

21 MPa compact design hydraulic cylinders
with magnetic proximity sensors
developed first in the industry

- 21 MPa compact design hydraulic cylinders. Sufficient strength verified by fatigue test and pressure test.
- The adoption of AX/AZ type sensors with high maintainability as standard.
- Switch Set cylinders can be used at up to 100°C depending on the selection of sensors.
- The mounting hole pitch is completely compatible to 100S-1 Series and 160S-1 Series. (The length in the stroke direction is different.)



Standard Specifications

Type	Standard type	Switch Set
Nominal pressure	21 MPa	
Maximum allowable pressure	21 MPa	
Proof test pressure	31.5 MPa	
Minimum operating pressure	0.3 MPa	
Working temperature range (ambient temperature)	-10 to +120°C (No freezing)	AX·AZ type····· -10 to +70°C Note) AX125 and AZ125 sensors can be used at up to +100°C. (No freezing)
Structure of cushioning	None	
Adaptable fluid	Petroleum-based fluid (When using another fluid, refer to the table of fluid adaptability.)	
Tolerance for thread	JIS 6H/6g	
Tolerance of stroke	0 to 0.8mm	
Mounting style	Basic style	
Rod end threads	Female thread and male thread	

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) ● This series of cylinders does not have air vents.
- Since side load (eccentric load) must not be applied to the piston rod, take care when installing the cylinder.
- The working temperature range depends on the seal material. For details, refer to the selection materials at the beginning of this catalog.
- When the piston hits against the cylinder end face at the stroke end, reduce the speed to less than the minimum speed.

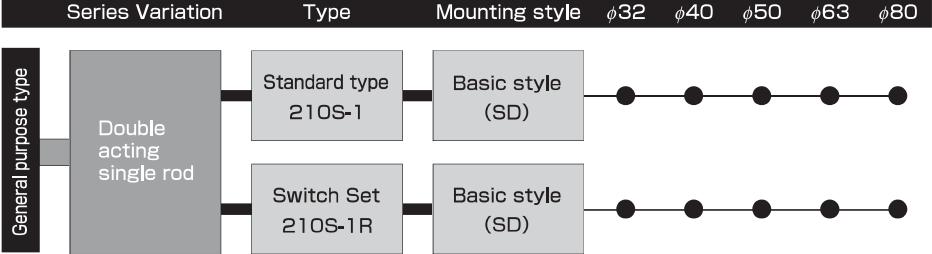
Adaptability of Fluid to Seal Material

Seal material	Adaptable fluid				
	Petroleum-based fluid	Water-glycol fluid	Phosphate ester fluid	Water in oil fluid	Oil in water fluid
③ Fluorocarbon	○	×	○	○	○
⑥ HNBR	◎	◎	×	◎	◎

- Notes) 1. ◎○: Applicable ×: Inapplicable
2. The ◎-marked items are recommended seal materials in case of giving the first priority to abrasion resistance.

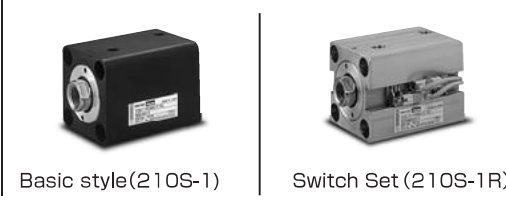
Product Lineup

Unit: mm



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

Double acting single rod



Weight Table

Unit: kg

Bore	Basic style (210S-1)		Switch Set (210S-1R)		Male thread additional weight
	Basic weight	Additional weight per mm of stroke	Basic weight	Additional weight per mm of stroke	
φ32	1.66	0.025	1.43	0.022	0.057
φ40	2.16	0.030	1.94	0.028	0.114
φ50	2.97	0.037	2.66	0.036	0.201
φ63	5.03	0.047	4.57	0.049	0.435
φ80	8.32	0.067	8.00	0.071	0.798

Sensor Additional Weight Table

Unit: kg

AX type		
Cord length 1.5 m	Cord length 5 m	Connector type
0.05	0.13	0.04

Calculation formula Cylinder weight(kg)=basic weight+(cylinder stroke(mm)×additional weight per mm of stroke)
+(sensor additional weight×sensor quantity)
Calculation example 210S-1R, bore φ40, cylinder stroke 30 mm, 2 pcs of AZ101(cord length 1.5 m)
2.16+(30×0.030)+(0.05×2)=3.16kg

