

# Operating Instructions



## F9302 Strain transducer

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# 1 Safety

## 1.1 Concerning these operating instructions

### What information do you expect?

These operating instructions contain all of the information that you need to assemble, install and operate the strain transducer.

All information contained within these operating instructions is in accordance with the latest state of technology and takes our previous experience and knowledge into consideration.

### General instructions

**NOTE** This typographic emphasis is used to mark general information concerning the text.

### Index

At the end of the operating instructions you will find an **Index**, via which information that is required can be accessed quickly.

### Illustrations

The illustrations do not necessarily correspond to the scope of delivery or any possible spare part order. The drawings and graphics are not to scale.

## 1.2 Marking of safety instructions

### Levels

The safety instructions are in three levels. These indicate possible residual dangers.



**This safety instruction indicates an immediate danger. Failure to follow the instructions will lead to serious physical injury or death.**



**This safety instruction indicates a potential danger. Failure to comply with the instruction can lead to serious physical injury or death.**



**This safety instruction indicates a potentially dangerous situation that can lead to moderate and minor physical injury. This instruction can also warn against possible damage to property.**

## 1.3 Residual dangers

The performance and scope of delivery of the strain transducer only cover a sub-area of signal monitoring.

The technical safety aspects of overload protection must also be planned and implemented by the

system planner / equipper / operator in such a way that residual dangers are minimised.

Combining the strain transducer with the machinery can cause hazards in the new system. These hazards must be structurally minimised by the system planner / equipper / operator by means of a hazard analysis. The system planner / equipper / operator must notify the user in writing about any residual dangers that still exist in connection with the force measuring technology.

## 1.4 Operator obligations

### Correct purpose of use

The designated use of the strain transducer is for detecting load and converting it into an electrical signal.

Any other use of the system is not as intended.

### Abuse

#### **The following are considered to be incorrect use of the equipment (abuse):**

- Any use of the equipment that deviates from its correct purpose, or any other type of use.
- Failing to comply with the safety instructions.
- Failing to remedy safety-related faults immediately.

- Any manipulation of equipment that makes the system operate correctly, provides unrestricted use or provides active or passive safety.
- Failure to use original replacement parts and accessories.
- Making unauthorised attachments to the equipment or modification thereof that can affect safety.
- Using the device in a condition that is not technically immaculate, if the user fails to take safety aspects into consideration or fails to follow all of the operating instructions.

Failure to use the equipment for its correct purpose (abuse) releases the manufacturer from all liability.



### **Monitoring obligation**

The operator is obliged to continuously monitor the overall technical condition of the equipment and check for externally visible faults and damage, or changes in operating behaviour.

The operator is obliged to operate the equipment in technically immaculate condition at all times. The operator must check the condition of the equipment before use and ensure that faults are remedied before the equipment is started up.

### **Personnel qualifications**

Only trained, authorised and reliable personnel must be used by the operator.

The personnel must have been given special instruction concerning the dangers that may occur.

The use of the strain transducer does not release the operator from the obligation to operate the crane correctly.

All maintenance and repairs must be carried out by personnel who have been specially trained and qualified for the specialist area. All safety regulations must be complied with.

## **Work safety regulations**

The operator of the crane system is obliged to comply with the national work safety regulations. This particularly applies to:

- Checking the system
- Operation (erection, operation and repairs)
- Safety equipment
- Personnel qualifications

## 2 Description

### 2.1 Scope of delivery

The scope of delivery for the strain transducer includes:

- Strain transducer
- Operating manual

### 2.2 Design

The strain transducer is intended for measuring static and dynamic deformations on certain components.

The strain transducer is suitable for tough environments and demanding situations. It is maintenance-free and can also be fitted in places that are hard to access. By virtue of the diversity of output signals, tectsis strain transducers can be adapted to many different conditions of operation.

Careful handling is called for during transport and installation because the strain transducer is a precision measuring instrument. Shock loads (e.g. impact with a hard surface) may result in unexpected overloading with irreparable damage, even in measuring mode.

**NOTE:** The limits for permissible mechanical, thermal and electrical loading are listed in the "Technical Specifications". They must be adhered to without fail.

## **2.3 Fitting**

### **2.3.1 Precautions during installation**

- Strain transducers are sensitive measuring instruments and accordingly must be handled with care.
- When fitting the strain transducer, attention must be paid to the installation position and hence to the direction of loading.
- Torsional moments, off-centre loadings and shear forces cause measuring errors and may cause irreparable damage to the transducer.
- Care should therefore be taken during installation to ensure that the transducer is kept free of any shear forces or torsions.
- Overloading must be precluded at all times.
- The assignment of the connections can also be found on the type plate and in the "Ele section. Correct polarity must always be observed.

### **2.3.2 Preparing the installation site**

- The mounting surface must be free of any grease, oil or dust.
- The mounting surface must be flat.
- The mounting surface must be free of paint or any other coatings
- For the best results please check the datasheet for detailed surface information

### 2.3.3 Installing the strain transducer

- It is mounted onto unstressed (untensioned) components.
- Do not fit the transducer askew.
- Tighten the securing screws evenly with  $\approx 12$  Nm .
- Re-tighten the screws after loading several times.
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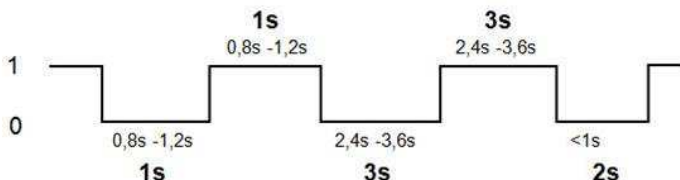
### 2.3.4 Electrical connection

Output 4...20 mA

Electrical connection	4...20 mA (3 wire)
<b>Output</b>	
Supply: (UB+)	brown
Supply: (UB-)	blue
Signal: (+)	white
Signal: (-)	--
<b>Inputs</b>	
Control line "Tara" (Com 1)	black

### 2.3.5 Electrical commissioning

- Connect the supply voltage to UB+ and UB-.
- In the unloaded state, the zero point is set via the control line "Tara" . For this, connect your programmable logic controller and send the bit-sequence as shown in the table.

