



KINGFISHER CONTROLS

Making Better Sense For You

Proximity CE RoHS

2016

120C to 180C Hi-Temp Inductives



INDUCTIVE

METAL FACE

HIGH/LOW TEMPERATURE

PHOTOELECTRIC

ULTRASONIC

ADAPTIVE

CAPACITIVE

QUICK CONNECT CABLES

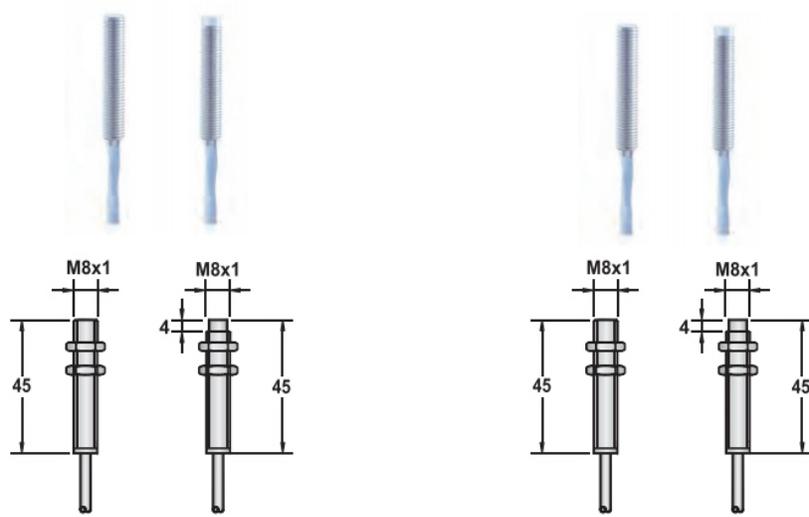
CUSTOMIZATION

www.kfcontrol.com

Proximity

M8

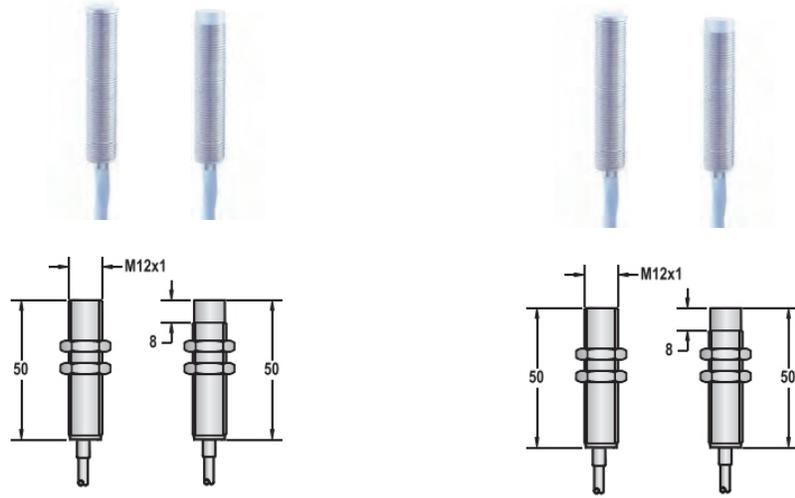
3-Wire DC Inductive



Diameter		M8		M8	
		● Flush	○ Non-flush	●	○
Switching Distance	Sn:mm	1mm	2mm	2mm	4mm
LED Indicator		No		No	
Operating Voltage		10 - 30 vdc		10 - 30 vdc	
Ripple		<10%		<10%	
No Load Current		<10mA		<10mA	
Max Load Current		120mA		120mA	
Leakage Current		<0.01mA		<0.01mA	
Voltage Drop		<1.5v		<1.5v	
Switching Frequency		1 KHz	800Hz	800Hz	500Hz
Response Time		0.2ms/0.2ms	0.6ms/0.6ms	0.6ms/0.6ms	1ms/1ms
Switching Hysteresis		<15%(Sr)		<15%(Sr)	
Repeat Accuracy		<1%(Sr)	<2%(Sr)	<1%(Sr)	<2%(Sr)
Enclosure Rating		IP67		IP67	
Operating Temperature		-25C+120C		-25C+120C	
Temperature Drift		<10%(Sr)		<10%(Sr)	
Protection		Short Circuit, Reverse Polarity		Short Circuit, Reverse Polarity	
Connection Type		3-wire, 2-meter Cable		3-wire, 2-meter Cable	
Material Tube/Face		Stainless Steel/Teflon		Stainless Steel/Teflon	
Cable Material		Teflon		Teflon	
Product Style	Wiring Diag.	2-meter Cable		2-meter Cable	
NPN N.O.	1	KH1SF-M0801N-O3U2-120	KH1SF-M0802N-O3U2-120	KH1SF-M0802N-O3U2-120	KH1SF-M0804N-O3U2-120
NPN N.C.	2	KH1SF-M0801N-C3U2-120	KH1SF-M0802N-C3U2-120	KH1SF-M0802N-C3U2-120	KH1SF-M0804N-C3U2-120
PNP N.O.	3	KH1SF-M0801P-O3U2-120	KH1SF-M0802P-O3U2-120	KH1SF-M0802P-O3U2-120	KH1SF-M0804P-O3U2-120
PNP N.C.	4	KH1SF-M0801P-C3U2-120	KH1SF-M0802P-C3U2-120	KH1SF-M0802P-C3U2-120	KH1SF-M0804P-C3U2-120

