EN

wenglor
the innovative family

UMF402U035
UMF303U035

Reflex Sensor with Analog Output



Operating Instructions

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EN

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1. Proper Use

This wenglor product has to be used according to the following functional principle:
Ultrasonic reflex sensors with analog output can be adjusted using Teach-In, or externally via the IO-Link interface. Sensors of the type M30×1.5 also feature a four digit 7-segment display.
If several UMF reflex sensors are in operation in the immediate vicinity, you can choose between synchronous and multiplex mode. In synchronous mode, all synchronized sensors send out ultrasound pulses simultaneously. As a result, object detection is possible over a wider area.
In multiplex mode, the sensors send their ultrasonic pulses alternately, so that sensors which are mounted side by side do not interact with each other.

2. Safety Precautions

- This operating instruction is part of the product and must be kept during its entire service life.
- Read this operating instruction carefully before using the product.
- Installation, start-up and maintenance of this product has only to be carried out by trained personnel.
- Tampering with or modifying the product is not permissible.
- Protect the product against contamination during start-up.
- Not a safety component in accordance with the EU Machinery Directive.

3. EC Declaration of Conformity

The products are developed, constructed and manufactured according to the directive 2004/108/EC.
The following international standards and specifications apply:

EN 60947-5-2:2007+A1:2012 Low-voltage switchgear and controlgear, Part 5-2: Control circuit devices and switching elements – Proximity switches

Any additional standards which are applicable for the given application must be observed.

RoHS

c UL us LISTED
IND. CONT. EQ. 72HL
For use in class 2 circuits
Environmental Type 1

4. Technical Data

	UMF402U035	UMF303U035
Ultrasonic		
Working Range	50...400 mm	200...3000 mm
Reproducibility, maximum	1 mm	4 mm
Linearity Deviation	3 mm	4 mm
Measuring Range	0,1 mm	0,3 mm
Resolution	500 µm	3500 µm
Ultrasonic Frequency	300 kHz	120 kHz
Opening Angle	< 12°	< 14°
Service Life (Tu = 25 °C)	100000 h	100000 h
Switching Hysteresis	2 mm	30 mm
Electrical Data		
Supply Voltage	18…30 V DC	18…30 V DC
Current Consumption (Ub = 24 V)	<40 mA	<40 mA
Switching Frequency	20 Hz	3 Hz
Response Time	25 ms	167 ms
Temperature Range	–25...60 °C	–25…60 °C
Switching Outputs	1	1
Switching Output Voltage Drop	<2,5 V	<2,5 V
PNP Switching Output/Switching Current	100 mA	100 mA
Analog Output	0…10 V	0…10 V
Analog Output	4…20 mA	4…20 mA
Synchronisation	yes	yes
Multiplex Mode	yes	yes
Short Circuit Protection	yes	yes
Reverse Polarity Protection	yes	yes
Overload Protection	yes	yes
Interface	IO-Link	IO-Link
Mechanical Data		
Adjustment	Teach-In	Teach-In
Housing	Stainless Steel	Stainless Steel
Degree of Protection	IP 67	IP 67
Connection	M12 × 1	M12 × 1
Protection Class	III	III
PNP NO/NC switchable	yes	yes
Error Output	yes	yes
Analog Output	yes	yes
IO-Link	yes	yes

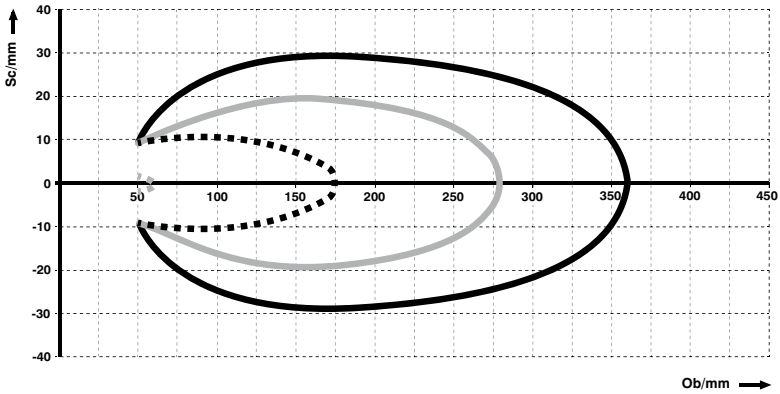
The warm-up phase takes approx. 30 minutes. At the beginning of this time, the linearity deviation and the reproducibility may deviate. During the warm-up phase, the values improve in the form of an exponential function until the technical data are achieved. The sensor works with an internal temperature compensation in order to compensate air temperature fluctuations. Via the IO link interface, you can also specify externally determined temperature values.

