

Application

The self-contained sensor BDK Duo is used for non-contact monitoring of double sheet metals. It is especially suitable when it is necessary to avoid contact with sheets (such as enclosure panels), when sheets are to be measured during transport, or when a large air gap caused by the sheet texture is unavoidable (with treadplate, for example). 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 0.2 mm to 10 mm for stainless steel can be monitored.

Configuration

The all-in-one sensor consists of transmitter, receiver and evaluation electronics in a U-shaped aluminium housing. The transmitter produces an alternating electromagnetic field which is detected by the receiver. The sheet to be monitored passes between transmitter and receiver, and attenuates the alternating field in approximate proportion to the sheet thickness. The sheet must cover the 38 mm diameter of the sensing face completely, and project at least 38 mm beyond it in all directions. In addition, a distance of at least 10 mm must be maintained between the sheet surface and the transmitter or receiver.

The BDK Duo 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. An optional version has a non-linear analogue output (with a choice of current or voltage output) to assist, for example, threshold value monitoring in a post-connected Programmable Logic Controller (PLC).

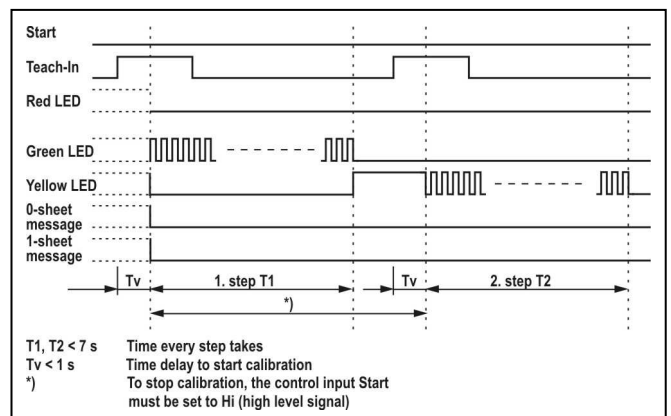
Teach-In

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*). To do so, the control input must be set to *Hi* for at least 400 ms. The sensor then returns to its previous operating mode.



Timing diagram: Teach-In

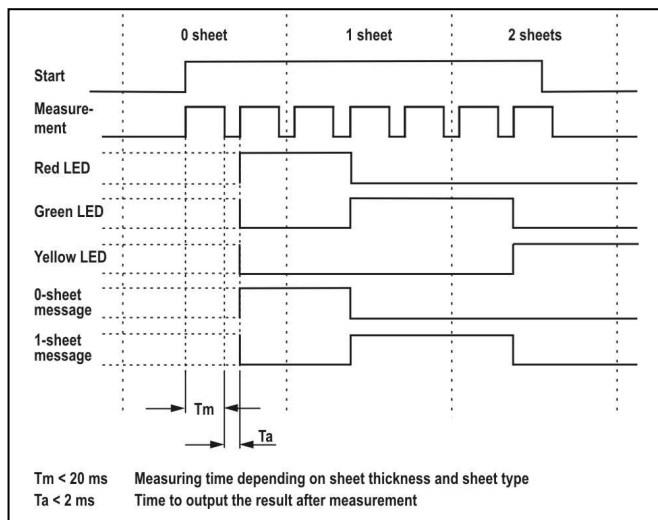
Interface

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). There are three LEDs for visual monitoring. The diagram below shows the time sequences of a measurement.

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

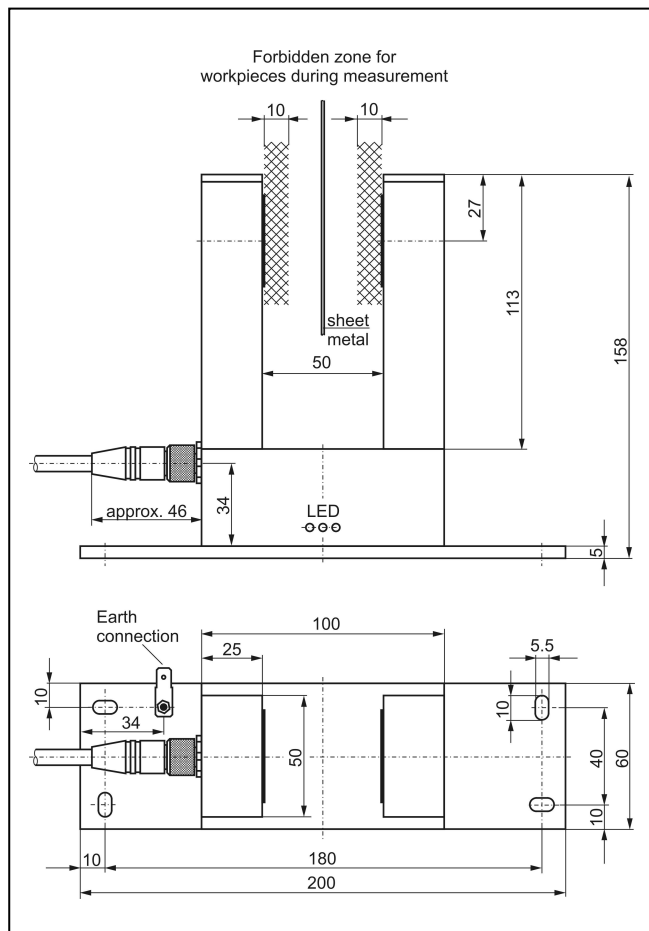
LED			
Sheets	yellow LED	green LED	red LED
0	on	off	off
1	off	on	off
2	off	off	on

