microsonic crm plus Ultrasonic Sensors with One Analogue Output Instruction Manual

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microsonic crm plus Ultrasonic Sensors with One Analogue Output

Specifications:

- **Model Variants:** crm+25/IU/TC/E, crm+35/IU/TC/E, crm+130/IU/TC/E, crm+340/IU/TC/E, crm+600/IU/TC/E
- **Output:** One analogue output
- **Transducer Surface:** Laminated with PEEK film
- **Additional Features:** Three-color LEDs, Teach-in procedure, Add-on menu

Product Description:
The crm+ sensor with one analogue output measures the distance to an object within the detection zone contactlessly. The sensor creates a signal proportional to distance based on the adjusted window limits of the analogue characteristic curve. The ultrasonic transducer surface is sealed against the housing by a PTFE joint ring, providing high resistance against aggressive substances.

Usage Instructions

Setting up the Sensor:

1. Press T1 and T2 simultaneously for about 3 seconds until the welcome message has passed.
2. Use T1 and T2 buttons to set the sensor-close window limit in mm or cm.
3. Set the sensor-distant window limit using T1 and T2 buttons.
4. Choose between rising or falling output characteristic curve using T1 and T2 buttons.

Proper Use and Safety Notes:
crm+ ultrasonic sensors are designed for non-contact detection of objects. Always read the operating instructions before startup. Connection, installation, and adjustment should be done by expert personnel only. Do not use the sensor in areas related to personal and machine protection as it does not comply with safety regulations.

Synchronization:
If using multiple sensors, ensure the assembly distance is within specified values for synchronization. Connect Sync/Com channels of all sensors for proper operation.

Multiplex Mode Installation:
Refer to Fig. 1 for assembly distances and synchronization/multiplex information. Follow the pin assignment as shown in Fig. 2 for correct installation.

Factory Settings:
The crm+ sensors are factory set with a rising analog characteristic and window limits already configured.

crm+ Ultrasonic Sensors with one analogue output

- crm+25/IU/TC/E
- crm+35/IU/TC/E
- crm+130/IU/TC/E
- crm+340/IU/TC/E
- crm+600/IU/TC/E

Product Description

- The crm+ sensor with one analogue output measures the distance to an object within the detection zone contactless. A signal proportional to distance is created according to the adjusted window limits of the analogue characteristic curve.
- The ultrasonic transducer surface of the crm+ sensors is laminated with a PEEK film. The transducer itself is sealed against the housing by a PTFE joint ring. This composition ensures a high resistance against many aggressive substances.
- All settings are done with two pushbuttons and a three-digit LED display (TouchControl).
- Three-colour LEDs indicate all operation conditions.
- Choosing between rising and falling output characteristic is possible.
- 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) and the LinkControl software for Windows®, all

Teach-in and additional sensor parameter settings can be optionally undertaken. The crm+ 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
crm+ 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).

	⊐↕⊐	⊐↔⊏
crm+25...	≥0.35 m	≥2.50 m
crm+35...	≥0.40 m	≥2.50 m
crm+130...	≥1.10 m	≥8.00 m
crm+340...	≥2.00 m	≥18.00 m
crm+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	$+U_B$	brown
3	$-U_B$	blue
4	–	black
2	I/U	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)

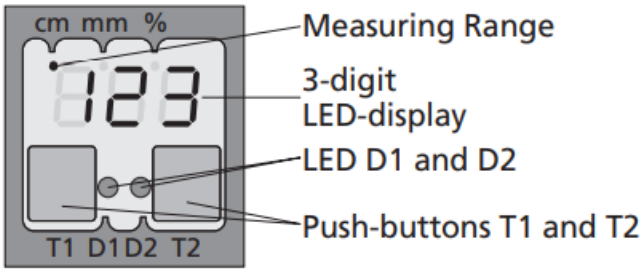
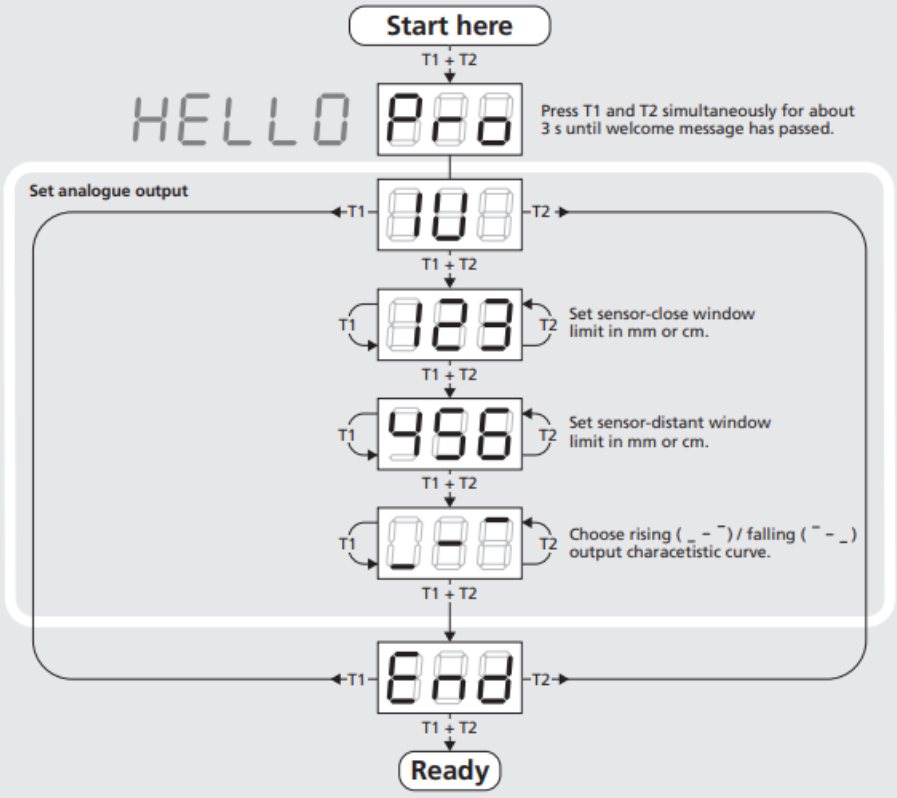


