

# Ultrasonic sensor



## Features:

- High reliability, high versatility
- Object detection at millimeter accuracy
- Rugged and robust for harsh environment



UM18  
**Ultrasonic sensor**  
Brass,nickel-plated  
DC 4 wire, Switching output

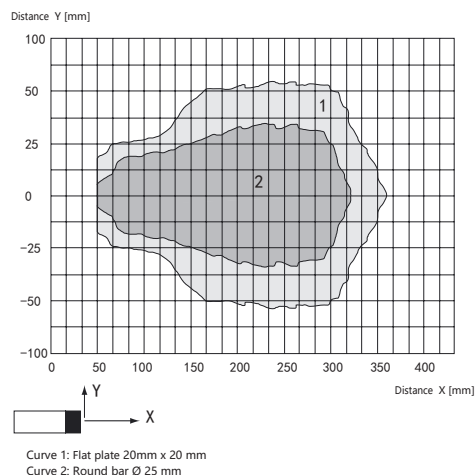
### Features

- NO/NC can selectable
- Adjustable sensing distance
- Temperature compensation
- Small blind zone
- Single-point teaching

### Response characteristic curve

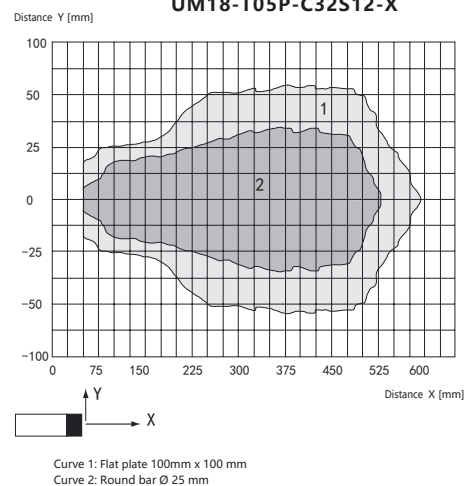
**UM18-T03N-C32S12-X**

**UM18-T03P-C32S12-X**



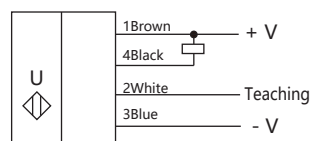
**UM18-T05N-C32S12-X**

**UM18-T05P-C32S12-X**

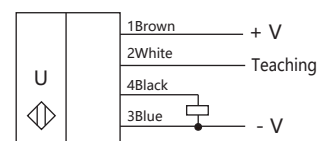


### Wiring

#### NPN Output



#### PNP Output



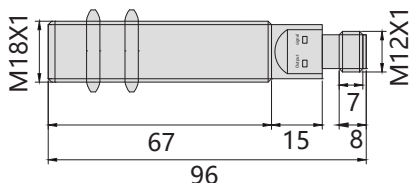
#### M12 Connector



## Technical data

|                                   |              |                                                                                                              |                    |
|-----------------------------------|--------------|--------------------------------------------------------------------------------------------------------------|--------------------|
| Appearance                        |              |                            |                    |
| Model No                          | NPN N.O./N.C | UM18-T03N-C32S12-X                                                                                           | UM18-T05N-C32S12-X |
|                                   | PNP N.O./N.C | UM18-T03P-C32S12-X                                                                                           | UM18-T05P-C32S12-X |
| Exterior structure                |              | M18*1mm                                                                                                      |                    |
| Sensing distance                  |              | 35...300mm                                                                                                   | 50...500mm         |
| Blind zone                        |              | 0...35mm                                                                                                     | 0...50mm           |
| Standard detection object         |              | 20*20mm                                                                                                      | 100*100mm          |
| Transducer frequency              |              | 300K                                                                                                         | 250K               |
| Power-on delay                    |              | About 400ms                                                                                                  |                    |
| Yellow LED                        |              | Constantly bright: Object detected within the teaching range; flicker: Teaching.                             |                    |
| Green LED                         |              | Constantly bright: Object detected within sensing range but out of teaching range; flicker: Teaching failure |                    |
| Operating Voltage                 |              | DC 18...30V, Ripple $\pm 10\%$                                                                               |                    |
| No-load current                   |              | $\leq 30\text{mA}$                                                                                           |                    |
| Output type                       |              | Switching output NPN/PNP, NO/NC                                                                              |                    |
| Short Circuit/overload protection |              | Yes                                                                                                          |                    |
| Voltage drop                      |              | $< 2\text{V}$                                                                                                |                    |
| Load current                      |              | $\leq 150\text{mA}$                                                                                          |                    |
| Switching frequency               |              | $\leq 10\text{Hz}$                                                                                           |                    |
| Repeatability                     |              | Full scale value's $\pm 0.5\%$                                                                               |                    |
| Temperature drift                 |              | Full scale value's $\pm 1.5\%$                                                                               |                    |
| Ambient temperature               |              | $-25...70^{\circ}\text{C}$                                                                                   |                    |
| Storage temperature               |              | $-40...85^{\circ}\text{C}$                                                                                   |                    |
| Connectors                        |              | M12 Connector (4-Pin)                                                                                        |                    |
| Ingress protection                |              | IP65                                                                                                         |                    |
| Housing material                  |              | Brass,nickel-plated                                                                                          |                    |

## Dimensioned drawing



## Teaching method

**Teaching method:** Put the target object in place where to be detected.Short connect white wire with blue wire for >2s.The yellow LED indicator will flash indicating that sensor enters into Teachings status.(Teaching duration<8s). Cut off white wire.If the Teaching operation is successfully completed,the yellow LED indicator will be normally on. And if Teaching operation fails,the yellow LED and green LED will flash alternatively.

**NO/NC setting:** Short connect white wire with brown wire for 2s.The yellow and green LED indicators will flash alternatively. Cut off the white wire to complete the output mode setting. If the short connection duration is >8s,this Teaching operation will be abandoned.



UM18

## Ultrasonic sensor

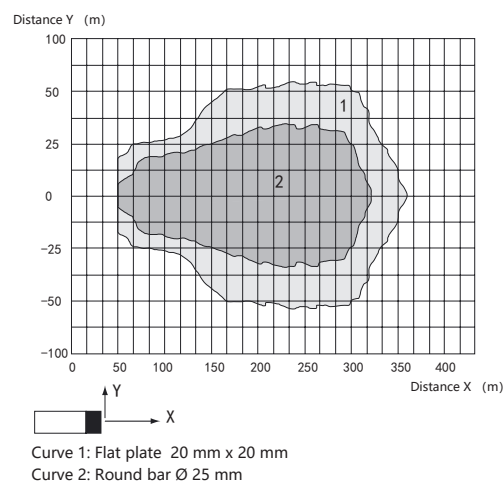
Brass, nickel-plated

DC 4 wire/DC 5 wire, Analog output

### Features

- Analog 4...20mA/20...4mA current output
- Analog 0...10V/10...0V voltage output
- Adjustable sensing distance
- Temperature compensation;
- Very small blind zone;
- Single-point teaching

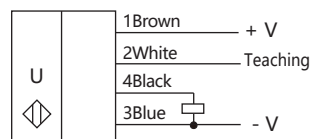
### Response characteristic curve



### Wiring

UM18-T03I-C32S12-X

UM18-T03V-C32S12-X

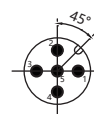
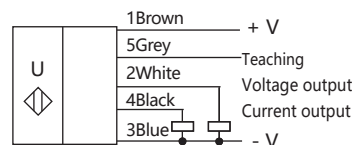


M12 Connector



UM18-T03M-C32S12-X

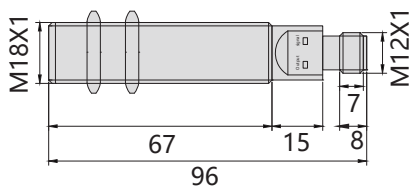
M12 Connector



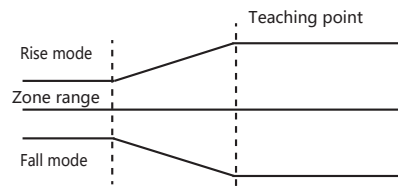
## Technical data

|                                |  |                                                                                                              |                             |                                                                    |                    |
|--------------------------------|--|--------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------|--------------------|
| Appearance                     |  |                            |                             |                                                                    |                    |
|                                |  | Model                                                                                                        | 4-20mA/0-10V                | UM18-T03I-C32S12-X                                                 | UM18-T03V-C32S12-X |
| Exterior structure             |  | M18*1mm                                                                                                      |                             |                                                                    |                    |
| Sensing distance               |  | 35...300mm                                                                                                   |                             |                                                                    |                    |
| Blind zone                     |  | 0...35mm                                                                                                     |                             |                                                                    |                    |
| Standard detection object      |  | 20*20mm                                                                                                      |                             |                                                                    |                    |
| Transducer frequency           |  | 300K                                                                                                         |                             |                                                                    |                    |
| Power-on delay                 |  | About 400ms                                                                                                  |                             |                                                                    |                    |
| Yellow LED                     |  | Constantly bright: Object detected within the teaching range; flicker: Teaching.                             |                             |                                                                    |                    |
| Green LED                      |  | Constantly bright: Object detected within sensing range but out of teaching range; flicker: Teaching failure |                             |                                                                    |                    |
| Operating Voltage              |  | DC 18...30V, Ripple ±10%                                                                                     |                             |                                                                    |                    |
| No-load current                |  | ≤30mA                                                                                                        |                             |                                                                    |                    |
| Output type                    |  | 1 analog output 4-20mA/20-4mA                                                                                | 1 analog output 0-10V/10-0V | 2 analog output current: 4-20mA/20-4mA;<br>Voltage: 0-10V/10-0V DC |                    |
| Load impedance                 |  | ≤500Ω                                                                                                        | ≥1000Ω                      | Current: ≤500Ω; Voltage≥1000Ω                                      |                    |
| Characteristic curve deviation |  | Full scale value's ±0.5%                                                                                     |                             |                                                                    |                    |
| Repeatability                  |  | Full scale value's ±0.1%                                                                                     |                             |                                                                    |                    |
| Temperature drift              |  | Full scale value's ±1.5%                                                                                     |                             |                                                                    |                    |
| Resolution                     |  | 0.3mm                                                                                                        |                             |                                                                    |                    |
| Ambient temperature            |  | -25...70℃ (248...343K)                                                                                       |                             |                                                                    |                    |
| Storage temperature            |  | -40...85℃ (233...358K)                                                                                       |                             |                                                                    |                    |
| Connectors                     |  | M12 Connector (4-Pin)                                                                                        |                             | M12 Connector (5-Pin)                                              |                    |
| Ingress protection             |  | IP65                                                                                                         |                             |                                                                    |                    |
| Housing material               |  | Brass,nickel-plated                                                                                          |                             |                                                                    |                    |

## Dimensioned drawing



## Analog Output mode



## Teaching method

**Teaching method:** Put the target object in place where to be detected.Short connect white wire with blue wire for >2s.The yellow LED indicator will flash indicating that sensor enters into Teachings status.(Teaching duration<8s). Cut off white wire.If the Teaching operation is successfully completed,the yellow LED indicator will be normally on. And if Teaching operation fails,the yellow LED and green LED will flash alternatively, (UM18-T03I-C32S12-X与UM18-T03V-C32S12-X)

**Teaching method:** Put the target object in place where to be detected.Short connect gray wire with blue wire for >2s.The yellow LED indicator will flash indicating that sensor enters into Teachings status.(Teaching duration<8s). Cut off gray wire.If the Teaching operation is successfully completed,the yellow LED indicator will be normally on. And if Teaching operation fails,the yellow LED and green LED will flash alternatively (UM18-T03M-C32S12-X)

**Output modes setting:** Short connect white wire with brown wire for 2s.The yellow and green LED indicators will flash alternatively. Cut off the white wire to complete the output mode setting. If the short connection duration is >8s,this Teaching operation will be abandoned.



## UM18 Ultrasonic sensor

Brass,nickel-plated  
DC 4 wire, Analog output

ISO9001 CE UKCA CQC RoHS

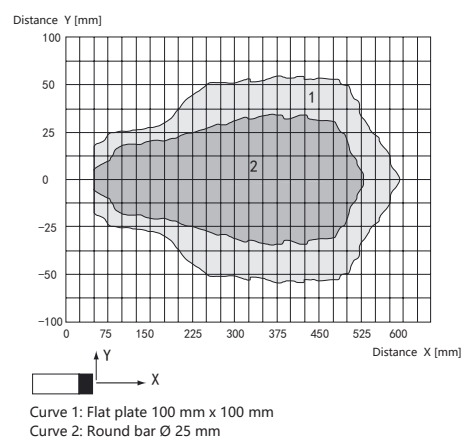
### Features

- Analog 4...20mA/20...4mA current output
- Analog 0...10V/10...0V voltage output
- Adjustable sensing distance
- Temperature compensation;
- Very small blind zone;
- Single-point teaching

### Response characteristic curve

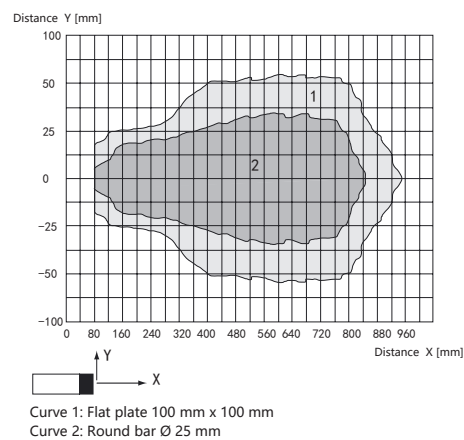
**UM18-T05I-C32S12-X**

**UM18-T05V-C32S12-X**



**UM18-T08I-C32S12-X**

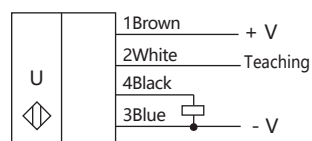
**UM18-T08V-C32S12-X**



### Wiring

**UM18-T03I-C32S12-X**

**UM18-T03V-C32S12-X**



M12 Connector

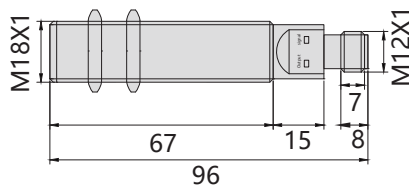


## Technical data

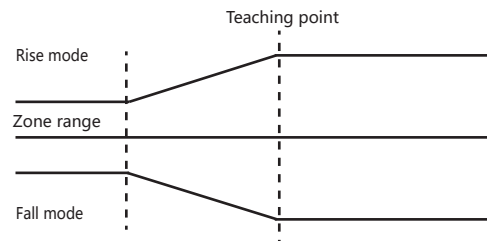
|                                |                                                                                                              |                                                                                    |                             |                    |                    |
|--------------------------------|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------|--------------------|--------------------|
| Appearance                     |                                                                                                              |  |                             |                    |                    |
| Model                          | 4-20mA/0-10V                                                                                                 | UM18-T05I-C32S12-X                                                                 | UM18-T08I-C32S12-X          | UM18-T05V-C32S12-X | UM18-T08V-C32S12-X |
| Exterior structure             | M18*1mm                                                                                                      |                                                                                    |                             |                    |                    |
| Sensing distance               | 50...500mm                                                                                                   | 80...800mm                                                                         | 50...500mm                  | 80...800mm         |                    |
| Blind zone                     | 0...50mm                                                                                                     | 0...80mm                                                                           | 0...50mm                    | 0...80mm           |                    |
| Standard detection object      | 100*100mm                                                                                                    | 100*100mm                                                                          | 100*100mm                   | 100*100mm          |                    |
| Transducer frequency           | 250K                                                                                                         | 200K                                                                               | 250K                        | 200K               |                    |
| Power-on delay                 | About 400ms                                                                                                  |                                                                                    |                             |                    |                    |
| Yellow LED                     | Constantly bright: Object detected within the teaching range; flicker: Teaching.                             |                                                                                    |                             |                    |                    |
| Green LED                      | Constantly bright: Object detected within sensing range but out of teaching range; flicker: Teaching failure |                                                                                    |                             |                    |                    |
| Operating Voltage              | e                                                                                                            |                                                                                    |                             |                    |                    |
| No-load current                | DC 18...30V, Ripple ±10%                                                                                     |                                                                                    |                             |                    |                    |
| Output type                    | 1 analog output 4-20mA/20-4mA                                                                                | ≤30mA                                                                              | 1 analog output 0-10V/10-0V |                    |                    |
| Load impedance                 | ≤500Ω                                                                                                        |                                                                                    | ≥1000Ω                      |                    |                    |
| Characteristic curve deviation |                                                                                                              |                                                                                    |                             |                    |                    |
| Repeatability                  | Full scale value's ±0.5%                                                                                     |                                                                                    |                             |                    |                    |
| Temperature drift              | Full scale value's ±0.1%                                                                                     |                                                                                    |                             |                    |                    |
| Resolution                     | Full scale value's ±1.5%                                                                                     |                                                                                    |                             |                    |                    |
| Ambient temperature            | 0.3mm                                                                                                        |                                                                                    |                             |                    |                    |
| Storage temperature            | -25...70°C (248...343K)                                                                                      |                                                                                    |                             |                    |                    |
| Connectors                     | -40...85°C (233...358K)                                                                                      |                                                                                    |                             |                    |                    |
| Ingress protection             | M12 Connector (4-Pin)                                                                                        |                                                                                    |                             |                    |                    |
| Housing material               | IP65                                                                                                         |                                                                                    |                             |                    |                    |

Brass,nickel-plated

## Dimensioned drawing



## Analog Output mode



## Teaching method

**Teaching method:** Put the target object in place where to be detected.Short connect white wire with blue wire for >2s.The yellow LED indicator will flash indicating that sensor enters into Teachings status.(Teaching duration<8s). Cut off white wire.If the Teaching operation is successfully completed,the yellow LED indicator will be normally on. And if Teaching operation fails,the yellow LED and green LED will flash alternatively.

**Output modes setting:** Short connect white wire with brown wire for 2s.The yellow and green LED indicators will flash alternatively. Cut off the white wire to complete the output mode setting. If the short connection duration is >8s,this Teaching operation will be abandoned.

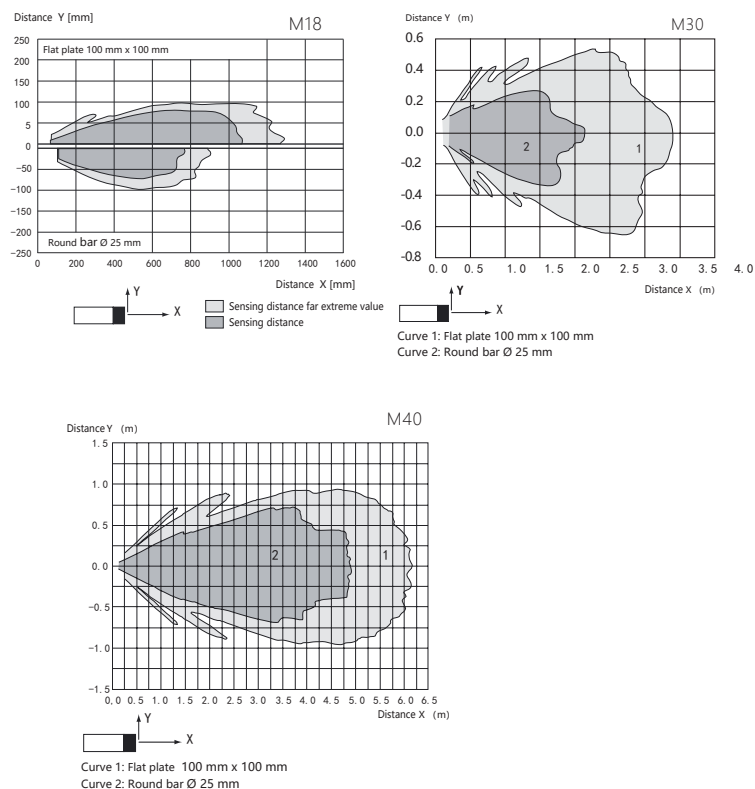


UM18 UM30 UM40  
**Ultrasonic sensor**  
Brass, nickel-plated  
DC 5 wire, Switching output

## Features

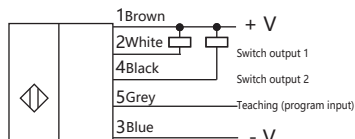
- 2 switching outputs;
- 3 different output functions can be set;
- Temperature compensation;
- Very small blind area;

## Response characteristic curve

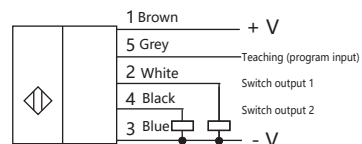


## Wiring

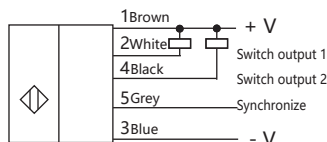
### M18 NPN Output



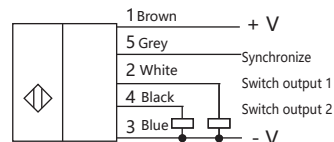
### PNP Output



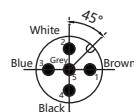
### M30 NPN Output



### PNP Output



### M12 Connector



## Technical data

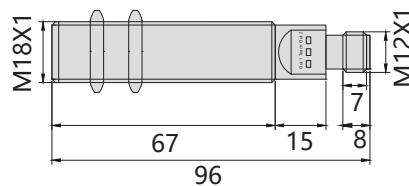
|                                   |              |                                                                                           |
|-----------------------------------|--------------|-------------------------------------------------------------------------------------------|
| Appearance                        |              |         |
| Model No                          | NPN N.O.+N.C | <b>UM18-T10N-C31S12-X</b>                                                                 |
|                                   | PNP N.O.+N.C | <b>UM18-T10P-C31S12-X</b>                                                                 |
| Exterior structure                |              | M18*1mm                                                                                   |
| Sensing distance                  |              | 70...1000mm                                                                               |
| Adjustment range                  |              | 90...1000mm                                                                               |
| Blind zone                        |              | 0...70mm                                                                                  |
| Standard detection object         |              | 100*100mm                                                                                 |
| Transducer frequency              |              | 200K                                                                                      |
| Power-on delay                    |              | ≤400ms                                                                                    |
| Yellow LED                        |              | Constantly bright: indicates the switching status. flicker: object is detected            |
| Red LED                           |              | Constantly bright: distance setting failed. flicker: no target detected in Teach-in state |
| Operating Voltage                 |              | DC 10...30V, Ripple 10%Vss                                                                |
| No-load current                   |              | ≤50mA                                                                                     |
| Output type                       |              | Switching output NPN/PNP, NO+NC                                                           |
| Short Circuit/overload protection |              | Yes                                                                                       |
| Voltage drop                      |              | ≤3V                                                                                       |
| Repeatability                     |              | ≤1%                                                                                       |
| Switching frequency               |              | Max:10Hz                                                                                  |
| Range lag                         |              | 1mm                                                                                       |
| Ambient temperature               |              | -25...70°C                                                                                |
| Storage temperature               |              | -40...85°C                                                                                |
| Connectors                        |              | M12 Connector                                                                             |
| Ingress protection                |              | IP65                                                                                      |
| Material                          |              | Housing: Brass,nickel-plated                                                              |

Ultrasonic

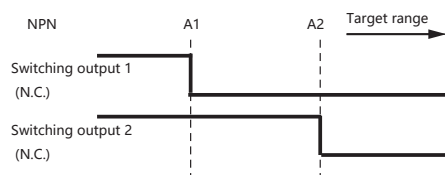
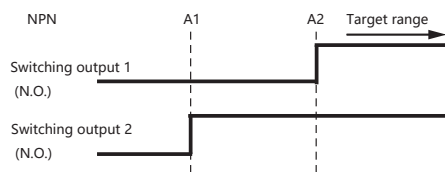
Rectangular

Single  
and double sheetsMetal single  
and double sheets

## Dimensioned drawing

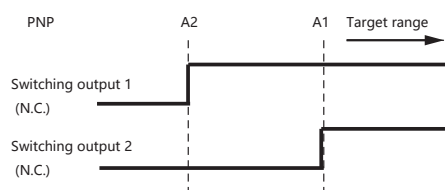
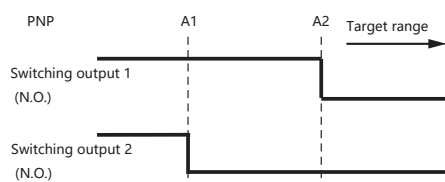


## Switch function output



### Ultrasonic

### Rectangular



## Sensor function description

### Teaching procedure:

This ultrasonic sensor has 2 switching outputs corresponding to 2 boundary points within its sensing range. These 2 boundary points can be individually set. The setting method is to connect Teaching wire with power -V and +V. The connection duration should be >2s. After 2s, the sensor LED indicator will flash. During the LED indicator flashing, cut off the Teaching wire connection to complete setting procedure. If Do not cut off Teaching wire connection for a long time, it will automatically give up this setting procedure. And meanwhile, LED indicator will stop flashing. And sensor will keep previous boundary points unchanged. If target object is not detected, the setting will fail and red LED will be normally ON. Quickly short-contact the Teaching wire with -V or +V, the sensor will restore settings.

