



D2-138736

DIGITAL Electro-pneumatic Regulator ER Series PARALLEL INPUT TYPE ER104-*P* Instruction

Thank you for purchasing Camozzi's product.
Please take care below sentences to use this product safely.
Retain this instruction with the product for further consultation whenever necessary.
Please read the instruction manual or the catalog about more details.

For Safety Use

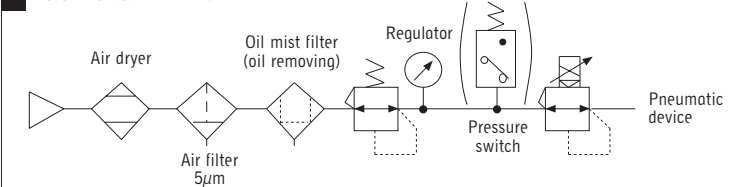
To use this product safely, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (ISO 4414 *1).
We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.
Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident.
Thus, before placing an order, examine whether the product meets your application, requirements, and how to use it.
This product incorporates many functions and mechanisms to ensure safety.
However, improper operation could result in an accident.
To pre-vent such accidents **read this operation manual carefully for proper operation.**

93-752-0068 rev. B

Caution for use

- 1) Bad quality air makes its characteristics and durability worse. For the pneumatic source, use cleaned air from which the solids, water and oil contents were eliminated sufficiently, using an air dryer, filter and oil mist filter.

Recommended air circuit



- 2) The response time is affected by the supply pressure and load capacity. When stable reproducibility is required for this responsibility, set up a regulator in the prestage.
- 3) Sufficiently flush air pipes before connecting to proportional pressure controls. Check that sealing tape is not caught when piping.
- 4) Tighten pipes with the appropriate torque. Pipes must be connected with the appropriate torque to prevent air leak-ages and screw damage. First tighten the screw by hand to prevent damage to screw threads, then use a tool.

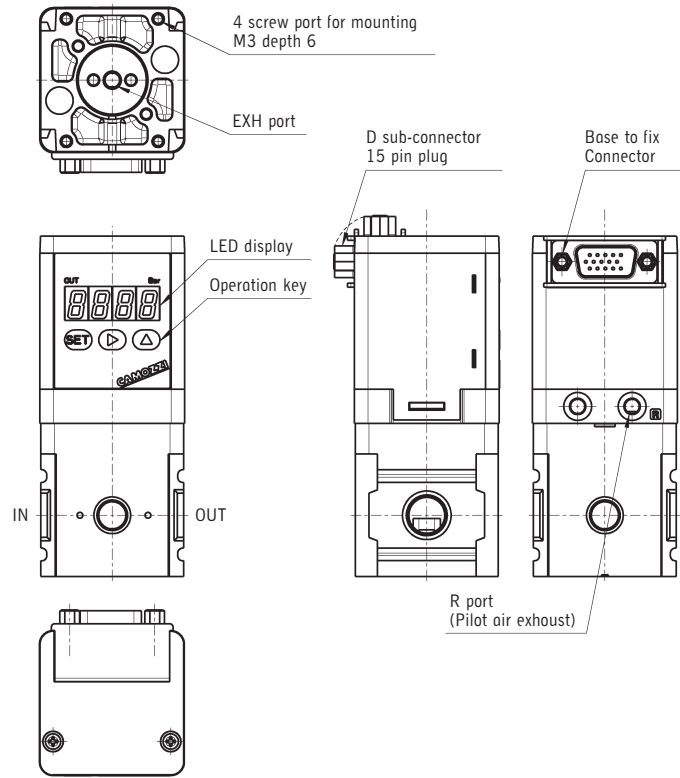
Port screw	Tightening torque Nm
G1/4	6 to 8

- 5) Correct pressure control is not possible if the exhaust port is plugged. Release this port to the atmosphere.
- 6) If an error is found during operation, turn the power off and stop the compressed air supply immediately and stop operation.
- 7) This product does not conduct pressure control for about two seconds for self diagnosis immediately after it is turned on. Build a control circuit or program to ignore signals for about two seconds immediately after power-on.
- 8) The case is made of resin. Do not use solvent, alcohol, detergent or other chemicals when removing dirt. They may cause damage to the resin. Use waste cloth immersed in diluted neutral detergent and squeezed.
- 9) If the product is left as it is with the supply pressure when no power is turned ON, the secondary side pressure may increase up to the supply pressure. If some trouble is concerned on safety, take proper safety measures in the system; for example, use a valve on inlet or outlet.
- 10) If the power is turned off under pressure, the secondary pressure is held. In this case, if you need to be in an exhaust state, lower the control pressure first and then turn off the power or use the exhaust valve. However, the maintained pressure is not guaranteed to last for very long.
- 11) Since the supply pressure is supposed to provide the exact control pressure, it is important for the working pressure not to drop below iset secondary pressure + 1 bar. If supply pressure is not supplied for a long time when power is ON, product life is shortened. Avoid this use.
- 12) Avoid operating the product in places where it may be affected by direct sunlight, water or oil.
- 13) The protective structure of this product is equivalent to that of the IP40. Do not install this product at places susceptible to moisture, salt, dust or chips or under positive or negative pressure. Do not operate at places with steep temperature changes or in high humidity because dew condensation inside the main body will cause problems.
- 14) To avoid malfunction caused by electrical noise.
 - Insert a line filter into the AC power line.
 - Use a surge suppresser like a CR or diode in the inductive load (solenoid valve, relay and so on) to remove any noise at the source.
 - Keep cables connected to this product as far away as possible from power line.
 - Use a shielded cable to connect a device.
 - The shielded wire should be grounded on the power supply side.
 - Wire the power line as short as possible.
 - Don't share the power with devices that generate the noise, such as in-verter motor.
 - Don't wire the power line or input signal line in parallel with other lines.
- 15) Check the leak current to avoid a malfunction caused by such leakage from other control equipment. The ER may malfunction under the influence of leak current when a programmable controller or the like.

