Compact Vacuum Regulator
Series ITV009□

CE RoHS

How to Order

For single unit and single unit for manifold

ITV00 9 0 – 3 □ □ □ N

Pressure range

9	–100 kPa

Power supply voltage

0	24 VDC ±10%
1	12 to 15 VDC

Input signal

0	Current type 4 to 20 mA DC
1	Current type 0 to 20 mA DC
2	Voltage type 0 to 5 VDC
3	Voltage type 0 to 10 VDC

Built-in One-touch fittings type

For single unit

Symbol		VAC[1]	OUT[2]	ATM[3]
—	Metric size (Light grey)	ø4		
U	Inch size (Orange)	ø5/32"		

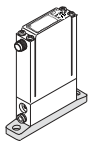
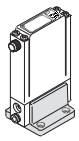
For manifold

Symbol		VAC[1]	OUT[2]	ATM[3]
—	Metric size (Light grey)	ø6	ø4	ø6
U	Inch size (Orange)	ø1/4"	ø5/32"	ø1/4"

Cable connector (Option)

N	Without cable connector
S	Straight type 3 m
L	Right angle type 2 m

Bracket/Option for single unit only

—	Without bracket
B	Flat Bracket 
C	L-bracket 

Base type

—	For single unit
M	For manifolds

Manifold

IITV00 – 02 – n

Stations

02	2 stations
03	3 stations
⋮	⋮
10	10 stations

Option

If a DIN rail longer than the specified stations is required, specify the applicable stations in two digits.
(Maximum 10 stations)
Example) **IITV00-05-07**

Note) A DIN rail with the length specified by the number of stations is attached to the manifold. For dimensions of the DIN rail, refer to the external dimensions.

How to Order Manifold Assembly (Example)

Indicate the part numbers of electro-pneumatic regulators and options to be mounted below the manifold part number.

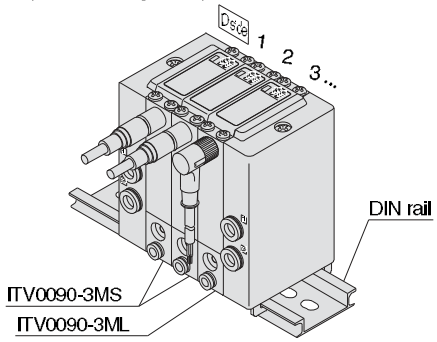
Example)
Due to the common supply/exhaust feature, note that different pressure range combinations are not available.

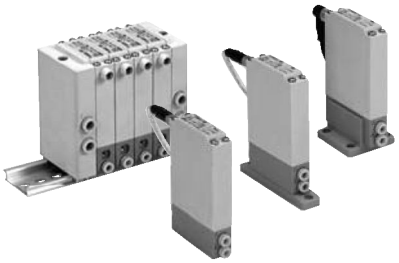
IITV00-03·····1 set (Manifold part no.)
∗ITV0090-3MS·····2 sets (Vacuum regulator part no. (1, 2 stations))
∗ITV0090-3ML·····1 set (Vacuum regulator part no. (3 stations))

Indicate part numbers in order starting from the first station on the D side.

Note) Combination with having different pressure ranges is not available due to common supply/exhaust features.

The asterisk (∗) specifies mounting. Add an asterisk (∗) at the beginning of electro-pneumatic regulator part numbers to be mounted.





Specifications

Model		ITV009□	
Minimum supply pressure		Set pressure −1 kPa	
Maximum supply pressure		−101 kPa	
Set pressure range		−1 to −100 kPa	
Maximum flow rate		2 ℓ/min (ANR) (Supply pressure: −101 kPa)	
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	
Input signal	Voltage type	0 to 5 VDC, 0 to 10 VDC	
	Current type	4 to 20 mA DC, 0 to 20 mA DC	
Input impedance	Voltage type	Approximately 10 kΩ	
	Current type	Approximately 250 Ω	
Output signal	Analogue output	1 to 5 VDC (Output impedance: Approximately 1 kΩ) Output accuracy: Within ±6% (Full span)	
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	
Operating temperature range		0 to 50°C (No condensation)	
Enclosure		IP65 equivalent *	
Connection type		Built-in One-touch fittings	
Connection size	For single unit	Metric size	1, 2, 3: ø4
		Inch size	1, 2, 3: ø5/32"
	Manifold	Metric size	1, 3: ø6, 2: ø4
		Inch size	1, 3: ø1/4", 2: ø5/32"
Weight Note 1)		100 g or less (without option)	

Note 1) Indicates the weight of a single unit.
For IITV00-n
Total weight (g) Stations (n) x 100 + 130 (Weight of end block A, B assembly) + Weight (g) of DIN rail

Note 2) When there is a downstream flow consumption, pressure may become unstable depending on piping conditions.

* When using under the conditions equivalent to IP65, connect the fitting or tube to the breathing hole prior to use. (For details, refer to "Specific Product Precautions 1" on page 41)

Accessories (Option)

Bracket

Flat bracket assembly (including 2 mounting screws)
P39800022

L-bracket assembly (including 2 mounting screws)
P39800023

Tighting torque when assembling is 0.3 N·m.