Piston Pressurized Area Table

Unit: mm²

Bore	Rod dia.	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

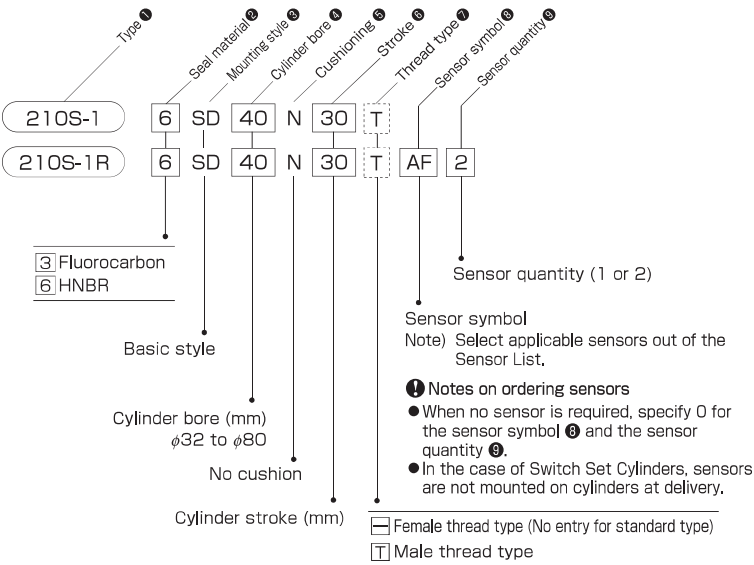
Calculation formula F=A·P·β (N)
F: Cylinder force (N)
A: Piston pressurized area (mm²)
P: Working pressure (MPa)
β: Load rate
Calculation example
Double acting single rod, bore φ40, working pressure: 21 MPa
Load rate: 0.8
Cylinder force on extension side (N)
=1257×21×0.8=2117 (N)
Cylinder force on retraction side (N)
=876×21×0.8=14716 (N)

● How to order

General purpose type

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

- Standard type
- Switch Set



Standard Stroke Range

Series variations	Type	Mounting style	Bore	Stroke (mm)											Male thread type
				5	10	15	20	25	30	40	50	60	70	80	
Double acting single rod	Standard type 210S-1	Basic style (SD)	φ32	○	○	○	○	○	○	○	○	○	○	○	○
			φ40	○	○	○	○	○	○	○	○	○	○	○	○
			φ50	○	○	○	○	○	○	○	○	○	○	○	○
			φ63	○	○	○	○	○	○	○	○	○	○	○	○
			φ80	○	○	○	○	○	○	○	○	○	○	○	○
	Switch Set 210S-1R	Basic style (SD)	φ32	○	○	○	○	○	○	○	○	○	○	○	○
			φ40	○	○	○	○	○	○	○	○	○	○	○	○
			φ50	○	○	○	○	○	○	○	○	○	○	○	○
			φ63	○	○	○	○	○	○	○	○	○	○	○	○
			φ80	○	○	○	○	○	○	○	○	○	○	○	○

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	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)	0.3mm ² , 2-core, outer dia. φ4mm Rear wiring	1.5m	Small relay, programmable controller	
	AG AX105CE				Provided			5m		
	AH AX111CE							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	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		
	AP AZ101CE	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)	0.3mm ² , 2-core, outer dia. φ4mm Upper wiring	1.5m		
	AR AZ105CE							5m		
	AS AZ111CE				1.5m					
	AT AZ115CE				5m					
	AN AZ125CE	DC: 30V or less AC: 120V or less	DC: 40mA or less AD: 20mA or less		None	None	5m			
	AU AZ11ACE	AC : 5 to 120V	5 to 20mA	2VA	Provided	LED (lights in red when sensing)	4-pin connector type Upper wiring	0.5m		
	AW AZ11BCE	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)	0.3mm ² , 2-core, outer dia. φ4mm Rear wiring 0.3mm ² , 2-core, outer dia. φ4mm Upper wiring	5m		
	AY AZ135CE							5m		
Solid state sensor	BE AX201CE-1	DC : 5 to 30V	5 to 40mA	—	Provided	LED (lights in red when sensing)	0.3mm ² , 2-core, outer dia. φ4mm Rear wiring	1.5m	Small relay, programmable controller	
	BF AX205CE-1							5m		
	CE AX211CE-1							1.5m		
	CF AX215CE-1					5m				
	BM AZ201CE-1					LED (lights in red when sensing)		1.5m		
	BN AZ205CE-1					5m				
	CM AZ211CE-1	LED (two-LED type in red/green)	0.3mm ² , 2-core, outer dia. φ4mm Upper wiring	1.5m						
	CN AZ215CE-1			5m						
	CT AX211CE-1	DC : 5 to 30V	5 to 40mA	—	Provided	LED (two-LED type in red/green)	0.3mm ² , 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							0.3mm ² , 2-core, outer dia. φ4mm Upper wiring		1.5m
	CX AZ215CE-1									5m
	CY AZ21BCE-1									4-pin connector type Upper wiring

