Precision Regulator

Series IR1000/2000/3000

	Series	Model	Regulating pressure range	Port size	Page
Basic Type	Series IR1000 	IR1000	0.005 to 0.2 MPa	1/8	553
		IR1010	0.01 to 0.4 MPa		
		IR1020	0.01 to 0.8 MPa		
	Series IR2000 	IR2000	0.005 to 0.2 MPa	1/4	553
		IR2010	0.01 to 0.4 MPa		
		IR2020	0.01 to 0.8 MPa		
	Series IR3000 	IR3000	0.01 to 0.2 MPa	1/4, 3/8, 1/2	553
		IR3010	0.01 to 0.4 MPa		
		IR3020	0.01 to 0.8 MPa		
Air Operated Type	Series IR2000 	IR2120	0.01 to 0.8 MPa	1/4	553
	Series IR3000 	IR3120	0.01 to 0.8 MPa	1/4, 3/8, 1/2	553

Precision Regulator

Series IR1000/2000/3000

Bracket and pressure gauge can be mounted from 2 directions

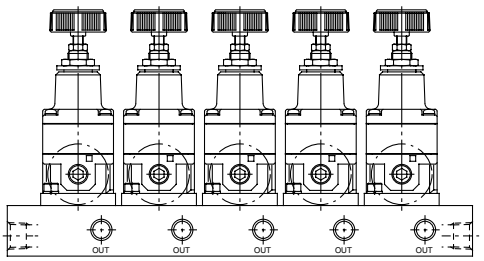
Mounting is possible on either the front or the back.

Expanded regulating pressure range

The maximum set pressure has been expanded from the conventional 0.7 MPa to 0.8 MPa.

Compact and lightweight

IR1000 width 35 mm mass 140 g
IR2000 width 50 mm mass 300 g
IR3000 width 66 mm mass 640 g



Manifolding is possible 8 stations at the maximum

Made to order specifications
(Except Series **IR2120, IR3000**)

Compatible with new modular connection brackets (-X120)

Can be combined with AF (Air filter) and AFM (Mist separator).

Attachments such as a pressure switch can be mounted as accessories

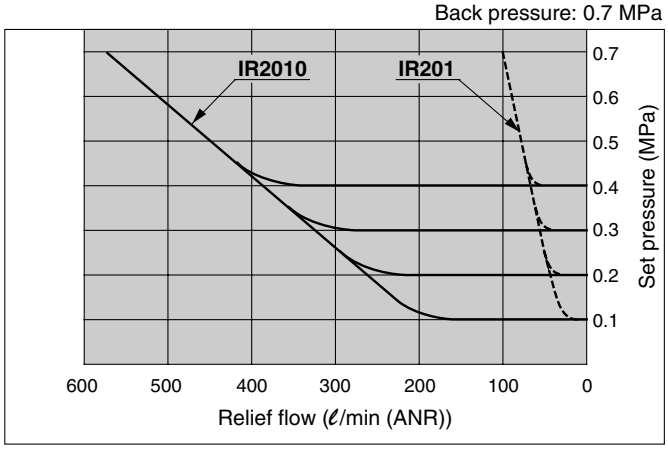
Applicable modular size **IR1000**: 20 type
IR2000: 30 type
IR3000: 40 type

∗ Mount the standard type with a conventional connection bracket.

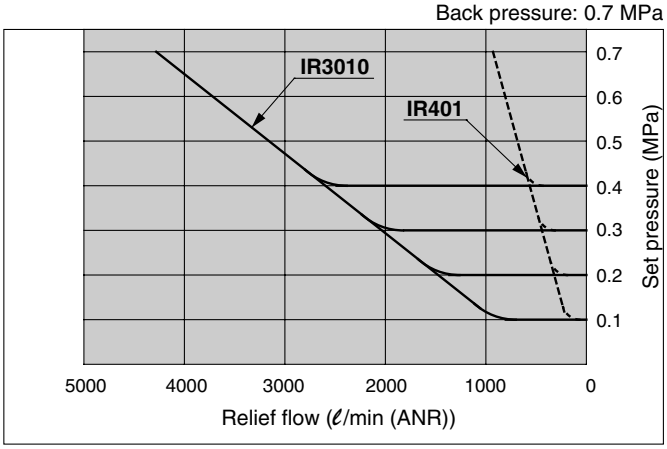
Relief flow characteristics

Possible to relieve (exhaust) air ranged 50 to 4000 ℓ/min (ANR)

Back pressure: 0.7 MPa



Back pressure: 0.7 MPa



Series Variations

Specifications \ Model		Basic type			Air operated type	
		IR10□0	IR20□0	IR30□0	IR2120	IR3120
Maximum set pressure	0.2 MPa	●	●	●	—	—
	0.4 MPa	●	●	●	—	—
	0.8 MPa	●	●	●	●	●
Port size	Rc 1/8	●	—	—	—	—
	Rc 1/4	—	●	●	●	●
	Rc 3/8	—	—	●	—	●
	Rc 1/2	—	—	●	—	●

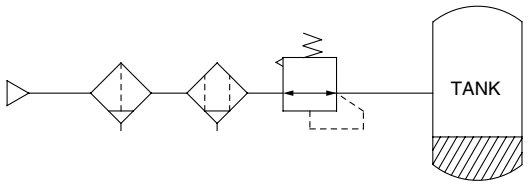
Made to Order Specifications

Symbol	Specifications/Content
10-	Clean Series
20-	Copper-free and fluorine-free
80-	Ozone resistant
-T	For high temperature
-L	For low temperature
-X1	Non-grease specifications
-X465□	With digital pressure switch (ISE30)
IRM□□	Manifold (Except Series IR2120, IR3000)

∗ For details, refer to page 560.

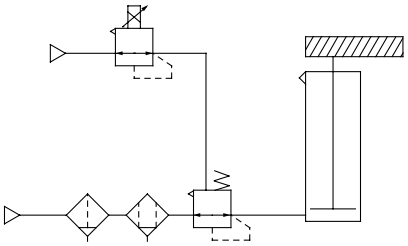
Application Example

Constant fluid pressure



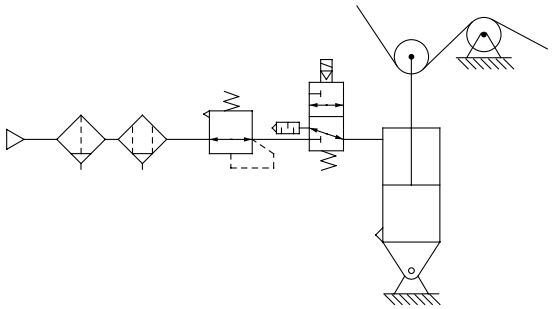
• Since there is a large effective area for supply and exhaust pressure, setting can be done quickly.

Balance and drive
Accurate balance pressure setting

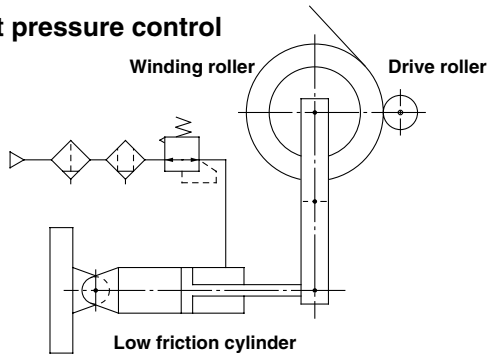


• Limits pressure fluctuation when driving a cylinder, maintaining excellent static and dynamic balance.

