

DIGITAL PRESSURE GAUGES WITH BUILT-IN SENSORS

Caution: **GS2** negative pressure is displayed in -cmHg, while positive pressure is displayed in kgf/cm².

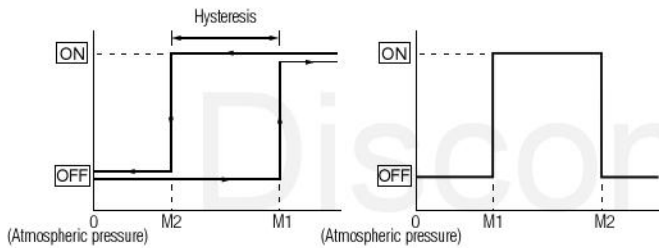
Characteristics

- Can set pressure while reading displays. (2½ digit LCD display)
Can align with the current situation while confirming the pressure setting in the display.
- Electronic lifetime is almost perpetual.
Uses diffusion-type semiconductor transducer.
Offers high reliability and long life even under the rigorous environment of changing pressures.
- 2-point setting
The 2-point setting of pressure allows selection of two different kinds of modes, the hysteresis mode and window comparator mode. Adaptable to all kinds of utilizations.

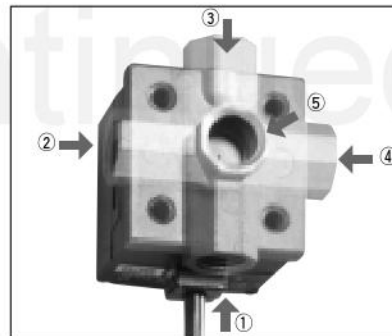


① Hysteresis mode

② Window comparator mode



- Connections in five directions.
Change the mounting direction of piping attachments to select five different kinds of connection directions.



