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Sensors - an essential part of many applications in the automotive industry, factory automation, metal processing, energy industry, etc.

In the field of sensor technology for stand-alone equipment and systems, Jingqi Sensor uses a variety of different working principles to ensure the overall automation solution. We provide high quality sensors for every application and requirement and precise, from displacement measurement to target object detection. For everyday industrial applications and for use in extreme and harsh environments.

Inductive Sensors

Inductive sensors are used in automation technology for process control, positioning and detection. This robust sensor enables non-contact detection of metallic targets within the detection range.

Photoelectric Sensors

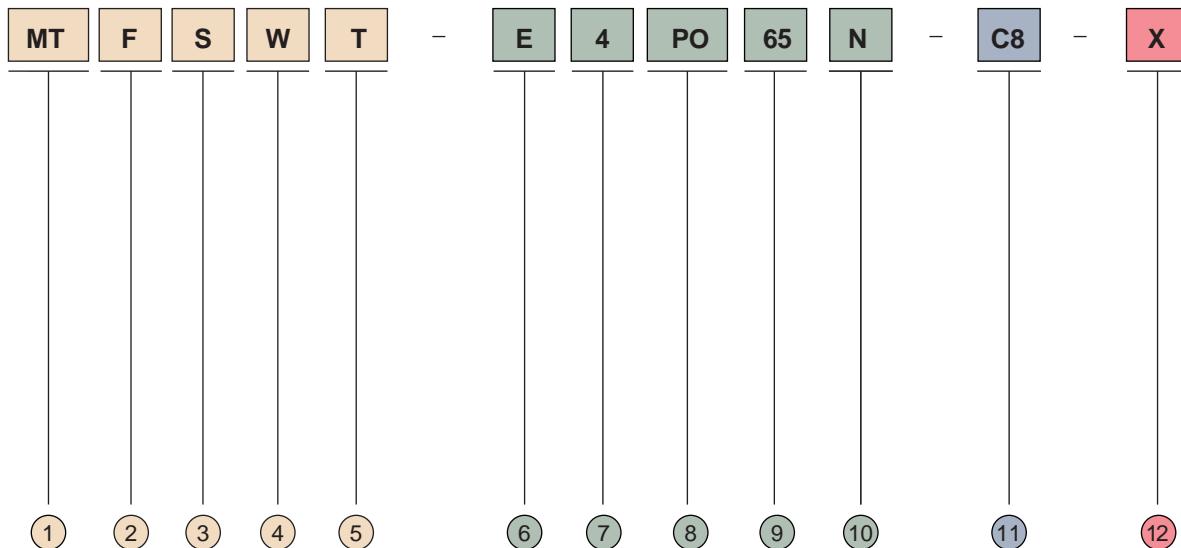
Photoelectric sensors are used to detect the presence of objects as well as their size, color, distance and thickness. These sensors are high-quality special products with different application focus.

Ultrasonic Sensors

Non-contact measurement of level, height or sag, presence check and target quantity check. Versatile use, independent of color and surface characteristics. Not affected by highly reflective transparent targets. Fog, dust or dirt pose little threat either. Ultrasonic products can be considered for position detection, distance measurement applications, and detection of solid, powdery, and liquid media.



- *Inductive Sensors*



① MT - inductive
MTA - analog output

② Housing
threaded cylindrical -
D - M4, Y - M5
E - M8, F - M12, G - M18
I - M30, J - M50, K - M80
smooth cylindrical -
A - D3, Z - D4
small square -
L - 5x5, LS/LM - 8x8,
Q - 18x18
big square -
M - 40x40

③ Housing material
Blank - brass nickel/chrome plated
S - stainless steel
K - plastic
T - PBT material

④ Special Function Description
Blank - no
W - Welding field immunity
P - Pressure-resistant
130, 150, 180, 250 - Max.
Environment Temp. (high)
60 - low temp.-60°C
40 - low temp.-40°C
K - IP69K

⑤ Product Series
Blank - standard
M - metal sensing surface
R - Factor 1
T - PTFE plating
D - short housing
S - wide temp. inductive
sensor split set
C - clamp position cp

⑥ Installation Method
E - flush
N - non-flush

⑦ Sensing Range
0.6 mm ... 60 mm

⑧ Electrical Output
NCO - 4 wire, DC, NPN, normally open and normally closed
PCO - 4 wire, DC, PNP, normally open and normally closed
NO - 3 wire, DC, NPN, normally open
NC - 3 wire, DC, NPN, normally closed
PO - 3 wire, DC, PNP, normally open
PC - 3 wire, DC, PNP, normally closed
NS - 3, DC, NPN, normally open or normally closed
PS - 3 wire, DC, PNP, normally open or normally closed
NA - NAMUR, normally closed
MC - 2 wire, AC/DC, normally closed
MO - 2 wire, AC/DC, normally open
AC - 2 wire, AC, normally closed
AO - 2 wire, AC, normally open
DO - 2 wire, DC, normally open, with reverse polarity protection
DC - 2 wire, DC, normally closed, with reverse polarity protection
I0 - analog output, 0...20mA
I4 - analog output, 4...20mA
U0 - analog output, 0...10mA
RSO - 4 wire, dry contact, DC SPST, normally open
RSC - 4 wire, dry contact, DC SPST, normally closed

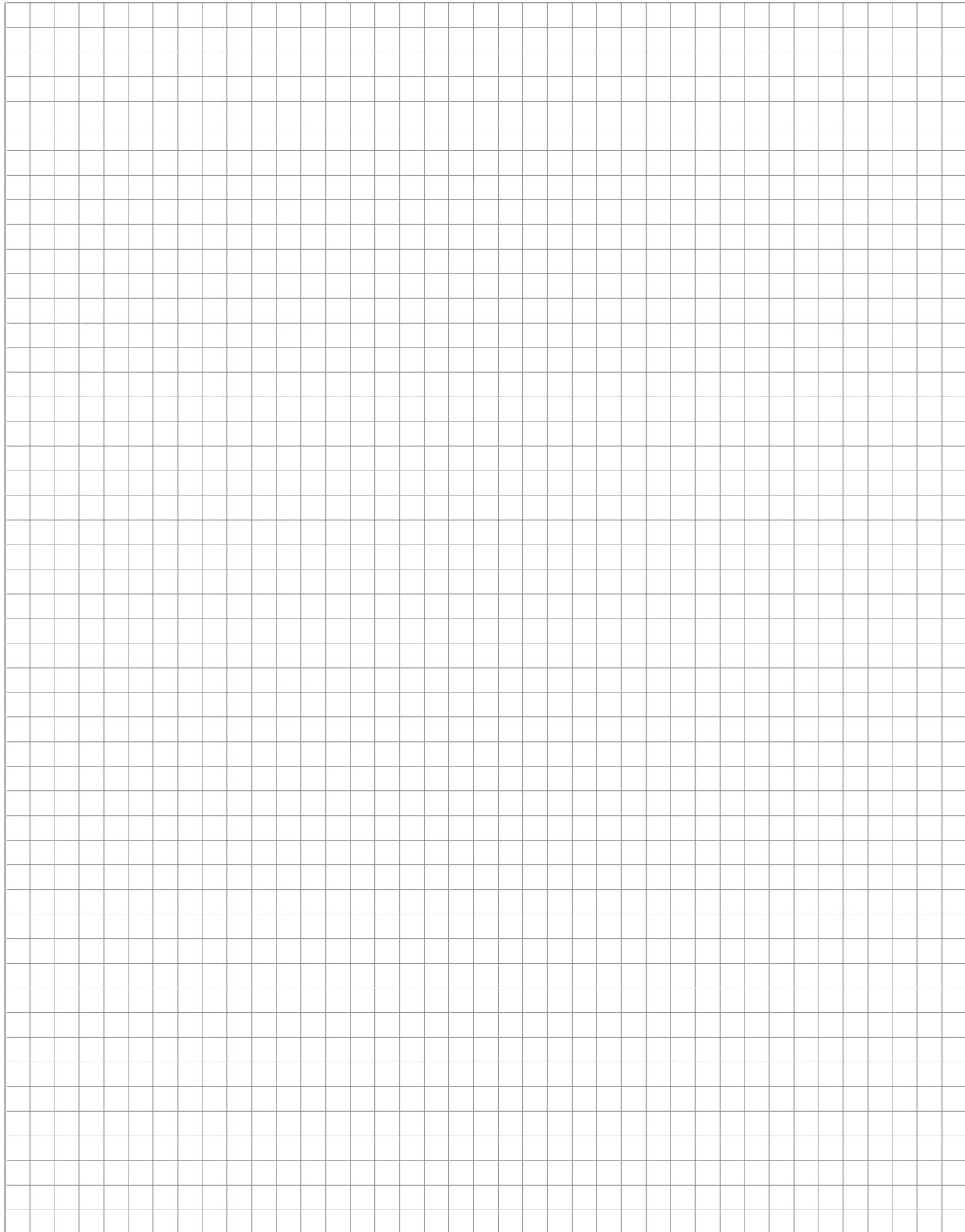
⑨ Housing Length
20mm, 22mm, 25mm ...

⑩ Status Indicator
Blank - LED
N - no LED

Electrical Connection

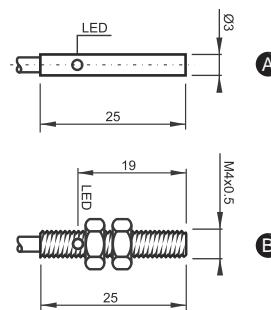
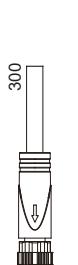
C12 - M12x1 connector
C8 - M8x1 connector
CLM - LEMO plug-high temperature limited type split product
probe part
CTC - Terminal chamber
C*U - straight outlet, TPU outer jacket, cable length (unit: m)
C*P - straight outlet, PVC outer jacket, cable length (unit: m)
C*R - straight outlet, PUR outer jacket, cable length (unit: m)
C*S - straight outlet, silica gel outer jacket, cable length (unit: m)
C*T - straight outlet, teflon outer jacket, cable length (unit: m)
C*F - straight outlet, PTFE outer jacket, cable length (unit: m)
C12*M - *m cable with M12 straight connector
C12L*M - *m cable with M12 angled connector
C8*M - *m cable with M8 straight connector
C8L*M - *m cable with M8 angled connector
C8R*M - *m cable with Ø8 straight connector

⑪ Additional Information
X - special code, usually 3 digits



MTAS-E ... C2U / MTDS-E ... C2U

- Φ3 smooth cylindrical type / M4X0.5 cylindrical threaded type, flush installation
- stainless steel-AISI 304-housing
- IP67
- sensing surface material is PBT
- 3 wire DC, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- 2m cable version electrical connection*1
- wiring diagram: Page T01



A Φ3 smooth cylindrical
B M4 threaded cylindrical

Inductive Sensor, Φ3/M4 Standard Type, Cable version, DC 3 Wire, Power Supply Voltage: 10-30 VDC

Type*2	Mounting	Rated operating distance Sn*3	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTAS-E0.6NO28-C2U	flush	0.6 mm	Φ3/ stainless steel/ IP67	normally open NPN	2mTPU cable	2000Hz/ -25~70 °C	61030000
MTAS-E0.6NC28-C2U				normally closed NPN	2mTPU cable	2000Hz/ -25~70 °C	61030001
MTAS-E0.6PO28-C2U				normally open PNP	2mTPU cable	2000Hz/ -25~70 °C	61030002
MTAS-E0.6PC28-C2U				normally closed PNP	2mTPU cable	2000Hz/ -25~70 °C	61030003
MTAS-E1NO28-C2U	non-flush	1 mm	Φ3/ stainless steel/ IP67	normally open NPN	2mTPU cable	2000Hz/ -25~70 °C	61030004
MTAS-E1NC28-C2U				normally closed NPN	2mTPU cable	2000Hz/ -25~70 °C	61030005
MTAS-E1PO28-C2U				normally open PNP	2mTPU cable	2000Hz/ -25~70 °C	61030006
MTAS-E1PC28-C2U				normally closed PNP	2mTPU cable	2000Hz/ -25~70 °C	61030007
MTDS-E0.6NO28-C2U	flush	0.6 mm	M4/ stainless steel/ IP67	normally open NPN	2mTPU cable	2000Hz/ -25~70 °C	61040000
MTDS-E0.6NC28-C2U				normally closed NPN	2mTPU cable	2000Hz/ -25~70 °C	61040001
MTDS-E0.6PO28-C2U				normally open PNP	2mTPU cable	2000Hz/ -25~70 °C	61040002
MTDS-E0.6PC28-C2U				normally closed PNP	2mTPU cable	2000Hz/ -25~70 °C	61040003
MTDS-E1NO28-C2U	flush	1 mm	M4/ stainless steel/ IP67	normally open NPN	2mTPU cable	2000Hz/ -25~70 °C	61040004
MTDS-E1NC28-C2U				normally closed NPN	2mTPU cable	2000Hz/ -25~70 °C	61040005
MTDS-E1PO28-C2U				normally open PNP	2mTPU cable	2000Hz/ -25~70 °C	61040006
MTDS-E1PC28-C2U				normally closed PNP	2mTPU cable	2000Hz/ -25~70 °C	61040007

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

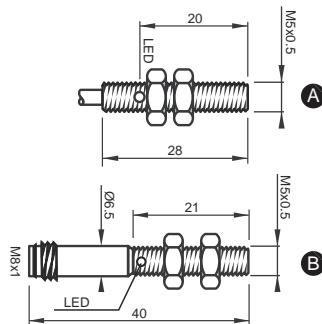
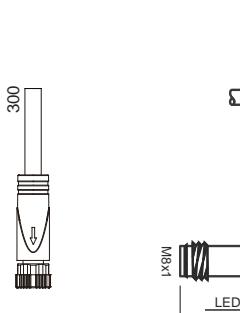
*3 Rated operating distance-Sn, measured by axial approach of standard detection object, ignoring manufacturing error and external influence.

*2 All listed in the data are standard housing sizes, for other Housing sizes, please consult the product manager for details

*4 ----

MTYS-E0.8 ... / MTYS-E1.5 ...

- M5x0.5 threaded cylindrical, flush installation
- stainless steel-AISI 304-housing
- IP67
- sensing surface material is PBT
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- 2m oil-resistant cable version electrical connection*1 / M8x1 connector electrical connection
- wiring diagram: Page T01



A flush, cable version
B flush, M8 connector

Inductive Sensor, M5 Standard Type, Cable/M8 Connector, DC 3 Wire, Supply Voltage: 10-30 VDC

Type*2	Mounting	Rated operating distance Sn*3	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTYS-E0.8NO28-C2U	flush	0.8 mm	M5/ stainless steel/ IP67	normally open NPN	2mTPU cable	2000Hz/ -25~70 °C	61050000
MTYS-E0.8NC28-C2U				normally closed NPN	2mTPU cable	2000Hz/ -25~70 °C	61050001
MTYS-E0.8PO28-C2U				normally open PNP	2mTPU cable	2000Hz/ -25~70 °C	61050002
MTYS-E0.8PC28-C2U				normally closed PNP	2mTPU cable	2000Hz/ -25~70 °C	61050003
MTYS-E1.5NO28-C2U	non-flush	1.5 mm	M5/ stainless steel/ IP67	normally open NPN	2mTPU cable	2000Hz/ -25~70 °C	61050004
MTYS-E1.5NC28-C2U				normally closed NPN	2mTPU cable	2000Hz/ -25~70 °C	61050005
MTYS-E1.5PO28-C2U				normally open PNP	2mTPU cable	2000Hz/ -25~70 °C	61050006
MTYS-E1.5PC28-C2U				normally closed PNP	2mTPU cable	2000Hz/ -25~70 °C	61050007
MTYS-E0.8NO40-C8	flush	0.8 mm	M5/ stainless steel/ IP67	normally open NPN	3 pins M8 connector	2000Hz/ -25~70 °C	61050008
MTYS-E0.8NC40-C8				normally closed NPN	3 pins M8 connector	2000Hz/ -25~70 °C	61050009
MTYS-E0.8PO40-C8				normally open PNP	3 pins M8 connector	2000Hz/ -25~70 °C	61050010
MTYS-E0.8PC40-C8				normally closed PNP	3 pins M8 connector	2000Hz/ -25~70 °C	61050011
MTYS-E1.5NO40-C8	non-flush	1.5 mm	M5/ stainless steel/ IP67	normally open NPN	3 pins M8 connector	2000Hz/ -25~70 °C	61050012
MTYS-E1.5NC40-C8				normally closed NPN	3 pins M8 connector	2000Hz/ -25~70 °C	61050013
MTYS-E1.5PO40-C8				normally open PNP	3 pins M8 connector	2000Hz/ -25~70 °C	61050014
MTYS-E1.5PC40-C8				normally closed PNP	3 pins M8 connector	2000Hz/ -25~70 °C	61050015

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

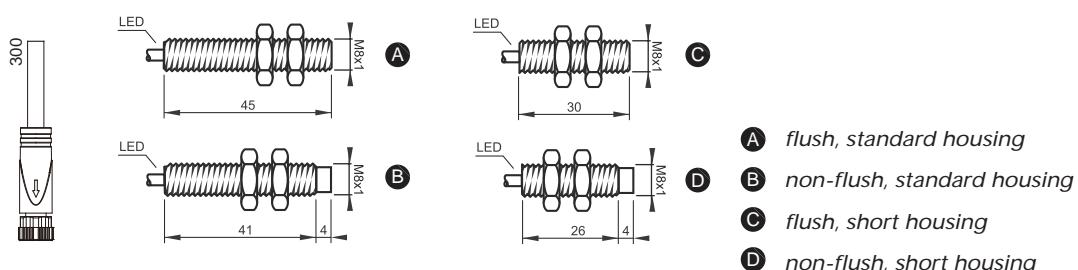
*3 Rated detection distance-Sn, measured by axial approach of standard detection object, ignoring manufacturing error and external influence.

*2 All listed in the data are standard shell sizes, for other shell sizes, please consult the product manager for details

*4 -----

MTES-E2 ... C2P / MTES-N4 ... C2P

- M8x1 threaded cylindrical, flush / non-flush installation
- stainless steel-AISI 304-housing
- IP67
- sensing surface material is POM
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- 2m cable version electrical connection*1
- wiring diagram: Page T01


Inductive Sensor, M8 Standard Housing/Short Housing, Cable, DC 3 Wire, Supply Voltage: 10-30 VDC

Type	Mounting	Rated operating distance Sn*2	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTES-E2NO45-C2P	flush	2 mm	M8/ stainless steel/ IP67	normally open NPN	2mPVC cable	2000Hz/ -25~70 °C	61000046
MTES-E2NC45-C2P				normally closed NPN	2mPVC cable	2000Hz/ -25~70 °C	61088019
MTES-E2PO45-C2P				normally open PNP	2mPVC cable	2000Hz/ -25~70 °C	6108003A
MTES-E2PC45-C2P				normally closed PNP	2mPVC cable	2000Hz/ -25~70 °C	61088017
MTES-N4NO45-C2P	non-flush	4 mm	M8/ stainless/ IP67	normally open NPN	2mPVC cable	2000Hz/ -25~70 °C	6108NE0B
MTES-N4NC45-C2P				normally closed NPN	2mPVC cable	2000Hz/ -25~70 °C	61088023
MTES-N4PO45-C2P				normally open PNP	2mPVC cable	2000Hz/ -25~70 °C	6108NE2B
MTES-N4PC45-C2P				normally closed PNP	2mPVC cable	2000Hz/ -25~70 °C	61088021
MTES-E2NO30-C2P	flush	2 mm	M8/ stainless steel/ IP67	normally open NPN	2mPVC cable	2000Hz/ -25~70 °C	6108DB25
MTES-E2NC30-C2P				normally closed NPN	2mPVC cable	2000Hz/ -25~70 °C	61088027
MTES-E2PO30-C2P				normally open PNP	2mPVC cable	2000Hz/ -25~70 °C	6108DB31
MTES-E2PC30-C2P				normally closed PNP	2mPVC cable	2000Hz/ -25~70 °C	61088025
MTES-N4NO30-C2P	non-flush	4 mm	M8/ stainless steel/ IP67	normally open NPN	2mPVC cable	2000Hz/ -25~70 °C	61088030
MTES-N4NC30-C2P				normally closed NPN	2mPVC cable	2000Hz/ -25~70 °C	61088031
MTES-N4PO30-C2P				normally open PNP	2mPVC cable	2000Hz/ -25~70 °C	61088028
MTES-N4PC30-C2P				normally closed PNP	2mPVC cable	2000Hz/ -25~70 °C	61088029

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

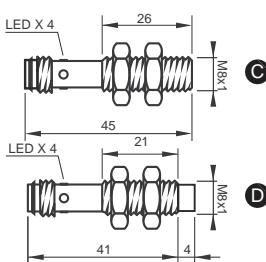
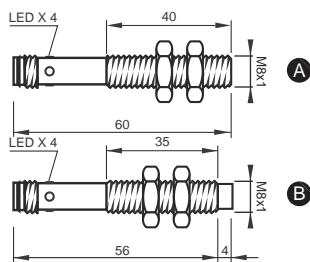
*3 ----

*2 Rated detection distance-Sn, measured by axial approach of standard detection object, ignoring manufacturing error and external influence.

*4 ----

MTES-E2 ... C8 / MTES-N4 ... C8

- M8x1 threaded cylindrical, flush / non-flush installation
- stainless steel-AISI 304-housing
- IP67
- sensing surface material is POM
- DC 3 wire,10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- M8X1 connector electrical connection
- wiring diagram: Page T01



- Ⓐ flush, standard housing
- Ⓑ non-flush, standard housing
- Ⓒ flush, short housing
- Ⓓ non-flush, short housing

Inductive Sensor, M8 Standard, M8 Connector, DC 3 Wire, Supply Voltage: 10-30 VDC

Type*1	Mounting	Rated operating distance Sn*2	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTES-E2NO60-C8	flush	2 mm	M8/ stainless steel/ IP67	normally open NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088014
MTES-E2NC60-C8				normally closed NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088015
MTES-E2PO60-C8				normally open PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	61088012
MTES-E2PC60-C8				normally closed PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	61082E3B
MTES-N4NO60-C8	non-flush	4 mm	M8/ stainless steel/ IP67	normally open NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088010
MTES-N4NC60-C8				normally closed NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088011
MTES-N4PO60-C8				normally open PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	61088008
MTES-N4PC60-C8				normally closed PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	61088009
MTES-E2NO45-C8	flush	2 mm	M8/ stainless steel/ IP67	normally open NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088006
MTES-E2NC45-C8				normally closed NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088007
MTES-E2PO45-C8				normally open PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	61088004
MTES-E2PC45-C8				normally closed PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	6108E3DB
MTES-N4NO45-C8	non-flush	4 mm	M8/ stainless steel/ IP67	normally open NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088002
MTES-N4NC45-C8				normally closed NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088003
MTES-N4PO45-C8				normally open PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	61088000
MTES-N4PC45-C8				normally closed PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	61088001

*1 All listed in the data are standard housing sizes. For other housing sizes, please consult the product manager for details.

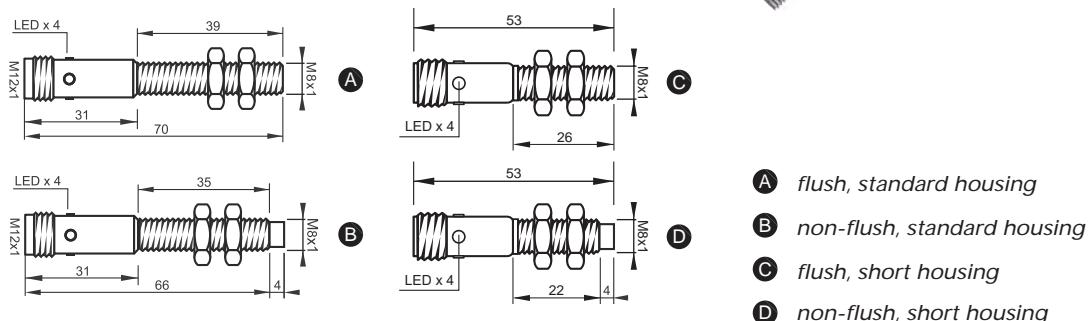
*2 Rated detection distance-Sn, measured by axial approach of standard detection object, ignoring manufacturing error and external influence.

*3 ----

*4 ----

MTES-E2 ... C12 / MTES-N4 ... C12

- M8x1 threaded cylindrical, flush / non-flush installation
- stainless steel-AISI 304-housing
- IP67
- sensing surface material is POM
- DC wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- M12X1 connector electrical connection
- wiring diagram: Page T01



Inductive Sensor, M8 Standard, M12 Connector, DC 3 Wire, Supply Voltage: 10-30 VDC

Type*1	Mounting	Rated operating distance Sn*2	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTES-E2NO70-C12	flush	2 mm	M12/ stainless steel/ IP67	normally open NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088034
MTES-E2NC70-C12				normally closed NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088035
MTES-E2PO70-C12				normally open PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	61000064
MTES-E2PC70-C12				normally closed PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	61088033
MTES-N4NO70-C12	non-flush	4 mm	M12/ stainless steel/ IP67	normally open NPN	3 pins M8 Connector	1000Hz/ -25~70 °C	61088038
MTES-N4NC70-C12				normally closed NPN	3 pins M8 Connector	1000Hz/ -25~70 °C	61088039
MTES-N4PO70-C12				normally open PNP	3 pins M8 Connector	1000Hz/ -25~70 °C	61088036
MTES-N4PC70-C12				normally closed PNP	3 pins M8 Connector	1000Hz/ -25~70 °C	61088037
MTES-E2NO53-C12	flush	2 mm	M12/ stainless steel/ IP67	normally open NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088042
MTES-E2NC53-C12				normally closed NPN	3 pins M8 Connector	2000Hz/ -25~70 °C	61088043
MTES-E2PO53-C12				normally open PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	61088040
MTES-E2PC53-C12				normally closed PNP	3 pins M8 Connector	2000Hz/ -25~70 °C	61088041
MTES-N4NO53-C12	non-flush	4 mm	M12/ stainless steel/ IP67	normally open NPN	3 pins M8 Connector	1000Hz/ -25~70 °C	61088056
MTES-N4NC53-C12				normally closed NPN	3 pins M8 Connector	1000Hz/ -25~70 °C	61088057
MTES-N4PO53-C12				normally open PNP	3 pins M8 Connector	1000Hz/ -25~70 °C	61088058
MTES-N4PC53-C12				normally closed PNP	3 pins M8 Connector	1000Hz/ -25~70 °C	61088059

*1 All listed in the data are standard housing sizes. For other housing sizes, please consult the product manager for details.

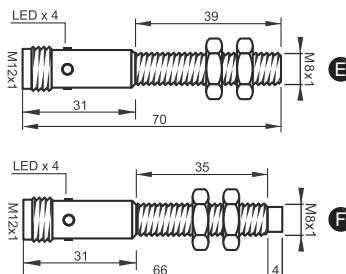
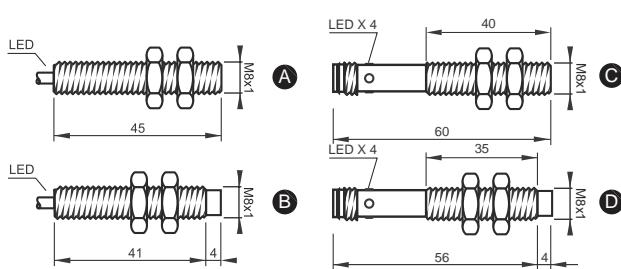
*3 ----

*2 Rated detection distance-Sn, measured by axial approach of standard detection object, ignoring manufacturing error and external influence.

*4 ----

MTES-E2D ... / MTES-N4D ...

- M8x1 threaded cylindrical, flush / non-flush installation
- stainless steel-AISI 304-housing
- IP67
- sensing surface material is POM
- DC 2 wire, 10...30VDC
- 2 wire DC, normally open or normally closed output mode
- 2m cable version electrical connection *1 / M8X1 / M12X1 connector electrical connection
- wring diagram: Page T01



- A flush, cable version
- B non-flush, cable version
- C flush, M8 connector
- D non-flush, M8 connector
- E flush, M12 connector
- F non-flush, M12 connector

Inductive Sensor, M8 Standard, Cable/M8/M12 Connector, DC 2 Wire, Supply Voltage: 10-30 VDC

Type*2	Mounting	Rated operating distance Sn*3	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTES-E2DO45-C2P	flush	2 mm	M8/ stainless steel/ IP67	DC 2-wire normally open	2m PVC cable	1000Hz/ -25~70 °C	61088044
MTES-E2DC45-C2P				DC 2-wire normally closed	2m PVC cable	1000Hz/ -25~70 °C	61088045
MTES-N4DO45-C2P	non-flush	4 mm	M8/ stainless steel/ IP67	DC 2-wire normally open	2m PVC cable	500Hz/ -25~70 °C	61088046
MTES-N4DC45-C2P				DC 2-wire normally closed	2m PVC cable	500Hz/ -25~70 °C	61088047
MTES-E2DO60-C8	flush	2 mm	M8/ stainless steel/ IP67	DC 2-wire normally open	3 pins M8 Connector	1000Hz/ -25~70 °C	61088048
MTES-E2DC60-C8				DC 2-wire normally closed	3 pins M8 Connector	1000Hz/ -25~70 °C	61088049
MTES-N4DO60-C8	non-flush	4 mm	M8/ stainless steel/ IP67	DC 2-wire normally open	3 pins M8 Connector	500Hz/ -25~70 °C	61088050
MTES-N4DC60-C8				DC 2-wire normally closed	3 pins M8 Connector	500Hz/ -25~70 °C	61088051
MTES-E2DO70-C12	flush	2 mm	M12/ stainless steel/ IP67	DC 2-wire normally open	3 pins M12 Connector	1000Hz/ -25~70 °C	61088052
MTES-E2DC70-C12				DC 2-wire normally closed	3 pins M12 Connector	1000Hz/ -25~70 °C	61088053
MTES-N4DO70-C12	non-flush	4 mm	M12/ stainless steel/ IP67	DC 2-wire normally open	3 pins M12 Connector	500Hz/ -25~70 °C	61088054
MTES-N4DC70-C12				DC 2-wire normally closed	3 pins M12 Connector	500Hz/ -25~70 °C	61088055

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

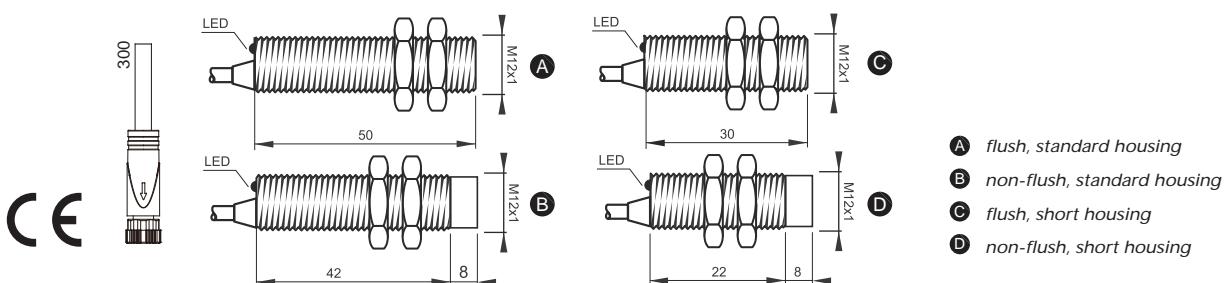
*2 All listed in the data are standard shell sizes. For other shell sizes, please consult the product manager for details.

