



Baumer

Passion for Sensors

Force and strain sensors.

Measure. Test. Control.

Edition 2016



Force and strain sensors
by Baumer combine
tried and tested
technology
and sophisticated
innovations.



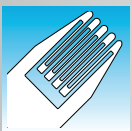
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Force and strain sensors – measuring testing and monitoring



Our product range embraces the entire field of force and strain sensors to meet a wide range of requirements and specific applications. It includes every component of efficient sensors and intelligent evaluation and application systems. Baumer supplies a complete range of sensors from a single source – universality that pays off. The question of the respective technology does not depend on the product range, but wholly and solely on the nature of the technical problem involved. Whether this calls for a bonded S/G, our patented press-fitted S/G or a high-resolution Piezo system, we are experts in all three.



Sensors with S/G technology

Strain gauges are used for measurements of physical values on structures, for example weight and strain.

- Strain measurement on tie bars and columns
- Strain measurement on platen and rigid structures
- Static and cyclic strain and force measurement
- 2x1/4 bridge or full bridge
- Bridge amplifier
- Display box incl. analysing software



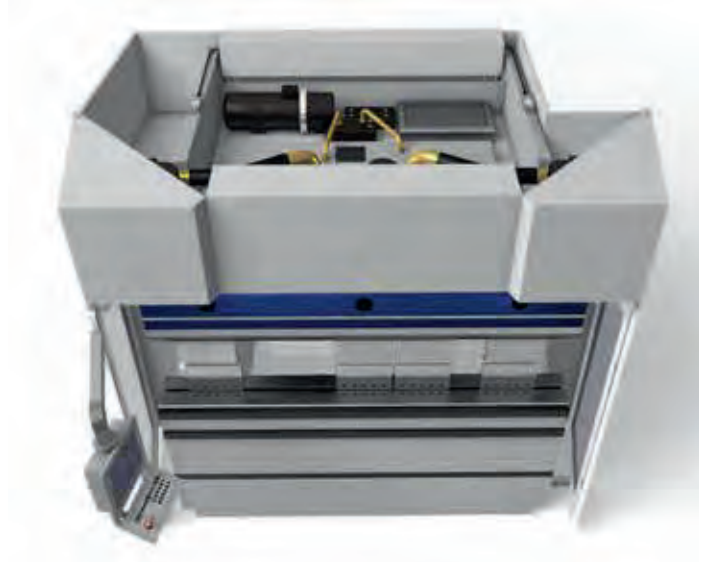
Sensors with Piezo technology

Quartz crystals and polarised ceramic materials are used where fast response time and a high signal to noise ratio are important.

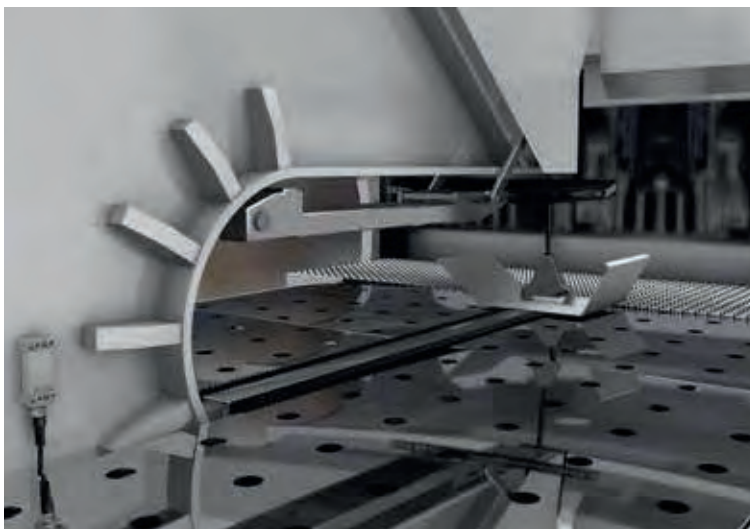
- Force sensors for dynamic measurement
- High resolution strain measurement on rigid structures
- Pooling and crash detection
- Cavity pressure measurement
- Direct and indirect measurement
- Industrial multi range charge amplifier

Sheet thickness control

Through sensors in the machine, the actual sheet thickness can be detected and the plunging depth of the upper tool automatically corrected. In this way, the machine achieves an angle quality independent of sheet thickness and with no loss of productivity or need for calibration.



1

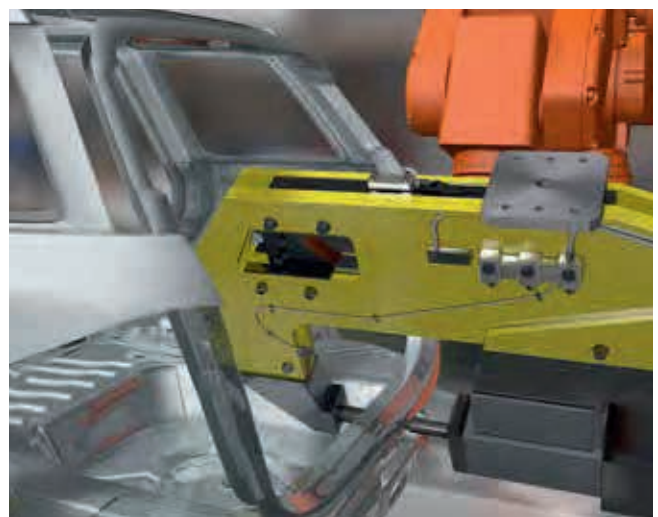


Holding force control

Holding the sheet with needed force to make sure the sheet can be moved as fast as possible without any slip or marks apply on the sheet.

Force control at joining process

In order to maintain best possible quality of the joining process, it's elementary to control the control the force during the joining process.





Product Summary

Force Sensors



Strain Sensors

DLRx	DSRC	DSRH	DSRT
			
Load Cell	Strain Ring	Strain Probe	Strain Links
Static and dynamic force measurement	Strain measurement on tie bars and shafts	Strain measurement in holes	Strain measurement on rigid structures
Measuring range 0,5...100 kN	Measuring range $\pm 1000 \mu\epsilon$	Measuring range $\pm 1000 \mu\epsilon$	Measuring range $\pm 750 \mu\epsilon$
Characteristic curve deviation < 0,3% FS	Characteristic curve deviation < 1% FS	Characteristic curve deviation < 1%FS	Characteristic curve deviation < 0,8% FS
Page 2.3	Page 3.3	Page 4.3	Page 5.3

Piezo Electric Sensors




DLPP	DPPC
	
Piezo electric force sensor	Cavity pressure sensor
Measurement of dynamic forces	Direct and indirect cavity pressure measurement
Measuring range from 2,5 to 30 kN	Measuring range 2000 bar
Linearity < 1% FS	Linearity < 1% FS
Page 8.3	Page 8.9

Analysis Devices

DABx	DDBF
	
Bridge amplifier	Display box
Analysis of S/G bridges	Signal analysis of strain rings, strain probes and extensometers
2 x 1/4 bridge or full bridge	Display range $\pm 1999 \mu\epsilon$
Current or voltage output	2 or 4 channels
1 channel	
Page 6.3	Page 7.3

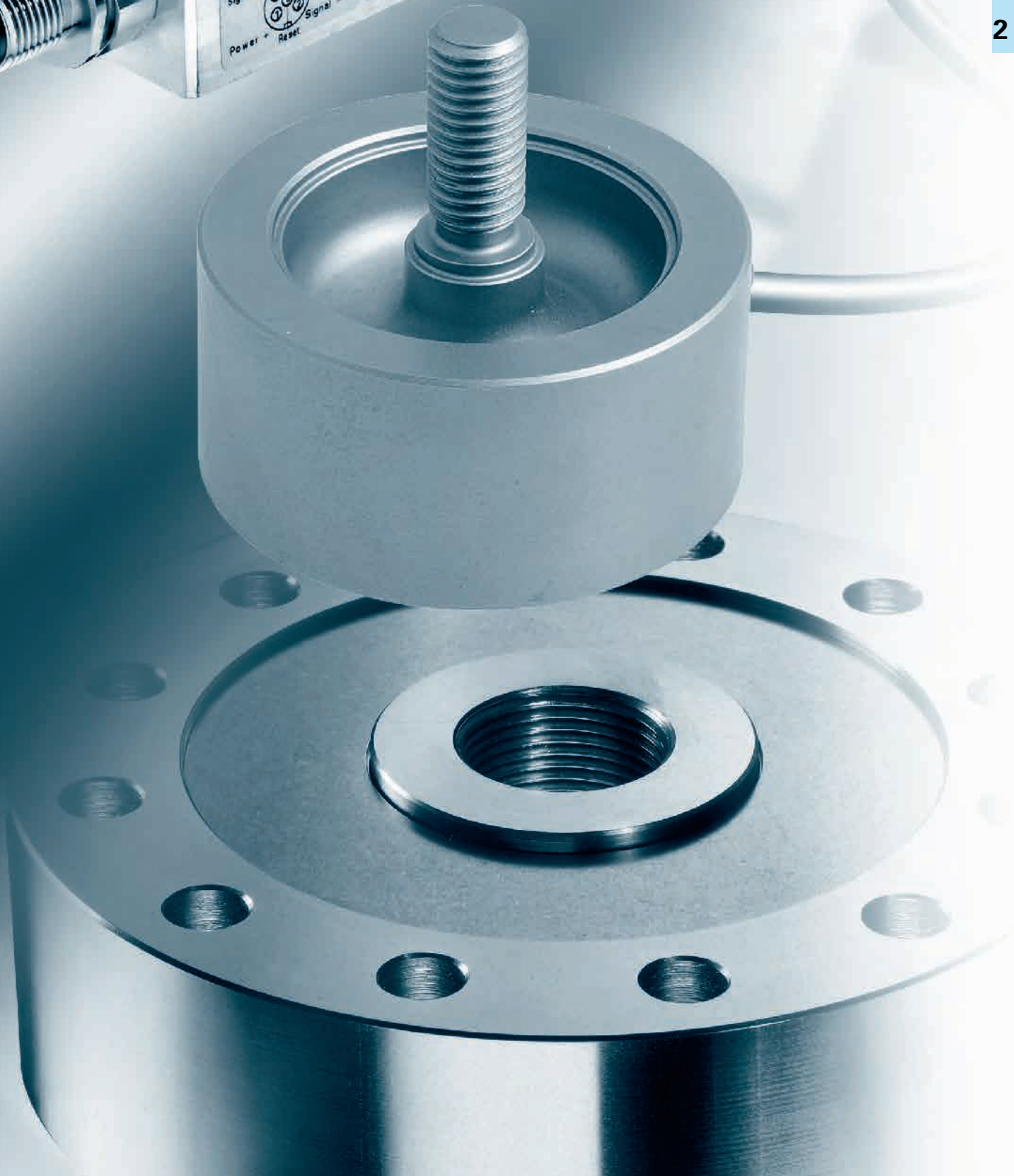
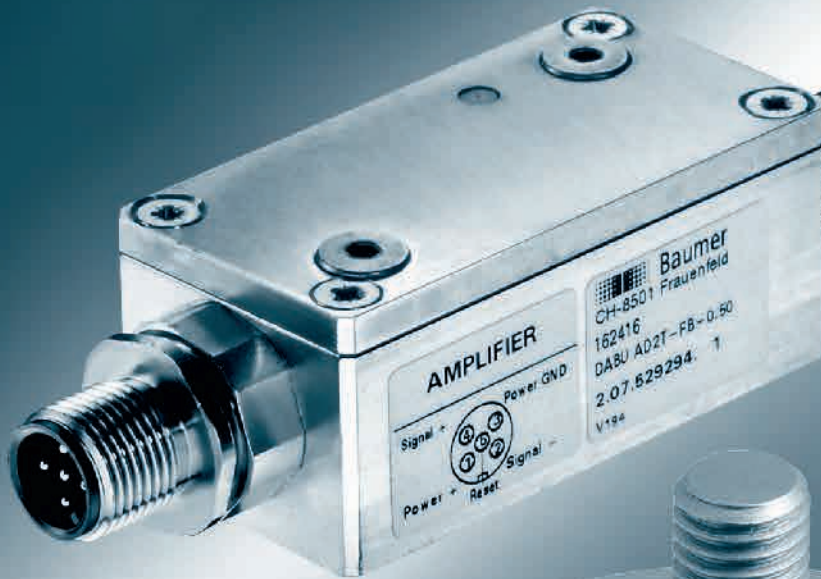
Accessories

Analysis Devices

DZPC	DZCC	DACx
		
Accessories	Coaxial Cable	Industrial multi range charge amplifier
Variety of mounting accessories for piezo electric sensors and cables	Sensor and connecting cables for piezo electric sensors	Analysis of piezo electric sensors
	Temperature range up to +220 °C	Measuring range from 100 pC to 1'000'000 pC
		Characteristic curve deviation < 1% FS
		1 channel
Page 9.19	Page 9.20	Page 10.3

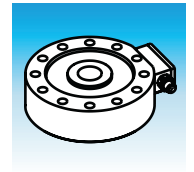


Load Cells



Product Key

Load cells DLRx



The correct order code must be taken from the corresponding data sheet.

DLRx L00x.xxx.xxxxxx/xxxxx

Output

- P** = passive
- U** = Voltage
- I** = Current

Housing Type

- L001** = miniature
- L002** = compact
- L003** = large

Connection

- S80** = 4-pin connector series 712
- W24** = 4-pin open cable end
- 14C** = 5-pin connector M12 x 1

Precision Category

- B** = 0,3 % Characteristic curve deviation (Type L002, Type L003)
- C** = 0,5 % Characteristic curve deviation (Type L001)

Measuring Range

- 150** = 0...500 N
- 210** = 0...1 kN
- 220** = 0...2 kN
- 250** = 0...5 kN
- 310** = 0...10 kN
- 320** = 0...20 kN
- 330** = 0...30 kN
- 350** = 0...50 kN
- 410** = 0...100 kN

Load Transmission

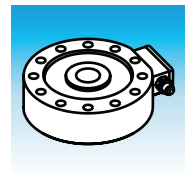
- CO** = Compression
- TC** = Tension/Compression

Option

- C** = top cover (Type L003)
- CL05** = 5 m cable length
- CL10** = 10 m cable length
- CCL10** = combinations possible (Type L003)

Summary

Load cells DLRx



<p>Type DLRP L001 Compression</p> 	<ul style="list-style-type: none"> • Characteristic curve deviation: 0,5% • Nominal force: 5...10 kN • Output signal: 1 mV/V • protection class: IP 67 • Load transmission: compression 	Page 2.4
<p>Type DLRP L002 Compression</p> 	<ul style="list-style-type: none"> • Characteristic curve deviation: 0,3% • Nominal force: 0,5...10 kN • Output signal: 2 mV/V • protection class: IP 67 • Load transmission: compression 	Page 2.6
<p>Type DLRP L002 Tension/Compression</p> 	<ul style="list-style-type: none"> • Characteristic curve deviation: 0,3% • Nominal force: 0,5...10 kN • Output signal: 2 mV/V • protection class: IP 67 • Load transmission: tension/compression 	Page 2.8
<p>Type DLRP L003 Tension/Compression</p> 	<ul style="list-style-type: none"> • Characteristic curve deviation: 0,3% • Nominal force: 10...100 kN • Output signal: 2 mV/V • protection class: IP 67 • Load transmission: tension/compression 	Page 2.10
<p>Type DLRx L001 Compression</p> 	<ul style="list-style-type: none"> • Characteristic curve deviation: 0,5% • Nominal force: 5...10 kN • Output signal: ± 10 V / 4...20 mA • protection class: IP 65 • Load transmission: compression 	Page 2.12
<p>Type DLRx L002 Compression</p> 	<ul style="list-style-type: none"> • Characteristic curve deviation: 0,3% • Nominal force: 0,5...10 kN • Output signal: ± 10 V / 4...20 mA • protection class: IP 65 • Load transmission: compression 	Page 2.14
<p>Type DLRx L002 Tension/Compression</p> 	<ul style="list-style-type: none"> • Characteristic curve deviation: 0,3% • Nominal force: 0,5...10 kN • Output signal: ± 10 V / 4...20 mA • protection class: IP 65 • Load transmission: tension/compression 	Page 2.16
<p>Type DLRx L003 Tension/Compression</p> 	<ul style="list-style-type: none"> • Characteristic curve deviation: 0,3% • Nominal force: 10...100 kN • Output signal: ± 10 V / 4...20 mA • protection class: IP 65 • Load transmission: tension/compression 	Page 2.18

Load cells can be used in static and high dynamic applications and can be loaded by compression or tension/compression. Load cells stand for high-precision and low noise signal processing.

Load cell DLRP L001

Features

- Passive load cell 0...10 kN
- Compact dimensions
- For compression
- Protection class IP 67
- Stainless steel



Technical Data

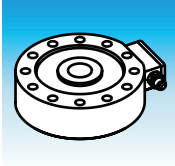
Standard capacities	0...5000 N 0...10000 N
Sensitivity at FS	1 mV/V
Combined error	< 0,5% FS
Linearity	< 0,5% FS
Hysteresis	< 0,5% FS
Compensated temperature range	0...+70 °C
Operating temperature range	-20...+70 °C
Storage temperature range	-40...+85 °C
Temperature effect zero	< ±0,06% /K
Temperature effect span	< ±0,05% /K
Zero balance	< ±1% FS
Non-repeatability	< 0,1% FS
Creep error	< 0,2% FS (after 30 min. with FS)
Sensitivity tolerance	< ±1% FS
Bridge resistance	Full bridge 350 Ω
Isolation resistance	> 3 GΩ
Excitation max.	7 V
Signal polarity	unipolar (compression +1mV/V)
– static load	150% FS
– dynamic load	100% FS
Breaking load	220% FS
Deflection FS	0,05 mm typical
Protection class	IP 67
Cable	2 m, shielded, PUR
Load cell material	1.4542

FS = Full scale output

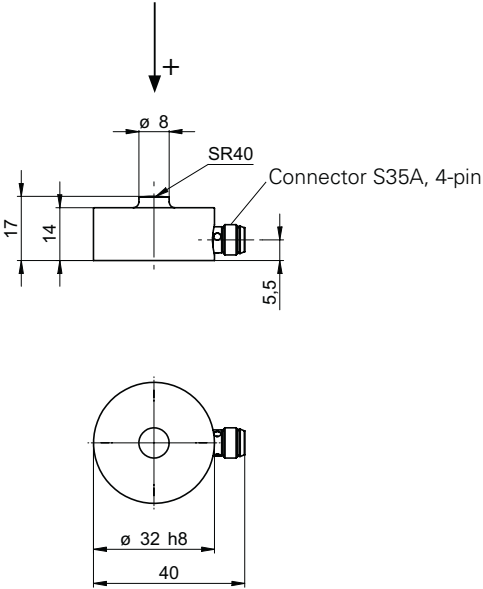
Combined error contains linearity, hysteresis and non-repeatability

Order Code

DLRP L001.	[] [] [] []	.	C	[] [] [] []	CO/	[] [] [] []
						Optional cable length (2 m standard)
						CL05 5 m cable length CL10 10 m cable length
						Load transmission
						CO Compression (see drawing)
						Measuring range
						250 0...5000 N 310 0...10000 N
						Combined error
						C 0,5%
						Connection
						S80 4-pin connector series 712 W24 Cable, 4-wire, open cable end



Dimensions (mm)



2

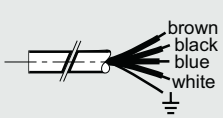
Electrical Connection

S80



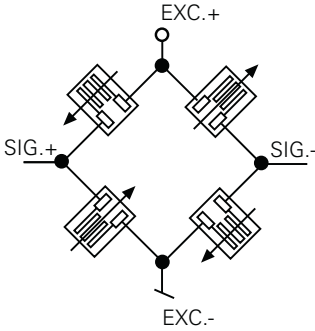
Pin	Signal
1	+Vs
2	-V _{OUT}
3	+V _{OUT}
4	GND
Housing	\perp

W24



Color	Signal
brown	+Vs
black	-V _{OUT}
blue	GND
white	+V _{OUT}
Housing	\perp

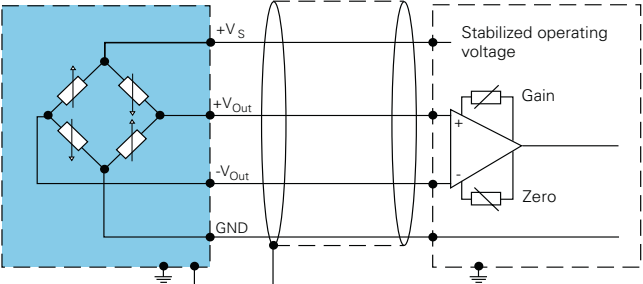
Bridge Circuit



Wiring

DLRP Transducer

Precision amplifier/ power supply unit



Load cell DLRP L002

Features

- Passive load cell 0...10 kN
- Compact dimensions
- For compression
- Protection class IP 67
- Stainless steel



Technical Data

Standard capacities	0...500 N 0...1000 N 0...2000 N 0...5000 N 0...10000 N
Sensitivity at FS	2 mV/V
Combined error	< 0,3% FS
Linearity	< 0,3% FS
Hysteresis	< 0,3% FS
Compensated temperature range	0...+70 °C
Operating temperature range	-20...+70 °C
Storage temperature range	-40...+85 °C
Temperature effect zero	< ±0,02% /K
Temperature effect span	< ±0,03% /K
Zero balance	< ±1% FS
Non-repeatability	< 0,1% FS
Creep error	< 0,15% FS (after 30 min. with FS)
Sensitivity tolerance	< ±1% FS
Bridge resistance	Full bridge 350 Ω
Isolation resistance	> 3 GΩ
Excitation max.	7 V
Signal polarity	unipolar (compression +2 mV/V)
– static load	200% FS
– dynamic load	100% FS
Breaking load	320% FS
Deflection FS	0,05 mm typical
Protection class	IP 67
Cable	5 m, shielded, PUR
Load cell material	1.4542

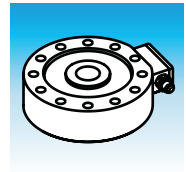
FS = Full scale output

Combined error contains linearity, hysteresis and non-repeatability

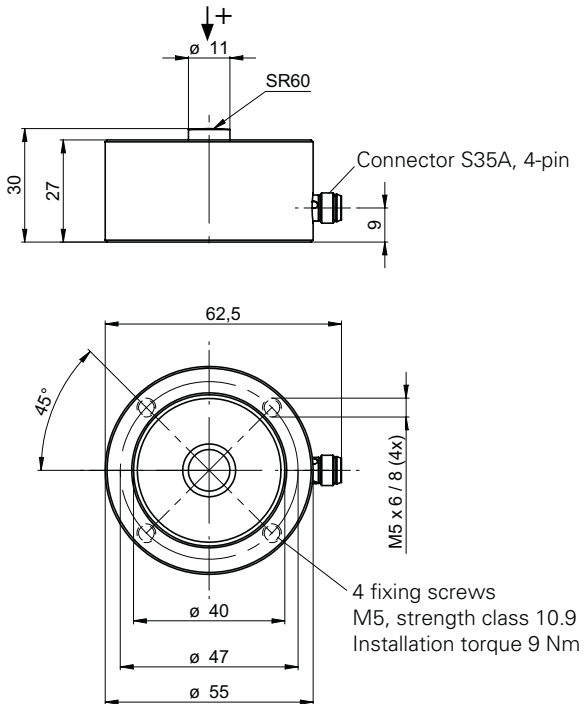
Order Code

DLRP L002. .B CO/CL10

cable length	CL10 10 m (5 m standard)
	Load transmission
Load transmission	CO Compression (see drawing)
	Measuring range
Measuring range	150 0...500 N
	210 0...1000 N
	220 0...2000 N
	250 0...5000 N
	310 0...10000 N
Combined error	B 0,3%
	Connection
S80 4-pin connector series 712	
W24 Cable, 4-wire, open cable end	



Dimensions (mm)



2

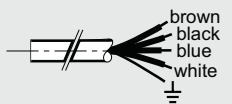
Electrical Connection

S80



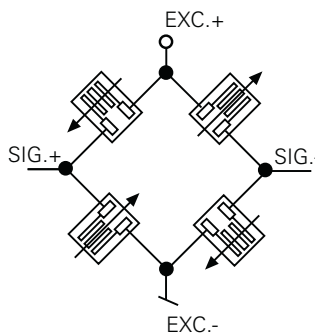
Pin	Signal
1	+Vs
2	-V _{OUT}
3	+V _{OUT}
4	GND
Housing	⏏

W24



Color	Signal
brown	+Vs
black	-V _{OUT}
blue	GND
white	+V _{OUT}
Housing	⏏

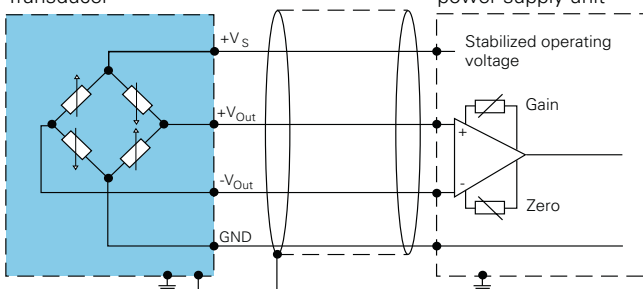
Bridge Circuit



Wiring

DLRP
Transducer

Precision amplifier/
power supply unit



Load cell DLRP L002

Features

- Passive load cell 0...10 kN
- Compact dimensions
- For tension and compression
- Protection class IP 67
- Stainless steel



Technical Data

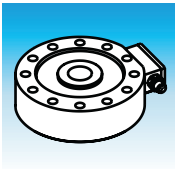
Standard capacities	0...500 N 0...1000 N 0...2000 N 0...5000 N 0...10000 N
Sensitivity at FS	2 mV/V
Combined error	< 0,3% FS
Linearity	< 0,3% FS
Hysteresis	< 0,3% FS
Compensated temperature range	0...+70 °C
Operating temperature range	-20...+70 °C
Storage temperature range	-40...+85 °C
Temperature effect zero	< ±0,02% /K
Temperature effect span	< ±0,03% /K
Zero balance	< ±1% FS
Non-repeatability	< 0,1% FS
Creep error	< 0,15% FS (after 30 min. with FS)
Sensitivity tolerance	< ±1% FS
Bridge resistance	Full bridge 350 Ω
Isolation resistance	> 3 GΩ
Excitation max.	7 V
Signal polarity	bipolar (tension +2 mV/V)
– static load	200% FS
– dynamic load	100% FS
Breaking load	320% FS
Deflection FS	0,05 mm typical
Protection class	IP 67
Cable	5 m, shielded, PUR
Load cell material	1.4542

FS = Full scale output

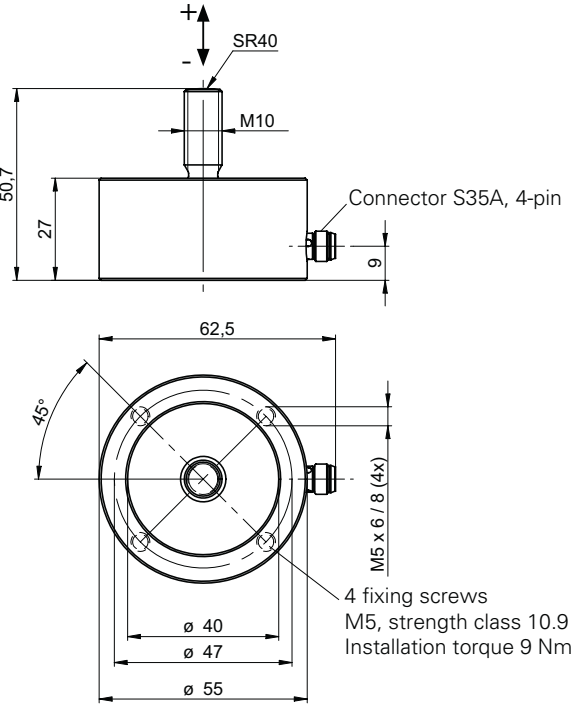
Combined error contains linearity, hysteresis and non-repeatability

Order Code

DLRP L002.	<input type="text"/>	<input type="text"/>	.B	<input type="text"/>	<input type="text"/>	TC/CL10
						cable length
						CL10 10 m (5 m standard)
						Load transmission
						TC Tension/Compression (see drawing)
						Measuring range
						150 0...500 N
						210 0...1000 N
						220 0...2000 N
						250 0...5000 N
						310 0...10000 N
						Combined error
						B 0,3%
						Connection
						S80 4-pin connector series 712
						W24 Cable, 4-wire, open cable end



Dimensions (mm)



2

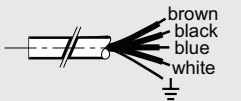
Electrical Connection

S80



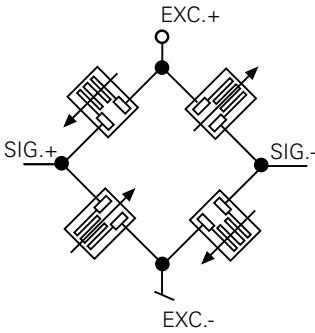
Pin	Signal
1	+Vs
2	-V _{OUT}
3	+V _{OUT}
4	GND
Housing	⏏

W24

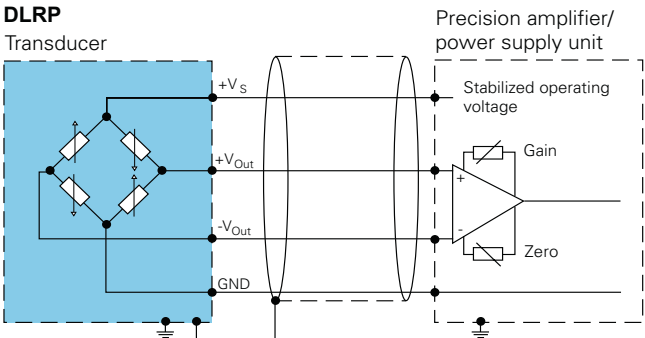


Color	Signal
brown	+Vs
black	-V _{OUT}
blue	GND
white	+V _{OUT}
Housing	⏏

Bridge Circuit



Wiring



Load cell DLRP L003

Features

- Passive load cell 0...100 kN
- Compact dimensions
- For tension and compression
- Protection class IP 67
- Corrosion-resistant steel



