



Baumer

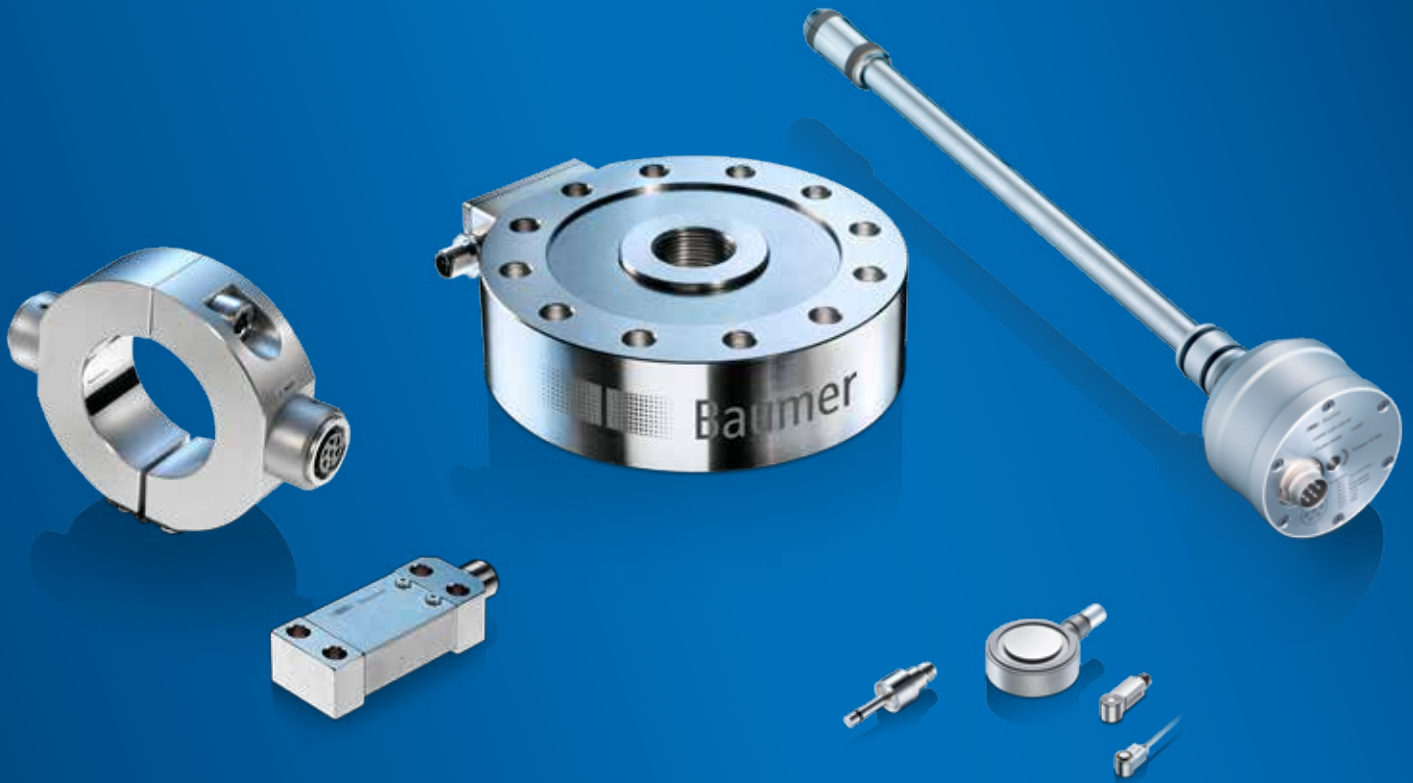
Passion for Sensors

Force and strain sensors.

Measure. Test. Control.



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



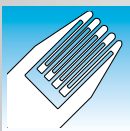
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Force and strain sensors – measuring testing and monitoring



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



Sensors with S/G technology

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

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



Sensors with Piezo technology

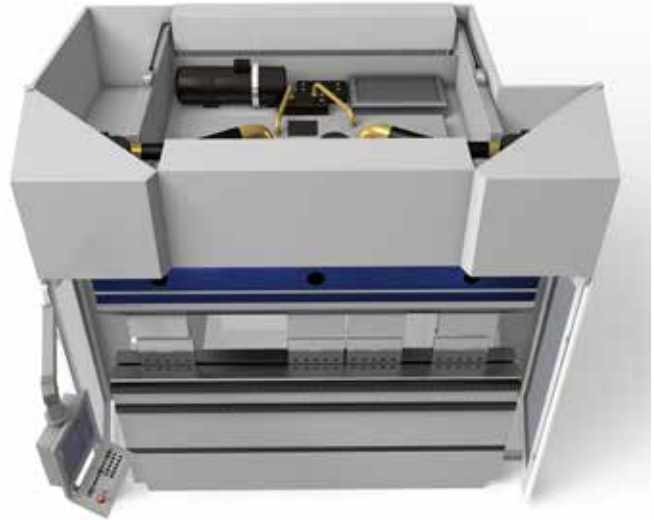
Quartz crystals and polarised ceramic materials are used where fast response time and a high signal to noise ratio are important.

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

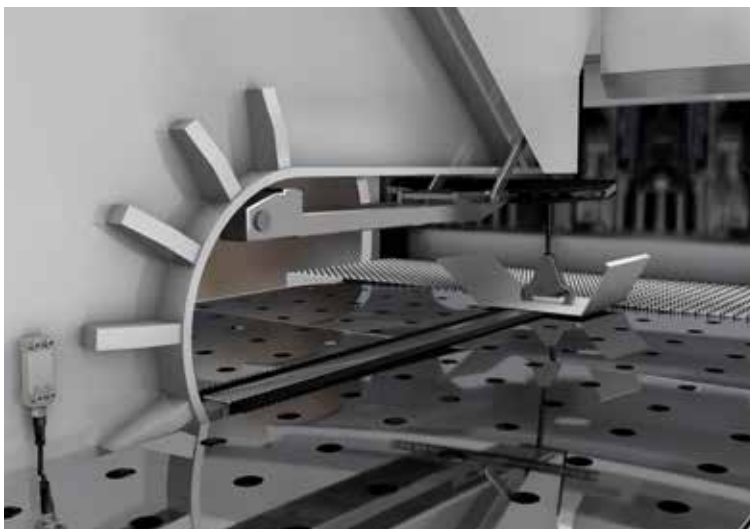
Load cell application examples

Sheet thickness control

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



1



Holding force control

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

Force control at joining process





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





Product Summary

Force Sensors



Strain Sensors

| DLRx | DSRC | DSRK | 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 0 ... 1000 $\mu\epsilon$ | Measuring range $\pm 750 \mu\epsilon$ |
| Characteristic curve deviation < 0,3% FS | Characteristic curve deviation < 1% FS | Characteristic curve deviation < 1%FS | Characteristic curve deviation < 0,8% FS |
| | | | |
| Page 2.3 | Page 3.3 | Page 4.3 | Page 5.3 |

Piezo Electric Sensors




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

Analysis Devices

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

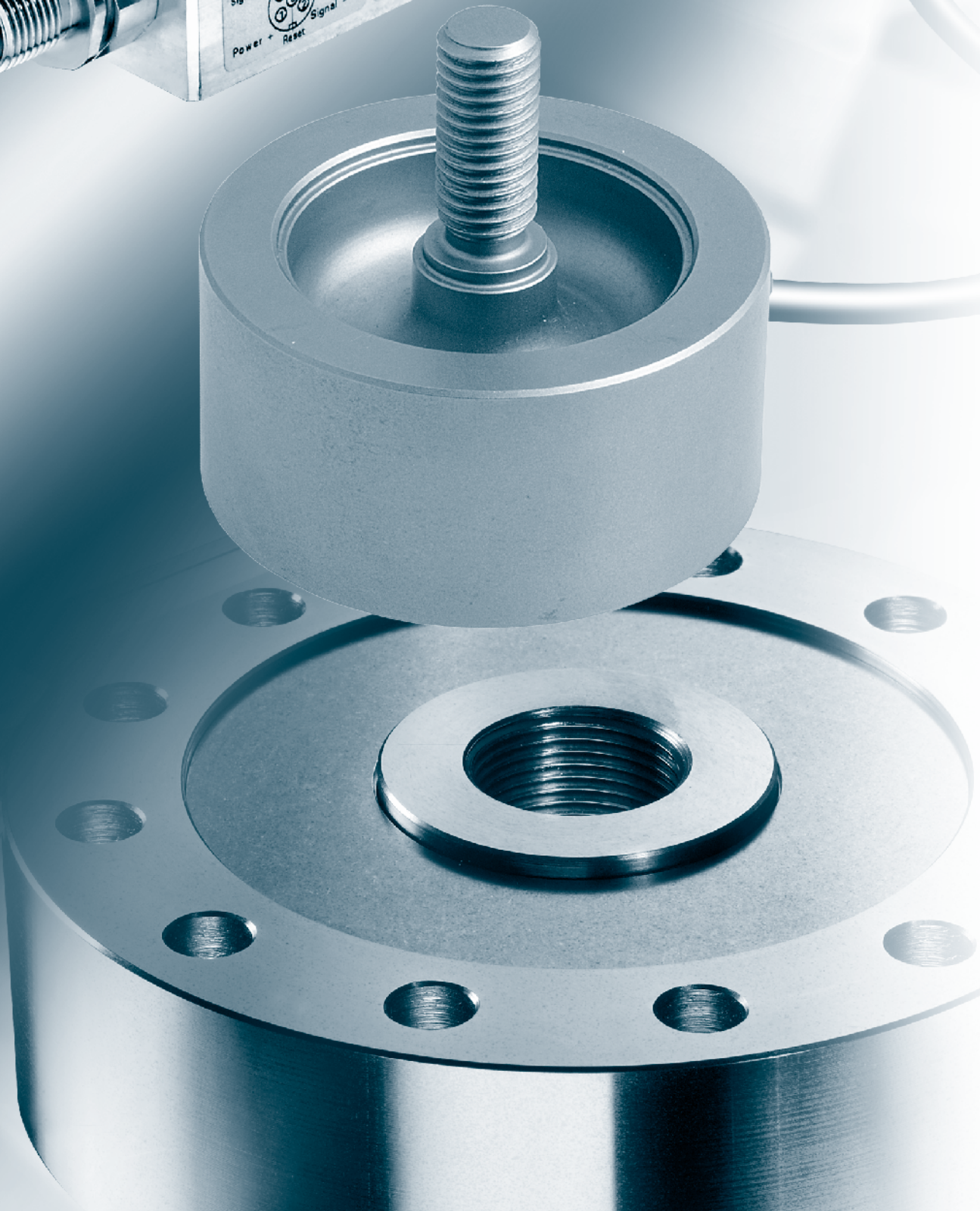
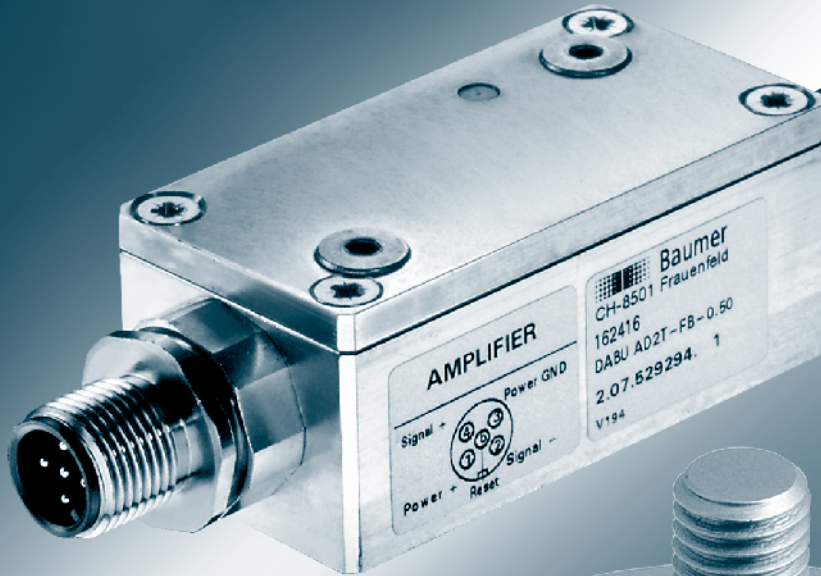
Accessories

Analysis Devices

| | | |
|---|---|--|
| DZPC | DZCC | DACx |
|  |  |  |
| Accessories | Coaxial Cable | Industrial multi range charge amplifier |
| Variety of mounting accessories for piezo electric sensors and cables | Sensor and connecting cables for piezo electric sensors | Analysis of piezo electric sensors |
| | Temperature range up to +220 °C | Measuring range from 100 pC to 1'000'000 pC |
| | | Characteristic curve deviation < 1% FS |
| | | 1 channel |
| Page 8.14 | Page 8.16 | Page 9.3 |

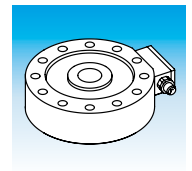


Load Cells



Product Key

Load cells DLRx



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

DLRx L00x.xxx.xxxxxx/xxxxx

Output

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

Housing Type

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

Connection

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

Precision Category

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

Measuring Range

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

Load Transmission

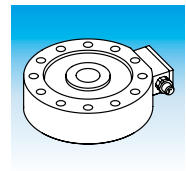
- CO** = Compression
- TC** = Tension/Compression

Option

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

Summary

Load cells DLRx



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

Load cells can be used in static and high dynamic applications and can be loaded by compression or tension/compression.

Load cell DLRP L001

Features

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



Technical Data

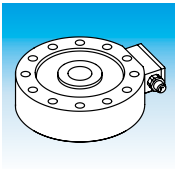
| | |
|-------------------------------|-----------------------------------|
| Standard capacities | 0...5000 N 0...10000 N |
| Sensitivity at FS | 1 mV/V |
| Combined error | < 0,5% FS |
| Linearity | < 0,5% FS |
| Hysteresis | < 0,5% FS |
| Compensated temperature range | 0...+70 °C |
| Operating temperature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

FS = Full scale output

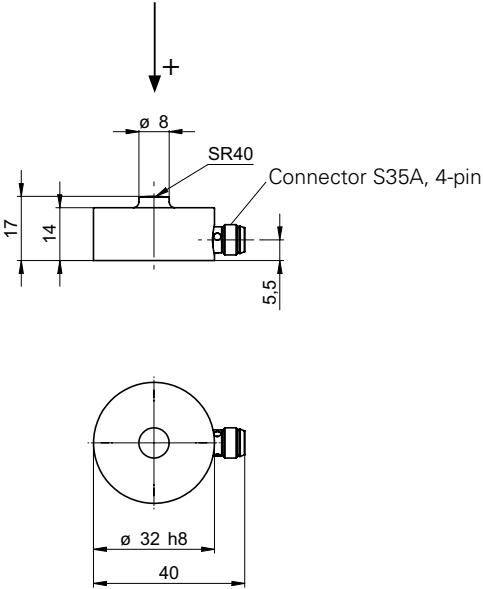
Combined error contains linearity, hysteresis and non-repeatability

Order Code

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



Dimensions (mm)



2

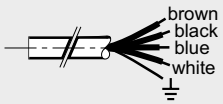
Electrical Connection

S80



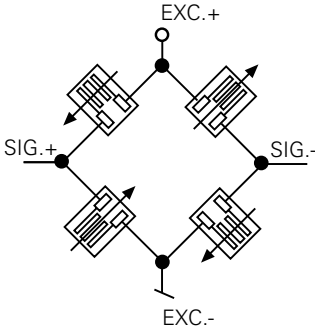
| Pin | Signal |
|---------|-------------------|
| 1 | +Vs |
| 2 | -V _{OUT} |
| 3 | +V _{OUT} |
| 4 | GND |
| Housing | ⏏ |

W24



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

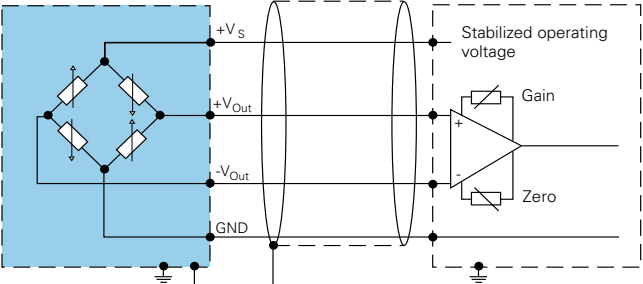
Bridge Circuit



Wiring

DLRP Transducer

Precision amplifier/ power supply unit



Load cell DLRP L002

Features

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



Technical Data

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

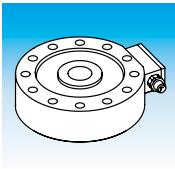
FS = Full scale output

Combined error contains linearity, hysteresis and non-repeatability

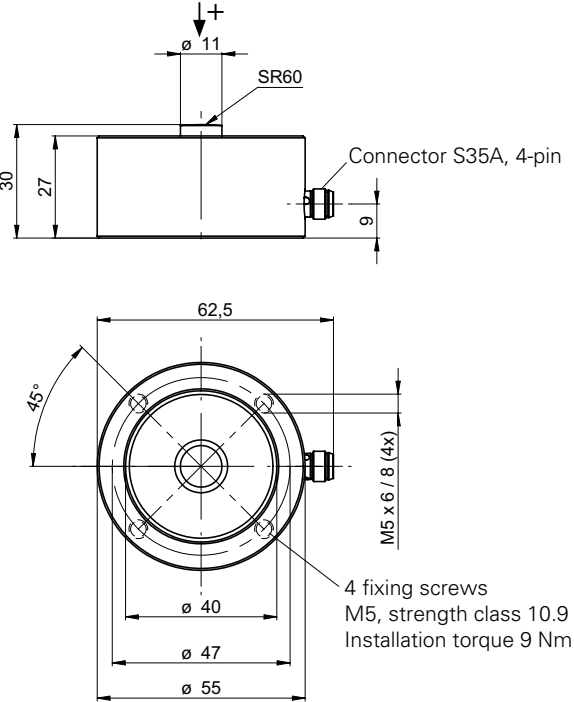
Order Code

DLRP L002. .B CO/CL10

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



Dimensions (mm)



2

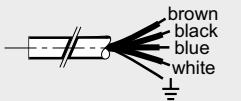
Electrical Connection

S80



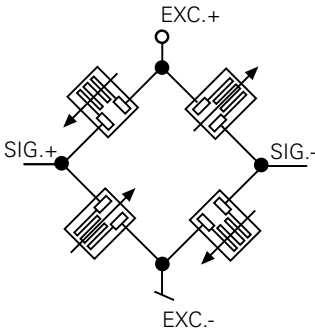
| Pin | Signal |
|---------|-------------------|
| 1 | +Vs |
| 2 | -V _{OUT} |
| 3 | +V _{OUT} |
| 4 | GND |
| Housing | \perp |

W24

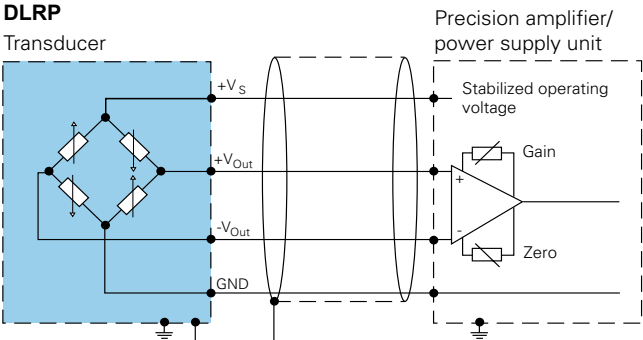


| Color | Signal |
|---------|-------------------|
| brown | +Vs |
| black | -V _{OUT} |
| blue | GND |
| white | +V _{OUT} |
| Housing | \perp |

Bridge Circuit



Wiring



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

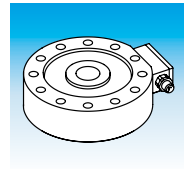
| | |
|-------------------------------|--|
| Standard capacities | 0...500 N 0...1000 N 0...2000 N 0...5000 N 0...10000 N |
| Sensitivity at FS | 2 mV/V |
| Combined error | < 0,3% FS |
| Linearity | < 0,3% FS |
| Hysteresis | < 0,3% FS |
| Compensated temperature range | 0...+70 °C |
| Operating temperature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

