



- **Robust unit for reliable double sheet detection in de-stacking and loading facilities for sheet metal processing works (especially presses and press lines)**
- **Single surface contact measurement with DSP thickness sensor up to 5.5 mm for Fe**
- **Single surface contact measurement with BDWF 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)**
- **Single surface non-contact measurement with DSD thickness sensor on reference basis up to 12 mm for Fe**
- **Double surface non-contact measurement with thickness sensors BDWD/S and BDWD/E up to 3.0 mm for Fe up to 6 mm for non-ferrous (NE)**
- **Operation of 2 sensors on one device, several sensors can be operated via T-coupler or sensor switch**
- **256 program memories for different materials and thicknesses with the associated sheet metal thickness sensors in the standard operation mode**
- **Indication of sheet thickness and program parameter**
- **Standard version with electrically isolated parallel interface to system controller**
- **Field bus version with interface to different standard field buses**
- **Serial interface for the down- and uploading of the program parameters**

Application

Double Sheet Metal Monitors check the automatic destacking and separation of ferrous (Fe) and non-ferrous (NE) 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 Metal Monitor is suitable for operation with various sheet metal thickness sensors for monitoring ferrous and non-ferrous sheet metals. Depending on the sensor and/or measuring method, a thickness up to max.12 mm can be detected.

Configuration

A lockable cover protects the evaluation device against unauthorised access. 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 these devices.

Four operator keys and a four-line illuminated 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 allow quick changes of material or tool during operation, and the programs remain stored even when the device is switched off.

A laptop and the PROPAR/BDK-1 software allow the down- and uploading of all program parameters using the RS232 interface on the front panel of the device.

Mode of Operation

There are various measurement methods for double sheet monitoring and measuring the sheet metal thickness with the BDK 1.3 evaluation device. Measuring methods can be subdivided into two groups: contact and non-contact.

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.

With the double surface non-contact measurement method of ferrous (Fe) and non-ferrous (NE) sheets, the generated alternating magnetic field is attenuated by the sheet metal placed between the two sensors, transmitter and receiver (transmission measurement).

A single surface non-contact measurement detects the distance between sensor and sheet metal. Based on this distance, the evaluation device evaluates the thickness of the sheet metal (distance measurement).

With all methods, after making the measurement, the micro-processor-controlled monitoring device uses the sensor signal to determine the thickness of the sheet metal and compares the result to the current threshold values.

On the LC display, sensor type, upper and lower threshold value, sensor connection right/left, 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 (initiator) and 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 ... K2. The outputs of BDK-1.3 are equipped with electromechanical relays, those of BDK/OB-1.3 with contactless semiconductor relays. K1 and K2 are equipped with one reversing switch each. K0 is equipped with one NO and one NC.

Parameters and similar information are entered using the four keys and their possible combinations.

Devices which have a field bus interface, for example Profinet, transmit via this interface instead of the relay outputs the measured value, the 0-, 1- and 2-sheet metal messages, the memory location number of the current program and the current threshold value.

The selection of the measuring program and initiation of the measurement can take place via either a parallel interface to the PLC or 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 initiated by the integral proximity switch (initiator) of the sensor.

Technical Data

Evaluation Devices

Inputs:

External start (STA)	
- Lo-level	1 ... 8 VDC
- Hi-level	12 ... 30 VDC
Lead break detection	0 ... 1 VDC
- Input current	approx. 10 mA
- Electrical isolation	yes (to power supply)
External threshold selection (A1 ... A8 and reset)	
- Lo-level	0 ... 4 VDC
- Hi-level	12 ... 30 VDC
- Input current	approx. 10 mA
- Electrical isolation	yes (to power supply)

Outputs:

Electromechanical relays

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

Semi-conductor relays *)

- Relay output K0	1 NC, 1 NO
- Relay outputs K1, K2	1 rev. switch each 0.5 A, 30 V

Measurement accuracy:

- At calibration point	± 0.1 or 0.2 mm
- Across measurement range	± 5% of sensor value
- Permissible air gap	see sensor data

Power supply:

- DC	24 VDC
- Tolerance	± 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
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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-1.3, relay outputs	Ref. no 20.05-80
Universal Double Sheet Metal Monitor	

BDK/OB-1.3, Semi-conductor relay outputs	Ref. no 20.21-01
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Devices with field bus connection:

BDK/FS-1.3 (InterBus S)	Ref. no 20.05-81
BDK/FP-1.3 (PROFIBUS DP)	Ref. no 20.05-82
BDK/PN-1.3 (PROFINET IO)	Ref. no 20.05-93

*) When connecting inductive loads to the semi-conductor relays, an appropriate cut-off protection has to be used.

