

PRESSURE SWITCHES CONTENTS



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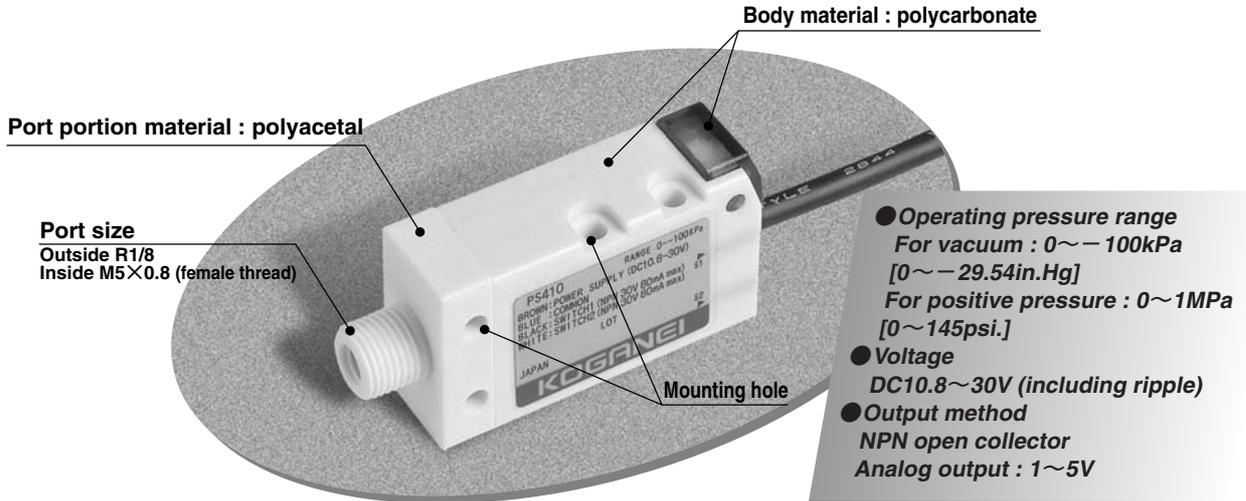
Caution

Before use, be sure to read the "Safety Precautions" on p. 49.

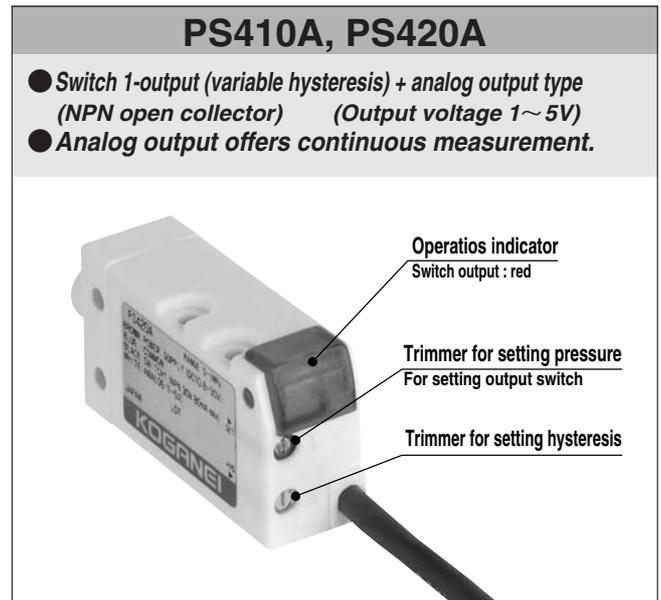
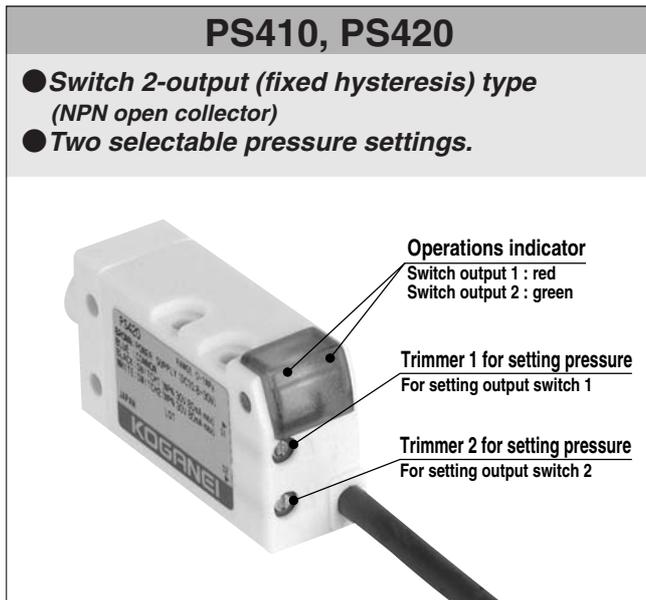
ELECTRONIC PRESSURE SWITCHES

PS4 Series

Highly reliable and more responsive solid state type.
Achieves precision and advanced performance of $\pm 3\%$ F.S!
Three-directional mounting boosts design layout flexibility!



■ Output specifications are of **TWO** types, for flexible use!



Order Codes

PS4

Electronic pressure switch

Operating pressure range
 10: For vacuum 0~-100kPa [0~-29.54in.Hg]
 20: For positive pressure 0~1MPa [0~145psi.]

Output specification
 Blank : Switch 2-output (fixed hysteresis)
 A : Switch 1-output (variable hysteresis) + analog output

Caution: Be aware that there are two types of switch output, fixed hysteresis and variable hysteresis.

Specifications

Electronic pressure switches PS4 series

Item	Type Model	Vacuum	Positive pressure	Vacuum	Positive pressure	
		Switch 2-output (fixed hysteresis)		Switch 1-output (variable hysteresis) + analog output		
		PS410	PS420	PS410A	PS420A	
General	Pressure range	0~−100kPa [0~−29.54in.Hg]	0~1MPa [0~145psi.]	0~−100kPa [0~−29.54in.Hg]	0~1MPa [0~145psi.]	
	Rated pressure	−100kPa [−29.54in.Hg]	1MPa [145psi.]	−100kPa [−29.54in.Hg]	1MPa [145psi.]	
	Maximum pressure	200kPa [29.0psi.]	1.5MPa [218psi.]	200kPa [29.0psi.]	1.5MPa [218psi.]	
	Breaking pressure	500kPa [72.5psi.]	2.0MPa [290psi.]	500kPa [72.5psi.]	2.0MPa [290psi.]	
	Operating temperature	−20~70°C [−4~158°F]				
	Compensation temperature	0~50°C [32~122°F]				
	Storage temperature	−20~80°C [−4~176°F] (Humidity of 65% RH or less, atmospheric pressure)				
	Operating ambient humidity	35~85% RH				
	Applicable media	Air or non-corrosive gas				
	Insulation resistance	100MΩ MIN. (at DC500V megger)				
	Dielectric strength	AC500V, 1 minute				
	Cable	Shielded 4-lead				
	Mass	50g [1.76oz.]				
Power supply	Voltage	DC10.8~30V (including ripple)				
	Consumption current	25mA or less ^{Note 1}		17mA or less ^{Note 1}		
Switch output	Number of outputs	2		1		
	Output method	NPN open collector				
	Pressure setting method	Variable, with use of trimmer				
	Pressure setting range	0~100% of the rated pressure				
	Output display	When ON, operation indicator (LED) lights up.				
	Accuracy	±3% F.S. or less ^{Note 2}				
	Hysteresis	2% F.S. or less (fixed)		Variable by 1-15% of the set value (reference value)		
	Switch capacity	DC30V, 80mA MAX.				
	Residual voltage	0.8V or less (at inrush current 80mA)				
	Response speed	1ms (reference value)				
Analog output	Output voltage			1~5V		
	Zero-point voltage (V ^{ZERO})			1±0.1V		
	Span voltage (V ^{SPAN})			4±0.1V		
	Temperature characteristics	V ^{ZERO}			±0.1% F.S./°C ^{Note 2}	
		V ^{SPAN}			±0.1% F.S./°C ^{Note 2}	
	Output current			1mA or less ^{Note 3}		
Linearity/hysteresis			±0.5% F.S. MAX.			
Environmental characteristics	Vibration resistance	98.1m/s ² [10G]				
	Shock resistance	490m/s ² [50G] (Non-repeated shock)				
	Continuous operation	10 ⁸ times MIN. (0~rated pressure)				
	Humidity resistance	90~95% RH 240 hours (40°C [104°F])				

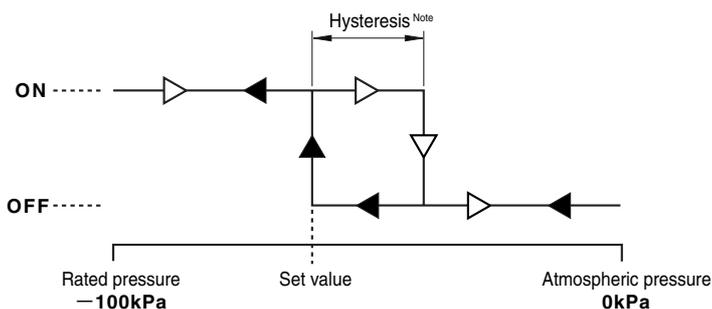
- Notes: 1. With power voltage of DC24V when output is ON.
 2. At 0~50°C [32~122°F]; reference point 25°C [77°F].
 3. Load resistance of 5kΩ or more.

Remark: Unless otherwise specified, the defined condition is an ambient temperature of 25±5°C [77±9°F], and power voltage of DC12V.

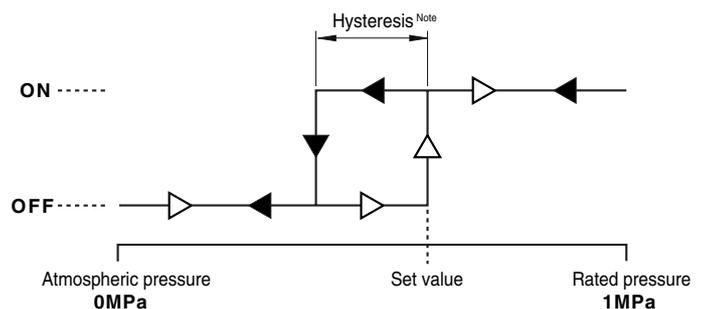
Switch Operation

Switches to ON at the set pressure, and switches to OFF when the hysteresis value is reached.

PS410



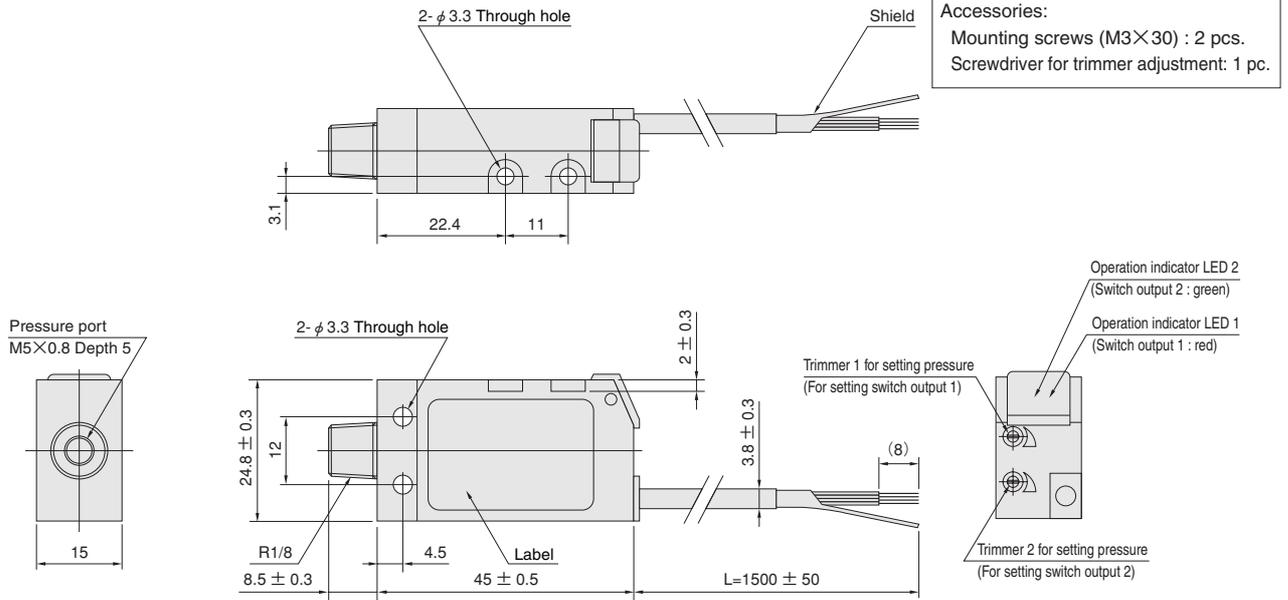
PS420



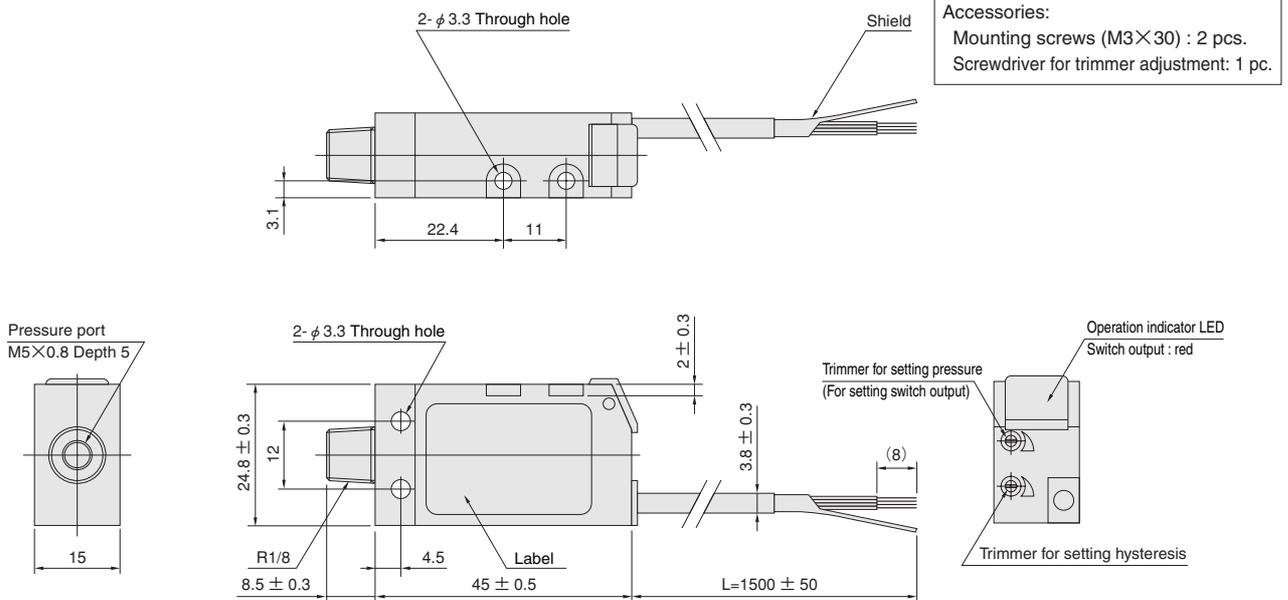
Note: The PS410 and PS420 types are fixed hysteresis (2% F.S. or less).

Dimensions (mm)

● PS410, PS420 Switch 2-output (fixed hysteresis) type

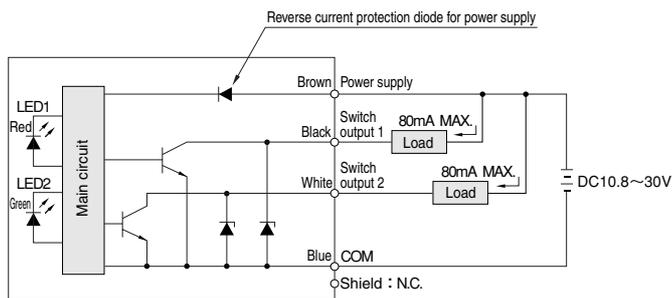


● PS410A, PS420A Switch 1-output (variable hysteresis) + analog output type



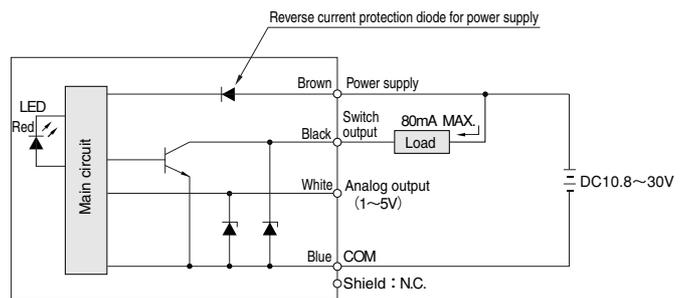
Internal Circuit

● PS410, PS420



Internal circuit \rightarrow External wiring

● PS410A, PS420A



Internal circuit \rightarrow External wiring

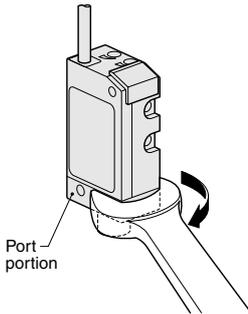


Mounting and piping

Piping

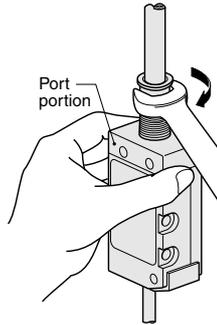
● When R1/8 male thread is used

Hold the body port portion to tighten, and do not exceed a tightening torque of $4.9\text{N}\cdot\text{m}$ [$3.6\text{ft}\cdot\text{lbf}$] to secure. If necessary, use sealing tape.



● When M5 female thread is used for attaching fitting

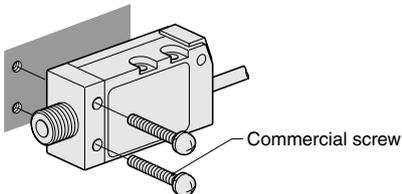
Hold the body port portion to tighten, and do not exceed a tightening torque of $0.49\text{N}\cdot\text{m}$ [$0.36\text{ft}\cdot\text{lbf}$] to secure.



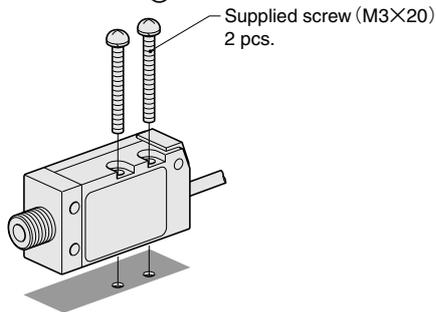
- Cautions:**
1. Tightening in excess of the specified tightening torque could result in damage to the pressure switch.
 2. The only area where the wrench may be applied is the port portion. Do not use the wrench on any other location.
 3. Always thoroughly blow off (use compressed air) or air blowing the tubing before piping. Be careful to prevent chips, sealing tape, or rust, etc., generated during piping work from entering into the pipes.

