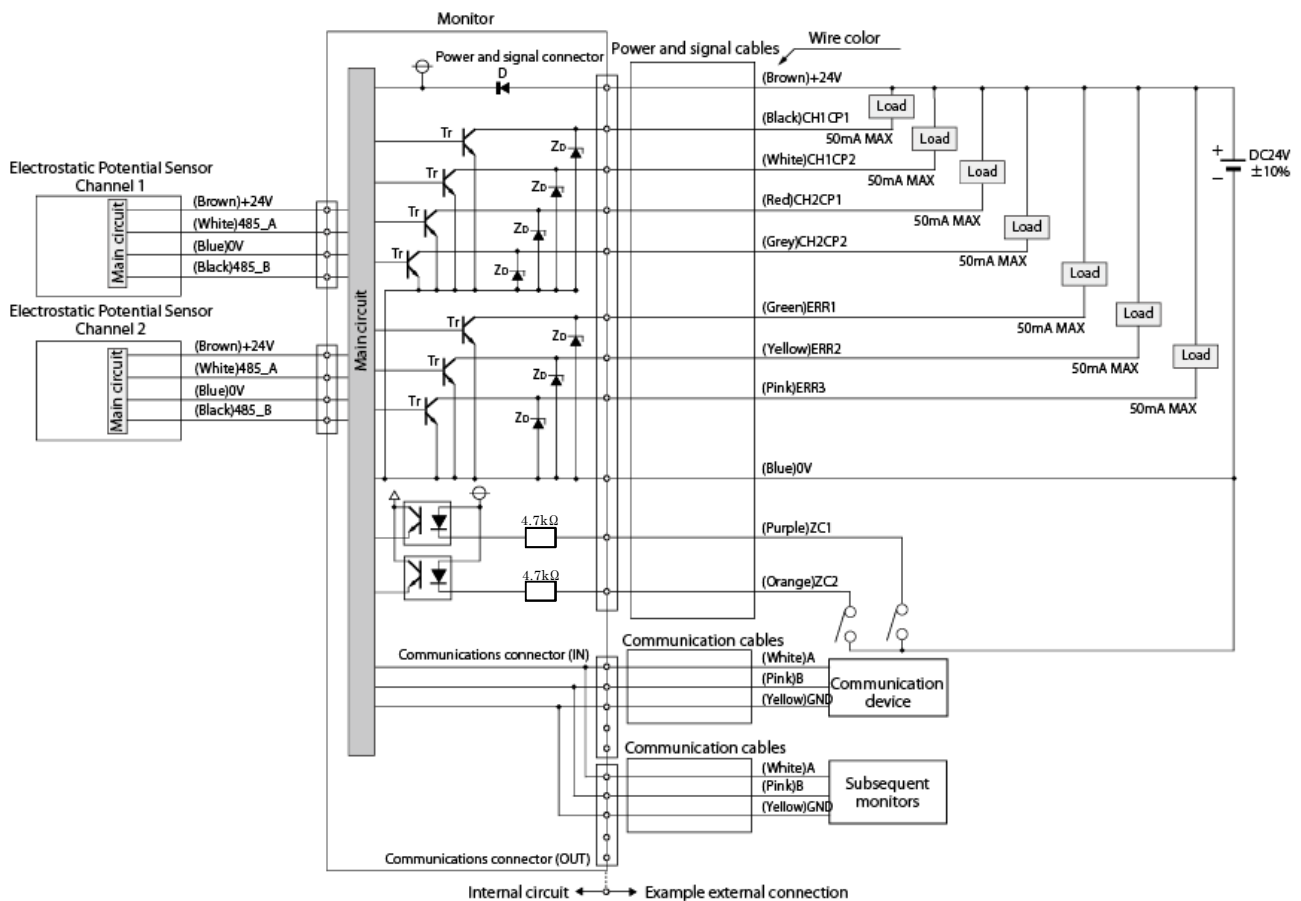
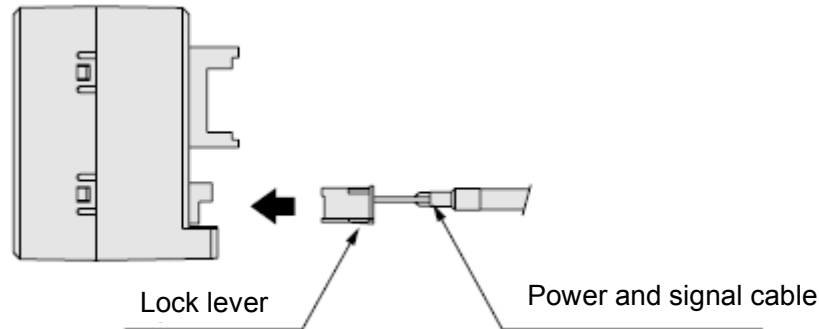
To attach the power and signal cables, position the lock levers as shown in the illustration below, and then insert the cables until they lock into place with the power/signal connectors.

To disconnect, press the lock lever down as far as it will go as you pull the connector to unplug it.

At this time, take care not to apply undue force to the lead wires.

Refers to the power and signal cable and wiring table to connect the power and external devices.

Be sure to ground the shielded cable (green/round terminal) for the power and signal cables.



[Wiring table for power and signal cables]

Number	Parts	Input/output	Cable color	Description
1	N.C.	-	-	Unconnected
2	N.C.	-	-	Unconnected
3	ZC2 (Zero calibration)	Input	Orange	Zero calibration input (for channel 2 potential sensor) This function compensates the standard electric potential so the measured value is 0 V. Point the sensor at an empty space, away from the metal plate to which the ground is attached, where there are no charged objects.
4	ZC1 (Zero calibration)	Input	Purple	Zero calibration input (for channel 1 potential sensor) This function compensates the standard electric potential so the measured value is 0 V. Point the sensor at an empty space, away from the metal plate to which the ground is attached, where there are no charged objects.
5	ERR3	Output	Pink	Error output 3 Error signal is output when an error is detected at monitor.
6	ERR2	Output	Yellow	Error output 2 Error signal is output when an error is detected at channel 2 potential sensor.
7	ERR1	Output	Green	Error output 1 Error signal is output when an error is detected at channel 1 potential sensor.
8	CP2CH2	Output	Gray	Judgment output 2 (for channel 2 potential sensor) If the measured potential exceeds or falls below the threshold, a judgment signal is output. The output method varies according to the judgment mode.
9	CH2CP1	Output	Red	Judgment output 1 (for channel 2 potential sensor) If the measured potential exceeds or falls below the threshold, a judgment signal is output. The output method varies according to the judgment mode.
10	CH1CP2	Output	White	Judgment output 2 (for channel 1 potential sensor) If the measured potential exceeds or falls below the threshold, a judgment signal is output. The output method varies according to the judgment mode.
11	CH1CP1	Output	Black	Judgment output 1 (for channel 1 potential sensor) If the measured potential exceeds or falls below the threshold, a judgment signal is output. The output method varies according to the judgment mode.
12	0V	-	Blue	Power source ground Connect 0 V power source.
13	+24V	-	Brown	Power Connect 24 VDC power source.

[Power supply connection]

Power and signal cables are connected to power and signal connectors.

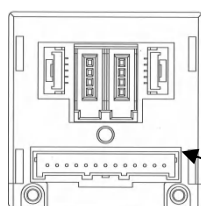
The 24 VDC power is connected to the brown cable in the power and signal cables.

The 0 V power is connected to the blue cable in the power and signal cables.

Note: Do not reverse the brown and blue connections in the power and signal cables.

There is a circuit to prevent reverse connections so the device will not be damaged, but it will not operate correctly.

Note: Immediately after turning on the power, the LED display may light momentarily.



Power and signal connector

[Connecting external devices]

This section provides the specifications for the input/output circuits and example connections. Refers to this when connecting external devices, such as PLCs.

- Input (zero calibration input)

- Input specifications

Item	Input circuit
Input voltage	24 VDC $\pm 10\%$ (shared with 24 VDC power supply)
Input current	4.8 mA/when 24 VDC
Input response time	Under 30 ms
Input impedance	4.7 K $\Omega$

- Input signal details

ZC1/ZC2 signal: Turning on zero calibration (closing the contact) sets the measured value to 0 V (standard value) when it is input.

The LCD shows 0 V.

**Note: Before doing zero calibration, set the electrostatic charge to below  $\pm 200$  V ( $\pm 2000$  V when in high-voltage mode).**

- Output (error output/judgment output)

- Output specifications

Item	Specifications
Output method	Transistor output NPN open collector (with overcurrent protection)
Output voltage	DC24V $\pm 10\%$
Output current	max50mA
Leakage current when off	max 0.10mA
Residual voltage when on	at max 0.3 V/5 mA and at max 1.0 V/50 mA
Output response time	Under 30 ms

- Output signal details

ERR1/ERR2/ERR3 signal: Error signal detects I/O output overcurrent, memory error, or sensor error, and then the transistor turns off (contact opens).  
Normally, the transistor is on (contact is closed). (Normally closed)  
Depending on the settings, you can also set it to be normally open.  
ERR1 turns on when there is a channel 1 potential sensor error, ERR2 turns on when there is a channel 2 potential sensor error, and ERR3 turns on when there is a monitor error.

CH1CP1/CH1CP2 signal: Judgment output 1 or judgment output 2 outputs a judgment signal if the measured potential exceeds or falls below the threshold. (for channel 1 potential sensor)  
The judgment mode has detailed judgment and simple judgment.

CH2CP1/CH2CP2 signal: Judgment output 1 or judgment output 2 outputs a judgment signal if the measured potential exceeds or falls below the threshold. (for channel 2 potential sensor)  
The judgment mode has detailed judgment and simple judgment.

### <Judgment mode>

The judgment mode has detailed judgment and simple judgment.

