

Vacuum Regulator

Series **IRV10/20**

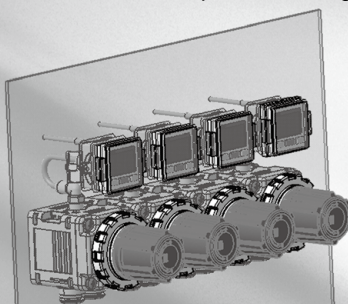
RoHS

Single Sided Connections Series

For ease of installation and panel mounting

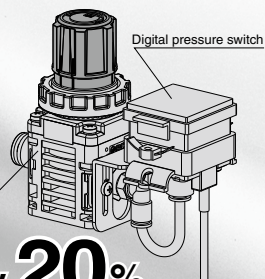


Single sided connections



Vacuum regulator
Series IRV

Integrated
digital pressure switch
for panel mounting
(Made to Order)



Digital pressure switch

Weight reduced by **20%**
(Compared with the existing IRV2000 with IRV20 fitting)

New and Improved
IRV Series

Max. flow

(Over twice the flow of the existing models)

140 L/min (ANR)
Existing IRV1000:
60 L/min (ANR)

240 L/min (ANR)
Existing IRV2000:
100 L/min (ANR)

Standard connections



Series **IRV 10**



Series **IRV20**

ARJ

AR425
to 935

ARX

AMR

ARM

ARP

IR

IRV

VEX

SRH

SRP

SRF

VCHR

ITV

IC

ITVX

PVQ

VEF
VEP

VER

VEA

VY1

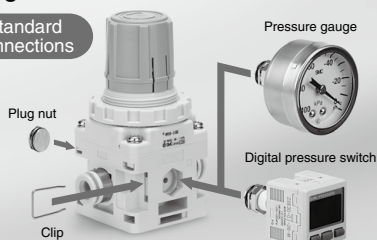
VBA
VBAT

AP100

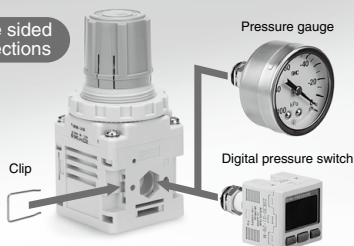
Easy to attach/detach the pressure gauge or digital pressure switch due to attachment by clip.

Mounting direction of the pressure gauge or digital pressure switch can be changed. (Standard connections only)

Standard connections



Single sided connections

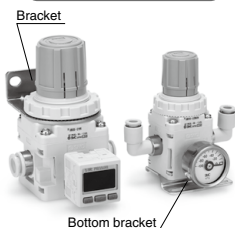


Mounting angle of the pressure gauge or digital pressure switch can be changed easily (in 60 degree increments).

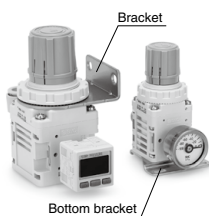


Mounting Variations

Standard connections

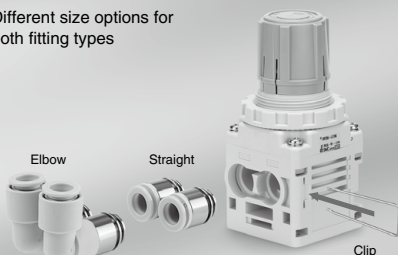


Single sided connections



Built-in One-touch fittings

Different size options for both fitting types



Fitting type	Applicable tubing O.D. (mm)	Model	
		IRV10	IRV20
Straight Elbow	ø6	●	●
	ø8	●	●
	ø10	—	●
	ø1/4"	●	●
	ø5/16"	●	●
	ø3/8"	—	●

Standard connections



Straight



Elbow

Single sided connections



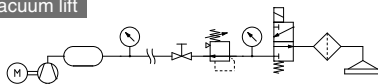
Elbow



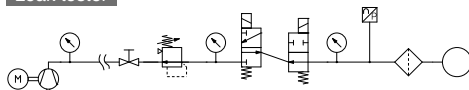
Straight

Applications

Vacuum lift



Leak tester



Vacuum Regulator Series *IRV10/20*

RoHS

How to Order

Standard connections

IRV 20 - C08

Body size

10	Max. flow 140 L/min (ANR)
20	Max. flow 240 L/min (ANR)

Fittings

Nil	Straight
L	Elbow



Straight



Elbow

Connection tubing O.D.

Symbol	Tubing O.D.	IRV10	IRV20
C06	ø6	●	●
C08	ø8	●	●
C10	ø10	—	●
N07	ø1/4"	●	●
N09	ø5/16"	●	●
N11	ø3/8"	—	●

Accessory ② [Supplied with product]

Nil	None	Note 1)
GN	Gauge nut assembly	Note 2)
G	Pressure gauge	Note 3) Note 4)
	(IRV10: GZ33-K-01, IRV20: GZ43-K-01)	
ZN	NPN open collector 1 output	With ZSE30A-01-N-ML
ZP	PNP open collector 1 output	With ZSE30A-01-P-ML
ZA	NPN open collector 2 outputs	With ZSE30A-01-A-ML
ZB	PNP open collector 2 outputs	With ZSE30A-01-B-ML

Note 1) Two plug nuts are mounted on the gauge port. When the Rc1/8 port is required, please order the optional gauge nut assembly P601010-18 separately. (Refer to page 736.)

