



Sensor Specifications

Notes Common to Sensors..... SW2

Selection Materials for Sensors.. SW4

Magnetic Proximity Type/..... SW19
Reed Sensor

Magnetic Proximity Type/.....SW39
Solid State Sensor

Magnetic Proximity Type/
Solid State Sensor (2-wire, 1- or 2-LED type) · SW53

Magnetic Proximity Type/.....SW77
Cutting Oil Proof Type

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and Large-current Load ..SW85

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Sensor List.....SW101

Important precautions

⚠ CAUTION

● Supply voltage/current and contact capacity

Do not apply voltage or current exceeding the sensor specifications or a load exceeding the contact capacity to any sensor. Do not apply AC voltage to sensors for DC voltage. Application of voltage or current not conforming to the specifications may cause sensor operation failure or damage or burn out the sensors.

● Disconnection of power supply

Before wiring or connecting any sensor, disconnect the power supply to the sensor. Failure to do so may expose you to electric shock.

● Miswiring

Connect the lead wires according to the colors.

If any wire is improperly connected even instantaneously, the sensor may be damaged or burnt out.



● No-load connection

Do not connect power supply directly to any sensor.

Connect the power supply through a load, such as a relay and a programmable controller.

If the power supply is connected directly to the sensor even instantaneously, the sensor or load may be damaged or burnt out.

Correct usage 《common to sensors》

1. Selection

To select a sensor, follow the procedures stated in "Sensor selection materials".

2. Use environment

- 1) The sensors are not explosion-proof. Do not use them in a place with hazardous substances, such as ignitable and flammable substances.
- 2) Use the sensors indoors.
- 3) Use the sensors within the specified working temperature ranges. When they are used on a hydraulic cylinder in which the fluid temperature may increase depending on the working conditions, take measures on the hydraulic circuit, or install an oil cooler.
- 4) Use the sensors within the specified vibration resistance and impact resistance ranges.
- 5) Avoid using the sensors in an atmosphere with chemicals.
- 6) Do not use the cylinders or sensors in a place where they may be exposed to metal cutting scraps, cutting oil or water. Doing so can cause breaking of cords and sensor malfunctions.
- 7) Check that cylinders are not installed close to one another.

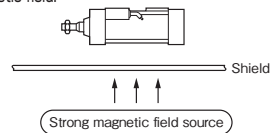
● When two Switch Set Cylinders or more are installed closely in parallel, the sensors may malfunction due to magnetic interference with one another. Keep a distance of 30 mm or more between cylinder tubes. If the allowable distance is specified for each series of cylinders, keep the specified distance.

- Before using the sensors, check their operations on the actual equipment.

8) Ferromagnetic field

- In a place where there is a strong magnetic field around the cylinder, install an iron plate, etc. to provide a magnetic shield. (Install the shield at a distance of 20 mm or more from the cylinder and sensor.)

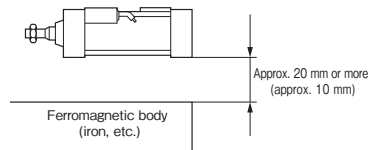
- The sensor may malfunction under the influence of the magnetic field.



9) Ferromagnetic body

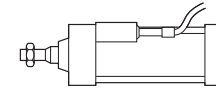
- Do not bring any ferromagnetic body (iron, etc.) around the cylinder body or close to the sensor. As a rule, keep a distance of 20 mm or more from such a magnetic body. When a compact design cylinder (KR or ZR type sensor) is used, keep it at a distance of 10 mm or more from the magnetic body.

- The sensor may malfunction under the influence of the magnetic field.



3. Wiring

- 1) Before wiring, be sure to disconnect the power supply.
 - Failure to do so may expose the workers to electric shock.
 - Or, the sensor and load may be damaged.
- 2) Take care not to apply bending, pulling or torsional load to the sensor cords. To prevent application of load to the roots of the sensor cords, secure the cords on a tie rod, etc., or take other appropriate measures.



- Failure to do so may break the cords. Particularly, when load is applied to the roots of the cords, the sensor internal electric circuit board may be damaged.
 - When securing them on a tie rod, etc., take care not to tighten them excessively. Doing so may break the cords.
- 3) Make the bending radius as large as possible (twice or more the cord diameter).
 - Doing so may break the cords.
 - 4) If the distance to the connection is long, secure the cords at intervals of about 20 cm to prevent sagging of the cords.
 - 5) When laying the cords on the ground, protect them with a metallic tube.
 - Failure to do so may damage the coating, thereby causing breaking or short-circuiting.
 - 6) The distance between the sensor and the load or power supply shall be less than 10 m.
 - If the distance exceeds 10 m, inrush current is carried to the sensor when it is used, and it may be damaged. Take measures against inrush current referring to "Notes on contact protection."
 - 7) Do not bundle the cords together with high-voltage wires of other electric devices or power source cables. Do not lay the cords close to such wires or cables.
 - Noises from the high-voltage wires, power sources or power source cables will enter the sensor cords and cause malfunctions of the sensor or load. It is recommended to protect the sensor cords with a shield tube.

4. Installation

- 1) Tighten the sensor mounting screws to the specified tightening torque.

If the tightening torque is higher than the specified torque, the sensor may be damaged. If the tightening torque is lower, the screws may loosen.
- 2) Adjust the sensor position so that the detecting position is in the center of the sensor operating range.

5. Maintenance

To operate the sensors stably for a long time, maintain the sensors as stated below in the same manner as when maintaining general electric control devices.

Never disassemble the sensors.

- 1) Check for dislocation of the sensors and looseness of the mounting screws.
- 2) Check the operation of the indicating lamps and load.
- 3) Check for abnormalities in the environment (e.g., vibration, impact and temperature).
- 4) Check for adhesion of metallic particles and metal cutting scraps.
- 5) Check for adhesion of cutting oil and water.
- 6) Check for abnormalities of wiring, connections and cords.

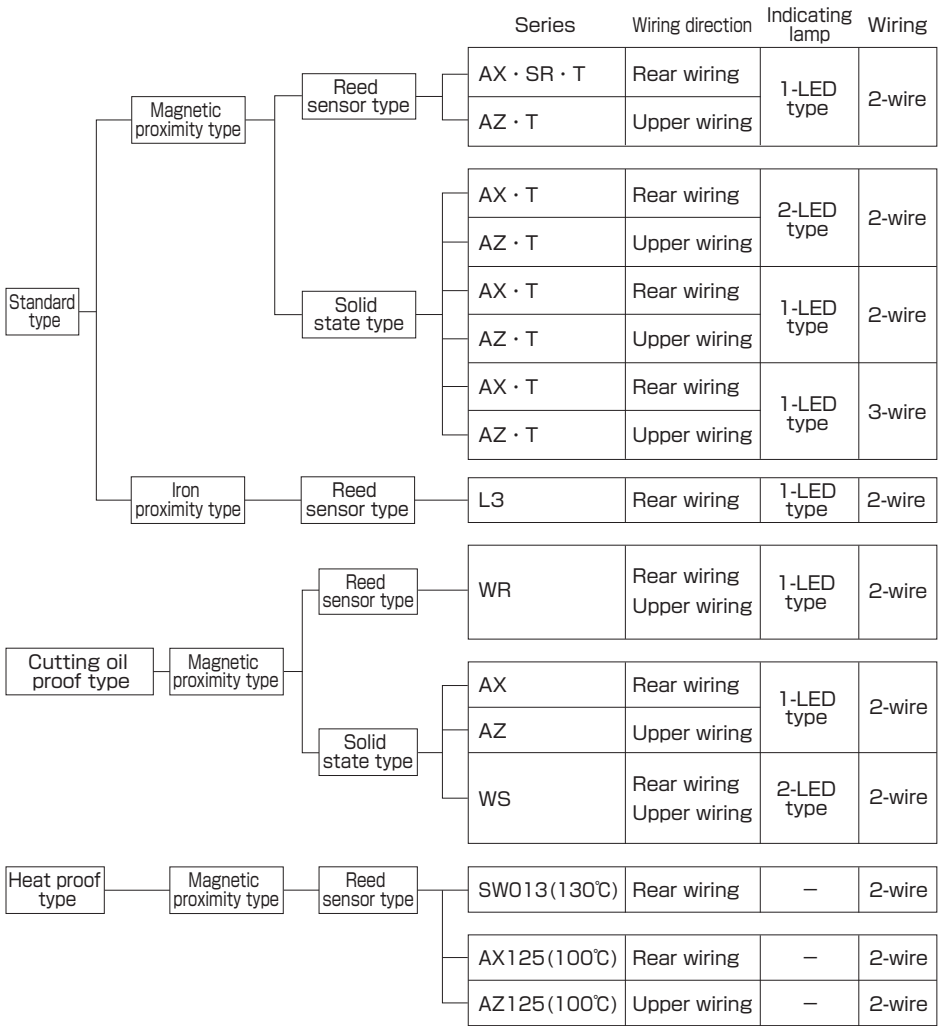
6. Storage

- 1) When storing the sensors, take care that they will not be exposed to abnormal temperatures, rust, vibration or impact and the cords will not be deteriorated.
- 2) Store the sensors in a dry, cool and dark place (−10 to +25°C).

7. Disposal

- 1) Do not throw the sensors into the fire. Toxic gas may be generated.
- 2) Dispose of the sensors as incombustibles.

Sensors for hydraulic equipment



Sensors for pneumatic equipment

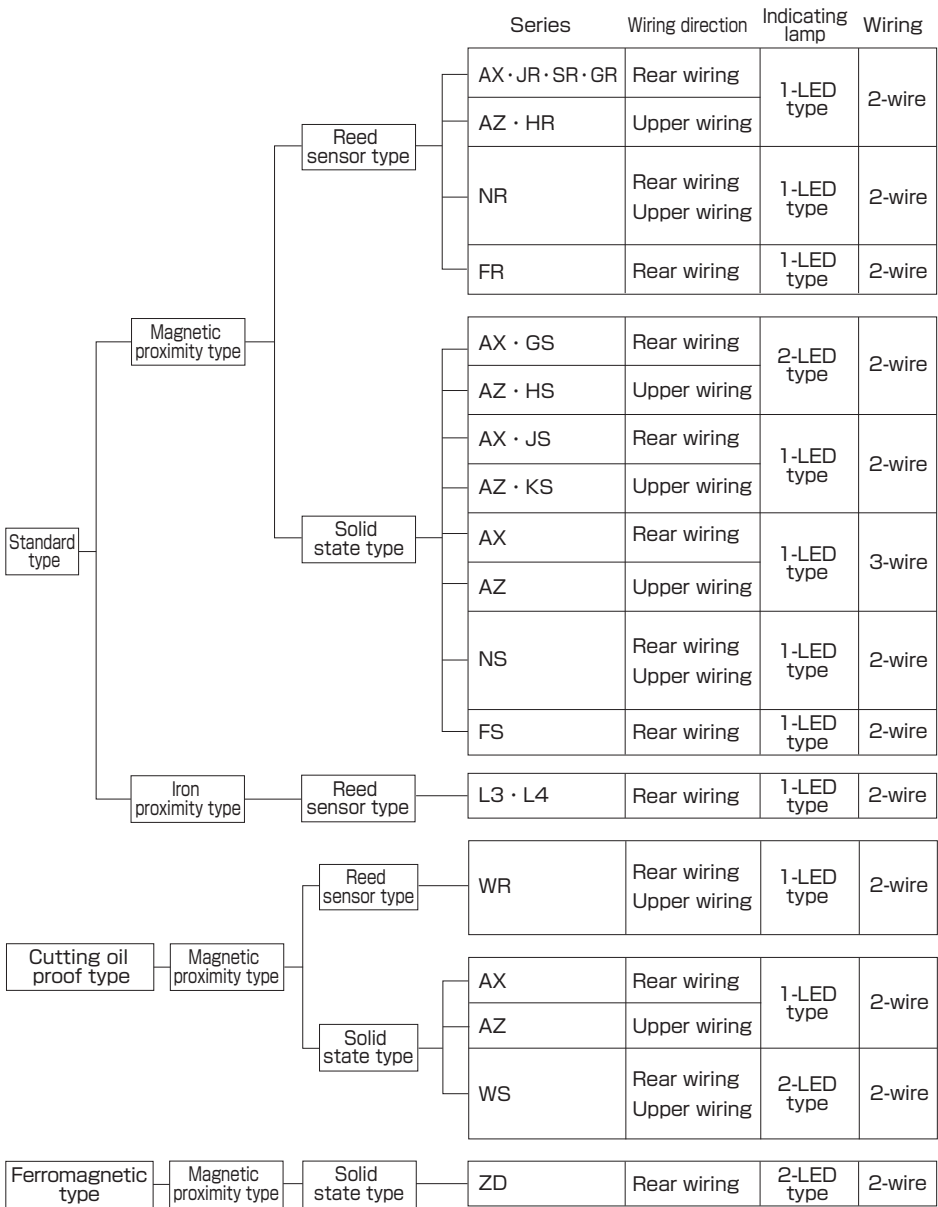


Table of applicability of sensors to hydraulic cylinders

Detection method	Contact type	Series	Indicating lamp	Compact hydraulic cylinder									General hydraulic cylinder		
				Standard type					Cutting oil proof type				Standard type		
				35S-1R	HQS2R	100S-1R	160S-1R	210S-1R	HQSW2R	100SW-1R	160SW-1R	35Z-1R	35H-3R	100Z-1R	
Magnetic proximity type	Reed sensor	AX/AZ type	1-LED type									●	●		
				●	●	●	●	●							
		T type	1-LED type		●	●								●	
		SR type	1-LED type									○	○		
	Solid state sensor	AX/AZ type	2-LED type		●	●	●	●	●				●	●	
														●	
		T type	2-LED type		●	●									
		AX/AZ type	1-LED type	●	●	●	●	●					●	●	
														●	
		T type	1-LED type		●	●									
Magnetic proximity type cutting oil proof sensors	Reed sensor	WR type Flexible tube	1-LED type		○	○	○	○		●	●	●		○	
	WR type Cord type	1-LED type											○		
	Solid state sensor	AX/AZ type	1-LED type							●	●	●			
														○	
		WS type Flexible tube	2-LED type	○	○	○	○			●	●	●			
	WS type Cord type	2-LED type											○		
Non proximity type	Reed sensor	L3 type	1-LED type												
Page				HB2	HB22	HB54	HB86	HB138	HB22	HB54	HB86	HA2	HA14	HA50	

Note) ● : Standard model ○ : Semi-standard model

AX and AZ type sensors are interchangeable regardless of the mounting method.

General hydraulic cylinder							Hydraulic cylinder with position detector	Rotary actuator	Telescopic cylinder	Mounting method	Page	
Standard type				Cutting oil proof type								
100H-2R	70/140H-8R	160H-1R	210C-1R	100HW-2R	70/140HW-8R	160HW-1R						
●	●	●	●	○	○	○	●	●	●		Tie rod type	SW20
											Mounting in groove	SW20
											Mounting with band	SW20
											Mounting in groove	SW25
	○						○	○	●	○	Tie rod type	SW32
●	●	●	●	○	○	○	●	●	●		Tie rod type	SW62
											Mounting in groove	SW62
											Mounting with band	SW62
											Mounting in groove	SW60
●	●	●	●	○	○	○	●	●	●		Tie rod type	SW54
											Mounting in groove	SW54
											Mounting with band	SW54
											Mounting in groove	SW59
○	○	○		●	●	●					Tie rod type	SW80
											Mounting in groove	SW80
											Mounting with band	SW80
○	○	○		●	●	●					Tie rod type	SW80
											Mounting with band	SW80
		○		●	●	●					Tie rod type	SW78
											Mounting in groove	SW78
○	○	○		●	●	●					Tie rod type	SW80
											Mounting in groove	SW80
											Mounting with band	SW80
○	○	○		●	●	●					Tie rod type	SW80
											Mounting with band	SW80
											Tie rod type	SW96
HA66	HA106	HA188	HA254	HA66	HA106	HA188	HH2	HH30	HM2	HJ2 HJ26		

Table of applicability of sensors to pneumatic cylinders

Detection method	Contact type	Series	Indicating lamp	Compact pneumatic cylinder				
				10S-1R	10S-6	10F-1	10G-3	RL2
Magnetic proximity type	Reed sensor	AX/AZ type	1-LED type					
					●			
					●		●	
		PD type	1-LED type		●			
		ZC type	1-LED type					
		KR type	1-LED type		●			
		JR type	1-LED type					
		ZR type	1-LED type	●				
		GR/HR type	1-LED type				●	
		SR type	1-LED type					
							●	
	Solid state sensor	AX/AZ type	2-LED type					
					●			
			1-LED type					
					●			
					●			
		PD/PE type	1-LED type		●			
		ZC type	1-LED type					
		KS (M) type	1-LED type	●				
		JS (M) type	1-LED type					
		GS/HS type	2-LED type				●	
		ZS type	1-LED type	●				
	ZD type	2-LED type						
				●				
Magnetic proximity type cutting oil proof sensors	Reed sensor	WR type Flexible tube	1-LED type					
		WR type Cord type		1-LED type				
	Solid state sensor	WS type Flexible tube	2-LED type					
		WS type Cord type		2-LED type				
Iron proximity type	Reed sensor	L3/L4 type	1-LED type					
Page				AA32	AA64	AA230	AA238	AA246

Note) ●: Standard model ○: Semi-standard model

AX and AZ type sensors are interchangeable regardless of the mounting method.

General pneumatic cylinder					Composite pneumatic cylinder			Mounting method	Page
10Z-3	10Z-2	10A-6	DC7	10A-2	CL1	RCA2	ST3		
		●	●	●				Tie rod type	SW20
●	●				●			Band type	SW20
								Mounting in groove	SW20
						●	●	Mounting in groove	SW24
●	●							Band type	SW27
								Mounting in groove	SW26
○	○							Band type	SW28
								Mounting in groove	SW30
								Rail type	SW31
		○	○	○				Tie rod type	SW32
○	○							Band type	SW32
								Rail type	SW32
		●	●	●				Tie rod type	SW62
●	●				●			Band type	SW62
								Mounting in groove	SW62
		●	●	●				Tie rod type	SW54
●	●				●			Band type	SW54
								Mounting in groove	SW54
●	●					●	●	Mounting in groove	SW44・58
								Band type	SW46・61
								Mounting in groove	SW68
○	○							Band type	SW70
								Rail type	SW71
								Mounting in groove	SW47
								Band type	SW66
					●			Rail type	SW66
				○				Tie rod type	SW80
○				○				Band type	SW80
				○				Tie rod type	SW80
○								Band type	SW80
				○				Tie rod type	SW80
○								Band type	SW80
			●		○			Band type	SW96
AB2	AB88	AB158	AB270	AB298	AD2	AD14	AD26		

Table of applicability of sensors to pneumatic equipment

Detection method	Contact type	Series	Indicating lamp
Magnetic proximity type	Reed sensor	AX type	1-LED type
		PD type	1-LED type
		ZC type	1-LED type
		SR type	1-LED type
		VR type	1-LED type
	Solid state sensor	AX type	2-LED type
		PE type	1-LED type
		ZC type	1-LED type
		AX type	1-LED type
Page			

Note) ●: Standard model ○: Semi-standard model

Rotary actuator		High power system			Mounting method	Page
7RP3	TRA-1	NBH	PBH	PBE		
	●				Tie rod type	SW20
●					Mounting in groove	SW24
	○				Mounting in groove	SW27
●					Tie rod type	SW32
	●				Mounting in groove	SW34
					Tie rod type	SW62
●					Mounting in groove	SW44-58
	●				Mounting in groove	SW46-61
		●	●	●	Tie rod type	SW54
EA62	EA88	ED24	ED32	ED32		

General Comparison of Reed Sensors and Solid State Sensors

Contact type Item	Reed sensor	Solid state sensor
Reliability	Low due to presence of mechanical contact	High due to absence of mechanical contact
No. of times of operation(durability)	Several millions to tens of millions	Semipermanent
Chattering	Provided	None
Response	Slow	Fast
Vibration/impact resistance	Low	High
Hysteresis	Large	Small
No. of lead wires	2 pcs.	2 or 3 pcs.
Price	Low	High

Definitions of terms relating to sensor

Supply voltage

Voltage to drive the sensor main circuit.
(3-wire type solid state sensor)

Load voltage (working voltage)

Voltage which can be applied to the sensor.
(Voltage which can be applied to the output part in the case of 3-wire type solid state sensor)

Load current (working current)

Current which can be carried to the sensor.
(Current which can be carried to the output part in the case of 3-wire type solid state sensor)

Consumption current

Current flowing through the sensor main circuit.
(3-wire type solid state sensor)

Internal voltage drop

Voltage generated between the ⊕ and ⊖ poles of the sensor (output and 0 V in the case of 3-wire type solid state sensor) when the sensor is turned on. Therefore, the voltage applied to the load when the sensor is turned on reduces by the internal voltage drop.

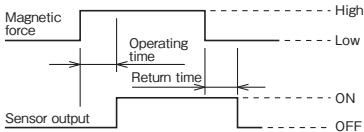
Leakage current

Current flowing between the ⊕ and ⊖ poles of the sensor (output and 0 V in the case of 3-wire type solid state sensor) when the sensor is turned off.

Operating time and return time

Operating time : Time until the sensor in the off state turns on after magnetic force reaches the sensor ON level

Return time : Time until the sensor in the on state turns off after magnetic force reaches the sensor OFF level



Response time

Operating time or return time. For solid state sensors, the term "response time" refers to the operating time and return time because they are almost equal.

Protective structure

IEC(International Electrotechnical Commission)Standards(IEC529)

IP-6

Grade	Degree of protection	Test method
4	Protection from splashes 	Sensor must not detrimentally affected by splashes of water from any direction. Sprinkle water from all directions for 10 minutes each.
5	Protection from jets of water 	Sensor must not detrimentally affected by direct jets of water from any direction. Inject water from all directions for 15 minutes in all.
6	Protection from wave 	No ingress of water must occur when sensor is exposed to intense direct jets of water from any direction. Inject water from all directions for 15 minutes in all.
7	Protection from immersion in water 	No ingress of water must occur when sensor is immersed in water at specified pressure for specified time. Immerse in water at a depth of 1 m for 30 minutes.
8	Protection from submersion in water 	Sensor can be used in water. Individually specified

Grade of protection from ingress of water

Grade of protection of human bodies and from solid foreign particles

Grade	Degree of protection
6	Dust proof type No entry of dust.

Protection characteristic symbol(International Protection)

JEM(The Japan Electrical Manufacturers' Association)Standards

IP-6

Grade	Degree of protection
G	Oil proof type No ingress of oil drops or splashes from any direction.

Grade of protection from ingress of oil

Grade of protection from ingress of water

Grade of protection of human bodies and from solid foreign particles

Same as IEC529

Same as IEC529

Sensor LED lamp types

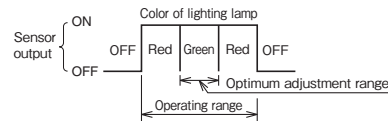
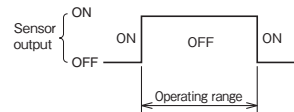
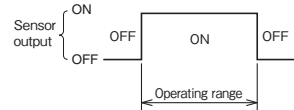
1) 1-LED type

a) Lighting with sensing

When the sensor detects the piston position, the indicating lamp lights, and the sensor turns on. When the sensor loses the piston position, the indicating lamp goes out, and the sensor turns off.

b) Lighting with not sensing

When the sensor detects the piston position, the indicating lamp goes out, and the sensor turns on. When the sensor loses the piston position, the indicating lamp lights, and the sensor turns off.



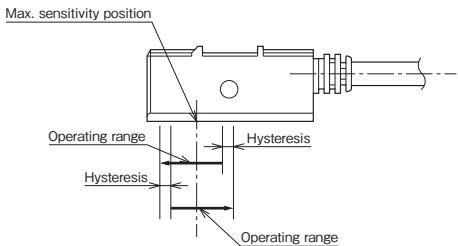
2) 2-LED type

When the sensor detects the piston position, the indicating lamp lights, and the sensor turns on. The red or green lamp lights depending on the piston position. The range in which the green lamp is on is the optimum adjustment range.

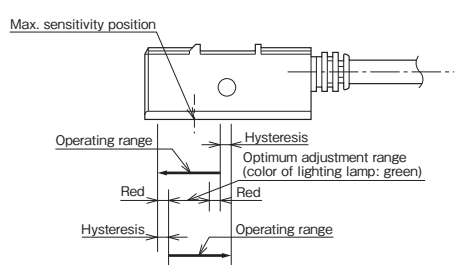
When mounting the sensor, adjust its position so that the detecting position is in the center of this optimum adjustment range.

Max. sensitivity position and operating range/hysteresis of sensor

[1-LED type]



[2-LED type]



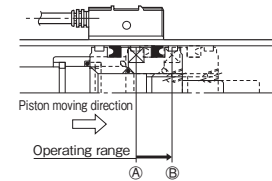
- When mounting the sensor, adjust its position so that the detecting position is in the center of the operating range (center of the range where the green lamp is on in the case of 2-LED type).
- To detect the piston at both cylinder stroke ends, mount the sensor at the "optimum sensor setting position" (see the catalog of each series), and the detecting position will be in the center of the operating range.

Notes) ● For the max. sensitivity position of each sensor, see the sensor outline drawing.
● For the operating range and hysteresis of each sensor, see the catalog of applicable cylinders.

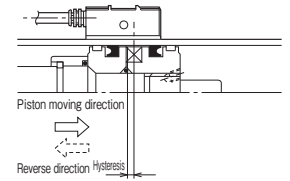
Explanation of sensor operation

1) Operation of magnetic proximity type sensor

A magnetic proximity sensor mounted on the tube periphery detects the piston position when the piston provided with a magnet reaches the position under the sensor. This type of sensor is designed to externally detect the cylinder stroke position without contact.



When the piston moves in the arrow direction (⇒) and the magnet reaches position ①, the sensor turns on. The sensor is kept on in the range from ① to ②. This range is called the operating range.

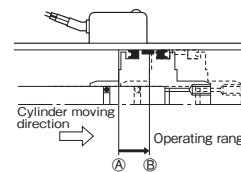


When the piston moves in the arrow direction (⇒) and the piston reaches position ①, the sensor turns on. When the piston moves from the position in the reverse direction, the sensor is kept on until the piston reaches position ③. The distance between ① and ③ is called hysteresis. This hysteresis occurs at both ends of the operating range.

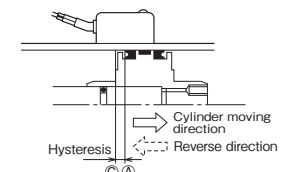
Note) The above figures show the operation of AX type sensor.

2) Iron proximity type sensor

While the piston is not close to the sensor, the sensor contact is in a magnetic equilibrium state and open (OFF). If a ferromagnetic body (piston) comes close to the sensor in such a state, its contact loses the magnetic equilibrium and closes (ON). In this way, the sensor detects the piston position from the outside of the cylinder without contact.



When the piston moves in the arrow direction (⇒) and the piston reaches position ①, the sensor turns on. The sensor is kept on in the range from ① to ②. This range is called the operating range.



When the piston moves in the arrow direction (⇒) and the piston reaches position ①, the sensor turns on. When the piston moves from the position in the reverse direction, the sensor is kept on until the piston reaches position ③. The distance between ① and ③ is called hysteresis. This hysteresis occurs at both ends of the operating range.

Conditions for selection of sensor

Item	Description
1. Cylinder series	The applicable shape of sensor varies depending on the cylinder series.
2. Type of load	Small relay, programmable controller, small solenoid, etc.
3. Working voltage and working current of load	Steady-state voltage value, surge voltage value, steady-state current value and inrush current value
4. Operating voltage/current and return voltage/current of load	Verify the applicability to sensor electrical specifications.
5. Operating time of load (ms)	Time until the load operates after the input signal from the sensor is received.
6. Cylinder operating speed (mm/s)	Necessary for detection at an intermediate stroke.
7. Frequency of operation of sensor (times/hr)	The reed sensors and solid state sensors differ in durability.
8. Control method	Sequence circuit of sensor for cylinder operation. Check mainly for serial and parallel connections.
9. Environment	Temperature, vibration, impact, splashes of cutting oil and water, ambient magnetic field intensity, existence of ferromagnetic bodies (iron, metal cutting scraps, etc.) and existence of power sources (motors, etc.) for other electric appliances.

Sensor selecting procedures

When selecting a sensor, determine the following conditions.

Check	Selection item	How to select
<input type="checkbox"/> 1	Selection of cylinder	Select a cylinder referring to the cylinder selection materials. Select a sensor among the sensors applicable to the selected cylinder (see the sensor specification table of each series).
<input type="checkbox"/> 2	Selection of load type	Determine the load type necessary for control referring to the loads applicable to each sensor. (IC, small relay, programmable controller, small solenoid, etc.)
<input type="checkbox"/> 3	Determination of power supply for control circuit	DC (voltage, voltage regulation and current capacity) AC (voltage, voltage regulation, current capacity, etc.)
<input type="checkbox"/> 4	Selection of sensor working voltage and working current	Determine the working voltage and current to ensure that the steady-state voltage values (for DC and AC) and current value are within the sensor working voltage and current ranges. For a reed sensor, ensure that the contact capacity does not exceed the max. contact capacity (voltage×current). Check the internal voltage drop, leakage current and consumed current of the sensor to verify its applicability to the load.
<input type="checkbox"/> 5	Selection of contact (output) protective circuit	If an induction load (small relay or small solenoid) or capacitive load (extended cable 10 m or more long, capacitor, AC input programmable controller, etc) is used as a load, provide contact (output) protective means because surge voltage and inrush current can occur when the sensor turns on or off. (See the sensor specifications and the instruction manual for each sensor.) If an induction load is used, it is recommended to use a load with a built-in protective circuit against surge voltage.
<input type="checkbox"/> 6	Selection of reed or solid state sensor	When high durability is required, select a solid state sensor. Select a sensor referring to the table of comparison of reed and solid state sensors.
<input type="checkbox"/> 7	Selection based on environmental conditions	Select according to the following table.
<input type="checkbox"/> 8	Confirmation of response speed	Make sure that the load can operate based on the sensor operating time, return time and response speed and load operating time referring to the following page.
<input type="checkbox"/> 9	Cord length	1.5- and 5-m long cords are standardized. (except for some sensors) For details, see the catalog of each cylinder.

Sensor Specifications

Sensor Specifications

Environment

1) Working temperature

Use the sensor within the working temperature range shown in the sensor specification table. In a hydraulic cylinder, the fluid temperature may increase depending on the operating conditions. Take measures on the hydraulic circuit, or install a cooler.

2) Guidelines for selection in case that sensor is splashed with cutting oil or water

Conditions	Guidelines for selection
Sensor is constantly or frequently splashed with cutting oil or water.	Even if the sensor is misted or it is splashed several times a day, use a cutting oil proof sensor (AX205W, AZ205W, WR or WS type). However, contact us when the sensor may be splashed with type 2 nonaqueous cutting oil.
In cutting oil or water	Do not use any sensor in cutting oil or water, even temporarily.

3) Other environmental conditions

Place with hazardous materials, e.g., combustible and ignitable materials	⇒ Do not use any sensor under these conditions.
Place in atmosphere with chemicals	
Exposure to metal cutting scraps	⇒ Take measures referring to the specifications for installation location stated in the sensor instruction manual.
Ferromagnetic field	
Existence of ferromagnetic bodies (iron, etc.) near sensor and cylinder	
Vibration and impact	⇒ See the specified vibration resistance and impact resistance of each sensor.
Exposure to direct sunlight (outdoors)	⇒ Use the sensors indoors. If the sensor is exposed to direct sunlight, provide a cover.

Detectable cylinder piston speed

- When setting the sensor at an intermediate position, set the cylinder max. speed to less than 300 mm/s in consideration of the response speed of the load relay.
- If the piston speed is too high, the load, such as a relay, may not operate because the sensor operating time is short although it works.
Determine the detectable cylinder piston speed referring to the following formula.

Detectable piston speed (mm/s) = $\frac{\text{Sensor operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$

Notes) ● For the load operating time, see the catalog of loads, such as relays, of each manufacturer.
● For the calculation, use the minimum value of the sensor operating range and the maximum value of the load operating time.



Sensor Specifications

Magnetic Proximity Type/Reed Sensor

AX type sensor...SW20



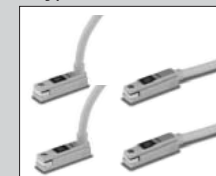
AZ type sensor...SW22



PD type sensor...SW24



T type sensor...SW25



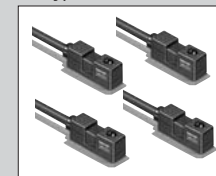
KR type sensor...SW26



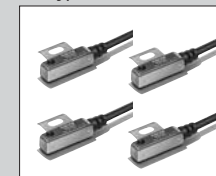
ZC type sensor...SW27



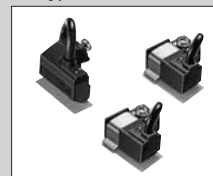
JR type sensor...SW28



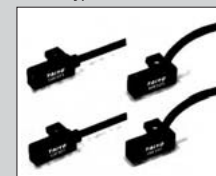
YR type sensor...SW29



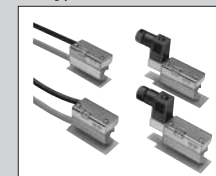
ZR type sensor...SW30



GR+HR type sensor...SW31

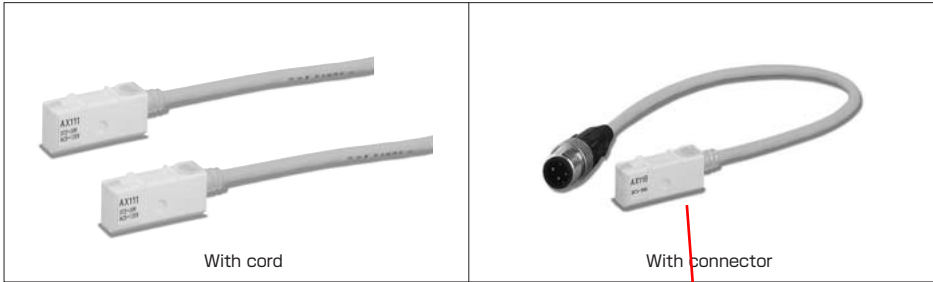


SR type sensor...SW32



VR type sensor...SW34





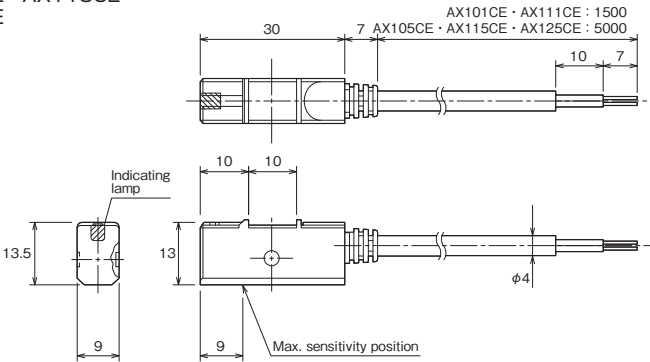
Sensor Specifications

Type	With cord (1.5 m)	AX101CE	AX111CE	—	—	—
	With cord (5 m)	AX105CE	AX115CE	—	—	AX125CE
	With connector (for AC)	—	—	AX11ACE	—	—
	With connector (for DC)	—	—	—	AX11BCE	—
Load voltage range	AC : 5 to 120V DC : 5 to 30V		AC : 5 to 120V	DC : 5 to 30V	AC : 120V or less DC : 30V or less	
Load current range	AC : 5 to 20mA DC : 5 to 40mA		5 to 20mA	5 to 40mA	AC : 20mA or less DC : 40mA or less	
Max. switching capacity	AC : 2VA DC : 1.5W					
Internal voltage drop	2 V (at 10 mA) 3 V or less					0V
Leakage current	0μA	10μA or less				0μA
Operating time	1 ms or less					
Return time	1 ms or less					
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)					
Withstand voltage	1500 V AC for 1 min (between case and cord)					
Impact resistance	294m/s ² (unrepeated)					
Vibration resistance	Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions					
Ambient temperature	-10 to +70°C (no freezing)					-10 to +100°C (no freezing)
Wiring method	0.3 mm ² , 2-core, outer dia. φ4 mm, oil-proof cabtyre cord					
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)					
Output protective circuit	Note) None	Provided				Note) None
Indicating lamp	LED (lights in red with sensing)					None
Electric circuit						
Applicable load	Small relay, programmable controller					IC, Small relay, programmable controller

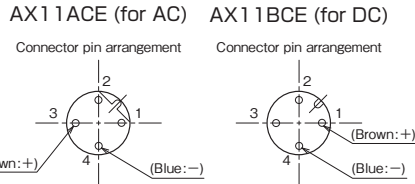
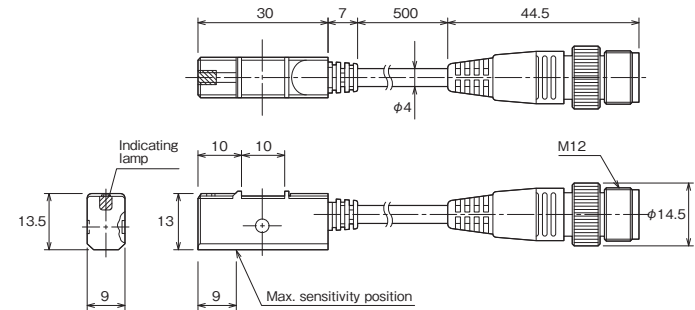
(Notes) ● When using any induction load (relay, etc.), be sure to provide a protective circuit (SK-100) with the load.
● For the length of the cord with connector and the connector pin arrangement, see the dimensional drawings.
● When an AC voltage input type programmable controller is used as a load, select a sensor with contact protective circuit.

