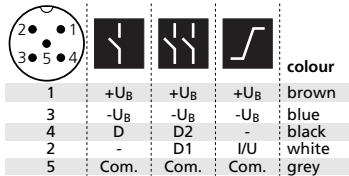


III. 2: Permissible assembly distances

Assembly instruction

- Assemble the sensor at the installation location.
- Plug in the connector cable to the M 12 connector.



III. 3: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

Note

The LinkControl adapter uses Pin 5 as a communication channel. This pin is not used in operational or setting mode with TouchControl.

Start-up

mic sensors are delivered factory made with the following settings:

- Switched output on NO
- Detect distances on operating range
- Rising analogue characteristic
- Window margins of the analogue signal set to blind zone and operating range
- Maximum detection range set to maximum range

In order to adjust the sensors, please follow the instructions mentioned in "Setting mode with TouchControl"

Operation

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

Note

- 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 the normal operating mode, a yellow LED signals that the corresponding switched output has connected.
- When switching on the power supply, the analogue sensor checks the connected load and switches in case of terminating impedance $\leq 500 \Omega$ to current output and in case of terminating impedance $> 100 \text{ k}\Omega$ to voltage output.
- If an object is within the set window margins, then both LEDs light up green. If the window margin near the sensor is exceeded, then LED D2 lights up red, if the object leaves the window margin away from the sensor, then LED D1 lights up red.

Setting mode with TouchControl

The sensor continues to work when setting with TouchControl.

The following table defines the minimum assembly distances between two sensors. These distances should not be exceeded, otherwise the sensors could influence each other.



mic-25/D/HV/M30
mic-31/D/HV/M30
mic-101/D/HV/M30
mic-301/D/HV/M30
mic-601/D/HV/M30

Detect distance teach-in setting

- Press the T1 and T2 push-buttons until the LED flashes yellow (after approx. 3 seconds).
 - Let both push-buttons go.
 - Place the object to be scanned or a reflector at the position where the detect distance should be.
- If the object is within the detect distance, then the LED lights up yellow. If the distance to the object is greater than the actual detect distance, then the LED flashes.

Simultaneously press the T1 and T2 push-button.

The sensor accepts the actual distance value to the sensor as the new detect distance and immediately returns to its normal operating mode.

Manually setting the detect distance

- Press the T1 and T2 push-buttons until the LED flashes yellow (after approx. 3 seconds).
 - Let both push-buttons go.
 - Place the object to be scanned or a reflector at the position where the detect distance should be.
 - Press push-button T1 or T2.
- T1 increases the detect distance
T2 decreases the detect distance

If the object is within the detect distance, then the LED lights up yellow. If the distance to the object is greater than the actual detect distance, then the LED flashes.

Do not press any push-button for 20 seconds:

The newly set detect distance is stored and the sensor returns to its normal operating mode after approx. 20 seconds.

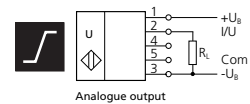
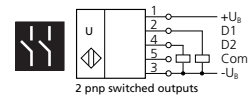
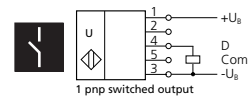
Setting NOC/NCC

- Press the T1 and T2 push-buttons until the LED lights yellow (after approx. 10 seconds).
- Let both push-buttons go.
- LED flashes green: NCC
- LED flashes red: NOC
- With T1 push-button select NCC or with T2 push-button select NOC.
- Do not press any push-button for 20 seconds:

The newly set output function is stored and the sensor returns to its normal operating mode after approx. 20 seconds.

Product description

- Depending on the type of the sensor, the measured distance is converted into an analogue current or voltage signal proportional to the distance, or the switched output is set according to the set detect distance.
- All settings are adjusted with 2 push-buttons, which can be accessed on the side of the housing (TouchControl).
- LEDs (3-colour LEDs) display all operation conditions.
- For sensors with switched output, you can choose the output functions NOC and NCC.
- The analogue sensors independently check the connected load and automatically switch to active current or voltage output.
- You can choose between rising (4-20 mA or 0-10 V) and falling (20-4 mA or 10-0 V) output characteristics.
- With the LinkControl adapter (available as an accessory), all TouchControl and additional sensor parameter settings can be adjusted using a Windows software.



