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)
  - M18 model: 30 to 350 mm / 65 to 600 mm / 120 to 1,300 mm
  - M30 model: 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, Simultaneous digital and analog output models available
- Configure settings and monitor status with ultrasonic sensor programming units (UT-P)
- Dedicated software provided (atDistance)
- Protection structure
  : IP66, IP67, IP68, IP69K (may vary by model)

CE UKCA cULus LISTED IO-Link

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
- 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.
  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.

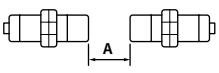
■ Wire

- 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.

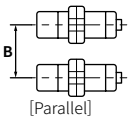
■ Installation

• 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]

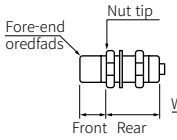


[Parallel]

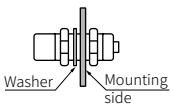
Type \ Model	UTRCM18-350	UTRCM18-600	UTRCM18-1300	UTRCM30-8M
A	2,500 mm	2,500 mm	4,000 mm	30,000 mm
B	350 mm	400 mm	700 mm	4,000 mm

• 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]



[Figure 1]



[Figure 2]

Strength \ Model	UTRCM18	UTRCM30
Front size	13 mm	15 N m
Front torque	9.81 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 ❶ - ❷ ❸ ❹ - ❺ - ❻

❶ DIA. of mount
Number: DIA. of mount (unit: mm)

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

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

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

❺ Display part
No-mark: None
D: 3-digit display

❻ 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 (PDCT).

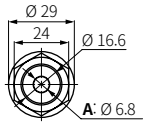
Dimensions

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

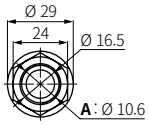
A	Transducer (sensing side)	B	Operation Indicator	C	Display part

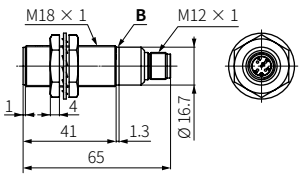
■ UTRCM18

- UTRCM18-350 / 600



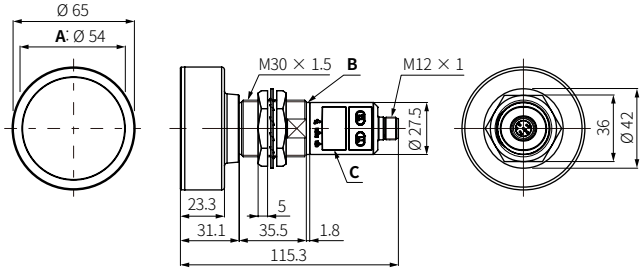
- UTRCM18-1300





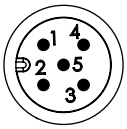
■ UTRCM30

- 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.



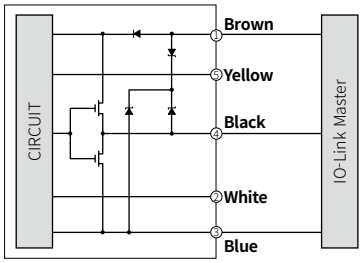
Pin no.	Color	Function	
①	Brown	VCC	12 - 30 VDC⎓
②	White	I/V	Analog output
③	Blue	GND	0 V
④	Black	C/Q	Digital output / IO-Link
⑤	Yellow	COM	Multifunctional input

Connections

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

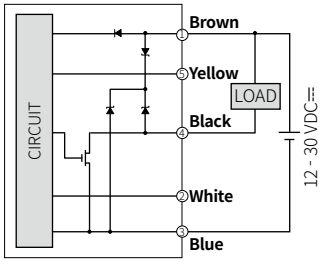
■ IO-Link mode

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

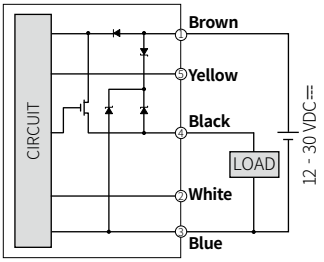


■ SIO mode

- 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 accurance		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 01)	0 to 27 mm	0 to 59 mm	0 to 115 mm	0 to 590 mm
Foreground suppression 01)	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 02)	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 03)	± 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)