*3 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*4

MTF-E4 ... C2P / MTF-N8 ... C2P

- M12x1 threaded cylindrical, flush / non-flush installation
- nickel-plated brass housing
- IP67
- sensing surface material is PBT
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- 2m cable version electrical connection*1
- wiring diagram: Page T01


Inductive Sensor, M12 Standard, Cable version, DC 3 Wire, Supply Voltage: 10-30 VDC

Type	Mounting	Rated operating distance Sn*2	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTF-E4NO50-C2P	flush	4 mm	M12/nickel-plated brass/IP67	normally open NPN	2mPVC cable	2000Hz/-25~70 °C	61000047
MTF-E4NC50-C2P				normally closed NPN	2mPVC cable	2000Hz/-25~70 °C	61120001
MTF-E4PO50-C2P				normally open PNP	2mPVC cable	2000Hz/-25~70 °C	61120002
MTF-E4PC50-C2P				normally closed PNP	2mPVC cable	2000Hz/-25~70 °C	61120003
MTF-N8NO50-C2P	non-flush	8 mm	M12/nickel-plated brass/IP67	normally open NPN	2mPVC cable	500Hz/-25~70 °C	61120004
MTF-N8NC50-C2P				normally closed NPN	2mPVC cable	500Hz/-25~70 °C	61120005
MTF-N8PO50-C2P				normally open PNP	2mPVC cable	500Hz/-25~70 °C	61120006
MTF-N8PC50-C2P				normally closed PNP	2mPVC cable	500Hz/-25~70 °C	61120007
MTF-E4NO30-C2P	flush	4 mm	M12/nickel-plated brass/IP67	normally open NPN	2mPVC cable	2000Hz/-25~70 °C	61120008
MTF-E4NC30-C2P				normally closed NPN	2mPVC cable	2000Hz/-25~70 °C	61120009
MTF-E4PO30-C2P				normally open PNP	2mPVC cable	2000Hz/-25~70 °C	61000063
MTF-E4PC30-C2P				normally closed PNP	2mPVC cable	2000Hz/-25~70 °C	61120011
MTF-N8NO30-C2P	non-flush	8 mm	M12/nickel-plated brass/IP67	normally open NPN	2mPVC cable	500Hz/-25~70 °C	61120012
MTF-N8NC30-C2P				normally closed NPN	2mPVC cable	500Hz/-25~70 °C	61120013
MTF-N8PO30-C2P				normally open PNP	2mPVC cable	500Hz/-25~70 °C	61120014
MTF-N8PC30-C2P				normally closed PNP	2mPVC cable	500Hz/-25~70 °C	61120015

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

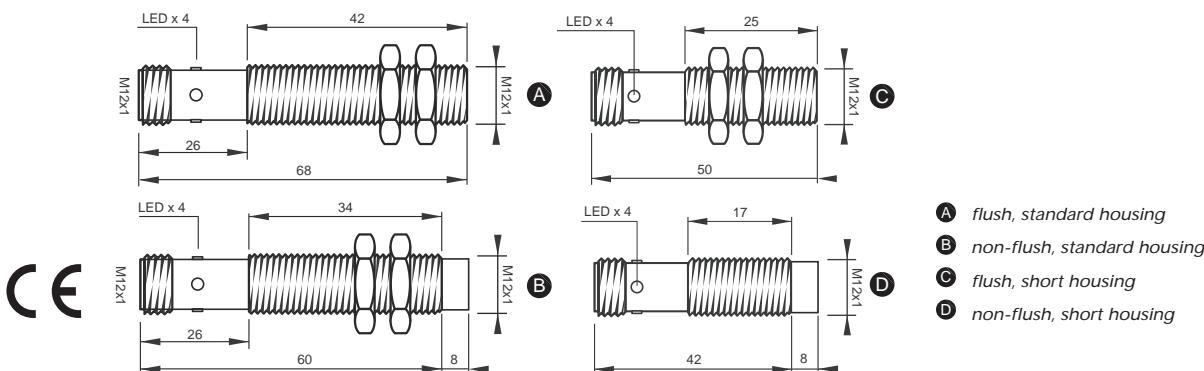
*3 ----

*2 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*4 ----

MTF-E4 ... C12 / MTF-N8 ... C12

- M12x1 threaded cylindrical, flush / non-flush installation
- nickel-plated brass housing
- IP67
- sensing surface material is PBT
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- M12X1 connector electrical connection
- wiring diagram: Page T01



Inductive Sensor, M12 Standard, M12 Connector, DC 3 Wire, Supply Voltage: 10-30 VDC

Type*1	Mounting	Rated operating distance Sn*2	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTF-E4NO68-C12	flush	4 mm	M12/nickel-plated brass/IP67	normally open NPN	M12 Connector	2000Hz/-25~70 °C	61120016
MTF-E4NC68-C12				normally closed NPN	M12 Connector	2000Hz/-25~70 °C	61120017
MTF-E4PO68-C12				normally open PNP	M12 Connector	2000Hz/-25~70 °C	61120018
MTF-E4PC68-C12				normally closed PNP	M12 Connector	2000Hz/-25~70 °C	61120019
MTF-N8NO68-C12	non-flush	8 mm	M12/nickel-plated brass/IP67	normally open NPN	M12 Connector	500Hz/-25~70 °C	61120020
MTF-N8NC68-C12				normally closed NPN	M12 Connector	500Hz/-25~70 °C	61120021
MTF-N8PO68-C12				normally open PNP	M12 Connector	500Hz/-25~70 °C	61120022
MTF-N8PC68-C12				normally closed PNP	M12 Connector	500Hz/-25~70 °C	61120023
MTF-E4NO50-C12	flush	4 mm	M12/nickel-plated brass/IP67	normally open NPN	M12 Connector	2000Hz/-25~70 °C	61120024
MTF-E4NC50-C12				normally closed NPN	M12 Connector	2000Hz/-25~70 °C	61120025
MTF-E4PO50-C12				normally open PNP	M12 Connector	2000Hz/-25~70 °C	61120026
MTF-E4PC50-C12				normally closed PNP	M12 Connector	2000Hz/-25~70 °C	61120027
MTF-N8NO50-C12	non-flush	8 mm	M12/nickel-plated brass/IP67	normally open NPN	M12 Connector	500Hz/-25~70 °C	61120028
MTF-N8NC50-C12				normally closed NPN	M12 Connector	500Hz/-25~70 °C	61120029
MTF-N8PO50-C12				normally open PNP	M12 Connector	2000Hz/-25~70 °C	61120030
MTF-N8PC50-C12				normally closed PNP	M12 Connector	500Hz/-25~70 °C	61120031

*1 All listed in the data are standard housing sizes. For other housing sizes, please consult the product manager for details.

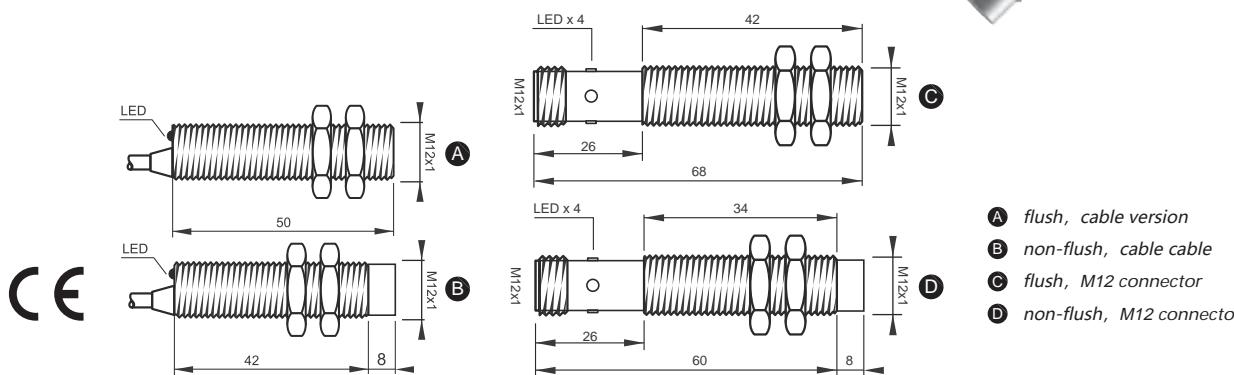
*3 ----

*2 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*4 ----

MTF-E4D ... / MTF-N8D ...

- M12x1 threaded cylindrical, flush / non-flush installation
 - nickel-plated brass housing
 - IP67
 - sensing surface material is PBT
 - DC 2 wire, 10...30VDC
 - 2 wire DC, normally open or normally closed output mode
 - 2m cable version electrical connection*1 / M12X1 connector electrical connection
 - wiring diagram: Page T01



Inductive Sensor, M12 Standard, Cable/M12 Connector, DC 2 Wire, Supply Voltage: 10-30 VDC

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

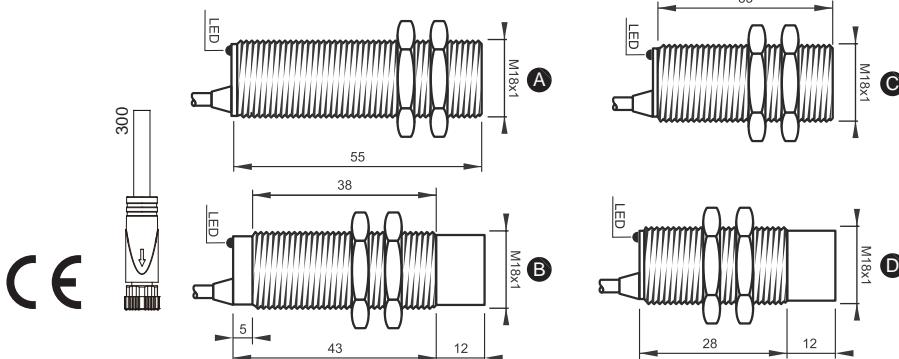
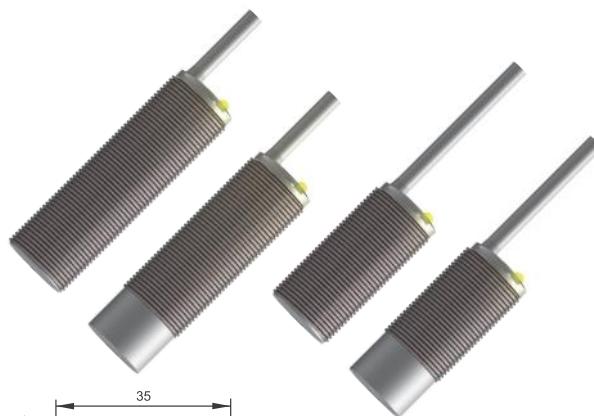
*3 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*2 All listed in the data are standard housing sizes. For other housing sizes, please consult the product manager for details.

*4

MTG-E8 ... C2P / MTG-N16 ... C2P

- M18x1 threaded cylinder, flush / non-flush installation
- nickel-plated brass housing
- IP67
- sensing surface is PBT
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- 2m cable version electrical connection*1
- wiring diagram: Page T01



A flush, standard housing
B non-flush, standard housing
C flush, short housing
D non-flush, short housing

Inductive Sensor, M18 Standard, Cable version, DC 3 Wire, Supply Voltage: 10-30 VDC

Type	Mounting	Rated operating distance Sn*2	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTG-E8NO55-C2P	flush	8 mm	M18/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	2000Hz/ -25~70 °C	61000048
MTG-E8NC55-C2P				normally closed NPN	2m PVC cable	2000Hz/ -25~70 °C	61180001
MTG-E8PO55-C2P				normally open PNP	2m PVC cable	2000Hz/ -25~70 °C	61180002
MTG-E8PC55-C2P				normally closed PNP	2m PVC cable	2000Hz/ -25~70 °C	61180003
MTG-N16NO55-C2P	non-flush	16 mm	M18/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	500Hz/ -25~70 °C	61180004
MTG-N16NC55-C2P				normally closed NPN	2m PVC cable	500Hz/ -25~70 °C	61180005
MTG-N16PO55-C2P				normally open PNP	2m PVC cable	500Hz/ -25~70 °C	61180006
MTG-N16PC55-C2P				normally closed PNP	2m PVC cable	500Hz/ -25~70 °C	61180007
MTG-E8NO35-C2P	flush	8 mm	M18/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	2000Hz/ -25~70 °C	61180008
MTG-E8NC35-C2P				normally closed NPN	2m PVC cable	2000Hz/ -25~70 °C	61180009
MTG-E8PO35-C2P				normally open PNP	2m PVC cable	2000Hz/ -25~70 °C	61180010
MTG-E8PC35-C2P				normally closed PNP	2m PVC cable	2000Hz/ -25~70 °C	61180011
MTG-N16NO40-C2P	non-flush	16 mm	M18/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	500Hz/ -25~70 °C	61180012
MTG-N16NC40-C2P				normally closed NPN	2m PVC cable	500Hz/ -25~70 °C	61180013
MTG-N16PO40-C2P				normally open PNP	2m PVC cable	500Hz/ -25~70 °C	61180014
MTG-N16PC40-C2P				normally closed PNP	2m PVC cable	500Hz/ -25~70 °C	61180015

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

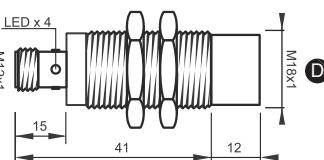
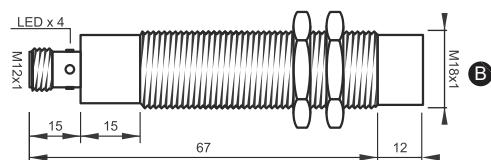
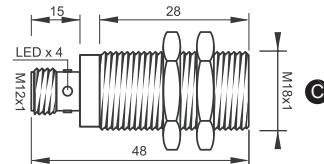
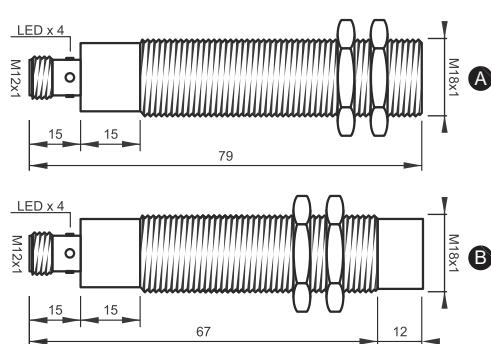
*3 ----

*2 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*4 ----

MTG-E8 ... C12 / MTG-N16 ... C12

- M18x1 threaded cylinder, flush / non-flush installation
- nickel-plated brass housing
- IP67
- sensing surface material is PBT
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- M12X1 connector electrical connection
- wiring diagram: Page T01



- A flush, standard housing
 B non-flush, standard housing
 C flush, short housing
 D non-flush, short housing

Inductive Sensor, M18 Standard, M12 Connector, DC 3 Wire, Supply Voltage: 10-30 VDC

Type*1	Mounting	Rated operating distance Sn*2	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTG-E8NO79-C12	flush	8 mm	M18/nickel-plated brass/IP67	normally open NPN	M12 Connector	2000Hz/-25~70 °C	61180016
MTG-E8NC79-C12				normally closed NPN	M12 Connector	2000Hz/-25~70 °C	61180017
MTG-E8PO79-C12				normally open PNP	M12 Connector	2000Hz/-25~70 °C	61180018
MTG-E8PC79-C12				normally closed PNP	M12 Connector	2000Hz/-25~70 °C	61180019
MTG-N16NO79-C12	non-flush	16 mm	M18/nickel-plated brass/IP67	normally open NPN	M12 Connector	500Hz/-25~70 °C	61180020
MTG-N16NC79-C12				normally closed NPN	M12 Connector	500Hz/-25~70 °C	61180021
MTG-N16PO79-C12				normally open PNP	M12 Connector	500Hz/-25~70 °C	6118804A
MTG-N16PC79-C12				normally closed PNP	M12 Connector	500Hz/-25~70 °C	61180023
MTG-E8NO48-C12	flush	8 mm	M18/nickel-plated brass/IP67	normally open NPN	M12 Connector	2000Hz/-25~70 °C	61180024
MTG-E8NC48-C12				normally closed NPN	M12 Connector	2000Hz/-25~70 °C	61180025
MTG-E8PO48-C12				normally open PNP	M12 Connector	2000Hz/-25~70 °C	61180DB5
MTG-E8PC48-C12				normally closed PNP	M12 Connector	2000Hz/-25~70 °C	61180027
MTG-N16NO53-C12	non-flush	16 mm	M18/nickel-plated brass/IP67	normally open NPN	M12 Connector	500Hz/-25~70 °C	61180028
MTG-N16NC53-C12				normally closed NPN	M12 Connector	500Hz/-25~70 °C	61180029
MTG-N16PO53-C12				normally open PNP	M12 Connector	2000Hz/-25~70 °C	61180030
MTG-N16PC53-C12				normally closed PNP	M12 Connector	500Hz/-25~70 °C	61180031

*1 All listed in the data are standard housing sizes. For other housing sizes, please consult the product manager for details.

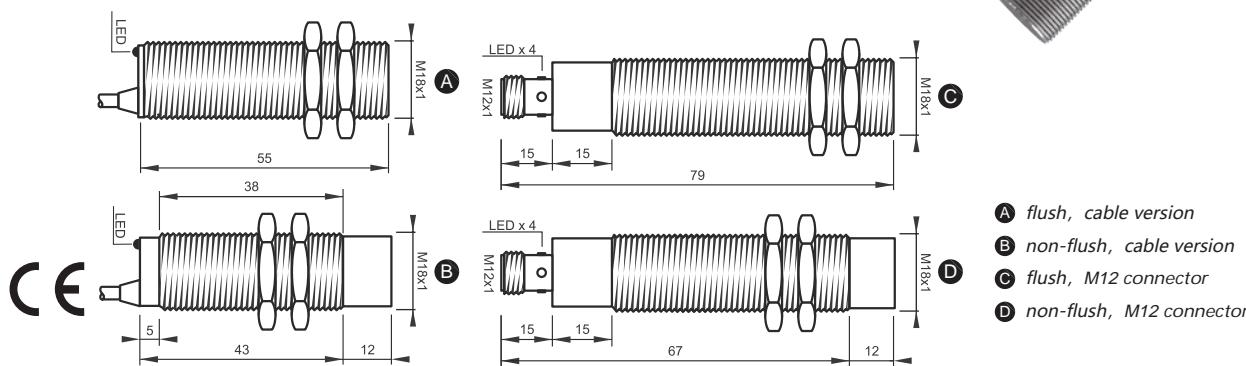
*3 ----

*2 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*4 ----

MTG-E8D ... / MTG-N16D ...

- M18x1 threaded cylinder, flush / non-flush installation
 - nickel-plated brass housing
 - IP67
 - sensing surface material is PBT
 - DC 2 wire, 10...30VDC
 - 2 wire DC, normally open or normally closed output mode
 - 2m cable version electrical connection*1 / M12X1 connector electrical connection
 - wiring diagram: Page T01



Inductive Sensor, M12 Standard, Cable version/M12 Connector, DC 2 Wire, Supply Voltage: 10-30 VDC

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

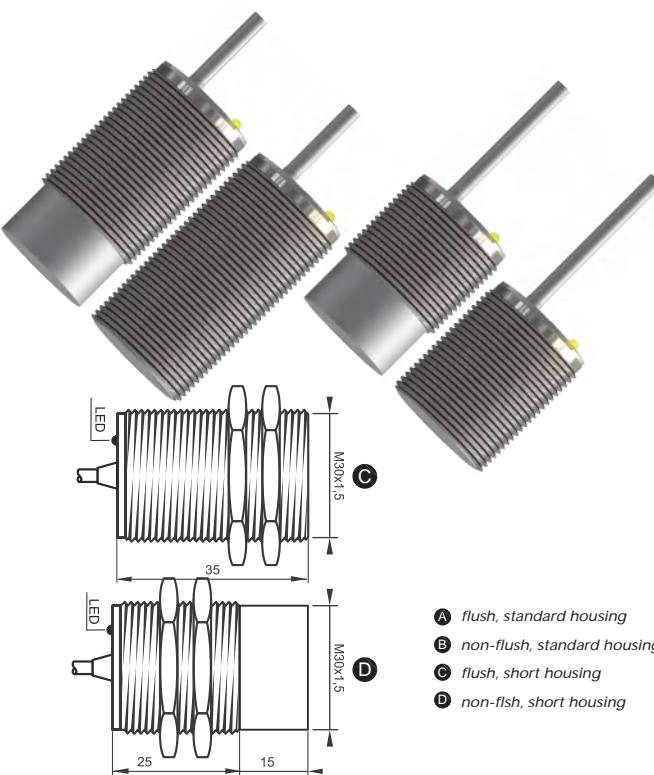
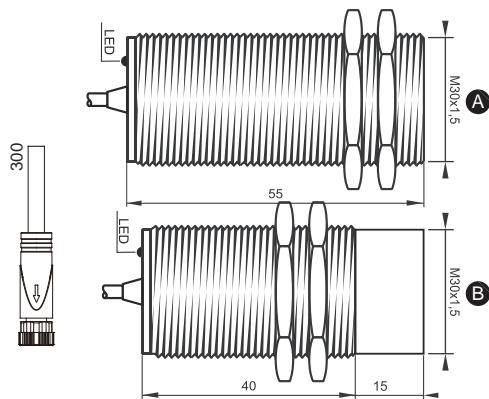
*2 All listed in the data are standard housing sizes. For other housing sizes, please consult the product manager for details.

*3 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*4

MTI-E16 ... C2P / MTI-N25 ... C2P

- M30x1.5 threaded cylindrical, flush / non-flush installation
- nickel-plated brass housing
- IP67
- sensing surface material is PBT
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output
- 2m cable version electrical connection*1
- wiring diagram: Page T01



A flush, standard housing
 B non-flush, standard housing
 C flush, short housing
 D non-flush, short housing

Inductive Sensor, M30 Standard, Cable version, DC 3 Wire, Supply Voltage: 10-30 VDC

Type	Mounting	Rated operating distance Sn*2	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTI-E16NO55-C2P	flush	16 mm	M30/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	300Hz/ -25~70 °C	61300000
MTI-E16NC55-C2P				normally closed NPN	2m PVC cable	300Hz/ -25~70 °C	61300001
MTI-E16PO55-C2P				normally open PNP	2m PVC cable	300Hz/ -25~70 °C	61300002
MTI-E16PC55-C2P				normally closed PNP	2m PVC cable	300Hz/ -25~70 °C	61300003
MTI-N25NO55-C2P	non-flush	25 mm	M30/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	300Hz/ -25~70 °C	61300004
MTI-N25NC55-C2P				normally closed NPN	2m PVC cable	300Hz/ -25~70 °C	61300005
MTI-N25PO55-C2P				normally open PNP	2m PVC cable	300Hz/ -25~70 °C	61300006
MTI-N25PC55-C2P				normally closed PNP	2m PVC cable	300Hz/ -25~70 °C	61300007
MTI-E16NO35-C2P	flush	16 mm	M30/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	300Hz/ -25~70 °C	61300008
MTI-E16NC35-C2P				normally closed NPN	2m PVC cable	300Hz/ -25~70 °C	61300009
MTI-E16PO35-C2P				normally open PNP	2m PVC cable	300Hz/ -25~70 °C	61300010
MTI-E16PC35-C2P				normally closed PNP	2m PVC cable	300Hz/ -25~70 °C	61300011
MTI-N25NO40-C2P	non-flush	25 mm	M30/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	300Hz/ -25~70 °C	61300012
MTI-N25NC40-C2P				normally closed NPN	2m PVC cable	300Hz/ -25~70 °C	61300013
MTI-N25PO40-C2P				normally open PNP	2m PVC cable	300Hz/ -25~70 °C	61300014
MTI-N25PC40-C2P				normally closed PNP	2m PVC cable	300Hz/ -25~70 °C	61300015

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

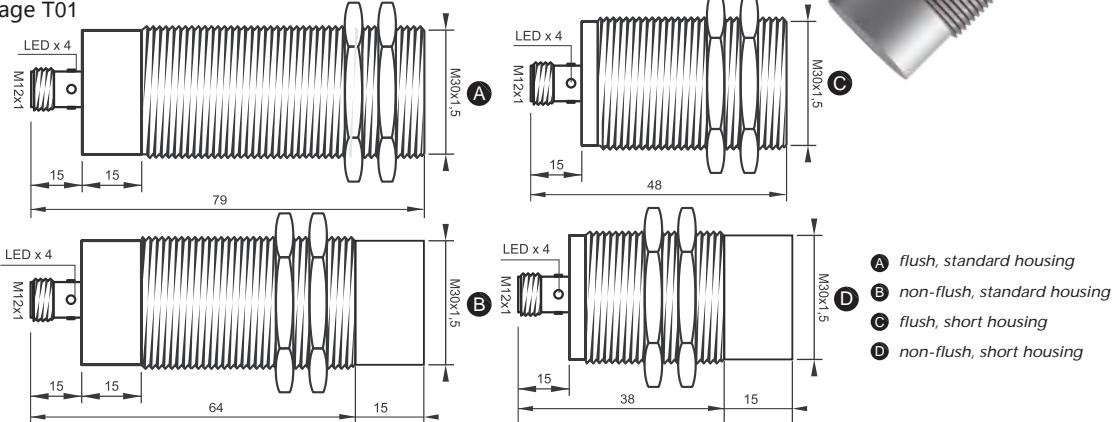
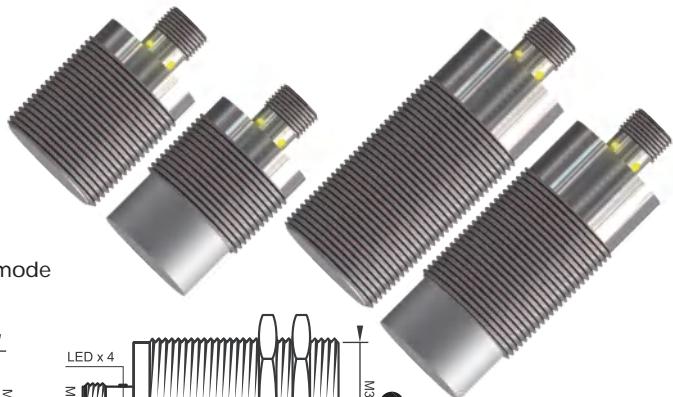
*3 ----

*2 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*4 ----

MTI-E16 ... C12 / MTI-N25 ... C12

- M30x1.5 threaded cylindrical, flush / non-flush installation
- nickel-plated brass housing
- IP67
- sensing surface material is PBT
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- M12X1 connector electrical connection
- wiring diagram: Page T01



Inductive Sensor, M30 Standard, M12 Connector, DC 3 wire, Supply Voltage: 10-30 VDC

Type*1	Mounting	Rated operating distance Sn*2	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTI-E16NO79-C12	flush	16 mm	M12/nickel-plated brass/IP67	normally open NPN	M12 Connector	300Hz/-25~70 °C	61300016
MTI-E16NC79-C12				normally closed NPN	M12 Connector	300Hz/-25~70 °C	61300017
MTI-E16PO79-C12				normally open PNP	M12 Connector	300Hz/-25~70 °C	61300018
MTI-E16PC79-C12				normally closed PNP	M12 Connector	300Hz/-25~70 °C	61300019
MTI-N25NO79-C12	non-flush	25 mm	M12/nickel-plated brass/IP67	normally open NPN	M12 Connector	300Hz/-25~70 °C	61300020
MTI-N25NC79-C12				normally closed NPN	M12 Connector	300Hz/-25~70 °C	61300021
MTI-N25PO79-C12				normally open PNP	M12 Connector	300Hz/-25~70 °C	61300022
MTI-N25PC79-C12				normally closed PNP	M12 Connector	300Hz/-25~70 °C	61300023
MTI-E16NO48-C12	flush	16 mm	M12/nickel-plated brass/IP67	normally open NPN	M12 Connector	300Hz/-25~70 °C	61300024
MTI-E16NC48-C12				normally closed NPN	M12 Connector	300Hz/-25~70 °C	61300025
MTI-E16PO48-C12				normally open PNP	M12 Connector	300Hz/-25~70 °C	61300026
MTI-E16PC48-C12				normally closed PNP	M12 Connector	300Hz/-25~70 °C	61300027
MTI-N25NO53-C12	non-flush	25 mm	M12/nickel-plated brass/IP67	normally open NPN	M12 Connector	300Hz/-25~70 °C	61300028
MTI-N25NC53-C12				normally closed NPN	M12 Connector	300Hz/-25~70 °C	61300029
MTI-N25PO53-C12				normally open PNP	M12 Connector	300Hz/-25~70 °C	61300030
MTI-N25PC53-C12				normally closed PNP	M12 Connector	300Hz/-25~70 °C	61300031

*1 All listed in the data are standard housing sizes. For other housing sizes, please consult the product manager for details.

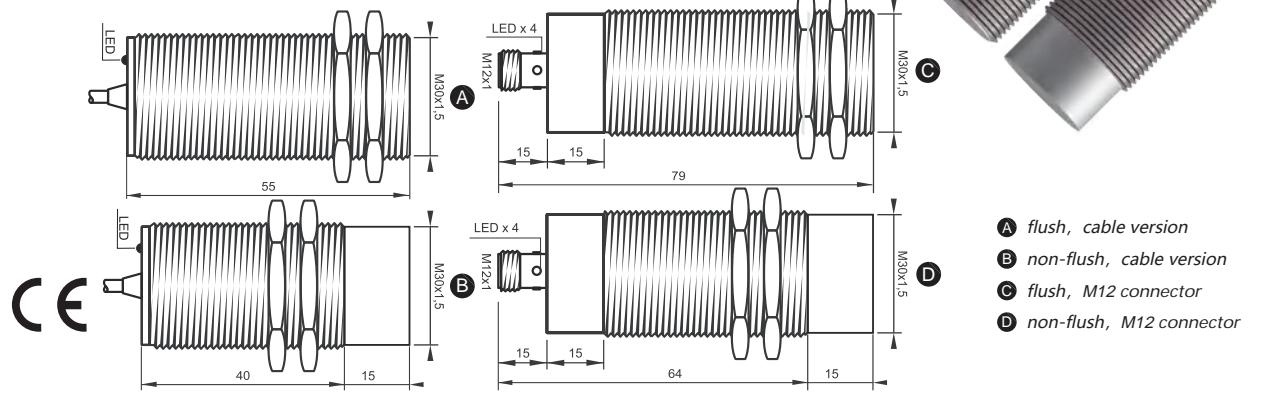
*3 ----

*2 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*4 ----

MTI-E16D ... / MTI-N25D ...