Cable connector

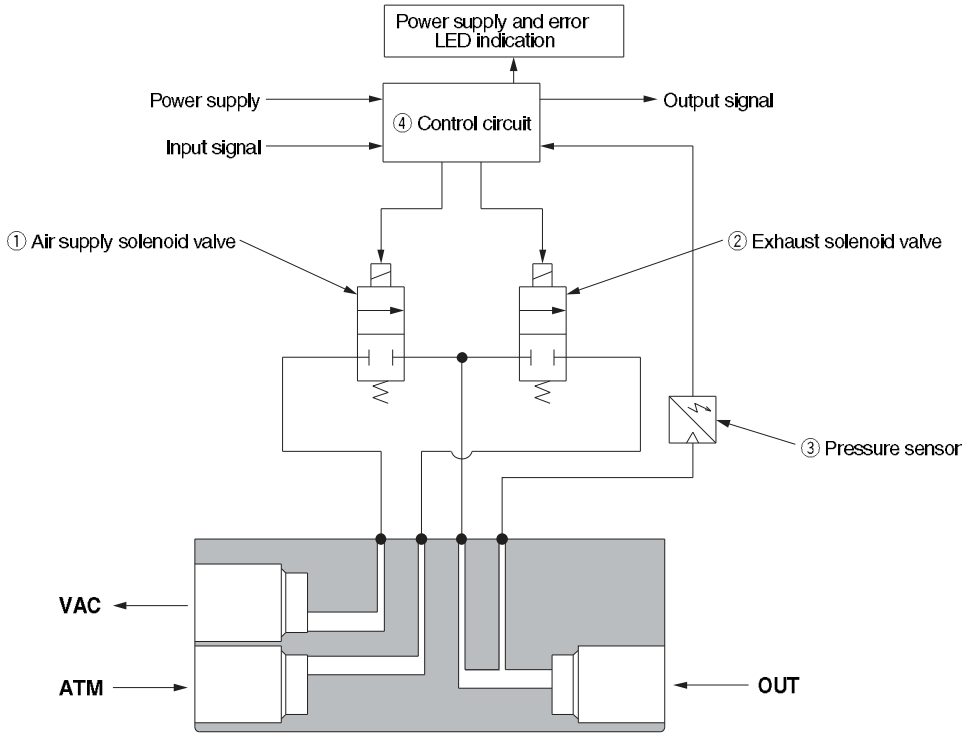
Straight type
M8-4DSX3MG4

Right angle type
P398000-501-2

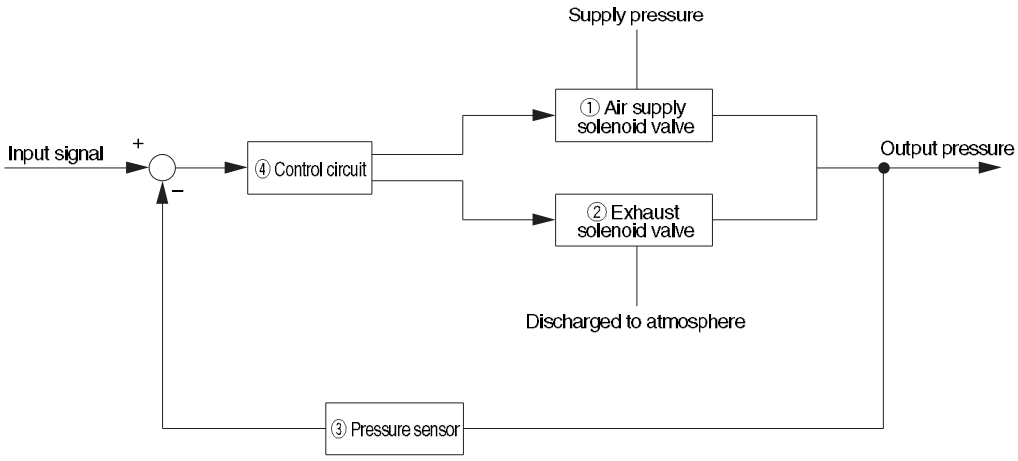
Working Principle

When the input signal rises, the air supply soloenoid valve ① turns ON. Due to this, part of the supply pressure passes through the air supply solenoid valve ① and changes to output pressure. This output pressure feeds back to the control circuit ④ via the pressure sensor ③. Here, pressure corrections continue until output pressure becomes proportional to the input signal, enabling output pressure that is proportional to the input signal.

