microsonic

Instruction manual

hps+ Ultrasonic Sensors for application in overpressure with two switched outputs

hps+25/DD/TC/E/G1
hps+35/DD/TC/E/G1
hps+130/DD/TC/E/G1
hps+340/DD/TC/E/G2
hps+340/DD/TC/G2

Product description
- The hps+ sensor measures the level in a vessel in up to 6 bar overpressure contactless. The G1 and G2 threaded pipe end permits the mounting and sealing of the sensor in a flange of the vessel. The pnp switched outputs are set according to the adjusted detect distances.
- The surfaces of the ultrasonic transducers of the hps+ sensors are protected by a PTFE film (Teflon film) and sealed with a FFKM O-ring against the sensor housing. Therefore the surface of the ultrasonic transducer can be cleaned from cakings or spots.
- 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 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.
- With the LinkControl- Adapter LCA-2, available as accessory, all sensor settings can be made optionally with a PC using the LinkControl 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 hps+ 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 in normal atmospheric pressure with sufficient function reserve.

Assembly instructions
▶ Assemble the sensor at the installation location.
▶ If necessary seal the sensor with the enclosed Viton O-ring (34 x 2,5 mm or 60 x 4 mm) against the flange.
▶ Plug in the connector cable to the M 12 connector.

		colour
1	+U$_B$	brown
3	-U$_B$	blue
4	D2	black
2	D1	white
5	Sync/Com.	grey

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

Start-up
hps+ sensors are delivered factory made with the following settings:
- Switched outputs on NOC.
- Detecting distances at operating range and half operating range.

- Measurement range set to maximum range.
- Sensitivity at Normal pressure.

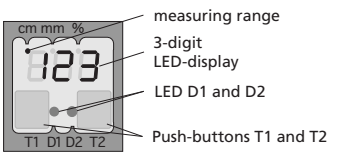Set the parameters of the sensor manually or use the Teach-in procedure to adjust the detect points.
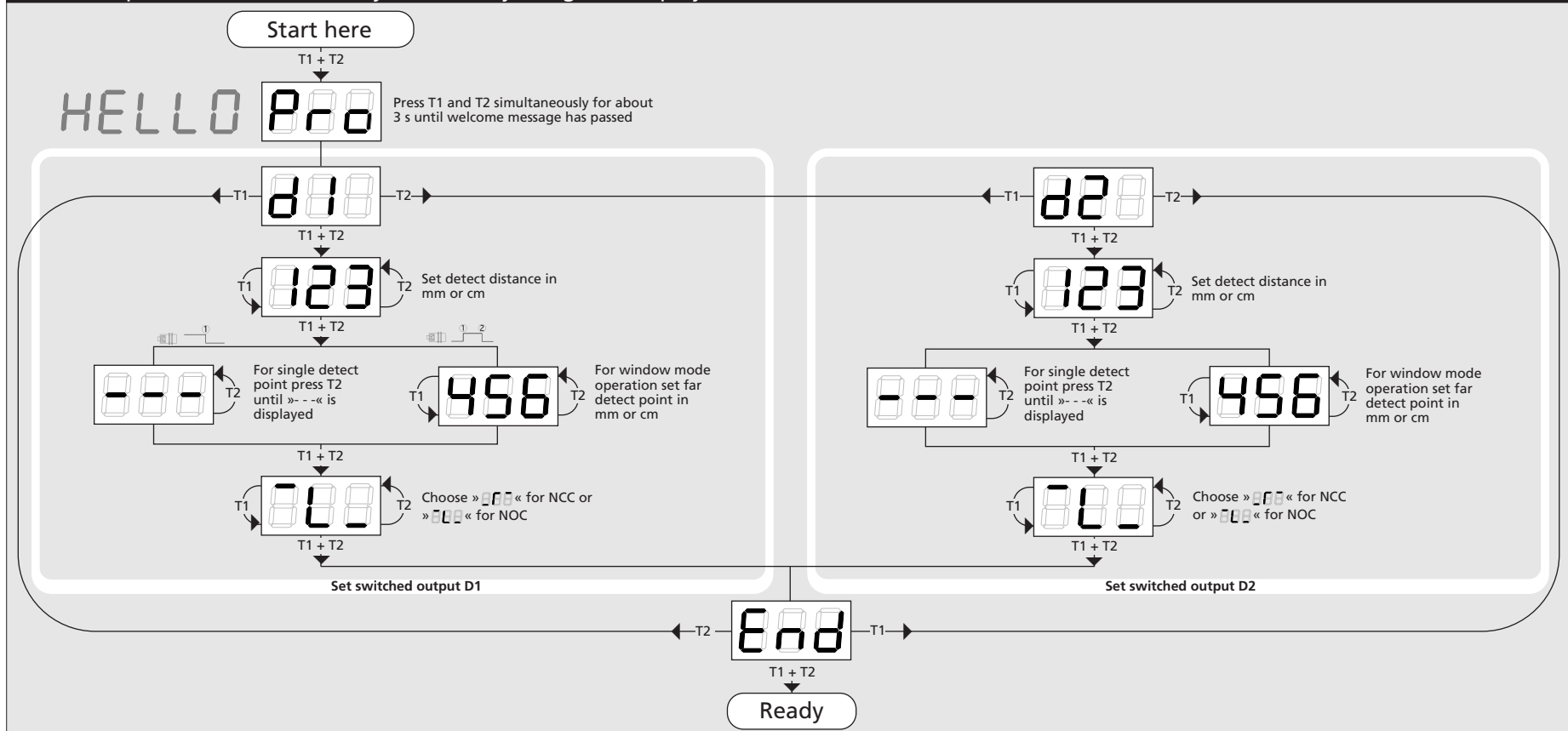

