Pressure Sensor

E8MS/E8M

Four-channel Input Controller for Control of Multiple Sensor Heads



Be sure to read *Safety Precautions* on page 12.

Ordering Information

Sensors E8MS

-	Output configuration	Model
0 to 100 kPa		E8MS-01
0 to 1 MPa		E8MS-10
0 to -101 kPa		E8MS-N0
-101 to 101 kPa		E8MS-N1 *
	0 to 100 kPa 0 to 1 MPa 0 to -101 kPa -101 to 101 kPa	0 to 100 kPa 0 to 1 MPa 0 to -101 kPa -101 to 101 kPa Linear output: 1 to 5 V

 * Do not connect the E8MS-N1 to a Controller. A Controller is not necessary.

E8M

	Pressure range	Output configuration	Model
Minute pressure differential	Differential pressure from 0 to 1,000 Pa between positive and negative ports		E8M-A1-S
Positive pressure 0 to 1 MPa		Linear output: 1 to 5 v	E8M-10
Negative pressure	0 to –101 kPa		E8M-N0

Controllers

Power supply voltage	Output configuration	Number of sensor inputs	Models
24 VDC	NPN open collector	4сн	K3C-MP8 *

* The E8M-MP8 cannot be connected to the E8MS-N1.

Accessories (Order Separately) Sensor I/O Connectors

Applicable model	Appearance	Model	Specifications	Unit	Remarks
E8M		E89-M3-S *	4-pin connector with 3-m-long cable		Provided with one XN2A-1430 e-CON Con-
E8MS		E89-M4-S	3-pin connector with 3-m-long cable	1	nector for Cable Connection.
E8MS/E80-C2		E89-M4-1	3-conductor, 3-m-long cable with connectors on both ends		Cannot be cut or extended.

 * E8M-A1 does not require the Sensor I/O Connector.

e-CON Connector for Cable Connection

Appearance	Model	Applicable wire size (mm ²)	Quantity	Minimum order unit	Remarks
	XN2A-1430	0.08 to 0.5	1	10	The E89-M3 and E89-M4 are each provid- ed with one XN2A-1430.

Power and Output Connector

Model	Specifications	Quantity
E89-M5-S	8-pin connector with 2-m cable	1

Adapter

Model	Remarks
Y92F-37-S	One Adapter is attached to the E8M-MP8 Controller.

Hard Protective Front Cover

Appearance	Model
	Y92A-40-S

48 x 48 Panel Hole Adapter

Appearance	Model
	Y92F-48-S

Sensor and Controller Combinations

Use the Pressure Controllers in the following combinations. The E89-M3/M4 is required when using the Sensor as a single unit.

Model	E89-M3-S	E89-M4-S	E8M-MP8	E89-M5-S	E89-M4-1
E8MS-01	No	Yes	Yes	Yes	Yes
E8MS-10	No	Yes	Yes	Yes	Yes
E8MS-N0	No	Yes	Yes	Yes	Yes
E8MS-N1 *	No	No	No	No	Yes
E8M-A1-S	No	No	Yes	Yes	No
E8M-10	Yes	No	Yes	Yes	No
E8M-N0	Yes	No	Yes	Yes	No

* Connect the E8MS-N1 to a E89-M4-S Sensor I/O Connector. Do not connect it to a Controller. A Controller is not necessary.

Yes: Required No: Not required

Sensor and Controller Connection



Ratings and Specifications

Sensors E8MS

Item	Model	E8MS-01	E8MS-10	E8MS-N0	E8MS-N1		
Power supp	ly voltage	12 VDC ±10%, ripple (p-p) of	12 VDC ±10%, ripple (p-p) of 5% max.				
Current con	sumption	25 mA max.	25 mA max.				
Pressure type	De	Gauge pressure	Gauge pressure				
Applicable f	luid	Non-corrosive gas and non-	flammable gas				
Rated press	ure range	0 to 100 kPa	0 to 1 MPa	0 to -101 kPa	-101 to 100 kPa		
Withstand p	ressure	400 kPa	1.5 MPa	400 kPa			
Linearity		±1% FS max.					
Hysteresis		±1% FS max.					
Linear output	ut	Voltage output: 1 to 5 V with	n an output impedance of 1 k	Ω			
Protection of	ircuits	Reverse polarity protection,	load short-circuit protection				
Ambient ten range	nperature	Operating: 0 to 50°C Storage: -15 to 60°C (with	n no icing)				
Ambient hu	midity range	Operating/Storage: 35% to	85% (with no condensation)				
Temperature	e influence	±0.12% FS/°C max.					
Voltage influ	lence	±1% FS max.					
Insulation re	esistance	100 $M\Omega$ min. (at 500 VDC) I	petween current-carrying par	ts and case			
Dielectric st	rength	1,000 VAC for 1 minute					
Vibration rea	sistance	Destruction: 10 to 150 Hz, 0	.35-mm single amplitude or	50 m/s ² , 10 times each for 8	min in X, Y and Z directions		
Shock resis	tance	Destruction: 500 m/s ² 3 time	es each in X, Y and Z direction	ons			
Degree of p	rotection	IP50 (IEC60529)					
Pressure po	rt	R (PT) 1/8 taper screw and M5 female screw					
Connection	method	Connector					
Weight (pac	ked state)	Approx. 6 g					
Material	Pressure port	Aluminum					
Accessories Instruction manual							