Simple judgment can judge measured potential with the least amount of settings.

**Note) Sets the setting conditions of the judgment threshold so they are as shown below.**

- $(\text{CP1H threshold} - \text{CP1H hysteresis}) > (\text{CP1L threshold} + \text{CP1L hysteresis})$
- $(\text{CP2H threshold} - \text{CP2H hysteresis}) > (\text{CP2L threshold} + \text{CP2L hysteresis})$

Notes that an error will occur if the setting conditions are not met.

### ■Detailed judgment

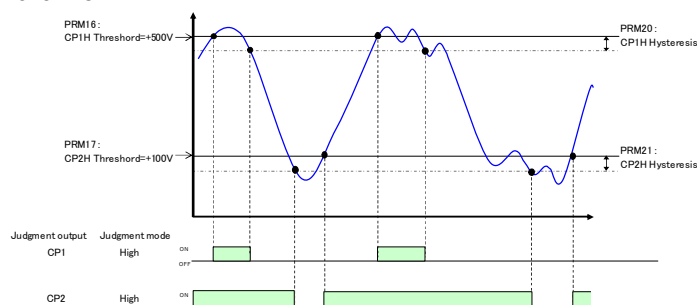
#### <High/Low modes>

- If the measured potential exceeds threshold H or threshold L, output turns on.
- The output judgment can output a maximum of two positions (CP1/CP2).
- You can set hysteretic values for the thresholds.

Setting example)

Given judgment output CP1 is High mode (CP1H threshold = +500 V) and judgment output CP2 is High mode (CP2H threshold = +100 V)/

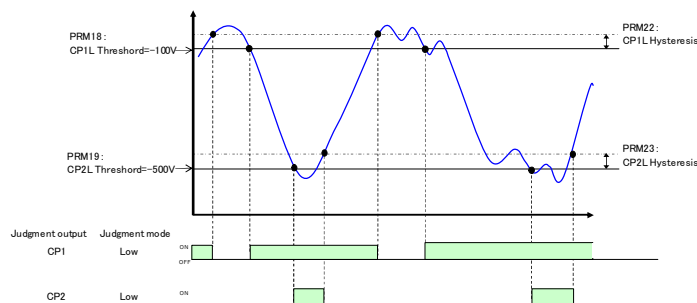
For channel 1



Setting example)

Given judgment output CP1 is Low mode (CP1L threshold = -100 V) and judgment output CP2 is Low mode (CP2L threshold = -500 V)/

For channel 1



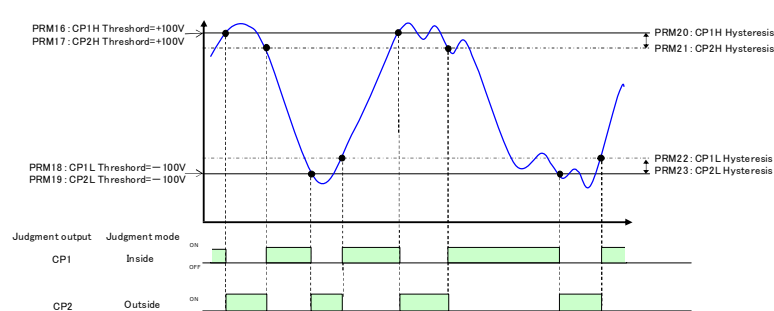
### <Inside/Outside mode>

- Output is on while the measured potential is within (Inside mode) threshold H and threshold L or when it is outside (Outside mode).
- The output judgment can output a maximum of two positions (CP1/CP2).
- You can set hysteretic values for the thresholds.

Setting example)

Given judgment output CP1 is Inside mode (CP1H threshold = +100 V and CP1L threshold = - 100 V) and judgment output CP2 is Outside mode (CP2H threshold = +100 V and CP2L threshold = - 100 V)/

For channel 1



## ■ Simple judgment

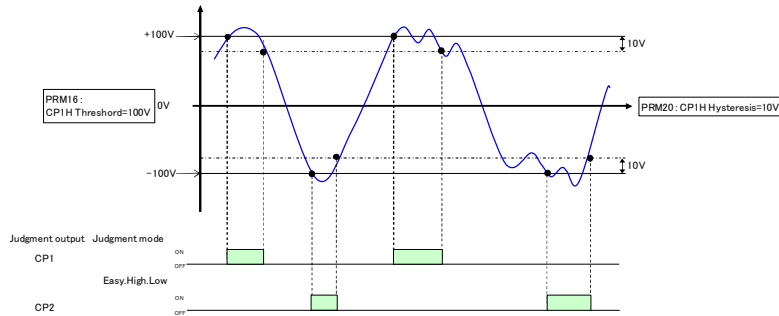
### <Easy.High.Low mode>

- Judgment output CP1 is automatically set to High mode and CP2 to Low mode.
- You can set just one threshold, using a base of 0 V, so the positive charge side and the negative charge side are symmetric.

Setting example)

Given a threshold = 100 V and hysteresis = 10 V, in Easy.High.Low mode/

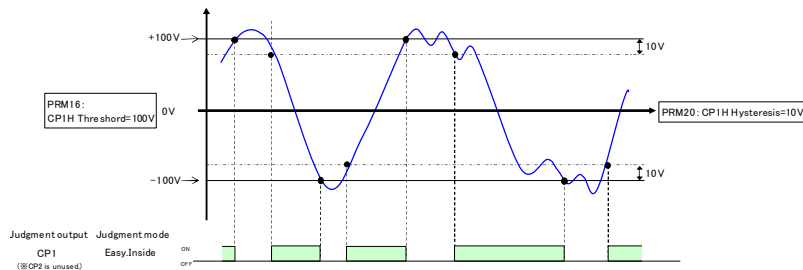
For channel 1



### <Easy.Inside mode>

- Judgment output CP1 is automatically set to Inside mode. Judgment output CP2 is in Off mode and is not output.
- You can set just one threshold, using a base of 0 V, so the positive charge side and the negative charge side are symmetric.

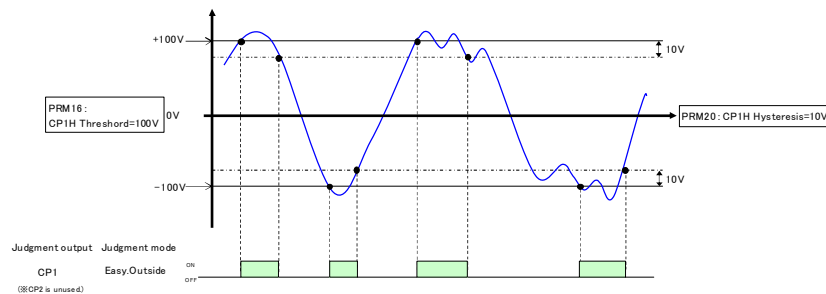
For channel 1



### <Easy.Outside mode>

- Judgment output CP1 is automatically set to Outside mode. Judgment output CP2 is in Off mode and is not output.
- You can set just one threshold, using a base of 0 V, so the positive charge side and the negative charge side are symmetric.

For channel 1



## ■ Stop judgment

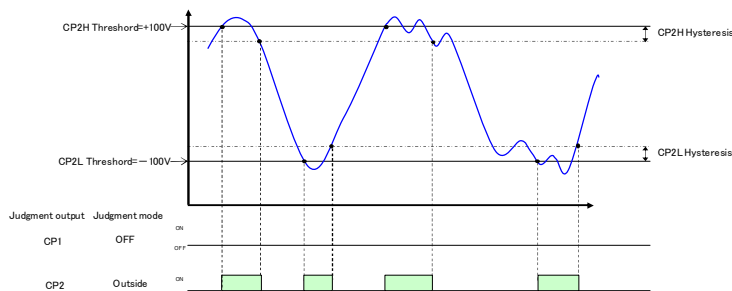
### <Off mode>

- If you do not want to output judgment, set Off mode and it will not be output. You can set this individually for CP1 and CP2.

Setting example)

Given judgment output CP1 is Off mode and judgment output CP2 is Outside mode (CP2H threshold = +100 V and CP2L threshold = - 100 V)/

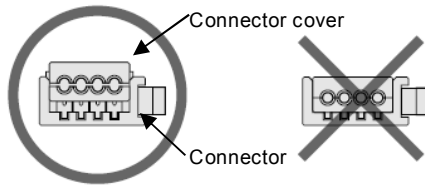
For channel 1



### 3-3-2 Connecting an electrostatic potential sensor

Connects a mount plug for the mini clamp wire to DTY-EPS01 series electrostatic potential sensor.  
Uses the following procedure when connecting.

1. Checks to make sure that the connector cover (lead wire inlet) is raised above the body of the connector.

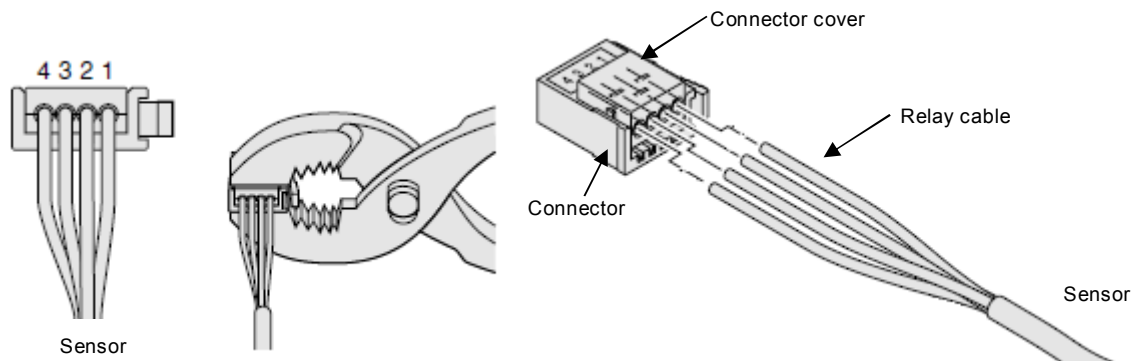


Notes that a connector whose cover is even with the body of the connector cannot be used.

