Provided with linear pulse encoder

- Resolution : 0.1 mm/pulse
- Combination with a computer or an electronic counter ensures high-accuracy position control and position detection.
- Since a permanent magnet is used for the length measuring roller for detection of distance, the length measuring accuracy is improved.

Standard Specifications

Type		Standard type, Switch Set	
Nominal pressure		7 MPa	14 MPa
Maximum allowable pressure		Cap side: 9 MPa Rod side: (B)13.5 MPa (C)11 MPa	Cap side: 18 MPa Rod side: (B)18 MPa (C)14 MPa
Proof test pressure		10.5 MPa	21 MPa
Minimum operating pressure		Cap side: 0.3 MPa or less Rod side: (B) 0.45 MPa or less (C) 0.4 MPa or less	
Working speed range		8 to 300mm/s	
Working temperature range (ambient temp. and oil temp.)		−10 to +50℃ (no freezing)	
Structure of cushioning		Metal fitting system	
Applicable fluid		Petroleum-based fluid (When using another fluid, refer to the table of fluid adaptability.)	
Tolerance for thread		JIS 6g/6H	
Tolerance of stroke		0 to 100mm $^{+0.8}_{0}$ 101 to 250mm $^{+1.0}_{0}$ 251 to 630mm $^{+1.25}_{0}$ 631 to 1000mm $^{+1.4}_{0}$ 1001 to 1600mm $^{+1.6}_{0}$ 1601 to 2000mm $^{+1.8}_{0}$	
Tube material		Standard type····· ● Carbon steel for machine structural use Switch Set ····· ● Stainless steel	
Mounting style		LA·LB·FG·FH·CT	LA·FG·FH·CT
Accessory	Boots	Standard : Nylon tarpaulin Semi-standard : Chloroprene, Conex	
	Rod end attachment	Rod eye (T-end), rod clevis (Y-end) with pin, lock nut Floating joint (F-end) : Only for 7 MPa type	

Terminologies

Nominal pressure
Pressure given to a cylinder for convenience of naming.
It is not always the same as the working pressure (rated pressure) that guarantees performance under the specified conditions.

Maximum allowable pressure
Maximum allowable pressure generated in a cylinder (surge pressure, etc.).

Proof test pressure
Test pressure against which a cylinder can withstand without unreliable performance at the return to nominal pressure.

Minimum operating pressure
Minimum pressure at which cylinder installed horizontally operates under no load.

Notes) ● The hydraulic pressure generated in a cylinder due to the inertia of load must be lower than the maximum allowable pressure.
● For the internal structure, refer to the sectional drawings at the end of this catalog.
● Conex is the registered trademark of Teijin Limited.

Product Lineup

Unit: mm

Series Variations	Type	φ40	φ50	φ63	φ80	φ100
General purpose type	Double acting single rod	Standard type 70/140P-8	●	●	●	●	●
		Switch Set 70/140P-8R	●	●	●	●	●
	Double acting double rod	Standard type 70/140P-8D	●	●	●	●	●
		Switch Set 70/140P-8RD	●	●	●	●	●

Notes) ● When using a sensor, use a Switch Set Cylinder.
● DO NOT USE a sensor onto standard type cylinder.

Standard type

Switch Set

Standard Stroke

Unit: mm

Bore	Standard type	Switch Set
φ40·φ50	1200	1200
φ63·φ80	1600	1600
φ100	2000	2000

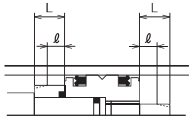
The above strokes indicate the maximum available strokes for the standard type. For the rod buckling, check with the buckling chart in the selection materials. Contact us for longer strokes.

Cushion Stroke Length

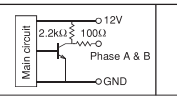
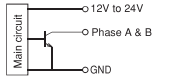
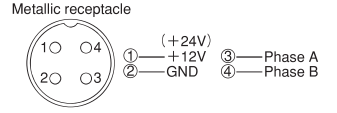
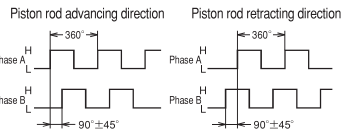
Unit: mm

Type / Bore	Cushion ring length L	Cushion ring parallel part length ℓ
φ40 to φ63	25	7
φ80 to φ100	25	8

- The cushion stroke lengths in case of cylinders used up to the stroke end.
- In the case that a cylinder is not used up to the stroke end, and it is stopped 5 mm or more before the stroke end, the cushioning effect will be weakened. In this case, consult us.



