

SVP3000 Alphaplus

Smart Valve Positioner with HART® Communication Protocol

Model AVP302

OVERVIEW

SVP3000 Alphaplus model AVP302 is a current-pneumatic smart valve positioner.

The SVP3000 Alphaplus receives a DC current signal from control devices and controls pneumatic valves. In addition to this basic function, the SVP3000 Alphaplus has communication capabilities, an automatic configuration program and selfdiagnostics functions that will greatly increase productivity and the efficiency of plant operation.

Calibration, configuration and self-diagnostics can be performed by using a HART communicator.

FEATURES

Easy to use

• **Auto setup**

The auto-setup function is a fully-automatic configuration program which specifies the actuator and adjusts the zero and span of the valve. The program can be turned on simply from an external switch so that adjustments to the valve can be performed quickly and safely in hazardous areas.

High reliability

• **Positive seating**

The positive seating function completely shuts off the valve if the input signal becomes lower than previously set. This in turn enhances the full shut-off capabilities of the valves.

• **Self-diagnostic**

The self-diagnostic function provides the user with the ability to check the status of the positioner at any time and to alert in case of failure.

Single model for multiple specifications

SVP Alphaplus' settings can be changed without replacing any parts. A single model can be modified to suit any application.



- **Input range:** Configurable to any required range for split range
- **Flow characteristic:** Linear, EQ%, Quick opening or custom user characteristics
- **Actuator type:** Double or single acting actuator (optional reversing relay required)

HART communication

HART communicator model 275 can be used for calibration, configuration and self-diagnostics.

HART® is a registered trademark of the HART Communication Foundation.

FUNCTIONAL SPECIFICATIONS

Applicable actuator

- Single and double acting actuator
- Linear and rotary motion actuator

Approvals

FM Explosionproof approval

Explosionproof for Class I, Division 1, Group A, B, C, D

Dust-ignition for Class II, Division 1, Group E, F, G

Suitable for Class III, Division 1

Flameproof for Class I, Zone 1, AEx d IIC T6 at Ambient temperature < 80°C

Approval no. 3001246

Installation should comply with NEC.

FM Intrinsically safe approval

Intrinsically safe for Class I, II, III, Division 1, Group A, B, C, D, E, F, G, T4

Intrinsically safe for Class I, Zone 0, AEx ia IIC T4

Nonincendive for Class I, Division 2, Group A, B, C, D, T5

Suitable for Class II, III, Division 2, Group F, G, T4

Approval No. 3006126

The barriers should be FM recognized types and comply with the following conditions as follows.

Input signal line: $12.02 \leq V_{max} \leq 30$ V,

$I_{max} = 100$ mA, $P_{max} = 1$ W, $C_i = 0.0$ uF, $L_i = 0.22$ mH

For travel transmission line: $V_{max} = 30$ V,

$I_{max} = 100$ mA, $P_{max} = 1$ W, $C_i = 0.07$ uF, $L_i = 0.22$ mH

Installation should comply with NEC.

ISSep/CENELEC Flameproof approval

EEx d II C T6 at $-20^\circ\text{C} \leq T_{amb} \leq +70^\circ\text{C}$

IEC IP66

Approval No. ISSep 02ATEX056

CSA Explosionproof approval

Explosionproof for Class I, Division 1, Group B, C, and D

Flameproof for Class I, zone 1, Ex d IIC, T6

Dust ignition proof for Class II and III Division 1, Group E, F and G Type 4X, Approval No. 188352-2500004029, LR113752-6

KEMA/CENELEC Intrinsically safe approval

Intrinsic safety: II 1 GD EEx ia IIC T4 T135°C

Approval No. KEMA 00ATEX1111 X

IEC IP66

The barriers should be CENELEC certified types and comply with the following condition as follows.