Fig. 2: TouchControl

Operation
hps+ sensors work maintenance free. Small amounts of dirt on the surface do not influence function. Thick layers of dirt and caked-on dirt affect the sensor function and therefore must be removed.

Note
- In operation in overpressure it is recommended to adjust the sensitivity of the hps+ sensor: choose the parameter A14 in the Add-on menu and set it to sensitivity E2 for atmospheric pressure from 1 to 3 bar or to sensitivity E3 for atmospheric pressure > 3 bar.
- hps+ 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 normal mode operation, a yellow LED signals that the corresponding 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.
- 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.

Show parameters
Tapping push-button T1 shortly during normal mode operation shows »PAr« on the LED-display. Each time you tap push-button T1 the actual settings of the analogue output and the switched output are shown.

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

Start here

HELLO Pro — Press T1 and T2 simultaneously for about 3 s until welcome message has passed

Set switched output D1
- d1
- 123 — Set detect distance in mm or cm
- For single detect point press T2 until »- - -« is displayed
- 456 — For window mode operation set far detect point in mm or cm
- Choose » « for NCC or » « for NOC

Set switched output D2
- d2
- 123 — Set detect distance in mm or cm
- For single detect point press T2 until »- - -« is displayed
- 456 — For window mode operation set far detect point in mm or cm
- Choose » « for NCC or » « for NOC

End

Ready

...or with the Teach-in procedure

Teach-in switched output D1

Adjust detect point D1	Adjust window mode D1	Adjust two-way reflective barrier D1	Set NOC/NCC D1
Place object at position ①	Place object at position ①	Place object at position ①	Press T1 until countdown passed from »- 8 -« to »- 0 -« and NOC or NCC symbol is displayed
Press T1 until »d« is shown	Press T1 until »d« is shown	Press T1 until »d« is shown	
123 Current measuring value	**123** Current measuring value	**123** Current measuring value	**Symbol** NOC or NCC
	Place object at position ②		
	456 Current measuring value		
Press T1 until »End« is shown	Press T1 until »End« is shown	Press T1 until countdown passed from »- 8 -« to »- 0 -« and »End« is displayed	To change output function press T1
			Symbol NOC or NCC
			Press T1 and T2 simultaneously until »End« is displayed