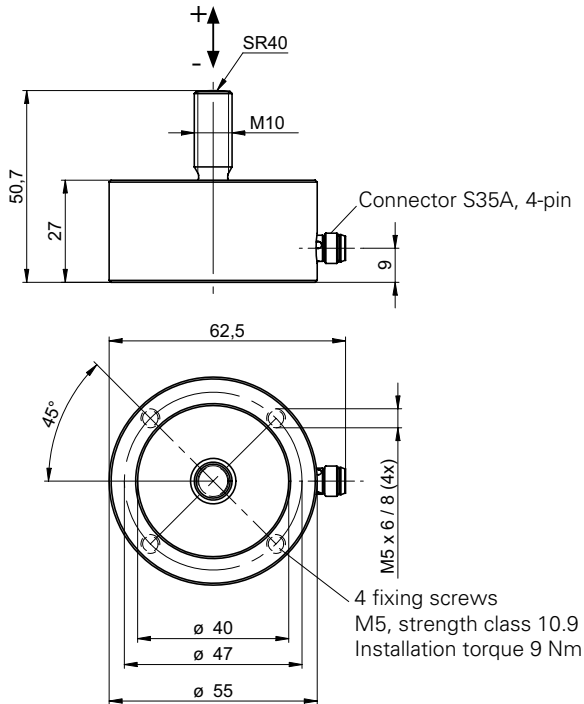
Combined error contains linearity, hysteresis and non-repeatability

Order Code

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



Dimensions (mm)



2

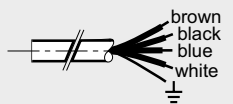
Electrical Connection

S80



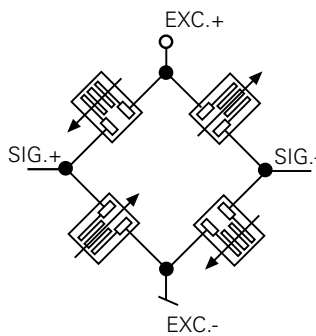
| Pin | Signal |
|---------|-------------------|
| 1 | +Vs |
| 2 | -V _{OUT} |
| 3 | +V _{OUT} |
| 4 | GND |
| Housing | ⏏ |

W24

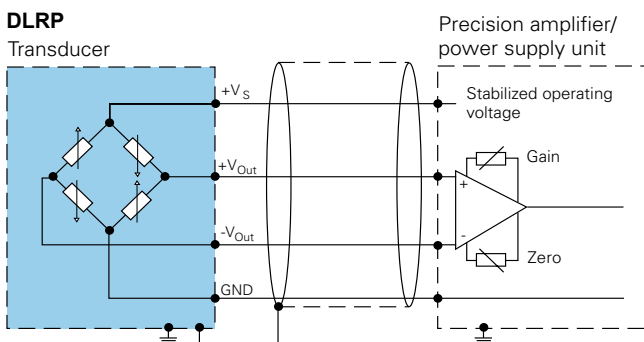


| Color | Signal |
|---------|-------------------|
| brown | +Vs |
| black | -V _{OUT} |
| blue | GND |
| white | +V _{OUT} |
| Housing | ⏏ |

Bridge Circuit



Wiring



Load cell DLRP L003

Features

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



Technical Data

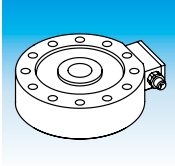
| | |
|-------------------------------|--|
| Standard capacities | 0...10000 N 0...20000 N 0...30000 N 0...50000 N 0...100000 N |
| Sensitivity at FS | 2 mV/V |
| Combined error | < 0,3% FS |
| Linearity | < 0,3% FS |
| Hysteresis | < 0,3% FS |
| Compensated temperature range | 0...+70 °C |
| Operating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

FS = Full scale output

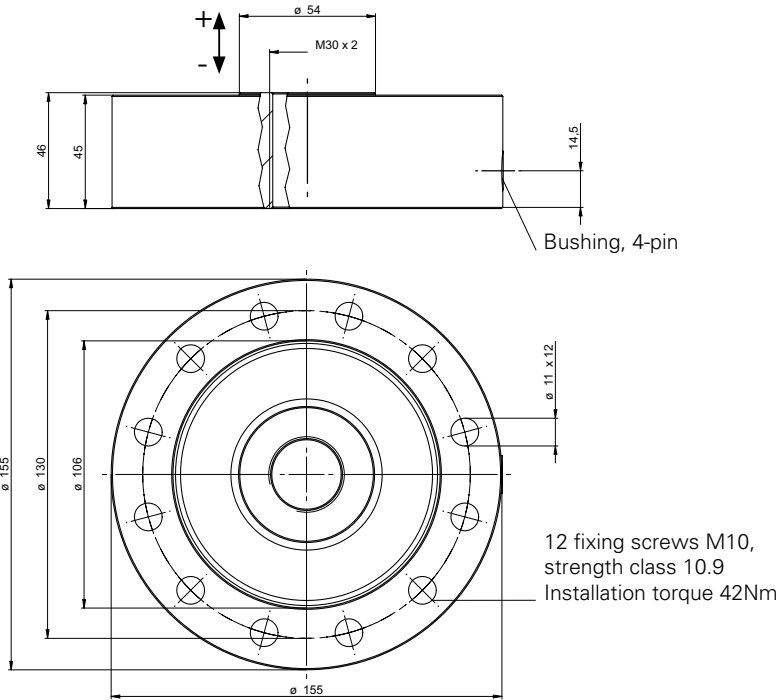
Combined error contains linearity, hysteresis and non-repeatability

Order Code

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



Dimensions (mm)



2

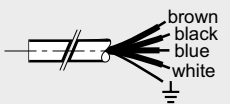
Electrical Connection

S80



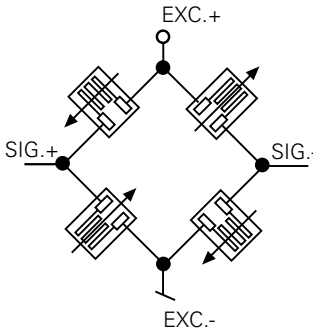
| Pin | Signal |
|---------|-------------------|
| 1 | +Vs |
| 2 | -V _{OUT} |
| 3 | +V _{OUT} |
| 4 | GND |
| Housing | ⏏ |

W24



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

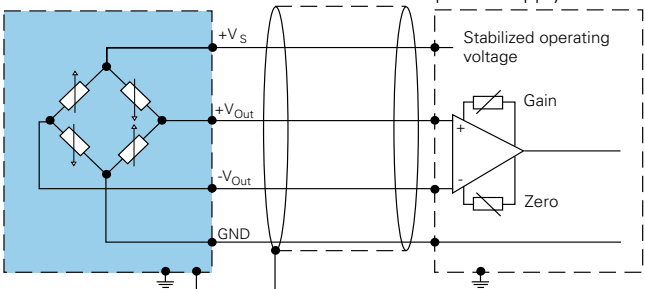
Bridge Circuit



Wiring

DLRP Transducer

Precision amplifier/
power supply unit



Load cell with amplifier DLRx L001

Features

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



Technical Data

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

FS = Full scale output

Technical Data

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

Order Code

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

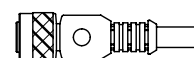
Accessories (not included in delivery)

Cable between the amplifier and the control unit.



Series 713

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



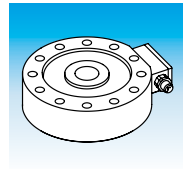
M12 x 1

Connector female with cable, control side, 5-pin

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

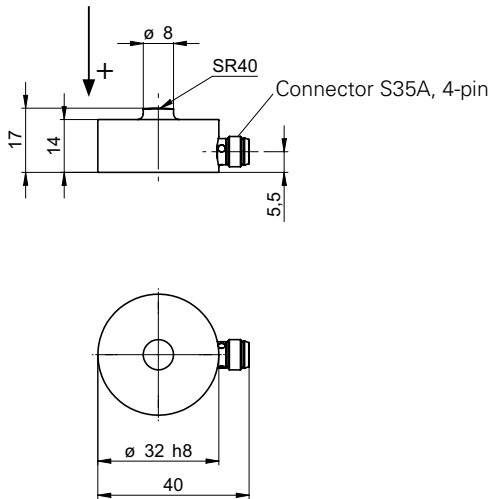
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

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

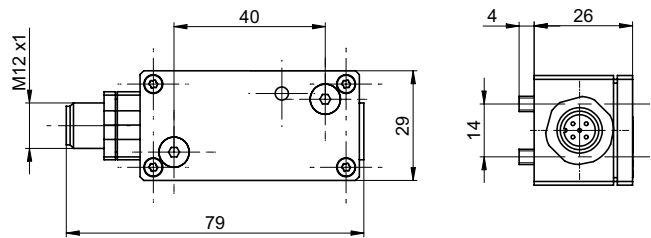


Dimensions (mm)

Load cell



Amplifier DABx AD2T



2

Electrical Connection

DLRU

14C



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

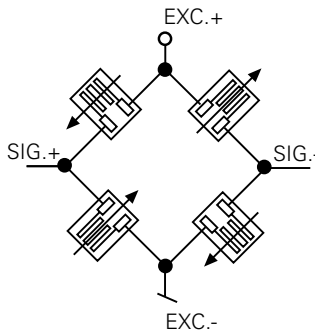
DLRI

14C



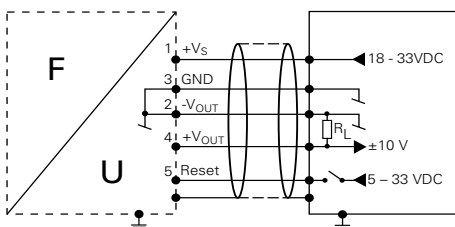
| Pin | |
|---------|-------------------|
| 1 | +Vs |
| 2 | n.c. |
| 3 | GND |
| 4 | +I _{OUT} |
| 5 | Reset |
| Housing | ⏏ |

Bridge Circuit

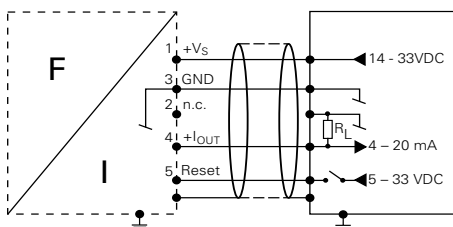


Wiring

DLRU



DLRI



Load cell with amplifier DLRx L002

Features

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



Technical Data

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

FS = Full scale output

Technical Data

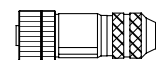
| | |
|--------------------|---|
| Cable | 5 m, shielded, PUR, (between amplifier and sensor) |
| Load cell material | 1.4542 |

Order Code

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

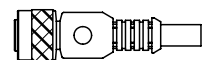
Accessories (not included in delivery)

Cable between the amplifier and the control unit.



Series 713

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

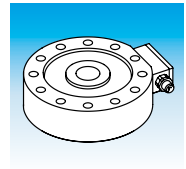


M12 x 1

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

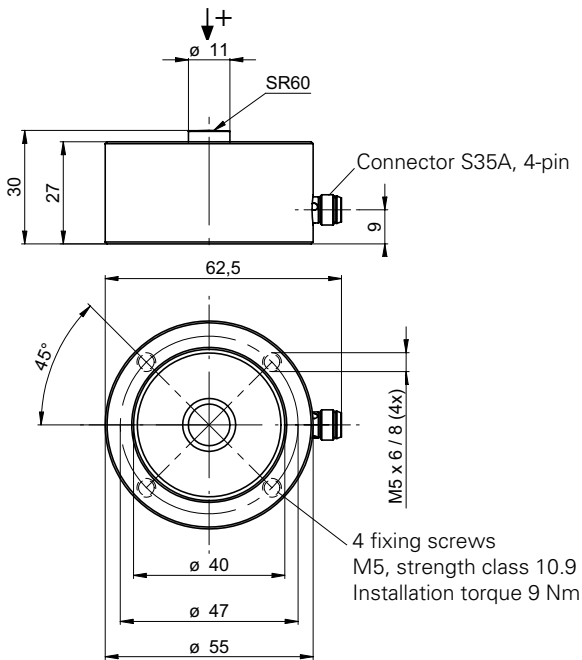
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

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

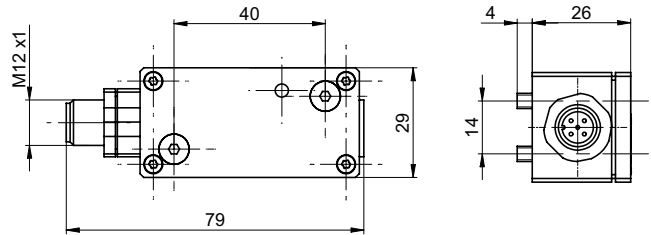


Dimensions (mm)

Load cell



Amplifier DABx AD2T



Electrical Connection

DLRU

14C



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

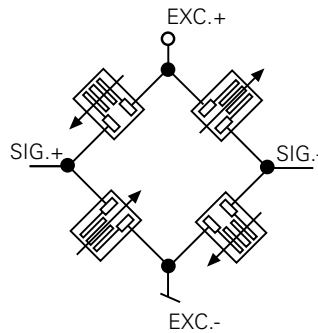
DLRI

14C



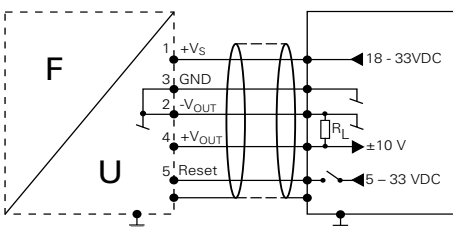
| Pin | |
|---------|-------------------|
| 1 | +Vs |
| 2 | n.c. |
| 3 | GND |
| 4 | +I _{OUT} |
| 5 | Reset |
| Housing | ⏏ |

Bridge Circuit

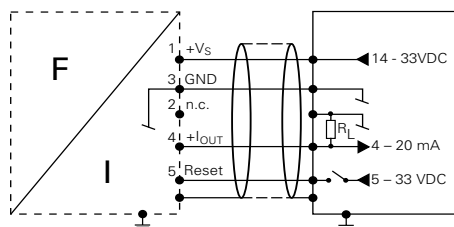


Wiring

DLRU



DLRI



Load cell with amplifier DLRx L002

Features

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



Technical Data

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

Technical Data

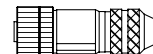
| | |
|--------------------|---|
| Cable | 5 m, shielded, PUR, (between amplifier and sensor) |
| Load cell material | 1.4542 |

Order Code

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

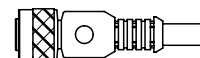
Accessories (not included in delivery)

Cable between the amplifier and the control unit.



Series 713

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

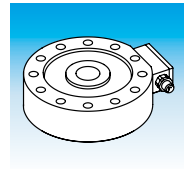


M12 x 1

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

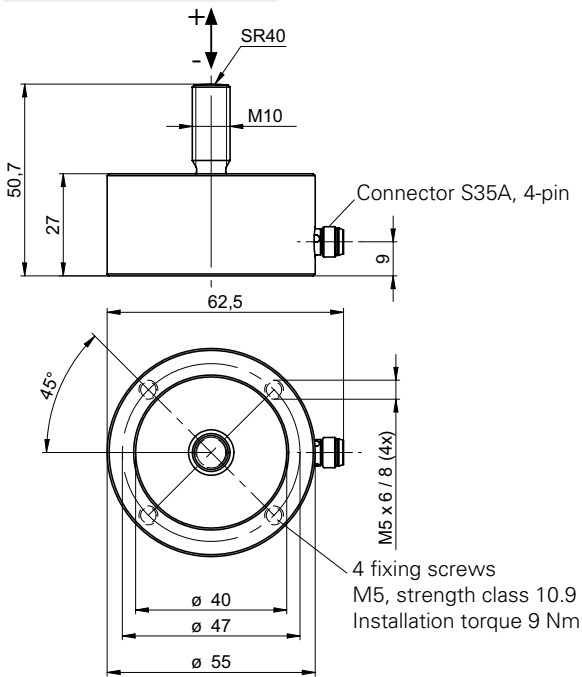
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

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

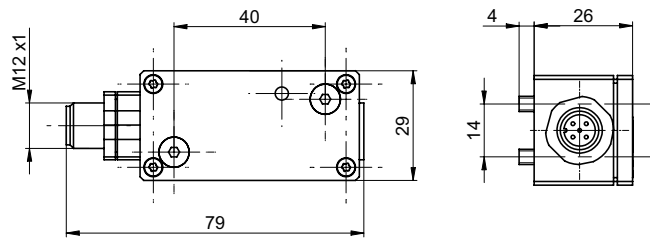


Dimensions (mm)

Load cell



Amplifier DABx AD2T



Electrical Connection

DLRU

14C



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

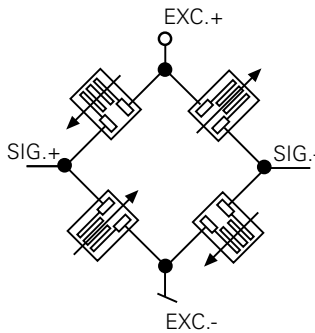
DLRI

14C



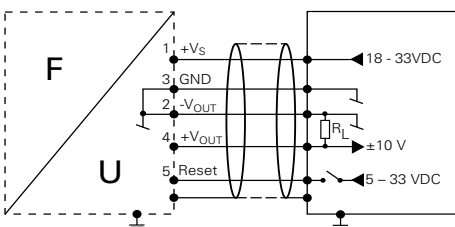
| Pin | |
|---------|-------------------|
| 1 | +Vs |
| 2 | n.c. |
| 3 | GND |
| 4 | +I _{OUT} |
| 5 | Reset |
| Housing | ⊥ |

Bridge Circuit

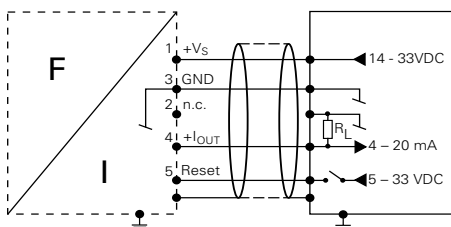


Wiring

DLRU



DLRI



Load cell with amplifier DLRx L003

Features

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

Technical Data

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

FS = Full scale output



Technical Data

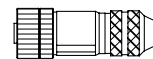
Load cell material 1.7225, nickel-plated

Order Code

| | | | | | | | | | |
|-----|-------|--|---|--|-----|--|--|--|--|
| DLR | L003. | | B | | TC/ | | | | Option |
| | | | | | | | | | C Top cover |
| | | | | | | | | | SP Altered polarity |
| | | | | | | | | | CSP Combinations possible |
| | | | | | | | | | Load transmission |
| | | | | | | | | | TC Tension/Compression (see drawing) |
| | | | | | | | | | Measuring range |
| | | | | | | | | | 310 0...10000 N 350 0...50000 N |
| | | | | | | | | | 320 0...20000 N 410 0...100000 N |
| | | | | | | | | | 330 0...30000 N |
| | | | | | | | | | Combined error |
| | | | | | | | | | B 0,3% |
| | | | | | | | | | Connection |
| | | | | | | | | | 14C 5-pin connector series M12 x 1 |
| | | | | | | | | | Output |
| | | | | | | | | | U Voltage output ± 10 V |
| | | | | | | | | | I Current output 4...20 mA |

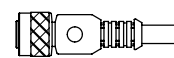
Accessories (not included in delivery)

Cable between the amplifier and the control unit.



