

BALLUFF

Ultrasonic Sensors



Instruction manual

BUS M30 Ultrasonic Sensor with two switched outputs

BUS M30 M1-PWX-03/025-S92K
BUS M30 M1-PWX-07/035-S92K
BUS M30 M1-PWX-20/130-S92K
BUS M30 M1-PWX-35/340-S92K
BUS M30 M1-PWX-60/600-S92K

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BUS M30 M1-NWX-60/600-S92K

Product description

- The BUS M30 sensor with two switched outputs measures the distance to an object within the detection zone contactless. Depending on the adjusted detect distance the switched outputs are set.
- All settings are done with two push-buttons and a three-digit LED-display (TouchControl).
- Light emitting diodes (three-colour LEDs) indicate the switching status.
- The output functions are changeable from NOC to NCC.
- 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.

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 BUS M30 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 receptable) of all sensors (10 maximum).

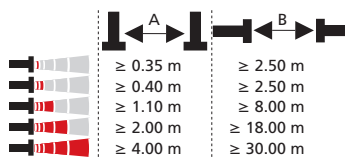


Fig. 1: Assembly distances, indicating synchronisation/multiplex

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«.)

Assembly instructions

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

		colour
1	+U _S	brown
3	0 V	blue
4	Out 2	black
2	Out 1	white
5	Sync/Com.	grey

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

Start-up
BUS M30 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

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

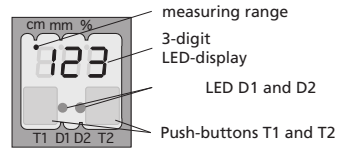


Fig. 3: TouchControl

Operation

BUS M30 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.

