

Vacuum Regulator Series IRV1000/2000/3000

3 sizes

offered in the series
Variations have been expanded to three sizes from only one in the previous Series T203. Selection is possible to accommodate the applicable flow rate.

Note) Flow rate corresponds to VAC pressure of -101 kPa, SET pressure of -80 kPa, and initial flow rate setting of 0 l/min (ANR).

Compact

Lightweight

IRV1000

60
l/min (ANR) Note)



35 mm

120 g

IRV2000

100
l/min (ANR) Note)



50 mm

270 g

IRV3000

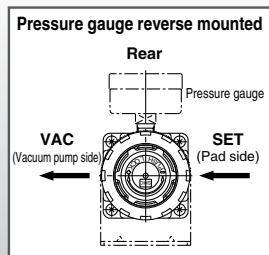
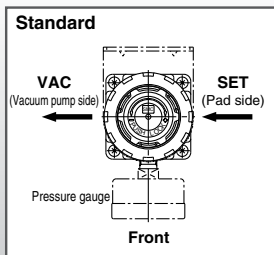
150
l/min (ANR) Note)



66 mm

700 g

■ Pressure gauge can be mounted from the front or rear

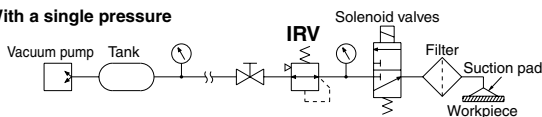


■ Mounting capability is standard

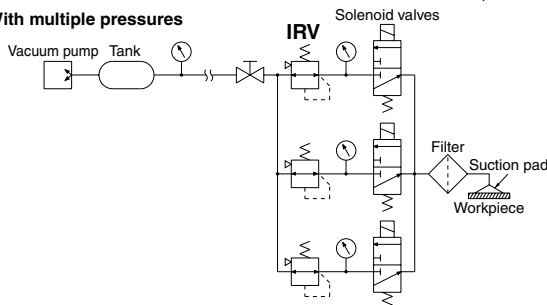
Application Example

Lifting of workpieces

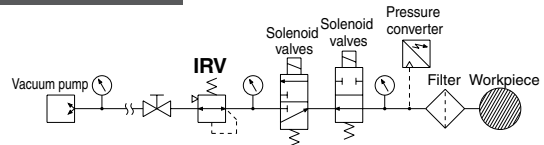
With a single pressure



With multiple pressures



Leak tester



F.R.L.

AV

AU

AF

AR

IR

VEX

AMR

ITV

IC

VBA

VE □

VY1

G

PPA

AL

⚠ Precautions

Be sure to read before handling. Refer to pages 14-21-3 to 14-21-4 for Safety Instructions and 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 a malfunction of 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 on an existing regulator, be sure to reduce the set pressure to 0 (atmospheric pressure) before removing the plug.
2. Do not remove the body screw while the negative 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.

Operating Environment

⚠ Warning

1. Do not use valves in such environments where corrosive gases, chemicals, or brine or water or steam is airborne, or where valves can be directly exposed to any of those.
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 an ejector's flow rate is smaller than that of the vacuum regulator, and therefore, it is not suitable as a "vacuum supply".

Air Supply

⚠ Caution

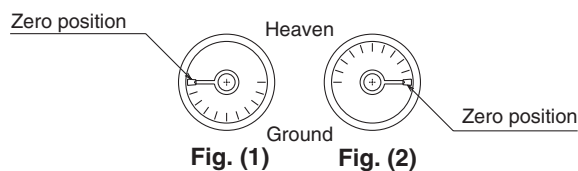
1. These products are designed for use with air. Please contact SMC if any other fluid will be used.
2. Do not use air which includes chemicals, synthetic oils containing organic solvents, salt, or corrosive gases, etc., as this can cause damage or malfunction.

Operation

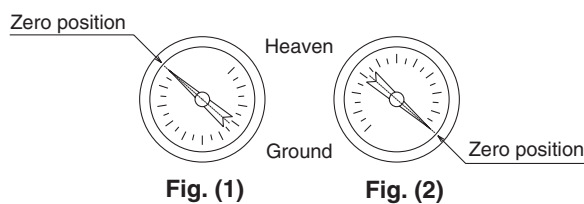
⚠ Caution

1. Connect piping to the port with "VAC" indication (upper right of the port) for connection to the vacuum pump.
2. To adjust the pressure, turn the knob to the right for changing "atmospheric pressure to vacuum pressure" and to the left for changing "vacuum pressure to atmospheric pressure".
3. When adjusting pressure, do not touch the lateral hole in the mid-section of the body and the lateral hole (atmospheric air suction hole) below the "VAC" indication.
4. When locking the handle 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 handle, pull it up until the orange band is visible and a click is heard.
5. This vacuum regulator is for use with negative pressure only. Be sure that positive pressure is not applied instead. In the event that positive pressure is applied, the vacuum regulator will not be damaged; however, the main valve of the pressure adjustment valve will open and positive pressure will enter the vacuum pump. This may cause malfunction of the vacuum pump.
6. When the capacity of the vacuum pump 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.
7. 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 of the setting side (includes piping capacity). Since the vacuum pump capacity also affects the response time, consider all these points when operating.
8. 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).