Series 713

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



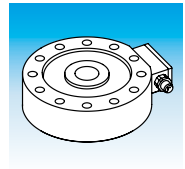
M12 x 1

Connector female with cable, control side, 5-pin

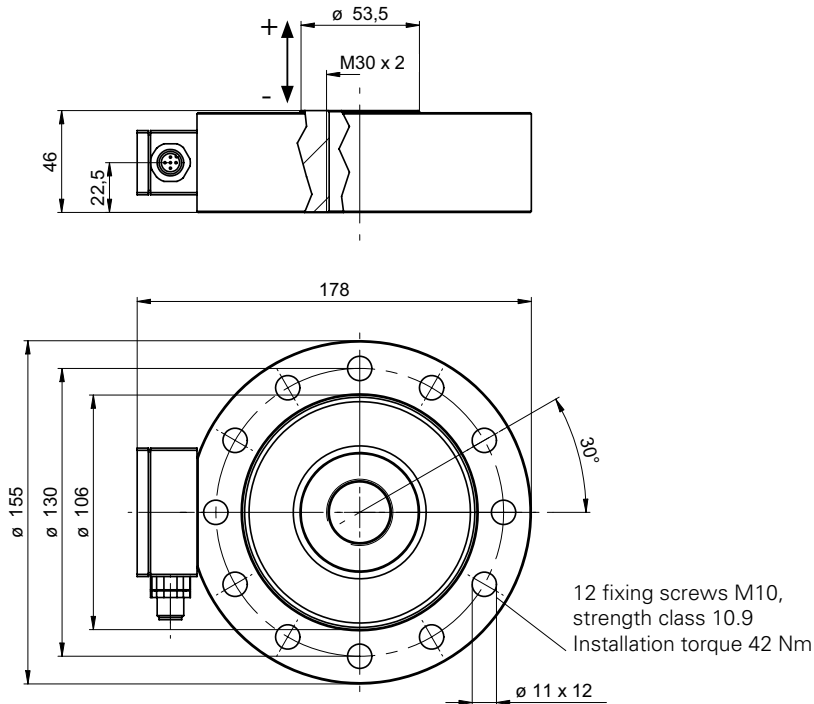
ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

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

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



Dimensions (mm)



2

Electrical Connection

DLRU

14C



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

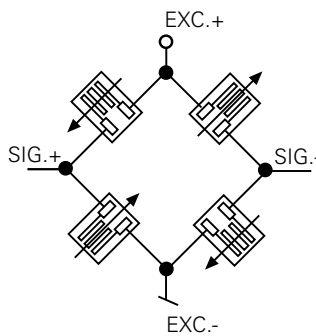
DLRI

14C



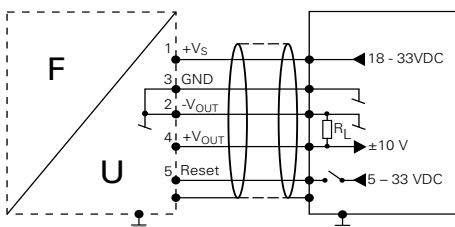
| Pin | |
|---------|-------------------|
| 1 | +Vs |
| 2 | n.c. |
| 3 | GND |
| 4 | +I _{OUT} |
| 5 | Reset |
| Housing | ⊥ |

Bridge Circuit

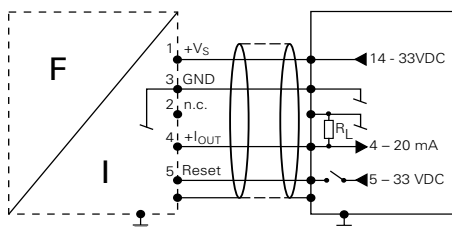


Wiring

DLRU



DLRI

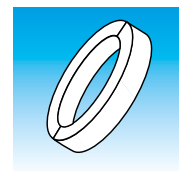


Strain Rings



Product Key

Strain Rings DSRC



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

DSRC BT053M/CM

Product Description

DS = Strain sensor

Method

R = Resistive

Series

C = Series C (strain ring)

Type

ST = Standard, 6 pin connector radial, 2 x 1/4 S/G bridge, k = 2,00

BT = Execution with radial cable exit, w/o connector, cable 5 m, 2 x 1/4 S/G bridge, k = 2,00

Nominal Size (mm)

Shaft Diameter

Metric sizes = Ring diameter in mm

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

Example

053 = 53 mm

Metric / Inch

M = Metric

Options

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

/CM = 4 pin cable connector

/CN = 6 pin cable connector

/CL10 = Cable length 10 m

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

Note the Following Important Points

When applying the strain ring:

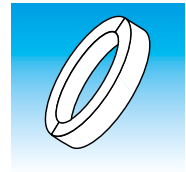
- The strain rings are not suitable for static applications. Reset measuring chain before each cycle.
- The strain rings are equipped with two exactly diametrically opposed strain gages.



Possible bridge circuits:

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

Summary

Strain Rings DSRC



| | | |
|--|--|-----------------|
| Type ST  | <ul style="list-style-type: none">• Standard strain ring with radial connector for tension, compression or torsion measurements• Installation without surface preparation• Simple strain measurement on shafts, axes and cylinders• Only for cyclical applications, i.e. clamping force measurements on presses | Page 3.4 |
| Type BT  | <ul style="list-style-type: none">• Strain ring with radial cable exit for tension and compression measurements• Installation without surface preparation• OEM execution• Ideal for permanent installation• Only for cyclical applications, i.e. clamping force measurements on presses | Page 3.8 |

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

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

Strain Ring with Radial Connector DSRC ST

Features

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



Strain Gage Data

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

Mechanical Data

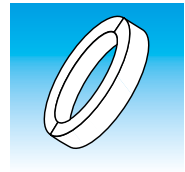
| | |
|-------------------|----------------------------------|
| Connection | 6 pin female (Binder series 423) |
| Material | |
| - Ring | Aluminum anodized |
| - Protective foil | Stainless steel |
| - Hinge | Nitril |
| - Screws | M8 (torque 3 Nm) |

Environmental Conditions

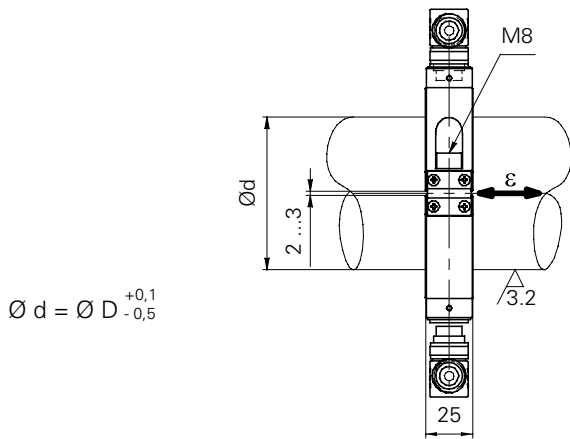
| | |
|-----------------------|-----------------------|
| Surface quality | Ra 3.2 (N8) or better |
| Operating temp. range | -10...+60 °C |
| Storage temperature | -40...+100 °C |
| Protection class | IP 54 |

Electrical Data

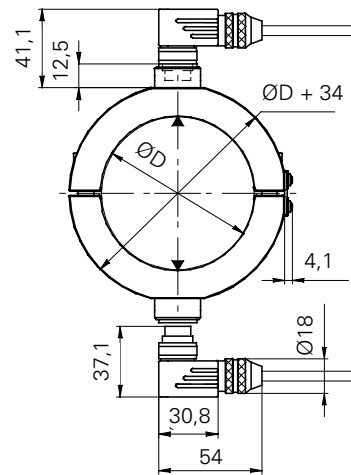
| | |
|-----------------------------|--|
| Measuring range | ±1000 µε (1 µε = 0,001 mm/m resp. 1 µε equals 0,001 mm strain per meter of shaft) |
| Output signal per 1000 µε | 1 mV/V (with completed full bridge) |
| Combined error | < 1% FS |
| Linearity | < 0,5% FS |
| Hysteresis | < 0,5% FS |
| Repeatability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



Dimensions (mm)



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

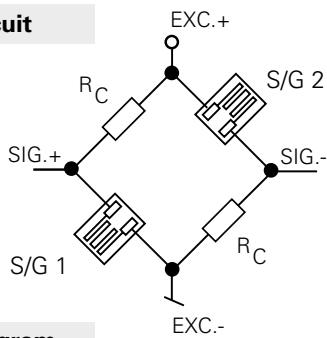


Ø D = Nominal diameter
Ø d = Shaft diameter

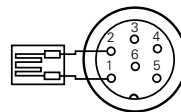
ε = Strain
▲ = Gage location

Electrical Connections

Bridge Circuit

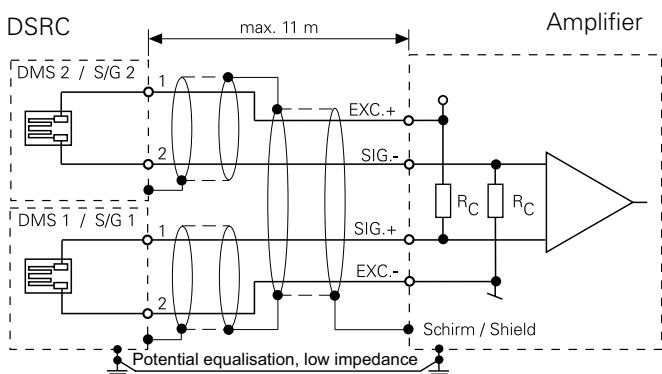


Pin Assignment (per ring half)



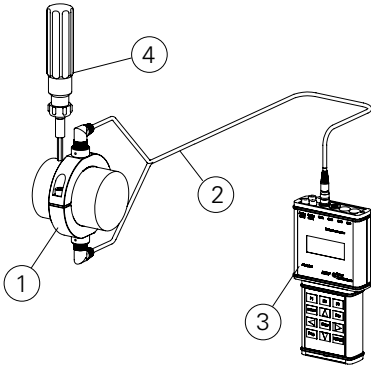
| Pin | Signal |
|-----|--------|
| 1 | S/G |
| 2 | S/G |
| 3 | n.c. |
| 4 | n.c. |
| 5 | n.c. |
| 6 | n.c. |

Wiring Diagram



Strain Ring with Radial Connector DSRC ST

Typical Measuring Chains



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

Order Code

DSRC ST **M** /

Option

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

Unit

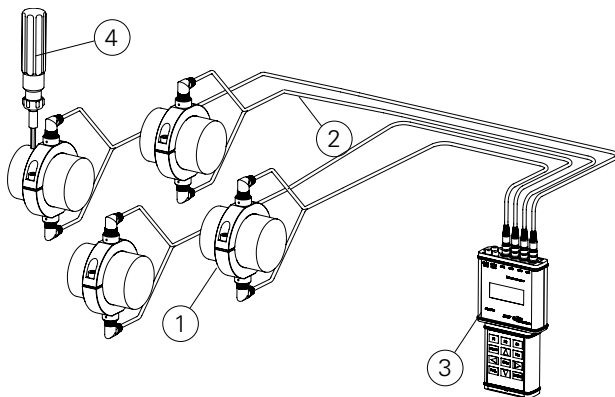
M Metric sizes

Nominal diameter*

Metric (M)

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

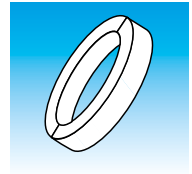
* Other diameters available upon request



| 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 |

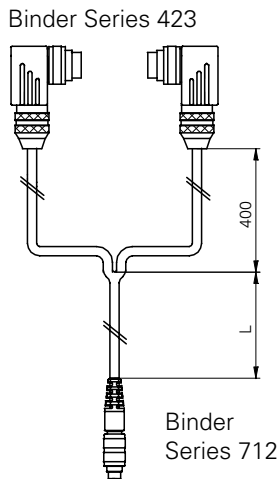
Accessories

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



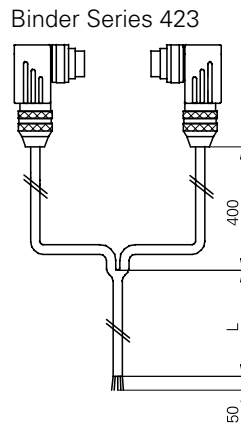
Accessories

Connecting Cable for display box and Bridge Amplifier



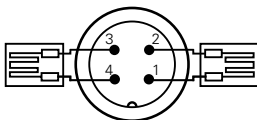
DZCY -**ST-WM-C**
 Length L
05 5 m
10 10 m

Connecting Cable with Open Leads



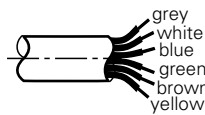
DZCY -**ST-WO-C**
 Length L
05 5 m
10 10 m

Binder Series 712



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

Wire Colors



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

Order Code

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

Length L

05 5 m
10 10 m
00 00 m

Connection types

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

Strain Ring with Radial Cable DSRC BT

Features

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



Strain Gage Data

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

Mechanical Data

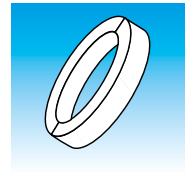
| | |
|-------------------|------------------------------|
| Connection | Open leads |
| Material | |
| - Ring | Aluminum anodized |
| - Protective foil | Stainless steel |
| - Screws | M8 (torque 3 Nm) |
| Cable | 5 m 2 core, shielded, PVC |

Environmental Conditions

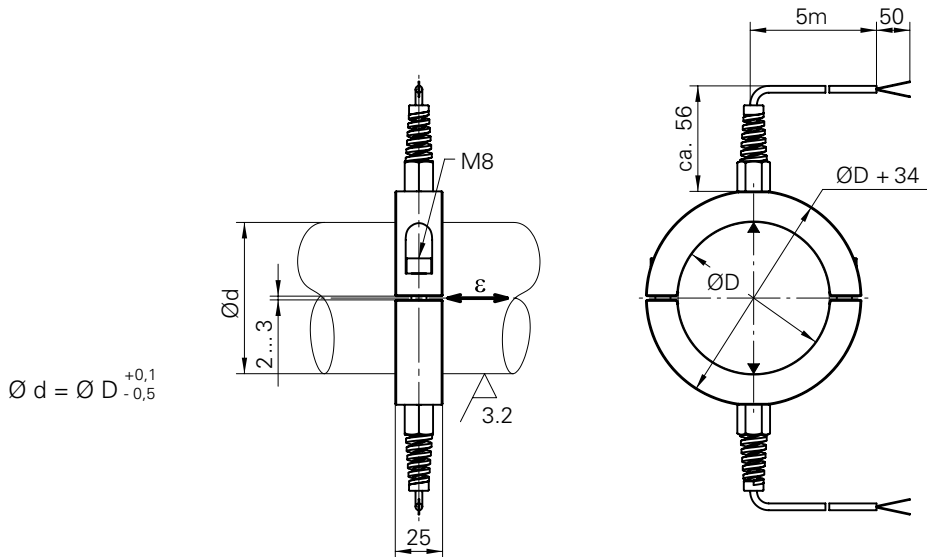
| | |
|---------------------------|-----------------------|
| Surface installation spot | Ra 3.2 (N8) or better |
| Operating temp. range | -10...+60 °C |
| Storage temperature | -40...+100 °C |
| Protection class | IP 54 |

Electrical Data

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



Dimensions (mm)

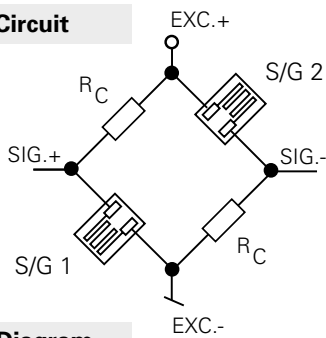


$\varnothing d = \varnothing D \begin{matrix} +0,1 \\ -0,5 \end{matrix}$

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

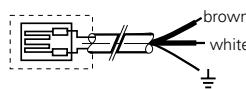
Electrical Connections

Bridge Circuit



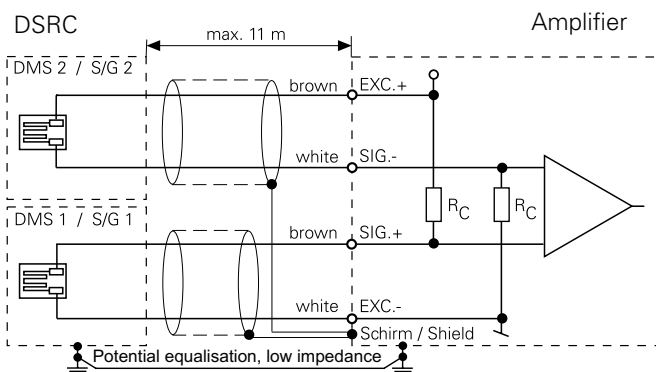
Wire Color

(per ring half)

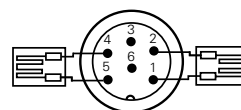
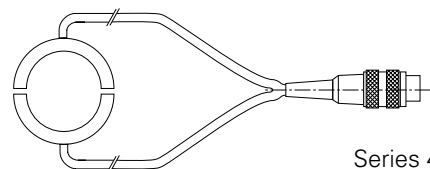


| Color | Signal |
|-------|--------|
| brown | S/G |
| white | S/G |

Wiring Diagram



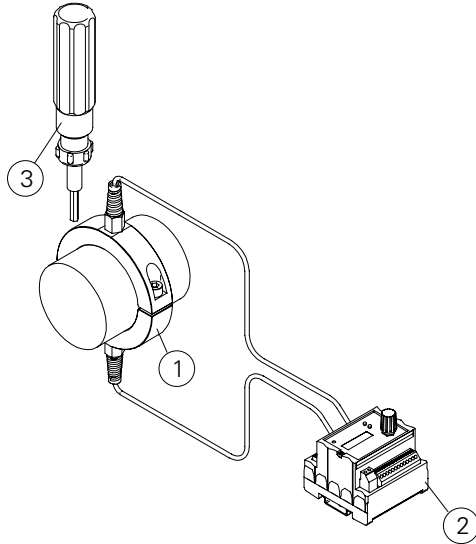
Option /CN



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

Strain Ring with Radial Cable DSRC BT

Typical Measuring Chain



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

Order Code

DSRC BT M /

Option

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

Unit

M Metric sizes

Nominal diameter*

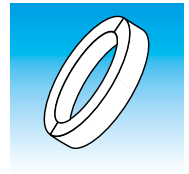
Metric (M)

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

* Other diameters available upon request

Accessories

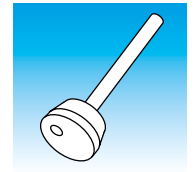
| | |
|---|--------------------------|
| Torque wrench, variable adjustable range 1 - 6 Nm | Order code: DZMT TW-A1-6 |
| Torque wrench fix factory setting 3 Nm | Order code: DZMT TW-F3 |



Strain Probes



Product Key Strain Probes DSRK



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

DSRK U16-0400M

Product Description

DS = Strain sensor

Method

R = Resistive

Series

K = Series K (Strain probes)

Type

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

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

Nominal Size (mm) (tip diameter)

16 = 16 mm

20 = 20 mm

Measurement Depth (mm)

Example

0400 = 400 mm

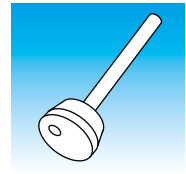
1930 = 1930 mm

Metric

M = Metric

Summary

Strain Probes DSRK



Type 16/20



- Strain measurement in deep holes
- Very robust design
- Increased lifetime with glued strain gauges
- Maintenance free

Page 4.4

With the strain probes it is possible for the first time to measure strain in deep, previously inaccessible holes.

