

EP Monitor (Dedicated for EP Sensor) DTY-EPU

Owner's Manual

Ver. 2.0

Thank you very much for purchasing the EP Monitor DTY-EPU.
Please read this Owner's Manual carefully and thoroughly for the correct
and optimum use of the EP Monitor. Kindly keep this manual in a
convenient place for quick reference.

**This product is intended for detection of targeted objects, and does not have control functions for the purposes
of accident prevention or other safety measures.**

1 Specifications

● EP Monitor

| Model | | DTY-EPU |
|-----------------------------|-------------------------|---|
| Item | | |
| Voltage | | 24VDC±10% |
| Current | | 100mA MAX ^{Note 1} |
| Sensor input | Number of inputs | 4 channels |
| | Voltage range | 1～5VDC |
| | Maximum applied voltage | 5.3V |
| Switch output | Number of outputs | 4 |
| | Method | NPN open collector |
| | Applied voltage | 30VDC MAX |
| | Current | 50mA MAX |
| | Voltage drop | 0.3V MAX/At 5mA |
| | | |
| Electric potential display | | 7-segment LED 4 digits, Unit: kV (with decimal point) ^{Note 2} |
| Switch output check display | | Red LED 4 pcs. |
| Input channel check display | | Green LED 4 pcs. |
| Setting key switch | | Pushbutton type, 3 keys (UP, DOWN, MODE) |
| Communication I/F | | Conformity with RS232C |
| Operating temperature range | | -10～50°C [14～122°F] |
| Operating humidity range | | 35～80%RH |
| Storage temperature range | | -20～80°C [-4～176°F] |
| Case material | | PBT |
| Outer dimensions | | 40(W)mm×40(H)mm×32(D)mm |
| Mass | | Approximately 45g [1.59oz.] |
| Accessories | | Mini clamp wire mount plug 4 pcs. |

Notes: 1. At EP Sensor in unconnected state
2. When in the ion balance monitor mode, the unit is V (no decimal point).

2 General Precautions

Wiring

- When using a switching regulator obtained on the market for the power supply, always ground the frame ground (F.G.) terminal.
- When using equipment (switching regulator, inverter motor, etc.) that can become a source of noise around the EP Sensor mounting area, always ground the equipment frame ground (F.G.) terminal.
- When wiring is completed, check that there is no error in the wiring connections.
- Although this monitor can monitor the conditions of up to 4 EP Sensors at the same time, the EP Sensor settings are performed 1 unit at a time. This is performed by connecting the communication cable for each EP Sensor to be set.

Others

- Check power supply fluctuations to ensure that power input does not exceed the rated value.
- Avoid use during the transient period (0.5s) when the power is switched on.
- Do not use needle tips or other sharp points to perform key operation.

3 Mounting

Sensor and connector connection procedure

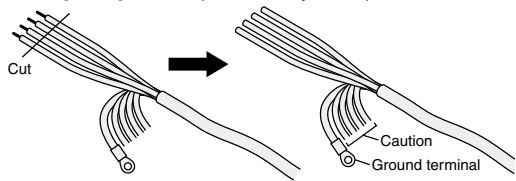
Connect the EP Sensor DTY-EPS and the mini clamp connector. Follow the procedure below to perform the connections.

- Check that the connector cover (the part where lead wires are to be inserted) is protruding from the connector body.



It cannot be used if it's flat and placed at the same level against the body.

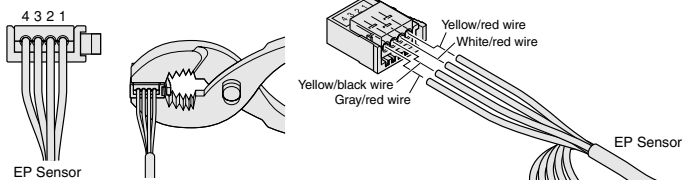
- Arrange the EP Sensor cable into the required form.
Since the insulation on the tips of the lead wires have been peeled off and soldered, cut the wires at about 10mm [0.39in.] from the tips so that they do not protrude from the insulation.



Caution: Handle any unused lead wires so that they will not short circuit.