Input circuit (terminals \pm IN)

$U_i = 30$ V, $I_i = 100$ mA (resistively limited),

$P_i = 1$ W, $C_i = 33$ nF, $L_i = 0.2$ mH

Output circuit (terminals \pm OUT)

$U_i = 30$ V, $I_i = 100$ mA (resistively limited),

$P_i = 1$ W, $C_i = 1$ nF, $L_i =$ negligibly small

Both circuits shall be considered to be connected to ground from a safety point of view.

Control signal input

4-20 mA DC (Configurable to any required range for split range.)

Input resistance

600 Ω max / 20 mA DC

Output characteristics

- Linear, Equal percentage, Quick opening
- Custom Configurable- 15 segments

Stem travel range

Feedback Lever Angle $\pm 4^\circ$ to $\pm 20^\circ$

Bypass operation

Auto/Manual external switch (For single acting type only)

Air supply pressure

140 to 700 kPa (1.4 to 7.0 kgf/cm²)

Air consumption

4 ℓ /min(N) maximum at 140 kPa (1.4 kgf/cm²)

5 ℓ /min(N) maximum at 280 kPa (2.8 kgf/cm²)

6 ℓ /min(N) maximum at 500 kPa (5.0 kgf/cm²)

10 ℓ /min(N) maximum at 400 kPa (4.0 kgf/cm²) for double acting type

Maximum air deliver flowrate

110 ℓ /min(N) at 140 kPa (1.4 kgf/cm²)

250 ℓ /min(N) at 400 kPa (4.0 kgf/cm²) for double acting type

Output balanced pressure

$55 \pm 5\%$ for double acting type only

Lightning protection

Peak value of voltage surge: 12 kV

Peak value of current surge: 1000 A

Vibration tolerance

2G, 5 to 400 Hz

(with standard mounting kit on Yamatake HA actuator)

Ambient temperature limits

-40°C to 80°C for general model

FM Explosionproof : -40°C to 80°C

FM Intrinsically safe : -40°C to 80°C

ISSep/CENELEC Flameproof : -20°C to 70°C

CSA Explosionproof : -40°C to 80°C

KEMA/CENELEC Intrinsically safe: -40°C to 60°C

Ambient humidity limits

10% to 90% RH

CE conformity

Electromagnetic compatibility

EN61326 : 1997 (CE Marking)

Configuration tools

HART communicator model 275

SFC160 or SFC260 (SFC Smart Field Communicator, software version 7.8 or newer)

PERFORMANCE SPECIFICATIONS**Accuracy**For $8\text{ mA} \leq \text{input signal span} < 16\text{ mA}$ $\pm 1\%$ F.S. ($\pm 2.5\%$ with custom output characteristics)For $4\text{ mA} \leq \text{input signal span} < 8\text{ mA}$ $\pm 1.5\%$ F.S.**PHYSICAL SPECIFICATIONS****Enclosure classification**

