

## Four-channel Input Controller for Control of Multiple Sensor Heads



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

## Ordering Information

### Sensors

#### E8MS

Pressure range		Output configuration	Model
Positive pressure	0 to 100 kPa	Linear output: 1 to 5 V	E8MS-01
	0 to 1 MPa		E8MS-10
Negative pressure	0 to -101 kPa		E8MS-N0
Compound pressure	-101 to 101 kPa		E8MS-N1 *

\* 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	Linear output: 1 to 5 V	E8M-A1-S
Positive pressure	0 to 1 MPa		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	4CH	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	1	Provided with one XN2A-1430 e-CON Connector for Cable Connection.
E8MS		E89-M4-S	3-pin connector with 3-m-long cable		
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 <sup>2</sup> )	Quantity	Minimum order unit	Remarks
	XN2A-1430	0.08 to 0.5	1	10	The E89-M3 and E89-M4 are each provided 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

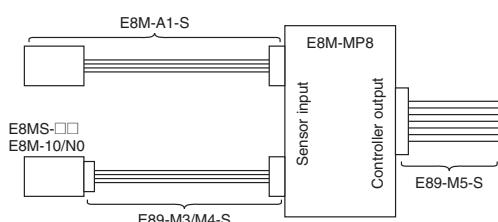
Use the Pressure Controllers in the following combinations. The E89-M3/M4 is required when using the Sensor as a single unit.

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

Yes: Required No: Not required

\* 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.

### Sensor and Controller Connection



## Ratings and Specifications

### Sensors

#### E8MS

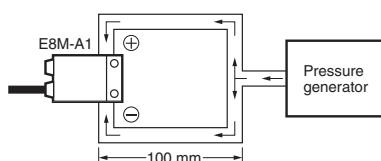
Item	Model	E8MS-01	E8MS-10	E8MS-N0	E8MS-N1
<b>Power supply voltage</b>		12 VDC $\pm 10\%$ , ripple (p-p) of 5% max.			
<b>Current consumption</b>		25 mA max.			
<b>Pressure type</b>		Gauge pressure			
<b>Applicable fluid</b>		Non-corrosive gas and non-flammable gas			
<b>Rated pressure range</b>		0 to 100 kPa	0 to 1 MPa	0 to $-101$ kPa	$-101$ to 100 kPa
<b>Withstand pressure</b>		400 kPa	1.5 MPa	400 kPa	
<b>Linearity</b>		$\pm 1\%$ FS max.			
<b>Hysteresis</b>		$\pm 1\%$ FS max.			
<b>Linear output</b>		Voltage output: 1 to 5 V with an output impedance of 1 k $\Omega$			
<b>Protection circuits</b>		Reverse polarity protection, load short-circuit protection			
<b>Ambient temperature range</b>		Operating: 0 to 50°C Storage: $-15$ to 60°C (with no icing)			
<b>Ambient humidity range</b>		Operating/Storage: 35% to 85% (with no condensation)			
<b>Temperature influence</b>		$\pm 0.12\%$ FS/ $^{\circ}\text{C}$ max.			
<b>Voltage influence</b>		$\pm 1\%$ FS max.			
<b>Insulation resistance</b>		100 M $\Omega$ min. (at 500 VDC) between current-carrying parts and case			
<b>Dielectric strength</b>		1,000 VAC for 1 minute			
<b>Vibration resistance</b>		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			
<b>Shock resistance</b>		Destruction: 500 m/s $^2$ 3 times each in X, Y and Z directions			
<b>Degree of protection</b>		IP50 (IEC60529)			
<b>Pressure port</b>		R (PT) 1/8 taper screw and M5 female screw			
<b>Connection method</b>		Connector			
<b>Weight (packed state)</b>		Approx. 6 g			
<b>Material</b>	<b>Pressure port</b>	Aluminum			
<b>Accessories</b>		Instruction manual			

## E8M

Item	Model	E8M-A1-S	E8M-10	E8M-N0
<b>Power supply voltage</b>	12 VDC $\pm 10\%$ , ripple (p-p) of 5% max.			
<b>Current consumption</b>	30 mA max.			
<b>Pressure type</b>	Differential pressure      Gauge pressure			
<b>Applicable fluid</b>	Non-corrosive gas and non-flammable gas			
<b>Rated pressure range</b>	Differential pressure from 0 to 1,000 Pa between positive and negative ports		0 to 1 MPa	0 to $-101$ kPa
<b>Withstand pressure</b>	Differential pressure from 0 to 2,500 Pa between positive and negative ports *		1.5 MPa	400 kPa
<b>Accuracy</b>	$\pm 3\%$ FS max.	$\pm 5\%$ FS max.		
<b>Linearity</b>	$\pm 1\%$ FS max.			
<b>Hysteresis</b>	$\pm 1\%$ FS max.			
<b>Linear output</b>	Voltage output: 1 to 5 V with an output impedance of 1 k $\Omega$			
<b>Protection circuits</b>	Reverse polarity protection, load short-circuit protection			
<b>Ambient temperature range</b>	Operating: 0 to 40°C Storage: $-15$ to 50°C (with no icing)			
<b>Ambient humidity range</b>	Operating/Storage: 35% to 85% (with no condensation)			
<b>Temperature influence</b>	$\pm 0.25\%$ FS/ $^{\circ}\text{C}$ max.	$\pm 0.12\%$ FS/ $^{\circ}\text{C}$ max.		
<b>Voltage influence</b>	$\pm 3\%$ FS max.			
<b>Insulation resistance</b>	100 M $\Omega$ min. (at 500 VDC) between current-carrying parts and case			
<b>Dielectric strength</b>	1,000 VAC for 1 minute			
<b>Vibration resistance</b>	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			
<b>Shock resistance</b>	Destruction: 300 m/s $^2$ 3 times each in X, Y and Z directions			
<b>Degree of protection</b>	IP50 (IEC60529)			
<b>Pressure port</b>	M5 female screw	R (PT) 1/8 and M5 female screw	M5 male screw	
<b>Connection method</b>	Pre-wired cable (standard length: 3 m)	Connector		
<b>Weight (packed state)</b>	Approx. 130 g	Approx. 30 g	Approx. 20 g	
<b>Material</b>	<b>Pressure port</b>	Stainless steel (SUS303)		
	<b>Case</b>	ABS		
<b>Accessories</b>		Pin Controller Connector, instruction manual	Instruction manual	

