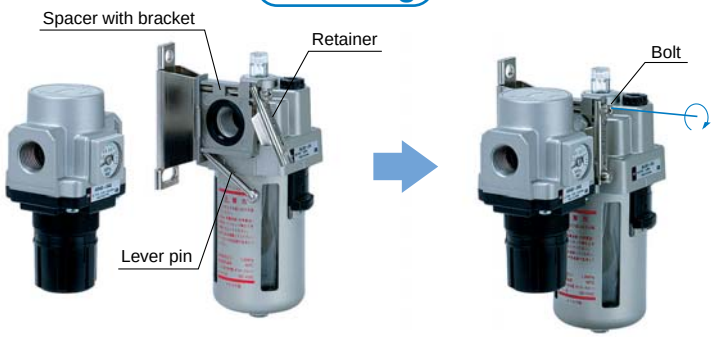
Air Combination

F.R.L. Units
Series AC

Mounting



① Attach the component into the fitting of the spacer with bracket.
② Lock the lever pin into the retainer. (temporary mounting)
③ Tighten the bolt.

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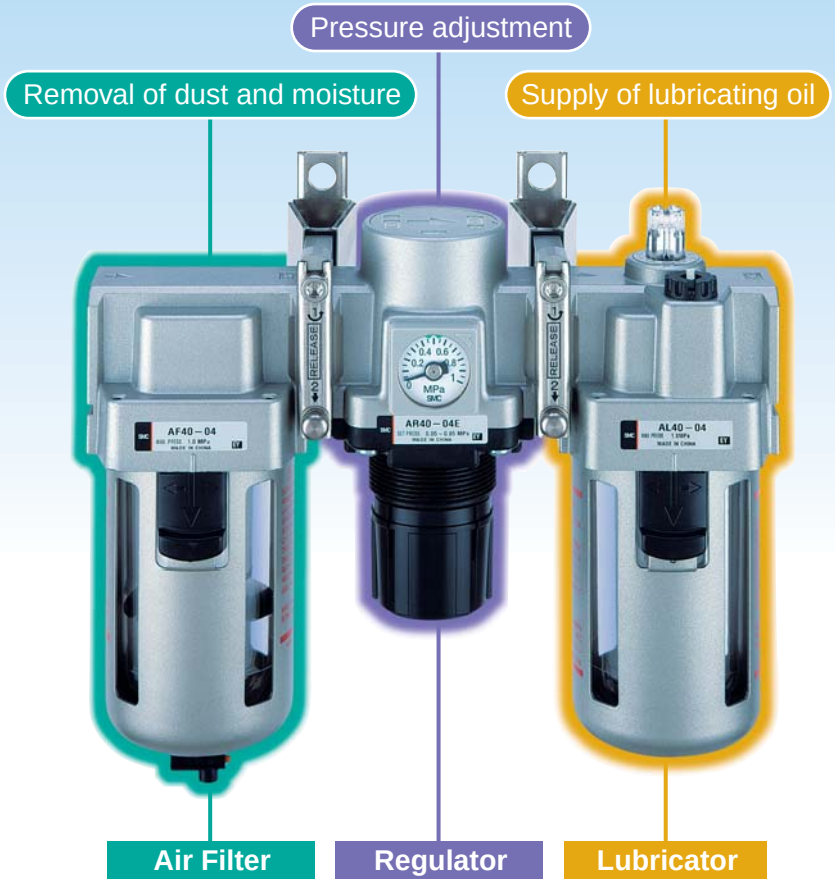
Supplies compressed air best suited for your equipment.

In general, moisture, oil content and solid foreign matter contained in compressed air from compressors used in general industrial machinery are removed using air preparation equipment before the air reaches an operating line. The compressed air experiences a temperature drop on the way to the operating line and oversaturated moisture due to condensation or rust inside the piping may mix into the compressed air, possibly causing problems to pneumatic equipment. In addition, proper pressure levels must be set at the operating line according to the type of equipment. In most applications, the Air Combination is installed in the operating line and used for the purpose of preventing the abovementioned problems and setting required pressures. The Air Combination basically consists of an air filter, a regulator and a lubricator and has the following functions.



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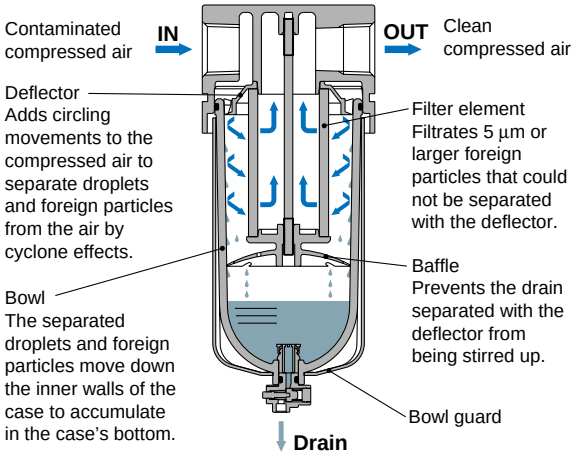
Air Filter

P. 327

The air filter is installed at the inlet to prevent moisture and dust contained in compressed air from entering the pneumatic control circuit.



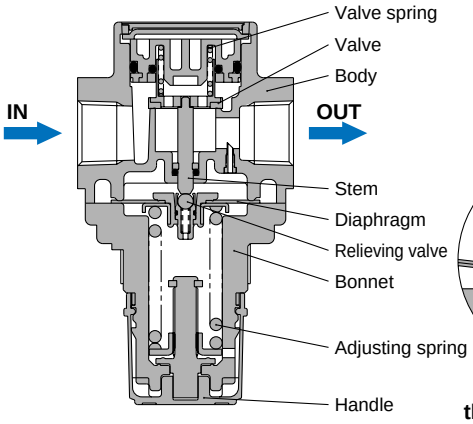
A 5 µm element has been employed as a standard for the air filter's nominal filtration rating and this nominal filtration rating is compatible with most general-purpose pneumatic equipment. If a filtration rating other than 5 µm are required, select an air filter that uses an element with a different filtration rating. If the Air Combination is used in, for example, precision instruments and even finer foreign particles need to be removed, select a mist separator (0.3 µm) or a micromist separator (0.01 µm).

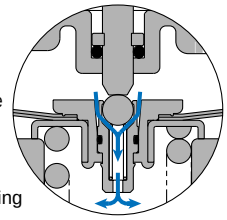
Refer to the "Air Preparation Equipment" catalog no. NCAT.E30-1.

Regulator

P. 345

In pneumatic control equipment, a regulator or other pressure control valves are used since the pressure of air from an air compressor need to be reduced to a specific level according to the purpose of use.





