

Switch Catalogue

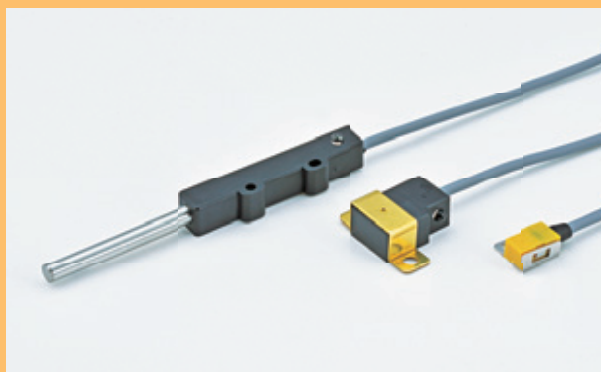


Contactless Series

**Assured
Reliable
Contactless**



Magnetic Proximity Sensors P.4~



Ferrous Proximity Sensors P.25~

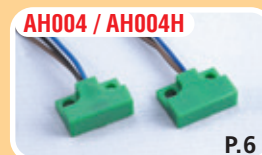


High Precision Touch Switches P.34~

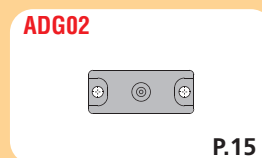
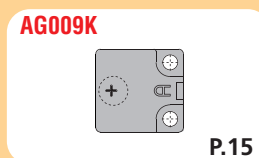
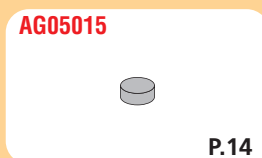
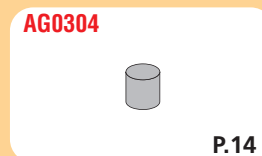
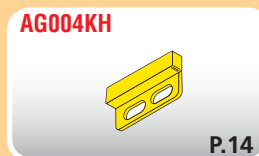
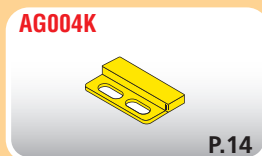
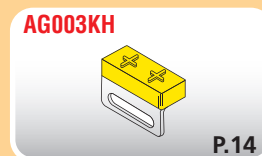
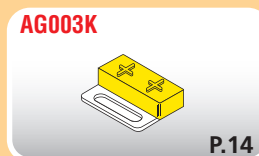
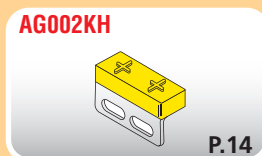
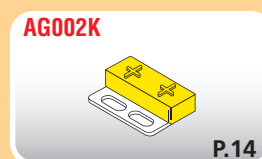
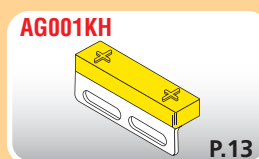
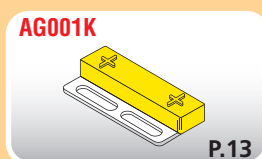
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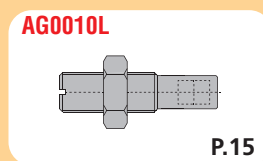
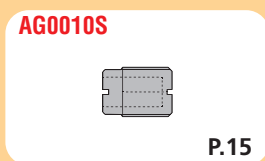
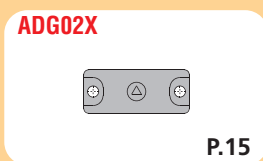
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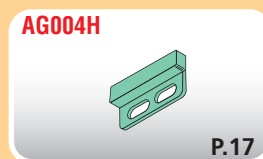
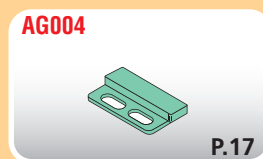
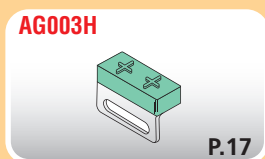
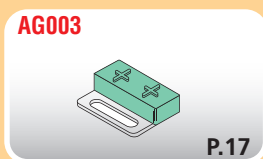
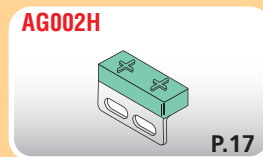
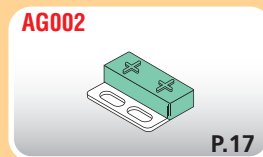
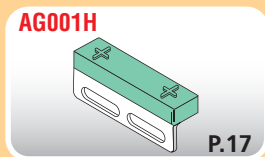
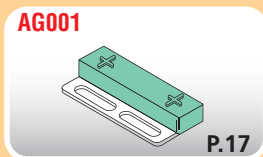
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● “Mag” for Magnetic Proximity Sensors……P.13～15



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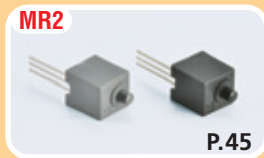
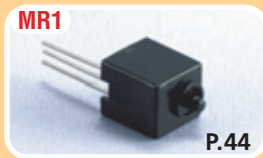
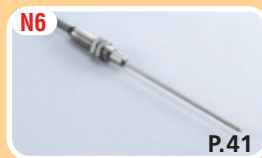
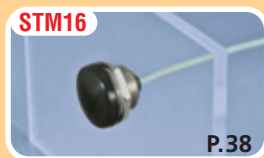
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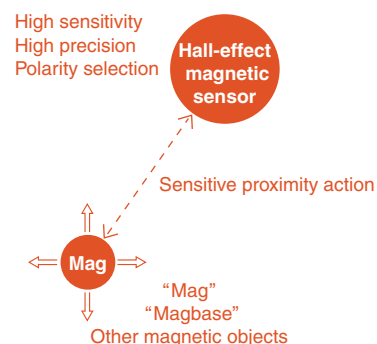
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Magnetic Proximity Sensors



Mechanism



Features

- Magnetic proximity sensors are sensors that are activated/deactivated in response to the changes in the intensity of magnetic field.
- Incorporating Hall IC, the models have polarity with the south-pole side as the standard sense zone.
- High-speed response (less than $5\mu\text{sec}$), good for speedometers and rotational speed meters.
- Higher sensitivity (wider operation distance to a target) and reduced size compared to typical sensors of a kind.
- Both the original alignment of the servo motor and overrun detection can be conducted with the double sensor.
- It is a reliable sensor that is less susceptible to interference caused by radiation noise.

General specifications

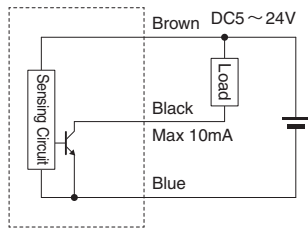
Supply Voltage	DC5 ~ 24V
Output specifications	NPN open collector (ON when in proximity) *PNP, current amplification, and output conversion are possible with cable options. (Refer to P.12)
Response time	$5\mu\text{sec}$
Voltage Resistance	AC1000V (1 minute / packaged charging part / between the case)
Insulation Resistance	DC250V (Over 20MΩ in megohms / between the case)
Operation Temperature Range	$-20^{\circ}\text{C} \sim +85^{\circ}\text{C}$ (Without condensation)
Operating Humidity Range	20 ~ 95%RH

Precautions

- **Precautions for safety use**
 - (1) Although our products are designed to ensure safety and address risks, in case that a sensor malfunction or failure is expected to lead to serious risks to life or property, please be advised to expand further safety gear such as the incorporation of dual circuit.
 - (2) Applying a strong magnetic field may cause malfunction.
- **Correct wiring**
 - (1) **Prevention of reverse connection**...Please observe the circuit diagrams so as to ensure correct connections. Reverse connection of power supply is strictly prohibited.
 - (2) **Relay drive**...When driving a relay, please connect a freewheel diode in parallel.
- **Mounting the sensor**
 - (1) **Tightening torque**...Please observe the value of torque designated for each sensor.
 - (2) **Disconnection of the cable outlet**
 - ① Do not apply excessive stress to the cable outlets of the sensor body.
 - ② When moving the cable, please secure the middle of the cable so that stress is not applied to the outlet.
 - ③ The bending radius as R7 at least.

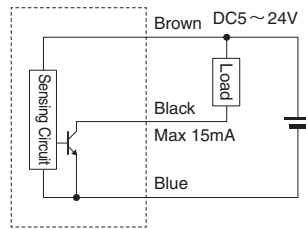
Connection examples (circuit diagrams)

Circuit system CNC-1



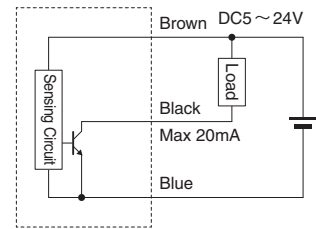
■AH0010 ■AH013

Circuit system CNC-3



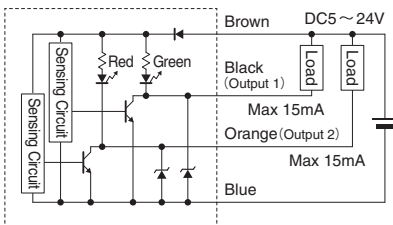
■AH003 ■AH004

Circuit system CNC-4



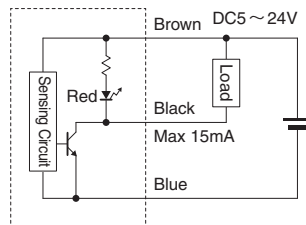
■AHM026

Circuit system CNC-5



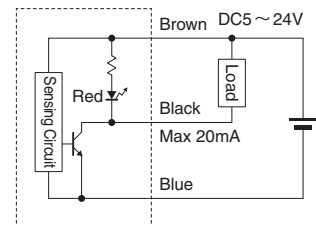
■AH002-D

Circuit system CNC-7



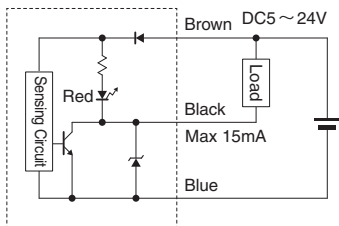
■AH005H ■AH023

Circuit system CNC-12



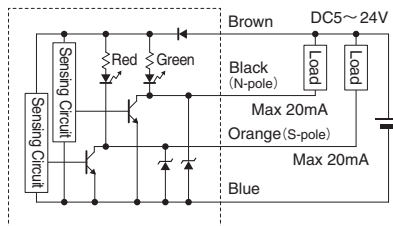
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Circuit system CNC-17



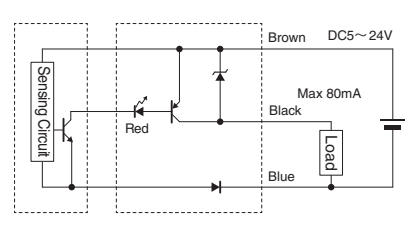
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Circuit system CNC-23



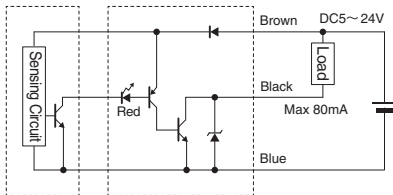
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Circuit system CNC-24



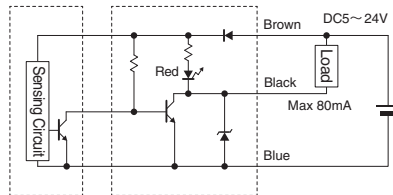
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Circuit system CNC-25



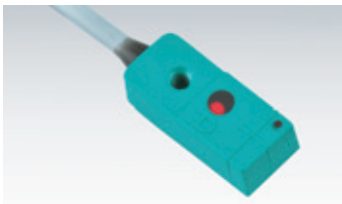

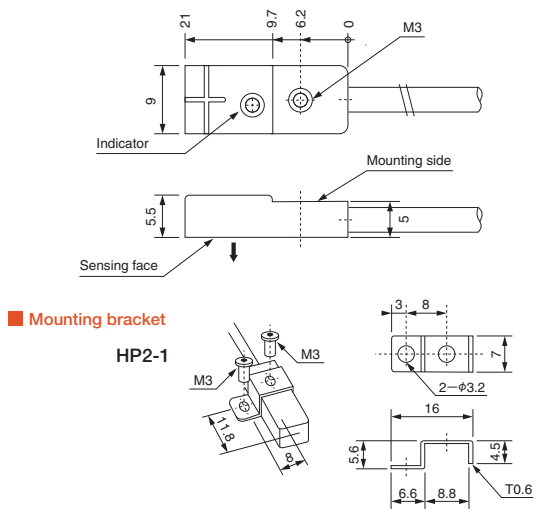

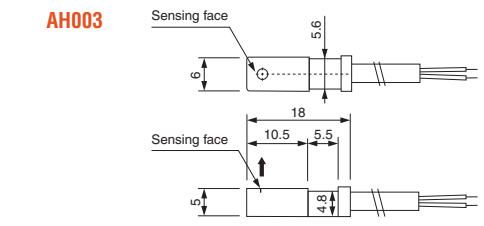
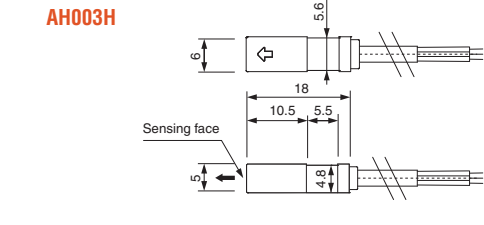
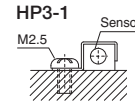
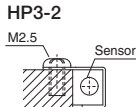
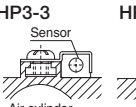
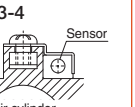
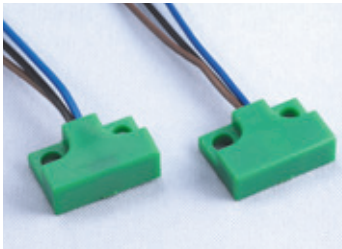
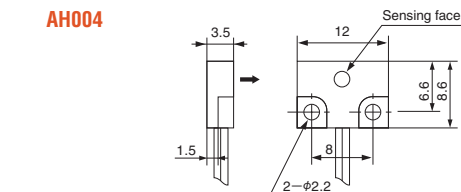
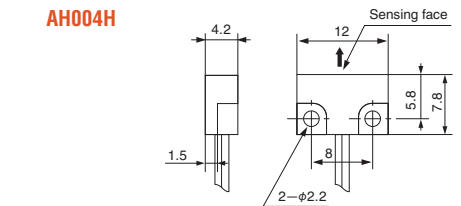
■AH0241-FA ■AHM0241-FA


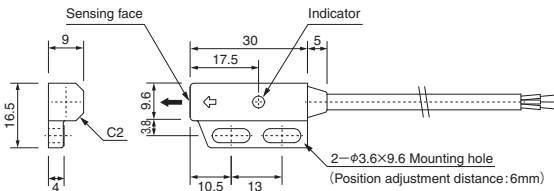

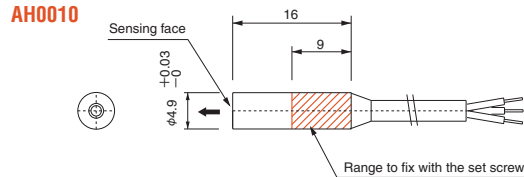
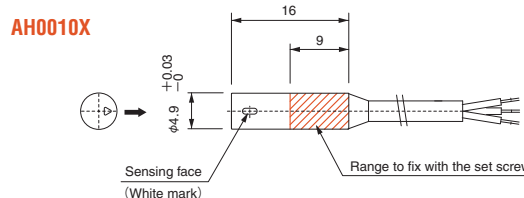
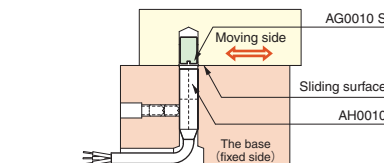
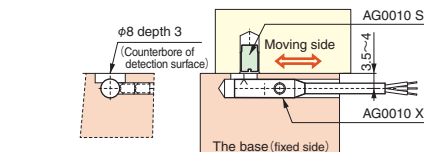
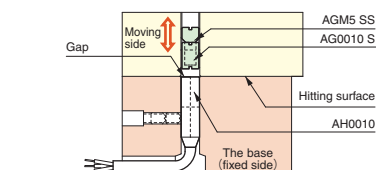
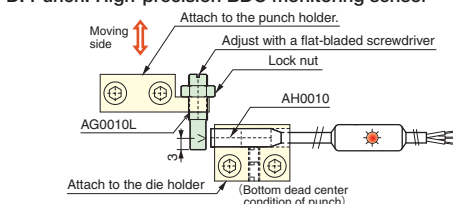

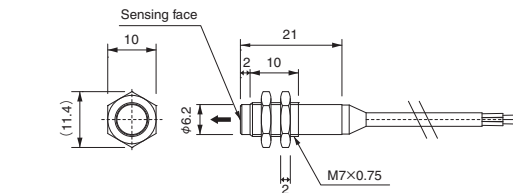
Circuit system CNC-26

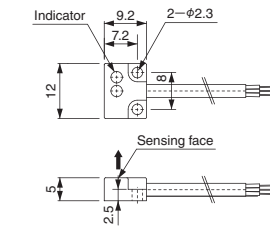
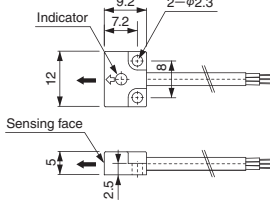
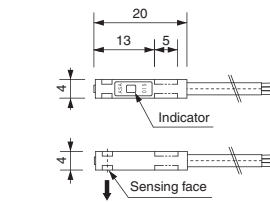
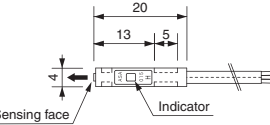
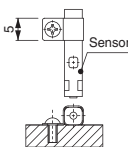
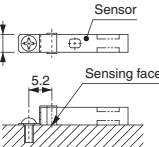
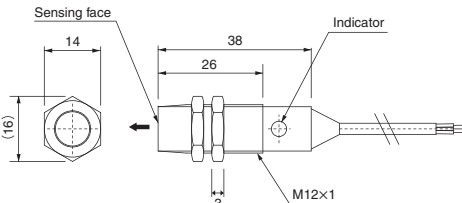



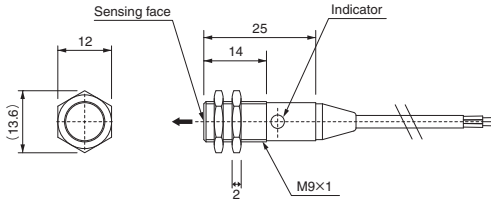

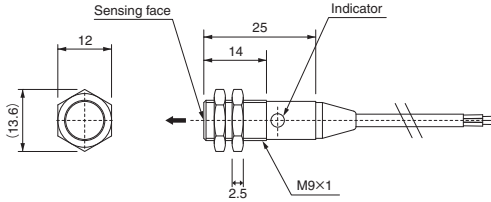
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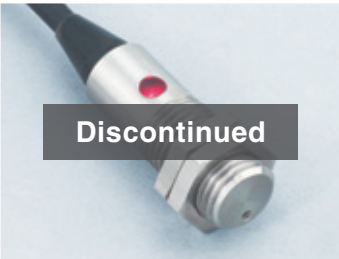
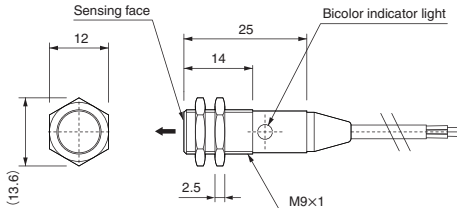
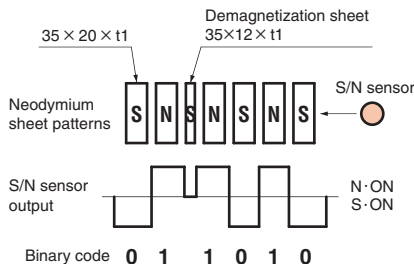
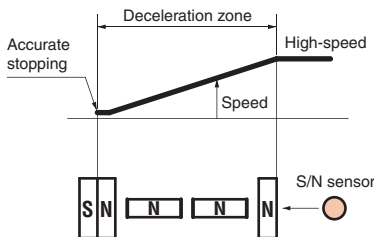