DSP thickness sensor for Fe sheets (single surface contact measurement)

Field coil

- Nominal voltage approx. 38 VDC
- Power consumption max. 2.2 A

Integral proximity switch

- Switching distance approx. 1.2 mm
Housing material nickel-plated steel
Protection rating IP 65
Ambient temperature 0 ... 60 °C

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 NE sheets (single surface contact measurement)

Power supply 24 VDC
Signal voltage 10 Vpp

Sheet detection

- Switching distance 1 ... 5 mm
dep. on sheet type
Housing material nickel-plated steel
Protection rating IP 65
Ambient temperature 0 ... 60 °C

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

BDWD/S and BDWD/E thickness sensors for Fe and NE sheets (double surface non-contact measurement)

Power supply 24 VDC
Signal voltage 10 Vpp
Housing material nickel-plated steel
Protection rating IP 65
Ambient temperature 0 ... 60 °C

Type	Ref. no.	Meas. range mm	Sheets in mm
BDWD/S-m36rg-1s (transmitter)	13.05-74	Fe 0.2 ... 3.5 NE 0.2 ... 20.0	3.0
BDWD/E-m36rg-1s (receiver)	13.05-75		
BDWD/S-60aq30-1Y1 (transmitter)	13.05-76	Fe 0.2 ... 3.5 NE 0.2 ... 20.0	6.0
BDWD/E-60aq30-1Y1 (receiver)	13.05-77		

DSD thickness sensor for Fe sheets (single surface non-contact measurement)

Power supply 24 VDC
Housing material nickel-plated brass
Protection rating IP 65
Ambient temperature 0 ... 60 °C

Type	Ref. no.	Measuring range mm	Sheets up to... mm
DSD-18mg 61n0,5/3-1Sd1	13.05-91	0.5 ... 6.0 0.5 ... 0.7 *)	3.0 3.5 *)
DSD-60mg 90n3/12-1Y1	13.05-83	3 ... 20.0	12.0

*) Possibility to extend the measurement and sheet thickness range with software version E119 or higher (from July 2014).

DSPW thickness sensor for Fe and NE sheets (single surface contact measurement)

Power supply 24 VDC

Sheet detection

- Switching distance 1 ... 5 mm
(dep. on sheet type)
Housing material nickel-plated steel
Protection rating IP 65
Ambient temperature 0 ... 60 °C

Type	Ref. no.	Measuring range mm	Sheets up to... 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 **5 mm** by use of a special adapter for the sensor installation, which can be supplied separately on demand.

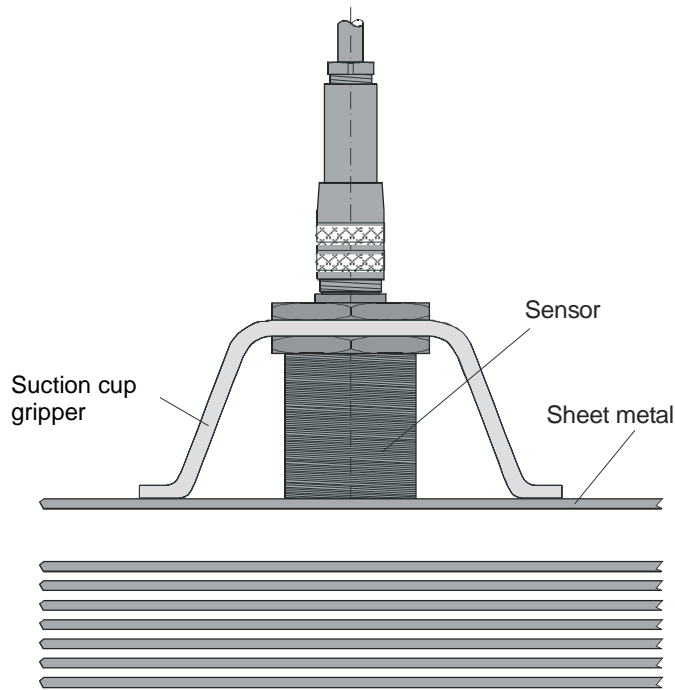
When using an unsuitable adapter, the accuracy and linearity of the sensor may deteriorate.