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

Measurement method



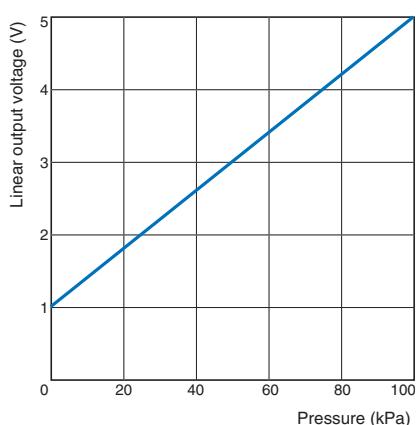
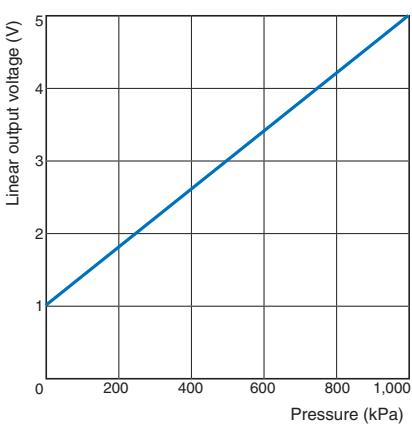
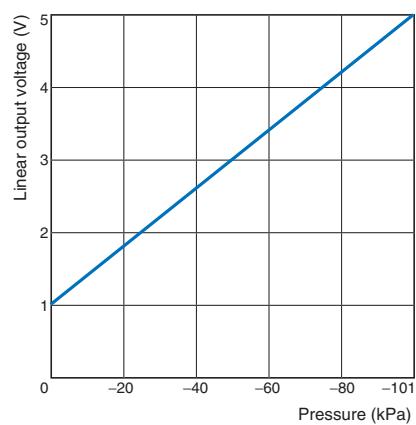
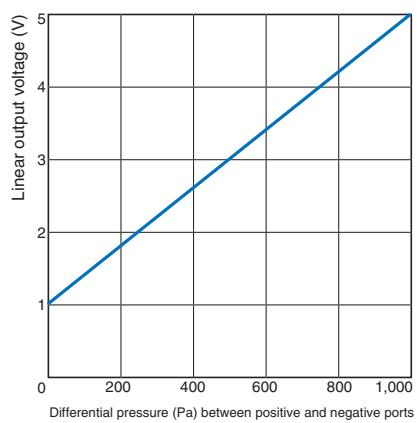
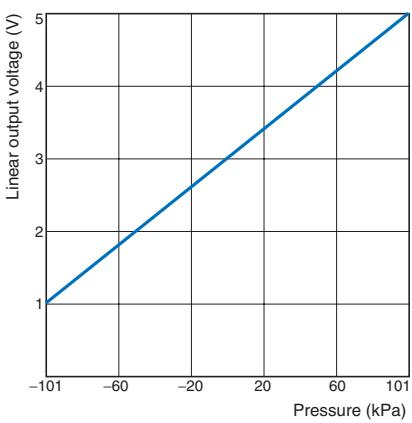
## Controllers

