

X903680
Ver.2.0

KOGANEI

EP Sensor DTY-EPS

Owner's Manual

Ver. 2.0

Thank you very much for purchasing the EP Sensor DTY-EPS.

Please read this Owner's Manual carefully and thoroughly for the correct and optimum use of the EP Sensor. Kindly keep this manual in a convenient place for quick reference.

	CAUTION	This product is an industrial sensor, and is not a measuring instrument. We cannot guarantee 100% measurement accuracy.
	WARNING	This product was designed and manufactured as parts 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. Mechanical devices or equipment designed for the purpose of moving or transporting people. 3. Critical safety components in mechanical devices. This product has not been planned or designed for purposes that require advanced stages of safety. It could be injurious to human life.

1 Product Parts

Check that all parts have been included. If parts are missing, contact the distributor (agent) where the product was purchased or the nearest Koganei sales office.

EP Sensor 1 pc. Mounting screw (M3×0.5 length: 18mm)..... 2 pcs.
L type mounting bracket..... 1 pc. Washer..... 2 pcs.

2 Overview

1. This product can perform non-contact measurement of the electric potential (voltage) in objects carrying an electrostatic charge.
2. The measurement value is expressed as an electric potential with reference to the ground potential (FG, ground).
3. Install the product in a position at a fixed distance from the object being measured, for steady state measurement.
4. If the value is higher or lower than the preset voltage value (comparative voltage), a judgment signal is output.

3 Specifications

Model		DTY-EPS	DTY-EPS-10L
Item			
Voltage		24VDC±10%	
Current		Max. 50mA	
Measurement range		5~50mm [0.20~1.97in.]	
Accuracy		±5%rdg±2dig	
Judgment output	Method	NPN transistor open collector	
	Applied voltage	30VDC or less	
	Sink current	20mA or less	
Sensor abnormality output	Method	NPN transistor open collector	
	Applied voltage	30VDC or less	
	Sink current	20mA or less	
Analog output	Output voltage	1~5V	
	Zero point	3V	
Communication I/F		Conformity with RS232C	
Sampling period		Approximately 10ms	
Data output cycle		100ms, 200ms, 500ms, 1s	
Input/output response time (for averaged data output mode) ^{Note}		Maximum of double the data output cycle	
Temperature characteristics		-0.5% F.S./°C	
Operating temperature range		0~40°C [32~104°F]	
Operating humidity range		80% RH or less (no condensation)	
Storage temperature range		-20~60°C [-4~140°F]	
Cable length		3m [9.84ft.]	10m [32.8ft.]
Case material		Conductive ABS resin	
Outer dimensions		61.2(W)mm×34.2(H)mm×15.0(D)mm	
Mass		Approximately 30g [1.06oz.] (Not including the cable)	
Accessories		L shaped mounting bracket 1 pc. (with 2 mounting screws)	

Note: Response time in the actual measured data output mode is 100ms or less.

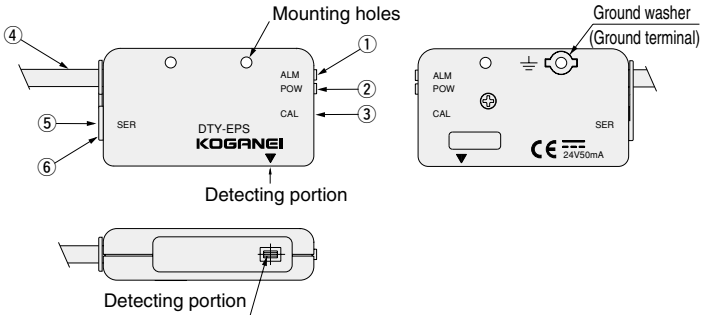
Remark: If not specified, the measurement condition assumes an ambient temperature of 25°C.

■ Measurement distance and measurement voltage range

Measurement distance	Maximum voltage	Resolution
Ion balance mode	±1kV	2V
5~10mm [0.20~0.39in.]	±5kV	10V
11~20mm [0.43~0.79in.]	±10kV	20V
21~30mm [0.83~1.18in.]	±15kV	30V
31~40mm [1.22~1.57in.]	±20kV	40V
41~50mm [1.61~1.97in.]	±20kV	40V

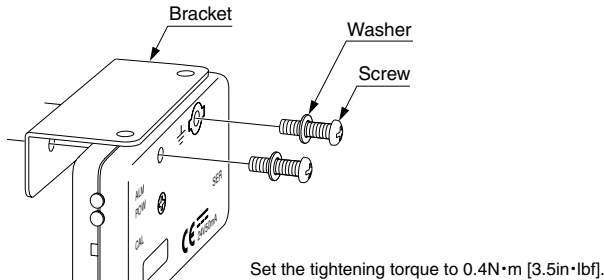
Note: Whenever the distance setting is changed, zero calibration is automatically performed.