### A1 point setting:

Put the target object in place. Connect Teaching wire with power -V for >2s. The yellow LED which corresponds to switching output 2 will start to flash. Cut off the Teaching wire connection to complete A1 point setting. If no target object is detected, the red LED will flash.

### A2 point setting:

Put the target object in place. Connect Teaching wire with power +V for >2s. The yellow LED which corresponds to switching output 1 will start to flash. Cut off the Teaching wire connection to complete A2 point setting. If no target object is detected, the red LED will flash.

### Default setting:

A1 point: 70mm  
A2 point: 1000mm  
Default output: NO mode

### Output mode:

Below 2 outputs are for option:

1. NO mode: Output will be ON when target object is within sensing range, and it will be off when target object is out of sensing range.
  2. NC mode: Output will be OFF when target object is within sensing range, and it will be ON when target object is out of sensing range.
- If position  $A1 < A2$ , the output mode will be automatically switched to NO mode.
- If position  $A1 > A2$ , the output mode will be automatically switched to NC mode.

### Modify the emission angle of sound beam:

Connect Teaching wire with blue wire and supply power-on, the red LED will flash to indicate that modification is successful and then cut off Teaching wire connection

3 emission angles of the sound beam are available:

Narrow emission angle: red LED flash 1 time.

Middle emission angle: red LED flash 2 times.

Wide emission angle: red LED flash 3 times.

## Technical data

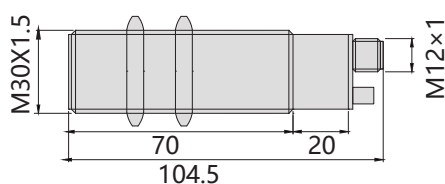
|                           |             |                                                                                                                                             |
|---------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Appearance                |             |                                                           |
| Model No                  | NPN N.O+N.C | <b>UM30-T20N-C31S12-X</b>                                                                                                                   |
|                           | PNP N.O+N.C | <b>UM30-T20P-C31S12-X</b>                                                                                                                   |
| Exterior structure        |             | M30*1.5mm                                                                                                                                   |
| Sensing distance          |             | 150...2000mm                                                                                                                                |
| Adjustment range          |             | 200...2000mm                                                                                                                                |
| Blind zone                |             | 0...150mm                                                                                                                                   |
| Standard detection object |             | 100mm*100mm                                                                                                                                 |
| Transducer frequency      |             | 112k Hz                                                                                                                                     |
| Response delay            |             | Factory setting 200ms                                                                                                                       |
| LED Green                 |             | Constantly bright:power on, flicker:standby mode or detection at setting status                                                             |
| LED Yellow1               |             | Constantly bright:output switching point 1, flicker:setting function                                                                        |
| LED Yellow2               |             | Constantly bright:output switching point 2, flicker:setting function                                                                        |
| LED Red                   |             | Constantly bright:temperature/setting plug not connected;flicker:no target detected at setting status or error                              |
| Temperature/setting plug  |             | Temperature compensation,switch point setting, output function setting                                                                      |
| Operating Voltage         |             | 10...30VDC, Ripple 10%Vpp                                                                                                                   |
| No-load current           |             | ≤50mA                                                                                                                                       |
| Synchronize               |             | Two-way; Level 0: -... +1V; Level 1: +4V... +V; Input impedance: >12KΩ; Synchronization pulse: ≥100us, synchronization pulse duration: ≥2ms |
| Common mode operation     |             | ≤30Hz                                                                                                                                       |
| Multiple mode operation   |             | ≤30Hz/n, n= the number of proximity sensors,n≤5                                                                                             |
| Output type               |             | 2 switching output, NPN/PNP NO+NC                                                                                                           |
| Repeatability             |             | ≤0.1% full scale value                                                                                                                      |
| Rated operated current    |             | 200mA                                                                                                                                       |
| Voltage drop              |             | ≤2.5V                                                                                                                                       |
| Switching frequency       |             | ≤3Hz                                                                                                                                        |
| Temperature Drift         |             | ≤2% of full scale value (with temperature compensation)                                                                                     |
| Standard                  |             | IEC/EN 60947-5-2                                                                                                                            |
| Ambient temperature       |             | -25...70°C (248...343K)                                                                                                                     |
| Storage temperature       |             | -40...85°C (233...358K)                                                                                                                     |
| Ingress protection        |             | IP65                                                                                                                                        |
| Connectors                |             | M12 Connector                                                                                                                               |
| Housing material          |             | Brass,nickel-plated                                                                                                                         |

Ultrasonic

Rectangular

Single  
and double sheetsMetal single  
and double sheets

## Dimensioned drawing



## Functional description

Proximity sensor has a 4-pin temperature/setting plug which can be plugged in from 4 positions. The specific functions are as follows (teaching plug letter corresponds to the plug function reference point on the back cover) :

| Plug position | Function                                                           |
|---------------|--------------------------------------------------------------------|
| A1            | Set switch point A1                                                |
| A2            | Set switch point A2                                                |
| E2/E3         | Set working mode: Switching Point mode/window mode/hysteresis mode |
| T             | Temperature compensation                                           |

## How to set up the sensor

Set the switch point 1 or 2 of the detection range

1. Cut off the power.
2. Unplug the setting plug.
3. Power on again (restart).
4. Place the target object at the desired boundary point.
5. Insert the setting-plug in the corresponding output switching point A1 or A2 , and then unplug. The switching points A1 and A2 are set.

## Note

When the temperature/setting plug is pulled out, the position value of the target object will be saved.

1. The setting process can be indicated by LED light. When the green light flashes, the target object is detected;When the red light flashes, the target object is not detected.
2. Insert the setting plug into the T position, the setting process ends, and the set value is saved.
3. The proximity sensor enters common mode operation.

## Set output function

1. Cut off the power.
  2. Pull out the setting plug.
  3. Power on again (restart).
  4. Insert the setting plug into the E2/E3 position .By multiple times inserting and pulling-out the setting plug,you can set up 3 output modes in cycles:
    - 1) Switching point mode, LED A1 flashing.
    - 2)Window mode, LED A2 flashing.
    - 3)Hysteresis mode: LED A1 and A2 lights flash simultaneously.
  5. Insert the setting plug into the T position, the setting process ends, and save the set working mode.
  6. The proximity sensor enters the common mode operation.
- Description: If the temperature/setting plug is not inserted into the T position within five minutes, the proximity sensors will enter the common mode operation (with the most recently stored parameter value), and the temperature compensation function will be off.

## Synchronization input

The proximity sensor has a sync input terminal to suppress the inter-action between different proximity sensors.If the sync input is not connected,sensor will operate according to its internally generated clock frequency(inherent frequency).Loading a square-wave impulse with >100us impulse width on the sensor's sync input terminal,can achieve sync operation.Sync impulse on the sync input terminal will initiate a detection cycle which is triggered by the falling edge of sync impulse.

If the low level duration is more than 1s or sync input terminal is open-circuit,the proximity sensor will operate by its own inherent frequency.

If adding high level for duration more than 1s to the sync input,proximity sensor will enters into standby mode(green indicator light) and output stops at the last status.

It is not possible to do sync operation during setting, and the switching point also can not be set during synchronous operation.

## Application of synchronous input terminal

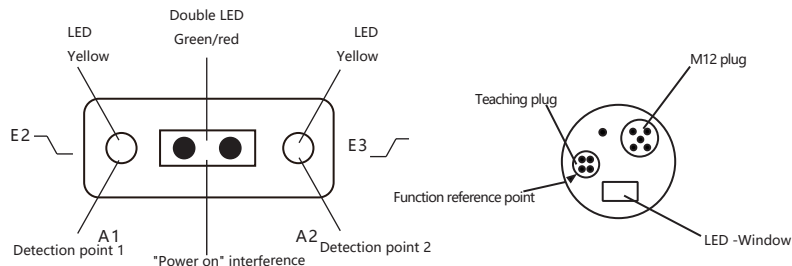
- 1.The sync input terminals of 2-5 sensors are connected together to achieve sync operation, at this time the proximity sensor alternately emits ultrasonic pulses.
  - 2.Loading same impulse signal on multiple sensors' sync input terminals,- can achieve sync operation.
  3. sending sync impulse in cycles to each sensor's sync input terminal,can achieve multiple mode operation.
  4. Loading high level on sensor's sync input terminal to stop sensor's operation.
- Sensor's sync function increased its detection cycle times.So when sensors operate at sync mode,its response time will increase.
- Note:If synchronization is not required, the sync input must be grounded (0V).

## Factory default settings

A1 : Blind zone  
A2 : Maximum range  
Switching mode: NO

## LED display/analog output

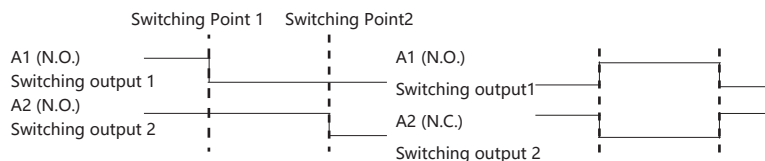
| Operating status                             | Double LED green | Double LED Red | Yellow LED A1           | Yellow LED A2           |
|----------------------------------------------|------------------|----------------|-------------------------|-------------------------|
| Switching point A1                           |                  |                |                         |                         |
| Target detected                              | Flash            | Dark           | Flash                   | Dark                    |
| Target not detected                          | Dark             | Flash          | Flash                   | Dark                    |
| Switching point A2                           |                  |                |                         |                         |
| Target detected                              | Flash            | Dark           | Dark                    | Flash                   |
| Target not detected                          | Dark             | Flash          | Dark                    | Flash                   |
| Output mode Settings (E2/E3)                 |                  |                |                         |                         |
| Switching point mode                         | Bright           | Dark           | Flash                   | Dark                    |
| Window mode                                  | Bright           | Dark           | Dark                    | Flash                   |
| Hysteresis mode                              | Bright           | Dark           | Flash                   | Flash                   |
| Common mode operation                        |                  |                |                         |                         |
| Temperature compensation                     | Bright           | Dark           | Switching status A1     | Switching status A2     |
| Setting plug pulling-out or short-connection | Dark             | Bright         | Switching status A1     | Switching status A2     |
| Standby mode                                 | Flash            | Dark           | Previous status         | Previous status         |
| Interference (eg., Compressed air)           | Dark             | Flash          | Last or previous status | Last or previous status |



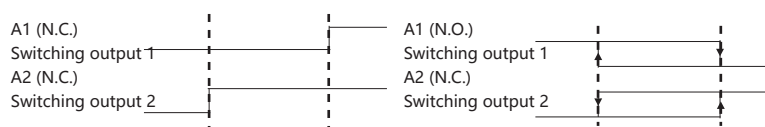
## Switching output

### 1、 Switching mode

When  $A1 < A2$ , the output is activated as NO



When  $A1 > A2$ , the output is activated as NC



### 2、 Window mode

A1, A2 are interchangeable

### 3.Hysteresis mode

A1, A2 are interchangeable

## Technical data

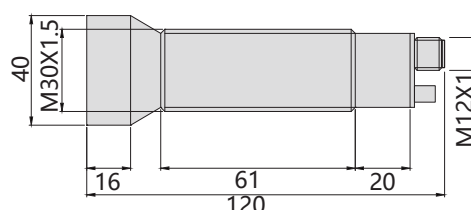
|                           |             |                                                                                                                                             |  |
|---------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------|--|
| Appearance                |             |                                                           |  |
| Model No                  | NPN N.O+N.C | <b>UM40-T40N-C31S12-X</b>                                                                                                                   |  |
|                           | PNP N.O+N.C | <b>UM40-T40P-C31S12-X</b>                                                                                                                   |  |
| Exterior structure        |             | M30*1.5mm                                                                                                                                   |  |
| Sensing distance          |             | 300...4000mm                                                                                                                                |  |
| Adjustment range          |             | 340...4000mm                                                                                                                                |  |
| Blind zone                |             | 0...300mm                                                                                                                                   |  |
| Standard detection object |             | 100mm*100mm                                                                                                                                 |  |
| Transducer frequency      |             | 75k Hz                                                                                                                                      |  |
| Response delay            |             | Factory setting 440ms                                                                                                                       |  |
| LED Green                 |             | Constantly bright:power on, flicker:standby mode or detection at setting status                                                             |  |
| LED Yellow1               |             | Constantly bright:output switching point 1 status, flicker:setting function                                                                 |  |
| LED Yellow2               |             | Constantly bright:output switching point 2 status, flicker:setting function                                                                 |  |
| LED Red                   |             | Constantly bright:temperature/setting plug not connected ;flicker:no target detected or error                                               |  |
| Temperature/setting plug  |             | Temperature compensation,switching point setting, output function setting                                                                   |  |
| Operating Voltage         |             | 10...30VDC, Ripple10%Vpp                                                                                                                    |  |
| No-load current           |             | ≤50mA                                                                                                                                       |  |
| Synchronize               |             | Two-way; Level 0: -... +1V; Level 1: +4V... +V; Input impedance: >12KΩ; Synchronization pulse: ≥100us, synchronization pulse duration: ≥2ms |  |
| Common mode operation     |             | ≤13Hz                                                                                                                                       |  |
| Multiple mode operation   |             | ≤13Hz/n, n=the number of proximity sensors,n≤5                                                                                              |  |
| Output type               |             | 2 switching output, NPN/PNP NO+NC                                                                                                           |  |
| Repeatability             |             | ≤0.1% full scale value                                                                                                                      |  |
| Rated operating current   |             | 200mA                                                                                                                                       |  |
| Voltage drop              |             | ≤2.5V                                                                                                                                       |  |
| Switching frequency       |             | ≤1Hz                                                                                                                                        |  |
| Temperature Drift         |             | ≤2% of full scale value (with temperature compensation)                                                                                     |  |
| Standard                  |             | IEC/EN 60947-5-2                                                                                                                            |  |
| Ambient temperature       |             | -25...70°C (248...343K)                                                                                                                     |  |
| Storage temperature       |             | -40...85°C (233...358K)                                                                                                                     |  |
| Ingress protection        |             | IP65                                                                                                                                        |  |
| Connectors                |             | M12 Connector                                                                                                                               |  |
| Housing material          |             | Brass,nickel-plated                                                                                                                         |  |

Ultrasonic

Rectangular

Single  
and double sheetsMetal single  
and double sheets

## Dimensioned drawing



## Functional description

Proximity sensor has a 4-pin temperature/setting plug which can be plugged in from 4 positions. The specific functions are as follows (teaching plug letter corresponds to the plug function reference point on the back cover) :

| Plug position | Function                                                        |
|---------------|-----------------------------------------------------------------|
| A1            | Set switch point A1                                             |
| A2            | Set switch point A2                                             |
| E2/E3         | Set working mode: Switch Point mode/window mode/hysteresis mode |
| T             | Temperature compensation                                        |

## How to set up the sensor

Set the switch point 1 or 2 of the detection range

1. Cut off the power.
2. Unplug the setting plug.
3. Power on again (restart).
4. Place the target object at the desired boundary point.
5. Insert the setting-plug in the corresponding output switching point 1 or 2 , and then unplug. The switching points A1 and A2 are set.

## Note

When the temperature/setting plug is pulled out, the target object position value will be saved.

1. The setting process can be indicated by LED light. When the green light flashes, the target object is detected; When the red light flashes, the target object is not detected.
2. Insert the setting plug into the T position, the setting process ends, and the set value is saved.

## Set output function

1. Cut off the power.
2. Pull out the setting plug.
3. Power on again (restart).
4. Insert the setting plug into the E2/E3 position .By multiple times inserting and pulling-out the setting plug,you can set up 3 output modes in cycles:

- 1) Switching point mode, LED A1 flashing.
- 2) Window mode, LED A2 flashing.
- 3) Hysteresis mode: LED A1 and A2 lights flash simultaneously.

5. Insert the setting plug into the T position, the setting process ends, and save the set working mode.

6. The proximity sensor enters the common mode operation.  
Description: If the temperature/setting plug is not inserted into the T position within five minutes, the proximity sensor will enter the common mode operation (with the latest stored parameter value), and the temperature compensation function will be lost.

## Synchronization input

The proximity sensor has a sync input terminal to suppress the inter-action between different proximity sensors. If the sync input is not connected, sensor will operate according to its internally generated clock frequency (inherent frequency). Loading a square-wave impulse with > 100us impulse width on the sensor's sync input terminal, can achieve sync operation. Sync impulse on the sync input terminal will initiate a detection cycle which is triggered by the falling edge of sync impulse.

If the low level duration is more than 1s or sync input terminal is open-circuit, the proximity sensor will operate by its own inherent frequency.

If adding high level for duration more than 1s to the sync input, proximity sensor will enter into standby mode (green indicator light) and output stops at its last status.

It is not possible to do sync operation during setting, and the switching point cannot be set during synchronous operation.

## Application of synchronous input terminal

1. The sync input terminals of 2-5 sensors are connected together to achieve sync operation, at this time the proximity sensor alternately emits ultrasonic pulses.
2. Loading same impulse signal on multiple sensors' sync input terminals, - can achieve sync operation.
3. sending sync impulse in cycles to each sensor's sync input terminal, can achieve multiple mode operation.
4. Loading high level on sensor's sync input terminal to stop sensor's operation.

Sensor's sync function increased its detection cycle times. So when sensors operate at sync mode, its response time will increase.

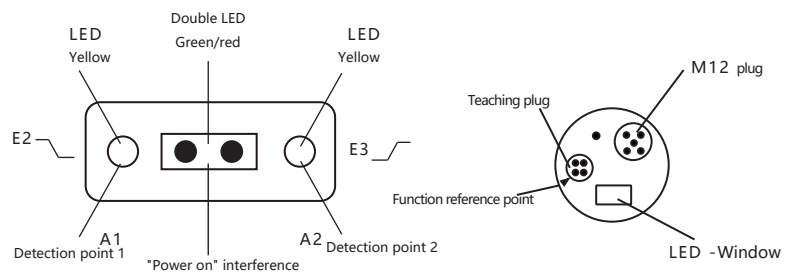
Note: If synchronization is not required, the sync input must be grounded (0V).

