



IP6000 Ex ia



IP6000d Ex d

IP6000 Series Intelligent Valve Positioner

Brief Introduction

Times New Roman

01

Technical Description



IP6000 Series Intelligent Valve Positioner

IP6000 intelligent valve positioner is mounted on pneumatic control valves. It's used to control air intake and exhaust of the pneumatic actuators to drive the valve position to the set point by calculating both data from 4-20mA DC signal and feedback position.

> Enclosure Material

- Intrinsic Safety:
Aluminum alloy(Ex ia IIC T4/T6 Ga;
Ex ia IIIC T₂₀₀ 135°C/T₂₀₀ 85°C Da)
Stainless steel 316L(Ex ia I Ma)
- Flameproof:
Aluminum alloy(Ex db IIC T6 Gb;
Ex tb IIIC T85°C Db)
Stainless steel 316L(Ex db I Mb)

> Pressure Gauge Block Material

- Aluminum, anodized

> Input Signal

- Input Resistance: 120Ω
- Limit Voltage: 28V

> Output Signal

- Feedback Type: 2-wire 4~20mA signal, internal resistance 120Ω

> Digital Communication Protocol

- HART 7

> Minimum Operating Current

- 3.8mA

> Steady State Air Consumption

- ≤ 0.4 L/min

> Stroke Range

- Default Linear Type: 10~100mm
- Default Rotary Type: 30~100°
- Separate Type: 5~50mm
- Flameproof Separate Type: 5~25mm
- Optional Mounting Bracket: Hard connection or soft connection
- Note: The stroke range of remote type is the same as that of default type

> Pneumatic Data

- Air quality meets ISO 8573-1 standard
- Pressure range: 1.4-7 bar (20.3-101.5psi)
- Solid Particle Size and Density: Class 3
- Pressure Dew Point: Class 3 (minimum 20K (36° F) lower than the ambient temperature)
- Oil Content: Class 3

> Flow Rate

- Intake:

2 bar	4.8 Nm ³ /h
4 bar	8.0 Nm ³ /h
6 bar	11.2 Nm ³ /h
- Exhaust (fail-safe) :

2 bar	5.9 Nm ³ /h
4 bar	9.8 Nm ³ /h
6 bar	13.7 Nm ³ /h
- Exhaust (fail-freeze) :

2 bar	6.6 Nm ³ /h
4 bar	11.1 Nm ³ /h
6 bar	15.6 Nm ³ /h

The value of the flameproof type (IP6000d) is reduced by about 20%

> NAMUR Intrinsically Safe Explosion-proof Limit Switch Technical Parameters

- Rated Working Voltage (Ue): 8.2DC
- Supply voltage (UB): 8-9VDC
- Output Current:
No action: $\geq 2.2\text{mA}$;
Action: $\leq 1\text{mA}$
- Ambient Temperature Range (Ta): -25°C ~ +70°C
- Switching Frequency: 800Hz

> Electrical Connection

- NPT 1/2 (default)
- M20 × 1.5

> Pneumatical Connection

- NPT 1/4 (default)
- G 1/4

> Protection Class

- IP69K

> Vibration Resistance

- 0.15 mm, 10 Hz-60 Hz, 20 cycle/axis
- 20 m/s², 60 Hz-500 Hz, 20 cycle/axis
- Recommended range for control valve $\leq 20 \text{ m/s}^2$, no resonance peak

> Linearity & Hysteresis

- Linearity: $\leq 0.5\%$
- Hysteresis: $\leq 0.5\%$

> Ambient Temperature

- Normal Version for Non-explosion-proof:
-20°C ~ +80°C
- Low Temperature for Non-explosion-proof:
-40°C ~ +80°C
- Ultra-low Temperature for Non-explosion-proof:
-55°C ~ +80°C
- Normal Version for Explosion-proof:
-20°C ~ +80°C(T4)
-20°C ~ +40°C(T6)
-20°C ~ +60°C(EAC-T4)
-20°C ~ +40°C(EAC-T6)
- Low Temperature Version for Explosion-proof:
-40°C ~ +80°C(T4)
-40°C ~ +40°C(T6)
-55°C ~ +60°C(EAC-T4)
-55°C ~ +40°C(EAC-T6)
- Ex d Default Type:
-20°C ~ +60°C(CCC)
-20°C ~ +40°C(EAC-T6)
- Ex d Low Temperature Type :
-40°C ~ +60 °C(CCC)
-55°C ~ +40°C(EAC-T6)

> Explosion-proof Grade

- Intrinsic Safety:
Ex ia I Ma(CCC)
Ex ia IIC T4/T6 Ga(CCC, ATEX, IECEx, EAC)
Ex ia IIIC T₂₀₀ 135°C/T₂₀₀ 85°C Da (CCC)
- Flameproof:
Ex db I Mb(CCC)
Ex db IIC T6 Gb(CCC, ATEX, IECEx, EAC)
Ex tb IIIC T85°C Db(CCC)

> Intrinsically Safe Type Electrical Parameters

Circuit Name	Max Input Voltage Ui (v)	Max Input Current Ii (mA)	Max Input Power Pi (W)	Max Internal Equivalent Parameters	
				Ci (nF)	Li (mH)
4-20 mA Input	28	93	0.66	≈ 0	≈ 0
4-20 mA Output	28	93	0.66	≈ 0	≈ 0