For IRV1000



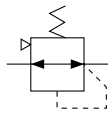
For IRV2000, IRV3000



Vacuum Regulator

Series IRV1000/2000/3000

JIS Symbol



Standard Specifications

Model	IRV1000	IRV2000	IRV3000
Fluid	Air		
Regulating pressure range ⁽¹⁾	-100 to -1.3 kPa		
Atmospheric intake consumption ⁽²⁾	0.6 ℓ/min (ANR) or less		1.1 ℓ/min (ANR) or less
Knob resolution	Within 0.13 kPa		
Ambient and fluid temperature	5 to 60°C		
Port size	Rc 1/8	Rc 1/4	Rc 1/4, 3/8, 1/2
Pressure gauge port size	Rc 1/8 (2 locations)		
Weight (kg) [Without accessory]	0.12	0.27	0.7

Note 1) Use caution it varies depending on the pressure in vacuum pump side.
 Note 2) Taking air from atmosphere all the time.

How to Order

IRV 1 000 - 01 -

Vacuum regulator

Body size

1	IRV1000
2	IRV2000
3	IRV3000

Thread type

Nil	Rc
N*	NPT
F*	G

* Option

Suffix (Pressure gauge mounting)

Nil Standard

R Rear pressure gauge mounting

Accessory

Nil	None
B	With bracket (Note)
G	With pressure gauge

Note) Brackets are shipped together, (but not assembled).

Port size

Symbol	Size	Application		
		IRV1000	IRV2000	IRV3000
01	1/8	●	—	—
02	1/4	—	●	●
03	3/8	—	—	●
04	1/2	—	—	●

Specification Combinations

◎ Standard specification ○ Valid combination □ Invalid combination

Specifications	Symbol	Applicable model		
		IRV1000	IRV2000	IRV3000
Standard specifications	Connection Rc 1/8	◎		
	Connection Rc 1/4		◎	◎
	Connection Rc 3/8			◎
	Connection Rc 1/2			◎
Accessory	Bracket	○	○	○
	Pressure gauge	○	○	○
Option specifications	Pressure gauge reverse mounted	R	○	○
	Connection NPT 1/8	N01	○	
	Connection NPT 1/4	N02		○
	Connection NPT 3/8	N03		○
	Connection NPT 1/2	N04		○
	Connection G 1/8	F01	○	
	Connection G 1/4	F02		○
	Connection G 3/8	F03		○
Connection G 1/2	F04		○	

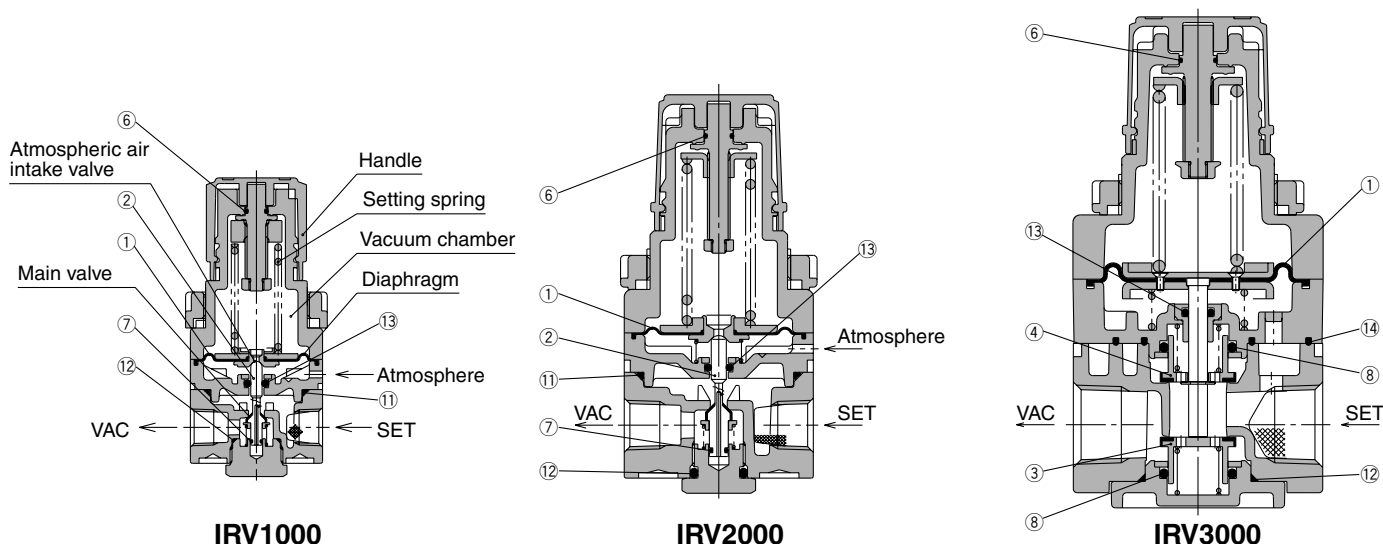
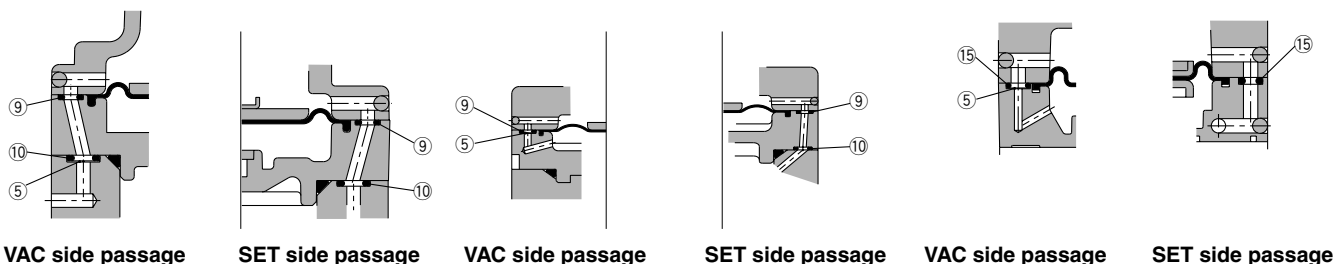
Accessory (Option) Part No.

