



Operating Manual

mic+ Ultrasonic Sensors with one switching output an IO-Link

mic+25/F/TC
mic+35/F/TC
mic+130/F/TC
mic+340/F/TC
mic+600/F/TC



- Product description**
- The mic+ sensor with one switching output measures the distance to an object within the detection zone contactless. Depending on the adjusted detect distance the switching output is set.
 - All settings are done with two push-buttons and a three-digit LED-display (TouchControl).
 - Three-colour LEDs indicate the switching status.
 - The output functions are changeable from NOC to NCC.
 - The sensors are adjustable manually via TouchControl or via Teach-in procedure.
 - Useful additional functions are set in the Add-on-menu.
 - Using the LinkControl adapter (optional accessory) all TouchControl and additional sensor parameter

settings can be adjusted by a Windows® Software.

IO-Link

The mic+ sensors are IO-Link-capable in accordance with IO-Link specification V1.1 and support Smart Sensor Profile like Digital Measuring Sensor.

The mic+ sensors have a **blind zone** in which distance measurement is not possible. The **operating range** indicates the distance of the sensor that can be applied with normal reflectors with sufficient function reserve. When using good reflectors, such as a calm water surface, the sensor can also be used up to its **maximum range**. Objects that strongly absorb (e.g. plastic foam) or diffusely reflect sound (e.g. pebble stones) can also reduce the defined operating range.

- Safety Notes**
- Read the operating instructions prior to start-up.
 - Connection, installation and adjustment works may only be carried out by expert personnel.
 - No safety component in accordance with the EU Machine Directive, use in the area of personal and machine protection not permitted

Proper Use

mic+ ultrasonic sensors are used for non-contact detection of objects.

Synchronisation

If the assembly distance of multiple sensors falls below the values shown in Fig. 1 the integrated synchronisation should be used. Connect Sync/Com-channels (pin 5 at the units receptable) of all sensors (10 maximum).

mic+25...	≥0.35 m	≥2.50 m
mic+35...	≥0.40 m	≥2.50 m
mic+130...	≥1.10 m	≥8.00 m
mic+340...	≥2.00 m	≥18.00 m
mic+600...	≥4.00 m	≥30.00 m

Fig. 1: Assembly distances, indicating synchronisation/multiplex

Multiplex mode

The Add-on-menu allows to assign an individual address »01« to »10« to each sensor connected via the Sync/Com-channel (Pin5). The sensors perform the ultrasonic measurement sequentially from low to high address. Therefore any influence between the sensors is rejected.

The address »00« is reserved to synchronisation mode and deactivates the multiplex mode. To use synchronised mode all sensors must be set to address »00«.

Installation

- ➔ Assemble the sensor at the installation location.
- ➔ Plug in the connector cable to the M12 connector, see Fig. 2.

		colour
1	+UB	brown
3	-UB	blue
4	F	black
2	-	white
5	Sync/Com	grey

Fig. 2: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

Start-up

- ➔ Connect the power supply.
- ➔ Set the parameters of the sensor manually via TouchControl (see Fig. 3 and Diagram 1)
- ➔ or use the Teach-in procedure to adjust the detect points (see Diagram 2).

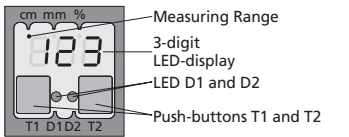


Fig. 3: TouchControl/LED display

- Factory setting**
- mic+ sensors are delivered factory made with the following settings:
- Switching output on NOC
 - Detecting distance at operating range
 - Measurement range set to maximum range

Maintenance

mic+ sensors work maintenance free. Small amounts of dirt on the surface do not influence function. Thick layers of dirt and caked-on dirt affect sensor function and therefore must be removed.

- Notes**
- mic+ sensors have internal temperature compensation. Because the sensors heat up on their own, the temperature compensation reaches its optimum working point after approx. 30 minutes of operation.
 - During normal operating mode, a yellow LED D2 signals that the switching output has connected.
 - During normal operating mode, the measured distance value is displayed on the LED-indicator in mm (up to 999 mm) or cm (from 100 cm). Scale switches automatically and is indicated by a point on top of the digits.
 - During Teach-in mode, the hysteresis loops are set back to factory settings.
 - If no objects are placed within the detection zone the LED-indicator shows »- - -«.
 - If no push-buttons are pressed for 20 seconds during parameter setting mode the made changes are stored and the sensor returns to normal operating mode.
 - The sensor can be reset to its factory setting, see »Key lock and factory setting«, Diagram 3.
 - The latest IODD file and informations about start-up and configuration of pico+ sensors with IO-Link, you will find online at www.microsonic.de/en/mic+.
- Show parameters**
- ➔ In normal operating mode shortly push T1. The LED display shows »PAR.«
- Each time you tap push-button T1 the actual settings of the analogue output are shown.

