



- **Robust unit for reliable double sheet detection in destacking and loading facilities for sheet metal processing works (especially presses and press lines).**
- **Single surface contact measurement with DSP sheet metal thickness sensor up to 5.5 mm for Fe.**
- **Single surface contact measurement with BDWF sheet metal thickness sensor up to 5.5 mm for non-ferrous (NE).**
- **Single surface contact measurement with DSPW combination thickness sensor. up to 3.5 mm for Fe. up to 4.0 mm for non-ferrous (NE).**
- **Operation of 1 sensor directly at the device, and up to 4 sensors via a switch.**
- **256 program memories for different material types and thicknesses with the associated sheet metal thickness sensors in the standard operating mode.**
- **Indication of sheet thickness and program parameters.**
- **Standard version with electrically isolated parallel interface to system controller.**
- **Field bus version with interface to PROFIBUS DP.**

Application

Double Sheet Monitors check the automatic destacking and separation of ferrous and non-ferrous workpieces at sheet metal processing works (e.g. presses) with automatic feeding systems such as destackers, robots, feeders, etc. They reliably detect the situations when two or more sheets stick together, and allow thus to stop the process before resulting in damage to machinery or tooling.

The BDK Double Sheet Monitor is suitable for operation with various sheet metal thickness sensors for monitoring ferrous (Fe) and non-ferrous (NE) sheet metals. Depending on the sensor and/or measurement method a thickness up to max. 5.5 mm can be detected.

Configuration

A cover held by a standard rotary lock protects the evaluation device. Sensor and evaluation device are characterised by a sturdy construction and a high protection class. The ready-made connecting leads, with plugs and sockets on both sensor and device ends, permit quick and easy mounting and commissioning of the entire system.

Four operator keys and a four-line illuminated LC text display permit the convenient entry of device and measuring parameters. There are 256 program memory locations, which permit the storage of the measuring programs. They permit quick changes of material or tool during operation, and the programs remain stored even when the device is switched off.

Method of Operation

The double sheet metal monitoring and the measurement of the sheet metal thickness by means of the evaluation device BDK-ET-1.3 takes place by way of single surface contact measurement methods.

The selection between ferrous sheet measurement using the magnetic flux method and the non-ferrous sheet measurement based on the eddy current principle takes place automatically when selecting the sensor type. This procedure requires that the sensor rests on the sheet metal during the measurement.

After each measurement the sheet metal thickness is evaluated from the sensor signal in the microprocessor-controlled evaluation device and compared with the current threshold values.

On the LC display, sensor type, upper and lower threshold value, measurement internal/external and the calibration selection are presented in dependence of the selected program number. After each measurement the reading is updated and displayed.

The display is equipped with signal lamps, which optically indicate the active status of a measurement, of the proximity switch in the sensor as well as the 0-, 1-and 2-sheet detection. In connection with these messages the press controller allows an individual evaluation via three potential-free relay outputs K0, K1 and K2.

Parameters and similar are entered using the four keys next to the LC display.

Devices with PROFIBUS DP interface transmit via the field bus interface instead of the relay outputs the measured value, the 0-, 1- or 2-sheet metal messages, the memory location number of the current program and the current threshold value.

With the BDK-ET-1.3 the selection of the measuring program and initiation of the measurement can take place via a parallel interface to the PLC, with the BDK-ET/FP-1.3 via the field bus interface.

When being operated without PLC (stand alone operation), the measurement program can be selected on the device itself and the measuring operation can be triggered by a proximity switch within the sensor.

Technical Data

Evaluation Device

Inputs:

External start (STA)

- Lo-level 1 ... 8 V DC
- Hi-level 12 ... 30 V DC
- Lead breakage detection 0 ... 1 V DC
- Input current approx. 10 mA
- Electrical isolation yes (to power supply)

External threshold selection (A1 ... A8 and Reset)

- Lo-level 0 ... 4 V DC
- Hi-level 12 ... 30 V DC
- Input current approx. 10 mA
- Electrical isolation yes (to power supply)

Outputs:

- Relay output K0 1 NO,
1 NC
- Relay output K1, K2 1 rev. switch each
6 A, 250 V AC

Measurement accuracy:

- At calibration point ± 0.1 mm
- Across measurement range $\pm 5\%$ of sensor value
- Permissible air gap see sensor data