Diagram of working principle

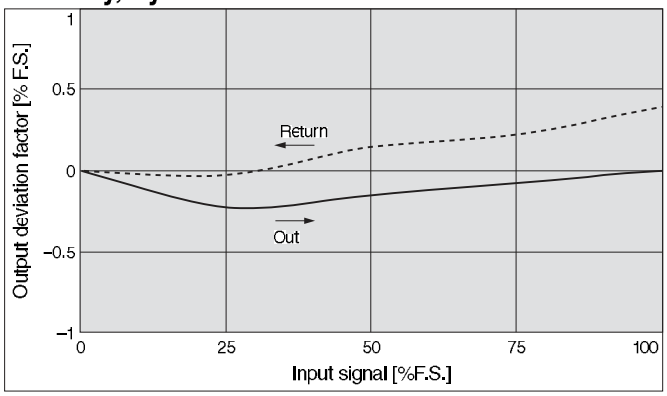


Block diagram



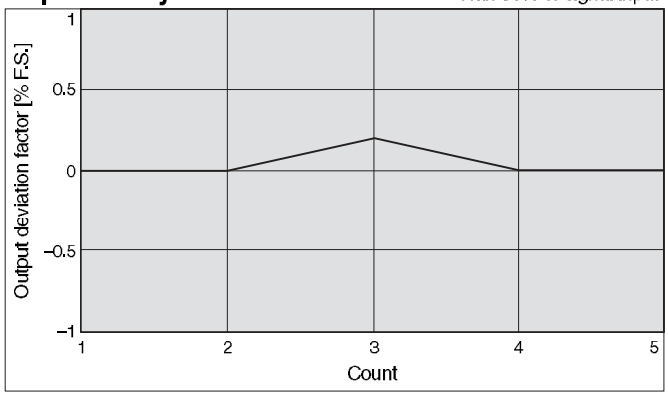
Series ITV009□

Linearity, Hyteresis



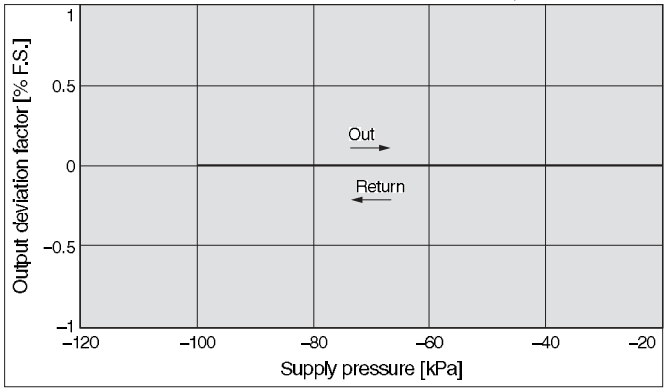
Repeatability

With 50% of signal input

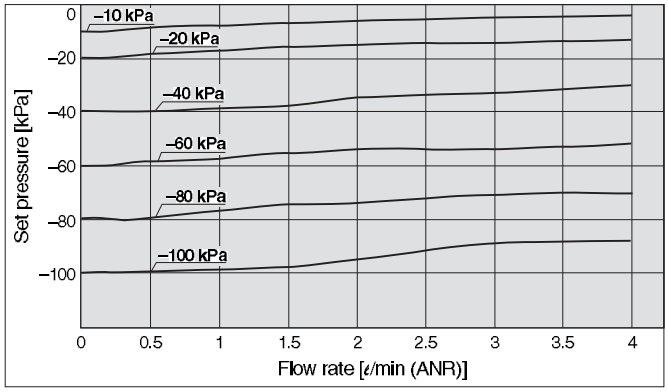


Pressure Characteristics

Set pressure: −10 kPa

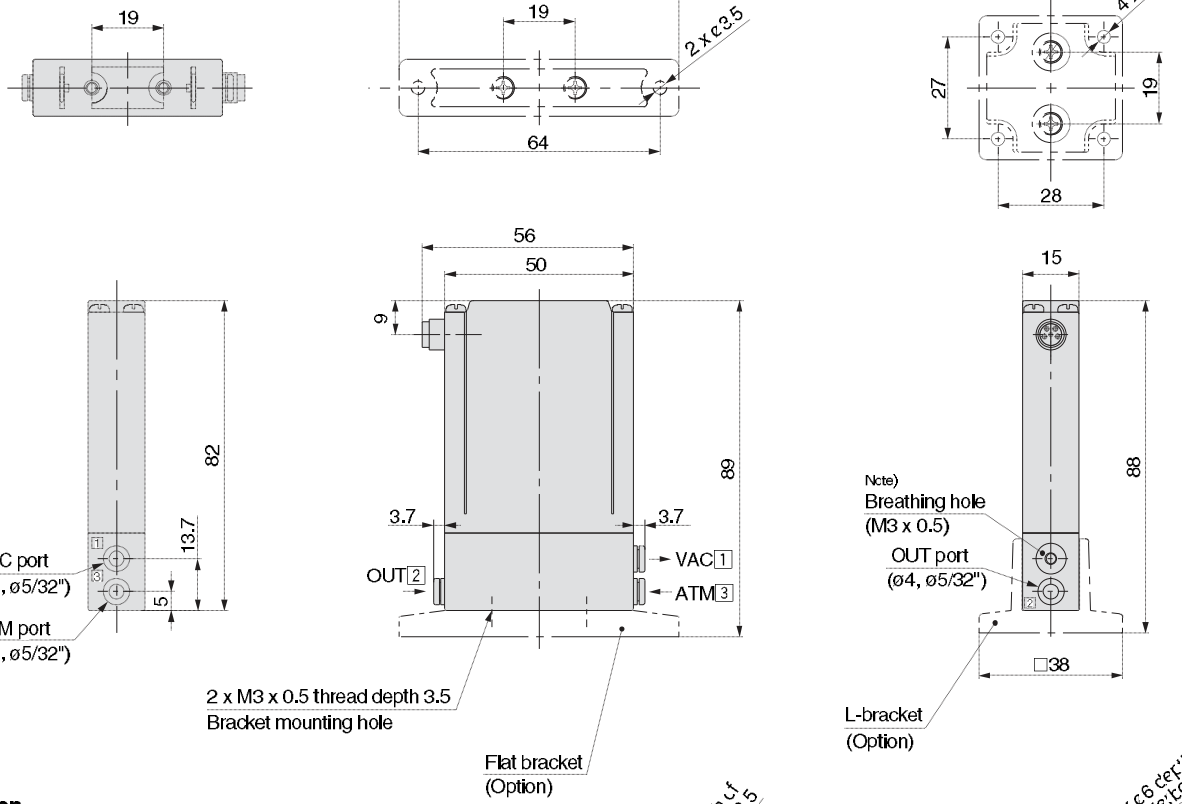


Flow Characteristics



Dimensions

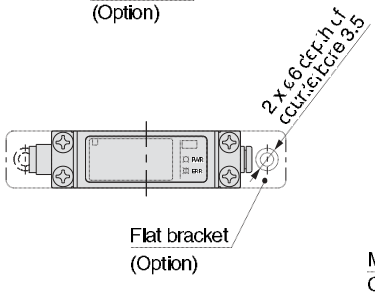
For Single Unit

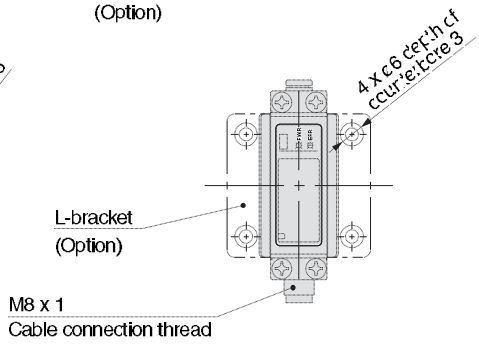


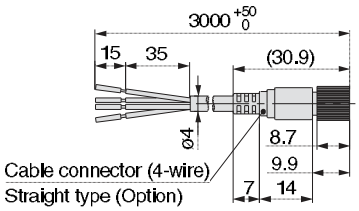
Port Location

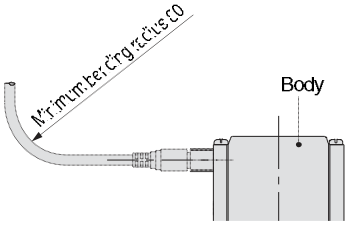
No.	1	2	3
ITV009□	VAC	OUT	ATM

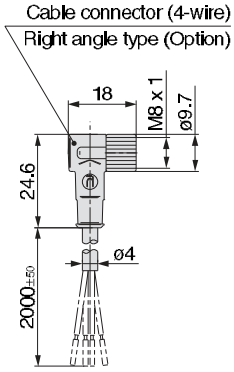
Note) When using under the conditions equivalent to IP65, connect the fittings or tube to the breathing hole prior to use. (For details, refer to "Specific Product Precautions 1" on page 41)

