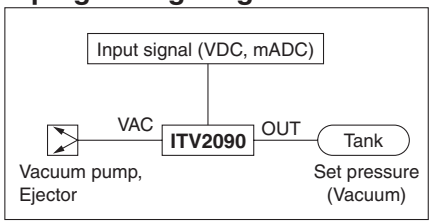
Electronic Vacuum Regulator
Series ITV2090/2091

■ Stepless control of vacuum pressure in proportion to an electric signal

Straight type　　Right angle type

Piping/Wiring Diagram



Standard Specifications

Model		ITV2090	ITV2091
Power supply	Voltage	24 VDC ±10%	12 to 15 VDC
	Current consumption	Power supply voltage 24 VDC type: 0.12 A or less Power supply voltage 12 to 15 VDC type: 0.18 A or less	
Minimum supply vacuum pressure (1)		Set pressure –13.3 kPa	
Maximum supply vacuum pressure		–101 kPa	
Regulating pressure range		–1.3 to –80 kPa	
Input signal	Current type (2)	4 to 20 mA, 0 to 20 mA	
	Voltage type	0 to 5 VDC, 0 to 10 VDC	
	Preset input	4 points	
Input impedance	Current type	250 Ω or less	
	Voltage type	Approximately 6.5 kΩ	
	Preset input	Approximately 2.7 kΩ	
Output signal (3) (Monitor output)	Analog output	1 to 5 VDC (Load impedance: 1 kΩ or more) 4 to 20 mA (Sink type) (Load impedance: 250 Ω or less)	
	Switch output	NPN open collector output: Max. 30 V, 30 mA PNP open collector output: Max. 30 mA	
Linearity		Within ±1% (Full span)	
Hysteresis		Within 0.5% (Full span)	
Repeatability		Within ±0.5% (Full span)	
Sensitivity		Within 0.2% (Full span)	
Temperature characteristics		Within ±0.12% (Full span)/°C	
Output pressure display	Accuracy	±3% (Full span)	
	Units	kPa (4) Minimum display: 1	
Ambient and fluid temperature		0 to 50°C (With no condensation)	
Enclosure		IP65 equivalent	
Weight		350 g	

Note 1) The minimum supply vacuum pressure should be 13.3 kPa less than the maximum vacuum pressure setting value.
Note 2) 4 to 20 mA is not possible with the 2-wire type. Power supply voltage (24 VDC or 12 to 15 VDC) is required.
Note 3) Either analog output or switch output must be selected. Furthermore, when switch output is selected, either NPN output or PNP output must also be selected. Use caution that the preset input type is not equipped with an output signal function.
Note 4) Please contact SMC regarding indication with other units of pressure.

How to Order

ITV 209 [0] – [0] [1] [ ] [2] [ ] [S] [5]

Pressure range

9	–1.3 to –80 kPa

Power supply voltage

0	24 VDC
1	12 to 15 VDC

Input signal

0	Current type 4 to 20 mADC
1	Current type 0 to 20 mADC
2	Voltage type 0 to 5 VDC
3	Voltage type 0 to 10 VDC
4 *	Preset input

* Option

Monitor output

0 *	None (For preset input)
1	Analog output 1 to 5 VDC
2 *	Switch output/NPN output
3 *	Switch output/PNP output
4 *	Analog output 4 to 20 mADC

