● How to order

General Purpose Type

The item enclosed by broken line needs not to be entered, if unnecessary. Semi-standard

● Standard type PSR-1A | ❶Type | ❷Seal material | ❸Mounting style | ❹Cylinder bore | ❺Cushioning | ❻Stroke | ❼Thread type | ❽Port type | ❾Lock nut | ❿Air vent type

6 | SD | 40 | N | 50 | T | G | – | L | – | V

❷ Seal material
- 3 Fluorocarbon
- 6 HNBR

❸ Mounting style
- SD Basic style
- FA Rod flange
- LA Foot type

Note) When ordering the FA style cylinder body, it is necessary to change dimension WF of the SD style cylinder. For details, contact us.

❹ Cylinder bore
- SD : ϕ32 to ϕ125
- FA : ϕ32 to ϕ80
- LA : ϕ32 to ϕ63

❺ Cushioning
- No cushion

❻ Stroke
- Male thread type

Cylinder stroke (mm)
5, 10, 15, 20, 25, 30, 35, 40, 45, 50 mm
Note) For strokes other than the above standard strokes, contact us.

❼ Thread type
- None Rc thread
- G G thread

Note) G thread is applicable only to the SD style.

❽ Port type
- None Without lock nut
- L With one lock nut

Note) If two or more lock nuts are required, make an order for the additional lock nut(s).

❾ Lock nut

❿ Air vent type
- None [None] Without air vent (standard)
- V With air vents (order made: ϕ32 to ϕ125)

✪ Port G thread type (only for SD style)

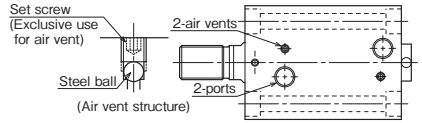
● For a port G thread type cylinder, specify the code as following.

(Example)
PSR-1A 6SD40N50TG
Port G thread type

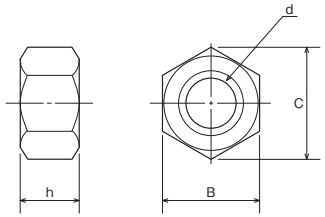
Note) The port G thread has dimensions different from the standard dimensions depending on the bore. Refer to the dimensional drawing.

✪ Air vent specifications (order made)

The air vents are laid on the port surface and located symmetrical positions to the ports.



✪ Lock nut number for ordering



Dimensional Table

Unit: mm

Symbol / Bore	Part number	d	B	C	h
ϕ32	LNH-16F-H	M16×1.5	22	25.4	10
ϕ40	LNH-20F-H	M20×1.5	27	31.2	12
ϕ50	LNH-24F-H	M24×1.5	32	37.0	14
ϕ63	LNH-30F-H	M30×1.5	41	47.3	17
ϕ80	LNH-39F-H	M39×1.5	55	63.5	20
ϕ100	LNH-48F-H	M48×1.5	70	80.8	26
ϕ125	LNH-64F-H	M64×2	90	104	35

Note) When making an order only for the lock nut, indicate the part number.

Weight Table

Unit: kg

Bore (mm)	Basic style (SD)		Flange type (FA)		Foot type (LA)		Amplifier weight
	Basic weight	Additional weight per mm of stroke	Basic weight	Additional weight per mm of stroke	Basic weight	Additional weight per mm of stroke	
ϕ32	1.5	0.025	2.1	0.025	1.5	0.027	0.05
ϕ40	1.9	0.030	3.1	0.030	1.9	0.034	
ϕ50	2.7	0.037	4.3	0.037	2.8	0.044	
ϕ63	4.2	0.047	6.3	0.047	4.5	0.062	
ϕ80	7.4	0.067	11.2	0.067	–	–	
ϕ100	14.0	0.102	–	–	–	–	
ϕ125	24.7	0.152	–	–	–	–	

Calculation formula: Cylinder weight (kg)=basic weight+(cylinder stroke (mm)×additional weight per mm of stroke)

Calculation example: PSR-1A, SD style, bore ϕ50, cylinder stroke 50 mm
2.7+(50×0.037)=4.55kg

Piston Pressure Receiving Area Table

Unit: mm²

Bore (mm)	Rod dia. (mm)	Double acting single rod	
		Extension side	Retraction side
ϕ32	ϕ18	804	550
ϕ40	ϕ22	1257	876
ϕ50	ϕ28	1963	1348
ϕ63	ϕ36	3117	2100
ϕ80	ϕ45	5027	3436
ϕ100	ϕ56	7854	5391
ϕ125	ϕ70	12272	8424