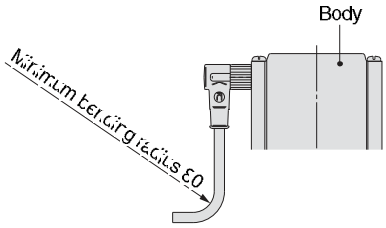






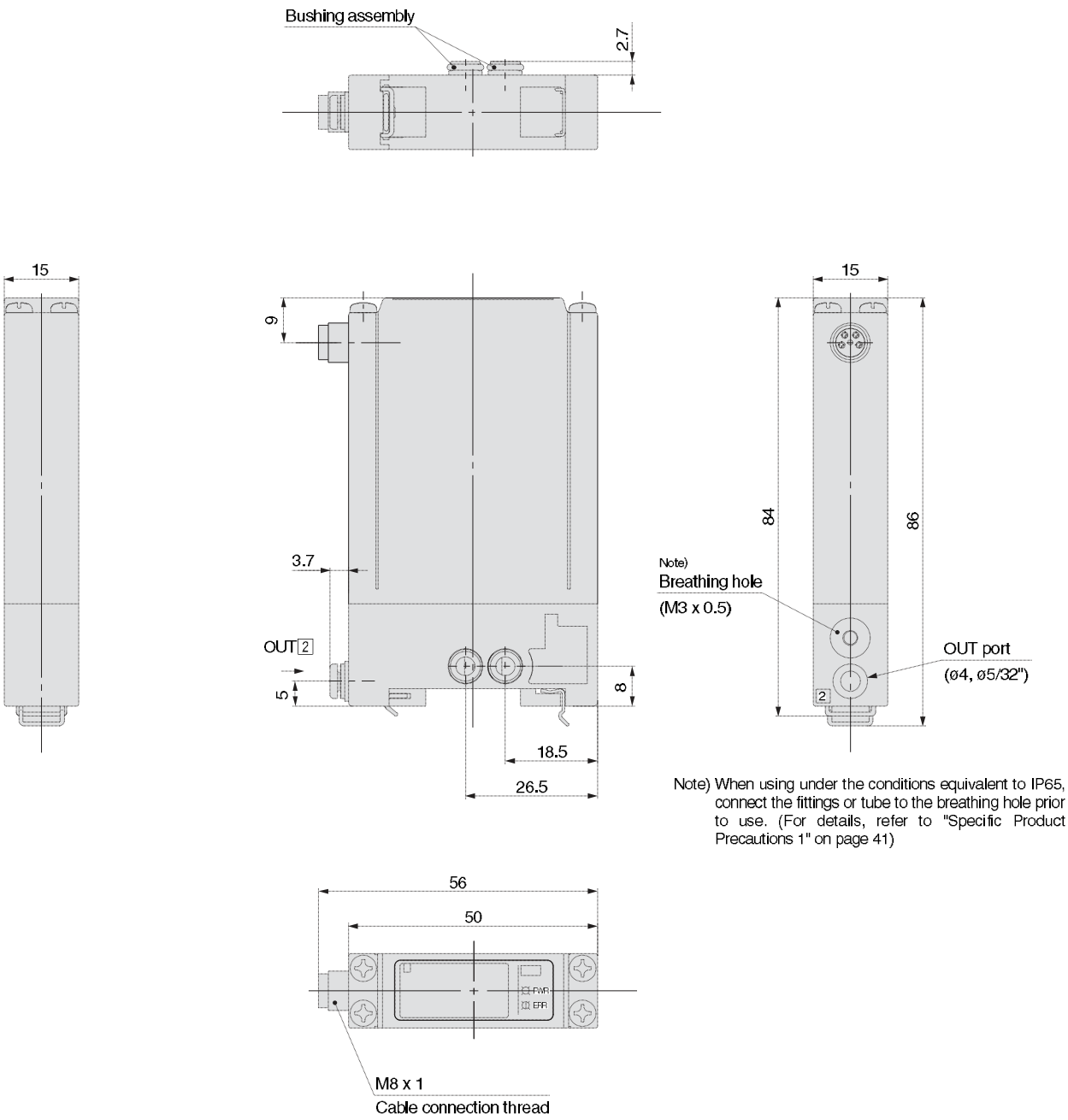






Dimensions

Single unit for manifold

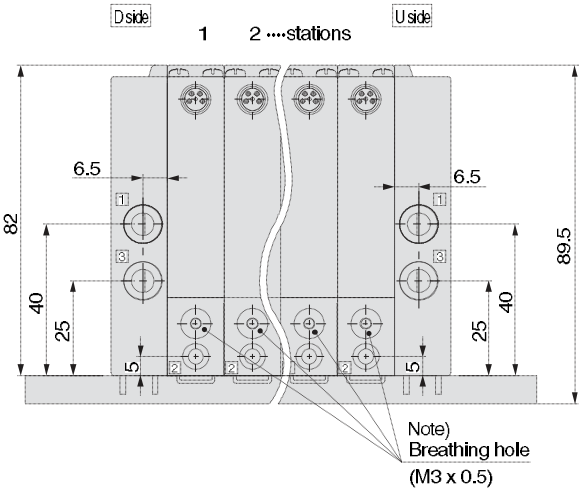


Note) When using under the conditions equivalent to IP65, connect the fittings or tube to the breathing hole prior to use. (For details, refer to "Specific Product Precautions 1" on page 41)

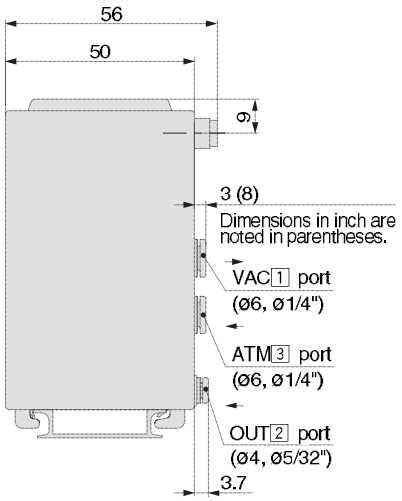
Note) For dimensions of the cable connector, refer to single unit on page 32.

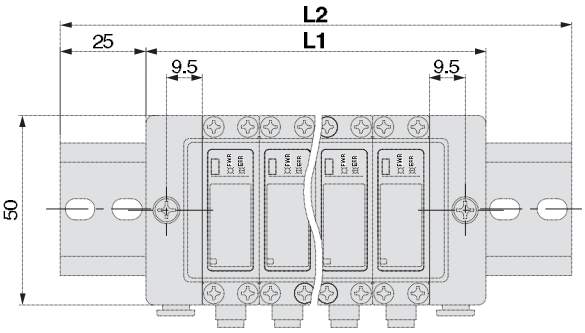
Dimensions

Manifold



Note) When using under the conditions equivalent to IP65, connect the fittings or tubing to the breathing hole prior to use.
(For details, refer to "Specific Product Precautions 1" on page 41)

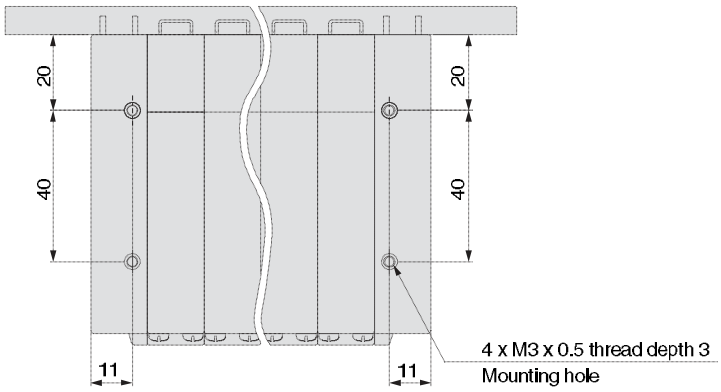




Port Location

No.	1	2	3
ITV009□	VAC	OUT	ATM

Note) Stations are counted starting from the D side.



Note) For dimensions of the cable connector, refer to single unit on page 32.

[mm]

Manifold stations n	2	3	4	5	6	7	8	9	10
L1	60	75	90	105	120	135	150	165	180
L2	110.5	123	148	160.5	173	185.5	198	223	235.5
Weight of DIN rail [g]	20	22	27	29	31	34	36	41	43

Electronic Vacuum Regulator

Series ITV2090/2091

How to Order

ITV 209 [0] - [0] [1] [F] [2] [ ] [S] [5]

Pressure range

9	−1.3 to −80 kPa

Power supply voltage

0	24 VDC
1	12 to 15 VDC

Note) Communication models are available only for 24 V DC.