JIS C0920 watertight, NEMA type 4X, IEC529 IP66 equivalent

Finish

Baked acrylic

Color

Dark blue

Material

Cast aluminum

Weight**For single acting type**

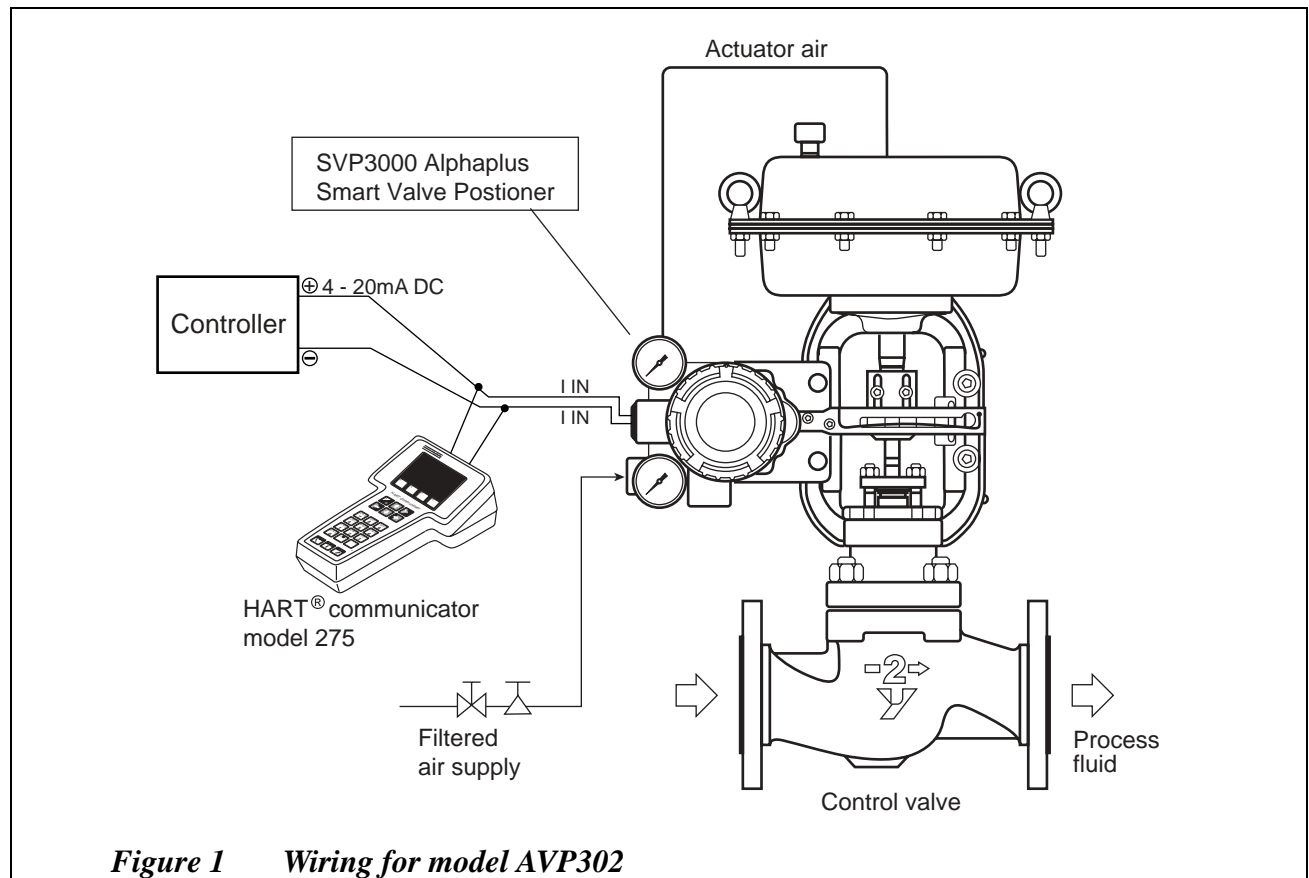
Without Pressure regulator with filter : 2.5 kg

With Pressure regulator with filter : 3.2 kg

For double acting type

Without Pressure regulator with filter : 2.8 kg

With Pressure regulator with filter : 3.5 kg

Typical installation**Figure 1** Wiring for model AVP302**INSTALLATION****Air connections**

1/4NPT internal thread

Electrical connections

1/2NPT internal thread

Conditions of supply air**Particles**Maximum diameter $3\ \mu\text{m}$ **Oil mist**

None acceptable

Dew point 10°C below ambient temperature

MODEL SELECTION

AVP302	(1)	(2)	(3)	(4)	(5)	-	(6)	(7)	(8)	(9)	-	(10)
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Analog signal (4 to 20 mA DC) with HART communication protocol.

- Note) *1 No domestic sales in Japan due to Non-SI unit.
 *2 Standard finish is equivalent to paint specifications Y138A. Corrosion proof is equivalent to paint specifications Y138B.
 *3 Select model AVP (integral type) only when the direction of drain of the pressure regulator with filter on the control valve is downward (ground).