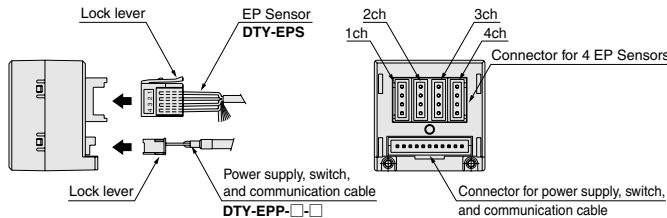
- Follow the instructions in the table to insert the lead wires into the hole in the connector cover. Look through the top of the semi-transparent cover to check that the lead wires have been firmly inserted all the way to the back. (Insertion is about 9mm [0.35in.])
Use caution in making the connections, since switching on the power with mistakes in the connections will damage the EP Sensor and EP Monitor.

| No. on the connector | Signal name | Color of lead wire |
|----------------------|-----------------------------|-----------------------------|
| 1 | EP Sensor power supply (+) | EP Sensor yellow/red wire |
| 2 | EP Sensor analog output | EP Sensor white/red wire |
| 3 | EP Sensor power supply (0V) | EP Sensor yellow/black wire |
| 4 | EP Sensor abnormality | EP Sensor gray/red wire |



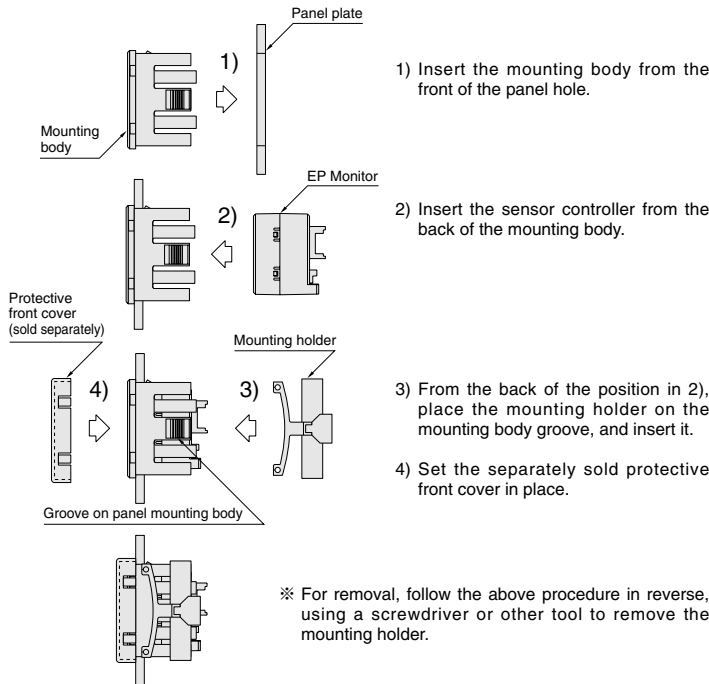
- Taking care to avoid letting the lead wires slip out from the connector, use pliers or some other hand tool to crimp the cover and connector body, and push the cover into the connector body.
Limit the crimping force to 980.7N [220lbf].
When the cover is flat and placed at the same level against the connector body, the connection is complete.
- Check one more time that the wiring is correct.

Attaching and removing of the EP Sensor, and the power supply, switch, and communication cable

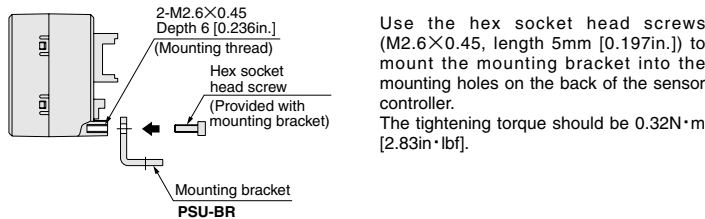


To mount the EP Sensor and the power supply, switch, and communication cable, align the lock lever position as shown in the figure, and push until the lock hooks on the controller-side connector.
To remove, push down hard on the lock lever, take the connector and pull it out. At this time, be careful to avoid applying unnecessary force on the lead wires.