Dimensional Drawings

- Cord type
AX101CE · AX105CE
AX111CE · AX115CE
AX125CE



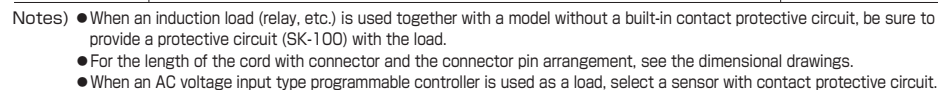
- Connector type
AX11ACE · AX11BCE



Applicable Mating Connectors		
Manufacturer	Connector series name	
Correns Corporation	VA connector	VA-4DS, VA-4DL
OMRON Corporation	XS2 sensor I/O connector	XS2
Hirose Electric Co., Ltd.	Connector for FA sensor	HR24

● For details, see the catalog of each connector manufacturer.

- Connector standard numbers
Models M12X1 screw locking
 - IEC 947-5-2
 - DIN/VDE 0660 part 208 A2
 - NECA (Nippon Electric Control Equipment Industries Association) 4202 Connectors for FA sensors



- NECA (Nippon Electric Control Equipment Industries Association) 4202 Connectors for FA sensors



Small, light and compact magnetic proximity type reed sensors

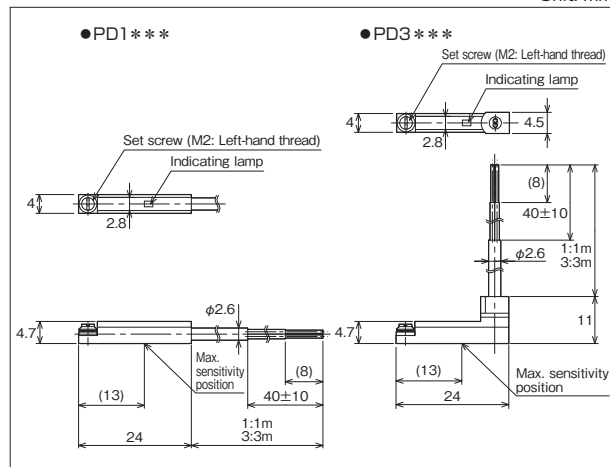
- Small, light and compact (compared to our conventional products)
- The sensors can work with both AC and DC voltages.
- Since the sensors are embedded in cylinder bodies, they do not protrude from the body surfaces.
(Rear wiring type)



Product conforming to CE Marking

Dimensional Drawings

Unit: mm

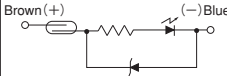



Magnetic Proximity Type (Reed Sensor)



Small, light and compact magnetic proximity type reed sensors

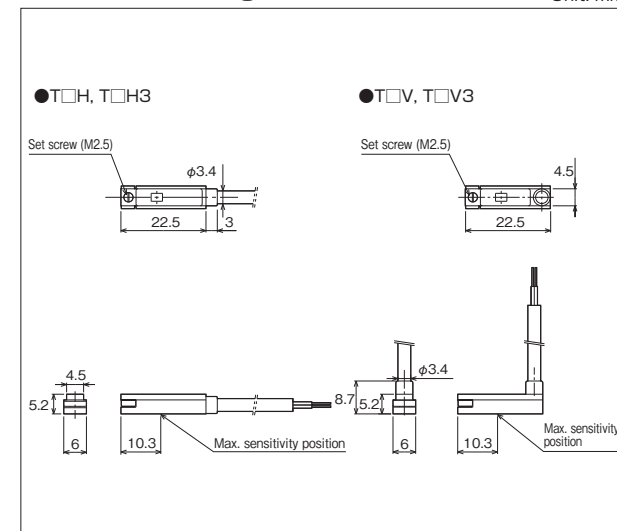
- Small, light and compact (compared to our conventional products)
- Oil-proof vinyl cabtyre cords are used.
- Since the sensors are embedded in cylinder bodies, they do not protrude from the body surfaces. (Rear wiring)

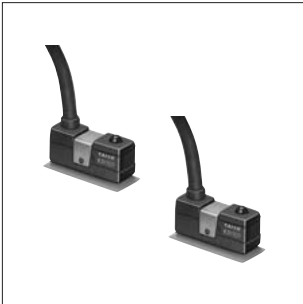
Type	With cord (1 m)	T0H	T0V	T5H	T5V	
	With cord (3 m)	T0H3	T0V3	T5H3	T5V3	
Wiring direction		Rear wiring	Rear wiring	Rear wiring	Rear wiring	
Load voltage range		100 V AC, 12/24 V DC		100 V AC, 5/12/24 V DC		
Load current range		AC : 7 to 20mA, DC : 5 to 50mA		AC : 20mA or less DC : 50mA or less		
Max. switching capacity		AC : 2VA, DC : 1.2W		AC : 2VA, DC : 1.2W		
Internal voltage drop		2.4V or less			0V	
Leakage current		0μA				
Insulation resistance		20 MΩ or more on 500-VDC Megger (between case and cord)				
Withstand voltage		1000 V AC for 1 min (between case and cord)				
Impact resistance		294m/s ²				
Ambient temperature		-10 to +70°C (no freezing)				
Wiring method		0.2 mm ² , 2-core, outer dia. φ3.4 mm, oil-proof vinyl cabtyre cord				
Protection structure		IP67 (IEC Standard), JIS C0920 (submersible) oil-proof				
Output protective circuit		None				
Indicating lamp		LED (lights in red when sensing)			None	
Electric circuit						
Applicable load		Small relay, programmable controller			Small relay, programmable controller IC (without lamp), for series connection	

Note) When using any induction load (relay, etc.), be sure to provide a protective circuit (SK-100) with the load.

Dimensional Drawings

Unit: mm





Small, light and low-cost magnetic proximity type reed sensors

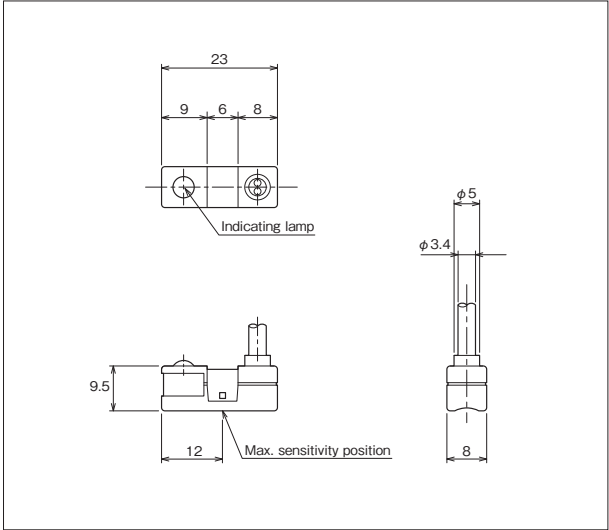
- Small, light and compact (compared to our conventional products)
- The sensors can work with both AC and DC voltages.
- Oil-proof cabtyre cords are used.

Type	With cord (1.5 m)	KR101	—
	With cord (5 m)	KR105	KR105N
Load voltage range	AC : 5 to 120V DC : 5 to 50V AC : 120V or less DC : 50V or less		
Load current range	AC : 3 to 20mA DC : 3 to 40mA AC : 20mA or less DC : 40mA or less		
Max. switching capacity	AC : 2VA DC : 1.5W		
Internal voltage drop	3 V or less		0 V
Leakage current	0 μA		
Operating time	1 ms or less		
Return time	1 ms or less		
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)		
Withstand voltage	1500 V AC for 1 min (between case and cord)		
Impact resistance	294m/s ² (unrepeated)		
Vibration resistance	Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions		
Ambient temperature	-10 to +70°C (no freezing)		-10 to +100°C (no freezing)
Wiring method	0.3 mm ² , 2-core, outer dia. ϕ3.4 mm, oil-proof cabtyre cord		
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)		
Indicating lamp	LED (lights when sensing)		None
Electric circuit			
Applicable load	Small relay, programmable controller		

Note) When using any induction load (relay, etc.), be sure to provide a protective circuit (SK-100) with the load.

Dimensional Drawings

Unit: mm



Small, light and compact magnetic proximity type reed sensors

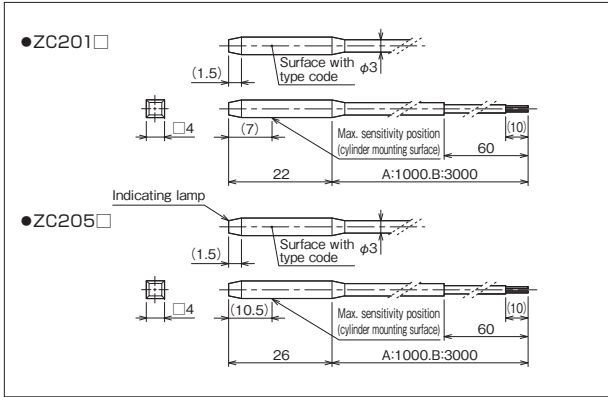
- Small, light and compact (compared to our conventional products)
- The sensors can work with both AC and DC voltages. (ZC201)
- Oil-proof cabtyre cords are used.

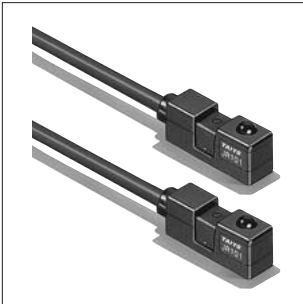
Type	With cord (1m)	ZC201A	ZC205A
	With cord (3m)	ZC201B	ZC205B
Wiring direction	Rear		
Load voltage range	AC: 115 V or less DC: 28 V or less		DC:10 to 28 V
Load current range	AC: 25 mA or less DC: 40 mA or less		DC:5 to 40 mA
Internal voltage drop ^{Note 1}	0.1 V or less (at load current of 40 mA)		2.1 V or less (at load current of 40 mA)
Leakage current	0 μA		
Operating time	1 ms or less		
Return time	1 ms or less		
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)		
Withstand voltage	1500 V AC for 1 min (between case and cord)		
Impact resistance ^{Note 2}	294 m/s ² (unrepeated)		
Vibration resistance ^{Note 2}	Double amplitude 1.5 mm, 10 to 55 Hz (88.3 m/s ²)		
Ambient temperature	0 to +60°C (no freezing)		
Wiring method	PVC, 0.2 mm ² , 2-core, outer dia. ϕ3 mm		
Protection structure	IP66 (IEC Standard), JIS C0920 (water-resistant)		
Indicating lamp	None		LED (lights when sensing)
Electric circuit			
Applicable load	Small relay, programmable controller		

Note) When using any induction load (relay, etc.), be sure to provide a protective circuit (SK-100) with the load.
Note 1: The internal voltage drop varies depending on the load current.
Note 2: In accordance with our test standards

Dimensional Drawings

Unit: mm





Small, light and low-cost magnetic proximity type reed sensors

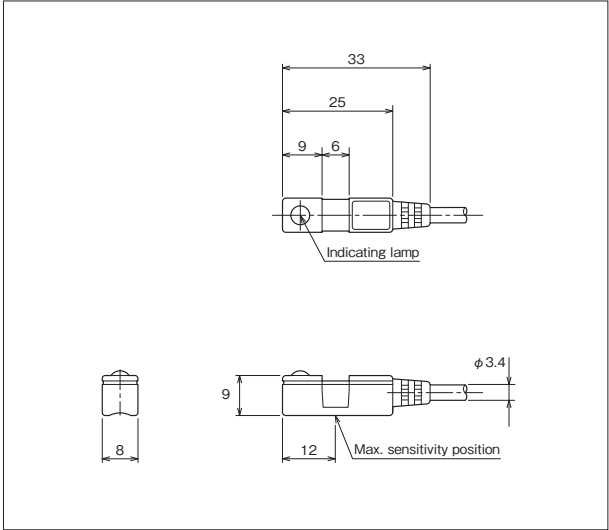
- Small, light and compact (compared to our conventional products)
- The sensors can work with both AC and DC voltages.
- Oil-proof cabtyre cords are used.

Type	With cord (1.5 m)	JR101
	With cord (5 m)	JR105
Load voltage range	AC : 5 to 120V DC : 5 to 50V	
Load current range	AC : 3 to 20mA DC : 3 to 40mA	
Max. switching capacity	AC : 2VA DC : 1.5W	
Internal voltage drop	3 V or less	
Leakage current	0 μA	
Operating time	1 ms or less	
Return time	1 ms or less	
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage	1500 V AC for 1 min (between case and cord)	
Impact resistance	294m/s ² (unrepeated)	
Vibration resistance	Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions	
Ambient temperature	-10 to +70°C (no freezing)	
Wiring method	0.3 mm ² , 2-core, outer dia. φ3.4 mm, oil-proof cabtyre cord	
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)	
Indicating lamp	LED (lights when sensing)	
Electric circuit		
Applicable load	Small relay, programmable controller	

Note) When using any induction load (relay, etc.), be sure to provide a protective circuit (SK-100) with the load.

Dimensional Drawings

Unit: mm



Small, light and low-cost magnetic proximity type reed sensors

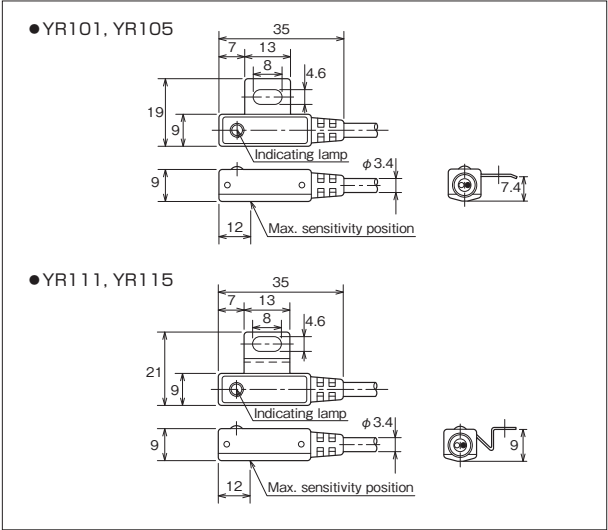
- Small, light and compact (compared to our conventional products)
- The sensors can work with both AC and DC voltages.
- Oil-proof cabtyre cords are used.

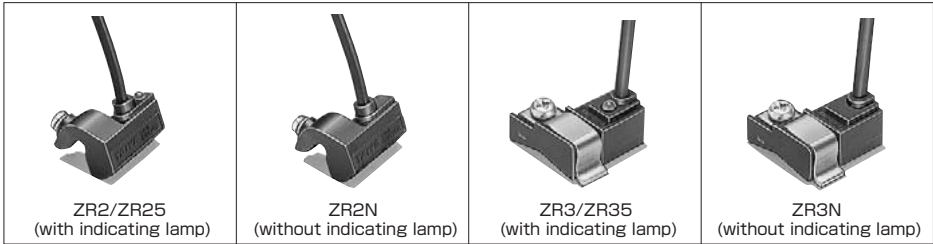
Type	With cord (1.5 m)	YR101 (tie rod type)	YR111 (fixed type)
	With cord (5 m)	YR105 (tie rod type)	YR115 (fixed type)
Load voltage range	AC : 5 to 120V DC : 5 to 50V		
Load current range	AC : 3 to 20mA DC : 3 to 40mA		
Max. switching capacity	AC : 2VA DC : 1.5W		
Internal voltage drop	3 V or less		
Leakage current	0 μA		
Operating time	1 ms or less		
Return time	1 ms or less		
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)		
Withstand voltage	1500 V AC for 1 min (between case and cord)		
Impact resistance	294m/s ² (unrepeated)		
Vibration resistance	Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions		
Ambient temperature	-10 to +70°C (no freezing)		
Wiring method	0.3 mm ² , 2-core, outer dia. φ3.4 mm, oil-proof cabtyre cord		
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)		
Indicating lamp	LED (lights when sensing)		
Electric circuit			
Applicable load	Small relay, programmable controller		

Note) When using any induction load (relay, etc.), be sure to provide a protective circuit (SK-100) with the load.

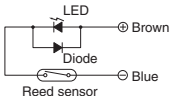
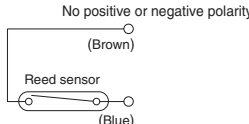
Dimensional Drawings

Unit: mm





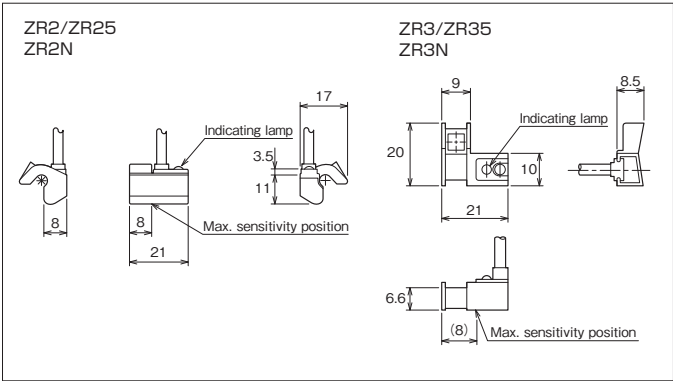
Specifications

Type	With cord (1.5 m)	ZR2	ZR3	ZR2N	ZR3N
	With cord (5 m)	ZR25	ZR35	—	—
Load voltage range	AC : 5 to 120 V DC : 5 to 50 V			AC : 120 V or less DC : 50 V or less	
Load current range	AC : 3 to 20 mA DC : 3 to 40 mA			AC : 20 mA or less DC : 40 mA or less	
Max. switching capacity	AC : 2VA DC : 1.5W				
Internal voltage drop	2 V (at 10 mA) 3 V or less			0 V	
Leakage current	0 μA				
Operating time	1 ms or less				
Return time	1 ms or less				
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)				
Withstand voltage	1500 V AC for 1 min (between case and cord)				
Impact resistance	294m/s ² (unrepeated)				
Vibration resistance	Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions				
Ambient temperature	−10 to +70°C (no freezing)				
Wiring method	0.2 mm ² , 2-core, outer dia. φ3 mm, oil-proof cabtyre cord				
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)				
Indicating lamp	LED (lights when sensing)			None	
Electric circuit					
Applicable load	Small relay, programmable controller			Small relay, programmable controller, IC	

Note) When using any induction load (relay, etc.), be sure to provide a protective circuit (SK-100) with the load.

Dimensional Drawings

Unit: mm



Small, light and low-cost magnetic proximity type reed sensors

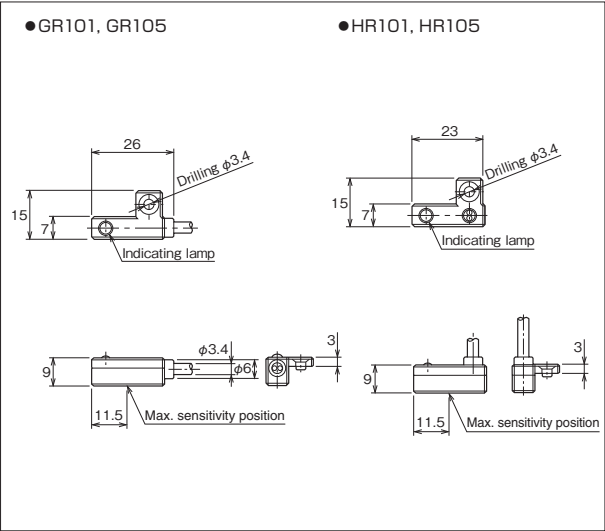
- Small, light and compact (compared to our conventional products)
- The sensors can work with both AC and DC voltages.
- Oil-proof cabtyre cords are used.



Type	With cord (1.5m)	GR101 (rear wiring)	HR101 (upper wiring)
	With cord (5m)	GR105 (rear wiring)	HR105 (upper wiring)
Load voltage range	AC:5 to 120 V DC:5 to 50 V		
Load current range	AC:3 to 20 mA DC:3 to 40 mA		
Max. switching capacity	AC:2VA DC:1.5W		
Internal voltage drop	3 V or less		
Leakage current	0μA		
Operating time	1 ms or less		
Return time	1 ms or less		
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)		
Withstand voltage	1500 V AC for 1 min (between case and cord)		
Impact resistance	294 m/s ² (unrepeated)		
Vibration resistance	Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions		
Ambient temperature	−10 to +70°C (no freezing)		
Wiring method	0.3 mm ² , 2-core, outer dia. φ3.4 mm, oil-proof cabtyre cord		
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)		
Indicating lamp	LED (lights when sensing)		
Electric circuit			
Applicable load	Small relay, programmable controller		

Note) When using any induction load (relay, etc.), be sure to provide a protective circuit (SK-100) with the load.

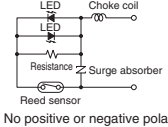
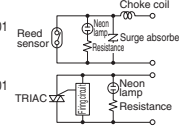
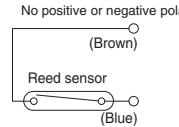
Dimensional Drawings

Unit: mm



			
SR100·SR200·SR300·SR400	SR500	SR101·SR201·SR301·SR401·SR105·SR205·SR305·SR405	SR501·SR505

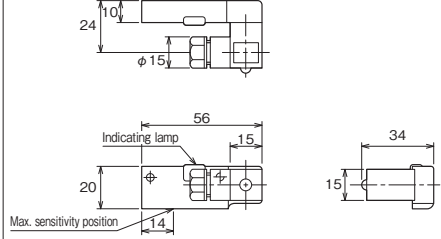
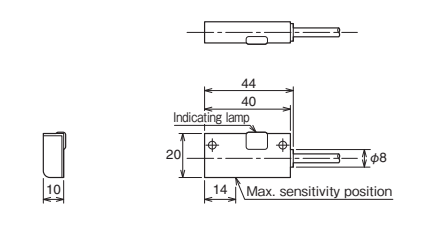
Specifications

Type	With connector	SR100	SR200	SR300	SR400	SR500
	With cord (1.5 m)	SR101	SR201	SR301	SR401	SR501
	With cord (5 m)	SR105	SR205	SR305	SR405	SR505
Load voltage range	5 to 50V DC			80 to 220V AC		AC : 220V or less DC : 50V or less
Load current range	6 to 25mA (70°C or less), 25 to 40mA (70°C or less), 6 to 30mA (60°C or less) 25 to 50mA (60°C or less)			2 to 20mA	2 to 300mA	50 mA or less
Max. switching capacity	1.5W			2VA	30VA	AC : 2VA · DC : 1.5W
Internal voltage drop	3 V or less			0 V	2 V or less	0 V
Leakage current	10 μA or less			1 mA or less		0 μA
Operating time				1 ms or less		
Return time	1 ms or less			1 ms or less	11 ms or less	1 ms or less
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)					
Withstand voltage	1500 V AC for 1 min (between case and cord)					
Impact resistance	294 m/s ² (unrepeated)					
Vibration resistance	No abnormalities after exposure to impact of 10G at 50 to 200 Hz for 2 hours in each of X, Y and Z directions with 10-min log sweep					
Ambient temperature	-10 to +70°C (no freezing)					
Wiring method	Connector	Supplied connector				
	Cord	0.5 mm ² , 2-core, outer dia. ø6 mm, oil-proof cabtyre cord (black) 0.5 mm ² , 2-core, outer dia. ø6 mm, oil-proof cabtyre cord (gray) 0.5 mm ² , 2-core, outer dia. ø6 mm, oil-proof cabtyre cord (black)				
Protection structure	With cord: IP67 (IEC Standard), JIS C0920 (dust-proof and submersible) With connector: IP64 (IEC Standard), JIS C0920 (dust-proof and splash-proof)					
Indicating lamp	LED (lights when sensing)			Neon lamp (lights when not sensing)		None
Electric circuit						
Applicable load	Small relay Programmable controller	Small relay	Small relay	Small relay Programmable controller Small solenoid Pilot lamp	Small relay Programmable controller IC	

Notes) 1. When a sensor with a connector is used, use 0.75 mm² 2-core cord having an outer dia. of ø6.8 to ø7.2 mm.
2. *For a load (AC programmable controller, etc.) to which rush current flows when the sensor is turned on, use SR40* in place of SR30* or SR50* even if the steady current is 20 mA or less.
3. When R50* is used together with an induction load (small relay, etc.), be sure to connect a protective circuit (SK-100) to the load in parallel.

Dimensional Drawings

Unit: mm

SR100·SR200·SR300·SR400 (with indicating lamp) SR500 (without indicating lamp)	SR101·SR201·SR301·SR401·SR105·SR205·SR305·SR405 (with indicating lamp) SR501·SR505 (without indicating lamp)
	

Procedures for handling sensor with connector

Handling procedures

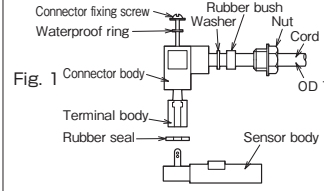


Fig. 1 Connector body

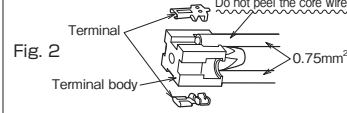


Fig. 2 Terminal body

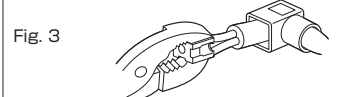


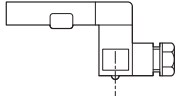
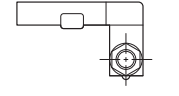
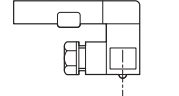
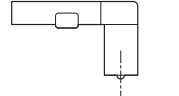

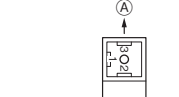
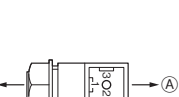
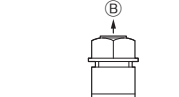
Fig. 3

Procedures

1. Loosen the connector fixing screw, and remove the connector from the reed sensor.
2. Further turn the connector fixing screw, and remove the terminal body from the connector body.
3. Peel off the sheath in advance to prepare the core wires as shown below (wiring direction and sheath peeling length).
4. Insert the cord as shown in Fig. 1.
5. Remove the terminals from the terminal body (the terminal body has three terminals, use the two opposed terminals No. 2 and 3), and put the core wires on the terminal body as shown in Fig. 2.
6. Fit the terminals on the core wires pressing with pliers as shown in Fig. 3.
7. Push the terminal body into the connector body while pulling the cord.
8. Secure the terminal body in the connector body with the connector fixing screw. Attach the connector to the sensor. (Ensure that the sensor pins are inserted to No. 2 and 3 of the connector.)

Wiring Direction and Sheath Peeling Length

Select one of the wiring directions (I) to (IV) shown in the following table, and peel off the sheath of the cord.

Method	Wiring direction	(I) Packaged state	(II)	(III)	(IV)
Direction of L socket					
Cord sheath peeling length					

Note) Do not peel the core wires.

Applicable Cord

Wire name	Applicable wire		
	Conductor	Core	Finished OD
Vinyl cabtyre cord (VCTF) (JIS C3322)	0.75mm²	2-core	ø7 (ø6.8 to ø7.2mm)



Small, light and low-cost magnetic proximity type reed sensors

- Small, light and compact (compared to our conventional products)
- The sensors can work with both AC and DC voltages.
- Oil-proof cabtyre cords are used.

Applicable Actuator

Model	Series
Rotary actuator	7RP3 Note)

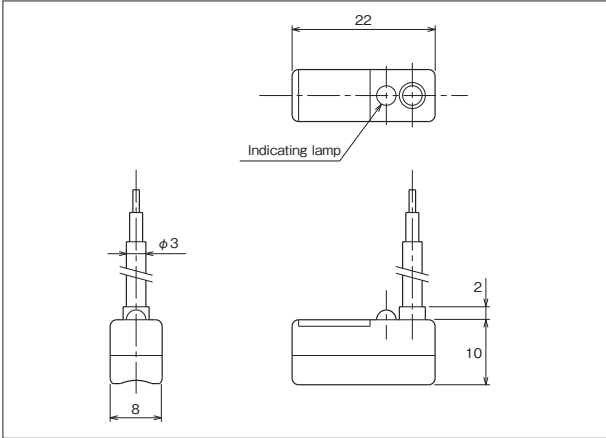
Note) Only 7RP3*1318 and 7RP3*1420 can be fitted.

Type	With cord (1.5m)	VR1
	With cord (5m)	VR15
Load voltage range	AC: 5 to 120V DC: 5 to 50V	
Load current range	AC: 3 to 20mA DC: 3 to 40mA	
Max. switching capacity	AC: 2VA DC: 1W	
Internal voltage drop	2 V or less	
Leakage current	0	
Operating time	1 ms or less	
Return time	1 ms or less	
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage	1500 V AC for 1 min (between case and cord)	
Impact resistance	294 m/s ² (unrepeated)	
Vibration resistance	Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min)	
Ambient temperature	-10 to +60°C (no freezing)	
Wiring method	0.2 mm ² , 2-core, outer dia. ϕ 3 mm, oil-proof cabtyre cord	
Protection structure	IP67 (IEC Standard), JIS C0920 (water-resistant)	
Indicating lamp	LED (lights when sensing)	
Electric circuit		
Applicable load	Small relay, programmable controller	

Note) When using any induction load (relay, etc.), be sure to provide a protective circuit (SK-100) with the load.

Dimensional Drawings

Unit: mm



Handling procedures

Notes on wiring

- When wiring the sensor, disconnect the power from the equipment on the electric circuit to be connected.
 - Failure to do so may expose the workers to electric shock. Or, the sensor and load may be damaged.
- Take care not to apply bending, pulling or torsional load to the sensor cords. To prevent application of load to the roots of the sensor cords, secure the wires on a tie rod, or take other appropriate measures. (See the figure.)
 - Failure to do so may break the cords.
- The bending radius shall be as large as possible.
 - Otherwise, the cords may break.
- If the distance to the connection is long, secure the cords at intervals of about 20 cm to prevent sagging of the cords.
- When the cord is laid on the ground, it may be stepped on directly or put under equipment. Protect it with a metallic conduit or the like.
 - Failure to do so may damage the coating, thereby causing breaking or short-circuiting.
- The distance between the sensor and the load or power supply shall be less than 10 m.
 - If the distance exceeds 10 m, inrush current is carried to the sensor when it is used, and it may be damaged. Take measures against rush current referring to "Notes on contact protection".
- Do not bundle the cord together with the high-voltage wires of other electric devices or power source cables. Do not lay the cord close to these wires, cables or power sources.
 - Noises from the high-voltage wires, power sources or power source cables will enter the sensor cords and cause malfunctions of the sensor or load. It is recommended to protect the sensor cords with a shield tube.

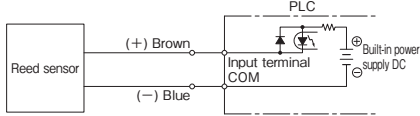
Notes on connecting

- Disconnect the power from the sensor.
 - Failure to do so may expose the workers to electric shock. Or, the sensor and load may be damaged.
- Do not use a load exceeding the sensor load voltage or current or the contact switching capacity.
 - If the voltage or current is improper, the sensor may malfunction or be damaged.
- Do not connect power supply directly to any sensor. Connect the sensor to the power supply through a predetermined load, such as a small relay or a programmable controller.
 - Otherwise, the circuit may short, and the sensor may be damaged.
 - Use only one of the following models of relays or their equivalents.
- Connect the lead wire correctly according to the wire colors.
 - If power is applied to the sensor which has been wired incorrectly, the sensor will be damaged. In addition, the load may be damaged. Even an instantaneous short-circuit will result in burnout of the electric circuit in the sensor.

<Connecting procedures>

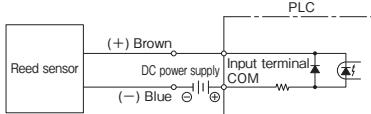
1. Basic connection

- To connect with PLC (programmable controller)
 - When the PLC has a built-in power supply



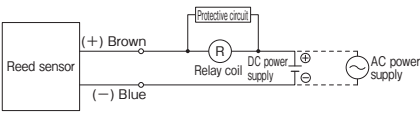
- The figure shown above is an example of connection with a DC input type PLC. (For details, see the manual for the PLC.)
- An AC input type PLC can be connected in the same manner. However, carefully read "Notes on contact protection."

- When the PLC does not have a built-in power supply



- The figure shown above is an example of connection with a DC input type PLC. (For details, see the manual for the PLC.)
- An AC input type PLC can be connected in the same manner. However, carefully read "Notes on contact protection".

- To connect with small relay



- For the protective circuit, carefully read "Notes on contact protection".

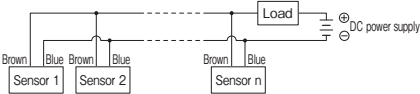
2. Connection of multiple sensors

When sensors are combined with a load, the sensors may not operate. Avoid connecting several sensors (in series or parallel) with a load.

- Parallel connection

The circuit is configured as shown below.

- The indicating lamps may not light depending on the combination with a load.
- If sensors leak current, the leakage current from the sensor output will increase for the number of sensors. Leakage current may operate the load or hinder it from returning.

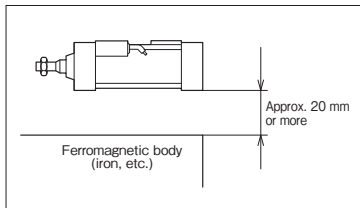
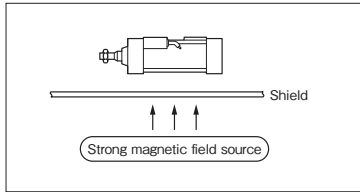


- Ensure that the sum of leakage current is less than the load returning current value.
- The same applies in the case of use of AC power supply.

Handling procedures

Notes on installation

1. Do not use the cylinder where metal cutting scraps or cutting oil may be splattered directly on the cylinder and sensor.
 - The cord may be cut by metal cutting scraps, or cutting oil may enter the sensor, and the electric circuit may short, thereby causing sensor operation failure.
2. In a place where there is a strong magnetic field around the cylinder, install an iron plate or the like to provide a magnetic shield. (Install the shield at a distance of 20 mm or more from the cylinder and sensor.)
 - The sensor may malfunction under the influence of the magnetic field.
3. Do not bring any ferromagnetic body (iron, etc.) around the cylinder body or close to the sensor. As a rule, keep a distance of 20 mm or more from such a ferromagnetic body. When a compact design cylinder (KR or ZR type sensor) is used, keep the sensor at a distance of 10 mm or more from the ferromagnetic body.
 - The sensor may malfunction under the influence of the ferromagnetic body.