Note 2) One plug nut, one gauge nut (Rc1/8), and two clips are included. The pressure gauge and digital pressure switch are not included.

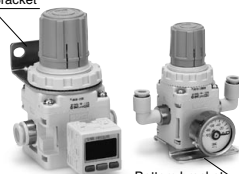
Note 3) Pressure gauge accuracy: Within ±3% of full scale

Note 4) Plug nut and gauge nut are included. (For details, refer to page 736.)

Accessory ① [Supplied with product]

Nil	None
B	With bracket
L	With bottom bracket

Bracket



Bottom bracket

Single sided connections

IRV 20 A - C08

Body size

10	Max. flow 140 L/min (ANR)
20	Max. flow 240 L/min (ANR)

Single sided connections

A	Single sided connections
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Fittings

Nil	Straight
L	Elbow



Elbow



Straight

Connection tubing O.D.

Symbol	Tubing O.D.	IRV10A	IRV20A
C06	ø6	●	●
C08	ø8	●	●
C10	ø10	—	●
N07	ø1/4"	●	●
N09	ø5/16"	●	●
N11	ø3/8"	—	●

Made to Order

For details, refer to page 738.

Symbol	Specification
X1	Integrated digital pressure switch for panel mounting

Accessory ② [Supplied with product]

Nil	None	Note 1)
GN	Gauge nut assembly	Note 2)
G	Pressure gauge	Note 3) Note 4)
	(IRV10A: GZ33-K-01, IRV20A: GZ43-K-01)	
ZN	NPN open collector 1 output	With ZSE30A-01-N-ML
ZP	PNP open collector 1 output	With ZSE30A-01-P-ML
ZA	NPN open collector 2 outputs	With ZSE30A-01-A-ML
ZB	PNP open collector 2 outputs	With ZSE30A-01-B-ML

Note 1) Two plug nuts are mounted on the gauge port. When the Rc1/8 port is required, please order the optional gauge nut assembly P601010-18 separately. (Refer to page 736.)

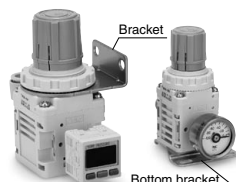
Note 2) One gauge nut (Rc1/8) and one clip are included. The pressure gauge and digital pressure switch are not included.

Note 3) Pressure gauge accuracy: Within ±3% of full scale

Note 4) Gauge nut is included. (For details, refer to page 736.)

Accessory ① [Supplied with product]

Nil	None
B	With bracket
L	With bottom bracket

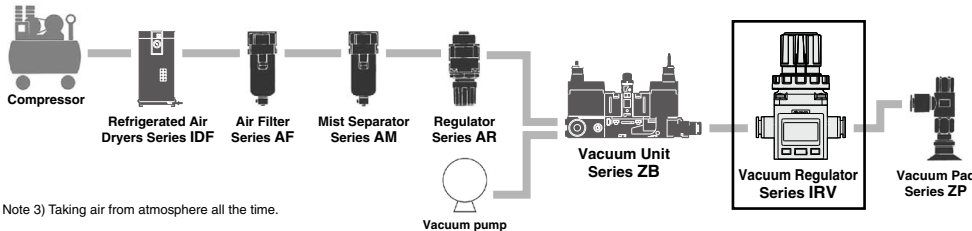


Bottom bracket

Standard Specifications

Model	IRV10	IRV20
Fluid	Air	
Set pressure range ^{Note 1)}	-100 to -1.3 kPa	
Withstand pressure ^{Note 2)}	100 kPa (Except with pressure gauge)	
Atmospheric intake consumption ^{Note 3)}	0.6 L/min (ANR) or less	
Knob resolution	0.13 kPa or less	
Ambient and fluid temperature	5 to 60°C	
VAC side tubing O.D.	ø6, ø8	ø6, ø8, ø10
SET side tubing O.D.	ø1/4", ø5/16"	ø1/4", ø5/16", ø3/8"
Weight (Without accessories)	Standard connections 135 g (IRV10-C08)	250 g (IRV20-C10)
	Single sided connections 125 g (IRV10A-C08)	250 g (IRV20A-C10)

Note 1) Use caution it varies depending on the pressure in vacuum pump side.
Note 2) For vacuum regulators with a pressure gauge, the pressure gauge will be damaged if positive pressure is supplied. In the event that positive pressure is applied, the vacuum regulator will not be damaged; however, the main valve will open and positive pressure will enter the vacuum pump. This may cause malfunction of the vacuum pump. when the vacuum regulator is used in the adsorbing and transferring system, refer to the following piping example and avoid supplying positive pressure to the vacuum pump. The vacuum regulator cannot adjust positive pressure.

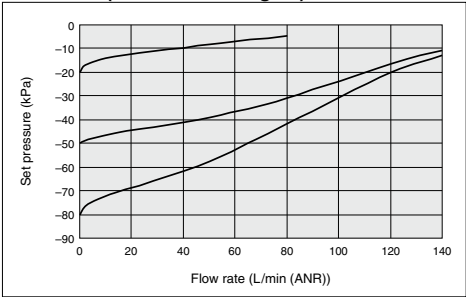


Note 3) Taking air from atmosphere all the time.

