Baumer
Passion for Sensors

Force and strain sensors.

Measure. Test. Control.

Edition 2016

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

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Force and strain sensors – measuring testing and monitoring

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

Sensors with S/G technology

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

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

Sensors with Piezo technology

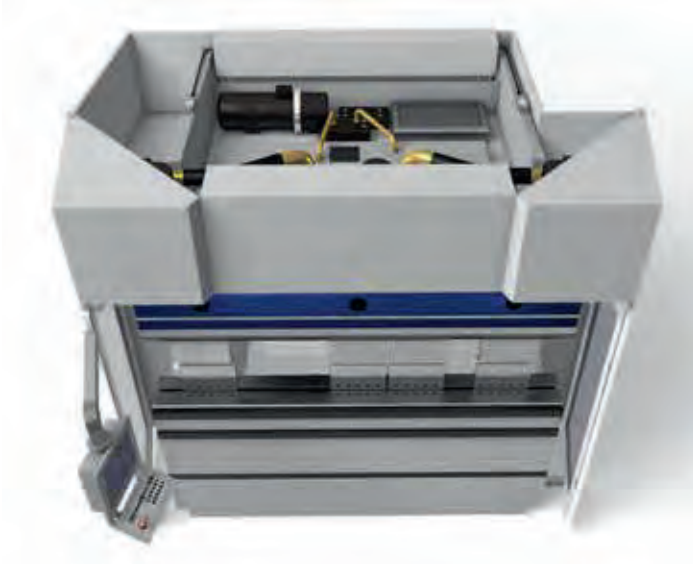
Quartz crystals and polarised ceramic materials are used where fast response time and a high signal to noise ratio are important.

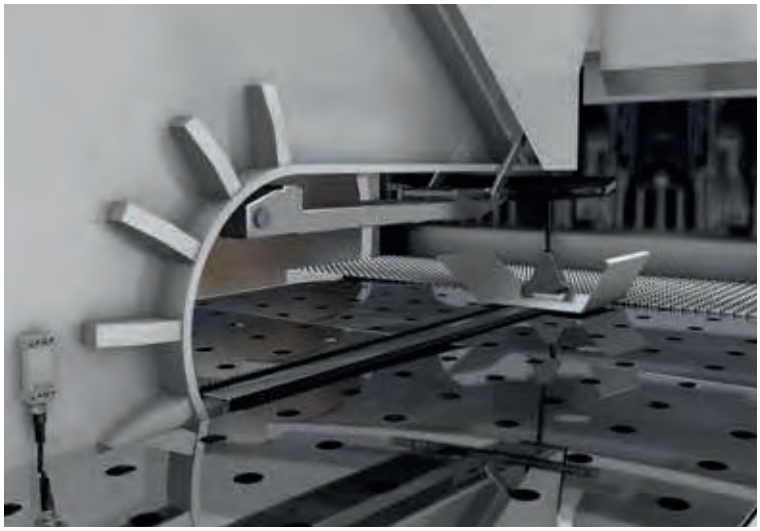
- Force sensors for dynamic measurement
- High resolution strain measurement on rigid structures
- Pooling and crash detection
- Cavity pressure measurement
- Direct and indirect measurement
- Industrial multi range charge amplifier

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.





Holding force control

Holding the sheet with needed force to make sure the sheet can 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.

Force Sensors Strain Sensors

DLRx	DSRC	DSRH	DSRT
			
Load Cell	**Strain Ring**	**Strain Probe**	**Strain Links**
Static and dynamic force measurement	Strain measurement on tie bars and shafts	Strain measurement in holes	Strain measurement on rigid structures
Measuring range 0,5…100 kN	Measuring range ±1000 με	Measuring range ±1000 με	Measuring range ±750 με
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 ±1999 με
Current or voltage output	2 or 4 channels
1 channel	
Page 6.3	**Page 7.3**

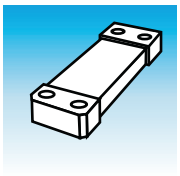
Accessories

Analysis Devices

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

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

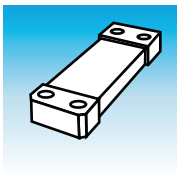
Series
T = Strain link

Type
22DA = 25,9 x 70 x16,9 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 με surface strain
1.25 = 1,25 mV/V at 250 με surface strain
0100 = 100 με surface strain with nominal output signal
0250 = 250 με surface strain with nominal output signal
0350 = 350 με surface strain with nominal output signal
0500 = 500 με surface strain with nominal output signal
0750 = 750 με surface strain with nominal output signal

Summary
Strain Links DSRT



Type 22DA 	• Strain link without amplifier • For static and dynamic applications • Very good repeatability • Measurement range from ±100με up to ±750με • Overloadsave	**Page 5.4**
Type 22DD 	• 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 ±100με up to ±750με	**Page 5.6**
Type 22DJ 	• For cyclical measurements; with integrated amplifier • CANopen • Excellent signal to noise ratio • High sensitivity	**Page 5.8**

Operating method of DSRT strain links:

