



## Operating manual mic+ Ultrasonic Sensors with one analogue output and one switched output

- mic+25/DIU/TC
- mic+35/DIU/TC
- mic+130/DIU/TC
- mic+340/DIU/TC
- mic+600/DIU/TC

**Product description**

- The mic+sensor with one analogue output and one switched output measures the distance to an object within the detection zone contactless. A signal proportional to distance is created and the switched output is set according to the adjusted detect distance.
- The sensor automatically detects the load put to the analogue output and switches to current output or voltage output respectively.
- All settings are done with two push-buttons and a three-digit LED-display (TouchControl).
- Light emitting diodes (three-colour LEDs) indicate all operation conditions.
- Choosing between rising and falling output characteristic as well as output function NOC and NCC is possible.
- The sensors are adjustable manually using the numerical LED-display or may be trained using Teach-in processes.
- Useful additional functions are set in the Add-on-menu.
- Using the LinkControl adapter (optional accessory) all TouchControl and additional sensor parameter settings may be made by a Windows-Software.

**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 as safety equipment and may not be used to ensure human or machine safety!**

The mic+sensors indicate a **blind zone**, in which the distance cannot be measured. 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.

**Synchronisation**

If the assembly distances shown in Fig.1 for two or more sensors are exceeded the integrated synchronisation should be used. Connect Sync/Com-channels (pin 5 at the units acceptable) of all sensors (10 maximum).

| Symbol | Distance | Distance  |
|--------|----------|-----------|
|        | ≥ 0.35 m | ≥ 2.50 m  |
|        | ≥ 0.40 m | ≥ 2.50 m  |
|        | ≥ 1.10 m | ≥ 8.00 m  |
|        | ≥ 2.00 m | ≥ 18.00 m |
|        | ≥ 4.00 m | ≥ 30.00 m |

Fig. 1: Assembly distances, indicating synchronisation/multiplex

**Assembly instructions**

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

| Pin | Signal          | Colour |
|-----|-----------------|--------|
| 1   | +U <sub>B</sub> | brown  |
| 3   | -U <sub>B</sub> | blue   |
| 4   | D               | black  |
| 2   | IU              | white  |
| 5   | Sync/Com.       | grey   |

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

**Start-up**

mic+ sensors are delivered factory made with the following settings:

- Rising analogue characteristic
- Window margins for the analogue output set to blind zone and operating range
- Switched output on NOC
- Detecting distance at operating range
- Measurement range set to maximum range

Set the parameters of the sensor manually or use the Teach-in procedure to adjust the detect points.

