

Proximity CE RoHS

2016

Standard Range Inductives



INDUCTIVE

METAL FACE

HIGH/LOW TEMPERATURE

PHOTOELECTRIC

ULTRASONIC

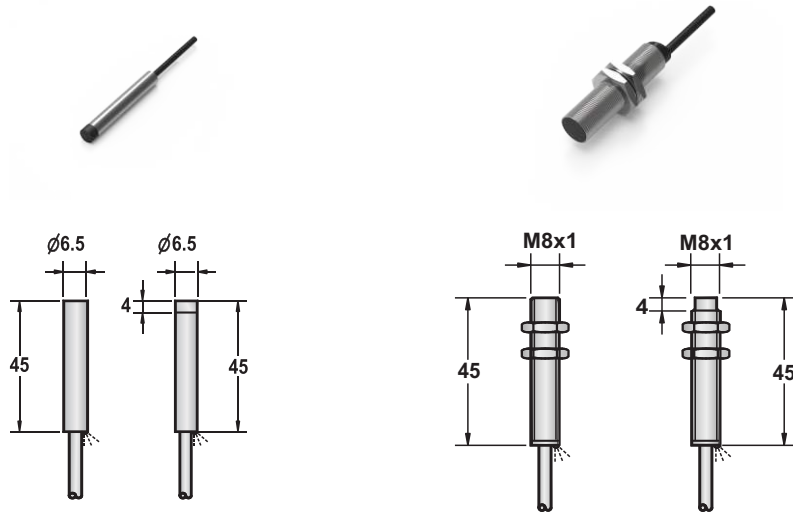
ADAPTIVE

CAPACITIVE

QUICK CONNECT CABLES

CUSTOMIZATION

3-Wire DC Inductive



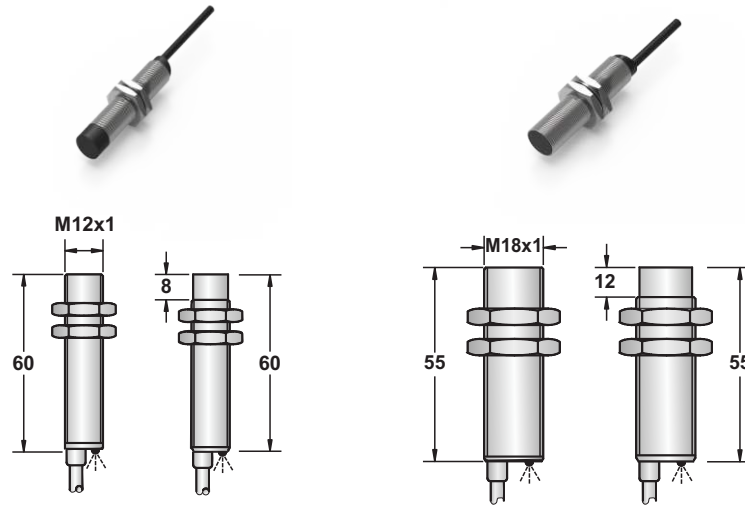
Diameter	M6.5				M8	
	● Flush	○ Non-flush	● 1mm	○ 2mm	● 1mm	○ 2mm
Switching Distance Sn:mm						
LED Indicator			Yes		Yes	
Operating Voltage			10 - 30 vdc		10 - 30 vdc	
Ripple			<10%		<10%	
No Load Current			<10mA		<10mA	
Max Load Current			150mA		150mA	
Leakage Current			<0.01mA		<0.01mA	
Voltage Drop			<1.5v		<1.5v	
Switching Frequency			2 KHz	2 KHz	2 KHz	1 KHz
Response Time			0.1ms/0.1ms	0.1ms/0.1ms	0.1ms/0.1ms	0.2ms/0.2ms
Switching Hysteresis			<15%(Sr)		<15%(Sr)	
Repeat Accuracy			<1%(Sr)	<2%(Sr)	<1%(Sr)	<2%(Sr)
Enclosure Rating			IP67		IP67	
Operating Temperature			-25C-+70C		-25C-+70C	
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			SST/PBT		Ni-Brass/PBT	
Cable Material			PVC		PVC	
Product Style	Wiring Diag.	2-meter Cable			2-meter Cable	
NPN N.O.	1	IRFB-06.501-NOWC2	IRFB-06.502-NOWC2	IRFB-0801-NOWC2	IRNB-0802-NOWC2	
NPN N.C.	2	IRFB-06.501-NNWC2	IRFB-06.502-NNWC2	IRFB-0801-NNWC2	IRNB-0802-NNWC2	
PNP N.O.	3	IRFB-06.501-POWC2	IRFB-06.502-POWC2	IRFB-0801-POWC2	IRNB-0802-POWC2	
PNP N.C.	4	IRFB-06.501-PNWC2	IRFB-06.502-PNWC2	IRFB-0801-PNWC2	IRNB-0802-PNWC2	

Note: See Terminal Connection page for wiring diagram

Proximity

M12, M18

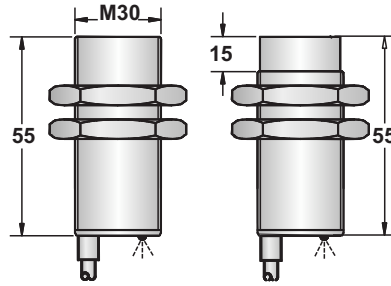
3-Wire DC Inductive



Diameter	M12		M18		
	● Flush	○ Non-flush	●	○	
Switching Distance Sn:mm	2mm	4mm	5mm	8mm	
LED Indicator	Yes		Yes		
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	2 KHz	1 KHz	1 KHz	500Hz	
Response Time	0.1ms/0.1ms	0.2ms/0.2ms	0.2ms/0.2ms	0.5ms/0.5ms	
Switching Hysteresis	<15%(Sr)		<15%(Sr)		
Repeat Accuracy	<1%(Sr)	<2%(Sr)	<1%(Sr)	<2%(Sr)	
Enclosure Rating	IP67		IP67		
Operating Temperature	-25C-+70C		-25C-+70C		
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	Ni-Brass/PBT		Ni-Brass/PBT		
Cable Material	PVC		PVC		
Product Style	Wiring Diag.	2-meter Cable		2-meter Cable	
NPN N.O.	1	IRFB-1202-NOWC2	IRNB-1204-NOWC2	IRFB-1805-NOWC2	IRNB-1808-NOWC2
NPN N.C.	2	IRFB-1202-NNWC2	IRNB-1204-NNWC2	IRFB-1805-NNWC2	IRNB-1808-NNWC2
PNP N.O.	3	IRFB-1202-POWC2	IRNB-1204-POWC2	IRFB-1805-POWC2	IRNB-1808-POWC2
PNP N.C.	4	IRFB-1202-PNWC2	IRNB-1204-PNWC2	IRFB-1805-PNWC2	IRNB-1808-PNWC2

Note: See Terminal Connection page for wiring diagram

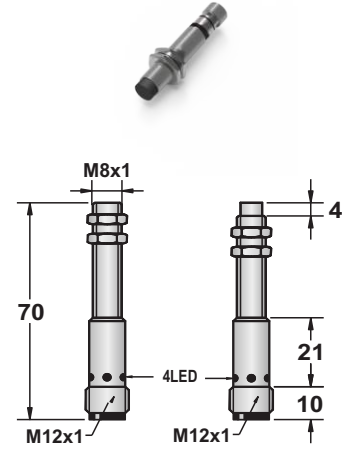
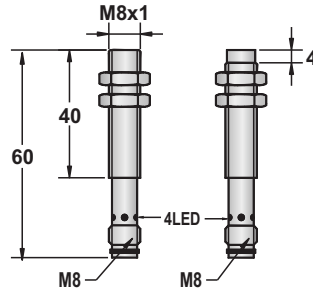
3-Wire DC Inductive