Accurate pressure setting — Sensitivity within 0.2% F.S. (Full Span) Tension control

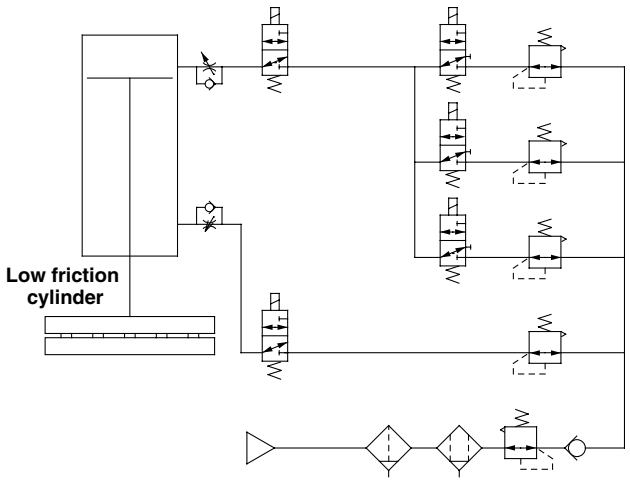


Contact pressure control

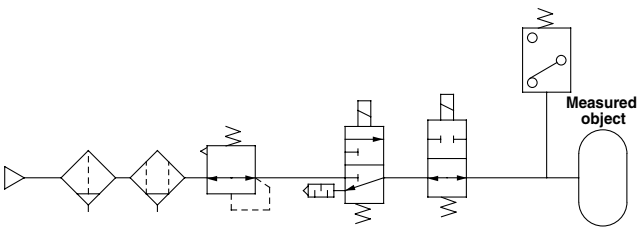


• Adapts to the cylinder's piston displacement, maintaining a constant pressure.

Multistage control of pressing force for workpiece (Wrapping machine)



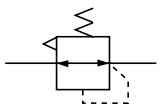
Leak test circuit



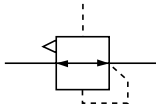
Precision Regulator
Series IR1000/2000/3000

JIS Symbol

Basic type



Air operated type



Standard Specifications

Model	Basic type			Air operated type	
	IR10□0	**IR20□0**	**IR30□0**	**IR2120**	**IR3120**
Max. supply pressure	Max. 1.0 MPa				
Min. supply pressure (1)	Set pressure + 0.05 MPa		Set pressure + 0.1 MPa	Set pressure + 0.05 MPa	Set pressure + 0.1 MPa
Regulating pressure range	**IR1000:** 0.005 to 0.2 MPa **IR1010:** 0.01 to 0.4 MPa **IR1020:** 0.01 to 0.8 MPa	**IR2000:** 0.005 to 0.2 MPa **IR2010:** 0.01 to 0.4 MPa **IR2020:** 0.01 to 0.8 MPa	**IR3000:** 0.01 to 0.2 MPa **IR3010:** 0.01 to 0.4 MPa **IR3020:** 0.01 to 0.8 MPa	0.01 to 0.8 MPa	0.01 to 0.8 MPa
Input signal pressure (2)	———			0.01 to 0.8 MPa	0.01 to 0.8 MPa
Sensitivity	Within 0.2% of full span				
Repeatability	Within ±0.5% of full span				
Linearity (3)	———			Within ±1% of full span	
Air consumption (4) (At supply pressure of 1.0 MPa)	4.4 ℓ/min (ANR) or less	4.4 ℓ/min (ANR) or less	11.5 ℓ/min (ANR) or less	4.4 ℓ/min (ANR) or less	11.5 ℓ/min (ANR) or less
Port size	Rc 1/8	Rc 1/4	Rc 1/4, 3/8, 1/2	Rc 1/4	Rc 1/4, 3/8, 1/2
Pressure gauge port	Rc 1/8 (2 locations)				
Ambient and fluid temperature	–5 to 60°C (No freezing)				
Mass (kg)	0.14	0.30	0.64	0.35	0.71

Note 1) With the condition of no flow on the output side. Together with the set pressure, be sure to maintain a minimum differntial pressure of 0.05 MPa for models IR1000 and IR2000, and 0.1 MPa for model IR3000.
Note 2) Applicable only to air operated types IR2120 and IR3120. The basic type is excepted.
Note 3) Indicates the linearity of the output pressure with respect to the input signal pressure.
Note 4) Air is normally being discharged to the atmosphere from a bleed hole or an exhaust port.

How to Order

IR 2 0 0 0 — □ 02 □ — □ — □

Precision regulator

Body size

1	IR1000
2	IR2000
3	IR3000

Type of setting

0	Basic type (Handle)
1	Air operated type (Series IR2000/3000 only)

Regulating pressure range

For series IR1000/2000

0	0.005 to 0.2 MPa
1	0.01 to 0.4 MPa
2	0.01 to 0.8 MPa

Note) Air operated type is model IR2120 only.

For series IR3000

0	0.01 to 0.2 MPa
1	0.01 to 0.4 MPa
2	0.01 to 0.8 MPa

Note) Air operated type is model IR3120 only.

Thread type

Nil	Rc
N *	NPT
F *	G

* Option

Port size

Symbol	size	Application		
		IR1000	IR2000	IR3000
01	1/8	●		
02	1/4		●	●
03	3/8			●
04	1/2			●

Accessory

Nil	None
B	With bracket
G	With pressure gauge

Suffix (Pressure gauge mounting)

Nil	—
Note) R	Pressure gauge, Bracket, Name plate, Mounting on the opposite side

Note) The standard mounting position of the pressure gauge is on the front, when viewing the regulator with the SUP side to the left and OUT side to the right.

Made to Order Specifications (Refer to page 560)

Symbol	Specifications/Content
Nil	—
T	For high temp. enviroments (–5 to 100˚C) (Max. 80˚C with pressure gauge.)
L	For low temp. enviroments (–30 to 60˚C)
X1	Non-grease specifications
X120	Compatible with modular connection brackets(Refer to page 554)
X465□	With digital pressure switch (ISE30)

* 1 Add prefix (10-) for the clean room specification.
* 2 Add prefix (20-) for the copper-free and fluorine-free specification.
* 3 Add prefix (80-) for the ozone-resistant specification.
* 4 Manifold specification is available for IR1000 and IR2000. (Except IR2120 and IR3000)

Series IR3000

Series IR2000

Series IR1000

Specification Combinations

◎: Standard specifications ○: Combination possible ▭: Combination not possible

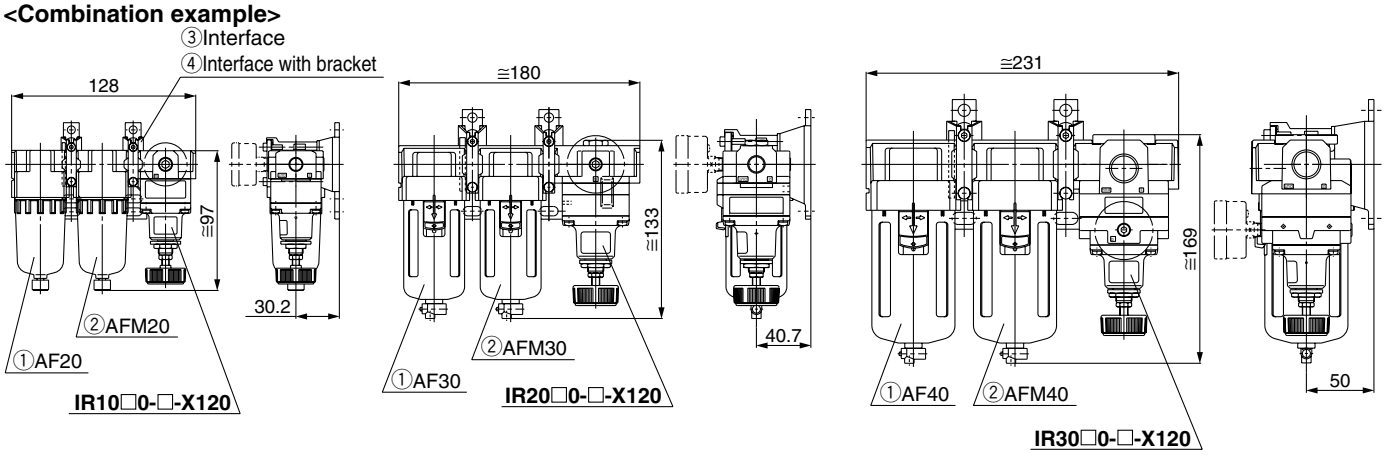
Specifications		Symbol	Applicable model				
			IR1000 IR1010 IR1020	IR2000 IR2010 IR2020	IR2120	IR3000 IR3010 IR3020	IR3120
Standard specifications	Set pressure Max. 0.2 MPa	0	◎	◎		◎	
	Set pressure Max. 0.4 MPa	1	◎	◎		◎	
	Set pressure Max. 0.8 MPa	2	◎	◎	◎	◎	◎
	Connection Rc 1/8	01	◎				
	Connection Rc 1/4	02		◎	◎	◎	◎
	Connection Rc 3/8	03				◎	◎
	Connection Rc 1/2	04				◎	◎
Accessory	Bracket	B	○	○	○	○	○
	Pressure gauge	G	○	○	○	○	○
Option	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				○	○