Strain Probe with Integrated Amplifier DSRK x16/x20

Features

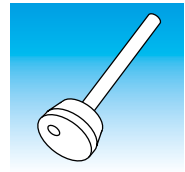
- Strain measurement in deep holes
- Very robust design
- Increased lifetime with glued strain gauges
- Maintenance free



| Electrical Data | DSRK U | DSRK I |
|---------------------------------|--------------------------|----------------|
| Measuring range | 0 ... 1000 $\mu\epsilon$ | |
| Output signal | 0 ... 10 VDC | 4 ... 20 mA |
| Output impedance | > 10 k Ω | < 500 Ω |
| Signal polarity tensile load | positive | |
| Combined error | < 1% FS | |
| Frequency range (-3 dB) | 120 Hz | |
| Supply voltage range | 18 - 33 VDC | |
| Current draw | < 50 mA | |
| Reset input | 15 - 45 VDC | |
| Reset active | > ± 15 V | |
| Reset inactive | < ± 5 V | |
| min. Reset pulse | > 1ms | |

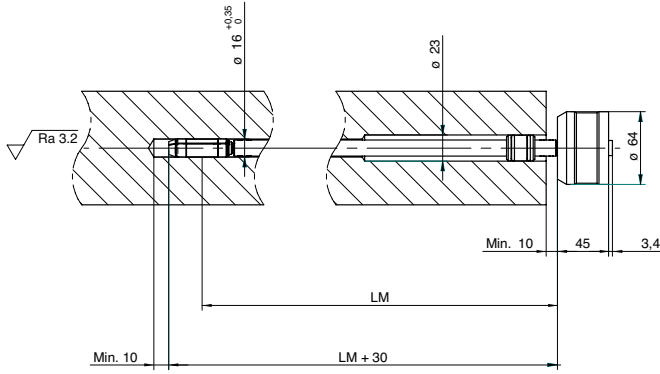
| Mechanical Data | |
|--------------------------|--|
| Connection | 7 pin male (Series 680/SGR 70) |
| Material | |
| - Amplifier enclosure | Aluminum anodized |
| - Tube | Stainless steel |
| - Support ring (Type 20) | Aluminum anodized |
| - Measuring tip | Heat treated steel |
| Mounting | Hexagon socket 6 mm Installation torque 12 Nm |

| Environmental Conditions | |
|--------------------------|-------------------------------|
| Operating temp. range | -5...+85 °C non condensing |
| Storage temperature | -40...+85 °C |
| Protection class | IP 54 |
| CE regulations | |
| - EMC Dir. 2004/108/EC | EN 61000-2-3:2006 |
| - RoHS Dir. 11/65/EC | |
| UL listed | 20120223-E217824 |

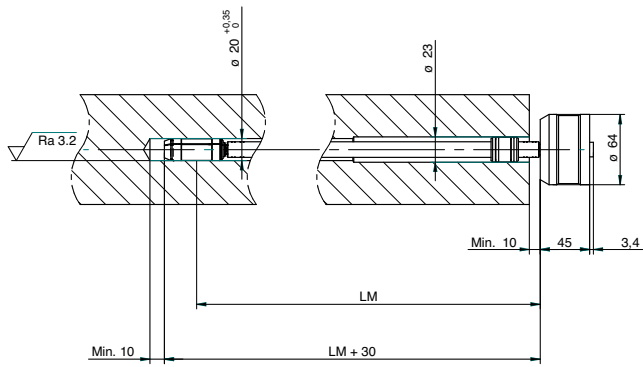


Dimensions (mm)

Type 16



Type 20

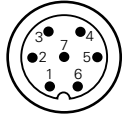


\varnothing DS = Tip diameter
 LM = Measurement depth
 ϵ = Strain

Strain Probe with Integrated Amplifier DSRK x16/x20

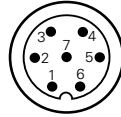
Electrical Connections

Current Output



| Pin | Signal |
|-----|-------------------------------|
| 1 | +Vs (18 - 33 VDC) |
| 2 | do not connect* |
| 3 | Reset (bipolar) |
| 4 | Reset (bipolar) |
| 5 | +I _{OUT} (4 - 20 mA) |
| 6 | -I _{OUT} |
| 7 | GND |

Voltage Output



| Pin | Signal |
|-----|---------------------------|
| 1 | +Vs (18 - 33 VDC) |
| 2 | do not connect* |
| 3 | Reset (bipolar) |
| 4 | Reset (bipolar) |
| 5 | +V _{OUT} (±10 V) |
| 6 | -V _{OUT} |
| 7 | GND |

* Factory use

Order Code

DSRK - M

Tip diameter (Ø DS) - Length (LM)

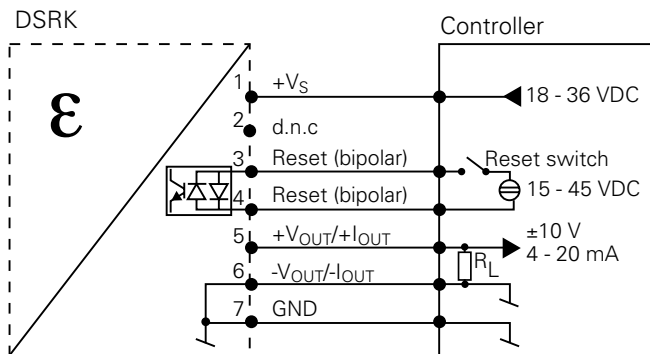
| | |
|---------|---------|
| 16-0240 | 20-0240 |
| 16-0320 | 20-0320 |
| 16-0400 | 20-0400 |
| 16-0500 | 20-0500 |
| 16-0600 | 20-0600 |
| 16-0760 | 20-0760 |
| 16-0800 | 20-0800 |
| 16-0900 | 20-0900 |
| 16-1050 | 20-1050 |
| 16-1300 | 20-1300 |
| 16-1400 | 20-1400 |

Output signal

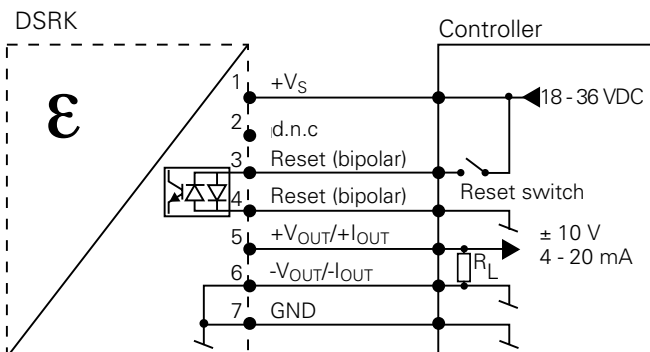
- U** Voltage output 0 ... 10 V
- I** Current output 4 ... 20 mA

Control

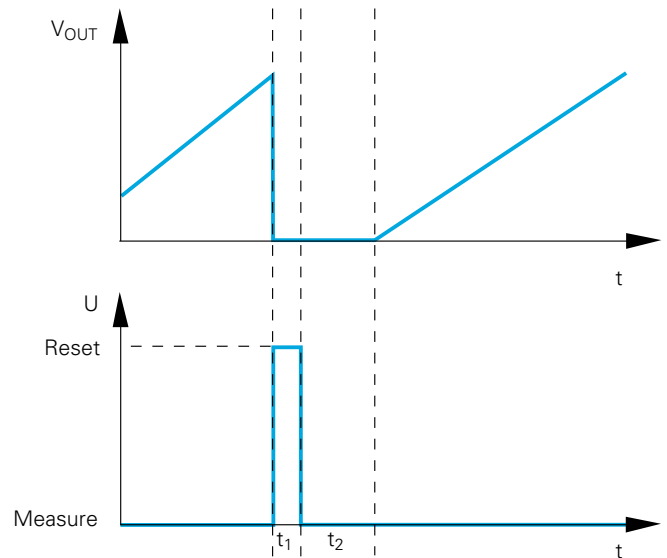
Reset galvanically isolated



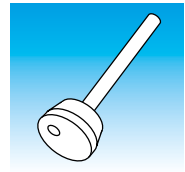
Reset not galvanically isolated



Reset Function

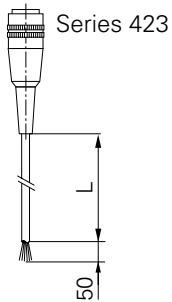


| | |
|--------------------|---|
| V/I _{OUT} | Output signal |
| Reset | Reset input (active high) |
| t ₁ | Reset pulse (> 1 ms) |
| t ₂ | Reset settle time after reset pulse (> 15 ms) |

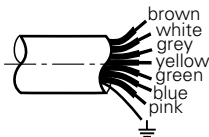


Accessories

Connecting Cable with Flying Leads



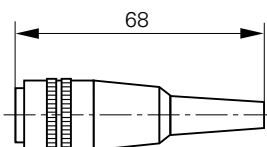
| Length | Order Code |
|--------|-----------------------|
| 5 m | DZCS 05/404155 |
| 10 m | DZCS 10/404155 |



| Color | Signal |
|--------|-------------------|
| white | +Vs (18 - 35 VDC) |
| brown | do not connect |
| green | Reset (bipolar) |
| yellow | Reset (bipolar) |
| grey | +Iout / +Vout |
| blue | -Iout / -Vout |
| pink | GND |

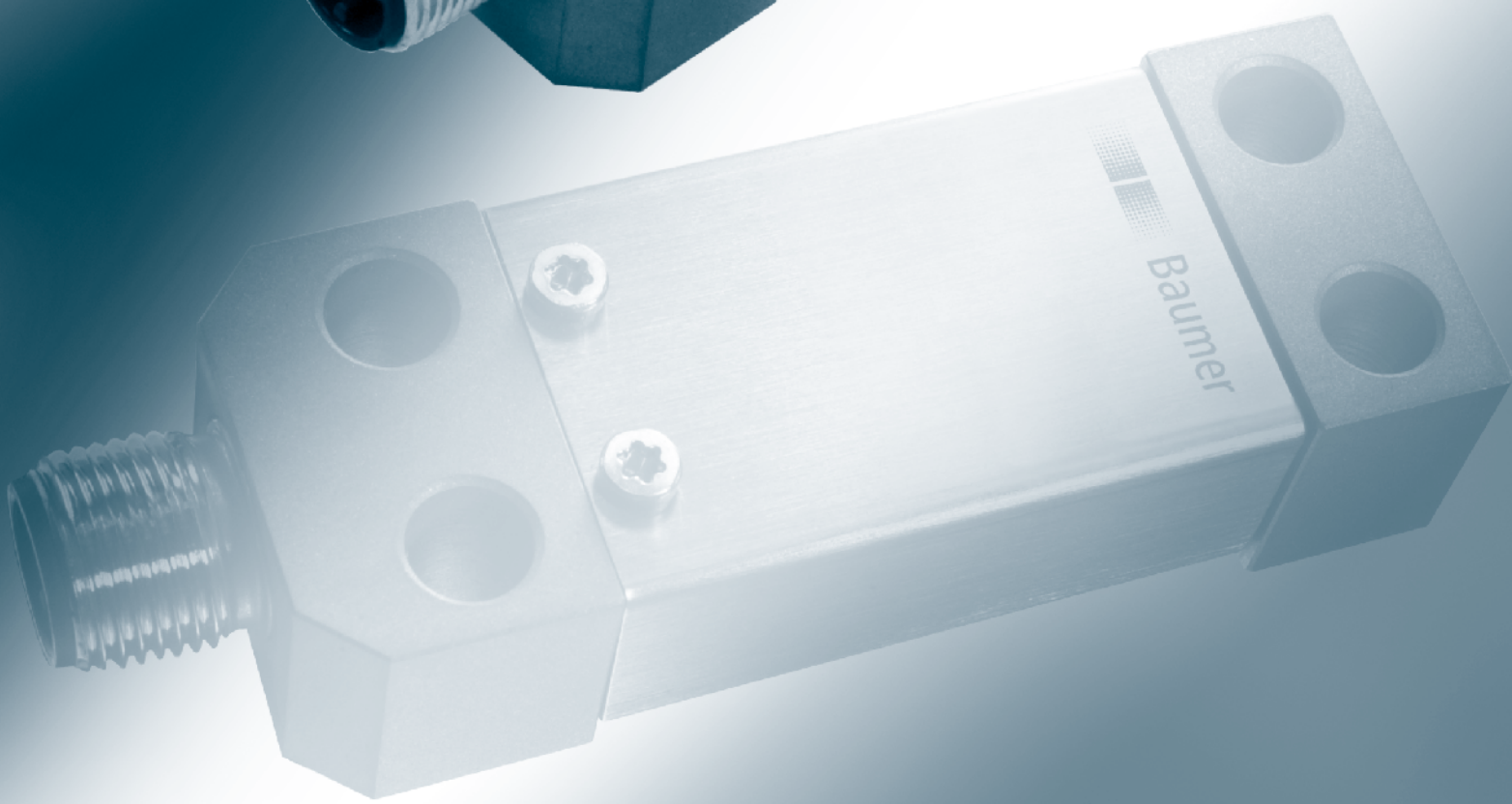
Straight Connector

Series 423



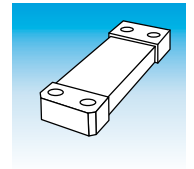
Part No. 10146423

Strain Links



Product Key

Strain Links DSRT



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

DSRT 22DD-S5-1.25

Product Description

DS = Strain sensor

Method

R = Resistive

Series

T = Strain link

Type

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

Electric Connection

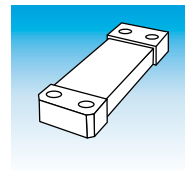
S5 = Cable, 5 pin connector, M12 x 1




Sensitivity

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

Summary

Strain Links DSRT



| | | |
|---|--|------------------------|
| <p>Type 22DA</p>  | <ul style="list-style-type: none"> • Strain link without amplifier • For static and dynamic applications • Very good repeatability • Measurement range from $\pm 100\mu\epsilon$ up to $\pm 750\mu\epsilon$ • Overloadsave | <p>Page 5.4</p> |
| <p>Type 22DD</p>  | <ul style="list-style-type: none"> • Surface strain sensor with integrated amplifier • For static and dynamic applications • Integrated reset circuit for automatic zero signal • Voltage output 0 to 10 V, power output 4 to 20 mA • Very good repeatability • Measurement range from $\pm 100\mu\epsilon$ up to $\pm 750\mu\epsilon$ | <p>Page 5.6</p> |
| <p>Type 22DJ</p>  | <ul style="list-style-type: none"> • For cyclical measurements; with integrated amplifier • CANopen • Excellent signal to noise ratio • High sensitivity | <p>Page 5.8</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 ± 250 resp. $\pm 750 \mu\epsilon$



S/G Data

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

Mechanical Data

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

Environmental Conditions

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

Delivery Contents

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

Order Code

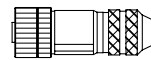
DSRT 22DA-S5-

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

Electrical Data

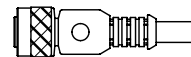
| | |
|----------------------------------|--|
| Measuring range | $\pm 250 \mu\epsilon$... $\pm 750 \mu\epsilon$ (1 $\mu\epsilon$ = 0,001 mm/m resp. 1 $\mu\epsilon$ equals 0,001 mm strain per meter) |
| Sensitivity | 1,85 mV/V @ 750 $\mu\epsilon$ 0,93 mV/V @ 250 $\mu\epsilon$ |
| Sensitivity tolerance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

Accessories (not included in delivery)



Series 713

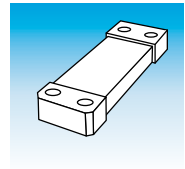
Connector female, 5 pin, part no. 135462



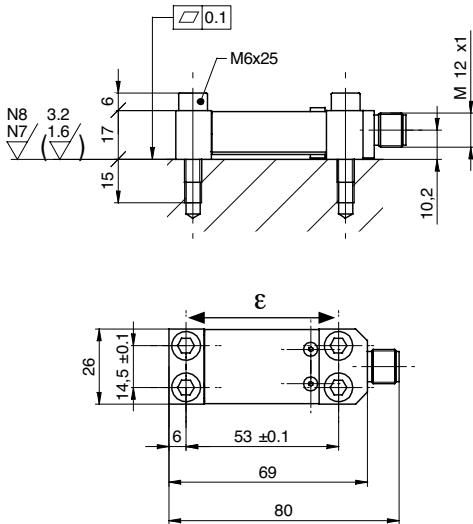
Connector female with cable, 5 pin
ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

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

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



Dimensions (mm)

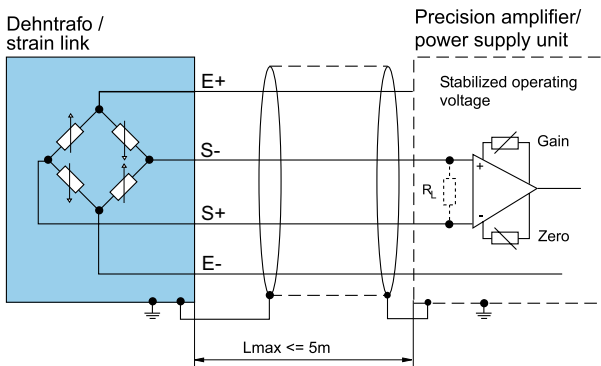


Electrical Connections



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

Control



Strain Link with Amplifier DSRT 22DD

Features

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



S/G Data

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

Mechanical Data

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

Environmental Conditions

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

Delivery Contents

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

Order Code

DSRT 22DD-S5-

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

Electrical Data

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

Accessories (not included in delivery)



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

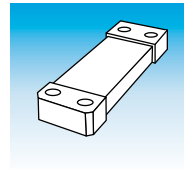


Connector female with cable, control side, 5-pin

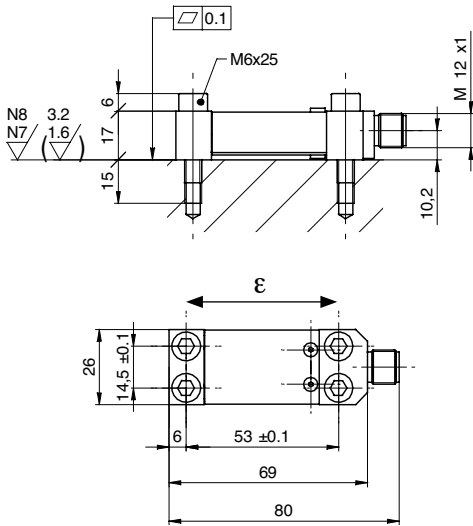
ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)

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

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



Dimensions (mm)

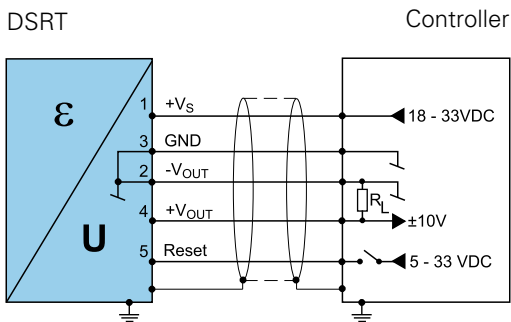


Electrical Connections

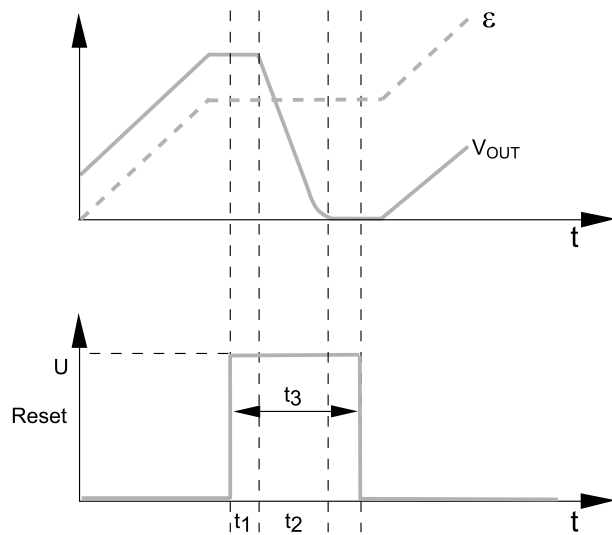


| Pin | Signal |
|---------|-------------------|
| 1 | +Vs |
| 2 | -V _{OUT} |
| 3 | GND |
| 4 | +V _{OUT} |
| 5 | Reset |
| Housing | Shield |

Control



Reset Function



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

Strain Link with CANopen DSRT 22DJ

Features

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



S/G Data

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

Mechanical Data

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

Environmental Conditions

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

Delivery Contents

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

Order Code

DSRT 22DJ-S5-

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

Electrical Data

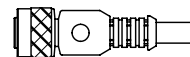
| | |
|------------------------------------|--|
| Measuring range | $\pm 100 \mu\epsilon$... $\pm 750 \mu\epsilon$ (1 $\mu\epsilon$ = 0,001 mm/m resp. 1 $\mu\epsilon$ equals 0,001 mm strain per meter) |
| Output / Protocol | CANopen DS404 |
| Resolution | 0,1 $\mu\epsilon$ |
| Measuring rate | 1000 x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

Accessories (not included in delivery)

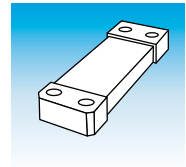


Series 713

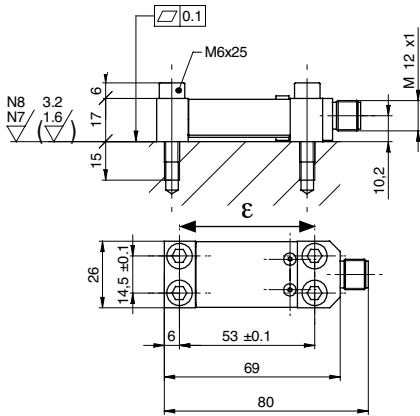
Connector female, control side, 5-pin, Part No. 10135462