Technical Data

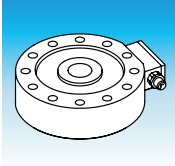
Standard capacities	0...10000 N 0...20000 N 0...30000 N 0...50000 N 0...100000 N
Sensitivity at FS	2 mV/V
Combined error	< 0,3% FS
Linearity	< 0,3% FS
Hysteresis	< 0,3% FS
Compensated temperature range	0...+70 °C
Operating temperature range	-20...+70 °C
Storage temperature range	-40...+85 °C
Temperature effect zero	0,02% /K
Temperature effect span	< 0,02% /K
Zero balance	< ±1% FS
Non-repeatability	< 0,1% FS
Creep error	< 0,2% FS (after 30 min. with FS)
Sensitivity tolerance	< ±1% FS
Bridge resistance	Full bridge 350 Ω
Isolation resistance	> 3 GΩ
Excitation max.	7 V
Signal polarity	bipolar (tension +2 mV/V)
– static load	150% FS
– dynamic load	100% FS
Breaking load	220% FS
Deflection FS	0,05 mm typical
Protection class	IP 67
Cable	5 m, shielded, PUR
Load cell material	1.7225, nickel-plated

FS = Full scale output

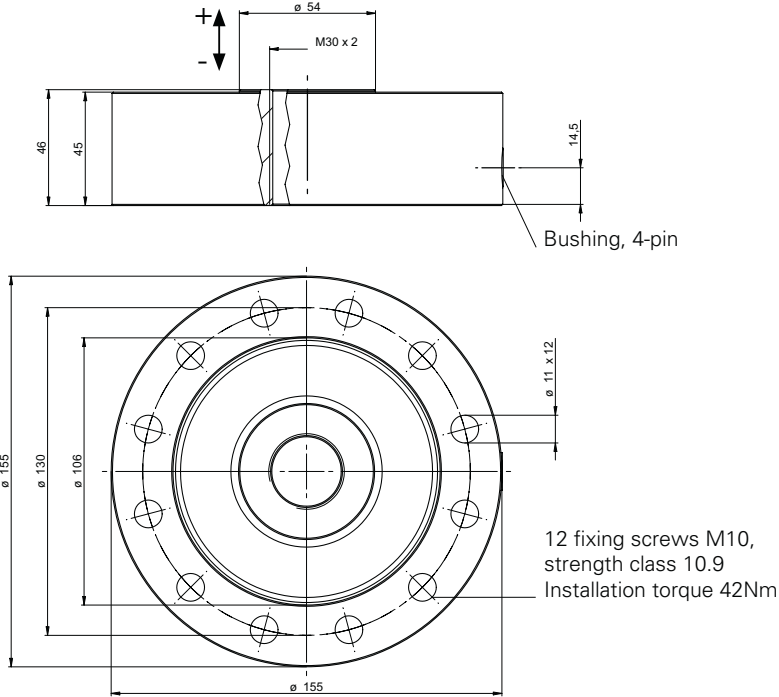
Combined error contains linearity, hysteresis and non-repeatability

Order Code

DLRP L003.	<input type="text"/>	.B	<input type="text"/>	TC/	<input type="text"/>
					Option
					C Top cover
					CL10 10 m cable length (5 m standard)
					CCL10 Combinations possible
					Load transmission
					TC Tension/Compression (see drawing)
					Measuring range
					310 0...10000 N
					320 0...20000 N
					330 0...30000 N
					350 0...50000 N
					410 0...100000 N
					Combined error
					B 0,3%
					Connection
					S80 4-pin connector series 712
					W24 Cable, 4-wire, open cable end



Dimensions (mm)



2

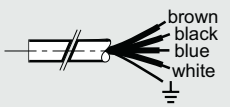
Electrical Connection

S80



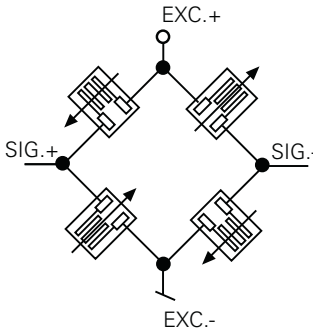
Pin	Signal
1	+Vs
2	-V _{OUT}
3	+V _{OUT}
4	GND
Housing	⏏

W24

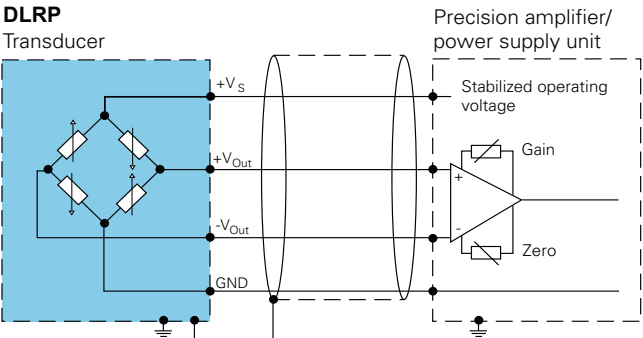


Color	Signal
brown	+Vs
black	-V _{OUT}
blue	GND
white	+V _{OUT}
Housing	⏏

Bridge Circuit



Wiring



Load cell with amplifier DLRx L001

Features

- Voltage (DLRU) or current output (DLRI)
- Compact dimensions
- For compression
- Protection class IP 65
- Stainless steel



Technical Data

Standard capacities	0...5000 N 0...10000 N
Output signal at FS	DLRU 0...10 V DLRI 4...20 mA
Linearity	0,5% FS
Hysteresis	0,5% FS
Non-repeatability	< 0,1% FS
Creep error	< 0,2% FS (after 30 min. with FS)
Zero balance	DLRU < 5 mV DLRI < 8 µA
Reset-Input active	5...33 VDC < 2 mA
Reset-Input inactive	< 1 VDC
Reset-Pulse	> 1 ms
Reset time	< 5 ms
Switching frequency	1000 Hz
Signal polarity	DLRU unipolar (compression +10 V) DLRI unipolar (compression 20 mA)
Noise	DLRU (0...5 kHz) < 5 mVpp DLRI (0...5 kHz) < 8 µApp
Compensated temperature range	0...+70 °C
Operating temperature range	-20...+70 °C
Storage temperature range	-40...+85 °C
Temperature effect zero	< ±0,05% /K
Temperature effect span	< ±0,06% /K
Bridge resistance	Full bridge 350 Ω
Isolation resistance	> 3 GΩ
Excitation	DLRU 18...33 V DLRI 14...33 V
Supply current	DLRU < 60 mA DLRI < 90 mA
– static load	150% FS
– dynamic load	100% FS
Breaking load	220% FS
Protection class	IP 65

FS = Full scale output

Technical Data

Cable	2 m, shielded, PUR, (between amplifier and sensor)
Load cell material	1.4542

Order Code

DLR	L001	C	CO	CL
Output	Connection	Measuring range	Load transmission	Optional cable length (2 m standard)
U Voltage output 0...10 V I Current output 4...20 mA	14C 5-pin connector series M12 x 1	250 0...5000 N 310 0...10000 N	CO Compression (see drawing)	CL05 5 m cable length CL10 10 m cable length
		Combined error		
		C 0,5%		

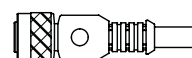
Accessories (not included in delivery)

Cable between the amplifier and the control unit.



Series 713

Connector female, control side, 5-pin, Part No. 10135462



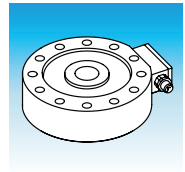
M12 x 1

Connector female with cable, control side, 5-pin

ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

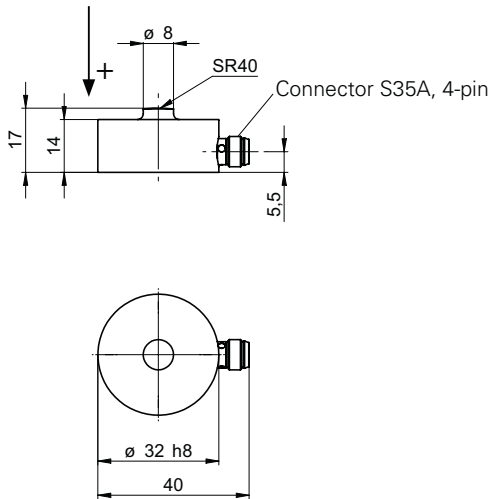
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)

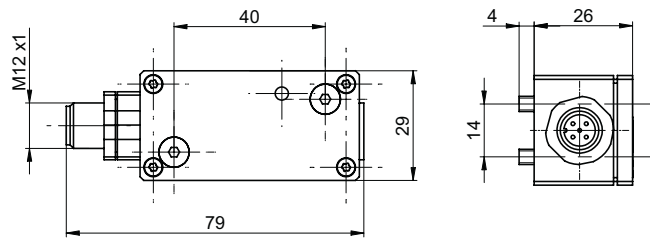


Dimensions (mm)

Load cell



Amplifier DABx AD2T



2

Electrical Connection

DLRU

14C



Pin	
1	+Vs
2	-V _{OUT}
3	GND
4	+V _{OUT}
5	Reset
Housing	⊥

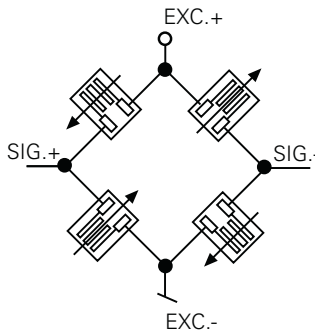
DLRI

14C



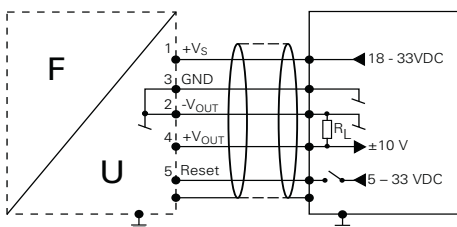
Pin	
1	+Vs
2	n.c.
3	GND
4	+I _{OUT}
5	Reset
Housing	⊥

Bridge Circuit

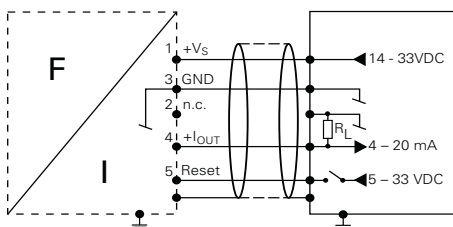


Wiring

DLRU



DLRI



Load cell with amplifier DLRx L002

Features

- Voltage (DLRU) or current output (DLRI)
- Compact dimensions
- For compression
- Protection class IP 65
- Stainless steel



Technical Data

Standard capacities	0...500 N 0...1000 N 0...2000 N	0...5000 N 0...10000 N
Output signal at FSR	DLRU 0...10 V DLRI 4...20 mA	
Linearity	0,5% FS	
Hysteresis	0,5% FS	
Non-repeatability	< 0,1% FS	
Creep error	< 0,15% FS (after 30 min. with FS)	
Zero balance	DLRU < 5 mV DLRI < 8 µA	
Reset-Input active	5...33 VDC < 2 mA	
Reset-Input inactive	< 1 VDC	
Reset-Pulse	> 1 ms	
Reset time	< 5 ms	
Switching frequency	1000 Hz	
Signal polarity	DLRU unipolar (compression +10 V) DLRI unipolar (compression 20 mA)	
Noise	DLRU (0...5 kHz) < 5 mVpp DLRI (0...5 kHz) < 8 µApp	
Compensated temperature range	0...+70 °C	
Operating temperature range	-20...+70 °C	
Storage temperature range	-40...+85 °C	
Temperature effect zero	< ±0,02% /K	
Temperature effect span	< ±0,03% /K	
Bridge resistance	Full bridge 350 Ω	
Isolation resistance	> 3 GΩ	
Excitation	DLRU 18...33 V DLRI 14...33 V	
Supply current	DLRU < 60 mA DLRI < 90 mA	
- static load	200% FS	
- dynamic load	100% FS	
Breaking load	320% FS	
Protection class	IP 65	

FS = Full scale output

Technical Data

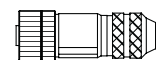
Cable	5 m, shielded, PUR, (between amplifier and sensor)
Load cell material	1.4542

Order Code

DLR	L002	B	CO/CL10
Output	Measuring range	Load transmission	Cable length
U Voltage output 0...10 V	150 0...500 N	CO Compression (see drawing)	CL10 10 m cable length (5 m standard)
I Current output 4...20 mA	210 0...1000 N	B 0,3%	
	220 0...2000 N	Connection	
	250 0...5000 N	14C 5-pin connector series M12 x 1	
	310 0...10000 N		
	Combined error		

Accessories (not included in delivery)

Cable between the amplifier and the control unit.



Series 713

Connector female, control side, 5-pin, Part No. 10135462

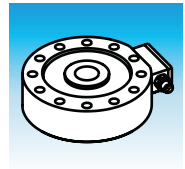


M12 x 1

Connector female with cable, control side, 5-pin
ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

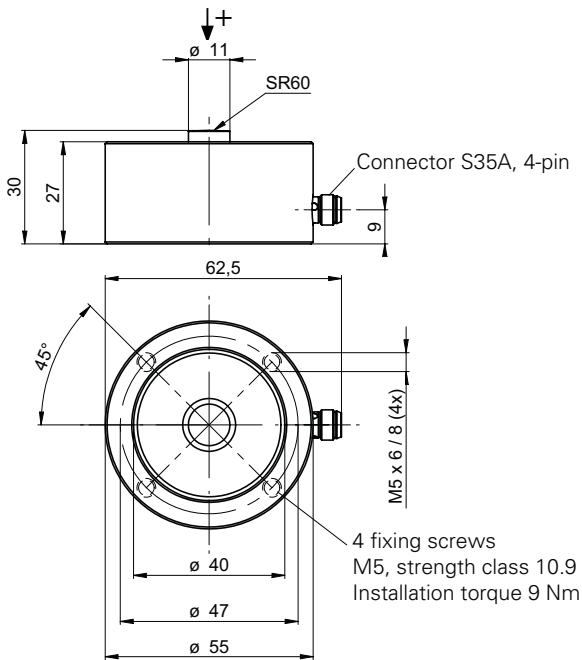
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)

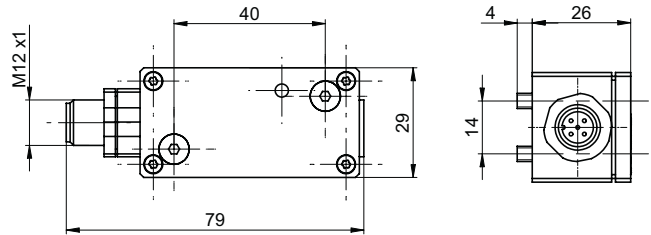


Dimensions (mm)

Load cell



Amplifier DABx AD2T



2

Electrical Connection

DLRU

14C



Pin	
1	+Vs
2	-V _{OUT}
3	GND
4	+V _{OUT}
5	Reset
Housing	⊥

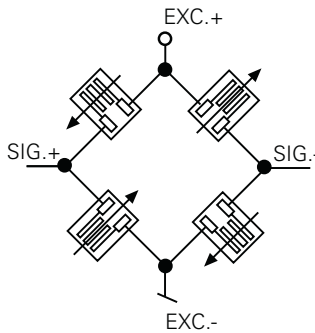
DLRI

14C



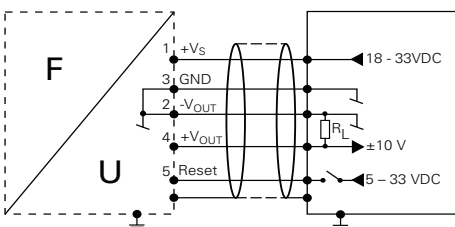
Pin	
1	+Vs
2	n.c.
3	GND
4	+I _{OUT}
5	Reset
Housing	⊥

Bridge Circuit

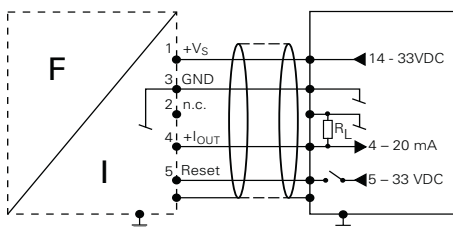


Wiring

DLRU



DLRI



Load cell with amplifier

DLRx L002

Features

- Voltage (DLRU) or current output (DLRI)
- Compact dimensions
- For tension or compression (DLRI)
- For tension and compression (DLRU)
- Protection class IP 65
- Stainless steel

Technical Data

Standard capacities	0...500 N 0...1000 N 0...2000 N	0...5000 N 0...10000 N
Output signal at FSR	DLRU ± 10 V DLRI 4...20 mA	
Linearity	0,3% FS	
Hysteresis	0,3% FS	
Non-repeatability	< 0,1% FS	
Creep error	< 0,15% FS (after 30 min. with FS)	
Zero balance	DLRU < 5 mV DLRI < 8 μ A	
Reset-Input active	5...33 VDC < 2 mA	
Reset-Input inactive	< 1 VDC	
Reset-Pulse	> 1 ms	
Reset time	< 5 ms	
Switching frequency	1000 Hz	
Signal polarity	DLRU bipolar (tension +10 V) DLRI unipolar (tension 20 mA)	
Noise	DLRU (0...5 kHz) < 5 mVpp DLRI (0...5 kHz) < 8 μ App	
Compensated temperature range	0...+70 °C	
Operating temperature range	-20...+70 °C	
Storage temperature range	-40...+85 °C	
Temperature effect zero	< $\pm 0,02\%$ /K	
Temperature effect span	< $\pm 0,03\%$ /K	
Bridge resistance	Full bridge 350 Ω	
Isolation resistance	> 3 G Ω	
Excitation	DLRU 18...33 V DLRI 14...33 V	
Supply current	DLRU < 60 mA DLRI < 90 mA	
- static load	200% FS	
- dynamic load	100% FS	
Breaking load	320% FS	
Protection class	IP 65	

FS = Full scale output



Technical Data

Cable	5 m, shielded, PUR, (between amplifier and sensor)
Load cell material	1.4542

Order Code

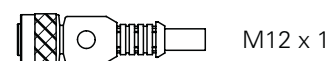
DLR	L002.		B		TC/ CL10 /	
						Polarity
						SP Altered polarity
						Option
						CL10 10 m cable length (5 m standard)
						Load transmission
						TC Tension/Compression (see drawing)
						Measuring range
						150 0...500 N 250 0...5000 N
						210 0...1000 N 310 0...10000 N
						220 0...2000 N
						Combined error
						B 0,3% Connection
						14C 5-pin connector series M12 x 1
						Output
						U Voltage output ± 10 V
						I Current output 4...20 mA

Accessories (not included in delivery)

Cable between the amplifier and the control unit.



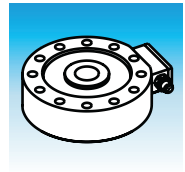
Connector female, control side, 5-pin, Part No. 10135462



Connector female with cable, control side, 5-pin
ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

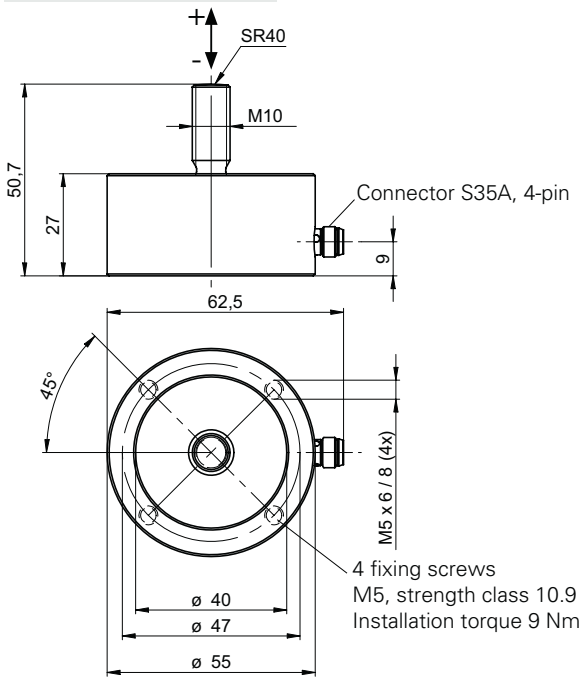
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)

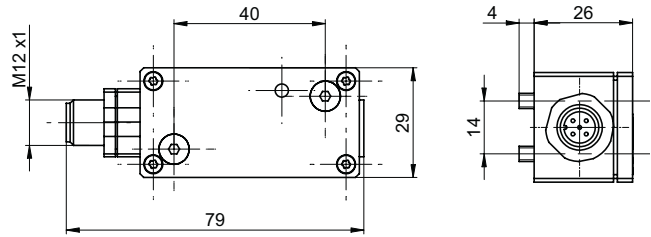


Dimensions (mm)

Load cell



Amplifier DABx AD2T



Electrical Connection

DLRU

14C



Pin

1	+Vs
2	-V _{OUT}
3	GND
4	+V _{OUT}
5	Reset
Housing	\perp

DLRI

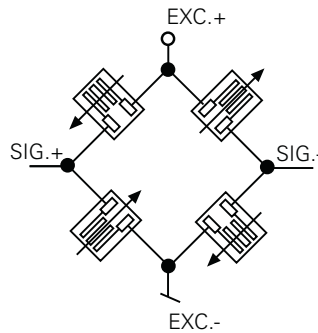
14C



Pin

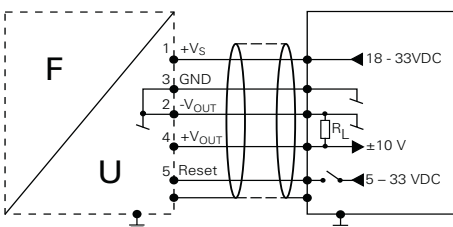
1	+Vs
2	n.c.
3	GND
4	+I _{OUT}
5	Reset
Housing	\perp

Bridge Circuit

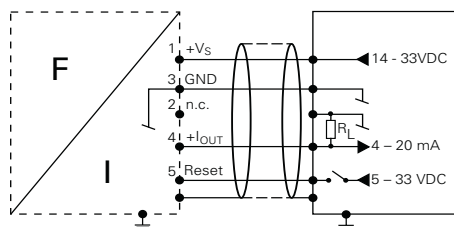


Wiring

DLRU



DLRI



Load cell with amplifier DLRx L003

Features

- Voltage (DLRU) or current output (DLRI)
- Compact dimensions
- For tension (DLRI) and tension/compression (DLRU)
- Protection class IP 65
- Corrosion-resistant steel

Technical Data

Standard capacities	0...10000 N 0...20000 N 0...30000 N	0...50000 N 0...100000 N
Output signal at FSR	DLRU ± 10 V DLRI 4...20 mA	
Linearity	0,3% FS	
Hysteresis	0,3% FS	
Non-repeatability	< 0,1% FS	
Creep error	< 0,2% FS (after 30 min. with FS)	
Zero balance	DLRU < 5 mV DLRI < 8 μ A	
Reset-Input active	5...33 VDC < 2 mA	
Reset-Input inactive	< 1 VDC	
Reset-Pulse	> 1 ms	
Reset time	< 5 ms	
Switching frequency	1000 Hz	
Signal polarity	DLRU bipolar (tension +10 V) DLRI unipolar (tension 20 mA)	
Noise	DLRU (0...5 kHz) < 5 mVpp DLRI (0...5 kHz) < 8 μ App	
Compensated temperature range	0...+70 °C	
Operating temperature range	-20...+70 °C	
Storage temperature range	-40...+85 °C	
Temperature effect zero	< $\pm 0,02\%$ /K	
Temperature effect span	< $\pm 0,03\%$ /K	
Bridge resistance	Full bridge 350 Ω	
Isolation resistance	> 3 G Ω	
Excitation	DLRU 18...33 V DLRI 14...33 V	
Supply current	DLRU < 60 mA DLRI < 90 mA	
Permitted		
– static load	200% FS	
– dynamic load	100% FS	
Breaking load	320% FS	
Protection class	IP 65	

FS = Full scale output



Technical Data

Load cell material 1.7225, nickel-plated

Order Code

DLR L003. .B TC /

Option

- C** Top cover
- SP** Altered polarity
- CSP** Combinations possible

Load transmission

TC Tension/Compression (see drawing)

Measuring range

310 0...10000 N	350 0...50000 N
320 0...20000 N	410 0...100000 N
330 0...30000 N	

Combined error

B 0,3%

Connection

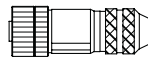
14C 5-pin connector series M12 x 1

Output

- U** Voltage output ± 10 V
- I** Current output 4...20 mA

Accessories (not included in delivery)

Cable between the amplifier and the control unit.



Series 713

Connector female, control side, 5-pin, Part No. 10135462



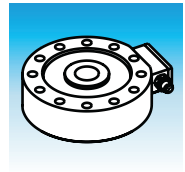
M12 x 1

Connector female with cable, control side, 5-pin

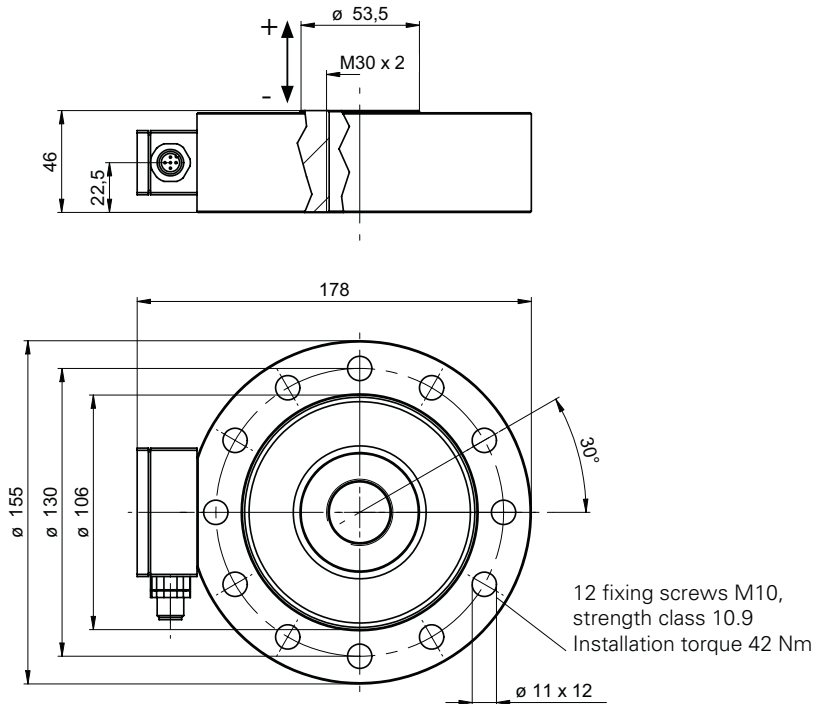
ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)



Dimensions (mm)



2

Electrical Connection

DLRU

14C



Pin	
1	+Vs
2	-V _{OUT}
3	GND
4	+V _{OUT}
5	Reset
Housing	⊥

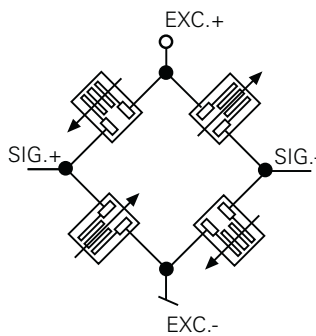
DLRI

14C



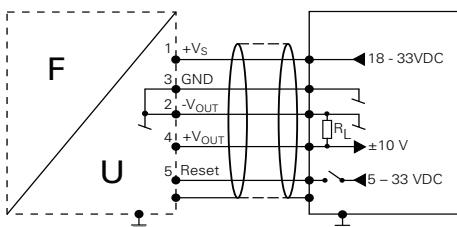
Pin	
1	+Vs
2	n.c.
3	GND
4	+I _{OUT}
5	Reset
Housing	⊥

Bridge Circuit

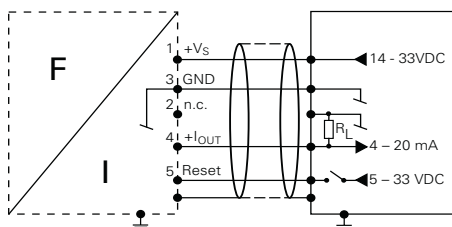


Wiring

DLRU



DLRI



Strain Rings



Product Key Strain Rings DSRC



The correct order code must be taken from the corresponding data sheet.

DSRC BT053M/CM

Product Description

DS = Strain sensor

Method

R = Resistive

Series

C = Series C (strain ring)

Type

ST = Standard, 6 pin connector radial, 2 x 1/4 S/G bridge, k = 2,00
BT = Execution with radial cable exit, w/o connector, cable 5 m, 2 x 1/4 S/G bridge, k = 2,00
QM = Quick mount, with hinge and quick mount latch, 6 pin connector radial, with bayonet lock, 2 x 1/4 S/G bridge, k = 2,00
AX = Execution with axial cable exit, w/o connector, cable 5 m, 2 x 1/4 S/G bridge, k = 2,00

Nominal Size (mm)

Shaft Diameter

Metric sizes = Ring diameter in mm

Inch sizes = Inch size converted to mm and rounded to next closest integer mm

Example

053 = 53 mm

Metric / Inch

M = Metric

Options

/TO = Execution for torsion measurement 2 x 1/4 S/G bridge 350 Ω, k = 2,00

/CM = 4 pin cable connector

/CN = 6 pin cable connector

/CL10 = Cable length 10 m

Combinations are possible: example **CL10CM** or **CL10TO**

Note the Following Important Points

When applying the strain ring:

- The strain rings are not suitable for static applications. Reset measuring chain before each cycle.
- The strain rings are equipped with two exactly diametrically opposed strain gages.





Possible bridge circuits:

- Bending compensated with 2 x 1/4 bridge configuration of both strain gages.
- Axial load compensated with 1/2 bridge configuration of both strain gages.
- For strain rings with full bridge circuit, the corresponding cable must be used. The bridge is completed with precision resistors.
- After several hundred repeated installations, the stainless metal foil in the ring may be damaged. Under normal circumstances, this does not compromise the measurement accuracy as long as the gages remain properly aligned.
- The strain rings can be returned to Baumer for reconditioning. All components involved in the measurement are exchanged (Part No. 900554). The strain ring will be shipped back in a 'as new' condition including a certificate of conformity.

