High-level energy-saving intelligent hydraulic drive unit consisting of "Direct drive type hydraulic servo" and "Cylinder with load and stroke sensors"

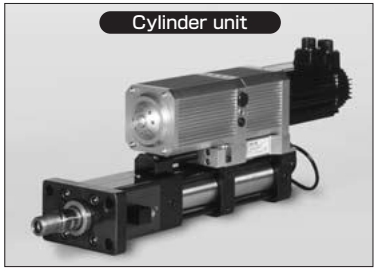
We finished a high-level energy-saving intelligent hydraulic control unit "ATSUKAN Servo" consisting of a direct drive type hydraulic servo requiring no control valve and piping and excelling in environmental safety and economic efficiency and a cylinder provided with load and stroke sensors.
Any load and positioning control can be performed based on data given by the stroke and load sensors in the cylinder. (The cylinders provided with load sensors have been patented in USA and Japan.)

Cylinder unit

Not necessary for control valve and hydraulic power unit

"ATSUKAN Servo" uses a bi-directional hydraulic pump. The unit can change cylinder movement (advance and retract) by the hydraulic pump rotating direction, and the unit can control the hydraulic fluid rate according to the hydraulic pump rotation speed. Therefore, flow control valves are not required.
In addition, the torque control enables to arbitrarily control the hydraulic pressure. It does not need an external reservoir.
Moreover, it uses a remarkably small quantity of hydraulic fluid and can work with petroleum-based fluid which can be easily disposed of.

Cylinder unit



High functionality, High output, High accuracy and High efficiency leading to High energy-saving effect

Conventional hydraulic drive units had extremely poor efficiency because of cooling of hydraulic fluid. "ATSUKAN Servo" consumes a very little energy because the servo motor and hydraulic pump are running at the lowest speed while the cylinder is in a stopped state.
The fluid temperature is not increased by extension and retraction of the cylinder under no load. Therefore, even if the cylinder is operating at a high speed, the energy consumption is very low (the energy efficiency during operation is 85% to 95%). It is a real low-power-consumption energy-saving hydraulic drive unit.

No piping, and Not necessary for hydraulic work

Since "ATSUKAN Servo" uses a system which drives directly the actuator changing the hydraulic pump rotation direction, flow rate and pressure, it does not need a control valve. It is unnecessary to connect the pipe between the hydraulic pump and the actuator.

Maintenance-free, and Drastic reduction of environmental load

"ATSUKAN Servo" will free you from the necessity of disposal of waste cooling water and hydraulic fluid. The hydraulic pump, actuator and reservoir are integrated into one unit, which is filled with hydraulic fluid and set upped for servo control before shipment. Accordingly, you can install and use it soon after receiving.

Controller for control

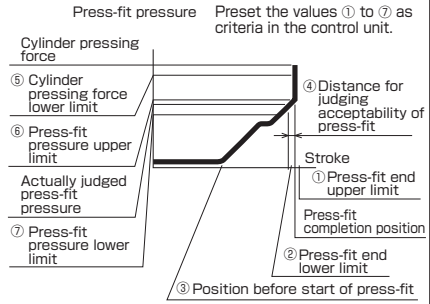
Select from two kinds of controllers for control depending on the application.

Type	Servo controller 	Simple control unit 
Model number	PQCS2-SCU-01****	PQCSE-SCU*-*
Positioning control	Possible: PID feedback control	Impossible
Load control	Possible: PID feedback control High accuracy (16-bit AD converter is used.)	Possible: PID feedback control Simple accuracy (10-bit AD converter is used.)
Speed setting (Speed control is not performed.)	①Speed can be set with touch panel (PTP control, table control) ②Speed can be set with digital signal (digital signal command control)	①Speed switching control by cylinder sensor fitting position ②Speed switching control by output signals from control unit for judgment, output unit for PQCP and output unit for PQCPA
External dimensions	W166×H355×D222	W140×H64×D80 (without DIN rail fitting)
Price	The price of the simple control unit is approx. 1/4 of the price of the controller for control.	

Evaluation controller

The patented judgment method ensures high press-fit quality.

Press-fit results were conventionally evaluated by a method that switches between high hydraulic pressures or a method judging on peak values recorded before press-fit end. These methods, however, required the area close to a press-fit end to be excluded from the evaluation scope because of the response errors of control and other equipment, the scanning timing of a programmable control unit and press-fit end variation attributable to the accumulated production tolerances of pieces of work.
Our new "recognized press-fit end" method recognizes press-fit ends per cycle and evaluates the press-fitting force immediately before a press-fit end. This helps upgrade the press-fitting quality of the work in process. The new evaluation controller using the new method also evaluates recognized press-fit end positions and ultimate press-cutting force and prevents foreign matter from being trapped in the drive unit or the unit from being built into a wrong machine. In addition, the controller detects thrust errors.



Press-fit software based on long-term know-how of assembling machines

① Press-fit modes can be registered in 15 channels.
② Seven types of criteria can be preset by using the UP and DOWN keys on the control unit front panel and also by inputting current values. Therefore, when there are actual workpieces, the time to input the data can be diminished.
③ The preset position before start of press-fit is output from the control unit every cycle, so that the data can be used when the press-fit shaft speed is switched between high and low to reduce the cycle time.
④ Data are output every 0.01 mm at minimum, and the storage has a capacity of up to 1000 pieces of data.
⑤ Although the system can be controlled by an external programmable controller, a complicated ladder program is unnecessary because of the simple input/output.

Control unit
PQC-CU-02

・Standard ・Peak
・Front gate ・Back gate

For the details, see the catalog of "ATSUKAN" issued by us. At present, the controller for judgment is applicable only to the analog stroke sensors.
If press-fit control is required, use the controller for judgment.

Energy-saving intelligent hydraulic drive unit

- Not necessary for control valve or hydraulic power unit
- High functionality, high output and high accuracy (Positioning control: Load control)
- No piping, and Not necessary for hydraulic work
- High efficiency and excellent energy-saving effect
- A controller suitable for purpose of use can be selected
- Examples of application:
  Caulking machine, Curling, Powder molding press, Fixed displacement pump, Durability tester, etc.

Model configuration table

Bi-directional pump cc/rev	Nominal rated thrust force kN	Max. thrust force kN	Advance/ Retract kN	Max. speed Advance/Retract mm/s	Stroke mm	Motor kW	Cylinder bore mm
1.1	5	10	7.1/ 4.9	28/40	200 to 500 In units of 50 mm	0.20	ϕ50
	10	20	14.2/ 9.8			0.40	
	20	20	20.1/13.8			0.75	
	10	15	11.3/ 7.7	17/25		0.20	ϕ63
	20	30	22.6/15.4			0.40	
	30	30	31.9/21.8			0.75	
	15	22	18.3/12.5	10/16		0.20	ϕ80
	35	50	36.5/24.9			0.40	
	50	50	51.5/35.2			0.75	
	25	37	28.6/19.6	7/10		0.20	ϕ100
	55	80	57.0/39.1			0.40	
	80	80	80.4/55.2			0.75	
3.5	10	15	11.2/ 7.7	89/129	200 to 500 In units of 50 mm	1.0	ϕ50
	15	22	17.7/12.1	52/82		1.0	ϕ63
	25	37	25.8/18.1			1.5	
	35	43	35.4/24.2			2.0	
	25	37	28.7/19.6	34/50		1.0	ϕ80
	40	60	43.0/29.2			1.5	
	55	70	57.4/39.2			2.0	
11.0	15	22	16.9/11.5	175/258	200 to 500 In units of 50 mm	3.0	ϕ63
	20	30	22.5/15.3			4.0	
	25	37	28.1/19.1			5.0	
	25	37	27.3/18.6	109/160		3.0	ϕ80
	35	52	36.5/24.7			4.0	
	45	67	45.6/30.9			5.0	
	40	60	42.7/29.1	70/102		3.0	ϕ100
	55	82	57.0/38.8			4.0	
	70	100	71.2/48.5			5.0	

