Series ITV

- **Stepless control of air pressure proportional to an electrical signal**
- **Series ITV1000/2000/3000 are compatible with various input specifications, including serial communications.**

CE cULus RoHS IP65

Serial communications specifications

Applicable Fieldbus protocols

CC-Link DeviceNet PROFIBUS

Built-in communication board, so no converter needed.



RS-232C specification to serial communications is standardized.

Compact/lightweight (Integrated communicatioin parts)

Weight: 350 g Note 1) **(ITV1000)**

Power consumption: 4 W Note 1) **or less**

Note 1) Value for communications type. (PROFIBUS DP)

Note 2) ITV1000. Dimensions in parentheses ( ) are for the CC-Link or PROFIBUS DP.

▼ Electro-Pneumatic Regulators

Series ITV0000

Maximum flow rate
6 L/min (ANR)
Set pressure: 0.6 MPa
Supply pressure: 1.0 MPa



Series ITV1000

Maximum flow rate
200 L/min (ANR)
Set pressure: 0.6 MPa
Supply pressure: 1.0 MPa
Grease-free specification (wetted parts)



Series ITV2000

Maximum flow rate
1500 L/min (ANR)
Set pressure: 0.6 MPa
Supply pressure: 1.0 MPa



Series ITV3000

Maximum flow rate
4000 L/min (ANR)
Set pressure: 0.6 MPa
Supply pressure: 1.0 MPa



▼ Electronic Vacuum Regulators

Series ITV009□



Series ITV209□



Compact Electro-Pneumatic Regulator *Series ITV0000*
Compact Vacuum Regulator *Series ITV009□*



Compact 15 mm
With a simplified high-density circuit board design, an extremely compact size has been achieved.

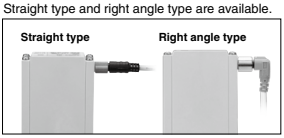


Lightweight 100 g

Realizes space-saving and reduction of weight for manifold use.
Stations can easily be increased or decreased due to DIN rail mount design.

Model	Pressure range	Power supply voltage	Input signal	Output signal	Option
ITV001□	0.1 MPa	24 VDC 12 VDC	4 to 20 mA DC 0 to 20 mA DC 0 to 5 VDC 0 to 10 VDC	Analog output 1 to 5 VDC	• Cable connectors Straight type Right angle type • Brackets Flat bracket L-bracket
ITV003□	0.5 MPa				
ITV005□	0.9 MPa				
ITV009□	−100 kPa				

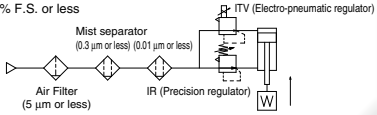
■ **Cable connectors**
Straight type and right angle type are available.



■ **Built-in One-touch fittings**
■ **With error indication LED**
■ **Brackets**
Flat and L-brackets are available.



● **Equivalent to IP65**
● **Linearity: ±1% F.S. or less**
Hysteresis: 0.5% F.S. or less
Repeatability: ±0.5% F.S. or less
● **High-speed response time: 0.1 sec** (Without load)
Note) This is not a guaranteed value as it depends on the operating environment.
● **High stability**
Sensitivity 0.2% F.S. or less



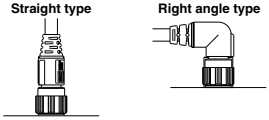
Electro-Pneumatic Regulator *Series ITV1000/2000/3000*
Electronic Vacuum Regulator *Series ITV209□*





Serial communications specifications to Series *ITV1000/2000/3000* are standardized.
● **Reduced wiring**
Applicable Fieldbus protocols
CC-Link DeviceNet PROFIBUS
RS-232C specification to serial communications is standardized.

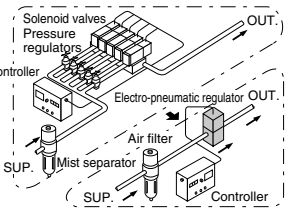
● **Sensitivity: 0.2% F.S. or less**
● **Linearity: ±1% F.S. or less**
● **Hysteresis: 0.5% F.S. or less**
● **IP65**
● **Cable connections in 2 directions**



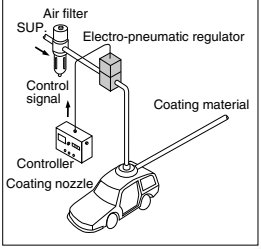
● **Grease-free specification** (Series ITV1000)

● **Application examples**

Multi-stage control to analog control



Electrostatic coating control



Electro-Pneumatic Regulator
Electronic Vacuum Regulator

Series ITV

● **Stepless control of air pressure proportional to an electrical signal.**

	Series	Model	Set pressure range	Input signal	Port size	Page
Electro-Pneumatic Regulator	*Series ITV0000* 	**ITV001□**	0.001 to 0.1 MPa	Current type: 4 to 20 mA DC (Sink type) Current type: 0 to 20 mA DC (Sink type) Voltage type: 0 to 5 VDC Voltage type: 0 to 10 VDC	Built-in One-touch fittings Metric size: ø4 Inch size: ø5/32	**806**
		ITV003□	0.001 to 0.5 MPa			
		ITV005□	0.001 to 0.9 MPa			
	Series ITV1000 	**ITV101□**	0.005 to 0.1 MPa	Current type: 4 to 20 mA DC (Sink type) Current type: 0 to 20 mA DC (Sink type) Voltage type: 0 to 5 VDC Voltage type: 0 to 10 VDC Preset input (4 points/16 points) 10 bit digital input CC-Link compatible DeviceNet™ compatible PROFIBUS DP compatible RS-232C communication	1/8, 1/4	**814**
		ITV103□	0.005 to 0.5 MPa			
		ITV105□	0.005 to 0.9 MPa			
	Series ITV2000 	**ITV201□**	0.005 to 0.1 MPa		1/4, 3/8	**814**
		ITV203□	0.005 to 0.5 MPa			
		ITV205□	0.005 to 0.9 MPa			
	Series ITV3000 	**ITV301□**	0.005 to 0.1 MPa		1/4, 3/8, 1/2	**814**
		ITV303□	0.005 to 0.5 MPa			
		ITV305□	0.005 to 0.9 MPa			
Electronic Vacuum Regulator	*Series ITV009□* 	**ITV009□**	–1 to –100 kPa	Current type: 4 to 20 mA DC (Sink type) Current type: 0 to 20 mA DC (Sink type) Voltage type: 0 to 5 VDC Voltage type: 0 to 10 VDC	Built-in One-touch fittings Metric size: ø4 Inch size: ø5/32	**836**
	Series ITV209□ 	**ITV209□**	–1.3 to –80 kPa	Current type: 4 to 20 mA DC (Sink type) Current type: 0 to 20 mA DC (Sink type) Voltage type: 0 to 5 VDC Voltage type: 0 to 10 VDC Preset input (4 points/16 points) 10 bit digital input CC-Link compatible DeviceNet™ compatible PROFIBUS DP compatible RS-232C communication	1/4	**843**

Compact Electro-Pneumatic Regulator

Series ITV0000

CE RoHS

How to Order

For single unit and single unit for manifold

ITV00 1 0 – 0 □ □ □ N

Pressure range

1	0.1 MPa
3	0.5 MPa
5	0.9 MPa

Power supply voltage

0	24 VDC ±10%
1	12 to 15 VDC

Input signal

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

Built-in One-touch fittings type

For single unit

Symbol		SUP 1	OUT 2	EXH 3
Nil	Metric size (Light gray)	ø4		
U	Inch size (Orange)	ø5/32"		

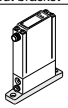
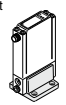
For manifold

Symbol		SUP 1	OUT 2	EXH 3
Nil	Metric size (Light gray)	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

Nil	Without bracket
B	Flat Bracket 
C	L-bracket 

Base type

Nil	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**

One-touch fitting size for supply/exhaust parts (End plate)

Nil	ø6 (Light gray)
U	ø1/4" (Orange)

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 to be mounted below the manifold part number.

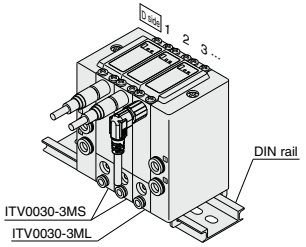
Example)
Due to the common supply/exhaust feature, note that different pressure range combinations are not available.

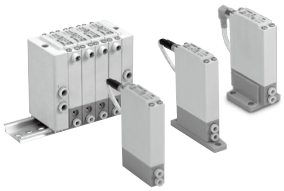
IITV00-03·····1 set (Manifold part no.)
∗**ITV0030-3MS·····2 sets (Electro-pneumatic regulator part no. (1, 2 stations))**
∗**ITV0030-3ML·····1 set (Electro-pneumatic regulator part no. (3 stations))**

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		ITV001□	ITV003□	ITV005□
Minimum supply pressure		Set pressure +0.1 MPa		
Maximum supply pressure		0.2 MPa	1.0 MPa	
Set pressure range		0.001 to 0.1 MPa	0.001 to 0.5 MPa	0.001 to 0.9 MPa
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 (Sink type)		
Input impedance	Voltage type	Approx. 10 kΩ		
	Current type	Approx. 250 Ω		
Output signal Note 4)	Analog output	1 to 5 VDC (Output impedance: Approx. 1 kΩ) Output accuracy: ±6% F.S. or less		
Linearity		±1% F.S. or less		
Hysteresis		0.5% F.S. or less		
Repeatability		±0.5% F.S. or less		
Sensitivity		0.2% F.S. or less		
Temperature characteristics		±0.12% F.S./°C or less		
Operating temperature range		0 to 50°C (No condensation)		
Enclosure		Equivalent to IP65 *		
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.

Note 3) When the input signal is at 0%, the exhaust solenoid valve is controlled to reduce the outlet pressure to zero. For this reason, a noise may be generated. This noise is normal and does not indicate a fault.

Note 4) When measuring ITV analog output from 1 to 5 VDC, if the load impedance is less than 100 kΩ, the analog output monitor accuracy of ±6% F.S. or less may not be available. The product with the accuracy of within ±6% is supplied upon your request. Output pressure remains unaffected.

* 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 849)

Accessories (Option)

Bracket

Flat bracket assembly (includes 2 mounting screws)
P39800022



L-bracket assembly (includes 2 mounting screws)
P39800023



Tighting torque when assembling is 0.3 N·m.

Cable connector

Straight type
M8-4DSX3MG4



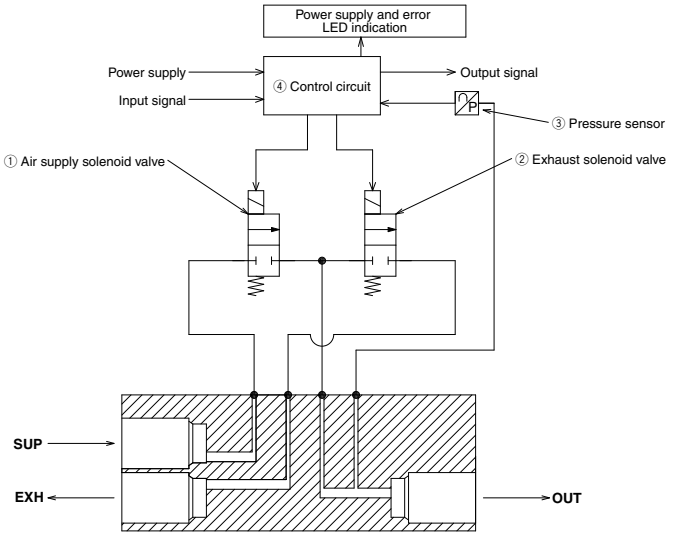
Right angle type
P398000-501-2



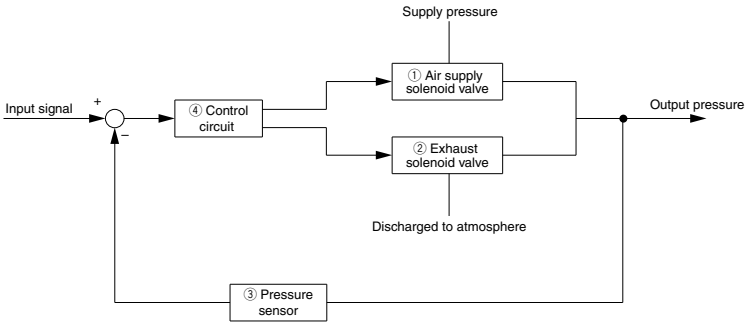
Working Principle

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.

Working Principle Diagram

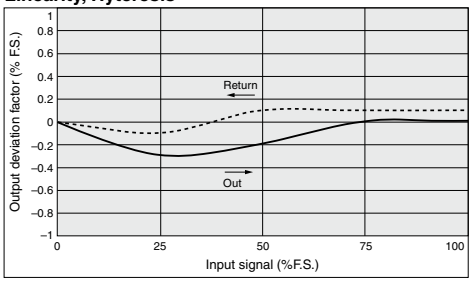


Block Diagram



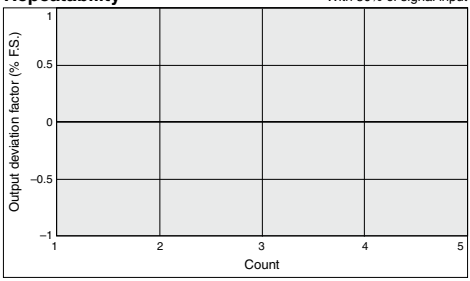
Series ITV001□

Linearity, Hyteresis



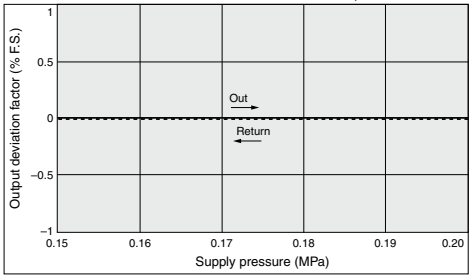
Repeatability

With 50% of signal input



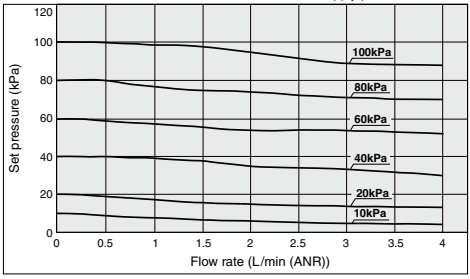
Pressure Characteristics

Set pressure: 0.05 MPa



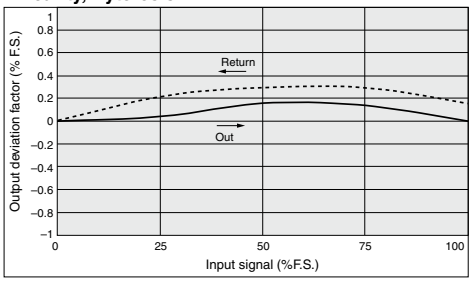
Flow Characteristics

Supply pressure: 0.2 MPa



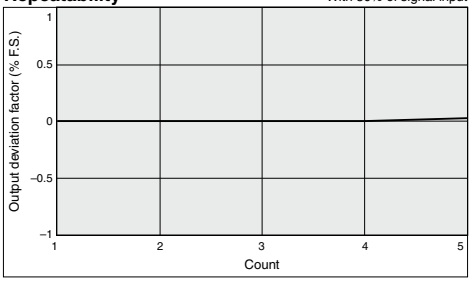
Series ITV003□

Linearity, Hyteresis



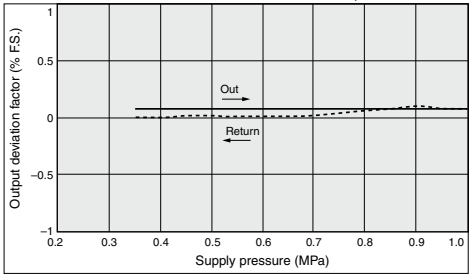
Repeatability

With 50% of signal input



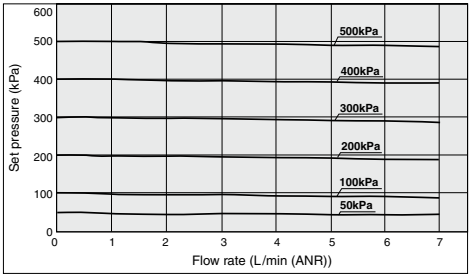
Pressure Characteristics

Set pressure: 0.25 MPa



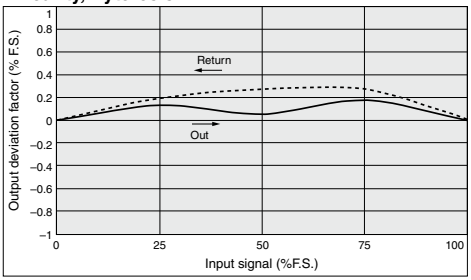
Flow Characteristics

Supply pressure: 0.6 MPa



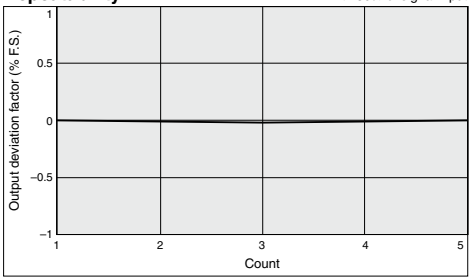
Series ITV005□

Linearity, Hyteresis



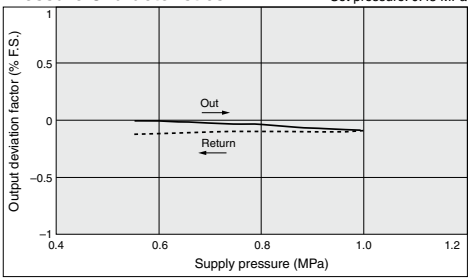
Repeatability

With 50% of signal input



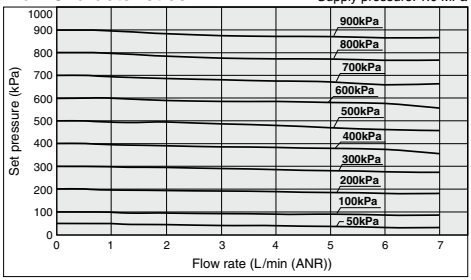
Pressure Characteristics

Set pressure: 0.45 MPa



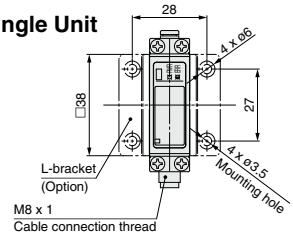
Flow Characteristics

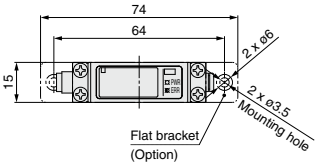
Supply pressure: 1.0 MPa

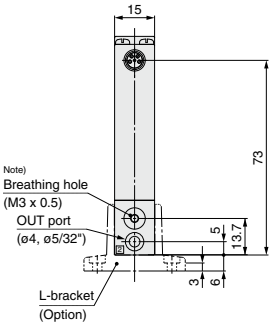


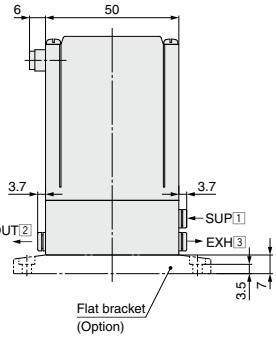
Dimensions

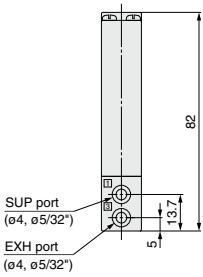
For Single Unit





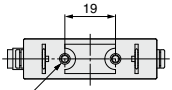






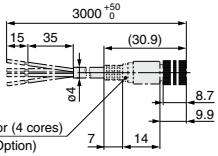
Port Location

No.	1	2	3
ITV003□5	SUP	OUT	EXH

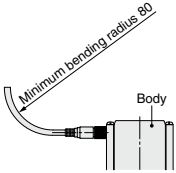


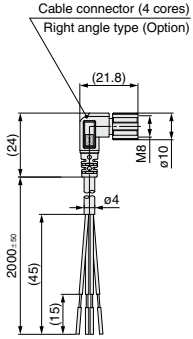
2 x M3 x 0.5 thread depth 3.5
Mounting thread

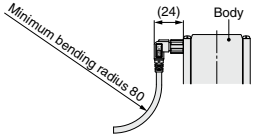
Note) When using under the conditions equivalent to IP65, connect the fittings or tube to the breathing hole prior to use.
(For details, refer to "Specific Product Precautions 1" on page 849)



Cable connector (4 cores)
Straight type (Option)

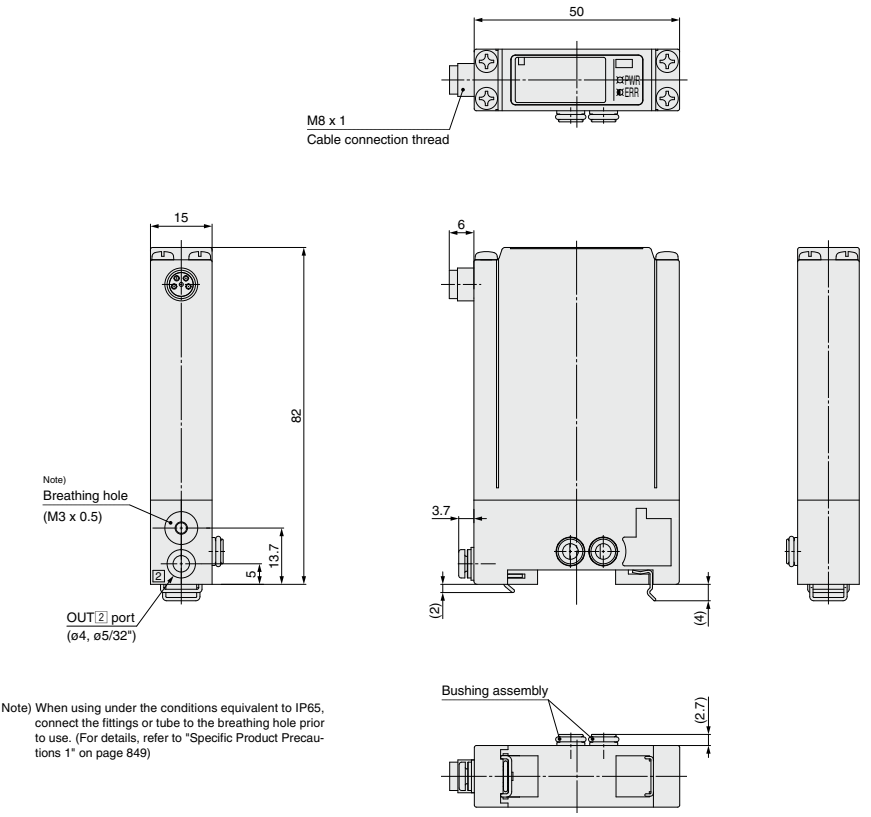






Dimensions

Single unit for manifold

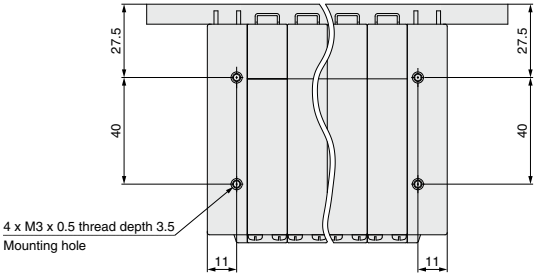


Note) When using under the conditions equivalent to IP65, connect the fittings or tube to the breathing hole prior to use. (For details, refer to "Specific Product Precautions 1" on page 849)

Note) For dimensions of the cable connector, refer to single unit on page 811.