Note: See Terminal Connection page for wiring diagram

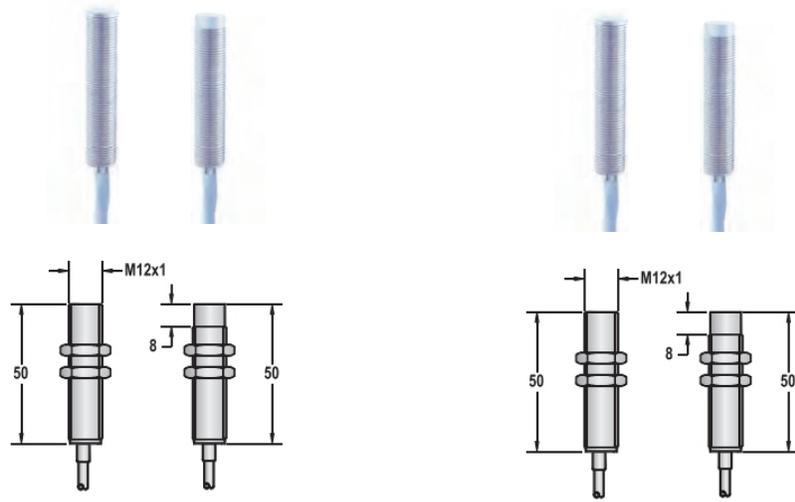
3-Wire DC Inductive



Diameter	M12				M12	
	● Flush	○ Non-flush	● 2mm	○ 4mm	● 4mm	○ 8mm
Switching Distance Sn:mm						
LED Indicator	No				No	
Operating Voltage	10 - 30 vdc				10 - 30 vdc	
Ripple	<10%				<10%	
No Load Current	<10mA				<10mA	
Max Load Current	150mA				150mA	
Leakage Current	<0.01mA				<0.01mA	
Voltage Drop	<1.5v				<1.5v	
Switching Frequency	1 KHz		800Hz		800Hz	500Hz
Response Time	0.2ms/0.2ms		0.6ms/0.6ms		0.6ms/0.6ms	1ms/1ms
Switching Hysteresis	<15%(Sr)				<15%(Sr)	
Repeat Accuracy	<1%(Sr)		<2%(Sr)		<2%(Sr)	<3%(Sr)
Enclosure Rating	IP67				IP67	
Operating Temperature	-25C+120C				-25C+120C	
Temperature Drift	<10%(Sr)				<10%(Sr)	
Protection	Short Circuit, Reverse Polarity				Short Circuit, Reverse Polarity	
Connection Type	3-wire, 2-meter Cable				3-wire, 2-meter Cable	
Material Tube/Face	Stainless Steel/Teflon				Stainless Steel/Teflon	
Cable Material	Teflon				Teflon	
Product Style	Wiring Diag.	2-meter Cable		2-meter Cable		
NPN N.O.	1	KH1SF-M1202N-O3U2-120	KH1SF-M1204N-O3U2-120	KH1SF-M1204N-O3U2-120	KH1SF-M1208N-O3U2-120	
NPN N.C.	2	KH1SF-M1202N-C3U2-120	KH1SF-M1204N-C3U2-120	KH1SF-M1204N-C3U2-120	KH1SF-M1208N-C3U2-120	
PNP N.O.	3	KH1SF-M1202P-O3U2-120	KH1SF-M1204P-O3U2-120	KH1SF-M1204P-O3U2-120	KH1SF-M1208P-O3U2-120	
PNP N.C.	4	KH1SF-M1202P-C3U2-120	KH1SF-M1204P-C3U2-120	KH1SF-M1204P-C3U2-120	KH1SF-M1208P-C3U2-120	

Note: See Terminal Connection page for wiring diagram

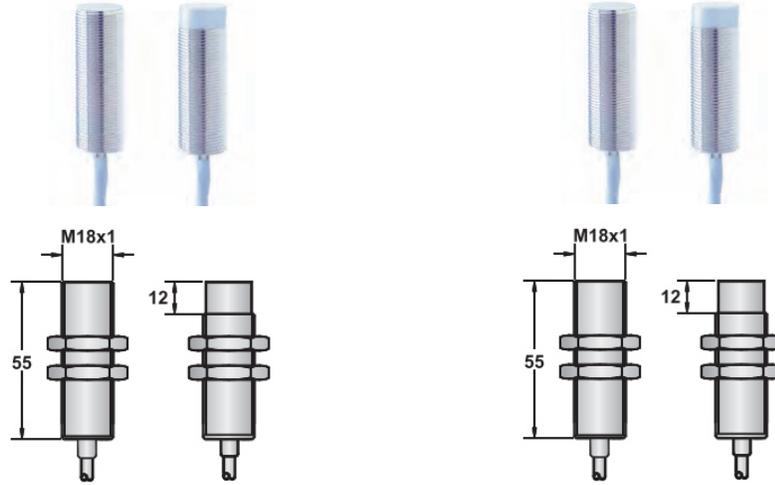
3-Wire DC Inductive



Diameter	M12				M12	
	● Flush	○ Non-flush	● 2mm	○ 4mm	● 4mm	○ 8mm
Switching Distance Sn:mm			2mm	4mm	4mm	8mm
LED Indicator			No		No	
Operating Voltage			10 - 30 vdc		10 - 30 vdc	
Ripple			<10%		<10%	
No Load Current			<10mA		<10mA	
Max Load Current			100mA		100mA	
Leakage Current			<0.01mA		<0.01mA	
Voltage Drop			<1.5v		<1.5v	
Switching Frequency			800Hz	500Hz	500Hz	300Hz
Response Time			0.6ms/0.6ms	1ms/1ms	1ms/1ms	1.5ms/1.5ms
Switching Hysteresis			<15%(Sr)		<15%(Sr)	
Repeat Accuracy			<1%(Sr)	<2%(Sr)	<2%(Sr)	<3%(Sr)
Enclosure Rating			IP67		IP67	
Operating Temperature			-25C+150C		-25C+150C	
Temperature Drift			<10%(Sr)		<10%(Sr)	
Protection			Short Circuit, Reverse Polarity		Short Circuit, Reverse Polarity	
Connection Type			3-wire, 2-meter Cable		3-wire, 2-meter Cable	
Material Tube/Face			Stainless Steel/Teflon		Stainless Steel/Teflon	
Cable Material			Teflon		Teflon	
Product Style	Wiring Diag.	2-meter Cable		2-meter Cable		
NPN N.O.	1	KH1SF-M1202N-O3U2-150	KH1SF-M1204N-O3U2-150	KH1SF-M1204N-O3U2-150	KH1SF-M1208N-O3U2-150	
NPN N.C.	2	KH1SF-M1202N-C3U2-150	KH1SF-M1204N-C3U2-150	KH1SF-M1204N-C3U2-150	KH1SF-M1208N-C3U2-150	
PNP N.O.	3	KH1SF-M1202P-O3U2-150	KH1SF-M1204P-O3U2-150	KH1SF-M1204P-O3U2-150	KH1SF-M1208P-O3U2-150	
PNP N.C.	4	KH1SF-M1202P-C3U2-150	KH1SF-M1204P-C3U2-150	KH1SF-M1204P-C3U2-150	KH1SF-M1208P-C3U2-150	