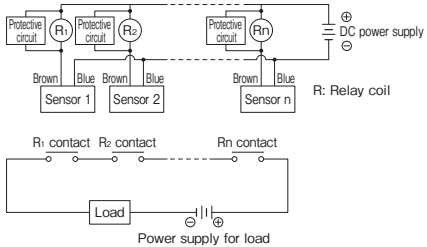


Detectable cylinder piston speed

- When setting the sensor at an intermediate position, set the cylinder maximum speed to less than 300 mm/s in consideration of the response speed of the load relay.
 - If the piston speed is too high, the load, such as a relay, may not operate because the sensor operating time is short although it works.
- Determine the detectable cylinder piston speed referring to the following formula.
- $$\text{Detectable piston speed (mm/s)} = \frac{\text{Sensor operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$$
- (Notes) ● See the operating time of the load, such as a relay, of each manufacturer.
● For the calculation, use the minimum value of the sensor operating range and the maximum value of the load operating time.

2) Series connection

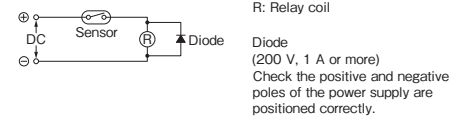
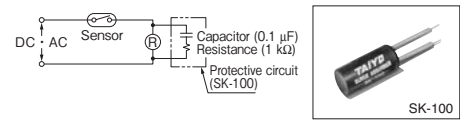
A circuit as shown below is recommended. Connect each sensor through a small relay, and connect the small relay contacts in series.



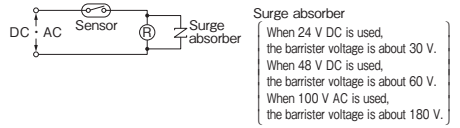
- If sensors are connected in series, the internal voltage drop of the sensor output will increase for the number of sensors. If the internal voltage drop is large, the load may not operate.
- When connecting sensors in series, ensure that the sum of internal voltage drop is less than the load operating voltage.
- The same applies in the case of use of AC power supply.
- Be sure to connect a protective circuit to both ends of the relay coil.

Notes on contact protection

1. When an induction load (small relay, solenoid, etc.) is connected, surge voltage is generated when the sensor is turned off. To protect the contact, be sure to provide a protective circuit on the load side as shown below.
 - If a protective circuit as shown below is not provided, the electric circuit in the sensor may be damaged by the surge voltage.



R: Relay coil
Diode
(200 V, 1 A or more)
Check the positive and negative poles of the power supply are positioned correctly.



Surge absorber
When 24 V DC is used, the barrister voltage is about 30 V.
When 48 V DC is used, the barrister voltage is about 60 V.
When 100 V AC is used, the barrister voltage is about 180 V.



Sensor Specifications

Magnetic Proximity Type/Solid State Sensor (3-wire type)

AX type sensor...SW40



AZ type sensor...SW42



PD·PE Type Sensor...SW44



T type sensor...SW45



ZC type sensor...SW46

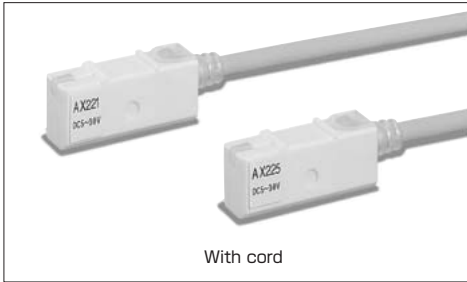


ZS type sensor...SW47



SS type sensor...SW48





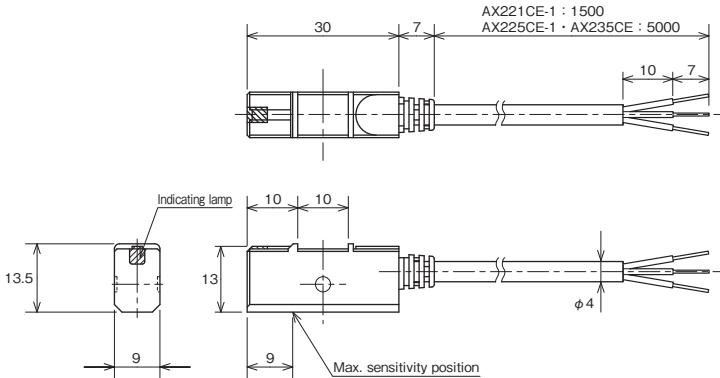
Specifications

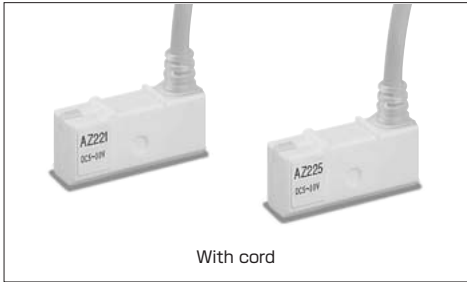
Type	With cord (1.5 m)	AX221CE-1	—
	With cord (5 m)	AX225CE-1	AX235CE
Wiring direction	Rear wiring		
Power supply voltage range	5 to 30 V DC		3.3 to 30 V DC
Load voltage range	30 V DC or less		
Load current	200 mA or less (NPN open collector output)		100 mA or less (PNP open collector output)
Consumption current	15 mA or less		10 mA or less
Internal voltage drop	0.6 V or less		
Leakage current	10 μ A or less		
Operating time	1 ms or less		
Return time	1 ms or less		
Insulation resistance	100 M Ω or more on 500-VDC Megger (between case and cord)		
Withstand voltage	1500 V AC for 1 min (between case and cord)		
Impact resistance	490 m/s ² (unrepeated)		
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz (log sweep, 1 hr), each of X, Y and Z directions		
Ambient temperature	-10 to +70°C (no freezing)		
Wiring method	0.3 mm ² , 2-core, outer dia. ϕ 4 mm, oil-proof cabtyre cord		
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)		
Output protective circuit	Provided		
Indicating lamp	LED (lights in red when sensing)		
Electric circuit	<div><div></div><div></div></div>		
Applicable load	IC, small relay, programmable controller		

Unit: mm

Dimensional Drawings

- Cord type
AX221CE-1 · AX225CE-1 · AX235CE





With cord

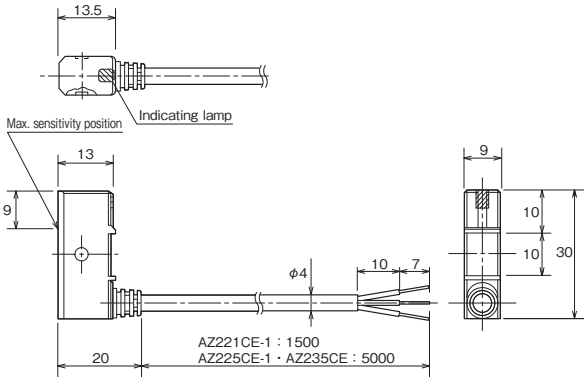
Specifications

Type	With cord (1.5 m)	AZ221CE-1	—
	With cord (5 m)	AZ225CE-1	AZ235CE
Wiring direction	Upper wiring		
Power supply voltage range	5 to 30 V DC		3.3 to 30 V DC
Load voltage range	30 V DC or less		
Load current	200 mA or less (NPN open collector output)		100 mA or less (PNP open collector output)
Consumption current	15 mA or less		10 mA or less
Internal voltage drop	0.6 V or less		
Leakage current	10 μA or less		
Operating time	1 ms or less		
Return time	1 ms or less		
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)		
Withstand voltage	1500 V AC for 1 min (between case and cord)		
Impact resistance	490 m/s ² (unrepeated)		
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz (log sweep, 1 hr), each of X, Y and Z directions		
Ambient temperature	−10 to +70°C (no freezing)		
Wiring method	0.3 mm ² , 2-core, outer dia. φ4 mm, oil-proof cabtyre cord		
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)		
Output protective circuit	Provided		
Indicating lamp	LED (lights in red when sensing)		
Electric circuit	<div><div></div><div></div></div>		
Applicable load	IC, small relay, programmable controller		

Unit: mm

Dimensional Drawings

- Cord type
AZ221CE-1 · AZ225CE-1 · AZ235CE





Small, light and compact magnetic proximity type solid state sensors

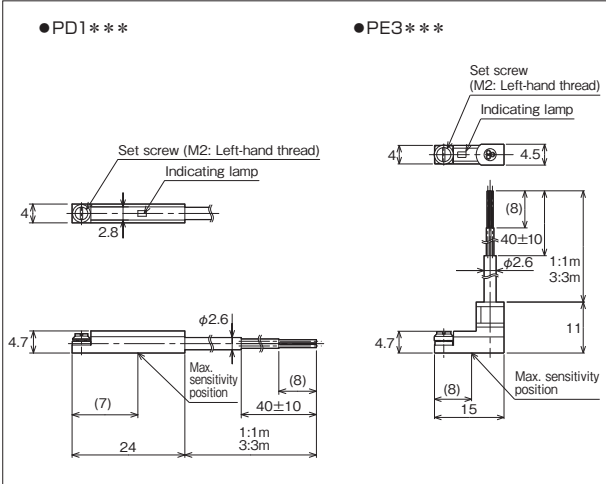
- Small, light and compact (compared to our conventional products)
- Solid state sensors with long life and high response
- Since the sensors are embedded in cylinder bodies, they do not protrude from the body surfaces. (Rear wiring type)



Type	With cord (1 m)	PD13L (S) 1	PE33L (S) 1
	With cord (3 m)	PD13L (S) 3	PE33L (S) 3
Wiring direction		Rear	Upper
Supply voltage range		DC: 5 to 28 V	
Load voltage range		DC: 28 V or less	
Load current range		0.1 to 40 mA	
Internal voltage drop		0.5 V or less	
Leakage current		50 μA or less (24 V DC)	
Operating time		1 ms or less	
Return time		1 ms or less	
Insulation resistance		100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage		1500 V AC for 1 min (between case and cord)	
Impact resistance		294 m/s ²	
Vibration resistance		Double amplitude 1.5 mm, 10 to 55 Hz (2 hrs in each of X, Y and Z directions)	
Ambient temperature		0 to +60°C (no freezing)	
Wiring method		PVC, 0.15 mm ² , 3-core, outer dia. φ2.6 mm	
Protection structure		IP67 (IEC Standard), JIS C0920	
Output protective circuit		Provided	
Indicating lamp		LED (lights when sensing)	
Electric circuit			
Applicable load		Small relay, programmable controller	

Dimensional Drawings

Unit: mm



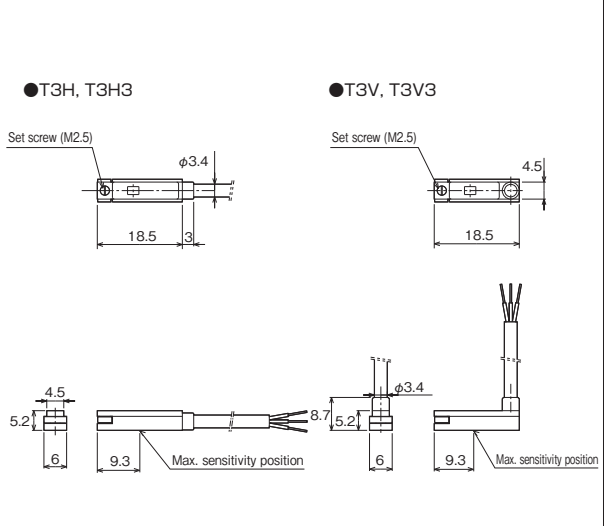
Small, light and compact magnetic proximity type solid state sensors

- Small, light and compact. (compared to our conventional products)
- Oil-proof vinyl cabtyre cords are used.
- Since the sensors are embedded in cylinder bodies, they do not protrude from the body surfaces. (Rear wiring)

Type	With cord (1 m)	T3H	T3V
	With cord (3 m)	T3H3	T3V3
Wiring direction		Rear wiring	Upper wiring
Power supply voltage		10 to 28 V DC	
Load voltage range		30 V DC or less	
Load current range		100 mA or less (NPN open collector output)	
Consumption current		10 mA or less (24 V DC)	
Internal voltage drop		0.5 V or less	
Leakage current		10 μA or less	
Insulation resistance		20 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage		1000 V AC for 1 min (between case and cord)	
Impact resistance		294 m/s ²	
Ambient temperature		-10 to +70°C (no freezing)	
Wiring method		0.2 mm ² , 3-core, outer dia. φ3.4 mm, oil-proof vinyl cabtyre cord	
Protection structure		IP67 (IEC Standard), JIS C0920 (submersible) oil-proof	
Output protective circuit		Provided	
Indicating lamp		LED (lights in red when sensing)	
Electric circuit			
Applicable load		Programmable controller	

Dimensional Drawings

Unit: mm



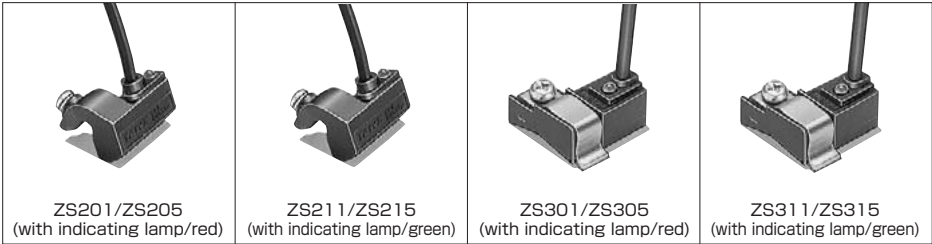
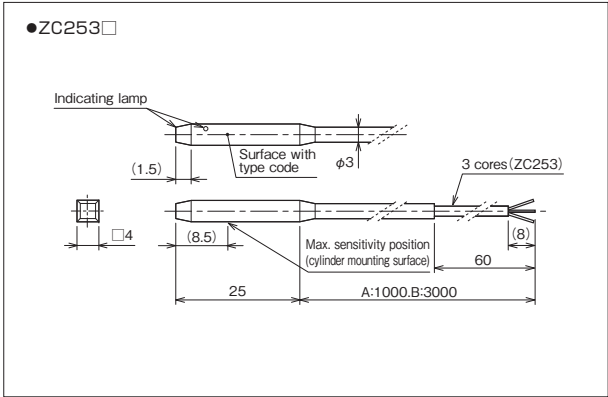


- Small, light and compact magnetic proximity type solid state sensors
- Small, light and compact (compared to our conventional products)
 - Usable only with DC voltage
 - Oil-proof cabtyre cords are used.

Type	With cord (1m)	ZC253A
	With cord (3m)	ZC253B
Wiring direction		Rear
Supply voltage range		DC:4.5 to 28 V
Load voltage range		DC: 28 V or less
Load current range		100 mA or less (NPN open collector output)
Internal voltage drop		0.5 V or less
Leakage current		50 μA or less (24 V DC)
Operating time		1 ms or less
Return time		1 ms or less
Insulation resistance		100 MΩ or more on 500-VDC Megger (between case and cord)
Withstand voltage		500 V AC (50/60 Hz) for 1 min (between case and code)
Impact resistance		294 m/s ² (unrepeated)
Vibration resistance		Double amplitude 1.5 mm, 10 to 55 Hz (88.3 m/s ²)
Ambient temperature		0 to +60°C (no freezing)
Wiring method		PVC, 0.2 mm ² , 3-core, outer dia. φ3 mm
Protection structure		IP67 (IEC Standard), JIS C0920 (water-resistant)
Indicating lamp		LED (lights when sensing)
Electric circuit		
Applicable load		Small relay, programmable controller

Dimensional Drawings

Unit: mm

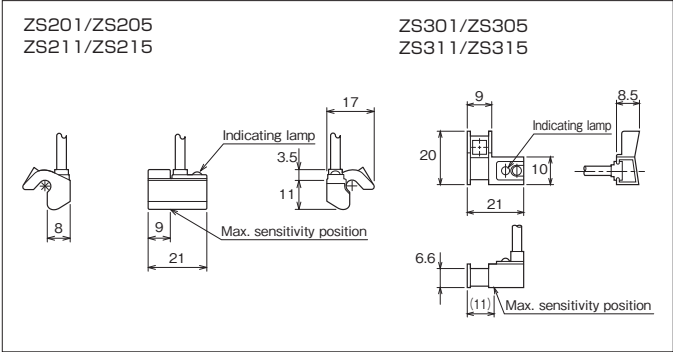


Specifications

Type	With cord (1.5 m)	ZS201	ZS211	ZS301	ZS311
	With cord (5 m)	ZS205	ZS215	ZS305	ZS315
Power supply voltage		5 V DC (5 to 10 V DC)	12/24 V DC (10 to 30 V DC)	5 V DC (5 to 10 V DC)	12/24 V DC (10 to 30 V DC)
Load voltage		30 V DC or less			
Load current		200 mA or less (NPN open collector output)			
Consumption current		15 mA or less at 5 V DC	15 mA or less at 24 V DC	15 mA or less at 5 V DC	15 mA or less at 24 V DC
Internal voltage drop		0.6 V or less			
Leakage current		10 μA or less			
Operating time		1 ms or less			
Return time		1 ms or less			
Insulation resistance		100 MΩ or more on 500-VDC Megger (between case and cord)			
Withstand voltage		1500 V AC for 1 min (between case and cord)			
Impact resistance		490 m/s ² (unrepeated)			
Vibration resistance		Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions			
Ambient temperature		-10 to +70°C (no freezing)			
Wiring method		0.2 mm ² , 2-core, outer dia. φ3 mm, Oil-proof cabtyre cord			
Protection structure		IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)			
Indicating lamp		LED/red (lights when sensing)	LED/green (lights when sensing)	LED/red (lights when sensing)	LED/green (lights when sensing)
Electric circuit					
Applicable load		Small relay, programmable controller, IC			

Dimensional Drawings

Unit: mm



* Sale of this series of sensors was discontinued. Please select other sensors.
Contact us for replacements.



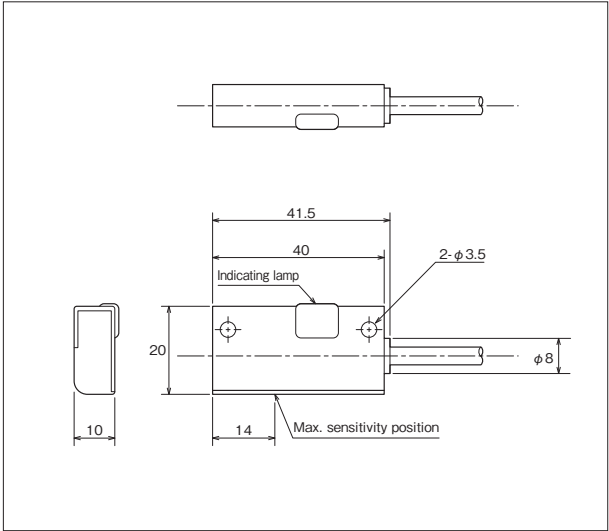
Magnetic proximity type
solid state sensors with
long life, high reliability and
large switching capacity

- Solid state sensors with longer life and higher reliability.
(By 10 times or more than reed sensors used within ratings (compared to our conventional products))
- Large switching capacity. (200 mA max.)
- Oil-proof cabtyre cords are used.

Type	With cord (1.5 m)	SS101	SS201
	With cord (5 m)	SS105	SS205
Power supply voltage	5 V DC (5 to 10 V DC)		12/24 V DC (10 to 30 V DC)
Load voltage	30 V DC or less		
Load current	200 mA or less (NPN open collector output)		
Consumption current	15 mA or less at 5 V DC	15 mA or less at 24 V DC	
Internal voltage drop	0.6 V or less		
Leakage current	10 μ A or less		
Response time	1 ms or less		
Insulation resistance	100 M Ω or more on 500-VDC Megger (between case and cord)		
Withstand voltage	1500 V AC for 1 min (between case and cord)		
Impact resistance	490 m/s ² (unrepeated)		
Vibration resistance	Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions		
Ambient temperature	-10 to +70°C (no freezing)		
Wiring method	0.2 mm ² , 3-core, outer dia. ϕ 4 mm, oil-proof cabtyre cord		
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)		
Indicating lamp	LED (lights when sensing)		
Electric circuit			
Applicable load	Small relay, programmable controller, IC		

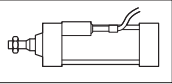
Dimensional Drawings

Unit: mm



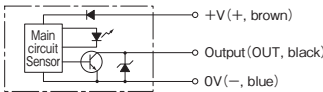
Handling procedures

Notes on wiring

- When wiring the sensor, disconnect the power from the equipment on the electric circuit to be connected.
 - Failure to do so may expose the workers to electric shock. Or, the sensor and load may be damaged.
- Take care not to apply bending, pulling or torsional load to the sensor cords. To prevent application of load to the roots of the sensor cords, secure the wires on a tie rod, or take other appropriate measures. (See the figure.)
 - Failure to do so may break the cords.
 - Particularly if load is applied to the root of the cord, the electric circuit board in the sensor may be damaged.
- When securing them on a tie rod, take care not to tighten them excessively. Doing so may break the cords.
- The bending radius shall be as large as possible.
 - Otherwise, the cords may break.
 - Ensure that the bending radius is twice or more the cord diameter.
- If the distance to the connection is long, secure the cords at intervals of about 20 cm to prevent sagging of the cords.
- When the cord is laid on the ground, it may be stepped on directly or put under equipment. Protect it with a metallic conduit or the like.
 - Otherwise, the coating may be damaged, thereby causing breaking of wire or short-circuit.
- The distance between the sensor and the load or power supply shall be less than 10 m.
 - If the distance exceeds 10 m, inrush current is carried to the sensor when it is used, and it may be damaged. Take measures against rush current referring to "Notes on output circuit protection".
- Do not bundle the cord together with the high-voltage wires of other electric devices or power source cables. Do not lay the cord close to these wires, cables or power sources.
 - Noises from the high-voltage wires, power sources or power source cables will enter the sensor cords and cause malfunctions of the sensor or load. It is recommended to protect the sensor cords with a shield tube.

Notes on connecting

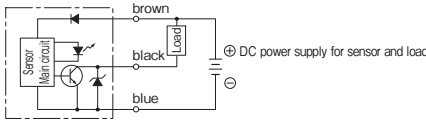
- Do not connect power supply directly to any sensor. Connect the sensor to the power supply through a predetermined load, such as a small relay or a programmable controller.
 - Failure to do so will cause short-circuit and burnout of the sensor.
- Carefully check the voltage and current specifications for the sensor, power supply and load to be used.
 - If the voltage or power supply is improper, the sensor may malfunction or be damaged.
- Connect the lead wire correctly according to the wire colors. Before connecting, disconnect the power from the equipment on the electric circuit to be connected.
 - Miswiring or short-circuit of the load can damage the electric circuits on the sensor and load sides. Even an instantaneous short-circuit will result in burnout of the main circuit and the output circuit. Wiring in the energized state will damage the electric circuits on the sensor and load sides.



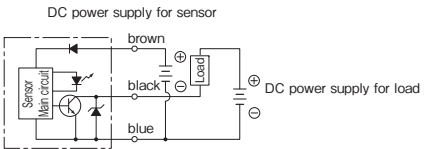
<Connecting procedures>

1. Basic circuit

- When the sensor voltage is the same as the load voltage

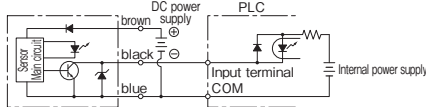


- When the sensor voltage is different from the load voltage



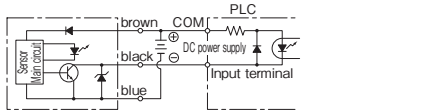
2. Connection with PLC (programmable controller)

- When the PLC has a built-in power supply



- For details, carefully read the manual for the PLC to be used.

- When the PLC does not have a built-in power supply



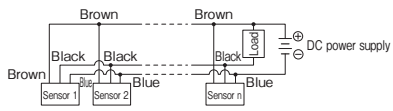
- For details, carefully read the manual for the PLC to be used.

3. Connection of multiple sensors

When sensors are combined with a load, the sensors may not operate. Avoid connecting several sensors (in series or parallel) with a load.

1) Parallel connection

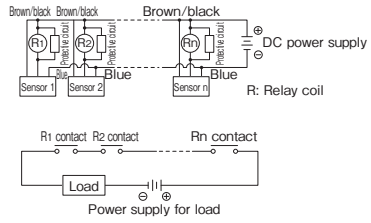
- The sensor operating state can be confirmed with the indicating lamp of the sensor.
- Note that the leakage current of the output increases for the number of sensors. Leakage current may operate the load or hinder it from returning.



Ensure that the sum of leakage current is less than the load returning current value.

2) Series connection

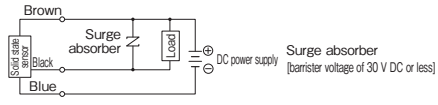
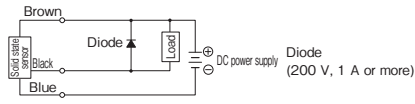
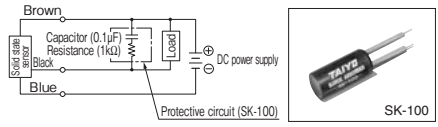
- Sensors cannot be connected in series.
- Connect the sensors through small relays as shown in the following circuit diagram, and connect the small relay contacts in series, or connect the PLC internal contacts in series with sensors.



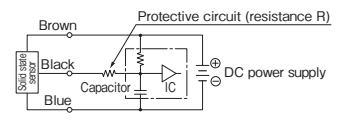
- Be sure to connect a protective circuit to both ends of the relay coil.

Notes on output circuit protection

- To connect induction load (small relay, solenoid valve, etc.) When the sensor is turned off, surge voltage is generated. Therefore, be sure to provide a protective circuit on the load side.
 - If a protective circuit as shown below is not provided, the electric circuit in the sensor may be damaged by the surge voltage.



- When a capacitive load (capacitor, etc.) is connected or the cord is extended to 10 m or more Rush current is generated when the sensor is turned on. Therefore, be sure to provide a protective circuit near the sensor (within 2 m from the sensor) as shown below.
 - If a protective circuit as shown below is not provided, the electric circuit in the sensor may be damaged by the rush current.



Note) The value of R (Ω) shall be higher than the value obtained by the following formula.

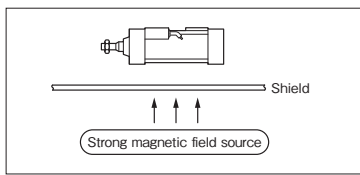
$$R = \frac{V}{0.2} \text{ (}\Omega\text{)} \quad V: \text{Power supply voltage}$$

- If noise enters the power supply due to adverse electrical environment, fit a noise filter on the power supply line.

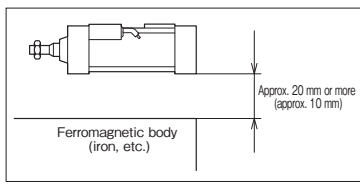
Handling procedures

Notes on installation

- Do not use the cylinder where metal cutting scraps or cutting oil may be spattered directly on the cylinder and sensor.
 - The cord may be cut by metal cutting scraps, or cutting oil may enter the sensor, and the electric circuit may short, thereby causing sensor operation failure.
- Check that cylinders are not installed close to one another.
 - When two or more Switch Set Cylinders are installed closely in parallel, the sensors may malfunction due to magnetic interference with one another. Keep a distance of 30 mm or more between cylinder tubes. If the allowable distance is specified for each series of cylinders, keep the specified distance.
- In a place where there is a strong magnetic field around the cylinder, install an iron plate or the like to provide a magnetic shield. (Install the shield at a distance of 20 mm or more from the cylinder and sensor.)
 - The sensor may malfunction under the influence of the magnetic field.



- Do not bring any ferromagnetic body (iron, etc.) around the cylinder body or close to the sensor. Generally, set such a magnetic body at a distance of 20 mm or more (SS type sensor). When a compact design cylinder (ZS type sensor) is used, keep the sensor at a distance of 10 mm or more from the ferromagnetic body.
 - The sensor may malfunction under the influence of the ferromagnetic body.



Detectable cylinder piston speed

- When setting the sensor at an intermediate position, set the cylinder maximum speed to less than 300 mm/s in consideration of the response speed of the load relay.
- If the piston speed is too high, the load, such as a relay, may not operate because the sensor operating time is short although it works. Determine the detectable cylinder piston speed referring to the following formula.

$$\text{Detectable piston speed (mm/s)} = \frac{\text{Sensor operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$$

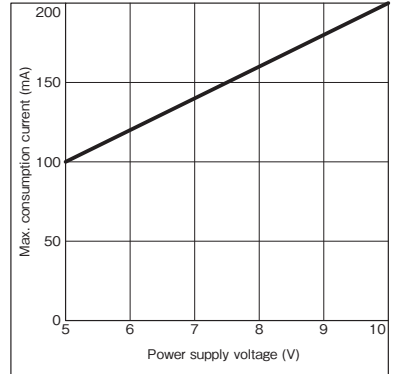
- (Notes) ● See the operating time of the load, such as a relay, of each manufacturer.
- For the calculation, use the minimum value of the sensor operating range and the maximum value of the load operating time.

Other notes

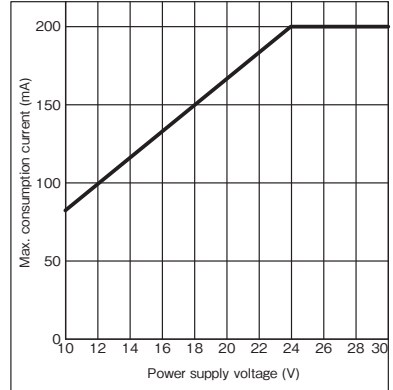
- Note that the max. consumption current and max. working voltage vary depending on the power supply voltage.

Power supply voltage - max. working current characteristic graph

- For 5 to 10 V DC (SS101, SS105) (ZS201·ZS205·ZS301·ZS305)



- For 10 to 30 V DC (SS201, SS205) (ZS211·ZS215·ZS311·ZS315)





Sensor Specifications

Magnetic Proximity Type/Solid State Sensor (2-wire, 1- or 2-LED type)

AX type sensor
(2-wire, 1-LED type)---SW54



AZ type sensor
(2-wire, 1-LED type)---SW56



PD-PE Type Sensor
---SW58



T type sensor
(2-wire, 1-LED type)---SW59



T type sensor
(2-wire, 2-LED type)---SW60



ZC type sensor---SW61



AX type sensor
(2-wire, 2-LED type)---SW62



AZ type sensor
(2-wire, 2-LED type)---SW64



ZD type sensor---SW66



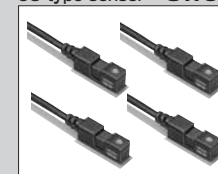
KS type sensor---SW67



KS-(M) Type Sensor
---SW68



JS type sensor ---SW69



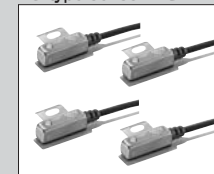
JS-(M) Type Sensor
---SW70

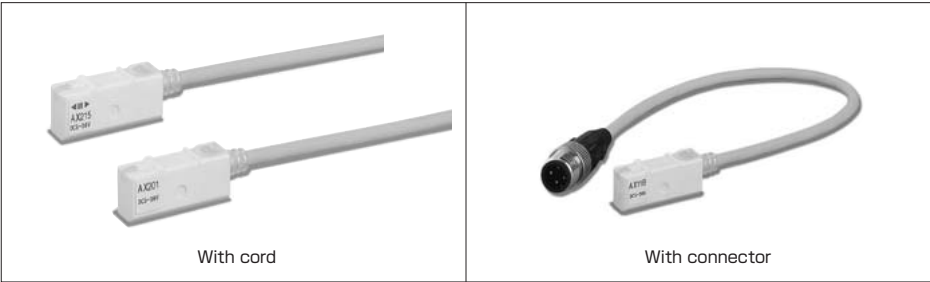


GS-HS Type Sensor
---SW71



YS type sensor---SW72



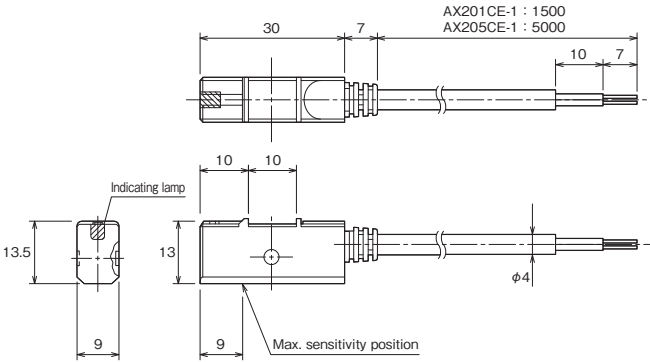


Specifications

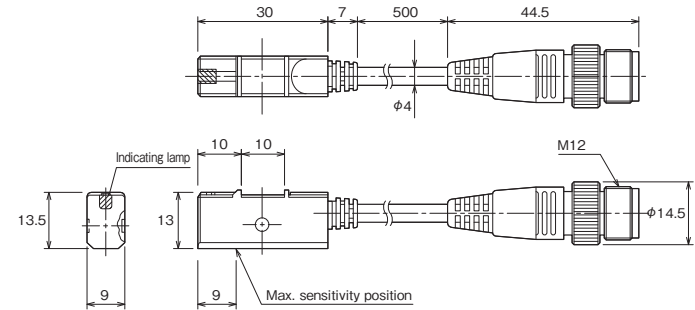
Type	With cord (1.5 m)	AX201CE-1
	With cord (5 m)	AX205CE-1
	With connector	AX20BCE-1
Wiring direction	Rear wiring	
Load voltage range	DC : 5 to 30 V	
Load current range	5 to 40 mA	
Internal voltage drop	4 V or less	
Leakage current	0.7 mA or less	
Operating time	1 ms or less	
Return time	1 ms or less	
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage	1500 V AC for 1 min (between case and cord)	
Impact resistance	490 m/s² (unrepeated)	
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz (log sweep, 1 hr), each of X, Y and Z directions	
Ambient temperature	-10 to +70°C (no freezing)	
Wiring method	0.3 mm², 2-core, outer dia. φ4 mm, oil-proof cabtyre cord	
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)	
Output protective circuit	Provided	
Indicating lamp	LED (lights in red when sensing)	
Electric circuit		
Applicable load	Small relay, programmable controller	

Dimensional Drawings

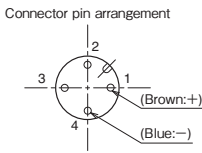
- Cord type
AX201CE-1 · AX205CE-1



- Connector type
AX20BCE-1



AX20BCE-1 (for DC)

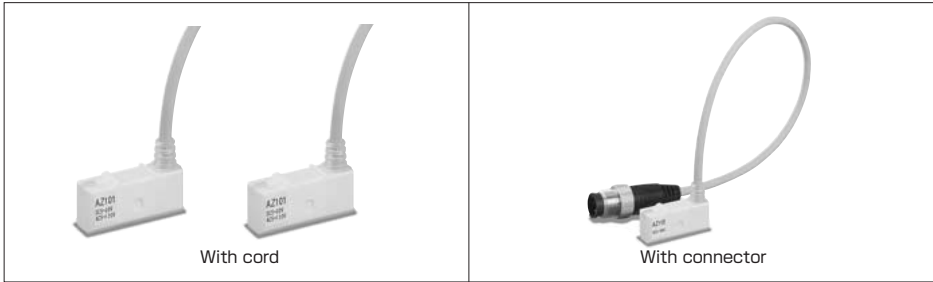


- Connector standard numbers
Models M12X1 screw locking
 - IEC 947-5-2
 - DIN/VDE 0660 part 208 A2
 - NECA (Nippon Electric Control Equipment Industries Association) 4202 Connectors for FA sensors

Applicable Counter Connectors

Manufacturer	Connector series name	
Correns Corporation	VA connector	VA-4DS, VA-4DL
OMRON Corporation	XS2 sensor I/O connector	XS2
Hirose Electric Co., Ltd.	Connector for FA sensor	HR24

- For details, see the catalog of each connector manufacturer.

