

Application

The BDK Duo Flex sensor is used for non-contact monitoring of sheet metals and is especially suitable wherever it is essential to avoid handling marks on the surfaces. The transmitter and the receiver modules are mounted separately, and so can be easily and quickly installed to become integral parts of your plant or machinery to reliably detect sheets at different locations.

Measurement can be made while sheets are moving on a conveyor and ensures the quick and reliable detection of double sheets even when there are large air gaps, for example with textured surfaces such as studded or ribbed sheets. They are suitable for monitoring ferromagnetic sheets with a thickness of 0.1 mm to 2 mm and non-ferromagnetic sheets with a thickness of 0.1 mm to 10 mm for aluminium, or 0.3 mm to 10 mm for stainless steel.

Configuration

BDK Duo Flex consists of a transmitter and a separate receiver with integral evaluation electronics. The transmitter produces an alternating electromagnetic field which is evaluated by the receiver. The sheet to be measured between transmitter and receiver attenuates the alternating field in approximate proportion to the sheet thickness. The sheet between transmitter and receiver must completely cover the sensor's active sensing face (diameter 38 mm) and extend at least 38 mm around it on all sides. The minimum distance between transmitter or receiver and sheet surface is 10 mm. When mounting, the active sensing faces must be concentric and set at a fixed distance of 50 mm between transmitter and receiver modules.

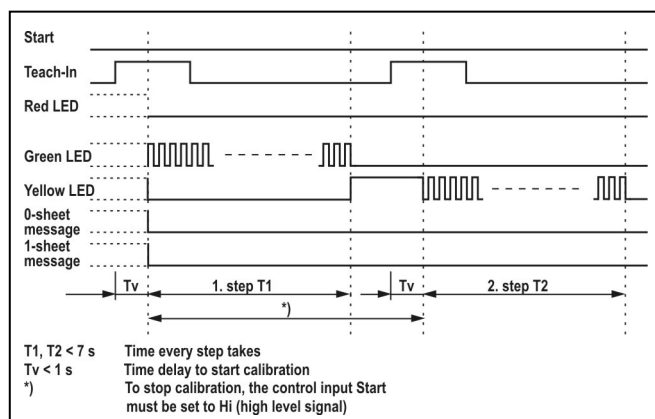
The BDK Duo Flex is fitted with an M12 connector for the power supply and control and signal function. The number of the detected sheets is available at two semiconductor outputs (K0 and K1). There are three LEDs for visual monitoring and for calibration indication. Two optional versions have non-linear analogue outputs (with a choice of current or voltage output) to assist, for example, threshold value monitoring in a post-connected Programmable Logic Controller (PLC).

Teach-In

Calibration is initiated by the high active control input *Teach-In*. It consists of two equal parts (two step calibration). The system is calibrated for *sheet thickness* and *sheet type*. The evaluated calibration parameters are stored in a non-volatile memory (EEPROM) so that they are available even after a power failure.

To start calibration, the control input *Teach-In* must be set for approx. 2 seconds to *Hi* (high level signal) while *Start* is *Lo* (low level signal). The green LED blinks during calibration. After the first calibration step, the green LED is switched off and the yellow LED switched on. To start the second calibration step, *Teach-In* must again be set to *Hi* for about 2 seconds. The yellow LED blinks during calibration and switches off when calibration has finished. The sheet metal must be between transmitter and receiver during either the first or the second calibration step. Sheets of different thickness and type require recalibration.

If calibration is started by mistake, this procedure may be stopped before the second calibration step begins (see timing diagram for *Teach-In*) by setting the control input *Start* to *Hi* for at least 400 ms. The sensor then returns to its previous operating mode.