Power supply:

- DC voltage 24 V DC
- Tolerance $\pm 15\%$
- Residual ripple max. 10%

Power consumption:

- Measurement process active max. 100 W
- Idle state approx. 12 W

Overload protection:

- Melt fuse T3.15 A

Housing:

- Version metal,
with window
- Protection rating IP65
- Mounting screw mounting
(4 x M6)
- Weight approx. 3.5 kg
- Ambient temperature 0 ... 55 °C

Order Data:

BDK-ET-1.3, relay outputs 20.05-96

Double Sheet Metal Monitor
for single surface contact measurement
Power supply 24 V DC

**BDK-ET/OB-1.3
semi-conductor relay outputs 20.21-02**

**BDK-ET/FP-1.3
PROFIBUS DP interface connection 20.05-97**

DSP Thickness Sensor for ferrous (Fe) sheets

Exciter coil	
- Nominal voltage	approx. 38 V DC
- Power consumption	max. 2.2 A
<u>Integral proximity switch</u>	
- Switching distance	approx. 1.2 mm
Housing material	nickel-plated steel
Protection rating	IP 65
Ambient temperature	0 ... 60 °C

Versions:

Type	Ref. no.	Measuring range mm	Sheets ... mm
DSP-36sg-1s	13.05-86	0.2 ... 2.0	1.5
DSP-42sg-1s	13.05-87	0.2 ... 3.0	2.5
DSP-54sg-1s	13.05-89	0.2 ... 4.0	3.5
DSP-75sg-1s	13.05-90	0.2 ... 6.0	5.5

BDWF Thickness Sensor for non-ferrous (NE) sheets

Power supply	24 V DC
Signal voltage	10 Vpp
<u>Sheet detection</u>	
- Switching distance	1 ... 5 mm (depending on sheet type)
Housing material	nickel-plated steel
Protection rating	IP 65
Ambient temperature range	0 ... 60 °C

Versions:

Type	Ref. no.	Measuring range mm	Sheets up to mm
BDWF-m54rg-2s	13.05-73	0.2 ... 6.0	5.5

DSPW Combination Thickness Sensor for ferrous (Fe) and non-ferrous (NE) sheets

Power supply	24 V DC
<u>Sheet detection</u>	
- Switching distance	1 ... 5 mm (depending on sheet type)
Housing	nickel-plated steel
Protection type	IP 65
Ambient temperature	0 ... 60 °C

Type	Ref. no.	Measuring range mm	Sheets ... mm
DSPW-42sg-1s **)	13.05-66	Fe 0.2 ... 3.5 NE 0.2 ... 2.5 NE 0.2 ... 4.0 *)	3.0 2.0 3.0
DSPW-54sg-1s	13.05-67	Fe 0.2 ... 4.0 NE 0.2 ... 3.0 NE 0.2 ... 5.0 *)	3.5 2.5 4.0

*) The measuring range for non-ferrous (NE) sheets can be extended to **4 mm** or rather **5 mm** by use of a special adapter for the sensor installation, which can be supplied separately on demand.

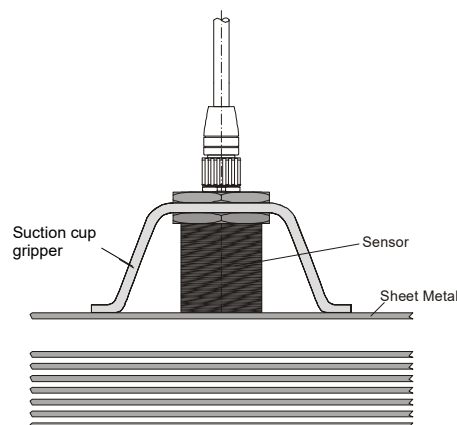
When using an unsuitable adapter, the accuracy and linearity of the sensor may deteriorate.