Set filter	Reproducibility in mm	
	UMF402U035	UMF303U035
Filter 0 (default)	5	7
Filter 1	5	7
Filter 2	3	6
Filter 3	3	6
Filter 4	3	5
Filter 5	2	5
Filter 6	2	4
Filter 7	1	4

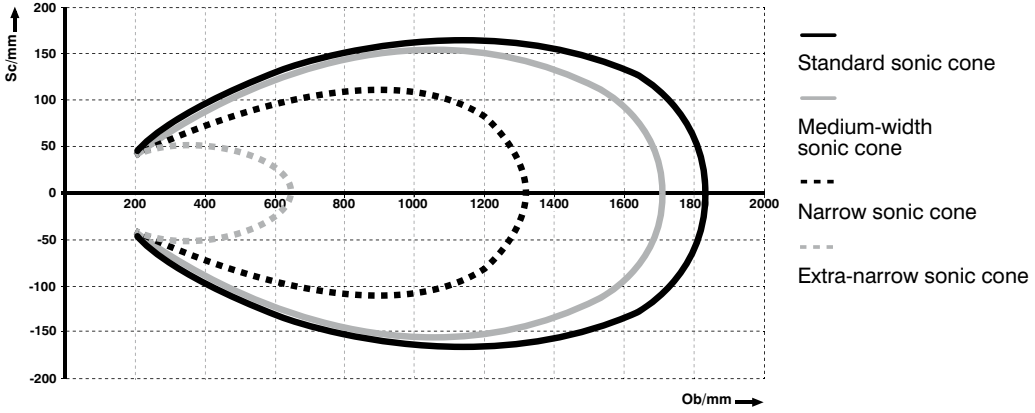
4.1 Sonic cone Diagram

4.1.1 Measurement a diameter of 27 mm

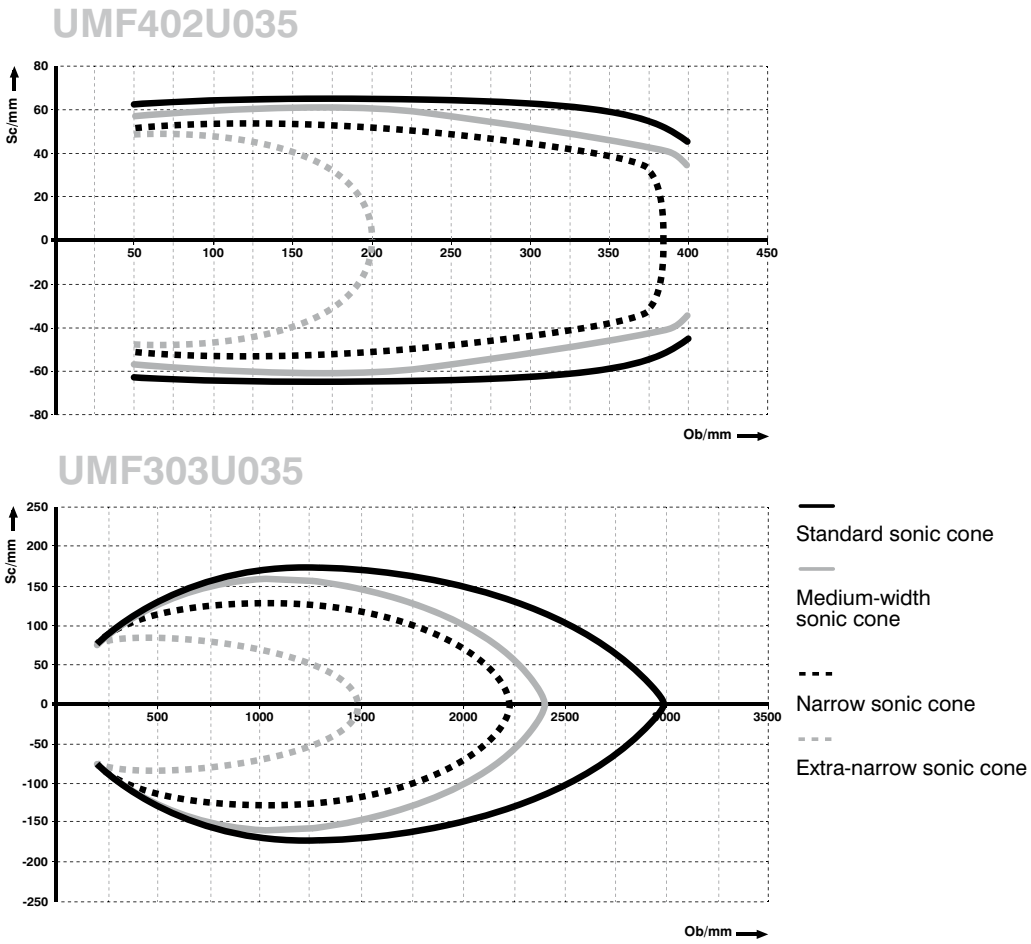
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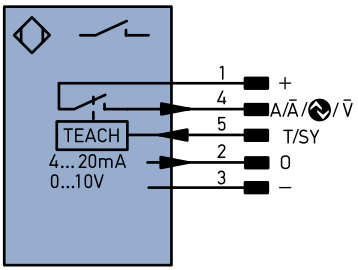


