

Cylindrical Ultrasonic Sensors



UTR Series PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Features

- Detect and measure various material and surface types with ultrasonic sensing
- Sensing distance (by mount diameter)
 - Ø 18 mm : 120 to 1,300 mm
 - Ø 30 mm : 600 to 8,000 mm
- Temperature compensation (auto/manual) and detection width conversion function for high accuracy
- 316L stainless steel body for high corrosion resistance
- 360° ring type indicator to check operation status from any directions
- Digital output (Push-Pull) support
- IO-Link models available
- Simultaneous digital and analog output models available
- Configure settings and monitor status with ultrasonic sensor programming units (UT-P)
- Dedicated software provided (atDistance)
- IP67 protection rating

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow instructions may result in serious injury or death.

- 01. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)**
Failure to follow this instruction may result in personal injury, economic loss or fire.
- 02. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, salinity, moisture, or steam, or dust may be present.**
Failure to follow this instruction may result in explosion or fire.
- 03. Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire.
- 04. Do not connect, repair, inspect, or replace the unit while connected to a power source.**
Failure to follow this instruction may result in fire.
- 05. Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.
- 06. Qualified personnel shall carry out installation, configuration.**
Responsible person for use is an operator who:
- **is fully knowledgeable about the installation, settings, use and maintenance of the product.**
Failure to follow this instruction may cause malfunction or result in accident.

⚠ Caution Failure to follow instructions may result in injury or product damage.

- 01. Use the product within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.
- 02. Depending on the medium and the ambient temperature, the sound speed may change and the sensing performance may change.**
Use the product within the rated specifications.
- 03. When the ambient temperature is 70 °C, make sure that the relative humidity does not exceed 50 % RH.**
Sensing performance may deteriorate in humid environments.
- 04. Use a dry cloth to clean the unit, and do not use water or organic solvent.**
Failure to follow this instruction may result in fire.
- 05. Do not allow dust to be on the surface of the sensing surface or build up a thick layer of dust.**
Failure to follow this instruction may result in product damage and malfunction.
- 06. Keep the product away from metal chip, dust, and wire residue which might flow into the unit.**
Failure to follow this instruction may result in fire or product damage.
- 07. Do not connect the load if power is supplied only to UT-P (sold separately, ultrasonic sensor programming unit).**
Failure to follow this instruction may result in fire or product damage.
- 08. In case of IO-Link models, IO-Link and UT-P communications cannot be used simultaneously.**
Do not connect wiring arbitrarily.

Product Components

- Product × 1
- Instruction Manual × 1
- Nut × 2
- Washer × 1

Sold Separately

- Ultrasonic sensor programming unit : UT-P Series
- M12 connector cable: CID5-□, C1D5-□

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- The 12 - 30 VDC power input is insulated and limited voltage/current or use SELV, Class 2 power supply.
- Use the product, after about 30 min of supplying power. Temperature compensation stabilizes the sensor. If sensor stabilization is not completed, sensing performance deteriorate or an error occurs when setting parameters.
- The filtered distance may not be immediately reflected due to EMC interference.
- Wire as short as possible and keep away from high voltage lines or power lines, to prevent surge and inductive noise. Do not use near the equipment which generates strong magnetic force or high frequency noise (transceiver, etc.).
- In case installing the product near the equipment which generates strong surge (motor, welding machine, etc.), use diode or varistor to remove surge.
- This unit may be used in the following environments.
 - Indoors (UL Type 1 Enclosure)
 - Altitude max. 2,000 m
 - Pollution degree 3
 - Installation Category II

Cautions for Installation

Environment

- Install the unit correctly with the usage environment, location, and the designated specifications.
- Install the sensor and the sensing target at right angles.
- It cannot be used in a vacuum without a medium.
- If there is an object nearby that absorbs sound strongly or diffuses, sensing performance may deteriorate.
- Install no objects other than the sensing target in the detection width area. For the detection width area, refer to the product manual.
- When changing the sensor settings, test the sensor before use. Check whether the indicator light operates correctly according to the detection range and filter or other settings change.

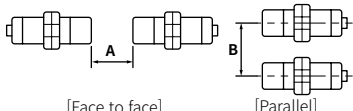
Wire

- Do NOT impacts with a hard object or excessive bending of the wire lead-out. It may cause damage the water resistance.
- In case of IO-Link mode, the cable length between the unit and the IO-Link Master should be under 20 m.

Installation

Distance

When plural ultrasonic sensors are mounted in a close row, malfunction of sensor may be caused due to mutual interference. Therefore, be sure to provide a minimum distance between the two sensors, as below table.

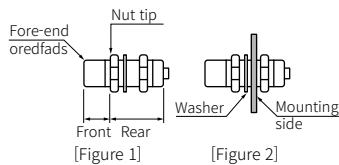


Model	UTRCM18	UTRCM30
Type		
A	4,000 mm	30,000 mm
B	700 mm	4,000 mm

Tightening torque

Use the provided washer to tighten the nuts.

The tightening torque of the nut varies with the distance from the fore-end. [Figure 1] If the nut tip is located at the front of the product, apply the front tightening torque. The allowable tightening torque table is for inserting the washer as [Figure 2]



Model	UTRCM18	UTRCM30
Strength		
Front size	13 mm	
Front torque	9.81 N m	15 N m
Rear torque	15 N m	

Ordering Information

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.

UTRCM ① - ② ③ ④ - ⑤ - ⑥

① DIA. of mount

Number: DIA. of mount (unit: mm)

② Sensing distance

Number: Sensing distance (unit: mm)
Number + M: Sensing distance (unit: m)

③ Output

No-mark: Digital output
D: Digital + Analog output

④ Analog output

No-mark: current (4 - 20 mA)
B: Voltage (0 - 10 V) / current (4 - 20 mA)

⑤ Display part

No-mark: None
D: 3-digit display

⑥ Communication output

No-mark: Not supported
IL2: IO-Link COM2

Software

Download the installation file and the manuals from the Autonics Website.

atDistance

It is the monitoring data management program for installation of the ultrasonic sensor, parameter setting, and status information.

atIOLink

atIOLink with purposes for setting, diagnosis, and maintenance of IO-Link device via IODD file is provided as the Port and Device Configuration Tool (PDCT).