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

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

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

Strain Link without Amplifier
DSRT 22DA

Features

- Strain link without amplifier
- Static and dynamic applications
- Measuring range ±250 resp. ±750 με

S/G Data

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

Mechanical Data

Material - Housing - Cover	 1.7225 chemically nickel-plated 1.4301
Electrical connection	5 pin (M12 x 1)
Sensor stiffness	1 N/με @250 mechanic 0,2 N/με @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 ±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

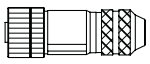
DSRT 22DA-S5- ☐☐☐☐

0250 Measuring range 250 με
0750 Measuring range 750 με

Electrical Data

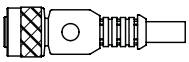
Measuring range	±250 με...±750 με (1 με = 0,001 mm/m resp. 1 με equals 0,001 mm strain per meter)
Sensitivity	1,85 mV/V @ 750 με 0,93 mV/V @ 250 με
Sensitivity tolerance typical	± 2 %
Linearity	< 0,5% FSR
Hysteresis	< 0,5% FSR
Repeatability	< 0,1% FSR (cycle to cycle)

Accessories (not included in delivery)

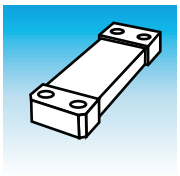


Series 713

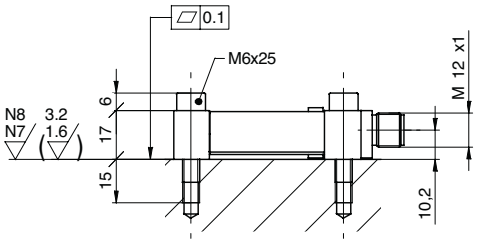
Connector female, 5 pin, part no. 135462

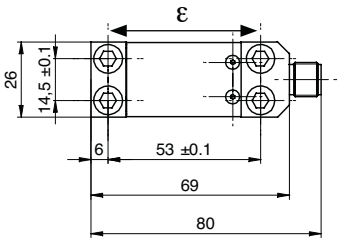


Connector female with cable, 5 pin ESG 34CH0200G 5-pin (shielded) 2 m, PUR, (Part No. 11046264)
ESG 34CH0500G 5-pin (shielded) 5 m, PUR, (Part No. 11046266)
ESG 34CH1000G 5-pin (shielded) 10 m, PUR, (Part No. 10155587)



Dimensions (mm)

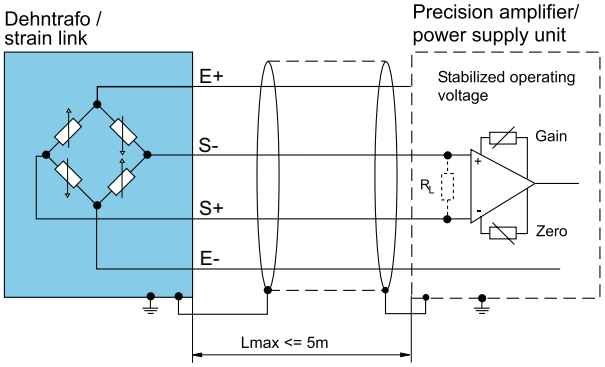




Electrical Connections

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

Control



5

Strain Link with Amplifier
DSRT 22DD

Features

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

S/G Data

Strain gage type	Foil strain gage

Mechanical Data

Material - Housing - Cover	 1.7225 chemically nickel-plated 1.4301
Electrical connection	5 pin (M12 x 1)
Application position	any
Sensor stiffness	1 N/με @100 0,2 N/με @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 ±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

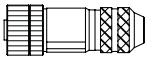
DSRT 22DD-S5- ☐☐☐☐

0100 Measuring range 100 με
0250 Measuring range 250 με
0350 Measuring range 350 με
0500 Measuring range 500 με
0750 Measuring range 750 με

Electrical Data

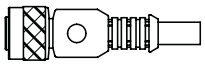
Measuring range	±100 με...±750 με (1 με = 0,001 mm/m resp. 1 με equals 0,001 mm strain per meter)
Output signal	±10 VDC (max. ±12 VDC)
Characteristic curve deviation	< 1,0% FS
Linearity	< 0,5% FS
Hysteresis	< 0,5% FS
Repeatability	< 0,1% FS
Supply voltage range	18 - 33 VDC
Taring "activ High"	Low < 1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

Accessories (not included in delivery)



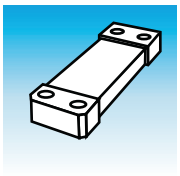
Series 713

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

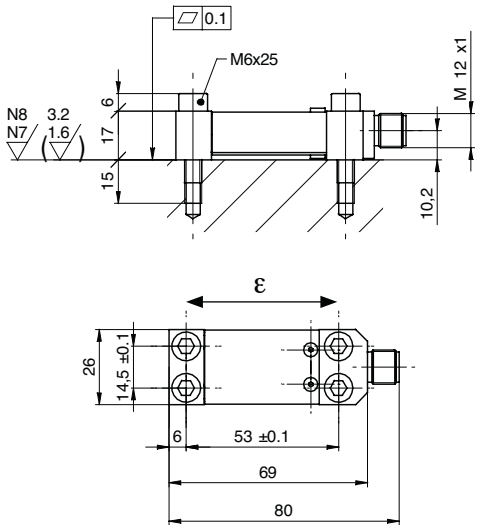


Connector female with cable, control side, 5-pin

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)