> Summary of Electromagnetic Compatibility Results

Object	Description	Standard	Test Level	Result
Ex ia Type	Electrostatic Discharge Immunity	GB/T 17626.2	$\pm 4\text{kV}$ Contact, $\pm 8\text{kV}$ Air	Pass
Ex ia Type	Radio Frequency Electromagnetic Field Radiation Immunity	GB/T 17626.3	3V/m, 80%AM (1kHz) , 80MHz-1000MHz	Pass
Ex ia Type	Power Frequency Magnetic Field Immunity	GB/T 17626.8	50Hz, 100A/m	Pass
Ex ia Type	Electrical Fast Transient Pulse Group Immunity	GB/T 17626.4	$\pm 1.0\text{ kV}$	Pass
Ex d Type	Radio Frequency Electromagnetic Field Radiation Immunity	GB/T 17626.3	10V/m, 80%AM (1kHz) , 80MHz-1000MHz	Pass

> Rated Conditions-height

- 2000m above sea level
- At locations above 2000m above sea level, please use a suitable power supply

> Rated Conditions-installation Position

- Anywhere
- In a humid environment, the pneumatic connector and exhaust port are not facing upwards, please install correctly

> Position Feedback Module

For Position Feedback DC Output, 2-wire Connection

Current Output	Terminals OUT1 and OUT2
Output Rated Signal Range	4-20mA, short-circuit proof
Dynamic Range	3.8-20.5mA
External Load $R_B[k\Omega]$	$\leq (U_{Aux}[V]-12V) I [mA]$
Transmission Error	$\leq 0.5\%$
Temperature Effect	$\leq 0.1\%/10K (\leq 0.1\%/18^\circ F)$
Resolution	$\leq 0.1\%$
Effective Internal Capacitance	C_i =Approximately 0
Effective Internal Inductance	L_i =Approximately 0

02

Advantages & Applications

> Advantages

- Simple mounting and one-key automatic commissioning
- Mature and reliable piezo module, imported from Germany
- Simple operation and configuration of the device using 4 buttons and LCD local display
- Numerous functions can be activated(e.g. characteristic curves and limits)
- Negligible air consumption in stationary operation
- Tight closing function
- Fail-freeze function (Optional according to product selection chart)
- One device variant for linear and rotary actuators
- Excellent shock resistance
- External remote sensor as option for extreme ambient conditions
- On-site calibration of 4-20mA input signal can be performed

> Application Industry

- Refining / Petrochemical / Nuclear Power / Power Plant
- Paper and glass / water and wastewater industry
- Food & beverage, pharmaceutical industry
- Marine Industry

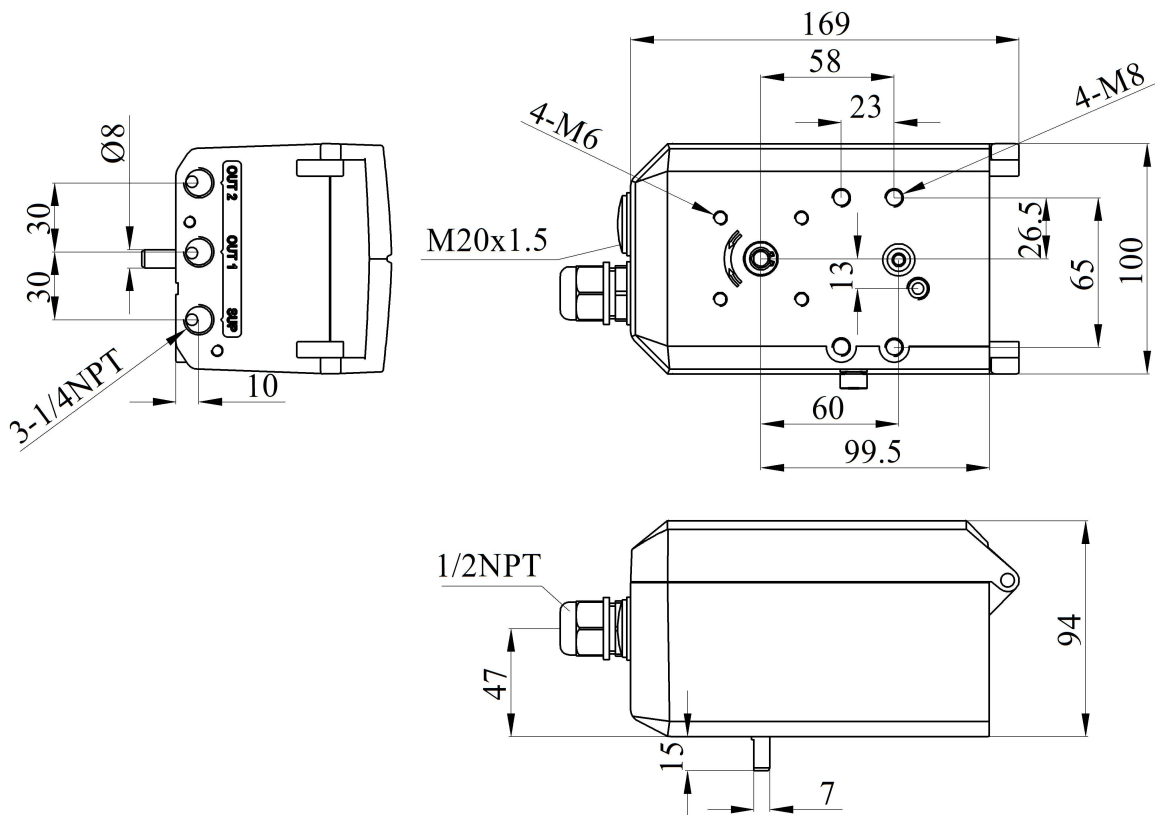
> Application Form

- For Single/Double Acting Actuators: aluminum enclosure and flameproof aluminum enclosure
- Used in non-hazardous locations
- Types used in hazardous locations: Intrinsically safe explosion-proof type "Ex ia"
Flameproof type "Ex d", aluminum flameproof enclosure
Ex db、 Ex tb(Dust explosion-proof)、
Ex ia