Input signal/ Communication model

0	Current type 4 to 20 mA DC (Sink type)
1	Current type 0 to 20 mA DC (Sink type)
2	Voltage type 0 to 5 VDC
3	Voltage type 0 to 10 VDC
40	4 points preset input
52	16 points preset input (Switch output/NPN output)
53	16 points preset input (Switch output/PNP output)
60	10 bit digital input
CC	CC-Link
DE	DeviceNet™
PR	PROFIBUS DP
RC	RS-232C communication

Monitor output

1	Analogue output 1 to 5 VDC
2	Switch output/NPN output
3	Switch output/PNP output
4	Analogue output 4 to 20 mA DC (Sink type)
—	None

Thread type

—	Rc
N	NPT
T	NPTF
F	G

Port size

2	1/4

Bracket

—	Without bracket
B	Flat bracket
C	L-bracket

Cable connector type

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

Note) Order communication cable (other than RS-232C) separately. See below.

Pressure display unit

5	kPa

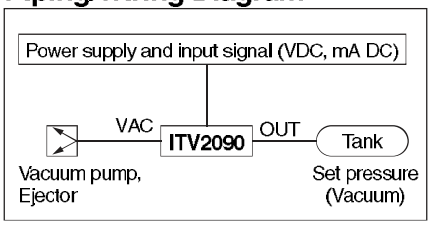
Note) For the communication models, CC, DE, PR and RC, only "—" is available as it does not have a pressure display.

For communications cables, use the parts listed below
(refer to the catalogue [M8/M12 Connector] CAT.ES100-73 for details)
or order the product certified for the respective protocol (with M12 connector) separately.

Application	Communication cable part number	Remarks
CC-Link compatibility	PCA-1567720 (Socket type)	Dedicated Bus adapter supplied with the product.
	PCA-1567717 (Plug type)	
DeviceNet™ compatibility	PCA-1557633 (Socket type)	T-branch connector not supplied.
	PCA-1557646 (Plug type)	
PROFIBUS DP compatibility	PCA-1557688 (Socket type)	T-branch connector not supplied.
	PCA-1557691 (Plug type)	

Stepless control of vacuum pressure in proportion to an electrical signal

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 Note 6) Power supply voltage 12 to 15 VDC type: 0.18 A or less	
Minimum supply vacuum pressure Note 1)		Set pressure −13.3 kPa	
Maximum supply vacuum pressure		−101 kPa	
Set pressure range		−1.3 to −80 kPa	
Input signal	Current type Note 2)	4 to 20 mA DC, 0 to 20 mA DC	
	Voltage type	0 to 5 VDC, 0 to 10 VDC	
	Preset input	4 points (Negative common), 16 points (No common polarity)	
Input impedance	Current type	250 Ω or less Note 3)	
	Voltage type	Approximately 6.5 kΩ	
	Preset input	Power supply voltage 24 VDC type: Approximately 4.7 kΩ Power supply voltage 12 VDC type: Approximately 2.0 kΩ	
Output signal (Monitor output) Note 4)	Analogue output	1 to 5 VDC (Output impedance: Approximately 1 kΩ) 4 to 20 mA DC (Sink type) (Load impedance: 250 Ω or less) Output accuracy within ±6% (Full span)	
	Switch output	NPN open collector output: Max. 30 V, 80 mA PNP open collector output: Max. 80 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	±2%F.S. ±1 digit	
	Units	kPa Note 5) Minimum display: 1	
Ambient and fluid temperature		0 to 50°C (No condensation)	
Enclosure		IP65	
Weight Note 7)		350 g	

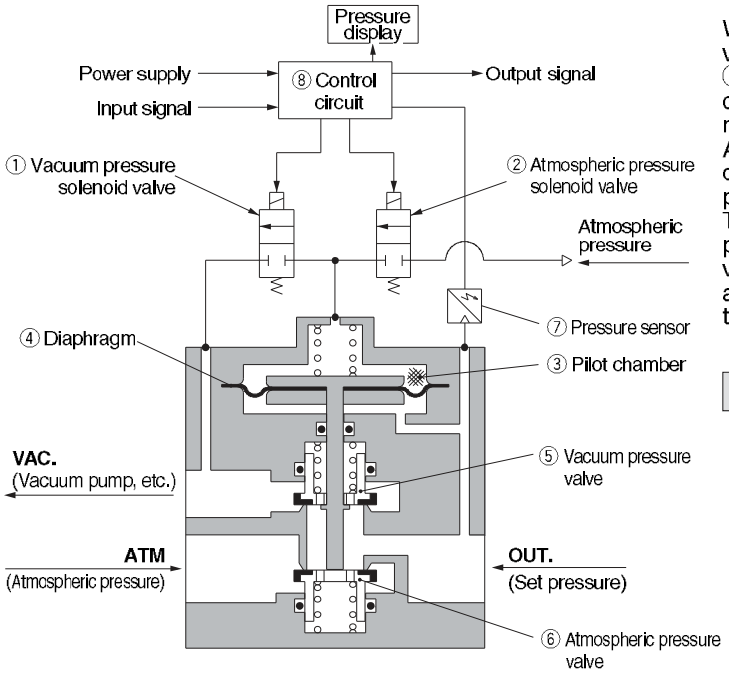
Note 1) The minimum supply vacuum pressure should be 13.3 kPa less than the maximum vacuum pressure setting value.
Note 2) 4 to 20 mA DC is not possible with the 2-wire type. Power supply voltage (24 VDC or 12 to 15 VDC) is required.
Note 3) Value for the state with no over current circuit included. If an allowance is provided for an over current circuit, the input impedance varies depending on the input power supply. This is 350 Ω or less for an input current of 20 mA DC.
Note 4) When measuring ITV analogue output from 1 to 5 VDC, if the load impedance is less than 100 kΩ, the analogue output monitor accuracy of within ±6% (full span) may not be available. The product with the accuracy of within ±6% is supplied upon your request. Output pressure remains unaffected.
Note 5) Please contact SMC regarding indication with other units of pressure.
Note 6) For communication models, the maximum current consumption is 0.16 A or less.
Note 7) For communication models, add roughly 80 g to the weight (100 g for the PROFIBUS DP).