Mounting body

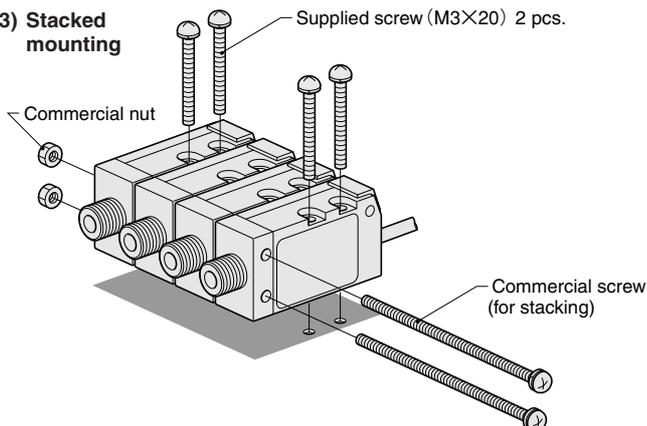
(1) Side mounting



(2) Flat mounting

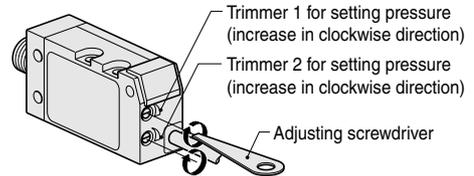


(3) Stacked mounting



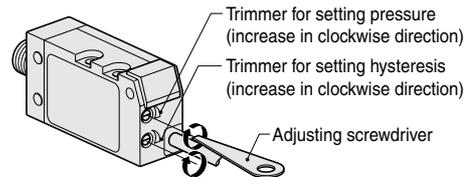
Setting

● PS410, PS420 Switch 2-output (fixed hysteresis) type



- 1) Apply pressure to activate switch 1, and then rotate the pressure setting trimmer 1 to set. (When switch output 1 is ON, the operation indicator (red) lights up.)
- 2) Apply pressure to activate switch 2, and then rotate the pressure setting trimmer 2 to set. (When switch output 2 is ON, the operation indicator (green) lights up.)

● PS410A, PS420A Switch 1-output (variable hysteresis) + analog output type



- 1) Use the Trimmer for setting hysteresis to set the hysteresis to an appropriate value.
- 2) Apply pressure to activate the switch, rotate the trimmer for setting pressure, and set.
- 3) Repeat steps 1) and 2) above to determine the setting points.

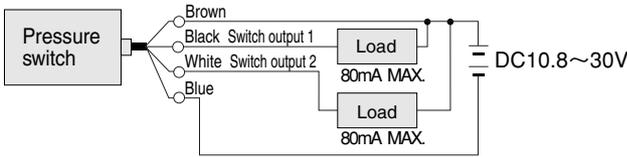
- Cautions:**
1. When using the trimmer for setting, be careful to avoid applying excessive force.
 2. The rotation torque for the trimmer for setting hysteresis should not exceed $4.4\text{N}\cdot\text{cm}$ [$0.39\text{in}\cdot\text{lbf}$].
 3. If the pressure setting trimmer is rotated too far, clicking sounds warn that it is beyond the normal adjustment range. Return the pressure setting trimmer to within the adjustment range in the case.

Handling Instructions and Precautions

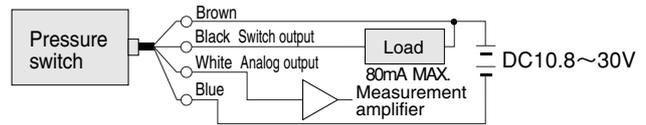
Wiring instructions

Basic connection

●PS410, PS420 Switch 2-output (fixed hysteresis) type

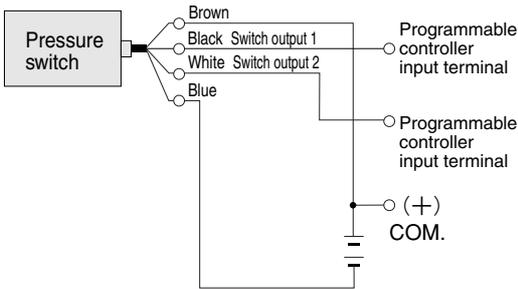


●PS410A, PS420A Switch 1-output (variable hysteresis) + analog output type

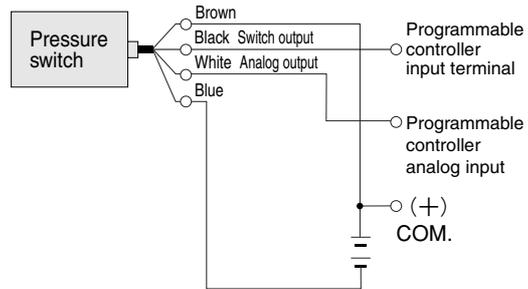


Connection to programmable controller

●PS410, PS420 Switch 2-output (fixed hysteresis) type



●PS410A, PS420A Switch 1-output (variable hysteresis) + analog output type



- Cautions:**
1. For the power supply, use a stable direct current power supply. If using a power supply unit such as a switching power supply, use it with the FG terminal grounded.
 2. Pay attention to the color of the lead wire to connect. Miswiring could cause incorrect operation or damage.
 3. Do not short-circuit the switch output terminal with any other terminal, nor connect to a low-resistance load with a current exceeding 80mA. Such actions will damage the internal circuits.
 4. Use a surge protection diode, etc., for relays and other inductive loads.



General precautions

1. This product does not feature a drip-proof or dust-proof construction. Do not use in locations subject to dripping water, dripping oil, or dust, etc., or in corrosive atmospheres.
2. Do not use corrosive gases or fluids in the medium.
3. Do not apply pressure in excess of the maximum pressure value.
4. Do not subject the lead wires to strong pulling force or excessive bending. In addition, when handling the product, always hold it by the body and avoid applying excessive force to the power cord.
5. As subjecting the pressure switch to strong shocks could lead to damage or erratic operation, be careful when handling it.

PRESSURE SWITCHES

PS1, PS2

- The pressured area uses a highly reliable bellows for accurate detection of set pressure.
- Two types are available, a differential pressure fixed type and differential pressure adjusting type. The differential pressure adjustment type can be set to each ON and OFF switching range.
- A switch with indicator is offered as an option. Helps determine at a glance whether the operating pressure is at an optimal level or not.

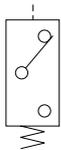


PS1



PS2

Symbol



Specifications

Item	Model	PS1	PS2
		Differential pressure fixed type	Differential pressure adjusting type
Media		Air	
Operating temperature range (atmosphere and media) ^{Note 1}	°C [°F]	-20 ~ 70 [-4 ~ 158]	
Maximum operating pressure	MPa [psi.]	1.47 [213]	1.47 [213]
Proof pressure	MPa [psi.]	2.21 [320]	2.21 [320]
Airtight pressure ^{Note 2}	MPa [psi.]	1.62 [235]	
Pressure adjusting range ^{Note 3}	MPa [psi.]	0.1 ~ 0.6 [15 ~ 87]	0.1 ~ 1.0 [15 ~ 145]
Differential pressure adjusting range	MPa [psi.]	—	0.1 ~ 0.3 [15 ~ 44]
Hysteresis	MPa [psi.]	0.05 ± 0.02 [7.3 ± 2.9]	—
Repeatability	MPa [psi.]	± 0.02 [2.9]	
Shock resistance	m/s ² [G]	9.8 [1.0]	
Insulation resistance	MΩ	Min. 100 (500V megger)	
Contact point dielectric strength		AC1500V, 1 minute	
Wiring		Lead wire type, length : 500mm [20in.] ^{Note 4}	Crimping terminal type
Lead wire port	Standard	Grommet	
	Optional	—	With adaptor for conduit tube
Indicator	Optional	LED for both AC and DC	Neon lamp for AC, LED for DC
Mounting bracket		None	Standard accessory
Mounting direction		Any	
Pressured area material		Copper alloy bellows	
Mass	g [oz.]	150 [5.29]	300 [10.58]

- Notes: 1. At 0°C [32°F] or less, and no freezing conditions.
 2. Airtight pressure applied to pressured area (bellows).
 3. For a summary of pressure regulation, see p.504.
 4. Made to order available, at 1000 [39in.], 2000 [79in.], and 3000mm [118in.].

Operating Current Range

Operating current range	Model	PS1			PS2		
		Rated voltage	AC100V	AC200V	DC24V	AC100V	AC200V
Upper limit voltage		AC125V	AC250V	DC26.4V	AC125V	AC250V	DC26.4V
Lower limit voltage		AC90V	AC180V	DC21.6V	AC90V	AC180V	DC21.6V
Inductive load	Continuous	0.02 ~ 2	0.02 ~ 1	0.02 ~ 0.5	0.01 ~ 8.5	0.005 ~ 4.5	0.01 ~ 3
	Inrush	8MAX.	4MAX.	2MAX.	40MAX.	20MAX.	10MAX.
Non-induction load		0.02 ~ 2	0.02 ~ 1	0.02 ~ 0.5	0.01 ~ 10	0.005 ~ 5	0.01 ~ 5

Order Codes

● Differential pressure fixed type

PS1 -

- Indicator**
 Blank — No indicator
 AL — With indicator for AC100V
 BL — With indicator for AC200V
 DL — With indicator for DC24V

Differential pressure fixed type pressure switch

● Differential pressure adjusting type

PS2 - -

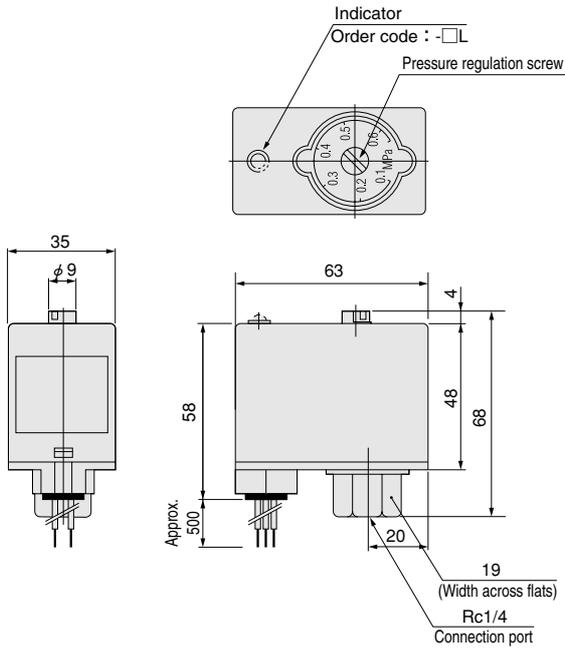
- Lead wire port**
 Blank — Grommet
 T — With adaptor for conduit tube

- Indicator**
 Blank — No indicator
 AL — With indicator for AC100V and 200V
 DL — With indicator for DC24V

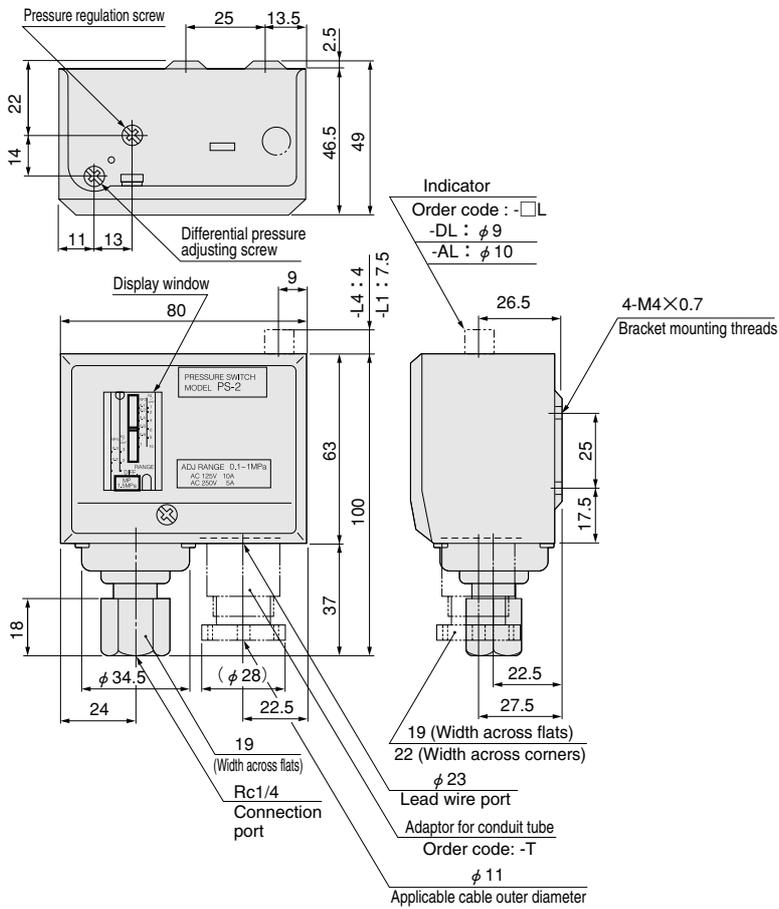
Differential pressure adjusting type pressure switch

Dimensions (mm)

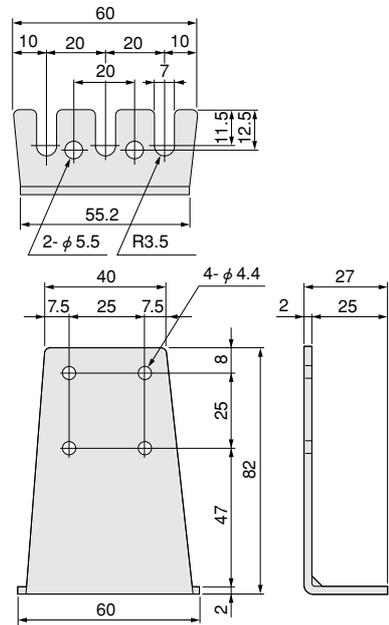
PS1



PS2



Mounting bracket



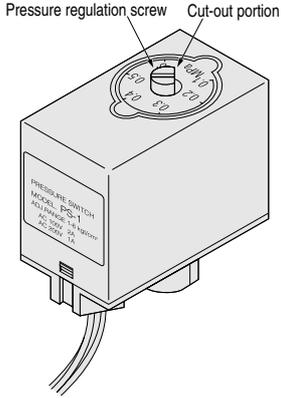
● The mounting bracket can be attached facing forward or backward at 90° angles for a total of eight placements.

Handling Instructions and Precautions

Pressure regulation

PS1

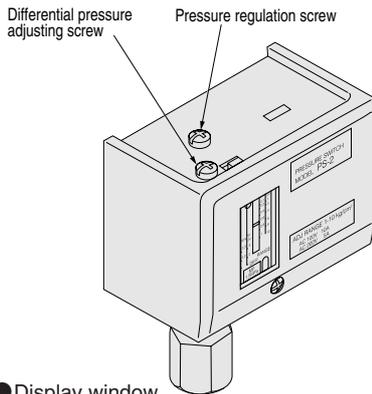
Rotate the pressure regulation screw, align the cut-out portion of the pressure regulation screw to the numbers on the scale, and set to the set pressure. The switch is triggered when the air pressure rises as far as the set pressure, and returns to its original state when the pressure falls to the "set pressure - 0.05MPa [-7psi.]".



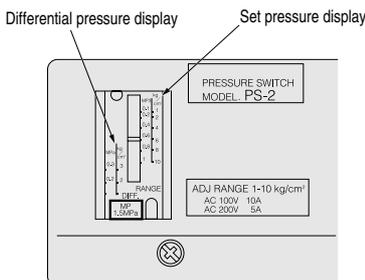
Caution: Use the pressure indicator scale to roughly measure the pressure. For more accurate pressure adjusting, connect and use a pressure gauge.

PS2

PS2 is a differential pressure adjusting type, and the setting of differential pressure that activates the switch can be anywhere in the range of -0.1 [-15psi.] to -0.3MPa [-44psi.]. First, rotate the pressure regulation screw to set the set pressure, and then rotate the differential pressure adjusting screw to set the differential pressure to either ON or OFF. At this time, the set pressure and differential pressure are indicated in the display window on the front of the switch body, with RANGE showing the set pressure, and DIFF showing the differential pressure.



Display window



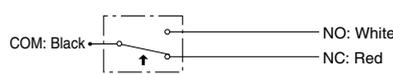
Caution: In terms of the numbers on the scale, less than 0.05MPa [7.3psi.] error is allowed. For fine-tuning adjustment, apply the set pressure to check the switching operation.

Wiring instructions

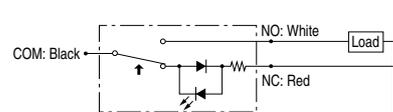
PS1

PS1 wiring uses the lead wire method. Care must be taken with the NC and NO contacts, and the color of lead wire. The arrow in the diagram below ↑ shows the direction of rising pressure. When the indicator rises above the set pressure, the light goes off, and when the value falls below the set pressure, the light comes on again as a warning.

Standard



With indicator AC100V, AC200V



DC24V

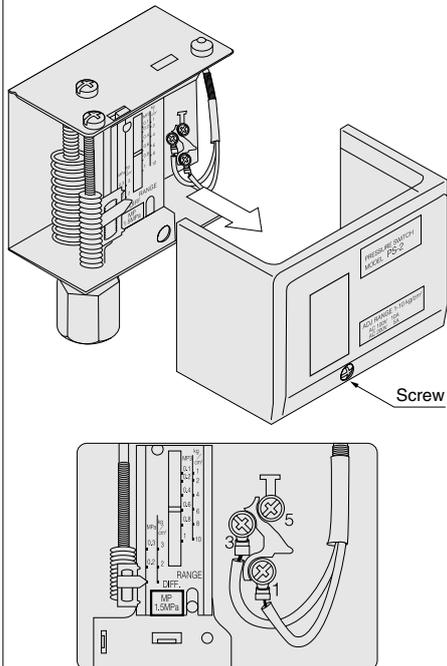


Caution: For the with indicator type, always connect the load to the NO side.

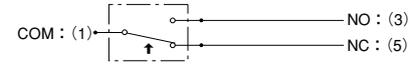
PS2

PS2 wiring uses the crimping terminal type. Remove the front screw and cover. The terminal block inside appears as shown in the illustration below. Connect the wiring so that the NC and NO contacts are aligned with the terminal No. Numbers in parentheses in the circuit diagram in the next column show the terminal No., and arrow ↑ shows the direction of increasing pressure.

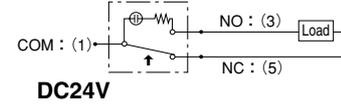
When the indicator lamp pressure rises above the set pressure, the indicator lamp goes off, and when the value falls below the set pressure, the indicator lamp comes on again as a warning. When the indicator remains ON even when it rises above the set pressure, connect the indicator to terminal (5) and the load to the NC side.



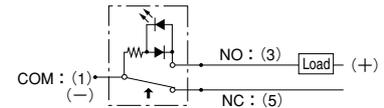
Standard



With indicator AC100V, AC200V



DC24V



Caution: For the with indicator type, always connect the load to the NO side. If connection to the NC side is required, connect the indicator to terminal (5).