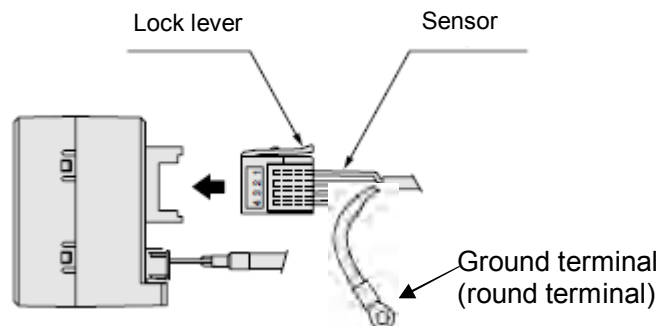
2. Inserts the lead wires into the connector cover holes in accordance with the information in the table below.  
Checks to make sure the lead wires are fully inserted as far as they will go by looking into the semi-transparent top cover of the connector. (wire goes in about 9 mm [0.354 in.])

Notes that supplying power while connections are incorrect will damage the potential sensor and monitor.

Number on connector	Signal name	Lead wire color
1	Electrostatic potential sensor power supply 24 V	Brown
2	A(+)	White
3	Electrostatic potential sensor power supply 0 V	Blue
4	B(-)	Black



3. Taking care not to allow the lead wires to come out of the connector, use a hand tool, such as pliers, to squeeze the cover and body of the connector until the cover is pressed into the body.  
Uses a tightening torque of less than 980.7 N.  
Connection is complete when the cover is even with the connector body.
4. Double check to make sure that wiring is correct.
5. Be sure to connect the ground terminal (round terminal) on the loose-wire side of the relay cable to a ground.



### 3-3-3 Connecting to communication devices

Connects a communications cable or USB-RS485 converter to the communications connector (serial IN side).

It is possible to do various settings and acquire information from the electrostatic potential sensor.

You can use USB-RS485 converter if you set up USB from your computer.

You can use the communications cable if you set up the 485 communications unit for external devices.

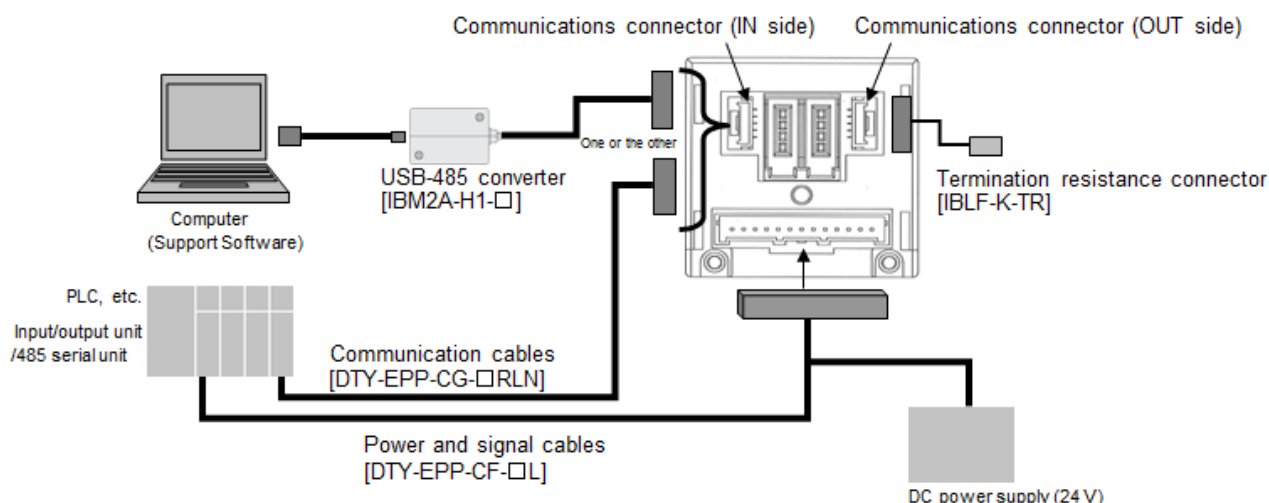
You can connect a daisy chain of up to 16 monitors by connecting the communication connector for daisy chains to the communication connector (serial OUT side), and then connecting that to the communication connector (serial IN side) of the next monitor.

Be sure to connect a termination connector to the communications connector (serial OUT side) on the last monitor.

Connect it even if there is only one monitor.

Before connecting the communications cable for the first time, confirm that the green LCD on the monitor is lit as normal, then briefly turn off the power, and then connect the cable.

If you connect communications cables or USB-RS485 converter while the monitor's power is connected in reverse, it may damage the device that is that is being connected.



[Wiring table for communication cables]

Number	Parts	Input/output	Cable color	Description
1	A	Input/output	White	485 communication data +
2	B	Input/output	Pink	485 communication data -
3	GND	-	Yellow	Ground
4	N.C.	-	-	Unconnected
5	N.C.	-	-	Unconnected

Settings are done by pressing the setting keys, but it is also possible to transmit the settings via the communications cables.

You can easily do the settings from a computer (support software) or a communications unit.

The set conditions are written and stored to non-volatile memory.

Notes that the non-volatile memory has a limited service life of  $10^{12}$  guaranteed writes and reads.



■ How to set parameters

Uses a computer (support software) or a 485 communications unit, such as PLC, to set the various parameters.  
If you use a computer (support software), you can use USB-RS485 converter, and the settings can be done with the support software.

Refers to the instruction manual for the support software regarding how to operate the support software.

If you are using a communication unit, such as the 485, use the parameter write command to set the parameters.

After writing the parameters, check the readout data.

● Parameter write command

@Monitor address (0 - F), destination number (0-2)\*, WP, operand 1 (parameter number), operand 2 (data)

● Parameter readout command

@Monitor address (0 - F), destination number (0-2)\*, RP, operand 1 (parameter number)

● Other commands

@Monitor address (0 - F), destination number (0-2)\*, command 3, operand 1, operand 2

For details, see the list of commands on the following page.

\* Destination number 0: Monitor/1: electrostatic potential sensor channel 1/2: electrostatic potential sensor channel 2

● Communications settings

Item		Specifications
Communications standard		RS-485 (2 lead wire type)
Transmission speed		115200bps
Transmission format		Half duplex
Data format	Start code	'@' (=0x40)
	Delimiter code	',' (=0x2C)
	Completion code	CR (=0x0D)
	Data bit	8bit
	Stop bit	1bit
	Parity	Odd numbers
	Checksum	None
Number of transmitters		16 unit
Termination resistance		Attach the termination resistance connector

● Content of communications response

Reply	Specifications
OK	Normal. If there is data, delimit it with commas.
ER	Error generated. Error codes display delimited by commas.

Note: Since the communication method is half duplex,  
when transmitting continuously confirm reply(OK,CR or ER,CR) in advance to avoid signal collision.

■ Command list

Command 1 (Monitor address)	Command 2 (Destination number)	Command 3	Operand 1	Operand 2	Description
@0~F	0: Monitor	WP	Parameter number	Data	Writes monitor parameters
		RP	Parameter number	-	Reads monitor parameters
		IPRM	Parameter number	-	Initializes monitor parameter settings
		ACLEAR	-	-	Clears errors
		VERSION	-	-	Reads monitor version
		REALL	-	-	Batch reads monitor error history Reads the last 10
		IERR	-	-	Initializes monitor error history
		ERR	Output settings	-	Error output settings 0: Normally closed 1: Normally open
		TIME	Display cycle	-	Sets cycle for monitor display 0: 100ms, 1: 200ms, 2: 500ms, 3: 1000ms
		DISP	Display on/off	-	Sets display 0: OFF, 1: ON
		HOLD	Display mode	-	Sets display mode 0: No hold, 1: Peak hold 2: Bottom hold, 3: Absolute value hold
		AUTO	Auto scan	-	Sets auto scan 0: Auto scan off 1: Auto scan on
		PROTECT	Key-protect	-	Sets key-protect 0: Key-protect off 1: Key-protect on (CH1 displayed) 2: Key-protect on (CH2 displayed) 3: Key-protect on (Auto scan displayed)
	1: electrostatic potential sensor on channel 1 2: electrostatic potential sensor on channel 2		Parameter number	Data	Writes sensor parameters
		RP	Parameter number	-	Reads sensor parameters
		IPRM	-	-	Initializes sensor parameters
		VERSION	-	-	Reads sensor version
		REALL	-	-	Batch reads sensor error history Reads the last 10
		IERR	-	-	Initializes sensor error history
		RC	-	-	Reads the voltage (These values may differ from the values displayed on the monitor because the voltage during transmission is returned.) Note: Over range: $\pm 30000$ Sensor not connected: 32000 is returned.
		ZERO	-	-	Executes zero calibration
		MM	Measurement mode	-	Switch measurement mode 0: Standard mode 1: High voltage mode 2: Ion balance mode
		TIME	Output cycle	-	Sets sensor data output cycle 0: 10ms, 1: 50ms, 2: 100ms, 3: 200ms, 4: 500ms, 5: 1000ms

List of parameters for monitors that can be read by sending RP command, and can be written by sending WP command, to the @monitor address, destination number (0).

