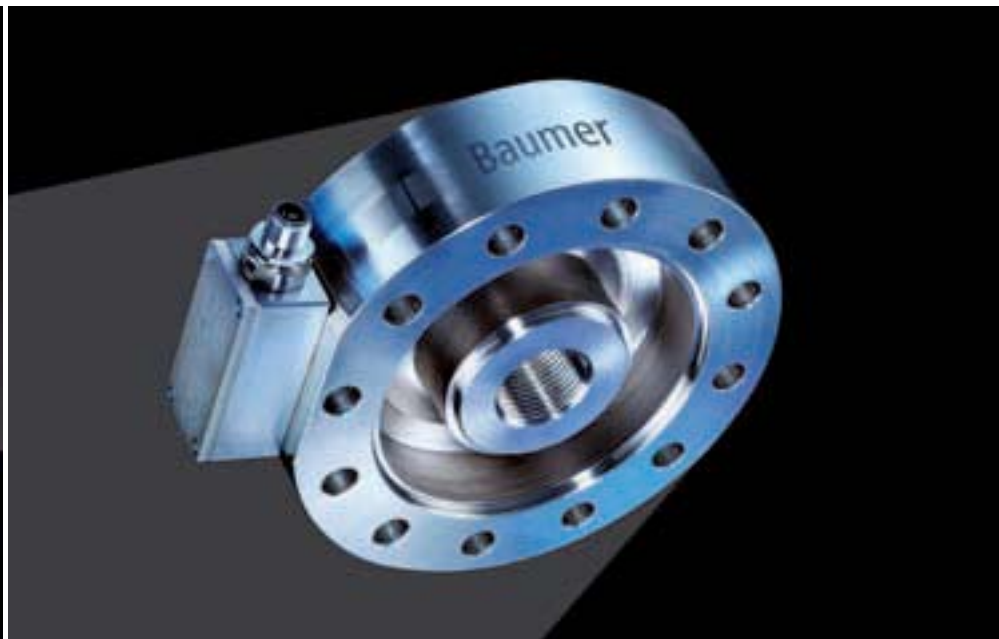


Measure. Test. Control.  
Force and Strain Sensors.



Edition 2010

Process Instrumentation  
Sensor Solutions  
Motion Control  
Vision Technologies

## Welcome to the world of sensors



Since 1989, we have globally supplied high quality assortment of force and strain sensors. Our commitment to above average customer service is a measure of our success and will remain one of our highest priorities.

Our extensive knowledge, specialized project management and the most modern technologies provide the foundation for a successful innovative standard as well as a custom product offering. Ongoing support and continuous education of our employees are a guarantee of professionalism, quality and continuity.

We search for solutions which simplify applications, increase efficiency and guarantee outstanding results.

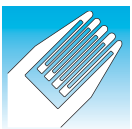
Baumer offers you the assurance of a long term successful partnership.

<b>Introduction</b>	<b>1</b>
Introduction	Page 1.2
Summary Force and Strain Sensors	Page 1.4
<b>Load Cells DLRx</b>	<b>2</b>
Product key	Page 2.2
Summary Load Cells	Page 2.3
<b>Strain Rings DSRC</b>	<b>3</b>
Product key	Page 3.2
Summary Strain Rings	Page 3.3
<b>Strain Probes DSRH</b>	<b>4</b>
Product key	Page 4.2
Summary Strain Probes	Page 4.3
<b>Strain Links DSRT</b>	<b>5</b>
Product key	Page 5.2
Summary Strain Links	Page 5.3
<b>Bridge Amplifiers DABx</b>	<b>6</b>
Product key	Page 6.2
Summary Bridge Amplifiers	Page 6.3
<b>Strain Clamps DSRV</b>	<b>7</b>
Summary Strain Clamps	Page 7.2
<b>Extensometer Sets DSRM</b>	<b>8</b>
Summary Extensometer Sets	Page 8.2
<b>Display Boxes DDBF</b>	<b>9</b>
Product key	Page 9.2
Summary Display Boxes	Page 9.3
<b>Piezo Electric Sensors</b>	<b>10</b>
Product key	Page 10.2
Summary Force and Strain Sensors	Page 10.3
Product key	Page 10.8
Summary Cavity Pressure Sensors	Page 10.9
<b>Charge Amplifiers DACx</b>	<b>11</b>
Product key	Page 11.2
Summary Charge Amplifiers	Page 11.3
<b>Supplementary Information</b>	<b>12</b>
General	Page 12.2
<b>Glossary and Explanations</b>	<b>13</b>
General	Page 13.2

# 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 in bore holes
- 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
- Tooling and crash detection
- Cavity pressure measurement
- Direct and indirect measurement
- Industrial multi range charge amplifier



## Injection force

- Measurement of high dynamic applications
- High precision force measurement
- Covers wide force ranges
- High overload protection



1



## Compression force

- Simple measurement of tension, compression and torsion on shafts, axes and cylinders
- High accuracy
- For cyclical applications (i.e. clamping force measurements on presses)

## Assembly force





- Permanent quality monitoring
- Compression or tension/compression load
- Measurement of static and dynamic forces
- Compact design






# 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
<b>Page 2.3</b>	<b>Page 3.3</b>	<b>Page 4.3</b>	<b>Page 5.3</b>





## Piezo Electric Sensors

DLPP	DSPN	DPPC	
			
Piezo electric force sensor	High resolution piezo-electric strain sensor	Cavity pressure sensor	
Measurement of dynamic forces	Mold protection and crash detection	Direct and indirect cavity pressure measurement	
Measuring range from 2,5 to 30 kN	Measuring range up to 500 $\mu\epsilon$	Measuring range 2000 bar	
Linearity < 1% FS	Linearity < 1% FS	Linearity < 1% FS	
<b>Page 10.3</b>	<b>Page 10.3</b>	<b>Page 10.9</b>	








## Analysis Devices

DABx	DSRV	DSRM	DDBF
			
<b>Bridge amplifier</b>	<b>Strain Clamps</b>	<b>Extensometer Set</b>	<b>Display box</b>
Analysis of S/G bridges	Strain measuring on bars and shafts	Portable measuring system	Signal analysis of strain rings, strain probes and extensometers
2 x 1/4 bridge or full bridge	Measuring range $\pm 1000 \mu\epsilon$	Strain measurement on tie bars and plates	Display range $\pm 1999 \mu\epsilon$
Current or voltage output	Characteristic curve deviation < 1% FS	Measuring range $\pm 1000 \mu\epsilon$	2 or 4 channels
1 channel		Characteristic curve deviation < 2% FS	
<b>Page 6.2</b>	<b>Page 7.2</b>	<b>Page 8.3</b>	<b>Page 9.3</b>

## Analysis Devices and Accessories

DZPC	DZCC	DACx
		
<b>Accessories</b>	<b>Coaxial Cable</b>	<b>Industrial multi range charge amplifier</b>
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
<b>Page 10.19</b>	<b>Page 10.20</b>	<b>Page 11.03</b>



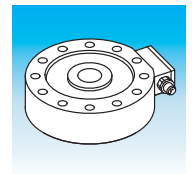


# Load Cells



# 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

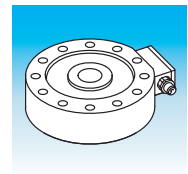
**CO** = Compression  
**TC** = Tension/Compression

### Option

**C** = top cover  
**CL05** = 5 m cable length  
**CL10** = 10 m cable length  
**CCL10** = combinations possible

# Summary

## Load cells DLRx



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

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

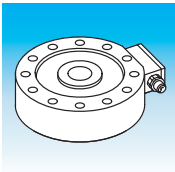
Standard capacities	0...5000 N 0...10000 N
Sensitivity at FS	1 mV/V
Combined error	< 0,5% FS
Linearity	< 0,5% FS
Hysteresis	< 0,5% FS
Compensated temperature range	0...+70 °C
Operating temperature range	-20...+70 °C
Storage temperature range	-40...+85 °C
Temperature effect zero	< ±0,06% /K
Temperature 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

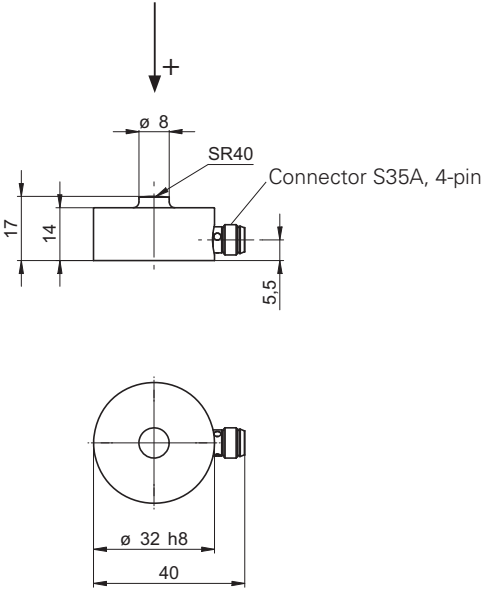
Combined error contains linearity, hysteresis and non-repeatability

## Order Code

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



**Dimensions (mm)**



2

**Electrical Connection**

**S80**



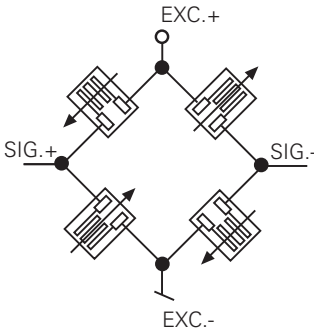
Pin	Signal
1	+Vs
2	-V <sub>OUT</sub>
3	GND
4	+V <sub>OUT</sub>
Housing	$\perp$

**W24**

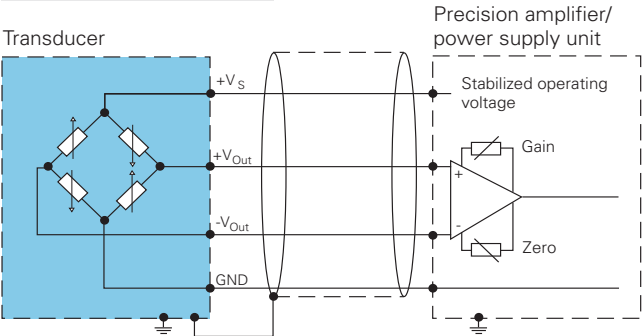


Color	Signal
brown	+Vs
black	-V <sub>OUT</sub>
blue	GND
white	+V <sub>OUT</sub>
Housing	$\perp$

**Bridge Circuit**



**Wiring**



# Load cell DLRP L002

## Features

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



## Technical Data

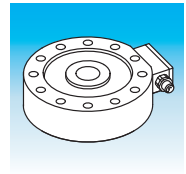
Standard capacities	0...500 N 0...1000 N 0...2000 N 0...5000 N 0...10000 N
Sensitivity at FS	2 mV/V
Combined error	< 0,3% FS
Linearity	< 0,3% FS
Hysteresis	< 0,3% FS
Compensated temperature range	0...+70 °C
Operating temperature range	-20...+70 °C
Storage temperature range	-40...+85 °C
Temperature effect 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

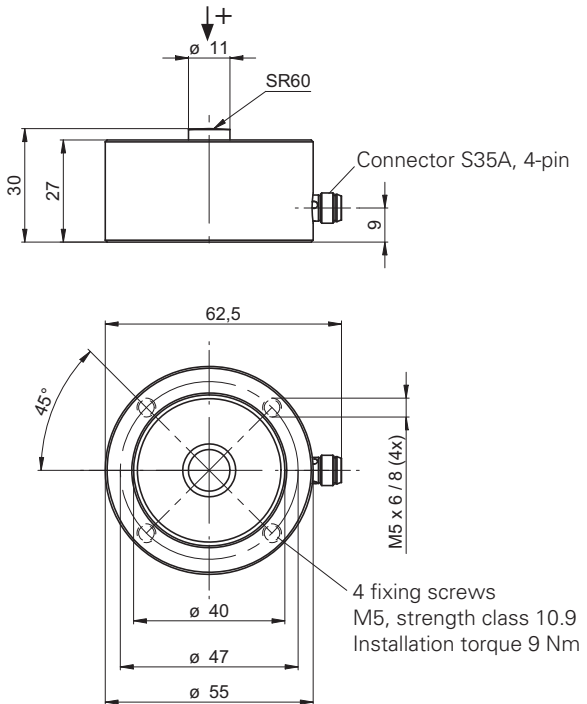
Combined error contains linearity, hysteresis and non-repeatability

## Order Code

DLRP L002.	[ ] [ ] [ ] .	<b>B</b>	[ ] [ ] [ ]	<b>CO</b> /	[ ] [ ] [ ] [ ] [ ] [ ]
					Option
					<b>C</b> Top cover
					<b>CL10</b> 10 m cable length (5 m standard)
					<b>CCL10</b> Combinations possible
					Load transmission
					<b>CO</b> Compression (see drawing)
					Measuring range
					<b>150</b> 0...500 N
					<b>210</b> 0...1000 N
					<b>220</b> 0...2000 N
					<b>250</b> 0...5000 N
					<b>310</b> 0...10000 N
					Combined error
					<b>B</b> 0,3%
					Connection
					<b>S80</b> 4-pin connector series 712
					<b>W24</b> Cable, 4-wire, open cable end



**Dimensions (mm)**



2

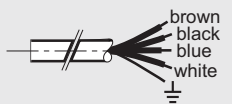
**Electrical Connection**

**S80**



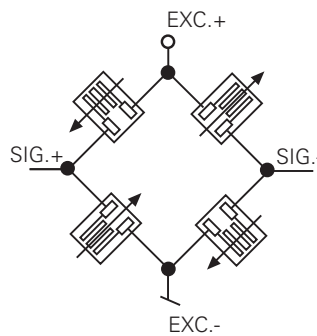
Pin	Signal
1	+Vs
2	-V <sub>OUT</sub>
3	GND
4	+V <sub>OUT</sub>
Housing	⏏

**W24**



Color	Signal
brown	+Vs
black	-V <sub>OUT</sub>
blue	GND
white	+V <sub>OUT</sub>
Housing	⏏

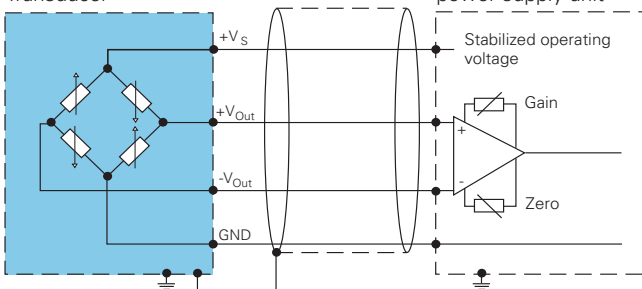
**Bridge Circuit**



**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

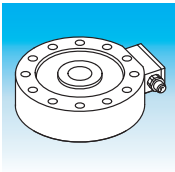
Standard capacities	0...500 N 0...1000 N 0...2000 N 0...5000 N 0...10000 N
Sensitivity at FS	2 mV/V
Combined error	< 0,3% FS
Linearity	< 0,3% FS
Hysteresis	< 0,3% FS
Compensated temperature range	0...+70 °C
Operating temperature range	-20...+70 °C
Storage temperature range	-40...+85 °C
Temperature effect 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

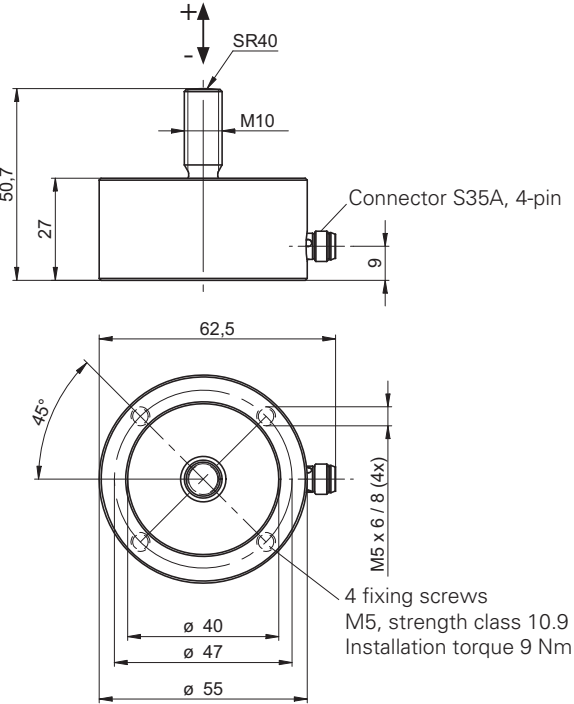
Combined error contains linearity, hysteresis and non-repeatability

## Order Code

DLRP L002.	<input type="text"/>	.B	<input type="text"/>	TC/	<input type="text"/>
					Option
					<b>C</b> Top cover
					<b>CL10</b> 10 m cable length (5 m standard)
					<b>CCL10</b> Combinations possible
					Load transmission
					<b>TC</b> Tension/Compression (see drawing)
					Measuring range
					<b>150</b> 0...500 N
					<b>210</b> 0...1000 N
					<b>220</b> 0...2000 N
					<b>250</b> 0...5000 N
					<b>310</b> 0...10000 N
					Combined error
					<b>B</b> 0,3%
					Connection
					<b>S80</b> 4-pin connector series 712
					<b>W24</b> Cable, 4-wire, open cable end



Dimensions (mm)



2

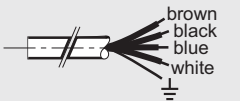
Electrical Connection

S80



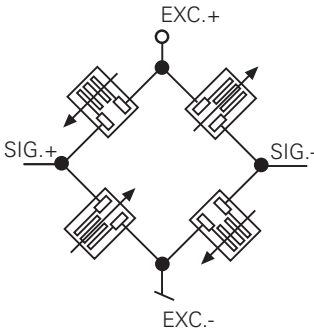
Pin	Signal
1	+Vs
2	-V <sub>OUT</sub>
3	GND
4	+V <sub>OUT</sub>
Housing	⏏

W24

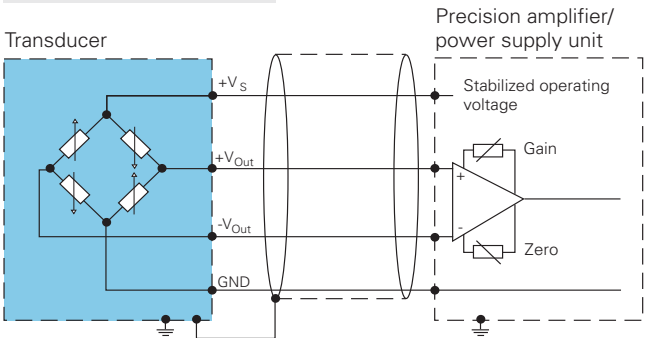


Color	Signal
brown	+Vs
black	-V <sub>OUT</sub>
blue	GND
white	+V <sub>OUT</sub>
Housing	⏏

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.    .B    TC/

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



# 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



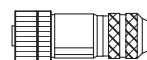
## Technical Data

Cable	5 m, shielded, PUR
Load cell material	1.4542

## Order Code

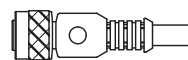
<b>DLR</b>	<b>L001</b>	<b>.C</b>	<b>CO</b>	<b>/</b>	<b>CL05</b>	<b>CL10</b>
Output	Measuring range	Connection	Load transmission	Optional cable length (2 m standard)	5 m cable length	10 m cable length
<b>U</b> Voltage output 0...10 V	<b>250</b> 0...5000 N	<b>14C</b> 5-pin connector series M12 x 1	<b>CO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

## Accessories (not included in delivery)



Series 713

Bushing, control side, 5-pin, Part No. 10135462



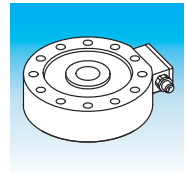
M12 x 1

Bushing with cable, control side, 5-pin

ES 34CP2B 5-pin (shielded) 2 m, PUR,  
(Part No. 10144720)

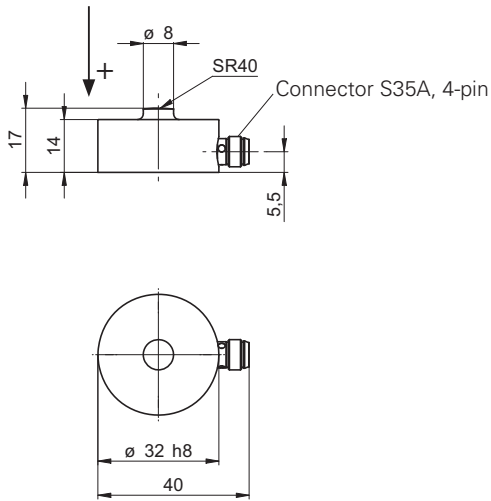
ES 34CP5B 5-pin (shielded) 5 m, PUR,  
(Part No. 10137485)

ES 34CP10B 5-pin (shielded) 10 m, PUR,  
(Part No. 10155587)

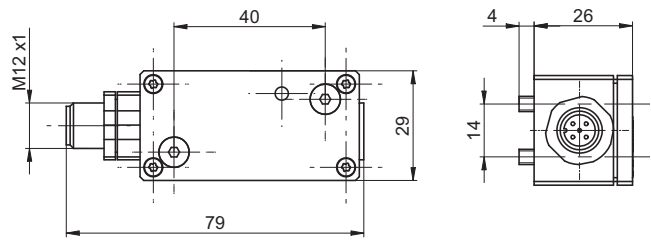


Dimensions (mm)

Load cell



Amplifier DABx AD2T



Electrical Connection

DLRU

14C



Pin

1	+Vs
2	-V <sub>OUT</sub>
3	GND
4	+V <sub>OUT</sub>
5	Reset
Housing	⊥

DLRI

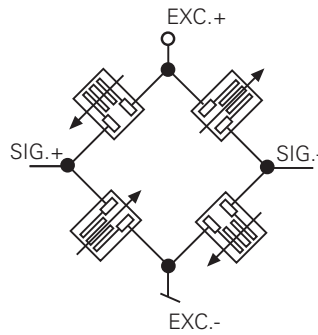
14C



Pin

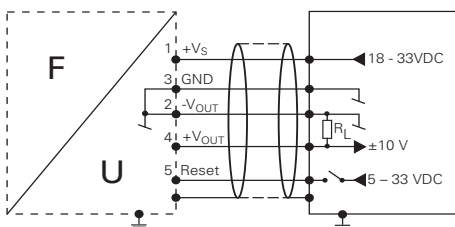
1	+Vs
2	-I <sub>OUT</sub>
3	GND
4	+I <sub>OUT</sub>
5	Reset
Housing	⊥

Bridge Circuit

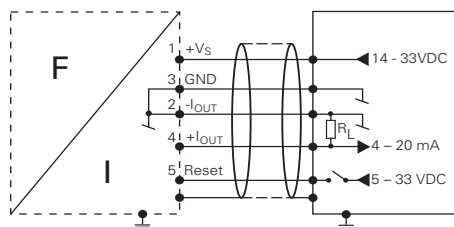


Wiring

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

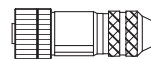
## Technical Data

Cable	5 m, shielded, PUR
Load cell material	1.4542

## Order Code

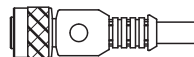
DLR	□	L002.	□□□□	.B	□□□□	CO/	□□□□□□	Option
								<b>C</b> Top cover
								<b>CL10</b> 10 m cable length (5 m standard)
								<b>CCL10</b> Combinations possible
								Load transmission
								<b>CO</b> Compression (see drawing)
								Measuring range
								<b>150</b> 0...500 N
								<b>210</b> 0...1000 N
								<b>220</b> 0...2000 N
								<b>250</b> 0...5000 N
								<b>310</b> 0...10000 N
								Combined error
								<b>B</b> 0,3%
								Connection
								<b>14C</b> 5-pin connector series M12 x 1
								Output
								<b>U</b> Voltage output 0...10 V
								<b>I</b> Current output 4...20 mA

## Accessories (not included in delivery)



Series 713

Bushing, control side, 5-pin, Part No. 10135462



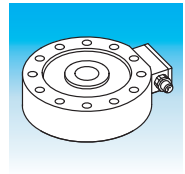
M12 x 1

Bushing with cable, control side, 5-pin  
ES 34CP2B 5-pin (shielded) 2 m, PUR,  
(Part No. 10144720)

ES 34CP5B 5-pin (shielded) 5 m, PUR,  
(Part No. 10137485)

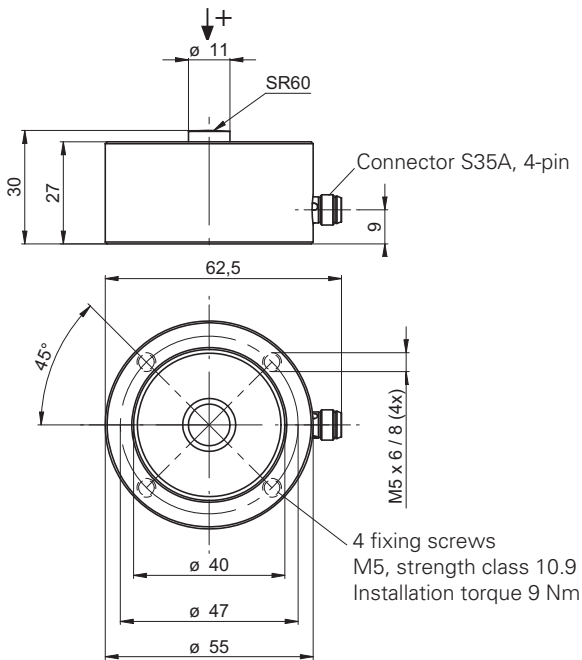
ES 34CP10B 5-pin (shielded) 10 m, PUR,  
(Part No. 10155587)



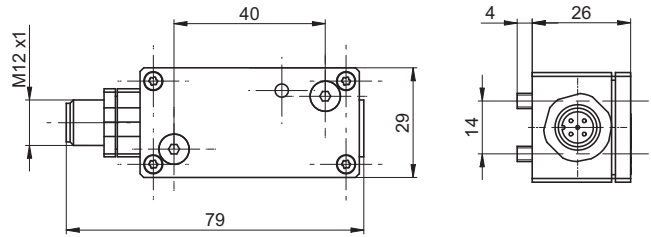


Dimensions (mm)

Load cell



Amplifier DABx AD2T



2

Electrical Connection

DLRU

14C



Pin	
1	+Vs
2	-V <sub>OUT</sub>
3	GND
4	+V <sub>OUT</sub>
5	Reset
Housing	⏏

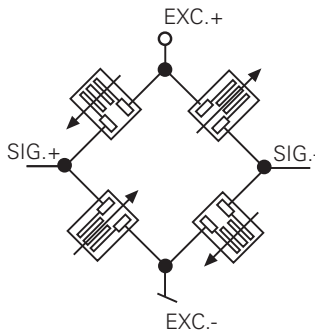
DLRI

14C



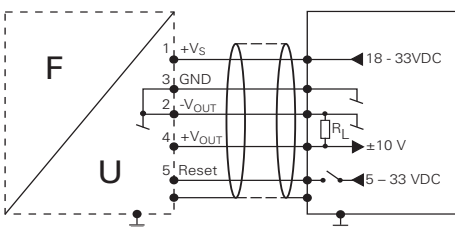
Pin	
1	+Vs
2	-I <sub>OUT</sub>
3	GND
4	+I <sub>OUT</sub>
5	Reset
Housing	⏏

Bridge Circuit

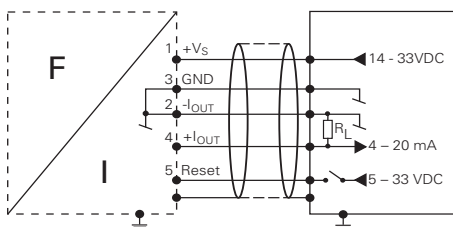


Wiring

DLRU



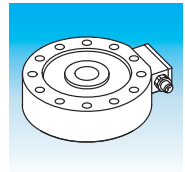
DLRI



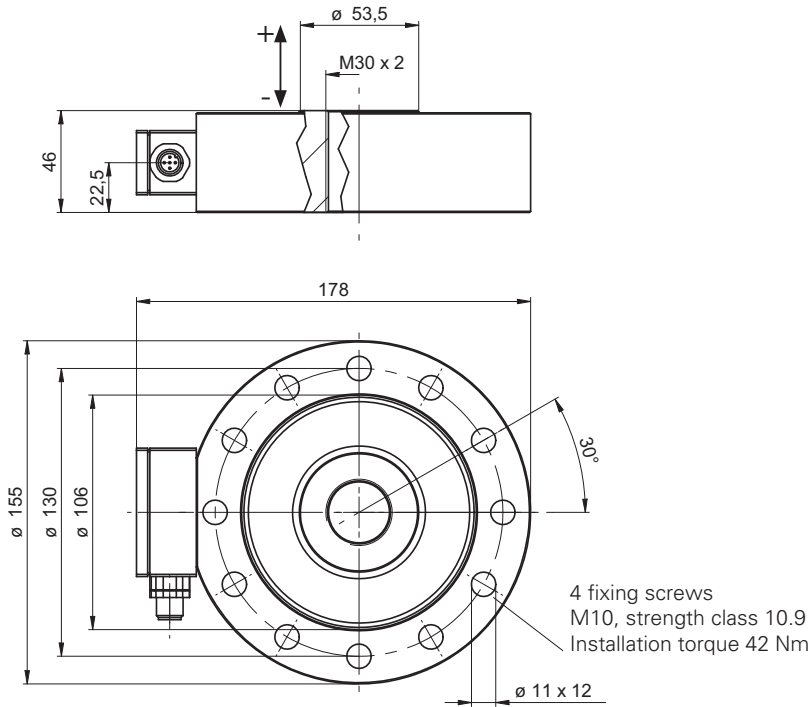








Dimensions (mm)



2

Electrical Connection

DLRU

14C



Pin	
1	+Vs
2	-V <sub>OUT</sub>
3	GND
4	+V <sub>OUT</sub>
5	Reset
Housing	⊥

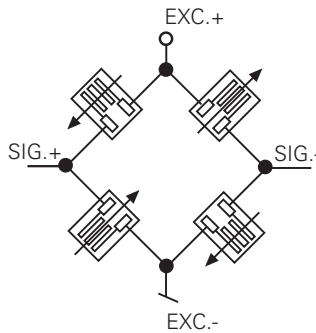
DLRI

14C



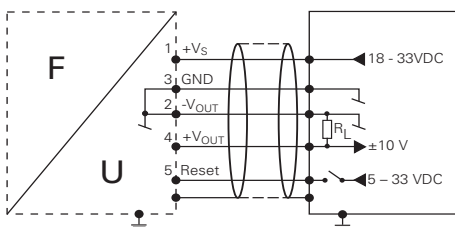
Pin	
1	+Vs
2	-I <sub>OUT</sub>
3	GND
4	+I <sub>OUT</sub>
5	Reset
Housing	⊥

Bridge Circuit

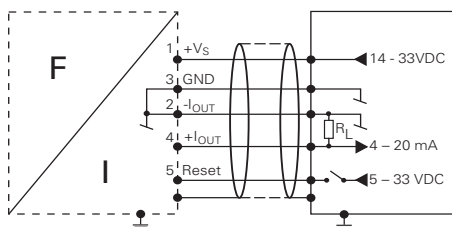


Wiring

DLRU



DLRI



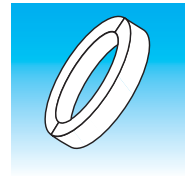


# *Strain Rings*





# 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

**Z** = Inch

## Options

**/TO** = Execution for torsion measurement 2 x 1/4 S/G bridge 350  $\Omega$ , 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:

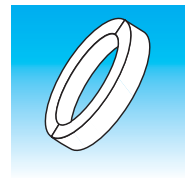
- The strain rings are not suitable for static applications. Reset measuring chain before each cycle.
- The strain rings are equipped with two exactly diametrically opposed strain gages.