01) If a sensing target is detected in over blind zone and below foregroud suppression range, the distance value is displayed as foreground suppression value.
02) Set parameter or dedicated software (atDistance)
03) Ambient temperature 25 °C, temperatures characteristic ± 0.1 % F.S. / °C

Model	UTRCM18-350-□	UTRCM18-350D-□	UTRCM18-600-□	UTRCM18-600D-□	UTRCM18-1300-□	UTRCM18-1300D-□	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/s² (≈ 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, KC, cULus, IO-Link 01)

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

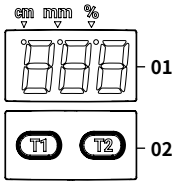
Communication Interface

■ 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.



01. Display part (3-digit)

Displays present value and parameter setting value

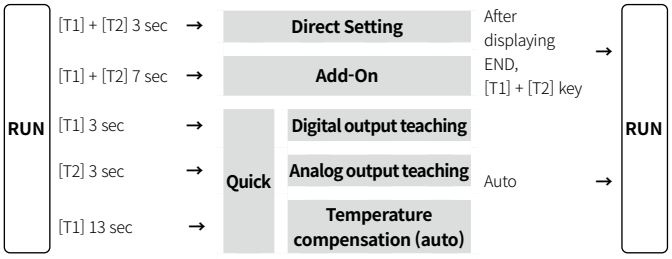
cm	mm	%
100 cm	100 mm	100 %

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.
SYC	Release the key.
SYn	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.
rSt	Release the key.
rES	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 settingvalue.
- **Bold** specifications for each parameter setting range are factory default.

■ Digital output

Output method

Slide display	dir SEt
Setting range	**D: digital output**, IV: analog output

Operation mode

Slide display	mode SELECt
Setting range	**ARE: Area,** WIN: Window, 1-P: One-Point

Switching point 1

The setting range varies depending on the model and operation mode setting, and may be limited depending on parameter settings.

Slide display					
Setting range		UTRCM18-350	UTRCM18-600	UTRCM18-1300	UTRCM30-8M
	ARE	30 to **250** to 349 [mm]	65 to **350** to 599 [mm]	120 to **1000** to 1299 [mm]	600 to **6000** to 7999 [mm]
	WIN	31 to **250** to 349 [mm]	66 to **355** to 599 [mm]	121 to **1000** to 1299 [mm]	601 to **6000** to 7999 [mm]
	1-P	31 to **125** to 343 [mm]	67 to **175** to 588 [mm]	123 to **500** to 1274 [mm]	613 to **3000** to 7843 [mm]

Switching point 2

The setting range varies depending on the model and operation mode setting, and may be limited depending on parameter settings.

Slide display					
Setting range		UTRCM18-350	UTRCM18-600	UTRCM18-1300	UTRCM30-8M
	WIN	31 to **277** to 349 [mm]	66 to **395** to 599 [mm]	121 to **1200** to 1299 [mm]	601 to **7900** to 7999 [mm]

Output mode (N.O. / N.C.)

Slide display	noC
Setting range	**NO: Normally Open** NC: Normally Closed

■ Analog output

Output method

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

Slide display	dir SEt
Setting range	**D: digital output**, IV: analog output

Analog near point

Slide display				
Setting range	UTRCM18-350	UTRCM18-600	UTRCM18-1300	UTRCM30-8M
	30 to 349 [mm]	**65** to 599 [mm]	**120** to 1299 [mm]	**600** to 7999 [mm]

Analog far point

Slide display				
Setting range	UTRCM18-350	UTRCM18-600	UTRCM18-1300	UTRCM30-8M
	31 to **350** [mm]	66 to **600** [mm]	121 to **1300** [mm]	601 to **8000** [mm]

Output mode (rising / falling)

Slide display	CHArACtEr1 St1 C5
Setting range	_ - ¯: **Rising (0 → 100 %)** ¯ - _: Falling (100 → 0 %)

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 settingvalue.
- **Bold** specifications for each parameter setting range are factory default.