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*.

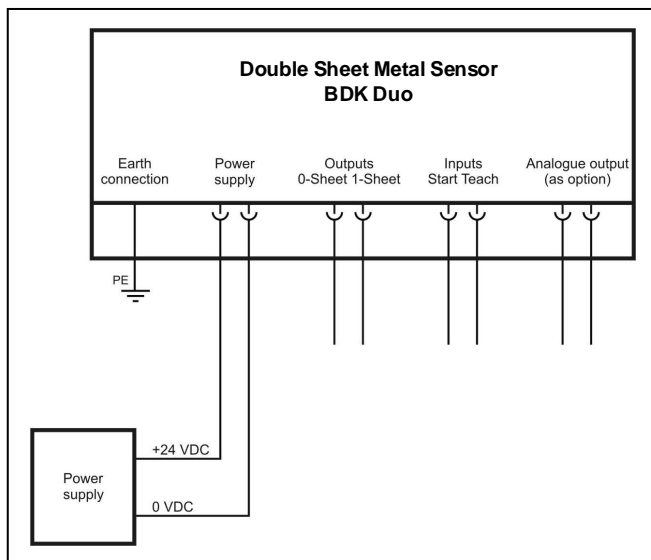


Timing diagram: Measuring procedure

Dimensions



Wiring diagram



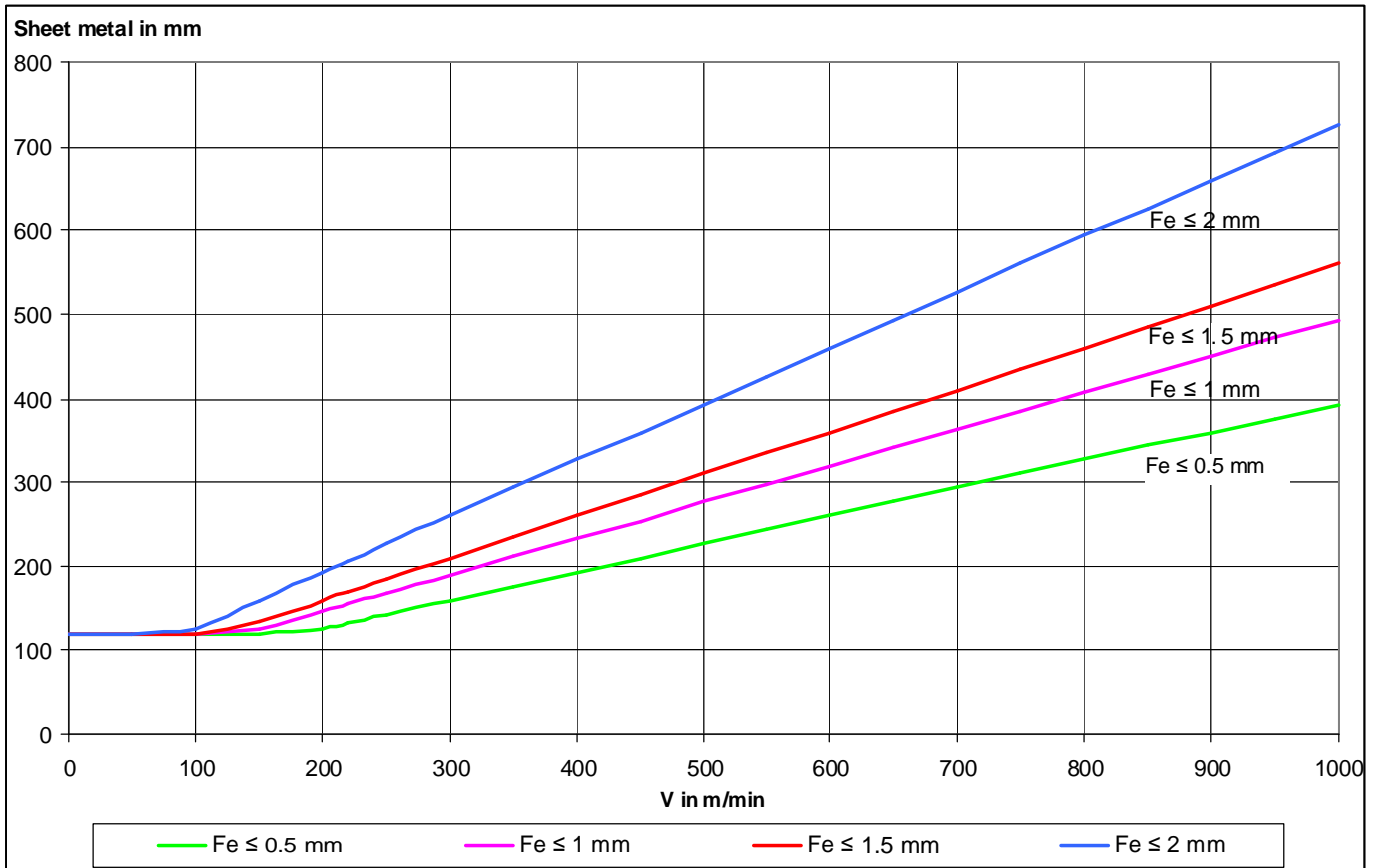


Diagram: Minimum sheet size in dependence of the speed (Ferrous (Fe) sheets)