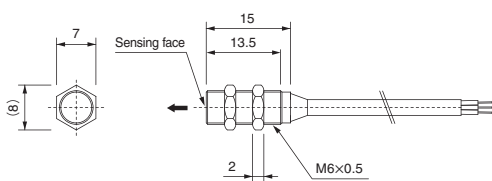

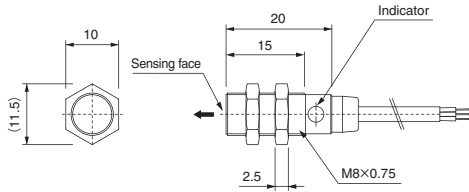
Lineup of Magnetic Proximity Sensors


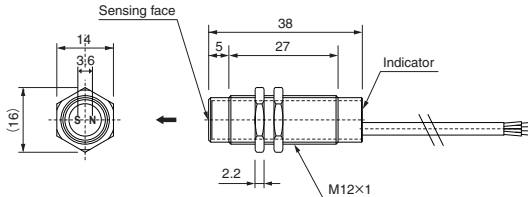

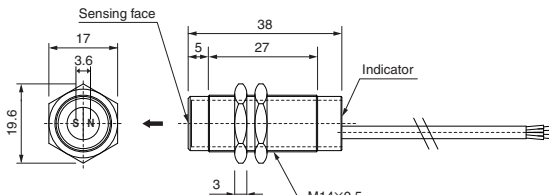
Model	Dimensions (mm)	Specifications																								
<div>AH002-S</div> <div></div> <div>AH002-D</div> <div></div>	<div></div> <div>Do not drive a M3 screw in too tightly. Please refer to the "The way to use as a double sensor" section in the P.15 regarding the differential distance of the double sensor.</div>	<table><tr><td>Sensing Pole</td><td>S-pole</td></tr><tr><td>Magnetic sensitivity</td><td>2.5 ~ 3.5mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Output current</td><td>15mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Cable specifications</td><td>AH002-S : ϕ 2.8 3wire, Gray 1m AH002-D : ϕ 3.1 4wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Green</td></tr><tr><td>Mounting</td><td>M3 tightening torque 0.2N·m It is recommendable to bond the screw in order to prevent loosening.</td></tr><tr><td>Built-in-sensor</td><td>AH002-S : Single AH002-D : Double Differential distance 1.5mm±0.3</td></tr><tr><td>Indicator light</td><td>AH002-S : Red AH002-D : Output 1...Green Output 2...Red</td></tr><tr><td>Protective structure</td><td>IP65</td></tr><tr><td>Circuit diagram</td><td>AH002-S : CNC-17 (Refer to P.5) AH002-D : CNC-5 (Refer to P.5)</td></tr></table> <div>· The AH002-S can convert output specifications, amplify current, or extend the cable by using a cable options. · The AH002-D can only extend the cable.</div>	Sensing Pole	S-pole	Magnetic sensitivity	2.5 ~ 3.5mT	Direction to detect	Downward	Output current	15mA Max	Consumption current	8mA Max	Cable specifications	AH002-S : ϕ 2.8 3wire, Gray 1m AH002-D : ϕ 3.1 4wire, Black 1m	Case material	GF reinforced PBT : Green	Mounting	M3 tightening torque 0.2N·m It is recommendable to bond the screw in order to prevent loosening.	Built-in-sensor	AH002-S : Single AH002-D : Double Differential distance 1.5mm±0.3	Indicator light	AH002-S : Red AH002-D : Output 1...Green Output 2...Red	Protective structure	IP65	Circuit diagram	AH002-S : CNC-17 (Refer to P.5) AH002-D : CNC-5 (Refer to P.5)
Sensing Pole	S-pole																									
Magnetic sensitivity	2.5 ~ 3.5mT																									
Direction to detect	Downward																									
Output current	15mA Max																									
Consumption current	8mA Max																									
Cable specifications	AH002-S : ϕ 2.8 3wire, Gray 1m AH002-D : ϕ 3.1 4wire, Black 1m																									
Case material	GF reinforced PBT : Green																									
Mounting	M3 tightening torque 0.2N·m It is recommendable to bond the screw in order to prevent loosening.																									
Built-in-sensor	AH002-S : Single AH002-D : Double Differential distance 1.5mm±0.3																									
Indicator light	AH002-S : Red AH002-D : Output 1...Green Output 2...Red																									
Protective structure	IP65																									
Circuit diagram	AH002-S : CNC-17 (Refer to P.5) AH002-D : CNC-5 (Refer to P.5)																									
<div>AH003 / AH003H</div> <div></div>	<div><div>AH003</div><div></div></div> <div><div>AH003H</div><div></div></div> <div>■ Mounting bracket</div> <div><div>HP3-1</div><div></div><div>(Plane mounting bracket)</div></div> <div><div>HP3-2</div><div></div><div>(Corner mounting bracket)</div></div> <div><div>HP3-3</div><div></div><div>Air cylinder (Dedicated nuts included)</div></div> <div><div>HP3-4</div><div></div><div>Air cylinder (Use commercially available M3 nuts)</div></div>	<table><tr><td>Sensing Pole</td><td>S-pole</td></tr><tr><td>Magnetic sensitivity</td><td>2.5 ~ 3.5mT</td></tr><tr><td>Direction to detect</td><td>AH003 : Upward AH003H : Forward</td></tr><tr><td>Output current</td><td>15mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Cable specifications</td><td>ϕ 2.8 3wire, Gray 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Mounting</td><td>Dedicated mounting bracket</td></tr><tr><td>Protective structure</td><td>IP65</td></tr><tr><td>Circuit diagram</td><td>CNC-3 (Refer to P.5)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Sensing Pole	S-pole	Magnetic sensitivity	2.5 ~ 3.5mT	Direction to detect	AH003 : Upward AH003H : Forward	Output current	15mA Max	Consumption current	8mA Max	Cable specifications	ϕ 2.8 3wire, Gray 1m	Case material	GF reinforced PBT : Black	Mounting	Dedicated mounting bracket	Protective structure	IP65	Circuit diagram	CNC-3 (Refer to P.5)				
Sensing Pole	S-pole																									
Magnetic sensitivity	2.5 ~ 3.5mT																									
Direction to detect	AH003 : Upward AH003H : Forward																									
Output current	15mA Max																									
Consumption current	8mA Max																									
Cable specifications	ϕ 2.8 3wire, Gray 1m																									
Case material	GF reinforced PBT : Black																									
Mounting	Dedicated mounting bracket																									
Protective structure	IP65																									
Circuit diagram	CNC-3 (Refer to P.5)																									
<div>AH004 / AH004H</div> <div></div>	<div><div>AH004</div><div></div></div> <div><div>AH004H</div><div></div></div> <div>Make sure not to tighten the M2 screws too tight with torques under 0.15N·m.</div>	<table><tr><td>Sensing Pole</td><td>S-pole</td></tr><tr><td>Magnetic sensitivity</td><td>2.5 ~ 3.5mT</td></tr><tr><td>Direction to detect</td><td>AH004 : Upward AH004H : Forward</td></tr><tr><td>Output current</td><td>15mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Cable specifications</td><td>Core wire ϕ 0.9×3, 0.3m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Green</td></tr><tr><td>Mounting</td><td>M2 tightening torque 0.15N·m</td></tr><tr><td>Protective structure</td><td>IP65</td></tr><tr><td>Circuit diagram</td><td>CNC-3 (Refer to P.5)</td></tr></table>	Sensing Pole	S-pole	Magnetic sensitivity	2.5 ~ 3.5mT	Direction to detect	AH004 : Upward AH004H : Forward	Output current	15mA Max	Consumption current	8mA Max	Cable specifications	Core wire ϕ 0.9×3, 0.3m	Case material	GF reinforced PBT : Green	Mounting	M2 tightening torque 0.15N·m	Protective structure	IP65	Circuit diagram	CNC-3 (Refer to P.5)				
Sensing Pole	S-pole																									
Magnetic sensitivity	2.5 ~ 3.5mT																									
Direction to detect	AH004 : Upward AH004H : Forward																									
Output current	15mA Max																									
Consumption current	8mA Max																									
Cable specifications	Core wire ϕ 0.9×3, 0.3m																									
Case material	GF reinforced PBT : Green																									
Mounting	M2 tightening torque 0.15N·m																									
Protective structure	IP65																									
Circuit diagram	CNC-3 (Refer to P.5)																									

Model	Dimensions (mm)	Specifications																								
<div>AH005H</div> <div></div>	<div></div>	<table><tr><td>Sensing Pole</td><td>AH005H-S : S-pole AH005H-N : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>0.9±0.2mT</td></tr><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Output current</td><td>15mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Cable specifications</td><td>S-pole : φ4 3wire, Gray 1m N-pole : φ4 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Mounting</td><td>M3 tightening torque 0.3N·m</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-7 (Refer to P.5)</td></tr></table> <div>· Cable extension are possible.</div>	Sensing Pole	AH005H-S : S-pole AH005H-N : N-pole	Magnetic sensitivity	0.9±0.2mT	Direction to detect	Forward	Output current	15mA Max	Consumption current	8mA Max	Cable specifications	S-pole : φ4 3wire, Gray 1m N-pole : φ4 3wire, Black 1m	Case material	GF reinforced PBT : Black	Mounting	M3 tightening torque 0.3N·m	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-7 (Refer to P.5)		
Sensing Pole	AH005H-S : S-pole AH005H-N : N-pole																									
Magnetic sensitivity	0.9±0.2mT																									
Direction to detect	Forward																									
Output current	15mA Max																									
Consumption current	8mA Max																									
Cable specifications	S-pole : φ4 3wire, Gray 1m N-pole : φ4 3wire, Black 1m																									
Case material	GF reinforced PBT : Black																									
Mounting	M3 tightening torque 0.3N·m																									
Indicator light	Red																									
Protective structure	IP67																									
Circuit diagram	CNC-7 (Refer to P.5)																									
<div>AH0010 / AH0010X</div> <div></div>	<div><div>AH0010</div><div></div></div> <div><div>AH0010X</div><div></div></div>	<table><tr><td>Sensing Pole</td><td>S-pole</td></tr><tr><td>Magnetic sensitivity</td><td>5 ~ 7mT</td></tr><tr><td>Direction to detect</td><td>AH0010 : Forward AH0010X : Upward</td></tr><tr><td>Output current</td><td>10mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Cable specifications</td><td>φ2.8 3wire, Gray 1m</td></tr><tr><td>Case material</td><td>SUS</td></tr><tr><td>Mounting</td><td>M3 tightening torque 0.2N·m or less</td></tr><tr><td>Protective structure</td><td>IP65</td></tr><tr><td>Circuit diagram</td><td>CNC-1 (Refer to P.5)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Sensing Pole	S-pole	Magnetic sensitivity	5 ~ 7mT	Direction to detect	AH0010 : Forward AH0010X : Upward	Output current	10mA Max	Consumption current	8mA Max	Cable specifications	φ2.8 3wire, Gray 1m	Case material	SUS	Mounting	M3 tightening torque 0.2N·m or less	Protective structure	IP65	Circuit diagram	CNC-1 (Refer to P.5)				
Sensing Pole	S-pole																									
Magnetic sensitivity	5 ~ 7mT																									
Direction to detect	AH0010 : Forward AH0010X : Upward																									
Output current	10mA Max																									
Consumption current	8mA Max																									
Cable specifications	φ2.8 3wire, Gray 1m																									
Case material	SUS																									
Mounting	M3 tightening torque 0.2N·m or less																									
Protective structure	IP65																									
Circuit diagram	CNC-1 (Refer to P.5)																									
<div><div>A. Example of embedding to the mechanical sliding surface.</div><div></div></div> <div><div>B. Example of embedding to the mechanical sliding surface</div><div></div></div> <div><div>C. Proximity type stop sensor</div><div></div></div> <div><div>D. Punch: High-precision BDC monitoring sensor</div><div></div></div>																										
<div>AH013</div> <div></div>	<div></div>	<table><tr><td>Sensing Pole</td><td>AH013-S : S-pole AH013-N : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>2.5 ~ 3.5mT</td></tr><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Output current</td><td>10mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Cable specifications</td><td>S-pole : φ2.8 3wire, Gray 1m N-pole : φ2.8 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Gray</td></tr><tr><td>Nut material</td><td>Brass</td></tr><tr><td>Mounting</td><td>M7 nut tightening torque 0.3N·m It is recommendable to bond the screw in order to prevent loosening.</td></tr><tr><td>Mounting hole processing dimensions</td><td>φ7 +0.5 0</td></tr><tr><td>Protective structure</td><td>IP65</td></tr><tr><td>Circuit diagram</td><td>CNC-1 (Refer to P.5)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Sensing Pole	AH013-S : S-pole AH013-N : N-pole	Magnetic sensitivity	2.5 ~ 3.5mT	Direction to detect	Forward	Output current	10mA Max	Consumption current	8mA Max	Cable specifications	S-pole : φ2.8 3wire, Gray 1m N-pole : φ2.8 3wire, Black 1m	Case material	GF reinforced PBT : Gray	Nut material	Brass	Mounting	M7 nut tightening torque 0.3N·m It is recommendable to bond the screw in order to prevent loosening.	Mounting hole processing dimensions	φ7 +0.5 0	Protective structure	IP65	Circuit diagram	CNC-1 (Refer to P.5)
Sensing Pole	AH013-S : S-pole AH013-N : N-pole																									
Magnetic sensitivity	2.5 ~ 3.5mT																									
Direction to detect	Forward																									
Output current	10mA Max																									
Consumption current	8mA Max																									
Cable specifications	S-pole : φ2.8 3wire, Gray 1m N-pole : φ2.8 3wire, Black 1m																									
Case material	GF reinforced PBT : Gray																									
Nut material	Brass																									
Mounting	M7 nut tightening torque 0.3N·m It is recommendable to bond the screw in order to prevent loosening.																									
Mounting hole processing dimensions	φ7 +0.5 0																									
Protective structure	IP65																									
Circuit diagram	CNC-1 (Refer to P.5)																									

Model	Dimensions (mm)	Specifications																																		
AH014 / AH014H	<div><div>AH014</div><div></div><div>AH014H</div><div></div></div>	<table><tr><td>Sensing Pole</td><td>AH014-S / AH014H : S-pole AH014-N : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>3 ~ 4mT</td></tr><tr><td>Direction to detect</td><td>AH014-□ : Upward AH014H : Forward</td></tr><tr><td>Output current</td><td>20mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Response speed</td><td>16 μsec</td></tr><tr><td>Cable specifications</td><td>S-pole : φ2.8 3wire, Gray 1m N-pole : φ2.8 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Mounting</td><td>M2 tightening torque 0.15N·m</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP65</td></tr><tr><td>Circuit diagram</td><td>CNC-12(Refer to P.5)</td></tr></table> <p>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</p>	Sensing Pole	AH014-S / AH014H : S-pole AH014-N : N-pole	Magnetic sensitivity	3 ~ 4mT	Direction to detect	AH014-□ : Upward AH014H : Forward	Output current	20mA Max	Consumption current	8mA Max	Response speed	16 μsec	Cable specifications	S-pole : φ2.8 3wire, Gray 1m N-pole : φ2.8 3wire, Black 1m	Case material	GF reinforced PBT : Black	Mounting	M2 tightening torque 0.15N·m	Indicator light	Red	Protective structure	IP65	Circuit diagram	CNC-12(Refer to P.5)										
Sensing Pole	AH014-S / AH014H : S-pole AH014-N : N-pole																																			
Magnetic sensitivity	3 ~ 4mT																																			
Direction to detect	AH014-□ : Upward AH014H : Forward																																			
Output current	20mA Max																																			
Consumption current	8mA Max																																			
Response speed	16 μsec																																			
Cable specifications	S-pole : φ2.8 3wire, Gray 1m N-pole : φ2.8 3wire, Black 1m																																			
Case material	GF reinforced PBT : Black																																			
Mounting	M2 tightening torque 0.15N·m																																			
Indicator light	Red																																			
Protective structure	IP65																																			
Circuit diagram	CNC-12(Refer to P.5)																																			
AH015 / AH015H	<div><div>AH015</div><div></div><div>AH015H</div><div></div></div> <div><div>■ Mounting bracket</div><div><div>HP15-1</div><div></div></div><div><div>HP15-2</div><div></div></div></div>	<table><tr><td>Sensing Pole</td><td>AH015-S / AH015H : S-pole AH015-N : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>3 ~ 4mT</td></tr><tr><td>Direction to detect</td><td>AH015-□ : Downward AH015H : Forward</td></tr><tr><td>Output current</td><td>20mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Response speed</td><td>16 μsec</td></tr><tr><td>Cable specifications</td><td>S-pole : φ2.6 3wire, Gray 1m N-pole : φ2.6 3wire, Black 1m</td></tr><tr><td>Case material</td><td>AH015-□ : GF reinforced PBT Black AH015H : GF reinforced PBT Gray</td></tr><tr><td>Mounting</td><td>Dedicated mounting bracket</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-12(Refer to P.5)</td></tr></table> <p>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</p>	Sensing Pole	AH015-S / AH015H : S-pole AH015-N : N-pole	Magnetic sensitivity	3 ~ 4mT	Direction to detect	AH015-□ : Downward AH015H : Forward	Output current	20mA Max	Consumption current	8mA Max	Response speed	16 μsec	Cable specifications	S-pole : φ2.6 3wire, Gray 1m N-pole : φ2.6 3wire, Black 1m	Case material	AH015-□ : GF reinforced PBT Black AH015H : GF reinforced PBT Gray	Mounting	Dedicated mounting bracket	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-12(Refer to P.5)										
Sensing Pole	AH015-S / AH015H : S-pole AH015-N : N-pole																																			
Magnetic sensitivity	3 ~ 4mT																																			
Direction to detect	AH015-□ : Downward AH015H : Forward																																			
Output current	20mA Max																																			
Consumption current	8mA Max																																			
Response speed	16 μsec																																			
Cable specifications	S-pole : φ2.6 3wire, Gray 1m N-pole : φ2.6 3wire, Black 1m																																			
Case material	AH015-□ : GF reinforced PBT Black AH015H : GF reinforced PBT Gray																																			
Mounting	Dedicated mounting bracket																																			
Indicator light	Red																																			
Protective structure	IP67																																			
Circuit diagram	CNC-12(Refer to P.5)																																			
AH023	<div></div>	<table><tr><td>Sensing Pole</td><td>AH023 / AH023H : S-pole AH023N / AH023HN : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>Refer to below</td></tr><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Output current</td><td>15mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Cable specifications</td><td>S-pole : φ2.8 3wire, Gray 1m N-pole : φ2.8 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Nut material</td><td>Brass</td></tr><tr><td>Mounting</td><td>M12 nut tightening torque 2N·m It is recommendable to bond the screw in order to prevent loosening.</td></tr><tr><td>Mounting hole processing dimensions</td><td>φ12 +0.5 0</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-7(Refer to P.5)</td></tr></table> <table><tr><th>Model</th><th>Magnetic sensitivity</th></tr><tr><td>AH023 / AH023N</td><td>2.5 ~ 3.5mT</td></tr><tr><td>AH023H</td><td>0.7±0.15mT (High sensitivity)</td></tr><tr><td>AH023HN</td><td>0.8±0.15mT (High sensitivity)</td></tr></table> <p>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</p>	Sensing Pole	AH023 / AH023H : S-pole AH023N / AH023HN : N-pole	Magnetic sensitivity	Refer to below	Direction to detect	Forward	Output current	15mA Max	Consumption current	8mA Max	Cable specifications	S-pole : φ2.8 3wire, Gray 1m N-pole : φ2.8 3wire, Black 1m	Case material	GF reinforced PBT : Black	Nut material	Brass	Mounting	M12 nut tightening torque 2N·m It is recommendable to bond the screw in order to prevent loosening.	Mounting hole processing dimensions	φ12 +0.5 0	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-7(Refer to P.5)	Model	Magnetic sensitivity	AH023 / AH023N	2.5 ~ 3.5mT	AH023H	0.7±0.15mT (High sensitivity)	AH023HN	0.8±0.15mT (High sensitivity)
Sensing Pole	AH023 / AH023H : S-pole AH023N / AH023HN : N-pole																																			
Magnetic sensitivity	Refer to below																																			
Direction to detect	Forward																																			
Output current	15mA Max																																			
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Mounting	M12 nut tightening torque 2N·m It is recommendable to bond the screw in order to prevent loosening.																																			
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AH023HN	0.8±0.15mT (High sensitivity)																																			

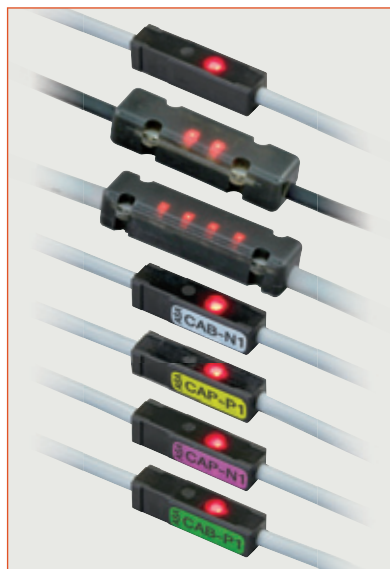
Model	Dimensions (mm)	Specifications																																						
<div>Renewal</div> <div>AH0241</div> <div></div>	<div></div> <div><div>Model</div><div>AH0241<div><div>Magnetic sensitivity</div><div>Sensing Pole</div><div>Output specifications</div></div></div><div><div>Blank : Normal</div><div>H : High sensitivity</div><div>P : Ultra high sensitivity</div></div><div><div>S : S-pole</div><div>N : N-pole</div></div><div><div>Blank : 15mA, NPN, OFF→ON</div><div>FA : 80mA, NPN, OFF→ON</div><div>FB : 80mA, NPN, ON→OFF</div><div>FAP : 80mA, PNP, OFF→ON</div></div></div> <div>*If the magnetic sensitivity is "P", only "S" can be selected for the detection magnetic pole.</div>	<table><tr><td>Sensing Pole</td><td>AH0241S / AH0241HS / AH0241P : S-pole AH0241N / AH0241HN : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>Refer to below</td></tr><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Output specifications</td><td>AH0241□ / AH0241H□ / AH0241P / AH0241□-FA : NPN open collector (When proximity is turned ON) AH0241□-FB : NPN open collector (When proximity is turned OFF) AH0241□-FAP : PNP open collector (When proximity is turned ON)</td></tr><tr><td>Output current</td><td>AH0241□□ : 15mA Max AH0241□□-FA / FB / FAP : 80mA Max</td></tr><tr><td>Consumption current</td><td>AH0241□□ : 8mA Max AH0241□□-FA / FB / FAP : 15mA Max</td></tr><tr><td>Cable specifications</td><td>S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Nut material</td><td>Brass</td></tr><tr><td>Mounting</td><td>M9 nut tightening torque 0.5N·m</td></tr><tr><td>Mounting hole processing dimensions</td><td>φ 9 +0.5 0</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>AH0241□□ : CNC-17(Refer to P.5) AH0241□□-FA : CNC-25(Refer to P.5) AH0241□□-FB : CNC-26(Refer to P.5) AH0241□□-FAP : CNC-24(Refer to P.5)</td></tr></table> <table><tr><th>Model</th><th>Magnetic sensitivity</th></tr><tr><td>AH0241</td><td>2.5 ~ 3.5mT</td></tr><tr><td>AH0241HS</td><td>0.8±0.2mT (High sensitivity)</td></tr><tr><td>AH0241HN</td><td>0.9±0.2mT (High sensitivity)</td></tr><tr><td>AH0241P</td><td>0.5±0.1mT (Ultra high sensitivity)</td></tr></table> <div>· Cable extension are possible.</div>	Sensing Pole	AH0241S / AH0241HS / AH0241P : S-pole AH0241N / AH0241HN : N-pole	Magnetic sensitivity	Refer to below	Direction to detect	Forward	Output specifications	AH0241□ / AH0241H□ / AH0241P / AH0241□-FA : NPN open collector (When proximity is turned ON) AH0241□-FB : NPN open collector (When proximity is turned OFF) AH0241□-FAP : PNP open collector (When proximity is turned ON)	Output current	AH0241□□ : 15mA Max AH0241□□-FA / FB / FAP : 80mA Max	Consumption current	AH0241□□ : 8mA Max AH0241□□-FA / FB / FAP : 15mA Max	Cable specifications	S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m	Case material	GF reinforced PBT : Black	Nut material	Brass	Mounting	M9 nut tightening torque 0.5N·m	Mounting hole processing dimensions	φ 9 +0.5 0	Indicator light	Red	Protective structure	IP67	Circuit diagram	AH0241□□ : CNC-17(Refer to P.5) AH0241□□-FA : CNC-25(Refer to P.5) AH0241□□-FB : CNC-26(Refer to P.5) AH0241□□-FAP : CNC-24(Refer to P.5)	Model	Magnetic sensitivity	AH0241	2.5 ~ 3.5mT	AH0241HS	0.8±0.2mT (High sensitivity)	AH0241HN	0.9±0.2mT (High sensitivity)	AH0241P	0.5±0.1mT (Ultra high sensitivity)
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<div>AHM025</div> <div></div> <div>Discontinued</div>	<div></div>	<table><tr><td>Supply Voltage</td><td>DC12 ~ 24V</td></tr><tr><td>Sensing Pole</td><td>Two output for S-pole and N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>S-pole : 0.4 (±0.05) mT N-pole : 0.3 (±0.05) mT</td></tr><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Output specifications</td><td>Nch Open drain</td></tr><tr><td>Output current</td><td>30mA Max</td></tr><tr><td>Consumption current</td><td>10mA Max</td></tr><tr><td>Response speed</td><td>50m sec</td></tr><tr><td>Cable specifications</td><td>φ 3.1 4wire, Black 1m</td></tr><tr><td>Case,nut material</td><td>SUS303</td></tr><tr><td>Mounting</td><td>M9 nut tightening torque 5N·m</td></tr><tr><td>Mounting hole processing dimensions</td><td>φ 9 +0.5 0</td></tr><tr><td>Indicator light</td><td>S-pole : Red N-pole : Green</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-14 (Refer to P.5)</td></tr></table> <div>· Cable extension are possible.</div>	Supply Voltage	DC12 ~ 24V	Sensing Pole	Two output for S-pole and N-pole	Magnetic sensitivity	S-pole : 0.4 (±0.05) mT N-pole : 0.3 (±0.05) mT	Direction to detect	Forward	Output specifications	Nch Open drain	Output current	30mA Max	Consumption current	10mA Max	Response speed	50m sec	Cable specifications	φ 3.1 4wire, Black 1m	Case,nut material	SUS303	Mounting	M9 nut tightening torque 5N·m	Mounting hole processing dimensions	φ 9 +0.5 0	Indicator light	S-pole : Red N-pole : Green	Protective structure	IP67	Circuit diagram	CNC-14 (Refer to P.5)
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<div>■ Applications</div> <div><div>(1) Environment-resistant, high-sensitivity magnetic proximity sensor.</div><div>(2) Detection and stop position of the moving objects inside the automated warehouse.</div><div>(3) Recognition sensor for loading or shipping. (S→N for loading, N→S for shipments, etc.)</div></div>																																
<div>■ Application examples</div> <div><div><div>1. Address sensor of the automated transport vehicles</div><div></div></div><div><div>2. Running system of fast moving objects</div><div></div></div></div>																																
<div>AHM026</div> <div></div>	<div></div>	<table><tr><td>Sensing Pole</td><td>S-pole</td></tr><tr><td>Magnetic sensitivity</td><td>3 ~ 4mT</td></tr><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Output current</td><td>20mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Response speed</td><td>16 μsec</td></tr><tr><td>Cable specifications</td><td>φ 2.8 3wire, Gray 1m</td></tr><tr><td>Case,nut material</td><td>SUS303</td></tr><tr><td>Mounting</td><td>M6 nut tightening torque 2N·m</td></tr><tr><td>Mounting hole processing dimensions</td><td>φ 6 +0.5 0</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-4 (Refer to P.5)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Sensing Pole	S-pole	Magnetic sensitivity	3 ~ 4mT	Direction to detect	Forward	Output current	20mA Max	Consumption current	8mA Max	Response speed	16 μsec	Cable specifications	φ 2.8 3wire, Gray 1m	Case,nut material	SUS303	Mounting	M6 nut tightening torque 2N·m	Mounting hole processing dimensions	φ 6 +0.5 0	Protective structure	IP67	Circuit diagram	CNC-4 (Refer to P.5)						
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<div>AHM028</div> <div></div>	<div></div>	<table><tr><td>Sensing Pole</td><td>AHM028-S : S-pole AHM028-N : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>3 ~ 4mT</td></tr><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Output current</td><td>20mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Response speed</td><td>16 μsec</td></tr><tr><td>Cable specifications</td><td>S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m</td></tr><tr><td>Case,nut material</td><td>SUS303</td></tr><tr><td>Mounting</td><td>M8 nut tightening torque 2N·m</td></tr><tr><td>Mounting hole processing dimensions</td><td>φ 8 +0.5 0</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-12 (Refer to P.5)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Sensing Pole	AHM028-S : S-pole AHM028-N : N-pole	Magnetic sensitivity	3 ~ 4mT	Direction to detect	Forward	Output current	20mA Max	Consumption current	8mA Max	Response speed	16 μsec	Cable specifications	S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m	Case,nut material	SUS303	Mounting	M8 nut tightening torque 2N·m	Mounting hole processing dimensions	φ 8 +0.5 0	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-12 (Refer to P.5)				
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Model	Dimensions (mm)	Specifications																										
<div>New</div> <div>AHM029</div> <div></div>	<div></div> <div>* See "AHM025" for how to use the S/N sensor.</div>	<table><tr><td>Sensing Pole</td><td>Two output for S-pole and N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>0.8 ±0.1mT</td></tr><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Output current</td><td>20mA</td></tr><tr><td>Consumption current</td><td>12.5mA</td></tr><tr><td>Response speed</td><td>16 μsec or less</td></tr><tr><td>Cable specifications</td><td>φ 3.1 4wire, Black 1m</td></tr><tr><td>Case, nut material</td><td>SUS303</td></tr><tr><td>Mounting</td><td>M12 nut tightening torque 12N·m</td></tr><tr><td>Mounting hole processing dimensions</td><td>φ 12 ^{+0.5}₀</td></tr><tr><td>Indicator light</td><td>S-pole : Red N-pole : Green</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-23 (Refer to P.5)</td></tr></table> <div>· Cable extension are possible.</div>	Sensing Pole	Two output for S-pole and N-pole	Magnetic sensitivity	0.8 ±0.1mT	Direction to detect	Forward	Output current	20mA	Consumption current	12.5mA	Response speed	16 μsec or less	Cable specifications	φ 3.1 4wire, Black 1m	Case, nut material	SUS303	Mounting	M12 nut tightening torque 12N·m	Mounting hole processing dimensions	φ 12 ^{+0.5} ₀	Indicator light	S-pole : Red N-pole : Green	Protective structure	IP67	Circuit diagram	CNC-23 (Refer to P.5)
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<div>New</div> <div>AHM030</div> <div></div>	<div></div> <div>* See "AHM025" for how to use the S/N sensor.</div>	<table><tr><td>Sensing Pole</td><td>Two output for S-pole and N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>0.8 ±0.1mT</td></tr><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Output current</td><td>20mA</td></tr><tr><td>Consumption current</td><td>12.5mA</td></tr><tr><td>Response speed</td><td>16 μsec or less</td></tr><tr><td>Cable specifications</td><td>φ 3.1 4wire, Black 1m</td></tr><tr><td>Case, nut material</td><td>SUS303</td></tr><tr><td>Mounting</td><td>M14 nut tightening torque 18N·m</td></tr><tr><td>Mounting hole processing dimensions</td><td>φ 14 ^{+0.5}₀</td></tr><tr><td>Indicator light</td><td>S-pole : Red N-pole : Green</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-23 (Refer to P.5)</td></tr></table> <div>· Cable extension are possible.</div>	Sensing Pole	Two output for S-pole and N-pole	Magnetic sensitivity	0.8 ±0.1mT	Direction to detect	Forward	Output current	20mA	Consumption current	12.5mA	Response speed	16 μsec or less	Cable specifications	φ 3.1 4wire, Black 1m	Case, nut material	SUS303	Mounting	M14 nut tightening torque 18N·m	Mounting hole processing dimensions	φ 14 ^{+0.5} ₀	Indicator light	S-pole : Red N-pole : Green	Protective structure	IP67	Circuit diagram	CNC-23 (Refer to P.5)
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Cable Options

