

A comprehensive solution for industrial applications

# ULTRASONIC SENSORS



Extract from our online catalogue:

## dbk+5 ultrasonic double sheet control

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The dbk+5 extends the area of application of double sheet controls to heavy carton, corrugated cardboard, and plastic sheets.



## Highlights

- > **High-performance ultrasonic double-sheet control** ::: especially for the probing of corrugated cardboard as well as plastic plates several mm thick
- > **3 control inputs** ::: for Teach-in, trigger, and external sensitivity settings for the material,
- > **Teach-in option** ::: e.g. for probing plates stuck together with an oil film
- > **Compact design in M18 x 1 threaded tube**

## Basics

- > **Reliable detection of single and double sheets**
- > **No Teach-in needed (plug and play)**
- > **Double-sheet and missing-sheet output**
- > **Working distance between the transmitter and the receiver selectable from 30 to 70 mm**
- > **Trigger option** ::: for applications in warehouse flow
- > **LinkControl** ::: for configuration of sensors from a PC

# Description

## The dbk+5 ultrasonic double sheet control

is designed for scanning thin sheet metal, plastic sheets and corrugated cardboard with thicknesses exceeding the working range of the dbk+4 sensors. The principle behind the operation is the same as for the dbk+4 sensors. The main difference between the systems lies in the materials to be detected. (For further information, see dbk+4.)

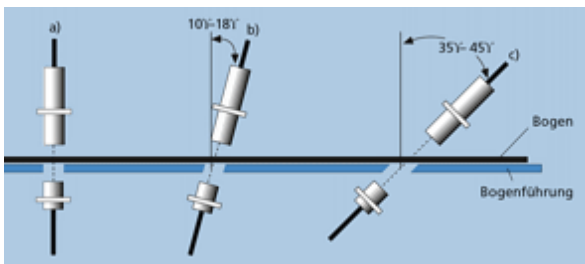
## Typical materials

in the range of applications of the dbk+5 are sheet metal up to approx. 2 mm thick (depending on the type of metal), plastic sheets and boards for printed circuits up to a thickness of several millimetres, and coarse corrugated card.

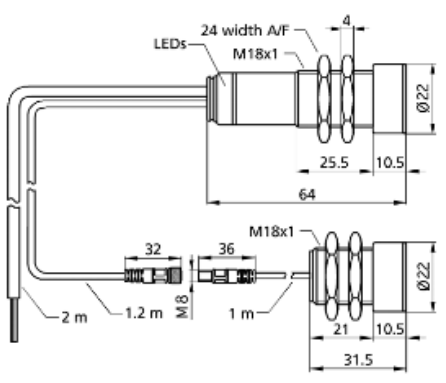

Papers require the sensors to be mounted perpendicular to the passing sheets. But in the case of sheet metal, plastic sheets and boards for printed circuits, it is preferable to mount the dbk+5 at an angle of 10-18° to the passing sheets. The optimum angle should be determined by way of trials. Corrugated cards should be scanned at an angle of 35-45° to the corrugations.

## Transmitter and receiver

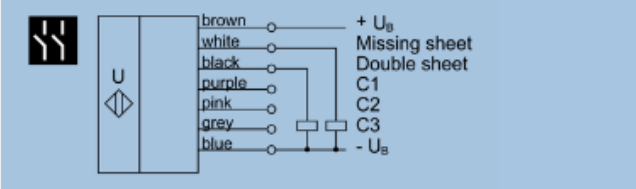
are housed in M18 x 1 mm threaded sleeves which should be mounted from 30 to 70 mm apart.