Normal mode operation

Teach-in switched output D2

Adjust detect point D2	Adjust window mode D2	Adjust two-way reflectiv barrier D2	Set NOC/NCC D2
Place object at position ①	Place object at position ①	Place reflector at position ①	Press T2 until countdown passed from »- 8 -« to »- 0 -« and NOC or NCC symbol is displayed
Press T2 until »d2« is shown	Press T2 until »d2« is shown	Press T2 until »d2« is shown	
123 Current measuring value	**123** Current measuring value	**123** Current measuring value	**Symbol** NOC or NCC
	Place object at position ②		
	456 Current measuring value		
Press T2 until »End« is shown	Press T2 until »End« is shown	Press T2 until countdown passed from »- 8 -« to »- 0 -« and »End« is displayed	To change output function press T2
			Symbol NOC or NCC
			Press T1 and T2 simultaneously until »End« is displayed

Normal mode operation

Key lock and factory setting

Activate/deactivate TouchControl	Reset to factory setting
Turn supply voltage OFF	Turn supply voltage OFF
While pressing T1 turn supply voltage ON until »on« or »off« is displayed	Turn supply voltage ON while pressing T1 and keep it pressed for ca. 15 s until »rESEt« has passed through the display
On »on« or »off«	Release T1 before turning supply voltage OFF
To activate or deactivate press T1	
OFF »on« or »off«	
To activate or deactivate press T1	

Normal mode operation

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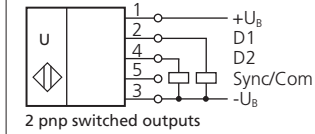
Start here

T1 + T2

HELLO Pro Add-on

Press T1 and T2 simultaneously for about 13 s until »Add« is shown in the LED-display

Menu items: A1 — A4 — A5 — A6 — A7 — A8 — A9 — A10 — A11 — A12 — A13 — A14

Values: C01 — 020 — 030 — F01 — P01 — 01 — 123 — 01 — 10 — 123 — 123 — E01

End → **Ready**

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.

Low power mode	Hysteresis switched output D1	Hysteresis switched output D2	Measurement filter	Filter strength	Response time	Foreground suppression	Multiplex mode device addressing	Multiplex mode highest address	Measurement range	Calibration display	Sensitivity
»C01«: Display bright	Minimum value: »001«	Minimum value: »001«	»F00«: no filter	Defines the strength of the chosen 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).	Minimum value: blind zone	»00«: synchronisation	To optimize multiplex speed the highest sensor address may be set.	Minimum value: sensor-distant window margin	Put plane reflector vertically disposed in front of sensor: in an exact distance of 250 mm for hps+ 25... and hps+35... and 900 mm for all other typs.	Affects the sensitivity for operation in overpreassure.
»C02«: Display dimmed	Maximum value: difference between maximum range and detect point - 1	Maximum value: difference between maximum range and detect point - 1	»F01«: standard filter	»P00«: weak filter up to		Maximum value: nearwindow limit - 1	»01« to »10«: sensor address for multiplex mode	Setting range »01« to »10«	Maximum value: 999 mm for hps+25/...,hps+35/..., 999 cm for hps+130/...,hps+340/		»E01«: normal pressure
»C03«: Display off	During window mode operation hysteresis influences both detect points.	During window mode operation hysteresis influences both detect points.	»F02«: averaging filter	»P09«: strong filter	"00": 0 s (no delay) up to		»oFF«: synchronisation deactivated			Adjust display to 250 mm or 900 mm. Confirm calibration with T1 + T2.	»E02«: 1-3 bar overpresurre
			»F03«: foreground filter		"20": 20 s response time						»E03«: > 3 bar overpreasurre
			»F04«: background filter								

