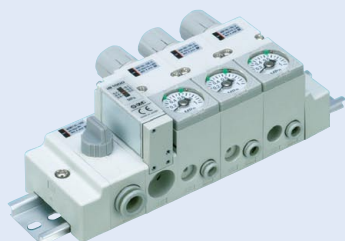


# Pressure Control Equipment

General Purpose



High-pressure



Precision



Vacuum



Special Fluid/Deionized Water (Pure Water)



## INDEX

Pressure Control Equipment [General purpose, high-pressure, precision, vacuum, special fluid, deionized water (pure water)]	P.114
Basic Characteristics of Pressure Control Equipment	P.120
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### 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.

Directional Control Valves

Actuators

Air Preparation Equipment

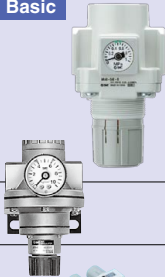


Air Combination

Pressure Control Equipment

Pressure Detection Equipment


Flow Rate Detection Equipment

## 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 *1 [L/min (ANR)]	Exhaust air characteristics Maximum flow rate *2 [L/min (ANR)]	Port size ( ): Tubing size
<b>Basic</b> 	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
	Compact manifold type	ARM5 ARM10	0.05 to 0.7	300 400	20 75	(ø4, ø6, ø8)
	Manifold type	ARM1000 to 3000	0.05 to 0.85	300 to 4,200	40 to 80	1/8 to 1/2
	<b>With air filter</b> 	Nominal filtration rating for instrumentation 5 µm	IW / 1301	0.02 to 0.5	320 to 530	55
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.




## 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
<b>Basic</b> 	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.

AR	6	P.543	ARX	6	P.681	AR425 to 925	6	P.678	ARM	6	P.691	IW	11	P.154	1301	11	P.158
AWM	6	P.586	AMR	6	P.686	AWD	6	P.586	VCHR	9	P.444	IR	6	P.807	VEX1□	6	P.840
ARP	6	P.759	ITV	6	P.893	IRV	6	P.825	SRP	6	P.869	SRH	6	P.855	SRF	6	P.877

## ◆◆ 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 [L/min (ANR)]	Exhaust air characteristics Maximum flow rate <sup>*3</sup> [L/min (ANR)]	Port size ( ): Tubing size
<b>Basic</b> 	Pilot	IR1000-A to 3000-A	0.005 to 0.2 <sup>*1</sup> 0.01 to 0.4 0.01 to 0.8	720 to 5,000	120 to 3,000	1/8 to 1/2
		VEX1A33/1B33 VEX1133 to 1933	0.05 to 0.7	580 to 29,000	290 to 23,000	M5, 1/8 to 2
<b>Electronic</b> 	Precision direct-operated regulator	ARP20 to 40	0.005 to 0.6	300 to 900	45 to 100 <sup>*4</sup>	1/8 to 1/2
	With built-in pressure sensor	ITV1000 to 3000	0.005 to 0.9 <sup>*5</sup>	200 to 4,000	50 to 1,000	1/8 to 1/2
<b>Air-operated</b> 	High-relief nozzle-flapper type	ITV0000	0.001 to 0.9 <sup>*5</sup>	6	6	(ø4, ø5/32")
		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 <sup>*1</sup> [L/min (ANR)]	Port size ( ): Tubing size
	Manual	IRV10/20 IRV10A/20A	-1.3 to -100	140 to 240	(ø6, ø8, ø10, ø1/4" ø5/16", ø3/8")
	Electronic (Built-in pressure sensor)	ITV2090	-1.3 to -80 <sup>*2</sup>	130	1/4
		ITV0090	-1.0 to -100 <sup>*2</sup>	2	(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) ◆◆

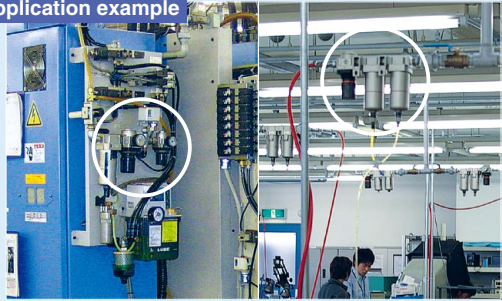
Products classification			Specifications/Characteristics (Representative value)		Piping
Classification	Features	Model	Set pressure range [MPa]	Supply air characteristics Maximum flow rate [L/min (ANR)]	Port size ( ): Tubing size
	Manual	SRP1111	0.01 to 0.4	20 to 200	M5, 1/8
		SRH3000/4000	0.05 to 0.7	100 to 1500	1/8 to 1/2
Air-operated		SRF10 to 50	0.02 to 0.4	2 to 50	(ø1/4, ø3/8, ø3/4)

# Pressure Control Equipment

..... **General purpose** Widely used for pressure control in factory lines. ....