## Factory default settings

A1 : Blind zone  
A2 : Maximum range  
Switching mode: NO

## LED display/analog output

| Operating status                             | Double LED green | Double LED Red | Yellow LED A1           | Yellow LED A2           |
|----------------------------------------------|------------------|----------------|-------------------------|-------------------------|
| Switching point A1                           |                  |                |                         |                         |
| Target detected                              | Flash            | Dark           | Flash                   | Dark                    |
| Target not detected                          | Dark             | Flash          | Flash                   | Dark                    |
| Switching point A2                           |                  |                |                         |                         |
| Target detected                              | Flash            | Dark           | Dark                    | Flash                   |
| Target not detected                          | Dark             | Flash          | Dark                    | Flash                   |
| Output mode Settings (E2/E3)                 |                  |                |                         |                         |
| Switching point mode                         | Bright           | Dark           | Flash                   | Dark                    |
| Window mode                                  | Bright           | Dark           | Dark                    | Flash                   |
| Hysteresis mode                              | Bright           | Dark           | Flash                   | Flash                   |
| Common mode operation                        |                  |                |                         |                         |
| Temperature compensation                     | Bright           | Dark           | Switching status A1     | Switching status A2     |
| Setting plug pulling-out or short-connection | Dark             | Bright         | Switching status A1     | Switching status A2     |
| Standby mode                                 | Flash            | Dark           | Previous status         | Previous status         |
| Interference (eg. Compressed air)            | Dark             | Flash          | Last or previous status | Last or previous status |



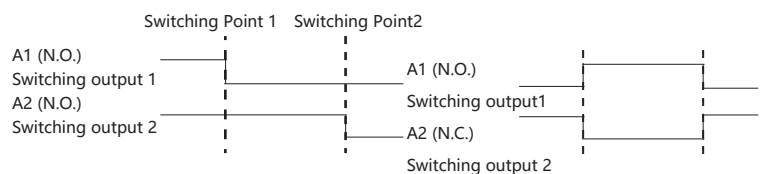
## Switching output mode

### 1. Switching mode

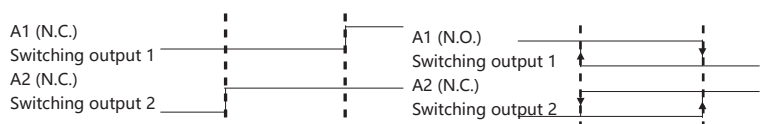
When  $A1 < A2$ , the output is activated as NO

### 2. Window mode

A1, A2 are interchangeable



When  $A1 > A2$ , the output is activated as NC



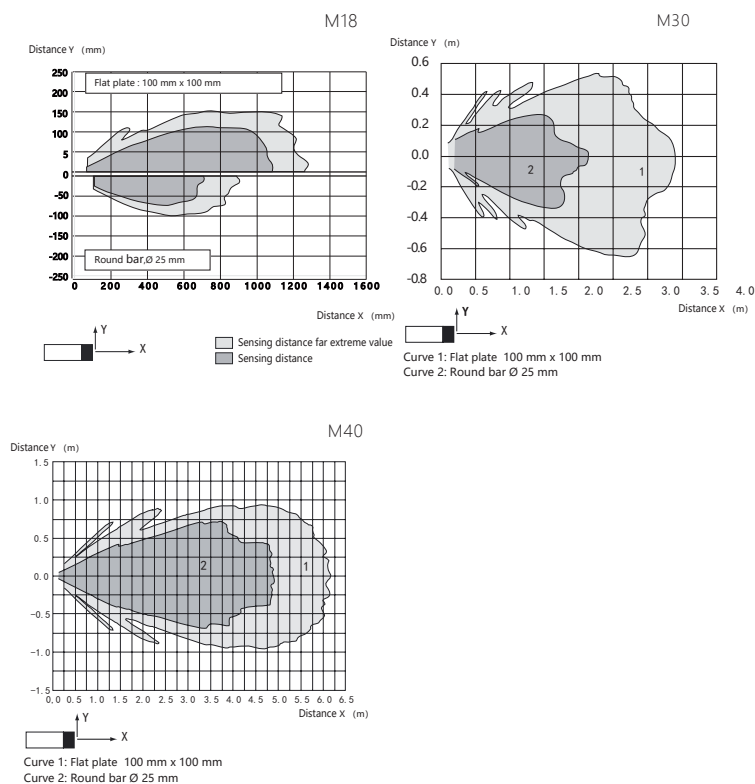
### 3. Hysteresis mode

A1, A2 are interchangeable

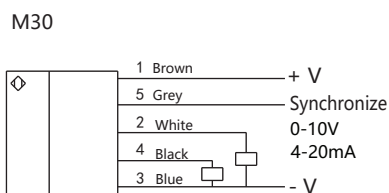
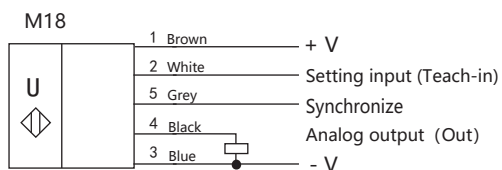
## Features

- 4-20mA current output/Analog 0V... 10V output (M18)
- current and voltage output (M30/M40)
- Adjustable detection window
- Teach-in input
- Synchronization function
- Proximity sensor closing function
- Temperature compensation
- Small blind zone

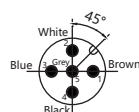
## Response characteristic curve



## Wiring



### M12 Connector



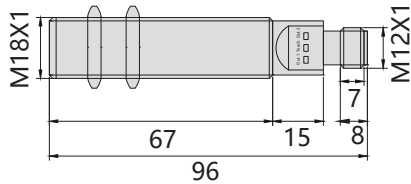
UM18 UM30 UM40  
**Ultrasonic sensor**  
 Brass,nickel-plated  
 D C 5wire, Analog output

## Technical data

|                                |                                                                                                                  |                         |
|--------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------|
| Model                          | 4-20mA/0-10V                                                                                                     |                         |
|                                | UM18-T10I-C31S12-X                                                                                               | UM18-T10V2-C31S12-X     |
| Exterior structure             | M18*1mm                                                                                                          |                         |
| Sensing distance               | 70...1000mm                                                                                                      |                         |
| Blind zone                     | 0...70mm                                                                                                         |                         |
| Standard detection object      | 100*100mm                                                                                                        |                         |
| Transducer frequency           | 200K                                                                                                             |                         |
| Power-on delay                 | About 1.5s                                                                                                       |                         |
| Yellow LED                     | Constantly bright:the object is within the detection range; flicker:failure of setting detection range           |                         |
| Green LED                      | Constantly bright:object is within 1000mm,but out of detection range; flicker:failure of setting detection range |                         |
| Operating voltage              | DC 18... 30V, Ripple 10%Vss                                                                                      |                         |
| No-load current                | ≤50mA                                                                                                            |                         |
| Output type                    | 1 analog output 4-20mA                                                                                           | 1 analog output 0...10V |
| Resolution                     | 0.35mm                                                                                                           |                         |
| Characteristic curve deviation | Full scale value's ±1%                                                                                           |                         |
| Repeatability                  | Full scale value's ±0.1%                                                                                         |                         |
| Load impedance                 | ≤500Ω                                                                                                            | > 1000Ω                 |
| Temperature drift              | Full scale value's ±1.5%                                                                                         |                         |
| Ambient temperature            | -25...70℃ (248...343K)                                                                                           |                         |
| Storage temperature            | -40...85℃ (233...358K)                                                                                           |                         |
| Connectors                     | M12 connector (5-Pin)                                                                                            |                         |
| Ingress protection             | IP65                                                                                                             |                         |
| Housing material               | Housing : Brass,nickel-plated                                                                                    |                         |



## Dimensioned drawing



## Synchronize

### Synchronous input terminal

Proximity sensor has a sync input terminal to suppress the inter-action between different sensors. If the sync input terminal is not connected, sensor will operate according to its internally generated clock frequency (inherent frequency). Multiple sensors' sync operation can be achieved by below methods:

### External synchronization

Before power-on, loading a square-wave impulse with low level width  $>100\mu s$  and cycle  $<1s$  on sensor's sync input terminal, can achieve sync operation. Sync impulse of sensor's sync input terminal will initiate a detection cycle which is triggered by the falling edge of sync impulse. External sync has 2 modes for option:

1. Loading same impulse signal on multiple sensors' sync input terminal, can achieve sync operation.
2. Sending sync impulse in cycles to the sync input terminal of each sensor, can achieve multiple mode operation.

### External synchronization has two modes to choose

1. loading same impulse signal on multiple sensors' sync input terminal, can achieve sync operation.
2. sending sync impulse in cycles to the sync input terminal of each sensor, can achieve multiple mode operation.

### Internal synchronization

Connect all sensors sync wires together to achieve internal sync mode. Internal sync function can connect up to 5 proximity sensors. After power-on, these proximity sensors operate in multiple modes. The response delay will increase as the number of sync operation sensors increase. Sensing range can not be set during internal or external sync operation. Please only set-up sensing range when sensors operate at non-synchronous status.

#### Note:

If sync operation is not required, sync input terminal must be grounded (0V) or idle.

## Detection setting

Ultrasonic proximity sensor has one analog output to set up 2 boundary points for its near point and far point detection range. Setting method is to let Teach-in input terminal separately connect power source -V or +V for  $>2s$ . After 2s, LED will start to flash. Cut off the Teach-in input connection during LED flashing to complete setting process. If Do not cut off the Teach-in input connection for a long time, this setting process will be automatically given up. And LED will stop flashing. Previously kept boundary points will remain unchanged.

If the target object is Not detected, the setting process will fail. Yellow LED and green LED will flash alternatively. Quickly contact Teach-in input with -V or +V will restore to normal.

#### Position A1 setting:

Put the target object in place. Contact Teach-in input terminal with power source -V for  $>2s$ . The yellow LED will start to flash. Cut off the Teach-in input connection to complete the setting process.

#### Position A2 setting:

Put the target object in place. Contact Teach-in input terminal with power source +V for  $>2s$ . The green LED will start to flash. Cut off the Teach-in input connection to complete the setting process.

## Output modes

Below 2 output modes are for option:

1, Rise mode: Analog output value will increase as the increase of distance.

2, Fall mode: Analog output value will decrease as the increase of the distance.

If position  $A1 < A2$ , output mode will be automatically switched to Rise mode.

If position  $A1 > A2$ , output mode will be automatically switched to Fall mode.

Modify the emission angle of sound beam

Connect Teach-in input terminal with blue wire, then power-on, green LED will normally bright and yellow LED flash. Modification of the emission angle of sound beam will be completed. Cut off the Teach-in input connection.

3 emission angles are for option:

Narrow emission angle: yellow LED flash 1 time.

Middle emission angle: yellow LED flash 2 times.

Wide emission angle: yellow LED flash 3 times.

### Default settings

Position A1: 70mm

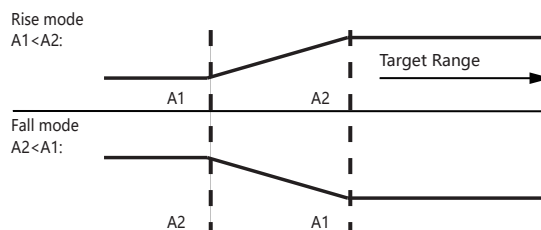
Position A2: 1000mm

Output mode: Rise mode

## LED display

| Operating status                                                      | Yellow LED | Green LED |
|-----------------------------------------------------------------------|------------|-----------|
| Target object is within near boundary point                           | Dark       | Dark      |
| Target object is within sensing range                                 | Bright     | Dark      |
| Target object is out of far boundary point, but within sensing range. | Dark       | Bright    |
| Target object can Not be detected                                     | Dark       | Dark      |

## Analog output mode



Ultrasonic

Rectangular

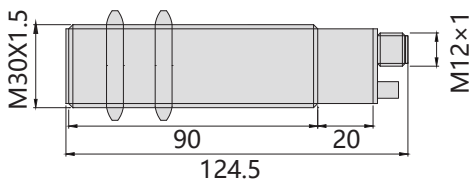
Single  
and double sheets

Metal single  
and double sheets

Technical data

|                                |              |                                                                                                                                  |
|--------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------|
| Appearance                     |              |                                                |
| Model                          | 4-20mA/0-10V |                                                                                                                                  |
|                                |              | UM30-T20M-C31S12-X                                                                                                               |
| Exterior structure             |              | M30*1.5mm                                                                                                                        |
| Sensing Distance               |              | 300...2000mm                                                                                                                     |
| Adjustment range               |              | 340...2000mm                                                                                                                     |
| Blind zone                     |              | 0...300mm                                                                                                                        |
| Standard detection object      |              | 100mm*100mm                                                                                                                      |
| Transducer frequency           |              | 112k Hz                                                                                                                          |
| Response delay                 |              | factory setting 440ms                                                                                                            |
| Green LED                      |              | Constantly bright:power on, flicker:detection at setting status or standby mode                                                  |
| Yellow LED1                    |              | Constantly bright:Target in the detection range;flicker:setting function                                                         |
| Yellow LED2                    |              | Constantly bright:Target in the detection range;flicker:setting function                                                         |
| Red LED                        |              | Constantly bright:temperature/setting plug not connected;flicker:no target detected in or error setting state                    |
| Temperature/setting plug       |              | Temperature compensation, switching point setting, output function setting                                                       |
| Operating voltage              |              | 10...30VDC , ripple 10%Vpp                                                                                                       |
| Power consumption              |              | ≤900mW                                                                                                                           |
| Synchronize                    |              | Two-way;0-level:-...+1v;1-level:+4v...+V; input impedance:>12kΩ;synchronization pulse:≥100us,synchronization pulse duration:≥2ms |
| Common mode operation          |              | ≤13Hz                                                                                                                            |
| Multiple mode operation        |              | ≤13Hz/n, n=the NO. of proximity sensors,n≤5                                                                                      |
| Output type                    |              | 1 current output 4...20mA; 1 voltage output 0...10V                                                                              |
| Characteristic curve deviation |              | ≤0.2% of Full scale value                                                                                                        |
| Repeatability                  |              | ≤0.1% of Full scale value                                                                                                        |
| Load impedance                 |              | current output: ≤500Ω; voltage output: ≥1000Ω                                                                                    |
| Temperature drift              |              | ≤2% of full scale value(with temperature compensation); ≤0.2%/K(without temperature compensation)                                |
| Standard                       |              | IEC/EN 60947-5-2                                                                                                                 |
| Ambient temperature            |              | -25...70℃ (248...343K)                                                                                                           |
| Storage temperature            |              | -40...85℃ (233...358K)                                                                                                           |
| Ingress protection             |              | IP65                                                                                                                             |
| Connectors                     |              | M12 connector                                                                                                                    |
| Housing material               |              | Brass, nickel-plated                                                                                                             |

Dimensioned drawing



## Functional description

Proximity sensor has a 4-pin temperature/setting plug which can be plugged in from 4 positions. The specific functions are as follows (teaching plug letter corresponds to the plug function reference point on the back cover) :

| Plug position | Function                                         |
|---------------|--------------------------------------------------|
| A1            | Set switching point A1                           |
| A2            | Set switching point A2                           |
| E2/E3         | Set working mode: rise mode/fall mode/hysteresis |
| T             | Temperature compensation                         |

### How to set up the sensor

Set the boundary point 1 within 2 of the detection range

1. Cut off the power.
2. Unplug the setting plug.
3. Power on again (restart).
4. Place the detection object at the required boundary point.
5. Insert the setting-plug in the corresponding output switching point A1 or A2 , and then unplug. The switching points A1 and A2 are set.

### Note

While unplugging the temperature/setting plug, the value of the detected object position will be saved.

- 1, the setting process can be indicated by the LED light. When the green light flashes, the detection object is detected; When the red light blinks, the detection object is not detected.
2. Insert the setting plug into the T position, the setting process is over, and the setting value is saved.
3. The proximity sensor enters common mode operation.

### Set output function

1. Cut off the power .
  2. Pull out the setting plug.
  3. Power on again (restart).
  4. Insert the setting plug into the E2/E3 position .By multiple times inserting and pulling-out the setting plug,you can set up 3 output modes in cycles:
    - 1) Rise mode, LED A2 light flashes.
    - 2) Fall mode, LED A1 light flashes.
    - 3) Hysteresis: LED A1 and A2 lights flash at the same time.
  4. Insert the setting plug into the T position, the setting process end, and save the set working mode.
  6. The proximity sensor enters the common mode operation.
- Description: If the temperature/setting plug is not inserted into the T position within five minutes, the proximity sensor will enter the common mode operation (with the most recently stored parameter value), and the temperature compensation function will be lost.

### Synchronization input

The proximity sensor has a sync input terminal to suppress the inter-action between different proximity sensors.If the sync input is not connected,sensor will operate according to its internally generated clock frequency(inherent frequency).Loading a square-wave impulse with >100us impulse width on the sensor's sync input terminal,can achieve sync operation.Sync impulse on the sync input terminal will initiate a detection cycle which is triggered by the falling edge of sync impulse.

If the low level duration is more than 1s or sync input terminal is open-circuit,the proximity sensor will operate by its own inherent frequency.

If adding high level for duration more than 1s to the sync input,proximity sensor will enters into standby mode(green indicator light) and output stops at the last status.

It is not possible to do sync operation during setting, and the switch point cannot be set during synchronous operation.

### Application of synchronous input terminal

- 1.The sync input terminals of 2-5 sensors are connected together to achieve sync operation, at the same time the proximity sensor alternately emits ultrasonic pulses.
- 2.Loading same impulse signal on multiple sensors' sync input terminals,- can achieve sync operation.
3. sending sync impulse in cycles to each sensor's sync input terminal,can achieve multiple mode operation.
4. Loading high level on sensor's sync input terminal to stop sensor's operation.

Sensor's sync function increased its detection cycle times.So when sensors operate under sync mode,its response time will increase.

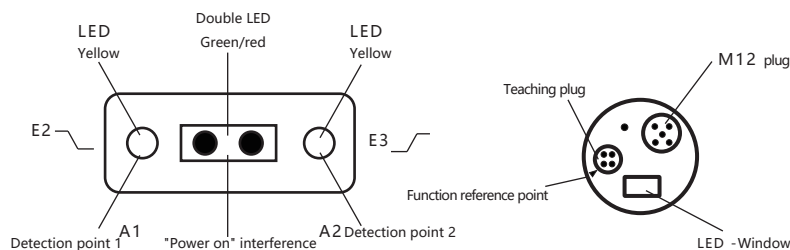
Note:If synchronization is not required, the sync input must be grounded (0V).

### Factory default settings

A1 : Blind zone  
A2 : Maximum range  
Working mode: Rising mode

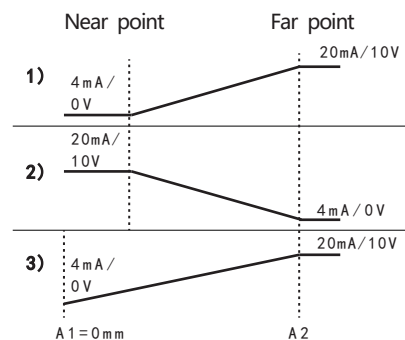
### LED display/analog output

| Operating status                             | Double LED green | Double LED Red | Yellow LED A1                         | Yellow LED A1                         | Analog output            |
|----------------------------------------------|------------------|----------------|---------------------------------------|---------------------------------------|--------------------------|
| Boundary point A1                            |                  |                |                                       |                                       | No change                |
| Target detected                              | Flash            | Dark           | Flash                                 | Dark                                  |                          |
| Target not detected                          | Dark             | Flash          | Flash                                 | Dark                                  |                          |
| Boundary point A2                            |                  |                |                                       |                                       | No change                |
| Target detected                              | Flash            | Dark           | Dark                                  | Flash                                 |                          |
| Target not detected                          | Dark             | Flash          | Dark                                  | Flash                                 |                          |
| Output mode settings                         |                  |                |                                       |                                       | No change                |
| Rise mode                                    | Bright           | Dark           | Dark                                  | Flash                                 |                          |
| Fall mode                                    | Bright           | Dark           | Flash                                 | Dark                                  |                          |
| Hysteresis mode                              | Bright           | Dark           | Flash (synchronous)                   | Flash (synchronous)                   |                          |
| Common mode operation                        |                  |                |                                       |                                       | Analog value             |
| Temperature compensation                     | Bright           | Dark           | Bright, if the target is in set Range | Bright, if the target is in set Range |                          |
| Setting plug pulling-out or short-connection | Dark             | Bright         |                                       |                                       |                          |
| Standby mode                                 | Flash            | Dark           | Previous status                       | Previous status                       | No change                |
| Interference (e.g. Compressed air)           | Dark             | Flash          | Previous status                       | Previous status                       | No change or wrong value |



### Analog output mode

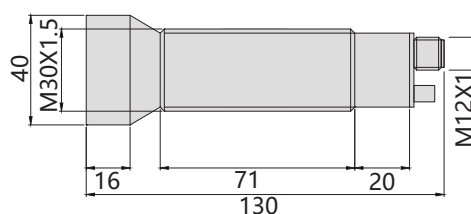
#### Analog output



## Technical data

|                                |                                                                                                                                   |              |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------|
| Appearance                     |                                                 |              |
|                                | Model                                                                                                                             | 4-20mA/0-10V |
| <b>UM40-T40M-C31S12-X</b>      |                                                                                                                                   |              |
| Exterior structure             | M30*1.5mm                                                                                                                         |              |
| Sensing Distance               | 300...4000mm                                                                                                                      |              |
| Adjustment range               | 340...4000mm                                                                                                                      |              |
| Blind zone                     | 0...300mm                                                                                                                         |              |
| Standard detection object      | 100mm*100mm                                                                                                                       |              |
| Transducer frequency           | 75k Hz                                                                                                                            |              |
| Response delay                 | factory setting 440ms                                                                                                             |              |
| Green LED                      | Constantly bright:power on, flicker:standby mode or detection in setting state                                                    |              |
| Yellow LED1                    | Constantly bright:Target in the detection range;flicker:setting function                                                          |              |
| Yellow LED2                    | Constantly bright:Target in the detection range;flicker:setting function                                                          |              |
| Red LED                        | Constantly bright:temperature/setting plug not connected;flicker:error or target not detected in setting state                    |              |
| Temperature/setting plug       | Temperature compensation, switching point setting, output function setting                                                        |              |
| Operating voltage              | 10...30VDC, ripple10%Vpp                                                                                                          |              |
| Power consumption              | ≤900mW                                                                                                                            |              |
| Synchronize                    | Two-way;0-level:-V...+1v;1-level:+4v...+V; input impedance:>12kΩ;synchronization pulse:≥100us,synchronization pulse duration:≥2ms |              |
| Common mode operation          | ≤13Hz                                                                                                                             |              |
| Multiple mode operation        | ≤13Hz/n, n=the NO. of proximity sensors,n≤5                                                                                       |              |
| Output type                    | 1 current output 4...20mA; 1 voltage output 0...10V                                                                               |              |
| Characteristic curve deviation | Full scale value's ≤0.2%                                                                                                          |              |
| Repeatability                  | Full scale value's ≤0.1%                                                                                                          |              |
| Load impedance                 | current output:≤500Ω; voltage output:≥1000Ω                                                                                       |              |
| Temperature drift              | ≤2% of full scale value(with temperature compensation); ≤0.2%/K(without temperature compensation)                                 |              |
| Standard                       | IEC/EN 60947-5-2                                                                                                                  |              |
| Ambient temperature            | -25...70°C (248...343K)                                                                                                           |              |
| Storage temperature            | -40...85°C (233...358K)                                                                                                           |              |
| Ingress protection             | IP65                                                                                                                              |              |
| Connection method              | M12 connector                                                                                                                     |              |
| Housing material               | Brass, nickel-plated                                                                                                              |              |

## Dimensioned drawing



## Functional description

Proximity sensor has a 4-pin temperature/setting plug which can be plugged in from 4 positions. The specific functions are as follows (teaching plug letter corresponds to the plug function reference point on the back cover):

| Plug position | Function                                         |
|---------------|--------------------------------------------------|
| A1            | Set switching point A1                           |
| A2            | Set switching point A2                           |
| E2/E3         | Set working mode: rise mode/fall mode/hysteresis |
| T             | Temperature compensation                         |

## How to set up the sensor

Set the boundary point 1 or 2 of the detection range

1. Cut off the power.
2. Unplug the setting plug.
3. Power on again (restart).
4. Place the detection object at the required boundary point.
5. Insert the setting-plug in the corresponding output switching point A1 or A2, and then unplug. The switching points A1 and A2 are set.

## Note

While unplugging the temperature/setting plug, the position value of the detected object will be saved.

1, the setting process can be indicated by the LED light. When the green light flashes, the detection object is detected; When the red light blinks, the detection object is not detected.

2. Insert the setting plug into the T position, the setting process is over, and the setting value is saved.

3. The proximity sensor enters common mode operation.

## Set output function

1. Cut off the power.
2. Pull out the setting plug.
3. Power on again (restart).
4. Insert the setting plug into the E2/E3 position. By multiple times inserting and pulling-out the setting plug, you can set up 3 output modes in cycles:
  - 1) Rise mode, LED A2 light flashes.
  - 2) Fall mode, LED A1 light flashes.
  - 3) Hysteresis mode: LED A1 and A2 lights flash at the same time.
4. Insert the setting plug into the T position, the setting process end, and save the set working mode.
6. The proximity sensor enters the common mode operation.

Description: If the temperature/setting plug is not inserted into the T position within five minutes, the proximity sensor will enter the common mode operation (with the most recently stored parameter value), and the temperature compensation function will be lost.