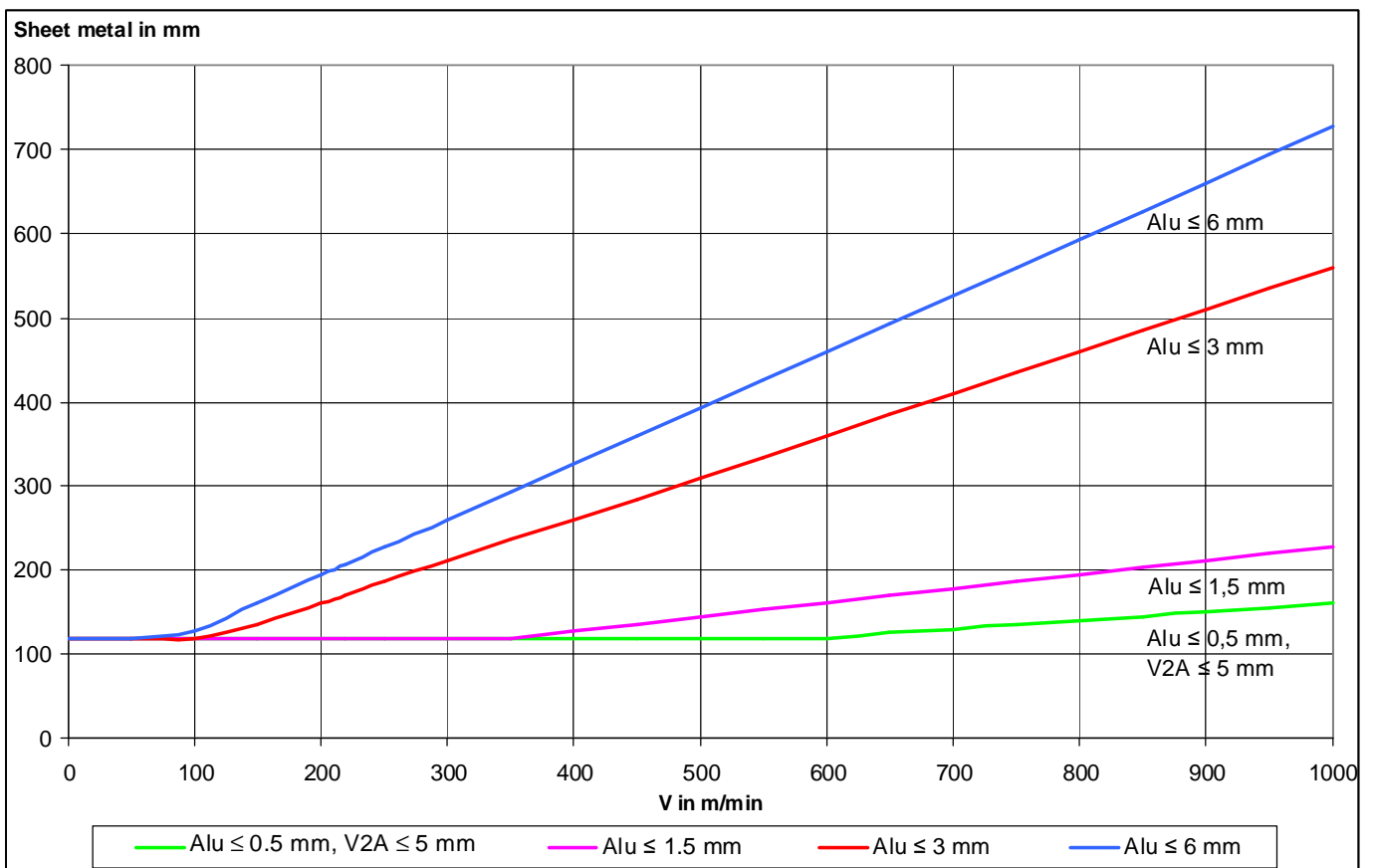


Diagram: Minimum sheet size in dependence of the speed and material (non-ferrous (NE) sheets)

Technical data

Double Sheet Metal Sensors BDK Duo

Self-contained, double surface (Fe/NE)

BWD/L-60as-1s Ref. no. 13.35-03

Operating voltage U_B	19 ... 24 ... 30 V DC
Reverse polarity protection	yes
Power consumption	max. 300 mA
Operating temperature	0 ... + 55 °C

Inputs

Start signal	Hi = 12 ... 24 ... 30 V DC Lo = 0 ... 5 V DC
Input current	approx. 5 mA (bei 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 output, plus-switching, short-circuit proof
Output voltage	$\geq U_B - 1,75 V$
Output current	max. 100 mA
Electrical isolation	no

Status display	3 LEDs (red, green, yellow)
Measuring time	max. 20 ms, min. 3 ms
Measuring procedure	transmission loss
Connection type	M12 Euro connector
Dimensions (W x H x D)	100 x 158 x 60 mm
Weight	approx. 1.000 g
Housing material	aluminium anodized
Mounting	screw mounting

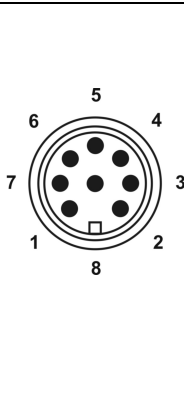
Sheet thickness range (1-sheet)

ferromagnetic	0.1 ... 2 mm
non-ferromagnetic (Alu)	0.1 ... 6 mm
non-ferromagnetic (V2A)	0.2 ... 5 mm

Depending on the alloy, non-ferromagnetic sheets up to a thickness of 10 mm can be measured.

Pin assignment

Pin no.	Colour	Function
1	white	+24 V DC
2	brown	M
3	green	0-sheet message K0
4	yellow	1-sheet message K1
5	grey	Start signal