4.1.2 Measurement on a 100 × 100 mm plate



4.2 Connection Diagram

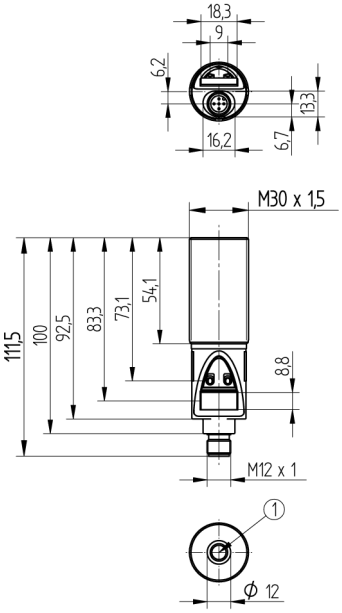
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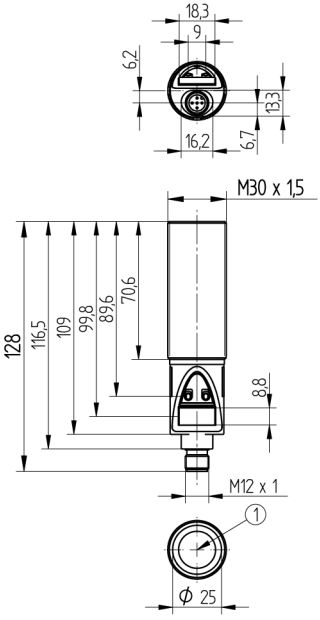
+	Supply Voltage "+"
A/Ā/⏦/V̄	Switching Output NO/ Switching Output NC/IO-Link/ Contamination Output/Error Output (NC)
T/SY	Teach Input/Synchronisation
O	Analog Output
–	Supply Voltage "0 V"

4.3 Housing dimensions

UMF402U035

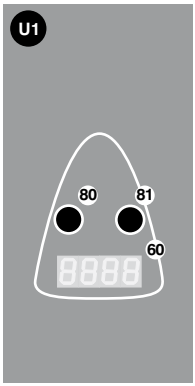


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① = Sensing Face

4.4 Control Panel

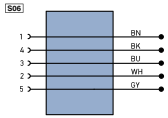


80 = Mode Button/Switching Status Indicator
81 = Plus Button/Error Indication
60 = Display

4.5 Complementary Products (see catalog)

wenglor offers Connection Technology for field wiring.

