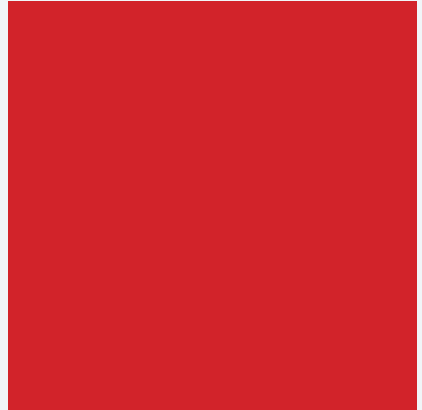
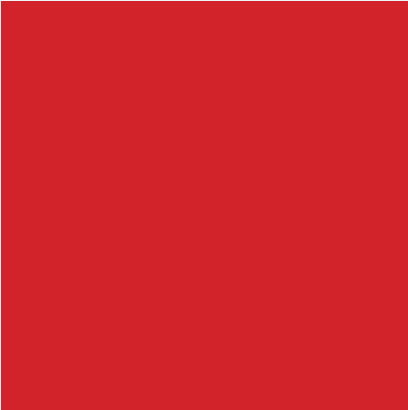


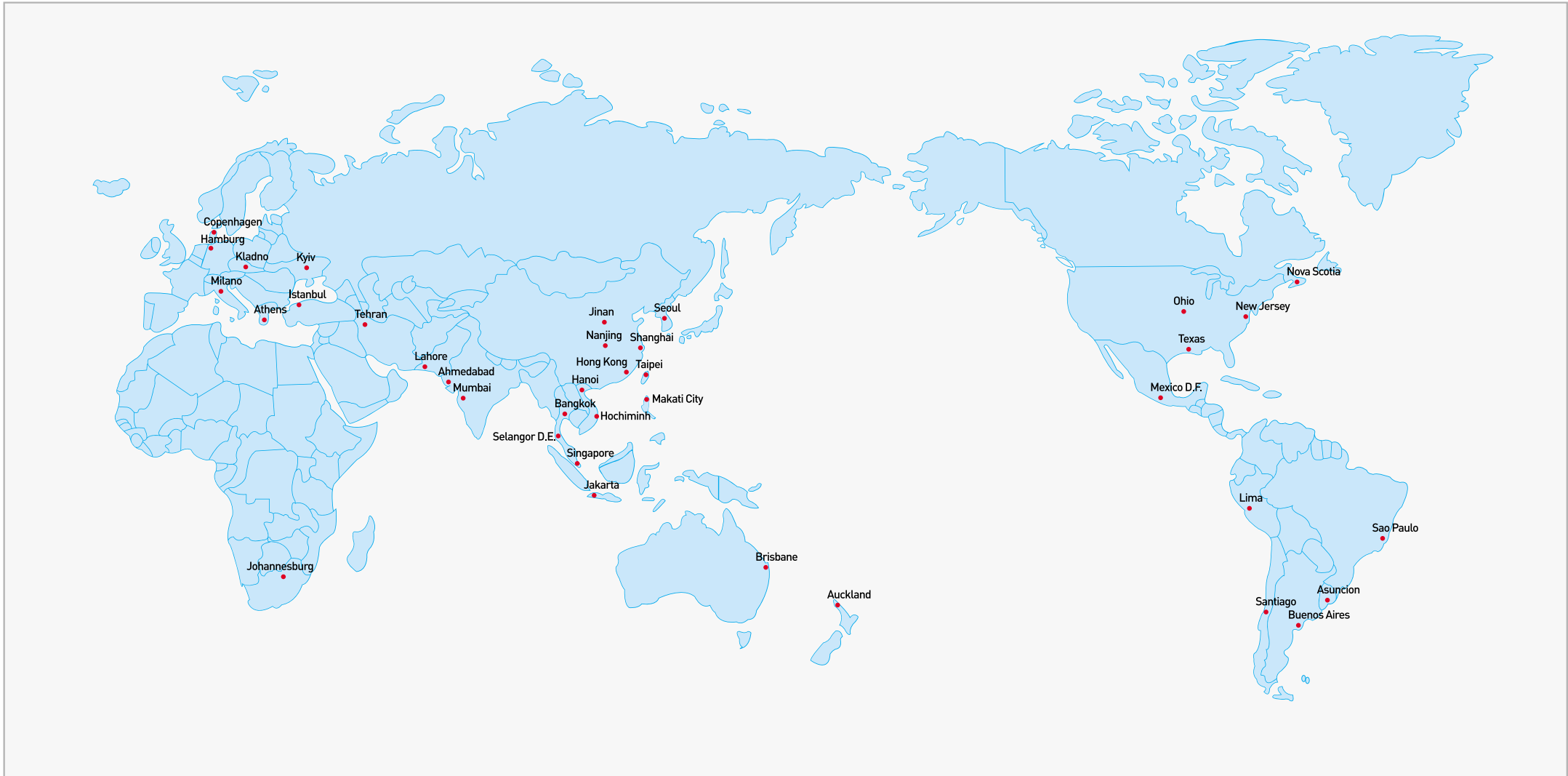
PG POWER-GENEX®



All innovation on driving valve automation



Worldwide Sales Network



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Contents

A solid workhorse you can depend on for consistent, reliable control

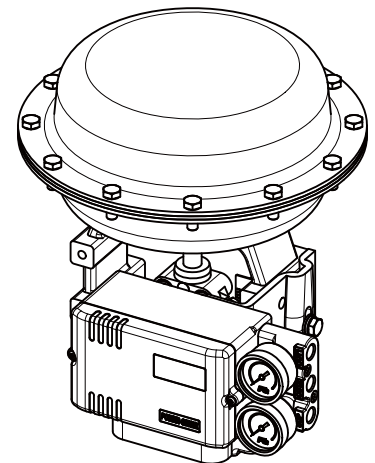
CERTIFICATES	A1 ~ A2
SMART VALVE POSITIONER – SS2L & SS2R / RSS2L & RSS2R / SS3L & SS3R SSL & SSR / RSSL & RSSR	B1 ~ B30
DIGITAL VALVE POSITIONER – SEL & SER	C1 ~ C8
ELECTRO-PNEUMATIC POSITIONER – EPL & EPR	D1 ~ D8
PNEUMATIC-PNEUMATIC POSITIONER – PPL & PPR	E1 ~ E4
CYLINDER POSITIONER – EPCL & PPCL	F1 ~ F4
I / P CONVERTER – IPC	G1 ~ G2
POSITION TRANSMITTER – PTP	H1 ~ H2
LOCK UP VALVE – LU	I 1
SOLENOID VALVE – ESV-S & ESV-D & ESV10 & ESV-3	J1 ~ J7
AIR FILTER REGULATOR – FR10 & FR15 & FR30	K1 ~ K2
AIR VOLUME BOOSTER – AVB	L 1
VALVE MONITORING CONTROLLER – LSB-7	M1 ~ M4
VALVE MONITORING INDICATOR – LSB	N1 ~ N2
MINI ELECTRIC ACTUATOR – PGI 0020	O1
PNEUMATIC ANGLE SEAT VALVE	P1 ~ P4
UNIT CONVERSION TABLE	Q1 ~ Q2

Smart performance with innovative and ever-strong coil drive even under harsh working environments

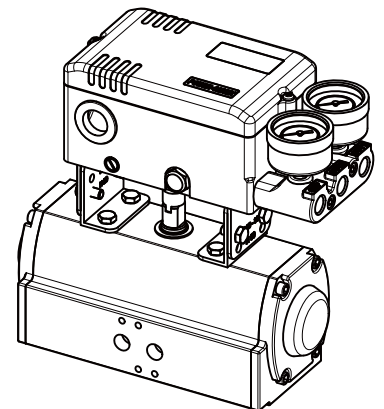


Features

- ▶ Easy and quick auto-calibration
- ▶ Detecting RA (reverse acting) or DA (direct acting) automatically regardless of wrong air connections
- ▶ Available to use for single or double acting without any special adjustments
- ▶ Compact design allowing to be installed on small actuators
- ▶ Providing error messages against performance failures
- ▶ Possible to test the actuator with any fixed signal under a test mode
- ▶ Programmable characteristic curve with 17 points
- ▶ Wide operating temperature range -30 ~ +80 °C
- ▶ Improved control of high-friction globe and ball valves by eliminating an overshoot and a hunting
- ▶ Low air consumption
- ▶ Providing a mounting bracket to meet IEC 60534-6-1 for linear valves
- ▶ Supporting a NAMUR mounting pattern VDI/VDE 3845 (IEC 60534-6-2) and providing a multi-size mounting bracket for rotary valves



- SS2L (Linear Type)



- SS2R (Rotary Type)

Options

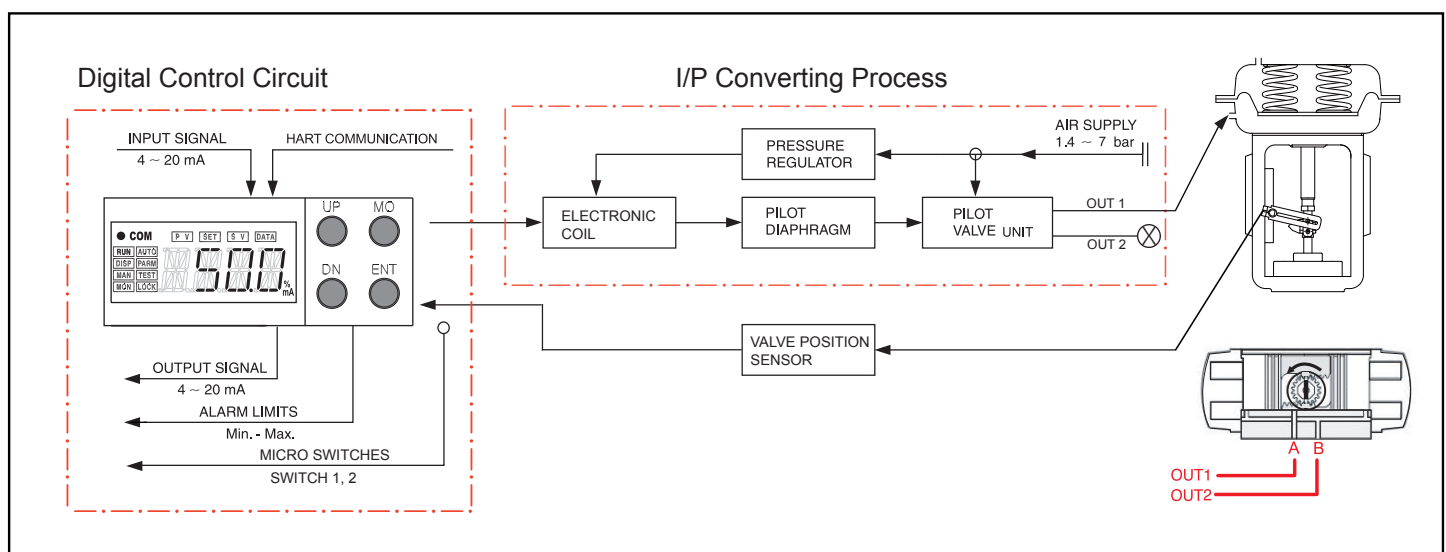
- ▶ Output position transmitter (4 - 20 mA)
- ▶ 2 x alarm limit or micro switch (SPDT)
- ▶ Explosion proof type (IECEX / ATEX / KC Ex ia IIC T6)
- ▶ HART communication
- ▶ Profibus communication

Specifications

Input Signal	4 - 20 mA @ 24 VDC
Min. / Max. Current	3.6 mA / 50 mA
Voltage Drop (Resistance)	Without Hart : 8.7 VDC (435Ω @ 20 mA) With Hart : 9.4 VDC (470Ω @ 20 mA)
Stroke / Angle	Linear type : 5 - 130 mm * Rotary type : 25 - 120°
Air Supply Pressure	1.4 - 7.0 bar (20 - 100 psi), filtered, compressed dry and non-oiled to meet Class 3 of ISO 8573-1
Output Pressure Range	0 - 100% of supply air pressure
Air Capacity	80 ℓ/min = 4.8 N ^m /h = 2.8 scfm (Sup = 1.4 bar) 233 ℓ/min = 14 N ^m /h = 8.2 scfm (Sup = 6 bar)
Air Consumption	2 ℓ/min = 0.12 N ^m /h = 0.07 scfm (Sup = 1.4 ~ 6 bar)
Characteristic	Linearity < ±0.3% F.S Sensitivity < 0.2% F.S Hysteresis < 0.2% F.S Repeatability < 0.2% F.S
Performance Characteristic	Linear, EQ %, Quick open, User set (17 points)
LCD Indication	4-digit LCD indicator
Adjustable Speed	1 - 1000 (lowest 1, highest 1000)
Scan Time	2ms
Shut-off Value	Range 0 - 10% of position signal
Valve Action	Direct action(DA) / reverse action(RA)
Operating Temperature	- 30 ~ +80°C (- 22 ~ +176 °F) **
Pneumatic Connections	Rc 1/4 or 1/4 NPT
Electrical Connections	2 x G 1/2 or 1/2 NPT
Protection Class	IP66, intrinsic safety (IECEX / ATEX / KC Exia IIC T6)
Body Material	Aluminum die-cast / powder-painted
Weight	1.6 kg

* Up to 200mm on request ** -40°C on request

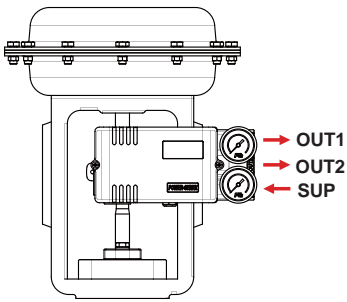
Principle of Operation



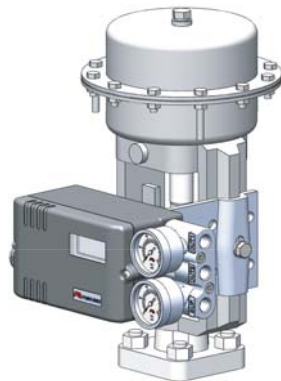
If 4-20 mA input signal is supplied, the micro processor compares input signal with position feedback and sends control signal to the I/P converting module. Pneumatic signal from the I/P converting module operates the valve and the valve stays at the desired position.

Mounting to Linear Actuator

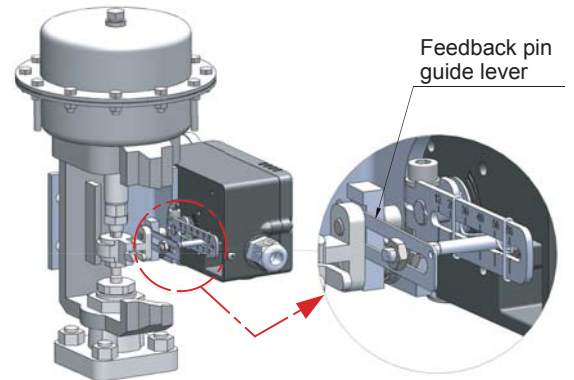
- SS2L (Linear Type)



< Front View >

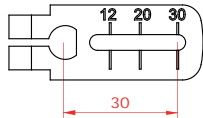


< Side View >

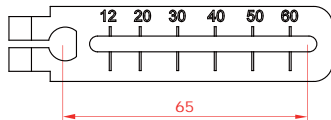


< Feedback Lever Connection >

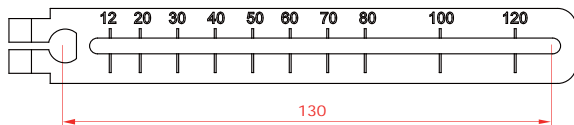
"A" Type



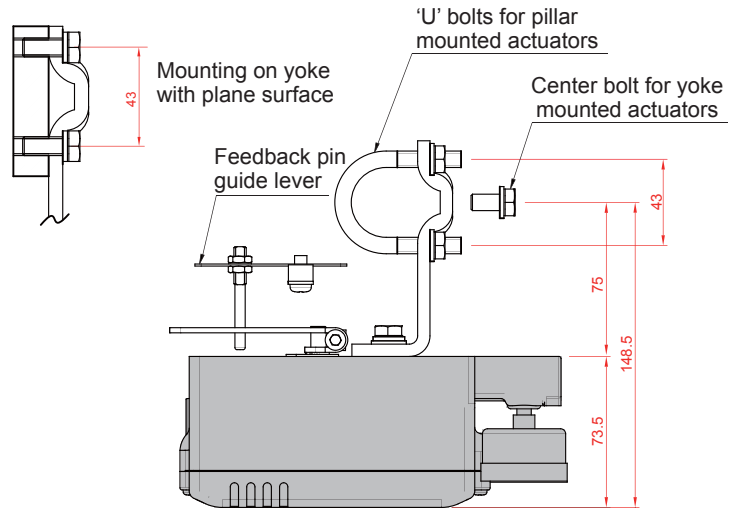
"B" Type



"C" Type



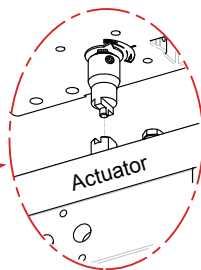
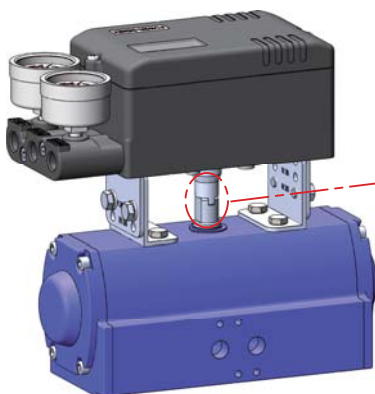
Feedback Lever



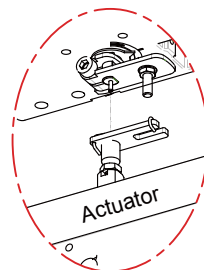
Mounting to linear actuators to IEC 60534 6-1

Mounting to Rotary Actuator

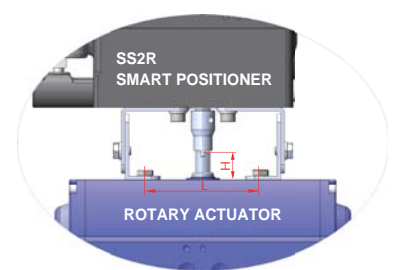
- SS2R (Rotary Type)



NAMUR Type Mounting
(VDI/VDE 3845,
IEC 60534-6-2)



Fork Lever Type Mounting



Size Variation of Multi-Size Bracket

- 1) 80 x 30 x 20 (H), 4) 130 x 30 x 20 (H)
- 2) 80 x 30 x 30 (H), 5) 130 x 30 x 30 (H)
- 3) 80 x 30 x 50 (H), 6) 130 x 30 x 50 (H)

H : Rotary Actuator Shaft Height
L : Length (80 or 130mm)

Air Connections

- SS2L (Linear Type)

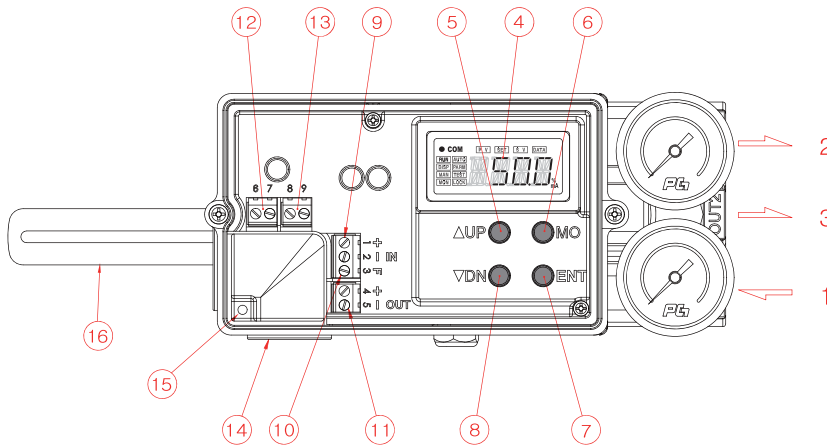
Direct Acting (DA)		Reverse Acting (RA)	
<p>DA 1</p> <p>As the input signal increases, Valve stem moves downwards Actuator : DA</p>	<p>OUT2 must be plugged</p>	<p>RA 1</p> <p>As the input signal increases, Valve stem moves upwards Actuator : RA</p>	<p>OUT2 must be plugged</p>
<p>DA 2</p> <p>As the input signal increases, Valve stem moves downwards Actuator : DA</p>	<p>OUT1 must be plugged</p>	<p>RA 2</p> <p>As the input signal increases, Valve stem moves upwards Actuator : RA</p>	<p>OUT1 must be plugged</p>
<p>DA 3</p> <p>As the input signal increases, Valve stem moves downwards</p>		<p>RA 3</p> <p>As the input signal increases, Valve stem moves upwards</p>	

- SS2R (Rotary Type)

Spring Return	Double Acting	Double Acting
<p>Actuator : RA</p> <p>OUT2 must be plugged</p>	<p>Actuator : RA</p>	<p>Actuator : DA</p>
<p>As the input signal increases, Actuator shaft rotates counter-clockwise</p>	<p>As the input signal increases, Actuator shaft rotates counter-clockwise</p>	<p>As the input signal increases, Actuator shaft rotates clockwise</p>

	Spring Return	Double Acting
Reverse Acting	Out1 : piped, Out2 : plugged	Out1 : piped to Actuator port A, Out2 : piped to Actuator port B
Direct Acting	Out1 : plugged, Out2 : piped	Out1 : piped to Actuator port B, Out2 : piped to Actuator port A

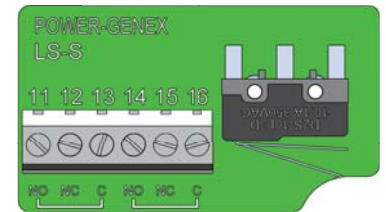
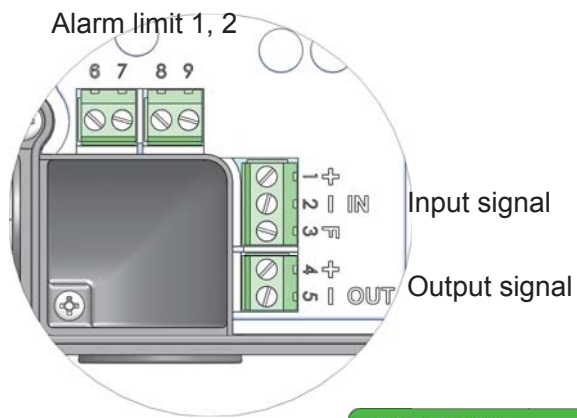
SS2 Front Cover Removed



- 1 : Air supply
- 2 : OUT 1
- 3 : OUT 2
- 4 : Display LCD
- 5 : Up key
- 6 : Mode key
- 7 : Enter key
- 8 : Down key
- 9 : Input signal (+, -)
- 10 : Frame ground
- 11 : Output signal (+, -)
- 12 : Alarm limit 1
- 13 : Alarm limit 2
- 14 : Electrical connections
- 15 : Ground
- 16 : Feedback lever

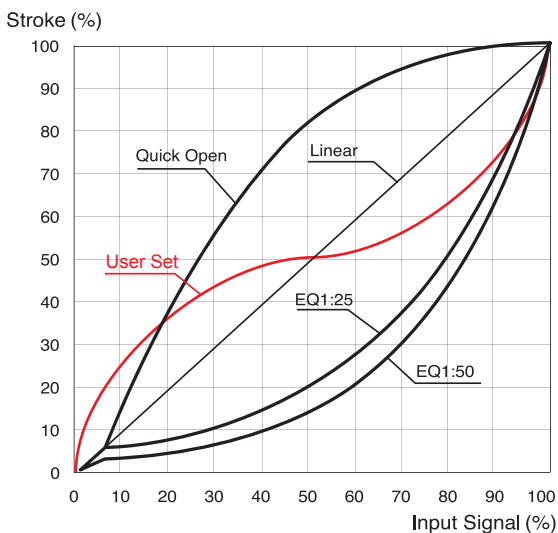
Electrical Connections

- 1 (+) } IN. 4-20mA input signal
- 2 (-) }
- 3 (FG) } Frame Ground
- 4 (+) } OUT. 4-20mA output signal
- 5 (-) }
- 6 (+) } LS1. (Low) Alarm limit 1
- 7 (-) }
- 8 (+) } LS2. (High) Alarm limit 2
- 9 (-) }



Micro switches 1, 2

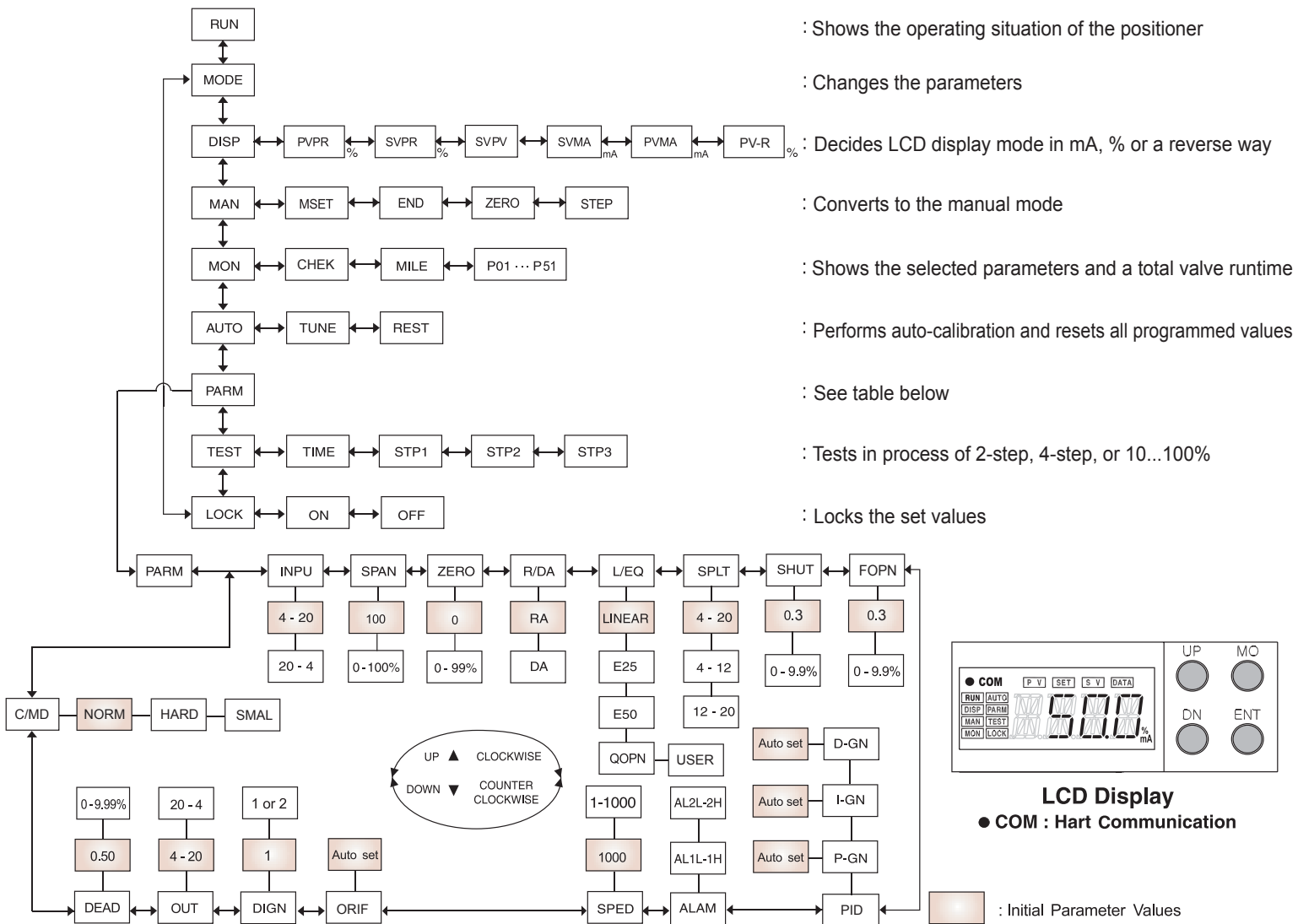
Characteristic Curves



Quick Start and Checking

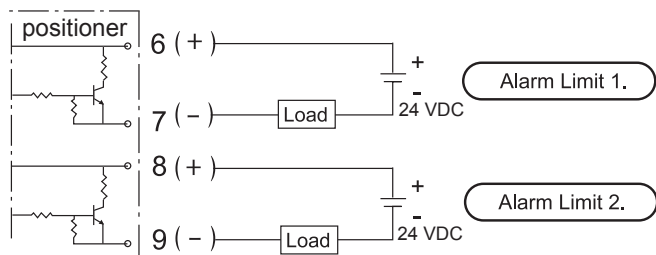
	Button	Action
Auto - Calibration	MO	Push 5 seconds for auto-calibration
Span	VDN → ENT or VDN → ΔUP ENT → MO	Push VDN 5 seconds to change a measured span (Try this option only when a valve doesn't reach a desired position)
Ambient Temp.	ENT	Confirm an ambient temperature surrounding this smart valve positioner

Parameters Diagram



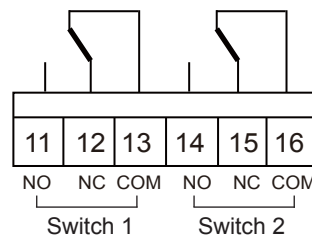
Parameters	Descriptions	Functions	Initial value
INPU	Input signal	4 - 20mA or 20 - 4mA	4 - 20 mA
SPAN	Span range	0 - 100% span adjustment	100 %
ZERO	Zero-up	Position Zero up and down 0 - 99%	0 %
R / DA	RA / DA	Reverse or direct acting	RA
L / E.Q / QOPN / USER	Linear / E.Q% / Quick open / User set	Linear, E.Q%(1:25 or 1:50), Quick open User set (17 points)	Linear
SPLT	Split range	4 - 12mA or 12 - 20mA	4 - 20 mA
SHUT	Shut-off	Valve shut off at 0 - 9.9 %	0.3 %
FOPN	Full-open	Valve full open at 0 - 9.9%	0.3 %
PID	P-Gain / I-Gain / D-Gain	Gain value	Auto setting
ALAM	Alarm limit low, high	AL1L / AL1H, AL2L / AL2H	Low (0 - 10%), High (90 - 100%)
SPED	Speed control	1 - 1000	1000
ORIF	Orifice	Orifice value	Auto setting
DIGN	Display digit	Move to one or two decimal places	1
OUT	Output signal	4 - 20mA or 20 - 4mA	4 - 20 mA
DEAD	Dead zone	0 - 9.99%	0.5%
C/MD	NORM / HARD / SMAL	Standard operation, with hard friction for small valve	NORM

Wiring Alarm Limits



Note that 24 VDC should be supplied for power.

Micro Switches (SPDT)

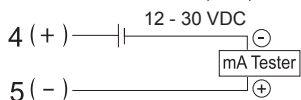


Measuring Output Signal

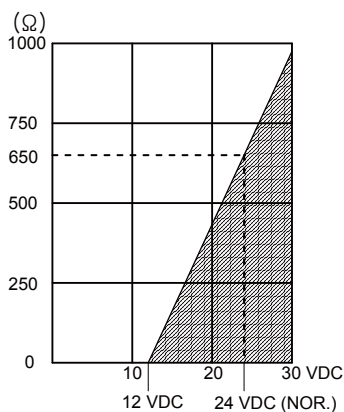
① With mA loop calibrator



② With multimeter (mA)



ZERO and SPAN of position feedback are automatically set after auto-calibration process.



Transmitter Load Limitation

Micro Switches

Type	SPDT
Rating	10.1A @ 250 VAC
Ambient Temperature	-25 ~ +85 °C
Position Transmitter	
Output Signal	4 - 20 mA, 2-wire
Power Supply	12 - 30 VDC
Output Current Limit	30 mA DC
Linearity	±0.5% F.S
Operating Temperature	-20 ~ +80 °C

How to Order

SS2

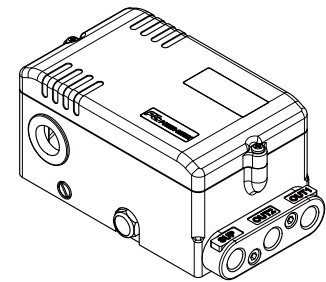
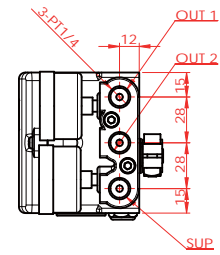
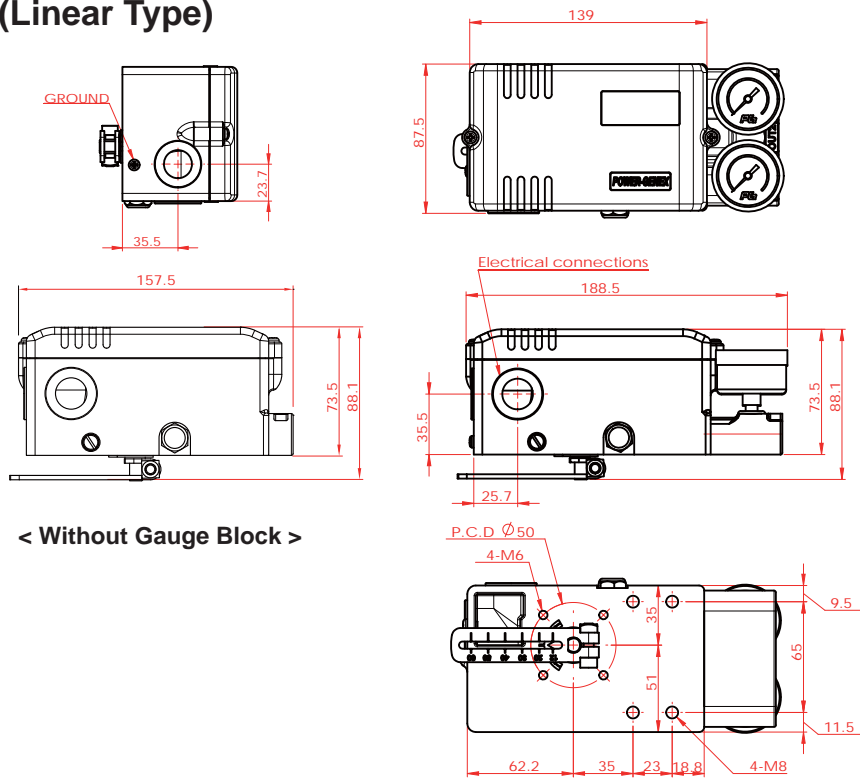
- Actuator Operation
- Protection Class
- Feedback Lever
- Pressure Gauges
- By-pass
- Position Feedback
- Communication
- Connection Threads
- Mounting Bracket
- Feedback Pin Guide Lever Set

Description	Code
Actuator Operation :	L: Linear type R: Rotary type
Protection Class :	I : Intrinsic safety (IECEx Ex ia IIC T6, ATEX Eex ia IIC T6) K : Intrinsic safety (KC Ex ia IIC T6) W : Weatherproof to IP66
Feedback Lever : - Linear Type	A: Stroke (5 ~ 30mm) B: Stroke (5 ~ 70mm) C: Stroke (5 ~ 130mm) D: Stroke (80 ~ 200mm)
- Rotary Type	F: Fork lever N: Namur shaft (direct mounting)
Pressure Gauge Block :	0: Not mounted 1: 6 bar (90 psi) 2: 10 bar (150 psi)
By-pass :	N: None Y: Yes (auto / manual screw)

Description	Code
Position Feedback:	N : None O : Position transmitter (4 ~ 20mA output signal) L : 2 x alarm limit S : 2 x micro switch (SPDT) M: O+L Q: O+S
Communication:	N: None H: HART communication P: Profibus communication
Connection Threads: (pneumatic - electrical)	3: Rc 1/4 - G1/2 (standard) 4: NPT 1/4 - NPT 1/2 5: Rc 1/4 - M20 x 1.5
Mounting bracket:	N: None L: IEC 60534-6-1 (for SS2L) R: VDI/VDE 3845 (IEC 60534-6-2) (for SS2R)
Feedback Pin Guide Lever Set: (only for linear type SS2L)	0: Not included 1: Included

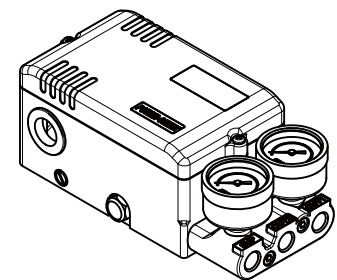
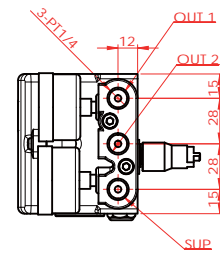
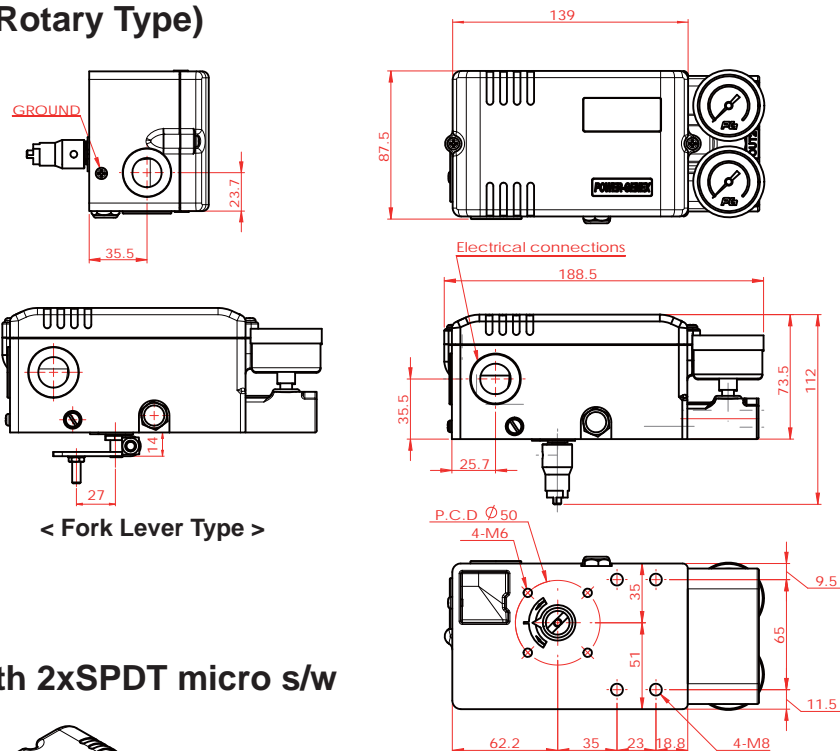
Dimensions

- SS2L (Linear Type)



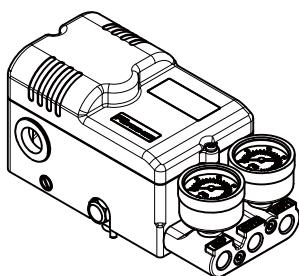
Without Gauge Block

- SS2R (Rotary Type)



With Gauge Block

- SS2 with 2xSPDT micro s/w



Smart Valve Positioner (Remote Type)