■List of parameters(monitor)

Number	Initial value	Input range	Unit	Description 1	Description 2
16	100	-20000 to 20000	V	CH1 CP1H threshold	Parameters related to electrostatic potential sensors on channel 1
17	100	-20000 to 20000	V	CH1 CP2H threshold	
18	-100	-20000 to 20000	V	CH1 CP1L threshold	
19	-100	-20000 to 20000	V	CH1 CP2L threshold	
20	50	0 to 20000	V	CH1 CP1H hysteresis	
21	50	0 to 20000	V	CH1 CP2H hysteresis	
22	50	0 to 20000	V	CH1 CP1L hysteresis	
23	50	0 to 20000	V	CH1 CP2L hysteresis	
24	0	0 to 7	-	CH1 CP1 output modes 0: High mode 1: Low mode 2: Inside mode 3: Outside mode 4: OFF mode 5: Easy.High.Low mode 6: Easy.Inside mode 7: Easy. Outside mode	Parameters related to electrostatic potential sensors on channel 2
25	1	0 to 7	-	CH1 CP2 output modes 0: High mode 1: Low mode 2: Inside mode 3: Outside mode 4: OFF mode 5: Easy.High.Low mode 6: Easy.Inside mode 7: Easy. Outside mode	
32	100	-20000 to 20000	V	CH2 CP1H threshold	
33	100	-20000 to 20000	V	CH2 CP2H threshold	
34	-100	-20000 to 20000	V	CH2 CP1L threshold	
35	-100	-20000 to 20000	V	CH2 CP2L threshold	
36	50	0 to 20000	V	CH2 CP1H hysteresis	
37	50	0 to 20000	V	CH2 CP2H hysteresis	
38	50	0 to 20000	V	CH2 CP1L hysteresis	
39	50	0 to 20000	V	CH2 CP2L hysteresis	
40	0	0 to 7	-	CH2 CP1 output modes 0: High mode 1: Low mode 2: Inside mode 3: Outside mode 4: OFF mode 5: Easy.High.Low mode 6: Easy.Inside mode 7: Easy. Outside mode	
41	1	0 to 7	-	CH2 CP2 output modes 0: High mode 1: Low mode 2: Inside mode 3: Outside mode 4: OFF mode 5: Easy.High.Low mode 6: Easy.Inside mode 7: Easy. Outside mode	

List of parameters for monitors that can be read by sending RP command, and can be written by sending WP command, to the @monitor address, destination number (1 or 2).

■ List of parameters (sensors)

Number	Initial value	Input range	Unit	Description
31	0	0 to 2	-	Measurement mode (Same as MM Command) 0: Standard mode 1: High voltage mode 2: Ion balance mode
34	2	0 to 5	-	Output cycle (Same as TIME Command) 0:10ms 1:50ms 2:100ms 3:200ms 4:500ms 5:1000ms
90	300[11.8]	20[0.787] to 400[15.7]	mm[in]	Workpiece size
91	50[1.969]	6[0.236] to 100[3.9]	mm[in]	Measurement distance

### 3-4 Settings

Supplies 24 VDC power to the monitor and then uses the setting keys on the front of the monitor and a computer (support software) to do the various necessary settings.

- \* For the operating procedures to do settings through the support software, refer to the support software instruction manual for the electrostatic potential sensor monitors.
- \* If multiple monitors are connected in a daisy chain, set the individual addresses using the address setting keys so that the address setting keys on the front of the monitors are all different.
- \* It is not possible to acquire an electrostatic charge or input/output while doing settings and sending commands (in setting mode).

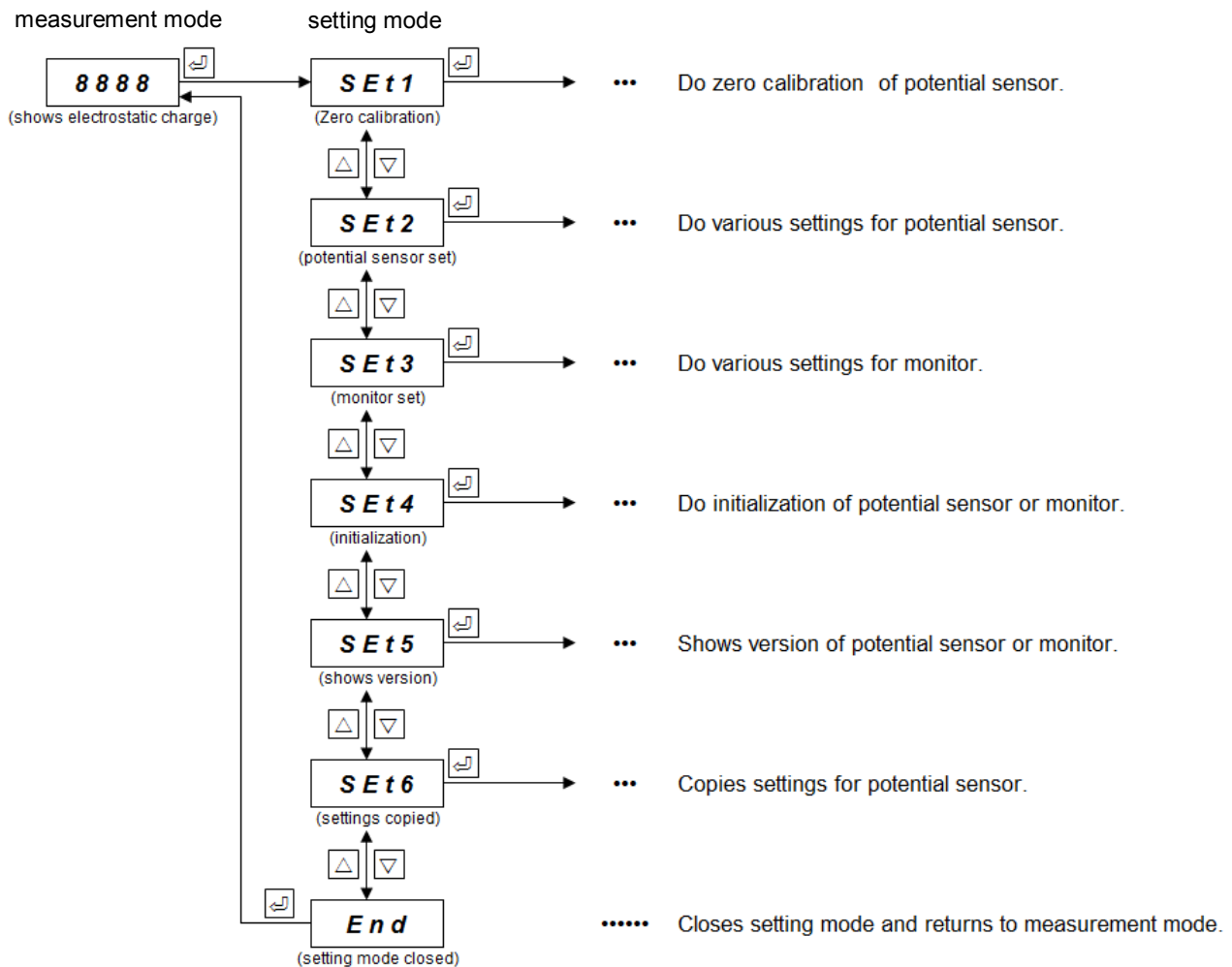
#### <Key operations>

When you turn on the power, the electrostatic charge is shown in measurement mode.

When doing settings in measurement mode, each time you press the [MODE] key, you move to the setting mode display.

Pressing the [UP]/[DOWN] keys changes the setting items.

Changes to the setting item you need, and presses the [MODE] key to set it.



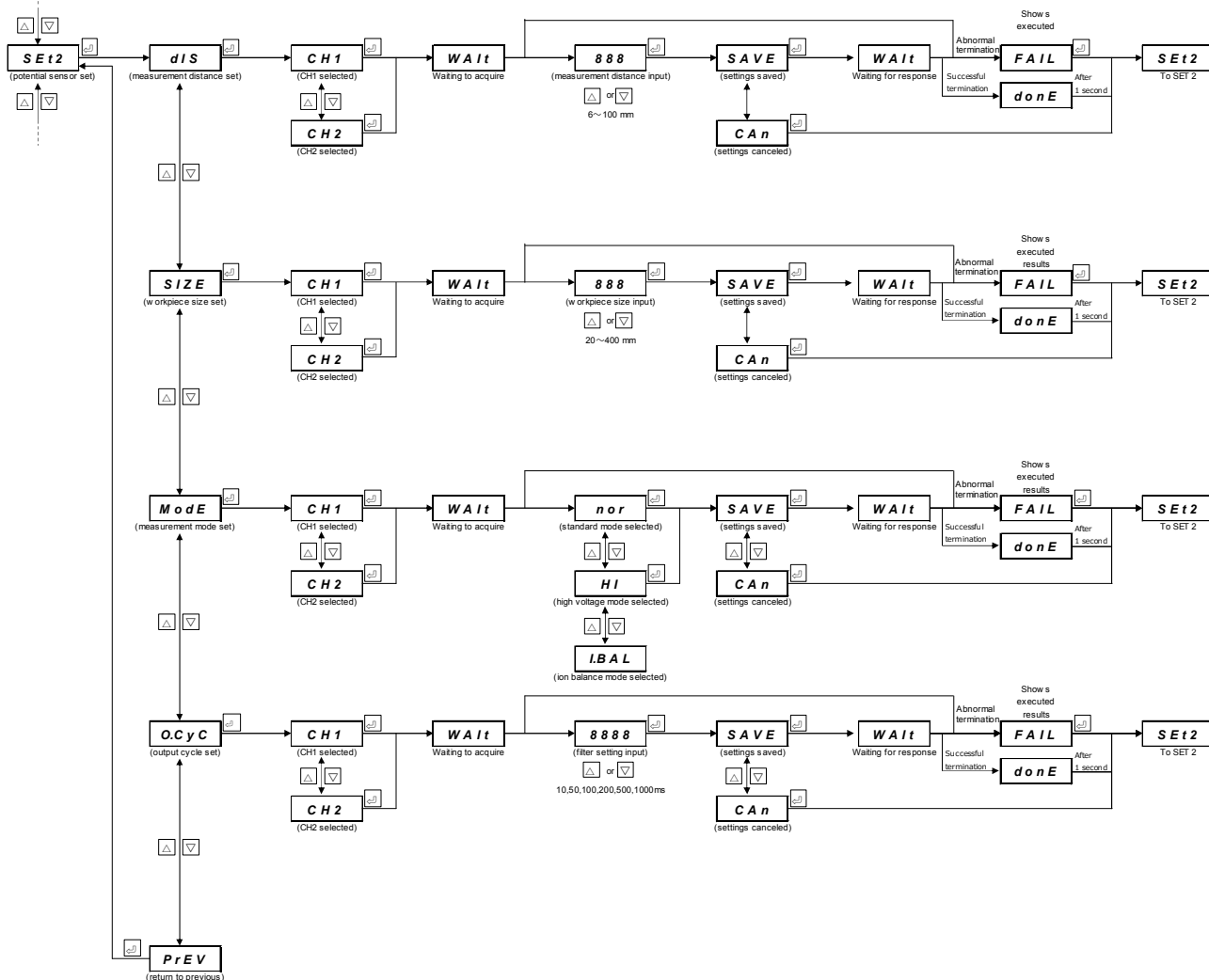
### 3-4-1 Settings for electrostatic potential sensors [SET2]

