Pressure Control Equipment

High-pressure

General Purpose

Precision

Vacuum

Special Fluid/Deionized Water (Pure Water)

INDEX

General Specifications

Fluid	Air
Ambient and fluid temperature	–5 to 60°C (No freezing)
Proof pressure	1.5 MPa
Maximum operating pressure	1.0 MPa
Set pressure range	0.05 to 0.85 MPa
Construction*	Relieving type

Each of the above values represents a typical value of general pressure control equipment, and does not apply to all pressure control equipment.
For more details, check the specifications of each pressure control equipment because the values vary depending on the model.

∗Construction

Relieving type (Standard)

When the outlet pressure exceeds the set value, the excess pressure is discharged to the outside to reduce the pressure to the set value.

Non-relieving type

Since there is no discharge port, the outlet pressure cannot be decreased if there is no air consumption on the outlet side. In general, air discharge using a solenoid valve on the outlet side is often employed.

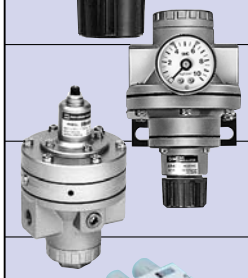
Bleed type

A small amount of air is always discharged by providing a port for continuous air discharge, so that the pressure can be promptly adjusted.

Pressure Control Equipment

ARJ ····· P. 452
AW ····· P. 365
AR ····· P. 345
AWM ····· P. 378
ARP ····· P. 537

General purpose [Pressure characteristics (Supply air pressure characteristics): 1 to 17%]

Products classification			Specifications/Characteristics (Representative value)			Piping
Classification	Features	Model	Set pressure range [MPa]	Supply air characteristics Maximum flow rate [ℓ/min (ANR)]	Exhaust air characteristics Maximum flow rate [ℓ/min (ANR)]	Port size ( ): Tubing size
Basic 	Miniature	ARJ1020F ARJ210/310	0.2 to 0.7	100 to 500	5 to 60	M5, 1/8 (ø4, ø6)
	Standard	AR10 to 60	0.05 to 0.85	220 to 18,900	60 to 120	M5,1/8 to 1
	High-pressure 2.0 MPa compliant	ARX20	0.05 to 0.85	950	95	1/8,1/4
	Relieving type	AR425 to 925	0.05 to 0.83	6,000 to 35,000	300 to 380	1/4 to 2
	High-flow exhaust type	IR412 *3	0.01 to 0.7	4,000	600	1/4 to 1/2
	Compact manifold type	ARM5	0.05 to 0.7	300	20	(ø4, ø6, ø8)
		ARM10	0.05 to 0.7	400	75	(ø4, ø6, ø8, ø10)
	Manifold type	ARM1000 to 3000	0.05 to 0.85	300 to 4,200	40 to 80	1/8 to 1/2
With air filter 	Nominal filtration rating for instrumentation 5 μm	IW / 1301	0.02 to 0.5	320 to 530	55	1/4
	Nominal filtration rating 5 μm	AW10 to 60	0.05 to 0.85	220 to 14,000	60 to 120	M5, 1/8 to 1
	Nominal filtration rating 0.3 μm	AWM20 to 40	0.05 to 0.85	150 to 820	60 to 120	1/8 to 1/2
		AMR3000 to 6000	0.05 to 0.85	750 to 6,000	55 to 150	1/4 to 1
	Nominal filtration rating 0.01 μm	AWD20 to 40	0.05 to 0.85	90 to 450	60 to 120	1/8 to 1/2

∗1) The flow rate on the atmospheric release with inlet pressure at 0.7 MPa, set pressure at 0.5 MPa.
∗2) The exhaust flow rate with set pressure at 0.5 MPa, outlet pressure at 1.0 MPa. ∗3) The exhaust flow rate when keeping the set pressure at 0.5 MPa.

High-pressure 6.0 MPa compliant

Products classification			Specifications/Characteristics		Piping
Classification	Features	Model	Set pressure range [MPa]	Supply air characteristics Maximum flow rate *1 [ℓ/min(ANR)]	Port size
Basic 	Direct operated regulator (Relieving type)	VCHR30	0.5 to 5.0	50,000	G3/4, G1
		VCHR40	0.5 to 5.0	50,000	G1, G1½

∗1)The flow rate on the atmospheric release with inlet pressure at 6.0 MPa, set pressure at 5.0 MPa.

ARX ····· P. 625
AMR ····· P. 465
ITV ····· P. 639
AR425 to 925 ····· P. 462
AWD ····· P. 378
IRV ····· P. 563
ARM ····· P. 469
VCHR ····· P. 630
SRP ····· P. 601
IW ····· Back page 61
IR ····· P. 549
SRH ····· P. 587
1301 ····· Back page 61
VEX1□ ····· P. 571
SRF ····· P. 609

Precision [Pressure characteristics (Supply air pressure characteristics): 1% or less]

Products classification			Specifications/Characteristics (Representative value)			Piping
Classification	Features	Model	Set pressure range [MPa]	Supply air characteristics Maximum flow rate *2 [ℓ/min (ANR)]	Exhaust air characteristics Maximum flow rate *3 [ℓ/min (ANR)]	Port size ( ): Tubing size
Basic 	High-relief nozzle-flapper type	IR1000 to 3000	0.005 to 0.2 *1 0.01 to 0.4 0.01 to 0.8	300 to 4,000	150 to 3,000	1/8 to 1/2
		VEX1A33/1B33 VEX1133 to 1933	0.05 to 0.7	900 to 60,000	400 to 30,000	M5,1/8 to 2
	Precision direct-operated regulator	ARP20 to 40	0.005 to 0.6	300 to 900	45 to 100 *4	1/8 to 1/2
Electronic 	With built-in pressure sensor	ITV0000 to 3000	0.001 to 0.9 *5	6 to 4,500	6 to 3,000	1/8 to 1/2 (ø4, ø5/32")
Air-operated 	High-relief nozzle-flapper type	IR2120/3120	0.01 to 0.8	900 to 4,000	450 to 3,000	1/4 to 1/2

*1) 0.01 to 0.2 MPa for IR3000. *2) The flow rate on the atmospheric release with inlet pressure at 0.7 MPa, set pressure at 0.5 MPa.
*3) The exhaust flow rate when keeping the set pressure at 0.5 MPa. *4) The exhaust flow rate with set pressure at 0.4 MPa, outlet pressure at 0.5 MPa.
*5) This varies depending on each model.

Vacuum

Products classification			Specifications/Characteristics		Piping
Classification	Features	Model	Set pressure range [kPa]	Supply air characteristics Maximum flow rate *1 [ℓ/min (ANR)]	Port size ( ): Tubing size
	Manual	IRV1000 to 3000	–1.3 to –100	60 to 150	1/8 to 1/2
	Electronic (Built-in pressure sensor)	ITV0090/2090	–1.0 to –100 *2	2 to 130	1/4 (ø4, ø5/32")

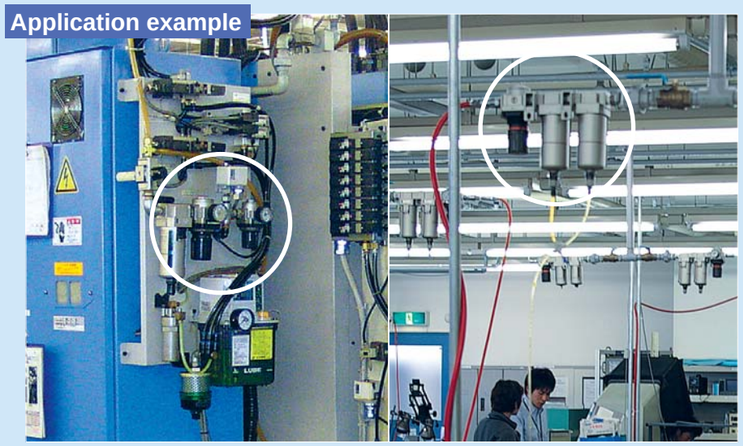
*1) The maximum flow rate varies depending on the conditions. *2) This varies depending on each model.