In case of 24 V DC | 1.8mA or less



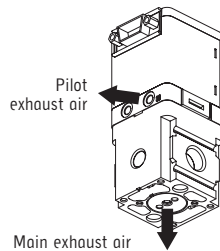
Parts name



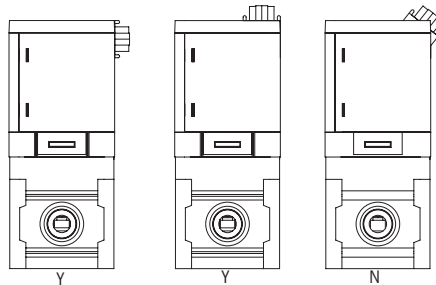
Installation

CAUTION

- Keep a sufficient space for operation & re-installation, wiring and piping work around the product.
- Do not block the exhaust port. Reserve space necessary for exhaust air.

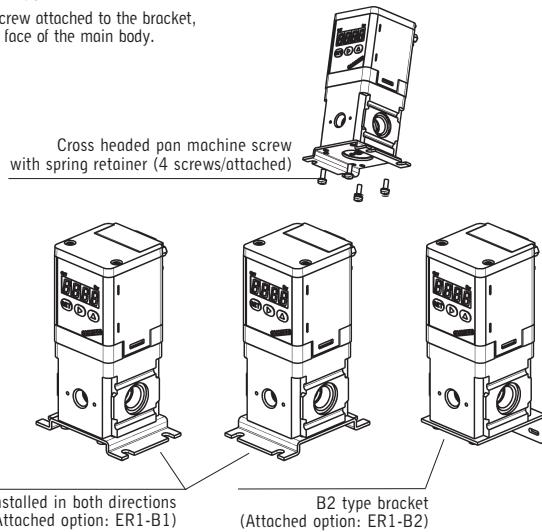


- The rotation mechanism of the D-sub connector does not assume operation with a moving unit. Use at either the top or side position (do not use at an odd angle), and fix the cable if the cable moves.



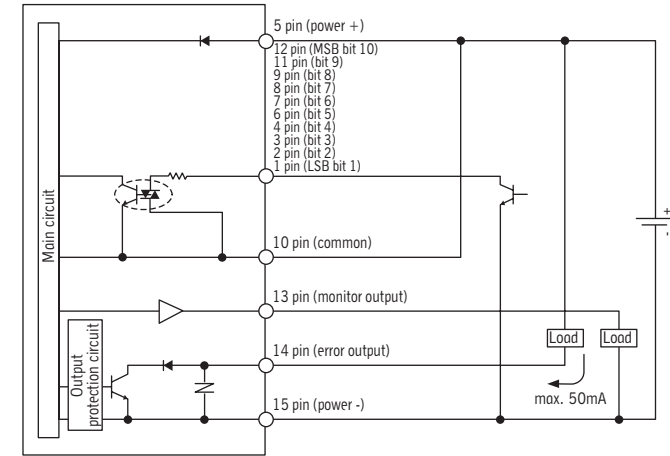
Option Bracket Installation

Use the mounting screw attached to the bracket, to fix on the bottom face of the main body.

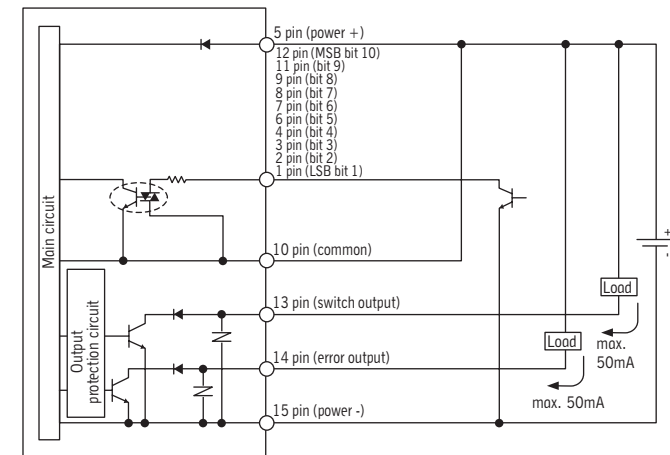


Internal circuit and connection

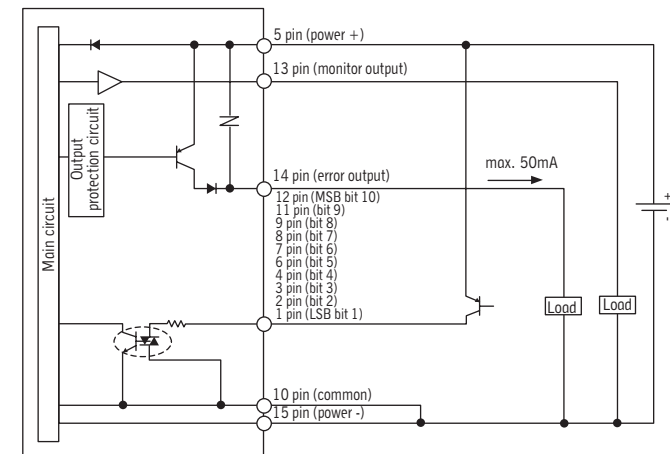
- Product code-AN: Analog output + Error <NPN> Output type



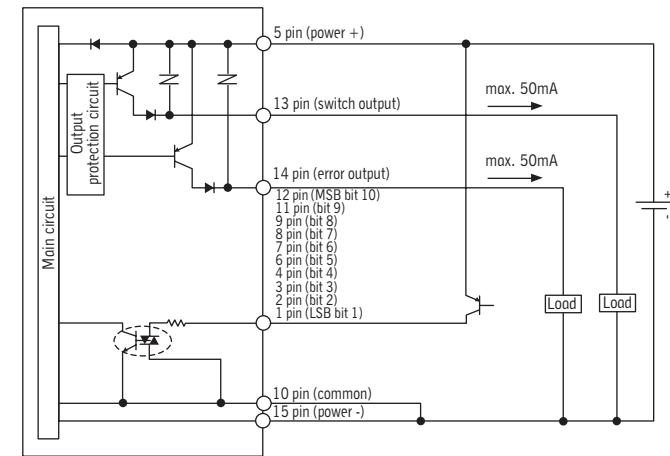
- Product code-SN: Switch output <NPN> + Error <NPN> Output type



- Product code-AP: Analog output + Error <PNP> Output type



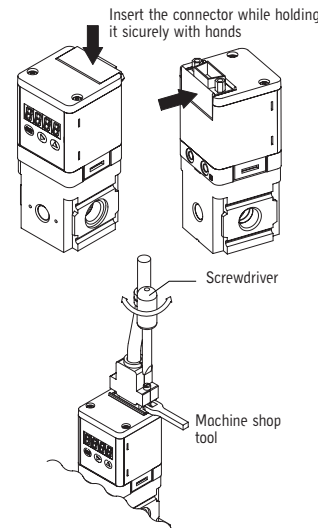
- Product code-SP: Switch output <PNP> + Error <PNP> Output type



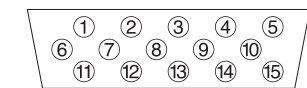
Connector connecting

CAUTION

- Insert the D-sub connector to the depth securely.
 - The D-sub connector has a mechanism for turning 90°.
- When connecting the D-sub connector, insert it at the top or side position while holding it securely with hands.