E8M

Loin						
Item	Model	E8M-A1-S	E8M-10	E8M-N0		
Power supp	ly voltage	12 VDC ±10%, ripple (p-p) of 5% max	κ.			
Current con	sumption	30 mA max.				
Pressure type	ре	Differential pressure	Gauge pressure			
Applicable f	luid	Non-corrosive gas and non-flammable	e gas			
Rated press	ure range	Differential pressure from 0 to 1,000 Pa between positive and negative ports	0 to 1 MPa 0 to -101 kPa			
Withstand p	ressure	Differential pressure from 0 to 2,500 Pa between positive and negative ports *	1.5 MPa	400 kPa		
Accuracy		±3% FS max.	±5% FS max.			
Linearity		±1% FS max.				
Hysteresis		±1% FS max.				
Linear output	ut	Voltage output: 1 to 5 V with an output impedance of 1 k Ω				
Protection c	ircuits	Reverse polarity protection, load short-circuit protection				
Ambient ten range	nperature	Operating: 0 to 40°C Storage: -15 to 50°C (with no icing)				
Ambient hu	midity range	Operating/Storage: 35% to 85% (with	no condensation)			
Temperature	e influence	±0.25% FS/°C max.	±0.12% FS/°C max.			
Voltage influ	lence	±3% FS max.				
Insulation re	esistance	100 M Ω min. (at 500 VDC) between o	current-carrying parts and case			
Dielectric st	rength	1,000 VAC for 1 minute				
Vibration res	sistance	Destruction: 10 to 150 Hz, 0.75-mm s	single amplitude or 100 m/s ² , 4 times e	ach for 8 min in X, Y and Z directions		
Shock resis	tance	Destruction: 300 m/s ² 3 times each in	X, Y and Z directions			
Degree of p	rotection	IP50 (IEC60529)				
Pressure po	rt	M5 female screw	R (PT) 1/8 and M5 female screw	M5 male screw		
Connection	method	Pre-wired cable (standard length: 3 m)	Connector			
Weight (pac	ked state)	Approx. 130 g	Approx. 30 g	Approx. 20 g		
Material	Pressure port	Stainless steel (SUS303)	Stainless steel (SUS304)			
	Case	ABS	Aluminum, polyether sulfonic resin			
Accessories	;	Pin Controller Connector, instruction manual	Instruction manual			

* The absolute pressure value of each port is 100 kPa.