RSS2L

NOTE : All specifications and characteristics are the same with SS2L

How to Order

RSS2L

Protection Class

Feedback Lever

Pressure Gauges

Position Feedback

Communication

Connection Threads

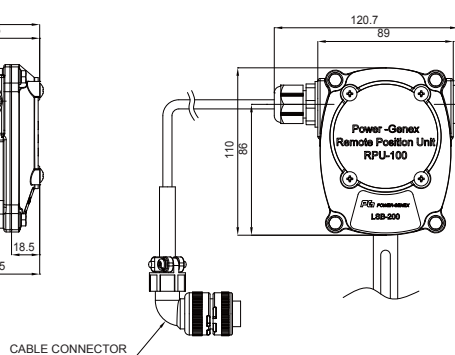
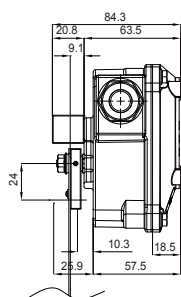
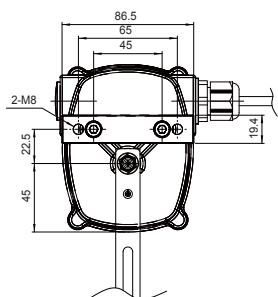
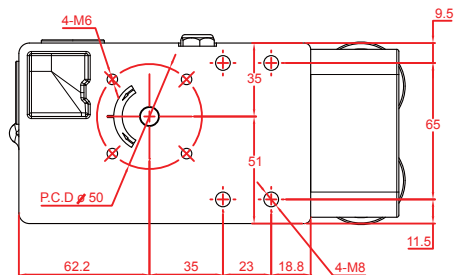
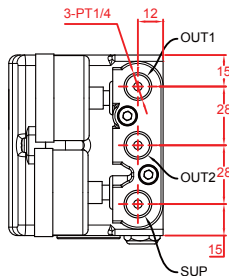
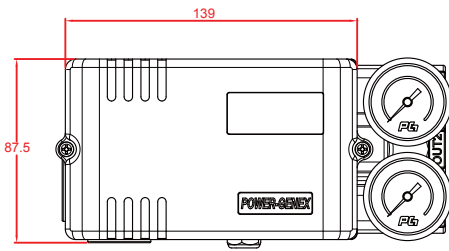
Cable Length

Description	Code
Protection Class :	I Intrinsic safety (Exia IIC T6) W Weatherproof to IP66
Feedback Lever:	A: Stroke (10 ~ 40mm) B: Stroke (10 ~ 80mm) C: Stroke (80 ~ 150mm)
Gauge Block:	0: Not mounted 1: 6 bar (90 psi) 2: 10 bar (150 psi)

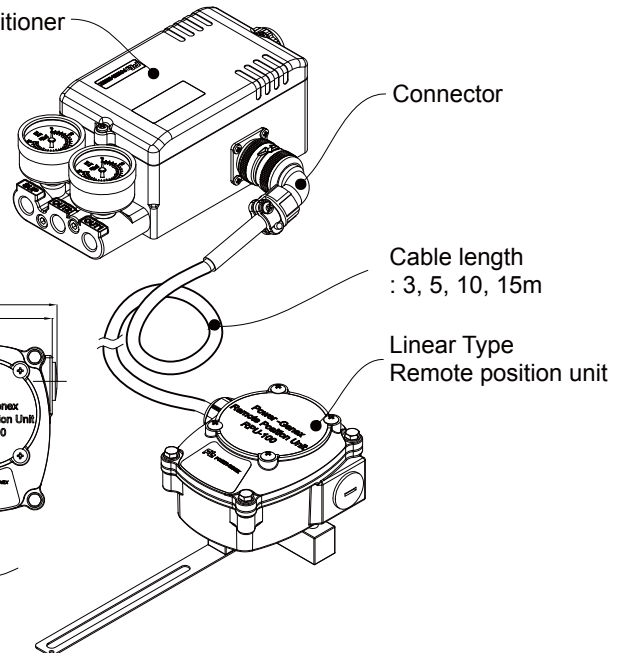
Description	Code
Position Feedback:	N : None O : Position transmitter (4 ~ 20mA output signal)
Communication:	N: None H: HART communication P: Profibus communication
Connection Threads: (pneumatic – electrical)	3: Rc 1/4 – G1/2 (standard) 4: NPT 1/4 – NPT 1/2 5: Rc 1/4 – M20 x 1.5
Cable Length:	3, 5, 10, 15m Other : On request

Ex) RSS2L-WA10H3-3 (weatherproof, Feedback lever 10 ~ 40mm stroke, 6bar pressure gauges, position transmitter, Rc 1/4 - G 1/2, HART communication, cable 3m)

Dimensions



RSS2 Positioner



NOTE : All specifications and characteristics are the same with SS2R

How to Order

RSS2R

Protection Class

Feedback Lever

Pressure Gauges

Position Feedback

Communication

Connection Threads

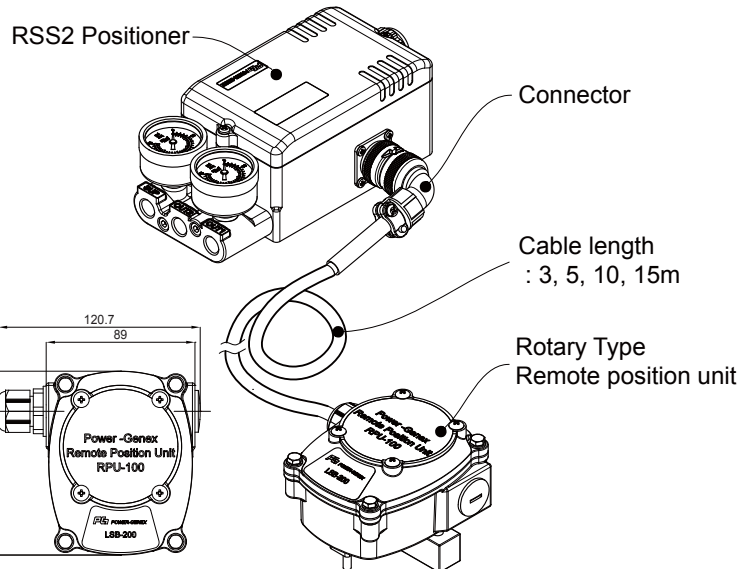
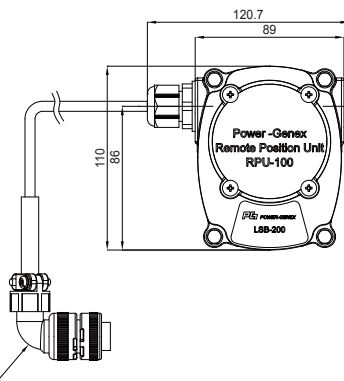
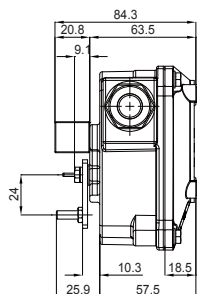
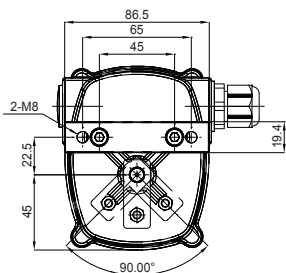
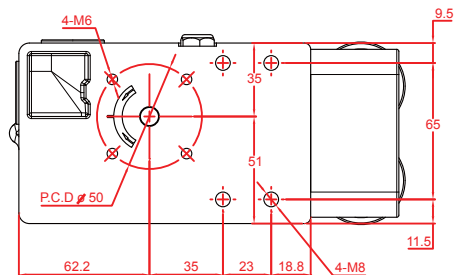
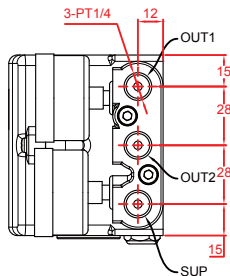
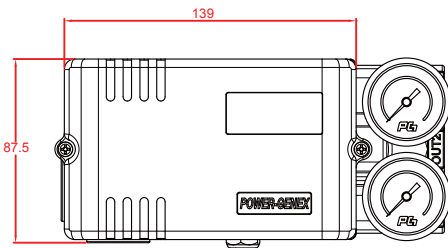
Cable Length

Description	Code
Protection Class :	I Intrinsic safety (Exia IIC T6) W Weatherproof to IP66
Feedback Shaft :	F: Fork lever
Gauge Block :	0: Not mounted 1: 6 bar (90 psi) 2: 10 bar (150 psi)
Position Feedback :	N : None O : Position transmitter (4 ~ 20mA output signal)

Description	Code
Communication :	N: None H: HART communication P: Profibus communication
Connection Threads : (pneumatic – electrical)	3: Rc 1/4 – G1/2 (standard) 4: NPT 1/4 – NPT 1/2 5: Rc 1/4 – M20 x 1.5
Cable Length :	3, 5, 10, 15m Other : On request

Ex) RSS2R-WF10H3-3 (weatherproof, Fork lever shaft, 6bar pressure gauges, position transmitter, Rc 1/4 - G 1/2, HART communication, cable 3m)

Dimensions



Smart performance with innovative and ever-strong coil drive even under harsh working environments

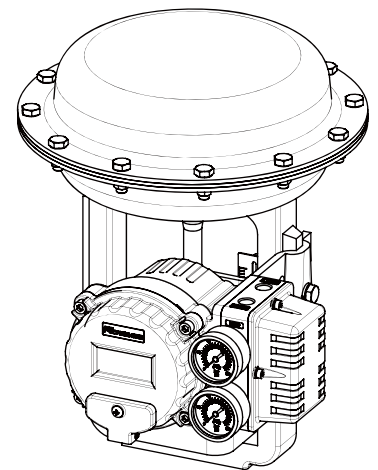


Features

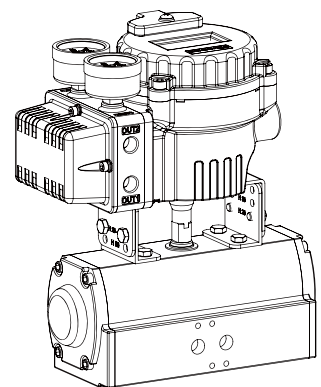
- ▶ Flameproof IECEx / ATEX / KC Ex d IIC T6
- ▶ Easy and quick auto-calibration
- ▶ Detecting RA (reverse acting) or DA (direct acting) automatically regardless of wrong air connections
- ▶ Available to use for single or double acting without any special adjustments
- ▶ Compact design allowing to be installed on small actuators
- ▶ Providing error messages against performance failures
- ▶ Possible to test the actuator with any fixed signal under a test mode
- ▶ Programmable characteristic curve with 17 points
- ▶ Wide operating temperature range -30 ~ +80 °C
- ▶ Improved control of high-friction globe and ball valves by eliminating an overshoot and a hunting
- ▶ Low air consumption
- ▶ Providing a mounting bracket to meet IEC 60534-6-1 for linear valves
- ▶ Supporting a NAMUR mounting pattern IEC 60534-6-2 (VDI/VDE 3845) and providing a multi-size mounting bracket for rotary valves

Options

- ▶ Output position transmitter (4 - 20 mA)
- ▶ 2 x alarm limit or micro switch (SPDT)
- ▶ HART communication
- ▶ Profibus communication



- SS3L (Linear Type)



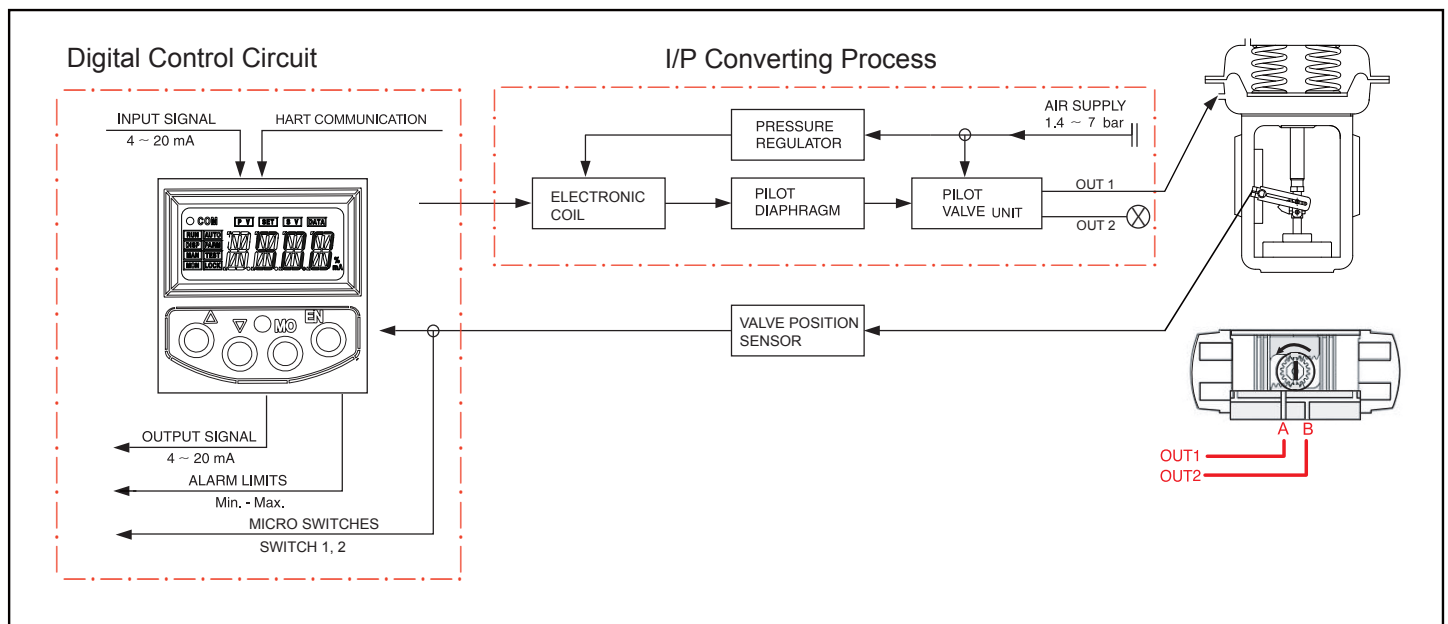
- SS3R (Rotary Type)

Specifications

Input Signal	4 - 20 mA @ 24 VDC
Min. / Max. Current	3.6 mA / 50 mA
Voltage Drop (Resistance)	Without Hart : 8.7 VDC (435Ω @ 20 mA) With Hart : 9.4 VDC (470Ω @ 20 mA)
Stroke / Angle	Linear type : 5 - 130 mm * Rotary type : 25 - 120°
Air Supply Pressure	1.4 - 7.0 bar (20 - 100 psi)
Output Pressure Range	0 - 100% of supply air pressure
Air Capacity	80 ℓ/min = 4.8 N ^m /h = 2.8 scfm (Sup = 1.4 bar)
Air Consumption	233 ℓ/min = 14 N ^m /h = 8.2 scfm (Sup = 6 bar)
Characteristic	Linearity < ±0.3% F.S Sensitivity < 0.2% F.S Hysteresis < 0.2% F.S Repeatability < 0.2% F.S
Performance Characteristic	Linear, EQ %, Quick open, User set (17 points)
LCD Indication	4-digit LCD indicator
Adjustable Speed	1 - 1000 (lowest 1, highest 1000)
Scan Time	2ms
Shut-off Value	Range 0 - 10% of position signal
Valve Action	Direct action(DA) / revers action(RA)
Operating Temperature	- 30 ~ +80 °C (- 22 ~ +176 °F)
Pneumatic Connections	Rc 1/4 or 1/4 NPT
Electrical Connections	2 x G 1/2 or 1/2 NPT
Protection Class	Flameproof IECEx / ATEX / KC Ex d IIC T6, IP66
Body Material	Aluminum die-cast / powder-painted
Weight	2.8 kg

* Up to 200mm on request ** -40°C on request

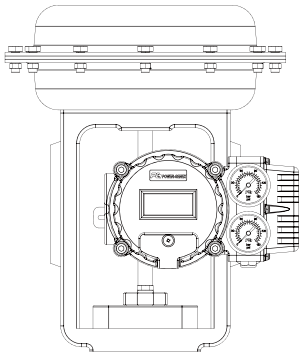
Principle of Operation



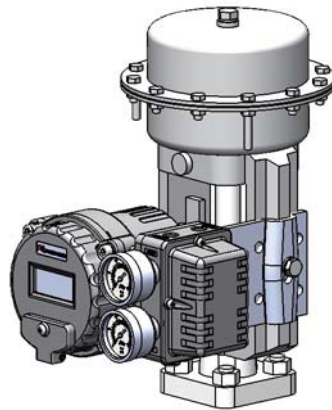
If 4-20 mA input signal is supplied, the micro processor compares input signal with position feedback and sends control signal to the I/P converting module. Pneumatic signal from the I/P converting module operates the valve and the valve stays at the desired position.

Mounting to Linear Actuator

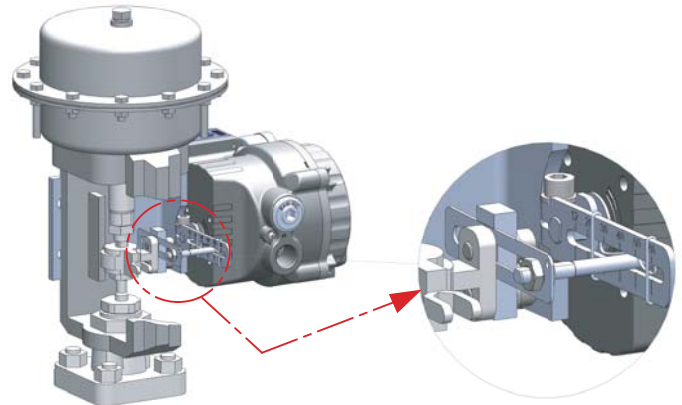
- SS3L (Linear Type)



< Front View >

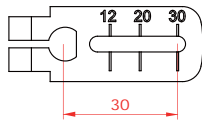


< Side View >

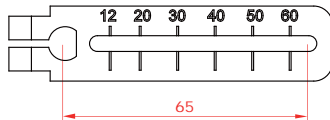


< Feedback Lever Connection >

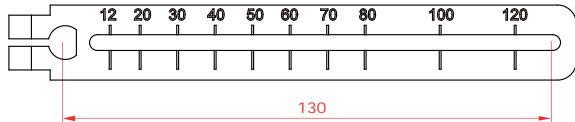
"A" Type



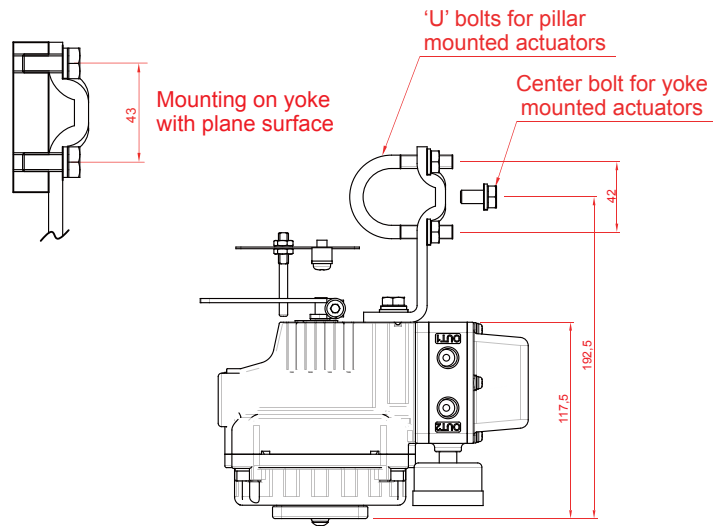
"B" Type



"C" Type



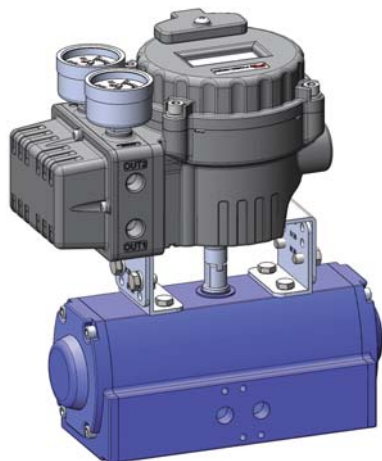
Feedback Lever



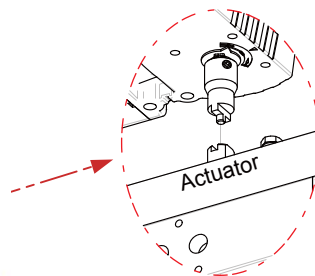
Mounting to linear actuators to IEC 60534 6-1

Mounting to Rotary Actuator

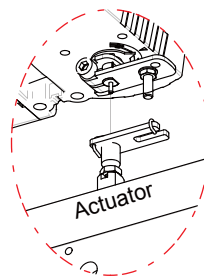
- SS3R (Rotary Type)



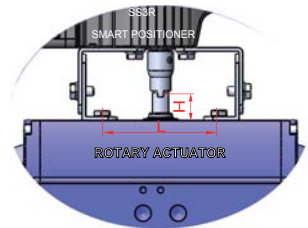
Attachment Diagram of Multi-size Bracket



NAMUR Type Mounting
(VDI/VDE 3845,
IEC 60534-6-2)



Fork Lever Type Mounting



Size Variation of Multi-Size Bracket

- 1) 80 x 30 x 20 (H) , 4) 130 x 30 x 20 (H)
 - 2) 80 x 30 x 30 (H) , 5) 130 x 30 x 30 (H)
 - 3) 80 x 30 x 50 (H) , 6) 130 x 30 x 50 (H)
- H : Rotary Actuator Shaft Height
L : Length (80 or 130mm)

Air Connections

- SS3L (Linear Type)

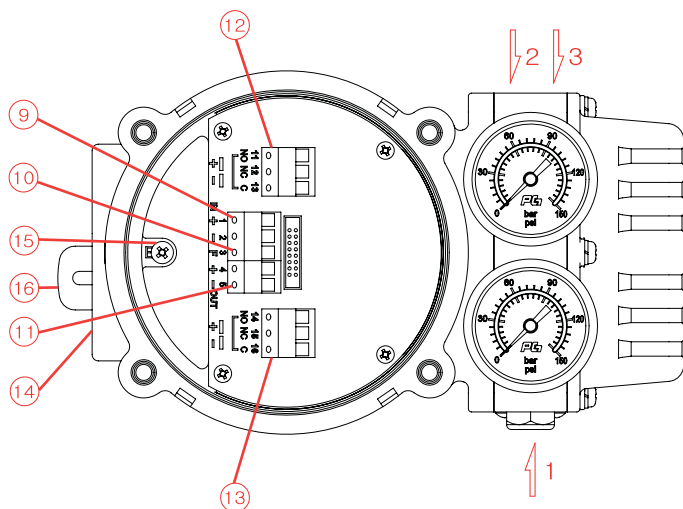
Direct Acting (DA)		Reverse Acting (RA)	
<p>DA 1</p> <p>As the input signal increases, Valve stem moves downwards Actuator : DA</p>	<p>OUT2 must be plugged</p>	<p>RA 1</p> <p>As the input signal increases, Valve stem moves upwards Actuator : RA</p>	<p>OUT2 must be plugged</p>
<p>DA 2</p> <p>As the input signal increases, Valve stem moves downwards Actuator : DA</p>	<p>OUT1 must be plugged</p>	<p>RA 2</p> <p>As the input signal increases, Valve stem moves upwards Actuator : RA</p>	<p>OUT1 must be plugged</p>
<p>DA 3</p> <p>As the input signal increases, Valve stem moves downwards</p>		<p>RA 3</p> <p>As the input signal increases, Valve stem moves upwards</p>	

- SS3R (Rotary Type)

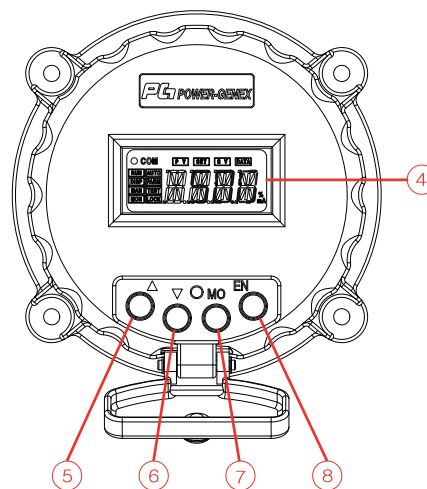
Spring Return	Double Acting	Double Acting
<p>OUT2 must be plugged</p>		
As the input signal increases, Actuator shaft rotates counter-clockwise	As the input signal increases, Actuator shaft rotates counter-clockwise	As the input signal increases, Actuator shaft rotates clockwise

	Spring Return	Double Acting
Reverse Acting	Out1 : piped, Out2 : plugged	Out1 : piped to Actuator port A, Out2 : piped to Actuator port B
Direct Acting	Out1 : plugged, Out2 : piped	Out1 : piped to Actuator port B, Out2 : piped to Actuator port A

SS3 Front Cover Removed

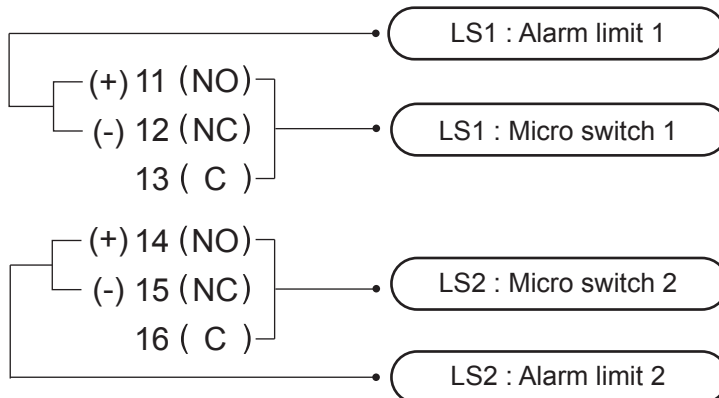
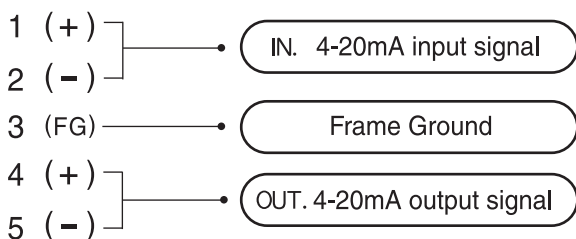


SS3 Front Cover

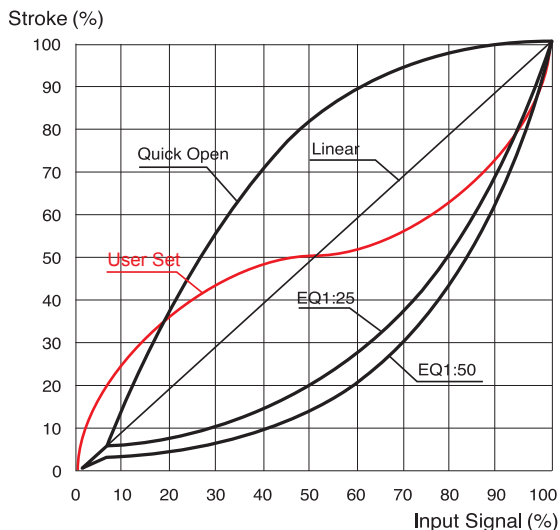


- | | | | |
|-----------------|---------------|---------------------------|-----------------------------|
| 1 : Air supply | 5 : Up key | 9 : Input signal (+, -) | 13 : Alarm limit 2 |
| 2 : OUT 1 | 6 : Down key | 10 : Frame ground | 14 : Electrical connections |
| 3 : OUT 2 | 7 : Mode key | 11 : Output signal (+, -) | 15 : Ground |
| 4 : Display LCD | 8 : Enter key | 12 : Alarm limit 1 | 16 : Feedback lever |

Electrical Connections



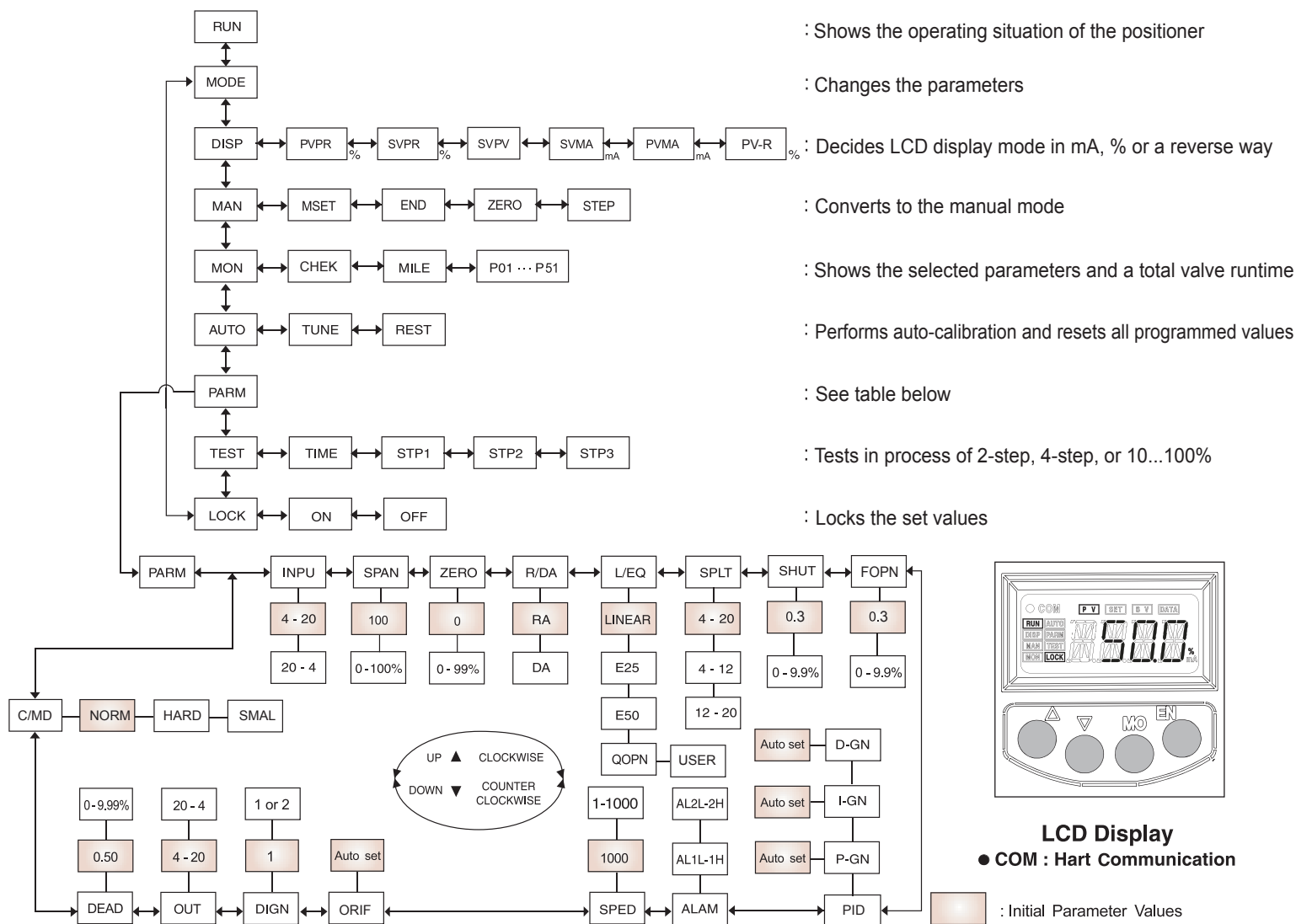
Characteristic Curves



Quick Start and Checking

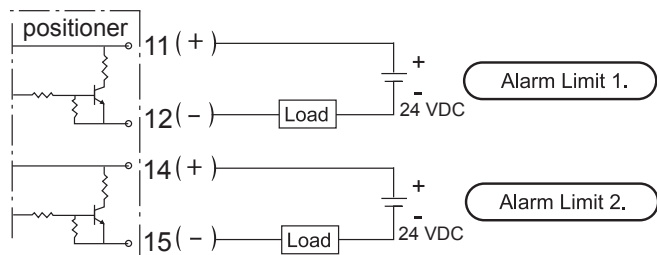
	Button	Action
Auto - Calibration	MO	Push 5 seconds for auto-calibration
Span	VDN → ENT VDN or ΔUP ENT → MO	Push VDN 5 seconds to change a measured span (Try this option only when a valve doesn't reach a desired position)
Ambient Temp.	ENT	Confirm an ambient temperature surrounding this smart valve positioner

Parameters Diagram



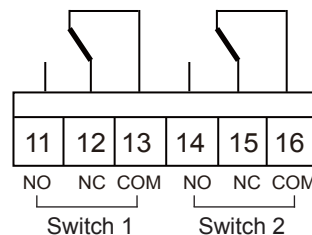
Parameters	Descriptions	Functions	Initial value
INPU	Input signal	4 - 20mA or 20 - 4mA	4 - 20 mA
SPAN	Span range	0 - 100% span adjustment	100 %
ZERO	Zero-up	Position Zero up and down 0 - 99%	0 %
R / DA	RA / DA	Reverse or direct acting	RA
L / E.Q / QOPN / USER	Linear / E.Q% / Quick open / User set	Linear, E.Q%(1:25 or 1:50), Quick open User set (17 points)	Linear
SPLT	Split range	4 - 12mA or 12 - 20mA	4 -20 mA
SHUT	Shut-off	Valve shut off at 0 - 9.9%	0.3%
FOPN	Full-open	Valve full open at 0 - 9.9%	0.3%
PID	P-Gain / I-Gain / D-Gain	Gain value	Auto setting
ALAM	Alarm limit low, high	AL1L / AL1H, AL2L / AL2H	Low (0 - 10%), High (90 - 100%)
SPED	Speed control	1 - 1000	1000
ORIF	Orifice	Orifice value	Auto setting
DIGN	Display digit	Move to one or two decimal places	1
OUT	Output signal	4 - 20mA or 20 - 4mA	4 - 20 mA
DEAD	Dead zone	0 - 9.99%	0.5%
C/MD	NORM / HARD / SMAL	Standard operation, with hard friction for small valve	NORM

Wiring Alarm Limits



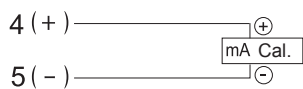
Note that 24 VDC should be supplied for power.

Micro Switches (SPDT)

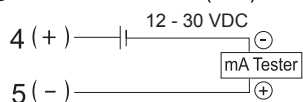


Measuring Output Signal

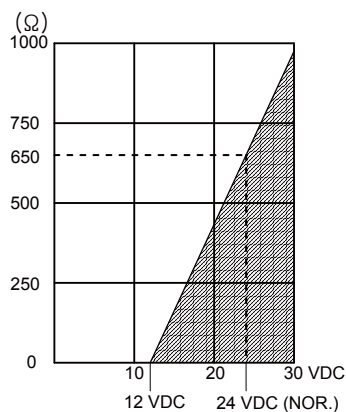
① With mA loop calibrator



② With multimeter (mA)



ZERO and SPAN of position feedback are automatically set after auto-calibration process.



