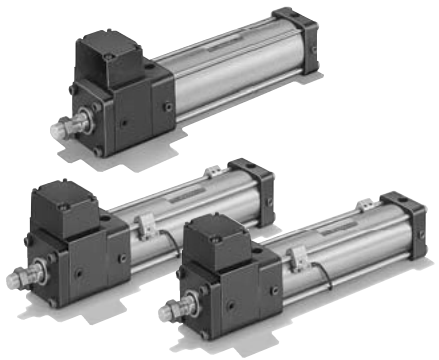
Provided with linear pulse encoder

- 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.
- Resolution : 0.1 mm/pulse



Standard Specifications

Type		Standard type		Switch Set	
Kind of piston seal		U seal	Slipper Seal	U seal	Slipper Seal
Nominal pressure		3.5 MPa			
Maximum allowable pressure		4.5 MPa			
Proof test pressure		5 MPa			
Minimum operating pressure		0.2 MPa or less			
Working speed range		8 to 300mm/s	0.1 to 300mm/s	8 to 300mm/s	0.1 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 250mm $^{+0.1}_{0}$ 251 to 1000mm $^{+1.4}_{0}$ 1001 to 1600mm $^{+1.8}_{0}$			
Tube material		Standard type ····· ● Carbon steel for machine structural use Switch Set ····· ● Stainless steel			
Mounting style		LA·LB·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, floating joint (F-end)			

Cushion Stroke Length

Unit: mm

Cylinder bore	Cushion stroke (cushion ring length)
ϕ32 to ϕ63	16
ϕ80 to ϕ100	20

- 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 such a case, consult us.

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.
- Slipper Seal is the registered trade mark of Nippon Valqua Industries, Ltd.
- Conex is the registered trademark of Teijin Limited.

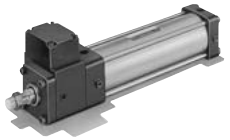
Product Lineup

Unit: mm

Series Variations	Type	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100
General purpose type / Double acting single rod	Standard type 35P-3	●	●	●	●	●	●
	Switch Set 35P-3R	●	●	●	●	●	●

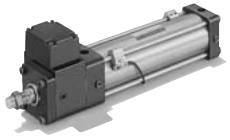
Notes)
- When using a sensor, use a Switch Set Cylinder.
- No sensor can be mounted onto the standard type cylinder.

Standard type



35P-3

Switch Set



35P-3R

Standard Stroke Range

Unit: mm

Bore \ Type	Standard type	Switch Set
ϕ32·ϕ40	1000	1000
ϕ50·ϕ63	1200	1200
ϕ80·ϕ100	1600	1600

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

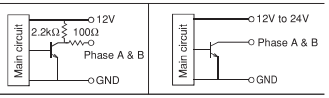
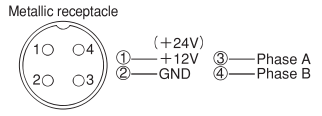
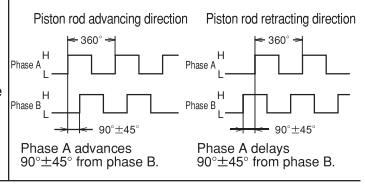
Bore \ Item	Mounting of 1 sensor		Mounting of 2 sensors	
	AX type	SR type	AX type	SR type
ϕ32	25	35	25	35
ϕ40				
ϕ50				
ϕ63	20		20	
ϕ80				
ϕ100				

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
Nitrile rubber	○	○	×	○	○

Note) ○ : Applicable × : Inapplicable

Detector Specifications

	Standard	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

General Purpose Type

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

	❶ Type	❷ Seal material	❸ Mounting style	❹ Cylinder bore	❺ Cushioning	❻ Stroke	❼ Sensor symbol	❽ Sensor quantity	❾ Rod end attachment	❿ Boots
●Standard type	35P-3	1	LA	40	B	100			T	J
●Switch Set	35P-3R	1	LA	40	B	100	AH	2	T	J

❷ Seal material
- 1 U seal (nitrile rubber)
- 8 Slipper Seal

❸ Mounting style

❹ Cylinder bore (mm)
ϕ32 to ϕ100

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

❻ Cylinder stroke (mm)

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

❽ Sensor quantity (1, 2, to n)

❾ Rod end attachment
- T T-end (rod eye)
- Y Y-end (rod clevis)
- F F-end (floating joint)

❿ Boots
- J Nylon tarpaulin
- JN Chloroprene
- JK Conex

❗ Notes on ordering Switch Set
- When no sensor is required, specify 0 for the sensor symbol ❼ and the sensor quantity ❽.
- Sensors are not mounted on cylinders at delivery.

