

Sensor switches

Two-color LED solid state type

● Robot cable is standard equipment

Lead wire flexibility is excellent because the conductor used is the same as for robot cables.

Specifications

● Two-color LED solid state type

Item	Model	ZE137□	ZE157□	ZE177□	ZE237□	ZE257□	ZE277□
Wiring method		2-lead wire	3-lead wire with NPN output	3-lead wire with PNP output	2-lead wire	3-lead wire with NPN output	3-lead wire with PNP output
Lead wire direction		Horizontal			Vertical		
Power supply voltage		—	4.5 to 28 VDC		—	4.5 to 28 VDC	
Load voltage		10 to 28 VDC	4.5 to 28 VDC		10 to 28 VDC	4.5 to 28 VDC	
Load current		2.5 to 20 mA (at 25°C [77°F], and 10 mA at 60°C [140°F])	40 mA max.		2.5 to 20 mA (at 25°C [77°F], and 10 mA at 60°C [140°F])	40 mA max.	
Consumption current		—	8 mA max. (24 VDC)	10 mA max. (24 VDC)	—	8 mA max. (24 VDC)	10 mA max. (24 VDC)
Internal voltage drop ^{Note 1}		4 V max.	2 V max. (0.8 V max if load is less than 10 mA)		4 V max.	2 V max. (0.8 V max if load is less than 10 mA)	
Leakage current		0.7 mA max. (24 VDC, 25°C [77 °F])	50 μA max. (24 VDC)		0.7 mA max. (24 VDC, 25°C [77 °F])	50 μA max. (24 VDC)	
Response time		1 ms max.					
Insulation resistance		100 M Ω min. (at 500 VDC megger, between case and lead wire terminal)					
Dielectric strength		500 VAC (50/60 Hz) 1 minute (between case and lead wire terminal)					
Shock resistance ^{Note 2}		294.2 m/s ² [30 G] (non-repeated)					
Vibration resistance ^{Note 2}		88.3 m/s ² [9 G] (total amplitude of 1.5 mm [0.059 in], 10 to 55 Hz)					
Protection from environment		IP67 (IEC standard), JIS C0920 (water-proof type)					
Operation indicators		Appropriate operation range: Green LED indicator lit when on, operation range: Red LED indicator lit when on					
Lead wires		PCCV0.2SQ x 2-lead (brown and blue) x ℓ ^{Note 3}	PCCV0.15SQ x 3-lead (brown, blue, and black) x ℓ ^{Note 3}	PCCV0.2SQ x 2-lead (brown and blue) x ℓ ^{Note 3}	PCCV0.15SQ x 3-lead (brown, blue, and black) x ℓ ^{Note 3}		
Ambient temperature		0 to 60°C [32 to 140°F]					
Storage temperature range		-10 to 70°C [14 to 158°F]					
Mass		15 g [0.53 oz] (for lead wire length A: 1000 mm [39 in]), 35 g [1.23 oz] (for lead wire length B: 3000 mm [118 in]), 15 g [0.53 oz] (for lead wire length 300 mm [11.8 in] with M8 connector)					

Note 1: Internal voltage drop changes with the load current.

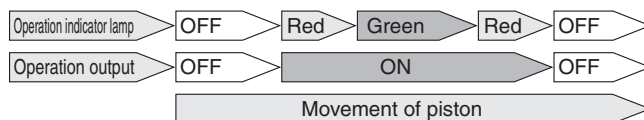
2: According to Koganei test standards.

3: Lead wire length ℓ : A; 1000 mm [39 in], B; 3000 mm [118 in], G; 300 mm [11.8 in] with M8 connector only on the ZE177□ and ZE277□

Operation

● Explanation of operation of two-color LED solid state type

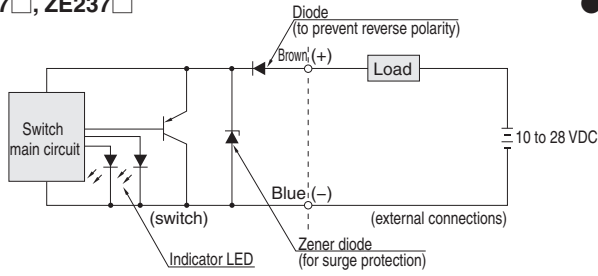
ZE137□, ZE157□, ZE177□, ZE237□, ZE257□, ZE277□



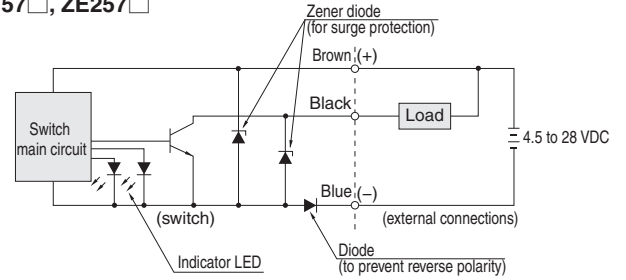
Note: The operating output may become unstable, due to the effects of the operating and installation environments, even if the appropriate operating range (green LED indicator lit) is fixed.