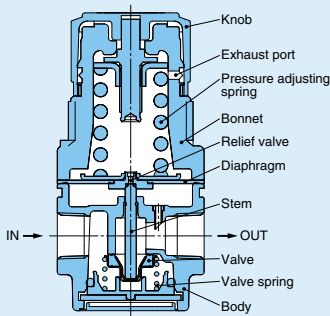


## Application example



## 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

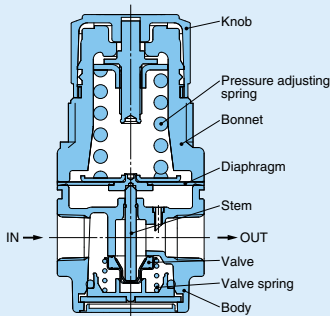
This is used when the load fluctuation of the outlet side is large, when adjusting frequently and filling the container (including a cylinder) of the outlet side, etc.

### 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 8%
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 8%
Repeatability	±0.02 MPa

## Residual pressure exhaust valve

Model: **VHS**

### Features

The outlet pressure can be easily discharged.

### How to use

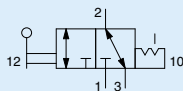
This is a manual switching valve for safety measures to prevent accidents caused by residual pressure.

### Flow rate characteristics

Model	Port size		Flow rate characteristics					
	IN, OUT	EXH	IN → OUT			OUT → EXH		
			C (dm <sup>3</sup> /s-bar)	b	Cv	C (dm <sup>3</sup> /s-bar)	b	Cv
VHS20	1/8	1/8	2.4	0.43	0.65	2.5	0.39	0.69
	1/4		3.3	0.40	0.88	3.1	0.51	0.84
VHS30	1/4	1/4	6.4	0.45	1.7	6.2	0.38	1.7
	3/8		8.3	0.41	2.3	7.0	0.41	1.9
VHS40	1/4	3/8	7.3	0.49	2.0	8.5	0.35	2.3
	3/8		10.9	0.45	3.0	11.6	0.40	3.1
VHS40-06	1/2	1/2	14.2	0.39	3.8	13.3	0.43	3.6
	3/4		18.3	0.31	5.0	17.7	0.37	4.8
VHS50	3/4	1/2	23.8	0.41	6.4	21.8	0.41	5.9
	1		31.9	0.33	8.6	23.5	0.44	6.4

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

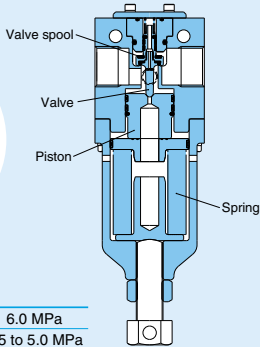
### Symbol



# Pressure Control Equipment

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

Model: VCHR



**Specifications**

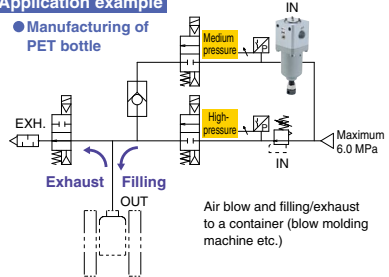
Maximum operating pressure	6.0 MPa
Set pressure range	0.5 to 5.0 MPa

**Working principle**

Direct-operated type with a piston valve.

**Application example**

- Manufacturing of PET bottle

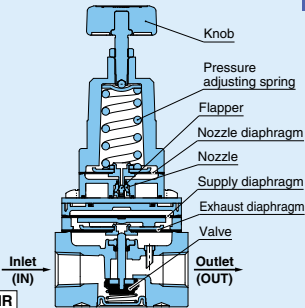


..... **Precision** Possible to set within 0.2% of the sensitivity full span. ....

