Shear beam for OEM-applications with thin film sensor

Accuracy: 0,5%
Output signals: 4...20 mA; 2-wire,
0...10 VDC; 3-wire

Optional ATEX/IECEX
II 2G Ex ib IIC T4/T3

Optional for SIL3-Applications
with 2-channel PC control

Description

In addition to our force transducer program with bonded foils, a new force transducer with a welded thin film sensor was developed. The usage of standardised sensors, which are welded into the measuring element, makes an automated manufacturing possible. Combined with an accuracy of 0,5%, the new shear beams are also of interest for OEM applications due to the attractive price- performance ratio.
Thin film sensors, produced by very modern manufacturing technology, have all advantages of the conventional bonded foil strain gauges, but without having their substantial disadvantages (temperature drifts of the glue and creeping).
Shear beams are specially used as toque support of drives or as standard component in weighing applications.
Different output signals are available: analogue standard-output signals (4...20 mA, 0...10V). Shear beams fulfil the regulations of EMC according to directive EN 61326.

ATEX/IECEX (Option)
Only equipment and protective systems with the corresponding certification and markings are to be put into operation in potentially explosive areas. Our force transducers with a thin-film measuring cell and integrated amplifier now have approval according to directive 94/9/EC in equipment group II (non-mining products), category 2G for zones 1 and 2 (gases). Other zones on request.

SIL-3 (Option)
In cooperation with the TÜV Süddeutschland a special security electronics has been developed for theatre and stage applications. It fulfils security standard SIL 3 with a 2-channel PC control in connection.
This international security standard for systems and processes is based on the standards IEC 61508 and 61511. The latter is used for ascertaining risk potentials of (engineering) systems. Depending on the potential existing risk a risk reduction has to be made. If automation components are used for that, they have to fulfil the demands of IEC 61508.
Both standards subdivide systems and risk reducing actions in four security steps: **SIL**1...SIL4 (**S**afety **I**ntegrity **L**evel) – from small up to very high risks. If persons are allowed to stay under hanging loads, e.g. in theatres, security level 3 (SIL 3) is valid.

UL-Certification (Option)
tecsis force transducers are also available with UL approval.

FM and CSA Approval submitted.

Features

- thin film implants
  (instead of conventional bonded foil strain gauges)
- corrosion free stainless steel
- integrated amplifier
- small temperature drift
- high long term stability
- high shock and vibration resistance
- for dynamic or static measurements
- good repeatability
- easy to install

ATEX/IECEX (Option)
- for Zone 1 and 2
- II 2G Ex ib IIC T4/T3

SIL-3 (Option)
- Security electronic
- SIL-3 approval with
  2-channel PC control;
  Zulassung:
  TÜV-Süd-Nr. 2005-08-11/tecsis

Measuring ranges

- 2 kN … 100 kN

Applications

- Torque support
- Industrial weighing
- Automation of the manufacturing process
- Mechanical engineering and machinery

ATEX/IECEX (Option)
- Mining
- Chemical and petrochemical industries
- Dedusting and filtration units

SIL-3 (Option)
For theatre and stage design:
- Above-stage machinery
- Below-stage machinery
- Point hoists
- Bar hoists