• IODD (IO Device Description)

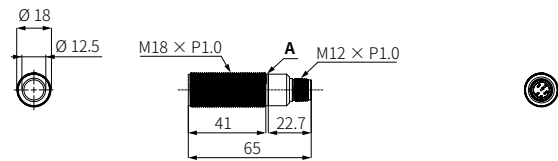
This file contains information such as manufacturer information, process data, diagnostic data, and parameter setting of a sensor using IO-Link communication. By uploading the IODD file to PDCT Software, you can check the setting and communication data according to the user interface. Download the IODD file from the Autonics website. For the parameter index, refer to the product manual.

Dimensions

- Unit: mm, For the detailed, follow the Autonocs website.

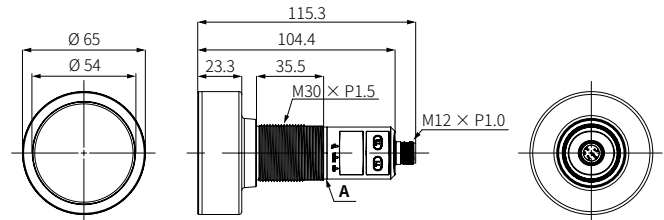
A Operation Indicator

UTRCM18



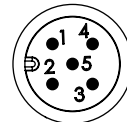
UTRCM30

- UTRCM30-8MDB-D-□: The dimension depends on the display part.



Connector Specification

- For LOAD connection, follow the cable type connection.
- Fasten the connector along the thread. (tightening torque: 0.39 to 0.49 N m)
- Fasten the vibration part with PTFE tape.



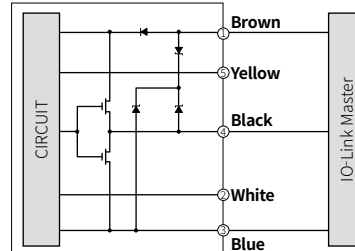
Pin no.	Color	Function
①	Brown	VCC 12 - 30 VDC
②	White	I/V Analog output
③	Blue	GND 0 V
④	Black	C/Q Digital output / IO-Link
⑤	Yellow	COM Multifunctional input

Connections

① Brown	② White	③ Blue	④ Black	⑤ Yellow
VCC	I/V (analog output)	GND	C/Q (digital output)	COM

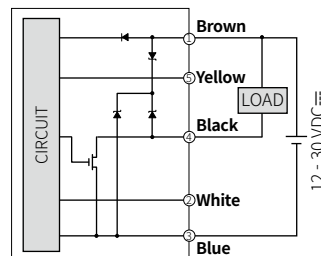
IO-Link mode

- The control output mode can be switched through parameter setting.

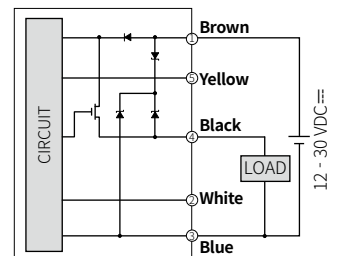


SIO mode

• NPN



• PNP



Wire Setting

- Depending on wire setting it is available to operate same with the input keys.
The settings for supplying power and quick mode are available.
- The setting action of the input key and connector cable connection and the input / release time are the same.

Wire setting	Input key
1 terminal (VCC, brown) + 5 terminal (COM, yellow)	[T1]
3 terminal (GND, green) + 5 terminal (COM, yellow)	[T2]

Operation Indicator

Status	Indicator	
Supply power	Flashes with green + orange rotation (1 Hz)	
Setting	Entering mode	Orange flashes (the key input elapse time)
	Set parameter	Orange + green cross-flashing
Signal output	Digital output	Orange ON
	Analog output	Green ON
Abnormal accuracy	Orange + green cross-flashing (3 Hz)	
Communication	COM	Orange flashes (1 Hz) (digital priority output)
	IO-Link	Green flashes (1 Hz) (analog priority output)

Specification

Model	UTRCM18-1300-□	UTRCM18-1300D-□	UTRCM30-8M-□-□	UTRCM30-8MDB-□-□
Sensing distance	120 to 1300 mm		600 to 8000 mm	
Blind zone	0 to 120 mm		0 to 600 mm	
Foreground suppression	120 to 360 mm		600 to 1800 mm	
Max. setting zone	1300 mm		8000 mm	
Transducer frequency	200 kHz		80 kHz	
Switching frequency	≥ 10 Hz		≥ 3 Hz	
Response time	≤ 100 ms		≤ 300 ms	
Hysteresis ⁰¹⁾	20 mm		100 mm	
Standard sensing target: Aluminum	200 × 200 mm		500 × 500 mm	
Resolution	≥ 0.175 mm		≥ 0.180 mm	
Accuracy ⁰²⁾	± 1 % F.S.		± 1 % F.S.	
Repeat accuracy	± 0.15 % F.S.		± 0.15 % F.S.	
Power supply	12 - 30 VDC≐ (ripple P-P: ≤ 10 %)		12 - 30 VDC≐ (ripple P-P: ≤ 10 %)	
Current consumption	≤ 45 mA (no load)		≤ 80 mA (no load)	
Digital output	Push-pull		Push-pull	
Load voltage	≤ 30 V		≤ 30 V	
Load current	≤ 100 mA		≤ 100 mA	
Residual voltage	≤ 3 V		≤ 3 V	
Analog output	-	[current output] DC 4 - 20 mA	-	[voltage output] DC 0 - 10 V [current output] DC 4 - 20 mA
Load resistance	[voltage output] 12 - 30 VDC≐: ≥ 100 kΩ [current output] 12 - 20 VDC≐: ≤ 100 Ω / 20 - 30 VDC≐: 100 to 500 Ω			
Protection circuit	Surge protection circuit, output short over current protection circuit, reverse polarity protection			
Insulation resistance	≥ 50 MΩ (500 VDC≐ megger)			
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50 / 60 Hz for 1 min			
Vibration	1.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 2 hours			
Shock	500 m/s ² (≈ 50 G) in each X, Y, Z direction for 3 times			
Ambient temperature	-25 to 70 °C, storage: -40 to 85 °C (no freezing or condensation)			
Protection structure	IP67 (IEC standard)			
Connection	Connector models			
Connector spec.	M12 5-pin plug connector			
Material	Case: mount - SUS316L, body - PC / transducer: ceramic			
Certification	CE IO-Link ⁰³⁾			
Weight (packaged)	≈ 32 g (≈ 90 g)		≈ 214 g (≈ 310 g)	

01) Set parameter or dedicated software (atDistance)

02) Ambient temperature 25 °C, temperatures characteristic ± 0.1 % F.S. / °C

03) It is applied to UTRCM□-□□□□-IL2 model.

