



Operation manual vnp-Ultrasonic Sensors with two switched outputs

- vnp-25/DD/TC
- vnp-35/DD/TC
- vnp-130/DD/TC
- vnp-340/DD/TC
- vnp-600/DD/TC

Product description

- The vnp-sensor with two switched outputs measures the distance to an object within the detection zone contactless. Depending on the adjusted detect points the switched outputs are set.
- The actual detect points arise from a virtual origin set with the Teach-in procedure and offsets that are set numerically using two push-buttons and a three-digit LED-display (TouchControl). As an additional feature the virtual origin can be shifted continuously by connecting the control input line »Sync/Com« at pin 5 of the sensor connector to +U_B.
- Light emitting diodes (three-colour LEDs) indicate the switching status.
- The output functions are changeable from NOC to NCC.
- Useful additional functions are set in the Add-on-menu.
- The measured distance value can be displayed relatively in relation to the virtual origin (see Add-on-menu).
- Using the LinkControl adapter (optional accessory) all TouchControl and additional sensor parameter settings may be made by a Windows-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 vnp-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).

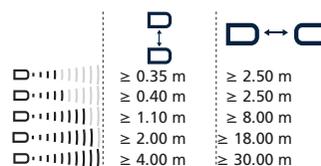


Fig. 1: Assembly distances, indicating synchronisation/multiplex

Multiplex mode

The Add-on-menu allows to assign an individual address »01« to »10« to each sensor connected via the »Sync/Com« line (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.

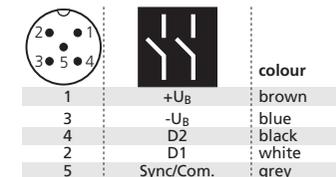


Fig. 2: Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

Start-up

- vnp-sensors are delivered factory made with the following settings:
- Switched outputs on NOC
- Offsets at 10 cm
- Measurement range set to maximum range

Set the parameters of the sensor manually to adjust the relative detect points (offsets).

- The offsets can be programmed in the range of ± 99 cm around the teachable origin.
- For offsets less than 10 cm the programmable resolution is 1 mm.

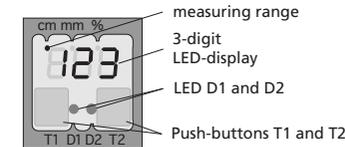


Fig. 3: TouchControl

Operation

By connecting the control input line »Sync/Com« at pin 5 for 3 seconds to + U_B the virtual origin is set to the actually measured distance. This has to be done in normal operation mode. vnp-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.