III. 1: Standard symbols

Important instructions for assembly and application

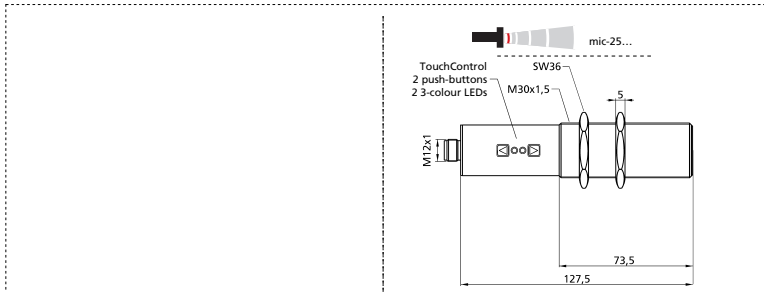
All employee and plant safety-relevant measures must be taken prior to assembly, start-up, or maintenance work (see operation manual for the entire plant and the operator instruction of the plant).

The sensors are not considered safety equipment and may not be used to ensure human or machine safety!

The ultrasonic sensors of the mic family indicate a blind zone, in which the distance cannot be measured. It is possible to divert the sound 90° within the blind zone by using a diverting surface. However the object to be scanned nor other objects should reach into the blind zone.

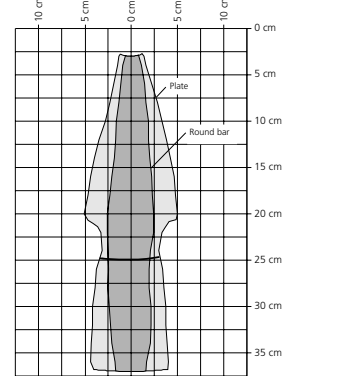
The operating range indicates the distance of the sensor that can be applied with normal reflectors with sufficient function reserve. When using good reflectors, such as a calm water surface, the sensor can also be used up to its maximum range. Objects that strongly absorb (e.g. plastic foam) or diffusely reflect sound (e.g. pebble stones) can also reduce the defined operating range.

The following table defines the minimum assembly distances between two sensors. These distances should not be exceeded, otherwise the sensors could influence each other.



Blind zone	30 mm
Operating range	250 mm
Maximum range	350 mm
Angle of beam spread	Please see Detection zones
Transducer frequency	320 kHz
Resolution, sampling rate	0,36 mm
Reproducibility	$\pm 0,15 \%$
Accuracy	Temperature drift internal compensation, $\leq 2 \%$ may be deactivated ¹⁾ (0,17%/K without compensation)

Detection zones for different objects:
The dark grey areas are determined with a thin round bar (10 or 27 mm dia.) and indicate the typical operating range of a sensor.
In order to obtain the light grey areas, a plate (500 x 500 mm) is introduced into the beam spread from the side. In doing so, the optimum angle between plate and sensor is always employed. This therefore indicates the maximum detection zone of the sensor. It is not possible to evaluate ultrasonic reflections outside this area.



	1 pnp switched output Order No. Switching hysteresis ¹⁾ Switching frequency ¹⁾ Switched output	mic-25/D/HV/M30 2,5 mm 11 Hz pnp, U _B - 2 V, I _{max} = 500 mA
	2 pnp switched outputs Order No. Switching hysteresis ¹⁾ Switching frequency ¹⁾ Switched output	mic-25/DD/HV/M30 2,5 mm 11 Hz 2 x pnp, U _B - 2 V, I _{max} = 2 x 500 mA
	Analogue output Order No. Current output 4 - 20 mA Voltage output 0 - 10 V	mic-25/IU/HV/M30 R _i $\leq 500 \Omega$, U _B $\geq 20 \text{ V}$; R _i $\leq 100 \Omega$, U _B $\geq 12 \text{ V}$ R _i $\geq 100 \text{ k}\Omega$, U _B $\geq 15 \text{ V}$, short circuit proof
	Response time ¹⁾ Time delay before availability ¹⁾ Operating voltage U _B Voltage ripple No-load supply current Housing	50 ms $< 1,5 \text{ s}$ 12 V - 30 V DC, reverse polarity protection $\pm 10 \%$ $\leq 70 \text{ mA}$ Brass sleeve, nickel-plated Plastic parts: PBT Ultrasonic transducers: polyurethane foam epoxy resin with glass content
	Class of protection to EN 60529 Norm conformity Type of connection Controls Indicators Programmable Operating temperature Storage temperature Weight	IP65 EN 60947-5-2 5-pin M12 initiator plug, material: PBT 2 push-buttons (TouchControl) 2 3-colour LEDs Yes, with LinkControl and LinkCopy -20°C to +70°C -40°C to +85°C 260 g