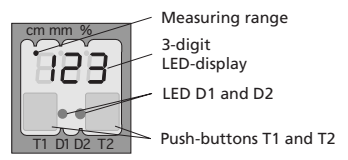


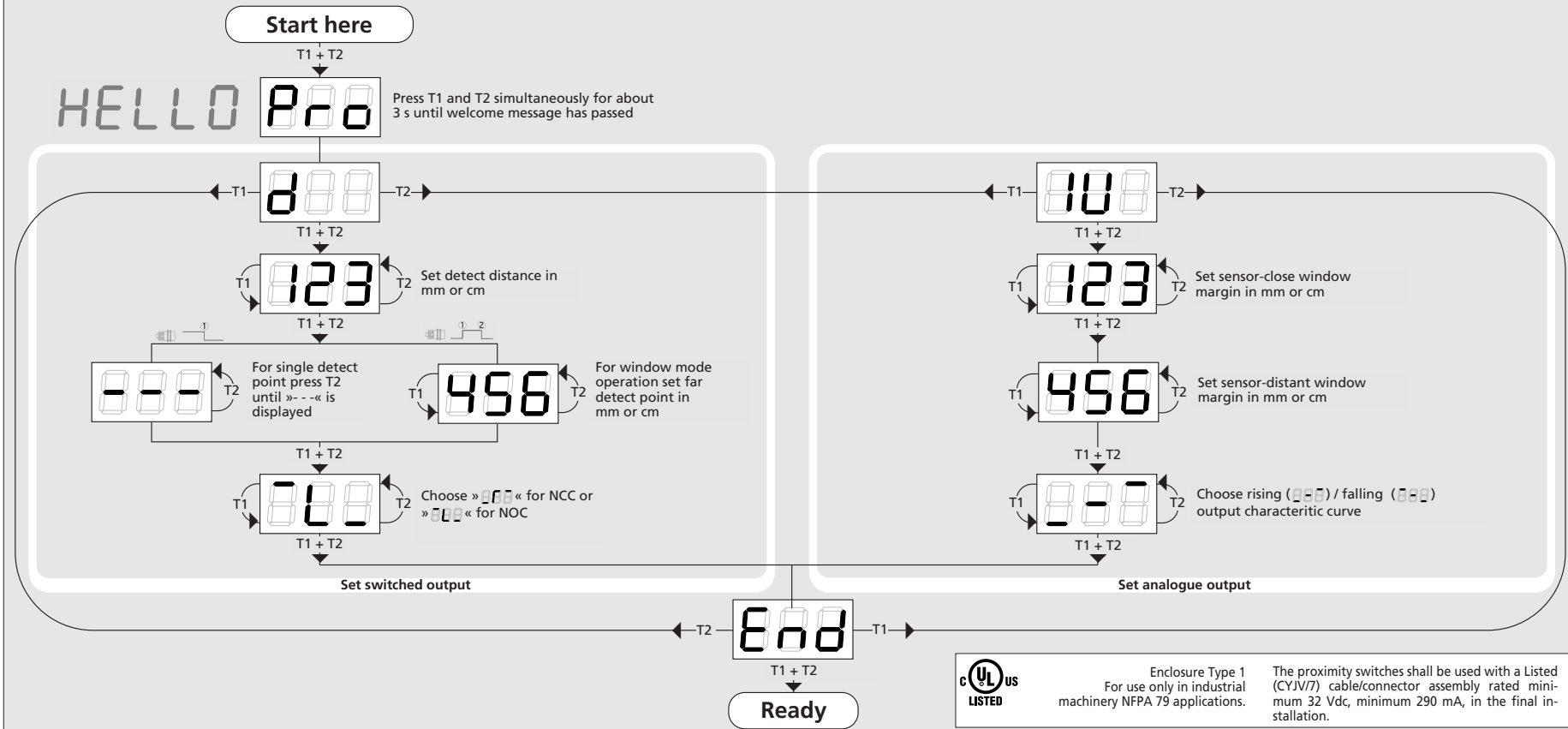
Fig. 3: TouchControl

**Operation**

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.

- 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.
  - If an object is within the set window margins of the analogue output, then LED D1 lights up green, if the object is outside the window margins, then LED D1 lights up red.
  - The load put to the analogue output is detected automatically when turning supply voltage on.
  - During normal mode operation, a yellow LED D2 signals that the switched output has connected.
  - During normal mode operation, 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. Alternatively a percentage scale may be set in the add-on menu. In this connection 0 % and 100 % correspond to the set window margins of the analogue output.
  - In the »Two-way reflective barrier« operating mode, the object has to be within the range of 0-85 % of the set distance.
  - 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 mode operation.