Diagram of inner circuits

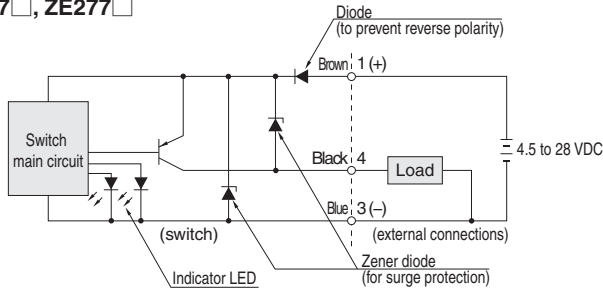
● ZE137□, ZE237□



● ZE157□, ZE257□



● ZE177□, ZE277□

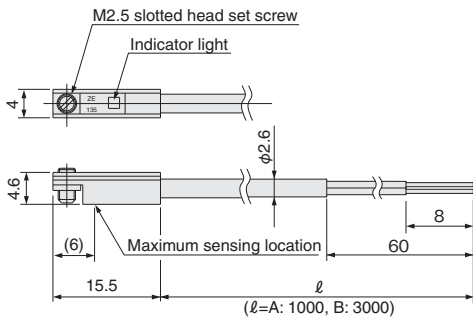


Sensor Switch Dimensions

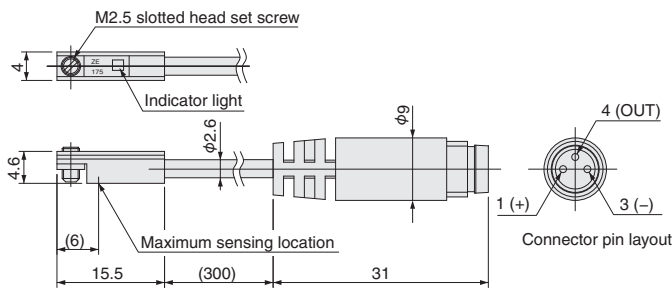
unit: mm

● Horizontal lead wire

● Solid state (ZE137□, ZE157□, ZE177□)

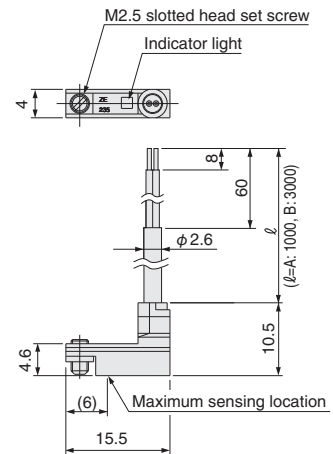


● Solid state (ZE177G)

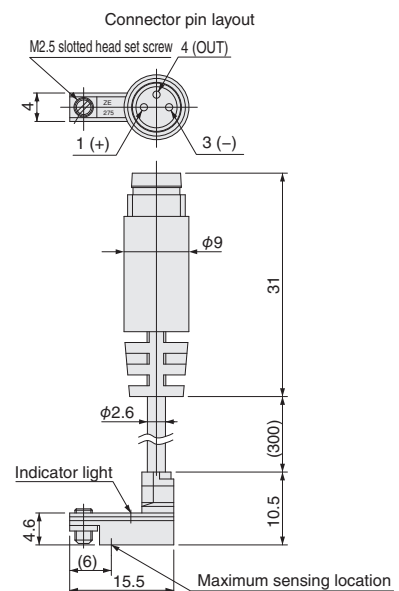


● Vertical lead wire

● Solid state (ZE237□, ZE257□, ZE277□)



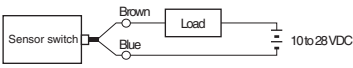
● Solid state (ZE277G)