- M30x1.5 threaded cylindrical, flush / non-flush installation
- nickel-plated brass housing
- IP67
- sensing surface material is PBT
- DC 2 wire, 10...30VDC
- 2 wire DC, normally open or normally closed output mode
- 2m cable version electrical connection*1 / M12X1 connector electrical connection
- wiring diagram: Page T01


Inductive Sensor, M30 Standard Type, Cable version/M12 Connector, DC 2 Wire, Supply Voltage: 10-30 VDC

Type*2	Mounting	Rated operating distance Sn*3	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTI-E16DO55-C2P	flush	16 mm	M30/ nickel-plated brass/ IP67	DC 2 wire normally open	2m PVC cable	150Hz/ -25~70 °C	61300032
MTI-E16DC55-C2P				DC 2 wire normally closed	2m PVC cable	150Hz/ -25~70 °C	61300033
MTI-N25DO55-C2P	non-flush	25 mm	M30/ nickel-plated brass/ IP67	DC 2 wire normally open	2m PVC cable	150Hz/ -25~70 °C	61300034
MTI-N25DC55-C2P				DC 2 wire normally closed	2m PVC cable	150Hz/ -25~70 °C	61300035
MTI-E16DO79-C12	flush	16 mm	M30/ nickel-plated brass/ IP67	DC 2 wire normally open	2m PVC cable	150Hz/ -25~70 °C	61300036
MTI-E16DC79-C12				DC 2 wire normally closed	2m PVC cable	150Hz/ -25~70 °C	61300037
MTI-N25DO79-C12	non-flush	25 mm	M30/ nickel-plated brass/ IP67	DC 2 wire normally open	2m PVC cable	150Hz/ -25~70 °C	61300038
MTI-N25DC79-C12				DC 2 wire normally closed	2m PVC cable	150Hz/ -25~70 °C	61300039

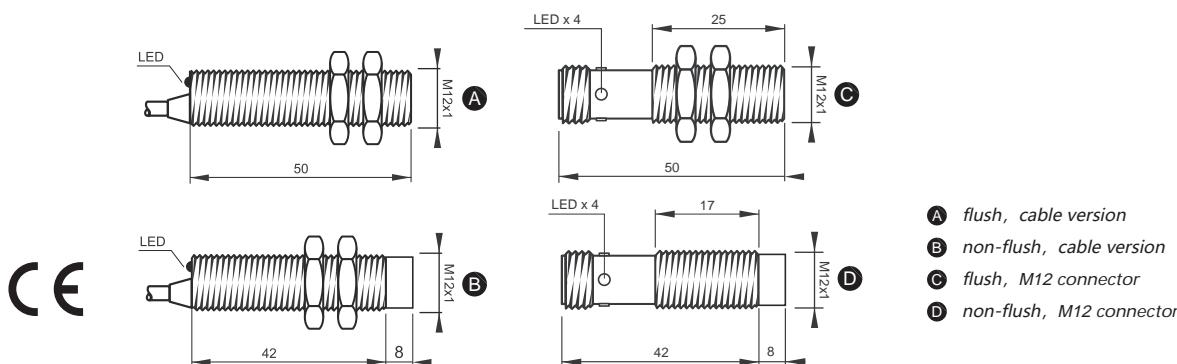
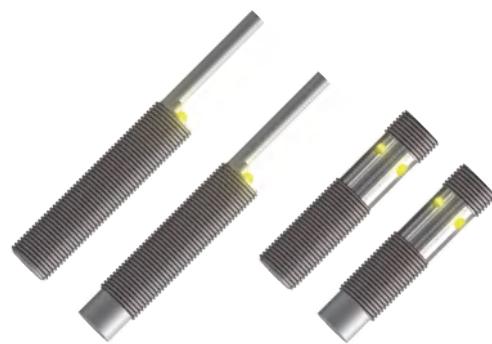
*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

*2 All listed in the data are standard housing sizes. For other housing sizes, please consult the product manager for details.

*3 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

MTF-E6 ... / MTF-N10 ...

- M12x1 threaded cylindrical, flush / non-flush installation
- nickel-plated brass housing
- IP67
- sensing surface is PBT
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- 2m cable version electrical connection*1 /
M12X1 connector electrical connection
- wiring diagram: Page T01


Inductive Sensor, M12 Standard, Cable version/M12 Connector, DC 3 Wire, Supply Voltage: 10-30 VDC

Type*2	Mounting	Rated operating distance Sn*3	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTF-E6NO50-C2P	flush	6 mm	M12/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	800Hz/ -25~70 °C	61120040
MTF-E6NC50-C2P				normally closed NPN	2m PVC cable	800Hz/ -25~70 °C	61120041
MTF-E6PO50-C2P				normally open PNP	2m PVC cable	800Hz/ -25~70 °C	61120042
MTF-E6PC50-C2P				normally closed PNP	2m PVC cable	800Hz/ -25~70 °C	61120043
MTF-N10NO50-C2P	non-flush	10 mm	M12/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	400Hz/ -25~70 °C	61120044
MTF-N10NC50-C2P				normally closed NPN	2m PVC cable	400Hz/ -25~70 °C	61120045
MTF-N10PO50-C2P				normally open PNP	2m PVC cable	400Hz/ -25~70 °C	61120046
MTF-N10PC50-C2P				normally closed PNP	2m PVC cable	400Hz/ -25~70 °C	61120047
MTF-E6NO50-C12	flush	6 mm	M12/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	800Hz/ -25~70 °C	61120048
MTF-E6NC50-C12				normally closed NPN	2m PVC cable	800Hz/ -25~70 °C	61120049
MTF-E6PO50-C12				normally open PNP	2m PVC cable	800Hz/ -25~70 °C	61120050
MTF-E6PC50-C12				normally closed PNP	2m PVC cable	800Hz/ -25~70 °C	61120051
MTF-N10NO50-C12	non-flush	10 mm	M12/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	400Hz/ -25~70 °C	61120052
MTF-N10NC50-C12				normally closed NPN	2m PVC cable	400Hz/ -25~70 °C	61120053
MTF-N10PO50-C12				normally open PNP	2m PVC cable	400Hz/ -25~70 °C	61120054
MTF-N10PC50-C12				normally closed PNP	2m PVC cable	400Hz/ -25~70 °C	61120055

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

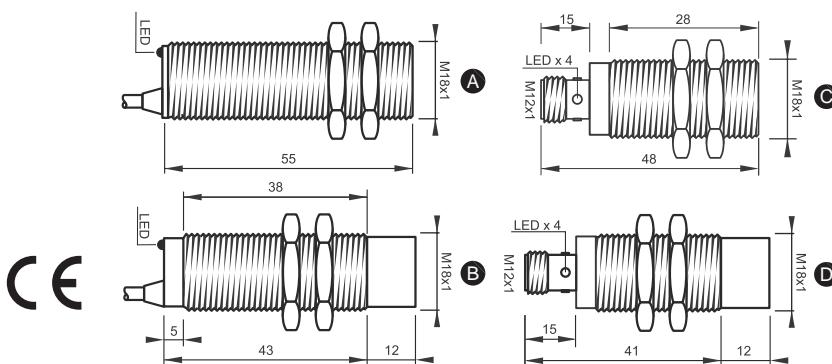
*3 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*2 All listed in the data are standard housing sizes. For other housing sizes, please consult the product manager for details.

*4 ----

MTG-E12 ... / MTG-N20 ...

- M18x1 threaded cylindrical, flush / non-flush installation
- nickel-plated brass housing
- IP67
- sensing surface material is PBT
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- 2m cable version electrical connection*1 / M12X1 connector electrical connection
- wiring diagram: Page T01



A flush, cable version
 B non-flush, cable version
 C flush, M12 connector
 D non-flush, M12 connector

Inductive Sensor, M18 Standard, Cable version/M12 Connector, DC 3 Wire, Supply Voltage: 10-30 VDC

Type*2	Mounting	Rated operating distance Sn*3	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTG-E12NO55-C2P	flush	12 mm	M18/nickel-plated brass/IP67	normally open NPN	2m PVC cable	300Hz/-25~70 °C	61180040
MTG-E12NC55-C2P				normally closed NPN	2m PVC cable	300Hz/-25~70 °C	61180041
MTG-E12PO55-C2P				normally open PNP	2m PVC cable	300Hz/-25~70 °C	61180042
MTG-E12PC55-C2P				normally closed PNP	2m PVC cable	300Hz/-25~70 °C	61180043
MTG-N20NO55-C2P	non-flush	20 mm	M18/nickel-plated brass/IP67	normally open NPN	2m PVC cable	100Hz/-25~70 °C	61180044
MTG-N20NC55-C2P				normally closed NPN	2m PVC cable	100Hz/-25~70 °C	61180045
MTG-N20PO55-C2P				normally open PNP	2m PVC cable	100Hz/-25~70 °C	61180046
MTG-N20PC55-C2P				normally closed PNP	2m PVC cable	100Hz/-25~70 °C	61180047
MTG-E12NO48-C12	flush	12 mm	M18/nickel-plated brass/IP67	normally open NPN	2m PVC cable	300Hz/-25~70 °C	61180048
MTG-E12NC48-C12				normally closed NPN	2m PVC cable	300Hz/-25~70 °C	61180049
MTG-E12PO48-C12				normally open PNP	2m PVC cable	300Hz/-25~70 °C	61180050
MTG-E12PC48-C12				normally closed PNP	2m PVC cable	300Hz/-25~70 °C	61180051
MTG-N20NO53-C12	non-flush	20 mm	M18/nickel-plated brass/IP67	normally open NPN	2m PVC cable	100Hz/-25~70 °C	61180052
MTG-N20NC53-C12				normally closed NPN	2m PVC cable	100Hz/-25~70 °C	61180053
MTG-N20PO53-C12				normally open PNP	2m PVC cable	100Hz/-25~70 °C	61180054
MTG-N20PC53-C12				normally closed PNP	2m PVC cable	100Hz/-25~70 °C	61180055

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

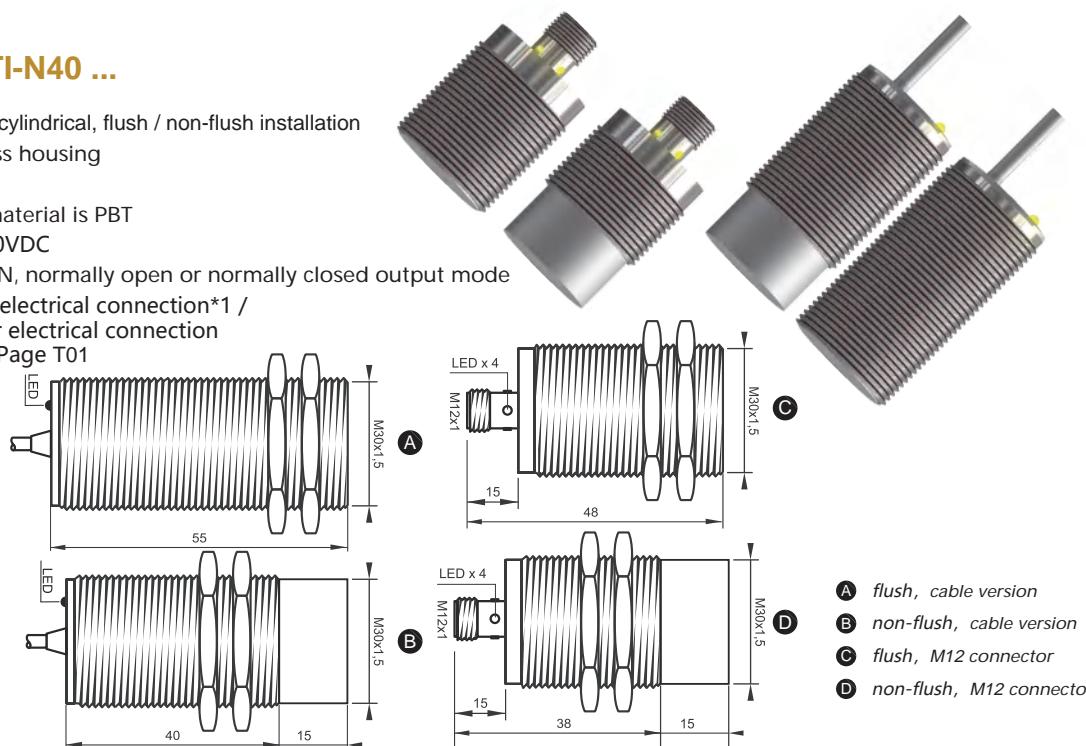
*2 All listed in the data are standard housing sizes. For other housing sizes, please consult the product manager for details.

*3 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*4 ----

MTI-E22 ... / MTI-N40 ...

- M30x1.5 threaded cylindrical, flush / non-flush installation
- nickel-plated brass housing
- IP67
- sensing surface material is PBT
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- 2m cable version electrical connection*1 / M12X1 connector electrical connection
- wiring diagram: Page T01



Inductive Sensor, M12 Standard, Cable version/M12 Connector, DC 3 Wire, Supply Voltage: 10-30 VDC

Type*2	Mounting	Rated operating distance Sn*3	Housing style/ Housing Material/ Protection Degree	Output Function	Connection	Switching Frequency/ Operating Temperature	ID NO.
MTI-E22NO55-C2P	flush	22 mm	M30/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	150Hz/ -25~70 °C	61300040
MTI-E22NC55-C2P				normally closed NPN	2m PVC cable	150Hz/ -25~70 °C	61300041
MTI-E22PO55-C2P				normally open PNP	2m PVC cable	150Hz/ -25~70 °C	61300042
MTI-E22PC55-C2P				normally closed PNP	2m PVC cable	150Hz/ -25~70 °C	61300043
MTI-N40NO55-C2P	non-flush	40 mm	M30/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	100Hz/ -25~70 °C	61300044
MTI-N40NC55-C2P				normally closed NPN	2m PVC cable	100Hz/ -25~70 °C	61300045
MTI-N40PO55-C2P				normally open PNP	2m PVC cable	100Hz/ -25~70 °C	61300046
MTI-N40PC55-C2P				normally closed PNP	2m PVC cable	100Hz/ -25~70 °C	61300047
MTI-E22NO48-C12	flush	22 mm	M30/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	150Hz/ -25~70 °C	61300048
MTI-E22NC48-C12				normally closed NPN	2m PVC cable	150Hz/ -25~70 °C	61300049
MTI-E22PO48-C12				normally open PNP	2m PVC cable	150Hz/ -25~70 °C	61300050
MTI-E22PC48-C12				normally closed PNP	2m PVC cable	150Hz/ -25~70 °C	61300051
MTI-N40NO53-C12	non-flush	40 mm	M30/ nickel-plated brass/ IP67	normally open NPN	2m PVC cable	100Hz/ -25~70 °C	61300052
MTI-N40NC53-C12				normally closed NPN	2m PVC cable	100Hz/ -25~70 °C	61300053
MTI-N40PO53-C12				normally open PNP	2m PVC cable	100Hz/ -25~70 °C	61300054
MTI-N40PC53-C12				normally closed PNP	2m PVC cable	100Hz/ -25~70 °C	61300055

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

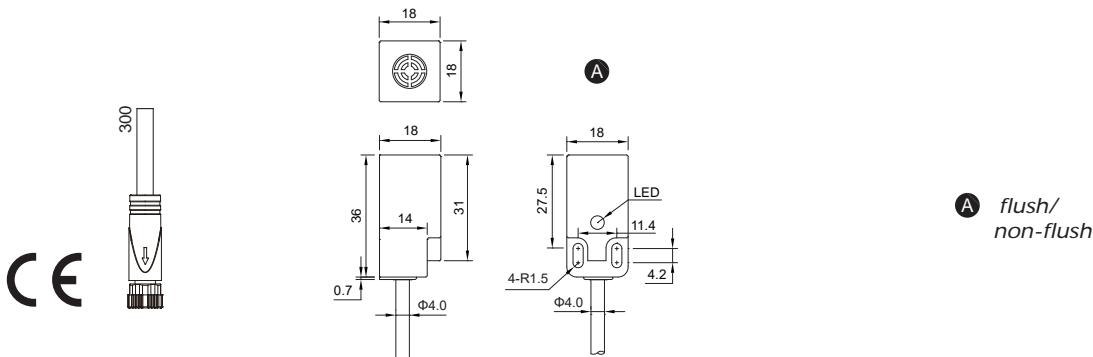
*3 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*2 All listed in the data are standard housing sizes. For other housing sizes, please consult the product manager for details.

*4 ----

MTQT-E5 ... C2P / MTQT-N12 ... C2P

- Q18 Small square housing, flush/non-flush installation
 - black PBT plastic housing
 - IP67
 - general housing style and installation dimensions
 - DC 3 wire, 10...30VDC
 - 3 wire PNP or NPN, normally open or normally closed output mode
 - 2m cable version electrical connection*1
 - wiring diagram: Page T01



Inductive Sensor, Q18 (□18) Small Square Housing, Cable version, DC 3 wire, Power Supply Voltage: 10-30 VDC

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

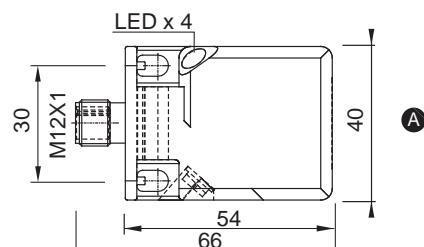
*2 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*3 -----

*4 -----

MTMK-E20 ... / MTMK-N40 ...

- P40 square housing, flush or non-flush installation
 - black/orange PA plastic housing
 - IP67
 - sensing surface can be set in 5 positions
 - DC 3 wire, 10...30VDC
 - 3 wire PNP or NPN, normally open/normally closed/complementary output m
 - M12X1 connector electrical connection
 - wiring diagram: Page T01/T02



- A flush/non-flush connector type

Inductive Sensor, 40x40 Standard Square Housing, M12 Connector Type, DC 3 wire, Supply Voltage: 10-30 VDC

*1 Models with other output methods are available, please consult the product manager for details.

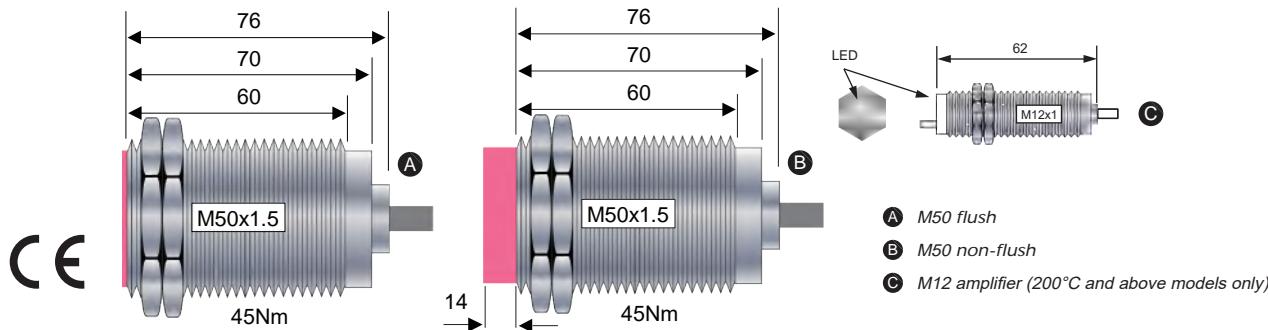
*2 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*3 -----

*4 -----

MTJS... -E20 ... / MTJS... -N25 ...

- M50x1.5 threaded cylindrical, flush / non-flush installation
- stainless steel-SUS 303-housing
- IP67
- temp. range: -60°C / -40°C / 130°C / 150°C / 180°C / 250°C
- DC 2/3 wire, 10...30VDC
- 2 wire DC, 3 wire PNP or NPN, normally open or normally closed output mode
- 2m silicone (silicone) cable / teflon (PTFE) cable electrical connection*1
- wiring diagram: Page T01


Extended Temp. Inductive Sensor, M50x1.5 Stainless Steel Housing, Cable version, DC 3 Wire, Supply Voltage: 10 - 30 VDC

Type*2	Mounting	Rated operating distance Sn*3	Housing style/ Housing Material/ Protection Degree	Output Function	Connection *4	Switching Frequency/ Operating Temperature	ID NO.
MTJS60-E20PO70N-C2S	flush	20 mm	M50/ stainless steel/ IP67	normally open PNP	2m silicone cable	100Hz/ -60~180 °C	61503100
MTJS40-E20PO70N-C2S				normally open PNP	2m silicone cable	100Hz/ -40~150 °C	61503101
MTJS130-E20PO70-C2S				normally open PNP	2m silicone cable	100Hz/ -25~130 °C	61503102
MTJS150-E20PO70N-C2S				normally open PNP	2m silicone cable	100Hz/ -25~150 °C	61503103
MTJS180-E20PO70N-C2S				normally open PNP	2m silicone cable	100Hz/ -25~180 °C	61503104
MTJS250S-E20PO70N-C2T				normally open PNP	2m silicone cable	100Hz/ -25~250 °C	61503105
MTJS60-N25PO84N-C2S	non-flush	25 mm	M50/ stainless steel/ IP67	normally open PNP	2m silicone cable	100Hz/ -60~180 °C	61503106
MTJS40-N25PO84N-C2S				normally open PNP	2m silicone cable	100Hz/ -40~150 °C	61503107
MTJS130-N25PO84-C2S				normally open PNP	2m silicone cable	100Hz/ -25~130 °C	61503108
MTJS150-N25PO84N-C2S				normally open PNP	2m silicone cable	100Hz/ -25~150 °C	61503109
MTJS180-N25PO84N-C2S				normally open PNP	2m silicone cable	100Hz/ -25~180 °C	61503110
MTJS250S-N25PO84N-C2T				normally open PNP	2m Teflon cable	100Hz/ -25~250 °C	61503111
MTJS60-E20DO70N-C2S	flush	20 mm	M50/ stainless steel/ IP67	DC 2 wire normally wire	2m silicone cable	100Hz/ -60~180 °C	61503112
MTJS40-E20DO70N-C2S				DC 2 wire normally wire	2m silicone cable	100Hz/ -40~150 °C	61503113
MTJS130-E20DO70-C2S				DC 2 wire normally wire	2m silicone cable	100Hz/ -25~130 °C	61503114
MTJS150-E20DO70N-C2S				DC 2 wire normally wire	2m silicone cable	100Hz/ -25~150 °C	61503115
MTJS180-E20DO70N-C2S				DC 2 wire normally wire	2m silicone cable	100Hz/ -25~180 °C	61503116
MTJS250S-E20DO70N-C2T				DC 2 wire normally wire	2m Teflon cable	100Hz/ -25~250 °C	61503117

*1 Pigtail wire connector electrical connection products, the wire length/connector type can be customized, please consult the product manager for details.

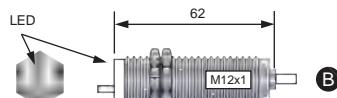
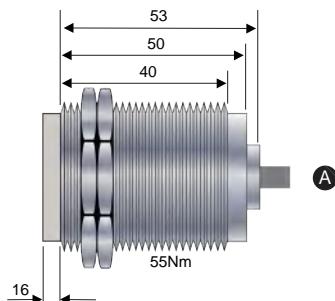
*2 Product models with other output methods are available, please consult the product manager for details.

*3 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*4 2m is the standard silicone cable length, other length specifications and materials (PTFE) can be customized, please consult the product manager for details.

MTKS... -N50 ...

- M80x1.5 threaded cylindrical, flush or non-flush installation
- stainless steel-SUS 304-housing
- IP67
- temp. range: 130°C / 150°C / 180°C(Max. 190°C)
- DC 3 wire, 10...30VDC
- 3 wire PNP or NPN, normally open or normally closed output mode
- 2m silicone (silicone) cable / teflon (PTFE) cable electrical connection*1
- wiring diagram: Page T01



A M80 non-flush

B M12 amplifier (200°C and above models only)

Extended Temp. Inductive Sensor, M80x1.5 Stainless Steel Housing, Cable version, DC 3 Wire, Supply Voltage: 10 - 30 VDC

Type*2	Mounting	Rated operating distance Sn*3	Housing style/ Housing Material/ Protection Degree	Output Function	Connection *4	Switching Frequency/ Operating Temperature	ID NO.
MTKS130-N50NO68-C2S	non-flush	50 mm	M80/ stainless steel/ IP67	normally open NPN	2m silicone cable	300Hz/ -25~130 °C	61803085
MTKS130-N50NC68-C2S				normally closed NPN	2m silicone cable	300Hz/ -25~130 °C	61803086
MTKS130-N50PO68-C2S				normally open PNP	2m silicone cable	300Hz/ -25~130 °C	61803087
MTKS130-N50PC68-C2S				normally closed PNP	2m silicone cable	300Hz/ -25~130 °C	61803088
MTKS150-N50NO68N-C2S	non-flush	50 mm	M80/ stainless steel/ IP67	normally open NPN	2m silicone cable	200Hz/ -25~150 °C	61803089
MTKS150-N50NC68N-C2S				normally closed NPN	2m silicone cable	200Hz/ -25~150 °C	61803090
MTKS150-N50PO68N-C2S				normally open PNP	2m silicone cable	200Hz/ -25~150 °C	61803091
MTKS150-N50PC68N-C2S				normally closed PNP	2m silicone cable	200Hz/ -25~150 °C	61803092
MTKS180-N50NO68N-C2S	non-flush	50 mm	M80/ stainless steel/ IP67	normally open NPN	2m silicone cable	100Hz/ -25~180 °C	61803093
MTKS180-N50NC68N-C2S				normally closed NPN	2m silicone cable	100Hz/ -25~180 °C	61803094
MTKS180-N50PO68N-C2S				normally open PNP	2m silicone cable	100Hz/ -25~180 °C	61803095
MTKS180-N50PC68N-C2S				normally closed PNP	2m silicone cable	100Hz/ -25~180 °C	61803096

*1 Pigtail wire connector electrical connection products, the wire length/connector type can be customized, please consult the product manager for details.

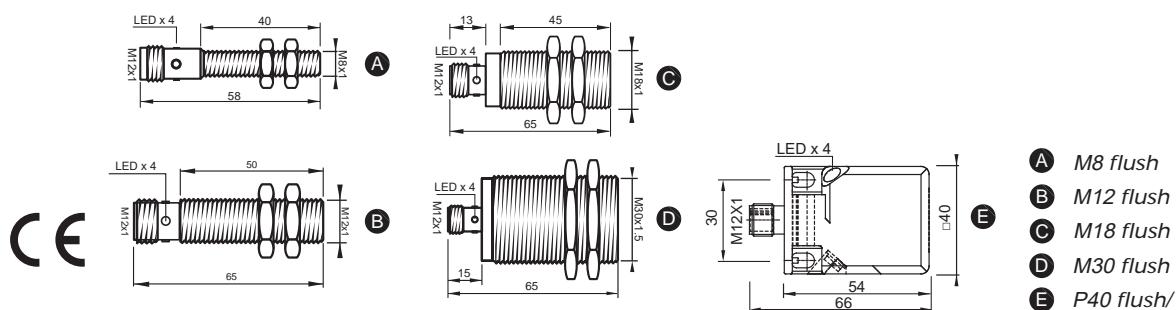
*2 Product models with other output methods are available, please consult the product manager for details.

*3 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*4 2m is the standard silicone cable length, other length specifications and materials (PTFE) can be customized, please consult the product manager for details.

MTEWT ... / MTFWT ... / MTGWT ... / MTIWT ... / MTMKWT ... C12

- M12/M18/M30 threaded cylindrical housing, P40 square housing, flush or non-flush installation
 - brass, PTFE-coated, metal housing (cylindrical) / PA-anti-spatter plastic housing (square)
 - IP67
 - Factor 1 for all metals(K=1), welding field magnetic immunity & slag accumulation
 - DC 3/4 wire, 10...30 VDC
 - 3 wire PNP or NPN, four-wire PNP or NPN, normally open/complementary output mode
 - M12X1 connector electrical connection
 - wiring diagram: Page T01/T02



Anti-Magnetic&Welding Inductive Sensor, M12/M18/M30 Threaded Cylindrical Housing, 40x40 Square Housing, DC 3/4 Wire, Supply Voltage: 10-30 VDC

*1 M12/M18/M30 cylindrical threaded housings can provide other detection distance models, please consult the product manager for details.

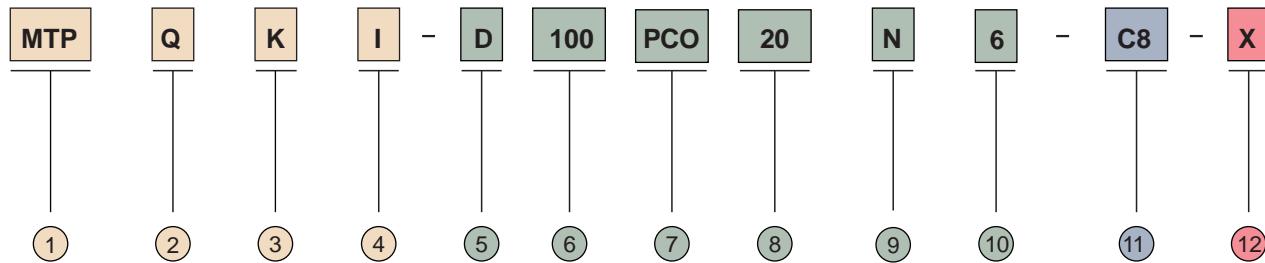
*2 The rated detection distance-Sn is measured with the axial approach of the standard detection object, ignoring the manufacturing error and external influence.

