

Cylindrical Ultrasonic Sensors

UTR Series

INSTRUCTION MANUAL

TCD240003AC

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 temperature and humidity of the air, atmospheric pressure, or wind, the sound speed may be changed and it affects detection performance.
Use the product within the rated specifications.

03. At high temperatures, ensure that relative air 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.
When power is applied, vibration and sound occur by sound waves at the front part of the sensor.
- 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.

		[Face to face]		[Parallel]	
Type	Model	UTRCM18-350	UTRCM18-600	UTRCM18-1300	UTRCM30-8M
A		2,500 mm	2,500 mm	4,000 mm	30,000 mm
B		350 mm	400 mm	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	
Strength	Model	UTRCM18	UTRCM30
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)
- ② Output**
No-mark: Digital output
D: Digital + Analog output
- ③ Display part**
No-mark: None
D: 3-digit display
- ④ 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)
- ⑤ Communication**
No-mark: Unsupported
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

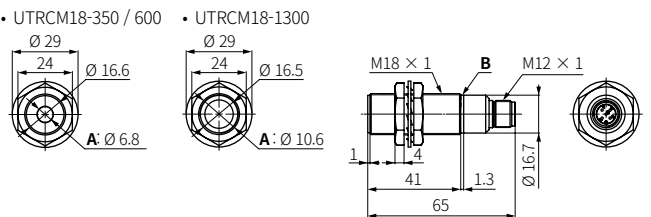
atiOLink with purposes for setting, diagnosis, and maintenance of IO-Link device via IODD file is provided as the Port and Device Configuration Tool (PDC.T).

Dimensions

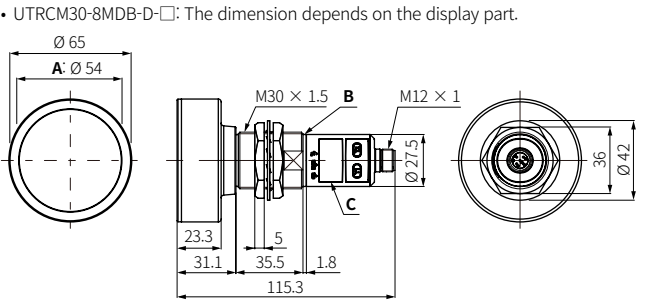
- Unit: mm, For the detailed, follow the Autonocs website.

A	Transducer (sensing side)	B	Operation Indicator	C	Display part
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UTRCM18



UTRCM30



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.

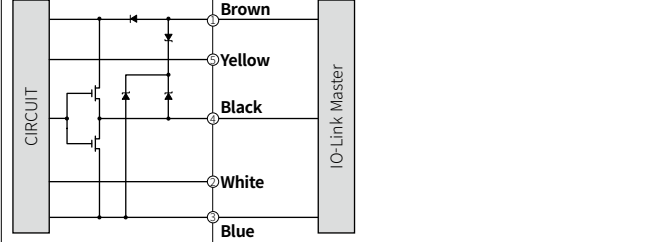
Pin no.	Color	Function
①	Brown	VCC 12 - 30 VDC=
②	White	I/V Analog output
③	Blue	GND 0 V
④	Black	C/Q Digital output / IO-Link
⑤	Yellow	COM Multifunctional input

Connections

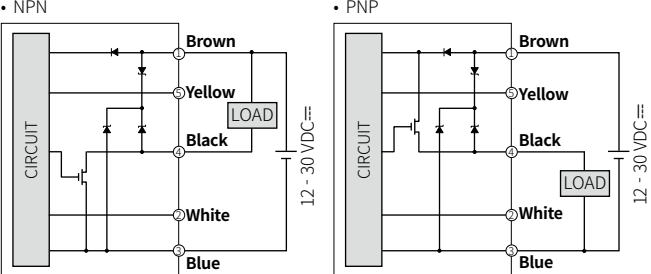
① Brown	② White	③ Blue	④ Black	⑤ Yellow
VCC	I/V (analog output)	GND	C/Q (digital output)	COM