¹⁾ Can be programmed with LinkControl.



mic-25/DD/HV/M30
mic-31/DD/HV/M30
mic-101/DD/HV/M30
mic-301/DD/HV/M30
mic-601/DD/HV/M30

If the object is within the detect distance, then the LED lights up yellow. If the distance to the object is greater than the actual detect distance, then the LED flashes.



mic-25/IU/HV/M30
mic-31/IU/HV/M30
mic-101/IU/HV/M30
mic-301/IU/HV/M30
mic-601/IU/HV/M30

Setting the window margin manually
Press push-button T1 or T2.
T2 places the window margin further away from the sensor.
T2 places the window margin closer to the sensor.
Do not press any push-button for 20 seconds:
The newly set window margin is stored and the sensor returns to its normal operating mode after approx. 20 seconds.

Set detect distance

Press the T1 and T2 push-buttons until the LED flashes yellow (after approx. 3 seconds).

Let both push-buttons go.

The LEDs D1 and D2 alternately flash yellow.

Select switched output

Press T1 for switched output D1

or press T2 for switched output D2.

The LED that belongs to the selected output flashes yellow (or lights up yellow, if an object is located below the detect distance). The other LED goes out.

Detect distance teach-in setting

Place the object to be scanned or a reflector at the position where the detect distance should be.

If the object is within the detect distance, then the LED lights up yellow. If the distance to the object is greater than the actual detect distance, then the LED flashes.

Simultaneously press the T1 and T2 push-button.

The sensor accepts the actual distance value to the object as the new detect distance and immediately returns to its normal operating mode.

Manually setting the detect distance

Place the object to be scanned or a reflector at the position where the detect distance should be.

Press push-button T1 or T2.
T1 increases the detect distance
T2 decreases the detect distance
Do not press any push-button for 20 seconds:
The newly set detect distance is stored and the sensor returns to its normal operating mode after approx. 20 seconds.

Note

Go back to section "Set detect distance" in order to set the second switched output.

Setting NOC/NCC

Press the T1 and T2 push-buttons until both LEDs light yellow (after approx. 10 seconds).

Let both push-buttons go.

LED D1 indicates the output function of switched output D1 (green = NCC, red = NOC).

LED D2 indicates the output function of switched output D2 (green = NCC, red = NOC).

Push-button T1 changes the output function between NCC and NOC for switched output D1.

Push-button T2 changes the output function between NCC and NOC for switched output D2.

Do not press any push-button for 20 seconds:

The newly set output functions are stored and the sensor returns to its normal operating mode after approx. 20 seconds.

Window margin setting

Instruction:

First set the window margin closest to the sensor and then set the window margin furthest from the sensor.

The window margins can be pushed together up to a minimum window breadth of 1 mm.

Press the T1 and T2 push-buttons until the LED flashes yellow (after approx. 3 seconds).

Let both push-buttons go.

The LEDs D1 and D2 alternately flash yellow.

Select window margin

Press T2 to select the window margin closest to the sensor

or press T1 to select the window margin furthest from the sensor

The LED that belongs to the selected window margin flashes yellow. The other LED goes out.

Window margin teach-in setting

Place the object to be scanned or a reflector at the position where the detect distance should be.

Simultaneously press the T1 and T2 push-button.

The sensor accepts the actual distance value to the object as the new window margin and immediately returns to its normal operating mode.

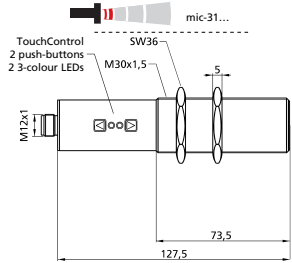
Setting rising/falling output characteristic
Press the T1 and T2 push-buttons until both LEDs light yellow (after approx. 10 seconds).