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

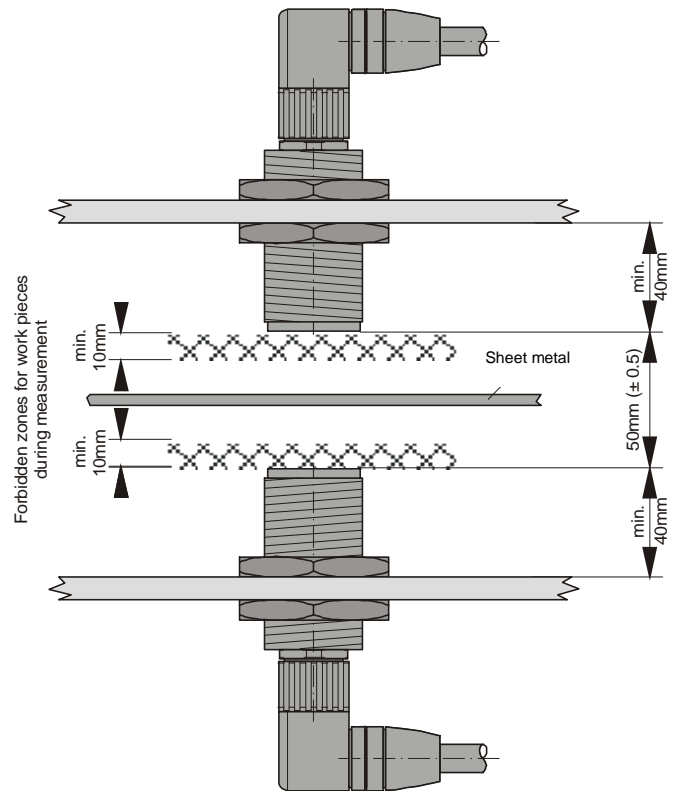
Standards Applied

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

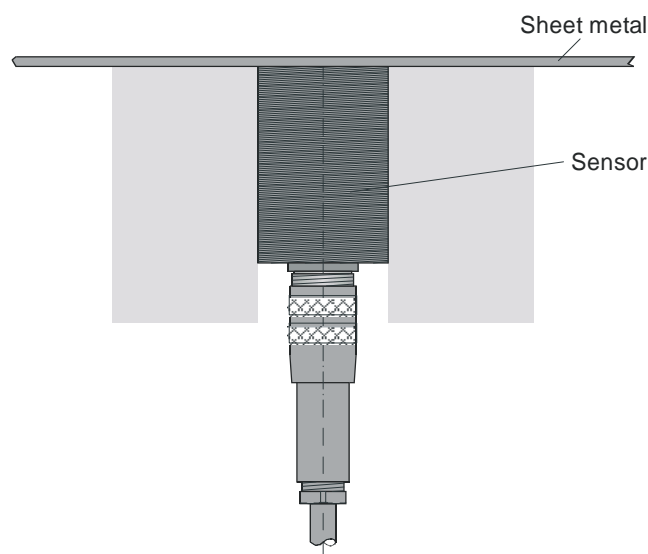
Examples for installation



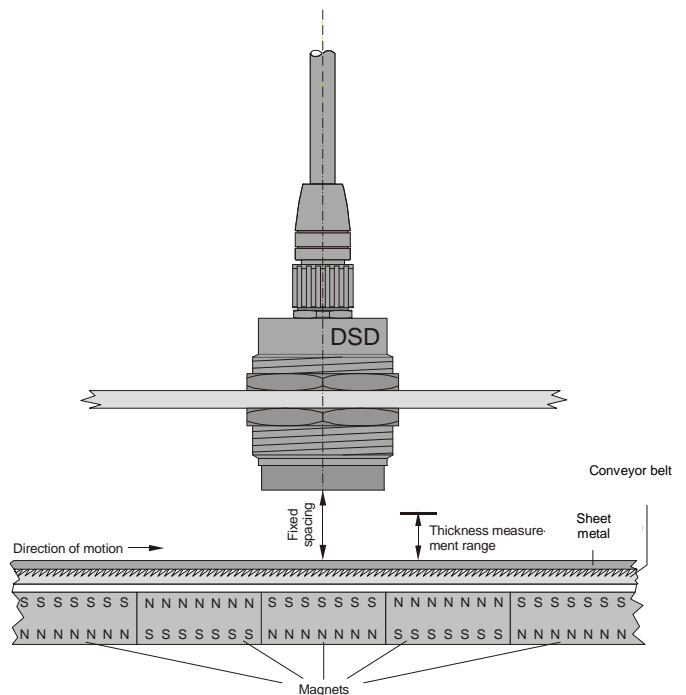
Single surface contact measurement with sheet metal thickness sensors DSP, BDWF or DSPW (combination sensor) in suction cup gripper.