	Connection	Air piping connection	Electrical connection	Mounting thread	Code
(1) Structure	Water-proof	1/4NPT internal	1/2NPT internal	5/16-18	P
	FM Explosionproof and Flameproof	1/4NPT internal	1/2NPT internal	5/16-18	F
	FM Intrinsically safe	1/4NPT internal	1/2NPT internal	5/16-18	M
	ISSep CENELEC Flameproof	1/4NPT internal	M20 ×5	M8	C
	CSA Exprosnproof	1/4NPT internal	1/2NPT internal	5/16-18	A
	KEMA/CENELEC Intrinsically safe	1/4NPT internal	M20 ×5	M8	L
(2) Finish	Standard (Baked acrylic) *2				S
	Corrosion proof (Baked epoxy) *2				B
	Silver finish (Baked acrylic) *2				D
(3) Positioner action	Direct action - Air pressure increases with control signal increase				D
	Reverse action - Air pressure decreases with control signal increase				R
(4) Supply air pressure classification	Air supply range	Pressure gauge scale	Max regulator setting		
	130≤Ps≤150 kPa { 1.3≤Ps≤1.5 kgf/cm ² }	200 kPa { 2 kgf/cm ² }	400 kPa { 4 kgf/cm ² }		1
	150<Ps≤300 kPa { 1.5<Ps≤3.0 kgf/cm ² }	400 kPa { 4 kgf/cm ² }	400 kPa { 4 kgf/cm ² }		2
	300<Ps≤400 kPa { 3.0<Ps≤4.0 kgf/cm ² }	600 kPa { 6 kgf/cm ² }	400 kPa { 4 kgf/cm ² }		3
	400<Ps≤450 kPa { 4.0<Ps≤4.50 kgf/cm ² }	600 kPa { 6 kgf/cm ² }	700 kPa { 7 kgf/cm ² }		4
	450<Ps≤700 kPa { 4.5<Ps≤7.0 kgf/cm ² }	1000 kPa { 10 kgf/cm ² }	700 kPa { 7 kgf/cm ² }		5
(5) Scale unit (Pressure gauge)	kPa				A
	kgf/cm ² *1				B
	MPa				C
	bar				D
	psi *1				E
(6) Pressure regulator with filter	No selection				X
	Model KZ03 pressure regulator with filter (Mounted on positioner) *3				1
	Model KZ03 pressure regulator with filter (with bracket for separated mount)				2
(7) Material of Bracket / Bolts	No selection				X
	Steel - Zinc plated / Stainless steel				C
	Stainless steel / Stainless steel				D
(8)(9) Actuators (for bracket)	No selection				XX
	For single acting actuator				Refer to Table 1
	For double acting actuator				Refer to Table 2
(10) Option (Plural selection available)	No selection				X
	Stainless filter for KZ03 (Pressure regulator with filter)				K
	Filter (Screen for air-exhaust port)				H
	Reversing relay for double acting actuator				W

Configuration Following shows default and optional settings of each configurable parameter of SVP.

- | | | |
|--------------------------|--------------------------|---|
| 1. Input control signal | 4 to 20 mA | The minimal span for custom range = 4mA |
| 2. Output characteristic | Liner | EQ or QO can be ordered or set by user. |
| 3. Valve action | Direct (Plug above seat) | Reverse (Plug below seat) can be ordered or set |