*3 -----

*4 - - -



- *Photoelectric Sensors*



1 MTP photoelectric

2 Housing
Blank - threaded cylindrical
E8/EH - M8
FD - M12
GF/GS/GM - axial optic - M18
GFR/GSR/GMR - radial optic - M18
smooth cylindrical - DG, D10
Q square
- QM, QE, QF, QX, QC, QG, QB
S slot
- SC5, SC6, SC7, SC8(ultrasonic)

3 Housing Material
Blank - plastic
S - stainless steel
N - nickel-plated brass
A - die-cast aluminum/aluminum alloy

4 Light Source
Blank - red
I - infrared
B - blue
G - green
W - white
L1 - Class 1 laser-Class1
L2 - Class 2 laser-Class2
T - R,G,B 3-color light source

5 Detection Mode
D - diffuse reflection
F - focused
R - retroreflective
PR - polarized retroreflective
E - through-beam emitter
R - through-beam receiver
T - through-beam set
S - slot photoelectric sensor
TR - transparent objects detection
BS - background suppression
PF - plastic optical fiber
GF - glass fiber

6 Sensing Distance
0 mm ... 50 m
X optical fiber amplifier

7 Electrical Output

NCO - 4 wire, DC, NPN, normally open and normally closed
PCO - 4 wire, DC, PNP, normally open and normally closed
NL - 3 wire, DC, NPN, light-on
ND - 3 wire, DC, NPN, dark-on
PL - 3 wire, DC, PNP, light-on
PD - 3 wire, DC, PNP, dark-on
NS - DC, NPN, normally open/normally closed selectable
PS - DC, PNP, normally open/normally closed selectable
NL/D - DC, NPN, light-on/dark-on selectable
PL/D - DC, PNP, light-on/dark-on selectable
PNS - PNP/NPN bipolar
P/NS - PNP/NPN selectable
P/ND - dual PNP/NPN
PDS - dual PNP output
NDS - dual NPN output
PNTS - tripple PNP/NPN bipolar output
I4 - analog output, 4...20mA
U0 - analog output, 0...10V
IU - analog output, 4...20mA/0...10V
PI - PNP/4...20mA
PU - PNP/0...10V
NI - NPN/4...20mA
NU - NPN/0...10V
PNSIU - PNP/NPN bipolar+
4...20mA/0...10V adjustable output
RD - relay output, SPDT type
RS4 - RS485 communication output
Blank - no output

8 Housing Dimensions
10, 12, 18, 20, 30, 50 ...

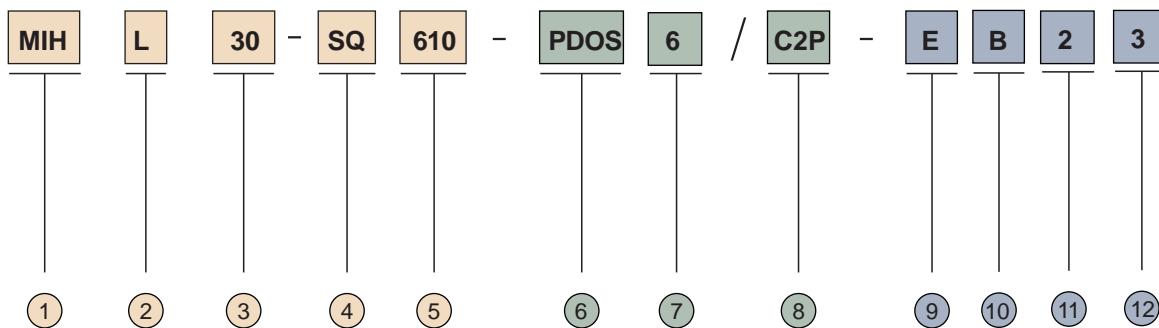
9 Status Indicator
Blank - LED
N - no LED

10 Supply Voltage
6 - 10 ... 30VDC
2 - 90 ... 250VAC
32 - 24 ... 60VDC
24 ... 240VAC

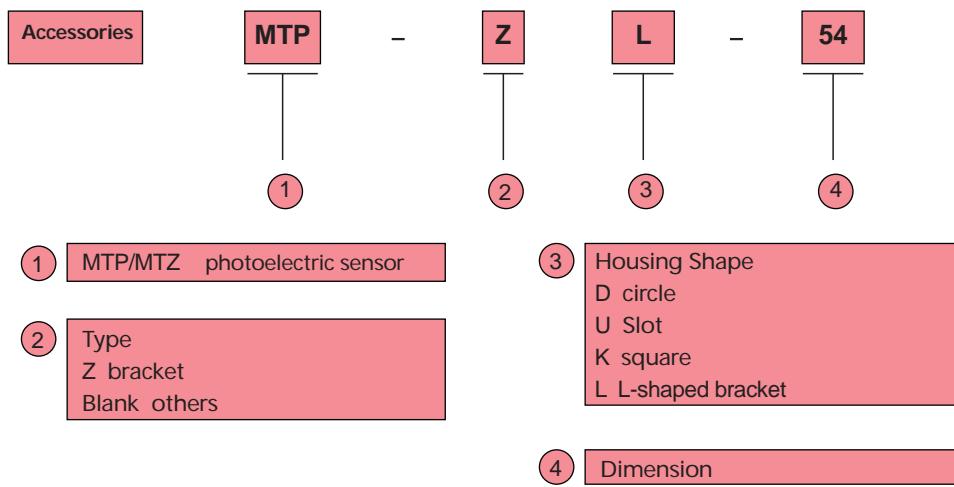
11 Electrical Connection

C12 - M12x1 connector
C8 - M8x1 connector
CTC - wiring terminal
C*P - straight outlet, PVC outer jacket, cable length (unit: m)
C*R - straight outlet, PUR outer jacket, cable length (unit: m)
C*T - straight outlet, teflon outer jacket, cable length (unit: m)
C*F - straight outlet, PTFE outer jacket, cable length (unit: m)
C12*M - *m cable with M12 straight connector
C12L*M - *m cable with M12 angled connector
C8*M - *m cable with M8 straight connector
C8L*M - *m cable with M8 angled connector
C8R*M - *m cable with Φ8 straight connector

12 Additional Information
Blank - no additional information,
preset sensitivity cannot be adjusted
PB - teach-in button
PO - potentiometer adjustment
TD - time delay
LS - fluorescence sensor
CS - color mark sensor

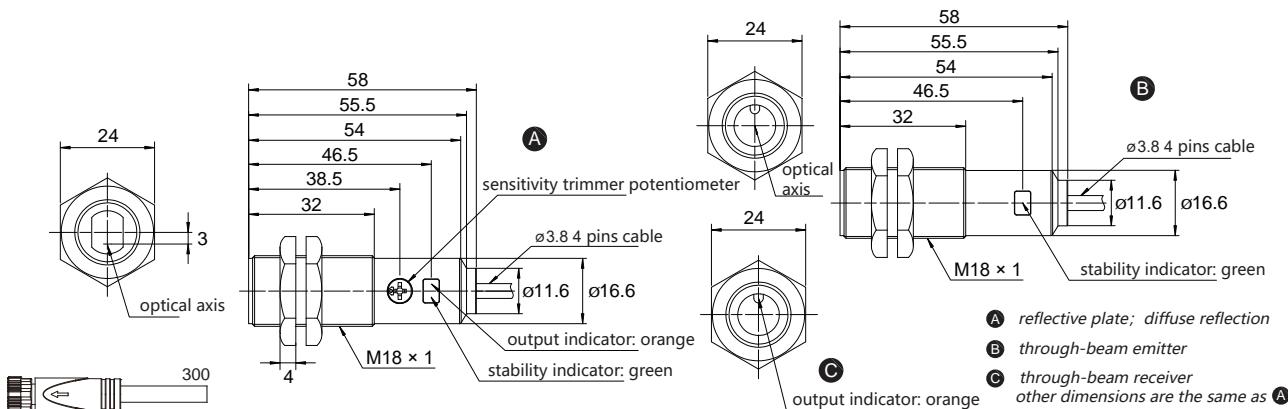


Photoelectric Inductive Ultrasonic Accessories Tech. data



MTPGRN- ... 586- ...

- M18 cylindrical general shape product, suitable for most applications
- complete optical functions and perfect product series
- axial or radial optic, adapt to different requirements
- rugged nickel-plated brass metal housing design
- high sensitivity trimmer potentiometer adjustment function
- high shock resistance, internal hot-melt molding technology, IP67
- 2m PVC cable version electrical connection*1
- wiring diagram: Page T02

**Photoelectric Sensor, M18 Standard Type, Cable version, Power Supply Voltage: 10-30 VDC**

Type*2	Detection mode	Rated Sensing Range*3	Light Source *4	Output Function	Connection	Adjustment	ID NO.
MTPGRN-T25NL/D586-C2P-PO	through beam	25 m	visible red	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61CRWN00
MTPGRN-T25PL/D586-C2P-PO							61CRWP00
MTPGRN-R4MNL/D586-C2P-PO	standard retro-reflective	0.01...4 m reflector MTV-61	visible red	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61CR1N00
MTPGRN-R4MPL/D586-C2P-PO							61CR1P00
MTPG2N-PR4MNL/D586-C2P-PO	polarized	0.01...4 m reflector MTV-61	visible red	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61C22N00
MTPG2N-PR4MPL/D586-C2P-PO							61C22P00
MTPGRN-D110NL/D586-C2P-PO	short distance diffuse reflection	0...110 mm	visible red	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61CR0N00
MTPGRN-D110PL/D586-C2P-PO							61CR0P00
MTPGRNI-D400NL/D586-C2P-PO	middle distance diffuse reflection	0...400 mm	infrared light	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61CR0N01
MTPGRNI-D400PNL/D586-C2P-PO							61CR0P01
MTPGRN-D1MNL/D586-C2P-PO	long distance diffuse reflection	0...1 m	visible red	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61CR0N02
MTPGRN-D1MPL/D586-C2P-PO							61CR0P02
MTPG2N-BS300NL/D586-C2P-PO	background suppression	300 mm	visible red	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61C26N00
MTPG2N-BS300PL/D586-C2P-PO							61C26P00
MTPG2-BS300NL/D586-C2P-PO	background suppression	300 mm	visible red	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61C26N01
MTPG2-BS300PL/D586-C2P-PO							61C26P01

1* The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

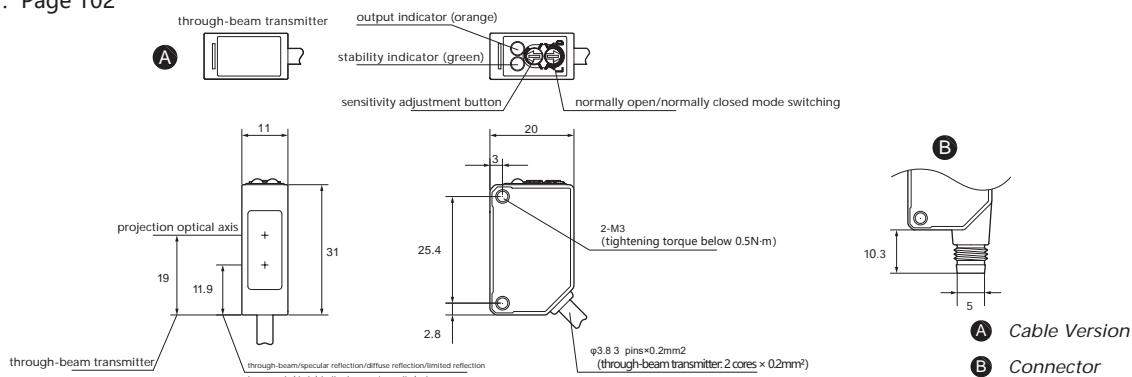
2* For more models, please consult the product manager.

3* The detection distance of reflective plate type depends on the selected reflective plate model.

4* Some detection modes can provide other light source models, please consult the product manager for details.

MTPQX ... 206-C8 ...

- compact housing, suitable for field environments with limited installation space
- excellent performance to meet more application requirements
- sensitivity fine-tuning potentiometer setting, selectable LO/DO output state setting
- complete optical functions and complete product series, can provide Class 1/Class 2 laser light source products
- with sensitivity/sensing distance trimmer potentiometer
- 2m cable version electrical connection*1 or M8 connector electrical connection
- PNP/NPN light and dark state optional output
- wiring diagram: Page T02



Standard Small Square Housing, Universal Photoelectric Sensor, Power Supply Voltage: 10-30 VDC;

Type*2	Detection mode	Rated Sensing Range*3	Light Source *4	Output Function	Connection	Adjustment	ID NO.
MTPQXL1-T30MNL/D206-C8-PO	laser through-beam set	30 m	Class 1 laser cl.1	NPN LO/DO adjustable PNP LO/DO adjustable	4 pins M8 Connector 4 pins M8 Connector	potentiometer adjustment potentiometer adjustment	61Z2QN30 61Z2QP30
MTPQXL1-T30MPL/D206-C8-PO	through-beam set	20 m	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	4 pins M8 Connector 4 pins M8 Connector	potentiometer adjustment potentiometer adjustment	61Z2WN30 61Z2WP30
MTPQX-T20MNL/D206-C8-PO	laser retroreflective	0.2...10 m reflector MTP-250F	Class 2 laser cl.2	NPN LO/DO adjustable PNP LO/DO adjustable	4 pins M8 Connector 4 pins M8 Connector	potentiometer adjustment potentiometer adjustment	61Z2CN30 61Z2CP30
MTPQX-R4MPL/D206-C8-PO	standard retroreflective	0.01...4 m reflector MTV-61	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	4 pins M8 Connector 4 pins M8 Connector	potentiometer adjustment potentiometer adjustment	61Z21N30 61Z21P30
MTPQX-TR2MNL/D206-C8-PO	transparent object detection retroreflective	0...2 m reflector MTP-250F	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	4 pins M8 Connector 4 pins M8 Connector	potentiometer adjustment potentiometer adjustment	61Z2EN30 61Z2EP30
MTPQXL2-D400NL/D206-C8-PO	laser diffuse reflection	400 mm	Class 2 laser cl.2	NPN LO/DO adjustable PNP LO/DO adjustable	4 pins M8 Connector 4 pins M8 Connector	potentiometer adjustment potentiometer adjustment	61Z2BN30 61Z2BP30
MTPQXL2-D400PL/D206-C8-PO	standard diffuse reflection	1 m	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	4 pins M8 Connector 4 pins M8 Connector	potentiometer adjustment potentiometer adjustment	61Z20N30 61Z20P30
MTPQX-D1MNL/D206-C8-PO	laser background suppression	10...300 mm	Class 1 laser cl.1	NPN LO/DO adjustable PNP LO/DO adjustable	4 pins M8 Connector 4 pins M8 Connector	potentiometer adjustment potentiometer adjustment	61Z2FN30 61Z2FP30
MTPQX-BS300NL/D206-C8-PO	standard background suppression	10...300 mm	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	4 pins M8 Connector 4 pins M8 Connector	potentiometer adjustment potentiometer adjustment	61Z26N30 61Z26P30

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

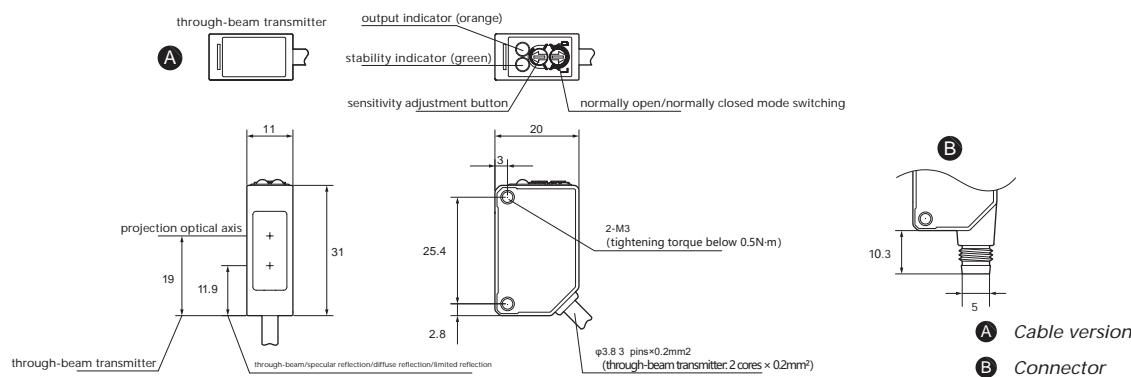
*3 The sensing distance of the retroreflector type depends on the selected reflector model.

*2 For more models, please contact the product manager.

*4 ----

MTPQX ... 206-C2P ...

- compact housing, suitable for field environments with limited installation space
- excellent performance to meet more application requirements
- sensitivity fine-tuning potentiometer setting, light and dark state knob setting
- complete optical functions and complete product series, can provide Class 1/Class 2 laser light source products
- with sensitivity/sensing distance trimmer potentiometer
- 2m cable version electrical connection*1 or M8 connector electrical connection
- PNP/NPN light and dark state optional output
- wiring diagram: Page T02



Standard Small Square Housing, Universal Photoelectric Sensor, Power Supply Voltage: 10-30 VDC;

Type* ²	Detection mode	Rated Sensing Range* ³	Light Source * ⁴	Output Function	Connection	Adjustment	ID NO.
MTPQXL1-T30MNL/D206-C2P-PO	laser through-beam set	30 m	Class 1 laser  cl.1	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2QN00
MTPQXL1-T30MPL/D206-C2P-PO	through-beam set	20 m	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2QP00
MTPQX-T20MNL/D206-C2P-PO	through-beam set	20 m	visible red 640nm	NPN LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2WN00
MTPQX-T20MPL/D206-C2P-PO	laser retroreflective	0.2...10 m	Class 2 laser  cl.2	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2WP00
MTPQXL2-R10MNL/D206-C2P-PO	laser retroreflective	0.2...10 m reflector MTP-250F	Class 2 laser  cl.2	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2CN00
MTPQXL2-R10MPL/D206-C2P-PO	standard retroreflective	0.01...4 m reflector MTV-61	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2CP00
MTPQX-R4MPL/D206-C2P-PO	standard retroreflective	0.01...4 m reflector MTV-61	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z21N00
MTPQX-R4MPL/D206-C2P-PO	standard retroreflective	0.01...4 m reflector MTV-61	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z21P00
MTPQX-TR2MNL/D206-C2P-PO	transparent object detection retroreflective	0...2 m reflector MTP-250F	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2EN00
MTPQX-TR2MPL/D206-C2P-PO	transparent object detection retroreflective	0...2 m reflector MTP-250F	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2EP00
MTPQXL2-D400NL/D206-C2P-PO	laser diffuse reflection	400 mm	Class 2 laser  cl.2	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2BN00
MTPQXL2-D400PL/D206-C2P-PO	laser diffuse reflection	400 mm	Class 2 laser  cl.2	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2BP00
MTPQX-D1MNL/D206-C2P-PO	standard diffuse reflection	1 m	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z20N00
MTPQX-D1MPL/D206-C2P-PO	standard diffuse reflection	1 m	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z20P00
MTPQXL1-BS300NL/D206-C2P-PO	laser background suppression	10...300 mm	Class 1 laser  cl.1	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2FN00
MTPQXL1-BS300PL/D206-C2P-PO	laser background suppression	10...300 mm	Class 1 laser  cl.1	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z2FP00
MTPQX-BS300NL/D206-C2P-PO	standard background suppression	10...300 mm	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z26N00
MTPQX-BS300PL/D206-C2P-PO	standard background suppression	10...300 mm	visible red 640nm	NPN LO/DO adjustable PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61Z26P00

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

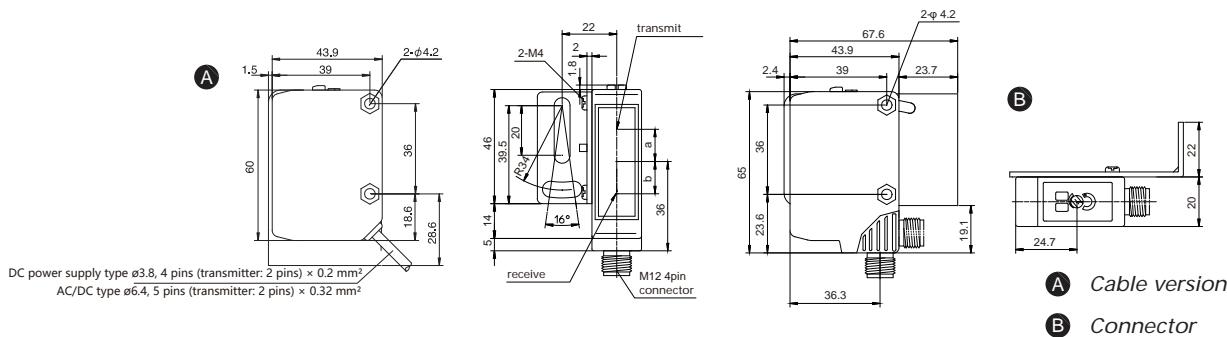
*2 For more models, please contact the product manager.

*3 The sensing distance of the retroreflector type depends on the selected reflector model.

*4 ----

MTPQG- ... 606 ...

- robust housing and compact dimensions
- longer sensing distance and large lens realizes the stability of detection
- includes background suppression, polarizing retroreflector, and through-beam
- AC/DC power supply model sensors can be provided
- with sensitivity/sensing distance trimmer potentiometer
- 2m cable version electrical connection*1 or M12 connector electrical connection
- PNP/NPN selectable LO/DO state output, SPDT relay output
- wiring diagram: Page T02



Large Square Housing, High-Performance Photo Sensor, supply voltage- different types: 10-30 Vdc; 24...240 Vac/dc (SPDT relay output)

Type* ²	Detection mode	Rated Sensing Range* ³	Light Source * ⁴	Output Function	Connection	Adjustment	ID NO.
MTPQG-T70MNL/D656-C12-PO	through-beam set	70 m	visible red	NPN LO/DO adjustable	4 pins M12 Connector	potentiometer adjustment	61V2WN10
MTPQG-T70MPL/D656-C12-PO				PNP LO/DO adjustable	4 pins M12 Connector	potentiometer adjustment	61V2WP10
MTPQG-T70MPL/D656-C2P-PO				PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61V2WP00
MTPQG-T70MRD6532-C2P-PO				AC & DC SPDT relay	2m PVC cable	potentiometer adjustment	61V2WR00
MTPQG-PR12MNL/D656-C12-PO	polarized retroreflective	0.01...12 m reflector MTV-61	visible red	NPN LO/DO adjustable	4 pins M12 Connector	potentiometer adjustment	61V22N10
MTPQG-PR12MPL/D656-C12-PO				PNP LO/DO adjustable	4 pins M12 Connector	potentiometer adjustment	61V22P10
MTPQG-PR12MPL/D656-C2P-PO				PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61V22P00
MTPQG-PR12MRD6532-C2P-PO				AC & DC SPDT relay	2m PVC cable	potentiometer adjustment	61V22R00
MTPQG-BS1MNL/D656-C12-PO	long distance background suppression	0.25...1 m	visible red	PNP LO/DO adjustable	4 pins M12 Connector	potentiometer adjustment	61V26N10
MTPQG-BS1MPL/D656-C12-PO				PNP LO/DO adjustable	4 pins M12 Connector	potentiometer adjustment	61V26P10
MTPQG-BS1MPL/D656-C2P-PO				PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61V26P00
MTPQG-BS1MRD6532-C2P-PO				AC & DC SPDT relay	2m PVC cable	potentiometer adjustment	61V26R00
MTPQG-BS500NL/D656-C12-PO	middle distance background suppression	0.15...0.5 m	visible red	NPN LO/DO adjustable	4 pins M12 Connector	potentiometer adjustment	61V26N11
MTPQG-BS500PL/D656-C12-PO				PNP LO/DO adjustable	4 pins M12 Connector	potentiometer adjustment	61V26P11
MTPQG-BS500PL/D656-C2P-PO				PNP LO/DO adjustable	2m PVC cable	potentiometer adjustment	61V26P01
MTPQG-BS500RD6532-C2P-PO				AC & DC SPDT relay	2m PVC cable	potentiometer adjustment	61V26R01

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

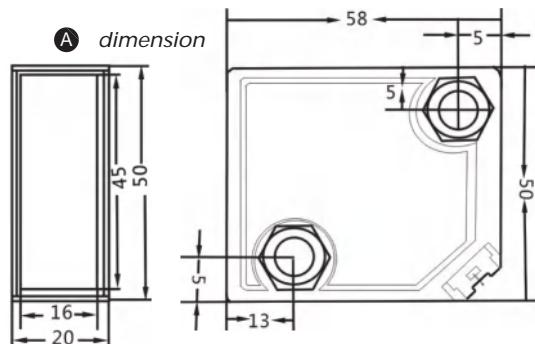
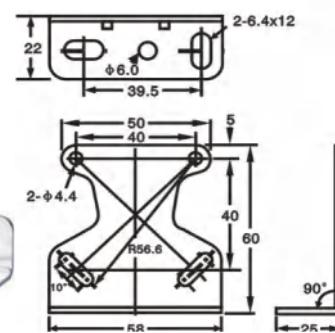
*2 For more models, please contact the product manager.

*4 ----

*3 The sensing distance of the retroreflector type depends on the selected reflector model.

MTPQK- ... 58 ...

- robust housing and compact dimensions
- strong anti-sunlight interference ability, up to 100,000 Lux
- excellent EMC characteristics, strong anti-electromagnetic interference ability
- with output protection, short circuit protection function
- with sensitivity/sensing distance trimmer potentiometer
- 2m cable version electrical connection*1
- PNP/NPN output, SPDT relay output
- wiring diagram: Page 000

**B** mouting brackets

Large Square Housing, Sunlight-Resistant Photoelectric Sensor, Supply Voltage - Depending on Type: 10-30 VDC; SPDT Relay Output available

Type*2	Detection mode	Rated Sensing Range*3	Light Source *4	Output Function	Connection	Adjustment	ID NO.
MTPQKI-T10MND586-C2P-PO	through-beam set	10 m	visible red 940nm	normally open NPN	2m PVC cable	potentiometer adjustment	6158W300
MTPQKI-T10MPD586-C2P-PO				normally open PNP	2m PVC cable	potentiometer adjustment	6158W000
MTPQKI-T10MRD586-C2P-PO				DC power supply SPDT relay	2m PVC cable	potentiometer adjustment	6158W700
MTPQKI-T30MND586-C2P-PO	through-beam set	30 m	infrared 940nm	normally open NPN	2m PVC cable	potentiometer adjustment	6158W301
MTPQKI-T30MPD586-C2P-PO				normally open PNP	2m PVC cable	potentiometer adjustment	6158W001
MTPQKI-T30MRD586-C2P-PO				DC power supply SPDT relay	2m PVC cable	potentiometer adjustment	6158W701
MTPQKI-T50MND586-C2P-PO	through-beam set	50 m	infrared 850nm	normally open NPN	2m PVC cable	potentiometer adjustment	6158W302
MTPQKI-T50MPD586-C2P-PO				normally open PNP	2m PVC cable	potentiometer adjustment	6158W002
MTPQKI-T50MRD586-C2P-PO				DC power supply SPDT relay	2m PVC cable	potentiometer adjustment	6158W702
MTPQK-PR5MND586-C2P-PO	polarized retroreflective	5 m 反光板 MTRF-62	visible red 660nm	normally open NPN	2m PVC cable	potentiometer adjustment	61582300
MTPQK-PR5MPD586-C2P-PO				normally open PNP	2m PVC cable	potentiometer adjustment	61582000
MTPQK-PR5MRD586-C2P-PO				DC power supply SPDT relay	2m PVC cable	potentiometer adjustment	61582700
MTPQKI-D3.5MNL586-C2P-PO	standard diffuse reflection	1...3.5 m	infrared 850nm	normally open NPN	2m PVC cable	potentiometer adjustment	61580300
MTPQKI-D3.5MPL586-C2P-PO				normally open PNP	2m PVC cable	potentiometer adjustment	61580000
MTPQKI-D3.5MRD586-C2P-PO				DC power supply SPDT relay	2m PVC cable	potentiometer adjustment	61580700
MTPQKI-D10MNL586-C2P-PO	standard diffuse reflection	2.5...10 m	infrared 950nm	normally open NPN	2m PVC cable	potentiometer adjustment	61580301
MTPQKI-D10MPL586-C2P-PO				normally open PNP	2m PVC cable	potentiometer adjustment	61580001
MTPQKI-D10MRD586-C2P-PO				DC power supply SPDT relay	2m PVC cable	potentiometer adjustment	61580701

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

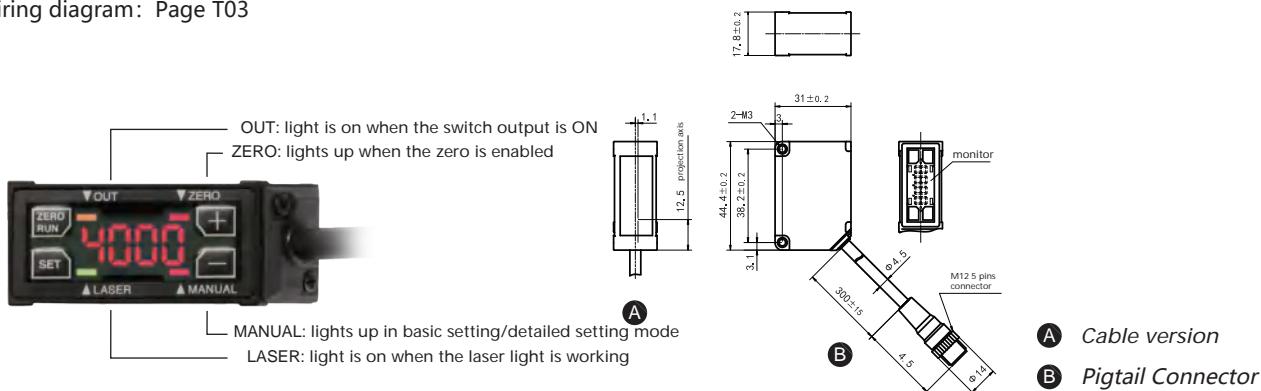
*2 For more models, please contact the product manager.

*3 The sensing distance of the retroreflector type depends on the selected reflector model.

*4 ----

MTPQXAL1(2)-D... 446 ...