Description	Part no.		
	IRV1000	IRV2000	IRV3000
Bracket	P53801018	P53802016	P53803013
Pressure gauge *	GZ33-K-01	GZ43-K-01	GZ43-K-01

* Precision of pressure gauge within ±3% (Full span)

Series IR1000/2000/3000

Construction



Working principle (For IR1000)

When the handle is turned to the right, the adjusting spring's generated force pushes down the diaphragm and the main 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 main 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 SET side pressure of the vacuum chamber is lost, and the diaphragm is pushed down. This causes the atmospheric intake valve to close and the main 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.		
			IRV1000	IRV2000	IRV3000
①	Diaphragm assembly	HNBR, etc.	P538010-6	P538020-3	P538030-5
②	Valve	Stainless steel, HNBR	P53801005	P53802005	—
③	Valve	Brass, HNBR	—	—	P53803015
④	Valve	Brass, HNBR	—	—	P53803016
⑤	Fixed throttle	SUS304	P36202018	P36202018	P36203017
⑥	O-ring	HNBR	ø4.35 x 1	ø6 x 1	ø8.31 x 1
⑦	O-ring	HNBR	ø2 x 0.6	ø3.2 x 1	—
⑧	O-ring	NBR	—	—	JIS B 2401 P16 ⁽¹⁾
⑨	O-ring	NBR	ø1.7 x 0.85	ø2.5 x 1	—
⑩	O-ring	NBR	ø2.5 x 1	ø3 x 1	—
⑪	O-ring	NBR	ø24 x 1.5	ø39.5 x 2	—
⑫	O-ring	NBR	ø10 x 1.3	JIS B 2401 P11	ø27.8 x 1.5
⑬	O-ring	NBR	JIS B 2401 P3 ⁽¹⁾	JIS B 2401 P4 ⁽¹⁾	JIS B 2401 P5 ⁽¹⁾
⑭	Seal (A)	NBR	—	—	P36203015
⑮	Seal (B)	NBR	—	—	P36203016
Repair kit no. (A set of above nos. ① to ⑮.)			KT-IRV1000	KT-IRV2000	KT-IRV3000

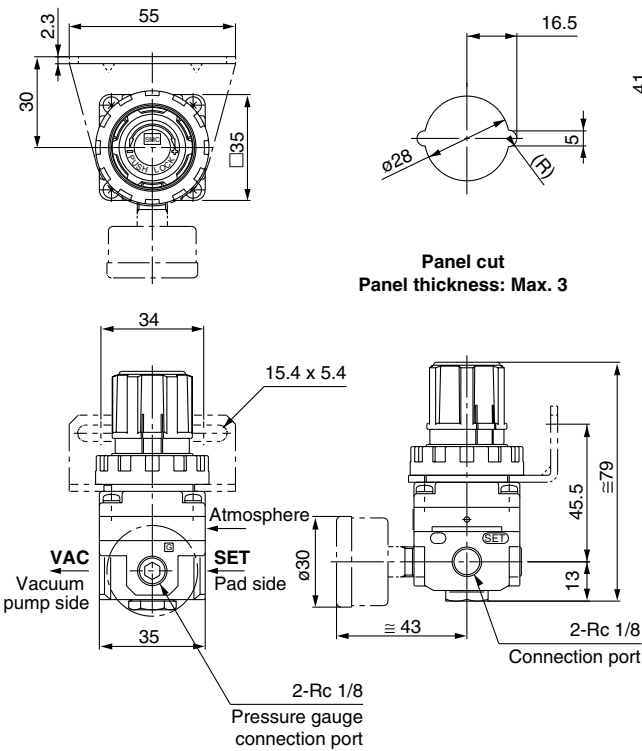
Note 1) For O-ring numbers 8 and 13, use mini-flicking type.

Note 2) Replacement part numbers correspond to the item numbers in the figures.

