

Cylindrical Ultrasonic Sensors

UTR Series INSTRUCTION MANUAL

TCD220051AC

Autonics

Thank you for choosing our Autonics product.

Read and understand the instruction manual and manual thoroughly before using the product.

For your safety, read and follow the below safety considerations before using.

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

Keep this instruction manual in a place where you can find easily.

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

Follow Autonics website for the latest information.

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
- Nut × 2
- Instruction Manual × 1
- 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
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
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① DIA. of mount

Number: DIA. of mount (unit: mm)

③ Output

No-mark: Digital output

D: Digital + Analog output

⑤ Display part

No-mark: None

D: 3-digit display

② Sensing distance

Number: Sensing distance (unit: mm)

Number + M: Sensing distance (unit: m)

④ Analog output

No-mark: current (4 - 20 mA)

B: Voltage (0 - 10 V) / current (4 - 20 mA)

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)

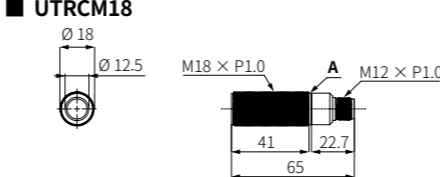
This file contains information such as manufacturer information, process data, diagnostic data, and parameter setting of a sensor using IO-Link communication. By uploading the IODD file to PDCT Software, you can check the setting and communication data according to the user interface. Download the IODD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

Dimensions

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

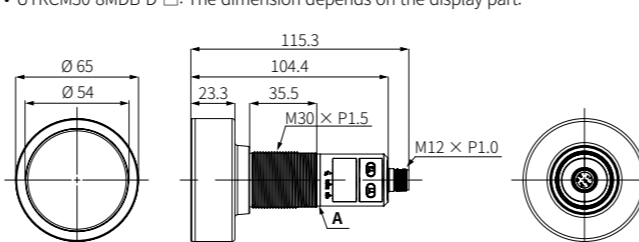
A Operation Indicator

■ UTRCM18



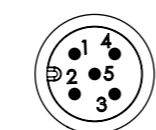
■ UTRCM30

- 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.

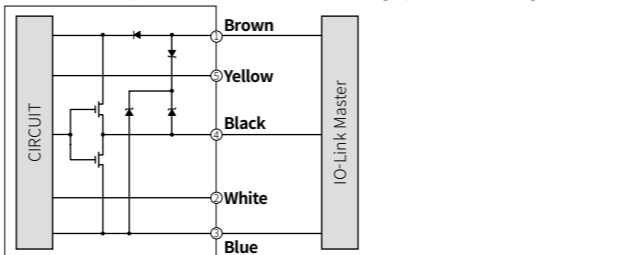


Connections

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

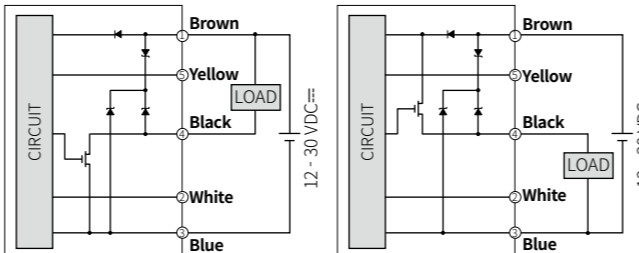
■ IO-Link mode

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



■ SIO mode

- NPN



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)
Signal output	Set parameter
	Orange + green cross-flashing
Signal output	Digital output
	Orange ON
Signal output	Analog output
	Green ON
Abnormal accuracy	Orange + green cross-flashing (3 Hz)
Communication	COM
	Orange flashes (1 Hz) (digital priority output)
Communication	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	
Hysteresis⁰¹⁾	20 mm		100 mm	
Standard sensing target: Aluminum	200 × 200 mm		500 × 500 mm	
Resolution	≥ 0.175 mm		≥ 0.180 mm	
Accuracy⁰²⁾	± 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, RoHS, 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□-□□□□-□□□□ model.

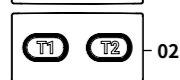
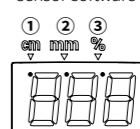
Communication Interface

■ 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)

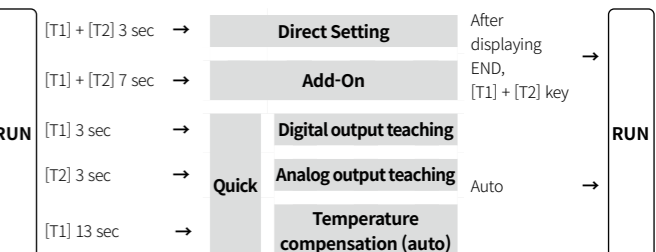
③ %: displays % (100 = 100 %)

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.
5 9 C	Release 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.
r 5 t	Press the [T2] key for 9 sec.
r 5 t	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