microsonic

Operating Manual

Ultrasonic proximity switch with one switching output and IO-Link

pico+15/TF/F/A
pico+25/TF/F/A
pico+35/TF/F/A
pico+100/TF/F/A

Product description

The pico+ sensor offers a non-contact measurement of the distance to an object which must be positioned within the sensor's detection zone. The switching output is set conditional upon the adjusted detect distance.
The ultrasonic transducer surface of the pico+ sensors is laminated with a PTFE film. The transducer itself is sealed against the housing by a joint ring. This composition permits measurement in up to 0.5 bar over pressure.

Via the Teach-in procedure, the detect distance and operating mode can be adjusted. Two LEDs indicate the state of the switching output.

IO-Link

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

Safety instructions

- Read the operating manual prior to start-up.
- Connection, installation and adjustments may only be carried out by qualified staff.
- No safety component in accordance with the EU Machine Directive.

Use for intended purpose only

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

Installation

➔ Mount the sensor at the place of fitting.
For the pico+100/TF/F/A we recommend not to use for mounting the first 5 mm of the M22 thread on the side of the transducer.

➔ Connect a connection cable to the M12 device plug, see Fig. 1.

		colour
1	$+U_B$	brown
3	$-U_B$	blue
4	F	black
2	–	white
5	Com	grey

Fig. 1: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cables

Start-up

➔ Connect the power supply.
➔ Carry out sensor adjustment in accordance with Diagram 1.

Factory setting

- Switching point operation
- Switching output on NOC
- Detect distance at operating range
- Multi-function input »Com« set to »Teach-in« and »synchronisation«
- Filter at F01
- Filter strength at P00

Operating modes

Three operating modes are available for the switching output:

- **Operation with one switching point**
  The switching output is set when the object falls below the set switching point.
- **Window mode**
  The switching output is set when the object is outside the set window.
- **Two-way reflective barrier**
  The switching output is set when the object is between sensor and fixed reflector.

Synchronisation

If the assembly distance of multiple sensors falls below the values shown in Fig. 2, the internal synchronisation should be used. For this purpose set the switching outputs of all sensors in accordance with Diagram 1. Then switch-on the multi-function output »Com« to »Teach-in« and »synchronisation« (see »Further settings«, Diagram 1). Finally interconnect each pin 5 of the sensors to be synchronised.

pico+15...	≥0.25 m	≥1.30 m
pico+25...	≥0.35 m	≥2.50 m
pico+35...	≥0.40 m	≥2.50 m
pico+100...	≥0.70 m	≥4.00 m

Fig. 2: Assembly distances.