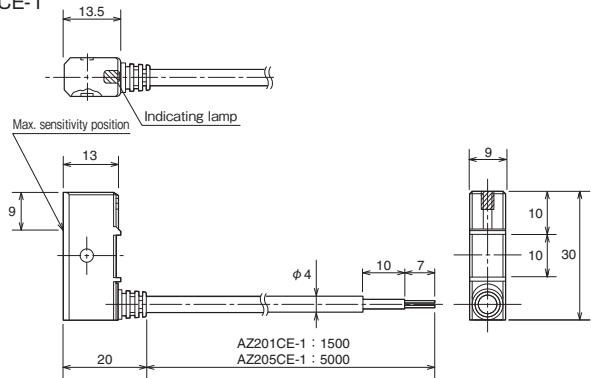


Specifications

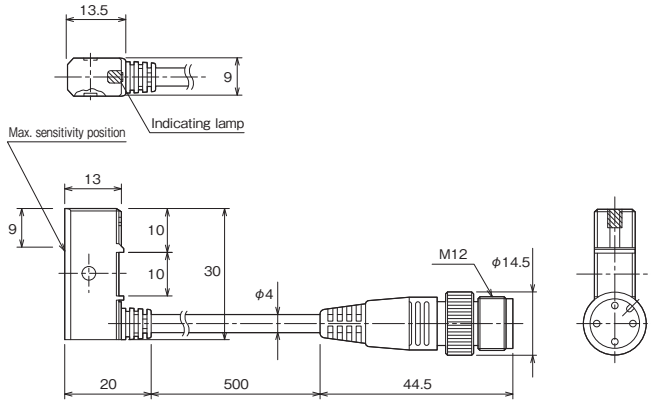
Type	With cord (1.5 m)	AZ201CE-1
	With cord (5 m)	AZ205CE-1
	With connector	AZ20BCE-1
Wiring direction	Upper wiring	
Load voltage range	DC : 5 to 30 V	
Load current range	5 to 40 mA	
Internal voltage drop	4 V or less	
Leakage current	0.7 mA or less	
Operating time	1 ms or less	
Return time	1 ms or less	
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage	1500 V AC for 1 min (between case and cord)	
Impact resistance	490 m/s ² (unrepeated)	
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz (log sweep, 1 hr), each of X, Y and Z directions	
Ambient temperature	-10 to +70°C (no freezing)	
Wiring method	0.3 mm ² , 2-core, outer dia. φ4 mm, oil-proof cabtyre cord	
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)	
Output protective circuit	Provided	
Indicating lamp	LED (lights in red when sensing)	
Electric circuit		
Applicable load	Small relay, programmable controller	

Dimensional Drawings

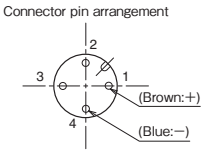
- Cord type
AZ201CE-1 · AZ205CE-1



- Connector type
AZ20BCE-1



AZ20BCE-1 (for DC)



Applicable Counter Connectors

Manufacturer	Connector series name	
Correns Corporation	VA connector	VA-4DS, VA-4DL
OMRON Corporation	XS2 sensor I/O connector	XS2
Hirose Electric Co., Ltd.	Connector for FA sensor	HR24

- For details, see the catalog of each connector manufacturer.

- Connector standard numbers
Models M12X1 screw locking
 - IEC 947-5-2
 - DIN/VDE 0660 part 208 A2
 - NECA (Nippon Electric Control Equipment Industries Association) 4202 Connectors for FA sensors



Small, light and compact magnetic proximity type solid state sensors

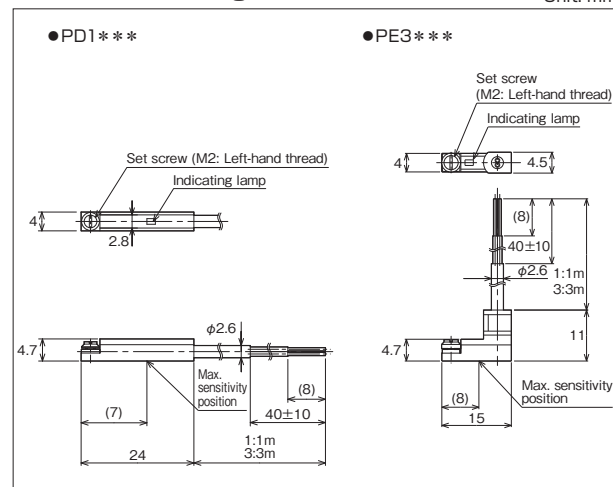
- Small, light and compact (compared to our conventional products)
- Solid state sensors with long life and high response
- Since the sensors are embedded in cylinder bodies, they do not protrude from the body surfaces. (Rear wiring type)



Product conforming to CE Marking

Dimensional Drawings

Unit: mm



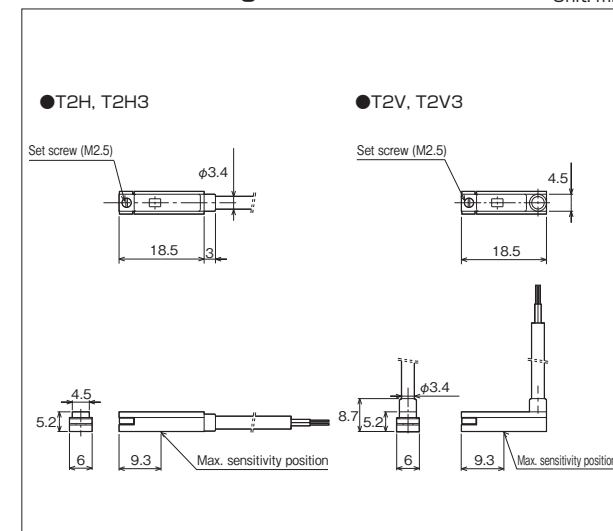
Small, light and compact
magnetic proximity type
solid state sensors

- Small, light and compact (compared to our conventional products)
 - Oil-proof vinyl cabtyre cords are used.
 - Since the sensors are embedded in cylinder bodies, they do not protrude from the body surfaces.
- (Rear wiring)

Type	With cord (1 m)	T2H	T2V
	With cord (3 m)	T2H3	T2V3
Wiring direction	Rear wiring		Upper wiring
Load voltage range	10 to 30 V DC		
Load current range	5 to 20 mA		
Internal voltage drop	4 V or less		
Leakage current	1 mA or less		
Insulation resistance	20 MΩ or more on 500-VDC Megger (between case and cord)		
Withstand voltage	1000 V AC for 1 min (between case and cord)		
Impact resistance	294 m/s ²		
Ambient temperature	-10 to +70°C (no freezing)		
Wiring method	0.2 mm ² , 2-core, outer dia. φ3.4 mm, oil-proof vinyl cabtyre core		
Protection structure	IP67 (IEC Standard), JIS C0920 (submersible) oil-proof		
Output protective circuit	Provided		
Indicating lamp	LED (lights in red when sensing)		
Electric circuit			
Applicable load	Programmable controller		

Dimensional Drawings

Unit: mm



T Type Sensor

Magnetic Proximity Type (Solid State Sensor/2-wire, 2-LED type)



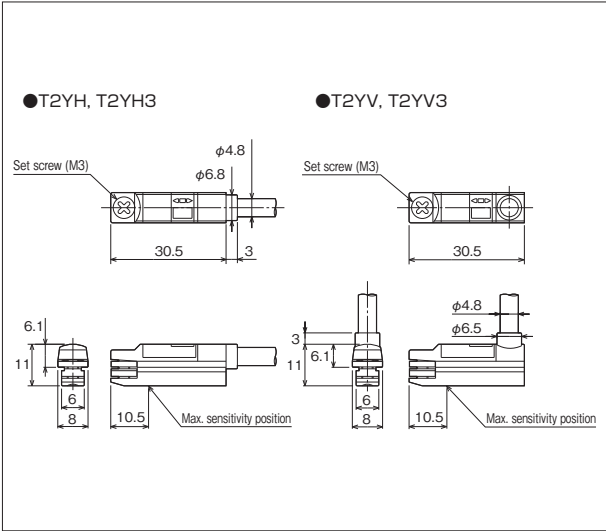
Small, light and compact magnetic proximity type solid state sensors

- Small, light and compact (compared to our conventional products)
- Oil-proof vinyl cabtyre cords are used.

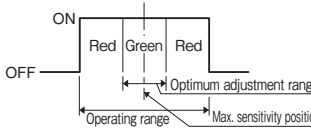
Type	With cord (1 m)	T2YH	T2YV
	With cord (3 m)	T2YH3	T2YV3
Wiring direction	Rear wiring		Upper wiring
Load voltage range	10 to 30 V DC		
Load current range	5 to 20 mA		
Internal voltage drop	4 V or less		
Leakage current	1 mA or less		
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)		
Withstand voltage	1000 V AC for 1 min (between case and cord)		
Impact resistance	980 m/s ²		
Ambient temperature	-10 to +70°C (no freezing)		
Wiring method	0.3 mm ² , 2-core, outer dia. φ4.8 mm, oil-proof vinyl cabtyre cord		
Protection structure	IP67 (IEC Standard), JIS C0920 (submersible) oil-proof		
Output protective circuit	Provided		
Indicating lamp	Operation position: Red LED lights. Optimum position: Green LED lights.		
Electric circuit			
Applicable load	Programmable controller		

Dimensional Drawings

Unit: mm



LED lamp indicating method
(2-wire, 2-LED type)



Magnetic Proximity Type (Solid State Sensor/2-wire, 1-LED type)

ZC Type Sensor



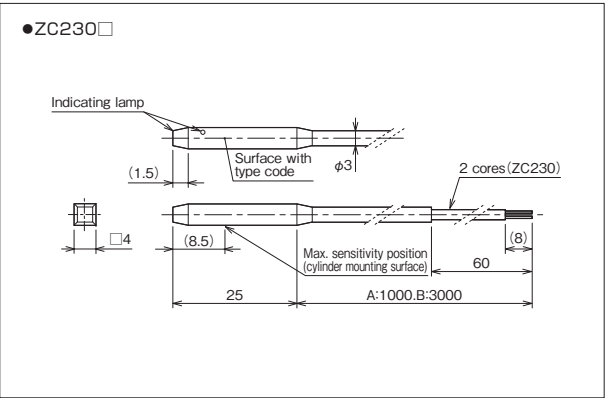
Small, light and compact magnetic proximity type solid state sensors

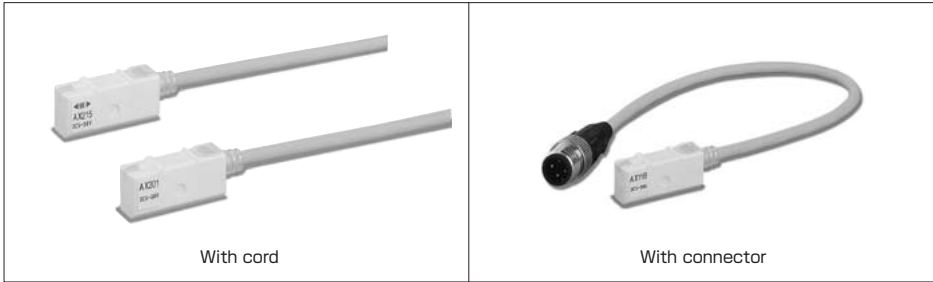
- Small, light and compact (compared to our conventional products)
- Usable only with DC voltage
- Oil-proof cabtyre cords are used.

Type	With cord (1m)	ZC230A
	With cord (3m)	ZC230B
Wiring direction	Rear	
Load voltage range	DC:10 to 28 V	
Load current range	4 to 50 mA	
Internal voltage drop	3.5 V or less	
Leakage current	1 mA or less (24 V DC)	
Operating time	1 ms or less	
Return time	1 ms or less	
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage	500 V AC (50/60 Hz) for 1 min (between case and code)	
Impact resistance	294 m/s ² (unrepeated)	
Vibration resistance	Double amplitude 1.5 mm, 10 to 55 Hz (88.3 m/s ²)	
Ambient temperature	0 to +60°C (no freezing)	
Wiring method	PVC, 0.2 mm ² , 2-core, outer dia. φ3 mm	
Protection structure	IP67 (IEC Standard), JIS C0920 (water-resistant)	
Output protective circuit	Provided	
Indicating lamp	LED (lights when sensing)	
Electric circuit		
Applicable load	Small relay, programmable controller	

Dimensional Drawings

Unit: mm

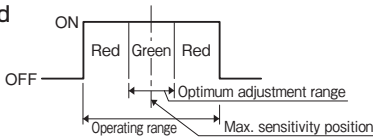




Specifications

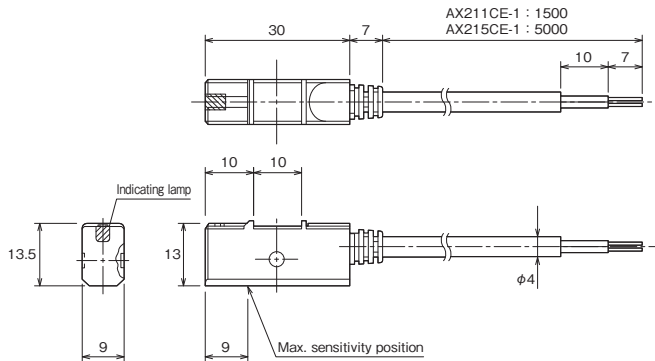
Type	With cord (1.5 m)	AX211CE-1
	With cord (5 m)	AX215CE-1
	With connector	AX21CCE-1
		AX21DCE-1
Wiring direction		Rear wiring
Load voltage range		DC : 5 to 30 V
Load current range		5 to 40 mA
Internal voltage drop		4 V or less
Leakage current		0.7 mA or less
Operating time		1 ms or less
Return time		1 ms or less
Insulation resistance		100 MΩ or more on 500-VDC Megger (between case and cord)
Withstand voltage		1500 V AC for 1 min (between case and cord)
Impact resistance		490 m/s ² (unrepeated)
Vibration resistance		Double amplitude 0.6 mm, 10 to 200 Hz (log sweep, 1 hr), each of X, Y and Z directions
Ambient temperature		−10 to +70°C (no freezing)
Wiring method		0.3 mm ² , 2-core, outer dia. ϕ4 mm, oil-proof cabtyre cord
Protection structure		IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)
Output protective circuit		Provided
Indicating lamp		Operation position: Red/green LED lights. Optimum position: Green LED lights.
Electric circuit		
Applicable load		Small relay, programmable controller

LED lamp indicating method
(2-wire, 2-LED type)

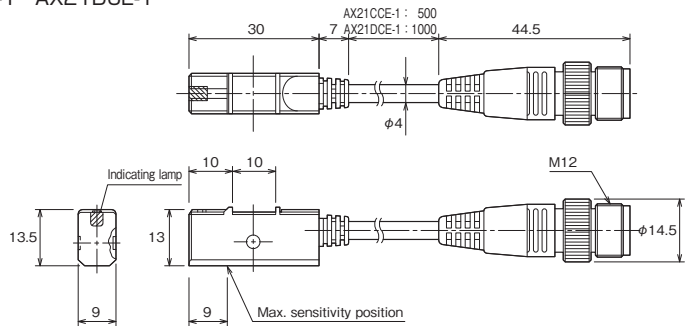


Dimensional Drawings

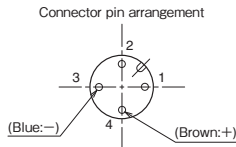
- Cord type
AX211CE-1 · AX215CE-1



- Connector type
AX21CCE-1 · AX21DCE-1



AX21CCE-1 · AX21DCE-1 (for DC)



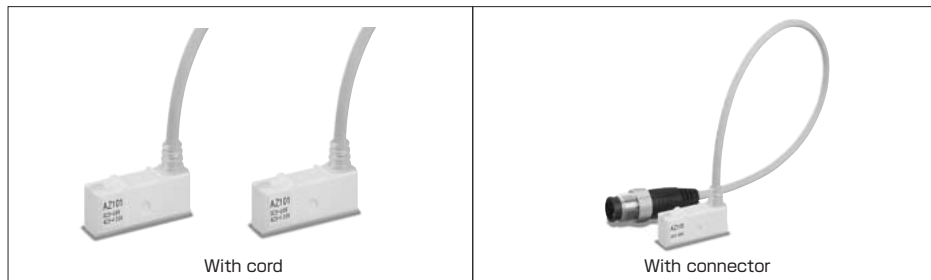
- Product conforming to TMS Standard

Applicable Counter Connectors

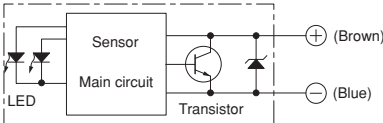
Manufacturer	Connector series name	
Correns Corporation	VA connector	VA-4DS, VA-4DL
OMRON Corporation	XS2 sensor I/O connector	XS2
Hirose Electric Co., Ltd.	Connector for FA sensor	HR24

- For details, see the catalog of each connector manufacturer.

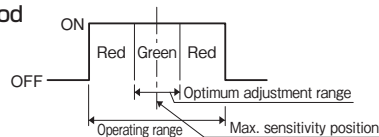
- Contact us for the connector pin arrangement conforming to IEC Standard (1:+ 4:−). (AX21B)



Specifications

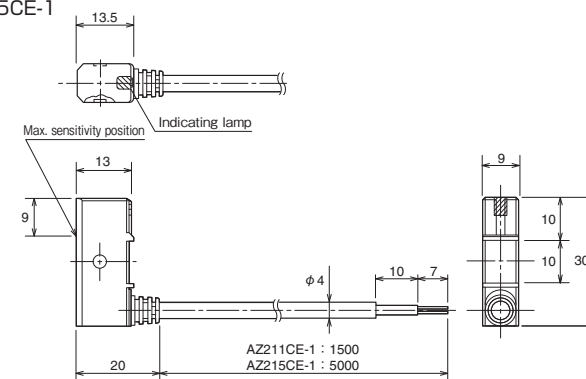
Type	With cord (1.5 m)	AZ211CE-1
	With cord (5 m)	AZ215CE-1
	With connector	AZ21CCE-1
		AZ21DCE-1
Wiring direction	Upper wiring	
Load voltage range	DC : 5 to 30 V	
Load current range	5 to 40 mA	
Internal voltage drop	4 V or less	
Leakage current	0.7 mA or less	
Operating time	1 ms or less	
Return time	1 ms or less	
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage	1500 V AC for 1 min (between case and cord)	
Impact resistance	490 m/s ² (unrepeated)	
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz (log sweep, 1 hr), each of X, Y and Z directions	
Ambient temperature	-10 to +70°C (no freezing)	
Wiring method	0.3 mm ² , 2-core, outer dia. φ4 mm, oil-proof cabtyre cord	
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)	
Output protective circuit	Provided	
Indicating lamp	Operation position: Red/green LED lights. Optimum position: Green LED lights.	
Electric circuit		
Applicable load	Small relay, programmable controller	

LED lamp indicating method
(2-wire, 2-LED type)

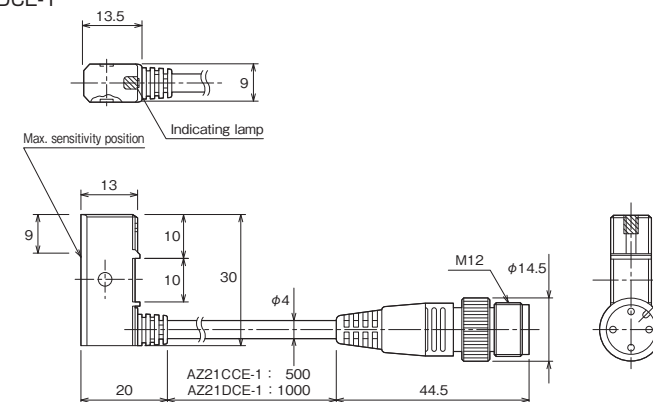


Dimensional Drawings

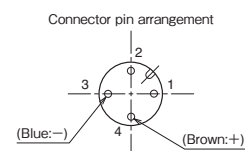
- Cord type
AZ211CE-1・AZ215CE-1



- Connector type
AZ21CCE-1・AZ21DCE-1



AZ21CCE-1 · AZ21DCE-1 (for DC)



- Product conforming to TMS Standard

Applicable Counter Connectors

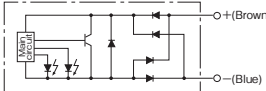
Manufacturer	Connector series name	
Correns Corporation	VA connector	VA-4DS, VA-4DL
OMRON Corporation	XS2 sensor I/O connector	XS2
Hirose Electric Co., Ltd.	Connector for FA sensor	HR24

- For details, see the catalog of each connector manufacturer.



Small-size high-reliability
2-wire, 2-LED magnetic
proximity type solid
state sensors

- Solid state sensors with longer life and higher reliability
- The two LED lamps facilitate setting of optimum position.
- 2-wire sensors of wire-saving type

Type	ZD type (for strong magnetic field resistance) (for AC magnetic field)
Type code	ZD136C—T (with 5 m cord)
Load voltage range	10 to 28 V DC
Load current range	5 to 50 mA
Internal voltage drop	6 V or less
Operating time	50 ms or less
Return time	80 ms or less
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)
Withstand voltage	500 V AC (50/60 Hz) for 1 min (between case and cord)
Impact resistance	294.2 m/s ² (unrepeated)
Vibration resistance	88.3 m/s ² (full amplitude 1.5 mm, 10 to 55 Hz)
Ambient temperature	0 to +60°C (no freezing)
Wiring method	0.5 mm ² , 2-core, outer dia. φ6 mm, oil-proof flame-retardant cabtyre cord
Protection structure	IP67 (IEC Standard)
Output protective circuit	Provided
Indicating lamp	Operation position: Red/green LED lights. Optimum position: Green LED lights.
Electric circuit	
Applicable load	Small relay, programmable controller

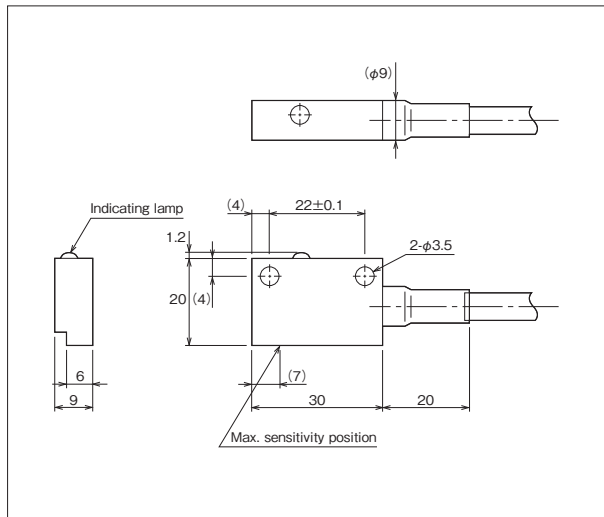
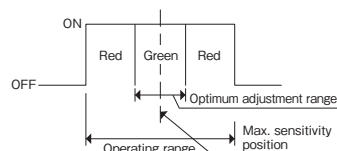
Notes) · When using a programmable controller having an input voltage of 12 V, check the ON voltage of the programmable controller.

- These sensors are designed for AC magnetic fields. They cannot be used in DC magnetic fields.
- For the sensors with connectors, contact us.

Dimensional Drawings

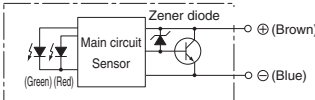
Unit: mm

LED lamp indicating method



Small-size high-reliability
2-wire, 2-LED magnetic
proximity type solid
state sensors

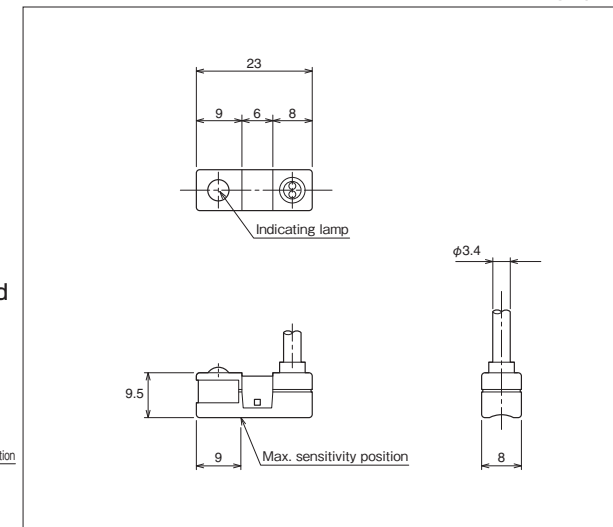
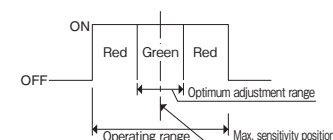
- Solid state sensors with longer life and higher reliability.
(By 10 times or more than reed sensors used within ratings (compared to our conventional products))
- The two LED lamps facilitate setting of optimum position.
- 2-wire sensors of wire-saving type
- Oil-proof cabtype cords are used.

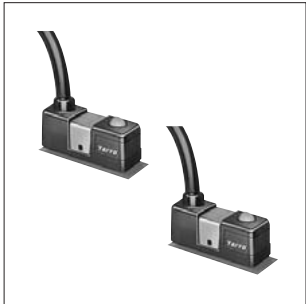
Type	With cord (1.5 m)	KS211
	With cord (5 m)	KS215
Load voltage range	10 to 30 V DC	
Load current range	6 to 70 mA	
Internal voltage drop	4 V or less	
Leakage current	1 mA or less	
Operating time	1 ms or less	
Return time	1 ms or less	
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage	1200 V AC for 1 min (between case and cord)	
Impact resistance	490 m/s ² (unrepeated)	
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz (each of X, Y and Z directions), 1-hr log sweep	
Ambient temperature	-10 to +70°C (no freezing)	
Wiring method	0.3 mm ² , 2-core, outer dia. φ3.4 mm, oil-proof cabtyre cord	
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)	
Output protective circuit	Provided	
Indicating lamp	Operation position: Red/green LED lights. Optimum position: Green LED lights.	
Electric circuit		
Applicable load	Small relay, programmable controller	

Dimensional Drawings

Unit: mm

LED lamp indicating method





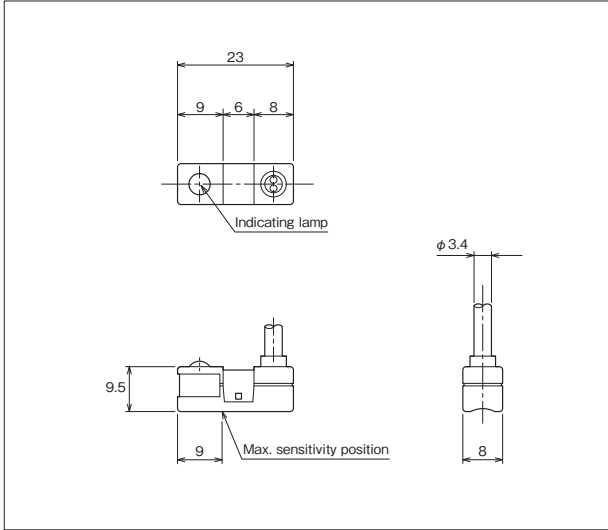
Small-size high-reliability
2-wire, 1-LED magnetic
proximity type solid
state sensors

- Solid state sensors with longer life and higher reliability (By 10 times or more than reed sensors used within ratings (compared to our conventional products))
- 2-wire sensors of wire-saving type
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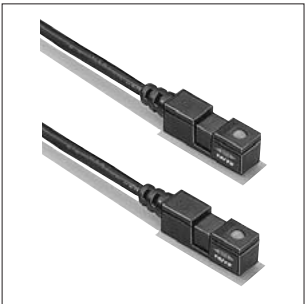
Type	With cord (1.5m)	KS211M
	With cord (5m)	KS215M
Load voltage range	10 to 30 V DC	
Load current range	6 to 70 mA	
Internal voltage drop	3.5 V or less	
Leakage current	1.3 mA or less	
Operating time	1 ms or less	
Return time	1 ms or less	
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage	1200 V AC for 1 min (between case and cord)	
Impact resistance	490 m/s ² (unrepeated)	
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz (each of X, Y and Z directions), 1-hr log sweep	
Ambient temperature	-10 to +70°C (no freezing)	
Wiring method	0.3 mm ² , 2-core, outer dia. ϕ3.4 mm, oil-proof cabtyre cord	
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)	
Output protective circuit	Provided	
Indicating lamp	LED (lights in red when sensing)	
Electric circuit		
Applicable load	Small relay, programmable controller	

Dimensional Drawings

Unit: mm



* Sale of this series of sensors was discontinued on Sept. 20, 2003. Please use AX or AZ type sensors or 1-LED type sensors. Contact us for replacements.



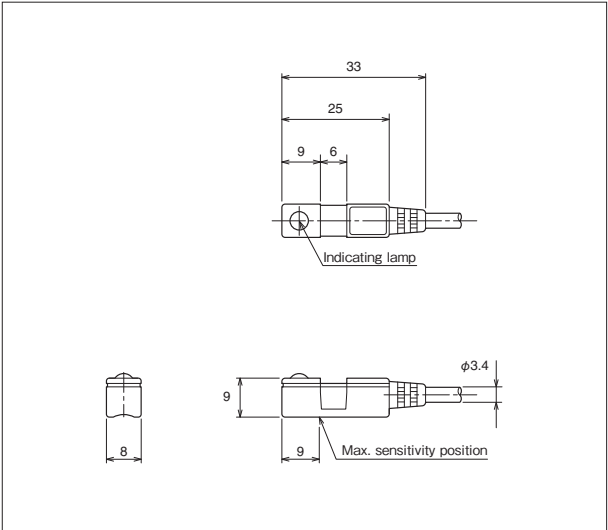
Small-size high-reliability
2-wire, 2-LED magnetic
proximity type solid
state sensors

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- 2-wire sensors of wire-saving type
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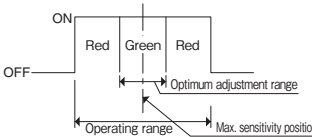
Type	With cord (1.5 m)	JS211
	With cord (5 m)	JS215
Load voltage range	10 to 30 V DC	
Load current range	6 to 70 mA	
Internal voltage drop	4 V or less	
Leakage current	1 mA or less	
Operating time	1 ms or less	
Return time	1 ms or less	
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage	1200 V AC for 1 min (between case and cord)	
Impact resistance	490 m/s ² (unrepeated)	
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz (each of X, Y and Z directions), 1-hr log sweep	
Ambient temperature	-10 to +70°C (no freezing)	
Wiring method	0.3 mm ² , 2-core, outer dia. ϕ3.4 mm, oil-proof cabtyre cord	
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)	
Output protective circuit	Provided	
Indicating lamp	Operation position: Red/green LED lights. Optimum position: Green LED lights.	
Electric circuit		
Applicable load	Small relay, programmable controller	

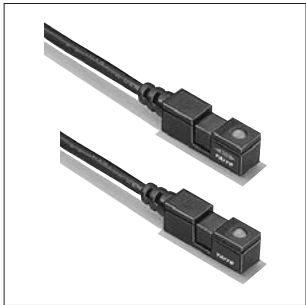
Dimensional Drawings

Unit: mm



LED lamp indicating method





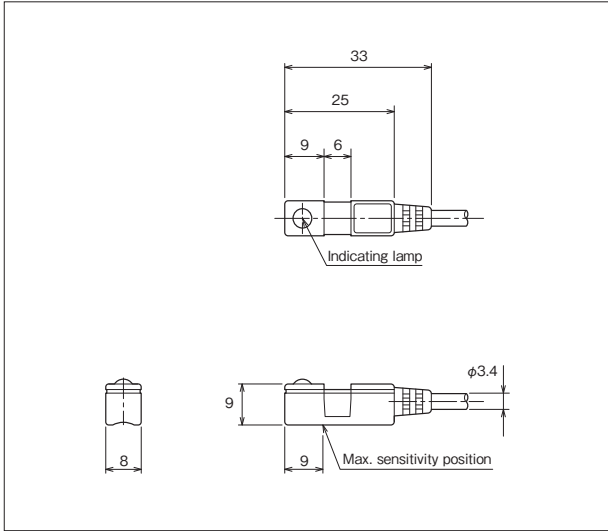
Small-size high-reliability
2-wire, 1-LED magnetic
proximity type solid
state sensors

- Solid state sensors with longer life and higher reliability (By 10 times or more than reed sensors used within ratings (compared to our conventional products))
- 2-wire sensors of wire-saving type
- Oil-proof cabtyre cords are used.

Type	With cord (1.5m)	JS211M
	With cord (5m)	JS215M
Load voltage range	DC10 to 30 V	
Load current range	6 to 70 mA	
Internal voltage drop	3.5 V or less	
Leakage current	1.3 mA or less	
Operating time	1 ms or less	
Return time	1 ms or less	
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage	1200 V AC for 1 min (between case and cord)	
Impact resistance	490 m/s ² (unrepeated)	
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz (each of X, Y and Z directions), 1-hr log sweep	
Ambient temperature	-10 to +70°C (no freezing)	
Wiring method	0.3 mm ² , 2-core, outer dia. φ3.4 mm, oil-proof cabtyre cord	
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)	
Output protective circuit	Provided	
Indicating lamp	LED (lights in red when sensing)	
Electric circuit		
Applicable load	Small relay, programmable controller	

Dimensional Drawings

Unit: mm



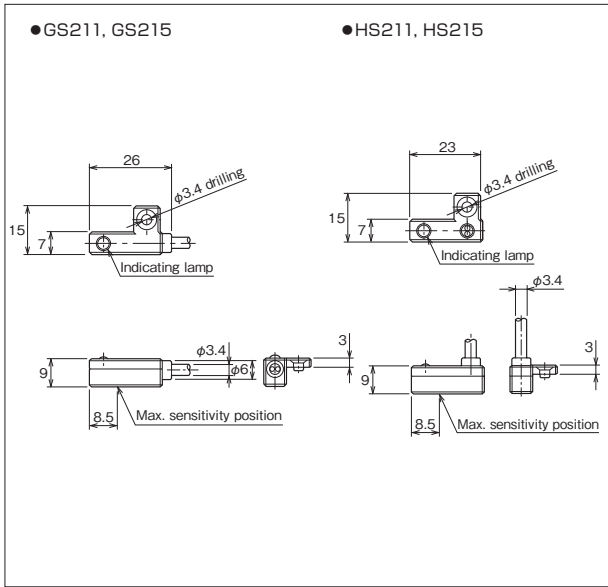
Small-size high-reliability
2-wire, 2-LED magnetic
proximity type solid
state sensors

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- 2-wire sensors of wire-saving type
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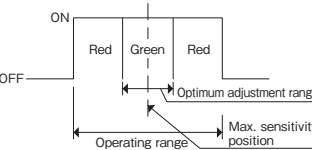
Type	With cord (1.5m)	GS211 (rear wiring)	HS211 (upper wiring)
	With cord (5m)	GS215 (rear wiring)	HS215 (upper wiring)
Load voltage range	10 to 30 V DC		
Load current range	6 to 70 mA		
Internal voltage drop	4 V or less		
Leakage current	1 mA or less		
Operating time	1 ms or less		
Return time	1 ms or less		
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)		
Withstand voltage	1200 V AC for 1 min (between case and cord)		
Impact resistance	490 m/s ² (unrepeated)		
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz (each of X, Y and Z directions), 1-hr log sweep		
Ambient temperature	-10 to +70°C (no freezing)		
Wiring method	0.3 mm ² , 2-core, outer dia. φ3.4 mm, oil-proof cabtyre cord		
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)		
Output protective circuit	Provided		
Indicating lamp	Operation position: Red/green LED lights. Optimum position: Green LED lights.		
Electric circuit			
Applicable load	Small relay, programmable controller		

Dimensional Drawings

Unit: mm



LED lamp indicating method



* Sale of this series of sensors was discontinued on Sept. 20, 2003. Please use AX or AZ type sensors. Contact us for replacements.