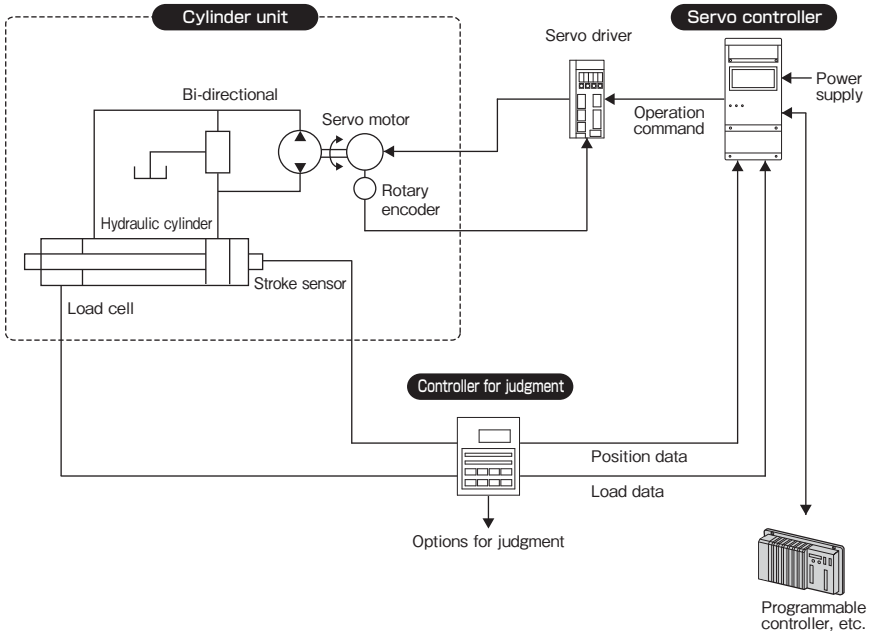
Notes) 1. The max speeds under no load are shown. Select a cylinder on condition that the max. speed under load is 90% of the speed shown above.
2. When a differential circuit is used, the extension speed is doubled.
3. The instantaneous max. thrust force is 1.5 times higher than the rated thrust force.

Control accuracy

Control method		Resolution	Repeatability (under no load)
Position control	Analog sensor	Approx. 25 μm	Resolution × ±2
	Digital sensor	2 μm	±10 μm
Load control		Approx. 1/1000	± 3% of rated thrust force

Notes) 1. The control accuracy may change depending on working conditions and ambient temperature.
2. The analog sensor resolution varies depending on sensor type.
3. If an absolute accuracy is required, consult us.

"ATSUKAN Servo" basic model configuration



Note) The controller for judgment is applicable only to analog stroke sensors.
It is not applicable to digital stroke sensors.

Servo driver specifications

Model	Motor specifications
SGDM-02ADA	0.2kW
SGDM-04ADA	0.4kW
SGDM-08ADA	0.75kW
SGDM-10ADA	1.0kW
SGDM-15ADA	1.5kW
SGDM-20ADA	2.0kW
SGDM-30ADA	3.0kW
SGDM-50ADA	4.0kW 5.0kW

Servo controller provided with easily viewable and operable touch panel with backlight

- Moving-average type digital filter for removing vibration and noise from mechanical system (Average number of revolutions can be set.)
- Real-time display of current load and current position etc.
- Easy interactive data entry by touch panel
- Use of PID control and high-accuracy 16-bit AD
- 10 kinds (6 processes each) of table control can be set

Servo controller specifications

Functions	PQCS2-SCU
Power supply	Single-phase, 200 V AC ± 10 % 50/60 Hz
Power supply capacity	30 VA or less
Ambient temperature	0 to + 50 ℃ (No freezing)
Ambient humidity	35 to 85 % RH (No condensing)
Noise immunity	Power supply line: AC: 1000VP-P1 μS square wave (by noise simulator)
Weight	4.8 kg
Control input	Photo-coupler isolation
Control output	Photo-coupler open collector output
Memory backup function	EEPROM

Control software specifications

Analog voltage Command control (standard)	Positioning control and load control are made according to the voltage directed by the host controller.
PTP control	Input PTP settings (target value, speed, acceleration time and deceleration time) as parameters at up to 16 points, and the control will be operated in accordance with the PTP numbers (up to 16 points) selected by the host controller.
Table control	Input up to 10 kinds (6 processes each) of table settings (target value, speed, acceleration time and deceleration time) as parameters, and the control will be operated in accordance with the table numbers (up to 10 kinds) selected by the host controller.
Digital signal Command control	The host controller sets and inputs the target value (position or load), speed, acceleration time and deceleration time in the controller through digital signals, and the positioning control and load control are operated in accordance with the settings.

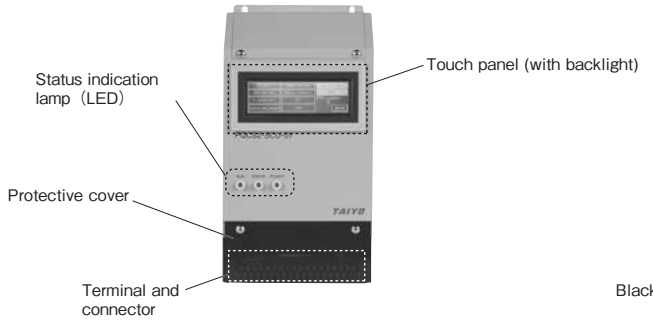
External input/output

Input	Output
Manual Advancing	Emergency stop
Manual Retracting	Servo ON
Error reset	Equipment normal
Servo driver error	Movement completion
Servo ON	Under operation
Position control/load control	Drop preventive valve timing
OT	PTP selection confirmation (OP)
−OT	Table selection confirmation (OP)
Position zero setting	
Origin limit	
Control start	
Origin return start	
Emergency stop	
Error input	
PTP selection (OP)	
Table selection (OP)	
Digital control start (OP)	

Data input/output

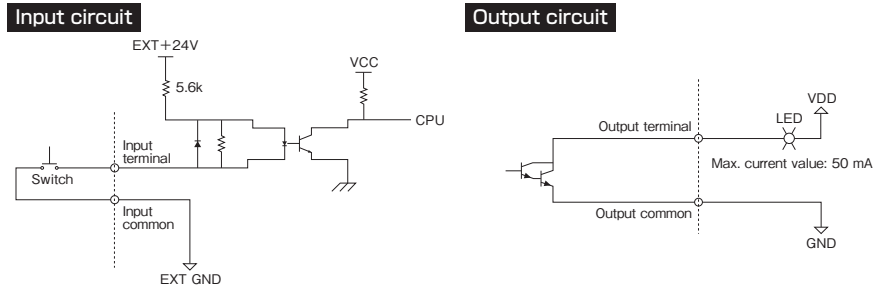
Target load	Analog input −10 to 10 V
	21 bit Binary input (OP)
Target position	Analog input −10 to 10 V
	21 bit Binary input (OP)
Command speed	12 bit Binary inpu (OP)
Acceleration time	6 bit Binary input (OP)
Deceleration time	6 bit Binary input (OP)
Current load	Analog input −10 to 10 V
	18 bit Binary output (OP)
Current position	18 bit Binary output (OP) (at digital command control)
	18 bit Binary output (OP) (at use of digital sensor)
	Analog input −10 to 10 V (at use of analog sensor)