Dimensions

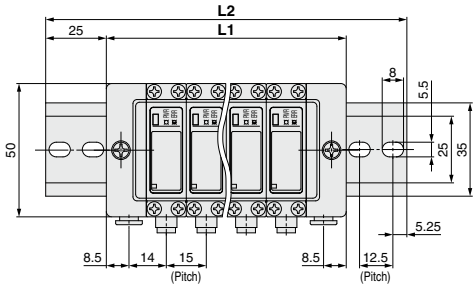
Manifold

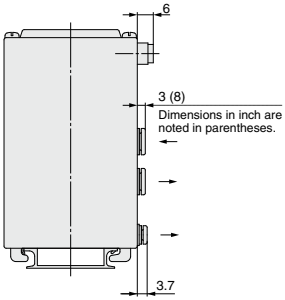


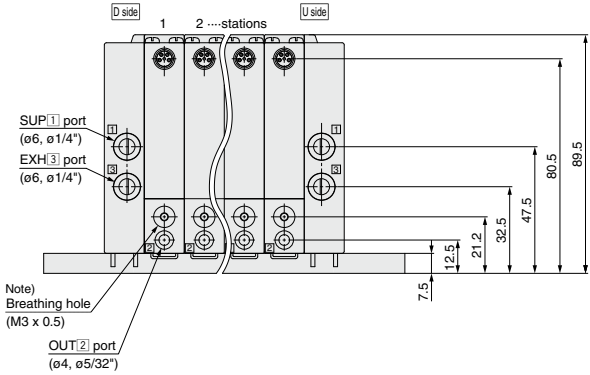
Port Location

No.	1	2	3
ITV003□5	SUP	OUT	EXH

Note) Stations are counted starting from the D side.







Note) For dimensions of the cable connector, refer to single unit on page 811.

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 849).

(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

Electro-Pneumatic Regulator
Series ITV1000/2000/3000

How to Order

ITV 3 0 1 0 – 0 1 □ 2 □ S □ – □

Model

1	1000 type
2	2000 type
3	3000 type

Pressure range

1	0.1 MPa
3	0.5 MPa
5	0.9 MPa

Power supply voltage

0	24 VDC
1	12 to 15 VDC

Note) Communication models (CC, DE PR, RC), 16 points preset input and 10 bit digital input are available only for 24 VDC.

Made to Order Specifications
Refer to pages 816, 832, and 833 for details.

Pressure display unit

Nil	MPa
2 Note)	kgf/cm²
3	bar
4 Note)	psi
5	kPa

Note) Under Japan's new Measurement Act, this is only for overseas sales (SI units are to be used inside Japan). For the communication models, CC, DE, PR and RC, only "Nil" is available as it does not have a pressure display.

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

Cable connector type

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

Note) Even when a cable connector is selected, communication cable is not included in the communication models, CC, DE and PR. Please order it separately. Refer to the below.
For 10 bit digital input, right angle type cannot be selected.

Thread type

Nil	Rc
N	NPT
T	NPTF
F	G

Bracket *

Nil	Without bracket
B	Flat bracket
C	L-bracket

* Bracket is included.

Port size

1	1/8 (1000 type)
2	1/4 (1000, 2000, 3000 type)
3	3/8 (2000, 3000 type)
4	1/2 (3000 type)

For communication cables, use the parts listed below
(refer to M8/M12 connector in Best Pneumatics No.1 for details)
or order the product certified for the respective protocol (with M12 connector) separately.

Application	Communication cable part number	Note
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)	



ITV1000



ITV2000

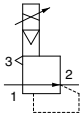


ITV3000



Serial-communications model

Symbol



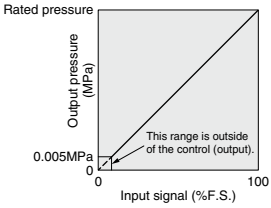


Figure 1. Input/output characteristics chart

Standard Specifications

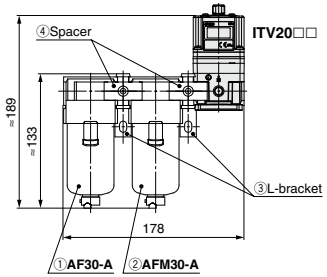
Model		ITV101□ Note 8) / ITV201□ / ITV301□	ITV103□ Note 8) / ITV203□ / ITV303□	ITV105□ Note 8) / ITV205□ / ITV305□
Minimum supply pressure		Set pressure +0.1 MPa		
Maximum supply pressure		0.2 MPa	1.0 MPa	
Set pressure range Note 1)		0.005 to 0.1 MPa	0.005 to 0.5 MPa	0.005 to 0.9 MPa
Power supply	Voltage	24 VDC ± 10%, 12 to 15 VDC		
	Current consumption	Power supply voltage 24 VDC type: 0.12 A or less Note 9) Power supply voltage 12 to 15 VDC type: 0.18 A or less		
Input signal Note 9)	Current type Note 2)	4 to 20 mA DC, 0 to 20 mA DC (Sink type)		
	Voltage type	0 to 5 VDC, 0 to 10 VDC		
	Preset input	4 points (Negative common), 16 points (No common polarity)		
	Digital input	10 bit (Parallel)		
Input impedance	Current type	250 Ω or less Note 6)		
	Voltage type	Approx. 6.5 kΩ		
	Preset input	Power supply voltage 24 VDC type: Approx. 4.7 kΩ Power supply voltage 12 VDC type: Approx. 2.0 kΩ		
	Digital input	Approx. 4.7 kΩ		
Output signal (monitor output) Note 3)	Analog output	1 to 5 VDC (Output impedance: Approx. 1 kΩ) 4 to 20 mA DC (Sink type) (Output impedance: 250 Ω or less) Output accuracy ± 6% F.S. or less		
	Switch output	NPN open collector output: Max. 30 V, 80 mA PNP open collector output: Max. 80 mA		
Linearity		± 1% F.S. or less		
Hysteresis		0.5% F.S. or less		
Repeatability		± 0.5% F.S. or less		
Sensitivity		0.2% F.S. or less		
Temperature characteristics		± 0.12% F.S./°C or less		
Output pressure display Note 4)	Accuracy	± 2% F.S. ± 1 digit or less		
	Minimum unit	MPa: 0.001, kgf/cm²: 0.01, bar: 0.01, psi: 0.1 Note 5) , kPa: 1		
Ambient and fluid temperature		0 to 50°C (No condensation)		
Enclosure		IP65		
Weight Note 10)	ITV10□□	Approx. 250 g (without options)		
	ITV20□□	Approx. 350 g (without options)		
	ITV30□□	Approx. 645 g (without options)		

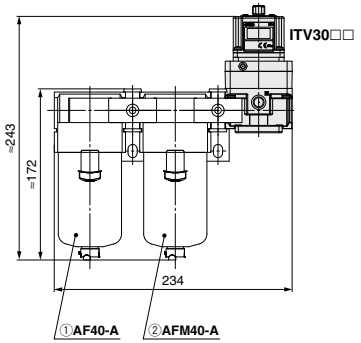
Note 1) Please refer to Figure 1 for the relationship between set pressure and input. Because the maximum set pressure differs for each pressure display, refer to page 853.
Note 2) 2-wire type 4 to 20 mA DC is not available. Power supply voltage (24 VDC or 12 to 15 VDC) is required.
Note 3) Select either analog output or switch output.
Further, when switch output is selected, select either NPN output or PNP output.
When measuring ITV analog output from 1 to 5 VDC, if the load impedance is less than 100 kΩ, the analog 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 4) Adjustment of numerical values such as the zero/span adjustment or preset input type is set based on the minimum units for output pressure display (e.g. 0.001 to 0.500 MPa). Note that the unit cannot be changed.
Note 5) The minimum unit for 0.9 MPa (130 psi) types is 1 psi.
Note 6) 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 current. This is 350 Ω or less for an input current of 20 mA DC.
Note 7) The above characteristics are confined to the static state. When air is consumed on the output side, the pressure may fluctuate.
Note 8) The ITV1000 series is a Grease-free specification (Wetted parts).
Note 9) Refer to the table below for communication specifications.
Note 10) Add 50 g for digital input type, 70 g for 16 points preset input type respectively.

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	Volume1 (Edition3.8), Volume3 (Edition1.5)	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
Electric insulation Note 4)		Insulation	Insulation	Insulation	Non-insulation
Terminating resistor		Built into the product (Switch setting)	Not built into the product	Built into the product (Switch setting)	—
Current consumption		0.16 A or less	0.14 A or less	0.16 A or less	0.12 A or less
Weight	ITV1000	330	320	350	320
	ITV2000	430	420	450	420
	ITV3000	730	720	750	720

Note 1) Note that version information is subject to change.
Note 2) Configuration files can be downloaded from the operation manual page on 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.
Note 4) The insulation between the electrical signal of the communication system and ITV power supply.





Modular Products and Accessory Combinations

Applicable products and accessories	Applicable model	
	ITV20□□	ITV30□□
① Air filter	AF30-A	AF40-A
② Mist separator	AFM30-A	AFM40-A
③ L-bracket	B310L	B410L
④ Spacer	Y30	Y40
⑤ Spacer with L-bracket (③ + ④)	Y30L	Y40L
⑥ Spacer with T-bracket	—	Y40T

∗ For ITV10□□, use a modular adapter (Refer to page 585 for details).

Accessories (Option)/Part No.

[Bracket]

Applicable model	Description	Part No.
ITV10□□	Flat bracket assembly (including mounting screws)	P398010-600
ITV20□□, 30□□		P398020-600
ITV10□□	L-bracket assembly (including mounting screws)	P398010-601
ITV20□□, 30□□		P398020-601

[Cable connector]

Applicable model	Description		Part No.
Current type Voltage type 4 points preset input	Cable connector (4 cores)	Straight type 3 m	P398020-500-3
		Right angle type 3 m	P398020-501-3
16 points preset input	Power cable (4 cores)	Straight type 3 m	P398020-500-3
		Right angle type 3 m	P398020-501-3
	Signal cable (5 cores)	Straight type 3 m	P398020-502-3
		Right angle type 3 m	P398020-503-3
10 bit digital input	Cable connector (13 cores)	Straight type 3 m	INI-398-0-59
CC-Link PROFIBUS DP DeviceNet™	Power cable (4 cores)	Straight type 3 m	P398020-500-3
		Right angle type 3 m	P398020-501-3
RS-232C	Power cable (4 cores)	Straight type 3 m	P398020-500-3
		Right angle type 3 m	P398020-501-3
	Communication cables connector (5 cores)	Straight type 3 m	P398020-502-3
		Right angle type 3 m	P398020-503-3

Note 1) For the 10-bit digital type, there is no right angle type cable connector.
Note 2) Even when "with cable connector" is selected the communication cable is not included in the communication model (CC, DE, PR). Please order separately.

[Bus adapter]

Applicable model	Description	Part No.
CC-Link	Bus adapter (Bus adapter supplied with the product.)	EX9-ACY00-MJ

Made to Order

(Refer to pages 832 and 835 for details.)

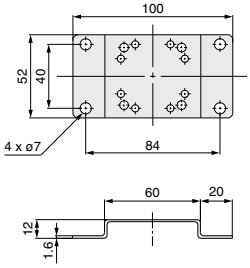
Symbol	Specifications
X102	Reverse type
X224	High pressure type (SUP 1.2 MPa, OUT 1.0 MPa)
X25	Set pressure range 1 to 100 kPa (Except Series ITV3000)
X88	High speed response type (Except Series ITV3000)
X26	For manifold mounting (Except Series ITV3000)
X410	Linearity: ±0.5% F.S. or less
X420	With alarm output

Note 1) Manifolds are compatible with 2 to 8 stations. Consult with SMC for 9 stations or more.
Note 2) Products without symbols are also compatible. Consult with SMC separately.
Note 3) Compliant with CE marking

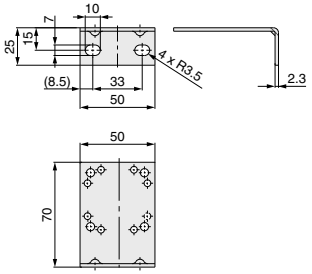
Model	Bracket tightening torque
ITV1000	0.76 ± 0.05 N·m
ITV2000/3000	1.5 ± 0.05 N·m

Dimensions

Flat bracket



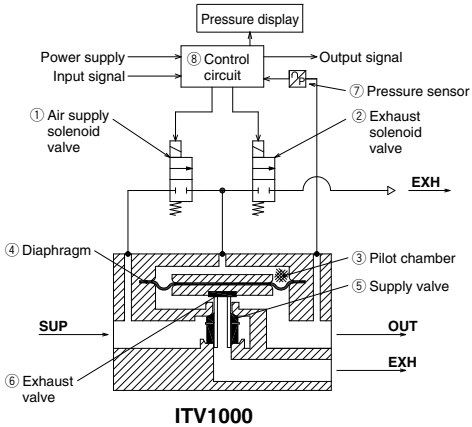
L-bracket



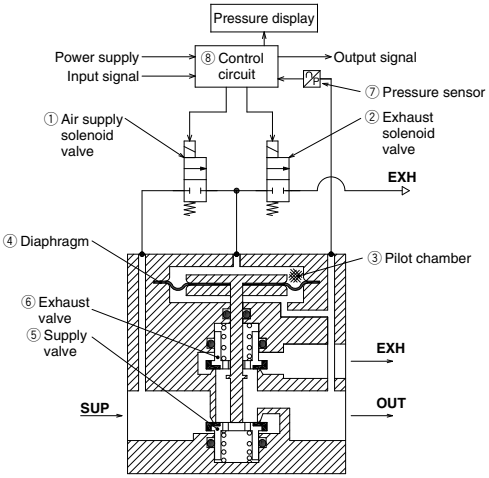
Working Principles

When the input signal rises, the air supply solenoid valve ① turns ON, and the exhaust solenoid valve ② turns OFF. Therefore, supply pressure passes through the air supply solenoid valve ① and is applied to the pilot chamber ③. The pressure in the pilot chamber ③ increases and operates on the upper surface of the diaphragm ④.
As a result, the air supply valve ⑤ linked to the diaphragm ④ opens, and a portion of the supply pressure becomes output pressure.
This output pressure feeds back to the control circuit ⑧ via the pressure sensor ⑦. Here, a correct operation functions until the output pressure is proportional to the input signal, making it possible to always obtain output pressure proportional to the input signal.

Working Principle Diagram

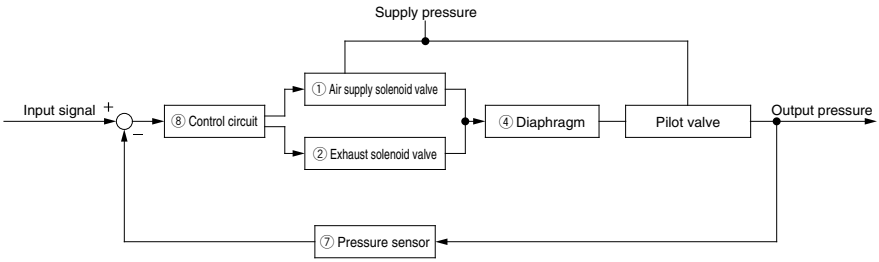


ITV1000



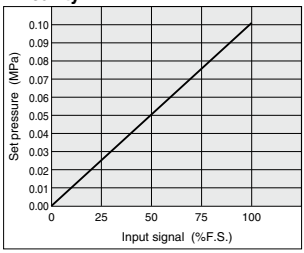
ITV2000, 3000

Block Diagram

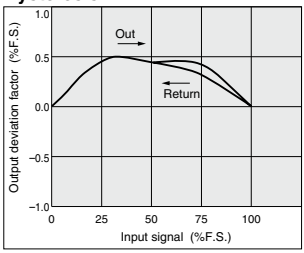


Series ITV101□

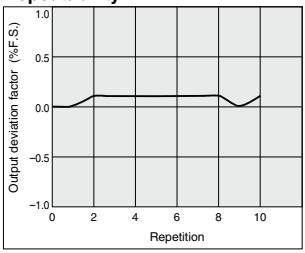
Linearity



Hysteresis

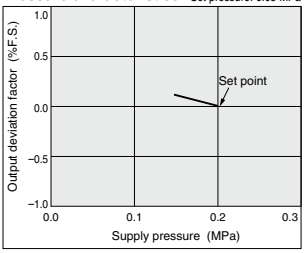


Repeatability



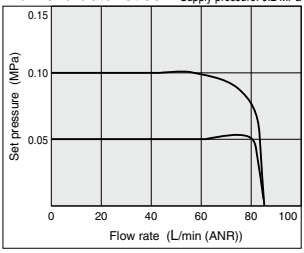
Pressure characteristics

Set pressure: 0.05 MPa



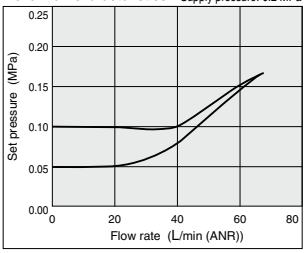
Flow characteristics

Supply pressure: 0.2 MPa



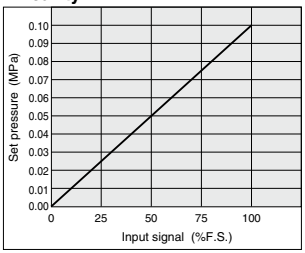
Relief flow characteristics

Supply pressure: 0.2 MPa

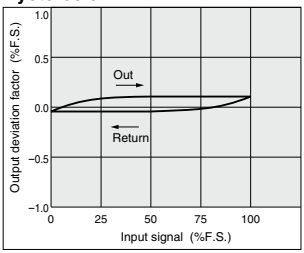


Series ITV201□

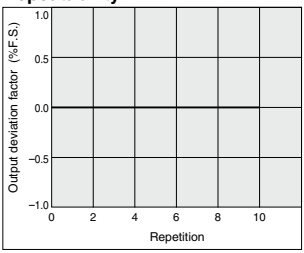
Linearity



Hysteresis

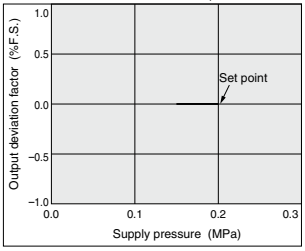


Repeatability



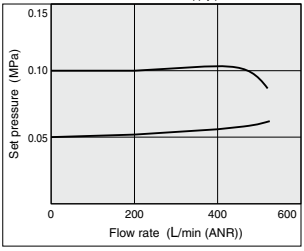
Pressure characteristics

Set pressure: 0.05 MPa



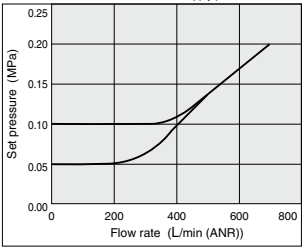
Flow characteristics

Supply pressure: 0.2 MPa



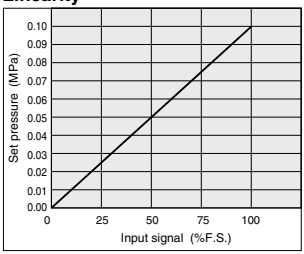
Relief flow characteristics

Supply pressure: 0.2 MPa

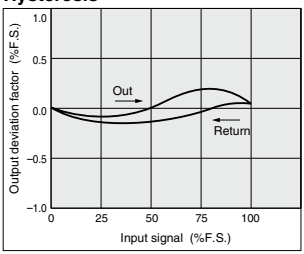


Series ITV301□

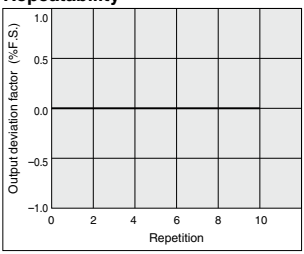
Linearity



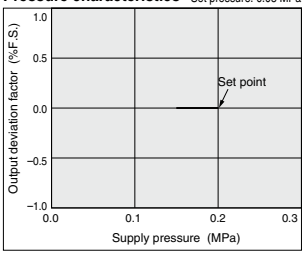
Hysteresis



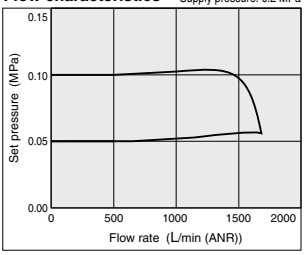
Repeatability



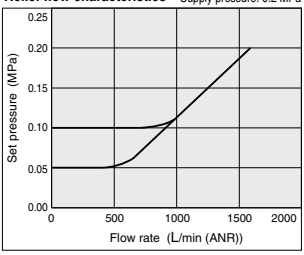
Pressure characteristics Set pressure: 0.05 MPa



Flow characteristics Supply pressure: 0.2 MPa

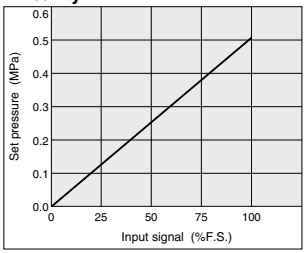


Relief flow characteristics Supply pressure: 0.2 MPa

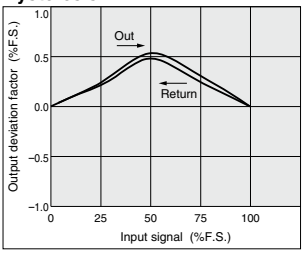


Series ITV103□

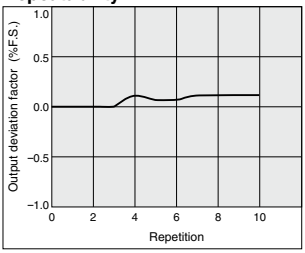
Linearity



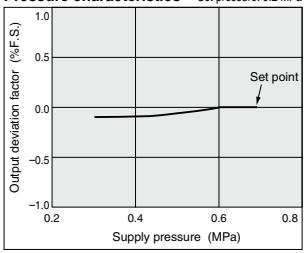
Hysteresis



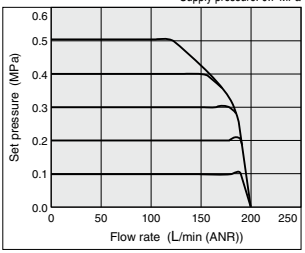
Repeatability



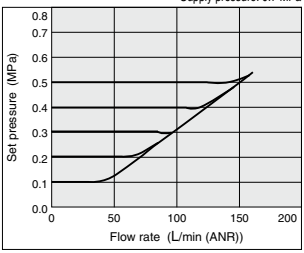
Pressure characteristics Set pressure: 0.2 MPa



Flow characteristics Supply pressure: 0.7 MPa

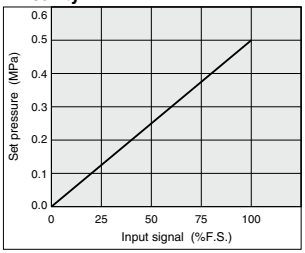


Relief flow characteristics Supply pressure: 0.7 MPa

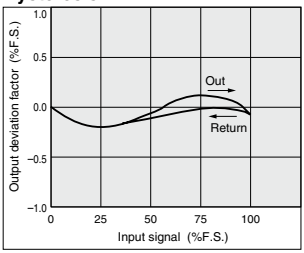


Series ITV203□

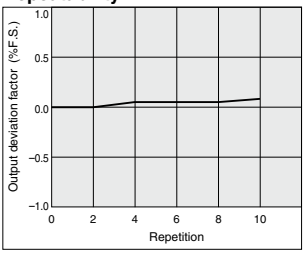
Linearity



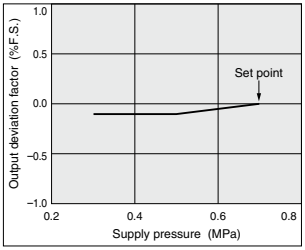
Hysteresis



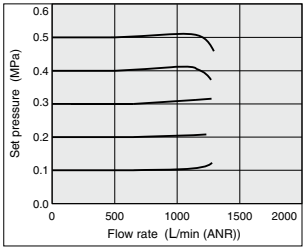
Repeatability



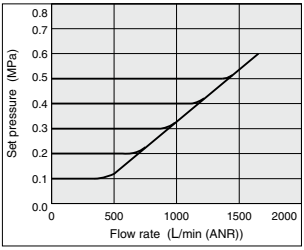
Pressure characteristics Set pressure: 0.2 MPa