Communication Specifications (CC, DE, PR, RC)

Model	ITV□0□0-CC□□	ITV□0□0-DE□□	ITV□0□0-PR□□	ITV□0□0-RC□□
Protocol	CC-Link	DeviceNet™	PROFIBUS DP	RS-232C
Version Note 1)	Ver 1.10	Volume 1 (Edition 3.8), Volume 3 (edition 1.5)	DP-V0	—
Communication speed	156 k/625 k 2.5 M/5 M/10 M bps	125 k/250 k/500 k bps	9.6 k/19.2 k/45.45 k 93.75 k/187.5 k/500 k 1.5 M/3 M/6 M/12 M bps	9.6 kbps
Configulation file Note 2)	—	EDS	GSD	—
I/O occupation area (input/output data)	4 word/4 word, 32 bit/32 bit (per station, remote device station)	16 bit/16 bit	16 bit/16 bit	—
Communication data resolution	12 bit (4096 resolution)	12 bit (4096 resolution)	12 bit (4096 resolution)	10 bit (1024 resolution)
Fail safe	HOLD Note 3)/CLEAR (Switch setting)	HOLD/CLEAR (Switch setting)	CLEAR	HOLD
Terminating resistor	—		Built into the product (Switch setting)	—

Note 1) Note that version information is subject to change.
Note 2) Configulation files can be downloaded from the SMC's website: http://www.smcworld.com
Note 3) The output HOLD value when a CC-Link communications error occurs can be set based on the bit area data.

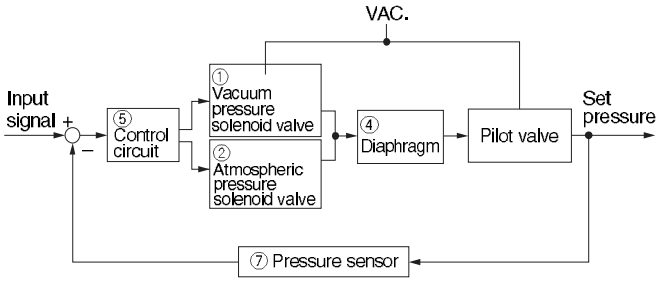
Working Principle



Working Principle

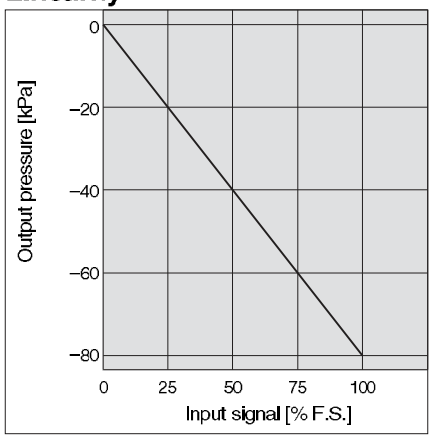
When the input signal increases, the vacuum pressure solenoid valve ① turns ON, and the atmospheric pressure solenoid valve ② turns OFF. Because of this, VAC. and the pilot chamber ③ are connected, the pressure in the pilot chamber ③ becomes negative and acts on the top of the diaphragm ④.
As a result, 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