Double surface non-contact measurement with sheet metal thickness sensor pair BDWD/S and BDWD/E.

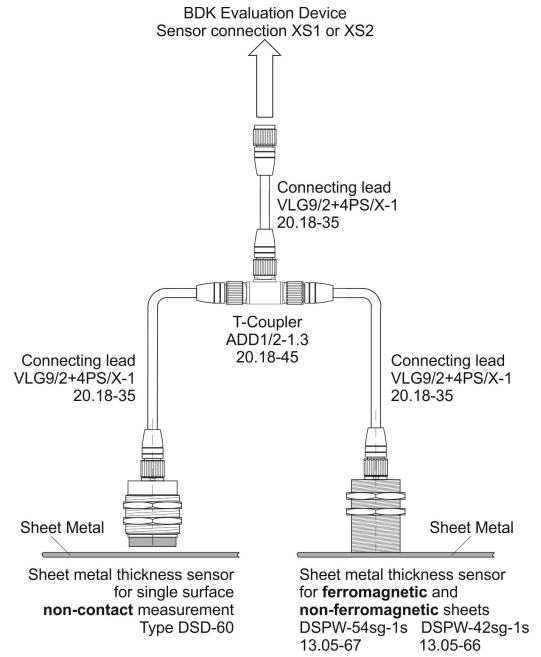
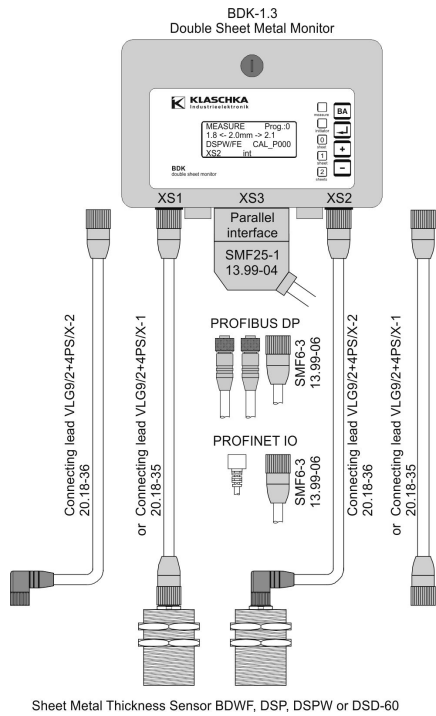


Single surface contact measurement with sheet metal thickness sensors DSP, BDWF or DSPW (combination sensor) mounted in the control station.



Single surface non-contact measurement with DSD sheet metal thickness sensor on reference basis.