6	pink	Teach-In signal
Only for Ref. no. 13.35-02 and 13.35-04		
7	blue	Analogue output
8	red	Analogue output M



The housing must be earthed with the available earth connection.

Versions with additional current or voltage output

BWE/L-60as-1s Ref. no. 13.35-02

Same technical data as BWD/L-60as-1s (13.35-03) but with additional analogue voltage output.

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

BWF/L-60as-1s Ref. no. 13.35-04

Same technical data as BWD/L-60as-1s (13.35-03) but with additional current output.

Output current	0 ... 20 mA, non-linear 1-sheet corresponds to 40 % of the value range
Load resistance	$\leq 500 \Omega$
Electrical isolation	no
Resolution	256 steps

Connecting leads

All connecting leads are resistant to oil and suitable for drag chains. Max. lead length is 20 m (for lead diameter 0.25 qmm). Other leads on request. When ordering, please indicate the lead length X (standard value X = 5 m).

VLG8E/8S/5-1 5 m Ref. no. **20.18-92-050**
 Connection lead of 5 m for
 BDK Uno, BDK Duo
 straight, shielded

VLG8E/8S/10-1 10 m Ref. no. **20.18-92-100**
 Connection lead of 10 m for
 BDK Uno, BDK Duo
 straight, shielded

VLG8E/8S/20-1 20 m Ref. no. **20.18-92-200**
 Connection lead of 20 m for
 BDK Uno, BDK Duo
 straight, shielded

The use of unshielded leads can cause interference signals.

Subject to changes!