Front side



Rear side

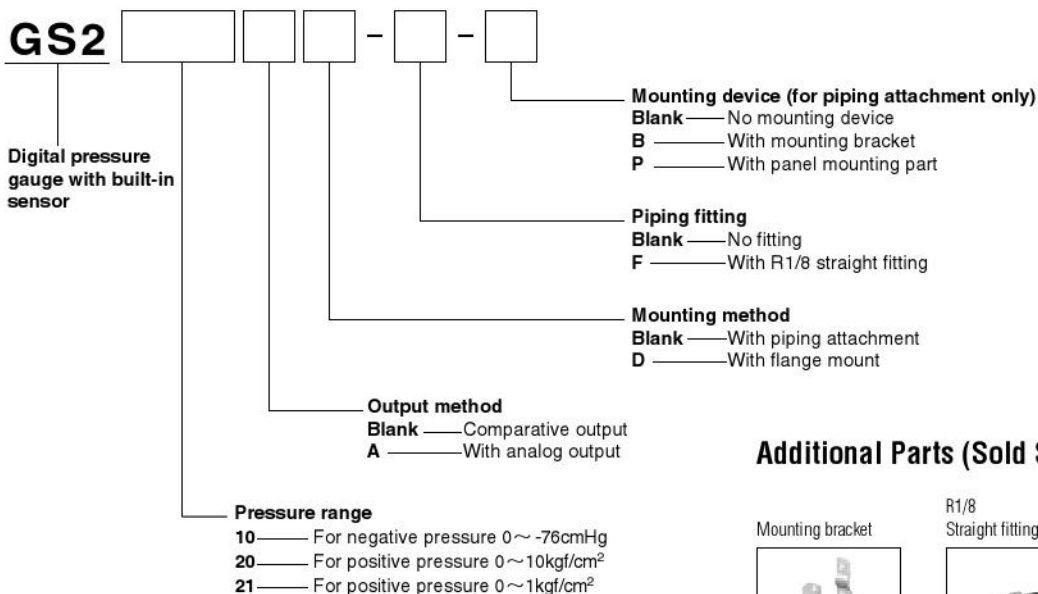


Specifications

Item	Category	Negative pressure		Positive pressure			
		Digital pressure gauge		1kgf/cm ² type		10kgf/cm ² type	
		Comparative output	With analog output	Comparative output	With analog output	Comparative output	With analog output
		Model	Model	Model	Model	Model	Model
		GS210 GS210D	GS210A GS210AD	GS221 GS221D	GS221A GS221AD	GS220 GS220D	GS220A GS220AD
Rated pressure range		0~-76cmHg		0~1kgf/cm ² (0~100kPa)		0~9.9kgf/cm ² (0~990kPa)	
Set pressure range		0~-76cmHg		0~1kgf/cm ² (0~100kPa)		0~9.9kgf/cm ² (0~990kPa)	
Proof pressure		5kgf/cm ² (500kPa)				15kgf/cm ² (1500kPa)	
Media		Air or non-corrosive gas					
Repeatable accuracy (comparative output)		±1%FS max.					
Power supply voltage		DC12~24V ±10% ripple P-P10% max.					
Consumption current		30mA max.					
Output method	Comparative output	NPN transistor, open collector ● Output capacity: DC30V, 100mA max. ● Residual voltage: 1V max. (at rush current of 100mA) 0.4V max. (at rush current of 16mA)					
	Analog output	—	● Output voltage: 1~5V (0~-76cmHg) ● Output impedance: 1K Ω ● Linearity: ±1%FS	—	● Output voltage: 1~5V (0~1kgf/cm ²) ● Output impedance: 1K Ω ● Linearity: ±1%FS	—	● Output voltage: 1~5V (0~10kgf/cm ²) ● Output impedance: 1K Ω ● Linearity: ±1%FS
Display		2 1/2 digit LCD display (sampling period 4 times/second)					
Operations display lamp		Red LED (lights up when output ON)					
Response frequency		200Hz					
Temperature characteristics		At a temperature range of 0~+50°C, with detection output of ±3%FS max. at 25°C					
Environmental resistance	Protective configuration	IP40 (IEC144)					
	Anti-noise	240Vp • pulse width 0.5 μs (power supply line radiation)					
	Withstand voltage	AC1000V in 1 minute					
	Insulation resistance	50M Ω max. (at DC500V meggers)					
	Anti-vibration	10~55Hz, double amplitude 1.5mm, 2 hours in each X, Y, Z direction					
Shock resistance	98m/s ² (10G), 3 times in each X, Y, Z direction						
Material	Front case	ABS					
	Rear case	Aluminium die-cast					
	Piping attachments	Zinc die-cast					
Cable		0.18SQ oil-proof, heat-resistant, cold-resistant cable (standard 0.5m)					
Mass		About 100g					

PRESSURE SWITCHES

Order Codes



Additional Parts (Sold Separately)

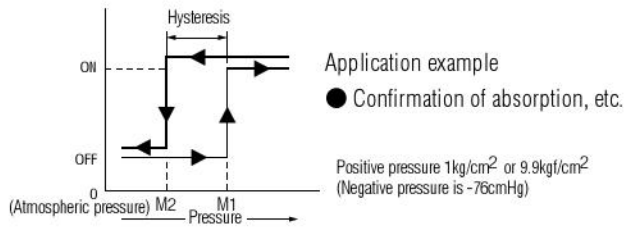


Setting the Operating Pressure

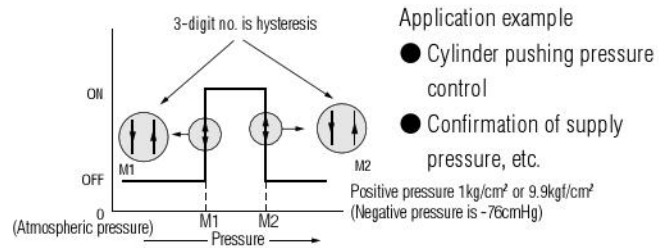
1) Output mode

For the output mode, use the 2-point settings of M1 and M2 to select from 2 output modes, ① hysteresis mode and ② window comparator mode.