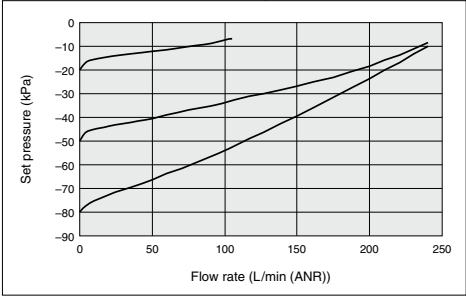
Conditions:
Vacuum pump exhaust speed:
2500 L/min
VAC side pressure:
-101 kPa (At initial setting)

Flow-rate Characteristics
(Representative Value)

IRV10-C08 (One-touch fitting ø8)

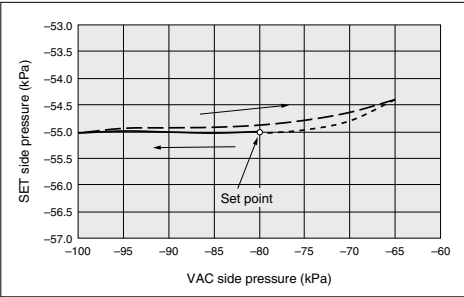


IRV20-C10 (One-touch fitting ø10)

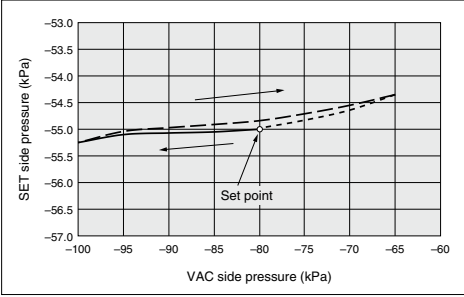


Pressure Characteristics
(Representative Value)

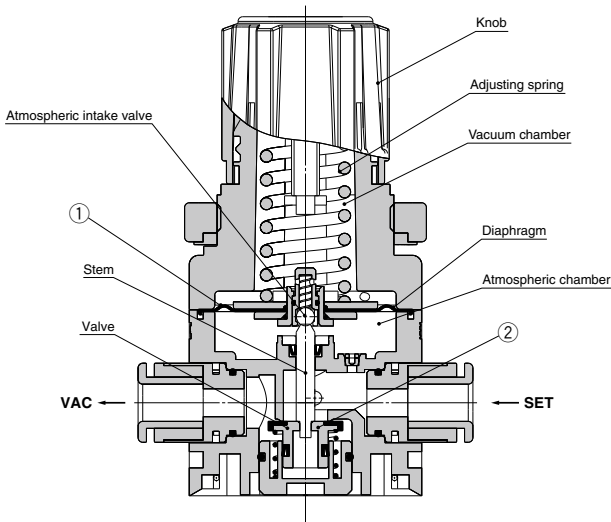
IRV10



IRV20



Construction



Working principle

When the knob is turned to the right (clockwise), the adjusting spring's generated force pushes down the diaphragm and the valve. This connects the VAC side and SET side, and the degree of vacuum on the SET side increases (becomes closer to an absolute vacuum). Furthermore, the SET side vacuum pressure moves through the air passage into the vacuum chamber, where it is applied to the top side of the diaphragm and counters the adjusting spring's compression force; and this adjusts the SET side pressure. When the degree of vacuum on the SET side is higher than the designated setting value (becomes closer to an absolute vacuum), the balance between the adjusting spring and the SET side pressure in the vacuum chamber is lost, and the diaphragm is pushed up. This causes the valve to close and the atmospheric intake valve to open, which lets atmospheric air into the SET side. When the adjusting spring's compression force and the SET side pressure are balanced, the SET side pressure is set. Also, when the degree of vacuum of the SET side pressure is lower than the designated setting value (becomes closer to the atmosphere), the balance between the adjusting spring and the vacuum chamber is lost, and the diaphragm is pushed down. This causes the atmospheric intake valve to close and the valve to open, which lets air into the VAC side. When the adjusting spring's compression force and the SET side pressure are balanced, the SET side pressure is set.

Replacement Parts

No.	Description	Material	Part no.	
			IRV10	IRV20
1	Diaphragm assembly	HNBR, etc.	P601010-2	P601020-2
2	Valve assembly	HNBR, etc.	P601010-3	P601020-3

ARJ

AR425
to 935

ARX

AMR

ARM

ARP

IR

IRV

VEX

SRH

SRP

SRF

VCHR

ITV

IC

ITVX

PVQ

VEF

VEP

VER

VEA

VY1

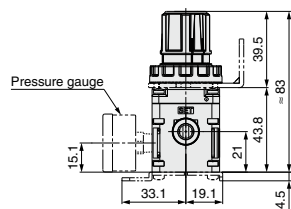
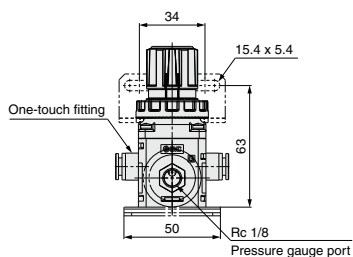
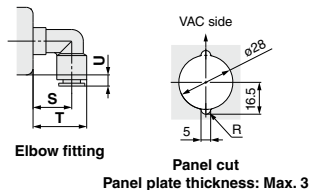
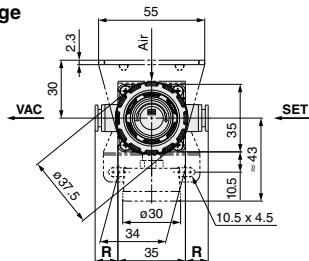
VBA