Connected along the cable pathway of ASA sensors or switches, the cable options avails current amplification and conversion of signals.



Specifications

Mode	Function	Output form	Maximum load	Indicator
CAL-01	Add indicator	NPN N.O.	DC24V / 15mA	Red LED
CAL-02	Add indicator	NPN N.O.	DC24V / 15mA	
CAL-04	Add indicator	NPN N.O.	DC24V / 15mA	
CAB-N1	N.O.→N.C. conversion Current amplification	NPN N.C.	DC24V / 80mA	
CAP-P1	NPN→PNP conversion Current amplification	PNP N.O.	DC24V / 80mA	
CAP-N1	Current amplification	NPN N.O.	DC24V / 80mA	
CAB-P1	N.O.→N.C. conversion NPN→PNP conversion Current amplification	PNP N.C.	DC24V / 80mA	

N.O. : Normally Open N.C. : Normally Closed

Features

- Current amplification enables to drive relay, solenoid valve or small motor, etc directly.
- Signal conversion enables applying to any system.
- Standard positioning of cable option shall be 100mm far from the sensor head. (Custom configuration is available.)

Lineup of Cable Options

Model	Dimensions (mm)	Connection examples (circuit diagrams)
CAL-01		
CAL-02		
CAL-04		
CAB-N1		
CAP-P1		
CAP-N1		
CAB-P1		

Precautions

CAB-N1: The built-in indicator light cannot be used when it is used as a built-in indicator light sensors or switches.
 CAP-P1: Cannot be used with an output 80mA sensors or switches for standard operation.
 CAP-N1: Cannot be used with an output 80mA sensors or switches for standard operation.
 CAB-P1: Cannot be used with an output 80mA sensors or switches for standard operation.

“Mag” for Magnetic Proximity Sensors

“Mag” and “Magbase” are magnetic objects designed suitable for Magnetic Proximity Sensors.

Features

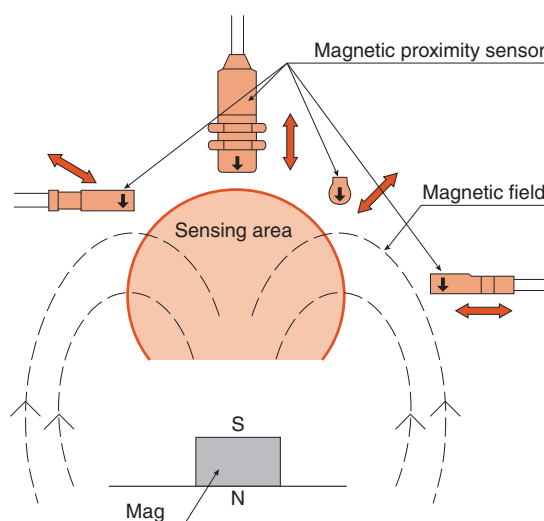
- Mag : wider and longer sensing area
- Magbase : high accuracy sensing

The combination of Magnetic proximity sensor and “Mag”

Summary

In case of combination of Magnetic proximity sensor and “Mag”, the sensing area is globular shape as indicated in the figure. Through this shape, magnetic proximity sensors have stable position sensing ability against any directional approaching. The extent of sensing area is fixed by choice of Mag (that is magnetic intensity) and Magnet proximity sensor (that is magnetic sensitivity).

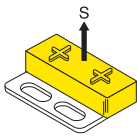
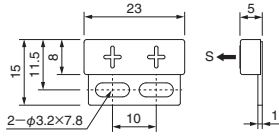
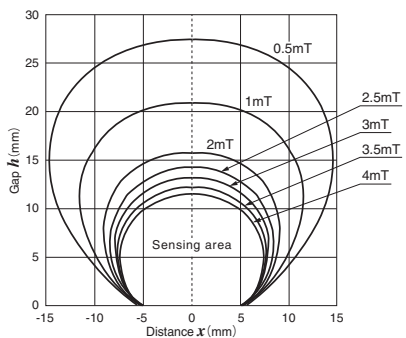
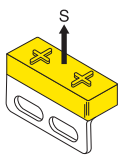
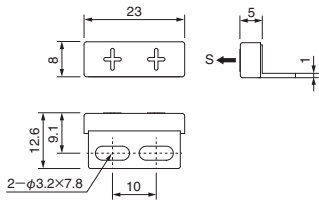
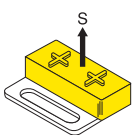
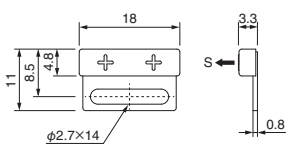
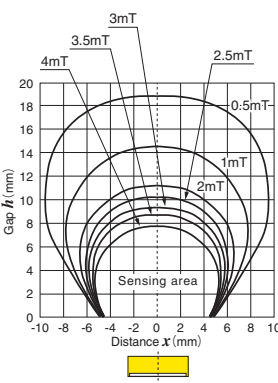
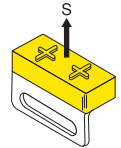
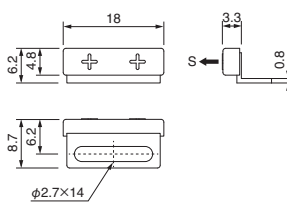
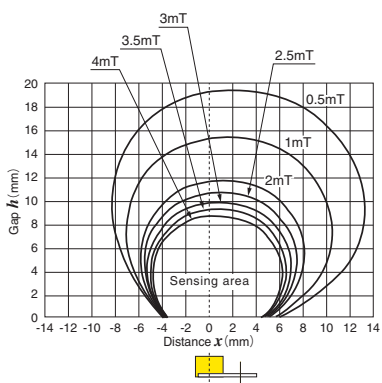
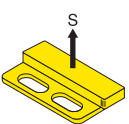
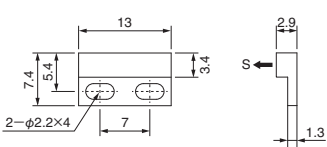
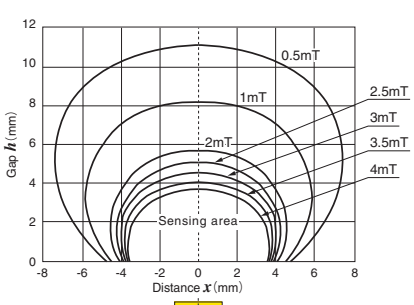
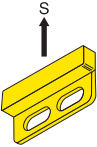
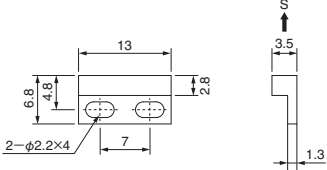

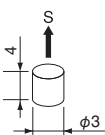
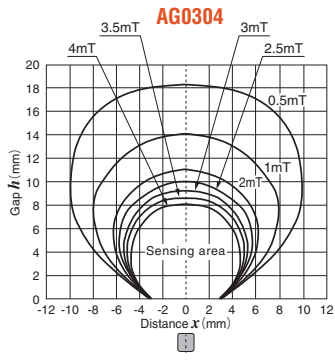

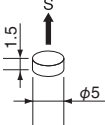
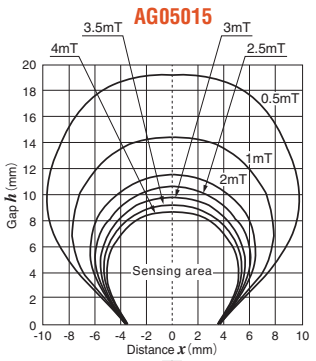
Model “AG0304” and “AG05015” are bare rare-earth magnets. They are suitable for mounting on a compact-sized unit with less installation space.


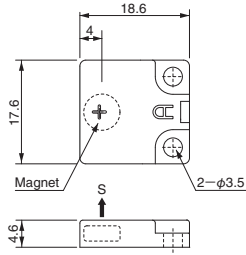
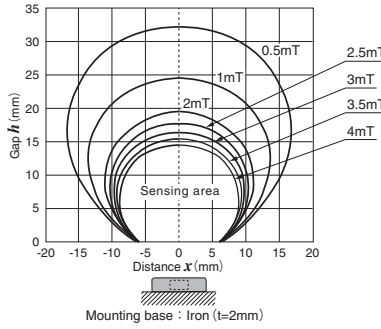
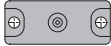
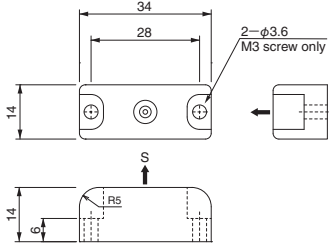
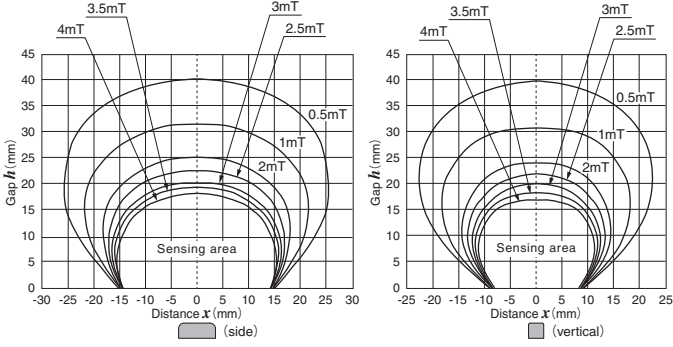

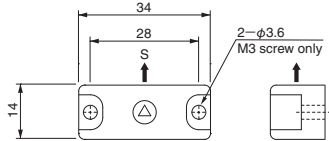

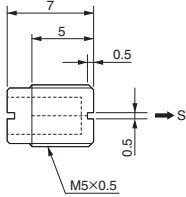
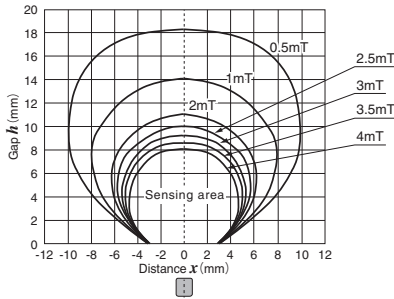
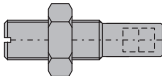
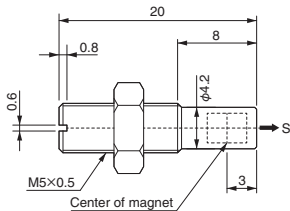


Lineup of “Mag”

Magnet property is measured under condition that the sensing face keeps being parallel to x-axis.

Model	Dimensions (mm)	Magnetic property
AG001K 		
AG001KH 		

Model	Dimensions (mm)	Magnetic property
AG002K 		
AG002KH 		
AG003K 		
AG003KH 		
AG004K 		
AG004KH 		<p>* M2 tightening torque 0.1N·m</p>
AG0304 		
AG05015 		

Model	Dimensions (mm)	Magnetic property
AG009K 	 <p>Case is shared with AH009</p>	 <p>Mounting base : Iron (t=2mm)</p>
ADG02 	 <p>Case is shared with ADH02</p>	 <p>(side) (vertical)</p>
ADG02X 	 <p>Case is shared with ADH02X</p>	
AG0010S 		
AG0010L 		<p>A set screw "AGM5SS" is also available. Please refer to "AH0010 Suitable Usage Examples" on page 7.</p>

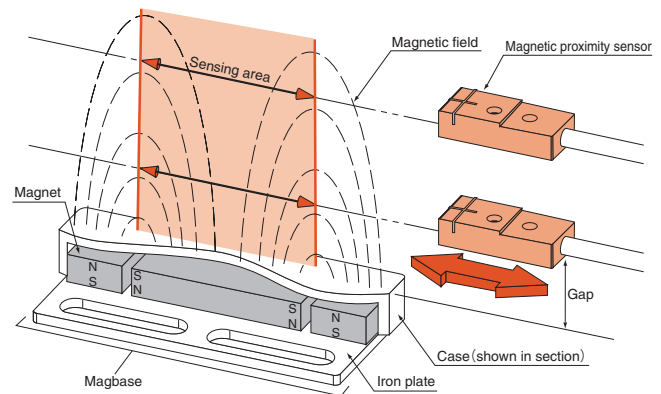
“Magbase” for High Accuracy Positioning

The combination of Magnetic proximity sensor and “Magbase”

As shown in the figure, “Magbase” is an array of 3 magnets disposed on an iron plate with each polarity alternated (patented).

By using “Magbase” instead of “Mag”, the effect of gap change on the sensing area can be minimized. As the arrayed magnets make the magnetic gradient neighboring the boundary of the sensing area dense, “Magbase” is capable of an extraordinary precise repeatability of the operating point compared to “Mag”.

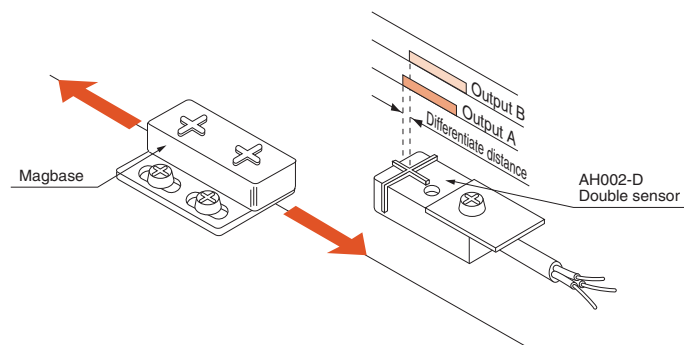
“Magbase” readily realized an extraordinary precise repeatability never before possible with traditional proximity sensors and magnetoresistance elements.



• The way to use double-sensor • Model “AH002-D”

Since magnetic proximity sensors are small in size and have no magnetic interaction between sensors, they can be closely disposed. Taking the advantages of these benefits, a double sensor incorporates a sensor with dual operational points in a single casing.

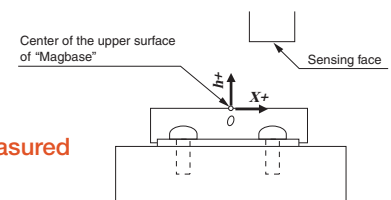
A double sensor can detect both the origin point of a servo system and overrun, thus contributive to a downsizing of machine unit and a reduction in assembling cost.



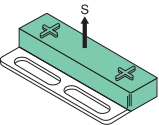
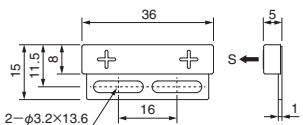
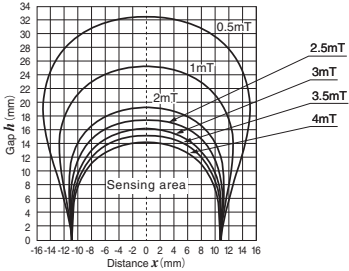
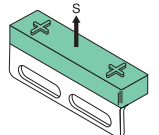
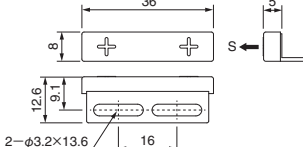
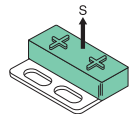
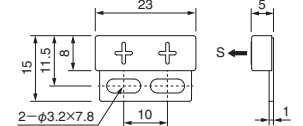
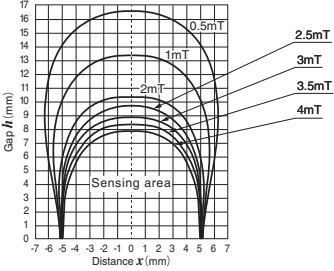
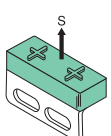
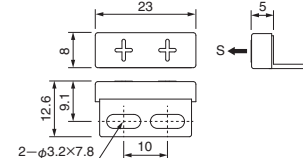
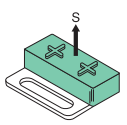
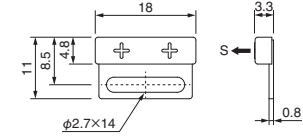
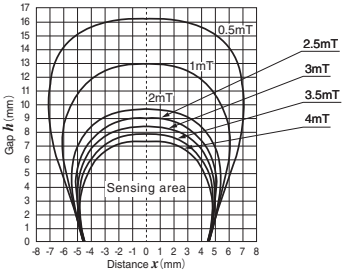
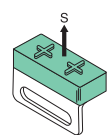
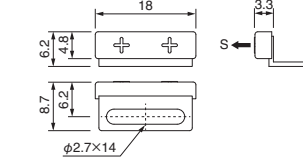
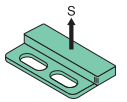
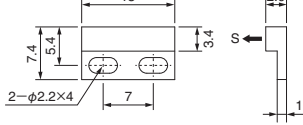
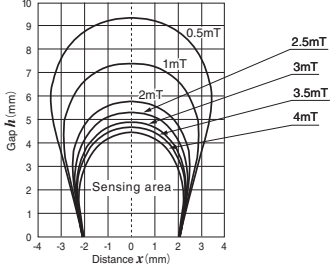
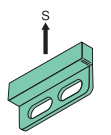
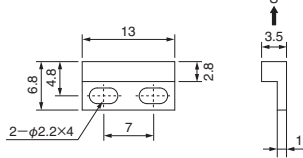
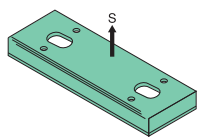
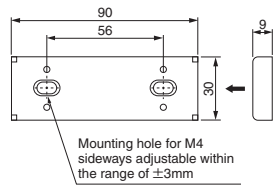
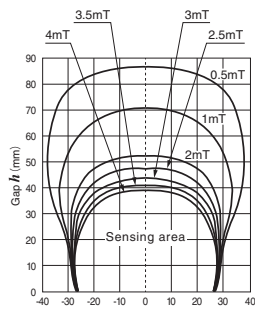
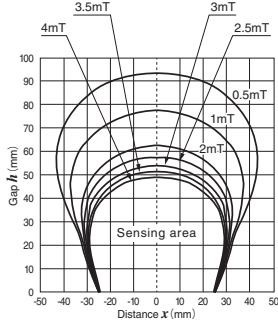
■ Magnetic property

The distribution of the magnetic force of “Magbase” was measured under the conditions described. The figures are not guaranteed values but average values.

Conditions under sensor magnetic property is measured



Lineup of “Magbase”

Model	Dimensions (mm)	Magnetic property
AG001 		
AG001H 		
AG002 		
AG002H 		
AG003 		
AG003H 		
AG004 		
AG004H 		<p>*M2 tightening torque 0.1N·m</p>
AG011 AG011-K (Powerful type) 		<div style="display: flex; justify-content: space-around;"> <div> AG011  </div> <div> AG011-K (Powerful type)  </div> </div>

High Precision Cylinder Sensors

High precision, Reliable, Contactless

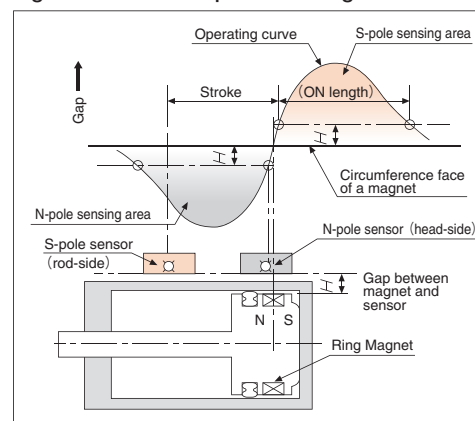


Features

Sensors for Air Cylinders detect the movement of magnetic field which is emitted from a magnet mounted on air cylinder piston. These sensors are capable of stable and high precision operations because of having a operating point on steep area of the operating curve. N-pole and S-pole sensors shall be used in combination.