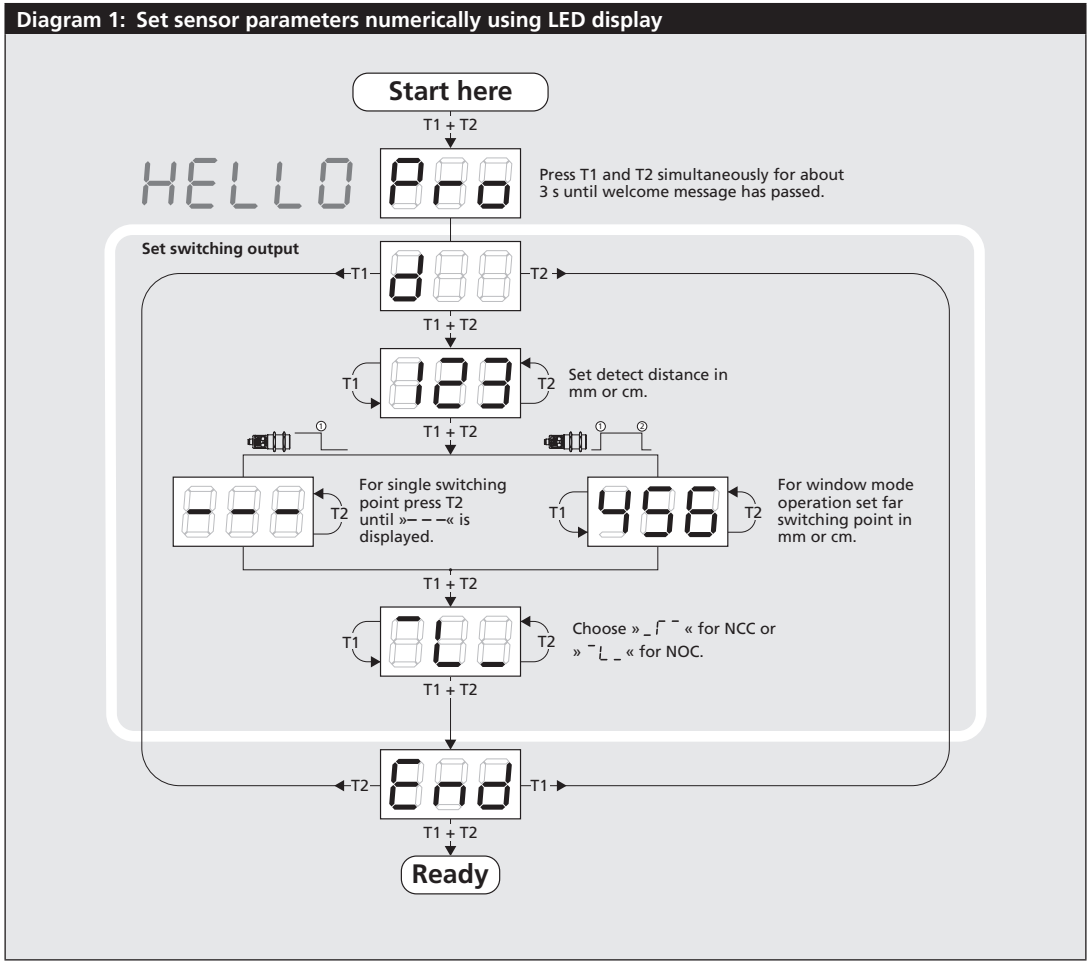


Diagram 2: Set sensor parameters via Teach-in procedure

Teach-in switching output

The diagram illustrates the teach-in procedure for setting sensor parameters via switching output. It is organized into four columns, each representing a different parameter to be set. Each column follows a similar sequence of steps: a diagram showing the sensor and the object/reflector placement, a box for the parameter name, a box for the action to be taken, a box for the display value, and a box for the final confirmation step. The final step for all columns is pressing T1 and T2 simultaneously until 'End' is displayed, returning the sensor to normal operating mode.