Fig. 3: TouchControl/LED display

Diagram 1: Set sensor parameters numerically using LED display



Factory setting

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

- Rising analogue characteristic
- Window limits for the analogue output set to blind zone and operating range
- Measurement range set to maximum range

Maintenance

crm+ 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

- As a result of the design the assembly of PEEK film and PTFE joint ring is not gas-proof.
- The chemical resistance has to be tested experimentally if necessary.
- crm+ 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 limits of the analogue output, then LED D1 lights up green, if the object is outside the window limits, 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, 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 limits of the analogue output.
- If no objects are placed within the detection zone the LED-indicator shows »– – –«.
- The sensor can be set to its factory setting, see Diagram 3.
- 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.

Show parameters
In normal operating mode shortlypush 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

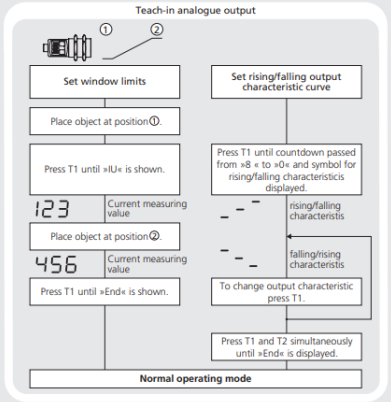


Diagram 3: Key lock and factory setting

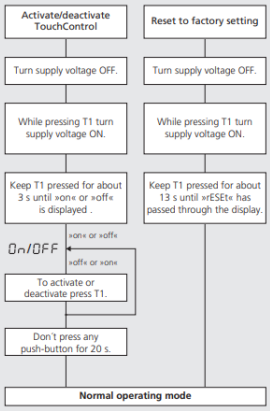
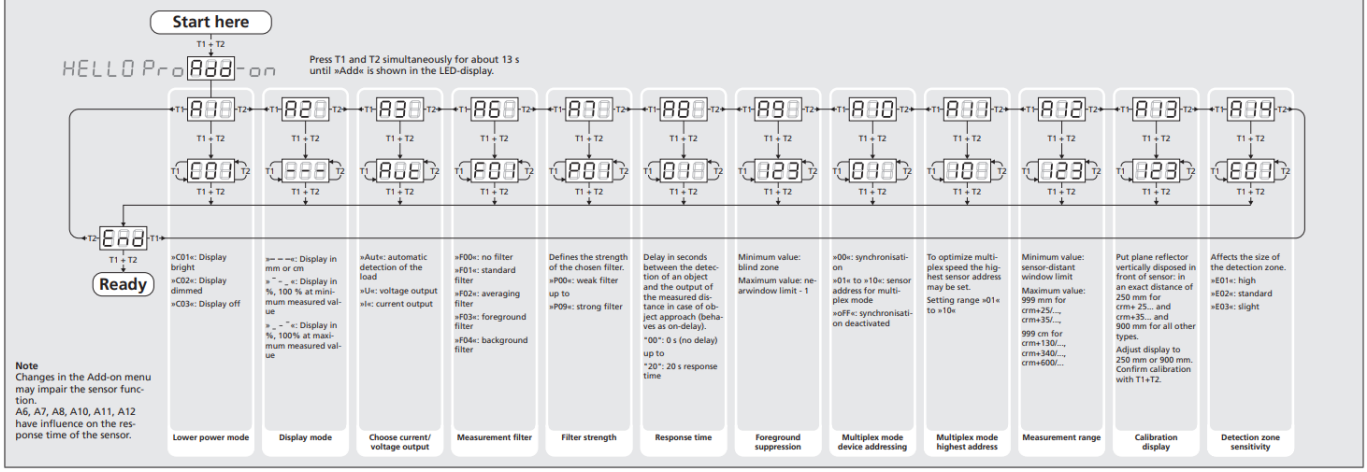
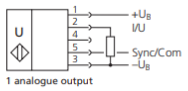
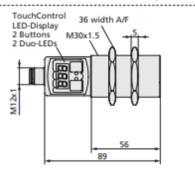