- (1) Measurement distance LCD shows: [d I S]  
Sets the distance from the object for measurement to the electrostatic potential sensor.  
Initial value: 50 mm [1.969 in.]  
Sets it within 6 mm [0.236 in.] to 100 mm [3.9 in.] range.  
Can be set in 1 mm [0.039 in.] units.  
If you are using ion balance mode, you do not need to input a measurement distance.  
**Note: If you are doing high voltage measurements, set the measurement distance according to the following guidelines.**

Measurement distance	Measured voltage
6 to 15 mm [0.236 to 0.591 in.]	Distance (mm) x 1.0 kV
16 to 100 mm [0.630 to 3.937 in.]	Distance (mm) x 0.5 kV
- (2) Work size LCD shows: [S I Z E]  
Sets the diameter on a diagonal line to the object being measured.  
Initial value:  $\phi$ 300 mm [11.811 in.]  
Sets it within a  $\phi$ 20 mm [0.787 in.] to  $\phi$ 400 mm [15.748 in.] range.  
Can be set in 1 mm [0.039 in.] units.
- (3) Measurement mode LCD shows: [M o d E]  
Sets the measurement mode/standard mode/high-voltage mode/ion-balance mode according to the target measurement or the amount of charge on the object being measured.  
Initial value: Standard mode  
\* Switches measurement modes on the potential sensor/can also be changed with the zero calibration switch.  
Presses and holds for 5 seconds to change modes in order from Standard mode  $\Rightarrow$  High voltage mode  $\Rightarrow$  Ion balance mode  $\Rightarrow$  Standard mode. If switched by the electrostatic potential sensor main unit set the measuring mode of the monitor same to the electrostatic potential sensor.
- (4) Output cycle LCD shows: [O.C y C]  
Selects a data output cycle from 10 ms (no smoothing), 50 ms, 100 ms, 200 ms, 500 ms, and 1000 ms.  
Initial value: 100 ms  
When Ion balance mode is selected, the data output cycle is fixed at 100 ms.

#### <Key operations>

- Various settings for the potential sensor, LCD shows: [S E t 2]

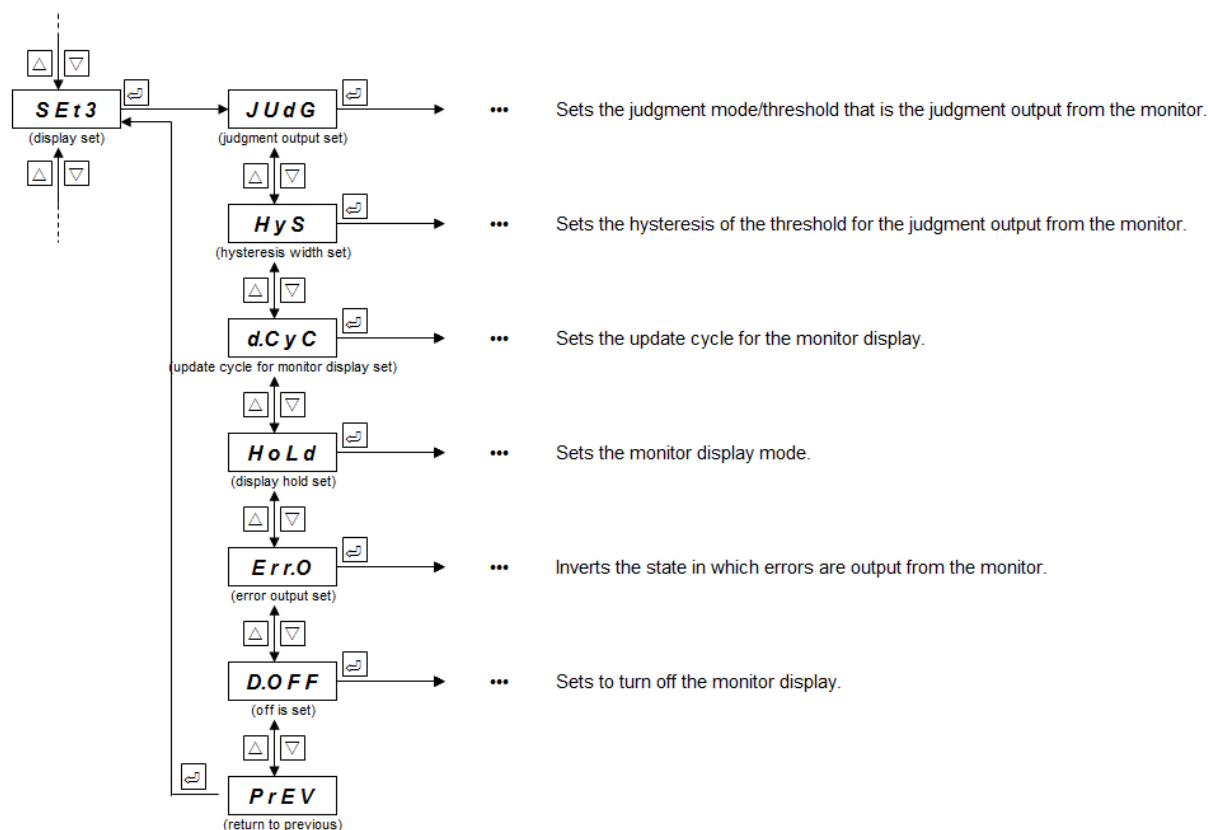


### 3-4-2 Settings for monitors [SET3]

- (1) Judgment mode/judgment threshold/hysteresis value      LCD shows: [**J U d G**]/[**H y S**]  
 Selects a judgment mode. (detailed judgment/simple judgment)  
 Sets the threshold at which judgment is done according to the judgment mode.  
 Initial value: detailed judgment, judgment threshold: +100 V/-100 V, hysteresis:  $\pm 50$  V
- (2) Monitor display update cycle      LCD shows: [**d.C y C**]  
 Sets the update cycle for LCD on the monitor.  
 Selects a cycle from 100, 200, 500, or 1000 ms.  
 Initial value: 100 ms
- (3) Display hold      LCD shows: [**H o L d**]  
 You can select from the normal display, peak-hold display, bottom-hold display, or absolute value display.  
 Initial value: normal display
- (4) Error output      LCD shows: [**E r r. O**]  
 Selects normal close or normal open for the error output signals (ERR1/ERR2/ERR3).  
 Normal close: transistor is ON during normal output, transistor is OFF when an error occurs  
 Normal open: transistor is OFF during normal output, transistor is ON when an error occurs  
 Initial value: normally closed
- (5) Display on/off      LCD shows: [**D.O F F**]  
 Sets this if you want to turn off the monitor's LCD and LED displays.  
 When they are off, you can light them by pressing the [UP], [DOWN], or [MODE] button.  
 Initial value: Lit