Detailed view of the relieving valve

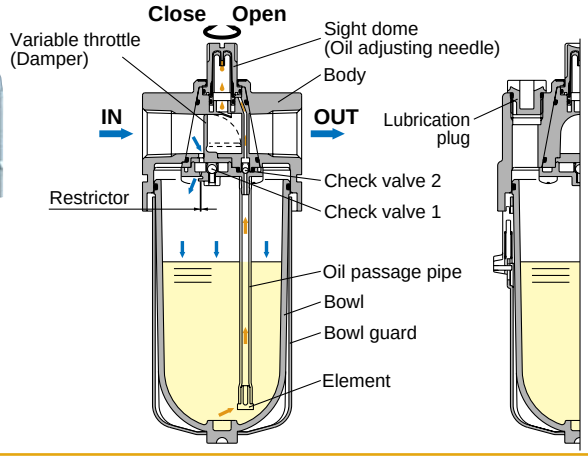
Regulators come in general-purpose and precision models are selectively used according to their setting accuracy. In most cases, the setting accuracy levels of general-purpose and precision regulators are approximately ±0.05 MPa and ±0.01 MPa, respectively. In general industrial machinery, general-purpose regulators are commonly used, while precision regulators are used only when high pressure accuracy levels are required.

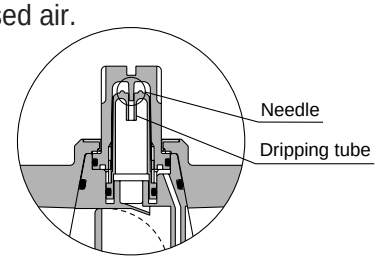
Refer to the "Pressure Control Equipment" catalog no. NCAT.E41-1.

Lubricator

P. 357

Portions of pneumatic equipment in need of lubrication include control valve spools and the sliding surfaces of, for example, cylinder pistons and pneumatic motor vanes. Since compressed air is commonly applied to these pieces of equipment, they cannot be easily lubricated from the outside. The method employed to solve this problem is to install a specially-constructed lubricator in the pipe line to mix lubricating oil into the compressed air.





Detailed view of the sight dome

Air Combination Basic Specifications

Air Filter + **Regulator** + **Lubricator**

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[Application]

Applicable to remove solid foreign objects sized 5 µm or more and oversaturated water contained in the compressed air, prevent malfunction of actuators and solenoid valves, control (regulate) the outlet pressure, suppress fluctuations of the outlet pressure affected by fluctuations of the inlet pressure, and apply oil to pneumatic equipments at the outlet side.

AC20

AC40

AC800

Standard Specifications

Model		AC10	AC20	AC25	AC30	AC40	AC40-06	AC50	AC55	AC60	AC800	AC900
Component	Air Filter	AF10	AF20	AF30	AF30	AF40	AF40-06	AF50	AF60	AF60	AF800	AF900
	Regulator	AR10	AR20	AR25	AR30	AR40	AR40-06	AR50	AR50	AR60	AR825	AR925
	Lubricator	AL10	AL20	AL30	AL30	AL40	AL40-06	AL50	AL60	AL60	AL800	AL900
Port size		M5	1/8, 1/4	1/4, 3/8	1/4, 3/8	1/4, 3/8, 1/2	3/4	3/4, 1	1	1	$1^{1/4}$, $1^{1/2}$	2
Fluid		Air										
Proof pressure (MPa)		1.5										
Max. operating pressure (MPa)		1.0										
Set pressure range (MPa)		0.05 to 0.7	0.05 to 0.85								0.05 to 0.83	
Ambient and fluid temperature (°C)		–5 to 60 (No freezing)										
Nominal filtration rating (µm)		5										
Bowl material		Polycarbonate										
Bowl guard		—	Semi-standard	Standard								
Regulator construction		Relieving type										
Mass (kg)		0.27	0.73	0.91	1	1.74	1.95	4.17	4.25	4.34	7.67	12.22

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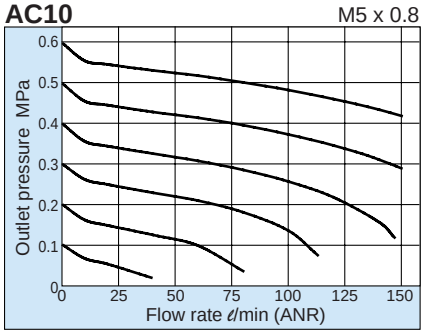
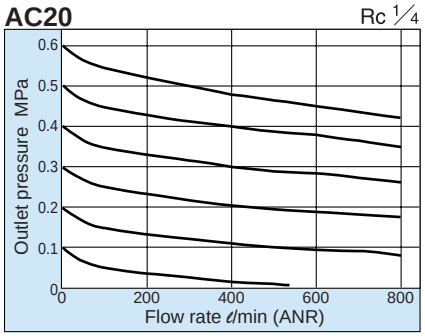
Flow Characteristics (Representative value)