- compact ultra-small housing, suitable for field environments with limited installation space
- Ultra-light die-cast aluminum housing, excellent performance to meet more application requirements
- built-in 4-digit display panel, the sensing distance is adjustable by referring to the displayed value
- effectively suppress the deviation of the installation position and the error of the measurement caused by the temperature change
- 4 operation buttons realize multi-function and simple setting
- 2m cable version electrical connection*1 or M12 connector electrical connection
- PNP/NPN switchable plus voltage/current analog output or RS-485 communication output
- wiring diagram: Page T03



Ultra-Small Square Housing, High-Precision Displacement Sensor, Power Supply Voltage: 12-24VDC±10% (Analog Current/485 Communication); 18-24VDC±10% (Analog Voltage)

Type*2	Detection mode	Rated Sensing Range*3	Light Source *4	Output Function	Connection	Adjustment	ID NO.
MTPQXAL1-D10PNSI446-C2P	diffuse reflection displacement sensor	15±5mm repeatability 1μm	Class 1 laser  cl.1 655nm	PNP/NPN 4-20mA	2m PVC cable	teach-in button	6122BU00
MTPQXAL1-D10PNSU446-C2P				PNP/NPN 0-10V	2m PVC cable	teach-in button	6122BV00
MTPQXAL1-D10PNSI446-C120.3M				PNP/NPN 4-20mA	5 pins M12 300mm cable	teach-in button	6122BU80
MTPQXAL1-D10PNSU446-C120.3M				PNP/NPN 0-10V	5 pins M12 300mm cable	teach-in button	6122BV80
MTPQXAL1-D10RS4446-C120.3M				RS-485 Communication Output	5 pins M12 300mm cable	teach-in button	6122BR80
MTPQXAL1-D30PNSI446-C2P	diffuse reflection displacement sensor	35±15mm repeatability 6μm	Class 1 laser  cl.1 655nm	PNP/NPN 4-20mA	2m PVC cable	teach-in button	6122BU01
MTPQXAL1-D30PNSU446-C2P				PNP/NPN 0-10V	2m PVC cable	teach-in button	6122BV01
MTPQXAL1-D30PNSI446-C120.3M				PNP/NPN 4-20mA	5 pins M12 300mm cable	teach-in button	6122BU81
MTPQXAL1-D30PNSU446-C120.3M				PNP/NPN 0-10V	5 pins M12 300mm cable	teach-in button	6122BV81
MTPQXAL1-D30RS4446-C120.3M				RS-485 Communication Output	5 pins M12 300mm cable	teach-in button	6122BR81
MTPQXAL2-D100PNSI446-C2P	diffuse reflection displacement sensor	100±50mm repeatability 20μm	Class 1 laser  cl.1 Class 2 laser  cl.2 655nm	PNP/NPN 4-20mA	2m PVC cable	teach-in button	6122BU02
MTPQXAL2-D100PNSU446-C2P				PNP/NPN 0-10V	2m PVC cable	teach-in button	6122BV02
MTPQXAL1-D100PNSI446-C120.3M				PNP/NPN 4-20mA	5 pins M12 300mm cable	teach-in button	6122BU82
MTPQXAL1-D100PNSU446-C120.3M				PNP/NPN 0-10V	5 pins M12 300mm cable	teach-in button	6122BV82
MTPQXAL1-D100RS4446-C120.3M				RS-485 Communication Output	5 pins M12 300mm cable	teach-in button	6122BR82
MTPQXAL2-D200PNSI446-C120.3M	diffuse reflection displacement sensor	150±100mm repeatability 60μm	Class 2 laser  cl.2 655nm	PNP/NPN 4-20mA	5 pins M12 300mm cable	teach-in button	6122BU83
MTPQXAL2-D200PNSU446-C120.3M				PNP/NPN 0-10V	5 pins M12 300mm cable	teach-in button	6122BV83
MTPQXAL2-D200RS4446-C120.3M				RS-485 Communication Output	5 pins M12 300mm cable	teach-in button	6122BR83

*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the suffix is C120.3M.

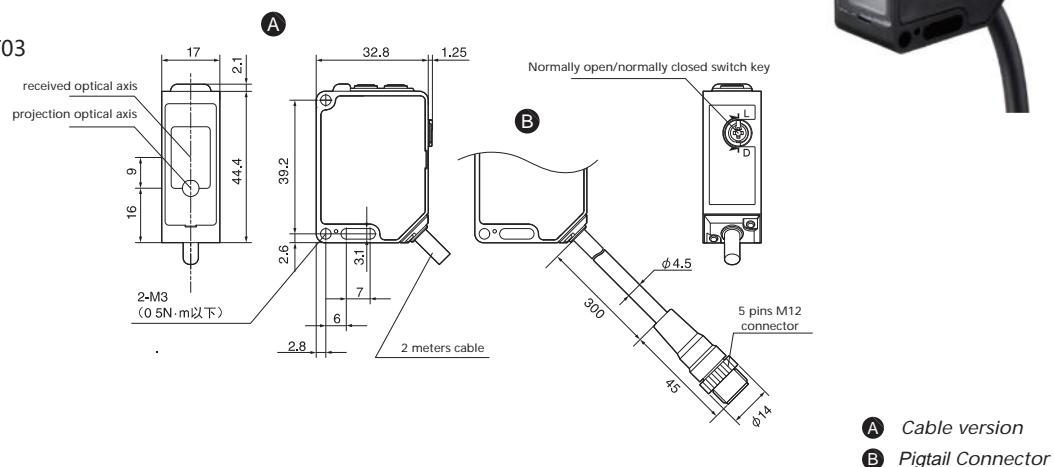
*2 For more models, please contact the product manager.

*3 ----

*4 ----

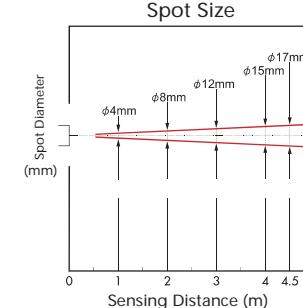
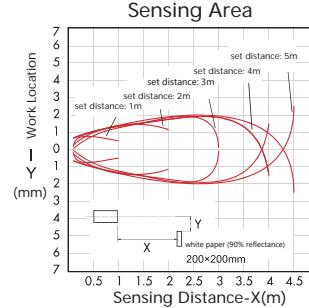
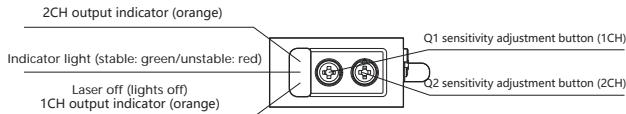
MTPQLL1-TD4500 ... 

- using TOF (Time Of Flight) time-of-flight technology
- not affected by the inclination angle of the object surface and different colors
- using Class1 (level 1) laser light source, it can realize long-distance reliable detection
- built-in dual lasers to effectively suppress the effects of temperature drift
- with sensitivity/sensing distance multi-turn adjustment potentiometer
- 2m cable version electrical connection*1
- PNP/NPN output
- wiring diagram: Page T03



Square Housing, TOF Technology, Long-Distance Laser Photoelectric Sensor, Power Supply Voltage: 10-30 VDC±10%

Type*2	Detection mode	Rated Sensing Range*3	Light Source *4	Output Function	Connection	Adjustment	ID NO.
MTPQLL1-TD4500NS446-C2P	TOF Technology Long Distance Diffuse Type	0...4.5 m	Class 1 laser  650nm	NPN normally open/ normally closed	2m PVC cable	potentiometer adjustment	61T4BM00
MTPQLL1-TD4500PS446-C2P				PNP normally open/ normally closed	2m PVC cable	potentiometer adjustment	61T4BK00
MTPQLL1-TD4500NS446-C8				NPN normally open/ normally closed	4 pins M8 Connector	potentiometer adjustment	61T4BM30
MTPQLL1-TD4500PS446-C8				PNP normally open/ normally closed	4 pins M8 Connector	potentiometer adjustment	61T4BK30
MTPQLL1-TD4500NS446-C120.3M				NPN normally open/ normally closed	5 pins M12 300mm cable	potentiometer adjustment	61T4BM81
MTPQLL1-TD4500PS446-C120.3M				PNP normally open/ normally closed	5 pins M12 300mm cable	potentiometer adjustment	61T4BK80
MTPQLL1-TD4500NDS446-C2P				NPN normally open/ normally closed	2m PVC cable	potentiometer adjustment	61T4BM01
MTPQLL1-TD4500PDS446-C2P				PNP normally open/ normally closed	2m PVC cable	potentiometer adjustment	61T4BK01
MTPQLL1-TD4500NDS446-C8				NPN normally open/ normally closed	4 pins M8 Connector	potentiometer adjustment	61T4BM31
MTPQLL1-TD4500PDS446-C8				PNP normally open/ normally closed	4 pins M8 Connector	potentiometer adjustment	61T4BK31
MTPQLL1-TD4500NDS446-C120.3M				NPN normally open/ normally closed	5 pins M12 300mm cable	potentiometer adjustment	61T4BM80
MTPQLL1-TD4500PDS446-C120.3M				PNP normally open/ normally closed	5 pins M12 300mm cable	potentiometer adjustment	61T4BK81



*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

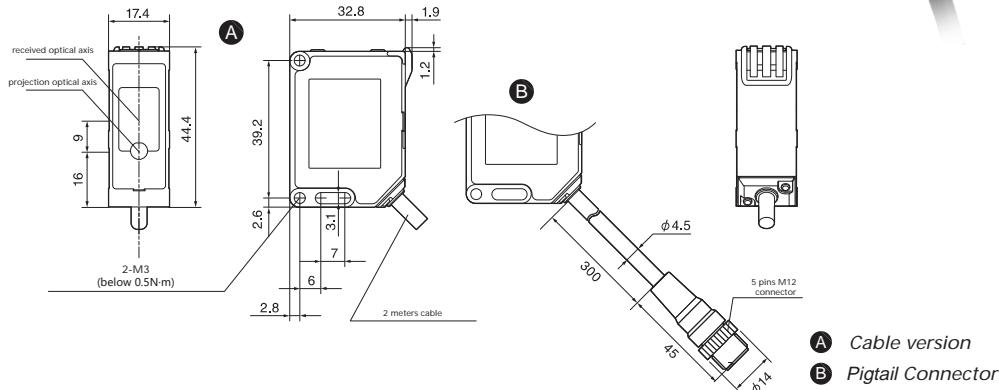
*2 For more models, please contact the product manager.

*3 The sensing distance of the retroreflector type depends on the selected reflector model.

*4 -----

MTPQLL1-TD2500 ...

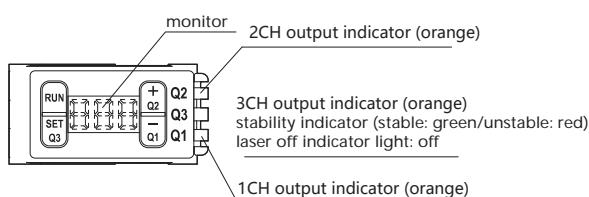
- using TOF (Time Of Flight) time-of-flight technology
- not affected by the inclination angle of the object surface and different colors
- using Class1 (level 1) laser light source, it can realize long-distance reliable detection
- built-in dual lasers to effectively suppress the effects of temperature drift
- intuitive display panel, teaching button + double threshold teach-in button
- 2m cable version electrical connection*1
- switching value + analog output / 3 switching value outputs
- wiring diagram: Page T03



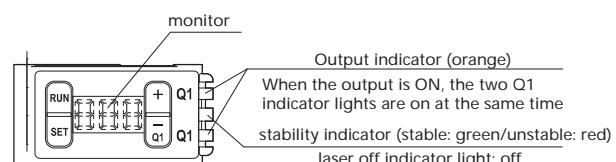
Square Housing, TOF Technology, Digital Laser Photoelectric Sensor, Power Supply Voltage: 10-30 VDC±10%

Type*2	Detection mode	Rated Sensing Range*3	Light Source *4	Output Function	Connection	Adjustment	ID NO.
MTPQLL1-TD2500PNSIU446-C2P	TOF Technology	0...2.5 m	 cl.1 650nm	PNP/NPN 4-20mA/0-10V	2mPVC cable	potentiometer adjustment	61T2BW00
MTPQLL1-TD2500PNSIU446-C120.3M	Digital Display Diffuse Type			PNP/NPN 4-20mA/0-10V	5 pins M12 Connector 300mm cable	potentiometer adjustment	61T4BW80
MTPQLL1-TD2500PNTS446-C2P	3 way PNP/NPN			2mPVC cable	potentiometer adjustment	61T2BX00	
MTPQLL1-TD2500PNTS446-C120.3M	3 way PNP/NPN			5 pins M12 Connector 300mm cable	potentiometer adjustment	61T4BX80	

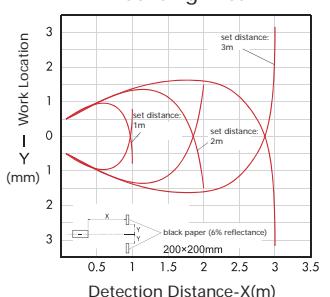
3 switch outputs type-display panel



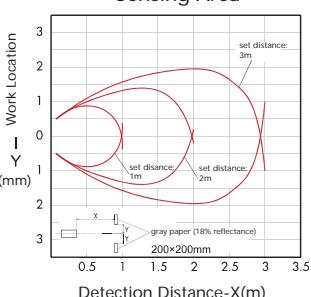
analog output type-display panel



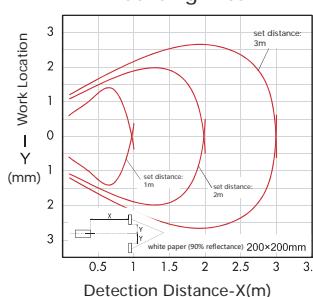
Sensing Area



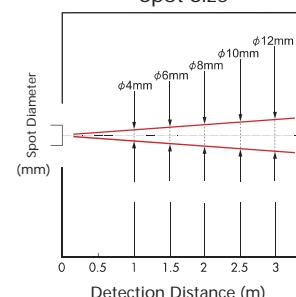
Sensing Area



Sensing Area



Spot Size



*1 The electrical connection method of Pigtail type wire to connector plug can be customized, and the length of wire/connector type can be customized.

*2 For more models, please contact the product manager.

*3 The sensing distance of the retroreflector type depends on the selected reflector model.

*4 ----

L30 Standard Version With Integrated Safety Light Curtain

- safety type 2 and 4 models optional (Type-2 / Type-4)
- basic MIHL30...A/B... and enhanced MIHL30...EA/B... are available
- control distance optional 0...4m and 0...12m
- wide protective height range (160 to 1810mm)
- short response time, 14mm/30mm/40mm/50mm/90mm resolution optional
- new compact and robust shell
- enhanced MIHL30...EA/B... models with optional manual/auto restart and EDM
- wiring diagram: Page T04



A-finger protection B-hand protection C-presence control D-body protection



L30 Standard Type, Integrated Safety Light Curtain, Type-4, Safety Level 4

Type*1	Resolution	Control Distance*2	Protection Height	Number of Beams	Response Time*3	Connection *4	Output Function	ID NO.
MIHL30-SQ160-PDOS6-EA41	14mm 	0...3m/ 0...6m optional	160mm	15	4	Emitter: 5 pins M12 Connector Receiver: 8 pins M12 Connector	OSSD 2 x PNP OSSD Output	61RJL100
MIHL30-SQ310-PDOS6-EA41			310mm	30	5.5			61RJL101
MIHL30-SQ460-PDOS6-EA41			460mm	45	7.5			61RJL102
MIHL30-SQ610-PDOS6-EA41			610mm	60	9			61RJL103
MIHL30-SQ760-PDOS6-EA41			760mm	75	11			61RJL104
MIHL30-SQ910-PDOS6-EA41			910mm	90	13			61RJL105
MIHL30-SQ1060-PDOS6-EA41			1060mm	105	14.5			61RJL106
MIHL30-SQ1210-PDOS6-EA41			1210mm	120	16.5			61RJL107
MIHL30-SQ1360-PDOS6-EA41			1360mm	135	18			61RJL108
MIHL30-SQ1510-PDOS6-EA41			1510mm	150	20			61RJL109
MIHL30-SQ1660-PDOS6-EA41			1660mm	165	22			61RJL110
MIHL30-SQ1810-PDOS6-EA41			1810mm	180	23.5			61RJL111
MIHL30-SQ160-PDOS6-EB43	30mm 	0...4m/ 0...12m optional	160mm	8	4	Emitter: 5 pins M12 Connector Receiver: 8 pins M12 Connector	OSSD 2 x PNP OSSD Output	61RJL112
MIHL30-SQ310-PDOS6-EB43			310mm	16	5.5			61RJL113
MIHL30-SQ460-PDOS6-EB43			460mm	23	7.5			61RJL114

*1 For other resolution models, please consult the product manager for details.

*2 The teaching line input selects the range.

*3 ----

*4 ----

Type*1	Resolution	Control Distance*2	Protection Height	Number of Beams	Response Time*3	Connection *4	Output Function	ID NO.
MIHL30-SQ610-PDOS6-EB43	30mm 	0...4m/ 0...12m optional	610mm	31	10	Emitter: 5 pins M12 Connector	OSSD 2 x PNP OSSD Output	61RJL115
MIHL30-SQ760-PDOS6-EB43			760mm	38	11			61RJL116
MIHL30-SQ910-PDOS6-EB43			910mm	46	13			61RJL117
MIHL30-SQ1060-PDOS6-EB43			1060mm	53	14.5			61RJL118
MIHL30-SQ1210-PDOS6-EB43			1210mm	61	16			61RJL119
MIHL30-SQ1360-PDOS6-EB43			1360mm	68	17.5	Receiver: 8 pins M12 Connector	61RJL120 61RJL121 61RJL122 61RJL123	
MIHL30-SQ1510-PDOS6-EB43			1510mm	76	19.5			61RJL121
MIHL30-SQ1660-PDOS6-EB43			1660mm	83	21			61RJL122
MIHL30-SQ1810-PDOS6-EB43			1810mm	91	22.5			61RJL123

L30 Standard Type, Integrated Safety Light Curtain, Type-2, Safety Level 2

Type*1	Resolution	Control Distance*2	Protection Height	Number of Beams	Response Time*3	Connection *4	Output Function	ID NO.
MIHL30-SQ160-PDOS6-EB23	30mm 	0...4m/ 0...12m optional	160mm	8	4.5	Emitter: 5 pins M12 Connector	OSSD 2 x PNP OSSD Output	61RJL124
MIHL30-SQ310-PDOS6-EB23			310mm	16	6			61RJL125
MIHL30-SQ460-PDOS6-EB23			460mm	23	8			61RJL126
MIHL30-SQ610-PDOS6-EB23			610mm	31	10			61RJL127
MIHL30-SQ760-PDOS6-EB23			760mm	38	11			61RJL128
MIHL30-SQ910-PDOS6-EB23			910mm	46	13	Receiver: 8 pins M12 Connector	61RJL129 61RJL130 61RJL131 61RJL132 61RJL133	61RJL129
MIHL30-SQ1060-PDOS6-EB23			1060mm	53	14.5			61RJL130
MIHL30-SQ1210-PDOS6-EB23			1210mm	61	16			61RJL131
MIHL30-SQ1360-PDOS6-EB23			1360mm	68	17.5			61RJL132
MIHL30-SQ1510-PDOS6-EB23			1510mm	76	19.5			61RJL133
MIHL30-SQ1660-PDOS6-EB23			1660mm	83	21			61RJL134
MIHL30-SQ1810-PDOS6-EB23			1810mm	91	22.5			61RJL135

Safety Relay
SM114-4R1-CTC, Order No.: 61AS0001

Class 4 Safety Rating - Type4 Safety Light Curtain Relay for proper connection between safety light curtains and machine shutdown circuits output signal and two-way signal of the switching device Output contacts: 2 NO safety output contacts and 1 feedback/EDM NC contact


SM114-4RM-CTC, Order No.: 61AS0002

Class 4 Safety Rating - Type4 Safety Light Curtain Relay integrated muting function with logic connection of 2 sensors shield pause time optional Output contacts: 2 NO safety output contacts and 1 feedback/EDM NC contact

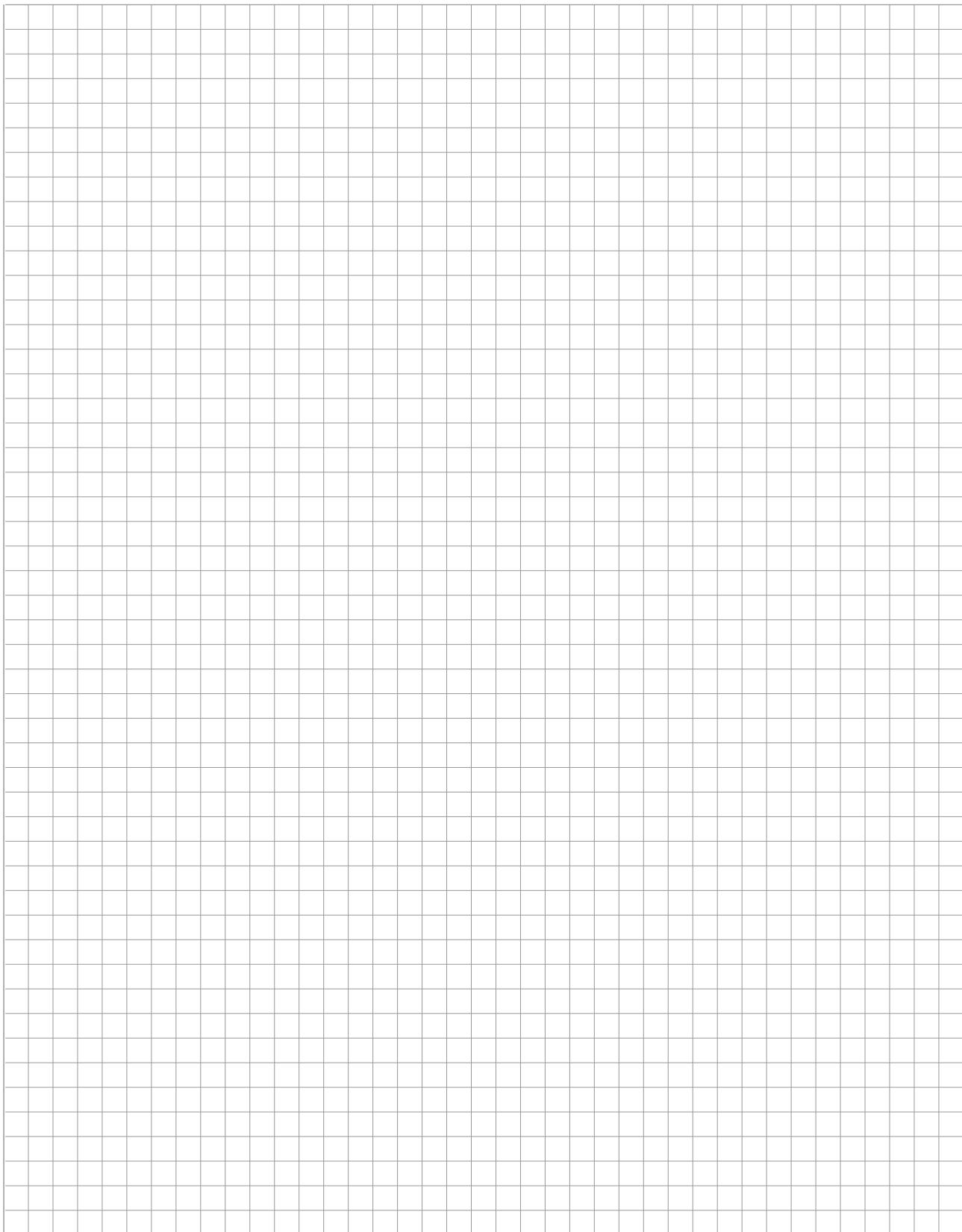


*1 For other resolution models, please consult the product manager for details.

*3 ----

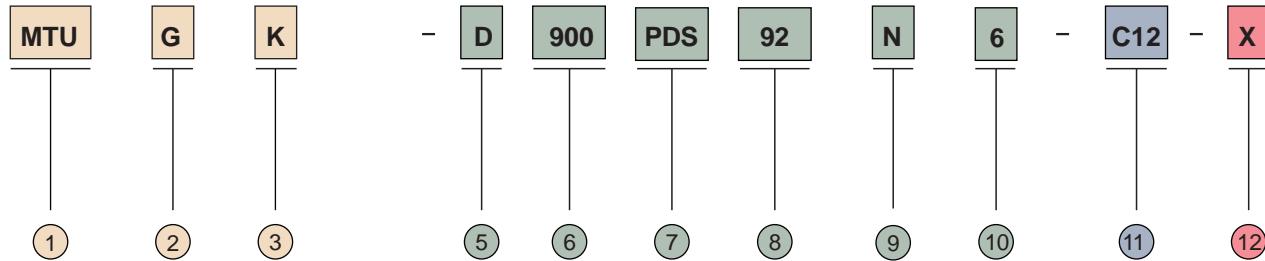
*2 The teaching line input selects the range.

*4 ----





- *Ultrasonic Sensors*



1 MTU ultrasonic sensors

2 Shape

G - threaded cylindrical - M18, axial emit
 G2 - threaded cylindrical - M18, radial emit
 I - threaded cylindrical - M30
 Q square
 - QM, QP
 S groove
 - SC8

3 Housing materials

Blank - plastic
 S - stainless steel
 N - nickel-plated brass

5 Sensing Mode
 D - diffuse reflection
 R - retroreflective / BGS

6 Sensing Distance
 0 mm ... 8 m

7 Electrical Output

PS - DC, PNP, normally open/normally closed selectable
 PS - DC, PNP, normally open/normally closed selectable
 PDS - dual PNP output
 NDS - dual NPN output
 NCO - DC, NPN, normally open and normally closed
 PCO - DC, PNP, normally open and normally closed
 I4 - analog output, 4...20mA
 U0 - analog output, 0...10V
 IU - analog output, 4...20mA/0...10V
 PI - PNP/4...20mA
 PU - PNP/0...10V
 NI - NPN/4...20mA
 NU - NPN/0...10V
 PNSIU - PNP/NPN bipolar+
 4...20mA/0...10V adjustable output
 RS4 - RS485 communication output
 Blank - no output

11 Electrical Connection

C12 - M12x1 connector
 C8 - M8x1 connector
 CTC - wiring terminal
 C*P - straight outlet, PVC outer jacket, cable length (unit: m)
 C*R - straight outlet, PUR outer jacket, cable length (unit: m)
 C*T - straight outlet, teflon outer jacket, cable length (unit: m)
 C*F - straight outlet, PTFE outer jacket, cable length (unit: m)
 C12*M - *m cable with M12 straight connector
 C12L*M - *m cable with M12 angled connector
 C8*M - *m cable with M8 straight connector
 C8L*M - *m cable with M8 angled connector
 C8R*M - *m cable with Ø8 straight connector

12 Additional Information
 Blank - no additional information,
 preset sensitivity cannot be adjusted
 PB - teach-in button
 PO - potentiometer adjustment
 TW - teach-in wire adjustment
 CT - teach-in plug adjustment

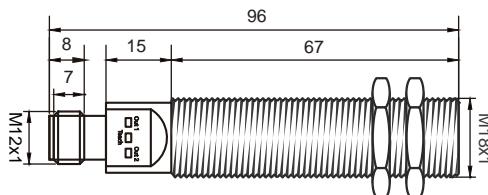
8 Housing Dimensions
 10, 12, 18, 20, 30, 50 ...

9 Status Indicator
 Blank - LED
 N - no LED

10 Supply Voltage
 6 - 10 ... 30VDC

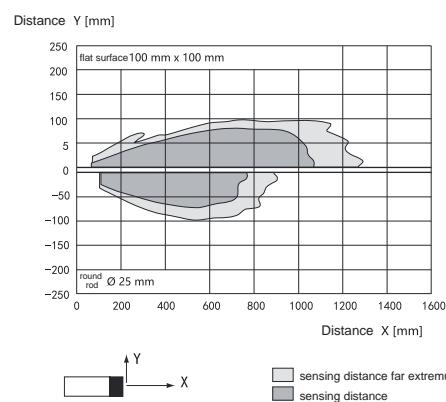
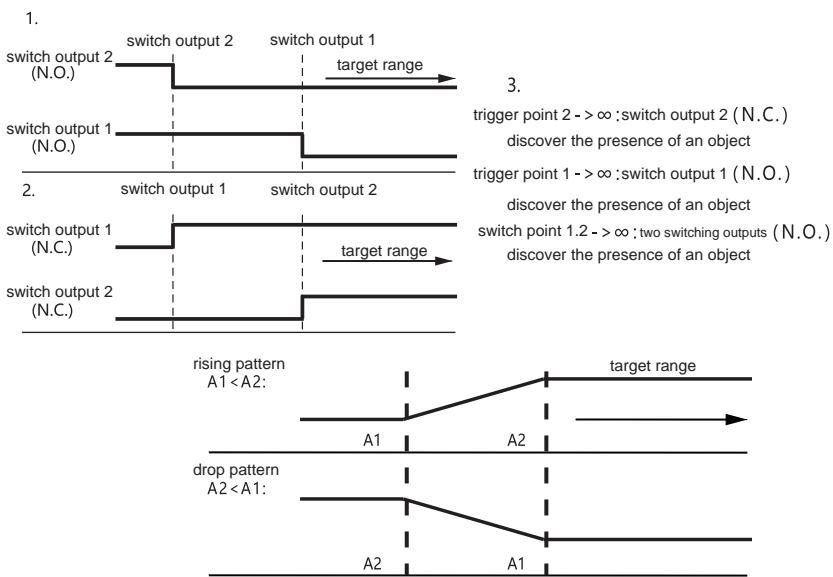
MTUGB ... 966-C12 ...

- M18x1 standard length housing products for most applications
- double switch output model, the switch point and normally open and normally closed output mode can be set, and 3 different output modes can be set
- analog output model, output slope can be set, with synchronization function
- sensing range is adjusted through the remote teach-in line, and the blind area is extremely small
- multi-function indicator light, output status, teach-in function indication
- IP67 protection degree, metal housing, temperature compensation function
- M12 connector electrical connection
- wiring diagram: Page T05



Ultrasonic Sensor, M18 Standard Type, M12 Connector Type, Supply Voltage: 10-30 VDC

Type*1	Housing Material*2	Sensing Distance	Detection Mode*3	Output Function	Connection	Adjustment	ID NO.
MTUGB-D1MNCO966-C12-TW	nickel-plated brass	70...1000mm	diffuse reflection	NPN Normally open and normally closed	5 pins M12 Connector	remote teaching line	61U18N10
MTUGB-D1MPCO966-C12-TW	nickel-plated brass	70...1000mm	diffuse reflection	PNP Normally open and normally closed	5 pins M12 Connector	remote teaching line	61U18P10
MTUGB-D1MI4966-C12-TW	nickel-plated brass	70...1000mm	diffuse reflection	4 ... 20 mA	5 pins M12 Connector	remote teaching line	61U18I10
MTUGB-D1MU0966-C12-TW	nickel-plated brass	70...1000mm	diffuse reflection	0 ... 10 V	5 pins M12 Connector	remote teaching line	61U18U10



*1 For more models, please consult the product manager.