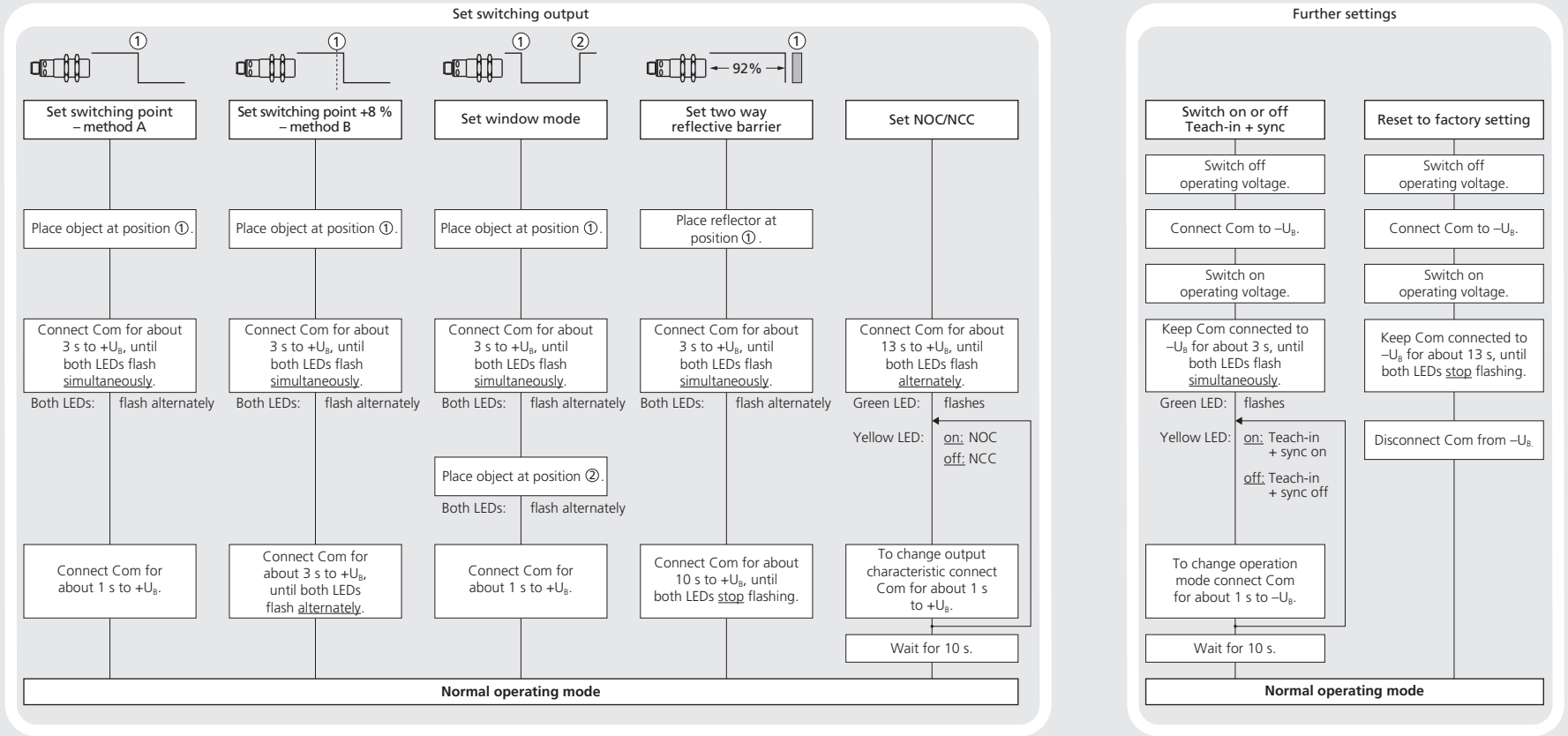
Maintenance

microsonic sensors are maintenance-free. In case of excess caked-on dirt we recommend cleaning the white sensor surface.

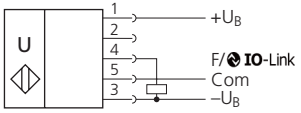
Notes

- The sensors of the pico+ family have a blind zone, within which a distance measurement is not possible.
- The pico+ sensors are equipped with an internal temperature compensation. Due to the sensors self heating, the temperature compensation reaches its optimum working-point after approx. 120 seconds of operation.
- In the normal operating mode, an illuminated yellow LED signals that the switching output is switched through.
- In the »Two-way reflective barrier« operating mode, the object has to be within the range of 0-92 % of the set distance.
- In the »Set switching point – method A« Teach-in procedure the actual distance to the object is taught to the sensor as the detect point. If the object moves towards the sensor (e.g. with level control) then the taught distance is the level at which the sensor has to switch the output.
- If the object to be scanned moves into the detection area from the

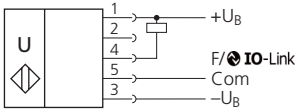
Diagram 1: Set sensor parameters via Teach-in procedure



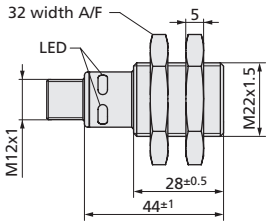
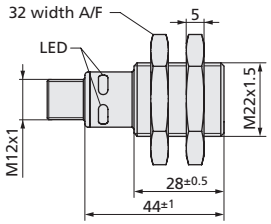
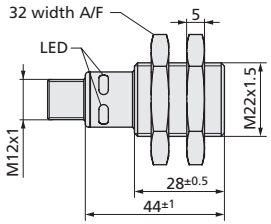
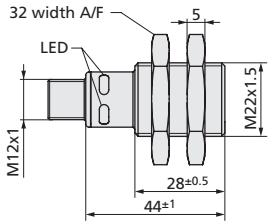
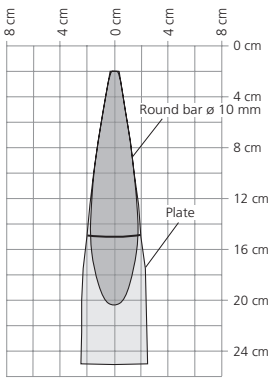
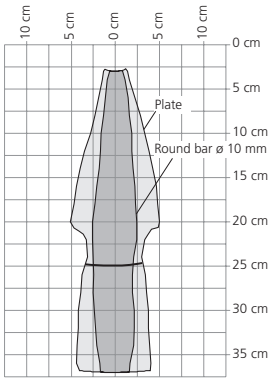
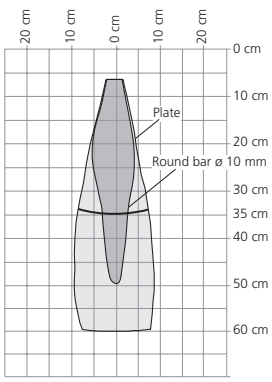
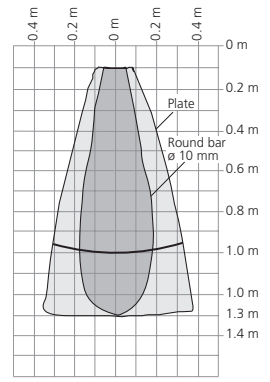
Technichal data