Servo controller



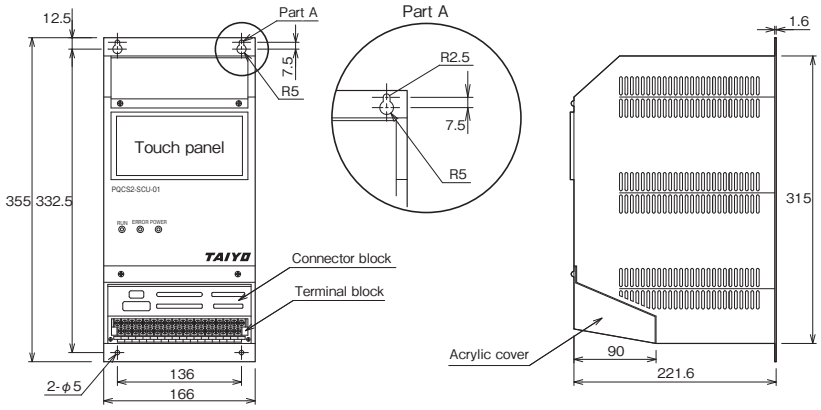
Black main body is available.

Input/output circuit diagram



Dimensional drawing

Unit: mm



Compact and simple control unit having only functions selected based on market needs

- Environment-friendly, Lead-free unit (Conforming to RoHS)
- Combination of this unit and "ATSUKAN Judgment Controller" enables press-fit judgment and data control
- Combination of this unit and "ATSUKAN Servo Cylinder" enables speed setting and load control (feedback control)
- It is easy to control the command speed and load control and set the gain by using the volume knobs, and set the parameters by using the joy stick
- Saving space and lower cost compared to PLC control

Simple control unit specifications

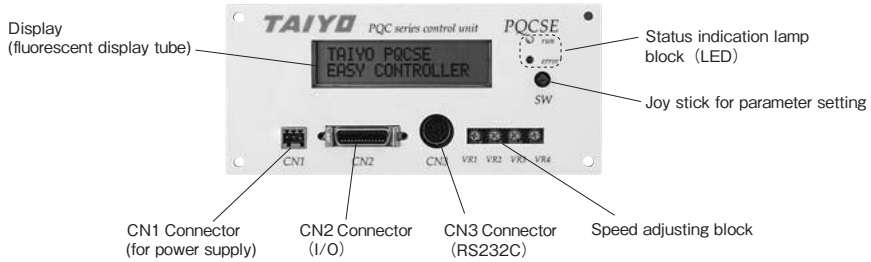
Functions		PQCSE-SCU
Power supply		24 V DC ± 10 %
Power consumption		2 VA
Ambient temperature		0 to +50 ℃ (No freezing)
Noise immunity		1 kVp-p, 1 μsec square wave (by noise simulator)
Weight		330 g
Indicator		16 characters × 2 digits LCD
Control input	Input signal	Photo-coupler isolation input
	Rated voltage	24 V DC (external power supply)
	Input current	5 mA
	Signal level	OFF power: 3 V DC or less ON power : 20 V DC or more
Control output	Output signal	Photo-coupler open collector output
	Rated load voltage	50 V
	Max. load current	5 mA
	Leakage current	20 μA
Memory backup function		EEPROM

External input/output

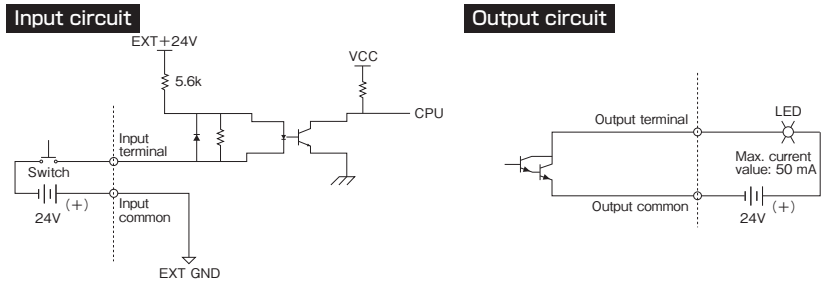
Input	
Automatic	Manual
Servo ON	
Operation start	
Limit SW input 1	CH switching bit 1
Limit SW input 2	CH switching bit 2
Limit SW input 3	CH switching bit 3
Press-fit completion	Speed/load switching
Cylinder operating direction	Advance/retract
Alarm reset	
Servo driver error	
Current load input (0 to 10 V)	

Output
Equipment normal
Servo ON
Positioning completion
Alarm reset
Servo driver error
Drove preventive valve timing signal
Speed output (−10 to + 10 V)

Simple control unit

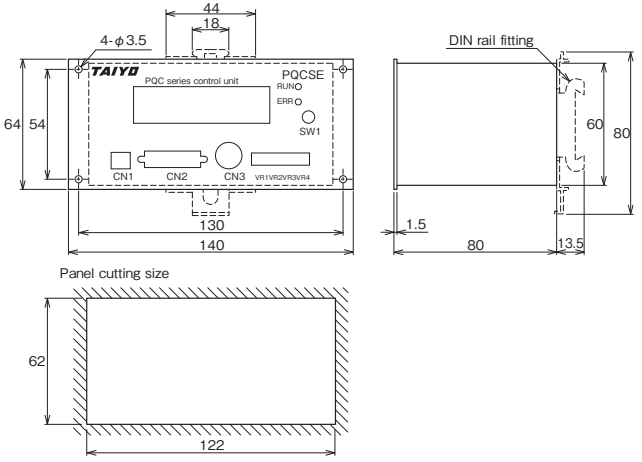


Input/output circuit diagram



Dimensional drawing

Unit: mm



● How to order

● Cylinders for "ATSUKAN Servo"

If no attachment is necessary, the box enclosed with dashed line must be blank.

	Series ❶	Seal material ❷	Mounting style ❸	Cylinder bore ❹	Rod type ❺	Cylinder stroke ❻		Pressure ❼	Stroke sensor ❽	Load sensor ❾	Sensor symbol ❿	Sensor quantity ⓫	End lock nut ⓬
●Standard type	PQCS2M	1	FG	80	B	500	–	H	A	E			L
●Switch Set	PQCS2RM	1	FG	80	B	500	–	H	A	E	AH	2	L

Mount style
PQCS2M : Standard type
PQCS2RM : Switch Set

1 Nitrile rubber
8 Slipper seal

FG Rod flange
FY Rod flange (without load sensor)

ϕ50, ϕ63, ϕ80, ϕ100

B ϕ50
A ϕ50
B ϕ63, ϕ80, ϕ100

Note) For bore ϕ50 and rod B, the pressure is 5 MPa.

200, 250, 300, 350, 400, 450, 500

N 7 MPa
H 14 MPa
T 21 MPa

O Without stroke sensor
A Analog stroke sensor (only PQCS2M)
D Digital stroke sensor (only PQCS2RM)

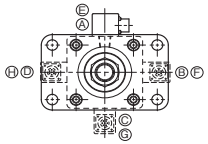
L With lock nut

Sensor quantity (1, 2 to n)

Sensor symbol

❗ Notes on ordering Switch Set
When sensors are not necessary, specify 0 for the sensor symbol ⓾ and the sensor quantity ⓫.