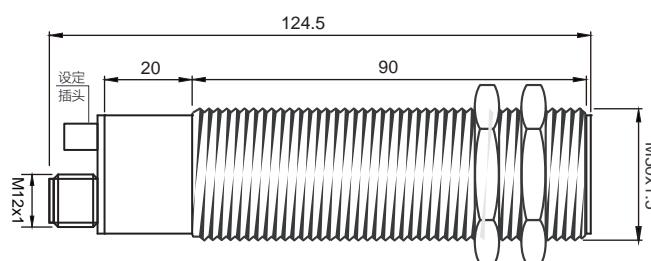
*2 For other housing material models, please consult the product manager for details.

*3 The sensing distance of the retroreflector type depends on the selected reflector model.

*4 -----

MTUIB ... 1256-C12 ...

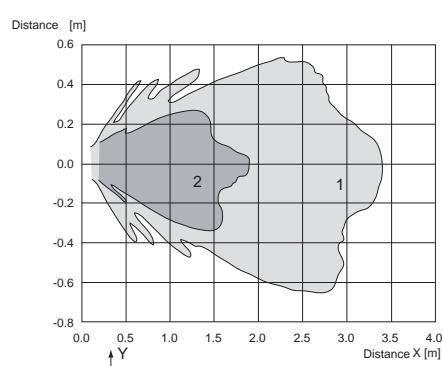
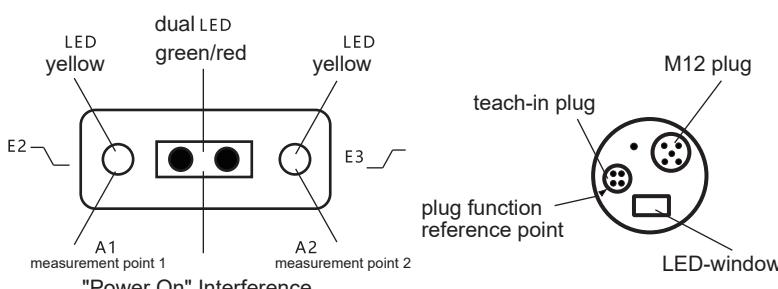
- M30x1.5 standard length housing products suitable for most applications
- double switch output model, the switch point and normally open and normally closed output mode can be set, and 3 different output modes can be set
- analog output model, output slope can be set, with synchronization function
- adjust the sensing range and output mode by setting the plug
- multi-function indicator light, output status, teach-in function indication
- IP67 protection degree, metal housing, temperature compensation function
- M12 connector electrical connection
- wiring diagram: Page T05



Ultrasonic Sensor, M30 Standard Type, M12 Connector Type, Supply Voltage: 10-30 VDC

Type*1	Housing Material*2	Sensing Distance	Detection Mode*3	Output Function	Connection	Adjustment	ID NO.
MTUIB-D2MNCO1256-C12-CT				NPN Normally open and normally closed	5 pins M12 Connector	teach-in plug	61U30N10
MTUIB-D2MPCO1256-C12-CT	nickel-plated brass	300...2000 mm	diffuse reflection	PNP Normally open and normally closed	5 pins M12 Connector	teach-in plug	61U30P10
MTUIB-D2MIU1256-C12-CT				4 ... 20 mA 0 ... 10 V	5 pins M12 Connector	teach-in plug	61U30Z10

Response Characteristic Curve



*1 For more models, please consult the product manager.

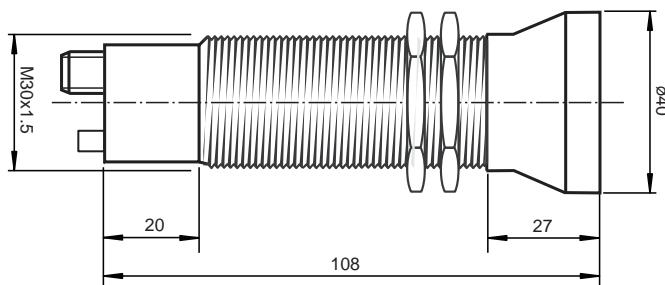
*2 For other housing material models, please consult the product manager for details.

*3 The sensing distance of the retroreflector type depends on the selected reflector model.

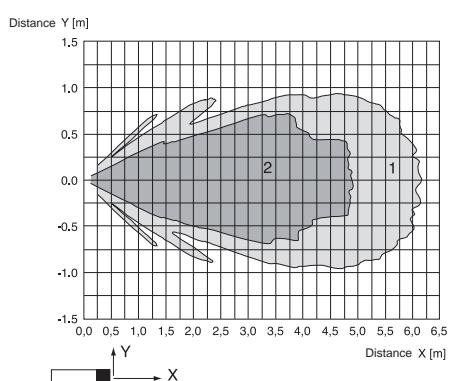
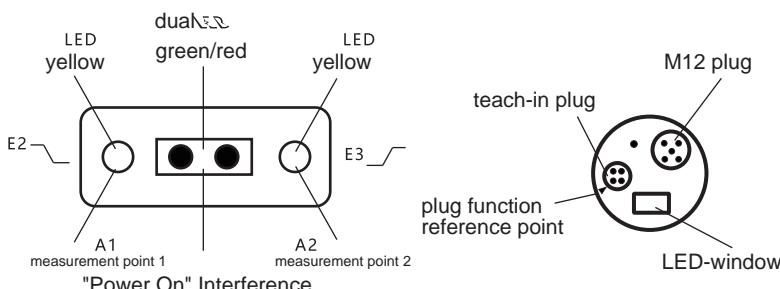
*4 -----

MTUIB ... 1306-C12 ...

- M30x1.5 housing products with extended sensing distance, max. adjustment range: 4000mm
- double switch output model, the switch point and normally open and normally closed output can be set, and 3 different output modes can be set
- analog output model, output slope can be set, with synchronization function
- adjust the sensing range and output mode by setting the plug
- multi-function indicator light, output status, teach-in function indication
- IP67 protection degree, metal housing, temperature compensation function
- M12 connector electrical connection
- wiring diagram: Page T05


Ultrasonic Sensor, M30 Enhanced Sensing Distance, M12 Connector, Power Supply Voltage: 10-30 VDC

Type*1	Housing Material*2	Sensing Distance	Sensing Mode*3	Output Function	Connection	Adjustment	ID NO.
MTUIB-D4MNCO1306-C12-CT	nickel-plated brass	300...4000 mm	diffuse reflection	NPN Normally open and normally closed	5 pins M12 Connector	teach-in plug	61U30N11
MTUIB-D4MPCO1306-C12-CT				PNP Normally open and normally closed	5 pins M12 Connector	teach-in plug	61U30P11
MTUIB-D4MIU1306-C12-CT				4 ... 20 mA 0 ... 10 V	5 pins M12 Connector	teach-in plug	61U30Z11

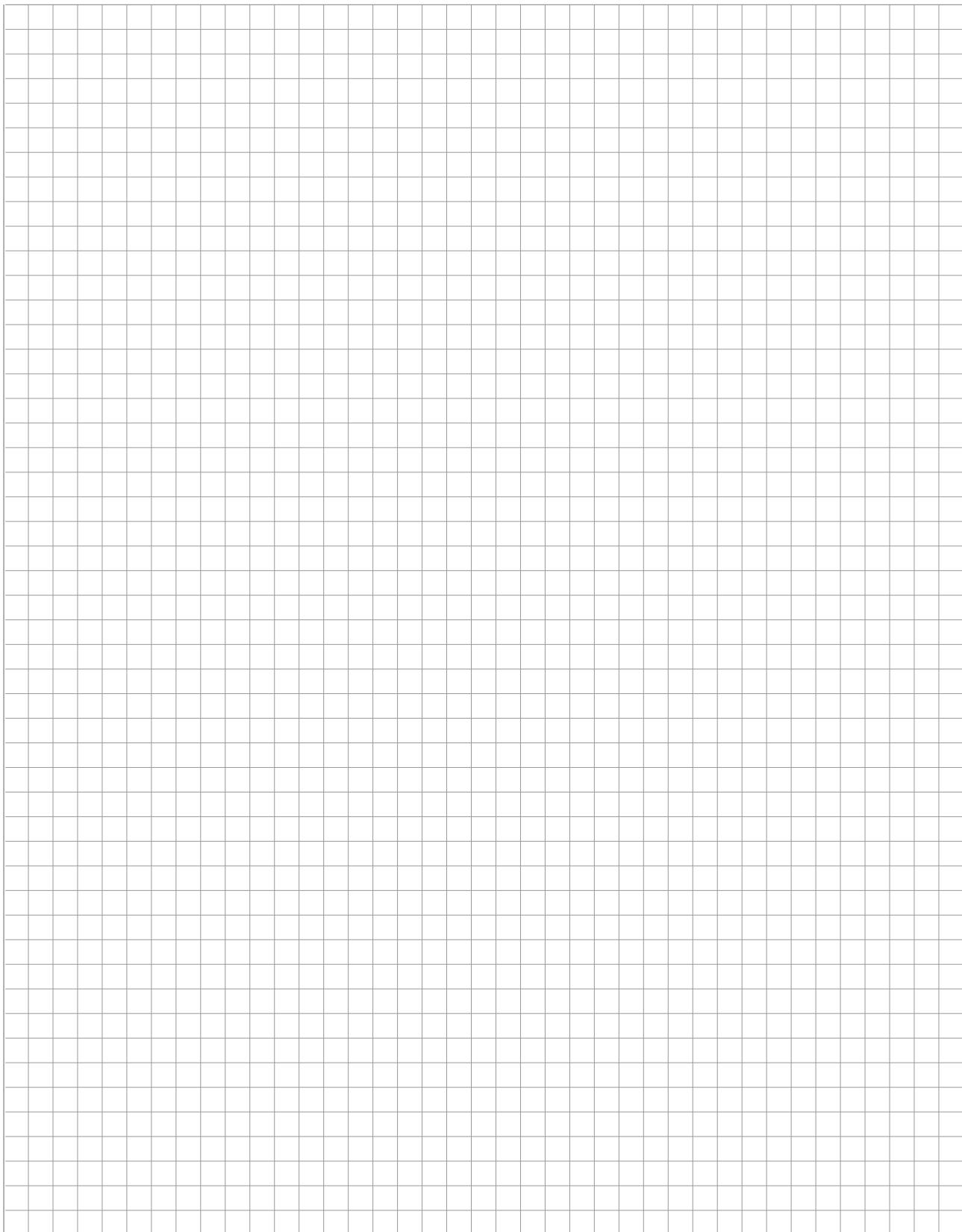
Response Characteristic Curve


*1 For more models, please consult the product manager.

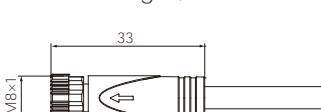
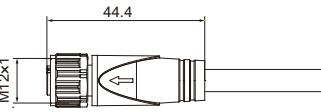
*2 For other housing material models, please consult the product manager for details.

*3 The sensing distance of the retroreflector type depends on the selected reflector model.

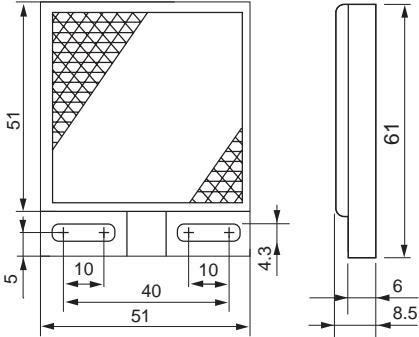
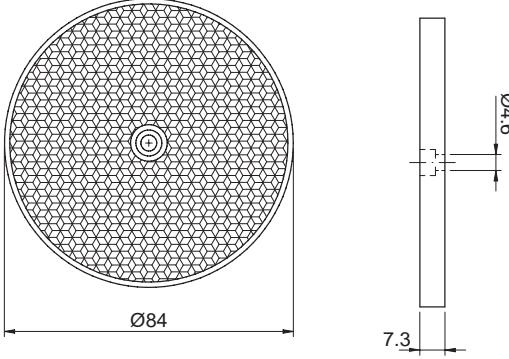
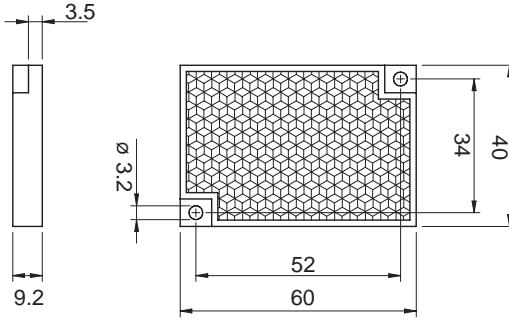
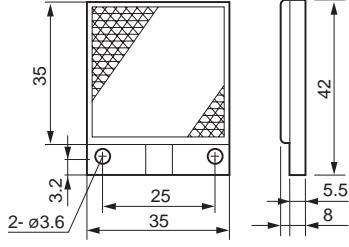
*4 ----

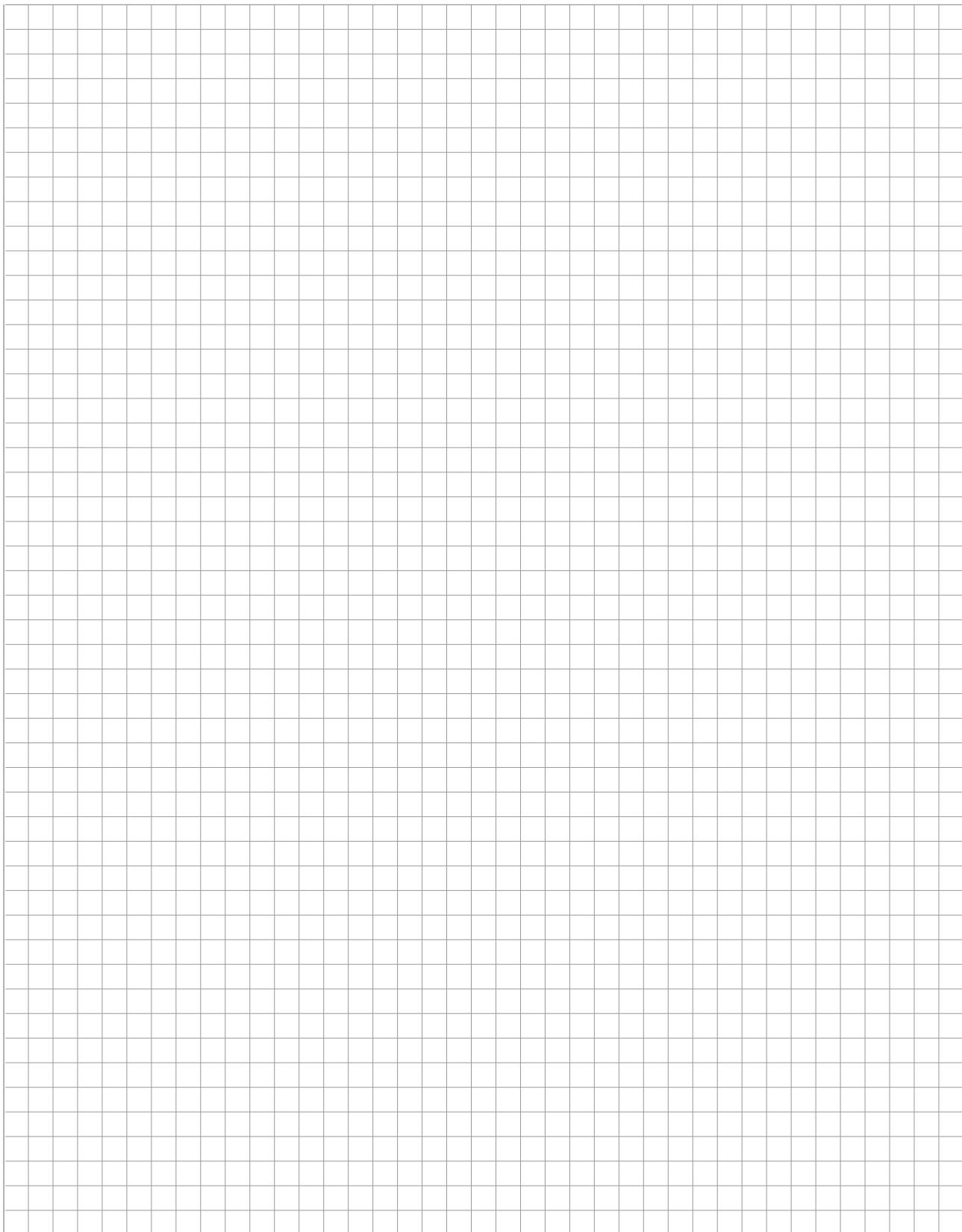


- *Accessories*

Connector*1		*1 For other connector product information, please consult the product manager.			
Pre-molding Type		Pins	Cable Length	Order Number	Model
M8x1 straight, female	 	3	2m	10080007	SAF3-2/C00
			5m	10080008	SAF3-5/C00
			10m	10080009	SAF3-10/C00
M8x1 angled, female		4	2m	10080010	SAF4-2/C00
			5m	10080011	SAF4-5/C00
			10m	10080012	SAF4-10/C00
M12x1 straight, female	 	4	2m	10011010	EAF4-2/C00
			5m	10011011	EAF4-5/C00
			10m	10011012	EAF4-10/C00
M12x1 angled, female		5	2m	10011020	EAF4.5-2/C00
			5m	10011021	EAF4.5-5/C00
			10m	10011022	EAF4.5-10/C00
		8	2m	10011800	EAF8-2/C00
			5m	10011801	EAF8-5/C00
			10m	10011802	EAF8-10/C00
		4	2m	10011040	EWAF4-2/C00
			5m	10011041	EWAF4-5/C00
			10m	10011042	EWAF4-10/C00
		5	2m	10011050	EWAF4.5-2/C00
			5m	10011051	EWAF4.5-5/C00
			10m	10011052	EWAF4.5-10/C00
		8	2m	10011810	EWAF8-2/C00
			5m	10011811	EWAF8-5/C00
			10m	10011812	EWAF8-10/C00

Mounting Brackets - Inductive & Ultrasonic Sensors					
Model	Description	Applicable Sensor	Order No.	Dimension	
MTBS-12	Glass filled nylon material PA, for cylindrical sensors Clip-on modular mounting brackets M4 screw mounting holes	M12 threaded cylinder shell inductive sensor	1612M001		
MTBS-18	Glass filled nylon material PA, for cylindrical sensors Clip-on modular mounting brackets M4 screw mounting holes	M18 threaded cylinder shell inductive sensor ultrasonic sensor	1612M002		
MTBS-30	Glass filled nylon material PA, for cylindrical sensors Clip-on modular mounting brackets M5 screw mounting holes	M30 threaded cylinder shell inductive sensor ultrasonic sensor	1612M003		
MTBS-40	High-strength industrial plastic material PP, for square sensors Clip-on Modular mounting brackets M6 screw mounting holes Optional rails and partitions	P40 square shell inductive sensor	1612M004		
MTLM-40	Sturdy stainless steel Suitable for square sensors Sheet chute mounting bracket M4 screw mounting holes	P40 square shell inductive sensor	1612M005		
MTRB-12	L-shaped stainless steel mounting bracket For cylindrical sensors M5 screw mounting slot	M12 threaded cylinder shell inductive sensor	1612M006		
MTRB-18	L-shaped stainless steel mounting bracket For cylindrical sensors M5 screw mounting slot	M18 threaded cylinder shell inductive sensor ultrasonic sensor	1612M007		
MTRB-30	L-shaped stainless steel mounting bracket For cylindrical sensors M5 screw mounting slot	M30 threaded cylinder shell inductive sensor ultrasonic sensor	1612M008		

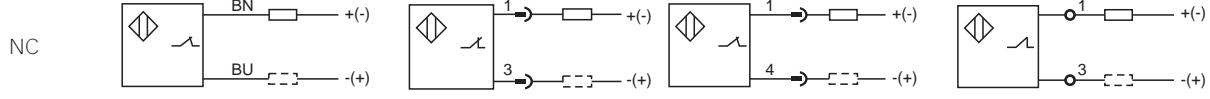
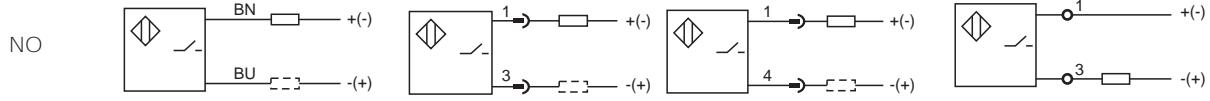
Reflector - Photoelectric Sensor				
Model	Reflection Coefficient	Applicable Sensor	Order No.	Dimension
MTRF-62	1.0	standard specular reflection polarized mirror reflection photoelectric sensors	1612ML00	 <p>Technical drawing of MTRF-62 reflector. Top view shows a square with a diagonal hatched section and two rectangular cutouts at the bottom. Side view shows a rectangular profile with dimensions: height 61, width 40, thickness 4.3, and base width 51. Bottom view shows a cross-section with a central slot of width 10 and height 5, flanked by two vertical supports of width 10 and height 5.</p>
MTRF-110	1.2	standard specular reflection polarized mirror reflection photoelectric sensors	1612ML01	 <p>Technical drawing of MTRF-110 reflector. Top view shows a circular pattern of hexagons with a central hole. Side view shows a rectangular profile with a flange. Dimensions: diameter Ø84, height 7.3, and flange width Ø4.6.</p>
MTP-RF1	1.0	standard specular reflection polarized mirror reflection photoelectric sensors	1612M002	 <p>Technical drawing of MTP-RF1 reflector. Top view shows a rectangular pattern of hexagons with a central hole. Side view shows a rectangular profile with a flange. Dimensions: height 9.2, flange height 3.5, flange width Ø3.2, and base width 34.</p>
MTRF-42	1.0	standard specular reflection polarized mirror reflection photoelectric sensors	1612M003	 <p>Technical drawing of MTRF-42 reflector. Top view shows a square with a diagonal hatched section and two rectangular cutouts at the bottom. Side view shows a rectangular profile with a flange. Dimensions: height 35, flange height 3.2, flange width Ø3.6, and base width 42.</p>



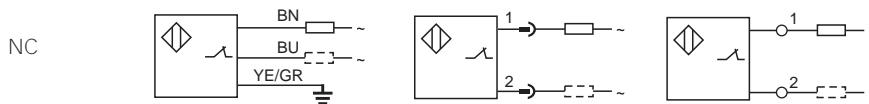
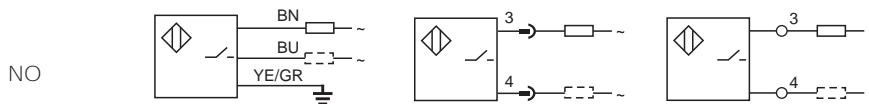
- *Technical Data*

Wiring Diagram - Inductive Sensors

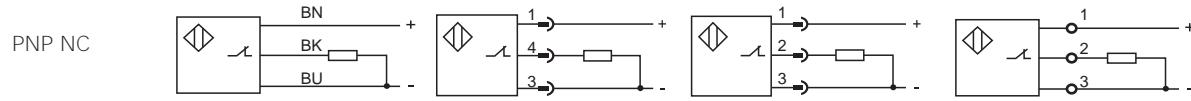
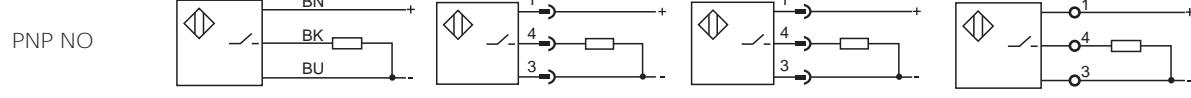
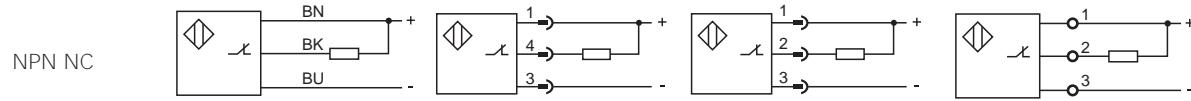
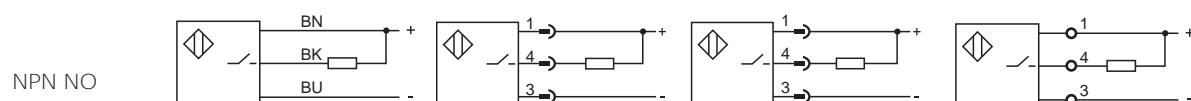
DC 2 Wire	Straight Outlet	M8 Connector	M12 Connector	Terminals
-----------	-----------------	--------------	---------------	-----------



AC 2 Wire	Straight Outlet	M12 Connector	Terminals
-----------	-----------------	---------------	-----------



DC 3 Wire	Straight Outlet	M8 Connector	M12 Connector	Terminals
-----------	-----------------	--------------	---------------	-----------



Wiring Diagram - Inductive Sensors				
DC 4 Wire	Straight Outlet	M8 Connector	M12 Connector	Terminals
NPN NO+NC				
PNP NO+NC				

Wiring Diagram - Photoelectric Sensor		
Through-beam Emitter	Straight Outlet	Connector

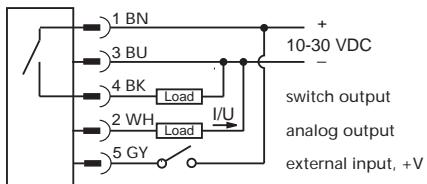
Light and Dark State Adjustable		
potentiometer adjustment PNP	Straight Outlet	Connector
<hr/>		
teaching line adjustment PNP	Straight Outlet	Connector

Relay Output	Straight Outlet
	<p>1 BK 24-240 Vac 3 BU 24-60 Vdc / 24-240 Vdc 2 RD normally closed-NC 5 WH GND 4 BN normally open-NO</p>

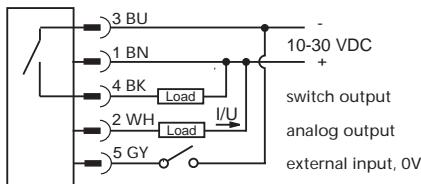
Wiring Diagram - Laser Source / Displacement Sensor

MTPQXAL Ultra-Small Square Shell, Series Photoelectric Displacement Sensor

PNP switching value + analog output wiring diagram



PNP switching value + analog output wiring diagram

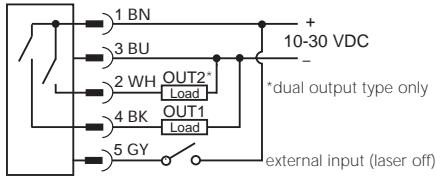


RS485 output wiring diagram

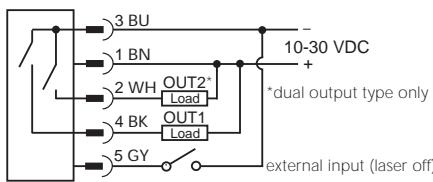


MTPQLL1-TD4500 Square Shell, TOF Technology, Long Distance Laser Photoelectric Sensor

PNP single/double switch output wiring diagram

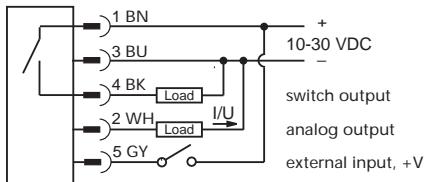


NPN single/double switch output wiring diagram

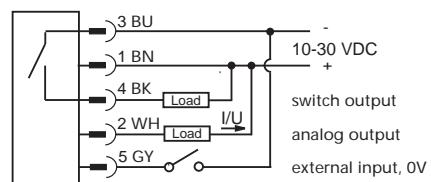


MTPQLL1-TD2500 Square shell, TOF Technology, Digital Laser Photoelectric Sensor

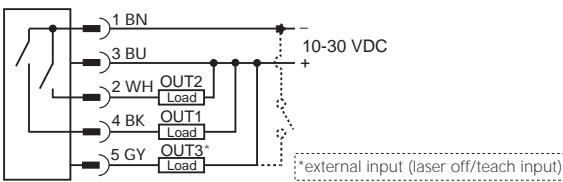
PNP switching value + analog output wiring diagram



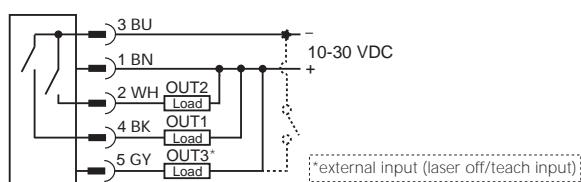
NPN switching value + analog output wiring diagram



PNP 3 way switch output wiring diagram



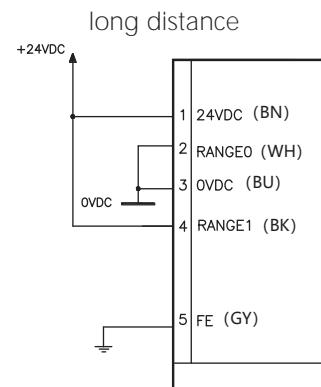
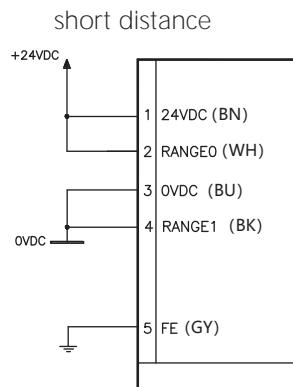
NPN 3 way switch output wiring diagram



Wiring Diagram - Safety Light Curtain

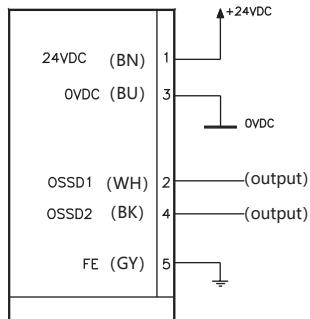
TYPE2 / TYPE4 (Emitter: 5-pin M12 connector; Receiver: 5-pin M12 Connector-no EDM / 8-pin M12 Connector-EDM)

Emitter

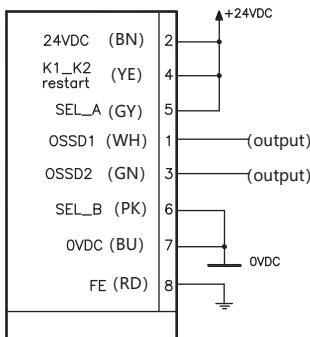


Receiver

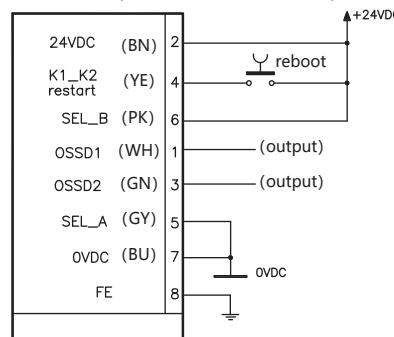
automatic reset (without EDM function)



automatic reset (with EDM function)



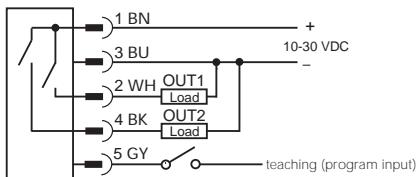
manual reset (with EDM function)



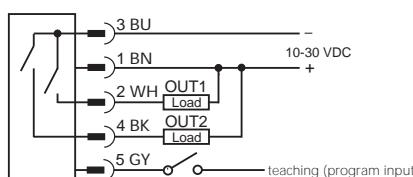
Wiring Diagram - Ultrasonic Sensor

MTUGB ... 966-C12 ... M18 Threaded Cylindrical Shell - Universal Ultrasonic Sensor

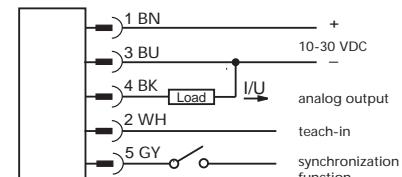
PNP dual switch output wiring diagram



NPN dual switch output wiring diagram

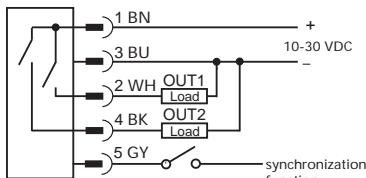


analog output wiring diagram

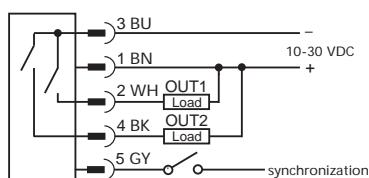


MTUJB ... 1256 / 1306-C12 ... M30 Threaded Cylindrical Shell - Universal / Extended Range Ultrasonic Sensors

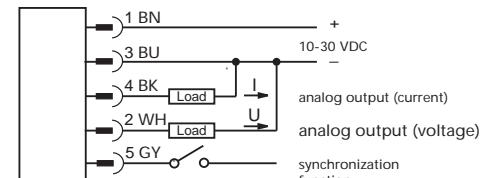
PNP dual switch output wiring diagram



NPN dual switch output wiring diagram



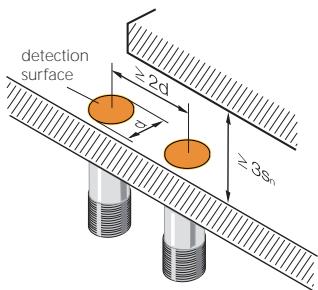
analog output wiring diagram



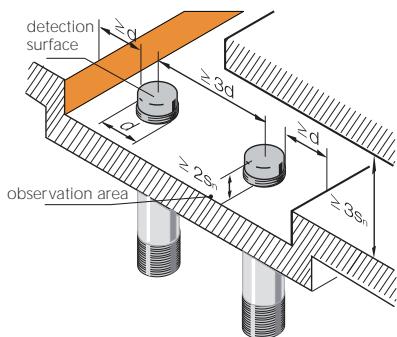
Mounted in Metal Inductive Sensors with Standard Sensing Distances

Flush Sensor

Flush-mount sensors allow the sensing surface to be mounted flush with a metal surface. The distance to the opposite metal surface shall not be less than $3S_n$, and the distance between two switches (mounted side by side) shall not be less than $2d$.