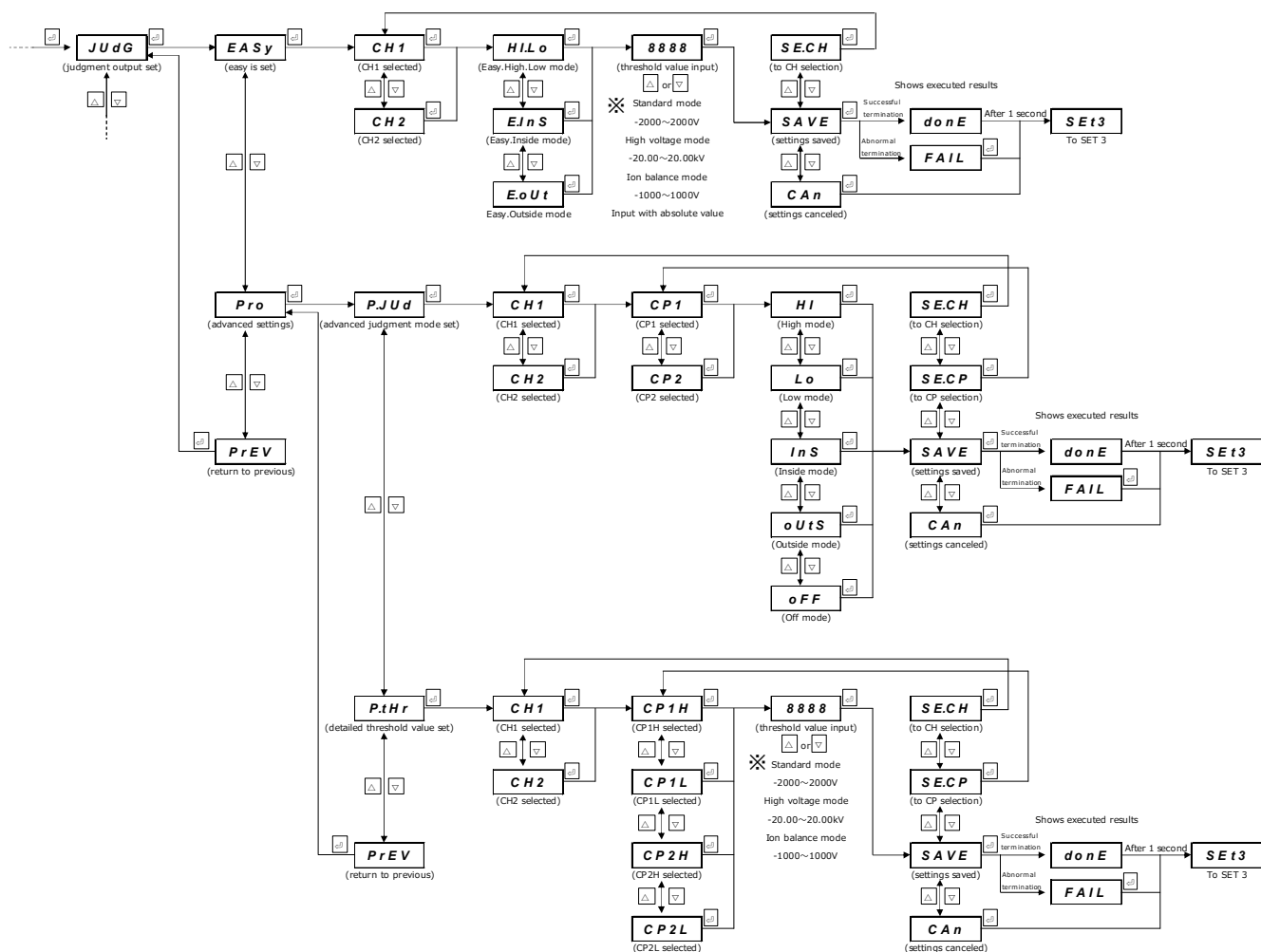
#### <Key operations>

- Various settings for the monitor, LCD shows: [**S E t 3**]



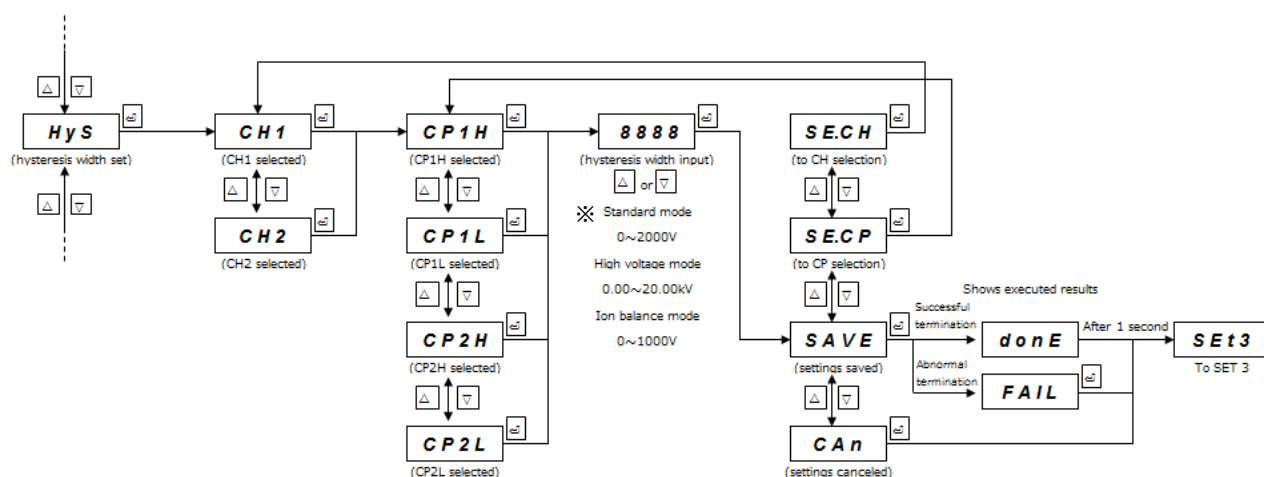
# • Judgment output settings

LCD shows: [J U d G]



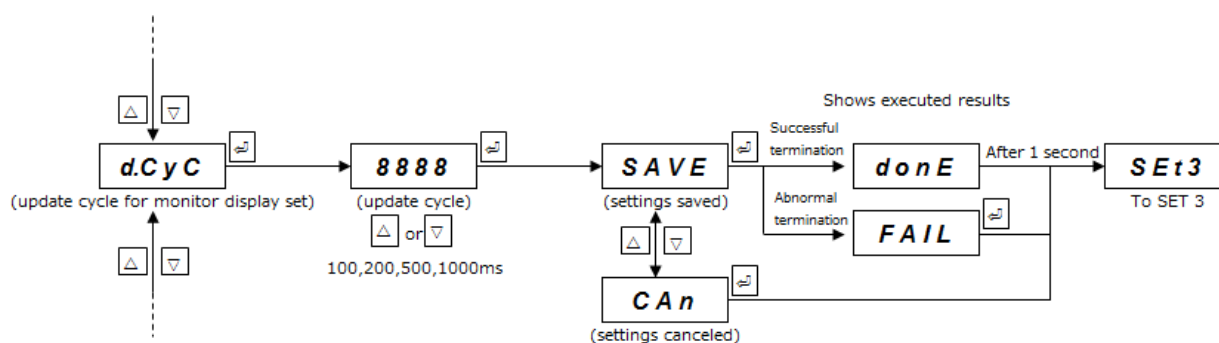
# • Hysteresis width settings

LCD shows: [Hys]

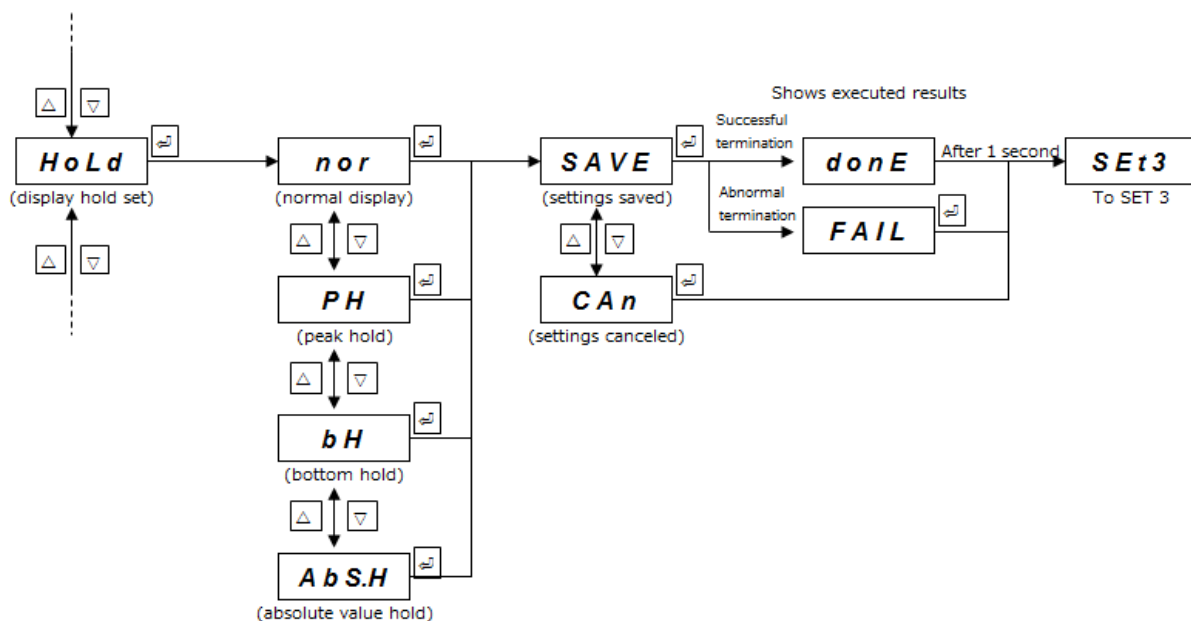


- ※ On the monitor screen, the input range of the threshold / hysteresis width is 20 kV regardless of the measurement mode.  
Since the input range varies depending on the measurement mode, set it within the range.