Transmitter Load Limitations

Micro Switches

Type	SPDT
Rating	10.1A @ 250 VAC
Ambient Temperature	-25 ~ 85 °C
Position Transmitter	
Output Signal	4 - 20 mA, 2-wire
Power Supply	12 - 30 VDC
Output Current Limit	30 mA DC
Linearity	±0.5% F.S
Operating Temp.	-20 ~ +80 °C

How to Order

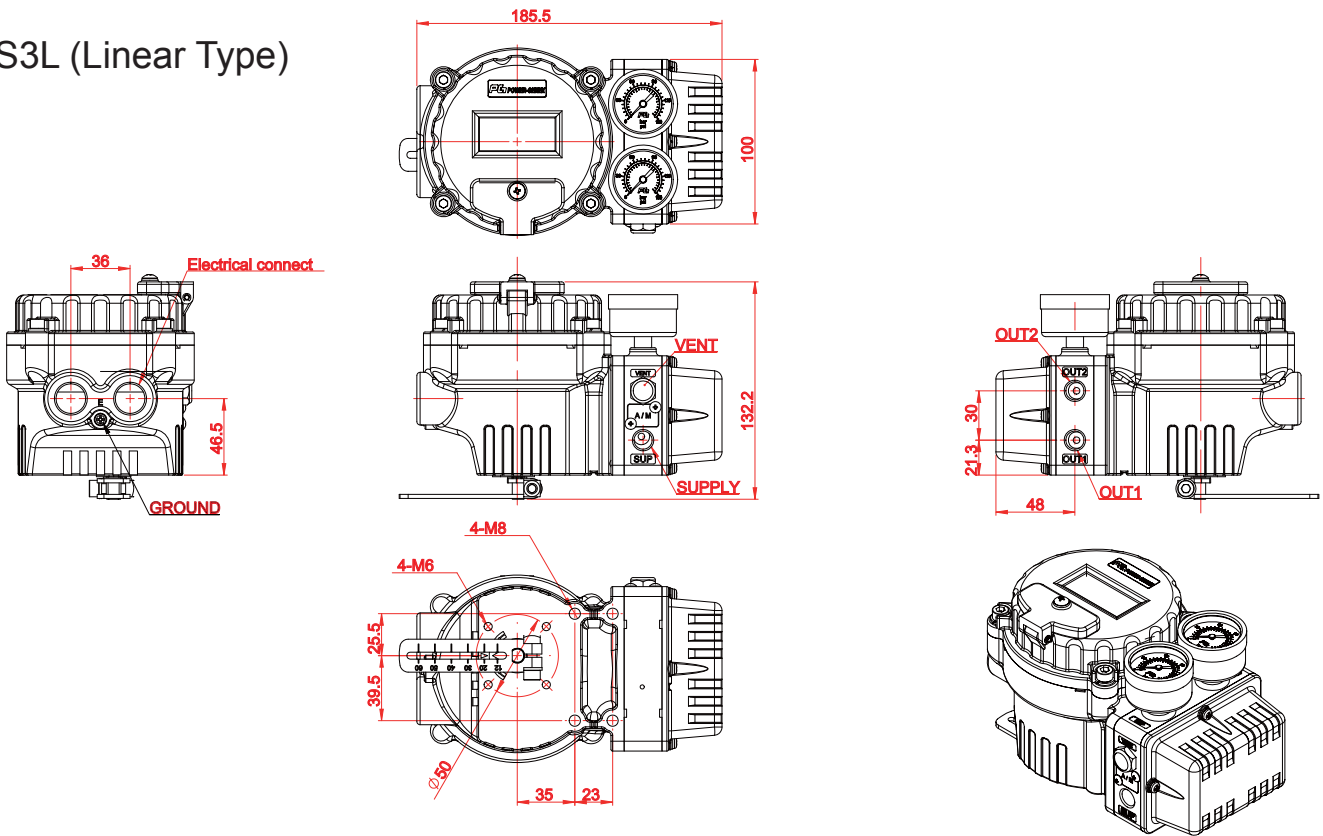
SS3 Actuator Operation Protection Class Feedback Lever Pressure Gauges By-pass Position Feedback Communication Connection Threads Mounting Bracket Feedback Pin Guide Lever Set

Description	Code
Actuator Operation :	L: Linear type R: Rotary type
Protection Class :	F : Flameproof (IECEX Ex d IIC T6, ATEX Eex d IIC T6) K : Flameproof (KC Ex d IIC T6)
Feedback Lever: - Linear Type	A: Stroke (5 ~ 30mm) B: Stroke (5 ~ 70mm) C: Stroke (5 ~ 130mm) D: Stroke (80 ~ 200mm)
- Rotary Type	F: Fork lever N: Namur shaft (direct mounting)
Gauge Block:	0: Not mounted 1: 6 bar (90 psi) 2: 10 bar (150 psi)
By-pass :	N: None Y: Yes (auto / manual screw)

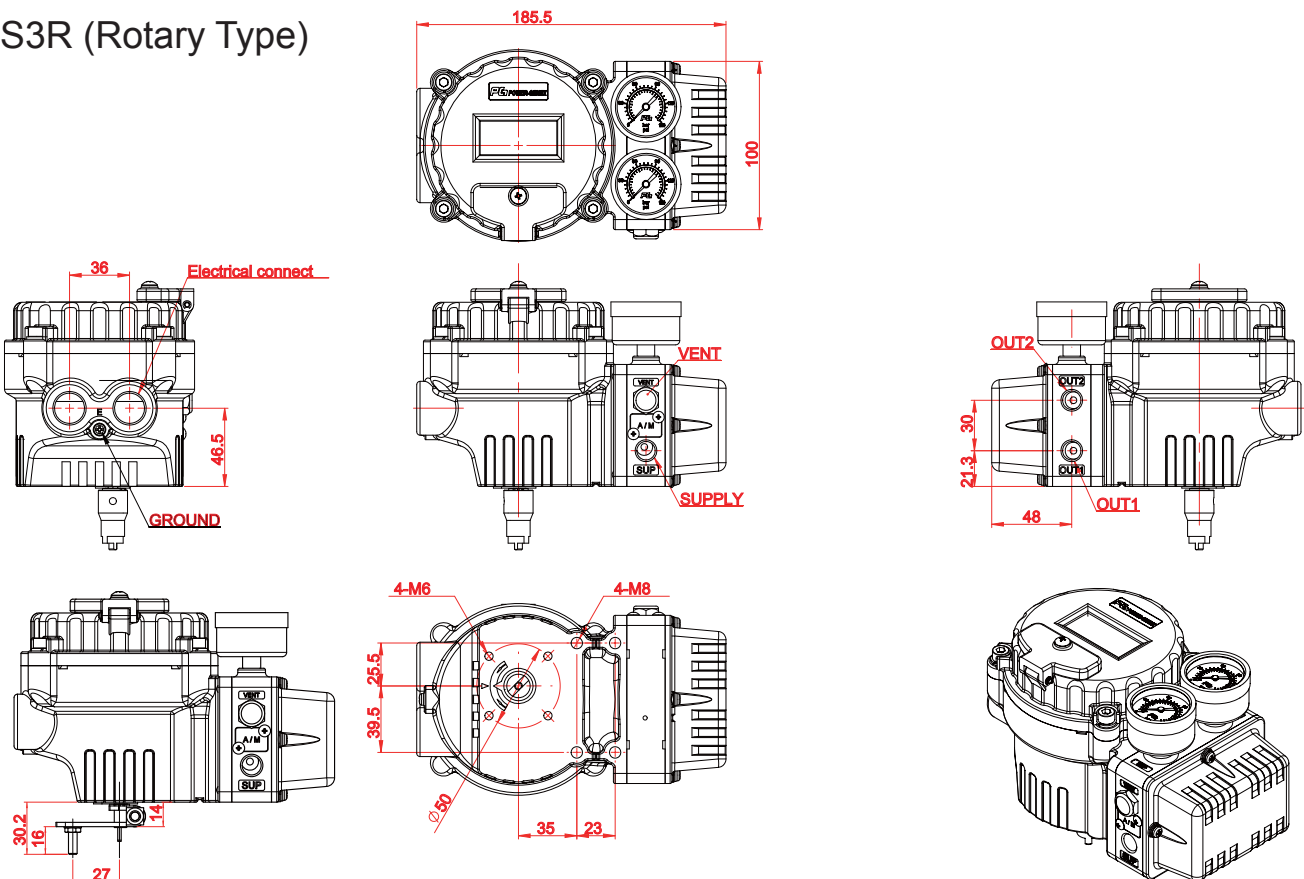
Description	Code
Position Feedback:	N : None O : Position transmitter (4 ~ 20mA output signal) L : 2 x alarm limit S : 2 x micro switch (SPDT) M: O+L Q: O+S
Communication:	N: None H: HART communication P: Profibus communication
Connection Threads: (pneumatic – electrical)	3: Rc 1/4 – G1/2 (standard) 4: NPT 1/4 – NPT 1/2 5: Rc 1/4 – M20 x 1.5
Mounting bracket:	N: None L: IEC 60534-6-1 (for SS3L) R: VDI/VDE 3845 (IEC 60534-6-2) (for SS3R)
Feedback Pin Guide Lever Set: (only for linear type SS3L)	0: Not included 1: Included

Dimensions

- SS3L (Linear Type)



- SS3R (Rotary Type)



< Fork Lever Type >



Smartest valve control device meeting a dynamic performance and a precise setting with a piezoelectric technology and an optimized auto-calibration program

Features

- ▶ Auto-Calibration for optimum conditions
- ▶ Precise control performance and high dynamic response
- ▶ Easy operation with four-key pads and full text graphical LCD
- ▶ Single and double acting
- ▶ Low air consumption due to piezo electric microvalve
- ▶ Pressure regulator built-in to eliminate variations in supply air pressure
- ▶ Problem-free characteristics on a small actuator
- ▶ High resistance against shock and vibration
- ▶ Mounting on linear actuators according to IEC 534

Options

- ▶ Position transmitter (4...20mA output signal)
- ▶ 2 x alarm limit (Min., Max.)
- ▶ Explosion proof type (KC Ex d IIB+H₂ T6 IP66)
- ▶ HART communication (FSK)

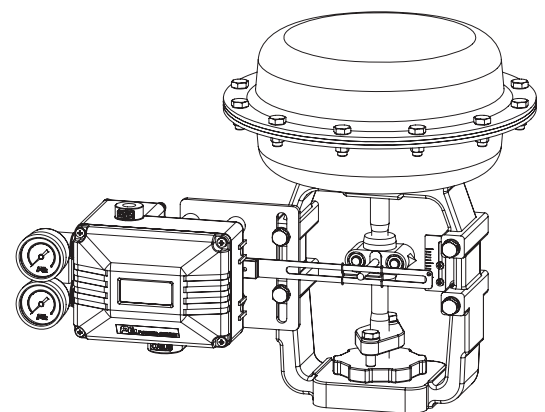


Specifications

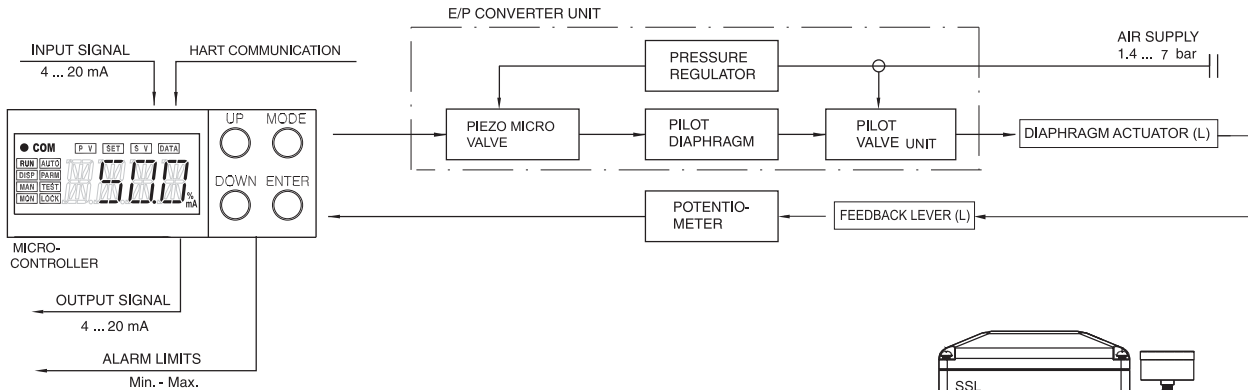
Input Signal	4 - 20 mA @ 24 VDC
Voltage Drop	8.5 VDC @ 20 mA (425 Ω)
Min. / Max. Current	3.6 mA / 50 mA
Required Load Voltage (≅ Ω @ 20mA)	Without HART : 8.5V (≅425 Ω) With HART : 9.2V (≅460 Ω)
Air Supply Pressure	1.4 - 7.0 bar (20 - 100 psi) Filtered compressed dry and non-oiled air
Output Pressure	0 - 100% supply air pressure / single or double action
Shut-off Value	Range 0 - 5% of position signal
Air Capacity	6.6 kg/h = 5.4N _m ³ /h=3 scfm @ supply air of 1.4 bar (20 psi)
Air Consumption	< 0.04 kg/h
Humidity Limits	< 90% RH, non-condensing
Stroke	5 - 80mm (Max. up to 150mm)
Adjustable Speed	1 - 1000 (lowest 1, highest 1000)
LCD Indication	4-digit LCD indicator
Scan Time	2 ms
Valve Action	Position 0 - 100% / direct action (DA) / reverse action (RA)
Characteristic Curve	Linear, E.Q.% (1:25 or 1:50), Quick open Linearity <= 0.3% / sensitivity <= 0.2% / hysteresis <= 0.2%
Operating Temperature	-20 - +70 °C
Protection Class	IP66, flameproof (KC Ex d IIB+H ₂ T6 IP66)
Body Material	Aluminum die-cast
Pneumatic Connections	Rc 1/4 or 1/4 NPT
Electrical Connections	2 x G 1/2 or 1/2 NPT
Weight	2.5 kg



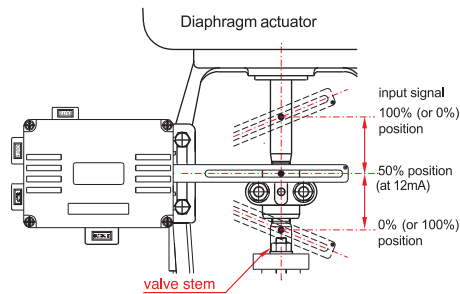
Explosion proof Type (Exd)



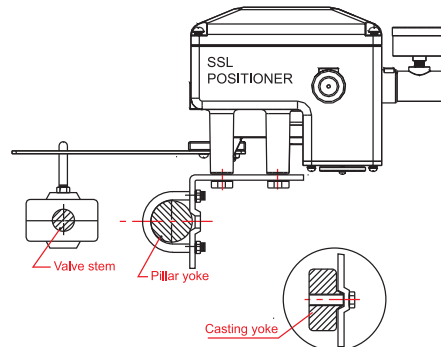
Principle of Operation



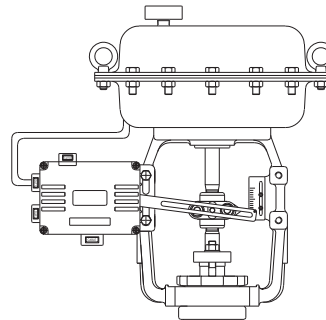
Mounting



Feedback Lever Installation



Mounting to Linear Actuator to IEC 534

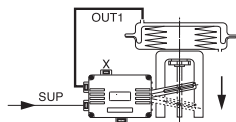


General Mounting to Linear Actuator

Air Connections

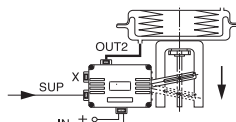
Direct Acting(DA)

As the input signal increases,
Valve stem moves downwards
Actuator : DA



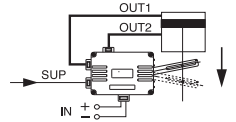
OUT2 must be plugged

As the input signal increases,
Valve stem moves downwards
Actuator : DA



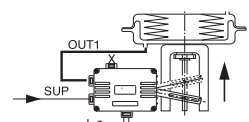
OUT1 must be plugged

As the input signal increases,
Valve stem moves downwards



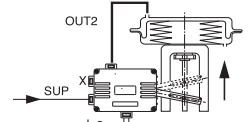
Reverse Acting(RA)

As the input signal increases,
Valve stem moves upwards
Actuator : RA



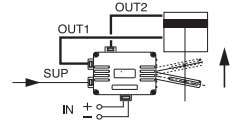
OUT2 must be plugged

As the input signal increases,
Valve stem moves upwards
Actuator : RA

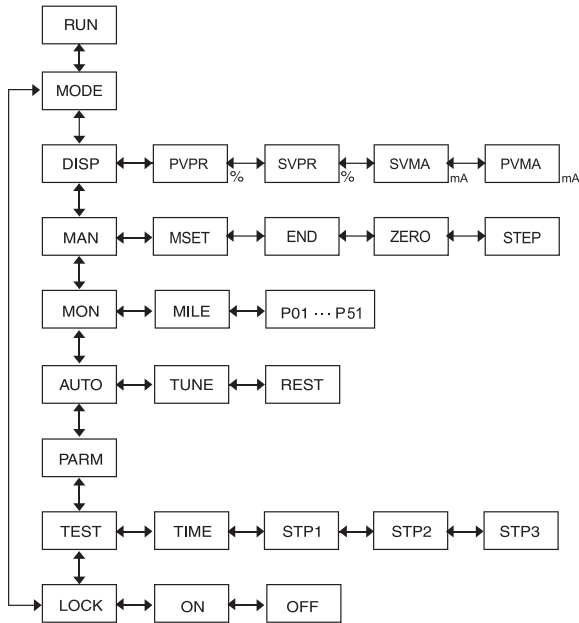


OUT1 must be plugged

As the input signal increases,
Valve stem moves upwards



Parameters Diagram



: Shows the operating situation of the positioner

: Changes the parameters

: Decides LCD display mode either mA or %

: Converts to Manual Mode

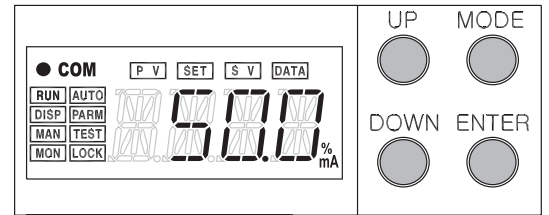
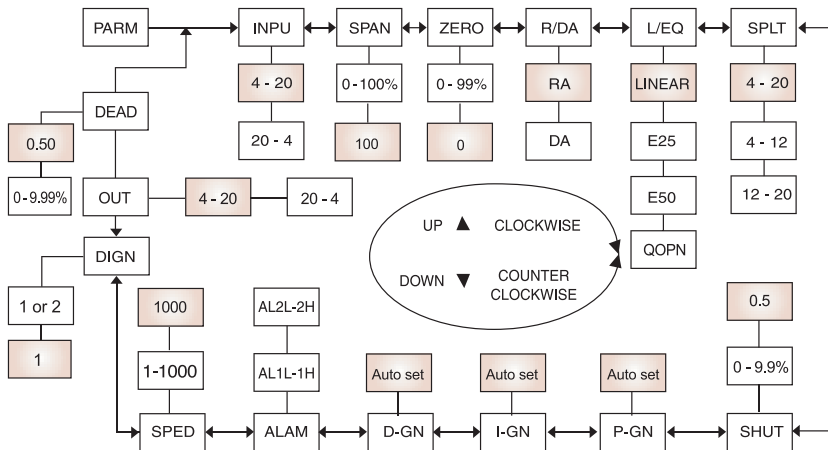
: Shows the selected parameters and the total valve runtime

: Performs auto-calibration and resets all programmed values

: See the table below

: Tests in process of 2-step, 4-step, or 10... 100%

: Locks the set values



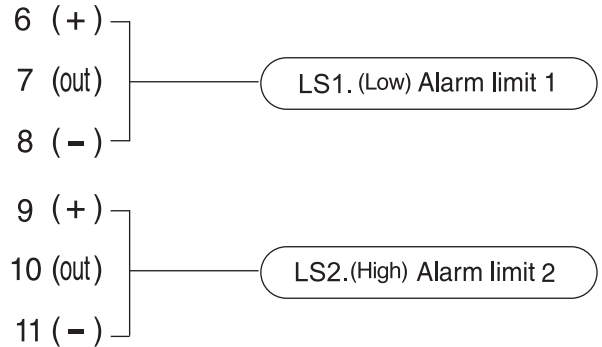
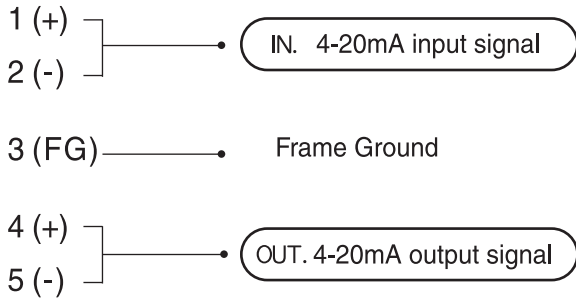
LCD Display

● COM : Hart Communication (FSK)

Initial Parameter Values

Parameters	Descriptions	Functions	Initial value
INPU	Input signal	4 - 20mA or 20 - 4mA	4 - 20 mA
SPAN	Span range	0 - 100% span adjustment	100 %
ZERO	Zero-up	Position Zero up and down 0 - 99%	0 %
R / DA	RA / DA	Reverse or direct acting	RA
L / E.Q / QOPN	Linear / E.Q% / Quick open	Linear, E.Q%(1:25 or 1:50) , Quick open	Linear
SPLT	Split range	4 - 12mA or 12 - 20mA	4 - 20 mA
SHUT	Shut-off	Valve shut off at 0 - 9,9 %	0.5 %
P-GN	P-Gain	Proportional gain value	Auto setting
I-GN	I-Gain	Integral gain value	Auto setting
D-GN	D-Gain	Differential gain value	Auto setting
ALAM	Alarm limit low, high	AL1L / AL1H, AL2L / AL2H	Low (0 - 10%), High (90 - 100%)
SPED	Speed control	1 - 1000	1000
DIGN	Display digit	Move to one or two decimal places	1
OUT	Output signal	4 - 20mA or 20 - 4mA	4 - 20 mA
DEAD	Dead zone	0 - 9.99%	0.5%

Electrical Connections

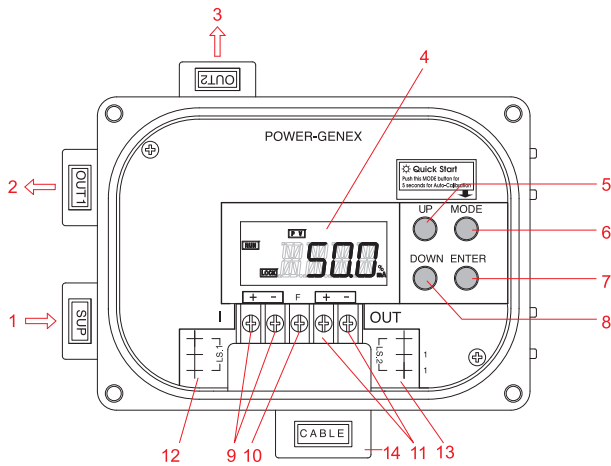


Auto-Calibration

- ① Push MODE button for more than 5 seconds, and Auto Calibration will start.
- ② The time required for this process may be different according to the actuator volume, but it generally takes about 2~3 minutes.

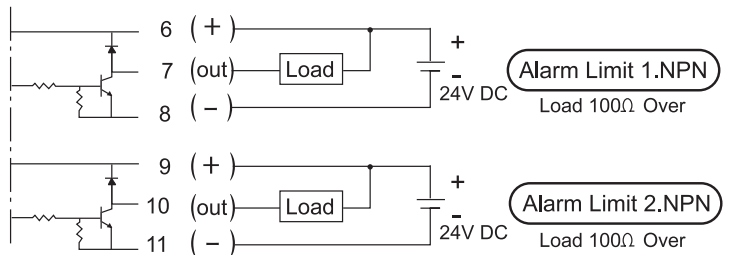
Checking Ambient Temperature

Push ENTER button, and the ambient temperature will be shown on the LCD.

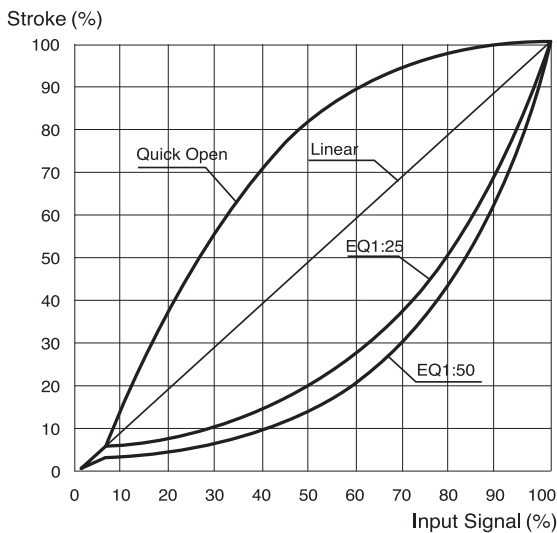


- | | |
|-----------------|-----------------------------|
| 1 : Air supply | 9 : Input signal (+,-) |
| 2 : Output 1 | 10 : Frame ground |
| 3 : Output 2 | 11 : Output signal (+ -) |
| 4 : Display LCD | 12 : Alarm limit 1 |
| 5 : Up key | 13 : Alarm limit 2 |
| 6 : Mode key | 14 : Electrical connections |
| 7 : Enter key | |
| 8 : Down key | |

Measuring Alarm Limits



Characteristic Curves



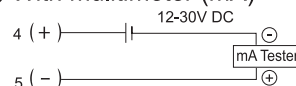
Measuring 4-20mA Output Signal

Note that the input signal should be provided for measurement of output signal.

- ① With mA loop calibrator



- ② With multimeter (mA)



ZERO / SPAN of position feedback will be automatically set after Auto Calibration.

How to Order

SSL

Protection Class

Feedback Lever

Pressure Gauge Block

Position Feedback

HART Communication

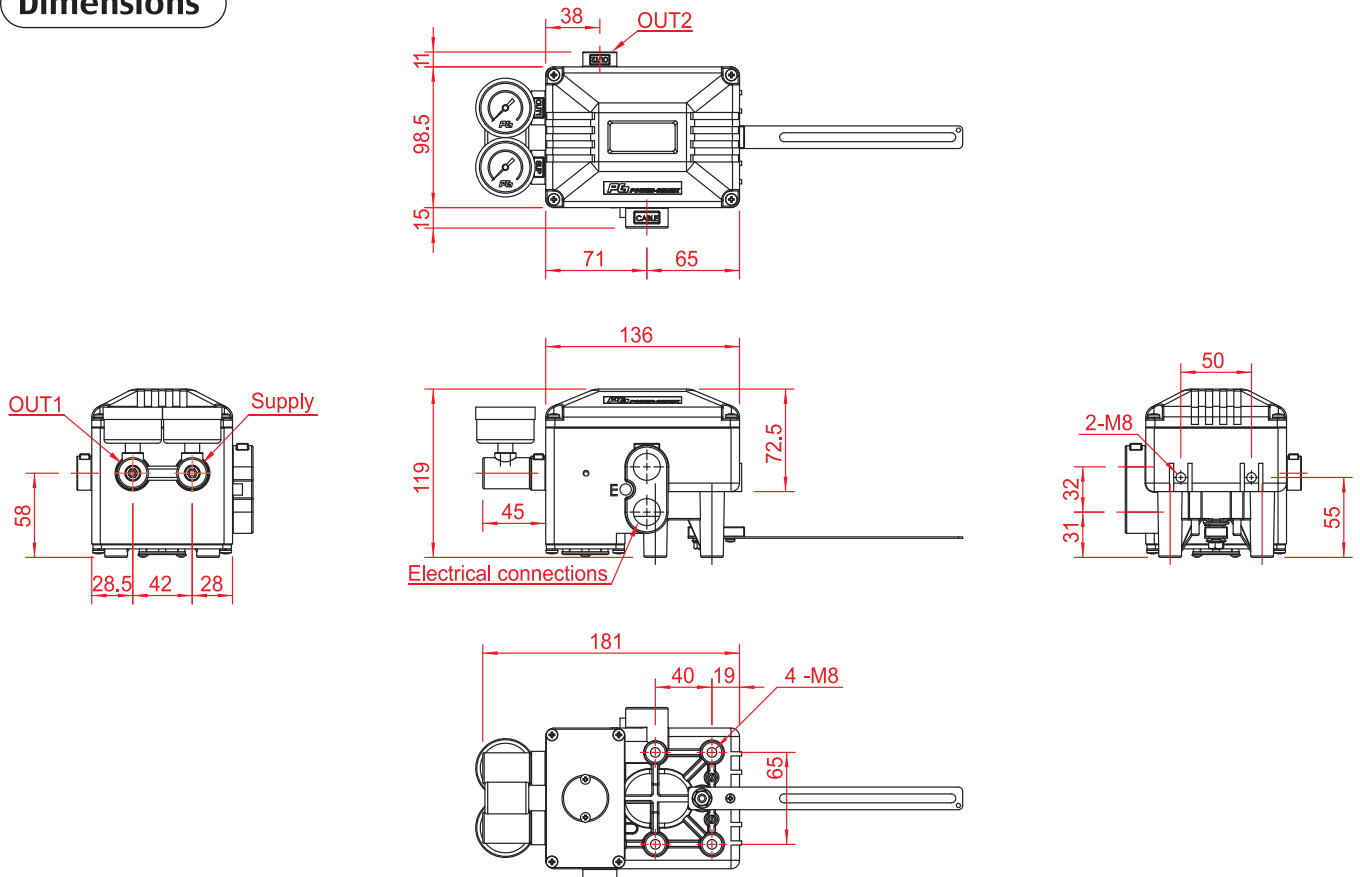
Connection Threads

Mounting Bracket

Description	Code
Protection Class :	F : Flameproof (KC Ex d IIB+H ₂ T6 IP66) W : Weatherproof to IP 66
Feedback Lever	A : Stroke (5 ~ 40mm) B : Stroke (5 ~ 80mm) C : Stroke (up to 150mm)
Pressure Gauge Block :	N : None 1 : 6 bar (90 psi) 2 : 10 bar (150 psi)
Position Feedback :	N : None O : Position transmitter (4 ~ 20 mA output signal) L : 2 × alarm limit M : O + L

Description	Code
HART Communication :	N : None H : HART Comm
Connection Threads: (pneumatic - electrical)	3 : Rc 1/4 - G 1/2 (standard) 4 : NPT 1/4 - NPT 1/2 5 : Rc 1/4 - M20 x 1.5
Mounting Bracket :	N : None L : DIN / IEC 534

Dimensions



Note : All specifications and characteristics are the same with SSL.

How to Order

RSSL

Protection Class

Feedback Lever

Pressure Gauge

Position Feedback

Connection Threads

HART Comm.

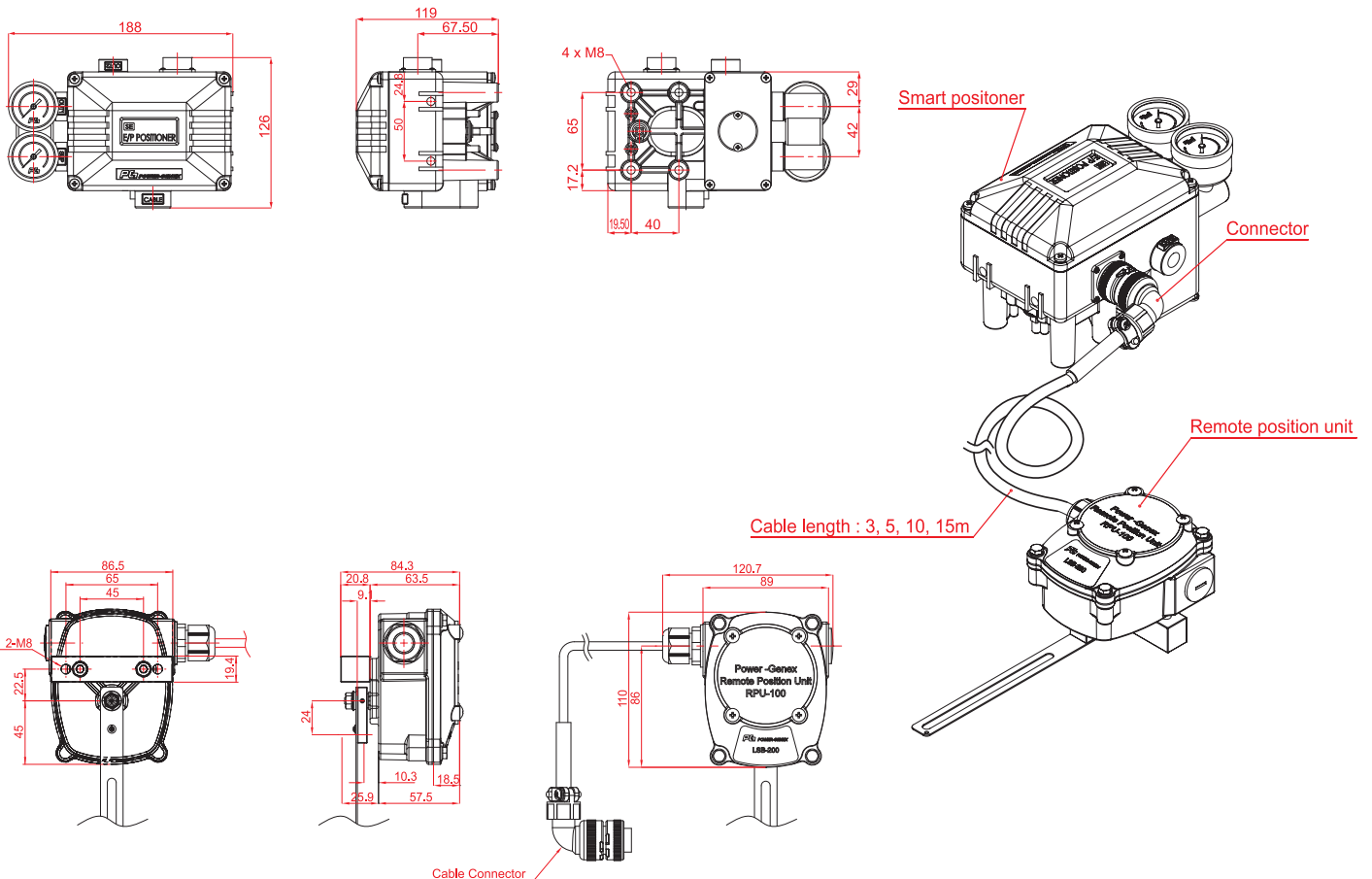
Cable Length

Description	Code
Protection Class :	I : Intrinsic safety (Exia IIC T6) W : Weatherproof to IP 66
Feedback Lever :	A : Stroke (10 ~ 40mm) B : Stroke (10 ~ 80mm) C : Stroke (80 ~ 150mm)
Pressure Gauge :	1 : 6 bar (90 psi) 2 : 10 bar (150 psi)

Description	Code
Position Feedback :	N : None O : Position transmitter (4 ~ 20 mA output signal)
Connection Threads : (pneumatic - electrical)	3 : Rc 1/4 - G 1/2 4 : NPT 1/4 - NPT 1/2 5 : Rc 1/4 - M20 x 1.5
HART Communication :	N : None H : HART Communication
Cable Length :	3, 5, 10, 15m Other : On request

Ex) RSSL-WA103H-3 (weatherproof, feedback lever 10 - 40mm stroke, 6 bar pressure gauges, position transmitter, Rc 1/4 - G 1/2, HART communication, cable 3m)

Dimensions





Smartest valve control device meeting a dynamic performance and a precise setting with a piezoelectric technology and an optimized auto-calibration program

Features

- ▶ Auto-Calibration for optimum conditions
- ▶ Precise control performance and high dynamic response
- ▶ Easy operation with four-key pads and full text graphical LCD
- ▶ Single and double acting
- ▶ Low air consumption due to piezo electric microvalve
- ▶ Pressure regulator built-in to eliminate variations in supply air pressure
- ▶ Problem-free characteristics on a small actuator
- ▶ High resistance against shock and vibration
- ▶ Mounting on rotary actuators according to VDI/VDE 3845

Options

- ▶ Position transmitter (4...20mA output signal)
- ▶ 2 x alarm limit (Min., Max.)
- ▶ Explosion proof type (KC Ex d IIB+H₂ T6 IP66)
- ▶ HART communication (FSK)

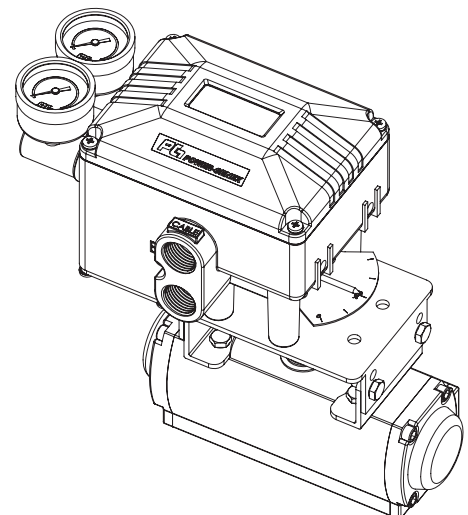


Specifications

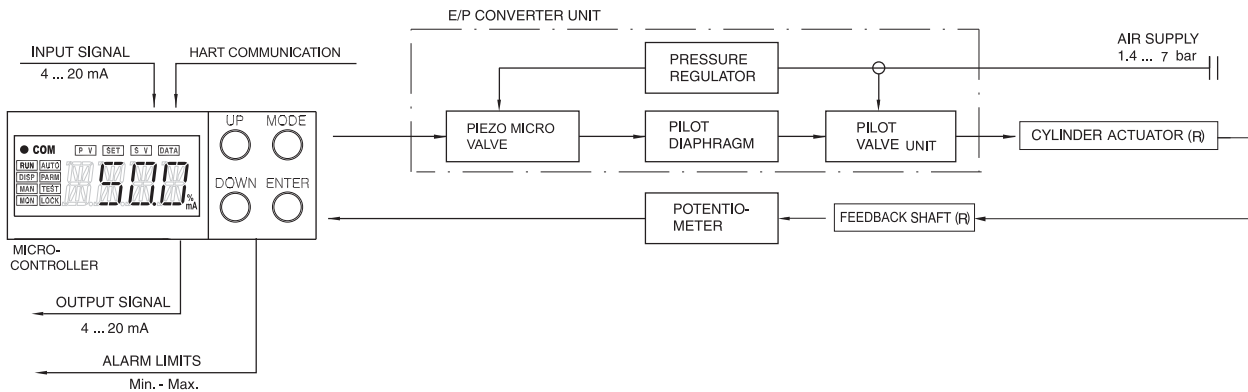
Input Signal	4 - 20 mA @ 24 VDC
Voltage Drop	8.5 VDC @ 20 mA (425 Ω)
Min. / Max. Current	3.6 mA / 50 mA
Required Load Voltage (≅ Ω @ 20mA)	Without HART : 8.5V (≅425 Ω) With HART : 9.2V (≅460 Ω)
Air Supply Pressure	1.4 - 7.0 bar (20 - 100 psi) Filtered compressed dry and non-oiled air
Output Pressure	0 - 100% supply air pressure / single or double action
Shut-off Value	Range 0 - 5% of position signal
Air Capacity	6.6 kg/h = 5.4N _m ³ /h=3 scfm @ supply air of 1.4 bar (20 psi)
Air Consumption	< 0.04 kg/h
Humidity Limits	< 90% RH, non-condensing
Stroke / Angle	40 - 90° (max.up to 100°)
Adjustable Speed	1 - 1000 (lowest 1, highest 1000)
LCD Indication	4-digit LCD indicator
Scan Time	2ms
Valve Action	Position 0 - 100% / direct action (DA) / reverse action (RA)
Characteristic curve	Linear, E.Q. % (1:25 or 1:50), Quick open Linearity <= 0.3% / sensitivity <= 0.2% / hysteresis <= 0.2%
Operating Temperature	-20 - +70 °C
Protection Class	IP66, flameproof (KC Ex d IIB+H ₂ T6 IP66)
Body Material	Aluminum die-cast
Pneumatic Connections	Rc 1/4 or 1/4 NPT
Electrical Connections	2 x G 1/2 or 1/2 NPT
Weight	2.5 kg



Explosion proof Type (Exd)

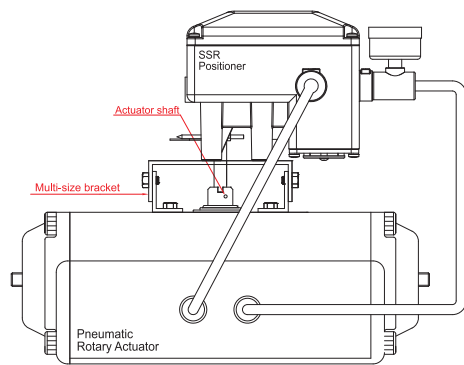


Principle of Operation

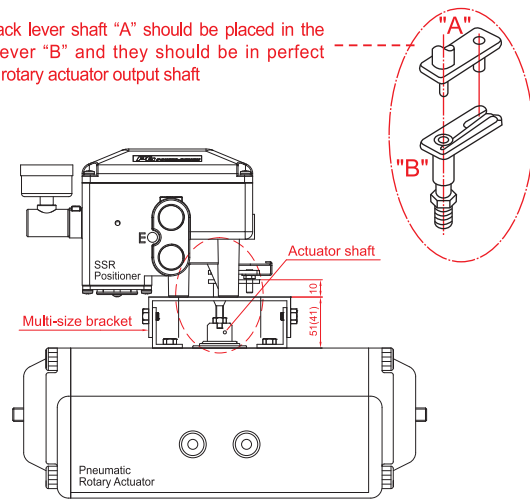


Mounting

Note that feedback lever shaft "A" should be placed in the orifice of fork lever "B" and they should be in perfect alignment with a rotary actuator output shaft



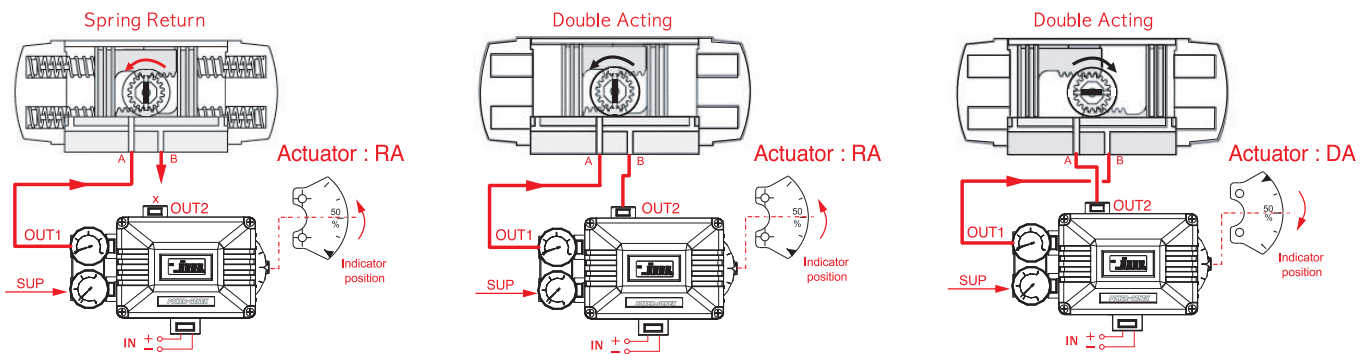
NAMUR Type Mounting



Fork Lever Type Mounting

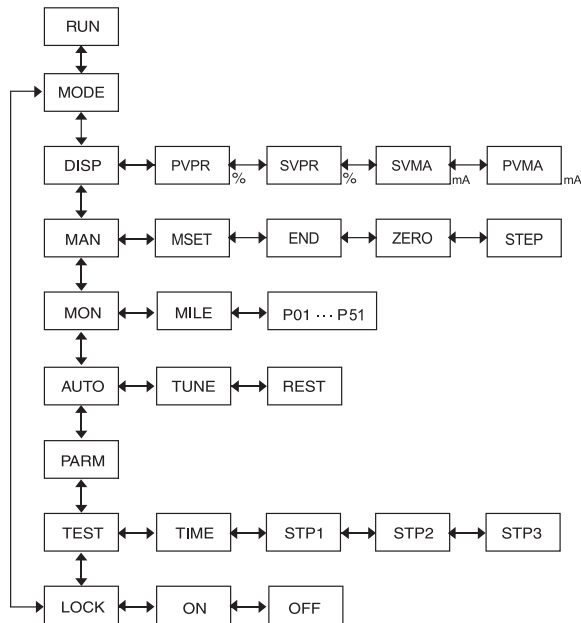
Air Connections

Confirm the rotating direction of the actuator and connect the air lines as below



	Spring Return	Double Acting
Reverse Acting	Out 1 : piped, Out2 : plugged	Out 1 : piped to Actuator port A, Out2 : piped to Actuator port B
Direct Acting	Out 1 : plugged, Out2 : piped	Out 1 : piped to Actuator port B, Out2 : piped to Actuator port A

Parameters Diagram



: Shows the operating situation of the positioner

: Changes the parameters

: Decides LCD display mode either mA or %

: Converts to Manual Mode

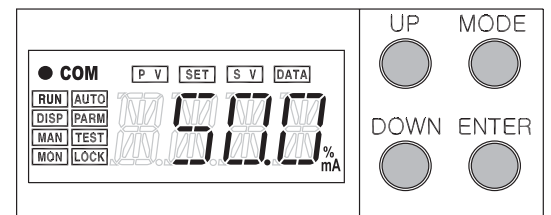
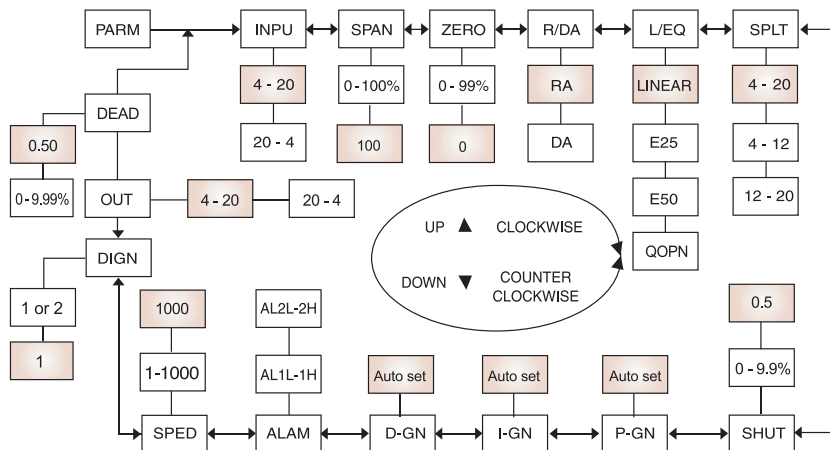
: Shows the selected parameters and the total valve runtime

: Performs auto-calibration and resets all programmed values

: See the table below

: Tests in process of 2-step, 4-step, or 10... 100%

: Locks the set values



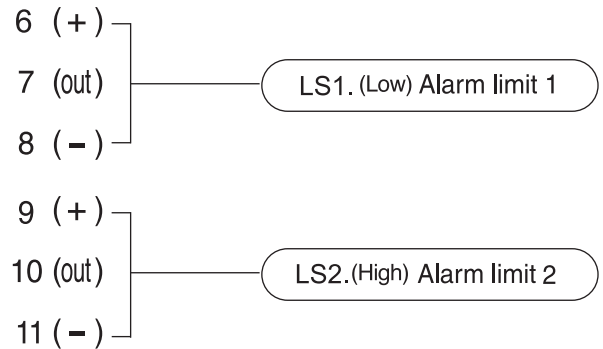
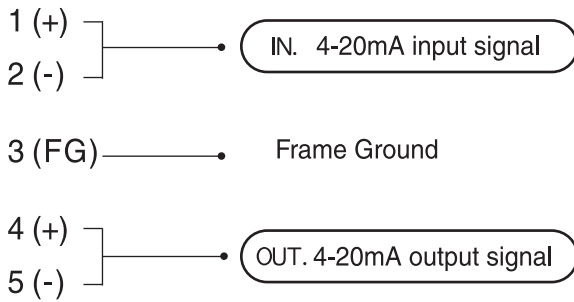
LCD Display

● COM : Hart Communication (FSK)

Initial Parameter Values

Parameters	Descriptions	Functions	Initial value
INPU	Input signal	4 - 20mA or 20 - 4mA	4 - 20 mA
SPAN	Span range	0 - 100% span adjustment	100 %
ZERO	Zero-up	Position Zero up and down 0 - 99%	0 %
R / DA	RA / DA	Reverse or direct acting	RA
L / E.Q / QOPN	Linear / E.Q% / Quick open	Linear, E.Q%(1:25 or 1:50) , Quick open	Linear
SPLT	Split range	4 - 12mA or 12 - 20mA	4 - 20 mA
SHUT	Shut-off	Valve shut off at 0 - 9,9 %	0,5 %
P-GN	P-Gain	Proportional gain value	Auto setting
I-GN	I-Gain	Integral gain value	Auto setting
D-GN	D-Gain	Differential gain value	Auto setting
ALAM	Alarm limit low, high	AL1L / AL1H, AL2L / AL2H	Low (0 - 10%), High (90 - 100%)
SPED	Speed control	1 - 1000	1000
DIGN	Display digit	Move to one or two decimal places	1
OUT	Output signal	4 - 20mA or 20 - 4mA	4 - 20 mA
DEAD	Dead zone	0 - 9,99%	0,5%

Electrical Connections

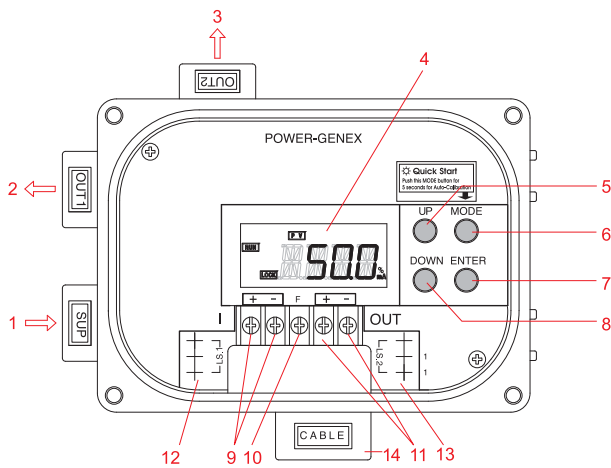


Auto-Calibration

- ① Push MODE button for more than 5 seconds, and Auto Calibration will start.
- ② The time required for this process may be different according to the actuator volume, but it generally takes about 2~3 minutes.