O Without load sensor
E Connector position E
F Connector position F
G Connector position G
H Connector position H
P With pressure sensor (only on cap side)



Load sensor connector position
Select a load sensor connector position. On the standard models, the connector is positioned on surface F. Surface E, G or H can be selected. However, if the connector is fitted on surface E, it faces toward surface F.

● Unit for "ATSUKAN Servo"

	Series ❶	Series No. ❷	Pump displacement ❸	Motor series ❹		Rapid drop preventive valve ❺	Differential circuit ❻	Cylinder bore ❶		Cylinder stroke ❻
	PQCS2-PM	01	110	–	SH010N	H	S	80	B	500

PQCS2-PM : Standard type
PQCS2-PC : Cross mount type (custom-made)

Series No.
011 1.1cc/rev
035 3.5cc/rev
110 11.0cc/rev

*****N Without seal

O None
R Rod side
H Cap side
B Both sides

Cylinder bore

O Without differential circuit
S With differential circuit

Cylinder stroke

Table of standard stroke range

Unit: mm

Bi-directional pump	200	250	300	350	400	450	500
1.1cc	○	○	○	○	○	○	○
3.5cc	○	○	○	○	○	○	○
11.0cc	○	○	○	○	○	○	○

Cylinders with strokes other than the above standard strokes can be fabricated. Separately consult us.

Sensor list

Type	Sensor symbol	Load voltage range	Load current range	Max. switching capacity	Protective circuit	Indicating lamp	Wiring method	Cord length	Applicable load
Reed sensor	AH AX111CE	DC:5 to 30V	DC:5 to 40mA	DC: 1.5W AC: 2VA	Provided	LED (lights in red when sensing)	0.3 mm², 2-core, external diameter ϕ4 Rear wiring	1.5m	Small relay programmable controller
	AJ AX115CE	AC:5 to 120V	AC:5 to 20mA					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	
Solid state sensor	BE AX201CE-1	DC:5 to 30V	5 to 40mA	—	Provided	LED (lights in red when sensing)	0.3 mm², 2-core, external diameter ϕ4 Rear wiring	1.5m	Small relay programmable controller
	BF AX205CE-1							5m	
	CE AX211CE-1					LED (two-LED type, red and green)		1.5m	
	CF AX215CE-1							5m	
	CT AX211CE-1						0.3 mm², 2-core, external diameter ϕ4 Rear wiring	1.5m	
	CU AX215CE-1							5m	
	CV AX21BCE-1						4-pin connector type Rear wiring	0.5m	
	CW AZ211CE-1						0.3 mm², 2-core, external diameter ϕ4 Upper wiring	1.5m	
	CX AZ215CE-1							5m	
	CY AZ21BCE-1						4-pin connector type Upper wiring	0.5m	

Notes) ● When any induction load (relay or the like) is used for a sensor without a protective circuit, fit a protective circuit (SK-100) to the load without fail.
● For handling of the sensors, read the sensor specifications at the end of this book.

● Standard type

AX type sensor

Cord type

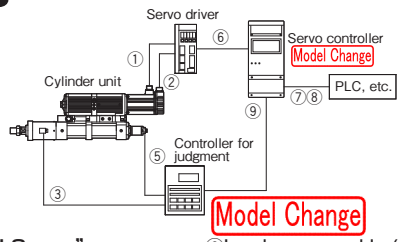
Connector type

Table of motor series output configuration

Bi-directional pump cc/rev	Nominal rated thrust force kN	Max. thrust force kN	Advance/ Retract kN	Max. speed Advance/Retract mm/s	Stroke mm	Motor series	Cylinder bore mm
1.1	5	10	7.1/ 4.9	28/40	200 to 500 In units of 50 mm	PH020N	ϕ50
	10	20	14.2/ 9.8			PH040N	
	20	20	20.1/13.8			AH075N	
	10	15	11.3/ 7.7	17/25		PH020N	ϕ63
	20	30	22.6/15.4			PH040N	
	30	30	31.9/21.8			AH075N	
	15	22	18.3/12.5	10/16		PH020N	ϕ80
	35	50	36.5/24.9			PH040N	
	50	50	51.5/35.2			AH075N	
	25	37	28.6/19.6	7/10		PH020N	ϕ100
	55	80	57.0/39.1			PH040N	
	80	80	80.4/55.2			AH075N	
3.5	10	15	11.2/ 7.7	89/129	200 to 500 In units of 50 mm	SH100N	ϕ50
	15	22	17.7/12.1	52/82		SH100N	ϕ63
	25	37	25.8/18.1			SH150N	
	35	43	35.4/24.2			SH200N	
	25	37	28.7/19.6	34/50		SH100N	ϕ80
	40	60	43.0/29.2			SH150N	
	55	70	57.4/39.2			SH200N	
11.0	15	22	16.9/11.5	175/258	200 to 500 In units of 50 mm	SH300N	ϕ63
	20	30	22.5/15.3			SH400N	
	25	37	28.1/19.1			SH500N	
	25	37	27.3/18.6	109/160		SH300N	ϕ80
	35	52	36.5/24.7			SH400N	
	45	67	45.6/30.9			SH500N	
	40	60	42.7/29.1	70/102		SH300N	ϕ100
	55	82	57.0/38.8			SH400N	
	70	100	71.2/48.5			SH500N	

● How to order

With judgment control unit



Controller for "ATSUKAN Servo"

● Servo controller

PQCS2-SCU – [01] [1] [1] [1] [G] [T]

- Series: Servo controller
- Series No.
- Expansion I/O board: [0] None; [1] Provided (for external control)
- Length measuring amplifier: [0] Analog length measuring amplifier; [1] Digital length measuring amplifier; [2] Digital high-resolution type; [3] Digital high-resolution/with correction
- Load cell amplifier: [0] None; [1] Provided
- Body color: [G] Gray; [B] Black
- Software specifications: [Blank] Standard (only analog command control); [P] PTP control; [T] Table control; [D] Digital control

● Controller for judgment

PQC-CU – [02] – [VAS000] – [D]

- Series: Controller for judgment
- Series No.
- Judgment software specifications: [VAS000] : Standard; [VAF000] : Front gate; [VAP000] : Peak; [VAB000] : Back gate
- Type of stroke sensor: [A] Analog stroke sensor; [D] Digital stroke sensor

Note) Place an order for the controller for judgment with the code "***000," and you will receive the latest version. To specify the version, place an order with the version number shown in the manual or displayed on the LCD of the controller for judgment.

● Example of code
Back gate
PQC-CU-02-VAB423-D

Cable for "ATSUKAN Servo"

● For servo controller (with controller for judgment)

①Motor cable

PQCS2-CV [1] – [05] – [M0] [R]

- Series
- Series No.
- Cable length: [00] Only connector; [05] 5m; [10] 10m
- Motor capacity: [M0] 0.2 to 0.75kW; [M1] 1.0 to 2.0kW; [M3] 3.0 to 5.0kW
- Cable specifications: [R] Robot cable; [Blank] General cable

● 00 not shown in catalog

Note) L type connector is used on the motor side.

②Encoder cable

PQCS2-CV [1] – [05] – [E0] [R]

- Series
- Series No.
- Cable length: [05] 5m; [10] 10m
- Motor capacity: [E0] 0.2 to 0.75kW; [E1] 1.0 to 5.0kW
- Cable specifications: [R] Robot cable; [Blank] General cable

Note) L type connector is used on the motor side.