Display part light

The setting value is applied only for display part supporting models.

Display	d01
Slide display	LIGHt LEvEL
Setting range	**STD: lightness**, DRK: darkness, OFF: turn-off

Display part direction

The setting value is applied only for display part supporting models.

Display	d02
Slide display	diSPLAY1 nvErt
Setting range	**NOR: forward direction**, INV: half-turn

Display part unit

The setting value is applied only for display part supporting models.

Display	d03
Slide display	diSPLAY Unit
Setting range	- - - : **distance display** ¯ - _: 100 → 0 % display _ - ¯: 0 → 100 % display

Analog output type

The setting value is applied only for digital + analog output models.

Display	d04
Slide display	AnALoG oUtPUt tYPE
Setting range	V: voltage output, **I: current output**

Digital output hysteresis

The setting range varies depending on the model and operation mode setting, and may be limited depending on parameter settings.

Display		d05			
Slide display		HYStErESIS			
Setting range		UTRCM18-350	UTRCM18-600	UTRCM18-1300	UTRCM30-8M
	ARE	1 to **3** to 320 [mm]	1 to **5** to 535 [mm]	1 to **20** ~1180 mm	1 to **100** to 7400 mm
	WIN	1 to **3** to 160 [mm]	1 to **5** to 267 [mm]	1 to **20** to 590 mm	1 to **100** to 3700 mm
	1-P	1 to **3** to 157 [mm]	1 to **5** to 261 [mm]	1 to **20** to 576 mm	1 to **100** to 3614 mm

Measurement filter

Display	d06
Slide display	FILtEr tYPE
Setting range	F00: no filter **F01: foreground filter** F02: averaging filter F03: foreground + averaging filter F04: background + averaging filter

Measurement filter strength

Display	d07
Slide display	FILtEr StrEnGtH
Setting range	**P00** to P09: weak to strong

Timer mode

Display	d08
Slide display	dELAY
Setting range	**---: OFF** ON: On-delay OFF: Off-delay ONE: One-shot delay

Timer delay time

Display	d09
Slide display	dELAY uALUE
Setting range	**001** to 025 [sec]

Foreground suppression

Sets the detection start position.
The setting range varies depending on the model and operation mode setting, and may be limited depending on parameter settings.

Display	d10			
Slide display	FGnd SUPPrESSIon			
Setting range	UTRCM18-350	UTRCM18-600	UTRCM18-1300	UTRCM30-8M
	30 to 90 [mm]	**65** to 195 [mm]	**120** to 360 [mm]	**600** to 1800 [mm]

Temperature manual compensation

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.

Display	d11
Slide display	CAL-tEMP
Setting range	≤ ± 10 % of setting location

Detection width

The setting value is applied only for UTRCM18-1300, UTRCM30-8M models.

Display	d12
Slide display	SEnSItIuItY
Setting range	**WID: wide**, MID: middle, NAR: narrow

Max. address value of multiplex

Set higher than the multiplex address.

Display	d13
Slide display	MULtI AddrESS
Setting range	01 to **10**

Synchronization mode

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

Display	d14
Slide display	SYnC-Id
Setting range	**00: synchronization** 01 to 10: multiplex address 11: IO-Link synchronization

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.
		dt1		Press the [T1] key for 3 sec.
				Release the [T1] key to complete the SP1 teaching.
2	Select the operation mode	nod	1-P	Press and release the [T1] key for 3 sec.
			ArE	Press and release the [T1] key for 5 sec.
			Win	Place the sensing target on the window switching point2 (SP2) position.
				Press and release the [T1] key for 7 sec.
				Release the [T1] key to complete the SP2.
3	N.O. / N.C.	noC 01)	no	Normally open Press and release the [T1] key for 3 sec to return to the RUN mode.
			nC	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.
		At1	AT1 teaching	Press the [T2] key for 3 sec.
				Release the [T2] key to complete the AT1 teaching.
		At2	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	rF 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 fuction after the temperature stabilization (for over 30 min after power supply).