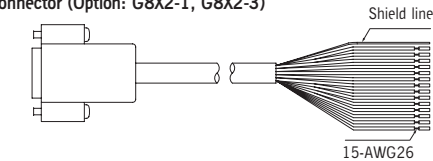


Connector pin array (Product body side)



Refer to the below "Connecting" for the wiring method.

Shield cable connector (Option: G8X2-1, G8X2-3)



Connecting

CAUTION

- Check the product code and take sufficient care of connection.
- Handle the unused monitor output, switch output or preset input so that it does not make contact with other cables (including shielded cables).
- Ground the shield wire on the power (-) side.

D sub socket pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Option cable isolator color	Brown	Orange	Yellow	Purple	Red	Pale Blue	Pink	White Black	Red Black	Gray	White	Green Black	Green	Blue	Black
Type of input	Input signal				Power		Input signal				Input signal		Monitor/Switch output	Error output	Power
	1 bit	2 bit	3 bit	4 bit	+24V DC	5 bit	6 bit	7 bit	8 bit	Common	9 bit	10 bit	1-5V DC	N : P P : N	GND

Possible colour modification will be indicated on the cable's packaging.

Specification

Item	Type	ER104-5P	ER104-9P
Media		Cleaned air	
Max. working pressure		7 Bar	10 Bar
Min. working pressure		Control pressure + 1 Bar	
Pressure control range		0 ÷ 5 Bar (residual press 0,05 Bar or less)	0.5 - 9 Bar (residual press 0,09 Bar or less)
Power supply voltage		DC24V ± 10% (stabilized power supply with a ripple rate 1% or less)	
Consumption current		0.15A or less (rush current 0.6A or less when the power is turned on)	
Input signal		10 bit	
Output signal		Analog output 1-5VDC (load to be connected impedance 500kΩ or more) Switch output NPN or PNP, open collector output, 30V or less, 50mA or less, voltage drop 2.4V or less, compatible for usage in PLC and Relay	
Error output signal		NPN or PNP, open collector output, 30V or less, 50mA or less, voltage drop 2.4V or less, compatible for usage in PLC and Relay	
Direct memory set		0,05 ~ 5 Bar (setting min. width 0,01 Bar setting resolution 0,01 Bar)	0,09 ~ 9 Bar (setting min. width 0,01 Bar setting resolution 0,02 Bar)
Hysteresis *1)		0.5% F.S. or less	
Linearity *1)		±0.3% F.S. or less	
Max. flow rate (ANR) *2)		400 L/min	
Step response *3)		0.2sec. or less (No load)	
Ambient/Fluid temperature		5~50°C	
Protective circuit		Power reverse protect, Switch output reverse protect, Switch output load short protect	

1) Above characteristics are values where power voltage is 24VDC, and working pressure is "max. control pressure + 1 Bar [ER104-5P: 6 bar, ER104-9P*: 10 bar], and control pressure is 10 to 90%.

*2) Working pressure: Max. working pressure, Control pressure : Max. control pressure.

*3) Working pressure: Max. working pressure, Step rate: 50 → 100% F.S., 50 → 60% F.S., 50 → 40% F.S.



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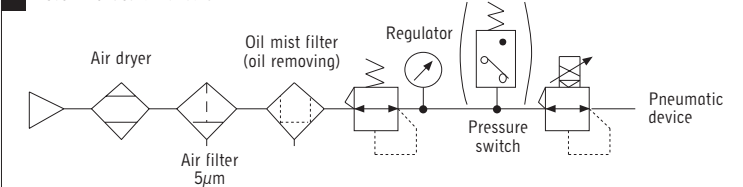
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93-752-0070 rev. B

Caution for use

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Recommended air circuit



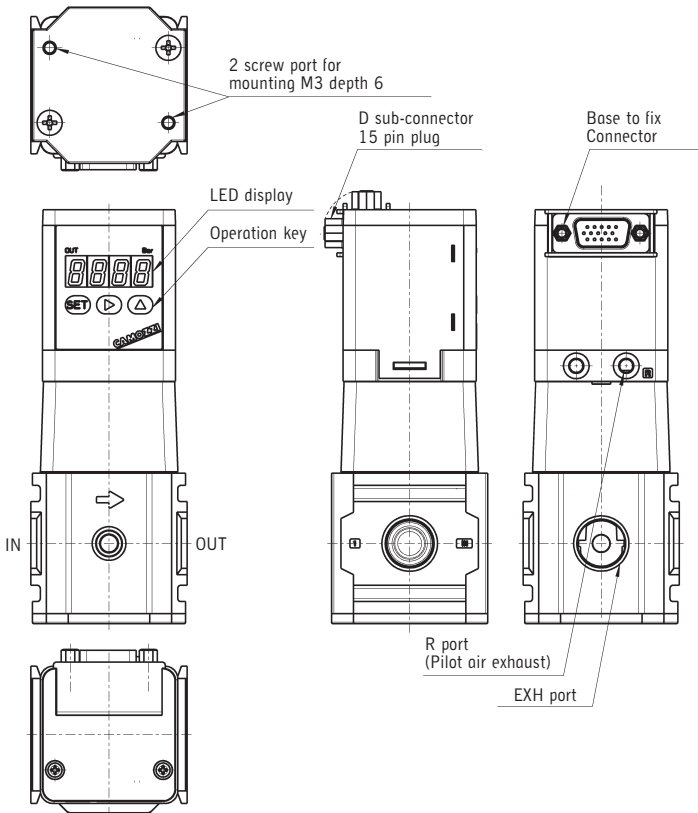
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- 3) Sufficiently flush air pipes before connecting to proportional pressure controls. Check that sealing tape is not caught when piping.
- 4) Tighten pipes with the appropriate torque. Pipes must be connected with the appropriate torque to prevent air leak-ages and screw damage. First tighten the screw by hand to prevent damage to screw threads, then use a tool.