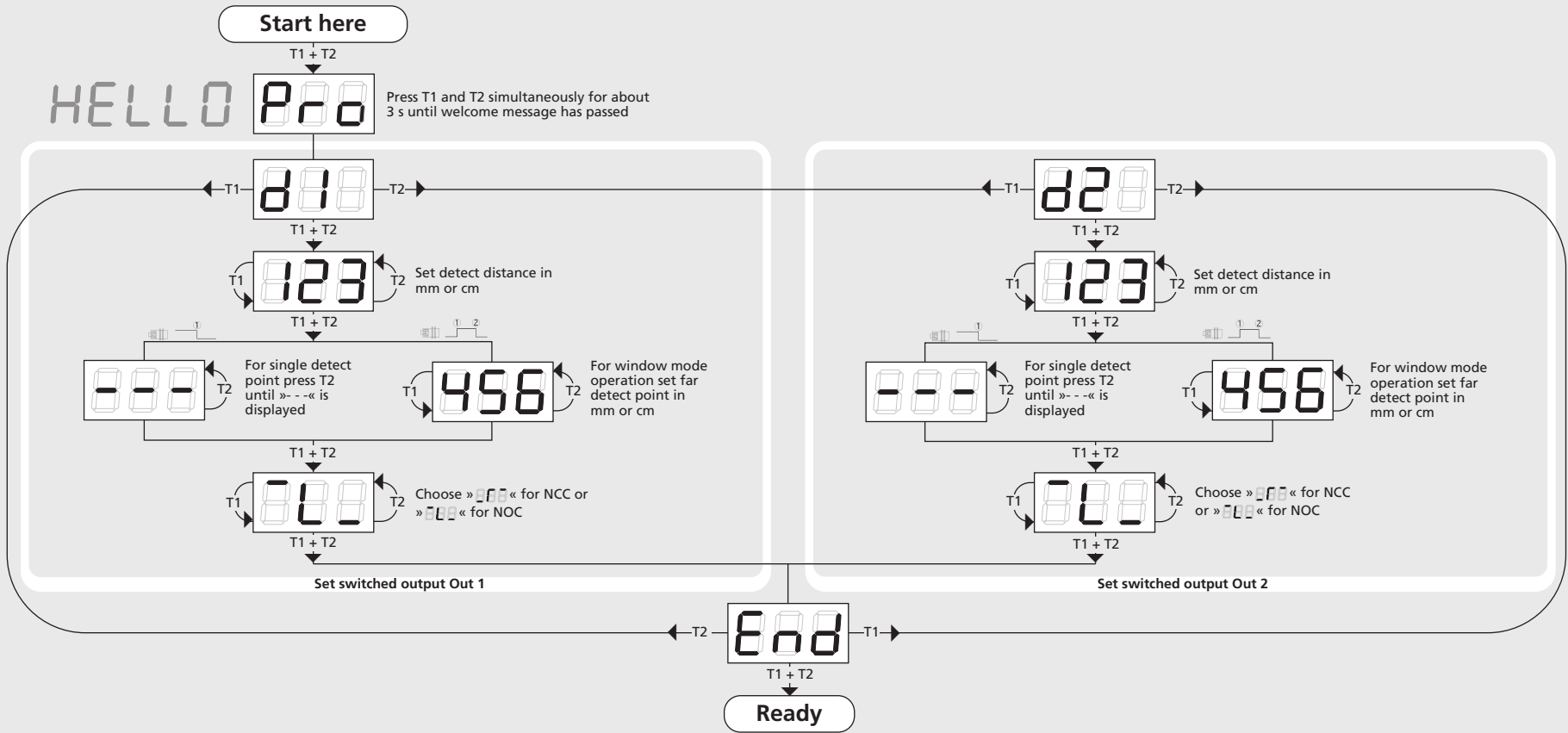
Note

- BUS M30 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.
- You can lock the key pad to provide inputs, see »Key lock and factory setting«.
- You can reset the factory settings at any time, see »Key lock and factory setting«.

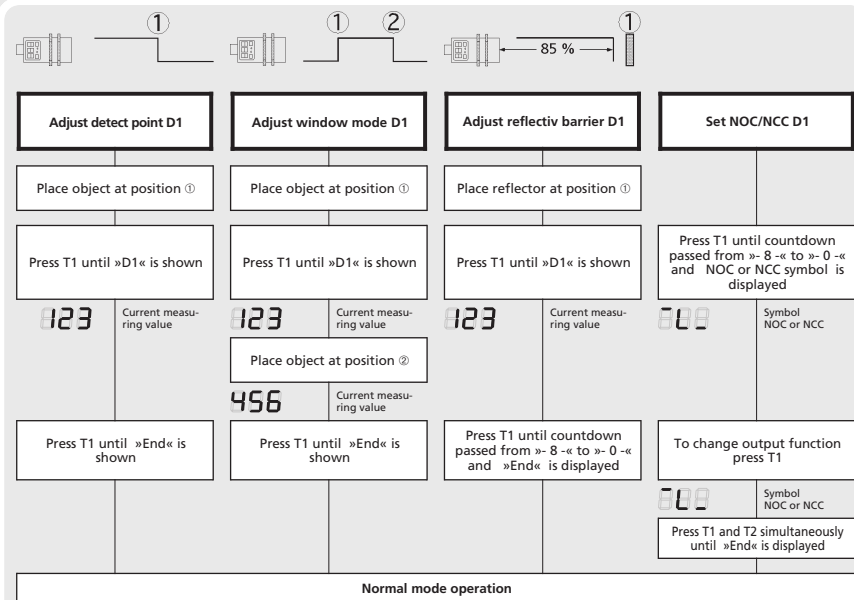
Show parameters

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 switched outputs are shown.