## Synchronization input

The proximity sensor has a sync input terminal to suppress the inter-action between different proximity sensors. If the sync input is not connected, sensor will operate according to its internally generated clock frequency (inherent frequency). Loading a square-wave impulse with >100us impulse width on the sensor's sync input terminal, can achieve sync operation. Sync impulse on the sync input terminal will initiate a detection cycle which is triggered by the falling edge of sync impulse.

If the low level duration is more than 1s or sync input terminal is open-circuit, the proximity sensor will operate by its own inherent frequency.

If adding high level for duration more than 1s to the sync input, proximity sensor will enter into standby mode (green indicator light) and output stops at the last status.

It is not possible to do sync operation during setting, and the switch point can not be set during synchronous operation.

## Application of synchronous input terminal

1. The sync input terminals of 2-5 sensors are connected together to achieve sync operation, at the same time the proximity sensor alternately emits ultrasonic pulses.
2. Loading same impulse signal on multiple sensors' sync input terminals, can achieve sync operation.
3. sending sync impulse in cycles to each sensor's sync input terminal, can achieve multiple mode operation.
4. Loading high level on sensor's sync input terminal to stop sensor's operation.

Sensor's sync function increased its detection cycle times. So when sensors operate under sync mode, its response time will increase.

Note: If synchronization is not required, the sync input must be grounded (0V).

## Factory settings

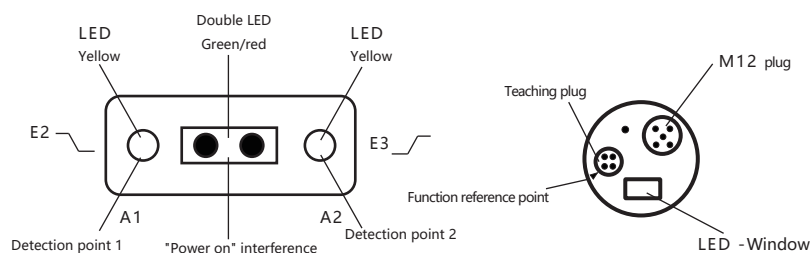
A1 : Blind zone

A2 : Maximum range

Working mode: Rising mode

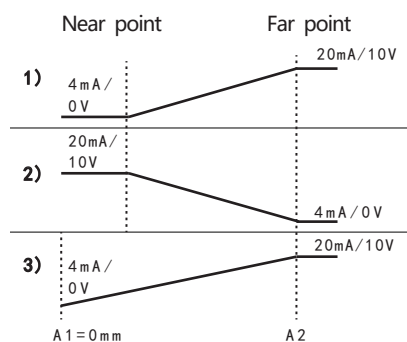
## LED display/analog output

| Operating status                             | Double LED green | Double LED Red | Yellow LED A1                         | Yellow LED A1                         | Analog output            |
|----------------------------------------------|------------------|----------------|---------------------------------------|---------------------------------------|--------------------------|
| Boundary point A1 position                   |                  |                |                                       |                                       | No change                |
| Target detected                              | Flash            | Dark           | Flash                                 | Dark                                  |                          |
| Target not detected                          | Dark             | Flash          | Flash                                 | Dark                                  |                          |
| Boundary point A2 position                   |                  |                |                                       |                                       | No change                |
| Target detected                              | Flash            | Dark           | Dark                                  | Flash                                 |                          |
| Target not detected                          | Dark             | Flash          | Dark                                  | Flash                                 |                          |
| Output mode settings                         |                  |                |                                       |                                       | No change                |
| Rise mode                                    | Bright           | Dark           | Dark                                  | Flash                                 |                          |
| Fall mode                                    | Bright           | Dark           | Flash                                 | Dark                                  |                          |
| Hysteresis mode                              | Bright           | Dark           | Flash (synchronous)                   | Flash (synchronous)                   |                          |
| Common mode operation                        |                  |                |                                       |                                       | Analog value             |
| Temperature compensation                     | Bright           | Dark           | Bright, if the target is in Set Range | Bright, if the target is in Set Range |                          |
| Setting plug pulling-out or short-connection | Dark             | Bright         |                                       |                                       |                          |
| Standby mode                                 | Flash            | Dark           | Previous state                        | Previous state                        | No change                |
| Interference (e.g., Compressed air)          | Dark             | Flash          | Previous state                        | Previous state                        | No change or wrong value |



## Analog output mode

### Analog output





## UM30Z Ultrasonic sensor

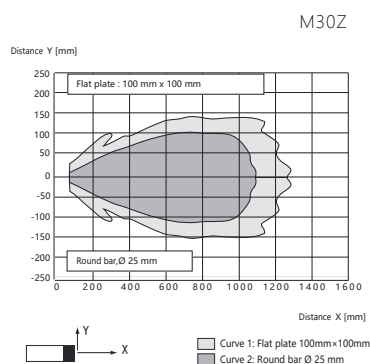
Plastic kousing

DC 4 wire, Analog output

### Features

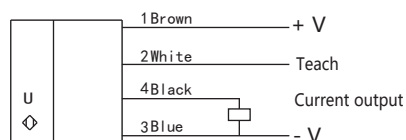
- Analog 4...20mA/20...4mA current output;
- Analog 0...10V/10...0V voltage output;
- Adjustable sensing distance;
- Temperature compensation;
- Small blind zone;
- Double-point teaching.

### Response characteristic curve

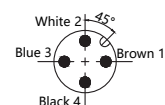


### Wiring

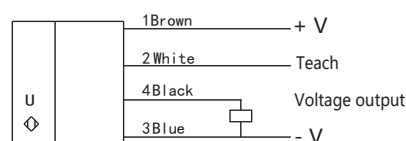
#### UM30Z-T10I-P32S12



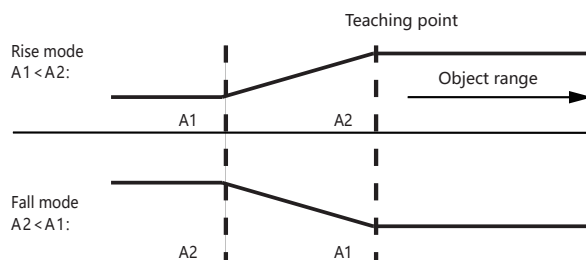
M12 Connector



#### UM30Z-T10V-P32S12



### Analog Output mode



## Technical data

|                                |              |                                                                                                                                      |                             |
|--------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Appearance                     |              |                                                     |                             |
| Model                          | 4-20mA/0-10V | UM30Z-T10I-P32S12                                                                                                                    | UM30Z-T10V-P32S12           |
| Exterior structure             |              | M30*1.5mm                                                                                                                            |                             |
| Sensing distance               |              | 90...1000mm                                                                                                                          |                             |
| Blind zone                     |              | 0...90mm                                                                                                                             |                             |
| Standard detection object      |              | 100*100mm                                                                                                                            |                             |
| Transducer frequency           |              | 200K                                                                                                                                 |                             |
| Response delay                 |              | About 400ms                                                                                                                          |                             |
| Response time                  |              | 50ms                                                                                                                                 |                             |
| LED Yellow                     |              | Constantly bright:the object is within the teaching range; flicker:teaching near point                                               |                             |
| LED Green                      |              | Constantly bright:the object is out of the teaching range, but within the detection range(within 1000mm); flicker:teaching far point |                             |
| Operating Voltage              |              | DC 18... 30V, Ripple 10%Vss                                                                                                          |                             |
| No-load current                |              | ≤35mA                                                                                                                                |                             |
| Teaching method                |              | Short connect white wire with +V / -V                                                                                                |                             |
| Output type                    |              | 1 analog output 4-20mA/20-4mA                                                                                                        | 1 analog output 0-10V/10-0V |
| Repeatability                  |              | 0.5mm                                                                                                                                |                             |
| Characteristic curve deviation |              | Full scale value's ±0.5%                                                                                                             |                             |
| Repeatability                  |              | Full scale value's ±0.1%                                                                                                             |                             |
| Load impedance                 |              | ≤500Ω                                                                                                                                | ≥1000Ω                      |
| Temperature Drift              |              | Full scale value's ±1.5%                                                                                                             |                             |
| Ambient temperature            |              | -25...70℃ (248...343K)                                                                                                               |                             |
| Storage temperature            |              | -40...85℃ (233...358K)                                                                                                               |                             |
| Connectors                     |              | M12 connector (4pins)                                                                                                                |                             |
| Ingress protection             |              | IP65                                                                                                                                 |                             |
| Housing material               |              | ABS                                                                                                                                  |                             |
| Switching frequency            |              | B12-4GV2/B12-4WV2                                                                                                                    |                             |

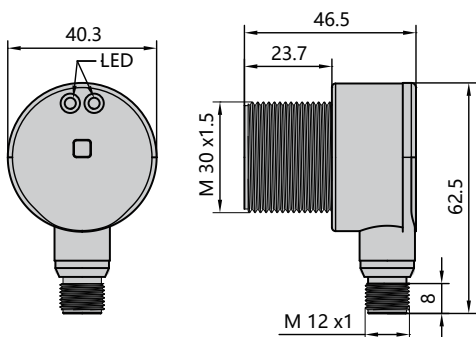
Ultrasonic

Rectangular

Single and double sheets

Metal single and double sheets

## Dimensioned drawing



## Teaching method

2 boundary points within the sensing range can be set by Teaching. Connect white wire with power -V/+V for >2s. When the yellow/green LED starts to flash, the Teaching process will start. Put the target object in proper place and cut off the white wire connection to complete Teaching process.

Connect white wire with -V, the yellow LED will flash to do Teaching A1 point; Connect white wire with +V, the green LED will flash to do Teaching A2 point.

If Teaching fails, the yellow LED and green LED will flash alternatively. Quickly short-contact white wire with -V or +V to restore. Previous kept Teaching data will remain unchanged.

Below 2 output modes are for option (default: Rising mode)

1. Analog output value will increase as the increase of distance (Rising mode)
  2. Analog output value will decrease as the increase of distance (Falling mode)
- A1 < A2 is Rising mode. A1 > A2 is Falling mode.

Default setting

A1: 90mm; A2: 1000mm; default output mode: Rising mode

**Bedook®**



**UQ31**  
**Ultrasonic sensor**  
Plastic housing  
**Rectangular**  
AC 4 wire, Switching output

## Features

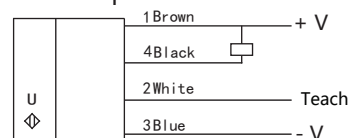
- NO/NC can be switchable
- Adjustable measuring distance
- Very small blind zone;
- Double-point teaching

## LED display

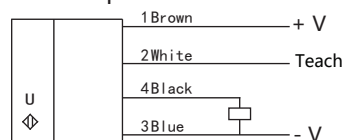
| output | Operating status                                                                 | yellow LED | green LED |
|--------|----------------------------------------------------------------------------------|------------|-----------|
| NO     | Target object is within teaching range                                           | Bright     | Dark      |
|        | target object is within sensing range, but out of Teaching range                 | Dark       | Bright    |
|        | Target object is Not detected or the target object is within near Teaching point | Dark       | Dark      |
| NC     | Target object is within teaching range                                           | Dark       | Bright    |
|        | Target object is out of teaching range                                           | Bright     | Dark      |

## Wiring

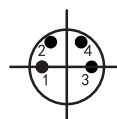
### NPN output



### PNP output



### M8 Connector



## Technical data

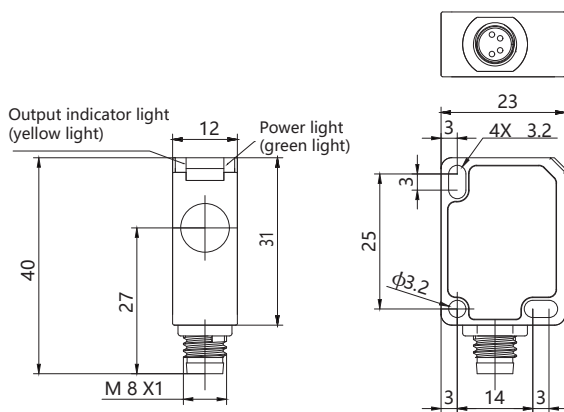
|                           |             |                                                                                   |
|---------------------------|-------------|-----------------------------------------------------------------------------------|
| Appearance                |             |  |
| Model No                  | NPN N.O/N.C | <b>UQ31-T04N-P32S8</b>                                                            |
|                           | PNP N.O/N.C | <b>UQ31-T04P-P32S8</b>                                                            |
| Exterior structure        |             | 31*23*12mm                                                                        |
| Sensing distance          |             | 50...400mm                                                                        |
| Blind zone                |             | 0...50mm                                                                          |
| Standard detection object |             | 20X20mm                                                                           |
| Transducer frequency      |             | 300K                                                                              |
| Response delay            |             | ≤50ms                                                                             |
| Yellow LED                |             | Flicker:teaching near point                                                       |
| Green LED                 |             | Flicker:teaching far point                                                        |
| Operating voltage         |             | DC 18... 30V, Ripple 10%Vss                                                       |
| No-load current           |             | ≤30mA                                                                             |
| Power-on delay            |             | ≤150ms                                                                            |
| Output type               |             | Switching output NPN/PNP, NO/NC                                                   |
| Load current              |             | ≤150mA                                                                            |
| Voltage drop              |             | ≤2V                                                                               |
| Repeatability             |             | Full scale value's ±0.1%                                                          |
| Resolution                |             | 0.3mm                                                                             |
| Ambient temperature       |             | -10...50℃                                                                         |
| Storage temperature       |             | -40...85℃                                                                         |
| Connectors                |             | M8 connector                                                                      |
| Ingress protection        |             | IP65                                                                              |
| Material                  |             | PC                                                                                |

Ultrasonic

Rectangular

Single  
and double sheetsMetal single  
and double sheets

## Dimensioned drawing



## Sensor function description

2 boundary points within the sensing range can be set by Teaching. Connect white wire with power -V/+V for >2s. When the yellow/green LED start to flash, Teaching process will start. Put the target object in proper place and cut off the white wire connection to complete Teaching process.

Connect white wire with -V, the yellow LED will flash to do Teaching A1 point; Connect white wire with +V, the green LED will flash to do Teaching A2 point.

If Teaching fails, the yellow LED and green LED will flash alternatively. Quickly short-contact white wire with -V or +V to restore. Previous kept teaching data will remain unchanged.

**Below 2 output modes are for option:**

1. NO mode: Output will be ON when target object is within sensing range, and it will be off when target object is out of sensing range.

2. NC mode: Output will be off when target object is within sensing range, and it will be ON when target object is out of sensing range.

If position A1 < A2, output will be automatically switched to NO mode;

If position A1 > A2, output will be automatically switched to NC mode.

**Default settings:**

A1: 50mm ; A2: 400mm; Default output: NO mode

**Bedook®**



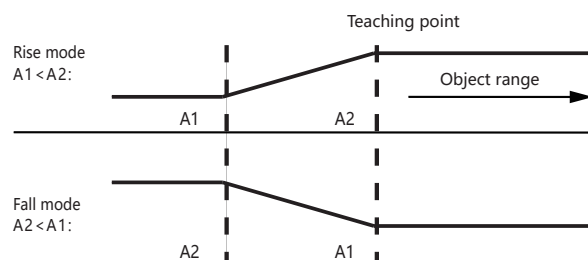
UQ31  
**Ultrasonic sensor**  
Plastic housing  
**Rectangular**  
AC 4 wire, Analog output

ISO9001 CE UKCA CQC RoHS

## Features

- 4...20mA current output/0...10V voltage output;
- Adjustable detection distance;
- Small blind zone;
- Double-point teaching.

## Analog output method

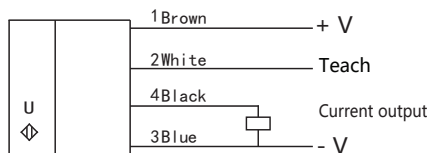


## LED display

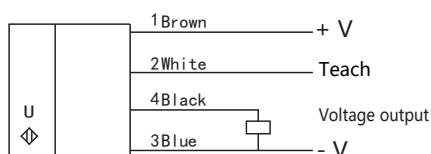
| Operating status                                                              | yellow LED | green LED |
|-------------------------------------------------------------------------------|------------|-----------|
| Target object is within teaching range                                        | Bright     | Dark      |
| Target object is out of teaching range, but within sensing range              | Dark       | Bright    |
| Target object is not detected, or target object is within near teaching point | Dark       | Dark      |

## Wiring

### UQ31-T04I-P32S8



### UQ31-T04V-P32S8



M8 Connector



## Technical data

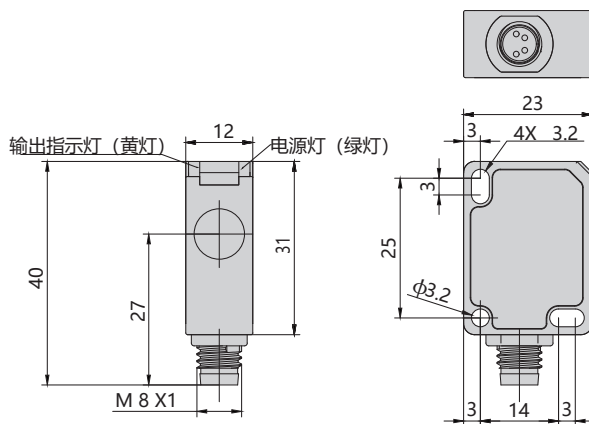
|                           |  |                                                                                                                               |                             |
|---------------------------|--|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Appearance                |  |                                              |                             |
|                           |  | Model                                                                                                                         | 4-20mA/0-10V                |
|                           |  | UQ31-T04I-P32S8                                                                                                               | UQ31-T04V-P32S8             |
| Exterior structure        |  | 31*23*12mm                                                                                                                    |                             |
| Sensing distance          |  | 50...400mm                                                                                                                    |                             |
| Blind zone                |  | 0...50mm                                                                                                                      |                             |
| Standard detection object |  | 20X20mm                                                                                                                       |                             |
| Transducer frequency      |  | 300K                                                                                                                          |                             |
| Response delay            |  | ≤50ms                                                                                                                         |                             |
| Yellow LED                |  | Constantly bright:the object is within the teaching range; flicker:teaching near point                                        |                             |
| Green LED                 |  | Constantly bright: Object detected within sensing range(within 400mm), but outside teaching range; flicker:teaching far point |                             |
| Operating voltage         |  | DC 18... 30V, Ripple 10%Vss                                                                                                   |                             |
| No-load current           |  | ≤30mA                                                                                                                         |                             |
| Power-on delay            |  | ≤150ms                                                                                                                        |                             |
| Output type               |  | 1 analog output 4-20mA/20-4mA                                                                                                 | 1 analog output 0-10V/10-0V |
| Voltage drop              |  | ≤2V                                                                                                                           |                             |
| Repeatability             |  | Full scale value's ±0.1%                                                                                                      |                             |
| Load impedance            |  | ≤500Ω                                                                                                                         | > 1000Ω                     |
| Resolution                |  | 0.3mm                                                                                                                         |                             |
| Ambient temperature       |  | -10...50℃                                                                                                                     |                             |
| Storage temperature       |  | -40...85℃                                                                                                                     |                             |
| Connectors                |  | M8 connector                                                                                                                  |                             |
| Ingress protection        |  | IP65                                                                                                                          |                             |
| Material                  |  | PC                                                                                                                            |                             |

Ultrasonic

Rectangular

Single  
and double sheetsMetal single  
and double sheets

## Dimensioned drawing



## Sensor function description

2 boundary points within the sensing range can be set by Teaching. Connect white wire with power -V/+V for >2s. When the yellow/green LED start to flash, Teaching process will start. Put the target object in proper place and cut off the white wire connection to complete Teaching process.

Connect white wire with -V, the yellow LED will flash to do Teaching A1 point; Connect white wire with +V, the green LED will flash to do Teaching A2 point.

If Teaching fails, the yellow LED and green LED will flash alternatively. Quickly short-contact white wire with -V or +V to restore. Previous kept teaching data will remain unchanged.

**Below 2 output modes are for option (default: Rising mode):**

1. Analog output value will increase as the increase of distance (Rising mode)
2. Analog output value will decrease as the increase of distance (Falling mode)

A1 < A2 is Rising mode. A1 > A2 is Falling mode.

**Default setting:**

A1: 50mm; A2: 400mm; default output mode: Rising mode.

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**UQ31**  
**Ultrasonic sensor**  
Plastic housing  
**Rectangular**  
DC 4 wire, Switching output

## Features

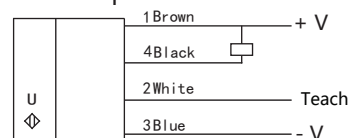
- NO/NC selectable
- Adjustable detection distance
- Very small blind zone;
- Double-point teaching

## LED display

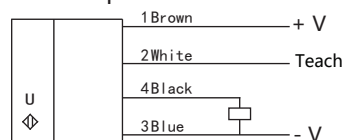
| output | Operating status                                                                 | yellow LED | green LED |
|--------|----------------------------------------------------------------------------------|------------|-----------|
| NO     | Target object is within teaching range                                           | Bright     | Dark      |
|        | target object is within sensing range, but out of Teaching range                 | Dark       | Bright    |
|        | Target object is Not detected or the target object is within near Teaching point | Dark       | Dark      |
| NC     | Target object is within teaching range                                           | Dark       | Bright    |
|        | Target object is out of teaching range                                           | Bright     | Dark      |

## Wiring

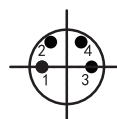
### NPN output



### PNP output



### M8 Connectors



## Technical data

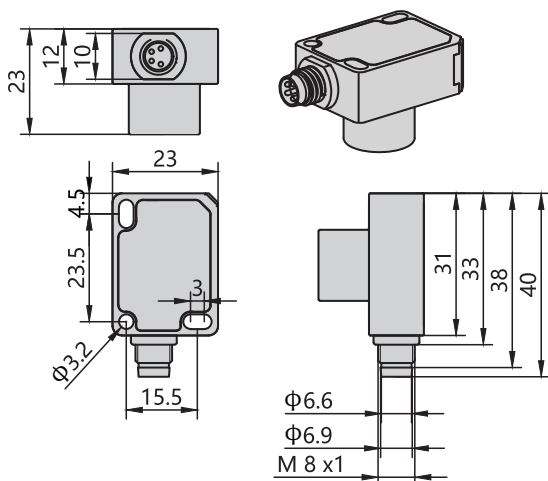
|                           |             |                                                                                    |
|---------------------------|-------------|------------------------------------------------------------------------------------|
| Appearance                |             |  |
| Model No                  | NPN N.O/N.C | <b>UQ31-T08N-P32S8</b>                                                             |
|                           | PNP N.O/N.C | <b>UQ31-T08P-P32S8</b>                                                             |
| Exterior structure        |             | 31*23*12mm                                                                         |
| Sensing distance          |             | 100...800mm                                                                        |
| Blind zone                |             | 0...100mm                                                                          |
| Standard detection object |             | 100X100mm                                                                          |
| Transducer frequency      |             | 200K                                                                               |
| Response delay            |             | ≤50ms                                                                              |
| Yellow LED                |             | Flicker:teaching near point                                                        |
| Green LED                 |             | Flicker:teaching far point                                                         |
| Operating voltage         |             | DC 18... 30V, Ripple 10%Vss                                                        |
| No-load current           |             | ≤50mA                                                                              |
| Power-on delay            |             | ≤150ms                                                                             |
| Output type               |             | Switching output NPN/PNP, NO/NC                                                    |
| Load current              |             | ≤150mA                                                                             |
| Voltage drop              |             | ≤2V                                                                                |
| Repeatability             |             | Full scale value's ±0.1%                                                           |
| Resolution                |             | 0.3mm                                                                              |
| Ambient temperature       |             | -10...50℃                                                                          |
| Storage temperature       |             | -40...85℃                                                                          |
| Connectors                |             | M8 connector (4-Pin)                                                               |
| Ingress protection        |             | IP65                                                                               |
| Material                  |             | PC                                                                                 |

Ultrasonic

Rectangular

Single  
and double sheetsMetal single  
and double sheets

## Dimensioned drawing



## Sensor function description

2 boundary points within the sensing range can be set by Teaching. Connect white wire with power -V/+V for >2s. When the yellow/green LED start to flash, Teaching process will start. Put the target object in proper place and cut off the white wire connection to complete Teaching process.