Port screw	Tightening torque Nm
G1/4	6 to 8
G3/8	13 to 15

- 5) Correct pressure control is not possible if the exhaust port is plugged. Release this port to the atmosphere.
- 6) If an error is found during operation, turn the power off and stop the compressed air supply immediately and stop operation.
- 7) This product does not conduct pressure control for about two seconds for self diagnosis immediately after it is turned on. Build a control circuit or program to ignore signals for about two seconds immediately after power-on.
- 8) The case is made of resin. Do not use solvent, alcohol, detergent or other chemicals when removing dirt. They may cause damage to the resin. Use waste cloth immersed in diluted neutral detergent and squeezed.
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- 15) Check the leak current to avoid a malfunction caused by such leakage from other control equipment. The ER may malfunction under the influence of leak current when a programmable controller or the like.

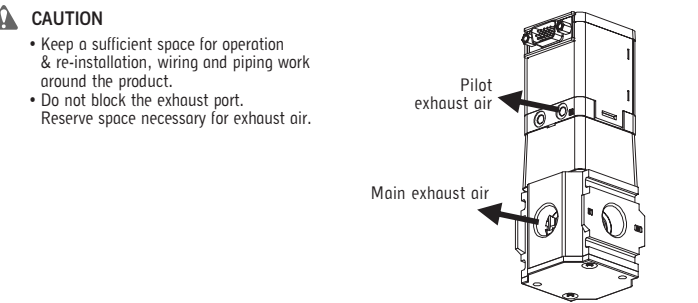
In case of 24 V DC 1.8mA or less

Parts name

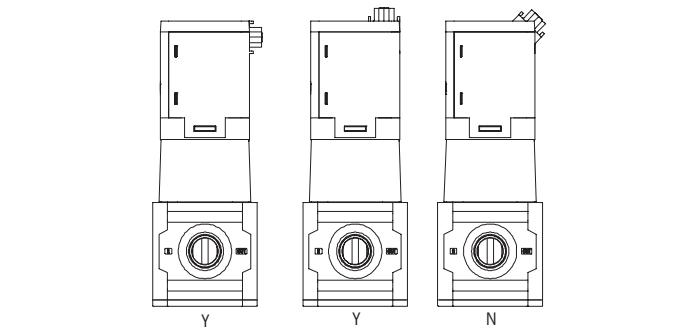


Installation

- CAUTION**
- Keep a sufficient space for operation & re-installation, wiring and piping work around the product.
 - Do not block the exhaust port. Reserve space necessary for exhaust air.

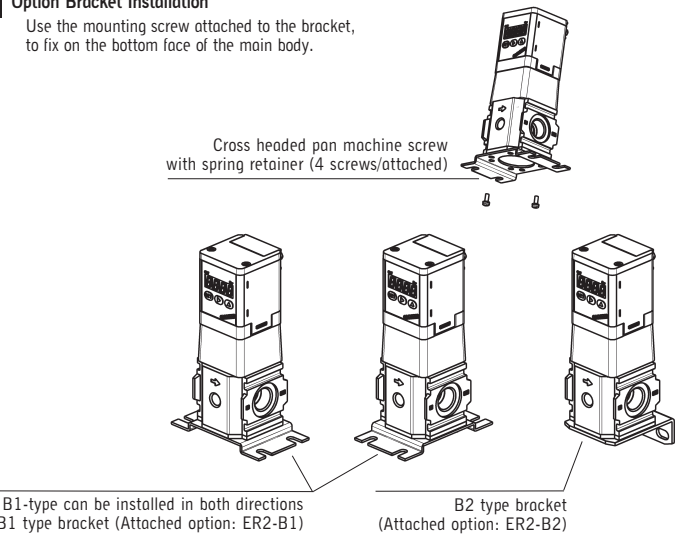


- The rotation mechanism of the D-sub connector does not assume operation with a moving unit. Use at either the top or side position (do not use at an odd angle), and fix the cable if the cable moves.



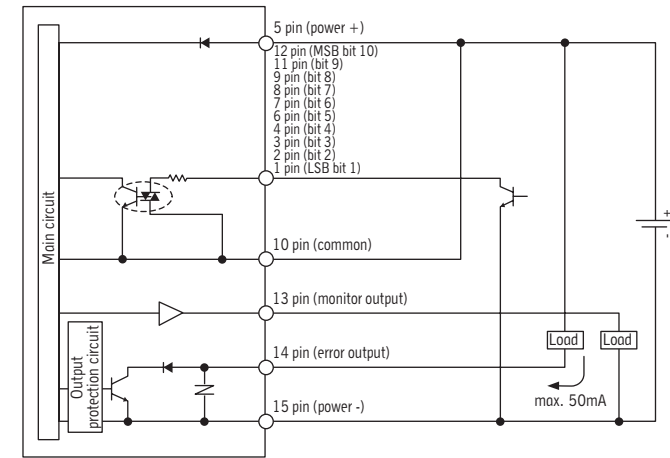
Option Bracket Installation

Use the mounting screw attached to the bracket, to fix on the bottom face of the main body.

