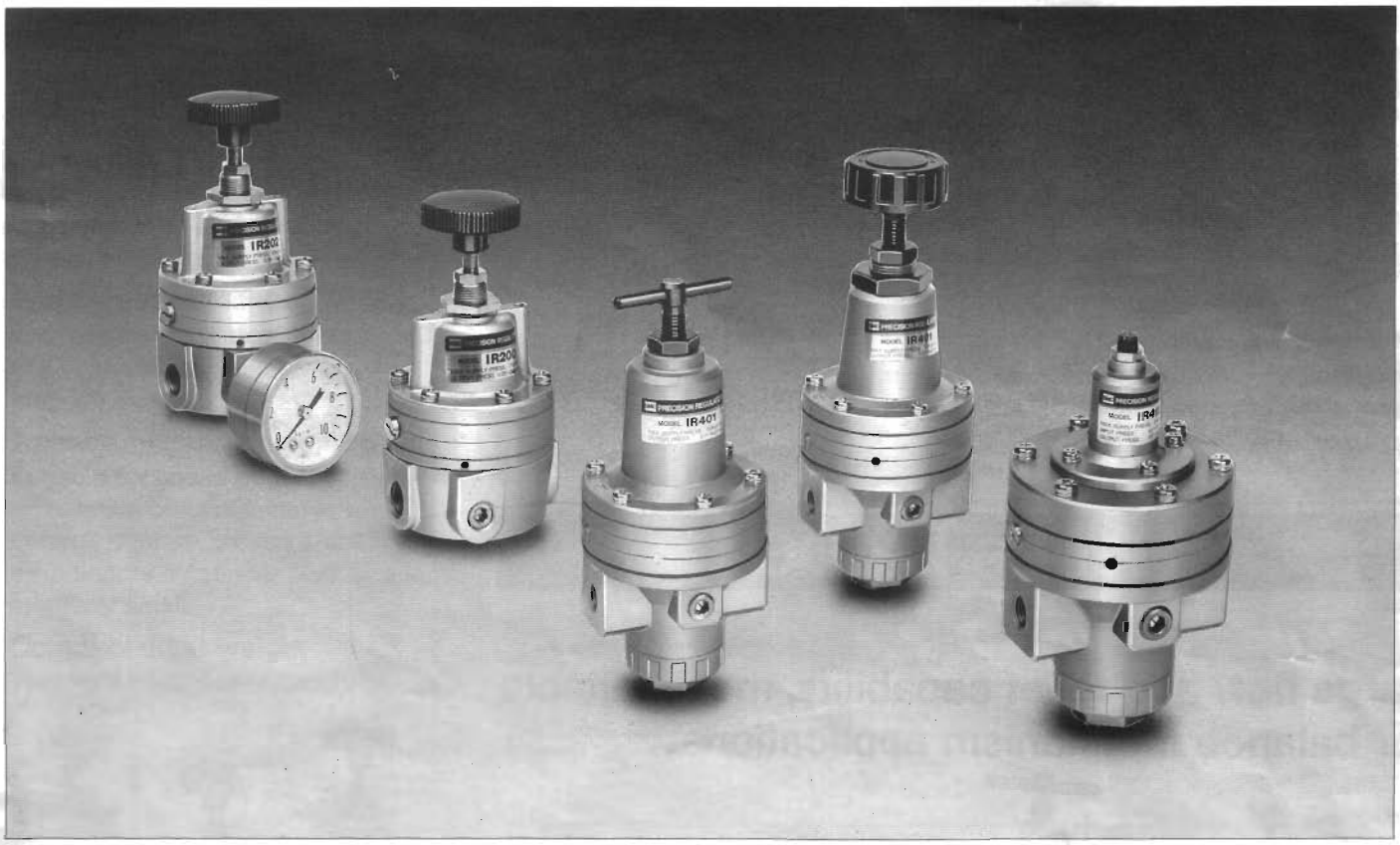
CAT. E606—Ⓐ

SMC

Precision Regulator

Series IR200·400



Possible to obtain very high precision and accuracy of pressure setting.

Precision Regulator

Series IR200

Compact and light weight

Sensitivity ——— Within 0.2%F. S.
Repeatability——Within ±0.5%F. S.
Pressure regulation range——0.05 to 7kgf/cm²
Port size——¼

Series IR400

Large flow and relief capability, most suitable for balance mechanism applications.

Standard type Pilot operated type

Sensitivity ——— Within 0.2%F. S.
Repeatability——Within ±0.5%F. S.
Pressure regulation range——0.1 to 7kgf/cm²
Port size——¼, ⅜, ½

SMC Precision Regulator
Series IR200

High accuracy
Possible to regulate accurately the output pressure at 0.2% F.S. sensitivity and ±0.5% F.S. repeatability by an accurate flapper nozzle mechanism.

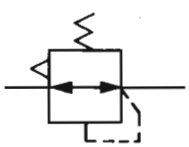
Excellent characteristics
This unit displays very excellent characteristics such as flow, pressure and relief characteristics compared with a general purpose pressure reducer.

Wide pressure range
The wide controllable range of 0.05 to 7 kgf/cm² equivalent to a general purpose regulator.

Balance mechanism applications
Suitable for use in applications such as balance mechanisms, tension control, contact pressure control or air balancer if cylinder bore size is relatively small.

Compact·light weight
Very light weight only 290gf.

Symbol



Specifications

Model	IR200	IR201	IR202
Max. supply pressure	7kgf/cm²{700kpa}		9.9kgf/cm²{990kpa}
Min. supply pressure	Set pressure + 0.5kgf/cm²{50kpa}		
Set pressure	0.05～2kgf/cm² {5～200kPa}	0.05～4kgf/cm² {5～400kPa}	0.05～7kgf/cm² {5～700kPa}
Sensitivity	Within 0.2% of full span		
Repeatability	Within ±0.5% of full span		
Air consumption	(Note) Within 3Nl/min (for supply pressure of 7kgf/cm²)		
Ambient and fluid temperature	−5～60°C		
Port size	1/4		
Pressure gauge connection	1/8 (One part)		
Weight	290gf		

(Note) Air vent must be to atmosphere.