Note: See Terminal Connection page for wiring diagram

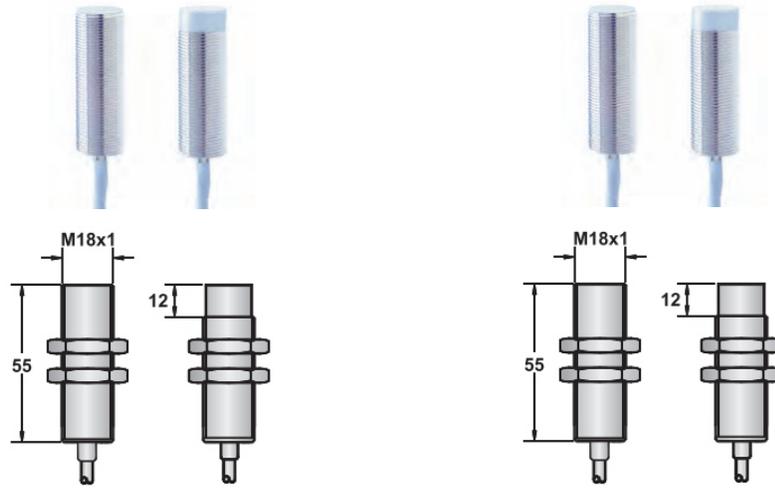
3-Wire DC Inductive



Diameter	M18				M18	
	● Flush	○ Non-flush	●	○	●	○
Switching Distance Sn:mm			5mm	8mm	8mm	16mm
LED Indicator	No				No	
Operating Voltage	10 - 30 vdc				10 - 30 vdc	
Ripple	<10%				<10%	
No Load Current	<10mA				<10mA	
Max Load Current	120mA				120mA	
Leakage Current	<0.01mA				<0.01mA	
Voltage Drop	<1.5v				<1.5v	
Switching Frequency	400Hz		300Hz		400Hz	300Hz
Response Time	1.2ms/1.2ms		1.5ms/1.5ms		1.2ms/1.2ms	1.5ms/1.5ms
Switching Hysteresis	<15%(Sr)				<15%(Sr)	
Repeat Accuracy	<1%(Sr)		<2%(Sr)		<2%(Sr)	<3%(Sr)
Enclosure Rating	IP67				IP67	
Operating Temperature	-25C+120C				-25C+120C	
Temperature Drift	<10%(Sr)				<10%(Sr)	
Protection	Short Circuit, Reverse Polarity				Short Circuit, Reverse Polarity	
Connection Type	3-wire, 2-meter Cable				3-wire, 2-meter Cable	
Material Tube/Face	Stainless Steel/Teflon				Stainless Steel/Teflon	
Cable Material	Teflon				Teflon	
Product Style	Wiring Diag.	2-meter Cable		2-meter Cable		
NPN N.O.	1	KH1SF-M1805N-O3U2-120	KH1SF-M1808N-O3U2-120	KH1SF-M1808N-O3U2-120	KH1SF-M1816N-O3U2-120	
NPN N.C.	2	KH1SF-M1805N-C3U2-120	KH1SF-M1808N-C3U2-120	KH1SF-M1808N-C3U2-120	KH1SF-M1816N-C3U2-120	
PNP N.O.	3	KH1SF-M1805P-O3U2-120	KH1SF-M1808P-O3U2-120	KH1SF-M1808P-O3U2-120	KH1SF-M1816P-O3U2-120	
PNP N.C.	4	KH1SF-M1805P-C3U2-120	KH1SF-M1808P-C3U2-120	KH1SF-M1808P-C3U2-120	KH1SF-M1816P-C3U2-120	

Note: See Terminal Connection page for wiring diagram

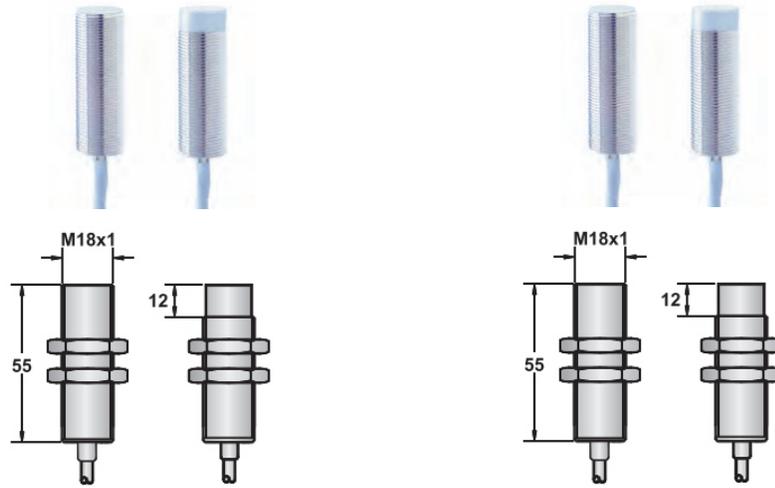
3-Wire DC Inductive



Diameter		M18		M18					
		● Flush	○ Non-flush	●	○	●	○		
Switching Distance	Sn:mm	5mm		8mm		8mm		16mm	
LED Indicator		No				No			
Operating Voltage		10 - 30 vdc				10 - 30 vdc			
Ripple		<10%				<10%			
No Load Current		<10mA				<10mA			
Max Load Current		100mA				100mA			
Leakage Current		<0.01mA				<0.01mA			
Voltage Drop		<1.5v				<1.5v			
Switching Frequency		400Hz		300Hz		400Hz		300Hz	
Response Time		1.2ms/1.2ms		1.5ms/1.5ms		1.2ms/1.2ms		1.5ms/1.5ms	
Switching Hysteresis		<15%(Sr)				<15%(Sr)			
Repeat Accuracy		<1%(Sr)		<2%(Sr)		<2%(Sr)		<3%(Sr)	
Enclosure Rating		IP67				IP67			
Operating Temperature		-25C+150C				-25C+150C			
Temperature Drift		<10%(Sr)				<10%(Sr)			
Protection		Short Circuit, Reverse Polarity				Short Circuit, Reverse Polarity			
Connection Type		3-wire, 2-meter Cable				3-wire, 2-meter Cable			
Material Tube/Face		Stainless Steel/Teflon				Stainless Steel/Teflon			
Cable Material		Teflon				Teflon			
Product Style	Wiring Diag.	2-meter Cable				2-meter Cable			
NPN N.O.	1	KH1SF-M1805N-O3U2-150	KH1SF-M1808N-O3U2-150	KH1SF-M1808N-O3U2-150	KH1SF-M1816N-O3U2-150	KH1SF-M1808N-O3U2-150	KH1SF-M1808N-O3U2-150	KH1SF-M1808N-O3U2-150	KH1SF-M1816N-O3U2-150
NPN N.C.	2	KH1SF-M1805N-C3U2-150	KH1SF-M1808N-C3U2-150	KH1SF-M1808N-C3U2-150	KH1SF-M1816N-C3U2-150	KH1SF-M1808N-C3U2-150	KH1SF-M1808N-C3U2-150	KH1SF-M1808N-C3U2-150	KH1SF-M1816N-C3U2-150
PNP N.O.	3	KH1SF-M1805P-O3U2-150	KH1SF-M1808P-O3U2-150	KH1SF-M1808P-O3U2-150	KH1SF-M1816P-O3U2-150	KH1SF-M1808P-O3U2-150	KH1SF-M1808P-O3U2-150	KH1SF-M1808P-O3U2-150	KH1SF-M1816P-O3U2-150
PNP N.C.	4	KH1SF-M1805P-C3U2-150	KH1SF-M1808P-C3U2-150	KH1SF-M1808P-C3U2-150	KH1SF-M1816P-C3U2-150	KH1SF-M1808P-C3U2-150	KH1SF-M1808P-C3U2-150	KH1SF-M1808P-C3U2-150	KH1SF-M1816P-C3U2-150