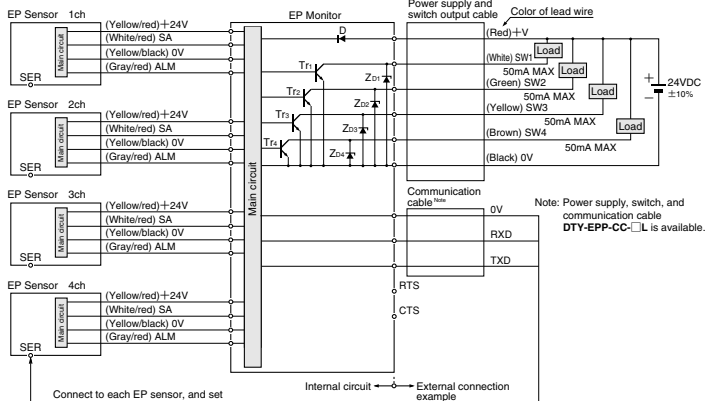
Attaching the panel mounting parts and protective front cover



Attaching the mounting bracket



4 Internal Circuit and Wiring Specifications (External Connection Example)



Note: When the cable is extended, be aware that voltage will drop due to resistance in the cable.

| Key to codes | D: | Reverse current protection diode for power supply |
|--------------|----------|---|
| | ZD1~ZD4: | Zener diode for surge voltage absorption |
| | Tr1~Tr4: | NPN output transistor |

5 Major Parts and Functions

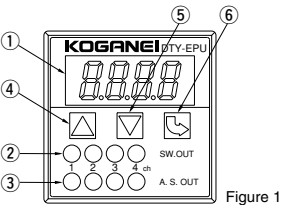
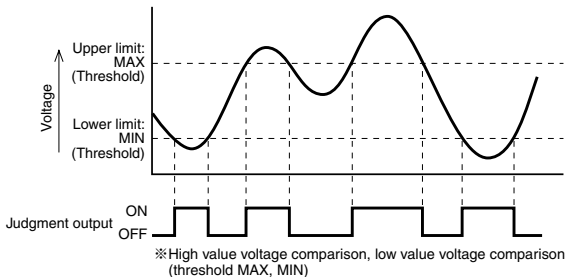


Figure 1

| | Name | Description |
|---|-------------------------------|---|
| ① | LED display (red) | Displays the detected electric potential value, setting contents, and error content |
| ② | Switch output indicator (red) | Lights up when switch output is ON |
| ③ | Autoscan indicator (green) | Channel displaying current electric potential lights up |
| ④ | UP key (Δ) | Used when adjusting setting value upward |
| ⑤ | DOWN key (▽) | Used when adjusting setting value downward |
| ⑥ | Mode key (□) | Used for all types of settings |

6 Judgment Output



7 Electric Potential Display

Electric potential display mode

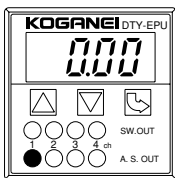


Figure 2

- Switching on the power supply (24VDC voltage) automatically provides electric potential display mode.
- Electric potential display unit for ion balance monitor mode: V, for other modes: kV. When the kV display is used, it becomes a decimal point display.
- The electric potential of the selected channel is indicated in the LED display. (The selected channel's A.S.OUT LED (green) lights up. See Figure 2.)
- The SW.OUT LED (red) lights up when the switch output is turned ON.
- Pressing the Δ key or ▽ key changes the selected channel.
- When in auto switch display, pressing the Δ, ▽, or □ key returns the display to the electric potential display at fixed channel.
- If **FF** display appears, it means that the selected channel's EP Sensor was not connected or has a wire break.
- In the case of a wire break, shut off the power and replace the EP Sensor.

8 EP Monitor Settings

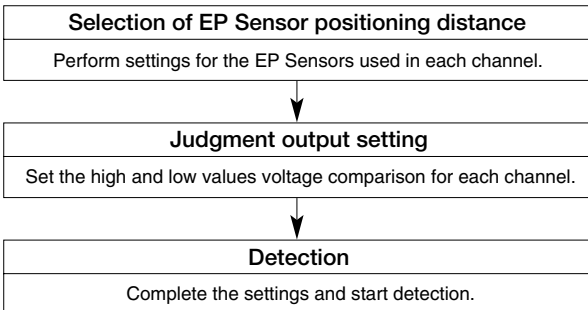
Caution

- Since miswiring in the EP Sensor, or in the power supply, switch, and communication cable, can damage both the EP Monitor and EP Sensor, always check the wiring before switching on the power.
- The setting conditions are written to EEPROM and saved. Be aware that EEPROM has a finite lifetime, with a write guarantee times up to 100,000 times.