Accessories (Optional)

Description	Part No.
※Pressure gauge	G43-2-01 (for IR200)
	G43-4-01 (for IR201)
	G43-10-01 (for IR202)
Bracket	230451

※Accuracy : ±3%F.S. (full span)

How to Order

IR20 **0** — **02** **B**

- **Set pressure**
  - **0** — 0.05～2kgf/cm²
  - **1** — 0.05～4kgf/cm²
  - **2** — 0.05～7kgf/cm²
- **Port size**
  - **02** — 1/4
- **Accessories**
  - **Nil** — No accessory
  - **B** — With bracket
  - **G** — With pressure gauge

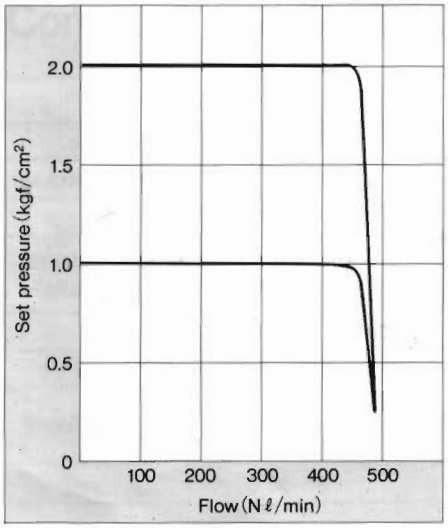
Precision Regulator/Series IR200

Flow characteristics

※To JIS B8372.

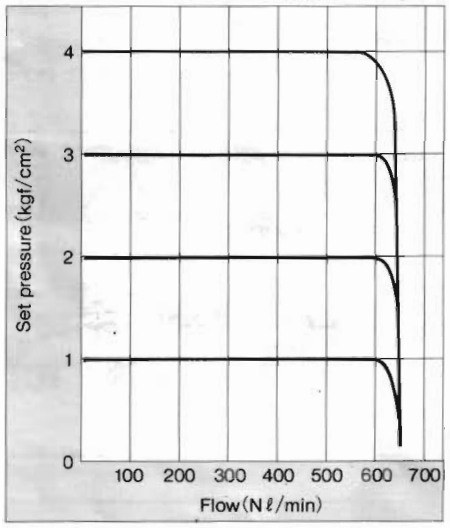
IR200-02

Conditions : Supply pressure 5kgf/cm²



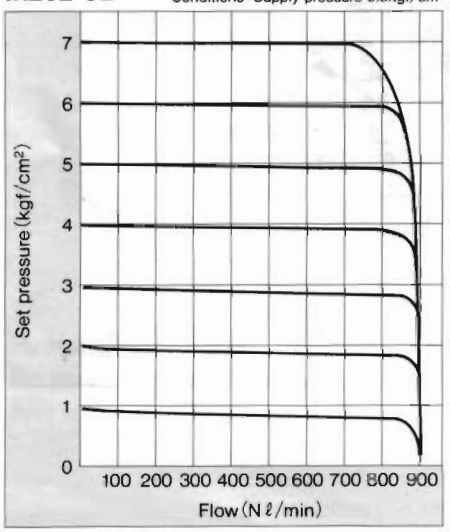
IR201-02

Conditions : Supply pressure 7kgf/cm²



IR202-02

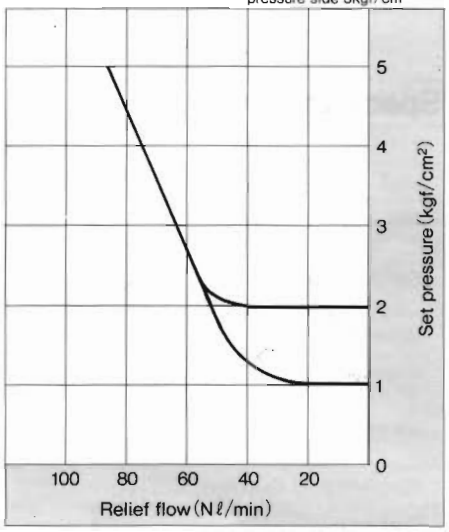
Conditions : Supply pressure 9.9kgf/cm²



Relief characteristics

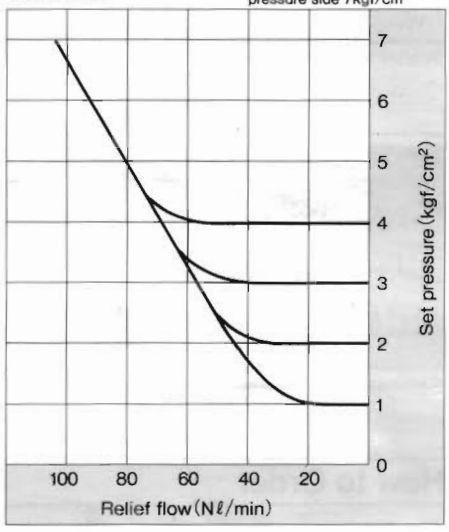
IR200-02

Conditions : Pressure in back pressure side 5kgf/cm²



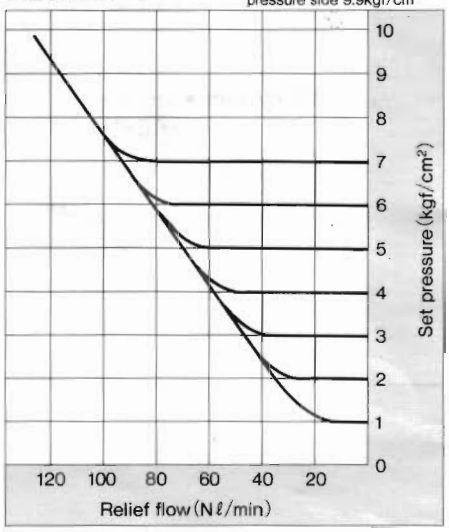
IR201-02

Conditions : Pressure in back pressure side 7kgf/cm²



IR202-02

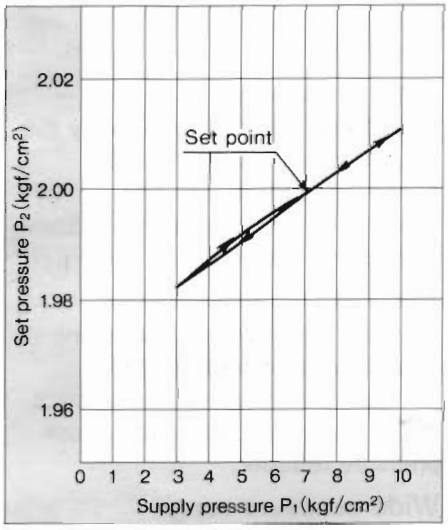
Conditions : Pressure in back pressure side 9.9kgf/cm²