Condition: Inlet pressure 0.7 MPa

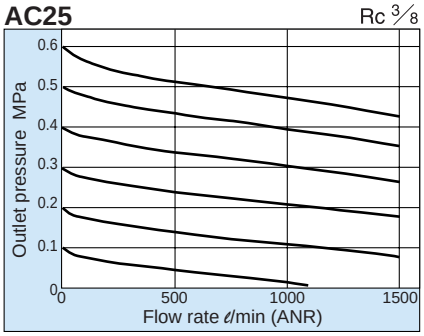
AC10 M5 x 0.8



AC20 Rc 1/4



AC25 Rc 3/8



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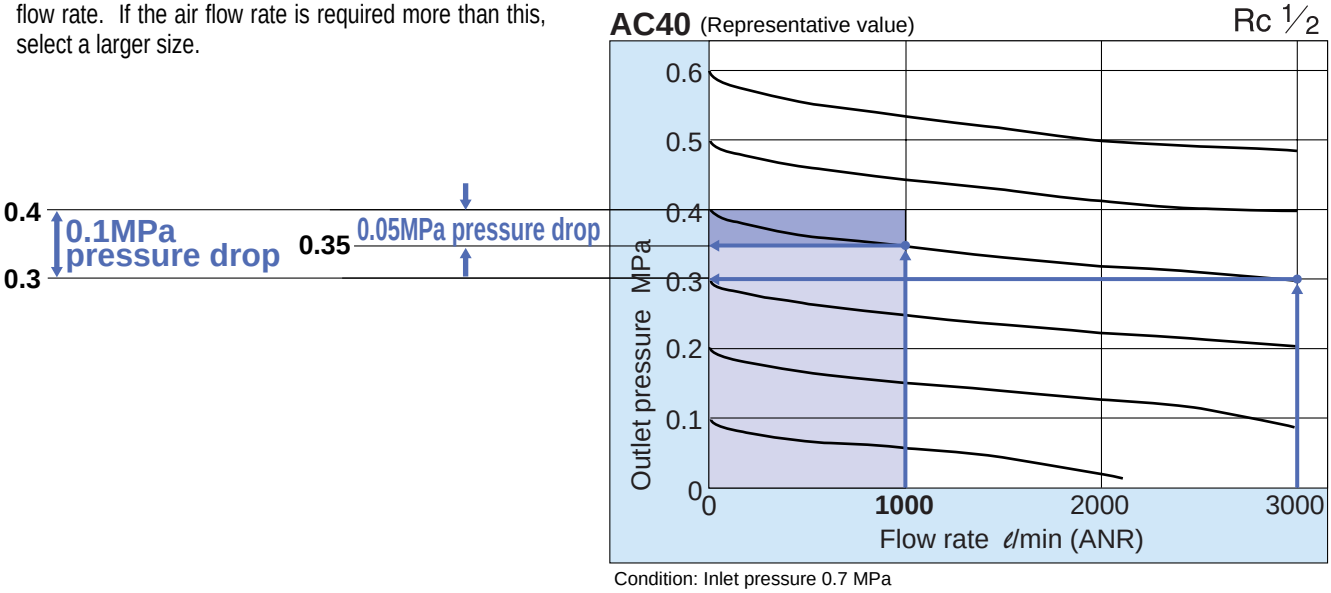
Selecting a body size applicable to service conditions according to the flow rate and flow characteristics

(Example) Selecting the AC40

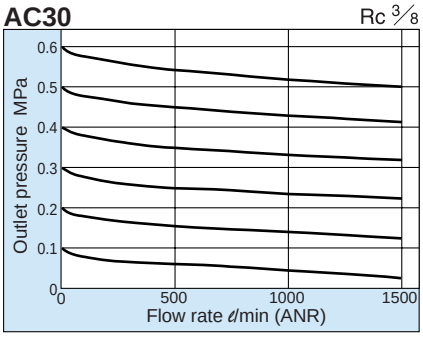
The flow characteristics are presented by characteristic charts indicating the variation of set pressure (amount of pressure drop) corresponding to the consumption air flow at the outlet side. When the outlet pressure is set to 0.4 MPa and the air flow of 1000 ℓ/min (ANR) is supplied, the set pressure drops to 0.35 MPa. If the required pressure range of a device is between 0.3 and 0.4 MPa and the set pressure of AC40 is set to 0.4 MPa, the corresponding air flow rate to the outlet pressure of 0.3 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.

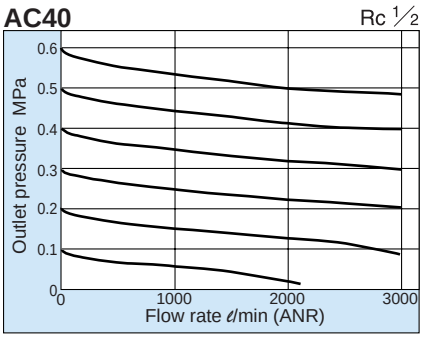


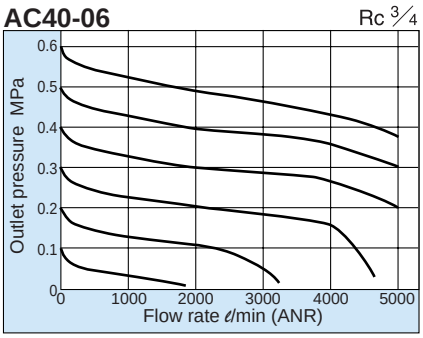
Condition: Inlet pressure 0.7 MPa

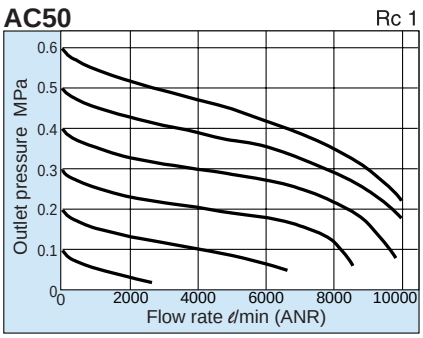
Flow Characteristics (Representative value)

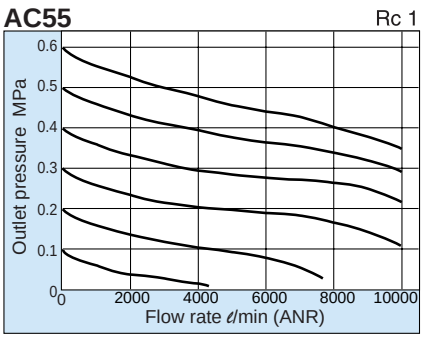
Condition: Inlet pressure 0.7 MPa

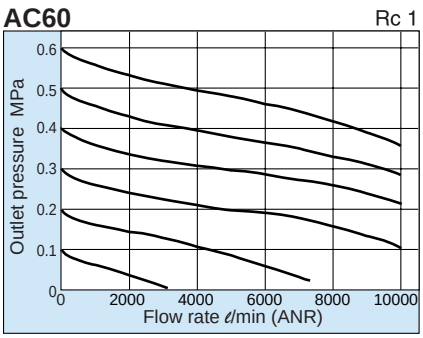


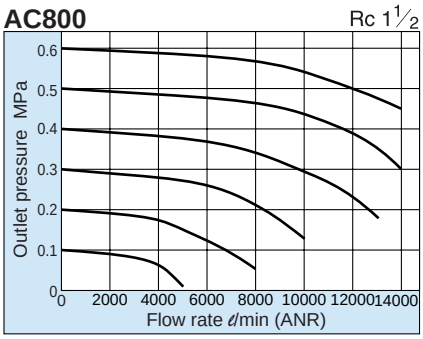


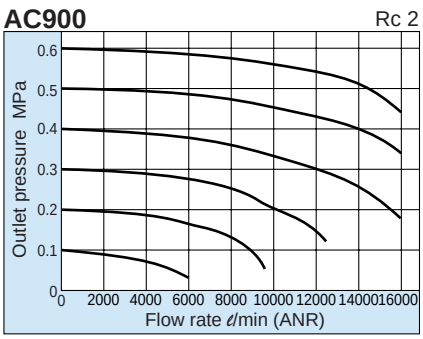












Variation of Combination

Foreign matter and moisture removal + Pressure control + Lubrication

(Nominal filtration rating: 5 µm) (0.05 to 0.85 MPa)

Air Filter + Regulator + Lubricator

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Filter Regulator + Lubricator

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Foreign matter and moisture removal + Pressure control

(Nominal filtration rating: 5 µm) (0.05 to 0.85 MPa)

Air Filter + Regulator

P.327 P.345

Foreign matter and moisture removal + Oil mist removal + Pressure control

(Nominal filtration rating: 5 µm) (Nominal filtration rating: 0.3 µm) (0.05 to 0.85 MPa)