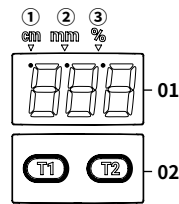
Communication Interface

IO-Link

Version	Ver. 1.1
Class	Class A
Baud rate	COM 2 (38.4 kbps)
Min. cycle time	4 ms
Data length	PD: 4 byte, OD: 2 byte (M-sequence: TYPE_2_V)
Vendor ID	899 (0x383)

Unit Descriptions

- It is for the display part supporting models.
- In case of the non-display part models, it is possible to set the parameter in the ultrasonic sensor programming unit UT-P Series (sold separately) or in the ultrasonic sensor software atDistance.



01. Display part (3-digit)

Displays present value and parameter setting value

① cm: displays 10 units (100 = 1000)

② mm: displays 1 units (100 = 100)

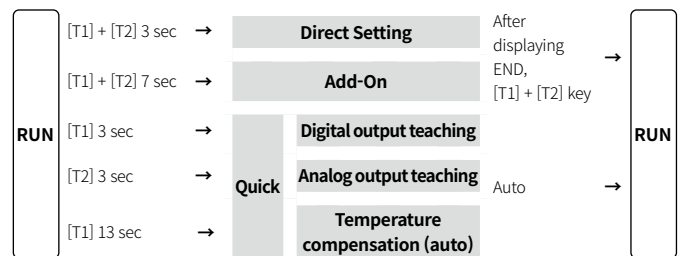
③ %: displays % (100 = 100 %)

02. [T1], [T2] key

Parameter selection, moving digit of the setting value or changing the setting value

Mode Setting

- Quick mode can be set to the input key or M12 connector cable (sold separately) connection.
- On entering the mode, the key input elapse time is displayed through the display part. If there is no key input for 27 sec, the settings are ignored and it returns to the RUN mode.
- For more information, refer to the product manual.



Setting for Supplying Power

- When supplying power, it is possible to set multiplex OFF / reset by the [T2] key.
- It is possible to set to the input key or M12 connector cable (sold separately) connection. For more information, refer to the 'Wire Setting'.
- The setting action of the input key and M12 connector cable connection and the input / release time are the same.
- When pressing and releasing the [T2] keys for 12 sec on each parameter, the existing settings are ignored and the CAN is displayed before returning to RUN mode.

■ Multiplex OFF

- Same as the select synchronization mode (setting value:00) setting in Add-on mode.

Display	Setting operation
Supply power	Press the [T2] key to supply power. Press the [T2] key for 3 to 5 sec.
5 9 C	Release the key.
5 9 n	Press the [T2] key for 3 sec.
RUN mode	YES: Multiplex OFF (synchronization use) Release the [T2] key to complete setting and enter RUN mode.

■ Reset

Display	Setting operation
Supply power	Press the [T2] key to supply power. Press the [T2] key for 9 sec.
r 5 E	Release the key.
r E 5	Press the [T2] key for 3 sec.
RUN mode	YES: reset completion, Release the [T2] key to reset to factory default and enter RUN mode.

Error

Display	Operation	Cause
Error	Orange, green indicator 3 Hz cross-flashing, setting cancel and return to RUN mode.	Out of the parameter setting range or teaching range
		When running the temperature compensation before the temperature stabilization (for over 30 min after power supply)
		When setting the analog output or the analog output teaching on analog output unsupported models

Direct Setting

- Some parameters are activated / deactivated depending on the model or setting of other parameters.
- [T1] + [T2] keys: Select the parameter.
[T1] key: Transfers the previous parameter and digit of the setting value.
[T2] key: Transfers the next parameter and change the setting value.

Digital output

Parameter	Slide display	Defaults	Setting range	Display condition
Output method	d i r S E E	d	D: digital output IV: analog output	-
Operation mode	n o d E S E L E C T	A r E	ARE: area, WIN: window 1-P: one-point	-
Switching point 1 ⁰¹⁾	S P 1	1000	[UTRCM18] 120 to 1299 mm	Output method : D Operation mode : ARE Operation mode : WIN Operation mode : 1-P Operation mode : WIN
		6 0 0 0	[UTRCM30] 600 to 7999 mm	
		1000	[UTRCM18] 121 to 1299 mm	
		6 0 0 0	[UTRCM30] 601 to 7999 mm	
Switching point 2 ⁰¹⁾	S P 2	500	[UTRCM18] 123 to 1274 mm	Operation mode : WIN
		3 0 0 0	[UTRCM30] 613 to 7843 mm	
Output mode (N.O. / N.C.)	n o n C	n o	NO: normally open NC: normally closed	-

01) According to the operation mode and the setting conditions, the setting range can be limited.

Analog output

- In case of analog output unsupported models, an error may occur during setting.

Parameter	Slide display	Defaults	Setting range	Display condition
Output method	d i r S E E	d	D: digital output IV: analog output	-
Analog near point ⁰¹⁾	n E A r L i n e	120	[UTRCM18] 120 to 1299 mm [UTRCM30] 600 to 7999 mm	Output method : IV
Analog far point ⁰¹⁾	F A r L i n e	1300	[UTRCM18] 121 to 1300 mm [UTRCM30] 601 to 8000 mm	
Output mode (rising / falling)	C H A r A C - t E r i S e t C S	- -	- - : rising (0 → 100 %) - - : falling (100 → 0 %)	-

01) According to the operation mode and the setting conditions, the setting range can be limited.