① Hysteresis mode ($M1 \geq M2$)



② Window comparator mode ($M1 < M2$)



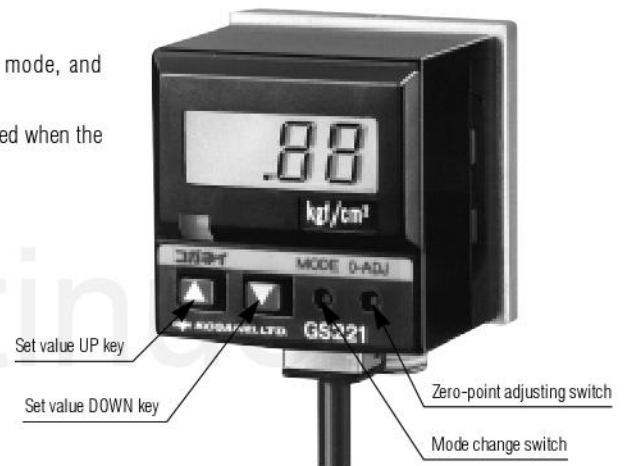
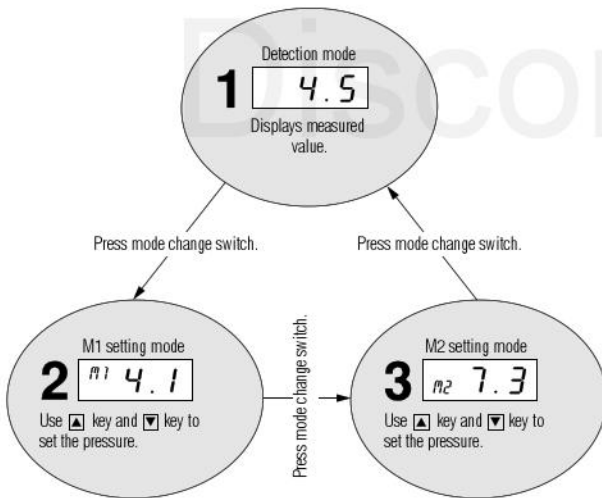
Note: Separate M1 and M2 by 6 digits min.

("Digit" refers to the minimum unit on the digital display.)

2) Setting method

Display modes include the detection mode, M1 setting mode and M2 setting mode, and pressing the mode change switch allows switching from one mode to another.

(The set values are written directly to the EEP • ROM and therefore are not erased when the power supply is turned OFF.)



Step No.	Setting item	Mode	Setting method																																
1	Zero-point adjustment	Detection mode	Return the applied pressure to atmospheric pressure level, and press the zero-point adjusting switch. If pressure is applied during zero-point adjustment, message E3 is displayed.																																
2	M1 level setting	M1 setting mode	Use the ▲ key and ▼ key to set the M1 level. Pressing the ▲ key raises the value, while pressing the ▼ key reduces the value. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Settings are, for positive pressure, in the 0 ~ 1kg/cm² and 0 ~ 9.9kg/cm² ranges, and for negative pressure, in the 0 ~ -76cmHg range. If it surpasses the range, UP or LO will be displayed.</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td colspan="2">Positive pressure</td> <td colspan="2">Negative pressure</td> </tr> <tr> <td>UP</td> <td>UP</td> <td>▲</td> <td>UP</td> </tr> <tr> <td>1.00</td> <td>10.0</td> <td>↑</td> <td>-76</td> </tr> <tr> <td>.99</td> <td>9.9</td> <td>↕</td> <td>-75</td> </tr> <tr> <td>⋮</td> <td>⋮</td> <td>↓</td> <td>⋮</td> </tr> <tr> <td>.01</td> <td>0.1</td> <td>▼</td> <td>-1</td> </tr> <tr> <td>0</td> <td>0</td> <td>↕</td> <td>-0</td> </tr> <tr> <td>LO</td> <td>LO</td> <td>↓</td> <td>LO</td> </tr> </table> <p>Display goes up to 10.0</p> </div>	Positive pressure		Negative pressure		UP	UP	▲	UP	1.00	10.0	↑	-76	.99	9.9	↕	-75	⋮	⋮	↓	⋮	.01	0.1	▼	-1	0	0	↕	-0	LO	LO	↓	LO
Positive pressure		Negative pressure																																	
UP	UP	▲	UP																																
1.00	10.0	↑	-76																																
.99	9.9	↕	-75																																
⋮	⋮	↓	⋮																																
.01	0.1	▼	-1																																
0	0	↕	-0																																
LO	LO	↓	LO																																
3	M2 level setting	M2 setting mode	In the same way as the M1 level settings, use the ▲ key and the ▼ key to set the M2 level.																																
4	—	Detection mode	Press the mode change switch to complete the setting.																																

