microsonic

Operating Manual

mic+ Ultrasonic Sensors with one analogue output

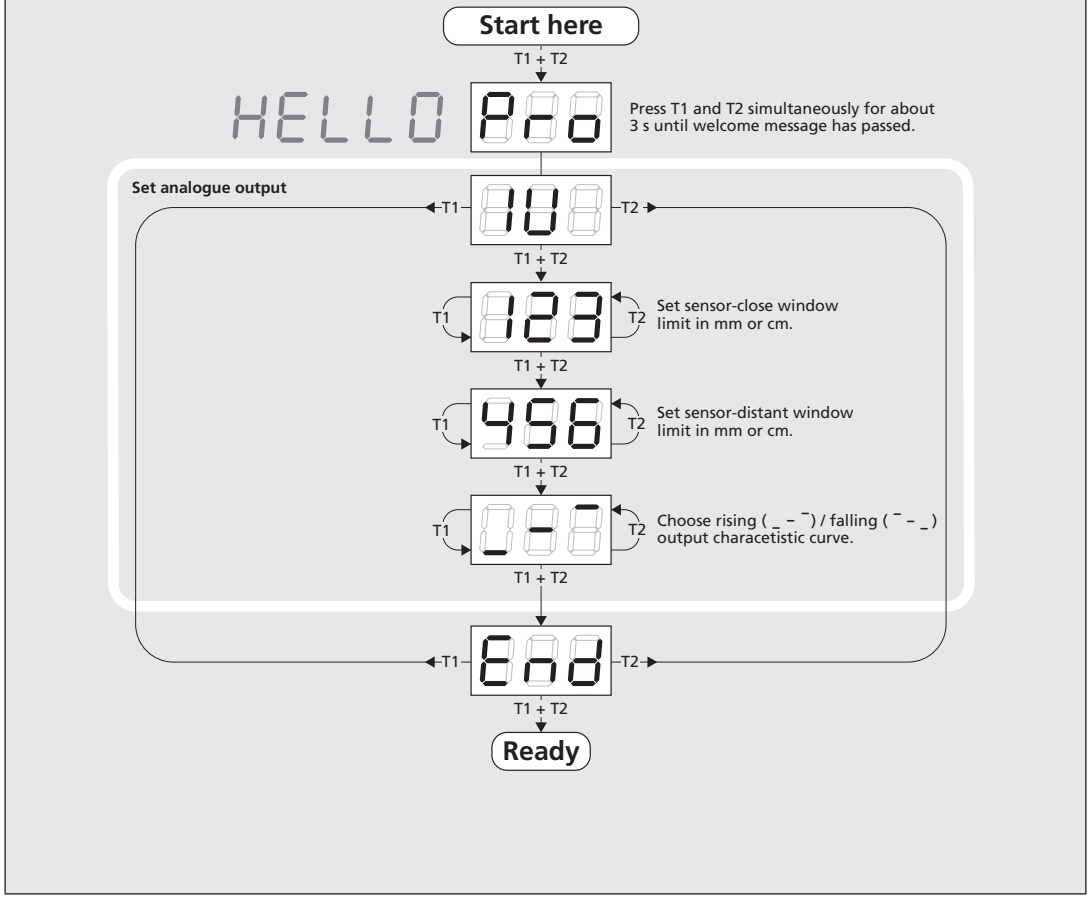
mic+25/IU/TC
mic+35/IU/TC
mic+130/IU/TC
mic+340/IU/TC
mic+600/IU/TC

Product description

- The mic+ 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 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).
- 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 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.

Diagram 1: Set sensor parameters numerically using LED display



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 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 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	$+U_B$	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).