- Connector female with cable, control side, 5-pin
ESG 34CH0200G 5-pin (shielded) 2 m, PUR,
(Part No. 11046264)
- ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)
- ESG 34CH1000G 5-pin (shielded) 10 m, PUR,
(Part No. 10155587)



Dimensions (mm)



Supported Objects

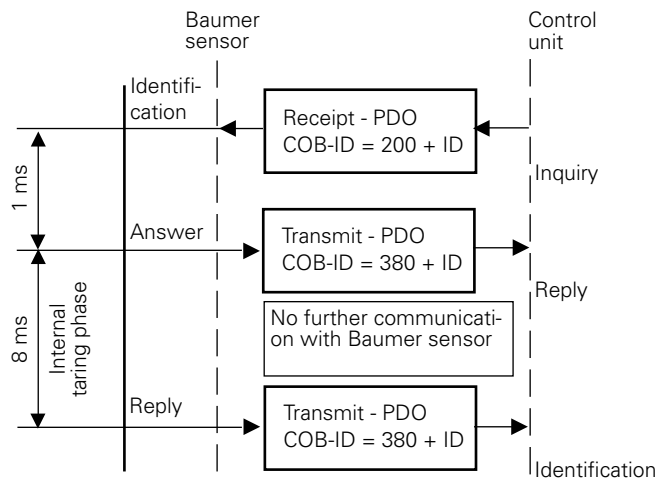
| Object | Description |
|--------|--|
| 1000 | Device profile |
| 1001 | Error register |
| 1002 | Serial number |
| 1003 | Emergency history |
| 1005 | Sync ID |
| 1008 | Device description |
| 1009 | Hardware version |
| 100A | Software version |
| 1010 | Store |
| 1011 | Load default values |
| 1017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

Electrical Connections



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

Temporal Course



Example

| ID | DLC |
|------|-----|
| 201h | 0 |

First answer of strain link

(Command realized)

| ID | DLC | Byte 1 |
|------|-----|--------|
| 381h | 1 | 75h |

Second answer of strain link

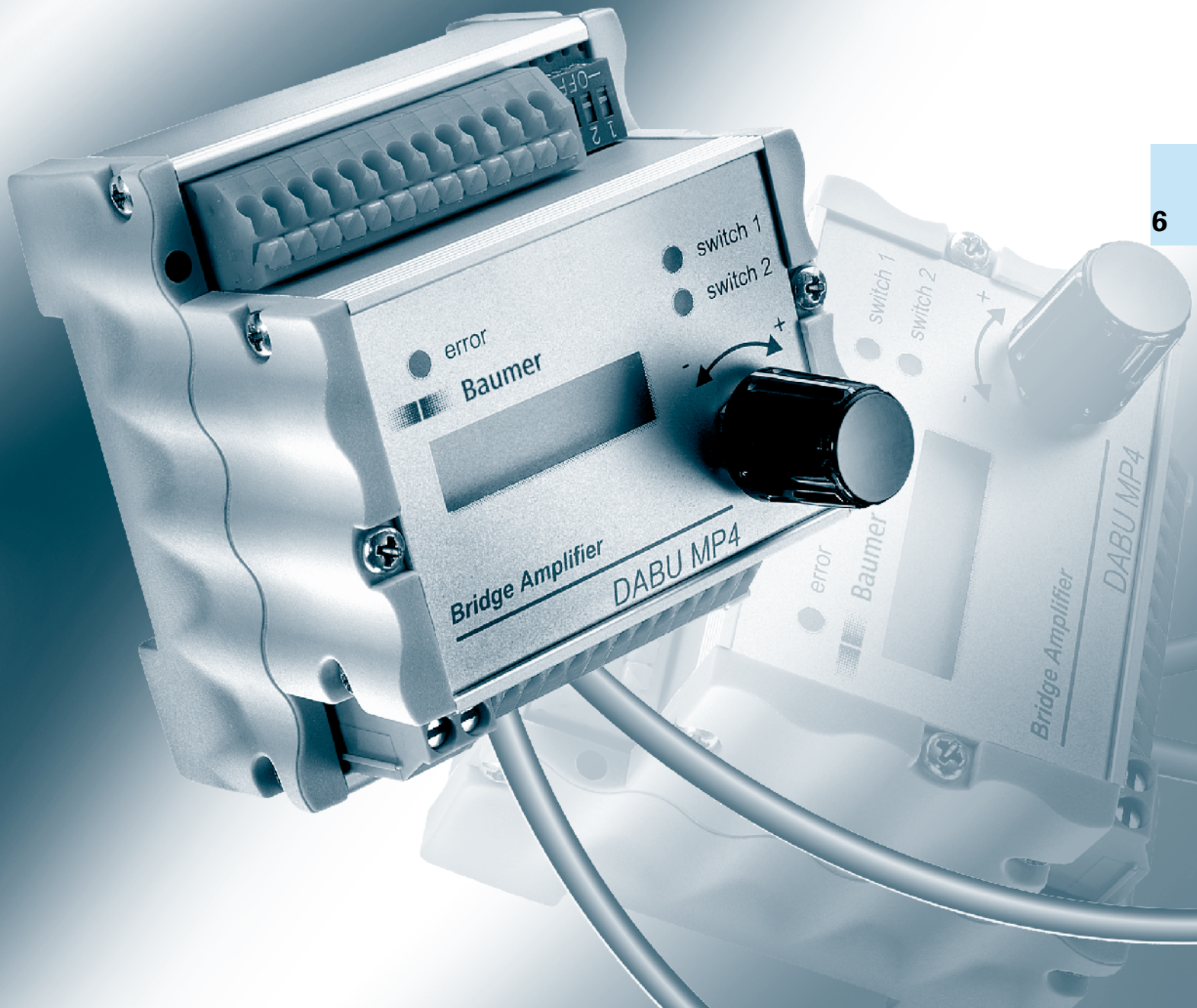
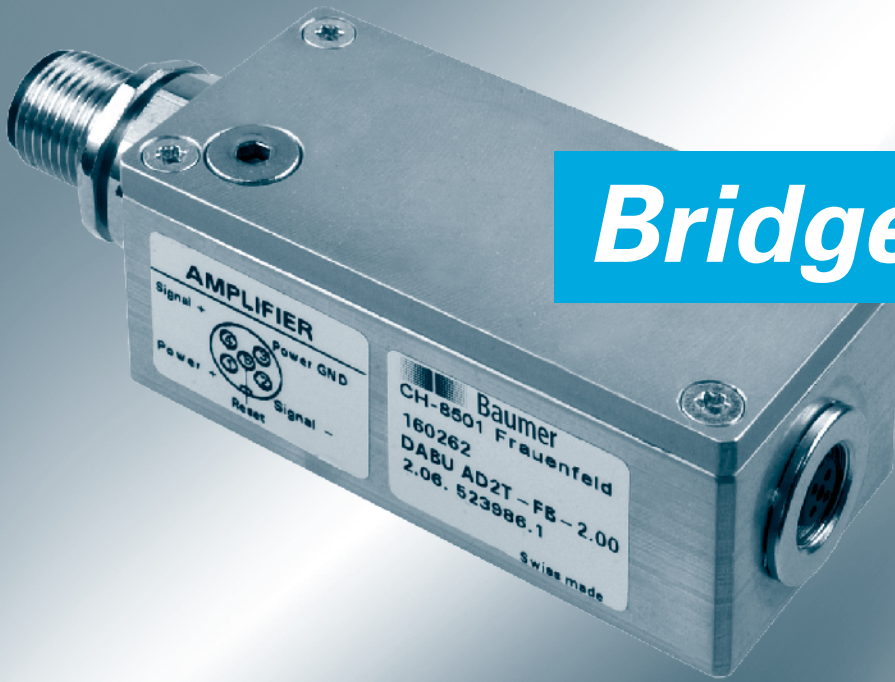
(Taring finished)

| ID | DLC | Byte 1 | Byte 2 |
|------|-----|--------|--------|
| 381h | 2 | 66 | 0 |

Error (Unstable signal)

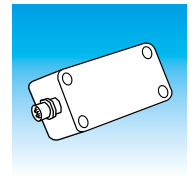
| ID | DLC | Byte 1 | Byte 2 |
|------|-----|--------|--------|
| 381h | 2 | 65h | 72h |

Bridge Amplifier



Product Key

Bridge Amplifier DABx



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

DABU AD2T-FB-1.00

Product Description

DAB = Bridge Amplifier

Output Signal

I = 4...20 mA
U = ± 10 V

Series

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

Method

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

Connection S/G Bridge

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

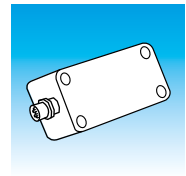
Sensitivity






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

0250 = 250 $\mu\epsilon$ at nominal output signal
0500 = 500 $\mu\epsilon$ at nominal output signal
1000 = 1000 $\mu\epsilon$ 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>DABU AD2T-2Q</p>  | <ul style="list-style-type: none"> • Bridge amplifier for 2 x 1/4 S/G bridge • Voltage output • For cyclic applications with reset • Protection class IP 65 | <p>Page 6.4</p> |
| <p>DABI AD2T-2Q</p>  | <ul style="list-style-type: none"> • Bridge amplifier for 2 x 1/4 S/G bridge • Current output • For cyclic applications with reset • Protection class IP 65 | <p>Page 6.6</p> |
| <p>DABU AD2T-FB</p>  | <ul style="list-style-type: none"> • Bridge amplifier for S/G full bridge • Voltage output • For cyclic and static applications with reset • Protection class IP 65 | <p>Page 6.8</p> |
| <p>DABI AD2T-FB</p>  | <ul style="list-style-type: none"> • Bridge amplifier for S/G full bridge • Current output • For cyclic and static applications with reset • Protection class IP 65 | <p>Page 6.10</p> |
| <p>DABx MP4M</p>  | <ul style="list-style-type: none"> • S/G amplifier, selectable configuration (2 x 1/4 S/G bridge and full bridge) • Voltage or current output • Peak value and two limit switches • Enclosure for DIN rail installation | <p>Page 6.12</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 bridge
- For cyclical applications with reset function
- Voltage output
- Protection class IP 65



Electrical Data

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

Mechanical Data

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

Environmental Conditions

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

Order Code

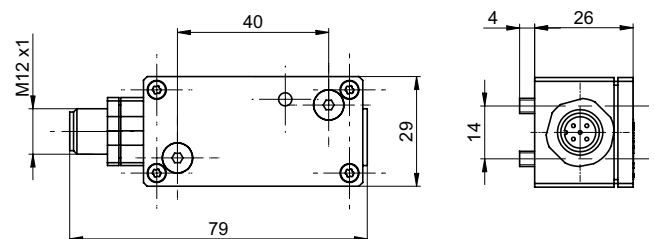
DABU AD2T-2Q



Gain

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

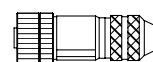
Dimensions (mm)



Delivery Contents

- Mounting screw 2 pcs. M4 x 30

Accessories (not included in delivery)



Series 713

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



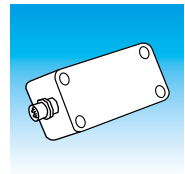
M12 x 1

Connector female with cable, control side, 5-pin

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

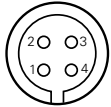
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

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



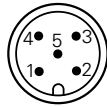
Electrical Connection

Sensor side Series 712



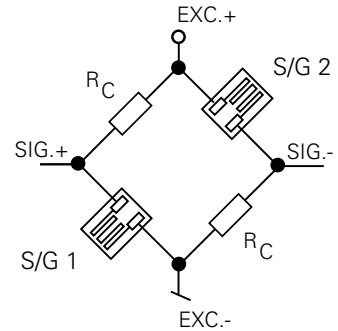
| Pin | Signal | |
|-----|--------|-------|
| 1 | DMS 1 | EXC.+ |
| 2 | DMS 1 | SIG.- |
| 3 | DMS 2 | SIG.+ |
| 4 | DMS 2 | EXC.- |

Control side Series 713

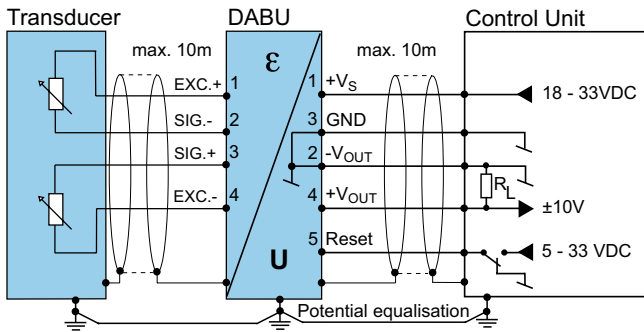


| Pin number | Signal |
|------------|-------------------|
| 1 | +Vs |
| 2 | -V _{OUT} |
| 3 | GND |
| 4 | +V _{OUT} |
| 5 | Reset |

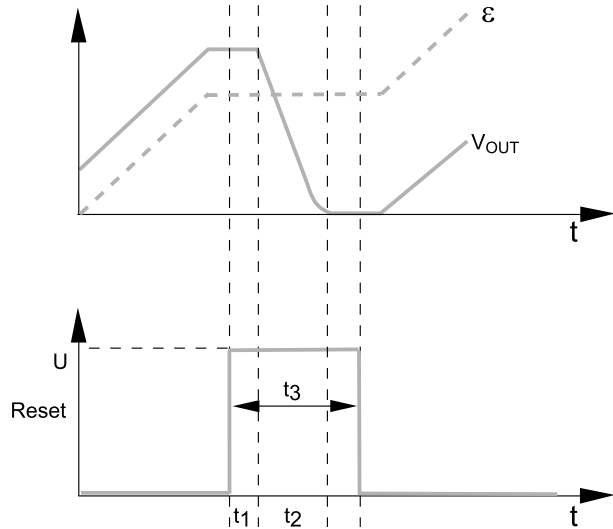
S/G Bridge



Control



Reset Function



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

Bridge Amplifier for 2 x 1/4 Strain Gage Bridge

DABI AD2T-2Q

Features

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



Electrical Data

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

Mechanical Data

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

Environmental Conditions

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

Order Code

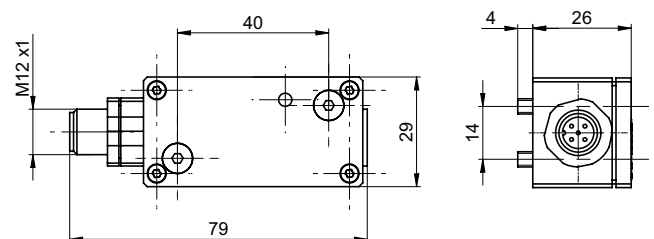
DABI AD2T-2Q /C

Gain

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

/C Tension leads to a positive output signal

Dimensions (mm)



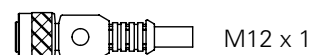
Delivery Contents

- Mounting screw 2 pcs. M4 x 30

Accessories (not included in delivery)



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

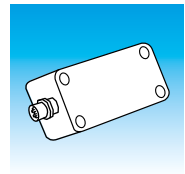


Connector female with cable, control side, 5-pin

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

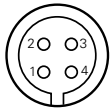
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

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



Electrical Connection

Sensor side Series 712



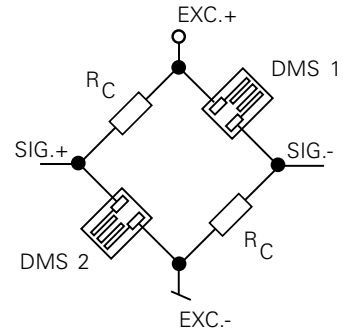
| Pin | Signal |
|-----|-------------|
| 1 | DMS 1 EXC.+ |
| 2 | DMS 2 SIG.- |
| 3 | DMS 3 SIG.+ |
| 4 | DMS 4 EXC.- |

Control side Series 713

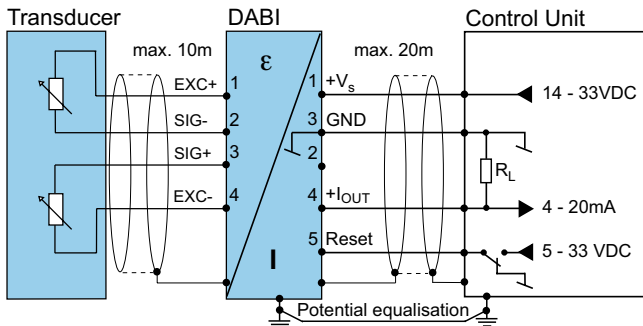


| Pin number | Signal |
|------------|-------------------|
| 1 | +Vs |
| 2 | n.c. |
| 3 | GND |
| 4 | +I _{OUT} |
| 5 | Reset |

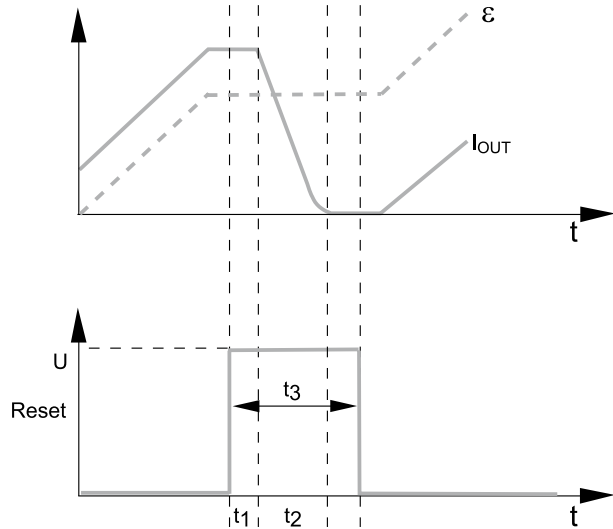
S/G Bridge



Control



Reset Function



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

Bridge Amplifier for Strain Gage Full Bridge DABU AD2T-FB

Features

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



Electrical Data

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

Mechanical Data

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

Environmental Conditions

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

Order Code

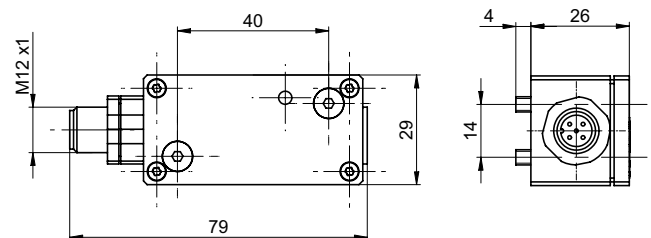
DABU AD2T-FB



Gain

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

Dimensions (mm)



Delivery Contents

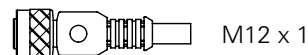
- Mounting screw 2 pcs. M4 x 30

Accessories (not included in delivery)



Series 713

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



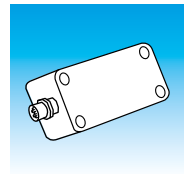
M12 x 1

Connector female with cable, control side, 5-pin

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

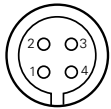
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

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



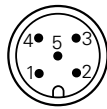
Electrical Connection

Sensor side Series 712



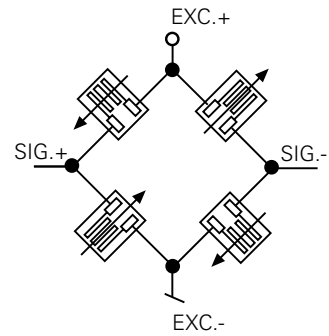
| Pin | Signal |
|-----|-------------------|
| 1 | Full bridge EXC.+ |
| 2 | Full bridge SIG.- |
| 3 | Full bridge SIG.+ |
| 4 | Full bridge EXC.- |

Control side Series 713

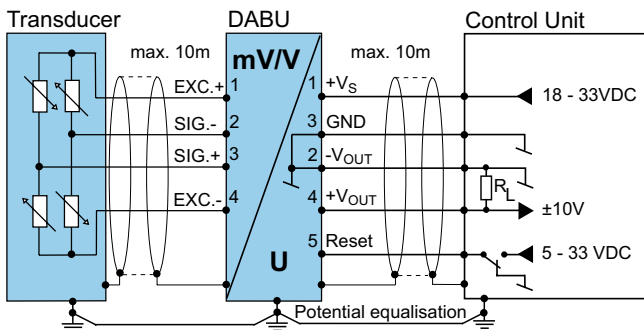


| Pin number | Signal |
|------------|-------------------|
| 1 | +Vs |
| 2 | -V _{OUT} |
| 3 | GND |
| 4 | +V _{OUT} |
| 5 | Reset |