Set switching point	Set window limits	Set two way reflective barrier	Set NOC/NCC
Place object at position ①.	Place object at position ①.	Place reflector at position ①.	Press T2 until countdown passed from »8 « to »0« and NOC or NCC symbol is displayed.
Press T2 until »d« is shown.	Press T2 until »d« is shown.	Press T2 until »d« is shown.	Press T2 until countdown passed from »8 « to »0« and »End« is displayed.
123	123	123	L
Current measuring value	Current measuring value	Current measuring value	NOC symbol or NCC symbol
Press T2 until »End« is shown.	Place object at position ②. Press T2 until »End« is shown.	Press T2 until »End« is shown.	To change output characteristic press T2.
	456		J
	Current measuring value		
	Press T2 until »End« is shown.		Press T1 and T2 simultaneously until »End« is displayed.
Normal operating mode			

Diagram 3: Key lock and factory setting

```
graph TD
    subgraph "Activate/deactivate TouchControl"
        A1[Activate/deactivate TouchControl] --> A2[Turn supply voltage OFF.]
        A2 --> A3[While pressing T1 turn supply voltage ON.]
        A3 --> A4[Keep T1 pressed until »on« or »off« is displayed.]
        A4 --> A5[»on« or »off«]
        A5 --> A6[»off« or »on«]
        A6 --> A7[To activate or deactivate press T1.]
        A7 --> A8[Don't press any push-button for 20 s.]
        A8 --> A9[Normal operating mode]
    end

    subgraph "Reset to factory setting"
        B1[Reset to factory setting] --> B2[Turn supply voltage OFF.]
        B2 --> B3[While pressing T1 turn supply voltage ON.]
        B3 --> B4[Keep T1 pressed for about 15 s until »rESet« has passed through the display.]
        B4 --> B5[Normal operating mode]
    end
```

The diagram illustrates two procedures for the device: activating/deactivating TouchControl and resetting to factory settings. Both procedures start with turning the supply voltage OFF and then turning it ON while pressing the T1 button. For TouchControl activation/deactivation, the user must keep T1 pressed until '»on«' or '»off«' is displayed, then press T1 again to toggle the state. For the factory reset, the user must keep T1 pressed for about 15 seconds until '»rESet«' is displayed. Both procedures conclude with a 20-second wait period before returning to normal operating mode.

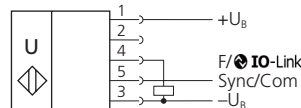
Diagram 4: Useful additional functions in Add-on menu (for experienced users only, settings not required for standard applications)

The diagram illustrates the configuration sequence for the HELLO Pro add-on menu. It begins at 'Start here' (HELLO Pro) and proceeds through ten numbered steps, each corresponding to a specific function. Each step shows a sequence of three displays (e.g., 888, 030, F00) and arrows indicating the navigation path between them. A 'Ready' state is reached after the tenth step.

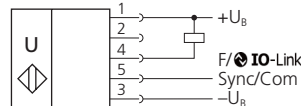
Note
Changes in the Add-on menu may impair the sensor function.
A6, A7, A10, A11, A12 have influence on the response time of the sensor.

Function	Description / Settings
Low power mode	»C01«: Display bright »C02«: Display dimmed »C03«: Display off
Hysteresis switched output	Minimum value: »001« Maximum value: difference between maximum range and switching point - 1 During window mode operation hysteresis influences both switching points.
Measurement filter	»F00«: no filter »F01«: standard filter »F02«: averaging filter »F03«: foreground filter »F04«: background filter
Filter strength	Defines the strength of the chosen filter. »P00«: weak filter up to »P09«: strong filter
Foreground suppression	Minimum value: blind zone Maximum value: nearwindow limit - 1
Multiplex mode device addressing	»00«: synchronisation »01« to »10«: sensor address for multiplex mode »oFF«: synchronisation deactivated
Multiplex mode highest address	To optimize multiplex speed the highest sensor address may be set. Setting range »01« to »10«
Measurement range	Minimum value: sensor-distant window limit Maximum value: 999 mm for mic+25/... mic+35/... 999 cm for mic+130/... mic+340/... mic+600/...
Calibration display	Put plane reflector vertically disposed in front of sensor: in an exact distance of 250 mm for mic+25... and 900 mm for all other types. Adjust display to 250 mm or 900 mm. Confirm calibration with T1+T2.
Detection zone sensitivity	Affects the size of the detection zone. »E01«: high »E02«: standard »E03«: slight