Model: F3301, F33C1

Technical data

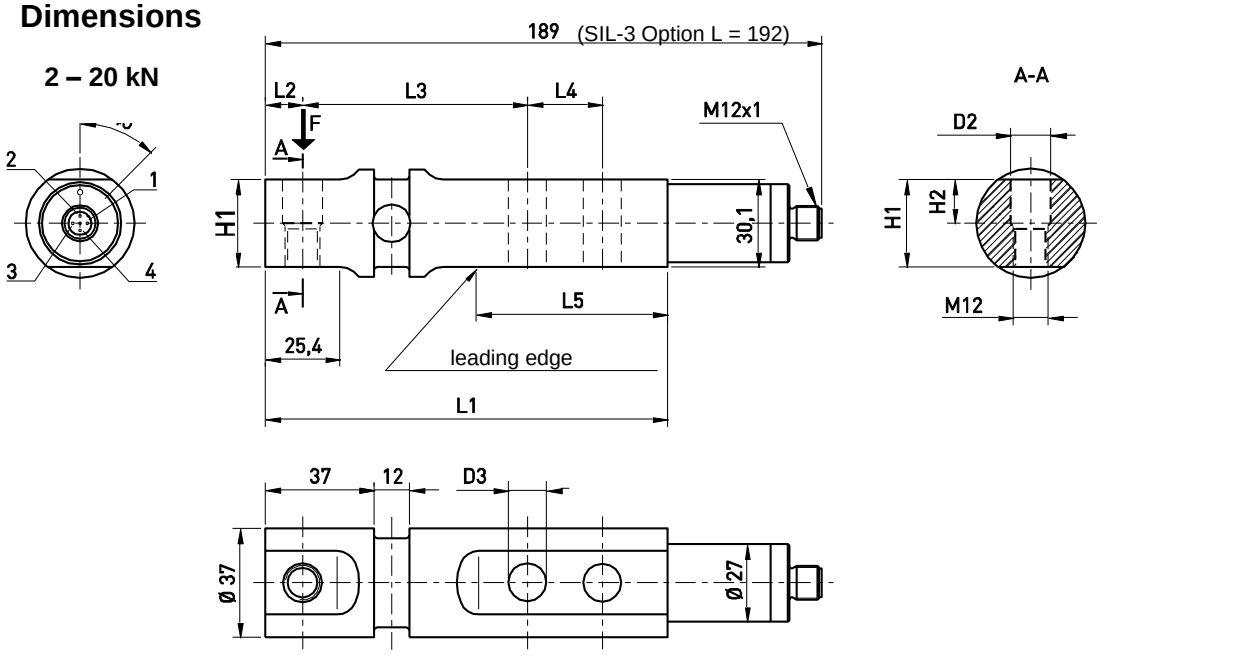
Model	**F3301**	**F33C1 ATEX/IECEX[1] (Option)**	**F33C1 SIL-3 (Option)**
Nominal load F_{nom}	2 / 3 / 5 / 10 / 20 / 30 / 50 / 100 kN	2 / 3 / 5 / 10 / 20 / 30 / 50 / 100 kN	2 / 3 / 5 / 10 / 20 kN
Limit load	150 % F_{nom}		
Breaking load	> 300 % F_{nom}		
Combined error	≤± 0,5% of F.S.		
Hysteresis	≤± 0,2% of F.S. C_n		
Cross sensitivity (signal with 100% F_{nom} at 90°)	≤± 5 % of F.S.		
Creeping, 30 min. at F_{nom}	≤± 0,1 % of F.S. C_n		
Nominal deflection	see table		
Nominal temperature range	-20 …+80 °C		
Service temperature range	-40 …+80 °C		
Storage temperature	-40 …+85 °C		
Temperature effect - span - zero	≤± 0,2 % of F.S./ 10K ≤± 0,2 % of F.S./ 10K		
Vibration resistance	20g, 100h, 50...150 Hz acc. to DIN EN 60068-2-6		
Protection type (acc. to EN 60 529 / IEC 529)	IP 67		
Noise emission	acc. to EN 61326		
Noise immunity	acc. to EN 61326		
Insulation resistance	> 5 GΩ / 50 V		
Electrical protection	Reverse voltage, overvoltage and short circuit protection		
Analogue output - Output signal	4 … 20 mA, 2-wire; 0 … 10 V DC; 3- wire		4 … 12 mA; 2-wire; 0 … 5 V; 3-wire
- Current consumption	Current output: Signal current Voltage output approx. 8 mA		
- Power requirement	10 … 30 V DC for current output; 14 … 30 V DC for voltage output		
- Burden	≤ (UB-6V) / 0,024 A for current output; > 10 kΩ for voltage output		≤ (UB-6 V) / 0.024 A for current output; > 10 kΩ for voltage output
- Response time	≤ 1 ms (within 10% … 90% F_{nom})		≤ 5 ms (within 10% … 90% F_{nom})
- Electrical connection	Circular connector M 12x1, 4-pin		
Relay power supply U_R Power consumption relay P_R Signal amplitude	-		Standard 24 V, max. 1.5 x UR, min. 0.8 x UR approx. 100 mW 8 ± 0.2 mA resp. 5 ± 0.2 V, others upon request
Material of measuring device	Stainless steel		
Certification		⟨Ex⟩ II 2G Ex ib IIC T4/T3	TÜV: 2005-08-11/tecsis