Special fluid/Deionized water (Pure water) (For pressure controls other than general pneumatics)

Products classification			Specifications/Characteristics (Representative value)		Piping
Classification	Features	Model	Set pressure range [MPa]	Supply air characteristics Maximum flow rate [ℓ/min (ANR)]	Port size ( ): Tubing size
	Manual	SRP1111	0.01 to 0.4	20 to 200	M5,1/8
		SRH3000/4000	0.05 to 0.7	100 to 1500	1/8 to 1/2
	Air-operated	SRF10 to 50	0.01 to 0.4	2 to 50	(ø1/4, ø3/8, ø3/4)

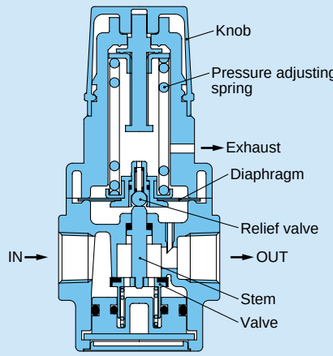
General purpose Widely used for pressure control in factory lines.

Application example



Relieving type

Model: **AR, ARJ, ARX, ARM, AMR, IW, 1301**



Features

When the outlet pressure exceeds the set value, the excess pressure is discharged to the outside to reduce the pressure to the set value.

How to use

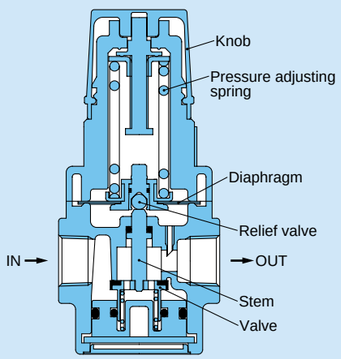
This is used when the load fluctuation of the outlet side is large, when adjusting frequently and filling the container (including a cylinder) of the outlet side, etc.

Specifications (representative value)

Maximum operating pressure	1.0 MPa
Set pressure range	0.05 to 0.85 MPa
Pressure characteristics (Supply air pressure characteristics)	1 to 5%
Repeatability	±0.02 MPa

Non-relieving type

Model: **AR, ARJ, ARX, ARM, AMR**



Features

The outlet pressure cannot be decreased if there is no air consumption on the outlet side.

How to use

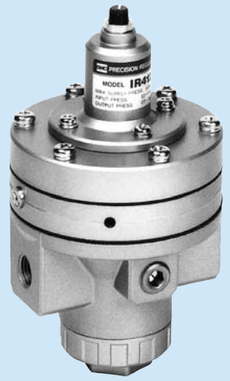
This is applicable if the air is always used at the outlet side (e.g., air discharge using a solenoid valve).

Specifications (representative value)

Maximum operating pressure	1.0 MPa
Set pressure range	0.05 to 0.85 MPa
Pressure characteristics (Supply air pressure characteristics)	1 to 5%
Repeatability	±0.02 MPa

High-flow exhaust type

Model: **IR412**



Features

This pilot type regulator has excellent relief characteristics and its structure maintains a constant pressure even if relief is required. This regulator is remotely controlled.

How to use

Suitable for pressure control for the balance of air cylinder

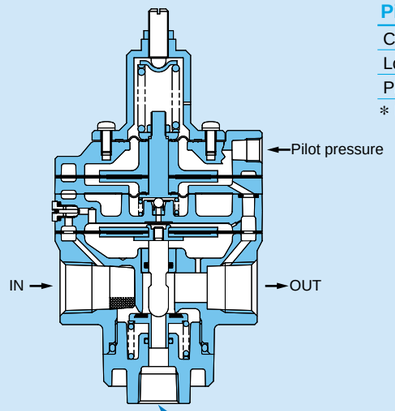
Specifications

Maximum operating pressure	1.0 MPa
Set pressure range	0.01 to 0.7 MPa
Pressure characteristics (Supply air pressure characteristics)	0.5%
Repeatability	±0.004 MPa

Piston speed when used as a balancer

Cylinder size [mm]	32	40	50	63	80	100
Load [kg]	35	54	84	143	231	364
Piston speed [mm/sec]	2,031	1,330	851	501	231	196

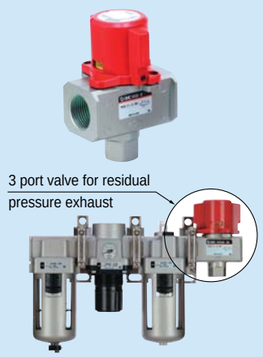
∗ Refer to page 121 for circuits and conditions, etc.



3/8 Exhaust flow rate: Maximum 600 [ℓ/min (ANR)]

Residual pressure exhaust valve

Model: **VHS**



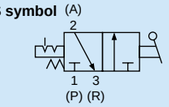
Features

The outlet pressure can be easily discharged.

How to use

This is a manual switching valve for safety measures to prevent accidents caused by residual pressure.

JIS symbol



Specifications

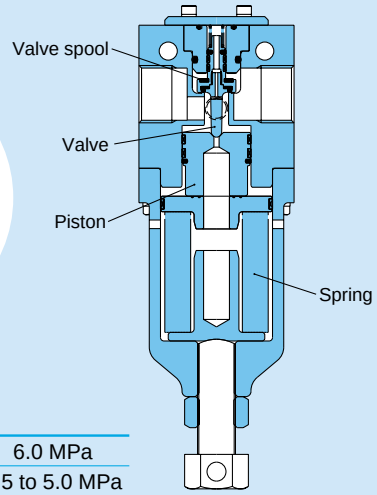
Model	Port size		Cv factor	
	IN, OUT	EXH.	IN→OUT	OUT→EXH.
VHS20	1/8	1/8	0.54	0.60
	1/4		0.76	0.87
VHS30	1/4	1/4	0.87	0.76
	3/8		1.68	1.57
VHS40	1/4	3/8	1.46	1.75
	3/8		2.06	2.08
	1/2		2.98	2.12
VHS40-06	3/4	1/2	4.17	2.12
VHS50	3/4	1/2	4.44	2.85
	1		6.78	2.93

Note) Use an air filter on the inlet side for proper operation.

Pressure Control Equipment

High-pressure 6.0 MPa compliant Durable up 6.0 MPa pressure.

Model: VCHR



Specifications

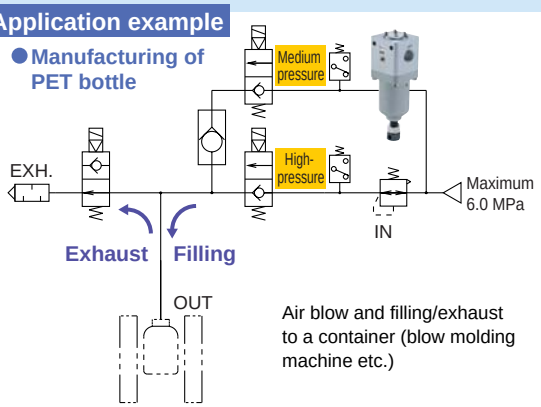
Maximum operating pressure	6.0 MPa
Set pressure range	0.5 to 5.0 MPa

Working principle

Direct-operated type with a piston valve.