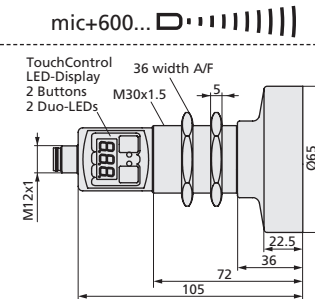
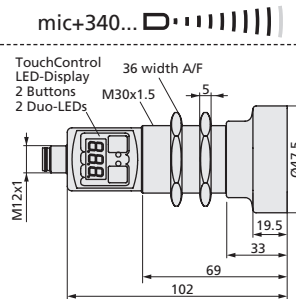
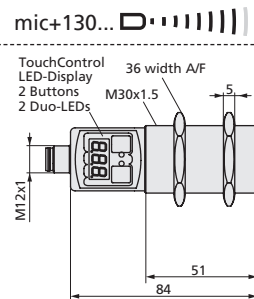
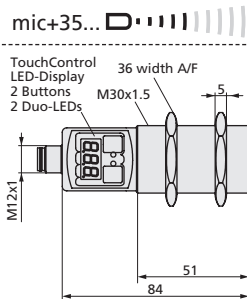
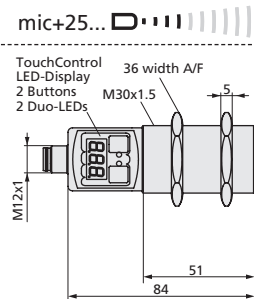
Technical data



1 Push-Pull output in pnp circuit



1 Push-Pull output in npn circuit

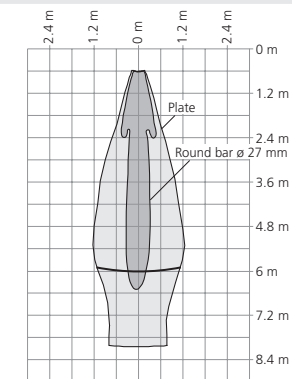
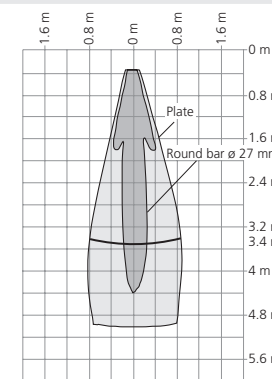
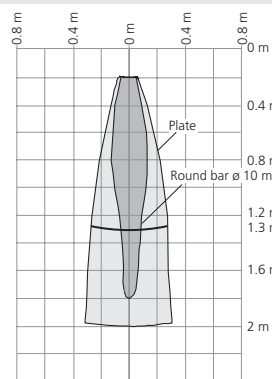
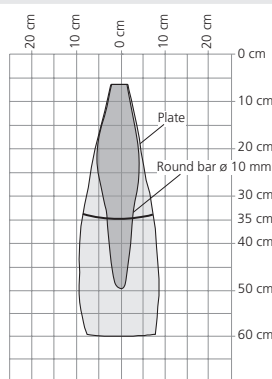
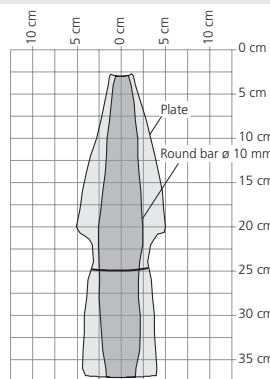


blind zone
operating range
maximum range

angle of beam spread
transducer frequency
resolution

detection zones

for different objects:
The dark grey areas represent the zone where it is easy to recognise the normal reflector (round bar). This indicates the typical operating range of the sensors. The light grey areas represent the zone where a very large reflector – for instance a plate – can still be recognised. The requirement here is for an optimum alignment to the sensor. It is not possible to evaluate ultrasonic reflections outside this area.



reproducibility
accuracy

operating voltage
voltage ripple

no-load supply current
housing

class of protection to EN 60529
norm conformity

type of connection

controls

indicators

programmable

operating temperature

storage temperature

weight

switching hysteresis

switching frequency

response time

time delay before availability

order No.

switching output

0 to 30 mm

250 mm

350 mm

see detection zone

320 kHz

0.025 mm

±0.15 %

±1 % (Temperature drift internal compensated, may be deactivated³⁾, 0.17%/K without compensation)
9 to 30 V DC, short-circuit-proof, Class 2

±10 %

≤ 80 mA

Brass sleeve, nickel-plated, plastic parts: PBT, TPU;
Ultrasonic transducer: polyurethane foam,
epoxy resin with glass content

IP 67

EN 60947-5-2

5-pin initiator plug, PBT

2 push-buttons (TouchControl)