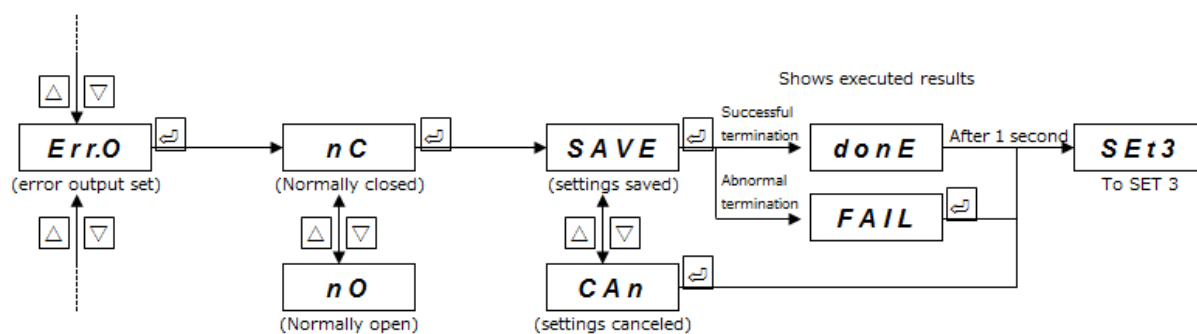
- Monitor display update cycle settings LCD shows: [d.C y C]



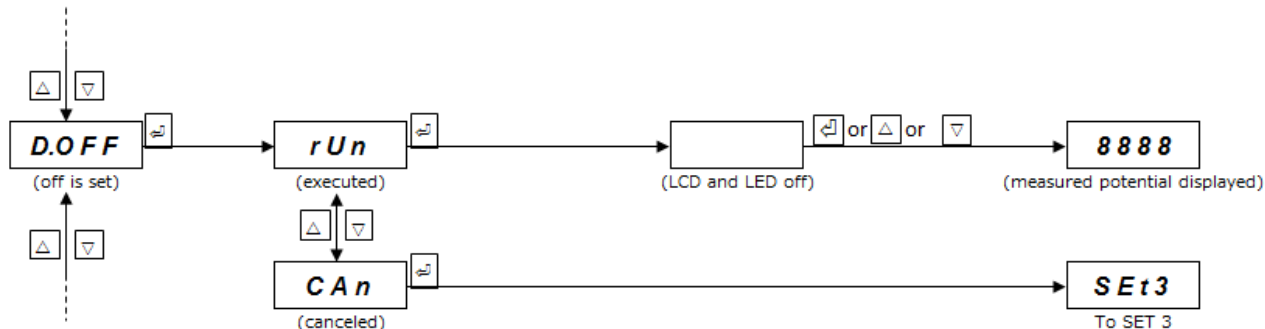
- Display hold settings LCD shows: [H o L d]



- Error output settings LCD shows: [E r r O]



- Monitor off settings LCD shows: [D.O F F]





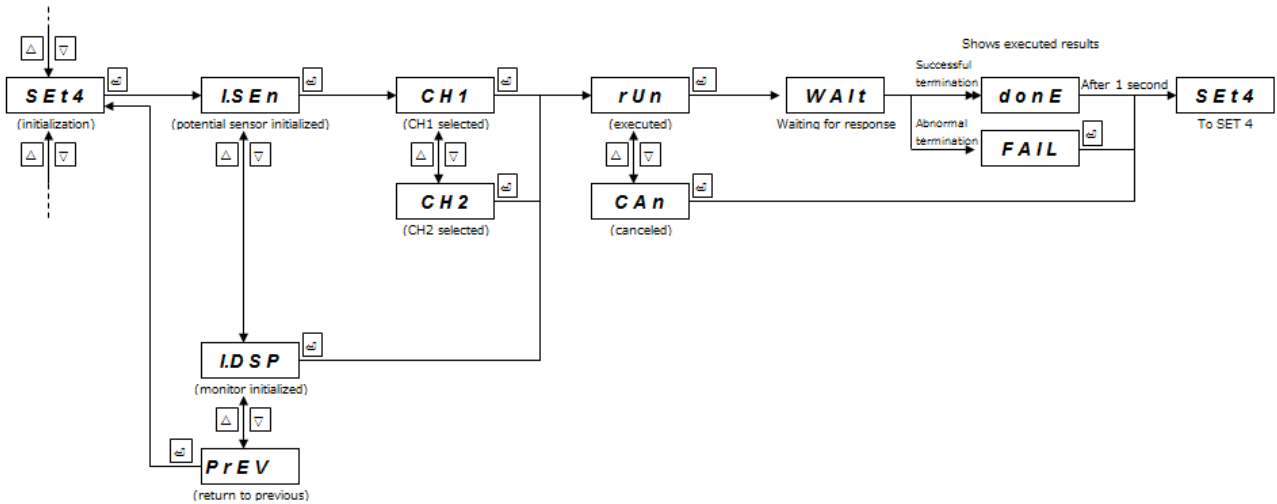
### 3-4-3 Other settings

#### <Key operations>

##### (1) Initialization LCD shows: [S E t 4]

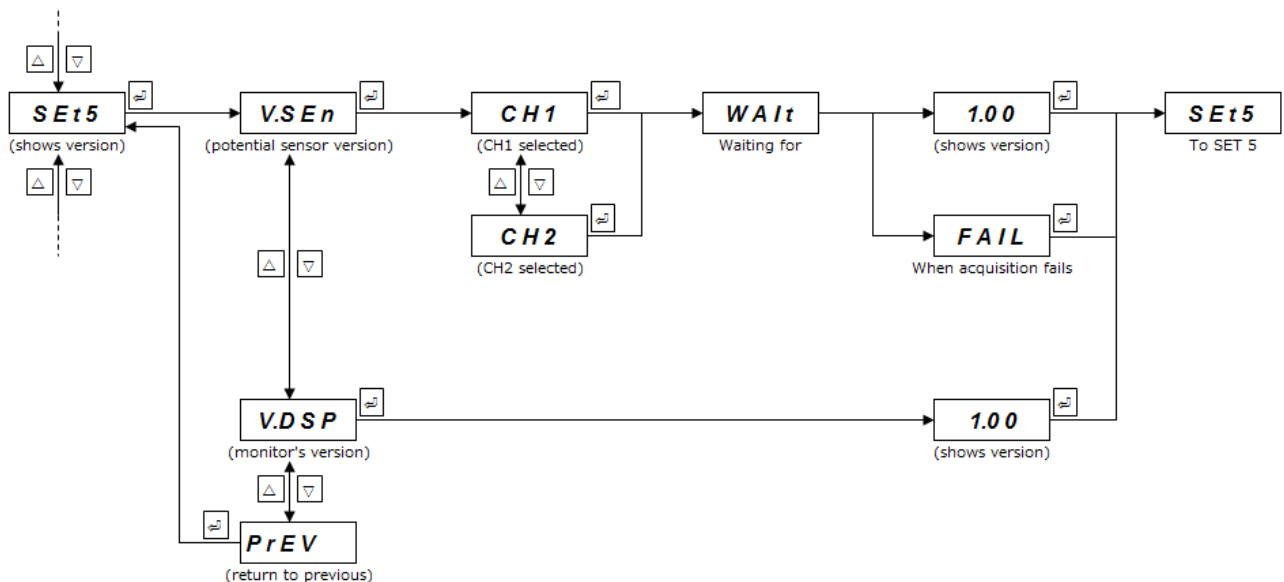
The electrostatic potential sensor or the monitor is initialized to the factory settings.

If you select an electrostatic potential sensor, then you must select channel 1 or channel 2.



##### (2) Check version LCD shows: [S E t 5]

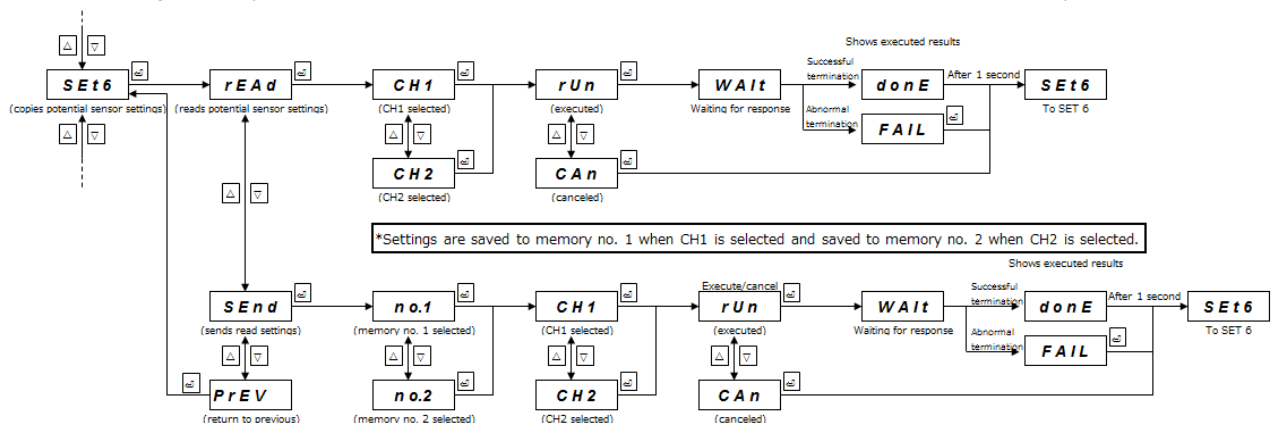
Shows the version of the software for the potential sensor or monitor.



##### (3) Copy settings for the potential sensor LCD shows: [S E t 6]

You can copy the settings from an electrostatic potential sensor that has been set to another electrostatic potential sensor.

Settings to copy: measurement distance, workpiece size, measurement mode, and output cycle



### 3-5 Measuring

If consistent measurements are needed, we recommend waiting 10 minutes or more after turning on the power to the potential sensor and monitor before using the sensor.

#### 3-5-1 Zero calibration LCD shows: [S e t 1]

Zero calibration is a function that compensates the standard electric potential so the measured value is 0 V. Points the sensor at an empty space, away from the metal plate to which the ground is attached, where there are no charged objects.

If you want to do zero calibration to a potential sensor on channel 1, turn on ZC1 signal (close the circuit). For channel 2, turn on ZC2 signal.

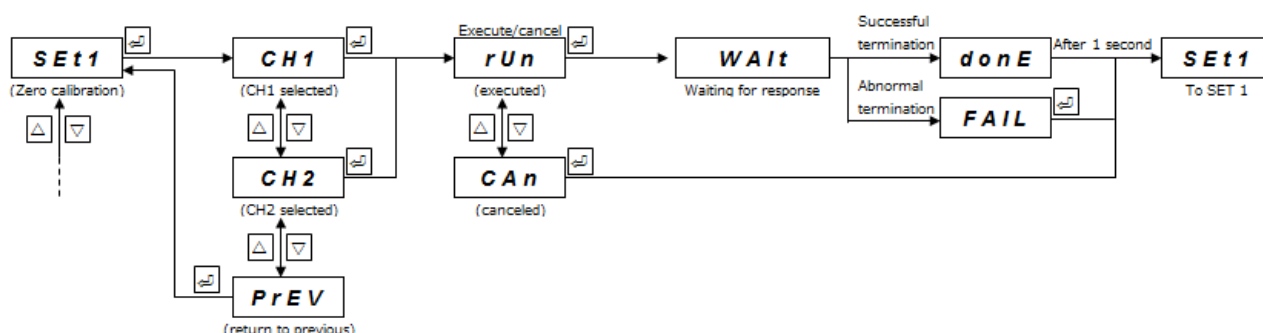
Alternatively, zero calibration can also be done with the switch on the electrostatic potential sensor.