Application example

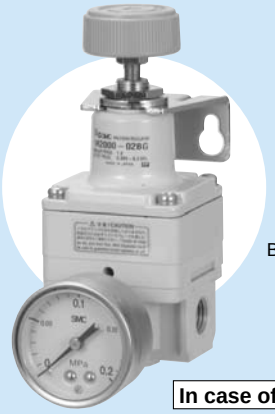
● Manufacturing of PET bottle



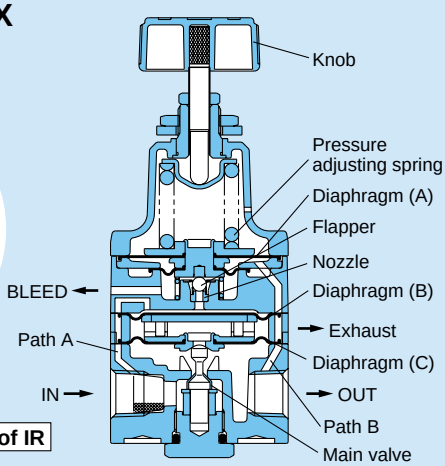
Air blow and filling/exhaust to a container (blow molding machine etc.)

Precision Possible to set within 0.2% of the sensitivity full span.

Model: IR, ITV, VEX



In case of IR



Specifications (representative value)

Maximum operating pressure	1.0 MPa
Set pressure range	0.01 to 0.8 MPa (0.005 to 0.9 MPa)
Pressure characteristics (Supply air pressure characteristics)	1%
Repeatability	±0.004 MPa (±0.005 MPa)

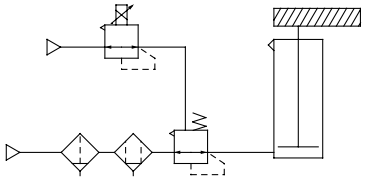
( ): In case of electronic type

Working principle

This type has an internal pilot structure that causes the valve to be opened through the diaphragm by the air pressure controlled by a nozzle-flapper mechanism.

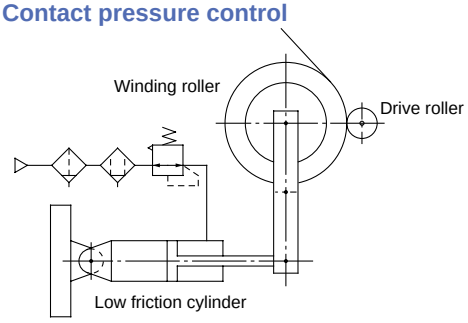
Application example

● Balance and actuation
Accurate balance pressure setting



Pressure changes during cylinder actuation are suppressed, balancing the cylinder in both static and dynamic conditions.

● Contact pressure control

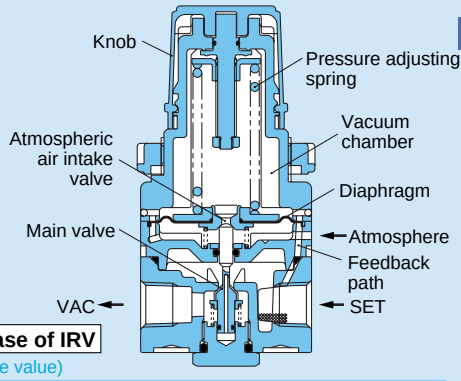


Pressure is kept steady, responding rapidly to the position change of a piston in the cylinder.

VCHR ····· P. 630
IR ····· P. 549
IRV ····· P. 563
ITV ····· P. 639
SRP ····· P. 601
VEX ····· P. 571
SRH ····· P. 587
ARP ····· P.537
SRF ····· P.609

Vacuum For vacuum settings

Model: IRV, ITV



In case of IRV

Specifications (representative value)

Maximum operating pressure	–101 kPa
Set pressure range	–1.3 to –100 kPa (–1 to –100 kPa/ITV0090, –1.3 to –80 kPa/ITV2090)
Pressure characteristics (Supply air pressure characteristics)	2% (1%)
Repeatability	±5 kPa (±0.5 kPa)

( ): In case of electronic type

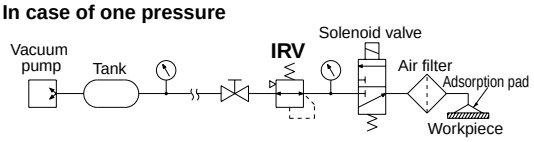
Working principle

The compression force of an adjusting spring opens the main valve through a diaphragm, causing the degree of vacuum to rise. At this moment, the pressure of the SET side is led to the vacuum chamber through a feedback path and is set with a balance of the generated force of a spring.

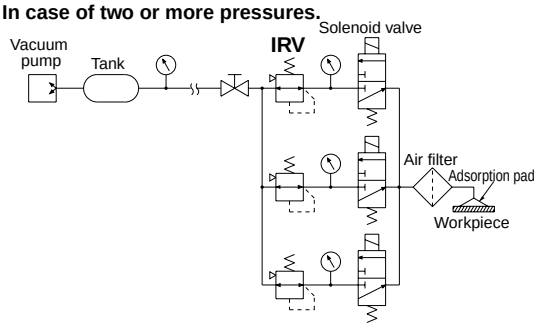
Application example

● Adsorption of workpiece

In case of one pressure



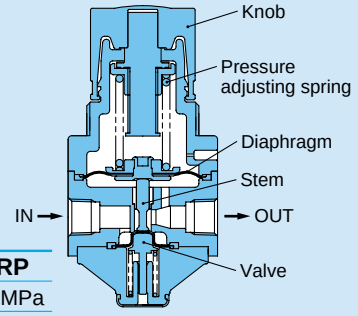
In case of two or more pressures.



Special fluid/Deionized water (Pure water) For pressure controls other than general pneumatics

Manual

Model: SRP, SRH



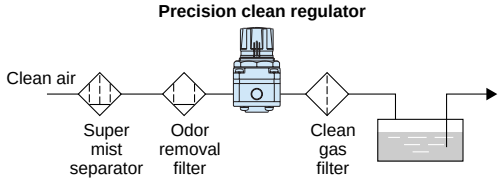
Specifications (representative value)

	SRH	SRP
Maximum operating pressure	1.0 MPa	1.0 MPa
Set pressure range	0.05 to 0.7MPa	0.01 to 0.4MPa
Pressure characteristics (Supply air pressure characteristics)	6 to 9%	1%
Repeatability	0.05 MPa or less	0.004 MPa or less

Application example

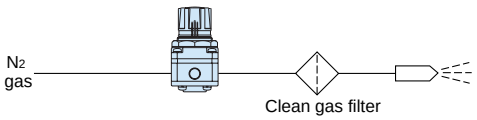
● Feding of chemicals

Precision clean regulator



● N_2 blow

Precision clean regulator



Working principle

Like the general type, this type has a direct-operated structure that causes the valve to be directly opened by adjusting spring load.

Wetted parts material

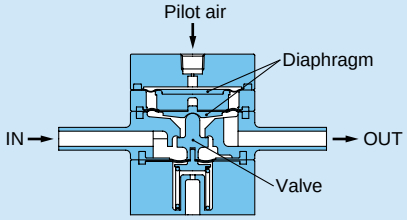
Stainless steel, Fluororesin, Fluororubber

Fluid

Air, N_2, CO_2, Ar, Clean air, Deionized water (Pure water), Water

Air-operated

Model: SRF



Specifications (representative value)

Maximum operating pressure	1.0 MPa
Set pressure range	0.02 to 0.4 MPa
Pressure characteristics (Supply air pressure characteristics)	1 to 4%
Repeatability	±0.01 MPa

Working principle

This air-operated structure causes the pressure to be controlled by the pressure of the pilot air from outside. A valve is opened and closed reacting the force of pilot pressure.