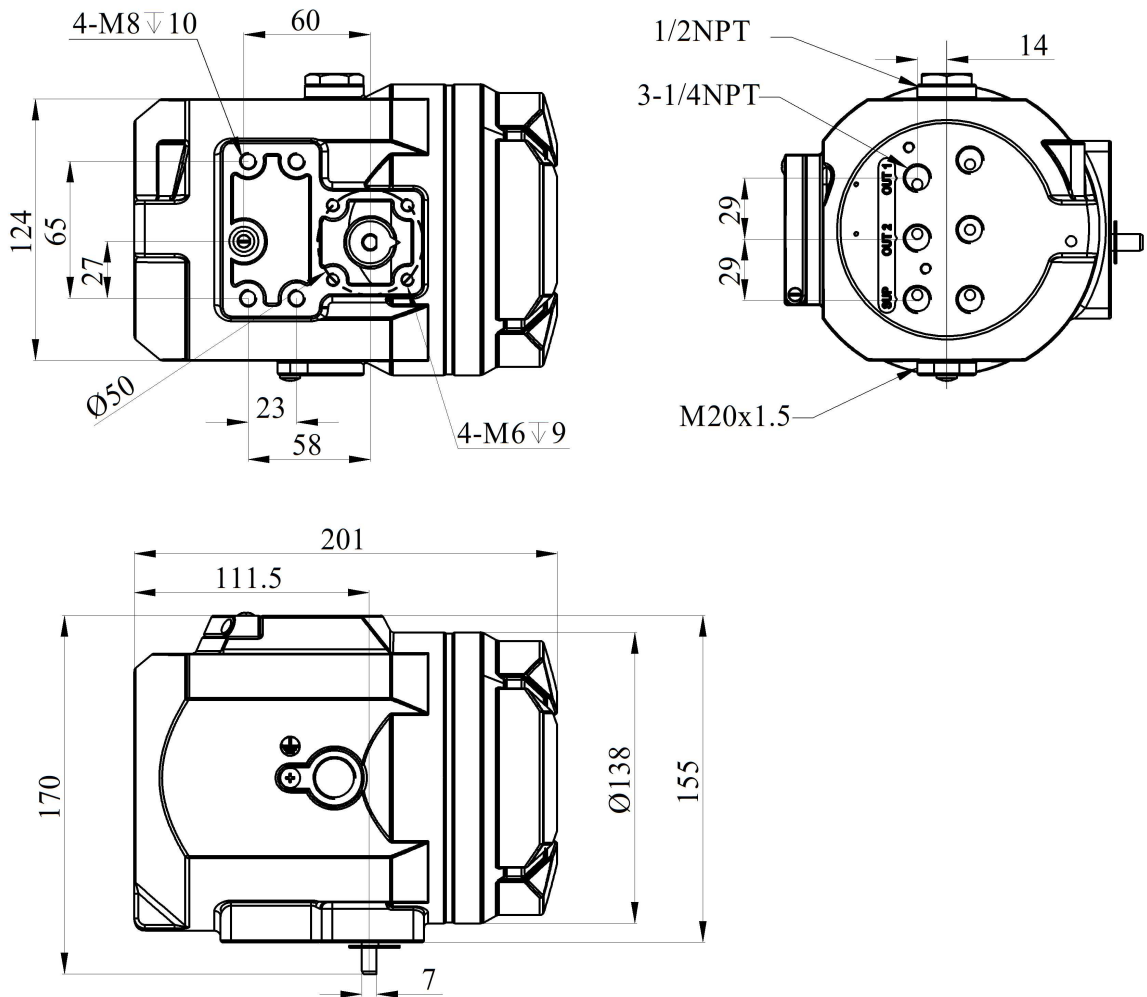
03

Mechanical Dimensions

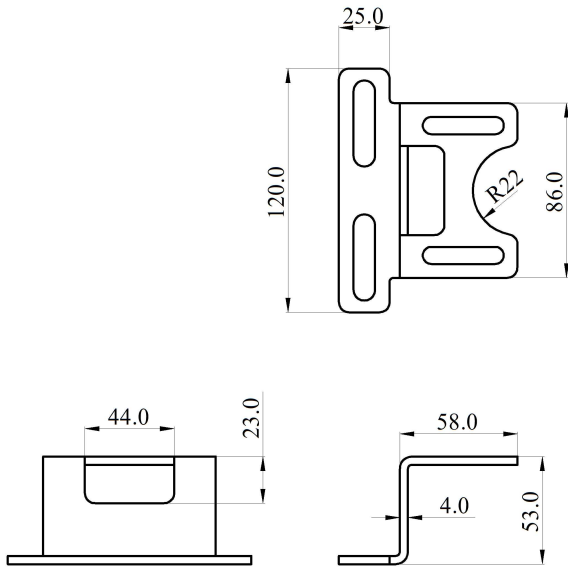
> IP6000 Ex ia Type Mechanical Dimensions