Note: See Terminal Connection page for wiring diagram

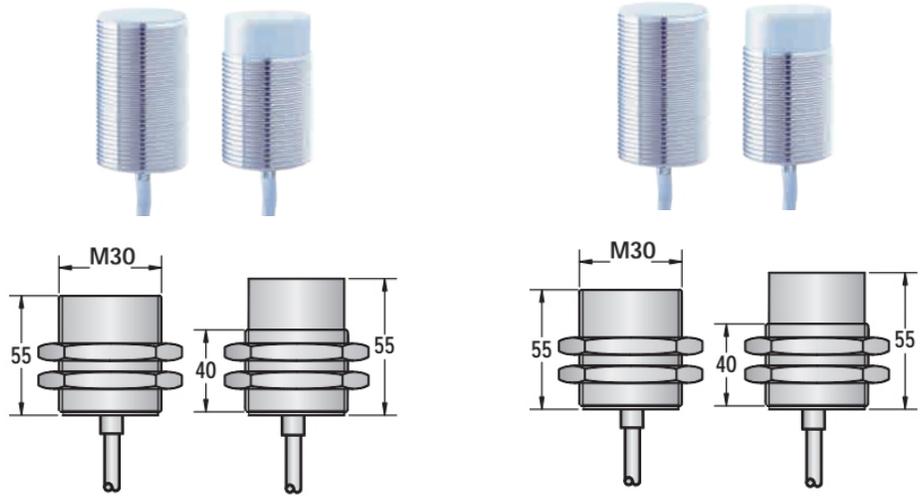
3-Wire DC Inductive



Diameter		M18		M18	
		● Flush	○ Non-flush	● 8mm	○ 16mm
Switching Distance	Sn:mm	5mm	8mm	8mm	16mm
LED Indicator		No		No	
Operating Voltage		10 - 30 vdc		10 - 30 vdc	
Ripple		<10%		<10%	
No Load Current		<10mA		<10mA	
Max Load Current		80mA		80mA	
Leakage Current		<0.01mA		<0.01mA	
Voltage Drop		<1.5v		<1.5v	
Switching Frequency		400Hz	300Hz	400Hz	300Hz
Response Time		1.2ms/1.2ms	1.5ms/1.5ms	1.2ms/1.2ms	1.5ms/1.5ms
Switching Hysteresis		<15%(Sr)		<15%(Sr)	
Repeat Accuracy		<1%(Sr)	<2%(Sr)	<2%(Sr)	<3%(Sr)
Enclosure Rating		IP67		IP67	
Operating Temperature		-25C+180C		-25C+180C	
Temperature Drift		<10%(Sr)		<10%(Sr)	
Protection		Short Circuit, Reverse Polarity		Short Circuit, Reverse Polarity	
Connection Type		3-wire, 2-meter Cable		3-wire, 2-meter Cable	
Material Tube/Face		Stainless Steel/Teflon		Stainless Steel/Teflon	
Cable Material		Teflon		Teflon	
Product Style	Wiring Diag.	2-meter Cable		2-meter Cable	
NPN N.O.	1	KH1SF-M1805N-O3U2-180	KH1SF-M1808N-O3U2-180	KH1SF-M1808N-O3U2-180	KH1SF-M1816N-O3U2-180
NPN N.C.	2	KH1SF-M1805N-C3U2-180	KH1SF-M1808N-C3U2-180	KH1SF-M1808N-C3U2-180	KH1SF-M1816N-C3U2-180
PNP N.O.	3	KH1SF-M1805P-O3U2-180	KH1SF-M1808P-O3U2-180	KH1SF-M1808P-O3U2-180	KH1SF-M1816P-O3U2-180
PNP N.C.	4	KH1SF-M1805P-C3U2-180	KH1SF-M1808P-C3U2-180	KH1SF-M1808P-C3U2-180	KH1SF-M1816P-C3U2-180

Note: See Terminal Connection page for wiring diagram

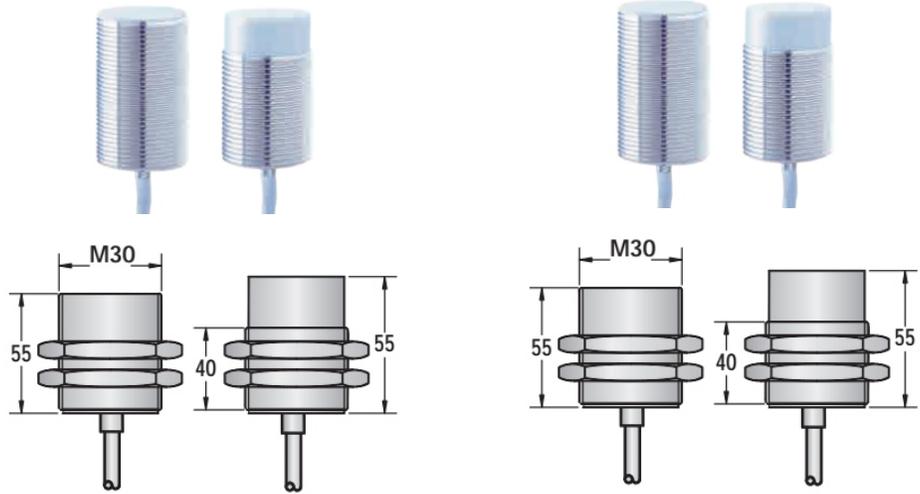
3-Wire DC Inductive



Diameter	M30				M30	
	● Flush	○ Non-flush	● 10mm	○ 15mm	● 16mm	○ 25mm
Switching Distance Sn:mm			10mm	15mm	16mm	25mm
LED Indicator			No		No	
Operating Voltage			10 - 30 vdc		10 - 30 vdc	
Ripple			<10%		<10%	
No Load Current			<10mA		<10mA	
Max Load Current			150mA		150mA	
Leakage Current			<0.01mA		<0.01mA	
Voltage Drop			<1.5v		<1.5v	
Switching Frequency			200Hz	150Hz	200Hz	150Hz
Response Time			2.5ms/2.5ms	3ms/3ms	2.5ms/2.5ms	3ms/3ms
Switching Hysteresis			<15%(Sr)		<15%(Sr)	
Repeat Accuracy			<1%(Sr)	<2%(Sr)	<2%(Sr)	<3%(Sr)
Enclosure Rating			IP67		IP67	
Operating Temperature			-25C+120C		-25C+120C	
Temperature Drift			<10%(Sr)		<10%(Sr)	
Protection			Short Circuit, Reverse Polarity		Short Circuit, Reverse Polarity	
Connection Type			3-wire, 2-meter Cable		3-wire, 2-meter Cable	
Material Tube/Face			Stainless Steel/Teflon		Stainless Steel/Teflon	
Cable Material			Teflon		Teflon	
Product Style	Wiring Diag.	2-meter Cable			2-meter Cable	
NPN N.O.	1	KH1SF-M3010N-O3U2-120	KH1SF-M3015N-O3U2-120	KH1SF-M3016N-O3U2-120	KH1SF-M3025N-O3U2-120	
NPN N.C.	2	KH1SF-M3010N-C3U2-120	KH1SF-M3015N-C3U2-120	KH1SF-M3016N-C3U2-120	KH1SF-M3025N-C3U2-120	
PNP N.O.	3	KH1SF-M3010P-O3U2-120	KH1SF-M3015P-O3U2-120	KH1SF-M3016P-O3U2-120	KH1SF-M3025P-O3U2-120	
PNP N.C.	4	KH1SF-M3010P-C3U2-120	KH1SF-M3015P-C3U2-120	KH1SF-M3016P-C3U2-120	KH1SF-M3025P-C3U2-120	