Suiting Mounting Technology No.	130
Suiting Connection Technology No.	35



Baffle Plate
IO-Link Master
PNP-NPN Converter BG2V1P-N-2M

Legend

+	Supply Voltage +	nc	not connected
–	Supply Voltage 0 V	U	Test Input
~	Supply Voltage (AC Voltage)	Ü	Test Input inverted
A	Switching Output (NO)	W	Trigger Input
Ā	Switching Output (NC)	O	Analog Output
V	Contamination/Error Output (NO)	O–	Ground for the Analog Output
V̄	Contamination/Error Output (NC)	BZ	Block Discharge
E	Input (analog or digital)	AMV	Valve Output
T	Teach Input	a	Valve Control Output +
Z	Time Delay (activation)	b	Valve Control Output 0 V
S	Shielding	SY	Synchronization
RxD	Interface Receive Path	E+	Receiver-Line
TxD	Interface Send Path	S+	Emitter-Line
RDY	Ready	⏚	Grounding
GND	Ground	SnR	Switching Distance Reduction
CL	Clock	Rx+/–	Ethernet Receive Path
E/A	Output/Input programmable	Tx+/–	Ethernet Send Path
	IO-Link	Bus	Interfaces-Bus A(+)/B(–)
PoE	Power over Ethernet	La	Emitted Light disengageable
IN	Safety Input	Mag	Magnet activation
OSSD	Safety Output	RES	Input confirmation
Signal	Signal Output	EDM	Contactor Monitoring

Wire Colors according to DIN IEC 757

BK	Black
BN	Brown
RD	Red
OG	Orange
YE	Yellow
GN	Green
BU	Blue
VT	Violet
GY	Grey
WH	White
PK	Pink
GNYE	Green Yellow

5. Mounting instructions

During mounting and operation of the sensors, the corresponding electrical and mechanical regulations, as well as safety regulations must be observed. The sensor must be protected from mechanical impact. The product has to be mounted so that the mounting position can not be changed.

- Make sure that the sensor is mounted in a mechanically secure fashion.
- If the object has smooth surfaces, the angle between the axis of the sound waves and the surface of the object should be 90° ±3°. The angle can be considerably larger in the case of rough object surfaces.
- There may not be any objects underneath the working range.
- The active surface of the sensor may not contact any other machine parts.

5.1 Causes for Triggering Error Indication (LED Plus Button)

- Too little ultrasonic is reflected.
- Very small objects, or objects which do not reflect sound well (sound-absorbing objects), are located within the working range.
- Incorrect installation
- Object outside of the working range
- Strong sources of ultrasound within the axis of the sound waves
- Strong air turbulence

6. Initial Operation

An IO-Link master with port Class A must be used, as for port Class A pin 5 is not connected.
Connect the sensor to 18…30 V DC.

In order to enter the configuration menu press the Mode key for 5 seconds. By pressing the Mode key again you change between the submenus.
The display shows the submenu and which setting is activated.
Example:



SL: Submenu: Change Switching Logic
no: Setting: NO

By pressing the Plus key the setting in the respective submenu is changed.
In order to leave the configuration menu, you have to change to the “Display mode (run)” submenu. By pressing the plus key, you leave the configuration menu. You can directly jump to the display mode from every submenu by pressing the Mode key for approx. 5 seconds.