Flow characteristics Supply pressure: 0.7 MPa

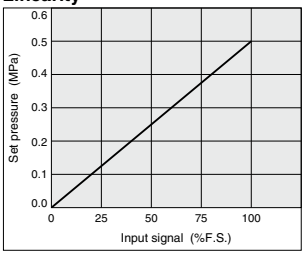


Relief flow characteristics Supply pressure: 0.7 MPa

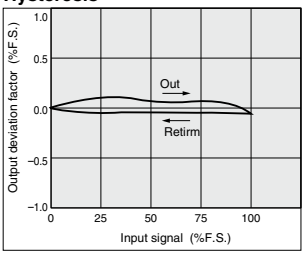


Series ITV303□

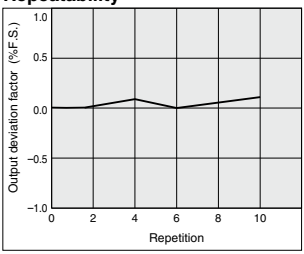
Linearity



Hysteresis

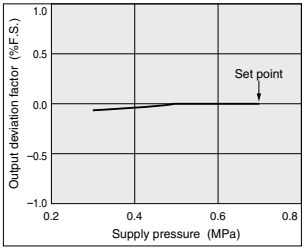


Repeatability



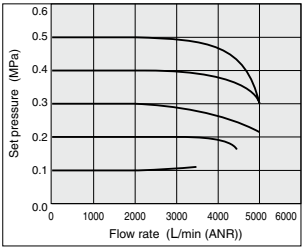
Pressure characteristics

Set pressure: 0.2 MPa



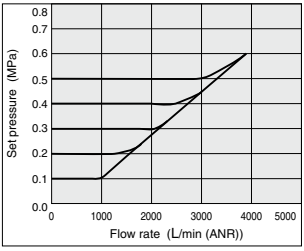
Flow characteristics

Supply pressure: 0.7 MPa



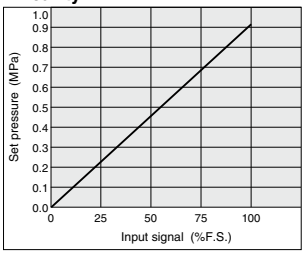
Relief flow characteristics

Supply pressure: 0.7 MPa

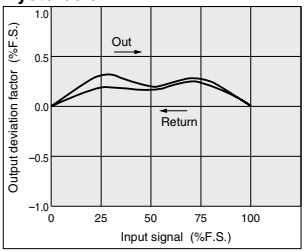


Series ITV105□

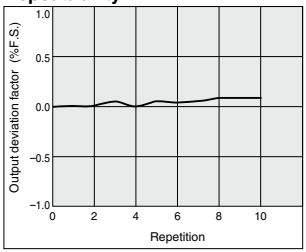
Linearity



Hysteresis

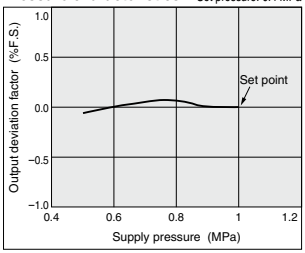


Repeatability



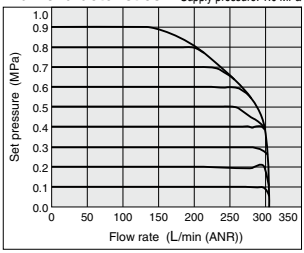
Pressure characteristics

Set pressure: 0.4 MPa



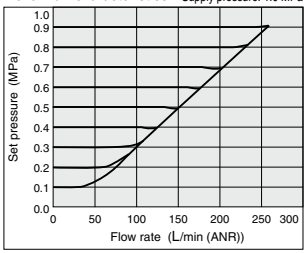
Flow characteristics

Supply pressure: 1.0 MPa



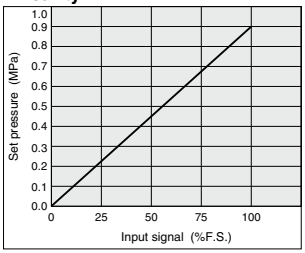
Relief flow characteristics

Supply pressure: 1.0 MPa

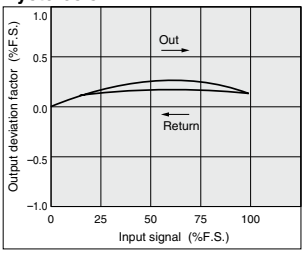


Series ITV205□

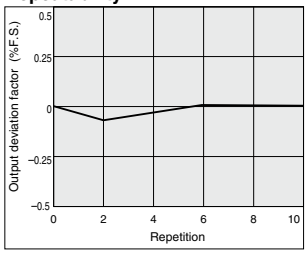
Linearity



Hysteresis

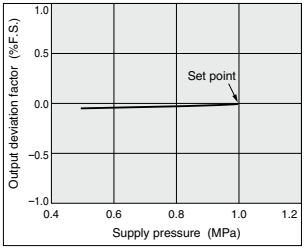


Repeatability



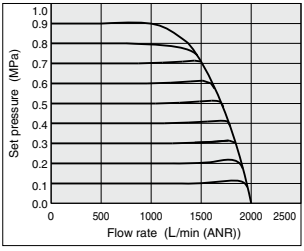
Pressure characteristics

Set pressure: 0.4 MPa



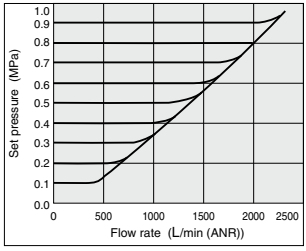
Flow characteristics

Supply pressure: 1.0 MPa



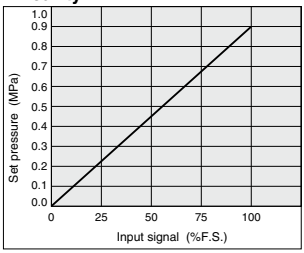
Relief flow characteristics

Supply pressure: 1.0 MPa

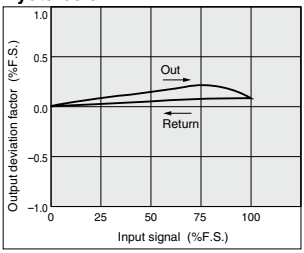


Series ITV305□

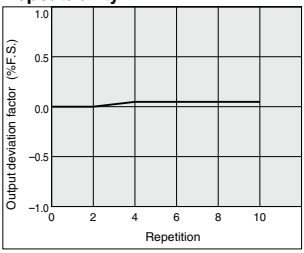
Linearity



Hysteresis

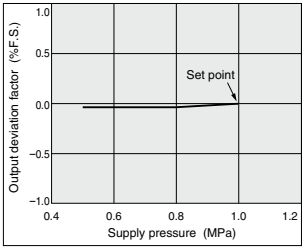


Repeatability



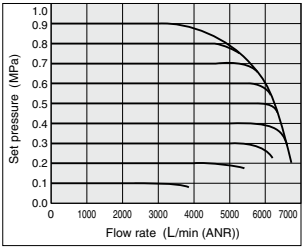
Pressure characteristics

Set pressure: 0.4 MPa



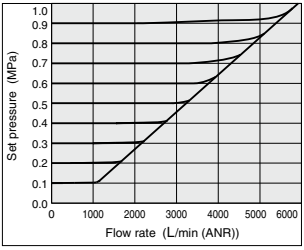
Flow characteristics

Supply pressure: 1.0 MPa



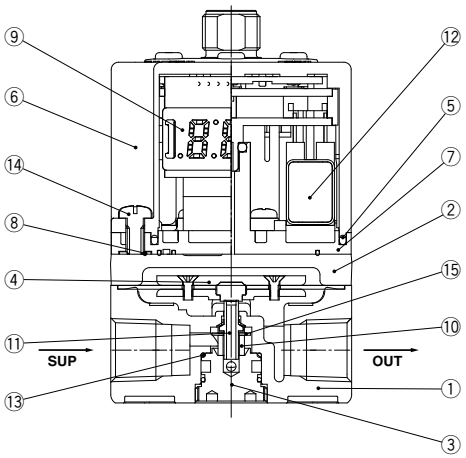
Relief flow characteristics

Supply pressure: 1.0 MPa



Construction

ITV1000

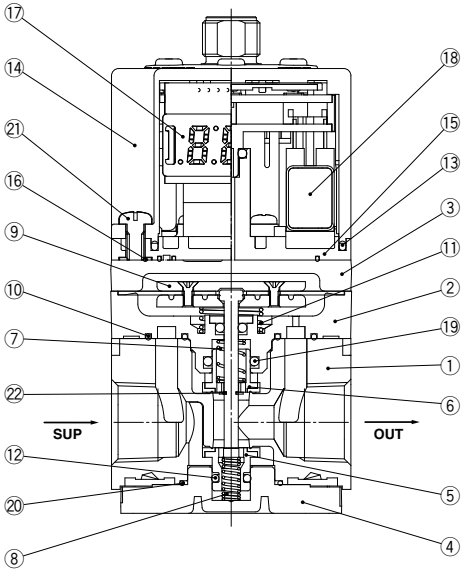


Main Component Parts

	No.	Description	Material
◆	1	Body	Aluminum alloy
	2	Cover	Aluminum alloy
◆	3	Valve guide	Aluminum alloy
◆	4	Diaphragm assembly	Aluminum alloy Weather resistant NBR Steel
	5	Seal	NBR
	6	Bowl assembly	Resin Silicone rubber
	7	Sub-plate	Resin
	8	Seal	NBR
	9	Control circuit assembly	—
◆	10	Bumper	NBR
◆	11	Valve	Stainless steel HNBR
	12	Solenoid valve	—
◆	13	O-ring	NBR
	14	Round head Phillips screw	Steel
◆	15	Flat washer	Stainless steel

∗ Parts in contact with fluid are indicated with a mark ◆.

ITV2000



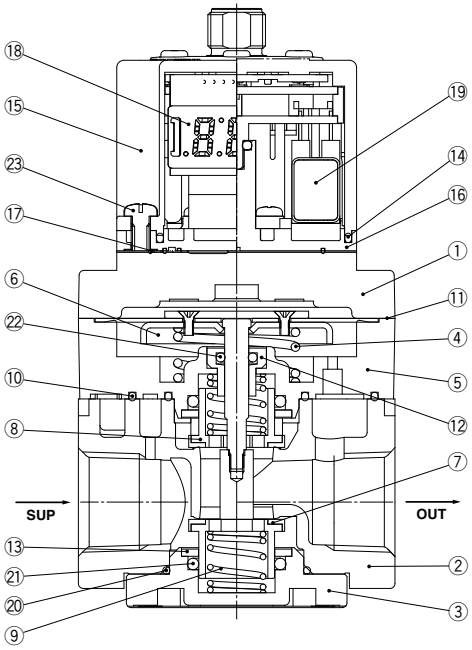
Main Component Parts

	No.	Description	Material
◆	1	Body	Aluminum alloy
◆	2	Intermediate body	Aluminum alloy
	3	Cover	Aluminum alloy
◆	4	Valve guide	Aluminum alloy
◆	5	Valve (Supply valve)	HNBR/Brass
◆	6	Valve (Exhaust valve)	HNBR/Brass
◆	7	Valve spring	Stainless steel
◆	8	Valve spring	Stainless steel
◆	9	Diaphragm assembly	Stainless steel Aluminum alloy Weather resistant NBR Steel
◆	10	Seal	NBR
◆	11	Bias spring	Stainless steel
◆	12	O-ring	NBR
	13	Seal	NBR
	14	Bowl assembly	Resin Silicone rubber
	15	Sub-plate	Resin
	16	Seal	NBR
	17	Control circuit assembly	—
	18	Solenoid valve	—
◆	19	O-ring	NBR
	20	O-ring	NBR
	21	Round head Phillips screw	Steel
◆	22	Retaining ring	Stainless steel

∗ Parts in contact with fluid are indicated with a mark ◆.

Construction

ITV3000



Main Component Parts

No.	Description	Material
1	Cover	Aluminum alloy
◆ 2	Body	Aluminum alloy
◆ 3	Valve guide	Aluminum alloy
◆ 4	Bias spring	Stainless steel
◆ 5	Intermediate body	Aluminum alloy
◆ 6	Diaphragm assembly	Weather resistant NBR
		Rolled sheet steel
		Stainless steel
		Aluminum alloy
		Steel
◆ 7	Valve (Supply valve)	HNBR/Brass
◆ 8	Valve (Exhaust valve)	HNBR/Brass
◆ 9	Valve spring	Stainless steel
◆ 10	Seal	NBR
11	Seal	NBR
◆ 12	Rod guide	Brass
◆ 13	O-ring retainer	Aluminum alloy
14	Seal	NBR
15	Bowl assembly	Resin
		Silicone rubber
16	Sub-plate	Resin
17	Seal	NBR
18	Control circuit assembly	—
19	Solenoid valve	—
20	O-ring	NBR
◆ 21	O-ring	NBR
◆ 22	O-ring	NBR
23	Round head Phillips screw	Steel

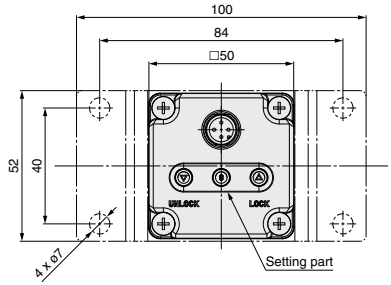
∗ Parts in contact with fluid are indicated with a mark ◆.

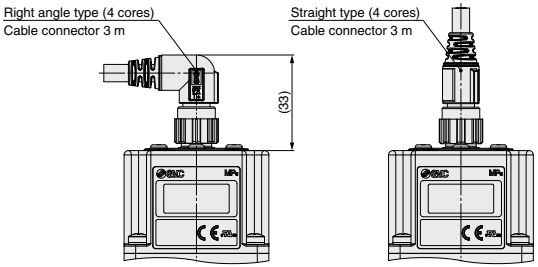
Dimensions

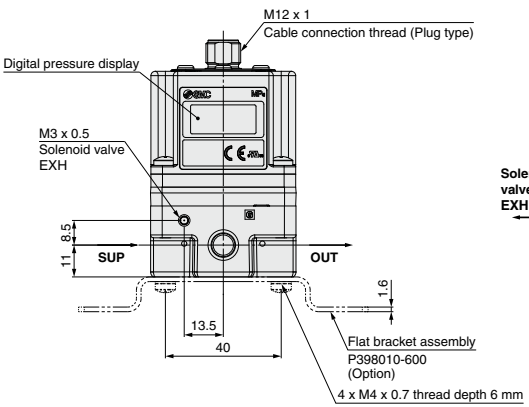
ITV10□□

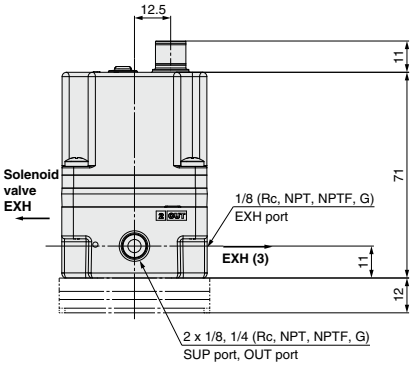
Flat bracket

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

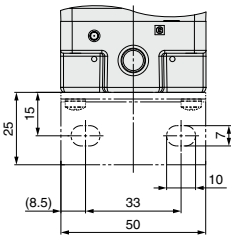


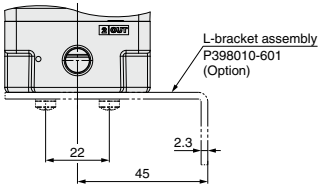






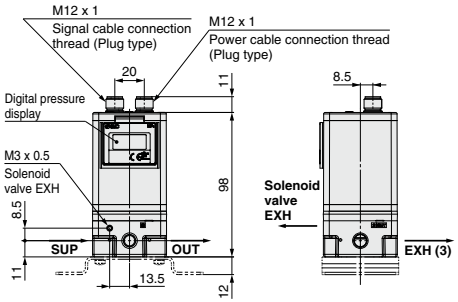
L-bracket



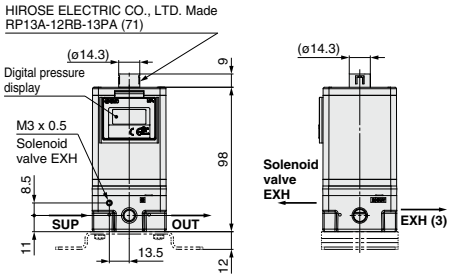


Dimensions (16 points preset input, 10 bit digital input, CC-Link, DeviceNet™, PROFIBUS DP and RS-232C)

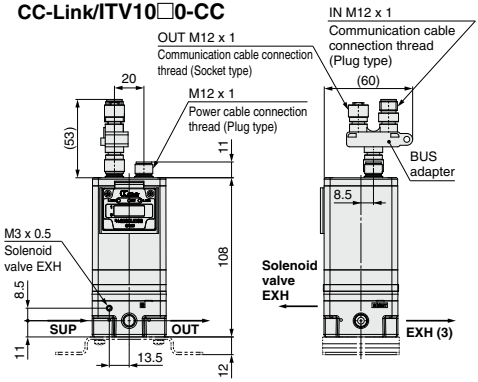
16 points preset input



10 bit digital input

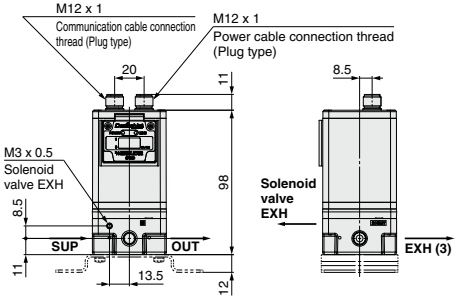


CC-Link/ITV10□0-CC



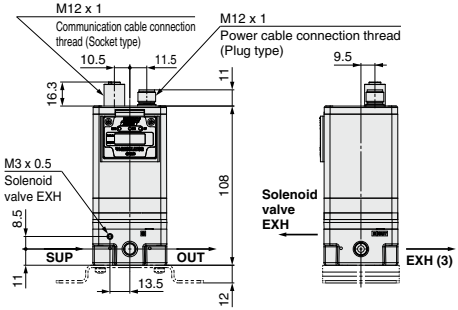
∗ Dimensions not shown are same as on page 826.

DeviceNet™/ITV10□0-DE



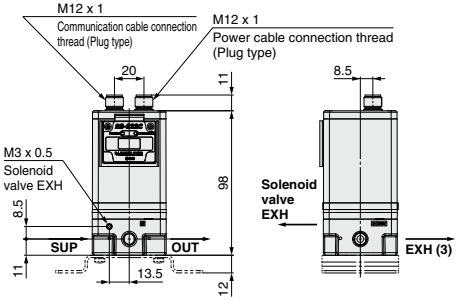
∗ Dimensions not shown are same as on page 826.

PROFIBUS DP/ITV10□0-PR



∗ Dimensions not shown are same as on page 826.

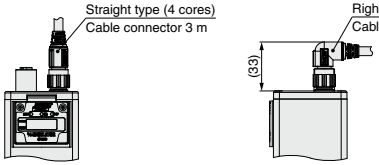
RS-232C/ITV10□0-RC



∗ Dimensions not shown are same as on page 826.

With power cable connector

∗ **ITV10□0-** **52 53 CC DE PR RC** **common dimensions**



Note) Order communication cable (other than 16 points, RS-232C) separately. (Refer to page 814.)

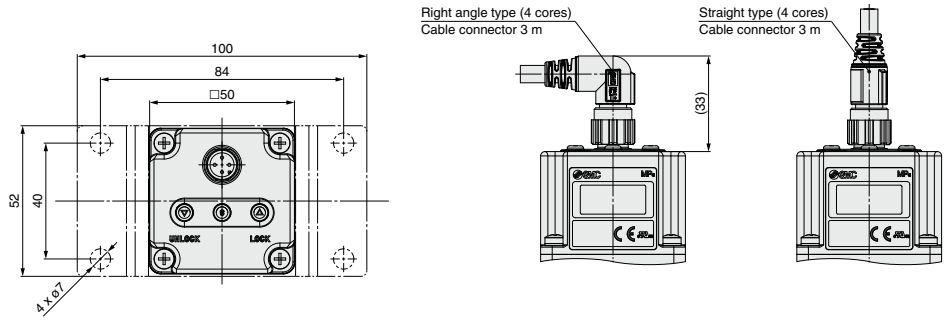
Note) Do not attempt to rotate, as the cable connector does not turn.

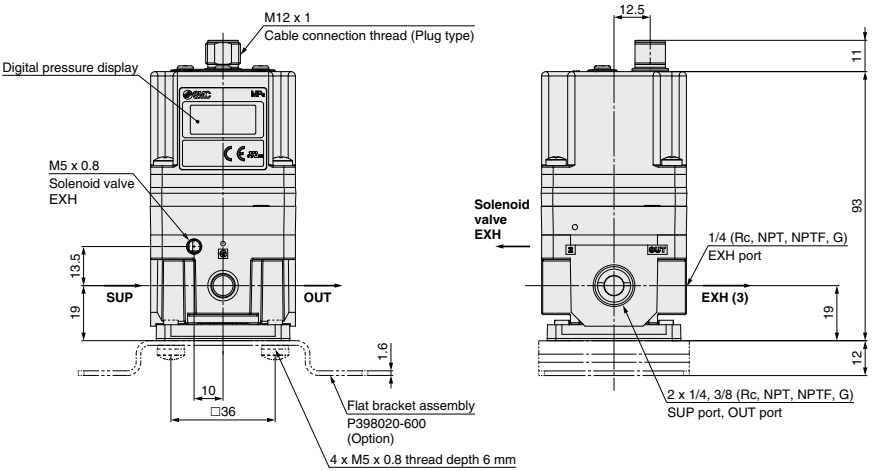
Dimensions

ITV20□□

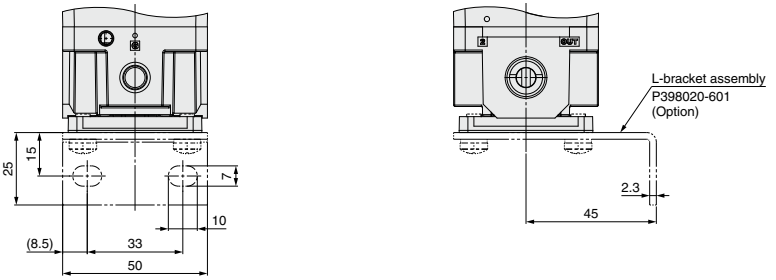
Flat bracket

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



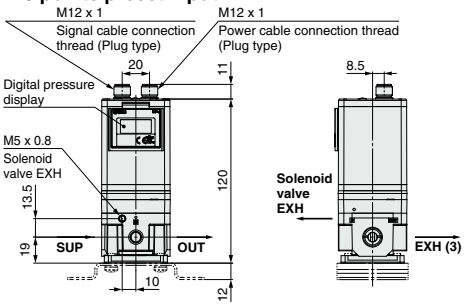


L-bracket

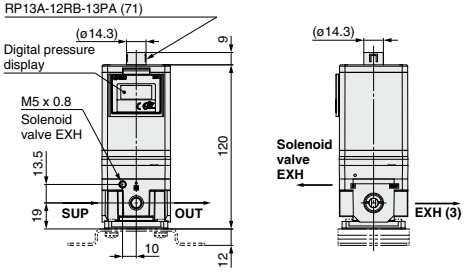


Dimensions (16 points preset input, 10 bit digital input, CC-Link, DeviceNet™, PROFIBUS DP and RS-232C)

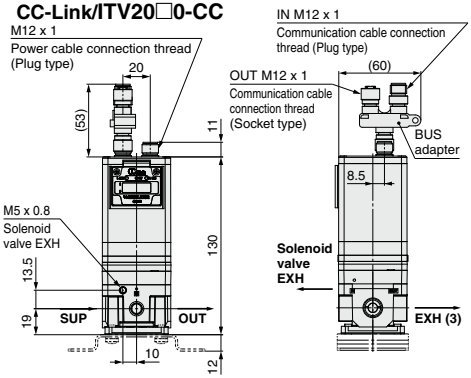
16 points preset input



10 bit digital input

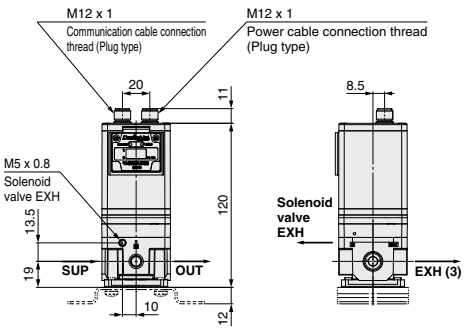


CC-Link/ITV20□0-CC



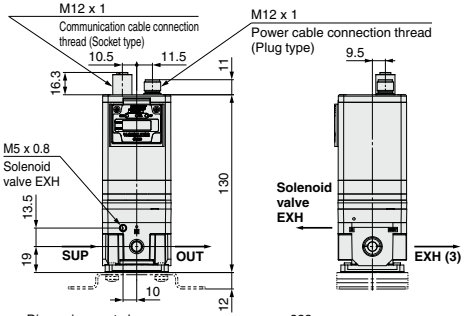
∗ Dimensions not shown are same as on page 828.