Controllers

ltem	Model	E8M-MP8					
Connectable Pressure Sensor		E8M-A1-S * Differential pressure from 0 to 1,000 Pa between posi- tive and negative ports	E8MS-01 (0 to 100 kPa)	E8MS-10 E8M-10 (0 to 1 MPa)	E8MS-N0 E8M-N0 (0 to -101 kPa)		
Power supply voltage		24 VDC ±10%, ripple (p-p) of 10% max.					
Current consumption		200 mA max. (including sensor section current consumption of 30 mA per channel)					
Sensor power supply		Supplied from the Controller, 12 VDC±10% (30 mA max. per channel)					
Input	Sensor input (through 4-pin one-touch connector)	Input voltage range: 1 to 5 VDC with an impedance of 800 k Ω per channel					
Output	Comparative output	NPN open collector Maximum load current: 80mA max. Load voltage: 30 VDC max. Residual voltage: 0.8 V max. with a flow current of 30 mA, 0.4 V max. with a flow current of 16 mA NO or NC (selectable) independent output in hysteresis or window mode (selectable) on each channel					
Autoshift input		Non-voltage input (contact or non-contact), Input: 10 ms min.					
	Measurement value	LED indicator (orange) with a character height of 9 mm for 4 digits.					
	Message	LED indicator (orange) with a character height of 9 mm for 4 digits.					
Indica- tors	Measurement and setting channel	LED indicator (red) with a character height of 5 mm for 1 digit.					
	Comparative output	LED indicator (red) that is lit when the output transistor is turned ON					
	Others	LED indicator (green) for connecting channel and unit display (green)					
Response speed		5 ms max. (The response speed will switch to 20 ms, 160 ms, or 640 ms when chattering prevention is enabled.)					
Set resolution		±0.1% FS max.					
Display	accuracy	±0.5% FS ±1 digit max. (at ambient temperature of 25°C)					
Protecti	on circuits	Reverse polarity protection, load short-circuit protection					
Ambient temperature range		Operating: 0 to 50°C Storage: -20 to 60°C (with no icing)					
Ambient humidity range		Operating/Storage: 35% to 85% (with no condensation)					
Temper	ature influence	±0.5 FS max. (25°C reference)					
Insulation	on resistance	100 M Ω min. (at 500 VDC) between current-carrying parts and case					
Dielectric strength		1,000 VAC for 1 min					
Vibration resistance		Destruction: 10 to 150 Hz, 0.75-mm single amplitude or 100 m/s ² , 4 times each for 8 min in X, Y and Z directions (with power supplied)					
Shock resistance		Destruction: 300 m/s ² 3 times each in X, Y and Z directions (with power supplied)					
Degree of protection		IEC 60529, Front surface only: IP65 (when panel mounted), Otherwise: IP30					
Connection method		Panel mounting Power supply and output: 8-pin terminal Sensor I/O: 4-pin e-CON connector					
Weight		Approx. 55 g (not including accessories)					
Accessories		Instruction manual, Adapter, Water-proof Packing					

* Pressure differentials are displayed with a minus (-) sign.

Engineering Data (Typical)

Linear Output Voltage vs. Pressure





E8MS-N0/E8M-N0









Output Linearity



E8MS-10/E8M-10



E8MS-N0/E8M-N0









Linear Output Fluctuation vs. Voltage





13.5

13 Voltage (V)











E8M-N1

-0.5^L10.5

11

Linear output fluctuation (%FS) 0 10 10 10 10

-0.2

-0.3

-0.4

Pressure 0

Λ.

Rated pressure

11.5

12

12.5



Linear Output Fluctuation vs. Temperature

















E8MS-N0



E8MS-N1



I/O Circuit Diagrams



Output configuration	Model	Output circuit
NPN output	E8M-MP8	Black 4 (Pink) 2 Brown 1 Blue 3 Brown 1 Blue 4 Blue 4 Brown 1 Blue 4 Brown 1 Blue 4 Brown 1 Blue 4 Blue 4 Brown 1 Blue 4 Brown 1 Blue 4 Blue 4 Blu

Note: The wire colors shown on the left are the wire colors of the E89-M5-S (Controller power supply/output connector cables).

Nomenclature

Pressure Sensor Controller





SET Button

Switch output indicators (red): Lit when OUT1 (CH1 to CH4) and OUT2 (CH1 only) are ON.LCD display (orange):Displays the present pressure status, setting mode status, display unit, and error code.Up Button:Used to select the mode and increase ON/OFF set values.Down Button:Used to select the mode and decrease ON/OFF set values.SET Button:Used to change modes and enter set values.

Down Button:	Used to select the mode and decrease ON/OFF set values.
SET Button:	Used to change modes and enter set values.
Unit indicators (orange):	The selected unit indicator will light. Only the SI units (i.e., Mpa or kPa) can be used.
Channel display (red):	The channel selected from CH1 to CH4 is displayed.

Accessories

Options

Power and Output Connector Cable (2 m) E89-M5-S





Safety Precautions

Refer to Warranty and Limitations of Liability.

<u> WARNING</u>

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.



Precautions for Correct Use

Do not use this product in atmospheres or environments that exceed product ratings.

Installation

Connecting and Locking the E8MS Sensor I/O Connector (E89-M4)

(1)Hold both ends of the female connector connected to the Sensor I/O Connector so that the protrusion on the female connector faces upward, orientate the hole in the male connector on the Sensor upwards, and insert the female connector into the hole until the protrusion clicks in.



(2)A lock cover is slid through the Sensor I/O Connector to prevent it from coming free due to vibration or shock. Insert the lock cover facing in the correct direction (a) as shown in the following figure, and rotate it clockwise (b) until it clicks in.



(3)To unlock the connector, rotate the lock cover counterclockwise until it clicks, then pull it towards you. To disconnect the connector, hold both ends of the connector, then pull it towards you.