Let both push-buttons go.

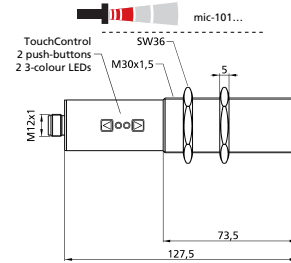
Both LEDs flash green: falling output characteristic
Both LEDs flash red: rising output characteristic

Press push-button T1 for falling or T2 for rising output characteristic.

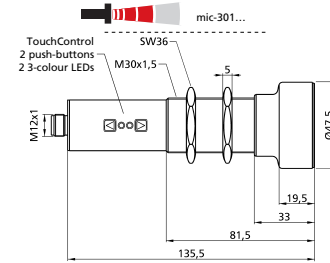
Do not press any push-button for 20 seconds:
The newly set output characteristic is stored and the sensor returns to its normal operating mode after approx. 20 seconds.



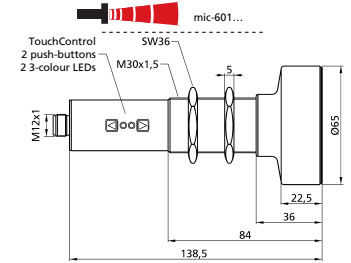
60 mm
350 mm
600 mm
Please see Detection zones
400 kHz
0,36 mm
± 0,15 %
Temperature drift internal compensation, ≤ 2 %
may be deactivated¹⁾ (0,17%/K without compensation)



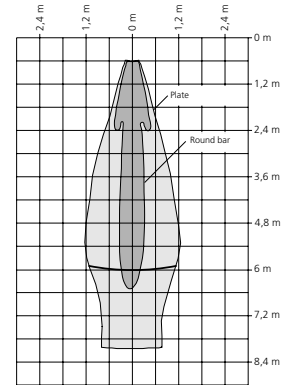
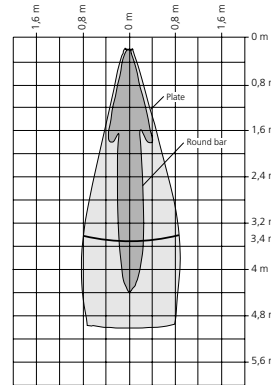
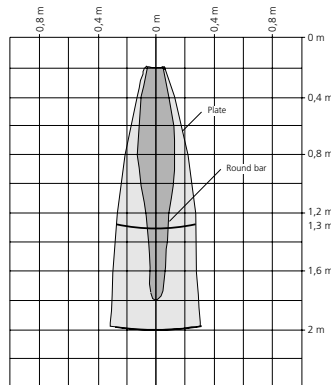
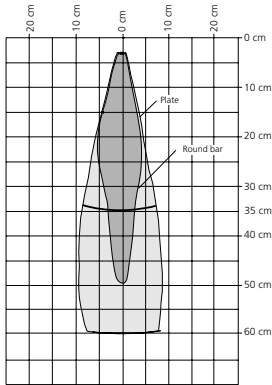
200 mm
1.300 mm
2.000 mm
Please see Detection zones
200 kHz
0,36 mm
± 0,15 %
Temperature drift internal compensation, ≤ 2 %
may be deactivated¹⁾ (0,17%/K without compensation)



350 mm
3.400 mm
5.000 mm
Please see Detection zones
120 kHz
1 mm
± 0,15 %
Temperature drift internal compensation, ≤ 2 %
may be deactivated¹⁾ (0,17%/K without compensation)



800 mm
6.000 mm
8.000 mm
Please see Detection zones
80 kHz
1 mm
± 0,15 %
Temperature drift internal compensation, ≤ 2 %
may be deactivated¹⁾ (0,17%/K without compensation)



mic-31/D/HV/M30
5 mm
8 Hz
pnp, $U_B - 2 V$, $I_{max} = 500 mA$
switchable NOC/NCC, short circuit proof
mic-31/DD/HV/M30
5 mm
8 Hz
2 x pnp, $U_B - 2 V$, $I_{max} = 2 \times 500 mA$
switchable NOC/NCC, short circuit proof
mic-31/IU/HV/M30
 $R_L \leq 500 \Omega$, $U_B \geq 20 V$; $R_L \leq 100 \Omega$, $U_B \geq 12 V$
 $R_L \geq 100 k\Omega$, $U_B \geq 15 V$, short circuit proof

