![Dietz Sensortechnik logo]

Ultrasonic proximity sensors
DUPR-B series

- Budget-priced, short design
- Robust metal housing
- Measuring distances from 100mm to 1000mm
- Binary output with window (PNP or NPN)
- Teach-In or potentiometer
- Option: Synchronization and suppression mode
- Axial or radial sensing direction
- Wide power supply voltage range 11…30VDC
- Waterproof, IP 67, oil resistant, robust
- Measurement independent of material, surface, color and size of target
- Work under dust, dirt, fog, light
- Detect transparent and shiny objects

low priced and great value!

Technical data		DUPR-B 1000 TVPA 24 C(W/Y) DUPR-B 1000 PVPS 24 (W)	
		DUPR-B 1000 TVNA 24 C(W/Y) DUPR-B 1000 PVNS 24 (W)	
Detection range	mm	100...1000	
Blind range	mm	0...100	
Hysteresis of binary output, axial	mm	4	
Over all accuracy in whole temperature range *1)	%FS	<2	
Operating frequency	kHz	~180	
Setting of switching distance	-	Teach-In	Potentiometer
Status indicator	-	LED yellow/red	LED yellow
Binary output, short circuit proof, max. 0.1A	-	PNP or NPN	PNP or NPN
		NO/NC	NO
Switching speed max.	Hz	~3	
Time to readiness when power on	s	1.3	
Power supply voltage (reversal polarity protection)	VDC	11...30	
Ripple of supply voltage	%	10	
Mean consumption	mA	~30	
Temperature range *2)	°C	0...+60	
Pressure range	mbar$_{abs}$	900...1100	
Mass	g	~50	~100
Protection class	-	IP67	
Housing material	-	nickel plated brass	nickel plated brass, PA
Electrical connection	-	M12 connector 4-pin	3-wire PVC cable

*1)   The accuracy can be further improved by teaching the sensor only after it has reached its thermally stable state (e.g. after 30 minutes).

*2)   Operation <0°C is partially possible when the sensor membrane is kept free from icing by the self-heating in continuous operation or by external heating.

Versions

	axial sensing direction	radial sensing direction
Binary output PNP, teach-in, connector	DUPR-B 1000 TVPA 24 C	DUPR-B 1000 TVPA 24 CW
Binary output NPN, teach-in, connector	DUPR-B 1000 TVNA 24 C	DUPR-B 1000 TVNA 24 CW
Binary output PNP with synchronization, teach-in, connector	DUPR-B 1000 TVPA 24 CY	DUPR-B 1000 TVPA 24 CWY
Binary output NPN with synchronization, teach-in, connector	DUPR-B 1000 TVNA 24 CY	DUPR-B 1000 TVNA 24 CWY
Binary output PNP, potentiometer, cable	DUPR-B 1000 PVPS 24	DUPR-B 1000 PVPS 24 W
Binary output NPN, potentiometer, cable	DUPR-B 1000 PVNS 24	DUPR-B 1000 PVNS 24 W

Description

The compact ultrasonic sensors of the DUPR-B series are characterized by good price and short design. Nevertheless, they have a wide range of max. 1m as well as a robust metal housing. And they can be synchronized among themselves and stopped with an external signal (suppression mode).

The sensor is available as a proximity switch with either PNP or NPN output. Suitable applications include object as well as level detection of all kinds of material.

The switching output can be programmed by the user (NC/NO or window). Programming is done using a single teach input. Optionally a teach-in box is available. For the traditionalists exists a version as well with setting of switching distance by potentiometer. This has a 2m long cable with free end instead of the M12 connector.

Thanks to the new transducer sealing the DUPR-B sensors are very robust against many environmental influences. In particular, they are oil resistant, unlike many other ultrasonic sensors.

Blind range

The lower detection range between 0…100mm is called blind range. It is typical for ultrasonic sensors. In the blind range no measurement is possible.