* Option

Thread type

Nil	Rc
N *	NPT
T *	NPTF
F *	G

* Option

Port size

2	1/4

Pressure display unit

5	kPa

Cable connector type

S	Straight type 3 m
L *	Right angle type 3 m
N *	Without cable connector

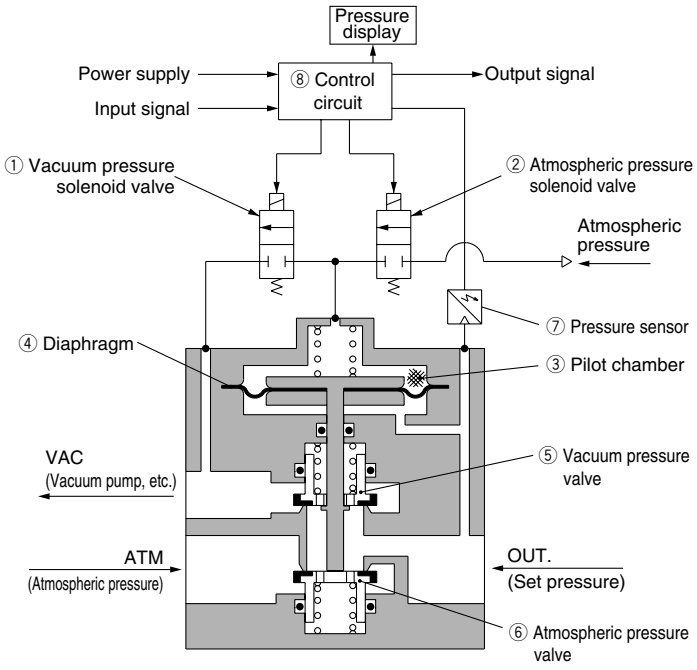
* Option

Option (Bracket)

Nil	Without bracket
B *	Flat bracket
C *	L-bracket

* Option

Working Principle



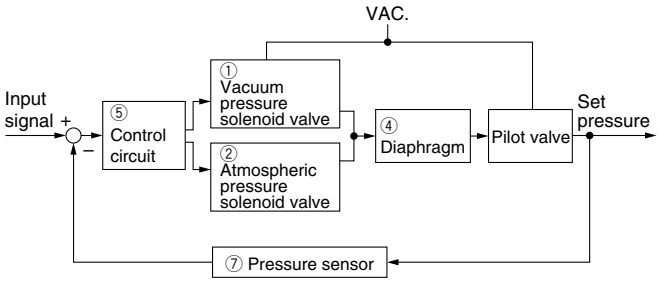
Working Principle

When the input signal increases, the vacuum pressure solenoid valve ① turns ON, and the atmospheric pressure solenoid valve ② turns OFF. Because of this, VAC and the pilot chamber ③ are connected, the pressure in the pilot chamber ③ becomes negative and acts on the top of the diaphragm.

As a result, the vacuum pressure valve ⑤ which is linked to the diaphragm ④ opens, VAC and OUT are connected, and the set pressure becomes negative.

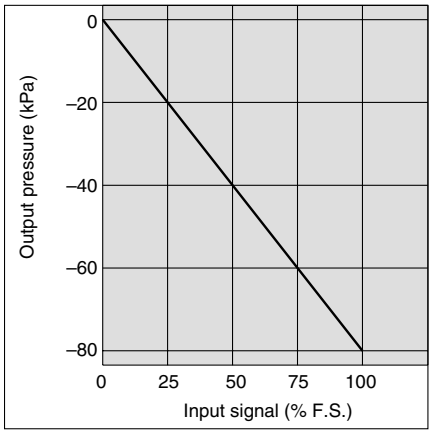
This negative pressure feeds back to the control circuit ⑧ via the pressure sensor ⑦. Then, a correct operation works until a vacuum pressure proportional to the input signal is reached, and a vacuum pressure is obtained which is always proportional to the input signal.