Connect white wire with -V, the yellow LED will flash to do Teaching A1 point; Connect white wire with +V, the green LED will flash to do Teaching A2 point.

If Teaching fails, the yellow LED and green LED will flash alternatively. Quickly short-contact white wire with -V or +V to restore. Previous kept teaching data will remain unchanged.

**Below 2 output modes are for option:**

1. NO mode: Output will be ON when target object is within sensing range, and it will be off when target object is out of sensing range.

2. NC mode: Output will be off when target object is within sensing range, and it will be ON when target object is out of sensing range.

If position A1 < A2, output will be automatically switched to NO mode;

If position A1 > A2, output will be automatically switched to NC mode.

**Default settings:**

A1: 100mm ; A2: 800mm; Default output: NO mode

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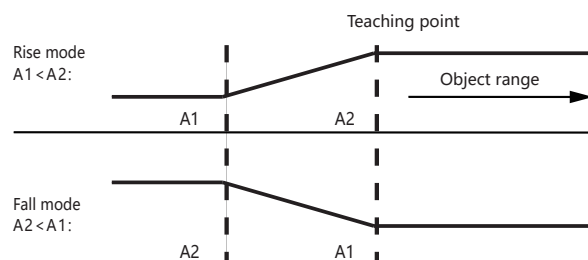


**UQ31**  
**Ultrasonic sensor**  
Plastic housing  
**Rectangular**  
AC 4 wire, Analog output

## Features

- 4...20mA current output/0...10V voltage output;
- Adjustable sensing distance;
- Small blind zone;
- Double-point teaching.

## Analog output method

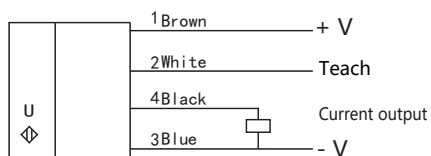


## LED display

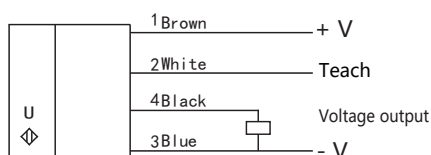
| Operating status                                                              | yellow LED | green LED |
|-------------------------------------------------------------------------------|------------|-----------|
| Target object is within teaching range                                        | Bright     | Dark      |
| Target object is out of teaching range, but within sensing range              | Dark       | Bright    |
| Target object is not detected, or target object is within near teaching point | Dark       | Dark      |

## Wiring

### UQ31-T08I-P32S8



### UQ31-T08V-P32S8



M8 Connector



## Technical data

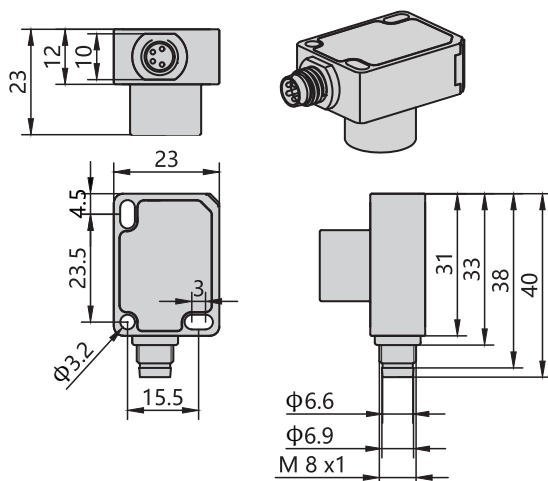
|                           |  |                                                                                                                              |                             |
|---------------------------|--|------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Appearance                |  |                                            |                             |
|                           |  | Model                                                                                                                        | 4-20mA/0-10V                |
|                           |  | UQ31-T08I-P32S8                                                                                                              | UQ31-T08V-P32S8             |
| Exterior structure        |  | 31*23*23mm                                                                                                                   |                             |
| Sensing distance          |  | 100...800mm                                                                                                                  |                             |
| Blind zone                |  | 0...10mm                                                                                                                     |                             |
| Standard detection object |  | 100X100mm                                                                                                                    |                             |
| Transducer frequency      |  | 200K                                                                                                                         |                             |
| Response delay            |  | ≤50ms                                                                                                                        |                             |
| Yellow LED                |  | Constantly bright:the object is within the teaching range; flicker:teaching near point                                       |                             |
| Green LED                 |  | Constantly bright: Object detected within sensing range(within 800mm), but out of teaching range; flicker:teaching far point |                             |
| Operating voltage         |  | DC 18... 30V, Ripple 10%Vss                                                                                                  |                             |
| No-load current           |  | ≤50mA                                                                                                                        |                             |
| Power-on delay            |  | ≤150ms                                                                                                                       |                             |
| Output type               |  | 1 analog output 4-20mA/20-4mA                                                                                                | 1 analog output 0-10V/10-0V |
| Voltage drop              |  | ≤2V                                                                                                                          |                             |
| Repeatability             |  | Full scale value's ±0.1%                                                                                                     |                             |
| Load impedance            |  | ≤500Ω                                                                                                                        | > 1000Ω                     |
| Resolution                |  | 0.3mm                                                                                                                        |                             |
| Ambient temperature       |  | -10...50℃                                                                                                                    |                             |
| Storage temperature       |  | -40...85℃                                                                                                                    |                             |
| Connectors                |  | M8 connector                                                                                                                 |                             |
| Ingress protection        |  | IP65                                                                                                                         |                             |
| Material                  |  | PC                                                                                                                           |                             |

Ultrasonic

Rectangular

Single  
and double sheetsMetal single  
and double sheets

## Dimensioned drawing



## Sensor function description

2 boundary points within the sensing range can be set by Teaching. Connect white wire with power -V/+V for >2s. When the yellow/green LED starts to flash, Teaching process will start. Put the target object in proper place and cut off the white wire connection to complete Teaching process.

Connect white wire with -V, the yellow LED will flash to do Teaching A1 point; Connect white wire with +V, the green LED will flash to do Teaching A2 point.

If Teaching fails, the yellow LED and green LED will flash alternatively. Quickly short-contact white wire with -V or +V to restore. Previous kept teaching data will remain unchanged.

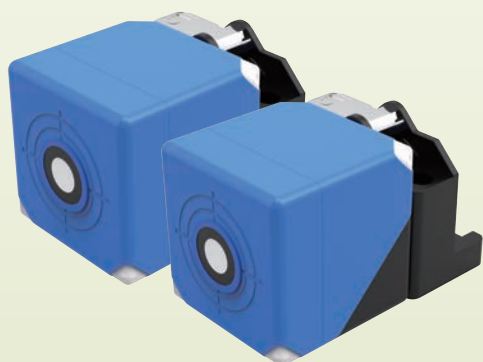
**Below 2 output modes are for option (default: Rising mode):**

1. Analog output value will increase as the increase of distance (Rising mode)
  2. Analog output value will decrease as the increase of distance (Falling mode)
- A1 < A2 is Rising mode. A1 > A2 is Falling mode.

**Default setting:**

A1: 100mm; A2: 800mm; default output mode: Rising mode

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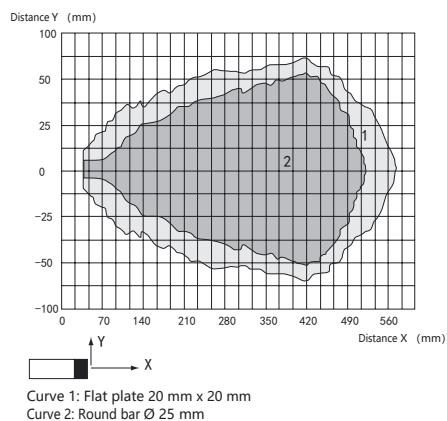
UQ40  
**Ultrasonic sensor**  
ABS  
DC 4 wire, Analog output

ISO9001 CE UKCA CQC RoHS

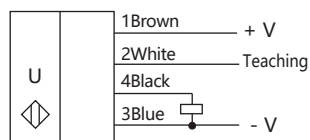
## Features

- Analog 4...20mA/20...4mA current output;
- Analog 0...10V/10...0V voltage output;
- Adjustable sensing distance;
- Temperature compensation;
- Small blind zone;
- Single-point teaching.

## Response characteristic curve



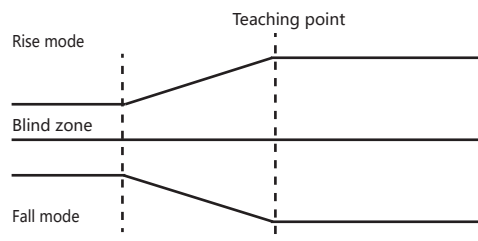
## Wiring



M12 Connector



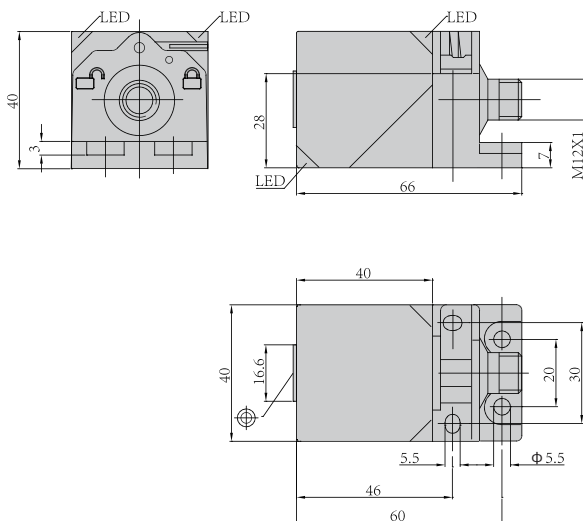
## Analog Output mode



## Technical data

|                                |                                                                                                               |                                                                                   |                    |
|--------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------|
| Appearance                     |                                                                                                               |  |                    |
| Model                          | 4-20mA/0-10V                                                                                                  | UQ40-T04I-P32S12-X                                                                | UQ40-T04V-P32S12-X |
| Exterior structure             | 40*40*66mm                                                                                                    |                                                                                   |                    |
| Sensing distance               | 40...400mm                                                                                                    |                                                                                   |                    |
| Blind zone                     | 0...40mm                                                                                                      |                                                                                   |                    |
| Standard detection object      | 20*20mm                                                                                                       |                                                                                   |                    |
| Transducer frequency           | 250K                                                                                                          |                                                                                   |                    |
| Power-on delay                 | About 400ms                                                                                                   |                                                                                   |                    |
| Yellow LED                     | Constantly bright: Object detected within the teaching range; flicker: Teaching.                              |                                                                                   |                    |
| Green LED                      | Constantly bright: Object detected within sensing range but out of teaching range; flicker: Teaching failure. |                                                                                   |                    |
| Operating voltage              | DC 18... 30V, Ripple $\pm 10\%$                                                                               |                                                                                   |                    |
| No-load current                | $\leq 30\text{mA}$                                                                                            |                                                                                   |                    |
| Output type                    | 1 analog output 4-20mA/20-4mA                                                                                 | 1 analog output 0-10V/10-0V                                                       |                    |
| Load impedance                 | $\leq 500\Omega$                                                                                              | $> 1000\Omega$                                                                    |                    |
| Characteristic curve deviation | Full scale value's $\pm 0.5\%$                                                                                |                                                                                   |                    |
| Repeatability                  | Full scale value's $\pm 0.1\%$                                                                                |                                                                                   |                    |
| Temperature drift              | Full scale value's $\pm 1.5\%$                                                                                |                                                                                   |                    |
| Resolution                     | 0.3mm                                                                                                         |                                                                                   |                    |
| Ambient temperature            | $-25\ldots 70^{\circ}\text{C}$ (248...343K)                                                                   |                                                                                   |                    |
| Storage temperature            | $-40\ldots 85^{\circ}\text{C}$ (233...358K)                                                                   |                                                                                   |                    |
| Connectors                     | M12 connector (4-pin)                                                                                         |                                                                                   |                    |
| Ingress protection             | IP65                                                                                                          |                                                                                   |                    |
| Material                       | ABS                                                                                                           |                                                                                   |                    |

## Dimensioned drawing



## Sensor function description

**Teaching method:** Put the target object in place where to be detected. Short connect white wire with blue wire for  $> 2\text{s}$ . The yellow LED indicator will flash indicating that sensor enters into Teaching status. (Teaching duration  $< 8\text{s}$ ). Cut off white wire. If the Teaching operation is successfully completed, the yellow LED indicator will be normally on. And if Teaching operation fails, the yellow LED and green LED will flash alternatively.

**Output method setting:** Short connect white wire with brown wire for  $2\text{s}$ . The yellow and green LED indicators will flash alternatively. Cut off the white wire to complete the output mode setting. If the short connection duration is  $> 8\text{s}$ , this Teaching operation will be abandoned.

Ultrasonic

Rectangular

Single  
and double sheetsMetal single  
and double sheets

**Bedook®**

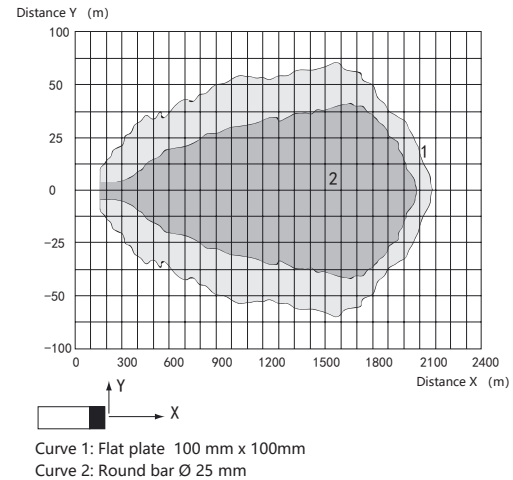
UQ80  
**Ultrasonic sensor**  
PBT  
DC 4 wire, Analog output

ISO9001 CE UKCA CQC RoHS

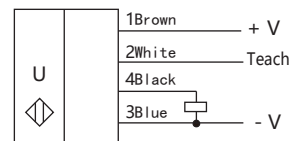
## Features

- Analog 4...20mA/20...4mA current output
- Analog 0...10V/10...0V voltage output
- Adjustable sensing distance;
- Small blind zone;
- Double-point teaching.

## Response characteristic curve



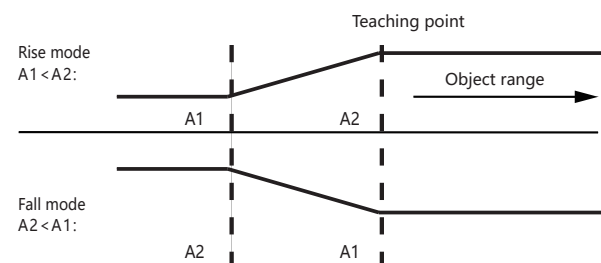
## Wiring



M12 Connector



## Analog output method



## LED display

| Operating status                                                              | yellow LED | green LED |
|-------------------------------------------------------------------------------|------------|-----------|
| Target object is within teaching range                                        | Bright     | Dark      |
| Target object is out of teaching range, but within sensing range              | Dark       | Bright    |
| Target object is not detected, or target object is within near teaching point | Dark       | Dark      |

## Technical data

|                                |                                                                                                               |                                                                                    |
|--------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Appearance                     |                                                                                                               |  |
| Model                          | 4-20mA/0-10V                                                                                                  | <b>UQ80-T20M-P32S12</b>                                                            |
| Exterior structure             | 80*80*25.7mm                                                                                                  |                                                                                    |
| Sensing distance               | 85...2000mm                                                                                                   |                                                                                    |
| Blind zone                     | 0...85mm                                                                                                      |                                                                                    |
| Standard detection object      | 100*100mm                                                                                                     |                                                                                    |
| Transducer frequency           | 125K                                                                                                          |                                                                                    |
| Power-on delay                 | About 400ms                                                                                                   |                                                                                    |
| Yellow LED                     | Constantly bright:the object is within the teaching range; flicker:teaching near point                        |                                                                                    |
| Green LED                      | Constantly bright: Object detected within sensing range but out of teaching range; flicker:teaching far point |                                                                                    |
| Operating Voltage              | DC 18...30V, Ripple $\pm 10\%$                                                                                |                                                                                    |
| No-load current                | $\leq 30\text{mA}$                                                                                            |                                                                                    |
| Output type                    | 1 analog output 4-20mA/20-4mA                                                                                 | 1 analog output 0-10V/10-0V                                                        |
| Load impedance                 | $\leq 500\Omega$                                                                                              | $\geq 1000\Omega$                                                                  |
| Characteristic curve deviation | Full scale value's $\pm 0.5\%$                                                                                |                                                                                    |
| Repeatability                  | Full scale value's $\pm 0.1\%$                                                                                |                                                                                    |
| Temperature drift              | Full scale value's $\pm 1.5\%$                                                                                |                                                                                    |
| Resolution                     | 0.5mm                                                                                                         |                                                                                    |
| Ambient temperature            | $-25...70^{\circ}\text{C}$ (248...343K)                                                                       |                                                                                    |
| Storage temperature            | $-40...85^{\circ}\text{C}$ (233...358K)                                                                       |                                                                                    |
| Connectors                     | M12 Connector (4-Pin)                                                                                         |                                                                                    |
| Ingress protection             | IP65                                                                                                          |                                                                                    |
| Housing material               | PBT                                                                                                           |                                                                                    |

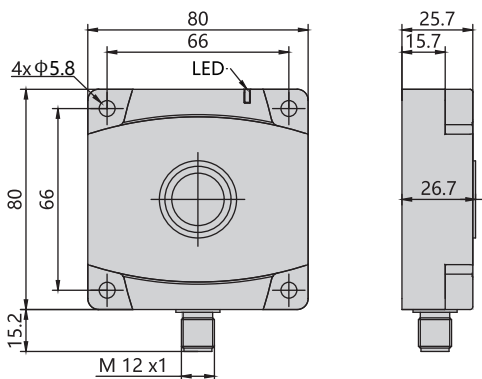
Ultrasonic

Rectangular

Single  
and double sheets

Metal single  
and double sheets

## Dimensioned drawing



## Teaching method

2 boundary points within the sensing range can be set by Teaching. Connect white wire with power -V/+V for >2s. When the yellow/green LED start to flash, Teaching process will start. Put the target object in proper place and cut off the white wire connection to complete Teaching process.

Connect white wire with -V, the yellow LED will flash to do Teaching A1 point; Connect white wire with +V, the green LED will flash to do Teaching A2 point.

If Teaching fails, the yellow LED and green LED will flash alternatively. Quickly short-contact white wire with -V or +V to restore. Previous kept Teaching data will remain unchanged.

Below 2 output modes are for option (default: Rising mode)

1. Analog output value will increase as the increase of distance (Rising mode).
  2. Analog output value will decrease as the increase of distance (Falling mode)
- A1 > A2 is Rising mode. A1 < A2 is Falling mode

Switch-over method for current output and voltage output (default setting: Voltage output)

1. Firstly cut off power supply. Connect white wire with +V, and then power-on again for about 2s. The yellow LED and green LED will flash alternatively. After stop flashing, cut off the white wire connection. The output mode will be current output;
2. Redo above operations if need to change to voltage output mode.



UG20  
**Ultrasonic label sensor**  
Rectangular  
DC 4 wire, Switching output

## Features

Appearance: fork  
Fork width: 3mm  
Fork depth: 69mmgap/single label size:2mm  
Minimum detection target object: two neighbouring labels  
Set-up: +/- buttons(teaching.sensitivity,NO/NC changeover)

## Operation Mode

Dynamic teaching by pressing "+" and "." buttons1.Put the label or substrate in the fork type sensor activationarea,press the "+" and "." buttons together at the same timefor at least 1 second,red LED will flash.2.Move multiple labels in the fork type sensorpressbutton,and then teaching process is completed.

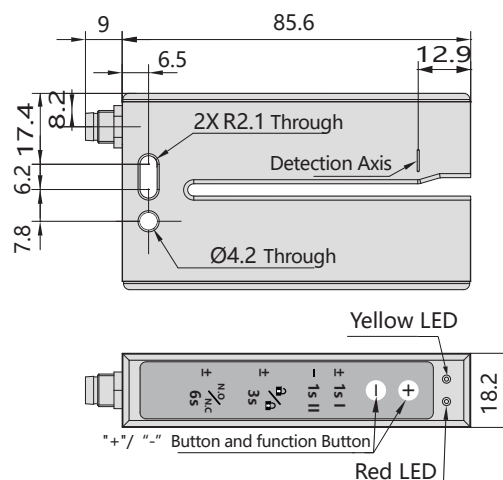
## Notes

Teaching can be repeated in cycles.After teaching is completed, there will be normal switching output. If final effect is notsatisfying after Teaching," +\* or \*- " buttons can be used forfine tuning.You may press "+" or \*." one time or multiptetimes. For quick set-up. please continuously push "+" or "-" for longer times.

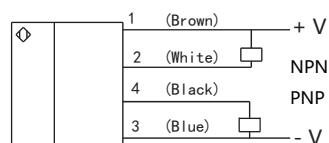
Simultaneously press "+" and "-" buttons for 3 seconds to lock (prevent accidental braking) or unlock.

Simultaneously press "+" and "-" buttons for 6 seconds to define Changeover function(NO/NC changeover).