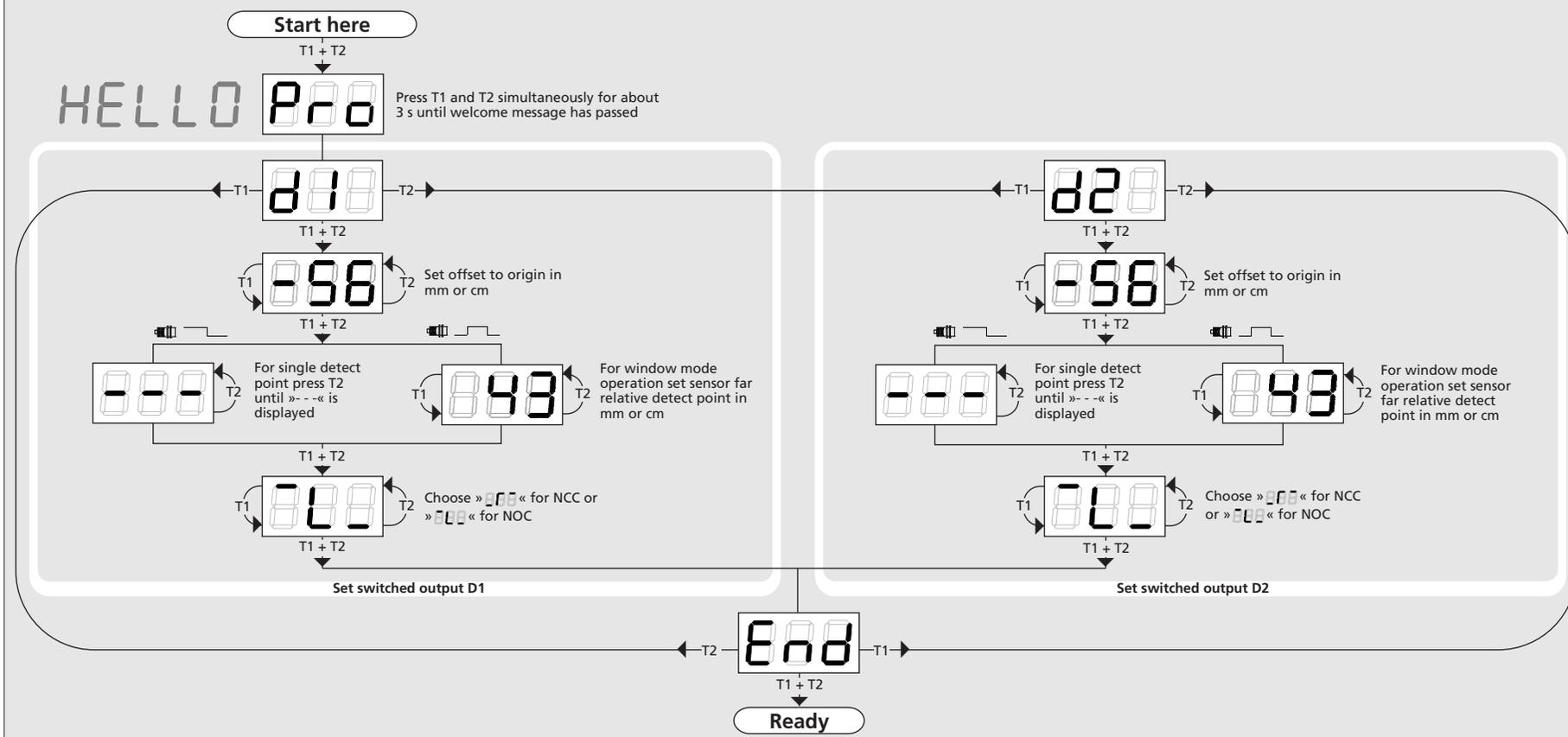
Note

- vnp-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«.

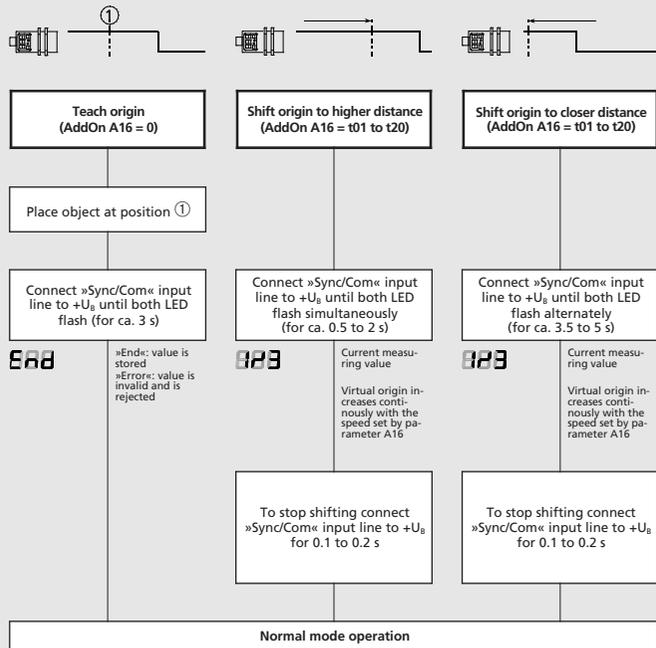
Show parameters

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.