Note: See Terminal Connection page for wiring diagram

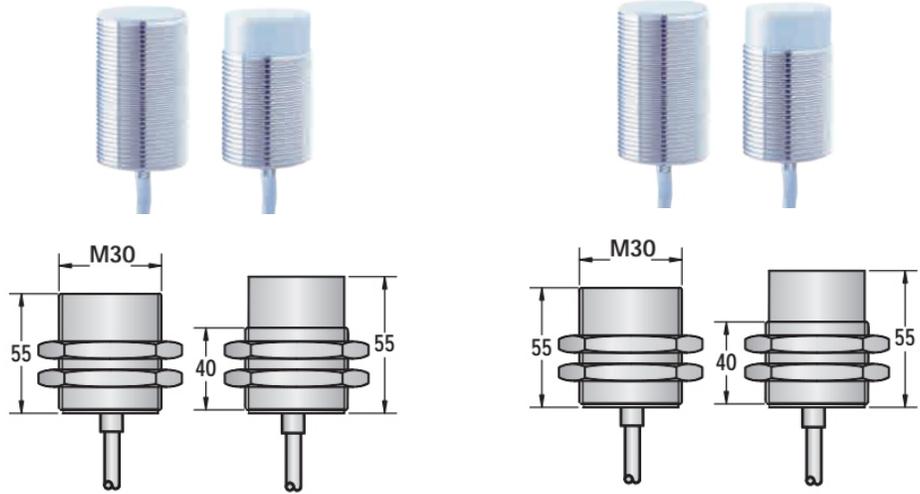
3-Wire DC Inductive



Diameter	M30				M30	
	● Flush	○ Non-flush	●	○	●	○
Switching Distance Sn:mm			10mm	15mm	16mm	25mm
LED Indicator	No				No	
Operating Voltage	10 - 30 vdc				10 - 30 vdc	
Ripple	<10%				<10%	
No Load Current	<10mA				<10mA	
Max Load Current	120mA				120mA	
Leakage Current	<0.01mA				<0.01mA	
Voltage Drop	<1.5v				<1.5v	
Switching Frequency			200Hz	150Hz	200Hz	150Hz
Response Time			2.5ms/2.5ms	3ms/3ms	2.5ms/2.5ms	3ms/3ms
Switching Hysteresis	<15%(Sr)				<15%(Sr)	
Repeat Accuracy			<1%(Sr)	<2%(Sr)	<2%(Sr)	<3%(Sr)
Enclosure Rating	IP67				IP67	
Operating Temperature	-25C+150C				-25C+150C	
Temperature Drift	<10%(Sr)				<10%(Sr)	
Protection	Short Circuit, Reverse Polarity				Short Circuit, Reverse Polarity	
Connection Type	3-wire, 2-meter Cable				3-wire, 2-meter Cable	
Material Tube/Face	Stainless Steel/Teflon				Stainless Steel/Teflon	
Cable Material	Teflon				Teflon	
Product Style	Wiring Diag.	2-meter Cable			2-meter Cable	
NPN N.O.	1	KH1SF-M3010N-O3U2-150	KH1SF-M3015N-O3U2-150	KH1SF-M3016N-O3U2-150	KH1SF-M3025N-O3U2-150	
NPN N.C.	2	KH1SF-M3010N-C3U2-150	KH1SF-M3015N-C3U2-150	KH1SF-M3016N-C3U2-150	KH1SF-M3025N-C3U2-150	
PNP N.O.	3	KH1SF-M3010P-O3U2-150	KH1SF-M3015P-O3U2-150	KH1SF-M3016P-O3U2-150	KH1SF-M3025P-O3U2-150	
PNP N.C.	4	KH1SF-M3010P-C3U2-150	KH1SF-M3015P-C3U2-150	KH1SF-M3016P-C3U2-150	KH1SF-M3025P-C3U2-150	

Note: See Terminal Connection page for wiring diagram

3-Wire DC Inductive



Diameter	M30				M30	
	● Flush	○ Non-flush	● 10mm	○ 15mm	● 16mm	○ 25mm
Switching Distance Sn:mm			10mm	15mm	16mm	25mm
LED Indicator			No		No	
Operating Voltage			10 - 30 vdc		10 - 30 vdc	
Ripple			<10%		<10%	
No Load Current			<10mA		<10mA	
Max Load Current			80mA		80mA	
Leakage Current			<0.01mA		<0.01mA	
Voltage Drop			<1.5v		<1.5v	
Switching Frequency			200Hz	150Hz	200Hz	150Hz
Response Time			2.5ms/2.5ms	3ms/3ms	2.5ms/2.5ms	3ms/3ms
Switching Hysteresis			<15%(Sr)		<15%(Sr)	
Repeat Accuracy			<1%(Sr)	<2%(Sr)	<2%(Sr)	<3%(Sr)
Enclosure Rating			IP67		IP67	
Operating Temperature			-25C+180C		-25C+180C	
Temperature Drift			<10%(Sr)		<10%(Sr)	
Protection			Short Circuit, Reverse Polarity		Short Circuit, Reverse Polarity	
Connection Type			3-wire, 2-meter Cable		3-wire, 2-meter Cable	
Material Tube/Face			Stainless Steel/Teflon		Stainless Steel/Teflon	
Cable Material			Teflon		Teflon	
Product Style	Wiring Diag.	2-meter Cable			2-meter Cable	
NPN N.O.	1	KH1SF-M3010N-O3U2-180	KH1SF-M3015N-O3U2-180	KH1SF-M3016N-O3U2-180	KH1SF-M3025N-O3U2-180	
NPN N.C.	2	KH1SF-M3010N-C3U2-180	KH1SF-M3015N-C3U2-180	KH1SF-M3016N-C3U2-180	KH1SF-M3025N-C3U2-180	
PNP N.O.	3	KH1SF-M3010P-O3U2-180	KH1SF-M3015P-O3U2-180	KH1SF-M3016P-O3U2-180	KH1SF-M3025P-O3U2-180	
PNP N.C.	4	KH1SF-M3010P-C3U2-180	KH1SF-M3015P-C3U2-180	KH1SF-M3016P-C3U2-180	KH1SF-M3025P-C3U2-180	

Note: See Terminal Connection page for wiring diagram

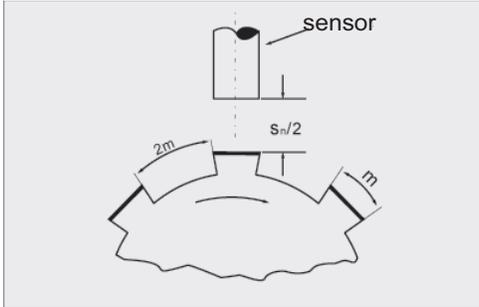
The minimum working current

To achieve the minimum load output current switch function

The pressure drop of the switch

After the load circuit to switch on both ends of the voltage value (load current is rated current)

Switching frequency



Every second, switch the maximum times, measure conform to: EN 60947-5-2/IEC 947-5-2

Through to delay

Moment of power supply is connected to the sensor prepared and normal output signal interval

Shut off the time delay

Sensors to cut off the power supply of the moment to its ready and shut off the normal signal interval

The response time

When the sensor switch to enter or leave the response time of the action zone

Working environment temperature

Is to ensure reliable sensor working environment temperature range

Protection grade

IP protection grade shall be formulated by the DIN 40050/IEC 60529 the following sensor is commonly used protection grade rules:

- IP 6 7
 - 6 Completely avoid contact with the shell between internal activity components, to prevent dust intrusion protection
 - 4 The waterproof splash, protection for water splashing from any direction Test conditions for 1 bar pressure, 10 l/minutes plus or minus 5% of the water spray for 5 minutes
 - 5 Water protection, under specific conditions, any direction nozzle spray out of the water without adverse effects Test conditions for 1 bar pressure 12.5 MM diameter nozzle distance is 3 meters
 - 7 Flood protection, in a certain pressure and time water shall not enter the shell. Test conditions, to 1 m deep water for 30 minutes
 - 8 Immersed in a specific pressure and time such as water, water will not invade the damage to the equipment. Test conditions for more than 5 meters deep water for a month