Air Filter + Mist Separator + Regulator

P. 327 P. 338 P. 345

Filter Regulator + Mist Separator

P. 365 P. 338

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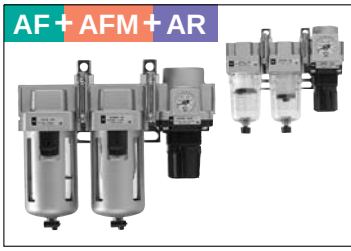
Appearance	Model	Port size	Component				
			Air Filter AF	Regulator AR	Lubricator AL	Filter Regulator AW	Mist Separator AFM
AF + AR + AL 	AC10	M5 x 0.8	AF10	AR10	AL10	—	—
	AC20	1/8, 1/4	AF20	AR20	AL20		
	AC25	1/4, 3/8	AF30	AR25	AL30		
	AC30	1/4, 3/8	AF30	AR30	AL30		
	AC40	1/4,3/8,1/2	AF40	AR40	AL40		
	AC40-06	3/4	AF40-06	AR40-06	AL40-06		
	AC50	3/4, 1	AF50	AR50	AL50		
	AC55	1	AF60	AR50	AL60		
	AC60	1	AF60	AR60	AL60		
	AC800	$1^{1}/_{4}$,$1^{1}/_{2}$	AF800	AR825	AL800		
	AC900	2	AF900	AR925	AL900		
AW + AL 	AC10A	M5 x 0.8	—	—	AL10	AW10	—
	AC20A	1/8, 1/4			AL20	AW20	
	AC30A	1/4, 3/8			AL30	AW30	
	AC40A	1/4,3/8,1/2			AL40	AW40	
	AC40A-06	3/4			AL40-06	AW40-06	
	AC50A	3/4, 1			AL50	AW60	
	AC60A	1			AL60	AW60	
AF + AR 	AC10B	M5 x 0.8	AF10	AR10	—	—	—
	AC20B	1/8, 1/4	AF20	AR20			
	AC25B	1/4, 3/8	AF30	AR25			
	AC30B	1/4, 3/8	AF30	AR30			
	AC40B	1/4,3/8,1/2	AF40	AR40			
	AC40B-06	3/4	AF40-06	AR40-06			
	AC50B	3/4, 1	AF50	AR50			
	AC55B	1	AF60	AR50			
	AC60B	1	AF60	AR60			
AF + AFM + AR 	AC20C	1/8, 1/4	AF20	AR20	—	—	AFM20
	AC25C	1/4, 3/8	AF30	AR25			AFM30
	AC30C	1/4, 3/8	AF30	AR30			AFM30
	AC40C	1/4,3/8,1/2	AF40	AR40			AFM40
	AC40C-06	3/4	AF40-06	AR40-06			AFM40-06
AW + AFM 	AC20D	1/4, 3/8	—	—	—	AW20	AFM20
	AC30D	1/4, 3/8				AW30	AFM30
	AC40D	1/4,3/8,1/2				AW40	AFM40
	AC40D-06	3/4				AW40-06	AFM40-06

Variation of Combination

＊Select with particular attention to the maximum flow rate and the port size.

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Product classification					Specifications and Characteristics						Piping	Product combination				
Appearance	Function	Application	Connection	Model	Set pressure range MPa	Max. flow rate ＊1 ℓ/min (ANR)	Pressure characteristics (Air supply pressure characteristics) %		Nominal filtration rating μm	Oil mist concentration mg/m³ (ANR)	Port size	Air Filter AF	Regulator AR	Lubricator AL	Filter Regulator AW	Mist Separator AFM
AF + AR + AL ① Air Filter + ② Regulator + ③ Lubricator 	Foreign matter and moisture removal + Pressure control + Lubrication	General industrial equipment air tool (lubrication equipment)	Modular connection	AC10	0.05 to 0.7	180	17		5	—	M5	① AF10	② AR10	③ AL10	—	—
				AC10A								—	—	② AL10	① AW10	—
				AC20	0.05 to 0.85	1,900	2		5	—	1/8, 1/4	① AF20	② AR20	③ AL20	—	—
				AC20A		1,700						—	—	② AL20	① AW20	—
				AC25	0.05 to 0.85	2,400	2		5	—	1/4, 3/8	① AF30	② AR25	③ AL30	—	—
				AC30	0.05 to 0.85	3,500	2		5	—	1/4, 3/8	① AF30	② AR30	③ AL30	—	—
				AC30A		2,300						—	—	② AL30	① AW30	—
				AC40	0.05 to 0.85	5,800	2		5	—	1/4, 3/8, 1/2	① AF40	② AR40	③ AL40	—	—
				AC40A		4,600						—	—	② AL40	① AW40	—
				AC40-06	0.05 to 0.85	5,800	2		5	—	3/4	① AF40-06	② AR40-06	③ AL40-06	—	—
				AC40A-06		4,600						—	—	② AL40-06	① AW40-06	—
				AC50	0.05 to 0.85	10,000	2		5	—	3/4, 1	① AF50	② AR50	③ AL50	—	—
				AC50A								—	—	② AL50	① AW60	—
				AC55	0.05 to 0.85	13,000	2		5	—	1	① AF60	② AR50	③ AL60	—	—
				AC60	0.05 to 0.85	14,000	2		5	—	1	① AF60	② AR60	③ AL60	—	—
				AC60A								—	—	② AL60	① AW60	—
			Nipple connection	AC800	0.05 to 0.83	16,000	2		5	—	$1^{1/4}$, $1^{1/2}$	① AF800	② AR825	③ AL800	—	—
				AC900	0.05 to 0.83	18,000	2		5	—	2	① AF900	② AR925	③ AL900	—	—
AF + AR ① Air Filter + ② Regulator 	Foreign matter and moisture removal + Pressure control	General industrial equipment (non-lube equipment)	Modular connection	AC10B	0.05 to 0.7	180	17		5	—	M5	① AF10	② AR10	—	—	—
				AC20B	0.05 to 0.85	1,900	2		5	—	1/8,1/4	① AF20	② AR20	—	—	—
				AC25B	0.05 to 0.85	2,400	2		5	—	1/4, 3/8	① AF30	② AR25	—	—	—
				AC30B	0.05 to 0.85	3,500	2		5	—	1/4, 3/8	① AF30	② AR30	—	—	—
				AC40B	0.05 to 0.85	5,800	2		5	—	1/4, 3/8, 1/2	① AF40	② AR40	—	—	—
				AC40B-06	0.05 to 0.85	5,800	2		5	—	3/4	① AF40-06	② AR40-06	—	—	—
				AC50B	0.05 to 0.85	10,000	2		5	—	3/4, 1	① AF50	② AR50	—	—	—
				AC55B	0.05 to 0.85	13,000	2		5	—	1	① AF60	② AR50	—	—	—
				AC60B	0.05 to 0.85	14,000	2		5	—	1	① AF60	② AR60	—	—	—
AF + AFM + AR ① Air Filter + ② Mist Separator + ③ Regulator  AW + AFM ① Filter Regulator + ② Mist Separator 	Foreign matter and moisture removal + Oil mist removal + Pressure control	Instrumentation and control air (non-lube air)	Modular connection	AC20C	0.05 to 0.85	200＊2	2		0.3	1	1/8,1/4	① AF20	③ AR20	—	—	② AFM20
				AC20D								—	—	—	① AW20	② AFM20
				AC25C	0.05 to 0.85	450＊2	2		0.3	1	1/4, 3/8	① AF30	③ AR25	—	—	② AFM30
				AC30C	0.05 to 0.85	450＊2	2		0.3	1	1/4, 3/8	① AF30	③ AR30	—	—	② AFM30
				AC30D								—	—	—	① AW30	② AFM30
				AC40C	0.05 to 0.85	1,100＊2	2		0.3	1	1/4, 3/8, 1/2	① AF40	③ AR40	—	—	② AFM40
				AC40D								—	—	—	① AW40	② AFM40
				AC40C-06	0.05 to 0.85	1,100＊2	2		0.3	1	3/4	① AF40-06	③ AR40-06	—	—	② AFM40-06
				AC40D-06								—	—	—	① AW40-06	② AFM40-06