Table 1 Mounting bracket for single acting actuator

(8)(9) Mounting bracket for pneumatic actuators	Code
PSA1, PSA2, PSK1	YS
PSA3, PSA4 / VA1 to VA3 produced after Apr.'83 *8	YQ
PSA3, PSA4 for existing valves produced on/ before 1999	YY
PSA6 / VA4 to VA6 produced after Apr.'83 *8	YL
HA1	YA
HA2, HA3, HL2, HL3	YT
HA4, HL4	YN
HK1, VM1 *12	YK
VM12 for model VSP *13	YB
VR1	YV
VR2, VR3	YR
RSA2	YU
GOM 83S, GOM 84S, GOM 103S	YG
GOM 124S	YM
VA1 - VA3 (for old-model motion connectors) Produced on/before Apr.'83 800-1, 800-3 *9	YW
VA4 - VA5 (for old-model motion connectors) Produced on/before Apr.'83 800-4, 800-5 *9	YJ
Motoyama Mfg. 2800 series 240, 280, 330, Nihon Koso A100 series 270, 320 *3	TA
Motoyama Mfg. 2800 series 400, 500S, 500L, Nihon Koso A100 series 400, 500 *3	TB
Motoyama Mfg. 2800 series 650S, 650L *3	TC
Motoyama Mfg. 2800 series 240, 280, 330 (with side manual)	TD
Motoyama Mfg. 2800 series 400, 500S, 500L (with side manual)	TE
Motoyama Mfg. 2800 series 650S, 650L (with side manual)	TF
Motoyama Mfg. 3800 series (multi-spring type) N24, N28, N33S	TJ
Motoyama Mfg. 2922 series (Gyrol-I) G.R.I 280H, 330H, 400HS, 400H, 500H	TL
Motoyama Mfg. 3993 series (Gyrol-II) 2911-1M series 280, 330, 400	TG
Nihon Koso 5100L series 240, 280 *3	TP
Nihon Koso 5200L series 218, 270, 350 *3	TR
Masoneilan 37, 38 series #9, #11 *3	MA
Masoneilan 37, 38 series #13 *3	MB
Masoneilan 37, 38 series #15, #18 *3	MC

Table 1 Mounting bracket for single acting actuator

(8)(9) Mounting bracket for pneumatic actuators	Code
Masoneilan 37, 38 series #15, #18 (with side manual)	MF
Masoneilan type 35002 series Camflex II #41/2, #6, (Valve size 1 in. - 4 in.)	MG
Masoneilan type 35002 Camflex II #7 (Valve size 6 in. - 12 in.)	MH
Kitamura Valve AK09S, AK12S, AK15S	KA
Kitamura Valve AG06S	KG
Kitamura Valve AG09S	KH
Kitamura Valve AG13S	KJ
Kitamura Valve AW13S	KV
Kitamura Valve AW17S	KW
Kitamura Valve AW20S	KT
KITZ B series BS-2, BSW-2	B2
KITZ B series BS-3, BSW-3, Hisaka TS-6	B3
KITZ B series BS-4, BSW-4	B4
KITZ B series BS-5, BSW-5	B5
KITZ B series BS-6, BSW-6	B6
Xomox (EL-O-MATIC) E25, 40, 65, 100, 200, 350	RA
Xomox (EL-O-MATIC) E600, 950, 1600, P2500, P4000	RB
Hisaka TS-1	H1
Hisaka TS-2	H2
Hisaka TS-3	H3
Hisaka TS-4, 5	H4
Tomoe Valve Z series Z-06S, 08S, 11S, 13S	EA
Tomoe Valve T-matic 3Q-1, 2, 3, 4	E3

Note) *3 Select in the case of without manual handle or with manual handle mounted on top of the actuators.

*8 Select "YW" or "YJ" for old-type motion connectors. (Produced on/before Apr.'83)

*9 Consult with sales representative in case of no mounting hole on the side of valve yoke.

*12 In case "VM" type actuator is required following conditions, 1. select model "VCT" for the body, 2. the existing positioner should be HEP or VPE, 3. yoke should be model HK. If another spec. is required, contact your sales representative.

*15 For model VSP (PVC body), an additional support bracket is required for the AVP.