IO-Link mode

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



SIO mode



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 Set parameter	Orange flashes (the key input elapse time) Orange + green cross-flashing
	Digital output Analog output	Orange ON 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	UTRCM18-350□-□	UTRCM18-600□-□	UTRCM18-1300□-□	UTRCM30-8M□□□-□
Sensing distance	30 to 350 mm	65 to 600 mm	120 to 1300 mm	600 to 8000 mm
Blind zone ^(a)	0 to 27 mm	0 to 59 mm	0 to 115 mm	0 to 590 mm
Foreground suppression ^(a)	30 to 90 mm	65 to 195 mm	120 to 360 mm	600 to 1800 mm
Max. setting zone	350 mm	600 mm	1300 mm	8000 mm
Transducer frequency	305 kHz	305 kHz	200 kHz	80 kHz
Switching frequency	≥ 25 Hz	≥ 12.5 Hz	≥ 10 Hz	≥ 3 Hz
Response time	≤ 32 ms	≤ 64 ms	≤ 100 ms	≤ 300 ms
Hysteresis ^(a)	3 mm	5 mm	20 mm	100 mm
Standard sensing target: Aluminum	200 × 200 mm	200 × 200 mm	200 × 200 mm	500 × 500 mm
Resolution	≥ 0.069 mm	≥ 0.069 mm	≥ 0.175 mm	≥ 0.180 mm
Accuracy ^(a)	± 1 % F.S.			
Repeat accuracy	± 0.15 % F.S.			
Weight (packaged)	≈ 30 g (≈ 85 g)	≈ 30 g (≈ 85 g)	≈ 32 g (≈ 90 g)	≈ 210 g (≈ 330 g)

(a) If a sensing target is detected in over blind zone and below foreground suppression range, the distance value is displayed as foreground suppression value.

(2) Set parameter or dedicated software (atDistance)

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

Model	UTRCM18-350□-□	UTRCM18-3500□-□	UTRCM18-600□-□	UTRCM18-6000□-□	UTRCM18-1300□-□	UTRCM18-13000□-□	UTRCM30-8M□□□-□	UTRCM30-8MDB□□□-□
Power supply	12 - 30 VDC= (ripple P-P ≤ 10 %)							
Current consumption	≤ 40 mA (no load)		≤ 45 mA (no load)		≤ 80 mA (no load)			
Digital output	Push-pull							
Load voltage	≤ 30 V							
Load current	≤ 100 mA							
Residual voltage	≤ 3 V							
Analog output	[current output] DC 4 - 20 mA / [voltage output] DC 0 - 10 V							
Current output	-	●	-	●	-	-	-	●
Voltage output	-	-	-	-	-	-	-	●
Load resistance	[voltage output] 12 - 30 VDC=: ≥ 100 kΩ [current output] 12 - 20 VDC=: ≤ 100 Ω / 20 - 30 VDC=: ≤ 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	UTRCM18-350, UTRCM18-600 : IP66, IP67 (IEC standard), IP69K (DIN standard), IP68 UTRCM18-1300: IP66, IP67 (IEC standard), IP69K (DIN standard) UTRCM30-8M: IP66, IP67 (IEC standard)
Connection	Connector models
Connector spec.	M12 5-pin plug connector
Material	Case: mount - SUS316L, body - PC transducer: polyurethane foam, epoxy resin with glass
Certification	CE, RoHS, REACH, IO-Link ^(a)

(a) It is applied to UTRCM□□□□□IL2 model.

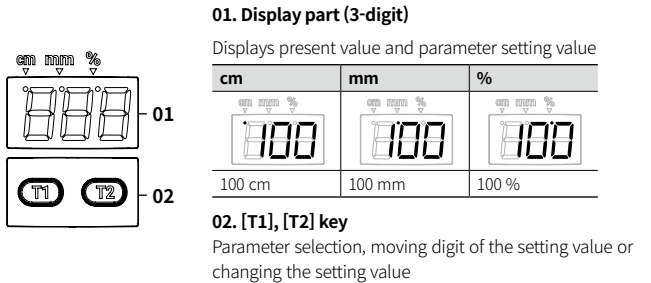
Communication Interface

IO-Link

Version	Ver. 1.1
Class	Class A
Baud rate	COM2 (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)

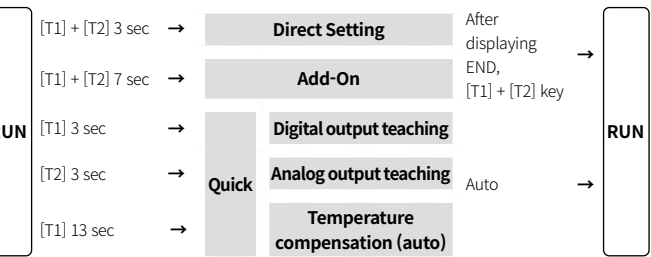
Unit Descriptions

- 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.



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.
59C	Release the key.
59n	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 5E	Release the key.
r 5E	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