Mounting

While any mounting directions are acceptable, avoid mounting the switch body in locations where it may be subject to high temperature heat radiation because the pressure switch cover is made of plastic.

Caution: During mounting and piping, do not use a wrench directly on the pressure switch body. To tighten, always use a wrench applied to the hexagonal piping connection port portion.

Media

1. Use air for the media. For the use of any other media, consult us.
2. Use clean air that does not contain deteriorated compressor oil or other contaminants. Install an air filter (with filtration of a minimum 40 μm) close to the pressure switch to eliminate any collected liquid or dust. Moreover, clean the air filter at regular intervals.

Atmosphere

The product cannot be used when the media or the ambient atmosphere contains any of the substances listed below. Organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, or acids, etc.

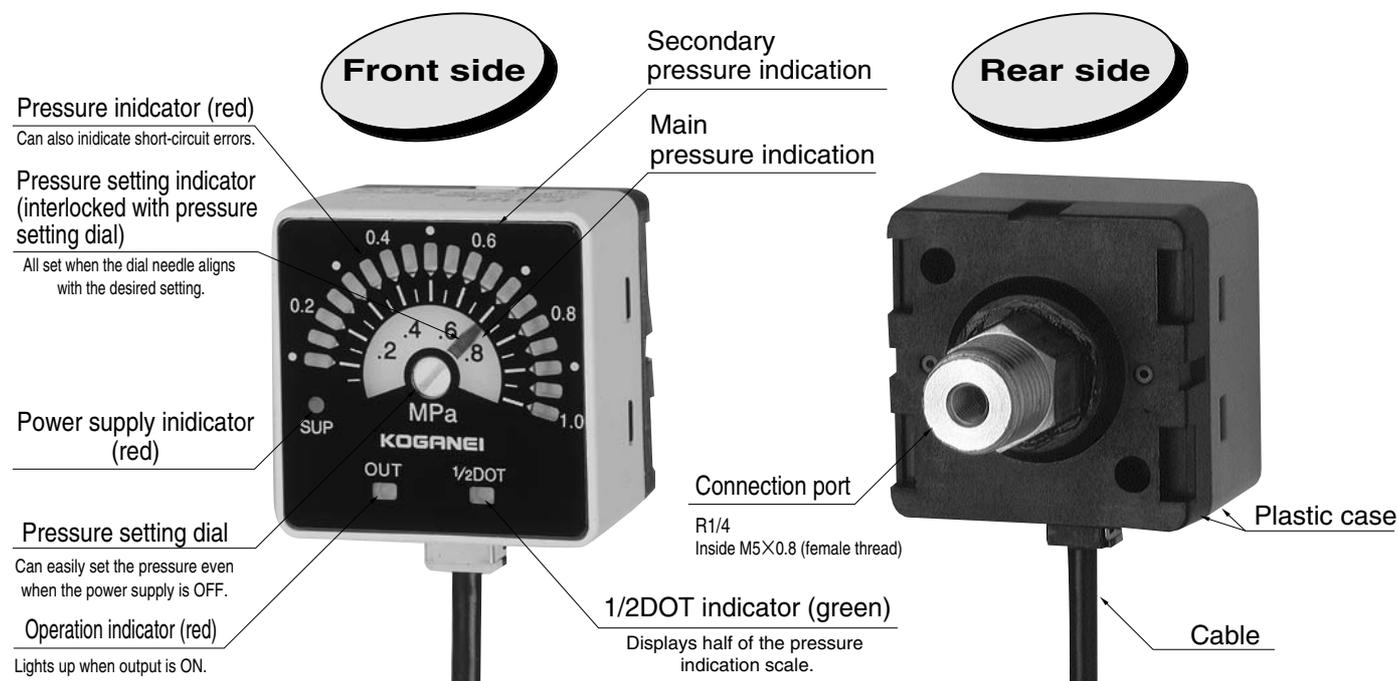
PRESSURE GAUGES WITH ELECTRONIC SWITCHES

EG110, EG120, EG121

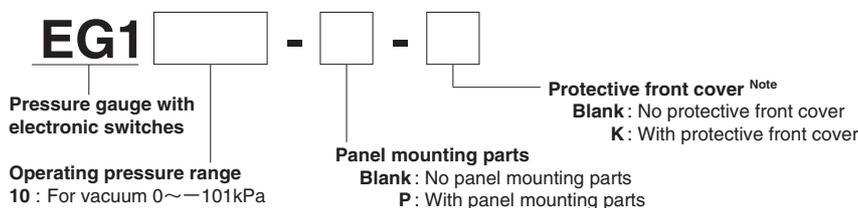
Reliably measures the pulsating pressure in locations that the conventional Bourdon tube pressure gauge has always had difficulty with, and without worries about breakage.

The pressure gauge comes equipped with an LED analog indication using a semiconductor pressure transducer.

The electronic mode, without any mechanical moving parts, assures longer operating life, better reliability, and higher precision than the Bourdon tube pressure gauge.



Order Codes



- Operating pressure range**
- 10 : For vacuum 0~-101kPa [0~-14.6psi.]
 - 20 : For positive pressure 0~1MPa [0~145psi.]
 - 21 : For positive pressure 0~100kPa [0~14.5psi.]

Note: The protective front cover may be selected only when the panel mounting parts are selected. The protective front cover cannot by itself be mounted on the pressure gauge with electronic switches.

Additional parts (to be ordered separately)



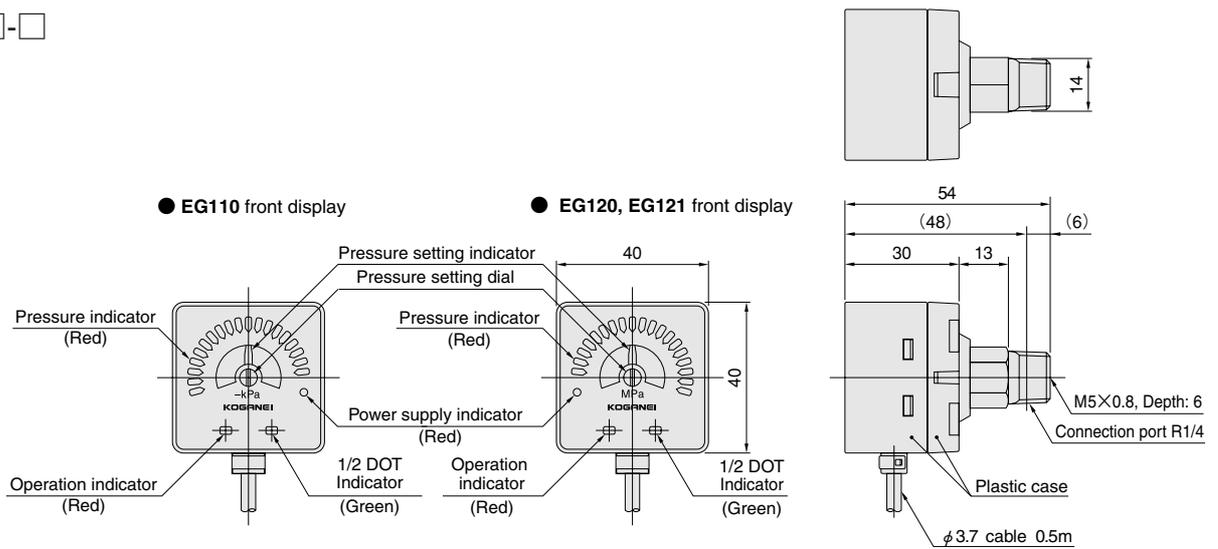
Specifications

● Pressure gauges with electronic switches

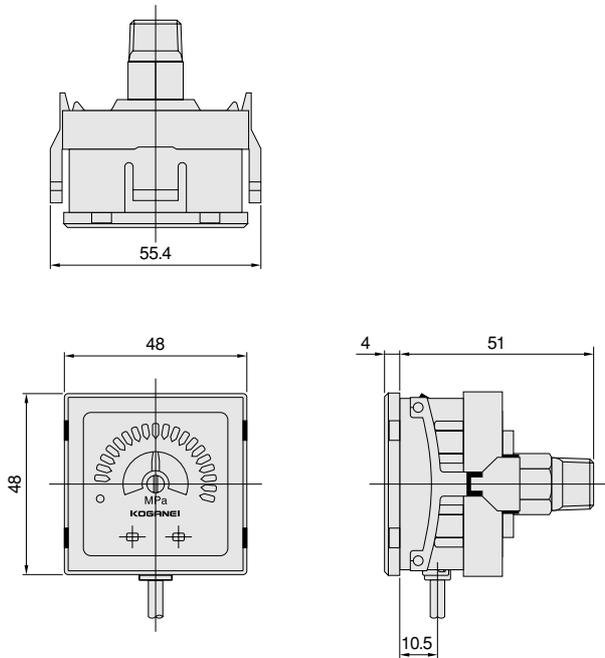
Item	Type Model	Vacuum	Positive pressure			
		EG110	100kPa type EG121	1MPa type EG120		
Rating	Rated pressure range	0~−101kPa [0~−14.6psi.]	0~100kPa [0~14.5psi.]	0~1.0MPa [0~145psi.]		
	Pressure setting range	−10~−90kPa [−1.5~−13.1psi.]	10~90kPa [1.5~13.1psi.]	0.1~0.9MPa [14.5~131psi.]		
	Indicator lamp	Pressure indicator	Red LED: Bar display Green LED: 1/2 dot display	(indication: Positive pressure type→Clockwise rotation, Vacuum pressure type→Counterclockwise rotation) Indication cycle: 10ms or less		
		Operation indicator	Red LED (when output is ON, lights up)			
		Power supply indicator	Red LED (when power supply is ON, lights up)			
	Proof pressure	490kPa [71psi.]		1.47MPa [213psi.]		
	Applicable media	Air or non-corrosive gas				
	Voltage	DC12~24V±10%, ripple tolerance P-P ±10% or less				
	Consumption current	40mA or less				
	Output	NPN transistor open collector (equipped with short-circuit protection function) ●Maximum inrush current 100mA ●Applied voltage DC30V max. ●Residual voltage 1V max. (inrush current 100mA) / 0.4V max. (inrush current 16mA) Output operation NO, NC (selectable by using the mode switching input line)				
Performance	Pressure sensitive element	Semiconductor type				
	Power supply voltage fluctuation	±1% F.S. or less				
	Non-linearity	±2% F.S. or less				
	Hysteresis	5% F.S.				
	Repeatability	±1% F.S. or less				
	Temperature characteristics	±5% F.S. or less (at temperature range of 0~50°C [32~122°F], as reference point 25°C [77°F])				
	Setting indicator accuracy	±2.5% F.S. or less (at median value)				
Environment	Response time	10ms or less				
	Operating ambient temperature	0~50°C [32~122°F], In storage : −10~60°C [14~140°F] (without condensation or freezing)				
	Operating ambient humidity	35~85% RH				
	Protective structure	IP40 (IEC144)				
	Vibration resistance	10~150Hz (total amplitude 0.75mm [0.03in.]), 2 hours in each of the XYZ directions (de-energized)				
	Shock resistance	98m/s ² [10G], 3 times in each of the XYZ directions (de-energized)				
	Dielectric strength	AC1000V one minute (between charging part and case)				
Structure/Materials	Insulation resistance	20MΩ or more (at DC500V megger)				
	Noise resistance	●Power supply line 240V or more ●Radiation 300V or more (in a pulse width 0.5μs by noise simulator)				
	Grounding method	Floating				
	Port size	R1/4, with M5×0.8 female thread inside				
	Front case, rear case	PBT				
	Front name plate	PC				
	Connection port	Brass (nickel plated)				
Cable	0.18SQ, 4-lead, Cabtyre cable φ 3.7 [0.146in.], 0.5m [1.6ft.]					
Mass	85g [3.0oz.]					

Dimensions (mm)

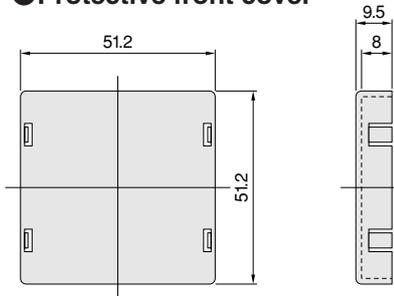
● EG1□-□



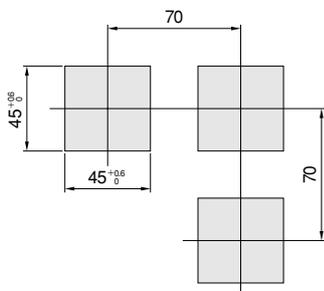
<Drawings for panel mounting parts>



● Protective front cover



● Cut panel dimensions (mm)



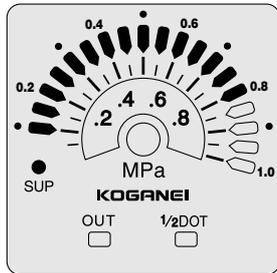
- Notes:
1. The mounting plate thickness should be 1 to 3.2mm.
 2. The cut panel dimensions are $45^{+0.6}_0 \times 45^{+0.6}_0$ mm.
 3. If mounting in a series, space the units at intervals of the value shown in the figure above or greater.
 4. Conformity **DIN43700**

Operating Pressure Settings

1) Pressure indication: The red LED bar indication has a lower resolution that is easy to read. In addition, the green LED “1/2DOT” offers pressure indication at higher resolution.

● (Example) EG120

Indicated pressure: 0.8MPa



0.825MPa



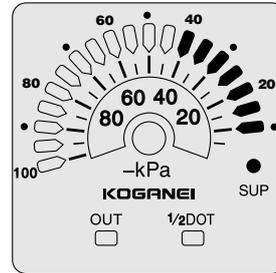
Green LED lights up

0.85MPa



● (Example) EG110

Indicated pressure: -40kPa

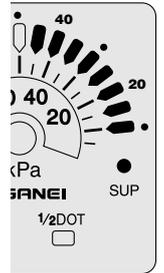


-42.5kPa



Green LED lights up

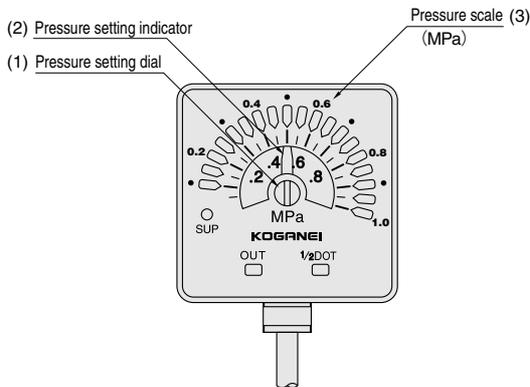
-45kPa



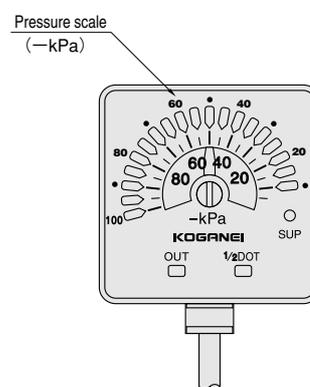
2) Pressure setting: The pressure setting uses (1) the pressure setting dial to move (2) the pressure setting indicator to align to (3) pressure scale.

<Operation parts>

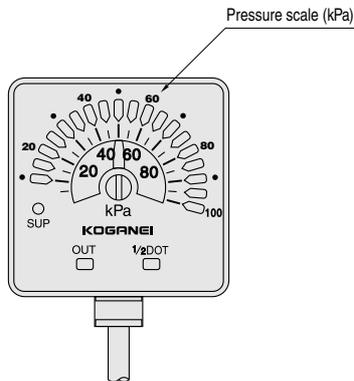
●EG120



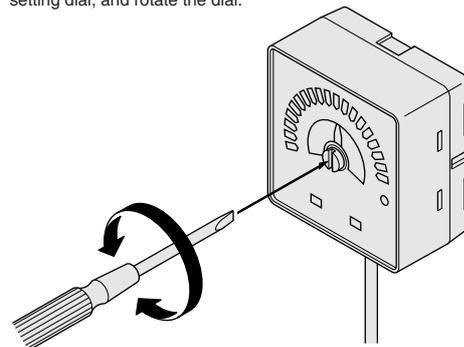
●EG110



●EG121

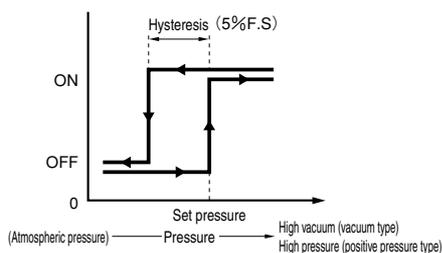


To set the pressure, insert a small screwdriver into the pressure setting dial, and rotate the dial.

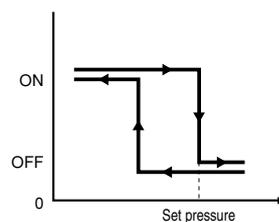


3) Output operation

NO type



NC type



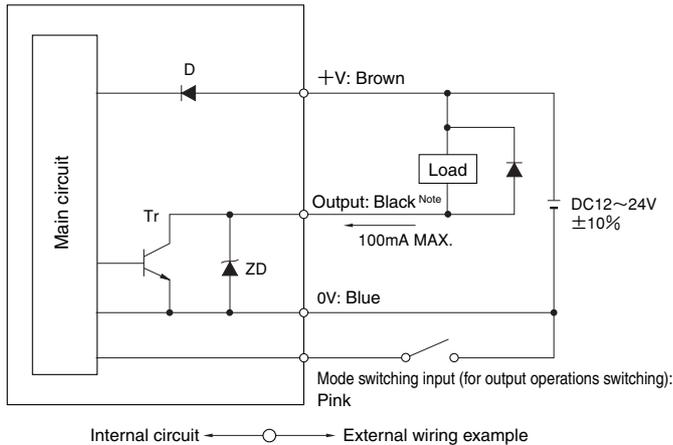
※ To switch the output operation, change the mode switching input line.

(Status for mode switching input line) Open : NO type
GND connection : NC type

Handling Instructions and Precautions

● Pressure gauges with electronic switches

1 Input/output circuit diagram



2 Precautions

Power supply

- If using a commercial switching regulator for the power supply, always ground it with a frame ground (F.G.) terminal.
- Avoid using the product while it is in a transitory state (about 0.5sec) immediately after the power supply has been switched on.
- For direct current power supply, always use an insulated transformer. Use of an autotransformer (single-winding transformer) could damage the product and the power supply.
- If surges appear in the power supply, connect a surge absorber to the source of the surge.

Input/output

- Use surge protection when connecting the inductive loads such as DC relays to the load.

Wiring

- Avoid wiring parallel to high voltage lines or power lines, or use in the same wiring conduits. Induction could cause erratic operation.
- Always shut off the power supply before performing wiring work.
- Keep wiring lengths as short as possible to avoid electric noise problems.