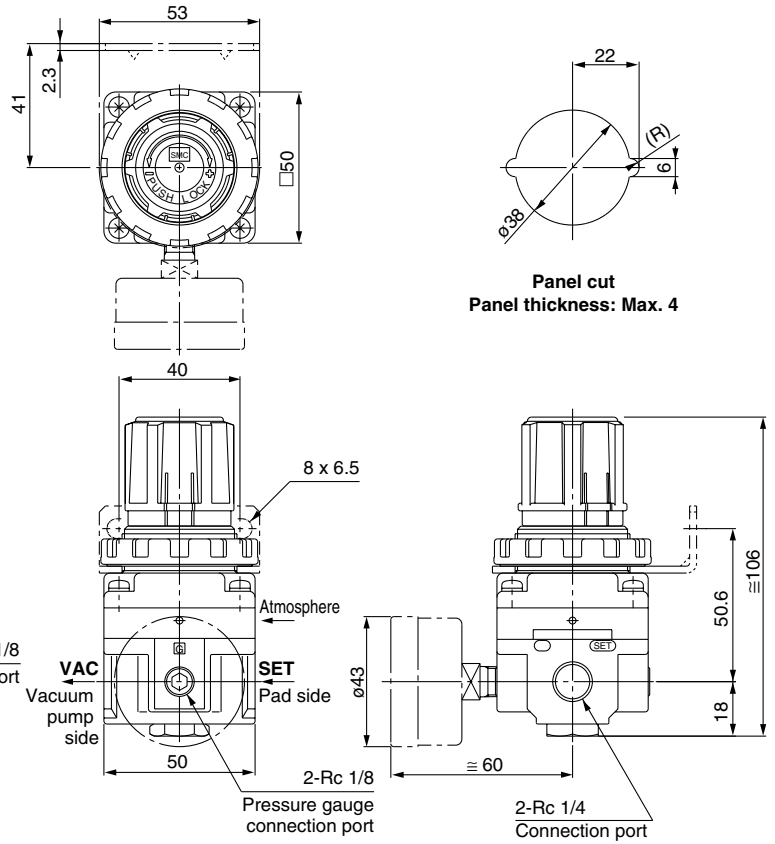
Precision Regulator Series IR1000/2000/3000

Dimensions

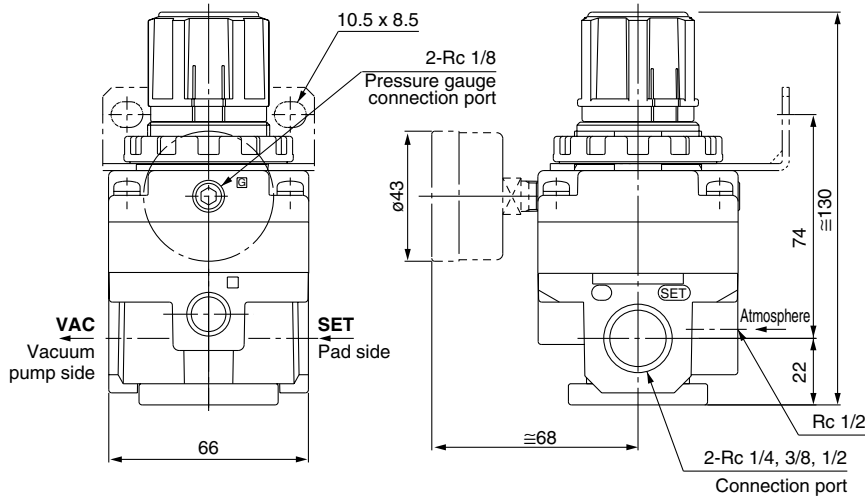
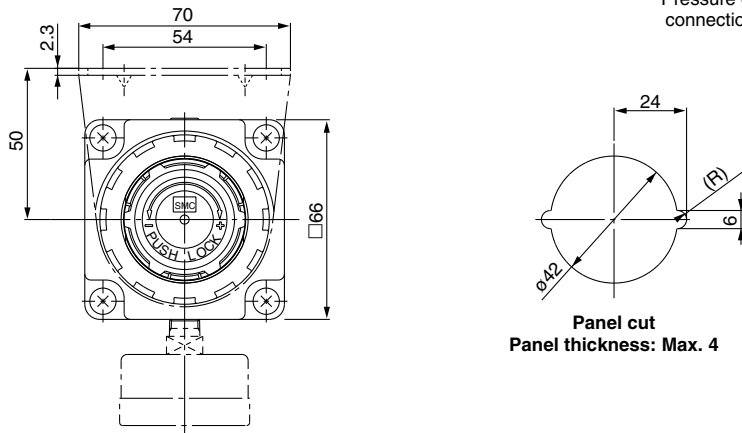
IRV1000-01 □



IRV2000-02 □



IRV3000-02 □
03 □
04 □



F.R.L.