Add-On

- Some parameters are activated / deactivated depending on the model or setting of other parameters.
- [T1] + [T2] keys: Select the parameter.
[T1] key: Transfers the previous parameter and digit of the setting value.
[T2] key: Transfers the next parameter and change the setting value.

Parameter	Mark	Slide display	Defaults	Setting range
Display part light	d 0 1	L I G H T L E U E L	S t d	[Display part supporting model] STD: lightness, DRK: darkness, OFF: turn-off
Display part direction	d 0 2	d i S P L A Y I n v e r t	n o r	[Display part supporting model] NOR: forward direction, INV: half-turn
Display part unit	d 0 3	d i S P L A Y U n i t	- - -	[Display part supporting model] - - -: distance display - - : 100 → 0 % display - -: 0 → 100 % display
Analog output type	d 0 4	A n A L o G o U t P U t t Y P E	i	[Digital + analog output model] V: voltage output, I: current output
Digital output hysteresis ⁰¹⁾	d 0 5	H Y S t E r E S i S	20	[UTRCM18] Area mode: 1 to 1180 mm Window mode: 1 to 590 mm One-point mode: 1 to 576 mm
			1 0 0	[UTRCM30] Area mode: 1 to 7400 mm Window mode: 1 to 3700 mm One-point mode: 1 to 3614 mm
Measurement filter	d 0 6	F i L t E r t Y P E	F 0 1	F00: no filter F01: foreground filter, F02: averaging filter F03: foreground + averaging filter F04: background + averaging filter
Measurement filter strength	d 0 7	F i L t E r S t r e n g t h	P 0 0	P00 to P09: (weak to strong)
Timer mode	d 0 8	d E L A Y	- - -	- - -: OFF, ON: on-delay OFF: off-delay, ONE: one-shot delay
Timer delay time	d 0 9	d E L A Y u R L U E	0 0 1	001 to 025 sec
Foreground suppression ⁰¹⁾ (detection start position)	d 1 0	F G n d S U P P r E S S i o n	120	[UTRCM18] 120 to 360 mm
			6 0 0	[UTRCM30] 600 to 1800 mm
Temperature manual compensation	d 1 1	C A L - t E n P	-	• ≤ ± 10 % of setting location • Place a sensing target before the temperature compensation. • Temperature compensation before the temperature stabilization (for over 30 min after supplying power) may cause occur an error.
Detection width	d 1 2	S E n S i t i v i t y	W i d	WID: wide, MID: middle NAR: narrow
Max. address value of multiplex	d 1 3	n U L t i n E n b e r	1 0	01 to 10 • Set higher than the multiplex address.
Synchronization mode ⁰²⁾	d 1 4	S y n c - i d	0 0	00: synchronization 01 to 10: multiplex address 11: IO-Link synchronization

01) According to the operation mode and the setting conditions, the setting range can be limited.

02) In case of the IO-Link synchronization, you can only set on IO-Link models.

Quick

- The setting method depends on the output method. With the setting in order, the setting value is saved and returned to RUN mode.
- It is possible to set to the input key or M12 connector cable (sold separately) connection. For more information, refer to the 'Wire Setting'.
- When pressing and releasing the [T1], and [T2] keys for 12 sec on each parameter, the existing settings are ignored and the CAN is displayed before returning to RUN mode.

Digital output teaching

No	Display	Operation
1	SP1 teaching	RUN mode Place the sensing target on the switching point1 (SP1) position.
		$d t 1$ Press the [T1] key for 3 sec. Release the [T1] key to complete the SP1 teaching.
		$l - P$ Press and release the [T1] key for 3 sec.
2	Select the operation mode	$R r E$ Press and release the [T1] key for 5 sec.
		$\bar{n} o d$ Place the sensing target on the window switching point2 (SP2) position. Press and release the [T1] key for 7 sec.
		$\bar{u} i n$ Release the [T1] key to complete the SP2.
3	N.O. / N.C.	$n o$ Normally open Press and release the [T1] key for 3 sec to return to the RUN mode.
		$n c$ Normally closed Press and release the [T2] key for 3 sec to return to the RUN mode.

01) When pressing the [T1] key in the RUN mode for 7 seconds, the same parameter is displayed and can be set independently.

Analog output teaching

- In case of analog output unsupported models, an error may occur during setting.

No	Display	Operation
1	Analog output	RUN mode Place the sensing target on the near point (AT1) position.
		$R t 1$ AT1 teaching Press the [T2] key for 3 sec. Release the [T2] key to complete the AT1 teaching.
		$R t 2$ AT2 teaching Place the sensing target on the far point (AT2) position. Press the [T2] key for 3 sec. Release the [T2] key to complete the AT2 teaching.
2	Analog output mode	$r F$ 01) Rising / Falling - - -: Rising (0 → 100 %), Press and release the [T1] key for 3 sec to return to the RUN mode. - - -: Falling (100 → 0 %), Press and release the [T2] key for 3 sec to return to the RUN mode.

01) When pressing the [T2] key in the RUN mode for 7 seconds, the same parameter is displayed and can be set independently.

Temperature Compensation (Auto)

- Use this function after the temperature stabilization (for over 30 min after power supply).

Display	Setting operation
RUN mode	Press the [T1] key for 13 sec.
$C R L$	Release the key
$C L b$	YES: Activate the automatic calibration of the detection value Press and release the [T1] key for 3 sec to return to the RUN mode.