Summary

Strain Rings DSRC



<p>Type ST</p> 	<ul style="list-style-type: none"> • Standard strain ring with radial connector for tension, compression or torsion measurements • Installation without surface preparation • Simple strain measurement on shafts, axes and cylinders • Only for cyclical applications, i.e. clamping force measurements on presses 	<p>Page 3.4</p>
<p>Type BT</p> 	<ul style="list-style-type: none"> • Strain ring with radial cable exit for tension and compression measurements • Installation without surface preparation • OEM execution • Ideal for permanent installation • Only for cyclical applications, i.e. clamping force measurements on presses 	<p>Page 3.8</p>
<p>Type QM</p> 	<ul style="list-style-type: none"> • Strain ring with quick mount latch for tension and compression measurements • Installation without surface preparation • Fast and simple installation thanks to a quick mount latch • Ideal for restricted space conditions • Only for cyclical applications, i.e. clamping force measurements on presses 	<p>Page 3.12</p>
<p>Type AX</p> 	<ul style="list-style-type: none"> • Strain ring with axial cable exit • Installation without surface preparation • Ideal for use in conjunction with telemetry system • For tension, compression or torsion measurements • Only for cyclical applications, i.e. clamping force measurements on presses 	<p>Page 3.16</p>

The strain rings are based on the proven STRAIN-MATE™ technology with strain gages.

Strain rings are used in general mechanical engineering applications as well as in the laboratory. Simple installation combined with high accuracy make the strain ring a versatile measurement tool for calibration and monitoring tasks.

Strain Ring with Radial Connector DSRC ST

Features

- Standard strain ring
- Simple strain measurements on shafts, axles and cylinders
- Installation without surface preparation
- For tension, compression or torque measurements
- For cyclical applications only, i.e. clamping force on presses



Strain Gage Data

Strain gage type	Foil gages
Bridge resistance at 24 °C	350 Ω 2 x quarter bridge
Sensitivity at 24 °C	Gage factor K= 2.00 ±0,5% (compensated with resistors)
Temp. compensation	Steel
Transverse sensitivity nominal	+0,7%
Bridge circuit	2 x 1/4 bridge (see electrical connections)

Mechanical Data

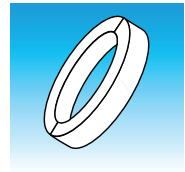
Connection	6 pin female (Binder series 423)
Material	
- Ring	Aluminum anodized
- Protective foil	Stainless steel
- Hinge	Nitril
- Screws	M8 (torque 3 Nm)

Environmental Conditions

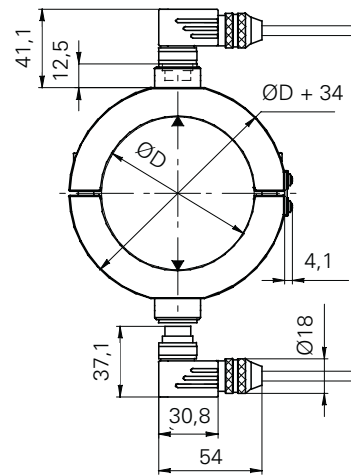
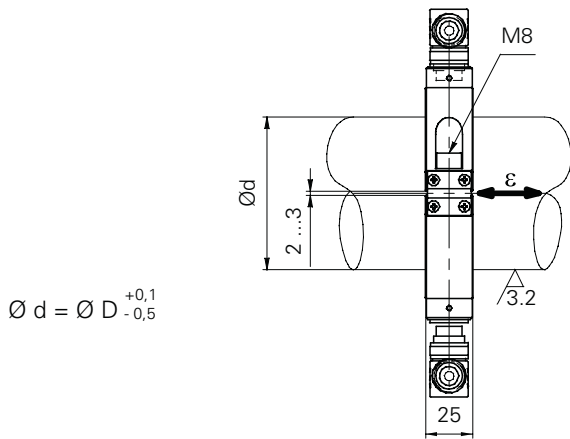
Surface quality	Ra 3.2 (N8) or better
Operating temp. range	-10...+60 °C
Storage temperature	-40...+100 °C
Protection class	IP 54

Electrical Data

Measuring range	±1000 µε (1 µε = 0,001 mm/m resp. 1 µε equals 0,001 mm strain per meter of shaft)
Output signal per 1000 µε	1 mV/V (with completed full bridge)
Combined error	< 1% FS
Linearity	< 0,5% FS
Hysteresis	< 0,5% FS
Repeatability	< 0,2% FS
Zero, bridge balance	< ±200% FS (depending on installation). Since the gages are pressed-on, the bridge can have any arbitrary zero offset after the ring is mounted. Baumer amplifiers and display boxes are equipped with a reset function to tare this offset. The bridge should be reset before each measuring cycle.
Excitation max. Recommended	9 VDC 5 VDC
Signal polarity	The signal polarity depends on the bridge circuit. In combination with Baumer amplifiers, the polarity is positive under tensile load.
Rise time (10 - 90%)	< 1 ms (on steel)



Dimensions (mm)

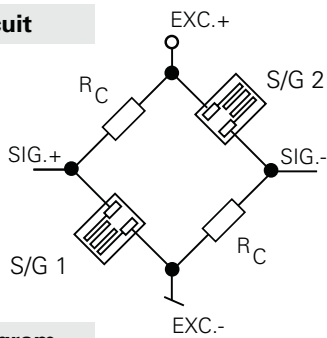


Ø D = Nominal diameter
Ø d = Shaft diameter

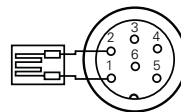
ε = Strain
▲ = Gauge location

Electrical Connections

Bridge Circuit

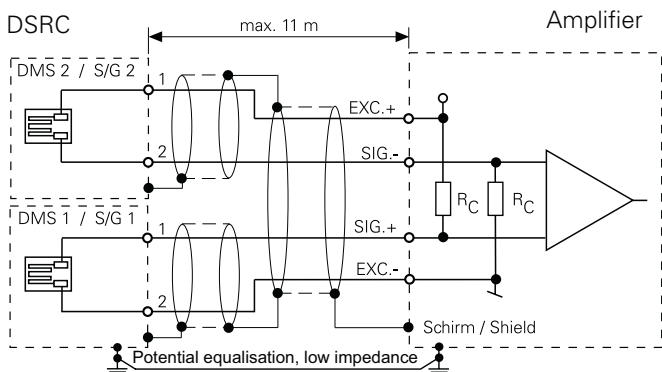


Pin Assignment (per ring half)



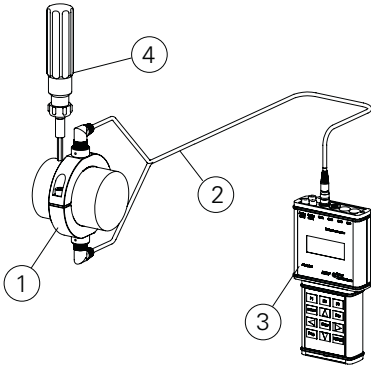
Pin	Signal
1	S/G
2	S/G
3	n.c.
4	n.c.
5	n.c.
6	n.c.

Wiring Diagram

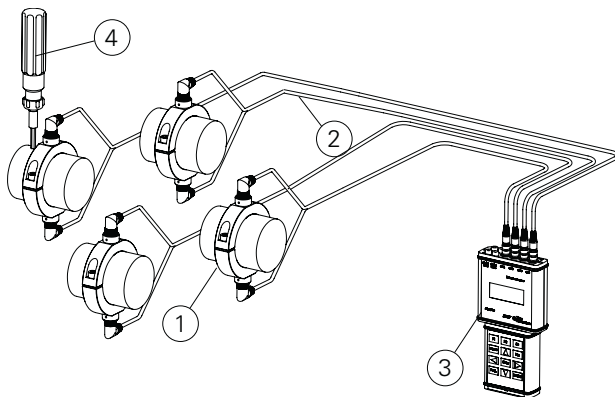


Strain Ring with Radial Connector DSRC ST

Typical Measuring Chains



Pos.	Qty	Type	Description
1	1	DSRC Type ST	Standard strain ring
2	1	DZCY 05-ST-WM-C	Connecting cable for strain ring, 5 m
3	1	DDBF 2-SC	2-channel display box incl. power adapter
4	1	DZMT TW-A1-6	Torque wrench



Pos.	Qty	Type	Description
1	4	DSRC Typ ST	Standard strain ring
2	4	DZCY 05-ST-WM-C	Connecting cable for strain ring, 5 m
3	1	DDBF 4-SC	4-channel display box incl. power cord and Analysis Software
4	1	DZMT TW-A1-6	Torque wrench

Order Code

DSRC ST M /

Option

/TO Execution for torsion measurement
2 x 1/4 S/G bridge 350 Ω, k = 2,00

Unit

M Metric sizes

Nominal diameter*

Metric (M)

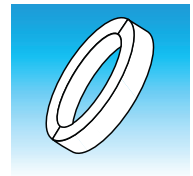
020	050	090	135	185	250
025	053	095	140	190	260
028	055	100	145	195	270
030	060	105	150	200	300
035	065	110	155	205	335
038	070	115	160	220	350
040	075	120	165	225	360
045	080	125	170	230	
048	085	130	180	240	

* Other diameters available upon request

Accessories

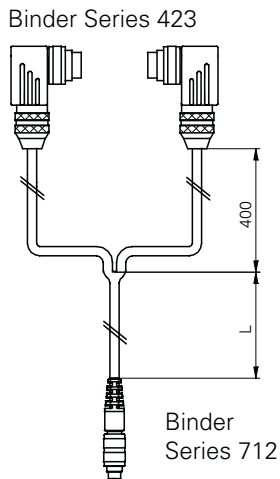
Torque wrench, range adjustable 1 - 6 Nm
Order code: DZMT TW-A1-6

Torque wrench fix factory setting 3 Nm
Order code: DZMT TW-F3



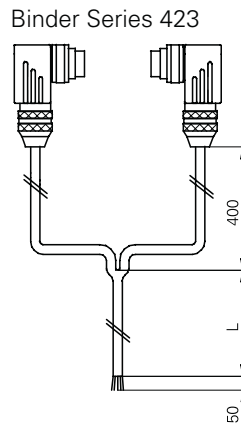
Accessories

Connecting Cable for display box and Bridge Amplifier



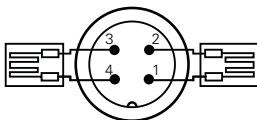
DZCY -**ST-WM-C**
 Length L
05 5 m
10 10 m

Connecting Cable with Open Leads



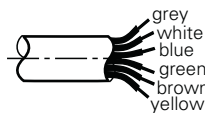
DZCY -**ST-WO-C**
 Length L
05 5 m
10 10 m

Binder Series 712



Pin	Signal
1	S/G 1
2	S/G 1
3	S/G 2
4	S/G 2

Wire Colors



Color	Signal
grey	S/G 1
white	S/G 1
blue	n.c.
green	S/G 2
brown	S/G 2
yellow	n.c.

Order Code

DZCY -**ST** -**C**

Length L

05 5 m
10 10 m
00 00 m

Connection types

WO right angle connector 6-pin open end
WM right angle connector 6-pin / 4-pin straight connector (amplifier DDBF/DABU AD2T)

Strain Ring with Radial Cable DSRC BT

Features

- OEM execution
- Installation without surface preparation
- Ideal for permanent installation
- For tension and compression measurements
- For cyclical applications only, i.e. clamping force on presses



Strain Gage Data

Strain gage type	Foil gages
Bridge resistance at 24 °C	350 Ω 2 x quarter bridge (without cable)
Sensitivity at 24 °C	Gage factor K= 2.00 ±0,5% (compensated with resistors)
Temp. compensation	Steel
Transverse sensitivity nominal	+0,7%
Bridge circuit	2 x 1/4 bridge (see electrical connections)

Mechanical Data

Connection	Open leads
Material	
- Ring	Aluminum anodized
- Protective foil	Stainless steel
- Screws	M8 (torque 3 Nm)
Cable	5 m 2 core, shielded, PVC

Environmental Conditions

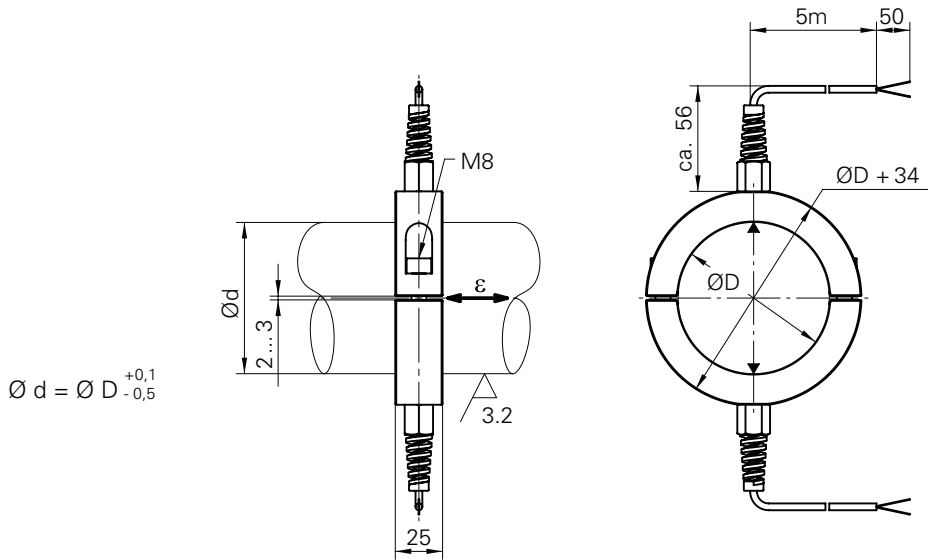
Surface installation spot	Ra 3.2 (N8) or better
Operating temp. range	-10...+60 °C
Storage temperature	-40...+100 °C
Protection class	IP 54

Electrical Data

Measuring range	±1000 µε (1 µε = 0,001 mm/m resp. 1 µε equals 0,001 mm strain per meter of shaft)
Output signal per 1000 µε	1 mV/V (with completed full bridge)
Combined error	< 1% FS
Linearity	< 0,5% FS
Hysteresis	< 0,5% FS
Repeatability	< 0,2% FS
Zero, bridge balance	< ±200% FS (depending on installation) Since the gages are pressed-on, the bridge can have any arbitrary zero offset after the ring is mounted. Baumer amplifiers and display boxes are equipped with a reset function to tare this offset. The bridge should be reset before each measuring cycle.
Excitation max. Recommended	9 VDC 5 VDC
Signal polarity	The signal polarity depends on the bridge circuit. In combination with Baumer amplifiers, the polarity is positive under tensile load.
Rise time (10 - 90%)	< 1 ms (on steel)



Dimensions (mm)

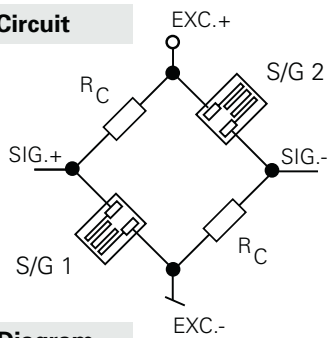


$\varnothing d = \varnothing D^{+0,1}_{-0,5}$

- Ø D = Nominal diameter
- Ø d = Shaft diameter
- ε = Strain
- ▲ = Gage location

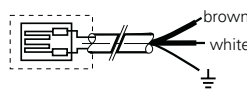
Electrical Connections

Bridge Circuit



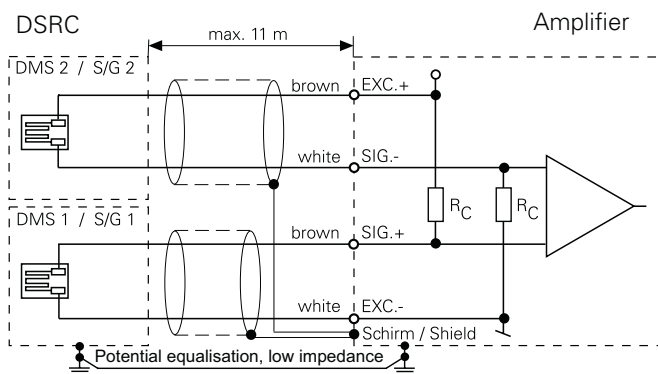
Wire Color

(per ring half)

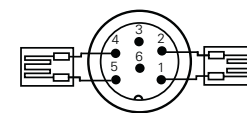
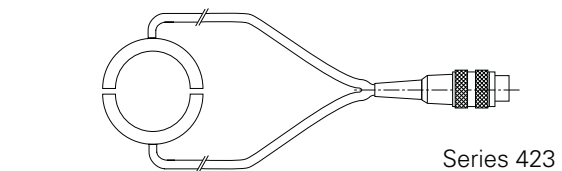


Color	Signal
brown	S/G
white	S/G

Wiring Diagram



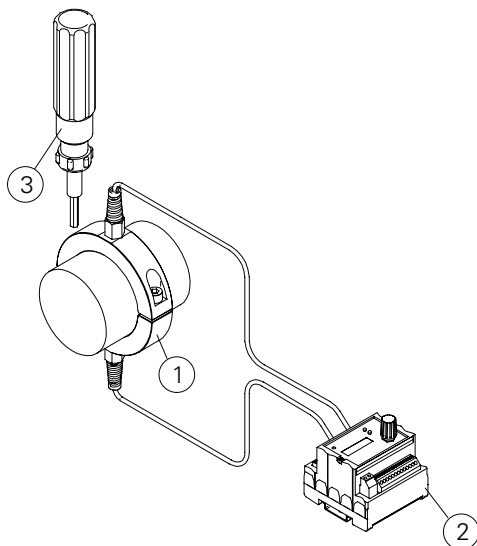
Option /CN



Pin	Signal
1	S/G 1
2	S/G 1
3	n.c.
4	S/G 2
5	S/G 2
6	n.c.

Strain Ring with Radial Cable DSRC BT

Typical Measuring Chain



Pos.	Qty	Type	Description
1	1	DSRC Type BT	Strain ring with radial cable
2	1	DABU MP4M	Bridge amplifier
3	1	DZMT TW-A1-6	Torque wrench

Order Code

DSRC BT M /

Option

- /CM** Connector 4 pin male installed (Connecting display box)
- /CN** Connector 6 pin male installed (Connecting Amplifier)
- /CL10** Cable length 10 m
- /CL10CM** Cable length 10 m with connector 4 pin
- /CL10CN** Cable length 10 m with connector 6 pin

Unit

M Metric sizes

Nominal diameter*

Metric (M)

020	050	090	135	185	250
025	053	095	140	190	260
028	055	100	145	195	270
030	060	105	150	200	300
035	065	110	155	205	335
038	070	115	160	220	350
040	075	120	165	225	360
045	080	125	170	230	
048	085	130	180	240	

* Other diameters available upon request

Accessories

Torque wrench, variable adjustable range 1 - 6 Nm	Order code: DZMT TW-A1-6
Torque wrench fix factory setting 3 Nm	Order code: DZMT TW-F3



Strain Ring with Quick Mount Latch DSRC QM

Features

- Installation without surface preparation
- Simple and fast installations thanks to a quick mount latch
- For tension and compression measurement
- Ideal for restricted space conditions
- For cyclical applications only



Strain Gage Data

Strain gage type	Foil gages
Bridge resistance at 24 °C	350 Ω 2 x quarter bridge
Sensitivity at 24 °C	Gage factor K= 2.00 ±0,5% (compensated with resistors)
Temp. compensation	Steel
Transverse sensitivity nominal	+0,7%
Bridge circuit	2 x 1/4 bridge (see electrical connections)

Mechanical Data

Connection	6 pin female (bayonet quick con.)
Material	
- Ring	Aluminum anodized
- Protective foil	Stainless steel
- Hinge	Steel
- Mounting buckle	Steel

Environmental Conditions

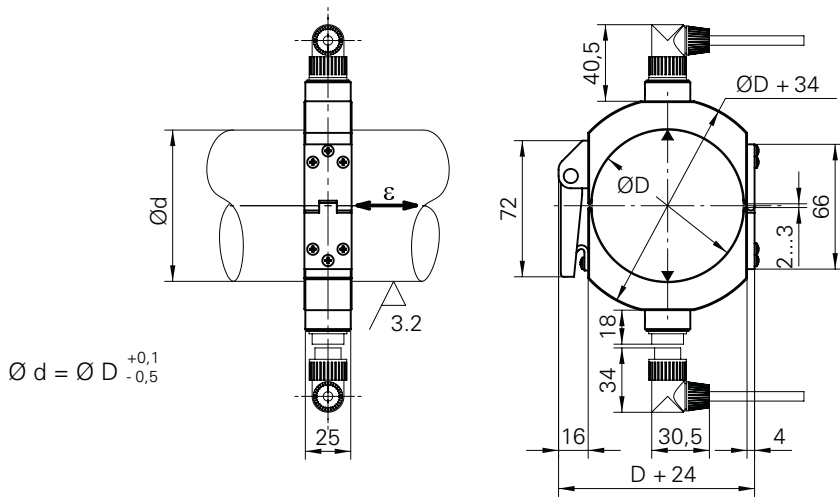
Surface installation spot	Ra 3.2 (N8) or better
Operating temp. range	-10...+60 °C
Storage temperature	-40...+100 °C
Protection class	IP 54

Electrical Data

Measuring range	±1000 µε (1 µε = 0,001 mm/m resp. 1 µε equals 0,001 mm strain per meter of shaft)
Output signal per 1000 µε	1 mV/V (with completed full bridge)
Combined error	< 1% FS
Linearity	< 0,5% FS
Hysteresis	< 0,5% FS
Repeatability	< 0,2% FS
Zero, bridge balance	< ±200% FS (depending on installation) Since the gages are pressed-on, the bridge can have any arbitrary zero offset after the ring is mounted. Baumer amplifiers and display boxes are equipped with a reset function to tare this offset. The bridge should be reset before each measuring cycle.
Excitation max. Recommended	9 VDC 5 VDC
Signal polarity	The signal polarity depends on the bridge circuit. In combination with Baumer amplifiers, the polarity is positive under tensile load.
Rise time (10 - 90%)	< 1 ms (on steel)



Dimensions (mm)

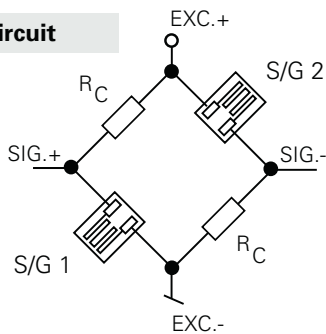


$\varnothing d = \varnothing D \begin{matrix} +0,1 \\ -0,5 \end{matrix}$

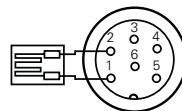
- $\varnothing D$ = Nominal diameter
- $\varnothing d$ = Shaft diameter
- ϵ = Strain
- ▲ = Gage location

Electrical Connections

Bridge Circuit

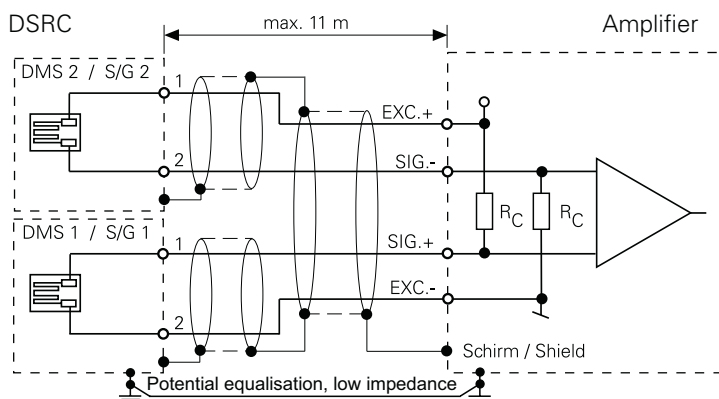


Pin Assignment (per ring half)



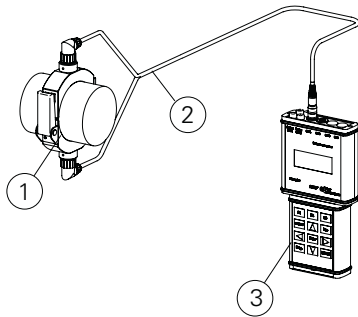
Pin	Signal
1	S/G
2	S/G
3	n.c.
4	n.c.
5	n.c.
6	n.c.

Wiring Diagram



Strain Ring with Quick Mount Latch DSRC QM

Typical Measuring Chains



Pos.	Qty	Type	Description
1	1	DSRC Typ QM	Strain ring with quick mount latch
2	1	DZCY 05-ST-BM-C	Connecting cable for strain ring, 5 m
3	1	DDBC 2-SC	2-Channel display box incl. power adapter and Analysis Software

Order Code

DSRC QM M

Unit

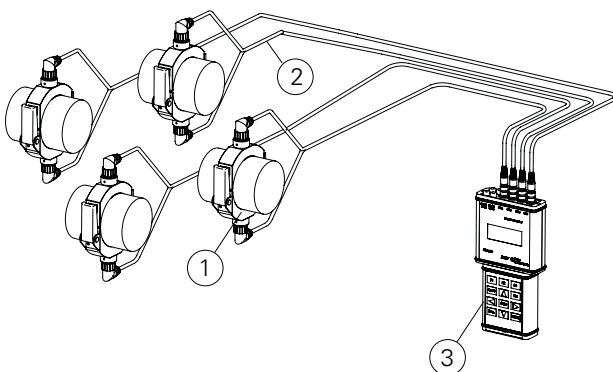
M Metric sizes

Nominal diameter*

Metric (M)

045	080	130	185	260
048	085	135	190	270
050	090	140	195	300
053	095	145	200	335
055	100	150	205	350
057	105	155	220	360
060	110	160	225	
065	115	165	230	
070	120	170	240	
075	125	180	250	

* Other diameters available upon request



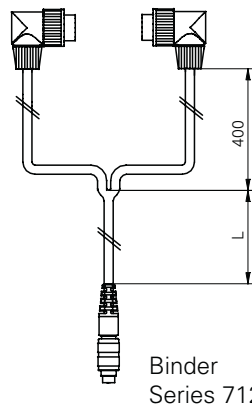
Pos.	Qty.	Type	Description
1	4	DSRC Typ QM	Strain ring with quick mount latch
2	4	DZCY 05-ST-BM-C	connecting cable for strain ring, 5 m
3	1	DDBF 4-SC	4-Channel display box incl. power cord and Analysis Software



Accessories

Connecting Cable for Display and Bridge Amplifier

Binder Series 678



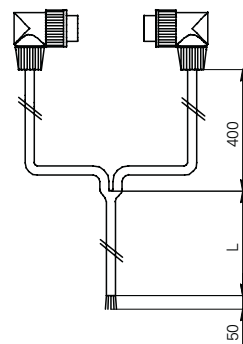
Binder Series 712

DZCY -ST-BM-C

Length L
 05 5 m
 10 10 m

Connecting Cable with Open Leads

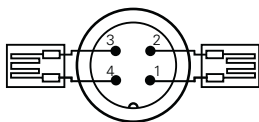
Binder Series 678



DZCY -ST-BO-C

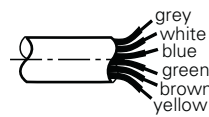
Length L
 05 5 m
 10 10 m

Binder Series 712



Pin	Signal
1	S/G 1
2	S/G 1
3	S/G 2
4	S/G 2

Wire Color



color	Signal
grey	S/G 1
white	S/G 1
blue	n.c.
green	S/G 2
brown	S/G 2
yellow	n.c.