Block Diagram

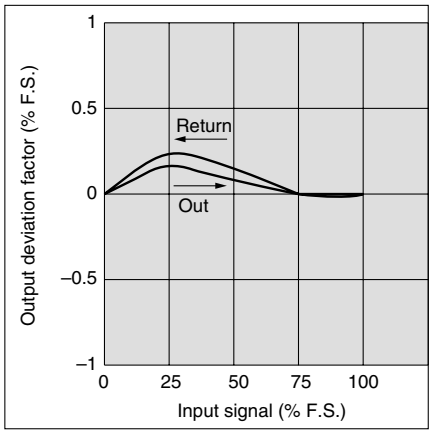


Series ITV209□

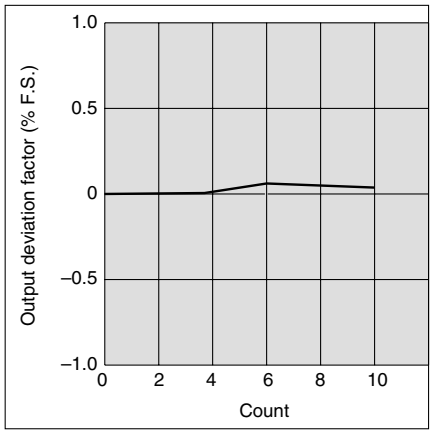
Linearity



Hysteresis

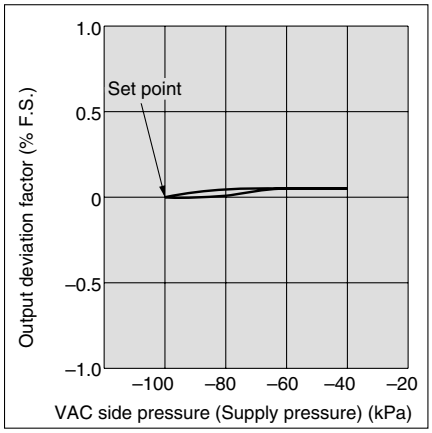


Repeatability



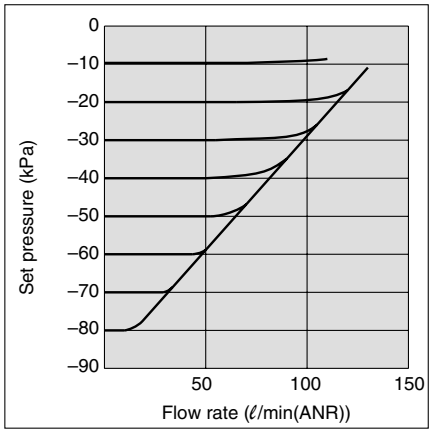
Pressure Characteristics

Set pressure: –20 kPa



Flow Characteristics

Supply pressure: –100 kPa



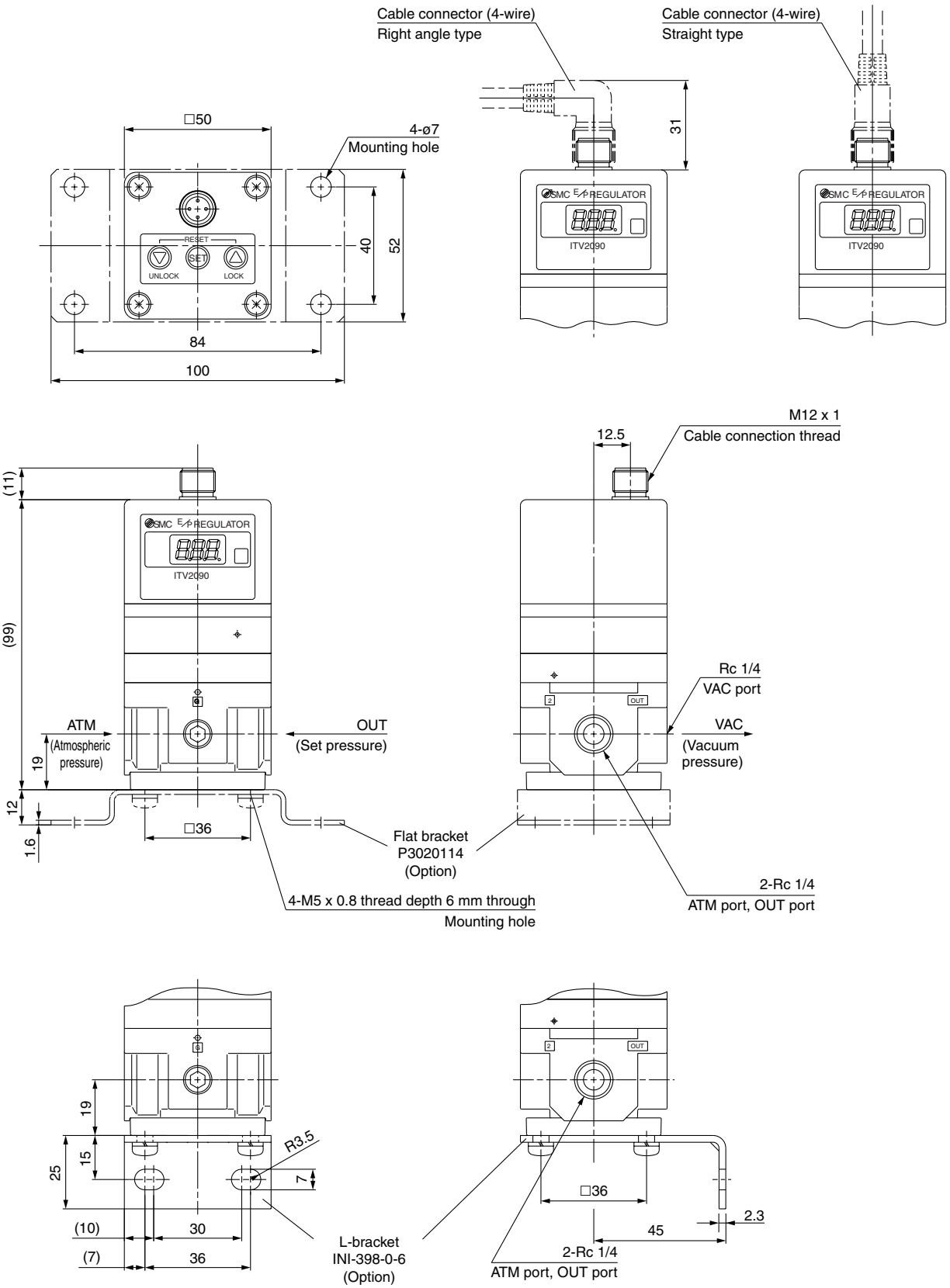
Flow characteristics measurement conditions