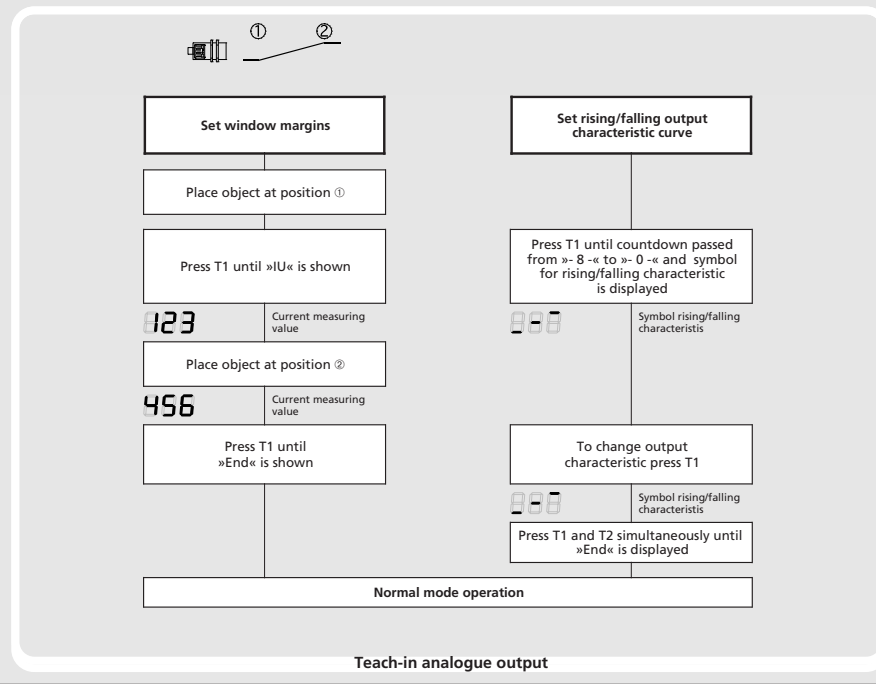
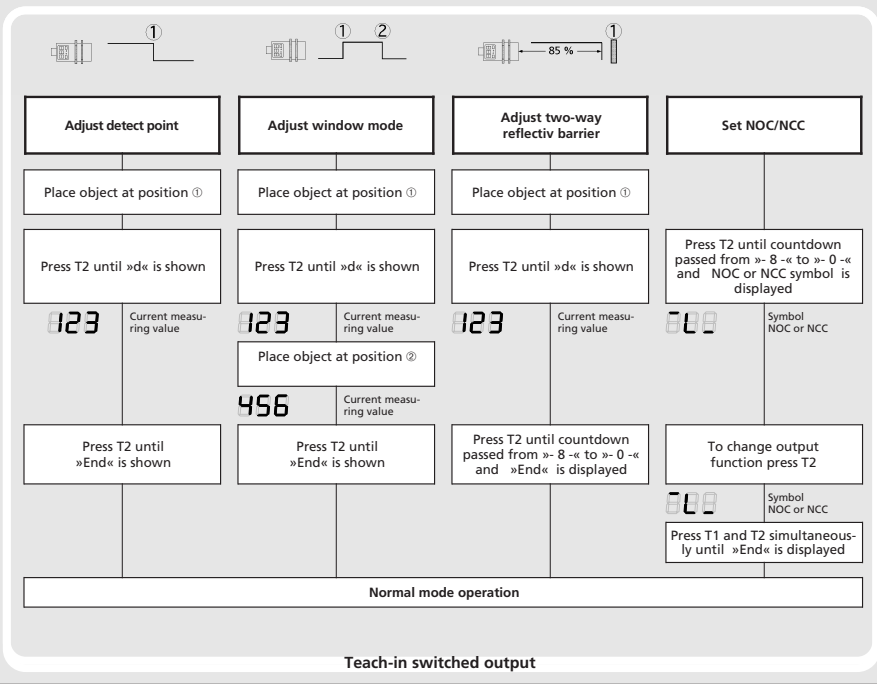
## Set sensor parameters alternatively numerically using LED-display...



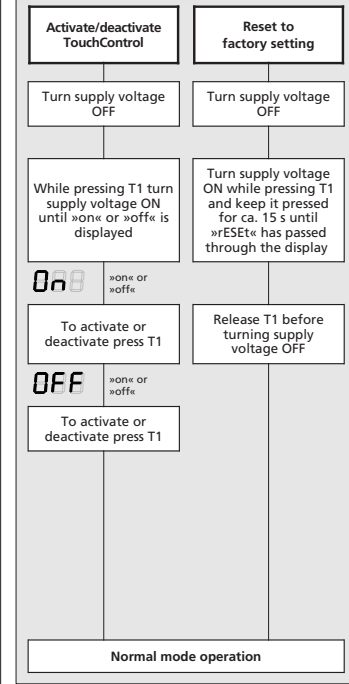
Enclosure Type 1  
For use only in industrial machinery NFPA 79 applications.

The proximity switches shall be used with a Listed (CYJV/7) cable/connector assembly rated minimum 32 Vdc, minimum 290 mA, in the final installation.