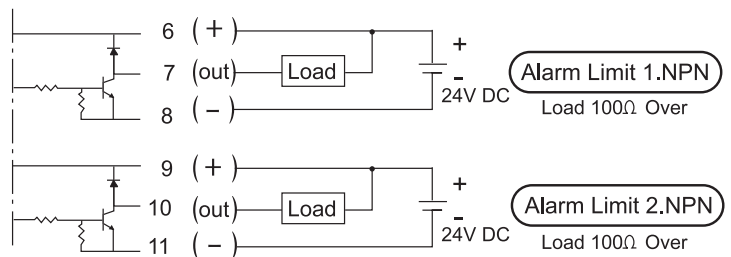
Checking Ambient Temperature

Push ENTER button, and the ambient temperature will be shown on the LCD.

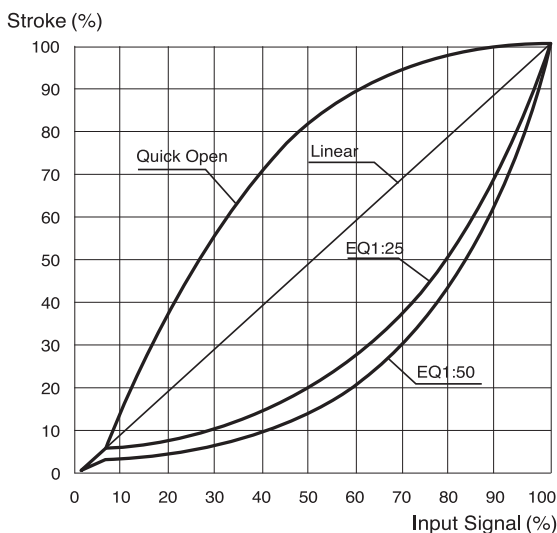


- | | |
|-----------------|-----------------------------|
| 1 : Air supply | 9 : Input signal (+,-) |
| 2 : Output 1 | 10 : Frame ground |
| 3 : Output 2 | 11 : Output signal (+ -) |
| 4 : Display LCD | 12 : Alarm limit 1 |
| 5 : Up key | 13 : Alarm limit 2 |
| 6 : Mode key | 14 : Electrical connections |
| 7 : Enter key | |
| 8 : Down key | |

Measuring Alarm Limits



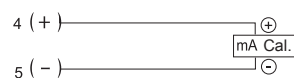
Characteristic Curves



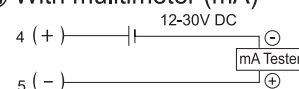
Measuring 4-20mA Output Signal

Note that the input signal should be provided for measurement of output signal.

- ① With mA loop calibrator



- ② With multimeter (mA)



ZERO / SPAN of position feedback will be automatically set after Auto Calibration.

How to Order

SSR

Protection Class

Feedback Lever

Pressure Gauge Block

Position Feedback

HART Communication

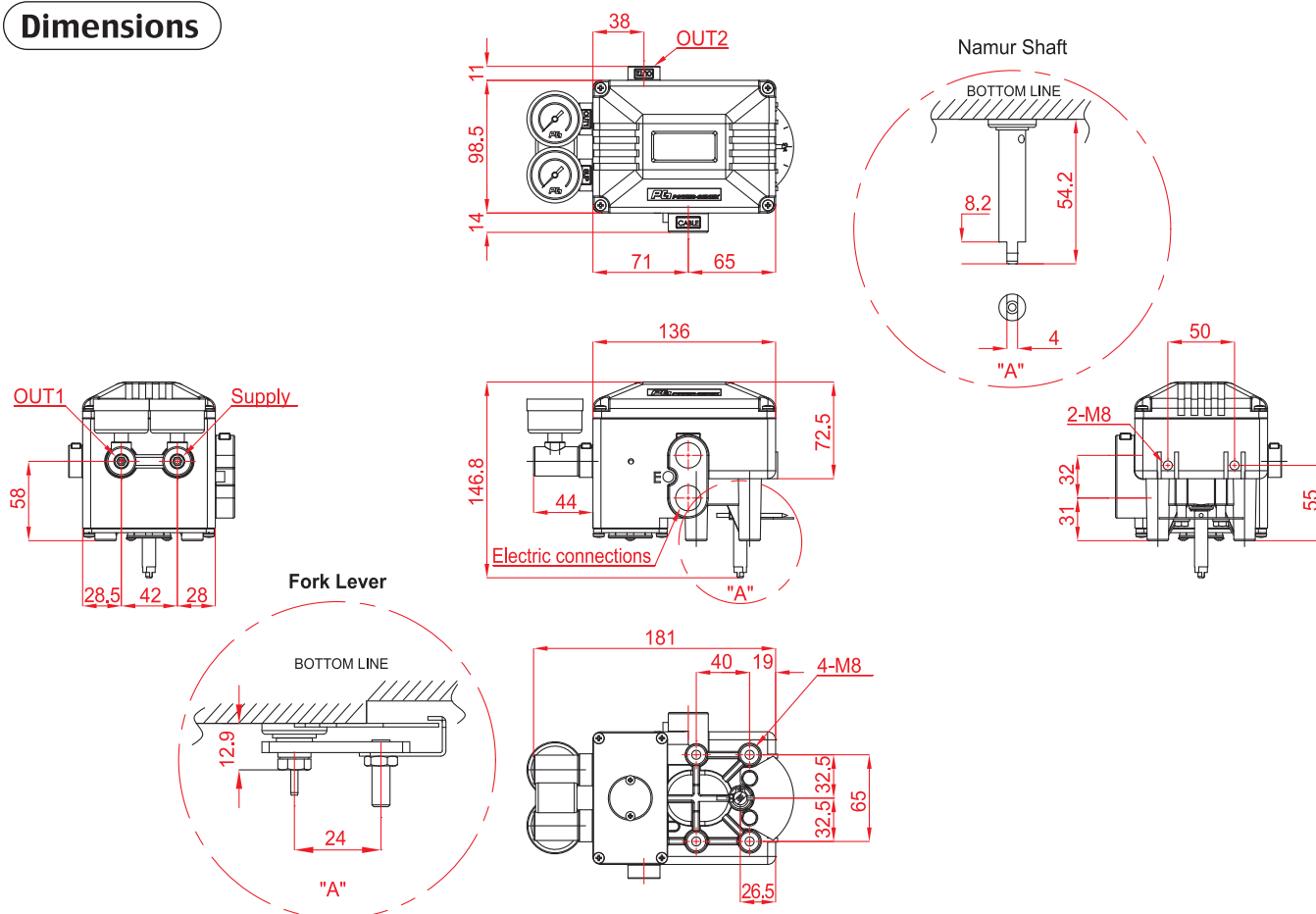
Connection Threads

Mounting Bracket

Description	Code
Protection Class :	F : Flameproof (KC Ex d IIB+H ₂ T6 IP66) W : Weatherproof to IP 66
Feedback Lever	F : Fork lever N : NAMUR shaft (direct mounting)
Pressure Gauge Block :	N : None 1 : 6 bar (90 psi) 2 : 10 bar (150 psi)
Position Feedback :	N : None O : Position transmitter (4 ~ 20 mA output signal) L : 2 × alarm limit M : O + L

Description	Code
HART Communication :	N : None H : HART Comm
Connection Threads: (pneumatic - electrical)	3 : Rc 1/4 - G 1/2 (standard) 4 : NPT 1/4 - NPT 1/2 5 : Rc 1/4 - M20 x 1.5
Mounting Bracket :	N : None R : Multi-size bracket for DIN VDI/DE 3845 (130 × 30 × 50 bracket on request)

Dimensions



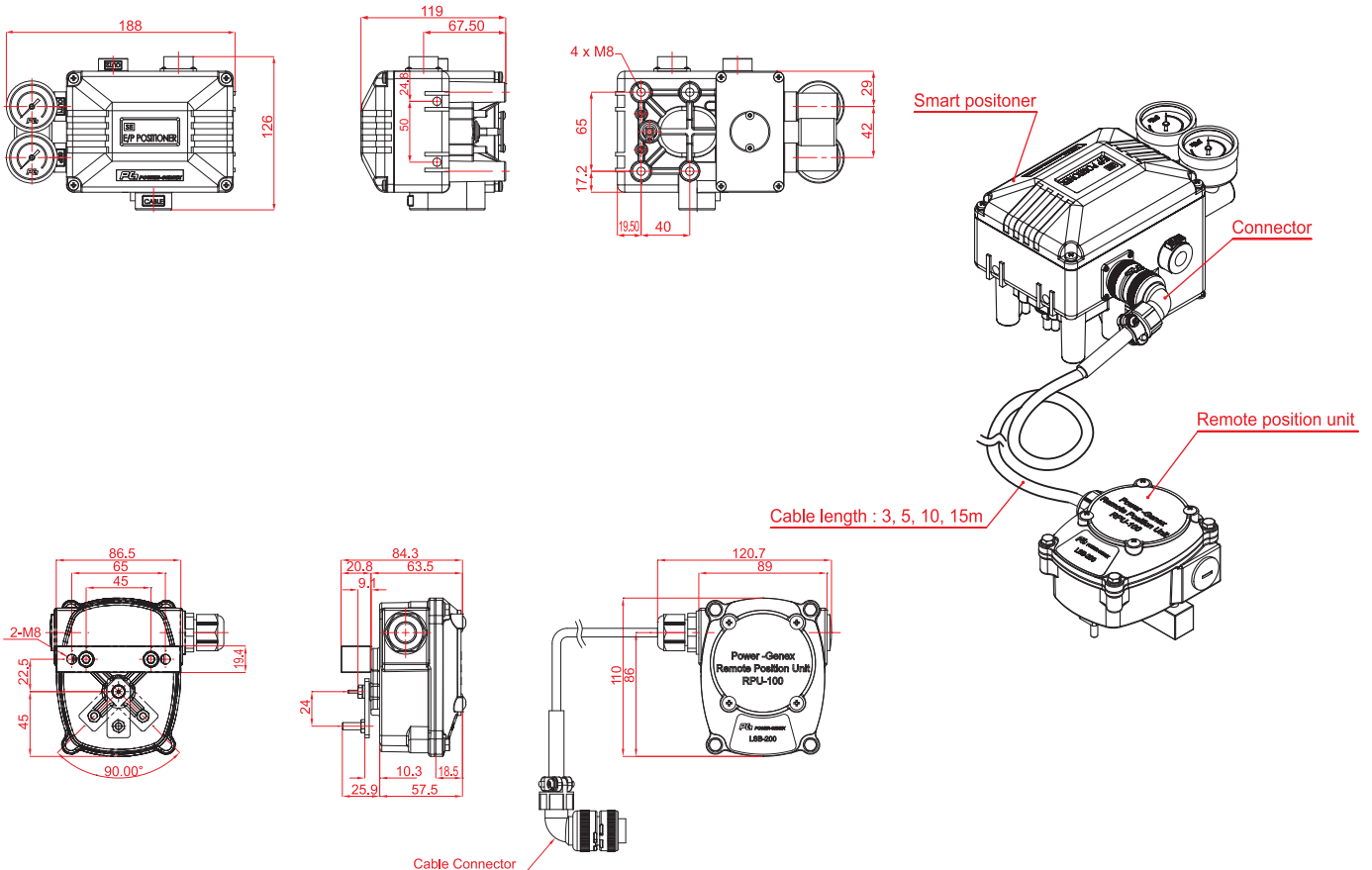
Note : All specifications and characteristics are the same with SSR.

How to Order

RSSR	Protection Class	Feedback Shaft	Pressure Gauge	Position Feedback	Connection Threads	HART Comm.	Cable Length
	Description Protection Class : Feedback Shaft : Pressure Gauge : Position Feedback :	Code I : Intrinsic safety (Exia IIC T6) W : Weatherproof to IP 66 F : Fork lever type 1 : 6 bar (90 psi) 2 : 10 bar (150 psi) N : None O : Position transmitter (4 ~ 20 mA output signal)	Description Connection Threads : (pneumatic - electrical) HART Communication : Cable Length :	Code 3 : Rc 1/4 - G 1/2 4 : NPT 1/4 - NPT 1/2 5 : Rc 1/4 - M20 x 1.5 N : None H : HART Communication 3, 5, 10, 15m Other : On request			

Ex) RSSR-WA103H-3 (weatherproof, fork lever type, 6 bar pressure gauges, position transmitter, Rc 1/4 - G 1/2, HART communication, cable 3m)

Dimensions





Reliable valve control device guaranteeing optimum span and zero settings by smart auto-calibration function

Features

- ▶ Auto-Calibration for optimum zero and span setting
- ▶ Simple and easy to set
- ▶ Precise control performance and high dynamic response
- ▶ Pressure regulator built in to eliminate variations in supply air pressure
- ▶ Low air consumption due to piezo electric microvalve
- ▶ Input / output signal isolated
- ▶ Automatic detection for DA(direct acting) or RA(reverse acting)
- ▶ Single and double acting available
- ▶ No hunting on the small actuators
- ▶ 1/2 split range available
- ▶ High resistance against shock and vibration



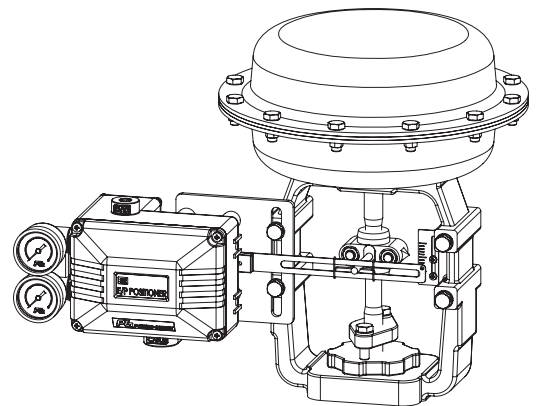
Options

- ▶ Position transmitter (4...20mA output signal)
- ▶ 2 x alarm limit (open, close)
- ▶ Explosion proof type (KC Ex d IIB+H₂ T6 IP66)

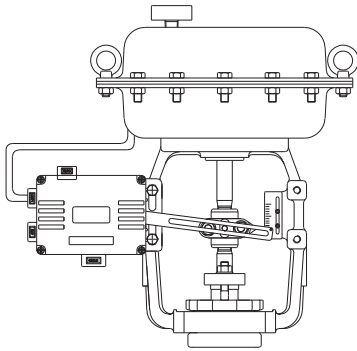
Specifications

Input Signal	4 - 20 mA DC
Voltage Supply Min. /Max.	8.5V DC / 30V DC (425 ohm)
Power Consumption	30.8 mW @ 4 mA / 170 mW @ 20 mA
Characteristic	Linear (Note)
Stroke	5 - 65 mm (max. up to 150 mm)
Air Supply Pressure	1.5 - 7.0 bar (20 - 100 psi) Pressurized air or allowed gas, free of water, oil, and dust
Air Capacity	6.6 kg/h = 5.4 m ³ N/h = 3 scfm @ supply air of 1.4bar (20psi)
Air Consumption	< 0.04 kg / h
Output Pressure Range	0 - 100% of supply air pressure
Linearity	Within ± 0.5 %
Hysteresis	Within 0.2 %
Sensitivity	Within ± 0.2 %
Operating Temperature	-20 - +80 °C
Pneumatic Connections	Rc 1/4 or 1/4 NPT
Electrical Connections	G 1/2 or 1/2 NPT
Protection Class	IP66, flameproof (KC Ex d IIB+H ₂ T6 IP66)
Body Material	Aluminum die-cast
Weight	2.5 kg

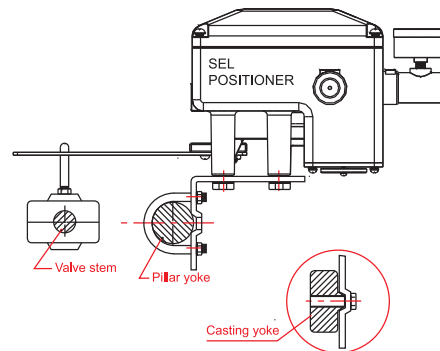
Note : Equal percentage or Quick-open option is available.
Please contact for more details



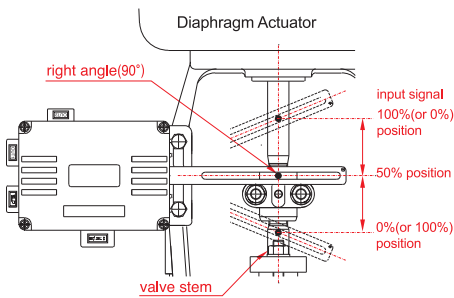
Mounting



General Mounting to Linear Actuator



Mounting to Linear Actuator to IEC 534

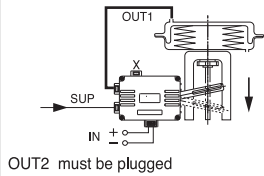


Feedback Lever Installation

Air Connections

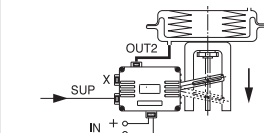
Direct Acting (DA)

As the input signal increases,
Valve stem moves downwards
Actuator : DA
Switch position : DA



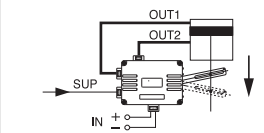
OUT2 must be plugged

As the input signal increases,
Valve stem moves downwards
Actuator : DA
Switch position : DA



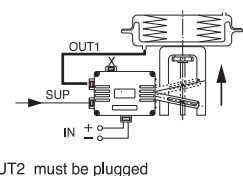
OUT1 must be plugged

As the input signal increases,
Valve stem moves downwards
Switch position : DA



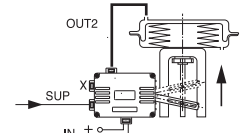
Reverse Acting (RA)

As the input signal increases,
Valve stem moves upwards
Actuator : RA
Switch position : RA



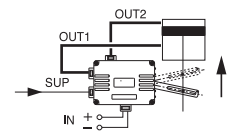
OUT2 must be plugged

As the input signal increases,
Valve stem moves upwards
Actuator : RA
Switch position : RA

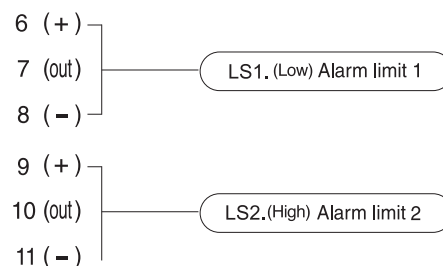
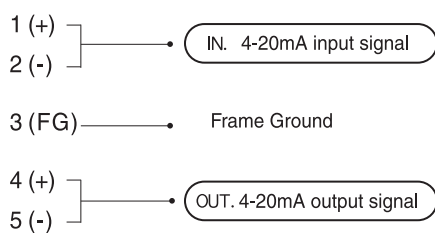


OUT1 must be plugged

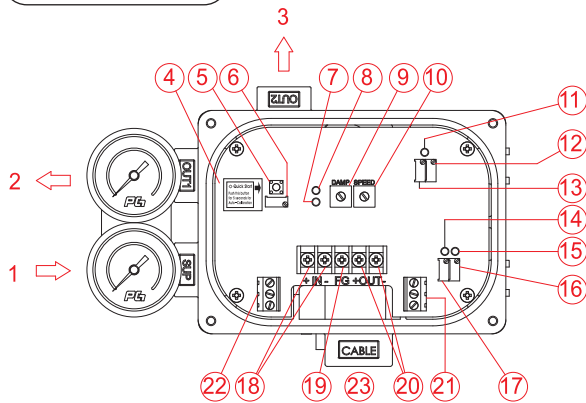
As the input signal increases,
Valve stem moves upwards
Switch position : RA



Electrical Connections



Board View



① Supply air	⑬ Feedback zero
② OUT 1	⑭ Limit switch lamp 2
③ OUT 2	⑮ Limit switch lamp 2
④ Board cover	⑯ Limit switch 2 adjusting screw
⑤ Auto-setting button	⑰ Limit switch 1 adjusting screw
⑥ Span adjusting screw	⑱ Input signal +, -
⑦ DA lamp	⑲ Frame ground
⑧ RA lamp	⑳ Output signal +, -
⑨ Damping screw	㉑ Limit switch 2 terminal
⑩ Speed adjusting screw	㉒ Limit switch 1 terminal
⑪ Feedback lamp	㉓ Electrical connections
⑫ Feedback span	

Auto-Calibration

Push Auto-Setting button ⑤ for 5 seconds for auto-calibration. Generally it will take 2 - 3 minutes until the process is finished but it can take more time according to the actuator volume.

Measuring 4-20mA Output Signal

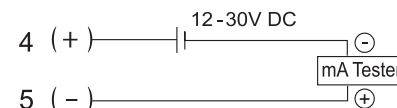
1) Specifications

Output Signal	4 - 20 mA, 2 - wire
Power Supply Rating	15 - 30V DC
Recommended Power Supply	24V DC
Operating Temperature	-20 - +70 °C
Input Impedance	0 - 430 Ω
Characteristic	Linear
Linearity	± 1.0 % F.S.
Hysteresis	0.5 % F.S.
Repeatability	± 0.5 % F.S.
Adjustment	Zero and span
Rotary Angle	50...90° (max. 100°)

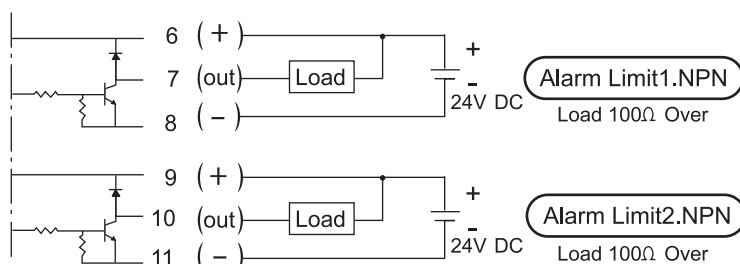
2) With mA Loop Calibrator



3) With Multi-Meter



Setting Alarm Limits



How to Order

SEL —

Protection Class

Feedback Lever

Pressure Gauge (SUP. OUT)

Position Feedback

Connection Threads

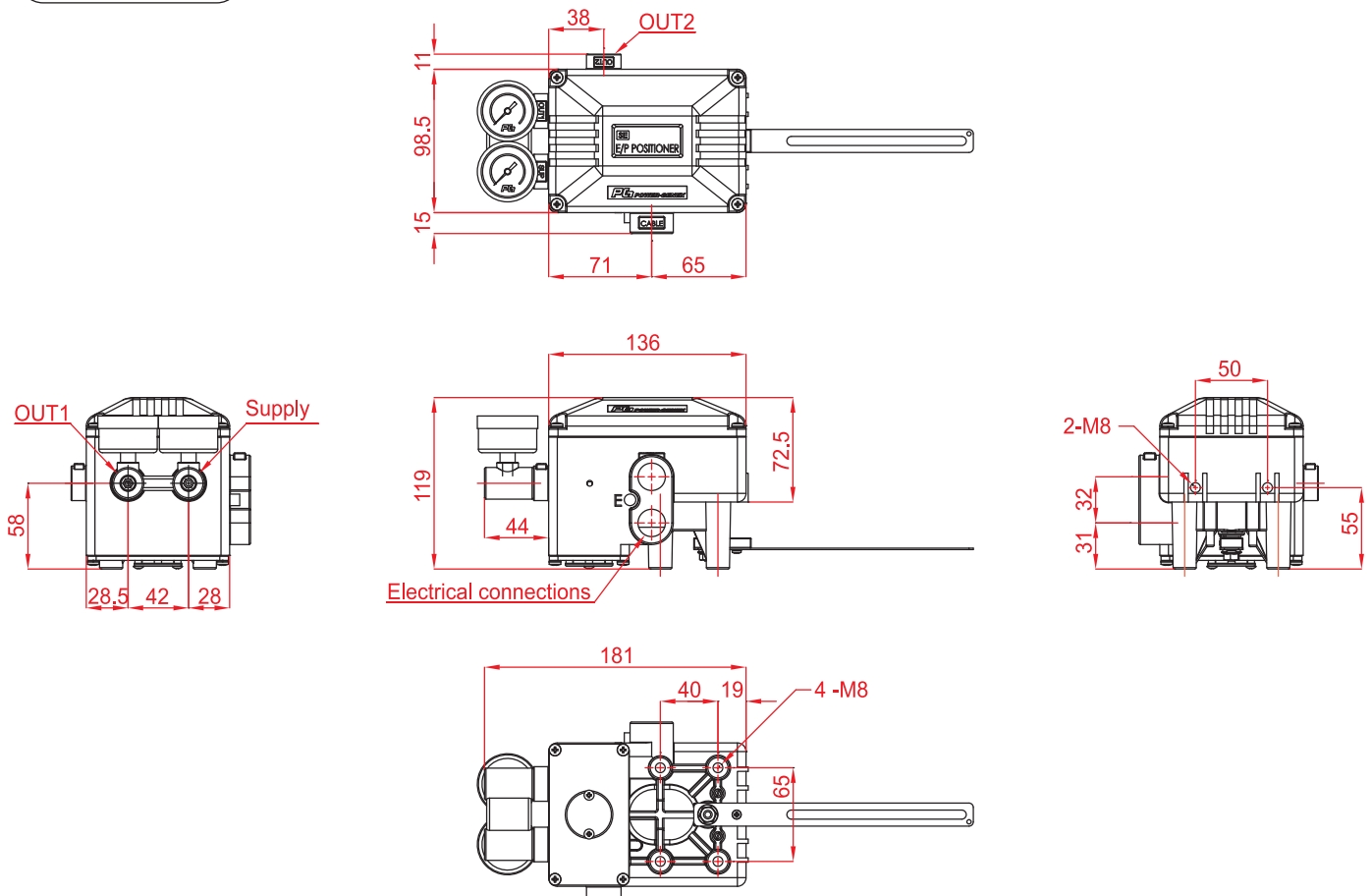
Mounting Bracket

Description	Code
Protection Class :	F : Flameproof (KC Ex d IIB+H ₂ T6 IP66) W : Weatherproof to IP66
Feedback Lever :	A : Stroke (5 ~ 65 mm) B : Stroke (10 ~ 85 mm) C : Stroke (up to 150 mm)
Pressure Gauge :	1 : 6 bar (90 psi) 2 : 10 bar (150 psi)

Description	Code
Position Feedback :	N : None (standard) O : Position transmitter (4~20mA output signal) L : 2 x alarm limit M : O + L
Connection Threads: (pneumatic - electrical)	3 : Rc 1/4 - G 1/2 (standard) 4 : NPT 1/4 - NPT 1/2 5 : Rc 1/4 - M20 x 1.5
Mounting Bracket :	N : None L : DIN / IEC 534

Ex) SEL-WA10N (weatherproof, 5 - 65mm stroke, 10 bar pressure gauges, position transmitter)

Dimensions





Reliable valve control device guaranteeing optimum span and zero settings by smart auto-calibration function

Features

- ▶ Auto-Calibration for optimum zero and span setting
- ▶ Simple and easy to set
- ▶ Precise control performance and high dynamic response
- ▶ Pressure regulator built in to eliminate variations in supply air pressure
- ▶ Low air consumption due to piezo electric microvalve
- ▶ Input / output signal isolated
- ▶ Automatic detection for DA(direct acting) or RA(reverse acting)
- ▶ Single and double acting available
- ▶ No hunting on the small actuators
- ▶ 1/2 split range available
- ▶ High resistance against shock and vibration

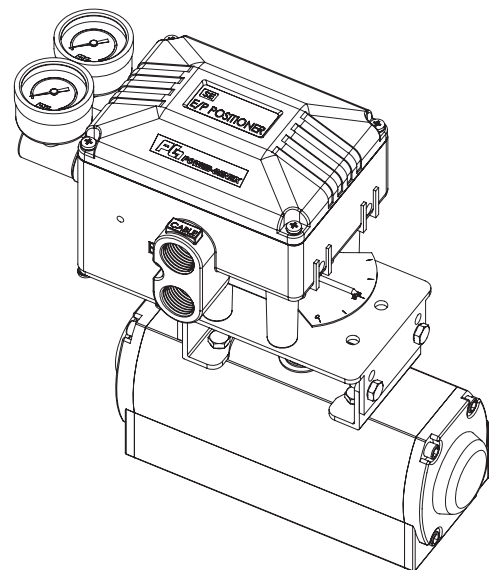


Options

- ▶ Position transmitter (4...20mA output signal)
- ▶ 2 x alarm limits (open, close)
- ▶ Explosion proof type (KC Ex d IIB+H₂ T6 IP66)

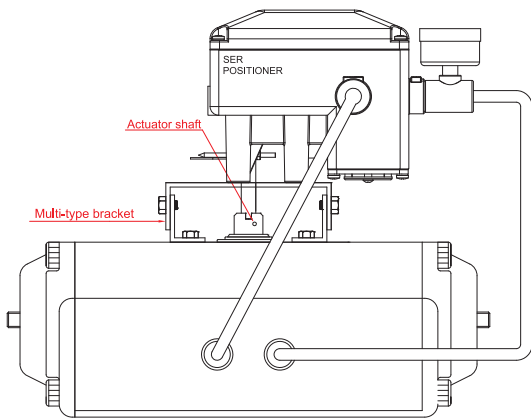
Specifications

Input Signal	4 - 20 mA DC
Voltage Supply Min. /Max.	8.5V DC / 30V DC (425 ohm)
Power Consumption	30.8 mW @ 4 mA / 170 mW @ 20 mA
Characteristic	Linear
Operating Angle	40° - 90°
Air Supply Pressure	1.5 - 7.0 bar (20 - 100 psi) Pressurized air or allowed gas, free of water, oil, and dust
Air Capacity	6.6 kg/h = 5.4 m ³ N/h = 3 scfm @ supply air of 1.4bar (20psi)
Air Consumption	< 0.04 kg / h
Output Pressure Range	0 - 100% of supply air pressure
Linearity	Within ± 0.5 %
Hysteresis	Within 0.2 %
Sensitivity	Within ± 0.2 %
Operating Temperature	-20 - +80 °C
Pneumatic Connections	Rc 1/4 or 1/4 NPT
Electrical Connections	G 1/2 or 1/2 NPT
Protection Class	IP66, flameproof (KC Ex d IIB+H ₂ T6 IP66)
Body Material	Aluminum die-cast
Weight	2.5 kg



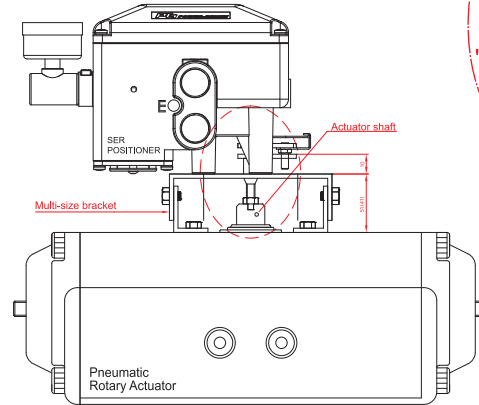
Note : Equal percentage or Quick-open option is available.
Please contact for more details

Mounting



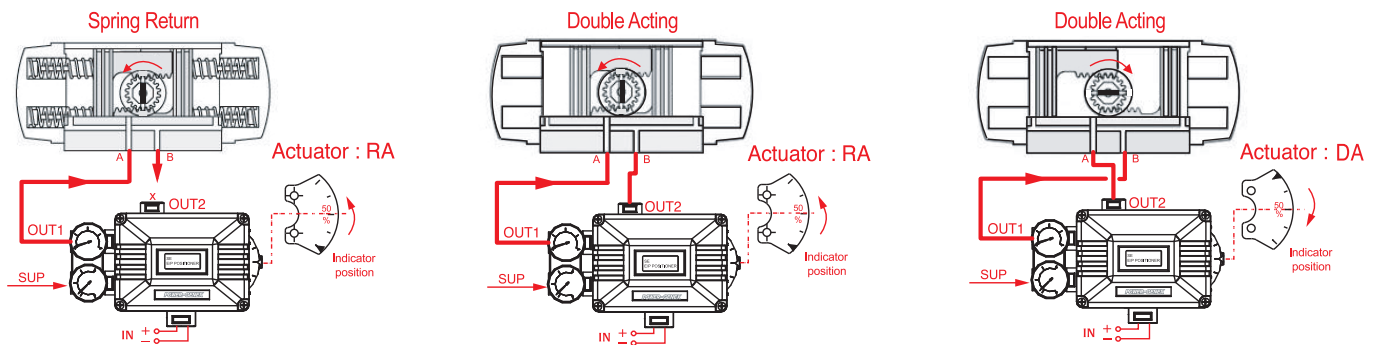
NAMUR Type

Note that feedback lever shaft "A" should be placed in the orifice of fork lever "B" and they should be in perfect alignment with a rotary actuator output shaft



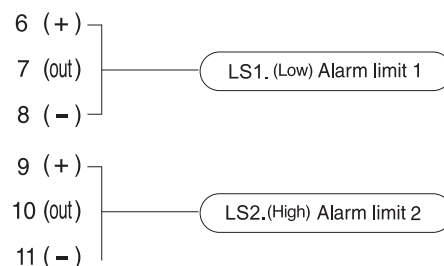
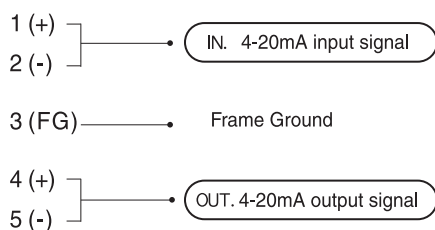
Fork Lever Type

Air Connections

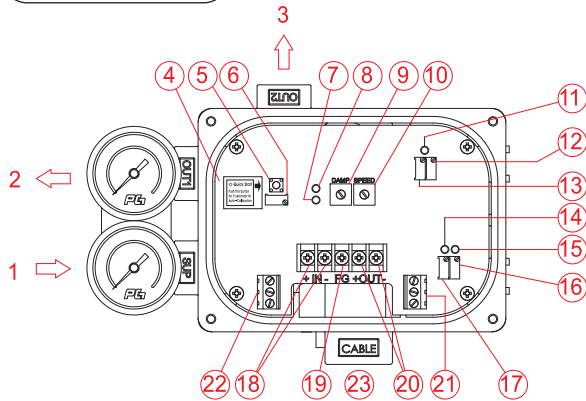


	Spring Return	Double Acting
Reverse Acting	Out 1 : piped, Out 2 : plugged	Out 1 : piped to Actuator port A, Out 2 : piped to Actuator port B
Direct Acting	Out 1 : plugged, Out 2 : piped	Out 1 : piped to Actuator port B, Out 2 : piped to Actuator port A

Electrical Connections



Board View



① Supply air	⑬ Feedback zero
② OUT 1	⑭ Limit switch lamp 2
③ OUT 2	⑮ Limit switch lamp 2
④ Board cover	⑯ Limit switch 2 adjusting screw
⑤ Auto-setting button	⑰ Limit switch 1 adjusting screw
⑥ Span adjusting screw	⑱ Input signal +, -
⑦ DA lamp	⑲ Frame ground
⑧ RA lamp	⑳ Output signal +, -
⑨ Damping screw	㉑ Limit switch 2 terminal
⑩ Speed adjusting screw	㉒ Limit switch 1 terminal
⑪ Feedback lamp	㉓ Electrical connections
⑫ Feedback span	

Auto-Calibration

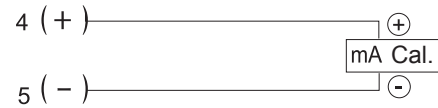
Push Auto-Setting button ⑤ for 5 seconds for auto-calibration. Generally it will take 2 - 3 minutes until the process is finished but it can take more time according to the actuator volume.