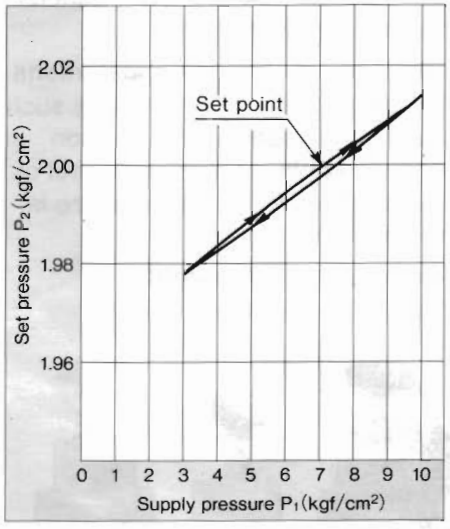
Pressure characteristics

Test conditions : Supply pressure 7kgf/cm²
Set pressure 2kgf/cm²
Flow 0 N ℓ/min.

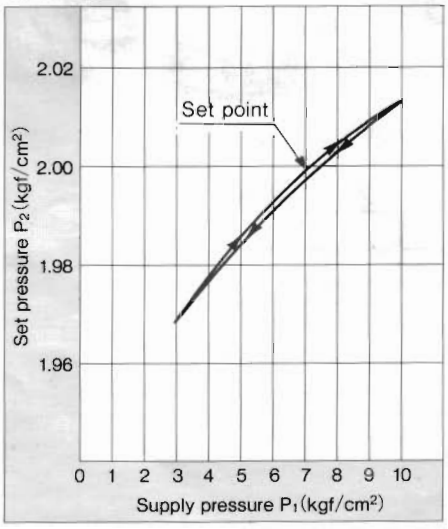
IR200-02



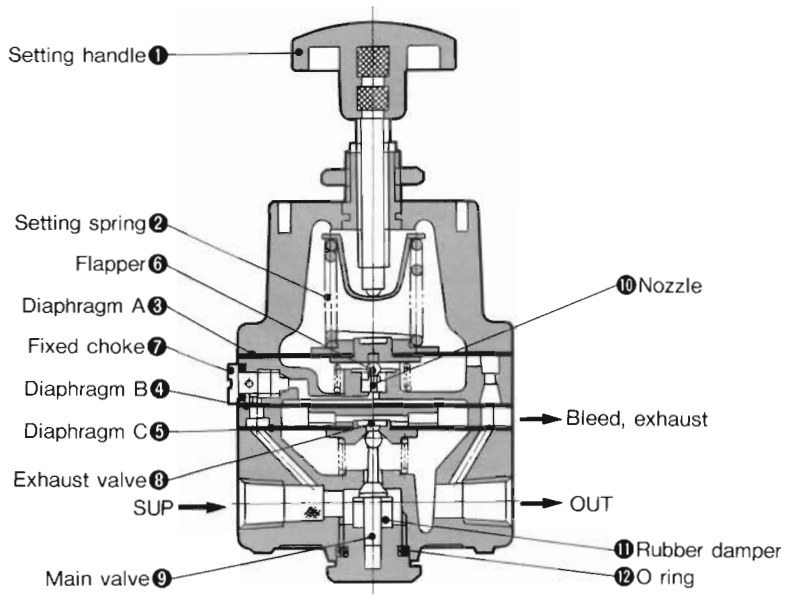
IR201-02



IR202-02



Construction/Operation principle/Spare parts



Clockwise rotation of setting handle ❶ pushes flapper ❻ down to close nozzle ❿. Supply pressure then bleeds into chamber through fixed choke ❼ to act on diaphragm B ❹. This pushes diaphragm assembly down thus opening main valve ❾, allowing supply pressure to flow to outlet. This increased pressure acts on both diaphragm C ❺ and diaphragm A ❸ by means of internal flow paths. The action on diaphragm C ❺ pushes diaphragm upwards thus closing main valve ❾ while the action on diaphragm A ❸ pushes set spring upwards thus opening flapper nozzle. Which decreases pressure on diaphragm B ❹ thus creating a balance resulting in the set pressure as required. Overpressure at the outlet pushes up diaphragm A ❸ and diaphragm C ❺. The upward pressure on diaphragm A ❸ opens flapper/nozzle to decrease, pressure on diaphragm B ❹, while the increased forward pressure also aids to push up diaphragm C ❺, thus opening relief valve to allow forward pressure to bleed away to atmosphere until set pressure is reached. This balancing principle results in a very accurate precision regulation device by use of the flapper/nozzle system.

Spare parts list

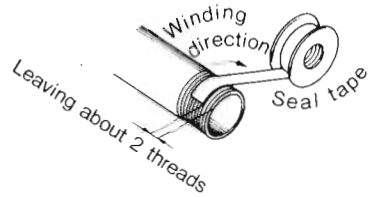
KT-IR200

No.	Description	Material	Part No.
❸	Diaphragm A assembly	NBR Aluminum alloy	23040-1
❹	Diaphragm B	NBR	230498
❺	Diaphragm C assembly	NBR Aluminum alloy	23040-4
❼	Fixed choke assembly (with O ring)	Stainless steel, NBR	230230A
❾	Valve assembly	Stainless steel, NBR, Brass	23040-5
⓫	Rubber damper	NBR	230422
⓬	O ring	NBR	JIS B2401 P11 1 Class A

Precautions

❶Ensure to flush piping thoroughly befor connection to ensure no chips, cutting oil, dust, etc, is present in the system.

❷Take care to ensure no chips, threads or sealant enters the ports while connecting piping. When winding with sealant tape, ensure to leave first 1.5 to 2 threads free of tape.



❸Ingress of drain fluid or dust at the inlet can degrade operation by clogging of the fixed choke. Therefore, a mist separater (series AM) should be employed in addition to standard air filter (series AF). Refer to our Air Cleaning Equipment (Catalog No. CAT. E3G) for the correct quality of air supply.