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

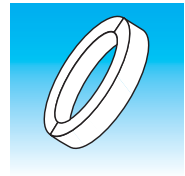
Connection	6 pin female (Series 680/KFR 60)
Material	
- Ring	Aluminum anodized
- Protective foil	Stainless steel
- Hinge	Nitril
- Screws	M8 (torque 3 Nm)

## Environmental Conditions

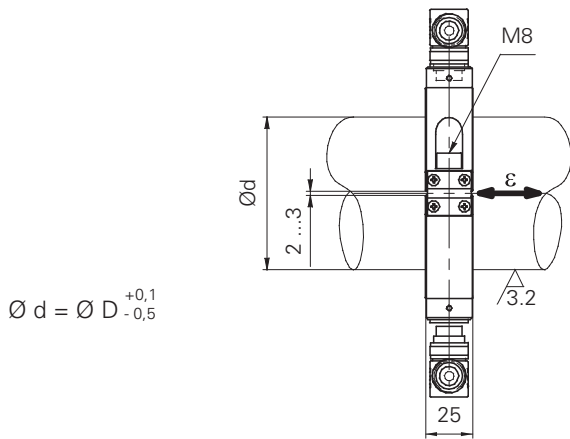
Surface quality	Ra 3.2 (N8) or better
Operating temp. range	-10...+60 °C
Storage temperature	-40...+100 °C
Protection class	IP 54

## Electrical Data

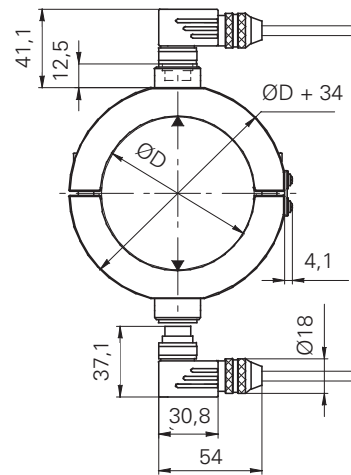
Measuring range	±1000 µε (1 µε = 0,001 mm/m resp. 1 µε equals 0,001 mm strain per meter of shaft)
Output signal per 1000 µε	1 mV/V (with completed full bridge)
Combined error	< 1% FS
Linearity	< 0,5% FS
Hysteresis	< 0,5% FS
Non-repeatability	< 0,2% FS
Zero, bridge balance	< ±200% FS (depending on installation). 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)



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

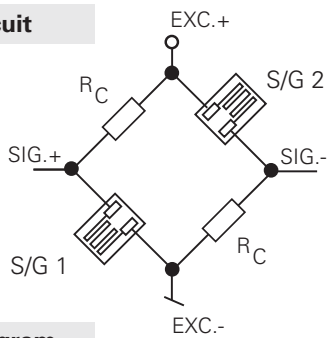


Ø D = Nominal diameter  
Ø d = Shaft diameter

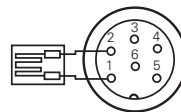
ε = Strain  
▲ = Gauge location

Electrical Connections

Bridge Circuit

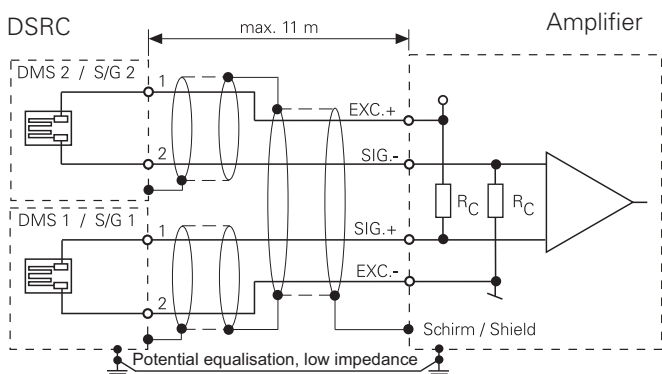


Pin Assignment (per ring half)



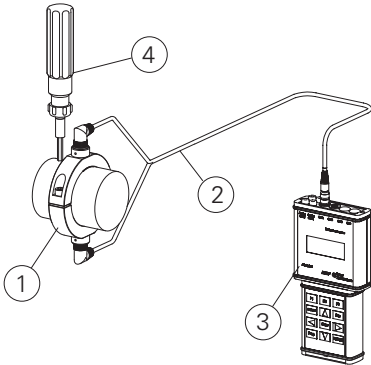
Pin	Signal
1	S/G
2	S/G
3	n.c.
4	n.c.
5	n.c.
6	n.c.

Wiring Diagram

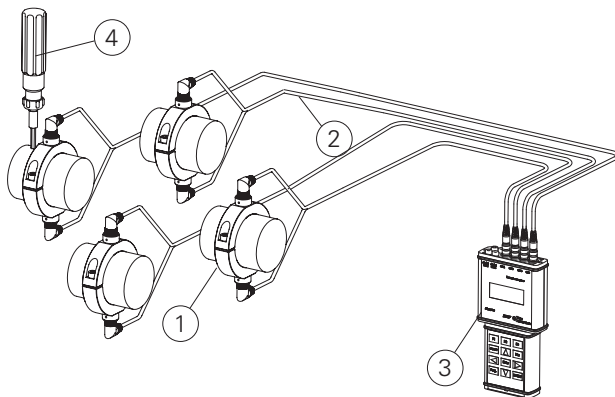


# Strain Ring with Radial Connector DSRC ST

## 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, 5m
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     /

Option

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

Unit

**M** Metric sizes

**Z** Inch sizes

Nominal diameter\*

Metric (M)

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

Nominal diameter\*

Inch (Z)

1"	<b>025</b>	5"	<b>127</b>	9"	<b>229</b>
1,5"	<b>038</b>	5,5"	<b>140</b>	9,5"	<b>241</b>
2"	<b>051</b>	6"	<b>152</b>	10"	<b>254</b>
2,5"	<b>064</b>	6,5"	<b>165</b>	10,5"	<b>267</b>
3"	<b>076</b>	7"	<b>178</b>	11"	<b>279</b>
3,5"	<b>089</b>	7,5"	<b>191</b>	11,5"	<b>292</b>
4"	<b>102</b>	8"	<b>203</b>	12"	<b>305</b>
4,5"	<b>114</b>	8,5"	<b>216</b>	12,5"	<b>318</b>

\* 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



# 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

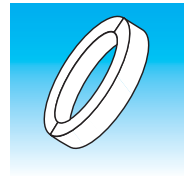
Connection	Open leads
Material	
- Ring	Aluminum anodized
- Protective foil	Stainless steel
- Screws	M8 (torque 3 Nm)
Cable	5 m 2 core, shielded, PVC

## Environmental Conditions

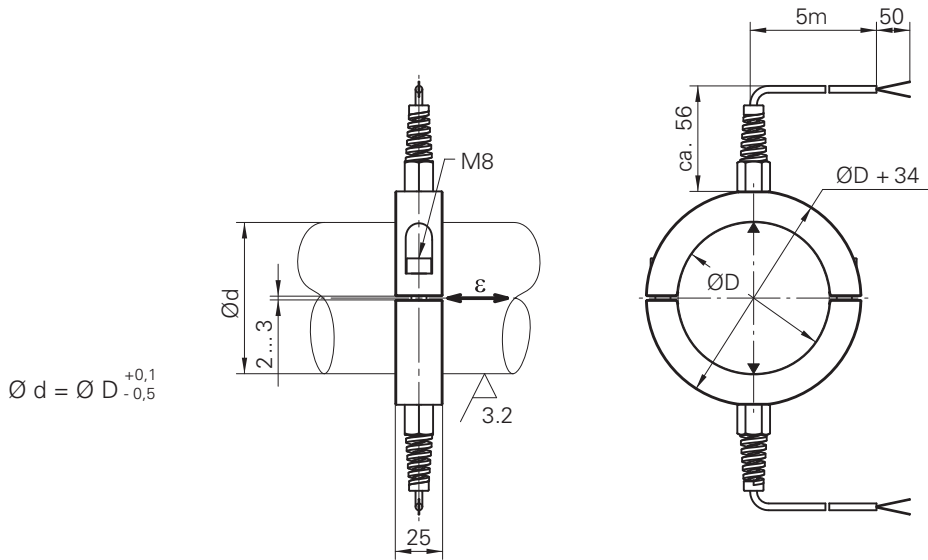
Surface installation spot	Ra 3.2 (N8) or better
Operating temp. range	-10...+60 °C
Storage temperature	-40...+100 °C
Protection class	IP 54

## 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
Non-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)**

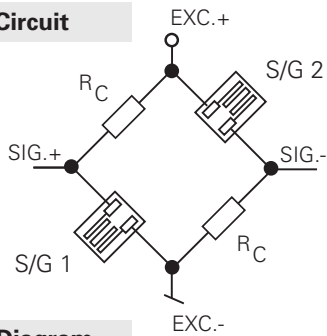


$\varnothing d = \varnothing D^{+0,1}_{-0,5}$

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

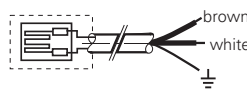
**Electrical Connections**

**Bridge Circuit**



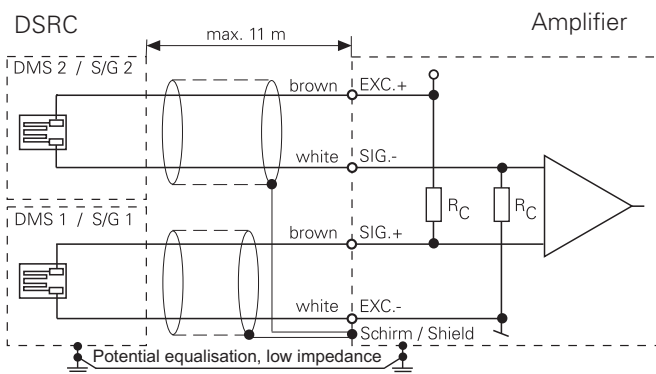
**Wire Color**

(per ring half)

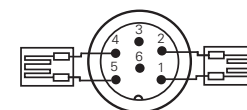
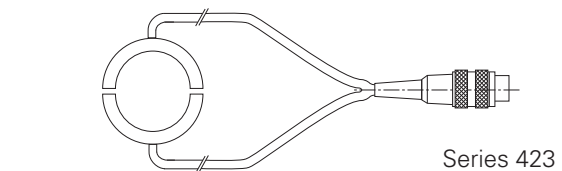


Color	Signal
brown	S/G
white	S/G

**Wiring Diagram**



**Option /CN**

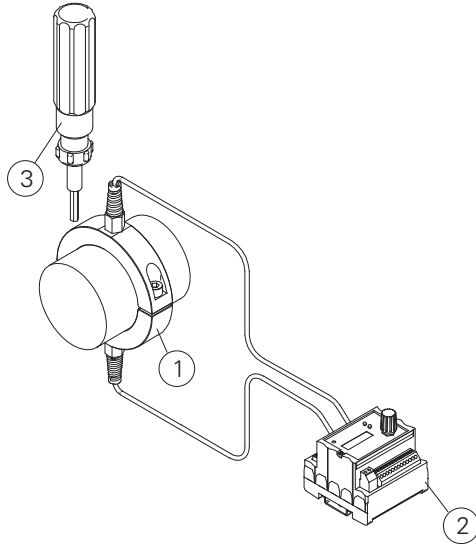


Pin	Signal
1	S/G 1
2	S/G 1
3	n.c.
4	S/G 2
5	S/G 2
6	n.c.



# 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  /

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
- Z** Inch sizes

Nominal diameter\*

Metric (M)

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

Nominal diameter\*

Inch (Z)

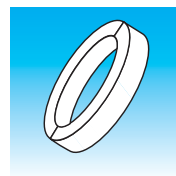
1"	<b>025</b>	5"	<b>127</b>	9"	<b>229</b>
1,5"	<b>038</b>	5,5"	<b>140</b>	9,5"	<b>241</b>
2"	<b>051</b>	6"	<b>152</b>	10"	<b>254</b>
2,5"	<b>064</b>	6,5"	<b>165</b>	10,5"	<b>267</b>
3"	<b>076</b>	7"	<b>178</b>	11"	<b>279</b>
3,5"	<b>089</b>	7,5"	<b>191</b>	11,5"	<b>292</b>
4"	<b>102</b>	8"	<b>203</b>	12"	<b>305</b>
4,5"	<b>114</b>	8,5"	<b>216</b>	12,5"	<b>318</b>

\* 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

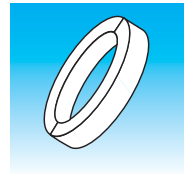
Connection	6 pin female (bayonet quick con.)
Material	
- Ring	Aluminum anodized
- Protective foil	Stainless steel
- Hinge	Steel
- Mounting buckle	Steel

## Environmental Conditions

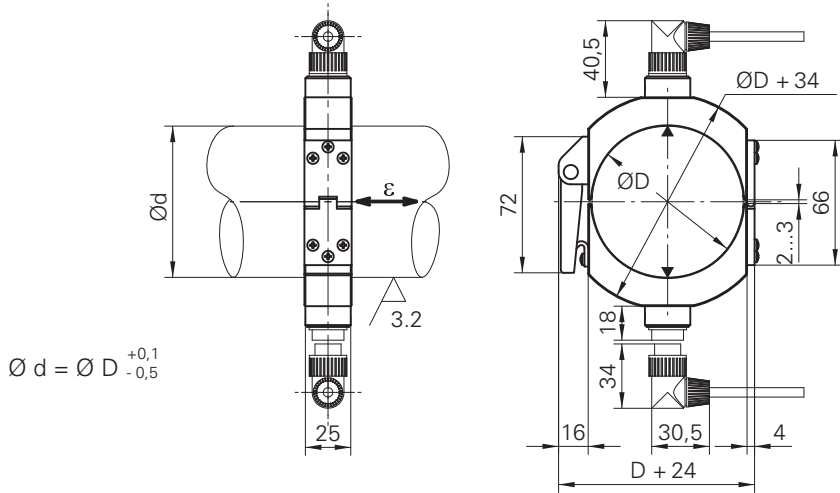
Surface installation spot	Ra 3.2 (N8) or better
Operating temp. range	-10...+60 °C
Storage temperature	-40...+100 °C
Protection class	IP 54

## 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
Non-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)

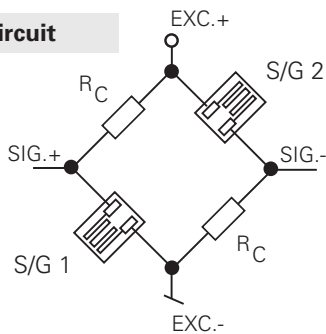


$\varnothing d = \varnothing D \begin{matrix} +0,1 \\ -0,5 \end{matrix}$

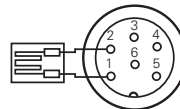
- Ø D = Nominal diameter
- Ø d = Shaft diameter
- ε = Strain
- ▲ = Gage location

Electrical Connections

Bridge Circuit

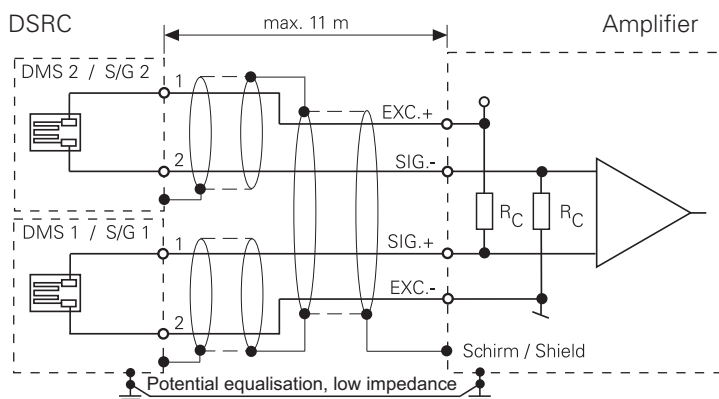


Pin Assignment (per ring half)



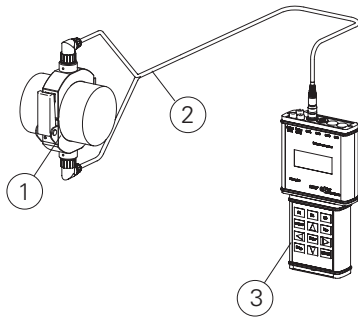
Pin	Signal
1	S/G
2	S/G
3	n.c.
4	n.c.
5	n.c.
6	n.c.

Wiring Diagram

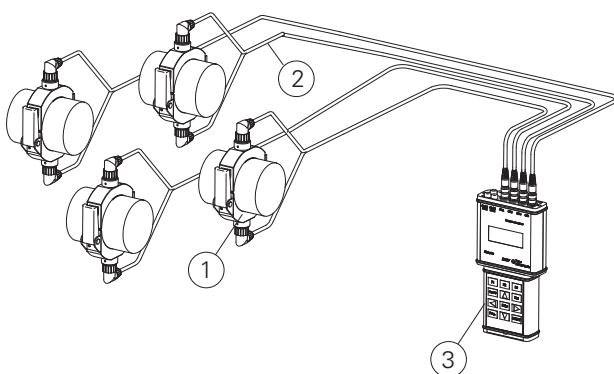


# Strain Ring with Quick Mount Latch DSRC QM

## 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



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

## Order Code

DSRC QM

Unit

**M** Metric sizes

**Z** Inch sizes

Nominal diameter\*

Metric (M)

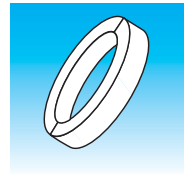
<b>045</b>	<b>080</b>	<b>130</b>	<b>185</b>	<b>260</b>
<b>048</b>	<b>085</b>	<b>135</b>	<b>190</b>	<b>270</b>
<b>050</b>	<b>090</b>	<b>140</b>	<b>195</b>	<b>300</b>
<b>053</b>	<b>095</b>	<b>145</b>	<b>200</b>	<b>335</b>
<b>055</b>	<b>100</b>	<b>150</b>	<b>205</b>	<b>350</b>
<b>057</b>	<b>105</b>	<b>155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

Nominal diameter\*

Inch (Z)

1"	<b>025</b>	5"	<b>127</b>	9"	<b>229</b>
1,5"	<b>038</b>	5,5"	<b>140</b>	9,5"	<b>241</b>
2"	<b>051</b>	6"	<b>152</b>	10"	<b>254</b>
2,5"	<b>064</b>	6,5"	<b>165</b>	10,5"	<b>267</b>
3"	<b>076</b>	7"	<b>178</b>	11"	<b>279</b>
3,5"	<b>089</b>	7,5"	<b>191</b>	11,5"	<b>292</b>
4"	<b>102</b>	8"	<b>203</b>	12"	<b>305</b>
4,5"	<b>114</b>	8,5"	<b>216</b>	12,5"	<b>318</b>

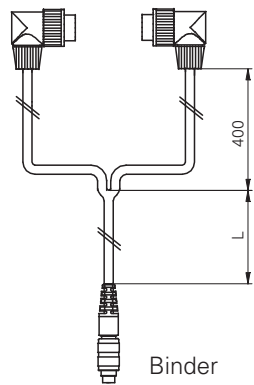
\* Other diameters available upon request



Accessories

Connecting Cable for Display and Bridge Amplifier

Binder Series 678

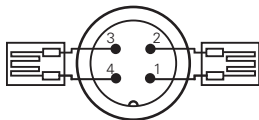


Binder Series 712

DZCY  -ST-BM-C

Length L  
 05 5 m  
 10 10 m

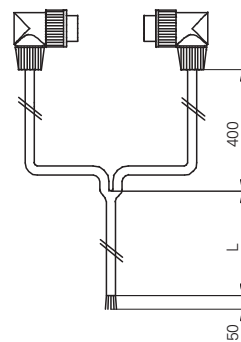
Binder Series 712



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

Connecting Cable with Open Leads

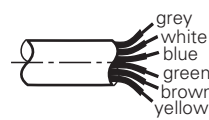
Binder Series 678



DZCY  -ST-BO-C

Length L  
 05 5 m  
 10 10 m

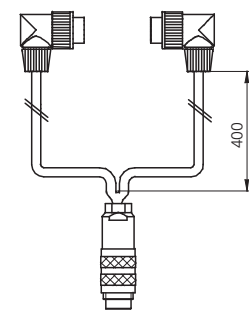
Wire Color



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

Connecting Cable with Bridge Completion for Amplifier

Binder Series 678



Binder Series 423

DSZY xx-ST-C/BC350

Binder Series 423



Pin	Signal
1	EXC.+
2	EXC.+
3	EXC.-
4	SIG.+
5	SIG.-
6	EXC.-

Order Code

DZCY  -ST  -C /

Length L  
 05 5 m  
 10 10 m  
 00 00 m

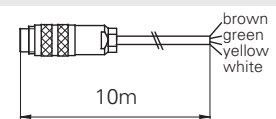
Option  
 /BC350 350 Ω connector bridge compensation

Connection types

- BO** right angle connector 6-pin open end
- BS** right angle connector 6-pin straight connector 6-pin (amplifier connection DABx AD1R)
- BM** right angle connector 6-pin / 4-pin straight connector (amplifier DDBF/DABU AD2T)

Extension for Connecting Cable with Bridge Completion

DZCS 10/404131



Color	Signal
brown	EXC.+
green	EXC.-
yellow	SIG.+
white	SIG.-

# 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

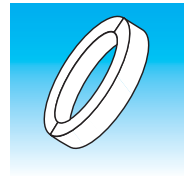
Connection	Open leads
Material	
- Ring	Aluminum anodized
- Protective foil	Stainless steel
- Screws	M8 (torque 3 Nm)
- Hinge	Nitril
Cable	5 m
	2 core, shielded, PVC

## Environmental Conditions

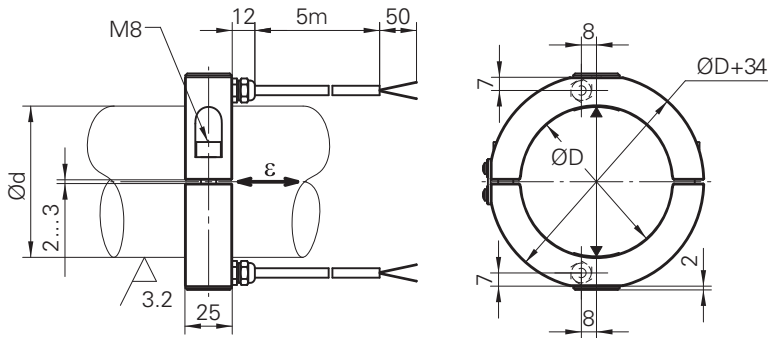
Surface installation spot	Ra 3.2 (N8) or better
Operating temp. range	-10...+60 °C
Storage temperature	-40...+100 °C
Protection class	IP 54

## 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
Non-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)**

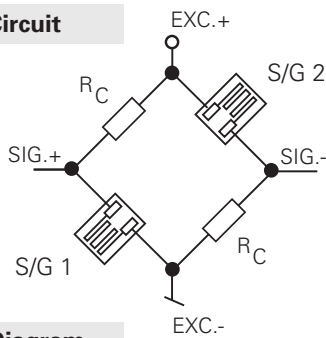


$\varnothing d = \varnothing D \begin{matrix} +0,1 \\ -0,5 \end{matrix}$

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

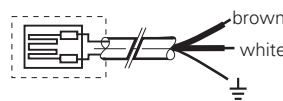
**Electrical Connections**

**Bridge Circuit**



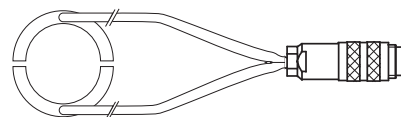
**Wire Color**

(per ring half)

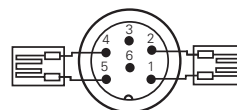


Color	Signal
brown	S/G
white	S/G

**Option /CN**

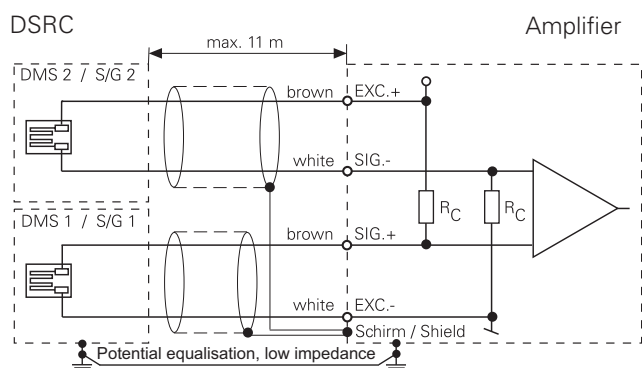


Series 712



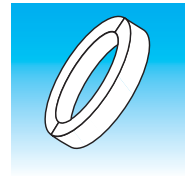
Pin	Signal
1	S/G 1
2	S/G 1
3	n.c.
4	S/G 2
5	S/G 2
6	n.c.

