



Operation Manual

PRODUCT NAME

Regulator

MODEL / Series / Product Number

AR20(K)-(F,N)01 ~ (F,N)02(B,E,E1,E2,E3,E4,G,H,J,M)(-1,N,R,Y,Z,ZA)-D

AR30(K)-(F,N)02 ~ (F,N)03(B,E,E1,E2,E3,E4,G,H,J,M)(-1,N,R,Y,Z,ZA)-D

AR40(K)-(F,N)02 ~ (F,N)04(B,E,E1,E2,E3,E4,G,H,J,M)(-1,N,R,Y,Z,ZA)-D

AR40(K)-(F,N)06(B,E,E1,E2,E3,E4,G,H,J,M)(-1,N,R,Y,Z,ZA)-D

AR50(K)-(F,N)06 ~ (F,N)10(B,E,E1,E2,E3,E4,G,M)(-1,N,R,Y,Z,ZA)-D

AR60(K)-(F,N)10(B,E,E1,E2,E3,E4,G,M)(-1,N,R,Y,Z,ZA)-D

SMC Corporation

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Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems.

ISO 4413: Hydraulic fluid power -- General rules relating to systems.

IEC 60204-1: Safety of machinery -- Electrical equipment of machines .(Part 1: General requirements)

ISO 10218: Manipulating industrial robots -Safety.

etc.



Caution

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.



Warning

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



Danger

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



Safety Instructions

Caution

The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*2) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction(WMD) or any other weapon is strictly prohibited.

2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Caution

SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.

Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Precautions for Design

Warning

- (1) Polyacetal resin parts are used for the exterior. Organic solvents including thinner, acetone, alcohol and ethylene chloride; chemicals including sulphuric acid, nitric acid and hydrochloric acid; cutting oil, synthetic oils, ester-based compressor oil, alkali, kerosene, gasoline, lock material of screw are harmful. Do not use the product where these are present.
- (2) Consult SMC if no leakage is allowed due to the environment, or if the operating fluid is not air.
- (3) Shield from ultra violet light and radiation with protective cover.
- (4) A safety device needs to be installed if output pressure is exceeding the set pressure, otherwise this can cause breakage of outlet device and equipment or lead to malfunction.

Caution

- (1) Allowed air consumption from the exhaust port is 0.1 L/min(ANR) or less.

Selection

Warning

- (1) Grease used on the internal sliding parts and seals may flow to the outlet side. If this is not acceptable, please consult SMC.
- (2) Residual pressure of product without backflow function is released unstably even though the inlet pressure is released (residual pressure might be left in the product). Please select product with backflow function to release the residual pressure completely.
- (3) Long absence of operation or operation with sealed circuit or balancing circuit on the outlet side may cause set pressure fluctuation. Please consult SMC if this is not acceptable.
- (4) Set range of outlet pressure shall be 85% or less of the inlet pressure. Operating at a setting exceeding 85% causes the outlet pressure to be easily affected by fluctuations in flow rate and inlet pressure, leading to instability.
- (5) Since the safety margin is calculated to the maximum value of the set pressure range shown in the specification table, the pressure setting may be over the maximum value. However, use the product within the specified range.
- (6) If the product is used with circuit which requires high exhaust sensitivity or set precision, please consult SMC.

Installation

Warning

- (1) Connect the product ensuring the direction of "1"(IN) and "2"(OUT) for air direction and indicated arrow. Incorrect connections may cause malfunction.
- (2) Install with enough space around the regulator to perform regular maintenance and operation. Refer to section [12.Dimensions] (p. 28 and p. 30) for necessary space.
- (3) Do not drop or apply impact during transportation or installation. Damage of products or pressure gauge can result in malfunction.
- (4) Do not install in areas with high humidity or high temperature. It may lead to a malfunction of the pressure gauge.

Adjustment

Warning

- (1) Adjust the set pressure ensuring correct inlet and outlet pressures. Turning the knob excessively can cause damage to the internal parts.
- (2) Do not use tools on the pressure regulator knob as this may cause damage. It must be operated manually.

Caution

- (1) For the product with a pressure gauge, do not apply pressure exceeding the maximum scale of the pressure gauge in order to protect the gauge.
- (2) Adjust the pressure whilst the pressure is increasing. Pressure may become lower than the set pressure if adjusted by decreasing the value. Rotate the knob clockwise to increase the set pressure. Counterclockwise to decrease the pressure. Moreover, please lock the knob after setting pressure.
- (3) For the regulator with backflow function, upstream pressure needs to be higher than downstream pressure by 0.05 MPa or more.
- (4) Outlet pressure may rise when the inlet pressure is discharged and resupplied after pressure setting. In this case, consume air at the outlet which will bring the pressure closer to the set pressure.
- (5) Outlet pressure may change if the product is used for a long period of time. Please confirm the set pressure regularly.
- (6) When pressure difference between the inlet side and the outlet side is large, chattering may occur. In that case, please reduce the pressure difference between the inlet and the outlet. Please consult SMC if chattering continues.