Timing diagram: Teach-In

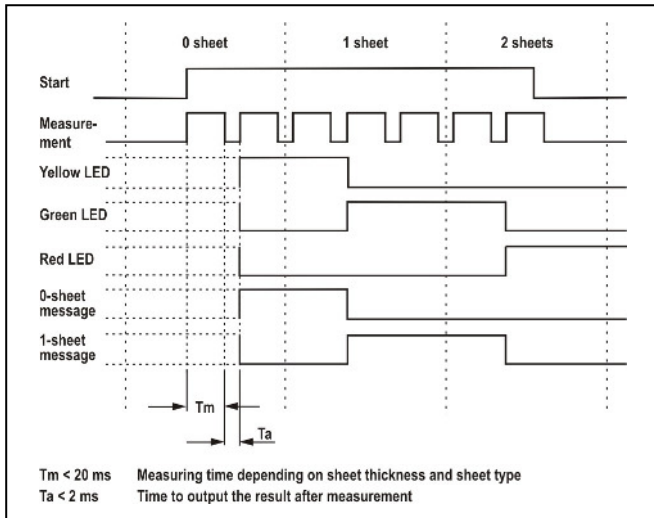
Measurement

After every measurement the current result (0-, 1-, or 2-sheet(s)) is available at two semi-conductor outputs for further processing in a Programmable Logic Controller (PLC).

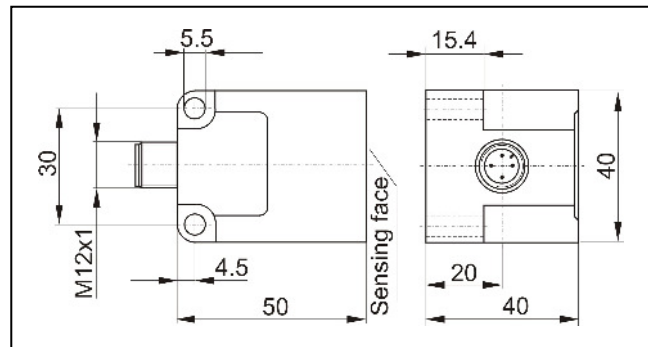
Message outputs		
Sheets	0-sheet message	1-sheet message
0	1	0
1	0	1
2	0	0

LEDs for visual monitoring			
Sheets	yellow LED	green LED	red LED
0	on	off	off
1	off	on	off
2	off	off	on

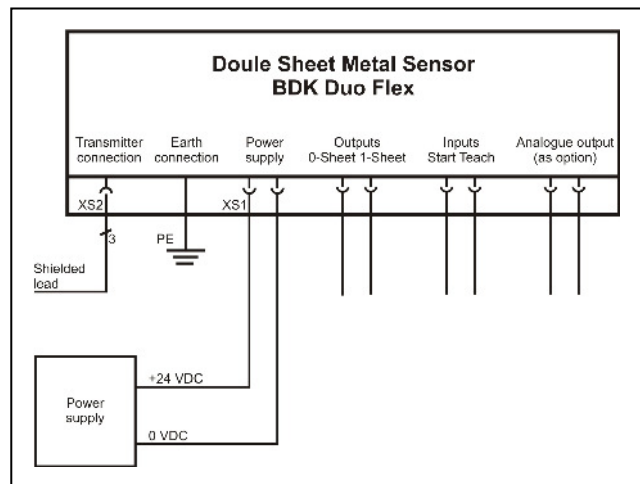
Timing diagram: Measuring procedure



Dimensions (transmitter)