Accessories

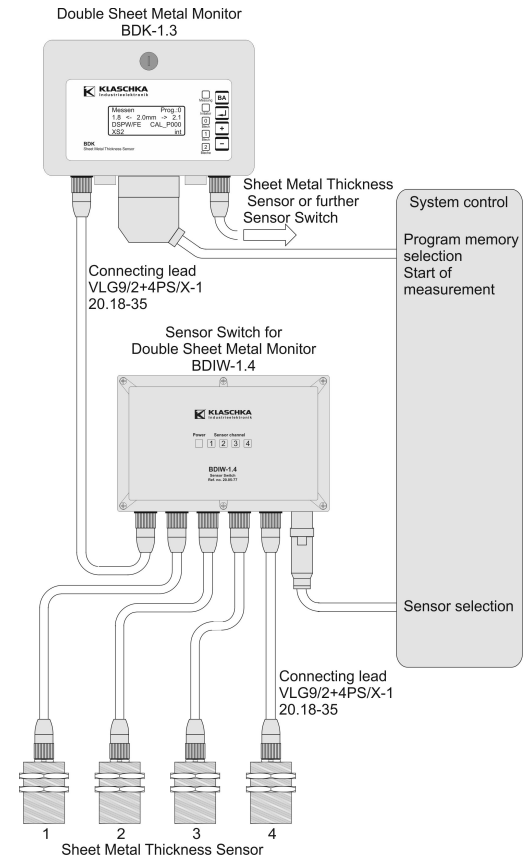
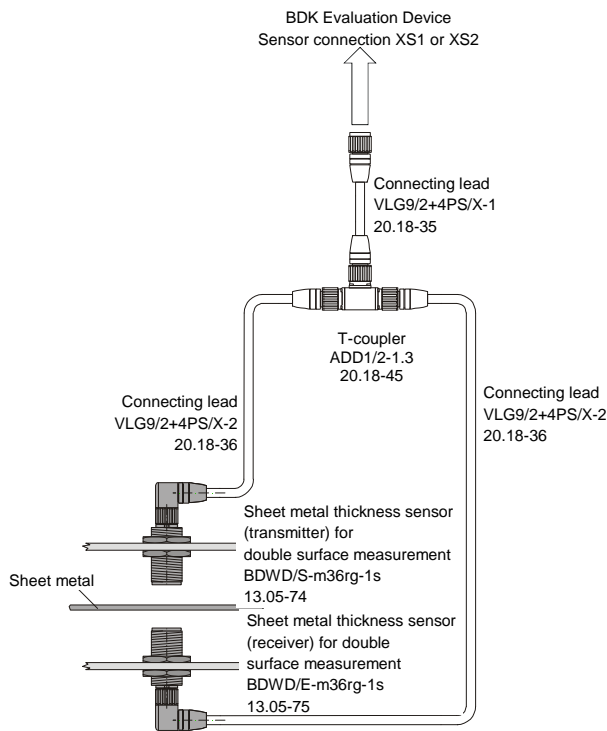


VLG Connecting leads

Plug-in versions with sensor connection straight or angled - available also as extension with open ends.

ADD1/2-1.3 T-Coupler

Connection of 2 different sensors to one connector of the BDK.



ADD1/2-1.3 T-Coupler

Connection of one BDWD sensor pair to one connector of the BDK.

BDIW-1.4 Thickness Sensor Switch

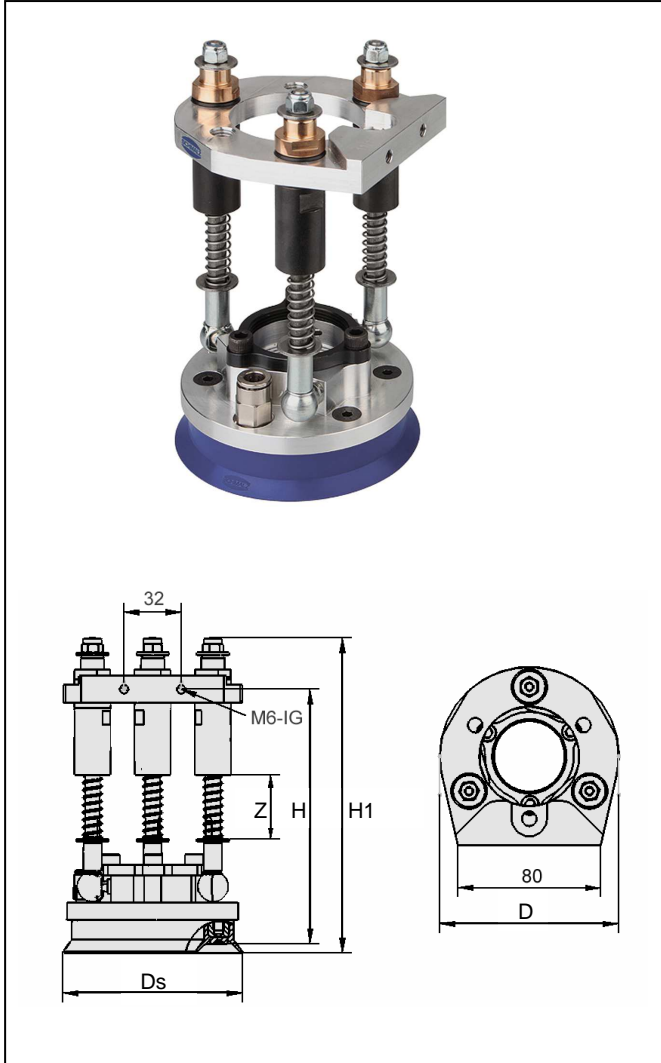
Connection of up to 4 sensors to one connector of the BDK.