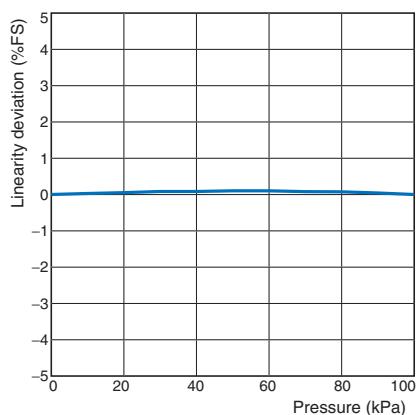
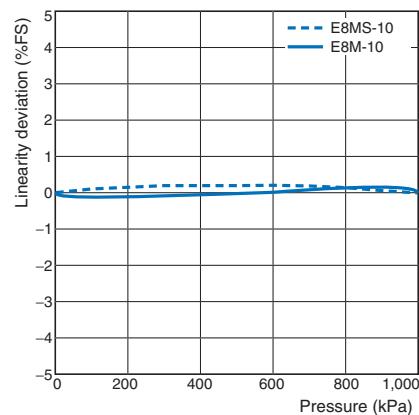
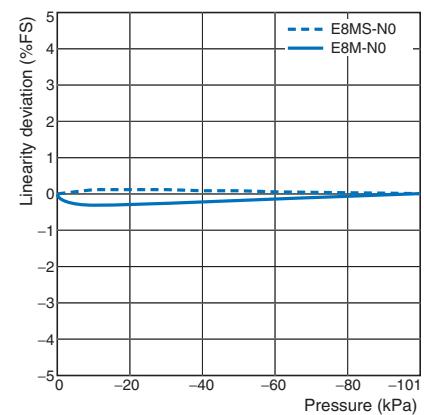
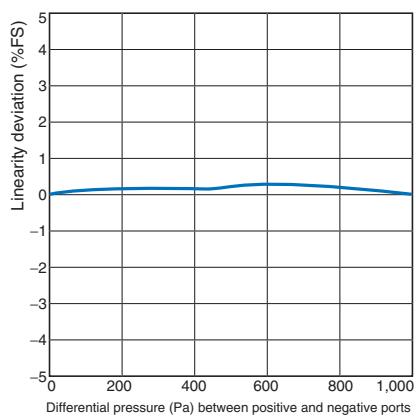
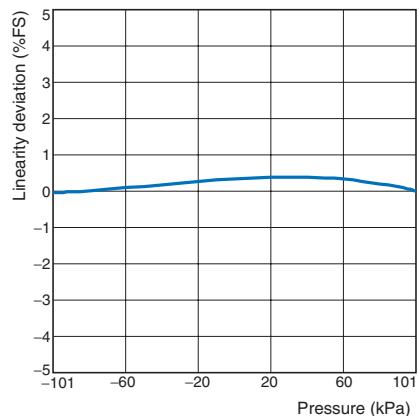
Item	Model	E8M-MP8							
<b>Connectable Pressure Sensor</b>	E8M-A1-S *	E8MS-01 (0 to 100 kPa)	E8MS-10 E8M-10 (0 to 1 MPa)	E8MS-N0 E8M-N0 (0 to -101 kPa)					
<b>Power supply voltage</b>	24 VDC $\pm 10\%$ , ripple (p-p) of 10% max.								
<b>Current consumption</b>	200 mA max. (including sensor section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

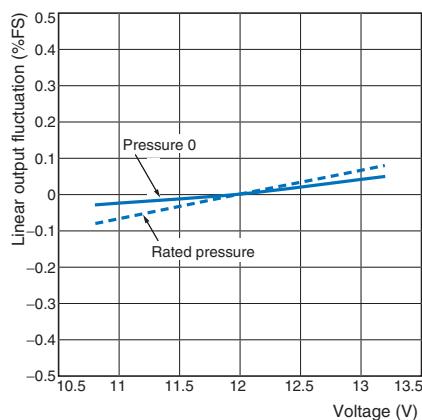
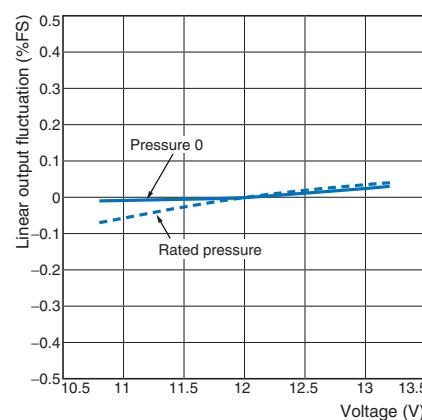
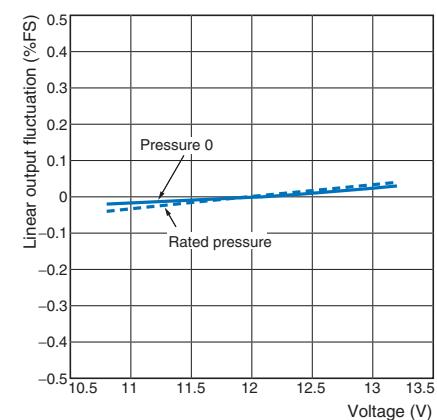
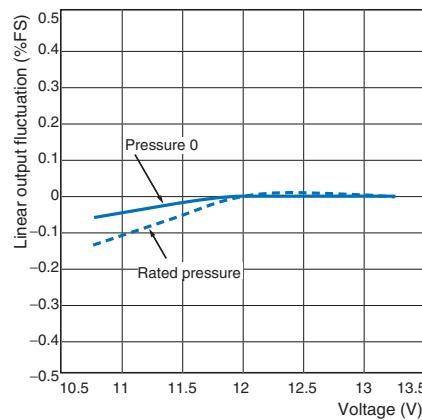
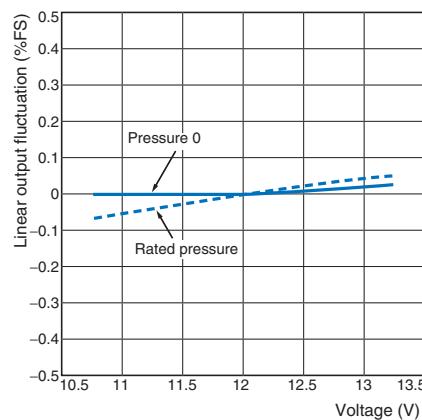
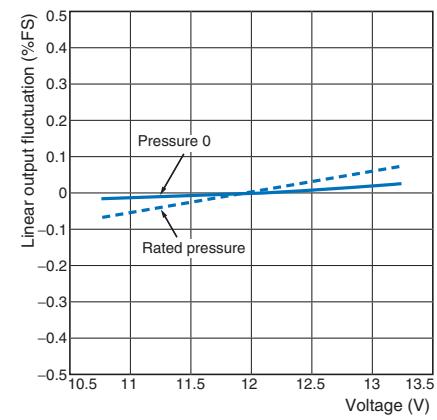
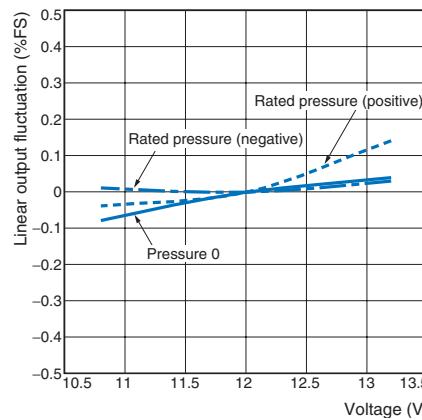
\* Pressure differentials are displayed with a minus (-) sign.