DeviceNet™/ITV20□0-DE



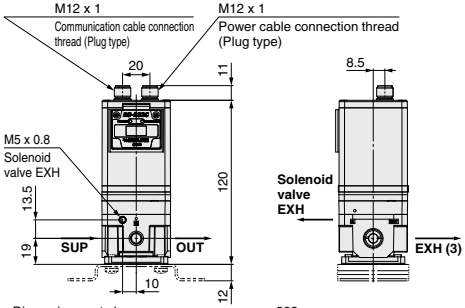
∗ Dimensions not shown are same as on page 828.

PROFIBUS DP/ITV20□0-PR



∗ Dimensions not shown are same as on page 828.

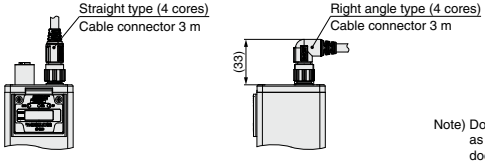
RS-232C/ITV20□0-RC



∗ Dimensions not shown are same as on page 828.

With power cable connector

∗ **ITV20□0- 52 53 CC DE PR RC common dimensions**



Note) Order communication cable (other than 16 points, RS-232C) separately. (Refer to page 814.)

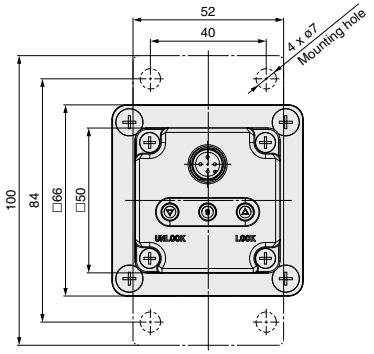
Note) Do not attempt to rotate, as the cable connector does not turn.

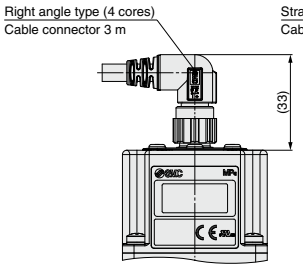
Dimensions

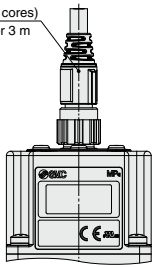
ITV30□□

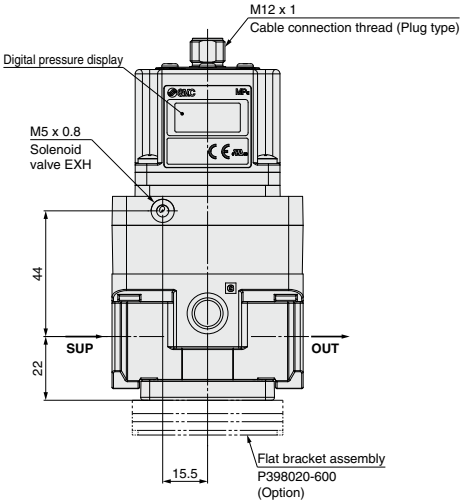
Flat bracket

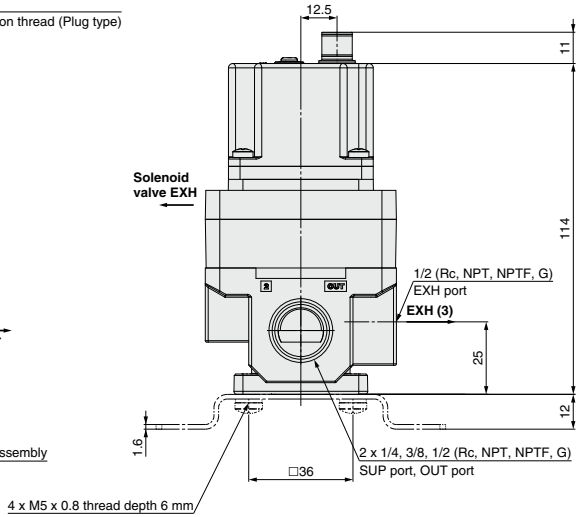
Note) Do not attempt to rotate, as the cable connector does not turn.



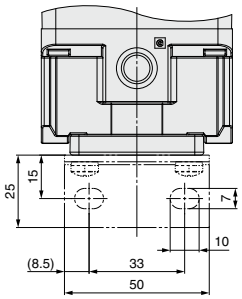


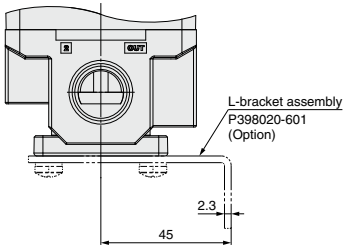






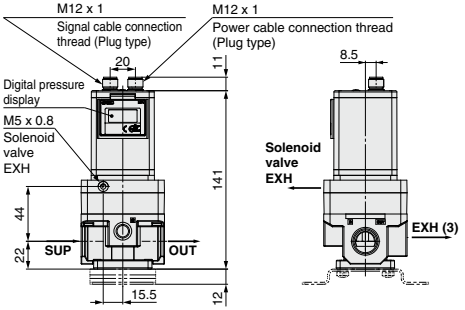
L-bracket



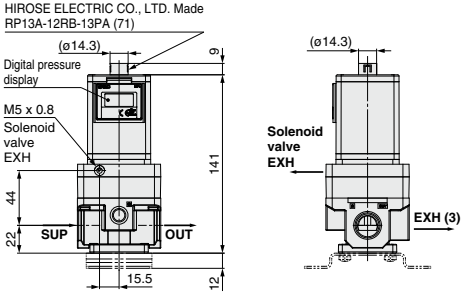


Dimensions (16 points preset input, 10 bit digital input, CC-Link, DeviceNet™, PROFIBUS DP and RS-232C)

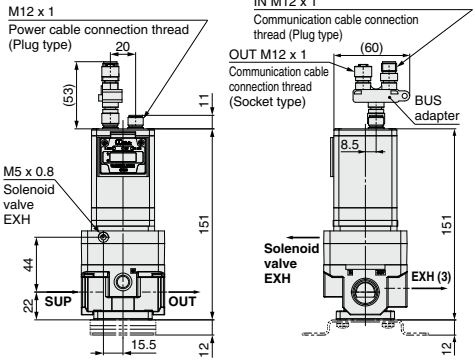
16 points preset input



10 bit digital input

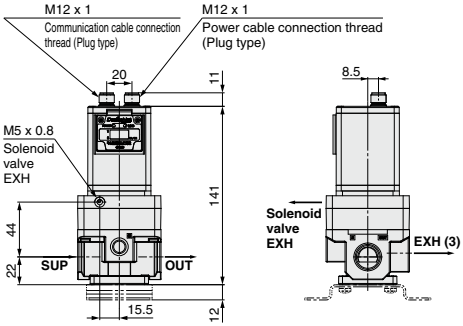


CC-Link/ITV30□-CC



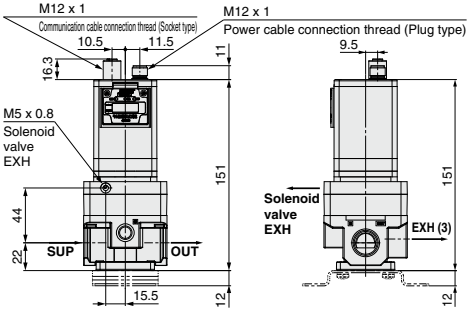
∗ Dimensions not shown are same as on page 830.

DeviceNet™/ITV30□-DE



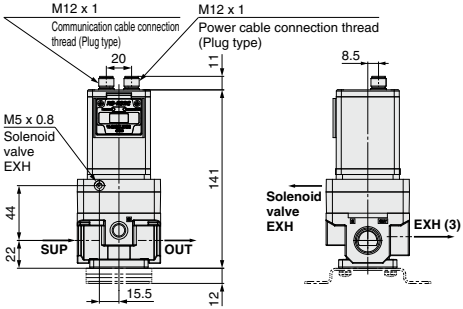
∗ Dimensions not shown are same as on page 830.

PROFIBUS DP/ITV30□-PR



∗ Dimensions not shown are same as on page 830.

RS-232C/ITV30□-RC



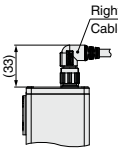
∗ Dimensions not shown are same as on page 830.

With power cable connector

∗ **ITV30□-** 52 / 53 / CC / DE / PR / RC **common dimensions**

Note) Order communication cable (other than 16 points, RS-232C) separately. (Refer to page 814.)





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

Made to Order Specifications 1

Please contact SMC for detailed dimensions, specifications and lead times.

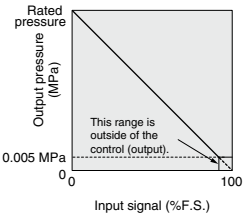
1 Reverse Type

In compliance with input, inverse proportional pressure is displayed.

ITV10□□−□□□□□□□□−X102

ITV20□□−□□□□□□□□−X102

ITV30□□−□□□□□□□□−X102



Input/output characteristics chart

Note 1) □ in part number is the same model no. for the standard products.
Note 2) Except for preset input type and digital input type.
Note 3) For communication models, consult SMC for availability.

2 High Pressure Type (SUP 1.2 MPa, OUT 1.0 MPa)

ITV10[5]□−□□□□□□□−X224

ITV20[5]□−□□□□□□□−X224

ITV30[5]□−□□□□□□□−X224

Note 1) For preset input type, digital input type and communication models, consult SMC for availability.

3 Set Pressure Range 1 to 100 kPa

ITV10[1]□−□□□□□□□−X25

ITV20[1]□−□□□□□□□−X25

Note 1) For preset input type, digital input type and communication models, consult SMC for availability.

Made to Order Specifications 2

Please contact SMC for detailed dimensions, specifications and lead times.

4 High-Speed Response Time Type

Pressure response with no load is approx. 0.1 sec.
Note 1) This is not a guaranteed value as it depends on the operating environment.
Note 2) When the input signal is at 0%, the exhaust solenoid valve is controlled to reduce the outlet pressure to zero. For this reason, a noise may be generated. This noise is normal and does not indicate a fault.

ITV 2 0 1 0 – 0 1 □ 2 □ S □ – X88

Model

1	1000 type
2	2000 type

Pressure range

1	0.1 MPa
3	0.5 MPa
5	0.9 MPa

Power supply voltage

0	24 VDC
1	12 to 15 VDC

Input signal

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

Monitor output

1	Analog output 1 to 5 VDC
2	Switch output/NPN output
3	Switch output/PNP output
4	Analog output 4 to 20 mA DC (Sink type)

Thread type

Nil	Rc
N	NPT
T	NPTF
F	G

Port size

1	1/8 (1000 type)
2	1/4 (1000, 2000 type)
3	3/8 (2000 type)

Bracket *

Nil	Without bracket
B	Flat bracket
C	L-bracket

* Bracket is included.

Cable connector type

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

Pressure display unit

Nil	MPa
2 *	kgf/cm²
3	bar
4 *	psi
5	kPa

* Under Japan's new Measurement Act, this is only for overseas sales (SI units are to be used inside Japan).

Made to Order Specifications 3

Please contact SMC for detailed dimensions, specifications and lead times.

5 Manifold Specifications (Except Series ITV3000)

2 through 8 station manifold.

How to Order Manifolds

IITV20 – □ 02 – 5

Stations

2	2 stations
⋮	⋮
8	8 stations

ITV1000, 2000

OUT port size

02	1/4
03	3/8

Connection thread type

Nil	Rc
N	NPT
F	NPTF

How to Order for Manifold Mounted

ITV 1 0 □□ – □□ 1 □□ – X26

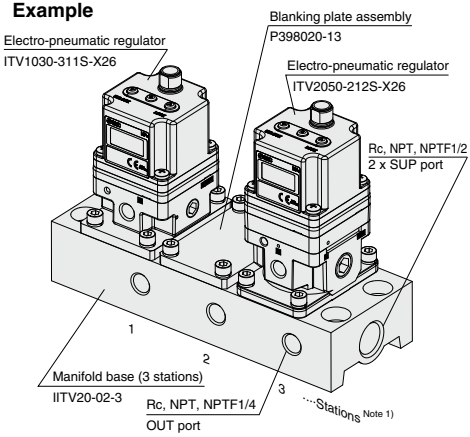
ITV 2 0 □□ – □□ 2 □□ – X26

Note 1) □ in part number is the same model no. for the standard products.
Note 2) For communication models, consult SMC for availability.
Note 3) The thread type is Rc only.
Note 4) For Series ITV1000, the port size is 1/8 only.
Note 5) For Series ITV2000, the port size is 1/4 only.
Note 6) The bracket accessory can not be selected.
Note 7) Not applicable to Series ITV3000

IITV20-02-3 .....1 set (3 station manifold base part no.)
*ITV1030-311S-X26 .....1 set (Electro-pneumatic regulator part no.) Note 2)
*P398020-13 .....1 set (Blanking plate assembly part no.)
*ITV2050-212S-X26 .....1 set (Electro-pneumatic regulator part no.) Note 2)
The * is the symbol for mounting. Add the * symbol at the beginning of part numbers for electro-pneumatic regulators, etc. to be mounted on the base.

How to Order Manifold Assemblies

Example



Note) Refer to the table below for possible mixed combination.

Model	ITV101□	ITV103□	ITV105□	ITV201□	ITV203□	ITV205□
ITV101□	●	—	—	●	—	—
ITV103□	—	●	●	—	●	●
ITV105□	—	●	●	—	●	●
ITV201□	●	—	—	●	—	—
ITV203□	—	●	●	—	●	●
ITV205□	—	●	●	—	●	●

Note 1) Electro-pneumatic regulators are counted starting from station 1 on the left side with the OUT ports in front.
Note 2) The port size for mounted electro-pneumatic regulators is Rc 1/8 (ITV1000), Rc 1/4 (ITV2000) only.
Note 3) When there is a large number of stations, use piping with the largest possible inside diameter for the supply side, such as steel piping.
Note 4) The use of the straight type cable connector is recommended. To mount right angle type, be certain to check that no possible interference occurs.
Note 5) When mounting a blanking plate and the regulator with different pressure set, please inform SMC of the order of a manifold station beside a purchase order.

Made to Order Specifications 4

Please contact SMC for detailed dimensions, specifications, and lead times.

6 Linearity: ±0.5% F.S. or Less

Application examples: Polishing equipment and peripheral equipment for wafers, LCD glasses, color filters, etc.

ITV 3 0 1 0 – 0 1 □ 2 □ S □ – X410

Model

1	1000 type
2	2000 type
3	3000 type

Pressure range

1	0.1 MPa
3	0.5 MPa
5	0.9 MPa

Power supply voltage

0	24 VDC
1	12 to 15 VDC

Input signal

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

Monitor output

1	Analog output 1 to 5 VDC
2	Switch output/NPN output
3	Switch output/PNP output
4	Analog output 4 to 20 mA DC (Sink type)

Thread type

Nil	Rc
N	NPT
T	NPTF
F	G

Bracket *

Nil	Without bracket
B	Flat bracket
C	L-bracket

* Bracket is included.

Port size

1	1/8 (1000 type)
2	1/4 (1000, 2000, 3000 type)
3	3/8 (2000, 3000 type)
4	1/2 (3000 type)

Cable connector type

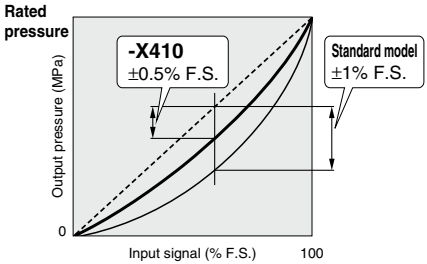
S	Straight type 3 m
L	Right angle type 3 m
N	Without cable connector

Linearity:
±0.5% F.S. or less

Pressure display unit

Nil	MPa
2 Note)	kgf/cm²
3	bar
4 Note)	psi
5	kPa

Note) Under Japan's new Measurement Act, this is only for overseas sales (SI units are to be used inside Japan).



The graph shown above is a typical example. (This graph shows that the output pressure curve is in a negative range when compared to the ideal line.)

Specifications

Fluid		Air
Minimum supply pressure		Set pressure +0.1 MPa
Maximum supply pressure		1.0 MPa (Pressure range 0.1 MPa type: 0.2 MPa)
Proof pressure	(Supply side)	1.5 MPa (Pressure range 0.1 MPa type: 0.3 MPa)
	(Output side)	1 MPa (Pressure range 0.1 MPa type: 0.2 MPa)
Set pressure range		1: 0.005 to 0.1 MPa, 3: 0.005 to 0.5 MPa, 5: 0.005 to 0.9 MPa
Power supply voltage		0: 24 VDC ±10%, 1: 12 to 15 VDC
Current consumption		0.12 A or less (24 VDC ±10% type) 0.18 A or less (12 to 15 VDC type)
Input signal		0: 4 to 20 mA, 1: 0 to 20 mA, 2: 0 to 5 VDC, 3: 0 to 10 VDC
Input impedance		Voltage type: Approx. 6.5 kΩ, Current type: 250 Ω or less
Output signal		Analog output: 1 to 5 VDC/4 to 20 mA DC, Switch output (NPN/PNP)
Linearity		±0.5% F.S. or less
Hysteresis		0.5% F.S. or less
Repeatability		±0.5% F.S. or less
Sensitivity		0.2% F.S. or less
Temperature characteristics		±0.12% F.S./°C or less
Output pressure display	**Accuracy**	±2% F.S. ±1 digit or less
	Minimum unit	MPa: 0.001, kgf/cm²: 0.01, bar: 0.01, psi: 0.1, kPa: 1
Ambient and fluid temperature		0 to 50°C (No condensation)
Enclosure		IP65
Weight		ITV10□□: Approx. 250 g, ITV20□□: Approx. 350 g, ITV30□□: Approx. 645 g (without brackets)

The above characteristics (specifications) are confined to the static state. When air is consumed on the output side, the pressure may fluctuate.

Made to Order Specifications 5

Please contact SMC for detailed dimensions, specifications, and lead times.

7 With Alarm Output

Alarm is output if the set pressure is not reached or maintained for 5 seconds or more.

Application examples: Pressure management for thrust control, etc.

ITV 3 0 1 0 – 0 2 □ 2 □ S □ – X420

Model

1	1000 type
2	2000 type
3	3000 type

Pressure range

1	0.1 MPa
3	0.5 MPa
5	0.9 MPa

Power supply voltage

0	24 VDC
1	12 to 15 VDC

Input signal

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

Monitor output

2	Alarm output/NPN output
3	Alarm output/PNP output

Thread type

Nil	Rc
N	NPT
T	NPTF
F	G

Port size

1	1/8 (1000 type)
2	1/4 (1000, 2000, 3000 type)
3	3/8 (2000, 3000 type)
4	1/2 (3000 type)

Bracket *

Nil	Without bracket
B	Flat bracket
C	L-bracket

* Bracket is included.

Cable connector type

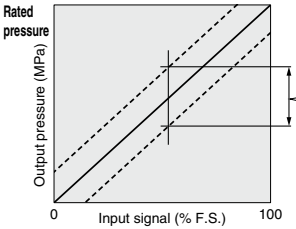
S	Straight type 3 m
L	Right angle type 3 m
N	Without cable connector

With alarm output

Pressure display unit

Nil	MPa
2 Note)	kgf/cm²
3	bar
4 Note)	psi
5	kPa

Note) Under Japan's new Measurement Act, this is only for overseas sales (SI units are to be used inside Japan).



Alarm detection range: Detects output pressure outside the ±10% F.S. range. For example, in the case of ITV2050 (0.9 MPa), a 50% input (0.45 MPa) creates a detectable range of 0.36 to 0.54 MPa.

Figure 1. Alarm output range

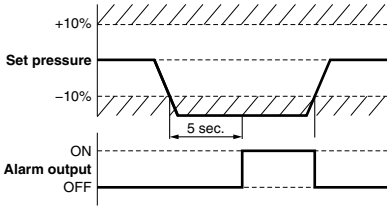


Figure 2. Relationship between output pressure and alarm output

Specifications

Fluid		Air
Minimum supply pressure		Set pressure +0.1 MPa
Maximum supply pressure		1.0 MPa (Pressure range 0.1 MPa type: 0.2 MPa)
Proof pressure	(Supply side)	1.5 MPa (Pressure range 0.1 MPa type: 0.3 MPa)
	(Output side)	1 MPa (Pressure range 0.1 MPa type: 0.2 MPa)
Set pressure range		1: 0.005 to 0.1 MPa, 3: 0.005 to 0.5 MPa, 5: 0.005 to 0.9 MPa
Power supply voltage		0: 24 VDC ±10%, 1: 12 to 15 VDC
Current consumption		0.12 A or less (24 VDC ±10% type) 0.18 A or less (12 to 15 VDC type)
Input signal		0: 4 to 20 mA, 1: 0 to 20 mA, 2: 0 to 5 VDC, 3: 0 to 10 VDC
Input impedance		Voltage type: Approx. 6.5 kΩ, Current type: 250 Ω or less
Output signal		Alarm output (NPN/PNP)
Linearity		±1.0% F.S. or less
Hysteresis		0.5% F.S. or less
Repeatability		±0.5% F.S. or less
Sensitivity		0.2% F.S. or less
Temperature characteristics		±0.12% F.S./°C or less
Output pressure display	**Accuracy**	±2% F.S. ±1 digit or less
	Minimum unit	MPa: 0.001, kgf/cm²: 0.01, bar: 0.01, psi: 0.1, kPa: 1
Ambient and fluid temperature		0 to 50°C (No condensation)
Enclosure		IP65
Weight		ITV10□□: Approx. 250 g, ITV20□□: Approx. 350 g, ITV30□□: Approx. 645 g (without brackets)

The above characteristics (specifications) are confined to the static state. When air is consumed on the output side, the pressure may fluctuate.

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 (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

Built-in One-touch fittings type

For single unit

Symbol		VAC 1	OUT 2	ATM 3
Nil	Metric size (Light gray)	ø4		
U	Inch size (Orange)	ø5/32"		

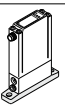
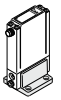
For manifold

Symbol		VAC 1	OUT 2	ATM 3
Nil	Metric size (Light gray)	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

Nil	Without bracket
B	Flat Bracket 
C	L-bracket 

Base type

Nil	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**

One-touch fitting size for supply/exhaust parts (End plate)

Nil	ø6 (Light gray)
U	ø1/4" (Orange)

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 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.)

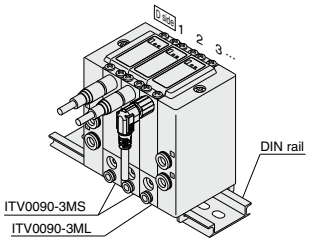
∗ **ITV0090-3MS·····2 sets (Vacuum regulator part no. (1, 2 stations))**

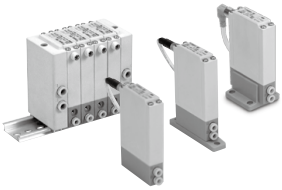
∗ **ITV0090-3ML·····1 set (Vacuum regulator part no. (3 stations))**

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
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 (Sink type)
Input impedance	Voltage type		Approx. 10 kΩ
	Current type		Approx. 250 Ω
Output signal Note 4)	Analog output		1 to 5 VDC (Output impedance: Approx. 1 kΩ) Output accuracy: ±6% F.S. or less
Linearity			±1% F.S. or less
Hysteresis			0.5% F.S. or less
Repeatability			±0.5% F.S. or less
Sensitivity			0.2% F.S. or less
Temperature characteristics			±0.12% F.S./°C or less
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.

Note 3) When the power is turned on, a noise may be generated. This noise is normal and does not indicate a fault.

Note 4) When measuring ITV analog output from 1 to 5 VDC, if the load impedance is less than 100 kΩ, the analog output monitor accuracy of ±6% F.S. or less may not be available. The product with the accuracy of within ±6% is supplied upon your request. Output pressure remains unaffected.