Sensor bracket with suction cup for mounting Sheet Thickness Sensor

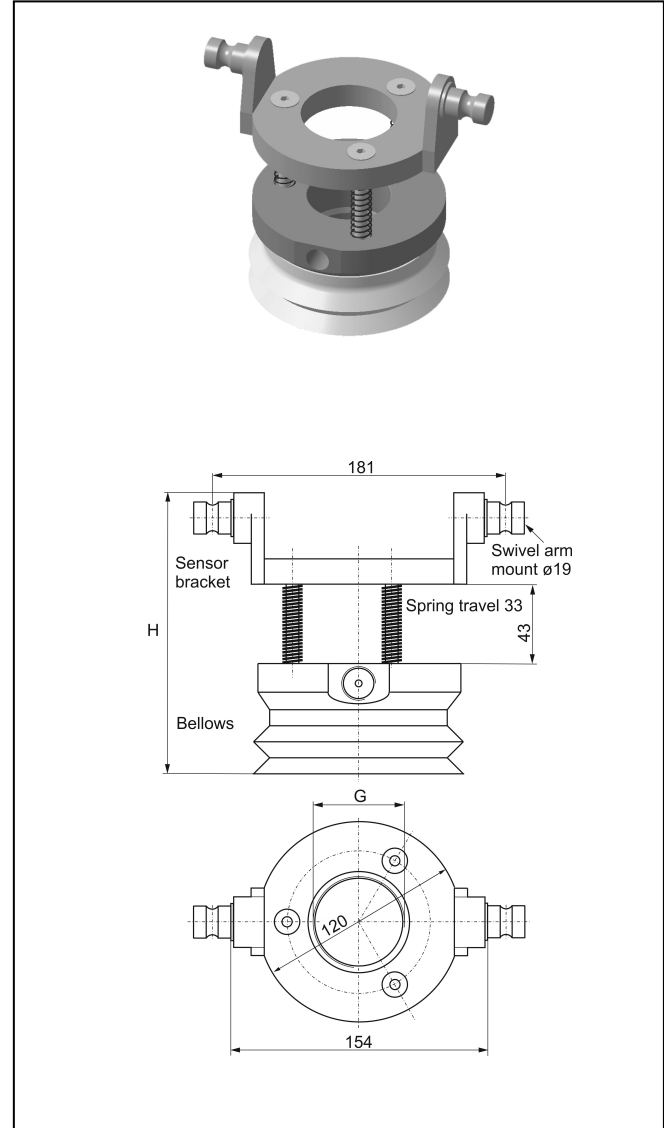
For single-surface contact monitoring (e.g. for destacking equipment), sheet thickness sensors are often built into the suction cup of the gripper. For the DSP, DSPW, and BDWF thickness sensors with (M36, M42, M54) design there are different versions of sensor brackets available.

For sheet thickness sensors with M36 x 1.5, M42 x 1.5 and M54 x 0.75 thread - spring-mounted, with suction ring, with flexible spherical bearing

For sheet thickness sensors with M42 x 1.5 and M54 x 0.75 thread - spring-mounted, with bellows



Type Ref. no.	D	Ds	H	H1	Z	Weight (g)
ZBF/FBF36-1 13.99-79	100	100	143	178	36	1120
ZBF/FBF42-1 13.99-77	100	100	143	178	36	1070
ZBF/FBF54-2 13.99-87	130	128.8	187	221	80	1300



Type Ref. no.	H	G	Weight (g)
ZBF/FBF42-2 13.99-84	165.2	M42 x 1.5	1300
ZBF/FBF54-1 13.99-69	162.0	M54 x 0.75	1500

Spare Parts for Sensor Brackets		
Type	Ref. no.	
ZBF/FB36+42-1	13.99-78	Suction cup for sensor brackets M36 + 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-1.3	(Relay outputs)	20.05-80
BDK/OB-1.3	(Semi-conductor relay outputs)	20.21-01
BDK/FS-1.3	(InterBus-S)	20.05-81
BDK/FP-1.3	(PROFIBUS DP)	20.05-82
BDK/PN-1.3	(PROFINET IO)	20.05-93