VBAT

AP100

Dimensions/IRV10: Standard Connections

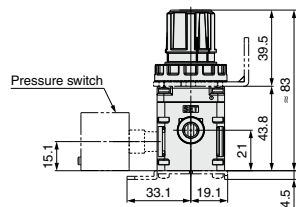
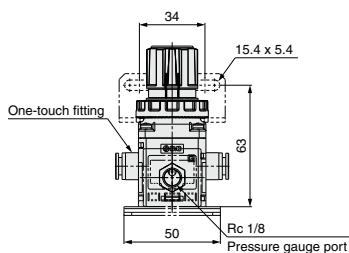
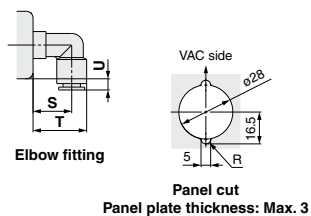
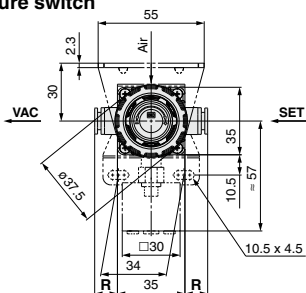
IRV10-□□□G: With pressure gauge



Fitting Part Dimensions (mm)

Fitting size	VAC/SET			
	Straight	Elbow	Elbow	Elbow
	R	S	T	U
ø6, ø1/4"	10	19	26	3
ø8, ø5/16"	12	20	28	6

IRV10-□□□Z_N^P_A_B: With digital pressure switch

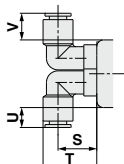


Fitting Part Dimensions (mm)

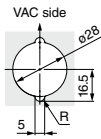
Fitting size	VAC/SET			
	Straight	Elbow	Elbow	Elbow
	R	S	T	U
ø6, ø1/4"	10	19	26	3
ø8, ø5/16"	12	20	28	6

Dimensions/IRV10A: Single Sided Connections

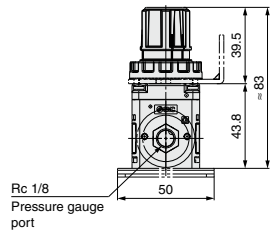
IRV10A-□□□G: With pressure gauge



Elbow fitting



Panel cut
Panel plate thickness: Max. 3

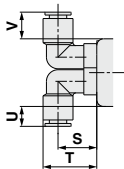


Rc 1/8
Pressure gauge
port

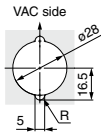
Fitting Part Dimensions

Fitting size	VAC/SET				
	Straight	Elbow	Elbow	Elbow	Elbow
	R	S	T	U	V
ø6, ø1/4"	10	19	26	7.5	11
ø8, ø5/16"	12	20	28	10.5	14

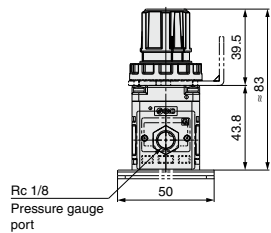
IRV10A-□□□Z_A^P_B: With digital pressure switch



Elbow fitting



Panel cut
Panel plate thickness: Max. 3



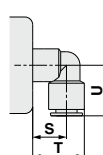
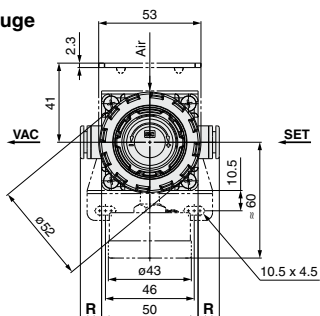
Rc 1/8
Pressure gauge
port

Fitting Part Dimensions

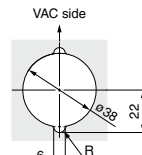
Fitting size	VAC/SET				
	Straight	Elbow	Elbow	Elbow	Elbow
	R	S	T	U	V
ø6, ø1/4"	10	19	26	7.5	11
ø8, ø5/16"	12	20	28	10.5	14

Dimensions/IRV20: Standard Connections

IRV20-□□□G: With pressure gauge

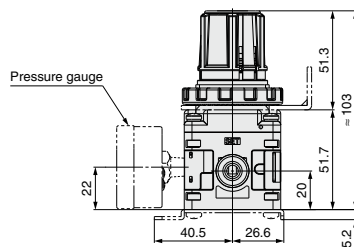
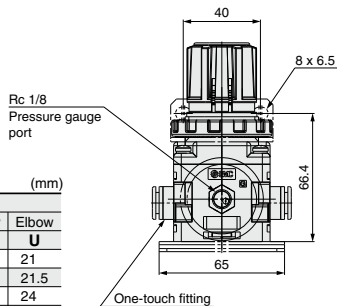