Order Code

DZCY -ST -C

Length L
 05 5 m
 10 10 m
 00 00 m

Connection types

- BO** right angle connector 6-pin open end
- BM** right angle connector 6-pin / 4-pin straight connector (amplifier DDBF/DABU AD2T)

Strain Ring with Axial Cable Exit DSRC AX

Features

- Ideal for use with telemetry system
- For tension and compression measurement
- Installation without surface preparation
- For cyclical applications only



Strain Gage Data

Strain gage type	Foil gages
Bridge resistance at 24 °C	350 Ω 2 x quarter bridge (without cable)
Sensitivity at 24 °C	Gage factor K= 2.00 ±0,5% (compensated with resistors)
Temp. compensation	Steel
Transverse sensitivity nominal	+0,7%
Bridge circuit	2 x 1/4 bridge (see electrical connections)

Mechanical Data

Connection	Open leads
Material	
- Ring	Aluminum anodized
- Protective foil	Stainless steel
- Screws	M8 (torque 3 Nm)
- Hinge	Nitril
Cable	5 m 2 core, shielded, PVC

Environmental Conditions

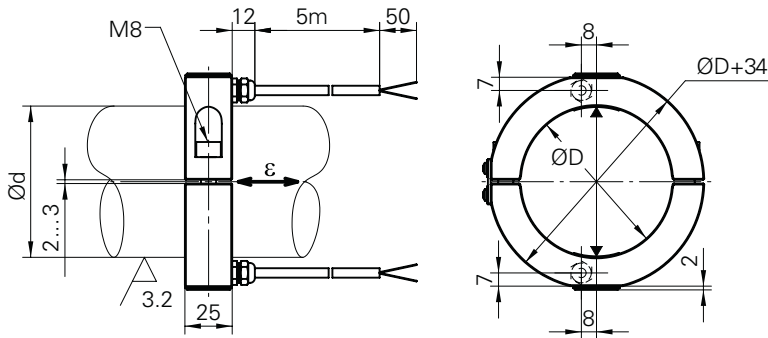
Surface installation spot	Ra 3.2 (N8) or better
Operating temp. range	-10...+60 °C
Storage temperature	-40...+100 °C
Protection class	IP 54

Electrical Data

Measuring range	±1000 µε (1 µε = 0,001 mm/m resp. 1 µε equals 0,001 mm strain per meter of shaft)
Output signal per 1000 µε	1 mV/V (with completed full bridge)
Combined error	< 1% FS
Linearity	< 0,5% FS
Hysteresis	< 0,5% FS
Repeatability	< 0,2% FS
Zero, bridge balance	< ±200% FS (depending on installation) Since the gages are pressed-on, the bridge can have any arbitrary zero offset after the ring is mounted. Baumer amplifiers and display boxes are equipped with a reset function to tare this offset. The bridge should be reset before each measuring cycle.
Excitation max.	9 VDC
Recommended	5 VDC
Signal polarity	The signal polarity depends on the bridge circuit. In combination with Baumer amplifiers, the polarity is positive under tensile load.
Rise time (10 - 90%)	< 1 ms (on steel)



Dimensions (mm)

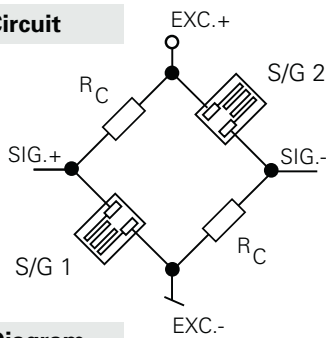


$\varnothing d = \varnothing D \begin{matrix} +0,1 \\ -0,5 \end{matrix}$

- Ø D = Nominal diameter
- Ø d = Shaft diameter
- ε = Strain
- ▲ = Gage location

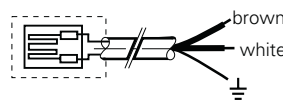
Electrical Connections

Bridge Circuit



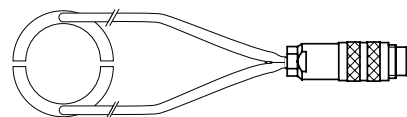
Wire Color

(per ring half)

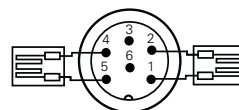


Color	Signal
brown	S/G
white	S/G

Option /CN

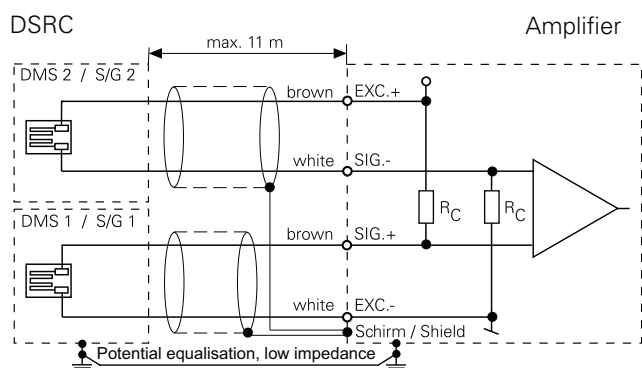


Series 423

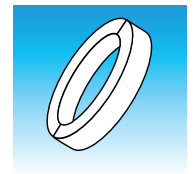


Pin	Signal
1	S/G 1
2	S/G 1
3	n.c.
4	S/G 2
5	S/G 2
6	n.c.

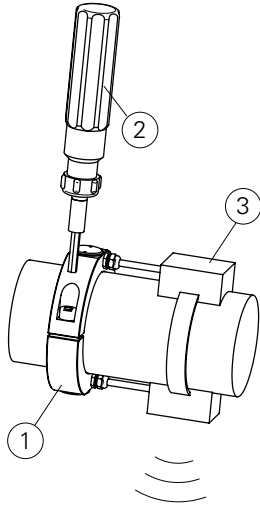
Wiring Diagram



Strain Ring with Axial Cable Exit DSRC AX



Typical Measuring Chain



Pos.	Qty	Type	Description
1	1	DSRC Type AX	Strain ring with axial cable exit
2	1	DZMT TW-A1-6	Torque wrench
3	1		Commercially available telemetry system

Order Code

DSRC AX **M** /

Option	
/TO	Execution for torsion measurement 2 x 1/4 bridge 350 Ω, k = 2,00
/CM	Connector 4-pin male installed (Connecting Display box)
/CN	Connector 6-pin male installed (Connecting Amplifier)
/CL10	Cable length 10 m
/CL10CM	Cable length 10 m with connector 4-pin
/CL10CN	Cable length 10 m with connector 6-pin
Unit	

M Metric sizes

Nominal diameter*

Metric (M)

020	050	090	135	185	250
025	053	095	140	190	260
028	055	100	145	195	270
030	060	105	150	200	300
035	065	110	155	205	335
038	070	115	160	220	350
040	075	120	165	225	360
045	080	125	170	230	
048	085	130	180	240	

* Other diameters available upon request

Accessories

Torque wrench, variable adjustable range 1 - 6 Nm Order code: DZMT TW-A1-6

Torque wrench, fix factory setting 3 Nm Order code: DZMT TW-F3

Strain Probes



Product Key Strain Probes DSRH



The correct order code must be taken from the corresponding data sheet.

DSRH U16-0400M/CM

Product Description

DS = Strain sensor

Method

R = Resistive

Series

H = Series H (Strain probes)

Type

I = With integrated amplifier, output signal 4 - 20 mA

U = With integrated amplifier, output signal 0 - 10 V

Nominal Size (mm) (tip diameter)

16 = 16 mm

20 = 20 mm

Measurement Depth (mm)

Example

0400 = 400 mm

1930 = 1930 mm

Metric

M = Metric

Option

/CM = 4 pin connector male installed (only for type P)

/CN = 6 pin cable connector installed (only for type P)

/CL10 = cable length 10 m (only for type P)

Combinations are possible: example **CL10CN**

Note the following important points

When applying the strain probe:

- The strain probes are not suitable for static applications. Reset measuring chain before each cycle.
- The sensor tip is equipped with two exactly diametrically opposed strain gages.
- Excessive removal and installation can damage the tip. Under normal circumstances this does not compromise the measurement accuracy as long as the gages remain properly aligned. When the probe is installed and removed on a regular basis, the resilient steel tip option is recommended. The surface of the bore does not have to be very smooth but it should be free of grooves and must be clean.

Summary

Strain Probes DSRH



Type 16/20



- Strain probe with integrated amplifier
- Simple strain measurements in deep holes
- Characteristic curve deviation < 1%
- For cyclical applications only
- Integrated amplifier with voltage or current output

Page 4.4

With the strain probes it is possible for the first time to measure strain in deep, previously inaccessible holes. A strain probe which is equipped with two diametrically opposed strain gages at the tip is inserted into a hole and clamped. By bracing the gages against the wall of the bore hole the strain is transmitted by friction contact. The bracing element serves as mounting element as well.

Since the clamping mechanism is acting only locally in the area of the gages, the probes measure the strain with high accuracy. The strain probes are based on the proven STRAIN-MATE™ technology with strain gages.

Strain probes are used in general mechanical engineering applications as well as in the laboratory. Simple installation combined with high accuracy makes the strain probe a versatile measurement tool for calibration and monitoring tasks.

Strain Probe with Integrated Amplifier DSRH x16/x20

Features

- Simple strain measurements in deep holes
- Characteristic curve deviation < 1%
- For cyclical applications only
- Integrated amplifier with voltage or current output



Electrical Data	DSRH U	DSRH I
Measuring range	$\pm 1000 \mu\epsilon$	0 - 1000 $\mu\epsilon$
Strain gage type	Foil gages	
S/G circuit	2 x 1/4 bridge bending compensated	
Output signal	± 10 V calibrated (max. ± 12 V)	4 - 20 mA max. load 500 Ω
Combined error	< 1% FS	
Linearity	< 0,5% FS	
Hysteresis	< 0,5% FS	
Supply voltage range	18 - 36 VDC	
Current draw	< 30 mA	< 45 mA
Output impedance	50 Ω	-
Zero reset active	< ± 10 mV	< $\pm 20 \mu\text{A}$
Reset input galvanically isolated	15 - 45 VDC	
Reset/operate offset	< ± 4 mV	< $\pm 10 \mu\text{A}$
Reset pulse (t1)	> 1 ms	
Reset settle time (t2)	≈ 60 ms	
Frequency range (3 dB)	120 Hz	
Rise time 10 - 90%	< 3 ms	
Signal polarity tensile load	positive	positive (only tensile load possible)

Mechanical Data

Connection	7 pin male (Series 680/SGR 70)
Material	
- Amplifier enclosure	Aluminum anodized
- Tube	Stainless steel
- Support ring (Type 20)	Aluminum anodized
Hexagon socket	6 mm
Installation torque	3 Nm

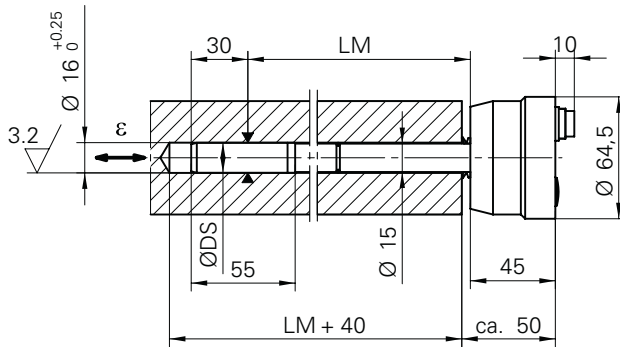
Environmental Conditions

Surface installation spot	Ra 3.2 (N8) or better
Operating temp. range	-5...+60 °C non condensing
Storage temperature	-20...+80 °C
Protection class	IP 54

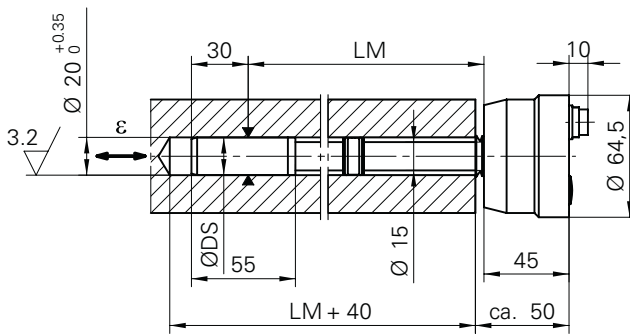


Dimensions (mm)

Type 16



Type 20

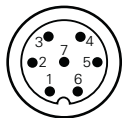


- Ø DS = Tip diameter
- LM = Measurement depth
- ε = Strain
- ▲ = Gage location

Strain Probe with Integrated Amplifier DSRH x16/x20

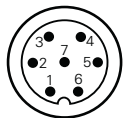
Electrical Connections

Current Output



Pin	Signal
1	+Vs (18 - 35 VDC)
2	Test _{OUT}
3	Reset (bipolar)
4	Reset (bipolar)
5	+I _{OUT} (4 - 20 mA)
6	-I _{OUT}
7	GND

Voltage Output



Pin	Signal
1	+Vs (18 - 35 VDC)
2	Test _{OUT}
3	Reset (bipolar)
4	Reset (bipolar)
5	+V _{OUT} (±10 V)
6	-V _{OUT}
7	GND

Order Code

DSRH - M

Tip diameter (Ø DS) - Length (LM)

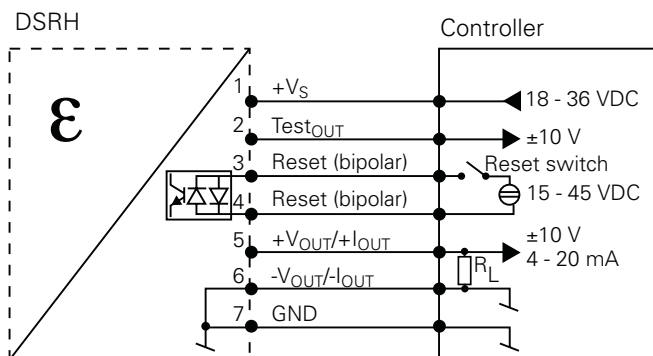
16-0200	20-0200
16-0240	20-0240
16-0320	20-0320
16-0400	20-0400
16-0500	20-0500
16-0600	20-0600
16-0760	20-0760
16-0800	20-0800
16-0900	20-0900
16-1050	20-1050
16-1300	20-1300
16-1400	20-1400

Output signal

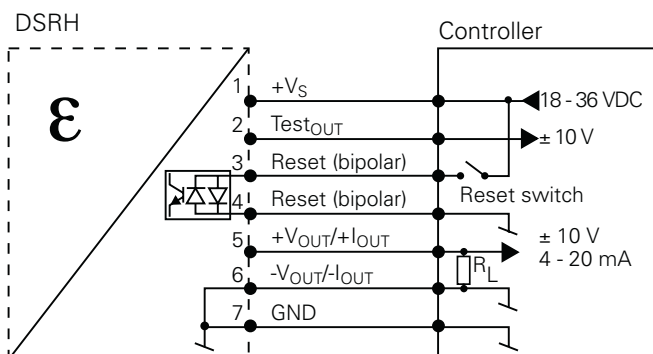
- U** Voltage output ±10 V
±1000 µε = ±10 V
- I** Current output 4 - 20 mA
±1000 µε = 20 mA

Control

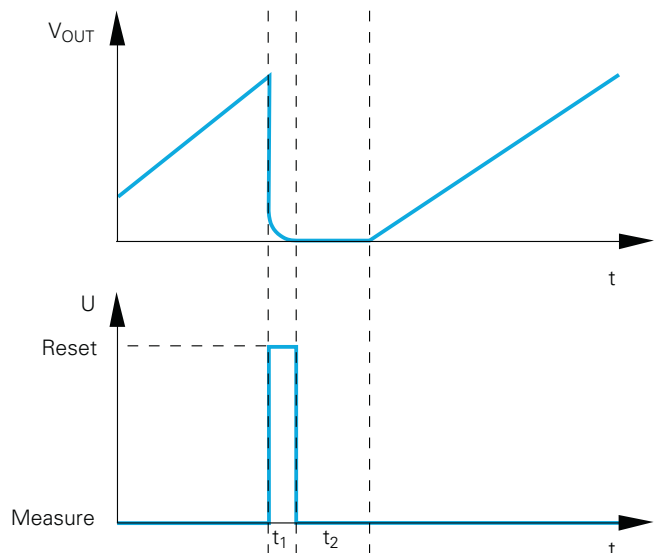
Reset galvanically isolated



Reset not galvanically isolated



Reset Function

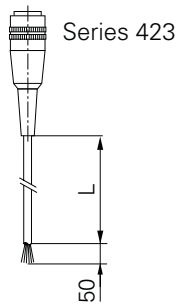


V/I _{OUT}	Output signal
Reset	Reset input (active high)
t ₁	Reset pulse (> 1 ms)
t ₂	Reset settle time after reset pulse (≈ 60 ms)

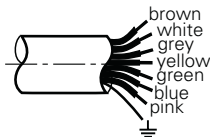


Accessories and Control Elements

Connecting Cable with Flying Leads

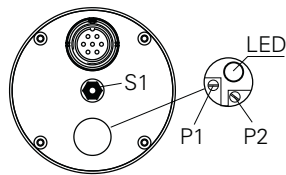


Length	Order Code
5 m	DZCS 05/404155
10 m	DZCS 10/404155



Color	Signal
white	+Vs (18 - 35 VDC)
brown	Testout
green	Reset (bipolar)
yellow	Reset (bipolar)
grey	+Iout / +Vout
blue	-Iout / -Vout
pink	GND

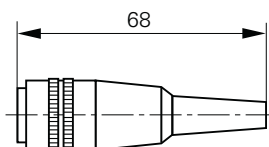
Control Elements



P1	Adjustment Testout
P2	Adjustment Gain (factory set)
LED	Control-LED for Testout
S1	Mounting screw with 6 mm hex

Straight Connector

Series 423



Part No. 10146423

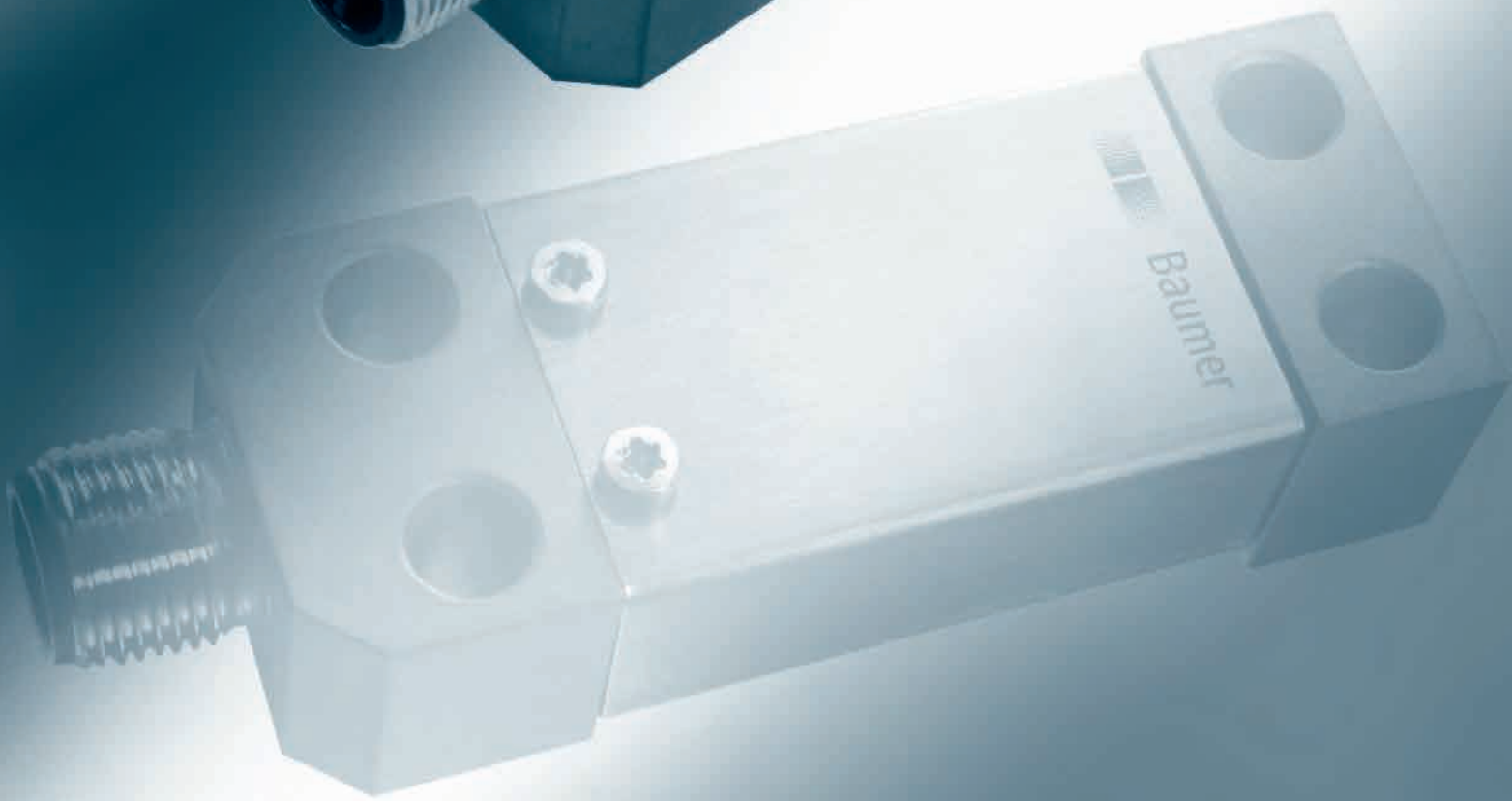
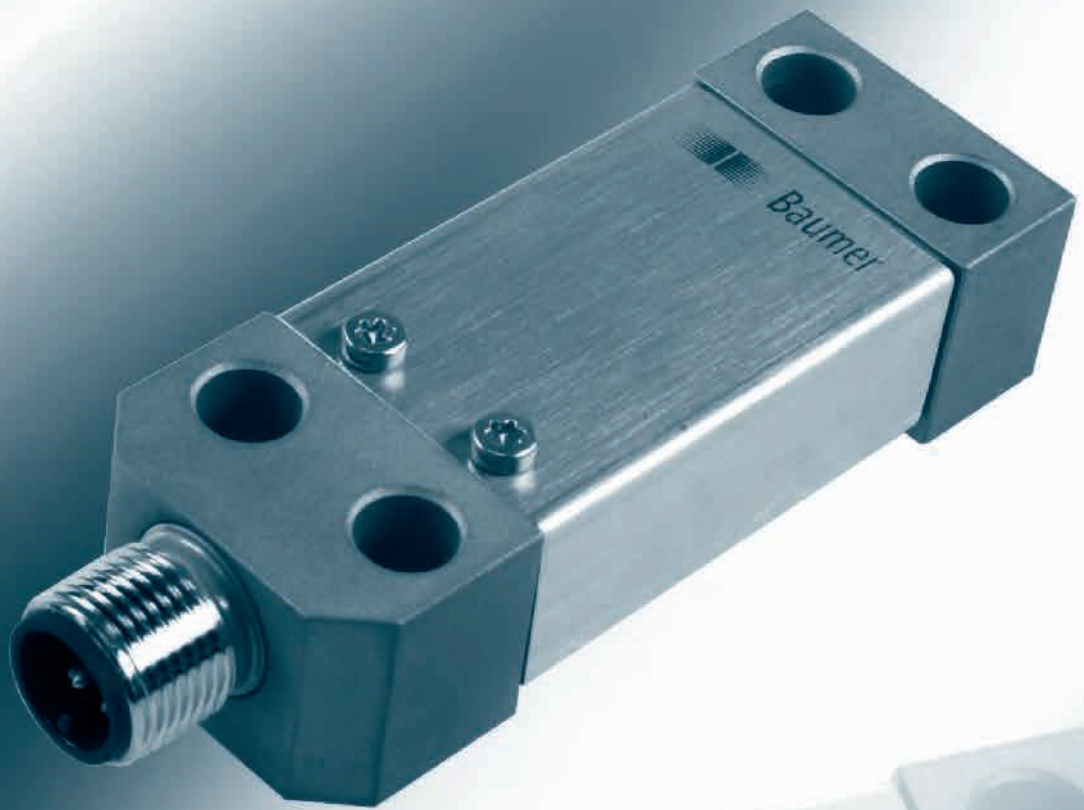
Torque Wrench



Order code: DZMT TW-A1-6
adjustable from 1 - 6 Nm
Part No. 11034496

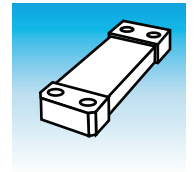
Order code: DZMT TW-F3
preset fix to 3 Nm
Part No. 11034494

Strain Links



Product Key

Strain Links DSRT



The correct order code must be taken from the corresponding data sheet.

DSRT 22DD-S5-1.25

Product Description

DS = Strain sensor

Method

R = Resistive

Series

T = Strain link

Type

22DA = 25,9 x 70 x 16,9 mm, for static and dynamic applications, without amplifier
22DD = 25,9 x 70 x 16,9 mm, for static and dynamic applications, with voltage output
22DJ = 25,9 x 70 x 16,9 mm, for cyclical applications, CANopen, with integrated amplifier

Electric Connection

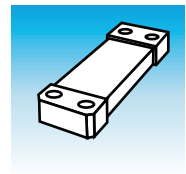
S5 = Cable, 5 pin connector, M12 x 1




Sensitivity

1.00 = 1,00 mV/V at 250 $\mu\epsilon$ surface strain
1.25 = 1,25 mV/V at 250 $\mu\epsilon$ surface strain
0100 = 100 $\mu\epsilon$ surface strain with nominal output signal
0250 = 250 $\mu\epsilon$ surface strain with nominal output signal
0350 = 350 $\mu\epsilon$ surface strain with nominal output signal
0500 = 500 $\mu\epsilon$ surface strain with nominal output signal
0750 = 750 $\mu\epsilon$ surface strain with nominal output signal

Summary

Strain Links DSRT



Type 22DA		<ul style="list-style-type: none"> • Strain link without amplifier • For static and dynamic applications • Very good repeatability • Measurement range from $\pm 100\mu\epsilon$ up to $\pm 750\mu\epsilon$ • Overloadsave 	Page 5.4
Type 22DD		<ul style="list-style-type: none"> • Surface strain sensor with integrated amplifier • For static and dynamic applications • Integrated reset circuit for automatic zero signal • Voltage output 0 to 10 V, power output 4 to 20 mA • Very good repeatability • Measurement range from $\pm 100\mu\epsilon$ up to $\pm 750\mu\epsilon$ 	Page 5.6
Type 22DJ		<ul style="list-style-type: none"> • For cyclical measurements; with integrated amplifier • CANopen • Excellent signal to noise ratio • High sensitivity 	Page 5.8

Operating method of DSRT strain links:

The present structure strain (of the measurement object) between the two screw supports is mechanically transferred to the strain sensor. The transfer takes place because of the strain transforming principle. This means, strain signal overload from 200% up to 400% and good signal/noise proportion will be reached.

Upon request the integrated amplifier may be adjusted to diverse applications.

DSRT strain links are especially suited to measurement on rigid structures appearing on presses, injection moulding machines and other cyclical applications. The transmitters (with integrated amplifier) may also be used for force and weight measuring on structures.

Strain Link without Amplifier DSRT 22DA

Features

- Strain link without amplifier
- Static and dynamic applications
- Measuring range ± 250 resp. $\pm 750 \mu\epsilon$



S/G Data

Strain gage type	Foil strain gage
Bridge resistance	Full bridge 350 Ω

Mechanical Data

Material	
- Housing	1.7225 chemically nickel-plated
- Cover	1.4301
Electrical connection	5 pin (M12 x 1)
Sensor stiffness	1 N/ $\mu\epsilon$ @250 mechanic 0,2 N/ $\mu\epsilon$ @750 mechanic
Overload capability	200 %

Environmental Conditions

Operating temp.range	0...+70 °C
Storage temp. range	-40...85°C
Vibration EN 60068-2-6	10 - 2000 Hz 10 g (Amplitude $\pm 0,75$ mm, 10 - 58 Hz)
Random IEC 60068-2-64	20 - 1000 Hz, 0,1 g ² /Hz
Schock IEC 60068-2-27	50 g / 11 ms
Protection class	IP 67

Delivery Contents

Mounting screws	4 pcs. M6 x 25 strength class 12.9
-----------------	---------------------------------------

Order Code

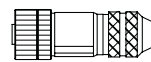
DSRT 22DA-S5-

0250 Measuring range 250 $\mu\epsilon$
0750 Measuring range 750 $\mu\epsilon$

Electrical Data

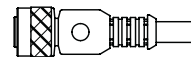
Measuring range	$\pm 250 \mu\epsilon$... $\pm 750 \mu\epsilon$ (1 $\mu\epsilon$ = 0,001 mm/m resp. 1 $\mu\epsilon$ equals 0,001 mm strain per meter)
Sensitivity	1,85 mV/V @ 750 $\mu\epsilon$ 0,93 mV/V @ 250 $\mu\epsilon$
Sensitivity tolerance typical	± 2 %
Linearity	< 0,5% FSR
Hysteresis	< 0,5% FSR
Repeatability	< 0,1% FSR (cycle to cycle)

Accessories (not included in delivery)



Series 713

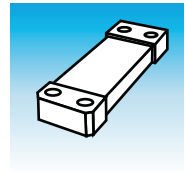
Connector female, 5 pin, part no. 135462



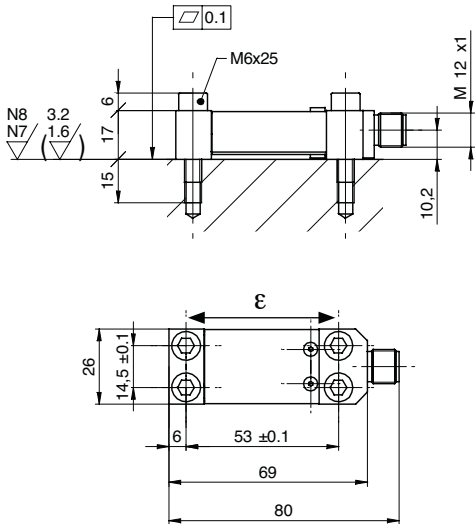
Connector female with cable, 5 pin
ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)



Dimensions (mm)

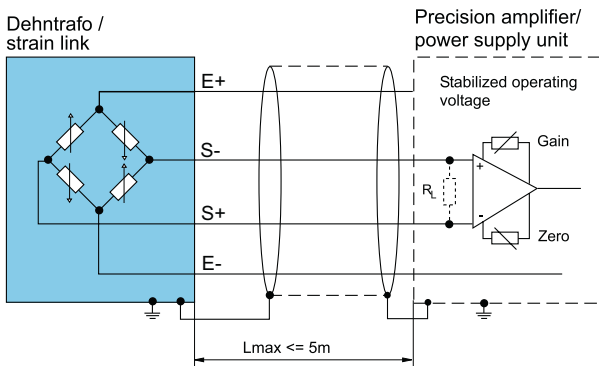


Electrical Connections



Pin	Signal
1	E+
2	S-
3	E-
4	S+
5	n.c.
Housing	Shield

Control



Strain Link with Amplifier DSRT 22DD

Features

- Static and dynamic applications
- Integrated reset switch for automatic zero point setting
- Measuring range ± 100 up to $\pm 750 \mu\epsilon$, extension and compression
- Voltage output



S/G Data

Strain gage type	Foil strain gage
------------------	------------------

Mechanical Data

Material	
- Housing	1.7225 chemically nickel-plated
- Cover	1.4301
Electrical connection	5 pin (M12 x 1)
Application position	any
Sensor stiffness	1 N/ $\mu\epsilon$ @100 0,2 N/ $\mu\epsilon$ @250 - 750

Environmental Conditions

Operating temp.range	0...+70 °C
Storage temp. range	-40...+85°C
EMC	EN 61000-6-2 EN 61000-6-4
Vibration IEC 60068-2-6	10 - 2000 Hz 10 g (amplitude $\pm 0,75$ mm, 10 - 58 Hz)
Random IEC 60068-2-64	20 - 1000 Hz, 0,1 g ² /Hz
Shock IEC 60068-2-27	50 g / 11 ms
Protection class	IP 67

Delivery Contents

Mounting screws	4 pcs. M6 x 25 strength class 12.9
-----------------	---------------------------------------

Order Code

DSRT 22DD-S5-

- 0100** Measuring range 100 $\mu\epsilon$
- 0250** Measuring range 250 $\mu\epsilon$
- 0350** Measuring range 350 $\mu\epsilon$
- 0500** Measuring range 500 $\mu\epsilon$
- 0750** Measuring range 750 $\mu\epsilon$