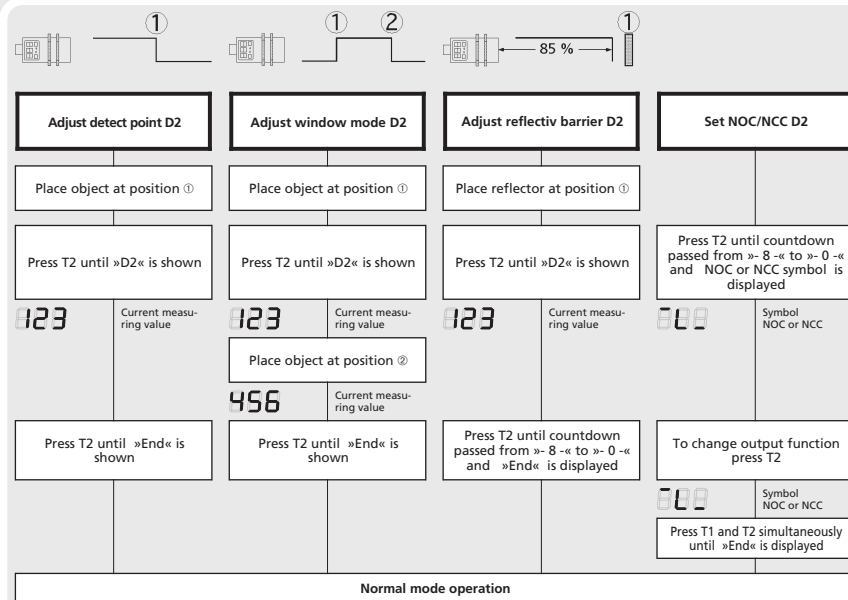
Set sensor parameters alternatively numerically using LED-display...