❹Ensure routine maintenance of air filter and mist separater. (Drain exhaust and element cleaning or replacement).

❺Lubrication should not be used at the supply side because the fixed choke may become clogged resulting in poor operation of the regulator.
If lubrication is required by the terminal equipment, a lublicator can be connected to the output side of the regulator.

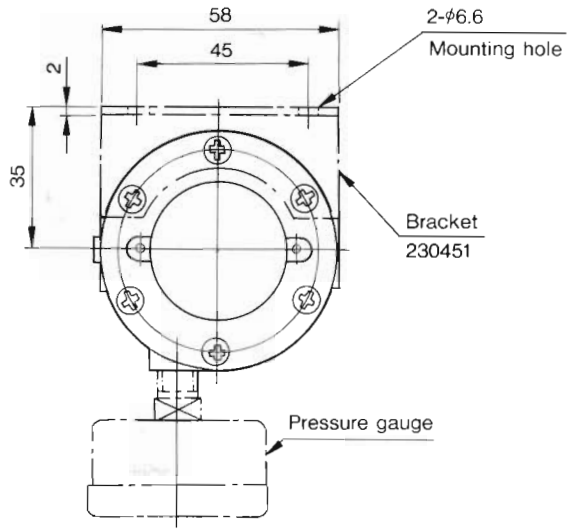
❻For mounting, connect in direction of the arrow which indicates the correct air flow direction .

❼Repeated ON-OFF operation of a directional control valve (solenoid valve, mechanical valve, etc.) in the supply line of the regulator may cause some lag of the set value through wear of the nozzle and flapper parts.
Therefore, a directional control valve should not be used in the supply line but can be used at the output of the regulator.

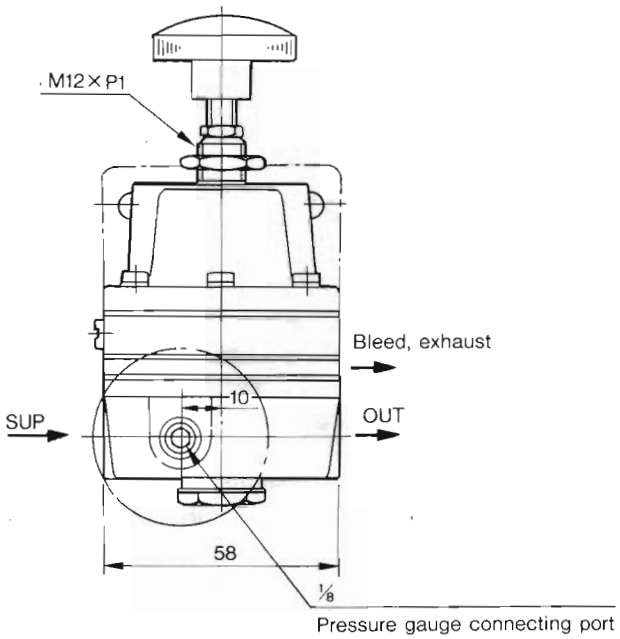
❽Air is usually constantly exhausted from the bleed opening (horizontal hole in the body central portion). This air consumption is necessary for correct operation of the precision regulator. Exhaustion of air is normal operation.

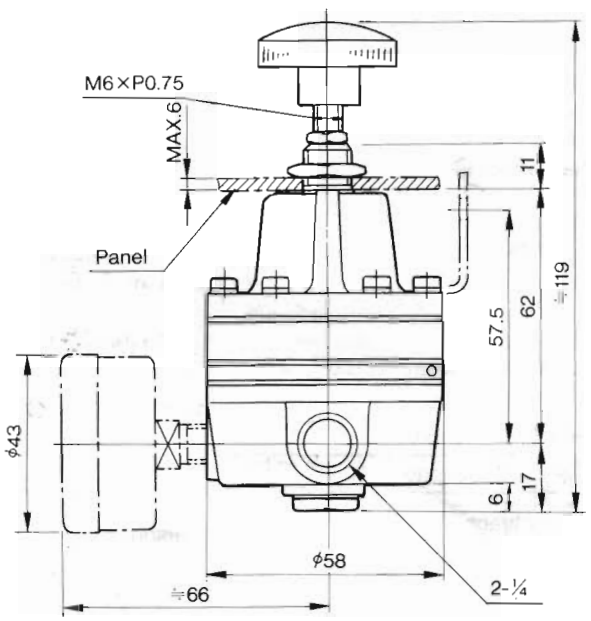
Precision Regulator/Series IR200

Dimensions



Panel mounting hole





SMC Precision Regulator
Series IR400

High accuracy
Possible to regulate accurately the output pressure at 0.2% F. S. sensitivity and ±0.5% F. S. repeatability by an accurate flapper nozzle mechanism.

Exellent characteristics
This unit displays very excellent characteristics such as flow, pressure and relief characteristics compared with a general purpose pressure reducer.

Large capacity
Both supply air flow and relief flow are large capacity.

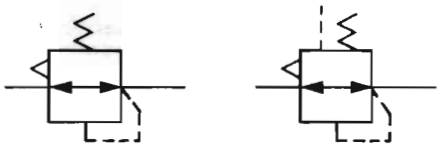
Wide pressure range
The wide controllable range of 0.05 to 7kgf/cm² equivalent to a general purpose regulator.

Most suitable for balance mechanism applications.
Possible to use for wide range of applications such as tension control contact pressure control, or applications having balance mechanism or for use with various types of test equipment.