Presses the measurement range switch/zero calibration switch on the side of the electrostatic potential sensor.

(For details, refer to the electrostatic potential sensor instruction manual.)

When zero calibration is done, the yellow LED on the electrostatic potential sensor flashes for 2 seconds. After that, it stays on.

#### <Key operations>



#### 3-5-2 Showing electrostatic charge (measurement mode)

Selects normal display (channel 1 or channel 2) or auto scan mode (switch between channel 1 and channel 2).

The auto scan display switches every second.

You can confirm which channel is being displayed according to CH LED (yellow) on the front side.

When you turn on the power, the channel that was shown previously is displayed.

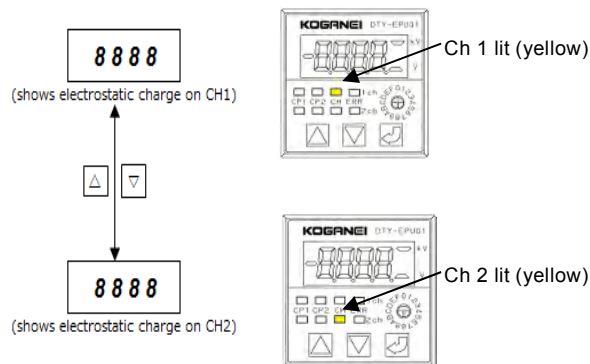
If auto scan mode is set, then the display is from channel 1.

The currently displayed units are indicated as [kV] or [V] by the line in the right side of the display.

You can disable key operations by executing key protect.

#### <Key operations>

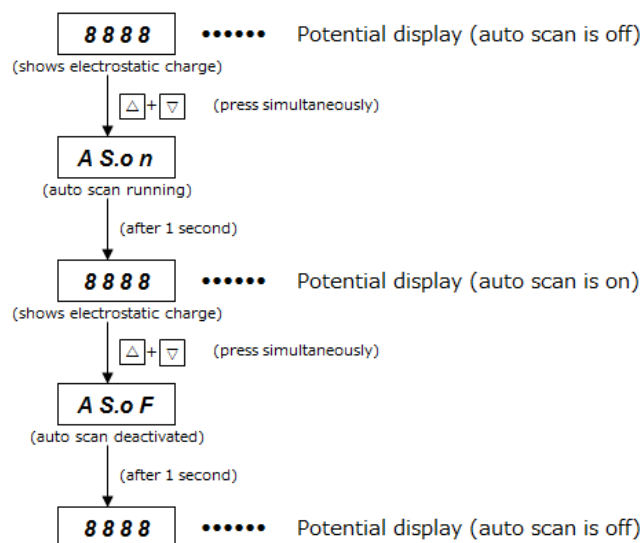
##### [Normal display]



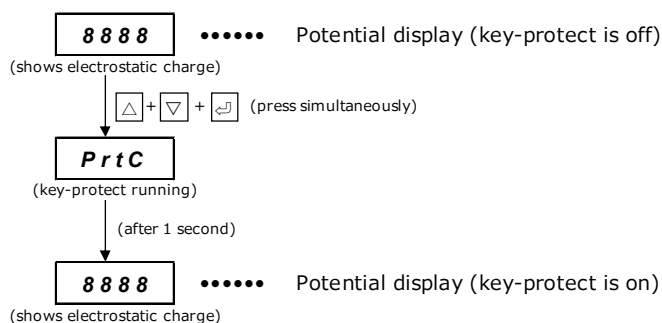
8888  $\overline{\text{V}}$  : Units are [kV]  
if the line is on top

8888  $\text{V}$  : Units are [V]  
if the line is on bottom

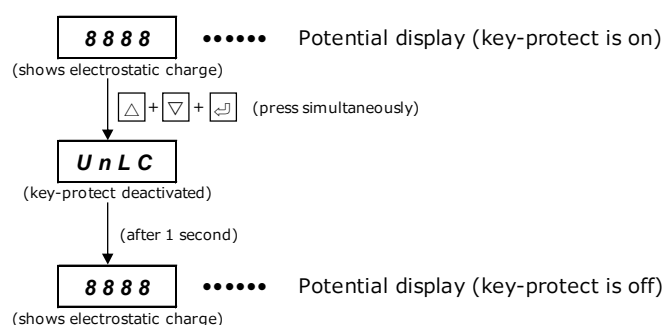
##### [Auto scan display]



#### [Key-protect activated]



#### [Key-protect deactivated]



#### [If no sensor is connected]

Off is displayed if no sensor is connected to the channel that is displayed.

**OFF**

(Unconnected)

#### [When power was turned on and communicating with sensor]

Wait is displayed for 2 seconds after turning on the power and while communicating with the sensor via the monitor from the external device.

**Wait**

#### [Error display]

LCD changes to red when an error is displayed.

If an error appears, refer to 4-3 List of errors and do the countermeasures there.

After doing the countermeasures, press any key to return to the electrostatic charge display.

<b>E.888</b>	...	When a monitor error has occurred
<b>E 1.88</b>	...	When a channel 1 potential sensor error has occurred
<b>E2.88</b>	...	When a channel 2 potential sensor error has occurred

(Error display)

#### [Over range display]

The LCD changes to red when over range is displayed.

<b>Over</b>	...	When over range occurred on the positive charge side
<b>-Over</b>	...	When over range occurred on the negative charge side

## Chapter 4. Troubleshooting

### 4-1 When problems occur

If you are going to contact Koganei about the conditions of your problems, please prepare the following items in as much detail as possible.

Item	Description (example)
What	Model (Monitor DTY-EPU01 for potential sensor) Other
When	Time of purchase (serial number) Period used, conditions of use When power was turned on and one hour after power was turned on
Under what conditions	While operating While doing settings
What happened	Does not operate Error occurs
Frequency	Always occurs Occurs once an hour Does not recur

### 4-2 What to do when an error occurs

An error is determined to have occurred if ERR 1, 2, or 3 signal output of the input/output is on.

ERR (red LED) lights when an error related to a sensor occurs. Or, LCD turns red and the error is displayed.

When an error related to a monitor occurs, LCD becomes red and displays the error, but ERR (red LED) does not light.

If an error occurs, refer to the countermeasures in 4-3 List of errors.

### 4-3 List of errors

Product	Error message	LCD display	Description	Likely causes	Countermeasure
Sensor related	Memory errors	<b>E 1. 1 0</b> <b>E 2. 1 0</b>	The data in the sensor has been corrupted	The power was turned off while data was being written.	Temporarily remove the monitor and then reconnect it. Use the support software to do an initialization. If the problem still remains unsolved, contact Koganei.
	Sensor error	<b>E 1. 1 1</b> <b>E 2. 1 1</b>	Error occurred at the sensor	Sensor is damaged	Temporarily remove the monitor and then reconnect it. If this does not solve the problem, contact Koganei.
Monitor related	Memory errors	<b>E.1 0 0</b>	The data in the monitor has been corrupted	The power was turned off while data was being written.	Turns off the power, and then turn it on again. If this does not solve the problem, use the support software to do an initialization. If the problem still remains unsolved, contact Koganei.
	Overcurrent at I/O output	<b>E.3 0 0</b>	I/O output had an overcurrent.	The load connected to I/O output had a short circuit.	Turns off the power, and check the load. After removing the cause of the error, turn the power on again.

#### 4-4 List of error codes

(Monitor)

Error codes	Description	Likely causes	Countermeasure
100	Memory errors	■ Refer to "4-3 List of errors"	
300	I/O output error		
400	Typo	Command is incorrect	Check the commands.
410	Data error	Outside the input range	Check the input range.
420	Parameter is write protected	Outside the parameter input range	Check the parameter number.
430	Threshold error	Discrepancy in the threshold input data	Check the threshold input range and conditions. Refer to the <Judgment mode> section in 3-3 Connections.
450	Sensor not connected	Sensor was not connected when the command was sent	Check the status of your sensor's connection.
460	Monitor setting in progress	I sent a command during setting mode	Set the monitor to measurement mode.
500	Parity error	<ul style="list-style-type: none"> <li>• Communications settings are incorrect</li> <li>• Connected to sensor while applying power during communications via support software</li> <li>• Effect caused by noise</li> </ul>	Check the communication settings. Connect before applying power.
510	Framing error		

(Sensor)

Error codes	Description	Likely causes	Countermeasure
10	Memory errors	■ Refer to list "4-3 List of errors"	
11	Sensor error		
40	Typo	Command is incorrect	Check the commands.
41	Data error	Outside the input range	Check the input range.
42	Parameter is write protected	Outside the parameter input range	Check the parameter number.
44	Exceeded range of zero calibration	Outside range of zero calibration	Calibrate for zero within the range (within $\pm 200$ V). ( $\pm 2000$ V in high voltage mode)
50	Parity error	<ul style="list-style-type: none"> <li>• Communications settings are incorrect</li> <li>• Connected to sensor while applying power during communications via support software</li> <li>• Effect caused by noise</li> </ul>	Check the communication settings. Connect before applying power.
51	Framing error		

[MEMO]

[MEMO]

- \* For other details about specifications and precautions, see the catalog.
- \* For inquiries about the product, contact the Koganei overseas department at the number below.



## **KOGANEI CORPORATION**

### **OVERSEAS DEPARTMENT**

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