Electrical Data

Measuring range	$\pm 100 \mu\epsilon$... $\pm 750 \mu\epsilon$ (1 $\mu\epsilon$ = 0,001 mm/m resp. 1 $\mu\epsilon$ equals 0,001 mm strain per meter)
Output signal	± 10 VDC (max. ± 12 VDC)
Characteristic curve deviation	< 1,0% FS
Linearity	< 0,5% FS
Hysteresis	< 0,5% FS
Repeatability	< 0,1% FS
Supply voltage range	18 - 33 VDC
Taring "activ High"	Low < 1 VDC High 5...33 VDC

Accessories (not included in delivery)



Connector female, control side, 5-pin, Part No. 10135462

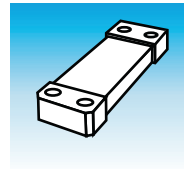


Connector female with cable, control side, 5-pin

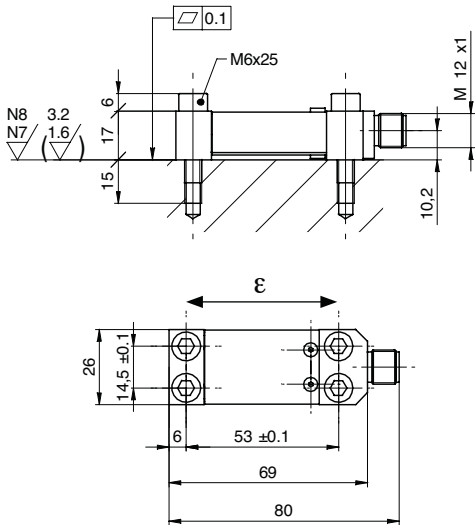
ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)



Dimensions (mm)

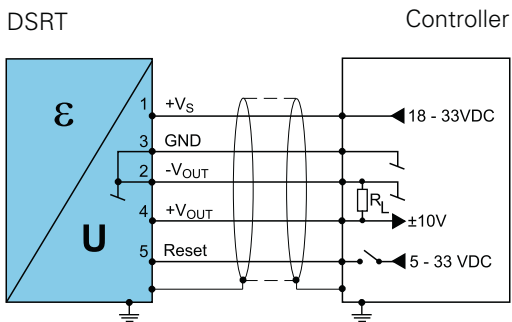


Electrical Connections

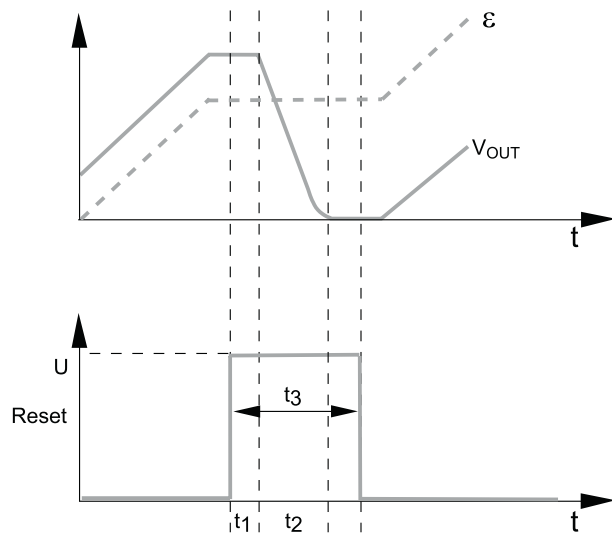


Pin	Signal
1	+Vs
2	-V _{OUT}
3	GND
4	+V _{OUT}
5	Reset
Housing	Shield

Control



Reset Function



V _{OUT}	Output signal
ε	Input signal
Reset	Reset input (active high)
t ₁	Reset delay (< 0,3 ms)
t ₂	Reset time (< 5 ms)
t ₃	Reset impulse (> 1 ms)

Strain Link with CANopen DSRT 22DJ

Features

- Digital linearization
- Decoupling of torsion and bending
- Taring function with PDO- or SDO-command
- Measuring range ± 100 up to $\pm 750 \mu\epsilon$, extension and compression



S/G Data

Strain gage type	Foil strain gage
------------------	------------------

Mechanical Data

Material	
- Housing	1.7225 chemically nickel-plated
- Cover	1.4301
Electrical connection	5 pin (M12 x 1)
Application position	any
Sensor stiffness	1 N/ $\mu\epsilon$ @100 0,2 N/ $\mu\epsilon$ @250 - 750

Environmental Conditions

Operating temp. range	0...+70 °C
Storage temp. range	-40...+85 °C
EMC	EN 61000-6-2 EN 61000-6-4
Vibration IEC 60068-2-6	10 - 2000 Hz 10 g (amplitude $\pm 0,75$ mm, 10 - 58 Hz)
Random IEC 60068-2-64	20 - 1000 Hz, 0,1 g ² /Hz
Shock IEC 60068-2-27	50 g / 11 ms
Protection class	IP 67

Delivery Contents

Mounting screws	4 pcs. M6 x 25 strength class 12.9
-----------------	---------------------------------------

Order Code

DSRT 22DJ-S5-

- 0100** Measuring range 100 $\mu\epsilon$
- 0250** Measuring range 250 $\mu\epsilon$
- 0500** Measuring range 500 $\mu\epsilon$
- 0750** Measuring range 750 $\mu\epsilon$

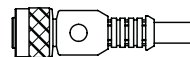
Electrical Data

Measuring range	$\pm 100 \mu\epsilon$... $\pm 750 \mu\epsilon$ (1 $\mu\epsilon$ = 0,001 mm/m resp. 1 $\mu\epsilon$ equals 0,001 mm strain per meter)
Output / Protocol	CANopen DS404
Resolution	0,1 $\mu\epsilon$
Measuring rate	1000 x / sec.
Data format	Fix points
Total error at ambient temperature	< 0,5% FS
Hysteresis	< 0,4% FS
Repeatability	< 0,1% FS
Taring time	< 9 ms
Supply voltage range	10 - 33 VDC
Current draw	< 60 mA

Accessories (not included in delivery)



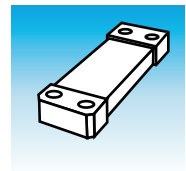
Connector female, control side, 5-pin, Part No. 10135462



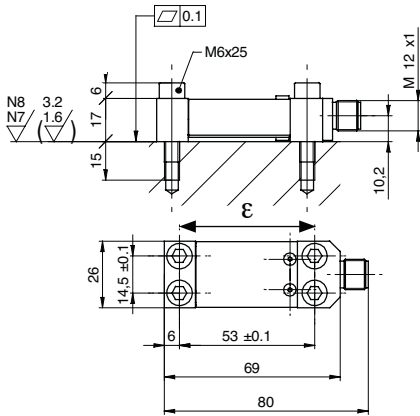
Connector female with cable, control side, 5-pin
ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)



Dimensions (mm)



Supported Objects

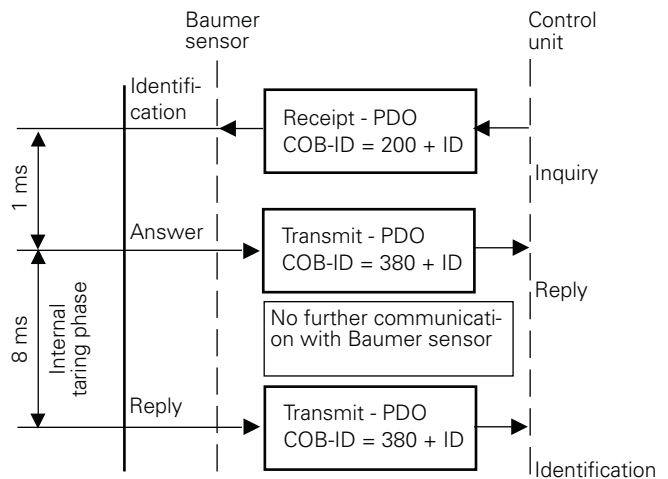
Object	Description
1000	Device profile
1001	Error register
1002	Serial number
1003	Emergency history
1005	Sync ID
1008	Device description
1009	Hardware version
100A	Software version
1010	Store
1011	Load default values
1017	Heartbeat
1018	Device identity
1400	Reception PDO1 parameter
1600	PDO 1 Mapping parameter
1800	Transmit PDO1 parameter
1801	Transmit PDO2 parameter
1802	Transmit PDO3 parameter
1A00	1. PDO Mapping
1A01	2. PDO Mapping
1A03	3. PDO Mapping
2000	Averaging time
2001	Auto zero store
2100	Baud rate
2101	Identification
6110	Sensor Type
6112	Operating mode
6125	Auto zero
6131	Process unit
6132	Decimal places
6150	Status of measurement
7130	Interrogate measured value (Process value)
7133	Delta Value

Electrical Connections



Pin	Signal
1	n.c.
2	+VS
3	GND
4	CANH
5	CANL
Housing	Shield

Temporal Course



Example

ID	DLC
201h	0

First answer of strain link

(Command realized)

ID	DLC	Byte 1
381h	1	75h

Second answer of strain link

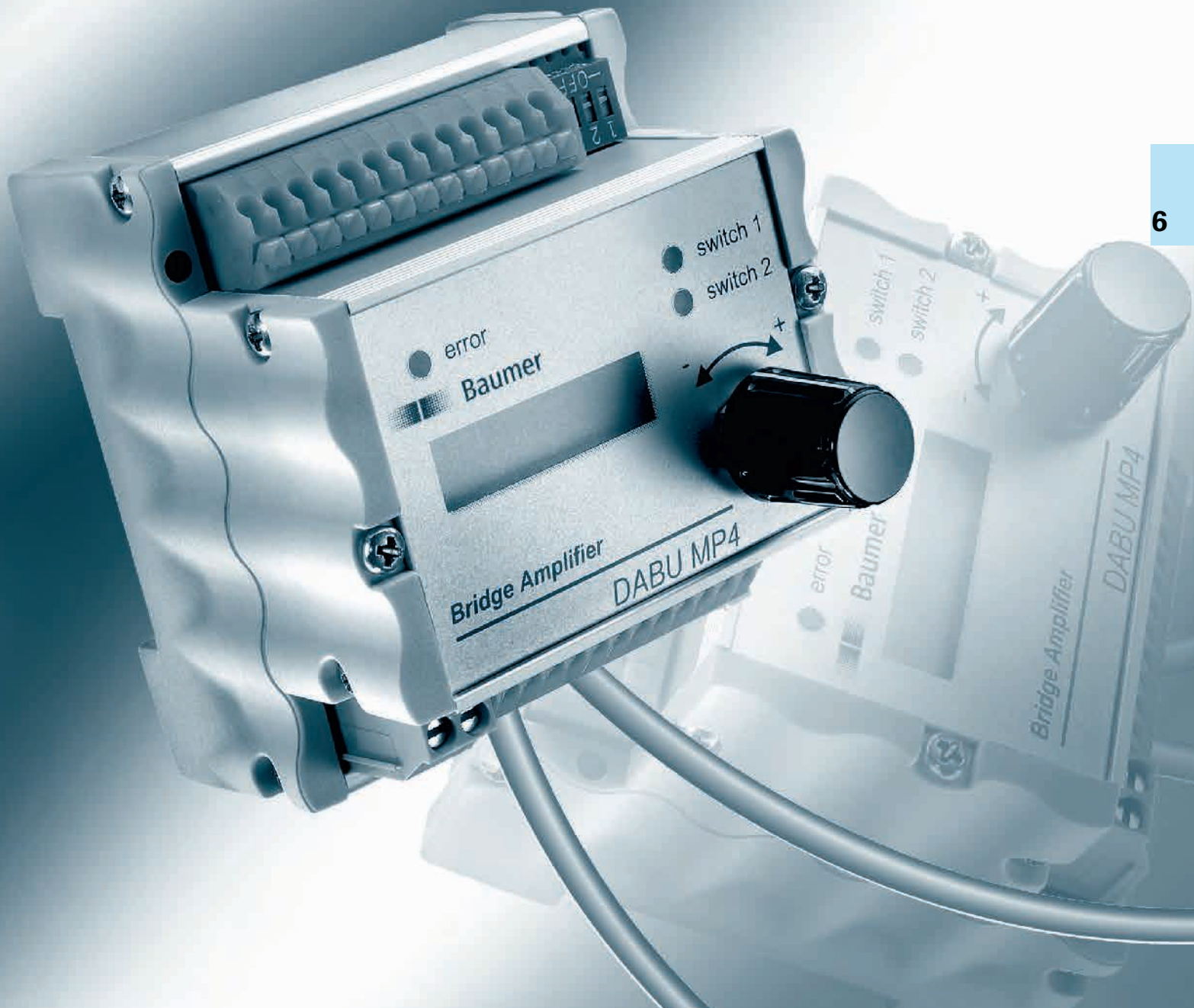
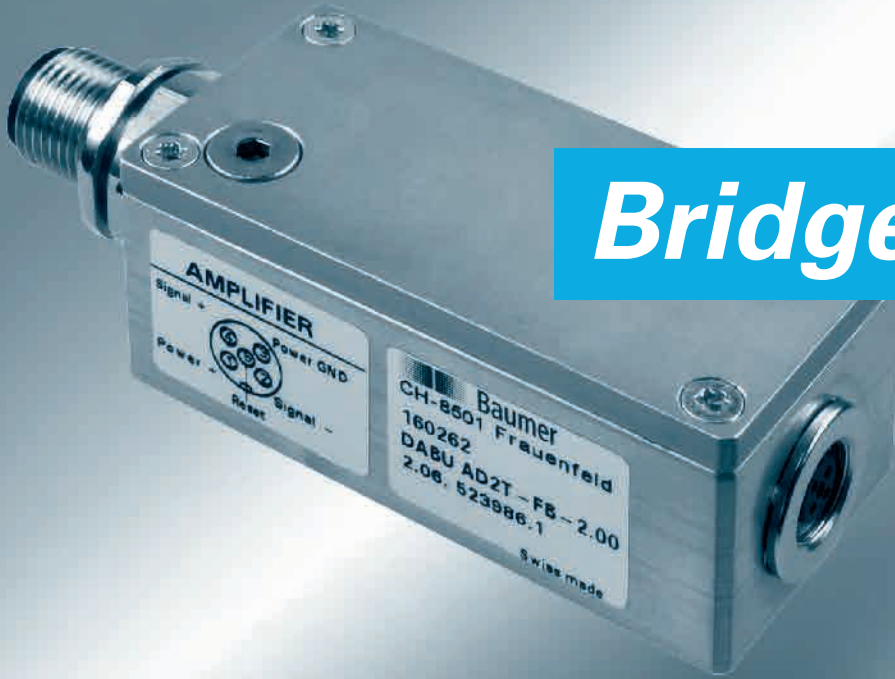
(Taring finished)

ID	DLC	Byte 1	Byte 2
381h	2	66	0

Error (Unstable signal)

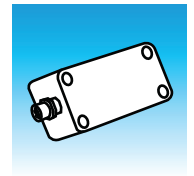
ID	DLC	Byte 1	Byte 2
381h	2	65h	72h

Bridge Amplifier



Product Key

Bridge Amplifier DABx



The correct order code must be taken from the corresponding data sheet.

DABU AD2T-FB-1.00

Product Description

DAB = Bridge Amplifier

Output Signal

I = 4...20 mA
U = ±10 V

Series

MP4 = 1-Channel, in aluminum/plastic enclosure, for DIN-rail mounting, with display
AD2 = 1-Channel, compact aluminum housing

Method

M = multifunctional for statical and cyclical applications
T = for static and cyclic applications

Connection S/G Bridge

2Q = 2 x 1/4 strain gage bridge, diagonal layout, 350 Ω
FB = full bridge
FC = selectable configuration, 350 Ω

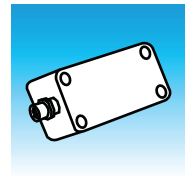
Sensitivity

0.50 = 0,50 mV/V at nominal output signal
1.00 = 1,00 mV/V at nominal output signal
1.25 = 1,25 mV/V at nominal output signal
2.00 = 2,00 mV/V at nominal output signal

0250 = 250 µε at nominal output signal
0500 = 500 µε at nominal output signal
1000 = 1000 µε at nominal output signal

Bridge amplifiers for strain gage circuits convert the mV signals from the bridges (S/G full bridge or 2 x 1/4 S/G bridge) into standardized output signals (V or mA). The S/G amplifiers are configured to work with Baumer sensors.

Summary Bridge Amplifier



DABU AD2T-2Q	<ul style="list-style-type: none"> • Bridge amplifier for 2 x 1/4 S/G bridge • Voltage output • For cyclic applications with reset • Protection class IP 65 	Page 6.4
DABI AD2T-2Q	<ul style="list-style-type: none"> • Bridge amplifier for 2 x 1/4 S/G bridge • Current output • For cyclic applications with reset • Protection class IP 65 	Page 6.6
DABU AD2T-FB	<ul style="list-style-type: none"> • Bridge amplifier for S/G full bridge • Voltage output • For cyclic and static applications with reset • Protection class IP 65 	Page 6.8
DABI AD2T-FB	<ul style="list-style-type: none"> • Bridge amplifier for S/G full bridge • Current output • For cyclic and static applications with reset • Protection class IP 65 	Page 6.10
DABx MP4M	<ul style="list-style-type: none"> • S/G amplifier, selectable configuration (2 x 1/4 S/G bridge and full bridge) • Voltage or current output • Peak value and two limit switches • Enclosure for DIN rail installation 	Page 6.12

Bridge Amplifier for 2 x 1/4 Strain Gage Bridge DABU AD2T-2Q

Features

- Industrial bridge amplifier for 2 x 1/4 S/G bridge
- For cyclical applications with reset function
- Voltage output
- Protection class IP 65



Electrical Data

Output signal	± 10 V calibrated (max. ± 12 V)
Characteristic curve deviation	< 0,2%
Supply voltage range	18 - 33 VDC
Current draw	< 60 mA < 40 mA @ 24 VDC
Bridge excitation	approx. 9 VDC
S/G bridge resistance	350 Ω (R_C)
Output impedance	22 Ω
Tare accuracy	0250 < 15 mV 0350 < 12 mV 0500 < 7 mV 1000 < 5 mV
Reset input	active 5 - 33 VDC < 2 mA inactive < 1 VDC
Tare range	± 6 mV/V
Reset puls	> 1 ms
Reset settle time	< 5 ms
Frequency range (-3 dB)	1'000 Hz
Signal polarity	Bipolar
Noise	(0 ... 5 kHz) 0250 < 15 mV _{pp} 0350 < 12 mV _{pp} 0500 < 7,5 mV _{pp} 1000 < 5 mV _{pp}

Mechanical Data

Control connection	5 pin male (Series 713)
Sensor connection	4 pin female (Series 712)
Enclosure	aluminum anodised

Environmental Conditions

Operating temp. range	-25...+85 °C
Specified temp. range	0...+70 °C
Storage temperature	-40...+100 °C
Protection class	IP 65

Order Code

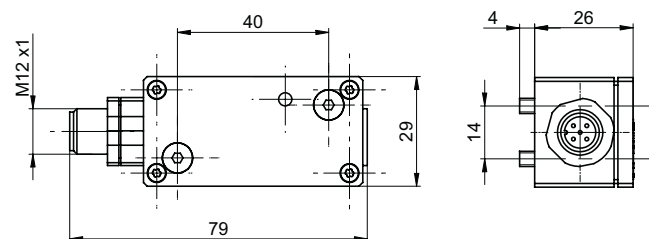
DABU AD2T-2Q



Gain

0250	0250 $\mu\epsilon$ = 0 - 10 V
0350	0350 $\mu\epsilon$ = 0 - 10 V
0500	0500 $\mu\epsilon$ = 0 - 10 V
1000	1000 $\mu\epsilon$ = 0 - 10 V

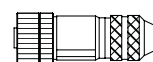
Dimensions (mm)



Delivery Contents

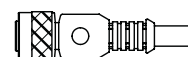
- Mounting screw 2 pcs. M4 x 30

Accessories (not included in delivery)



Series 713

Connector female, control side, 5-pin, Part No. 10135462



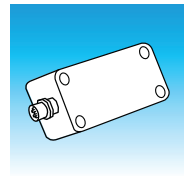
M12 x 1

Connector female with cable, control side, 5-pin

ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

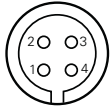
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)



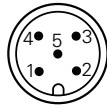
Electrical Connection

Sensor side Series 712



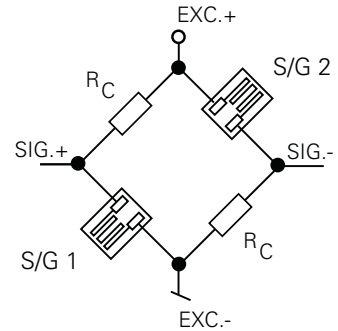
Pin	Signal
1	DMS 1 EXC.+
2	DMS 1 SIG.-
3	DMS 2 SIG.+
4	DMS 2 EXC.-

Control side Series 713

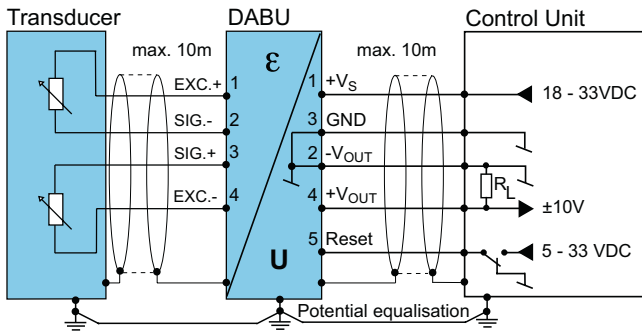


Pin number	Signal
1	+Vs
2	-V _{OUT}
3	GND
4	+V _{OUT}
5	Reset

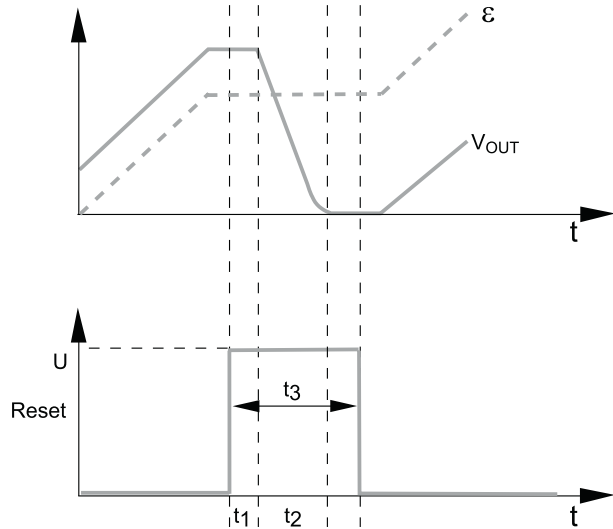
S/G Bridge



Control



Reset Function



V _{OUT}	Output signal
ε	Input signal
Reset	Reset input (active high)
t ₁	Reset delay (< 0,3 ms)
t ₂	Reset time (< 5 ms)
t ₃	Reset impuls (> 1 ms)

Bridge Amplifier for 2 x 1/4 Strain Gage Bridge

DABI AD2T-2Q

Features

- Industrial bridge amplifier for 2 x 1/4 S/G bridge
- For cyclical and static applications with reset function
- Current output
- Protection class IP 65



Electrical Data

Output signal	4 - 20 mA calibrated
Characteristic curve deviation	0250 < 0,5% 0500 < 0,25% 1000 < 0,2%
Supply voltage range	14 - 33 VDC
Current draw	< 90 mA < 70 mA @ 24 VDC
Bridge excitation	approx. 9 VDC
S/G bridge resistance	350 Ω
Burden	< 400 Ω
Tare accuracy	0250 < 30 μA 0500 < 20 μA 1000 < 16 μA
Reset input	active 5 - 33 VDC < 2 mA inactive < 1 VDC
Tare range	±6 mV/V
Reset puls	> 1 ms
Reset settle time	< 5 ms
Frequency range (-3 dB)	1'000 Hz
Noise	(0 ... 5 kHz) 0250 < 30 μA _{pp} 0500 < 20 μA _{pp} 1000 < 16 μA _{pp}

Mechanical Data

Control connection	5 pin male (Series 713)
Sensor connection	4 pin female (Series 712)
Enclosure	aluminum anodised

Environmental Conditions

Operating temp. range	-25...+85 °C
Specified temp. range	0...+70 °C
Storage temperature	-40...+100 °C
Protection class	IP 65
EMC	EN 61000-6-2 Immunity EN 61000-6-3 Emission

Order Code

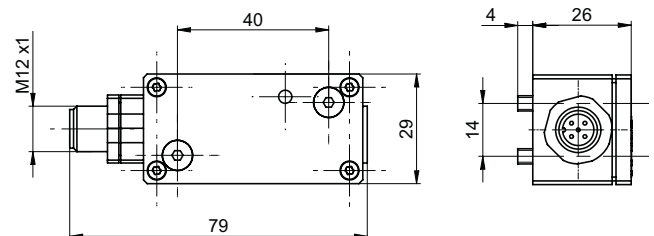
DABI AD2T-2Q /C

Gain

0250 0250 με = 4 - 20 mA
0500 0500 με = 4 - 20 mA
1000 1000 με = 4 - 20 mA

/C Tension leads to a positive output signal

Dimensions (mm)



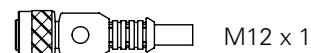
Delivery Contents

- Mounting screw 2 pcs. M4 x 30

Accessories (not included in delivery)



Connector female, control side, 5-pin, Part No. 10135462
max. cable length 20 m

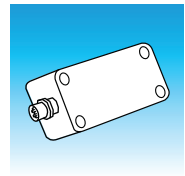


Connector female with cable, control side, 5-pin

ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

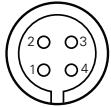
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)



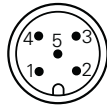
Electrical Connection

Sensor side Series 712



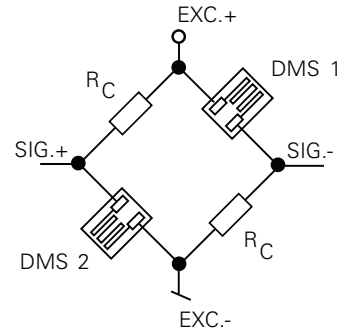
Pin	Signal
1	DMS 1 EXC.+
2	DMS 2 SIG.-
3	DMS 3 SIG.+
4	DMS 4 EXC.-

Control side Series 713

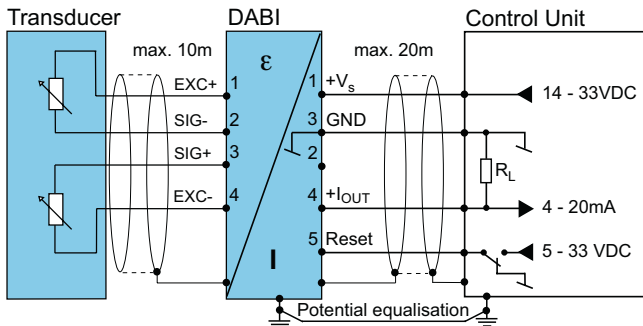


Pin number	Signal
1	+Vs
2	n.c.
3	GND
4	+I _{OUT}
5	Reset

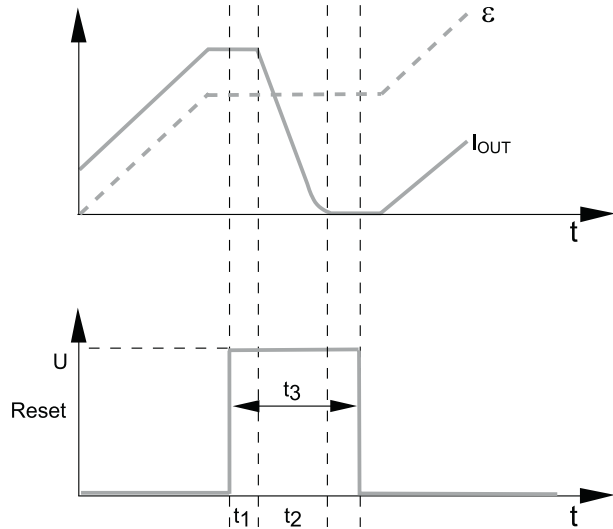
S/G Bridge



Control



Reset Function



I _{OUT}	Output signal
mV/V	Input signal
Reset	Reset input (active high)
t ₁	Reset delay (< 0,3 ms)
t ₂	Reset time (< 5 ms)
t ₃	Reset impuls (> 1 ms)

Bridge Amplifier for Strain Gage Full Bridge DABU AD2T-FB

Features

- Industrial bridge amplifier for S/G full bridge
- For cyclical and static applications with reset function
- Voltage output
- Protection class IP 65
- Analog signal path

Electrical Data

Output signal	± 10 V calibrated (max. ± 12 V)
Characteristic curve deviation	$< 0,2\%$
Supply voltage range	18 - 33 VDC
Current draw	< 60 mA < 40 mA @ 24 VDC
Bridge excitation	approx. 7 VDC
S/G bridge resistance	350Ω (R_C)
Output impedance	22Ω
Tare accuracy	$0.25 < 15$ mV $0.50 < 10$ mV $1.00 < 5$ mV $2.00 < 5$ mV
Reset input	active 5 - 33 VDC < 2 mA inactive < 1 VDC
Tare range	± 6 mV/V
Reset puls	> 1 ms
Reset settle time	< 5 ms
Frequency range (-3 dB)	1'000 Hz
Signal polarity	Bipolar
Noise	(0 ... 5 kHz) $0.25 < 15$ mV _{pp} $0.50 < 7,5$ mV _{pp} $1.00 < 5$ mV _{pp} $2.00 < 5$ mV _{pp}

Mechanical Data

Control connection	5 pin male (Series 713)
Sensor connection	4 pin female (Series 712)
Enclosure	aluminum anodised

Environmental Conditions

Operating temp. range	$-25...+85$ °C
Specified temp. range	$0...+70$ °C
Storage temperature	$-40...+100$ °C
Protection class	IP 65
EMC	EN 61000-6-2 Immunity EN 61000-6-3 Emission