Elbow fitting



Panel cut

Panel plate thickness: Max. 4

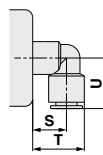
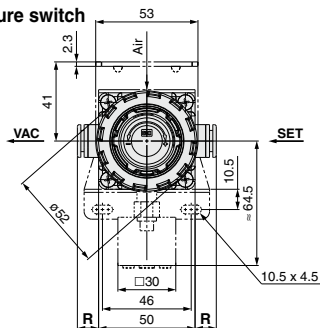


Fitting Part Dimensions

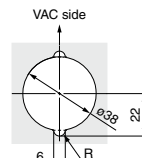
(mm)

Fitting size	VAC/SET			
	Straight	Elbow	Elbow	Elbow
	R	S	T	U
ø6	10.5	21	27.5	21
ø1/4"	10.5	21	27.5	21.5
ø8, ø5/16"	10.5	21	28.5	24
ø10, ø3/8"	11	21	30.5	27

IRV20-□□□Z_A^N: With digital pressure switch

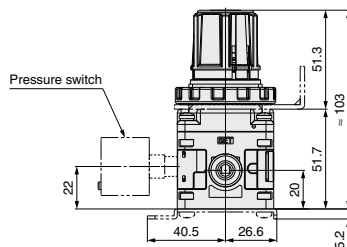
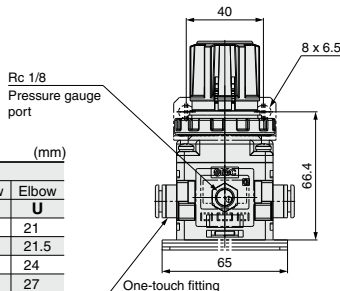


Elbow fitting



Panel cut

Panel plate thickness: Max. 4



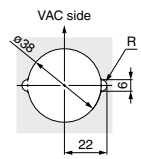
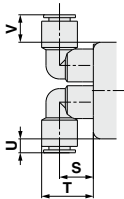
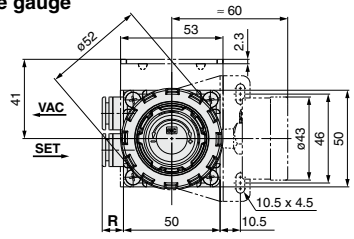
Fitting Part Dimensions

(mm)

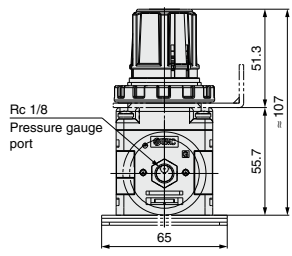
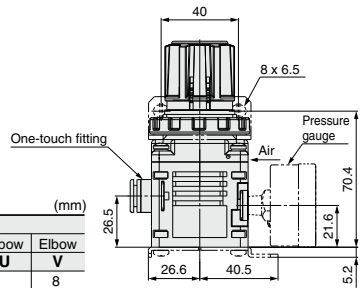
Fitting size	VAC/SET			
	Straight	Elbow	Elbow	Elbow
	R	S	T	U
ø6	10.5	21	27.5	21
ø1/4"	10.5	21	27.5	21.5
ø8, ø5/16"	10.5	21	28.5	24
ø10, ø3/8"	11	21	30.5	27

Dimensions/IRV20A: Single Sided Connections

IRV20A-□□□G: With pressure gauge



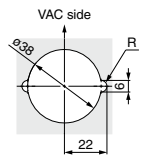
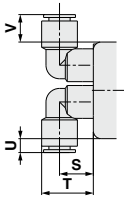
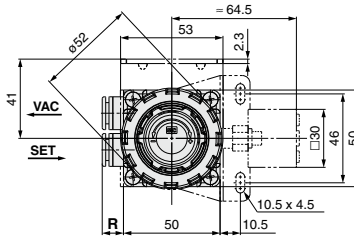
Elbow fitting
Panel cut
Panel plate thickness:
Max. 4



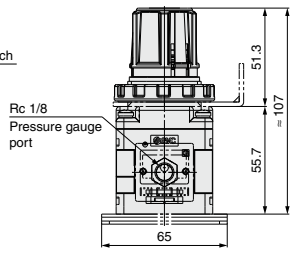
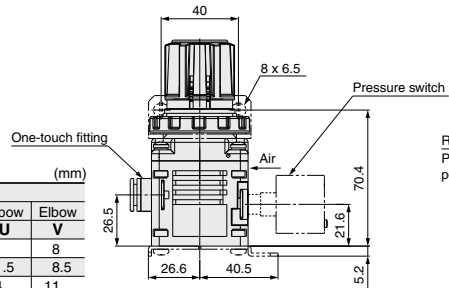
Fitting Part Dimensions

Fitting size	VAC/SET				
	R	S	T	U	V
ø6	10.5	21	27.5	1	8
ø1/4"	10.5	21	27.5	1.5	8.5
ø8, ø5/16"	10.5	21	28.5	4	11
ø10, ø3/8"	11	21	30.5	7	14

IRV20A-□□□Z: With digital pressure switch



Elbow fitting
Panel cut
Panel plate thickness:
Max. 4



Fitting Part Dimensions

Fitting size	VAC/SET				
	R	S	T	U	V
ø6	10.5	21	27.5	1	8
ø1/4"	10.5	21	27.5	1.5	8.5
ø8, ø5/16"	10.5	21	28.5	4	11
ø10, ø3/8"	11	21	30.5	7	14