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

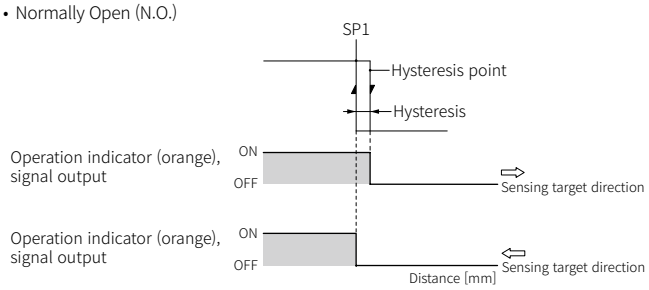
Digital Output: Operation Mode

■ Area

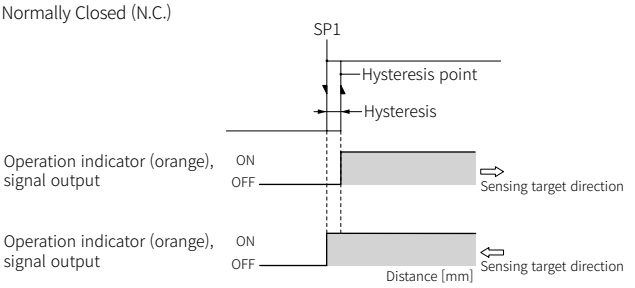
Determine a switching point1 (SP1) to set the detection area.

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.)

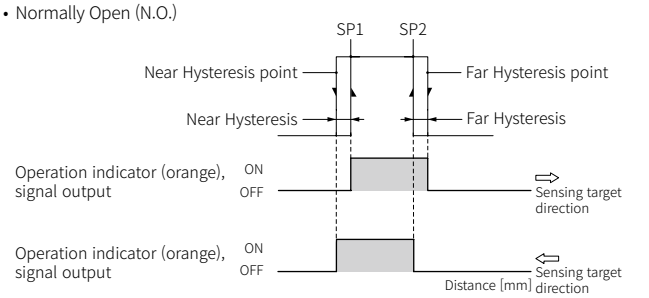


■ Window

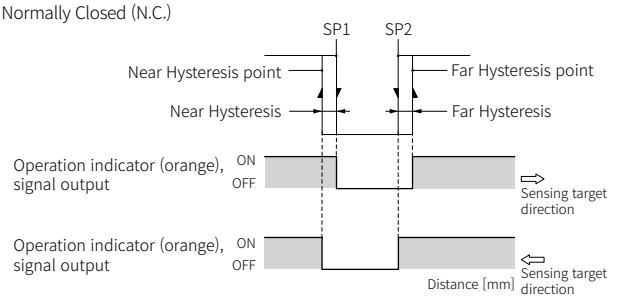
Determine a switching point1 (SP1) and a switching point2 (SP2) to set the detection area.

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.)

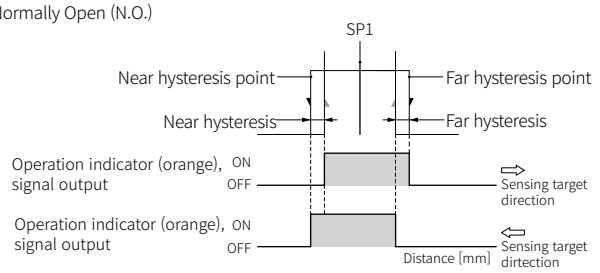


■ One-point

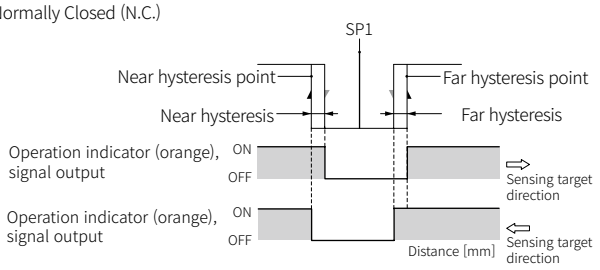
Determine automatically the near and far switching points depending on the switching point1 (SP1) and the offset ratio to set the detection area.