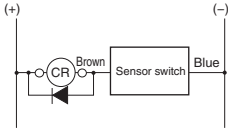
Wiring instructions

● 2-lead wire

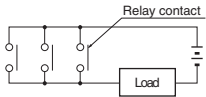
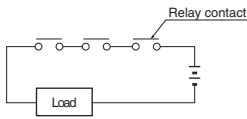
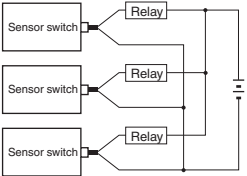
● Basic connection



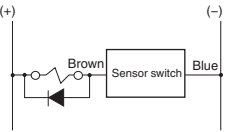
● Connection to relays



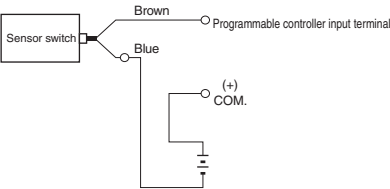
AND (series) connection and OR (parallel) connection



● Connection to solenoid valve

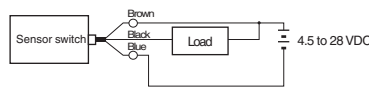


● Connection to programmable controller

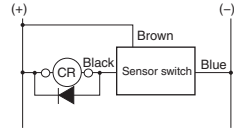


● 3-lead wire with NPN output type

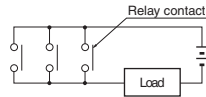
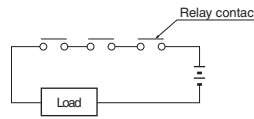
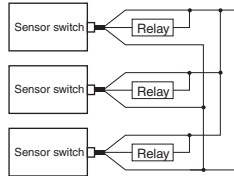
● Basic connection



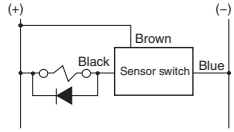
● Connection to relays



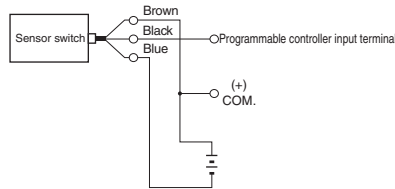
AND (series) connection and OR (parallel) connection



● Connection to solenoid valve

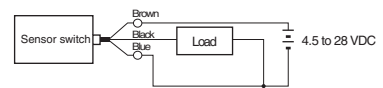


● Connection to programmable controller

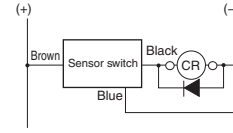


● 3-lead wire with PNP output type

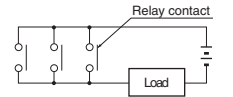
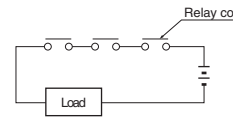
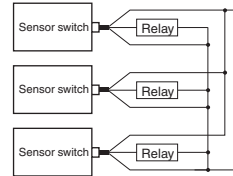
● Basic connection



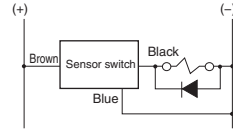
● Connection to relays



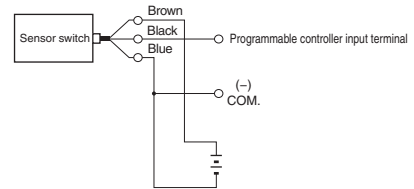
AND (series) connection and OR (parallel) connection



● Connection to solenoid valve



● Connection to programmable controller

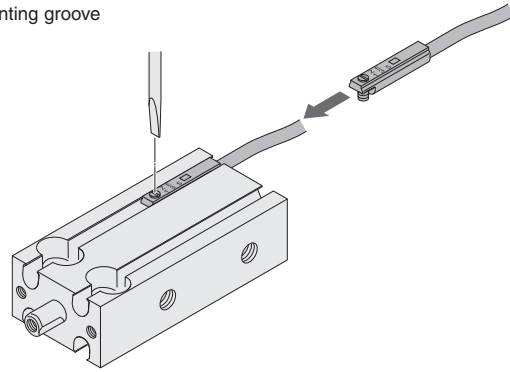


1. Connect the lead wires according to their color. Incorrect wiring will cause damage to the sensor switch.
2. The use of a surge protection diode is recommended with the inductive load such as an electromagnetic relay.
3. Avoid the use of AND (series) connections because the circuit voltage will drop in proportion to the number of sensor switches.
4. When using an OR (parallel) connection, it is possible to connect sensor switch outputs directly (ex: using corresponding black lead wires). Be aware of load return errors since current leakage increases with the number of switches.