of F.S. = full scale value Construction: stainless steel (1.4542) material

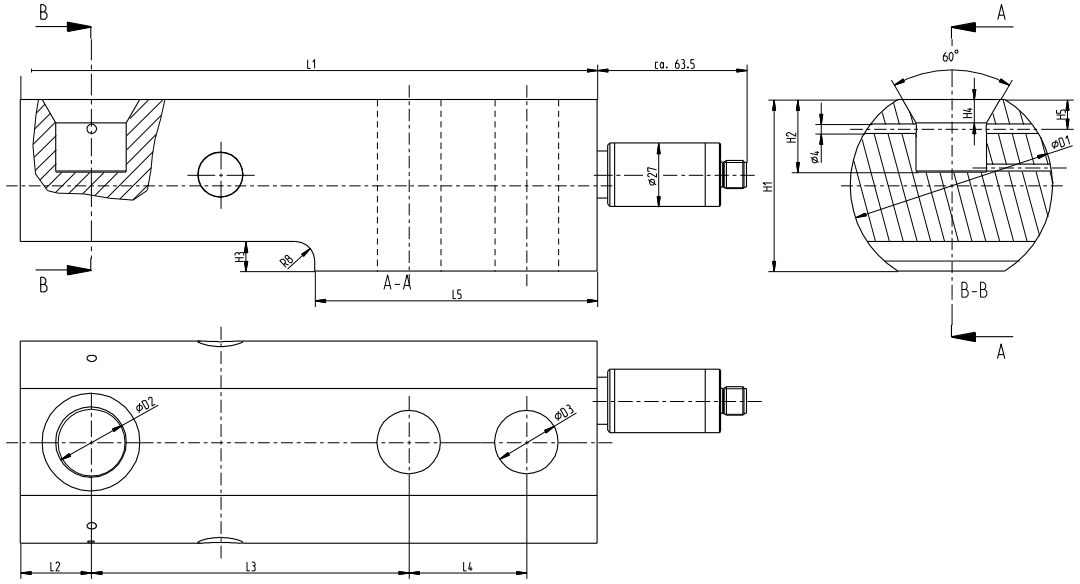
[1] The force transducers with ignition protection type “ib” must only be supplied using galvanically-isolated power supplies. Suitable supply isolators are also optionally available: EZE08X030003 (1-channel) und EZE08X03000x (2-channel).