**) For using the DSPW-42sg-1s sensor, the evaluation device has to be equipped with software version E118 or higher.

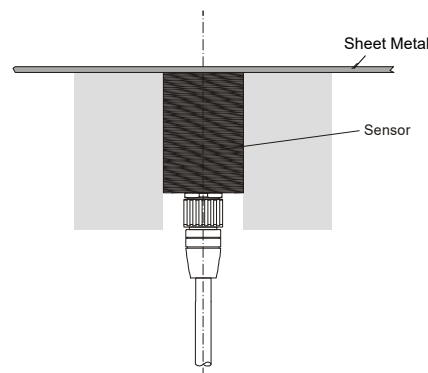
Standards Applied

Measuring relays and protection equipment	EN 60255-1
EMC emission	EN 61000-6-4
EMC immunity	EN 61000-6-2

Examples for mounting

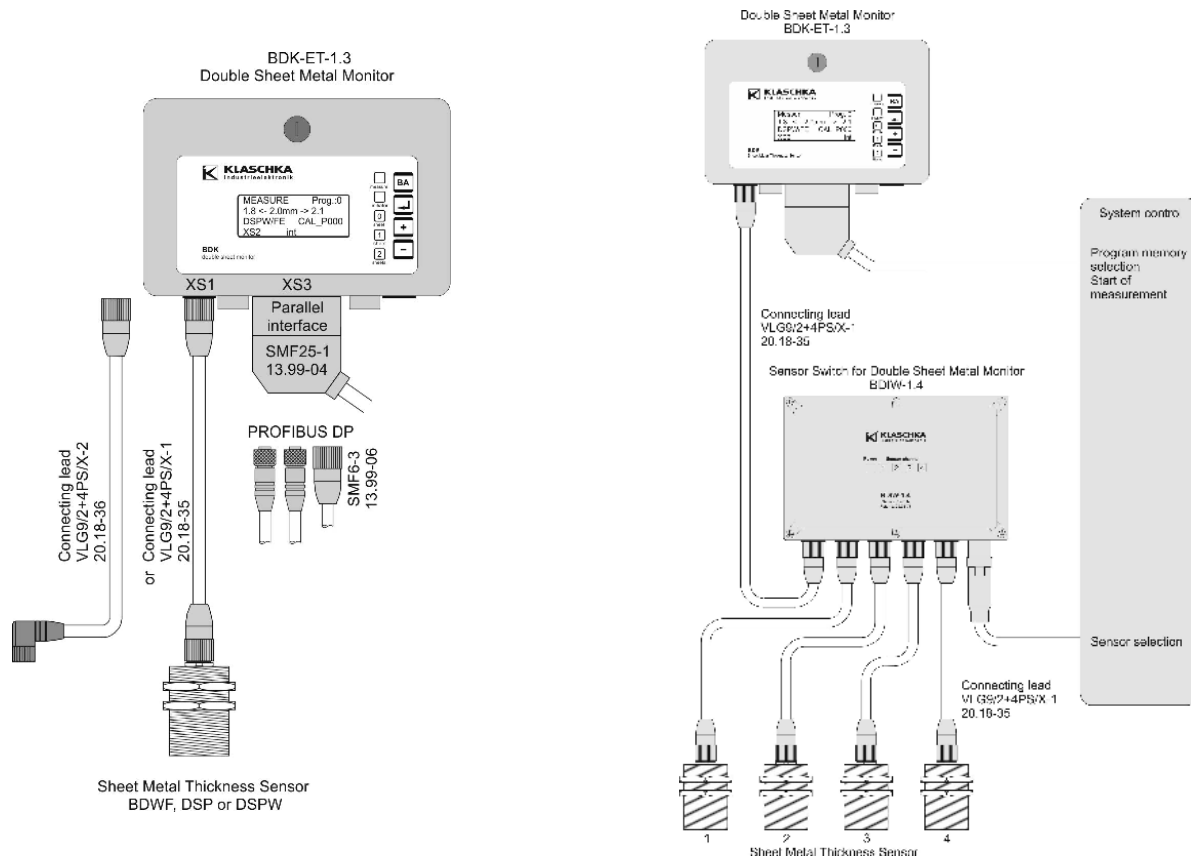


Single surface contact measurement with thickness sensors DSP, BDWF, or combination sensor DSPW in suction cup gripper.



Single surface contact measurement with thickness sensors DSP, BDWF, or combination sensor DSPW mounted in the control station.