③Load sensor cable (with controller for judgment)

PQC-CV [1] – [05] – L [R]

- Series
- Series No.
- Cable length: [05] 5m; [10] 10m
- Cable specifications: [R] Robot cable; [Blank] General cable

Note) Connector provided at both ends

⑤Stroke sensor cable (analog/with controller for judgment)

PQC-CV [1] – [05] – MM – [AS] [R]

- Series
- Series No.
- Cable length: [05] 5m; [10] 10m
- Connector type: [AS] Straight type; [AL] L type
- Cable specifications: [R] Robot cable; [Blank] General cable

Note) Connector provided at both ends

⑥Interface cable (between servo driver and servo controller)

PQCS2-CV [1] – [01] – IF

- Series
- Series No.
- Cable length: [01] 1m; [02] 2m

⑦Standard I/O cable (between host controller and servo controller)

PQCS2-CV [1] – [01] – I01

- Series
- Series No.
- Cable length: [01] 1m; [02] 2m

⑧Expansion I/O cable (between host controller and servo controller)

PQCS2-CV [1] – [01] – I02

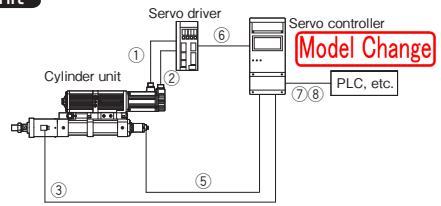
- Series
- Series No.
- Cable length: [01] 1m; [02] 2m

⑨Intermediate cable (between servo controller and controller for judgment)

PQCS2-CV [1] – [01] – AI0

- Series
- Series No.
- Cable length: [01] 1m; [02] 2m

Without judgment control unit



"ATSUKAN Servo" controller

● Servo controller

PQCS2-SCU – [01] [1] [1] [1] [G] [T]

- Series: Servo controller
- Series No.
- Expansion I/O board: [0] None; [1] Provided (for external control)
- Length measuring amplifier: [0] Analog length measuring amplifier; [1] Digital length measuring amplifier; [2] Digital high-resolution type; [3] Digital high-resolution/with correction
- Load cell amplifier: [0] None; [1] Provided
- Body color: [G] Gray; [B] Black
- Software specifications: [Blank] Standard (only analog command control); [P] PTP control; [T] Table control; [D] Digital control

Cable for "ATSUKAN Servo"

● For servo controller (without controller for judgment)

①Motor cable

PQCS2-CV [1] – [05] – [M0] [R]

- Series
- Series No.
- Cable length: [05] 5m; [10] 10m
- Motor capacity: [M0] 0.2 to 0.75kW; [M1] 1.0 to 2.0kW; [M3] 3.0 to 5.0kW
- Cable specifications: [R] Robot cable; [Blank] General cable

Note) L type connector is used on the motor side.

②Encoder cable

PQCS2-CV [1] – [05] – [E0] [R]

- Series
- Series No.
- Cable length: [05] 5m; [10] 10m
- Motor capacity: [E0] 0.2 to 0.75kW; [E1] 1.0 to 5.0kW
- Cable specifications: [R] Robot cable; [Blank] General cable

Note) L type connector is used on the motor side.

③Load sensor cable (without controller for judgment)

PQCL-CV [1] – [05] – [R]

- Series
- Series No.
- Cable length: [05] 5m; [10] 10m
- Cable specifications: [R] Robot cable; [Blank] General cable

Note) Wire terminal on the control side

④Stroke sensor cable (digital)

PQC-CV [1] – [05] – M – D [R]

- Series
- Series No.
- Cable length: [05] 5m; [10] 10m
- Cable specifications: [R] Robot cable; [Blank] General cable

Note) Connector provided at both ends

⑤Stroke sensor cable (analog/without controller for judgment)

PQCS2-CV [1] – [05] – M – [AS] [R]

- Series
- Series No.
- Cable length: [05] 5m; [10] 10m
- Connector type: [AS] Straight type; [AL] L type
- Cable specifications: [R] Robot cable; [Blank] General cable

Note) Loose wire on the control side

⑥Interface cable (between servo driver and servo controller)

PQCS2-CV [1] – [01] – IF

- Series
- Series No.
- Cable length: [01] 1m; [02] 2m

⑦Standard I/O cable (between host controller and servo controller)

PQCS2-CV [1] – [01] – I01

- Series
- Series No.
- Cable length: [01] 1m; [02] 2m

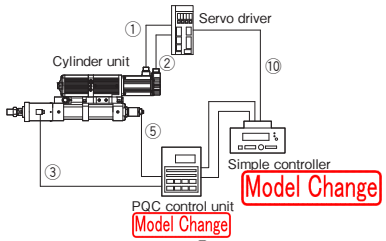
⑧Expansion I/O cable (between host controller and servo controller)

PQCS2-CV [1] – [01] – I02

- Series
- Series No.
- Cable length: [01] 1m; [02] 2m

● How to order

Simple controller + judgment control unit



● Simple control unit

PQCSE-SCU — A — D

- Series: Simple control unit
- Software specifications: A Load control + speed control by sensor; B Only speed control by sensor
- Option: D With DIN fitting; N Without DIN fitting

Cable for "ATSUKAN Servo"

● Simple control unit + Controller for judgment

①Motor cable

PQCS2-CV 1 — 05 — M0 R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Motor capacity: M0 0.2 to 0.75kW; M1 1.0 to 2.0kW; M3 3.0 to 5.0kW
- Cable specifications: R Robot cable; Blank General cable

Note) L type connector is used on the motor side.

②Encoder cable

PQCS2-CV 1 — 05 — E0 R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Motor capacity: E0 0.2 to 0.75kW; E1 1.0 to 5.0kW
- Cable specifications: R Robot cable; Blank General cable

Note) L type connector is used on the motor side.

③Load sensor cable
(simple control unit + controller for judgment)

PQC-CV 1 — 05 — L R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Cable specifications: R Robot cable; Blank General cable

Note) Connector provided at both ends

④ Stroke sensor cable
(digital/simple control unit + controller for judgment)

PQC-CV 1 — 05 — M — D R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Cable specifications: R Robot cable; Blank General cable

Note) Connector provided at both ends

⑤ Stroke sensor cable
(analog/simple control unit + controller for judgment)

PQC-CV 1 — 05 — MM — AS R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Connector type: AS Straight type; AL L type
- Cable specifications: R Robot cable; Blank General cable

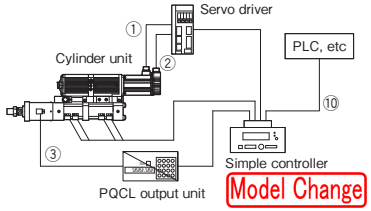
Note) Connector provided at both ends

⑩ I/O connector
(IEEE1284 half pitch connector/soldered/male connector/26-pin: commercially available product)

PQCSE-CV 1 — 00 — IO

- Series
- Series No.

Simple controller + limit sensor + PQCL



● Simple control unit

PQCSE-SCU — A — D

- Series: Simple control unit
- Software specifications: A Load control + speed control by sensor; B Only speed control by sensor
- Option: D With DIN fitting; N Without DIN fitting

● Load output unit

PQCL-CU2 — A

- Series
- Type: A With multi-point output; B Without multi-point output

● Simple control unit + Sensor + PQCL

①Motor cable

PQCS2-CV 1 — 05 — M0 R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Motor capacity: M0 0.2 to 0.75kW; M1 1.0 to 2.0kW; M3 3.0 to 5.0kW
- Cable specifications: R Robot cable; Blank General cable

Note) L type connector is used on the motor side.