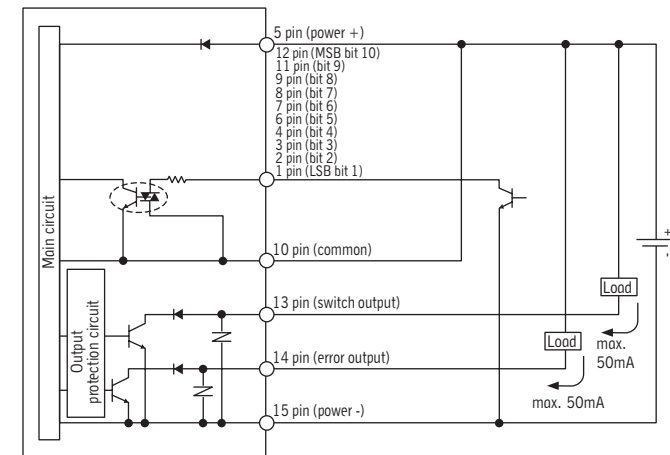


Internal circuit and connection

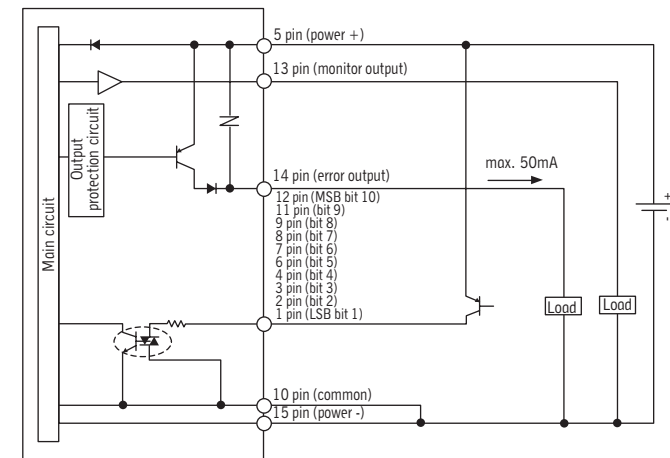
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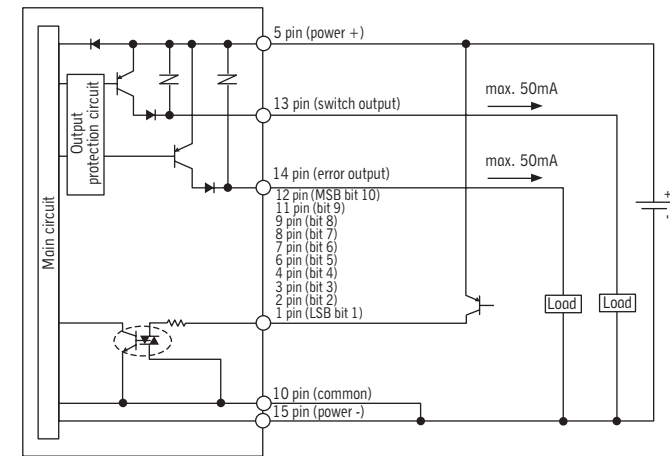
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- Product code-AP: Analog output + Error <PNP> Output type



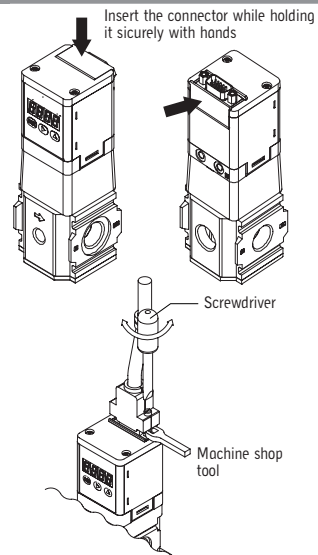
- Product code-SP: Switch output <PNP> + Error <PNP> Output type



Connector connecting

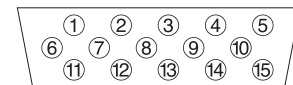
CAUTION

- Insert the D-sub connector to the depth securely.
 - The D-sub connector has a mechanism for turning 90°.
- When connecting the D-sub connector, insert it at the top or side position while holding it securely with hands.



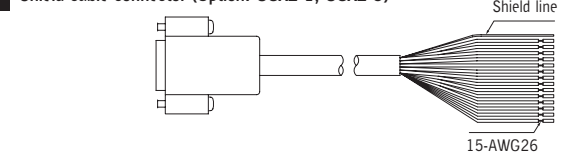
- Lock the D-sub connector so that it does not come off. To unlock, fix the fixing base with a machine shop tool or the like.

Connector pin array (Product body side)



Refer to the below "Connecting" for the wiring method.

Shield cable connector (Option: G8X2-1, G8X2-3)



Connecting

CAUTION

- Check the product code and take sufficient care of connection.
- Handle the unused monitor output, switch output or preset input so that it does not make contact with other cables (including shielded cables).
- Ground the shield wire on the power (-) side.

D sub socket pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Option cable isolator color	Brown	Orange	Yellow	Purple	Red	Pale Blue	Pink	White Black	Red Black	Gray	White	Green Black	Green	Blue	Black
Type of input	Input signal 1 bit	Input signal 2 bit	Input signal 3 bit	Input signal 4 bit	Power +24V DC	Power 5 bit	Power 6 bit	Input signal 7 bit	Input signal 8 bit	Common	Input signal 9 bit	Input signal 10 bit	Monitor/Switch output 1-5V DC	Error output NPN	Power PNP

Possible colour modification will be indicated on the cable's packaging.

Specification

Item	Type	ER2*-5P	ER2*-9P
Media		Cleaned air	
Max. working pressure		7 Bar	10 Bar
Min. working pressure		Control pressure + 1 Bar	
Pressure control range		0 ÷ 5 Bar (residual press 0,05 Bar or less)	0.5 - 9 Bar (residual press 0,09 Bar or less)
Power supply voltage		DC24V ± 10% (stabilized power supply with a ripple rate 1% or less)	
Consumption current		0.15A or less (rush current 0.6A or less when the power is turned on)	
Input signal		10 bit	
Output signal		Analog output 1-5VDC (load to be connected impedance 500kΩ or more) Switch output NPN or PNP, open collector output, 30V or less, 50mA or less, voltage drop 2.4V or less, compatible for usage in PLC and Relay	
Error output signal		NPN or PNP, open collector output, 30V or less, 50mA or less, voltage drop 2.4V or less, compatible for usage in PLC and Relay	
Direct memory set		0,05 ~ 5 Bar (setting min. width 0,01 Bar setting resolution 0,01 Bar)	0,09 ~ 9 Bar (setting min. width 0,01 Bar setting resolution 0,02 Bar)
Hysteresis *1)		0.5% F.S. or less	
Linearity *1)		± 0.3% F.S. or less	
Max. flow rate (ANR) *2)		1500 L/min	
Step response *3)		0.2sec. or less (No load)	
Ambient/Fluid temperature		5 ~ 50°C	
Protective circuit		Power reverse protect, Switch output reverse protect, Switch output load short protect	

1) Above characteristics are values where power voltage is 24VDC, and working pressure is "max. control pressure + 1 Bar [ER2-5P*: 6 bar, ER2*-9P*: 10 bar], and control pressure is 10 to 90%.

*2) Working pressure: Max. working pressure, Control pressure : Max. control pressure.

*3) Working pressure: Max. working pressure, Step rate: 50 → 100% F.S., 50 → 60% F.S., 50 → 40% F.S.