＊1: Indicates the maximum flow rate at inlet pressure 0.7 MPa or the maximum flow rate at inlet pressure 0.7 MPa and set pressure 0.5 MPa.
＊2: Indicates the rated flow of inlet pressure 0.7 MPa.

(Note) Numerical value 1 to 3 of the product combination shows the order of arrangement of the equipment from the upstream.

Basic Specifications for Other F.R.L. Units

Filter Regulator + Lubricator

Application: Applicable to remove solid foreign objects seized 5 µm or more and oversaturated water contained in the compressed air, prevent malfunction of actuators and solenoid valves, control (regulate) the outlet pressure, suppress fluctuations of the outlet pressure affected by fluctuations of the inlet pressure, and apply a lubricant to pneumatic equipments at the outlet side.

Standard Specifications

Model		AC10A	AC20A	AC30A	AC40A	AC40A-06	AC50A	AC60A
Component	Filter Regulator	AW10	AW20	AW30	AW40	AW40-06	AW60	AW60
	Lubricator	AL10	AL20	AL30	AL40	AL40-06	AL50	AL60
Port size		M5	1/8,1/4	1/4,3/8	1/4, 3/8, 1/2	3/4	3/4,1	1
Fluid		Air						
Proof pressure (MPa)		1.5						
Max. operating pressure (MPa)		1.0						
Set pressure range (MPa)		0.05 to 0.7	0.05 to 0.85					
Ambient and fluid temperature (°C)		–5 to 60 (No freezing)						
Nominal filtration rating (µm)		5						
Bowl material		Polycarbonate						
Bowl guard		—	Semi-standard	Standard				
Regulator construction		Relieving type						
Mass (kg)		0.20	0.59	0.75	1.41	1.46	3.33	3.40

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Air Filter + Regulator

Application: Applicable to remove solid foreign objects seized 5 µm or more and oversaturated water contained in the compressed air, prevent malfunction of actuators and solenoid valves, control (regulate) the outlet pressure, and suppress fluctuations of the outlet pressure affected by fluctuations of the inlet pressure.

Standard Specifications

Model		AC10B	AC20B	AC25B	AC30B	AC40B	AC40B-06	AC50B	AC55B	AC60B
Component	Filter Regulator	AF10	AF20	AF30	AF30	AF40	AF40-06	AF50	AF60	AF60
	Lubricator	AR10	AR20	AR25	AR30	AR40	AR40-06	AR50	AR50	AR60
Port size		M5	1/8,1/4	1/4,3/8	1/4,3/8	1/4, 3/8, 1/2	3/4	3/4,1	1	1
Fluid		Air								
Proof pressure (MPa)		1.5								
Max. operating pressure (MPa)		1.0								
Set pressure range (MPa)		0.05 to 0.7	0.05 to 0.85							
Ambient and fluid temperature (°C)		–5 to 60 (No freezing)								
Nominal filtration rating (µm)		5								
Bowl material		Polycarbonate								
Bowl guard		—	Semi-standard	Standard						
Regulator construction		Relieving type								
Mass (kg)		0.16	0.51	0.55	0.63	1.12	1.16	2.44	2.45	2.54

AC ····· P. 295
AF ····· P. 327
AR ····· P. 345

Air Filter + Mist Separator + Regulator

Application: Applicable to remove minute solid foreign objects and oil mist contained in the compressed air, control (regulate) the outlet pressure, and control pulsations of the outlet pressure affected by pulsations of the inlet pressure.

Standard Specifications

Model		AC20C	AC25C	AC30C	AC40C	AC40C-06
Component	Air Filter	AF20	AF30	AF30	AF40	AF40-06
	Mist Separator	AFM20	AFM30	AFM30	AFM40	AFM40-06
	Regulator	AR20	AR25	AR30	AR40	AR40-06
Port size		1/8, 1/4	1/4, 3/8	1/4, 3/8	1/4, 3/8, 1/2	3/4
Fluid		Air				
Proof pressure (MPa)		1.5				
Max. operating pressure (MPa)		1.0				
Set pressure range (MPa)		0.05 to 0.85				
Nominal filtration rating (µm)		0.3 (95% filtered particle size)				
Outlet side oil mist concentration		Maximum 1.0 mg/m³ (ANR) standard unit (≈0.8 ppm)				
Rated flow rate ℓ/min (ANR)		200	450	450	1,100	1,100
Ambient and fluid temperature (°C)		–5 to 60 (No freezing)				
Bowl material		Polycarbonate				
Bowl guard		Semi-standard	Standard			
Regulator construction		Relieving type				
Mass (kg)		0.74	0.88	0.95	1.76	1.83

AC ····· P. 295
AF ····· P. 327
AFM ····· P. 338
AR ····· P. 345

Filter Regulator + Mist Separator

Application: Applicable to remove minute solid foreign objects and oil mist contained in the compressed air, control (regulate) the outlet pressure, and control pulsations of the outlet pressure affected by pulsations of the inlet pressure.