Detector Specifications

	Standard type	Semi-standard
Power supply voltage	12 V DC	12 to 24 V DC
Output type	12 V DC voltage output Phase A & B (90° phase) 30mA or less	NPN open collector output Phase A & B (90° phase) Applied voltage : 24 V DC or less Sink current : 30mA or less
Resolution	0.1mm/Pulse	
Max. response speed	300mm/s	
Working temperature range	−10 to +50℃ (no freezing)	
Note) Length measuring error	0.5mm/m	
Humidity	90%RH (no condensing)	
Output circuit diagram		
Wiring method		
Output mode		

Note) Length measuring error per meter of total moving distance

● How to order

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

Semi-standard specification

General Purpose Type

	Type ❶	Seal type ❷	Mounting style ❸	Cylinder bore ❹	Rod type ❺	Cushioning ❻	Stroke ❼	Sensor symbol ❽	Sensor quantity ❾	Rod end attachment ❿	Lock nut ⓫	With boots ⓬
●Standard type	140P-8	2	LA	50	B	B	100	–		T	L	J
●Switch Set	140P-8R	2	LA	50	B	B	100	AH	2	T	L	J

Double acting single rod
- ●For 7 MPa
  - 70P-8 : Standard type
  - 70P-8R : Switch Set
- ●For 14 MPa
  - 140P-8 : Standard type
  - 140P-8R : Switch Set

Double acting double rod
- ●For 7 MPa
  - 70P-8D : Standard type
  - 70P-8RD : Switch Set
- ●For 14 MPa
  - 140P-8D : Standard type
  - 140P-8RD: Switch Set

❶ Seal type
- 1 Nitrile rubber
- 2 Urethane rubber
- 3 Fluorocarbon
- 6 HNBR

❸ Mounting style

❹ Cylinder Bore (mm)
ϕ40 to ϕ100

❺ Rod type
- B Rod B
- C Rod C

❻ Cushioning
- B With cushion on both ends
- R With cushion on rod side
- H With cushion on cap side
- N No cushion

❼ Cylinder stroke (mm)

❽ Sensor symbol
Note) Select applicable sensors out of the Sensor List.

❾ Sensor quantity (1, 2, to n)

❿ Rod end attachment
- T Rod eye (T-end)
- Y Rod clevis (Y-end)
- F Floating joint (F-end) (for 7 MPa)

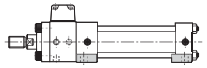
⓫ Lock nut
- L With lock nut

⓬ With boots
- J Nylon tarpaulin
- JN Chloroprene
- JK Conex

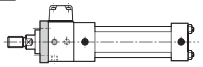
❗ Notes on ordering Switch Set
- ●When no sensor is required, specify O for the sensor symbol ❽ and the sensor quantity ❾.
- ●Sensors are not mounted on cylinders at delivery.

Mounting Style

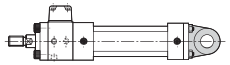
LA LA style (side lugs)



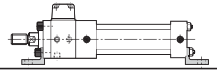
FG FG style (rod flange)



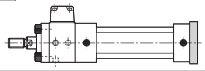
CT CT style (cap eye)



LB LB style (end angles) (for 7 MPa)



FH FH style (cap flange)



Note) The mounting styles for 7 MPa cannot be used at a pressure exceeding 7 MPa as a rule. Contact us for the usage.