☆ When an error occurs, take the following measures:

Error display	Content	Measures
E 1	Load is short-circuited and eddy current is flowing.	Turn off the power supply and confirm the load.
E 3	Pressure appears during zero-point adjustment.	Return the applied pressure to atmospheric pressure level, and then adjust the zero-point again.
- - -	Applied pressure surpasses rated pressure range.	Return the applied pressure within the rated pressure range.

Application Examples

Air Chuck Clamp Force Control (Positive Pressure, Window Comparator Mode)

Application: Conveyor Robot, Etc.

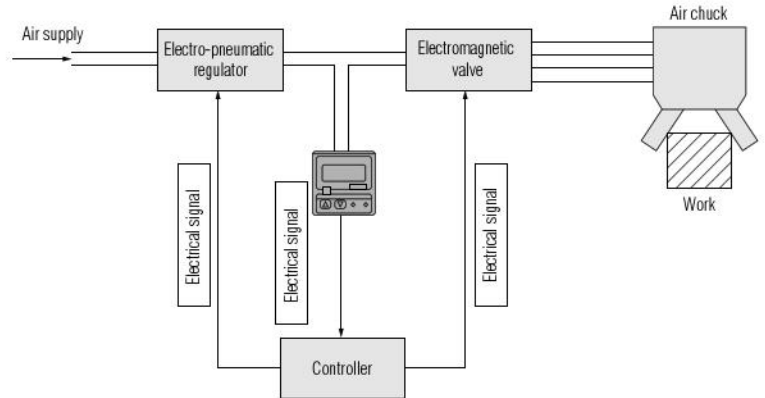
Analogue control of pressure can be done with analogue output.

Summary

Changes and controls the supply pressure according to work to alter the air chuck's clamp force.

Operating Instructions

The air chuck's clamp force is virtually proportional to the supply pressure. Analogue electrical signals from the controller can change the pressure supplied from the electro-pneumatic regulator. A pressure sensor confirms the pressure, and the analogue voltage corresponding to the pressure is fed back to the controller.



Seating Confirmation (Positive Pressure, Hysteresis Mode)

Application: Machine Tools, Press Machinery, Etc.

Pressure setting can be accurately conducted in 0.1kgf.cm² units.

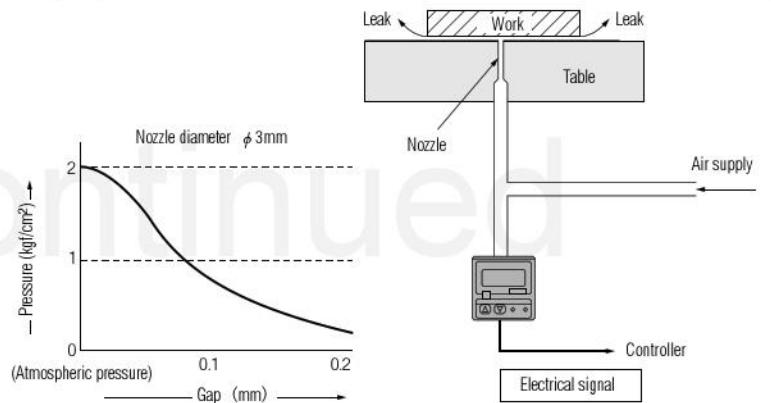
Summary

In processing metals, poorly fixed work can lead to degraded machining accuracy.