Diameter		M30	
● Flush	○ Non-flush	● 10mm	○ 15mm
Switching Distance	Sn:mm	10mm	15mm
LED Indicator		Yes	
Operating Voltage		10 - 30 vdc	
Ripple		<10%	
No Load Current		<10mA	
Max Load Current		150mA	
Leakage Current		<0.01mA	
Voltage Drop		<1.5v	
Switching Frequency		500Hz	150Hz
Response Time		0.5ms/0.5ms	1ms/1ms
Switching Hysteresis		<15%(Sr)	
Repeat Accuracy		<1%(Sr)	<2%(Sr)
Enclosure Rating		IP67	
Operating Temperature		-25C-+70C	
Temperature Drift		<10%(Sr)	
Protection		Short Circuit, Reverse Polarity	
Connection Type		3-wire, 2-meter Cable	
Material Tube/Face		Ni-Brass/PBT	
Cable Material		PVC	
Product Style	Wiring Diag.	2-meter Cable	
NPN N.O.	1	IRFB-3010-NOWC2	IRNB-3015-NOWC2
NPN N.C.	2	IRFB-3010-NNWC2	IRNB-3015-NNWC2
PNP N.O.	3	IRFB-3010-POWC2	IRNB-3015-POWC2
PNP N.C.	4	IRFB-3010-PNWC2	IRNB-3015-PNWC2

Note: See Terminal Connection page for wiring diagram

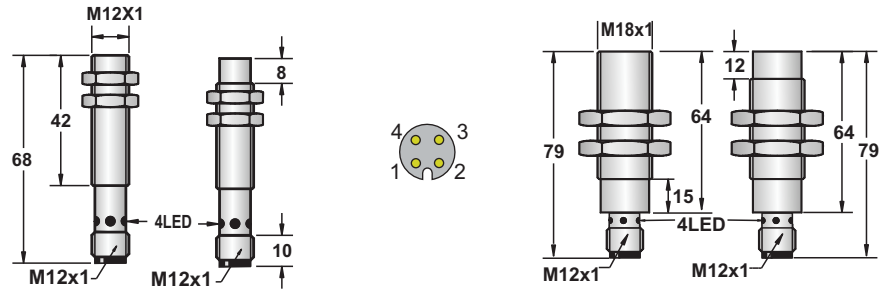
3-Wire DC Inductive



Diameter	M8 - Pico 3-Pin		M8 - Micro 4 Pin			
	● Flush	○ Non-flush	● 1mm	○ 2mm	● 1mm	○ 2mm
Switching Distance Sn:mm			1mm	2mm	1mm	2mm
LED Indicator			Yes		Yes	
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			2 KHz	1 KHz	2 KHz	1 KHz
Response Time			0.1ms/0.1ms	0.2ms/0.2ms	0.1ms/0.1ms	0.2ms/0.2ms
Switching Hysteresis			<15%(Sr)		<15%(Sr)	
Repeat Accuracy			<1%(Sr)	<2%(Sr)	<1%(Sr)	<2%(Sr)
Enclosure Rating			IP67		IP67	
Operating Temperature			-25C-+70C		-25C-+70C	
Temperature Drift			<10%(Sr)		<10%(Sr)	
Protection			Short Circuit, Reverse Polarity		Short Circuit, Reverse Polarity	
Connection Type			3-pin Pico DC		4-pin Micro DC	
Material Tube/Face			Ni-Brass/PBT		Ni-Brass/PBT	
Cable Material			PVC		PVC	
Product Style	Wiring Diag.	3-pin Pico DC		4-pin Micro DC		
NPN N.O.	1	IRFB-0801-NOWP3	IRNB-0802-NOWP3	IRFB-0801-NOWE3	IRNB-0802-NOWE3	
NPN N.C.	2	IRFB-0801-NNWP3	IRNB-0802-NNWP3	IRFB-0801-NNWE3	IRNB-0802-NNWE3	
PNP N.O.	3	IRFB-0801-POWP3	IRNB-0802-POWP3	IRFB-0801-POWE3	IRNB-0802-POWE3	
PNP N.C.	4	IRFB-0801-PNWP3	IRNB-0802-PNWP3	IRFB-0801-PNWE3	IRNB-0802-PNWE3	

Note: See Terminal Connection page for wiring diagram

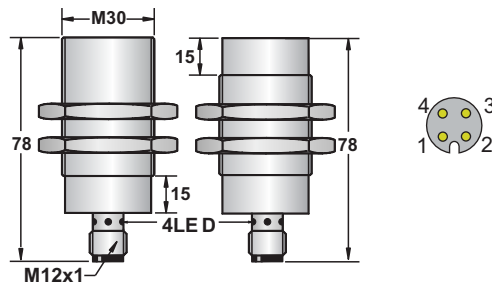
3-Wire DC Inductive



Diameter	M12 - Micro 4-Pin		M18 - Micro 4-Pin						
	● Flush	○ Non-flush	●	○	●	○			
Switching Distance Sn:mm	2mm		4mm		5mm		8mm		
LED Indicator	Yes				Yes				
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	2 KHz		1 KHz		1 KHz		500Hz		
Response Time	0.1ms/0.1ms		0.2ms/0.2ms		0.2ms/0.2ms		0.5ms/0.5ms		
Switching Hysteresis	<15%(Sr)				<15%(Sr)				
Repeat Accuracy	<1%(Sr)		<2%(Sr)		<1%(Sr)		<2%(Sr)		
Enclosure Rating	IP67				IP67				
Operating Temperature	-25C-+70C				-25C-+70C				
Temperature Drift	<10%(Sr)				<10%(Sr)				
Protection	Short Circuit, Reverse Polarity				Short Circuit, Reverse Polarity				
Connection Type	4-pin Micro DC				4-pin Micro DC				
Material Tube/Face	Ni-Brass/PBT				Ni-Brass/PBT				
Cable Material	PVC				PVC				
Product Style	Wiring Diag.	4-pin Micro DC		4-pin Micro DC		4-pin Micro DC		4-pin Micro DC	
NPN N.O.	1	IRFB-1202-NOWE3	IRNB-1204-NOWE3	IRFB-1805-NOWE3	IRNB-1808-NOWE3	IRFB-1805-NOWE3	IRNB-1808-NOWE3	IRFB-1805-NOWE3	IRNB-1808-NOWE3
NPN N.C.	2	IRFB-1202-NNWE3	IRNB-1204-NNWE3	IRFB-1805-NNWE3	IRNB-1808-NNWE3	IRFB-1805-NNWE3	IRNB-1808-NNWE3	IRFB-1805-NNWE3	IRNB-1808-NNWE3
PNP N.O.	3	IRFB-1202-POWE3	IRNB-1204-POWE3	IRFB-1805-POWE3	IRNB-1808-POWE3	IRFB-1805-POWE3	IRNB-1808-POWE3	IRFB-1805-POWE3	IRNB-1808-POWE3
PNP N.C.	4	IRFB-1202-PNWE3	IRNB-1204-PNWE3	IRFB-1805-PNWE3	IRNB-1808-PNWE3	IRFB-1805-PNWE3	IRNB-1808-PNWE3	IRFB-1805-PNWE3	IRNB-1808-PNWE3

Note: See Terminal Connection page for wiring diagram

3-Wire DC Inductive



Diameter		M30 - Micro 4-Pin	
● Flush	○ Non-flush	●	○
Switching Distance Sn:mm		10mm	15mm
LED Indicator		Yes	
Operating Voltage		10 - 30 vdc	
Ripple		<10%	
No Load Current		<10mA	
Max Load Current		150mA	
Leakage Current		<0.01mA	
Voltage Drop		<1.5v	
Switching Frequency		500Hz	150Hz
Response Time		0.5ms/0.5ms	1ms/1ms
Switching Hysteresis		<15%(Sr)	
Repeat Accuracy		<1%(Sr)	<2%(Sr)
Enclosure Rating		IP67	
Operating Temperature		-25C-+70C	
Temperature Drift		<10%(Sr)	
Protection		Short Circuit, Reverse Polarity	
Connection Type		4-pin Micro DC	
Material Tube/Face		Ni-Brass/PBT	
Cable Material		PVC	
Product Style	Wiring Diag.	4-pin Micro DC	
NPN N.O.	1	IRFB-3010-NOWE3	IRNB-3015-NOWE3
NPN N.C.	2	IRFB-3010-NNWE3	IRNB-3015-NNWE3
PNP N.O.	3	IRFB-3010-POWE3	IRNB-3015-POWE3
PNP N.C.	4	IRFB-3010-PNWE3	IRNB-3015-PNWE3