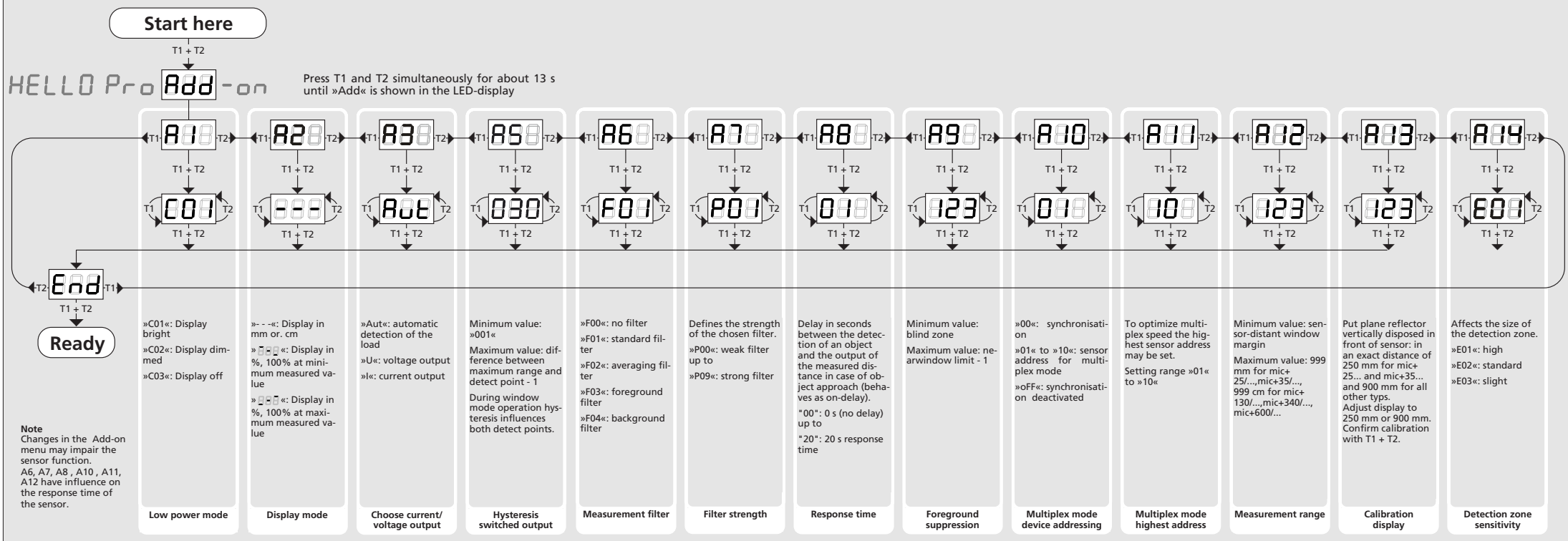
# ...or with the Teach-in procedure



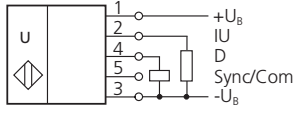
# Key lock and factory setting



# Usefull additional functions in Add-on menu (for experienced users only, settings not required for standard applications)



# Technical data



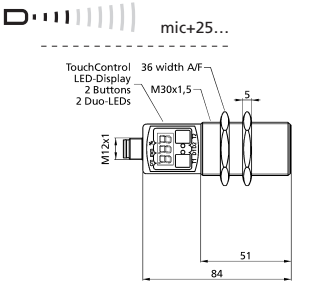
1 pnp switched output + analogue output

- blind zone
- operating range
- maximum range
- angle of beam spread
- transducer frequency
- resolution, sampling rate

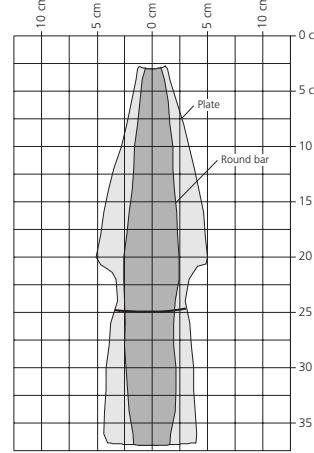
**detection zones for different objects:**  
 The dark grey areas are determined with a thin round bar (10 or 27 mm dia.) and indicate the typical operating range of a sensor. In order to obtain the light grey areas, a plate (500 x 500 mm) is introduced into the beam spread from the side. In doing so, 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.

- reproducibility
- accuracy
- operating voltage  $U_B$
- 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<sup>1)</sup>
- switching frequency<sup>1)</sup>
- response time<sup>1)</sup>
- time delay before availability

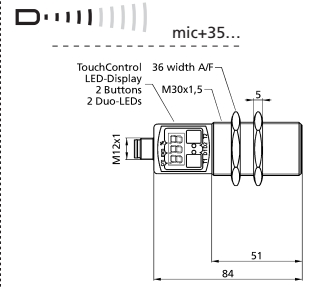
- order No.
- switched output
- current output 4 - 20 mA
- voltage output 0 - 10 V