AC ····· 5 P. 295
AW ····· 5 P. 365
AFM ····· 5 P. 338

Standard Specifications

Model		AC20D	AC30D	AC40D	AC40D-06
Component	Filter Regulator	AW20	AW30	AW40	AW40-06
	Mist Separator	AFM20	AFM30	AFM40	AFM40-06
Port size		1/8, 1/4	1/4, 3/8	1/4, 3/8,1/2	3/4
Fluid		Air			
Proof pressure (MPa)		1.5			
Max. operating pressure (MPa)		1.0			
Set pressure range (MPa)		0.05 to 0.85			
Nominal filtration rating (μm)		0.3 (95% filtered particle size)			
Outlet side oil mist concentration		Maximum 1.0 mg/m³ (ANR) standard unit (≈0.8 ppm)			
Rated flow rate ℓ/min (ANR)		150	330	800	800
Ambient and fluid temperature (°C)		–5 to 60 (No freezing)			
Bowl material		Polycarbonate			
Bowl guard		Semi-standard	Standard		
Regulator construction		Relieving type			
Mass (kg)		0.57	0.74	1.38	1.43

Attachment

Note) There are no attachment for the AC800 and AC900.

Piping adapter

A piping adapter allows installation/removal of the component without removing the piping.

5 P. 324

Port size	M5 x 0.8, 1/8, 1/4, 3/8, 1/2, 3/4, 1

T-interface

Redirection of air flow is possible.

5 P. 322

Port size	M5 x 0.8, 1/8, 1/4, 3/8, 1/2

Pressure switch with piping adapter

Compact reed switch integrated with the piping adapter

5 P. 324

Port size	1/8, 1/4, 3/8, 1/2, 3/4

Check valve

Can be used to prevent a back flow of lubricant from lubricator.

5 P. 321

Port size	1/8, 1/4, 3/8

Pressure switch

Compact reed switch

5 P. 322

Cross interface

Branch piping is possible in all 4 directions.

5 P. 323

Port size	M5 x 0.8, 1/8, 1/4, 3/8, 1/2

3-port valve for residual pressure release

Residual pressure in the line can be exhausted.

5 P. 323

Port size	1/8, 1/4, 3/8, 1/2, 3/4, 1

Option/Semi-standard/Made to Order

P. 295

Model	Option					Attachment				Semi-standard												Made to Order				
	Auto drain		Pressure gauge		Digital pressure switch	Check valve	Pressure switch	T-interface	3-port valve for residual pressure release	Filter / Lubricator						Filter drain outlet			Lubricator oil outlet	Regulator exhaust function	Flow direction	Clean room	Copper-free Fluorine-free	Applicable for high pressure	Applicable for high temperature	Applicable for low temperature
	N.C.	N.O.	Square embedded type	Round type						Metal bowl	Nylon bowl	Metal bowl with level gauge		With bowl guard	Nylon bowl with bowl guard	With drain guide 1/8	With drain guide 1/4	With drain cock barb fitting	With drain cock	Non-relieving type	Reverse flow (right→left)					
AC10	●	—	—	●	—	—	—	●	—	●	●	—		—	—	—	—	—	●	●	●	—	—	—	—	—
AC10A	●	—	—	●	—	—	—	—	—	●	●	—		—	—	—	—	—	●	●	●	—	—	—	—	—
AC20	●	—	●	●	●	●	●	●	●	●	●	—		●	●	●	—	—	●	●	●	—	—	—	—	—
AC20A	●	—	●	●	●	●	●	—	●	●	●	—		●	●	●	—	—	●	●	●	—	—	—	—	—
AC25	●	●	●	●	●	●	●	●	●	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC30	●	●	●	●	●	●	●	●	●	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC30A	●	●	●	●	●	●	●	—	●	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC40	●	●	●	●	●	●	●	●	●	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC40A	●	●	●	●	●	●	●	—	●	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC40-06	●	●	●	●	●	—	●	●	●	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC40A-06	●	●	●	●	●	—	●	—	●	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC50	●	●	●	●	●	—	●	●	●	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC50A	●	●	●	●	●	—	●	—	●	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC55	●	●	●	●	●	—	●	●	—	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC60	●	●	●	●	●	—	●	●	—	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC60A	●	●	●	●	●	—	●	—	—	●	●	●		—	—	—	●	●	●	●	●	—	—	—	—	—
AC800	●	●	—	●	—	—	—	—	—	●	●	●		—	—	●	●	—	●	—	●	—	—	—	—	—
AC900	●	●	—	●	—	—	—	—	—	●	●	●		—	—	●	●	—	●	—	●	—	—	—	—	—
AC10B	●	—	—	●	—	—	—	●	—	●	●	—		—	—	—	—	—	—	●	●	—	—	—	—	—
AC20B	●	—	●	●	●	—	●	●	●	●	●	—		●	●	●	—	—	—	●	●	▲	●	●	—	—
AC25B	●	●	●	●	●	—	●	●	●	●	●	●		—	—	—	●	●	—	●	●	▲	●	●	▲	▲
AC30B	●	●	●	●	●	—	●	●	●	●	●	●		—	—	—	●	●	—	●	●	▲	●	●	▲	▲
AC40B	●	●	●	●	●	—	●	●	●	●	●	●		—	—	—	●	●	—	●	●	▲	●	●	▲	▲
AC40B-06	●	●	●	●	●	—	●	●	●	●	●	●		—	—	—	●	●	—	●	●	▲	●	●	▲	▲
AC50B	●	●	●	●	●	—	●	●	●	●	●	●		—	—	—	●	●	—	●	●	▲	●	●	▲	▲
AC55B	●	●	●	●	●	—	●	●	—	●	●	●		—	—	—	●	●	—	●	●	▲	●	●	▲	▲
AC60B	●	●	●	●	●	—	●	●	—	●	●	●		—	—	—	●	●	—	●	●	▲	●	●	▲	▲
AC20C	●	—	●	●	●	—	●	●	●	●	●	—		●	●	●	—	—	—	●	●	▲	●	—	—	—
AC20D	●	—	●	●	●	—	●	—	●	●	●	—		●	●	●	—	—	—	●	●	—	●	—	—	—
AC25C	●	●	●	●	●	—	●	●	●	●	●	●		—	—	—	●	●	—	●	●	▲	●	—	—	—
AC30C	●	●	●	●	●	—	●	●	●	●	●	●		—	—	—	●	●	—	●	●	▲	●	—	—	—
AC30D	●	●	●	●	●	—	●	—	●	●	●	●		—	—	—	●	●	—	●	●	—	●	—	—	—
AC40C	●	●	●	●	●	—	●	●	●	●	●	●		—	—	—	●	●	—	●	●	▲	●	—	—	—
AC40D	●	●	●	●	●	—	●	—	●	●	●	●		—	—	—	●	●	—	●	●	—	●	—	—	—
AC40C-06	●	●	●	●	●	—	●	●	●	●	●	●		—	—	—	●	●	—	●	●	▲	●	—	—	—
AC40D-06	●	●	●	●	●	—	●	—	●	●	●	●		—	—	—	●	●	—	●	●	—	●	—	—	—