* 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 849)

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



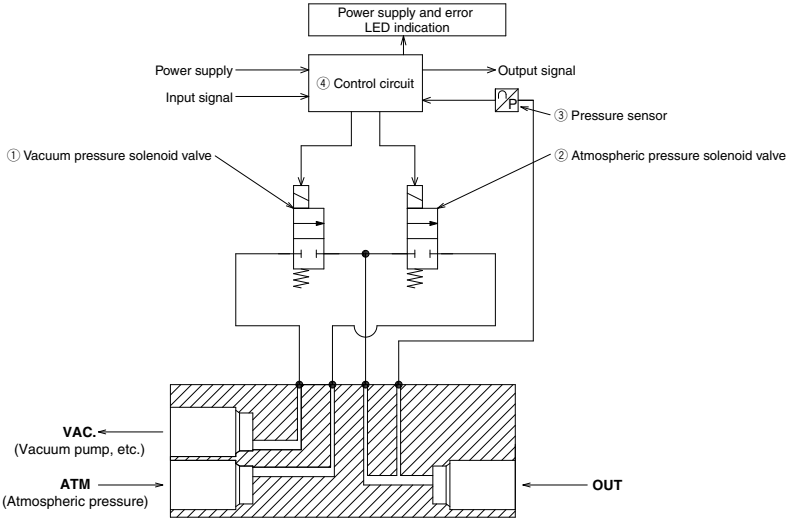
Right angle type
P398000-501-2



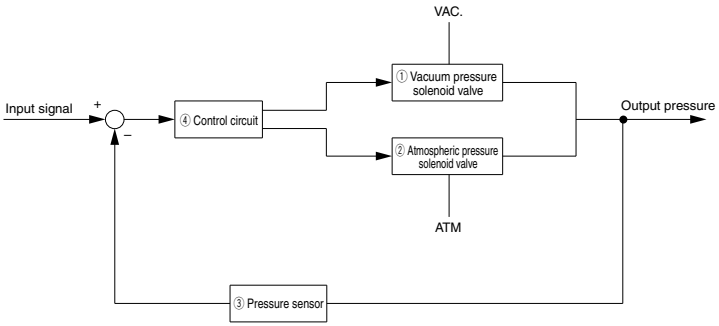
Working Principle

When the input signal rises, the vacuum pressure soloenoid valve ① turns ON. Due to this, part of the vacuum pressure (VAC.) passes through the vacuum pressure solenoid valve ① and changes to a vacuum pressure. This vacuum pressure feeds back to the control circuit ④ via the pressure sensor ③. Here, the vacuum pressure soloenoid valve and the atmospheric pressure soloenoid valve work alternately to make continuous pressure corrections until vacuum pressure becomes proportional to the input signal, thus, supplying vacuum pressure that is consistently proportional to the input signal.

Working Principle Diagram

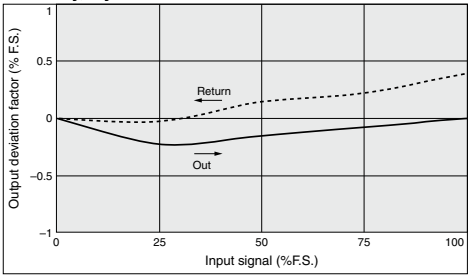


Block Diagram



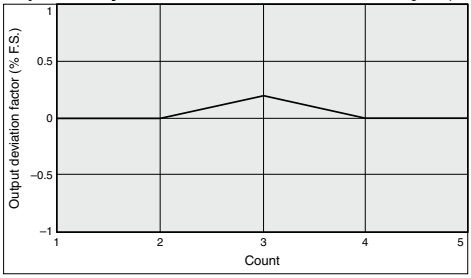
Series ITV009□

Linearity, Hyteresis



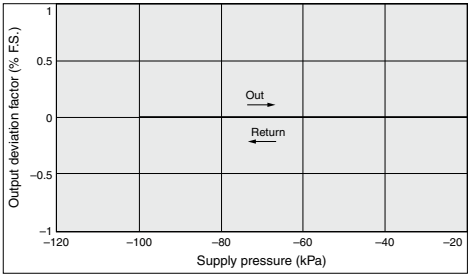
Repeatability

With 50% of signal input

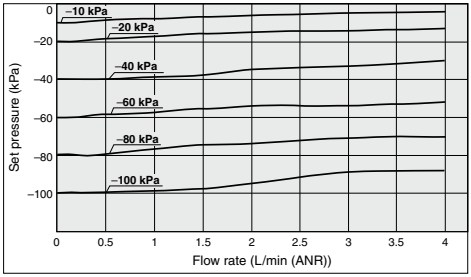


Pressure Characteristics

Set pressure: −10 kPa

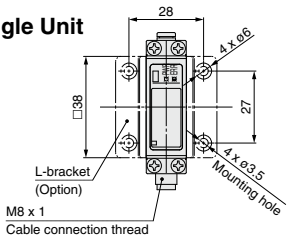


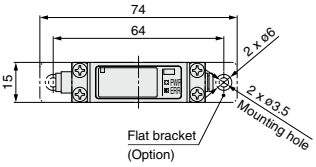
Flow Characteristics

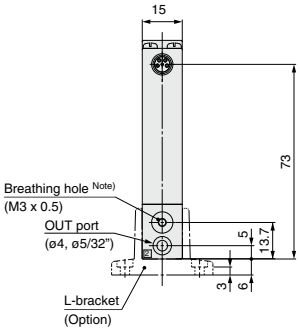


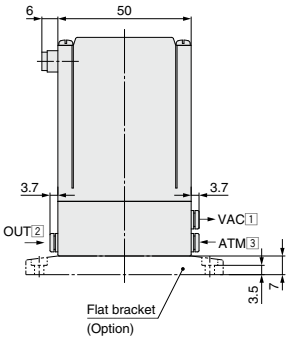
Dimensions

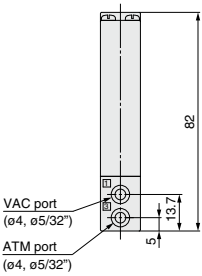
For Single Unit





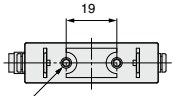




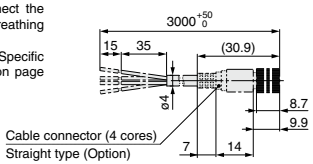


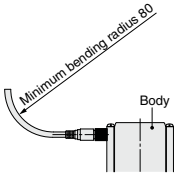
Port Location

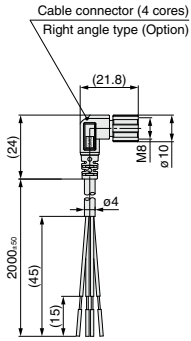
No.	1	2	3
ITV009□	VAC	OUT	ATM

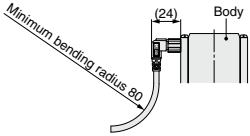


Note) When using under the conditions equivalent to IP65, connect the fittings or tube to the breathing hole prior to use.
(For details, refer to "Specific Product Precautions 1" on page 849)



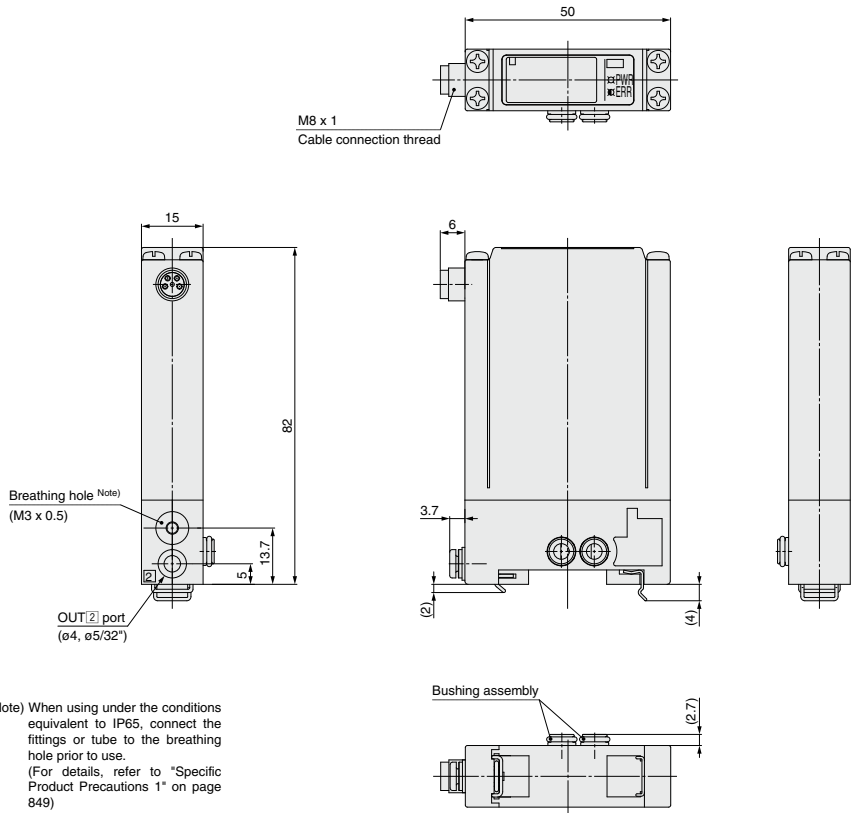






Dimensions

Single unit for manifold

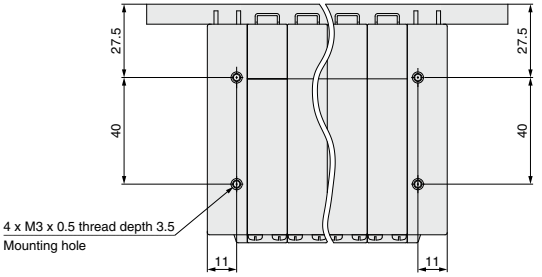


Note) When using under the conditions equivalent to IP65, connect the fittings or tube to the breathing hole prior to use.
(For details, refer to "Specific Product Precautions 1" on page 849)

Note) For dimensions of the cable connector, refer to single unit on page 840.

Dimensions

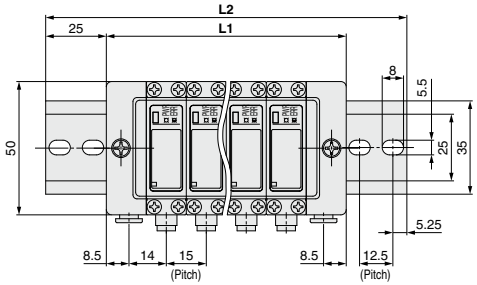
Manifold

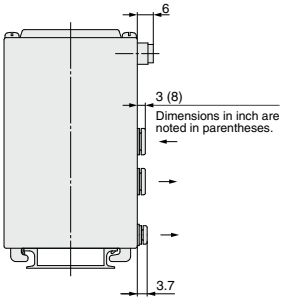


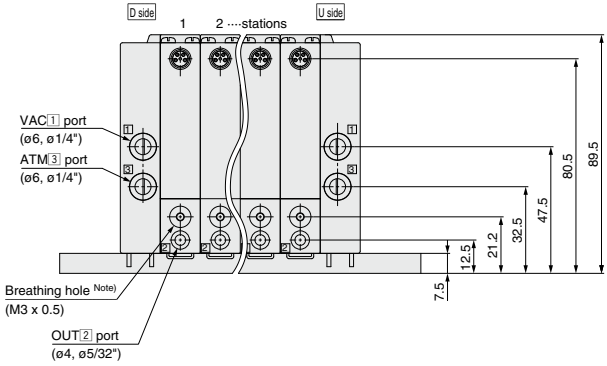
Port Location

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 840.

(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

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 849)

Electronic Vacuum Regulator
Series ITV2090/2091

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

Note) Communication models (CC, DE, PR, RC), 16 points preset input and 10 bit digital input are available only for 24 VDC.

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

Thread type

Nil	Rc
N	NPT
T	NPTF
F	G

Port size

2	1/4

Bracket *

Nil	Without bracket
B	Flat bracket
C	L-bracket

* Bracket is included.

Cable connector type

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

Note) Even when a cable connector is selected, communication cable is not included in the communication models, CC, DE and PR. Please order it separately. Refer to the below. For 10 bit digital input, right angle type cannot be selected.

Pressure display unit

5	kPa

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

For communications cables, use the parts listed below
(refer to M8/M12 connector in Best Pneumatics No.1 for details)
or order the product certified for the respective protocol (with M12 connector) separately.

Application	Communication cable part number	Note
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 proportional to an electrical signal



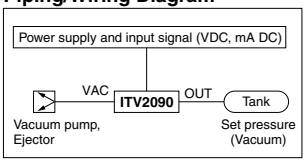


Standard Specifications

Model		ITV2090	ITV2091
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	
Power supply	Voltage	24 VDC ±10%	12 to 15 VDC
	Current consumption	Power supply voltage 24 VDC type: 0.12 A or less Note 7) Power supply voltage 12 to 15 VDC type: 0.18 A or less	
Input signal Note 7)	Current type Note 2)	4 to 20 mA DC, 0 to 20 mA DC (Sink type)	
	Voltage type	0 to 5 VDC, 0 to 10 VDC	
	Preset input	4 points (Negative common), 16 points (No common polarity)	
	Digital input	10 bit (Parallel)	
Input impedance	Current type	250 Ω or less Note 3)	
	Voltage type	Approx. 6.5 kΩ	
	Preset input	Power supply voltage 24 VDC type: Approx. 4.7 kΩ Power supply voltage 12 VDC type: Approx. 2.0 kΩ	
	Digital input	Approx. 4.7 kΩ	
Output signal (Monitor output) Note 4)	Analog output	1 to 5 VDC (Output impedance: Approx. 1 kΩ) 4 to 20 mA DC (Sink type) (Output impedance: 250 Ω or less) Output accuracy ± 6% F.S. or less	
	Switch output	NPN open collector output: Max. 30 V, 80 mA PNP open collector output: Max. 80 mA	
Linearity		± 1% F.S. or less	
Hysteresis		0.5% F.S. or less	
Repeatability		± 0.5% F.S. or less	
Sensitivity		0.2% F.S. or less	
Temperature characteristics		± 0.12% F.S./°C or less	
Output pressure display	Accuracy	± 2% F.S. ± 1 digit or less	
	Units	kPa Note 5) Minimum display: 1	
Ambient and fluid temperature		0 to 50°C (No condensation)	
Enclosure		IP65	
Weight Note 7, 8)		390 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.
When measuring ITV analog output from 1 to 5 VDC, if the load impedance is less than 100 kΩ, the analog 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 4) 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 5) Please contact SMC regarding indication with other units of pressure.
Note 6) The product characteristics are confined to the static state.
Pressure may fluctuate when air is consumed at the output side.
Note 7) Refer to the table below for communication specifications.
Note 8) Add 50 g for digital input type, 70 g for 16 points preset input type respectively.

Piping/Wiring Diagram

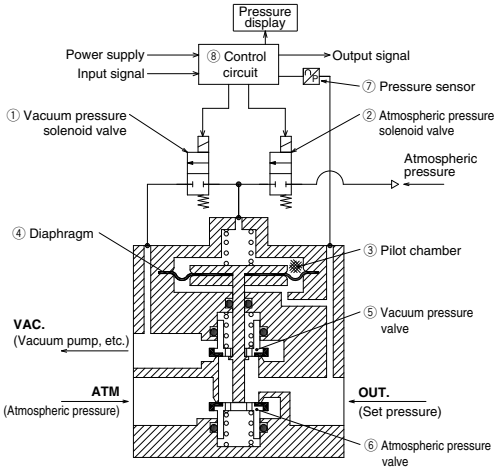


Communication Specifications (CC, DE, PR, RC)

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	Volume1 (Edition3.8), Volume3 (Edition1.5)	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
Electric insulation Note 4)	Insulation	Insulation	Insulation	Non-insulation
Terminating resistor	Built into the product (Switch setting)	Not built into the product	Built into the product (Switch setting)	—
Current consumption	0.16 A or less	0.14 A or less	0.16 A or less	0.12 A or less
Weight ITV2090	470	460	490	460

Note 1) Note that version information is subject to change.
Note 2) Configuration files can be downloaded from the operation manual page on 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.
Note 4) The insulation between the electrical signal of the communication system and ITV power supply.

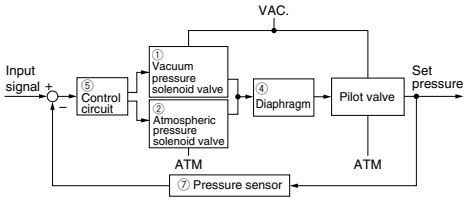
Working Principle



Working Principle

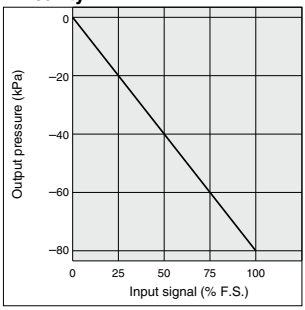
When the input signal increases, the vacuum pressure solenoid valve ① turns ON, and the atmospheric pressure solenoid valve ② turns OFF. Because of this, VAC. and the pilot chamber ③ are connected, the pressure in the pilot chamber ③ becomes negative and acts on the top of the diaphragm ④.
As a result,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

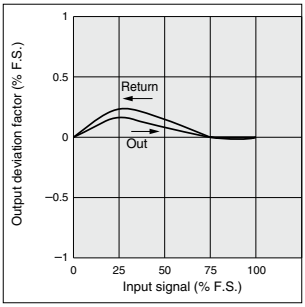


Series ITV209□

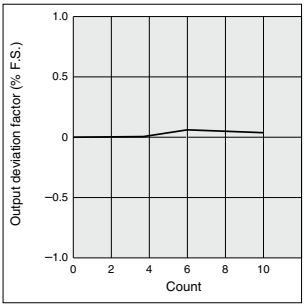
Linearity



Hysteresis

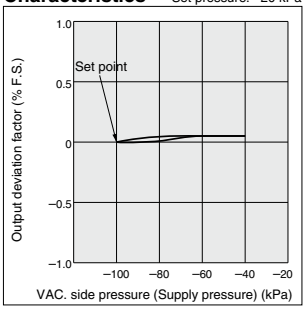


Repeatability



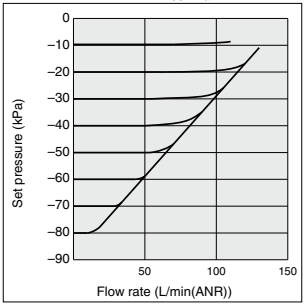
Pressure Characteristics

Set pressure: –20 kPa



Flow Characteristics

Supply vacuum pressure: –100 kPa



Flow characteristics measurement conditions

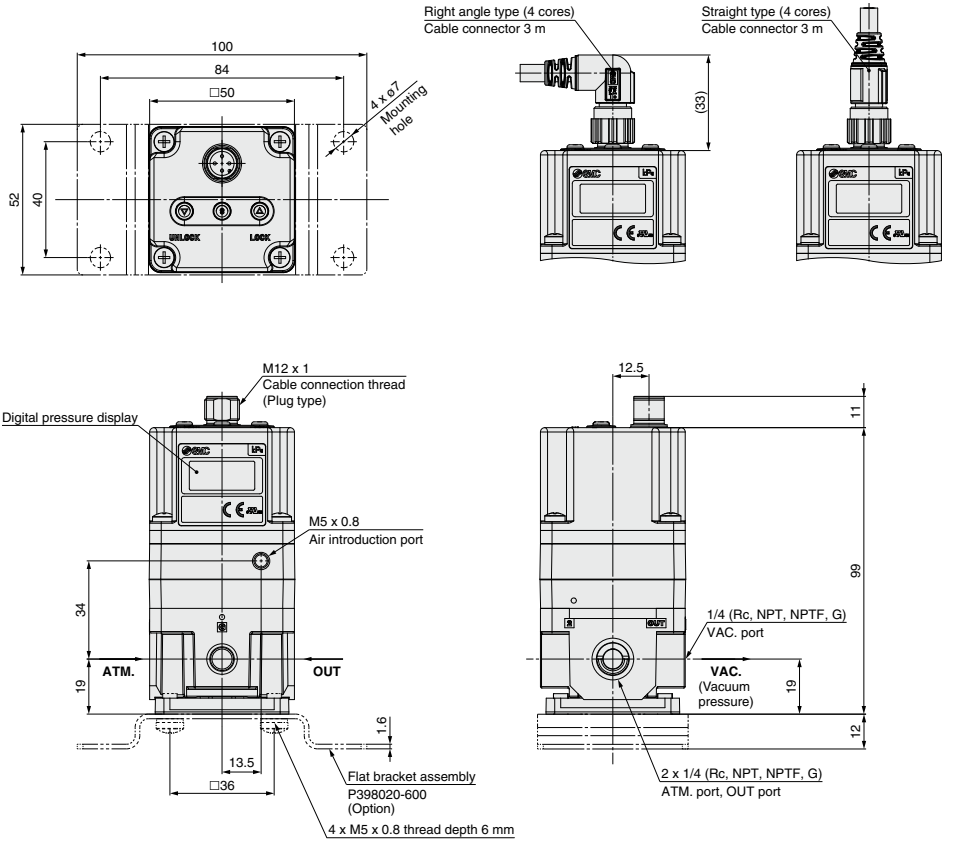
- Exhaust flow rate of the vacuum pump used for measurement: 500 L/min (ANR)
- Inlet vacuum pressure: –100 kPa (When outlet flow rate is 0 L/min (ANR))
- Maximum flow rate: 132 L/min (ANR) (With inlet vacuum pressure at –39 kPa)

Dimensions

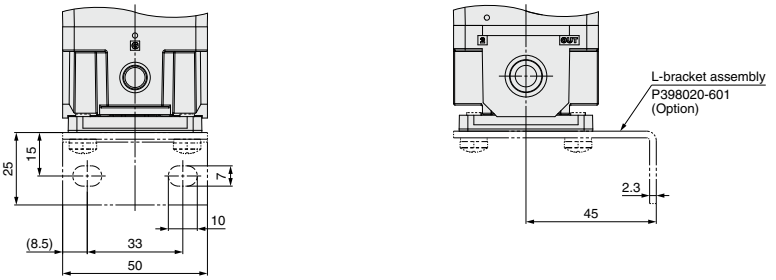
ITV209□

Flat bracket

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

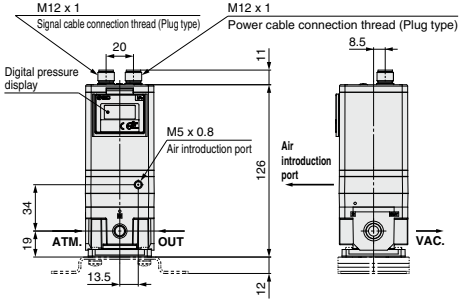


L-bracket

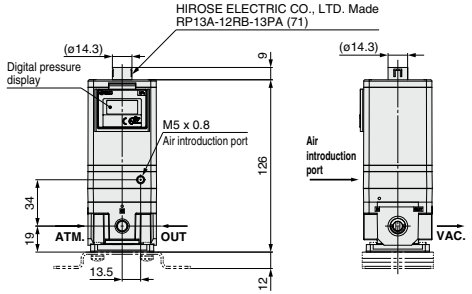


Dimensions (16 points preset input, 10 bit digital input, CC-Link, DeviceNet™, PROFIBUS DP and RS-232C)

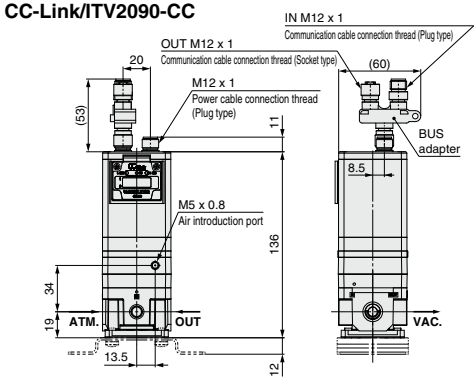
16 points preset input



10 bit digital input

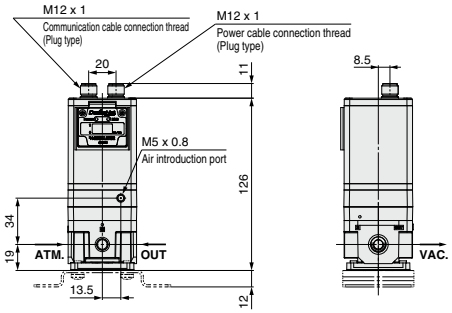


CC-Link/ITV2090-CC



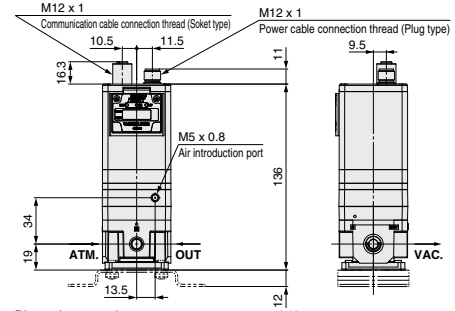
∗ Dimensions not shown are same as on page 846.