## Dimensioned drawing



## Wiring



Technical data

|                               |                                          |                                                                                    |
|-------------------------------|------------------------------------------|------------------------------------------------------------------------------------|
| Appearance                    |                                          |  |
| Model                         | NPN/PNP                                  | <b>UG50-T20M-P32S12</b>                                                            |
| size                          | 85,6*18,2*53mm                           |                                                                                    |
| Fork width                    | 3mm                                      |                                                                                    |
| Fork depth                    | 69mm                                     |                                                                                    |
| Operating voltage             | 10...30V DC                              |                                                                                    |
| Voltage ripple                | <10%                                     |                                                                                    |
| Current consumption           | ≤50 mA                                   |                                                                                    |
| Switching frequency           | 1500Hz                                   |                                                                                    |
| Response time                 | 250us                                    |                                                                                    |
| Switching output              | NPN/PNP                                  |                                                                                    |
| Switching output( Voltage)    | PNP:High level=Uv≤2V/ Low level about 0V |                                                                                    |
|                               | NPN:High level=About UV/low level≤2V     |                                                                                    |
| Switch type                   | NO/NC selectable                         |                                                                                    |
| Output Current                | 100mA                                    |                                                                                    |
| Initialization time           | 100mS                                    |                                                                                    |
| connection method             | Plug, M8,4 pins                          |                                                                                    |
| Protection Circuit            | Yes                                      |                                                                                    |
| Ingress protection            | IP65                                     |                                                                                    |
| Housing Material              | Aluminium                                |                                                                                    |
| Ambient temperature           | +5°C...+55°C                             |                                                                                    |
| Storage temperature           | -20°C...+70°C                            |                                                                                    |
| Shock load                    | EN 60068-2-27                            |                                                                                    |
| Electromagnetic compatibility | EN60947-5-2                              |                                                                                    |

Ultrasonic

Rectangular

Single  
and double sheets

Metal single  
and double sheets

# Ultrasonic single and double sheet sensor

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## Features:

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- Fast response speed, can achieve stable detection in high-speed transmission
- Wide detection range, can detect a variety of different materials, such as metal foil, label, paper, plastic film, PCB board, silicon wafer, etc
- Small installation space, can realize intelligent learning, easy debugging

## Main feature

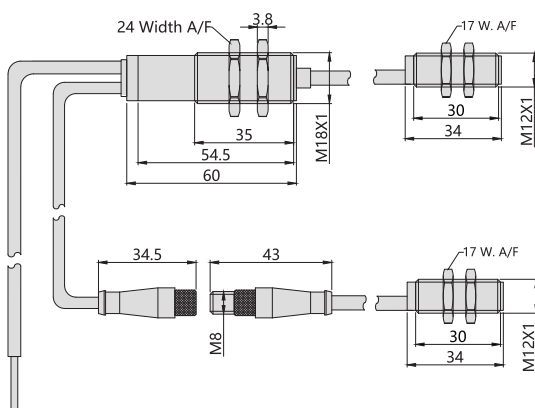
- 3 control inputs: external sensitivity selection and self-learning can be conducted according to the target object.
- Optional self-learning: for example, water bonded solar silicon wafers that is coated with water
- External individual M18 amplifier is available
- Compact M12 threaded barrel design for emitter and receiver

## Fundamental feature

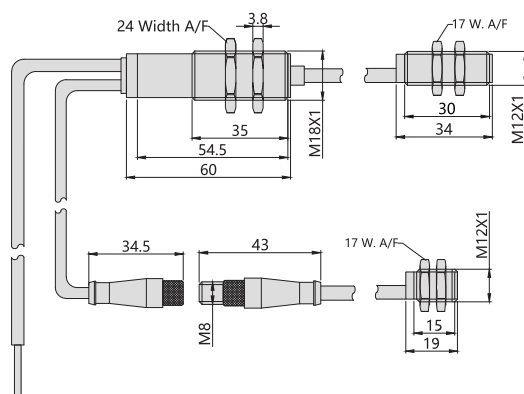
- Reliable detection of single and double sheets of material
- No self-learning (plug-and-play)
- Single sheet, double/multiple sheets and no-paper detection
- Working distance between emitter and receiver ranges from 20mm to 40mm, optional

## Dimensional drawings (M12 series)

### UM12-L040N/P-C34U2-M125

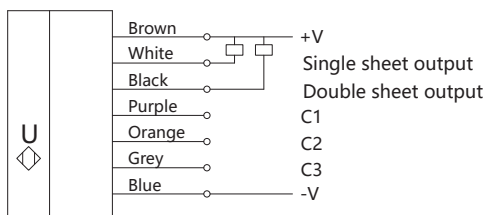


### UM12-L040N/P-C34U2-M125X/15MM

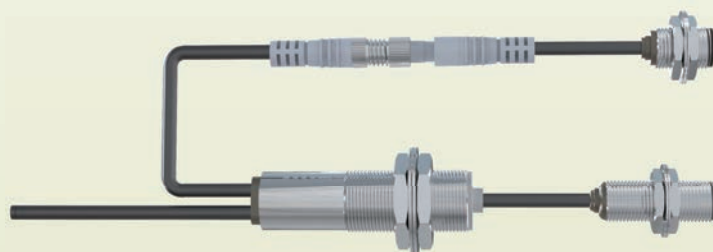
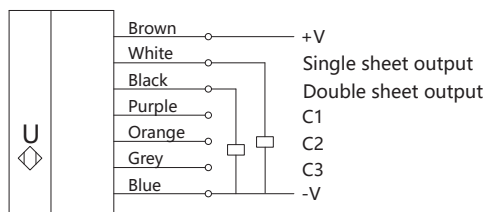


## Wiring

### NPN N.O + N.C



### PNP N.O + N.C



UM12

**Ultrasonic single and double sheets**

**Brass, nickel-plated**

**Cylindrical**

**DC 7 wire, Switching output**

ISO9001 CE UKCA CQC RoHS

## Technical data

|                                  |                                                                                                                                                                 |                              |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Model No                         | NPN N.O+N.C                                                                                                                                                     | <b>UM12-L040N-C34U2-M125</b> |
|                                  | PNP N.O+N.C                                                                                                                                                     | <b>UM12-L040P-C34U2-M125</b> |
| Exterior structure               | M12*1mm                                                                                                                                                         |                              |
| Sensing Distance                 | 20...40mm                                                                                                                                                       |                              |
| Target object range              | Paper,cardboard,metal laminated board with weight 20-600g/m <sup>2</sup> ,films/foils and self-adhesive films up to 0.2mm thickness                             |                              |
| Design                           | Cylindrical M12 ultrasonic wave transducer                                                                                                                      |                              |
| Operating mode                   | Double sheet control                                                                                                                                            |                              |
| Detection method                 | Pulse operation with amplitude evaluation                                                                                                                       |                              |
| Transducer frequency             | 500k Hz                                                                                                                                                         |                              |
| Blind zone                       | 5mm in front of emitter and receiver                                                                                                                            |                              |
| Operating voltage                | 20...30VDC, reverse polarity protection                                                                                                                         |                              |
| Ripple voltage                   | ±10%                                                                                                                                                            |                              |
| No-load current consumption      | ≤50mA                                                                                                                                                           |                              |
| connection method                | 2m PUR cable, 7*0.25mm <sup>2</sup>                                                                                                                             |                              |
| Cable                            | Emitter:1.2m PVC cable,cable between M8 connector and receiver/transducer:1.2m PVC cable                                                                        |                              |
| Output                           | NPN/PNP output;I <sub>max</sub> =200mA, Voltage drop: 2V, short circuit protection                                                                              |                              |
| Output logic                     | No-paper status: white wire OFF, black wire ON; Single sheet status: white wire ON, black wire ON; Double/multiple sheets status: white wire ON, black wire OFF |                              |
| Response time                    | Automatic running mode:2.5ms                                                                                                                                    |                              |
| Power-on delay                   | <750ms                                                                                                                                                          |                              |
| Gap between emitter and receiver | 20...40mm; optimal: 20mm±2mm                                                                                                                                    |                              |
| Permissible tilting angle        | Within ±45°from the sheet perpendicular                                                                                                                         |                              |
| Housing material                 | Brass, nickel-plated                                                                                                                                            |                              |
| Ultrasonic transducer            | PU foam,glass filled epoxy resin                                                                                                                                |                              |
| Max.fastening torque of nuts     | M18: 15Nm M12: 3Nm                                                                                                                                              |                              |
| Ingress protection EN60529       | IP65                                                                                                                                                            |                              |
| Operating temperature            | +5°C...+60°C                                                                                                                                                    |                              |
| Storage temperature              | -40°C...+85°C                                                                                                                                                   |                              |
| Control device                   | control input: C1 to C3                                                                                                                                         |                              |
| Control description              | <-V +6V:logic 1(control input terminal connect -V or idle)                                                                                                      |                              |
|                                  | >-V+10V:Logic 0(control input terminal connect +V)                                                                                                              |                              |
| Set the range                    | Teaching by control input                                                                                                                                       |                              |
| Indicator light                  | Green:single sheet;green flash:teaching;red:double/multiple sheets;red flash:no paper                                                                           |                              |

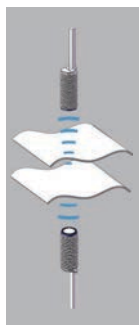


## Working principle

Super-high frequency ultrasonic emitter send ultrasonic sound wave from down below the target sheet to make the sheet vibrate. This vibration will produce a small sound wave on the opposite face of the sheet. So the receiver can receive this small sound wave. When the sound penetrate 2 layers of thin sheets (double sheets), it will become very weak and can not be detected by the receiver any more. UM12 can detect no-paper, single sheet and double sheets.

## UM12 scope of application

- Paper printing machine
- Assembly production line
- Folding machine
- Packaging machine
- Solar panel and silicon wafer production line
- Label/tag line
- PCB production line



## Working range

UM12 can preset 3 detection modes through 3 control inputs. Standard detection mode includes target thin sheets weight from 20g/m<sup>2</sup> to 600g/m<sup>2</sup>. For very thin material detection, for example: printing paper with weight <20g/m<sup>2</sup>, setting "thin" mode to scan the target sheet. For thick material, for example: hard cardboard and corrugated board, you can set "thick" mode to scan the target sheet. You can alter the target object material settings during in-process operating, during which there is no need to do self-learning setting for target sheet materials. If all 3 control inputs are not connected, UM12 will operate at standard operating mode, even though, it still can detect very wide range of materials.

## Self-learning

Additional self-learning function will come in handy when materials can not be detected by any of above 3 detection modes. Put single sheet material into double sheets controller to complete self-learning function. Firstly connect C1, C2 on blue cable, and then put control input C3 on blue cable for about 3 seconds. Move the sheet uneven area during self-learning process to make the target material be detected by the UM12 sensor. When green light brights, it indicates that self-learning process is completed and the target material is ready to be scanned. Self-learning ensures materials will be detected whatever it is from paper to water bonded silicon wafer.

## Automatic operation mode

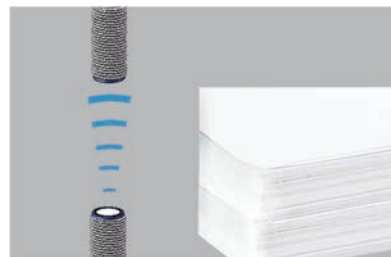
UM12 standard operating mode is automatic operating mode. It will conduct high detection rate for detection in cycles. During continuous operating status, it can alter operating modes and do self-learning through C1-C3 control inputs (note: Logic 0 connect brown cable or idle, Logic 1 connect blue cable).

| Control input | C1 (Purple) | C2 (Orange) | C3 (Gray) |
|---------------|-------------|-------------|-----------|
| Standard mode | 0           | 0           | 0         |
| Thick mode    | 0           | 1           | 0         |
| Thin mode     | 1           | 0           | 0         |
| Teaching mode | 1           | 1           | 0         |
| Teaching      | 1           | 1           | 1         |

## Installation

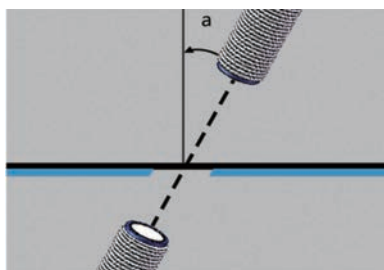
The gap between emitter and receiver is recommended to be 20mm.

If needed, select proper gap distance from 20mm to 40mm according to real situation. Commissioning can be done by single sheet self-learning process.



## Installation angle

For paper and films, double sheets controller is mounted perpendicularly to the target sheet. Swinging does not influence or weaken detection function. As to fine corrugated cardboard, thin metal sheet, wafer and thick plastic sheet (credit card, etc), UM12 could be mounted at a certain tilting angle  $\alpha$  with respect to the perpendicularity of the target sheet.



- Fine corrugated cardboard, best mounting angle  $\alpha \geq 35^\circ$
- Thin metal sheet or thick plastic sheet at  $27^\circ$
- Wafer mounting angle  $11^\circ$

## Maintenance

During long time using, products surface may get dust or other contaminants. We recommend to clean up the emitter's and receiver's surfaces. Use cotton fabric dipping isopropyl alcohol to quickly wipe out the dust from sensing head surfaces.

Ultrasonic

Rectangular

Single  
and double sheetsMetal single  
and double sheets

## Technical data

|                                  |                                                                                                                                                      |                                    |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| Model No                         | NPN N.O+N.C                                                                                                                                          | <b>UM12-L040N-C34U2-M125X/15MM</b> |
|                                  | PNP N.O+N.C                                                                                                                                          | <b>UM12-L040P-C34U2-M125X/15MM</b> |
| Exterior structure               | M12*1mm                                                                                                                                              |                                    |
| Sensing Distance                 | 20...40mm                                                                                                                                            |                                    |
| Target object range              | Paper,cardboard,metal laminated board with weight 20-600g/m <sup>2</sup> ,films/foils and self-adhesive films up to 0.2mm thickness                  |                                    |
| Design                           | Cylindrical M12 ultrasonic wave transducer                                                                                                           |                                    |
| Operating mode                   | Double sheet control                                                                                                                                 |                                    |
| Detection method                 | Pulse operation with amplitude evaluation                                                                                                            |                                    |
| Transducer frequency             | 500k Hz                                                                                                                                              |                                    |
| Blind zone                       | 5mm in front of emitter and receiver                                                                                                                 |                                    |
| Operating voltage                | 20...30VDC, reverse polarity protection                                                                                                              |                                    |
| Ripple voltage                   | ±10%                                                                                                                                                 |                                    |
| No-load current                  | ≤60mA                                                                                                                                                |                                    |
| Connection method                | 2m PUR cable, 7*0.25mm <sup>2</sup>                                                                                                                  |                                    |
| Transmitter cable                | Emitter:1.2m PVC cable,cable between M8 connector and receiver(transducer):1.2m PVC cable                                                            |                                    |
| Output                           | NPN/PNP output;I <sub>max</sub> =200mA, Voltage drop: 2V, short circuit protection                                                                   |                                    |
| Output logic                     | No-paper status: white wire OFF, black wire OFF; Single status: white wire ON, black wire OFF; Double/multiple status: white wire OFF, black wire ON |                                    |
| Response time                    | Automatic running mode:2.5ms                                                                                                                         |                                    |
| Power-on delay                   | <750ms                                                                                                                                               |                                    |
| Gap between emitter and receiver | 20-40mm; optimal: 20mm±2mm                                                                                                                           |                                    |
| Permissible tilting angle        | Within ±45°from the sheet perpendicular                                                                                                              |                                    |
| Housing material                 | Brass, nickel-plated                                                                                                                                 |                                    |
| Ultrasonic transducer            | PU foam,glass filled epoxy resin                                                                                                                     |                                    |
| Max.fastening torque of nuts     | M18: 15Nm M12: 3Nm                                                                                                                                   |                                    |
| Ingress protection EN60529       | IP65                                                                                                                                                 |                                    |
| Operating temperature            | +5°C...+60°C                                                                                                                                         |                                    |
| Storage temperature              | -40°C...+85°C                                                                                                                                        |                                    |
| Control device                   | control input: C1 to C3                                                                                                                              |                                    |
| Control description              | <-V +6V:logic 1(control input terminal connect -V or idle)                                                                                           |                                    |
|                                  | >-V+10V:Logic 0(control input terminal connect +V )                                                                                                  |                                    |
| Set the range                    | Teaching by control input                                                                                                                            |                                    |
| Indicator light                  | Green:single sheet;green flash:teaching;red:double/multiple sheets;red flash:no paper                                                                |                                    |

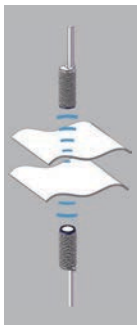


## Working principle

Super-high frequency ultrasonic emitter send ultrasonic sound wave from down below the target sheet to make the sheet vibrate. This vibration will produce a small sound wave on the opposite face of the sheet. So the receiver can receive this small sound wave. When the sound penetrate 2 layers of thin sheets (double sheets), it will become very weak and can not be detected by the receiver any more. UM12 can detect no-paper, single sheet and double sheets.

### UM12 scope of application

- Paper printing machine
- Assembly production line
- Folding machine
- Packaging machine
- Solar panel and silicon wafer production line
- Label/tag line
- PCB production line



## Installation

The gap between emitter and receiver is recommended to be 20mm.

If needed, select proper gap distance from 20mm to 40mm according to real situation. Commissioning can be done by single sheet self-learning process.



## Working range

UM12 can preset 3 detection modes through 3 control inputs. Standard detection mode includes target thin sheets weight from 20g/m<sup>2</sup> to 600g/m<sup>2</sup>. For very thin material detection, for example: printing paper with weight <20g/m<sup>2</sup>, setting "thin" mode to scan the target sheet. For thick material, for example: hard cardboard and corrugated board, you can set "thick" mode to scan the target sheet. You can alter the target object material settings during in-process operating, during which there is no need to do self-learning setting for target sheet materials. If all 3 control inputs are not connected, UM12 will operate at standard operating mode, even though, it still can detect very wide range of materials.

## Self-learning

Additional self-learning function will come in handy when materials can not be detected by any of above 3 detection modes. Put single sheet material into double sheets controller to complete self-learning function. Firstly connect C1, C2 on brown cable, and then put control input C3 on brown cable for about 3 seconds. Move the sheet uneven area during self-learning process to make the target material be detected by the UM12 sensor. When green light brights, it indicates that self-learning process is completed and the target material is ready to be scanned. Self-learning ensures materials will be detected whatever it is from paper to water bonded silicon wafer.

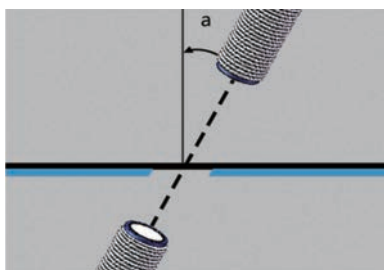
## Automatic operation mode

UM12 standard operating mode is automatic operating mode. It will conduct high detection rate for detection in cycles. During continuous operating status, it can alter operating modes and do self-learning through C1-C3 control inputs (note: Logic 0 connect brown cable, Logic 1 connect blue cable or idle).

| Control input | C1 (Purple) | C2 (Orange) | C3 (Gray) |
|---------------|-------------|-------------|-----------|
| Standard mode | 1           | 1           | 1         |
| Thick mode    | 1           | 0           | 1         |
| Thin mode     | 0           | 1           | 1         |
| Teaching mode | 0           | 0           | 1         |
| Teaching      | 0           | 0           | 0         |

## Installation angle

For paper and films, double sheets controller is mounted perpendicularly to the target sheet. Swinging does not influence or weaken detection function. As to fine corrugated cardboard, thin metal sheet, wafer and thick plastic sheet (credit card, etc), UM12 could be mounted at a certain tilting angle  $\alpha$  with respect to the perpendicularity of the target sheet.



- Fine corrugated cardboard, best mounting angle  $\alpha \geq 35^\circ$
- Thin metal sheet or thick plastic sheet at  $27^\circ$
- Wafer mounting angle  $11^\circ$

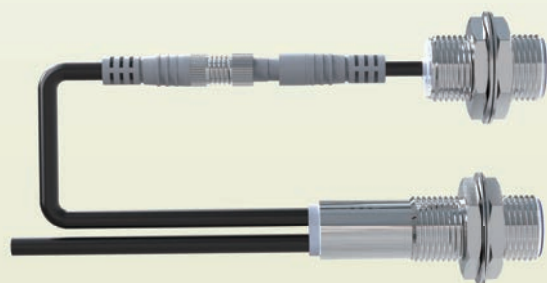
## Maintenance

During long time using, products surface may get dust or other contaminants. We recommend to clean up the emitter's and receiver's surfaces. Use cotton fabric dipping isopropyl alcohol to quickly wipe out the dust from sensing head surfaces.