## Engineering Data (Typical)

### Linear Output Voltage vs. Pressure

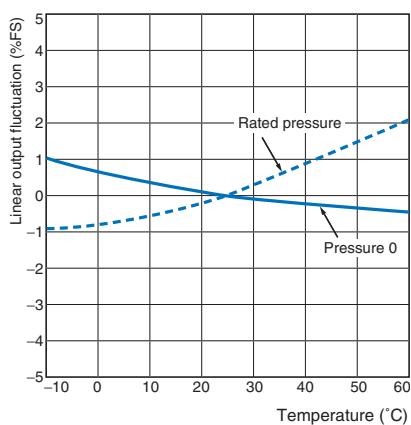
**E8MS-01****E8MS-10/E8M-10****E8MS-N0/E8M-N0****E8M-A1-S****E8MS-N1**

**Output Linearity****E8MS-01****E8MS-10/E8M-10****E8MS-N0/E8M-N0****E8M-A1****E8MS-N1**

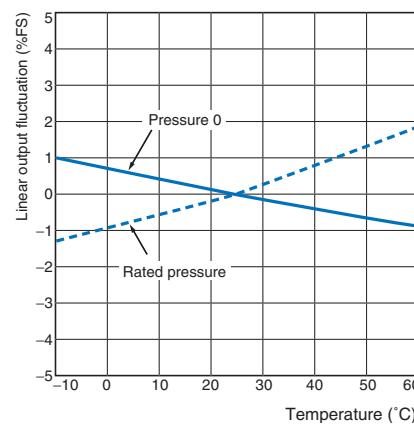
**Linear Output Fluctuation vs. Voltage****E8MS-01****E8MS-10****E8MS-N0****E8M-A1-S****E8M-10****E8M-N0****E8M-N1**