Table 2 Mounting bracket for double acting actuator

(8)(9) Mounting bracket for pneumatic actuators		Code
VP5, 6	*7	Y1
VP7	*7	Y7
SLOP560, 1000, 1000X	*7 *16	Y2
SLOP1500, 1500X	*7 *16	Y3
DAP560, 1000, 1000X	*7 *16	Y4
DAP1500, 1500X	*7 *16	Y5
Kitamura Valve AK09, AK12, AK15	*7	KA
Kitamura Valve AG06	*7	KG
Kitamura Valve AG09	*7	KH
Kitamura Valve AG13	*7	KJ
Kitamura Valve AW13	*7	KV
Kitamura Valve AW17	*7	KW
Kitamura Valve AW20	*7	KT
KITZ B series B-2	*7	B2
KITZ B series B-3	*7	B3
KITZ B series B-4	*7	B4
KITZ B series B-5	*7	B5
KITZ B series B-6	*7	B6
Xomox (EL-O-MATIC) E25, 40, 65, 100, 200, 350	*7	RA
Xomox (EL-O-MATIC) E600, 950, 1600, P2500, P4000	*7	RB
Tomoe Valve Z series Z-06, 08, 11, 13	*7	EA
Tomoe Valve T-matic 3I-1, 2, 3, 4	*7	E3
T. V. VALVE AT4-80	*7	V1
T. V. VALVE AT4-100	*7	V2
T. V. VALVE AT4-120	*7	V3
T. V. VALVE AT4-150	*7	V4
T. V. VALVE AT4-180	*7	V5

Note) *7 In case of double acting actuator, a reversing relay unit required.

*16 Contact a sales representative if a bracket for model VFR (FloWing) or butterfly valve is required.

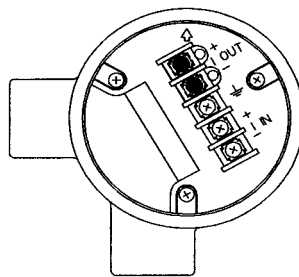
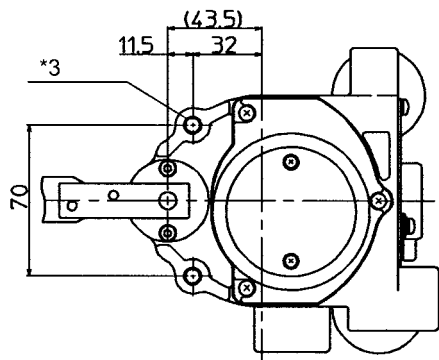
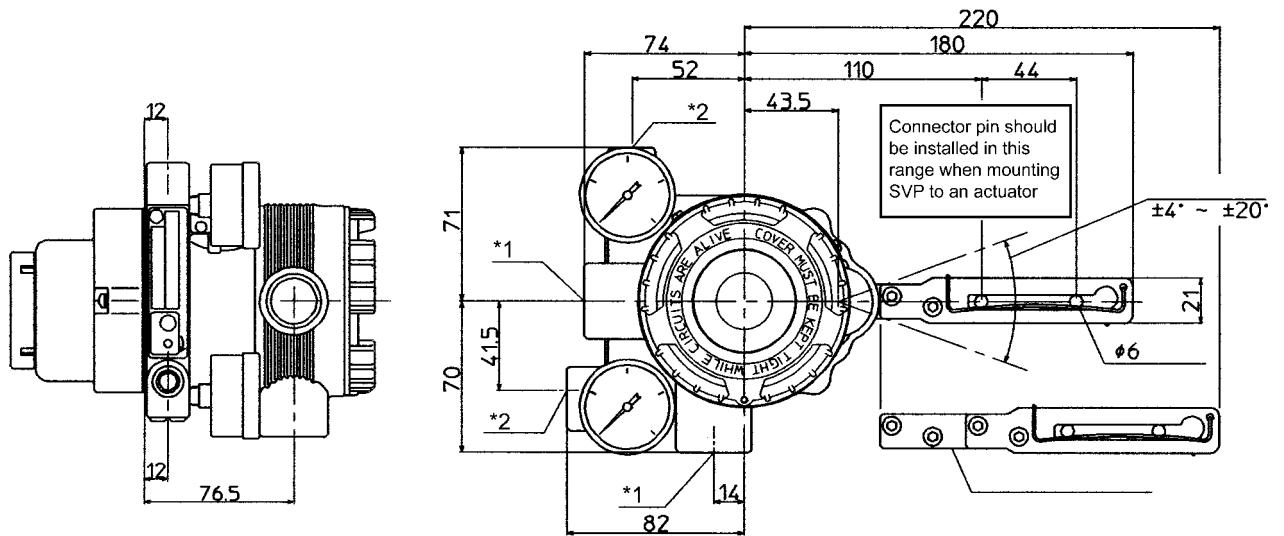
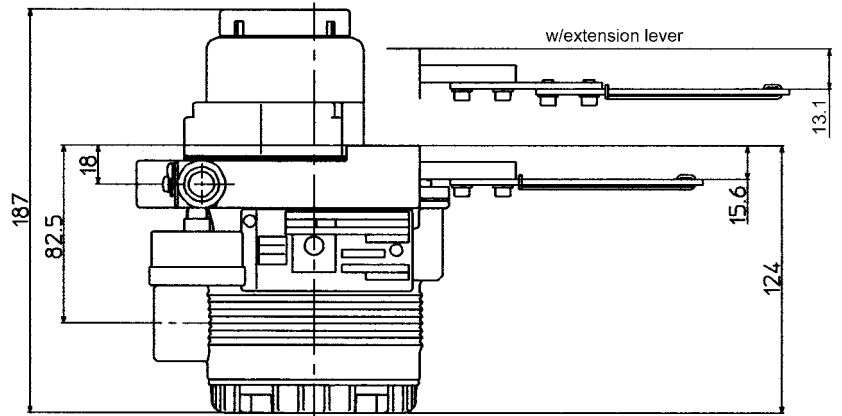
Table 3 Standard travel range and accuracy