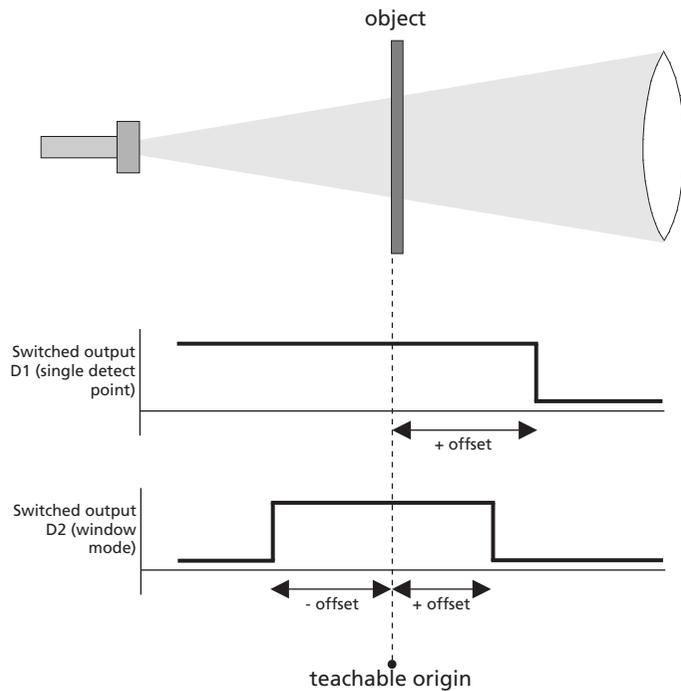
Set the offsets to origin numerically using LED-display...



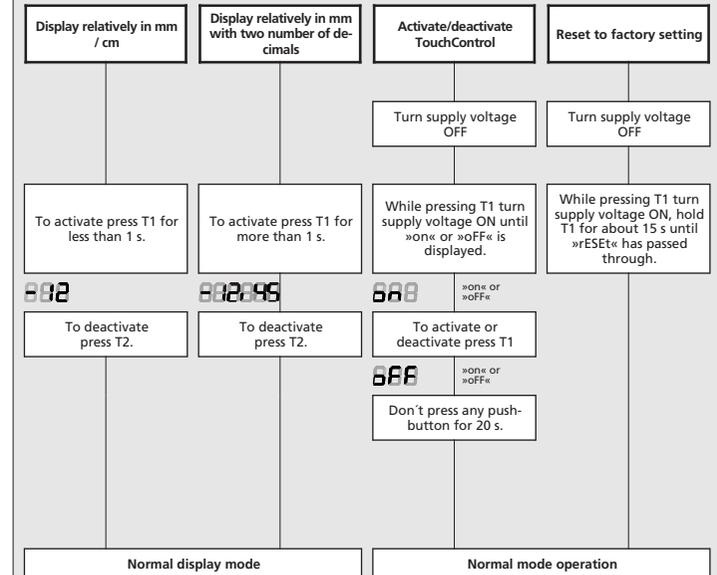
...then adjust origin with the Teach-in procedure