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

• Normally Open (N.O.)



• Normally Closed (N.C.)



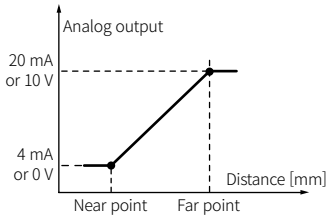
Analog Output: Output Mode

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 ≤ Near point ≤ Far point
Far point	Near point ≤ Far point ≤ Max. setting zone
Foreground suppression	Foreground suppression ≤ Near point

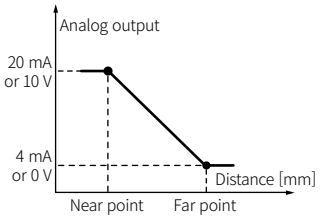
■ Rising

• Analog output increases when sensing distance increases.



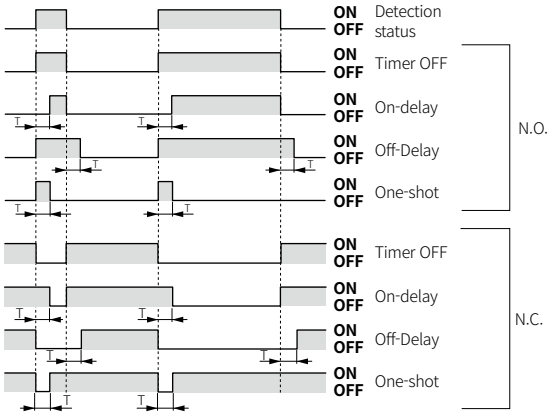
■ Falling

• Analog output decreases when sensing distance increases.



Timer

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



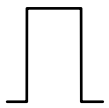
Measurement Filter and Strength

■ 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.

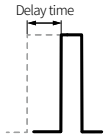
- - - -	Unfiltered
———	Filtered

F00: No filter



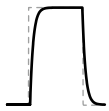
• Measurements with no filter

F01: Foreground filter



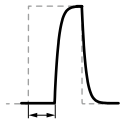
• If a distance is measured greater than the distance currently measured by the sensor, this filter maintains the existing value for a certain period of time and then outputs measured values with a delay.
• If the detection time is shorter than the delay time, the measurement value is not be output.
• 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.

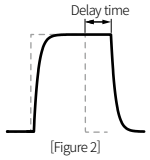
F03: Foreground + averaging filte



[Figure 1]

• 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)
• If the detection time is shorter than the delay time, the measurement value is not be output.
• 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



[Figure 2]

• 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.
• If the detection time is shorter than the delay time, the measurement value is not be output.
• 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 ± 10 %, the value is compensated according to the distances, and if it is more than ± 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.
- Standard distance

UTRCM18-350 / 600	300 mm
UTRCM18-1300	600 mm
UTRCM30-8M	1200 mm

■ Manual temperature compensation

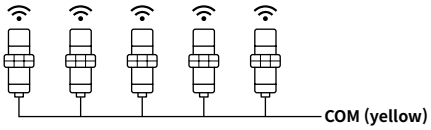
- Input the actual installation distance to compensate the measurement difference correctly.
- It is possible to set the manual temperature compensation (D11) parameter or dedicated software (atDistance) in Add-on mode.

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.

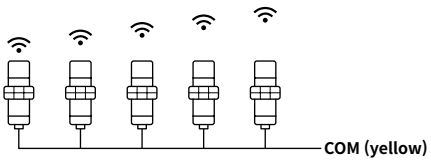
■ Synchronization

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.