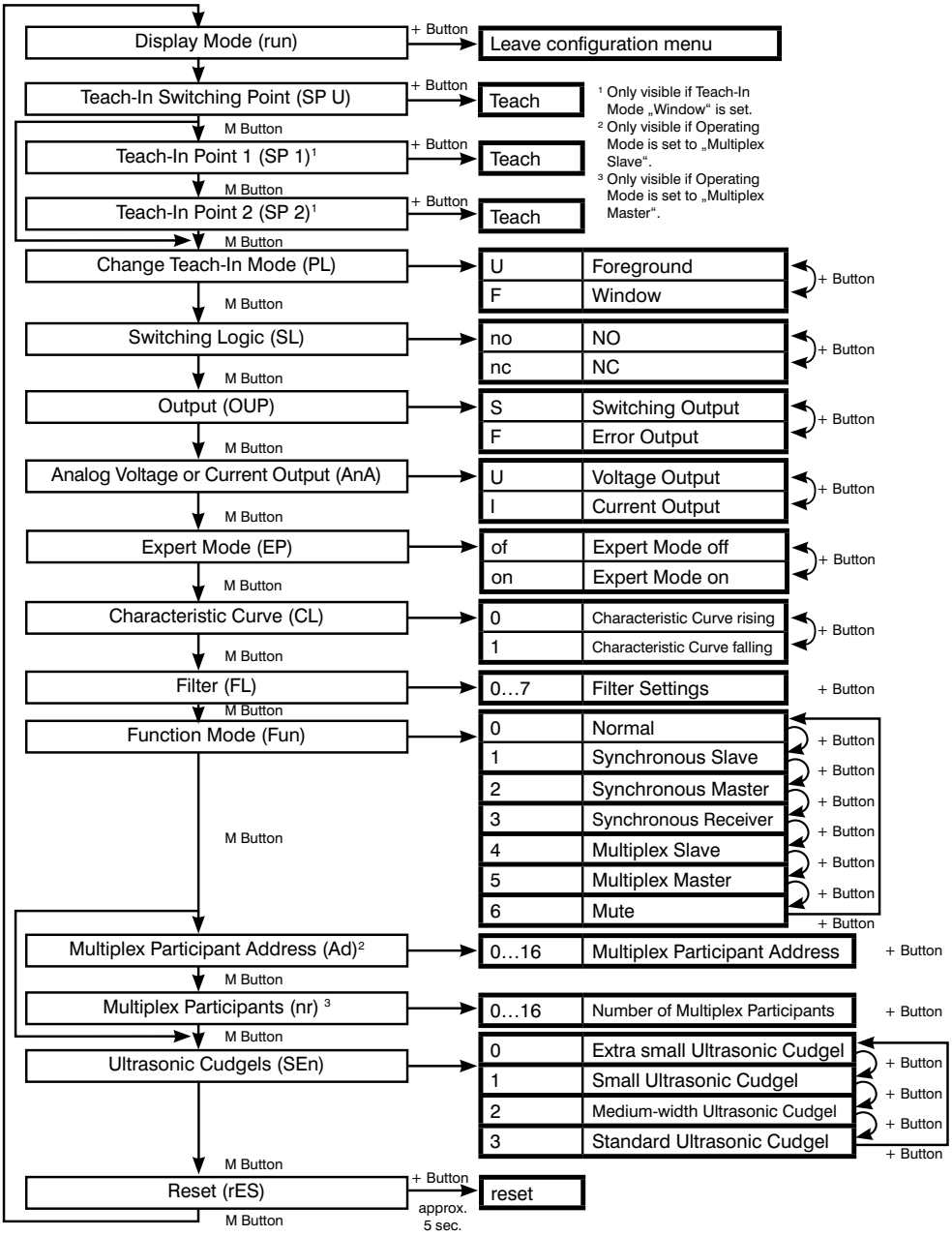
Important: In order to prevent a demage of the keys please don't use sharp objects for setting.

6.1 Overview of functions

Denomination	Function	Page
run	Leave the configuration menu	11
SP 1/SP 2, SP U	Teach-In the Sensor	11
PL	Change Teach-In Mode	11
SL	Change Switching Logic	12
OUP	Set Output Function	12
AnA	Set analog Voltage Output or Current Output	12
EP	Expert menu	13
CL	Select Characteristic Curve	13
FL	Filter Settings	13
Fun	Select Operating Mode	14
Ad	Participant Adress Multiplex	16
nr	Fix Number of Multiplex Participants	16
Sen	Select Ultrasonic Cudgel	16
rES	Reset	17

6.2 Menu Structure

The Structure of the Configuration Menu of the Sensor:



7. Adjustment

7.1 run (display mode)



By pressing the plus key, you leave the configuration menu.

7.2 SP U (Teach-In Switching Point)



Align Sensor to the object (SP U).
Press Plus key.
The dispay doesn't change from Distance Value and SP U.
⇨ Point is teached.

7.3 SP 1* (Teach-In first Point of the Window)



Align Sensor to the object.
Position the object to the first point (SP 1) of the Window you want to teach-in.
Press Plus key.
The dispay doesn't change from Distance Value and SP 1.
⇨ Point is teached.

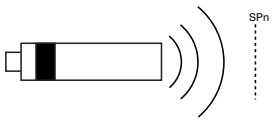
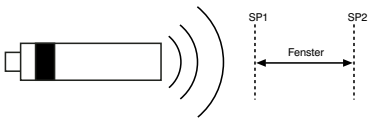
7.4 SP 2* (Teach-In second Point of the Window)



Align Sensor to the object.
Position the object to the second point (SP 2) of the Window you want to teach-in.
Press Plus key.
The dispay doesn't change from Distance Value and SP 2.
⇨ Point is teached.