**Wiring Diagram**

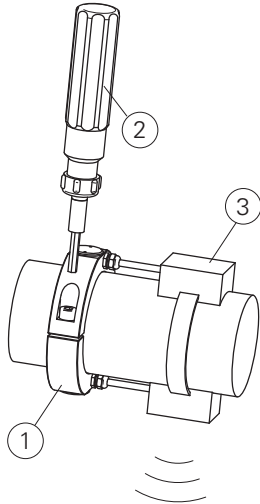




# Strain Ring with Axial Cable Exit DSRC AX



## 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  /

Option

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

Unit

**M** Metric sizes  
**Z** Inch sizes

Nominal diameter\*

Metric (M)

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

Nominal diameter\*

Inch (Z)

1"	<b>025</b>	5"	<b>127</b>	9"	<b>229</b>
1,5"	<b>038</b>	5,5"	<b>140</b>	9,5"	<b>241</b>
2"	<b>051</b>	6"	<b>152</b>	10"	<b>254</b>
2,5"	<b>064</b>	6,5"	<b>165</b>	10,5"	<b>267</b>
3"	<b>076</b>	7"	<b>178</b>	11"	<b>279</b>
3,5"	<b>089</b>	7,5"	<b>191</b>	11,5"	<b>292</b>
4"	<b>102</b>	8"	<b>203</b>	12"	<b>305</b>
4,5"	<b>114</b>	8,5"	<b>216</b>	12,5"	<b>318</b>

\* Other diameters available upon request

## Accessories

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

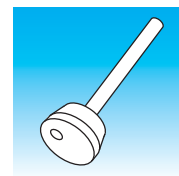
Torque wrench, fix factory setting 3 Nm      Order code: DZMT TW-F3

# Strain Probes



# Product Key

## Strain Probes DSRH



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

**DSRH U16-0400M/ST**

### Product Description

**DS** = Strain sensor

### Method

**R** = Resistive

### Series

**H** = Series H (Strain probes)

### Type

- I** = With integrated amplifier, output signal 4 - 20 mA
- P** = Passive sensor, without amplifier, cable 5m without connector (2 x 1/4 S/G bridge, k = 2,00)
- U** = With integrated amplifier, output signal 0 - 10 V

### Nominal Size (mm) (tip diameter)

- 12** = 12 mm
- 16** = 16 mm
- 20** = 20 mm

### Measurement Depth (mm)

- Example
- 0400** = 400 mm
  - 1930** = 1930 mm

### Metric

**M** = Metric

### Option

- /ST** = Sensor tip of steel
- /CN** = 6 pin cable connector installed (only for type P)
- /CL10** = cable length 10 m (only for type P)

Combinations are possible: example **CL10CN**

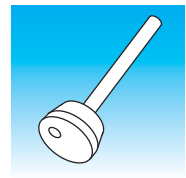
### Note the following important points



#### 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



<p><b>Type 12/16/20</b></p> 	<ul style="list-style-type: none"> <li>• Strain probe with integrated amplifier</li> <li>• Simple strain measurements in deep holes</li> <li>• Characteristic curve deviation &lt; 1%</li> <li>• For cyclical applications only</li> <li>• Integrated amplifier with voltage or current output</li> <li>• Optional sensor tip of steel for repeated installation and removal</li> </ul>	<p><b>Page 4.4</b></p>
<p><b>Type P20</b></p> 	<ul style="list-style-type: none"> <li>• Strain probe without amplifier</li> <li>• Simple strain measurements in deep holes</li> <li>• Recessed installation possible</li> <li>• Characteristic curve deviation &lt; 1%</li> <li>• For cyclical applications only</li> <li>• Optional sensor tip of steel for repeated installation and removal</li> </ul>	<p><b>Page 4.8</b></p>

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 x12/x16/x20

### Features

- Simple strain measurements in deep holes
- Characteristic curve deviation < 1%
- For cyclical applications only
- Integrated amplifier with voltage or current output
- Optional sensor tip of steel for repeated installation and removal



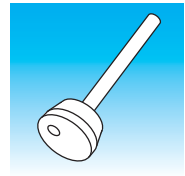
Electrical Data	DSRH U	DSRH I
Measuring range	$\pm 1000 \mu\epsilon$	0 - 1000 $\mu\epsilon$
Strain gage type	Foil gages	
S/G circuit	2 x 1/4 bridge bending compensated	
Output signal	$\pm 10$ V calibrated (max. $\pm 12$ V)	4 - 20 mA max. load 500 $\Omega$
Combinded error	< 1% FS	
Linearity	< 0,5% FS	
Hysteresis	< 0,5% FS	
Supply voltage range	18 - 36 VDC	
Current consumption	< 30 mA	< 45 mA
Output impedance	50 $\Omega$	-
Zero reset active	< $\pm 10$ mV	< $\pm 20$ $\mu$ A
Reset input galvanically separated	15 - 45 VDC	
Reset/operate offset	< $\pm 4$ mV	< $\pm 10$ $\mu$ A
Reset pulse (t1)	> 1 ms	
Reset settle time (t2)	$\approx 60$ 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	
- Sensor tip (option)	Aluminum anodized (stainless steel)
- Amplifier enclosure	Aluminum anodized
- Tube	Stainless steel
- Support ring (Type 20)	Aluminum anodized
Hexagon socket	6 mm
Installation torque	3 Nm

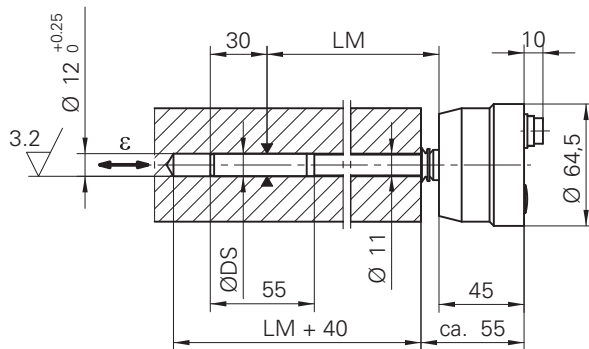
### Environmental Conditions

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

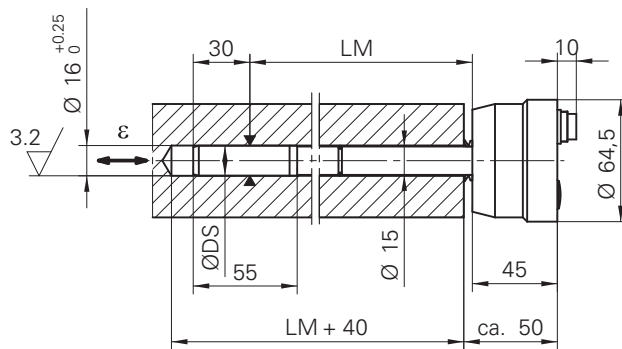


Dimensions (mm)

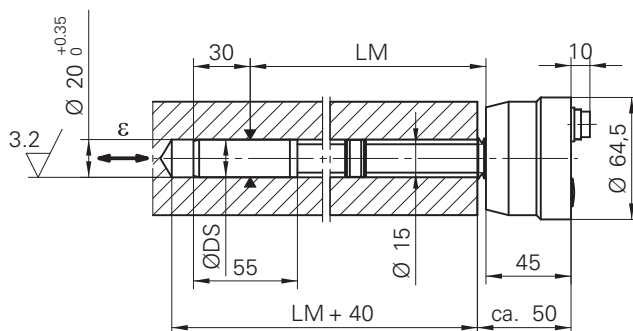
Type 12



Type 16



Type 20



- $\varnothing DS$  = Tip diameter
- $LM$  = Measurement depth
- $\epsilon$  = Strain
- $\blacktriangle$  = Gage location

# Strain Probe with Integrated Amplifier DSRH x12/x16/x20

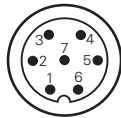
## Electrical Connections

### Current Output



Pin	Signal
1	+Vs (18 - 35 VDC)
2	Test <sub>OUT</sub>
3	Reset (bipolar)
4	Reset (bipolar)
5	+I <sub>OUT</sub> (4 - 20 mA)
6	-I <sub>OUT</sub>
7	GND

### Voltage Output



Pin	Signal
1	+Vs (18 - 35 VDC)
2	Test <sub>OUT</sub>
3	Reset (bipolar)
4	Reset (bipolar)
5	+V <sub>OUT</sub> (±10 V)
6	-V <sub>OUT</sub>
7	GND

## Order Code

DSRH  -  M /

Option

/ST Sensor tip of steel

Tip diameter (Ø DS) - Length (LM)

12-0200	16-0200	20-0200
12-0220	16-0240	20-0240
12-0230	16-0320	20-0320
12-0240	16-0400	20-0400
12-0400	16-0500	20-0500
12-0600	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

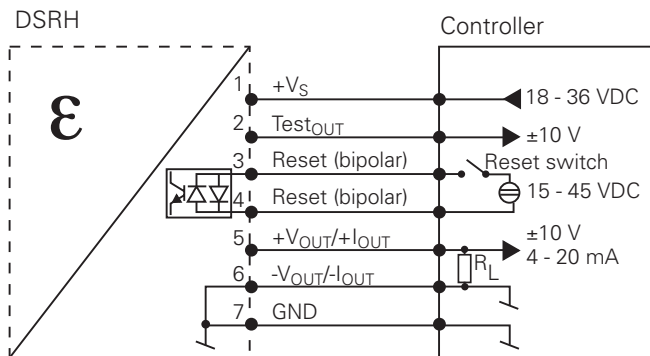
Output signal

**U** Voltage output ±10 V  
±1000 µε = ±10 V

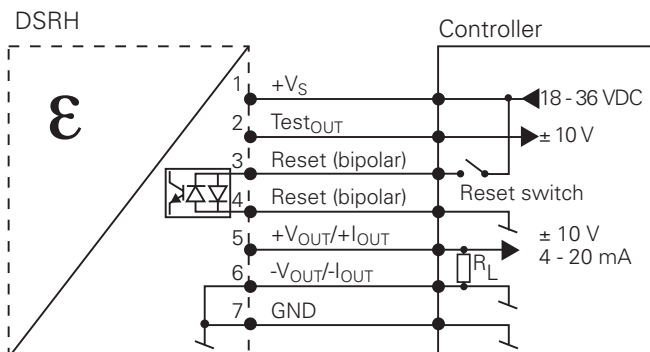
**I** Current output 4 - 20 mA  
±1000 µε = 20 mA

## Control

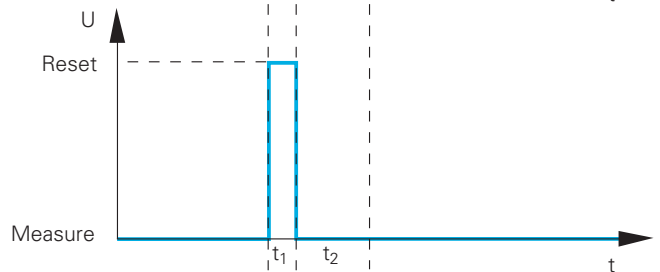
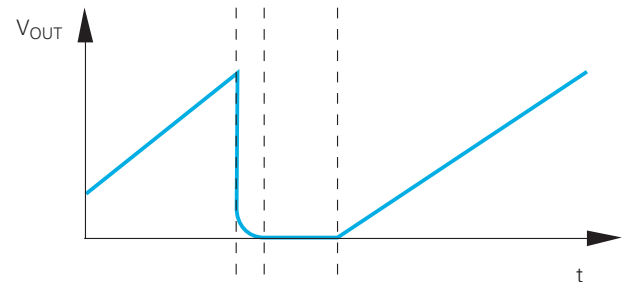
### Reset galvanically separated



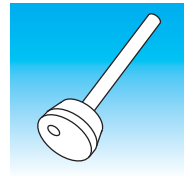
### Reset not galvanically separated



## Reset Function

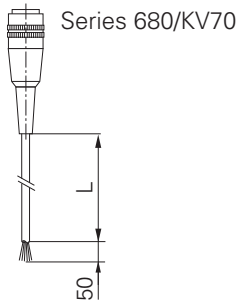


V/I <sub>OUT</sub>	Output signal
Reset	Reset input (active high)
t <sub>1</sub>	Reset pulse (> 1 ms)
t <sub>2</sub>	Reset settle time after reset pulse (≈ 60 ms)

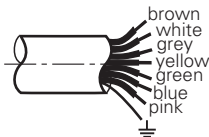


Accessories and Control Elements

Connecting Cable with Open Leads

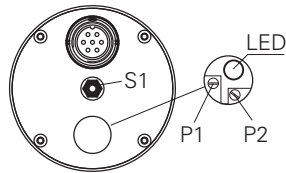


Length	Order Code
5 m	<b>DZCS 05/404155</b>
10 m	<b>DZCS 10/404155</b>



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

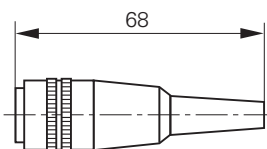
Control Elements



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

Straight Connector

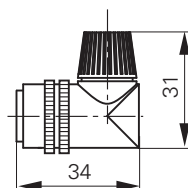
Series 680/KV70



Part No. 10134469

Right Angle Connector

Series 682/WKV70



Part No. 10133976

Torque Wrench



Order code: DZMT TW-A1-6  
adjustable from 1 - 6 Nm

Order code: DZMT TW-F3  
preset fix to 3 Nm



# Strain Probes without Amplifier

## DSRH P20

### Features

- Simple strain measurements in deep holes
- Completely recessed installation possible
- Characteristic curve deviation < 1%
- For cyclical applications only
- Optional sensor tip of steel for repeated installation and removal



### Strain Gage Data

Strain gage type	Foil gages
Nominal resistance at 24 °C	350 Ω
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

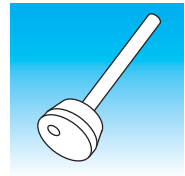
Connection	Open leads
Material	
- Sensor tip (option)	Aluminum anodized (stainless steel)
- Tube	Stainless steel
- Support ring	Aluminum anodized
Hexagon socket	6 mm
Installation torque	(3 Nm)
Cable	5 m, 4 core, shielded PUR

### Environmental Conditions

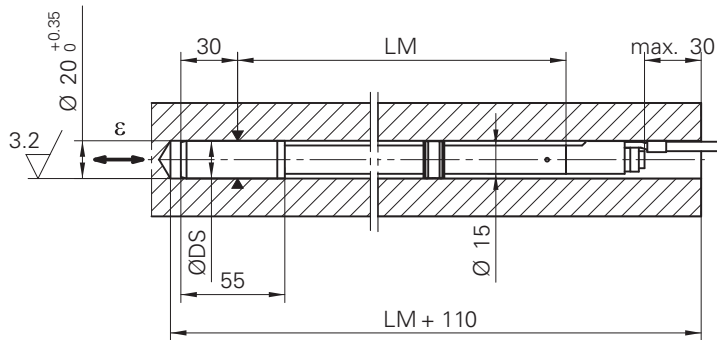
Surface installation spot	Ra 3.2 (N8) or better
Operating temp. range	-10...+60 °C
Storage temperature	-40...+100 °C
Protection class	IP 54

### Electrical Data

Measuring Range	±1000 µε (1 µε = 0,001 mm/m resp. 1 µε equals 0,001 mm strain per meter)
Output signal per 1000 µε	1 mV/V (with completed full bridge)
Combined error	< 1% FS
Linearity	< 0,5% FS
Hysteresis	< 0,5% FS
Non-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 probe is mounted. Baumer amplifiers and display instruments are equipped with a reset function to tare this offset. The bridge should be reset before each measuring cycle.
Max. recommended bridge excitation	9 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)



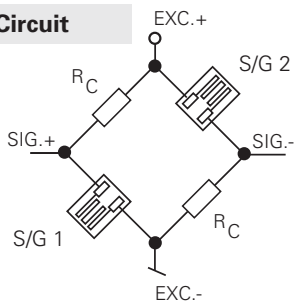
**Dimensions (mm)**



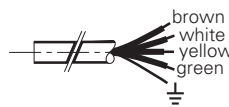
- Ø DS = Tip diameter
- LM = Measurement depth
- ε = Strain
- ▲ = Gage location

**Electrical Connections**

**Bridge Circuit**

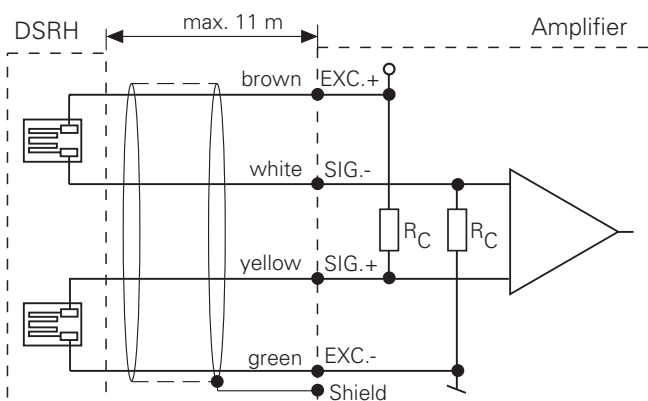


**Wire Color**

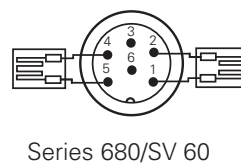


Color	Signal
brown	S/G 1
white	S/G 1
yellow	S/G 2
green	S/G 2

**Wiring Diagram**



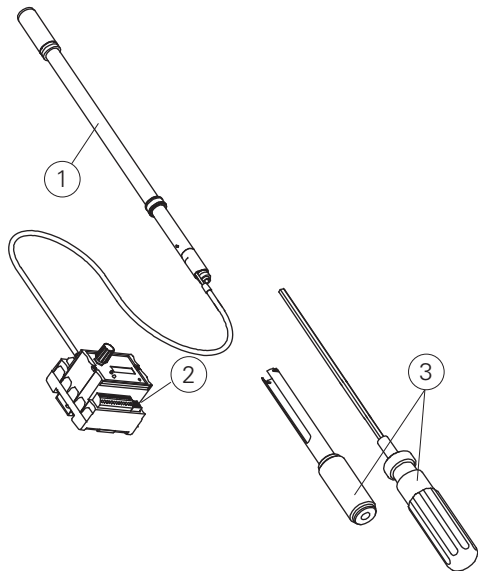
**Option /CN**



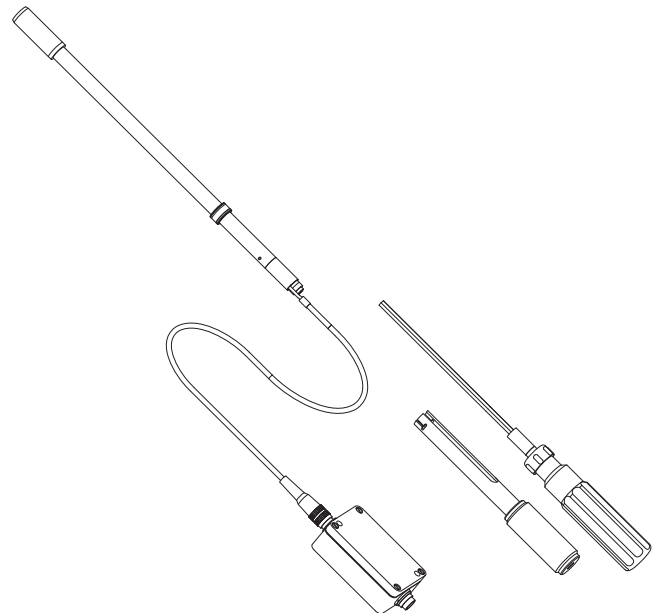
Pin	Signal
1	S/G 1
2	S/G 1
3	Shield
4	S/G 2
5	S/G 2
6	Shield

# Strain Probe without Amplifier DSRH P20

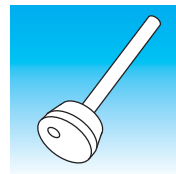
## Typical Measuring Chains



Pos.	Qty	Type	Description
1	1	DSRH P20	Strain probe w/o amplifier
2	1	DABU MP4M	Bridge amplifier
3	1	DZMT/404486	Mounting tool set



Pos.	Qty	Type	Description
1	1	DSRH P20-xxxxM/CN	Strain probe with optional connector
2	1	DABU AL1R	Bridge amplifier in aluminum enclosure
3	1	DZMT/404486	Mounting tool set



**Order Code**

DSRH P20 -     M /

Options

- /ST Sensor tip of steel
- /CN Conn. 6 pin/m installed
- /CL10 Cable length 10 m

Length (LM)

0200	0760
0220	0800
0240	0900
0400	1050
0500	1300
0600	1400

**Accessories**

**Mounting tool set**



Order code: DZMT/404486

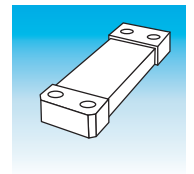


# Strain Links



# Product Key

## Strain Links DSRT



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

**DSRT 1400-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  
**22DB** = 25,9 x 70 x 16,9 mm, for static and dynamic applications, with current output  
**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

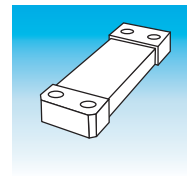
**S5** = Cable, 5 pin connector, M12 x 1





### 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



<p><b>Type 22DA</b></p> 	<ul style="list-style-type: none"> <li>• Strain link without amplifier</li> <li>• For static and dynamic applications</li> <li>• Very good repeatability</li> <li>• Measurement range from 100µε up to 750µε</li> <li>• Overloadsave</li> </ul>	<p><b>Page 5.4</b></p>
<p><b>Type 22DB</b></p> 	<ul style="list-style-type: none"> <li>• Surface strain sensor with integrated amplifier</li> <li>• For static and dynamic applications</li> <li>• Integrated reset circuit for automatic zero signal</li> <li>• Power output 4 to 20 mA</li> <li>• Very good repeatability</li> <li>• Measurement range from 100µε up to 750µε</li> </ul>	<p><b>Page 5.6</b></p>
<p><b>Type 22DD</b></p> 	<ul style="list-style-type: none"> <li>• Surface strain sensor with integrated amplifier</li> <li>• For static and dynamic applications</li> <li>• Integrated reset circuit for automatic zero signal</li> <li>• Voltage output 0 to 10 V, power output 4 to 20 mA</li> <li>• Very good repeatability</li> <li>• Measurement range from ±100µε up to ±750µε</li> </ul>	<p><b>Page 5.8</b></p>
<p><b>Type 22DJ</b></p> 	<ul style="list-style-type: none"> <li>• For cyclical measurements; with integrated amplifier</li> <li>• CANopen</li> <li>• Excellent signal to noise ratio</li> <li>• High sensitivity</li> </ul>	<p><b>Page 5.10</b></p>

### 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  $\pm 100$  up to  $\pm 750 \mu\epsilon$
- Overloadsave



## S/G Data

Strain gage type	Foil strain gage
Bridge resistance	Full bridge 350 $\Omega$

## Mechanical Data

Material	
- Housing	1.7225 chemically nickel-plated
- Cover	1.4301
Electrical connection	5 pin (M12 x 1)
Force on sensor attachment at 250 $\mu\epsilon$	approx. 120 N
Overload capability	200 %

## Environmental Conditions

Operating temp.range	0...+70 °C
Storage temp. range	-40...85°C
EMC	EN 61000-6-2 EN 61000-6-4
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 <sup>2</sup> /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

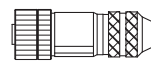
DSRT 22DA-S5-

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

## Electrical Data

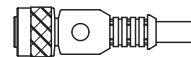
Measuring range	$\pm 100 \mu\epsilon$ ... $\pm 750 \mu\epsilon$ (1 $\mu\epsilon$ = 0,001 mm/m resp. 1 $\mu\epsilon$ equals 0,001 mm strain per meter)
Sensitivity	$\pm 1,8$ mV/V @ 750 $\mu\epsilon$ $\pm 0,9$ mV/V @ 250 $\mu\epsilon$
Sensitivity tolerance	$\pm 2$ %
Accuracy	< 1,0%
Linearity	< 0,5% FSR
Hysteresis	< 0,5% FSR
Repeatability	< 0,1% FSR (cycle to cycle)
Supply voltage range	5 - 10 VDC
Taring "activ High"	Low < 1 VDC High 5...33 VDC

## Accessories (not included in delivery)



Series 713

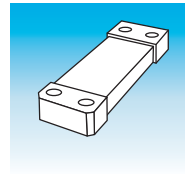
Connector, 5 pin, part no. 135462



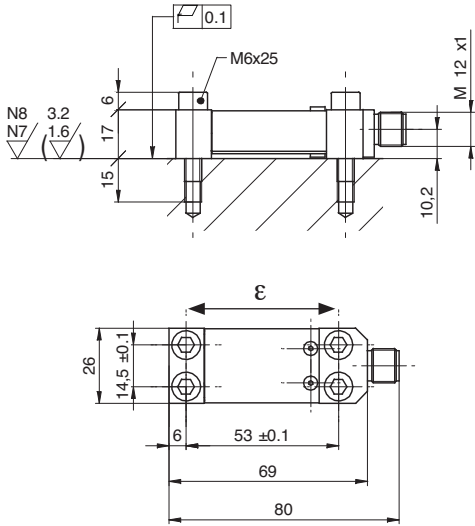
Connector with cable, 5 pin  
ES 34CP2B 5-pin (shielded) 2 m, PUR,  
(Part No. 10144720)

ES 34CP5B 5-pin (shielded) 5 m, PUR,  
(Part No. 10137485)

ES 34CP10B 5-pin (shielded) 10 m, PUR,  
(Part No. 10155587)



Dimensions (mm)

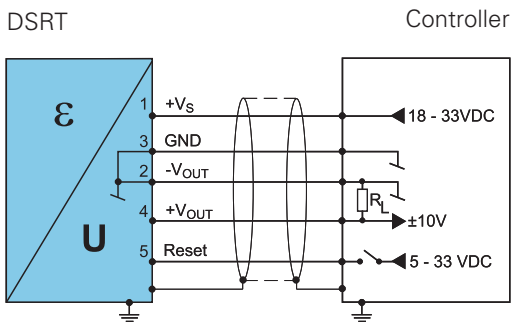


Electrical Connections

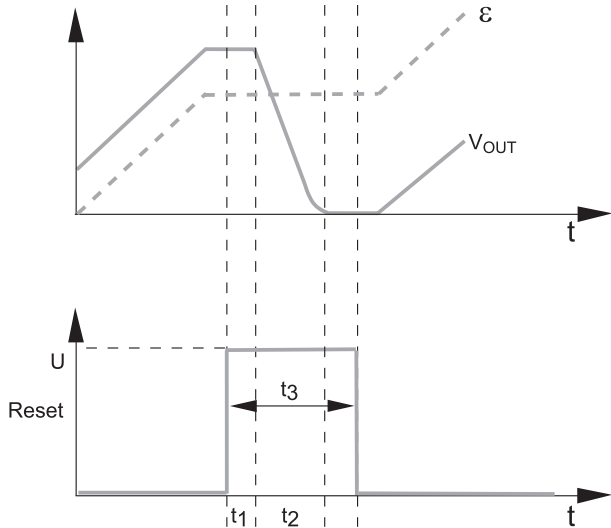


Pin	Signal
1	+Vs
2	-V <sub>OUT</sub>
3	GND
4	+V <sub>OUT</sub>
5	Reset
Housing	Shield

Control



Reset Function



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

# Strain Link with Amplifier DSRT 22DB

## Features

- Static and dynamic applications
- Integrated reset switch for automatic zero point setting
- Measuring range 100 up to 750  $\mu\epsilon$ , extension and compression
- Current 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
Force on sensor attachment at 250 $\mu\epsilon$	approx. 120 N

## 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 <sup>2</sup> /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 22DB-S5-     /

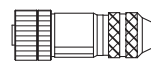
**T** Tension load (structure strain)  
**C** Compression load (structure strain)

<b>0100</b>	Measuring range 100 $\mu\epsilon$
<b>0250</b>	Measuring range 250 $\mu\epsilon$
<b>0350</b>	Measuring range 350 $\mu\epsilon$
<b>0500</b>	Measuring range 500 $\mu\epsilon$
<b>0750</b>	Measuring range 750 $\mu\epsilon$

## Electrical Data

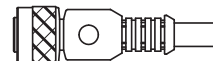
Measuring range	$\pm 100 \mu\epsilon \dots \pm 750 \mu\epsilon$ (1 $\mu\epsilon$ = 0,001 mm/m resp. 1 $\mu\epsilon$ equals 0,001 mm strain per meter)
Output signal	4 - 20 mA
Characteristic curve deviation	< 1,0% FSR
Linearity	< 0,5% FSR
Hysteresis	< 0,5% FSR
Repeatability	< 0,1% FSR (cycle to cycle)
Supply voltage range	14 - 33 VDC
Taring "activ High"	Low < 1 VDC High 5...33 VDC

## Accessories (not included in delivery)



Series 713

Bushing, control side, 5-pin, Part No. 10135462

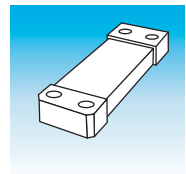


Bushing with cable, control side, 5-pin

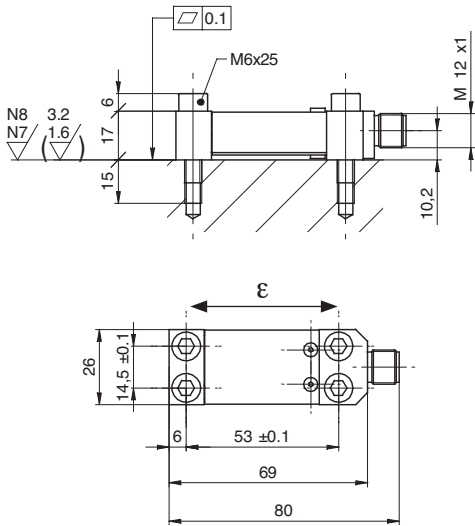
ES 34CP2B 5-pin (shielded) 2 m, PUR,  
(Part No. 10144720)

ES 34CP5B 5-pin (shielded) 5 m, PUR,  
(Part No. 10137485)

ES 34CP10B 5-pin (shielded) 10 m, PUR,  
(Part No. 10155587)



Dimensions (mm)

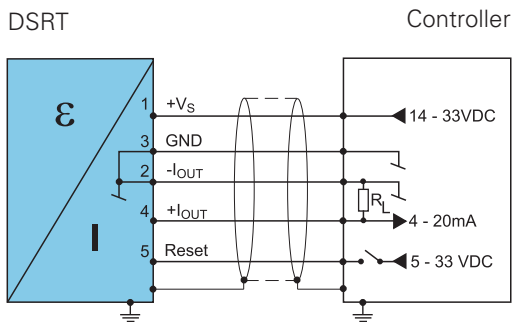


Electrical Connections

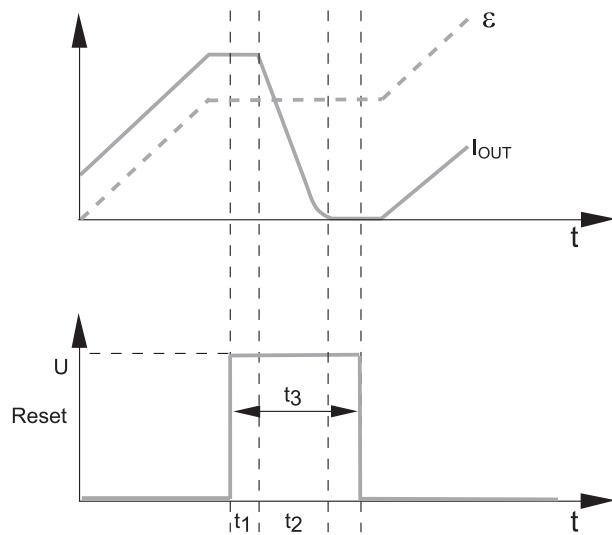


Pin	Signal
1	+Vs
2	-V <sub>OUT</sub>
3	GND
4	+V <sub>OUT</sub>
5	Reset
Housing	Shield

Control



Reset Function



$I_{OUT}$	Output signal
$\epsilon$	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 Amplifier DSRT 22DD

## Features

- Static and dynamic applications
- Integrated reset switch for automatic zero point setting
- Measuring range  $\pm 100$  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
Force on sensor attachment at 250 $\mu\epsilon$	approx. 120 N

## 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 <sup>2</sup> /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  $\mu\epsilon$

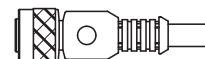
## Electrical Data

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	$\pm 10$ VDC (max. $\pm 12$ 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)



Bushing, control side, 5-pin, Part No. 10135462

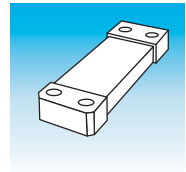


Bushing with cable, control side, 5-pin

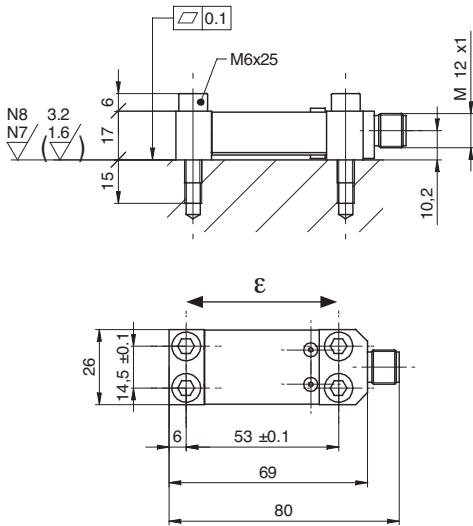
ES 34CP2B 5-pin (shielded) 2 m, PUR,  
(Part No. 10144720)

ES 34CP5B 5-pin (shielded) 5 m, PUR,  
(Part No. 10137485)