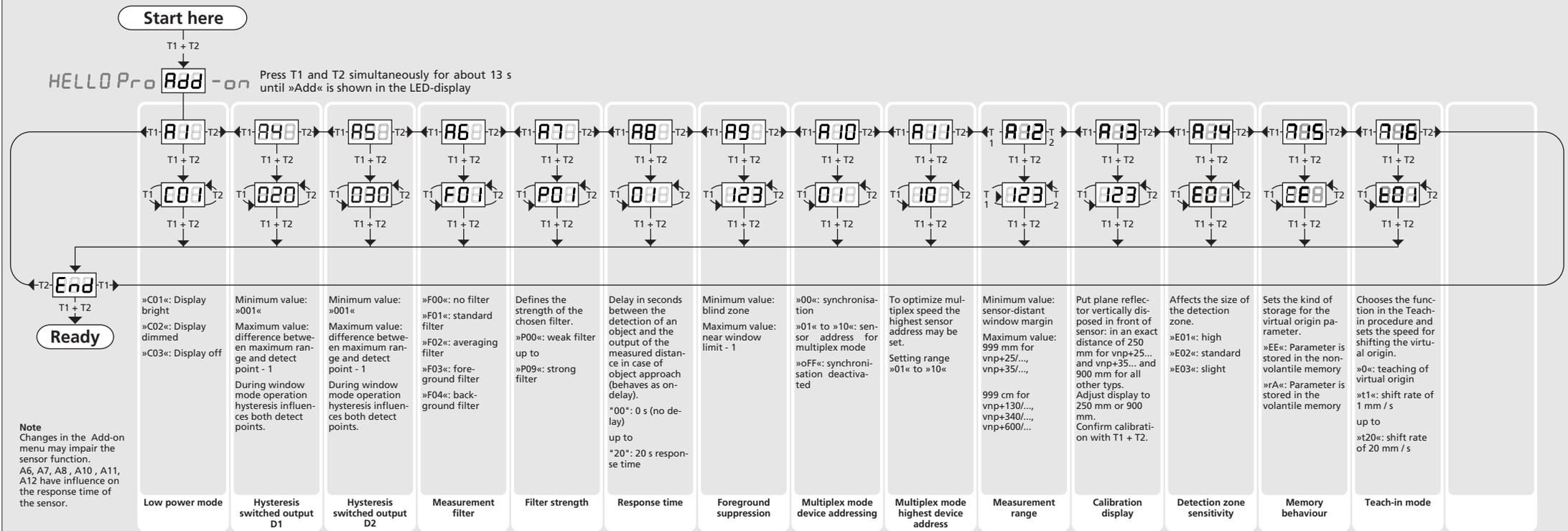
Example for numerically set offsets and taught origin



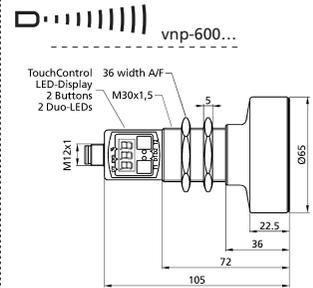
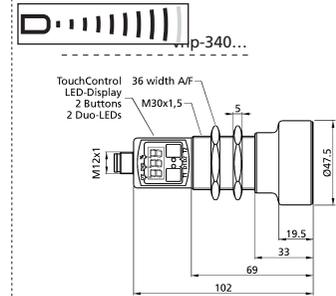
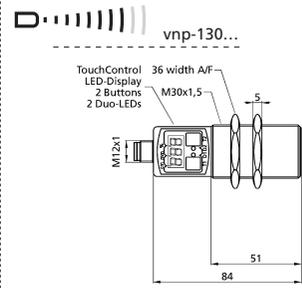
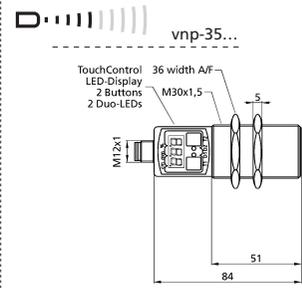
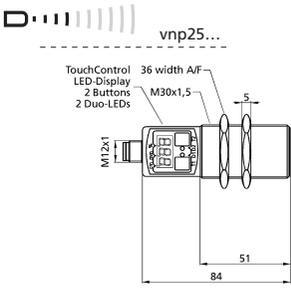
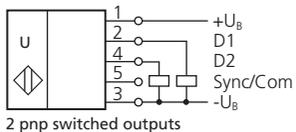
Display mode, key lock and factory setting