Standard Stroke Range

Unit: mm

Bore \ Type	Standard type	Switch Set
ϕ32・ϕ40	1000	1000
ϕ50・ϕ63	1200	1200
ϕ80・ϕ100	1600	1600

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.

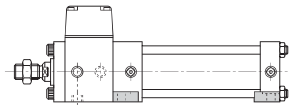
Sensor Mountable Minimum Stroke

Unit: mm

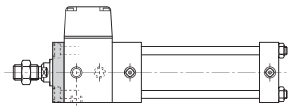
Bore \ Item	Mounting of 1 sensor		Mounting of 2 sensors	
	AX type	SR type	AX type	SR type
ϕ32	25	35	25	35
ϕ40				
ϕ50				
ϕ63	20		20	
ϕ80				
ϕ100				

Mounting Style

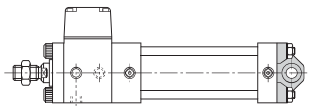
LA LA style (side lugs)



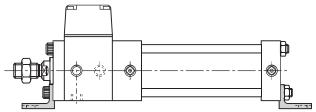
FG FG style (rod flange)



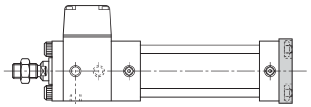
CT CT style (cap eye)



LB LB style (end angles)



FH FH style (cap flange)



Sensor List

Semi-standard

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 AC : 20mA or less		None	None		5m	
	AK AX11ACE	AC : 5 to 120V	5 to 20mA	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	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							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.

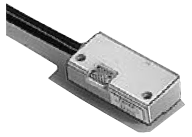
●Standard type

AX type sensor

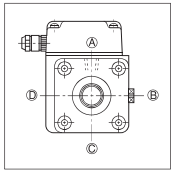
Cord type

Connector type

SR type sensor



★ Standard specifications



- Both ends cushioned
- Port position Ⓐ, 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 Ⓑ. When modifying the positions, enter the symbol shown in the dimensional drawings. (On the standard models, the detector is installed on the top.)

(Example)

35P-3R 1LA40B100–B C AH2–J

Port position (A, B, C, D)

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
- Plated cylinder tube (hard chrome plating thickness 0.02 mm)
- Magnetic proximity sensor of SR type

End Lock Nut Part Number

Bore	Number
ϕ32	LNA-12F-H
ϕ40	
ϕ50	LNA-18F-H
ϕ63	
ϕ80	LNA-24F-H
ϕ100	LNA-30F-H

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
Nitrile rubber	○	○	×	○	○

Note) ○ : Applicable × : Inapplicable

Unit: mm

Weight Table

Unit: kg

Bore (mm)	Basic weight	Mounting accessory weight					Rod end attachment weight			Additional weight per mm of stroke
	Standard type, Switch Set	LA style	LB style	FG style	FH style	CT style	Rod eye (T-end)	Rod clevis (Y-end) with pin	Floating joint (F-end)	
ϕ32	3.40	0.12	0.19	0.39	0.51	0.12	0.15	0.20	0.19	0.0041
ϕ40	3.72	0.19	0.23	0.40	0.58	0.18	0.16	0.34	0.19	0.0045
ϕ50	5.30	0.28	0.36	0.53	0.86	0.26	0.22	0.35	0.41	0.0078
ϕ63	7.28	0.29	0.46	0.51	1.15	0.40	0.22	0.35	0.41	0.0094
ϕ80	11.54	0.66	0.86	1.23	2.27	1.02	0.76	1.01	1.41	0.0122
ϕ100	17.03	0.96	1.60	1.47	3.26	1.28	1.30	1.76	2.68	0.0200