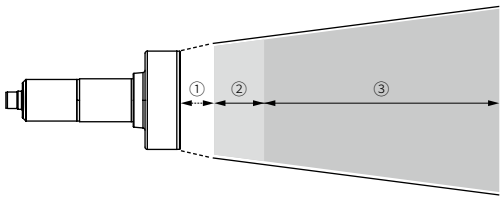


■ Multiplex

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

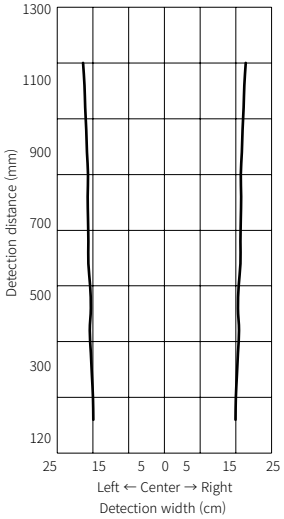


① Blind zone	Area that the sensor cannot physically detect
② Foreground suppression	Area ignored even if there is a sensing target within the setting area
③ Max. setting zone	Area that detection of the sensing target is valid

Detection Data

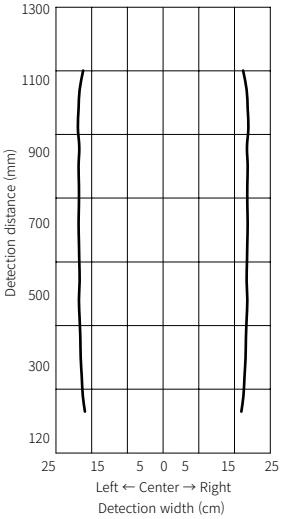
■ UTRCM18-350

- Sensing target size
  : Standard sensing target
- Detection width: Fixed
- Foreground suppression: 0 mm



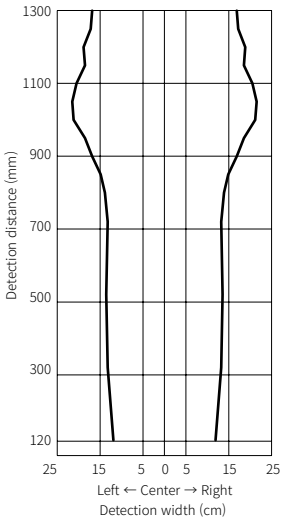
■ UTRCM18-600

- Sensing target size
  : Standard sensing target
- Detection width: Fixed
- Foreground suppression: 0 mm



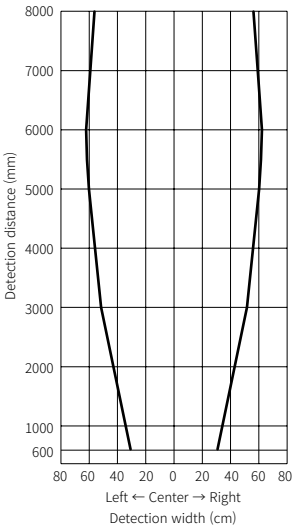
■ UTRCM18-1300

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



■ UTRCM30-8M

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



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				Integer
		UTRCM18-350	UTRCM18-600	UTRCM18-1300	UTRCM30-8M	
		30 to 350	65 to 600	120 to 1300	600 to 8000	
		Out of measuring range (-): -32760				
		Out of measuring range (+): 32760				
		No measurement data: 32764				
Scale	Display the measured distance scale.	UTRCM18-350	UTRCM18-600	UTRCM18-1300	UTRCM30-8M	Integer
		1	1	0	0	
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.

• UTRCM18-350 / 600

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
0x16	22	H/W Version	Hardware version	String	RO
0x17	23	F/W Version	Firmware version	String	RO
0x18	24	Application specific tag	Application program tag	String	RW
0x19	25	Function tag	Device function tag	String	RW
0x1A	26	Location tag	Device location tag	String	RW

• UTRCM18-1300, UTRCM30-8M

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		Sub index	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	Tempereature 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	UTRCM18-350 / UTRCM18-600 / UTRCM18-1300 / UTRCM30-8M 1 / 1 / 0 / 0	RO