Model: IR, ITV, VEX



In case of IR



**Specifications** (representative value)

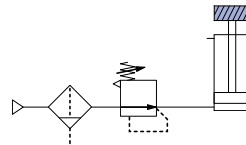
Maximum operating pressure	1.0 MPa
Set pressure range	0.01 to 0.8 MPa (0.005 to 0.9 MPa)
Pressure characteristics (Supply air pressure characteristics)	1% (0.3%)
Repeatability	±0.004 MPa (±0.005 MPa) ( ): In case of electronic type

**Working principle**

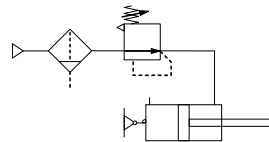
This type has an internal pilot structure in which the valve is opened through the diaphragm via air pressure.

**Application example**

- Balance and actuation  
Accurate balance pressure setting

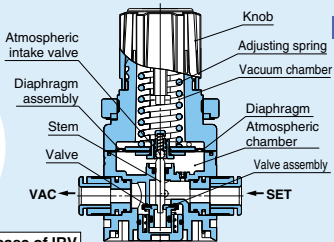


- Contact pressure control



## Vacuum For vacuum settings

### Model: IRV, ITV



In case of IRV

#### Specifications (representative value)

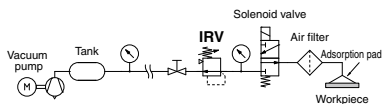
Maximum operating pressure	-101 kPa
Set pressure range	-1.3 to -100 kPa (-1 to -100 kPa/ITV0090, -1.3 to -80 kPa/ITV2090)
Pressure characteristics (Supply air pressure characteristics)	2% (1%)
Repeatability	±5 kPa (±0.5 kPa)

#### Working principle

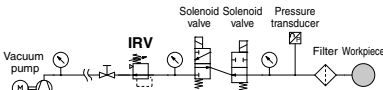
The compression force of an adjusting spring opens the main valve through a diaphragm, causing the degree of vacuum to rise. At this moment, the pressure of the SET side is led to the vacuum chamber through a feedback path and is set with a balance of the generated force of a spring.

#### Application example

##### ● Adsorption of workpiece



##### ● Leak tester



Directional Control Valves

Actuators

Air Preparation Equipment

Air Combination Equipment

Pressure Control Equipment

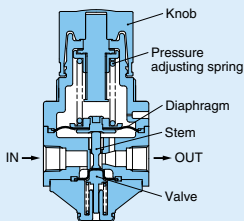
Pressure Detection Equipment

Flow Rate Detection Equipment

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

### Manual

### Model: SRH, SRP

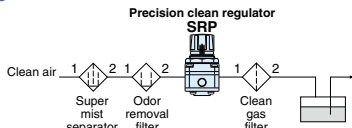


#### Specifications (representative value)

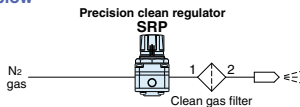
	SRH	SRP
Maximum operating pressure	1.0 MPa	1.0 MPa
Set pressure range	0.05 to 0.7 MPa	0.01 to 0.4 MPa
Pressure characteristics (Supply air pressure characteristics)	6 to 9%	1%
Repeatability	0.05 MPa or less	0.004 MPa or less
Fluid	Clean air, N <sub>2</sub> , Ar, CO <sub>2</sub> , Deionized water (Pure water), Water	Air, N <sub>2</sub> , CO <sub>2</sub> , Ar

#### Application example

##### ● Pressure feed of chemicals



##### ● N<sub>2</sub> blow



#### Working principle

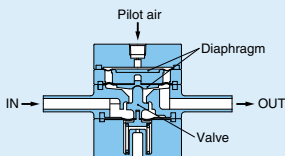
Like the general type, this type has a direct-operated structure that causes the valve to be directly opened by adjusting spring load.