- No sensor protrusion from cylinder case.
- Because the sensors have a long sensing length, the operating point can be taken even in the middle of the stroke.
- With the bounce time as $5\mu\text{sec.}$, capable of accurate position signaling even working in high speed cylinder.

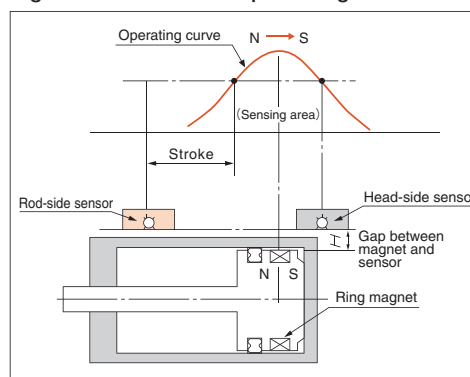
Figure-1. In case of polarized magnetic sensors



In case of the conventional product

Conventional sensors use non-polar “magnetoresistance element” or “magnetic coils”. In the case of non-polar sensor, the sensor head should face the magnetic field lines to detect the intensity of the magnetism; the operating curve becomes the pattern shown in the figure-2. As the curve takes a chevron pattern with its midpoint as the peak, the operating points at along the ascent and descent slopes are distant. Furthermore since the slopes are shelving, it is difficult for conventional sensors to get a due accuracy or stability.

Figure-2. In case of non-polar magnetic sensors



Specifications

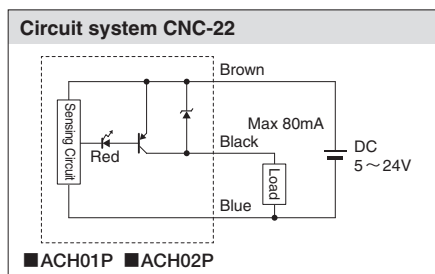
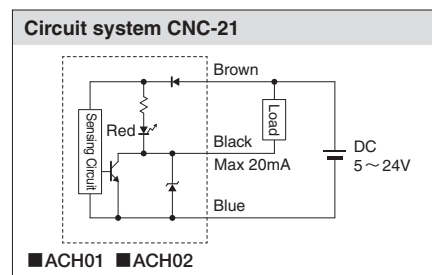
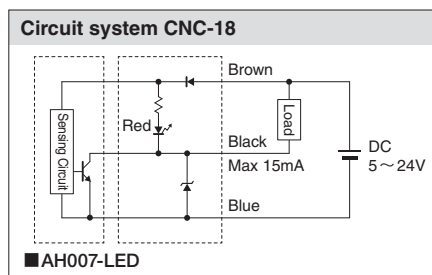
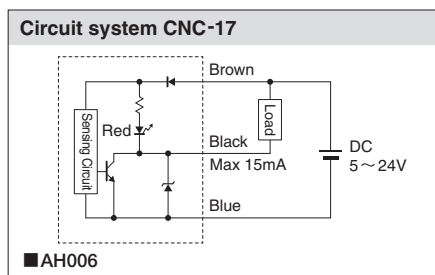
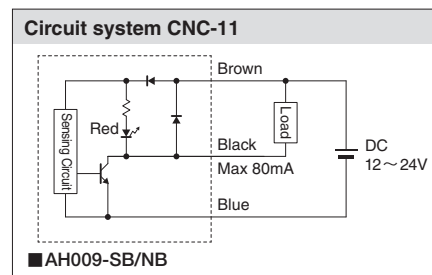
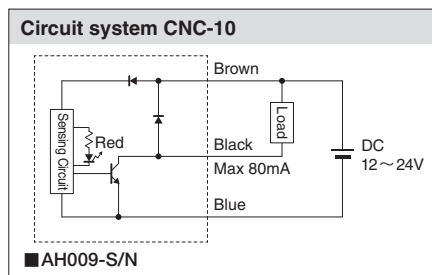
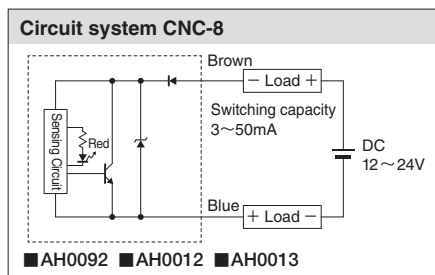
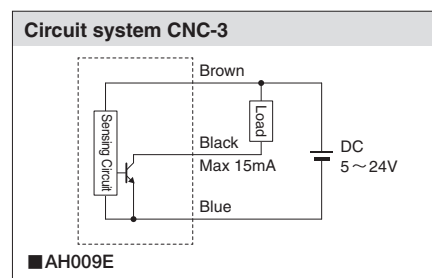
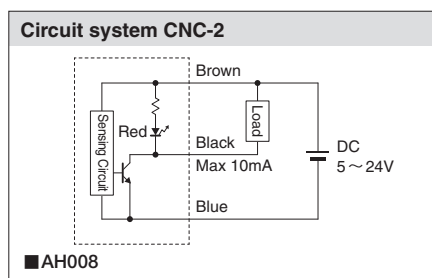
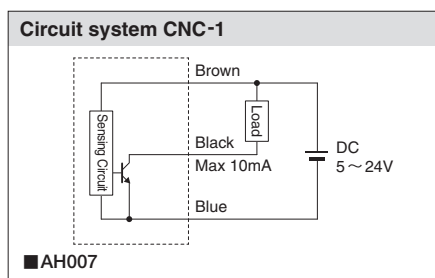
3-wire system

Supply Voltage	DC5 ~ 24V
Output specifications	NPN open collector (ON when in proximity) * PNP, current amplification, and output conversion are possible with cable options. (Refer to P.12)
Voltage Resistance	AC1000V (1 minute / packaged charging part / between the case)
Insulation Resistance	DC250V (Over 20M Ω in megohms / between the case)
Operation Temperature Range	-20°C ~ +85°C (Without condensation)
Operating Humidity Range	20 ~ 95%RH

2-wire system

Supply Voltage	DC12 ~ 24V
Output current	50mA Max
Leakage current	OFF state Under maximum 0.5mA
Response time	50m sec
Voltage Resistance	AC1000V (1 minute / packaged charging part / between the case)
Insulation Resistance	DC250V (Over 20M Ω in megohms / between the case)
Operation Temperature Range	-20°C ~ +85°C (Without condensation)
Operating Humidity Range	20 ~ 95%RH

Connection examples (circuit diagrams)



Precautions

Precautions for safety use

- Although our products are designed to ensure safety and address risks, in case that a sensor malfunction or failure is expected to lead to serious risks to life or property, please be advised to expand further safety gear such as the incorporation of dual circuit.
- Applying a strong magnetic field may cause malfunction.


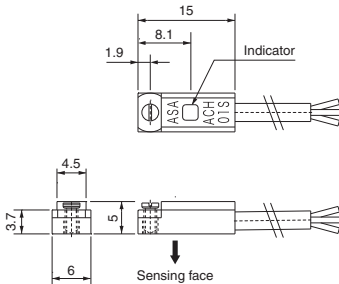

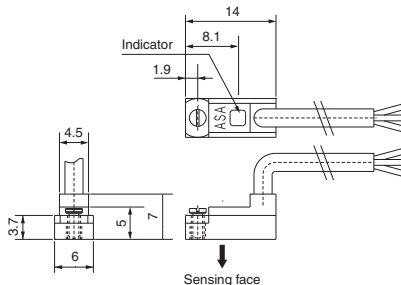

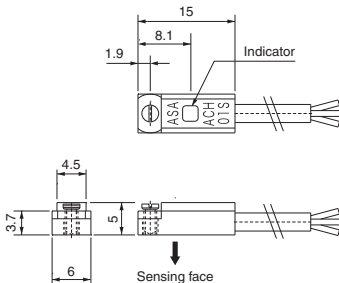

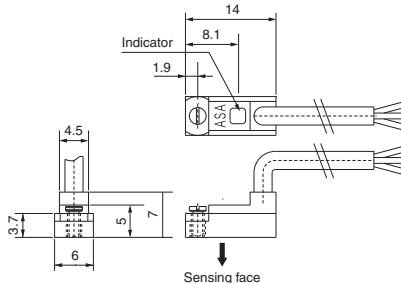
Correct wiring


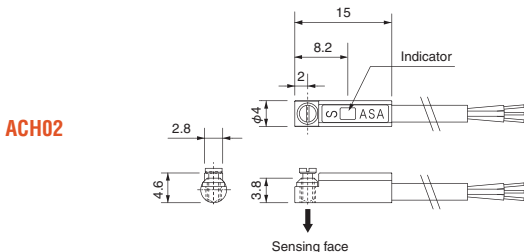

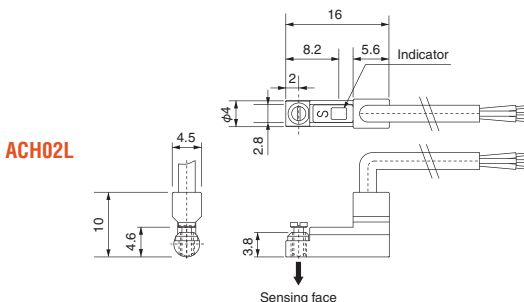

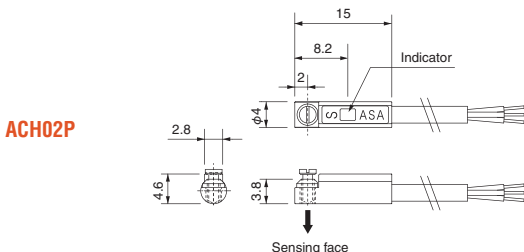

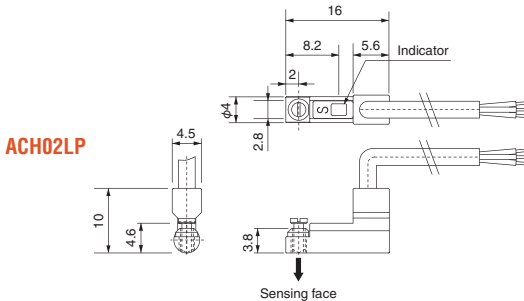
- Prevention of reverse connection**...Please observe the circuit diagrams so as to ensure correct connections. Reverse connection of power supply is strictly prohibited.
- Relay drive**...When driving a relay, please connect a freewheel diode in parallel.

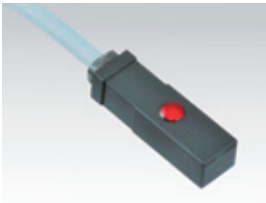
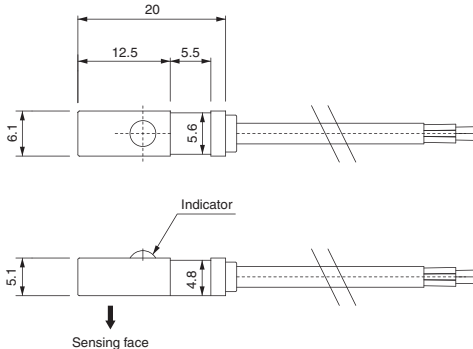
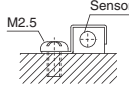
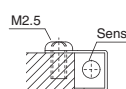
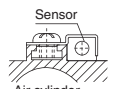
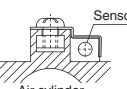

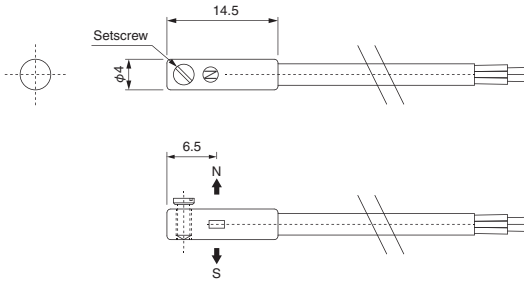


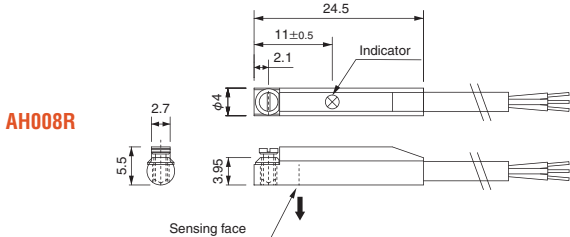
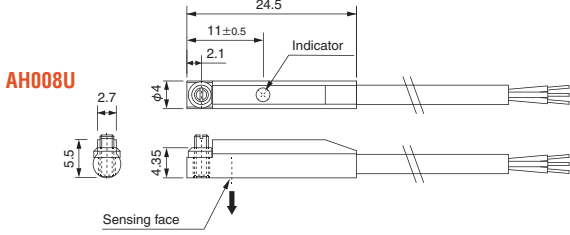
Mounting the sensor


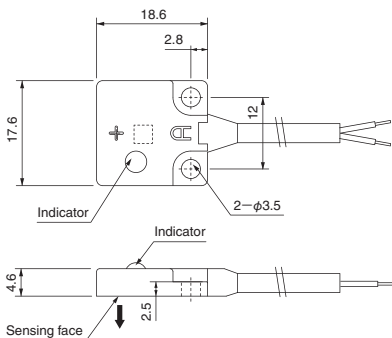

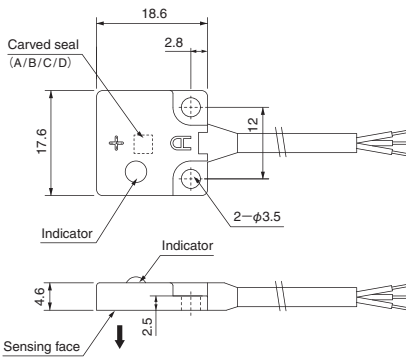

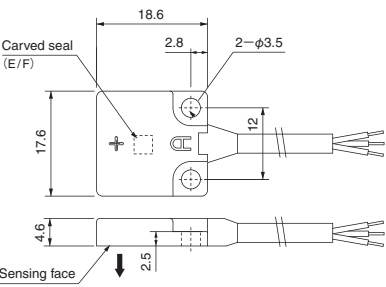
- Tightening torque...Please observe the value of torque designated for each sensor.
- Disconnection of the cable outlet
 - Do not apply excessive stress to the cable outlets of the sensor body.
 - When moving the cable, please secure the middle of the cable so that stress is not applied to the outlet.
 - The bending radius as R7 at least.


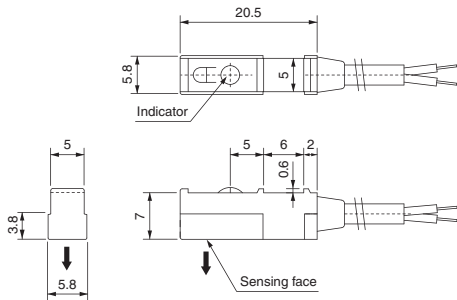
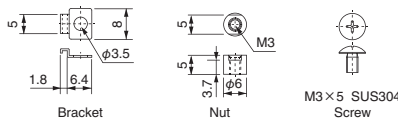
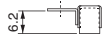
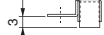
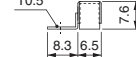
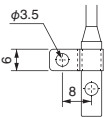
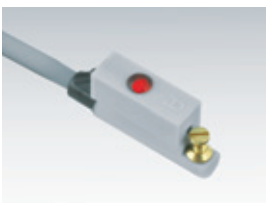
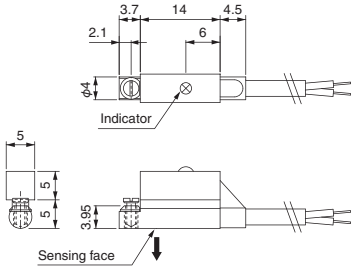
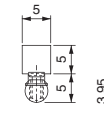

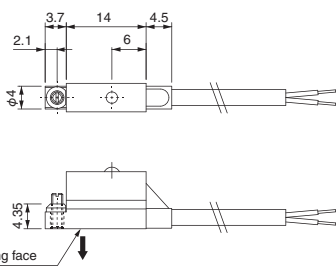
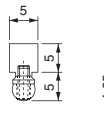
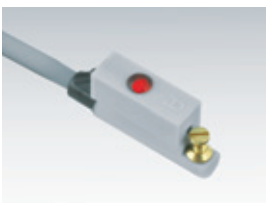
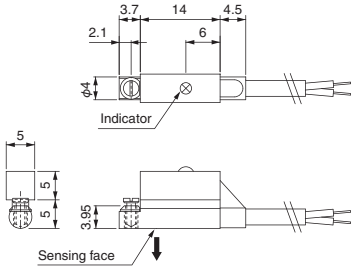
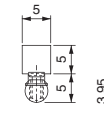

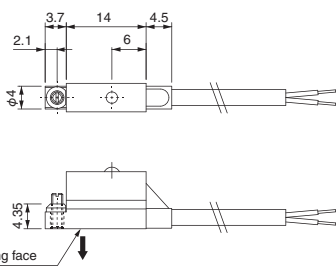
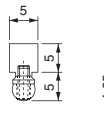
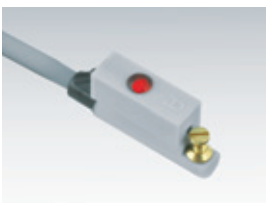
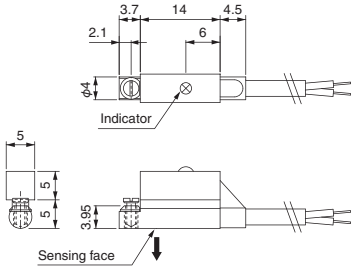
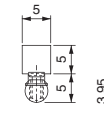

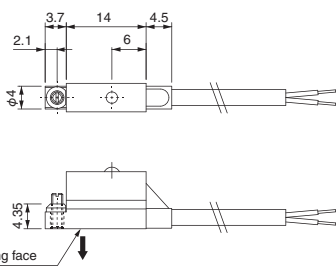
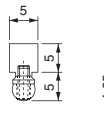
Lineup of High Precision Cylinder Sensors

Model	Dimensions (mm)	Specifications																												
<div>ACH01</div> <div></div>	<div>ACH01</div> <div></div>	<table><tr><td>Sensing Pole</td><td>ACH01□□S : S-pole ACH01□□N : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>3 ~ 4mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Output current</td><td>20mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Response time</td><td>16 μ sec or less</td></tr><tr><td>Cable specifications</td><td>S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Screw material</td><td>Brass</td></tr><tr><td>Mounting</td><td>Attachment screws 0.06N·m</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-21 (Refer to P.19)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Sensing Pole	ACH01□□S : S-pole ACH01□□N : N-pole	Magnetic sensitivity	3 ~ 4mT	Direction to detect	Downward	Output current	20mA Max	Consumption current	8mA Max	Response time	16 μ sec or less	Cable specifications	S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m	Case material	GF reinforced PBT : Black	Screw material	Brass	Mounting	Attachment screws 0.06N·m	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-21 (Refer to P.19)		
Sensing Pole	ACH01□□S : S-pole ACH01□□N : N-pole																													
Magnetic sensitivity	3 ~ 4mT																													
Direction to detect	Downward																													
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Protective structure	IP67																													
Circuit diagram	CNC-21 (Refer to P.19)																													
<div>ACH01L</div> <div></div>	<div>ACH01L</div> <div></div>																													
<div>■ Model</div> <div>ACH01<div><div>Cable exit direction</div><div>Blank : straight L : L shape</div></div><div><div>Cable type</div><div>Blank : standard G : Oil resistance</div></div><div><div>Sensing Pole</div><div>S : S-pole N : N-pole</div></div></div> <div>*You can choose between standard and oil-resistant cables.</div>																														
<div>ACH01P</div> <div></div>	<div>ACH01P</div> <div></div>	<table><tr><td>Sensing Pole</td><td>ACH01□□PS : S-pole ACH01□□PN : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>3 ~ 4mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Output specifications</td><td>PNP open collector (When proximity is turned ON)</td></tr><tr><td>Output current</td><td>80mA Max*</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Response time</td><td>16 μ sec or less</td></tr><tr><td>Cable specifications</td><td>S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Screw material</td><td>Brass</td></tr><tr><td>Mounting</td><td>Attachment screws 0.06N·m</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-22 (Refer to P.19)</td></tr></table> <div>*If you need the maximum output current (80mA), use a 12V to 24V power supply.</div> <div>· By using cable options, conversion of output specifications and cable extension are possible.</div>	Sensing Pole	ACH01□□PS : S-pole ACH01□□PN : N-pole	Magnetic sensitivity	3 ~ 4mT	Direction to detect	Downward	Output specifications	PNP open collector (When proximity is turned ON)	Output current	80mA Max*	Consumption current	8mA Max	Response time	16 μ sec or less	Cable specifications	S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m	Case material	GF reinforced PBT : Black	Screw material	Brass	Mounting	Attachment screws 0.06N·m	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-22 (Refer to P.19)
Sensing Pole	ACH01□□PS : S-pole ACH01□□PN : N-pole																													
Magnetic sensitivity	3 ~ 4mT																													
Direction to detect	Downward																													
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<div>ACH01LP</div> <div></div>	<div>ACH01LP</div> <div></div>																													
<div>■ Model</div> <div>ACH01<div><div>Cable exit direction</div><div>Blank : straight L : L shape</div></div><div><div>Cable type</div><div>Blank : standard G : Oil resistance</div></div><div><div>Sensing Pole</div><div>S : S-pole N : N-pole</div></div></div> <div>*You can choose between standard and oil-resistant cables.</div>																														

Model	Dimensions (mm)	Specifications																												
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Sensing Pole	ACH02□□S : S-pole ACH02□□N : N-pole																													
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Protective structure	IP67																													
Circuit diagram	CNC-21 (Refer to P.19)																													
<div>ACH02L</div> <div></div>	<div>ACH02L</div> <div></div>																													
<div>■ Model</div> <div>ACH02<div><div>Cable exit direction</div><div>Blank : straight L : L shape</div></div><div><div>Cable type</div><div>Blank : standard G : Oil resistance</div></div><div><div>Sensing Pole</div><div>S : S-pole N : N-pole</div></div></div> <div>* You can choose between standard and oil-resistant cables.</div>																														
<div>ACH02P</div> <div></div>	<div>ACH02P</div> <div></div>	<table><tr><td>Sensing Pole</td><td>ACH02□□PS : S-pole ACH02□□PN : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>3 ~ 4mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Output specifications</td><td>PNP open collector (When proximity is turned ON)</td></tr><tr><td>Output current</td><td>80mA Max*</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Response time</td><td>16 μ sec or less</td></tr><tr><td>Cable specifications</td><td>S-pole : φ 2.6 3wire, Gray 1m N-pole : φ 2.6 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Screw material</td><td>Brass</td></tr><tr><td>Mounting</td><td>Attachment screws 0.06N·m</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-22 (Refer to P.19)</td></tr></table> <div>* If you need the maximum output current (80mA), use a 12V to 24V power supply.</div> <div>· By using cable options, conversion of output specifications and cable extension are possible.</div>	Sensing Pole	ACH02□□PS : S-pole ACH02□□PN : N-pole	Magnetic sensitivity	3 ~ 4mT	Direction to detect	Downward	Output specifications	PNP open collector (When proximity is turned ON)	Output current	80mA Max*	Consumption current	8mA Max	Response time	16 μ sec or less	Cable specifications	S-pole : φ 2.6 3wire, Gray 1m N-pole : φ 2.6 3wire, Black 1m	Case material	GF reinforced PBT : Black	Screw material	Brass	Mounting	Attachment screws 0.06N·m	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-22 (Refer to P.19)
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<div>ACH02LP</div> <div></div>	<div>ACH02LP</div> <div></div>																													
<div>■ Model</div> <div>ACH02<div><div>Cable exit direction</div><div>Blank : straight L : L shape</div></div><div><div>Cable type</div><div>Blank : standard G : Oil resistance</div></div><div><div>Sensing Pole</div><div>S : S-pole N : N-pole</div></div><div>P</div></div> <div>* You can choose between standard and oil-resistant cables.</div>																														