Note: See Terminal Connection page for wiring diagram

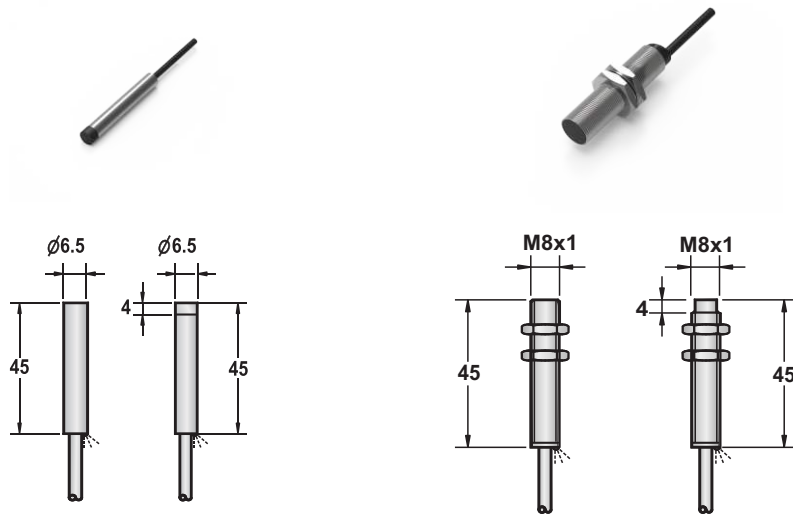
Proximity CE RoHS

Extended Range Inductives



INDUCTIVE EXTENDED
METAL FACE
HIGH/LOW TEMPERATURE
PHOTOELECTRIC
ULTRASONIC
ADAPTIVE
CAPACITIVE
QUICK CONNECT CABLES
CUSTOMIZATION

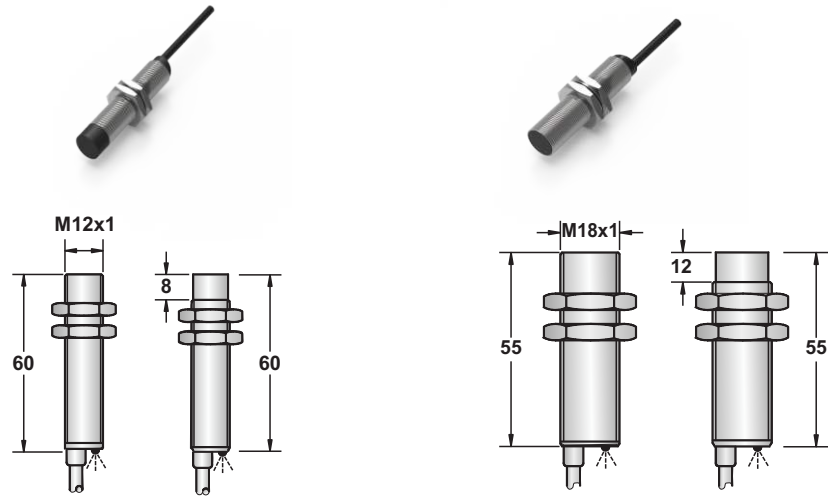
3-Wire Extended DC Inductive



Diameter	M6.5		M8			
	● Flush	○ Non-flush	● 2mm	○ 4mm	● 2mm	○ 4mm
Switching Distance Sn:mm			2mm	4mm	2mm	4mm
LED Indicator			Yes		Yes	
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			2 KHz	2 KHz	2 KHz	1 KHz
Response Time			0.1ms/0.1ms	0.1ms/0.1ms	0.1ms/0.1ms	0.2ms/0.2ms
Switching Hysteresis			<15%(Sr)		<15%(Sr)	
Repeat Accuracy			<2%(Sr)	<3%(Sr)	<2%(Sr)	<3%(Sr)
Enclosure Rating			IP67		IP67	
Operating Temperature			-25C-+70C		-25C-+70C	
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			SST/PBT		Ni-Brass/PBT	
Cable Material			PVC		PVC	
Product Style	Wiring Diag.	2-meter Cable		2-meter Cable		
NPN N.O.	1	ESFS-06.502-NOWC2	ESNS-06.504-NOWC2	ERFB-0802-NOWC2	ERNB-0804-NOWC2	
NPN N.C.	2	ESFS-06.502-NNWC2	ESNS-06.504-NNWC2	ERFB-0802-NNWC2	ERNB-0804-NNWC2	
PNP N.O.	3	ESFS-06.502-POWC2	ESNS-06.504-POWC2	ERFB-0802-POWC2	ERNB-0804-POWC2	
PNP N.C.	4	ESFS-06.502-PNWC2	ESNS-06.504-PNWC2	ERFB-0802-PNWC2	ERNB-0804-PNWC2	

Note: See Terminal Connection page for wiring diagram

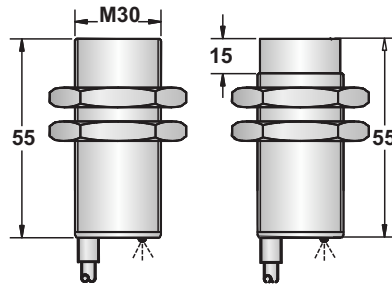
3-Wire Extended DC Inductive



Diameter	M12		M18			
	● Flush	○ Non-flush	●	○		
Switching Distance Sn:mm			4mm	8mm	8mm	16mm
LED Indicator	Yes		Yes		Yes	
Operating Voltage	10 - 30 vdc		10 - 30 vdc		10 - 30 vdc	
Ripple	<10%		<10%		<10%	
No Load Current	<10mA		<10mA		<10mA	
Max Load Current	150mA		150mA		150mA	
Leakage Current	<0.01mA		<0.01mA		<0.01mA	
Voltage Drop	<1.5v		<1.5v		<1.5v	
Switching Frequency	1 KHz		500Hz		500Hz	150Hz
Response Time	0.2ms/0.2ms		0.5ms/0.5ms		0.5ms/0.5ms	1ms/1ms
Switching Hysteresis	<15%(Sr)		<15%(Sr)		<15%(Sr)	
Repeat Accuracy	<2%(Sr)		<3%(Sr)		<2%(Sr)	<3%(Sr)
Enclosure Rating	IP67		IP67		IP67	
Operating Temperature	-25C-+70C		-25C-+70C		-25C-+70C	
Temperature Drift	<10%(Sr)		<10%(Sr)		<10%(Sr)	
Protection	Short Circuit, Reverse Polarity		Short Circuit, Reverse Polarity		Short Circuit, Reverse Polarity	
Connection Type	3-wire, 2-meter Cable		3-wire, 2-meter Cable		3-wire, 2-meter Cable	
Material Tube/Face	Ni-Brass/PBT		Ni-Brass/PBT		Ni-Brass/PBT	
Cable Material	PVC		PVC		PVC	
Product Style	Wiring Diag.	2-meter Cable		2-meter Cable		
NPN N.O.	1	ERFB-1204-NOWC2	ERNB-1208-NOWC2	ERFB-1808-NOWC2	ERNB-1816-NOWC2	
NPN N.C.	2	ERFB-1204-NNWC2	ERNB-1208-NNWC2	ERFB-1808-NNWC2	ERNB-1816-NNWC2	
PNP N.O.	3	ERFB-1204-POWC2	ERNB-1208-POWC2	ERFB-1808-POWC2	ERNB-1816-POWC2	
PNP N.C.	4	ERFB-1204-PNWC2	ERNB-1208-PNWC2	ERFB-1808-PNWC2	ERNB-1816-PNWC2	

Note: See Terminal Connection page for wiring diagram

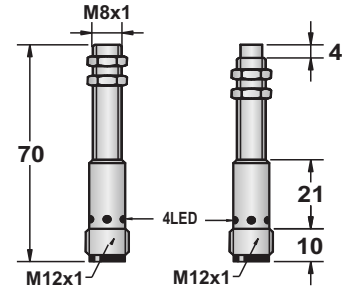
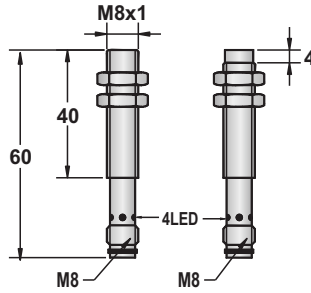
3-Wire Extended DC Inductive