ES 34CP10B 5-pin (shielded) 10 m, PUR,  
(Part No. 10155587)



Dimensions (mm)

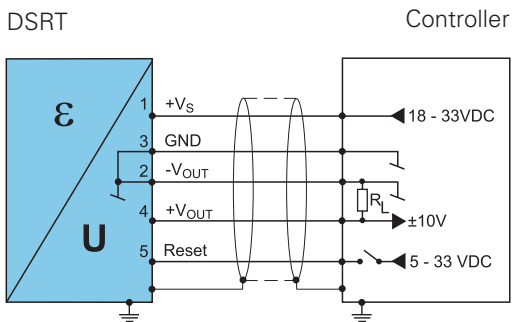


Electrical Connections

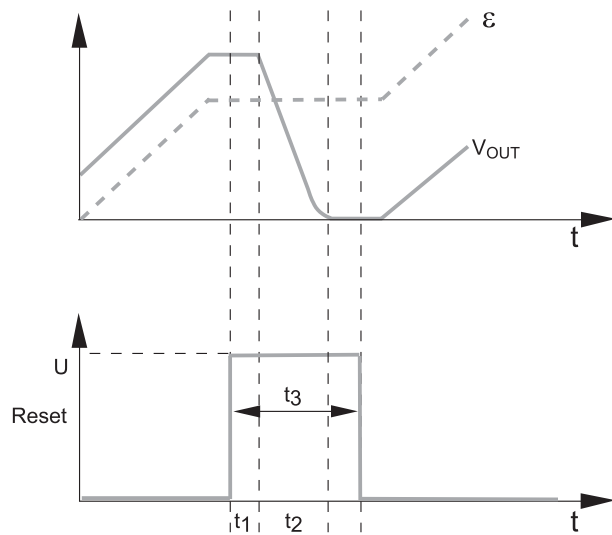


Pin	Signal
1	+Vs
2	-V <sub>OUT</sub>
3	GND
4	+V <sub>OUT</sub>
5	Reset
Housing	Shield

Control



Reset Function



V <sub>OUT</sub>	Output signal
ε	Input signal
Reset	Reset input (active high)
t <sub>1</sub>	Reset delay (< 0,3 ms)
t <sub>2</sub>	Reset time (< 5 ms)
t <sub>3</sub>	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  $\pm 100$  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

Force on sensor attachment at  $250 \mu\epsilon$     approx. 100 N

## 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<sup>2</sup>/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

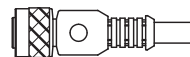
Current draw                 < 60 mA

## Accessories (not included in delivery)



Series 713

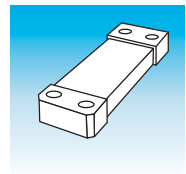
Bushing, control side, 5-pin, Part No. 10135462



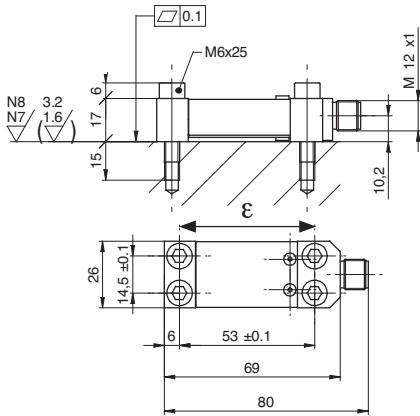
Bushing with cable, control side, 5-pin  
 ES 34CP2B 5-pin (shielded) 2 m, PUR,  
 (Part No. 10144720)

ES 34CP5B 5-pin (shielded) 5 m, PUR,  
 (Part No. 10137485)

ES 34CP10B 5-pin (shielded) 10 m, PUR,  
 (Part No. 10155587)



**Dimensions (mm)**



**Supported Objects**

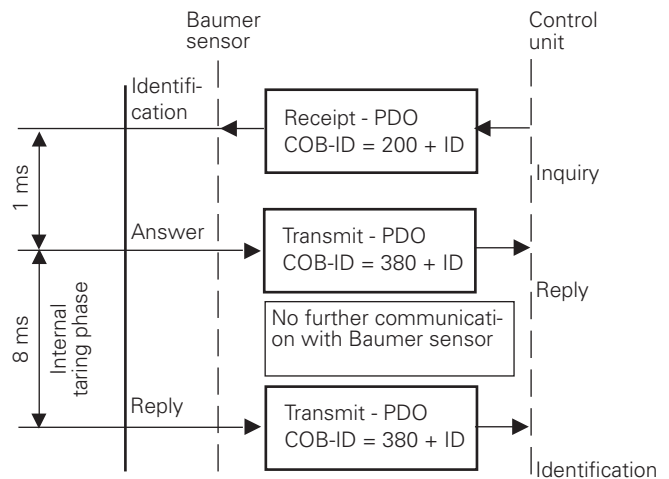
Object	Description
1000	Device profile
1001	Error register
1002	Serial number
1003	Emergency history
1005	Sync ID
1008	Device description
1009	Hardware version
100A	Software version
1010	Store
1011	Load default values
1017	Heartbeat
1018	Device identity
1400	Reception PDO1 parameter
1600	PDO 1 Mapping 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

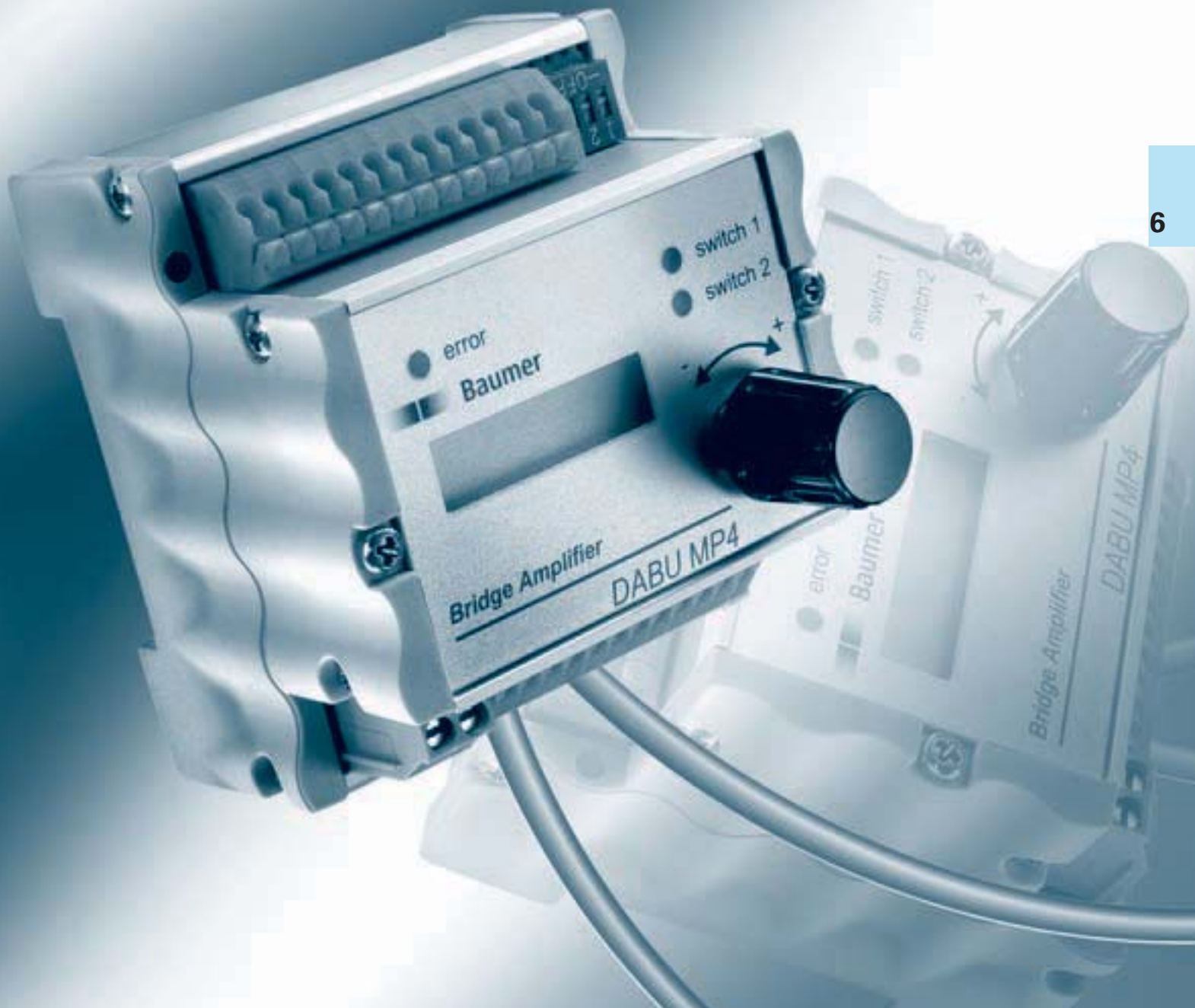
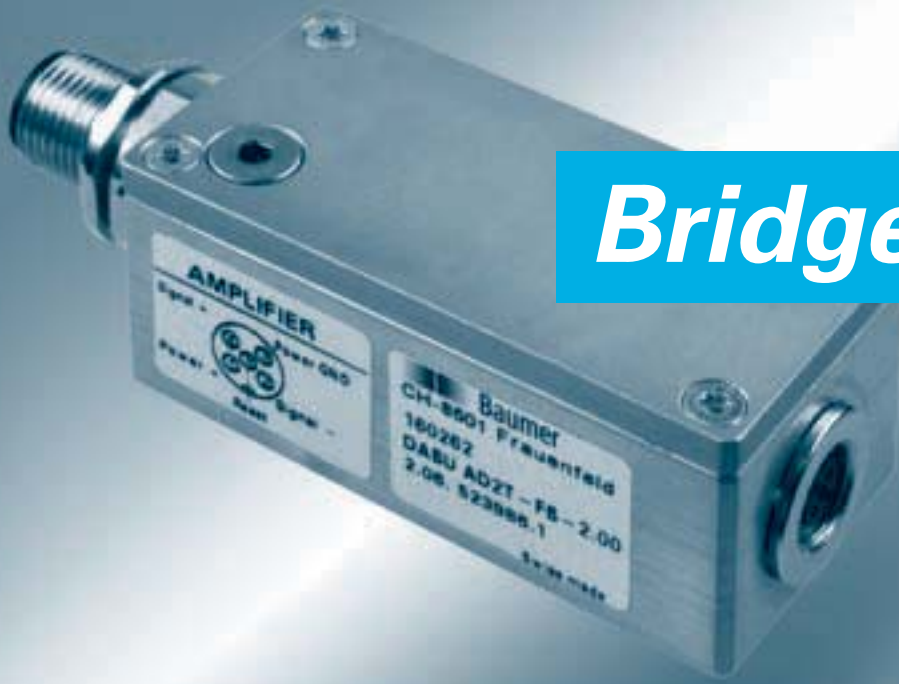
**Error (Unstable signal)**

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



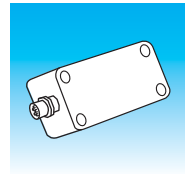


# Bridge Amplifier



# Product Key

## Bridge Amplifier DABx



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

**DABU MP4 M-FC-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

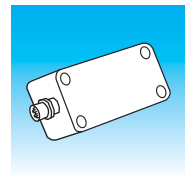
**0.50** = 0,50 mV/V at nominal output signal  
**1.00** = 1,00 mV/V at nominal output signal  
**1.25** = 1,25 mV/V at nominal output signal  
**2.00** = 2,00 mV/V at nominal output signal






**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



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

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

## Features

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



## Electrical Data

Output signal	$\pm 10$ V calibrated (max. $\pm 12$ 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	350 $\Omega$ ( $R_C$ )
Output impedance	22 $\Omega$
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	$\pm 6$ 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 <sub>pp</sub> 0350 < 12 mV <sub>pp</sub> 0500 < 7,5 mV <sub>pp</sub> 1000 < 5 mV <sub>pp</sub>

## 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

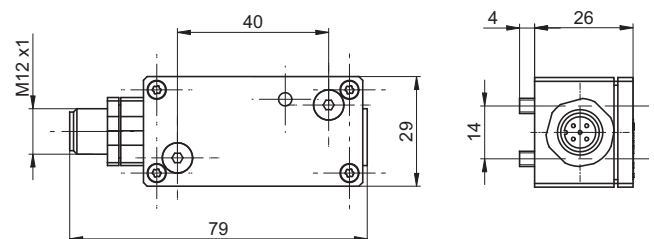
DABU AD2T-2Q



Gain

<b>0250</b>	0250 $\mu\epsilon$ = 0 - 10 V
<b>0350</b>	0350 $\mu\epsilon$ = 0 - 10 V
<b>0500</b>	0500 $\mu\epsilon$ = 0 - 10 V
<b>1000</b>	1000 $\mu\epsilon$ = 0 - 10 V

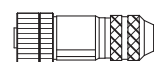
## Dimensions (mm)



## Delivery Contents

- Mounting screw 2 pcs. M4 x 30

## Accessories (not included in delivery)



Series 713

Bushing, control side, 5-pin, Part No. 10135462



M12 x 1

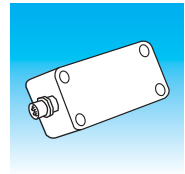
Bushing with cable, control side, 5-pin

ES 34CP2B 5-pin (shielded) 2 m, PUR, (Part No. 10144720)

ES 34CP5B 5-pin (shielded) 5 m, PUR, (Part No. 10137485)

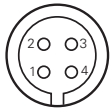
ES 34CP10B 5-pin (shielded) 10 m, PUR, (Part No. 10155587)

Flylead connector, sensor side, 4-pin., series 712 (Part No. 10136268)



Electrical Connection

Sensor side Series 712



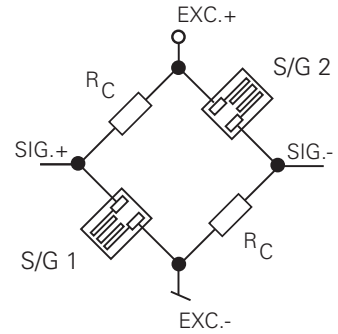
Pin	Signal	
1	DMS 1	EXC.+
2	DMS 1	SIG.-
3	DMS 2	SIG.+
4	DMS 2	EXC.-

Control side Series 713

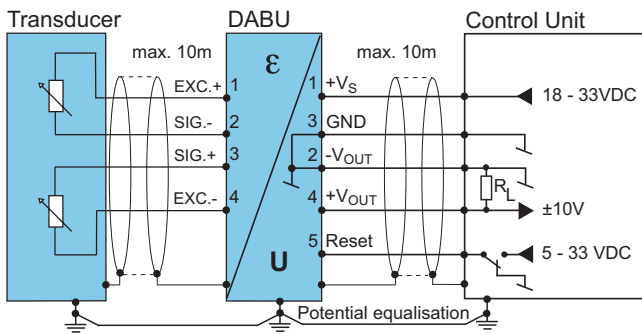


Pin number	Signal
1	+Vs
2	-V <sub>OUT</sub>
3	GND
4	+V <sub>OUT</sub>
5	Reset

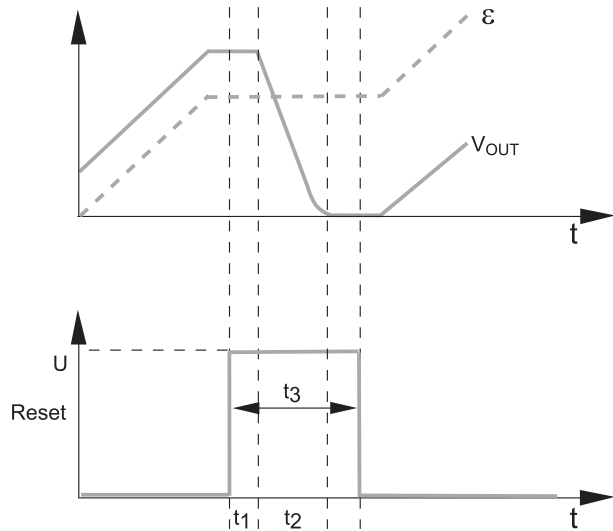
S/G Bridge



Control



Reset Function



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

# Bridge Amplifier for Strain Gage Full Bridge

## DABI AD2T-2Q

### Features

- Industrial bridge amplifier for 2 x 1/4 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 < 0,3% 0500 < 0,2% 1000 < 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	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 <sub>pp</sub> 0500 < 20 μA <sub>pp</sub> 1000 < 15 μA <sub>pp</sub>

### 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

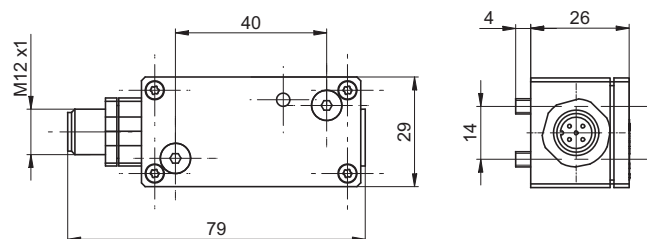
DABI AD2T-2Q  /C

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

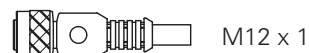
- Mounting screw 2 pcs. M4 x 30

### Accessories (not included in delivery)



Series 713

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



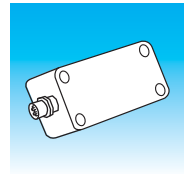
M12 x 1

Bushing with cable, control side, 5-pin  
ES 34CP2B 5-pin (shielded) 2 m, PUR,  
(Part No. 10144720)

ES 34CP5B 5-pin (shielded) 5 m, PUR,  
(Part No. 10137485)

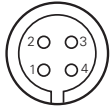
ES 34CP10B 5-pin (shielded) 10 m, PUR,  
(Part No. 10155587)

Flylead connector, sensor side, 4-pin., series 712  
(Part No. 10136268)



Electrical Connection

Sensor side Series 712



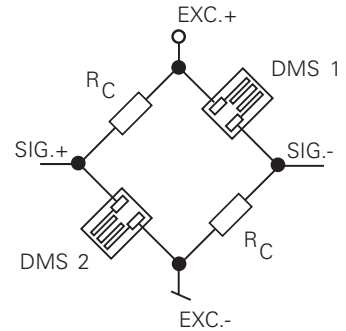
Pin	Signal
1	DMS 1 EXC.+
2	DMS 2 SIG.-
3	DMS 3 SIG.+
4	DMS 4 EXC.-

Control side Series 713

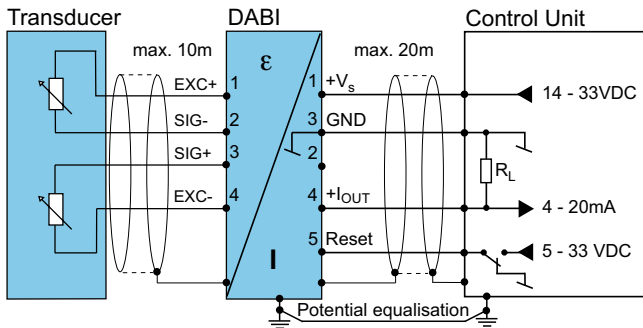


Pin number	Signal
1	+Vs
2	n.c. (GND)
3	GND
4	+I <sub>OUT</sub>
5	Reset

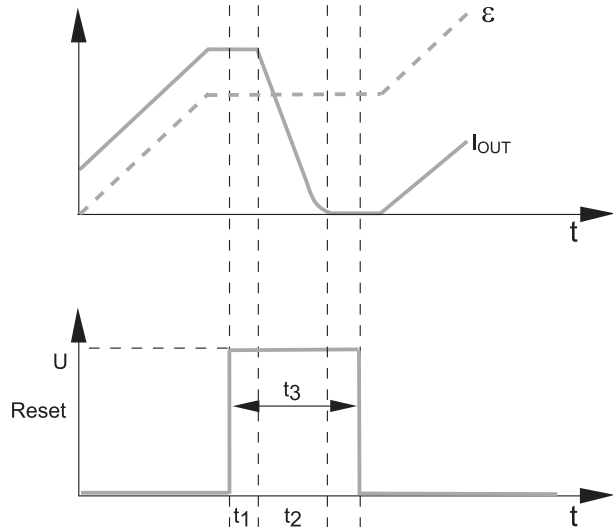
S/G Bridge



Control



Reset Function



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



## Electrical Data

Output signal	$\pm 10$ V calibrated (max. $\pm 12$ 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	$350 \Omega (R_C)$
Output impedance	$22 \Omega$
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	$\pm 6$ 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 <sub>pp</sub> $0.50 < 7,5$ mV <sub>pp</sub> $1.00 < 5$ mV <sub>pp</sub> $2.00 < 5$ mV <sub>pp</sub>

## 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

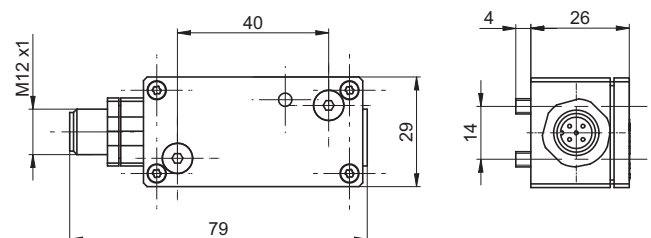
DABU AD2T-FB



Gain

<b>0.25</b>	0,25 mV/V = 0 - 10 V
<b>0.50</b>	0,50 mV/V = 0 - 10 V
<b>1.00</b>	1,00 mV/V = 0 - 10 V
<b>1.25</b>	1,25 mV/V = 0 - 10 V
<b>2.00</b>	2,00 mV/V = 0 - 10 V

## Dimensions (mm)



## Delivery Contents

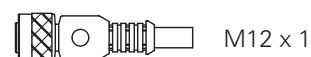
- Mounting screw 2 pcs. M4 x 30

## Accessories (not included in delivery)



Series 713

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



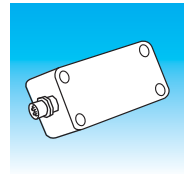
M12 x 1

Bushing with cable, control side, 5-pin  
ES 34CP2B 5-pin (shielded) 2 m, PUR,  
(Part No. 10144720)

ES 34CP5B 5-pin (shielded) 5 m, PUR,  
(Part No. 10137485)

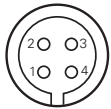
ES 34CP10B 5-pin (shielded) 10 m, PUR,  
(Part No. 10155587)

Flylead connector, sensor side, 4-pin., series 712  
(Part No. 10136268)



Electrical Connection

Sensor side Series 712



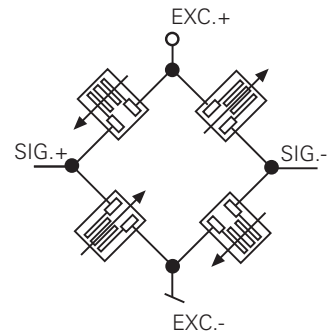
Pin	Signal
1	Full bridge EXC.+
2	Full bridge SIG.-
3	Full bridge SIG.+
4	Full bridge EXC.-

Control side Series 713

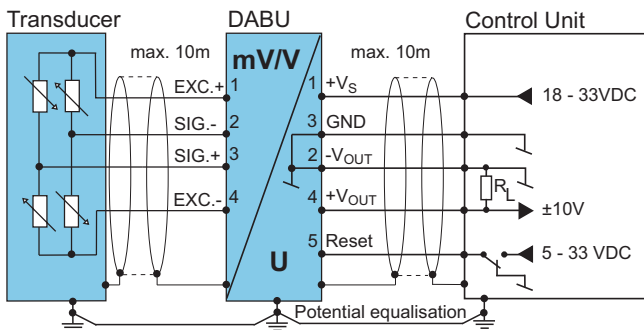


Pin number	Signal
1	+Vs
2	-V <sub>OUT</sub>
3	GND
4	+V <sub>OUT</sub>
5	Reset

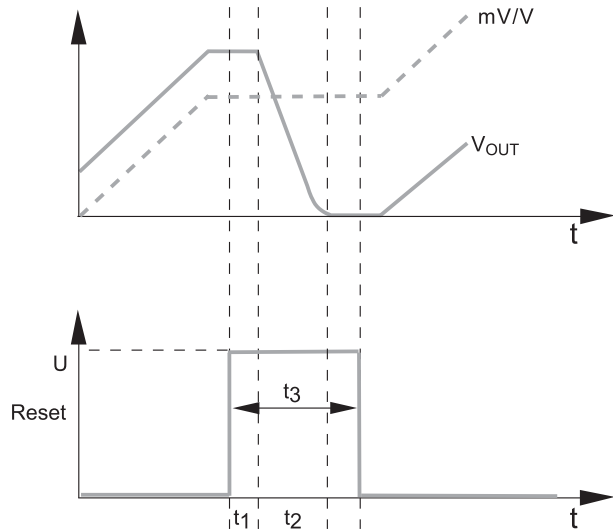
S/G Bridge



Control



Reset Function



V <sub>OUT</sub>	Output signal
mV/V	Input signal
Reset	Reset input (active high)
t <sub>1</sub>	Reset delay (< 0,3 ms)
t <sub>2</sub>	Reset time (< 5 ms)
t <sub>3</sub>	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 <sub>pp</sub>	
	0.50 < 7,5 μA <sub>pp</sub>	
	1.00 < 5 μA <sub>pp</sub>	
		2.00 < 5 μA <sub>pp</sub>

### 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

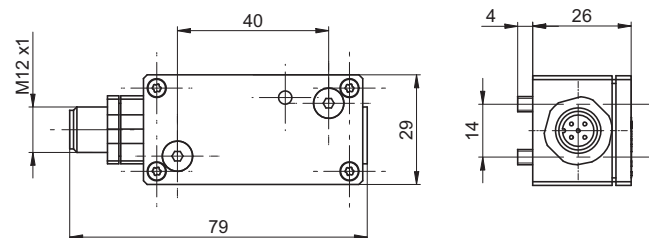
### Order Code

DABI AD2T-FB

Gain

<b>0.25</b>	0,25 mV/V = 4 - 20 mA
<b>0.50</b>	0,50 mV/V = 4 - 20 mA
<b>1.00</b>	1,00 mV/V = 4 - 20 mA
<b>2.00</b>	2,00 mV/V = 4 - 20 mA

### Dimensions (mm)



### Delivery Contents

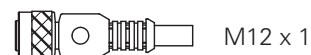
- Mounting screw 2 pcs. M4 x 30

### Accessories (not included in delivery)



Series 713

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



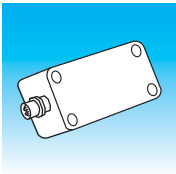
M12 x 1

Bushing with cable, control side, 5-pin  
ES 34CP2B 5-pin (shielded) 2 m, PUR,  
(Part No. 10144720)

ES 34CP5B 5-pin (shielded) 5 m, PUR,  
(Part No. 10137485)

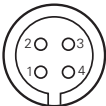
ES 34CP10B 5-pin (shielded) 10 m, PUR,  
(Part No. 10155587)

Flylead connector, sensor side, 4-pin., series 712  
(Part No. 10136268)



Electrical Connection

Sensor side Series 712



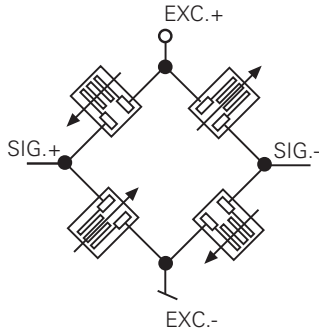
Pin	Signal
1	Full bridge EXC.+
2	Full bridge SIG.-
3	Full bridge SIG.+
4	Full bridge EXC.-

Control side Series 713

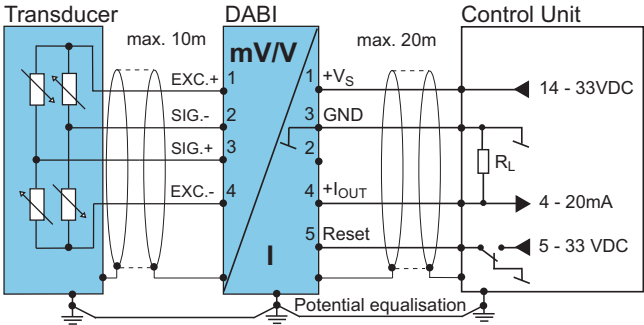


Pin number	Signal
1	+Vs
2	n.c. (GND)
3	GND
4	+I <sub>OUT</sub>
5	Reset

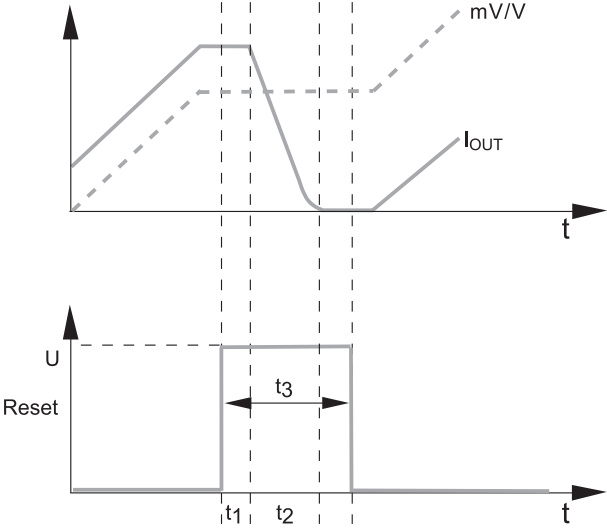
S/G Bridge



Control



Reset Function



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

# Bridge Amplifier, Selectable Configuration DABx MP4M

## Features

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



Electrical Data	DABU	DABI
Output signal	$\pm 10$ V calibrated load > 10 k $\Omega$	4 - 20 mA shunt < 500 $\Omega$
Resolution	< 0,035% FS	< 0,07% 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 $\Omega$	
Zero reset active	< $\pm 10$ mV	< $\pm 10$ $\mu$ A
Reset input galvanically separated	active 5 - 33 VDC inactive < 1 VDC	
Taring range	$\pm 6$ mV/V	
Reset pulse	< 1 ms	
Holding time	< 5 ms	
Reset/operate offset	< $\pm 10$ mV	< $\pm 15$ $\mu$ A
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 $^{\circ}$ C
Storage temperature	-20...+80 $^{\circ}$ C
Protection class	IP 40