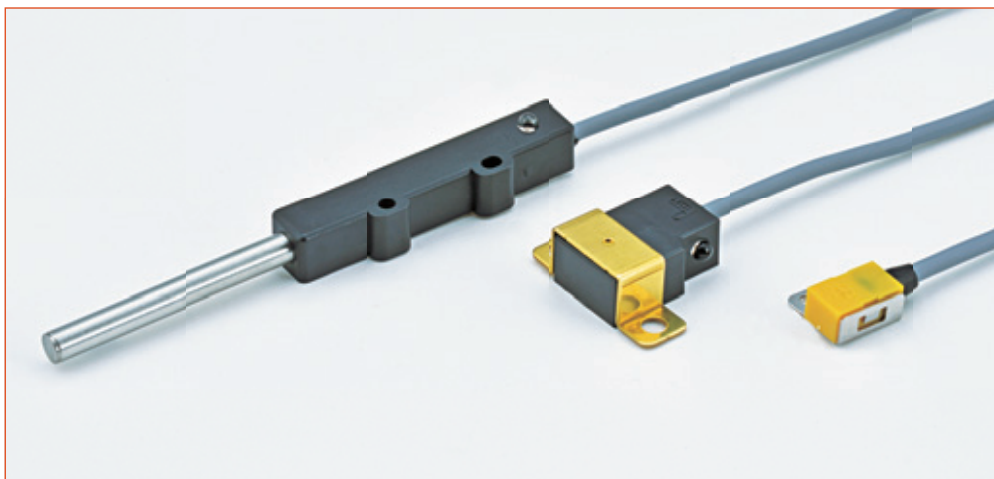
Model	Dimensions (mm)	Specifications																										
<div>AH006</div> <div></div>	<div></div> <div>■ Mounting bracket</div> <div><div><div><div>HP3-1</div><div></div><div>(Plane mounting bracket)</div></div><div><div>HP3-2</div><div></div><div>(Corner mounting bracket)</div></div><div><div>HP3-3</div><div></div><div>(Dedicated nuts included)</div></div><div><div>HP3-4</div><div></div><div>(Use commercially available M3 nuts)</div></div></div></div>	<table><tr><td>Sensing Pole</td><td>AH006-S : S-pole AH006-N : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>2.5 ~ 3.5mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Output current</td><td>15mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Response time</td><td>5 μ sec</td></tr><tr><td>Cable specifications</td><td>S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Mounting</td><td>Dedicated mounting bracket</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-17 (Refer to P.19)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Sensing Pole	AH006-S : S-pole AH006-N : N-pole	Magnetic sensitivity	2.5 ~ 3.5mT	Direction to detect	Downward	Output current	15mA Max	Consumption current	8mA Max	Response time	5 μ sec	Cable specifications	S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m	Case material	GF reinforced PBT : Black	Mounting	Dedicated mounting bracket	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-17 (Refer to P.19)		
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Circuit diagram	CNC-17 (Refer to P.19)																											
<div>AH007</div> <div></div>	<div></div> <div>Note: Both S and N detection are available with this model. When setting N-pole downside, please reinsert a setscrew from the reverse side.</div>	<table><tr><td>Sensing Pole</td><td>Dual use (Inverted to detect either S or N)</td></tr><tr><td>Magnetic sensitivity</td><td>4.5 ~ 6mT</td></tr><tr><td>Direction to detect</td><td>Downward or Upward</td></tr><tr><td>Output current</td><td>10mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Response time</td><td>5 μ sec</td></tr><tr><td>Cable specifications</td><td>φ 2.8 3wire, Gray 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Screw material</td><td>Brass</td></tr><tr><td>Mounting</td><td>Attachment screws 0.06N·m AH007 : Without indicator light</td></tr><tr><td>Indicator light</td><td>AH007-LED : Approximately 100mm from the main unit</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>AH007 : CNC-1 (Refer to P.19) AH007-LED : CNC-18 (Refer to P.19)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Sensing Pole	Dual use (Inverted to detect either S or N)	Magnetic sensitivity	4.5 ~ 6mT	Direction to detect	Downward or Upward	Output current	10mA Max	Consumption current	8mA Max	Response time	5 μ sec	Cable specifications	φ 2.8 3wire, Gray 1m	Case material	GF reinforced PBT : Black	Screw material	Brass	Mounting	Attachment screws 0.06N·m AH007 : Without indicator light	Indicator light	AH007-LED : Approximately 100mm from the main unit	Protective structure	IP67	Circuit diagram	AH007 : CNC-1 (Refer to P.19) AH007-LED : CNC-18 (Refer to P.19)
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<div>AH008R</div> <div></div> <div>AH008U</div> <div></div>	<div><div>AH008R</div><div></div></div> <div><div>AH008U</div><div></div></div>	<table><tr><td>Sensing Pole</td><td>AH008□-S : S-pole AH008□-N : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>4.5 ~ 6mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Output current</td><td>10mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Response time</td><td>5 μ sec</td></tr><tr><td>Cable specifications</td><td>S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Screw material</td><td>AH008R : Brass AH008U : SUS</td></tr><tr><td>Mounting</td><td>Attachment screws 0.06N·m</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-2 (Refer to P.19)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Sensing Pole	AH008□-S : S-pole AH008□-N : N-pole	Magnetic sensitivity	4.5 ~ 6mT	Direction to detect	Downward	Output current	10mA Max	Consumption current	8mA Max	Response time	5 μ sec	Cable specifications	S-pole : φ 2.8 3wire, Gray 1m N-pole : φ 2.8 3wire, Black 1m	Case material	GF reinforced PBT : Black	Screw material	AH008R : Brass AH008U : SUS	Mounting	Attachment screws 0.06N·m	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-2 (Refer to P.19)
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Model	Dimensions (mm)	Specifications																										
AH0092	 	<table><tr><td>Sensing Pole</td><td>AH0092-S : N-pole AH0092-N : S-pole</td></tr><tr><td>Magnetic sensitivity</td><td>2.5 ~ 3.5mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Cable specifications</td><td>S-pole : φ 3.2 2wire, Gray 1m N-pole : φ 3.2 2wire, Black 1m</td></tr><tr><td>Case material</td><td>Zinc die casting</td></tr><tr><td>Mounting</td><td>M3(SUS) tightening torque 1.5N·m</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-8(Refer to P.19)</td></tr></table> <p>· Be sure to connect to the load before use. · Cable extension are possible.</p>	Sensing Pole	AH0092-S : N-pole AH0092-N : S-pole	Magnetic sensitivity	2.5 ~ 3.5mT	Direction to detect	Downward	Cable specifications	S-pole : φ 3.2 2wire, Gray 1m N-pole : φ 3.2 2wire, Black 1m	Case material	Zinc die casting	Mounting	M3(SUS) tightening torque 1.5N·m	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-8(Refer to P.19)								
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AH009	 	<table><tr><td>Sensing Pole</td><td>AH009-S / AH009-SB : N-pole AH009-N / AH009-NB : S-pole</td></tr><tr><td>Magnetic sensitivity</td><td>2.5 ~ 3.5mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Output specifications</td><td>AH009-S / AH009-N : NPN open collector (When proximity is turned ON) AH009-SB / AH009-NB : NPN open collector (When proximity is turned OFF)</td></tr><tr><td>Output current</td><td>80mA Max*</td></tr><tr><td>Consumption current</td><td>15mA Max</td></tr><tr><td>Response time</td><td>5 μ sec</td></tr><tr><td>Cable specifications</td><td>AH009-□ : φ 3.2 3wire, Gray 1m AH009-□B : φ 3.2 3wire, Black 1m</td></tr><tr><td>Case material</td><td>Zinc die casting</td></tr><tr><td>Mounting</td><td>M3(SUS) tightening torque 1.5N·m</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>AH009-S / AH009-N : CNC-10(Refer to P.19) AH009-SB / AH009-NB : CNC-11(Refer to P.19)</td></tr></table> <p>*If you need the maximum output current (80mA), use a 12V to 24V power supply. · Cable extension are possible.</p>	Sensing Pole	AH009-S / AH009-SB : N-pole AH009-N / AH009-NB : S-pole	Magnetic sensitivity	2.5 ~ 3.5mT	Direction to detect	Downward	Output specifications	AH009-S / AH009-N : NPN open collector (When proximity is turned ON) AH009-SB / AH009-NB : NPN open collector (When proximity is turned OFF)	Output current	80mA Max*	Consumption current	15mA Max	Response time	5 μ sec	Cable specifications	AH009-□ : φ 3.2 3wire, Gray 1m AH009-□B : φ 3.2 3wire, Black 1m	Case material	Zinc die casting	Mounting	M3(SUS) tightening torque 1.5N·m	Indicator light	Red	Protective structure	IP67	Circuit diagram	AH009-S / AH009-N : CNC-10(Refer to P.19) AH009-SB / AH009-NB : CNC-11(Refer to P.19)
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AH009E	 	<table><tr><td>Sensing Pole</td><td>AH009E-S : N-pole AH009E-N : S-pole</td></tr><tr><td>Magnetic sensitivity</td><td>2.5 ~ 3.5mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Output current</td><td>15mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Response time</td><td>5 μ sec</td></tr><tr><td>Cable specifications</td><td>AH009E-S : φ 2.8 3wire, Gray 1m AH009E-N : φ 2.8 3wire, Black 1m</td></tr><tr><td>Case material</td><td>Zinc die casting</td></tr><tr><td>Mounting</td><td>M3(SUS) tightening torque 1.5N·m</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-3(Refer to P.19)</td></tr></table> <p>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</p>	Sensing Pole	AH009E-S : N-pole AH009E-N : S-pole	Magnetic sensitivity	2.5 ~ 3.5mT	Direction to detect	Downward	Output current	15mA Max	Consumption current	8mA Max	Response time	5 μ sec	Cable specifications	AH009E-S : φ 2.8 3wire, Gray 1m AH009E-N : φ 2.8 3wire, Black 1m	Case material	Zinc die casting	Mounting	M3(SUS) tightening torque 1.5N·m	Protective structure	IP67	Circuit diagram	CNC-3(Refer to P.19)				
Sensing Pole	AH009E-S : N-pole AH009E-N : S-pole																											
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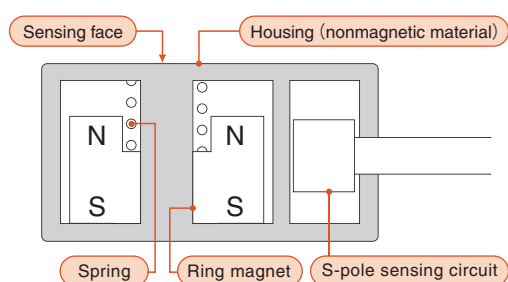
Model	Dimensions (mm)	Specifications																																							
AH0012	<div></div> <div></div> <div><p>■ Mounting bracket</p><div><p>HP12-1 (Dedicated nuts included)</p></div><div><p>HP12-2</p></div><div><p>HP12-3</p></div><div><p>HP12-4</p></div><div></div></div> <table><tr><td>Sensing Pole</td><td>AH0012-S : S-pole AH0012-N : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>2.5 ~ 3.5mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Cable specifications</td><td>S-pole : φ3.2 2wire, Gray 1m N-pole : φ3.2 2wire, Black 1m</td></tr><tr><td>Case material</td><td>S-pole : GF reinforced PBT Gray N-pole : GF reinforced PBT Black</td></tr><tr><td>Mounting</td><td>Dedicated mounting bracket</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-8 (Refer to P.19)</td></tr></table> <div><p>· Be sure to connect to the load before use.</p><p>· Cable extension are possible.</p></div> <tr><td>AH0013R AH0013U</td><td><div></div><div></div><div><p>AH0013R</p></div><div></div><div></div><div><p>AH0013U</p></div><table><tr><td>Sensing Pole</td><td>AH0013□-S : S-pole AH0013□-N : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>2.5 ~ 3.5mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Cable specifications</td><td>S-pole : φ2.8 2wire, Gray 1m N-pole : φ2.8 2wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Gray</td></tr><tr><td>Screw material</td><td>AH0013R : Brass AH0013U : SUS</td></tr><tr><td>Mounting</td><td>Attachment screws 0.06N·m</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-8 (Refer to P.19)</td></tr></table><div><p>· Be sure to connect to the load before use.</p><p>· Cable extension are possible.</p></div></td></tr>	Sensing Pole	AH0012-S : S-pole AH0012-N : N-pole	Magnetic sensitivity	2.5 ~ 3.5mT	Direction to detect	Downward	Cable specifications	S-pole : φ3.2 2wire, Gray 1m N-pole : φ3.2 2wire, Black 1m	Case material	S-pole : GF reinforced PBT Gray N-pole : GF reinforced PBT Black	Mounting	Dedicated mounting bracket	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-8 (Refer to P.19)	AH0013R AH0013U	<div></div> <div></div> <div><p>AH0013R</p></div> <div></div> <div></div> <div><p>AH0013U</p></div> <table><tr><td>Sensing Pole</td><td>AH0013□-S : S-pole AH0013□-N : N-pole</td></tr><tr><td>Magnetic sensitivity</td><td>2.5 ~ 3.5mT</td></tr><tr><td>Direction to detect</td><td>Downward</td></tr><tr><td>Cable specifications</td><td>S-pole : φ2.8 2wire, Gray 1m N-pole : φ2.8 2wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Gray</td></tr><tr><td>Screw material</td><td>AH0013R : Brass AH0013U : SUS</td></tr><tr><td>Mounting</td><td>Attachment screws 0.06N·m</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-8 (Refer to P.19)</td></tr></table> <div><p>· Be sure to connect to the load before use.</p><p>· Cable extension are possible.</p></div>	Sensing Pole	AH0013□-S : S-pole AH0013□-N : N-pole	Magnetic sensitivity	2.5 ~ 3.5mT	Direction to detect	Downward	Cable specifications	S-pole : φ2.8 2wire, Gray 1m N-pole : φ2.8 2wire, Black 1m	Case material	GF reinforced PBT : Gray	Screw material	AH0013R : Brass AH0013U : SUS	Mounting	Attachment screws 0.06N·m	Indicator light	Red	Protective structure	IP67	Circuit diagram	CNC-8 (Refer to P.19)
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Ferrous Proximity Sensors

Proximity switches for detecting ferromagnetic materials such as ferrous metals.
Not react to such materials as aluminum or nonmagnetic stainless steel.

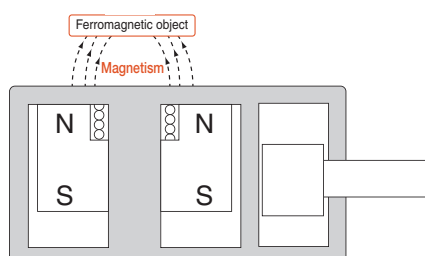


Mechanism



When OFF

Sensors are deactivated because magnet is being pushed by springs and the detection circuit is within the N-pole magnetic field.



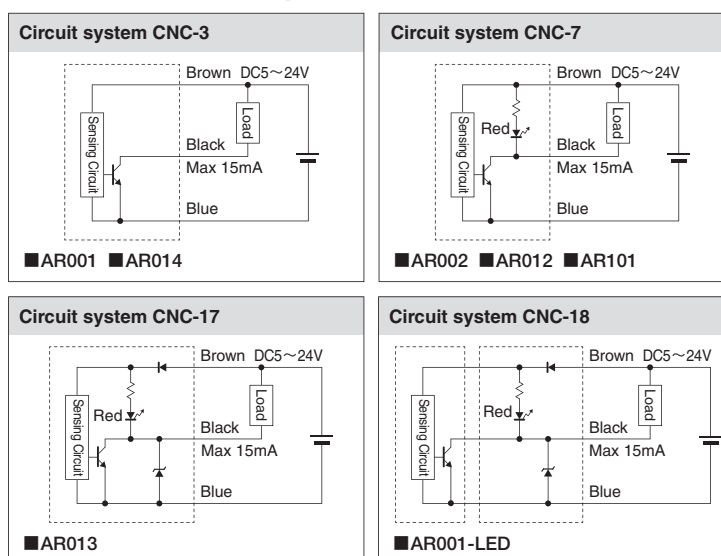
When ON

When a ferromagnetic object such as ferrous metals approaches the sensing face, magnet is pulled toward the object. Then, the sensing circuit detects S-pole and the switch is activated.

General Specifications

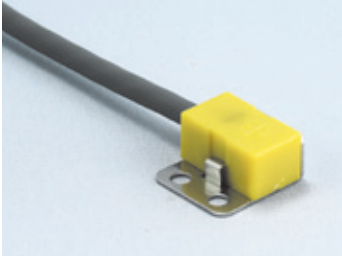
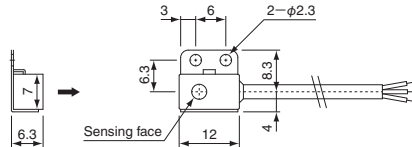

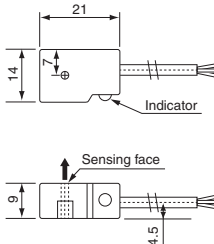
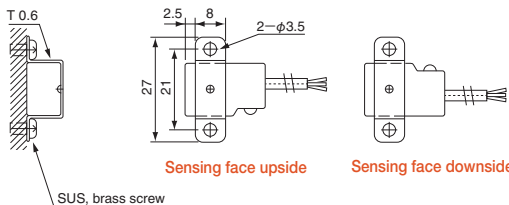

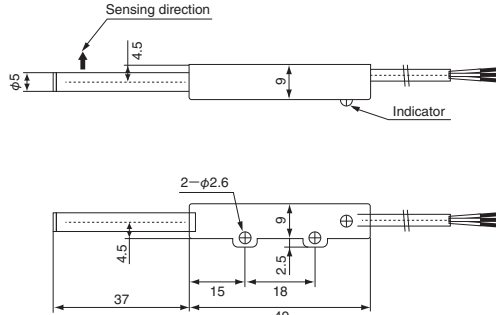
Supply Voltage	DC5 ~ 24V
Output specifications	NPN open collector (ON when in proximity) If it is OFF in close proximity, (B) is added to the end of the model number.
Output current	15mA
Consumption current	8mA
Voltage Resistance	AC1000V (1 minute / packaged charging part / between the case)
Insulation Resistance	DC250V (Over 20MΩ in megohms / between the case)
Operation Temperature Range	-20°C ~ +85°C (Without condensation)
Operating Humidity Range	20 ~ 95%RH

Connection examples (circuit diagrams)


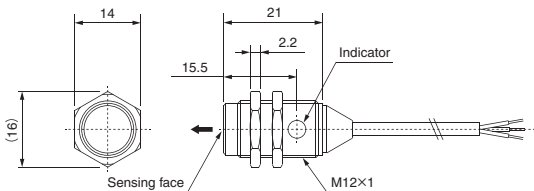

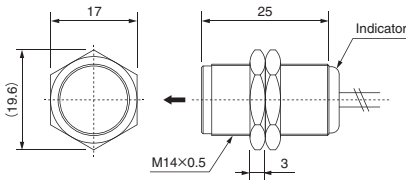

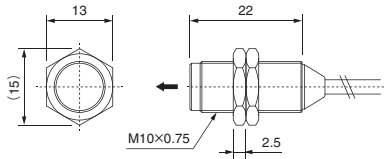


- Precautions**
- Ferrous proximity switches are not suitable for detecting tiny loose ferromagnetic materials such as iron powders because they are easily stuck to magnets.
 - When mounting a ferrous proximity switch, please check that there is no ferromagnetic material at the back and lateral sides.

Lineup of Ferrous Proximity Sensors

Model	Dimensions (mm)	Specifications																														
<div>AR001</div> <div>AR001(B)</div> <div></div>	<div></div>	<table><tr><td>Direction to detect</td><td colspan="2">Upward</td></tr><tr><td rowspan="2">Maximum sensing distance (mm)</td><td>Iron wire $\phi 2$</td><td>1.0</td></tr><tr><td>Iron $\square 30 \times 1t$</td><td>2.0</td></tr><tr><td>Cable specifications</td><td colspan="2">AR001 / AR001(LED) : $\phi 2.8$ 3wire, Gray 1m AR001(B) / AR001(B)-(LED) : $\phi 2.8$ 3wire, Black 1m</td></tr><tr><td>Case material</td><td colspan="2">Heat resistant ABS : Yellow</td></tr><tr><td>Mounting bracket material</td><td colspan="2">SUS304</td></tr><tr><td>Mounting</td><td colspan="2">Dedicated mounting bracket</td></tr><tr><td rowspan="2">Indicator light</td><td colspan="2">AR001 / AR001(B) : Without indicator light</td></tr><tr><td colspan="2">AR001(LED) / AR001(B)-(LED) : Approximately 100mm from the main unit</td></tr><tr><td rowspan="2">Circuit diagram</td><td colspan="2">AR001 / AR001(B) : CNC-3 (Refer to P.25)</td></tr><tr><td colspan="2">AR001(LED) / AR001(B)-(LED) : CNC-18 (Refer to P.25)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Direction to detect	Upward		Maximum sensing distance (mm)	Iron wire $\phi 2$	1.0	Iron $\square 30 \times 1t$	2.0	Cable specifications	AR001 / AR001(LED) : $\phi 2.8$ 3wire, Gray 1m AR001(B) / AR001(B)-(LED) : $\phi 2.8$ 3wire, Black 1m		Case material	Heat resistant ABS : Yellow		Mounting bracket material	SUS304		Mounting	Dedicated mounting bracket		Indicator light	AR001 / AR001(B) : Without indicator light		AR001(LED) / AR001(B)-(LED) : Approximately 100mm from the main unit		Circuit diagram	AR001 / AR001(B) : CNC-3 (Refer to P.25)		AR001(LED) / AR001(B)-(LED) : CNC-18 (Refer to P.25)	
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<div>AR002</div> <div>AR002(B)</div> <div></div>	<div></div> <div>■ Mounting bracket for AR002</div> <div></div>	<table><tr><td>Direction to detect</td><td colspan="2">Upward</td></tr><tr><td rowspan="2">Maximum sensing distance (mm)</td><td>Iron $\square 30 \times 10t$</td><td>6.0</td></tr><tr><td>Iron $\square 30 \times 2t$</td><td>4.0</td></tr><tr><td>Cable specifications</td><td colspan="2">AR002 : $\phi 2.8$ 3wire, Gray 1m AR002(B) : $\phi 2.8$ 3wire, Black 1m</td></tr><tr><td>Case material</td><td colspan="2">GF reinforced PBT : Black</td></tr><tr><td>Mounting bracket material</td><td colspan="2">Brass</td></tr><tr><td>Mounting</td><td colspan="2">M3 tightening torque 0.3N·m</td></tr><tr><td>Indicator light</td><td colspan="2">Red</td></tr><tr><td>Circuit diagram</td><td colspan="2">CNC-7 (Refer to P.25)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Direction to detect	Upward		Maximum sensing distance (mm)	Iron $\square 30 \times 10t$	6.0	Iron $\square 30 \times 2t$	4.0	Cable specifications	AR002 : $\phi 2.8$ 3wire, Gray 1m AR002(B) : $\phi 2.8$ 3wire, Black 1m		Case material	GF reinforced PBT : Black		Mounting bracket material	Brass		Mounting	M3 tightening torque 0.3N·m		Indicator light	Red		Circuit diagram	CNC-7 (Refer to P.25)					
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<div>AR101</div> <div>AR101(B)</div> <div></div>	<div></div>	<table><tr><td>Direction to detect</td><td colspan="2">Upward</td></tr><tr><td rowspan="3">Maximum sensing distance (mm)</td><td>Iron wire $\phi 1$</td><td>1.0</td></tr><tr><td>High speed steel drill $\phi 1.5$</td><td>1.5</td></tr><tr><td>Iron $\square 10 \times 1t$</td><td>2.0</td></tr><tr><td>Cable specifications</td><td colspan="2">AR101 : $\phi 2.8$ 3wire, Gray 1m AR101(B) : $\phi 2.8$ 3wire, Black 1m</td></tr><tr><td>Case material</td><td colspan="2">Case : Heat resistant ABS (Brack) Sensing part : SUS304</td></tr><tr><td>Mounting</td><td colspan="2">M2.5 tightening torque 0.2N·m</td></tr><tr><td>Indicator light</td><td colspan="2">Red</td></tr><tr><td>Circuit diagram</td><td colspan="2">CNC-7 (Refer to P.25)</td></tr></table> <div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div>	Direction to detect	Upward		Maximum sensing distance (mm)	Iron wire $\phi 1$	1.0	High speed steel drill $\phi 1.5$	1.5	Iron $\square 10 \times 1t$	2.0	Cable specifications	AR101 : $\phi 2.8$ 3wire, Gray 1m AR101(B) : $\phi 2.8$ 3wire, Black 1m		Case material	Case : Heat resistant ABS (Brack) Sensing part : SUS304		Mounting	M2.5 tightening torque 0.2N·m		Indicator light	Red		Circuit diagram	CNC-7 (Refer to P.25)						
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Circuit diagram	CNC-7 (Refer to P.25)																															