Modular Products and Accessory Combinations

Description	Applicable model		
	IR10□0-□□-X120	IR20□0-□□-X120	IR30□0-□□-X120
1. Air filter	AF20	AF30	AF40
2. Mist separator	AFM20	AFM30	AFM40
3. Interface	Y200	Y300	Y400
4. Interface with bracket	Y200T	Y300T	Y400T

∗ Note) Use the made-to-order product (IR□□□-X120) for modular connections.
The interface and interface with bracket listed above cannot be connected to the standard type.
Use a conventional connection interface when connecting the standard type with modular connections.

<Combination example>



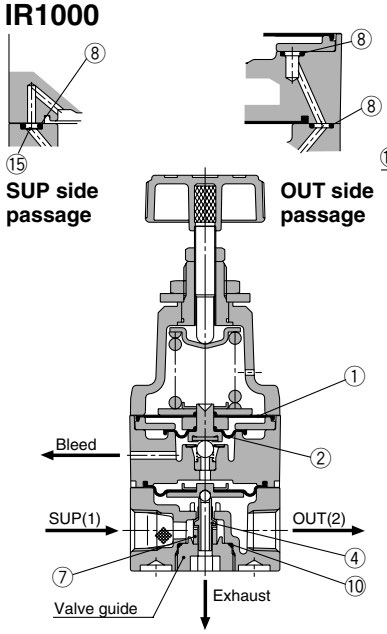
Accessory (Option)/Part No.

Description	Part no.								
	IR1000	IR1010	IR1020	IR2000	IR2010	IR2020/2120	IR3000	IR3010	IR3020/3120
Bracket	P36201023			P36202028			P36203018		
Pressure gauge ∗	G33-2-01	G33-4-01	G33-10-01	G43-2-01	G43-4-01	G43-10-01	G43-2-01	G43-4-01	G43-10-01

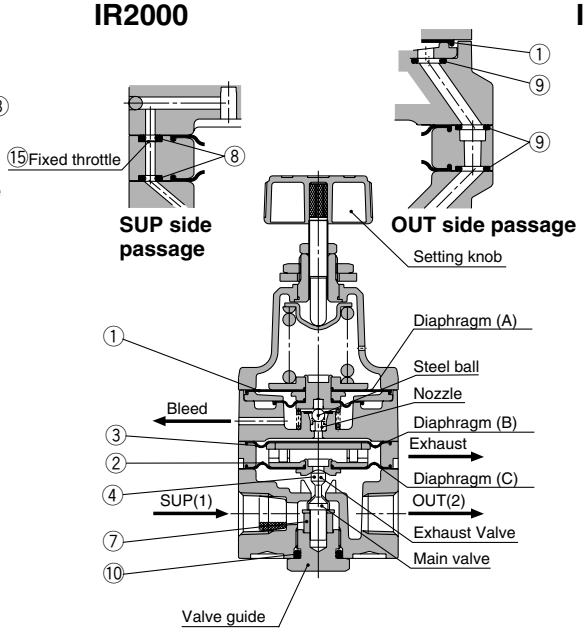
∗ Accuracy ±3% (Full span)

Construction

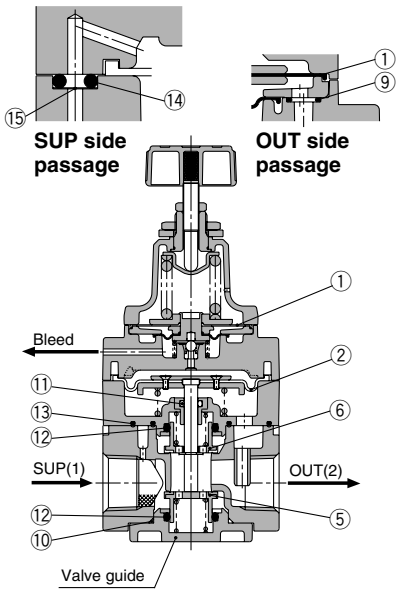
IR1000



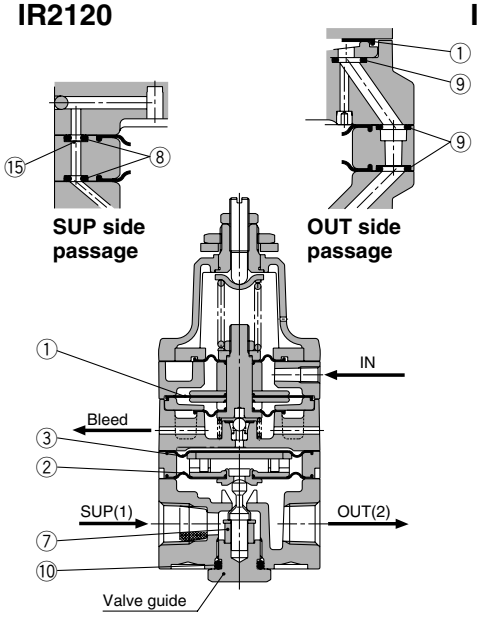
IR2000



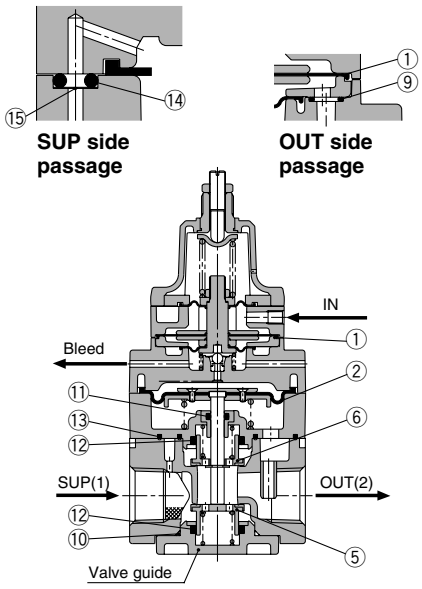
IR3000



IR2120



IR3120



Working principle (For IR2000)

When the setting knob is turned, the nozzle is closed by the flapper allowing the supply air that flows in from the upstream side to pass through the fixed throttle. It then acts on diaphragm B as nozzle back pressure, the main valve is pushed down by the generated force, and the supply pressure flows out to the downstream side. The air pressure that flows in acts on diaphragm C. While opposing the force generated by diaphragm B it also acts on diaphragm A, opposing the compression force of the setting spring and becomes the set pressure. If the set pressure rises too high, diaphragm A is pushed up, the interval between the flapper and the nozzle widens, the nozzle back pressure drops, the balance of diaphragms B and C is broken, the main valve closes, the exhaust valve opens and the excess pressure from the downstream side is discharged to the atmosphere. In this way fine pressure variations are detected by the nozzle/flapper type pilot mechanism, and precise pressure adjustment is performed.