Environment

- When using equipment that could be sources of electric noise (such as switching regulators, inverter motors, etc.) around the sensor installation area, ground them with an equipment's frame ground (F.G.) terminal.
- Avoid use in steamy or dusty locations, or in locations that are directly subject to dripping water.
- The product cannot be used when the media or the ambient atmosphere contains any of the substances listed below.
Organic solvents, phoshate ester type hydraulic oil, sulphur dioxide, chlorine gas, or acids, etc.

Detection

- Do not put wires or other foreign objects inside the pressured area.
- This product is for use with non-corrosive gases. Be aware that it cannot be used with liquids or with corrosive gases.

Mounting

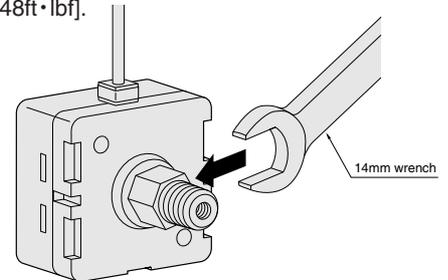
- Always thoroughly blow off (use compressed air) or air blowing the tubing before piping. Be careful to prevent chips, sealing tape, or rust, etc., generated during plumbing from entering into the pipes.
- When connecting a fitting to a piping connection port, mount by using a wrench on the hexagonal section of the port. The tightening torque for R1/4 (male thread) should be 20N·m [14.8ft·lbf] or less, and for M5×0.8 (female thread), 2.0N·m [1.48ft·lbf] or less.
- Never perform tightening on any other section.

Setting

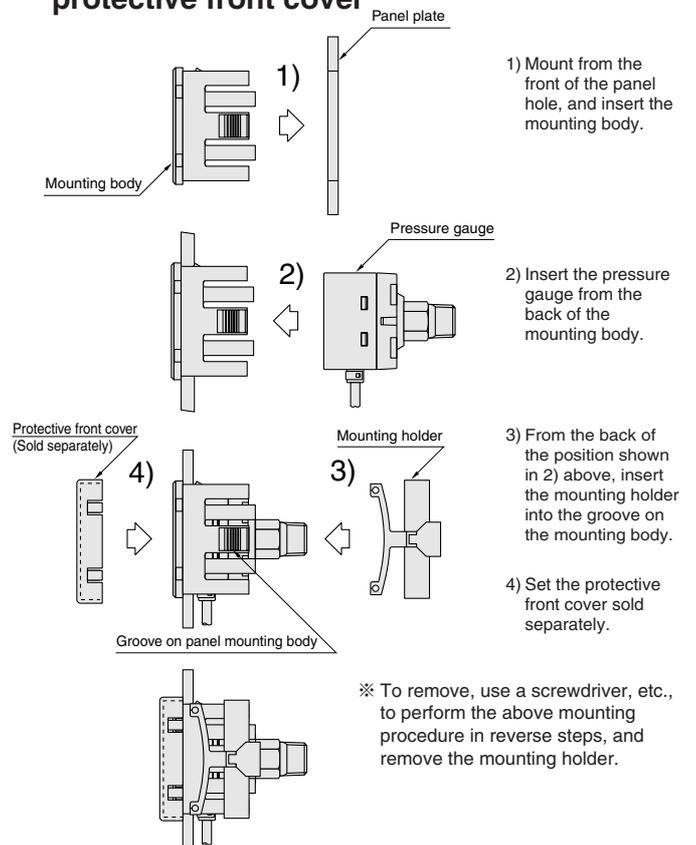
- Use a setting value that provides plenty of margin for the operating ambient temperature, power supply, voltage, and other conditions.

3 Body mounting

- As the mounting screws for the piping connection port are the R1/4 tapered thread or the M5 female thread, various commercial fittings can be used.
- For direct mounting on piping, use a 14mm wrench on the hexagonal section, do not exceed a torque value of 20N·m [14.8ft·lbf]. Do not use the wrench on the body case. When the M5 female thread is used, do not exceed a torque value of 2.0N·m [1.48ft·lbf].



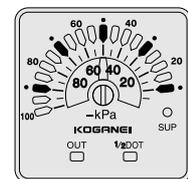
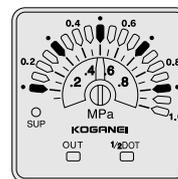
4 Mounting parts for panel mounting, and protective front cover



5 Error indication

<Short-circuit error>

- If the LED indicates as shown below, it means that over current is flowing to the load, and output has short-circuited. First, shut off the power supply, and then check the load and output.



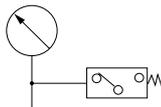
PRESSURE GAUGES WITH BUILT-IN SWITCH

GS1-50

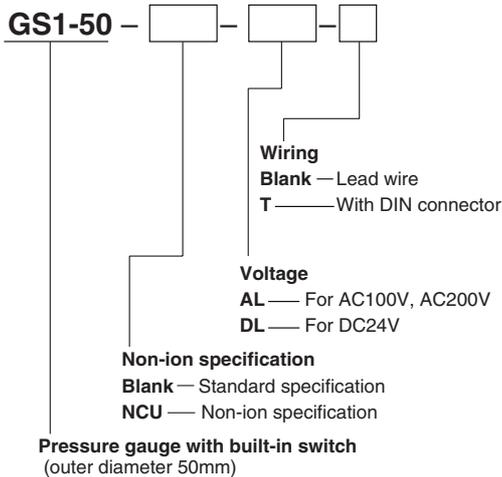
- The set pressure and operating pressure are indicated on the same pressure gauge. Panel mounting offers convenient centralized control and management built into the control panel.
- An indicator is standard equipment, to check the switch operation state. Wiring connection methods offered include a standard grommet (lead wire) type, and a DIN connector type as an option.



Symbol



Order Codes



Remark: A model with built-in contact protection circuit (external surge absorption element) is available. For details, consult us.

Specifications

Item	Model	GS1-50
Media		Air
Maximum operating pressure	MPa [psi.]	0.83 [120]
Pressure gauge specifications	Operating temperature range (atmosphere and media) °C [°F]	5~60 [41~140]
	Pressure indicator range MPa [psi.]	0~1.0 [0~145]
	Indicator accuracy	F.S.±3%
	Pressure adjusting range MPa [psi.]	0.1~0.83 [14~120]
Switch specifications	Regulating pressure indication error ^{Notes 1 and 3} MPa [psi.]	±0.05 [±7]
	Repeatability ^{Note 3} MPa [psi.]	±0.05 [7] (5~45°C [41~113°F])
	Hysteresis MPa [psi.]	0.07 [10] max.
	Contact type	Micro switch a contact (NO)
	Wiring	Standard Option
Indicator		Standard equipment: LED for DC, neon lamp for AC
Shock resistance	m/s ² [G]	9.8 [1]
Mounting direction		Any
Mass	kg [oz.]	0.17 [6.0] (0.19 [6.7] with DIN connector)
Materials	Body	Aluminum die-casting
	Case	SPCC
	Flats of nipple section	Brass
	Bourdon tube	Brass

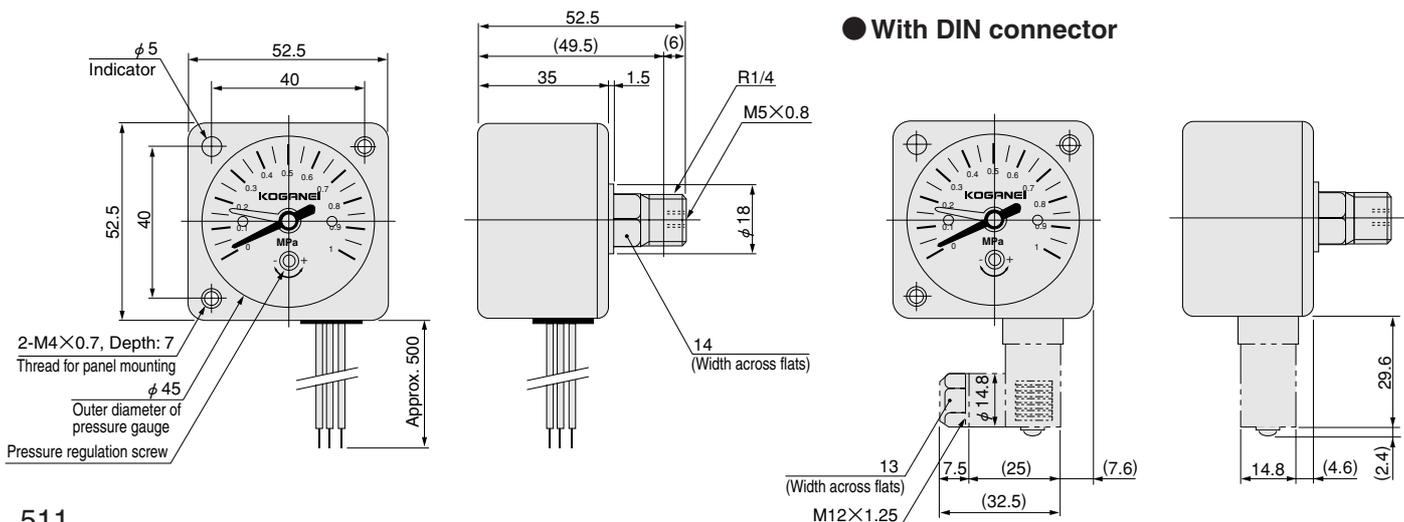
- Notes: 1. Shows when the pressure is rising.
 2. Made to order is available at -1L: 1000, -2L: 2000, -3L: 3000mm.
 3. Regulating pressure indicator errors and repeatability errors could be accumulated. (Maximum ±0.1MPa [±14.5psi.]). Be aware of this during use.

Operating Current Range

Rated voltage		DC30V	AC125V	AC250V
Operating current range				
Inductive load	Continuous	0.05~0.1	0.01~0.1	0.01~0.05
	Inrush	0.5 MAX.	0.5 MAX.	0.2 MAX.
Non-inductive load		0.01~0.5	0.01~0.3	0.01~0.2

Dimensions (mm)

GS1-50



Handling Instructions and Precautions



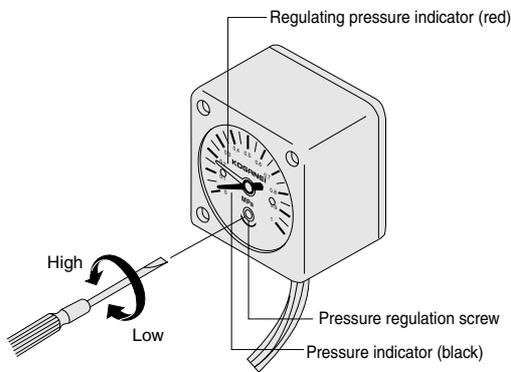
Pressure gauges with built-in switch

Mounting and piping

1. While any mounting direction is acceptable, install a throttle mechanism in cases where pressure pulsation is particularly severe, such as when mounted between a valve and an actuator. For mounting in locations subject to strong vibrations, consult us.
2. During mounting and piping operations, do not grab the pressure gauge body to tighten. For tightening, always use a hexagonal wrench on the piping connection port section.

Pressure regulation

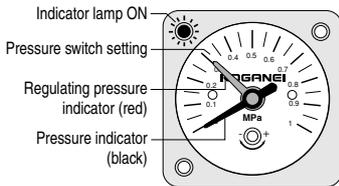
Rotate the pressure regulation screw, align the regulating pressure indicator (red) to the set pressure, and set. Rotating the pressure regulation screw to the left (counterclockwise) sets to a higher pressure, and rotating it to the right (clockwise) sets to a lower pressure. When the air pressure rises to the set pressure, the switch is activated, and when it falls to the setting pressure of 0.05MPa [7psi.], the switch is returned to the original state.



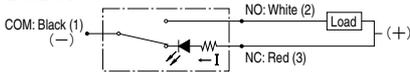
- Cautions:**
1. To regulate the pressure, do not remove the cap on the lens surface, but insert a small screwdriver into a slit in the cap instead, and directly rotate the pressure regulation screw.
 2. The pressure needle has a indication error of 0.05MPa [7psi.]. For fine-tuning adjustment, apply compressed air at the set pressure to check the switch triggering action.

Switch setting method and operations

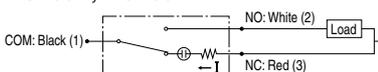
Setting example: Want the switch to activate when the pressure is at 0.3MPa or less.



● DC24V

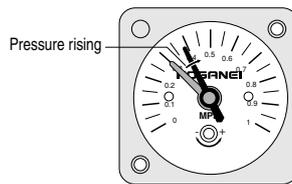


● AC100V, AC200V

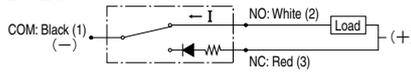


Set the regulating pressure indicator (red needle) to 0.3MPa [44psi.]. But because the regulating pressure indicator has a maximum error of 0.05MPa [7psi.], always apply compressed air regardless of the position the needle is pointing to on the indication scale, adjust the pressure, and use a multimeter, etc., to check whether the built-in switch goes to OFF when the pressure drops to 0.3MPa [44psi.] or below.

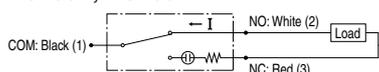
When the pressure is in the range of 0MPa ~ 0.3 MPa [0 ~ 44psi.], the built-in switch remains at NC, as shown in the circuit diagram above, and the indicator lamp lights up.



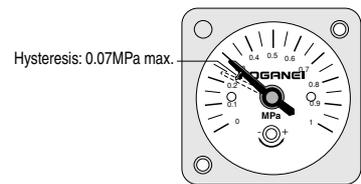
● DC24V



● AC100V, AC200V



When the pressure rises, and the regulating pressure indicator (red needle) exceeds 0.3MPa [44psi.], the built-in switch flips to NO, as shown in the circuit diagram above, the load current flows, and the indicator lamp goes out.



When the pressure falls, and the pressure indicator (black needle) is higher than the regulating pressure indicator (red needle), the internal switch changes to NC with a maximum hysteresis of 0.07MPa [10psi.]. At this time, the repeatability is a maximum ± 0.03 MPa [± 4 psi.].

Note that NC cannot be used as a load contact. Use the switching of NO to OFF to control the relay or other B contact.

To obtain finer accuracy than the above example, we recommend using:

- Digital pressure gauge with built-in sensor
- Digital pressure switches

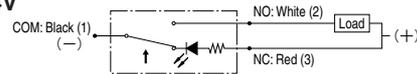
General precautions

1. Use this product to check the supply pressure. For use in precision control circuits, consult us.
2. Switch performance may be degraded in installation locations where the temperature is higher than 45°C [113°F] or where the humidity is constantly 50% or less. For use in these kinds of places, consult us.

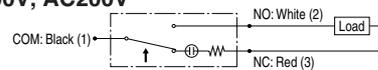
Wiring instructions

Pay attention to the NC and NO contacts and the colors of lead wires (in wires with connectors, the terminal numbers) for wiring. In the figure below, the numbers in parentheses () represent the terminal numbers, while the arrow \uparrow shows the direction of rising pressure. The indicator lamp switches off when the value is at the set pressure or higher, and lights up as a warning when the value falls below the set pressure.

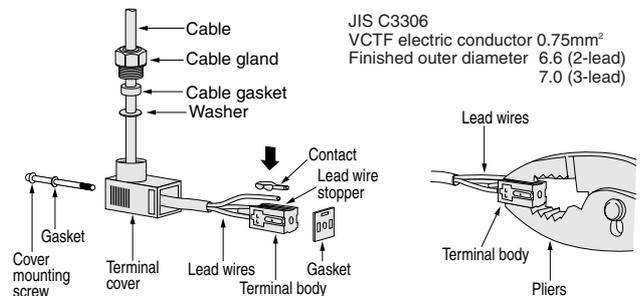
● DC24V



● AC100V, AC200V



● Wiring instructions with DIN connector



When peeling off the sheath (for cabtyre sheath only), pay attention to the lead wire bending direction. Setting the outer lead wires inside the terminal cover to be about 8mm longer than the inner wires can make it easier to mount the terminal body onto the terminal cover. Without peeling off their insulations, insert the lead wires into the terminal body until they bump up against the lead wire stopper, lower the contacts from above to exposed wires, and use pliers to push them into firm contact, so that the contacts are touching the exposed wires.

Caution: For the connector type, the connector wiring position at time of delivery is in the connecting thread side (back side).

PRESSURE SWITCHES

DIGITAL PRESSURE SWITCHES

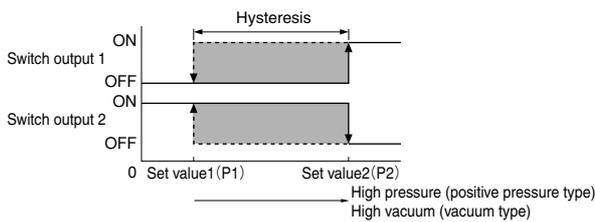
GS5 Series



Flexible control in four output modes

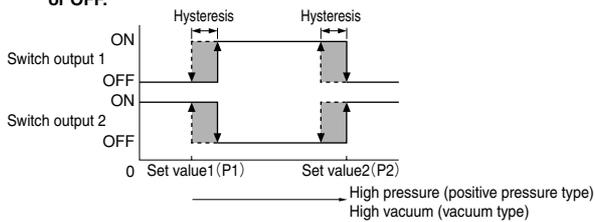
1 Hysteresis mode

Uses the setting value to freely set the switch output hysteresis.



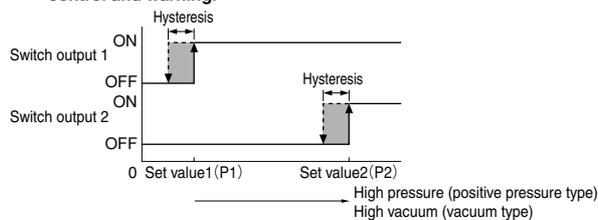
2 Window comparator mode

Uses pressure within the setting range to set switch output to ON or OFF.



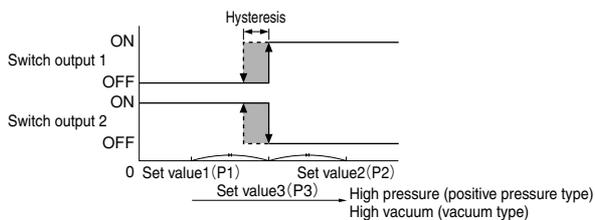
3 Two-output mode

Can detect different kinds of workpieces, or split use between control and warning.



4 Automatic sensitivity setting mode

Uses actual items to store the pressure values of accepted items and rejected items. The switch sets setting value.



Bright, easy-to-read 3 1/2 digit LED display

Character height is 10mm.
Equipped with a 3 1/2 digit red LED for easy identification in both dark places and bright places.



High precision, high resolution, fast response

No.1 in the industry! Achieves fast response of 2.5ms or less with a high 1/1000 resolution. Achieves superior repeatability and temperature characteristics, as well as high-precision measurement.