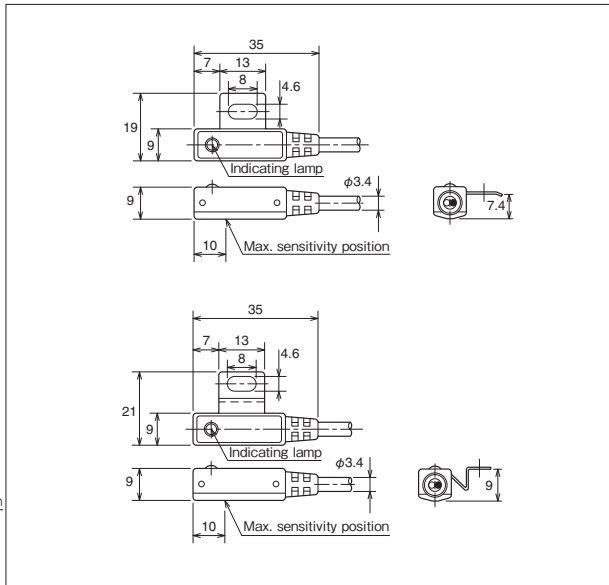
Small-size high-reliability
2-wire, 2-LED magnetic
proximity type solid
state sensors

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- The two LED lamps facilitate setting of optimum position.
- 2-wire sensors of wire-saving type.
- Oil-proof cabtyre cords are used.

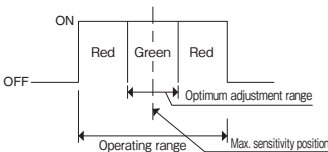
Type	With cord (1.5 m)	YS211 (tie rod type)	YS221 (fixed type)
	With cord (5 m)	YS215 (tie rod type)	YS225 (fixed type)
Load voltage range	10 to 30 V DC		
Load current range	6 to 70 mA		
Internal voltage drop	4 V or less		
Leakage current	1 mA or less		
Operating time	1 ms or less		
Return time	1 ms or less		
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)		
Withstand voltage	1200 V AC for 1 min (between case and cord)		
Impact resistance	490 m/s ² (unrepeated)		
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz (each of X, Y and Z directions), 1-hr log sweep		
Ambient temperature	-10 to +70°C (no freezing)		
Wiring method	0.3 mm ² , 2-core, outer dia. φ3.4 mm, oil-proof cabtyre cord		
Protection structure	IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)		
Output protective circuit	Provided		
Indicating lamp	Operation position: Red/green LED lights. Optimum position: Green LED lights.		
Electric circuit			
Applicable load	Small relay, programmable controller		

Dimensional Drawings

Unit: mm



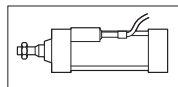
LED lamp indicating method



Handling procedures

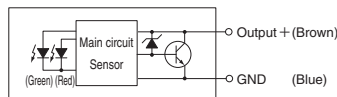
Notes on wiring

- When wiring the sensor, disconnect the power from the equipment on the electric circuit to be connected.
 - Failure to do so may expose the workers to electric shock. Or, the sensor and load may be damaged.
- Take care not to apply bending, pulling or torsional load to the sensor cords. To prevent application of load to the roots of the sensor cords, secure the wires on a tie rod, or take other appropriate measures. (See the figure.)
 - Failure to do so may break the cords. Particularly if load is applied to the roots of the cord, the electric circuit board in the sensor may be damaged.
 - When securing them on a tie rod, take care not to tighten them excessively. Doing so may break the cords.
- The bending radius shall be as large as possible.
 - Otherwise, the cords may break. Ensure that the bending radius is twice or more the cord diameter.
- If the distance to the connection is long, secure the cords at intervals of about 20 cm to prevent sagging of the cords.
- When the cord is laid on the ground, it may be stepped on directly or put under equipment. Protect it with a metallic conduit or the like.
 - Failure to do so may damage the coating, thereby causing breaking or short-circuiting.
- The distance between the sensor and the load or power supply shall be less than 10 m.
 - If the distance exceeds 10 m, inrush current is carried to the sensor when it is used, and it may be damaged. Take measures against rush current referring to "Notes on output circuit protection".
- Do not bundle the cord together with the high-voltage wires of other electric devices or power source cables. Do not lay the cord close to these wires, cables or power sources.
 - Noises from the high-voltage wires, power sources or power source cables will enter the sensor cords and cause malfunctions of the sensor or load. It is recommended to protect the sensor cords with a shield tube.



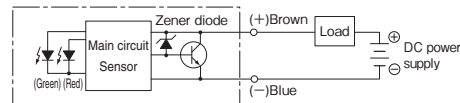
Notes on connecting

- Do not connect power supply directly to any sensor. Connect the sensor to the power supply through a predetermined load, such as a small relay or a programmable controller.
 - Failure to do so will cause short-circuit and burnout of the sensor.
- Carefully check the voltage and current specifications for the sensor, power supply and load to be used.
 - If the voltage or power supply is improper, the sensor may malfunction or be damaged.
- Connect the lead wire correctly according to the wire colors. Before connecting, disconnect the power from the equipment on the electric circuit to be connected.
 - Miswiring or short-circuit of the load can damage the electric circuits on the sensor and load sides. Even an instantaneous short-circuit will result in burnout of the main circuit and the output circuit. Wiring in the energized state will damage the electric circuits on the sensor and load sides.



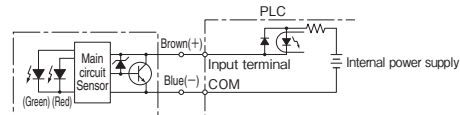
<Connecting procedures>

1. Basic circuit



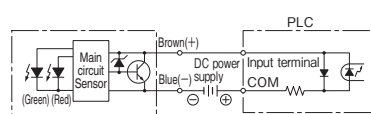
2. Connection with PLC(programmable controller)

- When the PLC has a built-in power supply



Note) For details, carefully read the manual for the PLC to be used.

- When the PLC does not have a built-in power supply



Note) For details, carefully read the manual for the PLC to be used.

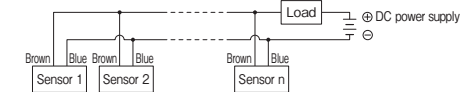
3. Connection of multiple sensors

When sensors are combined with a load, the sensors may not operate. Avoid connecting several sensors (in series or parallel) with a load.

1) Parallel connection

- The sensor operating state can be confirmed with the indicating lamp of the sensor.

Note that the leakage current of the output increases for the number of sensors. Leakage current may operate the load or hinder it from returning.

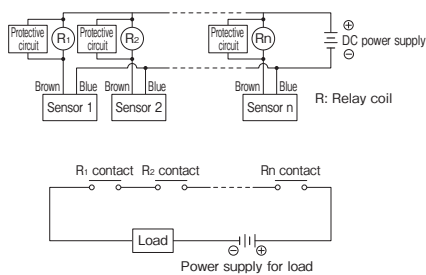


Ensure that the sum of leakage current is less than the load returning current value.

Handling procedures

2) Series connection

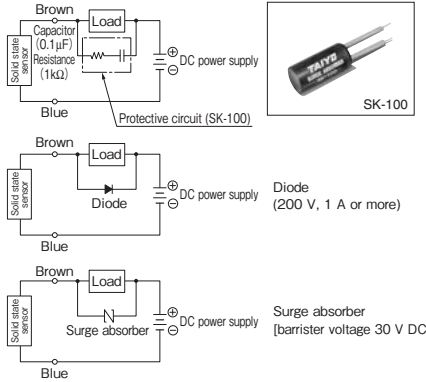
- Sensors cannot be connected in series.
- Connect the sensors through small relays as shown in the following circuit diagram, and connect the small relay contacts in series, or program to connect the PLC internal contacts in series with sensors.



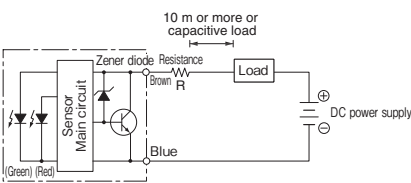
Note) Be sure to connect a protective circuit to both ends of the relay coil. For the protective circuit connecting method, see the output circuit protection section.

Notes on output circuit protection

- To connect induction load (small relay, solenoid valve, etc.) When the sensor is turned off, surge voltage is generated. Therefore, be sure to provide a protective circuit on the load side.
- If a protective circuit as shown below is not provided, the electric circuit in the sensor may be damaged by the surge voltage.



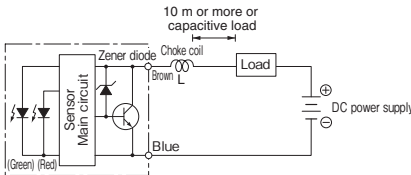
- When a capacitive load (capacitor, etc.) is connected or the cord is extended to 10 m or more Rush current is generated when the sensor is turned on. Therefore, be sure to provide a protective circuit near the sensor (within 2 m from the sensor) as shown below.
- If a protective circuit as shown below is not provided, the electric circuit in the sensor may be damaged by the rush current.



R: Rush current limiting resistance
R=Use as large a resistance as possible within the range allowed by the circuit on the load side.

Notes) ● If the resistance is too large, the load may not operate.

- Connect the resistance as close to the sensor as possible (within 2 m).



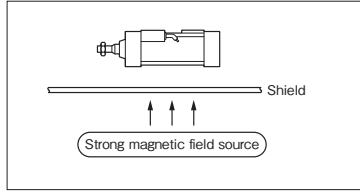
L: Choke coil
L=Equivalent to approx. 2 mH

Note) ● Connect the resistance as close to the sensor as possible (within 2 m).

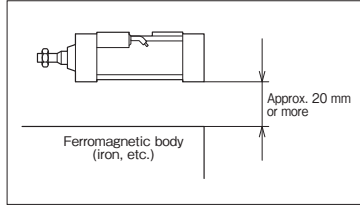
Handling procedures

Notes on installation

- Do not use the cylinder where metal cutting scraps or cutting oil may be spattered directly on the cylinder and sensor.
 - The cord may be cut by metal cutting scraps, or cutting oil may enter the sensor, and the electric circuit may short, thereby causing sensor operation failure.
- Check that cylinders are not installed close to one another.
 - When two or more Switch Set Cylinders are installed closely in parallel, the sensors may malfunction due to magnetic interference with one another. Keep a distance of 30 mm or more between cylinder tubes. If the allowable distance is specified for each series of cylinders, keep the specified distance.
- In a place where there is a strong magnetic field around the cylinder, install an iron plate or the like to provide a magnetic shield. (Install the shield at a distance of 20 mm or more from the cylinder and sensor.)
 - The sensor may malfunction under the influence of the magnetic field.



- Do not bring any ferromagnetic body (iron, etc.) around the cylinder body or close to the sensor. As a rule, keep a distance of 20 mm or more from such a ferromagnetic body. When a compact design cylinder is used, keep the cylinder at a distance of 10 mm or more from the ferromagnetic body.
 - The sensor may malfunction under the influence of the ferromagnetic body.



Detectable cylinder piston speed

- When setting the sensor at an intermediate position, set the cylinder maximum speed to less than 300 mm/s in consideration of the response speed of the load relay.
 - If the piston speed is too high, the load, such as a relay, may not operate because the sensor operating time is short although it works.
- Determine the detectable cylinder piston speed referring to the following formula.

$$\text{Detectable piston speed (mm/s)} = \frac{\text{Sensor operating range (mm)} \times 1000}{\text{Load operating time (ms)}}$$

(Notes) ● See the operating time of the load, such as a relay, of each manufacturer.

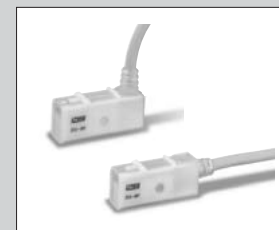
- For the calculation, use the minimum value of the sensor operating range and the maximum value of the load operating time.



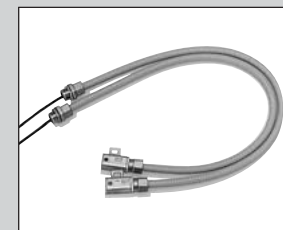
Sensor Specifications

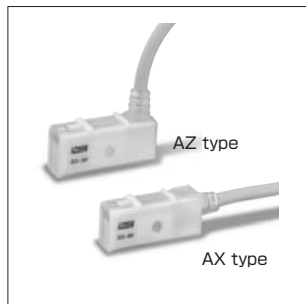
Magnetic Proximity Type (Cutting Oil Proof Type)

AX***W·AZ***W type sensor
.....SW78



WR·WS type sensor
.....SW80

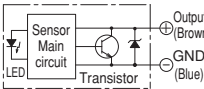
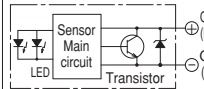




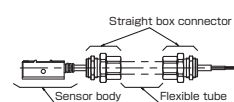
Cutting oil proof sensors are introduced as variations of A type sensors.

- AX and AZ type magnetic proximity solid state sensors.
- Longer life in environment directly exposed to cutting oil. (by approx. 10 times compared to our conventional products)
- Protection structure IP67G
- Optional flexible tubes for protection against metal cutting scraps are available.

Sensor Specifications

Type	AX205WCE	AZ205WCE	AX215WCE	AZ215WCE
Wiring direction	Rear wiring (with 5 m cord)	Upper wiring (with 5 m cord)	Rear wiring (with 5 m cord)	Upper wiring (with 5 m cord)
Load voltage range	5 to 30 V DC			
Load current range	5 to 40 mA		5 to 20 mA	
Internal voltage drop	3.5 V or less			
Leakage current	1.3 mA or less		1.0 mA or less	
Operating time	1 ms or less			
Return time	1 ms or less			
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)			
Withstand voltage	1500 V AC for 1 min (between case and cord)			
Impact resistance	490 m/s ² (unrepeated)			
Vibration resistance	Double amplitude 0.6 mm, 10 to 200 Hz(log sweep, 1 hr), each of X, Y and Z directions			
Ambient temperature	−10 to +70°C (no freezing)			
Wiring method	0.3 mm ² , 2-core, outer dia. φ4 mm, oil-proof cabtyre cord			
Protection structure	IP67G (JEM Standard) (oil proof)			
Output protective circuit	Provided			
Indicating lamp	LED (lights in red when sensing)		Operation position : Red/green LED lights. Optimum position : Green LED lights.	
Electric circuit				
Applicable load	Small relay, programmable controller			

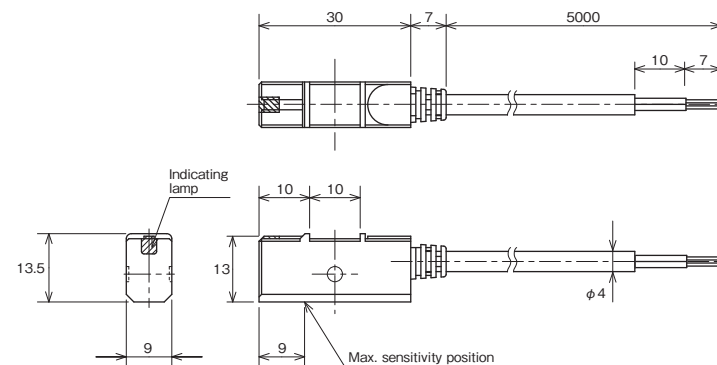
Optional flexible tubes for protection against metal cutting scraps are available.



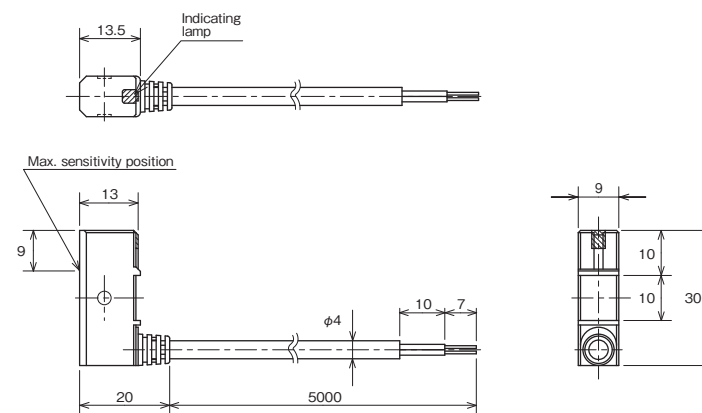
Unit: mm

Dimensional Drawings

- Rear wiring: with 5 m cord
AX205WCE · AX215WCE



- Upper wiring: with 5 m cord
AZ205WCE · AZ215WCE



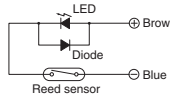
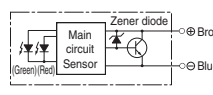
* Sale of WS255 and WS265 was discontinued on Sept. 21, 2006.



Reliable sealing in environment directly exposed to cutting oil

- Protection structure IP67G.
- Flexible tubes for protection of cabtyre cords are standardized.
- Resistant to cutting oil for longer term. (by approx. 10 times compared to our conventional products)
- For flexible tube jacketing, oil-proof soft PVC is used.
- Upper wiring type and cord type (without flexible tube) were added, so that an appropriate type can be selected.
- 2-wire solid state sensors of wire-saving type. The use of two LED lamps facilitates setting of optimum position.

Sensor Specifications

Contact type		Reed sensor		Solid state sensor	
Type	With cord (5 m)	WR505, WR515, WR525, WR545	WR535, WR555	WS215-1, WS225-1, WS235-1, WS255	WS245-1, WS265
Wiring direction		Rear	Upper	Rear	Upper
Load voltage range		AC : 5 to 120 V DC : 5 to 50 V		DC10 to 30 V	
Load current range		AC : 3 to 20 mA DC : 3 to 40 mA		6 to 20 mA (Note 1)	
Internal voltage drop		2 V or less		4 V or less	
Max. contact capacity		1.5 W DC · 2 VA AC		—	
Leakage current		0 μA		1 mA or less	
Operating time		1 ms or less			
Return time		1 ms or less			
Insulation resistance		100 MΩ or more on 500-VDC Megger (between case and cord)			
Withstand voltage		1500 V AC for 1 min (between case and cord)			
Impact resistance		294 m/s ² (unrepeated)		490 m/s ² (unrepeated)	
Vibration resistance		Lateral amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions		Lateral amplitude 0.6 mm, 10 to 200 Hz, each of X, Y and Z directions, 1-hr log sweep	
Ambient temperature		-10 to +60°C (no freezing)			
Wiring method		0.3 mm ² , 2-core, outer dia. φ4 mm, oil-proof cabtyre cord			
Protection structure		IP67G (JEM Standard) (oil proof)			
Indicating lamp		Red LED lights.		Operation position: Red/green LED Optimum position: Green LED	
Electric circuit					
Applicable load		Small relay, programmable controller			

Notes) 1. The load current range of WS255 and WS265 is 6 to 70 mA.
2. When using any induction load (relay, etc.), be sure to provide a protective circuit (SK-100) with the load.

Sensor Sectional Drawings

Unit: mm

- Sensor type
- Flexible tube type
- Reed sensor
- WR505, WR525, WR545(Rear)
- WR535, WR555(Upper)
- Solid state sensor
- WS215-1, WS235-1, WS255(Rear)
- WS245-1, WS265(Upper)

Cord type

Reed sensor WR515

Solid state sensor WS225-1

- Flexible tube
- Part No.: F-05
- (sales unit: 4.8 m)

*The shape of sensor body varies according to the type.

- When using a flexible tube type sensor, be sure to combine the sensor body with the flexible tube.
- For the flexible tube type, the sensor body is provided with the straight box connector (F-SB) as a standard accessory.
- Note that the flexible tube (F-05) shall be ordered separately.

List of Applicable Actuators and Mounting Brackets

Actuator series name	Hydraulic actuator						
	35H-3R	100H-2R *100HW-2R	70/140H-8R *70/140HW-8R 70/140Y-2R *70/140YW-2R	160H-1R *160HW-1R	35S-1R 35SY-1R	HQS2R *HQS2W2R 100S-1R *100SW-1R	160S-1R *160SW-1R
Sensor type	WR505 WS215-1 (Flexible tube type)				WR525 WS235-1 (Rear wiring)		
	WR515 WS225-1 (Cord type)				WR535 WS245-1 (Upper wiring)		
Bore							
φ20	—	—	—	—		—	—
φ25	—	—	—	—		—	—
φ32				R21WR(WS) □-H	T07WR(WS) □-H		
φ40	R21WR(WS) □-H	R21WR(WS) □-H	R22WR(WS) □-H	R22WR(WS) □-H			
φ50		R22WR(WS) □-H		R23WR(WS) □-H			
φ63	R22WR(WS) □-H	R23WR(WS) □-H	R24WR(WS) □-H	R24WR(WS) □-H			
φ80		R23WR(WS) □-H	R24WR(WS) □-H	R24WR(WS) □-H	—		
φ100	R23WR(WS) □-H	—	R25WR(WS) □-H	—	—		—
φ125	—	—	R26WR(WS) □-H	—	—	—	—
φ140	—	—	—	—	—	—	—
φ160	—	—	—	—	—	—	—

Notes) ● The *-marked actuators are cutting oil proof. WR and WS type sensors can be installed to these actuators as standard devices.
● WR and WS type sensors are installed to actuators other than the *-marked ones as semi-standard devices.
● When using WR or WS type sensor to an actuator other than the *-marked ones, sufficiently examine the working environment, and select an appropriate one.

<Example of part number>

R21

Bracket (band) number

WR505

Sensor type

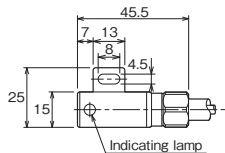
—H

Dimensional Drawings

Unit: mm

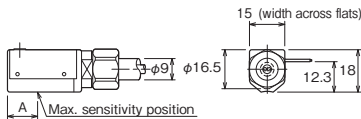
WR505 (reed sensor)
WS215-1 (solid state sensor)

[Rear wiring]



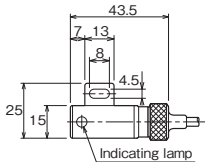
Dimension A

WR type (reed sensor)	12
WS type (solid state sensor)	10



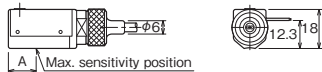
WR515 (reed sensor)
WS225-1 (solid state sensor)

[Cord type]



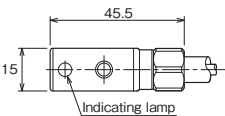
Dimension A

WR type (reed sensor)	12
WS type (solid state sensor)	10



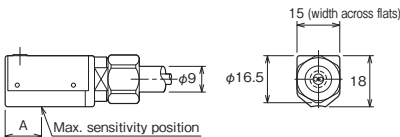
WR525 (reed sensor)
WS235-1 (solid state sensor)

[Rear wiring]



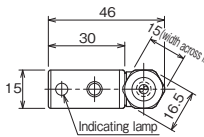
Dimension A

WR type (reed sensor)	12
WS type (solid state sensor)	10



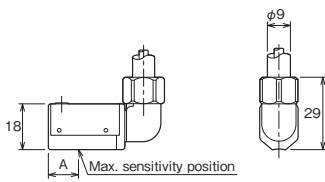
WR535 (reed sensor)
WS245-1 (solid state sensor)

[Upper wiring]



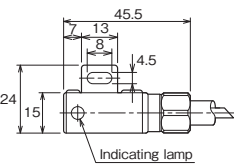
Dimension A

WR type (reed sensor)	12
WS type (solid state sensor)	10



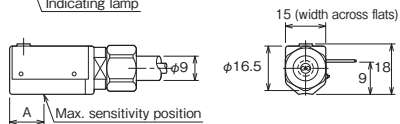
WR545 (reed sensor)
WS255 (solid state sensor)

[Rear wiring]



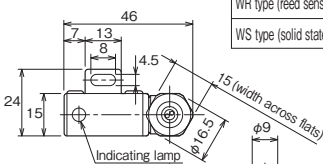
Dimension A

WR type (reed sensor)	12
WS type (solid state sensor)	10



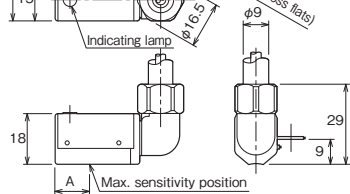
WR555 (reed sensor)
WS265 (solid state sensor)

[Upper wiring]



Dimension A

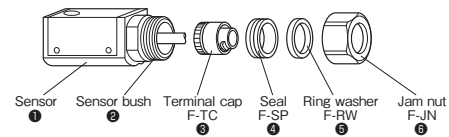
WR type (reed sensor)	12
WS type (solid state sensor)	10



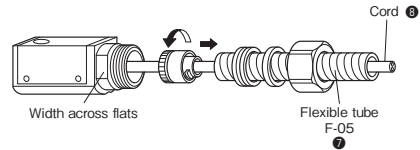
Handling procedures

When sensor and flexible tube are used

● Connector component configuration

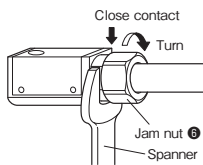


● How to attach to sensor

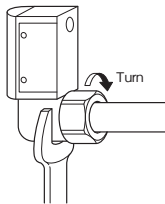


1. Cut the flexible tube (7) to the required length. (The cut surface must be free from burrs and deformation. Otherwise, the terminal cap may not be fitted to the tube.)
 2. Fit the jam nut (8), ring washer (9), seal (4) and terminal cap (3) onto the flexible tube (7) in order. (Insert the terminal cap (3) to the flexible tube (7).)
 3. Insert the cord (6) to the flexible tube provided with (3) to (6) from the terminal cap side.
 4. Insert the cord to the sensor bush (2), and fit the jam nut (8) to the threads of the sensor bush (2).
 5. Screw the jam nut (8) until its end face gets into contact with the end face of the flat part of the sensor bush (2) to complete attachment. (Indicated by arrow)
- * Tighten the jam nut (8) holding two flats of the sensor bush (2) with a spanner.

Side connecting type

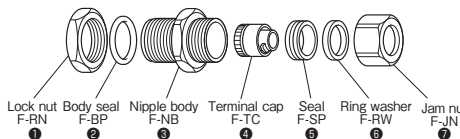


Upward connecting type

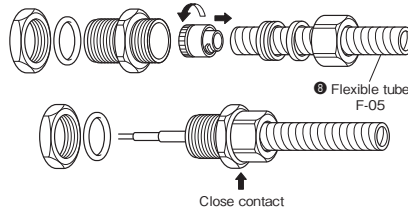


When straight box connector and flexible tube are used

● Components of straight box connector (F-SB)

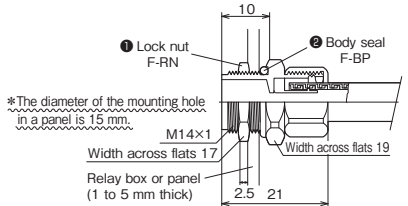


● How to attach to straight box connector (F-SB)



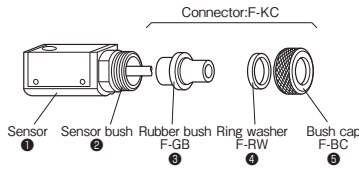
1. Fit the jam nut (7), ring washer (8), seal (5) and terminal cap (4) onto the flexible tube (6) in order. (Screw the terminal cap (4) in the flexible tube (6).)
2. Insert the end of the flexible tube (6) provided with (4) to (7) to the nipple body (3), and screw the jam nut (7) onto the threaded portion of the nipple body (3).
3. Screw the jam nut (7) until its end face gets into contact with the end face of the flat part of the nipple body (3) to complete attachment. (Indicated by arrow)

● Sectional view after completion of attachment to straight box connector (F-SB)

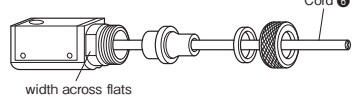


Cord type

● Connector component configuration



● How to attach to sensor



1. Fit the rubber bush (3), ring washer (4) and bush cap (5) to the cord (6) in order.
 2. Insert the cord to the sensor bush (2), and screw the bush cap (5) onto the threaded portion of the sensor bush (2).
 3. Tighten the bush cap (5) until its end face gets into contact with the end face of the flat part of the sensor bush (2) to complete attachment. (Indicated by arrow)
- * Tighten the bush cap (5) by "hand" while holding two flats of the sensor bush (2) with a spanner.

Handling procedures

Notes on working environment

- 1. The sensors can be used in a place exposed to cutting oil (coolant) for machine tools.
- 2. The sensors are resistant to the following cutting oils.

Adaptability of WR and WS Type Sensors to Cutting Oil

Nonaqueous cutting oil		Aqueous cutting oil
Type 1	Type 2	
○	×	○

○ : Applicable × : Inapplicable

- To maintain the oil resistance for a long period and reduce the influence of oil to the cylinder, fit a protective cover to protect the sensor from direct exposure to the cutting oil.
- 3. If the sensor is used in a place exposed to cutting oil, use a cutting oil proof cylinder.
 - If a cylinder other than cutting oil proof cylinders is used, carefully check that the seal materials of the cylinder are resistant to the cutting oil.
(See "Selection of seal materials" in the cylinder selection materials.)
- 4. The sensors can be used in a place exposed to water.
 - The cylinder must be treated with a rust preventive.
(See the cylinder selection materials.)
 - Since the sensor connectors (brass) have not been subjected to surface treatment, they may rust.

Other notes

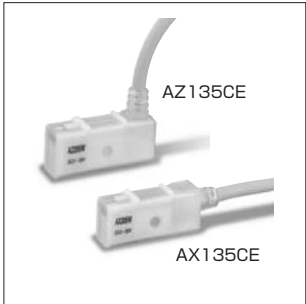
- For wiring, connecting and handling of the sensors, see "Handling instructions for reed sensors" for WR type or "Handling instructions for solid state sensors" for AX***W, AZ***W and WS types.



Sensor Specifications
Sensors for Driving High-voltage
and Large-current Load

AX135CE・AZ135CE type sensor
.....SW86





A type sensors for driving high voltage and large current loads

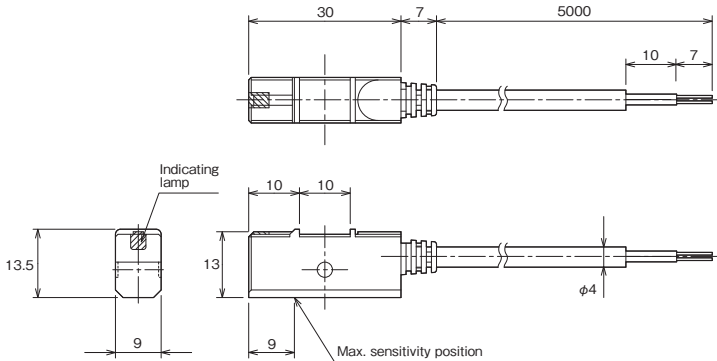
- The sensors can drive loads of up to 240 V AC and 300 mA.
- Highly safety-oriented B contact output is used.
- Contact life as long as that of solid state sensors. (by approx. 10 times compared to our conventional products)
- Usable in an environment at 100°C. (at load current of 50 mA)

Sensor Specifications

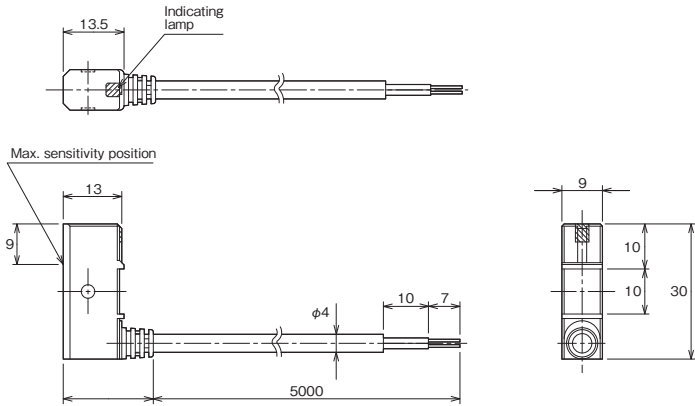
Type	AX135CE	AZ135CE
Wiring direction	Rear wiring (with 5 m cord)	Upper wiring (with 5 m cord)
Load voltage range	90 to 240 V AC/DC	
Load current range	5 to 300 mA	
Internal voltage drop	5 V at 10 mA	
	6 V at 100 mA	
	6.5 V at 300 mA	
Leakage current	1.3 mA at 200 V AC	
Operating time	1 ms or less	
Return time	1 ms or less	
Insulation resistance	100 MΩ or more on 500-DC Megger (between case and cord)	
Withstand voltage	1500 V AC for 1 min (between case and cord)	
Impact resistance	294 m/s ² (unrepeated)	
Vibration resistance	Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions	
Ambient temperature	-10 to +100°C at 50 mA	
	-10 to +70°C at 200 mA	
	-10 to +40°C at 300 mA	
	(No freezing)	
Wiring method	0.3 mm ² , 2-core, outer dia. ϕ4 mm, oil-proof cabtyre cord	
Protection structure	IP67 (IEC Standard)	
Output protective circuit	Provided	
Indicating lamp	LED (lights in red when not sensing)	
Electric circuit	No positive or negative polarity	
Applicable load	Small relay, small solenoid, pilot lamp	

Dimensional Drawings

- Rear wiring: with 5 m cord
AX135CE

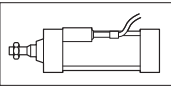


- Upper wiring: with 5 m cord
AZ135CE



Handling procedures

Notes on wiring

- When wiring the sensor, disconnect the power from the equipment on the electric circuit to be connected.
 - Failure to do so may expose the workers to electric shock. Or, the sensor and load may be damaged.
- Do not apply bending or tensile load to the sensor cord. To prevent application of load to the roots of the sensor cords, secure the wires on a tie rod, or take other appropriate measures. (See the figure.)
 - Failure to do so may break the cords.
 - When securing them on a tie rod, take care not to tighten them excessively. Doing so may break the cords.
- The bending radius shall be as large as possible.
 - Otherwise, the cords may break.

Ensure that the bending radius is twice or more the cord diameter.
- If the distance to the connection is long, secure the cords at intervals of about 20 cm to prevent sagging of the cords.
- When the cord is laid on the ground, it may be stepped on directly or put under equipment. Protect it with a metallic conduit or the like.
 - Failure to do so may damage the coating, thereby causing breaking or short-circuiting.
- The distance between the sensor and the load or power supply shall be less than 10 m.
 - If the distance exceeds 10 m, inrush current is carried to the sensor when it is used, and it may be damaged. Take measures against rush current referring to "Notes on contact protection".
- Do not bundle the cord together with the high-voltage wires of other electric devices or power source cables. Do not lay the cord close to these wires, cables or power sources.
 - Noises from the high-voltage wires, power sources or power source cables will enter the sensor cords and cause malfunctions of the sensor or load. It is recommended to protect the sensor cords with a shield tube.

Notes on connecting

- Disconnect the power from the sensor.
 - Failure to do so may expose the workers to electric shock. Or, the sensor and load may be damaged.
- Do not use a load exceeding the sensor working voltage or current or contact capacity.
 - If the voltage or current is improper, the sensor may malfunction or be damaged.
- Do not connect power supply directly to any sensor. Connect the sensor to the power supply through a predetermined load, such as a small relay or a programmable controller.
 - Otherwise, the circuit may short, and the sensor may be damaged.
 - Use only one of the following models of relays or their equivalents.

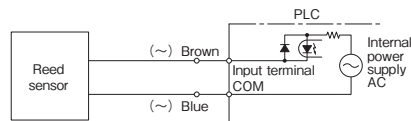
OMRON : Model MY	Fuji Electric Holdings Co., Ltd. : Model HH-5
IDEC : Model RY	Panasonic Electric Works Co., Ltd. : Model HC

- Connect the lead wire correctly according to the wire colors.
 - If power is applied to the sensor which has been wired incorrectly, the sensor will be damaged. In addition, the load may be damaged. Even an instantaneous short-circuit will result in burnout of the electric circuit in the sensor.