## Linear Output Fluctuation vs. Temperature

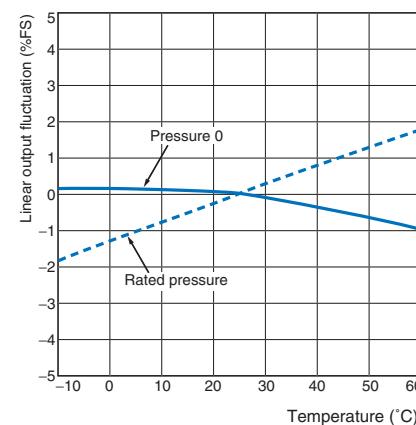
E8MS-01



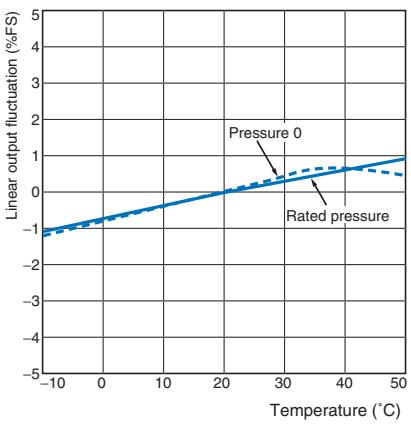
E8MS-10



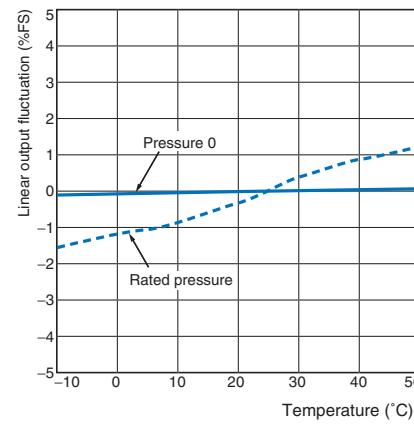
E8MS-N0



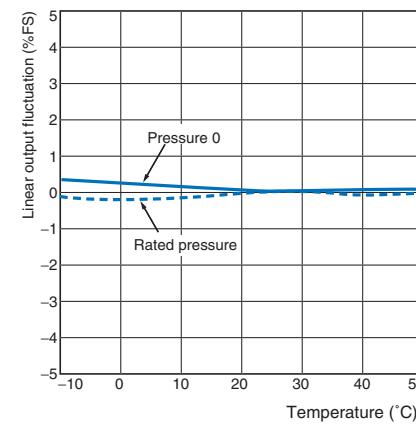
E8M-A1-S



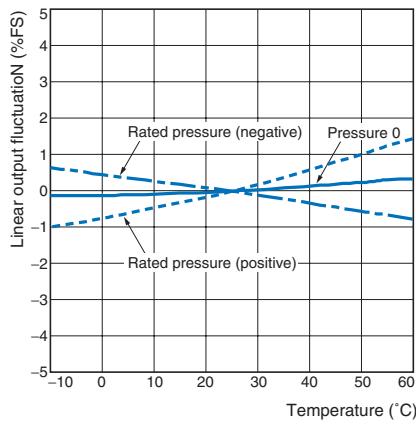
E8M-10



E8M-N0



E8MS-N1



## I/O Circuit Diagrams

## Sensor

Output configuration	Model	Output circuit
	E8MS-01 E8MS-10 E8MS-N0 E8MS-N1	
1 to 5 V linear output	E8M-A1-S	
	E8M-10 E8M-N0	

\* Input for lighting the power supply indicator.  
5 V supplied: lit, 0 V: not lit

## Controller

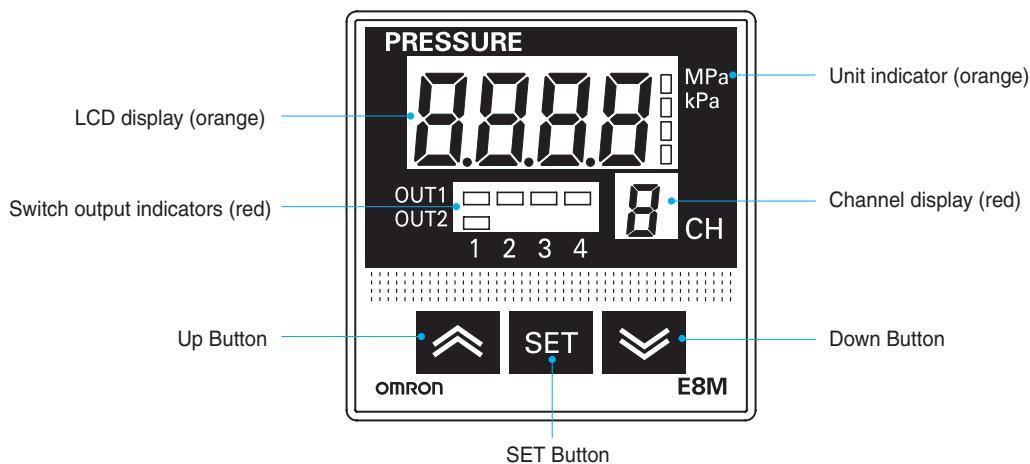
Output configuration	Model	Output circuit
NPN output	E8M-MP8	

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

E8M-MP8



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.

Unit indicators (orange): The selected unit indicator will light. Only the SI units (i.e., Mpa or kPa) can be used.

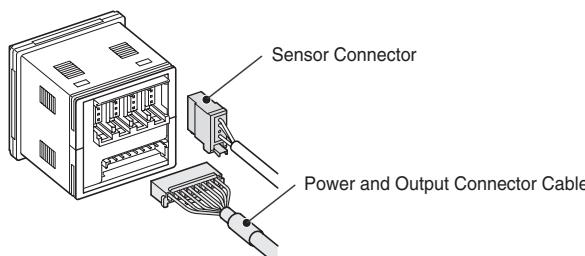
Channel display (red): The channel selected from CH1 to CH4 is displayed.

### Accessories

Panel Mounting Adapter . . . . . Y92F-37-S (M3 x 8L, two provided)

### Options

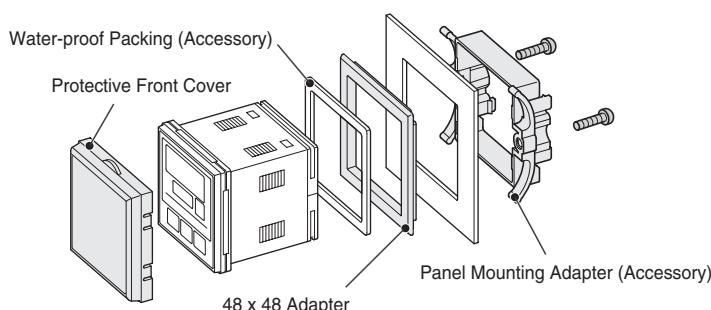
Power and Output Connector Cable (2 m) . . . . . E89-M5-S



Protective Front Cover . . . . . Y92A-40-S

48 x 48 Adapter . . . . . Y92F-48-S

(This Adapter is to mount the E8M-MP8 in the panel cutout dimensions for the K3C Series.)



## Safety Precautions

Refer to **Warranty and Limitations of Liability**.

### WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. 

**Do not use it for such purposes.**

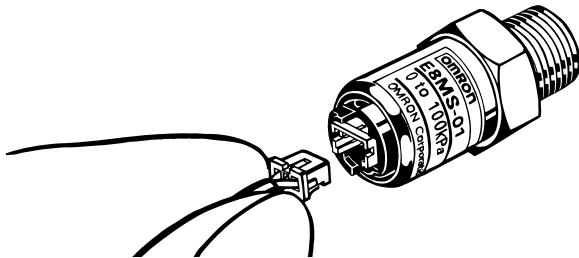
### Precautions for Correct Use

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

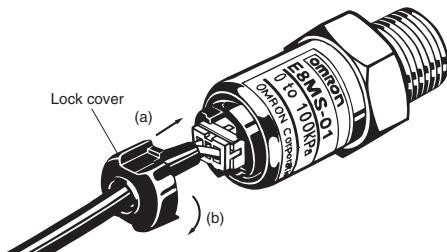
#### ● Installation

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

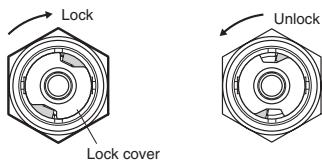
(1) Hold both ends of the female connector connected to the Sensor I/O Connector so that the protrusion on the female connector faces upward, orientate the hole in the male connector on the Sensor upwards, and insert the female connector into the hole until the protrusion clicks in.



(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-□□/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 N·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·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·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

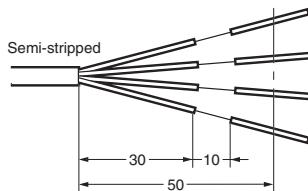
- (1) Install the Sensor horizontally.
- (2) The recommended panel thickness is 0.5 to 8 mm.
- (3) Do not install the Sensor in an environment subject to strong vibration or shock.
- (4) Do not install the Sensor under dusty conditions.
- (5) Do not install the Sensor in an environment subject to corrosive 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

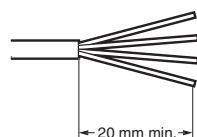
### Connector Assembly Procedure

#### 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.



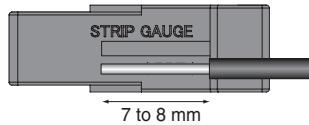
#### 2. Connecting the Sensor Cable and Connector

• 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)

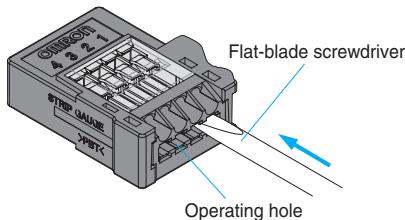
### Wire Preparation

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.

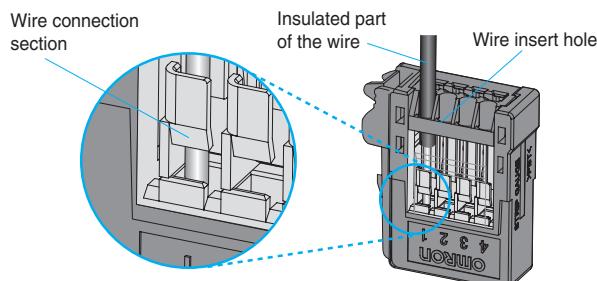


### Connection Procedure

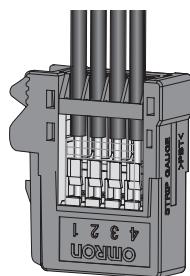
(1) Use a flat-blade screwdriver to press in the operating lever in the operating hole until the lever locks.



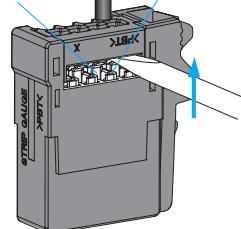
(2) Insert the wire all the way into the wire insert hole. Make sure that the insulated part of the wire is in the wire insert hole and that the end of the wire passes through the wire connection section.



(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.



Operating lever (White)  
Release hole

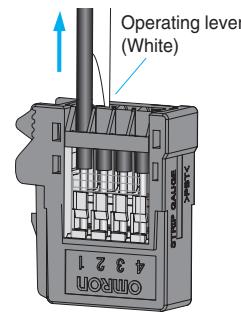


(3) Last, check the following points.  
 • The operating lever is released.  
 • Check step 2 again.  
 (Lightly pull on the wires. If there is resistance, the wires are connected.)

### Connection Release Procedure

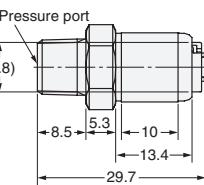
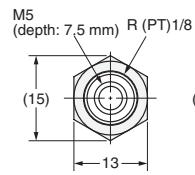
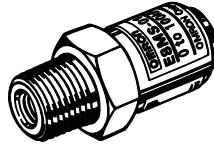
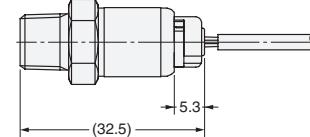
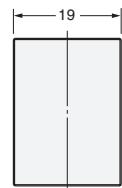
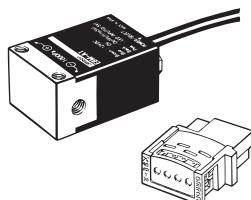
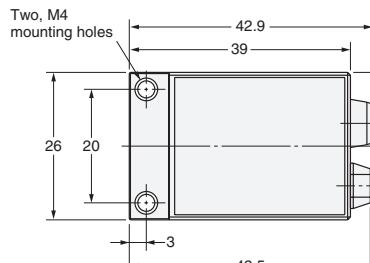
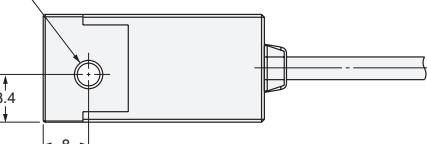
(1) Press in the operating lever, check that it is locked, and then pull out the wire.