Diameter		M30			
● Flush	○ Non-flush	●	○	●	○
Switching Distance Sn:mm		16mm	25mm		
LED Indicator		Yes			
Operating Voltage		10 - 30 vdc			
Ripple		<10%			
No Load Current		<10mA			
Max Load Current		150mA			
Leakage Current		<0.01mA			
Voltage Drop		<1.5v			
Switching Frequency		150Hz	100Hz		
Response Time		1ms/1ms	1.5ms/1.5ms		
Switching Hysteresis		<15%(Sr)			
Repeat Accuracy		<2%(Sr)	<3%(Sr)		
Enclosure Rating		IP67			
Operating Temperature		-25C-+70C			
Temperature Drift		<10%(Sr)			
Protection		Short Circuit, Reverse Polarity			
Connection Type		3-wire, 2-meter Cable			
Material Tube/Face		Ni-Brass/PBT			
Cable Material		PVC			
Product Style	Wiring Diag.	2-meter Cable			
NPN N.O.	1	ERFB-3016-NOWC2	ERNB-3025-NOWC2		
NPN N.C.	2	ERFB-3016-NNWC2	ERNB-3025-NNWC2		
PNP N.O.	3	ERFB-3016-POWC2	ERNB-3025-POWC2		
PNP N.C.	4	ERFB-3016-PNWC2	ERNB-3025-PNWC2		

Note: See Terminal Connection page for wiring diagram

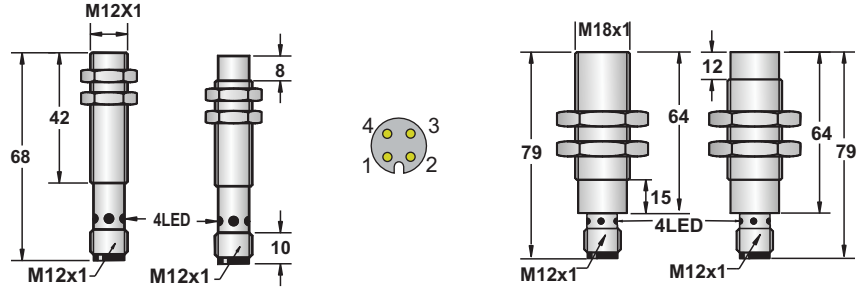
3-Wire Extended DC Inductive



Diameter	M8 - Pico 3-Pin		M8 - Micro 4 Pin			
	● Flush	○ Non-flush	● 2mm	○ 4mm	● 2mm	○ 4mm
Switching Distance Sn:mm			2mm	4mm	2mm	4mm
LED Indicator			Yes		Yes	
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			2 KHz	1 KHz	2 KHz	1 KHz
Response Time			0.1ms/0.1ms	0.2ms/0.2ms	0.1ms/0.1ms	0.2ms/0.2ms
Switching Hysteresis			<15%(Sr)		<15%(Sr)	
Repeat Accuracy			<2%(Sr)	<3%(Sr)	<2%(Sr)	<3%(Sr)
Enclosure Rating			IP67		IP67	
Operating Temperature			-25C-+70C		-25C-+70C	
Temperature Drift			<10%(Sr)		<10%(Sr)	
Protection			Short Circuit, Reverse Polarity		Short Circuit, Reverse Polarity	
Connection Type			3-pin Pico DC		4-pin Micro DC	
Material Tube/Face			Ni-Brass/PBT		Ni-Brass/PBT	
Cable Material			PVC		PVC	
Product Style	Wiring Diag.	3-pin Pico DC		4-pin Micro DC		
NPN N.O.	1	ERFB-0802-NOWP3	ERNB-0804-NOWP3	ERFB-0802-NOWE3	ERNB-0804-NOWE3	
NPN N.C.	2	ERFB-0802-NNWP3	ERNB-0804-NNWP3	ERFB-0802-NNWE3	ERNB-0804-NNWE3	
PNP N.O.	3	ERFB-0802-POWP3	ERNB-0804-POWP3	ERFB-0802-POWE3	ERNB-0804-POWE3	
PNP N.C.	4	ERFB-0802-PNWP3	ERNB-0804-PNWP3	ERFB-0802-PNWE3	ERNB-0804-PNWE3	

Note: See Terminal Connection page for wiring diagram

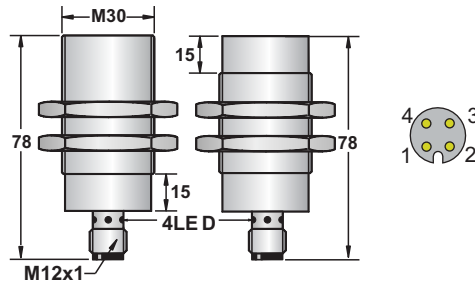
3-Wire Extended DC Inductive



Diameter	M12 - Micro 4-Pin		M18 - Micro 4-Pin		
	● Flush	○ Non-flush	●	○	
Switching Distance Sn:mm	4mm	8mm	8mm	16mm	
LED Indicator	Yes		Yes		
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	500Hz	500Hz	150Hz	
Response Time	0.2ms/0.2ms	0.5ms/0.5ms	0.5ms/0.5ms	1ms/1ms	
Switching Hysteresis	<15%(Sr)		<15%(Sr)		
Repeat Accuracy	<2%(Sr)	<3%(Sr)	<2%(Sr)	<3%(Sr)	
Enclosure Rating	IP67		IP67		
Operating Temperature	-25C-+70C		-25C-+70C		
Temperature Drift	<10%(Sr)		<10%(Sr)		
Protection	Short Circuit, Reverse Polarity		Short Circuit, Reverse Polarity		
Connection Type	4-pin Micro DC		4-pin Micro DC		
Material Tube/Face	Ni-Brass/PBT		Ni-Brass/PBT		
Cable Material	PVC		PVC		
Product Style	Wiring Diag.	4-pin Micro DC		4-pin Micro DC	
NPN N.O.	1	ERFB-1204-NOWE3	ERNB-1208-NOWE3	ERFB-1808-NOWE3	ERNB-1816-NOWE3
NPN N.C.	2	ERFB-1204-NNWE3	ERNB-1208-NNWE3	ERFB-1808-NNWE3	ERNB-1816-NNWE3
PNP N.O.	3	ERFB-1204-POWE3	ERNB-1208-POWE3	ERFB-1808-POWE3	ERNB-1816-POWE3
PNP N.C.	4	ERFB-1204-PNWE3	ERNB-1208-PNWE3	ERFB-1808-PNWE3	ERNB-1816-PNWE3

Note: See Terminal Connection page for wiring diagram

3-Wire Extended DC Inductive



Diameter		M30 - Micro 4-Pin	
● Flush	○ Non-flush	●	○
Switching Distance Sn:mm		16mm	25mm
LED Indicator		Yes	
Operating Voltage		10 - 30 vdc	
Ripple		<10%	
No Load Current		<10mA	
Max Load Current		150mA	
Leakage Current		<0.01mA	
Voltage Drop		<1.5v	
Switching Frequency		150Hz	100Hz
Response Time		1ms/1ms	1.5ms/1.5ms
Switching Hysteresis		<15%(Sr)	
Repeat Accuracy		<2%(Sr)	<3%(Sr)
Enclosure Rating		IP67	
Operating Temperature		-25C-+70C	
Temperature Drift		<10%(Sr)	
Protection		Short Circuit, Reverse Polarity	
Connection Type		4-pin Micro DC	
Material Tube/Face		Ni-Brass/PBT	
Cable Material		PVC	
Product Style	Wiring Diag.	4-pin Micro DC	
NPN N.O.	1	ERFB-3016-NOWE3	ERNB-3025-NOWE3
NPN N.C.	2	ERFB-3016-NNWE3	ERNB-3025-NNWE3
PNP N.O.	3	ERFB-3016-POWE3	ERNB-3025-POWE3
PNP N.C.	4	ERFB-3016-PNWE3	ERNB-3025-PNWE3