Calculation formula: $F=A\times P\times\beta(N)$
F: cylinder force (N)
A: piston pressure receiving area (mm²)
P: working pressure (MPa) β: load rate

Calculation example
Double acting single rod, bore ϕ40,
working pressure: 16 MPa, load rate: 0.8
Cylinder force on extension side (N)
=1257×16×0.8=16090(N)
Cylinder force on retraction side (N)
=876×16×0.8=11213(N)

Standard Stroke Range

Bore (mm)	Cylinder stroke (mm)									
	5	10	15	20	25	30	35	40	45	50
ϕ32	○	○	○	○	○	○	○	○	○	○
ϕ40	○	○	○	○	○	○	○	○	○	○
ϕ50	○	○	○	○	○	○	○	○	○	○
ϕ63	○	○	○	○	○	○	○	○	○	○
ϕ80	○	○	○	○	○	○	○	○	○	○
ϕ100	○	○	○	○	○	○	○	○	○	○
ϕ125	○	○	○	○	○	○	○	○	○	○

Note) For strokes of more than 60 mm, contact us.

Discontinued

PQCPA Series dedicated to analog/pulse output from position sensing cylinders

- Environmentally-friendly lead-free indicator.
- Analog input and pulse input types are available.
- Provided with multi-point output function (5 points) as a standard function to enable to individually set the upper and lower limits.Note 1)
- A 16-bit AD converter is provided to realize high resolution. (Analog input type)
- Provided with a counter with a response frequency of 200 kHz (Pulse input type)
- Provided with a pulse position correcting function.Note 2)

Note 1) Setting the bank switching enables to use the multi-output function of up to 15 points.
Note 2) Position correction can be made by mounting a cylinder sensor. Positional error caused by slippage of the encoder is eliminated.

Standard Specifications

Type	Analog	Pulse
Model number	PQCPA-CU-A	PQCPA-CU-P
Applicable input signals	Analog voltage/analog current	Phase AB
Display range	±999999	
Resolution	Stroke×1/10000	—
Reply frequency	1 kHz	200 kHz
Linearity	±0.02%FS	—
Signals	Voltage input 0 to 10 V Voltage input 1 to 5 V Current input 4 to 20 mA	Open collector input Differential input (line driver input) 12 V voltage input 24 V voltage input
Monitor output	Voltage output Note)	Line driver output
Sampling speed	1000 times/sec	
Display speed	10 times/sec	
Display method	Display by fluorescent display tube	
Control input	No-voltage input (reed sensor/solid state sensor)	
Control output	Open collector Max. rating: 50 V DC, 50 mA (Provided with multi-point output function (5 points) to enable to individually set the upper and lower limits and pulse position correcting function)	
Power supply voltage	24 V DC ±10%	
Ambient temperature	0 to 50℃ (No freezing)	
Ambient humidity	35 to 80%RH (No condensing)	

Note) The monitor output at current input (4 to 20 mA) is voltage output of 1 to 5 V.

Function Table

Type	Analog input	Pulse input
Model number	PQCPA-CU-A-A	PQCPA-CU-P-12
	PQCPA-CU-A-V	PQCPA-CU-P-24
	—	PQCPA-CU-P-00
Functions	Display of position	Display of position
	Bank switching	Bank switching
	Multi-point output	Multi-point output
	Positional data hold	Positional data hold
	—	0 setting signal
	—	Correcting function

List of Applicable Actuators

Series	Detection method	Signal type
PTN-1B	Absolute method	Analog type (4 to 20 mA, 0 to 10 V)
PTH-1B		
PTT-1B		
PSR-1A		Analog type (1 to 5 V)
35P-3	Linear pulse encoder	Encoder type
70P-8		
140P-8		

Note) For the details of each cylinder, see the section of each series.

How to order Discontinued

Position Indicator

●Analog input

PQCPA – CU – A – [A]