#### Wetted parts material

Stainless steel, Fluororesin, Fluororubber

### Air-operated

### Model: SRF



#### 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.

#### 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
Fluid	N <sub>2</sub> , Deionized water (Pure water)

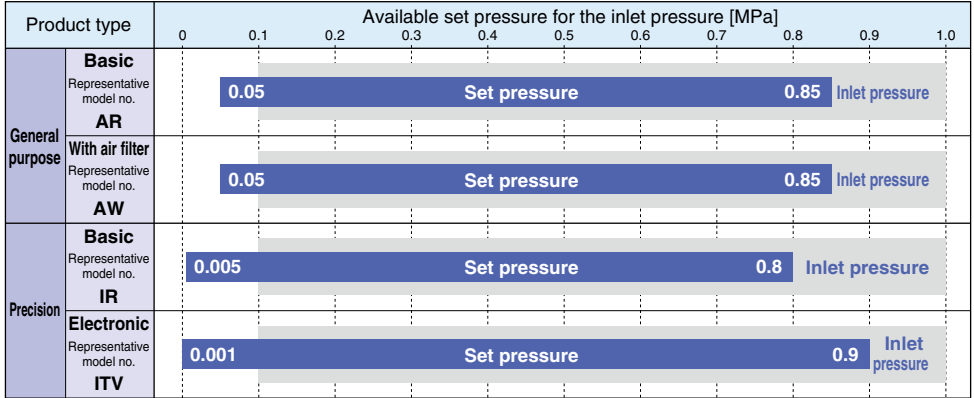
#### Wetted parts material

Fluororesin

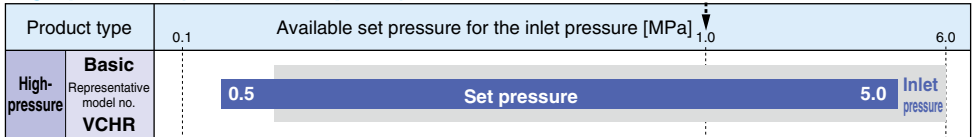
# Basic Characteristics of Pressure Control Equipment

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.

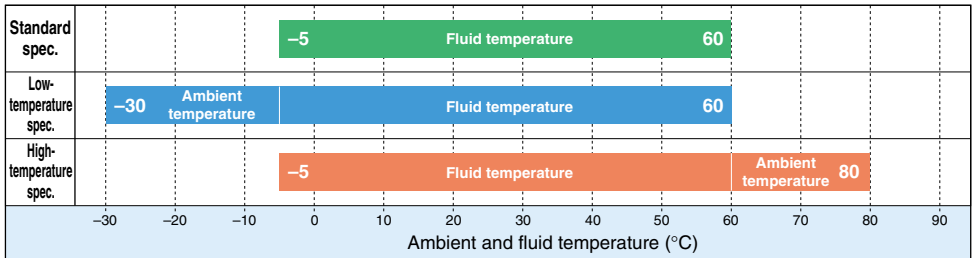
## 1 Available set pressure for the inlet pressure



### 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

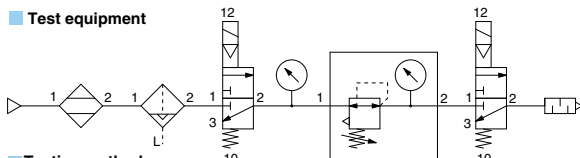
The number of service life is based on our test results and no guarantee is assured for everything. Use these values as guidelines. The following table shows the service life of a typical general type, high-pressure type and precision type.

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)	5 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.

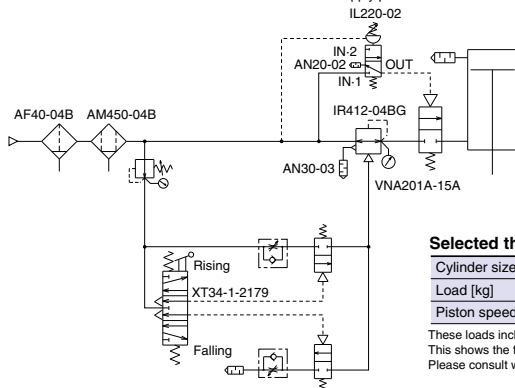
#### Guideline of service life

Phenomenon	Cause	Reference time of service life
<b>Leakage</b>	<ul style="list-style-type: none"> <li>• Damage of diaphragm</li> <li>• Wearing and cracks of rubber</li> </ul>	The amount of leakage exceeds 10 cm <sup>3</sup> /min (ANR) per minute.
<b>Inferior adjustment</b>	<ul style="list-style-type: none"> <li>• Damage of spring</li> <li>• Biting of foreign materials</li> </ul>	Neither the flow rate characteristics value nor the pressure characteristics value satisfy the specifications.

\* The service life of the electronic type (ITV) is 24 million input signal ON/OFF operation cycles.