AV

AU

AF

AR

IR

VEX

AMR

ITV

IC

VBA

VE □

VY1

G

PPA

AL

Series IR1000/2000/3000

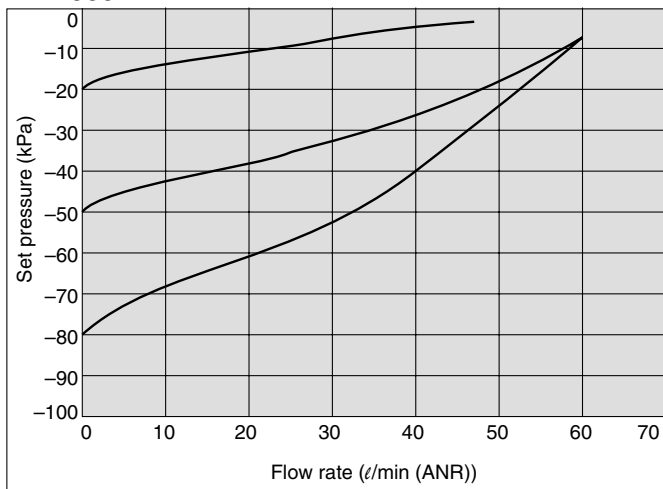
Flow Characteristics

Vacuum pump exhaust speed: 500 ℓ/min
VAC side pressure: -101 kPa at initial setting