(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 lever.

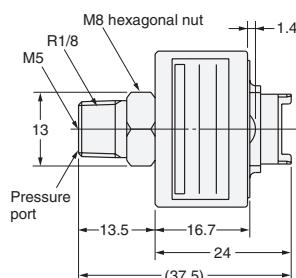
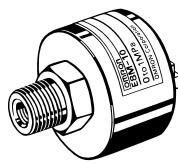
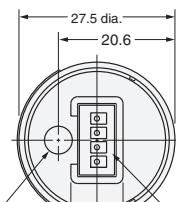


### ● Others

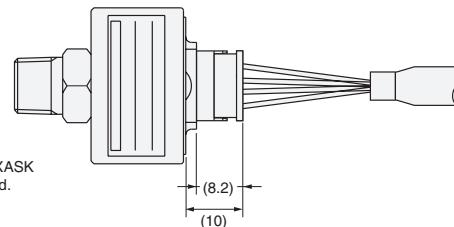
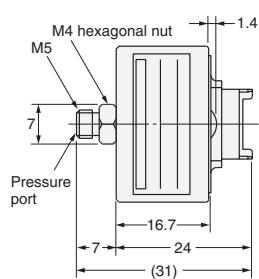
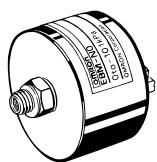
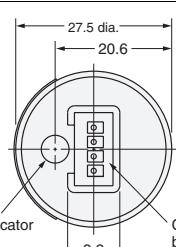
- Do not use the Sensor in an environment subject to corrosive or combustible gases.
- Do not use the Sensor alongside a high-tension voltage line or power line.
- Do not expose the Sensor to water.
- Be sure to use the Sensor under the rated pressure.
- Do not insert any wire into the pressure port. Doing so may damage the pressure elements and cause a malfunction.
- Do not apply any tensile strength in excess of 20N for E8MS, 30N for E8M to the cables or connectors.
- 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.
- Do not pull the cables. When removing the connectors for external connection, be sure to use the lock lever.

**Dimensions****Main Unit****Sensors****E8MS-01****E8MS-10****E8MS-N0****E8MS-N1**Connector: DF13B-3P-1.25V (21)  
by Hirose Electric**E8M-A1-S**M5 pressure port (Positive)  
(depth: 7 mm)4.0-dia vinyl-insulated round cable  
(Conductor cross section: 0.3 mm<sup>2</sup>  
Insulator diameter: 1.04 mm)  
with 4 conductors, Standard length: 3 mM5 pressure port (Negative)  
(depth: 7 mm)

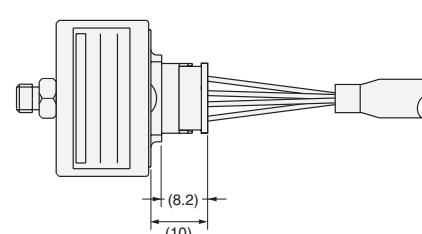
Note: One XN2A-1430 is supplied together with the E8M-A1-S.

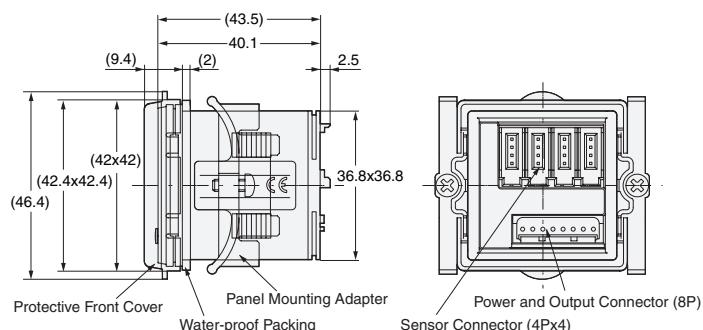
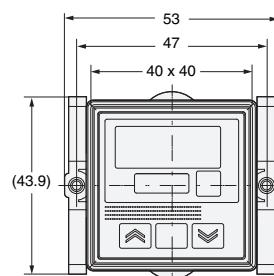
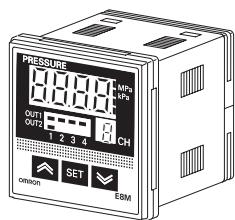
**E8M-10**Power indicator  
(green)  
4.9 dia

Connector with E89-M3-S Sensor I/O Connector

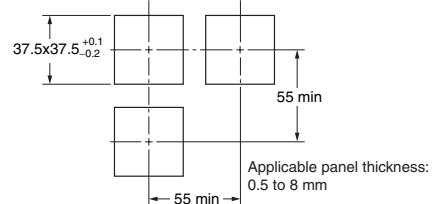
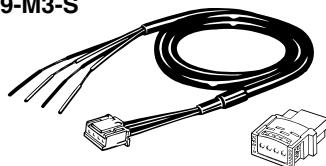
**E8M-N0**Power indicator  
(green)  
4.9 dia.