Possible to remote control

Panel mount type | Standard type | Pilot operated type

Symbol



Standard type | Pilot operated type

Specifications

Model	Standard type			Pilot operated type
	IR400	IR401	IR402	IR412
Max. supply pressure	9.9kgf/cm²{990kPa}			
Min. supply pressure	Set pressure+1kgf/cm²{100kPa}			
Set pressure	0.1~2kgf/cm² {10~200kPa}	0.1~4kgf/cm² {10~400kPa}	0.1~7kgf/cm² {10~700kPa}	0.1~7kgf/cm² {10~700kPa}
(Note 1) Input signal pressure	—			0.1~7kgf/cm² {10~700kPa}
Sensitivity	Within 0.2% of full span			
Repeatability	Within ±0.5% of full span			
(Note 1) (Note 2) Lineality	—			Within ±1% of full span
Air consumption	(Note 3) The bleed opening : Within 6Nℓ/min (for supply pressure of 9kgf/cm²) Exhaust port : Within 2Nℓ/min (at the max. set pressure)			
Ambient and fluid temperature	−5~60°C			
Port size	1/4・3/8・1/2			
Pressure gauge connection	1/4 (Two port)			
Weight	1.0kgf (Panel mount: 1.2kgf)			0.9kgf

(Note 1) Not applicable to IR400, IR401, IR402 and IR412 only.
(Note 2) Indicates output pressure to input signal pressure linearity.
(Note 3) Exhaust air into the atmosphere.

Accessories (optional)

Description	Part No.
※Pressure gauge	G46-2-02 (for IR400)
	G46-4-02 (for IR401)
	G46-10-02 (for IR402, IR412)
Bracket	B24P

※Accuracy : ±3% F. S. (full span)

How to Order

IR4 0 0 – 02 B – R

Type
0 — Standard type
1 — Pilot operated type

Set pressure
0 — 0.1~2kgf/cm²
1 — 0.1~4kgf/cm²
2 — 0.1~7kgf/cm²
※Pilot operated type : Only IR412.

Port size
02 — 1/4
03 — 3/8
04 — 1/2

Accessories
Nil — No accessory
B — With bracket
G — With pressure gauge

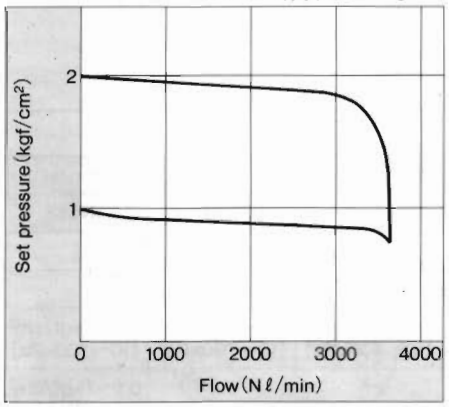
Additional mark
P — Expect panel mount/IR412
R — Round plastic handle/panel mount type does not require to R mark. (Supplied with round type handle.)

Precision Regulator : Series IR400

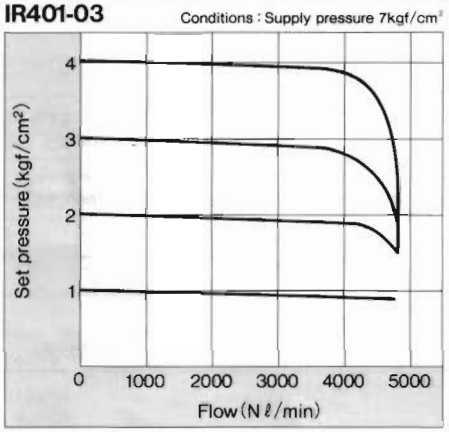
Flow characteristics

※To JIS B8372

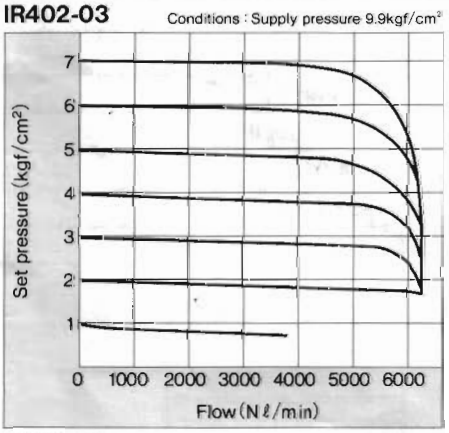
IR400-03 Conditions : Supply pressure 5kgf/cm²



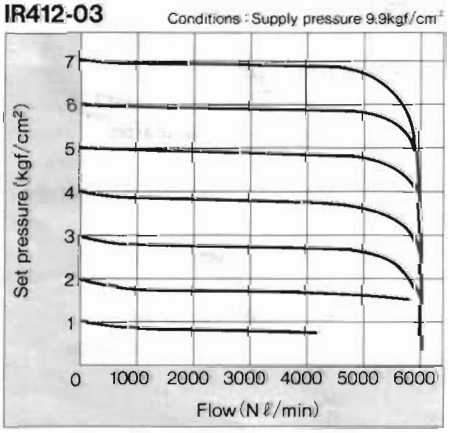
IR401-03 Conditions : Supply pressure 7kgf/cm²



IR402-03 Conditions : Supply pressure 9.9kgf/cm²

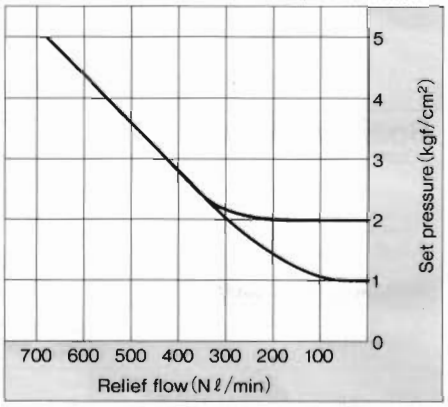


IR412-03 Conditions : Supply pressure 9.9kgf/cm²

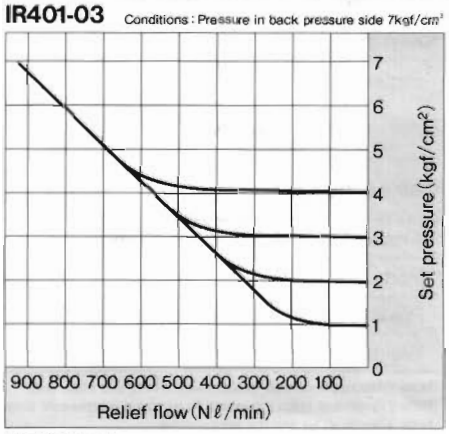


Relief characteristics

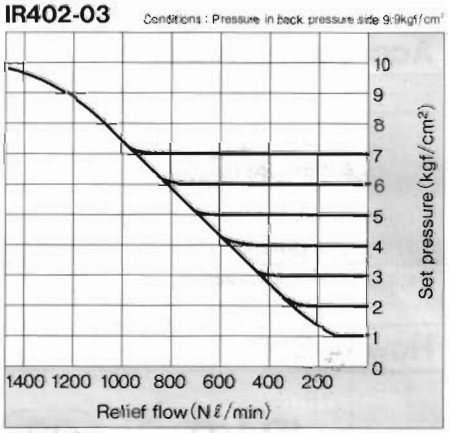
IR400-03 Conditions : Pressure in back pressure side 5kgf/cm²