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

Calculation example : Standard type, LB style, bore ϕ63, cylinder stroke 200 mm 7.28+0.46+0.0094×200=9.62kg

Sensor Additional Weight

Unit: kg

Bore (mm) \ Sensor	AX type			SR type
	Cord length 1.5 m	Cord length 5 m	With connector	Cord length 1.5 m
ϕ32	0.05	0.13	0.04	0.22
ϕ40				
ϕ50				
ϕ63				
ϕ80				
ϕ100	0.07	0.14	0.06	

Hydraulic Cylinders with Position Detector
35P-3

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 signal	Analog voltage/analog current	Phase AB
Display ranges	±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℃ (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

PQCPA – CU – A – A (① Series, ② Input method, ③ Type)

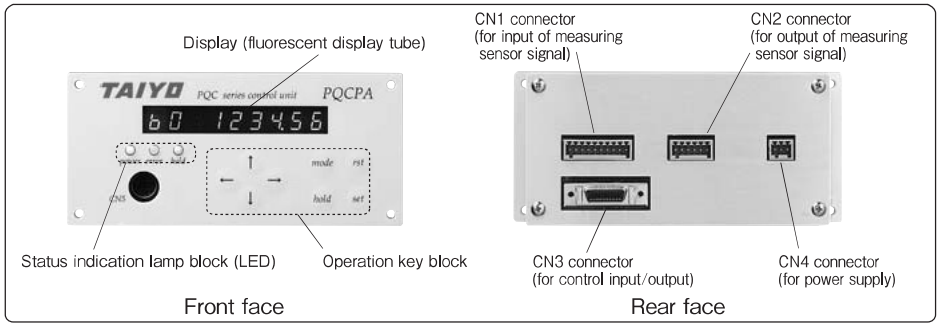
A	Current input
V	Voltage input

● Pulse input

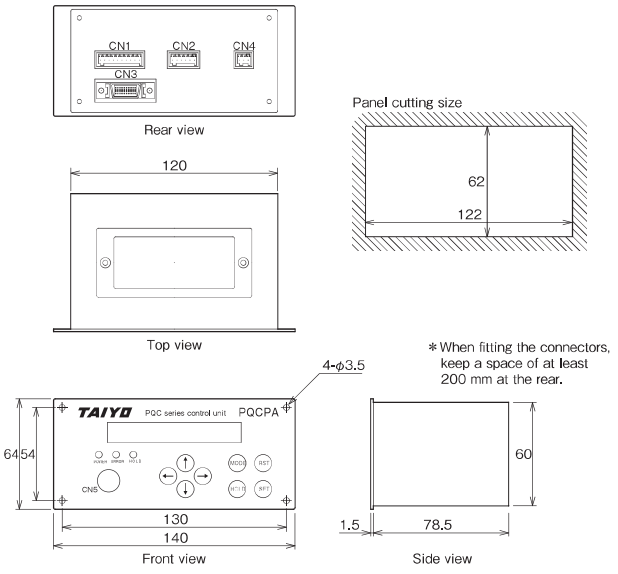
PQCPA – CU – P – 12 (① Series, ② Input method, ③ Type)

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)

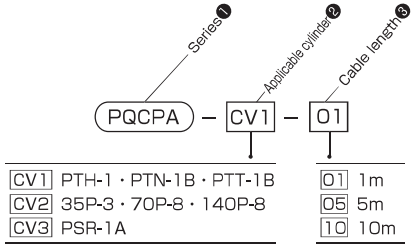
- CN2 connector (for output of measuring sensor signal)

- CN3 connector (for control input/output)

- CN4 connector (for power supply)

● How to order Discontinued

How to order cable between sensor and indicator

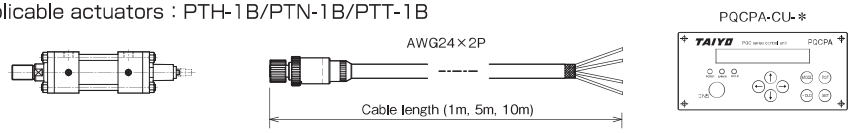


CV1	PTH-1・PTN-1B・PTT-1B	01	1m
CV2	35P-3・70P-8・140P-8	05	5m
CV3	PSR-1A	10	10m

* 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.