5. Because the sensor switches are magnetically sensitive, avoid using them in locations subject to strong external magnetic fields or bringing them in close proximity to power lines and areas where large electric currents are present. Also avoid using magnetic material for any parts used for mounting. It could result in erratic operation.
6. Do not excessively pull on or bend the lead wires.
7. Avoid using the switches in environments where chemicals or gas are present.
8. Consult the nearest Koganei sales office for use in environments subject to water or oil.

Moving Sensor Switch

- Loosening the screw allows the sensor switch to be moved along the switch mounting groove of the cylinder tube.
- The tightening torque for the screws is 0.1 to 0.2 N·m [0.86 to 1.77 in·lbf].



Sensor Switch Operating Range, Response Differential, and Maximum Sensing Location

- Operating range: ℓ

The range from where the piston turns the switch on and the point where the switch is turned off as the piston travels in the same direction.

- Response differential: C

The distance between the point where the piston turns the switch on and the point where the switch is turned off as the piston travels in the opposite direction.

unit: mm

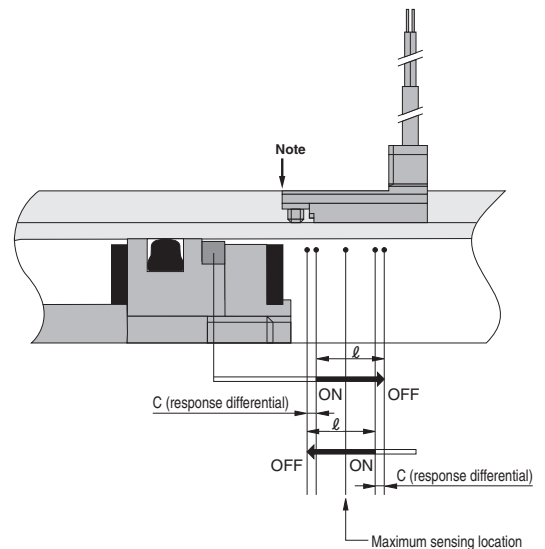
Item \ Diameter	6	8	10	12	16	20	25	32	40	50	63	80	100	125
Operating range: ℓ	1.5 to 5		2 to 6			3 to 8			4 to 12			5 to 12		
Response differential: C	0.5 or less													
Maximum sensing location ^{Note}	6													

Note: The values in the table above are reference values. Note: The value from the opposite end of the lead wire. (shown by arrow)

unit: in

Item \ Diameter	0.236	0.315	0.394	0.472	0.630	0.787	0.984	1.260	1.575	1.969	2.480	3.150	3.9	4.9
Operating range: ℓ	0.059 to 0.197		0.079 to 0.236			0.118 to 0.315			0.157 to 0.472			0.197 to 0.472		
Response differential: C	0.020 or less													
Maximum sensing location ^{Note}	0.236													

Note: The values in the table above are reference values. Note: The value from the opposite end of the lead wire. (shown by arrow)



When Mounting the Cylinders with Sensor Switches in Close Proximity

When using it connected to a cylinder, use under conditions using values greater than those shown in the table below.

- For cylinder with guide

unit: mm

Cylinder bore	A	B
6	23	0
8		
10		
12		
16		
20		
25		
32		
40		
50		
63		
80		
100		
125		

unit: mm

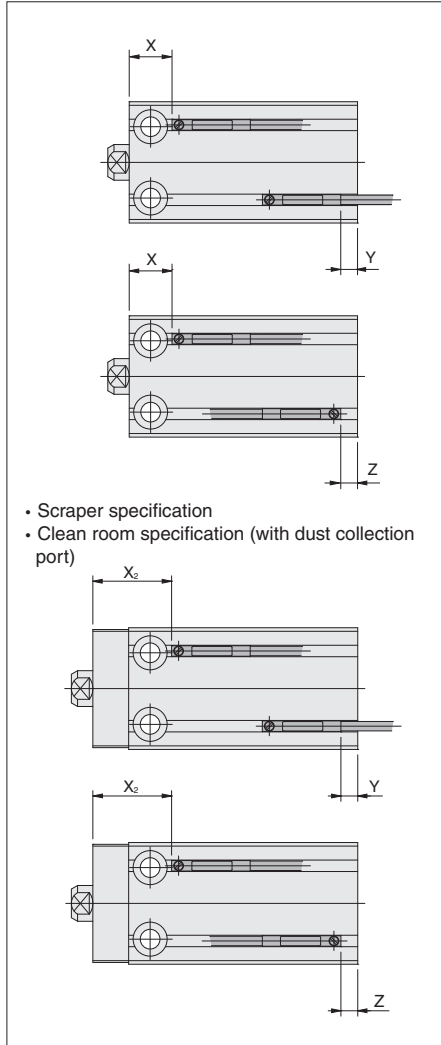
Cylinder bore	A	B
8	15	0
12		
16		
20		
25		
32		
40		
40		