<Connecting procedures>

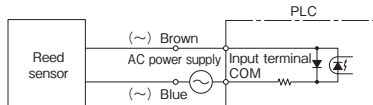
1. Basic connection

- To connect with PLC (programmable controller)
 - When the PLC has a built-in power supply



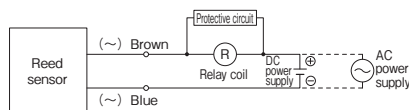
- The above drawing shows an example of connection of an AC input type PLC. (For details, see the manual for the PLC.)

- When the PLC does not have a built-in power supply



- The above drawing shows an example of connection of an AC input type PLC. (For details, see the manual for the PLC.)

- To connect with small relay



- For the protective circuit, carefully read "Notes on contact protection".

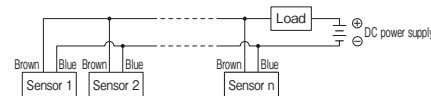
2. Connection of multiple sensors

When sensors are combined with a load, the sensors may not operate. Avoid connecting several sensors (in series or parallel) with a load.

- Parallel connection

The circuit is configured as shown below.

- The indicating lamps may not light depending on the combination with a load.
- If sensors leak current, the leakage current from the sensor output will increase for the number of sensors. Leakage current may operate the load or hinder it from returning.



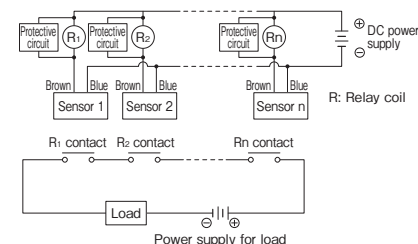
- Ensure that the sum of leakage current is less than the load returning current value.
- The same applies in the case of use of AC power supply.

Handling procedures

- Series connection

A circuit as shown below is recommended.

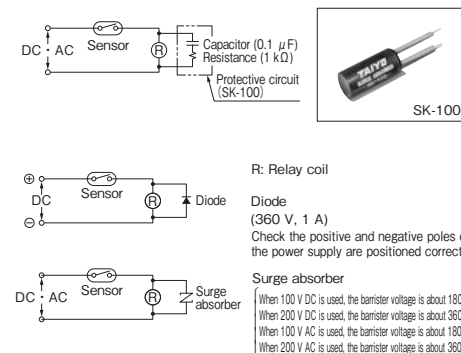
Connect each sensor through a small relay, and connect the small relay contacts in series.



- If sensors are connected in series, the internal voltage drop of the sensor output will increase for the number of sensors. If the internal voltage drop is large, the load may not operate.
- When connecting sensors in series, ensure that the sum of internal voltage drop is less than the load operating voltage.
- The same applies in the case of use of AC power supply.
- Be sure to connect a protective circuit to both ends of the relay coil.

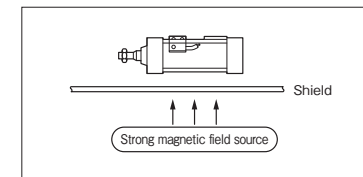
Notes on contact protection

- When an induction load (small relay, solenoid, etc.) is connected, surge voltage is generated when the sensor is turned off. To protect the contact, be sure to provide a protective circuit on the load side as shown below.
 - If a protective circuit as shown below is not provided, the electric circuit in the sensor may be damaged by the surge voltage.

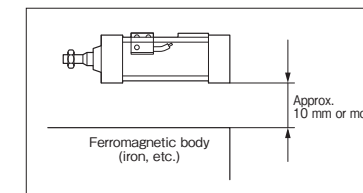


Notes on installation

- Do not use the cylinder where metal cutting scraps or cutting oil may be spattered directly on the cylinder and sensor.
 - The cord may be cut by metal cutting scraps, or cutting oil may enter the sensor, and the electric circuit may short, thereby causing sensor operation failure.
- In a place where there is a strong magnetic field around the cylinder, install an iron plate or the like to provide a magnetic shield. (Install the shield at a distance of 20 mm or more from the cylinder and sensor.)
 - The sensor may malfunction under the influence of the magnetic field.



- Do not bring any ferromagnetic body (iron, etc.) around the cylinder body or close to the sensor. As a rule, keep a distance of 10 mm or more from such a ferromagnetic body.
 - The sensor may malfunction under the influence of the ferromagnetic body.



Detectable cylinder piston speed

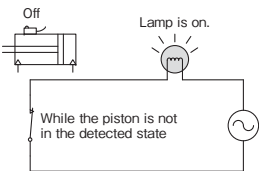
- When setting the sensor at an intermediate position, set the cylinder maximum speed to less than 300 mm/s in consideration of the response speed of the load relay.
- If the piston speed is too high, the load, such as a relay, may not operate because the sensor operating time is short although it works. Determine the detectable cylinder piston speed referring to the following formula.

$$\text{Detectable piston speed (mm/s)} = \frac{\text{Sensor operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$$

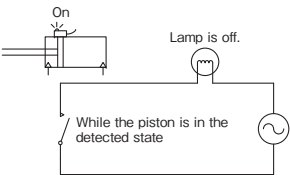
- (Notes)
- See the operating time of the load, such as a relay, of each manufacturer.
 - For the calculation, use the minimum value of the sensor operating range and the maximum value of the load operating time.

Explanation of B contact operation

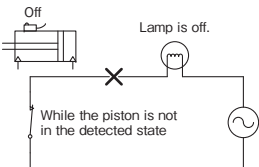
①While the piston is not in the detected state
The sensor lamp is off, and the load lamp is on.



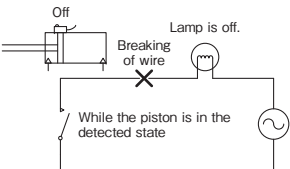
②While the piston is in the detected state
The sensor lamp is on, and the load lamp is off.



③Breaking of wire while the piston is not in the detected state
The sensor lamp is kept off, and the load lamp goes out.

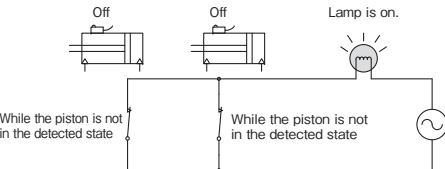


④Breaking of wire when the piston is in the detected state
The sensor lamp goes out, and the load lamp goes out.

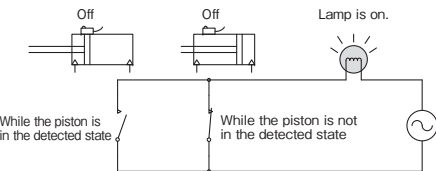


Output in the case of parallel connection

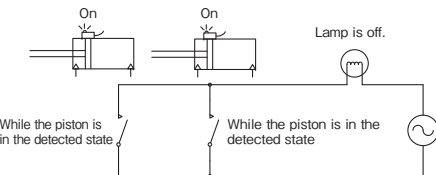
①While the piston is not in the detected state
The sensor lamp is off, and the load lamp is on.



Even while the piston is in the detected state, the sensor LED is kept off because voltage is not applied to the sensor terminal.



②When all sensors detect the piston, the load lamp goes out.

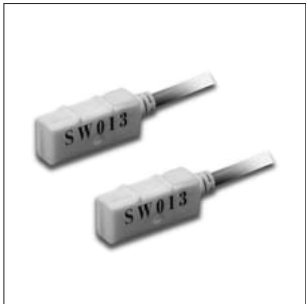


Sensor Specifications

Heat Proof Type/Reed Sensor

SW013SW92

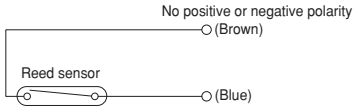




A type sensors for heated environment

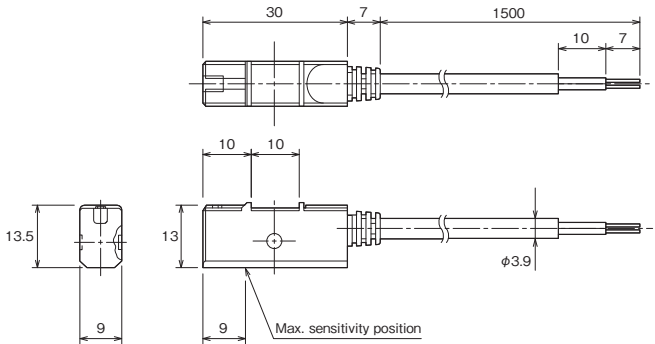
- Usable in an environment at 130°C
- Sensors can be connected in series.
- Heat proof silicone cabtyre cord is used.
- Mountable on HRST1 Series heat proof compact design hydraulic cylinders

Sensor Specifications

Type	SW013
Wiring direction	Rear wiring (with 1.5 m cord)
Load voltage range	AC : 120 V or less DC : 30 V or less
Load current range	AC : 20 mA or less DC : 40 mA or less
Max. switching capacity	AC : 2 VA DC : 1.5 W
Internal voltage drop	0 V
Leakage current	0 μA
Operating time	1 ms or less
Return time	1 ms or less
Insulation resistance	100 MΩ or more on 500-VDC Megger (between case and cord)
Withstand voltage	1500 V AC for 1 min (between case and cord)
Impact resistance	294 m/s ² (unrepeated)
Vibration resistance	Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions
Ambient temperature	−10 to +130°C (no freezing)
Wiring method	0.3 mm ² , 2-core, outer dia. ϕ3.9 mm, heat proof silicone cabtyre cord
Protection structure	IP67 (IEC Standard), JISC0920 (dust-proof and submersible)
Contact protective circuit	None
Indicating lamp	None
Electric circuit	
Applicable load	IC, small relay, programmable controller

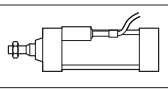
Dimensional Drawings

●SW013



Handling procedures

Notes on wiring

- When wiring the sensor, disconnect the power from the equipment on the electric circuit to be connected.
 - Failure to do so may expose the workers to electric shock. Or, the sensor and load may be damaged.
- Take care not to apply bending, pulling or torsional load to the sensor cords. To prevent application of load to the roots of the sensor cords, secure the wires on a tie rod, or take other appropriate measures. (See the figure.)
 - Failure to do so may break the cords.
- The bending radius shall be as large as possible.
 - Otherwise, the cords may break.
- If the distance to the destination is long, secure the cords at intervals of about 20 cm to prevent the cord sagging.
- When the cord is laid on the ground, it may be stepped on directly or put under equipment. Protect it with a metallic conduit or the like.
 - Failure to do so may damage the coating, thereby causing breaking or short-circuiting.
- The distance between the sensor and the load or power supply shall be less than 10 m.
 - If the distance exceeds 10 m, inrush current is carried to the sensor when it is used, and it may be damaged. Take measures against rush current referring to "Notes on contact protection".
- Do not bundle the cord together with the high-voltage wires of other electric devices or power source cables. Do not lay the cord close to these wires, cables or power sources.
 - Noises from the high-voltage wires, power sources or power source cables will enter the sensor cords and cause malfunctions of the sensor or load. It is recommended to protect the sensor cords with a shield tube.

Notes on connecting

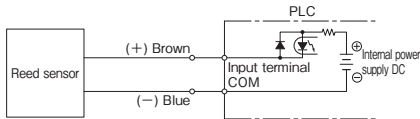
- Disconnect the power from the sensor.
 - Failure to do so may expose the workers to electric shock. Or, the sensor and load may be damaged.
- Do not use a load exceeding the sensor load voltage or current or the contact switching capacity.
 - If the voltage or current is improper, the sensor may malfunction or be damaged.
- Do not connect power supply directly to any sensor. Connect the sensor to the power supply through a predetermined load, such as a small relay or a programmable controller.
 - Otherwise, the circuit may short, and the sensor may be damaged.
 - Use only one of the following models of relays or their equivalents.

OMRON : Model MY Fuji Electric Holdings Co., Ltd. : Model HH-5
IDEC : Model RY Panasonic Electric Works Co., Ltd. : Model HC
- Connect the lead wire correctly according to the wire colors.
 - If power is applied to the sensor which has been wired incorrectly, the sensor will be damaged. In addition, the load may be damaged. Even an instantaneous short-circuit will result in burnout of the electric circuit in the sensor.

<Connecting procedures>

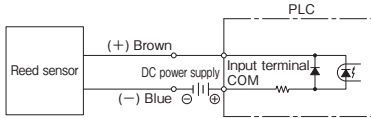
1. Basic connection

- To connect with PLC (programmable controller)
 - When the PLC has a built-in power supply



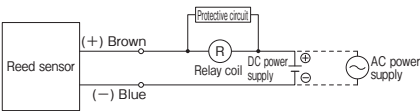
- The figure shown above is an example of connection with a DC input type PLC.
(For details, see the manual for the PLC.)
- An AC input type PLC can be connected in the same manner. However, carefully read "Notes on contact protection".

- When the PLC does not have a built-in power supply



- The figure shown above is an example of connection with a DC input type PLC.
(For details, see the manual for the PLC.)
- An AC input type PLC can be connected in the same manner. However, carefully read "Notes on contact protection".

2) To connect with small relay

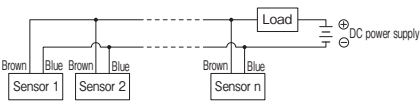


- For the protective circuit, carefully read "Notes on contact protection".

2. Connection of multiple sensors

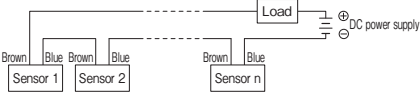
1) Parallel connection

The circuit is configured as shown below.



For AC power supply, a similar circuit is used.

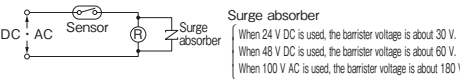
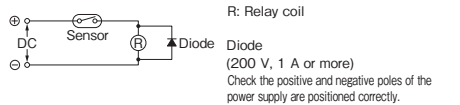
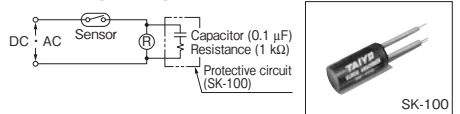
2) Series connection



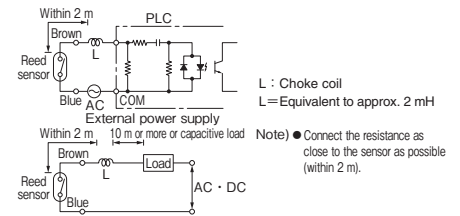
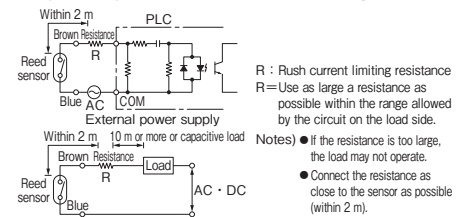
For AC power supply, a similar circuit is used.

Notes on contact protection

1. When an induction load (small relay or solenoid valve) is connected
Surge voltage is generated when the sensor is turned off.
To protect the contact, be sure to provide a protective circuit on the load side as shown below.
- If a protective circuit as shown below is not provided, the electric circuit in the sensor may be damaged by the surge voltage.



2. When the sensor cord is extended to 10 m or more or the sensor is connected to an AC input type PLC (programmable controller) or a capacitive load (capacitor, etc.), rush current will occur when the sensor is turned on. Therefore, be sure to provide a protective circuit as shown in the figure.

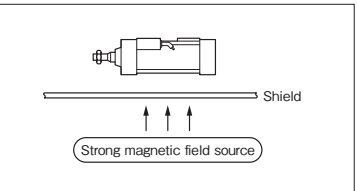


- If a protective circuit as shown above is not provided, the electric circuit in the sensor may be damaged by the rush current.

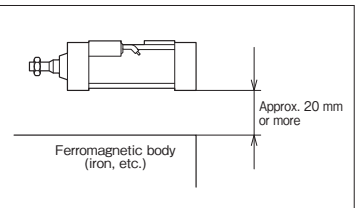
Handling procedures

Notes on installation

1. Do not use the cylinder where metal cutting scraps or cutting oil may be spattered directly on the cylinder and sensor.
- The cord may be cut by metal cutting scraps, or cutting oil may enter the sensor, and the electric circuit may short, thereby causing sensor operation failure.
2. In a place where there is a strong magnetic field around the cylinder, install an iron plate or the like to provide a magnetic shield. (Install the shield at a distance of 20 mm or more from the cylinder and sensor.)
- The sensor may malfunction under the influence of the magnetic field.



3. Do not bring any ferromagnetic body (iron, etc.) around the cylinder body or close to the sensor. As a rule, keep a distance of 20 mm or more from such a ferromagnetic body. When a compact design cylinder (KR or ZR type sensor) is used, keep the sensor at a distance of 10 mm or more from the ferromagnetic body.
- The sensor may malfunction under the influence of the ferromagnetic body.



Detectable cylinder piston speed

- When setting the sensor at an intermediate position, set the cylinder maximum speed to less than 300 mm/s in consideration of the response speed of the load relay.
 - If the piston speed is too high, the load, such as a relay, may not operate because the sensor operating time is short although it works.
- Determine the detectable cylinder piston speed referring to the following formula.

$$\text{Detectable piston speed (mm/s)} = \frac{\text{Sensor operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$$

- (Notes) ● See the operating time of the load, such as a relay, of each manufacturer.
- For the calculation, use the minimum value of the sensor operating range and the maximum value of the load operating time.



Sensor Specifications

Iron Proximity Type/Reed Sensor

L3 · L4 type sensor ... SW96



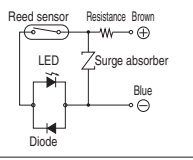
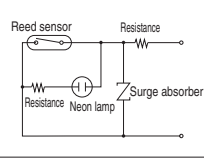
BR type sensorSW97





Iron proximity type reed sensors with built-in protective circuit

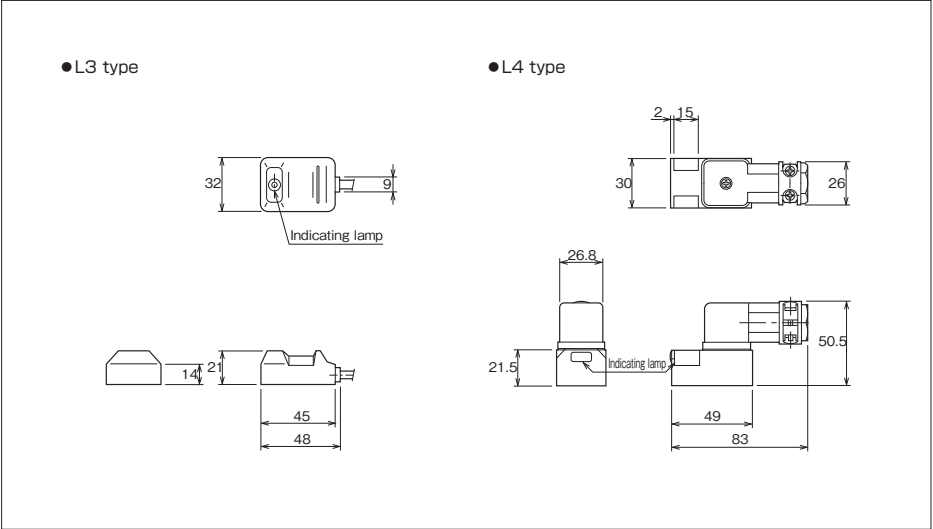
- Built-in protective circuit
- Lead wire type and terminal type are available.

Type	Terminal type	L4-24	L4-100
	With 1 m cord	L3-241	L3-101
	With 5 m cord	L3-245	L3-105
Load voltage range		DC : 20 to 28V	DC : 80 to 220V
Load current range		3 to 50mA	2 to 20mA
Max. switching capacity		1.5W	2VA
Internal voltage drop		5V or less	2V or less
Leakage current		0μA	1 mA or less
Operating time		1.2 ms or less	
Return time		1 ms or less	
Insulation resistance		100 MΩ or more on 500-VDC Megger (between case and cord)	
Withstand voltage		1500 V AC, for 1 min, 1 mA or less (between case and cord)	
Impact resistance		196 m/s ² (unrepeated)	
Ambient temperature		-10 to +60°C (no freezing)	
Wiring method		0.3 mm ² , 2-core, outer dia. ϕ5.3 mm, oil-proof vinyl cabtyre cord	
Protection structure		Lead wire type: IP67 Terminal type: IP65 (IEC Standard)	
Indicating lamp		LED (lights when sensing)	Neon lamp (lights when not sensing)
Output protective circuit		Induced surge preventive circuit for lead wire of up to 50 m is equipped in the sensor.	
Electric circuit			
Applicable load		Small relay, programmable controller	

Note) When using a terminal type sensor, use a 2-core vinyl cabtyre cord having a diameter of 8.5 mm².

Dimensional Drawings

Unit: mm



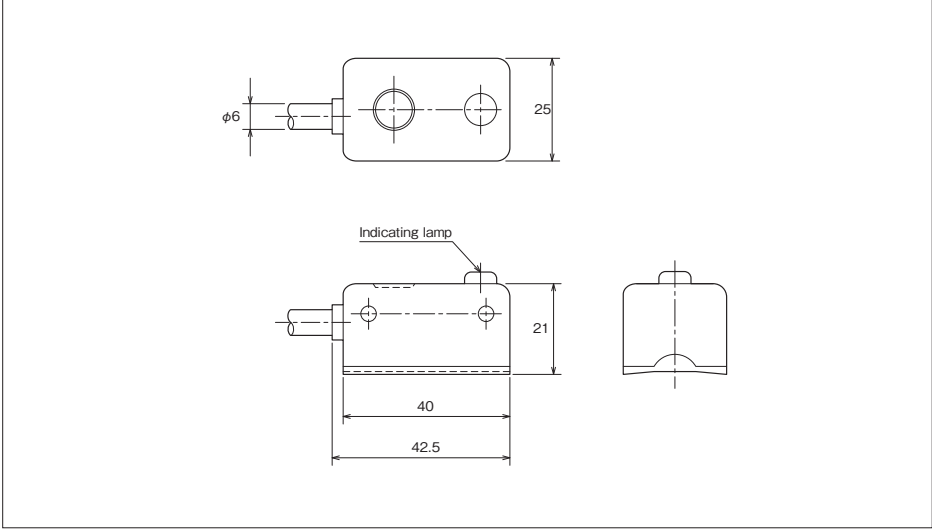
Sensor Specifications

Model		Low sensitivity	Medium sensitivity	High sensitivity	Low sensitivity	Medium sensitivity	High sensitivity
Type	With cord (5 m)	BR215W	BR225W	BR255W(S)	BR415W	BR425W	BR455W(S)
Load voltage range		20 to 50 V DC			80 to 220 V AC		
Load current range		3 to 50 mA			6 to 300 mA		
Max. switching capacity		1.5 W			30 VA		
Internal voltage drop		4 V or less			3 V or less		
Leakage current		0 μA			2 mA or less		
Operating time		1 ms or less			1 ms or less		
Return time		1 ms or less			11 ms or less		
Insulation resistance		100 MΩ or more on 500-VDC Megger (between case and cord)					
Withstand voltage		1500 V AC for 1 min (between case and cord)					
Impact resistance		294 m/s ² (unrepeated)					
Vibration resistance		Double amplitude 1.5 mm, 10 to 55 Hz (1 sweep, 1 min), 2 hrs in each of X, Y and Z directions					
Ambient temperature		−10 to +70°C (no freezing)					
Wiring method		0.5 mm ² , 2-core, outer dia. ϕ6 mm, oil-proof cabtyre cord DC type sensors do not have polarity (⊕ and ⊖).					
Protection structure		IP67 (IEC Standard), JIS C0920 (dust-proof and submersible)					
Output protective circuit		With protective circuit					
Indicating lamp		LED (lights when sensing)			Neon lamp (lights when not sensing)		
Applicable load		Small relay Programmable controller			Small relay Small solenoid valve Pilot lamp Programmable controller		

Note) When the part number contains "S", the sensor is designed only for the compact design hydraulic cylinder 140S-1F.
Example) BR255WS

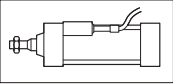
Dimensional Drawings

Unit: mm



Handling procedures

Notes on wiring

- When wiring the sensor, disconnect the power from the equipment on the electric circuit to be connected.
 - Failure to do so may expose the workers to electric shock. Or, the sensor and load may be damaged.
 - Do not apply bending or tensile load to the sensor cord. To prevent application of load to the roots of the sensor cords, secure the wires on a tie rod, or take other appropriate measures. (See the figure.)
 - Failure to do so may break the cords.
- 
- When securing them on a tie rod, take care not to tighten them excessively. Doing so may break the cords.
 - The bending radius shall be as large as possible.
 - Otherwise, the cords may break.
 - Ensure that the bending radius is twice or more the cord diameter.
 - If the distance to the connection is long, secure the cords at intervals of about 20 cm to prevent sagging of the cords.
 - When the cord is laid on the ground, it may be stepped on directly or put under equipment. Protect it with a metallic conduit or the like.
 - Failure to do so may damage the coating, thereby causing breaking or short-circuiting.
 - The distance between the sensor and the load or power supply shall be less than 10 m.
 - If the distance exceeds 10 m, inrush current is carried to the sensor when it is used, and it may be damaged. Take measures against rush current referring to "Notes on contact protection".
 - Do not bundle the cord together with the high-voltage wires of other electric devices or power source cables. Do not lay the cord close to these wires, cables or power sources.
 - Noises from the high-voltage wires, power sources or power source cables will enter the sensor cords and cause malfunctions of the sensor or load. It is recommended to protect the sensor cords with a shield tube.

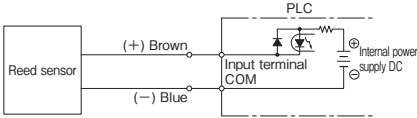
Notes on connecting

- Disconnect the power from the sensor.
 - Failure to do so may expose the workers to electric shock. Or, the sensor and load may be damaged.
 - Do not use a load exceeding the sensor working voltage or current or contact capacity.
 - If the voltage or current is improper, the sensor may malfunction or be damaged.
 - Do not connect power supply directly to any sensor. Connect the sensor to the power supply through a predetermined load, such as a small relay or a programmable controller.
 - Otherwise, the circuit may short, and the sensor may be damaged.
 - Use only one of the following models of relays or their equivalents.
- | | |
|------------------|---|
| OMRON : Model MY | Fuji Electric Holdings Co., Ltd. : Model HH-5 |
| IDEC : Model RY | Panasonic Electric Works Co., Ltd. : Model HC |
- Connect the lead wire correctly according to the wire colors.
 - If power is applied to the sensor which has been wired incorrectly, the sensor will be damaged. In addition, the load may be damaged. Even an instantaneous short-circuit will result in burnout of the electric circuit in the sensor.

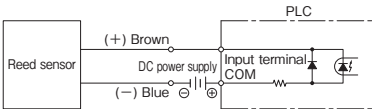
<Connecting procedures>

1. Basic connection

- To connect with PLC (programmable controller)
 - When the PLC has a built-in power supply

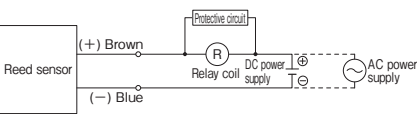


- The figure shown above is an example of connection with a DC input type PLC. (For details, see the manual for the PLC.)
 - An AC input type PLC can be connected in the same manner. However, carefully read "Notes on contact protection".
- When the PLC does not have a built-in power supply



- The figure shown above is an example of connection with a DC input type PLC. (For details, see the manual for the PLC.)
- An AC input type PLC can be connected in the same manner. However, carefully read "Notes on contact protection".

2) To connect with small relay



- For the protective circuit, carefully read "Notes on contact protection".

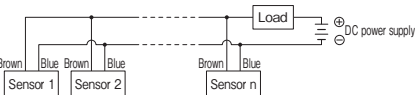
2. Connection of multiple sensors

When sensors are combined with a load, the sensors may not operate. Avoid connecting several sensors (in series or parallel) with a load.

1) Parallel connection

The circuit is configured as shown below.

- The indicating lamps may not light depending on the combination with a load.
- If sensors leak current, the leakage current from the sensor output will increase for the number of sensors. Leakage current may operate the load or hinder it from returning.

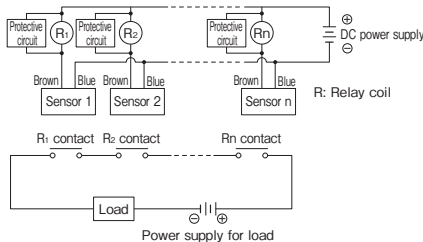


- Ensure that the sum of leakage current is less than the load returning current value.
- The same applies in the case of use of AC power supply.

Handling procedures

2) Series connection

A circuit as shown below is recommended. Connect each sensor through a small relay, and connect the small relay contacts in series.



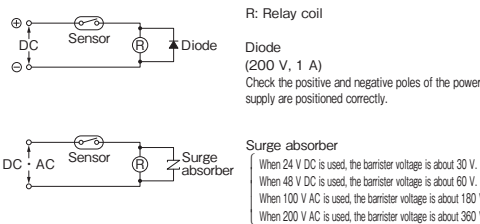
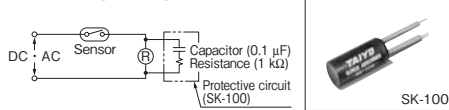
- If sensors are connected in series, the internal voltage drop of the sensor output will increase for the number of sensors. If the internal voltage drop is large, the load may not operate.
- When connecting sensors in series, ensure that the sum of internal voltage drop is less than the load operating voltage.
- The same applies in the case of use of AC power supply.
- Be sure to connect a protective circuit to both ends of the relay coil.

Notes on contact protection

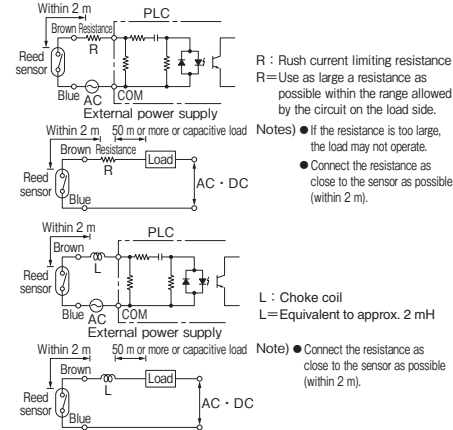
- When an induction load (small relay or solenoid valve) is connected

Surge voltage is generated when the sensor is turned off. To protect the contact, provide a protective circuit on the load side as shown below.

 - If a protective circuit as shown below is not provided, the electric circuit in the sensor may be damaged by the surge voltage.



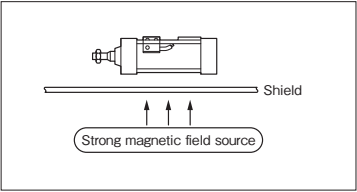
- When the sensor cord is extended to 10 m or more or the sensor is connected to an AC input type PLC (programmable controller) or a capacitive load (capacitor, etc.), rush current will occur when the sensor is turned on. Therefore, be sure to provide a protective circuit as shown in the figure.



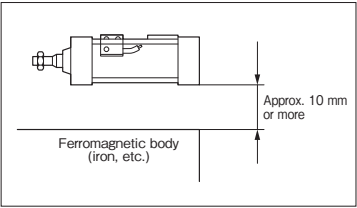
- If a protective circuit as shown above is not provided, the electric circuit in the sensor may be damaged by the rush current.

Notes on installation

- 1. Do not use the cylinder where metal cutting scraps or cutting oil may be spattered directly on the cylinder and sensor.
 - The cord may be cut by metal cutting scraps, or cutting oil may enter the sensor, and the electric circuit may short, thereby causing sensor operation failure.
- 2. In a place where there is a strong magnetic field around the cylinder, install an iron plate or the like to provide a magnetic shield. (Install the shield at a distance of 20 mm or more from the cylinder and sensor.)
 - The sensor may malfunction under the influence of the magnetic field.



- 3. Do not bring any ferromagnetic body (iron, etc.) around the cylinder body or close to the sensor. As a rule, keep a distance of 10 mm or more from such a ferromagnetic body.
 - The sensor may malfunction under the influence of the ferromagnetic body.



Detectable cylinder piston speed

- When setting the sensor at an intermediate position, set the cylinder maximum speed to less than 300 mm/s in consideration of the response speed of the load relay.
 - If the piston speed is too high, the load, such as a relay, may not operate because the sensor operating time is short although it works.
- Determine the detectable cylinder piston speed referring to the following formula.

Detectable piston speed (mm/s) = $\frac{\text{Sensor operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$

- (Notes)
- See the operating time of the load, such as a relay, of each manufacturer.
 - For the calculation, use the minimum value of the sensor operating range and the maximum value of the load operating time.

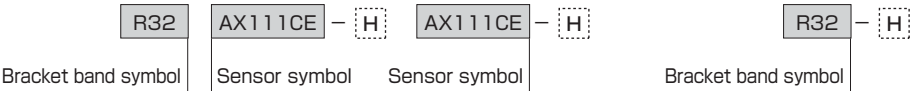


Sensor Specifications
Sensor List

Sensor ListSW102

Type Code

●Part code of sensor and bracket assembly ●Part code of sensor only ●Part code of bracket band only



●For AX and AZ type sensors, it is unnecessary to enter the symbols enclosed by broken line.