(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 AX and AZ135CE is B contact. When the piston is detected, the sensor contact turns off (the lamp turns on).
● WR and WS type sensors can be mounted.
● For the details of sensors, be sure to read the sensor specifications at the end of this catalog.
● We recommend AND Unit (AU series) for multiple sensors connected in series.
For details, refer to AND Unit at the end of this catalog.



Sensor Mountable Minimum Stroke Unit: mm

Bore	With 1 sensor	With 2 sensors
φ32	5	10 *
φ40		
φ50		
φ63		
φ80		

Operating Range and Hysteresis Unit: mm

Bore	contact		Non-contact	
	Operating range	Hysteresis	Operating range	Hysteresis
φ32	10 to 17	2 or less	4 to 8	1 or less
φ40				
φ50				
φ63				
φ80				

(Notes) ● When two reed sensors are mounted on a 10mm stroke cylinder, adjust their positions because the sensors may interfere with each other.
* If you want to mount solid state sensors to a 10mm stroke cylinder, use two sensor mounting grooves.

SD

Standard type

210S-1

6

SD

Bore

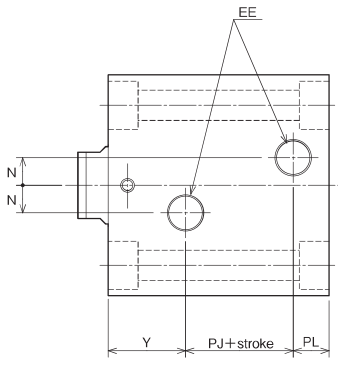
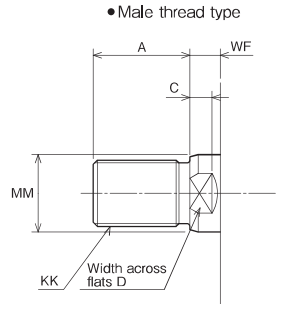
N

Stroke

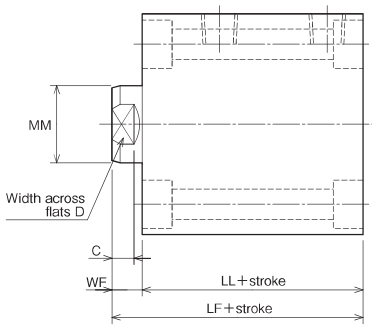
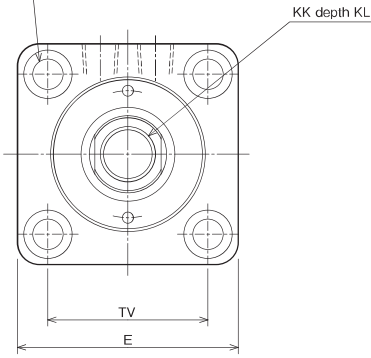
T

CAD/DATA is available.

None: Female thread type
T : Male thread type



4-FB through
2x4-spot facing dia. FG depth BT



Dimensional Table

Symbol Bore	A	BT	C	D	E	EE	FB	FG	KK		KL
									Female thread type	Male thread type	
φ32	25	6.5	7	14	□62	Rc1/4	φ6.6	φ11	M12×1.75	M16×1.5	15
φ40	30	8.6	7	19	□70	Rc1/4	φ9	φ14	M16×2	M20×1.5	20
φ50	35	10.8	8	24	□80	Rc1/4	φ11	φ17.5	M20×2.5	M24×1.5	24
φ63	45	13	9	30	□94	Rc1/4	φ14	φ20	M27×3	M30×1.5	33
φ80	60	15.2	14	41	□114	Rc3/8	φ16	φ23	M30×3.5	M39×1.5	36

Symbol Bore	LF	LL	MM	N	PJ	PL	TV	WF	Y
φ32	74	64	φ18	10	24	12	□47	10	28
φ40	75	65	φ22	10	26	12	□52	10	27
φ50	81	70	φ28	10	29	13	□58	11	28
φ63	100	87	φ36	10	44	13	□69	13	30
φ80	115	98	φ45	15	45	18	□86	17	35

Note) ● The tolerance of MM is f8.