Sensor List

Semi-standard specification

Type	Sensor symbol	Load voltage range	Load current range	Max. switching capacity	Protective circuit	Indicating lamp	Wiring method	Cord length	Applicable load
Reed sensor	AF AX101CE	DC : 5 to 30V AC : 5 to 120V	DC : 5 to 40mA AC : 5 to 20mA	DC : 1.5W AC : 2VA	None	LED (Lights in red when sensing)	0.3mm², 2-core, outer dia. ϕ4mm Rear wiring	1.5m	Small relay, programmable controller
	AG AX105CE							5m	
	AH AX111CE				Provided			1.5m	
	AJ AX115CE							5m	
	AE AX125CE	DC : 30V or less AC : 120V or less	DC : 40mA or less AD : 20mA or less		None	None		5m	
	AK AX11ACE	AC : 5 to 120V	5 to 20mA	AC : 2VA	Provided	LED (Lights in red when sensing)	4-pin connector type Rear wiring	0.5m	
	AL AX11BCE	DC : 5 to 30V	5 to 40mA	DC : 1.5W				0.5m	
	AM AX135CE	AC/DC : 90 to 240V	5 to 300mA	B contact output	Provided	LED (Lights in red when not sensing)	0.3mm², 2-core, outer dia. ϕ4mm Rear wiring	5m	
	S SR405	AC : 80 to 220V	2 to 300mA	30VA	Provided	Neon lamp (Lights when not sensing)	0.5mm², 2-core, outer dia. ϕ6mm Rear wiring	5m	
Solid state sensor	BE AX201CE-1	DC : 5 to 30V	5 to 40mA	—	Provided	LED (Lights in red when sensing)	0.3mm², 2-core, outer dia. ϕ4mm Rear wiring	1.5m	Small relay, programmable controller
	BF AX205CE-1							5m	
	CE AX211CE-1					LED (two-LED type in red/green)		1.5m	
	CF AX215CE-1							5m	
	CT AX211CE-1					LED (two-LED type in red/green)	0.3mm², 2-core, outer dia. ϕ4mm Rear wiring	1.5m	
	CU AX215CE-1							5m	
	CV AX21BCE-1						4-pin connector type Rear wiring	0.5m	
	CW AZ211CE-1						0.3mm², 2-core, outer dia. ϕ4mm Upper wiring	1.5m	
	CX AZ215CE-1							5m	
	CY AZ21BCE-1						4-pin connector type Upper wiring	0.5m	

Notes)
- ●For the sensors without a protective circuit, be sure to provide a protective circuit (SK-100) with the load when using any induction load (relay, etc.).
- ●The output logic of AX135CE is a B contact. When the piston is detected, the sensor contact turns off (the lamp turns on).
- ●For handling of sensors, be sure to see the sensor specifications at the end of this catalog.
- ●All AX type sensors can be mounted. For types other than the above, see the sensor specifications at the end of this catalog.

●Standard type

AX type sensor

Cord type

Connector type

Standard Stroke Range

Unit: mm

Bore	Standard type	Switch Set
ϕ40・ϕ50	1200	1200
ϕ63・ϕ80	1600	1600
ϕ100	2000	2000

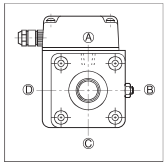
The above strokes indicate the maximum available strokes for the standard type.
For the rod buckling, check with the buckling chart in the selection materials. Contact us for longer strokes.

Sensor Mountable Minimum Stroke

Unit: mm

Bore	Mounting of 1 sensor		Mounting of 2 sensors	
	AX・AZ type	SR405	AX・AZ type	SR405
ϕ40	20	30	25	30
ϕ50				
ϕ63				
ϕ80				
ϕ100		25		25

✪ Standard specifications



- Both ends cushioned
- Port position Ⓐ and cushion valve position Ⓑ
- Detector specification supply voltage :12 V DC
  Output type :12 V DC AB-Phase output (90° phase)

✪ Change of port and cushion valve positions

The standard port position is Ⓐ, and the standard cushion valve position is Ⓑ. To change the positions, enter the symbols displayed on the dimensional drawing screen. (On the standard models, the detector is installed on the top.)

(Example)

70P-8R 2FG80BB100 − [B] [C] AH2
[B]: Port position (A, B, C, D)
[C]: Cushion valve position (A, B, C, D, or 0)

- In case that the cushion is not equipped, the cushion valve position is "0".

✪ Semi-standard range

- Change of detector specifications
  (NPN open collector output)
- With boots
- Change of piston rod end (dimensional symbol : W, A, KK)
- Plated cylinder tube
  (hard chrome plating thickness : 0.02 mm)

Adaptability of Fluid to Seal Material

Seal material	Applicable fluid				
	Petroleum-based fluid	Water-glycol fluid	Phosphate ester fluid	Water in oil fluid	Oil in water fluid
1 Nitrile rubber	○	○	×	○	○
2 Urethane rubber	◎	×	×	△	△
3 Fluorocarbon	○	×	○	○	○
6 HNBR	○	◎	×	◎	◎

Notes) 1. ◎○ : Applicable × : Inapplicable
Consult us before using the △-marked items.
2. ◎ shows the seal materials recommended for ensuring the abrasion resistance.