70 ms
< 1,5 s
12 V - 30 V DC, reverse polarity protection
±10 %
≤ 70 mA
Brass sleeve, nickel-plated
Plastic parts: PBT
Ultrasonic transducers: polyurethane foam epoxy resin with glass content
IP65
EN 60947-5-2
5-pin M12 initiator plug, material: PBT
2 push-buttons (TouchControl)
2 3-colour LEDs
Yes, with LinkControl and LinkCopy
-20°C to +70°C
-40°C to +85°C
260 g

mic-101/D/HV/M30
20 mm
6 Hz
pnp, $U_B - 2 V$, $I_{max} = 500 mA$
switchable NOC/NCC, short circuit proof
mic-101/DD/HV/M30
20 mm
6 Hz
2 x pnp, $U_B - 2 V$, $I_{max} = 2 \times 500 mA$
switchable NOC/NCC, short circuit proof
mic-101/IU/HV/M30
 $R_L \leq 500 \Omega$, $U_B \geq 20 V$; $R_L \leq 100 \Omega$, $U_B \geq 12 V$
 $R_L \geq 100 k\Omega$, $U_B \geq 15 V$, short circuit proof

110 ms
< 1,5 s
12 V - 30 V DC, reverse polarity protection
±10 %
≤ 70 mA
Brass sleeve, nickel-plated
Plastic parts: PBT
Ultrasonic transducers: polyurethane foam epoxy resin with glass content
IP65
EN 60947-5-2
5-pin M12 initiator plug, material: PBT
2 push-buttons (TouchControl)
2 3-colour LEDs
Yes, with LinkControl and LinkCopy
-20°C to +70°C
-40°C to +85°C
260 g

mic-301/D/HV/M30
50 mm
3 Hz
pnp, $U_B - 2 V$, $I_{max} = 500 mA$
switchable NOC/NCC, short circuit proof
mic-301/DD/HV/M30
50 mm
3 Hz
2 x pnp, $U_B - 2 V$, $I_{max} = 2 \times 500 mA$
switchable NOC/NCC, short circuit proof
mic-301/IU/HV/M30
 $R_L \leq 500 \Omega$, $U_B \geq 20 V$; $R_L \leq 100 \Omega$, $U_B \geq 12 V$
 $R_L \geq 100 k\Omega$, $U_B \geq 15 V$, short circuit proof

180 ms
< 1,5 s
12 V - 30 V DC, reverse polarity protection
±10 %
≤ 70 mA
Brass sleeve, nickel-plated
Plastic parts: PBT
Ultrasonic transducers: polyurethane foam epoxy resin with glass content
IP65
EN 60947-5-2
5-pin M12 initiator plug, material: PBT
2 push-buttons (TouchControl)
2 3-colour LEDs
Yes, with LinkControl and LinkCopy
-20°C to +70°C
-40°C to +85°C
310 g

mic-601/D/HV/M30
100 mm
2 Hz
pnp, $U_B - 2 V$, $I_{max} = 500 mA$
switchable NOC/NCC, short circuit proof
mic-601/DD/HV/M30
100 mm
2 Hz
2 x pnp, $U_B - 2 V$, $I_{max} = 2 \times 500 mA$
switchable NOC/NCC, short circuit proof
mic-601/IU/HV/M30
 $R_L \leq 500 \Omega$, $U_B \geq 20 V$; $R_L \leq 100 \Omega$, $U_B \geq 12 V$
 $R_L \geq 100 k\Omega$, $U_B \geq 15 V$, short circuit proof

240 ms
< 1,5 s
12 V - 30 V DC, reverse polarity protection
±10 %
≤ 70 mA
Brass sleeve, nickel-plated
Plastic parts: PBT
Ultrasonic transducers: polyurethane foam epoxy resin with glass content
IP65
EN 60947-5-2
5-pin M12 initiator plug, material: PBT
2 push-buttons (TouchControl)
2 3-colour LEDs
Yes, with LinkControl and LinkCopy
-20°C to +70°C
-40°C to +85°C
360 g