Name and Function of display/Operation Part

Output display (red)

F1 "F" is displayed during function setting.

F2 "2" is lit when the switch output is ON. (Only for switch output specifications)

F3 The bar blinks upon detection of an excessive current.

F4 "E" lights up upon an error output. The letter blinks upon detection of an excessive current.

*If there is an upper or lower limit in the function setting, one of the following is displayed.

F5 or **F6**

3-digit numerical LED display (green)

In the RUN mode (pressure display), the pressure or function setting data is displayed.

In the function setting data display mode, the setting mode number and setting are displayed.

During data entry, a value or other types of data are displayed.

Upon error display, the error code number is displayed.

<During pressure display> **F500**

<During setting display> **F100**

Setting mode number Setting

<Upon error output> **F000**

Code number

SET key

Use the key to start various setting modes.

Use the key to settle a value or the like during data entry.

Cursor key

Use the key to select the digit place of a value or the like during data entry.

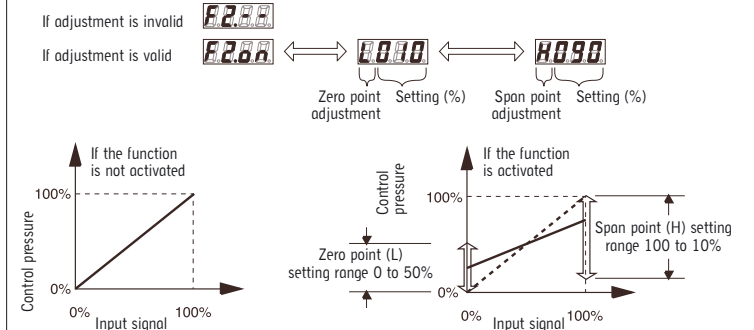
Display	Name	Displayed data (in RUN mode)	Setting (in setting mode)
F5.00	Pressure display	The secondary pressure can be checked at the three-digit number display LED. Unit: BAR 1 digit=0.01 BAR	
F1.000	Input signal selection	The selected input signal type on the current target value (conversion into pressure) can be checked. *Upon selection of the present input (8 points), the currently selected present number and the target value are displayed.	<In case of analog type> The analog input, preset memory input or direct memory input can be selected. In case of the preset or direct memory input, enter the setting in this mode. <In case of parallel type> The parallel input or direct memory input can be selected. In case of the direct memory input, enter the target value in this mode.
F2.00	Zero/span adjustment	Availability of zero/span adjustment and the settings can be checked. If adjustment can be made, "F2" is displayed, then the adjusted zero point setting (L) and the adjusted span point setting (H) alternate. *In the factory shipment state, the full scale (- -) is selected.	Use in the full scale or adjust the zero and span settings upon selection. If zero/span adjustment is selected, adjust the values in this mode to the desired settings.
F3.00	Auto power off	The setting of the auto power-off function can be checked. *In the factory shipment state, the function is invalid (- -).	Select whether the auto power-off function is valid or invalid. Note: The interval to auto power-off is about one minute. The interval may be changed.
F4.00	Switch output *Switch output specifications only	The switch output function and the setting can be checked. If "mode 1 valid" is selected, "F4.1" is displayed, then the "negative" limit setting (L) and "positive" limit setting (H) alternate. If "mode 2 valid" is selected, "F4.2" is displayed, then the lower limit setting (L) and the upper limit setting (H) alternate. *In the factory shipment state, the function is invalid (- -).	Select whether the switch output function is valid or invalid. If the function is valid, you can select either "mode 1 or mode 2". Enter the desired positive and negative allowable values and the upper and lower limit values. Note: The hysteresis width may not be entered.
F5.00	Proportional value change	Proportional value change and the setting level can be checked. In case of "proportional value increase", "F5.H" is displayed. In case of "proportional value decrease", "F5.L" and the setting level are displayed alternately. *In the factory shipment state, the standard value (-) is specified.	Operate in the standard value state, or operate with a desired proportional value upon selection. Only when "proportional value decrease" is selected, the desired proportional value level can be specified in this mode.

RUN mode Display list

F1 (select input signal) Display F1 contents The input signal type and target value alternate.

Input signal type symbol	Description	Input signal type symbol	Description
F100	Analog 0-10 VDC input	F1PA	Parallel 10-bit input
F101	Analog 0-5 VDC input	F1PB	Direct memory input
F102	Analog 4-20 mA DC input		
F1P1 F1P8	Preset memory input Selected preset no. is displayed.		
F1B2	Direct memory input		

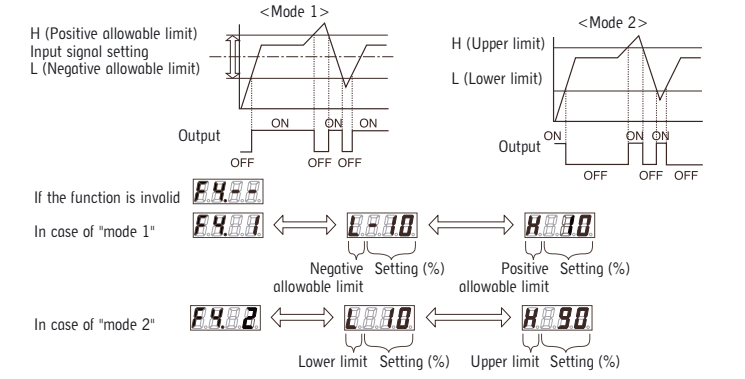
F2 (Zero and Span Adjustment) Display F2 contents Availability of the zero/span adjustment and the settings can be checked. Note: This function is invalid if the preset memory input or direct memory input is selected in the F1 mode.



F3 (Auto Power-off) Display F3 contents The setting of the auto power-off function can be checked.

If the function is not activated **F3.00** If the function is activated **F3.01**

F4 (Switch Output) Display F4 contents Availability of the switch output function and the setting can be checked. Note: This function is invalid for the analog output specification.



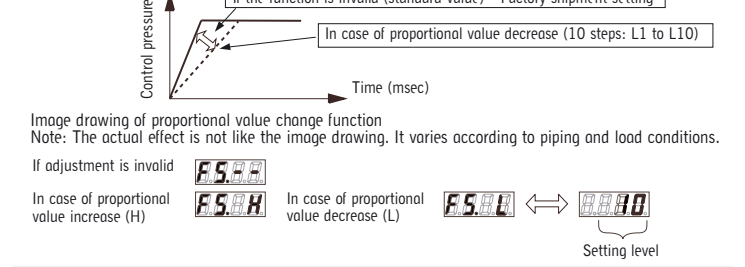
F5 (Proportional Value Change) Display F5 contents The proportional value change validity setting and the setting level can be checked.