Setting preparation

- Connect the connector to the EP Sensor cable.
- Connect the EP Sensor (1 to 4 units), and the power supply, switch, and communication cable to the EP Monitor.

EP Monitor setting procedure



■ Settings

● EP Monitor setting items (SET1)

| Setting item | 7-seg display | Setting | Description | Remark |
|-------------------------------|---------------|--------------|-------------------------------------|-------------------------------|
| Measurement distance | | lb | 2mm <IB (ion balance) monitor mode> | IB monitor mode |
| | | 10 | 10mm | EP Sensor distance 5 to 10mm |
| | | 20 | 20mm | EP Sensor distance 11 to 20mm |
| | | 30 | 30mm | EP Sensor distance 21 to 30mm |
| | | 40 | 40mm | EP Sensor distance 31 to 40mm |
| High value voltage comparison | | —1000~1000 | —1000V~1000V | When in IB monitor mode |
| | | —5.00~5.00 | —5.00kV~5.00kV | At measurement distance 10mm |
| | | —10.00~10.00 | —10.00kV~10.00kV | At measurement distance 20mm |
| | | —15.00~15.00 | —15.00kV~15.00kV | At measurement distance 30mm |
| | | —20.00~20.00 | —20.00kV~20.00kV | At measurement distance 40mm |
| Low value voltage comparison | | —20.00~20.00 | —20.00kV~20.00kV | At measurement distance 50mm |
| | | —1000~1000 | —1000V~1000V | When in IB monitor mode |
| | | —5.00~5.00 | —5.00kV~5.00kV | At measurement distance 10mm |
| | | —10.00~10.00 | —10.00kV~10.00kV | At measurement distance 20mm |
| | | —15.00~15.00 | —15.00kV~15.00kV | At measurement distance 30mm |
| | | —20.00~20.00 | —20.00kV~20.00kV | At measurement distance 40mm |
| | | —20.00~20.00 | —20.00kV~20.00kV | At measurement distance 50mm |

● EP Monitor zero adjustment (SET3)

| Setting item | 7-seg display | Setting | Description | Remark |
|--------------|---------------|---------------------|-------------|--------|
| CH1 | | Current input value | 0V | |
| CH2 | | Current input value | 0V | |
| CH3 | | Current input value | 0V | |
| CH4 | | Current input value | 0V | |

● EP Monitor operation method

EP Monitor settings

| Automatic display channel setting | | | | |
|---|------------------|---------------|---|--------------------------|
| Channel display switching is performed automatically. | | | | |
| Procedure | Device operation | 7-seg display | Remark | Selection |
| 1 | | | | SEt1, SEt2 |
| 2 | | | Press or for AutoScan selection | CH1, CH2, CH3, CH4, Auto |
| 3 | | | Press or for AutoScan selection | |
| 4 | | | Press or for AutoScan selection | |
| 5 | | | Press or for AutoScan selection | |
| 6 | | | Press or for AutoScan selection | |
| 7 | | | Press or for display ch. selection | AS-2, AS-3, AS-4 |
| 8 | | | Electric potential display is switched automatically. | |

[Display channel setting]
AS-2: ch1 to 2
AS-3: ch1 to 3
AS-4: ch1 to 4
ESC: Return

Measurement distance range settings

Perform settings to match the EP Sensor positioning distance (between an object targeted for measurement and EP Sensor) and EP Sensor distance setting.

| Procedure | Device operation | 7-seg display | Remark | Selection |
|-----------|------------------|---------------|---|--------------------------|
| 1 | | | | SEt1, SEt2 |
| 2 | | | Press or for channel selection | CH1, CH2, CH3, CH4, Auto |
| 3 | | | Distance setting selection | L, CPH, CPL |
| 4 | | | Press or for display distance selection | lb, 10, 20, 30, 40, 50 |
| 5 | | | Displayed for 1 sec. | |
| 6 | After 1 sec. | | Returns to electric potential display | |