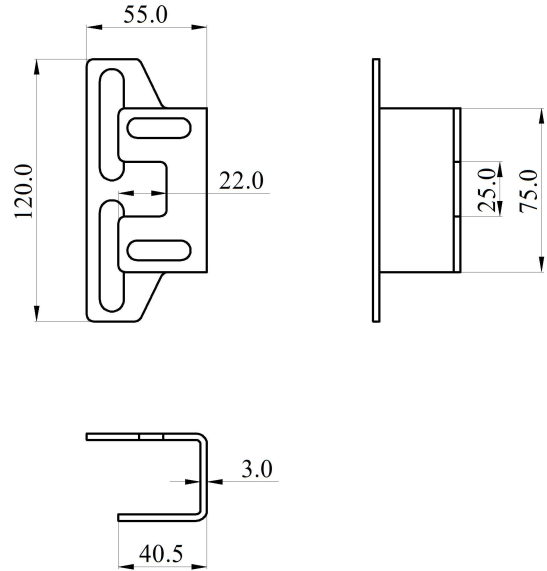
> **IP6000d Ex d** Type Mechanical Dimensions



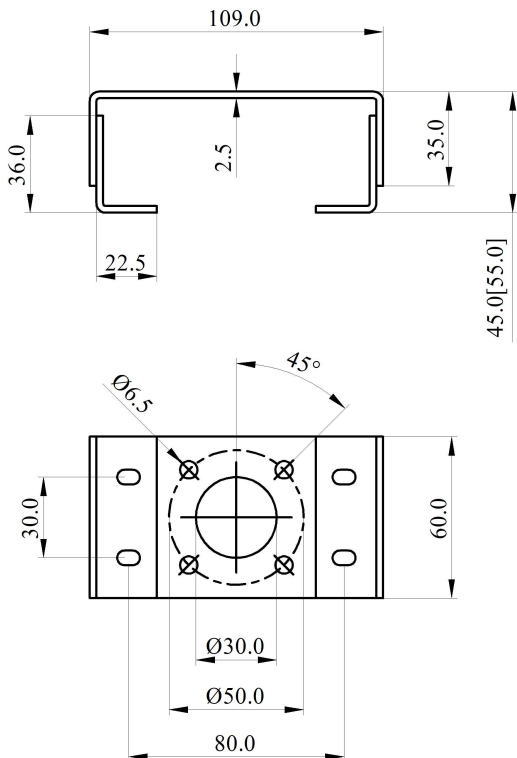
› Linear Mounting Bracket



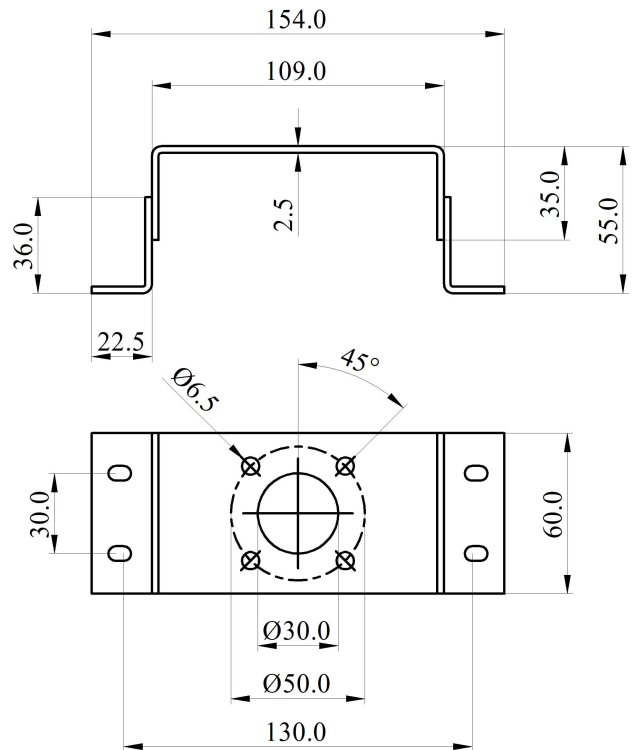
› Remote Type Linear Mounting Bracket



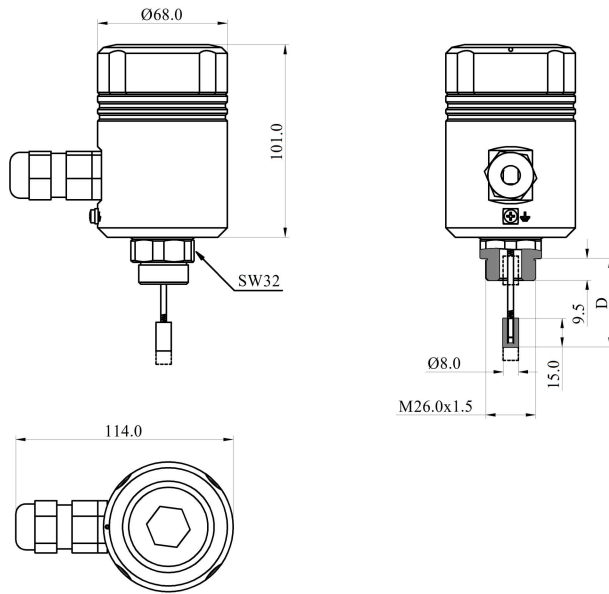
› Rotary Mounting Bracket - Form 1



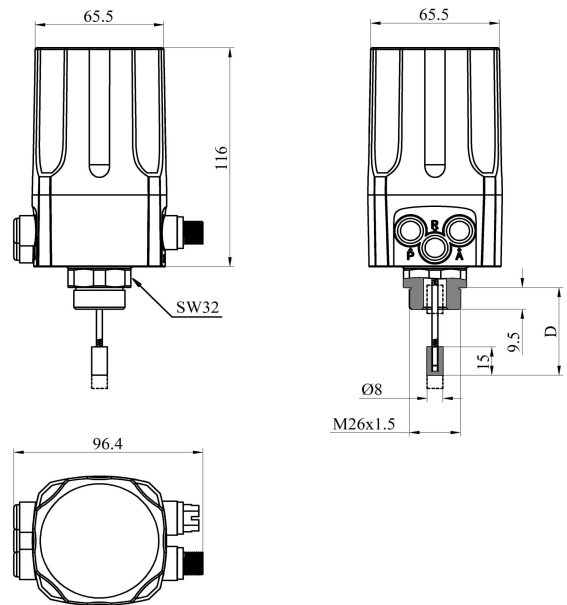
› Rotary Mounting Bracket - Form 2