Response time 2.5ms or less

Repeatability Within $\pm 0.2\%$ F.S. ± 1 digit

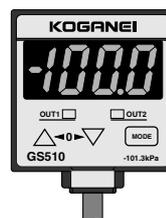
Temperature characteristics Within $\pm 1\%$ F.S.

Three pressure types available

Vacuum
- 100kPa type
GS510

Positive pressure
1MPa type
GS520

Positive pressure
100kPa type
GS521

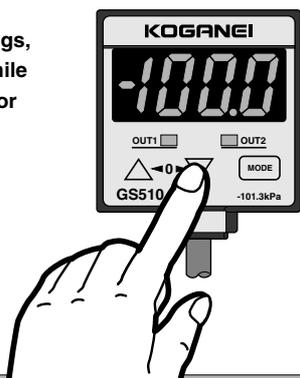


Easy-to-read LED Display!

High 1/1000 Resolution

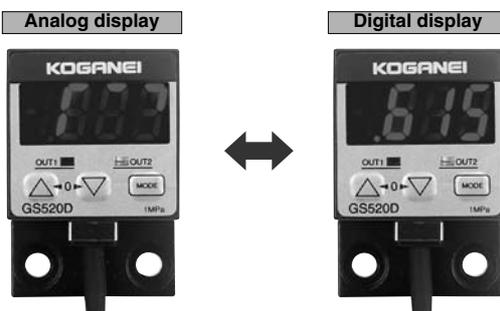
Key operations for simple settings

For initial settings or pressure value settings, use key operation while viewing the display for simple input.



Can switch to analog bar display

An LED bar offers analog display of the pressure changes, allowing visual confirmation of sudden pressure changes. (Displayed in about 10% F.S. steps, regardless of output units.)



Two mounting types available

Two types, the piping attachment type and the flange mounting type, are available. (The piping attachment type is optional, with mounting brackets and panel mounting parts also available.)

Piping attachment type

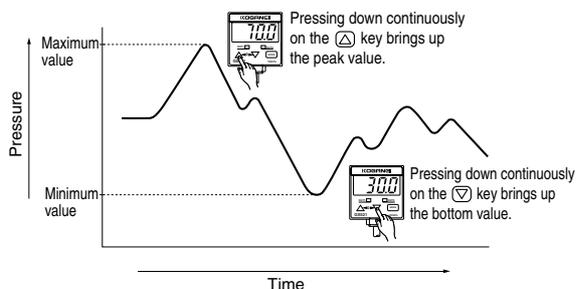


Flange mounting type



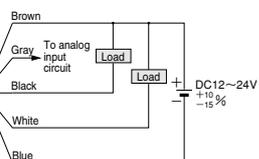
Can hold displays at peaks and bottoms

Displays both the peak (maximum) value and bottom (minimum) value of changing pressure. Convenient for visual examination of pressure setting values when checking the range of pressure changes.



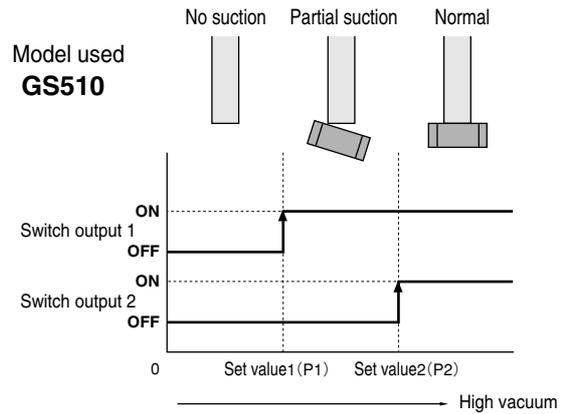
Analog voltage output is standard equipment

Linear analog voltage output (1-5V) is provided, to achieve monitoring in real-time, and control in combination with an analog controller, etc.



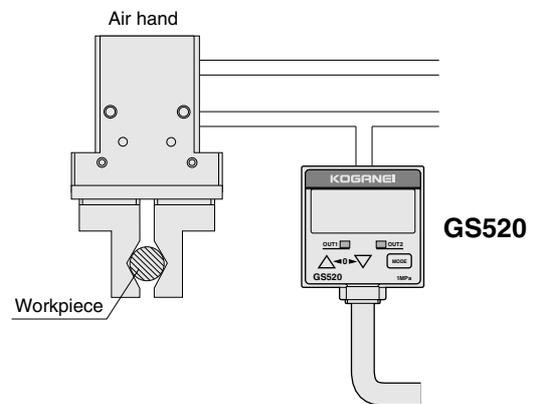
Parts picking check

- In picking, the difference in vacuum level is used to discern the existence of parts.
- **GS510** is a high-precision digital pressure switch capable of distinguishing pressure differentials in units of 0.1kPa. In addition, 2-output capability allows identification of three types of conditions, no suction, partial suction, and normal.
- Installation of the pressure switch near the picking area reduces the delay in air pressure changes, to ensure faster and higher precision control.



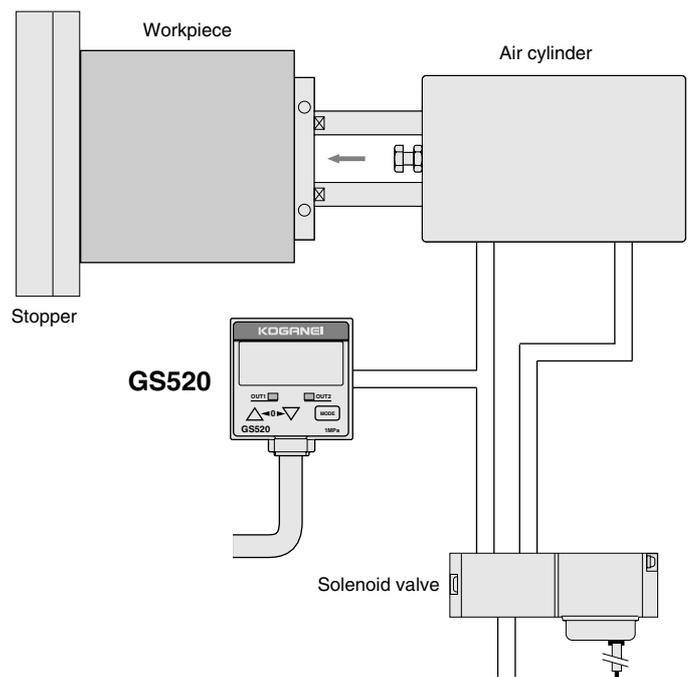
Air hand gripping force control

- When the gripping force of the air hand varies according to the workpiece, the supply pressure can be changed to maintain control.
- In addition to switch output, the **GS5** series is provided with linear analog voltage output (1-5V) as standard, for various kinds of control.



Air cylinder's extended side stroke end detection

- Detects the extended side stroke end of the air cylinder to determine workpiece position.
- When the air cylinder is used to push the workpiece, the air cylinder ceases acting from the point where the workpiece is pushed up against a stopper and the internal pressure on the rod side is reduced to near 0MPa. This change is detected by the pressure switch. **GS520** is a high-precision digital pressure switch capable of detecting pressure changes of 0.001MPa, and can therefore distinguish even extremely slight pressure differentials.
- This detection method does not require any set up changes even for workpieces of differing sizes, and enables detection of the extended side stroke end of the air cylinder.

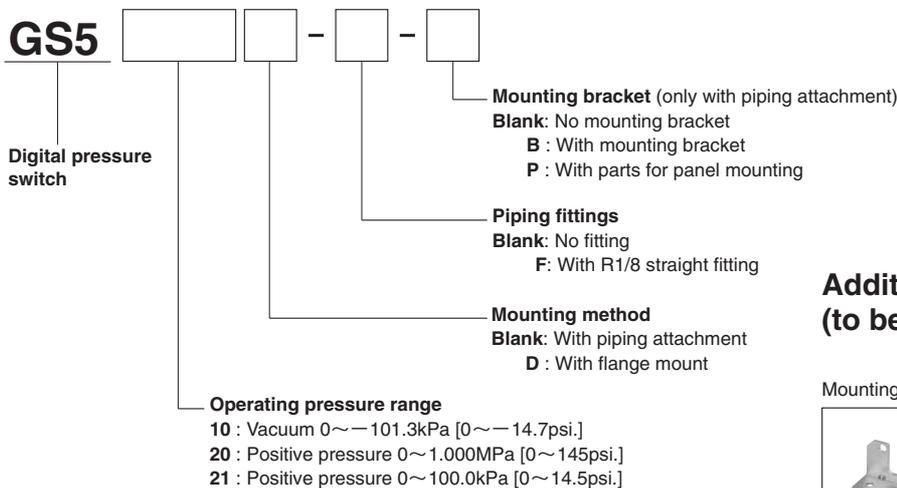


Specifications

Item	Type	Vacuum	Positive pressure	Positive pressure
	Model	— 100kPa type	1MPa type	100kPa type
		GS510	GS520	GS521
		GS510D	GS520D	GS521D
General	Pressure type	Gauge pressure		
	Applicable media	Air or non-corrosive gas		
	Rated pressure range	0~—101.3kPa [0~—14.7psi.]	0~1.000MPa [0~145psi.]	0~100.0kPa [0~14.5psi.]
	Pressure setting range	5.1~—101.3kPa [0.74~—14.7psi.]	—0.050~1.000MPa [—7~145psi.]	—5.0~100.0kPa [—0.73~14.5psi.]
	Proof pressure	490kPa [71psi.]	1.47MPa [213psi.]	490kPa [71psi.]
	Material	Front case: ABS Rear case: PPS (with glass fiber) LED display: Acrylic Piping port attachment: Zinc die-casting		
	Cable	0.15mm ² [0.00023in ²] 5-lead, oil resistance cabtyre cable, 2m [6.6ft]		
	Cable extension	Cable of 0.3mm ² [0.00046in ²] or larger, and extendable up to a total of 100m [328ft] in length		
	Mass	GS5□□ : 95g [3.35oz.] GS5□□D : 120g [4.23oz.]		
	Power supply	Power supply voltage	DC12~24V ±10% ripple P-P 10% MAX.	
Consumption current		50mA MAX.		
Display		3 1/2 digit red LED indicator		
Display pressure range		5.1~—101.3kPa [0.74~—14.7psi.]	—0.050~1.000MPa [—7~145psi.]	—5.0~100.0kPa [—0.73~14.5psi.]
Switch output	Temperature characteristics	In the range of —10 to 50°C [14~122°F], within ±1% F.S. of the detected output at 20°C [68°F]		
	Load voltage/current	DC30V MAX./100mA MAX.		
	Internal voltage drop	0.4V MAX./ at 16mA 1V MAX./at 100mA		
	Output mode	Use key operation to select between hysteresis mode, window comparator mode, 2-output mode, and automatic sensitivity setting mode		
	Hysteresis	1digit (hysteresis mode is variable)		
	Repeatability	±0.2% F.S. ±1digit MAX.		
	Response time	2.5ms MAX.		
	Protection circuit	Load short-circuit protection circuit, pulse overvoltage protection circuit, reverse connection protection circuit		
	Operations indicator	Switch output 1 ON: Amber LED lights up Switch output 2 ON: Green LED lights up		
	Analog output	Output voltage	1~5V (at the rated pressure range)	
Zero-point voltage		1V ±5% F.S.		
Span voltage		4V ±5% F.S.		
Linearity		Within ±1% F.S.		
Output impedance		1kΩ (reference value)		
Environmental characteristics	Protective structure	IP40 (IEC)		
	Operating temperature range	—10~50°C [14~122°F] (no condensation and freezing), Storage: —10~60°C [14~140°F]		
	Operating humidity range	35~85% RH		
	Noise resistance	Power supply line: 240Vp (cycle 10ms, pulse width 0.5 μs) Radiation: 300Vp (cycle 10ms, pulse width 0.5 μs)		
	Dielectric strength	AC1000V one minute (between charging part and case)		
	Insulation resistance	50MΩ MIN. between charging part and case (at DC500V megger)		
	Vibration resistance	10~150Hz (total amplitude 0.75mm [0.030in.]) 2 hours in each of the XYZ directions (de-energized)		
	Shock resistance	100m/s ² [10.2G] three times in each of the XYZ directions (de-energized)		

PRESSURE SWITCHES

Order Codes

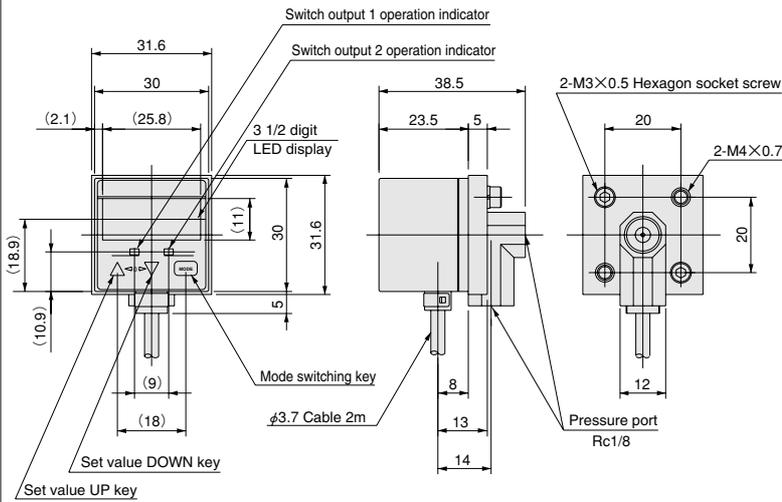


Additional parts (to be ordered separately)



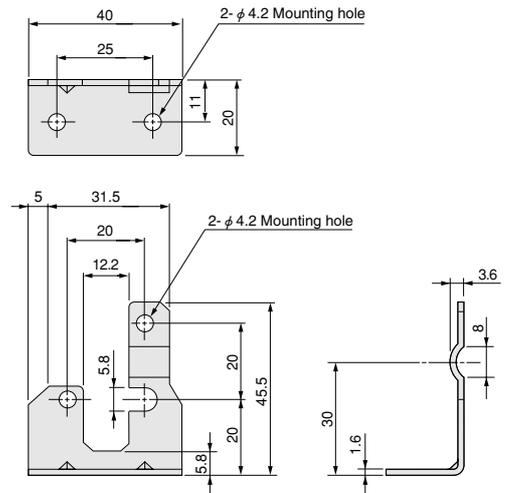
Dimensions (mm)

● GS5 (With piping attachment)

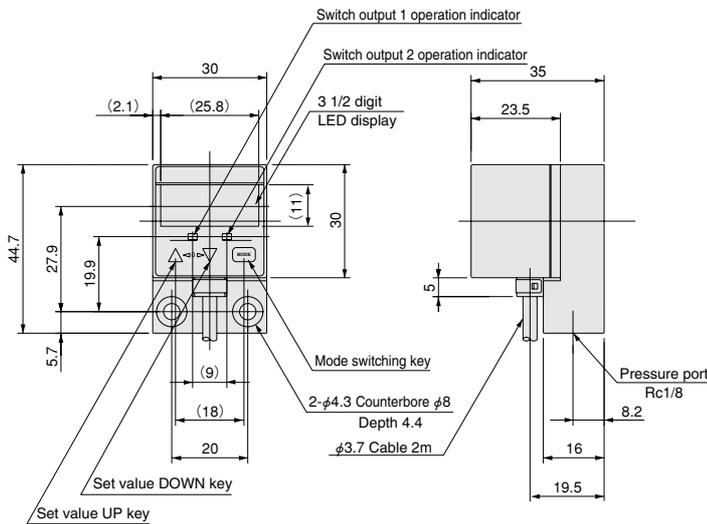


● GS2-B Mounting bracket

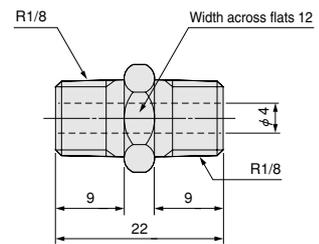
Materials: SPCC (Unichrome plated)
M4×0.7 screw length 6mm pan head screw 2 pcs.
Spring washer 2 pcs. are included.



● GS5 D (with flange mounting)

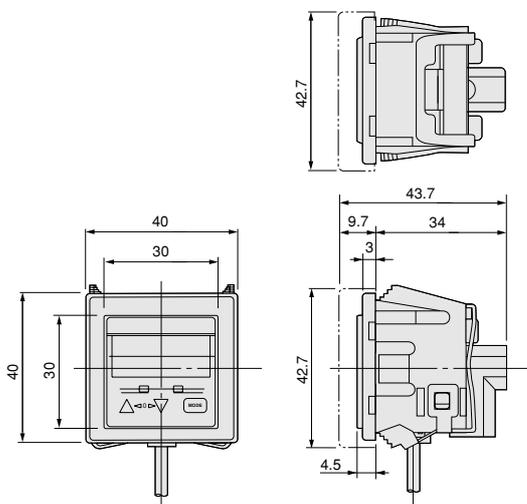


● GS2-F R1/8 straight fitting



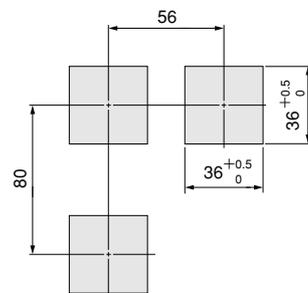
● GS2-P (drawings for panel mounting)

Available only "with piping attachment."



Note: The phantom line shows equipped with front surface protective cover.

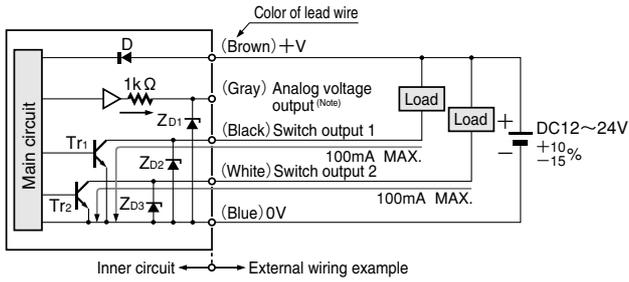
● Cut panel dimensions (Unit: mm)



- Notes: 1. The mounting plate thickness should be 1 to 3.2mm.
2. The cut panel dimensions are 36^{+0.5} × 36^{+0.5} mm.
3. If mounting in a series, space the units at intervals of the value shown in the drawing above or greater.

Input/output Circuits and Connection

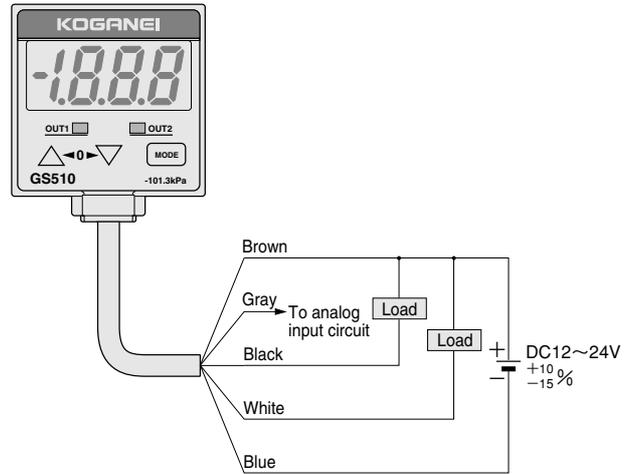
Input/output circuit diagram



Note: If using analog voltage output, caution must be exercised with the input impedance of the connected devices. Also be aware that resistance of an extended cable length can lead to drops in voltage.