Weight Table

Unit: kg

Bore (mm)	Rod type	Basic weight (SD style)		Additional weight per mm of stroke		Mounting accessory additional weight					Rod end attachment weight			
		Single rod type	Double rod type	Single rod type	Double rod type	LA	LB	FG	FH	CT	Rod eye (T-end)	Rod clevis (Y-end) with pin	Floating joint (F-end)	Lock nut
ϕ40	B	6.1	7.0	0.011	0.014	0.5	0.5	0.9	1.2	0.5	0.5	0.7	0.75	0.03
	C	6.0	6.9	0.010	0.012								0.39	0.02
ϕ50	B	8.1	9.5	0.014	0.019	0.9	0.7	1.3	2.0	1.0	1.0	1.2	1.41	0.05
	C	8.0	9.3	0.012	0.014								0.75	0.03
ϕ63	B	12.0	14.3	0.019	0.027	1.0	1.2	1.4	2.5	2.0	2.7	3.9	2.68	0.11
	C	11.7	13.9	0.017	0.022								1.41	0.05
ϕ80	B	22.1	26.2	0.032	0.045	1.8	2.0	2.1	4.4	3.1	2.2	3.7	—	0.24
	C	21.7	25.6	0.027	0.035								2.68	0.11
ϕ100	B	35.5	42.2	0.048	0.067	2.1	2.9	3.5	7.4	5.7	4.2	7.7	—	0.52
	C	34.9	41.1	0.042	0.055								—	0.24

Sensor Additional Weight

Unit: kg

Bore (mm)	AX•AZ type			SR405
	Cord length 1.5 m	Cord length 5 m	Connector type	Cord length 5 m
ϕ32 to ϕ50	0.05	0.13	0.04	0.22
ϕ63	0.07	0.14	0.06	0.22
ϕ80・ϕ100	0.07	0.15	0.06	0.22

Calculation formula : Cylinder weight (kg)=basic weight+(additional weight per mm of stroke×cylinder stroke (mm))+(sensor additional weight×sensor quantity)+mounting accessory weight+rod end attachment weight
Calculation example : 70P-8R, rod B, bore ϕ50, cylinder stroke 100 mm, mounting style LA, 2 pcs of AX215
8.1+(0.014×100)+(0.05×2)+0.9=10.5kg

Hydraulic Cylinders with Position Detector 70/140P-8

Discontinued

PQCPA Series dedicated to analog pulse output 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	—
Response frequency	1kHz	200kHz
Linearity	±0.02%FS	—
Signals	Voltage input 0 to 10V Voltage input 1 to 5V Current input 4 to 20mA	Open collector input Differential input (line driver input) 12V voltage input 24V voltage input
Monitor output	Voltage output Note)	Line driver output
Sampling speed	1000times/sec	
Display speed	10times/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, 50mA (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°C (no freezing)	
Ambient humidity	35 to 85%RH (no condensing)	

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

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

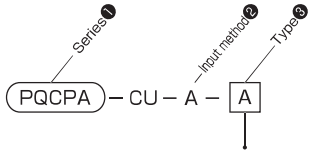
Series	Detection method	Signal type
PTN-1B	Absolute method	Analog type (4 to 20mA, 0 to 10V)
PTH-1B		
PTT-1B		
PSR-1A		Analog type (1 to 5V)
35P-3	Linear pulse encoder	Encoder type
70P-8		
140P-8		