### 4 Example of manual balancer circuit

Prevention of air omission when supply pressure decreases



#### 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.

Note) A cylinder with fixed throttle is not applicable.

# Basic Characteristics of Pressure Control Equipment

## 5 Selection

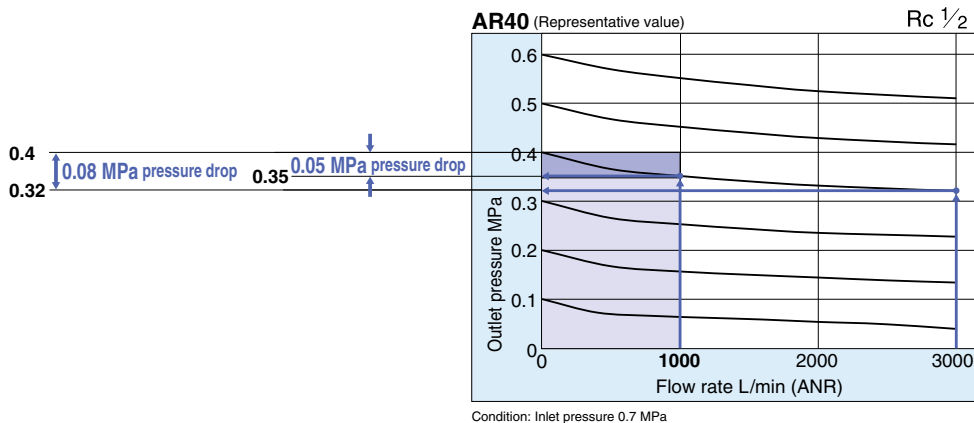
1) Select the regulator depending on the application.

Regulators	General purpose	Direct-operated	Relieving (Standard)	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.	
			Non-relieving			
		Pilot-operated	Manual	AR425, AR625 AR825, AR925	Regulators incorporating a pilot mechanism for adjusting the pressure accurately better than a directoperated regulator.	
			Air-operated	XT13-253, XT13-207 XT13-202, XT13-283		
		High-pressure	Direct-operated	Relieving	VCHR30, 40	Durable up to 6.0 MPa highpressure.
				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.
	Precision	Direct-operated				
		Pilot-operated	Manual	IR1000-A, IR2000-A IR3000-A VEX1A33, VEX1B33 VEX1133, VEX1233 VEX1333, VEX1533 VEX1733, VEX1933	As a small amount of IN-side air is continually discharged from the bleed hole to the atmosphere, sensitive pressure adjustment is possible (except for the electronic type).	
			Air-operated	IR2120, IR3120		
		Electronic	ITV0000, ITV1000 ITV2000, ITV3000			
	Vacuum	Direct-operated	Manual	IRV10, IRV20	Possible to set the vacuum pressure.	
Internal pilot		Electronic	ITV0090, ITV2090			
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			

AR	6	P.543	ARJ	6	P.668	ARX	6	P.681	ARM	6	P.691	AW	6	P.567	AWM.AWD	6	P.586
AMR	6	P.686	IW	11	P.154	1301	11	P.158	AR425 to 925	6	P.678	VCHR	9	P.444	ARP	6	P.759
IR	6	P.807	VEX1□	6	P.840	ITV	6	P.893	IRV	6	P.825	SRP	6	P.869	SRH	6	P.855
												SRF	6	P.877			

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

Example) How to read of the AR40 flow rate characteristics



When the outlet pressure is set to 0.4 MPa and the air flow of 1000 L/min (ANR) is supplied, the set pressure drops to 0.35 MPa. If the required pressure range of a device is between 0.32 and 0.4 MPa and the set pressure of AR40 is set to 0.4 MPa, the corresponding air flow rate to the outlet pressure of 0.32 MPa is indicated to be 3000 L/min (ANR) in the chart, therefore the air flow is allowed to be provided up to this flow rate. If the air flow rate is required more than this, select a larger size.

### The approx. characteristic value when the regulator or filter regulator inlet pressure is different from the flow rate characteristic conditions (0.7 MPa) in the catalog

Generally, the approx. value can be guessed using the flow rate characteristics chart in the catalog.