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

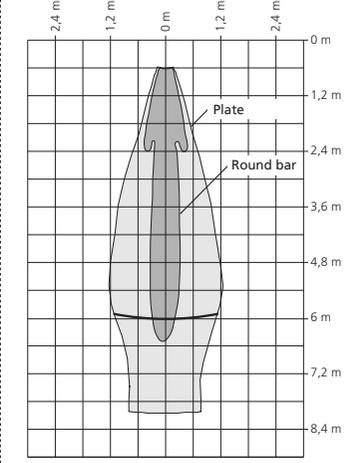
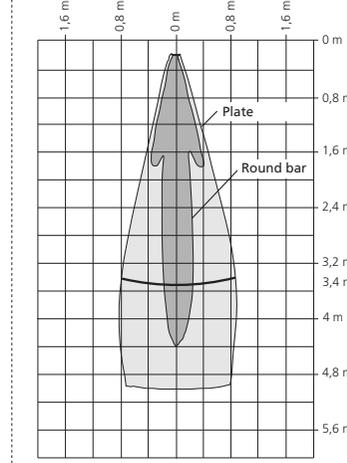
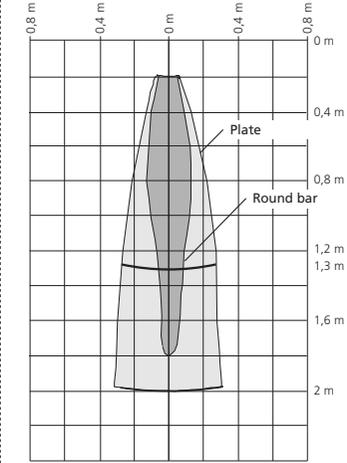
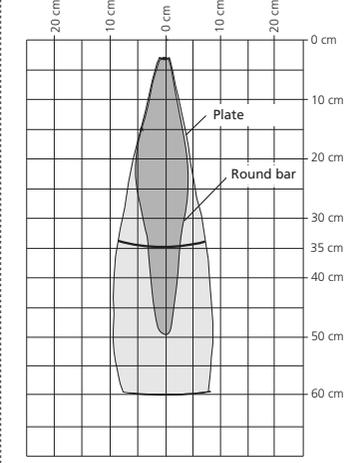
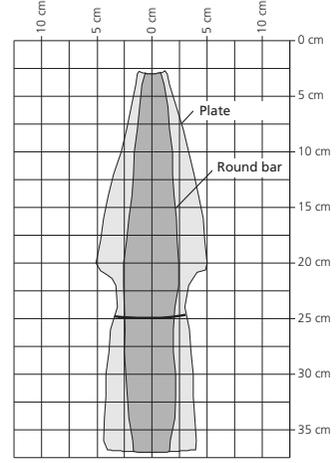


Technical data



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				
transducer frequency	ca. 320 kHz	ca. 400 kHz	ca. 200 kHz	ca. 120 kHz	ca. 80 kHz
resolution, sampling rate	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)				

detection zones for different objects:
The dark grey areas are determined with a thin round bar (10 or 27 mm dia.) 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.



operating voltage U_B	9 V to 30 V DC, reverse polarity protection	9 V to 30 V DC, reverse polarity protection	9 V to 30 V DC, reverse polarity protection	9 V to 30 V DC, reverse polarity protection	9 V to 30 V DC, reverse polarity protection
voltage ripple	±10 %	±10 %	±10 %	±10 %	±10 %
no-load supply current	≤ 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				
norm conformity	EN 60947-5-2				
type of connection	5-pin initiator plug, PBT				
controls	2 push-buttons (TouchControl)				
indicators	3-digit LED-display, 2 three-colour LEDs				
programmable	Yes, with TouchControl and LinkControl				
operating temperature	-25°C to +70°C	-25°C bis +70°C	-25°C bis +70°C	-25°C bis +70°C	-25°C bis +70°C
storage temperature	-40°C to +85°C	-40°C bis +85°C	-40°C bis +85°C	-40°C bis +85°C	-40°C bis +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⁾	11 Hz	8 Hz	6 Hz	3 Hz	2 Hz
response time¹⁾	32 ms	64 ms	110 ms	172 ms	240 ms
time delay before availability	< 300 ms				
order No.	vnp-25/DD/TC	vnp-35/DD/TC	vnp-130/DD/TC	vnp-340/DD/TC	vnp-600/DD/TC
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