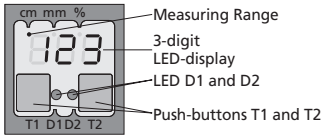


Fig. 3: TouchControl/LED display

Factory setting

mic+ 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

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.
- 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 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. 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 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

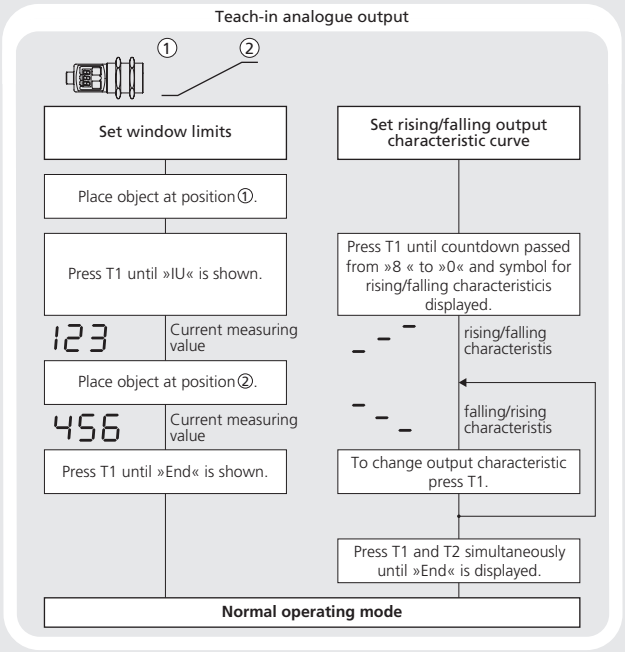


Diagram 3: Key lock and factory setting

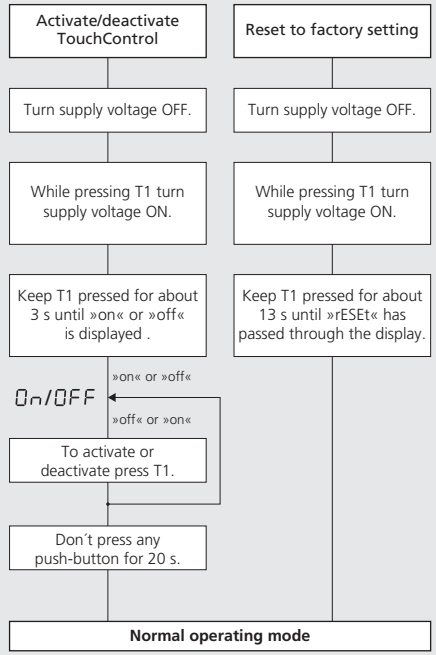
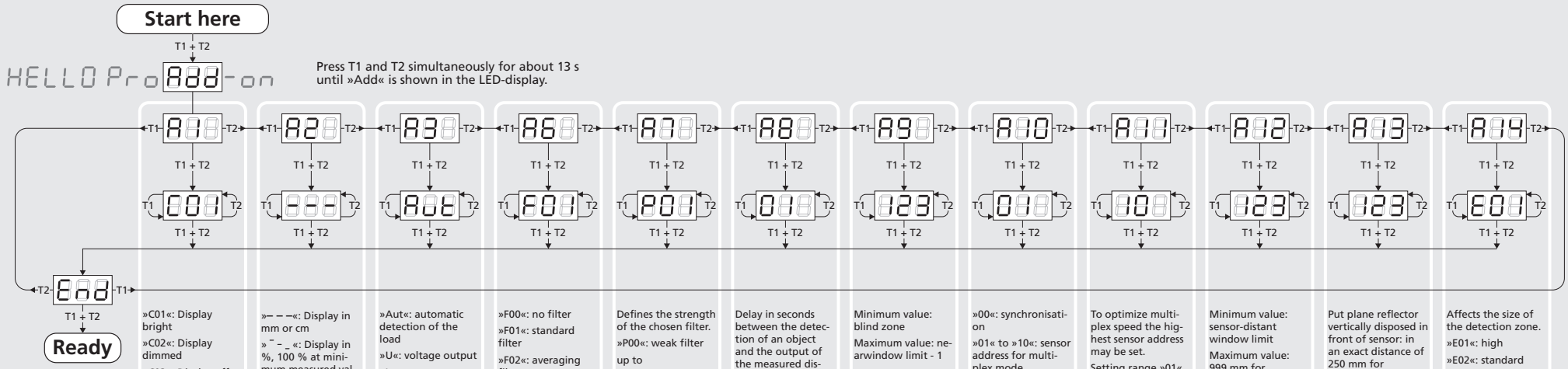