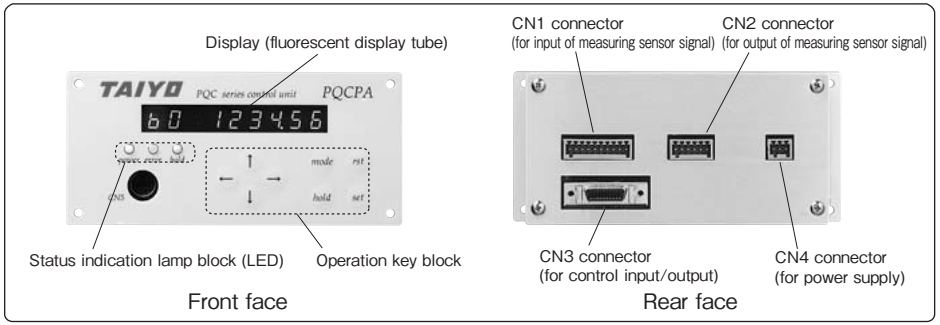
- [A] Current input
- [V] Voltage input

●Pulse input

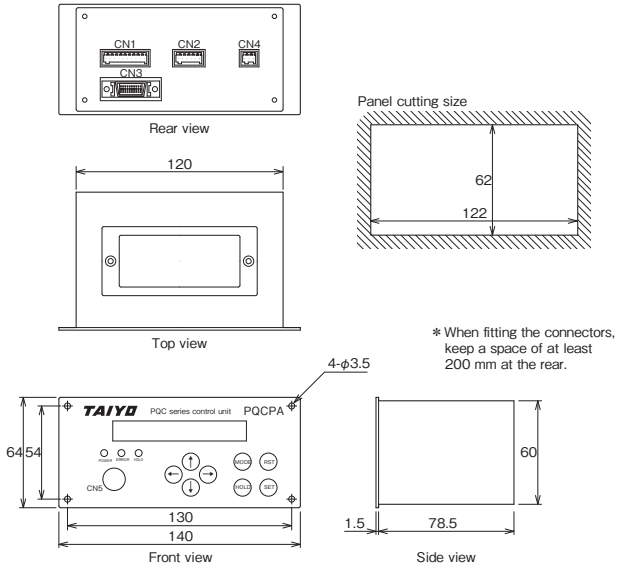
PQCPA – CU – P – [12]

- [12] 12 V open collector input, 12 V voltage input
- [24] 24 V open collector input, 24 V voltage input
- [00] Differential input

Note) Cylinders do not come with indicators of differential input type [00].
(Specification to use the indicator in stand-alone state)



Dimensional Drawings



Supplied Connector

- CN1 connector
  (for input of length measuring sensor signal)

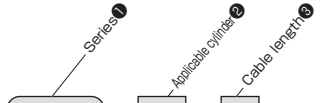
- CN2 connector
  (for output of length measuring sensor signal)

- CN3 connector
  (for control input/output)

- CN4 connector
  (for power supply)

Discontinued

How to order cable between sensor and indicator

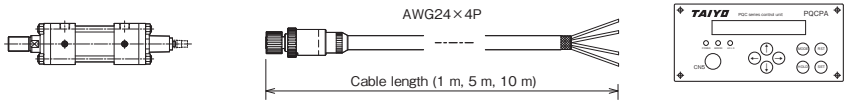


CV1	PTH-1・PTN-1B・PTT-1B	01	1m
CV2	35P-3・70P-8・140P-8	05	5m
CV3	PSR-1A	10	10m

* When ordering a cable, confirm the series name of the actuator on the sensor side. Some models cannot be connected.
* After wiring, connect the indicator side connector to the CN1 connector on the indicator.

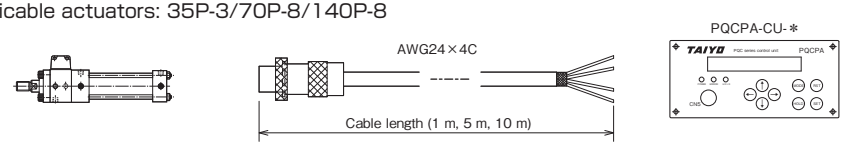
PQCPA-CV1-Cable length

Applicable actuators: PTH-1B/PTN-1B/PTT-1B



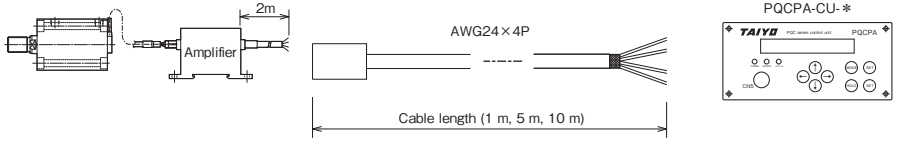
PQCPA-CV2-Cable length

Applicable actuators: 35P-3/70P-8/140P-8



PQCPA-CV3-Cable length

Applicable actuators: PSR-1A

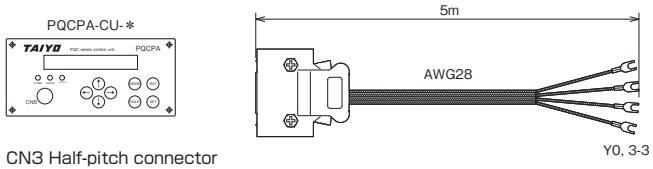


Note) PSR-1A comes with a 2m cable as a standard accessory. If another cable is required, select this cable. (In this case, disconnect the standard cable (2 m) of PSR-1A, and connect the selected cable directly to the amplifier.)