Model	Dimensions (mm)	Specifications																												
<div>AR012</div> <div>AR012(B)</div> <div></div>	<div></div>	<table><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Maximum sensing distance (mm)</td><td>Refer to below</td></tr><tr><td>Cable specifications</td><td>AR012 : $\phi 2.8$ 3wire, Gray 1m AR012(B) : $\phi 2.8$ 3wire, Black 1m</td></tr><tr><td>Case, nut material</td><td>SUS303</td></tr><tr><td>Mounting</td><td>M12 nut tightening torque 12N·m</td></tr><tr><td>Mounting hole processing dimensions</td><td>$\phi 12 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Circuit diagram</td><td>CNC-7 (Refer to P.25)</td></tr></table> <p>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</p> <div>■ Sensitivity test example</div> <table><tr><th>Specimen</th><th>Sensing distance (mm)</th></tr><tr><td>Iron $\square 50 \times 10t$</td><td>6</td></tr><tr><td>Iron plate width $10 \times 0.1t$</td><td>5</td></tr><tr><td>Iron plate width $10 \times 0.05t$</td><td>4</td></tr><tr><td>High speed steel drill $\phi 2$</td><td>3</td></tr><tr><td>Iron plate width $10 \times 0.03t$</td><td>2</td></tr></table> <p>< Notes > Tested horizontally. This is a reference value. The sensor is about 10% more sensitive in the downward direction and about 10% less sensitive in the upward direction.</p>	Direction to detect	Forward	Maximum sensing distance (mm)	Refer to below	Cable specifications	AR012 : $\phi 2.8$ 3wire, Gray 1m AR012(B) : $\phi 2.8$ 3wire, Black 1m	Case, nut material	SUS303	Mounting	M12 nut tightening torque 12N·m	Mounting hole processing dimensions	$\phi 12 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$	Indicator light	Red	Circuit diagram	CNC-7 (Refer to P.25)	Specimen	Sensing distance (mm)	Iron $\square 50 \times 10t$	6	Iron plate width $10 \times 0.1t$	5	Iron plate width $10 \times 0.05t$	4	High speed steel drill $\phi 2$	3	Iron plate width $10 \times 0.03t$	2
Direction to detect	Forward																													
Maximum sensing distance (mm)	Refer to below																													
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<div>New</div> <div>AR013</div> <div>AR013(B)</div> <div></div>	<div></div>	<table><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Maximum sensing distance (mm)</td><td>Iron $\square 10 \times 1t$ 3.5</td></tr><tr><td>Cable specifications</td><td>AR013 : $\phi 2.8$ 3wire, Gray 1m AR013(B) : $\phi 2.8$ 3wire, Black 1m</td></tr><tr><td>Case, nut material</td><td>SUS303</td></tr><tr><td>Mounting</td><td>M14 nut tightening torque 18N·m</td></tr><tr><td>Mounting hole processing dimensions</td><td>$\phi 14 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$</td></tr><tr><td>Indicator light</td><td>Red</td></tr><tr><td>Circuit diagram</td><td>CNC-7 (Refer to P.25)</td></tr></table> <p>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</p>	Direction to detect	Forward	Maximum sensing distance (mm)	Iron $\square 10 \times 1t$ 3.5	Cable specifications	AR013 : $\phi 2.8$ 3wire, Gray 1m AR013(B) : $\phi 2.8$ 3wire, Black 1m	Case, nut material	SUS303	Mounting	M14 nut tightening torque 18N·m	Mounting hole processing dimensions	$\phi 14 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$	Indicator light	Red	Circuit diagram	CNC-7 (Refer to P.25)												
Direction to detect	Forward																													
Maximum sensing distance (mm)	Iron $\square 10 \times 1t$ 3.5																													
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Circuit diagram	CNC-7 (Refer to P.25)																													
<div>New</div> <div>AR014</div> <div>AR014(B)</div> <div></div>	<div></div>	<table><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Maximum sensing distance (mm)</td><td>Iron $\square 10 \times 1t$ 2.3</td></tr><tr><td>Cable specifications</td><td>AR014 : $\phi 2.8$ 3wire, Gray 1m AR014(B) : $\phi 2.8$ 3wire, Black 1m</td></tr><tr><td>Case, nut material</td><td>SUS303</td></tr><tr><td>Mounting</td><td>M10 nut tightening torque 12N·m</td></tr><tr><td>Mounting hole processing dimensions</td><td>$\phi 10 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$</td></tr><tr><td>Circuit diagram</td><td>CNC-3 (Refer to P.25)</td></tr></table> <p>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</p>	Direction to detect	Forward	Maximum sensing distance (mm)	Iron $\square 10 \times 1t$ 2.3	Cable specifications	AR014 : $\phi 2.8$ 3wire, Gray 1m AR014(B) : $\phi 2.8$ 3wire, Black 1m	Case, nut material	SUS303	Mounting	M10 nut tightening torque 12N·m	Mounting hole processing dimensions	$\phi 10 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$	Circuit diagram	CNC-3 (Refer to P.25)														
Direction to detect	Forward																													
Maximum sensing distance (mm)	Iron $\square 10 \times 1t$ 2.3																													
Cable specifications	AR014 : $\phi 2.8$ 3wire, Gray 1m AR014(B) : $\phi 2.8$ 3wire, Black 1m																													
Case, nut material	SUS303																													
Mounting	M10 nut tightening torque 12N·m																													
Mounting hole processing dimensions	$\phi 10 \begin{smallmatrix} +0.5 \\ 0 \end{smallmatrix}$																													
Circuit diagram	CNC-3 (Refer to P.25)																													

Door Sensors

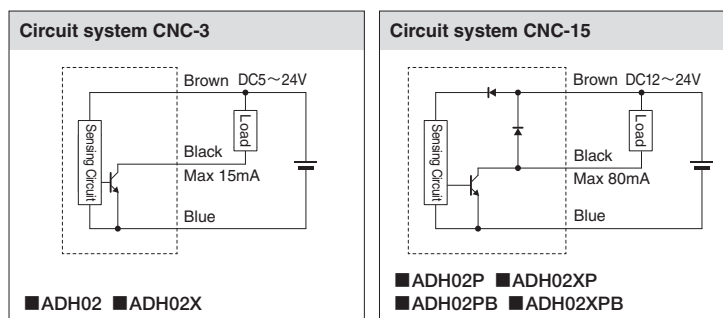
Sturdy, Highly-sensitive, Reliable



Features

- Compact-sized, highly-sensitive door sensors.
- High reliability and long functional life because of lack of physical contact.
- Any fast moving object detectable.
- Even in the case of incorporation into iron-made doors, capable of practical use by having a $\phi 12$ hole to let magnetism work.

Connection examples (circuit diagrams)



Specifications


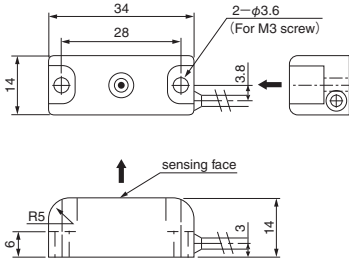

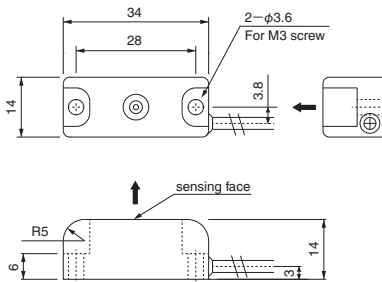
Supply Voltage	DC5 ~ 24V
Output specifications	NPN open collector (ON when in proximity) If it is OFF in close proximity, (B) is added to the end of the model number.
Response time	5 μ sec
Voltage Resistance	AC1000V (1 minute / packaged charging part / between the case)
Insulation Resistance	DC250V (Over 20M Ω in megohms / between the case)
Operation Temperature Range	-20°C ~ +85°C (Without condensation)
Operating Humidity Range	20 ~ 95%RH

Sensing distance

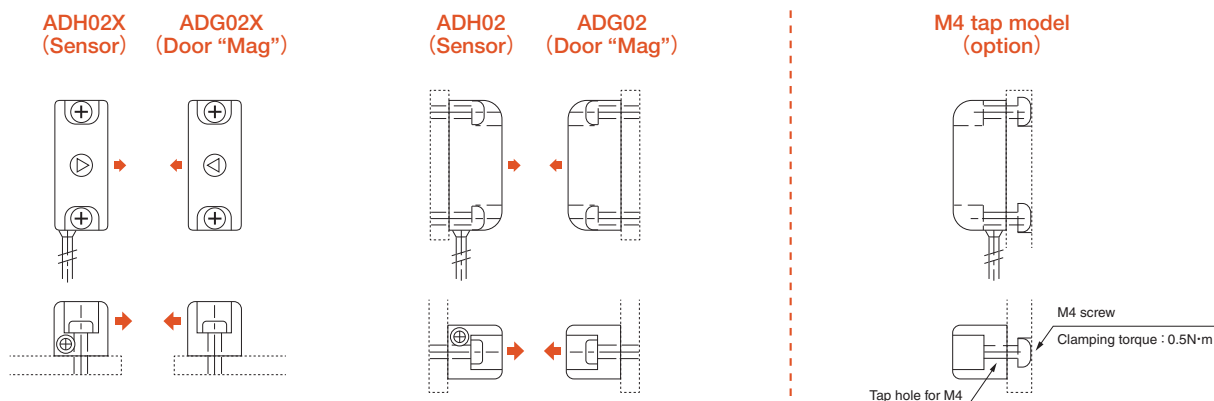
Sensor	Door "Mag"	Functional diagram	Sensing distance • L (mm) *
ADH02	ADG02		15
ADH02X	ADG02X		12
ADH02	ADG02	 Example of door embedding	5 (Iron made door with $\phi 12$ hole) 15 (Nonmagnetic door)


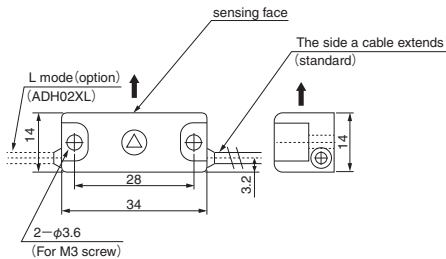

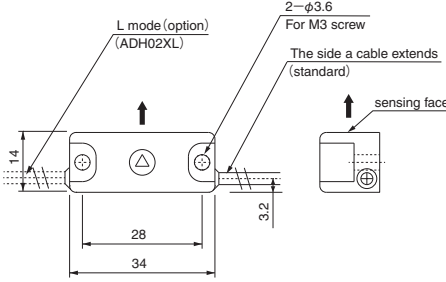
* The actual detecting distance can be longer depending on the surrounding conditions (iron material, etc).
The materials of nonmagnetic door include aluminum, SUS304, glass, wood and resin. You have free choice on the way to combine a "Mag" and a sensor; e.g. a "Mag" with lateral magnetic face and upward detecting sensor, the opposite combination, and so forth.

Lineup of Door Sensors

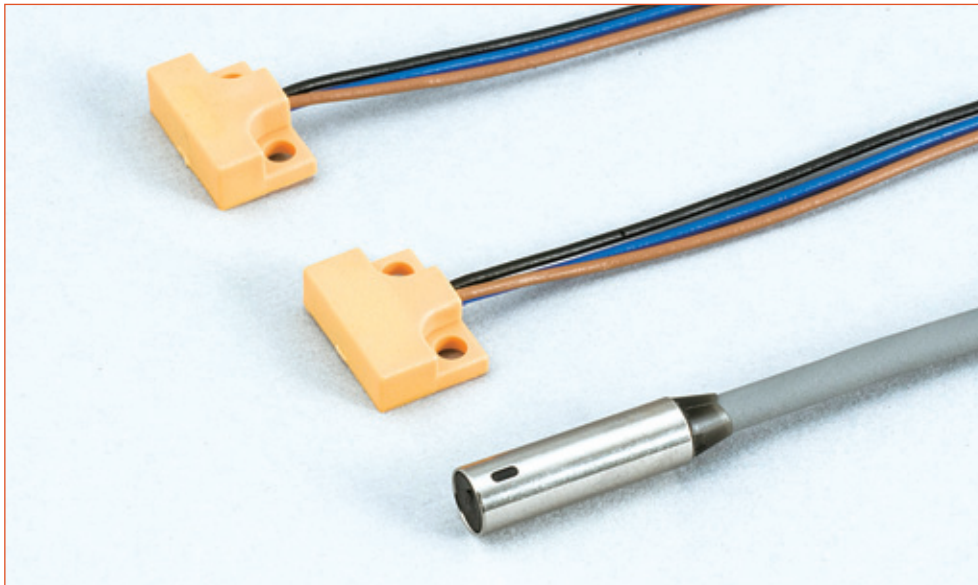
Model	Dimensions (mm)	Specifications																				
<div>ADH02</div> <div></div>	<div></div>	<table><tr><td>Sensing Pole</td><td>S-pole</td></tr><tr><td>Direction to detect</td><td>Upward</td></tr><tr><td>Sensing distance</td><td>15mm (When used in conjunction with a door mug)</td></tr><tr><td>Output current</td><td>15mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Cable specifications</td><td>φ2.8 3wire, Gray 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Mounting</td><td>M3 tightening torque 0.8N·m</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-3 (Refer to P.28)</td></tr></table> <div><ul style="list-style-type: none">By using cable options, conversion of output specifications, current amplification, and cable extension are possible.It is possible to change to an M4 tapped hole by modifying the set screw.</div>	Sensing Pole	S-pole	Direction to detect	Upward	Sensing distance	15mm (When used in conjunction with a door mug)	Output current	15mA Max	Consumption current	8mA Max	Cable specifications	φ2.8 3wire, Gray 1m	Case material	GF reinforced PBT : Black	Mounting	M3 tightening torque 0.8N·m	Protective structure	IP67	Circuit diagram	CNC-3 (Refer to P.28)
Sensing Pole	S-pole																					
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<div>ADH02P ADH02PB</div> <div></div>	<div></div>	<table><tr><td>Sensing Pole</td><td>S-pole</td></tr><tr><td>Direction to detect</td><td>Upward</td></tr><tr><td>Sensing distance</td><td>15mm (When used in conjunction with a door mug)</td></tr><tr><td>Output current</td><td>80mA Max*</td></tr><tr><td>Consumption current</td><td>12mA Max</td></tr><tr><td>Cable specifications</td><td>ADH02P : φ2.8 3wire, Gray 1m ADH02PB : φ2.8 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Mounting</td><td>M3 tightening torque 0.8N·m</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-15 (Refer to P.28)</td></tr></table> <div><p>* If you need the maximum output current (80mA), use a 12V to 24V power supply.</p><ul style="list-style-type: none">By using cable options, conversion of output specifications and cable extension are possible.It is possible to change to an M4 tapped hole by modifying the set screw.</div>	Sensing Pole	S-pole	Direction to detect	Upward	Sensing distance	15mm (When used in conjunction with a door mug)	Output current	80mA Max*	Consumption current	12mA Max	Cable specifications	ADH02P : φ2.8 3wire, Gray 1m ADH02PB : φ2.8 3wire, Black 1m	Case material	GF reinforced PBT : Black	Mounting	M3 tightening torque 0.8N·m	Protective structure	IP67	Circuit diagram	CNC-15 (Refer to P.28)
Sensing Pole	S-pole																					
Direction to detect	Upward																					
Sensing distance	15mm (When used in conjunction with a door mug)																					
Output current	80mA Max*																					
Consumption current	12mA Max																					
Cable specifications	ADH02P : φ2.8 3wire, Gray 1m ADH02PB : φ2.8 3wire, Black 1m																					
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Mounting	M3 tightening torque 0.8N·m																					
Protective structure	IP67																					
Circuit diagram	CNC-15 (Refer to P.28)																					

Mounting Examples of Door Sensors



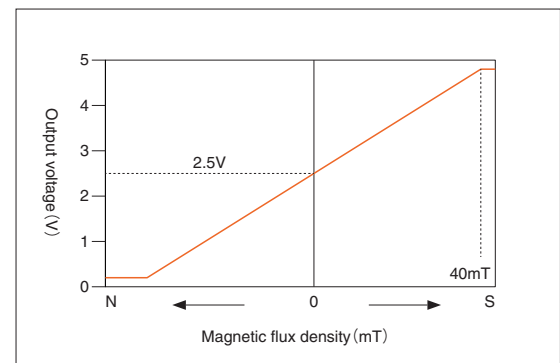
Model	Dimensions (mm)	Specifications																				
<div>ADH02X</div> <div></div>	<div></div>	<table><tr><td>Sensing Pole</td><td>S-pole</td></tr><tr><td>Direction to detect</td><td>Sideways</td></tr><tr><td>Sensing distance</td><td>12mm (When used in conjunction with a door mug)</td></tr><tr><td>Output current</td><td>15mA Max</td></tr><tr><td>Consumption current</td><td>8mA Max</td></tr><tr><td>Cable specifications</td><td>φ2.8 3wire, Gray 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Mounting</td><td>M3 tightening torque 0.8N·m</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-3 (Refer to P.28)</td></tr></table> <div><div>· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.</div><div>· It is possible to change to an M4 tapped hole by modifying the set screw.</div></div>	Sensing Pole	S-pole	Direction to detect	Sideways	Sensing distance	12mm (When used in conjunction with a door mug)	Output current	15mA Max	Consumption current	8mA Max	Cable specifications	φ2.8 3wire, Gray 1m	Case material	GF reinforced PBT : Black	Mounting	M3 tightening torque 0.8N·m	Protective structure	IP67	Circuit diagram	CNC-3 (Refer to P.28)
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Protective structure	IP67																					
Circuit diagram	CNC-3 (Refer to P.28)																					
<div>ADH02XP ADH02XPB</div> <div></div>	<div></div>	<table><tr><td>Sensing Pole</td><td>S-pole</td></tr><tr><td>Direction to detect</td><td>Sideways</td></tr><tr><td>Sensing distance</td><td>12mm (When used in conjunction with a door mug)</td></tr><tr><td>Output current</td><td>80mA Max*</td></tr><tr><td>Consumption current</td><td>12mA Max</td></tr><tr><td>Cable specifications</td><td>ADH02XP : φ2.8 3wire, Gray 1m ADH02XPB : φ2.8 3wire, Black 1m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Black</td></tr><tr><td>Mounting</td><td>M3 tightening torque 0.8N·m</td></tr><tr><td>Protective structure</td><td>IP67</td></tr><tr><td>Circuit diagram</td><td>CNC-15 (Refer to P.28)</td></tr></table> <div><div>* If you need the maximum output current (80mA), use a 12V to 24V power supply.</div><div>· By using cable options, conversion of output specifications and cable extension are possible.</div><div>· It is possible to change to an M4 tapped hole by modifying the set screw.</div></div>	Sensing Pole	S-pole	Direction to detect	Sideways	Sensing distance	12mm (When used in conjunction with a door mug)	Output current	80mA Max*	Consumption current	12mA Max	Cable specifications	ADH02XP : φ2.8 3wire, Gray 1m ADH02XPB : φ2.8 3wire, Black 1m	Case material	GF reinforced PBT : Black	Mounting	M3 tightening torque 0.8N·m	Protective structure	IP67	Circuit diagram	CNC-15 (Refer to P.28)
Sensing Pole	S-pole																					
Direction to detect	Sideways																					
Sensing distance	12mm (When used in conjunction with a door mug)																					
Output current	80mA Max*																					
Consumption current	12mA Max																					
Cable specifications	ADH02XP : φ2.8 3wire, Gray 1m ADH02XPB : φ2.8 3wire, Black 1m																					
Case material	GF reinforced PBT : Black																					
Mounting	M3 tightening torque 0.8N·m																					
Protective structure	IP67																					
Circuit diagram	CNC-15 (Refer to P.28)																					

Linear Sensor



Features

- Linear voltage output against magnetic force.
- Linear voltage output against moving magnetic force.
- Detection and monitoring of magnetic vibrations. (0-100kHz)
- Can be used in low or high temperatures.

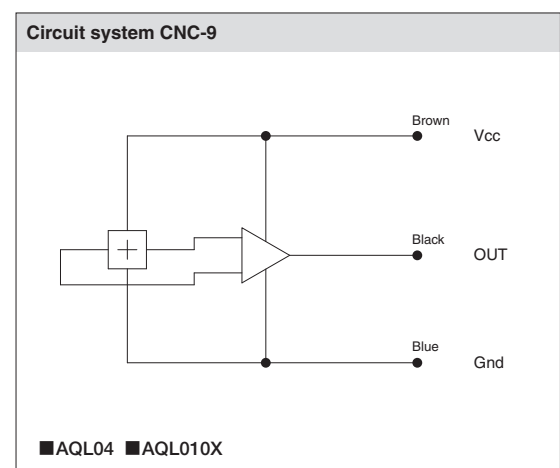


*The sensor outputs voltage that is proportional to the changes of the magnetic flux density.
*The output voltage saturates at about 40mT or more on both N-side and S-side.

General Specifications

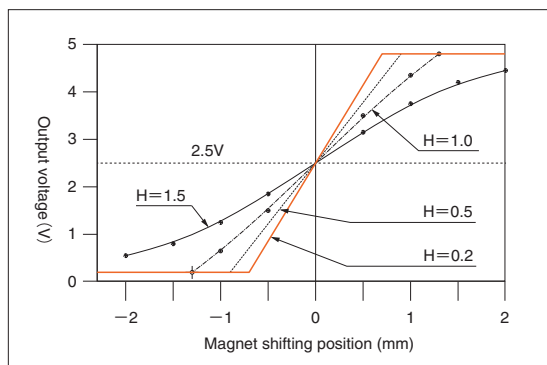
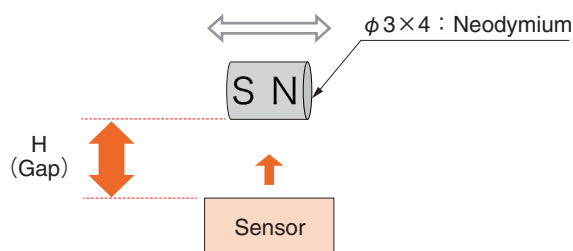
Supply Voltage	DC5V
Magnetic sensitivity	65mV / Mt : Central value
Output voltage	0.3→4.7V (−40→+40mT) : Central value
Central voltage	2.5V±0.15V
Output current	±1.2mA MAX
Consumption current	12mA
Response time	5 μ sec (100kHz)
Magnetic sensitivity temperature coefficient	0±0.04% / °C
Magnetic voltage temperature coefficient	0±0.5mV / °C
Operation Temperature Range	−20°C~+85°C (Without condensation)
Operating Humidity Range	20~95%RH

Connection example (circuit diagram)



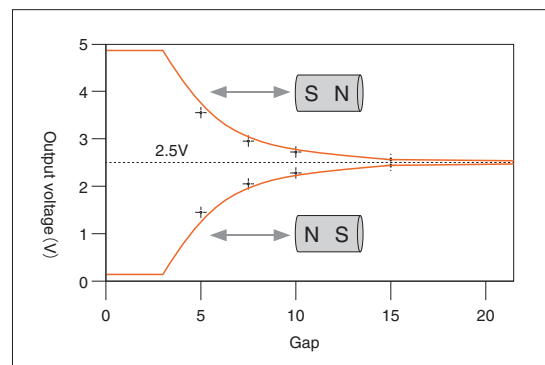
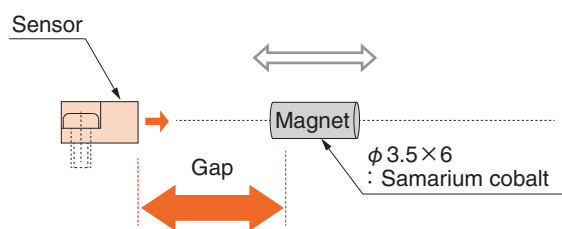
Test data

Test data (1)



- * If the magnets are moved to the left or right under a certain gap, the linear output voltage can be obtained.
- * The linear sensitivity can be modified by changing the gap size.
- * A large gap can be obtained against the same linear sensitivity with strong magnets.