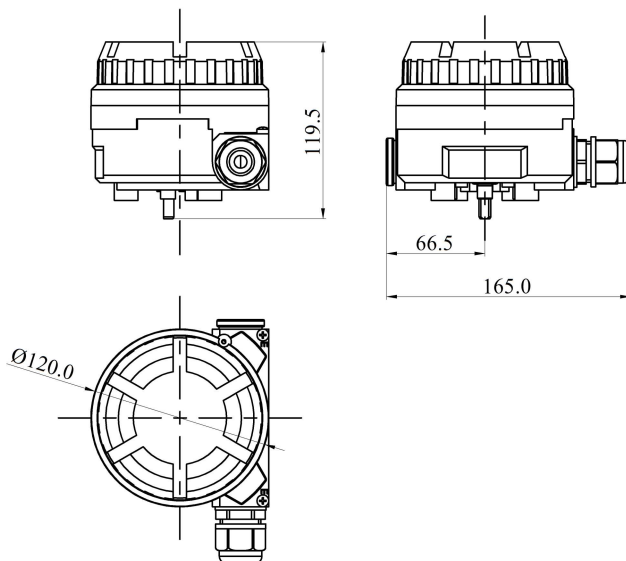
➤ **Dimensions of Ex d Separate Type Sensor**



➤ **Dimensions of Ex ia Separate Type Sensor**



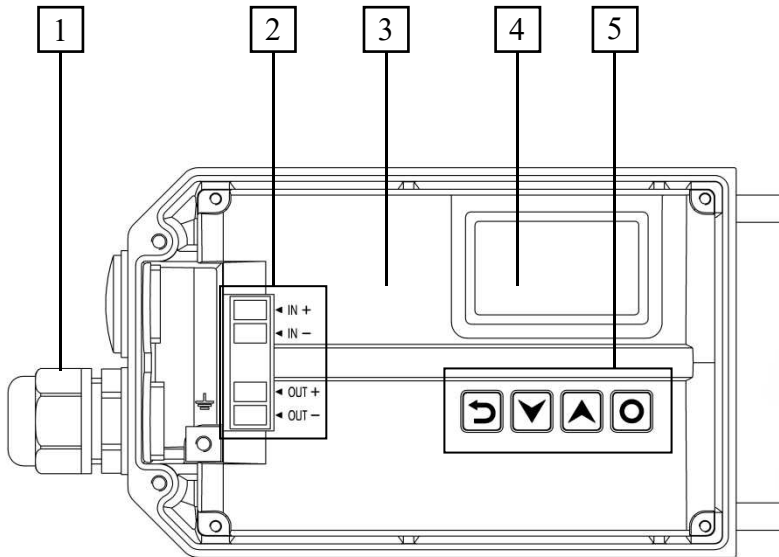
➤ **Dimensions of Remote Type Sensor**



04

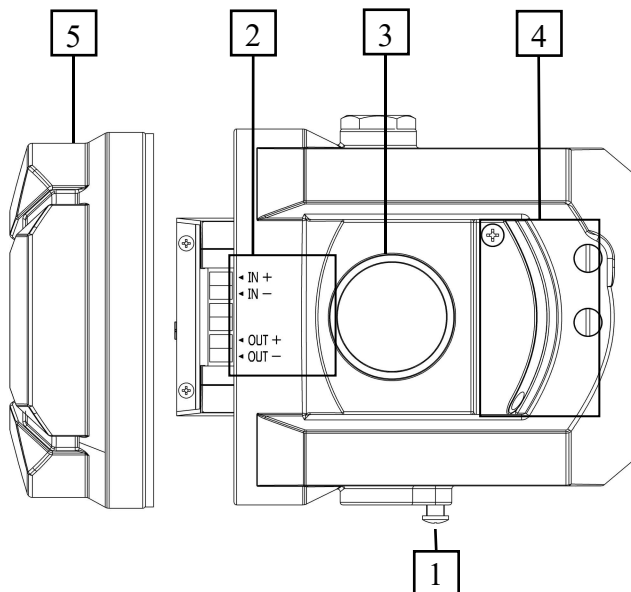
Product Structure

> IP6000 Ex ia Type Product Structure



- 1 Electrical Cable Access
- 2 Electrical Wiring Position
- 3 Shell
- 4 LCD Screen
- 5 Buttons

