



- 40 mm or 60 mm working range selectable with control input
- Time to respond to double or missing sheets 2.5 ms
- Double-sheet and missing-sheet output
- pnp outputs

Operating principle

The purpose of the double-sheet detector is to detect two or more sheets that are lying one on top of the other. The sensor system consists of a transmitter and a receiver with integrated evaluation electronics.

An ultrahigh-frequency ultrasonic transmitter fires a sonic beam at the underside of the sheet. The beam causes the sheet to vibrate, which in turn causes a very small sound wave on the other side of the sheet. This sound wave is then evaluated by the ultrasonic receiver opposite. If there are two sheets one on top of the other („double sheet“), then the signal is weakened to such an extent that it hardly reaches the receiver.

Operating manual

Ultrasonic double-sheet detection

dbk-4/CDD/O/M18 E+S/TB2
dbk-4/CDD/O/QP E+S/TB2

Product Description

- No need for calibration to the sheet material or to the material weight (grammage)
- Grammages from 20 to 1,200 g/m², films, thin sheet metals and fine corrugateds can be scanned
- Can be mounted perpendicular to the passing sheet

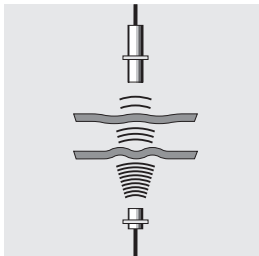


Fig. 1: Operating principle

The ultrasonic double-sheet detector is equipped with a control input that is used to select different working ranges between receiver and transmitter.

- 40 mm working range
Leave the control input disconnected or connect it to -U_B.
- 60 mm working range
Connect the control input to +U_B.

Note

- The higher working range of 60 mm reduces the sensitivity for thicker grammages by up to 30 %.

Important information for installation and application

When installing, starting up or carrying out maintenance work on the detection system, always perform all measures essential to ensuring the safety of staff and the system (cf. the instruction manual for the entire system and the instructions of the system operator). The double-sheet detectors of the dbk series have been designed for industrial applications.

The sensors are not items of safety equipment and must not be used for the purposes of personnel safety and machine protection!

Installation

→ Install the transmitter and receiver facing each other 40 mm ± 3 mm or 60 mm ± 3 mm apart (see Fig. 2). Installation of the dbk is not dependent on the position.

Note!

- The distance between the transmitter/receiver and the passing sheet must never be less than 7 mm.
- The coaxiality must be ≤ 0.5 mm.

- Angular deviation between the transmitter and the receiver must be no more than 2°.
- When working with papers and thin films, we recommend you install the dbk perpendicular to the sheet (Fig. 3a).
- When working with thin sheet metals, thicker plastic films (e.g. credit cards), install the dbk with a deviation of 27° from the perpendicular (Fig. 3b).
- Types of paper that lead to false triggering when the dbk is mounted perpendicular (as a rule, types with air pockets) can frequently be scanned more accurately when the dbk is installed at an angle of 45° to the sheet. If the dbk is angled towards the corrugations of corrugated, the system can even be used to scan fine corrugateds (G and F; see Fig. 3c).
- The maximum tightening torque for the nuts is 15 Nm.
- If you install the transmitter in a recessed position or position a sheet guide between the transmitter and

receiver, the hole must have a minimum diameter of ≥ 12 mm, but we recommend a diameter of 18 mm (Fig. 3).

→ Connect the transmitter to the receiver using the 2-pin plug-in connector.

Note!

- The cable between the transmitter and receiver must not be connected to an external voltage.
- Connect the 5-core control cable of the receiver as shown in Fig. 4. Connect the control input depending on the chosen working range to -U_B (40 mm) or +U_B (60 mm).

Start-up

- Switch on the power supply of the dbk. Check that the system is functioning properly with the aid of a test sheet.
- Hold a test sheet inside the working range between the transmitter and receiver. The LED must light up green. (If the LED lights up red, check the installation dimensions of the dbk and the test sheet you have chosen).
- Hold a double test sheet (two sheets) inside the working range between the transmitter and receiver. The LED must light up red.
- Remove all sheets from between the transmitter and the receiver. The LED must flash green.

Note

The test sheet may be either a high-grammage sheet of the material to be scanned or the test sheet available as an accessory from microsonic, which can be ordered under the article designation „dbk test sheet“. This test sheet serves as threshold material at room temperature and can be used to verify correct adjustment and operation of the dbk.