Accessories

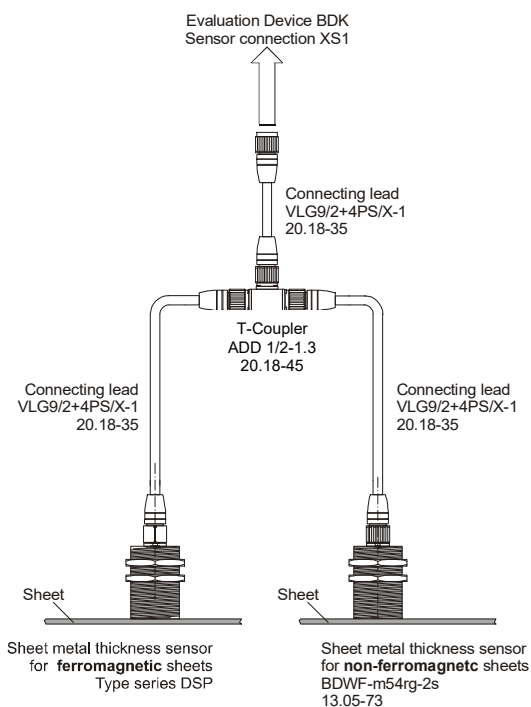


VLG Connecting Leads

Versions with connecting lead straight or angled – also available with open ends.

BDIW-1.4 Sheet Thickness Sensor Switch

Connection of up to 4 sensors to the BDK connector.



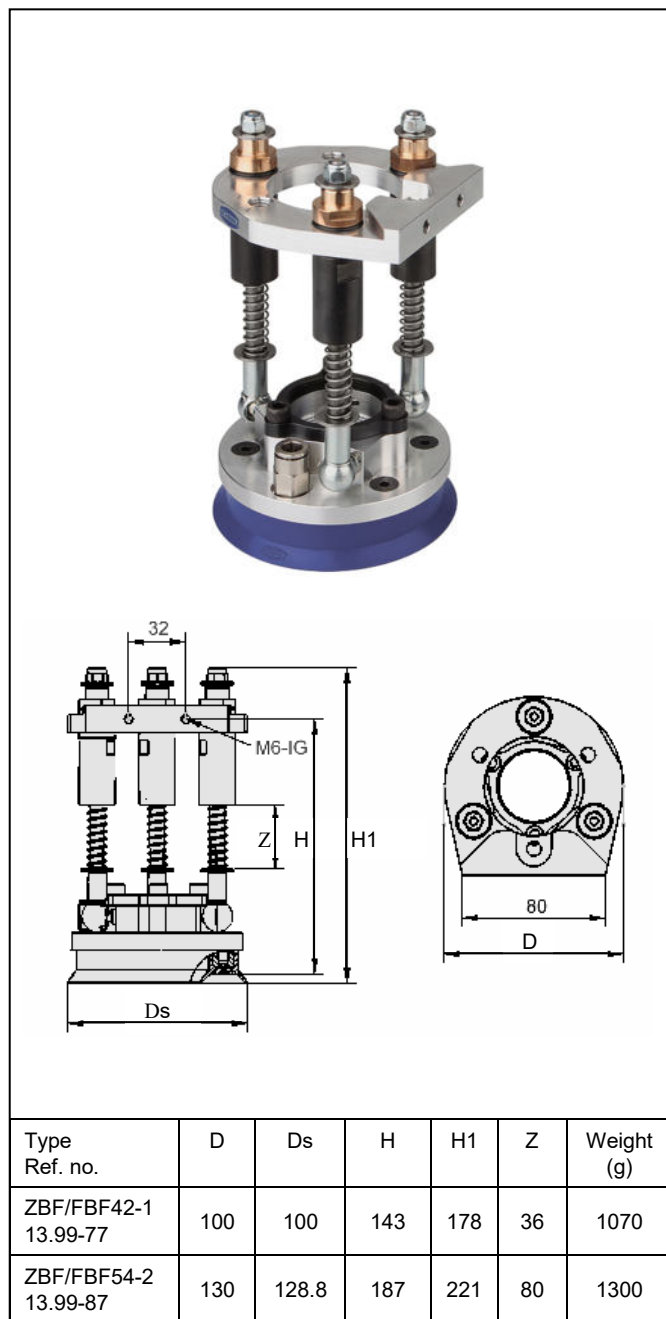
ADD1/2-1.3 T-Coupler

Connection of 2 different sensor types to the BDK connector.