Measuring 4-20mA Output Signal

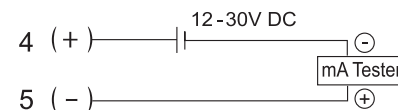
1) Specifications

Output Signal	4 - 20 mA, 2 - wire
Power Supply Rating	15 - 30V DC
Recommended Power Supply	24V DC
Operating Temperature	-20 - +70 °C
Input Impedance	0 - 430 Ω
Characteristic	Linear
Linearity	± 1.0 % F.S.
Hysteresis	0.5 % F.S.
Repeatability	± 0.5 % F.S.
Adjustment	Zero and span
Rotary Angle	50...90° (max. 100°)

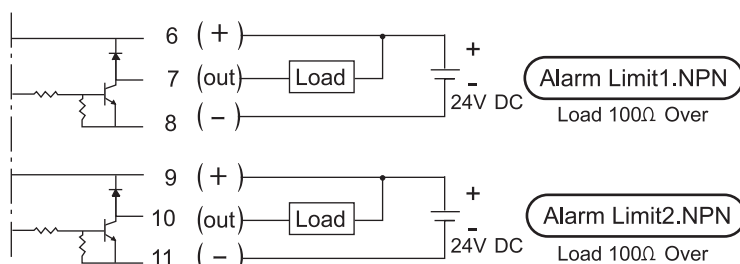
2) With mA Loop Calibrator



3) With Multi-Meter



Setting Alarm Limits



How to Order

SER

Protection Class

Feedback Shaft

Pressure Gauge (SUP. OUT)

Position Feedback

Connection Threads

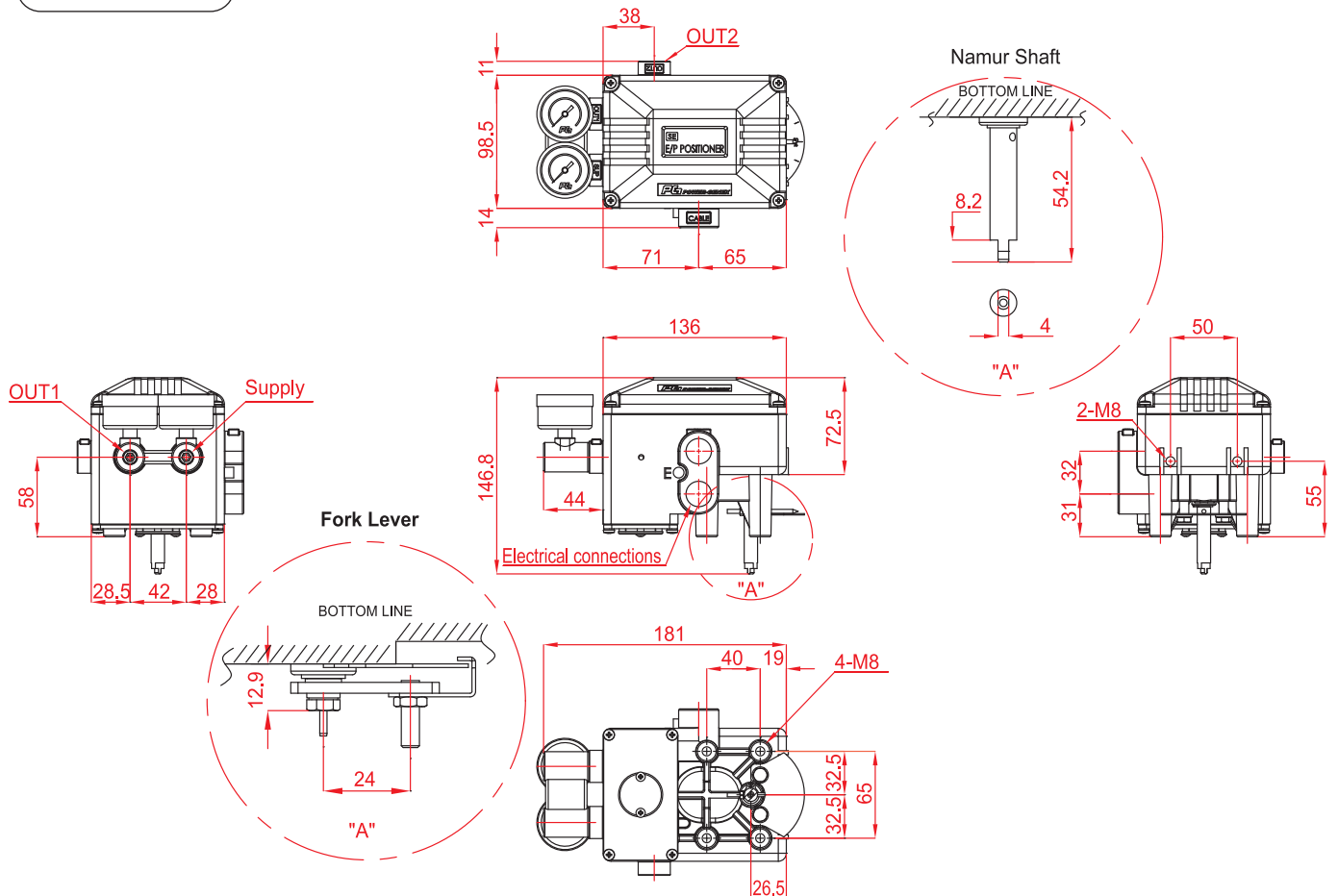
Mounting Bracket

Description	Code
Protection Class :	F : Flameproof (KC Ex d IIB+H ₂ T6 IP66) W : Weatherproof to IP66
Feedback Shaft :	F : Fork lever N : NAMUR shaft (direct mounting)
Pressure Gauge :	1 : 6 bar (90 psi) 2 : 10 bar (150 psi)

Description	Code
Position Feedback :	N : None (standard) O : Position transmitter (4~20mA output signal) L : 2 x alarm limit M : O + L
Connection Threads: (pneumatic - electrical)	3 : Rc 1/4 - G 1/2 (standard) 4 : NPT 1/4 - NPT 1/2 5 : Rc 1/4 - M20 x 1.5
Mounting Bracket :	N : None R : Multi-size bracket for DIN VDI/DE 3845 (130 x 30 x 50 bracket on request)

Ex) SER-WN2OR (weatherproof, NAMUR shaft, 10 bar pressure gauges, position transmitter, multi-size bracket)

Dimensions





ATEX / KC / NEPSI flameproof



IECEX / ATEX / KC intrinsically safe

Specifications

	EPL	
	Linear Type (Lever Feedback)	
	Single	Double
Input Signal	4~20 mA DC (Note. 1)	
Input Resistance	235 ± 15 Ω	
Air Supply	Max. 7.0 bar (100 psi) free of oil, water, and moisture	
Standard Stroke	10 ~ 80mm (Note. 2)	
Pneumatic Connections	Rc 1/4 or NPT 1/4	
Electrical Connections	G 1/2 or NPT 1/2	
Protection Class	ATEX Eex md IIB T5, KC Ex dmb IIB+H ₂ T6 IECEX / ATEX Ex ia IIC T6, KC Ex ia IIC T6, IP66	
Ambient Temperature	-20 ~ +70°C	
Pressure Gauge	Stainless Steel	
Output Characteristics	Linear	
Linearity	Within ±1.0 % F.S	Within ±1.5 % F.S
Sensitivity	Within ±0.2 % F.S	Within ±0.5 % F.S
Hysteresis	Within 1.0 % F.S	
Repeatability	Within ±0.5 % F.S	
Air Consumption	5 LPM (Sup. 1.4 kgf/cm ²)	
Flow Capacity	80 LPM (Sup. 1.4 kgf/cm ²)	
Material	Aluminum die-cast	
Weight	3.3 kg (with terminal box) 3.0 kg (without terminal box)	

Note : 1) 1/2 split range is available for 4-12mA input signal or 12-20mA input signal
2) Feedback lever can be extended to stroke 80 - 150mm

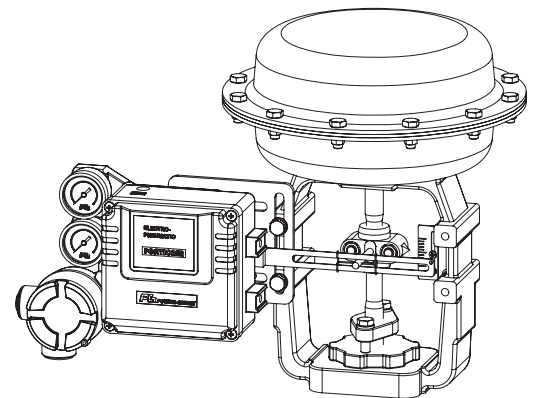
Robust valve control device giving a confidence in reliable performance and outstanding durability under harsh working environments

Features

- ▶ Easy maintenance
- ▶ Precise calibration with simple SPAN and ZERO adjustments
- ▶ Simple conversion to direct acting or reverse acting
- ▶ 1/2 split range available
- ▶ Rugged aluminum housing with corrosion-resistant coating
- ▶ Vibration resistant design
- ▶ Stainless steel gauges standard
- ▶ Restricted pilot valve orifice kit for small actuators included
- ▶ **ATEX**-certified (flameproof Eex md IIB T5)
- ▶ **KC**-certified (flameproof Ex dmb IIB+H₂ T6)
- ▶ **NEPSI**-certified (flameproof Ex dmb IIB+H₂ T6)
- ▶ **IECEX**-certified (intrinsically safe Ex ia IIC T6)
- ▶ **ATEX**-certified (intrinsically safe Eex ia IIC T6)
- ▶ **KC**-certified (intrinsically safe Ex ia IIC T6)
- ▶ EMC-certified

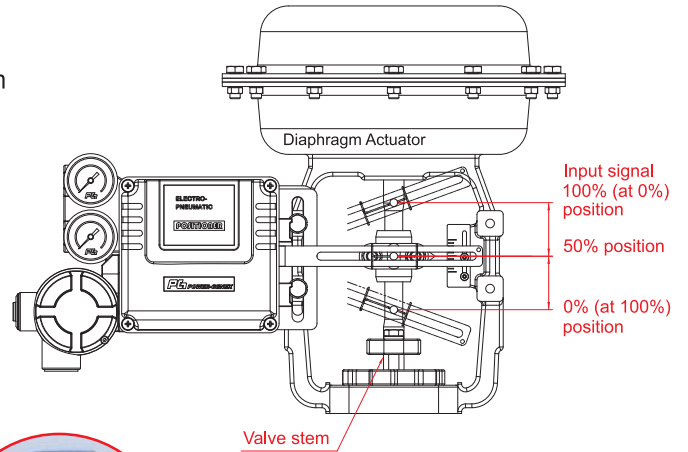
Options

- ▶ Position transmitter (4...20 mA output signal)
- ▶ High temperature

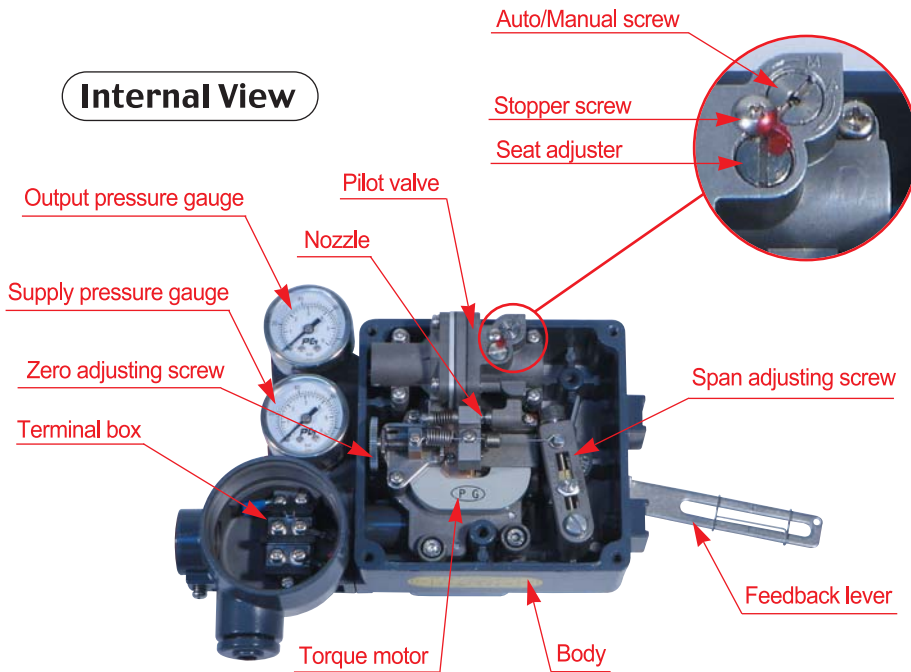


Mounting

1. Install the EPL positioner so that the angle between the valve stem and the feedback lever can be 90° at 12mA input signal (50%) as shown to the right.
2. The operating angle of the EPL feedback lever is minimum 10° to maximum 30°.



Internal View



Air Connections

Direct Acting (DA)

As the input signal increases, Valve stem moves downwards Actuator : DA Connection : out 1	
As the input signal increases, Valve stem moves downwards Actuator : DA Connection : out 2	
As the input signal increases, Valve stem moves downwards	

Reverse Acting (RA)

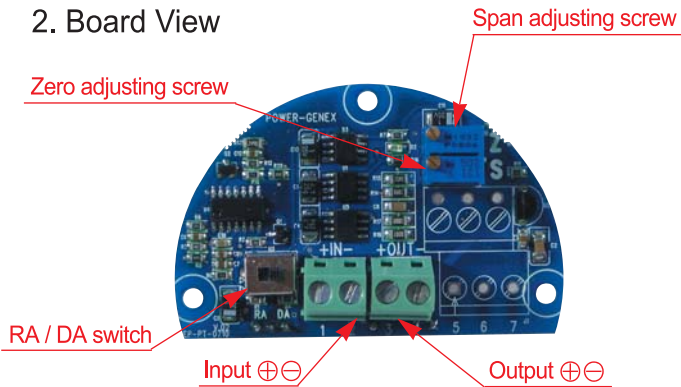
As the input signal increases, Valve stem moves upwards Actuator : RA Connection : out 2	
As the input signal increases, Valve stem moves upwards Actuator : RA Connection : out 1	
As the input signal increases, Valve stem moves upwards	

Position Transmitter Options (Built-in Type)

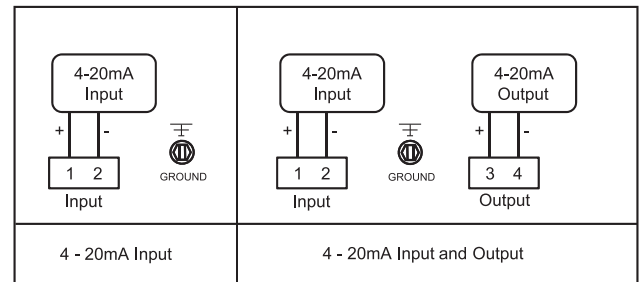
1. Specifications

Power Supply Rating	5.5 - 30 VDC loop power
Recommended Power Supply	24 VDC
Output Signal	4 - 20 mA, 2-wire
Operating Temperature	-20° - 70°C
Load Impedance	0 ~ 600 ohms
Max. Output	30 mA DC
Linearity	±1.0 %
Hysteresis	1.0 % of full scale
Repeatability	±0.5 % of full scale
Adjustment	Zero and Span in terminal box

2. Board View

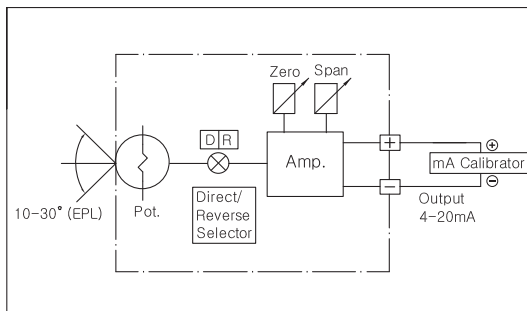


3. Wiring Diagram

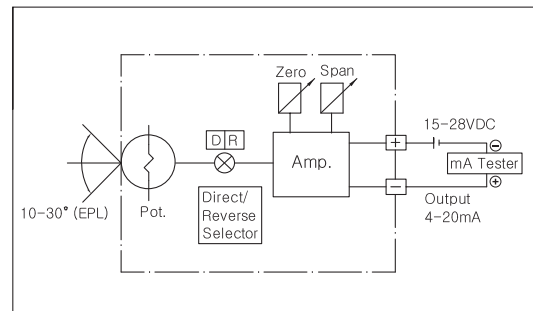


4. Measuring 4 - 20mA Output Signal

1) With mA calibrator

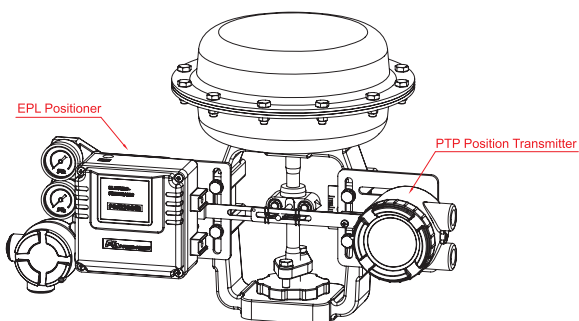


2) With multimeter

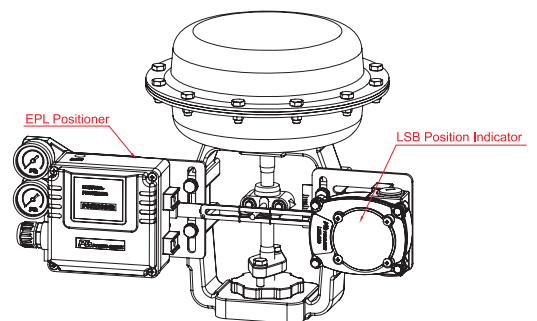


Application for Limit Switches (External Type)

1) With explosion proof PTP-L



2) With non-explosion proof LSB-200



How to Order

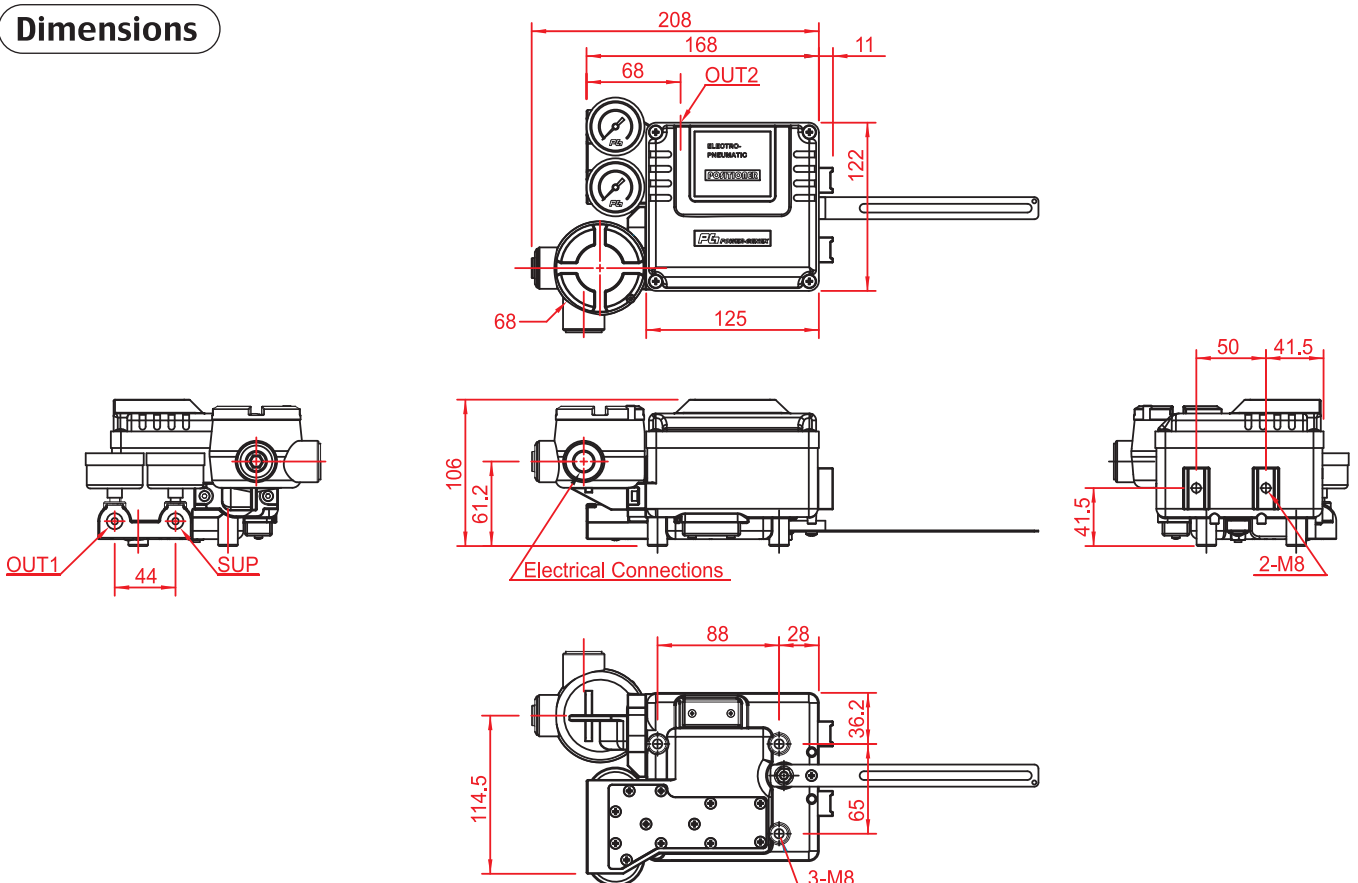
EPL —

Protection Class	Feedback Lever	Pressure Gauge (SUP. OUT)	Pilot Valve Orifice	Position Feedback	Connection Threads	High Temp	Mounting Bracket
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Description	Code
Protection Class:	F : KC flameproof Ex dmb IIB+H ₂ T6 NEPSI flameproof Ex dmb IIB+H ₂ T6 A : ATEX flameproof Eex md IIB T5 I : IECEx intrinsically safe Ex ia IIC T6 ATEX intrinsically safe Eex ia IIC T6 K : KC intrinsically safe Ex ia IIC T6 W : Weatherproof to IP66
Feedback Lever:	A : Stroke 10 ~ 40 mm B : Stroke 10 ~ 80 mm C : Stroke 80 ~ 150 mm
Pressure Gauge:	1 : 6 bar (90 psi) 2 : 10 bar (150 psi)
Pilot Valve Orifice:	S : Standard (Actuator volume over 180 cm ³) M : Small orifice (φ 1.0 or φ 0.7) (Actuator volume 90~180 cm ³)

Description	Code
Position Feedback: (only for weatherproof type)	N : None (standard) O : Position transmitter (4~20 mA output signal)
Connection Threads: (pneumatic - electrical)	3 : Rc 1/4 - G 1/2 (standard) 4 : NPT 1/4 - NPT 1/2 5 : Rc 1/4 - M20 x 1.5
High Temperature: (only for weatherproof type)	T : 70°C (standard) H : 120°C (without position feedback option) 85°C (with position feedback option)
Mounting Bracket:	N : None L : DIN / IEC 534

Dimensions





Ex ATEX / **KS** KC / **NEPSI** flameproof



IECEX / **Ex** ATEX / **KS** KC intrinsically safe

Specifications

	EPR	
	Rotary Type (Cam Feedback)	
	Single	Double
Input Signal	4~20 mA DC (Note. 1)	
Input Resistance	235 ± 15 Ω	
Air Supply	Max. 7.0 bar (100 psi) free of oil, water, and moisture	
Operating Angle	60 ~ 100° (Note. 2)	
Pneumatic Connections	Rc 1/4 or NPT 1/4	
Electrical Connections	G 1/2 or NPT 1/2	
Protection Class	ATEX Eex md IIB T5, KC Ex dmb IIB+H ₂ T6 IECEX / ATEX Ex ia IIC T6, KC Ex ia IIC T6, IP66	
Ambient Temperature	-20 ~ +70°C	
Pressure Gauge	Stainless steel	
Output Characteristics	Linear	
Linearity	Within ± 1.0 % F.S	Within ± 1.5 % F.S
Sensitivity	Within ± 0.5 % F.S	
Hysteresis	Within 1.0 % F.S	
Repeatability	Within ± 0.5 % F.S	
Air Consumption	5 LPM (Sup. 1.4 kgf/cm ²)	
Flow Capacity	80 LPM (Sup. 1.4 kgf/cm ²)	
Material	Aluminum die-cast	
Weight	3.5 kg (with terminal box) 3.2 kg (without terminal box)	

Note : 1) 1/2 split range is available for 4-12mA input signal or 12-20mA input signal
2) Operating angle can be adjusted to 0~60° or 0~100°

Robust valve control device giving a confidence in reliable performance and outstanding durability under harsh working environments

Features

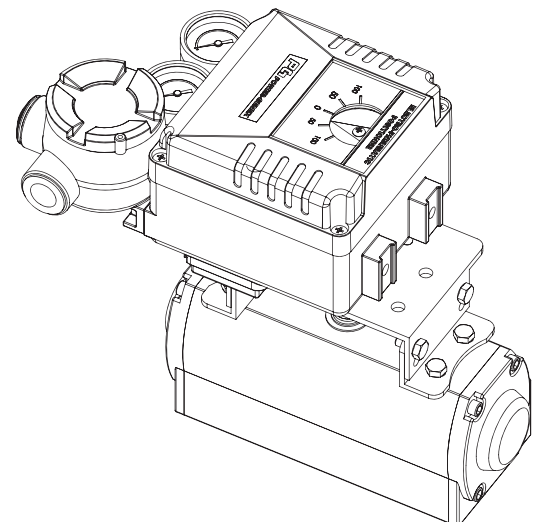
- ▶ Easy maintenance
- ▶ Precise calibration with simple SPAN and ZERO adjustments
- ▶ Simple conversion to direct acting or reverse acting
- ▶ 1/2 split range available
- ▶ Rugged aluminum housing with corrosion-resistant coating
- ▶ Vibration resistant design
- ▶ Stainless steel gauges standard
- ▶ Restricted pilot valve orifice kit for small actuators included
- ▶ **Ex** ATEX-certified (flameproof Eex md IIB T5)
- ▶ **KS** KC-certified (flameproof Ex dmb IIB+H₂ T6)
- ▶ **NEPSI** certified (flameproof Ex dmb IIB+H₂ T6)
- ▶ **IECEX** certified (intrinsically safe Ex ia IIC T6)
- ▶ **Ex** ATEX-certified (intrinsically safe Ex ia IIC T6)
- ▶ **KS** KC-certified (intrinsically safe Ex ia IIC T6)
- ▶ EMC-certified

Options

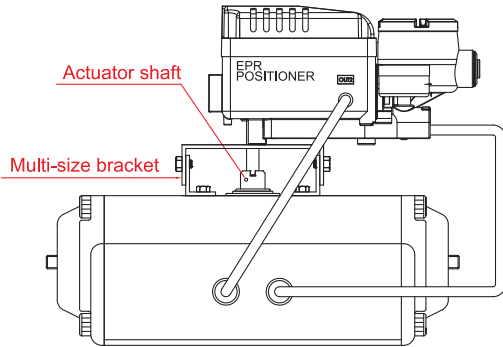
- ▶ Position transmitter (4...20 mA output signal)
- ▶ 2 x SPDT limit switch
- ▶ 2 x P&F proximity sensor NJ2-V3-N
- ▶ Visual dome indicator
- ▶ High temperature



With Dome Indicator

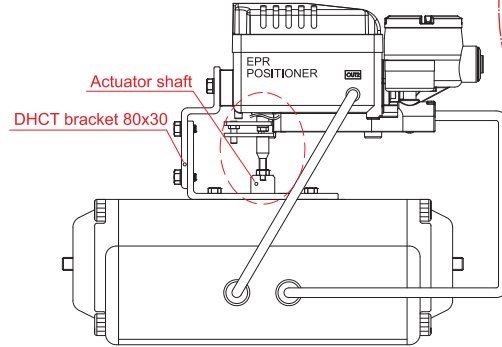


Mounting

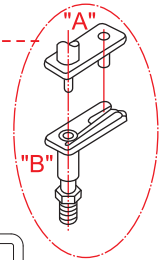


NAMUR Type Mounting

Note that feedback lever shaft "A" should be placed in the orifice of fork lever "B" and they should be in perfect alignment with a rotary actuator output shaft

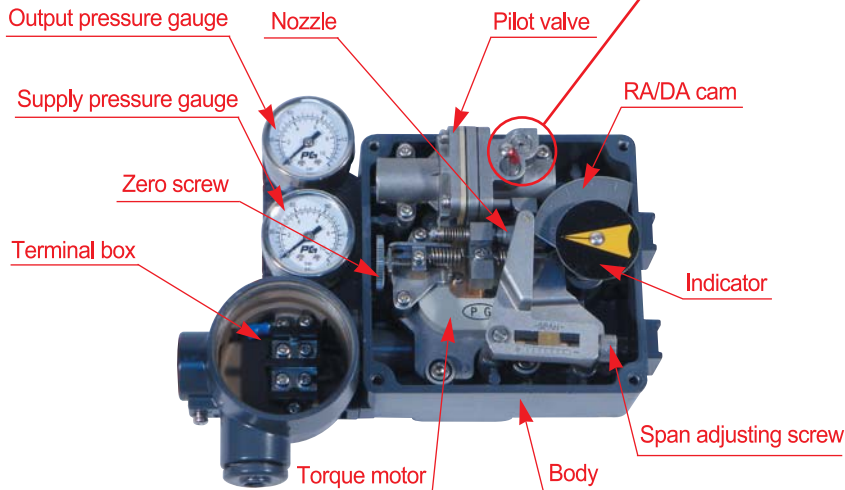


Fork Lever Type Mounting



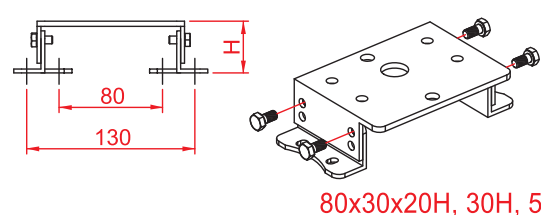
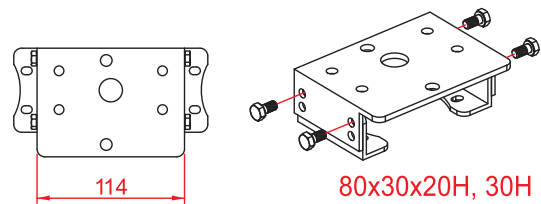
Internal View

Auto/Manual screw
Stopper screw
Seat adjuster



Multi-size Bracket

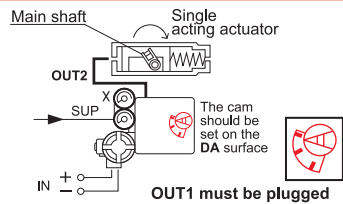
TYPE	H
80 x 30 x 20H	41
80 x 30 x 30H	51
130 x 30 x 20H	41
130 x 30 x 30H	51
130 x 30 x 50H	71



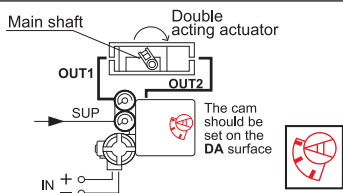
Air Connections

Direct Acting (DA)

As the input signal increases, Actuator stem rotates clockwise.

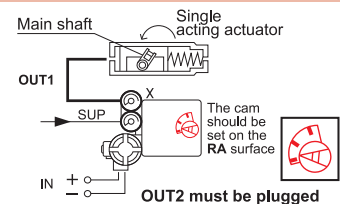


As the input signal increases, Actuator stem rotates clockwise.

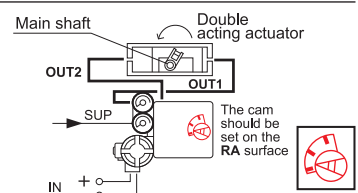


Reverse Acting (RA)

As the input signal increases, Actuator stem rotates counter clockwise.

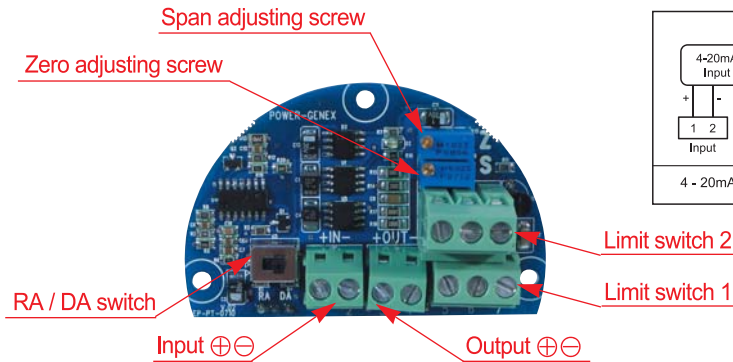


As the input signal increases, Actuator stem rotates counter clockwise.