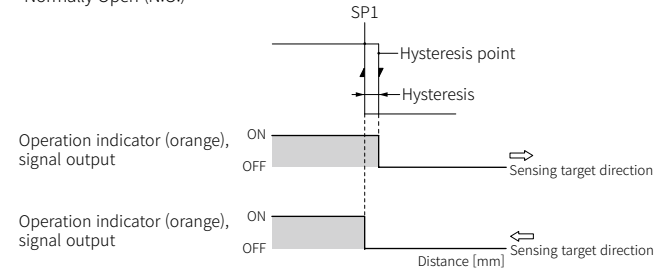
Digital Output: Operation Mode

Area

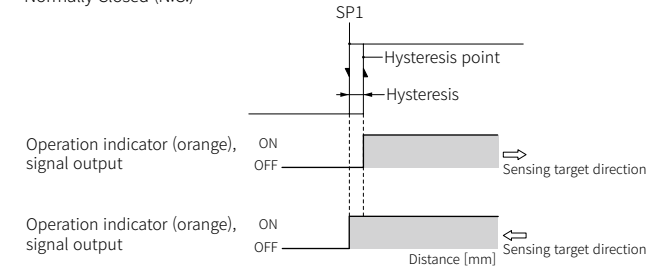
Determine a switching point1 (SP1) to set the detection area.

SP1 setting	Foreground suppression ≤ SP1 ≤ Max. setting zone - Hysteresis
Hysteresis	1 ≤ Hysteresis ≤ Max. setting zone - SP1
Foreground suppression	Foreground suppression ≤ SP1

- Normally Open (N.O.)



- Normally Closed (N.C.)

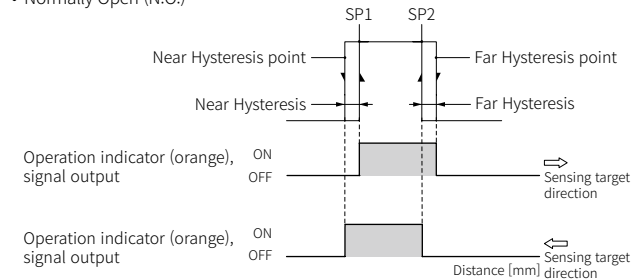


Window

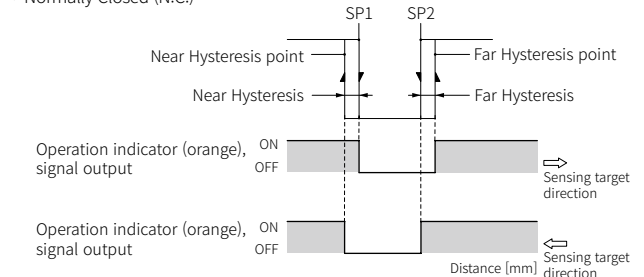
Determine a switching point1 (SP1) and a switching point2 (SP2) to set the detection area.

SP1 setting	Foreground suppression + Near hysteresis ≤ SP1 ≤ SP2
SP2 setting	SP1 ≤ SP2 ≤ Max. setting zone - Far hysteresis
Near hysteresis	1 ≤ Near hysteresis ≤ SP1 - Foreground suppression
Far hysteresis	1 ≤ Far hysteresis ≤ Max. setting zone - SP2
Foreground suppression	Foreground suppression ≤ SP1 - Near hysteresis

- Normally Open (N.O.)



- Normally Closed (N.C.)

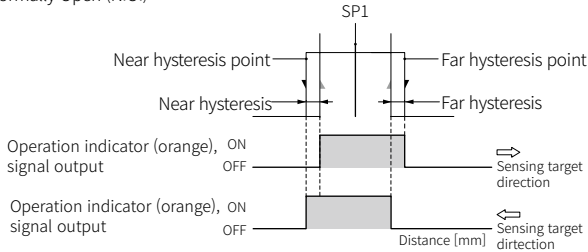


One-point

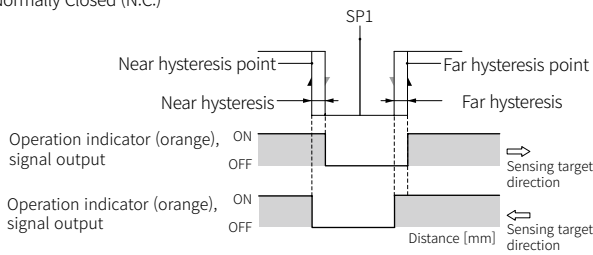
Determine automatically the near and far switching points depending on the switching point1 (SP1) and the offset ratio to set the detection area.

SP1 setting	Foreground suppression + Offset + Near hysteresis \leq SP1 \leq Max. setting zone - Offset - Far hysteresis
Offset	SP1 \times Offset ratio
Offset ratio	8 % (atDistance setting: 2 to 20 %)
Near hysteresis	$1 \leq$ Near hysteresis \leq SP1 - Offset - Foreground suppression
Far hysteresis	$1 \leq$ Far hysteresis \leq Max. setting zone - SP1 - Offset
Foreground suppression	Foreground suppression \leq SP1 - Offset - Near hysteresis

- Normally Open (N.O.)



- Normally Closed (N.C.)



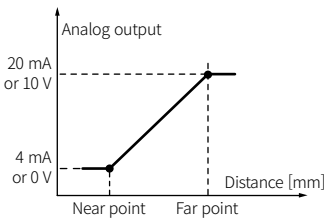
Analog Output: Output Mode

Rising mode is to increase the analog output value as the sensing distance increases. Falling mode is to decrease the analog output value as the sensing distance increases. If the sensing target is in the area between the near and far points, the operation indicator (green) turns on.

Near point	Foreground suppression \leq Near point \leq Far point
Far point	Near point \leq Far point \leq Max. setting zone
Foreground suppression	Foreground suppression \leq Near point

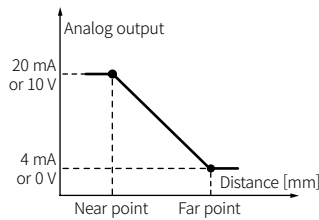
Rising

- Analog output increases when sensing distance increases.