■ Parameter menu

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

• UTRCM18-350 / 600

Index		Subindex	Parameter		Description	Setting range		Factory default		Type	Access
hex.	dec.					UTRCM18-350	UTRCM18-600	UTRCM18 -350	UTRCM18 -600		
0x02	2	-	System command	SP1 Teaching	SP1 teaching start	0x41		-	-	UInteger	WO
				SP2 Teaching	SP2 teaching start	0x42		-	-		WO
				Device Reset	Device reset	0x80		-	-		WO
				Application Reset	Application reset	0x81		-	-		WO
				Back-to-box	Factory reset	0x83		-	-		WO
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
0x40	64	1	SSC1 parameter (digital out)	One-point SP1	One-point Switching point1	30 to 350 mm	65 to 600 mm	125	175	Integer	RW
		2		Area SP1	Area Switching point1	30 to 350 mm	65 to 600 mm	250	350	Integer	RW
		3		Window SP1	Window Switching point1	30 to 350 mm	65 to 600 mm	253	355	Integer	RW
		4		Window SP2	Window Switching point2	30 to 350 mm	65 to 600 mm	277	395	Integer	RW
0x41	65	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 350 mm	1 to 600 mm	3	5	Integer	RW
		4		One-point far hysteresis	One-point far hysteresis	1 to 350 mm	1 to 600 mm	3	5	Integer	RW
		5		Offset ratio	Offset ratio	2 to 20 %		8	8	UInteger	RW
		6		Area hysteresis	Area hysteresis	1 to 350 mm	1 to 600 mm	3	5	Integer	RW
		7		Window near hysteresis	Window near hysteresis	1 to 350 mm	1 to 600 mm	3	5	Integer	RW
		8		Window far hysteresis	Window far hysteresis	1 to 350 mm	1 to 600 mm	3	5	Integer	RW
0x64	100	1	SSC1 advanced 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	30 to 350 mm	65 to 600 mm	30	65	Integer	RW
		2		SP2	Analog far point	30 to 350 mm	65 to 600 mm	350	600	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	30 to 90 mm	65 to 195 mm	30	65	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
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
0x17D	381	1	Operating time	Operating time alarm	Operating time alarm	1 to 131,071 h		100,000	100,000	UInteger	RW

• **UTRCM18-1300, UTRCM30-8M**

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		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	RW
		3		Display direction	Display direction	-	0: Display normal 1: Display 180 dgree	-	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 abnomal indicator flashes.

Index		Parameter	Description	Type
hex.	dec.			
0x4210	16912	Parameter Error	Parameter using warning	Error
0x7710	30480	Device temperature over-run	Overheating detection warnning	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	I	I	0	0	I	I	0	0	I	I	0	0	I	I
1	1	J	J	1	1	J	J	1	1	J	J	1	1	J	J
2	2	K	K	2	2	K	K	2	2	K	K	2	2	K	K
3	3	L	L	3	3	L	L	3	3	L	L	3	3	L	L
4	4	M	M	4	4	M	M	4	4	M	M	4	4	M	M
5	5	N	N	5	5	N	N	5	5	N	N	5	5	N	N
6	6	O	O	6	6	O	O	6	6	O	O	6	6	O	O
7	7	P	P	7	7	P	P	7	7	P	P	7	7	P	P
8	8	Q	Q	8	8	Q	Q	8	8	Q	Q	8	8	Q	Q
9	9	R	R	9	9	R	R	9	9	R	R	9	9	R	R
A	A	S	S	A	A	S	S	A	A	S	S	A	A	S	S
b	B	T	T	b	B	T	T	b	B	T	T	B	B	T	T
C	C	U	U	C	C	U	U	C	C	U	U	C	C	U	U
d	D	V	V	d	D	V	V	d	D	V	V	D	D	V	V
E	E	W	W	E	E	W	W	E	E	W	W	E	E	W	W
F	F	X	X	F	F	X	X	F	F	X	X	F	F	X	X
G	G	Y	Y	G	G	Y	Y	G	G	Y	Y	G	G	Y	Y
H	H	Z	Z	H	H	Z	Z	H	H	Z	Z	H	H	Z	Z