Wetted parts material

Fluororesin

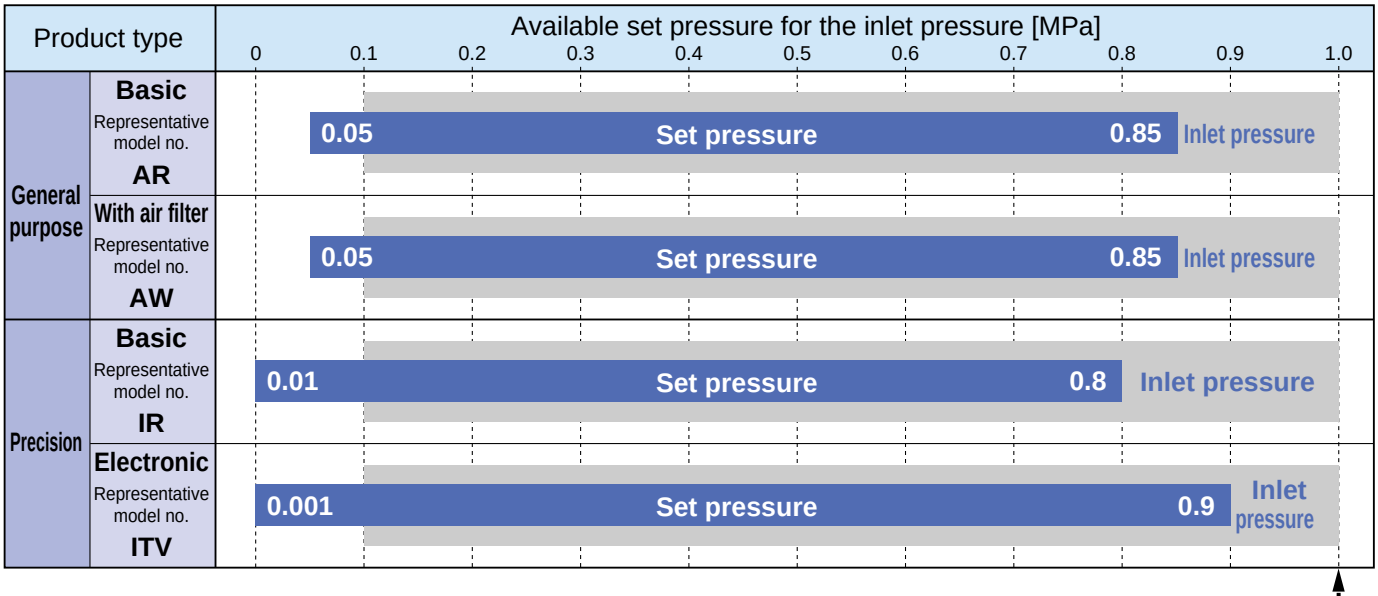
Fluid

N_2, Deionized water (Pure water)

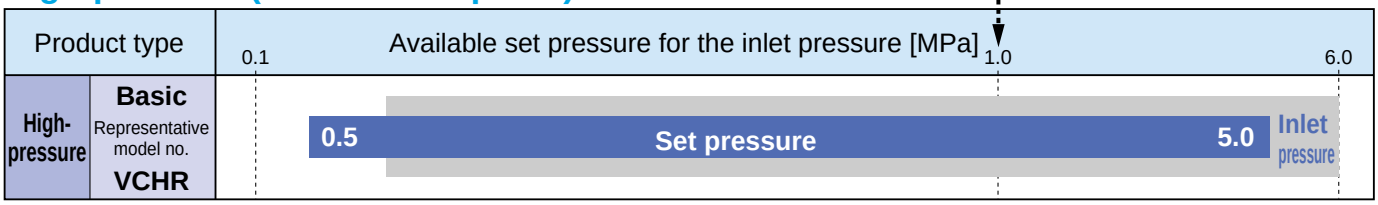
Basic Characteristics of Pressure Control Equipment

Shown below is the basic characteristics of pressure control equipment. Use the values as guidelines. For more details, check the catalog of each pressure control equipment.

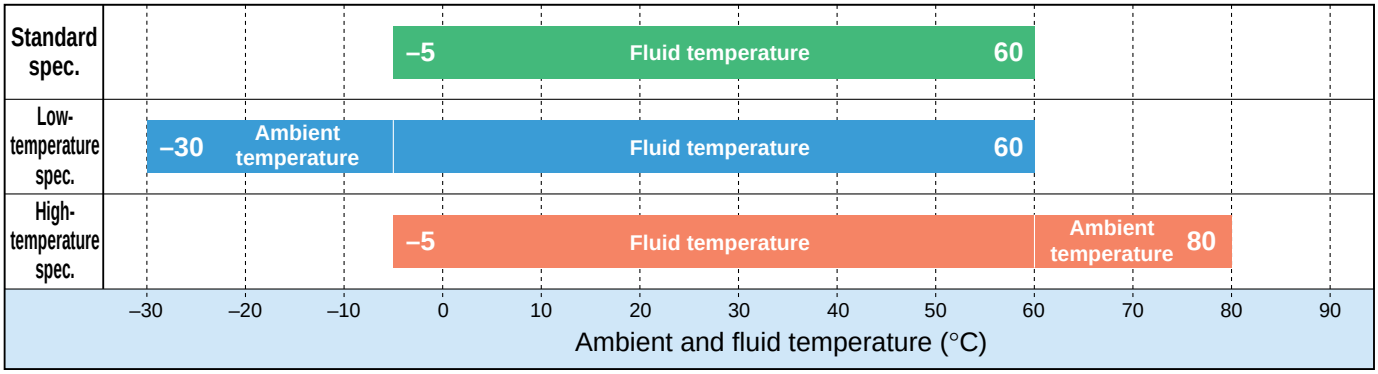
1 Available set pressure for the inlet pressure



High-pressure (6.0 MPa compliant)



2 Ambient and fluid temperature



Note) The above indicates the temperature specification of a basic regulator for general purposes and a precision basic regulator.
The standard temperature specification of an electronic regulator is ranging from 0 to 50°C.

3 Service life

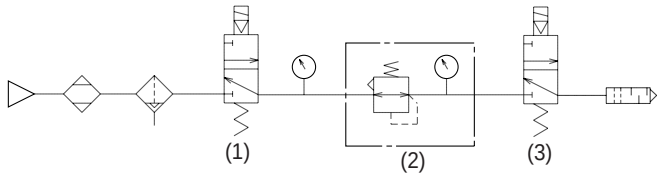
The number of service life is based on our test results and no guarantee is assured for everything. Use these values as guidelines. The following table shows the service life of a typical general type, high-pressure type and precision type.

Product type		Service life
General purpose	**Basic** (Model: **AR**)	**5 million cycles**
	With air filter (Model: **AW**)	**5 million cycles**
High-pressure	**Basic** (Model: **VCHR**)	**10 million cycles**
Precision	**Basic** (Model: **IR**)	**3 million cycles**
	Electronic (Model: **ITV**)	**24 million cycles**

Test equipment and condition

Shown below are the circuit diagram of **service life test equipment of general pressure control equipment and the test condition**. They conform to JIS B8372: 1994.