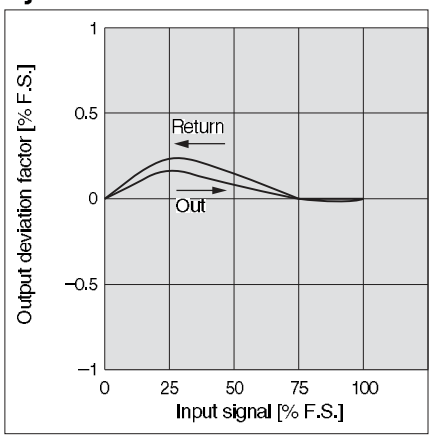


Series ITV209□

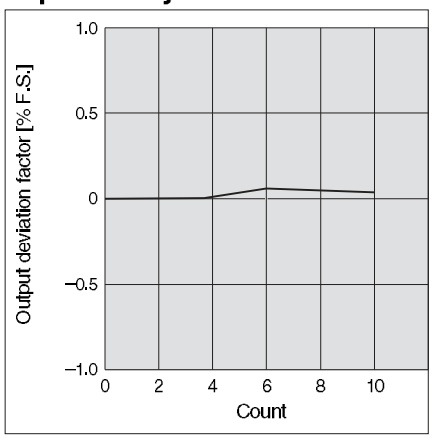
Linearity



Hysteresis

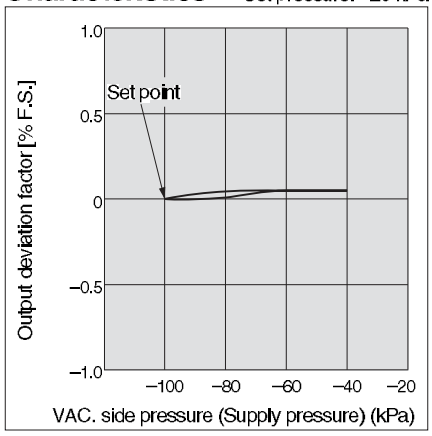


Repeatability



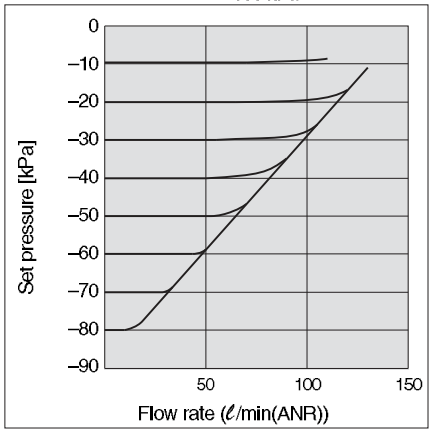
Pressure Characteristics

Set pressure: −20 kPa



Flow Characteristics

Supply vacuum pressure: −100 kPa



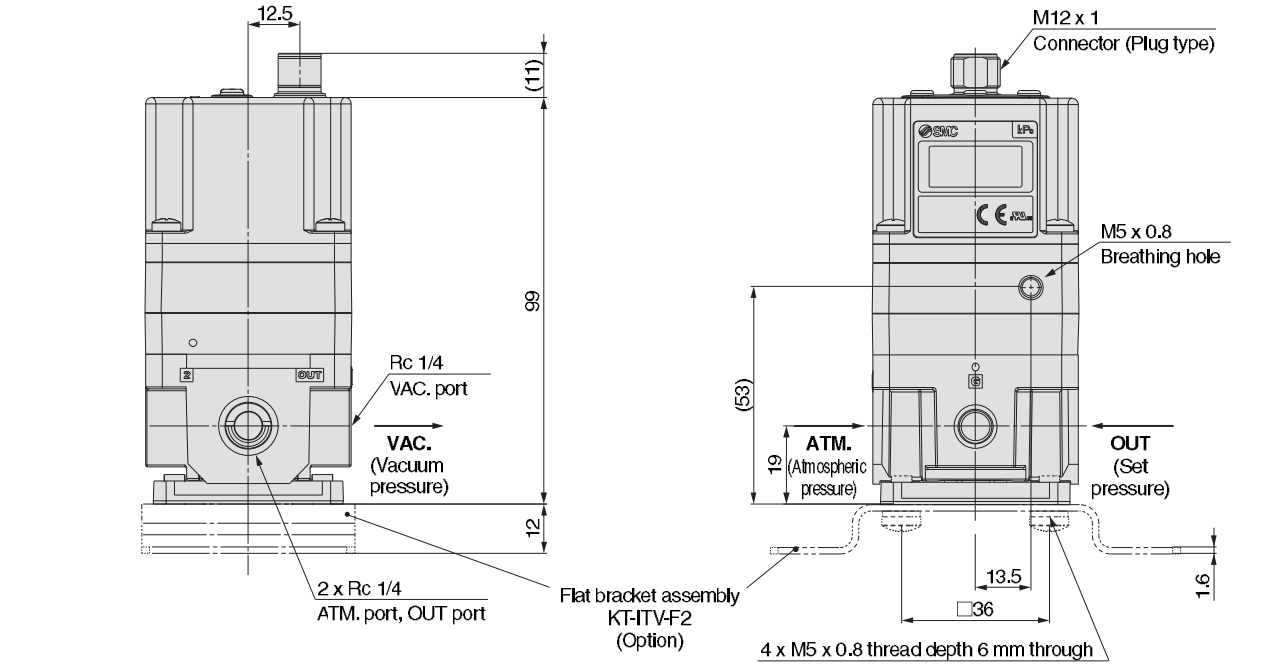
Flow characteristics measurement conditions

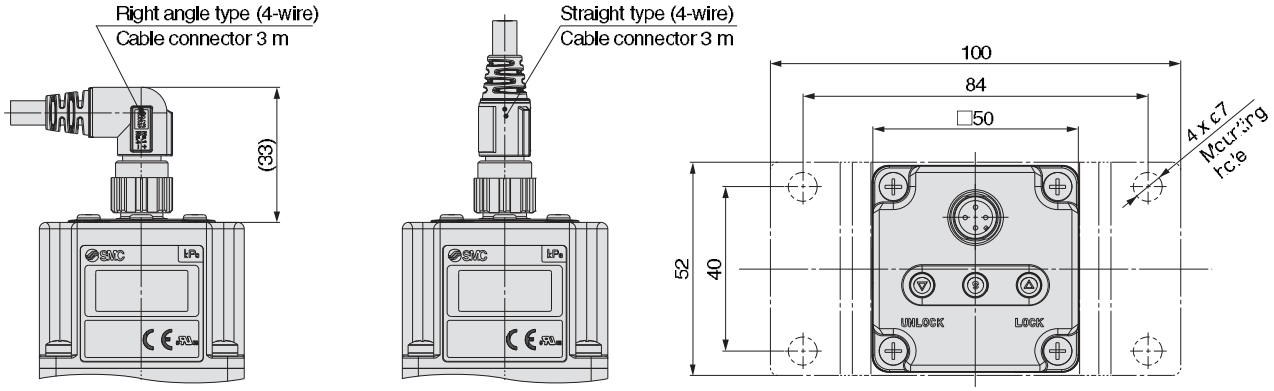
- Exhaust flow rate of the vacuum pump used for measurement: 500 ℓ/min (ANR)
- Inlet vacuum pressure: −100 kPa (When outlet flow rate is 0 ℓ/min (ANR))
- Maximum flow rate: 132 ℓ/min (ANR) (With inlet vacuum pressure at −39 kPa)

Dimensions

ITV209□

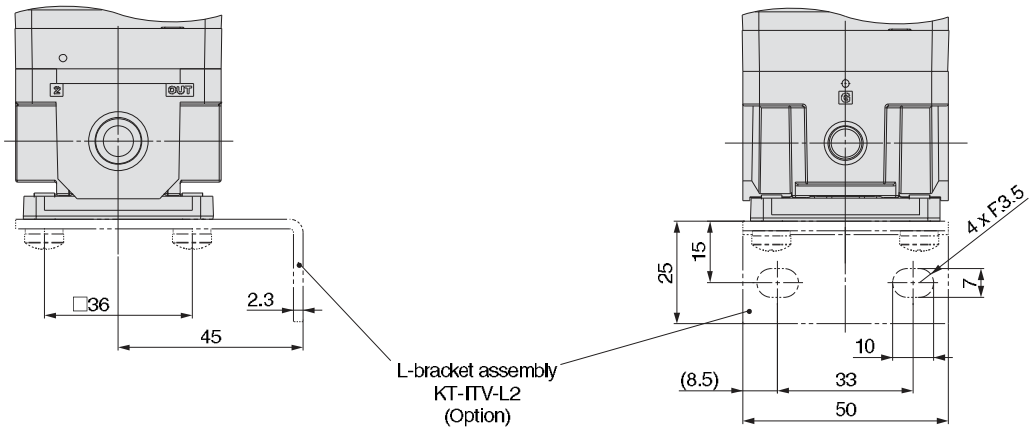
Flat bracket





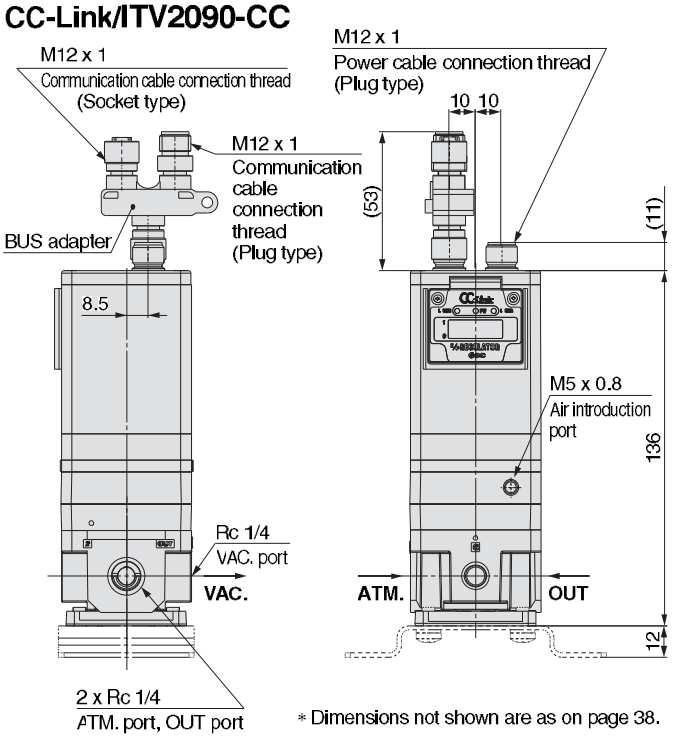
Note) Do not attempt to rotate the cable connector, as it does not turn.