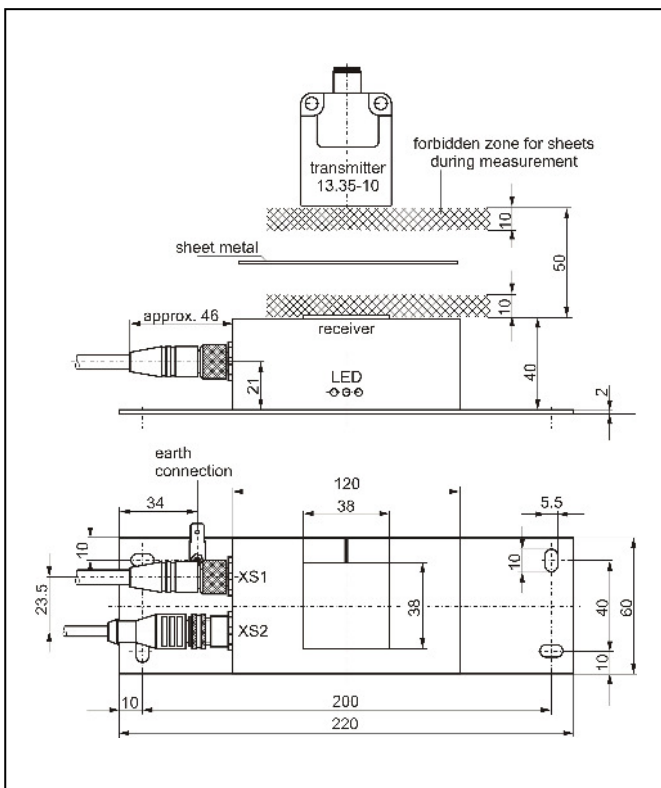


Wiring diagram



Measurement is initiated by the control input *Start*. As long as this is set to *Lo*, the sensor is on standby and stores the last measuring result. Measurement is possible as long as the sheet is within the measuring range. For a continuous measurement the control input has to be set to *Hi*.

Mounting and dimensions (receiver)



Pin assignment

XS1: PLC interface

5	1	+24 V DC
4	2	M
3	3	0-sheet message K0
2	4	1-sheet message K1
1	5	Start signal
8	6	Teach-In signal
7	7	Analogue output
6	8	Analogue output M

Only for Ref. no. 13.35-12 and 13.35-13

XS2: transmitter

2	1	+24 V DC
1	2	NC
3	3	M
4	4	Transmission signal

The housing must be earthed with the available earth connection.