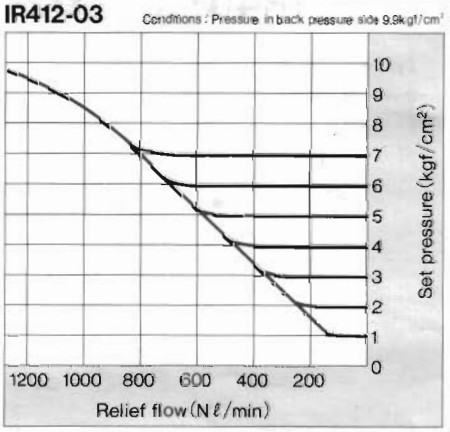
IR401-03 Conditions : Pressure in back pressure side 7kgf/cm²



IR402-03 Conditions : Pressure in back pressure side 9.9kgf/cm²



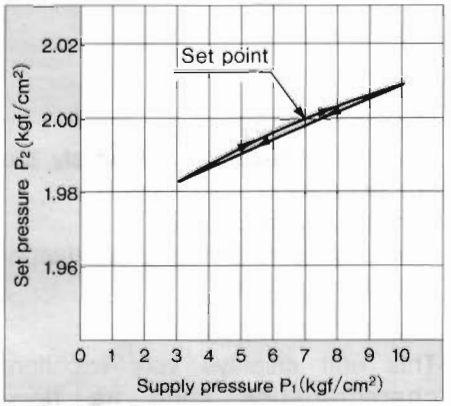
IR412-03 Conditions : Pressure in back pressure side 9.9kgf/cm²