> IP6000d Ex d Type Product Structure

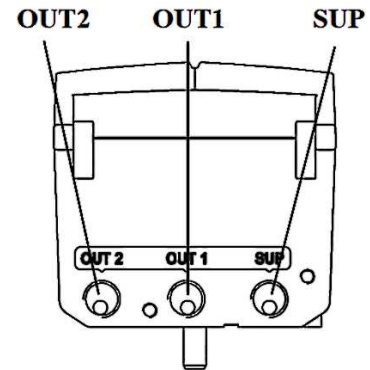
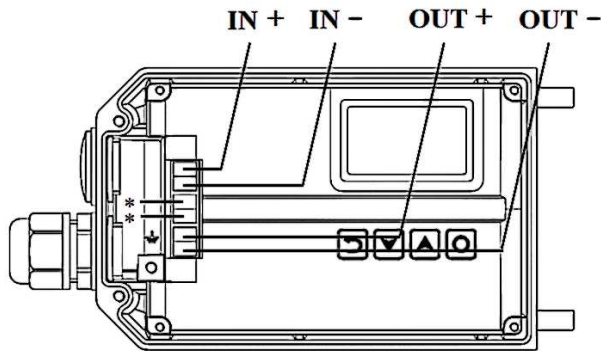


- 1 Electrical Cable Access
- 2 Electrical Wiring Position
- 3 LCD Screen
- 4 Buttons
- 5 End Cover

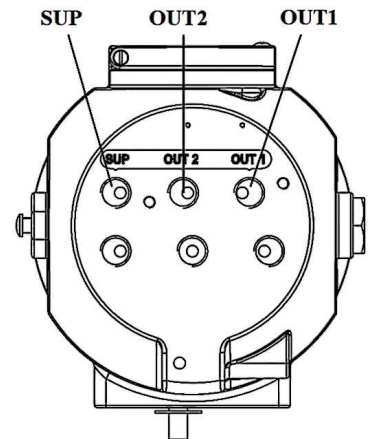
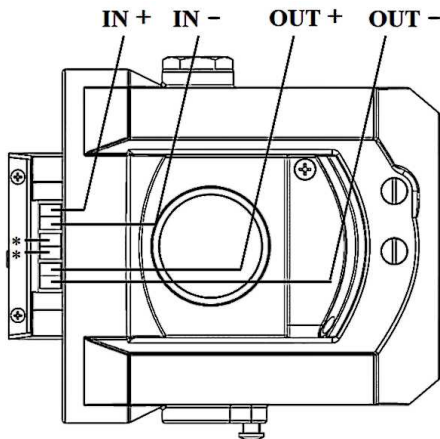
05

Electrical & Pneumatic Connections, Wiring Diagram

> IP6000 Ex ia Type



> IP6000d Ex d Type



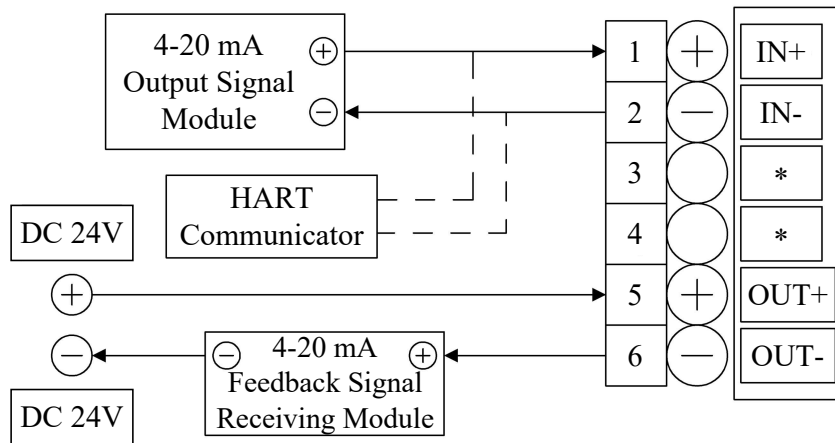
> Electrical Connections

- IN+: 4-20 mA input signal +
- IN-: 4-20 mA input signal -
- OUT+: Feedback signal module 18-30 V DC +
- OUT-: Feedback signal module 4-20mA output
- *: The two interfaces are connected with each other, and the device is in low impedance mode

> Pneumatic Connections

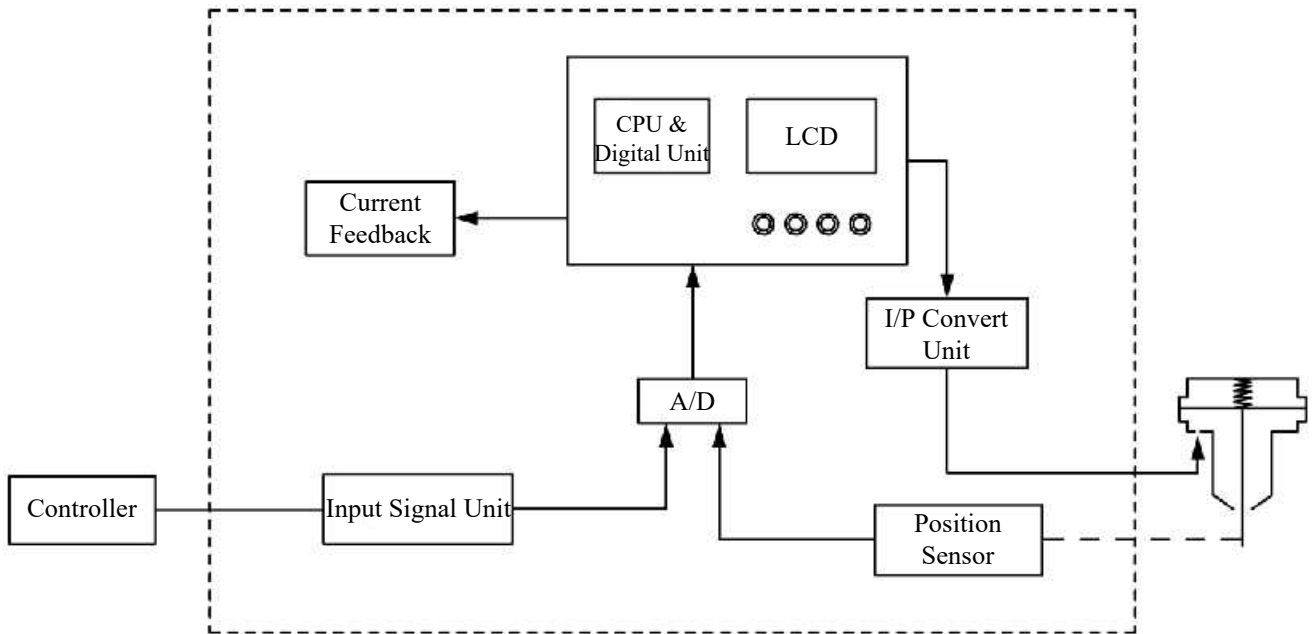
- SUP: Air supply enter
- OUT1: Pilot air outlet 1
- OUT2: Pilot air outlet 2, used for double acting type