## Order Code

DAB  MP4M-FC-

Gain

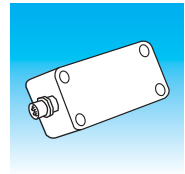
**0.50** = 0,50 mV/V= 0-10 V resp. 4-20 mA  
**0.75** = 0,75 mV/V= 0-10 V resp. 4-20 mA  
**1.00** = 1,00 mV/V= 0-10 V resp. 4-20 mA  
**1.25** = 1,25 mV/V= 0-10 V resp. 4-20 mA  
**2.00** = 2,00 mV/V= 0-10 V resp. 4-20 mA

Output signal

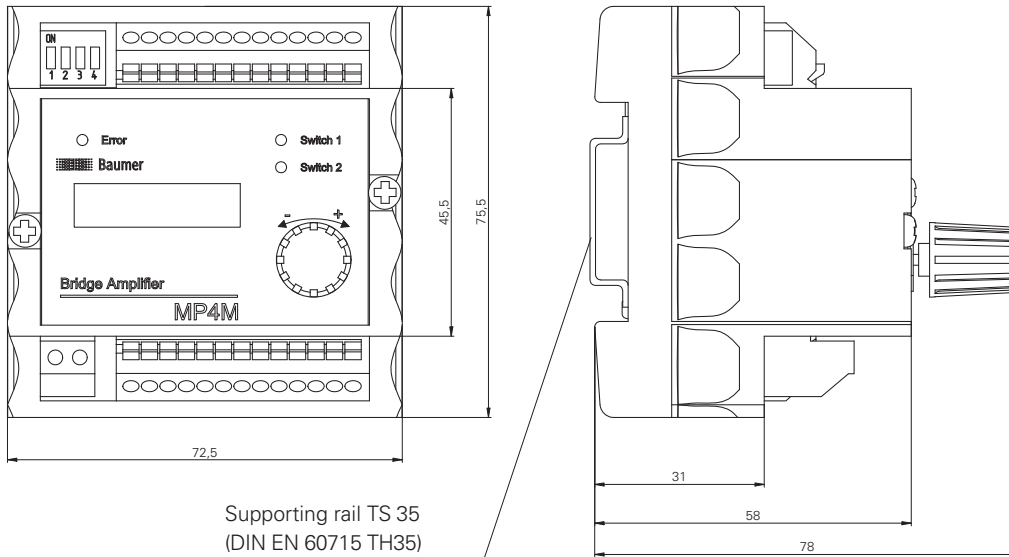
**U** Voltage output  $\pm 10$  V  
**I** Current output 4 - 20 mA

## Delivery Contents

- Clamping clip for ground connection



Dimensions (mm)



Electrical Connections

Pin assignment sensor side

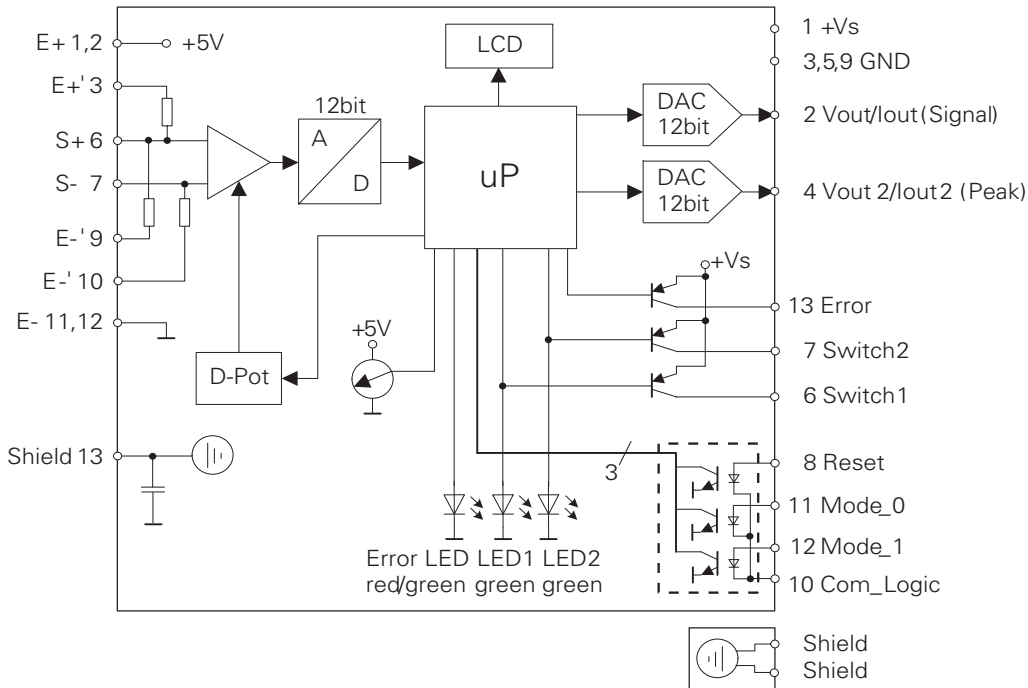
Pin	Signal	Description
1	+E	+bridge excitation
2	+E	+bridge excitation
3	+E'	bridge to completion resistor
4	n.c.	
5	n.c.	
6	+S	+ signal input
7	-S	- signal input
8	n.c.	
9	-E'	bridge to completion resistor
10	-E'	bridge to completion resistor
11	-E	- bridge excitation
12	-E	- bridge excitation
13	Shield	

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

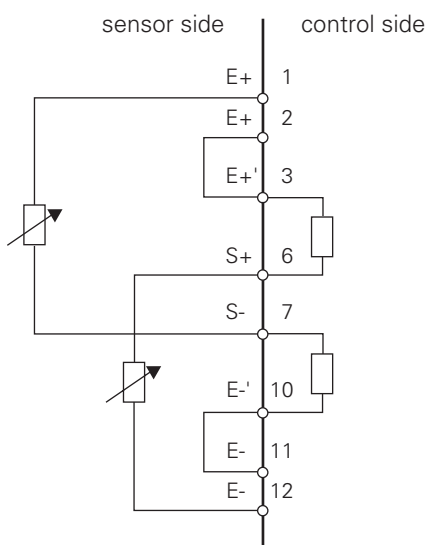
# Bridge Amplifier, Selectable Configuration DABx MP4M

## Electrical Connections

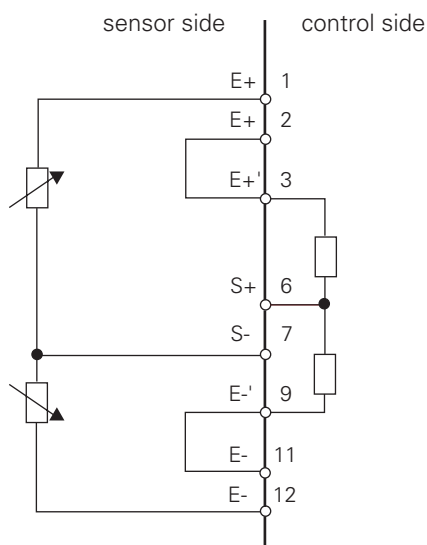


## S/G Bridge

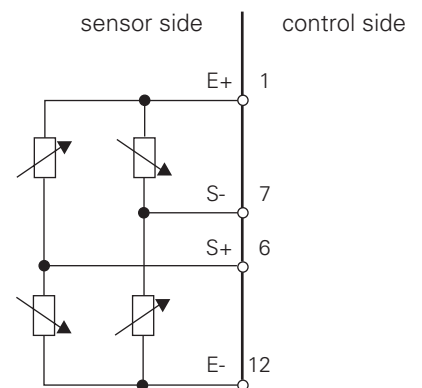
### 2 x 1/4-bridge (diagonal)

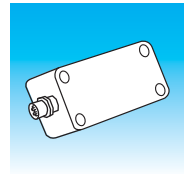


### half bridge

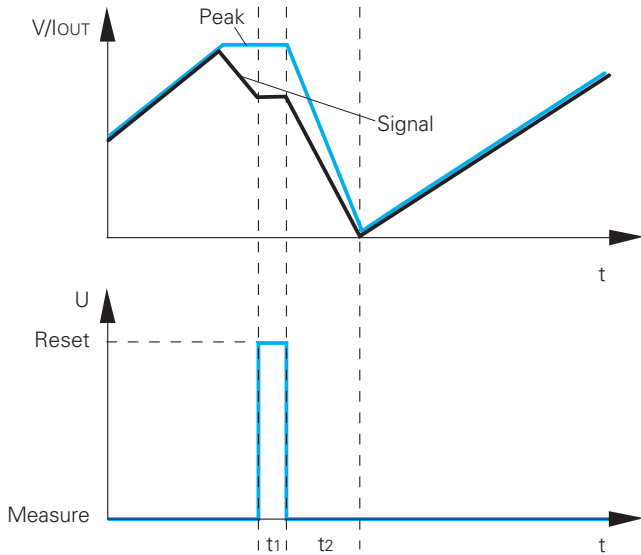


### full bridge



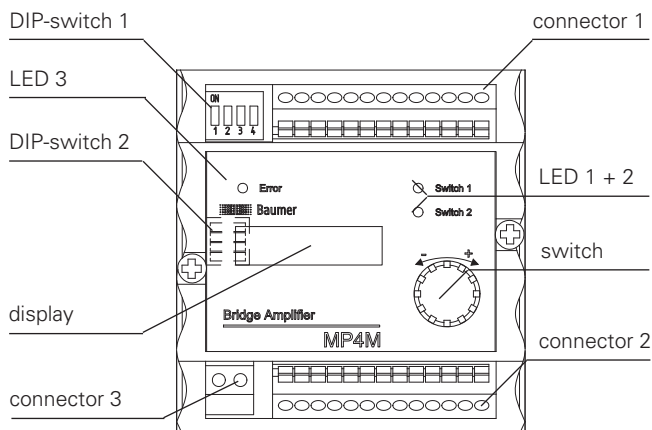


**Reset Function**



$V/I_{OUT}$	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

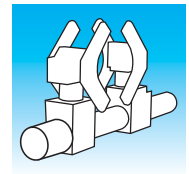












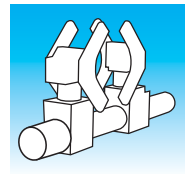
# *Strain Clamp DSRV*

# Summary Strain Clamp Sets



Systems		
<p><b>DSRV SET-SOL-170</b></p> 	<ul style="list-style-type: none"> <li>• Complete measuring system with one strain clamp for each diameter range (ø 30 up to 100 mm, ø 100 up to 170 mm)</li> <li>• 2-channel display box DDBF 2-SC</li> <li>• Battery or A/C operation</li> <li>• Complete set in tough plastic case</li> <li>• Including analysis software <i>InspectMaster</i></li> <li>• For the adjustment of presses, diecasting and injection molding machines</li> </ul>	<p><b>Page 7.4</b></p>
<p><b>DSRV SET-LEG-240</b></p> 	<ul style="list-style-type: none"> <li>• Complete measuring system with one strain clamp for each diameter range (ø 30 up to 100 mm, ø 100 up to 170 mm, ø 170 up to 240 mm)</li> <li>• 2-channel display box DDBF 2-SC</li> <li>• Battery or A/C operation</li> <li>• Complete set in tough plastic case</li> <li>• Including analysis software <i>InspectMaster</i></li> <li>• For the adjustment of presses, diecasting and injection molding machines</li> </ul>	<p><b>Page 7.5</b></p>
<p><b>DSRV SET-MED-170</b></p> 	<ul style="list-style-type: none"> <li>• Complete measuring system with four strain clamps for each diameter range (ø 30 up to 100 mm, ø 100 up to 170 mm)</li> <li>• 4-channel display box DDBF 4-SC</li> <li>• Inclusive analysis software <i>InspectMaster</i></li> <li>• Battery or A/C operation</li> <li>• Complete set in tough plastic case</li> <li>• For the adjustment of presses, diecasting and injection molding machines</li> </ul>	<p><b>Page 7.6</b></p>
<p><b>DSRV SET-MED-240</b></p> 	<ul style="list-style-type: none"> <li>• Complete measuring system with four strain clamps for each diameter range (ø 100 up to 170 mm, ø 170 up to 240 mm)</li> <li>• 4-channel display box DDBF 4-SC</li> <li>• Inclusive analysis software <i>InspectMaster</i></li> <li>• Battery or A/C operation</li> <li>• Complete set in tough plastic case</li> <li>• For the adjustment of presses, diecasting and injection molding machines</li> </ul>	<p><b>Page 7.7</b></p>
<p><b>DSRV SET-COM-240</b></p> 	<ul style="list-style-type: none"> <li>• Complete measuring system with four strain clamps for each diameter range (ø 30 up to 100 mm, ø 100 up to 170 mm, ø 170 up to 240 mm)</li> <li>• 4-channel display box DDBF 4-SC</li> <li>• Inclusive analysis software <i>InspectMaster</i></li> <li>• Battery or A/C operation</li> <li>• Complete set in tough plastic case</li> <li>• For the adjustment of presses, casting and injection molding machines</li> </ul>	<p><b>Page 7.8</b></p>
<p><b>DSRV SET-RNG-100</b></p> 	<ul style="list-style-type: none"> <li>• Complete measuring system with four strain clamps (ø 30 up to 100 mm)</li> <li>• 4-channel display box DDBF 4 -SC</li> <li>• Inclusive analysis software <i>InspectMaster</i></li> <li>• Battery or A/C operation</li> <li>• Complete set in tough aluminum case</li> <li>• For the adjustment of presses, casting and injection molding machines with tie bar diameter ø &lt; 100 mm</li> </ul>	<p><b>Page 7.9</b></p>

# Summary Strain Clamp Sets



## Systems/Set components/Accessories

### DSRV SET-RNG-170



- Complete measuring system with four strain clamps (ø 100 up to 170 mm)
- 4-channel display box DDBF 4-SC
- Battery or A/C operation
- Including analysis software *InspectMaster*
- Complete set in tough plastic case (with strain clamps ø 30 up to 100 mm and ø 170 up to 240 mm expandable)
- For the adjustment of presses, diecasting and injection molding machines

**Page 7.10**

### DSRV SET-RNG-240



- Complete measuring system with four strain clamps (ø 170 up to 240 mm)
- 4-channel display box DDBF 4-SC
- Battery or A/C operation
- Including analysis software *InspectMaster*
- Complete set in tough plastic case (with strain clamps ø 30 up to 100 mm and ø 100 up to 170 mm expandable)
- For the adjustment of presses, diecasting and injection molding machines

**Page 7.11**

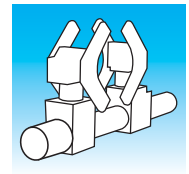
### DSRV KOM-KOS-100/170/240



- Variable adjustable strain clamp
- Continuous diameter adjustment in the ranges 30 to 100 mm, 100 to 170 mm, 170 to 240 mm
- Quick installing thanks to the patented positioning mechanic
- Integrated torque wrench

**Page 7.12**

# Strain Clamp Set DSRV SET-SOL-170



## Contents

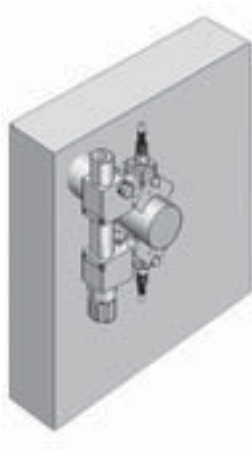
Plastic case  
(External dimensions 520 x 530 x 290 mm):

- 1 pc. Y-cable DZCY
- 1 pc. display box DDBF 2-SC  
incl. software *InspectMaster*
- 1 pc. power adapter (battery charger)
- Manual for DSRV, DDBF
- 1 strain clamp  $\varnothing$  30 - 100 mm
- 1 strain clamp  $\varnothing$  100 - 170 mm



## Application

Ideal for machine adjustment



## Description

Portable system for strain measurement on tie bars and shafts. The strain clamps are mounted on the tie bars or shafts. The display box shows the measured strain directly in  $\mu\epsilon$  (strain unit), t or kN.

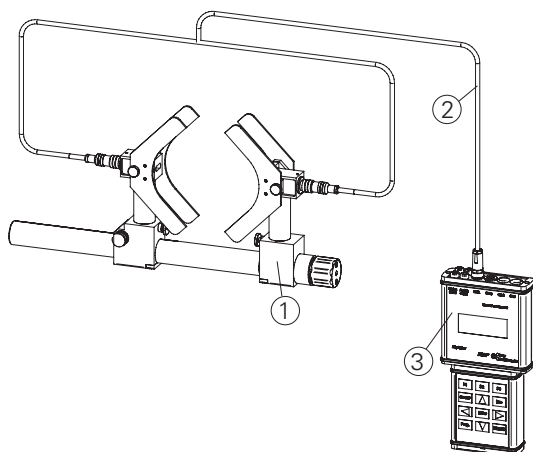
This set is ideal for machine setter and maintenance people. For casual machine settings and general monitoring on different tie bar diameters.

The set may be used on presses, injection molding and diecasting machines.

## Order code

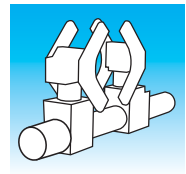
**DSRV SET-SOL-170**

## Measuring chain



Pos.	Pcs.	Article	Description	Technical data
1	1	DSRV	Strain clamp	page 7.12
2	1	DZCY	Y-cable	page 7.14
3	1	DDBF	Display box incl. power adapter	page 9.4

# Strain Clamp Set DSRV SET-LEG-240

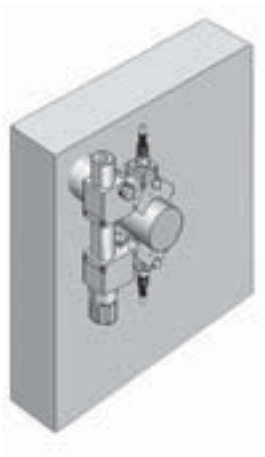


## Contents

- Plastic case  
(External dimensions 600 x 510 x 310 mm):
- 1 pc. Y-cable DZCY
  - 1 pc. display box DDBF 2-SC  
incl. software *InspectMaster*
  - 1 pc. power adapter (battery charger)
  - Manual for DSRV, DDBF
  - 1 strain clamp  $\varnothing$  30 - 100 mm
  - 1 strain clamp  $\varnothing$  100 - 170 mm
  - 1 strain clamp  $\varnothing$  170 - 240 mm

## Application

Ideal for machine adjustment



## Description

Portable system for strain measurement on tie bars and shafts. The four strain clamps are mounted on the tie bars or shafts. The display box shows the measured strain directly in  $\mu\epsilon$  (strain unit), t or kN.

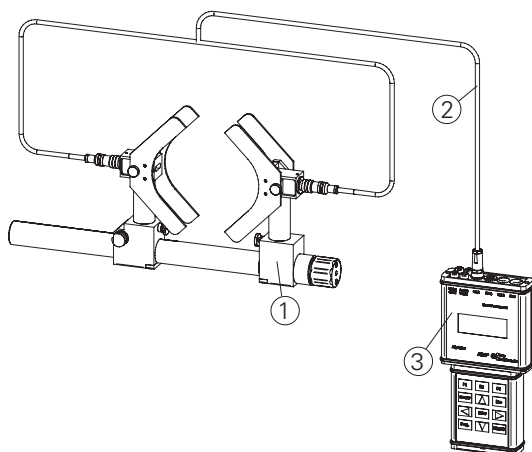
This set is ideal for machine setter and maintenance people. For casual machine setting and general monitoring on different tie bar diameters.

This set may be used on presses, injection molding and diecasting machines.

## Order code

DSRV SET-LEG-240

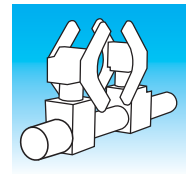
## Measuring chain



Pos.	Pcs.	Article	Description	Technical data
1	1	DSRV	Strain clamp	page 7.12
2	1	DZCY	Y-cable	page 7.14
3	1	DDBF	Display box incl. power adapter	page 9.4



# Strain Clamp Set DSRV SET-MED-170



## Contents

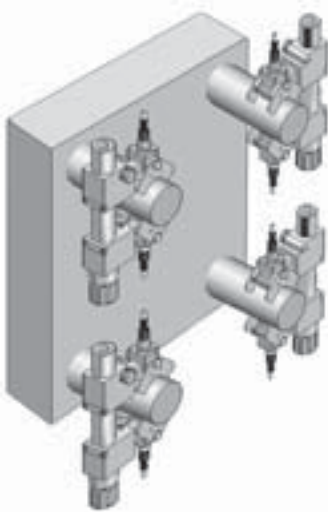
Plastic case  
(External dimensions 600 x 510 x 310 mm):

- 4 pcs. Y-cable DZCY
- 1 pc. display box DDBF 4-SC  
incl. software InspectMaster
- 1 pc. power adapter (battery charger)
- Manual for DSRV, DDBF
- 4 strain clamp  $\varnothing$  30 - 100 mm
- 4 strain clamp  $\varnothing$  100 - 170 mm



## Application

Ideal for machine adjustment of electric and hydraulic machines



## Description

Portable 4-channel system for strain measurement on tie bars and shafts. The strain clamps are mounted on the measurement object. The display box shows the measured strain of the four sensors in  $\mu\epsilon$  (strain unit), t or kN. The average value is also displayed.

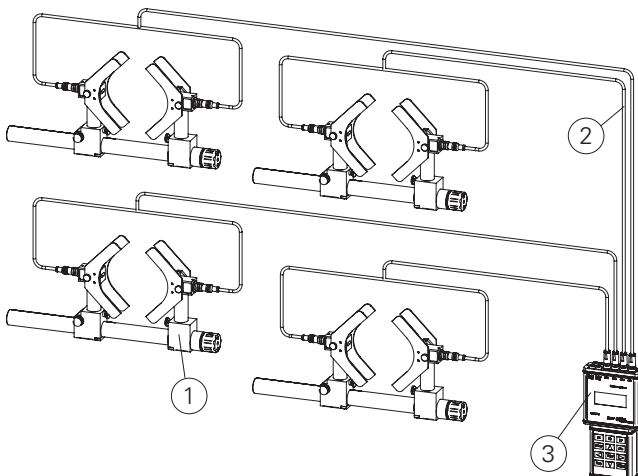
Depending on the position of the sensor on the tie bar for example the parallelism or the clamp force of presses, injection molding or diecasting machines can be analysed.

This set is ideal for machine setter and maintenance people. For casual machine setting and general monitoring with tie bar diameters from 30 up to 170 mm.

## Order code

**DSRV SET-MED-170**

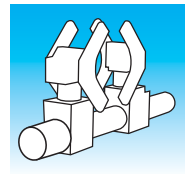
## Measuring chain



With strain clamps  $\varnothing$  170 up to 240 mm upgradable.

Pos.	Pcs.	Article	Description	Technical data
1	4	DSRV	Strain clamp	page 7.12
2	4	DZCY	Y-cable	page 7.14
3	1	DDBF	Display box incl. power adapter	page 9.6

# Strain Clamp Set DSRV SET-MED-240



## Contents

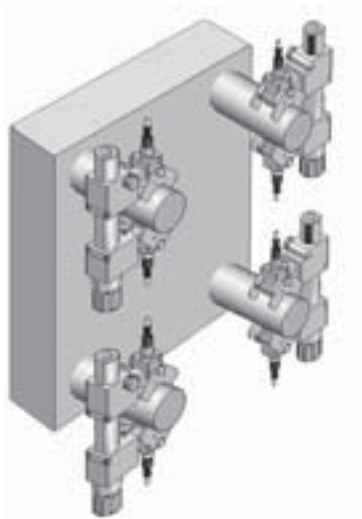
Plastic case  
(External dimensions 600 x 510 x 310 mm):

- 4 pcs. Y-cable DZCY
- 1 pc. display box DDBF 4-SC  
incl. software InspectMaster
- 1 pc. power adapter (battery charger)
- Manual for DSRV, DDBF
- 4 strain clamp  $\varnothing$  100 - 170 mm
- 4 strain clamp  $\varnothing$  170 - 240 mm



## Application

Ideal for machine adjustment



## Description

Portable system for strain measurement on tie bars and shafts. The four strain clamps are mounted on the measurement object. The display box shows the measured strain directly in  $\mu\epsilon$  (strain unit), t or kN. The average value of the four sensors is also displayed.

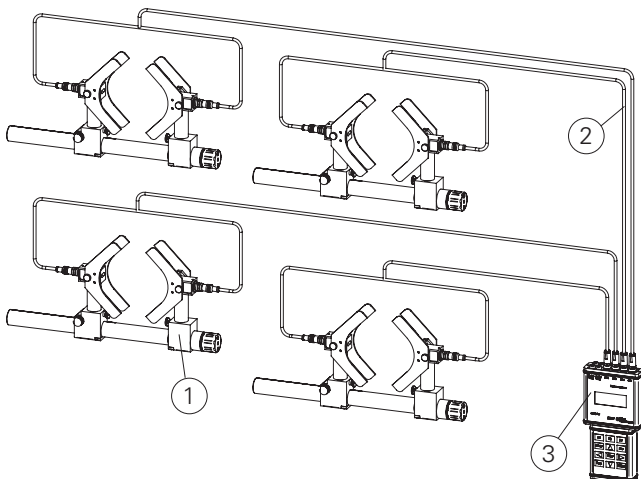
This set is ideal for machine setter and maintenance people. For casual machine settings and general monitoring with different tie bar diameter.

The set may be used on presses, injection molding and diecasting machines.

## Order code

**DSRV SET-MED-240**

## Measuring chain

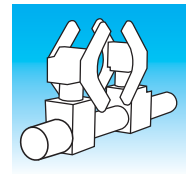


With strain clamps  $\varnothing$  30 up to 100 mm upgradable.

Pos.	Pcs.	Article	Description	Technical data
1	4	DSRV	Strain clamp	page 7.12
2	4	DZCY	Y-cable	page 7.14
3	1	DDBF	Display box incl. power adapter	page 9.6



# Strain Clamp Set DSRV SET-COM-240



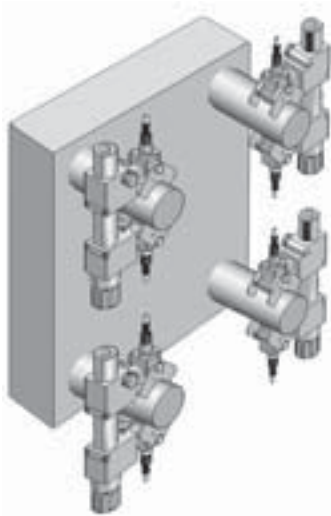
## Contents

Plastic case  
(External dimensions 600 x 510 x 310 mm):

- 4 pcs. Y-cable DZCY
- 1 pc. display box DDBF 4-SC  
incl. software *InspectMaster*
- 1 pc. power adapter (battery charger)
- Manual for DSRV, DDBF
- 4 strain clamps  $\varnothing$  30 - 100 mm
- 4 strain clamps  $\varnothing$  100 - 170 mm
- 4 strain clamps  $\varnothing$  170 - 240 mm

## Application

Ideal for machine adjustment



## Description

Portable system for strain measurement on tie bars and shafts. The strain clamps are mounted on the measurement object. The display box shows the measured strain directly in  $\mu\epsilon$  (strain unit), t or kN. The average value of the sensors is also displayed.

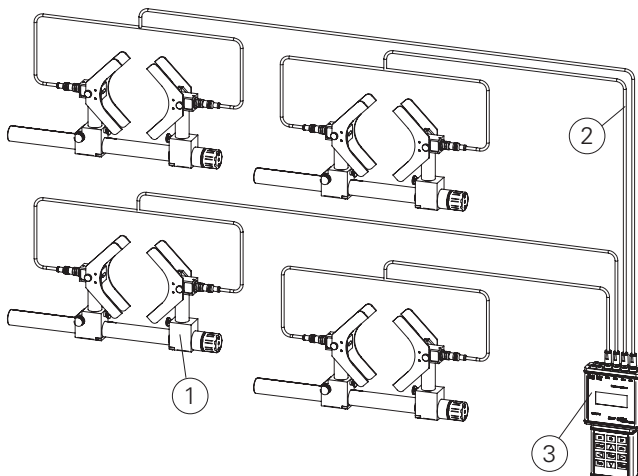
This set is ideal for machine setter and maintenance people. For casual machine settings and general monitoring on different tie bar diameter.

The set may be used on presses, injection molding and diecasting machines.

## Order code

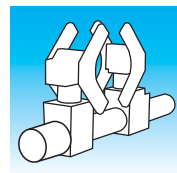
**DSRV SET-COM-240**

## Measuring chain



Pos.	Pcs.	Article	Description	Technical data
1	4	DSRV	Strain clamp	page 7.12
2	4	DZCY	Y-cable	page 7.14
3	1	DDBF	Display box incl. power adapter	page 9.6

# Strain Clamp Set DSRV SET-RNG-100



## Contents

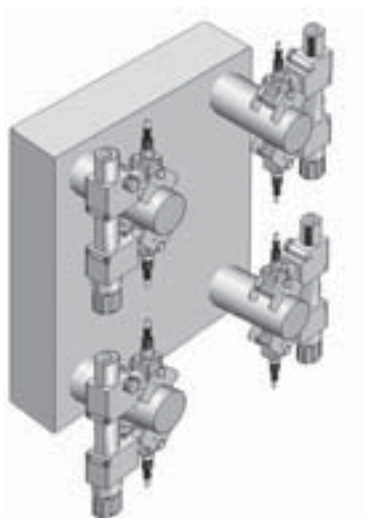
Aluminum case  
(External dimensions 480 x 390 x 180 mm):

- 4 pcs. Y-cable DZCY
- 1 pc. display box DDBF 4-SC  
incl. software *InspectMaster*
- 1 pc. power adapter (battery charger)
- Manual for DSRV, DDBF
- 4 strain clamps  $\varnothing$  30 - 100 mm



## Application

Ideal for machine adjustment



## Description

Portable 4-channel system for strain measurements on tie bars. The strain clamps are mounted on the measurement object. The display box shows the measured strain of the four sensors directly in  $\mu\epsilon$  (strain unit), t or kN. The average value of the four sensors is also displayed.