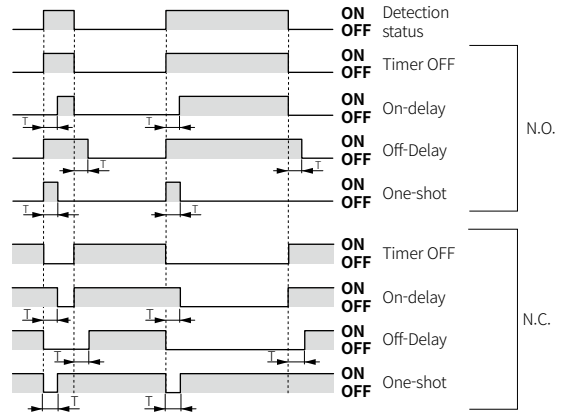
Falling

- Analog output decreases when sensing distance increases.



Timer

- Setting range: 1 to 25 sec, set at 1 sec intervals
- T: Timer time



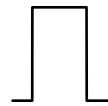
Measurement Filter and Strength

Measurement filter

Set the measurement filter (F00 to F04) to change the response time on the sensor's measurements or filter the values with a stable curve.

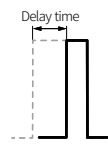
---	Unfiltered
—	Filtered

F00: No filter



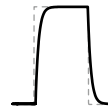
- Measurements with no filter

F01: Foreground filter



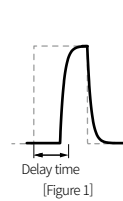
- If a distance is measured greater than the distance currently measured by the sensor, this filter maintains the existing value for a certain period of time and then outputs measured values with a delay.
- The higher the measurement filter strength, the longer the delay time for the increasing distance.

F02: Averaging filter



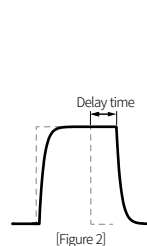
- If the measured values are unstable due to vibration etc., this filter outputs the values with a curve.
- If the measurement filter strength is higher, the measurements are filtered with a more stable curve.

F03: Foreground + averaging filter



- If a distance is measured greater than the distance currently measured by the sensor [Figure 1], this filter outputs simultaneously applied to measured values with delay and curve. (Foreground + Averaging filter)
- If a distance is measured closer than the distance currently measured by the sensor, this filter outputs applied to measured values with curve. (Average filter)
- The higher the measurement filter strength, the longer the delay time for the increasing distance, and the more stable the measurements are filtered.

F04: Background + averaging filter



- If a distance is measured greater than the distance currently measured by the sensor, this filter outputs applied to measured values with curve. (Average filter)
- If a distance is measured closer than the distance currently measured by the sensor, this filter outputs simultaneously applied to measured values with delay and curve. (Background + Averaging filter)
- If a distance is measured closer than the distance currently measured by the sensor, the background filter maintains the existing value for a certain period of time and then outputs the measured value with a delay.
- The higher the measurement filter strength, the longer the delay time for the decreasing distance, and the more stable the measurements are filtered.

Filter strength

The higher the filter strength, the longer the sensor output delay time, or filter with a more stable curve. The measurement filter can be set to the intensity in steps 0 to 9. (P00 (weak) to P09 (strong))

Temperature Compensation (Auto / Manual)

- Select Auto or Manual temperature compensation depending on models and environment to minimize the error between the actual distance and the measured value for measurement accuracy.
- If the difference between the standard or the actual distance and the measured value is less than $\pm 10\%$, the value is compensated according to the distances, and if it is more than $\pm 10\%$, the value is compensated according to the internal algorithm.
- Use after temperature stabilization (for over 30 min after power supply). An error can occur if temperature compensation is activated before temperature stabilization.

■ Auto temperature compensation

- Compensate the measured values using model standard distances. Set through the wire or the key input.

UTRCM18	600 mm
UTRCM30	1200 mm

■ Manual temperature compensation

- Input the actual installation distance to compensate the measurement difference correctly.
- It is possible to set the manual temperature compensation (D11) parameter or dedicated software (atDistance) in Add-on mode.

Synchronization Mode

- When multiple ultrasonic sensors are connected with the synchronization mode, a wider detection width can be detected. Synchronization mode and multiplex mode cannot be used together.
- It instantly operates when setting the synchronization mode (D14) or the dedicated software (atDistance) in Add-on mode and then connect the COM terminal.

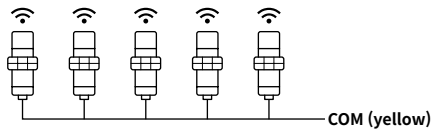
■ Synchronization

Ultrasonic signal connected from the synchronization is simultaneously transmitted to detect at the same time. It can detect wide areas more than the max. detection width of a product.

In the synchronization mode, the response time changes based on the longest response time among connected products.

To prevent mutual interference, install at a distance greater than the rated distance between sensors.

For detailed separation distances, refer to the Cautions for Installation.

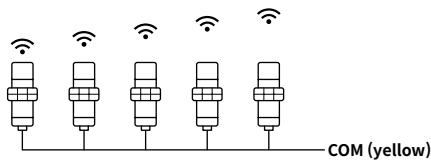


■ Multiplex

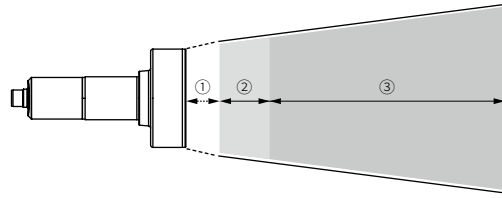
Set the multiplex addresses differently by transmitting / receiving the ultrasonic signals in turn, it is possible to detect one or more sensing targets and monitor wide areas simultaneously.

In the multiplex function, the overall system response time may increase and differ from the rated response time.

Since no mutual interference occurs, the sensors can be installed regardless of the distance between sensors.