How to order I/O cable

PQCPA – IO

* The I/O cable is 5 m long.



CN3 Half-pitch connector
Note) Only the CN3 half-pitch connector is supplied as a standard accessory. If you need the connector with a cable, place an order for the connector.

Discontinued

External input/output

CN1

Pin No.	Description	Signals
1	Voltage/current input	Analog input
2	NC	–
3	Voltage/current GND	Analog input
4	Phase A	Pulse input
5	Phase −A	Pulse input
6	Phase B	Pulse input
7	Phase −B	Pulse input
8	+24V	Power supply output
9	+12V	Power supply output
10	GND	Power supply output/Phase AB GND

CN2

Pin No.	Description	Signals
1	Pout	Analog output
2	Vss	Analog output
3	A pulse	Pulse output
4	A pulse GND	Pulse output
5	B pulse	Pulse output
6	B pulse GND	Pulse output

CN4

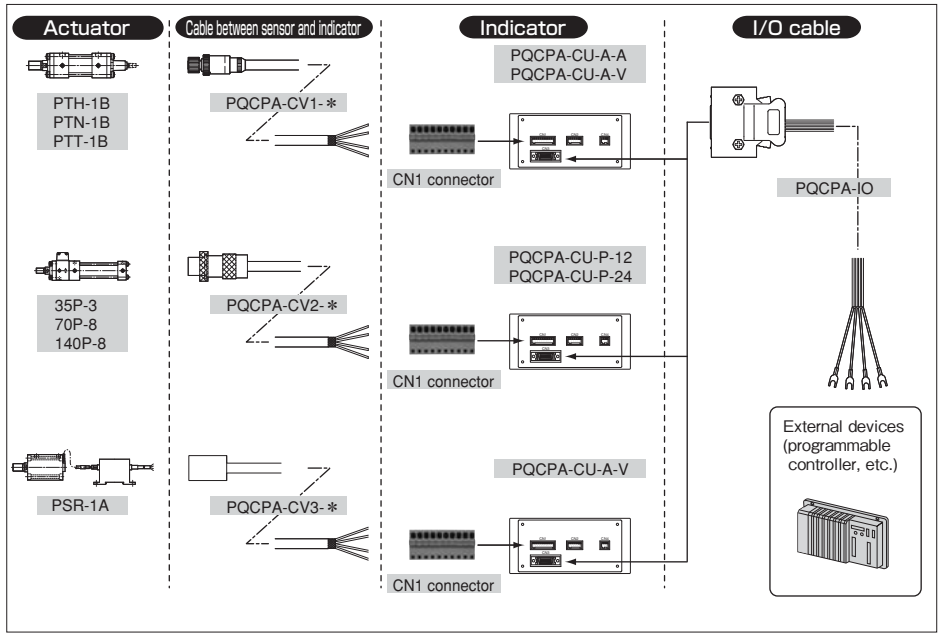
Pin No.	Description	Signals
1	P24	Power supply
2	N24	Power supply
3	PE	Power supply

CN3

Pin No.	Description	Signals
1	0 setting signal	Input
2	Positional data hold	Input
3	Correcting function	Input
4	Bank switching 0	Input
5	Bank switching 1	Input
6	Bank switching 2	Input
7	Reserved input	Input
8	Reserved input	Input
9	Input common	Input
10	Input common	Input
11	Multi-point output signal 0	Output
12	Multi-point output signal 1	Output
13	Multi-point output signal 2	Output
14	Multi-point output signal 3	Output
15	Multi-point output signal 4	Output
16	Reserved output	Output
17	Reserved output	Output
18	Reserved output	Output
19	Output common	Output
20	Output common	Output

*For details, see the instruction manual.