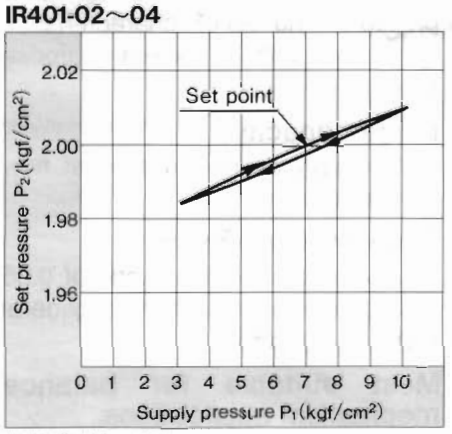
Pressure characteristics

Test conditions : Supply pressure 7kgf/cm²
Set pressure 2kgf/cm²
Flow 0N ℓ/min

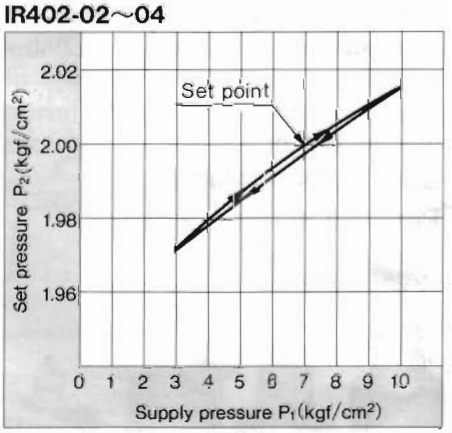
IR400-02～04



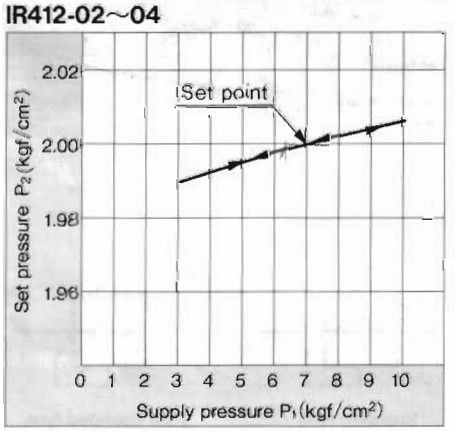
IR401-02～04



IR402-02～04

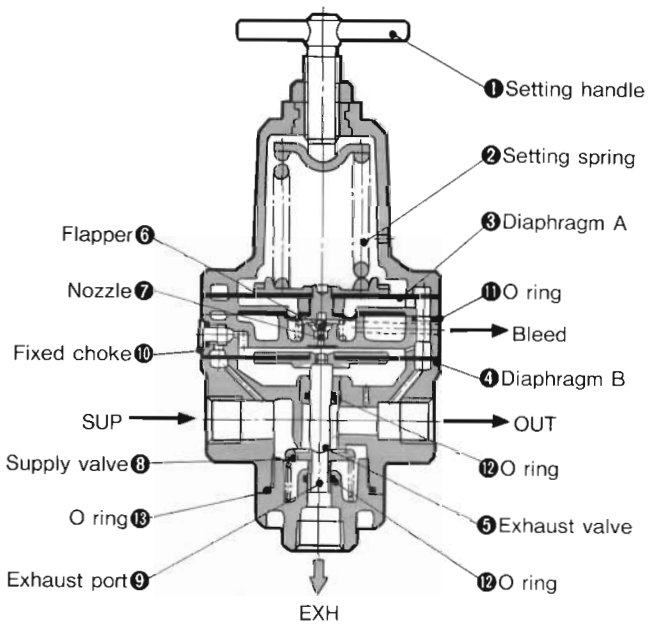


IR412-02～04



Construction/Operation principle/Spare parts

Standard type/IR400·IR401·IR402

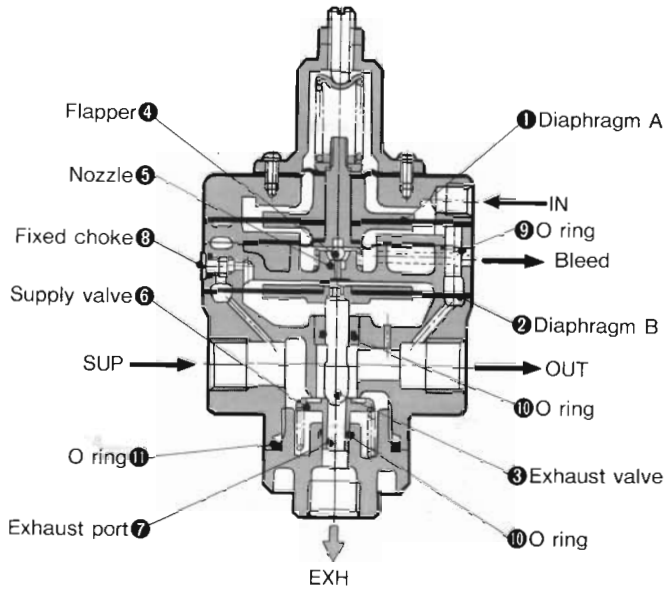


A clockwise rotation of set handle ❶ pushes flapper ❻ down to close nozzle ❼ thus, air supply bleeds through fixed choke ⓾ to push diaphragm B ❹ down, thus opening main valve ❽. Supply pressure flows to outlet and in fed back to act on diaphragm A ❸ which counteracts spring pressure and diaphragm B ❹ which is pushed up to close main valve when set pressure is reached. When secondary pressure rises above set pressure, this pressure is fed to act on diaphragm A ❸ which opens flapper nozzle ❼ thus decreasing pressure on diaphragm B ❹ raising main valve stem to open exhaust valve ❺ thus exhausting forward pressure to atmosphere exhaust port ❾.
Turning set handle ❶ counterclookwise reverses the previous operation allowing the secondary pressure to relief through exhaust valve ❺ until the lower set pressure is reached and balance is obtained.

Spare parts list

No.	Description	Material	Part No.
❸	Diaphragm A assembly	NBR Aluminum alloy	P256010-2
❹	Diaphragm B assembly	NBR Aluminum alloy	P256010-1
❽	Supply valve	Brass, NBR	P256019
⓾	Fixed choke assembly (with O ring)	Stainless steel	P256018A
⓫	O ring	NBR	JIS B 2401 P5 1 class A
⓬	O ring	NBR	JIS B 2401 P8 1 class A
⓭	O ring	NBR	JIS B 2401 G35 1 class A

Pilot operated type/IR412



When the input signal rises, the pressure pushes diaphragm A ❶ to push flapper ❹ onto nozzle ❺, thus the supply pressure bleeds through fixed choke ❽ to push diaphragm B ❷ down opening main valve ❻. Outlet pressure increases and is fed to act on diaphragm B ❷ to close main valve ❻ and diaphragm A ❶ to act against spring set pressure and balance pilot pressure, thus allowing flapper ❹ to relief nozzle ❽ and bleed to atmosphere.
When secondary pressure rises above set pressure, this pressure is fed to act on diaphragm A ❶ which lifts flapper ❹ from nozzle ❺ thus reducing pressure on diaphragm B ❷ thus opening exhaust valve ❸ allowing secondary pressure to exhaust to atmosphere through exhaust port ❼.
If the input signal is reduced the operation is reversed thus allowing forward pressure to exhaust until the lower set pressure balance is reached.

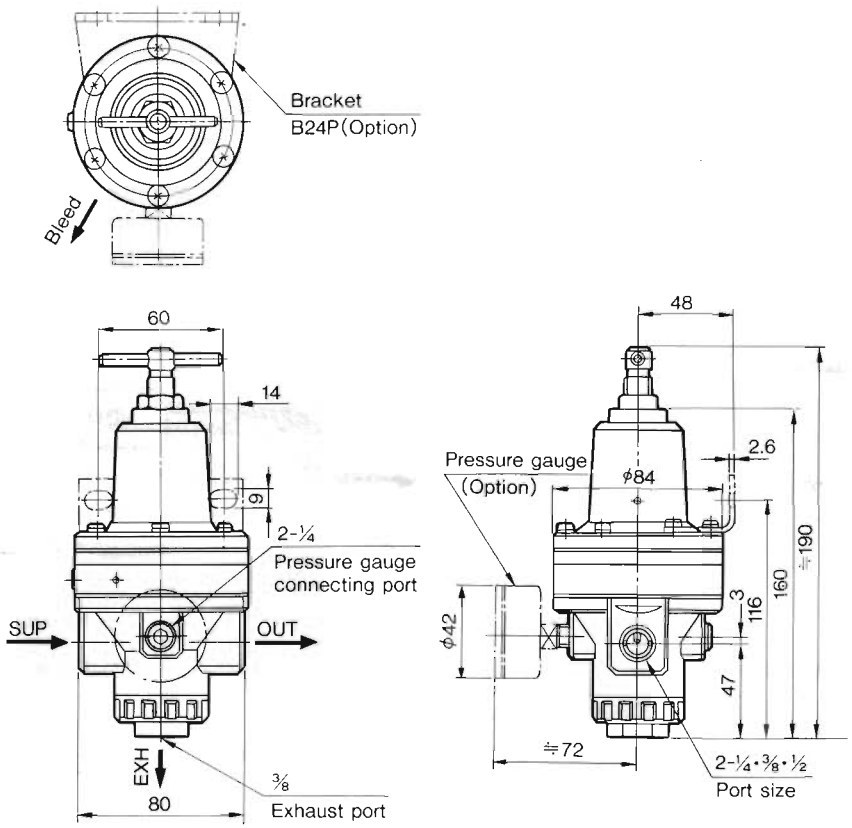
Spare parts list

No.	Description	Material	Part No.
❶	Diaphragm A assembly	NBR Aluminum alloy	P256020-1
❷	Diaphragm B assembly	NBR Aluminum alloy	P256010-1
❻	Supply valve	Brass, NBR	P256019
❽	Fixed choke assembly (with O ring)	Stainless steel	P256018A
❾	O ring	NBR	JIS B 2401 P5 1 class A
⓾	O ring	NBR	JIS B 2401 P8 1 class A
⓫	O ring	NBR	JIS B 2401 G35 1 class A