Here, low-pressure air supplied from the worktable can be used to check air leaks in the gap between the worktable and the work to determine whether the work is perfectly seated or not.

Operating Instructions

As can be seen in the graph on the right, the larger the gap, the greater the volume of leakage, and pressure falls. Leakage volume can also be affected by the size of the nozzle diameter.



Confirmation of Work Adsorption (Negative Pressure, Hysteresis Mode)

Application: Conveyor Machinery, Semiconductor Manufacturing Equipment, Etc.

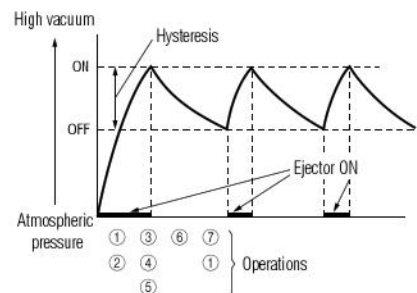
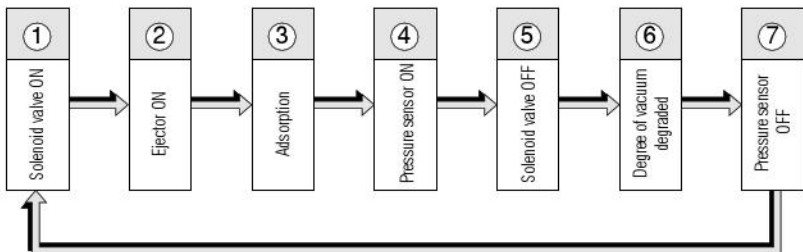
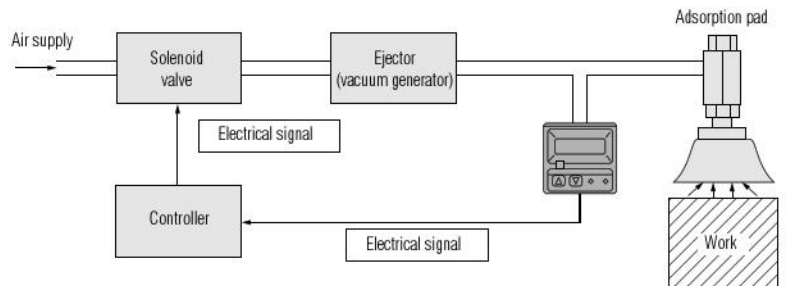
Hysteresis can be set to any value.

Summary

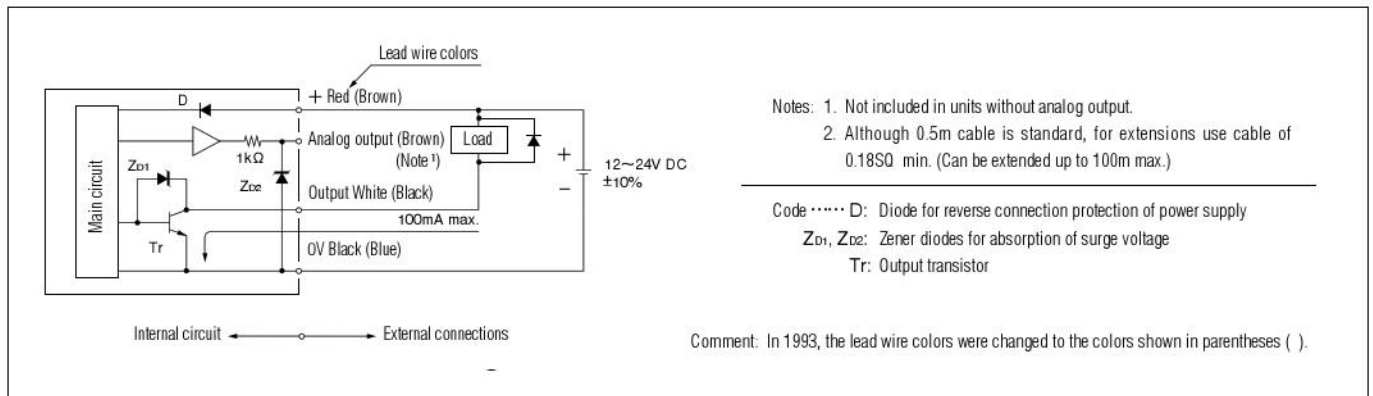
In a work adsorption conveyor system, a combination of ejectors (vacuum generators) and pressure sensors make an economical air circuit.