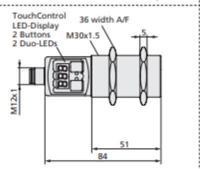
Diagram 4: Useful additional functions in Add-on menu (for experienced users only, settings not required for standard applications)

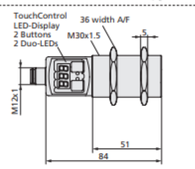


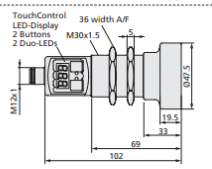
Technical data

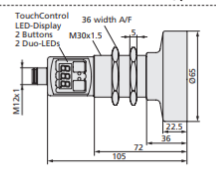




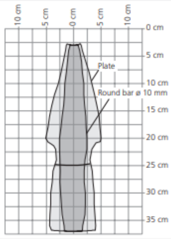


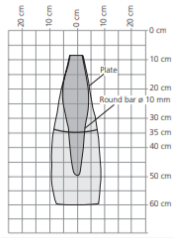


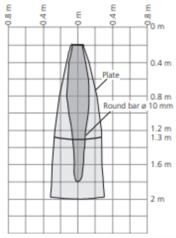


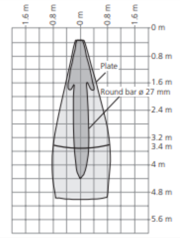


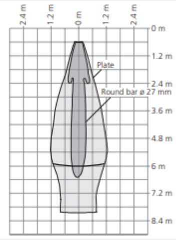
detection zones for different objects:
The dark grey areas represent the zone where it is easy to recognise the normal reflector (round bar). This indicates the typical operating range of the sensors. The light grey areas represent the zone where a very large reflector – for instance a plate – can still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