DeviceNet™/ITV2090-DE



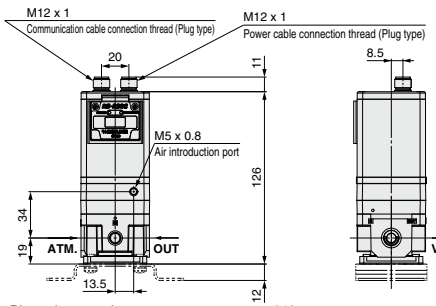
∗ Dimensions not shown are same as on page 846.

PROFIBUS DP/ITV2090-PR



∗ Dimensions not shown are same as on page 846.

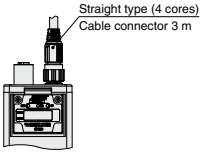
RS-232C/ITV2090-RC

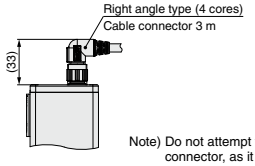


∗ Dimensions not shown are same as on page 846.

With power cable connector

∗ **ITV2090-** 52 53 CC DE PR RC **common dimensions**





Note) Order communication cable (other than 16 points, RS-232C) separately. (Refer to page 814.)

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

Accessories (Option)/Part No.

[Bracket]

Description	Part No.
Flat bracket assembly (including mounting screws)	P398020-600
L-bracket assembly (including mounting screws)	P398020-601

[Cable connector]

Applicable model	Description		Part No.
Current type Voltage type 4 points preset input	**Cable connector (4 cores)**	**Straight type 3 m**	P398020-500-3
		Right angle type 3 m	P398020-501-3
16 points preset input	**Power cable (4 cores)**	**Straight type 3 m**	P398020-500-3
		Right angle type 3 m	P398020-501-3
	Signal cable (5 cores)	**Straight type 3 m**	P398020-502-3
		Right angle type 3 m	P398020-503-3
10 bit digital input	**Cable connector (13 cores)**	**Straight type 3 m**	INI-398-0-59
CC-Link PROFIBUS DP DeviceNet™	**Power cable (4 cores)**	**Straight type 3 m**	P398020-500-3
		Right angle type 3 m	P398020-501-3
RS-232C	**Power cable (4 cores)**	**Straight type 3 m**	P398020-500-3
		Right angle type 3 m	P398020-501-3
	Communication cables connector (5 cores)	**Straight type 3 m**	P398020-502-3
		Right angle type 3 m	P398020-503-3

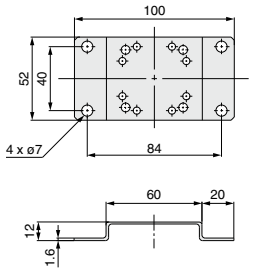
Note 1) For the 10-bit digital type, there is no right angle type cable connector.
Note 2) Even when "with cable connector" is selected the communication cable is not included in the communication model (CC, DE, PR). Please order separately.

[Bus adapter]

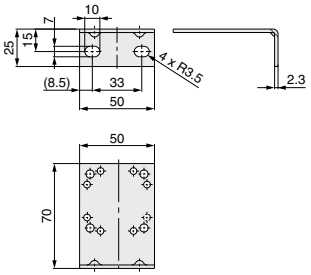
Applicable model	Description	Part No.
CC-Link	**Bus adapter (Bus adapter supplied with the product.)**	EX9-ACY00-MJ

Dimensions

Flat bracket



L-bracket



Model	Bracket tightening torque
ITV1000	0.76 ± 0.05N·m
ITV2000/3000	1.5 ± 0.05N·m

Series ITV0000/1000/2000/3000
Specific Product Precautions 1

Be sure to read before handling. Refer to front matter 43 for Safety Instructions and pages 365 to 369 for Common Precautions.

Series ITV0000/009□ Precautions

Air Supply

⚠ Caution

1. **Install an air filter near this product on the supply side. Select a filtration degree of 5 μm or less.**
2. **Compressed air containing large amounts of drainage can cause malfunction of this product and other pneumatic equipment. As a countermeasure, install an aftercooler, air dryer or Drain Catch, etc.**
3. **If large amounts of carbon dust are generated by the compressor, it can accumulate inside this product and cause malfunction.**

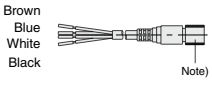
   For details on the above compressed air quality, refer to SMC's "Air Preparation Systems".

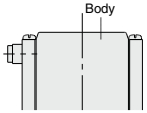
Wiring

⚠ 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.

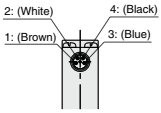
Further, use DC power with sufficient capacity and a low ripple.





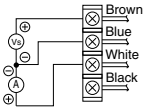
Terminal No.	1	2	3	4
Lead wire color	Brown	White	Blue	Black
Wiring	Power	Signal	COM	Monitor

Note) A right angle type cable is also available. The entry direction for the right angle type connector is to downwards (SUP port side).
Never turn the connector as it is not designed to turn. Using force to turn the connector will damage the connector coupling.



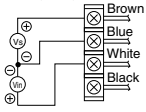
Wiring Diagrams

Current signal type



Vs: Power Supply 24 VDC ±10%
12 to 15 VDC
A : Input signals 4 to 20 mA DC
0 to 20 mA DC

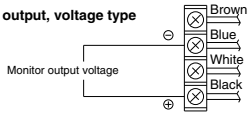
Voltage signal type



Vs : Power Supply 24 VDC ±10%
12 to 15 VDC
Vin: Input signals 0 to 5 VDC
0 to 10 VDC

Monitor output wiring diagram

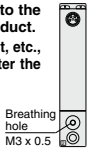
Analog output, voltage type



Handling

⚠ Caution

1. **Do not use a lubricator on the supply side of this product, as this can cause malfunction. When lubrication of terminal equipment is necessary, connect a lubricator on the output side of this equipment.**
2. **If electric power is shut off while pressure is being applied, pressure will be retained on the output side.**
   However, this output pressure is held only temporarily and is not guaranteed. If exhausting of this pressure is desired, shut off the power after reducing the set pressure, and discharge the air using a residual pressure exhaust valve, etc.
3. **If power to this product is cut off due to a power failure, etc. when it is in a controlled state, output pressure will be retained temporarily. Handle carefully when operating with output pressure released to the atmosphere, as air will continue to flow out.**
4. **If supply pressure to this product is interrupted while the power is still on, the internal solenoid valve will continue to operate and a humming noise may be generated.**
   Since the life of the product may be shortened, shut off the power supply also when supply pressure is shut off.
5. **This product is adjusted for each specification at the time of shipment from the factory. Avoid careless disassembly or removal of parts, as this can lead to malfunction.**
6. **The optional cable connector is a 4 wire type. When the monitor output (analog output or switch output) is not being used, keep it from touching the other wires as this can cause malfunction.**
7. **Please note that the right angle cable does not rotate and is limited to only one entry direction.**
8. **Take the following steps to avoid malfunction due to noise.**
   1) Remove power supply noise during operation by installing a line filter, etc. in the AC power line.
   2) For avoiding the influence of noise or static electricity, install this product and its wiring as far as possible from strong electric fields such as those of motors and power lines, etc.
   3) Be sure to implement protective measures against load surge for induction loads (solenoid valves, relays, etc.).
9. **The product characteristics are confined to the static state. When air is consumed on the output side, and especially used in the system with large leakage, pressure cannot approach the set pressure and the service life is drastically shortened with a humming noise of the solenoid valve.**
10. **For details on the handling of this product, refer to the operation manual which is included with the product.**
11. **In locations where the body is exposed to water, dust, etc., there is a possibility that moisture or dust could enter the body through the breathing hole.**
    Mount a fitting and tube (M-3AU-3 fitting and TIU01m-mm tube recommended) onto the breathing hole and run the tube to a location not exposed to moisture or dust, etc.



12. **If this product will be used in a sealed environment, such as inside an inspection box, a ventilation fan should be installed to ensure adequate ventilation as this product can generate heat in some operating conditions.**
    When the power is turned on, a noise may be generated as a means of checking the operating condition of the solenoid valve. This noise is normal and does not indicate a fault.
13. **Each product needs to be powered by one power supply unit.**
    The wiring of this product has the same common between the GND for power and the signals; there is a possibility that a wrong current occurs and prevents a proper operation if one power supply unit controls multiple electro-pneumatic regulators.
14. **This product does not have a shut-off valve function. If air pressure is supplied without electric power being applied, output pressure may increase to the pressure equivalent of the supply pressure. Operate the system to shut off the supply pressure when not operating the product.**

Series ITV0000/1000/2000/3000
Specific Product Precautions 2

Be sure to read before handling. Refer to front matter 43 for Safety Instructions and pages 365 to 369 for Common Precautions.

Series ITV1000/2000/3000/209□ Precautions

Piping

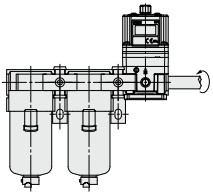
⚠Warning

1. Screw piping together with the recommended proper torque while holding the side that has female threads.

Looseness or faulty sealing will occur if tightening torque is insufficient, while thread damage will result if the torque is excessive. Furthermore, if the side with the female threads is not held while tightening, excessive force will be applied directly to piping brackets, etc. causing damage or other problems.

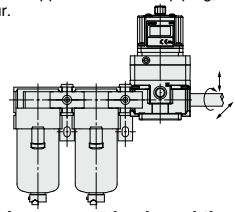
Recommended proper torque: N·m

Connection thread	1/8	1/4	3/8	1/2
Torque	3 to 5	8 to 12	15 to 20	20 to 25



2. Do not allow twisting or bending moment to be applied other than the weight of the equipment itself.

Provide separate support for external piping, as damage may otherwise occur.



3. Since excessive moment loads and the propagation of vibrations, etc. can easily result from inflexible piping made of materials such as steel, avoid these problems by using flexible tubing for intermediate connections.

⚠Caution

1. Preparation before piping

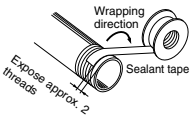
Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

If chips, sealing material or other debris enter into this product, the solenoid valve may buzz, or the outlet pressure may not be output normally.

2. Wrapping of sealant tape

When screwing together pipes and fittings, etc., be certain that chips from the pipe threads and sealing material do not get inside the piping.

Also, when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



Operating Environment

⚠Warning

1. Do not operate in locations having an atmosphere of corrosive gases, chemicals, sea water, or where there will be contact with the same.

2. Do not operate in locations where vibration or impact occurs.

⚠Caution

1. In locations where the body is exposed to water, steam, dust, etc., there is a possibility that moisture or dust could enter the body through the EXH (solenoid) ports, thereby causing problems.

2. To overcome this, simply install tubing to each port, using the fittings, and extend the tubing so that the other end is at a location where no water splash, etc. occurs. Make sure not to bend, or block the I.D. of the tubing as this will have a detrimental affect on the pressure control.

3. Do not operate in locations where vibration or impact occurs.

4. In locations which receive direct sunlight, provide a protective cover, etc.

5. In locations near heat sources, block off any radiated heat.

6. In locations where there is contact with spatter from water, oil or solder etc., implement suitable protective measures.

Air Supply

⚠Warning

1. Type of fluids

Please consult with SMC when using the product in applications other than compressed air.

2. Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause malfunction.

⚠Caution

1. Install an air filter near this product on the supply side. Select a filtration degree of 5 μm or less.

2. Compressed air containing large amounts of drainage can cause malfunction of this product and other pneumatic equipment. As a countermeasure, install an aftercooler, air dryer or Drain Catch, etc.

3. If large amounts of carbon dust are generated by the compressor, it can accumulate inside this product and cause malfunction. For details on the above compressed air quality, refer to SMC's "Air Preparation Systems".

Series ITV0000/1000/2000/3000
Specific Product Precautions 3

Be sure to read before handling. Refer to front matter 43 for Safety Instructions and pages 365 to 369 for Common Precautions.

Series ITV1000/2000/3000/209□ Precautions

Handling

⚠ Caution

1. Do not use a lubricator on the supply side of this product, as this can cause malfunction. When lubrication of terminal equipment is necessary, connect a lubricator on the output side of this equipment.

2. If electric power is shut off while pressure is being applied, pressure will be retained on the output side. However, this output pressure is held only temporarily and is not guaranteed. If exhausting of this pressure is desired, shut off the power after reducing the set pressure, and discharge the air using a residual pressure exhaust valve, etc.

3. If power to this product is cut off due to a power failure, etc. when it is in a controlled state, output pressure will be retained temporarily. Handle carefully when operating with output pressure released to the atmosphere, as air will continue to flow out.

4. If supply pressure to this product is interrupted while the power is still on, the internal solenoid valve will continue to operate and a humming noise may be generated. Since the life of the product may be shortened, shut off the power supply also when supply pressure is shut off.

5. The setting side pressure cannot be completely released from this product in the range below 0.005 MPa (or –1.3 kPa for Vacuum models). In cases where the pressure needs to be reduced completely to 0 MPa, install a 3 port valve, etc. on the setting side to discharge the residual pressure.

6. This product is adjusted for each specification at the time of shipment from the factory. Avoid careless disassembly or removal of parts, as this can lead to malfunction.

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

8. When connecting the cable to this product, turn the lock ring of the cable. If a portion other than the lock ring of the cable is turned, it may damage the connector on the body. Turn the lock ring by hand without using a tool.

9. The right angle cable does not rotate and is limited to only one entry direction. If the right angle cable is rotated forcibly, the cable may be broken or damaged, or may damage the connector on the body.

10. Take the following steps to avoid malfunction due to noise.

1) Remove power supply noise during operation by installing a line filter, etc. in the AC power line.
2) For avoiding the influence of noise or static electricity, install this product and its wiring as far as possible from strong electric fields such as those of motors and power lines, etc.
3) Be sure to implement protective measures against load surge for induction loads (solenoid valves, relays, etc.).

11. Due to the large volume of the output side, a loud exhaust noise will be produced when being used for the purpose of a relief function. Therefore, install a silencer (SMC Series AN20 or AN40) on the exhaust port (EXH port). The port sizes are Rc 1/8, Rc 1/4 and Rc 1/2.

12. Specifications on page 815 and 844 is in case of static environment. Pressure may fluctuate when air is consumed at the output side.

Handling

⚠ Caution

13. For details on the handling of this product, refer to the operation manual which is included with the product.

14. This product does not have a shut-off valve function. If air pressure is supplied without electric power being applied, output pressure may increase to the pressure equivalent of the supply pressure. Operate the system to shut off the supply pressure when not operating the product.

15. The solenoid valves built into this product are consumables. Perform periodic maintenance in environments where the solenoid valves are operated at a high frequency. The parts can be replaced with a solenoid valve assembly. Please contact SMC for the part number.

Design and Selection

⚠ Caution

1. Use the following UL approved products for DC power supply combinations.

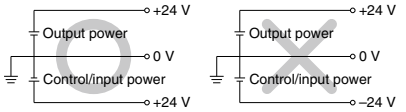
(1) Limited voltage current circuit in accordance with UL 508.
A circuit in which power is supplied by the secondary coil of a transformer that meets the following conditions.
- Maximum voltage (with no load):
  30 Vrms (42.4 V peak) or less
- Maximum current:
  (1) 8 A or less (including when short circuited)
  (2) limited by circuit protector (such as fuse) with the following ratings.

No load voltage (V peak)	Max. current rating
0 to 20 [V]	5.0
Over 20 and 30 or less [V]	$\frac{100}{\text{Peak voltage}}$

(2) A circuit (class 2 circuit) with maximum 30 Vrms (42.4 V peak) or less, and a power supply consisting of a class 2 power supply unit confirming to UL1310, or a class 2 transformer confirming to UL1585.

2. Operate these products only within the specified voltage.
Using voltages beyond the specified levels could cause faults or malfunctions.

3. Use 0 V as the baseline for the power supplied to the unit for output, control and input.



4. Each product needs to be powered by one power supply unit.
The wiring of this product has the same common between the GND for power and the signals; there is a possibility that a wrong current occurs and prevents a proper operation if one power supply unit controls multiple electro-pneumatic regulators.

5. Consult SMC for the usage when the downstream side is released to atmosphere.
This product is a pressure controller. The downstream side being released to atmosphere makes the inlet valve full open, allowing a large amount of atmosphere flow into the body. Consult SMC for the appropriate usage when you use the product under such condition since the product may not meet the specification or the life of the product may be shortened.

Series ITV0000/1000/2000/3000
Specific Product Precautions 4

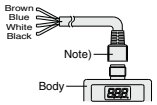
Be sure to read before handling. Refer to front matter 43 for Safety Instructions and pages 365 to 369 for Common Precautions.

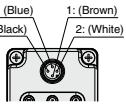
Series ITV1000/2000/3000/209□ Precautions

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.



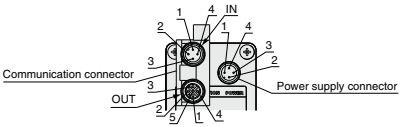


Current Signal Type
Voltage Signal Type

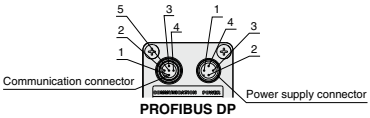
1	Brown	Power supply
2	White	Input signal
3	Blue	GND (COMMON)
4	Black	Monitor output

Preset Input Type

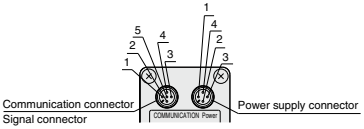
1	Brown	Power supply
2	White	Input signal 1
3	Blue	GND (COMMON)
4	Black	Input signal 2



CC-Link



PROFIBUS DP



DeviceNet™, RS-232C, 16 points preset

	IN/OUT communication connector				Signal connector
Pin No.	CC-Link	DeviceNet™	PROFIBUS DP	RS-232C	16 points preset
1	SLD [–]	DRAIN [–]	No connection	No connection	Input signal 1 [Brown]
2	DB [White]	V+ [Red]	RxD/TxD-N [Green]	TxD [White]	Input signal 2 [White]
3	DG [Yellow]	V– [Black]	No connection	RxD [Blue]	Input signal 3 [Blue]
4	DA [Blue]	CAN_H [White]	RxD/TxD-P [Red]	GND [Black]	Input signal 4 [Black]
5	No connection	CAN_L [Blue]	No connection	No connection	Common [Gray]

	Power supply connector				
Pin No.	CC-Link	DeviceNet™	PROFIBUS DP	RS-232C	16 points preset
1 [Brown]	Vcc	Vcc	Vcc	Vcc	Vcc
2 [White]	FG	Can not connect	FG	No connection	No connection
3 [Blue]	GND	GND	GND	GND	GND
4 [Black]	No connection	Can not connect	No connection	FG	Monitor output

Note 1) The indicated wire colors are when a cable connector made by SMC is used.
Note 2) The cable is also available in a right angle type. (Communication cable: straight type only)
A right angle type connector is attached facing left (towards the SUP port). On communication models, the connector faces backwards (towards the EXH port). Do not attempt to rotate, as the connector does not turn.

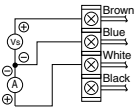
■ **Trademark Information**
DeviceNet™ is a trademark of ODVA.

Knock-down connectors * Order separately.

Application	CC-Link compatibility		DeviceNet™ compatibility			PROFIBUS DP compatibility		
Part number	Plug	Socket	Plug	Socket	Terminal Plug	Plug	Socket	Terminal Plug
	PCA-1557617	PCA-1557620	PCA-1557659	PCA-1557662	PCA-1557675	PCA-1557701	PCA-1557714	PCA-1557727

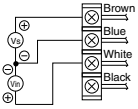
Wiring diagram

Current signal type



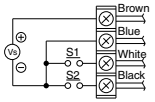
Vs : Power supply 24 VDC
12 to 15 VDC
A : Input signal 4 to 20 mA DC
0 to 20 mA DC

Voltage signal type



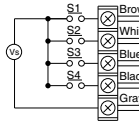
Vs : Power supply 24 VDC
12 to 15 VDC
Vin: Input signal 0 to 5 VDC
0 to 10 VDC

4 points preset input type



Vs : Power supply 24 VDC
12 to 15 VDC
(Negative common)

16 points preset input type



Vs : Power supply 24 VDC (No polarity)

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

S1	OFF	ON	OFF	ON	OFF		ON	OFF	ON
S2	OFF	OFF	ON	ON	OFF		OFF	ON	ON
S3	OFF	OFF	OFF	OFF	ON	···	ON	ON	ON
S4	OFF	OFF	OFF	OFF	OFF		ON	ON	ON
Preset pressure	P01	P02	P03	P04	P05		P14	P15	P16

* For safety reasons, it is recommended that one of the preset pressures be set to 0 MPa.
* Preset pressures are set based on the minimum unit for output display.

MPa	kgf/cm²	bar	psi	kPa
0.001	0.01	0.01	0.1	1

· Note that this is 1 psi for 130 psi types.

10 bit digital input type

Wire Color	Signal name
Pink-Black 2	Power supply (24 VDC)
Green-Black 2	Power supply (GND)
Blue	Signal Common (No Polarity)
Blue-Black 2	MSB 10 bit
Gray-Black 1	9 bit
Orange-Black 1	8 bit
Green-Black 1	7 bit
Pink-Black 1	6 bit
Blue-Black 1	5 bit
Gray	4 bit
Orange	3 bit
Green	2 bit
Pink	LSB 1 bit

Note) The wire color is shown for when an option cable is used.

Series ITV0000/1000/2000/3000
Specific Product Precautions 5

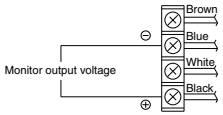
Be sure to read before handling. Refer to front matter 43 for Safety Instructions and pages 365 to 369 for Common Precautions.

Series ITV1000/2000/3000/209□ Precautions

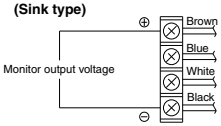
Wiring

Monitor output wiring diagram

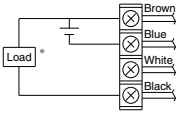
Analog output: Voltage type



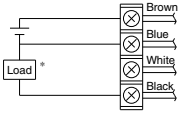
Analog output: Current type (Sink type)



Switch output: NPN type



Switch output: PNP type



* When 80 mA DC or more is applied, detecting device for overcurrentstarts activating and then emits an error signal. (Error number "5")

Set Pressure Range

The set pressure range, by unit of standard measured pressure, is shown in the table below.

Set pressure range, by unit of standard measured pressure

Unit	Set pressure range			
	ITV□01□	**ITV□03□**	**ITV□05□**	**ITV209□**
MPa	0.005 to 0.1	0.005 to 0.5	0.005 to 0.9	—
kgf/cm^2	0.05 to 1	0.05 to 5	0.05 to 9	—
bar	0.05 to 1	0.05 to 5	0.05 to 9	—
psi	0.7 to 15	0.7 to 70	0.7 to 130	—
kPa	5 to 100	5 to 500	5 to 900	–1.3 to –80

CE Marking

• Series ITV0000

Model	Ferrite core necessity	Recommended power supply cable
ITV0000-□□-Q	Unnecessary	M8-4DSX3MG4 (Straight type) P398000-501-2 (Right angle type)

Note) Recommended power supply cable length is 3 m. (P398000-501-2 is 2 m.) If any other length is desired, please consult with SMC.