Installation hints and terminal assignments

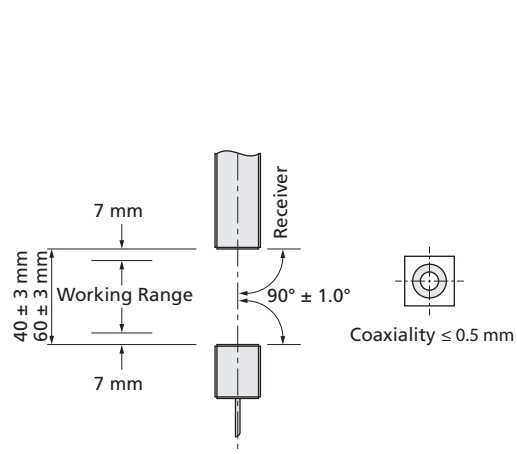


Fig. 2: Installation and working range

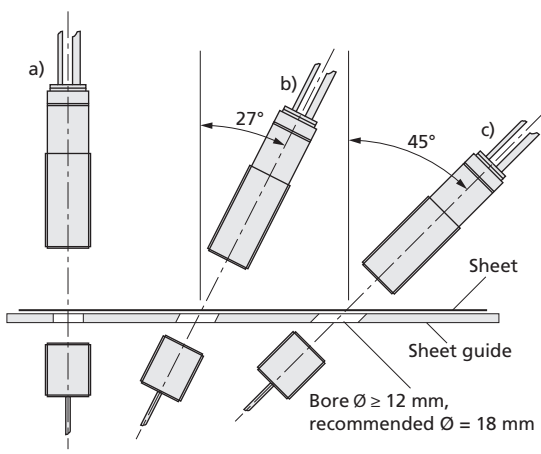


Fig. 3: Installation positions

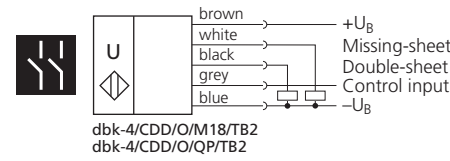


Fig. 4: Terminal assignments

Time diagram and dimensions

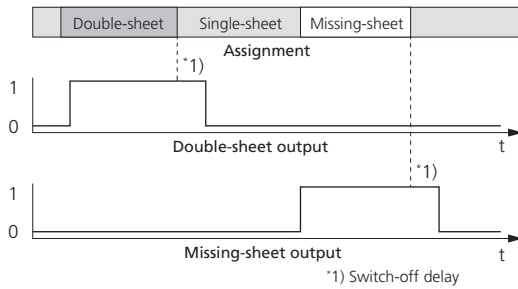


Fig. 5: dbk-4/CDD/O/.../TB2, Time diagram for Free Run Mode

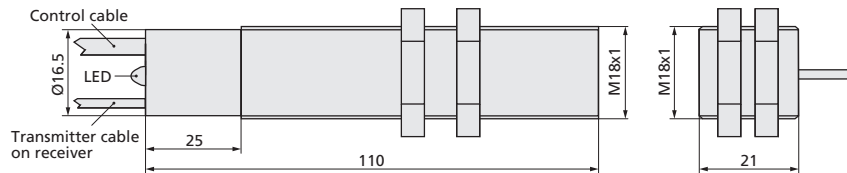


Fig. 6: Dimensions dbk-4CDD/O/M18/TB2; receiver (left), transmitter (right)