Actuator	Travel (mm)	Accuracy [% F.S.]
HA1	6, 8, 10	3
	14.3, 25	1
HA2	10	3
	14.3, 25, 38	1
HA3	14.3	3
	25, 38, 50	1
HA4	14.3	3
	25, 38, 50, 75	1
VA5	25, 37.5, 50, 75, 100	1
VA6	14.3	3
PSA6	25, 37.5, 50	1
PSA1, 2, PSK1	20	1
PSA3, 4	38	1
HK1	10	3
	19	1

DIMENSIONS

For single acting actuator without pressure regulator with filter

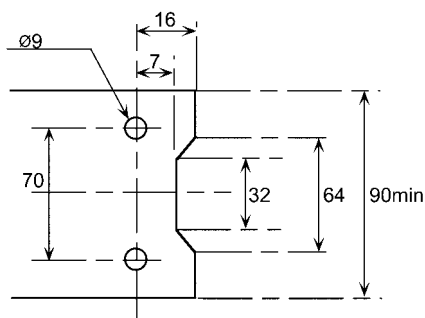
[Unit: mm]



Mounting plate reference dimension

Terminal connections
Terminal screw size M4

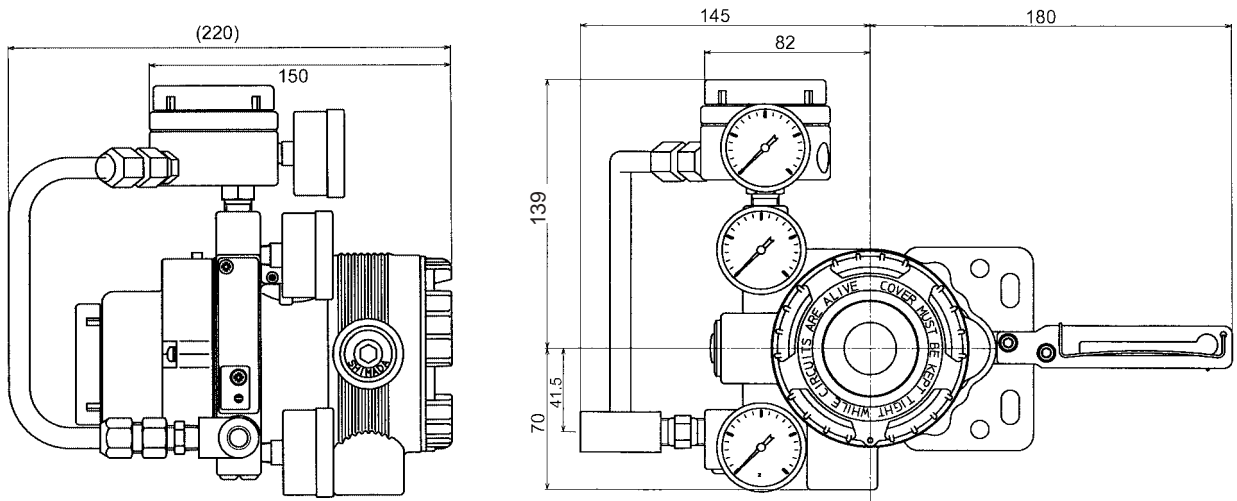
Extension lever	Actuator model	Code
No	PSA1, 2, PSK1	YS
	PSA3, 4	YQ
	HA1	YA
	HA2, 3	YT
	HK1	YK
Yes	VA1 to 3	YQ
	PSA6	YL
	HA4	YN
	VA4 to 6	YL
	VR1	YV
	VR2, 3	YR
	GOM83S, 84S, 103S	YG
	GOM124S	YM