• Series ITV1000/2000/3000

Model	Ferrite core necessity	Recommended power supply cable	
ITV□□-□□	Unnecessary	—	P398020-500-3 (Straight type) P398020-501-3 (Right angle type)
ITV□□-52□ **ITV□□-53□**		Power	P398020-500-3 (Straight type) P398020-501-3 (Right angle type)
		Signal	P398020-502-3 (Straight type) P398020-503-3 (Right angle type)
ITV□□-60□		—	INI-398-0-59 (Straight type)
ITV□□-CC□ Note 2) Note 3)		Power	P398020-500-3 (Straight type) P398020-501-3 (Right angle type)
		Communication	PCA-1567720 (Socket type) PCA-1567717 (Plug type)
ITV□□-DE□ Note 2) Note 4)		Power	P398020-500-3 (Straight type) P398020-501-3 (Right angle type)
		Communication	PCA-1557633 (Socket type) PCA-1557646 (Plug type)
ITV□□-PR□ Note 2) Note 4)		Power	P398020-500-3 (Straight type) P398020-501-3 (Right angle type)
		Communication	PCA-1557688 (Socket type) PCA-1557691 (Plug type)
ITV□□-RC□		Power	P398020-500-3 (Straight type) P398020-501-3 (Right angle type)
		Communication	P398020-502-3 (Straight type) P398020-503-3 (Right angle type)

Note 1) Recommended power supply cable length is 3 m. If any other length is desired, please consult with SMC.
Note 2) Even when the "with cable connector" type is selected, the communication connector is not included. Refer to the catalog [M8/M12 Connector] CAT.ES100-73 for the details of the communication cable.
Note 3) For CC-Link compatible products, a dedicated Bus adapter is included with the product.
Note 4) For DeviceNet™ compatible products, and PROFIBUS DP compatible products, a T-branch connector is not included with the product.

Series ITV0000/1000/2000/3000
Specific Product Precautions 6

Be sure to read before handling. Refer to front matter 43 for Safety Instructions and pages 365 to 369 for Common Precautions.

Series ITV009□/209□ 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) For avoiding the influence of noise or static electricity, install this product and its wiring as far as possible from strong electric fields such as those of motors and power lines, etc.
    3) Make sure to take protective measures against load surge for an induction load (solenoid valves, relays, etc.).
15. **Refer to the operation manual included with the product for details on its handling.**

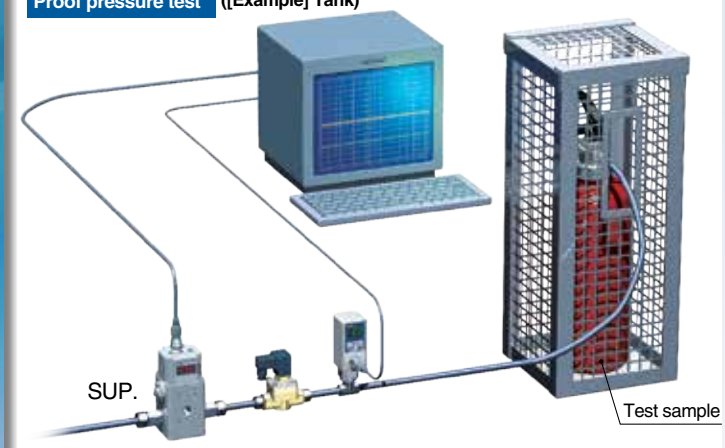
435 psi (3.0 MPa) Maximum Supply Pressure

High Pressure Electro-Pneumatic Regulator



Maximum supply pressure	435 psi (3.0 MPa)
Set pressure range	29 to 290 psi (0.2 to 2.0 MPa) Stepless control of air pressure up to 2.0 MPa
Stability	±1% F.S.* or less * The value is confined to the static state. Pressure may fluctuate when air is consumed at the output side.

Proof pressure test ([Example] Tank)



Power consumption	3 W or less
Maximum flow rate	106 scfm [3000 L/min (ANR)]* * Supply pressure: 435 psi (3.0 MPa), Set pressure: 145 psi (1.0 MPa)
Parts in contact with fluid	Fluorine grease
Pipe thread type	Rc, NPT, G
Weight	Approx. 630 g* * Without options
Digital pressure display	



Series ITVH

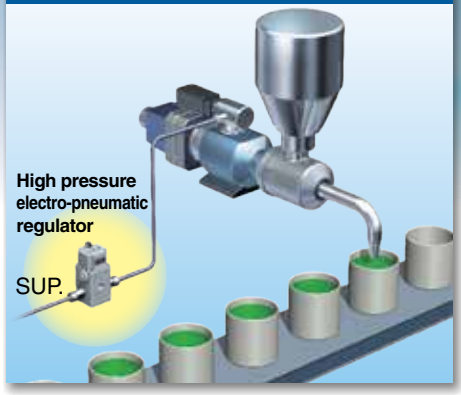
SMC

CAT.NAS60-23A

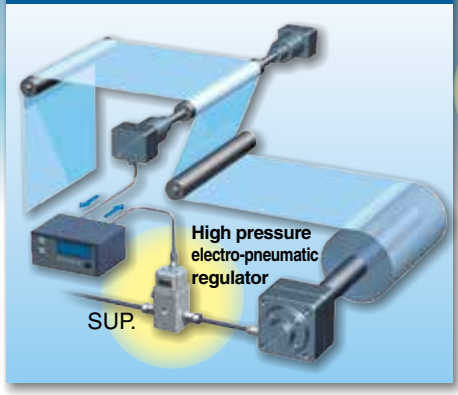
Linearity	±1% F.S. or less
Hysteresis	1% F.S. or less
Repeatability	±1% F.S. or less

Application Examples

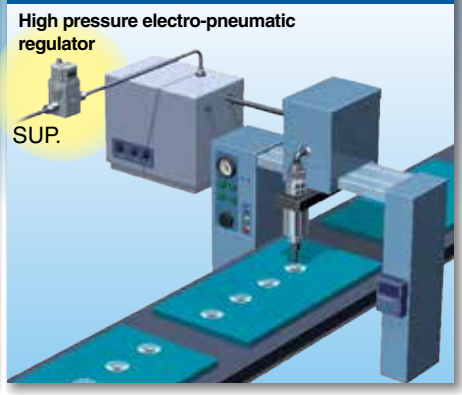
Discharge rate control



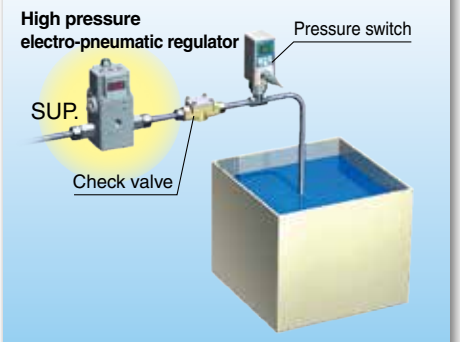
Tension control



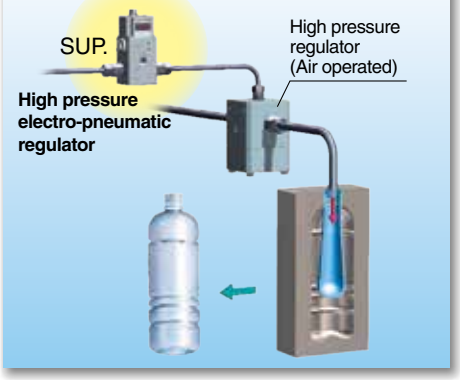
Pressure control for adhesive application



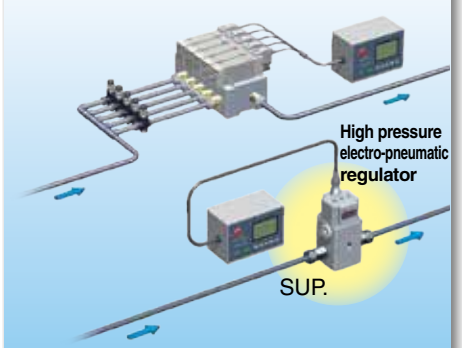
Leak tester



PET bottle molding machine
(for remote control of high pressure regulator)



Multi-stage control to analog control





Variation Map

Series	Model	Max. supply pressure (0.2 1.0 3.0 5.0)	Set pressure range (0.001 0.005 1.0 3.0 5.0)	Port size	Maximum flow rate	
435 psi (3.0 MPa) Maximum Supply Pressure High Pressure Electro-Pneumatic Regulator New Series ***ITVH*** 	**ITVH2020**	435 psi [3.0 MPa]	29 psi [0.2 MPa] – 290 psi [2.0 MPa]	1/4 3/8	**106 scfm** **[3000 L/min (ANR)]** Supply pressure: 435 psi (3.0 MPa) Set pressure: 145 psi (1.0 MPa)	
Compact Electro-Pneumatic Regulator Series ***ITV0000*** 	**ITV001□**	29 psi [0.2 MPa]	0.15 psi [0.001MPa] – 15 psi [0.1MPa]	Built-in One-touch fittings ø4 ø5/32	**0.21 scfm** **[6 L/min (ANR)]** Supply pressure: 145 psi (1.0 MPa) Set pressure: 87 psi (0.6 MPa)	For details, refer to **the WEB catalog** or **Best Pneumatics**  **Page 803**
	ITV003□	145 psi [1.0MPa]	0.15 psi [0.001MPa] – 73 psi [0.5MPa]			
	ITV005□	145 psi [1.0MPa]	0.15 psi [0.001MPa] – 131 psi [0.9MPa]			
Electro-Pneumatic Regulator Series ***ITV1000*** 	**ITV101□**	29 psi [0.2 MPa]	7.3 psi [0.005MPa] – 15 psi [0.1MPa]	1/8 1/4	**7.06 scfm** **[200 L/min (ANR)]** Supply pressure: 145 psi (1.0 MPa) Set pressure: 87 psi (0.6 MPa)	
	ITV103□	145 psi [1.0MPa]	7.3 psi [0.005MPa] – 73 psi [0.5MPa]			
	ITV105□	145 psi [1.0MPa]	7.3 psi [0.005MPa] – 131 psi [0.9MPa]			
Electro-Pneumatic Regulator Series ***ITV2000*** 	**ITV201□**	29 psi [0.2 MPa]	7.3 psi [0.005MPa] – 15psi [0.1MPa]	1/4 3/8	**53.0 scfm** **[1500 L/min (ANR)]** Supply pressure: 145 psi (1.0 MPa) Set pressure: 87 psi (0.6 MPa)	
	ITV203□	145 psi [1.0MPa]	7.3 psi [0.005MPa] – 73 psi [0.5MPa]			
	ITV205□	145 psi [1.0MPa]	7.3 psi [0.005MPa] – 131 psi [0.9MPa]			
Electro-Pneumatic Regulator Series ***ITV3000*** 	**ITV301□**	29 psi [0.2 MPa]	7.3 psi [0.005MPa] – 15 psi [0.1MPa]	1/4 3/8 1/2	**141 scfm** **[4000 L/min (ANR)]** Supply pressure: 145 psi (1.0 MPa) Set pressure: 87 psi (0.6 MPa)	
	ITV303□	145 psi [1.0MPa]	7.3 psi [0.005MPa] – 73 psi [0.5MPa]			
	ITV305□	145 psi [1.0MPa]	7.3 psi [0.005MPa] – 131 psi [0.9MPa]			
5.0 MPa Maximum Supply Pressure High Pressure Electro-Pneumatic Regulator Series ***ITVX*** 	**ITVX2030**	725 psi (5.0 MPa)	1.5 psi [0.01MPa] – 435 psi [3.0MPa]	3/8	**106 scfm** **[3000 L/min (ANR)]** Supply pressure: 725 psi (5.0 MPa) Set pressure: 435 psi (3.0 MPa)	For details, refer to **the WEB catalog** or **Best Pneumatics**  **Page 863**

∗ The outlet of the ITVX series is released to the atmosphere for blowing

435 psi (3.0 MPa) Maximum Supply Pressure High Pressure Electro-Pneumatic Regulator

Series ITVH2000

How to Order

ITVH2020-01□2□S□

Set pressure range

2	29 to 290psi (0.2 to 2.0 MPa)

Power supply voltage

0	24 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
40	4 points preset input type

Monitor output

Nil	None (Preset input only)
1	Analog output 1 to 5 VDC
2	Switch output/NPN output
3	Switch output/PNP output
4	Analog output 4 to 20 mA DC (Sink type)

Pipe thread type

Nil	Rc
N	NPT
F	G Note)

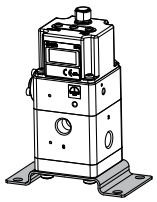
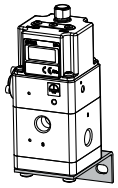
Note) Complies with ISO1179-1 (2007).

Port size

2	1/4
3	3/8

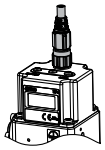
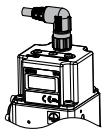
Note) EXH port: 1/4
Built-in regulator EXH port: M5
Solenoid valve EXH port: M5

Bracket*

Nil	Without bracket
B	Flat bracket 
C	L-bracket 

* Bracket is included.

Cable connector type

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

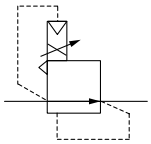
Pressure display unit

Nil	MPa
2 Note)	kgf/cm²
3	bar
4 Note)	psi

Note) Under Japan's new Measurement Act, this is only for overseas sales (SI units are to be used inside Japan).



Symbol



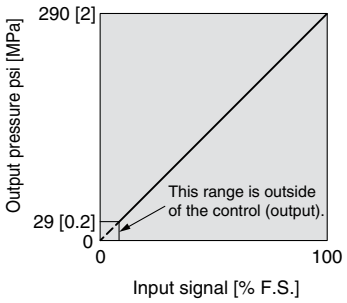


Fig. 1. Input/output characteristics chart

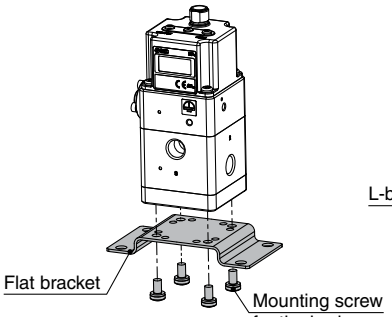
Standard Specifications

Model		ITVH2000
Minimum supply pressure		Whichever is higher: 73 psi (0.5 MPa) or the set pressure + 29 psi (0.2 MPa)
Maximum supply pressure		435 psi (3.0 MPa)
Set pressure range Note 1)		29 to 290 psi (0.2 to 2.0 MPa)
Power supply	**Voltage**	24 VDC ±10%
	Current consumption	0.12 A or less
Input signal	**Current type** Note 2)	4 to 20 mA DC, 0 to 20 mA DC (Sink type)
	Voltage type	0 to 5 VDC, 0 to 10 VDC
	Preset input type	4 points (Negative common)
Input impedance	**Current type**	500 Ω or less
	Voltage type	6.0 to 6.5 kΩ (at 77°F [25°C])
	Preset input type	Approx. 4.7 kΩ
Output signal (Monitor output) Note 3)	**Analog output**	1 to 5 VDC Output impedance: 1 kΩ or more Output accuracy: ±6% F.S. or less
		4 to 20 mA (Sink type) Output impedance: 250 Ω or less Output accuracy: ±6% F.S. or less
	Switch output	NPN open collector output: Max. 30 V, 80 mA Hysteresis: ±3% F.S. Self-diagnosis: ±5% F.S. or less
		PNP open collector output: Max. 80 mA Hysteresis: ±3% F.S. Self-diagnosis: ±5% F.S. or less
Linearity		±1% F.S. or less
Hysteresis		1% F.S. or less
Repeatability		±1% F.S. or less
Sensitivity		±1% F.S. or less
Temperature characteristics		±0.12% F.S. or less/°C
Output pressure display	**Accuracy**	±2% F.S. or less ±1 digit
	Minimum unit Note 4)	MPa: 0.01, kgf/cm^2: 0.1, bar: 0.1, psi: 1
Ambient and fluid temperature		32 to 122°F (0 to 50°C) (No condensation)
Weight		Approx. 630 g (without options)

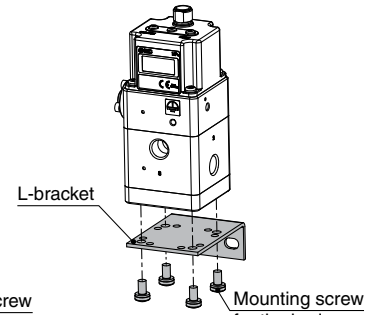
Note 1) Refer to Figure 1 for the relationship between set pressure and input signal.
Note 2) 2-wire type 4 to 20 mA is not available. Power supply voltage 24 VDC is required.
Note 3) Select either analog output or switch output. Further, when switch output is selected, select either NPN output or PNP output. When measuring analog output of 1 to 5 VDC with a load impedance less than 100 k Ω, the analog output may not obtain the output accuracy of ±6% F.S. or less.
Note 4) Adjustment of numerical values such as the zero/span adjustment is set based on the minimum units for output pressure display. Note that the unit cannot be changed.
Note 5) The above characteristics are confined to the static state. When air is consumed on the output side, the pressure may fluctuate.
Note 6) This product is not certified by Japan's High Pressure Gas Safety Act.

Accessories (Option)/Part No.

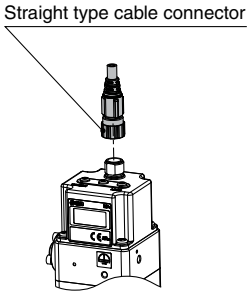
Description		Part no.
Flat bracket assembly (including mounting screws)		P398020-600
L-bracket assembly (including mounting screws)		P398020-601
Power cable connector	**Straight type 3 m**	P398020-500-3
	Right angle type 3 m	P398020-501-3



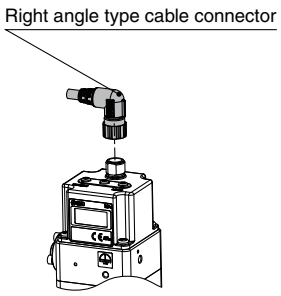
Flat bracket



L-bracket



Straight type cable connector

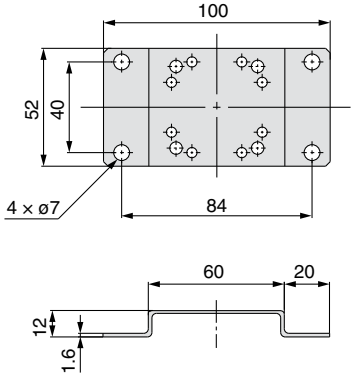


Right angle type cable connector

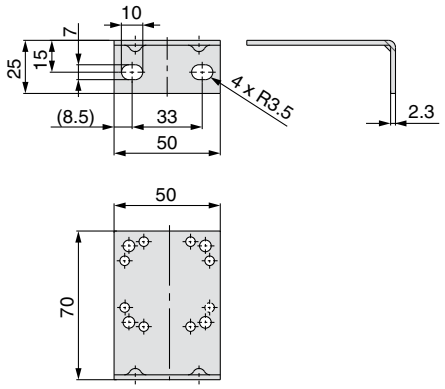
Dimensions

(mm)

Flat bracket



L-bracket



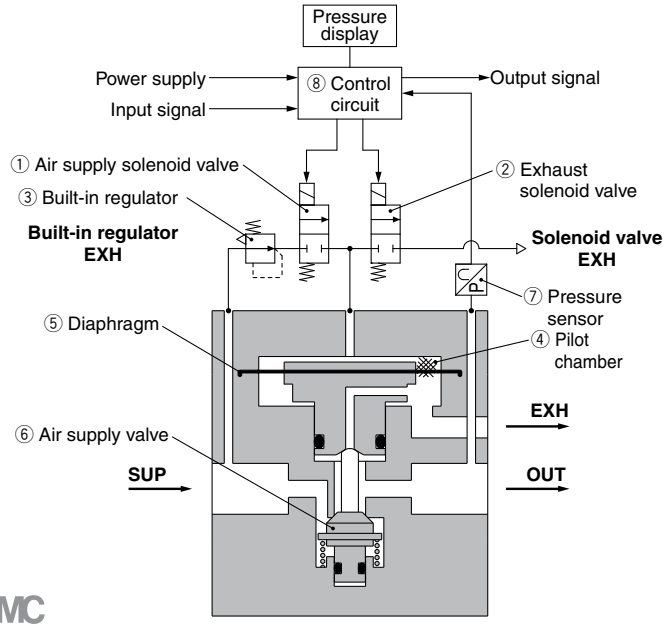
Working Principle

When the input signal rises, the **air supply solenoid valve** ① turns ON, and the **exhaust solenoid valve** ② turns OFF. Therefore, supply pressure regulated by a **built-in regulator** ③ passes through the **air supply solenoid valve** ① and is applied to the **pilot chamber** ④. The pressure in the **pilot chamber** ④ increases and operates on the upper surface of the **diaphragm** ⑤.

As a result, the **air supply valve** ⑥ linked to the **diaphragm** ⑤ opens, and a portion of the supply pressure becomes output pressure.

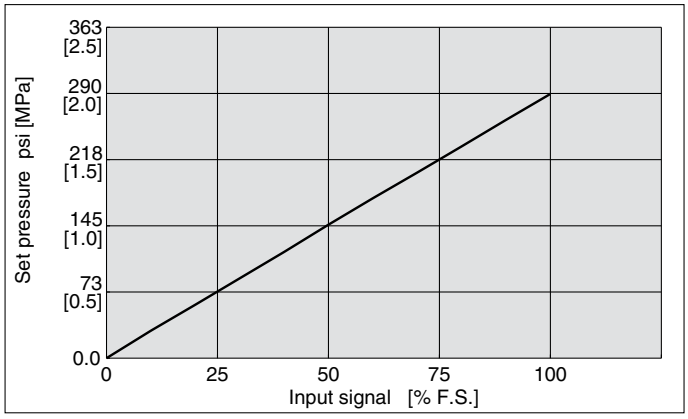
This output pressure feeds back to the **control circuit** ⑧ via the **pressure sensor** ⑦. Here, a correct operation functions until the output pressure is proportional to the input signal, making it possible to always obtain output pressure proportional to the input signal.