If adjustment is invalid: The control uses the standard value (factory shipment setting).
If adjustment is valid: "Proportional value increase" or "proportional value decrease" can be selected. Only when "proportional value decrease" is selected, the setting level can be selected among 10 steps.

<Effect of proportional value increase>
According to some operation conditions (such as piping and load capacity), more accurate control can be obtained. However, hunting is likely to be caused. Be careful when using the function.

<Effect of proportional value decrease>
According to some operation conditions (such as piping and load capacity), more stable control can be obtained.

The option is effective in particular for systems with large fluctuation of the control pressure or hunting.

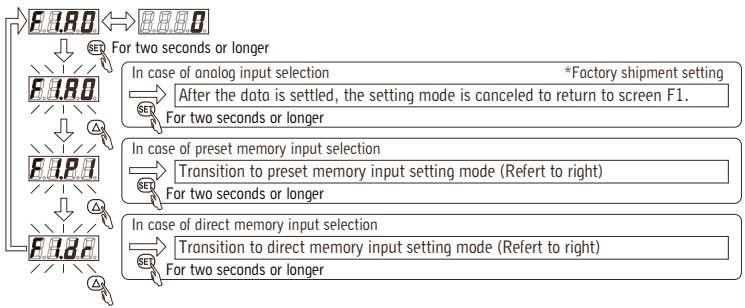


SETTING Mode Setting method

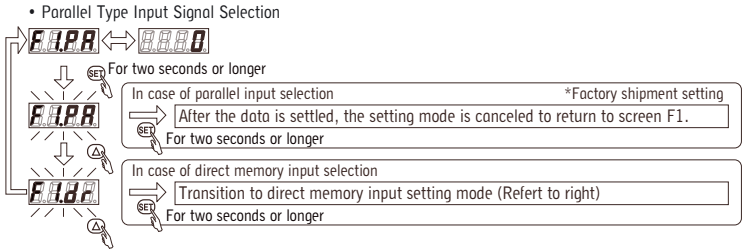
CAUTION Before changing the setting, unlock the key.

F1 (Select input signal) Press and hold the [SET] key at least for two seconds in the state of screen F1. The "F1 setting mode" starts.

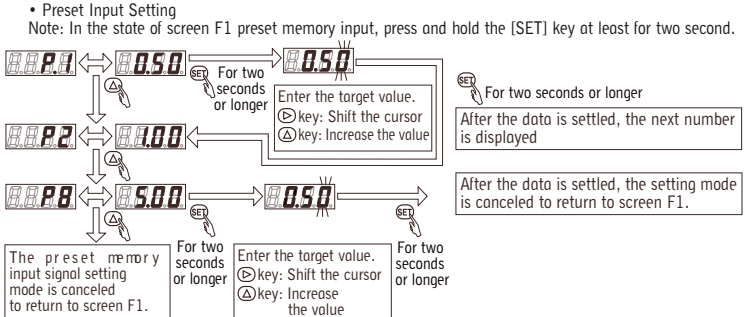
Analog Type Input Signal Selection Note: The analog input specification may not be changed.



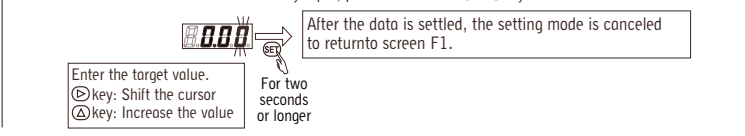
The input signal selection setting mode is canceled, to return to screen F1.



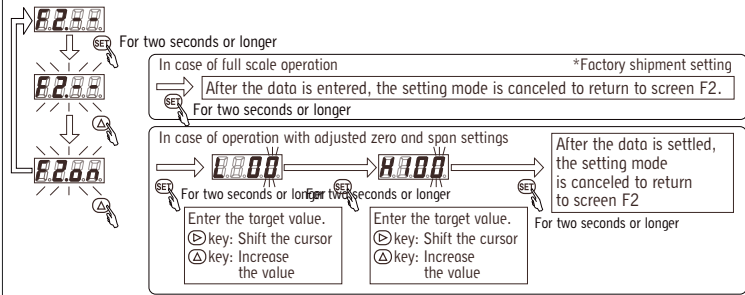
The input signal selection setting mode is canceled, to return to screen F1.



Direct memory Input Setting
* In the state of screen F1 Direct Memory Input, press and hold the [SET] key at least for two seconds.



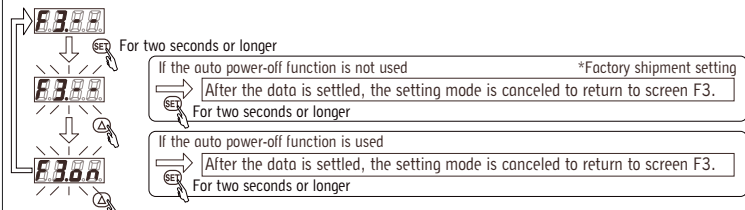
F2 (Zero and Span Setting) In the state of screen F2, press and hold the [SET] key at least for two seconds. The "F2 setting mode" starts.



The zero/span adjustment setting mode is canceled to return to screen F2

* In the preset memory input or direct memory input is selected at F1 (input signal selection function), this function may not be used. Only full-scale operation is permitted.

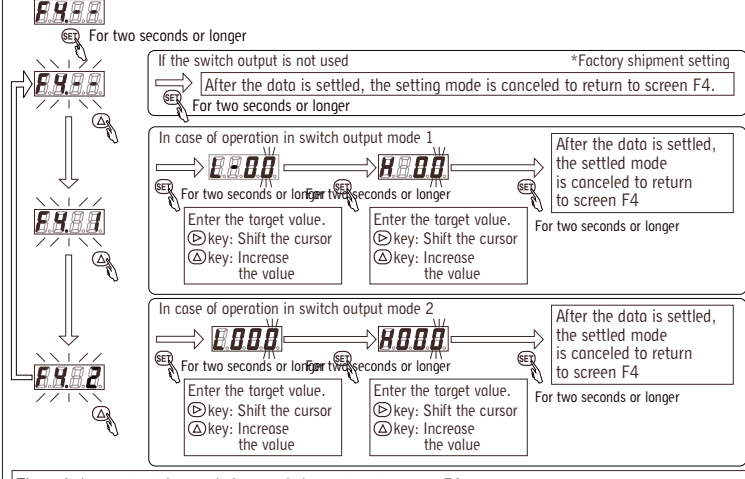
F3 (Auto Power-Off Setting) In the state of screen F3, press and hold the [SET] key at least for two seconds. The "F3 setting mode" starts.