②Encoder cable

PQCS2-CV 1 — 05 — E0 R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Motor capacity: E0 0.2 to 0.75kW; E1 1.0 to 5.0kW
- Cable specifications: R Robot cable; Blank General cable

Note) L type connector is used on the motor side.

③Load sensor cable

PQCL-CV 1 — 05 — R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Cable specifications: R Robot cable; Blank General cable

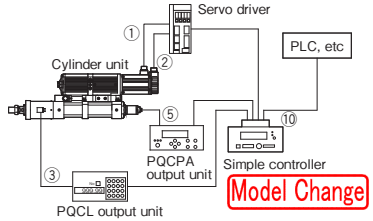
Note) Wire terminal on the control side

⑩ I/O connector
(IEEE1284 half pitch connector/soldered/male connector/26-pin: commercially available product)

PQCSE-CV 1 — 00 — IO

- Series
- Series No.

Simple controller + PQCPA + PQCL



● Simple control unit

PQCSE-SCU — A — D

- Series: Simple control unit
- Software specifications: A Load control + speed control by sensor; B Only speed control by sensor
- Option: D With DIN fitting; N Without DIN fitting

● Position indicator

PQCPA-CU — A — A

- Series
- Input method: Analog
- Type: A Current input; V Voltage input

● Simple control unit + PQCPA + PQCL

①Motor cable

PQCS2-CV 1 — 05 — M0 R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Motor capacity: M0 0.2 to 0.75kW; M1 1.0 to 2.0kW; M3 3.0 to 5.0kW
- Cable specifications: R Robot cable; Blank General cable

Note) L type connector is used on the motor side.

②Encoder cable

PQCS2-CV 1 — 05 — E0 R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Motor capacity: E0 0.2 to 0.75kW; E1 1.0 to 5.0kW
- Cable specifications: R Robot cable; Blank General cable

Note) L type connector is used on the motor side.

③Load sensor cable

PQCL-CV 1 — 05 — R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Cable specifications: R Robot cable; Blank General cable

Note) Wire terminal on the control side

⑤ Stroke sensor cable
(analog/simple control unit + PQCPA + PQCL)

PQCS2-CV 1 — 05 — M — AS R

- Series
- Series No.
- Cable length: 05 5m; 10 10m
- Motor capacity: AS Straight type; AL L type
- Cable specifications: R Robot cable; Blank General cable

Note) Wire terminal on the control side

⑩ I/O connector
(IEEE1284 half pitch connector/soldered/male connector/26-pin: commercially available product)

PQCSE-CV 1 — 00 — IO

- Series
- Series No.

Bi-directional pump 1.1 cc (without load cell)

● Cylinders for "ATSUKAN Servo"

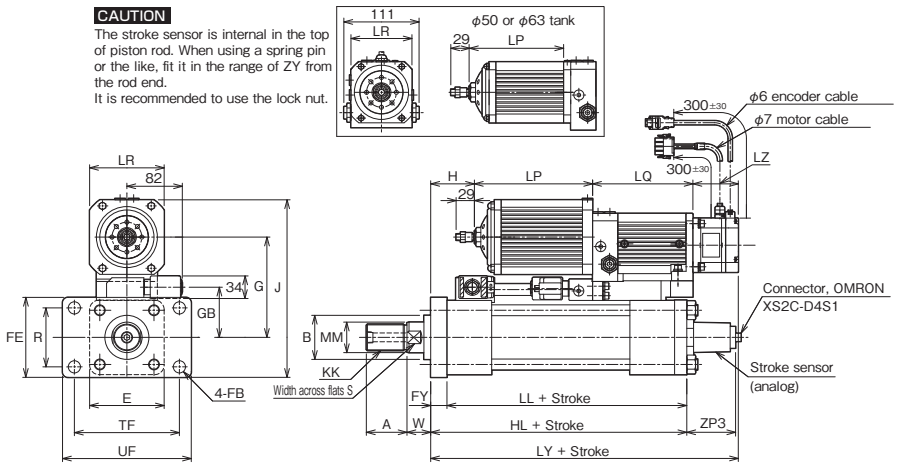
Standard type PQCS2M 1 FY Bore Rod type Stroke – Pressure Stroke sensor O L

Switch Set PQCS2RM 1 FY Bore Rod type Stroke – Pressure Stroke sensor O Sensor symbol Sensor quantity L

● Unit for "ATSUKAN Servo"

PQCS2-PM – Series No. 011 – Motor series output – Rapid drop preventive valve Differential circuit Bore B Stroke

CAUTION
The stroke sensor is internal in the top of piston rod. When using a spring pin or the like, fit it in the range of ZY from the rod end.
It is recommended to use the lock nut.



Bi-directional pump 1.1 cc (with load cell)

● Cylinders for "ATSUKAN Servo"

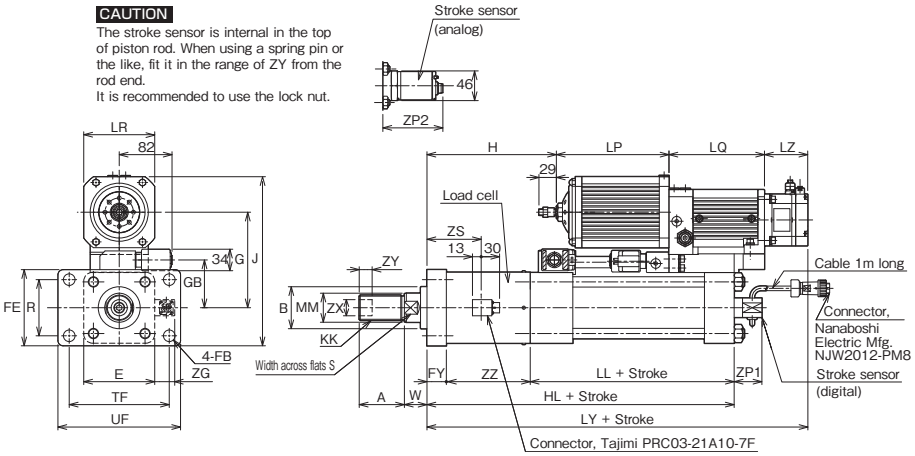
Standard type PQCS2M 1 FG Bore Rod type Stroke – Pressure Stroke sensor Load sensor L

Switch Set PQCS2RM 1 FG Bore Rod type Stroke – Pressure Stroke sensor Load sensor Sensor symbol Sensor quantity L

● Unit for "ATSUKAN Servo"

PQCS2-PM – Series No. 011 – Motor series output – Rapid drop preventive valve Differential circuit Bore B Stroke

CAUTION
The stroke sensor is internal in the top of piston rod. When using a spring pin or the like, fit it in the range of ZY from the rod end.
It is recommended to use the lock nut.