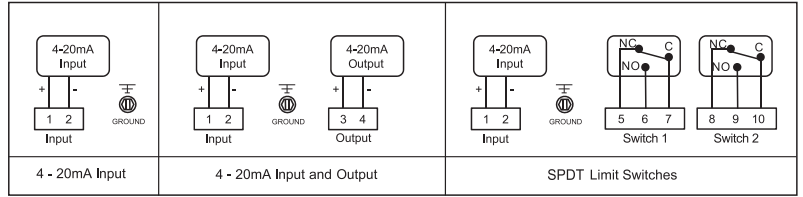


Position Transmitter Options (Built-in Type)

1. Board View



2. Wiring Diagram

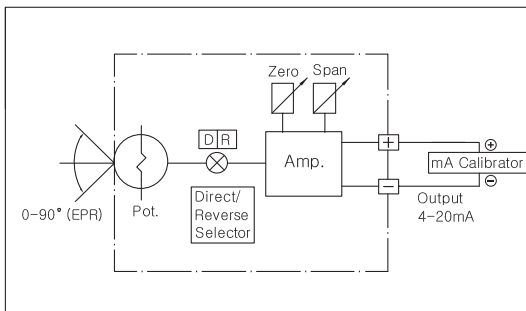


3. Position Transmitter (4-20mA output signal)

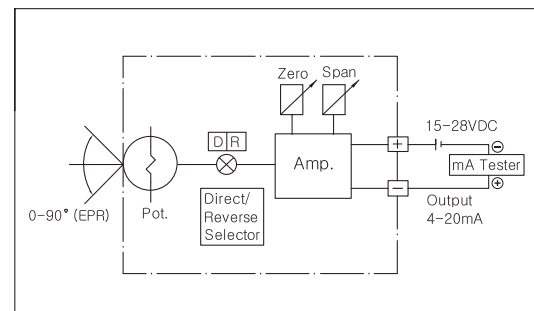
a. Specifications

Power Supply Rating	5.5 - 30 VDC loop power
Recommended Power Supply	24 VDC
Output Signal	4 - 20 mA, 2-wire
Operating Temperature	-20° to 70°C
Load Impedance	0 ~ 600 ohms
Max. Output	30 mA DC
Linearity	±1.0 %
Hysteresis	1.0 % of full scale
Repeatability	±0.5 % of full scale
Adjustment	Zero and Span in terminal box

b. with mA calibrator



c. with multimeter

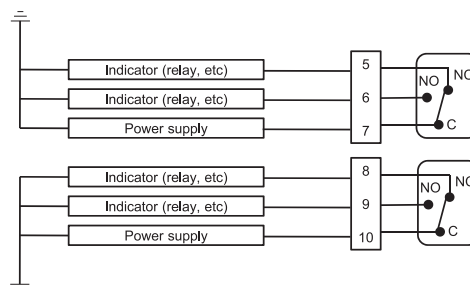


4. SPDT Limit Switches

a. Specifications

Contacts	SPDT Form C
AC Rating	16 A 1/2 HP 125/250 VAC
DC Rating	0.6 A 125 VDC / 0.3 A 250 VDC
Adjustment	Cams with set screws (L-wrench included for setting)

b. Wiring and Application



How to Order

EPR

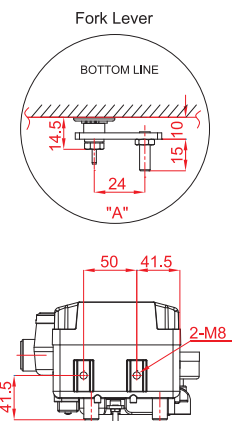
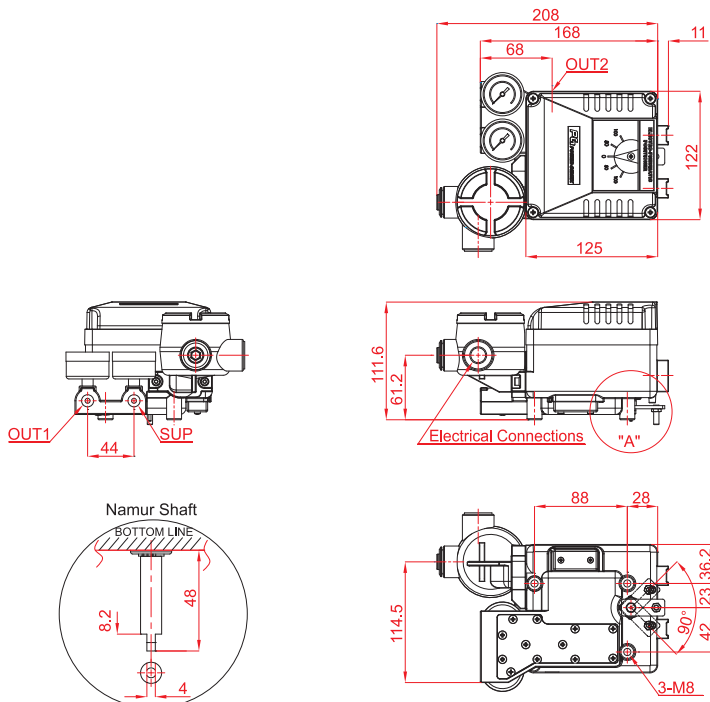
Protection Class	Feedback Shaft	Pressure Gauge (SUP. OUT)	Pilot Valve Orifice	Position Feedback	Connection Threads	Dome Indicator	High Temp	Mounting Bracket
------------------	----------------	---------------------------	---------------------	-------------------	--------------------	----------------	-----------	------------------

Description	Code
Protection Class:	F : KC flameproof Ex dmb IIB+H ₂ T6 NEPSI flameproof Ex dmb IIB+H ₂ T6 A : ATEX flameproof Eex md IIB T5 I : IECEx intrinsically safe Ex ia IIC T6 ATEX intrinsically safe Eex ia IIC T6 K : KC intrinsically safe Ex ia IIC T6 W : Weatherproof to IP66
Feedback Shaft:	N : NAMUR shaft (direct mounting) A : Fork lever M6 x 40L B : Fork lever other size on request
Pressure Gauge:	1 : 6 bar (90 psi) 2 : 10 bar (150 psi, standard)
Pilot Valve Orifice:	S : Standard (Actuator volume over 180 cm ³) M : Small orifice (φ 1.0 or φ 0.7) (Actuator volume 90~180 cm ³)
Position Feedback: (only for weatherproof type)	N : None (standard) O : Position transmitter (4~20mA output signal) L : 2 x SPDT limit switch P : 2 x proximity sensor P&F NJ2-V3-N M : O + L Q : O + P

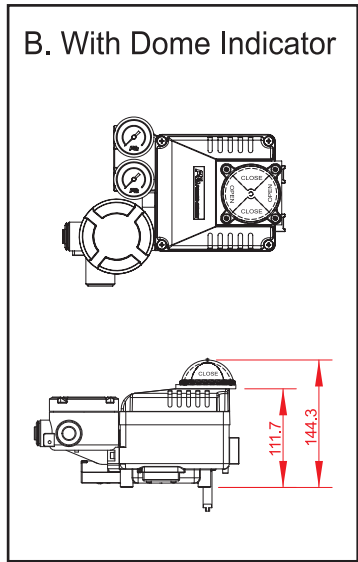
Description	Code
Connection Threads: (pneumatic - electrical)	3 : Rc 1/4 - G 1/2 (standard) 4 : NPT 1/4 - NPT 1/2 5 : Rc 1/4 - M20 x 1.5
Dome Indicator:	N : Flat indicator (standard) D : Dome indicator
High Temperature: (only for weatherproof type)	T : 70°C (standard) H : 120°C (without position feedback option) 85°C (with position feedback option)
Mounting Bracket:	N : None
• NAMUR Shaft Type :	R : Multi-size NAMUR bracket for DIN VDI/VE 3845 (130 × 30 × 50 bracket on request)
• Fork Lever Type :	F : DHCT bracket 80x30 for fork lever type E : Multi-size NAMUR bracket for fork lever type (130 × 30 × 50 bracket on request)

Dimensions

A. With Flat Indicator



B. With Dome Indicator





Robust valve control device giving a confidence in reliable performance and outstanding durability under harsh working environments

Features

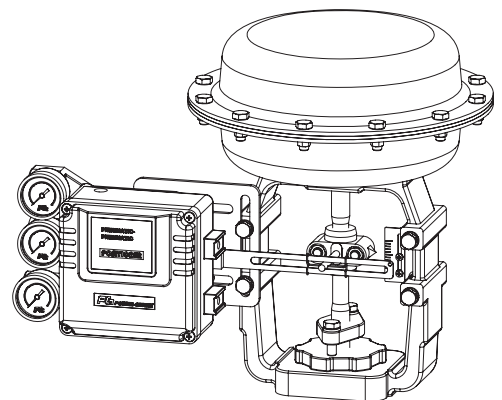
- ▶ Easy maintenance
- ▶ Precise calibration with simple SPAN and ZERO adjustments
- ▶ Simple conversion to direct acting or reverse acting
- ▶ 1/2 split range available
- ▶ Rugged aluminum housing with corrosion-resistant coating
- ▶ Vibration resistant design
- ▶ Stainless steel gauges standard
- ▶ Restricted pilot valve orifice kit for small actuators included

Options

- ▶ High temperature

Specifications

	PPL	
	Linear Type (Lever Feedback)	
	Single	Double
Input Signal	0.2 - 1.0 bar (3 - 15 psi) (Note.1, 2)	
Supply Air Pressure	Max. 7.0 bar (100 psi)	
Standard Stroke	10 - 80 mm (Note.3)	
Pneumatic Connections	Rc 1/4 or NPT 1/4	
Ambient Temperature	-20 - +70 °C	
Pressure Gauge	Stainless steel	
Output Characteristics	Linear	
Linearity	Within ± 1.0 % F.S	Within ± 1.5 % F.S
Sensitivity	Within ± 0.2 % F.S	Within ± 0.5 % F.S
Hysteresis	Within 1.0 % F.S	
Repeatability	Within ± 0.5 % F.S	
Air Consumption	5 LPM (Sup. 1.4 bar)	
Flow Capacity	80 LPM (Sup. 1.4 bar)	
Body Material	Aluminium die-cast	
Weight	2.1 kg	



Note : 1) 1/2 split range is available for 3-9 psi input signal or 9-15 psi input signal
 2) Please contact for 6-30 psi input signal
 3) Feedback lever can be extended to stroke 80 - 150mm

How to Order

PPL —

Feedback
Lever

Pressure
Gauge
(SUP. OUT)

Pilot
Valve
Orifice

Connection
Threads

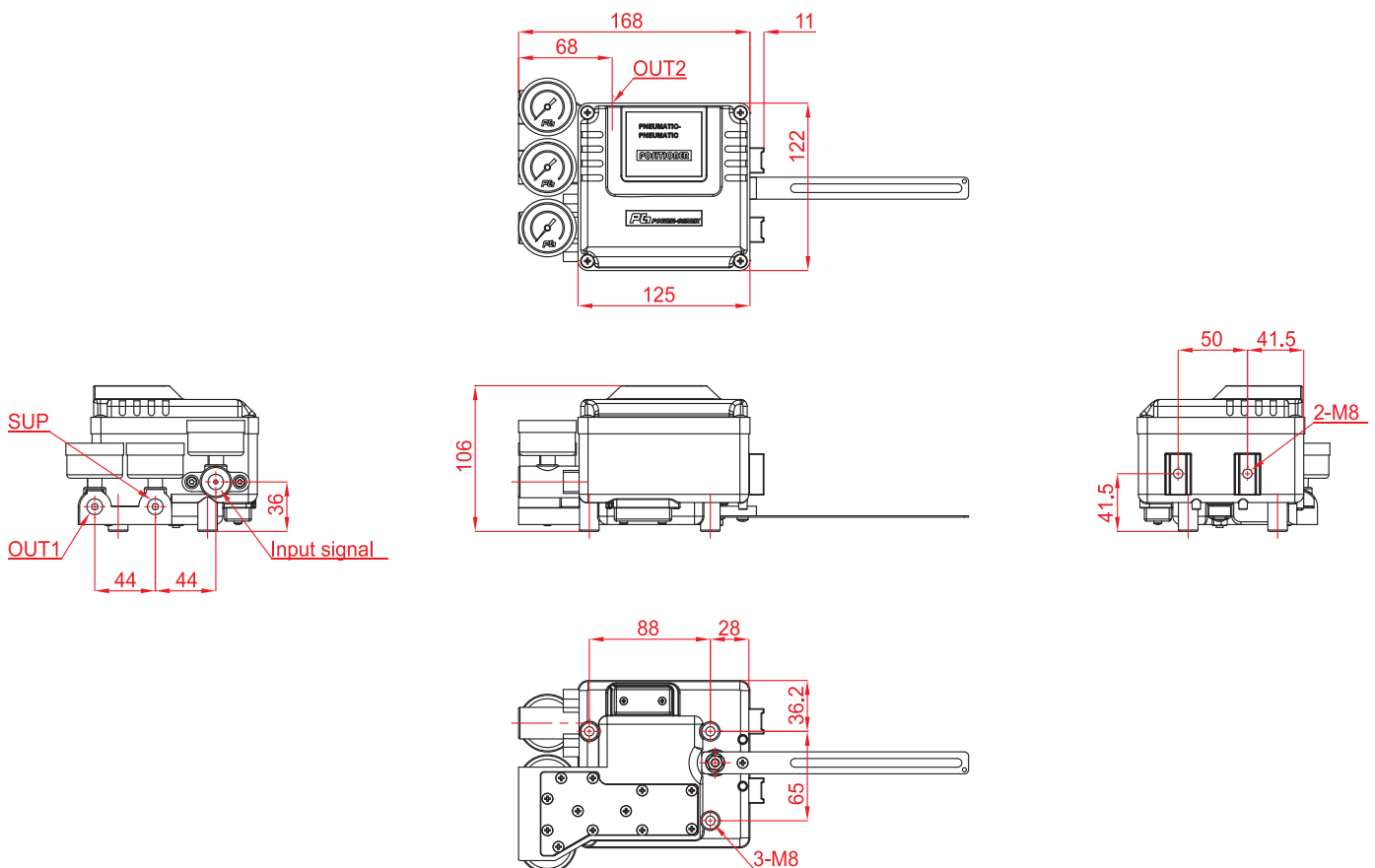
High
Temp

Mounting
Bracket

Description	Code
Feedback Lever :	A : Stroke (10 ~ 40 mm) B : Stroke (10 ~ 80 mm) C : Stroke (80 ~ 150 mm)
Pressure Gauge :	1 : 6 bar (90 psi) 2 : 10 bar (150 psi)
Pilot Valve Orifice :	S : Standard (Actuator volume over 180 cm ³) M : Small orifice (φ 1.0 or φ 0.7) (Actuator volume 90~180 cm ³)

Description	Code
Connection Threads : (pneumatic)	3 : Rc 1/4 4 : NPT 1/4
High Temperature .:	T : 70°C (standard) H : 120°C
Mounting Bracket :	N : None L : DIN / IEC 534

Dimensions





Robust valve control device giving a confidence in reliable performance and outstanding durability under harsh working environments

Features

- ▶ Easy maintenance
- ▶ Precise calibration with simple SPAN and ZERO adjustments
- ▶ Simple conversion to direct acting or reverse acting
- ▶ 1/2 split range available
- ▶ Rugged aluminum housing with corrosion-resistant coating
- ▶ Vibration resistant design
- ▶ Stainless steel gauges standard
- ▶ Restricted pilot valve orifice kit for small actuators included

Options

- ▶ Position transmitter (4-20mA output signal)
- ▶ 2 x SPDT limit switch
- ▶ 2 x P&F proximity sensor NJ2-V3-N
- ▶ Visual dome indicator
- ▶ High temperature

Specifications

	PPR	
	Rotary Type (Cam Feedback)	
	Single	Double
Input Signal	0.2 - 1.0 bar (3 - 15 psi) (Note.1, 2)	
Supply Air Pressure	Max. 7.0 bar (100 psi)	
Standard Stroke	60 - 100° (Note.3)	
Pneumatic Connections	Rc 1/4 or NPT 1/4	
Ambient Temperature	-20 - +70 °C	
Pressure Gauge	Stainless steel	
Output Characteristics	Linear	
Linearity	Within ± 1.0 % F.S	Within ± 1.5 % F.S
Sensitivity	Within ± 0.5 % F.S	
Hysteresis	Within 1.0 % F.S	
Repeatability	Within ± 0.5 % F.S	
Air Consumption	5 LPM (Sup. 1.4 bar)	
Flow Capacity	80 LPM (Sup. 1.4 bar)	
Body Material	Aluminium die-cast	
Weight	2.5 kg	



With Dome Indicator

Note : 1) 1/2 split range is available for 3-9 psi input signal or 9-15 psi input signal
 2) Please contact for 6-30 psi input signal
 3) Operating angle can be adjusted to 0~60° or 0~100°

How to Order

PPR

Feedback Shaft

Pressure Gauge (SUP. OUT)

Pilot Valve Orifice

Position Feedback

Connection Threads

Dome Indicator

High Temp

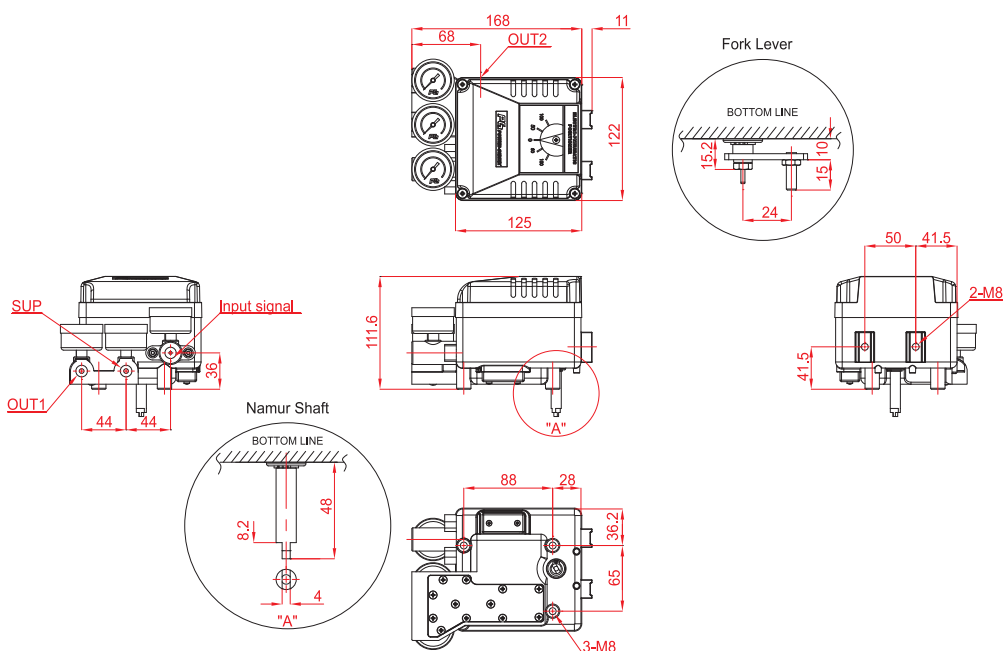
Mounting Bracket

Description	Code
Feedback Shaft :	N : NAMUR shaft (direct mounting) A : Fork lever M6 x 40L B : Fork lever other size on request
Pressure Gauge :	1 : 6 bar (90 psi) 2 : 10 bar (150 psi)
Pilot Valve Orifice :	S : Standard (Actuator volume over 180 cm ³) M : Small orifice (φ 1.0 or φ 0.7) (Actuator volume 90~180 cm ³)
Position Feedback :	N : None (standard) O : Position transmitter (4~20mA output signal) L : 2 x SPDT limit switch P : 2 x proximity sensor P&F NJ2-V3-N M : O+L Q : O+P

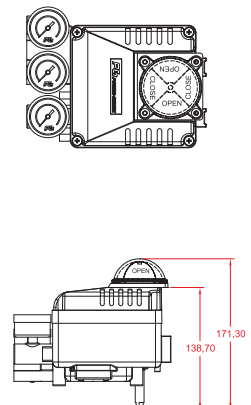
Description	Code
Connection Threads (pneumatic) :	3 : Rc 1/4 4 : NPT 1/4
Dome Indicator :	N : Flat indicator (standard) D : Dome indicator
High Temperature :	T : 70°C (standard) H : 120°C (without position feedback option) 85°C (with position feedback option)
Mounting Bracket :	N : None
• NAMUR Shaft Type :	R : Multi-size NAMUR bracket for DIN VDI/VDE 3845 (130 × 30 × 50 bracket on request)
• Fork Lever Type :	F : DHCT bracket 80x30 for fork lever type E : Multi-size NAMUR bracket for fork lever type (130 × 30 × 50 bracket on request)

Dimensions

A. With Flat Indicator



B. With Dome Indicator





Electro-pneumatic positioner ideally designed and optimized for cylinder actuator and guaranteeing precise and stable performance with cylinder actuator

Features

- ▶ Easy to set
- ▶ Compact
- ▶ Precise and stable performance
- ▶ Suitable for a wide application

Specifications

Input Signal	4 - 20 mA @ 24 VDC
Input Resistance	425 Ω
Air Supply	3 - 7 bar (100 psi) free of oil, water, and moisture
Standard Stroke	30 mm - 300 mm
Pneumatic Connections	Rc 1/4 or NPT 1/4
Electrical Connections	G 1/2 or NPT 1/2
Protection Class	Exd IIC T6
Ambient Temperature	-20 - + 70 °C
Output Characteristics	Linear
Linearity	Within \pm 1.0 % F.S
Sensitivity	Within \pm 0.5 % F.S
Hysteresis	Within 1.0 % F.S
Repeatability	Within \pm 0.5 % F.S
Air Consumption	5 LPM (Sup. 1.4 bar)
Material	Aluminum die-cast
Weight	2 kg

How to Order

EPCL

— Stroke —

Connections
(Pneumatic/
Electrical)

Description	Code
Stroke :	On request (30 mm - 300 mm)
Connections : (Pneumatic - electrical)	P : Rc 1/4 - G 1/2 N : NPT 1/4 - NPT 1/2

NOTE

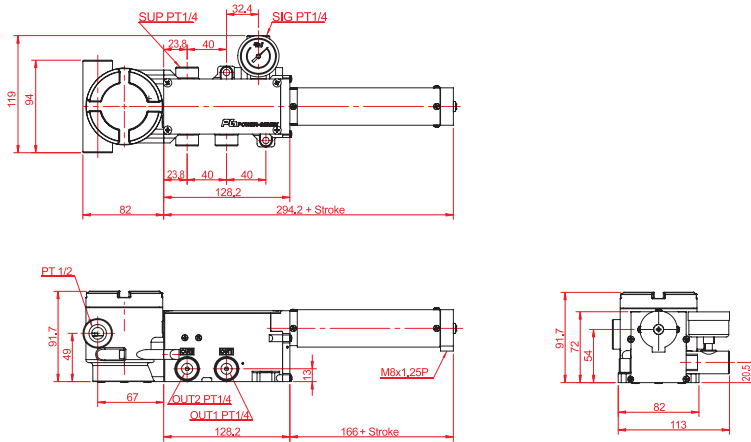
Please be sure to describe a size and a stroke of the cylinder actuator required when placing an order.

CAUTION

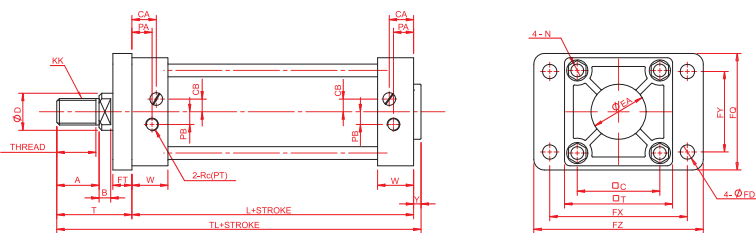
1. Please be sure to disconnect supply air completely before opening a feedback spring protection tube.
2. When input signal increases, the EPCL can operate only in the direction that the cylinder extends.

Dimensions

EPCL



Cylinder Actuator



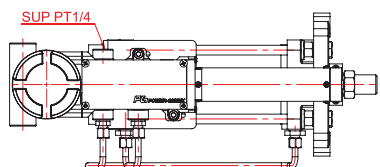
(Unit : mm)

Tube I·O (mm)	Stroke (mm)	Thread	A	B	□C	□T	CA	CB	φD	φEA	KK	L
40	~ 800	27	30	6	44	60	18	8	16	32	M14×P1.25	84
50	~1000	32	35	7	52	70	19.5	11	20	40	M18×P1.25	90
63	~1000	32	35	7	64	83	23	11	20	40	M18×P1.25	98
80	~1000	37	40	11	78	102	25	12	25	52	M22×P1.25	116
100	~1000	37	40	11	92	116	27.5	12	30	52	M26×P1.25	126

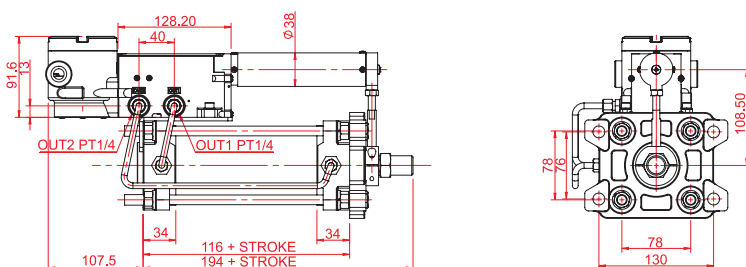
Tube I·O (mm)	N	Rc(PT)	PA	PB	W	V	FD	FQ	FT	FX	FY	FZ	T	TL
40	M 8×P1.25	1/4	12.5	6.5	26.5	3	9	65	12	80	42	100	51	138
50	M 8×P1.25	3/8	14	8	28	3	9	75	12	90	50	110	58	151
63	M 8×P1.25	3/8	15	9	29.5	3	11.5	91	15	105	59	130	58	159
80	M 12×P1.25	1/2	19	12	34	7	13.5	110	18	130	76	160	71	194
100	M 12×P1.25	1/2	20	12	36.5	7	13.5	126	18	150	92	180	72	205

Note : Please make an inquiry for other size cylinder actuators not described above.

Application Example for EPCL on Cylinder Actuator



Note that this drawing is an example showing the EPCL mounted on the cylinder actuator (φ80 × 125mm). The length of the EPCL feedback spring tube can be different according to strokes of the cylinder actuators. So please contact for an optimum mounting





Pneumatic-pneumatic positioner ideally designed and optimized for cylinder actuator and guaranteeing precise and stable performance with cylinder actuator

Features

- ▶ Easy to set
- ▶ Compact
- ▶ Precise and stable performance
- ▶ Suitable for a wide application

Specifications

Input Signal	3 - 15 psi (0.2 - 1 bar) (Note)
Air Supply	3 - 7 bar (100 psi) free of oil, water, and moisture
Standard Stroke	30 mm - 300 mm
Pneumatic Connections	Rc 1/4 or NPT 1/4
Protection Class	IP 55
Ambient Temperature	-20 - +70°C
Pressure Gauge	Stainless Steel
Output Characteristics	Linear
Linearity	Within \pm 1.0 % F.S
Sensitivity	Within \pm 0.5 % F.S
Hysteresis	Within 1.0 % F.S
Repeatability	Within \pm 0.5 % F.S
Air Consumption	5 LPM (Sup. 1.4 bar)
Material	Aluminum die-cast
Weight	1.5 kg

Note : Please contact for 0.4-2 bar (6-30 psi) input signal

How to Order

PPCL

— Stroke

— Connections
(Pneumatic)

Description	Code
Stroke :	On request (30 mm ~ 300 mm)
Connections : (Pneumatic)	P : Rc 1/4 N : NPT 1/4

NOTE

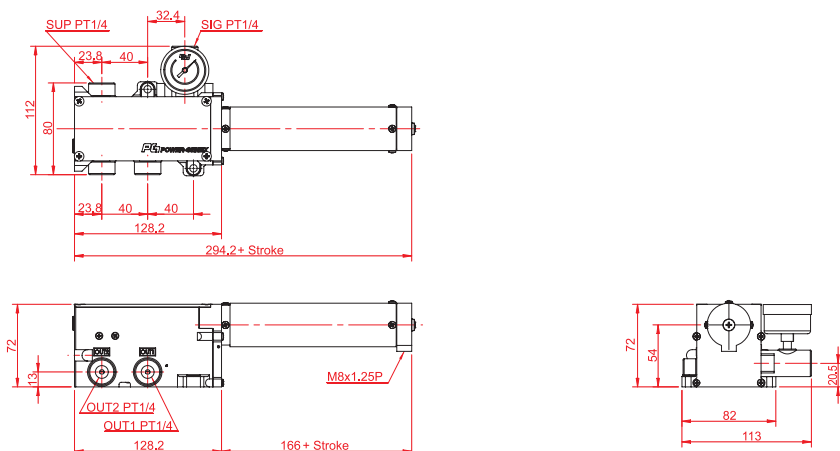
Please be sure to describe a size and a stroke of the cylinder actuator required when placing an order.

CAUTION

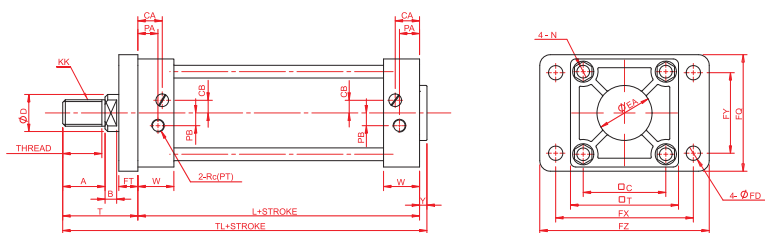
1. Please be sure to disconnect supply air completely before opening a feedback spring protection tube.
2. When input pressure increases, the PPCL can operate only in the direction that the cylinder extends.

Dimensions

PPCL



Cylinder Actuator



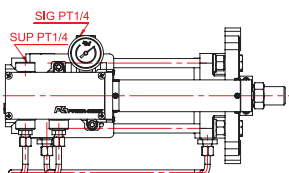
(Unit : mm)

Tube I·O (mm)	Stroke (mm)	Thread	A	B	□C	□T	CA	CB	φD	φEA	KK	L
40	~ 800	27	30	6	44	60	18	8	16	32	M14×P1.25	84
50	~ 1000	32	35	7	52	70	19.5	11	20	40	M18×P1.25	90
63	~ 1000	32	35	7	64	83	23	11	20	40	M18×P1.25	98
80	~ 1000	37	40	11	78	102	25	12	25	52	M22×P1.25	116
100	~ 1000	37	40	11	92	116	27.5	12	30	52	M26×P1.25	126

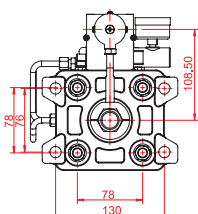
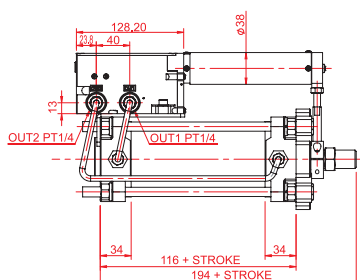
Tube I·O (mm)	N	Rc(PT)	PA	PB	W	V	FD	FQ	FT	FX	FY	FZ	T	TL
40	M 8×P1.25	1/4	12.5	6.5	26.5	3	9	65	12	80	42	100	51	138
50	M 8×P1.25	3/8	14	8	28	3	9	75	12	90	50	110	58	151
63	M 8×P1.25	3/8	15	9	29.5	3	11.5	91	15	105	59	130	58	159
80	M 12×P1.25	1/2	19	12	34	7	13.5	110	18	130	76	160	71	194
100	M 12×P1.25	1/2	20	12	36.5	7	13.5	126	18	150	92	180	72	205

Note : Please make an inquiry for other size cylinder actuators not described above.

Application Example for PPCL on Cylinder Actuator



Note that this drawing is an example showing the PPCL mounted on the cylinder actuator (φ80 × 125mm). The length of the PPCL feedback spring tube can be different according to strokes of the cylinder actuators. So please contact for an optimum mounting





Dynamic valve drive to convert 4-20mA current signal to pneumatic output pressure with state-of-the art piezoelectric technology

Features

- ▶ Rugged aluminum die-cast housing
- ▶ Precise control performance and high dynamic response
- ▶ Simple and easy to set
- ▶ Low air consumption due to piezo electric microvalve

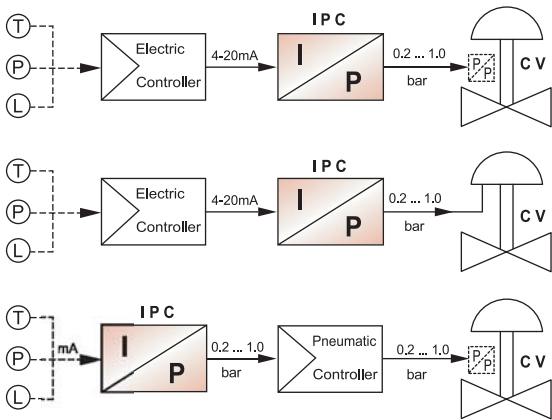
Specifications

Model	IPC
Input Signal	4 - 20 mA @ 24 VDC, 2-wire
Output Pressure	0 - 1 bar (0 - 15 psi) 0.2 - 1 bar (3 - 15 psi) 0.4 - 2 bar (6 - 30 psi) 0.2 - 3 bar (3 - 45 psi)
Output Characteristic	Linear to input signal
Action	Direct
Total Error	Max. error $\pm 0.3\%$ of span (linearity + hysteresis + repeatability)
Supply Air	Filtered compressed, dry and non-oiled air (up to 5 micron)
Operating Temperature	-20°C - +70°C
Protection Class	IP55
Impedance	425 Ω @ 20 mA
Mounting Type	Rail (to DIN EN 50022)
Pneumatic Connection	Rc 1/8
Electrical Connections	PG 9
Body Material	Aluminum die-cast
Weight	820 g

How to Order

Output Pressure	Required Supply Air	Part Number
0 - 1 bar (0 - 15 psi)	1.5 bar (23 psi)	IPC - 01
0.2 - 1 bar (3 - 15 psi)	1.5 bar (23 psi)	IPC - 21
0.4 - 2 bar (6 - 30 psi)	2.5 bar (38 psi)	IPC - 42
0.2 - 3 bar (3 - 45 psi)	3.5 bar (53 psi)	IPC - 23
Other Pressure		On request

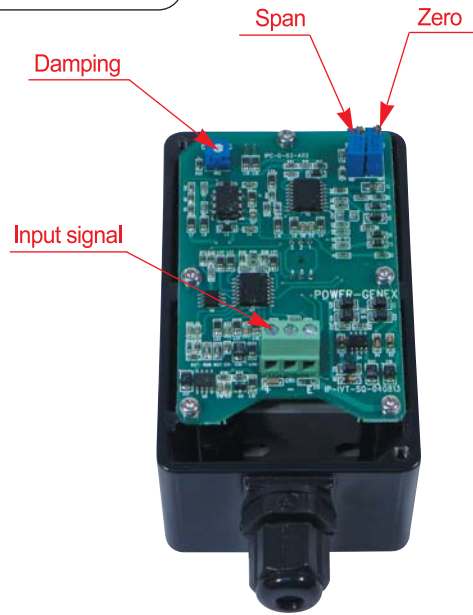
Applications



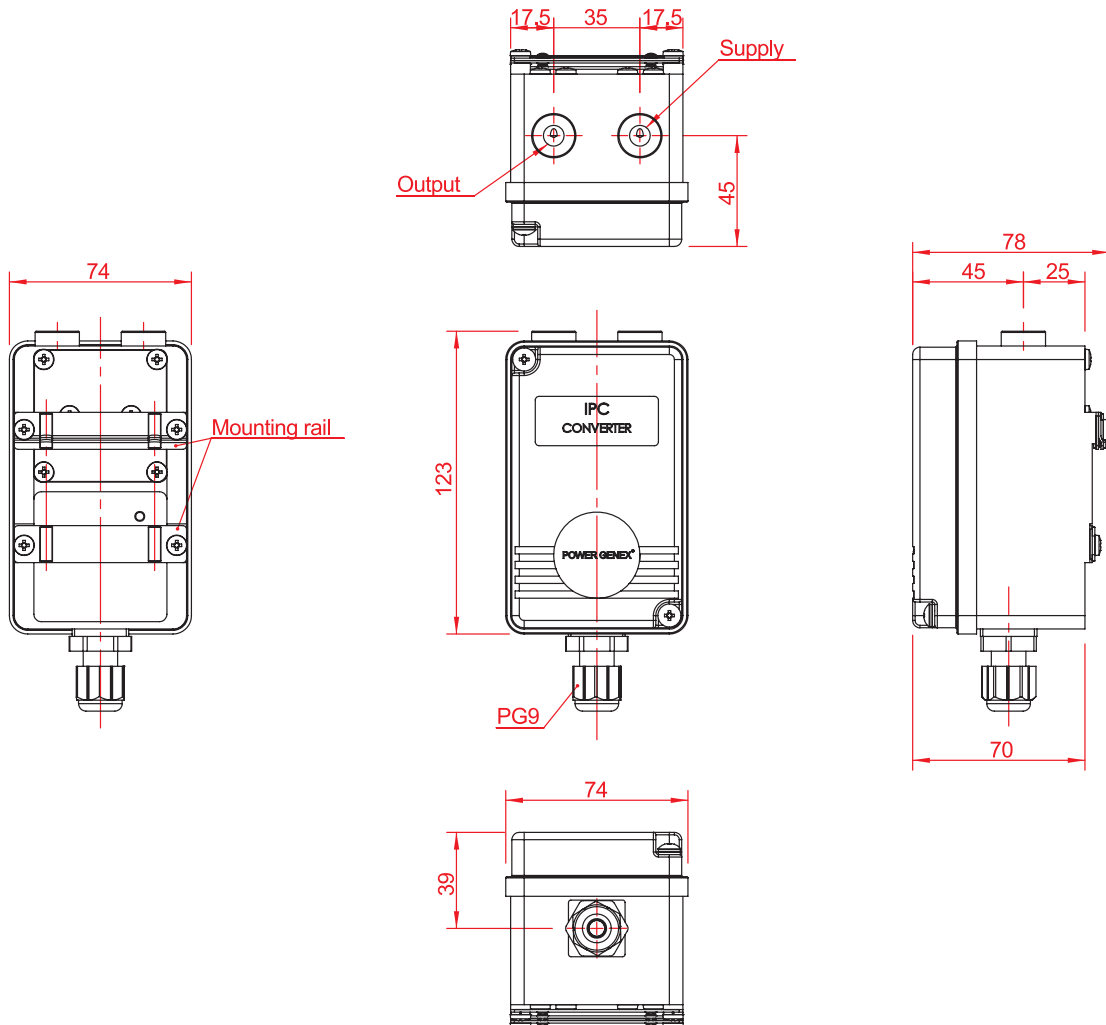
Ⓧ Temp. Transmitter Ⓧ Press. Transmitter Ⓧ Level Transmitter

IPC : I/P Converter, CV : Pneumatic Control Valve

Board view



Dimensions





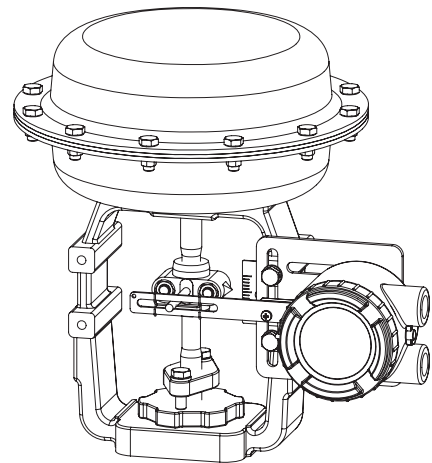
Explosion proof position transmitter for reliable valve position feedback with 4-20mA output signal

Features

- ▶ Rugged aluminum die-cast housing
- ▶ Optional 2 x SPDT limit switch or 2 x P&F proximity sensor NJ2-V3-N

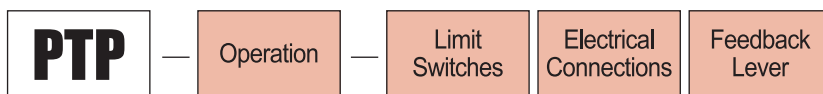
Specifications

Model	PTP-L	PTP-R
Current Output Signal	4 - 20 mA, 2-wire	
Power Supply Range	12 - 30 VDC (24VDC recommendable)	
Span Adjustable Angle	10° - 45°	0° - 90°
Linearity	Within $\pm 1.0\%$ F.S.	
Repeatability	Within $\pm 0.25\%$ F.S.	
Hysteresis	Within 1.0% F.S.	
Operating Ambient Temperature	-20°C - +70°C	
Explosion Proof Class	Exd IIC T6 (KOSHA Cert. No. 2008-1053-Q1)	
Protection Class	IP66	
Electrical Connections	G 1/2 or NPT 1/2	
Weight	0.9 kg	

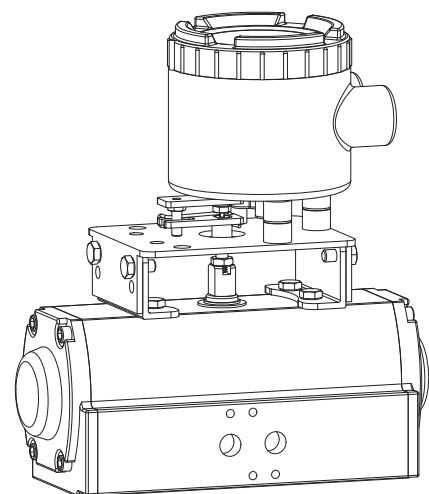


PTP-L Mounting to Globe Control Valve

How to Order



Description	Code
Operation :	L : Linear type R : Rotary type
Limit Switches:	N : None S : 2 x SPDT mechanical limit switch P : 2 x P&F proximity sensor NJ2-V3-N
Electrical Connections:	1 : G 1/2 2 : NPT 1/2
Feedback Lever: (only for linear type)	A : Stroke 10 - 40mm B : Stroke 10 - 80mm C : Stroke 80 - 150mm

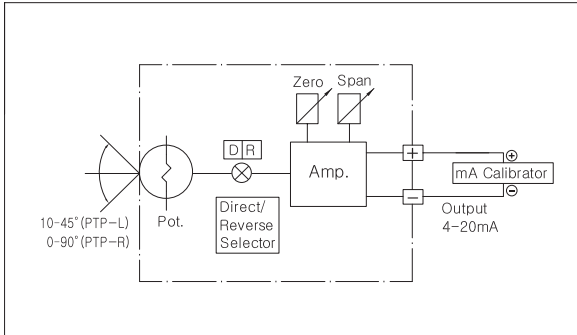


PTP-R Mounting to Pneumatic Rotary Actuator

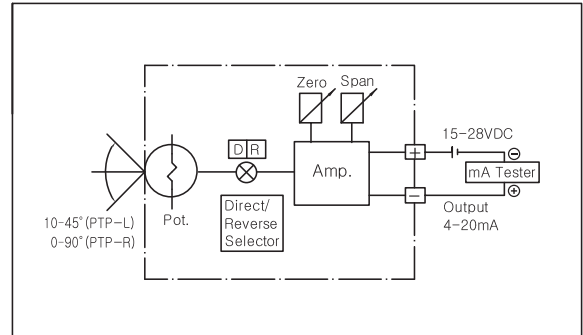
Ex) PTP-L-S1A (linear type, 2 x SPDT, G 1/2, 10-40mm stroke)

Measuring 4–20mA Output Signal

1) with mA calibrator

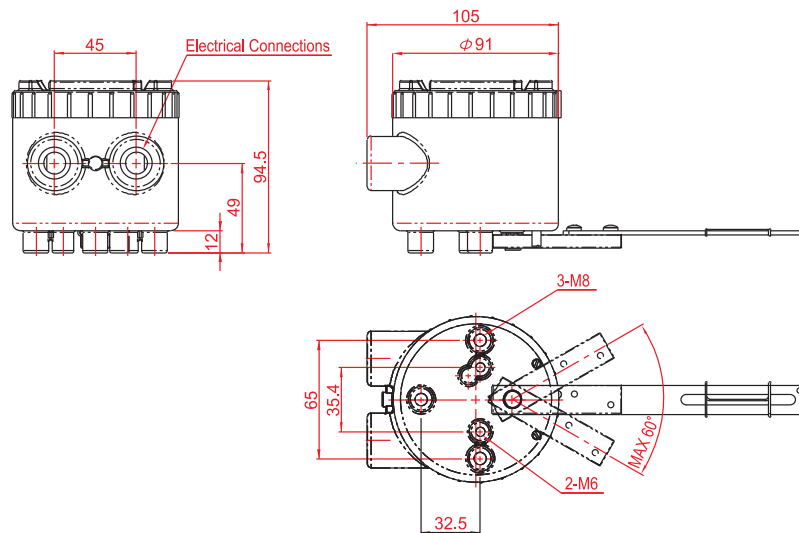


2) with multimeter

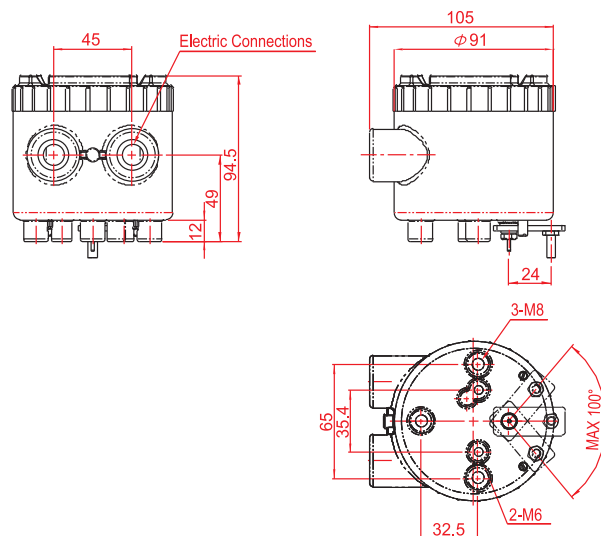


Dimensions

PTP-L (linear type)