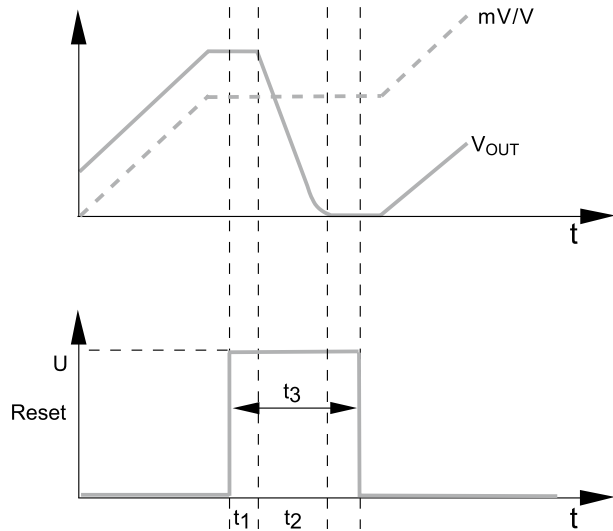
S/G Bridge



Control



Reset Function



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

Bridge Amplifier for Strain Gage Full Bridge

DABI AD2T-FB

Features

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



Electrical Data

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

Mechanical Data

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

Environmental Conditions

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

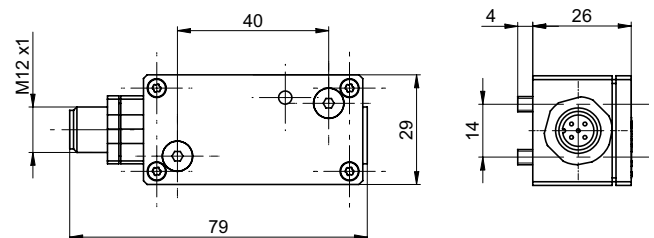
Order Code

DABI AD2T-FB

Gain

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

Dimensions (mm)



Delivery Contents

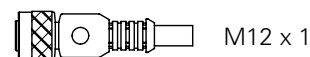
- Mounting screw 2 pcs. M4 x 30

Accessories (not included in delivery)



Series 713

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



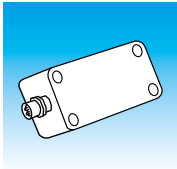
M12 x 1

Connector female with cable, control side, 5-pin

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

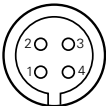
ESG 34CH0500G 5-pin (shielded) 5 m, PUR,
(Part No. 11046266)

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



Electrical Connection

Sensor side Series 712



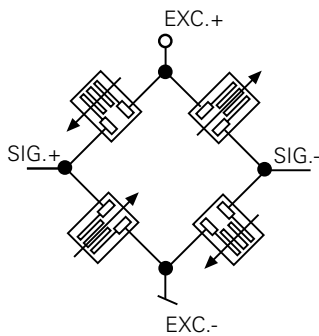
| Pin | Signal |
|-----|-------------------|
| 1 | Full bridge EXC.+ |
| 2 | Full bridge SIG.- |
| 3 | Full bridge SIG.+ |
| 4 | Full bridge EXC.- |

Control side Series 713

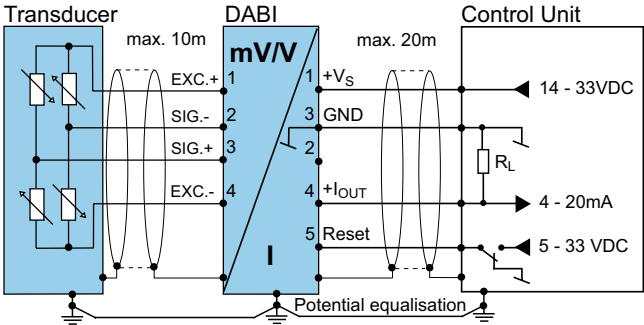


| Pin number | Signal |
|------------|-------------------|
| 1 | +Vs |
| 2 | n.c. |
| 3 | GND |
| 4 | +I _{OUT} |
| 5 | Reset |

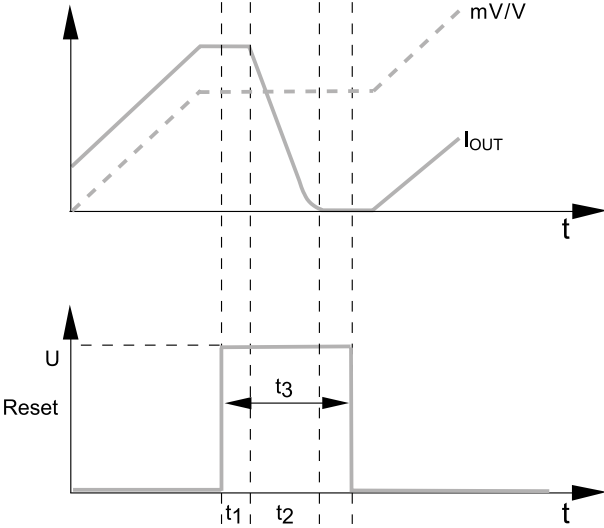
S/G Bridge



Control



Reset Function



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

Bridge Amplifier for DIN-rail mounting, Selectable Configuration DABU MP4M

Features

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



Electrical Data

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

Mechanical Data

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

Environmental Conditions

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

Order Code

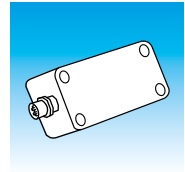
DABU MP4M-FC-

Gain

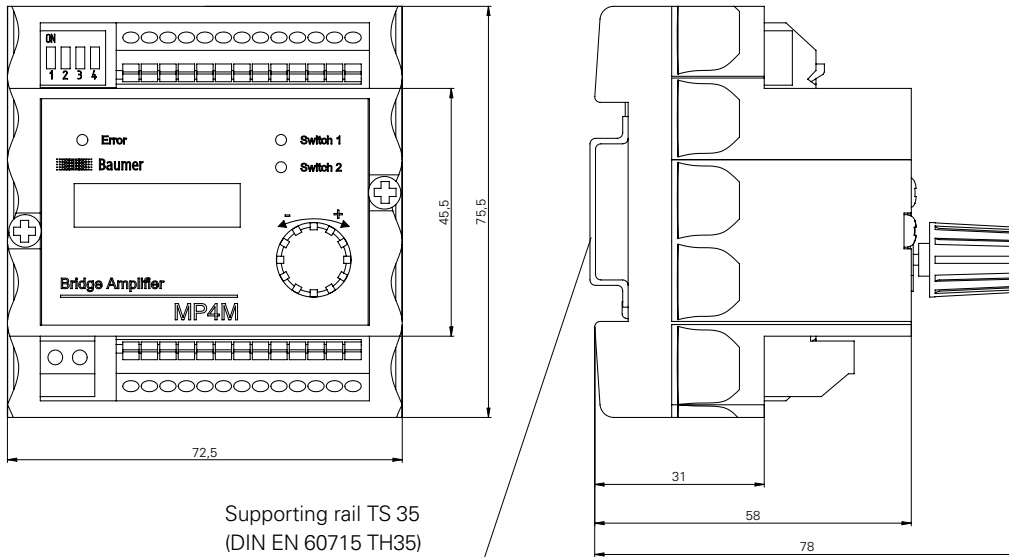
0.50 = 0,50 mV/V= 0-10 V
0.75 = 0,75 mV/V= 0-10 V
1.00 = 1,00 mV/V= 0-10 V
1.25 = 1,25 mV/V= 0-10 V
2.00 = 2,00 mV/V= 0-10 V

Delivery Contents

- Clamping clip for ground connection



Dimensions (mm)



Electrical Connections

Pin assignment sensor side

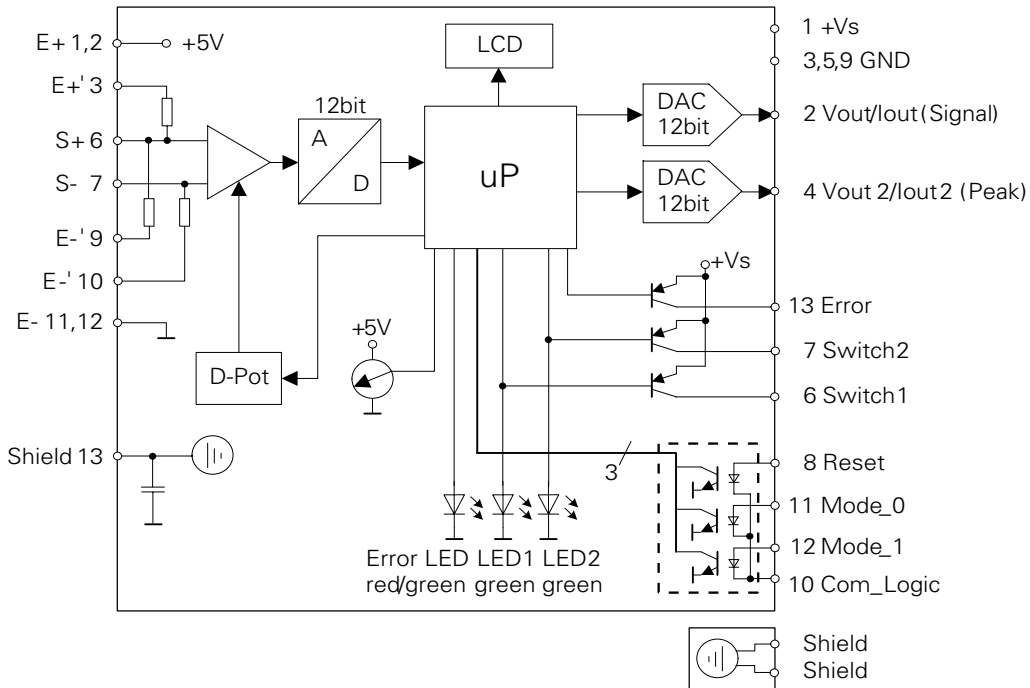
| Pin | Signal | Description |
|-----|--------|-------------------------------|
| 1 | +E | +bridge excitation |
| 2 | +E | +bridge excitation |
| 3 | +E' | bridge to completion resistor |
| 4 | n.c. | |
| 5 | n.c. | |
| 6 | +S | + signal input |
| 7 | -S | - signal input |
| 8 | n.c. | |
| 9 | -E' |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

Pin assignment control side

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

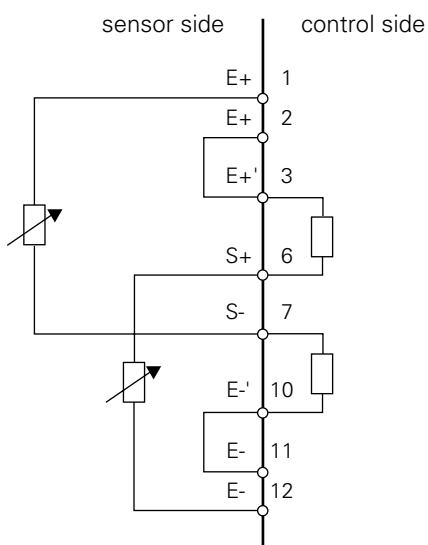
Bridge Amplifier for DIN-rail mounting, Selectable Configuration DABU MP4M

Electrical Connections

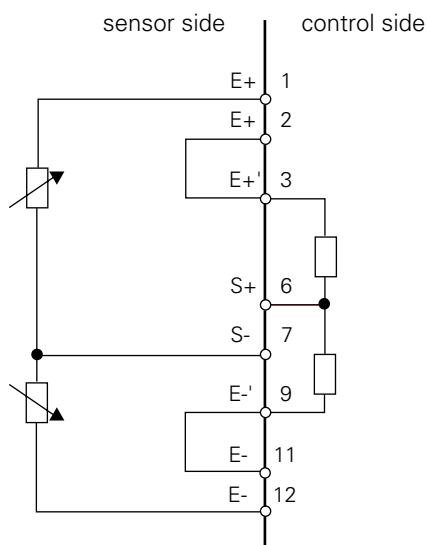


S/G Bridge

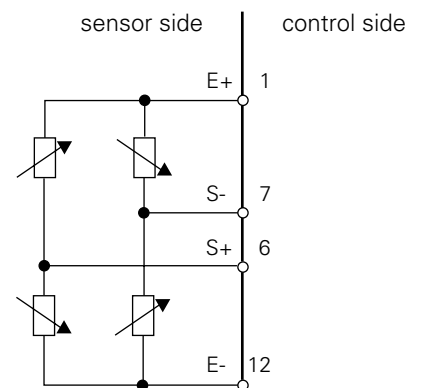
2 x 1/4-bridge (diagonal)

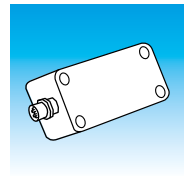


half bridge

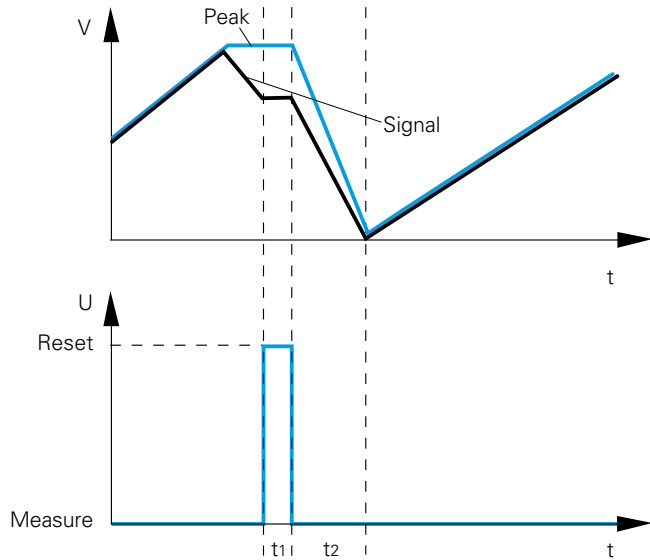


full bridge



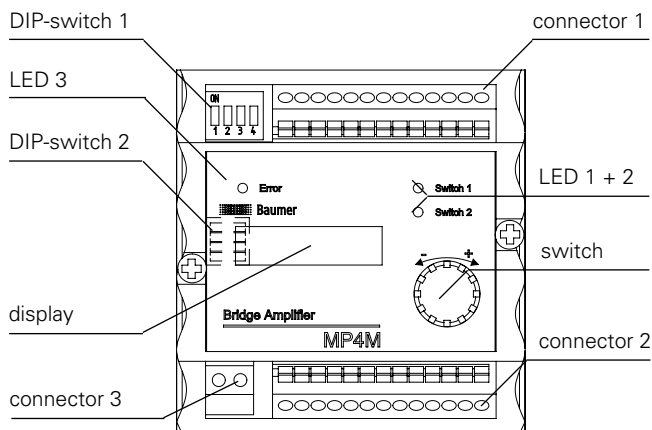


Reset Function



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

Control Element



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

Display box



Product Key Display box



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

Display box

DDBF 2-SC

Product Description

DDB = Display box

Sensor Input

F = Free Configuration

Number of Channels

2 = 2-channels

4 = 4-channels

Change-Over Displays

SC = Display box for Strain Rings

Summary Display box



DDBF 2-SC



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

Page 7.4

DDBF 4-SC



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

Page 7.6

Display box, 2-channel DDBF 2-SC

Features

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



Electrical Data

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

Mechanical Data

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

Environmental Conditions

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

Order Code

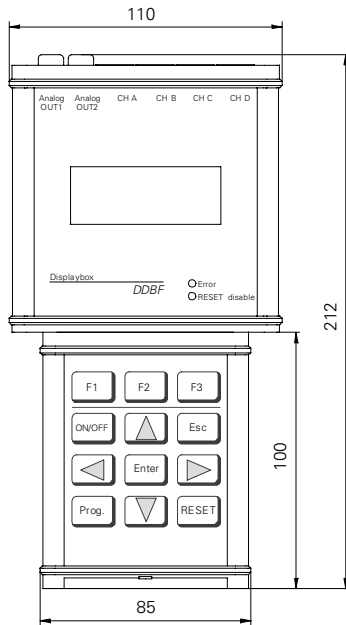
DDBF 2-SC

Delivery Contents

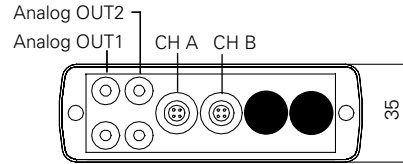
- Display box
- Power adapter (100 - 240 VAC)
- Software *InspectMaster*
- USB connecting cable
- Ground connection cable with clip



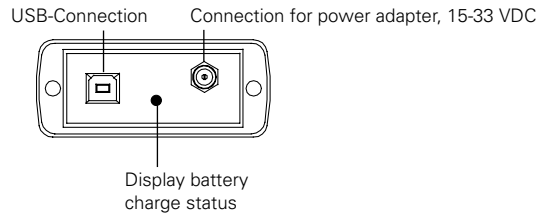
Dimensions (mm)



View Connector Side

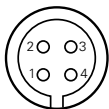


View Bottom Side, under the top cover



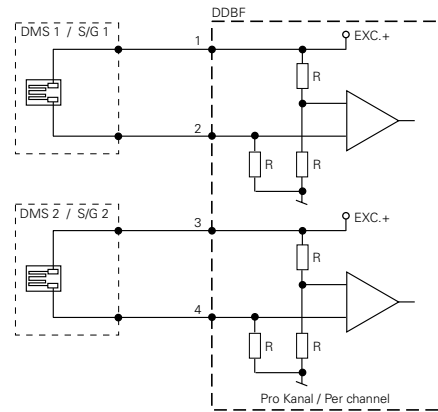
Electrical Connections

Sensor connection

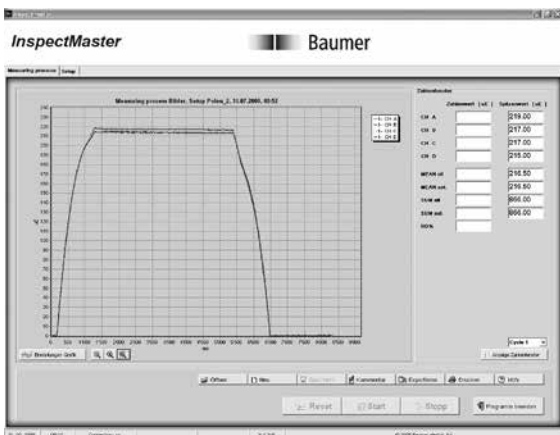


| Pin | Signal | |
|-----|--------|-------|
| 1 | S/G 1 | EXC.+ |
| 2 | S/G 1 | SIG.- |
| 3 | S/G 2 | EXC.+ |
| 4 | S/G 2 | SIG.- |

S/G Bridge



Analysis Software *InspectMaster*



Functions:

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

Requirements:

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

Display box, 4-channel DDBF 4-SC

Features

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



Electrical Data

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

Mechanical Data

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

Environmental Conditions

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

Order Code

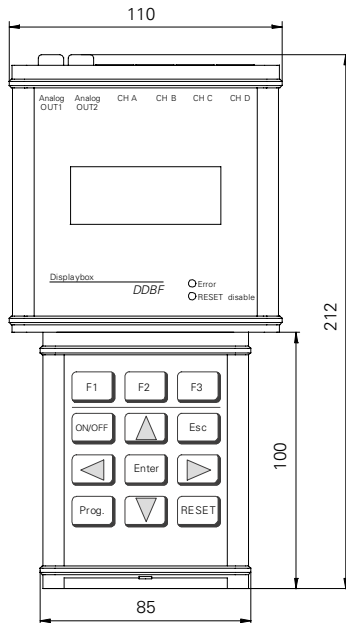
DDBF 4-SC

Delivery Contents

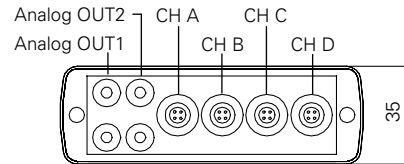
- Display box
- Power adapter (100 - 240 VAC)
- Software *InspectMaster*
- USB connecting cable
- Ground connection cable with clip