Note: Forcibly pulling the cable to disconnect the connector may damage the pressure-welded portion. Be sure to hold both ends of the connector when disconnecting it.

Other Installations

E8MS-00/E8M-10

(1)The pressure-introducing section (aluminum for E8MS, SUS304 for E8M) is fixed with tapered R(PT)1/8 male screws and M5 female screws.

(2)When using tapered screws, use tapered Rc(PT)1/8 female screws. Wrap the tapered R(PT)1/8 male screws with sealing tape to prevent any leakage. Tighten the male screws to a torque no more than 3.9 N·m.

(3)Tighten M5 female screws to a torque no more than 1 to $1.5 \text{ N}\cdot\text{m}$. (4)When tightening a screw, hold by its hexagonal head, not by its

body.

E8M-N0

(1)The pressure port (SUS304) is fixed with M5 male screws.

(2)Tighten male screws to a torque no more than 1 to 1.5 N·m.

(3)When tightening a male screw, hold by its hexagonal head, not by its body.

E8M-A1-S

- (1)The pressure port (SUS303) is fixed with M5 female screws (7 mm deep).
- (2)Tighten screws for the pressure port to a torque no more than 1 to 1.5 $N{\cdot}m.$
- (3)M4 female screws are used for the product mounting sections.
- (4)When mounting the product, tighten the screws while holding a metal part of the product, not a resin part.
- (5)Tighten the product mounting screws to a torque no more than 1.2 $N{\cdot}m.$
- (6)If the positive pressure section is released and positive pressure is applied to the negative pressure section, a positive pressure may be displayed.

E8M-MP8

- (1)Install the Sensor horizontally.
- (2) The recommended panel thickness is 0.5 to 8 mm.
- (3)Do not install the Sensor in an environment subject to strong vibration or shock.
- (4)Do not install the Sensor under dusty conditions.
- (5)Do not install the Sensor in an environment subject to corrosive gases, particularly sulfide and ammonia gases.
- (6)Do not install the Sensor near equipment that generates strong high-frequency noise such as high-frequency welders or sewing machines.

Installation

Connector Assembly Procedure

1. Processing the Sensor I/O Connector Cable End

(1)The cable end is semi-stripped.



(2)Cut the ends as shown in the illustration on the right, and do not peel the shield.



2. Connecting the Sensor Cable and Connector

• Terminal numbers are engraved on the Sensor Connector. Refer to the following chart and be sure that the terminal numbers correspond to the wire colors and insert the wires all the way in.

Model	E89-M4-S	E89-M3-S	
Terminal No.	I/O code		
1	Brown (Vcc)		
2		Pink (LED lighting input)	
3	Blue (GND)		
4	Black (IN: 1 to 5 V)		

Wire Preparation

Strip 7 to 8 mm of the wire insulation as shown by the strip gauge on the side of the connector and twist stranded wires several times.



Connection Procedure

(1)Use a flat-blade screwdriver to press in the operating lever in the operating hole until the lever locks.

Flat-blade screwdriver

(2) Insert the wire all the way into the wire insert hole. Make sure that the insulated part of the wire is in the wire insert hole and that the end of the wire passes through the wire connection section.



(3)Insert a flat-blade screwdriver into the release hole and lightly pull back the lever. The lever will be released when a click is heard.





(3)Last, check the following points. •The operating lever is released.

•Check step 2 again. (Lightly pull on the wires. If there is resistance, the wires are connected.)

Connection Release Procedure

(1)Press in the operating lever, check that

it is locked, and then pull out the wire.
(2) Be sure to release the operating lever after releasing the wire. If, however, wiring will be performed after releasing the connection, perform the wiring without releasing the operating



Others

lever.

- (1)Do not use the Sensor in an environment subject to corrosive or combustible gases.
- (2)Do not use the Sensor alongside a high-tension voltage line or power line.
- (3)Do not expose the Sensor to water.
- (4)Be sure to use the Sensor under the rated pressure.
- (5)Do not insert any wire into the pressure port. Doing so may damage the pressure elements and cause a malfunction.
- (6)Do not apply any tensile strength in excess of 20N for E8MS, 30N for E8M to the cables or connectors.
- (7)Compressor oil and air-borne water may form droplets at the pressure receiving section of the Sensor. Remove the oil and water using an air filter to prevent damage to Sensor elements.
- (8)Do not pull the cables. When removing the connectors for external connection, be sure to use the lock lever.

Dimensions

Main Unit





Controller



Note: One XN2A-1430 is provided with the E89-M4-S.

CH.

+10+

-30

3.000

- 50 -





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