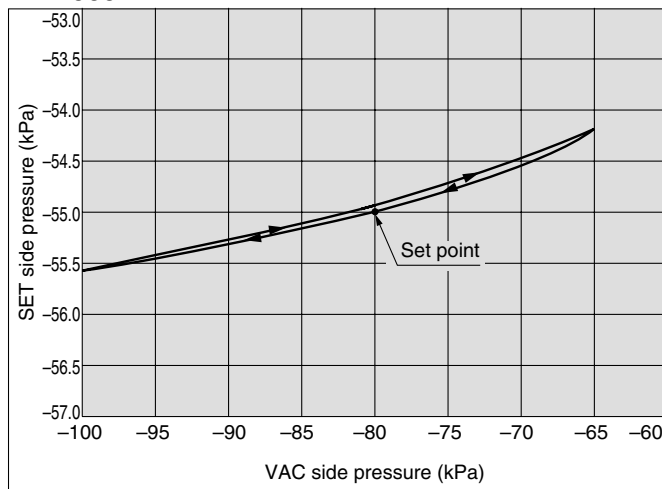
Pressure Characteristics

Vacuum pump exhaust speed: 500 ℓ/min

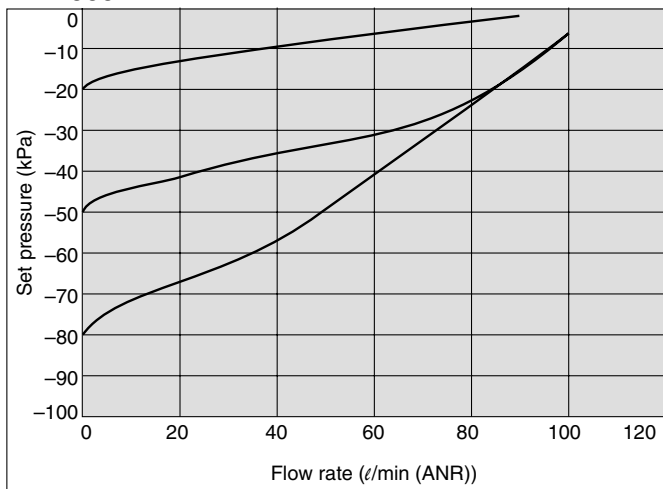
IRV1000



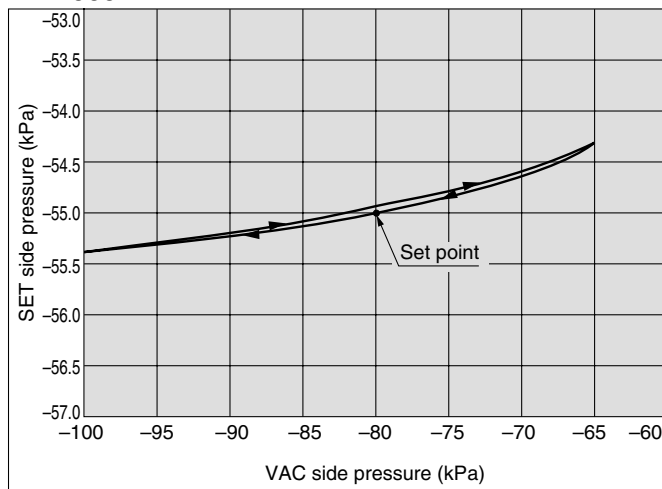
IRV1000



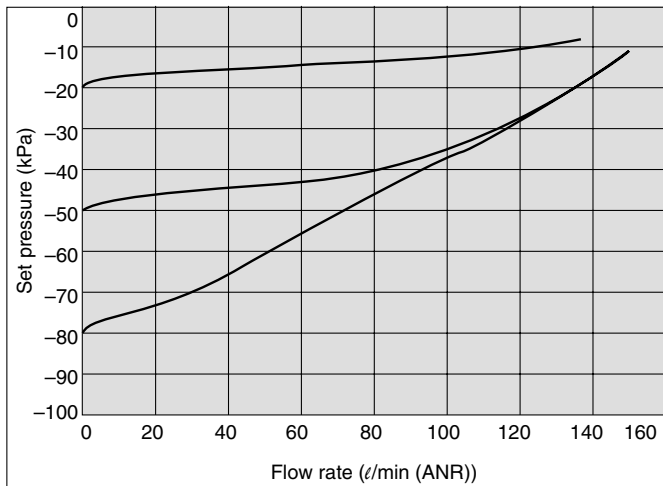
IRV2000



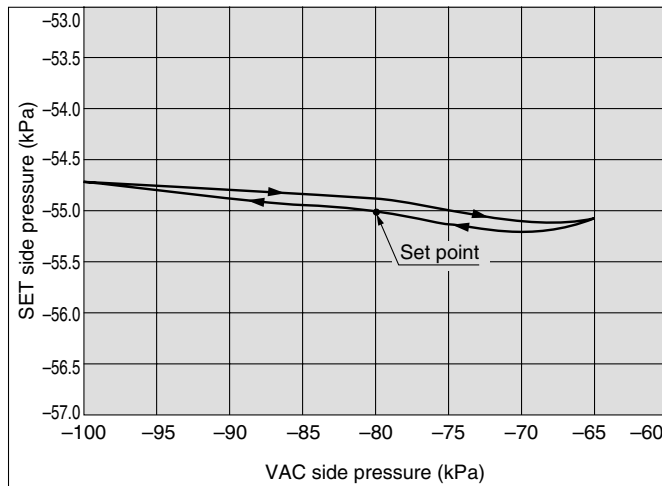
IRV2000



IRV3000



IRV3000



Series IRV1000/2000/3000

Made to Order Specifications:

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

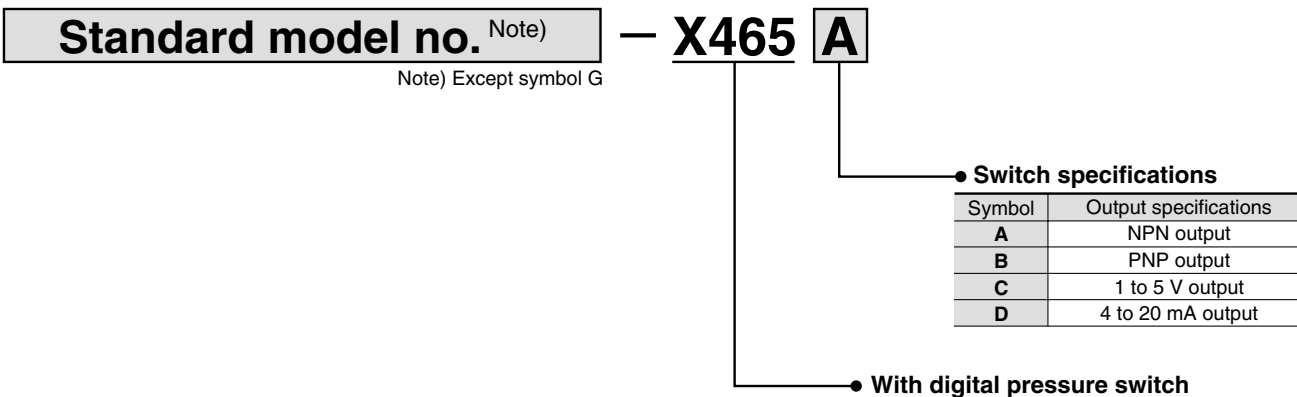
1. With Digital Pressure Switch

With digital pressure switch (Model: ZSE30-01-□□-ML). But, note that it is not assembled at the time of shipment from factory. Mount a digital pressure switch to the connecting port for pressure gauge.

Specifications

Made to order part no.		-X465□
Pressure gauge	Set pressure range (kPa)	-101 to 101
	Resolution of set and display (kPa)	0.2
	Power supply voltage	12 to 24 VDC ±10%, Ripple (p-p) 10% or less (With reverse connection protection)
	Current consumption	45 mA or less (but 70 mA or less at current output)

How to Order




- Note 1) Please contact SMC separately for details about the external dimensions, etc.
- Note 2) For details on handling digital pressure switch and its specifications, refer to pages of ZSE30 series digital pressure switch in Best Pneumatics Vol. 16.
- Note 3) Do not apply positive pressure on vacuum regulator Series IRV, because it is dedicated for negative pressure, while it is able to apply positive pressure on digital pressure switch.
- Note 4) Digital pressure switch is enclosed in a single container.


- F.R.L.
- AV
- AU
- AF
- AR
- IR
- VEX
- AMR
- ITV
- IC
- VBA
- VE□
- VY1
- G
- PPA
- AL




Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO 4414 ^{Note 1)}, JIS B 8370 ^{Note 2)} and other safety practices.

 **Caution** : Operator error could result in injury or equipment damage.

 **Warning** : Operator error could result in serious injury or loss of life.

 **Danger** : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power--General rules relating to systems.

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

Warning

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

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalog information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

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

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.



Common Precautions

Be sure to read before handling.

For detailed precautions on every series, refer to main text.