ARJ
AR425 to 935
ARX
AMR
ARM
ARP
IR
IRV
VEX
SRH
SRP
SRF
VCHR
ITV
IC
ITVX
PVQ
VEF
VEP
VER
VEA
VY1
VBA
VBAT
AP100


Series IRV10/20

Options

One-touch Fittings for Vacuum Regulator



One-touch fitting for IRV10(A)

VVQ1000-51A-C6

Fitting type	
Nil	Straight
L1	Elbow

Fitting size	
Symbol	Size
C6	ø6
C8	ø8
N7	ø1/4"
N9	ø5/16"

One-touch fitting for IRV20(A)

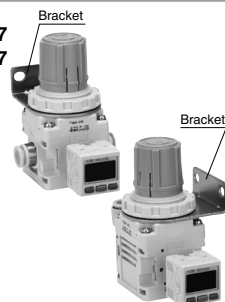
VVQ2000-51A-C6

Fitting type	
Nil	Straight
L1	Elbow

Fitting size	
Symbol	Size
C6	ø6
C8	ø8
C10	ø10
N7	ø1/4"
N9	ø5/16"
N11	ø3/8"

Bracket Assembly

For IRV10(A) P601010-17
For IRV20(A) P601020-17



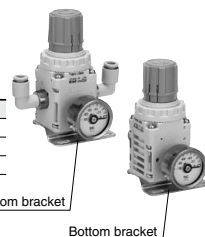
Bottom Bracket Assembly

For IRV10(A) P601010-14
For IRV20(A) P601020-14

Included Parts

No.	Description
1	Bottom bracket
2	Square nut x 4
3	Phillips screw x 4

Note) No. 1 to 3 are shipped together.



Plug Nut Assembly

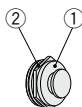


Plug unused pressure gauge port(s).

P601010-11

Included Parts

No.	Description
1	Plug nut
2	O-ring



Gauge Nut Assembly

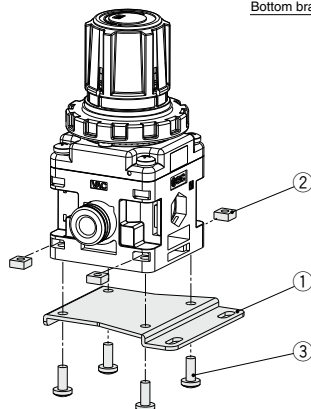
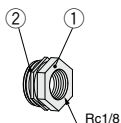


Used to connect the pressure gauge and pressure switch.

P601010-18

Included Parts

No.	Description
1	Gauge nut
2	O-ring



Phillips Screw Tightening Torque

For IRV10(A): M3	0.32 ±0.03 N·m
For IRV20(A): M4	0.76 ±0.05 N·m

Series IRV10/20

Made to Order

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



1 Integrated Digital Pressure Switch for Panel Mounting

Symbol

X1

How to Order

Single sided connections

IRV 20 A - C08 - X1

Body size		Single sided connections	
10	Max. flow 140 L/min (ANR)	A	Single sided connections
20	Max. flow 240 L/min (ANR)		

Fittings	
Nil	Straight
L	Elbow

Connection tubing O.D.		IRV10A	IRV20A
Symbol	Tubing O.D.		
C06	ø6	●	●
C08	ø8	●	●
C10	ø10	—	—
N07	ø1/4"	●	●
N09	ø5/16"	●	●
N11	ø3/8"	—	●

• Made to Order

X1 Integrated digital pressure switch for panel mounting

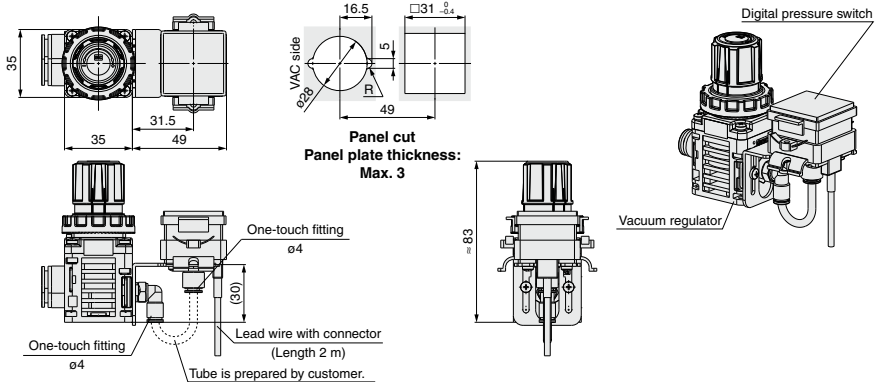
• Digital pressure switch type ^{Note)}

Symbol	Output specifications	Part no.
ZN	With digital pressure switch	NPN open collector 1 output
ZP		PNP open collector 1 output
ZA		NPN open collector 2 outputs
ZB		PNP open collector 2 outputs
		ZSE30A-C4H-N-MGD
		ZSE30A-C4H-P-MGD
		ZSE30A-C4H-A-MGD
		ZSE30A-C4H-B-MGD