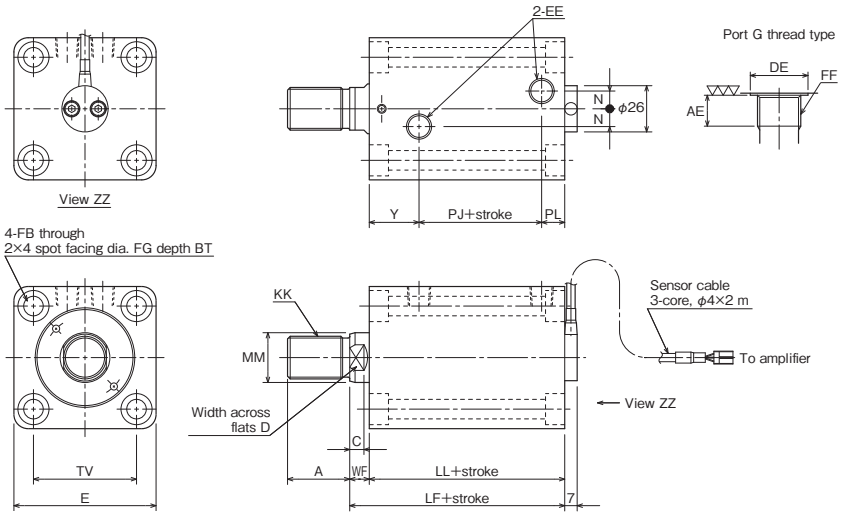
Example of product configuration



CAD/DATA is available.
PSR_1A/TPSR1A Bore

SD General purpose type PSR-1A 6 SD Bore N Stroke T

● Bore ϕ32 to ϕ125



Unit: mm

Dimensional Table

Symbol / Bore	A	AE	BT	C	D	DE	E	EE	FB	FF	FG	KK
ϕ32	25(40)	8	6.5	7	14	ϕ17.2	□62	Rc1/4	ϕ6.6	G1/8	ϕ11	M16×1.5
ϕ40	30(45)	8	8.6	7	19	ϕ17.2	□70	Rc1/4	ϕ9	G1/8	ϕ14	M20×1.5
ϕ50	35(50)	12	10.8	8	24	ϕ21.5	□80	Rc1/4	ϕ11	G1/4	ϕ17.5	M24×1.5
ϕ63	45(60)	12	13	9	30	ϕ21.5	□94	Rc1/4	ϕ14	G1/4	ϕ20	M30×1.5
ϕ80	60(80)	12	15.2	14	41	ϕ21.5	□114	Rc3/8	ϕ16	G1/4	ϕ23	M39×1.5
ϕ100	75(95)	12	19.5	22	50	ϕ25.5	□140	Rc3/8	ϕ20	G3/8	ϕ29	M48×1.5
ϕ125	95(125)	14	23.5	25	65	ϕ30	□172	Rc1/2	ϕ24	G1/2	ϕ35	M64×2

Symbol / Bore	LF	LL	MM	N		PJ		PL		TV	WF	Y	
				Rc thread	G thread	Rc thread	G thread	Rc thread	G thread			Rc thread	G thread
ϕ32	64	54	ϕ18	10	10	14	14	12	12	□47	10	28	28
ϕ40	65	55	ϕ22	10	10	16	16	12	12	□52	10	27	27
ϕ50	71	60	ϕ28	10	14	19	13.5	13	18.5	□58	11	28	28
ϕ63	80	67	ϕ36	10	16	24	20	13	17	□69	13	30	30
ϕ80	95	78	ϕ45	15	19	25	24	18	18	□86	17	35	36
ϕ100	122	96	ϕ56	15	18	26	26	28	28	□106	26	42	42
ϕ125	135	105	ϕ70	25	25	29	29	30	30	□132	30	46	46

Notes) 1. When the lock nut is used, the parenthesized dimension A is recommended.
2. The tolerance of MM is f8.
3. Since the piston rod has a built-in sensor, a female threaded rod is inapplicable as a rule. However, it may be applicable depending on the bore, stroke and dimension W. Contact us.

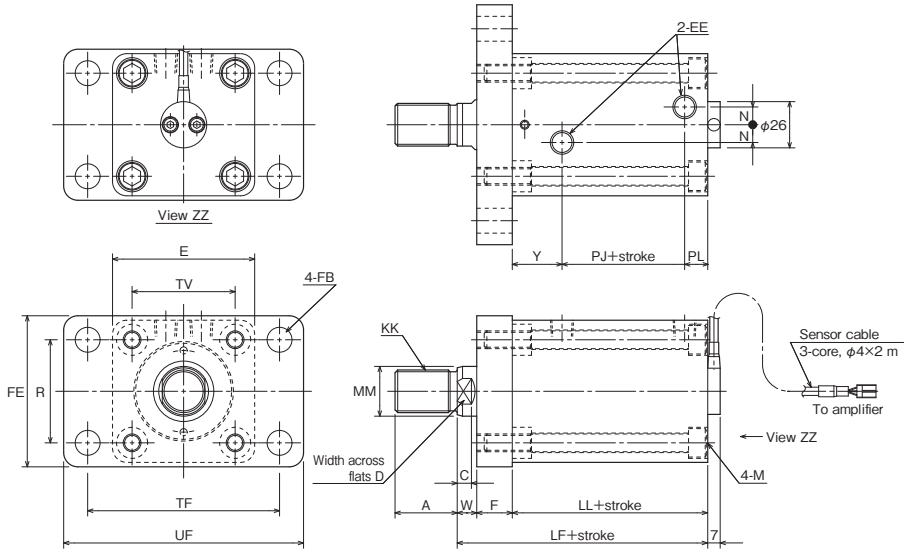
Position Sensing Cylinders PSR-1A

Unit: mm

PSR_1A/TPSR1A Bore CAD/DATA is available.