Types	Electrical connection	Air piping connection	Mounting threads
FM and CSA approvals or water-proof type	1/2NPT	1/4NPT	5/16-18UNC
CENELEC approvals	M20×1.5	1/4NPT	M8
Parts on drawings	*1	*2	*3

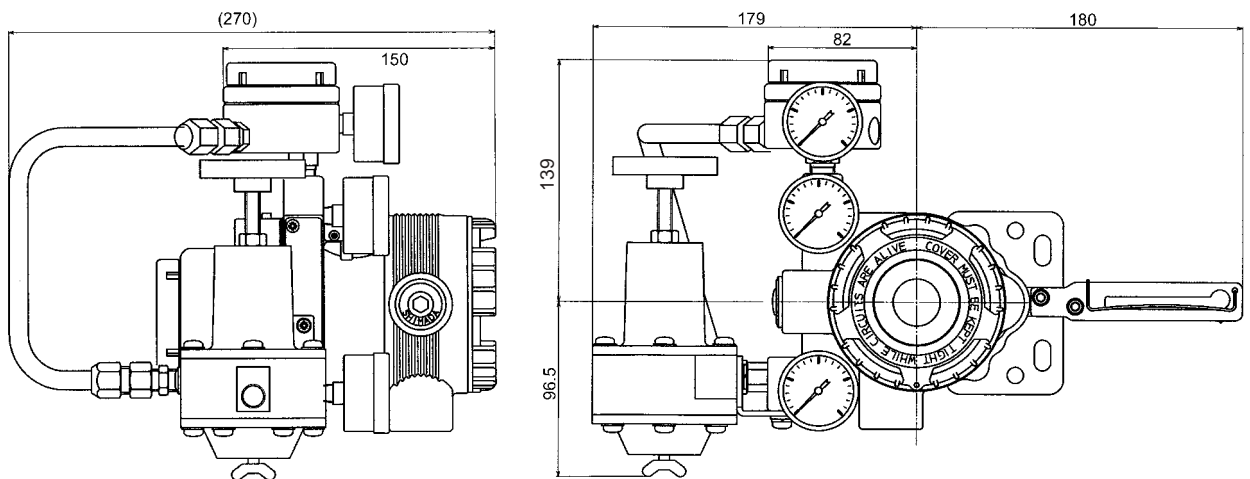
**For double acting actuator with reversing-relay type
without pressure regulator with filter**

[Unit: mm]



**For double acting actuator with reversing relay type
with pressure regulator with filter**

[Unit: mm]



Note

Yamatake Corporation

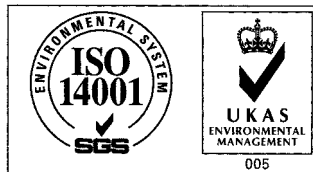
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