...or with the Teach-in procedure

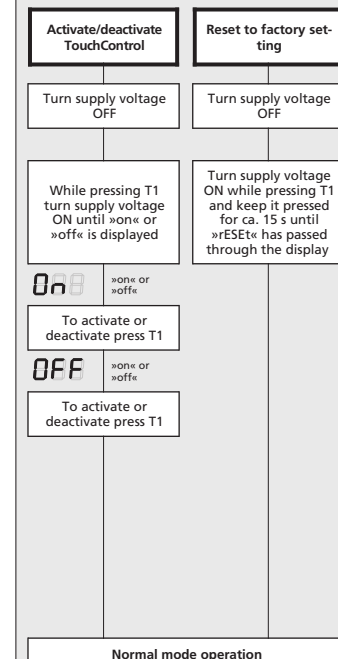


Teach-in switched output D1

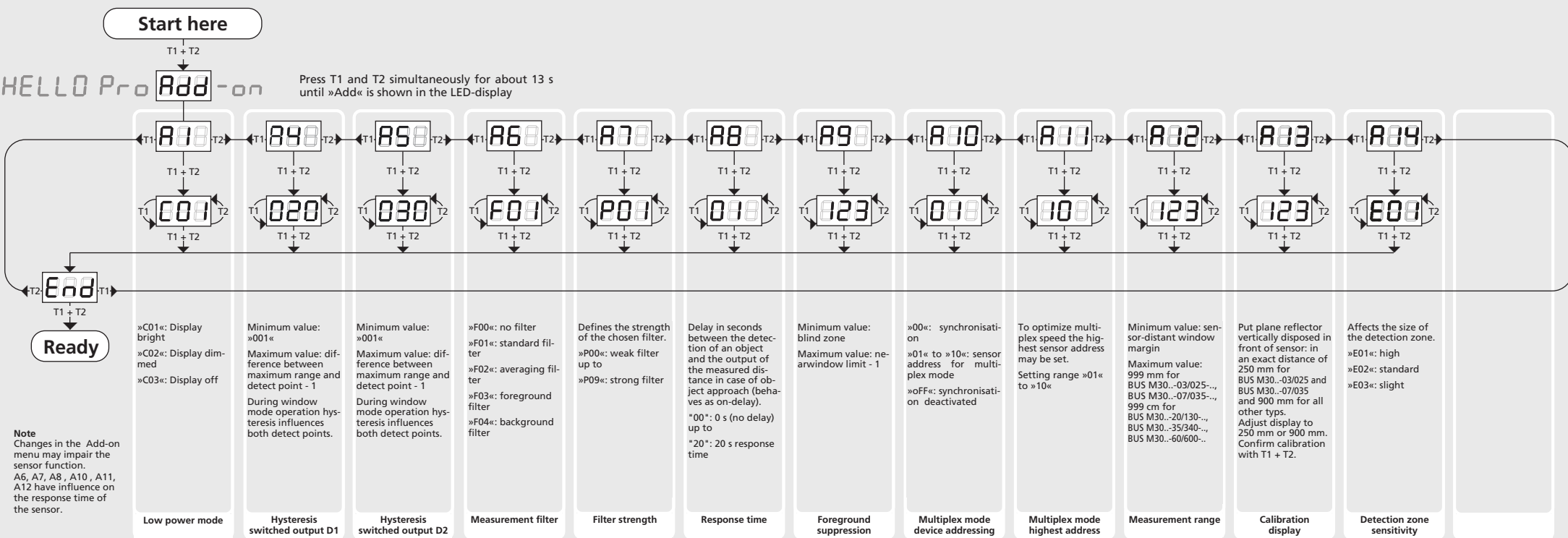


Teach-in switched output D2

Key lock and factory setting

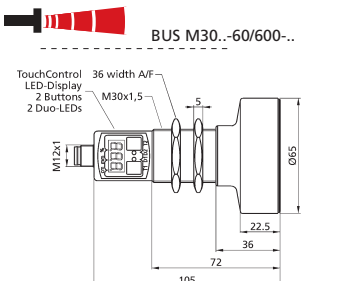
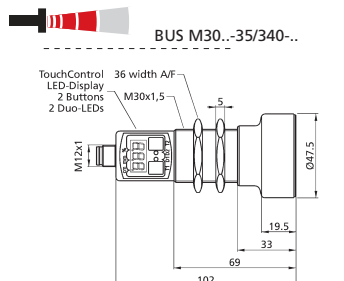
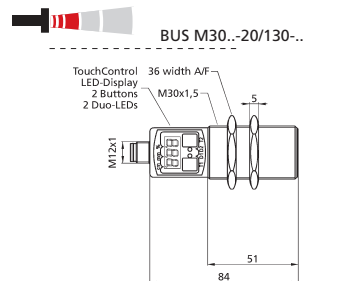
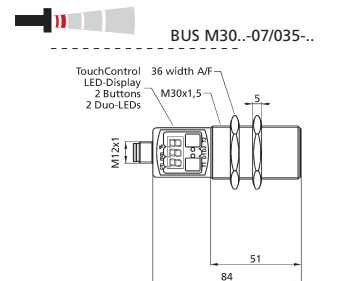
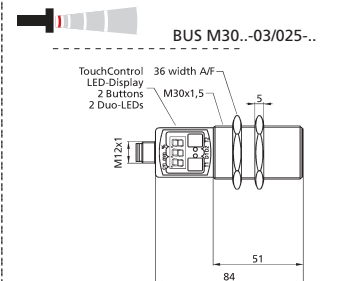
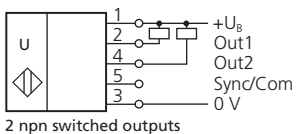
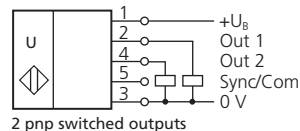


Usefull additional functions in Add-on menu (settings not required for standard applications)

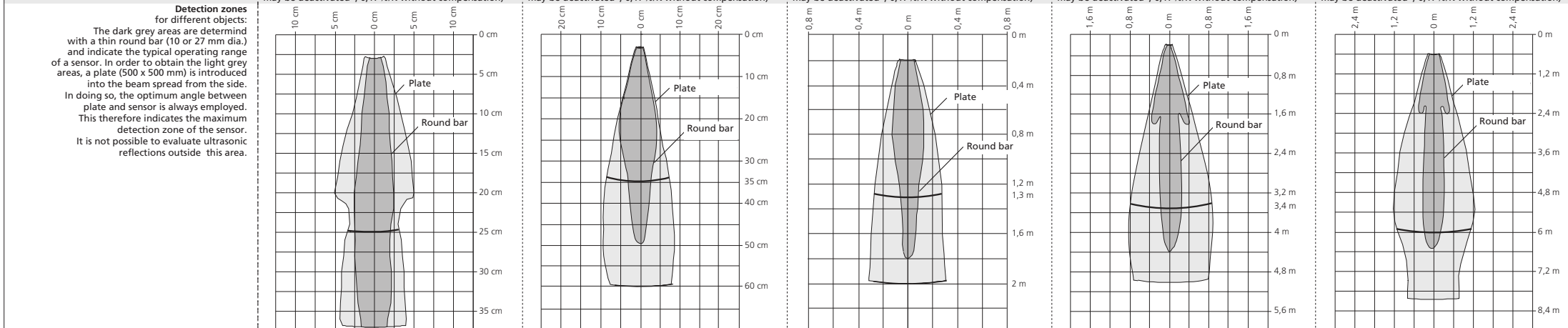


Note
Changes in the Add-on menu may impair the sensor function.
A6, A7, A8, A10, A11, A12 have influence on the response time of the sensor.