Working Principle Diagram

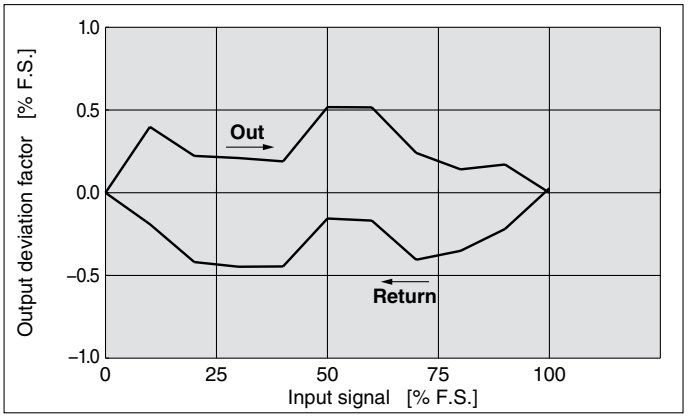


Series ITVH2000

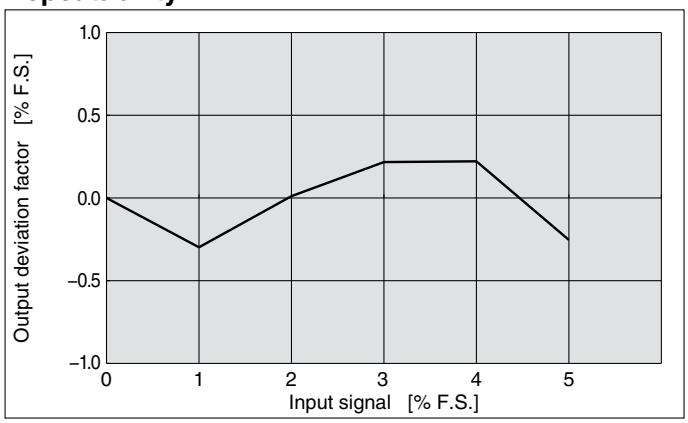
Linearity



Hysteresis

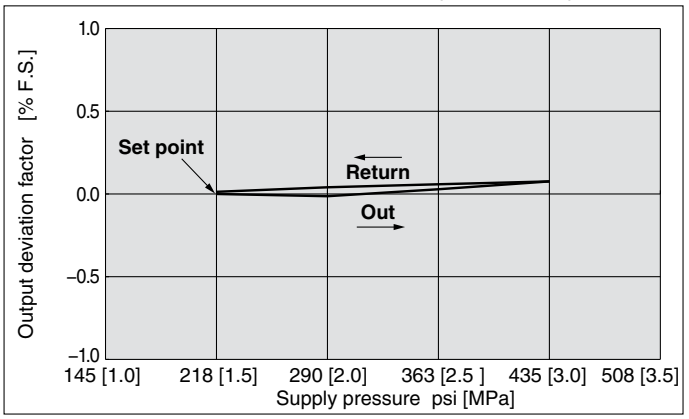


Repeatability



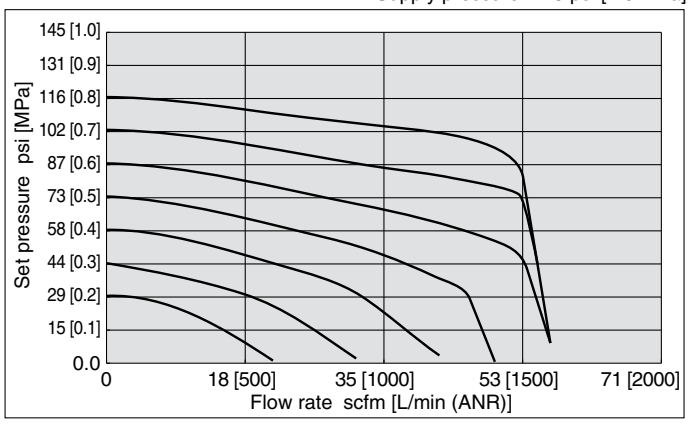
Pressure Characteristics

Set pressure: 145 psi [1.0 MPa]



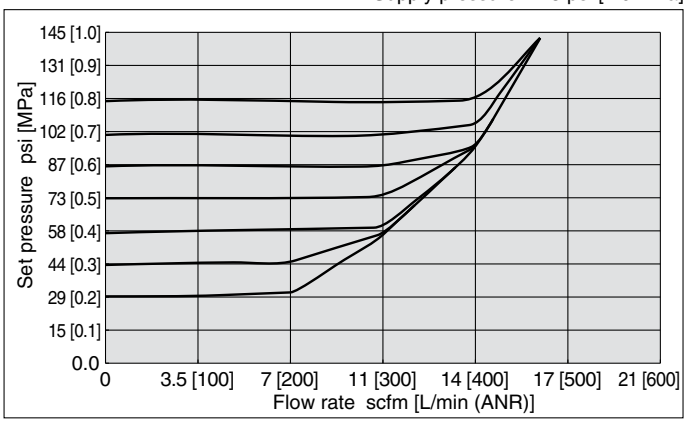
Flow-rate Characteristics

Supply pressure: 145 psi [1.0 MPa]



Relief Characteristics

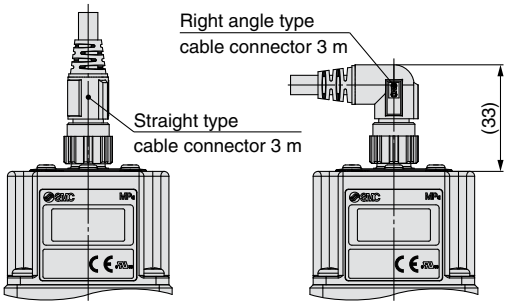
Supply pressure: 145 psi [1.0 MPa]



Dimensions

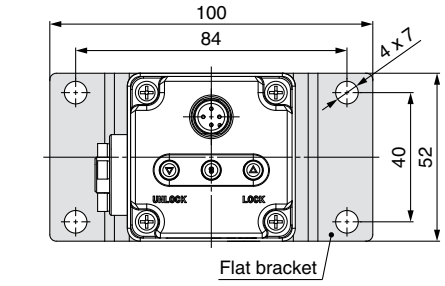
(mm)

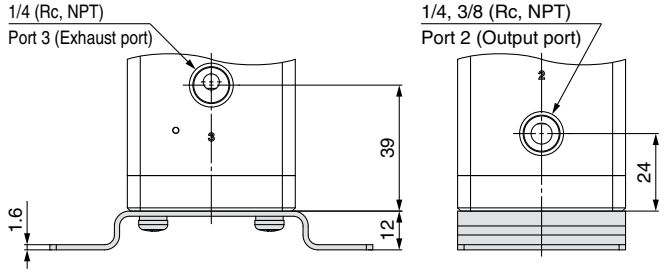
Do not turn the right angle type cable connector. It does not rotate and is limited to only one entry direction.



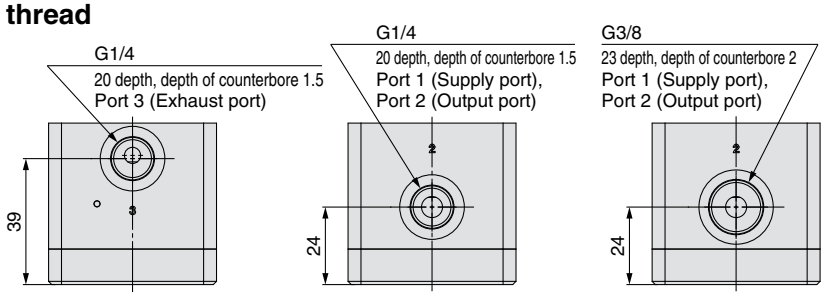
Do not block three EXH ports on this product.

With flat bracket

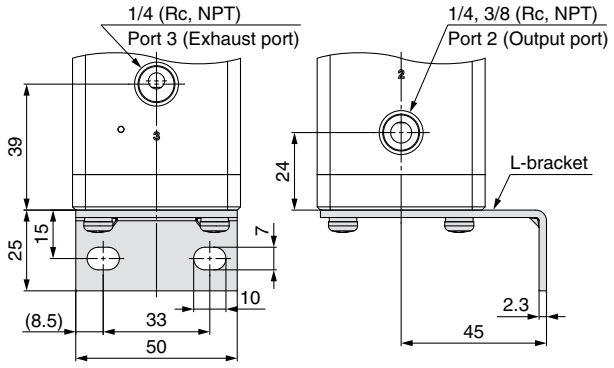




G thread



With L-bracket



SMC

Series ITVH2000
Specific Product Precautions 1

Be sure to read this before handling. Refer to the back cover for Safety Instructions.
For F.R.L. Precautions, refer to "Handling Precautions for SMC Products" and the Operation Manual on SMC website, http://www.smcworld.com

Piping

⚠ Warning

1. Screw piping together with the recommended proper torque while holding the side with the female threads.

Looseness or faulty sealing will occur if tightening torque is insufficient, while thread damage will result if the torque is excessive. Furthermore, if the side with the female threads is not held while tightening, excessive force will be applied directly to piping brackets etc., causing damage or other problems.

Connection thread	Recommended proper torque lbf·ft [N·m]
M5	1.1 to 1.5 (1.5 to 2)
1/4	5.9 to 8.9 (8 to 12)
3/8	11 to 15 (15 to 20)

2. Do not allow twisting or bending moment to be applied other than the weight of the equipment.

Provide separate support for external piping, as damage may otherwise occur.

3. Since excessive moment loads and the propagation of vibrations, etc. can easily result from inflexible piping made of materials such as steel, avoid these problems by using flexible tubing for intermediate connections.

4. Piping port indication

When connecting piping to a product, refer to the Operation Manual to avoid mistakes regarding the port.

Port 1: Supply port

Port 2: Output port

Port 3: Exhaust port

5. Exhaust port

Do not reduce the diameter of port 3 (the exhaust port), EXH port of solenoid valve, or EXH port of built-in regulator too much or block it. It will lead to an operation failure.

⚠ Caution

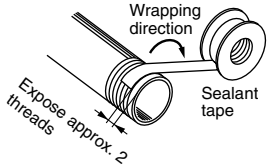
1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

2. Wrapping of sealant tape

When screwing together pipes and fittings, etc., be certain that chips from the pipe threads and sealing material do not get inside the piping.

Also, when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



Operating Environment

⚠ Warning

1. Do not operate in locations having an atmosphere of corrosive gases, chemicals, sea water, or where there will be contact with the same.

⚠ Caution

1. In locations where the body is exposed to water, steam, dust, etc., there is a possibility that moisture or dust could enter the body through the EXH port, solenoid valve EXH port and/or built-in regulator EXH port, thereby causing problems.

2. Do not operate in locations where vibration or impact occurs.

3. In locations which receive direct sunlight, provide a protective cover etc.

4. In locations near heat sources, block off any radiated heat.

5. Employ suitable protective measures in locations where there is contact with water droplets, oil or welding spatter, etc.

Fluid Supply

⚠ Warning

1. Compressed air or nitrogen can be used as a fluid.

2. Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt, or corrosive gases, etc., as this can cause damage or malfunction.

⚠ Caution

1. This product does not have a filtering function. Install an air filter on the supply side close to the product. Select an air filter with a filtration degree of 5 µm or finer.

2. Compressed air containing large amounts of drainage can cause a malfunction of this product and other pneumatic equipment. As a countermeasure, install an aftercooler, air dryer or water separator, etc.

3. If large amounts of carbon dust are generated by the compressor, it can accumulate inside this product and cause a malfunction (air leakage etc.).

For details on the above compressed air quality, refer to "Air Preparation Equipment Model Selection Guide" in the Best Pneumatics No. 5 catalog.

Series ITVH2000
Specific Product Precautions 2

Be sure to read this before handling. Refer to the back cover for Safety Instructions.
For F.R.L. Precautions, refer to "Handling Precautions for SMC Products" and the Operation Manual on SMC website, http://www.smcworld.com

Handling

⚠ Caution

1. Do not use a lubricator on the supply side of this product, as this can cause a malfunction.

2. If electric power is shut off while pressure is being applied, pressure will be retained on the output side.

However, this output pressure is held only temporarily and is not guaranteed. If exhausting of this pressure is desired, shut off the power after reducing the set pressure, and discharge the air using a residual pressure exhaust valve etc.

3. If power to this product is cut off due to a power failure etc. when it is in a controlled state, output pressure will be retained temporarily. Handle carefully when operating with output pressure released to the atmosphere, as air will continue to flow out.

4. If supply pressure to this product is interrupted while the power is still on, the internal solenoid valve will continue to operate and a humming noise may be generated. Since the life of the product may be shortened, shut off the power supply also when supply pressure is shut off.

5. Do not block three EXH ports on this product.

6. This product does not have a shutoff valve function. If air pressure is supplied without electric power being applied, output pressure may increase to the pressure equivalent of the supply pressure. Due to product construction, a very small amount of air is discharged from the exhaust port when output pressure is generated. Operate the system to shut off the supply pressure when not operating the product.

7. The product is adjusted to each specification at the time of shipment from the factory. Do not perform unnecessary disassembly or removal of parts as it will cause failure.

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

9. Do not turn the right angle type cable connector. It does not rotate and is limited to only one entry direction.

10. Take the following steps to avoid a malfunction due to noise.

1) Remove power supply noise during operation by installing a line filter etc. in the AC power line.

2) For avoiding the influence of noise or static electricity, install this product and its wiring as far as possible from strong electric fields such as those of motors and power lines, etc.

3) Be sure to implement protective measures against load surge for induction loads (solenoid valves, relays, etc.).

11. For details on the handling of this product, refer to the Operation Manual which is included with the product.

Design/Selection

⚠ Caution

1. The direct-current power supply to combine should be UL authorized power supply.

1) Limited voltage current circuit in accordance with UL508.

A circuit in which power is supplied by the secondary coil of a transformer that meets the following conditions.

- Maximum voltage (with no load):

30 [Vrms] (42.4 [V peak]) or less

- Maximum current:

1. 8 [A] or less (including when short circuited)
2. Limited by circuit protector (such as fuse) with the following ratings

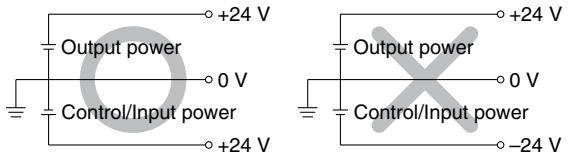
No load voltage [V peak]	Max. current rating [A]
0 to 20 [V]	5.0
Over 20 [V] to 30 [V]	$\frac{100}{\text{Peak voltage}}$

2) A circuit using max. 30 [Vrms] or less (42.4 [V peak]), which is powered by UL1310 or UL1585 compatible Class-2 power supply.

2. Operate these products only within the specified voltage.

Using voltages beyond the specified levels could cause faults or malfunctions.

3. Use 0 V as the baseline for the power supplied to this product for output, control and input.



4. Each product needs to be powered by one power supply unit.

The wiring of this product has the same common between the GND for power and the signals; there is a possibility that a wrong current occurs and prevents a proper operation if one power supply unit controls multiple electro-pneumatic regulators.

5. Please contact SMC for the usage when the downstream side is released to atmosphere.

This product is a pressure controller. The downstream side being released to atmosphere makes the inlet valve fully open, allowing a large amount of atmosphere flow into the body. Please contact SMC for the appropriate usage when you use the product under such condition since the product may not meet the specification or the life of the product may be shortened.

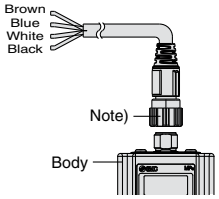
Series ITVH2000
Specific Product Precautions 3

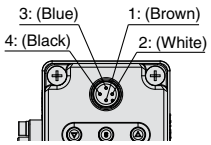
Be sure to read this before handling. Refer to the back cover for Safety Instructions.
For F.R.L. Precautions, refer to "Handling Precautions for SMC Products" and the Operation Manual on SMC website, http://www.smcworld.com

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.





Note) The cable is also available in a right angle type.
A right angle type connector is attached facing left (toward the SUP port). Do not attempt to rotate, as the connector does not turn.

Current Signal Type
Voltage Signal Type

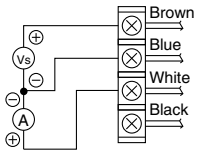
1	Brown	Power supply
2	White	Input signal
3	Blue	GND (COMMON)
4	Black	Monitor output

Preset Input Type

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

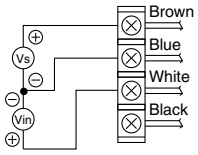
Wiring diagram

Current signal type



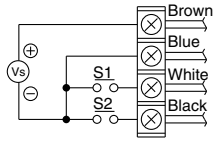
Vs: Power supply 24 VDC
A : Input signal 4 to 20 mA DC
0 to 20 mA DC

Voltage signal type



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

4 points preset input type



Vs: Power supply 24 VDC
(Negative common)

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

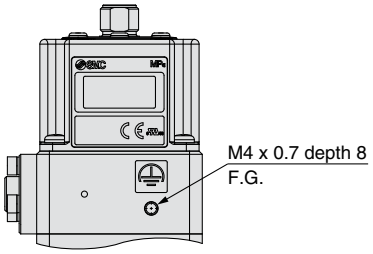
S1	OFF	ON	OFF	ON
S2	OFF	OFF	ON	ON
Preset pressure	P01	P02	P03	P04

∗ For safety reasons, it is recommended that one of the preset pressures be set to 0 MPa.
∗ Preset pressures are set based on the minimum unit for output display.

MPa	kgf/cm²	bar	psi
0.01	0.1	0.1	1

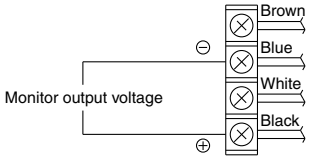
F.G. (Grounding)

Ground the frame ground (F.G.) terminal at the front of the main body. If the F.G. terminal port is not used, this product may not operate properly due to the noise.

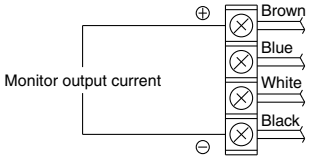


Monitor output wiring diagram

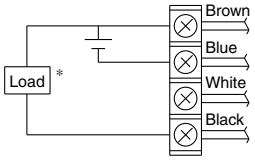
Analog output: Voltage type



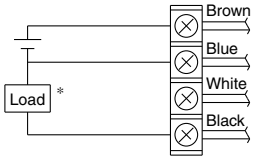
Analog output: Current type (Sink type)



Switch output: NPN type



Switch output: PNP type



∗ When 80 mA DC or more is applied, detecting device for over current starts activating and then emits an error signal. (Error number "5")

⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

⚠ Caution: **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

⚠ Warning: **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ Danger : **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/ equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

⚠ Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠ Caution

SMC products are not intended for use as instruments for legal metrology.
Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

⚠ Safety Instructions | Be sure to read "Handling Precautions for SMC Products" (M-E03-3) before using.

SMC Corporation of America
10100 SMC Blvd., Noblesville, IN 46060
www.smcusa.com

SMC Pneumatics (Canada) Ltd.
www.smcpneumatics.ca

(800) SMC.SMC1 (762-7621)
e-mail: **sales@smcusa.com**
International inquiries: **www.smcworld.com**

© 2015 SMC Corporation of America, All Rights Reserved.
All reasonable efforts to ensure the accuracy of the information detailed in this catalog were made at the time of publishing.
However, SMC can in no way warrant the information herein contained as specifications are subject to change without notice.

E/P Pressure Regulator

Manufacturing Pneumatics Worldwide

RoHS Compliant



Electro-Pneumatic Regulator

Electronic Vacuum Regulator

How to Order

ITV 2030 - SEN - N 2 - DUQ00833 - X26

Body Size

1010	2010	3010
1030	2030	3030
1050	2050	3050
	2090	

Fieldbus

SEN	EtherNet/IP
SEC	EtherCat
SPN	Profinet
SMB	ModBus/TCP
SPL	PowerLink

Thread Type

Nil	Rc
N	NPT

Port

1	1/8" (1000)
2	1/4" (1000, 2000)
3	3/8" (2000, 3000)
4	1/2" (3000)

Made to Order

Nil	Standard Mounting
X26	Manifold Mounting *

* Note that -X26 is available only for 2010, 2030, and 2050 sizes.



- Ethernet/IP SHIPPING NOW
- PROFINET *
- EtherCAT*
- MODBUS TCP*

* Inquire for Availability

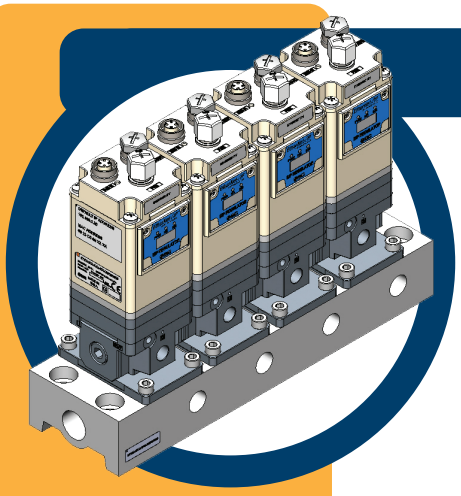


Model		1010 2010 3010	1030 2030 3030	1050 2050 3050	2090
Min. Supply Pressure (psi)		Set Pressure +14			-1.9
Max. supply pressure (psi)		29	145		-14.7
Set Pressure Range (psi)		0.7 to 14.5	0.7 to 72.5	0.7 to 130.5	-0.2 to -11.6
Power Supply Voltage		DC 24 V ± 10%			
Current Consumption		0.15A or less			
Input & Output Signal		Ethernet Based Fieldbus			
Linearity		Within ± 1% (Full Span)			
Hysteresis		Within ± 0.5% (Full Span)			
Repeatibility		Within ± 0.5% (Full Span)			
Sensitivity		Within ± 0.2% (Full Span)			
Temperature Characteristics		Within ± 0.12% (Full Span) / °C			
Ambient & Fluid Temperature		0 to 50°C (32 to 122 °F) (No condensation)			
Enclosure Rating		IP65			
Weight	Size 1000	8.8 oz.			
	Size 2000	12.3 oz.			
	Size 3000	15.9 oz.			

Features

- Daisy chain Power Over Ethernet
- Built-in two port ethernet switch
- 12 Bit resolution In/Out
- Device Level Ring (Ethernet/IP)
- Quick Connect (Ethernet/IP)
- Built in web server
- Available in ITV1000, 2000 and 3000 sizes
- Silicone free option

Ethernet ITV Manifold Assembly



How to Order

IITV20-XX-X-20X0-SXX-DUR01490

Port size

2	1/4" (1000, 2000)
3	3/8" (2000, 3000)

Thread Type

Nil	Rc(PT)
N	NPT
F	NPTF

Number of Stations

2 Station
3 Station
4 Station
5 Station
6 Station
7 Station
8 Station

Pressure

1	0.1 MPa
3	0.5 MPa
5	0.9 MPa

Protocol

SEN	Ethernet I/P
SMB	Modbus TCP

Porting

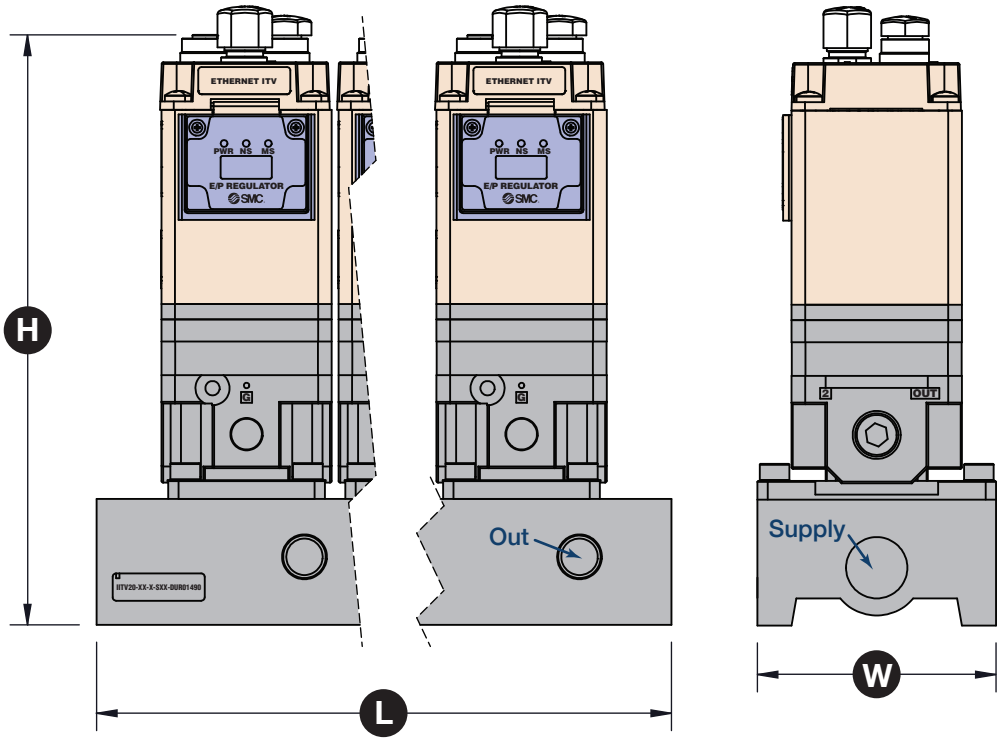
- **Supply:** 1/2
- **Out:** 1/4 or 3/8 (per order)
- **Thread Type:** Rc, NPT NPTF (per order)

Dimensions

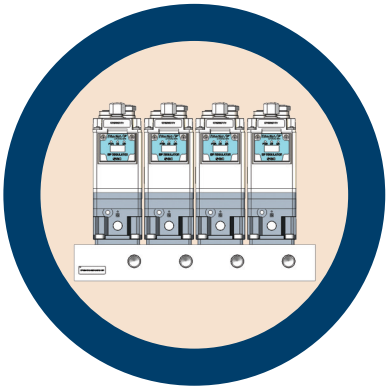
- **L** **Length (mm)** 52 (N-1) + 88
- **H** **Height (mm)** 173.2
- **W** **Width (mm)** 70

Mounting Screws

- **4X M5x0.812 SHCS**
- **Pitch (mm)** 36 x (52N + 16)



Specifications	
Voltage	24 VDC ± 10%
Input Signal (Digital)	12 BIT + SIGN
Output Signal (Digital)	12 BIT + SIGN
Linearity	Within ± 1% FULL SPAN
Hysteresis	Within ± 0.5% FULL SPAN
Repeatability	Within ± 0.5% FULL SPAN
Sensitivity	Within ± 0.2% FULL SPAN
Enclosure	IP 65



SMC Corporation of America
10100 SMC Blvd.
Noblesville, IN 46060
www.smcusa.com

(800) SMC.SMC1
(800 - 762 - 7621)

SMC Pneumatics (Canada) Ltd.
www.smcpneumatics.ca

e-mail: sales@smcusa.com
For International inquires:
www.smcworld.com

All reasonable efforts to ensure the accuracy of the information detailed in this flyer were made at the time of publishing. However, SMC can in no way warrant the information herein contained as specifications are subject to change without notice.