[Measurement distance settings]
lb: IB (ion balance) monitor mode
10: 10mm range → EP Sensor 5 to 10mm
20: 20mm range → EP Sensor 11 to 20mm
30: 30mm range → EP Sensor 21 to 30mm
40: 40mm range → EP Sensor 31 to 40mm
50: 50mm range → EP Sensor 41 to 50mm
ESC: Return

High value voltage comparison settings

Threshold value (MAX) set when using the EP Monitor switch output (judgment output).

| Procedure | Device operation | 7-seg display | Remark | Selection |
|-----------|------------------|---------------|---|--------------------------|
| 1 | | | | SEt1, SEt2 |
| 2 | | | Press or for channel selection | CH1, CH2, CH3, CH4, Auto |
| 3 | | | Press or for display setting item selection | L, CPH, CPL |
| 4 | | | Press or for CPH selection | L, CPH, CPL |
| 5 | | | Press or for voltage comparison selection | See the table below |
| 6 | | | Displayed for 1 sec. | |
| 7 | After 1 sec. | | Returns to electric potential display | |

| Distance setting | Voltage setting range | |
|--------------------------|-----------------------|-------------|
| | Lower limit | Upper limit |
| IB (ion balance) monitor | —1000V | 1000V |
| 10mm | —5.00kV | 5.00kV |
| 20mm | —10.00kV | 10.00kV |
| 30mm | —15.00kV | 15.00kV |
| 40mm | —20.00kV | 20.00kV |
| 50mm | —20.00kV | 20.00kV |

Low value voltage comparison settings

Threshold value (MIN) set when using the EP Monitor switch output (judgment output).

| Procedure | Device operation | 7-seg display | Remark | Selection |
|-----------|------------------|---------------|---|--------------------------|
| 1 | | | | SEt1, SEt2 |
| 2 | | | Press or for channel selection | CH1, CH2, CH3, CH4, Auto |
| 3 | | | Press or for display setting item selection | L, CPH, CPL |
| 4 | | | Press or for CPL selection | L, CPH, CPL |
| 5 | | | Press or for CPL selection | L, CPH, CPL |
| 6 | | | Press or for voltage comparison selection | See the table below |
| 7 | | | Displayed for 1 sec. | |
| 8 | After 1 sec. | | Returns to electric potential display | |

| Distance setting | Voltage setting range | |
|--------------------------|-----------------------|-------------|
| | Lower limit | Upper limit |
| IB (ion balance) monitor | —1000V | 1000V |
| 10mm | —5.00kV | 5.00kV |
| 20mm | —10.00kV | 10.00kV |
| 30mm | —15.00kV | 15.00kV |
| 40mm | —20.00kV | 20.00kV |
| 50mm | —20.00kV | 20.00kV |

Zero adjustment

Adjustment when the display is not “0.00” when there is 0 volt input to the EP Sensor.

| Procedure | Device operation | 7-seg display | Remark | Selection |
|-----------|------------------|---------------|---------------------------------------|-----------------------------|
| 1 | | | | SEt1, SEt2, SEt3 |
| 2 | | | Press or for setting mode selection | SEt1, SEt2, SEt3 |
| 3 | | | Press or for setting mode selection | SEt1, SEt2, SEt3 |
| 4 | | | Press or for channel selection | rEF1, rEF2, rEF3, rEF4, ESC |
| 5 | After 1 sec. | | Displayed for 1 sec. | |
| 6 | After 1 sec. | | Returns to electric potential display | |

9 EP Sensor Settings

This is a setting method when using the EP Monitor to set the EP Sensor.
If using support software for setting from a personal computer, see the EP Sensor Owner’s Manual.