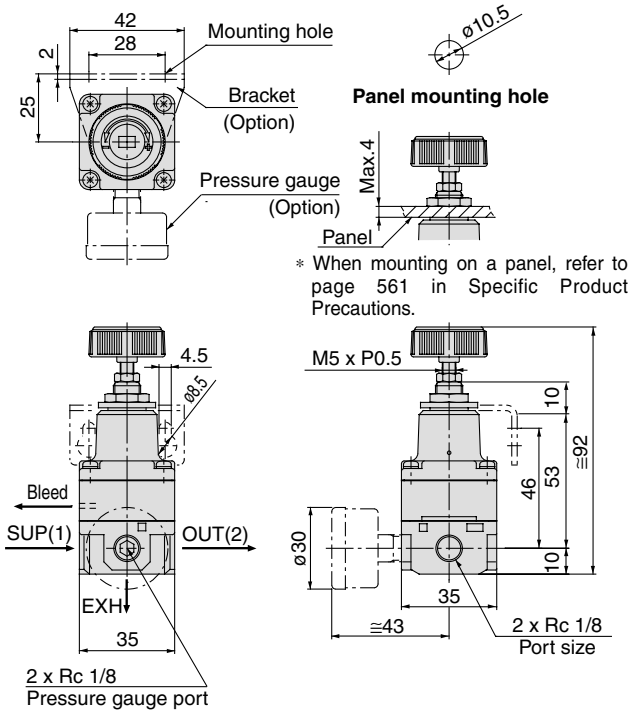
Replacement Parts

No.	Description	Material	IR10□0		IR20□0		IR30□0		IR2120		IR3120	
			Part no.	Qty.	Part no.	Qty.	Part no.	Qty.	Part no.	Qty.	Part no.	Qty.
1	**Diaphragm assembly**	NBR, other	P362010-1	1	P362020-2	1	P362020-2	1	P362020-13	1	P362020-13	1
2	**Diaphragm assembly**	NBR, other	P362010-2	1	P362020-5	1	P362030-1	1	P362020-5	1	P362030-1	1
3	**Diaphragm**	NBR, other	—	—	P36202019	1	—	—	P36202019	1	—	—
4	**Valve**	Stainless steel, NBR	P36201058	1	P36202068#1	1	—	—	P36202068#1	1	—	—
5	**Valve**	Brass, NBR	—	—	—	—	P36203009#1	1	—	—	P36203009#1	1
6	**Valve**	Brass, NBR	—	—	—	—	P36203010#1	1	—	—	P36203010#1	1
7	**Damper**	NBR, other	P36201021	1	P36202026	1	—	—	P36202026	1	—	—
8	**O-ring**	H-NBR	ø2.5 x 1.05	3	ø1.42 x 1.52	2	—	—	ø1.42 x 1.52	2	—	—
9	**O-ring**	NBR	—	—	ø4.5 x 1	3	ø4.5 x 1	1	ø4.5 x 1	3	ø4.5 x 1	1
10	**O-ring**	NBR	ø10 x 1.3	1	JISB2401P11	1	ø27.8 x 1.5	1	JISB2401P11	1	ø27.8 x 1.5	1
11	**O-ring**	NBR	—	—	—	—	JISB2401P5 Note)	1	—	—	JISB2401P5 Note)	1
12	**O-ring**	NBR	—	—	—	—	JISB2401P16 Note)	2	—	—	JISB2401P16 Note)	2
13	**Seal (A)**	NBR	—	—	—	—	P36203015	1	—	—	P36203015	1
14	**Seal (B)**	NBR	—	—	—	—	P36203016	3	—	—	P36203016	3
15	**Fixed throttle**	Stainless steel	P36202018	1	P36202018	1	P36203017	1	P36202018	1	P36203017	1
Repair kit no. (A set of above nos. ① to ⑮.)			KT-IR1000		KT-IR2000		KT-IR3000		KT-IR2120		KT-IR3120	

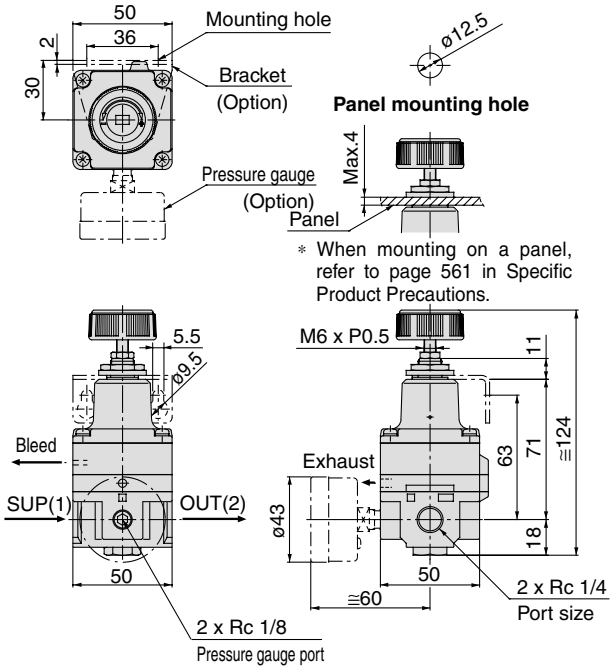
Note) Use mini-flick type.