Dimensional table

Bore	Nominal thrust force	Motor output	A	B	KK	MM	S	E	FY	FB	FE	G	GB	J	H	HL	LL
ϕ50	5kN	200W	35	ϕ46	M24×1.5	ϕ28	24	□76	18	ϕ14	85	121	57	208.5	65 to 225	187	169
	10kN	400W	35	ϕ46	M24×1.5	ϕ28	24	□76	18	ϕ14	85	121	57	208.5	65 to 225	187	169
	20kN	750W	35	ϕ46	M24×1.5	ϕ28	24	□76	18	ϕ14	85	121	57	208.5	65 to 225	187	169
ϕ63	10kN	200W	45	ϕ55	M30×1.5	ϕ35.5	30	□90	20	ϕ18	98	128	64	222	33 to 183	199	179
	20kN	400W	45	ϕ55	M30×1.5	ϕ35.5	30	□90	20	ϕ18	98	128	64	222	33 to 183	199	179
	30kN	750W	45	ϕ55	M30×1.5	ϕ35.5	30	□90	20	ϕ18	98	128	64	222	33 to 183	199	179
ϕ80	15kN	200W	60	ϕ65	M39×1.5	ϕ45	41	□110	24	ϕ18	118	148	74	262	54.5 to 194.5	228	204
	35kN	400W	60	ϕ65	M39×1.5	ϕ45	41	□110	24	ϕ18	118	148	74	262	54.5 to 194.5	228	204
	50kN	750W	60	ϕ65	M39×1.5	ϕ45	41	□110	24	ϕ18	118	148	74	262	54.5 to 194.5	228	204
ϕ100	25kN	200W	75	ϕ80	M48×1.5	ϕ56	50	□135	28	ϕ22	150	175.5	86.5	320.5	14.5 to 244.5	240	212
	55kN	400W	75	ϕ80	M48×1.5	ϕ56	50	□135	28	ϕ22	150	175.5	86.5	320.5	14.5 to 244.5	240	212
	80kN	750W	75	ϕ80	M48×1.5	ϕ56	50	□135	28	ϕ22	150	175.5	86.5	320.5	14.5 to 244.5	240	212

Bore	LY	LP	LQ	LR	LZ	R	TF	UF	W	ZP3
ϕ50	280	150 to 340	148	□90	67	58	115	145	30	83
	300	150 to 340	148	□90	87	58	115	145	30	83
	365	150 to 340	155	□90	145	58	115	145	30	83
ϕ63	288	190 to 390	148	□90	67	65	132	165	35	72
	308	190 to 390	148	□90	87	65	132	165	35	72
	373	190 to 390	155	□90	145	65	132	165	35	72
ϕ80	304	234.5 to 394.5	148	□110	67	87	155	190	35	72
	324	234.5 to 394.5	148	□110	87	87	155	190	35	72
	389	234.5 to 394.5	155	□110	145	87	155	190	35	72
ϕ100	314	154.5 to 354.5	148	□140	67	109	190	230	40	72
	334	154.5 to 354.5	148	□140	87	109	190	230	40	72
	399	154.5 to 354.5	155	□140	145	109	190	230	40	72

Dimensional table

Bore	Nominal thrust force	Motor output	A	B	KK	MM	S	E	FY	FB	FE	G	GB	J	H	HL	LL
ϕ50	5kN	200W	45	ϕ46	M24×1.5	ϕ28	24	□76	24	ϕ14	85	121	57	208.5	101 to 311	246(254)	142(150)
	10kN	400W	55	ϕ50	M30×1.5	ϕ35.5	30	□76	24	ϕ14	85	121	57	208.5	121 to 331	266(274)	142(150)
	20kN	750W	55	ϕ50	M30×1.5	ϕ35.5	30	□76	24	ϕ14	85	121	57	208.5	121 to 331	266(274)	142(150)
ϕ63	10kN	200W	55	ϕ55	M30×1.5	ϕ35.5	30	□90	24	ϕ18	98	128	64	222	77 to 277	262(273)	148(159)
	20kN	400W	55	ϕ55	M30×1.5	ϕ35.5	30	□90	24	ϕ18	98	128	64	222	77 to 277	262(273)	148(159)
	30kN	750W	55	ϕ55	M30×1.5	ϕ35.5	30	□90	24	ϕ18	98	128	64	222	107 to 307	292(303)	148(159)
ϕ80	15kN	200W	70	ϕ65	M39×1.5	ϕ45	41	□110	30	ϕ18	118	148	74	262	150.5 to 330.5	326	166
	35kN	400W	70	ϕ65	M39×1.5	ϕ45	41	□110	30	ϕ18	118	148	74	262	150.5 to 330.5	326	166
	50kN	750W	70	ϕ65	M39×1.5	ϕ45	41	□110	30	ϕ18	118	148	74	262	160.5 to 340.5	336	166
ϕ100	25kN	200W	85	ϕ80	M48×1.5	ϕ56	50	□135	32	ϕ22	150	175.5	86.5	320.5	182.5 to 382.5	351	185
	55kN	400W	85	ϕ80	M48×1.5	ϕ56	50	□135	32	ϕ22	150	175.5	86.5	320.5	182.5 to 382.5	351	185
	80kN	750W	85	ϕ80	M48×1.5	ϕ56	50	□135	32	ϕ22	150	175.5	86.5	320.5	192.5 to 392.5	361	185

Bore	LY	LP	LQ	LR	LZ	R	TF	UF	W	ZG	ZS	ZZ	ZP1	ZP2	ZX	ZY
ϕ50	366	150 to 340	148	□90	67	58	115	145	30	31	28.5	80	43	93	ϕ19	10
	406	150 to 340	148	□90	87	58	115	145	41	31	38.5	100	43	93	ϕ19	10
	471	150 to 340	155	□90	152	58	115	145	41	31	38.5	100	43	93	ϕ19	10
ϕ63	382	190 to 390	148	□90	67	65	132	165	35	31	34	90	43	93	ϕ19	10
	402	190 to 390	148	□90	87	65	132	165	35	31	34	90	43	93	ϕ19	10
	497	190 to 390	155	□90	152	65	132	165	35	31	49	120	43	93	ϕ19	10
ϕ80	440	174.5 to 394.5	148	□110	67	87	155	190	35	31	54	130	43	93	ϕ19	10
	460	174.5 to 394.5	148	□110	87	87	155	190	35	31	54	130	43	93	ϕ19	10
	535	174.5 to 394.5	155	□110	152	87	155	190	35	31	59	140	43	93	ϕ19	10
ϕ100	452	154.5 to 354.5	148	□140	67	109	190	230	40	31	61	134	30	93	ϕ25	20
	472	154.5 to 354.5	148	□140	87	109	190	230	40	31	61	134	30	93	ϕ25	20
	547	154.5 to 354.5	155	□140	152	109	190	230	40	31	66	144	30	93	ϕ25	20

Note) The parenthesized values shown in the HL and LL columns apply in the case where the analog stroke sensor is used.