Setting the switching points

The switching points are set by connecting the teach input with either the power supply $-U_B$ (0V) or $+U_B$ (+24VDC).
The blinking LED shows during teaching if the sensor has detected the object.

- LED blinks yellow: detected
- LED blinks red: not detected

Window operation NO
- Place the object on the near switching point
- Teach switching point with $-U_B$
- Place the object on the far switching point
- Teach switching point with $+U_B$

Window operation NC
- Place the object on the near switching point
- Teach switching point with $+U_B$
- Place the object on the far switching point
- Teach switching point with $-U_B$

Switching point NO
- Place the object on the switching point
- Teach switching point with $+U_B$
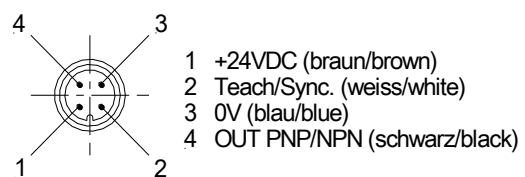- Let the sensor look into the empty space (>1m)
- Teach with $-U_B$

Switching point NC
- Place the object on the switching point
- Teach switching point with $-U_B$
- Let the sensor look into the empty space (>1m)
- Teach with $+U_B$

Caution:
The teach wire must not be connected during normal operation. The sensor can e.g. be operated after teaching with a 3 wire cable.

Electrical connections (view to the sensor)

1   +24VDC (braun/brown)
2   Teach/Sync. (weiss/white)
3   0V (blau/blue)
4   OUT PNP/NPN (schwarz/black)

Synchronization ("Y" option)

If several sensors are placed close together and scan the same object or if a common background is present, the sensors must be synchronized. For this, the Teach/Sync. leads of all sensors (max. 6 sensors) are interconnected. Important is the order:
1. teach each sensor individually (!)
2. turn off the power
3. interconnect all Teach/Sync. lines
4. power on again only when everything is wired!

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Suppression mode ("Y" option)

This additional function is interesting, for example, in level measurement with troublesome agitators. The sensor can be stopped by an external signal. For this purpose, the Teach/Sync. line is powered externally with a signal of 1...3 VDC. As long as this voltage is present, the sensor no longer transmits and keeps the last measured distance. To reactivate the sensor, the external power source has to be removed (not on mass, but separated at high impedance!).

Cable

The sensors have an M12 4-pin connector for screw mounting. The potentiometer versions have an integrated cable. The cable should not be mounted parallel or close to high current cables. Cables have to be ordered separately.

Setting the switching point on the potentiometer version

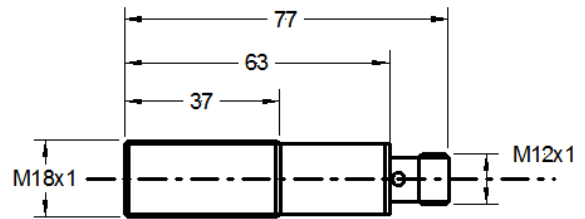This sensor has one switching point. The potentiometer has 3 turns and no stop.
- Place the target on the switching point
- Turn potentiometer completely counter clockwise
- Then turn slowly clockwise until the LED lights

Dimensions

Teach-in version, axial sensing direction

Teach-in version, radial sensing direction

Potentiometer version, axial sensing direction

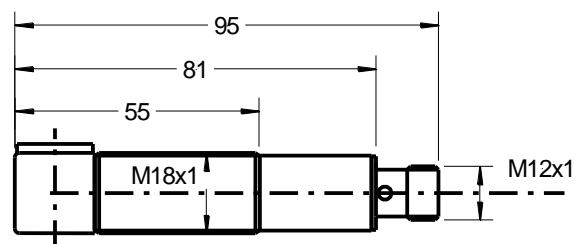*Potentiometer version, radial sensing direction*