Electromagnetic compatibility

Conform to the IEC international standards

Allow the shock and vibration

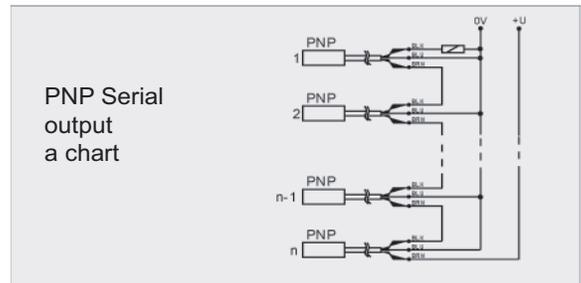
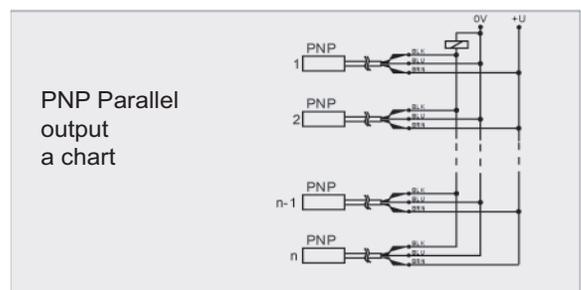
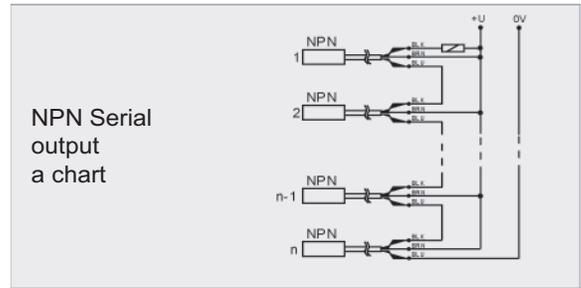
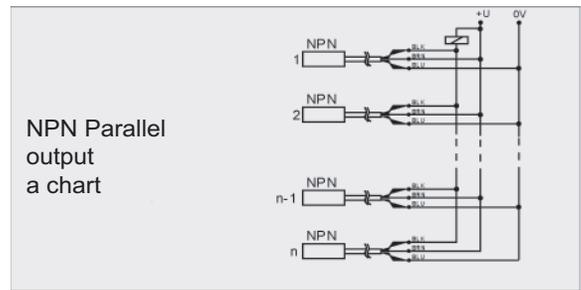
Mechanical shock test was conducted under the following conditions: conform to the IEC 60947-5-2, 30 g, using acceleration duration of 11 ms, X, Y, Z direction of the six times.

Mechanical vibration test was conducted under the following conditions: accord with IEC 60947-5-2, the amplitude of 1 mm, frequency of 10-66 hz, IEC 60947-5-2, the amplitude of 1 mm, frequency of 10-66 hz,



Products in the list of products meet the European standard EN 60947 - and EN 60947-5-22, so all have the CE mark .

Sensor series-parallel a chart



Functional description

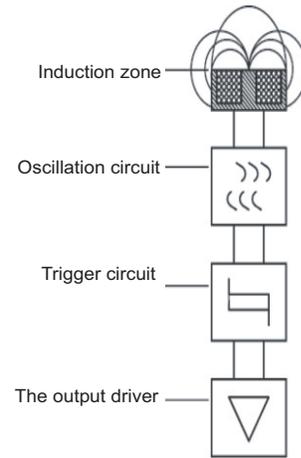
The working principle of inductive proximity switch

Inductive proximity switch mainly is to use the metal conductor and the mutual inductance alternating electromagnetic field theory, can make the magnetic field will produce eddy current attenuation of metal materials.

This will make the magnetic field energy attenuation and decreasing amplitude, in the inductive proximity switch such changes will make the corresponding output level flip (as shown in the right 1)

Inductive proximity switch standard induction

By induction type material for Fe37 steel to define the induction area, its thickness to 1 mm. (according to EN 60947-5-2) dimension is take induction floor for the side length of the square or for three times the diameter circle detection distance (either the head).



(figure 1)

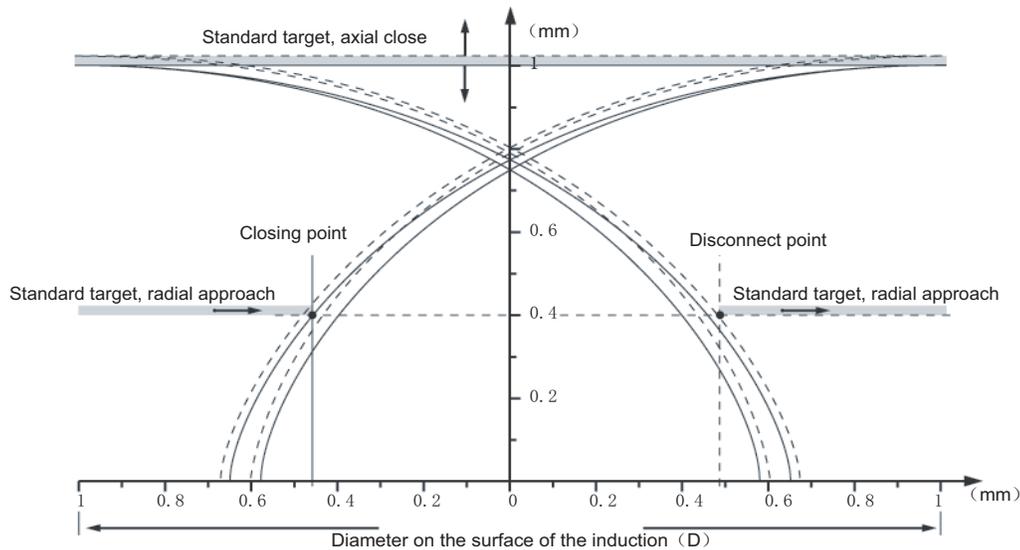
The correction coefficient of inductive proximity switch

Relative to the standard test, the detection distance of the provisions in the specified measurement conditions, tend to reduce the detection distance, the smaller the correction factor, the action of a particular material the smaller distance, the attenuation coefficient depending on the shell, especially the shielding materials will be change. For inductive proximity switch, the electrical conductivity of the test material is the main parameters affecting the attenuation coefficient. The following data shows the induction of different objects, the induction distance attenuation coefficient, Such as right as shown in table 1.

Material:	
Target Material	Reduction Rate
Fe37 steel	1
Aluminum	0.35-0.6
Yellow copper	0.4-0.7
Copper	0.25-0.5
Stainless steel	0.8-1
Cast iron	0.95-1
Nickel	0.6-0.75

(table 1)

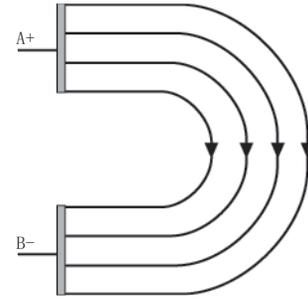
Inductive proximity switch standard response curve (as shown in figure 2)



(figure 2)

The working principle of capacitive proximity switch

Induction of capacitive sensor surface is composed of two concentric metal electrodes, similar to A non line around the capacitor electrode, the surface of the electrode (as shown in figure 3) A and B even received A high frequency oscillator in the feedback branch, adjustment of the oscillator to make it happen not in surface free oscillation, when the object approaches the effective sensor table surface, it entered the electric field on the surface of the electrode and the capacity of the capacitor will increase, make the oscillator start oscillation, oscillation amplitude recorded by the evaluation of A circuit, and is converted to a switch command, helps to detect any object of mesh.