Order Code

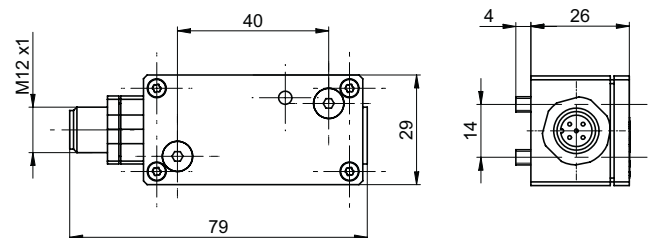
DABU AD2T-FB



Gain

0.50	0,50 mV/V = 0 - 10 V
1.00	1,00 mV/V = 0 - 10 V
1.25	1,25 mV/V = 0 - 10 V
2.00	2,00 mV/V = 0 - 10 V

Dimensions (mm)



Delivery Contents

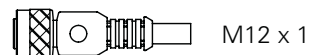
- Mounting screw 2 pcs. M4 x 30

Accessories (not included in delivery)



Series 713

Connector female, control side, 5-pin, Part No. 10135462
max. cable length 10 m



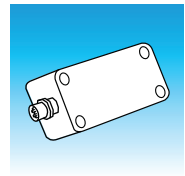
M12 x 1

Connector female with cable, control side, 5-pin

ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

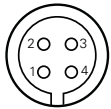
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)



Electrical Connection

Sensor side Series 712



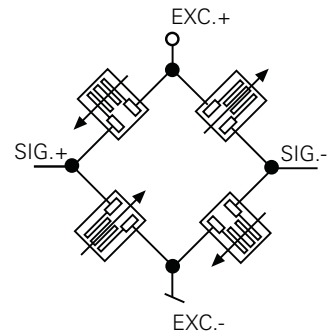
Pin	Signal
1	Full bridge EXC.+
2	Full bridge SIG.-
3	Full bridge SIG.+
4	Full bridge EXC.-

Control side Series 713

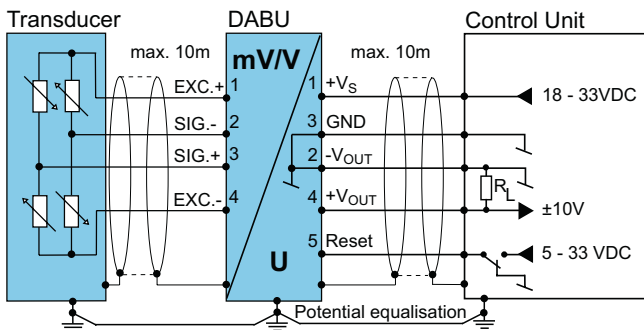


Pin number	Signal
1	+Vs
2	-V _{OUT}
3	GND
4	+V _{OUT}
5	Reset

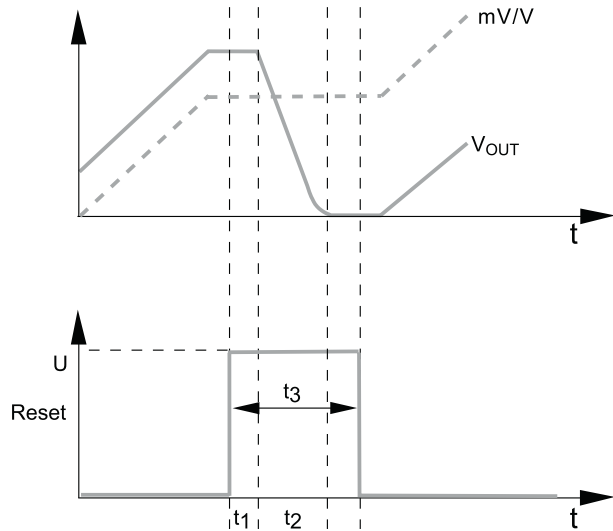
S/G Bridge



Control



Reset Function



V _{OUT}	Output signal
mV/V	Input signal
Reset	Reset input (active high)
t ₁	Reset delay (< 0,3 ms)
t ₂	Reset time (< 5 ms)
t ₃	Reset impuls (> 1 ms)

Bridge Amplifier for Strain Gage Full Bridge

DABI AD2T-FB

Features

- Industrial bridge amplifier for S/G full bridge
- For cyclical and static applications with reset function
- Current output
- Protection class IP 65
- Analog signal path



Electrical Data

Output signal	4 - 20 mA calibrated	
Characteristic curve deviation	0.25 < 0,5%	1.00 < 0,2%
	0.50 < 0,25%	2.00 < 0,2%
Supply voltage range	14 - 33 VDC	
Current draw	< 90 mA	
	< 70 mA @ 24 VDC	
Bridge excitation	approx. 7 VDC	
S/G bridge resistance	≥ 350 Ω	
Burden	< 500 Ω	
Tare accuracy	0.25 < 30 μA	
	0.50 < 20 μA	
	1.00 < 16 μA	
	2.00 < 16 μA	
Reset input	active	5 - 33 VDC < 2 mA
	inactive	< 1 VDC
Tare range	±6 mV/V	
Reset puls	> 1 ms	
Reset settle time	< 5 ms	
Frequency range (-3 dB)	1'000 Hz	
Noise	(0 ... 5 kHz)	
	0.25 < 15 μA _{pp}	
	0.50 < 7,5 μA _{pp}	
	1.00 < 5 μA _{pp}	
		2.00 < 5 μA _{pp}

Mechanical Data

Control connection	5 pin male (Series 713)
Sensor connection	4 pin female (Series 712)
Enclosure	aluminum anodised

Environmental Conditions

Operating temp. range	-25...+85 °C
Specified temp. range	0...+70 °C
Storage temperature	-40...+100 °C
Protection class	IP 65
EMC	EN 61000-6-2 Immunity
	EN 61000-6-3 Emission

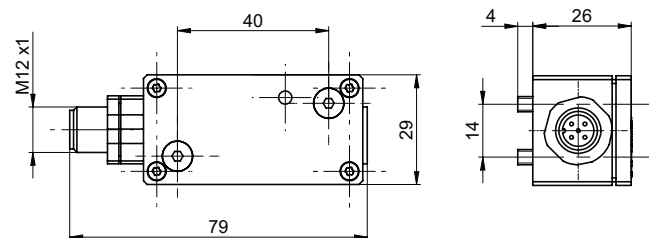
Order Code

DABI AD2T-FB

Gain

0.50	0,50 mV/V = 4 - 20 mA
1.00	1,00 mV/V = 4 - 20 mA
2.00	2,00 mV/V = 4 - 20 mA

Dimensions (mm)



Delivery Contents

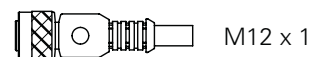
- Mounting screw 2 pcs. M4 x 30

Accessories (not included in delivery)



Series 713

Connector female, control side, 5-pin, Part No. 10135462
max. cable length 20 m



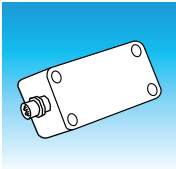
M12 x 1

Connector female with cable, control side, 5-pin

ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

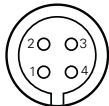
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)



Electrical Connection

Sensor side Series 712



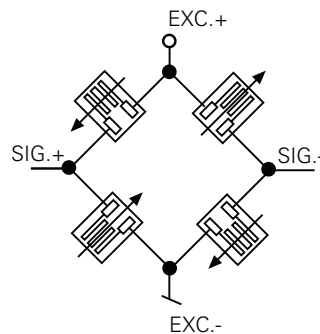
Pin	Signal
1	Full bridge EXC.+
2	Full bridge SIG.-
3	Full bridge SIG.+
4	Full bridge EXC.-

Control side Series 713

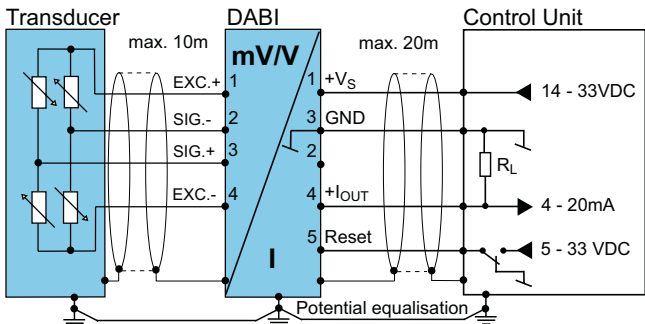


Pin number	Signal
1	+Vs
2	n.c.
3	GND
4	+I _{OUT}
5	Reset

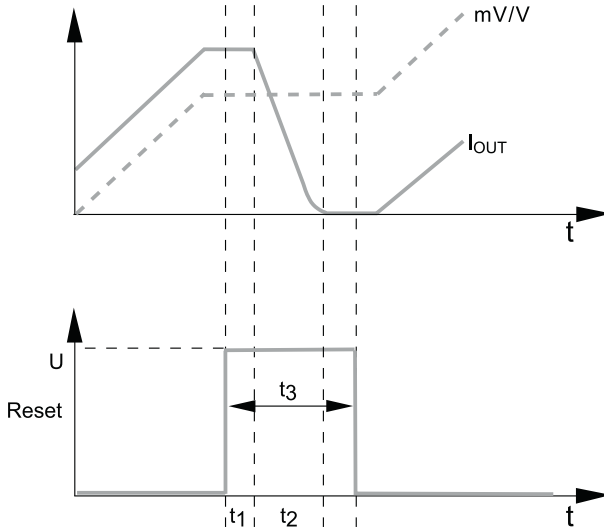
S/G Bridge



Control



Reset Function



I _{OUT}	Output signal
mV/V	Input signal
Reset	Reset input (active high)
t ₁	Reset delay (< 0,3 ms)
t ₂	Reset time (< 5 ms)
t ₃	Reset impuls (> 1 ms)

Bridge Amplifier, Selectable Configuration DABU MP4M

Features

- S/G Bridge amplifier
- Selectable bridge configuration
- Limit switches with switching output
- Peak value
- Double-line display
- Voltage output
- Digital signal path



Electrical Data

Output signal	± 10 V calibrated load > 10 k Ω
Resolution	< 0,035% FS
Measuring accuracy	< 0,15% v.E.
Supply voltage range	15 - 33 VDC
Current consumption	< 120 mA
Bridge excitation	5 VDC
Bridge completion resistors	350 Ω
Zero reset active	< ± 10 mV
Reset input galvanically separated	active 5 - 33 VDC inactive < 1 VDC
Taring range	± 6 mV/V
Reset pulse	< 1 ms
Holding time	< 5 ms
Reset/operate offset	< ± 10 mV
Scanning rate	> 1 ms
Frequency range (3 dB)	300 Hz
Display refresh rate	2/sec
Switching hysteresis limit switches	< 0,5% FS
Max. load limit switches	max. 50 mA
Signal polarity	selectable

Mechanical Data

Control connection	13 pin terminal block
Sensor connection	13 pin terminal block
Shield connection	2 pin terminal block
Enclosure material	aluminum/plastic

Environmental Conditions

Operating temp. range	0...+65 °C
Storage temperature	-20...+80 °C
Protection class	IP 40

Order Code

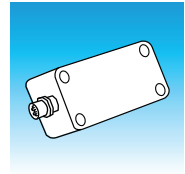
DABU MP4M-FC-

Gain

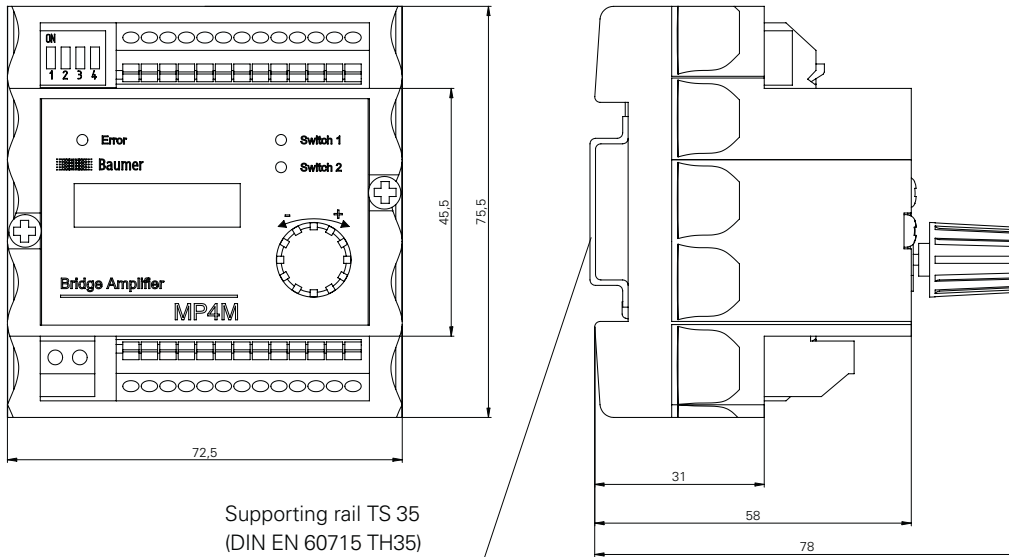
0.50 = 0,50 mV/V= 0-10 V
0.75 = 0,75 mV/V= 0-10 V
1.00 = 1,00 mV/V= 0-10 V
1.25 = 1,25 mV/V= 0-10 V
2.00 = 2,00 mV/V= 0-10 V

Delivery Contents

- Clamping clip for ground connection



Dimensions (mm)



Electrical Connections

Pin assignment sensor side

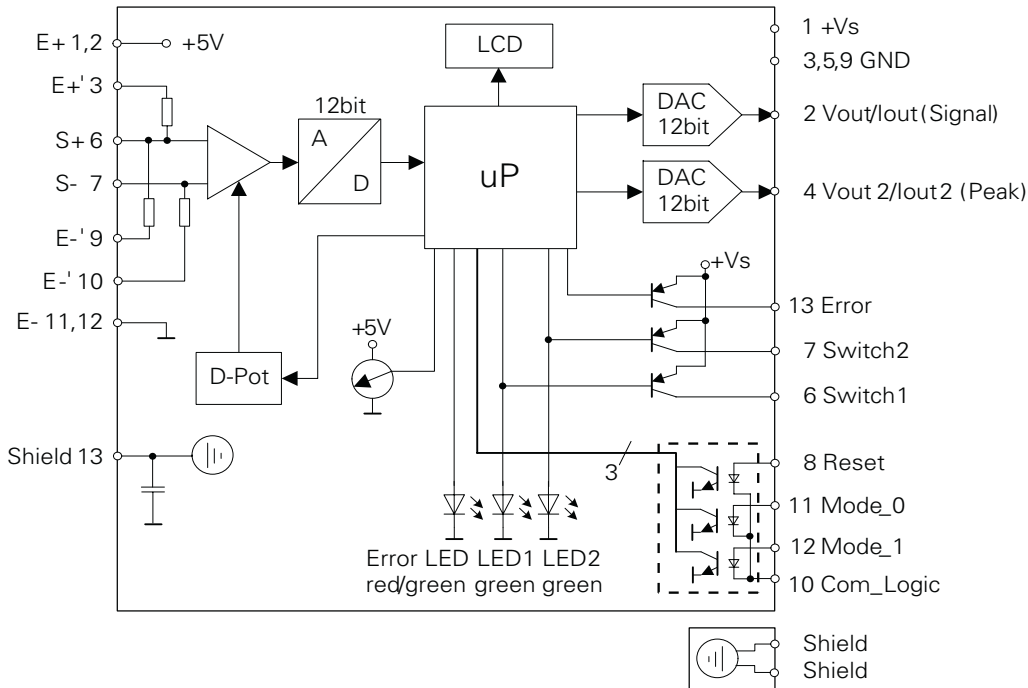
Pin	Signal	Description
1	+E	+bridge excitation
2	+E	+bridge excitation
3	+E'	bridge to completion resistor
4	n.c.	
5	n.c.	
6	+S	+ signal input
7	-S	- signal input
8	n.c.	
9	-E'	bridge to completion resistor
10	-E'	bridge to completion resistor
11	-E	- bridge excitation
12	-E	- bridge excitation
13	Shield	

Pin assignment control side

Pin	Signal	Description
1	+Vs	+supply voltage
2	Vout1/lout 1	output signal
3	GND	-supply voltage
4	Vout2/lout2 (peak value)	analog output
5	GND	signal reference
6	switch S1	output 1
7	switch S2	output 2
8	Reset	Taring of output signal
9	GND	signal reference
10	Comm_Logic	logical reference
11	Mode_0	mode 0
12	Mode_1	mode 1
13	Error	output

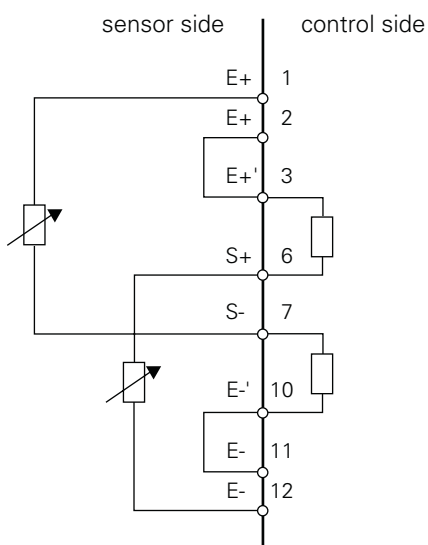
Bridge Amplifier, Selectable Configuration DABU MP4M

Electrical Connections

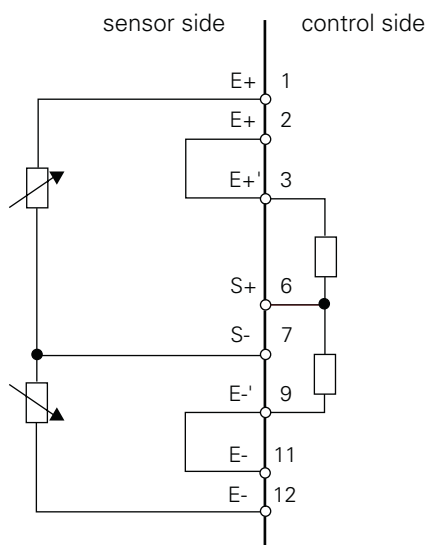


S/G Bridge

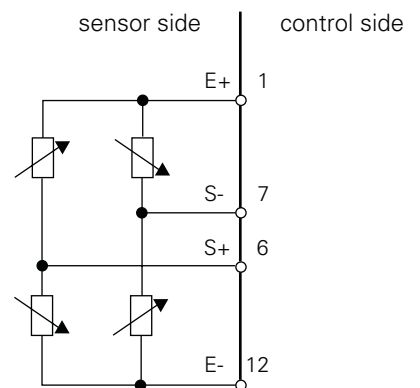
2 x 1/4-bridge (diagonal)

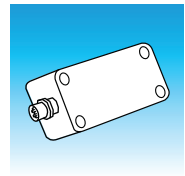


half bridge

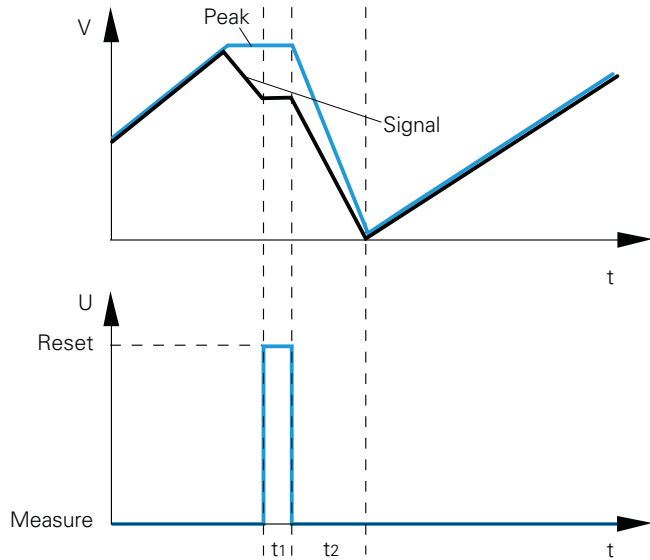


full bridge



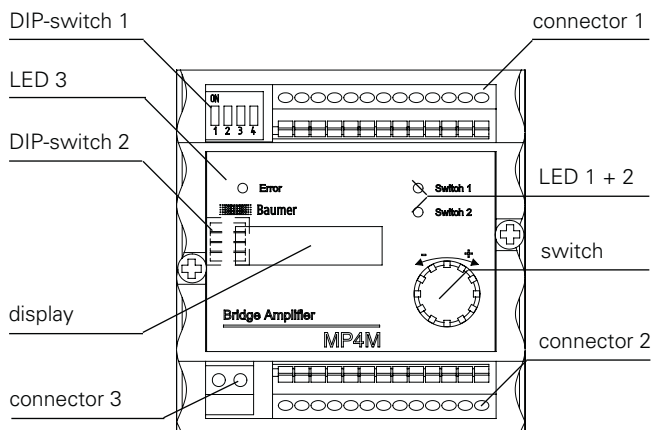


Reset Function



V	Output signal resp. peak signal
Reset	Reset input (active high)
t_1	Reset pulse (> 1 ms)
t_2	Reset holding time after Reset-Pulse (< 5 ms)

Control Element



DIP-Switch 1	Selection of display
Connector 1	Connection sensor side
LED 3	Error display
LED 1 + 2	Limit value (active/inactive)
DIP-Switch 2	Reset (active/inactive); signal polarity
Switch	For limit value adjustment
Connector 3	Shield connection
Connector 2	Control side connection
Display	Double-line LC-display with back ground lighting

Display box



Product Key Display box



The correct order code must be taken from the corresponding data sheet.

Display box

DDBF 2-SC

Product Description

DDB = Display box

Sensor Input

F = Free Configuration

Number of Channels

2 = 2-channels

4 = 4-channels

Change-Over Displays

SC = Display box for Strain Rings

Summary Display box



DDBF 2-SC



- 2-channel display box for strain rings DSRC
- Metered value display of every sensor, Average and peak value of both sensors
- Bending measurement through strain gauge display
- Including analysis software *InspectMaster*

Page 7.4

DDBF 4-SC



- 4-channel display box for strain rings DSRC
- Measurement display of every active channel
- Display of peak value, average value or sum
- Including analysis software *InspectMaster*

Page 7.6

Display box, 2-channel DDBF 2-SC

Features

- 2-channel display box for strain rings DSRC
- Measurement value of each sensor, Average and peak value of both sensors
- Bending measurement by individual S/G display
- A/C or Battery operation
- Display in $\mu\epsilon$, kN, t
- 2 analog outputs
- Reset with keypad or *InspectMaster*

Electrical Data

Connection	2 channels for 2 x 1/4 S/G bridge (350 Ω)
Display	Sensor A or B peak value, average value
Measuring range	$\pm 1000 \mu\epsilon$ (calibrated)
Resolution	1 $\mu\epsilon$
Characteristic curve deviation	< 0,25% FS
Reset/operate offset	< $\pm 0,1\%$ FS
Bridge completion resistors R _c	350 Ω
Reset	Zeroing is performed by pressing the reset button or by the software <i>InspectMaster</i>
Measuring rate	<i>InspectMaster</i> / analog output 250/sec
Analog output	± 1 V calibrated at $\pm 1000 \mu\epsilon$
Display refresh rate	2/sec
Battery	Maintenance-free Li-Ion battery
USB connection	USB 2.0, type B

Mechanical Data

Sensor connection	4 pin Binder (series 712)
Enclosure	Aluminum, lacquered

Environmental Conditions

Operating temp. range	+5...+50 °C
Storage temperature	-20...+60 °C
Protection class	IP 40



Order Code

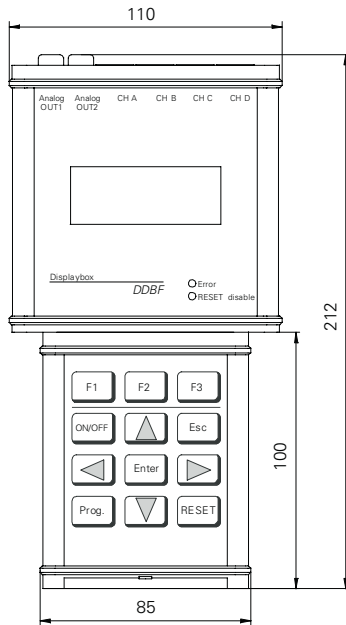
DDBF 2-SC

Delivery Contents

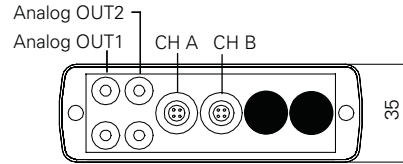
- Display box
- Power adapter (100 - 240 VAC)
- Software *InspectMaster*
- USB connecting cable
- Ground connection cable with clip



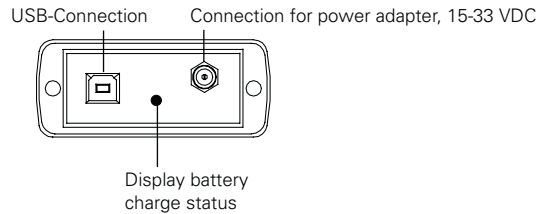
Dimensions (mm)



View Connector Side

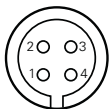


View Bottom Side, under the top cover



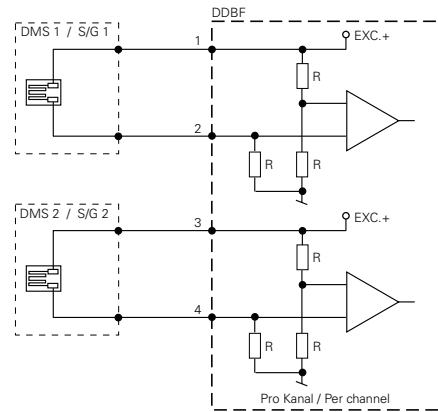
Electrical Connections

Sensor connection

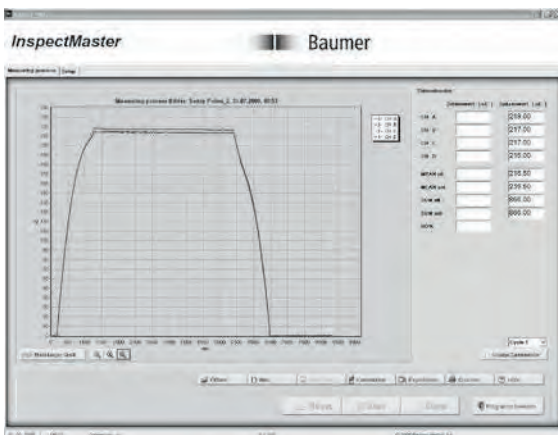


Pin	Signal	
1	S/G 1	EXC.+
2	S/G 1	SIG.-
3	S/G 2	EXC.+
4	S/G 2	SIG.-

S/G Bridge



Analysis Software *InspectMaster*



Functions:

- Display in μe , N, kN, t
- Display of deviation of tie bar load distribution in %
- Cycle function with auto reset mode
- Display of graphs
- Saving of measured data
- Export function (Text file may be exported and processed in Excel)

Requirements:

- PC with Windows, 2000, NT, XP
- minimum 500 MHz and USB interface required

Display box, 4-channel DDBF 4-SC

Features

- 4-channel display box for strain rings DSRC
- Contemporaneous measurement and display of 4 channels
- A/C or Battery operation
- Display in $\mu\epsilon$, kN, t
- 2 analog outputs
- Reset with keypad or *InspectMaster*



Electrical Data

Connection	4 channels for 2 x 1/4 S/G bridge (350 Ω)
Display	Average / peak value or sum / peak value of the activated channels
Measuring range	$\pm 1000 \mu\epsilon$ (calibrated)
Resolution	1 $\mu\epsilon$
Characteristic curve deviation	< 0,25% FS
Reset/operate offset	< $\pm 0,1\%$ FS
Bridge completion resistors Rc	350 Ω
Reset	Zeroing is performed by pressing the reset button or by the software <i>InspectMaster</i>
Measuring rate	<i>InspectMaster</i> / analog output 250/sec
Analog output	± 1 V calibrated at $\pm 1000 \mu\epsilon$
Display refresh rate	2/sec
Battery	Maintenance-free Li-Ion battery
USB connection	USB 2.0, type B

Mechanical Data

Sensor connection	4 pin Binder (series 712)
Enclosure	Aluminum, lacquered

Environmental Conditions

Operating temp. range	+5...+50 $^{\circ}\text{C}$
Storage temperature	-20...+60 $^{\circ}\text{C}$
Protection class	IP 40

Order Code

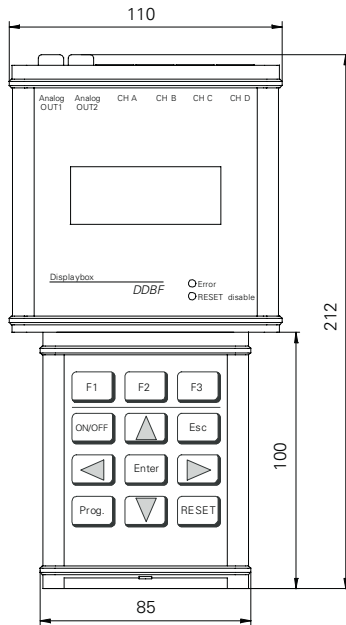
DDBF 4-SC

Delivery Contents

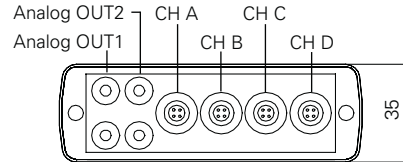
- Display box
- Power adapter (100 - 240 VAC)
- Software *InspectMaster*
- USB connecting cable
- Ground connection cable with clip



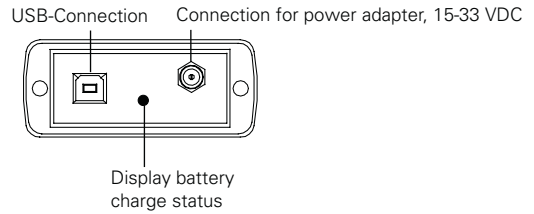
Dimensions (mm)