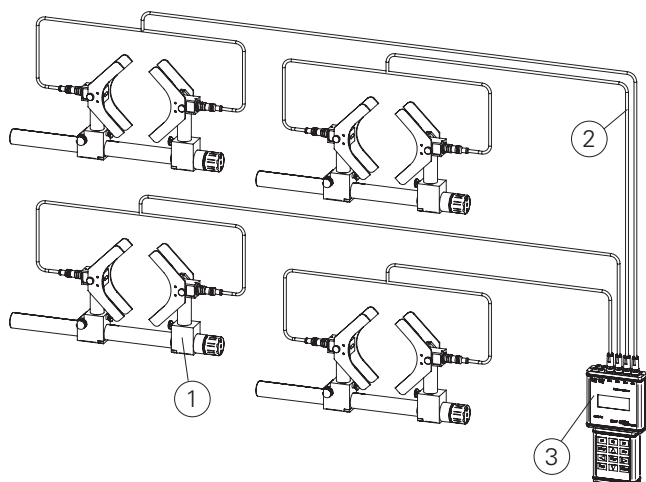
Depending on the position of the sensor on the tie bar for example the parallelism or the clamping force of presses, injection molding and diecasting machines can be monitored. Alternatively one up to four strain clamps can be analysed.

This set is ideal for service workers, maintenance people or die casting workers. For machines with tie bar diameters from 30 up to 100 mm.

## Order code

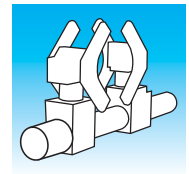
**DSRV SET-RNG-100**

## Measuring chain



Pos.	Pcs.	Article	Description	Technical data
1	4	DSRV	Strain clamp	page 7.12
2	4	DZCY	Y-cable	page 7.14
3	1	DDBF	Display box incl. power adapter	page 9.6

# Strain Clamp Set DSRV SET-RNG-170



## Contents

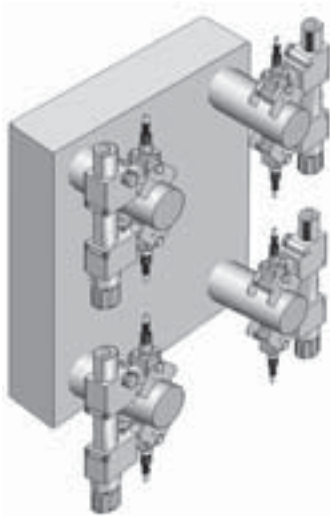
Plastic case  
(External dimensions 600 x 510 x 310 mm):

- 4 pcs. Y-cable DZCY
- 1 pc. display box DDBF 4-SC  
incl. software *InspectMaster*
- 1 pc. power adapter (battery charger)
- Manual for DSRV, DDBF
- 4 strain clamps  $\varnothing$  100 - 170 mm



## Application

Ideal for adjustment of electric and hydraulic machines.



## Description

Portable 4-channel system for strain measurement on tie bars and shafts. The strain clamps are mounted on the measurement object. The display box shows the measured strain of the four sensors directly in  $\mu\epsilon$  (strain unit), t or kN. The average value of the four sensors is also displayed.

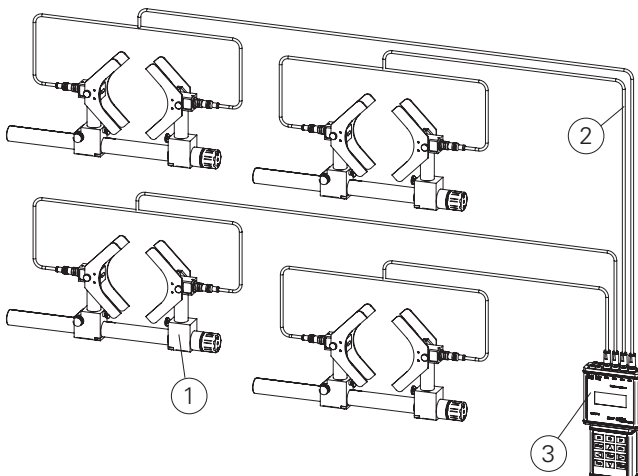
Depending on the position of the sensor on the tie bar for example the machine parallelism or the clamping force of presses, injection moulding and diecasting machines can be monitored. Alternatively one up to four strain clamps can be analysed.

This set is ideal for service people or machine setter. For machines with tie bar diameters from 100 up to 170 mm.

## Order code

**DSRV SET-RNG-170**

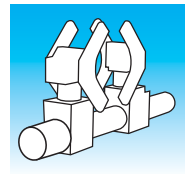
## Measuring chain



With strain clamps  $\varnothing$  30 up to 100 mm  
and  $\varnothing$  170 up to 240 mm upgradable.

Pos.	Pcs.	Article	Description	Technical Data
1	4	DSRV	Strain clamp	page 7.12
2	4	DZCY	Y-cable	page 7.14
3	1	DDBF	Display box incl. power adapter	page 9.6

# Strain Clamp Set DSRV SET-RNG-240



## Contents

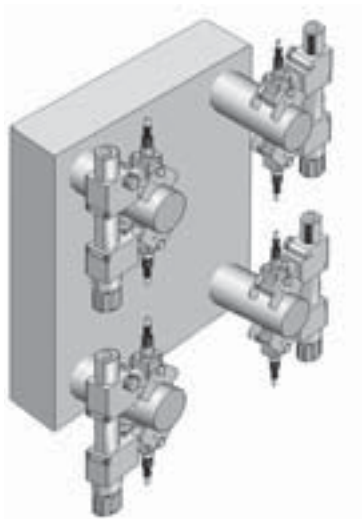
Plastic case  
(External dimensions 600 x 510 x 310 mm):

- 4 pcs. Y-cable DZCY
- 1 pc. display box DDBF 4-SC  
incl. software *InspectMaster*
- 1 pc. power adapter (battery charger)
- Manual for DSRV, DDBF
- 4 strain clamps  $\varnothing$  170 - 240 mm



## Application

Ideal for machine adjustment



## Description

Portable 4-channel system for strain measurement on tie bars and shafts. The strain clamps are mounted on the measurement object. The display box shows the measured strain of the four sensors directly in  $\mu\epsilon$  (strain unit), t or kN. The average value of the four sensors is also displayed.

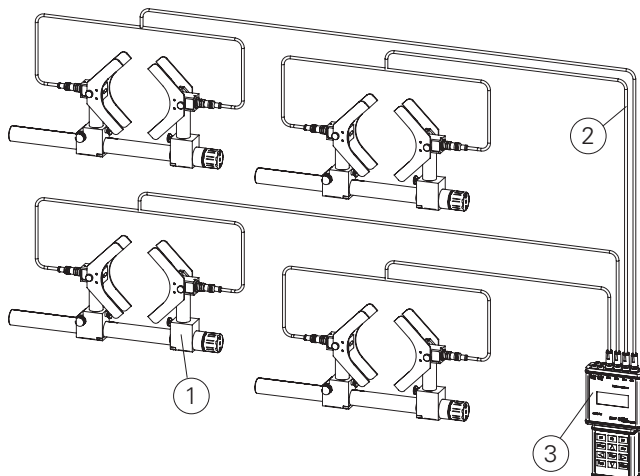
Depending on the position of the sensor on the tie bar for example the machine parallelism or the clamping force of presses, injection moulding and diecasting machines can be monitored. Alternatively one up to four strain clamps can be analysed.

This set is ideal for service people or machine setter. For machines with tie bar diameters from 170 up to 240 mm.

## Order code

**DSRV SET-RNG-240**

## Measuring chain



With strain clamps  $\varnothing$  30 up to 100 mm  
and  $\varnothing$  100 up to 170 mm upgradable.

Pos.	Pcs.	Article	Description	Technical data
1	4	DSRV	Strain clamps	page 7.12
2	4	DZCY	Y-cable	page 7.14
3	1	DDBF	Display box incl. power adapter	page 9.6

# Set Component

## Strain clamp

### DSRV KOM-KOS-100/170/240

#### Features

- Adjustable diameter between 30 and 240 mm
- Fast and easy installation
- Defined mounting clamping torque
- Exact measurement thanks to opposite strain gages



#### General data

Strain gage type	Foil gages
Nominal resistance at 24 °C	350 Ω (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)

#### Electrical data

Measuring range	±1000 µε (1 µε = 0,001 mm/m resp. 1 µε equals 0,001 mm strain per meter)
Output signal	1 mV/V (with completed full bridge)
Characteristic curve deviation	< 1% FS
Linearity	< 0,5% FS
Hysteresis	< 0,5% FS
Repeatability	< 0,2% FS
Zero point setting	depending on installation; reset necessary
Max. recommended bridge excitation	9 VDC
Rise time (10 - 90%)	< 1 ms (on steel)

#### Mechanical data

Connection	5 pin male
Clamping torque	3 Nm
Material	
- Sensor body	Aluminum anodised
Protection foil	stainless steel

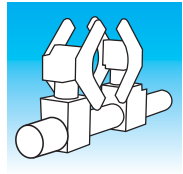
#### Environmental conditions

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

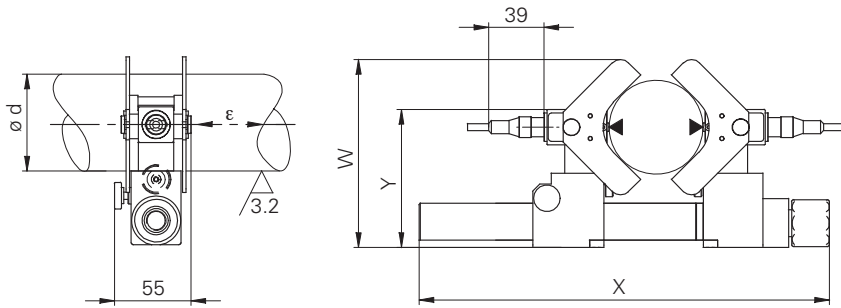
#### Electrical connections



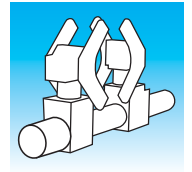
Pin	Signal
1	n.c.
2	S/G
3	S/G
4	n.c.
5	n.c.



Dimensions (mm)

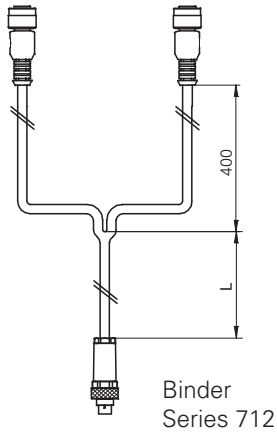


$\varnothing d$	Size 100		Size 170	Size 240
	30 - 55	55 - 100	100 - 170	170 - 240
X	289	289	394	480
Y	97	97	132	167
W	116	132	192	252



## Accessories

### Connecting Cable for display box



Binder  
Series 712

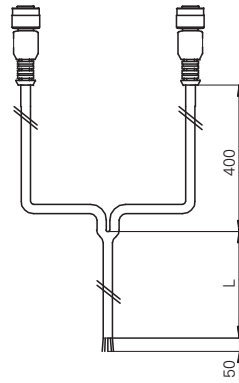
**DZCY** -PU-MM-C

Length L

**05** 5 m

**10** 10 m

### Connecting Cable with Open Leads



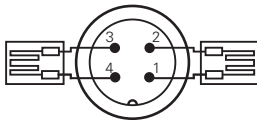
**DZCY** -PU-MO-C

Length L

**05** 5 m

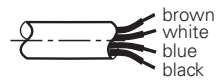
**10** 10 m

### Binder Series 712



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

### Wire Colors



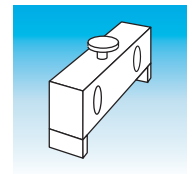
Color	Signal
white	S/G 1
blue	S/G 1
brown	S/G 2
black	S/G 2







# *Extensometer Set*

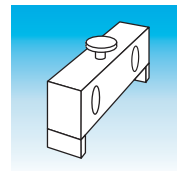






Systems		
<p><b>DSRM M2M</b></p> 	<ul style="list-style-type: none"> <li>• Complete measuring system with two extensometers</li> <li>• For bending compensated strain measurements on tie bars and accordingly strain measurement on two tie bars</li> <li>• A/C or battery operation display box and software <i>InspectMaster</i></li> <li>• Complete set in robust aluminum case</li> </ul>	<p><b>Page 8.3</b></p>
<p><b>DSRM M4M</b></p> 	<ul style="list-style-type: none"> <li>• Complete measuring system with four extensometers</li> <li>• A/C or battery operation display box and software <i>InspectMaster</i></li> <li>• Complete set in robust aluminum case</li> </ul>	<p><b>Page 8.4</b></p>
<p><b>DSRM M8M</b></p> 	<ul style="list-style-type: none"> <li>• Complete measuring system with eight extensometers</li> <li>• Simultaneous bending compensated strain measurement on four tie bars</li> <li>• A/C or battery operation display box and software <i>InspectMaster</i></li> <li>• Complete set in robust aluminum case</li> </ul>	<p><b>Page 8.5</b></p>
Set Components, Accessories		
<p><b>DSRM M1</b></p> 	<ul style="list-style-type: none"> <li>• Extensometer with magnet base</li> <li>• Diameter independent</li> <li>• Quick installation thanks to magnet base</li> <li>• Measures on cylindrical and flat surfaces</li> </ul>	<p><b>Page 8.6</b></p>

# Extensometer Set DSRM M2M (2 Sensors)



## Contents

Aluminum case  
(External dim. 480 x 390 x 180 mm):

- 2 pcs. Extensometer with magnet base DSRM M1
- 2 pcs. connecting cable DZCS 07/M1M
- 1 pc. 4-channel display box DDBF 4-SM incl. software *InspectMaster*
- 1 pc. power adapter (battery charger)
- Reporting via USB
- Operating manual DSRM, DDBF



## Application

Ideally suited for service personnel



## Description

Portable 2-channel system for strain measurements on tie bars and other surfaces. The two extensometers are installed with magnets on the object to be measured. The display box shows the measured strain directly in  $\mu\epsilon$  (strain units), kN or t. Simultaneous measurement and display of both channels.

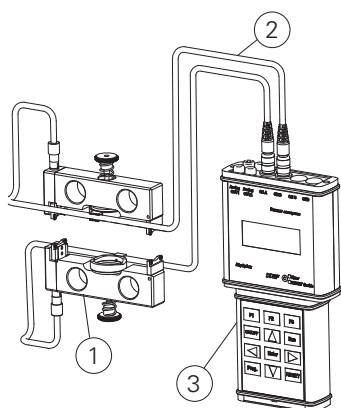
The system is ideally suited for final adjustment of injection molding and diecasting machines which have different tie bar diameters.

The set can also be used on presses to measure plate bending.

## Order Code

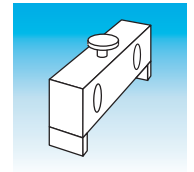
**DSRM M2M**

## Measuring Chain



Pos.	Qty.	Type	Description	Technical data
1	2	DSRM M1	Extensometer with magnet base	page 8.6
2	2	DZCS 07/M1M	Connecting cable	page 8.7
3	1	DDBF 4-SM	Display box incl. power adapter	page 9.8

# Extensometer Set DSRM M4M (4 Sensors)



## Contents

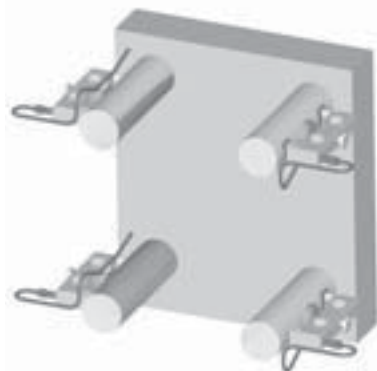
Aluminum case  
(External dimensions 460 x 340 x 160 mm):

- 4 pcs. Extensometer with magnet base DSRM M1
- 4 pcs. connecting cable DZCS 07/M1M
- 1 pc. 4-channel display box DDBF 4-SM incl. software *InspectMaster*
- 1 pc. power adapter (battery charger)
- Reporting via USB
- Operating manual DSRM, DDBF



## Application

Ideal for adjustment of injection molding machines and presses



## Description

Portable 4-channel system for strain measurements on tie bars and other surfaces. The four extensometers are installed with magnets on the object to be measured. The display box shows the measured strain directly in  $\mu\epsilon$  (strain units), kN or t. Simultaneous measurement and display of 4 channels.

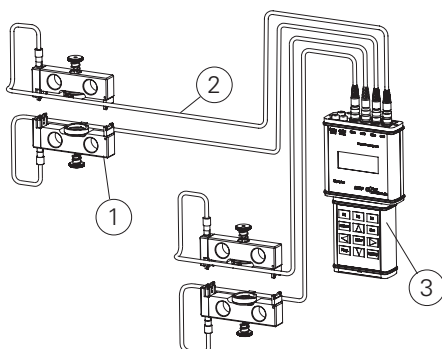
The system is ideally suited for final adjustment of injection molding and diecasting machines which have different tie bar diameters.

The kit can also be used on presses to measure platen bending.

## Order Code

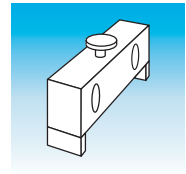
**DSRM M4M**

## Measuring Chain



Pos.	Qty.	Type	Description	Technical data
1	4	DSRM M1	Extensometer with magnet base	page 8.6
2	4	DZCS 07/M1M	Connecting cable	page 8.7
3	1	DDBF 4-SM	Display box incl. power adapter	page 9.8

# Extensometer Set DSRM M8M (8 Sensors)



## Contents

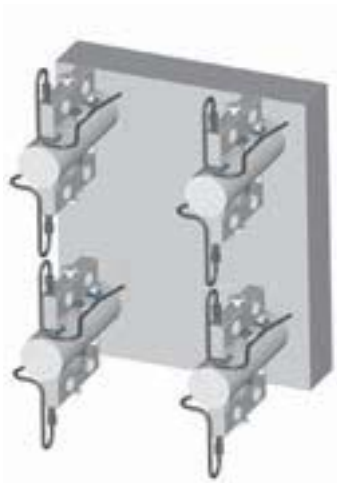
Aluminum case  
(External dimensions 460 x 340 x 160 mm):

- 8 pcs. Extensometer with magnet base DSRM M1
- 8 pcs. connecting cable DZCS 07/M1M
- 4 pcs. connecting cable DZCS 00/M2M
- 1 pc. 4-channel display box DDBF 4-SM  
incl. software *InspectMaster*
- 1 pc. power adapter (battery charger)
- Reporting via USB
- Operation manual DSRM, DDBF



## Application

Simultaneous bending compensated strain measurement on four tie bars



## Description

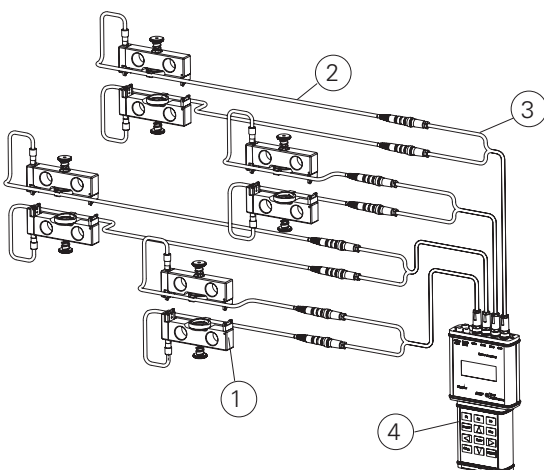
Portable 4-channel system with eight extensometers for strain measurements on tie bars and other surfaces. The eight extensometers are installed with magnets on the object to be measured. The display box shows the measured strain directly in  $\mu\epsilon$  (strain units), kN or t. Simultaneous measurement and display of 4 channels. With this system, alignment and clamping force of injection molding machines can be measured in one set up.

The system is ideally suited for final adjustment of injection molding and diecasting machines which have different tie bar diameters.

## Order Code

**DSRM M8M**

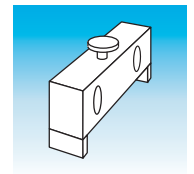
## Measuring Chain



Pos.	Qty	Type	Description	Technical data
1	8	DSRM M1	Extensometer with magnet base	page 8.6
2	8	DZCS 07/M1M	Connecting cable	page 8.7
3	4	DZCS 00/M2M	Connecting cable	page 8.7
4	1	DDBF 4-SM	Display box incl. power adapter	page 9.8

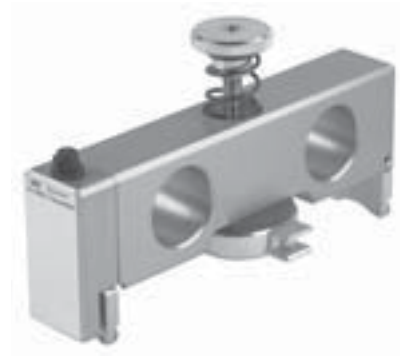
## Set Components

### Extensometer with Magnet Base DSRM M1



#### Features

- Independent of diameter > 30 mm
- Quick installation resulting from a magnetic base
- Light weight compact design
- Adjustable contact force
- Measures on cylindrical and flat surfaces



#### General Data

Nominal resistance at 24 °C	1000 Ω
Bridge circuit	Full bridge (bending beam)

#### Electrical Data

Measuring range	±1000 με (1 με = 0,001 mm/m resp. 1 με equals 0,001 mm strain per meter)
Output signal per 1000 με	0,125 mV/V ±2%
Characteristic curve deviation	< 2,0% FS
Linearity	< 1,0% FS
Hysteresis	< 2,0% FS
Repeatability	< 0,5% FS
Zero, Bridge balance	depending on installation; reset necessary
Max. recommended bridge excitation	5 VDC
Rise time 10 - 90%	< 10 ms

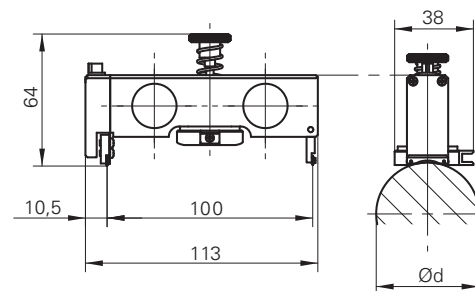
#### Mechanical Data

Connection	4 pin female
Magnet holding force	Approx. 60 N
Material	
- Sensor body	Aluminum anodized
- Spring incl. adj. screw	Steel
- Wheels	Tungsten

#### Environmental Conditions

Operating temp. range	0...+60 °C
Storage temperature	-40...+80 °C
Protection class	IP 54

#### Dimensions (mm)

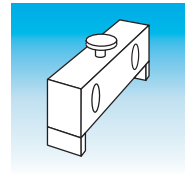


Ø d: Tie bar diameter > 30 mm

#### Electrical Connections

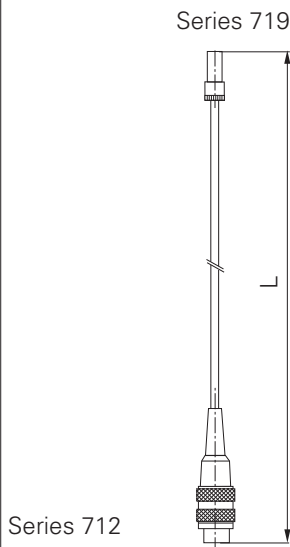


Pin	Signal
1	SIG.-
2	EXC.-
3	SIG.+
4	EXC.+



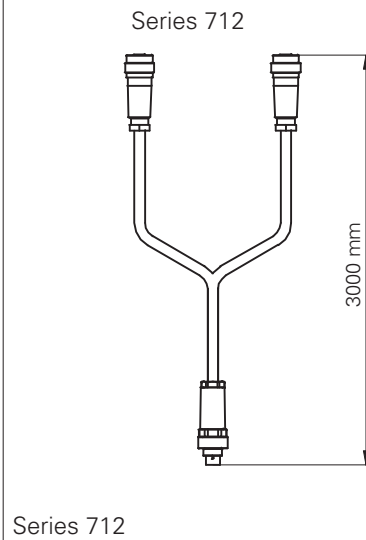
## Accessories

### Connecting Cable



**DZCS** /M1M  
 Length L  
**05** 5 m  
**07** 7 m

### Y-Adapter Cable



**DZCS 00/M2M**

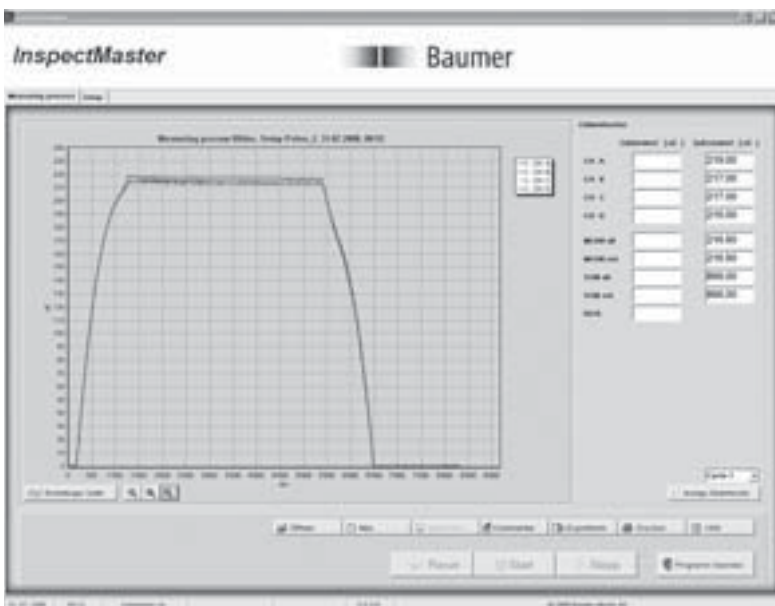
### Tungsten Wheel Set

Set of 8 tungsten wheels



Part No. 139454

## Analysis Software *InspectMaster*



This software is included in every Extensometer-Kit or DDBF

### Functions:

- Four channel display in  $\mu\epsilon$ , kN, t
- Display of sum value in  $\mu\epsilon$ , kN, t
- Display of clamping force in 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 can be processed with Excel)

### Requirements:

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





# 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 and Strain Probes

**SM** = Display box for Extensometer

# Summary Display box



<b>DDBF 2-SC</b> 	<ul style="list-style-type: none"><li>• 2-channel display box for strain rings DSRC and strain clamps DSRV</li><li>• Metered value display of every sensor, Average and peak value of both sensors</li><li>• Bending measurement through strain gauge display</li><li>• Including analysis software <i>InspectMaster</i></li></ul>	<b>Page 9.4</b>
<b>DDBF 4-SC</b> 	<ul style="list-style-type: none"><li>• 4-channel display box for strain rings DSRC and strain clamps DSRV</li><li>• Measurement display of every active channel</li><li>• Display of peak value, average value or sum</li><li>• Including analysis software <i>InspectMaster</i></li></ul>	<b>Page 9.6</b>
<b>DDBF 4-SM</b> 	<ul style="list-style-type: none"><li>• 4-channel display box for Extensometer DSRM</li><li>• Measurement display of the activated channels</li><li>• Display of peak value, average value or sum</li><li>• Including analysis software <i>InspectMaster</i></li></ul>	<b>Page 9.8</b>

# Display box, 2-channel DDBF 2-SC

## Features

- 2-channel display box for strain rings DSRC and strain clamps DSRV
- 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 $\Omega$ )
Display	Sensor A or B peak value, average value
Measuring range	$\pm 1000 \mu\epsilon$ (calibrated)
Display range	$\pm 1200 \mu\epsilon$
Resolution	1 $\mu\epsilon$
Characteristic curve deviation	< 0,25% FS
Reset/operate offset	< $\pm 0,1\%$ FS
Bridge completion resistors Rc	350 $\Omega$
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	$\pm 1$ 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

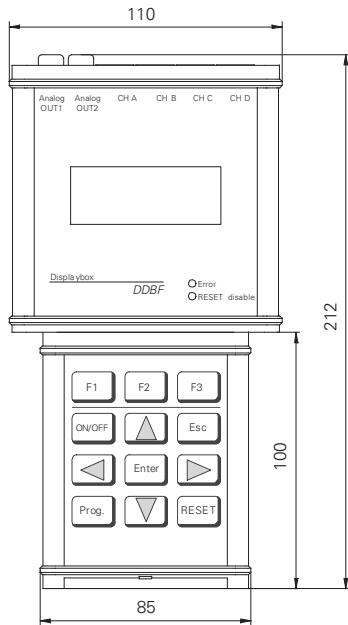
**DDBF 2-SC**

## Delivery Contents

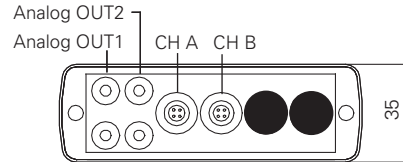
- Display box
- Power adapter (100 - 240 VAC)
- Software *InspectMaster*
- USB connecting cable
- Ground connection cable with clip