2 pnp switched outputs

Connection	Pin
+U_B	1
D1	2
D2	4
Sync/Com	5
-U_B	3

	hps+25…	hps+35…	hps+130…	hps+340…	hps+340…
Blind zone	0 to 30 mm	0 to 85 mm	0 to 200 mm	0 to 350 mm	0 to 350 mm
Operating range	250 mm	350 mm	1,300 mm	3,400 mm	3,400 mm
Maximum range	990 mm	1,500 mm	5,000 mm	8,000 mm	8,000 mm
Angle of beam spread	Please see detection zone	Please see detection zone	Please see detection zone	Please see detection zone	Please see detection zone
Transducer frequency	320 kHz	320 kHz	180 kHz	120 kHz	120 kHz
Resolution, sampling rate	0.025 mm	0.18 mm	0.18 mm	0.18 mm	0.18 mm
Reproducibility	± 0,15 %	± 0,15 %	± 0,15 %	± 0,15 %	± 0,15 %
Accuracy	Temperature drift internal compensated, ≤ 2 % may be deactivated[1] (0,17%/K without compensation)	Temperature drift internal compensated, ≤ 2 % may be deactivated[1] (0,17%/K without compensation)	Temperature drift internal compensated, ≤ 2 % may be deactivated[1] (0,17%/K without compensation)	Temperature drift internal compensated, ≤ 2 % may be deactivated[1] (0,17%/K without compensation)	Temperature drift internal compensated, ≤ 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 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.

Displayed is the detection zone at standard pressure. At 1 bar overpressure the sensitivity of the sensor will increase 5 times.

	hps+25…	hps+35…	hps+130…	hps+340…	hps+340…
Operating voltage U_B	9 V to 30 V DC, short-circuit-proof	9 V to 30 V DC, short-circuit-proof	9 V to 30 V DC, short-circuit-proof	9 V to 30 V DC, short-circuit-proof	9 V to 30 V DC, short-circuit-proof
Voltage ripple	±10 %	±10 %	±10 %	±10 %	±10 %
No-load supply current	≤ 80 mA	≤ 80 mA	≤ 80 mA	≤ 80 mA	≤ 80 mA
Ambient pressure	up to 6.0 bar	up to 6.0 bar	up to 6.0 bar	up to 6.0 bar	up to 6.0 bar
Housing	Stainless steel 1.4571, plastic parts: PBT, TPU; Ultrasonic transducer: PTFE film, FFKM O-ring	Stainless steel 1.4571, plastic parts: PBT, TPU; Ultrasonic transducer: PTFE film, FFKM O-ring	Stainless steel 1.4571, plastic parts: PBT, TPU; Ultrasonic transducer: PTFE film, FFKM O-ring	Stainless steel 1.4571, plastic parts: PBT, TPU; Ultrasonic transducer: PTFE film, FFKM O-ring	Plastic parts: PVDF, PBT, TPU; Ultrasonic transducer: PTFE film, FFKM O-ring
Process connection	G1	G1	G1	G2	G2
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	Yes, with TouchControl and LinkControl	Yes, with TouchControl and LinkControl	Yes, with TouchControl and LinkControl	Yes, with TouchControl and LinkControl	Yes, with TouchControl and LinkControl
Operating temperature	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C	-25°C to +70°C
Storage temperature	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Weight	210 g	210 g	210 g	1,200 g	350 g
Switching hysteresis[1]	3 mm	5 mm	20 mm	50 mm	50 mm
switching frequency[1]	11 Hz	9 Hz	5 Hz	3 Hz	3 Hz
Response time[1]	65 ms	84 ms	160 ms	240 ms	240 ms
Time delay before availability	< 300 ms	< 300 ms	< 300 ms	< 300 ms	< 300 ms
Order No.	hps+25/DD/TC/E/G1	hps+35/DD/TC/E/G1	hps+130/DD/TC/E/G1	hps+340/DD/TC/E/G2	hps+340/DD/TC/G2
Switched output	2 x pnp, U_B - 2 V, I_{max} = 2 x 200 mA switchable NOC/NCC, short-circuit-proof	2 x pnp, U_B - 2 V, I_{max} = 2 x 200 mA switchable NOC/NCC, short-circuit-proof	2 x pnp, U_B - 2 V, I_{max} = 2 x 200 mA switchable NOC/NCC, short-circuit-proof	2 x pnp, U_B - 2 V, I_{max} = 2 x 200 mA switchable NOC/NCC, short-circuit-proof	2 x pnp, U_B - 2 V, I_{max} = 2 x 200 mA switchable NOC/NCC, short-circuit-proof

1) Can be programmed with TouchControl and LinkControl