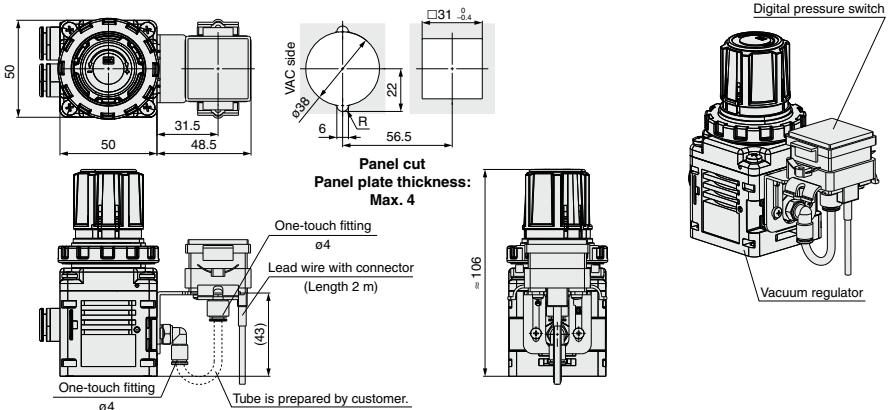
Note) Gauge nut is included. Accessories are included in the same container.
* Refer to the digital pressure switch specifications on page 737.

Dimensions

IRV10A



IRV20A





Series IRV10/20

Specific Product Precautions 1

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

Handling

Warning

1. When a system hazard can be expected due to a drop in vacuum pressure caused by power loss or vacuum pump trouble, install a safety circuit and configure the system so that it can avoid the danger.
2. When a system hazard can be expected with trouble with the vacuum regulator, install a safety circuit and configure the system so that it can avoid the danger.

Caution

1. When installing a pressure gauge or pressure switch on an existing regulator, be sure to reduce the set pressure to 0 (atmospheric pressure) before removing the plug.

1. Purchased with the pressure gauge or pressure switch

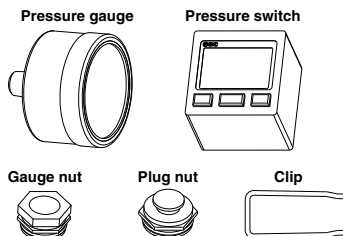
1-1. Accessories

- Pressure gauge or pressure switch 1 pc.
- Gauge nut (with O-ring) 1 pc.

Note) Gauge nut is mounted to the pressure gauge or pressure switch.

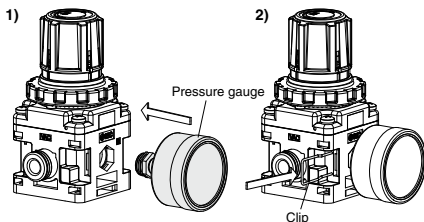
- Plug nut (with O-ring) 1 pc.
- Clip 2 pcs.

Note) One clip is included for single sided connections. Plug nut is not included.



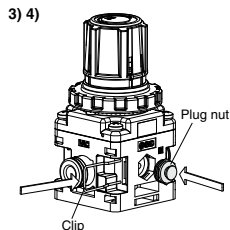
1-2. Mounting of the pressure gauge or pressure switch

- 1) Confirm the direction of VAC side and SET side. Insert the pressure gauge to the gauge port sufficiently (until the gauge nut of the pressure gauge is level with the product surface.) Insert the pressure gauge to the end on the opposite side of the connecting port for single sided connections.
- 2) Insert the clip from the left side (viewed from the pressure gauge side, as shown in the drawing) until the top of the clip is level with the product surface. This completes the mounting procedure for single sided connections.



Caution

- 3) Insert the plug nut to the gauge port on the opposite side of the pressure gauge until the top of the plug nut is level with the product surface.
- 4) Insert the clip from the left side (viewed from the plug nut side) to the end in the same way as 2).



Note) To remove the pressure gauge or pressure switch, remove the clip, then remove the pressure gauge or pressure switch straight out. Do not apply torque, as the body is made of resin.

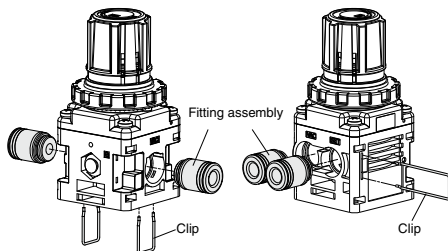
2. Do not remove the body screw while the vacuum pressure is applied.
3. Before removing the valve guide for inspection, reduce the set pressure to 0 (atmospheric pressure) and also shut down the vacuum pump pressure completely.
4. For ease of replacement, One-touch fittings are installed as the cassette type. One-touch fittings are retained with clips inserted from the directions illustrated below. Remove the clips with a flat head screwdriver to replace the One-touch fittings. (Refer to "Procedure to remove the clip.") When installing, insert each One-touch fitting deeply to the end and reinsert the clip to the specified position.

Note 1) Before replacement, confirm VAC/SET pressure is not applied and start operation after the internal pressure becomes atmospheric pressure. Operation with VAC/SET pressure is dangerous.

Note 2) To remove the clip, hold the clip with your fingers, then slowly pull out the clip. Do not pull out the clip by force. Otherwise, the clip may spring out and it is dangerous.