⚠ CAUTION

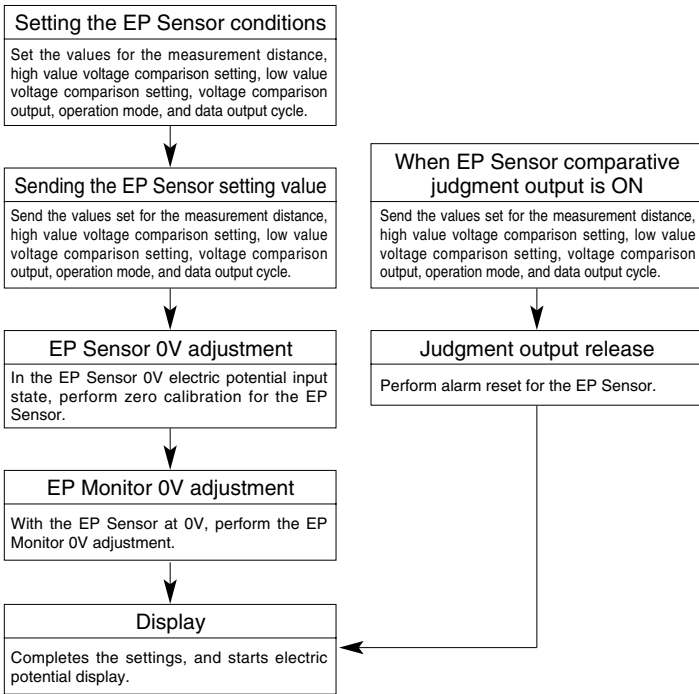
The EP Sensor setting is performed for the EP Sensor that is connected to the communication cable.
If setting multiple EP Sensors, the cable will have to be unplugged and reconnected to connect each time.

■ Setting preparation

- Connect the connector provided to the EP Sensor cable.
 - Connect the EP Sensor (1 to 4 units), and the power supply, switch, and communication cable to the EP Monitor.
 - Connect the communication cable plug to the jack for the EP Sensor being set.
- If performing settings for multiple EP Sensors, unplug and reconnect each time when a setting is performed.

The power can be left on while the plug is unplugged and reconnected.

■ EP Sensor setting procedure



■ Settings

● EP Sensor setting items (SET2)

| Setting item | 7-seg display | Setting | Description | Remark |
|---|---------------|--------------|---------------------------------------|--|
| | | lb, 5~50 | 2mm, 5mm~50mm | At 2mm setting, display is lb |
| High value voltage comparison | | —1000~1000 | —1000V~1000V | When in IB (ion balance) monitor mode |
| | | —5.00~5.00 | —5.00kV~5.00kV | At measurement distance 5~10mm |
| | | —10.00~10.00 | —10.00kV~10.00kV | At measurement distance 11~20mm |
| | | —15.00~15.00 | —15.00kV~15.00kV | At measurement distance 21~30mm |
| | | —20.00~20.00 | —20.00kV~20.00kV | At measurement distance 31~40mm |
| Low value voltage comparison | | —20.00~20.00 | —20.00kV~20.00kV | At measurement distance 41~50mm |
| | | —1000~1000 | —1000V~1000V | When in IB monitor mode |
| | | —5.00~5.00 | —5.00kV~5.00kV | At measurement distance 5~10mm |
| | | —10.00~10.00 | —10.00kV~10.00kV | At measurement distance 11~20mm |
| | | —15.00~15.00 | —15.00kV~15.00kV | At measurement distance 21~30mm |
| Voltage comparison output enabled/disabled* | | CPE0 | Voltage comparison output disabled | |
| | | CPE1 | Voltage comparison output enabled | |
| | | | | |
| Operation mode* | | A0 | Averaged data output mode | |
| | | A1 | Actual measured data output mode | |
| | | A2 | IB monitor mode | Automatically sets to distance = 2mm, and cycle = 0.5 sec. |
| Data output cycle* | | t1.0 | 1 sec. | Disabled in IB monitor mode |
| | | t0.5 | 0.5 sec. | |
| | | t0.2 | 0.2 sec. | |
| | | t0.1 | 0.1 sec. | |
| Judgment output reset | | — | Sensor alarm reset executed | |
| Zero calibration | | — | Sensor CAL executed | |
| Setting value sending | | — | Sending sensor setting value executed | |

* Only changing the value is not enough to set this item.
The change becomes valid when SEND is executed.