Calculation method: Calculate the flow rate in relation to the actual inlet pressure from the absolute pressure ratio

$$\text{Absolute pressure ratio} = \frac{\text{Actual inlet pressure}}{\text{Flow rate characteristic inlet pressure}}$$

Ex.) When the inlet pressure is 0.5 MPa

$$\frac{0.5 + 0.1}{0.7 + 0.1} = 0.75 \quad \text{Correct to: Flow rate value} \times 0.75$$

Ex.) When the inlet pressure is 1.0 MPa

$$\frac{1.0 + 0.1}{0.7 + 0.1} = 1.375 \quad \text{Correct to: Flow rate value} \times 1.375$$

# Basic Characteristics of Pressure Control Equipment

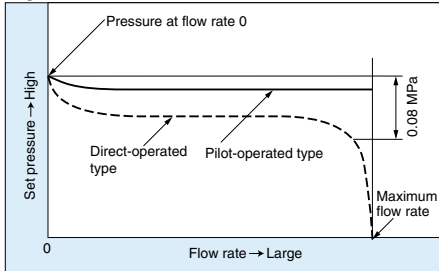
## 5 Selection

### Terminological explanation

#### Flow rate characteristics

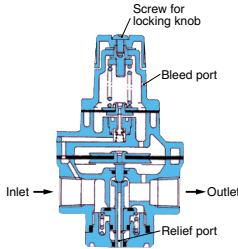
Generally, the outlet pressure is adjusted with no flow status. When the outlet side is gradually opened after setting the pressure and the flow rate is increased, the set pressure decreases accordingly. The smaller the degree of this pressure reduction, the better the flow rate characteristic of the regulator. 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 rate characteristics



#### 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.

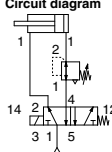
#### Regulator with back flow mechanism

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.



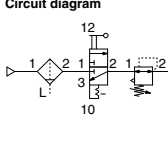
**Example 1.**  
When the pressure in the head side or the rod side of a cylinder is different.

**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.

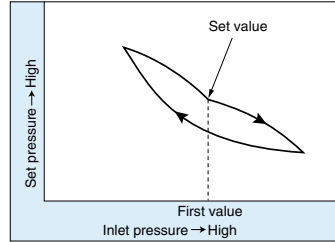
**Circuit diagram**



#### 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

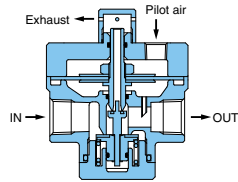


#### Maximum flow rate













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.

#### 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.



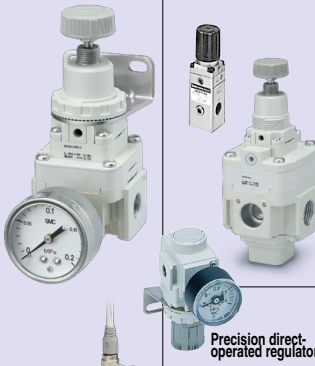
## General purpose Specifications and options

Products classification			Specifications/Characteristics (Representative value)			Port size
Classification	Features	Model	Set pressure range [MPa]	Maximum flow rate *1 [L/min(ANR)]	Pressure characteristics (Supply air pressure characteristics) [%]	( ): Tubing size
<b>Basic</b>	 <b>Miniature</b>	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)
	 <b>Standard</b>	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
	 <b>High-pressure 2.0 MPa Relieving type</b>	ARX20	0.05 to 0.85	950	8	1/8, 1/4
		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	1 1/4, 1 1/2
AR925		0.05 to 0.83	35,000	1	2	
 <b>Compact manifold type</b>	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)	
	 <b>Manifold type</b>	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	
<b>With air filter</b>	 <b>Nominal filtration rating for instrumentation 5 μm</b>	1301	0.02 to 0.5	320	0.5	1/4
		IW	0.02 to 0.5	530	1	1/4
		AW10	0.05 to 0.7	220	17	M5
	 <b>Nominal filtration rating 5 μm</b>	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
		 <b>Nominal filtration rating 0.3 μm</b>	AWM20	0.05 to 0.85	150	1
	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	
 <b>Nominal filtration rating 0.01 μm</b>	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	
	 <b>Modular</b>	ARG20(K)	0.05 to 0.85	2,000	2	1/8, 1/4
ARG30(K)		0.05 to 0.85	4,300	2	1/4, 3/8	
ARG40(K)		0.05 to 0.85	8,200	2	1/4, 3/8, 1/2	
<b>Built-in pressure gauge</b>	 <b>Nominal filtration rating 5 μm</b>	AWG20(K)	0.05 to 0.85	1,700	3	1/8, 1/4
		AWG30(K)	0.05 to 0.85	2,300	4	1/4, 3/8
		AWG40(K)	0.05 to 0.85	5,200	4	1/4, 3/8, 1/2
<b>Built-in pressure gauge With air filter</b>	 <b>High-flow type</b>	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	1 1/4, 1 1/2
		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.