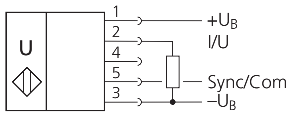
Diagram 4: Useful additional functions in Add-on menu (for experienced users only, settings not required for standard applications)



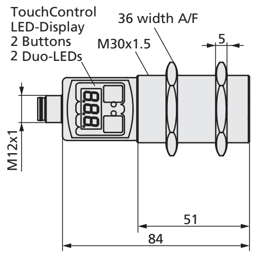
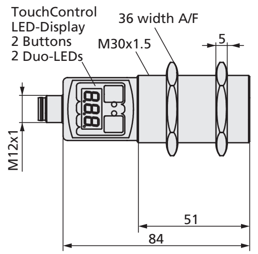
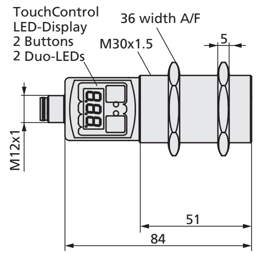
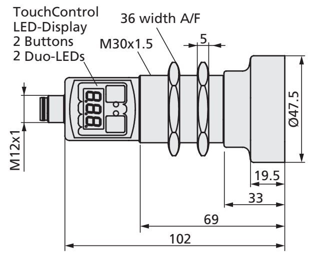
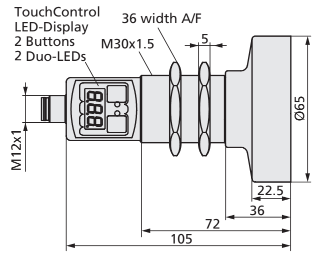
Lower power mode	Display mode	Choose current/ voltage output	Measurement filter	Filter strength	Response time	Foreground suppression	Multiplex mode device addressing	Multiplex mode highest address	Measurement range	Calibration display	Detection zone sensitivity
»C01«: Display bright »C02«: Display dimmed »C03«: Display off	»– – –«: Display in mm or cm » ¯ – _ «: Display in %, 100 % at minimum measured value » _ – ¯«: Display in %, 100% at maximum measured value	»Aut«: automatic detection of the load »U«: voltage output »I«: current output	»F00«: no filter »F01«: standard filter »F02«: averaging filter »F03«: foreground filter »F04«: background filter	Defines the strength of the chosen filter. »P00«: weak filter up to »P09«: strong filter	Delay in seconds between the detection of an object and the output of the measured distance in case of object approach (behaves as on-delay). "00": 0 s (no delay) up to "20": 20 s response time	Minimum value: blind zone Maximum value: nearwindow limit - 1	»00«: synchronisation »01« to »10«: sensor address for multiplex mode »oFF«: synchronisation deactivated	To optimize multiplex speed the highest sensor address may be set. Setting range »01« to »10«	Minimum value: sensor-distant window limit Maximum value: 999 mm for mic+25/..., mic+35/..., 999 cm for mic+130/..., mic+340/..., mic+600/...	Put plane reflector vertically disposed in front of sensor: in an exact distance of 250 mm for mic+ 25... and mic+35... and 900 mm for all other types. Adjust display to 250 mm or 900 mm. Confirm calibration with T1+T2.	Affects the size of the detection zone. »E01«: high »E02«: standard »E03«: slight