FA General purpose type PSR-1A 6 FA Bore N Stroke T

● Bore ϕ32 to ϕ80



Unit: mm

Dimensional Table

Symbol / Bore	A	C	D	E	EE	F	FB	FE	KK	LF
ϕ32	25(40)	7	14	□62	Rc1/4	15	ϕ6.6	62	M16×1.5	79
ϕ40	30(45)	7	19	□70	Rc1/4	20	ϕ11	70	M20×1.5	85
ϕ50	35(50)	8	24	□80	Rc1/4	20	ϕ14	85	M24×1.5	91
ϕ63	45(60)	9	30	□94	Rc1/4	20	ϕ14	98	M30×1.5	100
ϕ80	60(80)	14	41	□114	Rc3/8	25	ϕ18	118	M39×1.5	120

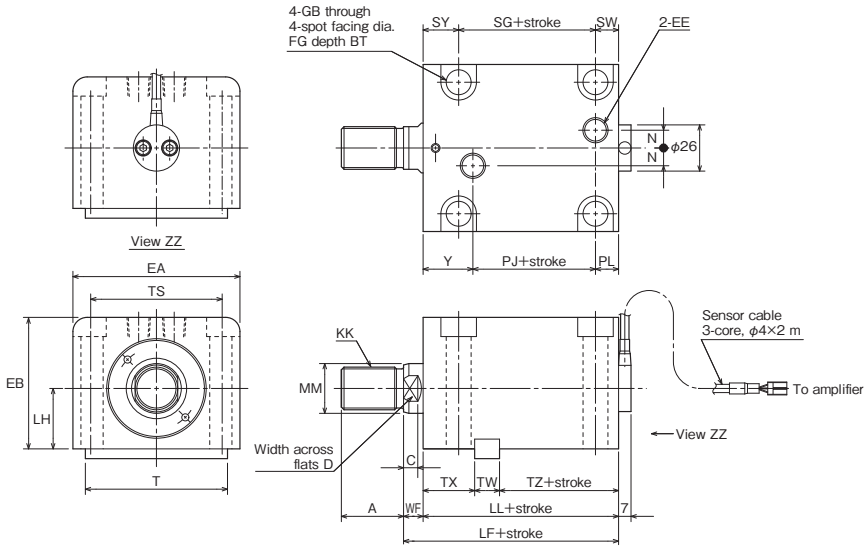
Symbol / Bore	LL	M	MM	N	PJ	PL	R	TF	TV	UF	W	Y
ϕ32	54	M6×1	ϕ18	10	14	12	40	80	□47	95	10	28
ϕ40	55	M8×1.25	ϕ22	10	16	12	46	96	□52	118	10	27
ϕ50	60	M10×1.5	ϕ28	10	19	13	58	108	□58	135	11	28
ϕ63	67	M12×1.75	ϕ36	10	24	13	65	124	□69	150	13	30
ϕ80	78	M14×2	ϕ45	15	25	18	87	154	□86	185	17	35

Notes) 1. When the lock nut is used, the parenthesized dimension A is recommended.
2. The tolerance of MM is f8.
3. Since the piston rod has a built-in sensor, a female threaded rod is inapplicable as a rule. However, it may be applicable depending on the bore, stroke and dimension W. Contact us.

PSR_1A/TPSR1A Bore CAD/DATA is available.

LA General purpose type PSR-1A 6 LA Bore N Stroke T

● Bore ϕ32 to ϕ63



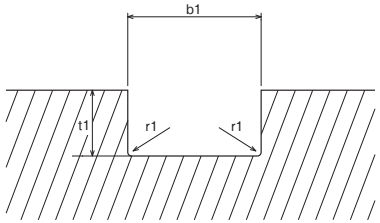
Dimensional Table

Symbol / Bore	A	BT	C	D	EA	EB	EE	FG	GB	KK	LF	LH
ϕ32	25(40)	8.6	7	14	70	56	Rc1/4	ϕ14	ϕ9	M16×1.5	64	25±0.06
ϕ40	30(45)	10.8	7	19	80	64	Rc1/4	ϕ17.5	ϕ11	M20×1.5	65	29±0.06
ϕ50	35(50)	13	8	24	94	74	Rc1/4	ϕ20	ϕ14	M24×1.5	71	34±0.06
ϕ63	45(60)	15.2	9	30	114	89	Rc1/4	ϕ23	ϕ16	M30×1.5	80	42±0.06