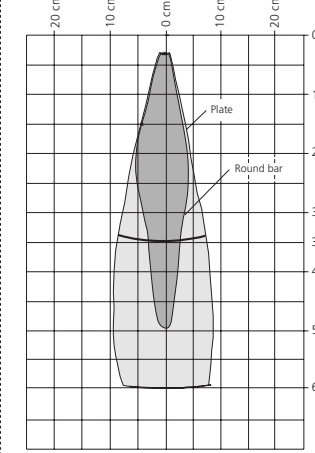
- 0 to 30 mm
- 250 mm
- 350 mm
- Please see detection zone
- 320 kHz
- 0,025 mm bis 0,10 mm, depending on the analogue window



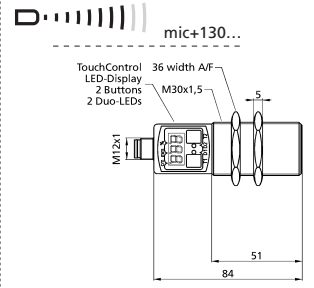
- ± 0,15 %
- ± 1 % (Temperature drift internal compensated, may be deactivated<sup>1)</sup>, 0,17%/K without compensation)
- 9 V to 30 V DC, short-circuit-proof, Class 2
- ± 10 %
- ≤ 80 mA
- Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with 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
- Yes, with TouchControl and LinkControl
- 25°C to +70°C
- 40°C to +85°C
- 150 g
- 3 mm
- 25 Hz
- 32 ms
- < 300 ms
- mic+25/DIU/TC
- pnp,  $U_B = 2 V$ ,  $I_{max} = 200 mA$
- switchable NOC/NCC, short-circuit-proof
- $R_L \leq 100 \Omega$  at  $9 V \leq U_B \leq 20 V$ ;
- $R_L \leq 500 \Omega$  at  $U_B \geq 20 V$
- Rising/falling output characteristic
- $R_L \geq 100 k\Omega$  at  $U_B \geq 15 V$ , short-circuit-proof
- Rising/falling output characteristic



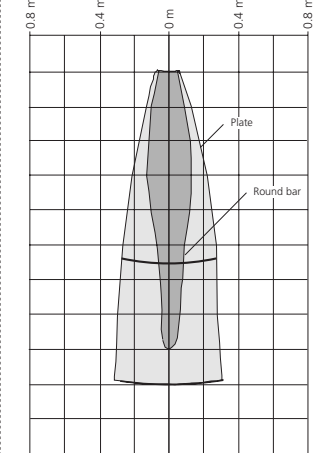
- 0 to 65 mm
- 350 mm
- 600 mm
- Please see detection zone
- 400 kHz
- 0,025 mm bis 0,17 mm, depending on the analogue window



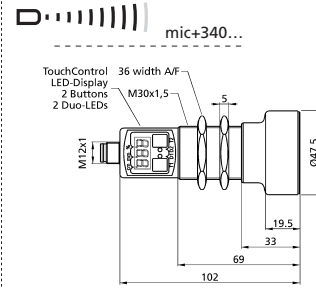
- ± 0,15 %
- ± 1 % (Temperature drift internal compensated, may be deactivated<sup>1)</sup>, 0,17%/K without compensation)
- 9 V to 30 V DC, short-circuit-proof, Class 2
- ± 10 %
- ≤ 80 mA
- Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with 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
- Yes, with TouchControl and LinkControl
- 25°C to +70°C
- 40°C to +85°C
- 150 g
- 5 mm
- 12 Hz
- 64 ms
- < 300 ms
- mic+35/DIU/TC
- pnp,  $U_B = 2 V$ ,  $I_{max} = 200 mA$
- switchable NOC/NCC, short-circuit-proof
- $R_L \leq 100 \Omega$  at  $9 V \leq U_B \leq 20 V$ ;
- $R_L \leq 500 \Omega$  at  $U_B \geq 20 V$
- Rising/falling output characteristic
- $R_L \geq 100 k\Omega$  at  $U_B \geq 15 V$ , short-circuit-proof
- Rising/falling output characteristic



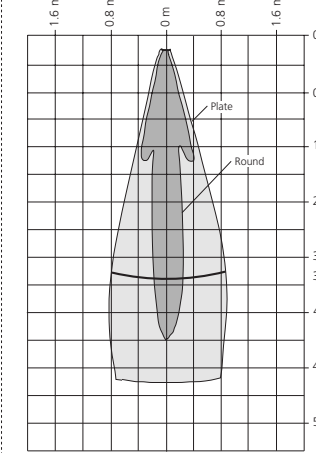
- 0 to 200 mm
- 1.300 mm
- 2.000 mm
- Please see detection zone
- 200 kHz
- 0,18 mm bis 0,57 mm, depending on the analogue window