Ultrasonic

Rectangular

Single  
and double sheetsMetal single  
and double sheets



UM18

**Ultrasound single and double sheets**  
Brass, nickel-plated  
**Cylindrical**

DC 7 wire, Switching output

ISO9001 CE UKCA CQC RoHS

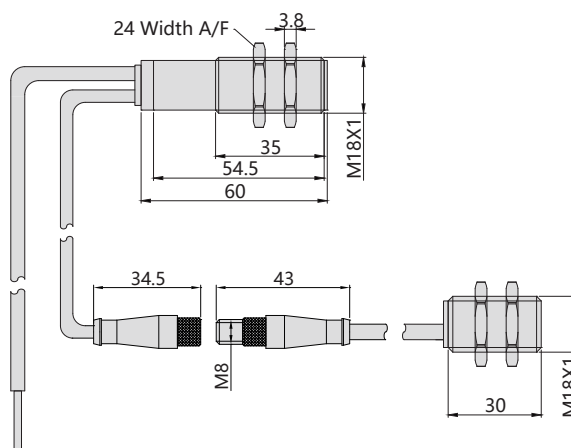
## Main feature

- 3 control inputs: external sensitivity selection and self-learning can be conducted according to target object material
- Optional self-learning: for example, water bonded silicon solar wafer
- M18 receiver and M18 emitter

## Fundamental feature

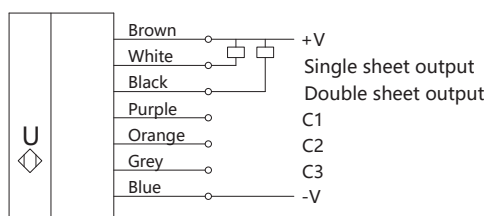
- Reliable detection of single and double sheets of material
- No need of self-learning (plug-and-play)
- single sheet, double/multiple sheet, no paper detection
- 184|184X:  
The working distance between the emitter and the receiver is from 20mm to 40mm
- 182X|182Y:  
The working distance between the emitter and the receiver is from 20mm to 60mm

## Dimensional drawings (M18 series)

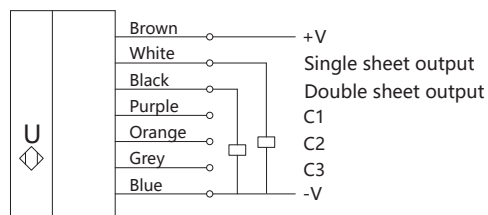


## Wiring

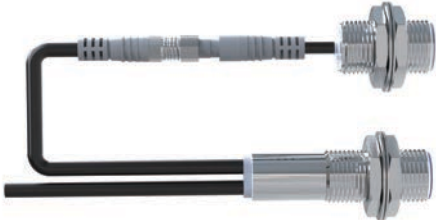
NPN N.O+N.C



PNP N.O+N.C



## Technical data

|                                  |              |                                                                                                                                                      |  |
|----------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Appearance                       |              |                                                                    |  |
| Model No                         | NPN N.O.+N.C | <b>UM18-L040N-C34U2-M184</b>                                                                                                                         |  |
|                                  | PNP N.O.+N.C | <b>UM18-L040P-C34U2-M184</b>                                                                                                                         |  |
| Exterior structure               |              | M18*1mm                                                                                                                                              |  |
| Sensing Distance                 |              | 20...40mm                                                                                                                                            |  |
| Target object material           |              | Paper,cardboard,metal laminated board with weight 20-1200g/m <sup>2</sup> ,films/foils and self-adhesive films up to 0.4mm thickness                 |  |
| Design                           |              | Cylindrical M18 ultrasonic wave transducer                                                                                                           |  |
| Operating mode                   |              | Double sheet control                                                                                                                                 |  |
| Detection method                 |              | Pulse operation with amplitude evaluation                                                                                                            |  |
| Transducer frequency             |              | 400k Hz                                                                                                                                              |  |
| Blind zone                       |              | 5mm in front of emitter and receiver                                                                                                                 |  |
| Operating voltage                |              | 20...30VDC, reverse polarity protection                                                                                                              |  |
| Ripple voltage                   |              | ±10%                                                                                                                                                 |  |
| No-load current consumption      |              | ≤60mA                                                                                                                                                |  |
| Connection method                |              | 2m PUR cable, 7*0.25mm <sup>2</sup>                                                                                                                  |  |
| Transmitter cable                |              | Emitter:1.2m PVC cable,cable between M8 connector and receiver(transducer):1.2m PVC cable                                                            |  |
| Output                           |              | NPN/PNP output;I <sub>max</sub> =200mA, Voltage drop: 2V, short circuit protection                                                                   |  |
| Output logic                     |              | No paper status: white wire OFF, black wire OFF; Single status: white wire ON, black wire OFF; Double/multiple status: white wire OFF, black wire ON |  |
| Response time                    |              | Automatic running mode:2.5ms                                                                                                                         |  |
| Power-on delay                   |              | <750ms                                                                                                                                               |  |
| Gap between emitter and receiver |              | 20...40mm; optimal: 20mm±2mm                                                                                                                         |  |
| Permissible tilting angle        |              | Within ±45°from the sheet perpendicular                                                                                                              |  |
| Housing material                 |              | Brass, nickel-plated                                                                                                                                 |  |
| Ultrasonic transducer            |              | PU foam,glass filled epoxy resin                                                                                                                     |  |
| Max.fastening torque of nuts     |              | M18: 15Nm                                                                                                                                            |  |
| Ingress protection EN60529       |              | IP65                                                                                                                                                 |  |
| Operating temperature            |              | +5°C...+60°C                                                                                                                                         |  |
| Storage temperature              |              | -40°C...+85°C                                                                                                                                        |  |
| Control device                   |              | control input: C1 to C3                                                                                                                              |  |
| Control description              |              | <-V+6V: Logic 1(control input terminal-v or idle)                                                                                                    |  |
|                                  |              | >-V+10V:Logic 0(control input terminal + V)                                                                                                          |  |
| Set the range                    |              | Teaching by control input                                                                                                                            |  |
| Indicator light                  |              | Green:single sheet;green flash:teaching;red:double/multiple sheets;red flash:no paper                                                                |  |

Ultrasonic

Rectangular

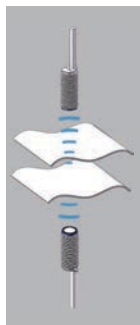
Single  
and double sheetsMetal single  
and double sheets

## Working principle

Super-high frequency ultrasonic emitter send ultrasonic sound wave from down below the target sheet to make the sheet vibrate. This vibration will produce a small sound wave on the opposite face of the sheet. So the receiver can receive this small sound wave. When the sound penetrate 2 layers of thin sheets (double sheets), it will become very weak and can not be detected by the receiver any more. UM18 can detect no-paper, single sheet and double sheets.

## UM18 scope of application

- Paper printing machine
- Assembly production line
- Folding machine
- Packaging machine
- Solar panel and silicon wafer production line
- Label/tag line
- PCB production line



## Working range

UM18 can preset 3 detection modes through 3 control inputs. Standard detection mode includes target thin sheets weight from 20g/m<sup>2</sup> to 1200g/m<sup>2</sup>. For very thin material detection, for example: printing paper with weight <20g/m<sup>2</sup>, setting "thin" mode to scan the target sheet. For thick material, for example: hard cardboard and corrugated board, you can set "thick" mode to scan the target sheet. You can alter the target object material settings during in-process operating, during which there is no need to do self-learning setting for target sheet materials. If all 3 control inputs are not connected, UM18 will operate at standard operating mode, even though, it still can detect very wide range of materials.

## Self-learning

Additional self-learning function will come in handy when materials can not be detected by any of above 3 detection modes. Put single sheet material into double sheets controller to complete self-learning function. Firstly connect C1, C2 on brown cable, and then put control input C3 on brown cable for about 3 seconds. Move the sheet uneven area during self-learning process to make the target material be detected by the UM18 sensor. When green light brights, it indicates that self-learning process is completed and the target material is ready to be scanned. Self-learning ensures materials will be detected whatever it is from paper to water bonded silicon wafer.

## Automatic operation mode

UM18 standard operating mode is automatic operating mode. It will conduct high detection rate for detection in cycles. During continuous operating status, it can alter operating modes and do self-learning through C1-C3 control inputs (note: Logic 0 connect brown cable, Logic 1 connect blue cable or idle).

| Control input | C1 (Purple) | C2 (Orange) | C3 (Gray) |
|---------------|-------------|-------------|-----------|
| Standard mode | 1           | 1           | 1         |
| Thick mode    | 1           | 0           | 1         |
| Thin mode     | 0           | 1           | 1         |
| Teaching mode | 0           | 0           | 1         |
| Teaching      | 0           | 0           | 0         |

## Installation

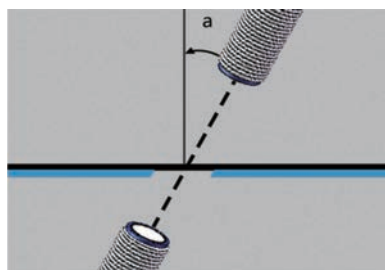
The gap between emitter and receiver is recommended to be 20mm.

If needed, select proper gap distance from 20mm to 40mm according to real situation. Commissioning can be done by single sheet self-learning process.



## Installation angle

For paper and films, double sheets controller is mounted perpendicularly to the target sheet. Swinging does not influence or weaken detection function. As to fine corrugated cardboard, thin metal sheet, wafer and thick plastic sheet (credit card, etc), UM18 could be mounted at a certain tilting angle  $\alpha$  with respect to the perpendicularity of the target sheet.

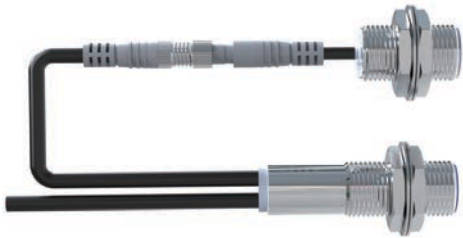


- Fine corrugated cardboard, best mounting angle  $\alpha \geq 35^\circ$
- Thin metal sheet or thick plastic sheet at  $27^\circ$
- Wafer mounting angle  $11^\circ$

## Maintainence

During long time using, products surface may get dust or other contaminants. We recommend to clean up the emitter's and receiver's surfaces. Use cotton fabric dipping isopropyl alcohol to quickly wipe out the dust from sensing head surfaces.

## Technical data

|                                  |             |                                                                                                                                                    |  |
|----------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Appearance                       |             |                                                                  |  |
| Model No                         | NPN N.O+N.C | <b>UM18-L040N-C34U2-M184X</b>                                                                                                                      |  |
|                                  | PNP N.O+N.C | <b>UM18-L040P-C34U2-M184X</b>                                                                                                                      |  |
| Exterior structure               |             | M18*1mm                                                                                                                                            |  |
| Sensing Distance                 |             | 20...40mm                                                                                                                                          |  |
| Target object material           |             | Paper,cardboard,metal laminated board with weight 20-1200g/m <sup>2</sup> ,films/foils and self-adhesive films up to 0.4mm thickness               |  |
| Design                           |             | Cylindrical M18 ultrasonic wave transducer                                                                                                         |  |
| Operating mode                   |             | Double sheet control                                                                                                                               |  |
| Detection method                 |             | Pulse operation with amplitude evaluation                                                                                                          |  |
| Transducer frequency             |             | 400k Hz                                                                                                                                            |  |
| Blind zone                       |             | 5mm in front of emitter and receiver                                                                                                               |  |
| Operating voltage                |             | 20...30VDC, reverse polarity protection                                                                                                            |  |
| Ripple voltage                   |             | ±10%                                                                                                                                               |  |
| No-load current                  |             | ≤60mA                                                                                                                                              |  |
| Connection method                |             | 2m PUR cable, 7*0.25mm <sup>2</sup>                                                                                                                |  |
| Cable                            |             | Emitter:1.2m PVC cable,cable between M8 connector and receiver:1.2m PVC cable                                                                      |  |
| Output                           |             | NPN/PNP output;I <sub>max</sub> =200mA, Voltage drop: 2V, short circuit protection                                                                 |  |
| Output logic                     |             | No paper status: white wire OFF, black wire ON; Single status: white wire ON, black wire ON; Double/multiple status: white wire ON, black wire OFF |  |
| Response time                    |             | Automatic running mode:2.5ms                                                                                                                       |  |
| Power-on delay                   |             | <750ms                                                                                                                                             |  |
| Gap between emitter and receiver |             | 20...40mm; optimal: 20mm±2mm                                                                                                                       |  |
| Permissible tilting angle        |             | Within ±45°from the sheet perpendicular                                                                                                            |  |
| Housing material                 |             | Brass, nickel-plated                                                                                                                               |  |
| Ultrasonic transducer            |             | PU foam,glass filled epoxy resin                                                                                                                   |  |
| Max.fastening torque of nuts     |             | M18: 15Nm                                                                                                                                          |  |
| Ingress protection EN60529       |             | IP65                                                                                                                                               |  |
| Operating temperature            |             | +5°C...+60°C                                                                                                                                       |  |
| Storage temperature              |             | -40°C...+85°C                                                                                                                                      |  |
| Control device                   |             | control input: C1 to C3                                                                                                                            |  |
| Control description              |             | <-V+6V: Logic 1(control input terminal-v )                                                                                                         |  |
|                                  |             | >-V+10V:Logic 0(control input terminal + V or idle)                                                                                                |  |
| Set the range                    |             | Teaching by control input                                                                                                                          |  |
| Indicator light                  |             | Green:single sheet;green flash:teaching;red:double/multiple sheets;red flash:no paper                                                              |  |

Ultrasonic

Rectangular

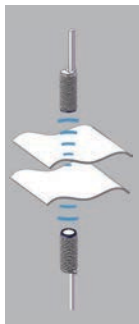
Single  
and double sheetsMetal single  
and double sheets

## Working principle

Super-high frequency ultrasonic emitter send ultrasonic sound wave from down below the target sheet to make the sheet vibrate. This vibration will produce a small sound wave on the opposite face of the sheet. So the receiver can receive this small sound wave. When the sound penetrate 2 layers of thin sheets(double sheets), it will become very weak and can not be detected by the receiver any more. UM18 can detect no-paper, single sheet and double sheets.

## UM18 scope of application

- Paper printing machine
- Assembly production line
- Folding machine
- Packaging machine
- Solar panel and silicon wafer production line
- Label/tag line
- PCB production line



## Installation

The gap between emitter and receiver is recommended to be 20mm.

If needed, select proper gap distance from 20mm to 40mm according to real situation. Commissioning can be done by single sheet self-learning process.



## Working range

UM18 can preset 3 detection modes through 3 control inputs. Standard detection mode includes target thin sheets weight from 20g/m<sup>2</sup> to 1200g/m<sup>2</sup>. For very thin material detection, for example: printing paper with weight <20g/m<sup>2</sup>, setting "thin" mode to scan the target sheet. For thick material, for example: hard cardboard and corrugated board, you can set "thick" mode to scan the target sheet. You can alter the target object material settings during in-process operating, during which there is no need to do self-learning setting for target sheet materials. If all 3 control inputs are not connected, UM18 will operate at standard operating mode, even though, it still can detect very wide range of materials.

## Self-learning

Additional self-learning function will come in handy when materials can not be detected by any of above 3 detection modes. Put single sheet material into double sheets controller to complete self-learning function. Firstly connect C1, C2 on blue cable, and then put control input C3 on blue cable for about 3 seconds. Move the sheet uneven area during self-learning process to make the target material be detected by the UM18 sensor. When green light brights, it indicates that self-learning process is completed and the target material is ready to be scanned. Self-learning ensures materials will be detected whatever it is from paper to water bonded silicon wafer.

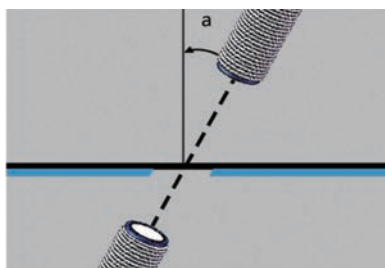
## Automatic operation mode

UM18 standard operating mode is automatic operating mode. It will conduct high detection rate for detection in cycles. During continuous operating status, it can alter operating modes and do self-learning through C1-C3 control inputs (note: Logic 0 connect brown cable or idle, Logic 1 connect blue cable).

| Control input | C1 (Purple) | C2 (Orange) | C3 (Gray) |
|---------------|-------------|-------------|-----------|
| Standard mode | 0           | 0           | 0         |
| Thick mode    | 0           | 1           | 0         |
| Thin mode     | 1           | 0           | 0         |
| Teaching mode | 1           | 1           | 0         |
| Teaching      | 1           | 1           | 1         |

## Installation angle

For paper and films, double sheets controller is mounted perpendicularly to the target sheet. Swinging does not influence or weaken detection function. As to fine corrugated cardboard, thin metal sheet, wafer and thick plastic sheet (credit card, etc), UM18 could be mounted at a certain tilting angle  $\alpha$  with respect to the perpendicularity of the target sheet.

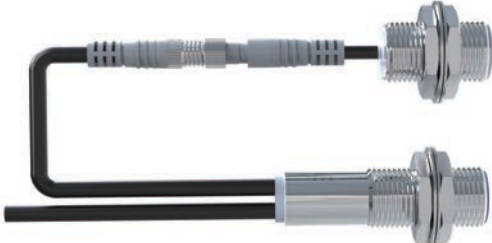


- Fine corrugated cardboard, best mounting angle  $\alpha \geq 35^\circ$
- Thin metal sheet or thick plastic sheet at  $27^\circ$
- Wafer mounting angle  $11^\circ$

## Maintenance

During long time using, products surface may get dust or other contaminants. We recommend to clean up the emitter's and receiver's surfaces. Use cotton fabric dipping isopropyl alcohol to quickly wipe out the dust from sensing head surfaces.

## Technical data

|                                  |              |                                                                                                                                                    |  |
|----------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Appearance                       |              |                                                                  |  |
| Model No                         | NPN N.O.+N.C | <b>UM18-L060N-C34U2-M182X</b>                                                                                                                      |  |
|                                  | PNP N.O.+N.C | <b>UM18-L060P-C34U2-M182X</b>                                                                                                                      |  |
| Exterior structure               |              | M18*1mm                                                                                                                                            |  |
| Sensing Distance                 |              | 20...60mm                                                                                                                                          |  |
| Target object material           |              | Papers with weights of 50-1200g/m <sup>2</sup> , Washi, metal-laminated sheets , self-adhesive films                                               |  |
| Design                           |              | Cylindrical M18 ultrasonic wave transducer                                                                                                         |  |
| Operating mode                   |              | Double sheet control                                                                                                                               |  |
| Detection method                 |              | Pulse operation with amplitude evaluation                                                                                                          |  |
| Transducer frequency             |              | 200k Hz                                                                                                                                            |  |
| Blind zone                       |              | 5mm in front of emitter and receiver                                                                                                               |  |
| Operating voltage                |              | 20...30VDC , reverse polarity protection                                                                                                           |  |
| Ripple voltage                   |              | ±10%                                                                                                                                               |  |
| No-load current                  |              | ≤60mA                                                                                                                                              |  |
| Connection method                |              | 2m PUR cable , 7*0.25mm <sup>2</sup>                                                                                                               |  |
| Cable                            |              | Emitter:1.2m PVC cable,cable between M8 connector and receiver:1.2m PVC cable                                                                      |  |
| Output                           |              | NPN/PNP output; I <sub>max</sub> =200mA, Voltage drop 2V, short circuit protection                                                                 |  |
| Output logic                     |              | No paper status: white wire OFF, black wire ON; Single status: white wire ON, black wire ON; Double/multiple status: white wire ON, black wire OFF |  |
| Response time                    |              | Automatic running mode:6.5ms                                                                                                                       |  |
| Power-on delay                   |              | <1.9s                                                                                                                                              |  |
| Gap between emitter and receiver |              | 20...60mm; optimal: 40mm±5mm                                                                                                                       |  |
| Permissible tilting angle        |              | Within ±45°from the sheet perpendicular                                                                                                            |  |
| Housing material                 |              | Brass, nickel-plated                                                                                                                               |  |
| Ultrasonic transducer            |              | PU foam,glass filled epoxy resin                                                                                                                   |  |
| Max.fastening torque of nuts     |              | M18: 15Nm                                                                                                                                          |  |
| Ingress protection EN60529       |              | IP65                                                                                                                                               |  |
| Operating temperature            |              | +5°C...+60°C                                                                                                                                       |  |
| Storage temperature              |              | -40°C...+85°C                                                                                                                                      |  |
| Control device                   |              | control input: C1 to C3                                                                                                                            |  |
| Control description              |              | <-V+6V: Logic 1(control input terminal-v )                                                                                                         |  |
|                                  |              | >-V+10V:Logic 0(control input terminal + V or idle)                                                                                                |  |
| Set the range                    |              | Teaching by control input                                                                                                                          |  |
| Indicator light                  |              | Green:single sheet;green flash:teaching;red:double/multiple sheets;red flash:no paper                                                              |  |

Ultrasonic

Rectangular

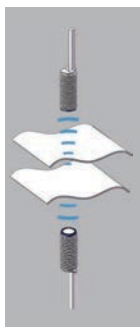
Single  
and double sheetsMetal single  
and double sheets

## Working principle

Super-high frequency ultrasonic emitter send ultrasonic sound wave from down below the target sheet to make the sheet vibrate. This vibration will produce a small sound wave on the opposite face of the sheet. So the receiver can receive this small sound wave. When the sound penetrate 2 layers of thin sheets (double sheets), it will become very weak and can not be detected by the receiver any more. UM18 can detect no-paper, single sheet and double sheets.

## UM18 scope of application

- Paper printing machine
- Assembly production line
- Folding machine
- Packaging machine
- Solar panel and silicon wafer production line
- Label/tag line
- PCB production line



## Working range

UM18 can preset 3 detection modes through 3 control inputs. Standard detection mode includes target thin sheets weight from 50g/m<sup>2</sup> to 1200g/m<sup>2</sup>. For very thin material detection, for example: printing paper with weight <50g/m<sup>2</sup>, setting "thin" mode to scan the target sheet. For thick material, for example: hard cardboard and corrugated board, you can set "thick" mode to scan the target sheet. You can alter the target object material settings during in-process operating, during which there is no need to do self-learning setting for target sheet materials. If all 3 control inputs are not connected, UM18 will operate at standard operating mode, even though, it still can detect very wide range of materials.

## Self-learning

Additional self-learning function will come in handy when materials can not be detected by any of above 3 detection modes. Put single sheet material into double sheets controller to complete self-learning function. Firstly connect C1, C2 on blue cable, and then put control input C3 on blue cable for about 6 seconds. Move the sheet uneven area during self-learning process to make the target material be detected by the UM18 sensor. When green light brights, it indicates that self-learning process is completed and the target material is ready to be scanned. Self-learning ensures materials will be detected whatever it is from paper to water bonded silicon wafer.

## Automatic operation mode

UM18 standard operating mode is automatic operating mode. It will conduct high detection rate for detection in cycles. During continuous operating status, it can alter operating modes and do self-learning through C1-C3 control inputs (note: Logic 0 connect brown cable or idle, Logic 1 connect blue cable).

| Control input | C1 (Purple) | C2 (Orange) | C3 (Gray) |
|---------------|-------------|-------------|-----------|
| Standard mode | 0           | 0           | 0         |
| Thick mode    | 0           | 1           | 0         |
| Thin mode     | 1           | 0           | 0         |
| Teaching mode | 1           | 1           | 0         |
| Teaching      | 1           | 1           | 1         |

## Installation

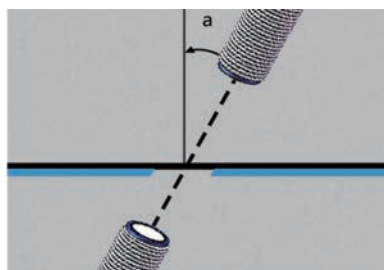
The gap between emitter and receiver is recommended to be 40mm.

If needed, select proper gap distance from 20mm to 60mm according to real situation. Commissioning can be done by single sheet self-learning process.



## Installation angle

For paper and films, double sheets controller is mounted perpendicularly to the target sheet. Swinging does not influence or weaken detection function. As to fine corrugated cardboard, thin metal sheet, wafer and thick plastic sheet (credit card, etc), UM18 could be mounted at a certain tilting angle  $\alpha$  with respect to the perpendicularity of the target sheet.

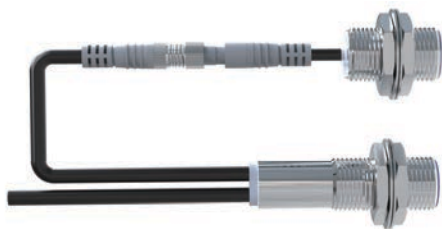


- Fine corrugated cardboard, best mounting angle  $\alpha \geq 35^\circ$
- Thin metal sheet or thick plastic sheet at  $27^\circ$
- Wafer mounting angle  $11^\circ$

## Maintenance

During long time using, products surface may get dust or other contaminants. We recommend to clean up the emitter's and receiver's surfaces. Use cotton fabric dipping isopropyl alcohol to quickly wipe out the dust from sensing head surfaces.