Connector with E89-M3-S Sensor I/O Connector



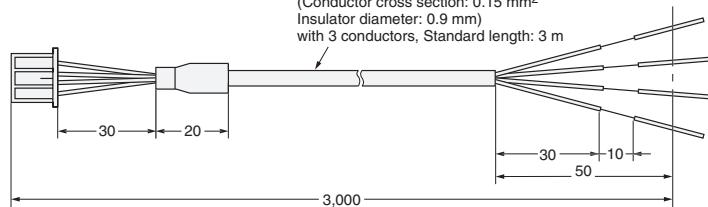
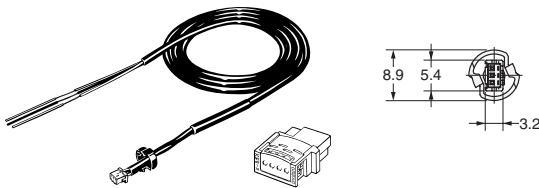
**Controller****E8M-MP8**

Panel Cutout Dimensions

**Accessories (Order Separately)****Sensor I/O Connector****For the E8M Only****E89-M3-S**

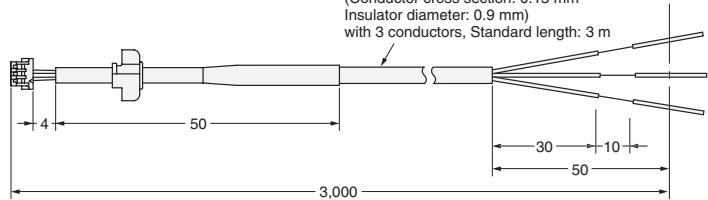
Note: One XN2A-1430 is provided with the E89-M3-S.

2.9-dia vinyl-insulated round cable  
(Conductor cross section: 0.15 mm<sup>2</sup>  
Insulator diameter: 0.9 mm)  
with 3 conductors, Standard length: 3 m

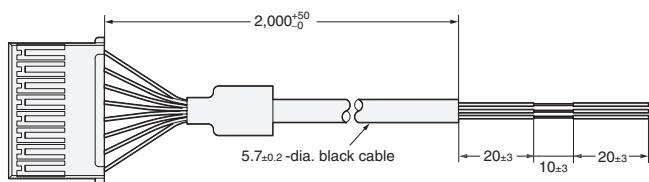
**For the E8MS Only****E89-M4-S**

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

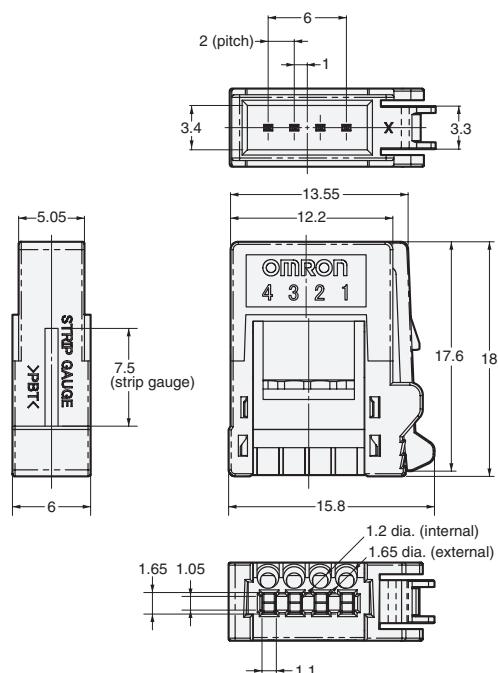
2.9-dia vinyl-insulated round cable  
(Conductor cross section: 0.15 mm<sup>2</sup>  
Insulator diameter: 0.9 mm)  
with 3 conductors, Standard length: 3 m



**Power and Output Connector**  
**E89-M5-S**

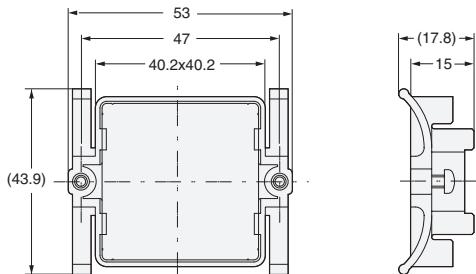


**Cable Connector**  
**XN2A-1430**



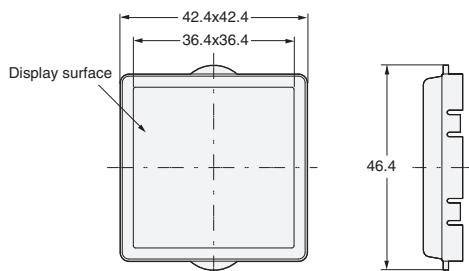
Note: One Connector is provided with the E89-M3-S or E89-M4-S.

**Adapter**  
**Y92F-37-S**

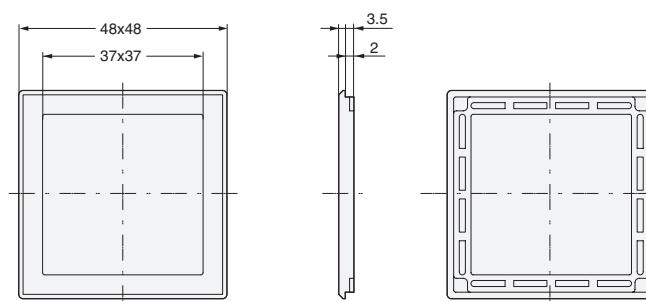


Note: One Y92F-37-S is provided with the E8M-MP8.

**Hard Protective Front Cover**  
**Y92A-40-S**



**48x48 Panel Hole Adapter**  
**Y92F-48-S**



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2008.11

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