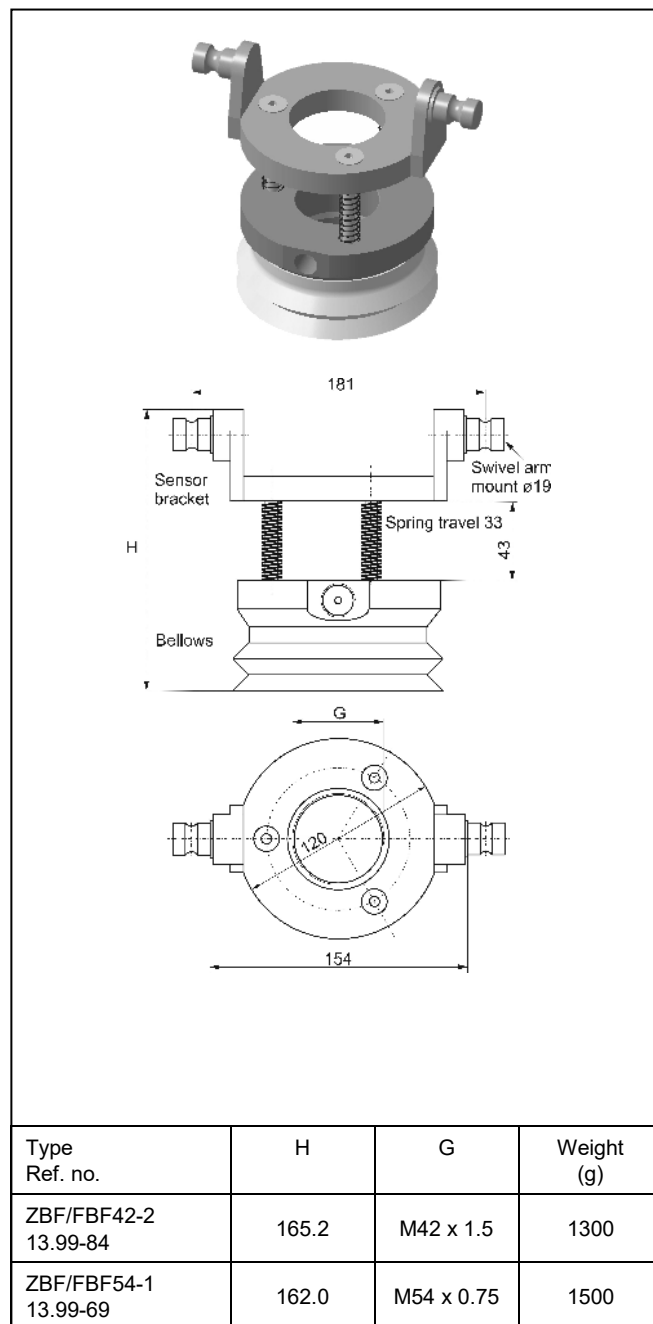
Sensor bracket with suction cup for mounting Sheet Thickness Sensor

For single surface contact monitoring (e.g. for destacking equipment), sheet thickness sensors are often built into the suction cup of the gripper. For the DSP, DSPW, and BDWF thickness sensors with (M42, M54) design there are different versions of sensor brackets available.

1. For Sensors with M42 x 1.5 and M54 x 0.75 thread - spring-mounted, with a flexible spherical bearing



2. For Sensors with M42 x 1.5 and M54 x 0.75 thread -spring-mounted



Spare Parts for Sensor Brackets		
Type	Ref. no.	
ZBF/FB42-1	13.99-78	Suction cup for sensor bracket M42
ZBF/FB54-2	13.99-88	Suction cup for sensor bracket M54

Spare Parts for Sensor Brackets		
Type	Ref. no.	
ZBF/FB42-2	13.99-85	Bellows for sensor bracket M42
ZBF/FB54-1	13.99-68	Bellows for sensor bracket M54

Order Data (designation / ref.no)

Evaluation Devices

BDK-ET-1.3, relay outputs	20.05-96
BDK-ET/OB-1.3, semi-conductor relay outputs	20.21-02
BDK-ET/FP-1.3, PROFIBUS DP	20.05-97

Sheet Metal Thickness Sensors for single-surface contact measurement

DSPW-42sg-1s	13.05-66
for Fe sheets up to 3.0 mm / for non-ferrous (NE) sheets up to 2.0 mm Thread M42 x 1.5	

- For using the DSPW-42sg-1s sensor, the evaluation device has to be equipped with software version E118 or higher.