Current code is w/d-1

3.5 MPa Small-bore Hydraulic Cylinder
35Z-1R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ20 to φ32	R32AX1**CE	R32AX2**CE-1	AX1**CE	AX2**CE-1	R32
AZ type	φ20 to φ32	R32AZ1**CE	R32AZ2**CE-1	AZ1**CE	AZ2**CE-1	R32
SR type	φ20 to φ32	R01SR405-H	—	SR405-H	—	R01-H

Sensor symbol/part code

■Reed sensor

Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
S : SR405 (with 5 m cord)
Upper wiring
AP : AZ101CE (with 1.5 m cord)
AR : AZ105CE (with 5 m cord)
AS : AZ111CE (with 1.5 m cord)
AT : AZ115CE (with 5 m cord)
AN : AZ125CE (with 5 m cord/no lamp)
AU : AZ11ACE (connector type/AC)
AW : AZ11BCE (connector type/DC)

Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

■Solid state sensor

●2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
Upper wiring
BM : AZ201CE-1 (with 1.5 m cord)
BN : AZ205CE-1 (with 5 m cord)
●2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
Upper wiring
CM : AZ211CE-1 (with 1.5 m cord)
CN : AZ215CE-1 (with 5 m cord)
●3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
Upper wiring
BR : AZ221CE-1 (with 1.5 m cord)
BS : AZ225CE-1 (with 5 m cord)
BQ : AZ235CE (with 5 m cord)

Sensors conforming to CE Marking

●2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (with connector)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

3.5 MPa Hydraulic Cylinder
35H-3R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32 to φ50	R32AX1**	R32AX2**	AX1**	AX2**	R32
	φ63	R33AX1**	R33AX2**			R33
	φ80	R34AX1**	R34AX2**			R34
	φ100	R35AX1**	R35AX2**			R35
AZ type	φ32 to φ50	R32AZ1**	R32AZ2**	AZ1**	AZ2**	R32
	φ63	R33AZ1**	R33AZ2**			R33
	φ80	R34AZ1**	R34AZ2**			R34
	φ100	R35AZ1**	R35AZ2**			R35
WR type/WS type	φ32 to φ50	R21WR***H	R21WS***H	WR***H	WS***	R21-H
	φ63 · φ80	R22WR***H	R22WS***H			R22-H
	φ100	R23WR***H	R23WS***H			R23-H
SR type	φ32 to φ50	R01SR405-H	—	SR405-H	—	R01-H
	φ63 to φ100	R02SR405-H	—			R02-H

Sensor symbol/part code

■Reed sensor

Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
S : SR405 (with 5 m cord)
Upper wiring
AP : AZ101CE (with 1.5 m cord)
AR : AZ105CE (with 5 m cord)
AS : AZ111CE (with 1.5 m cord)
AT : AZ115CE (with 5 m cord)
AN : AZ125CE (with 5 m cord/no lamp)
AU : AZ11ACE (connector type/AC)
AW : AZ11BCE (connector type/DC)
Cutting oil proof type
5 : WR505 (with 5 m cord)
7 : WR505F (with 5 m cord/
flexible tube attached)
6 : WR515 (cord type, with 5 m cord)

Sensors for driving high-voltage/large-current load

Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

■Solid state sensor

Standard type
●2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
Upper wiring
BM : AZ201CE-1 (with 1.5 m cord)
BN : AZ205CE-1 (with 5 m cord)
●2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
Upper wiring
CM : AZ211CE-1 (with 1.5 m cord)
CN : AZ215CE-1 (with 5 m cord)
●3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
Upper wiring
BR : AZ221CE-1 (with 1.5 m cord)
BS : AZ225CE-1 (with 5 m cord)
BQ : AZ235CE (with 5 m cord)

Cutting oil proof type
●2-wire 1-LED type
RA : AX205WCE (with 5 m cord, rear wiring)
RB : AZ205WCE (with 5 m cord, upper wiring)
●2-wire 2-LED type
RE : AX215WCE (with 5 m cord, rear wiring)
RF : AZ215WCE (with 5 m cord, upper wiring)
2 : WS215-1 (with 5 m cord)
4 : WS215-1F (with 5 m cord/
flexible tube attached)
3 : WS225-1 (cord type, with 5 m cord)

10 MPa Small-bore Hydraulic Cylinder
100Z-1R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Part code of band
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ20	AE020AX1**	AE020AX2**	AX1**	AX2**	AE020AX
	φ25	AE025AX1**	AE025AX2**			AE025AX
	φ32	HR032AX1**	HR032AX2**			HR032AX
WR type/WS type	φ20	HR020WR***-H	HR020WS***-H	WR***-H	WS***	HR020WR-H
	φ25	HR025WR***-H	HR025WS***-H			HR025WR-H
	φ32	HR032WR***-H	HR032WS***-H			HR032WR-H

Sensor symbol/part code

■ Reed sensor

Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
Upper wiring
AP : AZ101CE (with 1.5 m cord)
AR : AZ105CE (with 5 m cord)
AS : AZ111CE (with 1.5 m cord)
AT : AZ115CE (with 5 m cord)
AN : AZ125CE (with 5 m cord/no lamp)
AU : AZ11ACE (connector type/AC)
AW : AZ11BCE (connector type/DC)
Cutting oil proof type
5 : WR505 (with 5 m cord)
5F : WR505F (with 5 m cord/
flexible tube attached)
6 : WR515 (cord type, with 5 m cord)

Sensors for driving high-voltage/large-current load

Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

■ Solid state sensor

●2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
Upper wiring
BM : AZ201CE-1 (with 1.5 m cord)
BN : AZ205CE-1 (with 5 m cord)
●2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
Upper wiring
CM : AZ211CE-1 (with 1.5 m cord)
CN : AZ215CE-1 (with 5 m cord)
●3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
Upper wiring
BR : AZ221CE-1 (with 1.5 m cord)
BS : AZ225CE-1 (with 5 m cord)
BQ : AZ235CE (with 5 m cord)

Cutting oil proof type
●2-wire 1-LED type
RA : AX205WCE (with 5 m cord, rear wiring)
RB : AZ205WCE (with 5 m cord, upper wiring)
●2-wire 2-LED type
RE : AX215WCE (with 5 m cord, rear wiring)
RF : AZ215WCE (with 5 m cord, upper wiring)
2 : WS215-1 (2-LED type, with 5 m cord)
2F : WS215-1F (2-LED type, with 5 m cord/
flexible tube attached)
3 : WS225-1 (2-LED type, cord type, with 5 m cord)

Sensors conforming to CE Marking

●2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (with connector)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

10 MPa Double Acting Hydraulic Cylinder
100H-2R・100HW-2R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32・φ40	R32AX1**	R32AX2**	AX1**	AX2**	R32
	φ50・φ63	R33AX1**	R33AX2**			R33
	φ80	R34AX1**	R34AX2**			R34
	φ100	R35AX1**	R35AX2**			R35
	φ125	R36AX1**	R36AX2**			R36
AZ type	φ32・φ40	R32AZ1**	R32AZ2**	AZ1**	AZ2**	R32
	φ50・φ63	R33AZ1**	R33AZ2**			R33
	φ80	R34AZ1**	R34AZ2**			R34
	φ100	R35AZ1**	R35AZ2**			R35
	φ125	R36AZ1**	R36AZ2**			R36
WR type/WS type	φ32・φ40	R21WR***-H	R21WS***-H	WR***-H	WS***	R21-H
	φ50・φ63	R22WR***-H	R22WS***-H			R22-H
	φ80	R23WR***-H	R23WS***-H			R23-H
	φ100・φ125	R24WR***-H	R24WS***-H			R24-H

Sensor symbol/part code

■ Reed sensor

Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
Upper wiring
AP : AZ101CE (with 1.5 m cord)
AR : AZ105CE (with 5 m cord)
AS : AZ111CE (with 1.5 m cord)
AT : AZ115CE (with 5 m cord)
AN : AZ125CE (with 5 m cord/no lamp)
AU : AZ11ACE (connector type/AC)
AW : AZ11BCE (connector type/DC)
Cutting oil proof type
5 : WR505 (with 5 m cord)
7 : WR505F (with 5 m cord/
flexible tube attached)
6 : WR515 (cord type, with 5 m cord)

Sensors for driving high-voltage/large-current load

Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

■ Solid state sensor

Standard type
●2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
Upper wiring
BM : AZ201CE-1 (with 1.5 m cord)
BN : AZ205CE-1 (with 5 m cord)
●2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
Upper wiring
CM : AZ211CE-1 (with 1.5 m cord)
CN : AZ215CE-1 (with 5 m cord)
●3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
Upper wiring
BR : AZ221CE-1 (with 1.5 m cord)
BS : AZ225CE-1 (with 5 m cord)
BQ : AZ235CE (with 5 m cord)

Cutting oil proof type

●2-wire 1-LED type
RA : AX205WCE (with 5 m cord, rear wiring)
RB : AZ205WCE (with 5 m cord, upper wiring)
●2-wire 2-LED type
RE : AX215WCE (with 5 m cord, rear wiring)
RF : AZ215WCE (with 5 m cord, upper wiring)
Upper wiring
2 : WS215-1 (2-LED type, with 5 m cord)
4 : WS215-1F (2-LED type, with 5 m cord/
flexible tube attached)
3 : WS225-1 (2-LED type, cord type, with 5 m cord)

Sensors conforming to CE Marking

●2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (with connector)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

7/14 MPa Double Acting Hydraulic Cylinder
70/140H-8R・70/140HW-8R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32 to φ50	R34AX1**	R34AX2**	AX1**	AX2**	R34
	φ63	R35AX1**	R35AX2**			R35
	φ80・φ100	R36AX1**	R36AX2**			R36
	φ125	R37AX1**	R37AX2**			R37
	φ140	R38AX1**	R38AX2**			R38
AZ type	φ32 to φ50	R34AZ1**	R34AZ2**	AZ1**	AZ2**	R34
	φ63	R35AZ1**	R35AZ2**			R35
	φ80・φ100	R36AZ1**	R36AZ2**			R36
	φ125	R37AZ1**	R37AZ2**			R37
	φ140	R38AZ1**	R38AZ2**			R38
WR type/WS type	φ32 to φ50	R22WR***-H	R22WS***-H	WR***-H	WS***	R22-H
	φ63	R23WR***-H	R23WS***-H			R23-H
	φ80	R24WR***-H	R24WS***-H			R24-H
	φ100	R25WR***-H	R25WS***-H			R25-H
	φ125	R26WR***-H	R26WS***-H			R26-H
SR type	φ32 to φ63	R02SR405-H	—	SR405-H	—	R02-H
	φ80	R04SR405-H	—			R04-H
	φ100	R05SR405-H	—			R05-H
	φ125	R19SR405-H	—			R19-H

Sensor symbol/part code

■ Reed sensor

Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
S : SR405 (with 5 m cord)
Upper wiring
AP : AZ101CE (with 1.5 m cord)
AR : AZ105CE (with 5 m cord)
AS : AZ111CE (with 1.5 m cord)
AT : AZ115CE (with 5 m cord)
AN : AZ125CE (with 5 m cord/no lamp)
AU : AZ11ACE (connector type/AC)
AW : AZ11BCE (connector type/DC)
Cutting oil proof type
5 : WR505 (with 5 m cord)
7 : WR505F (with 5 m cord/
flexible tube attached)
6 : WR515 (cord type, with 5 m cord)

Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

■ Solid state sensor

Standard type
●2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
Upper wiring
BM : AZ201CE-1 (with 1.5 m cord)
BN : AZ205CE-1 (with 5 m cord)
●2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
Upper wiring
CM : AZ211CE-1 (with 1.5 m cord)
CN : AZ215CE-1 (with 5 m cord)
●3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
Upper wiring
BR : AZ221CE-1 (with 1.5 m cord)
BS : AZ225CE-1 (with 5 m cord)
BQ : AZ235CE (with 5 m cord)

Cutting oil proof type
●2-wire 1-LED type
RA : AX205WCE (with 5 m cord, rear wiring)
RB : AZ205WCE (with 5 m cord, upper wiring)
●2-wire 2-LED type
RE : AX215WCE (with 5 m cord, rear wiring)
RF : AZ215WCE (with 5 m cord, upper wiring)
Upper wiring
2 : WS215-1 (2-LED type, with 5 m cord)
4 : WS215-1F (2-LED type, with 5 m cord/
flexible tube attached)
3 : WS225-1 (2-LED type, cord type, with 5 m cord)

Sensors conforming to CE Marking

●2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (with connector)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

16 MPa Double Acting Hydraulic Cylinder
160H-1R・160HW-1R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32	R32AX1**	R32AX2**	AX1**	AX2**	R32
	φ40	R33AX1**	R33AX2**			R33
	φ50・φ63	R35AX1**	R35AX2**			R35
	φ80・φ100	R36AX1**	R36AX2**			R36
	φ125	R37AX1**	R37AX2**			R37
	φ140	R38AX1**	R38AX2**			R38
	φ160	R39AX1**	R39AX2**			R39
AZ type	φ32	R32AZ1**	R32AZ2**	AZ1**	AZ2**	R32
	φ40	R33AZ1**	R33AZ2**			R33
	φ50・φ63	R35AZ1**	R35AZ2**			R35
	φ80・φ100	R36AZ1**	R36AZ2**			R36
	φ125	R37AZ1**	R37AZ2**			R37
	φ140	R38AZ1**	R38AZ2**			R38
	φ160	R39AZ1**	R39AZ2**			R39
WR type/WS type	φ32	R21WR***-H	R21WS***-H	WR***-H	WS***	R21-H
	φ40	R22WR***-H	R22WS***-H			R22-H
	φ50・φ63	R23WR***-H	R23WS***-H			R23-H
	φ80	R24WR***-H	R24WS***-H			R24-H

Sensor symbol/part code

■ Reed sensor

Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
Upper wiring
AP : AZ101CE (with 1.5 m cord)
AR : AZ105CE (with 5 m cord)
AS : AZ111CE (with 1.5 m cord)
AT : AZ115CE (with 5 m cord)
AN : AZ125CE (with 5 m cord/no lamp)
AU : AZ11ACE (connector type/AC)
AW : AZ11BCE (connector type/DC)
Cutting oil proof type
5 : WR505 (with 5 m cord)
7 : WR505F (with 5 m cord/
flexible tube attached)
6 : WR515 (cord type, with 5 m cord)

Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

■ Solid state sensor

●2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
Upper wiring
BM : AZ201CE-1 (with 1.5 m cord)
BN : AZ205CE-1 (with 5 m cord)
●2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
CH : AX21CCE-1 (connector type/with 0.5 m cord)
CJ : AX21DCE-1 (connector type/with 1 m cord)
Upper wiring
CM : AZ211CE-1 (with 1.5 m cord)
CN : AZ215CE-1 (with 5 m cord)
●3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
Upper wiring
BR : AZ221CE-1 (with 1.5 m cord)
BS : AZ225CE-1 (with 5 m cord)
BQ : AZ235CE (with 5 m cord)

Cutting oil proof type
●2-wire 1-LED type
RA : AX205WCE (with 5 m cord, rear wiring)
RB : AZ205WCE (with 5 m cord, upper wiring)
●2-wire 2-LED type
RE : AX215WCE (with 5 m cord, rear wiring)
RF : AZ215WCE (with 5 m cord, upper wiring)
Upper wiring
2 : WS215-1 (2-LED type, with 5 m cord)
4 : WS215-1F (2-LED type, with 5 m
cord/flexible tube attached)
3 : WS225-1 (2-LED type, cord type,
with 5 m cord)

Sensors conforming to CE Marking

●2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (with connector)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

21 MPa Double Acting Hydraulic Cylinder
210C-1R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ40	R34AX1**	R34AX2**	AX1**	AX2**	R34
	φ50	R35AX1**	R35AX2**			R35
	φ63	R35AX1**	R35AX2**			R35
	φ80	R36AX1**	R36AX2**			R36
AZ type	φ40	R34AZ1**	R34AZ2**	AZ1**	AZ2**	R34
	φ50	R35AZ1**	R35AZ2**			R35
	φ63	R35AZ1**	R35AZ2**			R35
	φ80	R36AZ1**	R36AZ2**			R36

Sensor symbol/part code

■ Reed sensor	■ Solid state sensor	
Rear wiring	● 2-wire 1-LED type	
AF : AX101CE (with 1.5 m cord)	Rear wiring	Sensors conforming to CE Marking
AG : AX105CE (with 5 m cord)	BE : AX201CE-1 (with 1.5 m cord)	● 2-wire 2-LED type
AH : AX111CE (with 1.5 m cord)	BF : AX205CE-1 (with 5 m cord)	Rear wiring
AJ : AX115CE (with 5 m cord)	Upper wiring	CT : AX211CE-1 (with 1.5 m cord)
AE : AX125CE (with 5 m cord/no lamp)	BM : AZ201CE-1 (with 1.5 m cord)	CU : AX215CE-1 (with 5 m cord)
AK : AX11ACE (connector type/AC)	BN : AZ205CE-1 (with 5 m cord)	CV : AX21BCE-1 (with connector)
AL : AX11BCE (connector type/DC)	● 2-wire 2-LED type	Upper wiring
Upper wiring	Rear wiring	CW : AZ211CE-1 (with 1.5 m cord)
AP : AZ101CE (with 1.5 m cord)	CE : AX211CE-1 (with 1.5 m cord)	CX : AZ215CE-1 (with 5 m cord)
AR : AZ105CE (with 5 m cord)	CF : AX215CE-1 (with 5 m cord)	CY : AZ21BCE-1 (connector type)
AS : AZ111CE (with 1.5 m cord)	CH : AX21CCE-1 (connector type/with 0.5 m cord)	
AT : AZ115CE (with 5 m cord)	CJ : AX21DCE-1 (connector type/with 1 m cord)	
AN : AZ125CE (with 5 m cord/no lamp)	Upper wiring	
AU : AZ11ACE (connector type/AC)	CM : AZ211CE-1 (with 1.5 m cord)	
AW : AZ11BCE (connector type/DC)	CN : AZ215CE-1 (with 5 m cord)	
	● 3-wire 1-LED type	
Sensors for driving high-voltage/large-current load	Rear wiring	
Rear wiring	BH : AX221CE-1 (with 1.5 m cord)	
AM : AX135CE (with 5 m cord)	BJ : AX225CE-1 (with 5 m cord)	
Upper wiring	BL : AX235CE (with 5 m cord)	
AY : AZ135CE (with 5 m cord)	Upper wiring	
	BR : AZ221CE-1 (with 1.5 m cord)	
	BS : AZ225CE-1 (with 5 m cord)	
	BQ : AZ235CE (with 5 m cord)	

3.5 MPa Compact Design Hydraulic Cylinder
35S-1R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ20 to φ63	T10AX1**	T10AX2**	AX1**	AX2**	T10
AZ type	φ20 to φ63	T10AZ1**	T10AZ2**	AZ1**	AZ2**	T10
WR type/WS type	φ20 to φ63	T07WR***-H	T07WS***-H	WR***-H	WS***	T07-H

Sensor symbol/part code

■ Reed sensor	■ Solid state sensor	Sensors conforming to CE Marking
Standard type	Standard type	● 2-wire 2-LED type
Rear wiring	● 2-wire 1-LED type	Rear wiring
AF : AX101CE (with 1.5 m cord)	BE : AX201CE-1 (with 1.5 m cord)	CT : AX211CE-1 (with 1.5 m cord)
AG : AX105CE (with 5 m cord)	BF : AX205CE-1 (with 5 m cord)	CU : AX215CE-1 (with 5 m cord)
AH : AX111CE (with 1.5 m cord)	Upper wiring	CV : AX21BCE-1 (with connector)
AJ : AX115CE (with 5 m cord)	BM : AZ201CE-1 (with 1.5 m cord)	Upper wiring
AE : AX125CE (with 5 m cord/no lamp)	BN : AZ205CE-1 (with 5 m cord)	CW : AZ211CE-1 (with 1.5 m cord)
AK : AX11ACE (connector type/AC)	● 2-wire 2-LED type	CX : AZ215CE-1 (with 5 m cord)
AL : AX11BCE (connector type/DC)	Rear wiring	CY : AZ21BCE-1 (connector type)
Upper wiring	CE : AX211CE-1 (with 1.5 m cord)	
AP : AZ101CE (with 1.5 m cord)	CF : AX215CE-1 (with 5 m cord)	
AR : AZ105CE (with 5 m cord)	Upper wiring	
AS : AZ111CE (with 1.5 m cord)	CM : AZ211CE-1 (with 1.5 m cord)	
AT : AZ115CE (with 5 m cord)	CN : AZ215CE-1 (with 5 m cord)	
AN : AX125CE (with 5 m cord/no lamp)	● 3-wire 1-LED type	
AU : AZ11ACE (connector type/AC)	Rear wiring	
AW : AZ11BCE (connector type/DC)	BH : AX221CE-1 (with 1.5 m cord)	
Cutting oil proof type	BJ : AX225CE-1 (with 5 m cord)	
5 : WR525 (with 5 m cord)	BL : AX235CE (with 5 m cord)	
7 : WR525F (with 5 m cord/ flexible tube attached)	Upper wiring	
8 : WR535 (with 5 m cord)	BR : AZ221CE-1 (with 1.5 m cord)	
	BS : AZ225CE-1 (with 5 m cord)	
Sensors for driving high-voltage/large-current load	BQ : AZ235CE (with 5 m cord)	
Rear wiring		
AM : AX135CE (with 5 m cord)	Cutting oil proof type	
Upper wiring	● 2-wire 1-LED type	
AY : AZ135CE (with 5 m cord)	RA : AX205WCE (with 5 m cord, rear wiring)	
	RB : AZ205WCE (with 5 m cord, upper wiring)	
	● 2-wire 2-LED type	
	RE : AX215WCE (with 5 m cord, rear wiring)	
	RF : AZ215WCE (with 5 m cord, upper wiring)	
	2 : WS235-1 (with 5 m cord)	
	4 : WS235-1F (with 5 m cord/ flexible tube attached)	
	1 : WS245-1 (with 5 m cord)	

Compact Design Hydraulic Cylinder
HQS2R・HQS2R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
T type	φ20・φ25	—	—	T***	T***	—
AX type	φ32 to φ100	T10AX1**	T10AX2**	AX1**	AX2**	T10
AZ type	φ32 to φ100	T10AZ1**	T10AZ2**	AZ1**	AZ2**	T10
WR type/WS type	φ32 to φ100	T07WR***-H	T07WS***-H	WR***-H	WS***	T07-H

Sensor symbol/part code

- Reed sensor
Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
UA : T0H (with 1 m cord)
UB : T0H3 (with 3 m cord)
UC : T5H (with 1 m cord)
UD : T5H3 (with 3 m cord)
Upper wiring
AP : AZ101CE (with 1.5 m cord)
AR : AZ105CE (with 5 m cord)
AS : AZ111CE (with 1.5 m cord)
AT : AZ115CE (with 5 m cord)
AN : AZ125CE (with 5 m cord/no lamp)
AU : AZ11ACE (connector type/AC)
AW : AZ11BCE (connector type/DC)
UE : T0V (with 1 m cord)
UF : T0V3 (with 3 m cord)
UG : T5V (with 1 m cord)
UH : T5V3 (with 3 m cord)
Cutting oil proof type
5 : WR525 (with 5 m cord)
8 : WR535 (with 5 m cord)
5F : WR525F (with 5 m cord/
flexible tube attached)
8F : WR535F (with 5 m cord/
flexible tube attached)

Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)
- Solid state sensor
Standard type
●2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
UJ : T2H (with 1 m cord)
UK : T2H3 (with 3 m cord)
Upper wiring
BM : AZ201CE-1 (with 1.5 m cord)
BN : AZ205CE-1 (with 5 m cord)
UQ : T2V (with 1 m cord)
UR : T2V3 (with 3 m cord)
●2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
UL : T2YH (with 1 m cord)
UM : T2YH3 (with 3 m cord)
Upper wiring
CM : AZ211CE-1 (with 1.5 m cord)
CN : AZ215CE-1 (with 5 m cord)
US : T2YV (with 1 m cord)
UT : T2YV3 (with 3 m cord)
●3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
UN : T3H (with 1 m cord)
UP : T3H3 (with 3 m cord)
Upper wiring
BR : AZ221CE-1 (with 1.5 m cord)
BS : AZ225CE-1 (with 5 m cord)
BQ : AZ235CE (with 5 m cord)
UU : T3V (with 1 m cord)
UV : T3V3 (with 3 m cord)

- Cutting oil proof type
●2-wire 1-LED type
RA : AX205WCE (with 5 m cord, rear wiring)
RB : AZ205WCE (with 5 m cord, upper wiring)
●2-wire 2-LED type
RE : AX215WCE (with 5 m cord, rear wiring)
RF : AZ215WCE (with 5 m cord, upper wiring)
Upper wiring
2 : WS235-1 (with 5 m cord)
1 : WS245-1 (with 5 m cord)
2F : WS235-1F (with 5 m cord/
flexible tube attached)
1F : WS245-1F (with 5 m cord/
flexible tube attached)

- Sensors conforming to CE Marking
●2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (with connector)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

10 MPa Compact Design Hydraulic Cylinder
100S-1R・100SW-1R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
T type	φ20・φ25	—	—	T***	T***	—
AX type	φ32 to φ100	T10AX1**	T10AX2**	AX1**	AX2**	T10
AZ type	φ32 to φ100	T10AZ1**	T10AZ2**	AZ1**	AZ2**	T10
WR type/WS type	φ32 to φ100	T07WR***-H	T07WS***-H	WR***-H	WS***	T07-H

Sensor symbol/part code

- Reed sensor
Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
UA : T0H (with 1 m cord)
UB : T0H3 (with 3 m cord)
UC : T5H (with 1 m cord)
UD : T5H3 (with 3 m cord)
Upper wiring
AP : AZ101CE (with 1.5 m cord)
AR : AZ105CE (with 5 m cord)
AS : AZ111CE (with 1.5 m cord)
AT : AZ115CE (with 5 m cord)
AN : AZ125CE (with 5 m cord/no lamp)
AU : AZ11ACE (connector type/AC)
AW : AZ11BCE (connector type/DC)
UE : T0V (with 1 m cord)
UF : T0V3 (with 3 m cord)
UG : T5V (with 1 m cord)
UH : T5V3 (with 3 m cord)
Cutting oil proof type
5 : WR525 (with 5 m cord)
8 : WR535 (with 5 m cord)
5F : WR525F (with 5 m cord/
flexible tube attached)
8F : WR535F (with 5 m cord/
flexible tube attached)

Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)
- Solid state sensor
Standard type
●2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
UJ : T2H (with 1 m cord)
UK : T2H3 (with 3 m cord)
Upper wiring
BM : AZ201CE-1 (with 1.5 m cord)
BN : AZ205CE-1 (with 5 m cord)
UQ : T2V (with 1 m cord)
UR : T2V3 (with 3 m cord)
●2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
UL : T2YH (with 1 m cord)
UM : T2YH3 (with 3 m cord)
Upper wiring
CM : AZ211CE-1 (with 1.5 m cord)
CN : AZ215CE-1 (with 5 m cord)
US : T2YV (with 1 m cord)
UT : T2YV3 (with 3 m cord)
●3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
UN : T3H (with 1 m cord)
UP : T3H3 (with 3 m cord)
Upper wiring
BR : AZ221CE-1 (with 1.5 m cord)
BS : AZ225CE-1 (with 5 m cord)
BQ : AZ235CE (with 5 m cord)
UU : T3V (with 1 m cord)
UV : T3V3 (with 3 m cord)
- Cutting oil proof type
●2-wire 1-LED type
RA : AX205WCE (with 5 m cord, rear wiring)
RB : AZ205WCE (with 5 m cord, upper wiring)
●2-wire 2-LED type
RE : AX215WCE (with 5 m cord, rear wiring)
RF : AZ215WCE (with 5 m cord, upper wiring)
Upper wiring
2 : WS235-1 (with 5 m cord)
1 : WS245-1 (with 5 m cord)
2F : WS235-1F (with 5 m cord/
flexible tube attached)
1F : WS245-1F (with 5 m cord/
flexible tube attached)
- Sensors conforming to CE Marking
●2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (with connector)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

16 MPa Compact Design Hydraulic Cylinder
160S-1R・160SW-1R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32 to φ80	T10AX1**	T10AX2**	AX1**	AX2**	T10
AZ type	φ32 to φ80	T10AZ1**	T10AZ2**	AZ1**	AZ2**	T10
WR type/WS type	φ32 to φ80	T07WR***-H	T07WS***-H	WR***-H	WS***	T07-H

Sensor symbol/part code

■ Reed sensor

Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
Upper wiring
AP : AZ101CE (with 1.5 m cord)
AR : AZ105CE (with 5 m cord)
AS : AZ111CE (with 1.5 m cord)
AT : AZ115CE (with 5 m cord)
AN : AZ125CE (with 5 m cord/no lamp)
AU : AZ11ACE (connector type/AC)
AW : AZ11BCE (connector type/DC)
Cutting oil proof type
5 : WR525 (with 5 m cord)
8 : WR535 (with 5 m cord)
5F : WR525F (with 5 m cord/
flexible tube attached)
8F : WR535F (with 5 m cord/
flexible tube attached)

Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

■ Solid state sensor

Standard type
● 2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
Upper wiring
BM : AZ201CE-1 (with 1.5 m cord)
BN : AZ205CE-1 (with 5 m cord)
● 2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
Upper wiring
CM : AZ211CE-1 (with 1.5 m cord)
CN : AZ215CE-1 (with 5 m cord)
● 3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
Upper wiring
BR : AZ221CE-1 (with 1.5 m cord)
BS : AZ225CE-1 (with 5 m cord)
BQ : AZ235CE (with 5 m cord)

Cutting oil proof type
● 2-wire 1-LED type
RA : AX205WCE (with 5 m cord, rear wiring)
RB : AZ205WCE (with 5 m cord, upper wiring)
● 2-wire 2-LED type
RE : AX215WCE (with 5 m cord, rear wiring)
RF : AZ215WCE (with 5 m cord, upper wiring)
2 : WS235-1 (with 5 m cord)
1 : WS245-1 (with 5 m cord)
2F : WS235-1F (with 5 m cord/
flexible tube attached)
1F : WS245-1F (with 5 m cord/
flexible tube attached)

Sensors conforming to CE Marking
● 2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (with connector)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

21 MPa Compact Design Hydraulic Cylinder
210S-1R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32 to φ80	T10AX1**	T10AX2**	AX1**	AX2**	T10
AZ type	φ32 to φ80	T10AZ1**	T10AZ2**	AZ1**	AZ2**	T10
WR type/WS type	φ32 to φ80	T07WR***-H	T07WS***-H	WR***-H	WS***	T07-H

Sensor symbol/part code

■ Reed sensor

Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
Upper wiring
AP : AZ101CE (with 1.5 m cord)
AR : AZ105CE (with 5 m cord)
AS : AZ111CE (with 1.5 m cord)
AT : AZ115CE (with 5 m cord)
AN : AZ125CE (with 5 m cord/no lamp)
AU : AZ11ACE (connector type/AC)
AW : AZ11BCE (connector type/DC)
Cutting oil proof type
5 : WR525 (with 5 m cord)
8 : WR535 (with 5 m cord)
5F : WR525F (with 5 m cord/
flexible tube attached)
8F : WR535F (with 5 m cord/
flexible tube attached)

Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

■ Solid state sensor

Standard type
● 2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
Upper wiring
BM : AZ201CE-1 (with 1.5 m cord)
BN : AZ205CE-1 (with 5 m cord)
● 2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
Upper wiring
CM : AZ211CE-1 (with 1.5 m cord)
CN : AZ215CE-1 (with 5 m cord)
● 3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
Upper wiring
BR : AZ221CE-1 (with 1.5 m cord)
BS : AZ225CE-1 (with 5 m cord)
BQ : AZ235CE (with 5 m cord)

Cutting oil proof type
● 2-wire 1-LED type
RA : AX205WCE (with 5 m cord, rear wiring)
RB : AZ205WCE (with 5 m cord, upper wiring)
● 2-wire 2-LED type
RE : AX215WCE (with 5 m cord, rear wiring)
RF : AZ215WCE (with 5 m cord, upper wiring)
2 : WS235-1 (with 5 m cord)
1 : WS245-1 (with 5 m cord)
2F : WS235-1F (with 5 m cord/
flexible tube attached)
1F : WS245-1F (with 5 m cord/
flexible tube attached)

3.5 MPa Hydraulic Cylinder with Position Detector
35P-3R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32 to φ50	R32AX1**	R32AX2**	AX1**	AX2**	R32
	φ63	R33AX1**	R33AX2**			R33
	φ80	R34AX1**	R34AX2**			R34
	φ100	R35AX1**	R35AX2**			R35
AZ type	φ32 to φ50	R32AZ1**	R32AZ2**	AZ1**	AZ2**	R32
	φ63	R33AZ1**	R33AZ2**			R33
	φ80	R34AZ1**	R34AZ2**			R34
	φ100	R35AZ1**	R35AZ2**			R35
SR type	φ32 to φ50	R01SR405-H	—	SR405-H	—	R01-H
	φ63 to φ100	R02SR405-H	—			R02-H

Sensor symbol/part code

■ Reed sensor	■ Solid state sensor	
Standard type	Standard type	Sensors conforming to CE Marking
Rear wiring	● 2-wire 1-LED type	● 2-wire 2-LED type
AF : AX101CE (with 1.5 m cord)	Rear wiring	Rear wiring
AG : AX105CE (with 5 m cord)	BE : AX201CE-1 (with 1.5 m cord)	CT : AX211CE-1 (with 1.5 m cord)
AH : AX111CE (with 1.5 m cord)	BF : AX205CE-1 (with 5 m cord)	CU : AX215CE-1 (with 5 m cord)
AJ : AX115CE (with 5 m cord)	Upper wiring	CV : AX21BCE-1 (with connector)
AE : AX125CE (with 5 m cord/no lamp)	BM : AZ201CE-1 (with 1.5 m cord)	Upper wiring
AK : AX11ACE (connector type/AC)	BN : AZ205CE-1 (with 5 m cord)	CW : AZ211CE-1 (with 1.5 m cord)
AL : AX11BCE (connector type/DC)	● 2-wire 2-LED type	CX : AZ215CE-1 (with 5 m cord)
S : SR405 (with 5 m cord)	Rear wiring	CY : AZ21BCE-1 (connector type)
Upper wiring	CE : AX211CE-1 (with 1.5 m cord)	
AP : AZ101CE (with 1.5 m cord)	CF : AX215CE-1 (with 5 m cord)	
AR : AZ105CE (with 5 m cord)	Upper wiring	
AS : AZ111CE (with 1.5 m cord)	CM : AZ211CE-1 (with 1.5 m cord)	
AT : AZ115CE (with 5 m cord)	CN : AZ215CE-1 (with 5 m cord)	
AN : AZ125CE (with 5 m cord/no lamp)	● 3-wire 1-LED type	
AU : AX11ACE (connector type/AC)	Rear wiring	
AW : AZ11BCE (connector type/DC)	BH : AX221CE-1 (with 1.5 m cord)	
	BJ : AX225CE-1 (with 5 m cord)	
	BL : AX235CE (with 5 m cord)	
Sensors for driving high-voltage/large-current load	Upper wiring	
Rear wiring	BR : AZ221CE-1 (with 1.5 m cord)	
AM : AX135CE (with 5 m cord)	BS : AZ225CE-1 (with 5 m cord)	
Upper wiring	BQ : AZ235CE (with 5 m cord)	
AY : AZ135CE (with 5 m cord)		

7/14 MPa Hydraulic Cylinder with Position Detector
70/140P-8R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32 to φ50	R34AX1**	R34AX2**	AX1**	AX2**	R34
	φ63	R35AX1**	R35AX2**			R35
	φ80 · φ100	R36AX1**	R36AX2**			R36
AZ type	φ32 to φ50	R34AZ1**	R34AZ2**	AZ1**	AZ2**	R34
	φ63	R35AZ1**	R35AZ2**			R35
	φ80 · φ100	R36AZ1**	R36AZ2**			R36

Sensor symbol/part code

■ Reed sensor	■ Solid state sensor	
Standard type	Standard type	Sensors conforming to CE Marking
Rear wiring	● 2-wire 1-LED type	● 2-wire 2-LED type
AF : AX101CE (with 1.5 m cord)	Rear wiring	Rear wiring
AG : AX105CE (with 5 m cord)	BE : AX201CE-1 (with 1.5 m cord)	CT : AX211CE-1 (with 1.5 m cord)
AH : AX111CE (with 1.5 m cord)	BF : AX205CE-1 (with 5 m cord)	CU : AX215CE-1 (with 5 m cord)
AJ : AX115CE (with 5 m cord)	Upper wiring	CV : AX21BCE-1 (with connector)
AE : AX125CE (with 5 m cord/no lamp)	BM : AZ201CE-1 (with 1.5 m cord)	Upper wiring
AK : AX11ACE (connector type/AC)	BN : AZ205CE-1 (with 5 m cord)	CW : AZ211CE-1 (with 1.5 m cord)
AL : AX11BCE (connector type/DC)	● 2-wire 2-LED type	CX : AZ215CE-1 (with 5 m cord)
Upper wiring	Rear wiring	CY : AZ21BCE-1 (connector type)
AP : AZ101CE (with 1.5 m cord)	CE : AX211CE-1 (with 1.5 m cord)	
AR : AZ105CE (with 5 m cord)	CF : AX215CE-1 (with 5 m cord)	
AS : AZ111CE (with 1.5 m cord)	Upper wiring	
AT : AZ115CE (with 5 m cord)	CM : AZ211CE-1 (with 1.5 m cord)	
AN : AZ125CE (with 1.5 m cord/no lamp)	CN : AZ215CE-1 (with 5 m cord)	
AU : AX11ACE (connector type/AC)	● 3-wire 1-LED type	
AW : AZ11BCE (connector type/DC)	Rear wiring	
	BH : AX221CE-1 (with 1.5 m cord)	
Sensors for driving high-voltage/large-current load	BJ : AX225CE-1 (with 5 m cord)	
Rear wiring	BL : AX235CE (with 5 m cord)	
AM : AX135CE (with 5 m cord)	Upper wiring	
Upper wiring	BR : AZ221CE-1 (with 1.5 m cord)	
AY : AZ135CE (with 5 m cord)	BS : AZ225CE-1 (with 5 m cord)	
	BQ : AZ235CE (with 5 m cord)	