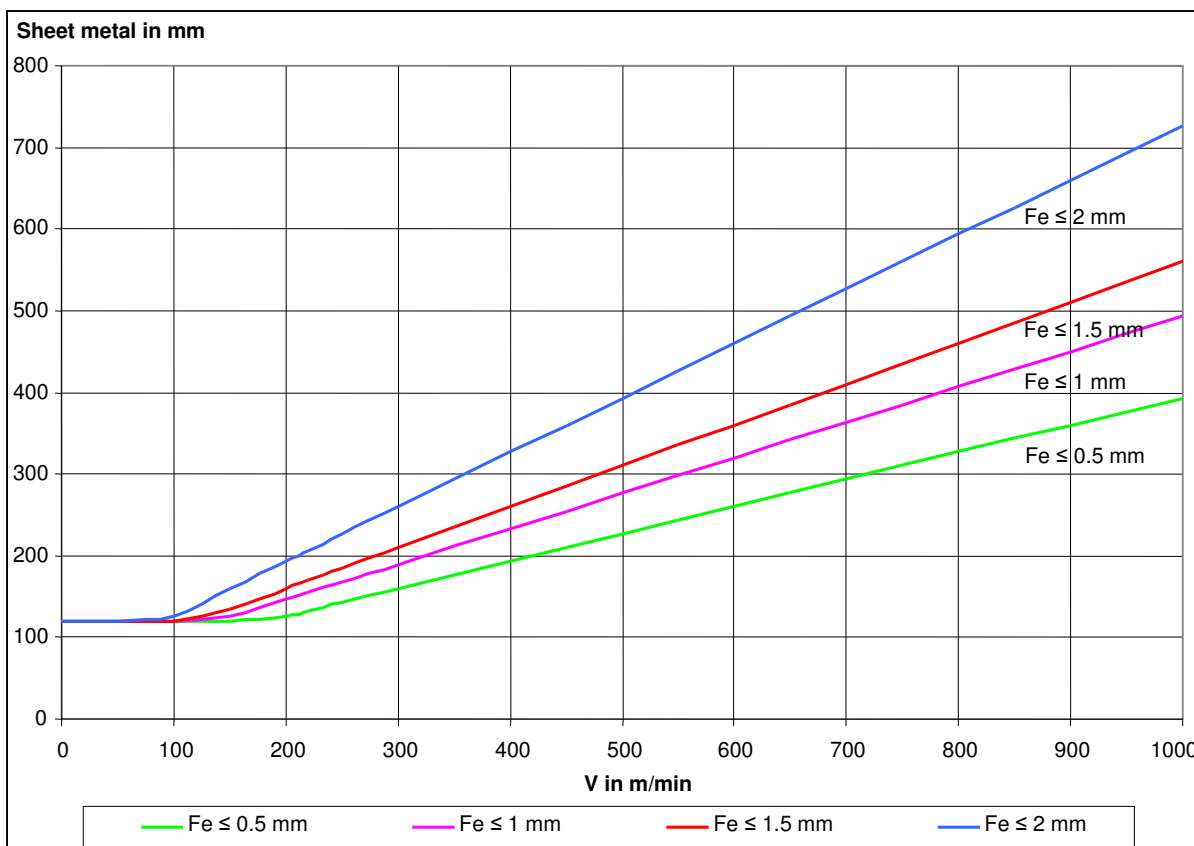


Diagram: Minimum sheet size in dependence of speed (Fe sheets)

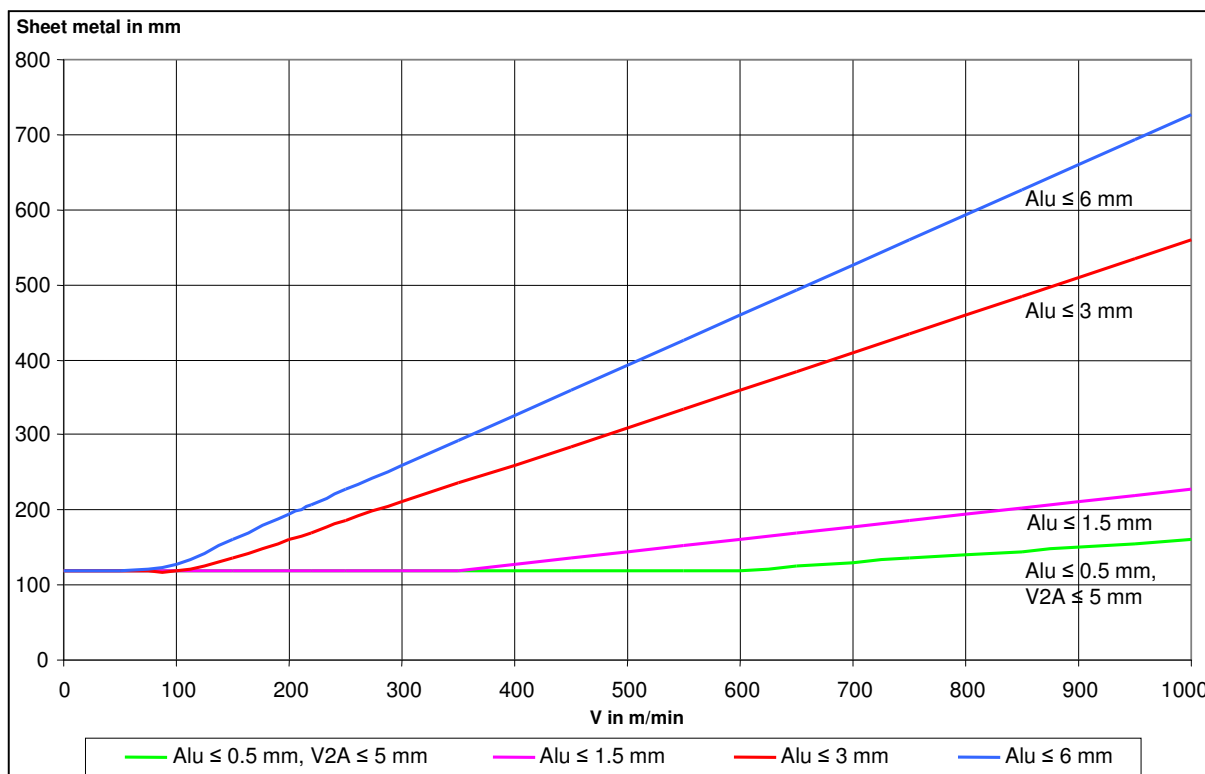


Diagram: Minimum sheet size in dependence of speed and material (non-ferrous (NE) sheets)