PTP-R (rotary type)



Dependable safety valve to retain a set supply air pressure and guarantee a steady process control when a supply air is suddenly failed by accident and its pressure becomes lower than a set pressure



LUS

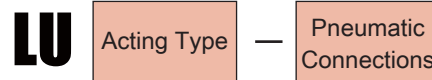


LUD

Specifications

	LU	
	LUS	LUD
Proof Pressure	Max 10 kgf/cm ² (150psi)	
Signal Pressure	1.4 ~ 7 kgf/cm ²	
Line Pressure	Max 7 kgf/cm ² (105psi)	
Flow Capacity (Cv)	0.9	
Operating Temperature	-20 ~ +70°C	
Pneumatic Connections	Rc 1/4 or NPT 1/4	
Hysteresis	Within 0.1 kgf/cm ²	
Body Material	Aluminum die-cast	
Weight	0.6 kg	0.8 kg

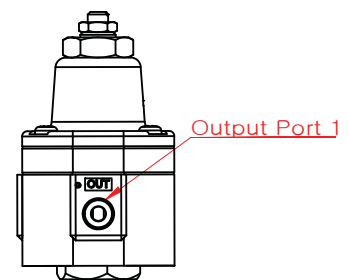
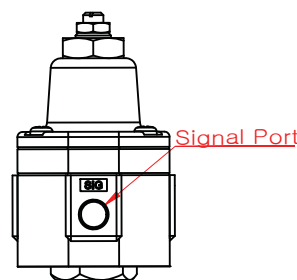
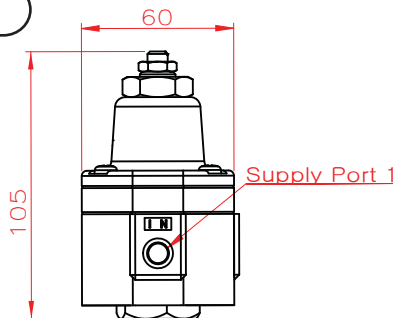
How to Order



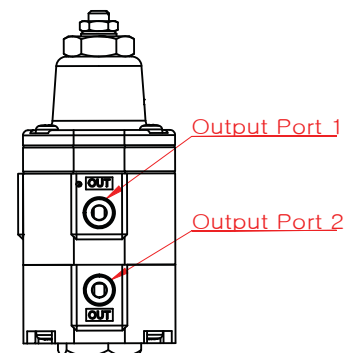
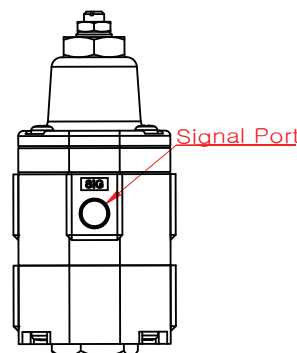
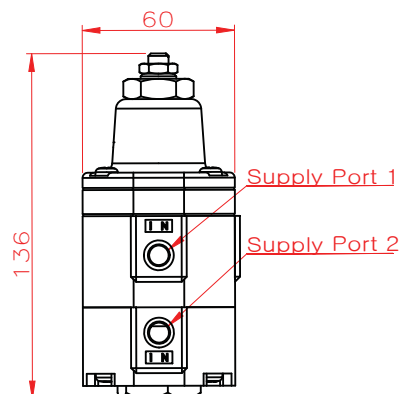
Description	Code
Acting Type :	S : Single acting D : Double acting
Pneumatic Connections :	1 : Rc 1/4 2 : NPT 1/4

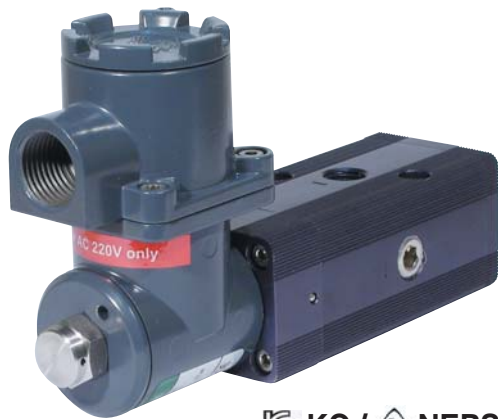
Dimensions

- LUS



- LUD





 **KC** /  **NEPSI flameproof**

**Explosion proof solenoid valve
for a confident control in
rough working environments**

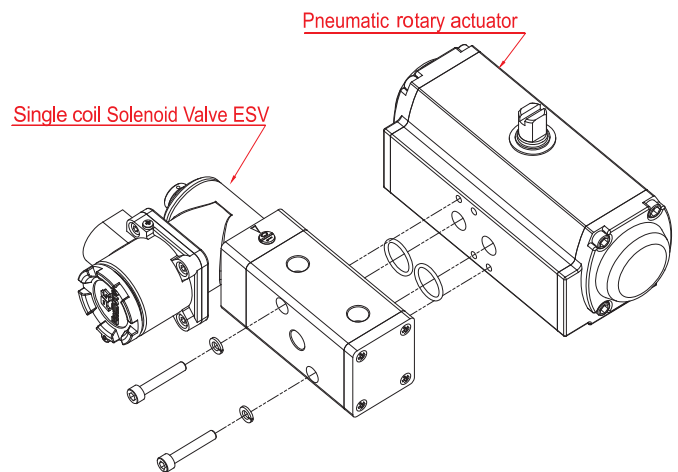
Features

- ▶ Rugged aluminum die-cast housing
- ▶ Convertible from 5/2 way to 3/2 way
- ▶ Rotatable valve head for optimal mounting
- ▶ Direct NAMUR mounting or screw mounting

Specifications

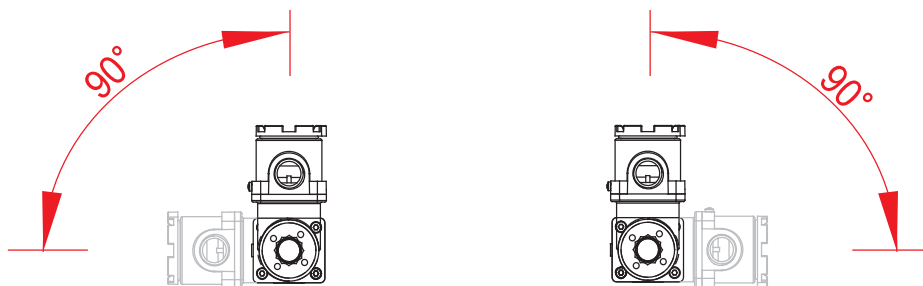
Model	ESV-S
Operating Air Pressure	1.5 - 10 bar
Air Supply (Max.)	15 bar
Operating Voltage : Current	AC 110V : 55 mA AC 220V : 17 mA DC 24V : 138 mA
Voltage Tolerance	± 10%
Frequency	50Hz / 60Hz
Explosion Proof Class	Exd IIC T6 (KOSHA Cert. No. 2008-1052-Q1)
Operating Ambient Temperature	-20°C - +60°C
Flow Capacity (Cv)	0.9
Mounting Configuration	NAMUR or screw interface
Pneumatic Connections	Rc 1/4 or NPT 1/4
Electrical Connection	G 1/2 or NPT 1/2
Coil Insulation Grade	Class F
Duty Cycle	100%
Weight	0.9 kg

Mounting



Rotatable Valve Head

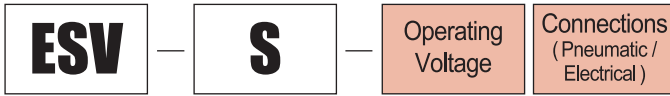
The ESV valve head can be rotated by 90° to the right or to the left for an optimal mounting as shown below



ESV-S (Single Coil)

Solenoid Valve

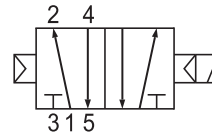
How to Order



Description	Code
Operating Voltage:	A220 : AC 220V A110 : AC 110V D24 : DC 24V
Connections: (pneumatic - electrical)	P : Rc 1/4 - G 1/2 N : NPT 1/4 - NPT 1/2

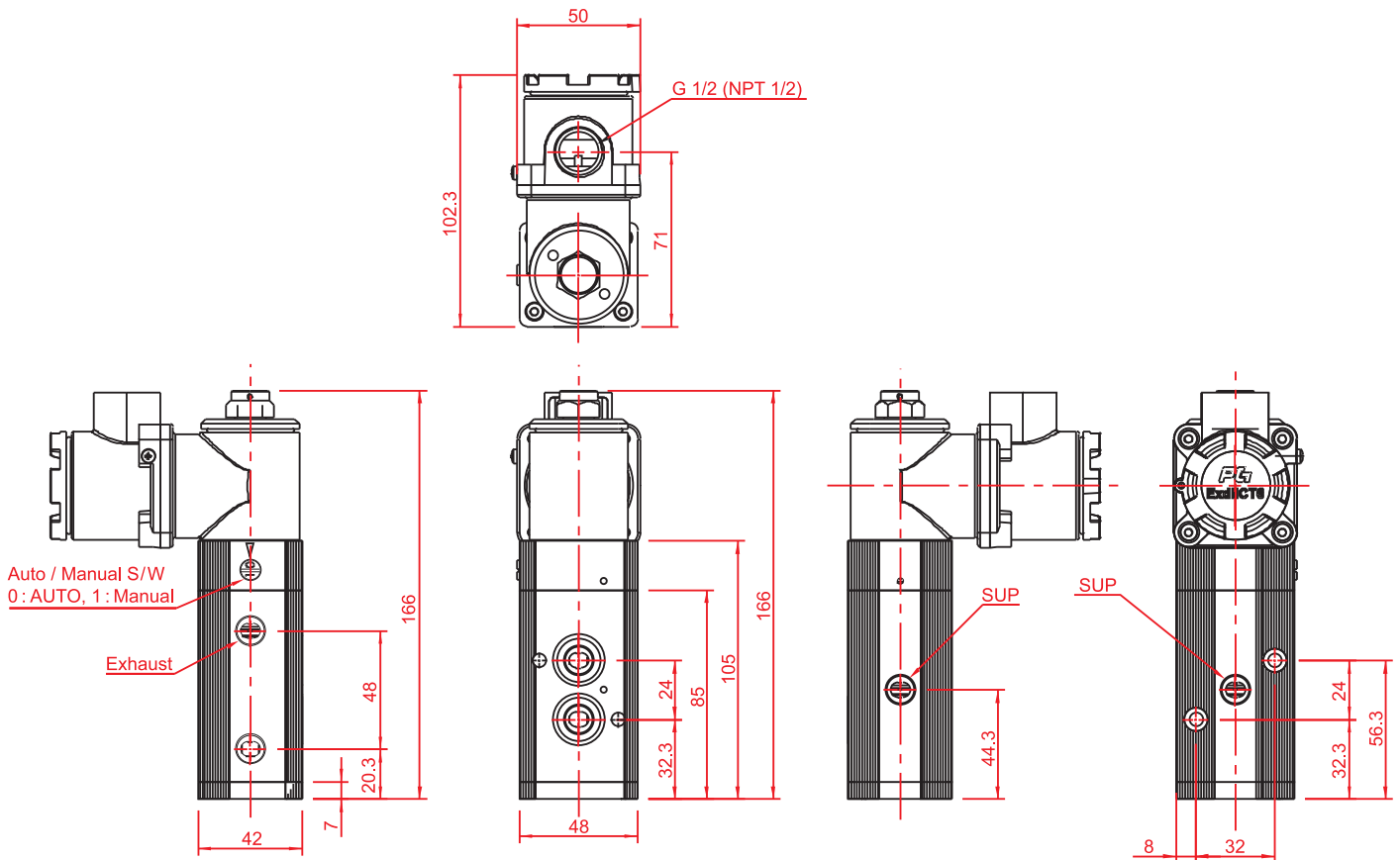
Ex) ESV-S-D24P (Single Coil, 24VDC, Rc 1/4 - G 1/2)

Symbol of Operation



Dimensions

Single Coil Type





  **NEPSI flameproof**

**Explosion proof solenoid valve
for a confident control in
rough working environments**

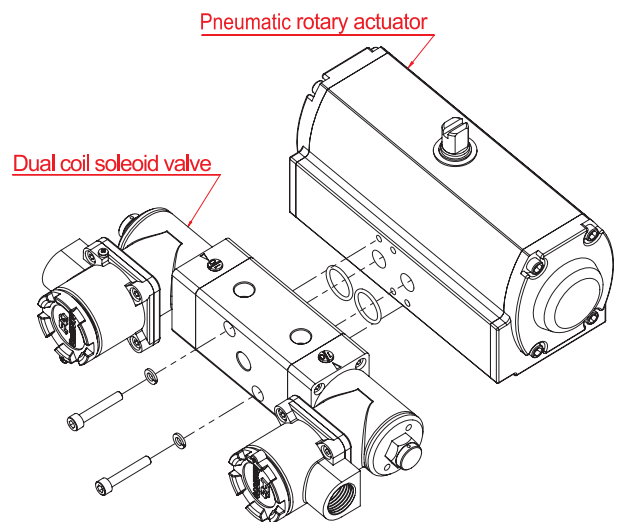
Features

- ▶ Rugged aluminum die-cast housing
- ▶ Convertible from 5/2 way to 3/2 way
- ▶ Rotatable valve head for optimal mounting
- ▶ Direct NAMUR mounting or screw mounting

Specifications

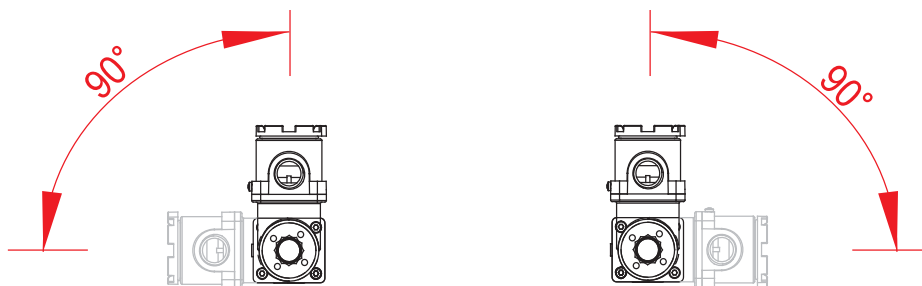
Model	ESV-D
Operating Air Pressure	1.5 - 10 bar
Air Supply (Max.)	15 bar
Operating Voltage : Current	AC 110V : 55 mA AC 220V : 17 mA DC 24V : 138 mA
Voltage Tolerance	± 10%
Frequency	50Hz / 60Hz
Explosion Proof Class	Exd IIC T6 (KOSHA Cert. No. 2008-1052-Q1)
Operating Ambient Temperature	-20°C - +60°C
Flow Capacity (Cv)	0.9
Mounting Configuration	NAMUR or screw interface
Pneumatic Connections	Rc 1/4 or NPT 1/4
Electrical Connection	G 1/2 or NPT 1/2
Coil Insulation Grade	Class F
Duty Cycle	100%
Weight	1.4 kg

Mounting

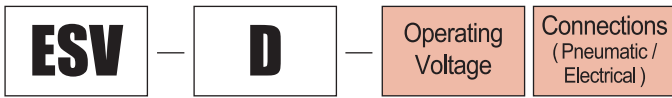


Rotatable Valve Head

The ESV valve head can be rotated by 90° to the right or to the left for an optimal mounting as shown below



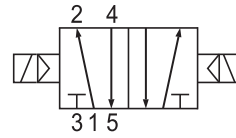
How to Order



Description	Code
Operating Voltage:	A220 : AC 220V A110 : AC 110V D24 : DC 24V
Connections: (pneumatic - electrical)	P : Rc 1/4 - G 1/2 N : NPT 1/4 - NPT 1/2

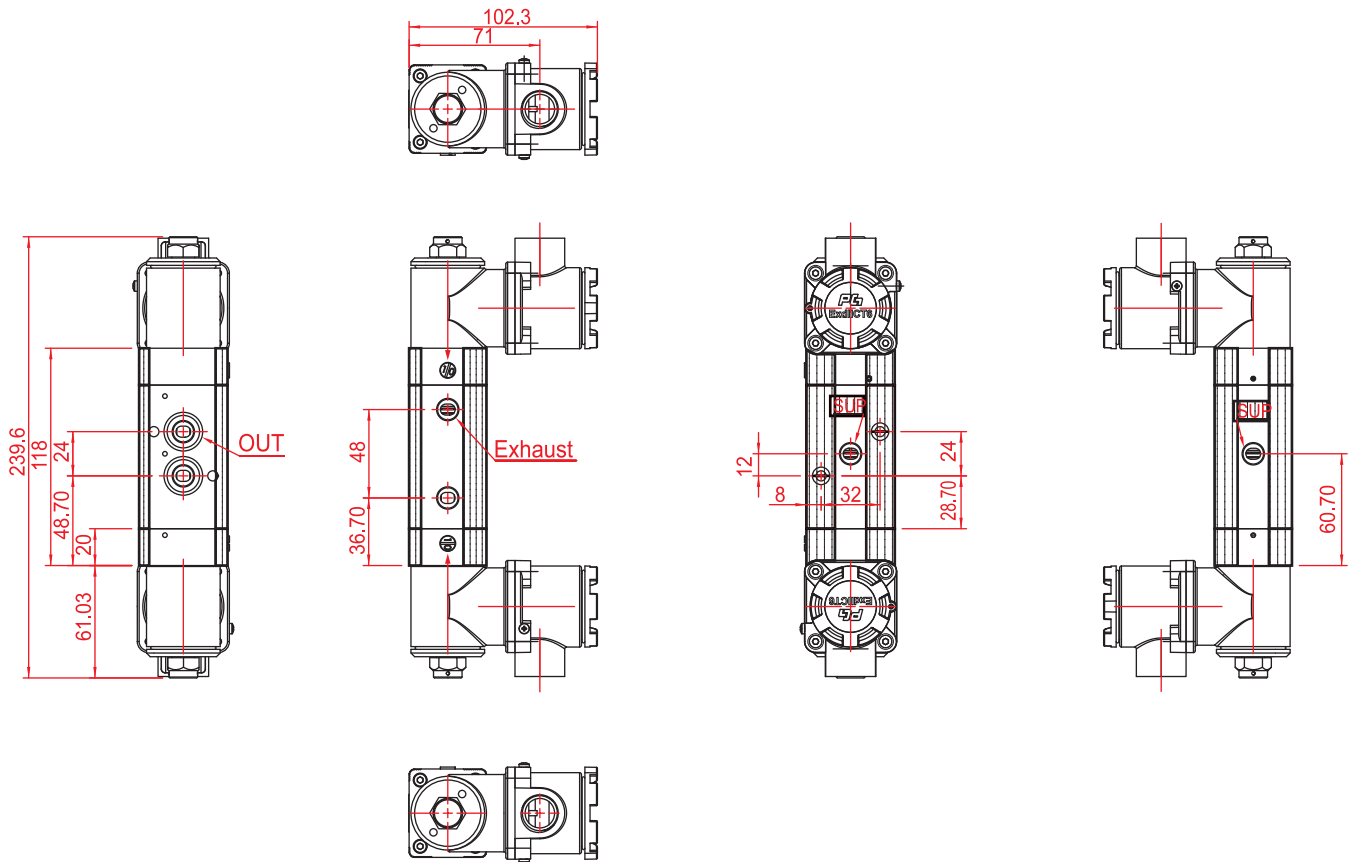
Ex) ESV-D-D24P (Dual Coil, 24VDC, Rc 1/4 - G 1/2)

Symbol of Operation



Dimensions

Dual Coil Type



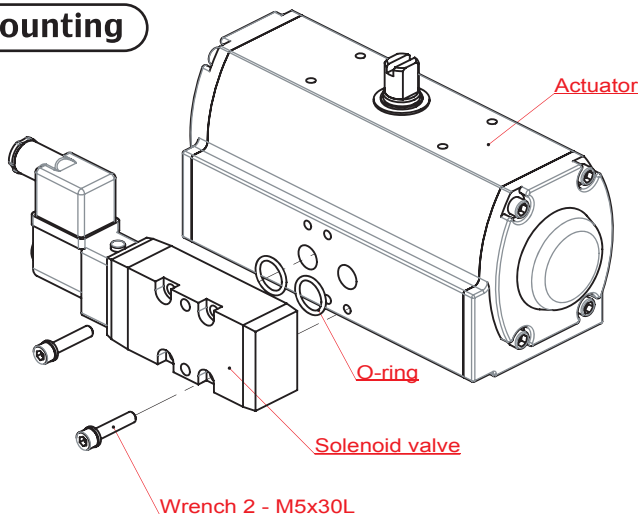


- 5 port pilot / no lubrication
- Excellent durability
- Suitable for operation of even large-sized actuators with large effective section area of valve
- Suitable for PLC control system and computerized system due to a low power consumption
- Direct NAMUR mounting type

Specifications

Model		ESV10 - S	ESV10 - D
Fluid		Air, Inert Gas	
Pneumatic Connections		Rc(PT) 1/4 / G 1/4	
Electrical Connection(s)		PG9	
Effective Sectional Area(Cv)		31.2 mm ² (1.7)	
Operating Pressure Range		1.5 - 9 bar	
Maximum Operating Frequency		5 cycle / sec.	
Operating (Response) Time		Less than 30ms	
Lubrication		Non-lubricant (if necessary, turbine oil ISO VG32 or equivalent recommended)	
Manual Operation		Non-lock push type	
Power	DC	2.8 W	
Consumption	AC	4.5 / 3.6VA (50 / 60Hz)	
Voltage Fluctuation Tolerance		± 10% of applicable voltage	
Operating Temperature		+5°C - +60°C	
Coil Insulation Class		Class F	
Applicable Cylinder Size for Reference		Ø32 - Ø125	
Weight		330g	410g

Mounting



How to Order

ESV10

Coil
Type

Pneumatic
Connections

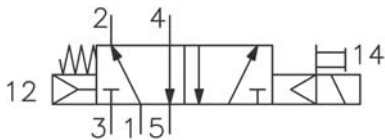
Operating
Voltage

Wiring
Method

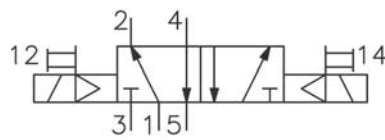
Description	Code	Description	Code
Coil type :	S : Single coil (return type) D : Dual coil (hold type)	Operating Volatage :	1 : AC 100/110V 50/60Hz 2 : AC 200/220V 50/60Hz 3 : DC 24V 4 : DC 12V
Pneumatic Connections :	R : PT 1/4 N : NPT 1/4 G : G 1/4	Wiring Method :	D : DIN connector Z : DIN connector with lamp and surge killer

Symbol of Operation

Single Coil (return type)

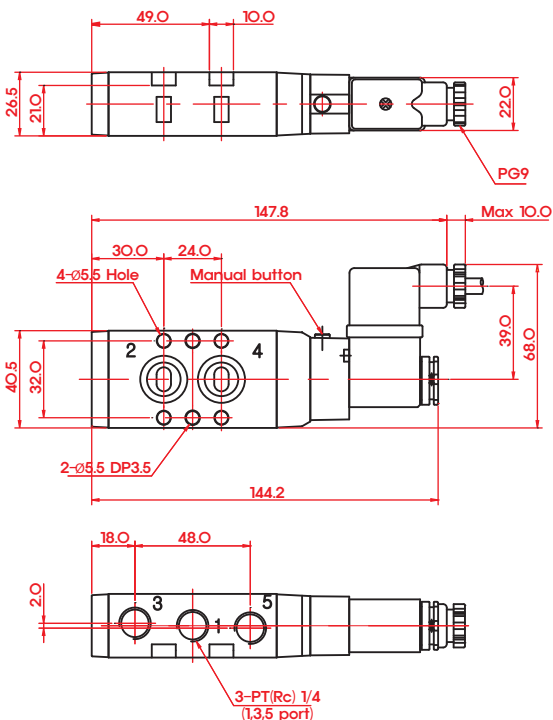


Dual Coil (hold type)

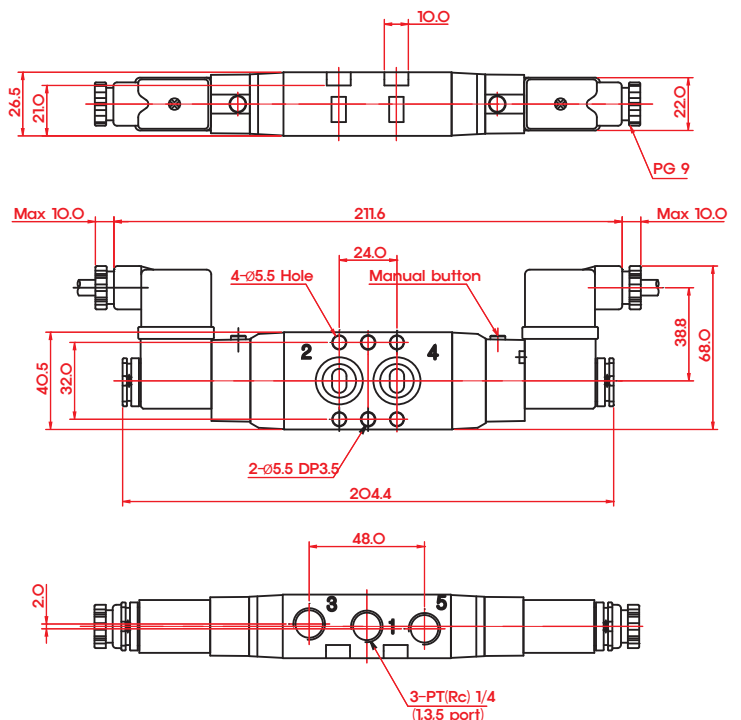


Dimensions

Single Coil Type



Dual Coil Type





Valve air unit essential to provide clean and dry supply air to valve positioners, solenoid valves and pneumatic actuators

Features

- ▶ Rugged aluminum die-cast housing
- ▶ Optional stainless steel 316 housing
- ▶ Stable setting pressure
- ▶ High capacity with 5 micron filter
- ▶ Self-relief function to balance output and setting pressures
- ▶ High flow capacity

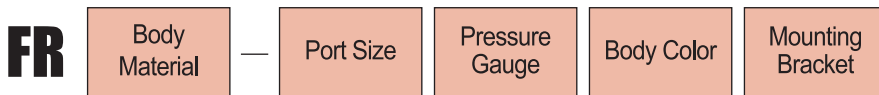
Specifications

Model	FR-10	FR-30
Port Size	Rc 1/4 or NPT 1/4	
Fluid	Air	
Output Pressure Range	0 - 8 bar (120 psi)	
Max. Supply Pressure	15 bar (225 psi)	
Operating and Fluid Temperature	Max. +70°C (no freezing)	
Supply Air	Filtered compressed, dry and non-oiled air (up to 5 micron)	
Gauge Port Size	Rc 1/8	
Filtration	5 micron	
Housing Material	Aluminum die-cast	Stainless steel 316
Pressure Gauge Material	Stainless steel	
Weight	0.5 kg	1 kg

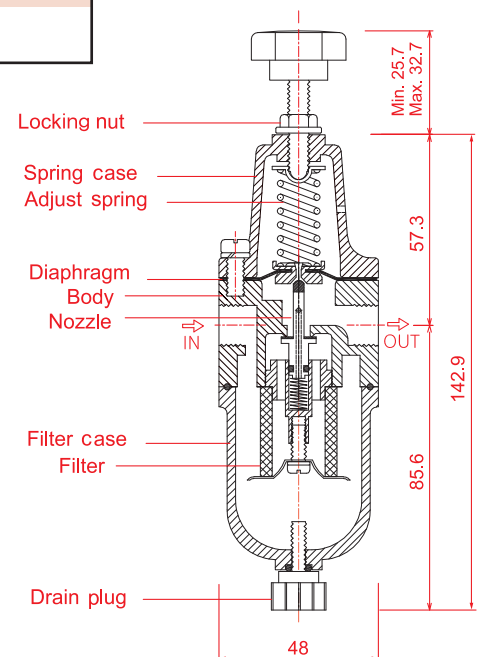


FR-30

How to Order



Description	Code	
Operation :	10: Aluminum die-cast	30: Stainless steel 316
Port Size :	R: Rc 1/4	N : NPT 1/4
Pressure Gauge :	N: None	2: 10 bar (150 psi)
	1: 6 bar (90 psi)	
Body Color :	G: Gray (standard)	S : None (for FR-30)
	B: Black	
Mounting Bracket :	N: None	M : L-type

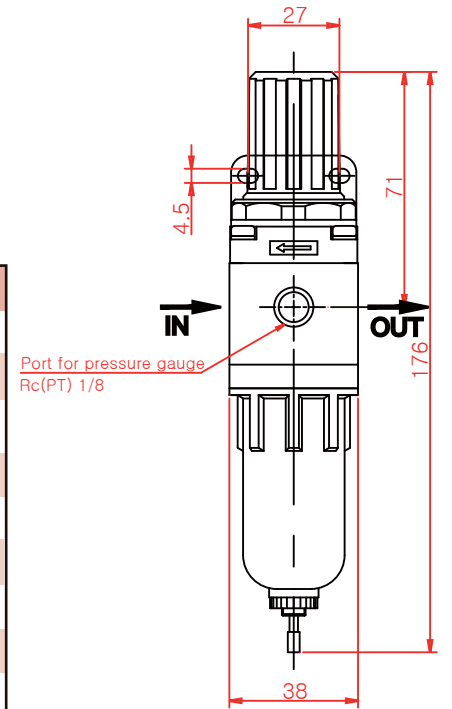




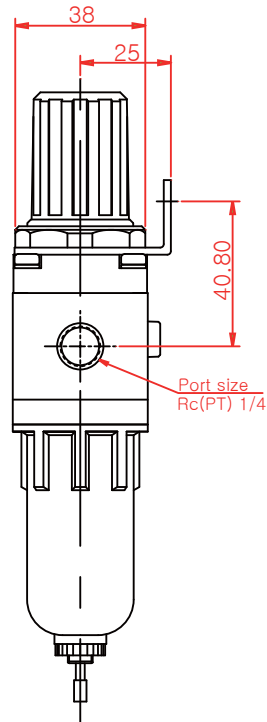
Compact air filter regulator with poly-carbonated body and optional auto-drain function

Specifications

Model	FR-15
Port Size	Rc 1/4 or NPT 1/4
Fluid	Air
Max. Supply Pressure	15 bar (225 psi)
Max. Operating Pressure	9 bar (130 psi)
Regulating Pressure	0.5 – 8.5 bar (7 – 123 psi)
Operating Temperature	5 – 60 °C
Supply Air	Filtered compressed, dry , non-oiled air and no freezing
Gauge Port Size	Rc 1/8
Filtration	10 microns
Housing Material	Poly -carbonate
Pressure Gauge Material	Stainless steel
Weight	0.4g (with pressure gauge)



< Front View >



< Side View >

How to Order

FR-15

Port Size

Pressure Gauge

Drain Type

Bowl Material

Description	Code
Port Size:	R: Rc 1/4 N: NPT 1/4
Pressure Gauge:	N: None 1: 6 bar (90 psi) 2: 10 bar (150 psi)
Drain Type:	M: Manual (standard) A: Auto-drain
Bowl Material:	N: PC bowl (standard) L: Metal bowl



Strong valve activator to increase actuator speed or decrease loss of supply air coming from a distance by supplying a larger flow capacity

Features

- ▶ Rugged aluminum die-cast housing
- ▶ High flow capacity

Specifications

Model	AVB
Max. Supply Pressure	10 kgf / cm ² (150 psi)
Max. Output Pressure	10 kgf / cm ² (150 psi)
Pressure Ratio In / Out	1 : 1
Flow Capacity (Cv)	1.25
In / Output Port Size	Rc 1/4 or NPT 1/4
Signal Port Size	Rc 1/4 or NPT 1/4
Operating Temperature	-20 - +70°C
Body Material	Aluminum die-cast
Weight	0.6 kg

How to Order

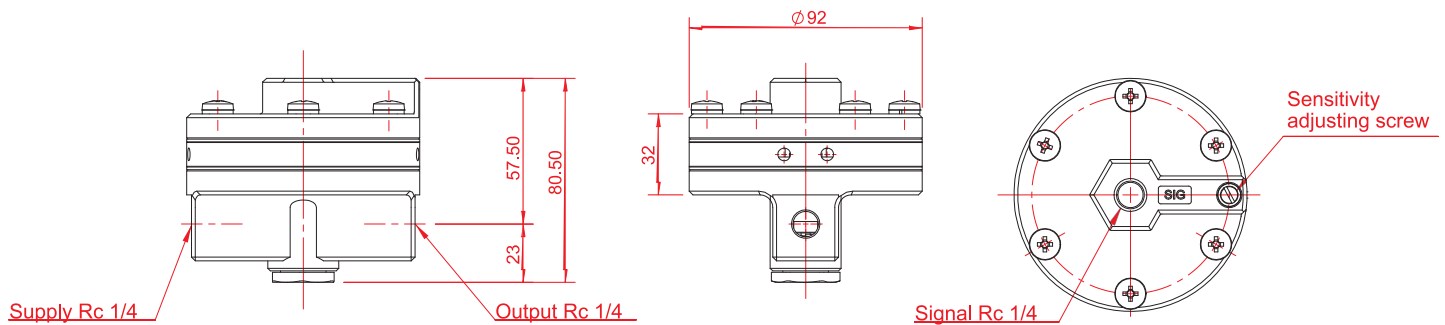
AVB—

Port
Size

Operating
Temp.

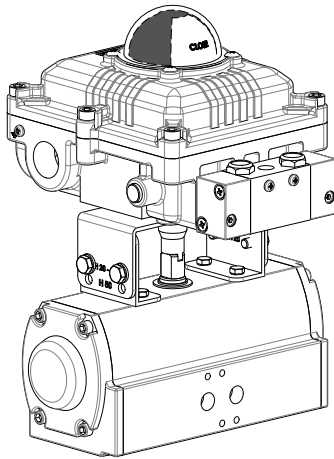
Description	Code
Port Size :	1 : Rc 1/4 - Rc 1/4
In - Output	2 : Rc 3/8 - Rc 3/8
	3 : NPT 1/4 - NPT 1/4
	4 : NPT 3/8 - NPT 3/8
Operating Temperature :	1 : -20 - +70°C (standard)
	2 : -20 - +120°C (high temp.)