Note: See Terminal Connection page for wiring diagram

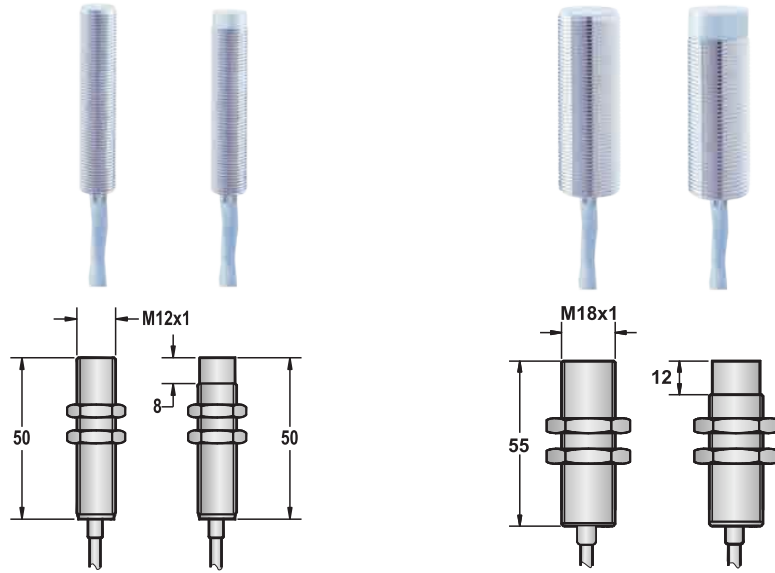
Proximity CE RoHS

Low Temperature Inductives



INDUCTIVE
METAL FACE
HIGH/LOW TEMPERATURE
PHOTOELECTRIC
ULTRASONIC
ADAPTIVE
CAPACITIVE
QUICK CONNECT CABLES
CUSTOMIZATION

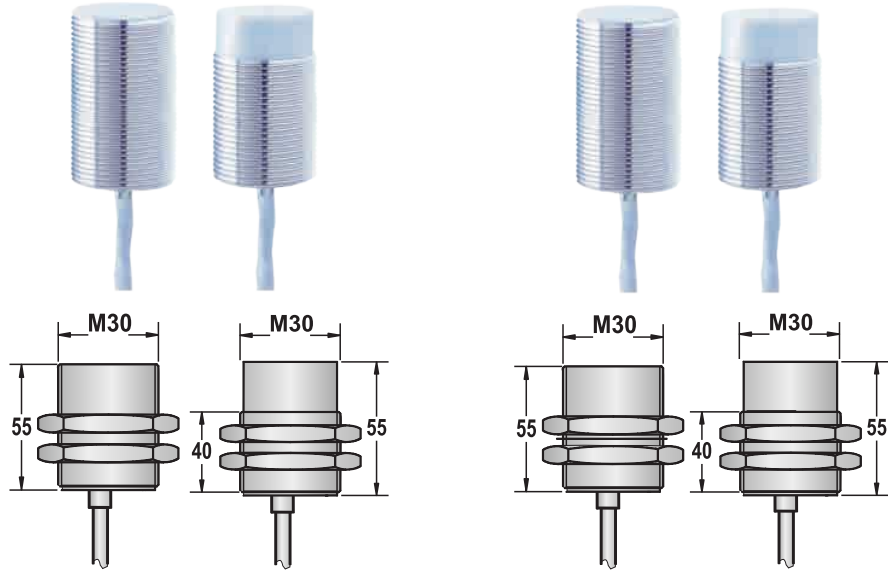
Low Temperature



Diameter	M12		M18		
	● Flush	○ Non-flush	●	○	
Switching Distance Sn:mm	4mm		8mm		
LED Indicator	Yes		Yes		
Operating Voltage	10 - 30 vdc		10 - 30 vdc		
Ripple	<10%		<10%		
No Load Current	<10mA		<10mA		
Max Load Current	200mA		200mA		
Leakage Current	<0.01mA		<0.01mA		
Voltage Drop	<1.5v		<1.5v		
Switching Frequency	1 KHz	800Hz	400Hz	300Hz	
Response Time	0.2ms/0.2ms	0.6ms/0.6ms	1.2ms/1.2ms	1.5ms/1.5ms	
Switching Hysteresis	<15%(Sr)		<15%(Sr)		
Repeat Accuracy	<2%(Sr)	<3%(Sr)	<1%(Sr)	<2%(Sr)	
Enclosure Rating	IP67		IP67		
Operating Temperature	-40C-+70C		-30C-+70C		
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	Ni-Brass/Teflon		Ni-Brass/Teflon		
Cable Material	PUR		PUR		
Product Style	Wiring Diag.	2-meter Cable		2-meter Cable	
NPN N.O.	1	KL1CF-M1204N-O3U2-40	KL1CN-M1208N-O3U2-40	KL1CF-M1805N-O3U2-30	KL1CN-M1808N-O3U2-30
NPN N.C.	2	KL1CF-M1204N-C3U2-40	KL1CN-M1208N-C3U2-40	KL1CF-M1805N-C3U2-30	KL1CN-M1808N-C3U2-30
PNP N.O.	3	KL1CF-M1204P-O3U2-40	KL1CN-M1208P-O3U2-40	KL1CF-M1805P-O3U2-30	KL1CN-M1808P-O3U2-30
PNP N.C.	4	KL1CF-M1204P-C3U2-40	KL1CN-M1208P-C3U2-40	KL1CF-M1805P-C3U2-30	KL1CN-M1808P-C3U2-30

Note: See Terminal Connection page for wiring diagram

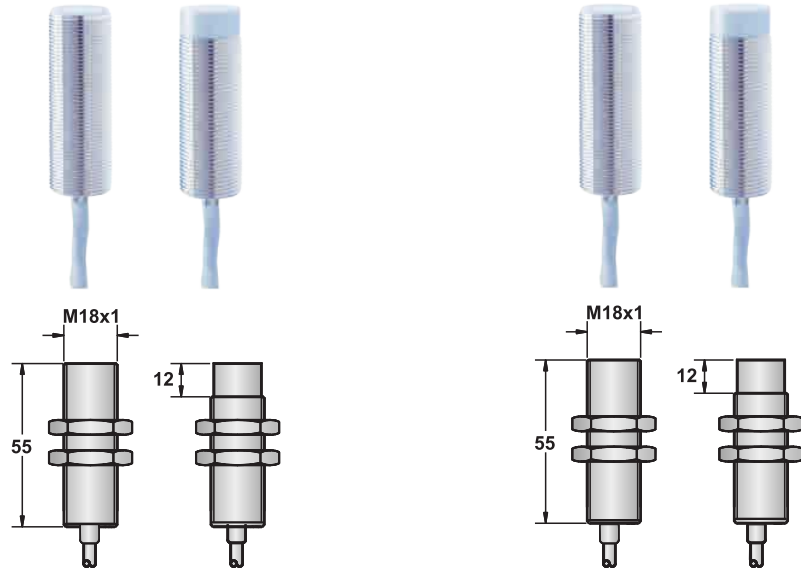
Low Temperature



Diameter	M30		M30		
	● Flush	○ Non-flush	●	○	
Switching Distance Sn:mm	10mm		15mm		
LED Indicator	Yes		Yes		
Operating Voltage	10 - 30 vdc		10 - 30 vdc		
Ripple	<10%		<10%		
No Load Current	<10mA		<10mA		
Max Load Current	200mA		200mA		
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	-40C-+70C		-40C-+70C		
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	Ni-Brass/Teflon		Ni-Brass/Teflon		
Cable Material	PUR		PUR		
Product Style	Wiring Diag.	2-meter Cable		2-meter Cable	
NPN N.O.	1	KL1CF-M3010N-O3U2-40	KL1CN-M3015N-O3U2-40	KL1CF-M3016N-O3U2-40	KL1CN-M3025N-O3U2-40
NPN N.C.	2	KL1CF-M3010N-C3U2-40	KL1CN-M3015N-C3U2-40	KL1CF-M3016N-C3U2-40	KL1CN-M3025N-C3U2-40
PNP N.O.	3	KL1CF-M3010P-O3U2-40	KL1CN-M3015P-O3U2-40	KL1CF-M3016P-O3U2-40	KL1CN-M3025P-O3U2-40
PNP N.C.	4	KL1CF-M3010P-C3U2-40	KL1CN-M3015P-C3U2-40	KL1CF-M3016P-C3U2-40	KL1CN-M3025P-C3U2-40