(figure 3)

Capacitance sensors that can detect metal objects, but also to detect non-metallic objects, to detect metal objects can obtain larger movement distance, non-metallic materials depends on The dielectric constant. see chart 2:

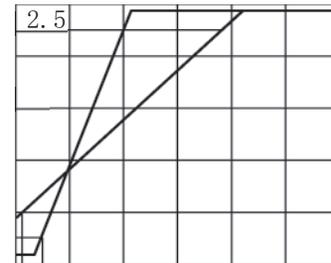
Material	Dielectric constant	Material	Dielectric constant
air, vacuum	1	alcohol	25.8
synthetic resin binder	3.6	bakelite	3.6
glass	5	mica	6
hard rubber	4	cardboard	4.5
cable rubber compounds	2.5	the marble	8
oiled paper	4	paper	2.3
gasoline	2.2	organic glass	3.2
polyamide	5	polyethylene	2.3
polypropylene	2.3	styrene	3
polyethylene compounds	2.9	ceramic	4.4
compression confetti	4	paraffin	2.2
quartz glass	3.7	quartz sand	4.5
silicon	2.8	soft rubber	2.5
teflon	2	turpentine oil	2.2
transformer oil	2.2	water	80
wood	2.7		

(table 2)

Capacitive proximity switch standard response curve (as shown in figure 4)

Analog proximity switch

According to the sensing surface to the change in its induction target distance lose out a continuous variation signal. Output signal voltage signal, current signal (as shown in figure 5, 6)



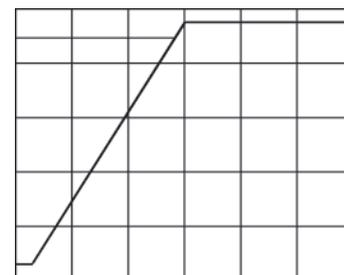
(figure 5)

The correction coefficient of capacitance proximity switch

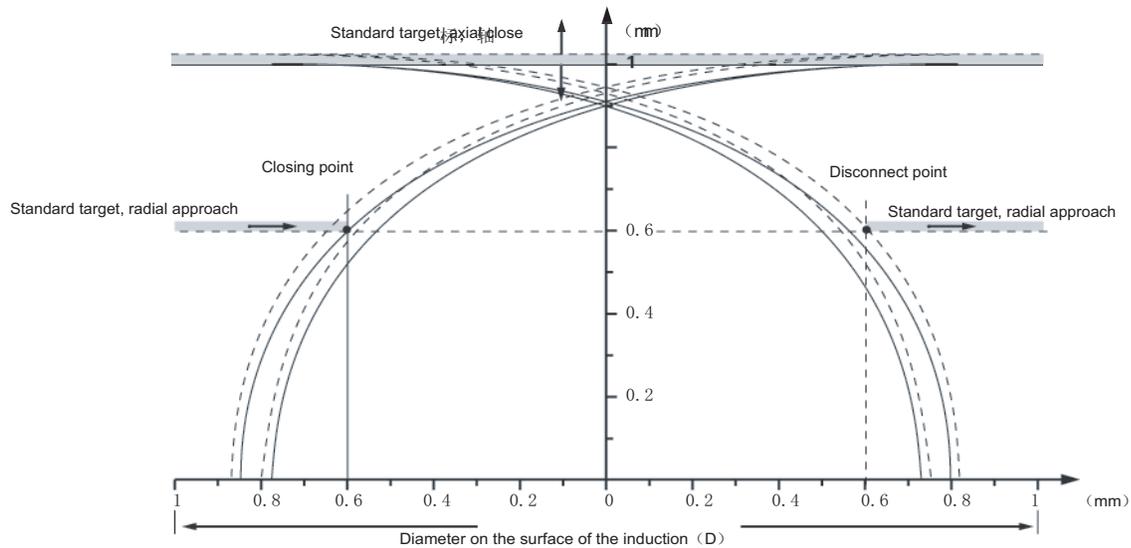
Part of the following is a list of the attenuation coefficient of material value (table 3)

Content material being tested	Attenuation coefficient
water	1
alcohol	0.7
ceramic	0.6
glass	0.5
oil	0.3

(table 3)



(figure 6)



(figure4)

Movement distance

Movement distance is on the turn signal standard induction target and induction distance (defined in accordance with EN 60947-5-2), for normally open from disconnect to connect, normally closed from on to off. Movement distance mainly depends on the diameter of the sensor, shape and materials of sensing target and environment temperature also affect the range of induction.

Movement distance related parameters:

Rated the movement distance is a theoretical value, this value does not take into account of tolerance, operating temperature, power supply voltage, and other issues. All action distance there is a standard test measured the effective action distance of S_r

A single proximity switch in the rated working voltage and temperature of the induction distance

$$0.9S_n \leq S_r \leq 1.1S_n$$

Useful induction distance S_u

Allows a single proximity switch in can guarantee the environment -25 + 70 °C temperature, input voltage rating, in line with the voltage fluctuation, measured the induction distance

$$0.81S_n \leq S_u \leq 1.1S_n$$

Reliable induction distance S_a

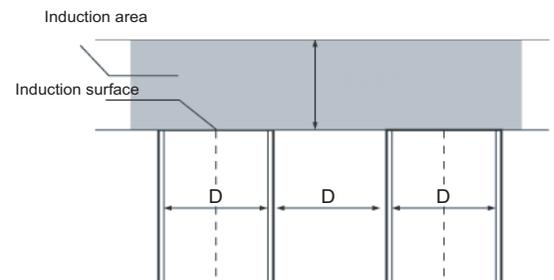
Target detection in this movement range, the switch action is reliable

$$0 \leq S_a \leq 0.81S_n$$

Installation requirements

The installation of flush proximity switch

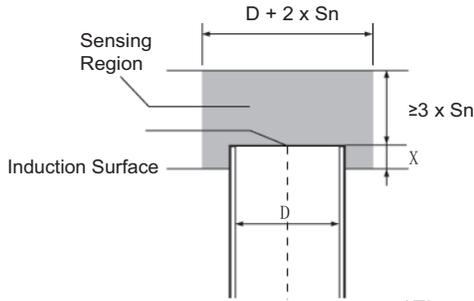
Flush switch installed near the end of the induction surface can be installed and metal surface flush, but for the sake of safety work, switch surface to the opposite of metal objects at a distance of 3 or higher sn, the distance between the adjacent two proximity switch must be D (D is the diameter of the switch) or higher (see figure 7)



(figure 7)

The installation of quasi flush proximity switch

Must flush the installation induction surface to the proximity switch table surface need to have a distance is not magnetic materials. Satisfy this condition when the switch is effective, and is not restricted. Switch induction surface to the permeability material underneath must meet minimum distance X , the following is a different diameter of sensors and the relations of X (as shown in table 4). Install schematic diagram (shown in figure 8).



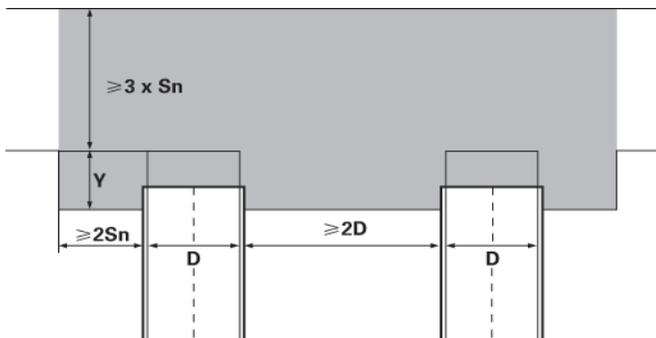
(Figure8)

Installed in the metal		
SizeD	X (mm)	Y (mm)
Φ 6.5	2	6
M8	2	6
Q8	2	6
M12	2.5	9
M18	4	16
M30	8	22

(Table4)

The installation of the flush proximity switch

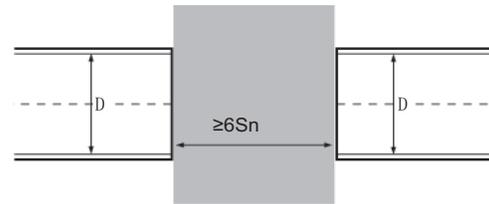
Not flush proximity switch can be identification based on their head, not flush the area around the induction surface no metal shell. Induction surface to metal installation media $Y \geq 3S_n$ (Y values in table 4). Induction on the surface of the distance to the other side of the metal objects must be 3 or more s_n , two adjacent installed close to the distance of the switch must be 2 d or higher. Install schematic diagram (as shown in figure 9).