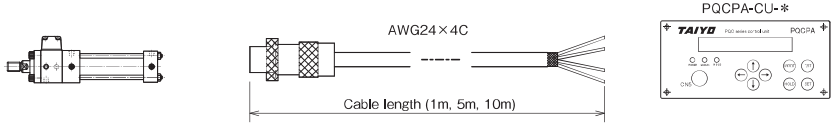
PQCPA-CV1-Cable length

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



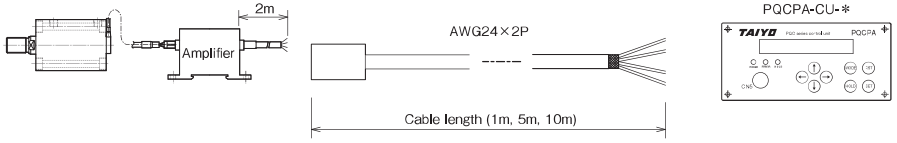
PQCPA-CV2-Cable length

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



PQCPA-CV3-Cable length

Applicable actuators : PSR-1A

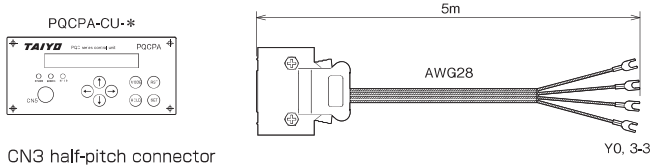


Note) PSR-1A comes with a 2-m cable as a standard accessory. If another cable is required, select this cable. (In this case, disconnect the standard cable (2m) of PSR-1A, and connect the selected cable directly to the amplifier.)

How to order I/O cable

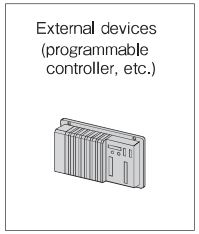
PQCPA – IO

* The I/O cable is 5m 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

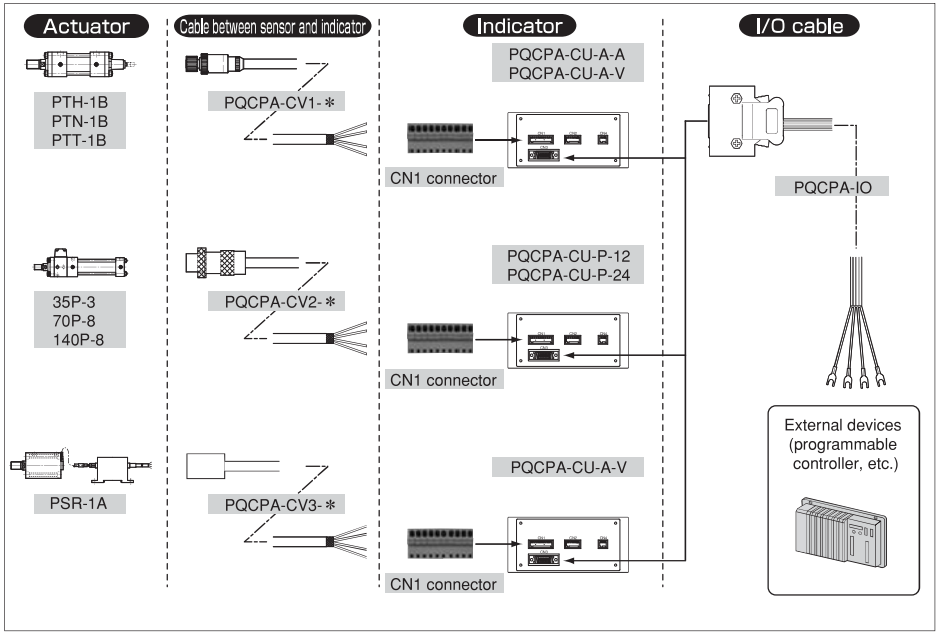
Pin No.	Description	Signals
1	P24	Power supply
2	N24	Power supply
3	PE	Power supply

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

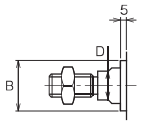
* For details, see the instruction manual.