Inclination angle of object

Smooth surfaces can be detected up to an inclination angle of 10°. However rough and structured (granular) surfaces can be detected up to much higher angles.
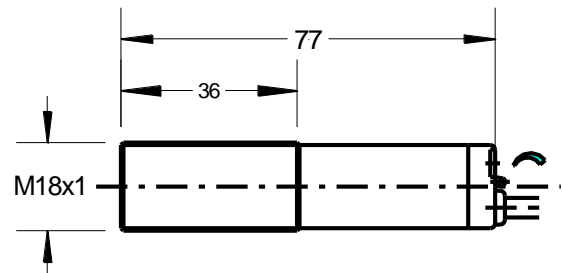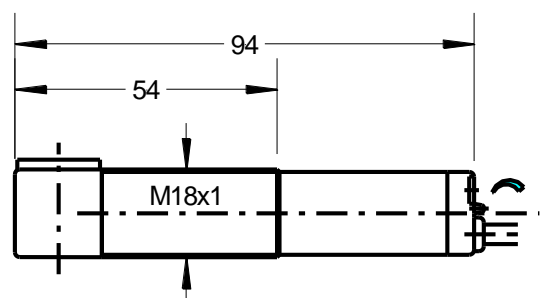
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Detection beam

400mm

1000 mm

500 mm

0mm
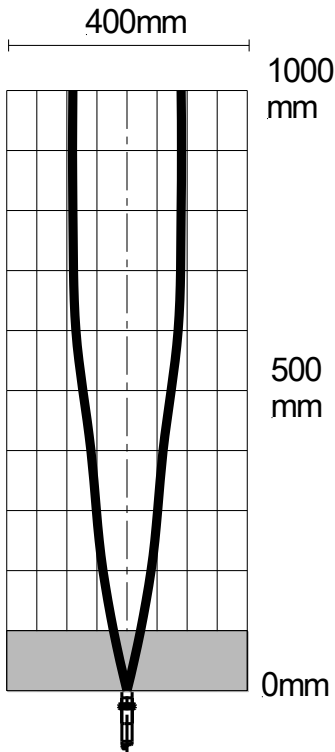
The detection beam of an ultrasonic sensor has the shape of a cone. The size depends on the target and its sound reflecting characteristics. Small and worse reflecting objects result in a smaller cone (narrower and shorter). Bigger objects and those with surfaces which are not perpendicular to the central axis can expand the cone. The exact cone shape and size can be determined only at the object itself. No disturbing objects must be between the sensor and the target within the cone. Otherwise the sensor would detect the disturbing object instead of the desired target. Shown above is a typical cone shape for the DUPR-B sensors. Furthermore the size of the detection beam is influenced by air temperature and humidity. The colder and dryer the air, the larger is the beam.

Mounting

Ultrasonic sensors shall be mounted as soft as possible in order keep acoustic disturbances away from the mounting spot. Thus two M18 nuts, washers and rubber sleeves for mounting are included. The rubber sleeves for a hole of Ø21mm shall be used at all events.

2 rubber sleeves

Hole Ø21
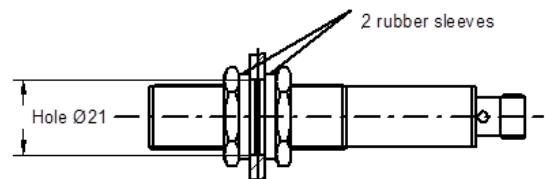
Teach-In box: see separate data sheet

Parts included

Teach-In versions:
- Sensor
- 2 of each M18 nuts, washers and rubber sleeves for mounting

Potentiometer versions:
- Sensor
- 2 of each M18 nuts, washers and rubber sleeves for mounting
- Miniature screw driver for potentiometer

Teach Table for teach-in versions

Connect teach wire with:	LED blinking	Function
+U$_B$ (typ. +24VDC)	yellow	NO: far window point or switching point NC: near window point
-U$_B$ (0VDC)	yellow	NO: near window point NC: far window point or switching point

The distance value is teached which was present at the end of the teach process.

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