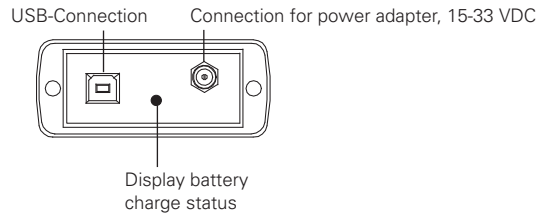
**Dimensions (mm)**



**View Connector Side**

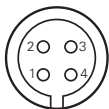


**View Bottom Side, under the top cover**



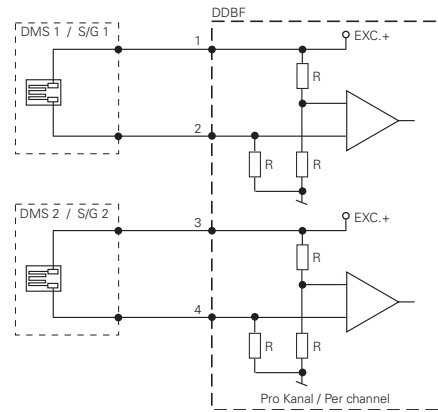
**Electrical Connections**

**Sensor connection**

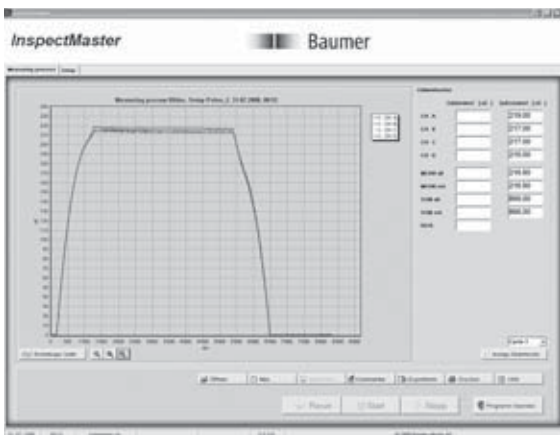


Pin	Signal	
1	S/G 1	EXC. +
2	S/G 1	SIG. -
3	S/G 2	EXC. +
4	S/G 2	SIG. -

**S/G Bridge**



**Analysis Software *InspectMaster***



**Functions:**

- Display in  $\mu\text{e}$ , 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 and strain clamps DSRV
- 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 $\Omega$ )
Display	Average / peak value or sum / peak value of the activated channels
Measuring range	$\pm 1000 \mu\epsilon$ (calibrated)
Display range	$\pm 1200 \mu\epsilon$
Resolution	1 $\mu\epsilon$
Characteristic curve deviation	< 0,25% FS
Reset/operate offset	< $\pm 0,1\%$ FS
Bridge completion resistors Rc	350 $\Omega$
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	$\pm 1$ 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

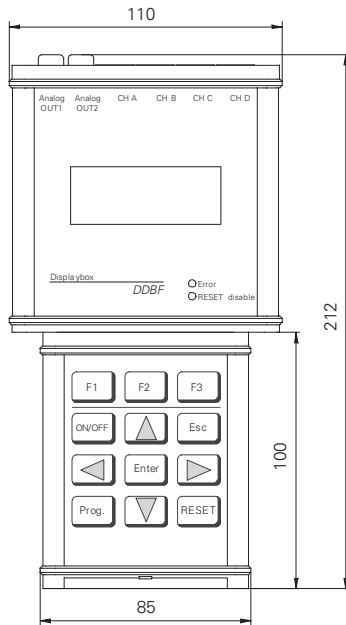
**DDBF 4-SC**

## Delivery Contents

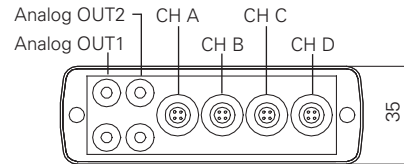
- Display box
- Power adapter (100 - 240 VAC)
- Software *InspectMaster*
- USB connecting cable
- Ground connection cable with clip



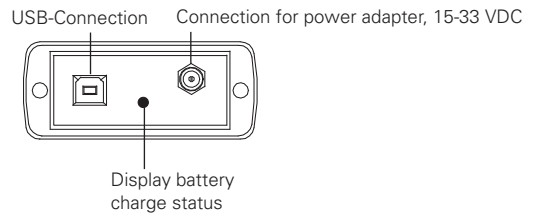
**Dimensions (mm)**



**View Connector Side**



**View Bottom Side, under the top cover**



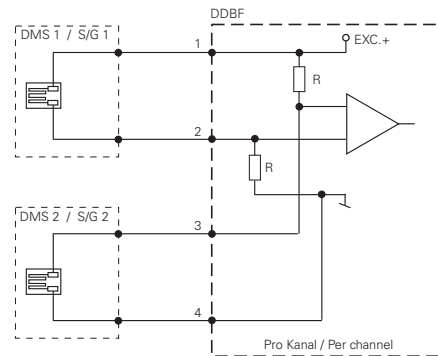
**Electrical Connections**

**Sensor connection**

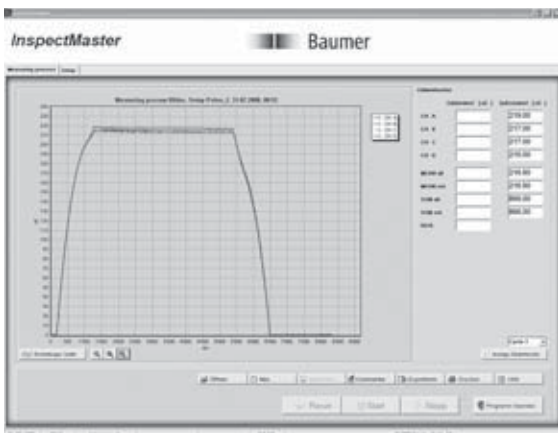


Pin	Signal
1	S/G 1 EXC,+
2	S/G 1 SIG.-
3	S/G 2 SIG.+
4	S/G 2 EXC.-

**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

# Display box, 4-channel DDBF 4-SM

## Features

- 4-channel display box for Extensometer DSRM
- Display of peak, average or sum value of the activated sensors
- 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 full bridge
Display	Average / peak value or sum / peak value of the activated channels
Measuring range	$\pm 1000 \mu\epsilon$ (calibrated)
Display range	$\pm 1200 \mu\epsilon$
Resolution	1 $\mu\epsilon$
Characteristic curve deviation	< 0,4% FS
Reset/operate offset	< 0,25% FS
Bridge resistor	min. 350 $\Omega$
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	$\pm 1$ 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

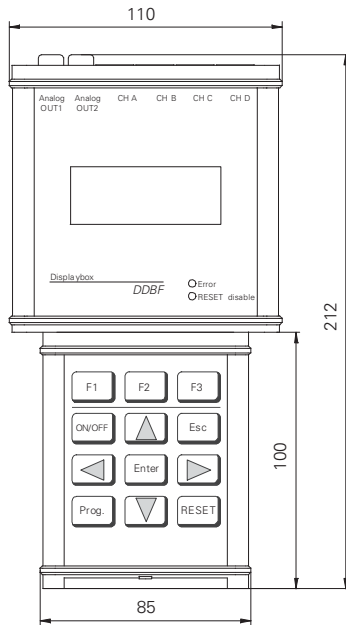
**DDBF 4-SM**

## Delivery Contents

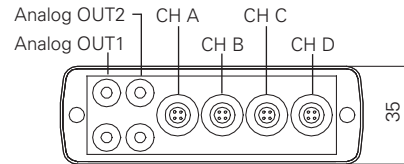
- Display box
- Power adapter (100 - 240 VAC)
- Software *InspectMaster*
- USB connecting cable
- Ground connection cable with clip



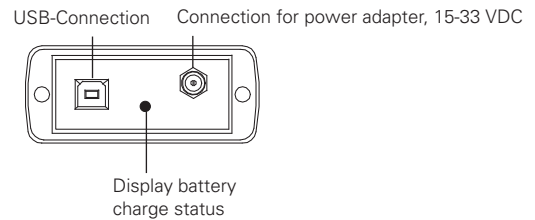
**Dimensions (mm)**



**View Connector Side**

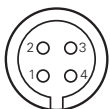


**View Bottom Side, under the top cover**



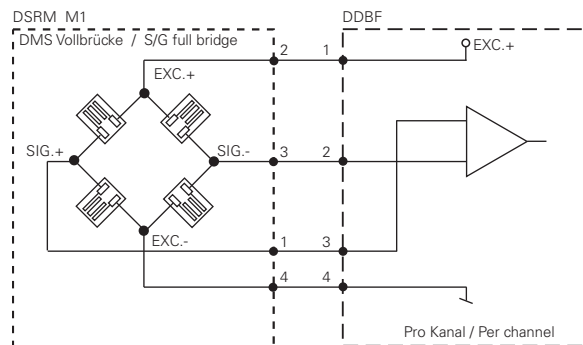
**Electrical Connections**

**Sensor connection**

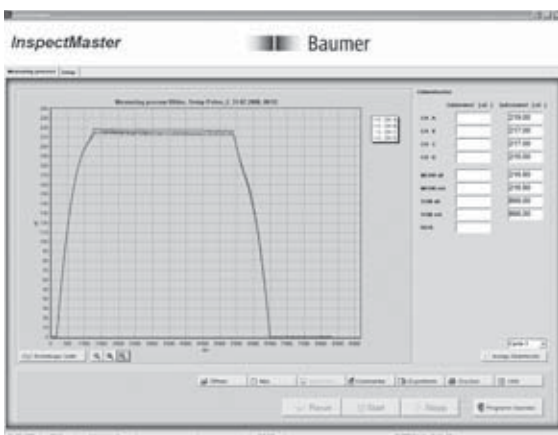


Pin	Signal
1	bridge EXC,+
2	bridge SIG,-
3	bridge SIG,+
4	bridge EXC,-

**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

**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

**2.5** = 2,5 kN

**010** = 10 kN

**030** = 30 kN

#### Nominal Sensitivity

Example

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

### Strain sensors

**DSPN 27-2.0B/CP**

#### Product Description

**DSPN** = Piezo electric strain sensor (high sensitivity)

#### Series

**27** = Series 27

#### Cable Length

**1.0** = 1 m

**2.0** = 2 m

**3.0** = 3 m

**4.0** = 4 m

**5.0** = 5 m

#### Cable Connector

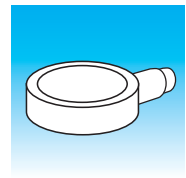
**B** = BNC





#### Option

**/CP** = Cable protection

# Summary

## Piezo Electric Force and Strain Sensors



<p><b>DLPP 6MO</b></p> 	<ul style="list-style-type: none"> <li>• Quartz miniature force sensor</li> <li>• Capacity 0...+2,5 kN</li> <li>• Connector thread M4 x 0,35</li> <li>• Sensor diameter 6 mm</li> </ul>	<p><b>Page 10.4</b></p>
<p><b>DLPP 7MO</b></p> 	<ul style="list-style-type: none"> <li>• Quartz force sensor</li> <li>• Capacity 0...+10 kN</li> <li>• Connector thread M4 x 0,35</li> <li>• Sensor diameter 12,6 mm</li> </ul>	<p><b>Page 10.5</b></p>
<p><b>DLPP 4MO</b></p> 	<ul style="list-style-type: none"> <li>• Quartz force sensor</li> <li>• Capacity 0...+30 kN</li> <li>• Connector thread 10 - 32 UNF</li> <li>• Sensor diameter 25 mm</li> </ul>	<p><b>Page 10.6</b></p>
<p><b>DSPN</b></p> 	<ul style="list-style-type: none"> <li>• High resolution, piezo electric surface strain sensor</li> <li>• Sensitivity 900 pC/<math>\mu\epsilon</math></li> <li>• Integral cable</li> <li>• Mounted with two screws</li> </ul>	<p><b>Page 10.7</b></p>

# Piezo Electric 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 <sup>12</sup> Ω
Insulation resistance at 150 °C	> 10 <sup>11</sup> Ω

## Mechanical Data

Connector thread	M4 x 0,35
Material	Stainless steel

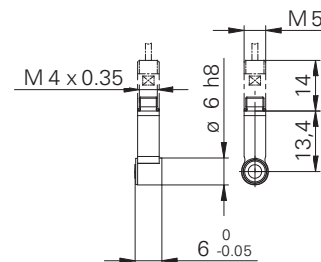
## Environmental Conditions

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

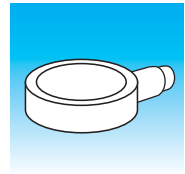
## Accessories

### Connecting Cable

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

# Piezo Electric 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 <sup>12</sup> Ω
Insulation resistance at 150 °C	> 10 <sup>11</sup> Ω

## Mechanical Data

Connector thread	M4 x 0,35
Material	Stainless steel

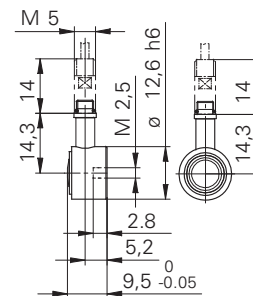
## Environmental Conditions

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

# Piezo Electric 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 <sup>12</sup> Ω
Insulation resistance at 150 °C	> 10 <sup>11</sup> Ω

## Mechanical Data

Connector thread	UNF 10-32
Material	Stainless steel

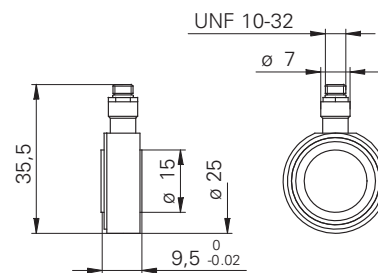
## Environmental Conditions

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)



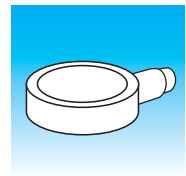
## Delivery Contents

- Calibration sheet

## Accessories

### Connecting Cable

DZCC xxxx-78-UB



### Features

- Ultra sensitive piezo electric surface strain sensor
- Sensitivity 900 pC/με
- To measure very small mechanical strains
- Ideally suited for mold protection
- Very simple installation



### Technical Data

Method	Piezo electric; ceramic
Recommended Measuring range	0...+500 με
Typical Sensitivity	900 pC/με
Linearity	< 1% FS
Capacitance	8000 pF
Insulation resistance at 20°C	> 10 <sup>10</sup> Ω

### Mechanical Data

Connector	BNC (50Ω)
Weight incl. cable	170 g
Material	
- Sensor housing	Stainless steel
- Cable	RGT 404 triax, FEP
Clamping torque	5 Nm

### Environmental Conditions

Operating temp. range	0...+50 °C
Storage temperature	0...+50 °C
Protection class	IP 65

### Order Code

**DSPN 27-**   **B**

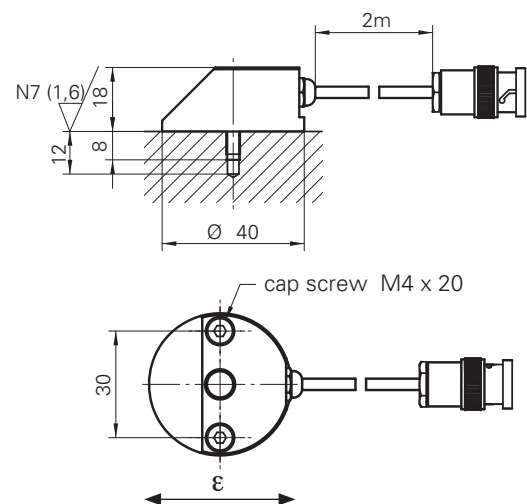
option

**/CP** = cable protection

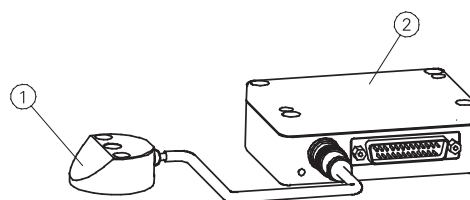
cable length

**1.0** = 1 m  
**2.0** = 2 m  
**3.0** = 3 m  
**4.0** = 4 m  
**5.0** = 5 m

### Dimensions (mm)



### Typical Measuring Chain



Pos.	Qty	Type	Description
1	1	DSPN	High resolution surface strain sensor
2	1	DACU	Charge amplifier

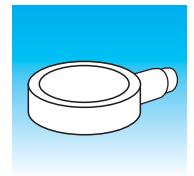
### Delivery Contents

- Screws 2 pcs. M4 x 20 (12.9)
- Calibration sheet



# 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  
**I** = Indirect cavity pressure measurement

#### Version

**S** = Standard

#### Size

**02.5** = 2,5 mm diameter sensor front  
**04.0** = 4 mm diameter sensor front  
**12.0** = 12,6 mm diameter sensor width

#### Nominal Sensitivity

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

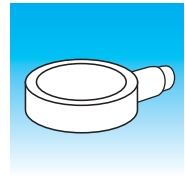
**2.0** = 2 pC/bar  
**5.0** = 5 pC/bar  
**9.4** = 9,4 pC/bar  
**4.4** = 4,4 pC/N  
**4.2** = 4,2 pC/N

#### Options

**/CS1** = Uniform sensitivity  $\pm 1\%$   
**/TP** = Rotation prevention

# Summary

## Cavity Pressure Sensors



<p><b>DPPC DS02.5</b></p> 	<ul style="list-style-type: none"> <li>• Cavity pressure sensor for direct measurement</li> <li>• Capacity 0...2000 bar</li> <li>• Connector thread M4 x 0,35</li> <li>• Sensor diameter 2,5 mm</li> </ul>	<p><b>Page 10.10</b></p>
<p><b>DPPC DS04.0</b></p> 	<ul style="list-style-type: none"> <li>• Cavity pressure sensor for direct measurement</li> <li>• Capacity 0...2000 bar</li> <li>• Connector thread M4 x 0,35</li> <li>• Sensor diameter 4 mm</li> </ul>	<p><b>Page 10.12</b></p>
<p><b>DPPC IS06.0</b></p> 	<ul style="list-style-type: none"> <li>• Miniature measuring clip</li> <li>• Cavity pressure sensor for indirect measurement</li> <li>• Capacity 0...+2,5 kN</li> <li>• Connector thread M4 x 0,35</li> </ul>	<p><b>Page 10.14</b></p>
<p><b>DPPC IS12.6</b></p> 	<ul style="list-style-type: none"> <li>• Measuring clip</li> <li>• Cavity pressure sensor for indirect measurement</li> <li>• Capacity 0...+10 kN</li> <li>• Connector thread M4 x 0,35</li> </ul>	<p><b>Page 10.16</b></p>

# 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 <sup>12</sup> Ω
Insulation resistance at 200 °C	> 10 <sup>11</sup> Ω

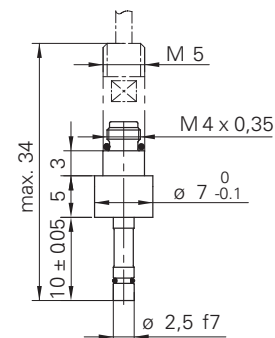
#### Mechanical Data

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

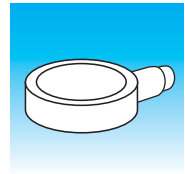
- Special nut DZPC MN04
- Calibration sheet

#### Order Code

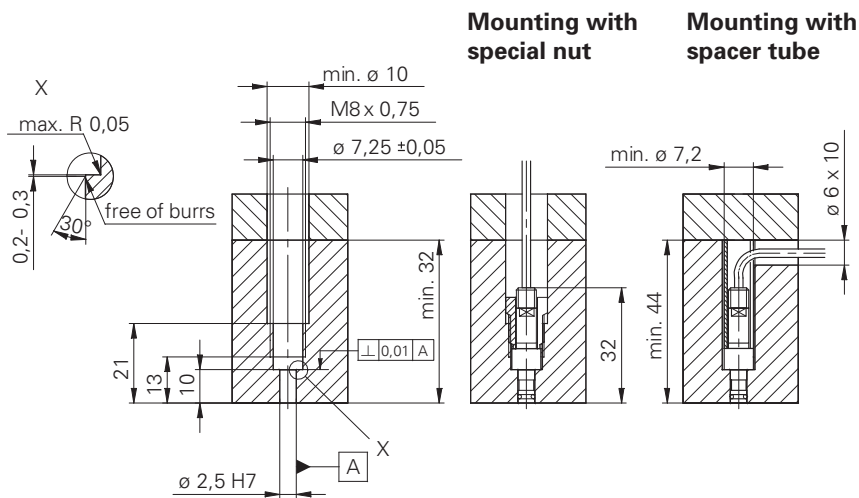
DPPC DS02.5-2.0/□□

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
DPPC DS04.0-9.4	-9,4 pC/bar
DPPC DS04.0-9.4/CS	-9,4 pC/bar ± 1%
Linearity	< 1% FS
Natural frequency	> 100 kHz
Insulation resistance at 20°C	>10 <sup>12</sup> Ω
Insulation resistance at 200 °C	>10 <sup>11</sup> Ω

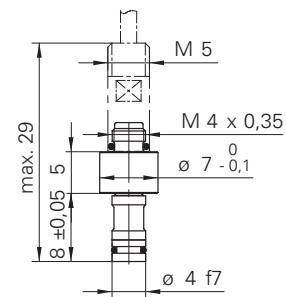
#### Mechanical Data

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

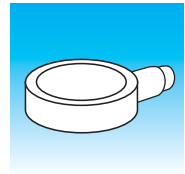
**TP** = Turning protection

**CS1** = Uniform sensitivity 1%

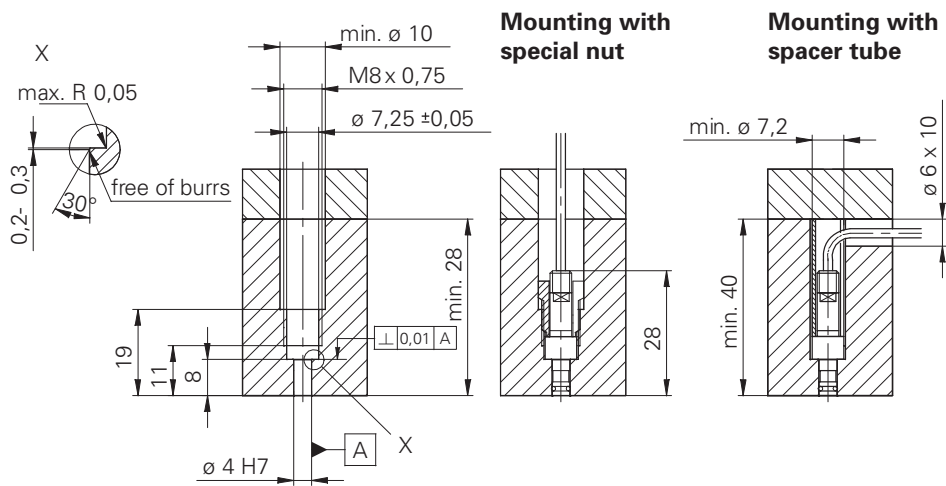
Nominal sensitivity

**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

# Miniature Measuring Tongue

2,5 kN

DPPC IS06.0

## Features

- For indirect measuring
- Measuring range 0...+2,5 kN
- Connector thread M4 x 0,35



## Technical Data

Method	Piezo electric; quartz
Range	0...2,5 kN
Overload	3 kN
Nom. sensitivity	-4,4 pC/N
Linearity	< 1% FS
Natural frequency	> 200 kHz
Insulation resistance at 20°C	> 10 <sup>12</sup> Ω
Insulation resistance at 200 °C	> 10 <sup>11</sup> Ω

## Mechanical Data

Connector thread	M4 x 0,35
Material enclosure	Stainless steel

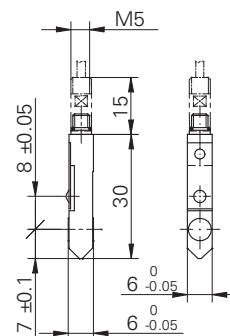
## Environmental Conditions

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

## Order Code

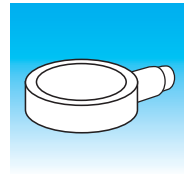
DPPC IS06.0-4.4

## Dimensions (mm)

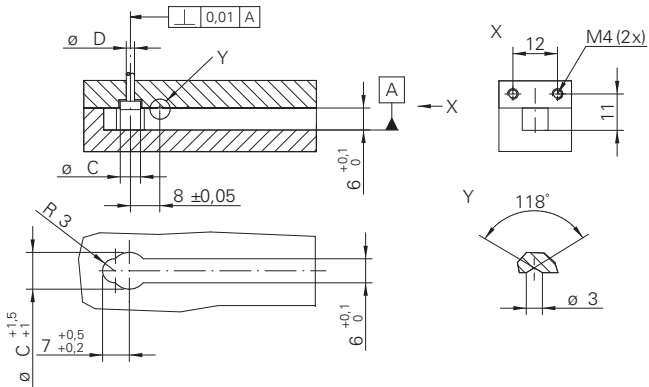


## Delivery Contents

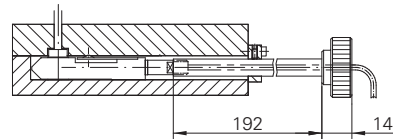
- Calibration sheet



**Mounting Dimensions**



**Mounting with Mounting Tool**



**Calculation**

Pin diameter D (mm)	Sensitivity (pC/bar)
2	-1,38
2,5	-2,16
3	-3,11
3,5	-4,23
4	-5,53

(Calculated with nom. sensitivity of -4,4 pC/N)

**Calculating formula:**

Pin cross section (mm<sup>2</sup>) \* 0,1 \* sensor sensitivity (pC/N)

**Accessories**

**Sensor Cable**

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

**Mounting Accessories**

- DZPC MTHO
- DZPC HFMT

**Description**

- Mounting/Dismounting tool
- Clamping piece



# Measuring Tongue

10 kN

DPPC IS12.6

## Features

- For indirect measuring
- Measuring range 0...+10 kN
- Connector thread M4 x 0,35



## Technical Data

Method	Piezo electric; quartz
Range	0...10 kN
Overload	12 kN
Nom. sensitivity	-4,2 pC/N
Linearity	< 1% FS
Natural frequency	> 60 kHz
Insulation resistance at 20°C	> 10 <sup>12</sup> Ω
Insulation resistance at 200 °C	> 10 <sup>11</sup> Ω

## Mechanical Data

Connector thread	M4 x 0,35
Material enclosure	Stainless steel

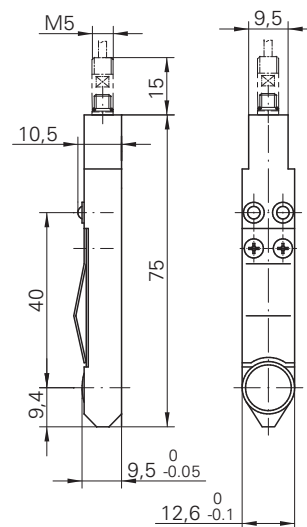
## Environmental Conditions

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

## Order Code

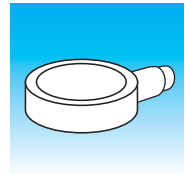
DPPC IS12.6-4.2

## Dimensions (mm)

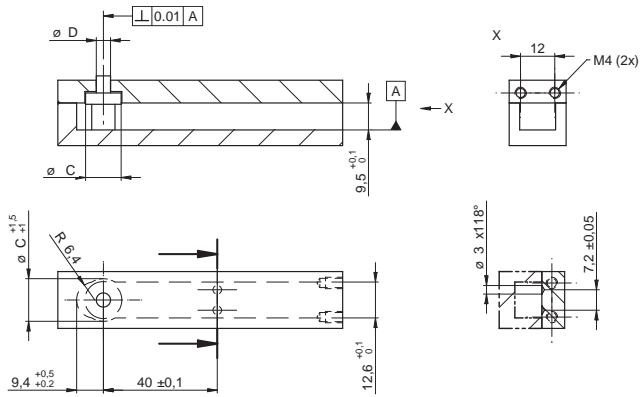


## Delivery Contents

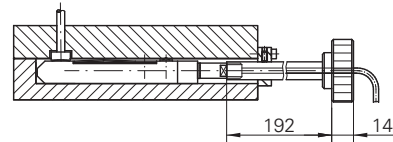
- Calibration sheet



**Mounting Dimensions**



**Mounting with Mounting Tool**



**Calculation**

Pin diameter D (mm)	Sensitivity (pC/bar)
2	-1,32
2,5	-2,06
3	-2,97
3,5	-4,04
4	-5,28

(Calculated with nom. sensitivity of -4,2 pC/N)

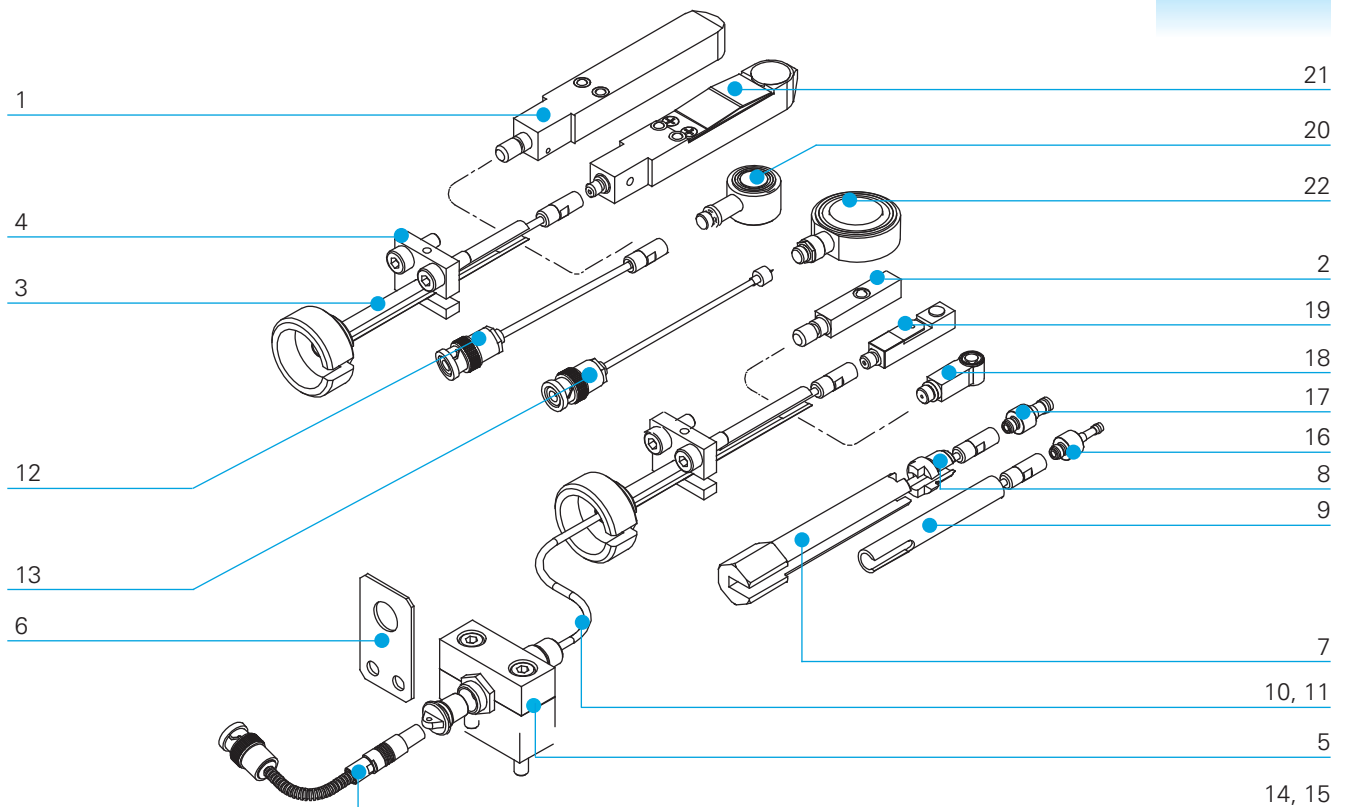
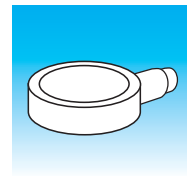
**Calculating formula:**