Selection

Warning

1. Confirm the specifications.

Products represented in this catalog are designed for use in compressed air applications only (including vacuum), unless otherwise indicated.

Do not use the product outside their design parameters.

Please contact SMC when using the products in applications other than compressed air (including vacuum).

Mounting

Warning

1. Instruction manual

Install the products and operate them only after reading the instruction manual carefully and understanding its contents. Also keep the manual where it can be referred to as necessary.

2. Securing the space for maintenance

When installing the products, please allow access for maintenance.

3. Tightening torque

When installing the products, please follow the listed torque specifications.

Piping

Caution

1. Before piping

Make sure that all debris, cutting oil, dust, etc., are removed from the piping.

2. Wrapping of pipe tape

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not get inside the piping. Also, when the pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.

Air Supply

Warning

1. Operating fluid

Please consult with SMC when using the product in applications other than compressed air (including vacuum).

Regarding products for general fluid, please ask SMC about applicable fluids.

2. Install an air dryer, aftercooler, etc.

Excessive condensate in a compressed air system may cause valves and other pneumatic equipment to malfunction.

Installation of an air dryer, after cooler etc. is recommended.

3. Drain flushing

If condensate in the drain bowl is not emptied on a regular basis, the bowl will over flow and allow the condensate to enter the compressed air lines.

If the drain bowl is difficult to check and remove, it is recommended that a drain bowl with the auto-drain option be installed.

For compressed air quality, refer to "Air Preparation Equipment" catalog.

4. Use clean air

If the compressed air supply is contaminated with chemicals, synthetic materials, corrosive gas, etc., it may lead to break down or malfunction.

Operating Environment

Warning

1. Do not use in environments where the product is directly exposed to corrosive gases, chemicals, salt water, water or steam.

2. Do not expose the product to direct sunlight for an extended period of time.

3. Do not use in a place subject to heavy vibrations and/or shocks.

4. Do not mount the product in locations where it is exposed to radiant heat.

Maintenance

Warning

1. Maintenance procedures are outlined in the operation manual.

Not following proper procedures could cause the product to malfunction and could lead to damage to the equipment or machine.

2. Maintenance work

If handled improperly, compressed air can be dangerous.

Assembly, handling and repair of pneumatic systems should be performed by qualified personnel only.

3. Drain flushing

Remove drainage from air filters regularly. (Refer to the specifications.)

4. Shut-down before maintenance

Before attempting any kind of maintenance make sure the supply pressure is shut of and all residual air pressure is released from the system to be worked on.

5. Start-up after maintenance and inspection

Apply operating pressure and power to the equipment and check for proper operation and possible air leaks. If operation is abnormal, please verify product set-up parameters.

6. Do not make any modifications to be product.

Do not take the product apart.

Quality Assurance Information (ISO 9001, ISO 14001)

Reliable quality of products in the global market

To enable our customers throughout the world to use our products with even greater confidence, SMC has obtained certification for international standards “ISO 9001” and “ISO 14001”, and created a complete structure for quality assurance and environmental controls. SMC products pursue to meet its customers’ expectations while also considering company’s contribution in society.

Quality management system ISO 9001

This is an international standard for quality control and quality assurance. SMC has obtained a large number of certifications in Japan and overseas, providing assurance to our customers throughout the world.



Environmental management system ISO 14001

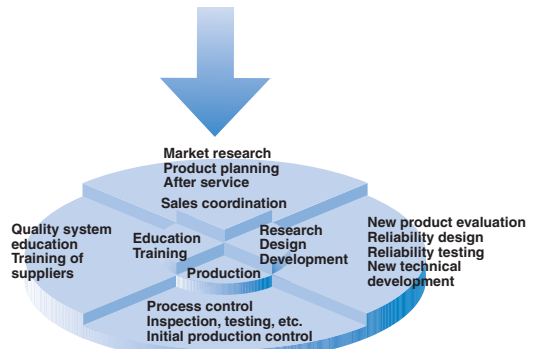
This is an international standard related to environmental management systems and environmental inspections. While promoting environmentally friendly automation technology, SMC is also making diligent efforts to preserve the environment.



SMC’s quality control system



Quality policies



Quality control activities

SMC Product Conforming to Inter

SMC products complying with EN/ISO, CSA/UL standards are supporting



The CE mark indicates that machines and components meet essential requirements of all the EC Directives applied.

It has been obligatory to apply CE marks indicating conformity with EC Directives when machines and components are exported to the member Nations of the EU.

Once “A manufacturer himself” declares a product to be safe by means of CE marking (declaration of conformity by manufacturer), free distribution inside the member Nations of the EU is permissible.

■ CE Mark

SMC provides CE marking to products to which EMC and Low Voltage Directives have been applied, in accordance with CETOP (European hydraulics and pneumatics committee) guide lines.