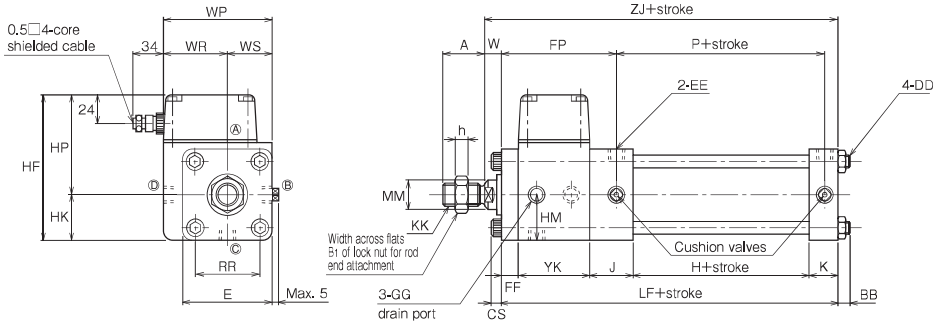
Example of Product Configuration



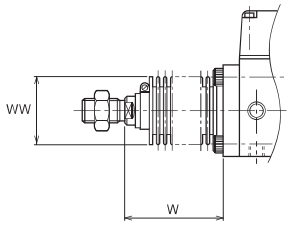
SD

35P-3 1 SD Bore B Stroke





- There are check valves on two sides out of the four outer sides of the cap and rod covers except the port and cushion sides. The check valve is concurrently used with air vent.
- When mounting a sensor, refer to the "dimensional drawings of Switch Set". All the contents other than "sensor mounting dimensions" are the same.



Nylon tarpaulin / Chloroprene: φ32 to φ63 → 1/3 stroke+X; φ80 and φ100 → 1/4 stroke+X

Conex: φ32 to φ63 → 1/2.5 stroke+X; φ80 and φ100 → 1/3 stroke+X

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

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

Notes)
- When the cylinder is provided with boots, the bush is different from that of the standard type cylinder.
- Remember that the heat proof field in the table above shows the allowable temperatures for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Limited.
- The boots have been mounted at our factory prior to delivery.

Dimensional Table

Bore \ Symbol	A	B	B_1	BB	CS	D	DD	E	EE	FF
φ32	24	φ30f9	19	7	6	13	M6×1	□44	Rc1/4	15
φ40	24	φ30f9	19	7	6	13	M6×1	□50	Rc3/8	15
φ50	36	φ34f9	24	7	6	19	M6×1	□62	Rc3/8	15
φ63	36	φ34f9	24	9	8	19	M8×1.25	□76	Rc3/8	15
φ80	48	φ42f9	32	10	10	24	M10×1.25	□94	Rc1/2	20
φ100	60	φ50f9	41	12	12	30	M12×1.5	□114	Rc1/2	20

Bore \ Symbol	FP	GG	H	HF	HK	HM	HP	h	J	K
φ32	99	Rc1/8	30	103	22	19	81	7	38	25
φ40	99	Rc1/8	30	106	25	22	81	7	38	25
φ50	99	Rc1/4	30	115	31	31	84	11	38	25
φ63	99	Rc1/4	33	122	38	38	84	11	38	25
φ80	107	Rc1/4	31	134	47	47	87	14	45	32
φ100	113	Rc1/4	31	155	57	57	98	17	45	32

Bore \ Symbol	KK	LF	MM	P	RR	W	WP	WR	WS	YK	ZJ
φ32	M12×1.25	168	φ16	58	□33	15	80	55	25	60	183
φ40	M12×1.25	168	φ16	58	□37	15	80	55	25	60	183
φ50	M18×1.5	168	φ22	58	□47	15	86	55	31	60	183
φ63	M18×1.5	171	φ22	61	□56	15	93	55	38	60	186
φ80	M24×2	188	φ28	67	□70	19	102	55	47	60	207
φ100	M30×2	194	φ36	67	□89	23	114	57	57	66	217

- The tolerance of MM is f8.
- Dimension HM indicates the drain port position.

With Boots

Bore \ Symbol	WW	X
φ32	φ36	50
φ40	φ40	50
φ50	φ45	55
φ63	φ45	55
φ80	φ60	65
φ100	φ71	65