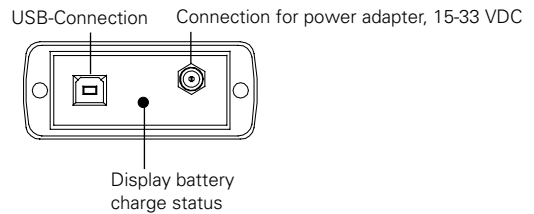
Dimensions (mm)



View Connector Side

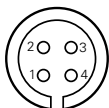


View Bottom Side, under the top cover



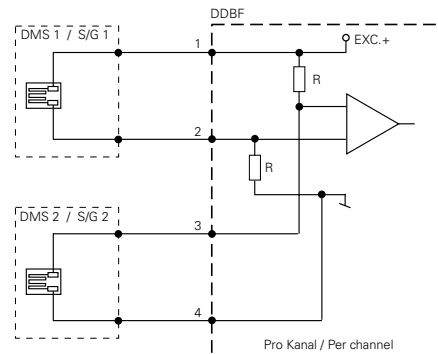
Electrical Connections

Sensor connection

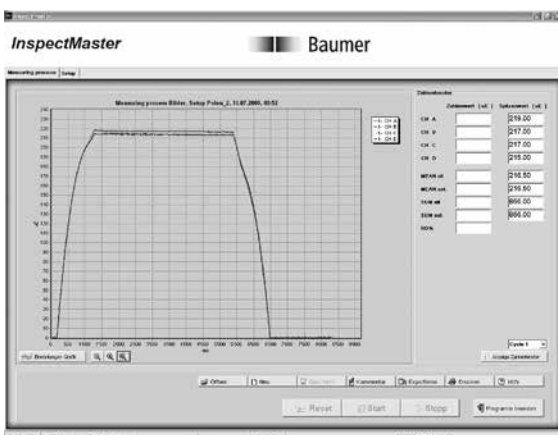


| Pin | Signal |
|-----|-------------|
| 1 | S/G 1 EXC,+ |
| 2 | S/G 1 SIG.- |
| 3 | S/G 2 SIG.+ |
| 4 | S/G 2 EXC.- |

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:

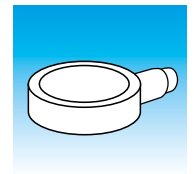
- PC with Windows, 2000, NT, XP
- minimum 500 MHz and USB interface required

Piezo Electric Sensors



Product Key

Piezo Electric Force and Strain Sensors



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

Force sensors

DLPP 6MO-2.5-4.4

Product Description

DLPP = Piezo electric force sensor

Series

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

Nom. Capacity

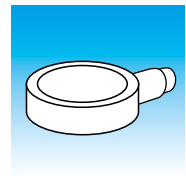
- 0.3** = 250 N
- 2.5** = 2,5 kN
- 010** = 10 kN
- 030** = 30 kN





Nominal Sensitivity

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

Summary

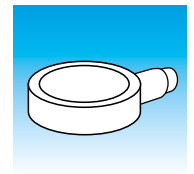
Piezo Electric Force and Strain Sensors



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

Cavity force sensor 0...250 N

DLPP 8MO



Features

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



Technical Data

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

Mechanical Data

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

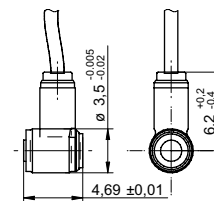
Environmental Conditions

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

Order Code

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

Dimensions (mm)



Delivery Contents

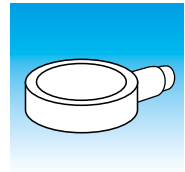
- Calibration sheet

Accessories

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

Cavity force sensor 2,5 kN

DLPP 6MO



Features

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



Technical Data

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

Mechanical Data

| | |
|------------------|-----------------|
| Connector thread | M4 x 0,35 |
| Material | Stainless steel |

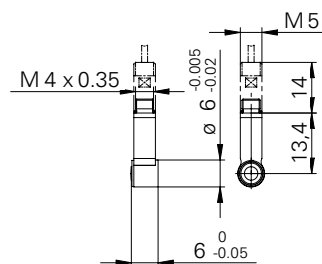
Environmental Conditions

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

Order Code

DLPP 6MO-2.5-4.4

Dimensions (mm)



Delivery Contents

- Calibration sheet

Accessories

Connecting Cable

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

Cavity force sensor 10 kN

DLPP 7MO



Features

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

Technical Data

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

Mechanical Data

| | |
|------------------|-----------------|
| Connector thread | M4 x 0,35 |
| Material | Stainless steel |

Environmental Conditions

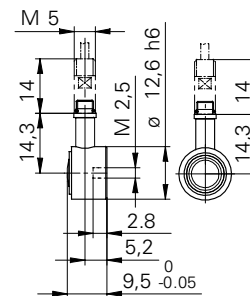
| | |
|------------------------|---------------|
| Operating temp. range | 0...+150 °C |
| Storage temperature | -40...+150 °C |
| Protection incl. cable | IP 65 |

Order Code

DLPP 7MO-010-2.2



Dimensions (mm)



Delivery Contents

- Calibration sheet

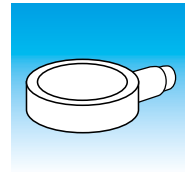
Accessories

Connecting Cable

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

Cavity force sensor 30 kN

DLPP 4MO



Features

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

Technical Data

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

Mechanical Data

| | |
|------------------|-----------------|
| Connector thread | UNF 10-32 |
| Material | Stainless steel |

Environmental Conditions

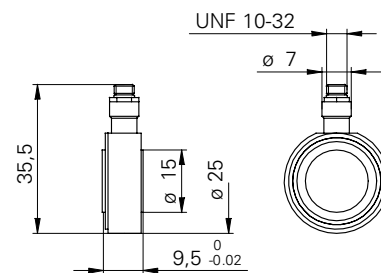
| | |
|------------------------|---------------|
| Operating temp. range | 0...+150 °C |
| Storage temperature | -40...+150 °C |
| Protection incl. cable | IP 65 |

Order Code

DLPP 4MO-030-4.4



Dimensions (mm)



Delivery Contents

- Calibration sheet

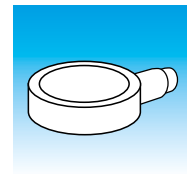
Accessories

Connecting Cable

DZCC xxxx-78-UB

Product Key

Cavity Pressure Sensors



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

DPPC DS04.0-9.4 /TP

Product Description

DPPC = Cavity pressure sensor

Method

D = Direct cavity pressure measurement

Version

S = Standard

Size

02.5 = 2,5 mm diameter sensor front

04.0 = 4 mm diameter sensor front

Nominal Sensitivity

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

2.0 = 2 pC/bar

5.0 = 5 pC/bar

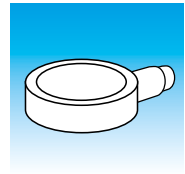
9.4 = 9,4 pC/bar



Options

/TP = Rotation prevention

Summary

Cavity Pressure Sensors



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

Cavity Pressure Sensor

2000 bar

DPPC DS02.5

Features

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



Technical Data

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

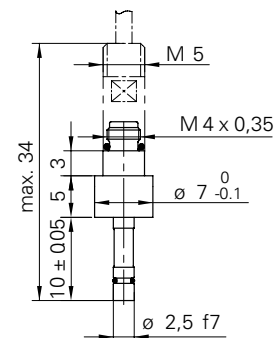
Mechanical Data

| | |
|--------------------|-----------------|
| Connector thread | M4 x 0,35 |
| Material enclosure | Stainless steel |

Environmental Conditions

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

Dimensions (mm)



Delivery Contents

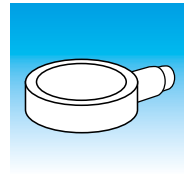
- Special nut DZPC MN04
- Calibration sheet

Order Code

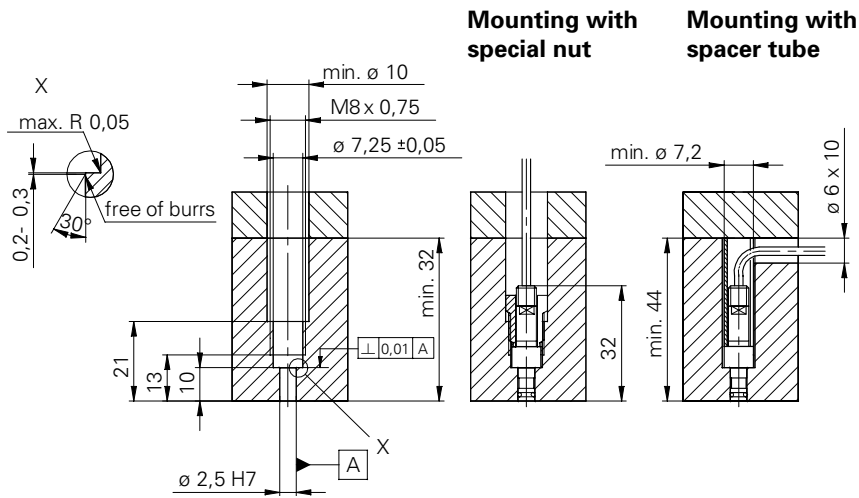
DPPC DS02.5-2.0/□□

Option

TP = Turning protection



Mounting Dimensions



Accessories

Sensor Cable

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

Mounting Accessories

DZPC MN04
 DZPC MWPT
 DZPC MT04

Description

Special nut
 Mounting wrench
 Spacer tube

Cavity Pressure Sensor

2000 bar

DPPC DS04.0

Features

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



Technical Data

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

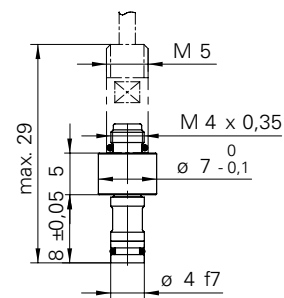
Mechanical Data

| | |
|--------------------|-----------------|
| Connector thread | M4 x 0,35 |
| Material enclosure | Stainless steel |

Environmental Conditions

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

Dimensions (mm)



Delivery Contents

- Special nut DZPC MN04
- Calibration sheet

Order Code

DPPC DS04.0- / TP

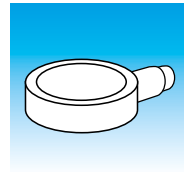
Option

TP = Turning protection

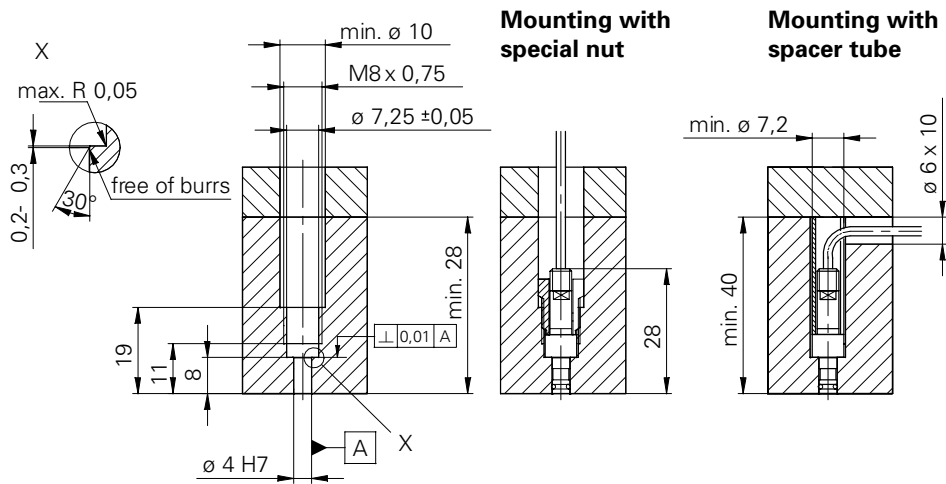
Nominal sensitivity

5.0 = -5,0 pC/bar

9.4 = -9,4 pC/bar



Mounting Dimensions



Accessories

Sensor Cable

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

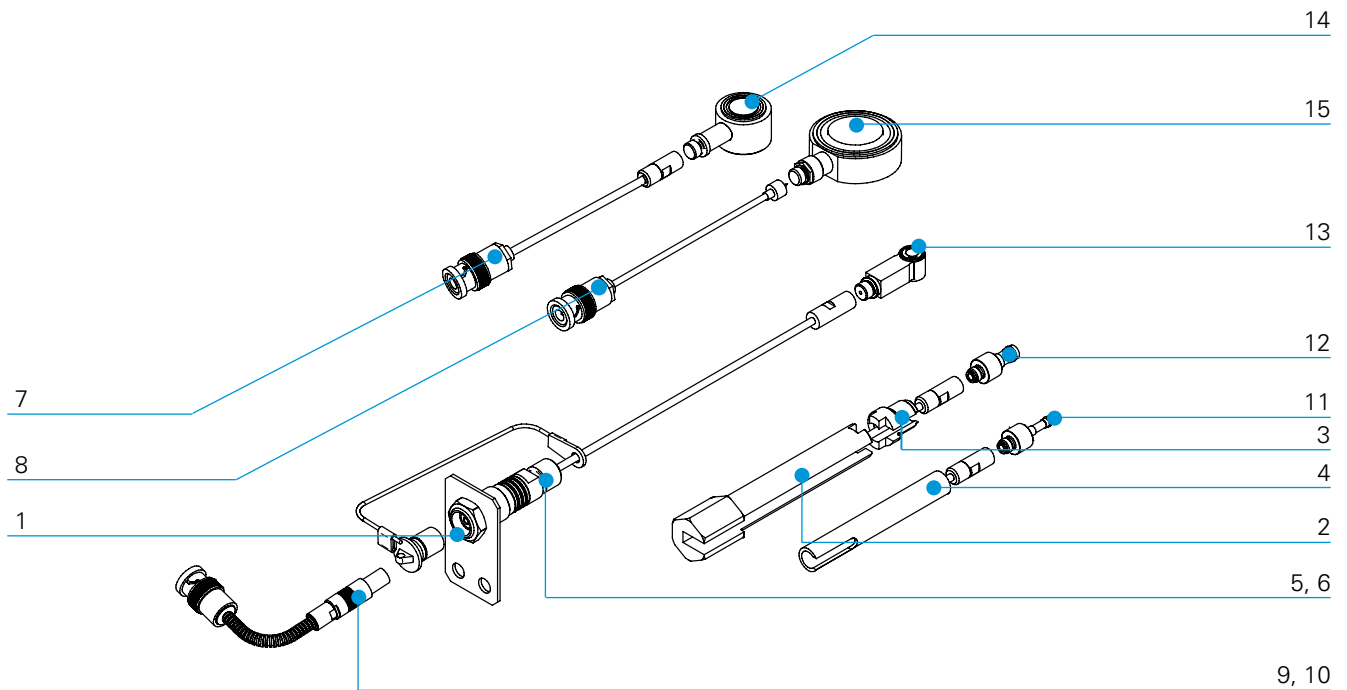
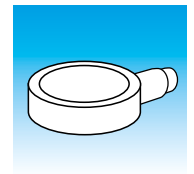
Mounting Accessories

DZPC MN04
 DZPC MWPT
 DZPC MT04

Description

Special nut
 Mounting wrench
 Spacer tube

Summary Accessories and Sensors

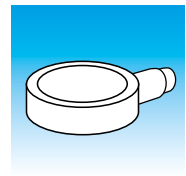


| Pos. | Mounting Accessories | Type |
|------|---|-----------|
| 1 | Mounting equipment Fischer connector | DZPC HPFC |
| 2 | Mounting wrench | DZPC MWPT |
| 3 | Special nut for 2,5 / 4 mm cavity pressure sensor | DZPC MN04 |
| 4 | Spacer tube for 2,5 / 4 mm cavity pressure sensor | DZPC MT04 |

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

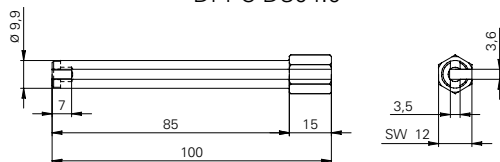
| Pos. | Sensors | Type |
|------|---------------------------------|------------------|
| 11 | Cavity pressure sensor ø 2,5 mm | DPPC DS02.5-2.0 |
| 12 | Cavity pressure sensor ø 4,0 mm | DPPC DS04.0-x.x |
| 13 | Miniature force sensor 2,5 kN | DLPP 6MO-2.5-4.4 |
| 14 | Force sensor 10 kN | DLPP 7MO-010-2.2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

Mounting Accessories



DZPC MWPT

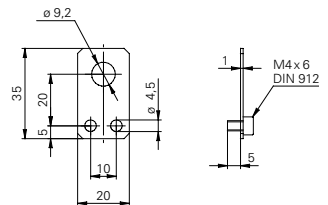
Mounting wrench for DPPC DS02.5
DPPC DS04.0



Mat.: 1.4305

DZPC HPFC

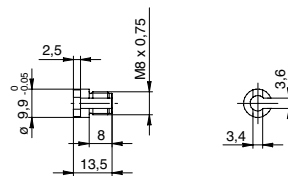
Mounting plate Fischer connector



Mat.: 1.4305

DZPC MN04

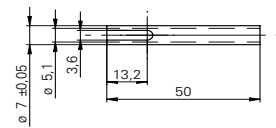
Special nut for DPPC DS02.5
DPPC DS04.5



Mat.: 1.4305

DZPC MT04

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

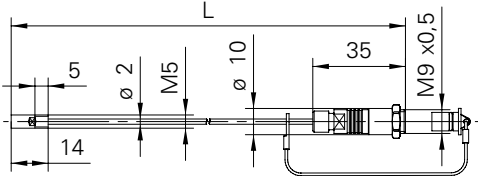
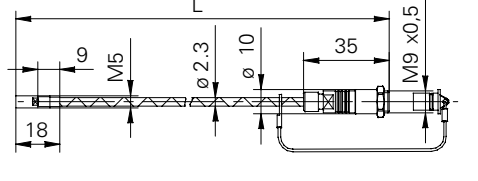
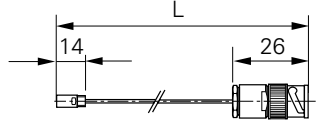