Note 3) Insert the clip to the end after confirming the replacement parts are inserted to the end. The clip may spring out if it is not inserted sufficiently.

Note 4) Hold the fitting in your hand when inserting the tube to elbow type One-touch fitting. Insertion of the tube without holding the fitting in your hand will apply excess force to blocks or One-touch fitting, which may lead to air leakage or breakage.





Series IRV10/20

Specific Product Precautions 2

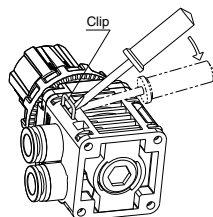
Be sure to read this before handling. Refer to front matter 43 for Safety Instructions, and pages 365 to 369 for Common Precautions.

Handling

⚠ Caution

Procedure to remove the clip

Apply the tip of a flat head screwdriver to the inclined part where the clip is inserted. Lift the clip by moving the screwdriver as illustrated below.



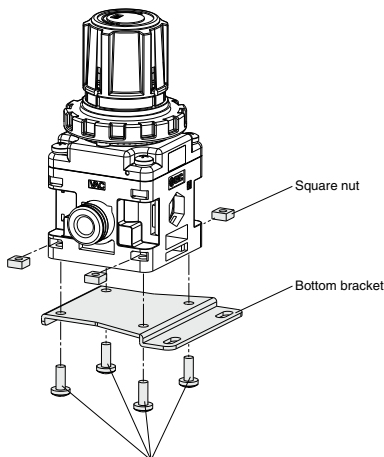
Insert the tip of the screwdriver to the root of the clip.

⚠ Warning

1. Observe the proper screw tightening torque.

If torque is exceeded, damage to the mounting screw or main body may occur. Also, if the screws are not tightened enough, the screws may come loose during operation.

Tightening torque of Phillips screw for mounting bottom bracket



Phillips Screw Tightening Torque

For IRV10(A): M3	$0.32 \pm 0.03 \text{ N} \cdot \text{m}$
For IRV20(A): M4	$0.76 \pm 0.05 \text{ N} \cdot \text{m}$

Operating Environment

⚠ Warning

1. Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.
2. Do not use in locations influenced by vibrations or impacts.
3. This vacuum regulator always uses atmospheric air, therefore, do not use in dusty environments.
4. In locations which receive direct sunlight, provide a protective cover, etc.
5. In locations near heat sources, block off any radiated heat.

Vacuum Supply

⚠ Caution

1. This vacuum regulator is not to be used for adjusting vacuum pump pressures.
2. Note that the ejector is not applicable to "vacuum supply" since the flow rate of the ejector is smaller than that of this vacuum regulator and changes in pressure by the flow rate are large. For details about ejector characteristics, refer to relevant ejector catalog.

Air Supply

⚠ Caution

1. These products are designed for use with air. Please contact SMC if any other fluid will be used.
2. Do not use air which includes chemicals, synthetic oils containing organic solvents, salt, or corrosive gases, etc., as this can cause malfunction.



Series IRV10/20

Specific Product Precautions 3

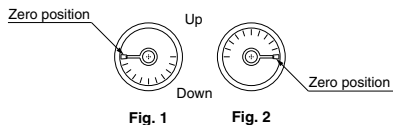
Be sure to read this before handling. Refer to front matter 43 for Safety Instructions, and pages 365 to 369 for Common Precautions.

Precautions

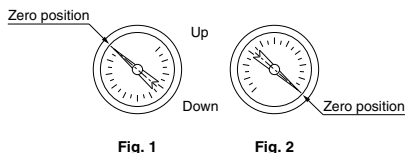
Caution

1. Connect piping to the port with "VAC" indication for connection to the vacuum pump.
2. To adjust the pressure, turn the knob to the right (clockwise) for changing "atmospheric pressure to vacuum pressure" and to the left (counterclockwise) for changing "vacuum pressure to atmospheric pressure".
3. When adjusting pressure, do not touch the lateral hole (atmospheric intake hole) of the body.
4. When locking the knob after setting the pressure, press down the knob until the orange band is hidden and a click is heard. On the other hand, when unlocking the knob, pull it up until the orange band is visible and a click is heard.
5. When the vacuum pump capacity is relatively small or when the inside diameter of the piping is small, a change in the set pressure (the pressure difference between the non-flow and flow conditions) may be large. In this case, change the vacuum pump or the inside diameter of the piping. When changing the vacuum pump is not possible, add a capacity tank (the capacity depends on the operating conditions) to the VAC side.
6. The pressure response time after opening and closing of valves (such as solenoid valves) is influenced in large and small measures by the internal capacity (includes piping capacity) of the set side. Since the vacuum pump capacity also affects the response time, consider all these points before operations.
7. When using a pressure gauge upside down like Fig. 1, it may result in a shifting of the zero point reading. Make sure to use it in the direction like Fig. 2. Gravity will affect the zero point of the gauge which is why it needs to be positioned properly.

IRV10



IRV20



ARJ

AR425
to 935

ARX

AMR

ARM

ARP

IR

IRV

VEX

SRH

SRP

SRF

VCHR

ITV

IC

ITVX

PVQ

VEF
VEP

VER

VEA

VY1

VBA
VBAT

AP100