Term Definition

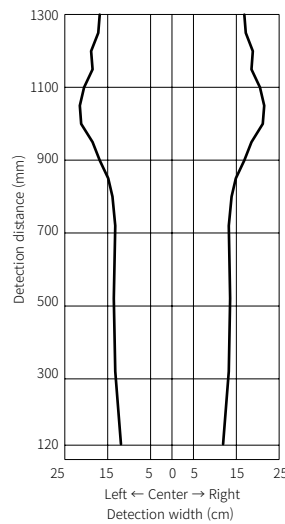


① Blind zone	Area that the sensor cannot physically detect
② Foreground suppression	Area ignored even if there is a sensing target within the setting area
③ Max. setting zone	Area that detection of the sensing target is valid

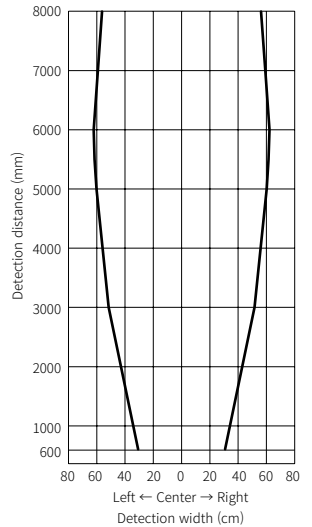
Detection Data

- Detection condition
Sensing target size
: Standard sensing target / Detection width: Wide / Foreground suppression: 0 mm

■ UTRCM18



■ UTRCM30



Parameter Index

■ Process data

- The current data value is displayed in real time.

Parameter	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte0 (PD0)	Distance Data							
Byte1 (PD1)	Distance Data							
Byte2 (PD2)	Scale							
Byte3 (PD3)	-	-	-	-	-	-	Analog Status Flag	Digital Status Flag

Parameter	Description	Display range	Type
Distance Data	Display the measured distance value.	Measured value: 120 to 1300 / 600 to 8000 Out of measuring range (-): -32760 Out of measuring range (+): 32760 No measurement data: 32764	Integer
Scale	Display the measured distance scale.	0	Integer
Analog Status Flag	Analog output status	False: inactive, true: active	Boolean
Digital Status Flag	Digital output status	False: inactive, true: active	Boolean

■ Identification menu

- The device's manufacturer and sensor information is displayed. It includes additional information on companies and sensors other than the IO-Link standard.

Index		Parameter	Description	Type	Access
hex.	dec.				
0x10	16	Vendor Name	Manufacturer name	String	RO
0x11	17	Vendor Text	Manufacturer description	String	RO
0x12	18	Product Name	Product name	String	RO
0x13	19	Product ID	Product ID	String	RO
0x14	20	Product Text	Product description	String	RO
0x15	21	Serial Number	Product serial number	String	RO
0x18	24	Application specific tag	Application program tag	String	RW

■ Observation menu

- The device setting value is displayed.

Index		Subindex	Parameter	Description	Access	
hex.	dec.					
0x28	40	1	Process data input	Distance Data	Distance measurement	RO
		2		Scale	Distance Scale	RO
		3		Analog Status Flag	Analog output status	RO
		4		Digital Status Flag	Digital output status	RO
0x71C	380	1	UOT diagnosis	UOT time	Operating time (30 min cycle)	RO
		2		User operation timeout flag	Operation time alarm	RO
0x7D0	2000	1	Temperature diagnosis	Device temperature	Temperature measurement data	RO
		2		Heating-up phase	Temperature stabilation (for over 30 min after power supply)	RO
0x4080	16512	1	Measurement data channel description	Blind Zone	Blind zone	RO
		2		Max. setting zone	Max. setting zone	RO
		3		Unit code	IO-Link unit code : 1013 [mm]	RO
		4		Scale	0	RO

Parameter menu

- Product setting can be changed according to the user environment.