- D** : Reverse current protection diode for power supply
- Z_{D1}, Z_{D2}, Z_{D3}** : Zener diode for surge voltage absorption
- T_{r1}, T_{r2}** : NPN output transistor

Wiring diagram



Handling Instructions and Precautions



General precautions

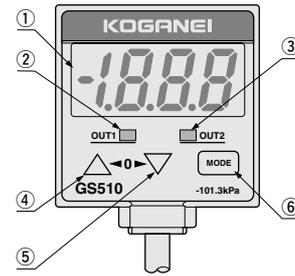
Wiring

1. If using a commercial switching regulator for the power supply, always ground it with a frame ground (F.G.) terminal.
2. When using equipment that could be sources of noise (such as switch regulators, inverter motors, etc.) around the sensor mounting area, ground them with a frame ground (F.G.) terminal of the equipment.
3. Avoid wiring parallel to high voltage lines or power lines, or use in the same wiring conduits. Induction could cause erratic operation.
4. After completing wiring, always check that there is no error in the wiring connections.

Others

1. The digital pressure switch is for use with non-corrosive gases. Do not use with corrosive gases or fluid.
2. Use the product within the rated pressure range.
3. Do not apply pressure in excess of the proof pressure value. The diaphragm could be damaged, resulting in failure of normal operation.
4. Check power fluctuations to ensure that power supply does not exceed the rated level.
5. Avoid using the power while it is in a transient state (about 0.5sec.) immediately after the power supply has been switched on.
6. Never insert wires, etc., through the pressure port. The diaphragm could be damaged, resulting in failure of normal operation.
7. Do not use needle tips or other sharp objects to operate the keys.

Panel indication, key and function



	Part	Description
①	3 1/2 digit LED display (red)	Indicates detected pressure value and content of settings, error, and key protect.
②	Switch output 1 Operations indicator (amber)	Switch output 1 ON : lights up
③	Switch output 2 Operations indicator (green)	Switch output 2 ON : lights up
④	Setting value UP key (Δ)	<ul style="list-style-type: none"> • During initial setting mode, each time the key is pressed switches the setting column. • During setting value 1 and 2 setting modes, pressing the key for the positive pressure type changes the setting value to a higher pressure, while for the vacuum pressure type it changes the setting value to a higher vacuum level. • During detection mode, pressing down on the key for four seconds or more causes the peak hold display to appear.
⑤	Setting value DOWN key (∇)	<ul style="list-style-type: none"> • During initial setting mode, each time the key is pressed changes the setting conditions. • During setting value 1 and 2 setting modes, pressing the key for the positive pressure type changes the setting value to a lower pressure, while for the vacuum pressure type it changes the setting value to a lower vacuum level. • During detection mode, pressing down on the key for four seconds or more causes the bottom hold display to appear.
⑥	Mode switching key (MODE)	<ul style="list-style-type: none"> • Pressing the key switches in succession between detection mode, setting value 1 (P1) setting mode, and setting value 2 (P2) setting mode. • During detection mode, pressing down on the key for about three seconds sets or releases key protect. • During detection mode, pressing the mode switching key while holding down the setting value UP key (Δ) brings up the initial setting mode.

During detection mode, pressing down on both keys at the same time performs zero point adjustment.

About the error indication

Take the following measures when an error occurs.

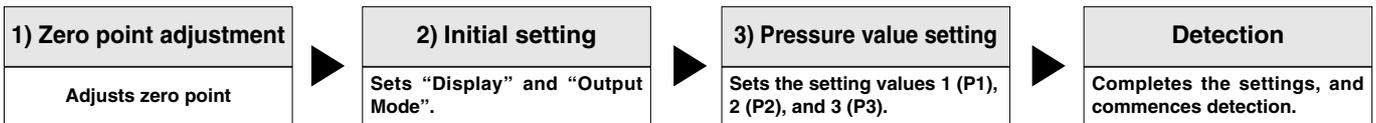
Error indication	Description	Remedy
	Load has shorted and over current is flowing.	Shut off the power, and check the load.
	Applying pressure during zero point adjustment.	Restore the applying pressure at the pressure port to normal atmospheric pressure, and perform zero point adjustment again.
	Positive pressure type Pressure exceeds the upper limit of the indicated pressure range.	Restore the applying pressure to the rated pressure range.
	Vacuum type Pressure exceeds the lower limit (reverse pressure) of the indicated pressure range.	
	Positive pressure type Pressure exceeds the lower limit (reverse pressure) of the indicated pressure range.	
	Vacuum type Pressure exceeds the upper limit of the indicated pressure range.	

Common for all models

Settings

- When setting the key protect, always release the key protect first and then operate the keys.
(For the operating method, see below, at “About the key protect function”.)
- Use of setting value 1 (P1) and setting value 2 (P2) is identical for all output modes.
- In the positive pressure type, setting value 2 (P2) is designed so that it can only be set at a higher pressure than setting value 1 (P1), and in the vacuum type, it is designed so that it can only be set at a higher vacuum level than setting value 1 (P1).
- Setting value 3 (P3) is automatically set at the midpoint value between setting value 1 (P1) and setting value 2 (P2). (In cases where the pressure value has been set in automatic sensitivity control setting mode.)
- While the setting conditions are written to EEPROM and stored there, be aware that EEPROM has a finite working life of 100,000 write-ins.

Setting procedure



1) Zero point adjustment

- Adjusts the pressure value indication to zero when the pressure port is open.



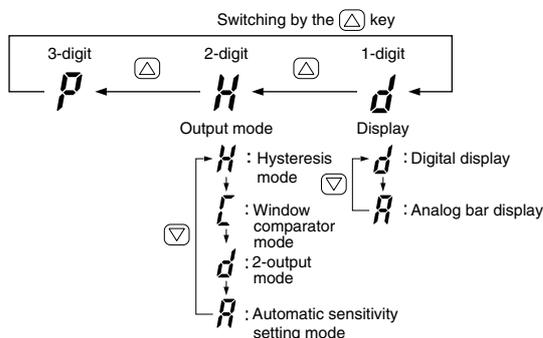
- Automatically enters detection mode when the power is switched on.
- Set the applying pressure at the pressure port to normal atmospheric pressure (a no-pressurized condition), and simultaneously press down and hold the ∇ key and \triangle key.
- 000 is displayed. Releasing the keys completes the zero point adjustment, and returns to detection mode.

2) Initial setting

- Sets the “display” in pressure and “output” mode in switch output.



- In detection mode, press down and hold the \triangle key, and then press the MODE key.
 - The initial setting content is indicated.
 - If using for the first time, PHd is displayed.
 - A digit available for setting begins flashing.
- Pressing the \triangle key switches the setting-available digit, while pressing the ∇ key switches the setting conditions.



3) Pressure value setting

When the output mode is set to hysteresis mode (H), window comparator mode (L), or 2-output mode (d).

- Sets the switch output setting value 1 (P1) and setting value 2 (P2).



- In detection mode, press the MODE key to reach setting value 1 (P1) mode.
- Use the \triangle key and ∇ key to set the setting value 1 (P1).
- After setting, press the MODE key to reach setting value 2 (P2) mode.
- Use the \triangle key or ∇ key to set the setting value 2 (P2).
- After setting, press the MODE key to return to detection mode.

When the output mode is set to automatic sensitivity setting mode (R).

- Sets the switch output setting value 1 (P1), setting value 2 (P2), and setting value 3 (P3).



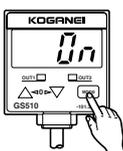
- In detection mode, press the MODE key to reach setting value 1 (P1) mode.
- Within the range allowed for the required pressure, select the pressure condition that is closest to normal atmospheric pressure, then press the ∇ key to set the setting value 1 (P1).
- After setting, press the MODE key to reach setting value 2 (P2) mode.
- Within the range allowed for the required pressure, in a positive pressure type, select the pressure condition that is closest to the high pressure level, and in a vacuum pressure type, the condition that is closest to the high vacuum level, and then press the \triangle key to set the setting value 2 (P2).
- After setting, press the MODE key to reach setting value 3 (P3) mode.
- Check setting value 3 (P3), which was automatically set. If a correction is needed, use the \triangle key or ∇ key to set the setting value 3 (P3).
- After checking and setting, press the MODE key to return to detection mode.

- The automatically set setting value 3 (P3) can be manually corrected to any setting between setting value 1 (P1) and setting value 2 (P2).

About the key protect function

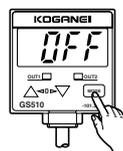
- The key protect function locks up the keys so that they cannot be operated, to prevent inadvertent changes from being made to the conditions set in each setting mode.

Setting key protect



- In detection mode, press the MODE key for about three seconds, and then release the key immediately after 000 is displayed.
- Key protect is set up, and the system returns to detection mode.

Releasing key protect



- In detection mode, press the MODE key for about three seconds, and then release the key immediately after OFF is displayed.
- Key protect is released, and the system returns to detection mode.



Mounting and piping

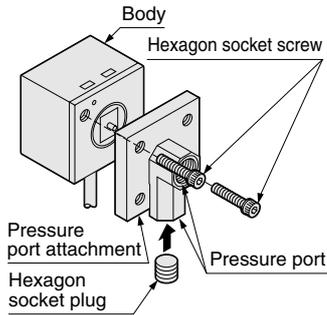
● Piping attachment type

Setting pressure piping direction

- The pressure port attachment can be freely removed and the mounting direction can be changed, to turn the pressure piping direction.

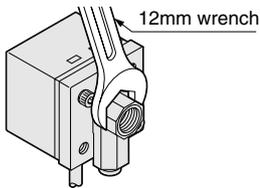
The tightening torque for the hexagon socket screw (length of 9mm or less) should not exceed $0.29\text{N} \cdot \text{m}$ [$0.21\text{ft} \cdot \text{lbf}$].

Note: For unused pressure ports, always block with the supplied hexagon socket plug.



Piping

- When installing a hexagon socket plug and fitting to the pressure port attachment, use a 12mm wrench on the hexagonal section of the pressure port to secure in place, and mount with a tightening torque not exceeding $9.8\text{N} \cdot \text{m}$ [$7.2\text{ft} \cdot \text{lbf}$]. In addition, wrap sealing tape around the fitting to prevent air leaks when attaching.

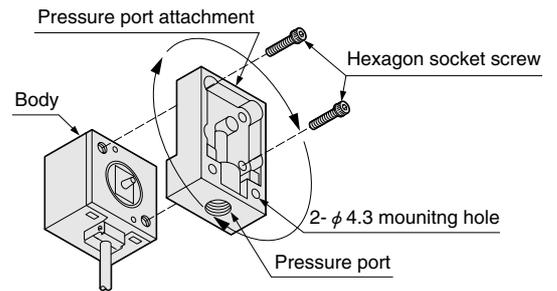


● Flange mounting type

Setting pressure piping direction

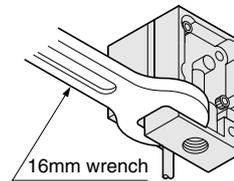
- The pressure port attachment can be freely removed and the mounting direction can be changed, to turn the pressure piping direction.

The tightening torque for the hexagon socket screw (length of 9mm or less) should not exceed $0.29\text{N} \cdot \text{m}$ [$0.21\text{ft} \cdot \text{lbf}$].



Piping

- When installing a fitting to the pressure port attachment, use a 16mm wrench to secure the attachment in place, and mount with a tightening torque not exceeding $9.8\text{N} \cdot \text{m}$ [$7.2\text{ft} \cdot \text{lbf}$]. In addition, wrap sealing tape around the fitting to prevent air leaks when attaching.

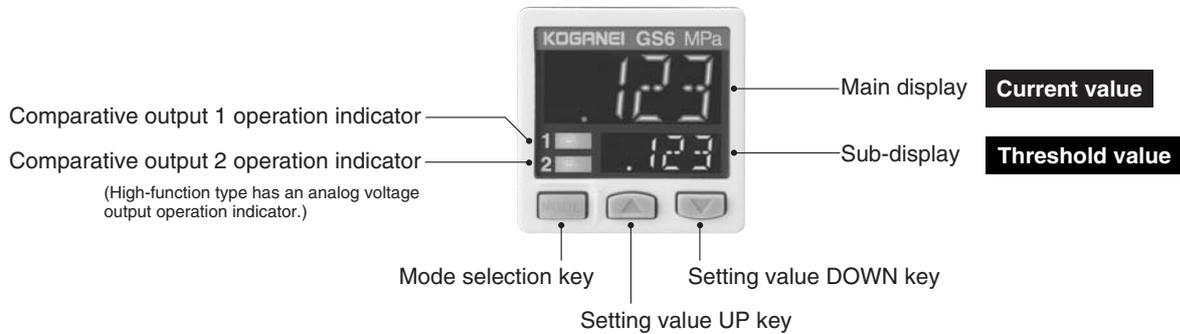


DIGITAL PRESSURE SWITCHES

GS6 Series

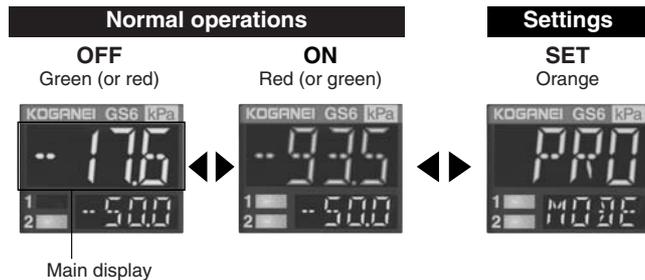
Two-screen, Three-color Display Makes Operations Simple!

Allows you to check the “current value” and the “threshold value” at the same time!



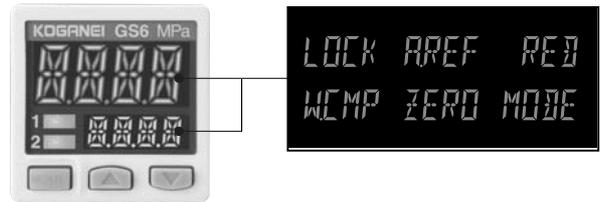
Three-color display (Red/Green/Orange)

The main display changes color in line with output ON/OFF operations, and can also change color during settings. This simplifies the operator’s grasp of pressure switch conditions, to reduce operating errors.



Easy to read! Digital display

An alphanumeric display with 12 segments is used, for improved visibility of the alphanumeric characters.



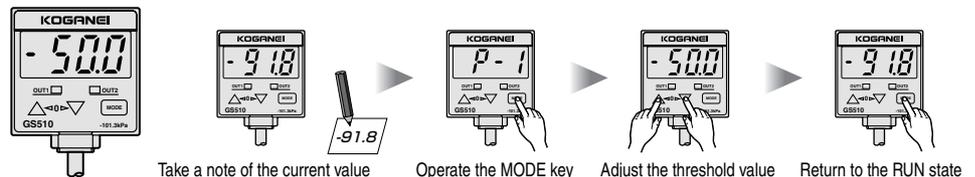
PRESSURE SWITCHES

Direct Setting of Threshold Values

Comes with two screens in a 30mm compact size. Since both the current value and threshold value can be checked at the same time, checking and setting the threshold value proceeds smoothly without the need to switch between screens. Since ON/OFF operations can proceed even during setting of the threshold value, the setting can be performed with the same way as a volume-knob style pressure switch. Naturally, a key lock function is also provided.

Previous single-screen model

Threshold value setting method



Two-screen GS6 series

Threshold value setting method



While in the RUN state, just press the button.



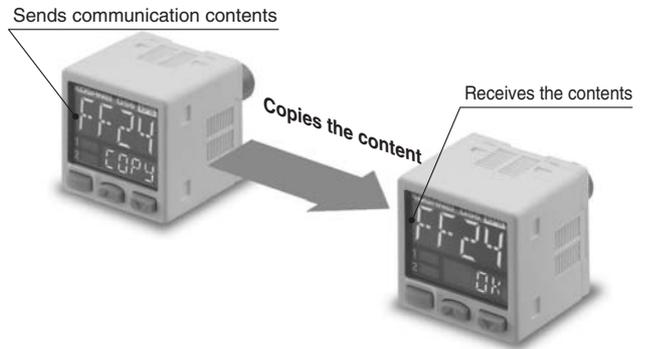
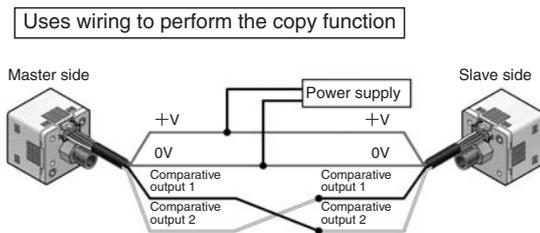
Copy Function Offers Easy Operation

Copy function reduces manhours and human errors

Setting content of a master pressure switch can be copied via data transmission to other pressure switches by connecting them one at a time to the master pressure switch. This prevents problems arising due to setting mistakes when multiple switches are being set to the same setting, and also reduces the amount of changes required in the work instructions when design changes are made to devices.

Merit 1 Shortens the pressure switch setting time

Merit 2 Avoids operation errors



Setting Is Simple and Smooth

Pressure switch operation mode can be set to three configuration levels depending on frequency of use

RUN mode: Daily operation setting



Enables threshold value adjustment, key lock, and other actions during operations.

Menu setting mode: Basic setting



Enables output mode setting, N.O./N.C. switching, and other basic settings.

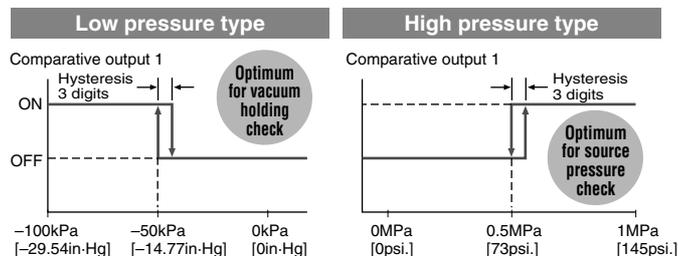
PRO mode: High-level function setting



Enables hysteresis adjustment, copy function, and other high-level function settings.

Initial setting can be used unchanged

The initial setting is made to be easy to use for applications where pressure switches are used frequently. The initial setting for the low pressure type is optimum for vacuum holding check, while the one for the high pressure type is optimum for source pressure check. This helps to reduce pressure switch setting operations.



Tactile click buttons

Buttons are designed for a tactile click when touched, to smooth the setting operations.



This click can be felt even through gloves.