*** Note:** Only possible if the Teach-In Mode ist set to Window“. View Chapter 7.5

7.5 PL (Change Teach-In Mode)

Setting	Description
U	Foreground Teach-In
	The Switching Distance to an object is teached. If the object is located within the teached distance, or closer to the Sensor, the Sensor is switched. 
F	Window Teach-In
	The sensor works by means of two switching points. If the object is located within the window (between SP 1 and SP 2), the Sensor is switched. If the object is located outside the window, the Sensor isn't switched. 

7.6 SL (Change Switching Logic)

Configuration	Description
no	NO
	The Sensor is switched to ON, if the teached-in object is detected. If the teached-in object is not detected, the Sensor is switched to OFF.
nc	NC
	The Sensor is switched to OFF, if the teached-in object is detected. If the teached-in object is not detected, the Sensor is switched to ON.

7.7 OUP (Set Output function)

Configuration	Description
S	Switching Output
	The sensor output switches depending on the set switching logics (see Chapter 7.6)
F	Error Output
	The Output of the Sensor switches in case of an error (view Chapter 5.1).

7.8 AnA (Set Analog Voltage Output or Current Output)

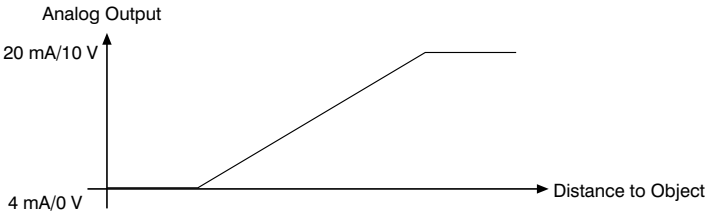
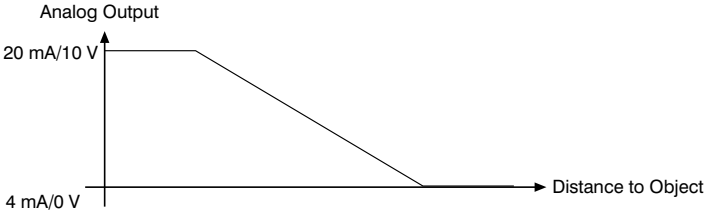
Configuration	Description
U	Voltage Output
	At the Analog Output the distance between Sensor and object is given out as Voltage Value between 0 V and 10 V.
I	Current Output
	At the Analog Output the distance between Sensor and object is given out as Current Value between 4 mA and 20 mA.

7.9 EP (expert menu)

Setting	Description
of	Off
	Expert menu switched off
on	On
	Expert menu switched on. More menu items can be selected (see Chapter 7.10 – Chapter 7.16)

7.10 CL (Select Characteristic Curve)

The Analog Output can be operated with rising or falling Characteristic Curve.

Setting	Description
0	Characteristic Curve rising
	
1	Characteristic Curve falling
	

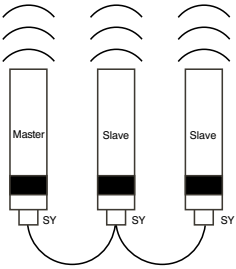
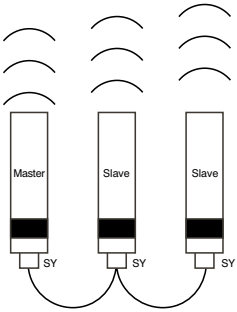
7.11 FL (Set Filter)



Depending upon the filter level 0…7 several additional ultrasonic impulses are taken for measurement. In this way, interference signals can be suppressed. The larger the selected filter the slower the response time of the sensor in case the measured values are changed.

Note: The switching frequency reduces the higher the filter is set.

7.12 Fun (Select Operating Mode)

Synchronous Mode	Multiplex Mode
	
Several sensors send ultrasonic impulses simultaneously (synchron).	Several sensors send ultrasonic impulses alternately (cyclic).
In both operating modes the Sensors are connected to each other through pin 5 (T/SY).	
Please note: Synchronous and multiplex operation are only possible with sensors of the same type.	