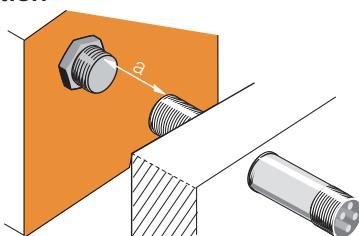


Non-flush Sensor Non-flush-mounted sensors can be identified by a protrusion on their sensing face, since non-flush-mounted sensors do not have a metal housing around the sensing face. The distance from the sensing surface to the metal mounting medium shall not be less than $2S_n$. The distance to the opposite metal surface shall not be less than $3S_n$, and the distance between two switches (installed side by side) shall not be less than $3d$.



Two Switches

Relative Installation



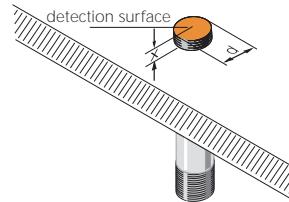
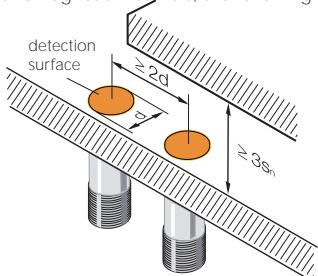
Opposite mounting of two switches requires a minimum distance of at least $3d$ between the sensing faces.

Installation Media

Material	Description
ferromagnetic material	iron, steel or other magnetizable material
non-ferrous metals	brass, aluminum or other non-magnetizable materials
other materials	plastic, non-conductive material

Mounted in Metal Inductive Sensors with Double Sensing Distance
Flush Sensor

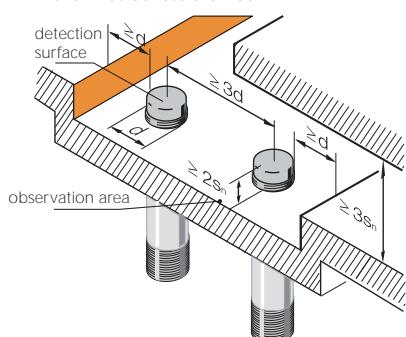
Flush-mounted sensors can be flush-mounted so that their sensing faces are flush with sensing surfaces made of non-ferrous metals. When installed in non-ferrous metals, the sensing distance may be shortened, the distance to the opposite metal surface must not be less than $3S_n$, and the distance between two switches (installed side by side) must be less than $2d$. For mounting sensors in ferromagnetic materials, the following instructions apply to dimension "x".



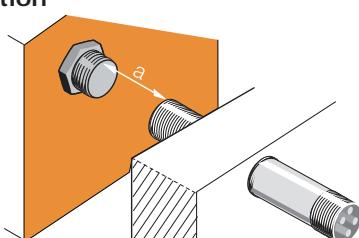
*For Factor1 sensor, when flush mounted into metal, the dimension "x" is not required.

Non-flush Sensor

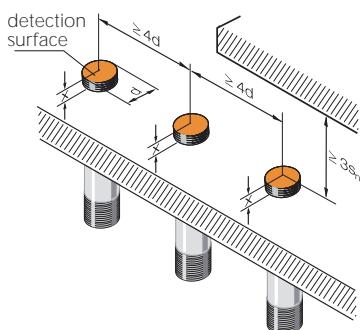
Non-flush-mounted sensors can be identified by a protrusion on their sensing face, since non-flush-mounted sensors do not have a metal housing around the sensing face. The distance between the detection surface plane and the metal mounting medium shall not be less than $2S_n$. The distance to the opposite metal surface shall not be less than $3S_n$, and the distance between two sensors shall not be less than $3d$.


Two Switches

Opposite mounting of two switches requires a minimum distance between the sensing faces of not less than $4d$.

Relative Installation

Mounted in Metal Inductive Sensors with 3 Times Sensing Distance (quasi-flush sensors)
Quasi-Flush Sensor

The quasi-flush mount switch requires a certain amount of space behind the sensing surface that does not contain conductive material. In this case, the specified sensing distances can be achieved without restriction. Dimension "x" (see figure below) represents the shortest distance between the sensing face and the conductive material behind it.

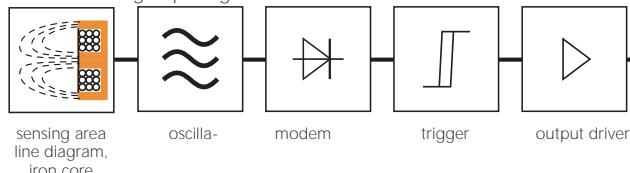


Dimension d	Dimensions x Installed in Following Materials	
	ferromagnetic material	other metal
Ø 6.5 mm	2 mm	1 mm
M8	2 mm	1 mm
M12	2.5 mm	2 mm
M18	4 mm	2.5 mm
M30	8 mm	4 mm

Principle

Inductive switches use the electromagnetic alternating field of the switch to affect the interaction of the metal target. Eddy currents are generated in the metallic damping material, removing energy from the magnetic field and reducing the amplitude height. This change is handled in the inductive switch and the output state of the switch is changed accordingly.

The functional groups of general standard inductive sensors include:



Detection Surface

The detection surface refers to the area that the high-frequency sensing area passes through when it enters an empty space. The sensing surface is mainly determined by the base of the shell core, and the area of the sensing surface is roughly equivalent to the surface area of the shell core cap.

Standard DUT

The standard test object is a ground square plate made of Fe 360 (ISO 630), the sensing distance is determined according to EN60947-5-2. Thickness $d=1\text{mm}$, side length equivalent to the recorded:

■ the diameter of the circular sensing face, or

■ $3 \cdot Sn$ (if the value is greater than the nominal diameter).

Attenuation Coefficient

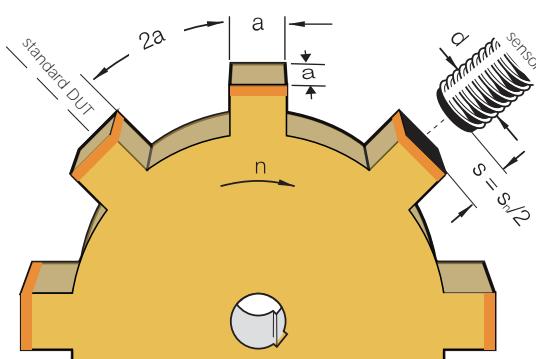
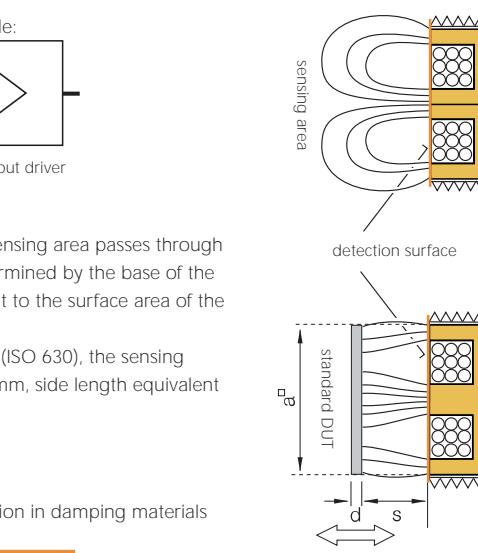
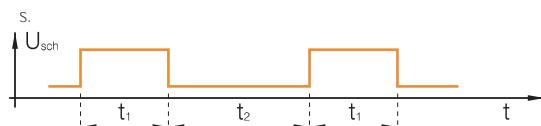
The attenuation coefficient indicates the induction distance reduction in damping materials other than Fe 360 .

Material	Coefficient
St37# steel	1.0
copper	0.25...0.45
brass	0.35...0.50
aluminum	0.30...0.45
stainless steel	0.60...1.00
nickel	0.65...0.75
cast iron	0.93...1.05

Switching Frequency

The switching frequency corresponds to the maximum number of switches per second. Damping according to EN 60947-5-2, during which the standard UUT shall be located on a non-conductive rotating washer. The surface ratio of iron to non-conductive material is 1:2.

A measurement of the switching frequency is obtained if the switching signal is $t_1=50\text{\mu s}$ or if the switching signal is $t_2=50\text{\mu s}$.



Power on Delay

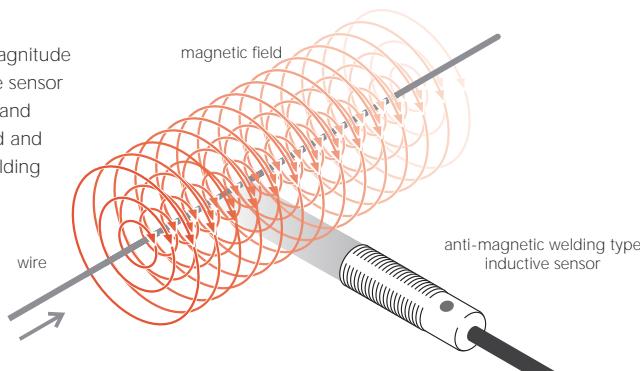
The power-up delay is the time between when the supply voltage is turned on and when the switch is ready to operate. This time shall not exceed 300ms. During this time, the duration of the fault signal must not exceed 2ms.

Temperature Drift

Temperature drift refers to the deviation of the actual sensing distance within the temperature range of $-25^{\circ}\text{C} \leq Ta \leq +70^{\circ}\text{C}$. According to EN 60947-5-2: $\Delta Sr/Sr \leq 10\%$

Anti-magnetic Welding Type Inductive Sensor Working Principle

Accurate detection performance depends on the magnitude of the welding current and the distance between the sensor and the current-carrying line. Due to constructional and switch-technical measures, the magnetically shielded and weld-proof inductive sensors are not affected by welding fields.



Supply Voltage The supply voltage is within the allowable voltage range for safe operation, including residual ripple.

Supply Voltage Measured Value Ue To determine the measured value and the limit value, the switch is operated at Ue voltage, which is:
 ■ DC switch Ue=24 V DC
 ■ AC and AC/DC switch Ue=220 V AC

Voltage Drop The voltage drop is the voltage across the interconnect sensor at a load current of rated operating current -Ie. When the output amplifier is in operation, there is a voltage drop across the amplifier and the polarity-reversal protection diode (voltage is related to current). (Especially care should be taken when several sensors are connected in series or with the input of an electronic component).

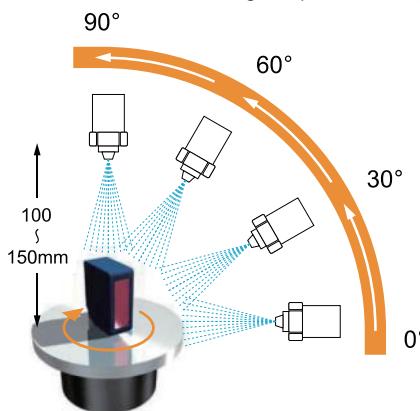
Protection Level The IP protection rating is a sign of compliance with IEC (International Electrotechnical Commission) standards.
 The environmental resistance of the sensor can be clearly reflected according to the IP rating standard.

Degree of Protection Against Dust and Foreign Objects			Degree of Protection Against Moisture and Water				
Protection Level	Degree of Protection	IEC Standard	Protection Level	Degree of Protection	IEC Standard		
5		Not completely prevent the intrusion of foreign objects, but the intrusion of dust will not affect the normal work.	dustproof	5		Water is sprayed in all directions towards the sensor will not cause harmful effects.	splashproof
6		Completely prevent dust intrusion.	dustproof	6		Water is strong in all directions towards the sensor jetting, no immersion inside.	water resistant
7		The sensor is 1m underwater, short time (less than 30min) immersed in water medium, will not cause harmful effects	soak-proof	7		The sensor is 1m underwater, long period (7 days) immersed in water, will not cause harmful effects.	immersion type
8		The sensor is 1m underwater, long period (7 days) immersed in water, will not cause harmful effects.	immersion type	8		The sensor is 1m underwater, long period (7 days) immersed in water, will not cause harmful effects.	immersion type

■ The above figure omits the description of grades below IP44.
 ■ "Dust-proof type" refers to a device in which dust with a diameter of 75 µm or more cannot penetrate into the interior at a certain density.
 ■ "Immersion-proof type" refers to a device that will not be submerged in water at a depth of 1 meter for 30 minutes.

IP69K Germany Standard

IP69K is a standard grade DIN40050-9 extended on the basis of the international standard grade IEC 60529, which is suitable for harsh environments washed under high temperature and high pressure conditions.



Test content:

Place the sensor on a rotating table rotating at 5 revolutions per minute and spray water on it.

Water pressure: 80~100bar
 Water flow: 14~16 liters/minute
 Water temperature: +80°C / -5°C
 Nozzle distance: 100~150mm
 Spray angle: 0°, 30°, 60°, 90°
 Spray time: 30 seconds per angle

※ IP69K does not fully guarantee that the sensor can work normally under the above test conditions;
 If the lens is stained with water droplets or oil, etc., causing the light beam to refract, it will not work properly.

Rated Power Frequency

The rated frequency of the supply network is 50 H or 60 HZ.

Residual Ripple (%)

Remnant Ripple is a reputable exchange on DC Ue (point to point from Ue). It is a percentage value (%). When operating DC switches, a filtered DC voltage with a ripple of no more than 15 % (according to IN 41755) is required.

Rated Working Current Ie

Rated operating current is the allowable continuous output voltage that flows through the load.

Leakage Current

Refers to the current that flows when the output transistor is non-conductive (when the sensor is not excited) (especially when several sensors are connected in parallel, it must be included in the calculation).

No-load Current

No-load supply current is the current that flows when no load is connected (only 3-wire and 4-wire switches are present). This current is supplied to the switching electronics.

Load Capacitance

Load capacitance is the maximum total capacitance allowed to be loaded on the output of the device, which is mainly line capacitance (approximately 00~200pF/m) and load input capacitance.

Reverse Polarity Protection Switches with short circuit protection are reverse polarity protected against any connection reversal. Switches without short circuit protection are reverse polarity protected against positive/negative cable reversals.

Disconnection Protection Cable break protection prevents malfunctions caused by cable breaks in 3-wire switches. The mounted diode gets its power through the output line.

Short Circuit Protection Short-circuit protection can be implemented in inductive sensors by timing or using thermal short-circuit switches, thereby protecting the output circuit from overload and short-circuit conditions. The release current during short-circuit protection is higher than the rated operating current I_e . Current from the sensor and load capacitance does not trigger the function, but is blocked by a short time delay.

Magnetic Field Constant magnetic field and low frequency weak magnetic field have no effect on the sensor. A strong magnetic field can penetrate the iron core, increase the detection distance, or even cause the sensor to conduct, but will not cause permanent damage. The high-frequency magnetic field of a few KHz or hundreds of KHz will interfere with the function of the sensor, because the frequency of the oscillator is also in this range. If this happens, it is recommended to take shielding measures.

Repeatability According to IEC60947-5-2/EN60947-5-2, the repeatability index is as follows: effective detection distance, period of 8 hours, temperature $23 \pm 5^\circ\text{C}$, repeatability under specified rated working voltage, continuous measurement will achieve better repeatability, expressed as a percentage of S_r .

Wiring Sensor cables must not run in parallel with cables for inductive loads (protection tubes, magnetic rectifiers, motors, etc.) or cables supplying motors. The cable should be as short as possible, but if the wiring is reasonable (small coupling capacitance, less interference), the cable can reach 300m.

Electromagnetic interference can be minimized by:

- keep a certain distance from the interference cable (>100mm)
- adopt shielding measures
- in the presence of inductive loads (contactors, magnetic rectifiers, relays), install RC filters or rheostats.

Anti-vibration The sensors in the catalog are subjected to vibration tests (1mm amplitude 55Hz) according to IEC60068-2-6. After withstanding: 30g (30 times the acceleration of gravity) 11ms impact test, passed IEC60068-2-27.

Detection Distance The signal change caused by the distance between the measured object and the sensor approaching the sensing surface.

Measurement standard: IEC947-5-2/EN60947-5-2, when measuring, the standard square object moves axially. The material of the object to be measured is steel, such as: FE360 or ISO630, smooth surface, square, 1mm thick, and the side length is equal to the diameter of the sensing surface or 3 times the rated detection distance S_n .

Rated detection distance S_n :

Refers to the detection distance for which the sensor is designed and can be found in the technical data.

Effective detection distance S_r :

According to IEC60947-5-2/EN60947-5-2, the detection distance of the sensor is specified.

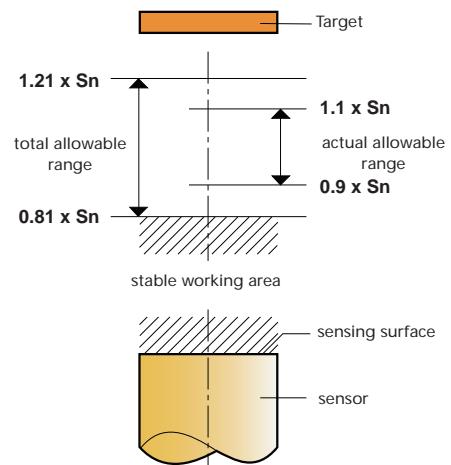
$0.9 S_n \leq S_r \leq 1.1 S_n$

That is, the error does not exceed $\pm 10\%$.

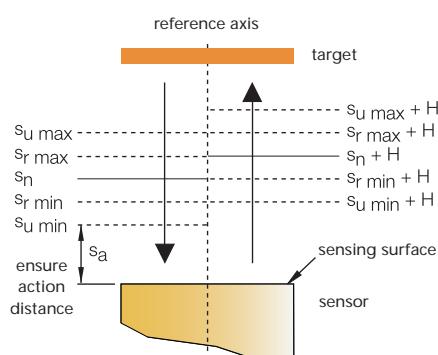
Useful action distance S_u :

This distance takes into account errors due to voltage and temperature variations.

$0.9 S_r \leq S_u \leq 1.1 S_r$



Hysteresis Hysteresis is specified as a percentage value of the actual sensing distance S_r . Hysteresis is measured under the conditions of ambient temperature $+23^\circ\text{C} \pm 5^\circ\text{C}$ and rated supply voltage. The hysteresis must be 20% less than the effective sensing distance (S_r). $H \leq 0.2 S_r$



Response Curve Axial and Radial Damping:

When damping is performed in the **axial direction**, the standard target will move to a direction coaxial with the system axis. Therefore, the switching point can only be determined by the distance "s" from the sensing surface of the switch. When damping is performed in the **radial direction**, the position of the switching point is also influenced by the radial distance "r" of the measured object relative to the system axis. The diagram shows the response curve, which indicates the dependence of the switching point on "s" and "r". The main purpose of this figure is to show the possibility of damping with lateral approach and the difference from damping with axial approach.

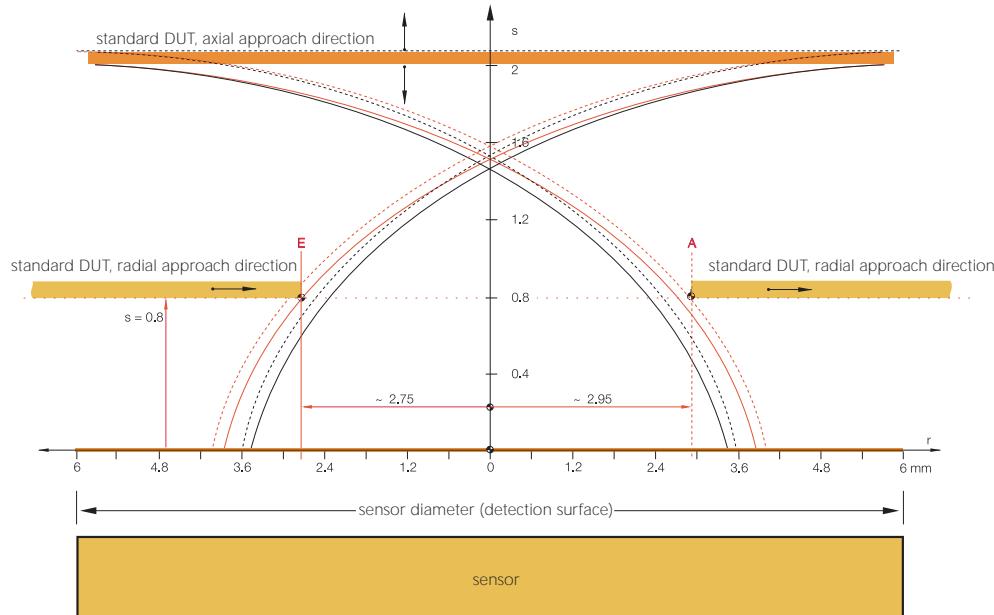
Application:

In any case, the exact switching point must be determined on site, in part due to manufacturing tolerances in the production process. The solid line indicates the associated trigger point (E): the dashed line indicates the shut-off point (A). The red wire is for a switch with free zone, the black wire is for a flush mount inductive sensor. Since the sensor can be actuated from either direction, the curve shows the reflection from the system axis.

Example:

A signal change is generated when an object being conveyed on the **conveyor belt** crosses the opening curve on the entry side at its leading edge. When the trailing edge of the object being conveyed crosses the (reflected) turn-off curve on the opposite side, the signal changes back again. In the case of a **loopback part** (for example, at the end of transmission), the signal is reversed at the turn-off curve on the same side.

Typical response curve based on the example of an M12 inductive sensor with **Sn** of 2 mm:



The **vertical axis** in the graph represents the distance from the sensing surface to the switching point. It is based on the nominal sensing distance **Sn**. At a distance of 0.8mm, a target making a lateral approach reaches the solid turn-on curve at point "**E**" and the principle turn-off curve at point "**A**".
 The **horizontal axis** in the figure is based on the radius of the sensing surface, and the zero point of the axis is located at the center of the shell core cap.
 Taking the M12 sensor as an example, the radius $r = 6$ mm.

Photoelectric Sensor

Sensors that use various characteristics of light to detect the presence or absence of objects and changes in surface conditions. A photoelectric sensor is mainly composed of a light-emitting transmitter and a light-receiving receiver. If the projected light is obscured or reflected due to different detection objects, the light energy reaching the receiver will vary. The receiver will detect this change and convert it into an electrical signal for output. Visible light (mainly red, but also green and blue to judge color) and infrared light are mostly used.

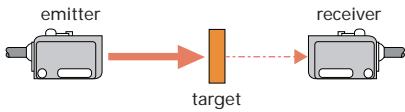
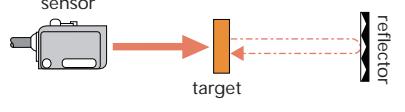
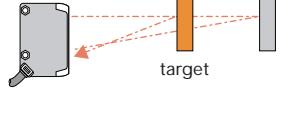
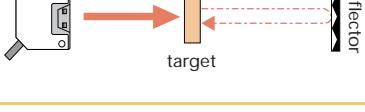
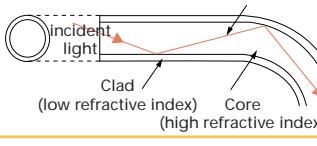
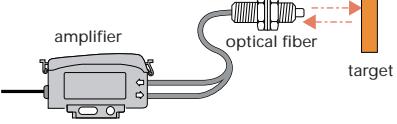
Feature

- | | | |
|-----------------------|------------------------------|----------------------------|
| non-contact detection | long distance detection | micro object detection |
| high response speed | most objects can be detected | vulnerable to oil and dust |

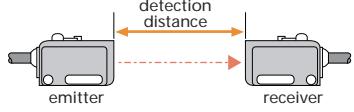
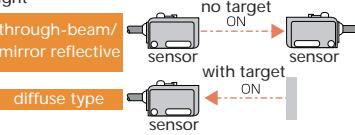
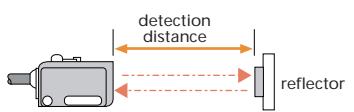
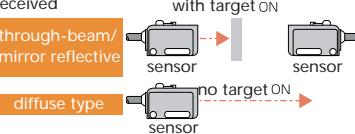
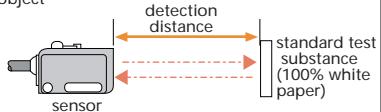
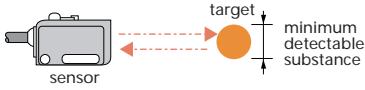
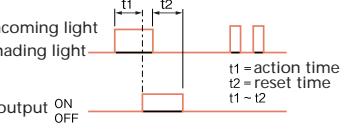
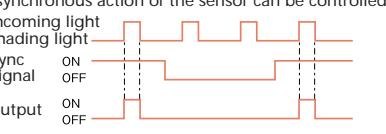
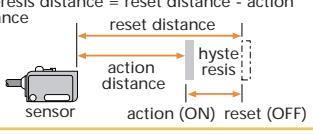
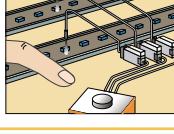
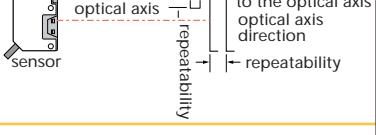
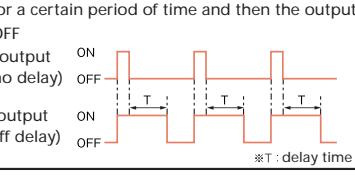
Sensor Selection Condition

	Selection Purpose and Conditions	Key Point	Recommended Sensor Type
Detection Purpose	position detection	<ul style="list-style-type: none"> high repeatability simple location setting 	<ul style="list-style-type: none"> through-beam type laser type BGS type
	micro object detection	<ul style="list-style-type: none"> smaller spot size sensitivity can be fine-tuned 	<ul style="list-style-type: none"> fiber optic sensor laser type
	high-speed objects detection	<ul style="list-style-type: none"> quick response 	<ul style="list-style-type: none"> fiber optic sensor
	transparent object detection	<ul style="list-style-type: none"> high sensitivity reflection/specular reflection 	<ul style="list-style-type: none"> transparent body output type
	level difference detection	<ul style="list-style-type: none"> high hysteresis 	<ul style="list-style-type: none"> defined reflection/BGS/displacement sensor
	color detection	<ul style="list-style-type: none"> determining factors: measured/background/light source color quick response 	<ul style="list-style-type: none"> color sensor/color mark sensor fiber optic sensor
	color grayscale difference detection	<ul style="list-style-type: none"> high resolution type 	<ul style="list-style-type: none"> color mark sensor
	fluorescence detection	<ul style="list-style-type: none"> UV light source 	<ul style="list-style-type: none"> fluorescence detection type
Setting Occasion	not affected by different colors	<ul style="list-style-type: none"> PSD/C-MOS type receiver 	<ul style="list-style-type: none"> BGS type
	small space	<ul style="list-style-type: none"> small transmitter/receiver 	<ul style="list-style-type: none"> separate amplifier/fiber optic sensor small, thin type with built-in amplifier
	detection from one side		<ul style="list-style-type: none"> diffuse reflection/limited reflection mirror reflection type/BGS type
	affected by background	<ul style="list-style-type: none"> high hysteresis characteristics 	<ul style="list-style-type: none"> BGS type
	affected by ambient light		<ul style="list-style-type: none"> LED/laser light source
	higher robustness occasions		<ul style="list-style-type: none"> resin filled type/metal cased type
	high water resistance occasions	<ul style="list-style-type: none"> higher protection level 	<ul style="list-style-type: none"> IP67、IP69K