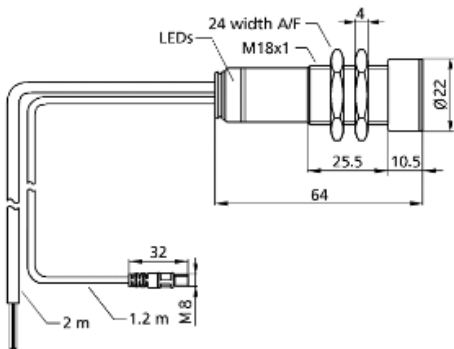

# dbk+5/3CDD/M18 E+S

scale drawing	detection zone
	
 <b>2 x pnp</b>	
design	cylindrical M18
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected
<b>ultrasonic -specific</b>	
means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver
working range	papers with weights of 100 - 2,000 g/m <sup>2</sup> , plastic sheets and films up to 5 mm thick*, self-adhesive films, sheet metals up to 2 mm thick*, corrugated card, wafers, PCBs (*: material-dependent)
<b>electrical data</b>	
operating voltage U <sub>B</sub>	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
no-load current consumption	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm <sup>2</sup>
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder

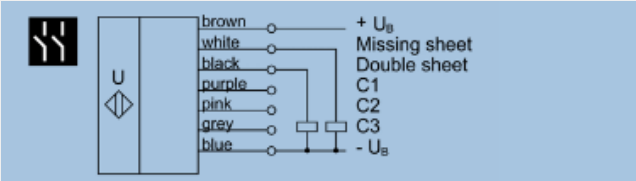
# dbk+5/3CDD/M18 E+S

<b>outputs</b>	
output 1	double sheet output npn: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
response time	< 500 $\mu\text{s}$ im Trigger-Mode, 5,5 ms im Free-Run-Mode
delay prior to availability	< 300 ms
release delay	until next edge in trigger mode, 5.5 ms in free-run mode
<b>inputs</b>	
input 1	control input
input 2	control input
input 3	control input
description	< $-U_B + 18 \text{ V}$ : logic 1; > $-U_B + 13 \text{ V}$ or control input open: logic 0
<b>housing</b>	
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm $\pm$ 3 mm
permissible angular deviation	$\pm 45^\circ$ from the perpendicular to the sheet
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	150 g
further versions	single transmitter/receiver
further versions	dbk+5/Sender/M18/K1 dbk+5/Empf/3CDD/M18
<b>technical features/characteristics</b>	
controls	control input
scope for settings	Teach-in LCA-2 with LinkCopy or LinkControl software
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected
<b>documentation (download)</b>	
pin assignment	

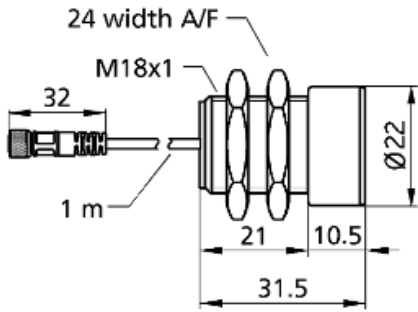
# dbk+5/Empf/3CDD/M18

scale drawing	detection zone
	
 <b>2 x pnp</b>	
design	cylindrical M18
operating mode	double sheet control
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected
<b>ultrasonic -specific</b>	
means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver
working range	papers with weights of 100 - 2,000 g/m <sup>2</sup> , plastic sheets and films up to 5 mm thick*, self-adhesive films, sheet metals up to 2 mm thick*, corrugated card, wafers, PCBs (*: material-dependent)
<b>electrical data</b>	
operating voltage $U_B$	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
no-load current consumption	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm <sup>2</sup>
transmitter cable	1.2 m PUR cable with M8 initiator plug

# dbk+5/Empf/3CDD/M18

outputs	
output 1	double sheet output npn: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output pnp: $I_{max} = 200 \text{ mA}$ ( $U_B - 2V$ ) NOC/NCC adjustable, short-circuit-proof
response time	< 500 $\mu\text{s}$ im Trigger-Mode, 5,5 ms im Free-Run-Mode
delay prior to availability	< 300 ms
release delay	until next edge in trigger mode, 5.5 ms in free-run mode
inputs	
input 1	control input
input 2	control input
input 3	control input
description	< $-U_B + 18 \text{ V}$ : logic 1; > $-U_B + 13 \text{ V}$ or control input open: logic 0
housing	
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm $\pm$ 3 mm
permissible angular deviation	$\pm 45^\circ$ from the perpendicular to the sheet
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
technical features/characteristics	
controls	control input
scope for settings	Teach-in LCA-2 with LinkCopy or LinkControl software
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected
documentation (download)	
pin assignment	