Technical data

Double Sheet Metal Sensor BDK Duo Flex

Double surface non-contact measurement (Fe/NE sheets)

1. Receiver

BVD/E-60as-1s

Ref. no. 13.35-11

Operating voltage U_B	19 ... 24 ... 30 V DC
Reverse polarity protection	yes
Power consumption	max. 150 mA (no load)
Operating temperature	0 ... + 55 °C

Inputs

Start signal	Hi = 12 ... 24 ... 30 V DC Lo = 0 ... 5 V DC
Input current	approx. 5 mA (for 24 V DC)
Teach-In	Hi = 12 ... 24 ... 30 V DC Lo = 0 ... 5 V DC
Input current	approx. 5 mA (for 24 V DC)

Outputs

Logic outputs	semiconductor , plus switching, short-circuit proof
Output voltage	$\geq U_B - 1.75$ V
Output current	max. 100 mA
Electrical isolation	no
Status indicator	three LEDs (red, green, yellow)
Measuring time	max. 20 ms, min. 3 ms
Measuring procedure	transmission loss
Wiring	M12 Euro connector
Dimensions (WxHxD)	120 x 42 x 60 mm
Weight	approx. 800 g
Material housing	aluminium anodised
Mounting plate	nickel-plated steel
Mounting	screw mounting

Sheet metal thickness range (1-sheet)

Ferromagnetisch	0.1 ... 2 mm
Non-ferromagnetic (Alu)	0.1 ... 6 mm
Non-ferromagnetic (V2A)	0.3 ... 5 mm

Depending on the alloy of the sheet a thickness of 10 mm maximum is possible.

2. Versions with additional current or voltage output

BVE/E-60as-1s

Ref. no. 13.35-12

Same data as BVD/E-60as-1s (13.35-11), but with **additional analogue current output**.

Output voltage	0 ... 10 V, non-linear 1-sheet corresponds to 40 % of the value range
Load resistance	≥ 10 k Ω
Electrical isolation	no
Resolution	256 steps

BVF/E-60as-1s

Ref. no. 13.35-13

Same data as BVD/E-60as-1s (13.35-11), but with **additional analogue current output**.

Output current	0 ... 20 mA, non-linear 1-sheet corresponds to 40 % value range
Load resistance	≤ 500 Ω
Electrical isolation	no
Resolution	256 steps

3. Transmitter

BV/S-40fq-1s

Ref. no. 13.35-10

Connection	M12 Euro connector
Dimensions (WxHxD)	40 x 40 x 50 mm
Weight	approx. 150 g
Material housing	grey plastic
Mounting plate	screw mounting

4. Connecting leads

Connecting leads for power supply or system control, resistant to oil and suitable for drag chains. Maximum lead length is 20 m (lead cross section 0.25 qmm).

VLG8E/8S/5-1	5 m	Ref. no. 20.18-92-050
Connecting lead, 5 m straight, shielded.		
VLG8E/8S/10-1	10 m	Ref. no. 20.18-92-100
Connecting lead, 10 m straight, shielded.		
VLG8E/8S/20-1	20 m	Ref. no. 20.18-92-200
Connecting lead, 20 m straight, shielded.		

5. Connecting lead between transmitter and receiver

VLG 4/3S/2-1	2 m	Ref. no. 20.18-96-020
Connecting lead (transmitter \leftrightarrow receiver) Plug on both ends straight , shielded.		
VLG 4/3S/2-2	2 m	Ref. no. 20.18-99-020
Connecting lead (transmitter \leftrightarrow receiver) Plug on sensor end angled , shielded.		

Other lead lengths on request.

The use of unshielded leads may cause interference signals.

Subject to changes!