● EP Monitor operation method

EP Sensor settings

| Measurement distance settings | | | | |
|---|------------------|---------------|---------------------------------------|------------------------------------|
| Perform settings to match the EP Sensor positioning distance (between object targeted for measurement and EP Sensor). | | | | |
| Procedure | Device operation | 7-seg display | Remark | Selection |
| 1 | | | Press or for setting mode selection | SEt1, SEt2 |
| 2 | | | Press or for setting mode selection | SEt1, SEt2 |
| 3 | | | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 4 | | | Press or for distance selection | lb, 5-50 |
| 5 | | | Displayed for 1 sec. | |
| 6 | After 1 sec. | | Returns to electric potential display | |

[Measurement distance settings]
lb: IB monitor mode
5~50: 5~50mm

High value voltage comparison settings

Threshold value (MAX) set when using the EP Sensor judgment output

| Procedure | Device operation | 7-seg display | Remark | Selection |
|-----------|------------------|---------------|---|------------------------------------|
| 1 | | | Press or for setting mode selection | SEt1, SEt2 |
| 2 | | | Press or for setting mode selection | SEt1, SEt2 |
| 3 | | | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 4 | | | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 5 | | | Press or for voltage comparison selection | See the table below |
| 6 | | | Displayed for 1 sec. | |
| 7 | After 1 sec. | | Returns to electric potential display | |

| Distance setting | Voltage setting range | |
|--------------------------|-----------------------|-------------|
| | Lower limit | Upper limit |
| IB (ion balance) monitor | —1000V | 1000V |
| 10mm | —5.00kV | 5.00kV |
| 20mm | —10.00kV | 10.00kV |
| 30mm | —15.00kV | 15.00kV |
| 40mm | —20.00kV | 20.00kV |
| 50mm | —20.00kV | 20.00kV |

Low value voltage comparison settings

Threshold value (MIN) set when using the EP Sensor judgment output.

| Procedure | Device operation | 7-seg display | Remark | Selection |
|-----------|------------------|---------------|---|------------------------------------|
| 1 | | | Press or for setting mode selection | SEt1, SEt2 |
| 2 | | | Press or for setting mode selection | SEt1, SEt2 |
| 3 | | | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 4 | | | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 5 | | | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 6 | | | Press or for voltage comparison selection | See the table below |
| 7 | | | Displayed for 1 sec. | |
| 8 | After 1 sec. | | Returns to electric potential display | |

| Distance setting | Voltage setting range | |
|--------------------------|-----------------------|-------------|
| | Lower limit | Upper limit |
| IB (ion balance) monitor | —1000V | 1000V |
| 10mm | —5.00kV | 5.00kV |
| 20mm | —10.00kV | 10.00kV |
| 30mm | —15.00kV | 15.00kV |
| 40mm | —20.00kV | 20.00kV |
| 50mm | —20.00kV | 20.00kV |

| Comparative output enabled settings | | | | |
|---|------------------|---------------|--|------------------------------------|
| Sets whether to use or not use the EP Sensor judgment output. | | | | |
| Procedure | Device operation | 7-seg display | Remark | Selection |
| 1 | | SEt 1 | Press or for setting mode selection | SEt1, SEt2 |
| 2 | | SEt 2 | Press or for setting mode selection | SEt1, SEt2 |
| 3 | | L | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 4 | | CPH | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 5 | | CPL | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 6 | | CPE | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 7 | | CPE0 | Press or for comparative output enabled/disabled setting | CPE0, CPE1 |
| 8 | | done | Displayed for 1 sec. | |
| 9 | After 1 sec. | *** | Returns to electric potential display | |
| [Enabled/disabled settings] CPE0: Invalid CPE1: Valid | | | | |

| Operation mode settings |
|--|
| There are 3 modes, averaged data output, actual measurement data output, and ion balance monitor mode. |

| Procedure | Device operation | 7-seg display | Remark | Selection |
|-----------|------------------|---------------|---|------------------------------------|
| 1 | | SEt 1 | Press or for setting mode selection | SEt1, SEt2 |
| 2 | | SEt 2 | Press or for setting mode selection | SEt1, SEt2 |
| 3 | | L | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 4 | | CPH | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 5 | | CPL | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 6 | | CPE | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 7 | | A | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 8 | | A0 | Press or for operation mode selection | A0, A1, A2 |
| 9 | | done | Displayed for 1 sec. | |
| 10 | After 1 sec. | *** | Returns to electric potential display | |