Sheet Metal Thickness Sensors for single-surface contact measurement

DSPW-42sg-1s	13.05-66
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for Fe sheets up to 3.0 mm / 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
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for Fe sheets up to 3.5 mm / NE sheets up to 2.5 mm,
thread M54 x 0.75

BDWF-m54rg-2s	13.05-73
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for NE sheets up to 5.5 mm,
thread M54 x 0.75

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

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

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

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

Sheet Metal Thickness Sensors for double-surface non-contact measurement

BDWD/S-m36rg-1s (transmitter)	13.05-74
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for Fe sheets up to 3.0 mm / NE sheets up to 6.0 mm,
thread M36 x 1.5

BDWD/E-m36rg-1s (receiver)	13.05-75
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for Fe sheets up to 3.0 / NE sheets up to 6.0 mm,
thread M36 x 1.5

BDWD/S-60aq30-1Y1 (transmitter)	13.05-76
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for Fe sheets up to 3.0 / NE sheets up to 6.0 mm,
rectangular housing 60x60 mm

BDWD/E-60aq30-1Y1 (receiver)	13.05-77
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for Fe sheets up to 3.0 / NE sheets up to 6.0 mm,
rectangular housing 60x60 mm

Sheet Metal Thickness Sensors for single-surface non-contact measurement

DSD-18mg61n0.5/3-1Sd1	13.05-91
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for Fe sheets up to 3.0 mm
for Fe sheets up to 3.5 mm with software version E119
(from July 2014) or higher
for NE sheets (depends on sheet type, on inquiry),
thread M18 x 1

DSD-60mg90n3/12-1Y1	13.05-83
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for Fe sheets up to 12.0 mm
for NE sheets (depends on sheet type, on inquiry),
thread M60 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
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Connecting lead BDK <---> sensor,
lead socket sensor-sided straight

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

VLG9/2+4PS/X-3	20.18-37
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Connecting lead BDK <---> sensor,
lead socket sensor-sided straight

VLG9/2+4PS/X-4	20.18-38
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Connecting lead BDK <---> sensor,
lead socket sensor-sided angled

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

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

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

VLG9+5/3S/X-1	20.18-80
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Connecting lead BDK <---> DSD-18,
lead socket sensor-sided straight

VLG9+5/3S/X-2	20.18-81
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Connecting lead BDK <---> DSD-18,
lead socket sensor-sided angled

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

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

SMF6-3	13.99-06
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Lead socket for connection of power supply leads
for InterBus, PROFIBUS and Profinet devices.

Switch for connecting additional Sensors

BDIW-1.4 20.05-77
 Sensor switch for selecting one out of four sensors (BDWF, BDWD, DSP, DSPW, or DSD).
 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, BDWD, DSP, DSPW, or DSD-60, plug sensor-sided straight.

VLG9/2+4PS/X-2 20.18-36
 Connecting lead BDIW <---> Sensor connection BDWF, BDWD, DSP, DSPW, or DSD-60, plug sensor-sided angled.

VLG9+5/3S/X-1 20.18-80
 Connecting lead BDK <---> DSD-18, lead socket sensor-sided straight

VLG9+5/3S/X-2 20.18-81
 Connecting lead BDK <---> DSD-18, lead socket sensor-sided angled

Connecting Leads

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.

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

Sensor Bracket for installing Thickness Sensor

Sensor bracket M36 x 1.5, spring-mounted, with suction ring, flexible spherical bearing
 ZBF/FBF/36-1 13.99-79

Sensor bracket M42 x 1.5, spring-mounted, with 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, with suction ring, flexible spherical bearing
 ZBF/FBF54-2 13.99-87

Spare Parts for Sensor Brackets

Suction cup for sensor brackets M36 + M42
 ZBF/FB36+42-1 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

Data Backup

PROPAR/BDK-1 40.43-33
 The software for data storage of the complete parameter set of the evaluation device BDK-1.3 on a PC via the serial interface is available on CD-ROM.

Operating system: MS Win 9x, NT4, 2000, XP or Win 7.

Connecting lead BDK to PC

VLG9/4S/X-1 30.13-25
 Connecting lead BDK <---> data backup PC (RS232, 9 pol. SUBmin D)

We are certified according to DIN EN ISO 9001.

Subject to changes!