Dimensions

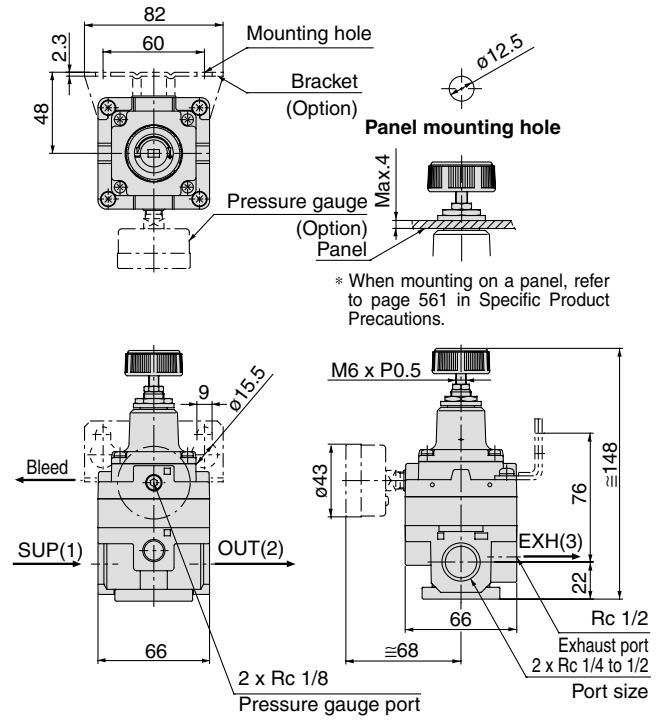
IR10□0-01□



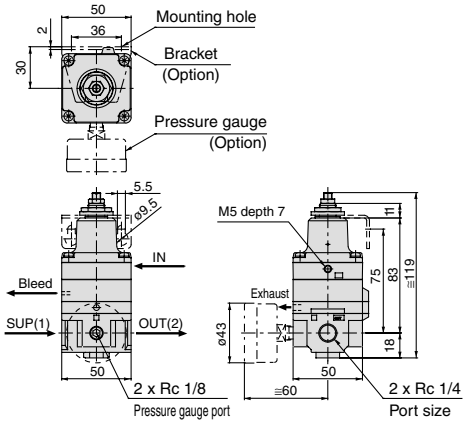
IR20□0-02□



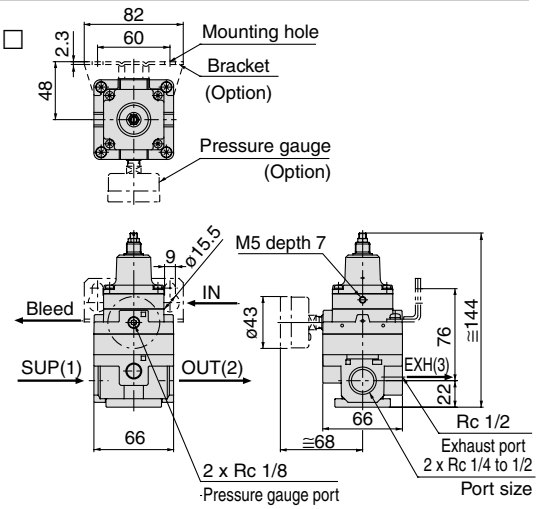
IR30□0-0□□



IR2120-02□



IR3120-0□□

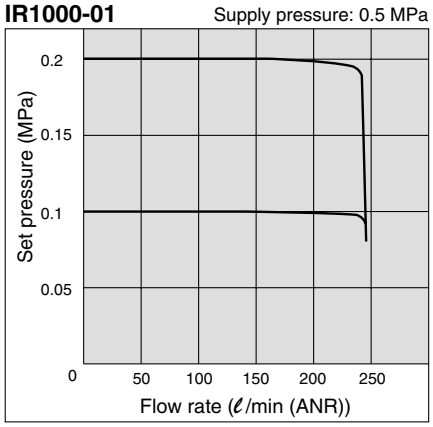


Series IR1000

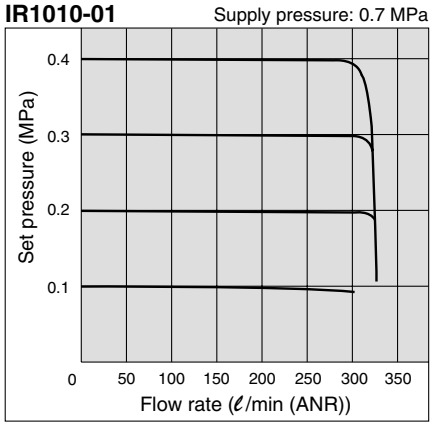
Flow Characteristics

∗ Testing methods conform to JIS B 8372.

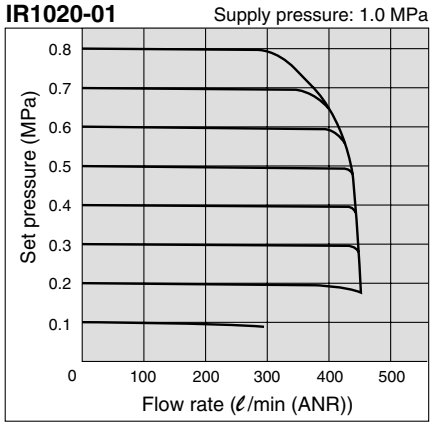
IR1000-01 Supply pressure: 0.5 MPa



IR1010-01 Supply pressure: 0.7 MPa

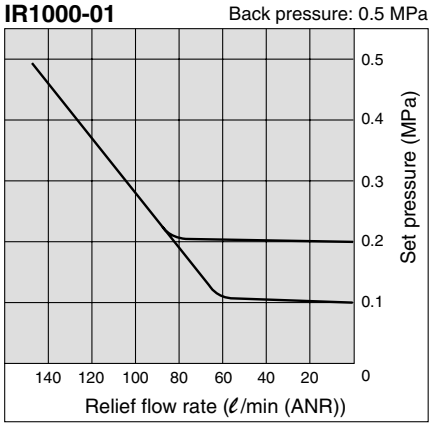


IR1020-01 Supply pressure: 1.0 MPa

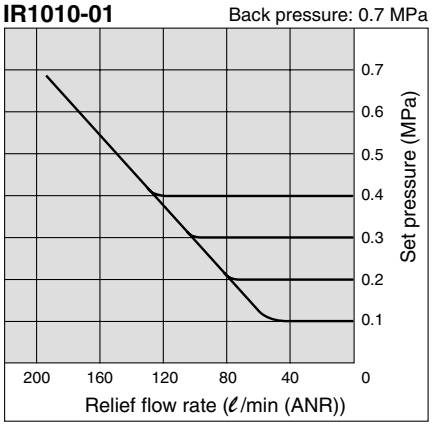


Relief Characteristics

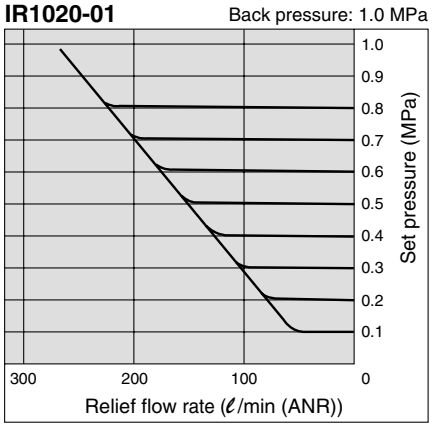
IR1000-01 Back pressure: 0.5 MPa



IR1010-01 Back pressure: 0.7 MPa



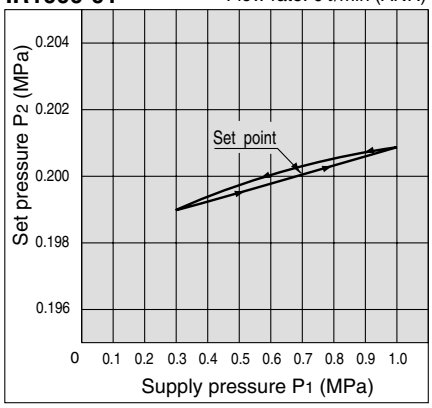
IR1020-01 Back pressure: 1.0 MPa



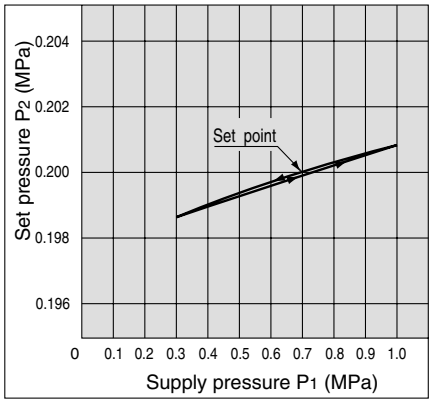
Pressure Characteristics

Supply pressure: 0.7 MPa
Set pressure: 0.2 MPa
Flow rate: 0 ℓ/min (ANR)

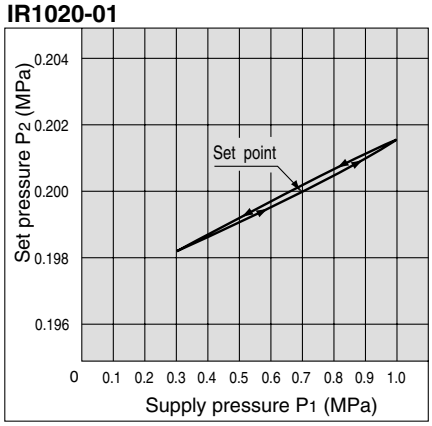
IR1000-01



IR1010-01



IR1020-01

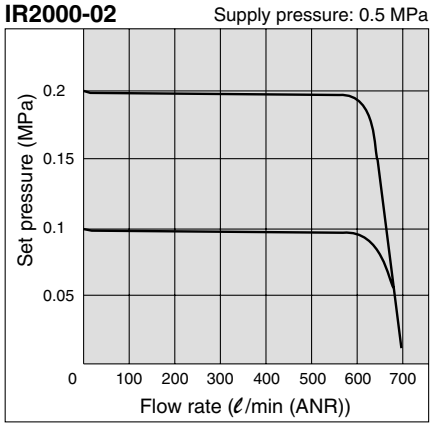


Series IR2000

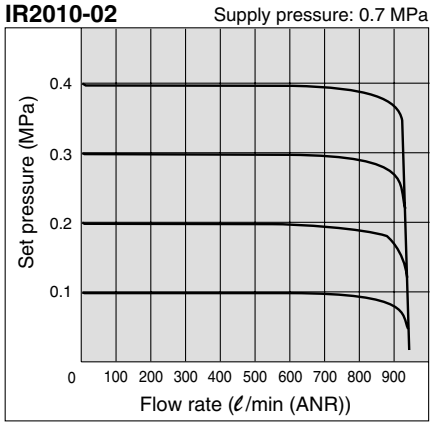
Flow Characteristics

∗ Testing methods conform to JIS B 8372.

