Load measuring Shackle F9221

for load measuring and lifting machines

with integrated amplifier

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

Optional for SIL3-Applications
with 2- channel computer monitoring

Description

The shackle load cell F9221 has been developed to measure the tension while lifting loads as well as forces working in riggings, wirings, tension ropes and similar objects.

This compact shackle load cell has been optimized for high accuracy. The high accuracy of 0.15% of F.S. is caused by integrated force measurement elements in both shackle blades. The space-saving construction is another benefit of this novel shackle load cell. This allows to implement the shackle easily in already existing constructions or to use it in limited space.

SIL-3 (Option)

In cooperation with TÜV SÜD, the safety electronics have been developed specifically for use in stage technology. They will meet the SIL 3 security standard when used in combination with a 2-channel computing system.

Features

- high accuracy 0.15% of F.S.
- ideal for retrofit applications
- integrated amplifier
- protection type IP 67
- stainless steel type
- high long term stability
- high shock and vibration resistance
- for dynamic and static measuring
- good reliability
- simple monitoring
- opt. with ATEX-approval

ATEX/IECEX (Option)

- for Zone 1 and 2
- II 2G Ex ib IIC T4/T3

SIL-3 (Option)

- Safety Electronics
- SIL-3 approval with 2-channel PC control;
  Certification: TÜV-Süd- No.
  Z-IS-ATA3-MAN 6000219499
  acc. to EN 62061:2005

Measuring Range

- 30 kN
- Other ranges on request

Applications

- Measuring of tensile loads

Application with SIL-3 (Option)

- Theatre and stage technology
- Fly System
- Theatrical rigging

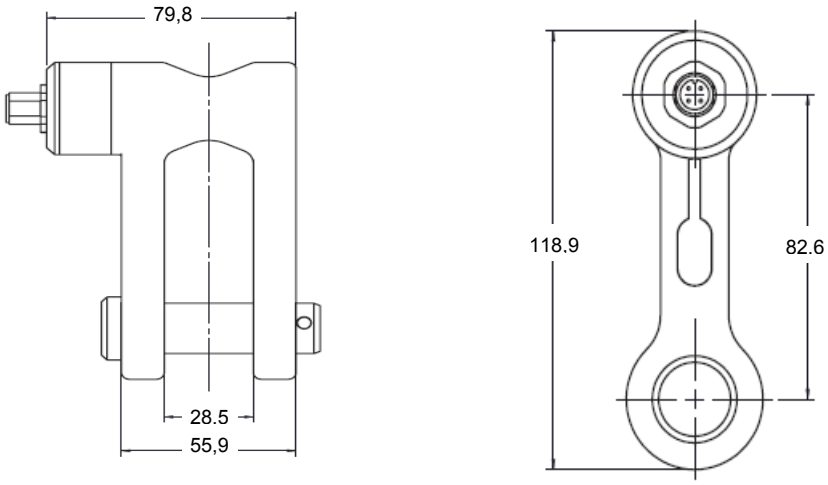
Model: F9221

Technical data

Model	F9221	F92C1SIL-3 (Option)
Nominal load F_{nom}	30 kN	
Combined error	±0.15% of F.S.	±0.5% of F.S.
Using load	150% F_{nom}	
Breaking load	>300% F_{nom}	
Nominal temperature range	+15 bis 70°C	
Service temperature range	-45 … +120°C	- 20 … +80°C
Temperature effect - span - zero	≤±0.1% of actual value/ 10K ≤±0.1% of F.S./ 10K	≤±0.2% of actual value / 10K ≤±0.2% of F.S. / 10K
Protection type acc.to EN 60 529 / IEC 529	IP 67	
Noise emission		Acc. EN 61326
Noise immunity		Acc. EN 61326
Insulation resistance	> 5 x 10^9 Ω	> 5 x 10^9 Ω or >5 GΩ / 50 V
Electrical protection		Reverse current protection Overvoltage-and Short-circuit protection
Analogue output - Output signal	4…20mA 3-wire Span 16mA, ±2%	4…16mA ; 3-wire system Signal shift 4mA ±0,2 mA, others on request; via inline amplifier
- Power supply	12…40 VDC	10…30VDC; supply unit SIL3-Relay 24VDC (+50%/-20%), power consumption. ca. 100 mW
- Zero	± 2% F.S.	-
- Electrical connection	Connector M12 x 1,4-pin	Connector M12x1, 4-pin
Certifications / Approvals		TÜV: 2005-08-11/tecsis
Material	Stainless steel (force transducers and amplifier housing)	