Setting	Description
0	Normal
	The Sensor is in normal mode.
1	Synchron Slave
	The Sensor is in synchronous slave mode. It gets simultaneously an impulse from the Master via Pin 5 to send out an Ultrasonic impulse for capturing a bigger detection zone with several sensors.
2	Synchron Master
	The Sensor is in synchronous master mode. It sends out impulses automatically to the connected Slaves via Pin 5 (T/SY), in order that they all send out Ultrasonic impulses (synchronously).
3	Synchron Receiver
	The Sensor is in synchronous receiver mode. Via pin 5, the slave receives the information from the master when the latter transmits ultrasonic signals. The sensor can only receive ultrasonic impulses does, however, not transmit them. This can be used to detect objects deflecting the sound of the transmitter so that the latter can no longer receive reflected sound waves. One or several sensors positioned as synchronous receivers allow for the reception of such sound waves. Operation as one-way light barrier is possible as well. However here, the synchronous receiver only displays half the measured value.
4	Multiplex Slave
	The Sensor is in multiplex slave mode. Via pin 5, the master transmits temporarily delayed signals to the slaves so that they transmit consecutively clocked ultrasonic impulses.
5	Multiplex Master
	The Sensor is in multiplex master mode. It sends out impulses automatically to the connected Slaves via Pin 5 (T/SY), in order that they all send out Ultrasonic impulses one after another.
6	Mute
	The Ultrasonic Emitter of the Sensor is switched off. Signals from other sensors are not accepted either.

7.13 Ad*[1] (Set Multiplex Participants Address)



For each Multiplex Slave Sensor a participants address between 0 and 15 has to be selected. In this order the Multiplex Slaves are then supplied with impulses by the Multiplex Master.

***[1] Note:** Only possible if the Operating Mode is set to „Multiplex Slave“. View Chapter 7.12

7.14 nr*[2] (Set Number of Multiplex Participants)



The number of the Slave Sensors that are connected to a Master has to be entered (max. 16), in order that the Master sends out the right number of impulses.

***[2] Note:** Only possible if the Operating Mode is set to „Multiplex Master“. View Chapter 7.12

7.15 SEn (Select Ultrasonic Cudgel)

Setting	Description
1	
	Extra small sonic cone*
2	
	Small sonic cone*
3	
	Medium-width sonic cone*
4	
	Standard sonic cone*

* View 4.1 Sonic cone Diagram

7.16 rES (Reset)



The selected sensor settings are reset to the delivery condition. To this end, the plus key has to be pushed for approx. 5 sec. until the display jumps back to the measured value.

8. External Teach-In

Before a external Teach-In process the desired Teach-In Mode has to be set at the Sensor one time in advance (view Chapter 7.5).

8.1 External Foreground Teach-In

Align the Sensor to the object.
Connect the Teach input to 18…30 V DC for approx. 5 sec. until PLU flashes. In the next step, disconnect the voltage supply from the Teach input until SPU flashes.
Connect the Teach-In Input approx. 1sec. to 18…30 V DC.
The display doesn't change from Distance Value to SP U any more.
→ Point is teached.

8.2 External Window Teach-In

Align the Sensor to the object.
Position the object at the front point (SP 1) of the Teach-In Window.
Connect the Teach input to 18…30 V DC for approx. 5 sec. until PLF flashes. In the next step, disconnect the voltage supply from the Teach input until SP1 flashes.
The display does no longer change between distance value and SP 1.
Connect the Teach input to 18…30 V DC for approx. 1 sec.
→ Point (SP 1) is teached
→ SP 2 blinks
Position the object at the rear point (SP 2) of the Teach-In Window.
Connect the Teach-In Input for approx. 1 sec. to 18…30 V DC.
The display doesn't change from Distance Value to SP 2 any more.
→ Point is teached. (SP 2)

9. Locking

If the Teach-In Input is permanentely connected to 18...30 V DC, the sensor is locked and protected against unintended adjustments. The sensor must be switched off when voltage is applied to the teach-in input. Otherwise sensor locking is not activated.

10. IO-Link

Process and parameter data can be found in the interface protocol under:
www.wenglor.com ➔ Product World ➔ Search (Enter the product number) ➔ Download ➔ Interface protocol

Process bytes
Output status is the status of the switching and error output.
The result is the distance value in 1/10 mm.

11. Maintenance Instructions

- This wenglor sensor is maintenance-free.
- It is advisable to clean the sensing face and the display, and to check the plug connections at regular intervals.
- Do not clean with solvents or cleansers which could damage the device.

12. Proper Disposal

wenglor sensoric GmbH does not accept the return of unusable or irreparable products. Respectively valid national waste disposal regulations apply to product disposal.