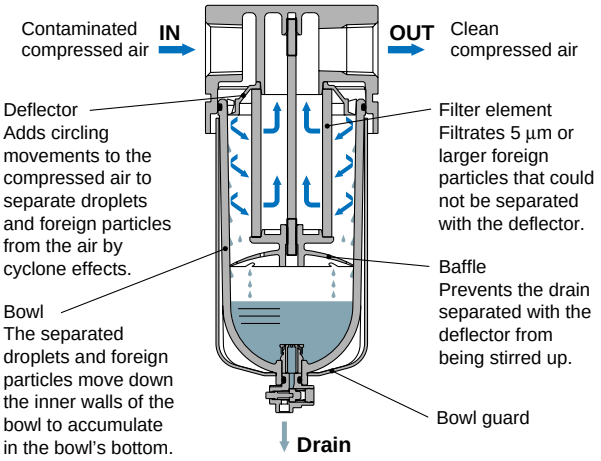
●: Available ▲: Not available at the moment, but available from engineering viewpoints (special order) —: Not available

Technical Data F.R.L. Basic Explanation

Air Filter P. 327

Construction

Moisture and dust are contained in compressed air. The air filter is installed at the inlet to prevent such moisture and dust from entering the pneumatic control circuit.



The compressed air introduced from the inlet is given circling movements by the deflector. The resulting cyclone effects forcibly push comparatively large free droplets and foreign particles toward the inner walls of the bowl, causing them to move down the wall surfaces and accumulate in the bowl's bottom.

The compressed air from which most foreign particles have been removed passes through the centrally-placed filter element made of synthetic resin or sintered metal and having numerous micropores. At the filter element, even finer dust particles are removed and the compressed air flows out to the outlet side.

On the other hand, the separated moisture, dust and other foreign particles are discharged out of the air filter by a manually-operated drain valve, such as a cock valve or a push valve, or an automatic drain valve mounted in the bowl's bottom.

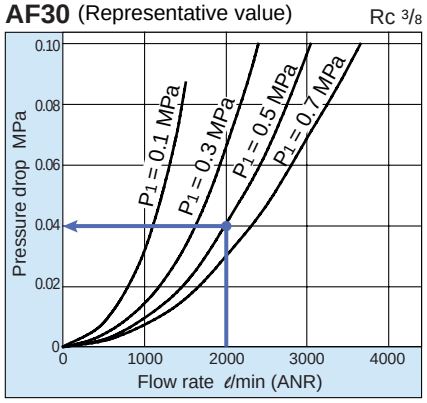
In most applications, filter elements with a 5 µm filtration rating are used.

Characteristics and Selection

Flow Characteristics

As one of the characteristics inherent in air filters, there is a flow characteristics. The flow characteristics refers to the relationship between the volume of air passing through the air filter and the resulting pressure drop. This relationship is represented by the curve illustrated below.

Flow Characteristics



Example: How to read the AF30's flow rate and pressure drop

The pressure drop when the inlet pressure is 0.5 MPa and air is flowed at a rate of 2000 ℓ/min (ANR), is 0.04 MPa.

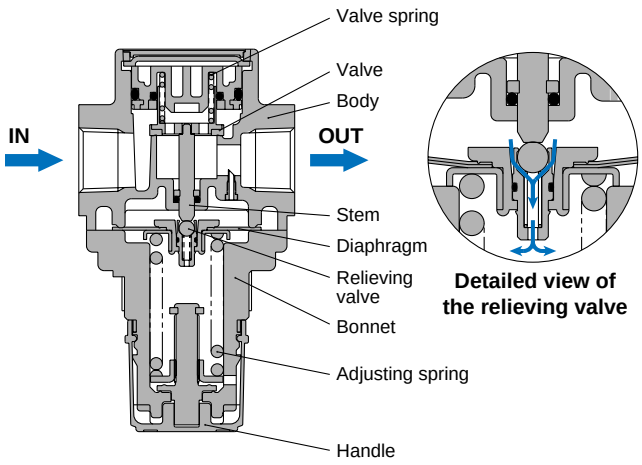
Select a model so that the pressure thus determined is no greater than 0.1 MPa.

Regulator P. 345

Construction

In a pneumatic system used for general industrial equipment, the pressure of compressed air to be supplied must be controlled to a level appropriate for the purpose of use of each piece of equipment. For this purpose, regulators are commonly used.

The regulator is used to reduce the inlet pressure and thereby regulate the outlet pressure to a given setpoint. It is also used when variations in the set pressure need to be kept to a minimum also against changes in the inlet pressure or in the volume of air consumed under the outlet pressure.
The following figure shows the construction of a direct-operated regulator with a release function.



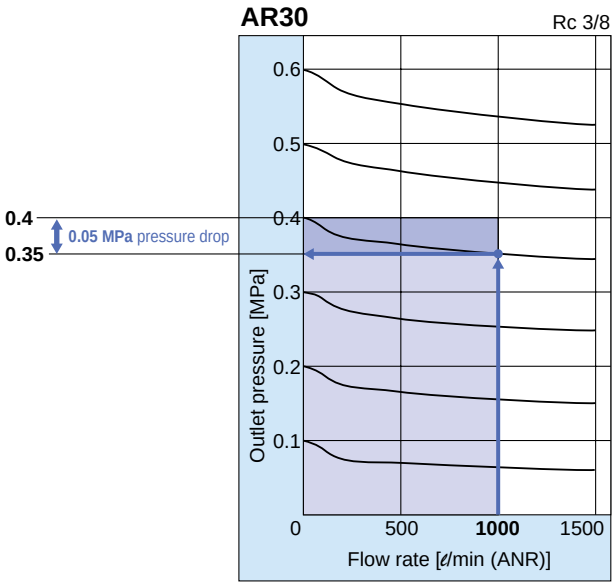
When the handle is rotated to compress the adjusting spring, the valve is pushed downward by way of the stem and the inlet pressure is transmitted to the outlet. This pressure acts upon the diaphragm and produces a downward force to conflict with the force produced by the adjusting spring. The inlet pressure continues to transmit as long as the outlet pressure is lower than the setpoint. The diaphragm goes down as the difference between these pressures decreases and, when the two forces counterbalance, the valve closes and the required pressure is established. If the outlet pressure rises above the setpoint or if the compressive load of the adjusting spring is reduced by rotating the handle, the diaphragm goes down and the relieving valve moves away from the stem. As a result, the outlet pressure is relieved to the atmosphere and therefore reduces.
Non-relieving type regulators have no relief ports on their relieving valves and are used when air is constantly consumed at the outlet or when the evacuation of air to the outside must be avoided.