F.S. = Fullscale output

Dimensions



Dimensions in mm

Electric Connection

Analog output 4..20mA (3-wire system)

PIN configuration M12x1 (4-pin) /
open cable outlet of the tecsis standard connection cable (STL 288, black)

Analog Output Electr. Connection	4...20 mA (3 – wire)	
	Pin	cable outlet
Supply: UB+	2	white
Supply: 0V	3	blue
Signal: S+	4	black
Signal: S-	3	blue
Shielding	Thread M12x1	shield

Analog output with SIL-3 Option

PIN configuration M12x1 (4-pin) /
inline amplifier with 4…20mA (3-wire system) or 0...10V (3-wire system), open cable outlet of the tecsis standard connection cable (STL 288, black)

Analog Output Electr. Connection	SIL3 4…20mA or 0…10V (3-wire)	
	Pin	cable outlet
Supply: UB+	1	brown
Supply: 0V	3	blue
Supply Relais: UR	2	white
Supply Relais: 0V	3	blue
Signal: S+	4	black
Signal: S-	3	blue
⏚ Shielding	Thread M12x1	shield

Short Description SIL-3

Amplifier 4...20mA or 0...10V
For SIL-3 Applications mit 2-channel computer control
(certificated byTÜV SÜD)

To construct Load Cells based on resistance straing gauges, four variable resistances (R1…R4) are connected to a Wheatstone-Bridge. When the object is being deformed the opposed resistances get either tensed or compressed in the same way. On this way the diagonal voltage U_o occurs and the Wheatstone-Bridge is detuned.

The test resistor R7 is important to monitor the amplifier and the signal pathes. As soon as the excitation voltage U_r is applied the relay contact (a) connects R7 parallel to the resistance R5 (fig. 1).

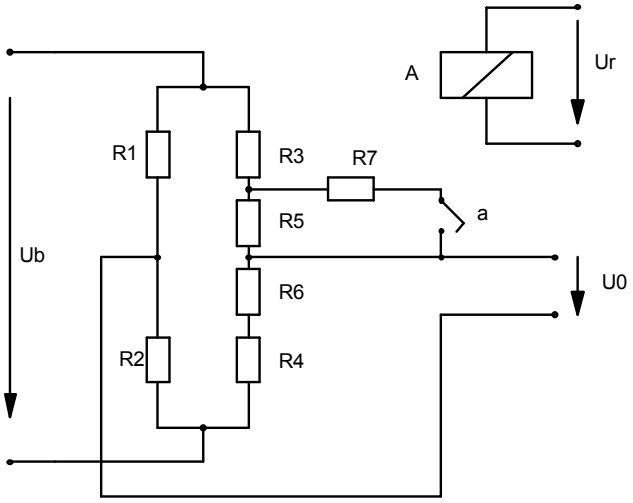
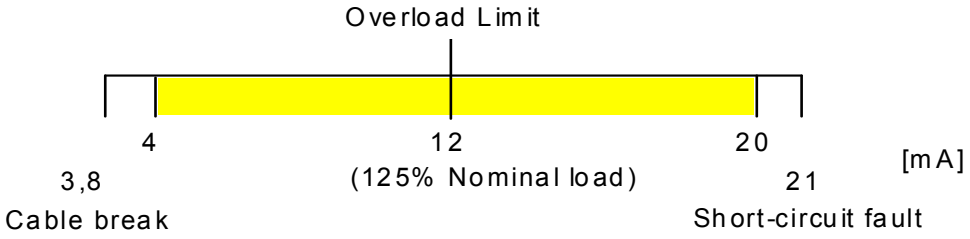


fig. 1

Applying R7 causes a defined, static detuning of the zero point (diagonal voltage) of the whatstone-bridge. Using an extern control, which is independend of the load cell (because of security reasons it has to have 2-channels), it's possible to activate the relay A and to change the output signal of the load cell in a defined way. The signal path between wheatstone-bride, amplifier and output is correct if the change of the output signal correlates to its expected change. If no change occurs it's most possible that there is an error in the signal path.

As example the default setting of the load cell with power output 4…20 mA for overload recognition:



Adjusting the signal shift to 8 mA after activating the test relay the overload limit is overtraversed in every operating status. But as the upper range limit of 20 mA isn't reached its possible to check the signal swing.