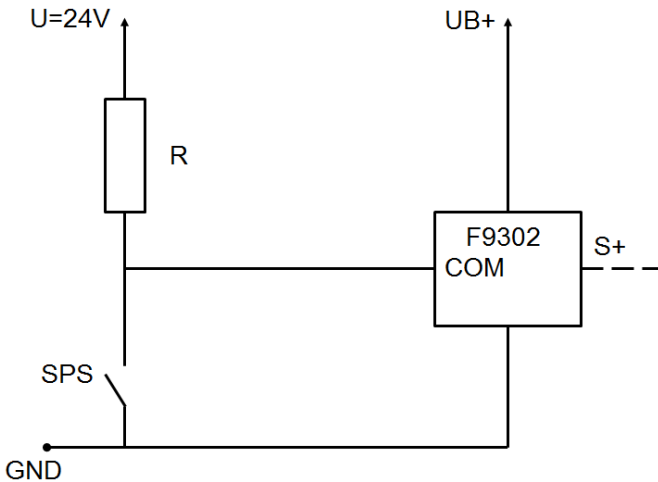


Bitsignal	Logic Inputs	All Logic Inputs
0	Input Low voltage (VINL) 0,4	V
1	Input High Voltage (VINH) 2,0	V

See the connection diagram

- Adaptation of the temperature response (TC) of the output signal to the applied component, as well as adjustment of the cutoff frequency is possible through factory pre-programming.

### Connection diagram



### 2.3.6 State table of the „tare“ function

Transition between each step has to take place within 1ms / and the level must be held at least 1ms to be recognized .

State	COM-Leitung / Level				Reaction of $\mu\text{C}$
	Start	Direction	End	Stop time	
0	1	↓	0	$0,001\text{s} < t$	Start timer
		=	1	-	none => No change of the state as long as the level doesn't change
1	0	↑	1	$t \leq 0,8\text{s}$	Timer stop
				$0,8\text{s} < t < 1,2\text{s}$	Timer set back
				$1,6\text{s} \leq t \leq 2,4\text{s}$	Timer stop
				$1,6\text{s} < t < 2,4\text{s}$	Timer set back
				$2,4\text{s} \leq t$	Timer stop
		=	0	-	none => No change of the state as long as the level doesn't change
2	1	↓	0	$t < 0,8\text{s}$	Timer stop
				$0,8\text{s} < t < 1,2\text{s}$	Timer set back
		=	1	$t < 1,2\text{s}$	none
				$1,2\text{s} < t$	Timer stop
3	0	↑	1	$t < 2,4\text{s}$	Timer stop
				$2,4\text{s} < t < 3,6\text{s}$	Timer set back
				$3,6\text{s} \leq t$	Timer stop
		=	0	-	none => No change of the state as long as the level doesn't change
4	1	↓	0	$t < 2,4\text{s}$	Timer stop
				$2,4\text{s} < t < 3,6\text{s}$	Timer set back
		=	1	$t < 3,6\text{s}$	none
				$3,6\text{s} \leq t$	Timer stop
5	0	↑	1	$t < 1\text{s}$	Timer stop
				$t < 1\text{s}$	none
		=	0	$1\text{s} \leq t$	Timer stop
6	0	= / ↑	0 / 1	-	tare zero (duration 150ms) If error occurs, set back to original values**
6-1	0	=	0	-	none => No change of the state as long as the level doesn't change
	0 / 1	↑ / =	1	-	An error occurred during tare function Tare function was successful

## 2.4 Technical data

Model	F9302
Measuring range	0 ... +/-200 $\mu\epsilon$ , +/-500 $\mu\epsilon$ , +/-1000 $\mu\epsilon$
Combined error	$\leq 1\%$ of F.S.*
Reproducibility	
- in same installation	0.5 % of F.S.
- after refitting	0.5 % of F.S.
Nominal temperature range	-20°C ... +80°C
Working temperature range	-40°C ... +80°C , permanently laid cable -25°C ... +80°C , moving cable
Storage temperature range	-40°C ... +85°C
Temperature influence	
- zero signal	typ. $\pm 0.1\%$ of F.S. /10K *
- characteristic	typ. $\pm 0.3\%$ of F.S. /10K *
Vibration immunity	20g, 100h, 50...150 Hz acc. to DIN EN 60068-2-6
Protection type (accord. to EN 60 529 / IEC 529)	IP 67
Emitted interference	acc. to EN 61326-1
Interference immunity	acc. to EN 61326-1
Types of electrical protection	Reversed polarity, overvoltage and short-circuit protection
Weight	200 g
Surface finish	Minimum requirement: evenness 0.05 mm / surface roughness Ra=16
M6 screw tightening torque	12 Nm
Analogue output	
- Output signal	4 ... 20 mA
- Auxiliary power	10 ... 30 V DC
- Current consumption	max. 25 mA
- Burden	> 10 k $\Omega$
- Limit frequency	< 2 kHz (-3 dB),
- Electrical connection	Round connector M12x1, 4 pin



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