Dimensions





With built-in solenoid valve



Explosion-proof robust valve position monitor with built-in solenoid and more feedback options and designed to provide an outstanding performance under harsh working environments

Features

- ▶ Flameproof IECEx / ATEX / KC Ex d IIB+H₂ T6 - IP66
- ▶ Rugged aluminum die-cast housing
- ▶ Compact single unit with built-in solenoid valve
- ▶ More economical in costs and simple wiring to a single unit comparison with separate installations of explosion proof limit switches and explosion proof solenoid valve
- ▶ Auto / Manual button easy to convert
- ▶ NAMUR mounting shaft or fork lever shaft adjustable for a non-NAMUR pneumatic actuator

Options

- ▶ 2 x SPDT mechanical limit switch
- ▶ 2 x P&F proximity sensor
- ▶ 4 - 20mA output position transmitter

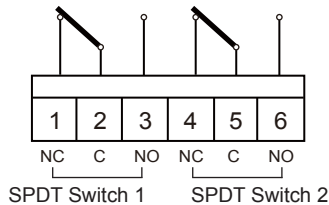
Specifications

	LSB-7
Protection Class	Flameproof IECEx / ATEX / KC Ex d IIB+H ₂ T6 - IP66
Operating Air Pressure	1.5 ~ 10 bar (single coil) / 1.0 ~ 10 bar (dual coils)
Air Supply	Max. 15 bar
Specifications of Mechanical Switches and Proximity Sensors	See next page
Operating Voltage of Solenoid Valve	24 VDC / 110 VAC / 220 VAC
Manual Override of Solenoid Valve	Push button type
Response Time of Solenoid Valve	25 ms
Coil Insulation Class	Class F
Operating Temperature	-20 ~ +80 °C
Pneumatic Connections	Rc 1/4 or NPT 1/4
Electrical Connections	G 3/4, G 1/2, G 1, NPT 3/4 NPT 1/2 or NPT 1
Body Material	Aluminum die-cast / powder-painted
Weight	2.5 kg

Mechanical Switches



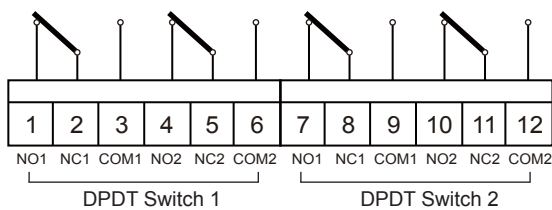
< SPDT Mechanical Switch >



SPDT, SZM-V16-2FA-61 / STARION					
Type		Non-inductive load		Inductive load	
		Resistive load	Lamp load	Inductive load	Motor load
Rating	250 VAC	16A	2A	10A	3A
	8 VDC	16A	4A	10A	6A
	30 VDC	10A	4A	10A	4A
	125 VDC	0.6A	0.1A	0.6A	0.1A
	250 VDC	0.3A	0.05A	0.3A	0.05A
Operating Temperature		-20 ~ +105 °C			



< DPDT Mechanical Switch >



DPDT, DZ-10G / OMRON								
Type		Non-inductive load			Inductive load			
		Resistive load		Lamp load	Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC
Rating	125 VAC	10A	2A	1A	6A	3A	1.5A	
	250 VAC	10A	1.5A	0.7A	4A	2A	1A	
	8 VDC	10A	3A	1.5A	6A	5A	2.5A	
	14 VDC	10A	3A	1.5A	6A	5A	2.5A	
	30 VDC	10A	3A	1.5A	4A	3A	1.5A	
	125 VDC	0.5A	0.5A	0.5A	0.05A	0.05A	0.05A	
	250 VDC	0.25A	0.25A	0.25A	0.03A	0.03A	0.03A	
Operating Temperature		-20 ~ +80 °C						

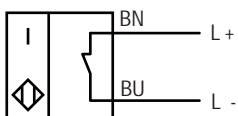
Proximity Sensors



< NJ2-V3-N / P&F >



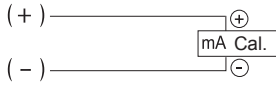
< NJ4-12GM-N / P&F >



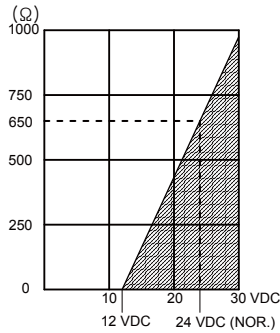
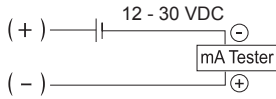
NJ2-V3-N / P&F		NJ4-12GM-N / P&F	
General Specifications		General Specifications	
Switching element function	NAMUR NC	Switching element function	NAMUR NC
Rated operating distance	2mm	Rated operating distance	4 mm
Installation	embeddable	Installation	not embeddable
Output polarity	NAMUR	Output polarity	NAMUR
Assured operating distance	0 ~ 1.62mm	Assured operating distance	0 ~ 3.24 mm
Nominal Ratings		Nominal Ratings	
Nominal voltage	8.2 VDC	Nominal voltage	8.2 VDC
Switching frequency	0 ~ 1000 Hz	Switching frequency	0 ~ 1000 Hz
Hysteresis	0.01 ~ 0.1 mm	Hysteresis	3 %
Current consumption		Current consumption	
Measuring plate not detected	> 3 mA	Measuring plate not detected	> 3 mA
Measuring plate detected	< 1 mA	Measuring plate detected	< 1 mA
Mechanical Specifications		Mechanical Specifications	
Connection type	cable PCV, 130 mm	Connection type	cable PCV, 2 m
Core cross-section	0.14 mm	Core cross-section	0.34 mm
Housing material	PBT	Housing material	Stainless steel
Sensing face	PBT	Sensing face	PBT
Protection degree	IP67	Protection degree	IP67
Operating Temperature	-25 ~ +100 °C	Operating Temperature	-25 ~ +100 °C

Position Transmitter

① With mA loop calibrator



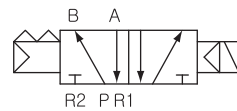
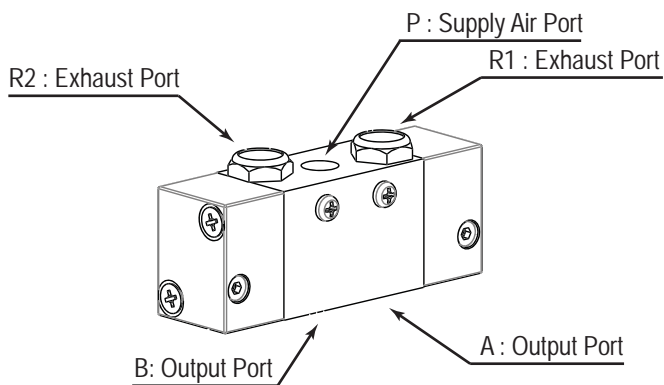
② With multimeter (mA)



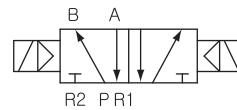
Transmitter Load Limitation

Position Transmitter	
Output Signal	4 - 20 mA, 2-wire
Power Supply	12 - 30 VDC
Output Current Limit	30 mA DC
Linearity	±0.5% F.S
Operating Temperature	-20 ~ +80 °C

Solenoid Valve



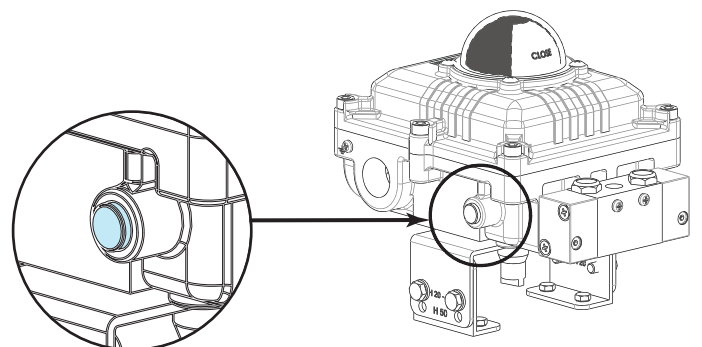
2 Position with Single Coil



2 Position with Dual Coils

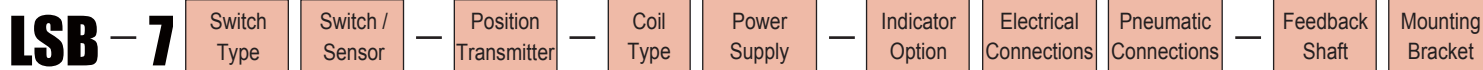
< Symbols of Operation >

Supply Air		Filtered, compressed, dry and non-oiled air
Supply Air Pressure	2 position with single coil	1.5 ~ 9.9 bar
	2 position with dual coils	1.0 ~ 9.9 bar
Eff. Sectional Area (5 kgf/cm ²)		19.0 mm ²
Manual Override		Push button type
Response Time		25 ms or less
Max. Working Frequency		5 c/sec
Power Consumption		AC : 4.5 / 3.6VA (60Hz/50Hz) DC : 2.8W
Coil Insulation Class		Class F or equivalent
Permissible Voltage Variation		±10% of rated voltage
Lubrication		Not required



< Auto Manual Button >

How to Order

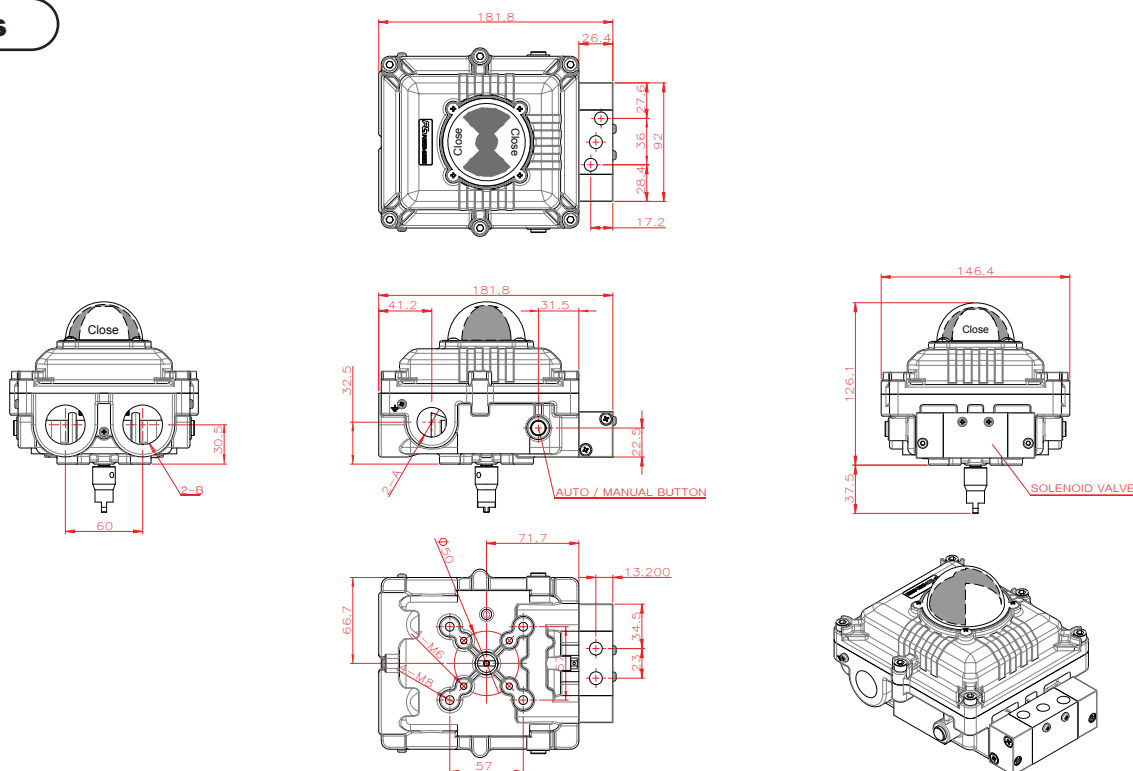


Description	Code
Switch Type :	0 : Mechanical switches 1 : Proximity sensors
Switch / Sensor : - Mechanical Switches	N : None 0 : 2 x SPDT 1 : 3 x SPDT 2 : 4 x SPDT 4 : 2 x DPDT
- Proximity Sensors	6 : 2 x NJ2-V3-N / P&F 7 : 4 x NJ2-V3-N / P&F 8 : 2 x NJ4-2GM-N / P&F 9 : 4 x NJ4-12GM-N / P&F
Position Transmitter :	N : None O : 4 ~ 20mA output signal
Coil Type :	N : None S : Single coil type D : Dual coil type
Pilot Power Supply :	A : 220 VAC B : 110 VAC C : 24 VDC

Description	Code
Indicator Option :	N : 2-way (standard) L : 3-way L-port T : 3-way T-port
Electrical Connections :	A : 2 x PF 1/2 B : 2 x NPT 1/2 C : 2 x M20 x 1.5 E : 2 x PF 3/4 (standard) F : 2 x NPT 3/4 H : 2 x PF 1 I : 2 x NPT 1
Pneumatic Connections :	0 : None (without solenoid) 1 : Rc 1/4 2 : NPT 1/4
Feedback Shaft :	F : Fork lever N : NAMUR shaft (direct mounting)
Mounting bracket :	N : None R : Multi-size bracket for VDI/VDE 3845 (IEC 60534-6-2)

Ex) LSB-700-O-SA-NAR-NR : Mechanical Switches / 2xSPDT / 4~20mA output signal / 220 VAC single coil / 2-way indicator / 2xPF 1/2 / Rc 1/4 / NAMUR shaft / Multi-size bracket

Dimensions





Robust valve position monitor with good recognizable dome indicator and various switches and feedback options

Features

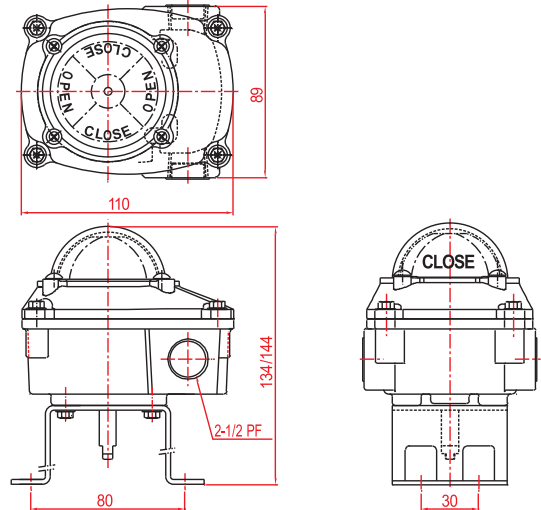
- ▶ Rugged aluminum die-cast housing
- ▶ NAMUR mounting
- ▶ Optional stainless steel housing (only for LSB-500)

Specifications

LSB-100

	Standard	Options
Enclosure	Weather proof IP67, O-ring sealed	IP 68
Outside coating	Epoxy-Polyester against corrosion	Nylon coating
Ambient temperature	-20°C – +80°C	Higher (~ +100°C) and lower (-40°C ~) temperature
Electrical connections	2 - PF1/2"	NPT1/2", M20x1.5, PG13.5
Terminal block	8 terminal strips (6 for switches, 2 for solenoid valve power)	
Position indicator	Dome type 0°~90°	3 way L-port, T-port
Mounting bracket	Stainless steel acc. to VDI/VDE3845, NAMUR type SS1 or SS2	SS3, MT1
Switches (sensors)	2-SPDT mechanical switch(Form C)	Proximity sensors (P & F, Autonics), Magnetic sensors
Body / Cover material	Aluminum die-cast	

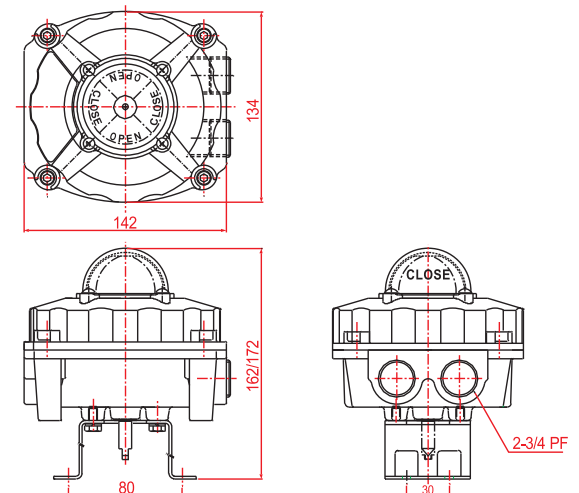
Dimensions



LSB-100

LSB-300 & LSB-500

	Standard	Options
Enclosure	Explosion proof Ex d IIC T6, IP67, O-ring sealed	IP 68
Outside coating	Epoxy-Polyester outside against corrosion	Nylon coating
Ambient temperature	-20°C – +80°C	Higher (~ 100°C) and lower (-40°C ~) temperature
Cable entries	2 - PF3/4"	NPT3/4", M25x1.5, M20x1.5
Terminal block	8 terminal strips (6 for switches, 2 for solenoid valve power)	
Position indicator	Dome type 0°~90°	3 way L-port, T-port
Mounting bracket	Stainless steel acc. to VDI/VDE3845 NAMUR type SS1 or SS2	SS3, MT1
Switches (sensors)	2-SPDT mechanical switch(Form C)	DPDT Switches Proximity sensors (P & F, Autonics) Magnetic sensors Position transmitter (output 0~1Kohm, 4~20mA DC)
Body / Cover material	Aluminum die-cast (LSB-300)	Stainless steel 316L (LSB-500)



LSB-300 & LSB-500

How to Order

LSB —

Explosion proof class

Switch Type

Switch / Feedback Option

Electrical Connections

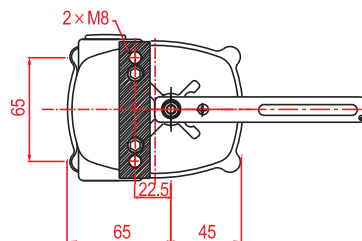
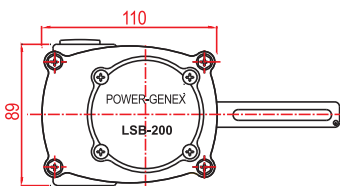
Indicator Option

Mounting Bracket

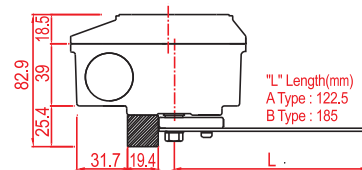
Description	Code
Explosion proof class:	1 : Weatherproof 2 : Linear type weatherproof 3 : Flameproof (Exd IIC T6)
Switch Type:	0 : Mechanical switches 1 : Proximity sensors
Switch / Feedback Option: - Mechanical switches and feedback	0 : 2 x SPDT 1 : 3 x SPDT 2 : 4 x SPDT 3 : 2 x SPST 4 : 2 x DPDT 5 : 2 x SPDT + 0-1kohm output 6 : 2 x SPDT + 4-20 mA output 7 : 2 x OMRON SPDT VX-012-1A3 gold-plated
- Proximity sensors	0 : AUTONICS PS17-5DNU 1 : P&F NJ2-V3-N 2 : P&F NJ4-12GK-SN 3 : P&F NBB2-V3-E2

Description	Code
Electrical Connections: - LSB-100 & 200	A : PF 1/2 (standard) B : NPT 1/2 C : M20 x 1.5 D : PG13.5
- LSB-300 & 500	E : PF 3/4 (standard) F : NPT 3/4 G : M25 x 1.5 C : M20 x 1.5
Indicator Option: (not available with LSB-200)	N : 2-way (standard) L : 3-way L-port T : 3-way T-port
Mounting Bracket: (not available with LSB-200)	0 : None 1 : 80x30x20 2 : 80x30x30 3 : 130x30x30 4 : Multi-size bracket

Dimensions (LSB-200)

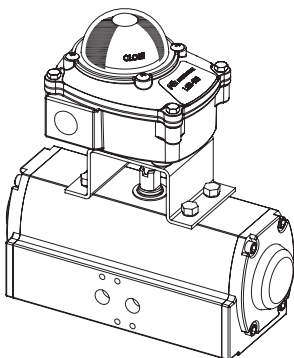


<BOTTOM VIEW>

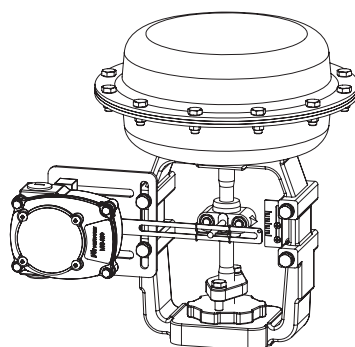


"L" Length(mm)
A Type : 122.5
B Type : 185

Mounting



LSB-100



LSB-200

Features

- ▶ Ideally designed for operation of 1" ball valve
- ▶ High efficiency and durability
- ▶ Free voltage (87~270 VAC, 1 phase) and optional 24V AC/DC
- ▶ Compact and light



PG11 cable gland with wires



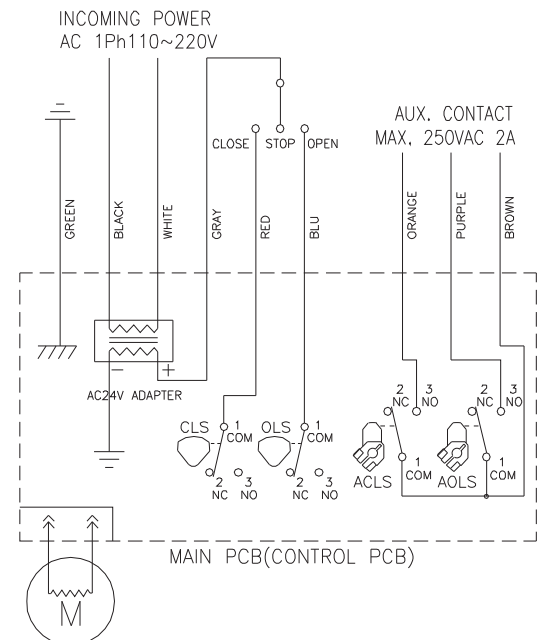
ISO F03 flange

11 x 11mm square female shaft

Specifications

Model		PGI 0020	
Rate Torque (Nm)		25	
Main Power		Free voltage (110 / 220VAC / 1Ph / 50 / 60Hz) 24V AC / DC	
Operating Time	50 Hz	11	
	60 Hz		
Rated Current	24V	AC	0.60
		DC	0.55
	1Phase	110	0.16
		220	0.08
Motor Insulation Class		E	
Enclosure		IP66, O-ring sealed	
Duty Cycle (on-off)		S2 : 50%	
Motor		DC motor	
Limit Switches		1 ea for Open & Close (5A, 250VAC)	
Extra Limit Switches		Relays for Open & Close (5A, 250VAC)	
Mounting		ISO F03, 9 X 9 - DP12 square female shaft	
Travel Angle		90° ± 5°	
Electrical Connection		1-PG11 cable gland with wires 30cm long	
Surface Protection		Polyester coating	
Operating Temperature		-10°C - +65°C	
Humidity (R.H)		90%	
Weight		1 kg	

Wiring



Globe valve equipped with angle seat body and flat plug with soft seal



Features

- ▶ Spring return closed or open, double-acting
- ▶ Stainless steel valve body standard (316SS)
- ▶ High flow rate
- ▶ Optical visual indication
- ▶ Low control air consumption due to minimized volume in the actuator
- ▶ Optional mechanical switches, proximity sensors, solenoid valve, valve positioner, stroke limiter and manual override device
- ▶ Proportional plug on request

Applications

- Water, air, steam up to 180°C, oils, corrosive media, neutral gases and liquids, textile dyeing and drying, ink and paint dispensing

Specifications

1) Valve Body

Size	DN15, DN20, DN25, DN32, DN40, DN50	
End Connections	Female thread, socket welding, flange type (ANSI, DIN, JIS)	
Nominal Pressure	PN16	
Wetted Material	Body	Stainless steel 316
	Plug & Steam	Stainless steel 316
	Plug Sealing	PTFE
	Packing	PTFE
Leakage Class	ANSI Class VI	
Media Viscosity	Max. 600 mm ² /s	
Fluid Temperature	-10 ~ +180°C (steam up to +180°C)	

2) Actuator

Type	Pneumatic piston actuator Normally close, normally open, double acting
Size	50mm, 63mm, 80mm, 100mm
Material	PA, PPS
Piston Seal Material	Viton
Pilot Port	G 1/4
Control Media	Air, natural gas
Control Pressure	4 ~ 10 bar
Rotation	360°
Ambient Temp.	PA : -10°C ~ +60°C PPS : +5°C ~ +130°C

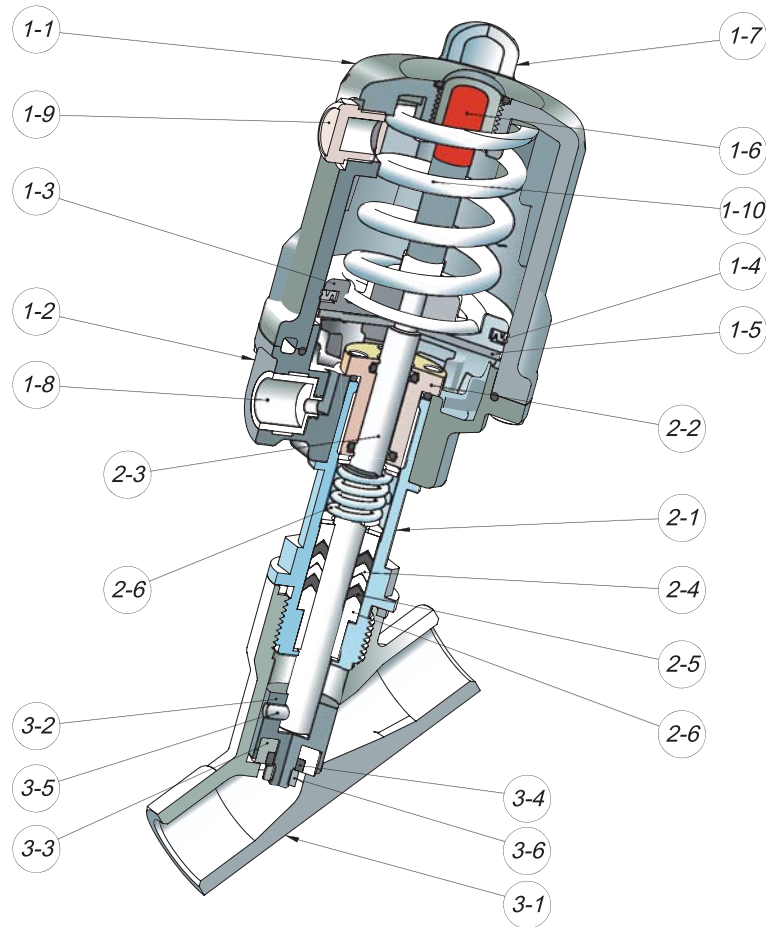


With Limit Switch Box



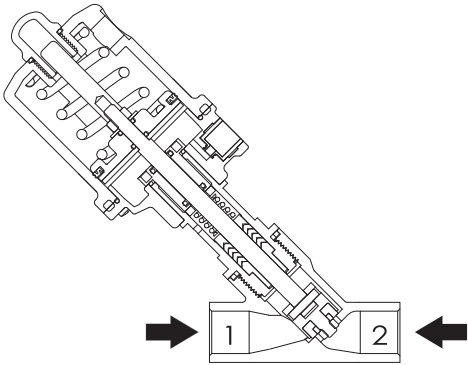
Internal View of Limit Switch Box

Internal View



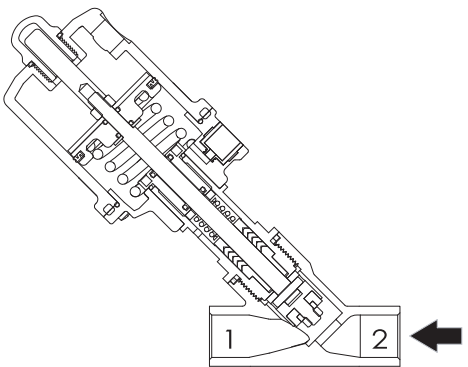
Part No.	Description	M	aterial	Q'ty
1-1	Auctuator case (UP)		PA & PPS	1
1-2	Auctuator case (Down)		PA & PPS	1
1-3	Piston		PA & PPS	1
1-4	Piston seal		Viton	1
1-5	Piston washer		316SS	1
1-6	Indicator rod		AL	1
1-7	indicator cap		PC	1
1-8	Air inlet		Brass	1
1-9	Noise filter	B	rass	1
1-10	Return Spring		SPS4	1
2-1	Stuffing box		316SS	1
2-2	Stuffing box joint screw		Brass	1
2-3	Valve stem		316SS	1
2-4	V-packing (1)		PTFE	2
2-5	V-packing (2)	V	iton	2
2-6	Packing Spring		STS304	1
3-1	Valve body		CF8M(316SS)	1
3-2	Plug		316SS	1
3-3	Plug seal		PTFE	1
3-4	Plug washer		316SS	1
3-5	Plug ping		316SS	1
3-6	Lock Nut		316SS	1

Normally Close (NC) 1 → 2 or 2 → 1



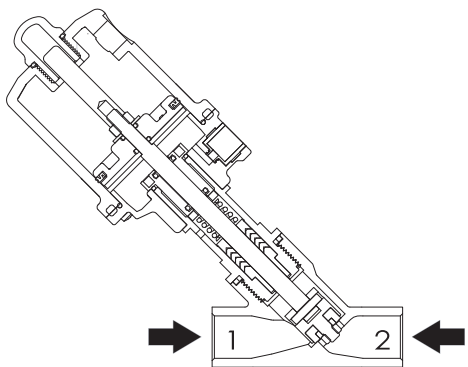
Valve size		Flow (Cv)	Operating pressure differential (bar)	Control Pressure (bar)		Actuator size (mm)	Weight (kg)	Part No.
DN	NPT			max	min			
15	1/2"	5.4	16	4.0	10	50	0.9	PG3-15XC5XX
20	3/4"	11.0	16	4.0	10	50	1.1	PG3-20XC5XX
25	1"	20.7	12	4.0	10	63	1.7	PG3-25XC6XX
32	1-1/4"	25	7	4.0	10	63	2.3	PG3-32XC6XX
32	1-1/4"	25	12	4.0	10	80	2.9	PG3-32XC8XX
40	1-1/2"	30.7	10	4.0	10	80	3.3	PG3-40XC8XX
40	1-1/2"	30.7	14	4.0	10	100	4.4	PG3-40XC9XX
50	2"	55.3	5	4.0	10	80	4.5	PG3-50XC8XX
50	2"	55.3	9	4.0	10	100	5.8	PG3-50XC9XX

Normally Open (NO) 2 → 1



Valve size		Flow (Cv)	Operating pressure differential (bar)	Control Pressure (bar)		Actuator size (mm)	Weight (kg)	Part No.
DN	NPT			max	min			
15	1/2"	5.4	16	4.0	10	50	0.9	PG3-15XO5XX
20	3/4"	11.0	16	4.0	10	50	1.1	PG3-20XO5XX
25	1"	20.7	15	4.0	10	63	1.7	PG3-25XO6XX
32	1-1/4"	25	10	4.0	10	63	2.3	PG3-32XO6XX
32	1-1/4"	25	14	4.0	10	80	2.9	PG3-32XO8XX
40	1-1/2"	30.7	10	4.0	10	80	3.3	PG3-40XO8XX
40	1-1/2"	30.7	15	4.0	10	100	4.4	PG3-40XO9XX
50	2"	55.3	8	4.0	10	80	4.5	PG3-50XO8XX
50	2"	55.3	10	4.0	10	100	5.8	PG3-50XO9XX

Double Acting, Bo-Direction 1 → 2, 2 → 1



Valve size		Flow (Cv)	Operating pressure differential (bar)	Control Pressure (bar)		Actuator size (mm)	Weight (kg)	Part No.
DN	NPT			max	min			
15	1/2"	5.4	16	4.0	10	50	0.8	PG3-15XD5XX
20	3/4"	11.0	16	4.0	10	50	1.0	PG3-20XD5XX
25	1"	20.7	16	4.5	10	63	1.5	PG3-25XD6XX
32	1-1/4"	25	12	4.5	10	63	2.1	PG3-32XD6XX
32	1-1/4"	25	16	4.5	10	80	2.4	PG3-32XD8XX
40	1-1/2"	30.7	12	4.5	10	80	2.8	PG3-40XD8XX
40	1-1/2"	30.7	16	4.5	10	100	3.1	PG3-40XD9XX
50	2"	55.3	9	4.5	10	80	4.0	PG3-50XD8XX
50	2"	55.3	12	4.5	10	100	4.5	PG3-50XD9XX

How to Order

PG3

Valve Size

Body Connections

Actuator Type

Actuator Size

Actuator Material

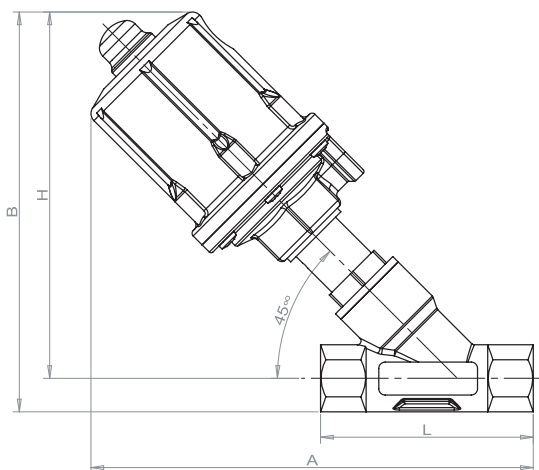
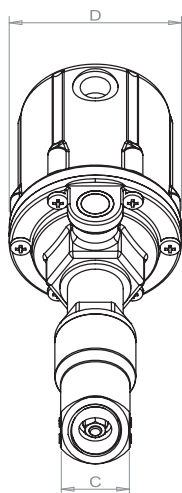
Options

* Body material: 3 = CF8M (316SS) , Other material on request

Description	Code
Valve Size:	15 = 1/2" (DN15) 20 = 3/4" (DN20) 25 = 1" (DN25) 32 = 1-1/4" (DN32) 40 = 1-1/2" (DN40) 50 = 2" (DN50)
Body Connections:	G = G threaded(standard) N = NPT threaded S = Socket welded F = Flange type (ANSI, DIN, JIS)
Actuator Type:	C = Normally close O = Normally open D = Double acting

Description	Code
Actuator Size:	5 = 50mm 6 = 63mm 8 = 80mm 9 = 100mm
Actuator Material:	A = PA : -10°C ~ +60°C (standard) S = PPS : +5°C ~ +130°C
Options:	N = Without accessory MS = Micro switches (open and close) PS = Proximity sensors (P&F NJ2) SV = Solenoid valve EP = Positioner (E/P or P/P) SL = Stroke limiter MO = Manual override device

Dimensions



Valve size		Actuator mm	A	B	C	D	H	L	Part No.
DN	NPT								
15	1/2"	ø 50	174.5	158	27	ø 68	144.5	84	PG3-15XX5XX
20	3/4"	ø 50	182	163.5	34	ø 68	146.5	94	PG3-20XX5XX
25	1"	ø 63	211	192.5	40	ø 84	172.5	104	PG3-25XX6XX
32	1-1/4"	ø 63	225	211.5	49	ø 84	187	120	PG3-32XX6XX
32	1-1/4"	ø 80	247.5	234	49	ø 105	209.5	120	PG3-32XX8XX
40	1-1/2"	ø 80	252	238.5	55	ø 105	211	130	PG3-40XX8XX
40	1-1/2"	ø 100	294.5	281	55	ø 126	253.5	130	PG3-40XX9XX
50	2"	ø 80	275	267	70	ø 105	232	150	PG3-50XX8XX
50	2"	ø 100	317	309	70	ø 126	274	150	PG3-50XX9XX

Unit Conversion Table

Length

From To→	mm	cm	m	km	in	ft	yd	mile
mm	1	0.1	0.001	-	0.03937	-	-	-
cm	10	1	0.01	-	0.393701	0.032808	-	-
m	1000	100	1	0.001	39.3701	3.28084	1.09361	-
km	-	-	1000	1	-	3280.84	1093.61	0.621371
in	25.4	2.54	-	-	1	0.083333	0.027778	-
ft	304.8	30.48	0.3048	-	12	1	0.33333	-
yd	914.4	91.44	0.9144	0.000914	36	3	1	0.000568
mile	-	-	1609.344	1.609344	-	5280	1760	1

Tip) SI Unit : mm, cm, m, km

Square Measure

From To→	cm ²	m ²	km ²	in ²	ft ²	yd ²	acre	mile ²
cm ²	1	0.0001	-	0.155	0.001076	0.00012	-	-
m ²	10000	1	0.000001	1550	10.7639	1.19599	0.000247	-
km ²	-	1000000	1	-	-	-	247.105	0.386102
in ²	6.4516	0.000645	-	1	0.006944	0.000772	-	-
ft ²	929.03	0.092903	-	144	1	0.111111	0.000023	-
yd ²	8361.27	0.836127	-	1296	9	1	0.000207	-
acre	-	4046.86	0.004047	-	43560	4840	1	0.001562
mile ²	-	-	2.589987	-	-	-	640	1

Tip) SI Unit : cm², m², km²

Weight

From To→	kg	tonne	lb	UK cwt	UK ton	UK cwt	UK ton
kg	1	0.001	2.20462	0.019684	0.000984	0.022046	0.001102
tonne	1000	1	2204.62	19.6841	0.984207	22.0462	1.10231
lb	0.453592	0.000454	1	0.008929	0.000446	0.01	0.0005
UK cwt	50.8023	0.050802	112	1	0.05	1.12	0.056
UK ton	1016.05	1.01605	2240	20	1	22.4	1.12
US cwt	45.3592	0.045359	100	0.892857	0.044643	1	0.05
US ton	907.185	0.907185	2000	17.8571	0.892857	20	1

Tip) SI Unit : kg, t

Cubic Capacity

From To→	cm ³	m ³	litre(dm ³)	in ³	ft ³	yd ³	UK pint	UK gall	UK pint	UK gall
cm ³	1	-	0.001	0.061024	0.0000353	-	0.00176	0.00022	0.002113	0.000264
m ³	-	1	1000	61023.7	35.3147	1.30795	1759.75	219.969	2113.38	264.172
litre(dm ³)	1000	0.001	1	61.0237	0.035315	0.001308	1.75975	0.219969	2.11338	0.264172
in ³	16.3871	0.000016	0.016387	1	0.000579	0.0000214	0.028837	0.003605	0.034632	0.004329
ft ³	28316.8	0.028317	28.3168	1728	1	0.037037	49.8307	6.22883	59.8442	7.48052
yd ³	764555	0.764555	764.555	46656	27	1	1345.429	168.1784	1615.793	201.974
UK pint	568.261	0.0005683	0.568261	34.6774	0.020068	0.000743	1	0.125	1.20095	0.150119
UK gall	4546.09	0.0045461	4.54609	277.42	0.160544	0.005946	8	1	9.6076	1.20095
UK pint	473.176	0.0004732	0.473176	28.875	0.01671	0.000619	0.832674	0.104084	1	0.125
UK gall	3785.41	0.0037854	3.785411	231	0.133681	0.004951	6.661392	0.832674	8	1

Tip) SI Unit : cm³, m³, L

Pressure

From To→	atmos	mm Hg	bar	Pa	in H ₂ O	in Hg	psi	kg/cm ²
atmos	1	760	1.0132	101325	406.781	29.9213	14.6959	1.033
mm Hg	0.0013158	1	0.001333	133.322	0.53524	0.03937	0.019337	0.00136
bar	0.9869	750.062	1	100000	401.463	29.53	14.504	1.01957
Pa	0.0000099	0.007501	0.00001	1	0.004015	0.000295	0.000145	0.00001
in H ₂ O	0.0024583	1.86832	0.002491	249.089	1	0.073556	0.036127	0.00254
in Hg	0.033421	25.4	0.033864	3386.391	3.5951	1	0.491154	0.003452
psi	0.068046	51.7149	0.068948	6894.76	27.6799	2.03602	1	0.07029
kg/cm ²	0.968	735.72	0.9808	98088	393.786	28.965	14.226	1

Tip) Pa = 1 N/m² 1 atmos = 1,033 kg/cm² SI Unit : bar, Pa

Unit Conversion Table

Cubic Capacity of Running Fluid	From To→	L/s(dm³/s)	L/h	m³/s	m³/h	cfm	ft³/h	UK gall/m	UK gall/h	US gall/m	US gall/h
	L/s(dm³/s)	1	3600	0.001	3.6	2.118882	127.133	13.19814	791.8884	15.85032	951.019
	L/h	0.000278	1	-	0.001	0.000588	0.035315	0.003666	0.219969	0.004403	0.264172
	m³/s	1000	3600000	1	3600	2118.88	127133	13198.1	791889	1585	0.3951019
	m³/h	0.277778	1000	0.000278	1	0.588578	35.3147	3.66615	219.969	4.402863	264.1718
	cfm	0.471947	1699.017	0.000472	1.699017	1	60	6.228833	373.73	7.480517	448.831
	ft³/h	0.007866	28.3168	-	0.028317	0.016667	1	0.103814	6.228833	0.124675	7.480517
	UK gall/m	0.075768	272766	0.0000758	0.272766	0.160544	9.63262	1	60	1.20095	72.057
	UK gall/h	0.001263	4.54609	-	0.004546	0.002676	0.160544	0.016667	1	0.020016	1.20095
	US gall/m	0.06309	227.125	0.0000631	0.227125	0.133681	8.020832	0.832674	49.96045	1	60
US gall/h	0.001052	3.785411	-	0.003785	0.002228	0.133681	0.013878	0.832674	0.016667	1	

Tip) SI Unit : L/s, L/h, m³/s, m³/h

Force	From To→	Btu/h	W	kcal/h	kW
	Btu/h	1	0.293071	0.251996	0.000293
	W	3.41214	1	0.859845	0.001
	kcal/h	3.96832	1.163	1	0.001163
	kW	3412.14	1000	859.845	1

Tip) SI Unit : W, kW

Energy	From To→	Btu	Therm	J	kJ	Cal
	Btu	1	0.00001	1055.06	1.055	251.996
	Therm	100000	1	-	105.5	25,199.60
	J	0.00094	-	1	0.001	0.2388
	kJ	0.9478	0.000009478	1000	1	238.85
	Cal	0.0039683	0.0039683 × 10 ⁵	4.1868	-	1

Tip) SI Unit : W, kW

Specific Heat	From To→	Btu/lb °F	J/kg °C
	Btu/lb °F	1	4186.8
	J/kg °C	0.00023	1

Tip) 1 kcal/kg °C = 1 Btu/lb °F SI 단위 : J/kg °C

Electrothermal Speed	From To→	Btu/ft²h	W/m²	kcal/m²h
	Btu/ft²h	1	3.154	2.712
	W/m²	0.3169	1	0.859
	kcal/m²h	0.368	1.163	1

Tip) SI Unit : W/m²

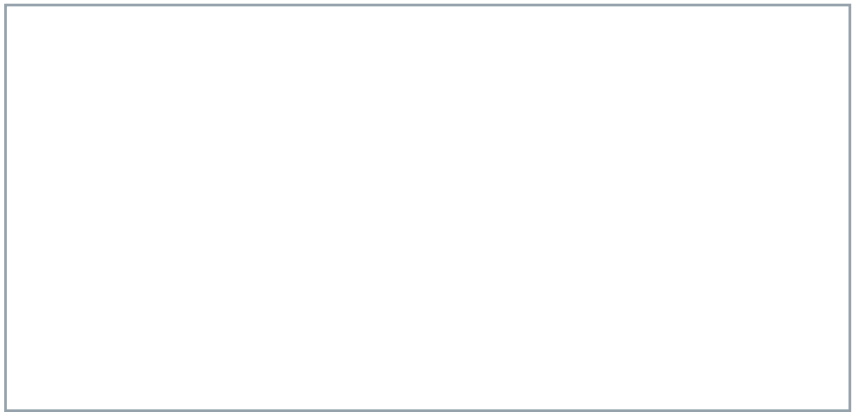
Electrothermal Coefficient	From To→	Btu/ft²h °F	W/m² °C	kcal/m²h °C
	Btu/ft²h °F	1	5.67826	4.88243
	W/m² °C	0.176110	1	0.859845
	kcal/m²h °C	0.204816	1.163	1

Tip) SI Unit : W/m² °C

Unit Thermal Capacity	From To→	Btu/lb	kJ/kg
	Btu/lb	1	2.326
	kJ/kg	0.4299	1

Tip) SI Unit : kJ/kg

Temperature °F → °C : (°F - 32) ÷ 1.8
°C → °F : (°C × 1.8) + 32



PG
POWER-GENEX®

POWER GENEX LTD.
44B9L, 434-9, Nonhyun-dong, Namdong-gu,
Incheon, 405-849 Korea
TEL : +82-32-812-6644 FAX : +82-32-812-6645
WEBSITE : WWW.POEWRGENEX.COM
E-MAIL : SALES@POEWRGENEX.COM