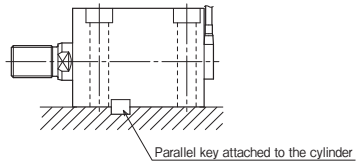
Symbol / Bore	LL	MM	N	PJ	PL	SG	SW	SY	T	TS	TW	TX	TZ	WF	Y
ϕ32	54	ϕ18	10	14	12	24	10	20	63	56	12	28	14	10	28
ϕ40	55	ϕ22	10	16	12	23	12	20	70	62	12	28	15	10	27
ϕ50	60	ϕ28	10	19	13	27	13	20	80	74	14	29	17	11	28
ϕ63	67	ϕ36	10	24	13	32	15	20	100	90	16	31	20	13	30

Notes) 1. When the lock nut is used, the parenthesized dimension A is recommended.
2. The tolerance of MM is f8.
3. Since the piston rod has a built-in sensor, a female threaded rod is inapplicable as a rule. However, it may be applicable depending on the bore, stroke and dimension W. Contact us.

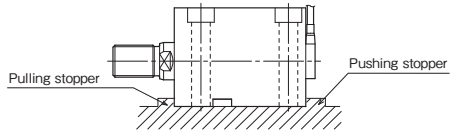
Recommended key groove dimensions



When using a parallel key



When not using a parallel key



The stopper size must be the same as the attached parallel key size.

Dimensional Table

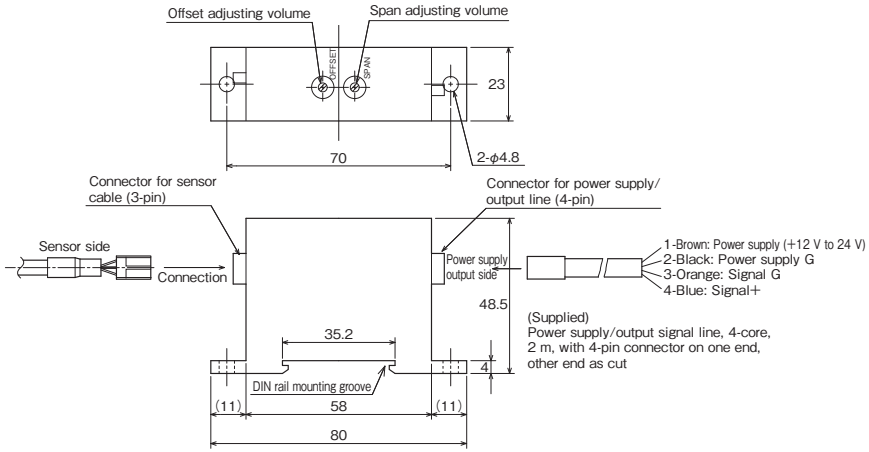
Bore	Nominal dimensions of key b×h×l	Key groove dimensions b1	t1	r1
ϕ32	12×8×63(both rounded)	$12\ ^{0}_{-0.043}$	$5\ ^{+0.2}_{0}$	0.25 to 0.40
ϕ40	12×8×70(both rounded)	$12\ ^{0}_{-0.043}$	$5\ ^{+0.2}_{0}$	
ϕ50	14×9×80(both rounded)	$14\ ^{0}_{-0.043}$	$5.5\ ^{+0.2}_{0}$	
ϕ63	16×10×100(both rounded)	$16\ ^{0}_{-0.043}$	$6\ ^{+0.2}_{0}$	

- When using the foot type, use the attached parallel key to install the cylinder, referring to the recommended key groove dimensions.
- When not using the parallel key, attach the stoppers at the front and rear with respect to the cylinder stroke direction. If the cylinder is used without a key or stoppers, excessive force is applied to the cylinder mounting bolts, and the bolts may be damaged.

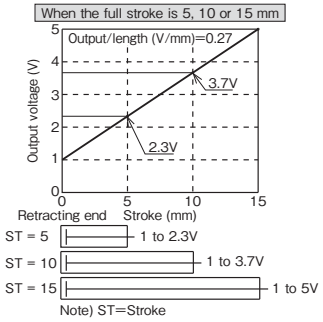
Unit: mm

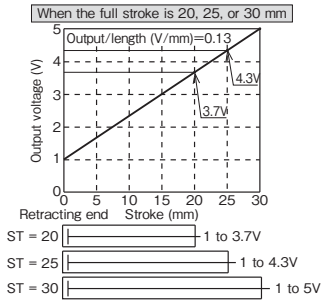
PSR_1A/TPSR1A Bore CAD/DATA is available.