Bi-directional pump 3.5 cc (with load cell)

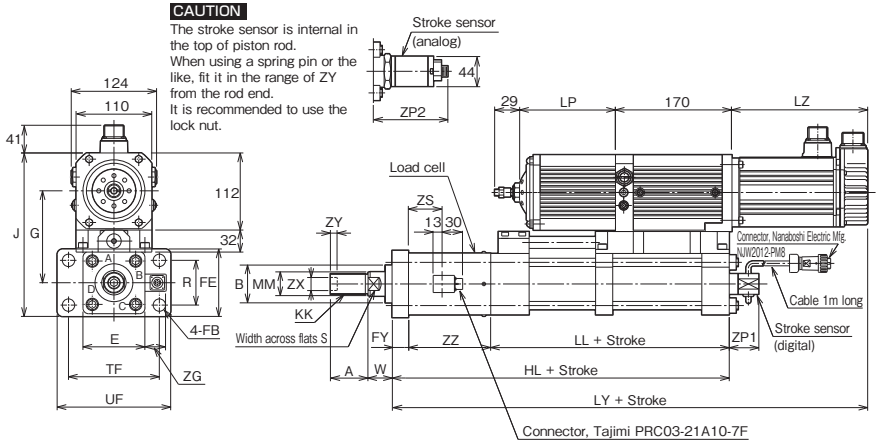
● Cylinders for "ATSUKAN Servo"

Standard type	PQCS2M	1	FG	Bore	Rod type	Stroke	–	Pressure	Stroke sensor	Load sensor							L
Switch Set	PQCS2RM	1	FG	Bore	Rod type	Stroke	–	Pressure	Stroke sensor	Load sensor	Sensor symbol	Sensor quantity					L

● Unit for "ATSUKAN Servo"

PQCS2-PM	–	Series No.	035 –	Motor series output	–	Rapid drop preventive valve	Differential circuit	Bore	B	Stroke

CAUTION
The stroke sensor is internal in the top of piston rod.
When using a spring pin or the like, fit it in the range of ZY from the rod end.
It is recommended to use the lock nut.



Bi-directional pump 11 cc (with load cell)

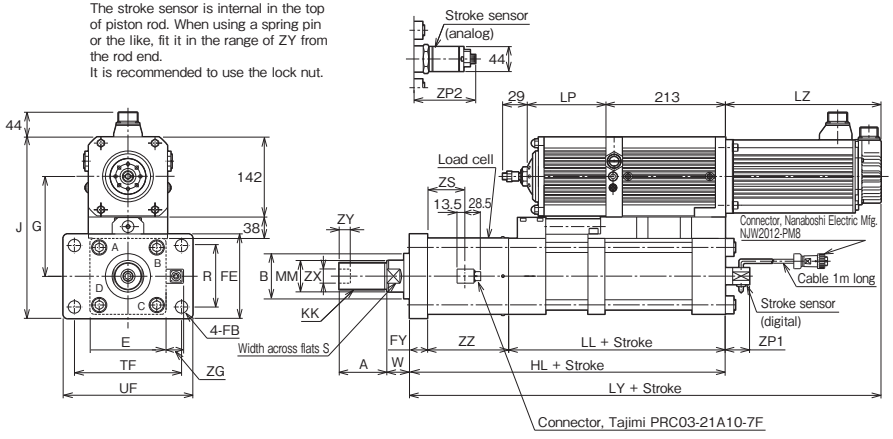
● Cylinders for "ATSUKAN Servo"

Standard type	PQCS2M	1	FG	Bore	Rod type	Stroke	–	Pressure	Stroke sensor	Load sensor							L
Switch Set	PQCS2RM	1	FG	Bore	Rod type	Stroke	–	Pressure	Stroke sensor	Load sensor	Sensor symbol	Sensor quantity					L

● Unit for "ATSUKAN Servo"

PQCS2-PM	–	Series No.	110 –	Motor series output	–	Rapid drop preventive valve	Differential circuit	Bore	B	Stroke

CAUTION
The stroke sensor is internal in the top of piston rod. When using a spring pin or the like, fit it in the range of ZY from the rod end.
It is recommended to use the lock nut.



Dimensional table

Bore	Nominal thrust force	Motor output	A	B	KK	MM	S	E	FY	FB	FE	G	J	HL	LL	LY	LP
φ50	10kN	1kW	45	φ46	M24×1.5	φ28	24	□76	24	φ14	85	126.5	224	246	142	399	112 to 172
φ63	15kN	1kW	55	φ55	M30×1.5	φ35.5	30	□90	24	φ18	98	133.5	237.5	262	148	415	142 to 232
	25kN	1.5kW	55	φ55	M30×1.5	φ35.5	30	□90	24	φ18	98	133.5	237.5	292	148	471	142 to 232
	35kN	2kW	55	φ55	M30×1.5	φ35.5	30	□90	24	φ18	98	133.5	237.5	292	148	494	142 to 232
φ80	25kN	1kW	70	φ65	M39×1.5	φ45	41	□110	30	φ18	118	143.5	257.5	326	166	479	177 to 337
	40kN	1.5kW	70	φ65	M39×1.5	φ45	41	□110	30	φ18	118	143.5	257.5	336	166	515	177 to 337
	55kN	2kW	70	φ65	M39×1.5	φ45	41	□110	30	φ18	118	143.5	257.5	336	166	538	177 to 337

Bore	LZ	R	TF	UF	W	ZG	ZS	ZZ	ZP1	ZP2	ZX	ZY
φ50	149	58	115	145	30	31	28.5	80	43	120	φ19	10
φ63	149	65	132	165	35	31	34	90	43	109	φ19	10
	175	65	132	165	35	31	49	120	43	109	φ19	10
	198	65	132	165	35	31	49	120	43	109	φ19	10
φ80	149	87	155	190	35	31	54	130	43	103	φ19	10
	175	87	155	190	35	31	59	140	43	103	φ19	10
	198	87	155	190	35	31	59	140	43	103	φ19	10

Notes) ● ZP1: Digital type stroke sensor
ZP2: Analog type stroke sensor
● LP depends on the stroke.

Dimensional table

Bore	Nominal thrust force	Motor output	A	B	KK	MM	S	E	FY	FB	FE	G	J	HL	LL	LY	LP
φ63	15kN	3kW	55	φ55	M30×1.5	φ35.5	30	□90	24	φ18	98	154.5	273.5	262	148	461	112 to 172
	20kN	4kW	55	φ55	M30×1.5	φ35.5	30	□90	24	φ18	98	154.5	273.5	262	148	498	112 to 172
	25kN	5kW	55	φ55	M30×1.5	φ35.5	30	□90	24	φ18	98	154.5	273.5	292	148	568	112 to 172
φ80	25kN	3kW	70	φ65	M39×1.5	φ45	41	□110	30	φ18	118	164.5	293.5	326	166	525	142 to 232
	35kN	4kW	70	φ65	M39×1.5	φ45	41	□110	30	φ18	118	164.5	293.5	326	166	562	142 to 232
	45kN	5kW	70	φ65	M39×1.5	φ45	41	□110	30	φ18	118	164.5	293.5	336	166	612	142 to 232
φ100	40kN	3kW	85	φ80	M48×1.5	φ56	50	□135	32	φ22	150	180	325	351	185	558	172 to 322
	55kN	4kW	85	φ80	M48×1.5	φ56	50	□135	32	φ22	150	180	325	351	185	598	172 to 322
	70kN	5kW	85	φ80	M48×1.5	φ56	50	□135	32	φ22	150	180	325	361	185	638	172 to 322

Bore	LZ	R	TF	UF	W	ZG	ZS	ZZ	ZP1	ZP2	ZX	ZY
φ63	199	65	132	165	35	31	34	90	43	109	φ19	10
	236	65	132	165	35	31	34	90	43	109	φ19	10
	276	65	132	165	35	31	49	120	43	109	φ19	10
φ80	199	87	155	190	35	31	54	130	43	103	φ19	10
	236	87	155	190	35	31	54	130	43	103	φ19	10
	276	87	155	190	35	31	59	140	43	103	φ19	10
φ100	199	109	190	230	40	31	61	134	30	93	φ25	20
	236	109	190	230	40	31	66	134	30	93	φ25	20
	276	109	190	230	40	31	66	144	30	93	φ25	20

Notes) ● ZP1: Digital type stroke sensor
ZP2: Analog type stroke sensor
● LP depends on the stroke.