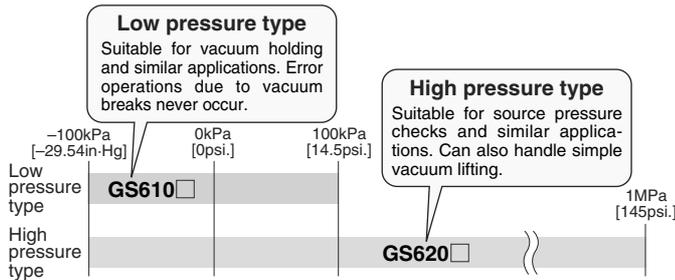
Reset function in case of setting failures

If the pressure switch setting fails for some reason, it automatically returns to the initial state.

Performance and Functions Concentrated into a Compact Body

All models in the lineup are the compound pressure type

Since there is no need to select the pressure switch for positive or negative pressure, the registered product numbers can be reduced.



Achieves highest performance in its class

Low pressure type

The low pressure type has a resolution of 1/2000, in a 0.1kPa [0.0145psi.] unit display, and with a response time of 2.5ms (variable up to 5000ms), temperature characteristics of $\pm 0.5\%$ F.S., and repeatability of $\pm 0.1\%$ F.S., to achieve the highest performance in its class.

0.1kPa unit display

Resolution: 1/2000
Response time: 2.5ms
Temperature characteristics: $\pm 0.5\%$ F.S.
Repeatability: $\pm 0.1\%$ F.S.

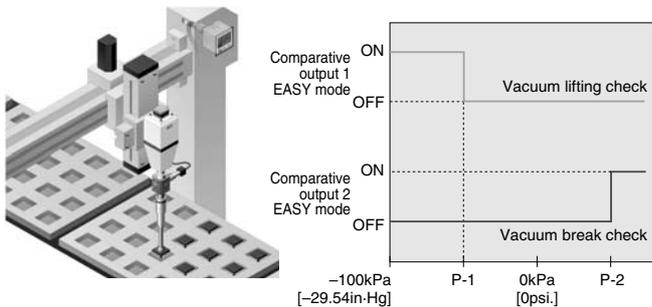


Equipped with two independent outputs

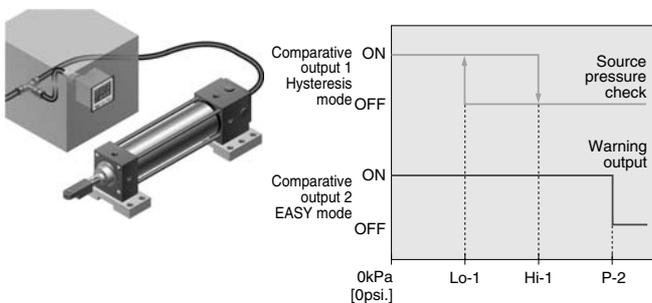
Standard type

Equipped with two independent comparative outputs, and the sensing mode can be separately selected for each. One of the comparative outputs can be used as a warning output. Or, the unused output can also be disabled.

Can also check vacuum breaks during vacuum lifting application!



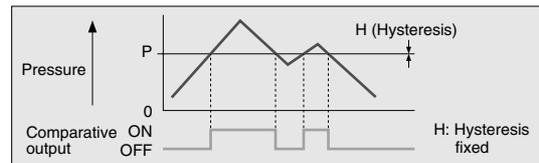
Can also produce pressure warning output during a source pressure check!



Three output modes offer response to a wide range of applications

1. EASY mode

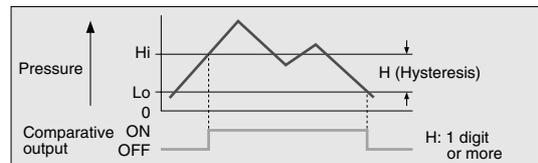
ON / OFF of the comparative output is controlled in this mode.



Notes: 1. Hysteresis can be fixed in eight steps.
2. "P-1" is displayed for comparative output 1 and "P-2" for comparative output 2 on the sub-display.

2. Hysteresis mode

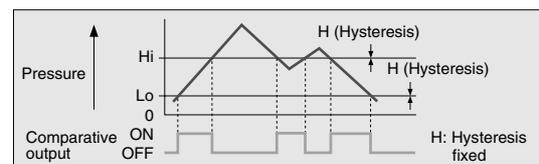
The comparative output ON / OFF state can be controlled with the desired set hysteresis in this mode.



Note: "Hi - 1" or "Lo - 1" is displayed for comparative output 1 and "Hi - 2" or "Lo - 2" for comparative output 2 on the sub-display.

3. Window comparator mode

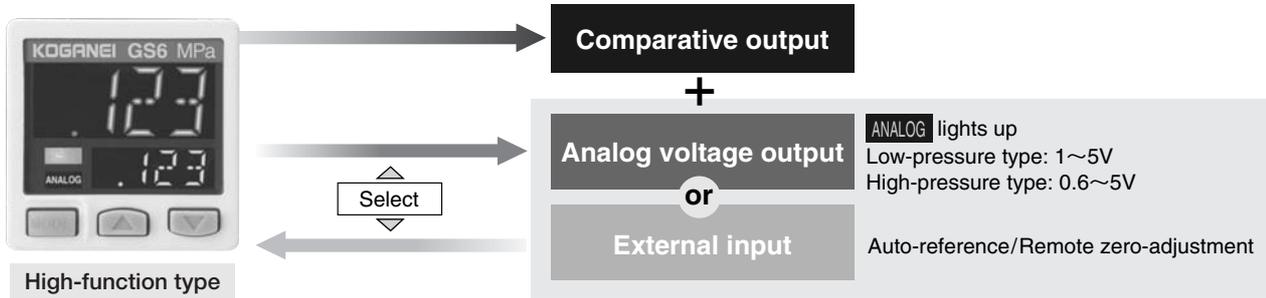
In this mode, the ON or OFF state of the comparative output is controlled with a pressure in the set range.



Notes: 1. Hysteresis can be fixed in eight steps.
2. "Hi - 1" or "Lo - 1" is displayed for comparative output 1 and "Hi - 2" or "Lo - 2" for comparative output 2 on the sub-display.

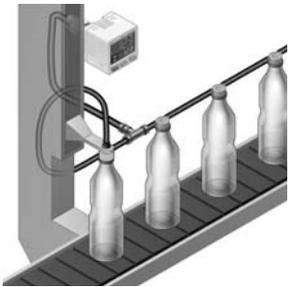
Can switch between analog output and external input High-function type

The high-function type offers selection between analog voltage output and external input (Auto-reference/Remote zero-adjustment). Capable of handling diverse applications.



Equipped with auto-reference/remote zero-adjustment functions High-function type

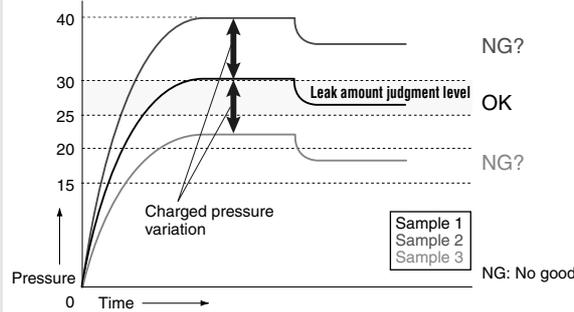
Achieves more precise high pressure control with minimum effort



When the source pressure in devices is fluctuating, external input can be used to select between the auto-reference function, which shifts the comparative output judgment level to correct for source pressure fluctuation, and the remote zero-adjustment function, which corrects the display value to zero. Contributes greatly to use in locations with severe fluctuations of source pressure, or locations where precise settings are required.

Without auto-reference/remote zero-adjustment functions

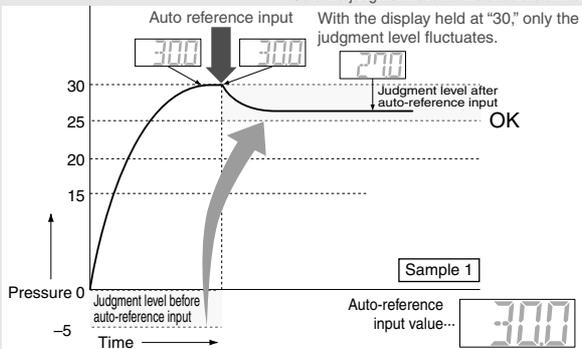
Comparative output: Hi-1...30, Lo-1...25
Window comparator mode Setting value fixed



Since the judgment level is fixed in ordinary pressure switches, source pressure fluctuation can lead to judgment errors.

When using the auto-reference function

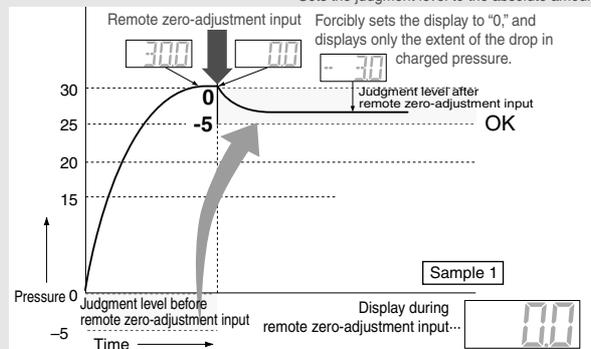
Comparative output: Hi-1...0, Lo-1...-5
Window comparator mode Sets the judgment level to the absolute amount



Adds the reference pressure "30" determined during auto-reference input to the judgment level. Even if the reference pressure changes to "20" or "40," the auto-reference input can be used to ignore the variation in charged pressure because of judgment level fluctuation.

When using the remote zero-adjustment function

Comparative output: Hi-1...0, Lo-1...-5
Window comparator mode Sets the judgment level to the absolute amount



Forcibly sets the reference pressure determined during remote zero-adjustment input to "0." Even if the reference pressure changes to "20" or "40," the remote zero-adjustment input can be used to ignore the variation in charged pressure because the reference pressure becomes "0."

Other Convenient Functions

Customizing the sub-display

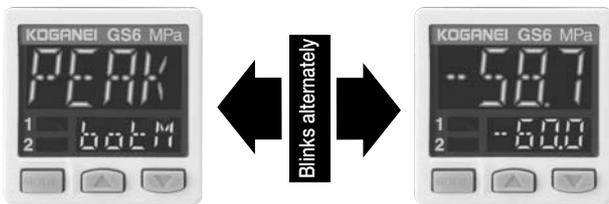
Other desired values and characters besides the threshold value can be displayed on the sub-display. This eliminates the effort required to post labels on the device showing the positive pressure value, etc.

Displays desired values and characters



Peak/bottom hold function

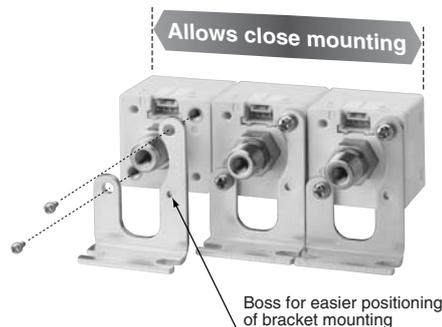
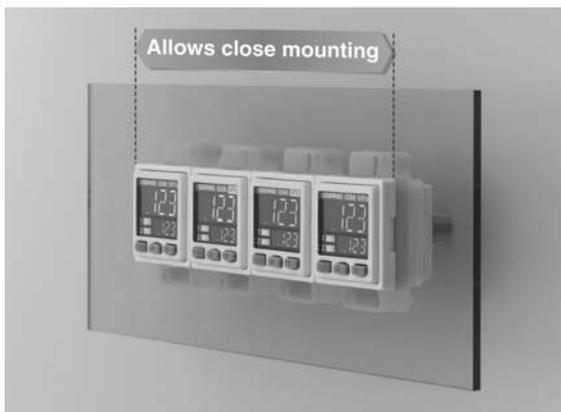
Uses two screens to display the peak value and bottom value of fluctuating pressure.



Installation is also simple!

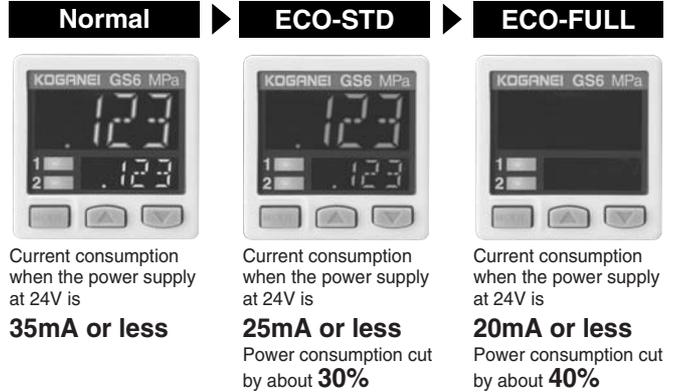
Allows close mounting on panels

Optional part for mounting on a panel that is capable of handling panel thicknesses of 1 to 6mm [0.04 to 0.24in.] is available.



Energy-saving design! ECO mode provided

Restricts brightness on display, to cut power consumption by 30%. Furthermore, shutting off lights on display can cut consumption by a maximum of about 40%.

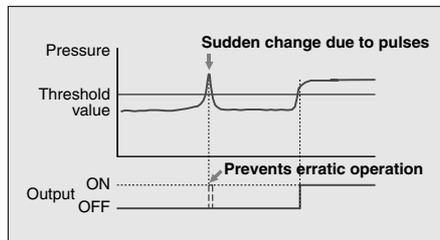


Variable display update cycle

The display update cycle for the digital display can be changed in three steps: at 250ms, 500ms, and 1000ms. Extending the display update cycle can limit display flicker.

Response time can be changed

The response time can be changed in 10 steps, from 2.5ms to 5000ms. This prevents chattering or erratic operation due to sudden changes in pressure.



Handling Instructions and Precautions



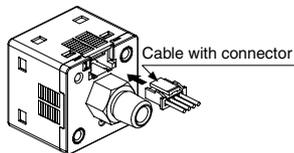
General precautions

Wiring

1. Make sure that the power supply is off while wiring.
2. Verify that the supply voltage variation is within the rating.
3. If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
4. When noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of pressure switch mounting portion, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
5. Do not run the wires together with high-voltage lines or power lines or put them in the same conduit. This can cause malfunction due to induction.
6. Take care that wrong wiring will damage the sensor.
7. When wiring is completed, check that there is no error in the wiring connections.

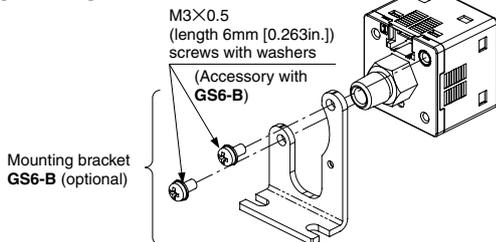
Connections

Do not apply stress directly to the cable leads or connectors.

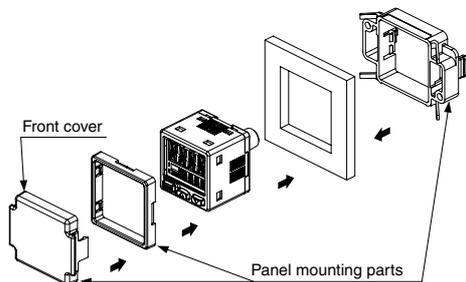


Mounting

1. The sensor mounting bracket **GS6-B** (optional) is available. When mounting the sensor onto the sensor mounting bracket, etc., the tightening torque should not exceed 0.5N·m [0.37ft·lb].

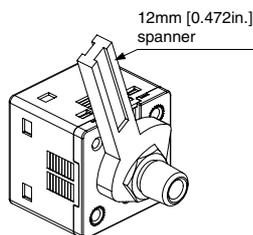


2. The parts for panel mounting **GS6-P** (optional) are also available.



Piping

When connecting a commercial fitting to the pressure port, apply a 12mm [0.472in.] spanner to the pressure port's hexagon section to secure the port, and then tighten with a tightening torque not exceeding 9.8N·m [7.23ft·lb] (M5 female: 1N·m [0.74ft·lb]). The commercial fitting or pressure port section will be damaged if the tightening torque is excessive. Wrap sealing tape around the fitting thread when connecting to prevent leaks.



Others

1. GS6 series is designed for use with non-corrosive gas. It cannot be used for liquid or corrosive gas.
2. Use within the rated pressure range.
3. Do not apply pressure exceeding the proof pressure value. The diaphragm will get damaged and correct operation shall not be maintained.
4. Do not use during the initial transient time (0.5 sec.) after the power supply is switched on.
5. Avoid dust, dirt, and steam in operating conditions.
6. Take care that the sensor does not come in direct contact with water, oil, grease, or organic solvents, such as thinner, etc.
7. Do not insert a wire, etc., into the pressure port. The diaphragm will get damaged and correct operation shall not be maintained.
8. Do not operate the keys with pointed or sharp objects.

RUN mode

This is the normal operation mode.

Setting item	Description
Threshold value setting	Changes the ON/OFF threshold value merely by pressing the UP key or DOWN key.
Zero-adjustment function	Forcibly sets the pressure value to 'zero' when the pressure port vents to the atmosphere.
Key lock function	Rejects acceptance of key operations.
Peak/bottom hold function	Displays the peak value and bottom value of the fluctuating pressure. The peak value is displayed on the main display and the bottom value is displayed on the sub-display.

Menu setting mode

1. When the mode selection key is held down for two seconds in the RUN mode, the menu setting mode will open.
2. The mode will change to the RUN mode when the mode selection key is held down during this setting process. In this case, the changed item is entered.

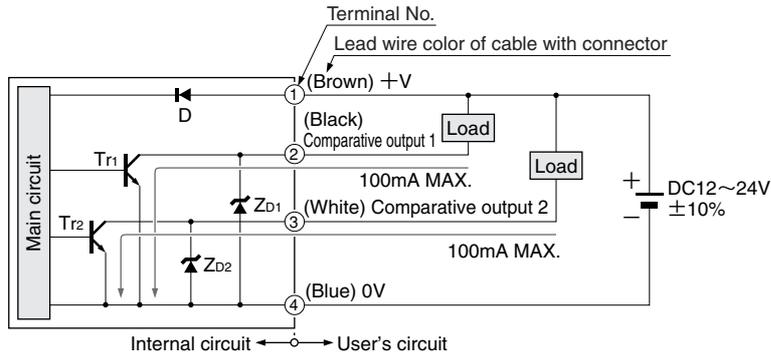
Setting item	Description
Comparative output 1 output mode setting	Sets the output mode of comparative output 1.
Comparative output 2 output mode setting (Standard type only)	Sets the output mode of comparative output 2.
Analog voltage output/external input selection (High-function type only)	Selects analog voltage output, auto-reference input, or remote zero-adjustment input.
N.O. / N.C. selection	Normal open (N.O.) or normal close (N.C.) can be selected.
Response time setting	Sets the response time. The response time can be selected from 2.5ms, 5ms, 10ms, 25ms, 50ms, 100ms, 250ms, 500ms, 1000ms or 5000ms.
Displayed color of the main display selection	Displayed color of the main indicator can be changed. Output ON/OFF can be designated either "red/green" or "green/red." The display can also permanently be fixed to "red" or "green."
Unit selection (High-pressure type only)	Pressure unit (MPa and kPa) can be changed.

Remarks: For details about each mode, function, or numerical setting, see the Owner's Manual supplied with the product.