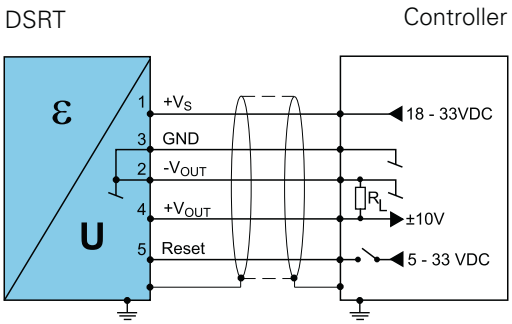
Dimensions (mm)



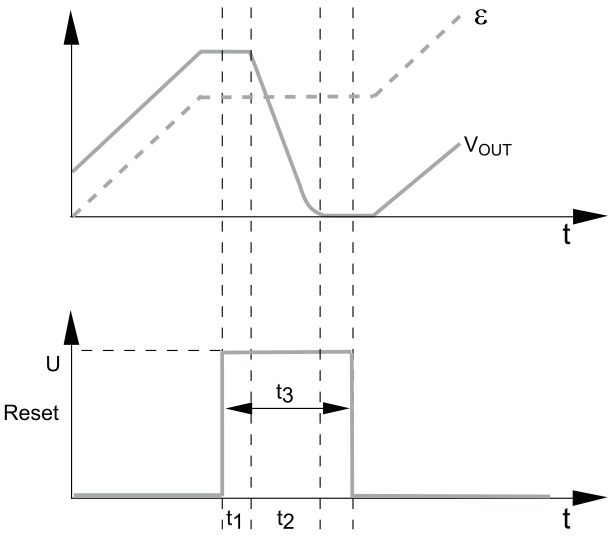
Electrical Connections

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 ±750 με, extension and compression

S/G Data

Strain gage type	Foil strain gage

Mechanical Data

Material - Housing - Cover	 1.7225 chemically nickel-plated 1.4301
Electrical connection	5 pin (M12 x 1)
Application position	any
Sensor stiffness	1 N/με @100 0,2 N/με @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 ±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

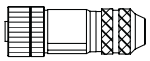
DSRT 22DJ-S5- ☐☐☐☐

0100 Measuring range 100 με
0250 Measuring range 250 με
0500 Measuring range 500 με
0750 Measuring range 750 με

Electrical Data

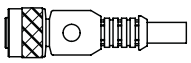
Measuring range	±100 με … ±750 με (1 με = 0,001 mm/m resp. 1 με equals 0,001 mm strain per meter)
Output / Protocol	CANopen DS404
Resolution	0,1 με
Measuring rate	1000 x / sec.
Data format	Fix points
Total error at ambient temperature	< 0,5% FS
Hysteresis	< 0,4% FS
Repeatability	< 0,1% FS
Taring time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

Accessories (not included in delivery)



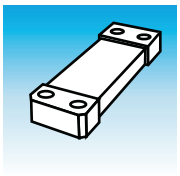
Series 713

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

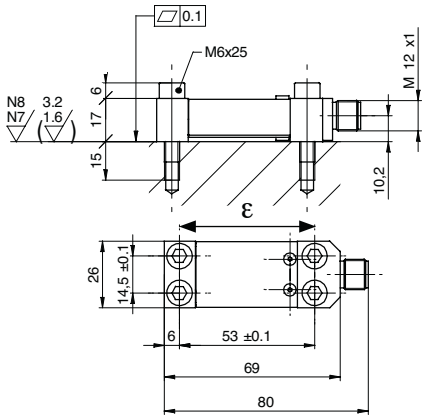


Connector female with cable, control side, 5-pin

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)



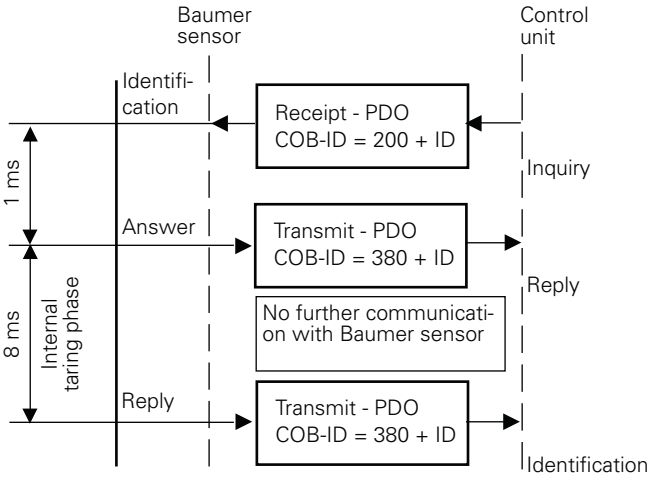
Electrical Connections

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

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

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