(Figure9)

Relative proximity switch installation

For relative proximity switch installed, the minimum distance between two induction surface must be 6 or more s_n (shown in figure 10)



(Figure10)

Tightening torque

Metal case proximity switch biggest fastening torque:	
M5	1.5Nm
M8	10Nm
M12	15Nm (Brass Shell)
	30Nm (Stainless Steel Shell)
M18	40Nm
M30	40Nm
Plastic shell proximity switch biggest fastening torque:	
M12	1Nm
M18	1.5Nm
M30	1.5Nm

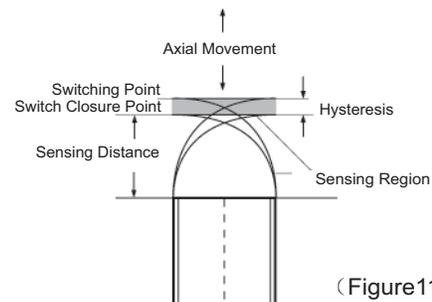
Repeatability R

According to IEC60947-5-2, repeatability refers to the following conditions, the detection distance, cycle 8 hours, $23 \pm 5^\circ\text{C}$ temperature humidity of 90% or less, the input voltage, the effective distance measuring the amount of change.

Switch hysteresis H

When testing piece near the proximity switch and when testing piece left the proximity switch for the distance between the two switch points, the distance is relative to the effective distance of a percentage of the S_r . Measuring the temperature of the environment to $23 \pm 5^\circ\text{C}$, 3% of the rated voltage range closed to H acuties were below 15% or less.

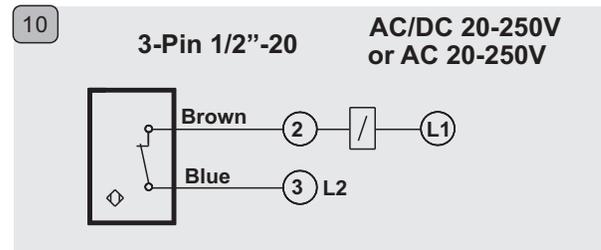
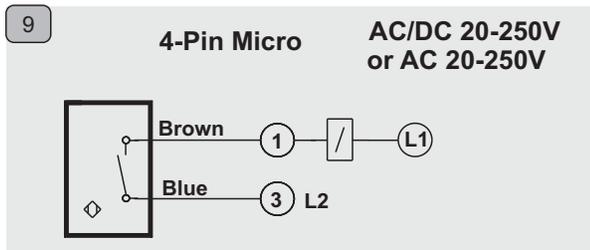
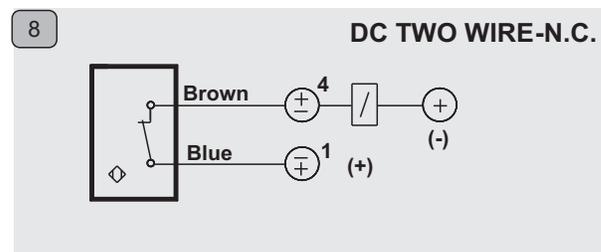
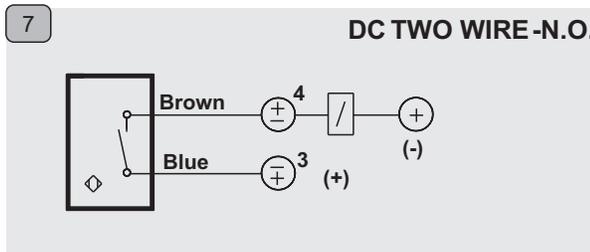
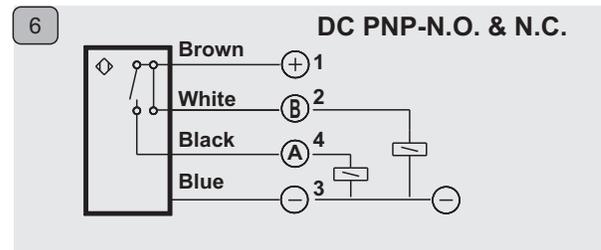
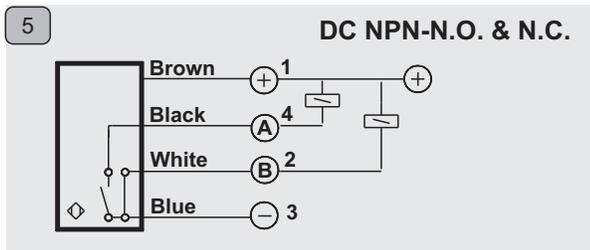
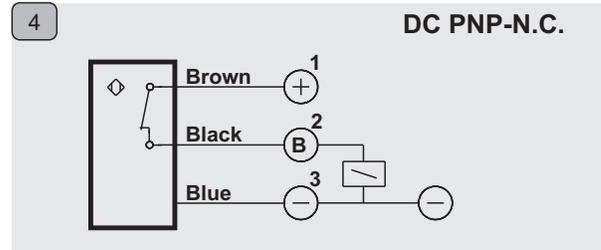
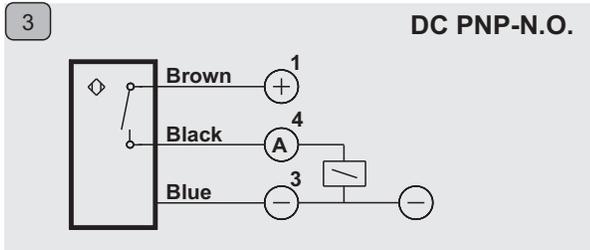
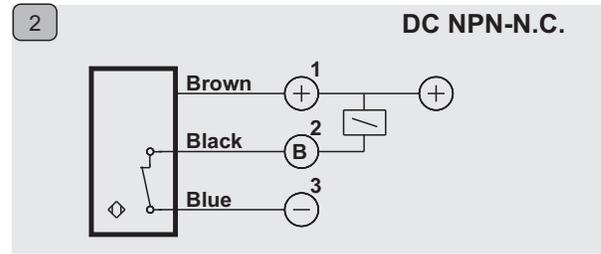
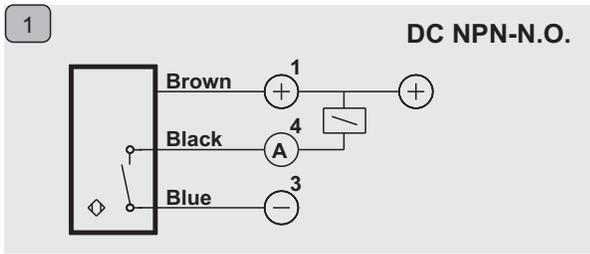
For the sensor moves switch hysteresis (as shown in figure 11, 12)



(Figure11)

TERMINAL CONNECTIONS:

Note: For cable version use color code, for connectors use pin numbers



12mm 4-Pin Micro DC



1/2"-20 3-Pin Micro AC



8mm 3-Pin Pico DC

Sensor View