	crm+25...	crm+35...	crm+130...	crm+340...	crm+600...
blind zone	0 to 30 mm	0 bis 85 mm	0 to 200 mm	0 to 350 mm	0 to 600 mm
operating range	250 mm	350 mm	1,300 mm	3,400 mm	6,000 mm
maximum range	350 mm	600 mm	2,000 mm	5,000 mm	8,000 mm
angle of beam spread	see detection zone	see detection zone	see detection zone	see detection zone	see detection zone
transducer frequency	320 kHz	360 kHz	200 kHz	120 kHz	80 kHz
resolution	0.025 to 0.10 mm, depending on the window limits	0.025 to 0.17 mm, depending on the window limits	0.18 to 0.57 mm, depending on the window limits	0.18 to 1.5 mm, depending on the window limits	0.18 to 2.4 mm, depending on the window limits
reproducibility	±0.15 %	±0.15 %	±0.15 %	±0.15 %	±0.15 %
accuracy	±1 % (Temperature drift internal compensated, may be deactivated [2], 0.17%/K without compensation)	±1 % (Temperature drift internal compensated, may be deactivated [2], 0.17%/K without compensation)	±1 % (Temperature drift internal compensated, may be deactivated [2], 0.17%/K without compensation)	±1 % (Temperature drift internal compensated, may be deactivated [2], 0.17%/K without compensation)	±1 % (Temperature drift internal compensated, may be deactivated [2], 0.17%/K without compensation)
operating voltage U_B	9 to 30 V DC, short-circuit-proof, Class 2	9 to 30 V DC, short-circuit-proof, Class 2	9 to 30 V DC, short-circuit-proof, Class 2	9 to 30 V DC, short-circuit-proof, Class 2	9 to 30 V DC, short-circuit-proof, Class 2
voltage ripple	±10 %	±10 %	±10 %	±10 %	±10 %
no-load supply current	≤ 80 mA	≤ 80 mA	≤ 80 mA	≤ 80 mA	≤ 80 mA
housing	Stainless steel 1.4571, plastic parts: PBT, TPU; Ultrasonic transducer: PEEK film, PTFE epoxy resin with glass content	Stainless steel 1.4571, plastic parts: PBT, TPU; Ultrasonic transducer: PEEK film, PTFE epoxy resin with glass content	Stainless steel 1.4571, plastic parts: PBT, TPU; Ultrasonic transducer: PEEK film, PTFE epoxy resin with glass content	Stainless steel 1.4571, plastic parts: PBT, TPU; Ultrasonic transducer: PEEK film, PTFE epoxy resin with glass content	Stainless steel 1.4571, plastic parts: PBT, TPU; Ultrasonic transducer: PEEK film, PTFE epoxy resin with glass content
class of protection to EN 60529	IP 67	IP 67	IP 67	IP 67	IP 67
norm conformity	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
type of connection	5-pin initiator plug, PBT	5-pin initiator plug, PBT	5-pin initiator plug, PBT	5-pin initiator plug, PBT	5-pin initiator plug, PBT
controls	2 push-buttons (TouchControl)	2 push-buttons (TouchControl)	2 push-buttons (TouchControl)	2 push-buttons (TouchControl)	2 push-buttons (TouchControl)
indicators	3-digit LED display, 2 three-colour LEDs	3-digit LED display, 2 three-colour LEDs	3-digit LED display, 2 three-colour LEDs	3-digit LED display, 2 three-colour LEDs	3-digit LED display, 2 three-colour LEDs
programmable	with TouchControl and LinkControl	with TouchControl and LinkControl	with TouchControl and LinkControl	with TouchControl and LinkControl	with TouchControl and LinkControl
operating temperature	–25 to +70 °C	–25 to +70 °C	–25 to +70 °C	–25 to +70 °C	–25 to +70 °C
storage temperature	–40 to +85 °C	–40 to +85 °C	–40 to +85 °C	–40 to +85 °C	–40 to +85 °C
weight	150 g	150 g	150 g	210 g	270 g
response time [1]	32 ms	64 ms	92 ms	172 ms	240 ms
time delay before availability	<300 ms	<300 ms	<300 ms	<380 ms	<450 ms
order No.	**crm+25/IU/TC/E**	**crm+35/IU/TC/E**	**crm+130/IU/TC/E**	**crm+340/IU/TC/E**	**crm+600/IU/TC/E**
current output 4 to 20 mA	$R_L \leq 100\ \Omega$ at $9\ V \leq U_B \leq 20\ V$ $R_L \leq 500\ \Omega$ at $U_B \geq 20\ V$ Rising/falling output characteristic	$R_L \leq 100\ \Omega$ at $9\ V \leq U_B \leq 20\ V$ $R_L \leq 500\ \Omega$ at $U_B \geq 20\ V$ Rising/falling output characteristic	$R_L \leq 100\ \Omega$ at $9\ V \leq U_B \leq 20\ V$ $R_L \leq 500\ \Omega$ at $U_B \geq 20\ V$ Rising/falling output characteristic	$R_L \leq 100\ \Omega$ at $9\ V \leq U_B \leq 20\ V$ $R_L \leq 500\ \Omega$ at $U_B \geq 20\ V$ Rising/falling output characteristic	$R_L \leq 100\ \Omega$ at $9\ V \leq U_B \leq 20\ V$ $R_L \leq 500\ \Omega$ at $U_B \geq 20\ V$ Rising/falling output characteristic
voltage output 0 to 10 V	$R_L \geq 100\ k\Omega$ at $U_B \geq 15\ V$, short-circuit-proof Rising/falling output characteristic	$R_L \geq 100\ k\Omega$ at $U_B \geq 15\ V$, short-circuit-proof Rising/falling output characteristic	$R_L \geq 100\ k\Omega$ at $U_B \geq 15\ V$, short-circuit-proof Rising/falling output characteristic	$R_L \geq 100\ k\Omega$ at $U_B \geq 15\ V$, short-circuit-proof 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 via TouchControl and LinkControl.
[2] Can be deactivated via LinkControl.

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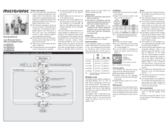
Enclosure Type 1
For use only in industrial machinery NFPA 79 applications. The proximity switches shall be used with a Listed (CYJV/7) cable/connector assembly rated minimum 32 Vdc, minimum 290 mA, in the final installation.

FAQ

Q: What is the purpose of the three-color LEDs on the sensor?
A: The three-color LEDs indicate various operation conditions of the sensor.

Q: Can the sensor measure distances through materials that absorb sound?
A: Objects that strongly absorb sound may reduce the defined operating range of the sensor.

Documents / Resources

	microsonic crm plus Ultrasonic Sensors with One Analogue Output [pdf] Instruction Manual crm 25-IU-TC-E, crm 35-IU-TC-E, crm 130-IU-TC-E, crm 340-IU-TC-E, crm 600-IU-TC-E, crm plus Ultrasonic Sensors with One Analogue Output, crm plus, Sensors, Ultrasonic Sensors, crm plus Ultrasonic Sensors, Ultrasonic Sensors with One Analogue Output

References

- microsonic | ultrasonic sensors | Made in Germany

- **User Manual**