- Exhaust flow rate of the vacuum pump used for measurement: 500 ℓ/min (ANR)
- Inlet vacuum pressure: –100 kPa (When outlet flow rate is 0 ℓ/min (ANR))
- Maximum flow rate: 132 ℓ/min (ANR) (With inlet vacuum pressure at –39 kPa)

Dimensions

ITV2090

Note) Do not attempt to rotate the cable connector, as it does not turn.

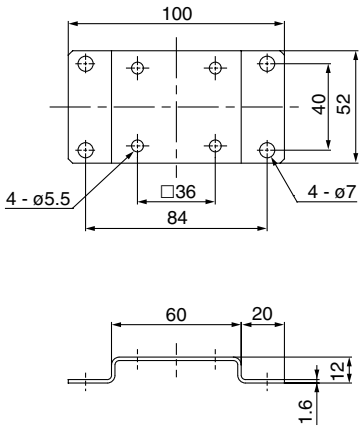


Accessory (Option)/Part No.

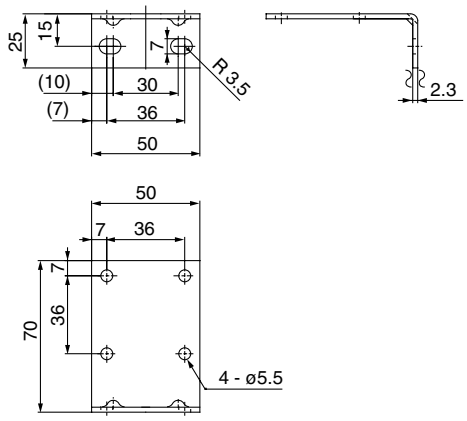
Description		Part no.
Flat bracket		P3020114
L-bracket		INI-398-0-6
Cable connector	Straight type	TM-4DSX3HG4
	Right angle type	TM-4DLX3HG4

Dimensions

Flat bracket



L-bracket



⚠Precautions

Be sure to read before handling. Refer to pages 14-21-3 to 14-21-4 for Safety Instructions and Common Precautions.

Handling

⚠Caution

1. Connect the vacuum pump to the port, which is labeled “VAC”.

2. Pressure adjustment changes from “atmospheric pressure to vacuum pressure” when the input signal is increased, and from “vacuum pressure to atmospheric pressure” when the input signal is decreased.

3. When adjusting the vacuum pressure, be careful not to block the atmospheric pressure inlet port labeled “ATM”.

4. Since this product is designed exclusively for use with negative pressure, be careful not to apply positive pressure in error.

5. In cases where the vacuum pump being used has a relatively small capacity, or the piping has a small inside diameter, etc., large variations in the set pressure (the range of pressure variation when changing from no flow to flow state) may appear. In this situation, the vacuum pump or the piping, etc. should be changed. In cases where it is not practical to change the vacuum pump, install a capacity tank (volume depending on the operating conditions) on the VAC side.

6. The vacuum pressure response time after a change in the input signal is influenced by the internal volume on the setting side (including piping). Since the capacity of the vacuum pump also influences the response time, give careful consideration to these points before operation.

7. If the electric power is shut off when in a control state, the pressure on the setting side will go into a holding condition. However, this setting side pressure will be held only temporarily and is not guaranteed. In addition, when atmospheric pressure is desired, shut off the power after reducing the set pressure, and then introduce atmospheric pressure by using a vacuum release valve, etc.

8. If the power for this product is cut off by a power failure, etc. when it is in a controlled state, the setting side pressure will be held temporarily. Further, if operated without sealing the setting side so that atmospheric air is sucked in, handle with care as air will continue to be sucked in.