DSPW-54sg-1s	13.05-67
for Fe sheets up to 3.5 mm/ for non-ferrous (NE) sheets up to 2.5 mm Thread M54 x 0.75	

BDWF-m54rg-2s	13.05-73
for non-ferrous (NE) sheets up to 5.5 mm Thread M54 x 0.75	

DSP-36sg-1s	13.05-86
for Fe sheets up to 1.5 mm, thread M36 x 1.5	

DSP-42sg-1s	13.05-87
for Fe sheets up to 2.5 mm, thread M42 x 1.5	

DSP-54sg-1s	13.05-89
for Fe sheets up to 3.5 mm, thread M54 x 0.75	

DSP-75sg-1s	13.05-90
for Fe sheets up to 5.5 mm, thread M75 x 1.5	

Connecting Leads and Accessories

All connecting leads are oil-resistant and suitable for drag chains. Please indicate the lead length X when ordering (standard length X = 5 m). The connectors are device-sided straight and sensor-sided optionally straight or angled.

VLG9/2+4PS/X-1	20.18-35
Connecting lead BDK <---> sensor Plug sensor-sided straight	

VLG9/2+4PS/X-2	20.18-36
Connecting lead BDK <---> sensor Plug sensor-sided angled	

VLG9/2+4PS/X-3	20.18-37
Extension lead: BDK-lead (VLG) <---> sensor Plug sensor-sided straight	

VLG9/2+4PS/X-4	20.18-38
Extension lead: BDK-lead (VLG) <---> sensor Plug sensor-sided angled	

VLG9E/2+4PS/X-1	20.18-39
Connecting lead BDK and multi-coupling (open ends)	

VLG9E/2+4PS/X-2	20.18-40
Connecting lead multi-coupling (open ends) and sensor, straight socket	

VLG9E/2+4PS/X-3	20.18-41
Connecting lead multi-coupling (open ends) and sensor, angled socket.	

ADD1/2-1.3	20.18-45
T-Coupler for connecting additional sensors, 1 x pin, 2 x socket	

SMF25-1	13.99-04
Socket for connection of power supply and control leads for devices with parallel interface.	

SMF6-3	13.99-06
Socket for connection of power supply leads for PROFIBUS devices.	

Switch for connecting additional Sensors

BDIW-1.4	20.05-77
Sensor switch for selecting one out of four sensors (BDWF, DSP, DSPW). Power supply 24 VDC.	

Connecting leads for BDIW-1.4

VLG9/2+4PS/X-1	20.18-35
Connecting lead BDK <---> BDIW and BDIW <---> Sensor connection BDWF, DSP, DSPW. Plug sensor-sided straight.	

VLG9/2+4PS/X-2	20.18-36
Connecting lead BDIW <---> Sensor connection BDWF, DSP, DSPW. Plug sensor-sided angled.	

SPF8-1	13.99-05
Lead socket for connecting supply and control leads.	

Bracket for mounting sheet metal thickness sensor

Sensor bracket M42 x 1.5	
spring-mounted, suction ring, flexible spherical bearing ZBF/FBF42-1	
	13.99-77

Sensor bracket M42 x 1.5	
spring-mounted, with bellows ZBF/FBF42-2	
	13.99-84

Sensor bracket M54 x 0.75	
spring-mounted, with bellows ZBF/FBF54-1	
	13.99-69

Sensor bracket M54 x 0.75	
spring-mounted, suction ring, flexible spherical bearing ZBF/FBF54-2	
	13.99-87

Spare parts for sensor brackets:

Suction cup for sensor brackets M42	
ZBF/FB42-1	13.99-78

Bellows for sensor bracket M42	
ZBF/FB42-2	13.99-85

Bellows for sensor bracket M54	
ZBF/FB54-1	13.99-68

Suction cup for sensor bracket M54	
ZBF/FB54-2	13.99-88

We are certified according to DIN EN ISO 9001.
Subject to technical changes!