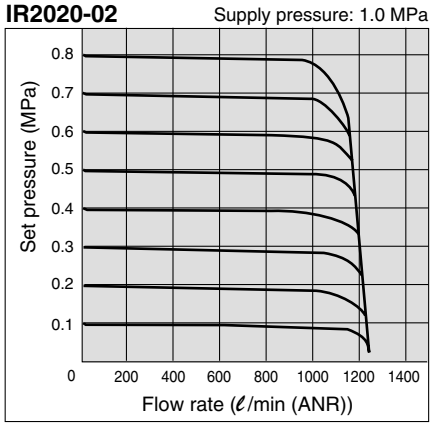
IR2000-02 Supply pressure: 0.5 MPa



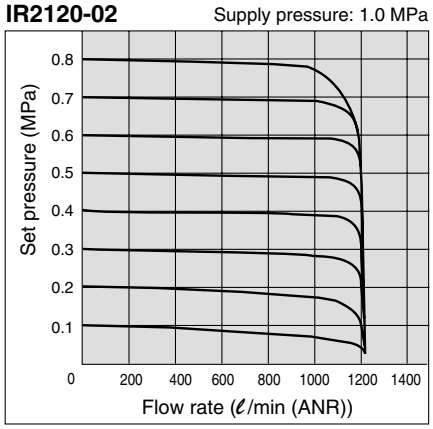
IR2010-02 Supply pressure: 0.7 MPa



IR2020-02 Supply pressure: 1.0 MPa

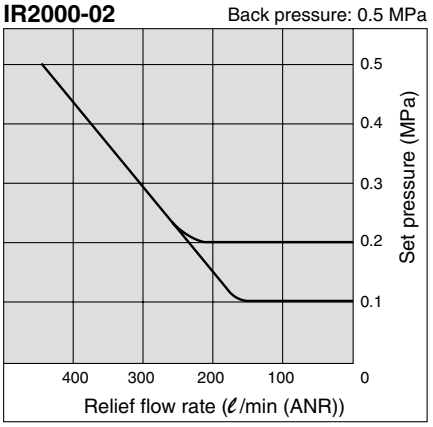


IR2120-02 Supply pressure: 1.0 MPa

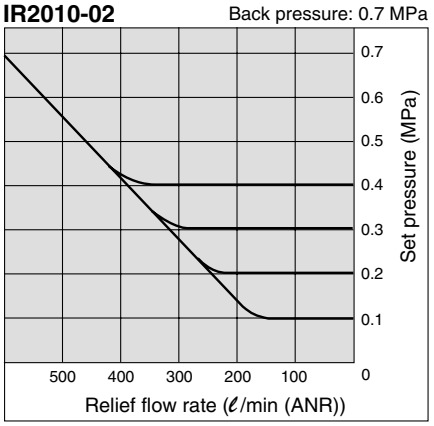


Relief Characteristics

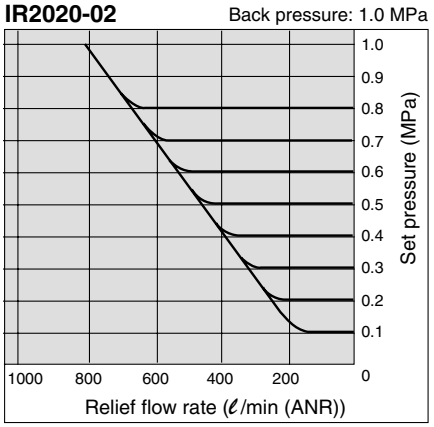
IR2000-02 Back pressure: 0.5 MPa



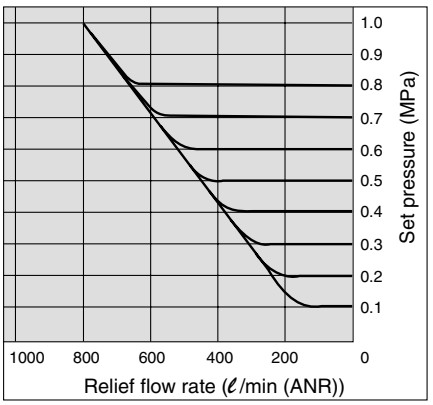
IR2010-02 Back pressure: 0.7 MPa



IR2020-02 Back pressure: 1.0 MPa



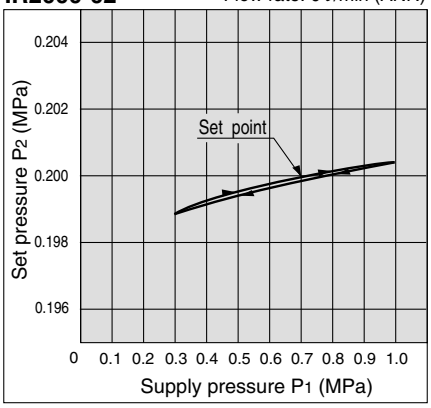
IR2120-02 Back pressure: 1.0 MPa



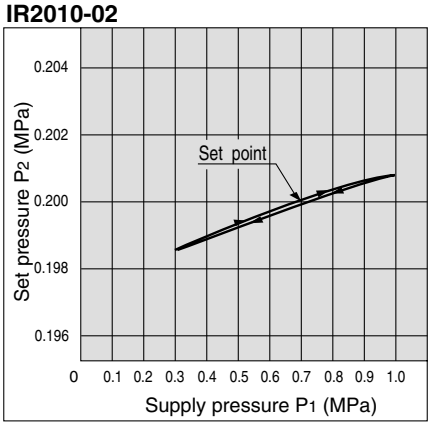
Pressure Characteristics

Supply pressure: 0.7 MPa
Set pressure: 0.2 MPa
Flow rate: 0 ℓ/min (ANR)

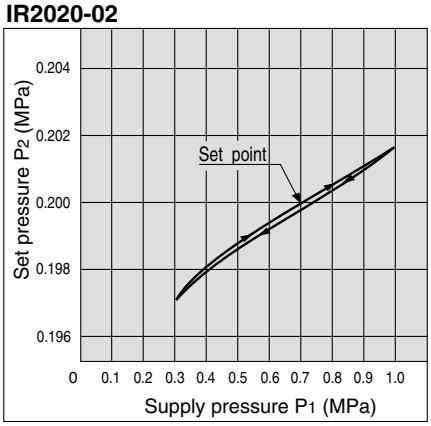
IR2000-02



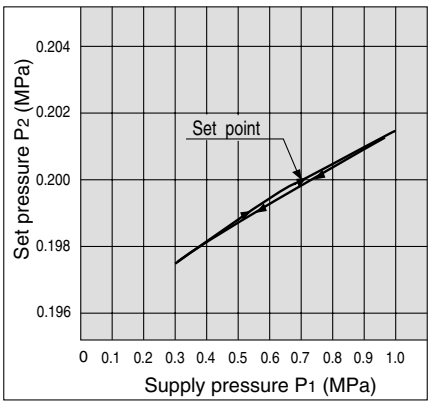
IR2010-02



IR2020-02



IR2120-02

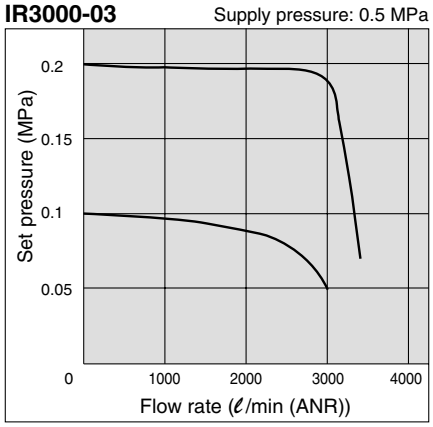


Series IR3000

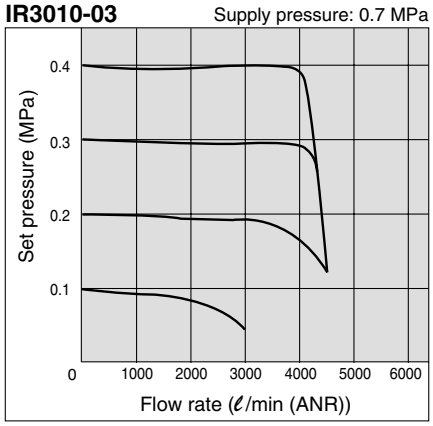
Flow Characteristics

∗ Testing methods conform to JIS B 8372.