Note: See Terminal Connection page for wiring diagram

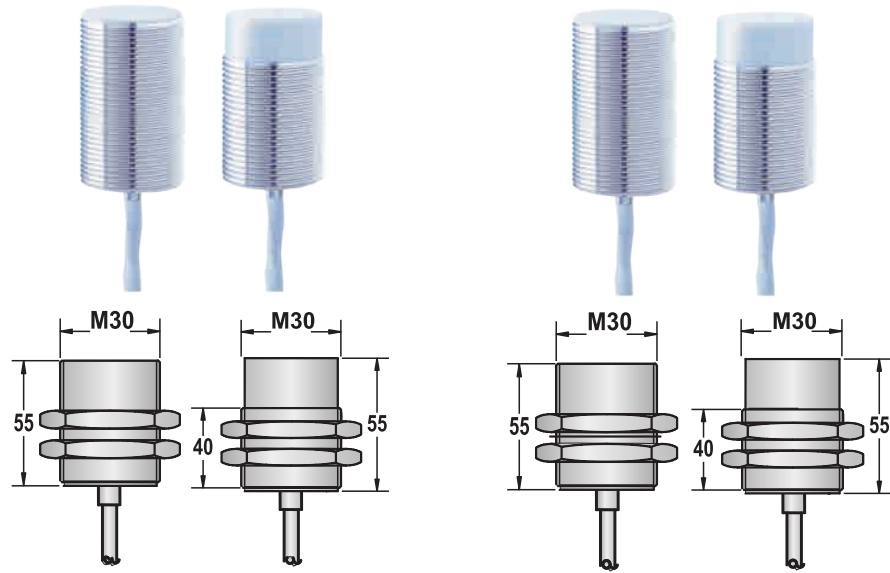
Low Temperature



Diameter		M18		M18	
		● Flush	○ Non-flush	● 8mm	○ 16mm
Switching Distance	Sn:mm	5mm	8mm	8mm	16mm
LED Indicator		Yes		Yes	
Operating Voltage		10 - 30 vdc		0	
Ripple		<10%		<10%	
No Load Current		<10mA		<10mA	
Max Load Current		200mA		200mA	
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		-40C-+70C		-40C-+70C	
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		Ni-Brass/Teflon		Ni-Brass/Teflon	
Cable Material		PUR		PUR	
Product Style	Wiring Diag.	2-meter Cable		2-meter Cable	
NPN N.O.	1	KL1CF-M1805N-O3U2-40	KL1CN-M1808N-O3U2-40	KL1CF-M1808N-O3U2-40	KL1CN-M1816N-O3U2-40
NPN N.C.	2	KL1CF-M1805N-C3U2-40	KL1CN-M1808N-C3U2-40	KL1CF-M1808N-C3U2-40	KL1CN-M1816N-C3U2-40
PNP N.O.	3	KL1CF-M1805P-O3U2-40	KL1CN-M1808P-O3U2-40	KL1CF-M1808P-O3U2-40	KL1CN-M1816P-O3U2-40
PNP N.C.	4	KL1CF-M1805P-C3U2-40	KL1CN-M1808P-C3U2-40	KL1CF-M1808P-C3U2-40	KL1CN-M1816P-C3U2-40

Note: See Terminal Connection page for wiring diagram

Low Temperature



Diameter	M30		M30		
	● Flush	○ Non-flush	●	○	
Switching Distance Sn:mm	10mm		15mm		
LED Indicator	Yes		Yes		
Operating Voltage	10 - 30 vdc		10 - 30 vdc		
Ripple	<10%		<10%		
No Load Current	<10mA		<10mA		
Max Load Current	200mA		200mA		
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	-30C-+70C		-30C-+70C		
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	Ni-Brass/Teflon		Ni-Brass/Teflon		
Cable Material	PUR		PUR		
Product Style	Wiring Diag.	3-pin Pico DC		4-pin Micro DC	
NPN N.O.	1	KL1CF-M3010N-O3U2-30	KL1CN-M3015N-O3U2-30	KL1CF-M3016N-O3U2-30	KL1CN-M3025N-O3U2-30
NPN N.C.	2	KL1CF-M3010N-C3U2-30	KL1CN-M3015N-C3U2-30	KL1CF-M3016N-C3U2-30	KL1CN-M3025N-C3U2-30
PNP N.O.	3	KL1CF-M3010P-O3U2-30	KL1CN-M3015P-O3U2-30	KL1CF-M3016P-O3U2-30	KL1CN-M3025P-O3U2-30
PNP N.C.	4	KL1CF-M3010P-C3U2-30	KL1CN-M3015P-C3U2-30	KL1CF-M3016P-C3U2-30	KL1CN-M3025P-C3U2-30

Note: See Terminal Connection page for wiring diagram

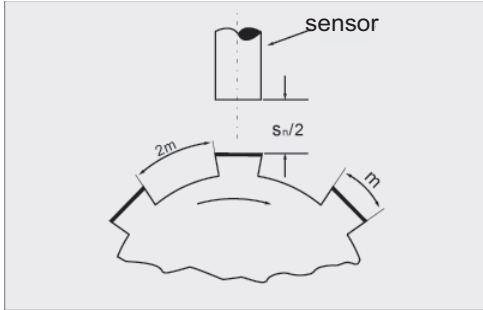
The minimum working current

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

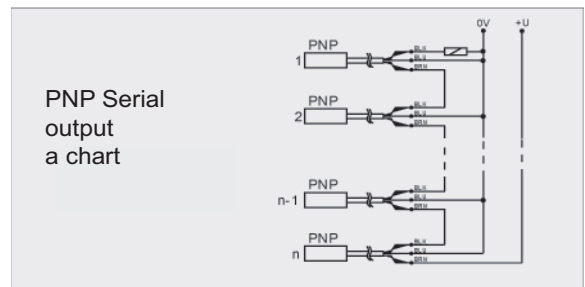
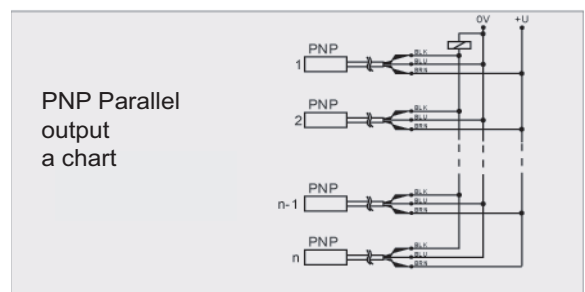
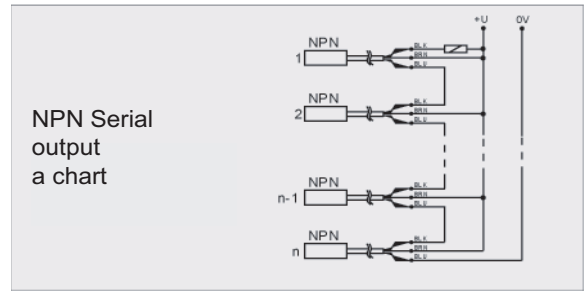
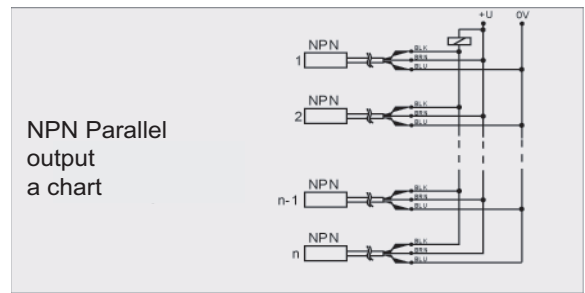
Mechanical shock test was conducted under the following conditions: conform to the IEC 60947-5-2, 30 g, using acceleration duration of 11 ms, X, Y, Z direction of the six times.

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

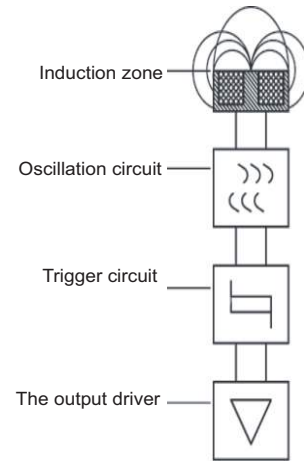
The working principle of inductive proximity switch

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)