> Wiring Diagram



06

Principle Block Diagram



> Additional Software Functions

- Calibrating the input signal
- Calibrating the set-point signal
- Tight closing function
- Stroke limit function
- Characteristic curve selection and settings
- Selection of signal direction.
- Selection of stroke direction.
- Reset function

> Advantages

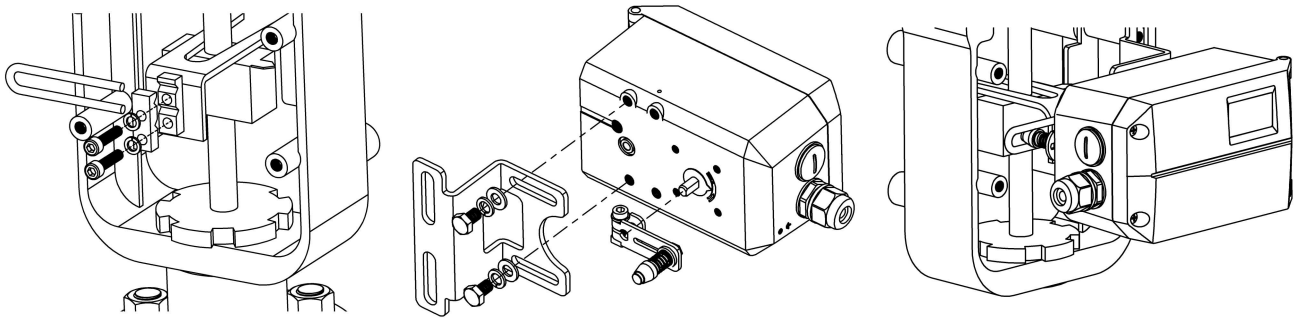
- The IP6000 series intelligent valve positioner uses a microprocessor and a new type of piezo valve to replace the nozzle and baffle pressure regulating system in the traditional positioner to realize the regulation and control of the output pressure. The control of the input signal of the valve opening and the feedback signal of the valve position is realized by CPU calculation processing. The piezo valve can release a short control pulse due to its small mass, thereby achieving high precision, and the piezo valve consumes air only when the valve is deviated and performing adjustment actions, so there is a low consumption.

07 Mounting Components

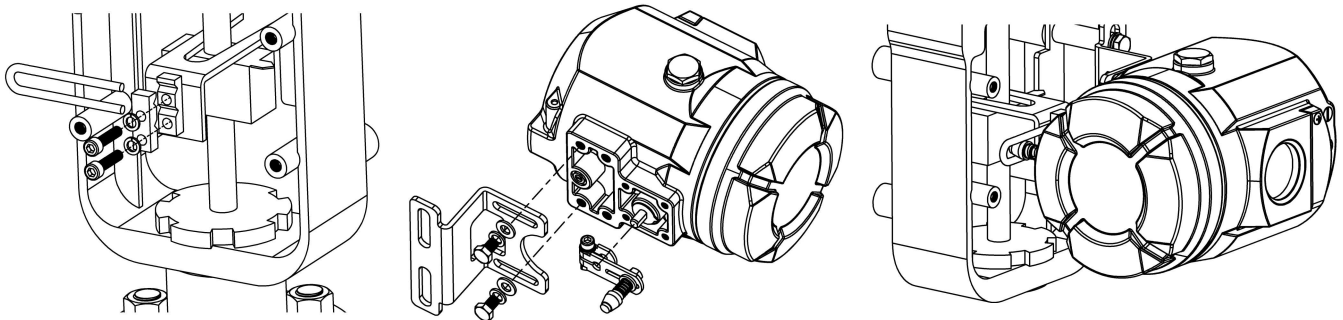
> Linear Actuator Mounting Components

- | | | | |
|---------------------------|----|---------------------------|----|
| • U-shaped Rod | *1 | • M6 Hexagon Socket Bolt | *1 |
| • Clamping Assembly | *1 | • Linear Mounting Bracket | *1 |
| • M6 Hexagon Socket Screw | *2 | • M8 Hexagon Head Bolt | *2 |
| • M6 Spring Washer | *2 | • M8 Spring Washer | *2 |
| • Feedback Lever | *1 | • M8 Flat Washer | *2 |