Test equipment



Test condition (A)

Inlet pressure	0.63 MPa
Outlet pressure	0.5 MPa
Operating frequency	1 cycle/sec

Testing method

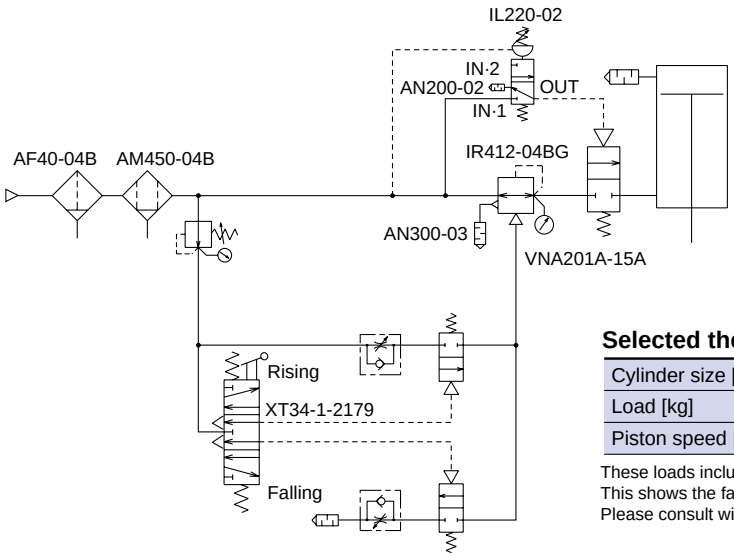
While the solenoid valve (1) on the inlet side is in the ON state, and the solenoid valve (3) on the outlet side is in the OFF state, set the pressure of the regulator (2) on the inlet side and the outlet side to the test condition value (as given in test condition A). Set the switching time of the solenoid valve to 0.5 sec for both ON and OFF, so that solenoid valves (1) and (3) located in front of and behind a regulator (2) can repeat fully-opening or fully-closing alternatively. Check the regulator periodically for the service life by measuring its leakage and performance, etc.

Guideline of service life

Phenomenon	Cause	Reference time of service life
Leakage	• Damage of diaphragm • Wearing and cracks of rubber	The amount of leakage exceeds 10 cm³/mm (ANR) per minute.
Inferior adjustment	• Damage of spring • Biting of foreign materials	Neither the flow characteristics value nor the pressure characteristics value satisfy the specifications.

4 Example of manual balancer circuit

Prevention of air omission when supply pressure decreases



Note) A cylinder with fixed throttle is not applicable.

Operation

Set the balance pressure with the rising button.
When the load starts moving upward, adjust the load to be stayed in the middle of the stroke by pressing the rising and falling button alternately.
Then, the load can be easily moved up and down manually.
To remove the load, press the falling button until the hook can be removed.

Selected the balance pressure as 0.5 MPa

Cylinder size [mm]	32	40	50	63	80	100
Load [kg]	35	54	84	143	231	364
Piston speed [mm/sec]	2,031	1,330	851	501	231	196

These loads include those of a piston and a rod.
This shows the falling speed. The rising speed is faster than this.
Please consult with SMC if you use this actually.

AR P. 345 · IW Back page 61 · ARJ P. 452 · 1301 Back page 61 · ARX P. 625 · AR425 to 925 P. 462 · ITV P. 639 · ARM P. 469 · VCHR P. 630 · IRV P. 563 · AW P. 365 · ARP P. 537 · SRP P. 601 · AWM, AWD P. 378 · IR P. 549 · SRF P. 609 · AMR P. 465 · VEX1□ P. 571 · SRH P. 587

5 Selection

1) Select the regulator depending on the application.

Regulators

General purpose

Direct-operated

Relieving (Standard)	Non-relieving
AR10 to 60 ARJ ARX20 ARM5 ARM10 ARM1000 to 3000 AW10 to 60 AWM20 to 40 AWD20 to 40 AMR3000 to 6000 IW, 1301	

When the outlet pressure exceeds the set value, the excess pressure is discharged to the outside in order to reduce the pressure to the set value.

Pilot-operated

Manual	Air-operated
AR425 AR625 AR825 AR925	XT13-253 XT13-207 XT13-202 XT13-283

Regulators incorporating a pilot mechanism for adjusting the pressure accurately better than a direct-operated regulator.

High-pressure

Direct-operated

Non-relieving
VCHR30/40

Durable up to 6.0 MPa high-pressure.

Precision

Direct-operated

Bleed
ARP20 to 40

A small amount of air is always discharged by providing a port for continuous air discharge, so that the pressure can be promptly adjusted.

Pilot-operated

Manual	Air-operated	Electronic
IR1000 IR2000 IR3000 VEX1A33 VEX1B33 VEX1133 VEX1233 VEX1333 VEX1533 VEX1733 VEX1933	IR2120 IR3120 IR412	ITV0000 ITV1000 ITV2000 ITV3000

High-precision type incorporating a nozzle-flapper mechanism. The air flowing from the nozzle on the IN side always escapes a little from the bleed hole to the atmosphere, so sensitive pressure adjustment is possible (except an electronic type).

Vacuum

Internal pilot

Manual	Electronic
IRV1000 IRV2000 IRV3000	ITV0090 ITV2090

Possible to set the vacuum pressure.

Special fluid/Deionized water (Pure water)

Direct-operated

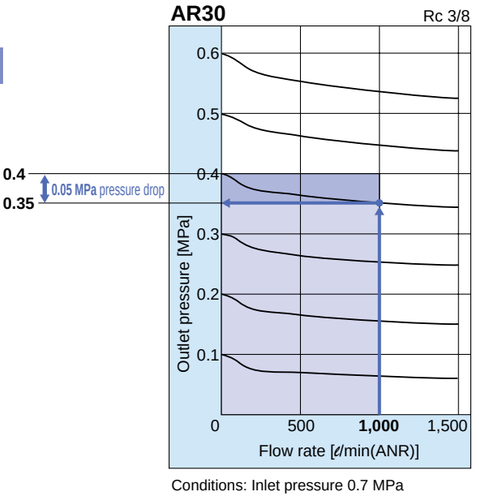
Manual
SRP1111 SRH3000 SRH4000

Used for pressure control other than general air pressure and mainly used for semiconductor-manufacturing equipment, etc.

Air-operated
SRF10 SRF30 SRF50

2) Select the body size suitable for the operating conditions from the flow rate and flow characteristics.

Example) How to read of the AR30 flow characteristics



Conditions: Inlet pressure 0.7 MPa

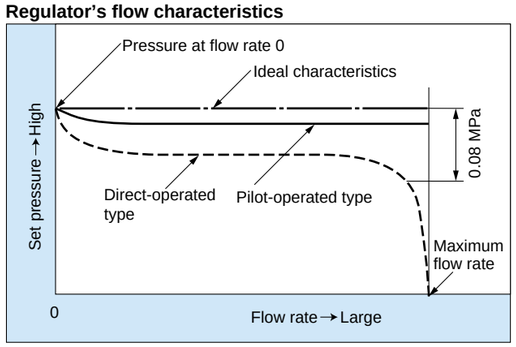
When the flow rate is 1,000 ℓ/min (ANR) with the outlet pressure set to 0.4 MPa, the outlet pressure goes down (pressure drop) to 0.35 MPa due to the flow characteristics. The guideline of pressure drop should be set to less than 0.08 MPa against the set pressure; thus in this case the pressure drop is 0.05 MPa, which is within 0.08 MPa, so 0.35 MPa is within the tolerance.

Terminological explanation

Flow characteristics

Generally, the outlet pressure is adjusted with no flow status. When the outlet side is gradually opened after setting the pressure and the flow rate is increased, the set pressure decreases accordingly. The smaller the degree of this pressure reduction, the better the flow characteristic of the regulator. Ideally, a constant pressure should always be maintained even if the flow rate changes. Use the pilot type to suppress fluctuations, even if only slightly. The pressure drop is generally within 0.08 MPa for the set pressure.