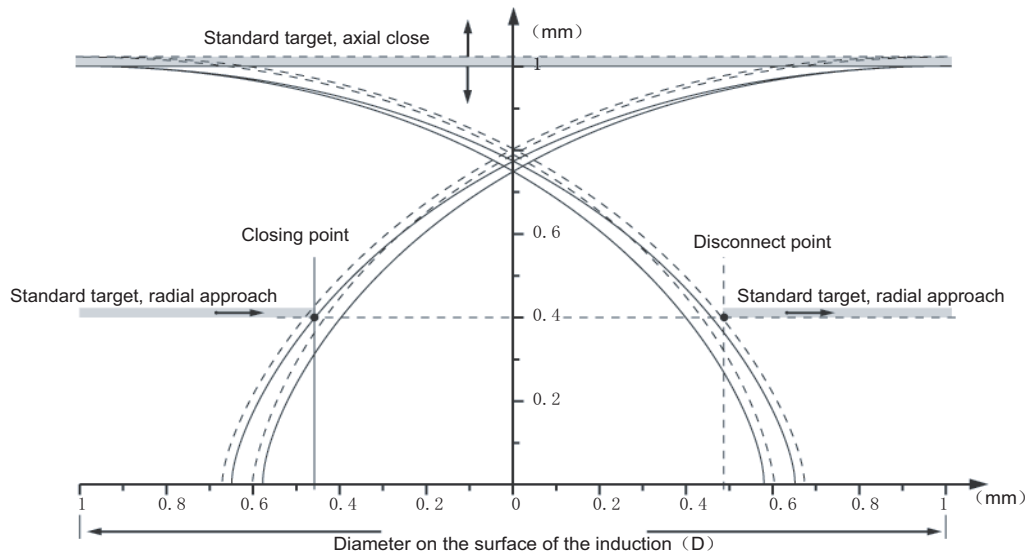
The correction coefficient of inductive proximity switch

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)

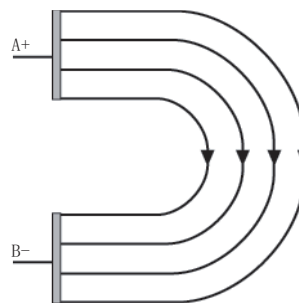
Inductive proximity switch standard response curve (as shown in figure 2)



(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:

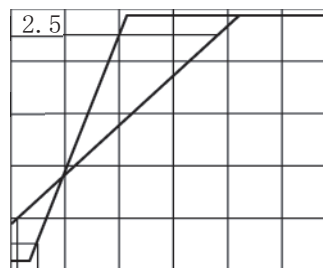
Material	Dielectric constant	Material	Dielectric constant
air, vacuum	1	alcohol	25.8
synthetic resin binder	3.6	bakelite	3.6
glass	5	mica	6
hard rubber	4	cardboard	4.5
cable rubber compounds	2.5	the marble	8
oiled paper	4	paper	2.3
gasoline	2.2	organic glass	3.2
polyamide	5	polyethylene	2.3
polypropylene	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)



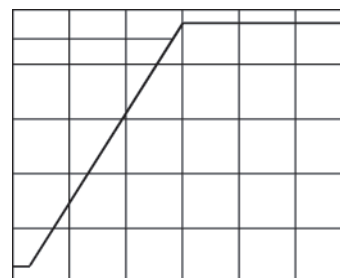
(figure 5)

The correction coefficient of capacitance proximity switch

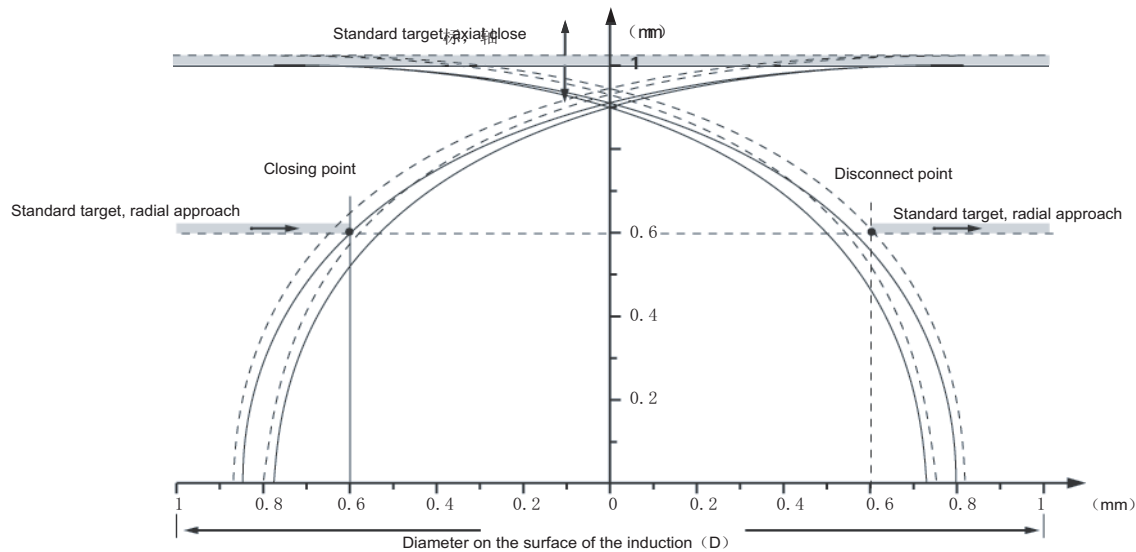
Part of the following is a list of the attenuation coefficient of material value (table 3)

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

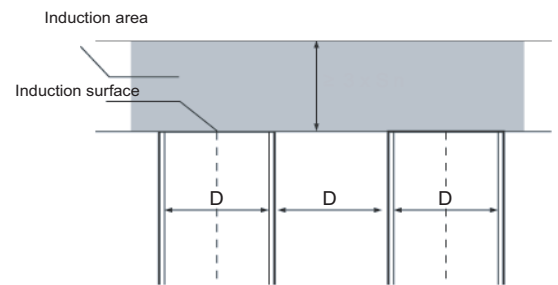
Target detection in this movement range, the switch action is reliable

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

Installation requirements

The installation of flush proximity switch

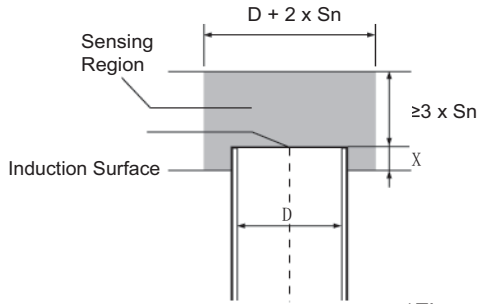
Flush switch installed near the end of the induction surface can be installed and metal surface flush, but for the sake of safety work, switch surface to the opposite of metal objects at a distance of 3 or higher sn, the distance between the adjacent two proximity switch must be D (D is the diameter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



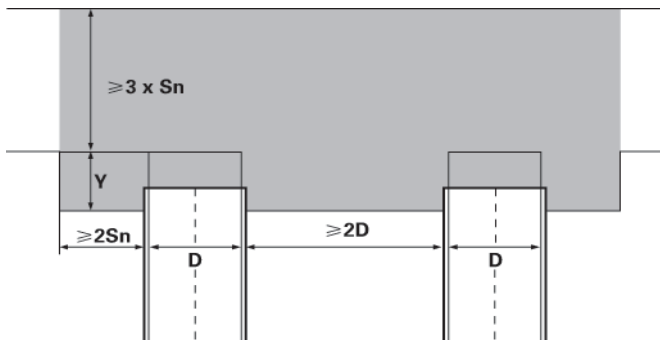
(Figure8)

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

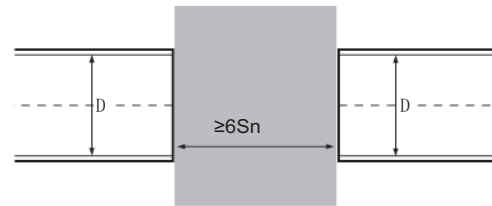
Not flush proximity switch can be identification based on their head, not flush the area around the induction surface no metal shell. Induction surface to metal installation media $Y \geq 2S_n$ (Y values in table 4). Induction on the surface of the distance to the other side of the metal objects must 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

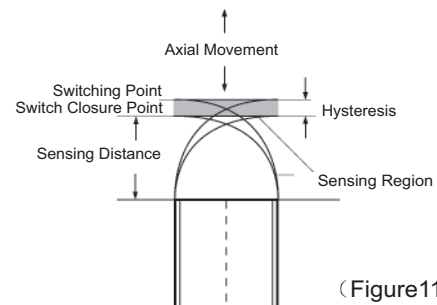
Repeatability R

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.