Input/Output Circuits and Connections

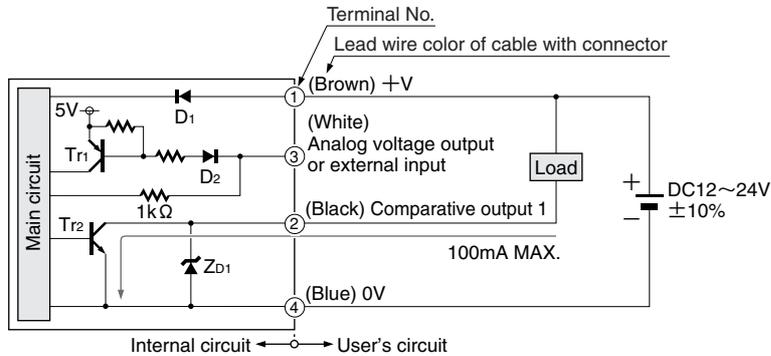
I/O circuit diagrams

● Standard type



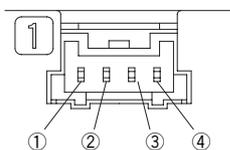
Key to codes... D: Reverse current protection diode for power supply
 Z_{D1}, Z_{D2}: Zener diode for surge voltage absorption
 T_{r1}, T_{r2}: NPN output transistor

● High-function type



Key to codes... D: Reverse current protection diode for power supply
 Z_{D1}: Zener diode for surge voltage absorption
 T_{r1}: PNP input transistor
 T_{r2}: NPN output transistor

Terminal arrangement diagram



Terminal No.	Name
①	+V
②	Comparative output 1
③	Standard type: Comparative output 2 High-function type: Analog voltage output or external input
④	0V

Specifications

Item	Type Model	Standard type		High-function type		
		Low pressure type	High pressure type	Low pressure type	High pressure type	
		GS610	GS620	GS610A	GS620A	
Pressure type	Gauge pressure					
Rated pressure range	-100.0 to +100.0kPa [-29.54in-Hg to 14.5psi.]	-0.100 to +1.000MPa [-29.54in-Hg to 145psi.]	-100.0 to +100.0kPa [-29.54in-Hg to 14.5psi.]	-0.100 to +1.000MPa [-29.54in-Hg to 145psi.]		
Set pressure range	-100.0 to +100.0kPa [-29.54in-Hg to 14.5psi.]	-0.100 to +1.000MPa [-29.54in-Hg to 145psi.]	-100.0 to +100.0kPa [-29.54in-Hg to 14.5psi.]	-0.100 to +1.000MPa [-29.54in-Hg to 145psi.]		
Proof pressure	500kPa [73psi.]	1.5MPa [218psi.]	500kPa [73psi.]	1.5MPa [218psi.]		
Applicable fluid	Non-corrosive gas					
Supply voltage	DC12 to 24V ±10%, Ripple P-P 10 % or less					
Power consumption	Normal operation: 840mW or less (current consumption 35mA or less at 24V supply voltage) ECO mode (STD): 600mW or less (current consumption 25mA or less at 24V supply voltage), ECO mode (FULL): 480mW or less (current consumption 20mA or less at 24V supply voltage)					
Comparative output	NPN open-collector transistor · Maximum sink current: 100mA · Applied voltage: DC30V or less (between comparative output and 0V) · Residual voltage: 0.5V or less (at sink current of 100mA, assuming a cable of 2m [6.56ft.] or less)					
	Output operation	Selectable either N.O. or N.C., with key operation				
	Output mode	EASY mode / hysteresis mode / window comparator mode				
	Hysteresis	Min. 1 digit (variable)				
	Repeatability	±0.1%F.S. (±within 2 digits)	±0.2%F.S. (±within 2 digits)	±0.1%F.S. (±within 2 digits)	±0.2%F.S. (±within 2 digits)	
	Response time	2.5ms, 5ms, 10ms, 25ms, 50ms, 100ms, 250ms, 500ms, 1000ms, or 5000ms selectable with key operations				
	Short-circuit protection	Equipped				
External input [Auto-reference function/Remote zero- adjustment function]	—		ON voltage: DC0.4V or less OFF voltage: DC5~30V or open Input impedance: 10kΩ approx. Input time: 1ms or more			
Analog voltage output	—		Output voltage: 1 to 5V Zero point: Within 3V±5% F.S. Span: Within 4V±5% F.S. Linearity: Within ±1% F.S. Output impedance: 1kΩ approx.	Output voltage: 0.6 to 5V Zero point: Within 1V±5% F.S. Span: Within 4.4V±5% F.S. Linearity: Within ±1% F.S. Output impedance: 1kΩ approx.		
Display	4 column+4 column 3 color LCD display (Display update cycle: 250ms, 500ms, or 1000ms, selectable with key operations)					
Display pressure range	-100.0 to +100.0kPa [-29.54in-Hg to 14.5psi.]	-0.100 to +1.000MPa [-29.54in-Hg to 145psi.]	-100.0 to +100.0kPa [-29.54in-Hg to 14.5psi.]	-0.100 to +1.000MPa [-29.54in-Hg to 145psi.]		
Indicator	Orange LED (Comparative output 1 operation indicator, Comparative output 2 operation indicator: Lights up when comparative output is ON)		Orange LED (Comparative output 1 operation indicator: Lights up when comparative output is ON, Analog voltage output operations indicator: Lights up when set)			
	IP40 (IEC)					
Environment resistance	Ambient temperature: -10 to +50°C [14 to 122°F], Storage: -10 to +60°C [14 to 140°F]					
	Ambient humidity: 35 to 85%RH (No dew condensation or icing allowed), Storage: 35 to 85%RH					
	Dielectric strength: AC1000V 1 minute between charging part and case					
	Insulation resistance: At DC500V Megger, 50MΩ or more between charging part and case					
	Vibration resistance: Endurance 10 to 500Hz with total amplitude 3mm [0.118in.] in XYZ directions for 2 hours (When panel mounted: Endurance 10 to 150Hz with total amplitude 0.75mm [0.0295in.] in XYZ directions for 2 hours)					
	Shock resistance: Endurance 100m/s ² (about 10G) in XYZ directions, three times					
Temperature characteristics	Within ±0.5%F.S. (+20°C [68°F] reference)	Within ±1%F.S. (+20°C [68°F] reference)	Within ±0.5%F.S. (+20°C [68°F] reference)	Within ±1%F.S. (+20°C [68°F] reference)		
Pressure port	M5×0.8 female thread and R1/8 male thread					
Material	Enclosure: PTB (with glass fiber), LCD display: Acrylic, Pressure port: Stainless steel (SUS303), Mounting screw section: Brass (nickel-plated), Switch: Silicone rubber					
Connection method	Connector connections					
Wiring length	Capable of up to 100m [328ft.] on a cable of 0.3mm ² or larger					
Weight	40g [1.41oz.] approx.					
Accessories	Cable with a connector (cable length 2m [6.56ft.]): 1 pc.					

Note: If not specified, measurement condition assumes ambient temperature: +20°C [68°F].

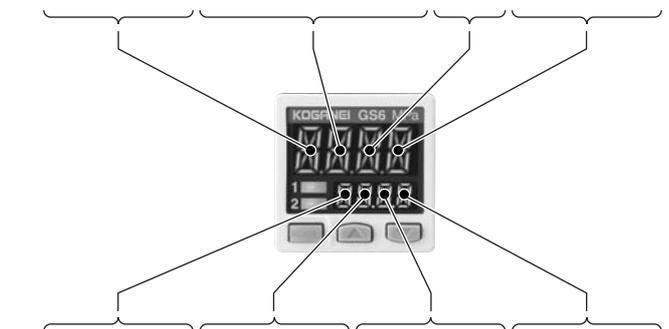
PRO Mode

- When the mode selection key is held down for five seconds in the RUN mode, the PRO mode will open.
- The mode will change to the RUN mode when the mode selection key is held down during this setting process. In this case, the changed item is entered.

Setting item	Description
Sub-display selection	Switches to desired alphanumeric characters on sub-display area during RUN mode.
Display update cycle switching	Switches the display update cycle for pressure value displayed on the main display area.
Hysteresis fixed value selection	Sets hysteresis of the EASY mode and the window comparator mode. (eight steps)
Displayed color change selection (Standard type only)	The displayed color for main display can be changed with either output operation of comparative output 1 or comparative output 2.
Eco mode setting	Darkens or switches off the display area to restrict power consumption.
Setting check code	Current setting contents can be checked.
Setting copy mode	The setting of the master pressure sensor can be copied to the slave side pressure sensors.
Reset setting	Returns to default settings (factory settings).

Code table

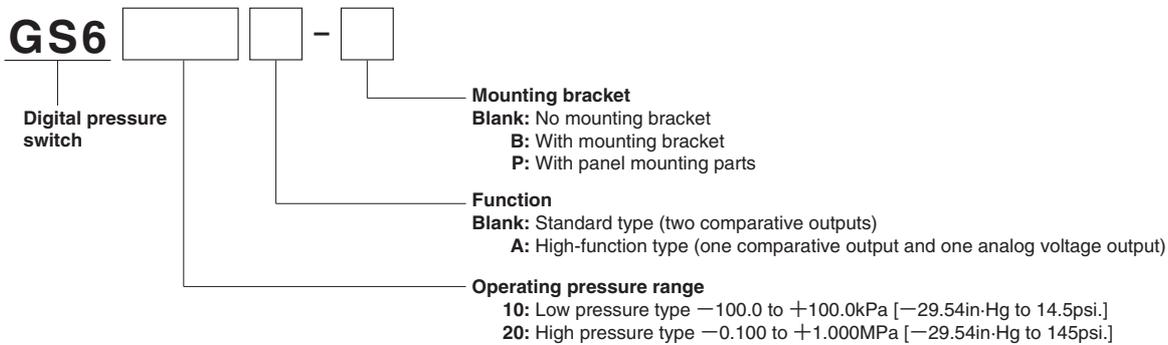
Code	First digit		Second digit			Third digit	Fourth digit	
	Comparative output 1	N.O./N.C. selection	Comparative output 2	N.O./N.C. selection	High-function type		Standard type only	Standard type only
0	EASY	N.O.	OFF	OFF	Analog voltage output	P-1, Lo-1	Red when ON	Comparative output 1
1		N.C.	EASY	N.O.	Auto-reference	Hi-1		Comparative output 2
2	Hysteresis	N.O.	Hysteresis	N.O.	Remote zero-adjustment	P-2, Lo-2	Green when ON	Comparative output 1
3		N.C.		N.C.	—	Hi-2		Comparative output 2
4	Window comparator	N.O.	Window comparator	N.C.	—	ADJ.	Always Red	Comparative output 1
5		N.C.		N.O.	—	—		Comparative output 2
6	—	—	—	N.C.	—	—	Always Green	Comparative output 1
7	—	—	—	—	—	—	—	Comparative output 2



Code	Fifth digit	6th digit	7th digit	8th digit
	Response time	Unit selection	Display speed	Eco mode
0	2.5ms	MPa	250ms	OFF
1	5ms	kPa	500ms	Std
2	10ms	—	1000ms	Full
3	25ms	—	—	—
4	50ms	—	—	—
5	100ms	—	—	—
6	250ms	—	—	—
7	500ms	—	—	—
8	1000ms	—	—	—
9	5000ms	—	—	—

PRESSURE SWITCHES

Order Codes



Additional parts (to be ordered separately)

Mounting bracket

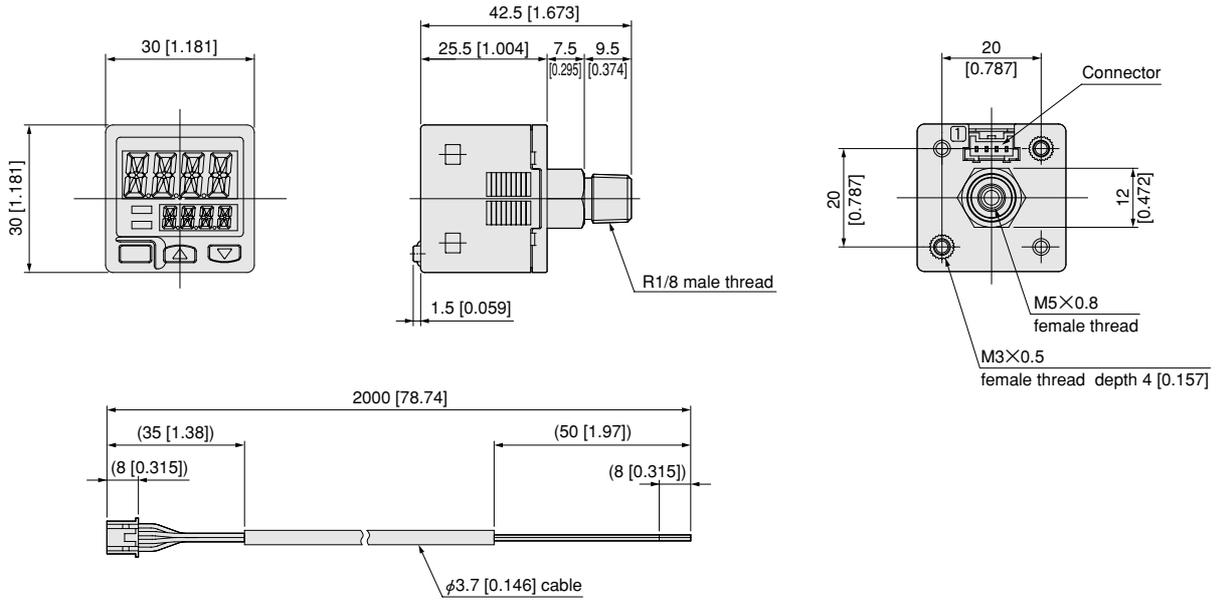


Panel mounting parts

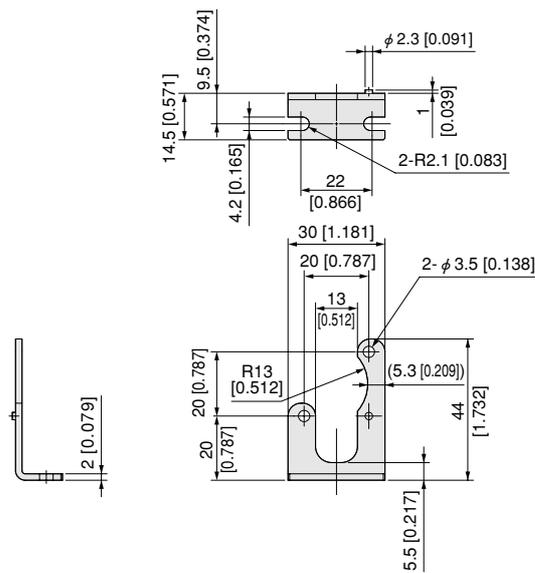


Dimensions mm [in.]

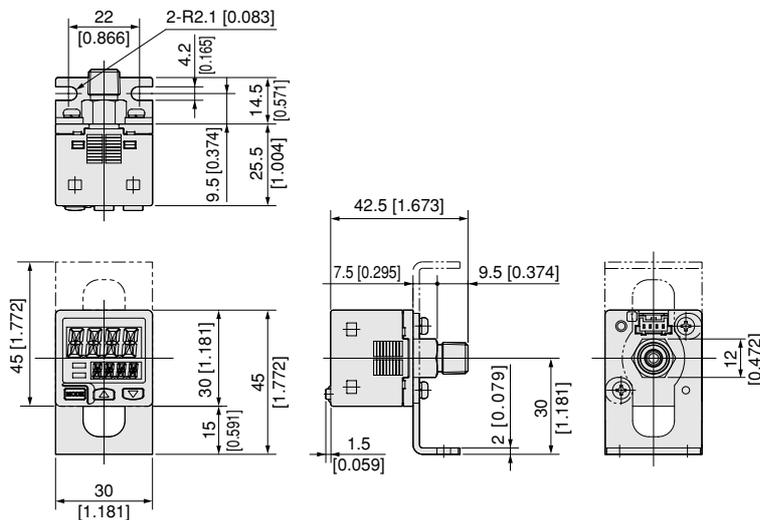
GS6 □ 0 □



GS6-B Mounting bracket (to be ordered separately)

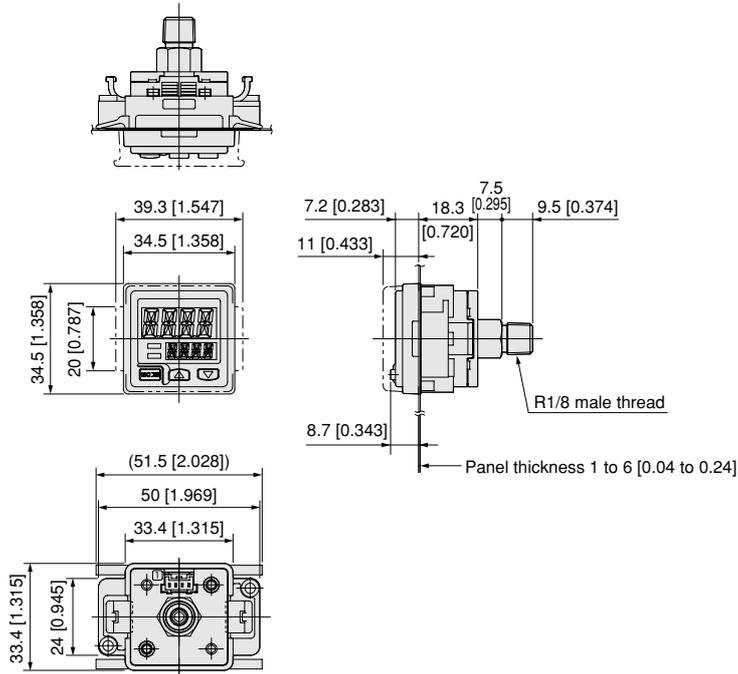


Installation drawing



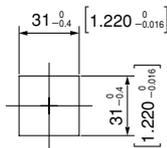
GS6-P Panel mounting parts (to be ordered separately)

Installation drawing

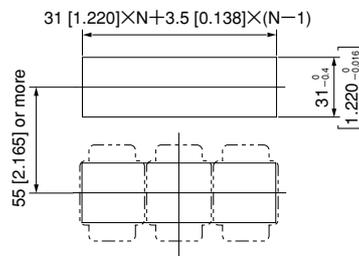


Panel cut-out size

When mounting one unit

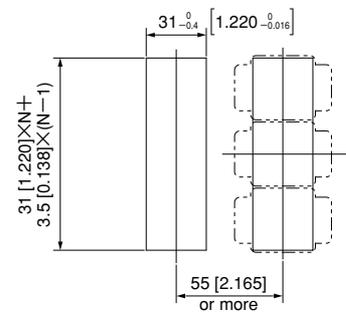


When mounting N units in series in horizontal direction



Note: Set the panel thickness to 1 to 6mm [0.04 to 0.24in.].

When mounting N units in series in vertical direction



Note: Set the panel thickness to 1 to 6mm [0.04 to 0.24in.].