Piping

Warning

- (1) Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and solid foreign material from inside the pipe. Contamination of piping may cause damage or malfunction.
- (2) When screwing together pipes and fittings, etc., be certain that chips from the pipe threads and sealant do not get inside the pipe. When a sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.
- (3) Connect piping/fittings using the recommended torque while holding the female thread side tightly. Insufficient tightening torque leads to cause of loosening or sealing failure, and excessive tightening torque leads to cause of breakage of screws. Tightening without holding female thread applies an excessive force to the piping bracket directly, leading to breakage.

Recommended tightening torque for the port Unit: N m

Thread size	1/8	1/4	3/8	1/2	3/4	1
Torque	7 to 9	12 to 14	22 to 24	28 to 30	28 to 30	36 to 38

Recommended tightening torque for the pressure gauge port Unit: N m

Thread size	1/8
Torque	3 to 5

*Please refer to "10-7. Replacing the plug (with O-ring)" (P23), Replacement parts For the tightening torque of the plug (with O-ring).

- (4) Before using an SMC fitting and S coupler, please refer to "Tightening the threaded portion of the connection thread" of the Fittings & Tubing Precautions.
- (5) Do not apply torsion or bending moment other than the weight of the product itself. External piping needs to be supported separately as it may cause breakage. Non-flexible piping like steel tube is susceptible to excessive moment load or vibration. Insert flexible tubes to prevent this.

Air Source



Warning

- (1) Use clean air. Do not use compressed air containing chemicals, organic solvent, synthetic oil or corrosive gas as it may be cause of breakage of components or operation failure.
- (2) Air containing too much moisture may cause malfunction. Install an air drier or aftercooler before the regulator.

Maintenance



Warning

- (1) Release the pressure in the product to the atmosphere when replacing parts or removing piping.
- (2) Maintenance and checks should be done by following the procedure in this operation manual. Incorrect handling of the product may cause breakage or operation failure of the equipment or device.
- (3) When using the regulator with backflow function between a solenoid valve and an actuator, check the pressure gauge periodically. Sudden pressure fluctuations may shorten the durability of the pressure gauge. A digital pressure gauge is recommended for such applications or as deemed necessary.



Caution

- (1) If an emergency countermeasure is to be taken during setting failure or exhaust leakage, the internal valve seating part should be checked. If failure such as foreign matter is found, remove it before performing the emergency countermeasure.

2. Application

This product aims at controlling pressure of air lines.

3. Standard Specifications

Model	AR20-D	AR30-D	AR40-D	AR40-06-D	AR50-D	AR60-D
Port size	1/8, 1/4	1/4, 3/8	1/4, 3/8, 1/2	3/4	3/4, 1	1
Pressure gauge port size ^{Note 1)}	1/8					
Fluid	Air					
Ambient and fluid temperature ^{Note 2)}	-5 to 60°C (No freezing)					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Set pressure range	0.05 to 0.85 MPa					
Construction	Relieving type					
Weight	0.14kg	0.27kg	0.48kg	0.51kg	1.13kg	1.25kg

Note 1) Pressure gauge connection threads are not available for F.R.L. units with a square embedded type pressure gauge, a right angle square type pressure gauge, or with a digital pressure switch.

Note 2) -5 to 50°C for the products with the digital pressure switch.