View Connector Side

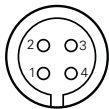


View Bottom Side, under the top cover



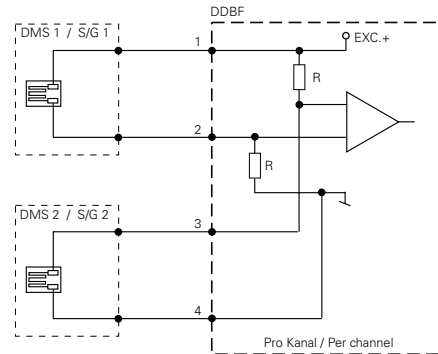
Electrical Connections

Sensor connection

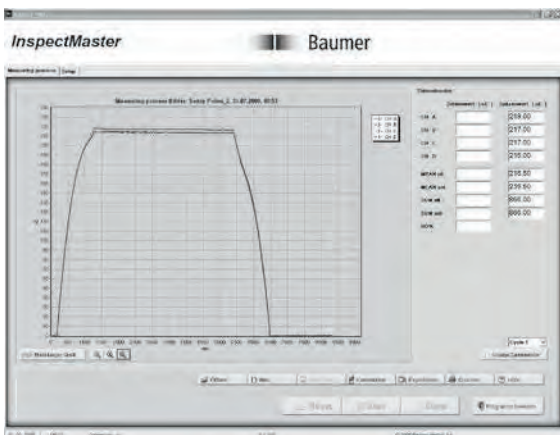


Pin	Signal
1	S/G 1 EXC,+
2	S/G 1 SIG.-
3	S/G 2 SIG.+
4	S/G 2 EXC.-

Bridge configuration per connector



Analysis Software *InspectMaster*



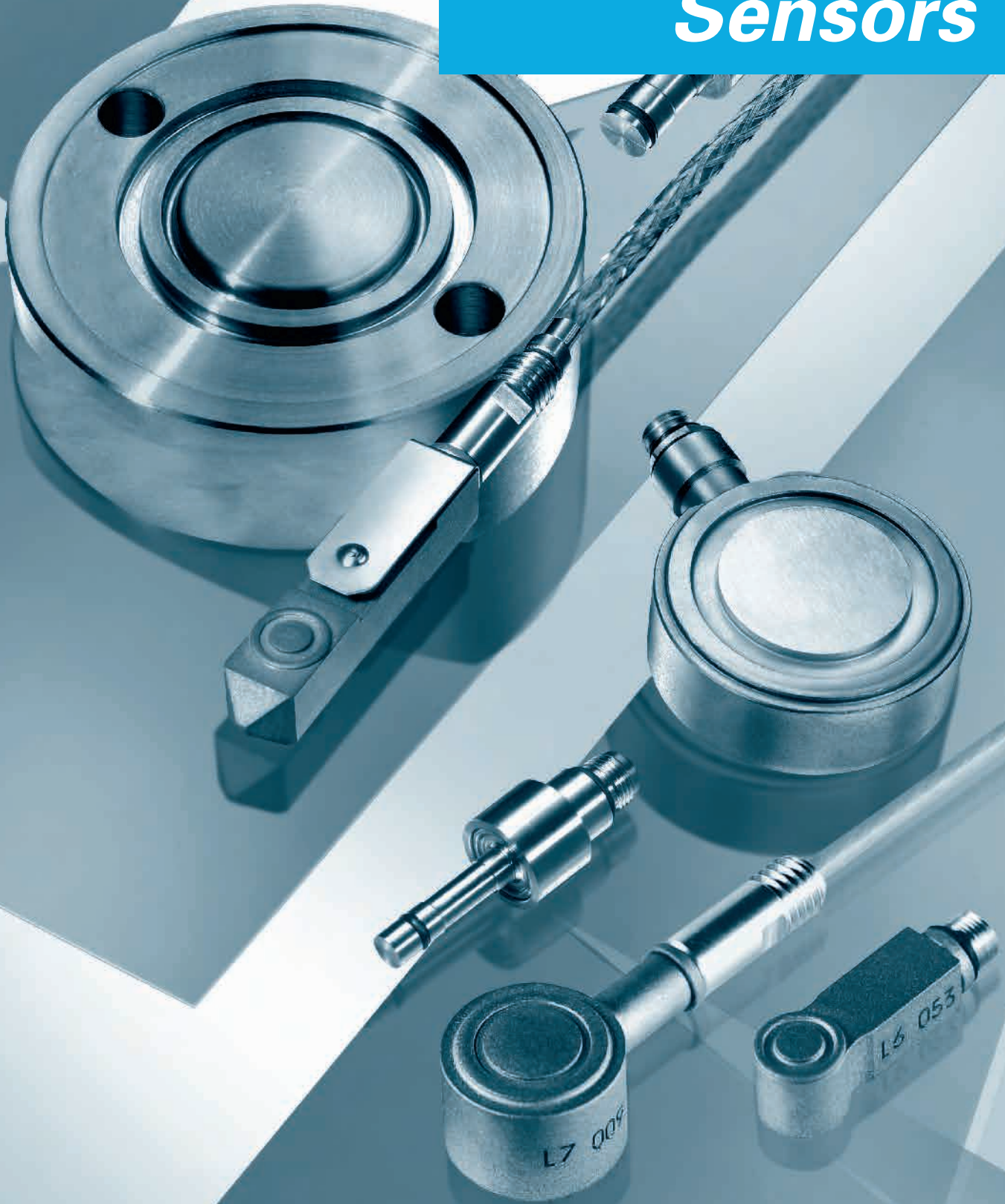
Functions:

- Display in $\mu\epsilon$, N, kN, t
- Display of deviation of tie bar load distribution in %
- Cycle function with auto reset mode
- Display of graphs
- Saving of measured data
- Export function (Text file may be exported and processed in Excel)

Requirements:

- PC with Windows, 2000, NT, XP
- minimum 500 MHz and USB interface required

Piezo Electric Sensors



Product Key

Piezo Electric Force and Strain Sensors



The correct order form must be taken from the corresponding data sheet.

Force sensors

DLPP 6MO-2.5-4.4

Product Description

DLPP = Piezo electric force sensor

Series

- 8MO** = Micro sensor, 0,8 cable
- 6MO** = Miniature sensor, connector with thread M4 x 0,35
- 7MO** = Circular shape, connector with thread M4 x 0,35
- 4MO** = Circular shape, connector with thread UNF 10 – 32

Nom. Capacity

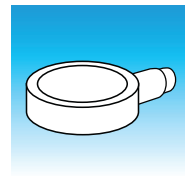
- 0.3** = 250 N
- 2.5** = 2,5 kN
- 010** = 10 kN
- 030** = 30 kN





Nominal Sensitivity

- Example
- 4.4** = 4,4 pC/N

Summary

Piezo Electric Force and Strain Sensors



<p>DLPP 8MO</p> 	<ul style="list-style-type: none"> • Quartz micro force sensor • Capacity 0...+250 N • 0,8 m cable • Sensor diameter 3,5 mm 	<p>Page 8.4</p>
<p>DLPP 6MO</p> 	<ul style="list-style-type: none"> • Quartz miniature force sensor • Capacity 0...+2,5 kN • Connector thread M4 x 0,35 • Sensor diameter 6 mm 	<p>Page 8.5</p>
<p>DLPP 7MO</p> 	<ul style="list-style-type: none"> • Quartz force sensor • Capacity 0...+10 kN • Connector thread M4 x 0,35 • Sensor diameter 12,6 mm 	<p>Page 8.6</p>
<p>DLPP 4MO</p> 	<ul style="list-style-type: none"> • Quartz force sensor • Capacity 0...+30 kN • Connector thread 10 - 32 UNF • Sensor diameter 25 mm 	<p>Page 8.7</p>

Cavity force sensor 0...250 N

DLPP 8MO



Features

- 250 N quartz micro force sensor
- To measure dynamic forces
- Welded construction
- available with or without connector



Technical Data

Method	Piezo electric; quartz
Measuring range	0...250 N
Max. allowable load	300 N
Nom. sensitivity	$> = 10$ pC/N
Linearity	$< \pm 2\%$ v.E.
Capacitance w/o cable	< 50 pF
Insulation resistance at 20°C	$> 10^{12} \Omega$
Insulation resistance at 150 °C	$> 10^{11} \Omega$

Mechanical Data

Material	Stainless steel
----------	-----------------

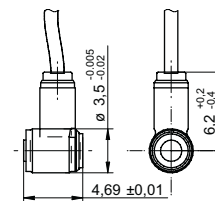
Environmental Conditions

Operating temp. range	0...+200 °C
Storage temperature	-40...+150 °C

Order Code

DLPP 8MO-0.3-010
DLPP 8MO-0.3-010/MF (cable version)

Dimensions (mm)



Delivery Contents

- Calibration sheet

Accessories

Mounting plate and screws for MF Typ DZPC HPFC
Mounting plate Fischer connector (for DLPP 8MO-0.3-010/MF)

Cavity force sensor 2,5 kN

DLPP 6MO



Features

- 2,5 kN miniature quartz force sensor
- Extremely small size
- To measure dynamic forces
- Welded construction
- With connector



Technical Data

Method	Piezo electric; quartz
Measuring range	0...+2,5 kN
Max. allowable load	3 kN
Nom. sensitivity	-4,4 pC/N
Linearity	< 1% FS
Capacitance w/o cable	< 50 pF
Insulation resistance at 20°C	> 10 ¹² Ω
Insulation resistance at 150 °C	> 10 ¹¹ Ω

Mechanical Data

Connector thread	M4 x 0,35
Material	Stainless steel

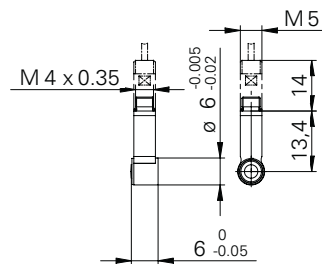
Environmental Conditions

Operating temp. range	0...+150 °C
Storage temperature	-40...+150 °C
Protection incl. cable	IP 65

Order Code

DLPP 6MO-2.5-4.4

Dimensions (mm)



Delivery Contents

- Calibration sheet

Accessories

Connecting Cable

- DZCC xxxx-ST-MF
- DZCC xxxx-HT-MF
- DZCC xxxx-ST-MB

Cavity force sensor 10 kN

DLPP 7MO



Features

- 10 kN quartz force sensor
- Small size
- To measure dynamic and quasi static forces
- Welded construction
- With connector

Technical Data

Method	Piezo electric; quartz
Measuring range	0...+10 kN
Max. allowable load	12 kN
Nom. sensitivity	-2,2 pC/N
Linearity	< 1% FS
Capacitance w/o cable	< 50 pF
Insulation resistance at 20°C	> 10 ¹² Ω
Insulation resistance at 150 °C	> 10 ¹¹ Ω

Mechanical Data

Connector thread	M4 x 0,35
Material	Stainless steel

Environmental Conditions

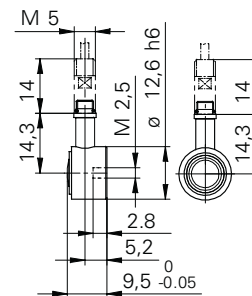
Operating temp. range	0...+150 °C
Storage temperature	-40...+150 °C
Protection incl. cable	IP 65

Order Code

DLPP 7MO-010-2.2



Dimensions (mm)



Delivery Contents

- Calibration sheet

Accessories

Connecting Cable

DZCC xxxx-ST-MF
DZCC xxxx-HT-MF
DZCC xxxx-ST-MB

Cavity force sensor 30 kN

DLPP 4MO



Features

- 30 kN quartz force sensor
- Compact size
- To measure dynamic and quasi static forces
- Welded construction
- With connector

Technical Data

Method	Piezo electric; quartz
Measuring range	0...+30 kN
Max. allowable load	36 kN
Nom. sensitivity	-4,4 pC/N
Linearity	< 1% FS
Capacitance w/o cable	< 50 pF
Insulation resistance at 20°C	> 10 ¹² Ω
Insulation resistance at 150 °C	> 10 ¹¹ Ω

Mechanical Data

Connector thread	UNF 10-32
Material	Stainless steel

Environmental Conditions

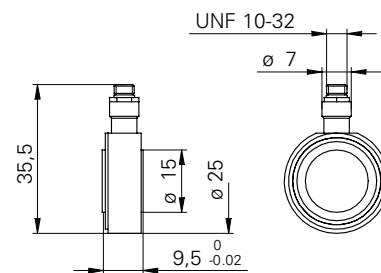
Operating temp. range	0...+150 °C
Storage temperature	-40...+150 °C
Protection incl. cable	IP 65

Order Code

DLPP 4MO-030-4.4



Dimensions (mm)



Delivery Contents

- Calibration sheet

Accessories

Connecting Cable

DZCC xxxx-78-UB

Product Key

Cavity Pressure Sensors



The correct order description must be taken from the corresponding data sheet.

DPPC DS04.0-9.4 /CS1

Product Description

DPPC = Cavity pressure sensor

Method

D = Direct cavity pressure measurement

Version

S = Standard

Size

02.5 = 2,5 mm diameter sensor front

04.0 = 4 mm diameter sensor front

Nominal Sensitivity

For direct cavity pressure measurement in pC/bar
For indirect cavity pressure measurement in pC/N

2.0 = 2 pC/bar

5.0 = 5 pC/bar

9.4 = 9,4 pC/bar

Options



/CS1 = Uniform sensitivity $\pm 1\%$

/TP = Rotation prevention

Summary

Cavity Pressure Sensors



DPPC DS02.5 	<ul style="list-style-type: none">• Cavity pressure sensor for direct measurement• Capacity 0...2000 bar• Connector thread M4 x 0,35• Sensor diameter 2,5 mm	Page 8.10
DPPC DS04.0 	<ul style="list-style-type: none">• Cavity pressure sensor for direct measurement• Capacity 0...2000 bar• Connector thread M4 x 0,35• Sensor diameter 4 mm	Page 8.12

Cavity Pressure Sensor

2000 bar

DPPC DS02.5

Features

- For direct measuring
- Measuring range 0...2000 bar
- Connector thread M4 x 0,35
- Sensor diameter 2,5 mm



Technical Data

Method	Piezo electric; quartz
Range	0...2000 bar
Overload	2500 bar
Nom. sensitivity	-2,0 pC/bar
Linearity	< 1% FS
Natural frequency	> 80 kHz
Insulation resistance at 20°C	> 10 ¹² Ω
Insulation resistance at 200 °C	> 10 ¹¹ Ω

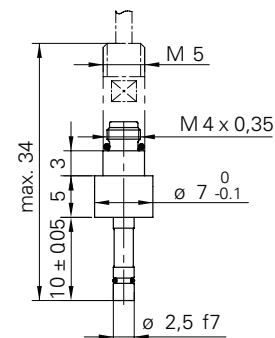
Mechanical Data

Connector thread	M4 x 0,35
Material enclosure	Stainless steel

Environmental Conditions

Operating temp. range	0...+200 °C
Storage temperature	-40...+200 °C
Melt temperature (at sensor front side)	< +400 °C
Protection incl. connector	IP 65

Dimensions (mm)



Delivery Contents

- Special nut DZPC MN04
- Calibration sheet

Order Code

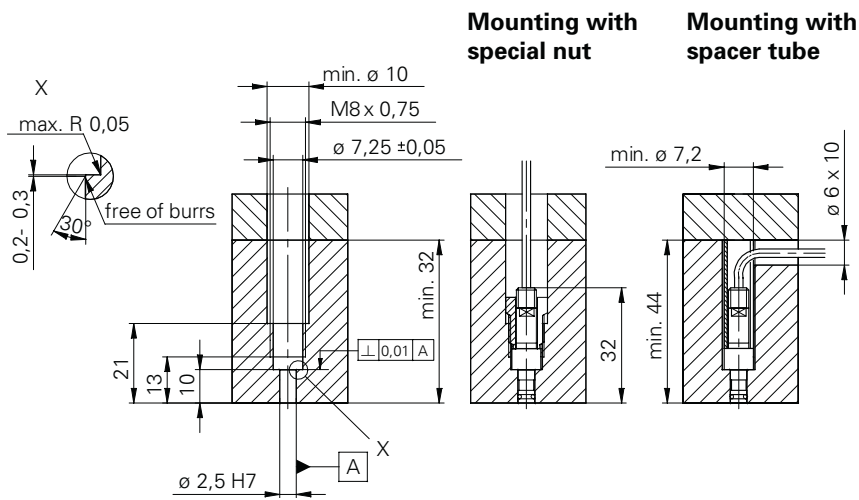
DPPC DS02.5-2.0/□□

Option

TP = Turning protection



Mounting Dimensions



Accessories

Sensor Cable

DZCC xxxx-ST-MF
DZCC xxxx-HT-MF

Mounting Accessories

DZPC MN04
DZPC MWPT
DZPC MT04

Description

Special nut
Mounting wrench
Spacer tube

Cavity Pressure Sensor

2000 bar

DPPC DS04.0

Features

- For direct measuring
- Measuring range 0...2000 bar
- Connector thread M4 x 0,35
- Sensor diameter 4 mm



Technical Data

Method	Piezo electric; quartz
Range	0...2000 bar
Overload	2500 bar
Nom. sensitivity	
DPPC DS04.0-5.0	-5,0 pC/bar ± 2%
DPPC DS04.0-9.4	-9,4 pC/bar ± 2%
DPPC DS04.0-9.4/CS	-9,4 pC/bar ± 1%
Linearity	< 1% FS
Natural frequency	> 100 kHz
Insulation resistance at 20°C	>10 ¹² Ω
Insulation resistance at 200 °C	>10 ¹¹ Ω

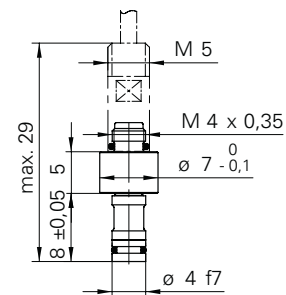
Mechanical Data

Connector thread	M4 x 0,35
Material enclosure	Stainless steel

Environmental Conditions

Operating temp. range	0...+200 °C
Storage temperature	-40...+200 °C
Melt temperature (at sensor front side)	< +400 °C
Protection incl. connector	IP 65

Dimensions (mm)



Delivery Contents

- Special nut DZPC MN04
- Calibration sheet

Order Code

DPPC DS04.0-/

Option

TP = Turning protection

CS1 = Uniform sensitivity 1%

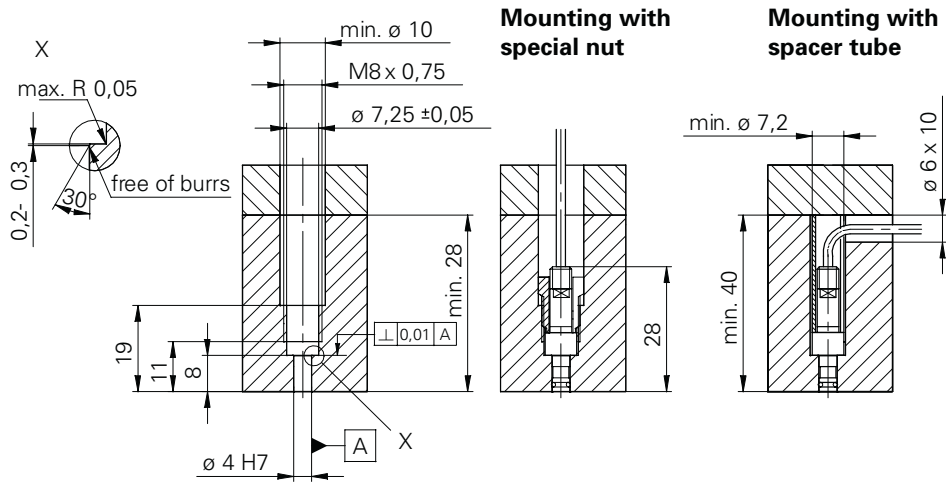
Nominal sensitivity

5.0 = -5,0 pC/bar

9.4 = -9,4 pC/bar



Mounting Dimensions



Accessories

Sensor Cable

DZCC xxxx-ST-MF
 DZCC xxxx-HT-MF

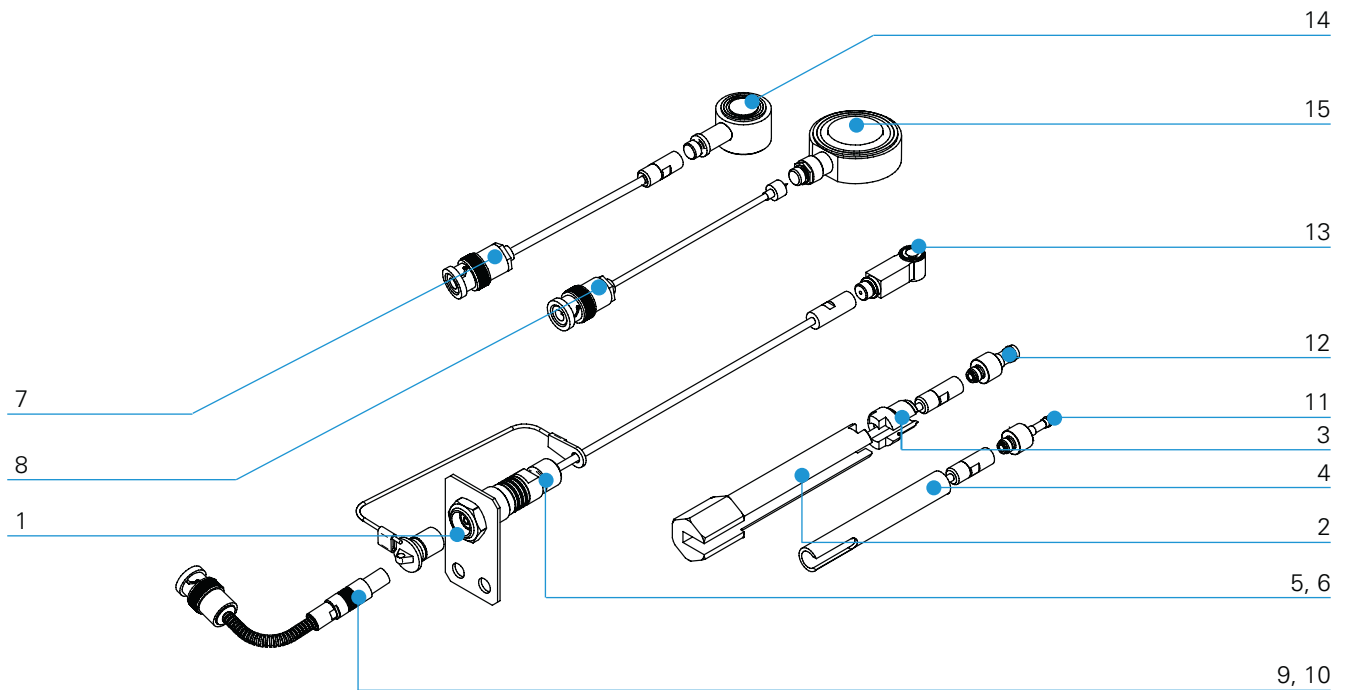
Mounting Accessories

DZPC MN04
 DZPC MWPT
 DZPC MT04

Description

Special nut
 Mounting wrench
 Spacer tube

Summary Accessories and Sensors



Pos.	Mounting Accessories	Type
1	Mounting equipment Fischer connector	DZPC HPFC
2	Mounting wrench	DZPC MWPT
3	Special nut for 2,5 / 4 mm cavity pressure sensor	DZPC MN04
4	Spacer tube for 2,5 / 4 mm cavity pressure sensor	DZPC MT04

Pos.	Cable	Type
5	Sensor cable 0...+200 °C M4 x 0,35 - Fischer	DZCC ... -ST-MF
6	Sensor cable 0...+220 °C M4 x 0,35 - Fischer	DZCC ... -HT-MF
7	Sensor cable M4 x 0,35 - BNC	DZCC ... -ST-MB
8	Sensor cable UNF 10-32 - BNC	DZCC ... -78-UB
9	Connecting cable Fischer - BNC	DZCC ... -04-FB
10	Connecting cable Fischer - BNC with protecting tube	DZCC ... -HT-FB

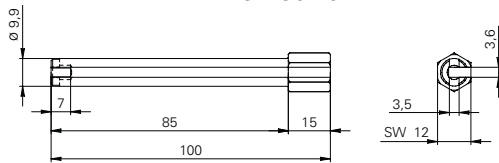
Pos.	Sensors	Type
11	Cavity pressure sensor \varnothing 2,5 mm	DPPC DS02.5-2.0
12	Cavity pressure sensor \varnothing 4,0 mm	DPPC DS04.0-x.x
13	Miniature force sensor 2,5 kN	DLPP 6MO-2.5-4.4
14	Force sensor 10 kN	DLPP 7MO-010-2.2
15	Force sensor 30 kN	DLPP 4MO-030-4.4

Mounting Accessories



DZPC MWPT

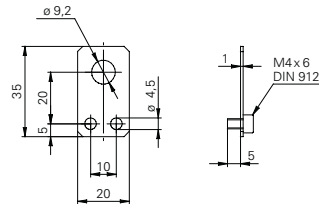
Mounting wrench for DPPC DS02.5
DPPC DS04.0



Mat.: 1.4305

DZPC HPFC

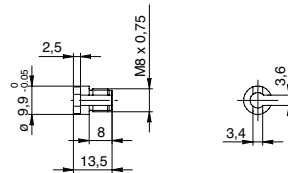
Mounting plate Fischer connector



Mat.: 1.4305

DZPC MN04

Special nut for DPPC DS02.5
DPPC DS04.5

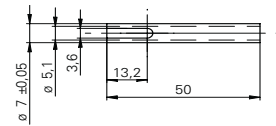


Mat.: 1.4305

DZPC MT04

Spacer tube for DPPC DS02.5 (MT04)
DPPC DS04.0 (MT04)

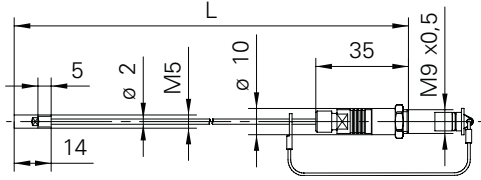
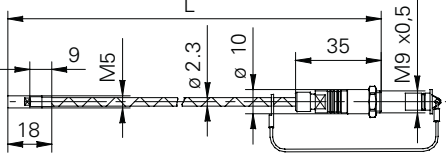
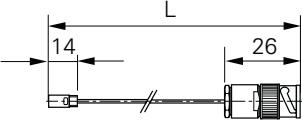
Mat.: 1.4305



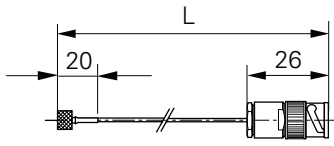
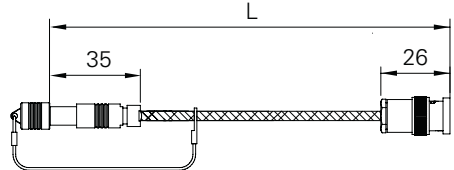
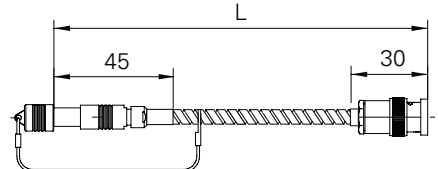
Cables

DZCC

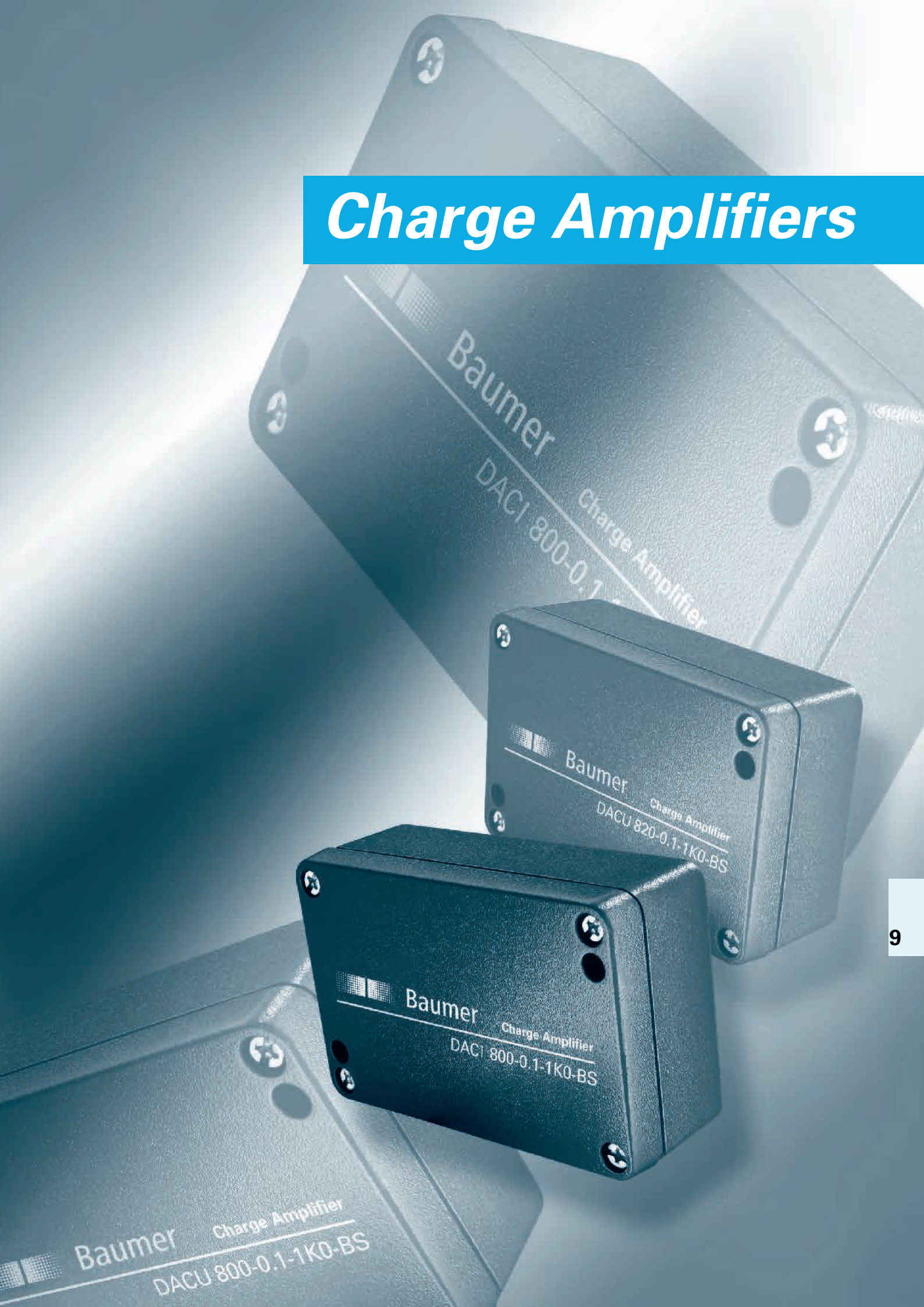


Sensor Cable		DZCC ...- ST-MF	
L [mm]	Order code	Connector	Connector
200	DZCC 0200-ST-MF	M4 x 0,35	
400	DZCC 0400-ST-MF		
600	DZCC 0600-ST-MF		
1000	DZCC 1000-ST-MF		
Custom length	DZCC xxxx-ST-MF		
Technical data			
Cable	Coax, Low Noise, PTFE/PFA	Delivery contents • Mounting plate Fischer connector DZPC HPFC	
Color	blue		
Impedance	50 Ω		
Cable-ø	2 mm		
Bending radius	R5		
Operating temp. range	0...+200°C		
		Fischer Type KE 102 A014	
Sensor Cable		DZCC ...- HT-MF	
L [mm]	Order code	Connector	Connector
200	DZCC 0200-HT-MF	M4 x 0,35	
400	DZCC 0400-HT-MF		
600	DZCC 0600-HT-MF		
1000	DZCC 1000-HT-MF		
Custom length	DZCC xxxx-HT-MF		
Technical data			
Cable	Coax, Low Noise, PTFE/PFA	Delivery contents • Mounting plate Fischer connector DZPC HPFC	
Color	steel sheathed		
Impedance	50 Ω		
Cable-ø	2, 4 mm		
Bending radius	R8		
Operating temp. range	0...+220°C		
		Fischer Type KE 102 A014	
Sensor Cable		DZCC ...- ST-MB	
L [mm]	Order code	Connector	Connector
1000	DZCC 1000-ST-MB	M4 x 0,35	
2000	DZCC 2000-ST-MB		
Custom length	DZCC xxxx-ST-MB		
Technical data		BNC	
Cable	Coax, Low Noise, PTFE/PFA		
Color	blue		
Impedance	50 Ω		
Cable-ø	1,9 mm		
Bending radius	R5		
Operating temp. range	0...+200°C		



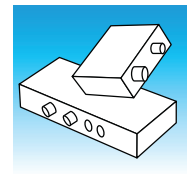
Sensor Cable		DZCC ...-78-UB	
L [mm]	Order code	Connector	Connector
1000	DZCC 1000-78-UB	UNF 10 - 32	
2000	DZCC 2000-78-UB		
3000	DZCC 3000-78-UB		
Tailor made	DZCC xxxx-78-UB		
Technical data			
Cable	Coax 178 RG		BNC
Color	brown		
Impedance	50 Ω		
Cable-ø	1,8 mm		
Bending radius	R10		
Operating temp. range	0...+200°C		
Connecting Cable		DZCC ...-04-FB	
L [mm]	Order code	Connector	Connector
2000	DZCC 2000-04-FB	Fischer Type S 102 A014	
4000	DZCC 4000-04-FB		
5000	DZCC 5000-04-FB		
Custom length	DZCC xxxx-04-FB		
Technical data			
Cable	Triax, Low Noise, PTFE/PFA		BNC
Color	transparent		
Impedance	50 Ω		
Cable-ø	3,4 mm		
Bending radius	R10		
Operating temp. range	0...+200°C		
Connecting Cable DZCC ...-HT-FB		DZCC ...-HT-FB	
L [mm]	Order code	Connector	Connector
2000	DZCC 2000-HT-FB	Fischer Type S 102 A014	
4000	DZCC 4000-HT-FB		
5000	DZCC 5000-HT-FB		
Custom length	DZCC xxxx-HT-FB		
Technical data			
Cable	Triax, Low Noise, PTFE, PFA		BNC
Color	metal sheath		
Impedance	50 Ω		
Cable-ø	5 mm		
Bending radius	R30		
Operating temp. range	0...+220 °C		

Charge Amplifiers



Product Key

Charge Amplifiers



The correct order code must be taken from the corresponding data sheet.