## Technical data

|                                  |              |                                                                                                                                                      |  |
|----------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Appearance                       |              |                                                                    |  |
| Model No                         | NPN N.O.+N.C | UM18-L060N-C34U2-M182Y                                                                                                                               |  |
|                                  | PNP N.O.+N.C | UM18-L060P-C34U2-M182Y                                                                                                                               |  |
| Exterior structure               |              | M18*1mm                                                                                                                                              |  |
| Sensing Distance                 |              | 20...60mm                                                                                                                                            |  |
| Target object material           |              | Papers with weights of 50-1200g/m <sup>2</sup> , Washi, metal-laminated sheets , self-adhesive films                                                 |  |
| Design                           |              | Cylindrical M18 ultrasonic wave transducer                                                                                                           |  |
| Operating mode                   |              | Double sheet control                                                                                                                                 |  |
| Detection method                 |              | Pulse operation with amplitude evaluation                                                                                                            |  |
| Transducer frequency             |              | 200k Hz                                                                                                                                              |  |
| Blind zone                       |              | 5mm in front of emitter and receiver                                                                                                                 |  |
| Operating voltage                |              | 20...30VDC , reverse polarity protection                                                                                                             |  |
| Ripple voltage                   |              | ±10%                                                                                                                                                 |  |
| No-load current                  |              | ≤60mA                                                                                                                                                |  |
| Connection method                |              | 2m PUR cable, 7*0.25mm <sup>2</sup>                                                                                                                  |  |
| Cable                            |              | Emitter:1.2m PVC cable,cable between M8 connector and receiver:1.2m PVC cable                                                                        |  |
| Output                           |              | NPN/PNP output;I <sub>max</sub> =200mA, Voltage drop 2V, short circuit protection                                                                    |  |
| Output logic                     |              | No paper status: white wire OFF, black wire OFF; Single status: white wire ON, black wire OFF; Double/multiple status: white wire OFF, black wire ON |  |
| Response time                    |              | Automatic running mode:6.5ms                                                                                                                         |  |
| Power-on delay                   |              | <1.9s                                                                                                                                                |  |
| Gap between emitter and receiver |              | 20...60mm; optimal: 40mm±5mm                                                                                                                         |  |
| Permissible tilting angle        |              | Within ±45°from the sheet perpendicular                                                                                                              |  |
| Housing material                 |              | Brass, nickel-plated                                                                                                                                 |  |
| Ultrasonic transducer            |              | PU foam,glass filled epoxy resin                                                                                                                     |  |
| Max.fastening torque of nuts     |              | M18: 15Nm                                                                                                                                            |  |
| Ingress protection EN60529       |              | IP65                                                                                                                                                 |  |
| Operating temperature            |              | +5°C...+60°C                                                                                                                                         |  |
| Storage temperature              |              | -40°C...+85°C                                                                                                                                        |  |
| Control device                   |              | control input: C1 to C3                                                                                                                              |  |
| Control description              |              | < -V+6V: Logic 1(control input terminal-v or idle )                                                                                                  |  |
|                                  |              | > -V+10V:Logic 0(control input terminal + V)                                                                                                         |  |
| Set the range                    |              | Teaching by control input                                                                                                                            |  |
| Indicator light                  |              | Green:single sheet;green flash:teaching;red:double/multiple sheets;red flash:no paper                                                                |  |

Ultrasonic

Rectangular

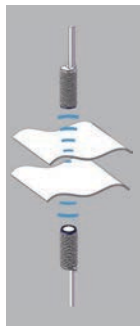
Single  
and double sheetsMetal single  
and double sheets

### Working principle

Super-high frequency ultrasonic emitter send ultrasonic sound wave from down below the target sheet to make the sheet vibrate. This vibration will produce a small sound wave on the opposite face of the sheet. So the receiver can receive this small sound wave. When the sound penetrate 2 layers of thin sheets (double sheets), it will become very weak and can not be detected by the receiver any more. UM18 can detect no-paper, single sheet and double sheets.

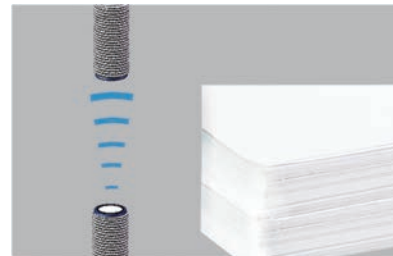
### UM18 scope of application

- Paper printing machine
- Assembly production line
- Folding machine
- Packaging machine
- Solar panel and silicon wafer production line
- Label/tag line
- PCB production line



### Installation

The gap between emitter and receiver is recommended to be 40mm. If needed, select proper gap distance from 20mm to 60mm according to real situation. Commissioning can be done by single sheet self-learning process.



### Working range

UM18 can preset 3 detection modes through 3 control inputs. Standard detection mode includes target thin sheets weight from 50g/m<sup>2</sup> to 1200g/m<sup>2</sup>. For very thin material detection, for example: printing paper with weight <50g/m<sup>2</sup>, setting "thin" mode to scan the target sheet. For thick material, for example: hard cardboard and corrugated board, you can set "thick" mode to scan the target sheet. You can alter the target object material settings during in-process operating, during which there is no need to do self-learning setting for target sheet materials. If all 3 control inputs are not connected, UM18 will operate at standard operating mode, even though, it still can detect very wide range of materials.

### Self-learning

Additional self-learning function will come in handy when materials can not be detected by any of above 3 detection modes. Put single sheet material into double sheets controller to complete self-learning function. Firstly connect C1, C2 on brown cable, and then put control input C3 on brown cable for about 6 seconds. Move the sheet uneven area during self-learning process to make the target material be detected by the UM18 sensor. When green light brights, it indicates that self-learning process is completed and the target material is ready to be scanned. Self-learning ensures materials will be detected whatever it is from paper to water bonded silicon wafer.

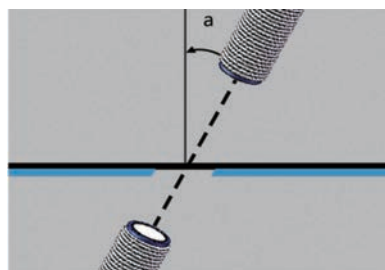
### Automatic operation mode

UM18 standard operating mode is automatic operating mode. It will conduct high detection rate for detection in cycles. During continuous operating status, it can alter operating modes and do self-learning through C1-C3 control inputs (note: Logic 0 connect brown cable, Logic 1 connect blue cable or idle).

| Control input | C1 (Purple) | C2 (Orange) | C3 (Gray) |
|---------------|-------------|-------------|-----------|
| Standard mode | 1           | 1           | 1         |
| Thick mode    | 1           | 0           | 1         |
| Thin mode     | 0           | 1           | 1         |
| Teaching mode | 0           | 0           | 1         |
| Teaching      | 0           | 0           | 0         |

### Installation angle

For paper and films, double sheets controller is mounted perpendicularly to the target sheet. Swinging does not influence or weaken detection function. As to fine corrugated cardboard, thin metal sheet, wafer and thick plastic sheet (credit card, etc), UM18 could be mounted at a certain tilting angle  $\alpha$  with respect to the perpendicularity of the target sheet.



- Fine corrugated cardboard, best mounting angle  $\alpha \geq 35^\circ$
- Thin metal sheet or thick plastic sheet at  $27^\circ$
- Wafer mounting angle  $11^\circ$

### Maintenance

During long time using, products surface may get dust or other contaminants. We recommend to clean up the emitter's and receiver's surfaces. Use cotton fabric dipping isopropyl alcohol to quickly wipe out the dust from sensing head surfaces.

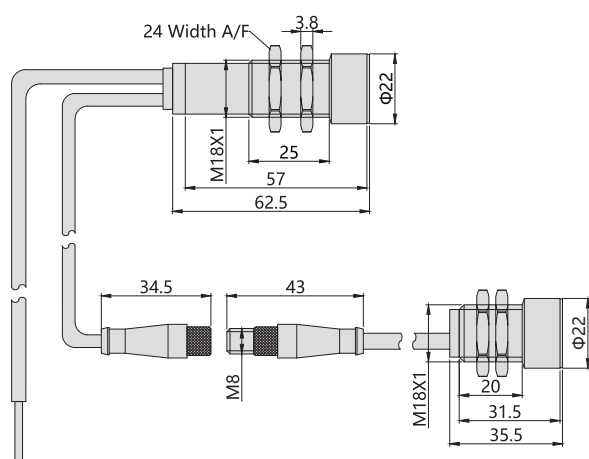
## Main feature

- 3 control inputs: select external sensitivity level and do self-learning according to the detected materials.
- Optional self-learning: for example, a solar silicon wafer that is coated with water.
- M18 receiver and M18 emitter.

## Fundamental feature

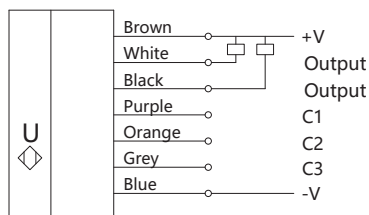
- Reliable detection of single and double sheets of material
- No need of self-learning (plug-and-play)
- single sheet, double/multiple sheets, no-paper detection
- Operating distance between emitter and receiver: 30-70mm for option

## Dimensional drawings (M18 series)

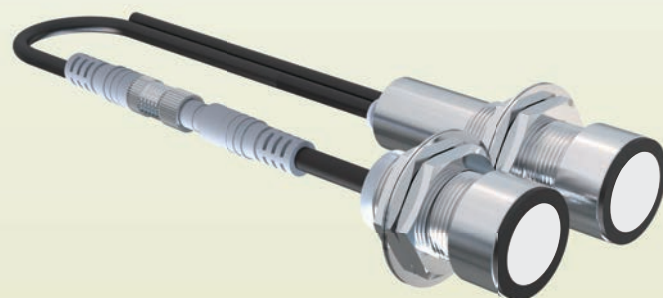
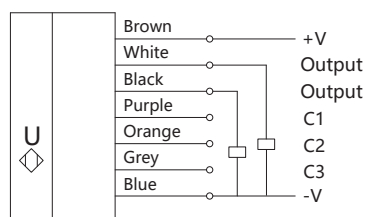


## Wiring

NPN



PNP



UM18  
**Ultrasound single and double sheets**  
 Brass, nickel-plated  
**Cylindrical**  
 DC 7 wire, Switching output

Technical data

|                                  |                                                                                                                                                    |                              |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Model No                         | NPN N.O+N.C                                                                                                                                        | <b>UM18-L070N-C34U2-M182</b> |
|                                  | PNP N.O+N.C                                                                                                                                        | <b>UM18-L070P-C34U2-M182</b> |
| Exterior structure               | M18*1mm                                                                                                                                            |                              |
| Sensing Distance                 | 30...70mm                                                                                                                                          |                              |
| Detection material               | Paper with weight 100-1200g/m <sup>2</sup> , thin metal sheet with 1mm thickness, PCB board with 2mm thickness                                     |                              |
| Design                           | Cylindrical M18 ultrasonic wave transducer                                                                                                         |                              |
| Operating mode                   | Double sheet control                                                                                                                               |                              |
| Detection method                 | Pulse operation with amplitude evaluation                                                                                                          |                              |
| Transducer frequency             | 200k Hz                                                                                                                                            |                              |
| Blind zone                       | 7mm in front of emitter and receiver                                                                                                               |                              |
| Operating voltage                | 20...30VDC, reverse polarity protection                                                                                                            |                              |
| Voltage ripple                   | ±10%                                                                                                                                               |                              |
| No-load current                  | ≤60mA                                                                                                                                              |                              |
| Type of connection               | 2m PUR cable, 7*0.25mm <sup>2</sup>                                                                                                                |                              |
| Cable                            | Emitter:1.2m PVC cable, cable between M8 connector and receiver(transducer): 1.2m PVC cable                                                        |                              |
| Output                           | NPN/PNP output; I <sub>max</sub> =200mA(-V+2V), short circuit protection                                                                           |                              |
| Output logic                     | No paper status: white wire OFF, black wire ON; Single status: white wire ON, black wire ON; Double/multiple status: white wire ON; black wire OFF |                              |
| Response time                    | Automatic running mode < 5.5ms                                                                                                                     |                              |
| Power-on delay                   | <750ms                                                                                                                                             |                              |
| Gap between emitter and receiver | 30...70mm; optimal: 40mm±3mm                                                                                                                       |                              |
| Permissible tilting angle        | Within ±45° from the sheet perpendicular                                                                                                           |                              |
| Material                         | Brass, nickel-plated                                                                                                                               |                              |
| Ultrasonic transducer            | PU foam, glass filled epoxy resin                                                                                                                  |                              |
| Max. tightening torque of nuts   | 15Nm                                                                                                                                               |                              |
| Ingress protection EN60529       | IP65                                                                                                                                               |                              |
| Working temperature              | +5°C...+60°C                                                                                                                                       |                              |
| Storage temperature              | -40°C...+85°C                                                                                                                                      |                              |
| Control device                   | control input: C1 to C3                                                                                                                            |                              |
| Control description              | <-V+6V: Logic 1(control input terminal-v )                                                                                                         |                              |
|                                  | >-V+10V: Logic 0(control input terminal + Vor idle)                                                                                                |                              |
| Set the range                    | Teaching by control input                                                                                                                          |                              |
| Indicator light                  | Green Light: single; Green light flashing: teaching; Red light: double/multiple; Red Flashing: no paper                                            |                              |

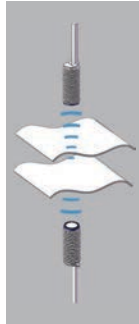


## Working principle

An ultra-high frequency ultrasonic transmitter emits an ultrasonic beam from below the thin film. The soundwaves vibrate the sheet, which also produces a very small sound wave from the other side of the sheet that is received by the ultrasonic receiver. When the signal passes through two layers of sheets (double sheets), it becomes very weak and cannot reach the receiver. The UM18 can detect missing, single and double sheets.

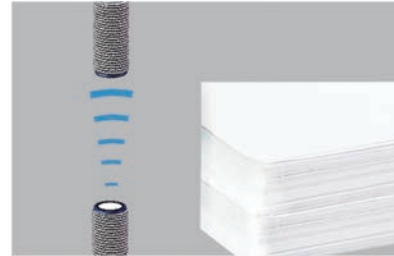
## UM18 scope of application

- Paper printing machine
- Assembly machine
- Folding machine
- Packaging machinery
- Manufacturing of solar cells and silicon wafers
- Label
- PCB board manufacturing industry



## Installation

The gap between emitter and receiver is recommended to be 40mm.  
If needed, select proper gap distance from 30mm to 70mm according to real situation.  
Commissioning can be done by single sheet self-learning process.



## Working range

UM18 can preset 3 detection modes through 3 control inputs. Standard detection mode includes target thin sheets weight from 100g/m<sup>2</sup> to 1200g/m<sup>2</sup>. For very thin material detection, for example: printing paper with weight <100g/m<sup>2</sup>, setting "thin" mode to scan the target sheet. For thick material, for example: hard cardboard and corrugated board, you can set "thick" mode to scan the target sheet. You can alter the target object material settings during in-process operating, during which there is no need to do self-learning setting for target sheet materials. If all 3 control inputs are not connected, UM18 will operate at standard operating mode, even though, it still can detect very wide range of materials.

## Self-learning

When any of the three detection ranges can not scan the materials, the additional self-learning function will work. Put the single sheet material into the double sheet controller, so that the self-learning process will be achieved. Firstly connect C1 and C2 with blue wire, and then put the control input terminal C3 on brown wire for 3 seconds. During self-learning process, move the material's uneven area in order to be detected by UM18. Self-learning will be totally completed and enabled to scan materials when the green light is on. Self-learning guaranteed the detection of the materials from paper to water-film-bonded-wafers.

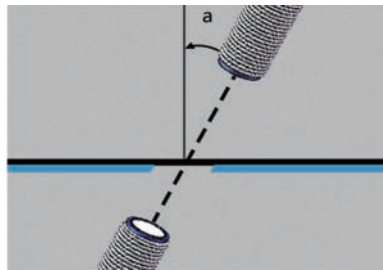
## Automatic operation mode

UM18 standard operating mode is automatic operating mode. It will conduct high detection rate for detection in cycles. During continuous operating status, it can alter operating modes and do self-learning through C1-C3 control inputs (note: Logic 0 connect brown cable or idle, Logic 1 connect blue cable).

| Control input | C1 (Purple) | C2 (Orange) | C3 (Gray) |
|---------------|-------------|-------------|-----------|
| Standard mode | 0           | 0           | 0         |
| Thick mode    | 0           | 1           | 0         |
| Thin mode     | 1           | 0           | 0         |
| Teaching mode | 1           | 1           | 0         |
| Teaching      | 1           | 1           | 1         |

## Installation angle

For paper and thin film, double sheet controller is mounted perpendicularly to the materials. Swinging motion will not reduce the detection function. For fine thin metal film, wafer and thick plastic film (for example: credit card), UM18 will be mounted at a tilting angle to the material mounting perpendicularity line.



- Fine corrugated cardboard, the best installation tilt angle  $\geq 35^\circ$
- Thin metal sheet or thick plastic film is  $27^\circ$
- Wafer mounting angle is  $11^\circ$

## Maintain

Due to the long-term use of the product, the surface of the product will be dirty. We recommend that the user clean the surface of the transmitter and receiver regularly. The best way to clean is to apply some isopropyl alcohol to the cotton cloth and then quickly dry the sensor surface.

Ultrasonic

Rectangular

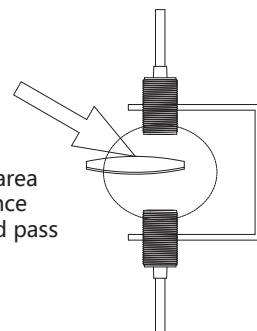
Single  
and double sheetsMetal single  
and double sheets

**Bedook®**

## Installation and commissioning

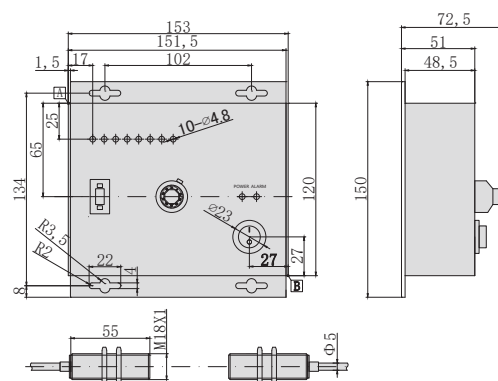
The sensor should be mounted face to face and relatively fixed.

The diameter of the sensing area should be larger than the distance between the sensors, and should pass through between the sensors.

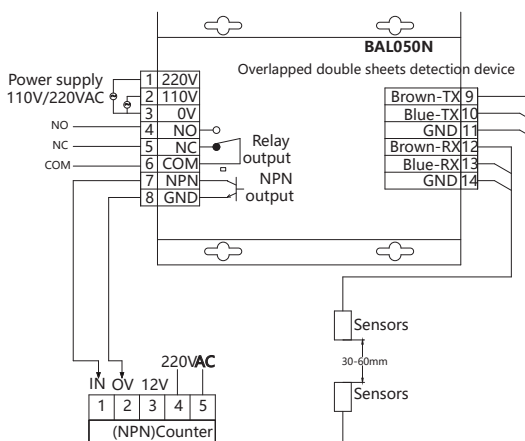


No strong magnetic field within a range of 100mm around the sensor; The surrounding 40mm cannot be shielded by metal barriers.

## Dimensioned drawing



## Wiring



**BAL050N**

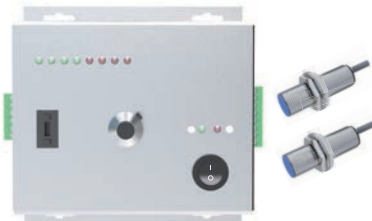
**Metal single and double sheets**

Brass, nickel-plated

AC 8 wire, Switching output

ISO9001 CE UKCA CQC RoHS

## Technical data

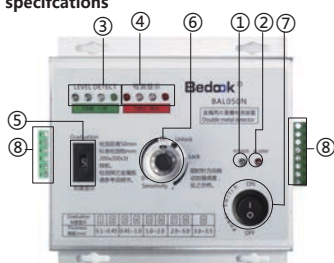
|                              |                   |                                                                                             |
|------------------------------|-------------------|---------------------------------------------------------------------------------------------|
| Appearance                   |                   |           |
| Model No                     | Host NPN N.O./N.C | <b>BAL050N</b>                                                                              |
|                              | Sensing elements  | <b>BB-M1850-CP5</b>                                                                         |
| Operating voltage            |                   | 110V/220VAC±10%                                                                             |
| Switching frequency          |                   | 50/60Hz                                                                                     |
| Detection method             |                   | Split design for sensing elements and host                                                  |
| Output                       |                   | NPN 100mA/ <24VDC,250VAC/3A                                                                 |
| Response time                |                   | <50ms                                                                                       |
| Sensitivity adjustment       |                   | Knob to adjust                                                                              |
| LED indicator                |                   | Red LED indicator light                                                                     |
| Ingress protection           |                   | IEC IP20                                                                                    |
| Ambient temperature/humidity |                   | 0...55°C (Non-freezing state) /RH35...85%                                                   |
| Master controller            |                   | BB-M1850-CP5                                                                                |
| Sensing distance             |                   | 30...60mm                                                                                   |
| Target object thickness      |                   | Iron: 0.1...3.5mm; aluminum: 0.1...3.5mm; copper: 0.1...3.5mm; stainless steel: 0.3...3.5mm |
| Standard detection object    |                   | 200x200x1(mm) Iron Plate                                                                    |
| Ingress protection           |                   | IEC IP67                                                                                    |
| Ambient temperature/humidity |                   | -10...55°C (Non-freezing state) /RH35...85%                                                 |
| Material                     |                   | Sensor housing:Brass, nickel-plated/Sensing face:PBT                                        |
| Cable                        |                   | PVC cable /5m(2*0.35mm <sup>2</sup> ); PVC shielded wire /5m(2*0.35mm <sup>2</sup> )        |
| Accessories                  |                   | Screwdriver, nut                                                                            |

Ultrasonic

Rectangular

Single  
and double sheetsMetal single  
and double sheets

## Functional specifications



## Typical applications

Products are widely used in PCB industry, metal packaging industry, household appliances industry, metal parts such as automatic feeding system in the stamping industry, automobile industry, testing to prevent double layer or multilayer films together into the next process, effective protection equipment molds, avoid the waste of materials.

## Instructions for use

Make sure the Power is on and the Power indicator light is on.

Confirm the thickness of the target object. Follow the product mark (please refer to scale display and thickness standard) to adjust scale display.

Put the single sheet material in the middle of 2 sensors, adjust the sensitivity knob to single sheet green indicators 2-3 pcs LED lighting up, and the red LED Alarm also lights up.

Put the double sheets material in the middle of 2 sensors, double sheets signal indicator will light up for 1-4 LEDs.

Commissioning is completed, lock the knob.

| Code | Name                                        | Description                                             |
|------|---------------------------------------------|---------------------------------------------------------|
| ①    | Power indicator                             | Light on: power on                                      |
| ②    | Indicator of double sheet output            | Light on: double sheet detected                         |
| ③    | Green LED indicator for single sheet output | 1-4 green light on: single sheet detected               |
| ④    | Red LED indicator for double sheet output   | 1-4 red light on: double sheet detected                 |
| ⑤    | Scale display                               | select the proper scale according to material thickness |
| ⑥    | Sensitivity adjustment                      | Adjust the best detection signal by knob                |
| ⑦    | Power switch                                | ON: power on, OFF: power off                            |
| ⑧    | Terminal                                    | Plug-in terminal                                        |