9. If the VAC side pressure to this product is interrupted while the power is still on, the internal solenoid valve will continue to operate and may cause a humming noise. Since this may shorten the life of the product, be sure to shut off the power when the VAC side pressure is shut off.

10. The setting side pressure cannot be completely released from this product in the range below –1.3 kPa. In cases where the pressure needs to be reduced completely to 0 kPa, install a 3 port valve, etc. on the setting side to discharge the residual pressure.

11. This product is adjusted for each specification at the factory before shipment. Avoid careless disassembly or removal of parts, as this can cause failure.

12. The optional cable connector is a 4-wire type. When the monitor output (analog output, switch output) is not being used, keep it from touching the other wires, as this can cause malfunction.

13. Use caution that the right angle cable does not rotate and is limited to only one entry direction.

14. Take the following steps to avoid malfunction due to noise.
1) Eliminate power supply noise during operation by installing a line filter, etc. in the AC power line.
2) Install this product so that it will not be effected by noise, keeping the product and its wiring away from strong electric field sources such as motors and power lines.
3) Make sure to take protective measures against load surge for an induction load (solenoid valves, relays, etc.).

15. Refer to the instruction manual included with the product for details on its handling.

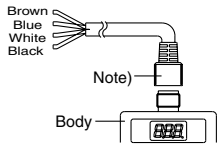
⚠ Precautions

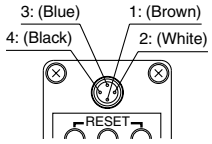
Be sure to read before handling. Refer to pages 14-21-3 to 14-21-4 for Safety Instructions and Common Precautions.

Wiring

⚠ Caution

Connect the cable to the connector on the body with the wiring arranged as shown below. Proceed carefully, as incorrect wiring can cause damage.
Further, use DC power with sufficient capacity and a low ripple.





Current Signal Type
Voltage Signal Type

1	Brown	Power supply
2	White	Input signal
3	Blue	GND (COMMON)
4	Black	Monitor output

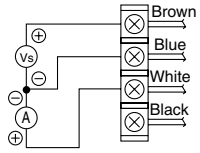
Preset Input Type

1	Brown	Power supply
2	White	Input signal 1
3	Blue	GND (COMMON)
4	Black	Input signal 2

Note) A right angle type cable is also available. The entry direction for the right angle type connector is to the left (SUP port side). Never rotate it, since it's not designed to turn.

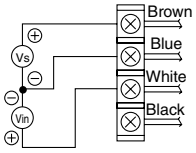
Wiring diagram

Current signal type



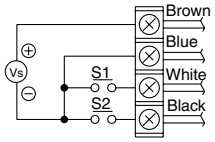
Vs : Power supply 24 VDC
12 to 15 VDC
A : Input signal 4 to 20 mADC
0 to 20 mADC

Voltage signal type



Vs : Power supply 24 VDC
12 to 15 VDC
Vin: Input signal 0 to 5 VDC
0 to 10 VDC

Preset input type



Vs : Power supply 24 VDC
12 to 15 VDC

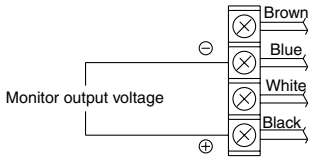
One of the preset pressures P1 through P4 is selected by the ON/OFF combination of S1 and S2.

S1	OFF	ON	OFF	ON
S2	OFF	OFF	ON	ON
Preset pressure	P1	P2	P3	P4

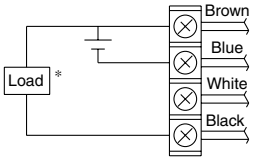
∗ For safety reasons, it is recommended that one of the preset pressures be set to 0 MPa.

Monitor output wiring diagram

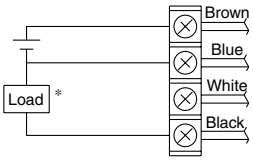
Analog output: Voltage type



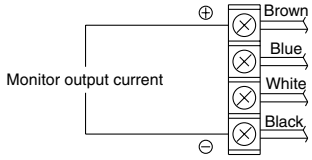
Switch output: NPN type



Switch output: PNP type



Analog output: Current type



∗ When 30 mADC or more is applied, detecting device for overcurrent starts activating and then emits an error signal. (Error number “5”)