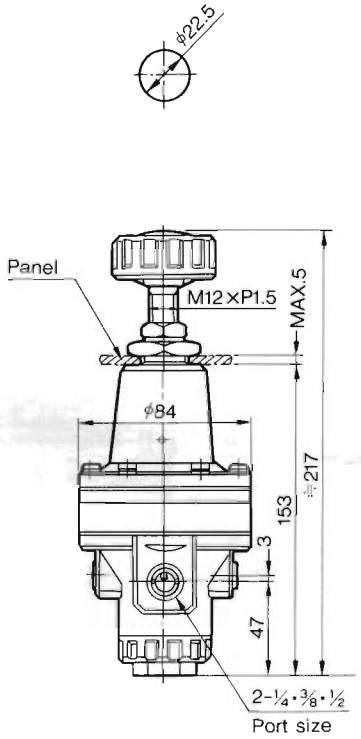
Precision Regulator/Series IR400

Dimensions

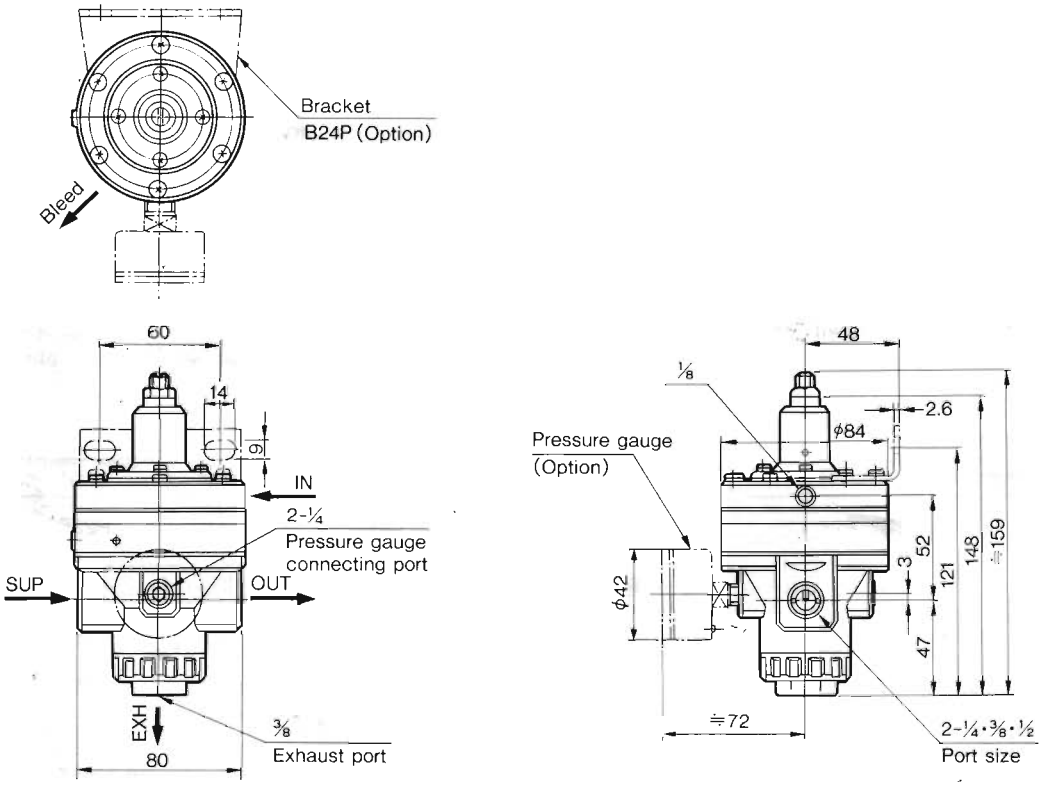
IR400, IR401, IR402



Panel mount type



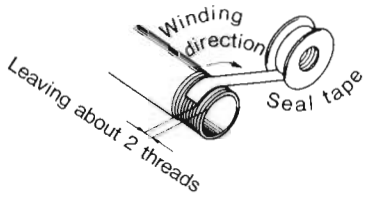
Pilot operated type/IR412



Precautions

Common characteristics of IR400, IR401, IR402 and IR412

❶Ensure to flush piping thoroughly before connection to ensure no chips, cutting oil, dust, etc, is present in the system.
❷Take care to ensure no chips, threads or sealant enters the ports while connecting piping. When winding with sealant tape, ensure to leave first 1.5 to 2 threads free of tape.



❸Ingress of drain fluid or dust at the inlet can degrade operation by clogging of the fixed choke. Therefore, a mist separater (series AM) should be employed in addition to standard air filter (series AF). Refer to our Air Cleaning Equipment (Catalog No. CAT. E3G) for the correct quality of air supply.
❹Ensure routine maintenance of air filter and mist separater. (Drain exhaust and element cleaning or replacement).
❺Lubrication should not be used at the supply side because the fixed choke may become clogged resulting in poor operation of the regulator.
If lubrication is required by the terminal equipment, a lublicator can be connected to the output side of the regulator.
❻For mounting, connect in direction of the arrow which indicates the correct air flow direction.
❼Repeated ON-OFF operation of a directional control valve (solenoid valve, mechanical valve etc.) in the supply line of the regulator may cause some lag of the set value through wear of the nozzle and flapper parts. Therefore, a directional control valve should not be used in the supply line but can be used at the output of the regulator.
❽Air is usually constantly exhausted from the bleed opening (horizontal hole in the body central portion). This air consumption is necessary for correct operation of the precision regulator. Exhaustion of air is normal operation.
❾Under operating conditions of supply pressure (ca. 5kgf/cm² or more), and low set pressure (ca. 5kgf/cm² or less) open to atmosphere at the output side, may cause pulsation of output. In this case, supply pressure should be lowered to the utmost or the output line should be restricted (adjusted with addition of stop valve) in slightly higher of set pressure.
❿In applications where large relief flow is expected the relief noise may be relatively loud therefore a silencer is recommended at the relief port EXH (series AN) Exhaust port (EXH) connection size is 3/8.

Additional information for IR412

❶Since output of IR412 is the same pressure as input signal pressure, the input signal device should be selected to suit the required output for the application.
❷Since the screws in the top section are already locked with zero adjustment screws, adjustment is not necessary before operation.

SMC

SMC CORPORATION

1-16-4 Shimbashi, Minato-ku, Tokyo 105 JAPAN
Tel:03-3502-2740 Fax:03-3508-2480

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