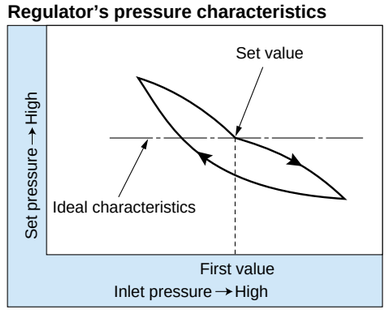
Regulator's flow characteristics



Pressure characteristics

The regulator has the characteristics that, as the inlet pressure varies, the set pressure varies accordingly. This is called the pressure characteristics, and a general example is given as shown below.

Regulator's pressure characteristics

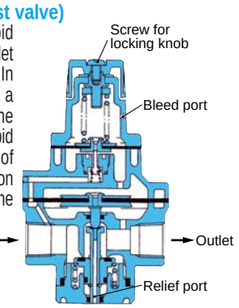


Maximum flow rate

When the inlet pressure is constantly maintained and the outlet pressure is set to the prescribed value, the air flow rate is represented when the outlet side is released to the atmosphere. The maximum flow rate in this catalog is represented when the inlet pressure is 0.7 MPa and the outlet pressure is 0.5 MPa.

High-relieving type (Quick exhaust valve)

This regulator is used when a rapid discharge is necessary in case the outlet pressure is higher than the set pressure. In general, the pressure control valve has a good relief sensitivity. By enlarging the cross-sectional area of the relief valve, rapid air discharge is obtained. This type of regulator has a rapid discharging function such that the discharge speed is high at the outlet side and is used mainly for adjusting pressure rapidly and precisely when the outlet pressure such as an air balancer increases.



Repeatability

Repeatability means the degree of fluctuation of a set value on the repeated actuation at comparatively short intervals.

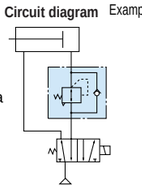
Regulator with back flow mechanism

The regulator is equipped with a check valve as a reverse flow mechanism in which the air pressure of the outlet side is discharged precisely and quickly to the inlet side. In general, it is installed between a solenoid valve and an actuator and used for dual-pressure control.

AR20K

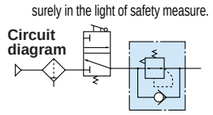
Example 1. When the pressure in the head side or the rod side of a cylinder is different.

Circuit diagram



Example 2. When stopping supplying the air and releasing the inlet side air to the atmosphere, the residual pressure of the air in the outlet side can be exhausted surely in the light of safety measure.

Circuit diagram

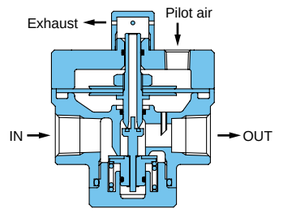


Air-operated type

The regulator controls the pressure of a main line by the pressure of pilot air from the outside. When the pilot air is introduced into the top part of the diaphragm, a valve is pushed downward and the inlet pressure is flown out to the outlet side.

This pressure acts under the diaphragm, generates an upward force, against the force by the pilot pressure, and controls the opening of the valve. The valve is closed when the pilot pressure force is almost identical to the outlet pressure.

This type of regulator enables remote operation, and is used at locations where humans cannot easily access or centralized control is desired.



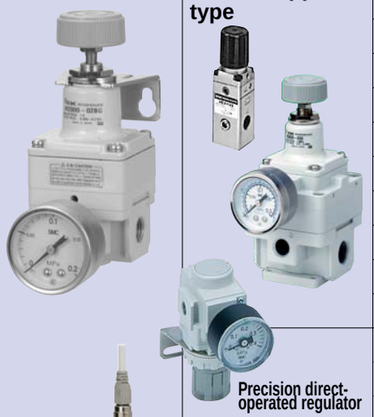
General purpose Specifications and options