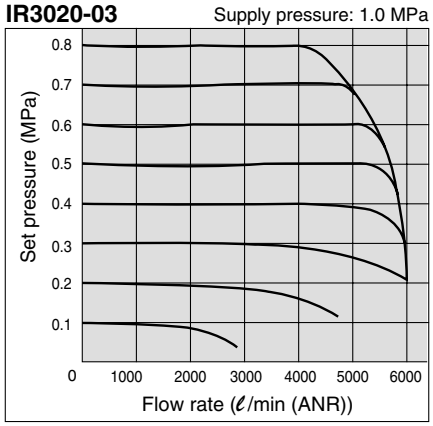
IR3000-03 Supply pressure: 0.5 MPa



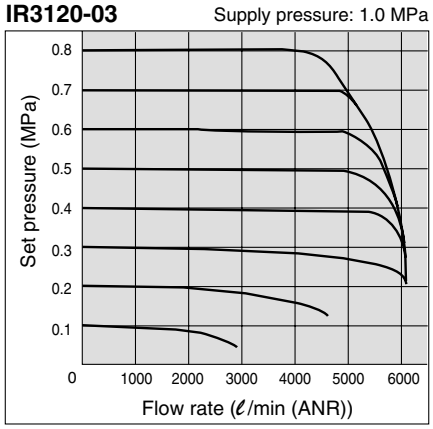
IR3010-03 Supply pressure: 0.7 MPa



IR3020-03 Supply pressure: 1.0 MPa

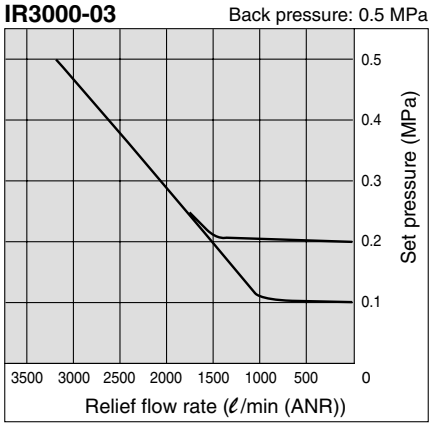


IR3120-03 Supply pressure: 1.0 MPa

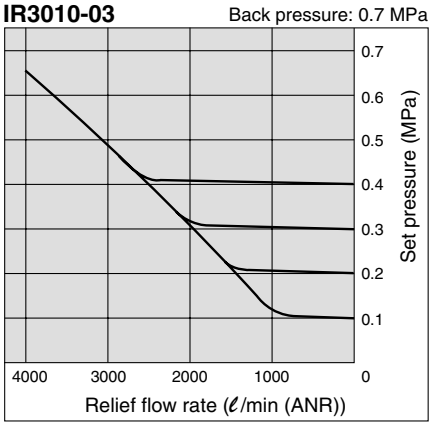


Relief Characteristics

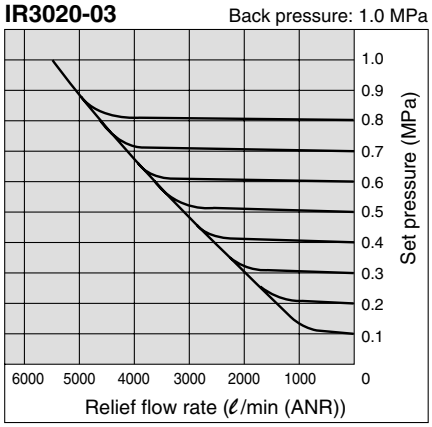
IR3000-03 Back pressure: 0.5 MPa



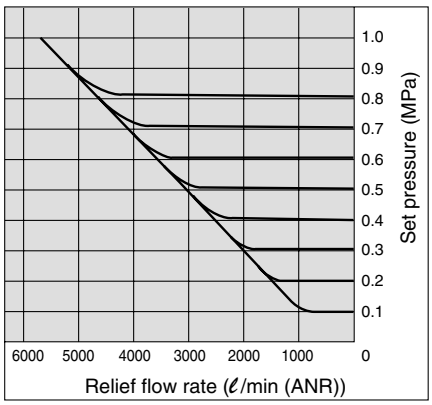
IR3010-03 Back pressure: 0.7 MPa



IR3020-03 Back pressure: 1.0 MPa



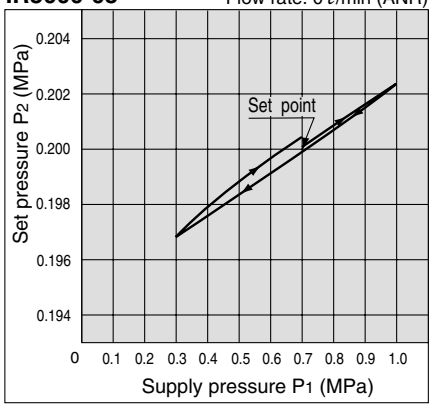
IR3120-03 Back pressure: 1.0 MPa



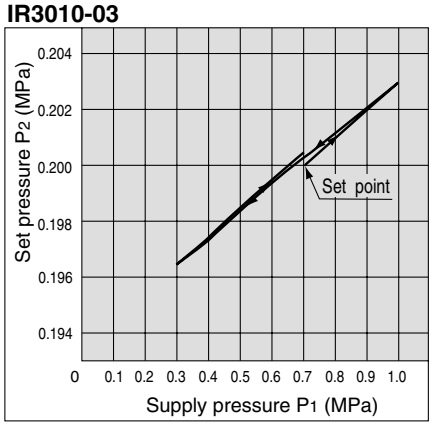
Pressure Characteristics

Supply pressure: 0.7 MPa
Set pressure: 0.2 MPa
Flow rate: 0 ℓ/min (ANR)

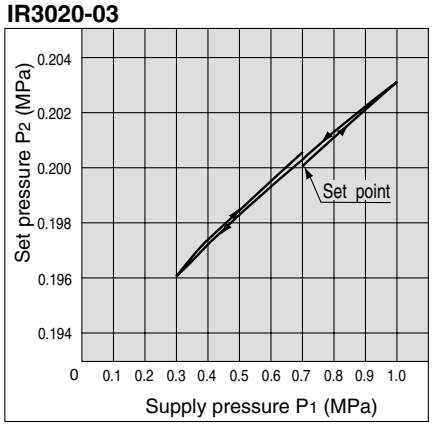
IR3000-03



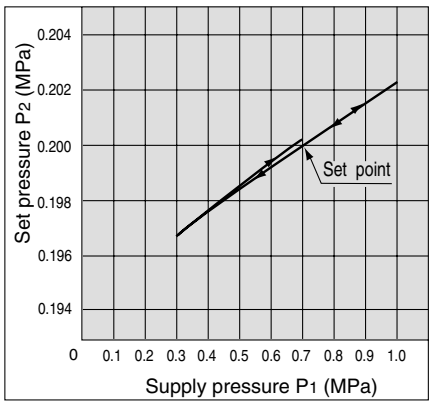
IR3010-03



IR3020-03



IR3120-03



Series IR1000/2000/3000
Made to Order Specifications:

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

1 Clean Series

10 — Standard model no.

Note) Please contact SMC if a product with pressure gauge is desired.