Test data (2)



- *View the quadratic curve output voltage by changing the gap between the sensor and magnet.
- *The gap size can be changed depending on the strength of the magnet.
- *A 3.5-8.5 gap range is practical when using this magnet.

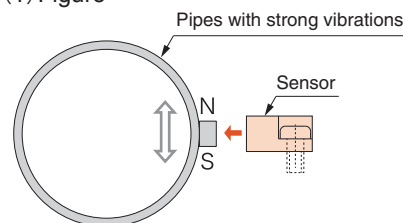
Application examples

- (1) The monitoring magnet of the pipes and sensors that have concerns about abnormal vibrations under temperatures exceeding 200°C must be kept under 85°C using an alnico 8 magnet and insulation cover or air purge, respectively.

Other

- (2) Analysis sensor for vehicle-related ride comfort and shock absorbers.
- (3) Deformation long-term analysis during and after construction.


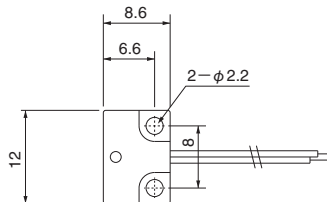
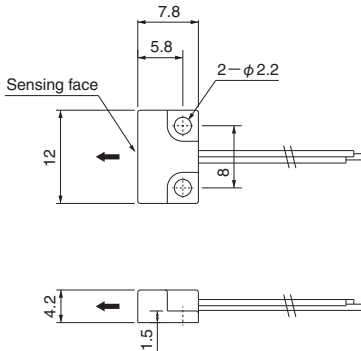

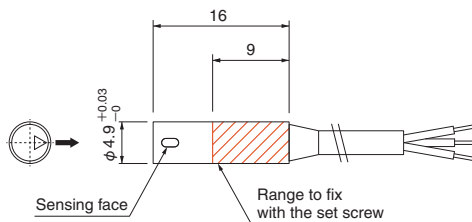
* (1) Figure



Precautions

- **Precautions for safety use**
 - (1) Although our products are designed to ensure safety and address risks, in case that a sensor malfunction or failure is expected to lead to serious risks to life or property, please be advised to expand further safety gear such as the incorporation of dual circuit.
 - (2) Applying a strong magnetic field may cause malfunction.
- **Correct wiring**
 - (1) **Prevention of reverse connection**...Please observe the circuit diagrams so as to ensure correct connections. Reverse connection of power supply is strictly prohibited.
 - (2) **Relay drive**...When driving a relay, please connect a freewheel diode in parallel.
- **Mounting the sensor**
 - (1) **Tightening torque**...Please observe the value of torque designated for each sensor.
 - (2) **Disconnection of the cable outlet**
 - ① Do not apply excessive stress to the cable outlets of the sensor body.
 - ② When moving the cable, please secure the middle of the cable so that stress is not applied to the outlet.
 - ③ The bending radius as R7 at least.

Lineup of Linear Sensor

Model	Dimensions (mm)	Specifications												
<div>AQL04 / AQL04H</div> <div></div>	<div><div>AQL04</div><div></div></div> <div><div>AQL04H</div><div></div></div>	<table><tr><td>Direction to detect</td><td>AQL04 : Upward AQL04H : Forward</td></tr><tr><td>Cable specifications</td><td>Core wire $\phi 0.9 \times 3$, 0.3m</td></tr><tr><td>Case material</td><td>GF reinforced PBT : Orange</td></tr><tr><td>Mounting</td><td>M2 tightening torque 0.15N·m</td></tr><tr><td>Protective structure</td><td>IP65</td></tr><tr><td>Circuit diagram</td><td>CNC-9 (Refer to P.31)</td></tr></table>	Direction to detect	AQL04 : Upward AQL04H : Forward	Cable specifications	Core wire $\phi 0.9 \times 3$, 0.3m	Case material	GF reinforced PBT : Orange	Mounting	M2 tightening torque 0.15N·m	Protective structure	IP65	Circuit diagram	CNC-9 (Refer to P.31)
Direction to detect	AQL04 : Upward AQL04H : Forward													
Cable specifications	Core wire $\phi 0.9 \times 3$, 0.3m													
Case material	GF reinforced PBT : Orange													
Mounting	M2 tightening torque 0.15N·m													
Protective structure	IP65													
Circuit diagram	CNC-9 (Refer to P.31)													
<div>AQL010X</div> <div></div>	<div></div>	<table><tr><td>Direction to detect</td><td>Forward</td></tr><tr><td>Cable specifications</td><td>$\phi 2.8$ 3wire, Gray 1m</td></tr><tr><td>Case material</td><td>SUS303</td></tr><tr><td>Mounting</td><td>Fix with M3 set screw under 0.2N·m</td></tr><tr><td>Protective structure</td><td>IP65</td></tr><tr><td>Circuit diagram</td><td>CNC-9 (Refer to P.31)</td></tr></table> <div>· Cable extension are possible.</div>	Direction to detect	Forward	Cable specifications	$\phi 2.8$ 3wire, Gray 1m	Case material	SUS303	Mounting	Fix with M3 set screw under 0.2N·m	Protective structure	IP65	Circuit diagram	CNC-9 (Refer to P.31)
Direction to detect	Forward													
Cable specifications	$\phi 2.8$ 3wire, Gray 1m													
Case material	SUS303													
Mounting	Fix with M3 set screw under 0.2N·m													
Protective structure	IP65													
Circuit diagram	CNC-9 (Refer to P.31)													

High Precision Touch Switches

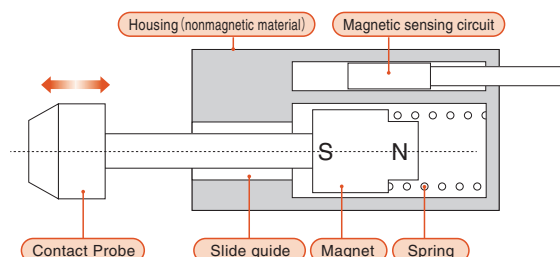


Features

- Long lasting, stable operation even under frequent use because of lack of physical contact.
- Capable of very high precision in repeatability of operating point.
- The configuration separating moving parts from sensing part enables environment resistance.
- Can be customized to a model of limited operational force.

Mechanism

An external input pushing or pulling the probe moves the magnet back or forth, respectively. Sensing the magnet's movements, the magnetic sensing circuit induces ON / OFF action and functions as a touch switch.



General specifications

3-wire system

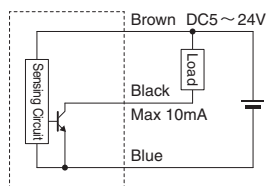
Supply Voltage	DC5 ~ 24V
Output specifications	NPN open collector (ON when in proximity) If it is OFF in close proximity, (B) is added to the end of the model number.
Output current	15mA
Consumption current	8mA
Frequency of operation	60 or less per minute
Voltage Resistance	AC1000V (1 minute / packaged charging part / between the case)
Insulation Resistance	DC250V (Over 20MΩ in megohms / between the case)
Operation Temperature Range	-20°C ~ +85°C (Without condensation)
Operating Humidity Range	20 ~ 95%RH

2-wire system

Supply Voltage	DC12 ~ 24V
Output current	50mA Max
Leakage current	OFF state Under maximum 0.5mA
Frequency of operation	60 or less per minute
Voltage Resistance	AC1000V (1 minute / packaged charging part / between the case)
Insulation Resistance	DC250V (Over 20MΩ in megohms / between the case)
Operation Temperature Range	-20°C ~ +85°C (Without condensation)
Operating Humidity Range	20 ~ 95%RH

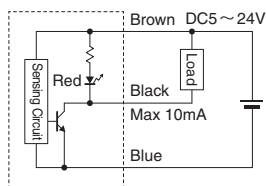
Connection examples (circuit diagrams)

Circuit system CNC-1



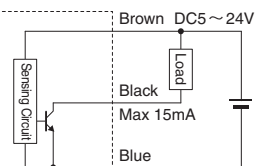
■STR8 ■STR10

Circuit system CNC-2



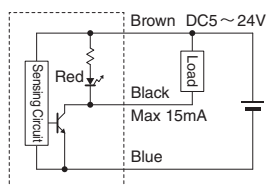
■STR6

Circuit system CNC-3



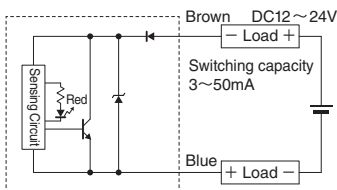
■STM6 ■STM8 ■STM8L ■STM14 ■STM16 ■STF15
■STS93E ■STS83 ■TSM102 ■STB30 ■N308 ■N6 ■HS1 ■MS1
■MR1 ■MR2 ■BSTF ■BSTM6 ■BSTM8 ■STMB10 ■STFB12

Circuit system CNC-7



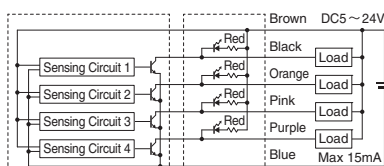
■HS1P

Circuit system CNC-8



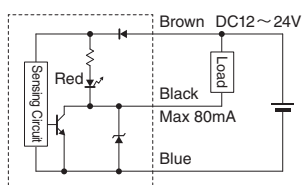
■STS92

Circuit system CNC-13



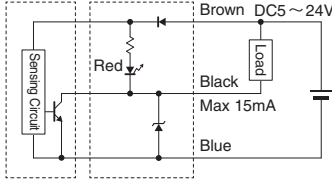
■PM5 ■PM6

Circuit system CNC-16



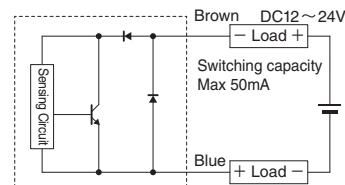
■STS93

Circuit system CNC-18



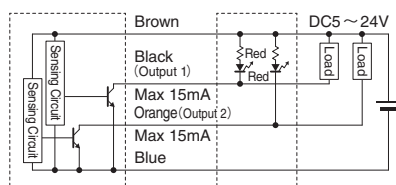
■STM6-LED ■STM8-LED ■STM8L-LED ■STF15-LED
■N6-LED ■STBM10-LED ■STFB12-LED

Circuit system CNC-19



■STMB10V

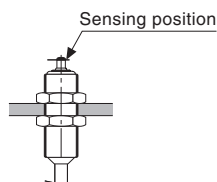
Circuit system CNC-20



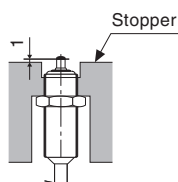
■STM10-D-LED

Examples for Application of Screw-type Switches

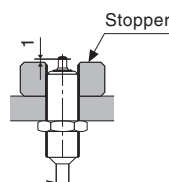
Touch Switch,
Switch for bottom dead center



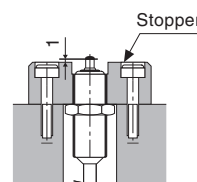
Example of mounting
in stop wall



Example of using
stop nut



Example of using
stop block



Precautions

•Precautions for safety use

- Although our products are designed to ensure safety and address risks, in case that a switch malfunction or failure is expected to lead to serious risks to life or property, please be advised to expand further safety gear such as the incorporation of dual circuit.
- Applying a strong magnetic field may cause malfunction.

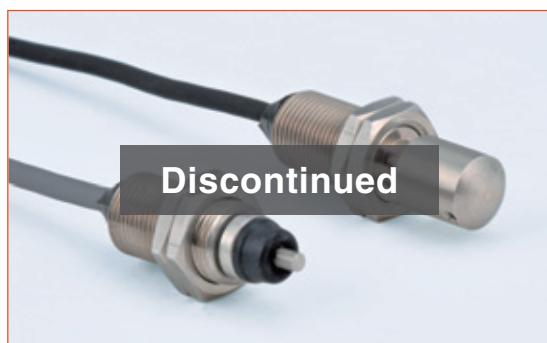
•Correct wiring

- Prevention of reverse connection**...Please observe the circuit diagrams so as to ensure correct connections. Reverse connection of power supply is strictly prohibited.
- Relay drive**...When driving a relay, please connect a freewheel diode in parallel.

•Mounting the switch

- Tightening torque**...Please observe the value of torque designated for each switch.
- Disconnection of the cable outlet**
 - Do not apply excessive stress to the cable outlets of the sensor body.
 - When moving the cable, please secure the middle of the cable so that stress is not applied to the outlet.
 - The bending radius as R7 at least.

M10 Single Touch Switch



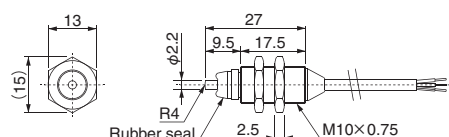
Model

STM10-S

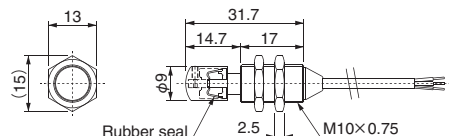
Operation	Contact configuration
Blank : OFF→ON (B) : ON→OFF	Blank : Standard type P : Contact type

Dimensions (mm)

Standard type



Contact type

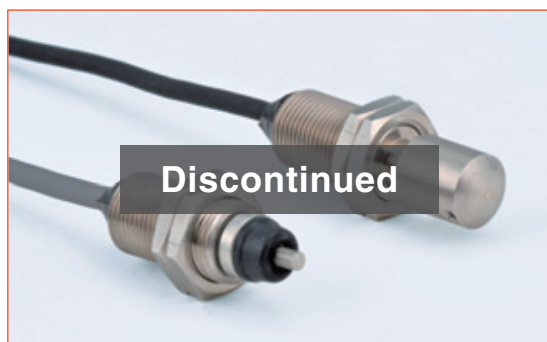


Specifications

Stroke	3mm
Operating force	1N
Movement until the operation [PT]	0.2 ~ 0.5mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.001mm
Cable specifications	STM10-S : φ2.8 3wire, Gray 1m STM10-S(B) : φ2.8 3wire, Black 1m
Case, Nut, Shaft material	SUS303
Mounting	M10 nut tightening torque 12N·m or less
Mounting hole processing dimensions	φ10 ^{+0.5} ₀
Protective structure	IP67
Circuit diagram	CNC-3 (Refer to P.35)

- Do not apply a force of 30N or more to the contact part.
- By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

M10 Double Touch Switch



Model

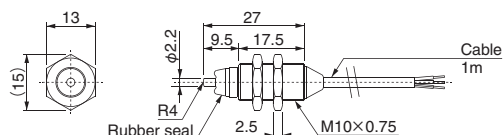
STM10-D (*a - *b)

Contact configuration	Cable indicator	Operation 1
Blank : Standard type P : Contact type	Blank : without indicator LED : with indicator	A : OFF→ON B : ON→OFF
		Operation 2
		A : OFF→ON B : ON→OFF

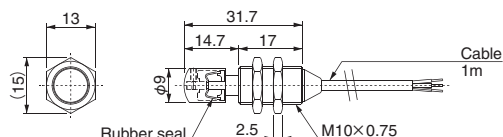
* Please refer to p.12 "CAL-02" for the external dimensions of the indicator light.

Dimensions (mm)

Standard type

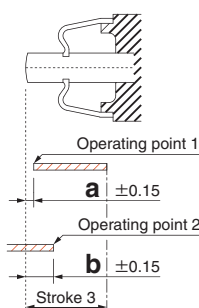


Contact type



* About the operating point positions of "a" and "b".

The operating point position (a, b) can be freely specified between 0.4±0.15mm and 2.0±0.15mm.

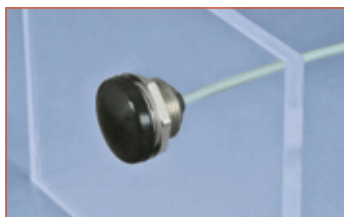


Specifications

Stroke	3mm
Operating force	1N
Movement until the operation [PT]	0.4 ~ 2.0mm (±0.15mm)
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.001mm
Cable specifications	φ3.1 4wire, Black 1m
Case, Nut, Shaft material	SUS303
Mounting	M10 nut tightening torque 12N·m or less
Mounting hole processing dimensions	φ10 ^{+0.5} ₀
Indicator light	STM10-D / STM10-D-P : Without indicator light STM10-D-LED / STM10-D-P-LED : Approximately 100mm from the main unit
Protective structure	IP67
Circuit diagram	STM10-D : CNC-6 (Refer to P.35) STM10-D-LED : CNC-20 (Refer to P.35)

- Do not apply a force of 30N or more to the contact part.
- Cable extension are possible.

Push-button switch



Model

STM16

Operation force & Waterproof
F : 2N・Waterproofing on front side of panel
W : 3N・Waterproofing on both sides of panel

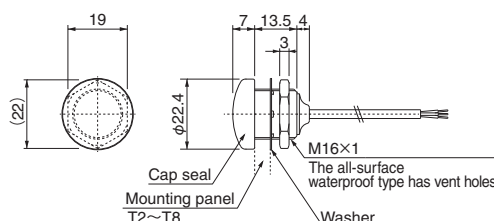
Operation
Blank : OFF→ON
(B) : ON→OFF

Specifications

Stroke	3.5mm
Operating force	F : 2N W : 3N
Waterproof	F : Waterproof front panel surface W : Both sides waterproof
Movement until the operation [PT]	1.2mm
Hysteresis	0.02mm
Repeat accuracy	±0.04mm
Cable specifications	STM16□ : φ2.8 3wire, Gray 1m STM16□(B) : φ2.8 3wire, Black 1m
Cap seal material	VMQ70°
Case, Nut material	SUS303
Mounting	M16 nut tightening torque 20N·m or less
Mounting hole processing dimensions	φ16 ^{+0.5} ₀
Protective structure	IP67
Circuit diagram	CNC-3 (Refer to P.35)

· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

Dimensions (mm)



Flat Switch



Model

STF15-

Operation
Blank : OFF→ON
(B) : ON→OFF

Cable indicator
Blank : without indicator
LED : with indicator

* Please refer to p.12 "CAL-01" for the external dimensions of the indicator light.

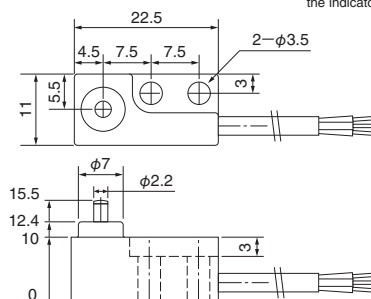
Specifications

Stroke	3mm
Operating force	0.4N
Movement until the operation [PT]	0.2 ~ 0.5mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.002mm
Cable specifications	STF15 / STF15-LED : φ2.8 3wire, Gray 1m STF15(B) / STF15(B)-LED : φ2.8 3wire, Black 1m
Case material	Zinc die casting
Shaft material	SUS303
Indicator light	STF15 / STF15(B) : Without indicator light STF15-LED / STF15(B)-LED : Approximately 100mm from the main unit.
Protective structure	IP65
Circuit diagram	STF15 / STF15(B) : CNC-3 (Refer to P.35) STF15-LED / STF15(B)-LED : CNC-18 (Refer to P.35)

· Do not apply a force of 15N or more to the contact part.

· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

Dimensions (mm)



Slim Switch



Model

STS83

Operation
Blank : OFF→ON
(B) : ON→OFF

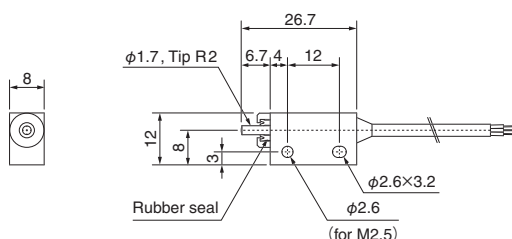
Specifications

Stroke	3mm
Operating force	0.7N
Movement until the operation [PT]	0.2 ~ 0.5mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.001mm
Cable specifications	STS83 : φ2.8 3wire, Gray 1m STS83(B) : φ2.8 3wire, Black 1m
Case material	Zinc die casting
Shaft material	SUS303
Protective structure	IP67
Circuit diagram	CNC-3 (Refer to P.35)

· Do not apply a force of 15N or more to the contact part.

· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

Dimensions (mm)



Renewal

Door switch Two-wire-system



Model

STS92

Operation

Blank : OFF→ON
(B) : ON→OFF

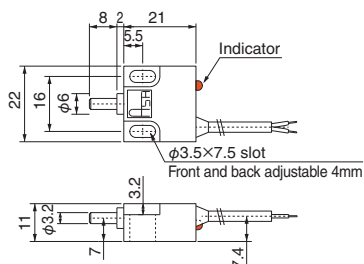
Specifications

Stroke	8mm
Operating force	0.4N
Movement until the operation [PT]	0.3 ~ 0.8mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.01mm
Cable specifications	STS92 : ϕ 2.8 2wire, Gray 1m STS92(B) : ϕ 2.8 2wire, Black 1m
Case material	GF reinforced PBT
Shaft material	SUS303
Mounting	M3 tightening torque 0.3N·m
Indicator light	Red
Protective structure	IP65
Circuit diagram	CNC-8 (Refer to P.35)

· Be sure to connect to the load before use.

· Cable extension are possible.

Dimensions (mm)



Door switch three-wire-system



Model

STS93

Operation

Blank : OFF→ON
(B) : ON→OFF

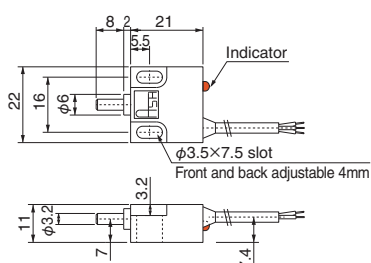
Specifications

Stroke	8mm
Operating force	0.4N
Movement until the operation [PT]	0.3 ~ 0.8mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.01mm
Output current	80mA Max*
Consumption current	15mA Max
Cable specifications	STS93 : ϕ 2.8 3wire, Gray 1m STS93(B) : ϕ 2.8 3wire, Black 1m
Case material	GF reinforced PBT
Shaft material	SUS303
Mounting	M3 tightening torque 0.3N·m
Indicator light	Red
Protective structure	IP65
Circuit diagram	CNC-16 (Refer to P.35)

* If you need the maximum output current (80mA), use a 12V to 24V power supply.

· By using cable options, conversion of output specifications and cable extension are possible.