Dimensions

2 – 20 kN

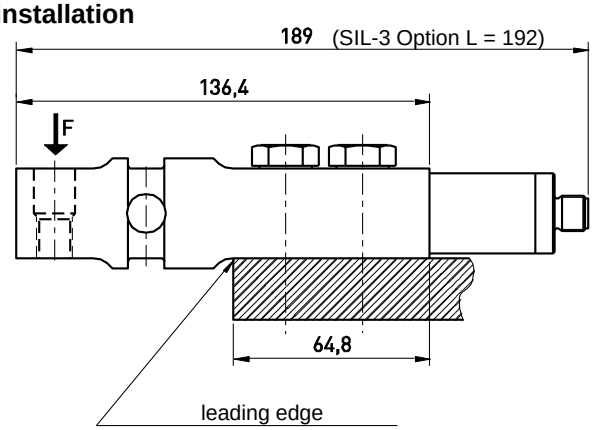


30 – 100 kN



Example of installation

2 – 20 kN



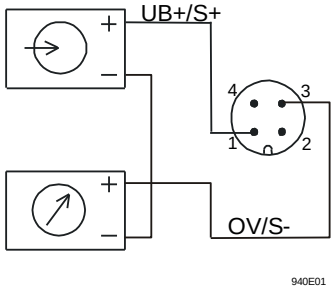
Version kN	Dimensions in mm															
	L1	L2	L3	L4	L5	H1	H2	H3	H4	H5	D1	D2	D3	Erection bolt	Clamping torque Nm	Nominal deflection
2-10	136,4	12,7	76,2	25,4	64,8	30,1	15	-	-	-	-	13,5	13	M12 8,8	90	< 0,2
20	136,4	12,7	76,2	25,4	64,8	30,1	15	-	-	-	-	13,5	13	M12 10,9	120	< 0,2
30-50	190	21	105	40	93	49	20,5	8	6	8	62	25	21	M20 8,8	400	< 0,4
100	245	30	135	50	120	73	31	12,5	10	-	86	30	27	M24 8,8	700	< 0,4

Electrical connection

F3301/F33C1 ATEX/IECEX (Option)

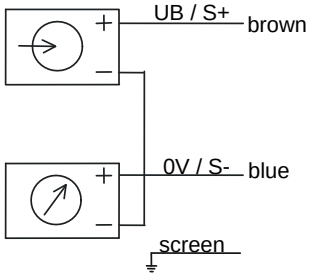
Output signal 4..20mA (2-wire)

Circular connector M12x1, 4-pin



940E01

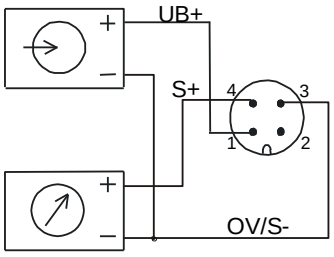
Cable outlet



940E03

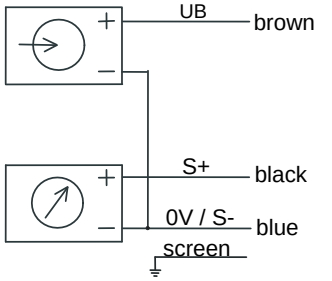
Output signal 0...10V (3-wire)

Circular connector M12x1, 4-pin



940E04

Cable outlet



940E06

Pin configuration of connector M12x1 (4-pin) /

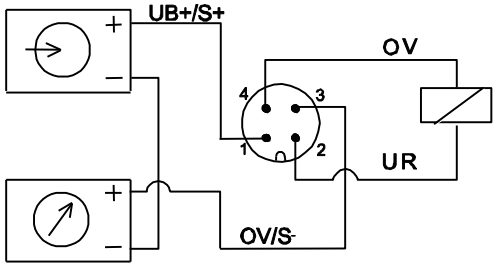
Open cable outlet of the tecsis standard connection cable (STL 288, black)

Analogue output Electrial connection	4...20 mA (2 – wire)		0...10 VDC (3 – wire)	
	pin	cable outlet	pin	cable outlet
Supply: UB+	1	brown	1	brown
Supply: 0V	3	blue	3	blue
Signal: S+	1	brown	4	black
Signal: S-	3	blue	3	blue
⏚	thread M12x1	screen	thread M12x1	screen

F33C1 SIL-3 (Option)

Analogue output 4..20mA (2-wire)

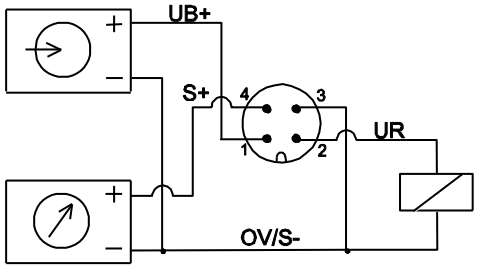
Circular connector M12x1, 4-pin



940E01

Analogue output 0...10V (3-wire)

Circular connector M12x1, 4-pin



940E04

Pin configuration of connector M12x1 (4-pin) /

Open cable outlet of the tecsis standard connection cable (STL 288, black)