Technical data



Blind zone	0 to 30 mm	0 to 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	Please see detection zone	Please see detection zone	Please see detection zone	Please see detection zone	Please see detection zone
Transducer frequency	320 kHz	400 kHz	200 kHz	120 kHz	80 kHz
Resolution	0,025 mm	0,025 mm	0,18 mm	0,18 mm	0,18 mm
Reproducibility	± 0,15 %	± 0,15 %	± 0,15 %	± 0,15 %	± 0,15 %
Accuracy	± 1 % (Temperature drift internal compensated, may be deactivated ¹⁾ , 0,17%/K without compensation)	± 1 % (Temperature drift internal compensated, may be deactivated ¹⁾ , 0,17%/K without compensation)	± 1 % (Temperature drift internal compensated, may be deactivated ¹⁾ , 0,17%/K without compensation)	± 1 % (Temperature drift internal compensated, may be deactivated ¹⁾ , 0,17%/K without compensation)	± 1 % (Temperature drift internal compensated, may be deactivated ¹⁾ , 0,17%/K without compensation)



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
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 plug	5-pin plug	5-pin plug	5-pin plug	5-pin plug
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	Yes, with TouchControl	Yes, with TouchControl	Yes, with TouchControl	Yes, with TouchControl
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	150 g	150 g	150 g	210 g	270 g
switching hysteresis¹⁾	3 mm	5 mm	20 mm	50 mm	100 mm
switching frequency¹⁾	25 Hz	12 Hz	8 Hz	4 Hz	3 Hz
Response time¹⁾	32 ms	64 ms	92 ms	172 ms	240 ms
Time delay before availability	< 300 ms	< 300 ms	< 300 ms	< 300 ms	< 300 ms
Order No.	BUS M30M1-PWX-03/025-S92K	BUS M30M1-PWX-07/035-S92K	BUS M30M1-PWX-20/130-S92K	BUS M30M1-PWX-35/340-S92K	BUS M30M1-PWX-60/600-S92K
Order code	BUS002R	BUS005H	BUS003C	BUS003W	BUS003Z
Switched output	2 x npn, U_B - 2 V, $I_{max} = 2 \times 200$ mA, switchable NOC/NCC, short-circuit-proof	2 x npn, U_B - 2 V, $I_{max} = 2 \times 200$ mA	2 x npn, U_B - 2 V, $I_{max} = 2 \times 200$ mA, switchable NOC/NCC, short-circuit-proof	2 x npn, U_B - 2 V, $I_{max} = 2 \times 200$ mA, switchable NOC/NCC, short-circuit-proof	2 x npn, U_B - 2 V, $I_{max} = 2 \times 200$ mA, switchable NOC/NCC, short-circuit-proof
Order No.	BUS M30M1-NWX-03/025-S92K	BUS M30M1-NWX-07/035-S92K	BUS M30M1-NWX-20/130-S92K	BUS M30M1-NWX-35/340-S92K	BUS M30M1-NWX-60/600-S92K
Order code	BUS002H	BUS005R	BUS003S	BUS0046	BUS005S
Switched output	2 x npn, 0 V + 2 V, $I_{max} = 2 \times 200$ mA, switchable NOC/NCC, short-circuit-proof	2 x npn, 0 V + 2 V, $I_{max} = 2 \times 200$ mA, switchable NOC/NCC, short-circuit-proof	2 x npn, 0 V + 2 V, $I_{max} = 2 \times 200$ mA, switchable NOC/NCC, short-circuit-proof	2 x npn, 0 V + 2 V, $I_{max} = 2 \times 200$ mA, switchable NOC/NCC, short-circuit-proof	2 x npn, 0 V + 2 V, $I_{max} = 2 \times 200$ mA, switchable NOC/NCC, short-circuit-proof

1) Can be programmed with TouchControl