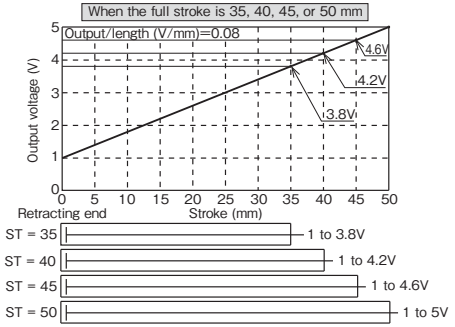
Amplifier



■Sensor output (3 patterns according to cylinder full stroke range)



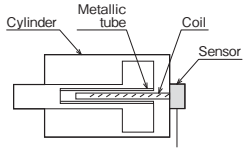




Notes) 1. The values shown above are for reference. The actual output may be slightly different.
2. The amplifier block has an offset adjusting screw and a span adjusting screw, so that an adjustment of about 5% can be made.
3. The output voltage at the same stroke may vary depending on the full stroke range.
(Example) The output voltage at a stroke of 5 mm on a cylinder with a full stroke of 15 mm differs from that at a stroke of 5 mm on a cylinder with a full stroke of 30 mm.

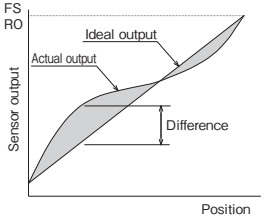
Principle of sensor

When a pulse signal is given to the coil, the pulse waveform shows not a regular form, but a form like a mound due to the inductance. If there is a metallic tube on the outside of the coil, the waveform changes further (the gradient becomes larger) under the influence of eddy current.
This change to the waveform depends on the ratio of the area covered with the metallic tube. This sensor converts the ratio of the area covered with the metallic tube to a positionally correlated voltage.



Linearity

The sensor accuracy under given conditions at a constant temperature is indicated. It is ideal that the sensor output is completely proportional to the position, but, actually, the sensor output shows a slight deviation.
The linearity (nonlinearity) refers to the difference between ideal output and sensor output and is normally indicated by the ratio (%FS or %RO) of the maximum value of deviation at the overall measurement length to the full stroke (FS) or rated stroke (RO).
For example, if the ratio is ±1%FS on a sensor with a stroke of 50 mm, an error of ±0.5 mm may occur. Since this sensor (amplifier block) has span and offset adjusting volumes, the output can be adjusted at the 0 point and FS (full stroke) position.



Influence of rotation of piston rod

Although the metallic tube is fixed in the piston rod, the output is changed by the change of the distance in the circumferential direction (run-out) between the metallic tube and the sensor rod with a built-in coil.
Therefore, the output may change approx. 0.2%FS when the piston rod is rotated. To obtain stable output, the cylinder should be connected in such a way that the rod is not rotated.

Influence of cable

If the cable length between the sensor and the amplifier is changed, the sensor output changes. Use the supplied cable without cutting or extending. The output obtained when the cable is in a coiled state may lightly differ from that when it is in a straight state.
Lay the cable in such a way that it will not considerably change in state during use.

Combination of sensor and amplifier

Since the amplifier has been adjusted according to the sensor, if the amplifier is combined with other sensor, normal output cannot be obtained. When using several sensors, make sure that each amplifier has the same serial number as that of the corresponding sensor.

Power supply voltage

This sensor is hardly affected by fluctuation in supply voltage. However, it is slightly affected. When the power supply voltage changes from 12 V to 24 V, the change in output is less than 1%FS.

Influence of deformation of cylinder body and piston rod

- The elastic deformation of the cylinder body and piston rod is approx. 0.025 to 0.05 mm (equivalent to 0.05 to 0.1%FS) at a nominal pressure of 16 MPa.
- The expansion and contraction of the cylinder caused by temperature change is less than 0.1 mm (approx. 0.15%FS) at 0 to 100℃ in the case of a stroke of 50 mm.
- If the work connecting part is loose, a difference in output by the looseness occurs on the work position basis at the advancing and retracting ends.

Temperature drift

The electric resistance values of the coil and metallic tube change with temperature, and the sensor output is affected by the temperature. The standard sensor is designed so that the temperature drift is reduced in a temperature range from 0 to 60℃. When the temperature exceeds 60℃, the error will become large. Carefully check the temperature. An example of influence of temperature on output of a sensor mounted on a cylinder is shown below.