The auto power-off setting mode is canceled to return to screen F3

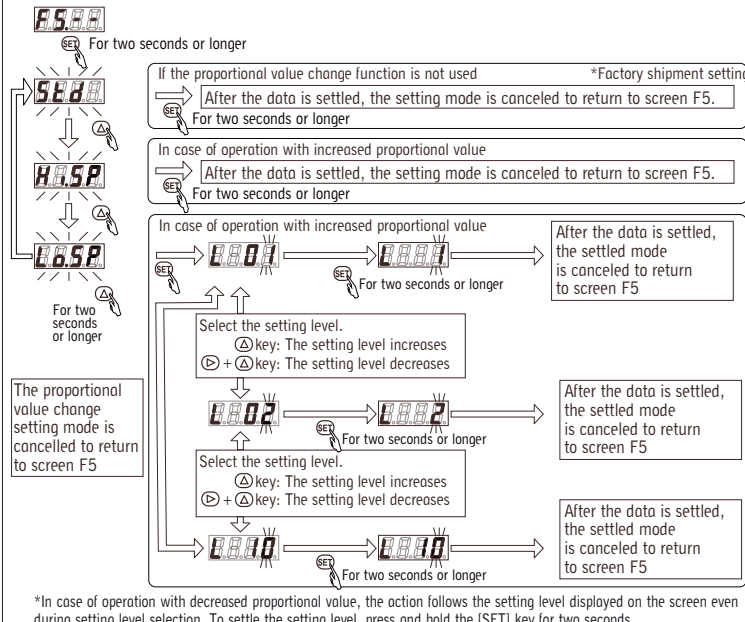
*Press any key in the auto power-off mode to recover the display.
*The auto power-off setting interval is about one minute. The interval may not be changed.

F4 (Switch Output Setting) In the state of screen F4, press and hold the [SET] key at least for two seconds. The "F4 setting mode" starts.



The switch output setting mode is canceled, to return to screen F4.

F5 (Proportional Value Change) In the state of screen F5, press and hold the [SET] key at least for two seconds. The "F5 setting mode" starts.



*In case of operation with decreased proportional value, the action follows the setting level displayed on the screen even during setting level selection. To settle the setting level, press and hold the [SET] key for two seconds.

Key Lock

This function locks the keys against erroneous operation. Unlock when changing settings.



Press and hold at least for two seconds at the same time.

*The keys are locked when the power is turned on (for the first time or again).



Press and hold at least for two seconds at the same time.

Setting Range of Each Function

Function	Setting display screen	Setting	Setting specifications
F1: Input signal selection function ~In case of preset memory input~	F1P1 F1P8	Enter the target value (pressure)	Range: 5/0.00 to 5.00 Note 1 9/0.00 to 9.00 Minimum input increment: 0.01 bar
F1: Input signal selection function ~In case of direct memory input~	F1B2	Enter the target value (pressure)	Range: 5/0.00 to 5.00 Note 1 9/0.00 to 9.00 Minimum input increment: 0.01 bar
F2: zero/span adjustment function	F2.00 H100	Enter the zero point adjustment value	Range: 00 to 50 Note 2 Minimum input increment: 1
	F2.01	Enter the span point adjustment value	Range: 100 to 010 Note 2 Minimum input increment: 1
F4: switch output function ~In case of mode 1~	F4.00 H000	Enter the "negative" allowen limit	Range: -00 to -50 Minimum input increment: 1
	F4.01	Enter the "positive" allowen limit	Range: 00 to 50 Minimum input increment: 1
F4: switch output function ~In case of mode 2~	F4.02 H100	Enter the lower limit value	Range: 00 to 90 Note 2 Minimum input increment: 1
	F4.03	Enter the upper limit value	Range: 100 to 010 Note 2 Minimum input increment: 1
F5: Proportional Value Change ~In case of operation with increased proportional value~	F5.H	Modification of the level setting is disabled	
F5: Proportional Value Change ~In case of operation with decreased proportional value~	F5.L	The desired setting level can be designated	Range: 01 to 10 Minimum input increment: 1

Note 1: If set to 0.01 Bar or less, it may not be possible to control pressure due to the effect of residual pressure.
Note 2: The setting range may be limited depending on the setting.

Factory Shipment Mode Setting (initialization)

Screen display	Name	Setting display	Setting descriptions	<Initialization method>
Screen F1 F1.00	Input signal selection	Analog type Parallel type A0.A1.A2	Analog/parallel input	Press and hold at least for three seconds at the same time
Screen F2 F2.00	Zero/span adjustment	F2.00	Full scale (Zero/span adjustment invalid)	During initialization
Screen F3 F3.00	Automatic power off	F3.00	Automatic power-off invalid	
Screen F4 F4.00	Switch output *Switch output specifications only	F4.00	Switch output invalid	
Screen F5 F5.00	Proportional Value Change	F5.00	Standard setting (Proportional value change invalid)	Finished

Error Cod

Error display	Cause	Remedy
E001	The source voltage is out of the rated range	Refer to the power supply, specification of this product. Restore the source voltage to the rated range and turn the power again.
E002	The input signal is supplied outside the rated range	Check the input signal type of this product and restore it within the rated range. Turn the power on again.
E003	An error is caused when EEPROM is read or written.	Contact the nearest Camozzi's sales office or agency.
E004	An error is caused when memory is read or written	Contact the nearest Camozzi's sales office or agency.
E005	The secondary pressure does not reach the set pressure value within five seconds	Check the supply pressure of the primary circuit, and supply the pressure within the rated range, turn power again. Check leakage from the piping, joints or devices are free, connect correctly and turn the power on again. Contact the nearest Camozzi's sales office or agency.
E006	The overcurrent protection circuit for the switch is activated	Check if the load current does not exceeds the rated current, connect correctly and turn the power on again.

If one of above errors occurs, the error output is issued together with error display.