# dbk+5/Sender/M18/K1


scale drawing	detection zone
	
design	cylindrical M18
operating mode	double sheet control
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected
<b>ultrasonic -specific</b>	
means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver
working range	papers with weights of 100 - 2,000 g/m <sup>2</sup> , plastic sheets and films up to 5 mm thick*, self-adhesive films, sheet metals up to 2 mm thick*, corrugated card, wafers, PCBs (*: material-dependent)
<b>electrical data</b>	
transmitter cable	1 m PUR cable with M8 initiator plug



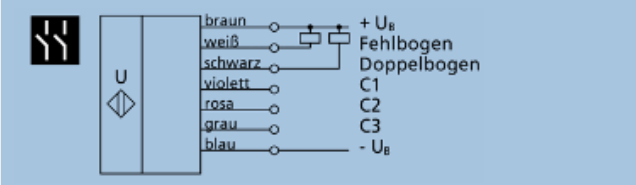
# dbk+5/Sender/M18/K1

<b>housing</b>	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm ± 3 mm
permissible angular deviation	± 45° from the perpendicular to the sheet
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	50 g
<b>technical features/characteristics</b>	
controls	not necessary
scope for settings	not necessary
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected

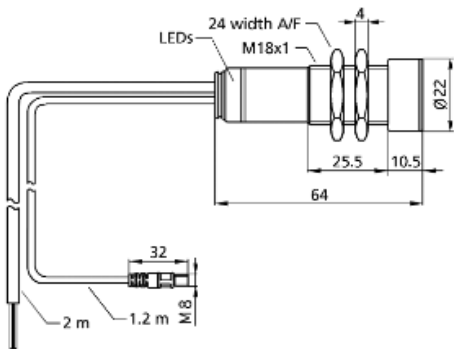

# dbk+5/3BEE/M18 E+S

scale drawing	detection zone
 <b>2 x pnp</b>	
design	cylindrical M18
operating mode	double sheet control
particularities	distance between transmitter and receiver can be selected
<b>ultrasonic -specific</b>	
means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver
working range	papers with weights of 100 - 2,000 g/m <sup>2</sup> , plastic sheets and films up to 5 mm thick*, self-adhesive films, sheet metals up to 2 mm thick*, corrugated card, wafers, PCBs (*: material-dependent)
<b>electrical data</b>	
operating voltage U <sub>B</sub>	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
no-load current consumption	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm <sup>2</sup>
transmitter cable	am Empfänger: 1,2 m PUR-Kabel, am Sender: 1 m PUR-Kabel, mit M8 Rundsteckverbinder

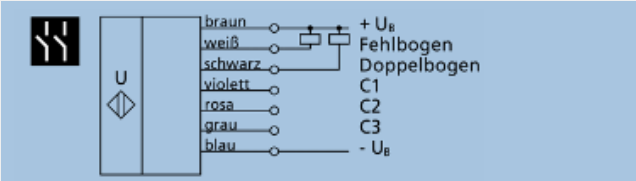
# dbk+5/3BEE/M18 E+S

<b>outputs</b>	
output 1	double sheet output npn: $I_{max} = 200 \text{ mA}$ ( $-U_B + 2V$ ) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: $I_{max} = 200 \text{ mA}$ ( $-U_B + 2V$ ) NOC/NCC adjustable, short-circuit-proof
response time	< 500 $\mu\text{s}$ im Trigger-Mode, 5,5 ms im Free-Run-Mode
delay prior to availability	< 750 ms
release delay	until next edge in trigger mode, 5.5 ms in free-run mode
<b>inputs</b>	
input 1	control input
input 2	control input
input 3	control input
description	< $-U_B + 18 \text{ V}$ : logic 1; > $-U_B + 13 \text{ V}$ or control input open: logic 0
<b>housing</b>	
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm $\pm$ 3 mm
permissible angular deviation	$\pm 45^\circ$ from the perpendicular to the sheet
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	150 g
further versions	single transmitter/receiver
further versions	dbk+5/Sender/M18/K1 dbk+5/Empf/3BEE/M18
<b>technical features/characteristics</b>	
controls	control input
scope for settings	Teach-in LCA-2 with LinkCopy or LinkControl software
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	distance between transmitter and receiver can be selected
<b>documentation (download)</b>	
pin assignment	