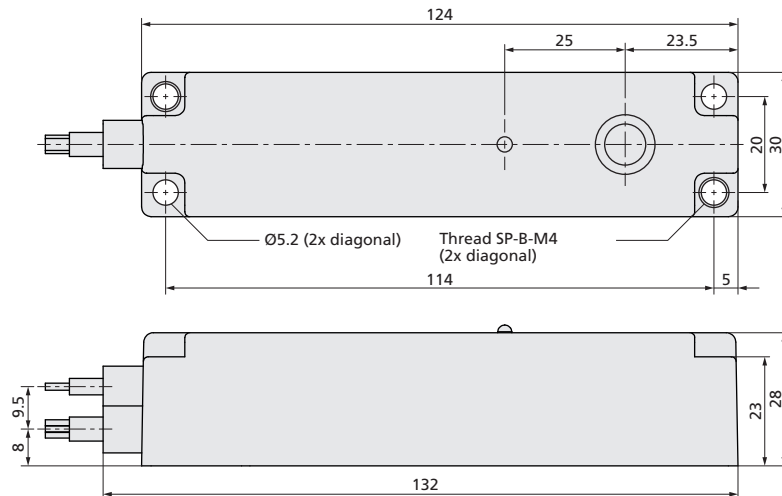


Fig. 7: Dimensions dbk-4CDD/O/QP/TB2 receiver

Technical data

	dbk-4/CDD/O/M18 E+S/TB2	dbk-4/CDD/O/QP E+S/TB2
Model name	dbk-4/CDD/O/M18 E+S/TB2	dbk-4/CDD/O/QP E+S/TB2
Transmitter-receiver spacing	40 ±3 mm or 60 ±3 mm	40 ±3 mm or 60 ±3 mm
Transmitter-receiver blind zone	7 mm in front of both transmitter and receiver	7 mm in front of both transmitter and receiver
Permissible angular deviation	±45° from the perpendicular to the sheet	±45° from the perpendicular to the sheet
Ultrasonic frequency	400 kHz	400 kHz
Resolution	2 sheets not stuck together across entire surface	2 sheets not stuck together across entire surface
Working range	Papers with grammages of 20 to 1,200 g/m ² , metal-laminated sheets and films up to 0.4 mm thick, self-adhesive films, sheet metals up to 0.3 mm thick, fine corrugateds	Papers with grammages of 20 to 1,200 g/m ² , metal-laminated sheets and films up to 0.4 mm thick, self-adhesive films, sheet metals up to 0.3 mm thick, fine corrugateds
Operating voltage U_B	20 to 30 V DC	20 to 30 V DC
Residual ripple	±10 %	±10 %
No-load current consumption	≤45 mA	≤45 mA
Type of connection	5-core cable, 2,000 mm long	5-core cable, 2,000 mm long
Signal cable	On receiver: 1,200 mm On transmitter: 1,000 mm, With 2-pin plug-in connector, IP 20	On receiver: 1,200 mm On transmitter: 1,000 mm, With 2-pin plug-in connector, IP 20
Terminal assignment		
Brown	+U _B	+U _B
Blue	-U _B (0 V)	-U _B (0 V)
White	Missing sheet	Missing sheet
Black	Double sheet	Double sheet
Grey	Control input	Control input
Controls	None required	None required
Programmable	No	No
Double-sheet output	pnp, +U _B -2 V, I _{max} = 500 mA, short-circuit-proof, NC contact	pnp, +U _B -2 V, I _{max} = 500 mA, short-circuit-proof, NC contact
Missing-sheet output	pnp, +U _B -2 V, I _{max} = 500 mA, short-circuit-proof, NC contact	pnp, +U _B -2 V, I _{max} = 500 mA, short-circuit-proof, NC contact
Response time, Trigger Mode	-	-
Response time, Free Run Mode	2.5 ms	2.5 ms
Tripping delay, Trigger Mode	-	-
Tripping delay, Free Run Mode	10 ms	10 ms
Indicator	Green: stand-by Red: double sheet Flashing green: missing sheet	Green: stand-by Red: double sheet Flashing green: missing sheet
U_E at control input	60 mm working range U _E > 0,7 x U _B 40 mm working range U _E < 0,3 x U _B or control input open	60 mm working range U _E > 0,7 x U _B 40 mm working range U _E < 0,3 x U _B or control input open
Description of control input	With a working range of 40 mm between receiver and transmitter the control input has to be connected to -U _B . With a working range of 60 mm between receiver and transmitter the control input has to be connected to +U _B . The dbk scans continuously. The response time is 2.5 ms.	With a working range of 40 mm between receiver and transmitter the control input has to be connected to -U _B . With a working range of 60 mm between receiver and transmitter the control input has to be connected to +U _B . The dbk scans continuously. The response time is 2.5 ms.
Housing receiver	Nickel-plated brass sleeve Plastic parts: PBT Cable: PVC sheath Ultrasonic transducer: polyurethane foam, epoxy resin with glass content	PBT Cable: PVC sheath Ultrasonic transducer: polyurethane foam, epoxy resin with glass content
Housing transmitter	Nickel-plated brass sleeve Plastic parts: PBT Cable: PVC sheath Ultrasonic transducer: polyurethane foam, epoxy resin with glass content	Nickel-plated brass sleeve Plastic parts: PBT Cable: PVC sheath Ultrasonic transducer: polyurethane foam, epoxy resin with glass content
Max. tightening torque of nuts	15 Nm	15 Nm
Degree of protection per EN 60529	IP 65	IP 65
Operating temperature	+5 to +60 °C	+5 to +60 °C
Storage temperature	-40 to +85 °C	-40 to +85 °C
Weight	150 g	280 g
Standard conformed with	EN 60947-5-2	EN 60947-5-2