4 Outward Appearance and Major Parts



	Name	Description
①	Alarm LED (red)	Blinks when judgment output is ON, lights up when sensor abnormality occurs
②	Power LED (green)	Lights up when power supply is ON
③	Calibration switch	Executes zero calibration Outputs reset after judgment output
④	Cable	Power and signal wiring connection
⑤	Communication cable jack	Communication cable connection for setting
⑥	Dust cover	Rubber cover for protection against dust

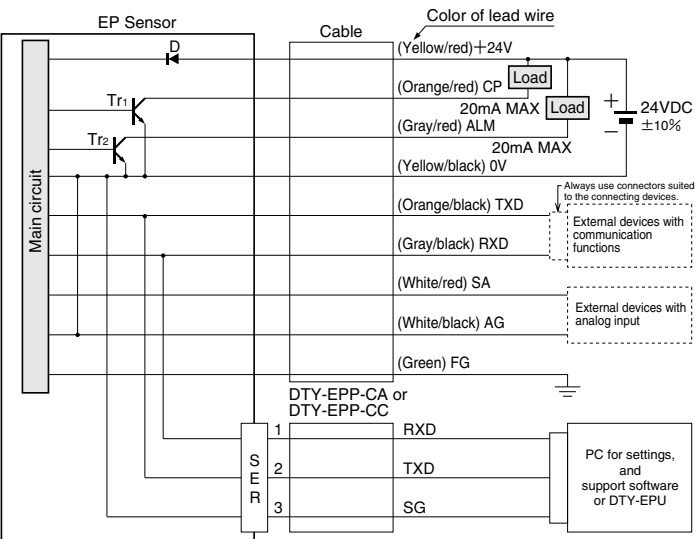
5 Mounting Bracket



6 Installation

1. Install the measurement surface of the sensor so that it is parallel with the surface of the object that is to be measured.
2. The measured electric potential has a close relationship to the distance to the object being measured. Position the distance as accurately as possible.
3. Always ground the sensor body, since failure to do so can affect measurement accuracy. The sensor mounting hole functions as a ground connection terminal, and a crimping terminal, etc., is recommended for secure connection. If connection using the mounting hole ground terminal is impossible, use a cable's ground terminal.
4. If voltage must unavoidably be applied to the mounting location, be sure to perform insulation. Failure to make insulation will not only affect the measurement value but will also short out the ground.
5. This sensor measures the strength of electric field to calculate the voltage value. As a result, be aware that the presence of items capable of disturbing the electric field (relays, solenoids, metal chips, etc.) near the sensor, or between the sensor and the item being measured, could affect the measurement value.

7 Output Circuit



8 Connection

■ Cable signal table

No.	Color	Signal name	Description
1	Orange/black	TXD	Communicating and sending data
2	Orange/red	CP	Voltage comparison output (Judgment output)
3	Gray/black	RXD	Communicating and receiving data
4	Gray/red	ALM	Sensor abnormality
5	White/black	AG	Analog GND
6	White/red	SA	Analog output
7	Yellow/black	0V	Power supply GND
8	Yellow/red	+24V	Power supply +24V
9	Green	FG	Frame GND

- Separately from the power GND, an analog GND is also provided. Both are internally connected each other in the sensor.

■ SER jack signal table

No.	Signal name	Description
1	RXD	Communicating and receiving data
2	TXD	Communicating and sending data
3	SG	Signal GND (Power supply GND)

- The SER jack is installed for connecting up when setting the sensor for the initial installation, etc.
- If using a communication signal constantly as a monitoring device, etc., use a direct cable communication signal.
- The cable terminal has had its insulation stripped and then solder processed. Insulate any unused signals to prevent them from shorting with other wires.

11 Settings

Communication data can be used to implement various settings for the sensor.