L-bracket



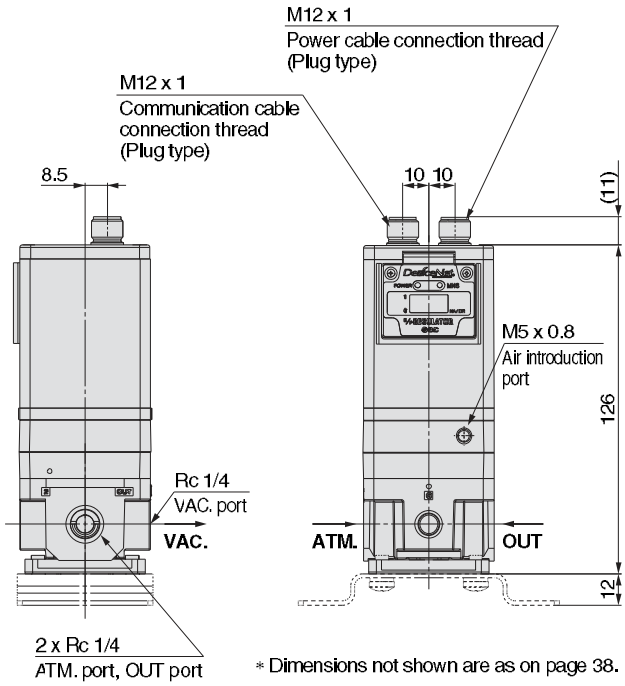
Dimensions (CC-Link, DeviceNet™, PROFIBUS DP and RS-232C)

CC-Link/ITV2090-CC



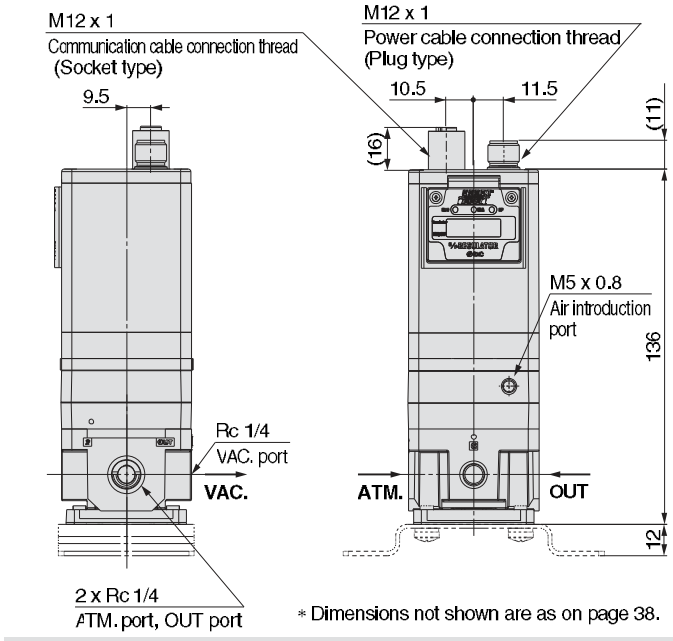
* Dimensions not shown are as on page 38.

DeviceNet™/ITV2090-DE



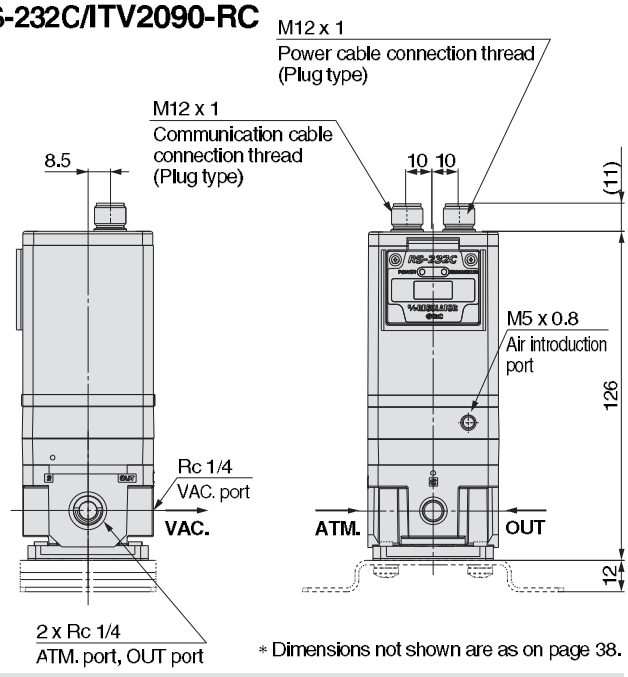
* Dimensions not shown are as on page 38.

PROFIBUS DP/ITV2090-PR



* Dimensions not shown are as on page 38.

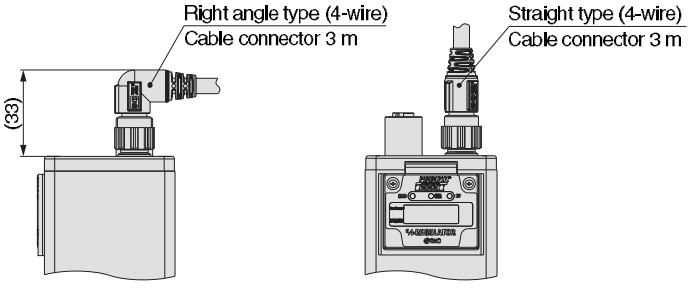
RS-232C/ITV2090-RC



* Dimensions not shown are as on page 38.

With power cable connector

* ITV2090-{52, 53, CC, DE, PR, RC} common dimensions



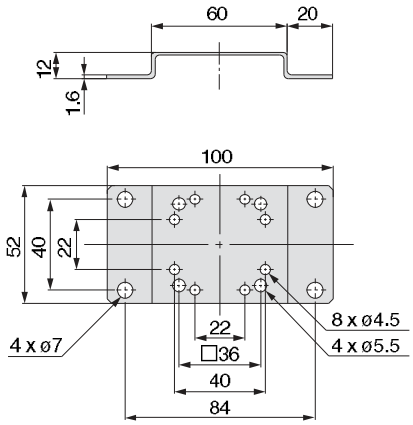
Note) Do not attempt to rotate the cable connector, as it does not turn.

Accessories (Option)/Part No.

Description		Part no.
Flat bracket assembly		KT-ITV-F2
L-bracket assembly		KT-ITV-L2
Power cable connector	**Straight type 3 m**	P398020-500-3
	Right angle type 3 m	P398020-501-3
Bus adapter (CC-Link model only)		EX9-ACY00-MJ

Dimensions

Flat bracket



L-bracket