Products classification			Specifications/Characteristics (Representative value)				Piping				Option		Semi-standard	Made to Order				
Classification	Features	Model	Set pressure range [MPa]	Maximum flow rate [ℓ/min(ANR)]	Pressure characteristics (Supply air pressure characteristics) [%]	Port size ( ): Tubing size	Body ported	Tubing	Modular connection	Manifold	Pressure gauge	Bracket	Non-relieving	Clean room	Copper-free, Fluorine-free	High-pressure	High-temperature (–5 to 80°C)	Low-temperature (–30 to 60°C)
Basic	Miniature	ARJ1020F	0.1 to 0.7	100	8	M5 (ø4,ø6)	●	●	—	●	—	▲	●	—	●	—	—	—
		ARJ210	0.2 to 0.7	200	11	M5, 1/8	●	—	—	—	●	●	●	●	●	—	▲	▲
		ARJ310	0.2 to 0.7	500	10	M5, 1/8 (ø4,ø6)	●	●	—	—	●	●	●	●	●	—	▲	▲
	Standard	AR10	0.05 to 0.7	220	17	M5	●	—	●	—	●	●	●	●	●	▲	▲	▲
		AR20(K)	0.05 to 0.85	2,000	2	1/8, 1/4	●	—	●	—	●	●	●	●	●	●	▲	▲
		AR25(K)	0.05 to 0.85	2,700	2	1/4, 3/8	●	—	●	—	●	●	●	●	●	●	●	●
		AR30(K)	0.05 to 0.85	4,300	2	1/4,3/8	●	—	●	—	●	●	●	●	●	●	●	●
		AR40(K)	0.05 to 0.85	8,200	2	1/4, 3/8, 1/2 ,3/4	●	—	●	—	●	●	●	●	●	●	●	●
		AR50(K)	0.05 to 0.85	16,700	2	3/4, 1	●	—	●	—	●	●	●	●	●	●	●	●
		AR60(K)	0.05 to 0.85	18,900	2	1	●	—	●	—	●	●	●	●	●	●	●	●
	High-pressure 2.0 MPa	ARX20	0.05 to 0.85	950	8	1/8, 1/4	●	—	—	—	●	●	▲	▲	▲	▲	▲	●
	Relieving type	AR425	0.05 to 0.83	6,000	1	1/4, 3/8, 1/2	●	—	—	—	●	●	—	●	●	●	●	●
		AR625	0.05 to 0.83	16,000	2	3/4, 1	●	—	—	—	●	●	—	●	●	●	●	●
		AR825	0.05 to 0.83	28,000	1	1¼, 1½	●	—	—	—	●	▲	—	▲	●	●	●	●
		AR925	0.05 to 0.83	35,000	1	2	●	—	—	—	●	▲	—	▲	●	●	●	●
		IR412	0.01 to 0.7	4,000	0.5	1/4, 3/8, 1/2	●	—	—	—	●	●	—	●	●	—	● *2	●
	Compact manifold type	ARM5	0.05 to 0.7	300	6	(ø4, ø6, ø8)	—	●	—	●	●	—	●	—	●	—	—	—
		ARM10	0.05 to 0.7	400	12	(ø4, ø6)	—	●	—	—	●	●	●	—	●	—	—	—
		ARM10F	0.05 to 0.7	400	12	(ø4, ø6)	—	●	—	—	●	●	●	—	●	—	—	—
		ARM11	0.05 to 0.7	400	12	(ø4, ø6, ø8, ø10)	—	●	—	●	●	●	●	—	●	—	—	—
	Manifold type	ARM1000	0.05 to 0.7	300	8	1/8	—	—	—	●	●	●	●	▲	●	—	▲	▲
		ARM2000	0.05 to 0.7	600	8	1/8, 1/4	—	—	—	●	●	●	●	▲	●	—	▲	▲
		ARM2500	0.05 to 0.85	1,900	1	1/4, 3/8	—	—	—	●	●	●	●	▲	●	—	▲	▲
		ARM3000	0.05 to 0.85	4,200	2	3/8, 1/2	—	—	—	●	●	●	●	▲	●	—	▲	▲
With air filter	Nominal filtration rating for instrumentation 5 μm	1301	0.02 to 0.5	320	0.5	1/4	●	—	—	—	●	●	—	—	▲	—	—	—
		IW	0.02 to 0.5	530	1	1/4	●	—	—	—	●	●	—	—	▲	—	● *2	●
	Nominal filtration rating 5 μm	AW10	0.05 to 0.7	220	17	M5	●	—	●	—	●	●	●	●	●	▲	▲	▲
		AW20(K)	0.05 to 0.85	1,700	3	1/8, 1/4	●	—	●	—	●	●	●	●	●	●	●	▲
		AW30(K)	0.05 to 0.85	2,300	4	1/4, 3/8	●	—	●	—	●	●	●	●	●	●	●	●
		AW40(K)	0.05 to 0.85	5,200	4	1/4, 3/8, 1/2, 3/4	●	—	●	—	●	●	●	●	●	●	●	●
		AW60(K)	0.05 to 0.85	14,000	2	3/4, 1	●	—	●	—	●	●	●	●	●	●	●	●
	Nominal filtration rating 0.3 μm	AWM20	0.05 to 0.85	150	1	1/8, 1/4	●	—	●	—	●	●	●	●	●	—	—	▲
		AWM30	0.05 to 0.85	330	1	1/4, 3/8	●	—	●	—	●	●	●	●	●	—	—	●
		AWM40	0.05 to 0.85	820	2	1/4, 3/8, 1/2	●	—	●	—	●	●	●	●	●	—	—	●
		AMR3000	0.05 to 0.85	750	5	1/4, 3/8	●	—	—	—	●	●	●	▲	●	▲	—	—
		AMR4000	0.05 to 0.85	1,500	3	1/4, 3/8, 1/2	●	—	—	—	●	●	●	▲	●	▲	—	—
		AMR5000	0.05 to 0.85	3,500	6	1/2, 3/4	●	—	—	—	●	●	●	▲	●	▲	—	—
		AMR6000	0.05 to 0.85	6,000	3	3/4, 1	●	—	—	—	●	●	●	▲	●	▲	—	—
	Nominal filtration rating 0.01 μm	AWD20	0.05 to 0.85	90	1	1/8, 1/4	●	—	●	—	●	●	●	●	●	—	—	▲
		AWD30	0.05 to 0.85	180	1	1/4, 3/8	●	—	●	—	●	●	●	●	●	—	—	●
		AWD40	0.05 to 0.85	450	2	1/4, 3/8, 1/2	●	—	●	—	●	●	●	●	●	—	—	●
Built-in pressure gauge	Modular	ARG20(K)	0.05 to 0.85	2,000	2	1/8,1/4	●	—	●	—	●	●	●	—	▲	—	—	▲ *3
		ARG30(K)	0.05 to 0.85	4,300	2	1/4,3/8	●	—	●	—	●	●	●	—	▲	—	—	▲ *3
		ARG40(K)	0.05 to 0.85	8,200	2	1/4, 3/8, 1/2	●	—	●	—	●	●	●	—	▲	—	—	▲ *3
Built-in pressure gauge With air filter	Nominal filtration rating 5 μm	AWG20(K)	0.05 to 0.85	1,700	3	1/8, 1/4	●	—	●	—	●	●	●	—	▲	—	—	▲ *3
		AWG30(K)	0.05 to 0.85	2,300	4	1/4, 3/8	●	—	●	—	●	●	●	—	▲	—	—	▲ *3
		AWG40(K)	0.05 to 0.85	5,200	4	1/4, 3/8, 1/2	●	—	●	—	●	●	●	—	▲	—	—	▲ *3
Air-operated	High-flow type	XT13-253	0.02 to 0.83	6,000	1	1/4, 3/8, 1/2	●	—	—	—	●	●	—	●	●	●	●	●
		XT13-207	0.02 to 0.83	16,000	2	3/4, 1	●	—	—	—	●	●	—	●	●	●	▲	▲
		XT13-202	0.02 to 0.83	28,000	1	1¼, 1½	●	—	—	—	●	▲	—	▲	●	●	●	●
		XT13-283	0.02 to 0.83	35,000	1	2	●	—	—	—	●	▲	—	▲	●	●	●	●

∗1) The maximum flow rate depends on the condition. ∗2) Available from –5°C to 100°C. However, available up to 80°C with a pressure gauge mounted on the product.
∗3) Parts made of resin are used. Consult with SMC separately for the temperature range.

●: Available with a standard model, ▲: This is technically possible, but consult with SMC for dimensions, costs and delivery. —: Not available, ☐:Special order

Precision Specifications and options

Products classification			Specifications/Characteristics (Representative value)			Piping								Option		Semi-standard	Made to Order				
Classification	Features	Model	Set pressure range [MPa]	Maximum flow rate *2 [ℓ/min(ANR)]	Pressure characteristics (Supply air pressure characteristics) [%]	Port size ( ): Tubing size		Body ported	Base piping	Tube piping	Modular connection	Manifold		Pressure gauge	Bracket	Non-relieving	Clean room	Copper-free, Fluorine-free	High-pressure	High-temperature (–5 to 80°C)	Low-temperature (–30 to 60°C)
Basic  Precision direct-operated regulator	High-relief nozzle-flapper type	IR1000	0.005 to 0.2 *1	350	0.5	1/8		●	—	—	●	●		●	●	—	●	●	—	● *3	▲
		IR2000	0.01 to 0.4	1,000	0.5	1/4		●	—	—	●	●		●	●	—	●	●	—	● *3	●
		IR3000	0.01 to 0.8	5,000	1	1/4, 3/8, 1/2		●	—	—	●	—		●	●	—	●	●	—	● *3	●
		VEX1A33	0.01 to 0.7	900	0.8	M5, 1/8		●	—	—	—	—		●	●	—	▲	●	—	▲	▲
		VEX1B33	0.01 to 0.7	900	0.8	M5, 1/8		—	●	—	—	●		●	●	—	▲	●	—	▲	▲
		VEX1133	0.05 to 0.7	2,200	0.7	1/8, 1/4		●	—	—	—	—		●	●	—	▲	●	—	▲	▲
		VEX1233	0.05 to 0.7	2,200	0.7	1/8, 1/4		—	●	—	—	●		●	●	—	▲	●	—	▲	▲
		VEX1333	0.05 to 0.7	6,300	0.7	1/4, 3/8, 1/2		●	—	—	—	—		●	●	—	▲	●	—	▲	▲
		VEX1533	0.05 to 0.7	16,000	0.6	1/2, 3/4, 1		●	—	—	—	—		●	●	—	▲	●	—	▲	▲
		VEX1733	0.05 to 0.7	29,000	0.7	1, 1 1/4		●	—	—	—	—		●	●	—	▲	●	—	▲	▲
		VEX1933	0.05 to 0.7	60,000	0.7	1 1/4, 2		●	—	—	—	—		●	●	—	▲	●	—	▲	▲
		ARP20	0.005 to 0.6	300	0.7	1/8, 1/4		●	—	—	●	—		●	●	—	●	●	—	▲	▲
		ARP30	0.005 to 0.6	600	0.5	1/4, 3/8		●	—	—	●	—		●	●	—	●	●	—	—	—
		ARP40	0.005 to 0.6	900	0.5	1/4, 3/8, 1/2		●	—	—	●	—		●	●	—	●	●	—	—	—
Electronic  Refer to the electric spec. table on page 128.	Built-in pressure sensor	ITV0000	0.001 to 0.9	6	1	(ø4, ø5/32")		—	—	●	—	●		—	●	—	▲	▲	▲	—	—
		ITV1000	0.005 to 0.9	200	1	1/8, 1/4		●	—	—	—	●		●	●	—	▲	▲	●	—	—
		ITV2000	0.005 to 0.9	1,200	1	1/4, 3/8		●	—	—	●	●		●	●	—	▲	▲	●	—	—
		ITV3000	0.005 to 0.9	4,500	1	1/4, 3/8, 1/2		●	—	—	●	—		●	●	—	▲	▲	●	—	—
Air-operated 	High-relief nozzle-flapper type	IR2120	0.01 to 0.8	1,000	0.5	1/4		●	—	—	●	—		●	●	—	●	●	—	● *3	●
		IR3120	0.01 to 0.8	5,000	1	1/4, 3/8, 1/2		●	—	—	●	—		●	●	—	●	●	—	● *3	●