## Precision Specifications and options

Products classification			Specifications/Characteristics (Representative value)			
Classification	Features	Model	Set pressure range [MPa]	Maximum flow rate *2 [L/min(ANR)]	Pressure characteristics (Supply air pressure characteristics) [%]	Port size ( ): Tubing size
<b>Basic</b> 	<b>Pilot</b>  <b>Precision direct-operated regulator</b>	IR1000-A	0.005 to 0.2*1	720	0.5	1/8
		IR2000-A	0.01 to 0.4	1,900	0.5	1/4
		IR3000-A	0.01 to 0.8	5,000	1	1/4, 3/8, 1/2
		VEX1A33	0.01 to 0.7	580	3	M5, 1/8
		VEX1B33	0.01 to 0.7	580	3	M5, 1/8
		VEX1133	0.05 to 0.7	1,600	0.7	1/8, 1/4
		VEX1233	0.05 to 0.7	1,600	0.7	1/8, 1/4
		VEX1333	0.05 to 0.7	3,100	0.7	1/4, 3/8, 1/2
		VEX1533	0.05 to 0.7	7,300	0.6	1/2, 3/4, 1
		VEX1733	0.05 to 0.7	14,600	0.7	1, 1 1/4
		VEX1933	0.05 to 0.7	29,000	0.7	1 1/2, 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		
<b>Electronic</b> Refer to the electric spec. table on page 128.	<b>Built-in pressure sensor</b>	ITV0000	0.001 to 0.9	6	0.3	(ø4, ø5/32")
		ITV1000	0.005 to 0.9	200	0.3	1/8, 1/4
		ITV2000	0.005 to 0.9	1,200	0.3	1/4, 3/8
		ITV3000	0.005 to 0.9	4,000	0.3	1/4, 3/8, 1/2
<b>Air-operated</b>	<b>High-relief nozzle-flapper type</b>	IR2120	0.01 to 0.8	1,000	0.5	1/4
		IR3120	0.01 to 0.8	5,000	1	1/4, 3/8, 1/2

## High-pressure 6.0 MPa compliant Specifications and options

Products classification			Specifications/Characteristics			
Classification	Features	Model	Set pressure range [MPa]	Maximum flow rate *1 [L/min(ANR)]	Port size	Body ported
<b>Basic</b> 	<b>Direct-operated regulator (Relieving type)</b>	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.

Piping					Option		Semi-standard	Made to Order					
Body ported	Base piping	Tube piping	Modular connection	Manifold	Pressure gauge	Bracket	Non-relieving	Clean room	Copper-free, Fluorine-free	High-pressure (1.0 MPa)	High-temperature (-5 to 80°C)	Low-temperature (-30 to 60°C)	
●	—	—	●	●	●	●	—	●	●	—	—	—	
●	—	—	●	●	●	●	—	●	●	—	—	—	
●	—	—	●	—	●	●	—	●	●	—	—	—	
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●	—	—	●	●	●*4	●	—	▲	▲	●	—	—	
●	—	—	▲	—	●*4	●	—	▲	▲	●	—	—	
●	—	—	●	—	●	●	—	●	●	—	●*3	●	
●	—	—	●	—	●	●	—	●	●	—	●*3	●	

● : Available with a standard model, ▲ : This is technically possible, but contact SMC for dimensions, costs and delivery. — : Not available  
 \* 1) 0.01 to 0.2 MPa for IR3000-A.\* 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.  
 \* 4) With LED indicator

Piping				Option		Semi-standard	Made to Order					
Base piping	Tube piping	Modular connection	Manifold	Pressure gauge	Bracket	Non-relieving	Clean room	Copper-free, Fluorine-free	High-pressure	High-temperature	Low-temperature	
—	—	—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	—	—	