Sensor setting items and communication commands list

Setting item	Command	Setting value	Description	Remark	Sending data	Responding data
Measurement distance	d	5~50	5mm~50mm -1100V~-1100V -5.50kV~5.50kV	※1	※4 XXd <CR>	d=XX <CR>
High value voltage comparison	a	-550~550 ※2	-11.00kV~-11.00kV -16.50kV~-16.50kV -22.00kV~-22.00kV	During IB (ion balance) monitor mode When measurement distance is 10mm When measurement distance is 20mm When measurement distance is 30mm When measurement distance is 40mm When measurement distance is 50mm	※3 XXXXa <CR>	a=XXXX <CR>
			-1100V~-1100V -5.50kV~5.50kV	During IB monitor mode When measurement distance is 10mm When measurement distance is 20mm When measurement distance is 30mm When measurement distance is 40mm When measurement distance is 50mm	※3 XXXXb <CR>	b=XXXX <CR>
			-11.00kV~-11.00kV -16.50kV~-16.50kV -22.00kV~-22.00kV			
Enabled/disabled voltage comparison output	e	0	Voltage comparison output disabled		Xe <CR>	e=X <CR>
		1	Voltage comparison output enabled			
Data output cycle	v	0	1 sec.	Disabled during IB monitor mode	Xv <CR>	v=X <CR>
		1	0.5 sec.	Disabled during IB monitor mode		
		2	0.2 sec.	Disabled during IB monitor mode		
		3	0.1 sec.	Disabled during IB monitor mode		
Operation mode	u	0	Averaged data output mode		Xu <CR>	u=X <CR>
		1	Actual measurement data output mode			
		2	IB (ion balance) monitor mode	※1		
Sending data ON/OFF	t	0	Sending OFF	Sends during data output cycle	Xt <CR>	t=X <CR>
		1	Sending ON			
Setting value check	s	—	Reads out the setting content.		s <CR>	d=XX <CR> v=X <CR> a=XXXX <CR> b=XXXX <CR> e=X <CR> u=X <CR> t=X <CR>
Alarm reset	r	—	Sets sensor abnormal output and comparative output to OFF.		r <CR>	ok <CR>
Zero calibration	z	—	Sets current input value to 0V.		z <CR>	ok <CR>

※1: When the Operation mode is set to the IB monitor mode, the measurement distance (between monitor plate and EP Sensor) is automatically set to 2mm, and the data output cycle is automatically set to 0.5 second.

※2: While data can take values of ±550, in the specifications, the measurement value guarantee range is ±500.

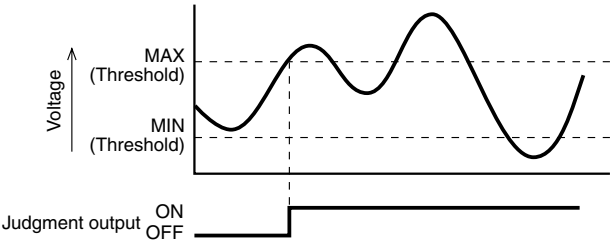
※3: When the operation mode is set to the IB monitor mode, the unit cannot receive commands to change the measurement distance or data output cycle.

※4: The X in the sending data column represents a numeric value specified in the parameters.

※5: The <CR> in the sending data column represents a carriage return, and in ASCII code is expressed by 0DH.

9 Judgment Output

If the sensor's measured electric potential exceeds a specified voltage value or falls below a specified voltage value, the sensor unit can output a judgment signal. Once this judgment output turns ON, output is preserved even if the measurement value comes back within the judgment voltage range. This configuration lets the generation of abnormal values be checked even if no holding circuit has been externally installed.



Reset the judgment output by operating a switch on the sensor body. The unit can also be reset by receiving a judgment reset command in communication.

10 Zero Calibration

1. Zero calibration is a function for adjusting the reference electric potential where the measured value is 0V. The 0V electric potential is recorded at space where no metal plate or charged object is connected to the ground.
2. When the power supply is connected and the operation mode is switched between the ion balance monitor mode and averaged data output mode, or between the ion balance monitor mode and actual measured data output mode, the reference electric potential is automatically set to the ground electric potential connected to the body.

Explanation of operation modes

■ Averaged data output mode

Outputs data averaging the input value of several rounds of sampling. Measurement accuracy becomes improved.

■ Actual measurement data output mode

Outputs as is the sampled input values. Responds to sharp changes in input. Measurement accuracy is degraded when compared with the averaged data output mode.

■ Ion balance monitor mode

Monitors the ion balance with mounting an optional monitor plate.