3.5 MPa Compact Design Hydraulic Cylinder
35SY-1R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
KR type/KS type	φ20 to φ63	T05KR***-H	T05KS***-H	KR***-H	KS***-H	T05
WR type/WS type	φ20 to φ63	T07WR535-H	T07WS245-H	WR535-H	WS245	T07

Sensor symbol/part code

- Reed sensor

Standard type

E : KR101 (with 1.5 m cord)

F : KR105 (with 5 m cord)

Cutting oil proof type

8 : WR535 (cord type, with 5 m cord)
- Solid state sensor

Standard type

S : KS211 (2-LED type, with 1.5 m cord)

T : KS215 (2-LED type, with 5 m cord)

Cutting oil proof type

1 : WS245-1 (2-LED type, cord type, with 5 m cord)

7/14 MPa Hydraulic Cylinder
70/140Y-2R・70/140YW-2R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32 to φ50	R34AX1**	R34AX2**	AX1**	AX2**	R34
	φ63	R35AX1**	R35AX2**			R35
	φ80・φ100	R36AX1**	R36AX2**			R36
	φ125	R37AX1**	R37AX2**			R37
WR type/WS type	φ32 to φ50	R22WR***-H	R22WS***-H	WR***-H	WS***	R22-H
	φ63	R23WR***-H	R23WS***-H			R23-H
	φ80	R24WR***-H	R24WS***-H			R24-H
	φ100	R25WR***-H	R25WS***-H			R25-H
	φ125	R26WR***-H	R26WS***-H			R26-H

Sensor symbol/part code

- Reed sensor

Standard type

Rear wiring

AF : AX101CE (with 1.5 m cord)

AG : AX105CE (with 5 m cord)

Cutting oil proof type

5 : WR505 (with 5 m cord)

7 : WR505F (with 5 m cord/flexible tube attached)
- Solid state sensor

Standard type

● 2-wire 2-LED type

Rear wiring

CE : AX211CE-1 (with 1.5 m cord)

CF : AX215CE-1 (with 5 m cord)

CH : AX21CCE-1 (with 0.5 m cord/connector type)

CJ : AX21DCE-1 (with 1 m cord/connector type)

Cutting oil proof type

2 : WS215-1 (with 5 m cord)

4 : WS215-1F (with 5 m cord/flexible tube attached)

3.5 MPa Rotary Actuator
35RP2

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32 to φ50	R32AX1**	R32AX2**	AX1**	AX2**	R32
	φ63	R33AX1**	R33AX2**			R33
	φ80	R34AX1**	R34AX2**			R34
AZ type	φ32 to φ50	R32AZ1**	R32AZ2**	AZ1**	AZ2**	R32
	φ63	R33AZ1**	R33AZ2**			R33
	φ80	R34AZ1**	R34AZ2**			R34
SR type	φ32 to φ50	R01SR405-H	—	SR405-H	—	R01-H
	φ63 · φ80	R02SR405-H	—			R02-H
WR type/WS type	φ32 to φ50	R21WR***-H	R21WS***-H	WR***-H	WS***	R21-H
	φ63 · φ80	R22WR***-H	R22WS***-H			R22-H

Sensor symbol/part code

- Reed sensor
- Standard type
- Rear wiring
- AF : AX101CE (with 1.5 m cord)
- AG : AX105CE (with 5 m cord)
- AH : AX111CE (with 1.5 m cord)
- AJ : AX115CE (with 5 m cord)
- AE : AX125CE (with 5 m cord/no lamp)
- AK : AX11ACE (connector type/AC)
- AL : AX11BCE (connector type/DC)
- S : SR405 (with 5 m cord)
- Upper wiring
- AP : AZ101CE (with 1.5 m cord)
- AR : AZ105CE (with 5 m cord)
- AS : AZ111CE (with 1.5 m cord)
- AT : AZ115CE (with 5 m cord)
- AN : AZ125CE (with 5 m cord/no lamp)
- AU : AZ11ACE (connector type/AC)
- AW : AZ11BCE (connector type/DC)
- Cutting oil proof type
- 5 : WR505 (with 5 m cord)
- 7 : WR505F (with 5 m cord/
flexible tube attached)
- 6 : WR515 (cord type, with 5 m cord)

- Solid state sensor
- Standard type
- 2-wire 1-LED type
- Rear wiring
- BE : AX201CE-1 (with 1.5 m cord)
- BF : AX205CE-1 (with 5 m cord)
- Upper wiring
- BM : AZ201CE-1 (with 1.5 m cord)
- BN : AZ205CE-1 (with 5 m cord)
- 2-wire 2-LED type
- Rear wiring
- CE : AX211CE-1 (with 1.5 m cord)
- CF : AX215CE-1 (with 5 m cord)
- Upper wiring
- CM : AZ211CE-1 (with 1.5 m cord)
- CN : AZ215CE-1 (with 5 m cord)
- 3-wire 1-LED type
- Rear wiring
- BH : AX221CE-1 (with 1.5 m cord)
- BJ : AX225CE-1 (with 5 m cord)
- BL : AX235CE (with 5 m cord)
- Upper wiring
- BR : AZ221CE-1 (with 1.5 m cord)
- BS : AZ225CE-1 (with 5 m cord)
- BQ : AZ235CE (with 5 m cord)

Sensors conforming to CE Marking

- 2-wire 2-LED type
- Rear wiring
- CT : AX211CE-1 (with 1.5 m cord)
- CU : AX215CE-1 (with 5 m cord)
- CV : AX21BCE-1 (with connector)
- Upper wiring
- CW : AZ211CE-1 (with 1.5 m cord)
- CX : AZ215CE-1 (with 5 m cord)
- CY : AZ21BCE-1 (connector type)
- Cutting oil proof type
- 2-wire 1-LED type
- RA : AX205WCE (with 5 m cord, rear wiring)
- RB : AZ205WCE (with 5 m cord, upper wiring)
- 2-wire 2-LED type
- RE : AX215WCE (with 5 m cord, rear wiring)
- RF : AZ215WCE (with 5 m cord, upper wiring)
- 2 : WS215-1 (2-LED type, with 5 m cord)
- 4 : WS215-1F (2-LED type, with 5 m
cord/flexible tube attached)
- 3 : WS225-1 (2-LED type, cord type,
with 5 m cord)

Sensors for driving high-voltage/large-current load

- Rear wiring
- AM : AX135CE (with 5 m cord)
- Upper wiring
- AY : AZ135CE (with 5 m cord)

(Note) The actuator bodies are not cutting oil proof.

Air Oil Booster
35HB

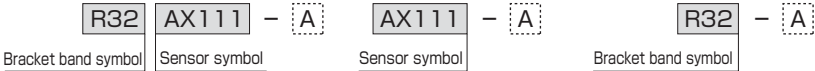
Sensor type	Bore	Part code of assembly	Part code of sensor only	Bracket type
		Reed sensor	Reed sensor	
L3 type	φ63	R33BL3-***	L3-***	R33B

Sensor symbol/part code

- Reed sensor
- FA : L3-101 (for AC, with 1 m cord)
- FB : L3-105 (for AC, with 5 m cord)
- FC : L3-241 (for DC, with 1 m cord)
- FD : L3-245 (for DC, with 5 m cord)

Type Code

●Part code of sensor and bracket assembly ●Part code of sensor only ●Part code of bracket band only



●For AX, AZ and ZC type sensors, it is unnecessary to enter the symbols enclosed by broken line.

Compact Design Pneumatic Cylinder
10S-1R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
ZR type/ZS type	φ12	—	—	ZR2**-A	ZS2**-A	—
	φ16					
	φ20					
	φ25					
	φ32					
	φ40	T02ZR3*-A	T02ZS3*-A	ZR3*-A	ZS3*-A	T02-A
	φ50					
	φ63					
	φ80					
	φ100					
KS type	φ125	—	T05KS***M-A	—	KS***M-A	T05-A
	φ40					
	φ50					
	φ63					
	φ80					
	φ100					
	φ125					

Sensor symbol/part code

■Reed sensor

Standard type

- Rear wiring
A : ZR2 (with 1.5 m cord)
E : ZR25 (with 5 m cord)
B : ZR2N (with 1.5 m cord)
C : ZR3 (with 1.5 m cord)
G : ZR35 (with 5 m cord)
D : ZR3N (with 1.5 m cord)

■Solid state sensor

Standard type

- 2-wire 1-LED type
Upper wiring
W : KS211M (with 1.5 m cord)
Y : KS215M (with 5 m cord)
●3-wire 1-LED type
Upper wiring
H : ZS201 (with 1.5 m cord)
J : ZS205 (with 5 m cord)
K : ZS211 (with 1.5 m cord)
L : ZS215 (with 5 m cord)
M : ZS301 (with 1.5 m cord)
N : ZS305 (with 5 m cord)
P : ZS311 (with 1.5 m cord)
Q : ZS315 (with 5 m cord)

Compact Design Pneumatic Cylinder
10S-6R/10S-6RG/10S-6RC

Sensor type	Bore	Part code of sensor only	
		Reed sensor	Solid state sensor
PD type PE type ZE type	φ 12 to φ 100	PD*** ZE***	PD*** PE*** ZE***
ZD type	φ 32 to φ 100	—	ZD136C-T-A

Compact Design Pneumatic Cylinder
10S-6RE/10S-6REC

Sensor type	Bore	Part code of sensor only	
		Reed sensor	Solid state sensor
PD type PE type	φ 32 to φ 100	PD*** ZE***	PD*** PE***
ZD type	φ 32 to φ 100	—	ZD136C-T-A

Sensor symbol/part code

■Reed sensor

Standard type

- Rear wiring
KA : ZE101A (with 1 m cord)
KB : ZE101B (with 3 m cord)
KC : ZE102A (with 1 m cord)
KD : ZE102B (with 3 m cord)
GA : PD12L1 (with 1 m cord/no lamp)
GB : PD12L3 (with 3 m cord/no lamp)
GC : PD11L1 (with 1 m cord)
GD : PD11L3 (with 3 m cord)
Upper wiring
KE : ZE201A (with 1 m cord)
KF : ZE201B (with 3 m cord)
KG : ZE202A (with 1 m cord)
KH : ZE202B (with 3 m cord)
GE : PD32L1 (with 1 m cord/no lamp)
GF : PD32L3 (with 3 m cord/no lamp)
GG : PD31L1 (with 1 m cord)
GH : PD31L3 (with 3 m cord)

■Solid state sensor

Standard type

- 2-wire 1-LED type
Rear wiring
KJ : ZE135A (with 1 m cord)
KK : ZE135B (with 3 m cord)
GJ : PD14L1 (with 1 m cord)
GK : PD14L3 (with 3 m cord)
Upper wiring
KN : ZE235A (with 1 m cord)
KP : ZE235B (with 3 m cord)
GN : PE34L1 (with 1 m cord)
GP : PE34L3 (with 3 m cord)
●3-wire 1-LED type
Rear wiring
KL : ZE155A (with 1 m cord)
KM : ZE155B (with 3 m cord)
GL : PD13L1 (with 1 m cord)
GM : PD13L3 (with 3 m cord)
Upper wiring
KR : ZE255A (with 1 m cord)
KS : ZE255B (with 3 m cord)
GR : PE33L1 (with 1 m cord)
GS : PE33L3 (with 3 m cord)
For strong magnetic field resistance
NK : ZD136C-T (with 5 m cord)

*PD and PE type sensors conform to CE Marking requirements.

Flat Cylinder
10F-1

Sensor type	Bore	Part code of assembly	Part code of sensor only	Bracket type
		Reed sensor	Reed sensor	
KR type	Equivalent to ϕ 25	T06KR***-A	KR***-A	T06-A
	Equivalent to ϕ 32			
	Equivalent to ϕ 50			

Sensor symbol/part code

- Reed sensor
- Standard type
 - Upper wiring
 - E : KR101 (with 1.5 m cord)
 - F : KR105 (with 5 m cord)

Compact Design Cylinder with Small Guide
10G-3

Sensor type	Bore	Part code of sensor only	
		Reed sensor	Solid state sensor
PD type/PF type	ϕ 12	PD***	PD*** PE***
	ϕ 16		
	ϕ 20		
	ϕ 25		
	ϕ 32		

Sensor symbol/part code

- Reed sensor
 - Standard type
 - Rear wiring
 - GA : PD12L1 (with 1 m cord/no lamp)
 - GB : PD12L3 (with 3 m cord/no lamp)
 - GC : PD11L1 (with 1 m cord)
 - GD : PD11L3 (with 3 m cord)
 - Upper wiring
 - GE : PD32L1 (with 1 m cord/no lamp)
 - GF : PD32L3 (with 3 m cord/no lamp)
 - GG : PD31L1 (with 1 m cord)
 - GH : PD31L3 (with 3 m cord)
- Solid state sensor
 - Standard type
 - 2-wire 1-LED type
 - Rear wiring
 - GJ : PD14L1 (with 1 m cord)
 - GK : PD14L3 (with 3 m cord)
 - Upper wiring
 - GN : PE34L1 (with 1 m cord)
 - GP : PE34L3 (with 3 m cord)
 - 3-wire 1-LED type
 - Rear wiring
 - GL : PD13L1 (with 1 m cord)
 - GM : PD13L3 (with 3 m cord)
 - Upper wiring
 - GR : PE33L1 (with 1 m cord)
 - GS : PE33L3 (with 3 m cord)

* PD and PE type sensors conform to CE Marking requirements.

Rodless Cylinder
RL2

Sensor type	Bore	Part code of assembly		Part code of sensor only	
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor
GR type/GS type	φ10	—	—	GR***-A	GS***-A
	φ16				
	φ20				
	φ25				
	φ32				
	φ40				
HR type/HS type	φ10	—	—	HR***-A	HS***-A
	φ16				
	φ20				
	φ25				
	φ32				
	φ40				
SR type	φ10	L02SR***-A	—	SR***-A	—
	φ16				
	φ20				
	φ25				
	φ32				
	φ40				

Sensor symbol/part code

- Reed sensor
Standard type
Rear wiring
B : GR101 (with 1.5 m cord)
C : GR105 (with 5 m cord)
E : SR101 (with 1.5 m cord)
P : SR105 (with 5 m cord)
F : SR201 (with 1.5 m cord)
Q : SR205 (with 5 m cord)
G : SR301 (with 1.5 m cord)
R : SR305 (with 5 m cord)
H : SR401 (with 1.5 m cord)
S : SR405 (with 5 m cord)
D : SR501 (with 1.5 m cord)
T : SR505 (with 5 m cord)
Upper wiring
J : HR101 (with 1.5 m cord)
K : HR105 (with 5 m cord)
- Solid state sensor
Standard type
● 2-wire 2-LED type
Rear wiring
M : GS211 (with 1.5 m cord)
N : GS215 (with 5 m cord)
Upper wiring
W : HS211 (with 1.5 m cord)
Y : HS215 (with 5 m cord)

Small Pneumatic Cylinder
1OZ-3

Sensor type	Bore	Part code of assembly		Part code of sensor only		Part code of band	
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	Reed sensor	Solid state sensor
AX type	φ 20	AS020AX1**	AS020AX2**	AX1**	AX2**	AS020AX	
	φ 25	AS025AX1**	AS025AX2**			AS025AX	
	φ 32	AS032AX1**	AS032AX2**			AS032AX	
	φ 40	AS040AX1**	AS040AX2**			AS040AX	
	φ 50	AS050AX1**	AS050AX2**			AS050AX	
	φ 63	AS063AX1**	AS063AX2**			AS063AX	
ZC type	φ 12	AS012ZC****	AS012ZC****	ZC****	ZC****	AS012ZC	
	φ 16	AS016ZC****	AS016ZC****			AS016ZC	
	φ 20	AS020ZC****	AS020ZC****			AS020ZC	
	φ 25	AS025ZC****	AS025ZC****			AS025ZC	
	φ 32	AS032ZC****	AS032ZC****			AS032ZC	
	φ 40	AS040ZC****	AS040ZC****			AS040ZC	
	φ 50	AS050ZC****	AS050ZC****			AS050ZC	
	φ 63	AS063ZC****	AS063ZC****			AS063ZC	
JR type/JS type	φ 12	AS012JR***-A	AS012JS***-A	JR***-A	JS***-A	AS012JR-A	
	φ 16	AS016JR***-A	AS016JS***-A			AS016JR-A	
	φ 20	AS020JR***-A	AS020JS***-A			AS020JR-A	
	φ 25	AS025JR***-A	AS025JS***-A			AS025JR-A	
	φ 32	AS032JR***-A	AS032JS***-A			AS032JR-A	
	φ 40	AS040JR***-A	AS040JS***-A			AS040JR-A	
	φ 50	AS050JR***-A	AS050JS***-A			AS050JR-A	
	φ 63	AS063JR***-A	AS063JS***-A			AS063JR-A	
SR type	φ 20	AS020SR405-A	—	SR405-A	—	AS020SR-A	—
	φ 25	AS025SR405-A				AS025SR-A	
	φ 32	AS032SR405-A				AS032SR-A	
	φ 40	AS040SR405-A				AS040SR-A	
	φ 50	AS050SR405-A				AS050SR-A	
	φ 63	AS063SR405-A				AS063SR-A	

Sensor symbol/part code

- Reed sensor
Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
JA : ZC201A (with 1 m cord/no lamp)
JB : ZC201B (with 3 m cord/no lamp)
JC : ZC205A (with 1 m cord)
JD : ZC205B (with 3 m cord)
A : JR101 (with 1.5 m cord)
B : JR105 (with 5 m cord)
S : SR405 (with 5 m cord)
● Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)
- Solid state sensor
Standard type
● 2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
JJ : ZC230A (with 1 m cord)
JK : ZC230B (with 3 m cord)
I : JS211M (with 1.5 m cord)
O : JS215M (with 5 m cord)
● 2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
● 3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
JL : ZC253A (with 1 m cord)
JM : ZC253B (with 3 m cord)
- Sensors conforming to CE Marking
● 2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (connector type)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

Small Pneumatic Cylinder
10Z-2

Sensor type	Bore	Part code of assembly		Part code of sensor only		Part code of band	
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	Reed sensor	Solid state sensor
AX type	φ20	AE020AX1**	AE020AX2**	AX1**	AX2**	AE020AX	
	φ25	AE025AX1**	AE025AX2**			AE025AX	
	φ32	AE032AX1**	AE032AX2**			AE032AX	
	φ40	AE040AX1**	AE040AX2**			AE040AX	
ZC type	φ20	AE020ZC***	AE020ZC***	ZC****	ZC****	AE020ZC	
	φ25	AE025ZC***	AE025ZC***			AE025ZC	
	φ32	AE032ZC***	AE032ZC***			AE032ZC	
	φ40	AE040ZC***	AE040ZC***			AE040ZC	
JR type	φ20	AE020JR***-A	—	JR***-A	—	AE020JR-A	—
	φ25	AE025JR***-A				AE025JR-A	
	φ32	AE032JR***-A				AE032JR-A	
	φ40	AE040JR***-A				AE040JR-A	
SR type	φ20	AE020SR***-A	—	SR405-A	—	AE020SR-A	—
	φ25	AE025SR***-A				AE025SR-A	
	φ32	AE032SR***-A				AE032SR-A	
	φ40	AE040SR***-A				AE040SR-A	

Sensor symbol/part code

- Reed sensor
Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
JA : ZC201A (with 1 m cord/no lamp)
JB : ZC201B (with 3 m cord/no lamp)
JC : ZC205A (with 1 m cord)
JD : ZC205B (with 3 m cord)
A : JR101 (with 1.5 m cord)
B : JR105 (with 5 m cord)
S : SR405 (with 5 m cord)
● Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

- Solid state sensor
Standard type
● 2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
JJ : ZC230A (with 1 m cord)
JK : ZC230B (with 3 m cord)
● 2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
● 3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
JL : ZC253A (with 1 m cord)
JM : ZC253B (with 3 m cord)
Sensors conforming to CE Marking
● 2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (connector type)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

Pneumatic Cylinder
10A-6/10A-6L

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32 to φ50	R32AX1**	R32AX2**	AX1**	AX2**	R32
	φ63	R33AX1**	R33AX2**			R33
	φ80·φ100	R34AX1**	R34AX2**			R34
	φ125	R35AX1**	R35AX2**			R35
	φ32 to φ50	R09YR***-A	—	YR***-A	—	R09-A
YR type	φ63	R18YR***-A				R18-A
	φ80·φ100	R12YR***-A				R12-A
	φ125	R14YR***-A				R14-A
SR type	φ32 to φ50	R01SR***-A	—	SR405-A	—	R01-A
	φ63 to φ100	R02SR***-A				R02-A
	φ125	R03SR***-A				R03-A

10A-6V

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ40 to φ50	(Rod side) R32AX1** (Cap side) K06AX1**	(Rod side) R32AX2** (Cap side) K06AX2**	AX1**	AX2**	(Rod side) R32 (Cap side) K06
	φ63	(Rod side) R33AX1** (Cap side) K07AX1**	(Rod side) R33AX2** (Cap side) K07AX2**			(Rod side) R33 (Cap side) K07
	φ80·φ100	R34AX1**	R34AX2**			R34
YR type	φ40 to φ50	(Rod side) R09YR***-A (Cap side) K03YR***-A	—	YR***-A	—	(Rod side) R09-A (Cap side) K03-A
	φ63	(Rod side) R18YR***-A (Cap side) K04YR***-A				(Rod side) R18-A (Cap side) K04-A
	φ80·φ100	R12YR***-A				R12-A
SR type	φ40 to φ50	(Rod side) R01SR***-A (Cap side) K01SR***-A	—	SR405-A	—	(Rod side) R01-A (Cap side) K01-A
	φ63	(Rod side) R02SR***-A (Cap side) K02SR***-A				(Rod side) R02-A (Cap side) K02-A
	φ80·φ100	R02SR***-A				R02-A

Sensor symbol/part code

- Reed sensor
Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
C : YR101 (with 1.5 m cord)
U : YR105 (with 5 m cord)
S : SR405 (with 5 m cord)
● Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

- Solid state sensor
Standard type
● 2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
● 2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
● 3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)

- Sensors conforming to CE Marking
- 2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (connector type)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

Pneumatic Cylinder
10B-6

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ40·φ50	R32AX1**	R32AX2**	AX1**	AX2**	R32
	φ63	R33AX1**	R33AX2**			R33
	φ80·φ100	R34AX1**	R34AX2**			R34
YR type	φ40·φ50	R09YR***-A	—	YR***-A	—	R09-A
	φ63	R18YR***-A				R18-A
	φ80·φ100	R12YR***-A				R12-A
SR type	φ40·φ50	R01SR***-A	—	SR405-A	—	R01-A
	φ63 to φ100	R02SR***-A				R02-A

Sensor symbol/part code

- Reed sensor
Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
C : YR101 (with 1.5 m cord)
U : YR105 (with 5 m cord)
S : SR405 (with 5 m cord)
● Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

- Solid state sensor
Standard type
● 2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
● 2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
● 3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
Sensors conforming to CE Marking
● 2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (connector type)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

Pneumatic Cylinder
DC7/DC7R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ40 to φ50	R33AX1**	R33AX2**	AX1**	AX2**	R33
	φ63	R34AX1**	R34AX2**			R34
	φ80·φ100	R35AX1**	R35AX2**			R35
	φ125	R36AX1**	R36AX2**			R36
YR type	φ40 to φ50	R18YR***-A	—	YR***-A	—	R18-A
	φ63	R12YR***-A				R12-A
	φ80·φ100	R14YR***-A				R14-A
	φ125	R15YR***-A				R15-A
SR type	φ40 to φ50	R28SR***-A	—	SR405-A	—	R28-A
	φ63	R02SR***-A				R02-A
	φ80·φ100	R03SR***-A				R03-A
	φ125	R04SR***-A				R04-A
L3 type/L4 type	φ40	L*-***-A40-S-A	—	L*-***	—	A40-S-A
	φ50	L*-***-A50-S-A				A50-S-A
	φ63	L*-***-A63-S-A				A63-S-A
	φ80	L*-***-A80-S-A				A80-S-A
	φ100	L*-***-A100-S-A				A100-S-A
	φ125	L*-***-A125-S-A				A125-S-A
	φ150	L*-***-A150-S-A				A150-S-A

Sensor symbol/part code

- Reed sensor
Standard type
Rear wiring
AF : AX101CE (with 1.5 m cord)
AG : AX105CE (with 5 m cord)
AH : AX111CE (with 1.5 m cord)
AJ : AX115CE (with 5 m cord)
AE : AX125CE (with 5 m cord/no lamp)
AK : AX11ACE (connector type/AC)
AL : AX11BCE (connector type/DC)
C : YR101 (with 1.5 m cord)
U : YR105 (with 5 m cord)
S : SR405 (with 5 m cord)
● Iron proximity type
FA : L3-101 (with 1 m cord)
FB : L3-105 (with 5 m cord)
FC : L3-241 (with 1 m cord)
FD : L3-245 (with 5 m cord)
FM : L4-101 (terminal type)
FN : L4-241 (terminal type)
● Sensors for driving high-voltage/large-current load
Rear wiring
AM : AX135CE (with 5 m cord)
Upper wiring
AY : AZ135CE (with 5 m cord)

- Solid state sensor
Standard type
● 2-wire 1-LED type
Rear wiring
BE : AX201CE-1 (with 1.5 m cord)
BF : AX205CE-1 (with 5 m cord)
● 2-wire 2-LED type
Rear wiring
CE : AX211CE-1 (with 1.5 m cord)
CF : AX215CE-1 (with 5 m cord)
● 3-wire 1-LED type
Rear wiring
BH : AX221CE-1 (with 1.5 m cord)
BJ : AX225CE-1 (with 5 m cord)
BL : AX235CE (with 5 m cord)
Sensors conforming to CE Marking
● 2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (connector type)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

Powerful Pneumatic Cylinder
10A-2R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ32 to φ50	R32AX1**	R32AX2**	AX1**	AX2**	R32
	φ63	R33AX1**	R33AX2**			R33
	φ80·φ100	R34AX1**	R34AX2**			R34
	φ125	R35AX1**	R35AX2**			R35
	φ140·φ160	R36AX1**	R36AX2**			R36
YR type	φ32 to φ50	R20YR***-A	—	YR***-A	—	R20-A
	φ63	R18YR***-A				R18-A
	φ80·φ100	R12YR***-A				R12-A
	φ125	R14YR***-A				R14-A
	φ140·φ160	R15YR***-A				R15-A
SR type	φ32 to φ50	R01SR***-A	—	SR405-A	—	R01-A
	φ63 to φ100	R02SR***-A				R02-A
	φ125	R03SR***-A				R03-A
	φ140·φ160	R04SR***-A				R04-A

10A-2K2

Sensor type	Bore	Part code of assembly		Part code of sensor only		Bracket type
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	
AX type	φ40 to φ50	(Rod side) R32AX1** (Cap side) K06AX1**	(Rod side) R32AX2** (Cap side) K06AX2**	AX1**	AX2**	(Rod side) R32 (Cap side) K06
	φ63	(Rod side) R33AX1** (Cap side) K07AX1**	(Rod side) R33AX2** (Cap side) K07AX2**			(Rod side) R33 (Cap side) K07
	φ80·φ100	R34AX1**	R34AX2**			R34
YR type	φ40 to φ50	(Rod side) R20YR***-A (Cap side) K05YR***-A	—	YR***-A	—	(Rod side) R20-A (Cap side) K05-A
	φ63	(Rod side) R18YR***-A (Cap side) K04YR***-A				(Rod side) R18-A (Cap side) K04-A
	φ80·φ100	R12YR***-A				R12-A
SR type	φ40 to φ50	(Rod side) R01SR***-A (Cap side) K01SR***-A	—	SR405-A	—	(Rod side) R01-A (Cap side) K01-A
	φ63	(Rod side) R02SR***-A (Cap side) K02SR***-A				(Rod side) R02-A (Cap side) K02-A
	φ80·φ100	R02SR***-A				R02-A

Sensor symbol/part code

■ Reed sensor	■ Solid state sensor
Standard type	Standard type
Rear wiring	● 2-wire 1-LED type
AF : AX101CE (with 1.5 m cord)	Rear wiring
AG : AX105CE (with 5 m cord)	BE : AX201CE-1 (with 1.5 m cord)
AH : AX111CE (with 1.5 m cord)	BF : AX205CE-1 (with 5 m cord)
AJ : AX115CE (with 5 m cord)	● 2-wire 2-LED type
AE : AX125CE (with 5 m cord/no lamp)	Rear wiring
AK : AX11ACE (connector type/AC)	CE : AX211CE-1 (with 1.5 m cord)
AL : AX11BCE (connector type/DC)	CF : AX215CE-1 (with 5 m cord)
C : YR101 (with 1.5 m cord)	● 3-wire 1-LED type
U : YR105 (with 5 m cord)	Rear wiring
S : SR405 (with 5 m cord)	BH : AX221CE-1 (with 1.5 m cord)
● Sensors for driving high-voltage/large-current load	BJ : AX225CE-1 (with 5 m cord)
Rear wiring	BL : AX235CE (with 5 m cord)
AM : AX135CE (with 5 m cord)	
Upper wiring	
AY : AZ135CE (with 5 m cord)	

Sensors conforming to CE Marking
● 2-wire 2-LED type
Rear wiring
CT : AX211CE-1 (with 1.5 m cord)
CU : AX215CE-1 (with 5 m cord)
CV : AX21BCE-1 (connector type)
Upper wiring
CW : AZ211CE-1 (with 1.5 m cord)
CX : AZ215CE-1 (with 5 m cord)
CY : AZ21BCE-1 (connector type)

Clamp Cylinder
CL1/CL1R

Sensor type	Bore	Part code of assembly		Part code of sensor only		Part code of band	
		Reed sensor	Solid state sensor	Reed sensor	Solid state sensor	Reed sensor	Solid state sensor
AX type	φ50	AL050AX1**	AL050AX2**	AX1**	AX2**	AL050AX	
	φ63	AL063AX1**	AL063AX2**			AL063AX	
ZD type	φ50	—	AL050ZD136C-T-A	—	ZD136C-T	—	AL050ZD
	φ63		AL063ZD136C-T-A			—	AL063ZD
L3 type	φ50	Contact us.	—	L*-***	—	Contact us.	—
	φ63						

Sensor symbol/part code

■ Reed sensor	■ Solid state sensor
Standard type	Standard type
Rear wiring	● 2-wire 1-LED type
AF : AX101CE (with 1.5 m cord)	Rear wiring
AG : AX105CE (with 5 m cord)	BE : AX201CE-1 (with 1.5 m cord)
AH : AX111CE (with 1.5 m cord)	BF : AX205CE-1 (with 5 m cord)
AJ : AX115CE (with 5 m cord)	● 2-wire 2-LED type
AE : AX125CE (with 5 m cord/no lamp)	Rear wiring
AK : AX11ACE (connector type/AC)	CE : AX211CE-1 (with 1.5 m cord)
AL : AX11BCE (connector type/DC)	CF : AX215CE-1 (with 5 m cord)
● Iron proximity type	● 3-wire 1-LED type
FA : L3-101 (with 1 m cord)	Rear wiring
FB : L3-105 (with 5 m cord)	BH : AX221CE-1 (with 1.5 m cord)
FC : L3-241 (with 5 m cord)	BJ : AX225CE-1 (with 5 m cord)
FD : L3-245 (with 5 m cord)	BL : AX235CE (with 5 m cord)
● Sensors for driving high-voltage/large-current load	Strong magnetic field resistance
Rear wiring	Rear wiring
AM : AX135CE (with 5 m cord)	MK : ZD136C-T (with 1.5 m cord)
Upper wiring	Sensors conforming to CE Marking
AY : AZ135CE (with 5 m cord)	● 2-wire 2-LED type
	Rear wiring
	CT : AX211CE-1 (with 1.5 m cord)
	CU : AX215CE-1 (with 5 m cord)
	CV : AX21BCE-1 (connector type)
	Upper wiring
	CW : AZ211CE-1 (with 1.5 m cord)
	CX : AZ215CE-1 (with 5 m cord)
	CY : AZ21BCE-1 (connector type)

Rotary Clamp Cylinder
RCA2

Sensor type	Bore	Part code of sensor only	
		Reed sensor	Solid state sensor
PD type	φ40	PD*** ZE***-A	PD***
PE type	φ50		PE***
ZE type	φ63		ZE***-A

Sensor symbol/part code

■ Reed sensor	■ Solid state sensor
Standard type	Standard type
Rear wiring	● 2-wire 1-LED type
KA : ZE101A (with 1 m cord)	Rear wiring
KB : ZE101B (with 3 m cord)	KJ : ZE135A (with 1 m cord)
KC : ZE102A (with 1 m cord)	KK : ZE135B (with 3 m cord)
KD : ZE102B (with 3 m cord)	GJ : PD14L1 (with 1 m cord)
GA : PD12L1 (with 1 m cord/no lamp)	GK : PD14L3 (with 3 m cord)
GB : PD12L3 (with 3 m cord/no lamp)	Upper wiring
GC : PD11L1 (with 1 m cord)	KN : ZE235A (with 1 m cord)
GD : PD11L3 (with 3 m cord)	KP : ZE235B (with 3 m cord)
Upper wiring	GN : PE34L1 (with 1 m cord)
KE : ZE201A (with 1 m cord)	GP : PE34L3 (with 3 m cord)
KF : ZE201B (with 3 m cord)	
KG : ZE202A (with 1 m cord)	
KH : ZE202B (with 3 m cord)	
GE : PD32L1 (with 1 m cord/no lamp)	
GF : PD32L3 (with 3 m cord/no lamp)	
GG : PD31L1 (with 1 m cord)	
GH : PD31L3 (with 3 m cord)	

*PD and PE type sensors conform to CE Marking requirements.

Pallet Stopper
ST3 Lever Type

Sensor type	Bore	Part code of sensor only	
		Reed sensor	Solid state sensor
PD type	φ32	PD*** ZE***-A	PD***
PE type	φ50		PE***
ZE type	φ80		ZE***-A

ST3 Straight Type

Sensor type	Bore	Part code of sensor only	
		Reed sensor	Solid state sensor
PD type	φ32	PD*** ZE***-A	PD***
PE type	φ40		PE***
ZE type	φ50		ZE***-A

Sensor symbol/part code

■ Reed sensor	■ Solid state sensor
Standard type	Standard type
Rear wiring	● 2-wire 1-LED type
KA : ZE101A (with 1 m cord)	Rear wiring
KB : ZE101B (with 3 m cord)	KJ : ZE135A (with 1 m cord)
KC : ZE102A (with 1 m cord)	KK : ZE135B (with 3 m cord)
KD : ZE102B (with 3 m cord)	GJ : PD14L1 (with 1 m cord)
GA : PD12L1 (with 1 m cord/no lamp)	GK : PD14L3 (with 3 m cord)
GB : PD12L3 (with 3 m cord/no lamp)	Upper wiring
GC : PD11L1 (with 1 m cord)	KN : ZE235A (with 1 m cord)
GD : PD11L3 (with 3 m cord)	KP : ZE235B (with 3 m cord)
Upper wiring	GN : PE34L1 (with 1 m cord)
KE : ZE201A (with 1 m cord)	GP : PE34L3 (with 3 m cord)
KF : ZE201B (with 3 m cord)	
KG : ZE202A (with 1 m cord)	● 3-wire 1-LED type
KH : ZE202B (with 3 m cord)	Rear wiring
GE : PD32L1 (with 1 m cord/no lamp)	KL : ZE155A (with 1 m cord)
GF : PD32L3 (with 3 m cord/no lamp)	KM : ZE155B (with 3 m cord)
GG : PD31L1 (with 1 m cord)	GL : PD13L1 (with 1 m cord)
GH : PD31L3 (with 3 m cord)	GM : PD13L3 (with 3 m cord)
	Upper wiring
	KR : ZE255A (with 1 m cord)
	KS : ZE255B (with 3 m cord)
	GR : PE33L1 (with 1 m cord)
	GS : PE33L3 (with 3 m cord)

*PD and PE type sensors conform to CE Marking requirements.