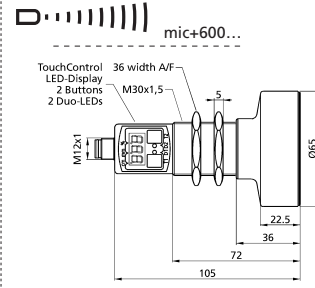
- ± 0,15 %
- ± 1 % (Temperature drift internal compensated, may be deactivated<sup>1)</sup>, 0,17%/K without compensation)
- 9 V to 30 V DC, short-circuit-proof, Class 2
- ± 10 %
- ≤ 80 mA
- Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with 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
- Yes, with TouchControl and LinkControl
- 25°C to +70°C
- 40°C to +85°C
- 150 g
- 20 mm
- 8 Hz
- 92 ms
- < 300 ms
- mic+130/DIU/TC
- pnp,  $U_B = 2 V$ ,  $I_{max} = 200 mA$
- switchable NOC/NCC, short-circuit-proof
- $R_L \leq 100 \Omega$  at  $9 V \leq U_B \leq 20 V$ ;
- $R_L \leq 500 \Omega$  at  $U_B \geq 20 V$
- Rising/falling output characteristic
- $R_L \geq 100 k\Omega$  at  $U_B \geq 15 V$ , short-circuit-proof
- Rising/falling output characteristic



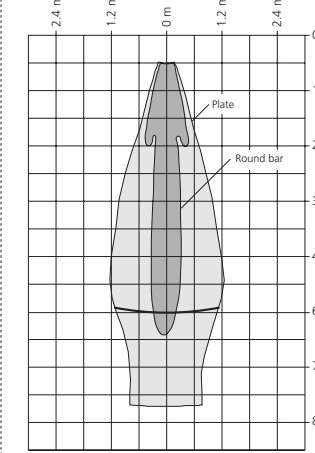
- 0 to 350 mm
- 3.400 mm
- 5.000 mm
- Please see detection zone
- 120 kHz
- 0,18 mm bis 1,50 mm, depending on the analogue window



- ± 0,15 %
- ± 1 % (Temperature drift internal compensated, may be deactivated<sup>1)</sup>, 0,17%/K without compensation)
- 9 V 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
- Yes, with TouchControl and LinkControl
- 25°C to +70°C
- 40°C to +85°C
- 210 g
- 50 mm
- 4 Hz
- 172 ms
- < 380 ms
- mic+340/DIU/TC
- pnp,  $U_B = 2 V$ ,  $I_{max} = 200 mA$
- switchable NOC/NCC, short-circuit-proof
- $R_L \leq 100 \Omega$  at  $9 V \leq U_B \leq 20 V$ ;
- $R_L \leq 500 \Omega$  at  $U_B \geq 20 V$
- Rising/falling output characteristic
- $R_L \geq 100 k\Omega$  at  $U_B \geq 15 V$ , short-circuit-proof
- Rising/falling output characteristic



- 0 to 600 mm
- 6.000 mm
- 8.000 mm
- Please see detection zone
- 80 kHz
- 0,18 mm bis 2,40 mm, depending on the analogue window



- ± 0,15 %
- ± 1 % (Temperature drift internal compensated, may be deactivated<sup>1)</sup>, 0,17%/K without compensation)
- 9 V 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
- Yes, with TouchControl and LinkControl
- 25°C to +70°C
- 40°C to +85°C
- 270 g
- 100 mm
- 3 Hz
- 240 ms
- < 450 ms
- mic+600/DIU/TC
- pnp,  $U_B = 2 V$ ,  $I_{max} = 200 mA$
- switchable NOC/NCC, short-circuit-proof
- $R_L \leq 100 \Omega$  at  $9 V \leq U_B \leq 20 V$ ;
- $R_L \leq 500 \Omega$  at  $U_B \geq 20 V$
- Rising/falling output characteristic
- $R_L \geq 100 k\Omega$  at  $U_B \geq 15 V$ , short-circuit-proof
- Rising/falling output characteristic

1) Can be programmed with TouchControl and LinkControl