Analogue output Electrial connection	4...20 mA (2 – wire)		0...10 VDC (3 – wire)	
	pin	cable outlet	pin	cable outlet
Supply: (UB+)	1	brown	1	brown
Supply: (0V)	3	blue	3	blue
Supply Relay: UR	2	white	2	white
Supply Relay: 0V	4	black	3	blue
Signal: (+)	1	brown	4	black
Signal: (-)	3	blue	3	blue
⏚	Thread M12x1	screen	Thread M12x1	screen

Brief description SIL-3

Amplifier-Electronics 4...20mA or 0...10V
for SIL-3 applications with 2-channel PC control
(Certified by TÜV Süddeutschland, Germany)

Certificate-no.: 2005-08-11/tecsis

Force Transducers, which are based on strain gauges, are working with four variable resistors (R1...R4) connected to a Wheatstone Bridge. Caused by deformation of the body the respective opposite resistors are lengthened or compressed in the same way. This results in an unbalanced bridge and a diagonal voltage U_0.

This well proven design has been amended by an additional resistor R7 in order to monitor the condition of the amplifier unit and signal path. This resistor is connected as a shunt to resistor R5 by a relay contact (a) as soon as an excitation voltage U_r appears at relay A.

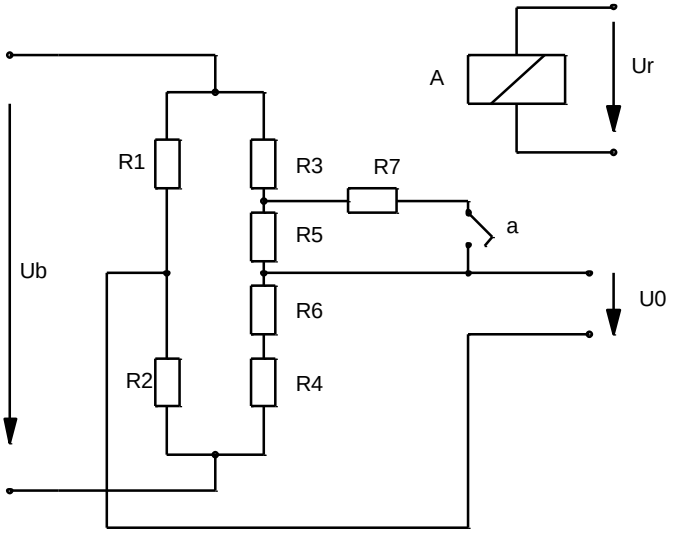
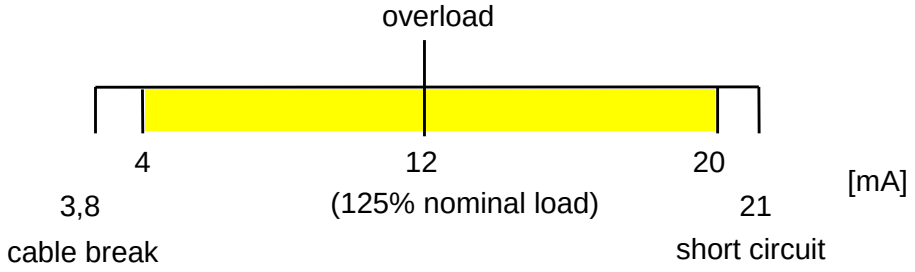


Fig.

The connection of resistor R7 will always result in a defined unbalancing of the zero point (diagonal voltage) of the Wheatstone Bridge.
An external independent control unit activates relay A which changes the output by a certain value. Because of security reasons the control unit has to be a 2-channel one. When the expected change of the output signal is detected it can be assumed that the whole signal path (Wheatstone Bridge – amplifier – output) works well. If it does not appear it can be concluded that there is a defect in the signal path.

The standard adjustment of force transducers with current output for overload control is e.g.:



With activating the check relay a fixed signal jump of 8 mA will exceed the overload limit in every working condition. The measurement's upper limit of 20 mA however will never be reached. This makes the checking of the signal jump possible.

Subject of technical changes