● : Available with a standard model, ▲ : This is technically possible, but consult with SMC for dimensions, costs and delivery. —: Not available

∗ 1) 0.01 to 0.2 MPa for IR3000. ∗ 2) The maximum flow rate depends on the condition.

∗ 3) Available from –5°C to 100°C. However, available up to 80°C with the pressure gauge mounted on the product.

High-pressure 6.0 MPa compliant Specifications and options

Products classification			Specifications/Characteristics		Piping							Option		Semi-standard	Made to Order				
Classification	Features	Model	Set pressure range [MPa]	Maximum flow rate *1 [ℓ/min(ANR)]	Port size	Body ported		Base piping	Tube piping	Modular connection	Manifold	Pressure gauge	Bracket	Non-relieving	Clean room	Copper-free, Fluorine-free	High-pressure	High-temperature	Low-temperature
Basic 	Direct-operated regulator (Relieving type)	VCHR30	0.5 to 5.0	50,000	G3/4, G1	●		—	—	—	—	—	—	—	—	—	—	—	—
		VCHR40			G1, G1 1/2	●		—	—	—	—	—	—	—	—	—	—	—	—

∗1) The maximum flow rate depends on the condition.

●: Available with a standard model, —: Not available

Vacuum Specifications and options

Products classification		Specifications/Characteristics			Piping				Option		Semi-standard	Made to Order				
Classification	Model	Set pressure range [kPa]	Maximum flow rate ∗1 [ℓ/min(ANR)]	Pressure characteristics (Supply air pressure characteristics) [%]	Port size ( ): Tubing size	Body ported	Tube piping	Manifold	Pressure gauge	Bracket	Non-relieving	Clean room	Copper-free, Fluorine-free	High-pressure	High-temperature (–5 to 80°C)	Low-temperature (–30 to 60°C)
Manual	IRV1000	–1.3 to –100	60	4	1/8	●	—	—	●	●	—	●	●	—	● ∗2	▲
	IRV2000	–1.3 to –100	100	3.1	1/4	●	—	—	●	●	—	●	●	—	● ∗2	▲
	IRV3000	–1.3 to –100	150	1.4	1/4, 3/8, 1/2	●	—	—	●	●	—	●	●	—	● ∗2	▲
Electronic	ITV0090	–1.0 to –100	2	1	(ø4, ø5/32)	—	●	●	—	●	—	▲	▲	—	—	—
Refer to the electric specifications to the table below.	ITV2090	–1.3 to –80	130	1	1/4	●	—	—	●	●	—	▲	▲	—	—	—

● : Available with a standard model, ▲ : This is technically possible, but consult with SMC for dimensions, costs and delivery. —: Not available

∗ 1) The maximum flow rate depends on the condition.
∗ 2) Available from –5°C to 100°C. However, available up to 80°C with the pressure gauge mounted on the product.

Special fluid/Deionized water (Pure water) Specifications and options

Products classification		Specifications/Characteristics (Representative value)		Piping			Option		Semi-standard	Made to Order				
Classification	Model	Set pressure range [MPa]	Pressure characteristics (Supply air pressure characteristics) [%]	Port size ( ): Tubing size	Body ported	Tube piping	Pressure gauge	Bracket	Non-relieving	Clean room	Copper-free, Fluorine-free	High-pressure	High-temperature (–5 to 80°C)	Low-temperature (–30 to 60°C)
Manual	SRP1111	0.01 to 0.4	1	M5, 1/8	●	—	●	●	—	● ∗2	●	—	▲	▲
	SRH3000	0.05 to 0.7	6	1/8, 1/4	●	—	●	●	●	● ∗2	●	—	▲	▲
	SRH4000	0.05 to 0.7	8	1/4, 3/8, 1/2	●	—	●	●	●	● ∗2	●	—	▲	▲
Air-operated	SRF10	0.02 to 0.4	2	(ø1/4)	—	●	—	—	● ∗1	● ∗2	●	—	—	—
	SRF30	0.02 to 0.4	1	(ø3/8)	—	●	—	—	● ∗1	● ∗2	●	—	—	—
	SRF50	0.02 to 0.4	4	(ø3/4)	—	●	—	—	● ∗1	● ∗2	●	—	—	—

● : Available with a standard model, ▲ : This is technically possible, but consult with SMC for dimensions, costs and delivery. —: Not available

∗ 1) This is not compatible with the relieving type.
∗ 2) Clean room specifications are available as standard.

Electronic type / ITV Electrical specifications

Model			Power supply voltage		Input specifications										Output specifications ∗1					Cable connector ∗2						Reverse type ∗3	CE marking
					Analog					Parallel			Serial transmission															
			24 V DC ±10%	12 to 15 VDC	4 to 20 mA DC	0 to 20 mA DC	0 to 5 VDC	0 to 10 VDC	Other voltage and current	4 points preset (2 bit)	16 points preset (4 bit)	10 bit	DeviceNet™	CC-Link	RS-232C	Others or serial transmission	1 to 5 V DC	4 to 20 mA DC (sink)	4 to 20 mA DC (source)	NPN output	PNP output	M8 straight union type 3 m	M12 straight union type 3 m	M8 right angle type 2 m	M12 right angle type 3 m	Shielding cable	Special length		
	Positive pressure	ITV0000	●	●	●	●	●	●	▲	—	—	—	—	—	—	—	●	—	—	—	—	●	—	●	—	▲	▲	—	●
		ITV1000	●	●	●	●	●	●	▲	●	▲	▲	▲	▲	▲	▲	●	●	▲	●	●	—	●	—	●	▲	▲	▲	●
		ITV2000	●	●	●	●	●	●	▲	●	▲	▲	▲	▲	▲	▲	●	●	▲	●	●	—	●	—	●	▲	▲	▲	●
		ITV3000	●	●	●	●	●	●	▲	●	▲	▲	▲	▲	▲	▲	●	●	▲	●	●	—	●	—	●	▲	▲	▲	●
	Vacuum	ITV0090	●	●	●	●	●	●	▲	—	—	—	—	—	—	—	●	—	—	—	—	●	—	●	—	▲	▲	—	●
		ITV2090	●	●	●	●	●	●	▲	●	▲	▲	▲	▲	▲	▲	●	●	▲	●	●	—	●	—	●	▲	▲	▲	●

● : Available with a standard model, ▲ : Special order, —: Not available

∗ 1) Select either one. Not possible to use them together. Refer to the output specifications of each equipment in detail.
∗ 2) Prepare a serial transmission cable separately. ∗3) Specifications that reverse the input-output characteristics.