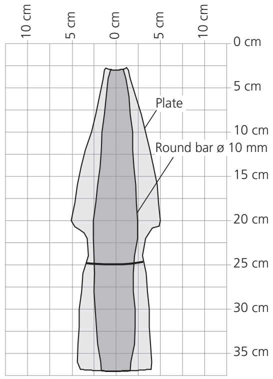
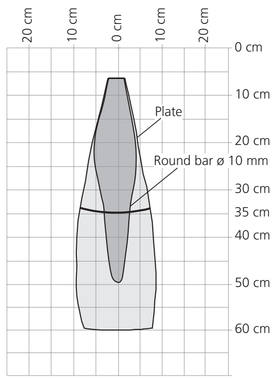
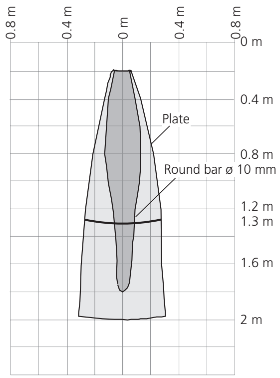
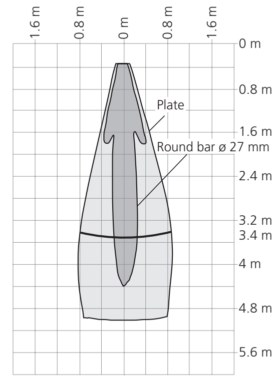
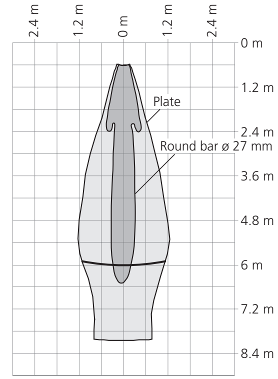
Note
Changes in the Add-on menu may impair the sensor function.
A6, A7, A8, A10, A11, A12 have influence on the response time of the sensor.

Technical data



1 analogue output

	mic+25...	mic+35...	mic+130...	mic+340...	mic+600...
					

	mic+25...	mic+35...	mic+130...	mic+340...	mic+600...
blind zone	0 to 30 mm	0 bis 65 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	400 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
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.					

	mic+25...	mic+35...	mic+130...	mic+340...	mic+600...
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	Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content	Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content	Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content	Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, epoxy resin with glass content	Brass sleeve, nickel-plated, plastic parts: PBT, TPU; Ultrasonic transducer: polyurethane foam, 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.	**mic+25/IU/TC**	**mic+35/IU/TC**	**mic+130/IU/TC**	**mic+340/IU/TC**	**mic+600/IU/TC**
current output 4 to 20 mA	$R_L \le 100\ \Omega$ at $9\ V \le U_B \le 20\ V$; $R_L \le 500\ \Omega$ at $U_B \ge 20\ V$; Rising/falling output characteristic	$R_L \le 100\ \Omega$ at $9\ V \le U_B \le 20\ V$; $R_L \le 500\ \Omega$ at $U_B \ge 20\ V$; Rising/falling output characteristic	$R_L \le 100\ \Omega$ at $9\ V \le U_B \le 20\ V$; $R_L \le 500\ \Omega$ at $U_B \ge 20\ V$; Rising/falling output characteristic	$R_L \le 100\ \Omega$ at $9\ V \le U_B \le 20\ V$; $R_L \le 500\ \Omega$ at $U_B \ge 20\ V$; Rising/falling output characteristic	$R_L \le 100\ \Omega$ at $9\ V \le U_B \le 20\ V$; $R_L \le 500\ \Omega$ at $U_B \ge 20\ V$; Rising/falling output characteristic
voltage output 0 to 10 V	$R_L \ge 100\ k\Omega$ at $U_B \ge 15\ V$, short-circuit-proof; Rising/falling output characteristic	$R_L \ge 100\ k\Omega$ at $U_B \ge 15\ V$, short-circuit-proof; Rising/falling output characteristic	$R_L \ge 100\ k\Omega$ at $U_B \ge 15\ V$, short-circuit-proof; Rising/falling output characteristic	$R_L \ge 100\ k\Omega$ at $U_B \ge 15\ V$, short-circuit-proof; Rising/falling output characteristic	$R_L \ge 100\ k\Omega$ at $U_B \ge 15\ V$, short-circuit-proof; Rising/falling output characteristic

1) Can be programmed via TouchControl and LinkControl.
2) Can be deactivated via LinkControl.

2014/30/EU

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.

Registration no. 75330-19
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