4. How to Order

AR **30** **K** - **03** **BE** - **D**

① ② ③ ④ ⑤ ⑥

				Symbol	Description	①						
						Body size						
						20	30	40	50	60		
②	With backflow function			Nil	Without backflow function	●	●	●	●	●		
				K	With backflow function	●	●	●	●	●		
③	Thread type			Nil	Rc	●	●	●	●	●		
				N	NPT	●	●	●	●	●		
				F	G	●	●	●	●	●		
④	Port size			01	1/8	●	—	—	—	—		
				02	1/4	●	●	●	—	—		
				03	3/8	—	●	●	—	—		
				04	1/2	—	—	●	—	—		
				06	3/4	—	—	●	●	—		
				10	1	—	—	—	●	●		
				⑤	Option	a	Mounting	Nil	Without mounting option	●	●	●
B	With bracket	●	●					●	●	●		
H	With set nut (for panel mount)	●	●					●	—	—		
b	Pressure gauge	Nil	Without pressure gauge			●	●	●	●	●		
		E	Square embedded type pressure gauge (with limit indicator)			●	●	●	●	●		
		G	Round type pressure gauge (with limit indicator)			●	●	●	●	●		
		J	Right angle square type pressure gauge (with limit indicator)			●	●	●	—	—		
		M	Round type pressure gauge (with color zone)			●	●	●	●	●		
		Digital pressure switch	E1			NPN output / Wiring bottom entry	●	●	●	●	●	
	E2		NPN output/ Wiring top entry			●	●	●	●	●		
	E3		PNP output / Wiring bottom entry			●	●	●	●	●		
	E4		PNP output/ Wiring top entry			●	●	●	●	●		
	⑥	Semi-standard	c			Set pressure	Nil	0.05 to 0.85 MPa setting	●	●	●	●
1							0.02 to 0.2 MPa setting	●	●	●	●	●
d			Exhaust mechanism			Nil	Relieving type	●	●	●	●	●
						N	Non-relieving type	●	●	●	●	●
e			Flow direction	Nil	Flow direction: Left to right	●	●	●	●	●		
				R	Flow direction: Right to left	●	●	●	●	●		
f			Knob	Nil	Downward	●	●	●	●	●		
				Y	Upward	●	●	●	●	●		
g			Unit indication	Nil	Unit on product label: MPa, Pressure gauge in SI units: MPa	●	●	●	●	●		
				Z	Unit on product label: psi, Pressure gauge: MPa/psi dual scale	○ Note 2)	○ Note 2)	○ Note 2)	○ Note 2)	○ Note 2)		
				ZA	Digital pressure switch: With unit selection function	△ Note 3)	△ Note 3)	△ Note 3)	△ Note 3)	△ Note 3)		

Note 1) ⑤Option and ⑥Semi-standard: Select one each for a to g.

Note 2) ○: For NPT thread type only.

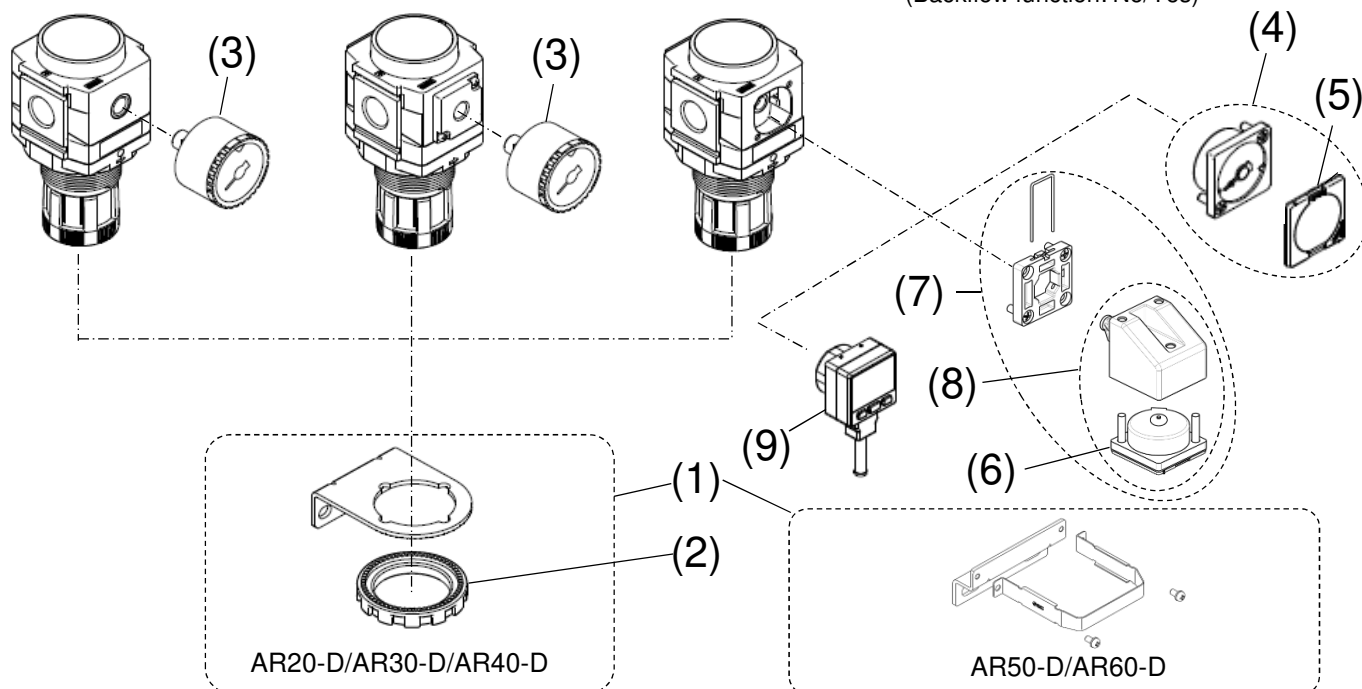
Note 3) △: Select with an option E1, E2, E3 or E4.