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

How to order Discontinued

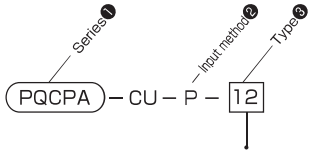
Position Indicator

● Analog input



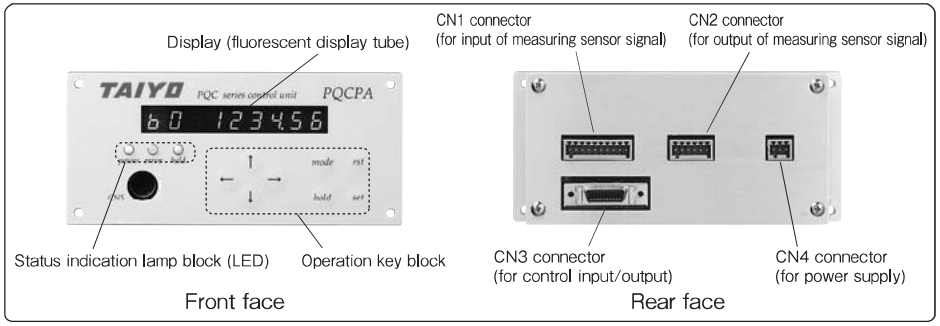
A	Current input
V	Voltage input

● Pulse input

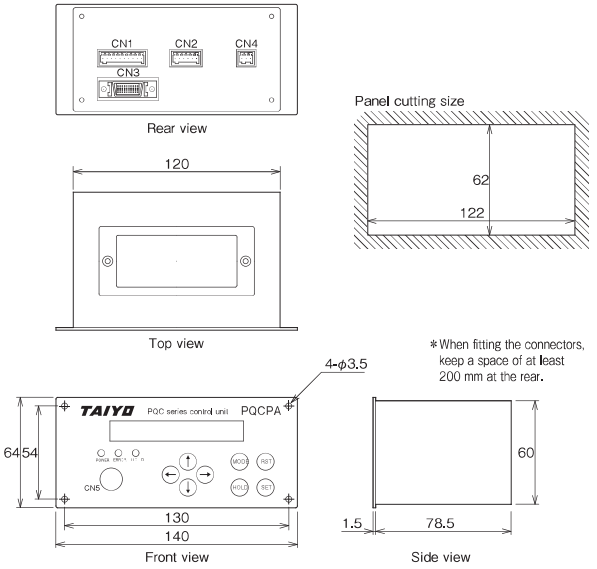


12	12V open collector input, 12V voltage input
24	24V open collector input, 24V voltage input
00	Differential input

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



Dimensional Drawings



Supplied connector

- CN1 connector (for input of measuring sensor signal)

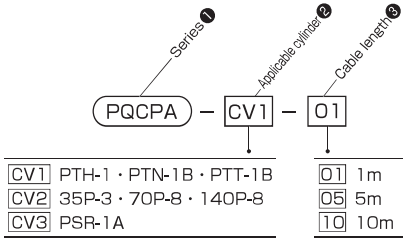
- CN2 connector (for output of measuring sensor signal)

- CN3 connecto (for control input/output)

- CN4 connector (for power supply)

● How to order Discontinued

How to order cable between sensor and indicator

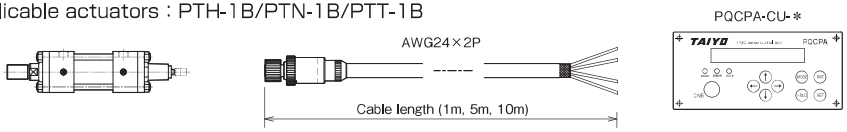


CV1	PTH-1・PTN-1B・PTT-1B	01	1m
CV2	35P-3・70P-8・140P-8	05	5m
CV3	PSR-1A	10	10m

＊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.

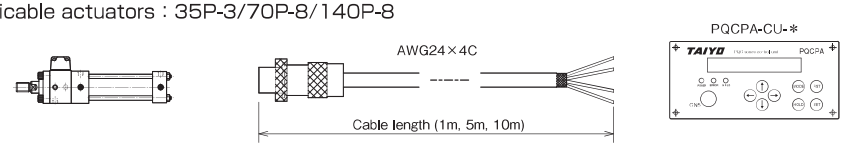
PQCPA-CV1-Cable length

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



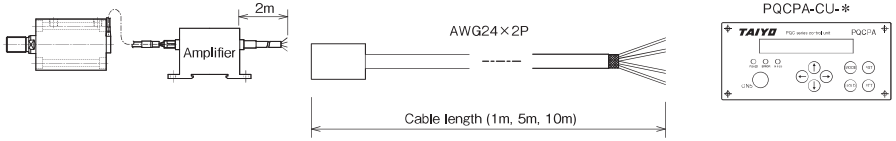
PQCPA-CV2-Cable length

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



PQCPA-CV3-Cable length

Applicable actuators : PSR-1A

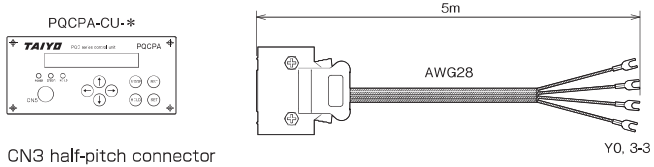


Note) PSR-1A comes with a 2-m cable as a standard accessory. If another cable is required, select this cable. (In this case, disconnect the standard cable (2m) of PSR-1A, and connect the selected cable directly to the amplifier.)