Dimensions (mm)



Door switch three-wire-system



Model

STS93E

Operation

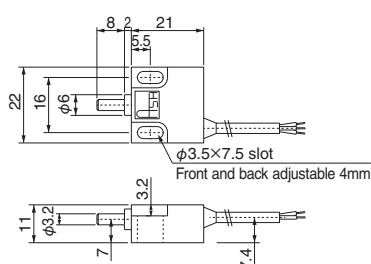
Blank : OFF→ON
(B) : ON→OFF

Specifications

Stroke	8mm
Operating force	0.4N
Movement until the operation [PT]	0.3 ~ 0.8mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.01mm
Cable specifications	STS93E : ϕ 2.8 3wire, Gray 1m STS93E(B) : ϕ 2.8 3wire, Black 1m
Case material	GF reinforced PBT
Shaft material	SUS303
Mounting	M3 tightening torque 0.3N·m
Protective structure	IP65
Circuit diagram	CNC-3 (Refer to P.35)

· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

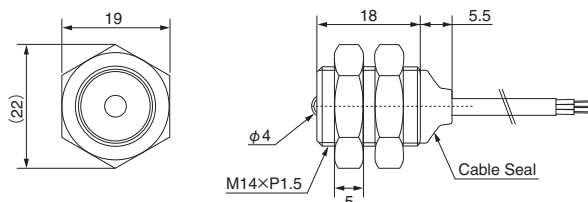
Dimensions (mm)



Stopper Switch



■ Dimensions (mm)



■ Model

STM14

Operation

Blank : OFF→ON
(B) : ON→OFF

■ Specifications

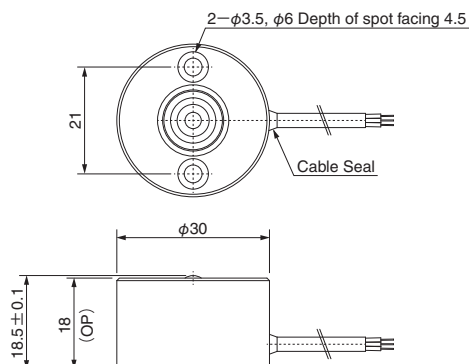
Static withstand load	10kN
Stroke	0.8mm
Movement until the operation [PT]	0.15 ~ 0.4mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.002mm
Cable specifications	STM14 : ϕ 2.8 3wire, Gray 1m STM14 (B) : ϕ 2.8 3wire, Black 1m
Case, nut material	SUS303
Tip material	SUS
Cable seal material	Nitrile rubber
Mounting	M14 nut tightening torque 18N·m or less
Mounting hole processing dimensions	ϕ 14 $^{+0.5}_{0}$
Protective structure	IP44
Circuit diagram	CNC-3 (Refer to P.35)

· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

Stopper Switch



■ Dimensions (mm)



■ Model

STB30

Operation

Blank : OFF→ON
(B) : ON→OFF

Cable Protection Sleeves

Blank : without sleeves
G : with sleeves

■ Specifications

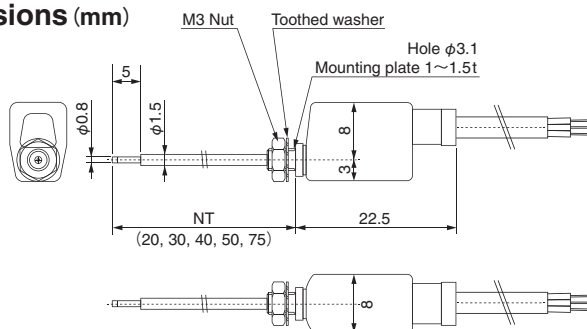
Static withstand load	100kN
Stroke	1mm
Operating position [OP]	18mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.002mm
Cable specifications	STB30 / STB30-G : ϕ 2.8 3wire, Gray 1m STB30 (B) / STB30 (B)-G : ϕ 2.8 3wire, Black 1m
Case, Tip material	SUS303
Cable seal material	Nitrile rubber
Material of cable protector	SUS304
Protective structure	IP67
Circuit diagram	CNC-3 (Refer to P.35)

· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

Needle Switch



■ Dimensions (mm)



■ Model

N308-

NT (mm)

20, 30, 40, 50, 75

■ Specifications

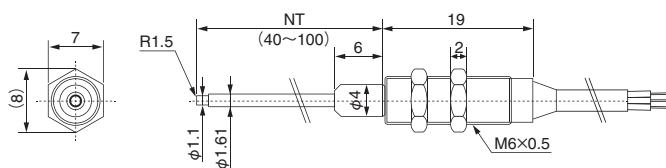
Stroke	5mm
Operating force	0.25N
Movement until the operation [PT]	0.5 ± 0.1 mm
Repeat accuracy	± 0.06 mm
Cable specifications	φ2.8 3wire, Gray 1m
Nut, Needle, toothed washer material	SUS
Mounting	M3 nut tightening torque 0.3N·m
Circuit diagram	CNC-3 (Refer to P.35)

· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

Needle Switch



■ Dimensions (mm)



■ Model

N6-

Operation

A : OFF→ON
B : ON→OFF

NT (mm)

40~100

Cable indicator

Blank : without indicator
LED : with indicator

* Please refer to p.12 "CAL-01" for the external dimensions of the indicator light.

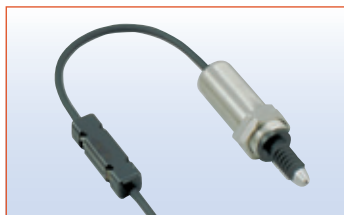
■ Specifications

Stroke	1.2mm
Operating force	0.25N
Movement until the operation [PT]	0.2 ~ 0.5mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	± 0.01 mm
Cable specifications	N6A : φ2.8 3wire, Gray 1m N6B : φ2.8 3wire, Black 1m
Case, Nut, Needle material	SUS
Mounting	M6 nut tightening torque 2N·m or less
Mounting hole processing dimensions	φ6.5 $^{+0.5}_0$
Indicator light	N6□ : Without indicator light N6□-LED : Approximately 100mm from the main unit.
Protective structure	IP65
Circuit diagram	N6□ : CNC-3 (Refer to P.35) N6□-LED : CNC-18 (Refer to P.35)

· Do not apply a force of 15N or more to the contact part.

· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

PM5 type Touch Switch



Model

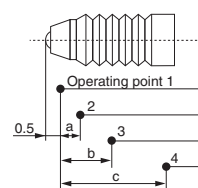
PM5-

Contact configuration

S : SUS ball
C : Carbide ball

The number of switches

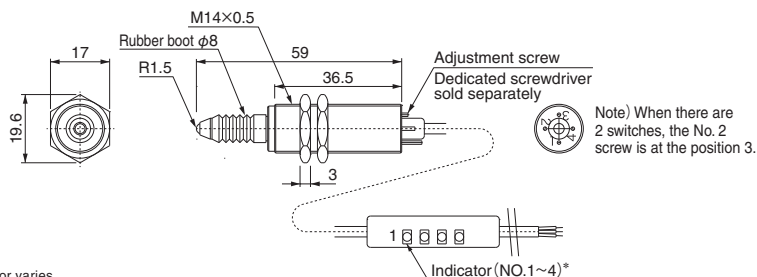
1 ~ 4



$0 \leq a < b < c \leq (\text{Stroke}-0.5)$

The positioning adjustable by users.

Dimensions (mm)



*The size of indicator varies in proportion to the number of switches.

Precautions

- Make sure the detection target hits the stroke axis at an angle of 5° or less.
- Do not turn the contact part.
- The adjusting screw part does not have a stopper, so make sure not to turn it excessively.

Specifications

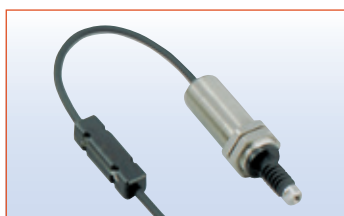
Operating point	1 ~ 4
Stroke	6mm
Operating force	0.8 ~ 1.2N
Hysteresis	0.08mm or less
Repeat accuracy	±0.001mm
Cable specifications	φ3.6 (Max) 3 ~ 6wire, Black 1m
Rubber boot material	Nitrile rubber
Case, Nut material	SUS303
Mounting	M14 nut tightening torque 18N·m or less
Mounting hole processing dimensions	φ14 $^{+0.5}_0$
Indicator light	Approximately 100mm from the main unit.
Circuit diagram	CNC-13 (Refer to P.35)

*The dimensions of the indicator light vary depending on the number of switches.

Number of switches 1 : P.12 "CAL-01"
Number of switches 2 : P.12 "CAL-02"
Number of switches 3 or 4 : P.12 "CAL-04"
Please check each.

PM6 type Touch Switch

Probe-changeable type

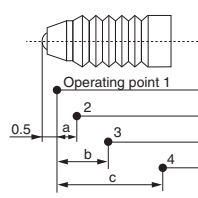


Model

PM6-

The number of switches

1 ~ 4

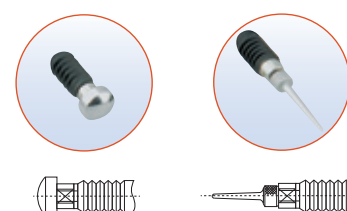


$0 \leq a < b < c \leq (\text{Stroke}-0.5)$

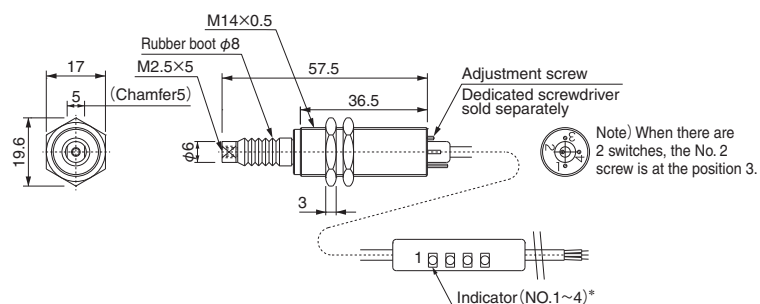
The positioning adjustable by users.

Probes to replace

(please purchase commercial products)



Dimensions (mm)



*The size of indicator varies in proportion to the number of switches.

Precautions

- When inserting the probe, support the tip part with a wrench and firmly screw it in.
- Do not apply the rotating torque between the probe and case.
- Do not turn the contact part.
- The adjusting screw part does not have a stopper, so make sure not to turn it excessively.

Specifications

Operating point	1 ~ 4
Stroke	6mm
Operating force	0.8 ~ 1.2N
Hysteresis	0.08mm or less
Repeat accuracy	±0.001mm
Cable specifications	φ3.6 (Max) 3 ~ 6wire, Black 1m
Rubber boot material	Nitrile rubber
Case, Nut material	SUS303
Mounting	M14 nut tightening torque 18N·m or less
Mounting hole processing dimensions	φ14 $^{+0.5}_0$
Indicator light	Approximately 100mm from the main unit.
Circuit diagram	CNC-13 (Refer to P.35)

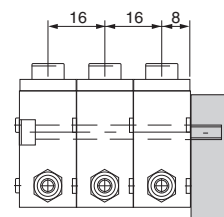
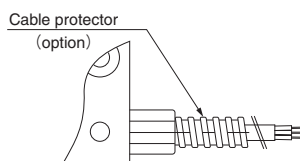
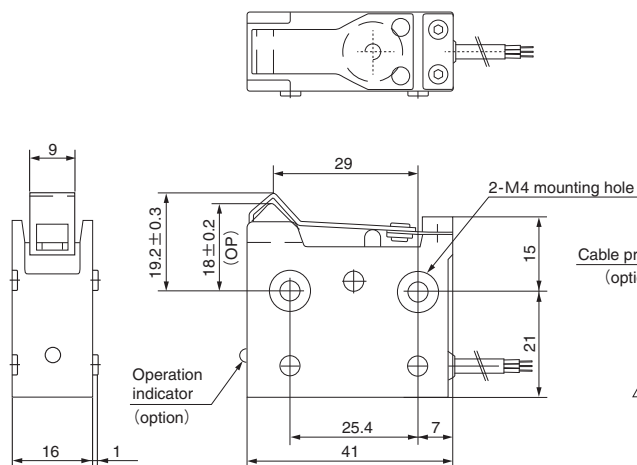
*The dimensions of the indicator light vary depending on the number of switches.

Number of switches 1 : P.12 "CAL-01"
Number of switches 2 : P.12 "CAL-02"
Number of switches 3 or 4 : P.12 "CAL-04"
Please check each.

Limit Switch



■ Dimensions (mm)



Mounting pitch
when disposing plural units side-by-side

■ Specifications

Stroke	3.3mm
Operating force	1.2N
Movement until the operation [PT]	1.4mm
Hysteresis movement [MD]	0.5mm
Operating position [OP]	18±0.2mm
Repeat accuracy	0.02mm
Cable specifications	φ 2.8 3wire, Gray 1m
Case material	Aluminum alloy / Black alumite treatment
Material of Chevron shaped lever	SUS304 nitriding treatment (Hmv 1300)
Material of flevural plate	Polyimide resin plate
Material of corrugated seal	Polyimide resin plate
Material of cable seal	Nitrile rubber
Material of cable protector	SUS304
Indicator light	HS1 / HS1-G : Without indicator light HS1P / HS1P-G : Red
Protective structure	IP67
Circuit diagram	HS1 / HS1-G : CNC-3 (Refer to P.35) HS1P / HS1P-G : CNC-7 (Refer to P.35)

■ Model

HS1 -

indicator

Blank : without indicator
P : with indicator

Cable Protection Sleeves

Blank : without sleeves
G : with sleeves

■ Features

• Contactless circuit

Superior reliability and long functional life compared to mechanical contact switches, durable more than 20 million operations.

• Shielded structure

Immune to hostile environments, available under such conditions as pouring water / oil.

• Stable operation

Because such parts susceptible to common troubles as hinges and sliding parts, are not exposed, stable operation can be assured.

• High sensibility

The accuracy of the repeatability of operating point is $\pm 0.02\text{mm}$.

Tool sensor

Renewal



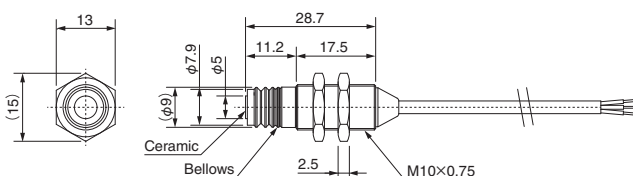
Model TSM102

Specifications

Stroke	3mm
Operating force	0.7N
Movement until the operation [PT]	0.2 ~ 0.5mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.001mm
Cable specifications	φ2.8 3wire, Gray 1m
Case, Nut material	SUS303
Mounting	M10 nut tightening torque 12N·m or less
Mounting hole processing dimensions	φ10 $+0.5$ ₀
Protective structure	IP67
Circuit diagram	CNC-3 (Refer to P.35)

· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

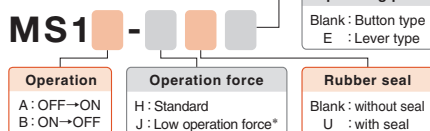
Dimensions (mm)



Micro Switch



Model



* Note : Low operation force type is not available with rubber-sealed models.

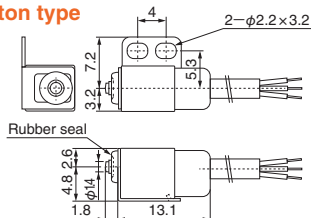
Specifications

Stroke	1mm
Operating force	Refer to below
Movement until the operation [PT]	0.15 ~ 0.4mm
Repeat accuracy	±0.002mm
Operation Temperature Range	With seal : 10 ~ 60°C (Without condensation) Without seal : -20 ~ +85°C (Without condensation)
Cable specifications	MS1A-□ : φ2.8 3wire, Gray 1m MS1B-□ : φ2.8 3wire, Black 1m
Case material	GF reinforced PBT : Black
Rubber seal material	Nitrile rubber
Circuit diagram	CNC-3 (Refer to P.35)

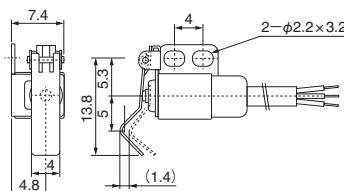
· By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

Dimensions (mm)

Button type



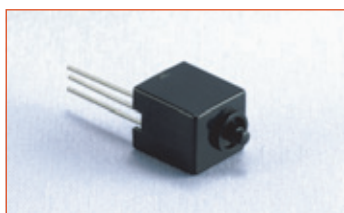
Lever type



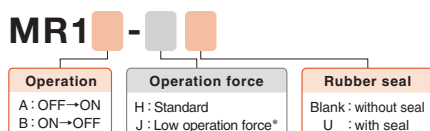
Maximum operation force

	Rubber seal	Standard mode	Low operation force
Button type	Without seal : 0.5 With seal : 0.5	0.5	0.1
Lever type	Without seal : 0.25 With seal : 0.3	0.25	0.1

Micro Switch



Model



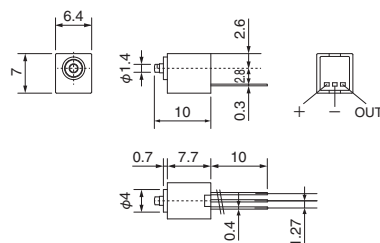
* Note : Low operation force type is not available with rubber-sealed models.

Specifications

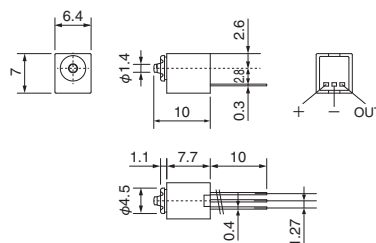
Stroke	1mm
Operating force	Refer to below
Movement until the operation [PT]	0.15 ~ 0.4mm
Repeat accuracy	±0.001mm
Operation Temperature Range	With seal : 10 ~ 60°C (Without condensation) Without seal : -20 ~ +85°C (Without condensation)
Case material	GF reinforced PBT : Black
Rubber seal material	Nitrile rubber
Circuit diagram	CNC-3 (Refer to P.35)

Dimensions (mm)

Without rubber seal



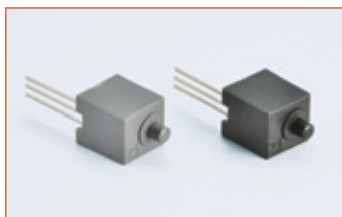
With rubber seal



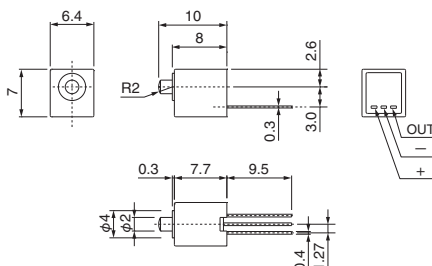
Maximum operation force

	Rubber seal	Standard mode	Low operation force
Button type	Without seal : 0.5 With seal : 0.5	0.5	0.1

Micro Switch



■ Dimensions (mm)



■ Model

MR2

Operation

A : OFF→ON
B : ON→OFF

■ Specifications

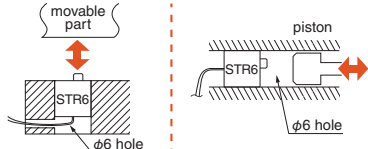
Stroke	2mm
Retention	1.6mm or less
Operating force	0.5N
Movement until the operation [PT]	0.15 ~ 0.4mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.001mm
Case material	GF reinforced PBT
Cable specifications	MR2A : Gray MR2B : Black
Circuit diagram	CNC-3 (Refer to P.35)

Mini-stopper switch



■ Usage example

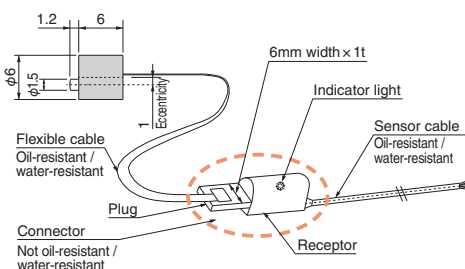
It is fixed in place by light press fitting into a $\phi 6$ hole.



■ Model

STR6

■ Dimensions (mm)



■ Specifications

Stroke	1.2mm
Operating force	0.7N
Output current	10mA Max
Consumption current	8mA Max
Movement until the operation [PT]	0.3 ~ 0.6mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.005mm
Cable specifications	Flexible cable width 3×300 with plug and $\phi 2.8$ 3wire, Gray 1m
Case material	GF20 / 66 Nylon
Shaft material	SUS303
Indicator light	Red
Protective structure	IP65
Circuit diagram	CNC-2 (Refer to P.35)

* 1. Please be careful when handling between the case and the flexible cable.

* 2. Do not insert and remove the plug more than 20 times.

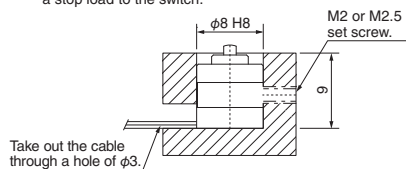
Mini-stopper switch



■ Usage example

Insert it into the hole of $\phi 8$ H8 and lightly fix it with screws from the side.

This is a method that does not apply a stop load to the switch.



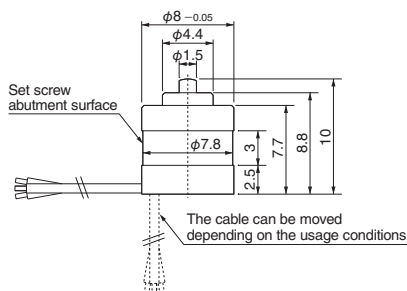
■ Model

STR8

Operation

Blank : OFF→ON
(B) : ON→OFF

■ Dimensions (mm)



■ Specifications

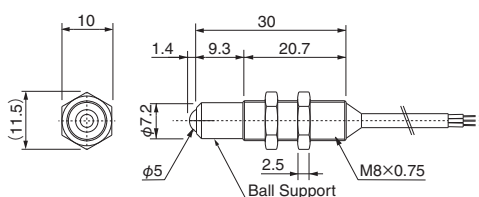
Stroke	1.2mm
Operating force	0.9N
Output current	10mA Max
Consumption current	8mA Max
Movement until the operation [PT]	0.3 ~ 0.6mm
Hysteresis movement [MD]	0.1mm or less
Static withstand load	50N
Repeat accuracy	±0.005mm
Cable specifications	Core wire $\phi 0.9 \times 3$, 1m
Case, Shaft material	SUS303
Protective structure	IP65
Circuit diagram	CNC-1 (Refer to P.35)

· Please be careful when handling between the case and the cable.

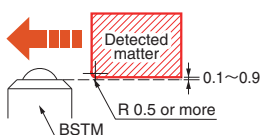
Ball touch switch



■ Dimensions (mm)



■ Installation image drawing



Precautions

- Do not push the ball support from the side with a force of 10N or more.
- The corner that hits the ball should be R0.5 or more.

■ Model

BSTM8

Operation

Blank : OFF→ON
(B) : ON→OFF

■ Specifications

Stroke	1.4mm
Operating force	0.9N
Movement until the operation [PT]	0.1 ~ 0.3mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.001mm
Cable specifications	BSTM8 : ϕ 2.8 3wire, Gray 1m BSTM8 (B) : ϕ 2.8 3wire, Black 1m
Case, nut material	SUS303
Ball material	SUS304
Mounting	M8 nut tightening torque 5N·m or less
Mounting hole processing dimensions	ϕ 8 $^{+0.5}_0$
Circuit diagram	CNC-3 (Refer to P.35)

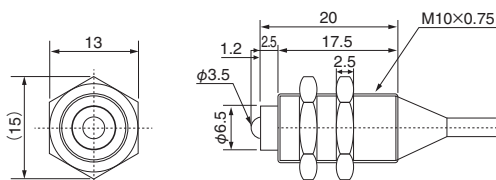
Do not apply a force of 15N or more to the contact part.

By using cable options, conversion of output specifications, current amplification, and cable extension are possible.

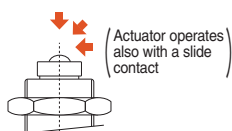
M10 Ball Plunger Switch



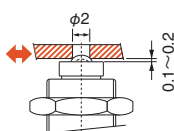
■ Dimensions (mm)



■ Examples of use



When used as a touch switch



When used as a ball plunger switch

■ Model

STMB10

Operation A : OFF→ON B : ON→OFF	Operation force H : 4.5N J : 0.35N	Cable indicator Blank : without indicator LED : with indicator
--	---	---

* Please refer to p.12 "CAL-01" for the external dimensions of the indicator light.

■ Specifications

Stroke	1mm
Operating force	H : 4.5N J : 0.35N
Movement until the operation [PT]	0.3 ~ 0.6mm
Hysteresis movement [MD]	0.1mm or less
Repeat accuracy	±0.01mm
Cable specifications	STMB10A-□ : ϕ 2.8 3wire, Gray 1m STMB10B-□ : ϕ 2.8 3wire, Black 1m
Case, Nut, Ball material	SUS303
Mounting	M10 nut tightening torque 12N·m or less
Mounting hole processing dimensions	ϕ 10 $^{+0.5}_0$
Indicator light	STMB10○-□ : Without indicator light STMB10○-□-LED : Approximately 100mm from the main unit
Protective structure	IP65
Circuit diagram	STMB10○-□ : CNC-3 (Refer to P.35) STMB10○-□-LED : CNC-18 (Refer to P.35)

By using cable options, conversion of output specifications, current amplification, and cable extension are possible.



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* In the interest of improvements, the contents of this catalogue are subject to change without notice.