[Mode settings]
A0: Averaged data output mode
A1: Actual measurement data output mode
A2: IB monitor mode

| Data output cycle settings | | | | |
|-------------------------------------|------------------|---------------|---|------------------------------------|
| Sets the data output refresh cycle. | | | | |
| Procedure | Device operation | 7-seg display | Remark | Selection |
| 1 | | SEt 1 | Press or for setting mode selection | SEt1, SEt2 |
| 2 | | SEt 2 | Press or for setting mode selection | SEt1, SEt2 |
| 3 | | L | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 4 | | CPH | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 5 | | CPL | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 6 | | CPE | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 7 | | A | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 8 | | Int | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 9 | | t 10 | Press or for output refresh cycle selection | t1.0, t0.5, t0.2, t0.1 |
| 10 | | done | Displayed for 1 sec. | |
| 11 | After 1 sec. | *** | Returns to electric potential display | |

[Cycle settings]
t1.0: 1 sec.
t0.5: 0.5 sec.
t0.2: 0.2 sec.
t0.1: 0.1 sec.

| Judgment output clear execution | | | | |
|---|------------------|---------------|---------------------------------------|------------------------------------|
| Sets judgment output to OFF. | | | | |
| Procedure | Device operation | 7-seg display | Remark | Selection |
| 1 | | SEt 1 | Press or for setting mode selection | SEt1, SEt2 |
| 2 | | SEt 2 | Press or for setting mode selection | SEt1, SEt2 |
| 3 | | L | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 4 | | CPH | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 5 | | CPL | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 6 | | CPE | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 7 | | A | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 8 | | Int | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 9 | | CPt | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 10 | | done | Displayed for 1 sec. | |
| 11 | After 1 sec. | *** | Returns to electric potential display | |
| Execution result | | | Communication output data | |
| Executes the "Judgment output clear" in sensor setting. | | | r <CR> | |

| Zero calibration execution | | | | |
|--|------------------|---------------|---------------------------------------|------------------------------------|
| Performs zero adjustment for the EP Sensor. | | | | |
| Procedure | Device operation | 7-seg display | Remark | Selection |
| 1 | | SEt 1 | Press or for setting mode selection | SEt1, SEt2 |
| 2 | | SEt 2 | Press or for setting mode selection | SEt1, SEt2 |
| 3 | | L | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 4 | | CPH | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 5 | | CPL | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 6 | | CPE | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 7 | | A | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 8 | | Int | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 9 | | CPt | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 10 | | RL | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 11 | | done | Displayed for 1 sec. | |
| 12 | After 1 sec. | *** | Returns to electric potential display | |
| Execution result | | | Communication output data | |
| Executes the "Zero calibration" in sensor setting. | | | z <CR> | |

| Setting value sending execution | | | | |
|---|------------------|---|---------------------------------------|---|
| Sends content of each EP Sensor settings to the EP Sensor, and registers the setting. | | | | |
| Procedure | Device operation | 7-seg display | Remark | Selection |
| 1 | | SEt 1 | Press or for setting mode selection | SEt1, SEt2 |
| 2 | | SEt 2 | Press or for setting mode selection | SEt1, SEt2 |
| 3 | | L | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 4 | | CPH | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 5 | | CPL | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 6 | | CPE | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 7 | | A | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 8 | | Int | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 9 | | CPt | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 10 | | RL | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 11 | | SEnd | Press or for setting item selection | L, CPH, CPL, CPE, A, Int, CPt, CAL |
| 12 | | done | Displayed for 1 sec. | |
| 13 | After 1 sec. | *** | Returns to electric potential display | |
| Execution result | | Communication output data | | Remark |
| Executes the "Sending set value" in sensor setting. | | 0t<CR>XXd<CR>XXXa<CR>XXXb<CR>Xe<CR>Xv<CR>Xu<CR>1t<CR> | | X, XX, and XXX represent numeric data. The actual displayed numbers are determined by the setting contents. |

10 Error Display

| Display | Error description | Error cancel |
|---------|--|--|
| oFF | Sensor on selected channel either not connected or has a wire break. | Perform correct sensor connection. |
| -or | Sensor input value falls short of the measurement range. | Eliminate the cause of the error occurrence. |
| or | Sensor input value exceeds the measurement range. | |
| PEr | Abnormal sensor input (P-IN) is ON. | |
| oL | Switch output is an overcurrent. | |