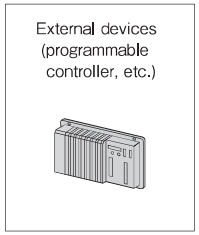
How to order I/O cable

PQCPA – IO

＊The I/O cable is 5m length.



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

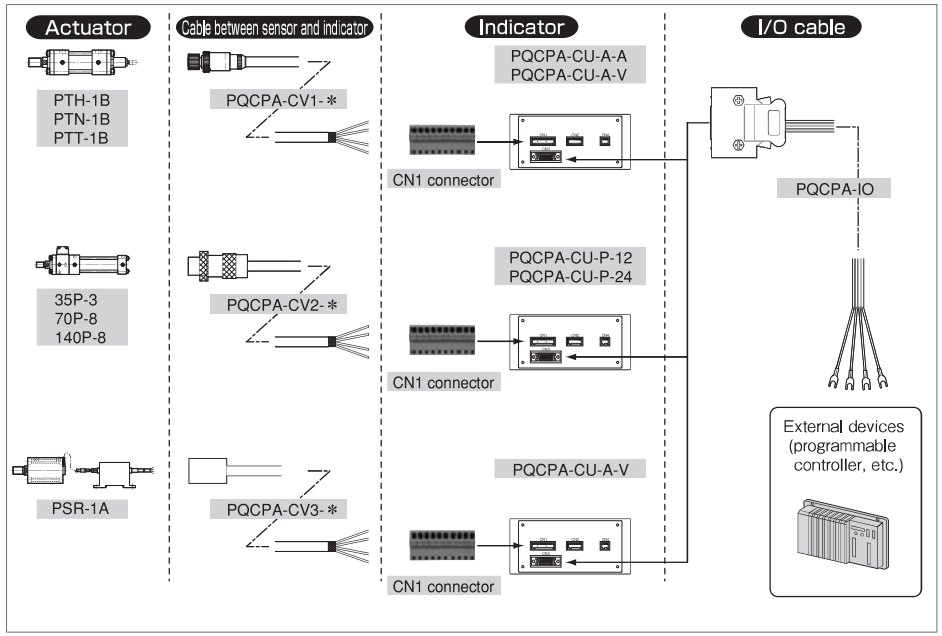
Pin No.	Description	Signals
1	P24	Power supply
2	N24	Power supply
3	PE	Power supply

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.