Pin cross section (mm<sup>2</sup>) \* 0,1 \* sensor sensitivity (pC/N)

**Accessories**

Sensor Cable	Mounting Accessories	Description
DZCC xxxx-ST-MF	DZPC MTHO	Mountin/Demounting tool
DZCC xxxx-HT-MF	DZPC HFMT	Clamping piece

# Summary Accessories and Sensors

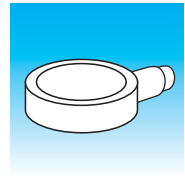


Pos.	Mounting Accessories	Type
1	Dummy measuring tongue 12 mm	DZPC DT12
2	Dummy measuring tongue 6 mm	DZPC DT06
3	Mounting//Extracting tool	DZPC MTHO
4	Clamping assembly for mounting/dismounting tool	DZPC HFMT
5	Mounting equipment Fischer connector	DZPC HOFc
6	Mounting equipment Fischer connector	DZPC HPFC
7	Mounting wrench	DZPC MWPT
8	Special nut for 2,5 / 4 mm cavity pressure sensor	DZPC MN04
9	Spacer tube for 2,5 / 4 mm cavity pressure sensor	DZPC MT04

Pos.	Cable	Type
10	Sensor cable 0...+200 °C M4 x 0,35 - Fischer	DZCC ... -ST-MF
11	Sensor cable 0...+220 °C M4 x 0,35 - Fischer	DZCC ... -HT-MF
12	Sensor cable M4 x 0,35 - BNC	DZCC ... -ST-MB
13	Sensor cable UNF 10-32 - BNC	DZCC ... -78-UB
14	Connecting cable Fischer - BNC	DZCC ... -04-FB
15	Connecting cable Fischer - BNC with protecting tube	DZCC ... -HT-FB

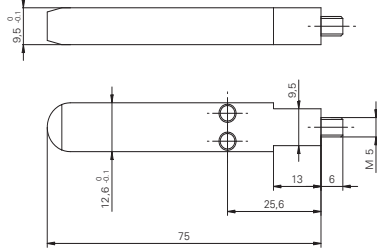
Pos.	Sensors	Type
16	Cavity pressure sensor $\varnothing$ 2,5 mm	DPPC DS02.5-2.0
17	Cavity pressure sensor $\varnothing$ 4,0 mm	DPPC DS04.0-x.x
18	Miniature force sensor 2,5 kN	DLPP 6MO-2.5-4.4
19	Miniature measuring tongue 2,5 kN	DPPC IS06.0-4.4
20	Force sensor 10 kN	DLPP 7MO-010-2.2
21	Measuring tongue 10 kN	DPPC IS12.6-4.2
22	Force sensor 30 kN	DLPP 4MO-030-4.4

# Mounting Accessories



## DZPC DT12

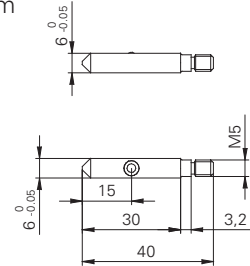
Dummy measuring tongue 12 mm



Mat.: 1.4305

## DZPC DT06

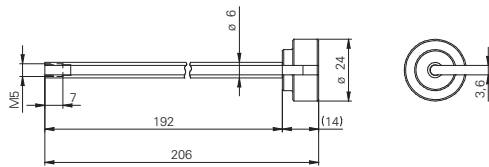
Dummy measuring tongue 6 mm



Mat.: 1.4305

## DZPC MTHO

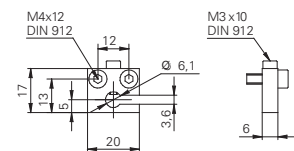
Mounting/extracting tool



Mat.: 1.4305

## DZPC HFMT

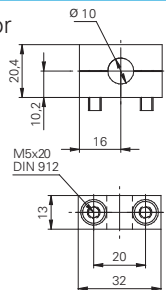
Clamping assembly for mounting/extracting tool



Mat.: Aluminum

## DZPC HOFc

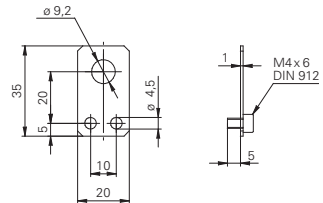
Mounting equipment Fischer connector



Mat.: Aluminum

## DZPC HPFC

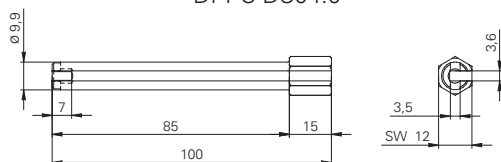
Mounting plate Fischer connector



Mat.: 1.4305

## DZPC MWPT

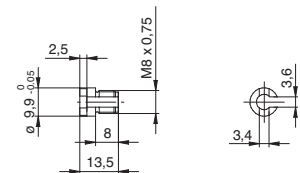
Mounting wrench for DPPC DS02.5  
DPPC DS04.0



Mat.: 1.4305

## DZPC MN04

Special nut for DPPC DS02.5  
DPPC DS04.5

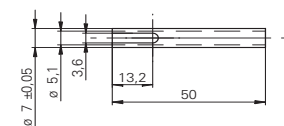


Mat.: 1.4305

## DZPC MT04

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

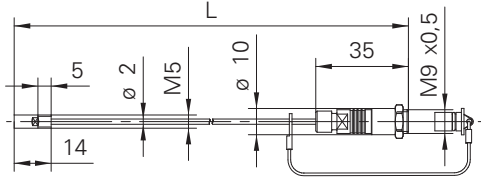
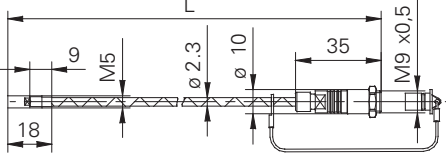
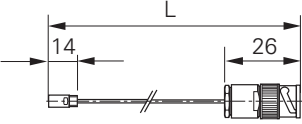
Mat.: 1.4305

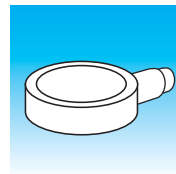


# Cables

## DZCC



Sensor Cable		DZCC ...- ST-MF	
<b>L [mm]</b>	<b>Order code</b>	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		
<b>Technical data</b>			
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	
<b>L [mm]</b>	<b>Order code</b>	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		
<b>Technical data</b>			
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	
<b>L [mm]</b>	<b>Order code</b>	Connector	Connector
1000	DZCC 1000-ST-MB	M4 x 0,35	
2000	DZCC 2000-ST-MB		
Custom length	DZCC xxxx-ST-MB		
<b>Technical data</b>		BNC	
Cable	Coax, Low Noise, PTFE/PFA		
Color	blue		
Impedance	50 Ω		
Cable-ø	1,9 mm		
Bending radius	R5	BNC	
Operating temp. range	0...+200°C		



Sensor Cable		DZCC ...-78-UB	
<b>L [mm]</b>	<b>Order code</b>	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		
<b>Technical data</b>			
Cable	Coax 178 RG		
Color	brown		
Impedance	50 Ω		
Cable-ø	1,8 mm		
Bending radius	R10		
Operating temp. range	0...+200°C		
Connector			BNC
Connecting Cable		DZCC ...-04-FB	
<b>L [mm]</b>	<b>Order code</b>	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		
<b>Technical data</b>			
Cable	Triax, Low Noise, PTFE/PFA		
Color	transparent		
Impedance	50 Ω		
Cable-ø	3,4 mm		
Bending radius	R10		
Operating temp. range	0...+200°C		
Connector			BNC
Connecting Cable DZCC ...-HT-FB		DZCC ...-HT-FB	
<b>L [mm]</b>	<b>Order code</b>	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		
<b>Technical data</b>			
Cable	Triax, Low Noise, PTFE, PFA		
Color	metal sheath		
Impedance	50 Ω		
Cable-ø	5 mm		
Bending radius	R30		
Operating temp. range	0...+220 °C		
Connector			BNC

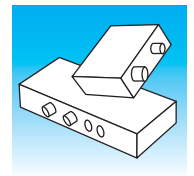


# Charge Amplifiers





# 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  $\pm 10$  V

**I** = Current output 4...20 mA (series 800)

### 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

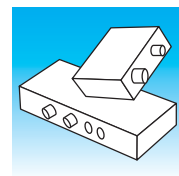
**B** = BNC




### Output Connection

**S** = 25 Pin D-Sub

# Summary

## Charge Amplifiers



<p><b>DACU 800</b></p> 	<ul style="list-style-type: none"> <li>• Charge amplifier for piezo electric sensors</li> <li>• 14 selectable ranges</li> <li>• Peak value</li> <li>• 2 limit switches with switching outputs</li> <li>• RS 232 interface</li> </ul>	<p><b>Page 11.4</b></p>
<p><b>DACI 800</b></p> 	<ul style="list-style-type: none"> <li>• Charge amplifier for piezo electric sensors</li> <li>• 14 selectable ranges</li> <li>• Peak value</li> <li>• 2 limit switches with switching outputs</li> <li>• RS 232 interface</li> </ul>	<p><b>Page 11.6</b></p>
<p><b>DACU 820</b></p> 	<ul style="list-style-type: none"> <li>• Charge amplifier for piezo electric strain sensors</li> <li>• 2 analogue outputs</li> <li>• 4 selectable ranges</li> <li>• Peak value storage</li> <li>• 2 limit switches with switching output</li> <li>• RS 232 interface</li> </ul>	<p><b>Page 11.8</b></p>

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	$\pm 10$ V
Characteristic curve deviation	< 1% FS
Linearity	< 0,02% FS
Output offset	< $\pm 5$ mV
Noise voltage	< 5 mVpp (0,1 Hz... 100 kHz) < 30 mVpp at 100 pC range
Output impedance	10 $\Omega$
Reset operate offset	electronically compensated
Drift	< 0,03 pC/s <sup>(2)</sup>
Frequency range (-3 dB)	0...20 kHz <sup>(1)</sup>
Control input	$\pm 5$ V... $\pm 45$ V, galv. separated
Switching output	max. 45 V, max. 100 mA galv. separated

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

<sup>(2)</sup> 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



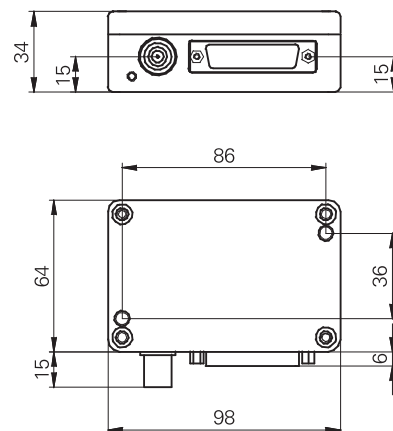
## Order Code

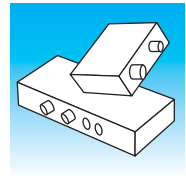
**DACU 800-0.1-1K0BS**

## Included

- Mounting screws 2 pcs. M4 x 16

## Dimensions (mm)

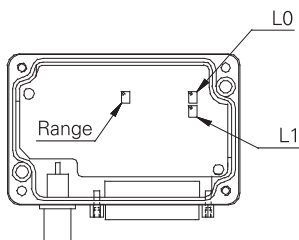




**Electrical Connections D-Sub 25**

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**



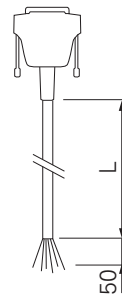
Range	Adjustment of variable range
L0	Adjustment of value 1. The limit switch voltage can be set with the potentiometer and has to be measured at pin 4. Alternatively a voltage can be supplied as well.
L1	Adjustment limit value 2. ditto, pin 3 only

**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	<b>DZCS 05/DACU 8</b>

# Charge Amplifier DACI 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 and test function



## Electrical Data

Voltage supply	15...35 VDC
Capacity draw	< 110 mA <sup>(1)</sup>
Measuring range	±100...1'000'000 pC
Output signal	4...20 mA
Characteristic curve deviation	< 1% FS
Linearity	< 0,02% FS
Output offset	< ±0,02 mA
Noise voltage	< 10 µA <sub>pp</sub> (0,1 Hz...100 kHz) <sup>(2)</sup>
Burden	500 Ω
Reset operate offset	electronic compensated
Drift	< 0,05 pC/s bei 23 °C <sup>(3)</sup>
Frequency range (-3 dB)	0...10 kHz
Control input	±5 V...±45 V, galv. separated
Switching output	max. 45 V max. 100 mA galv. separated

<sup>(1)</sup> Modulation signal out and peak out = 20 mA

<sup>(2)</sup> < 60 mV<sub>pp</sub> in the 100 pC range

<sup>(3)</sup> DACI at least 30 min. attached to operational voltage

All specifications at ambient temperature (23°C ±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

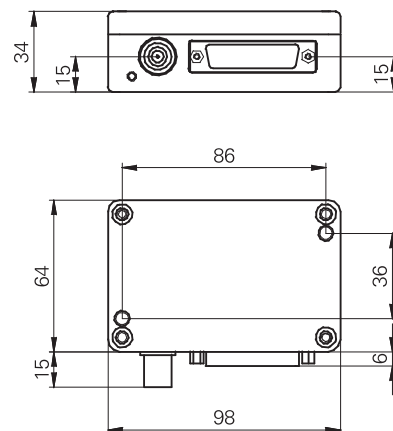
## Order Code

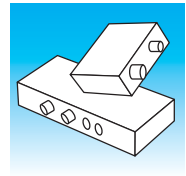
**DACI 800-0.1-1K0BS**

## Included

- Mounting screws 2 pcs. M4 x 16

## Dimensions (mm)

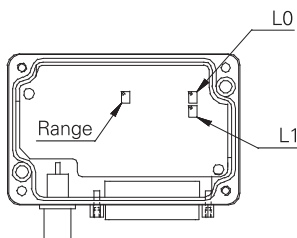




## Electrical Connections D-Sub 25

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	NC
18	NC
19	Com Logic Input
20	Operate
21	80% Test
22	Supply GND
23	NC
24	Code 1
25	Com Logic Output (Alarm)

## Control Elements



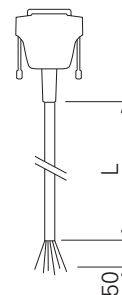
Range	Adjustment of variable range
L0	Adjustment of value 1. The limit switch voltage can be set with the potentiometer and has to be measured at pin 4. Alternatively a voltage can be supplied as well.
L1	Adjustment limit value 2. ditto, pin 3 only

## Measuring Range Selection

Range				Measuring range
3	2	1	0	pC/20 mA
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)

5 m

Order code

**DZCS 05/DACI 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 <sup>(1)</sup>
Measuring range channel 1	$\pm 100'000...500'000$ pC
Measuring range channel 2	$\pm 2'000...20'000$ pC
Output signal	$\pm 10$ V
Characteristic curve deviation	< 1% FS
Linearity	< 0,02%FS
Output offset	< $\pm 5$ mV
Noise voltage	< 5 mVpp (0,1 Hz...100 kHz) <sup>(2)</sup>
Output impedance	10 $\Omega$
Reset operate offset	< $\pm 10$ mV
Drift	< 0,03 pC/s at 23 °C <sup>(3)</sup>
Frequency range (-3 dB)	0...20 kHz <sup>(4)</sup>
Control input	$\pm 5$ V... $\pm 45$ V, galv. separated
Switching output	max. 45 V, max. 100 mA galv. separated

<sup>(1)</sup> < 55 mA at 24 V

<sup>(2)</sup> < 20 mVpp in the 2000 pC range

<sup>(3)</sup> DACU at least 30 min attached to operational voltage

<sup>(4)</sup> @ 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



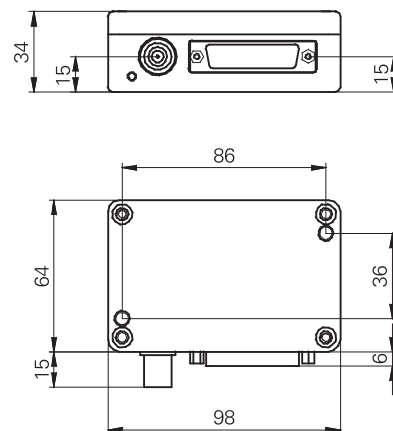
## Order Code

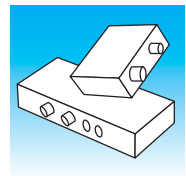
**DACU 820-2.0-500BS**

## Included

- Mounting screws 2 pcs. M4 x 16

## Dimensions (mm)





**Electrical Connections D-Sub 25**

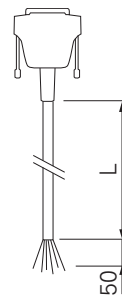
Pin	Function
1	Signal out CH1
2	Peak out
3	Level 1 (In or Out)
4	Level 0 (In or Out)
5	Range B1 (CH2)
6	Range B0 (CH2)
7	Range A1 (CH1)
8	Range A0 (CH1)
9	Supply GND
10	+Supply
11	Code 2
12	Code 0
13	Code Supply +
14	Signal GND
15	Alarm 1 (CH1)
16	Alarm 0 (CH1)
17	RX
18	TX
19	Com Logic Input
20	Operate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

**Measuring Range Selection**

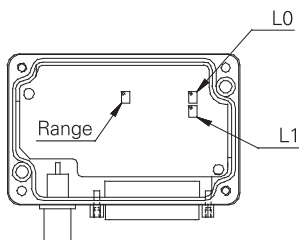
Range CH1		Measuring Range
A1	A0	pC/10V
0	0	500'000
0	1	200'000
1	0	100'000
1	1	100'000...500'000
Range CH2		
B1	B0	
0	0	20'000
0	1	10'000
1	0	5'000
1	1	2'000

**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	<b>DZCS 05/DACU 8</b>





# *Force Measurement*

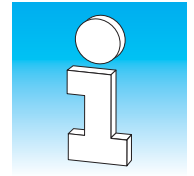
## **Supplementary Information**

*Axial-Load  
Torsion*

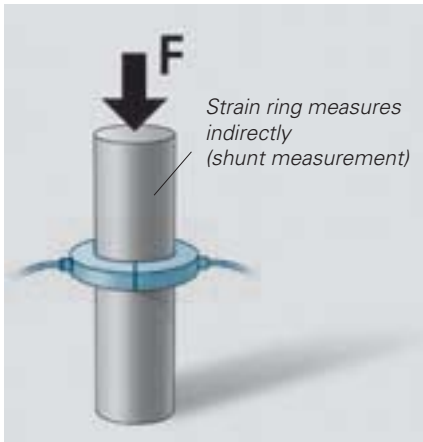
*Hydraulic  
Presses*

*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 [mm<sup>2</sup>]  
 E = E-Modulus [N/mm<sup>2</sup>]  
 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.

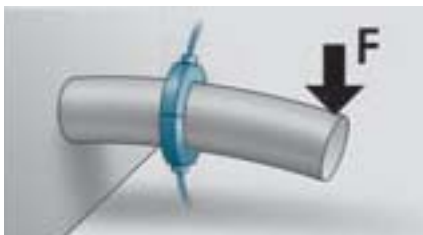
### Elastic modulus E

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



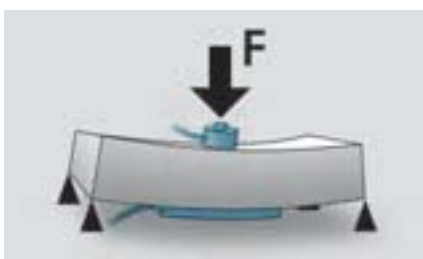
### Torsion

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.



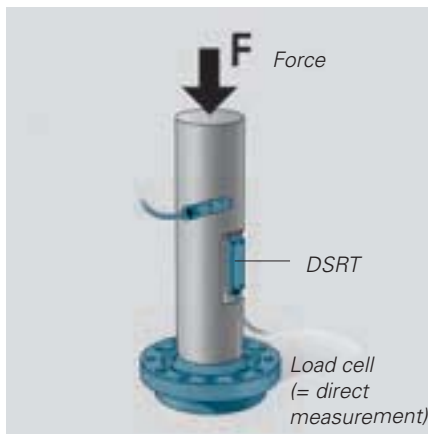
### Bending on Beams or Cross Heads

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.

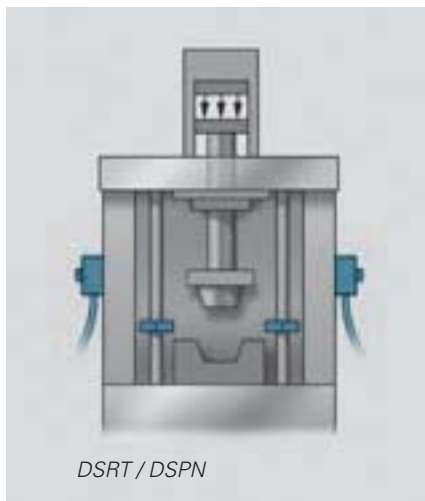


### Indirect Force Measurement

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.

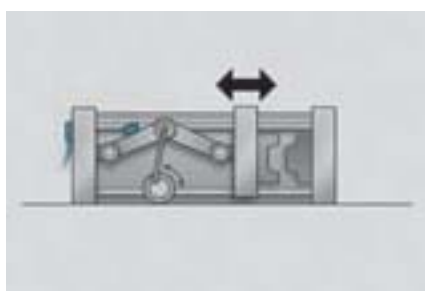
Application:

- 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.

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

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

### Material E-modulus (typical)

Steel	210 kN/mm <sup>2</sup>
Aluminium	70.5 kN/mm <sup>2</sup>

Example: 250  $\mu\text{m}/\text{m}$  strain equals to a mechanical strain of 52,2 N/mm<sup>2</sup> 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.

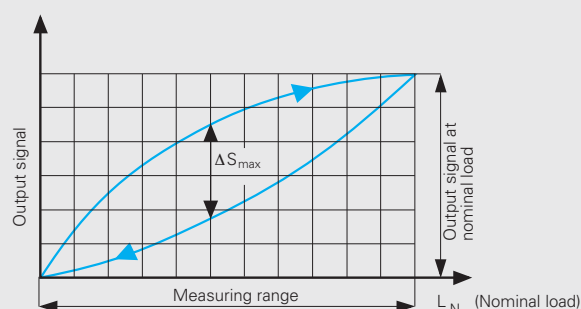
## Measuring range

Load range in which the specified errors are not exceeded.

## Hysteresis

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

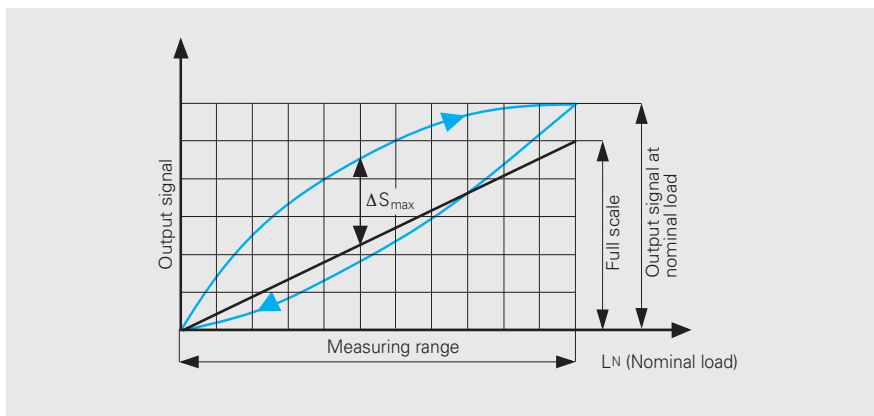
$$F_h = \frac{\Delta S_{\text{max}}}{F_N}$$



**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.

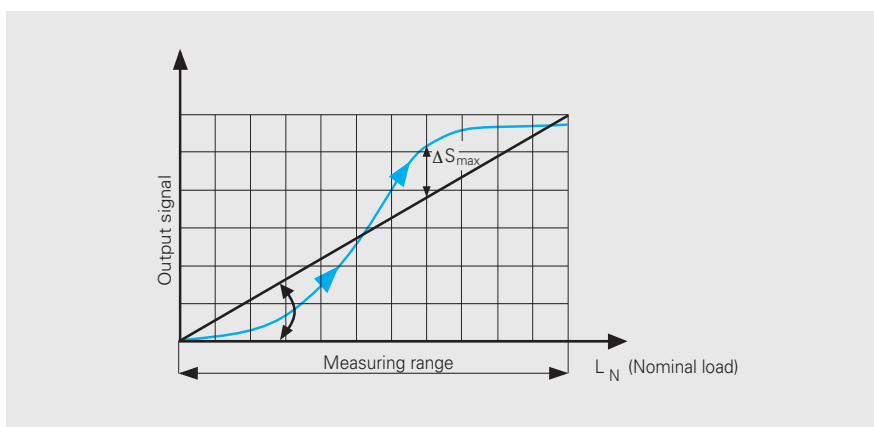
$$F_{\text{Com}} = \frac{\Delta S_{\text{max}}}{FS}$$



**Linearity**

Linearity error  $F_L$  is the largest difference  $\Delta S_{\text{max}}$  between the increasing calibration curve and the straight line through the origin with slope  $C_L$ .  $C_L$  is selected such that  $\Delta S_{\text{max}}$  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.

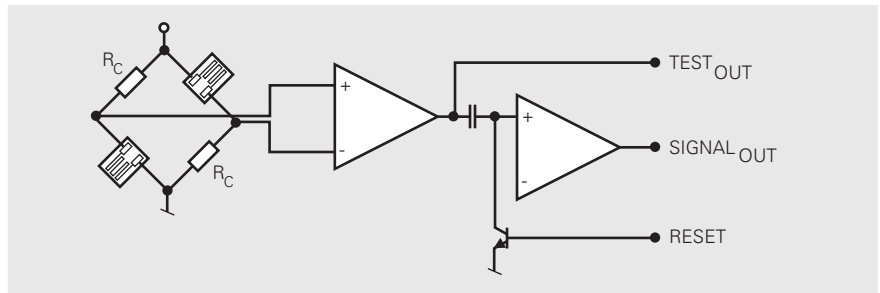
**Zero, bridge balance**

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**

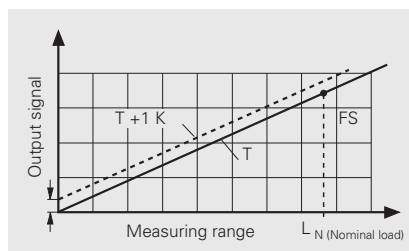
The difference in reference to the characteristic value between the max. and the min. display value of equal measuring points in case of repetition of identical load cycles.

**Test<sub>OUT</sub>**



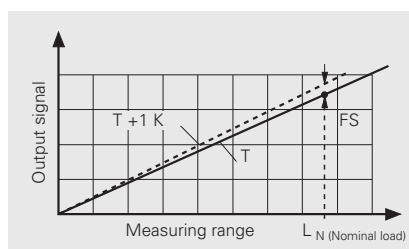
The non-tared signal is available at the output Test<sub>OUT</sub>. To prevent saturation of subsequent stages, Test<sub>OUT</sub> should ideally read between -2 V and +2 V when the sensor is installed and no load is applied. During operation this value may then be between -5 V and +5 V. The Test<sub>OUT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



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### 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:

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

**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.

# Safety concept

## International conformity marks

### CE-Information

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#### Safety concept

The safety concept lays down the technical, instructive and statutory measures which ensure the user (system manufacturers, owners and operators) a high degree of safety when handling our components. The detailed safety concept is available in the languages German, English and French.

#### Safety instructions

To ensure conformity with the markings on our products as listed below, the following safety instructions must be generally followed:

- Mounting, commissioning and safety instructions in data sheets, operating and mounting instructions must be followed.
- Connection, mounting and commissioning may only be executed by specialized personnel.
- Products which are not specifically classified as safety components shall not be used as stand-alone operator protection.

#### International conformity marks

The size of many products from Baumer is too small to attach all markings directly to the product. For this reason, the following marks are applied to the leaflets, mounting instructions and packages.



#### CE Mark

Guidelines exist in the EU which include the fundamental requirements to protect safety, health and the environment in order to ensure free trading in goods and services within the EU. The CE mark is not a quality mark, but a pure administration mark which indicates to the authorities that the marked product may be freely put into circulation in the internal EU market. The CE mark indicates that the product marked in this way fulfils the fundamental requirements of the applicable guidelines. To ensure this, the harmonized European standards are applied wherever applicable. The following relevant EU guidelines are applied for the various products manufactured by Baumer:

- Machine directive (98/37/EEC, 2006/42/EC)
- Low voltage directive (73/23/EEC, 2006/95/EC)
- EMC directive (89/336/EEC, 2004/108/EC)
- Radio equipment and telecommunication terminal equipment directive (1999/5/EC)

The declarations of conformity for the products are available to the party putting them into circulation.



#### C-UL-US Listing Mark

UL (Underwriters Laboratory Inc.) introduced this new Listing Mark in early 1998. According to UL it indicates compliance with both Canadian and U.S. requirements. The UL Listing Mark on a product is the manufacturer's representation that samples of that complete product have been tested by UL to nationally recognized Safety Standards and found to be free from reasonably foreseeable risk of fire, electric shock and related hazards and that the product was manufactured under UL's Follow-Up Services program. Most of the products of Baumer electric are UL listed. The file with the listed products can be looked into <http://www.ul.com>





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