F.R.L. Basic Explanation

Regulator P. 345

Characteristics and Selection

The main characteristics of a regulator are the flow and pressure characteristics. As a rule, select a size of the regulator body suited to the conditions of use by judging from the flow characteristics.



Condition: Inlet pressure 0.7 MPa

Example: How to read the AR30's flow characteristics

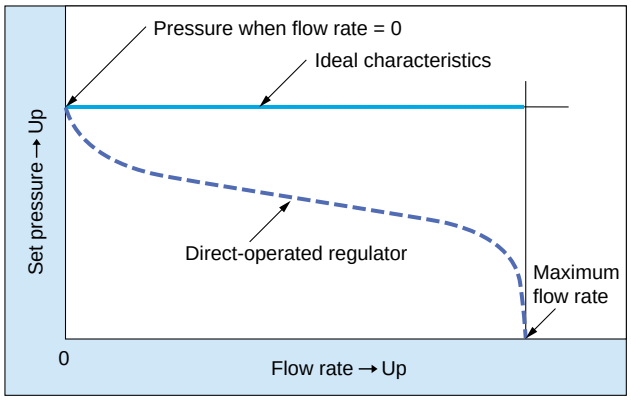
When the outlet pressure is set to 0.4 MPa and the air flow of 1000 ℓ/min (ANR) is supplied, the set pressure drops to 0.35 MPa.

It is desirable to use the regulator with a reference pressure drop from the set pressure no greater than 0.08 MPa. Since the pressure drop in this example is 0.05 MPa, smaller than the reference value 0.08 MPa, the pressure value 0.35 MPa is tolerable.

Flow Characteristics

Under normal conditions, the outlet pressure is adjusted without flowing air. If the outlet is gradually opened to increase the flow rate after pressure setting, the set pressure decreases consequently. It can be said that the smaller the pressure drop is, the better the flow characteristic is. Ideally, the pressure should be kept at a constant level even if the flow rate changes.

Regulator's Flow Characteristics

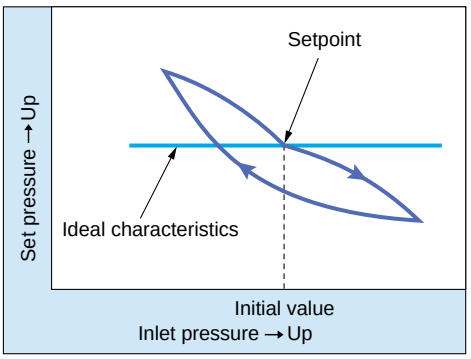


Pressure Characteristics

The characteristics in which the set pressure changes as the inlet pressure varies is referred to as the pressure characteristics.

A typical example is shown below:

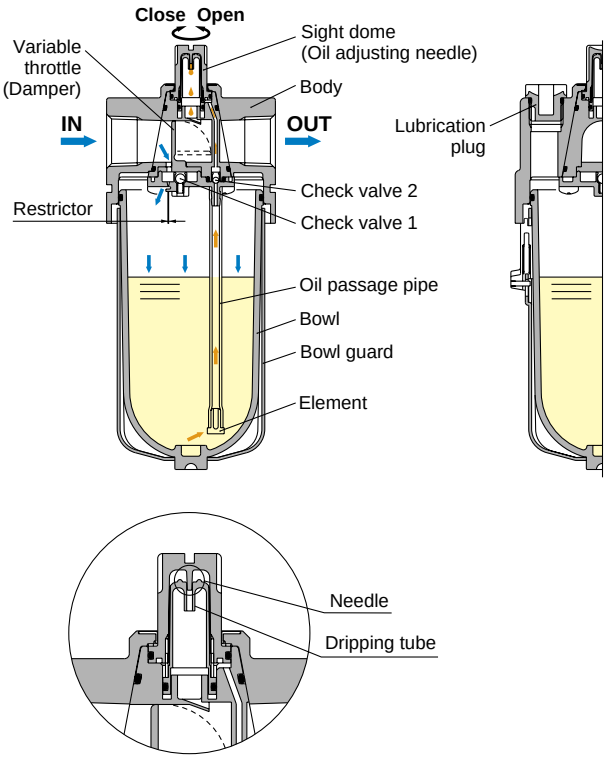
Regulator's Pressure Characteristics



Lubricator P. 357

Construction

The compressed air introduced from the inlet passes through a variable throttle (damper) and flows out to the outlet. At this point, a pressure difference is produced between the inlet and the outlet by the variable throttle.
The inlet pressure is introduced into the bowl through the restrictor.
On the other hand, the pressure within the sight dome is equivalent to the outlet pressure. The lubricating oil within the bowl is driven by the inlet pressure into the oil passage pipe. Thus, the oil passes through the sight dome and reaches the drip regulating needle built in the sight dome.
The lubricating oil adjusted to a specified drip rate by the drip regulating needle drips from the dripping tube and is carried on the stream of compressed air on the outlet side to reach equipment (e.g., cylinder) to be lubricated.



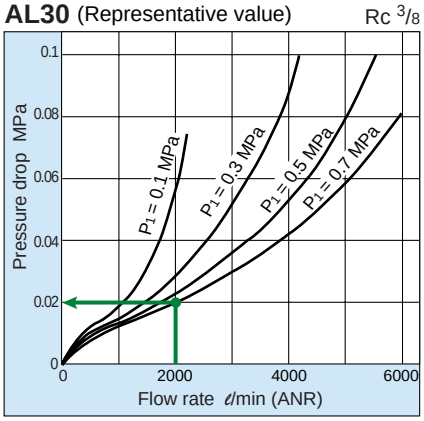
Detailed view of the sight dome

Characteristics and Selection

Flow Characteristics

The flow characteristics refers to the relationship between the volume of air passing through the lubricator and the resulting pressure drop. This relationship is represented by the curve illustrated below.

Flow Characteristics



Example: How to read the AL30's flow characteristics
The pressure drop when the inlet pressure is 0.7 MPa and air is flowed at a rate of 2000 ℓ/min (ANR), is 0.02 MPa.
Select a model so that the pressure drop is no greater than 0.1 MPa.

Minimum Flow Rate for Charging

The minimum flow rate for charging refers to the rate of air flow for producing a pressure difference necessary for the lubricating oil to drip.
Although this minimum flow rate for charging varies depending on the inlet pressure, it is based on the air flow rate at which five droplets of oil drip every minute when the inlet pressure is 0.5 MPa. Since the correct drip rate of oil depends on the conditions of use, it is difficult to universally prescribe a standard rate. As a guide however, the rate should be considered as one droplet (approximately 0.02 mℓ) for a flow rate of 10 ℓ under pressure. An excessively large amount of oil results in an increase in the amount of oil mixed into the exhaust air of a directional control valve and thus emitted outside. Care must be taken since this is not only wasteful but also likely to lead to environmental pollution.