Charge Amplifiers

DACU 800-0.1-1K0BS

Product Description

DAC = Charge Amplifier

Output

U = Voltage output ± 10 V

Series

800 = 1 Analog output, 14 ranges

820 = 2 Analog outputs, 4 ranges every

Smallest measuring range

Example:

0.1 = 100 pC / 10 V

Largest measuring range

Example:

1K0 = 1'000'000 pC / 10 V

Input Connection

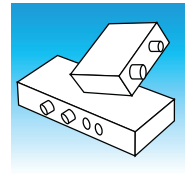
B = BNC

Output Connection

S = 25 Pin D-Sub

Summary

Charge Amplifiers



DACU 800



- Charge amplifier for piezo electric sensors
- 14 selectable ranges
- Peak value
- 2 limit switches with switching outputs
- RS 232 interface

Page 9.4

DACU 820



- Charge amplifier for piezo electric strain sensors
- 2 analogue outputs
- 4 selectable ranges
- Peak value storage
- 2 limit switches with switching output
- RS 232 interface

Page 9.8

Charge amplifiers convert the electrical charges (pC), which are emitted by piezo electric sensors, into a proportional output voltage. This output signal can then be further processed.

Charge Amplifier DACU 800

Features

- Multi-range charge amplifier for industrial application
- 14 selectable ranges
- 13 fixed ranges 100 pC - 1'000'000 pC
- 1 variable range 100 pC - 1'000'000 pC
- Adjustable limit value with switching output
- Peak value
- RS 232 serial interface

Electrical Data

Voltage supply	15...35 VDC
Current draw	< 70 mA
Measuring range	$\pm 100 \dots 1'000'000$ pC
Output signal	± 10 V
Characteristic curve deviation	< 1% FS
Linearity	< 0,02% FS
Output offset	< ± 5 mV
Noise voltage	< 5 mVpp (0,1 Hz... 100 kHz) < 30 mVpp at 100 pC range
Output impedance	10 Ω
Reset operate offset	electronically compensated
Drift	< 0,03 pC/s ⁽²⁾
Frequency range (-3 dB)	0...20 kHz ⁽¹⁾
Control input	± 5 V... ± 45 V, galv. separated
Switching output	max. 45 V, max. 100 mA galv. separated

⁽¹⁾ @ 100 pC...1'000'000 pC; > 2 kHz @ 1'000'000 pC

⁽²⁾ DACU at least 30 min. attached to operational voltage

All specifications at ambient temperature (23°C \pm 2°C)

Mechanical Data

Control connection	25 pin D-Sub
Sensor connection	BNC male
Enclosure material	Aluminum die cast

Environmental Conditions

Operating temp. range	-5...+60 °C
Storage temperature	-20...+80 °C
Protection class	IP 40
EMC	EN 61000-6-2 immunity EN 61000-6-4 emission



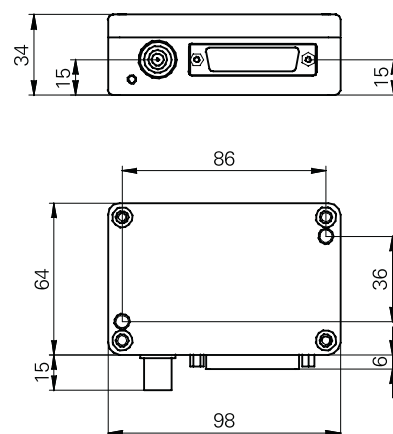
Order Code

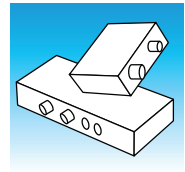
DACU 800-0.1-1K0BS

Included

- Mounting screws 2 pcs. M4 x 16

Dimensions (mm)

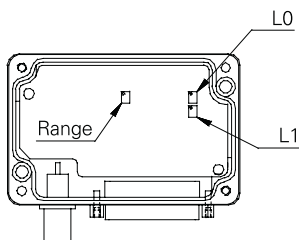




Electrical Connections D-Sub 25

Pin	Function
1	Signal out
2	Peak out
3	Level 1 (In or Out)
4	Level 0 (In or Out)
5	Range 3
6	Range 2
7	Range 1
8	Range 0
9	Supply GND
10	+Supply
11	Code 2
12	Code 0
13	Code Supply +
14	Signal GND
15	Alarm 1
16	Alarm 0
17	RX
18	TX
19	Com Logic Input
20	Operate
21	80% Test
22	Supply GND
23	NC
24	Code 1
25	Com Logic Output (Alarm)

Control Elements



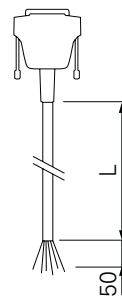
Range	Adjustment of variable range
L0	Adjustment of value 1. The limit switch voltage can be set with the potentiometer and has to be measured at pin 4. Alternatively a voltage can be supplied as well.
L1	Adjustment limit value 2. ditto, pin 3 only

Measuring Range Selection

Range				Measuring range
3	2	1	0	pC/10V
0	0	0	0	1'000'000
0	0	0	1	500'000
0	0	1	0	200'000
0	0	1	1	100'000
0	1	0	0	50'000
0	1	0	1	20'000
0	1	1	0	10'000
0	1	1	1	5'000
1	0	0	0	2'000
1	0	0	1	1'000
1	0	1	0	500
1	0	1	1	200
1	1	0	0	100
1	1	0	1	100'000...1'000'000
1	1	1	0	10'000...100'000
1	1	1	1	100...10'000

Accessories

Connecting cable with open end



Length(L)	Order code
5 m	DZCS 05/DACU 8

Charge Amplifier DACU 820

Features

- Multi-range charge amplifier for industrial application
- 4 selectable ranges channel 1
3 fixed ranges 100'000 pC - 500'000 pC
1 variable range 100'000 pC - 500'000 pC
- 4 fixed ranges channel 2
4 fixed ranges 2'000 pC - 20'000 pC
- Adjustable limit value with switching output
- Peak value and test function
- Serial RS 232 interface

Electrical Data

Voltage supply	10...40 VDC
Capacity draw	< 1,5 W ⁽¹⁾
Measuring range channel 1	$\pm 100'000...500'000$ pC
Measuring range channel 2	$\pm 2'000...20'000$ pC
Output signal	± 10 V
Characteristic curve deviation	< 1% FS
Linearity	< 0,02%FS
Output offset	< ± 5 mV
Noise voltage	< 5 mVpp (0,1 Hz... 100 kHz) ⁽²⁾
Output impedance	10 Ω
Reset operate offset	< ± 10 mV
Drift	< 0,03 pC/s at 23 °C ⁽³⁾
Frequency range (-3 dB)	0...20 kHz ⁽⁴⁾
Control input	± 5 V... ± 45 V, galv. separated
Switching output	max. 45 V, max. 100 mA galv. separated

⁽¹⁾ < 55 mA at 24 V

⁽²⁾ < 20 mVpp in the 2000 pC range

⁽³⁾ DACU at least 30 min attached to operational voltage

⁽⁴⁾ @ 2'000 pC...100'000 pC; > 2 kHz @ 500'000 pC

All specifications at ambient temperature (23°C $\pm 2^\circ\text{C}$)

Mechanical Data

Control connection	25 pin D-Sub
Sensor connection	BNC male
Enclosure material	Aluminum die cast

Environmental Conditions

Operating temp. range	-5...+60 °C
Storage temperature	-20...+80 °C
Protection class	IP 40
EMC	EN 61000-6-2 immunity EN 61000-6-4 emission



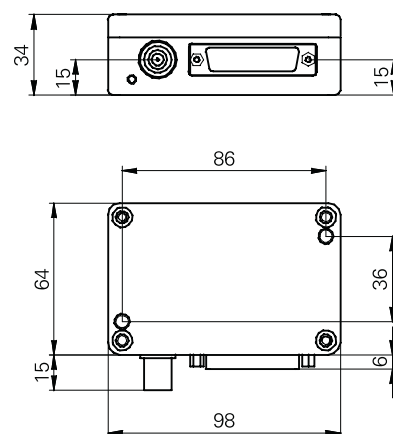
Order Code

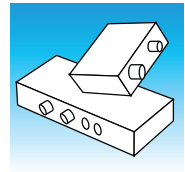
DACU 820-2.0-500BS

Included

- Mounting screws 2 pcs. M4 x 16

Dimensions (mm)





Electrical Connections D-Sub 25

Pin	Function
1	Signal out CH1
2	Peak out
3	Level 1 (In or Out)
4	Level 0 (In or Out)
5	Range B1 (CH2)
6	Range B0 (CH2)
7	Range A1 (CH1)
8	Range A0 (CH1)
9	Supply GND
10	+Supply
11	Code 2
12	Code 0
13	Code Supply +
14	Signal GND
15	Alarm 1 (CH1)
16	Alarm 0 (CH1)
17	RX
18	TX
19	Com Logic Input
20	Operate
21	80% Test
22	Supply GND
23	Signal out CH2
24	Code 1
25	Com Logic Output (Alarm)

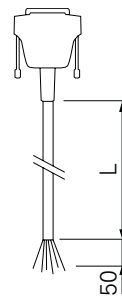
Measuring Range Selection

Range CH1		Measuring Range
A1	A0	pC/10V
0	0	500'000
0	1	200'000
1	0	100'000
1	1	100'000...500'000

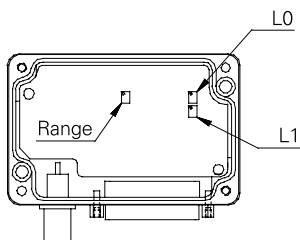
Range CH2		Measuring Range
B1	B0	
0	0	20'000
0	1	10'000
1	0	5'000
1	1	2'000

Accessories

Connecting cable with open end



Control Elements



Range	Adjustment of variable range
L0	Adjustment of value 1. The limit switch voltage can be set with the potentiometer and has to be measured at pin 4. Alternatively a voltage can be supplied as well.
L1	Adjustment limit value 2. ditto, pin 3 only

Length (L)	Order code
5 m	DZCS 05/DACU 8

Force Measurement

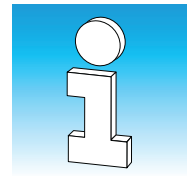
Supplementary Information

*Axial-Load
Torsion*

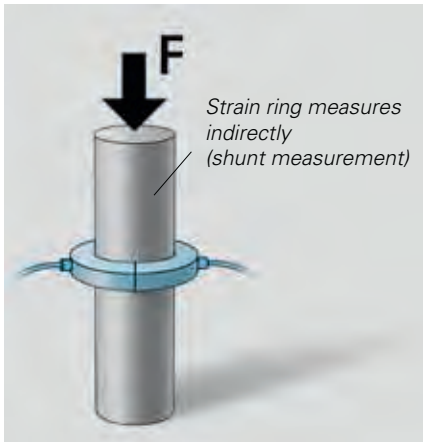
*Hydraulic
Presses*

Indirect Force Measurement

Bending



Overview of applications for STRAIN-MATE™ and other surface strain sensors



Axial Load in Cylinder

Calibrated measurement with strain ring type DSRC. The applied force can be directly calculated by the following formula:

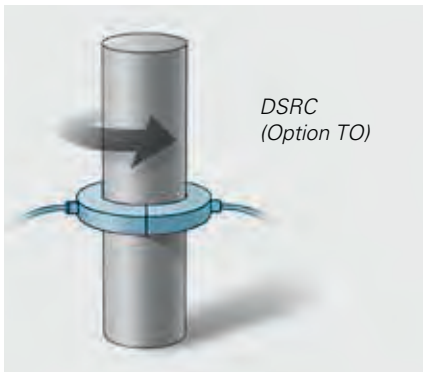
$$F = A \times E \times \epsilon$$

A = Cross section [mm²]
 E = E-Modulus [N/mm²]
 ε = Strain Δ l/l

The entire force passes through the cylinder and is measured with two pressed-on strain gages. The more accurate the Young's modulus is known the more precise the force can be measured.

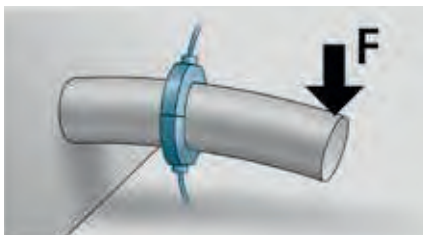
Elastic modulus E

Steel	210'000 N/mm ²	Titan	105'000 N/mm ²
Aluminum	70'500 N/mm ²	Copper	120'000 N/mm ²



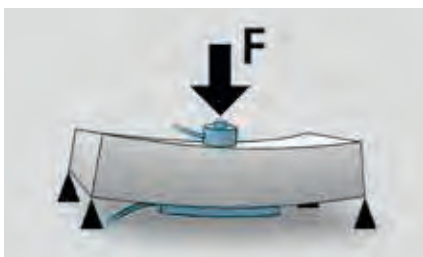
Torsion

Torsion measurement is easy with the strain ring type DSRC/Option TO. Strain rings with option TO can be connected to standard sensopress amplifiers. For rotating torque measurements the strain ring may be connected to a commercially available telemetry system.



Bending on a Cylinder

The strain ring type DSRC used in a 1/2-bridge arrangement directly measures the axial load compensated bending strain.



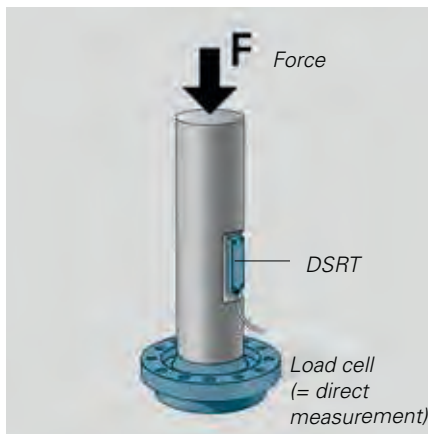
Bending on Beams or Cross Heads

Bending measurements on beams with strain link type DSRT.



Force Measurement

Load cells measure the force directly. The advantage is that the force can be directly recorded in kN. Alternatively, the indirect (or shunt) force measurement with strain sensors offers the advantage that there is no need to install a load cell into the load flow. In addition the strain sensors cannot be overloaded. On the other hand, it is necessary to calibrate the measuring chain. The indirect measurement always guarantees excellent repeatability.

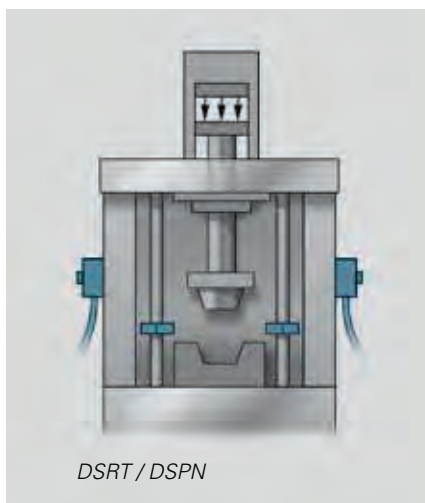


Indirect Force Measurement

Indirect force measurement can be done with asymmetrically attached strain sensors. The surface strain can contain a superimposed bending component. For a given set up, this component remains proportional to the force. Process monitoring can be performed with or without calibration.

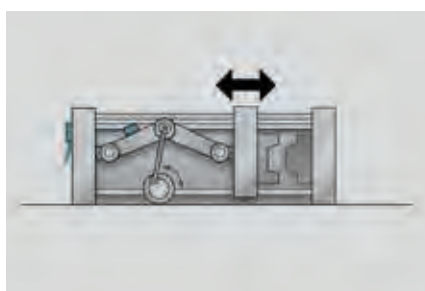
Application:

- Strain link DSRT for standard applications



Hydraulic Presses

The load distribution on a hydraulic frame press is measured with two strain sensors. To determine the magnitude of the force, a pressure sensor may be used to measure the hydraulic pressure in the cylinder. For accurate measurements, the system must be calibrated with a load cell installed in the load flow. The load cell for instance, can be temporarily put in place of the tool.



Mechanical Presses

On presses with a mechanical clamping mechanism, the force can be measured indirectly on the toggle mechanism or on one of the plates.

Using sensors with sufficiently high resolution (DSPN), allows one to measure the clamping force and at the same time detect a potential collision. For instance, a collision can be caused by a part not completely removed. With such a high resolution sensor, it is possible to implement a tool protection system on production machinery.

Hysteresis

***Glossary and
Explanations***

Gage

Nominal

Zero Signal

Thin-Film

Strain

$$\varepsilon = \frac{\Delta l}{l}$$

Strain is defined as the non-dimensional ratio of length change / initial length. Microstrain is often used as strain unit.

$$1 \text{ microstrain } [\mu\varepsilon] = 10^{-6} \frac{\text{m}}{\text{m}} = 1 \frac{\mu\text{m}}{\text{m}}$$

Mechanical strain

The mechanical strain results of the strain of the E-modulus of the material respectively of the force per area.

$$\sigma = \varepsilon \cdot E \text{ (in the flexible span)}$$

$$\text{bzw. } \sigma = F / (E \cdot A)$$

Material	E-modulus (typical)
Steel	210 kN/mm ²
Aluminium	70.5 kN/mm ²

Example: 250 $\mu\text{m/m}$ strain equals to a mechanical strain of 52,2 N/mm² respectively (52,5 MPa) on steel.

Output range

The output voltage is the difference between the output signal at zero load and the output signal at nominal load.

Nominal characteristic value

Specified output signal at nominal load (nom. output voltage).

Characteristic value

Actual (measured) output range.

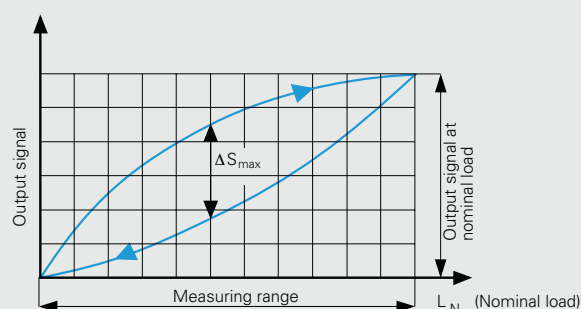
Measuring range

Load range in which the specified errors are not exceeded.

Hysteresis

Hysteresis signifies the hysteresis error F_h . ΔS_{max} is the largest difference between the increasing and decreasing calibration curve up to the nominal load. Hysteresis is expressed in % of full scale.

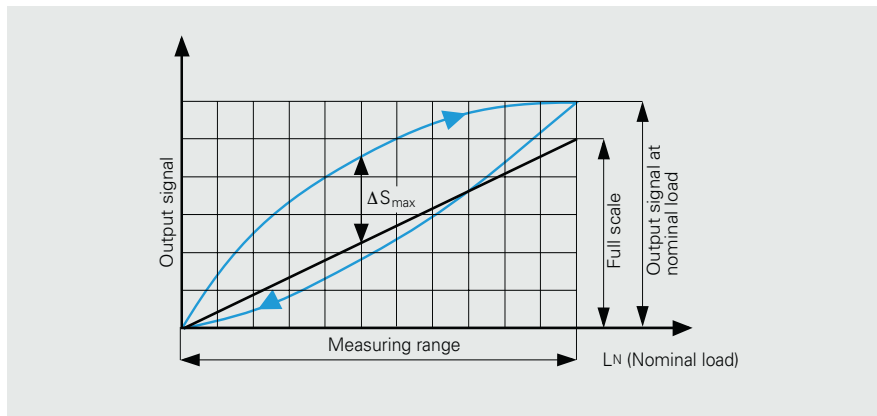
$$F_h = \frac{\Delta S_{\text{max}}}{F_N}$$



Characteristic curve deviation

The characteristic curve deviation signifies the maximum deviation of the calibration curve to the specified straight line. The specified straight line passes through the origin. The end point results from the origin + nominal output voltage. The characteristic curve deviation contains hysteresis, linearity error, repeatability and deviation of real to nominal output voltage.

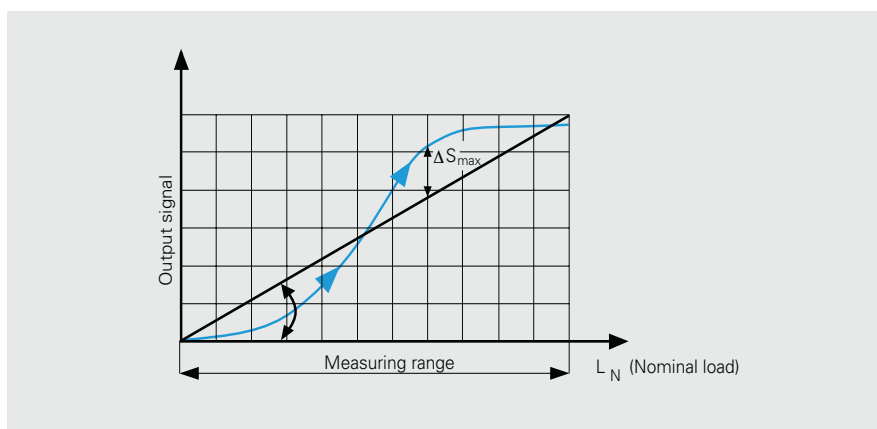
$$F_{\text{Com}} = \frac{\Delta S_{\text{max}}}{FS}$$



Linearity

Linearity error F_L is the largest difference ΔS_{max} between the increasing calibration curve and the straight line through the origin with slope C_L . C_L is selected such that ΔS_{max} is minimized. The linearity is expressed in % of full scale.

$$F_L = \frac{\Delta S_{\text{max}}}{C_L \cdot L_N}$$



Micro strain [$\mu\epsilon$]

See strain.

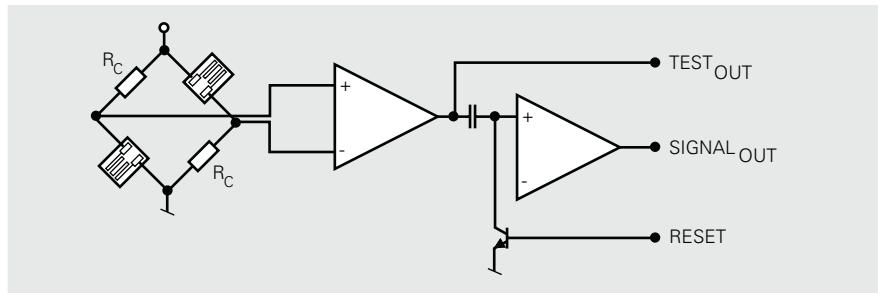
Zero, bridge balance

Generally all S/G bridges exhibit an initial offset which can be tared by different means. After the installation the offset of STRAIN MATE™ sensors may be quiet large due to the press-on technique. Baumer amplifiers and display instruments are equipped with a reset circuit which allows fast and convenient zeroing over a large range. For static applications, amplifiers with zero balance potentiometers or digital taring are used.

Repeatability

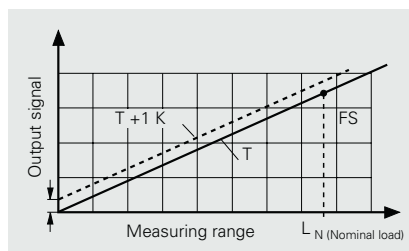
The difference in reference to the characteristic value between the max. and the min. display value of equal measuring points in case of repetition of identical load cycles.

Test_{OUT}



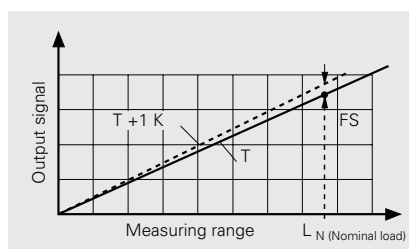
The non-tared signal is available at the output Test_{OUT}. To prevent saturation of subsequent stages, Test_{OUT} should ideally read between -2 V and +2 V when the sensor is installed and no load is applied. During operation this value may then be between -5 V and +5 V. The Test_{OUT} output can furthermore be used to check the measuring chain. In case of an open bridge circuit, Test_{OUT} goes into saturation.

TC of zero signal



The maximum temperature coefficient (TC) of the zero signal is the largest variation of the zero signal which occurs during a change in temperature by 1 Kelvin. It is expressed in percent of full-scale per Kelvin.

TC of output range



The largest temperature coefficient (TC) of output range is the largest variation in output range which occurs during a change in temperature by 1 Kelvin. It is expressed in percent of FS*) per Kelvin.

*) FS = Fullscale of output range

Strain gage (S/G)

Strain Gage. The S/G changes the electrical resistance proportionally to the applied strain.

Gage factor

The sensitivity of a S/G is expressed by the ratio of the relative resistance change to the strain:

$$k = \frac{\Delta R}{R} \times \frac{1}{\varepsilon}$$

R Resistance of S/G
ΔR Resistance change
due to strain
ε Strain of S/G

Transverse sensitivity

Ideally S/G should only react with a resistance change as expressed by the gage factor when strain is applied in the «active» direction of the gage. A resistance change is also observed when strain is exerted transverse to its «active» direction. This is known as transverse sensitivity and is expressed in percent of the gage factor.

Temperature compensation

When the temperature of the measurement location changes, an output signal is produced. This is due to the change in specific resistance and the thermal expansion of the object. This signal which is known as the temperature output of the measurement point is independent of the mechanical load applied to the object to be measured. The temperature output of a strain gage is controlled through the material properties such that the temperature effects are largely compensated.

Worldwide presence.

We strive to be close to our customers all around the world. We listen to them, and then after understanding their needs, we provide the best solution. Worldwide customer service for us starts with on-the-spot personal discussions and qualified consultation. Our application engineers speak your language and strive from the start, through an interactive problem analysis, to offer comprehensive and user-compatible solutions. The worldwide Baumer sales organizations guarantee a high level of readiness to deliver.



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Baumer provides for every application the perfect solution.

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- Photoelectric sensors
- Ultrasonic sensors
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- Mechanical precision switches

Distance measurement

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- Photoelectric sensors
- Ultrasonic sensors
- Bearingless linear encoders
- Cable-pull encoders

Rotary encoders / Angle measurement

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- Incremental encoders
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- Bearingless encoders
- Format alignment
- Inclination sensors

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- Conductivity measurement
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