Note: Install a shield plate (at least 1 mm [0.039 in] thick magnetic material) between two cylinders to use them in close proximity. However, magnetic materials cannot be used in magnetized environments.

Mounting Position of the End of Stroke Detection Sensor Switch

Mounting the sensor switch in the locations shown (reference values in diagram), the sensor magnet comes to the maximum sensing location of the sensor switch at the end of the stroke.

● Double acting type ● Single acting push type ● Single acting pull type



unit: mm

Item	Bore	6	8	10	12	16	20	25	32	40	50	63	80	100	125
Double acting type	X	10.5	11	11	11	12	15 (20)	16 (21)	17.5	22.5	27.5	33.5	34.5	46.5	53
	X ₂	—	—	21	21	22	25 (30)	26 (31)	32.5	37.5	42.5	53.5	*54.5	*66.5	*73
	Y	0	-0.5	0.5	1.5	2.5	3.5	4.5	7	9	10	12	14	18	19.5
	Z	3.5	3	4	5	6	7	8	10.5	12.5	13.5	15.5	17.5	21.5	23
Push Single acting type	X	25.5	26	26	26	27	30	31	32.5	37.5	47.5	—	—	—	—
	Y	0	-0.5	0.5	1.5	2.5	3.5	4.5	7	9	10	—	—	—	—
	Z	3.5	3	4	5	6	7	8	10.5	12.5	13.5	—	—	—	—
Pull Single acting type	X	25.5	26	26	26	27	30	31	32.5	37.5	47.5	—	—	—	—
	Y	0	-0.5	0.5	1.5	2.5	3.5	4.5	7	9	10	—	—	—	—
	Z	3.5	3	4	5	6	7	8	10.5	12.5	13.5	—	—	—	—

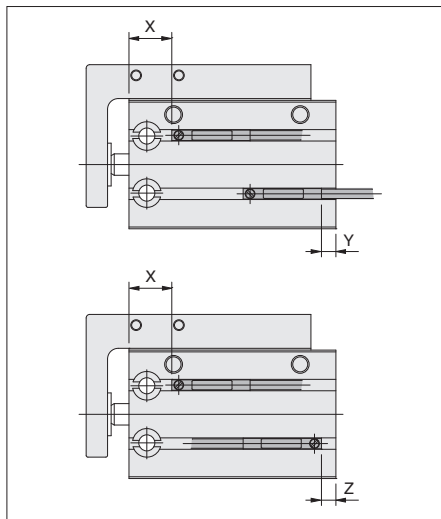
Note: Dimensions in () parentheses are for 5 mm dimensions for scrapper specification only.

● Double acting double rod end type

unit: mm

Item	Bore	6	8	10	12	16	20	25	32	40	50	63	80	100	125
Double acting type	X	10.5	11	11	11	12	15	16	17.5	22.5	27.5	33.5	34.5	46.5	53
	Y	4	4.5	5.5	6.5	7.5	8.5	9.5	12	14	20	22	24	18	19.5
	Z	7.5	8	9	10	11	12	13	15.5	17.5	23.5	25.5	27.5	21.5	23

* When the Y dimension is negative, the sensor switch protrudes from the cylinder body.



● Double acting type with guide

unit: mm

Item	Bore	8	12	16	20	25	32	40
Double acting type	X	11 (16)	11 (16)	12 (17)	15 (20)	16 (21)	17.5 (22.5)	22.5 (27.5) (32.5 for stroke 10 only)
	Y	-0.5	1.5	2.5	3.5	4.5	12	14
	Z	3	5	6	7	8	15.5	17.5

Note: Dimensions in () parentheses are for mid-stroke models (stroke 5, 15, 25, 35, 45, and 55).

* When the Y dimension is negative, the sensor switch protrudes from the cylinder body.