● Communication settings

Item	Settings
Transmission rate	19200 bps
Data bit	8 bits
Parity	None
Stop bit	1 bit
Flow control	None

● Data format

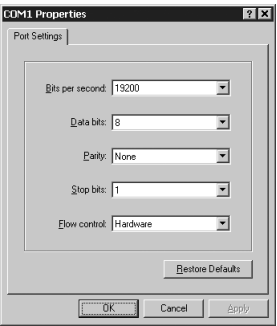
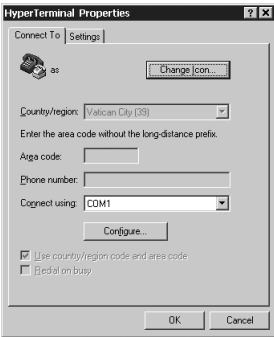
Sending data is all formatted in ASCII code, with CR (0Dh) added as a terminate code.

The sending data format includes parameters, commands, and the CR code.

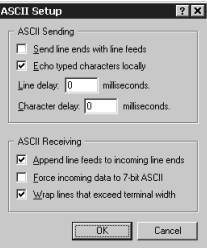
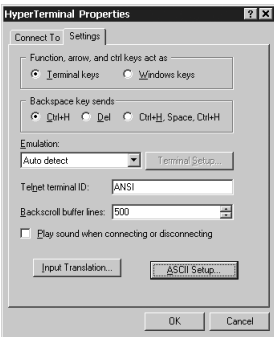
● Method for manual input settings from a personal computer

When using a hyper terminal equipped with Windows software, the setting method is as shown below.

The connection method uses a serial communications port that is connectable to a personal computer. The modem configuration should match the communication settings in the table above.

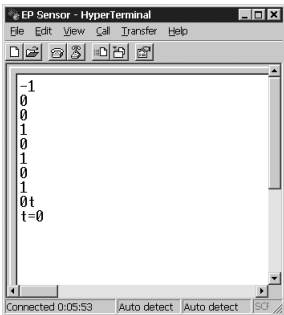


In the **Settings** tab in **Hyper Terminal Properties** window, click the **ASCII Setup** button. ASCII Setup window will appear. Then, select **Echo typed characters locally in ASCII Sending**, and select **Append line feeds to incoming line ends** and **Wrap lines that exceed terminal width in ASCII Receiving**.

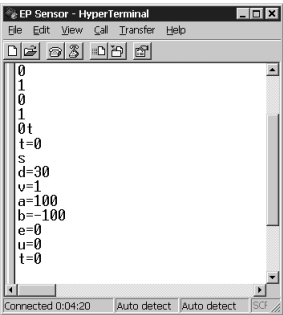


When settings are complete and the communications screen is set up, measurement data is normally received in sequency.

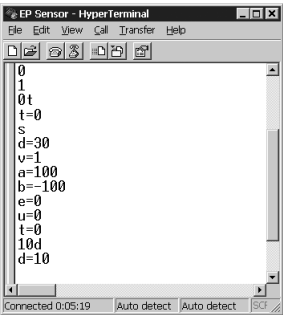
Here, input "0t" and press the Enter key to obtain a "t=0" response. This stops the EP Sensor sending of measurement data.



Input "s" and press Enter to read out the current measurement value.



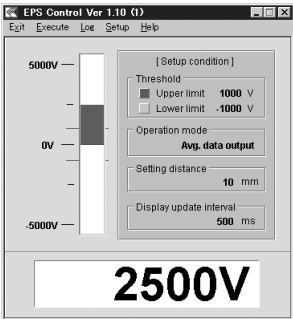
Here, to change an item, input a change value before the item command. For example, the measurement distance is changed to 10mm. The changed setting value is read out as a response, and the setting change is complete.



If receiving measurement data by communication, input "1" to restore the measurement data to sending in sequence. If receiving measurement data by communication is not necessary, the setting can be left unchanged.

● Setting method using support software

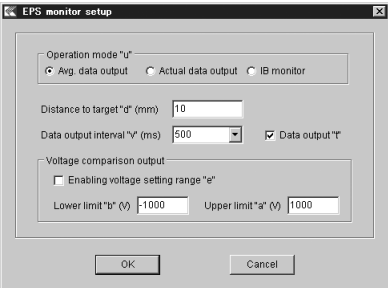
Starting up the support software (EPS Control) displays the Main window, as shown below.



If the communication settings are incorrect, an error display will appear. Select **EPS communication setup** in the **Setup** menu to set the correct port number.



■ Various EP Sensor settings: Select **EPS monitor setup** in the **Setup** menu to set the appropriate values to **Distance to target**, **Interval** (display update time [data output cycle]), **Operation mode**, **Upper limit**, and **Lower limit**, and **Enabling voltage setting range**.



When checking data output, the Main window display for measurement values shows the numbers —550 to 550.