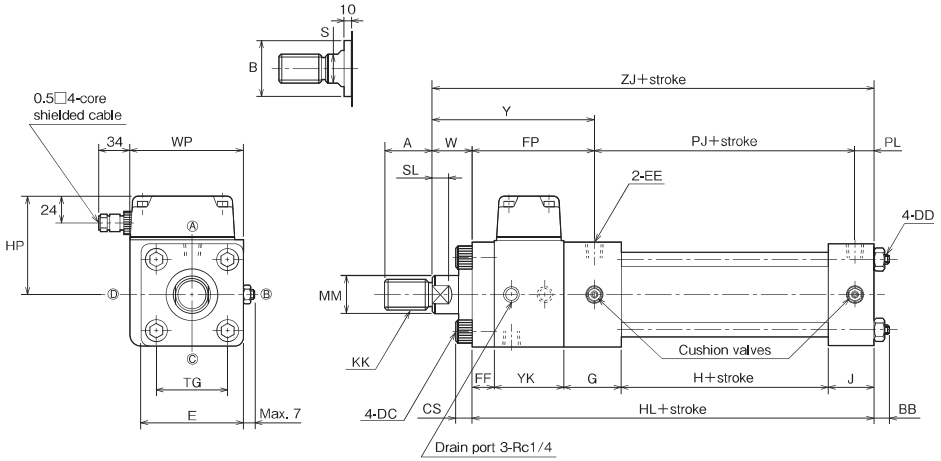
Example of Product Configuration



SD

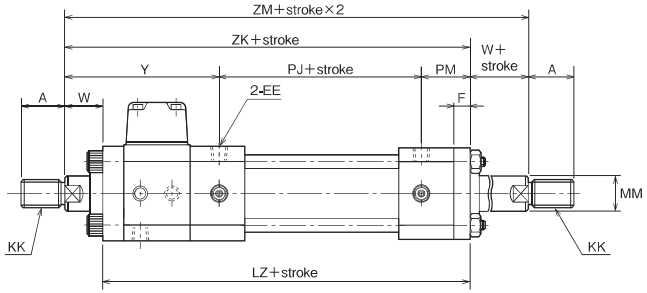
70P-8 2 SD Bore B B Stroke

140P-8 2 SD Bore B B Stroke

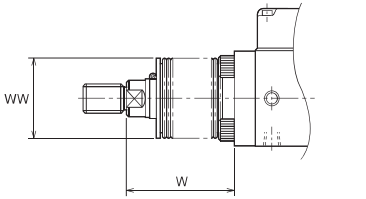


● When mounting a sensor, refer to the "dimensional drawings of Switch Set". All the contents other than "sensor mounting dimensions" are the same.

Double rod type (both ends loaded)



● Switch Set Cylinders are available.



Nylon tarpaulin, Chloroprene: φ40 and φ50 → 1/3.5 stroke+X; φ63 to φ100 → 1/4 stroke+X

Conex: φ40 and φ50 → 1/2.5 stroke+X; φ63 to φ100 → 1/3 stroke+X

● If the calculated value has a fractional part, round up the part.

	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Heat proof	80℃	130℃	200℃

Notes) ● Conex is the registered trademark of Teijin Limited.
● The boots have been mounted at our factory prior to delivery.
● The heat proof field shows the allowable temperature limit of the boots.
● The values are not the heat proof temperature of the cylinder body, etc.

Dimensional Table

Symbol / Bore	Rod B A	B	HP	KK	MM	S	SL	Rod C A	B	HP	KK	MM	S	SL	BB	CS	DC	DD
φ 40	30	φ 40	84.5	M20×1.5	φ22.4	19	11	25	φ 36	82	M16×1.5	φ18	14	10	11	10	M10×1.25	M10×1.25
φ 50	35	φ 46	87	M24×1.5	φ28	24	14	30	φ 40	84	M20×1.5	φ22.4	19	11	11	10	M10×1.25	M10×1.25
φ 63	45	φ 55	91	M30×1.5	φ35.5	30	16	35	φ 46	87	M24×1.5	φ28	24	14	13	12	M12×1.5	M12×1.5
φ 80	60	φ 65	95.5	M39×1.5	φ45	41	20	45	φ 55	95	M30×1.5	φ35.5	30	16	16	16	M16×1.5	M16×1.5
φ 100	75	φ 80	107.5	M48×1.5	φ56	50	23	60	φ 65	107.5	M39×1.5	φ45	41	20	18	18	M18×1.5	M18×1.5

Symbol / Bore	E	EE	F	FF	FP	G	H	HL	J	LZ	PJ	PL	PM	TG	W	WP	Y	YK	ZJ	ZK	ZM
φ 40	□65	Rc3/8	11	22	109	50	44	212	36	237	90	13	38	□45	30	87.5	139	60	242	267	297
φ 50	□76	Rc1/2	13	24	113	54	48	226	40	253	98	15	42	□52	30	92.5	143	60	256	283	313
φ 63	□90	Rc1/2	15	24	121	56	52	238	40	269	102	15	46	□63	35	100	156	66	273	304	339
φ 80	□110	Rc3/4	18	30	144	66	54	272	46	310	110	18	56	□80	35	110	179	76	307	345	380
φ 100	□135	Rc3/4	20	32	150	66	60	284	46	324	116	18	58	□102	40	135	190	80	324	364	404

● The tolerance of MM is f8.

With Boots

Symbol / Bore	WW Rod B	WW Rod C	X
φ 40	φ 50	φ 50	45
φ 50	φ 63	φ 50	45
φ 63	φ 71	φ 63	55
φ 80	φ 80	φ 71	55
φ 100	φ 100	φ 80	55