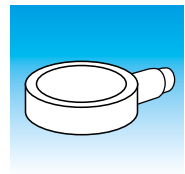
Mat.: 1.4305

Cables

DZCC

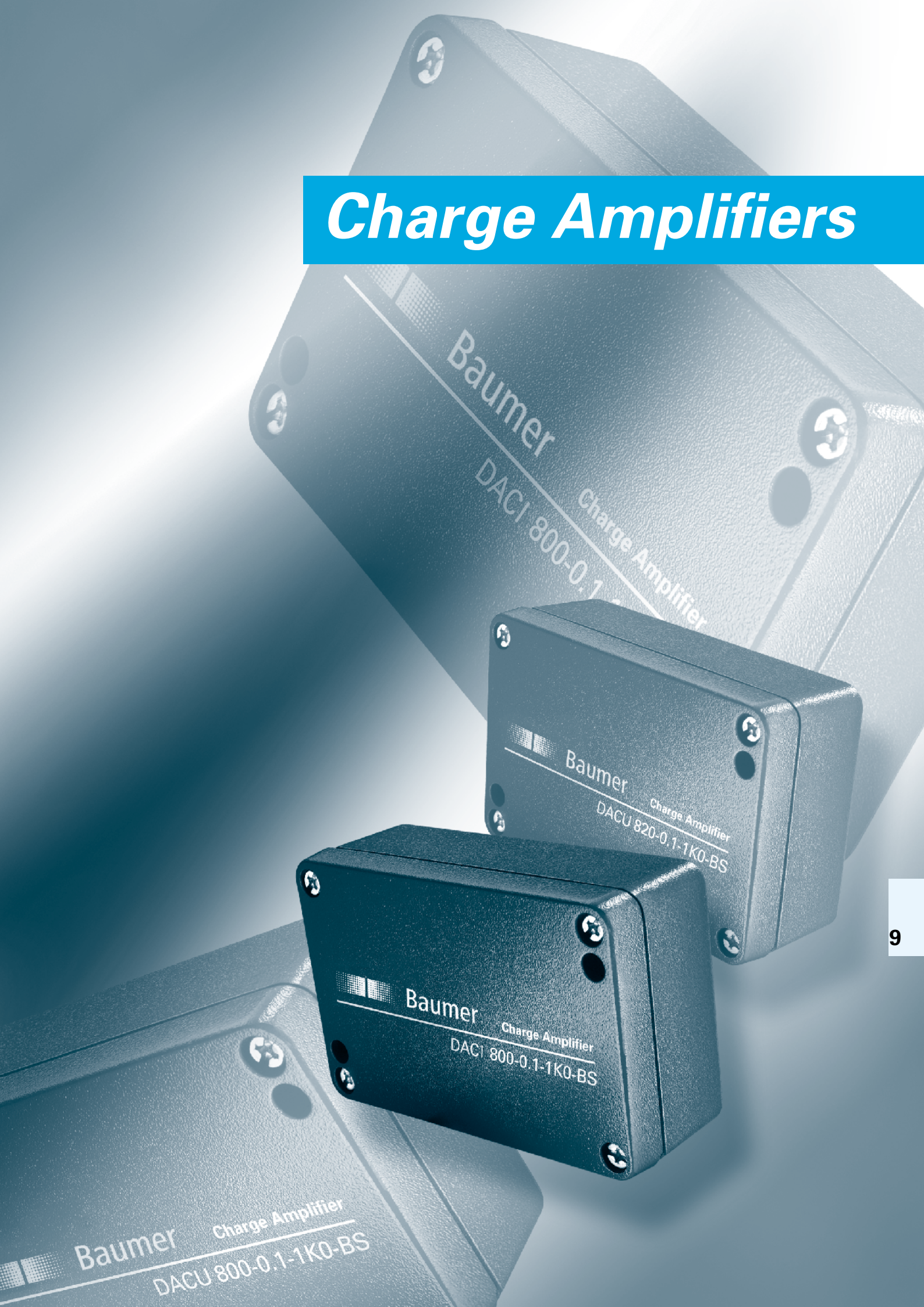


| Sensor Cable | | DZCC ...- ST-MF | |
|-----------------------|---------------------------|---|--|
| L [mm] | Order code | Connector | Connector |
| 200 | DZCC 0200-ST-MF | M4 x 0,35 |  |
| 400 | DZCC 0400-ST-MF | | |
| 600 | DZCC 0600-ST-MF | | |
| 1000 | DZCC 1000-ST-MF | | |
| Custom length | DZCC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

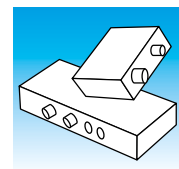


| Sensor Cable | | DZCC ...-78-UB | |
|---------------------------------|-----------------------------|-------------------------|-----------|
| L [mm] | Order code | Connector | Connector |
| 1000 | DZCC 1000-78-UB | UNF 10 - 32 | |
| 2000 | DZCC 2000-78-UB | | |
| 3000 | DZCC 3000-78-UB | | |
| Tailor made | DZCC xxxx-78-UB | | |
| Technical data | | | |
| Cable | Coax 178 RG | | |
| 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 | |
| L [mm] | Order code | Connector | Connector |
| 2000 | DZCC 2000-04-FB | Fischer Type S 102 A014 | |
| 4000 | DZCC 4000-04-FB | | |
| 5000 | DZCC 5000-04-FB | | |
| Custom length | DZCC xxxx-04-FB | | |
| Technical data | | | |
| Cable | Triax, Low Noise, PTFE/PFA | | |
| 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 | |
| L [mm] | Order code | Connector | Connector |
| 2000 | DZCC 2000-HT-FB | Fischer Type S 102 A014 | |
| 4000 | DZCC 4000-HT-FB | | |
| 5000 | DZCC 5000-HT-FB | | |
| Custom length | DZCC xxxx-HT-FB | | |
| Technical data | | | |
| Cable | Triax, Low Noise, PTFE, PFA | | |
| 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 ± 10 V

Series

800 = 1 Analog output, 14 ranges

820 = 2 Analog outputs, 4 ranges every

Smallest measuring range

Example:

0.1 = 100 pC / 10 V

Largest measuring range

Example:

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

Input Connection

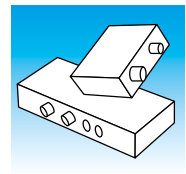
B = BNC

Output Connection

S = 25 Pin D-Sub

Summary

Charge Amplifiers



DACU 800



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

Page 9.4

DACU 820



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

Page 9.8

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

Charge Amplifier DACU 800

Features

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

Electrical Data

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

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

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

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

Mechanical Data

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

Environmental Conditions

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



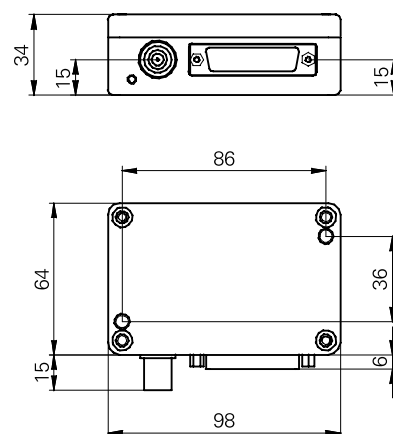
Order Code

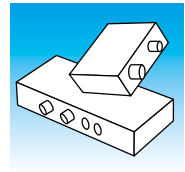
DACU 800-0.1-1K0BS

Included

- Mounting screws 2 pcs. M4 x 16

Dimensions (mm)

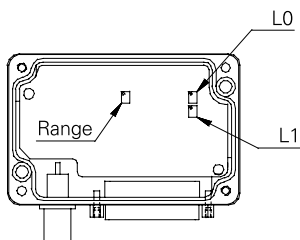




Electrical Connections D-Sub 25

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

Control Elements



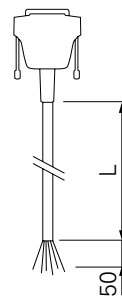
| | |
|-------|---|
| Range | Adjustment of variable range |
| L0 | Adjustment of value 1. The limit switch voltage can be set with the potentiometer and has to be measured at pin 4. Alternatively a voltage can be supplied as well. |
| L1 | Adjustment limit value 2. ditto, pin 3 only |

Measuring Range Selection

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

Accessories

Connecting cable with open end



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

Charge Amplifier DACU 820

Features

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

Electrical Data

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

⁽¹⁾ < 55 mA at 24 V

⁽²⁾ < 20 mVpp in the 2000 pC range

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

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

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

Mechanical Data

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

Environmental Conditions

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



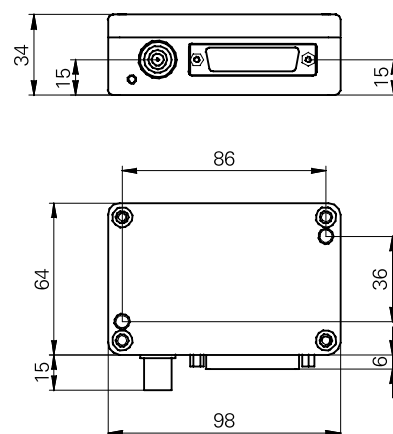
Order Code

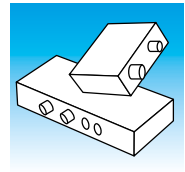
DACU 820-2.0-500BS

Included

- Mounting screws 2 pcs. M4 x 16

Dimensions (mm)





Electrical Connections D-Sub 25

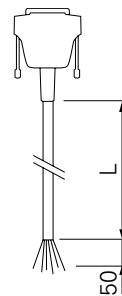
| Pin | Function |
|-----|--------------------------|
| 1 | Signal out CH1 |
| 2 | Peak out |
| 3 | Level 1 (In or Out) |
| 4 | Level 0 (In or Out) |
| 5 | Range B1 (CH2) |
| 6 | Range B0 (CH2) |
| 7 | Range A1 (CH1) |
| 8 | Range A0 (CH1) |
| 9 | Supply GND |
| 10 | +Supply |
| 11 | Code 2 |
| 12 |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

Measuring Range Selection

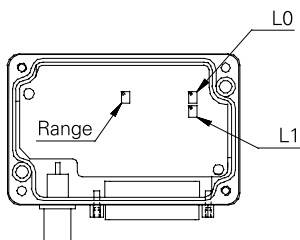
| Range CH1 | | Measuring Range |
|-----------|----|-------------------|
| A1 | A0 | pC/10V |
| 0 | 0 | 500'000 |
| 0 | 1 | 200'000 |
| 1 | 0 | 100'000 |
| 1 | 1 | 100'000...500'000 |
| Range CH2 | | |
| B1 | B0 | |
| 0 | 0 | 20'000 |
| 0 | 1 | 10'000 |
| 1 | 0 | 5'000 |
| 1 | 1 | 2'000 |

Accessories

Connecting cable with open end



Control Elements



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

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

Force Measurement

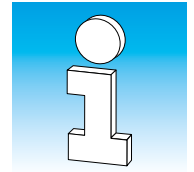
Supplementary Information

*Axial-Load
Torsion*

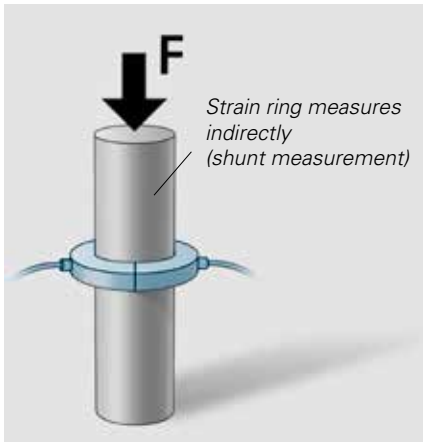
*Hydraulic
Presses*

Indirect Force Measurement

Bending



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



Axial Load in Cylinder

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

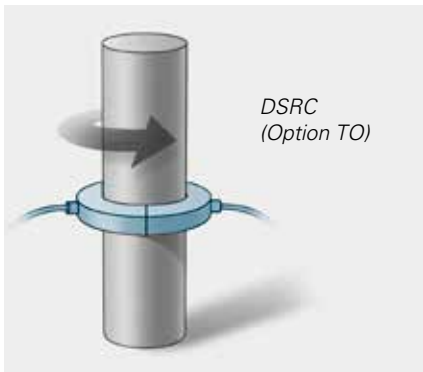
$$F = A \times E \times \epsilon$$

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

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

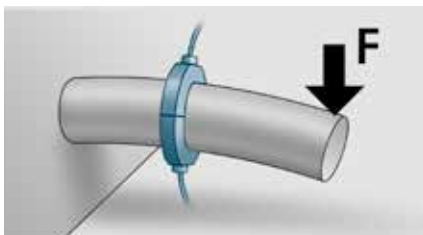
Elastic modulus E

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



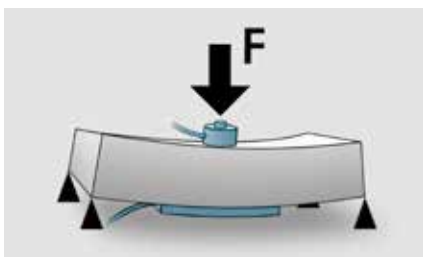
Torsion

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



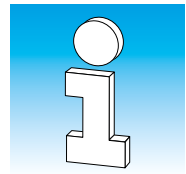
Bending on a Cylinder

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



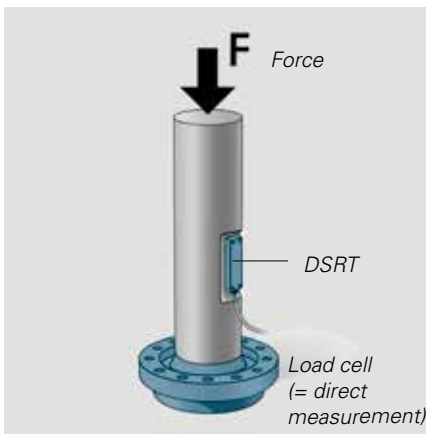
Bending on Beams or Cross Heads

Bending measurements on beams with strain link type DSRT.



Force Measurement

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

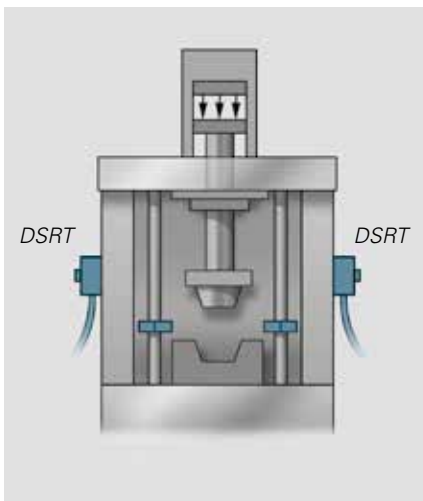


Indirect Force Measurement

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

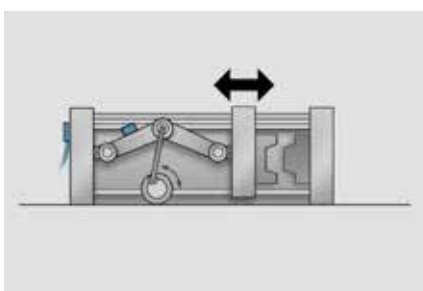
Application:

- Strain link DSRT for standard applications



Hydraulic Presses

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



Mechanical Presses

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

Using sensors with sufficiently high resolution, 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

Terms/Explanations

General

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 ² |
| Aluminium | 70.5 kN/mm ² |

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

Output range

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

Nominal characteristic value

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

Characteristic value

Actual (measured) output range.

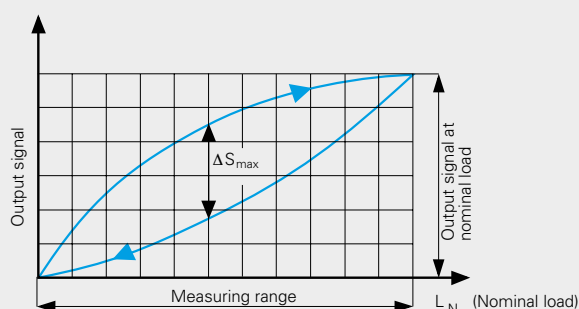
Measuring range

Load range in which the specified errors are not exceeded.

Hysteresis

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

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



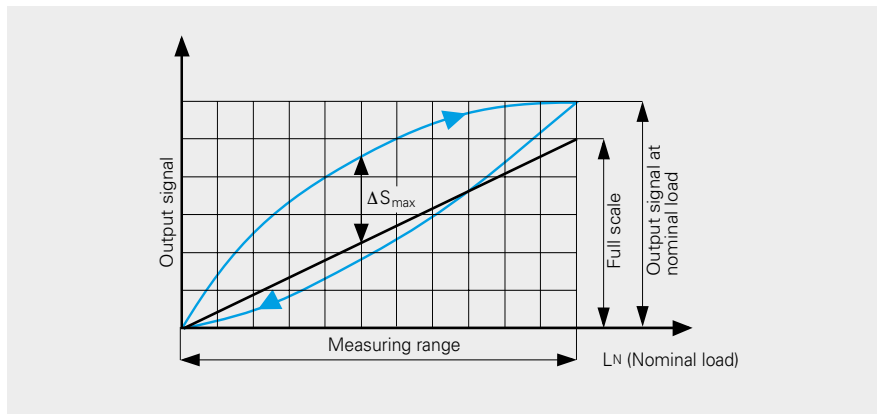
Terms/Explanations

General

Characteristic curve deviation

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

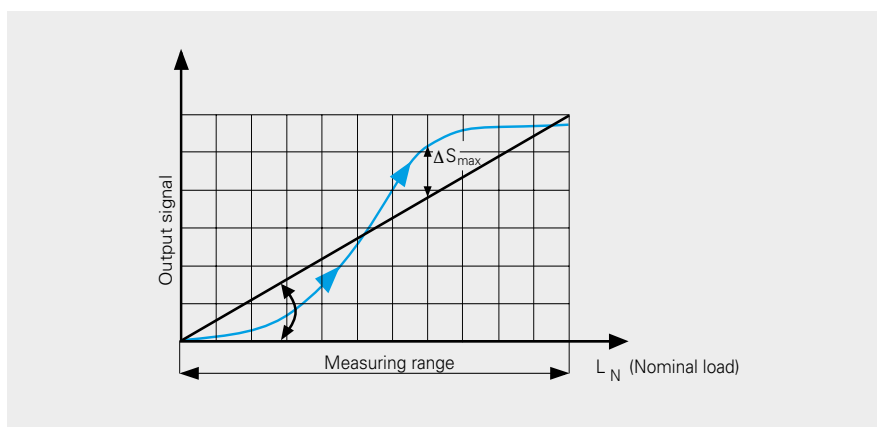
$$F_{\text{Com}} = \frac{\Delta S_{\text{max}}}{FS}$$



Linearity

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

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



Terms/Explanations

General

Micro strain [$\mu\epsilon$]

See strain.

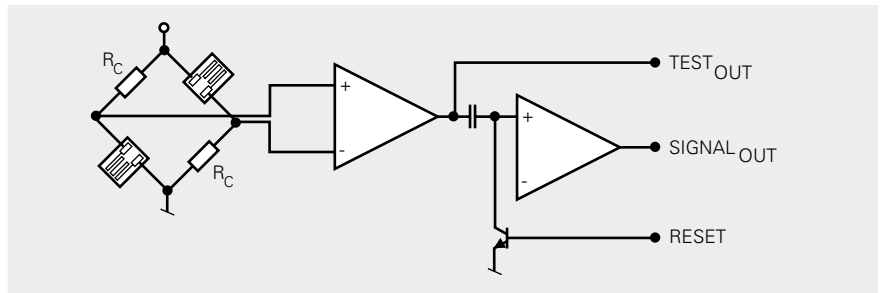
Zero, bridge balance

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

Repeatability

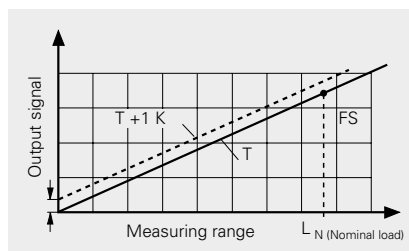
The difference in reference to the characteristic value between the max. and the min. display value of equal measuring points in case of repetition of identical load cycles.

Test_{OUT}



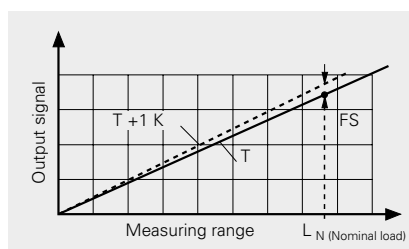
The non-tared signal is available at the output Test_{OUT}. To prevent saturation of subsequent stages, Test_{OUT} should ideally read between -2 V and +2 V when the sensor is installed and no load is applied. During operation this value may then be between -5 V and +5 V. The Test_{OUT} output can furthermore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

TC of zero signal



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

TC of output range



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

*) FS = Fullscale of output range

Terms/Explanations

Strain Gages

Strain gage (S/G)

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

Gage factor

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

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

R Resistance of S/G

ΔR Resistance change due to strain

ε Strain of S/G

Transverse sensitivity

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

Temperature compensation

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

Worldwide presence.

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



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Bahrain
China
India
Indonesia
Israel
Japan
Kuwait
Malaysia
Oman
Philippines
Qatar
Saudi Arabia
Singapore
South Korea
Taiwan
Thailand
UAE

Europe

Austria
Belgium
Bulgaria
Croatia
Czech Republic
Denmark
Finland
France
Germany
Greece
Hungary
Italy
Malta
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Netherlands
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Our overall portfolio

Baumer provides for every application the perfect solution.

Presence detection

- Inductive sensors
- Photoelectric sensors
- Ultrasonic sensors
- Capacitive sensors
- Magnetic sensors
- Mechanical precision switches

Distance measurement

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

Rotary encoders / Angle measurement

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

Identification / Image processing

- Industrial Cameras
- Vision Sensors

Process instrumentation

- Level measurement
- Temperature measurement
- Pressure measurement
- Conductivity measurement
- Force/strain sensors
- Counters
- Process displays



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