■ Screen display settings: Select **EPS display setup** in the **Setup** menu. Log interval: Sets the recording interval for capturing measurement data. Select from among 100ms, 200ms, 500ms, 1s, 2s, 5s, 10s, 30s, 1m, 5m, 10m, 30m, and 1h. Note: This interval depends on software processing. The time display may delay.

Display data form: Select either **Volts** or **Receiving data** for numeric display.

Display mode: Select from among **Real data**, **Max hold**, and **Min hold**.

Hold data clear: Select **Hold Data Clear** in the **Setup** menu to execute.



■ Log operation: Use the **Log** menu to execute.

Record: Received data can be recorded and saved as a log.

Start: Starts recording of measured data.

A separate window is displayed, and recording occurs alongside time data at the interval set by the log interval.

Note: The displayed time is dependent on the clock built into the personal computer. It may differ slightly from the actual time.

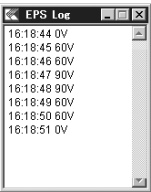
Stop: Stops data recording.

Clear: Clears the Log window display.

Save: Saves the recorded log data in a file. The file extension is "log".

Saving operation can be performed only during log stop.

Close: Closes the Log display window.



■ **Execute**: Operations for the EP Sensor other than settings.

Calibration: Performs zero calibration.

Reset: Clears the judgment signals.

■ **Exit**: Quits the process.

■ **Help**: Displays Help windows.

12 Measurement

1) Sending measured value by communication data

In communication, the measured value data is sent from the EP Sensor at regular intervals, except when setting operations are performed. A regular interval is time that is set in the data sending cycle setting. If data sending is set to OFF in the setting items, however, no measured value data is sent.

Relationship between data value and measured electric potential

Sending data values can change depending on the measurement distance setting and the operation mode.

The relationship between data values and electric potential by distance is shown below.

Mode and distance settings	Data value	Measured electric potential	Resolution (Electric potential equivalent to data value 1)
Ion balance mode		—1100V~1100V	2V
Measurement distance 5~10mm		—5.50kV~5.50kV	10V
Measurement distance 11~20mm		—11.00kV~11.00kV	20V
Measurement distance 21~30mm		—16.50kV~16.50kV	30V
Measurement distance 31~40mm		—22.00kV~22.00kV	40V
Measurement distance 41~50mm		—22.00kV~22.00kV	40V
—	—999	Over range	—
—	999	Sensor abnormality	—

Note: While data can take values of ± 550 , in the specifications, the measurement value guarantee range is ± 500 .

Example:

Data value is 275 when measurement distance is 25mm: $30V \times 275 = 8.25kV$

2) Sending measured value by analog signal

In analog output, as well, the measured value data is sent from the EP Sensor at regular intervals.

A regular interval is time that is set in the data sending cycle setting.

Relationship between data value and measured electric potential

Sending data values can change depending on the measurement distance setting and the operation mode.

The relationship between data values and electric potential by distance is shown below.

Mode and distance settings	Analog value	Measured electric potential	Measured electric potential per analog value displacement of 1V
Ion balance mode		—1000V~1000V	500V
Measurement distance 5~10mm		—5.00kV~5.00kV	2.5kV
Measurement distance 11~20mm		—10.00kV~10.00kV	5kV
Measurement distance 21~30mm		—15.00kV~15.00kV	7.5kV
Measurement distance 31~40mm		—20.00kV~20.00kV	10kV
Measurement distance 41~50mm		—20.00kV~20.00kV	10kV

Example:

Analog value is 4.0V when measurement distance is 25mm: $(4.0 - 3.0) \times 7.5 = 7.5kV$

13 Precautions

- Environment should not have dust accumulating around the detecting portion .
- If the detecting portion requires cleaning, orient the detecting portion downward, and clean by blowing air with a pressure of 0.1MPa or less, and at a distance of 100mm or more.
- In cases where stable electric potential detection is required, we recommend waiting at least 15 minutes after the power is supplied before starting use.
- The EP Sensor internally uses delicate electronic parts. When handling, be careful to avoid hitting, dropping, bumping, or otherwise applying excessive shocks to the unit. Even if the unit looks undamaged in outward appearance, there is a possibility that the interior is damaged, resulting in erratic operation.



KOGANEI CORPORATION

OVERSEAS DEPARTMENT

3-11-28, Midori-cho, Koganei City, Tokyo 184-8533, Japan

Tel: 042-383-7271 Fax: 042-383-7276

URL <http://www.koganei.co.jp>