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

Directional Control Valves

Actuators

Air Preparation Equipment

Air Combination Equipment

Pressure Control Equipment

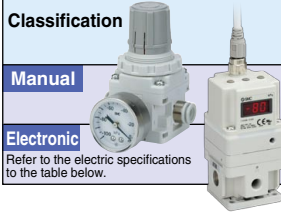
Pressure Detection Equipment

Flow Rate Detection Equipment



## Vacuum Specifications and options

Products classification		Specifications/Characteristics				Port size	
Classification	Model	Set pressure range [kPa]	Maximum flow rate*1 [L/min(ANR)]	Pressure characteristics (Supply air pressure characteristics) [%]	(: Tubing size)		
<b>Manual</b>	<b>IRV10</b>	-1.3 to -100	140	2	ø6, ø8, ø1/4", ø5/16"		
	<b>IRV20</b>	-1.3 to -100	240	2.7	ø6, ø8, ø10, ø1/4", ø5/16", ø3/8"		
<b>Electronic</b>	<b>ITV0090</b>	-1.0 to -100	2	1	(ø4, ø5/32)		
	<b>ITV2090</b>	-1.3 to -80	130	1	1/4		



Refer to the electric specifications to the table below.

## Special fluid/Deionized water (Pure water)\*3 Specifications and options

Products classification		Specifications/Characteristics (Representative value)		Piping	
Classification	Model	Set pressure range [MPa]	Pressure characteristics (Supply air pressure characteristics) [%]	Port size (: Tubing size)	Body ported
<b>Manual</b>	<b>SRP1111</b>	0.01 to 0.4	1	M5, 1/8	●
	<b>SRH3000</b>	0.05 to 0.7	6	1/8, 1/4	●
	<b>SRH4000</b>	0.05 to 0.7	8	1/4, 3/8, 1/2	●
<b>Air-operated</b>	<b>SRF10</b>	0.02 to 0.4	2	(ø1/4)	—
	<b>SRF30</b>	0.02 to 0.4	1	(ø3/8)	—
	<b>SRF50</b>	0.02 to 0.4	4	(ø3/4)	—



### Electronic type / ITV Electrical specifications

Model		Power supply voltage		Input specifications									
		24 VDC ±10%	12 to 15 VDC	Analog					Parallel			DeviceNet™	
				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		
	Positive pressure	<b>ITV0000</b>	●	●	●	●	●	●	▲	—	—	—	—
		<b>ITV1000</b>	●	●	●	●	●	●	▲	●	●	●	●
		<b>ITV2000</b>	●	●	●	●	●	●	▲	●	●	●	●
		<b>ITV3000</b>	●	●	●	●	●	●	▲	●	●	●	●
Vacuum	<b>ITV0090</b>	●	●	●	●	●	●	▲	—	—	—	—	
	<b>ITV2090</b>	●	●	●	●	●	●	▲	●	●	●	●	

Piping			Option		Semi-standard	Made to Order				
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)
▲	●	—	●	●	—	●	●	—	—	—
▲	●	—	●	●	—	●	●	—	—	—
—	●	●	—	●	—	▲	▲	—	—	—
●	—	—	● *2	●	—	▲	▲	—	—	—

● : 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) With LED indicator

		Option		Semi-standard	Made to Order				
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)	
—	●	●	—	● *2	●	—	▲	▲	
—	●	●	●	● *2	●	—	▲	▲	
—	●	●	●	● *2	●	—	▲	▲	
●	—	—	● *1	● *2	—	—	—	—	
●	—	—	● *1	● *2	—	—	—	—	
●	—	—	● *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. \* 3) Excluding the SPR.  
 \* 2) Clean room specifications are available as standard.

Serial transmission			Output specifications *1						Cable connector *2					Reverse type *3	CE marking
			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		
CC-Link	RS-232C	PROFIBUS DP													
—	—	—	●	—	—	—	—	●	—	●	—	▲	▲	—	●
●	●	●	●	●	▲	●	●	—	●	—	●	▲	▲	▲	●
●	●	●	●	●	▲	●	●	—	●	—	●	▲	▲	▲	●
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—	—	—	●	—	—	—	—	●	—	●	—	▲	▲	—	●
●	●	●	●	●	▲	●	●	—	●	—	●	▲	▲	▲	●

● : 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.

Directional Control Valves  
 Actuators  
 Air Preparation Equipment  
 Air Combination  
 Pressure Control Equipment  
 Pressure Detection Equipment  
 Flow Rate Detection Equipment