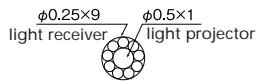
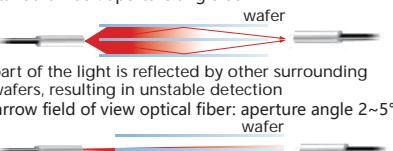
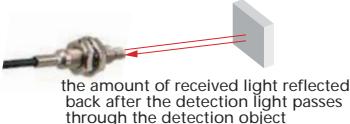
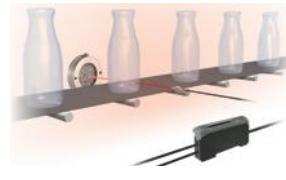
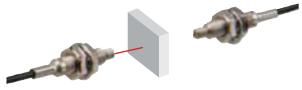
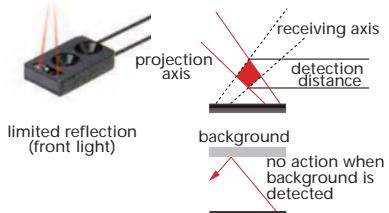
Classification of Detection Types

Type	Detection Method	Feature
Detection Method of Sensors	through-beam	 <p>Configure two sensing heads: emitter and receiver. The detection object interrupts the communication between the emitter and receiver. On the optical axis, the output is ON/OFF. Long detection distance. It is not affected by the shape, color and inclination of the detected object.</p>
	mirror reflection	 <p>Configure 1 sensor and 1 reflector. The detection object interrupts the communication between the sensor and the reflector. On the optical axis, the output is ON/OFF. Long detection distance. Unaffected by the shape, color, and inclination of the detected object, wiring and optical axis adjustment are easier than</p>
	diffuse type	 <p>1 sensor built-in transmitter and receiver. When the light emitted by the transmitter passes through the detection object and is reflected back to the receiver, the output is ON/OFF. Short detection distance. Different colors can be distinguished. Easy to install, no need to adjust the optical axis.</p>
	wide beam diffuse reflection type	 <p>The emission aperture of the emitter is enlarged so that ON/OFF can be output even with a small amount of reflected light. It is suitable for detecting objects such as transparent objects and grooves/cracks on the surface.</p>
	BGS type (adjustable distance)	 <p>The sensor adopts PSD/C-MOS photosensitive components, which can output ON/OFF within a certain set distance. Not affected by the color and material of the detected object. Not affected by background objects.</p>
	transparent object detection type	 <p>The hysteresis distance is small, and even slight changes in the amount of received light can be detected. It is suitable for the detection of transparent film, glass, etc.</p>
	fiber optic sensor (fiber unit)	 <p>Optical fibers consist of high and low refractive index cladding. The light is transmitted in the fiber core by total reflection.</p>
	fiber optic sensor (amplifier unit)	 <p>A fiber optic sensor consists of an amplifier unit and a fiber unit. Save installation space, easy to use in narrow spaces. According to different optical fiber units, it can be used for color /step difference discrimination, moisture/liquid level detection and other applications.</p>
	color sensor/color mark sensor	 <p>Due to its high-resolution characteristics, subtle color differences can be discriminated. Even the dark and light of the same color can be distinguished.</p>
	fluorescence detection sensor	 <p>Output ON/OFF when detecting objects with fluorescent components. Not affected by the vibration of the detected object, other colors, etc.</p>

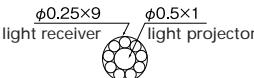
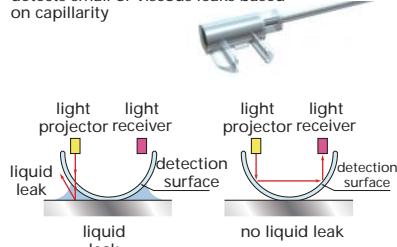
Explanation of Terms for Photoelectric Sensors

Term	Description	Term	Description
Detection Distance	through-beam distance between emitter and receiver 	Normally Open <Light State-L>	output ON when the transmitter receives enough light 
	mirror reflection type distance between sensor and mirror 	Normally Closed <Dark State-D>	output ON when the amount of light received by the transmitter is insufficient or there is no light received 
	diffuse type distance between sensor and standard detection object 	Automatic Diagnosis Output Function	when the sensor lens is disturbed by dust, etc. and the amount of light received is unstable, an alarm signal is output 
Minimum Detectable Substance	when the sensitivity is adjusted to the maximum value, the minimum size of the detection object can be detected 	Stop Light Input	when the black wire of the light transmitter is short-circuited (connected to the positive/negative pole), the light-emitting diode stops emitting light, and the light receiver is in a light-shielding state by stopping the light emission input function, it is possible to detect whether the operation of the receiver is normal without operating the detection object
Response Time	the time it takes for the sensor to receive light and output a signal 	Synchronous Trigger Input	when the synchronous trigger input line is short-circuited (connected to positive/negative), the synchronous action of the sensor can be controlled 
Hysteresis (Diffuse)	the position where the detected object approaches the sensor from far to near until the output turns ON is the operating distance, and the position that moves outward from this position until the output turns OFF is the reset distance hysteresis distance = reset distance - action distance 	External Teaching Input	sensitivity adjustment, re-teaching and other operations of the sensor can be remotely controlled without operating the buttons on the sensor body 
Repeatability	the deviation range of the sensor repeatedly detecting the ON position 	OFF Delay Function	after the sensor is blocked, the delay output is ON for a certain period of time and then the output is OFF 
Detectable Substance	the objects detected by the sensor are collectively referred to as detection objects also known as: measured object, workpiece		

Explanation of Terms for Fiber Optic sensors

Term	Description	Term	Description
Fiber Core	<p>the medium that transmits the light beam is called the core, which is the core part of the optical fiber</p> <p>in the diffuse reflective optical fiber shown in the figure below, the light projecting part is one fiber core of $\Phi 0.5\text{mm}$, and the light receiving part is nine fiber cores of $\Phi 0.25\text{mm}$</p>  <p>schematic diagram of fiber optic head</p>	Hole Diameter	<p>the emission and reception angles of projected/received light at the fiber head The aperture angle of the standard fiber is 60°, and the aperture angle of the narrow field of view fiber is $2\sim 5^\circ$</p> 
Bending Radius	<p>the minimum radius at which an optical fiber is allowed to bend note that this does not refer to diameter when the fiber is bent beyond the bendable radius value, the fiber core may be broken, resulting in shortened detection distance or failure to detect</p> 	Narrow Field of View	<p>the aperture angle of the optical fiber head lens is $2\sim 5^\circ$. The narrow field of view optical fiber has a longer detection distance even if there is an object with high reflectivity near the optical axis, it is not easily disturbed, so it is often suitable for wafer inspection</p> <p>standard fiber: aperture angle 60°</p>  <p>part of the light is reflected by other surrounding wafers, resulting in unstable detection narrow field of view optical fiber: aperture angle $2\sim 5^\circ$</p>  <p>the aperture angle is small, which can stably detect the presence or absence of each wafer</p>
Resistant to Bending	<p>the bend-resistant optical fiber is suitable for mounting on parts that move back and forth repeatedly, such as a robot arm</p> <p>generally, the bendable radius of the bend-resistant optical fiber is within $R4\text{mm}$</p>	Super Resistant to Bending	<p>even if the fiber is bent to a great extent, the core will not be broken an optical fiber with a bending radius of $R1$, the minimum allowable bending radius is 1 mm in general, the detection distance becomes shorter when standard optical fibers are bent and bend-resistant fiber will not be affected if the optical fiber is installed in a frequently moving place such as a manipulator, it is recommended to use a bend-resistant optical fiber with a bending radius within $R4$, or a super-bend-resistant optical fiber</p>
Vacuum Resistant	<p>optical fiber used in vacuum environment vacuum-resistant optical fiber is composed of vacuum-resistant and non-vacuum-resistant optical fibers the amplifier unit is optically connected to the non-vacuum resistant part the vacuum-resistant part of the fiber can withstand high temperature: Max. 300°C</p>	Ultra-thin Fiber	<p>an optical fiber with a core diameter of less than 0.5mm is called an ultra-fine optical fiber the thinner the core, the thinner the optical axis, making it easier to detect tiny objects, but the detection distance will be shorter</p>
Diffuse Type	<p>the emitting fiber and the receiving fiber are hidden in the core of the same fiber head easy installation, no need to adjust the optical axis, saving space short detection distance</p>  <p>the amount of received light reflected back after the detection light passes through the detection object</p>	Mirror Reflection Type	<p>the optical fiber and the reflector are installed facing each other, and the detection mode is used to detect whether there is a detection object between them</p> 
Through Beam	<p>two optical fibers are configured for the through-beam optical fiber: the projecting fiber and the receiving fiber</p> <p>when the emitting fiber and the receiving fiber are installed facing each other, when the detection object blocks the optical axis between the emitting fiber and the receiving fiber, the output is ON/OFF</p> <p>long detection distance</p> 	Limited Reflection	<p>it is limited that the object can be detected only in the light emitter and the light receiver are inclined at a certain angle relative to each other a certain range the range where the projecting light beam overlaps with the light receiving area is the effective detection distance the detection distance is short</p>  <p>limited reflection (front light)</p> <p>projection axis</p> <p>receiving axis</p> <p>detection distance</p> <p>background</p> <p>no action when background is detected</p>

Explanation of Terms for Fiber Optic sensors

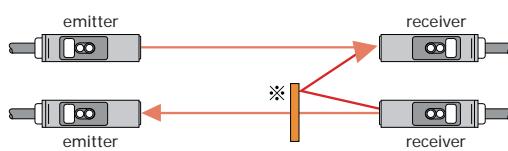
Term	Description	Term	Description
Parallel	<p>the cores of the optical fibers are arranged in a row, and the light spot is strip-shaped, similar to the light curtain type light spot</p> <p>it is used when the position of the detection object is deviated, or the shape of the detection object is irregular, resulting in random reflections</p>	Light Curtain Type	<p>the light projected by the optical fiber is a strip-shaped spot, which is suitable for the situation where the detection object has a deviation in positioning, or the irregular shape of the detection object leads to random reflections, etc</p> <p>the optical fiber uses a lens with a narrow aperture angle to achieve longer distance detection</p> 
Coaxial	<p>in the diffuse reflective fiber, the light emitter of the coaxial fiber is in the center of the fiber core, and the light receiver is around the light emitter even if the detection object enters the detection area from different directions, the amount of received light remains the same can detect the position of the object with high precision</p> <p>add a dedicated focusing lens to detect the presence or absence of tiny objects</p>  <p>schematic diagram of fiber optic head</p>	Head Light Type	<p>taking the moving direction of the detection object as the longitudinal direction, the optical system (light emitter and light receiver) is on the fiber optic head</p> 
Front Light	<p>take the moving direction of the detection object as the horizontal direction, and the optical system (emitter and receiver) is on the front side of the optical fiber</p> <p>the fiber optic head is thin and square, and the front is illuminated</p> <p>suitable for installation spaces with limited width.</p> 	Side Light Type	<p>the optical system (emitter and receiver) is on the side of the optical fiber with the moving direction of the detection object as the horizontal direction</p> 
Nut Type	<p>the fiber head is a hex nut type fiber</p> <p>comes with lock nut for easy installation</p> <p>a long-distance lens can be added to realize applications such as long-distance detection and tiny object detection</p> 	Casing Type	<p>the installation and fixing part of the fiber optic head protrudes a certain length of thin fiber optic head</p> <p>this type of optical fiber head shape is called sleeve type optical fiber</p> <p>if the sleeve of the sleeve-type optical fiber has a bendable type and a non-bendable type</p> 
Liquid Level Detection	<p>used to detect the height/position of the liquid level</p> <p>there are contact fibers and non-contact fibers</p> <p>the optical fiber head of the contact optical fiber detects the liquid level when it touches the liquid surface; the non-contact optical fiber is installed outside the transparent tube to detect the liquid level in the tube.</p>	Extended Lens	<p>an extension lens can be installed on the fiber optic head</p> <p>adding an extension lens to the through-beam fiber can expand the detection distance; adding an extension lens to the diffuse reflection fiber can detect tiny objects</p> <p>there are also some types of fiber optic heads with built-in lenses in the through-beam optical fiber, so there is no need to add an extension lens</p>
Leak Detection	<p>detects small or viscous leaks based on capillarity</p> 	Freely Cuttable Fiber	<p>the part of the fiber that can be freely cut with the special cutting knife attached to the fiber is called a freely cuttable fiber</p> <p>when the optical fiber cable is too long and the installation and wiring are inconvenient, you can use a special scissors to cut off the excess optical fiber</p>

Precautions for the Use of Photoelectric Sensors

(1) mutual interference

When the sensors are installed side by side, the sensors may receive the light beams of other sensors, resulting in unstable detection. In order to prevent mutual interference between sensors, the following countermeasures can be adopted:

- ① using a connection type optical fiber amplifier
- ② refer to the [interference area 1 characteristic diagram of the sensor, and adjust the distance between the sensors
- ③ when using a through-beam sensor, please install a slotted mask or a polarizer
- ④ when using a through-beam or mirror-reflective sensor, place the transmitter and receiver (reflector) crosswise (※ please pay attention to prevent the beam projected by the adjacent sensor from being reflected back into the receiver by the detection object)



(2) the influence of ambient light and random light

Since the photoelectric sensor transmitter only receives the modulated light beam projected by the receiver, it can suppress the influence of ambient light. However, if high-frequency fluorescent light or sunlight directly shines on the receiver, it is likely to cause malfunction of the sensor. In this case, you can adjust the installation angle or place a shading plate to prevent the influence of ambient light.

illumination benchmark

- sunny day sun 100,000lx
- cloudy day sun 30,000lx
- factory or in office 400~1500lx

(3) the influence of the surrounding environment during installation

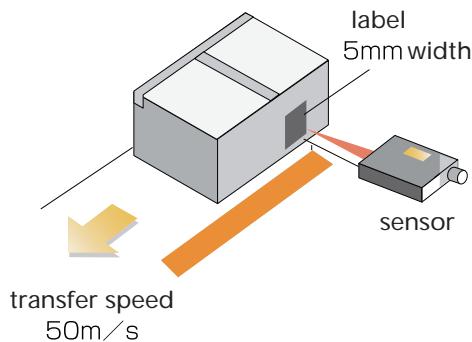
Through Beam	the light beam is refracted into the receiver through the bottom surface	 solution	 place a board to block the refraction of the beam adjust the installation height of the sensor
	the light beam is directly reflected back to the receiver through the bottom surface	 solution	 increase the installation height adjust the installation height or angle of the sensor
Diffuse Type	the background object is detected due to it has too high reflectivity	 solution	 paint black or paste a black film to reduce the reflection of the beam move the detection object away from the background ③ adopt BGS type photoelectric sensor

(4) basic precautions

- ① be sure to ground the case when using a switching regulator to provide power
- ② it takes about 100ms~2s when the sensor is powered on (the transition time varies with the model, please do not detect in the transition state
- ③ when wiring, do not route the sensor cables side-by-side with high-voltage lines or power lines, or place them in the same wiring duct
- ④ otherwise, the sensor may malfunction due to electromagnetic induction

Photoelectric Sensor Knowledge

Calculation Method of Response Time



<Calculation Example>

The conveying speed is 50m/s, when detecting the presence or absence of a label with a width of 5mm on the carton, how many usec must the response speed of the sensor reach at least to meet the requirements?

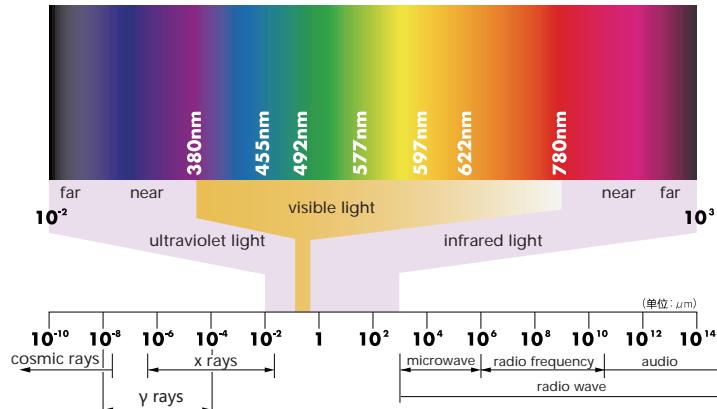
$$\text{responding speed} = \frac{\text{size of the target}}{\text{speed of the target}} = \frac{5(\text{mm})}{50(\text{m/s})} = \frac{5(\text{mm})}{50000(\text{mm/s})} \\ = 0.0001(\text{sec}) \\ = 0.1\text{msec.} \\ = 100\mu\text{sec.}$$

A. A sensor with a response speed of less than 100us is recommended

Light Source and Light Receiving Particles

The light source of the transmitter and the light-receiving particles of the receiver are the main components of the photoelectric sensor. The emitter projects a light source, and the light-receiving particles of the receiver receive light energy. Generally speaking, the light source of the photoelectric sensor mostly adopts LED (Light Emitting Diode) or semiconductor laser diode, and the light-receiving particles mostly adopt photodiode or phototransistor.

In addition, the color of light is related to its wavelength. Visible light that humans can perceive is a very small band in the electromagnetic wave range. The electromagnetic waves in this band are usually called "light", and the wavelength range is: 400nm~700nm. Usually, most photoelectric sensors use visible light in this band as the light source, and individual special-purpose sensors also use infrared light or ultraviolet light.



Optical Axis Adjustment



- ① The transmitter/receiver are placed on the same horizontal line.
- ② Tilt the transmitter left and right, and confirm the operating range of the sensor by observing the signal indicator light. The center of the operating range is the installation position of the sensor.
- ③ Tilt the receiver left and right, and confirm the operating range of the sensor by observing the signal indicator light. The center of the operating range is the installation position of the sensor.
- ④ Same method as above, adjust the position of the transmitter/receiver in the up and down direction.

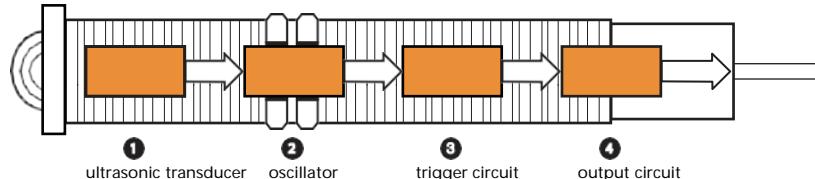
Laser Safety Level (IEC standard)

Laser Class	Summary of Safety Evaluation
Class 1	Class 1 is a low-energy laser, it is very safe and can avoid all electrostatic hazards, and has no biological hazards. No matter under any conditions, the laser will not cause damage to the human body or skin. Therefore, the Class1 laser displacement sensor does not need to take other safety protection measures except for the laser grade label.
Class 1M	Visible light radiation laser with a wavelength range of 302.5~4000nm. Eyes can be damaged during laser exposure.
Class 2	Visible light radiation lasers with a wavelength range of 400-700nm are harmless for instantaneous exposure to lasers, but will be harmed if you deliberately look directly at the laser.
Class 2M	Visible light radiation laser with a wavelength range of 400~700nm. Instant laser exposure is harmless, but intentionally looking directly at the laser will cause damage. Eyes can be damaged when laser exposure occurs.

Ultrasonic Sensor

Ultrasonic sensors periodically emit short, high-frequency sound waves that travel through the air at the speed of sound, and if they encounter an object, they will return to the sensor as echo signals, so the sensor can calculate the time between sending the signal and receiving the echo. time interval to calculate the distance between the sensor and the target. The distance between the sensor and the measured object is calculated by measuring the flight time of the sound wave, rather than by the intensity of the sound wave. The ultrasonic sensor has an obvious effect on background suppression.

Ultrasonic sensors are composed of ultrasonic transducers, oscillators, trigger circuits and output circuits.



Ultrasonic Sensor Advantage

Ultrasonic sensors can pass through dusty air or fog, and even a thin film on the sensor head will not affect its function. Almost any material that reflects sound waves, regardless of color, can be detected by ultrasonic sensors, including transparent materials or films.



can detect almost all liquids



can detect all colors



detect white objects on a white background
detect black objects on black background



transparent objects—
glass, plastic or film



fabrics - plush or leather



granules and powders—
grain, chips or fine sand

Technical Terms

Blind area of the sensor: determines its minimum detection distance, objects in the blind area may cause the sensor to trigger falsely;

Detection range: the limit value measured by different standard reflectors;

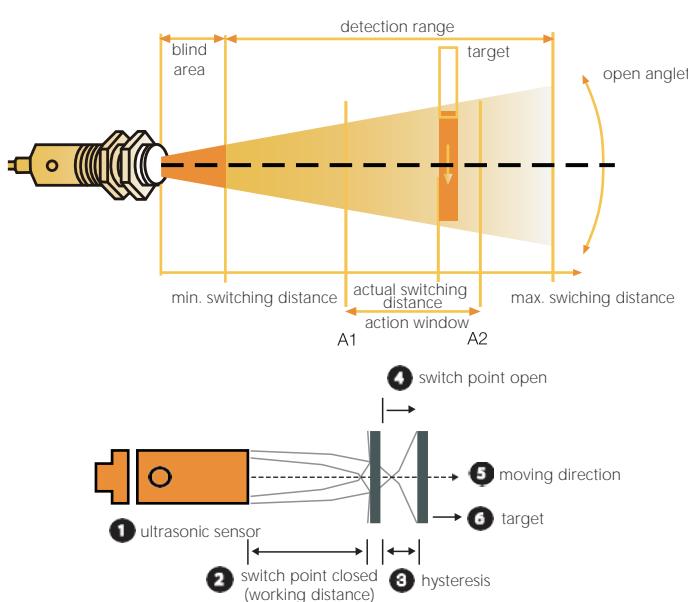
Working range: It is the standard area where the sensor works. Measured using standard analytes;

Linearity error: linearity deviation mainly occurs inside the sensor, or due to changes in ambient temperature; resolution, temperature drift and repeatability determine the linearity error;

Resolution: Determines the smallest change in object position that causes a voltage or current change in the sensor output;

Switching frequency: The switching frequency is the maximum output switching frequency completed by the output circuit when the standard object passes through the sensing area. It depends on: the characteristics of the sensor, the size of the object, and the distance from the object;

Hysteresis: Hysteresis is the difference between the closed and open positions of a switch. If the target object is vibrating or fixed near the

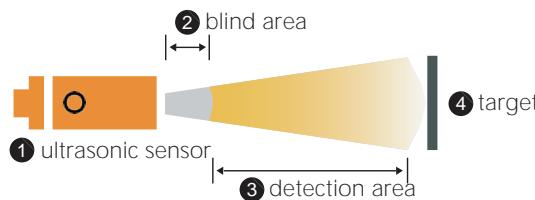


Ultrasonic Sensor Detection Mode

Diffuse reflection: the most common standard detection mode

The ultrasonic transducer is excited by a high voltage pulse and starts emitting ultrasonic signals. The ultrasonic signal is reflected by the target object to be detected by the sensor. The trigger circuit measures the time elapsed from the emission of the signal to the detection of the reflected signal. Because the velocity of the ultrasonic beam through air is known, it can be used both to detect the presence of an object and to measure the distance to it.

In the diffuse reflection model, the ultrasonic transducer acts first as a transmitter and then as a receiver. When it is in "transmit mode", the echo signal cannot be detected. This means that there is a blind zone near the sensor, and objects in this area cannot be detected, or the detection is not reliable. The size of the dead zone depends on the type of ultrasonic transducer used.



Mirror reflection: Similar to how a reflective photoelectric sensor works

To work correctly, there must be a background or reflective surface (any flat, vertical, fixed part). The sensor measures the distance to the reflective surface, and a change in the measured data of this distance means that a target object has passed between the sensor and the reflective surface. In this case, the blind zone does not exist and the angle of inclination of the object does not have to be considered, but we must consider the minimum sensing distance between the sensor and the reflective surface: any object in the entire working area can be detected.

Type of Object

Ultrasonic sensors can be used to detect any object (in theory). The effective detection distance depends on: the size of the object (the larger the object, the richer the reflected signal, and the greater the sensing distance can be), the type of material (compact objects, such as metal, wood, liquid, can reflect a large amount of ultrasonic waves signal; on the contrary, low-density materials, such as powder, foam, will absorb most of the ultrasonic beam). Sound-absorbing materials can only be detected at very short distances.

In diffuse reflection type sensors, other factors need to be considered:

The shape of the target object:

If the target object is perpendicular to the ultrasonic beam, the beam is reflected back toward the sensor, so that the object can be effectively detected. Non-detection can occur if the object has an irregular shape or a sloped surface that causes the beam to deviate.

Temperature of the target object:

Even though ultrasonic sensor products are fully temperature-controlled and compensated throughout the entire sensing range, a high thermal gradient between the surrounding environment and the object can cause turbulent air vortices that deflect the ultrasonic beam.

All the measurement methods mentioned in the catalog of this book are relative to the standard objects in the EN60947-5-2 international standard.

Users must pay attention to the possible differences in the actual use of objects.

Ultrasonic Sensor Important criteria:

Detection Range Important criteria to bear in mind when selecting an ultrasonic sensor are: the detection distance and the associated three-dimensional detection area.

During the measurement, different standard reflectors enter the detection area from the side, and when the reflector is detected by the sensor at certain points, these points are marked.

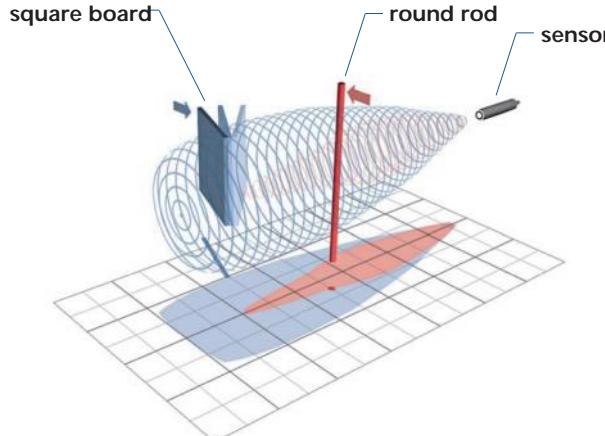
Red zone:

Measured on a long, thin round rod (10mm or 27mm in diameter, depending on the sensor model), it indicates the standard operating range of the sensor.

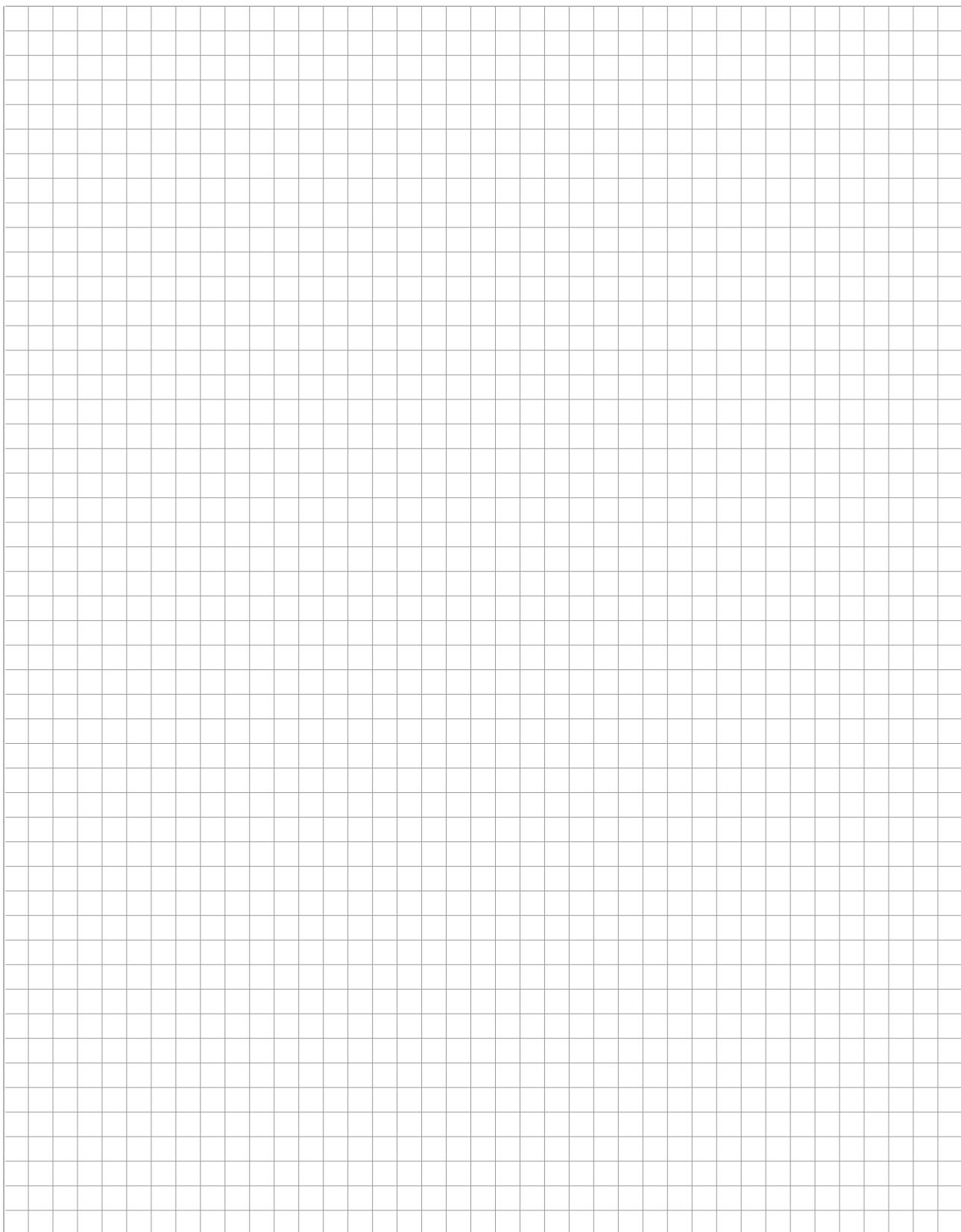
Blue area:

To obtain the blue area, place a square plate (500 x 500 mm²) from the edge into the detection range area of the ultrasonic sensor where the ultrasonic beam diverges. In this case, an optimal angle between the square plate and the ultrasound can be obtained. The maximum detection area of the sensor can thus be displayed. Assessing the reflection of ultrasound waves outside the blue zone is not possible.

Reflectors with less reflective properties than round rods can only be detected in an area smaller than the red area. On the other hand, reflectors with better reflective properties than round rods can be detected between the red and blue regions.



* Objects can enter the detection area from any direction.



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MTI-N25PC55-C2P	61300007	I15	MTPGRN-T25NL/D586-C2P-PO	61CRWN00	P03
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