● **Clean Series**

Specifications

Cleanliness	Class 10000
Bleed hole	With M5 fitting (Applicable tubing O.D. ø6)
EXH port	IR1000/2000: With M5 fitting (Applicable tubing O.D. ø6) IR3000: Rc 1/2 female thread
Grease	Teflon grease

2 Copper-free and Fluorine-free

External and internal copper parts are changed to stainless steel or aluminum.

20 — Standard model no.

Note) Please contact SMC if a product with pressure gauge is desired.

● **Copper-free and Fluorine-free**

3 Ozone Resistant

Fluoro rubber is used for rubber seal materials.

80 — Standard model no.

● **Ozone resistant**

4 For High/Low Temperature Environments

Standard model no. — T

● **For high/low temperature environments**

T	For high temperature
L	For low temperature

Specifications

Symbol	T	L
Environment	For high temp. environments	For low temp. environments
Ambient temperature	–5 to 100°C (Max. 80°C with pressure gauge)	–30 to 60°C
Rubber material	Fluoro rubber	Special NBR

5 Non-grease Specifications

Assembly is performed in an ordinary environment without using grease. However, since parts are not washed, they are not completely oil-free.

Standard model no. — X1

● **Non-grease specifications**

6 With Digital Pressure Switch

With digital pressure switch (model no: ISE30-01-□□-ML). Mount a digital pressure switch into the connection port for pressure gauge, as it is not mounted at the time of shipment.

Specifications

Made to order part no.		–X465□
Pressure switch	**Set pressure range (MPa)**	–0.1 to 1
	Desolution of setting and display (MPa)	0.001
	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

Standard model no. Note) **— X465 A**

● **Switch specifications**

Symbol	Output specifications
A	NPN output
B	PNP output
C	1-5 V output
D	4-20 mA output

● **With digital pressure switch**

Note) Except for symbol "G"

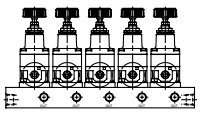
Note 1) Please contact SMC separately for details about the external dimensions, etc.

Note 2) For details on handling digital pressure switch and specifications, refer to Best Pneumatics No. 6 for digital pressure switch: Series ISE30.

Note 3) Digital pressure switch is packed togther.

7 Manifold Specifications (Except type IR2120 and series IR3000)

2 to 8 station manifold type regulators.
(Please contact SMC regarding 9 or more stations.)



IRM 10 — □ □ G — □

● **Set pressure and quantity**

0□	0.2 MPa setting 1 to n pcs.
1□	0.4 MPa setting 1 to n pcs.
2□	0.8 MPa setting 1 to n pcs.

Example 1) 0.4 MPa setting with 6 stations
IRM10-6G-16

Example 2) 0.2 MPa setting 2 pcs.,
0.4 MPa setting 2 pcs.,
0.8 MPa setting 1 pc.
with 5 stations
IRM20-5G-021221

● **Stations**

2	2 stations
⋮	⋮
8	8 stations

● **Accessory (Pressure gauge)**

Nil	None
G	IR1000: G33-□-01 IR2000: G43-□-01

● **Thread type (Thread on the manifold base)**

Nil	Rc
N	NPT
F	G

● **Body size**

10	IR1000
20	IR2000

● **Manifold type regulator**

Specifications

Stations	2 to 8 stations	
Port	Common SUP	IR1000: 1/4, IR2000: 1/2
	Individual OUT	IR1000: 1/8, IR2000: 1/4
	Individual EXH (From IR body)	
Set pressure	0.2 MPa, 0.4 MPa and 0.8 MPa settings can be combined.	
Accessory (Pressure gauge)	G33-□-01 (IR1000), G43-□-01 (IR2000)	

Note 1) Regulators to be manifolded are counted starting from stations 1 on the left side with the OUT ports in front.

Note 2) When regulators with a different set pressure are manifolded, viewing OUT ports from front, the low pressure range is installed on the left side and high pressure range is on the right side. In case of the "Example 2)" above mentioned, stations 1 and 2 are of 0.2 MPa setting, stations 3 and 4 are of 0.4 MPa setting, and station 5 is of 0.8 MPa setting.

Note 3) Please consult with SMC when a blanking plate is needed.

Series IR1000/2000/3000
Specific Product Precautions 1

Be sure to read before handling.
Refer to front matters 42 and 43 for Safety Precautions and pages 287 to 291 for Precautions on every series.

Air Supply

⚠ Warning

1. **If the drain removal from air filter and mist separator is missed, drain will be flown out to the outlet side and may result in a malfunction of the pneumatic equipment.**
   When removing drain is difficult, use of a filter with an auto-drain is recommended.

⚠ Caution

1. **If the supply pressure line contains drain or particlate, etc., the fixed throttle can become clogged leading to malfunction, and therefore, in addition to an air filter (SMC Series AF) be sure to use a mist separator (SMC Series AM, AFM).**
   Refer to pages 2 and 3 regarding air quality.
2. **Never use a lubricator on the supply side of the regulator, as this will positively cause the fixed throttle to become clogged and result in a malfunction. If lubrication is required for terminal devices, connect a lubricator on the output side of the regulator.**

Maintenance

⚠ Warning

1. **When the valve guide (refer to construction drawing on page 555) is to be removed during maintenance, first reduce the set pressure to "0" and completely shut off the supply pressure.**
2. **When a pressure gauge is to be mounted, remove the plug after reducing the set pressure to "0".**

Precautions for IR10□0 only

⚠ Warning

1. **When remounting the valve guide after removing it for maintenance, use a tightening torque of no more than 0.6 N·m.**
   Since the valve guide on this product is made of resin, there is a danger of damage if tightened with a torque exceeding the prescribed value.

Handling

⚠ Caution

1. **Do not apply force when transferring, mounting and dropping the regulator with a pressure gauge.**
   This may cause misalignment of the pressure gauge pointer.

Operation

⚠ Caution

1. **Do not use a precision regulator outside the range of its specifications as this can cause failure. (Refer to specifications.)**
2. **When mounting is performed, make connections while confirming port indications.**
3. **Screw a panel nut with the recommended proper torque when mounting onto a panel.**
   Looseness or faulty sealing will occur if tightening torque is insufficient, while thread damage will result if the torque is excessive.

Recommended Proper Torque (N·m)

IR1000	IR2000	IR3000
12.5	21	21

4. **If a directional switching valve (solenoid valve, mechanical valve, etc.) is mounted on the supply side of the regulator and repeatedly switched ON and OFF, wear of the nozzle/flapper section will be accelerated and a discrepancy in the setting value may occur. Therefore, avoid using a directional switching valve on the supply side. In the event a directional switching valve will be used, install it on the output side of the regulator.**
5. **Air is normally released from the bleed hole (the hole on the side of the body's mid-section). This is a necessary consumption of air based on the construction of the precision regulator, and is not an abnormality.**
6. **Make sure to tighten the lock nut after pressure adjustment.**

Precautions for IR30□0, IR3120 only

⚠ Caution

1. **The supply pressure is relatively high (approx. 0.5 MPa or more), the set pressure is low (approx. 0.1 MPa or less), and when operated with the output side released to the atmosphere, there may be pulsations in the setting pressure. In this kind of situation, operate with the supply pressure reduced as much as possible, or increase the set pressure somewhat and restrict the output line (add and adjust a stop valve, etc.).**
2. **The capacity of the output side is large, and when used for the purpose of a relief function, the exhaust sound will be loud when being relieved. Therefore, operate with a silencer (SMC Series AN) mounted on the exhaust port (EXH port). The connection is Rc 1/2.**

Precautions for IR2120, IR3120 (air operated type) only

⚠ Caution

1. **Since the output types of IR2120 and IR3120 are the same pressure as the input signal pressure, select a type of regulator (general purpose or precision type) for input signal pressure adjustment according to the application.**
2. **The screw on the topmost section is a zero point adjustment screw which is locked at the factory and requires no adjustment for operation.**