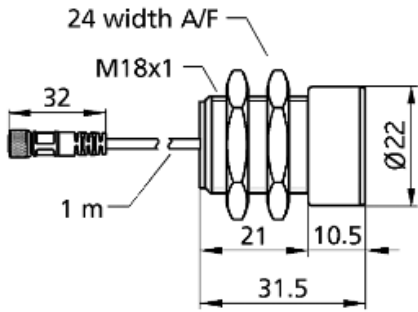
# dbk+5/Empf/3BEE/M18

scale drawing	detection zone
	
 <b>2 x pnp</b>	
design	cylindrical M18
operating mode	double sheet control
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected
<b>ultrasonic -specific</b>	
means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver
working range	papers with weights of 100 - 2,000 g/m <sup>2</sup> , plastic sheets and films up to 5 mm thick*, self-adhesive films, sheet metals up to 2 mm thick*, corrugated card, wafers, PCBs (*: material-dependent)
<b>electrical data</b>	
operating voltage $U_B$	20 - 30 V d.c., reverse polarity protection
voltage ripple	± 10 %
no-load current consumption	≤ 50 mA
type of connection	2 m PUR cable, 7 x 0.25 mm <sup>2</sup>
transmitter cable	1.2 m PUR cable with M8 initiator plug

# dbk+5/Empf/3BEE/M18

<b>outputs</b>	
output 1	double sheet output npn: $I_{max} = 200 \text{ mA}$ ( $-U_B + 2V$ ) NOC/NCC adjustable, short-circuit-proof
output 2	missing sheet output npn: $I_{max} = 200 \text{ mA}$ ( $-U_B + 2V$ ) NOC/NCC adjustable, short-circuit-proof
response time	< 500 $\mu\text{s}$ im Trigger-Mode, 5,5 ms im Free-Run-Mode
delay prior to availability	< 750 ms
release delay	until next edge in trigger mode, 5.5 ms in free-run mode
<b>inputs</b>	
input 1	control input
input 2	control input
input 3	control input
description	< $-U_B + 18 \text{ V}$ : logic 1; > $-U_B + 13 \text{ V}$ or control input open: logic 0
<b>housing</b>	
material	brass sleeve, nickel-plated, plastic parts, PBT, PA
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm $\pm$ 3 mm
permissible angular deviation	$\pm 45^\circ$ from the perpendicular to the sheet
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
<b>technical features/characteristics</b>	
controls	control input
scope for settings	Teach-in LCA-2 with LinkCopy or LinkControl software
indicators	1 x Duo-LED; green: working / red: double sheet / flashing red: missing sheet
particularities	receiver für ultrasonic-double sheet control distance between transmitter and receiver can be selected
<b>documentation (download)</b>	
pin assignment	

# dbk+5/Sender/M18/K2

scale drawing	detection zone
	
design	cylindrical M18
operating mode	double sheet control
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected
<b>ultrasonic -specific</b>	
means of measurement	pulse operation with amplitude evaluation
transducer frequency	200 kHz
blind zone	7 mm in front of transmitter and receiver
working range	papers with weights of 100 - 2,000 g/m <sup>2</sup> , plastic sheets and films up to 5 mm thick*, self-adhesive films, sheet metals up to 2 mm thick*, corrugated card, wafers, PCBs (*: material-dependent)
<b>electrical data</b>	
transmitter cable	1 m PUR cable with M8 initiator plug

## dbk+5/Sender/M18/K2

<b>housing</b>	
material	brass sleeve, nickel-plated, plastic parts, PBT
ultrasonic transducer	polyurethane foam, epoxy resin with glass contents
transmitter/receiver spacing	30 - 70 mm; optimal: 50 mm $\pm$ 3 mm
permissible angular deviation	$\pm$ 45° from the perpendicular to the sheet
max. tightening torque of nuts	15 Nm
class of protection to EN 60529	IP 65
operating temperature	+5°C to +60°C
storage temperature	-40°C to +85°C
weight	50 g
<b>technical features/characteristics</b>	
controls	not necessary
scope for settings	not necessary
particularities	transmitter for ultrasonic double sheet control distance between transmitter and receiver can be selected