■ As of February 1998, the following 18 countries will be obliged to conform to CE mark legislation

Iceland, Ireland, United Kingdom, Italy, Austria, Netherlands, Greece, Liechtenstein, Sweden, Spain, Denmark, Germany, Norway, Finland, France, Belgium, Portugal, Luxembourg

■ EC Directives and Pneumatic Components

• Machinery Directive

The Machinery Directive contains essential health and safety requirements for machinery, as applied to industrial machines e.g. machine tools, injection molding machines and automatic machines. Pneumatic equipment is not specified in Machinery Directive. However, the use of SMC products that are certified as conforming to EN Standards, allows customers to simplify preparation work of the Technical Construction File required for a Declaration of Conformity.

• Electromagnetic Compatibility (EMC) Directive

The EMC Directive specifies electromagnetic compatibility. Equipment which may generate electromagnetic interference or whose function may be compromised by electromagnetic interference is required to be immune to electromagnetic affects (EMS/immunity) without emitting excessive electromagnetic affects (EMI/emission).

• Low Voltage Directive

This directive is applied to products, which operate above 50 VAC to 1000 VAC and 75 VDC to 1500 VDC operating voltage, and require electrical safety measures to be introduced.

• Simple Pressure Vessels Directive

This directive is applied to welded vessels whose maximum operating pressure (PS) and volume of vessel (V) exceed 50 bar/L. Such vessels require EC type examination and then CE marking.

national Standards

you to comply with EC directives and CSA/UL standards.



■ CSA Standards & UL Standards

UL and CSA standards have been applied in North America (U.S.A. and Canada) symbolizing safety of electric products, and are defined to mainly prevent danger from electric shock or fire, resulting from trouble with electric products. Both UL and CSA standards are acknowledged in North America as the first class certifying body. They have a long experience and ability for issuing product safety certificate. Products approved by CSA or UL standards are accepted in most states and governments beyond question.

Since CSA is a test certifying body as the National Recognized Testing Laboratory (NRTL) within the jurisdiction of Occupational Safety and Health Administration (OSHA), SMC was tested for compliance with CSA Standards and UL Standards at the same time and was approved for compliance with the two Standards. The above CSA NRTL/C logo is described on a product label in order to indicate that the product is approved by CSA and UL Standards.

■ TSSA (MCCR) Registration Products

TSSA is the regulation in Ontario State, Canada. The products that the operating pressure is more than 5 psi (0.03 MPa) and the piping size is bigger than 1 inch. fall into the scope of TSSA regulation.

Products conforming to CE Standard

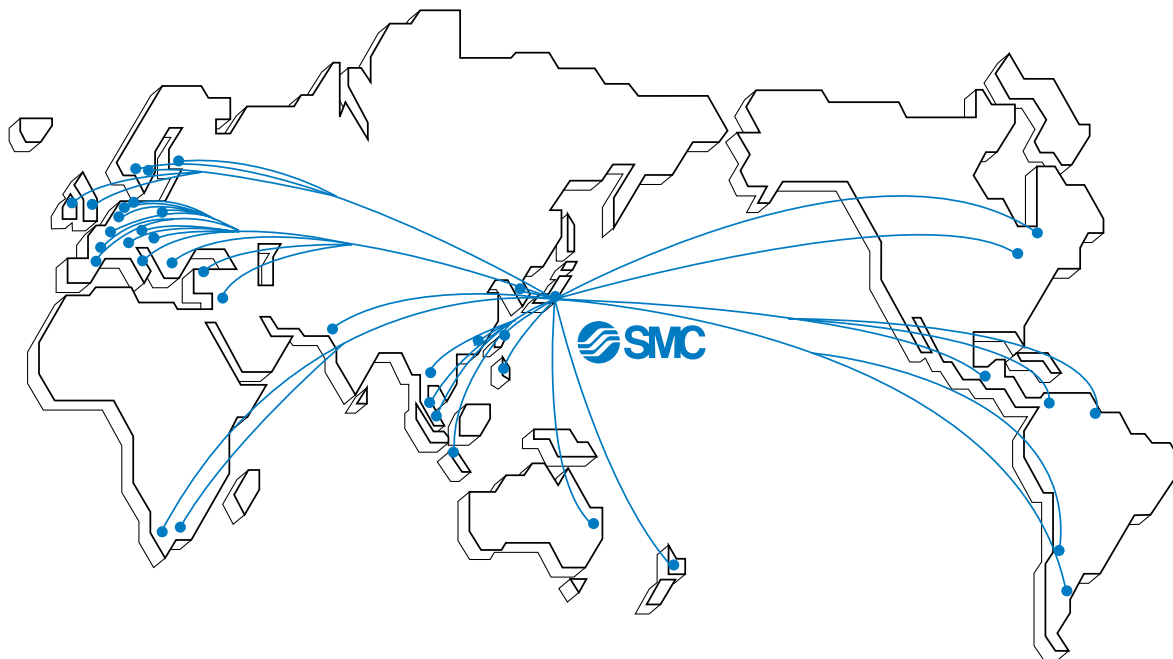


With CE symbol for simple visual recognition

In this catalog each accredited product series is indicated with a CE mark symbol. However, in some cases, every available models may not meet CE compliance. Please visit our web site for the latest selection of available models with CE mark.

<http://www.smcworld.com>

SMC's Global Service Network



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MEXICO **SMC Corporation (Mexico), S.A. DE C.V.**

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