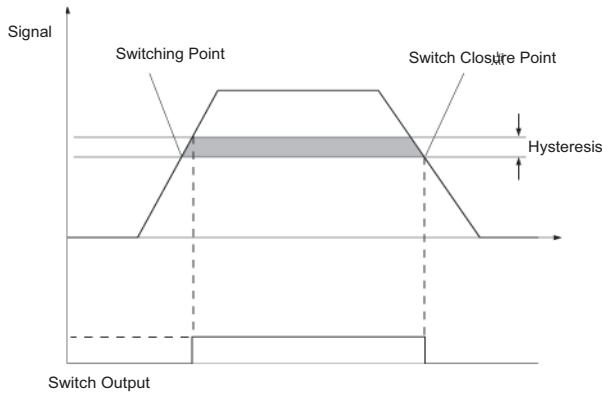
Switch hysteresis H

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)



(Figure12)

Correlation type photoelectric sensor



Correlation type photoelectric sensor consists of separate transmitter and receiver structure on both are separated. Emitter (E) directly sent to the receiver (R). When installation, must be both alignment on the establishment of a light path, regardless of any object blocking the light, receiver of the voltage drop, change the switch.

Photoelectric switch test standards

Rating of the photoelectric switch detection distance is by kodak grayscale board fired at a rate of 90% for the standard measured.

Dark ON

When the light receiver light switch in the conduction state; When the light receiver has a light switch in the on state.

Light ON

When the light receiver light switch in the conducting state; When the light receiver is light, switch in the on state.

Operating Voltage

On the premise of guarantee normal switch function, allowed by the voltage (including the ripple voltage)

Rated operational voltage

Don't consider the power supply voltage tolerance test.

Ripple

According to the rated working voltage of ac voltage value (amount of constant voltage peak valley value) percentage. To provide dc switching power supply of the biggest pulsation coefficient less than 10%.

No-load current

Proximity switch when they fail to pick up the load current consumption

Rated operational current

Is to allow continuous output current flows through the load.

Leakage current

Proximity switch is not switched on, the residual current in the load.

Max.Operating Current

Can realize the function of the maximum load output current.

Specular reflection type photoelectric sensor



Specular reflection type photoelectric sensor is encapsulate transmitters and receivers in the same shell, on the surface to install a piece of mirror, the emitter to the light by the mirror reflect back to the receiver. When the beam is blocked result in a change to a switch.

Belt filter polarity of specular reflection type photoelectric sensor



Reflection system is the typical problem for smooth and reflective objects, inspection test is not reliable. Because simple mirror system can't clearly distinguish "the mirror reflected light shot" or "object reflected light", therefore cause misoperation. So in a polar filter can solve this problem. In front of the transmitters and receivers placed a linear polarized filter. Filter is perpendicular to the plane of polarization. These filter determines the two polarization: plane deviation 90 degrees from each other. That only comes from triangle reflector light can return to the receiver, because the mirror change.

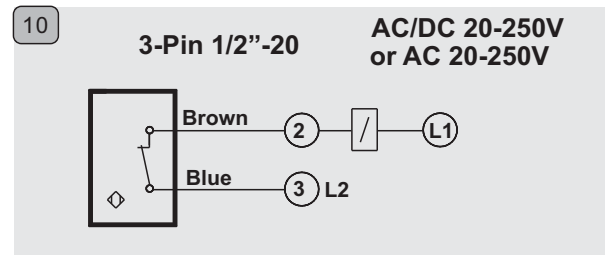
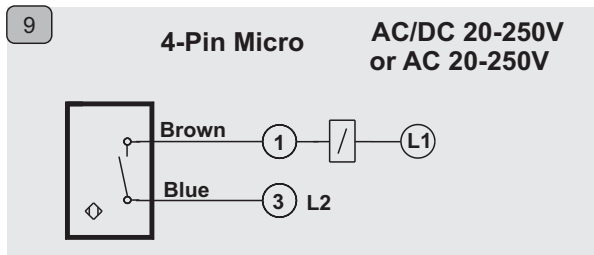
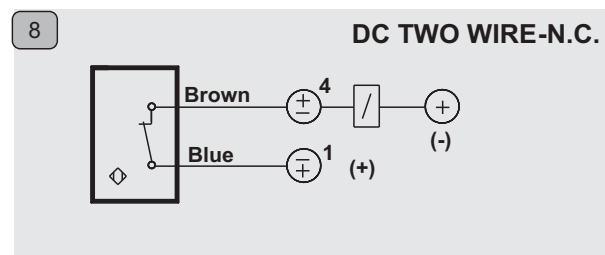
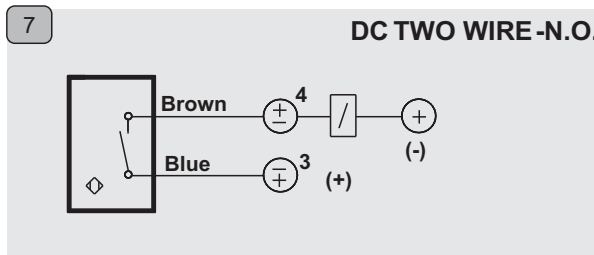
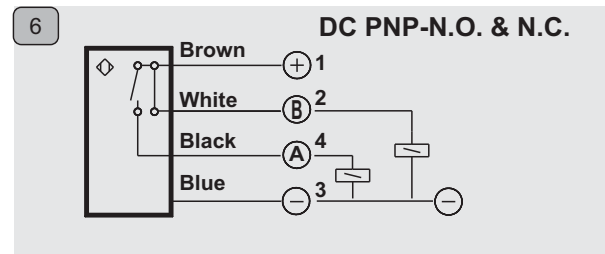
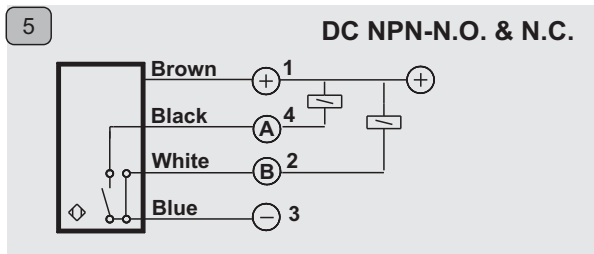
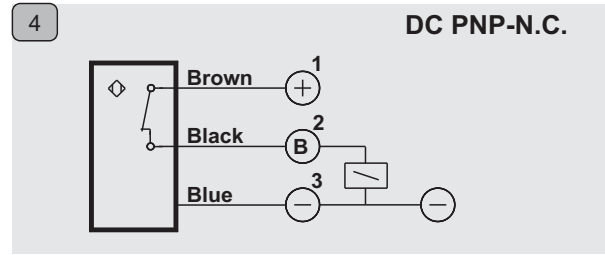
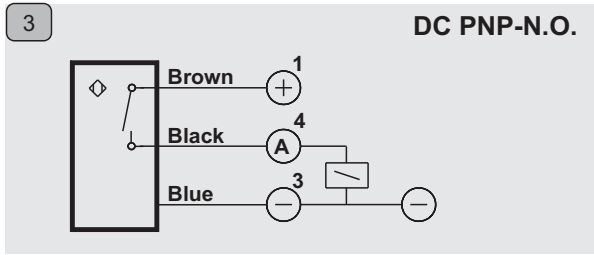
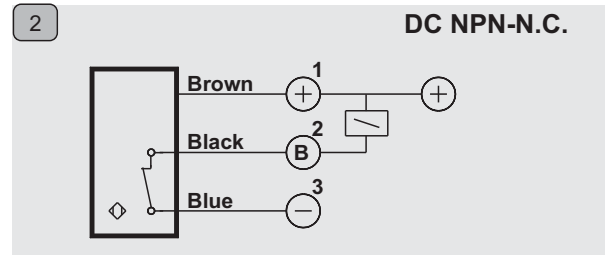
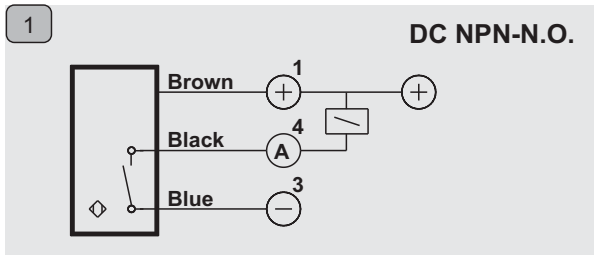
Diffuse reflection type photoelectric sensor



Diffuse reflection type photoelectric sensor principle and the principle of mirror reflection type photoelectric sensor is the same, but he did not take reflectors, transmitters, sending back light directly analyte by receiver. Detect light reflected back to a receiver to measure object, the object's location is not very strict. When the measured object into effective light area, the output state will change. Detection range depends on the size, shape, color of the object to be tested and surface properties.

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