3-digit LED display, 2 three-colour LEDs

with TouchControl and LinkControl

−25 to +70 °C

−40 to +85 °C

150 g

3 mm

25 Hz

32 ms

<300 ms

mic+25/F/TC

Push-Pull, $U_B = 3\text{ V}$, $-U_B + 3\text{ V}$, $I_{max} = 100\text{ mA}$

switchable NOC/NCC, short-circuit-proof

0 to 65 mm

350 mm

600 mm

see detection zone

400 kHz

0.025 mm

±0.15 %

±1 % (Temperature drift internal compensated, may be deactivated³⁾, 0.17%/K without compensation)
9 to 30 V DC, short-circuit-proof, Class 2

±10 %

≤ 80 mA

Brass sleeve, nickel-plated, plastic parts: PBT, TPU;
Ultrasonic transducer: polyurethane foam,
epoxy resin with glass content

IP 67

EN 60947-5-2

5-pin initiator plug, PBT

2 push-buttons (TouchControl)

3-digit LED display, 2 three-colour LEDs

with TouchControl and LinkControl

−25 to +70 °C

−40 to +85 °C

150 g

5 mm

12 Hz

64 ms

<300 ms

mic+35/F/TC

Push-Pull, $U_B = 3\text{ V}$, $-U_B + 3\text{ V}$, $I_{max} = 100\text{ mA}$

switchable NOC/NCC, short-circuit-proof

0 to 200 mm

1,300 mm

2,000 mm

see detection zone

200 kHz

0.18 mm

±0.15 %

±1 % (Temperature drift internal compensated, may be deactivated³⁾, 0.17%/K without compensation)
9 to 30 V DC, short-circuit-proof, Class 2

±10 %

≤ 80 mA

Brass sleeve, nickel-plated, plastic parts: PBT, TPU;
Ultrasonic transducer: polyurethane foam,
epoxy resin with glass content

IP 67

EN 60947-5-2

5-pin initiator plug, PBT

2 push-buttons (TouchControl)

3-digit LED display, 2 three-colour LEDs

with TouchControl and LinkControl

−25 to +70 °C

−40 to +85 °C

150 g

20 mm

8 Hz

92 ms

<300 ms

mic+130/F/TC

Push-Pull, $U_B = 3\text{ V}$, $-U_B + 3\text{ V}$, $I_{max} = 100\text{ mA}$

switchable NOC/NCC, short-circuit-proof

0 to 350 mm

3,400 mm

5,000 mm

see detection zone

120 kHz

0.18 mm

±0.15 %

±1 % (Temperature drift internal compensated, may be deactivated³⁾, 0.17%/K without compensation)
9 to 30 V DC, short-circuit-proof, Class 2

±10 %

≤ 80 mA

Brass sleeve, nickel-plated, plastic parts: PBT, TPU;
Ultrasonic transducer: polyurethane foam,
epoxy resin with glass content

IP 67

EN 60947-5-2

5-pin initiator plug, PBT

2 push-buttons (TouchControl)

3-digit LED display, 2 three-colour LEDs

with TouchControl and LinkControl

−25 to +70 °C

−40 to +85 °C

210 g

50 mm

4 Hz

172 ms

<380 ms

mic+340/F/TC

Push-Pull, $U_B = 3\text{ V}$, $-U_B + 3\text{ V}$, $I_{max} = 100\text{ mA}$

switchable NOC/NCC, short-circuit-proof

0 to 600 mm

6,000 mm

8,000 mm

see detection zone

80 kHz

0.18 mm

±0.15 %

±1 % (Temperature drift internal compensated, may be deactivated³⁾, 0.17%/K without compensation)
9 to 30 V DC, short-circuit-proof, Class 2

±10 %

≤ 80 mA

Brass sleeve, nickel-plated, plastic parts: PBT, TPU;
Ultrasonic transducer: polyurethane foam,
epoxy resin with glass content

IP 67

EN 60947-5-2

5-pin initiator plug, PBT

2 push-buttons (TouchControl)

3-digit LED display, 2 three-colour LEDs

with TouchControl and LinkControl

−25 to +70 °C

−40 to +85 °C

270 g

100 mm

3 Hz

240 ms

<450 ms

mic+600/F/TC

Push-Pull, $U_B = 3\text{ V}$, $-U_B + 3\text{ V}$, $I_{max} = 100\text{ mA}$

switchable NOC/NCC, short-circuit-proof

¹⁾ Can be programmed via TouchControl, LinkControl and IO-Link.

²⁾ With TouchControl, LinkControl and IO-Link, the selected filter setting and the maximum range influence the switching frequency and the response time.

³⁾ Can be deactivated via LinkControl.