Operating Instructions

The pressure sensor is used to confirm vacuum and air pressure, and to turn the solenoid valve for the supply air ON or OFF. (Even when the solenoid valve is OFF, the vacuum is maintained until the adsorption is broken.)



Input/Output Circuit Diagrams



Please Use Correctly

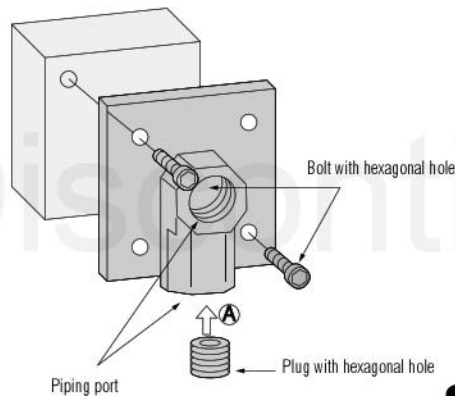
Setting the direction of pipe connections

By freely removing the piping attachments and changing their mounting directions, the direction of pipe connections can be changed. The tightening torque should 30N·cm(3kgf·cm) max.

Note: Always block unused piping ports with the hexagonal plug provided.

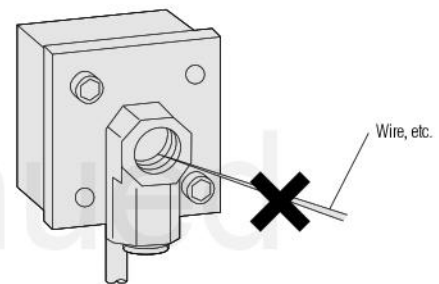
(Tightening torque is 1000N·cm {100kgf·cm} max.)

At delivery, port A is blocked by a hexagonal plug (with sealing tape).



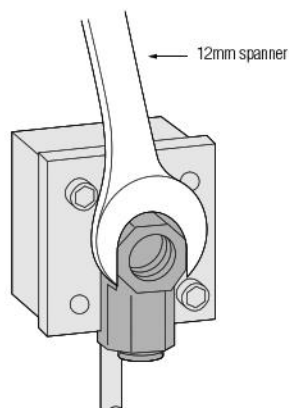
Do not insert wires from the piping port.

It damages the diaphragm, making it impossible to obtain accurate operations.



Piping

When connecting a fitting to the piping attachment, use a spanner (12mm) on the hexagonal portion of the piping port. The tightening torque should be at 1000N·cm{100kgf·cm} max. In addition, connect by putting sealing tape around the male screws to prevent leaks.



● The digital pressure gauge with a built-in sensor is for non-corrosive gases. Do not use it with liquids or corrosive gases.

● When using with the power supply switching regulators that are available on the market, ground it with a frame gland (F.G.) terminal.

● Do not use while the power supply is in a transient state during start-up (about 50ms).

● Avoid using in parallel lines or shared ducts with high-pressure or power lines. It could result in induction-caused erratic operations.

※ For an explanation of terms and a table of pressure unit conversions, see page 353.