> IP6000 Ex ia Linear Type



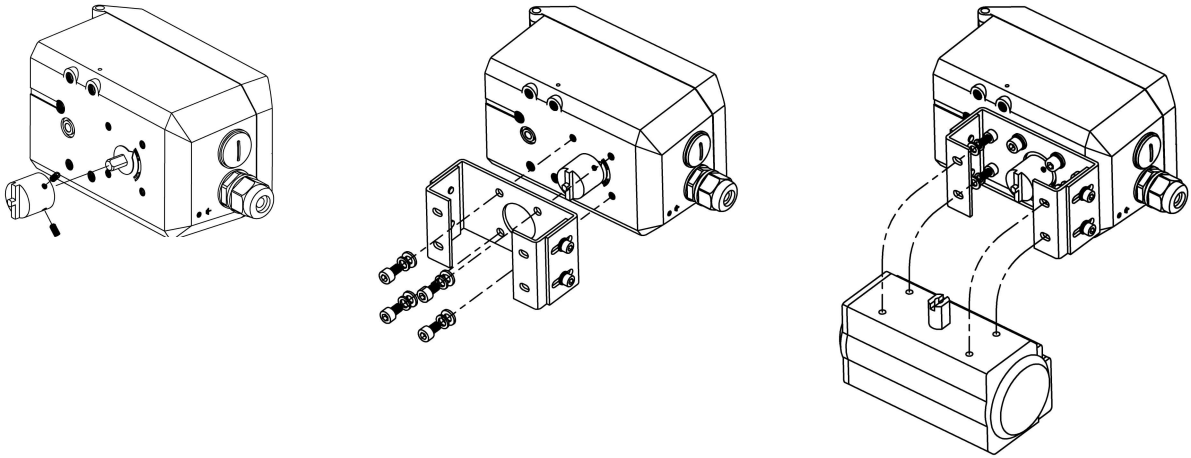
> IP6000d Ex d Linear Type



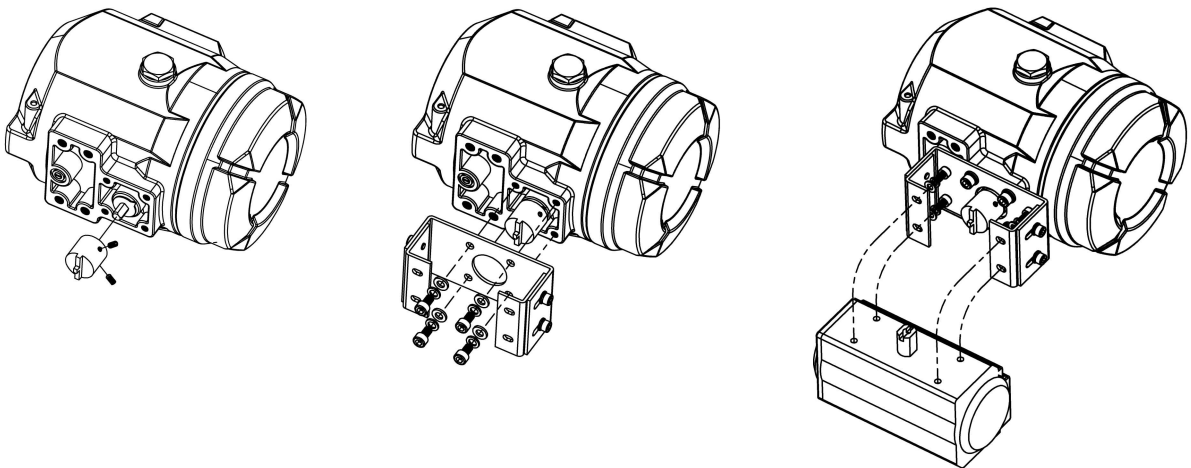
> Rotary Actuator Mounting Components

- | | | | |
|----------------------------|----|---------------------------|----|
| • Adapter | *1 | • M6 Hexagon Socket Screw | *4 |
| • Hexagon Socket Set Screw | *4 | • M5 Hexagon Socket Screw | *4 |
| • Rotary Mounting Bracket | *1 | • M5 Spring Washer | *4 |
| • M6 Flat Washer | *4 | • M5 Flat Washer | *4 |
| • M6 Spring Washer | *4 | | |

> IP6000 Ex ia Rotary Type



> IP6000d Ex d Rotary Type



IP6000	L	S	n	0	0	0	0	S	N
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[illegible]

- www.powerflow-tech.com

> **IP6000d Ex d** Selection and Ordering Data(CCC) - Applicable to China
(Mainland)

										L R	Linear Rotary			Stroke Type				
												S D	Single Acting Double Acting	Acting Mode				
												d k	Ex db IIC T6 Gb; Ex tb IIIC 85°C Db Ex db I Mb	Explosion Signs				
												0 1	No Yes	Feedback Signal				
												0 1	No Yes	HART				
												0 1 2	No Linear Bracket Rotary Bracket	Mounting Bracket				
												0 1	No Yes	Pressure Gauge				
												S F	Safe Freeze	Power Off State				
												N L	-20~60°C -40~60°C	Ambient Tempera- ture				
IP6000d										L	S	d	0	0	0	0	S	N

> **IP6000d Ex d** Selection and Ordering Data(ATEx, IECEx) - Applicable to European Union (ATEx), Global (IECEx)

										L	Linear			Stroke				
										R	Rotary			Type				
												S	Single Acting	Acting Mode				
												D	Double Acting					
												d	Ex db IIC T6 Gb	Explosion Signs				
												0	No	Feedback Signal				
												1	Yes					
												0	No	HART				
												1	Yes					
												0	No	Mounting Bracket				
												1	Linear Bracket					
												2	Rotary Bracket					
												0	No	Pressure Gauge				
												1	Yes					
												S	Safe	Power Off State				
												F	Freeze					
												N	-20~60℃	Ambient Temperature				
												L	-40~60℃					
IP6000d										L	S	n	0	0	0	0	S	N