Index		Subindex	Parameter	Description	Setting range		Factory default		Type	Access		
hex.	dec.				UTRCM18	UTRCM30	UTRCM18	UTRCM30				
0x02	2	-	System command	SP1 Teaching	SP1 teaching start	0x41		-	-	-	WO	
				SP2 Teaching	SP2 teaching start	0x42		-	-	-	WO	
				Restore factory setting	Factory reset	0x82		-	-	-	WO	
0x0C	12	2	Device access locks	Data Storage	Data storage locked between IO-Link Master - Device	0: False, 1: True		0	0	Boolean	RW	
0x3A	58	-	Teaching	Teaching mode	Tecahing operation mode	0: One-point mode 1: Area mode 2: Window mode 192: Analog output		0	0	UInteger	RW	
0x3B	59	1		Teaching status	Teaching status	0: Idle (Wait) 1: SP1 success (SP1 teaching success) 2: SP1 success (SP2 teaching success) 3: SP12 success (SP1, SP2 teaching success) 4: Wait for command (wait for operation mode selection) 5: Busy (processing previous step) 7: Error (teaching error)		0	0	UInteger	RO	
				2	SP1 TP1	SP1 teaching status	0: Flase (inactive), 1: True (active)		0	0	Boolean	RO
			3	SP2 TP1	SP2 teaching status	0: Flase (inactive), 1: True (active)		0	0	Boolean	RO	
0x3C	60	1	SSC1 parameter (digital out)	One-point SP1	One-point Switching point1	120 to 1300 mm	600 to 8000 mm	500	3000	Integer	RW	
				2	Area SP1	Area Switching point1	120 to 1300 mm	600 to 8000 mm	1000	6000	Integer	RW
				3	Window SP1	Window Switching point1	120 to 1300 mm	600 to 8000 mm	1000	6000	Integer	RW
				4	Window SP2	Window Switching point2	120 to 1300 mm	600 to 8000 mm	1200	7900	Integer	RW
0x3D	61	1	SSC1 configuration (digital out)	Digital output mode	Digital output mode	0: Normally Open (N.O.) 1: Normally Closed (N.C.)		0	0	UInteger	RW	
				2	Mode	Digital output operation mode	0: OFF 1: One-point mode 2: Area mode 3: Window mode		2	2	UInteger	RW
				3	One-point near hysteresis	One-point near hysteresis	1 to 1300 mm	1 to 8000 mm	20	100	Integer	RW
				4	One-point far hysteresis	One-point far hysteresis	1 to 1300 mm	1 to 8000 mm	20	100	Integer	RW
				5	Offset ratio	Offset ratio	2 to 20 %		8	8	UInteger	RW
				6	Area hysteresis	Area hysteresis	1 to 1300 mm	1 to 8000 mm	20	100	Integer	RW
				7	Window near hysteresis	Window near hysteresis	1 to 1300 mm	1 to 8000 mm	20	100	Integer	RW
				8	Window far hysteresis	Window far hysteresis	1 to 1300 mm	1 to 8000 mm	20	100	Integer	RW
0x64	100	1	SSC1 configuration (digital out)	Delay type	Timer mode	0: OFF 1: On-delay 2: Off-delay 3: One-shot delay		0	0	UInteger	RW	
				2	On-delay time	On-delay time	1 to 25 Sec		1	1	UInteger	RW
				3	Off-delay time	Off-delay time	1 to 25 Sec		1	1	UInteger	RW
				4	One-shot delay time	One-shot delay time	1 to 25 Sec		1	1	UInteger	RW
0xA0	160	1	ASC1 parameter (analog out)	SP1	Analog near point	120 to 1300 mm	600 to 8000 mm	120	600	Integer	RW	
				2	SP2	Analog far point	120 to 1300 mm	600 to 8000 mm	1300	8000	Integer	RW
0xA1	161	1	ASC1 configuration (analog out)	Output type	Analog output type	0: Current, 1: Voltage		0	0	UInteger	RW	
				2	Output characteristic	Analog output mode	0: Rising, 1: Falling		0	0	UInteger	RW
0xC8	200	1	Measurement configuration	Foreground suppression	Foreground suppression	120 to 360 mm	600 to 1800 mm	120	600	Integer	RW	
0x100	256	1	Filter	Type	Measurement filter	0: No filter 1: Foreground filter, 2: Averaging filter 3: Foreground + averaging filter 4: Background + averaging filter		1	1	UInteger	RW	
				2	Strength	Measurement filter strength	0: P00 (weak filter) 1 to 9: P01 to P09 (strong filter)		0	0	UInteger	RW
0x101	257	1	Detection width	Detection width	Detection width	0: Wide, 1: Middle, 2: Narrow		0	0	UInteger	RW	
0x12C	300	1	Temperature compensation	Setting temperature	Set temperature	0: Manual, 1: Auto		1	1	UInteger	RW	
				2	Reference temperature	User set temperature	-25 to 70 °C		25	25	Integer	RW
0x15E	350	1	Synchronization and multiplex operation	Synchronized mode	Synchronization mode selection	0: Synchronization active 1 to 10: Multiplex address 128: IO-Link Synchronization active		0	0	UInteger	RW	
				2	Max. address value of multiplex	Max. address value of multiplex	1 to 10		10	10	UInteger	RW
0x172	370	1	User Interface	External input setting lock	External input setting lock	0: Unlock, 1: Lock		0	0	UInteger	RW	
0x173	371	1		Indicator	Indicator	0: OFF, 1: ON		1	1	UInteger	RW	
0x174	372	1		Display unit	Display unit	-	0: Position 1: Rising, 2: Falling		-	0	UInteger	RW
				2	Display light level	Display light level	-	0: Display off 1 to 5 : Display level 1 to 5		-	5	UInteger
		3	Display direction	Display direction	-	0: Display normal 1: Display 180 degree		-	0	UInteger	RW	
0x17D	381	1	Operating time	Operating time alarm	Operating time alarm	1 to 131,071 h		100,000	100,000	UInteger	RW	

■ Diagnosis menu

- The information about problems encountered during device operation is displayed.

Index		Parameter	Description	Type	Access
hex.	dec.				
0x25	37	Detailed Device Status	Device detailed status	UInteger	RO



■ Events

- When the corresponding error occurs, the abnormal indicator flashes.

Index		Parameter	Description	Type
hex.	dec.			
0x4210	16912	Parameter Error	Parameter using warning	Error
0x7710	30480	Device temperature over-run	Overheating detection warning	Warning
0x8CA0	36000	Teaching error	Teaching error	Notification
0x8CA1	36001	Teaching success	Teaching success	Notification

Sold Separately: M12 Connector Cable

- For detailed information, refer to the 'M8/M12 Connector Cable' manual.

Appearance	Power	Connector 1	Connector 2	Length	Feature	Model
	DC	M12 (Socket-Female)	5-wire	1 m	PVC	CID5-1
				2 m		CID5-2
				3 m		CID5-3
				5 m		CID5-5
				7 m		CID5-7
	DC	M12 (Socket-Female)	M12 (Plug-Female)	1 m	PVC	C1D5-1
				2 m		C1D5-2
				3 m		C1D5-3
				5 m		C1D5-5
				7 m		C1D5-7

Segment Table

The segments displayed on the product indicate the following meanings. It may differ depending on the product.

7 segment				11 segment				12 segment				16 segment			
0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
1	1	2	2	1	1	2	2	1	1	2	2	1	1	2	2
2	2	3	3	2	2	3	3	2	2	3	3	2	2	3	3
3	3	4	4	3	3	4	4	3	3	4	4	3	3	4	4
4	4	5	5	4	4	5	5	4	4	5	5	4	4	5	5
5	5	6	6	5	5	6	6	5	5	6	6	5	5	6	6
6	6	7	7	6	6	7	7	6	6	7	7	6	6	7	7
7	7	8	8	7	7	8	8	7	7	8	8	7	7	8	8
8	8	9	9	8	8	9	9	8	8	9	9	8	8	9	9
9	9	A	A	9	9	A	A	9	9	A	A	9	9	A	A
A	A	B	B	A	A	B	B	A	A	B	B	A	A	B	B
B	B	C	C	B	B	C	C	B	B	C	C	B	B	C	C
C	C	D	D	C	C	D	D	C	C	D	D	C	C	D	D
D	D	E	E	D	D	E	E	D	D	E	E	D	D	E	E
E	E	F	F	E	E	F	F	E	E	F	F	E	E	F	F
F	F	G	G	F	F	G	G	F	F	G	G	F	F	G	G
G	G	H	H	G	G	H	H	G	G	H	H	G	G	H	H
H	H	I	I	H	H	I	I	H	H	I	I	H	H	I	I