5. Options

Without pressure gauge/
With round type pressure gauge
(Backflow function: No)

Without pressure gauge/
With round type pressure gauge
(Backflow function: Yes)

With square embedded type pressure gauge/
With right angle square type pressure gauge/
With digital pressure switch
(Backflow function: No/Yes)



Options

No.	Part name	Piping thread type	Semi-standard specification	Part No.					
				AR20-D	AR30-D	AR40-D	AR40-06-D	AR50-D	AR60-D
(1)	Bracket assembly ^{Note 1)}	—	—	AR23P-270AS	AR33P-270AS	AR43P-270AS		AR54P-270AS ^{Note 4)}	
(2)	Set nut	—	—	AR23P-260S	AR33P-260S	AR43P-260S			
(3)	Pressure gauge ^{Note 2)} (Round type)	Rc	—	G36-10-01		G46-10-01			
		NPT	—	G36-10-N01		G46-10-N01			
			Z : Both in MPa and psi	G36-P10-N01-X30		G46-P10-N01-X30			
	Pressure gauge ^{Note 2)} (Round type, with color zone)	G	—	G36-10-01		G46-10-01			
		Rc	—	G36-10-01-L		G46-10-01-L			
		NPT	—	G36-10-N01-L		G46-10-N01-L			
(4)	Square embedded type pressure gauge ^{Note 3)} (Including part (5))	G	—	G36-10-01-L		G46-10-01-L			
(5)	Pressure gauge cover assembly	—	—			GC3-10AS-D			
(6)	Right angle square type pressure gauge ^{Note 3)}	—	—			GC3-P10AS-D-X30			
(7)	Right angle square type pressure gauge (with mounting accessories) ^{Note 4)}	NPT	Z : Both in MPa and psi			136150A			
(8)	Right angle square type pressure gauge assembly ^{Note 5)}	—	—			GC3-10AS-J-D			
		NPT	Z : Both in MPa and psi			GC3-P10AS-J-D-X30			
(9)	Digital pressure switch (with accessories for mounting)	—	—	<Common for all sizes>					
				Output specification		Bottom entry wiring		Top entry wiring	
				NPN		ISE35-N-25-MLA-X523		ISE35-R-25-MLA-X523	
				PNP		ISE35-N-65-MLA-X523		ISE35-R-65-MLA-X523	
		—	ZA : Unit selection function	NPN		ISE35-N-25-LA-X523		ISE35-R-25-LA-X523	
				PNP		ISE35-N-65-LA-X523		ISE35-R-65-LA-X523	
		NPT	Z : Unit selection function Initial setting: psi	NPN		ISE35-N-25-PLA-X523		ISE35-R-25-PLA-X523	
				PNP		ISE35-N-65-PLA-X523		ISE35-R-65-PLA-X523	

Note) The numbers in the table and structural drawings are consistent with the numbers in sections [10. How to Replace the Components] (P17-24) and [11. Disassembly Drawing] (P25-27).

Note 1) This is an assembly of a bracket and set nut (2).

Note 2) Part number for 0.2 MPa: G36-4-01 (Rc type) / G36-4-N01 (NPT type) / G36-P4-N01-X30 (NPT, Z type).
G46-4-01 (Rc type) / G46-4-N01 (NPT type) / G46-P4-N01-X30 (NPT, Z type).

Note 3) With O-ring (1 pc.) and mounting screws (2 pcs.). Part number for 0.2 MPa: GC3-4AS(-J)-D (Rc, NPT type) / GC3-P4AS(-J)-D-X30 (NPT, Z type).

Note 4) In addition to the pressure gauge with a right angle adapter assembled, an adapter, lock pin, O-ring (1 pc.) and mounting screws (2 pcs.) are included.

Note 5) In addition to the pressure gauge with a right angle adapter assembled, an O-ring (1 pc.) is included.

Note 6) Assembly of 2 types of bracket and 2 set screws.