Push-Pull output in pnp circuit



Push-Pull output in npn circuit

	pico+15...	pico+25...	pico+35...	pico+100..
				
blind zone	20 mm	30 mm	70 mm	120 mm
operating range	150 mm	250 mm	350 mm	1,000 mm
maximum range	250 mm	350 mm	600 mm	1,300 mm
angle of beam spread	see detection zone	see detection zone	see detection zone	see detection zone
transducer frequency	380 kHz	320 kHz	400 kHz	200 kHz
resolution	0.1 mm	0.1 mm	0.1 mm	0.1 mm
reproducibility	±0.15 %	±0.15 %	±0.15 %	±0.15 %
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 regognized. The requirement here is for an optimum alignment to the sensor. It is not possible to evaluate ultrasonic reflections outside this area.				
accuracy	±1 % (temperature drift internally compensated)	±1 % (temperature drift internally compensated)	±1 % (temperature drift internally compensated)	±1 % (temperature drift internally compensated)
operating voltage U_B	10 to 30 V DC, reverse polarity protection	10 to 30 V DC, reverse polarity protection	10 to 30 V DC, reverse polarity protection	10 to 30 V DC, reverse polarity protection
voltage ripple	±10 %	±10 %	±10 %	±10 %
no-load current consumption	<50 mA	<50 mA	<50 mA	<50 mA
ambient pressure	up to 0.5 bar over pressure	up to 0.5 bar over pressure	up to 0.5 bar over pressure	up to 0.5 bar over pressure
housing	plastic parts: PVDF, PBT; ultrasonic transducer: PTFE, FFKM	plastic parts: PVDF, PBT; ultrasonic transducer: PTFE, FFKM	plastic parts: PVDF, PBT; ultrasonic transducer: PTFE, FFKM	plastic parts: PVDF, PBT; ultrasonic transducer: PTFE, FFKM
weight	30 g	30 g	30 g	30 g
class of protection per EN 60529	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
type of connection	5-pin M12 circular plug	5-pin M12 circular plug	5-pin M12 circular plug	5-pin M12 circular plug
max. tightening torque of nuts	1 Nm	1 Nm	1 Nm	1 Nm
controls	Teach-in via pin 5 (Com)	Teach-in via pin 5 (Com)	Teach-in via pin 5 (Com)	Teach-in via pin 5 (Com)
programmable	Teach-in, LinkControl, IO-Link	Teach-in, LinkControl, IO-Link	Teach-in, LinkControl, IO-Link	Teach-in, LinkControl, IO-Link
indicators	LED green, LED yellow	LED green, LED yellow	LED green, LED yellow	LED green, LED yellow
synchronisation	internal synchronisation up to 10 sensors	internal synchronisation up to 10 sensors	internal synchronisation up to 10 sensors	internal synchronisation up to 10 sensors
operating temperature	–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
switching hysteresis [1]	2 mm	3 mm	5 mm	20 mm
switching frequency [2]	25 Hz	25 Hz	12 Hz	10 Hz
response time [2]	32 ms	32 ms	64 ms	80 ms
time delay before availability	<300 ms	<300 ms	<300 ms	<300 ms
switching output	Push-Pull, UB –3 V, –UB +3 V, Imax = 100 mA switchable NOC/NCC, short-circuit-proof	Push-Pull, UB –3 V, –UB +3 V, Imax = 100 mA switchable NOC/NCC, short-circuit-proof	Push-Pull, UB –3 V, –UB +3 V, Imax = 100 mA switchable NOC/NCC, short-circuit-proof	Push-Pull, UB –3 V, –UB +3 V, Imax = 100 mA switchable NOC/NCC, short-circuit-proof
order no.	**pico+15/TF/F/A**	**pico+25/TF/F/A**	**pico+35/TF/F/A**	**pico+100/TF/F/A**

[1] Can be programmed via LinkControl and IO-Link.
[2] With LinkControl an IO-Link, the selected filter setting influences the switching frequenzy and response time.

side, the »Set switching point +8 % – method B« Teach-in procedure should be used. In this way the switching distance is set 8 % further than the actual measured distance to the object. This ensures a reliable switching distance even if the height of the objects varies slightly.

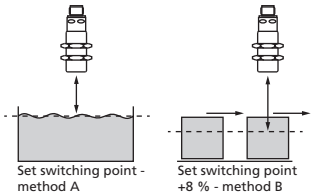


Fig. 3: Setting the switching point for different directions of movement of the object

- The sensor can be reset to its factory setting (see »Further settings«).
- Using the LinkControl adapter (optional accessory) and the LinkControl software for Windows, all Teach-in and additional sensor parameter settings can be optionally undertaken.
- If a Teach-in process is not completed, all changes are deleted after approx. 10 minutes.
- The pico+ sensors have a push-pull switching output.
- 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/pico+TF.

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