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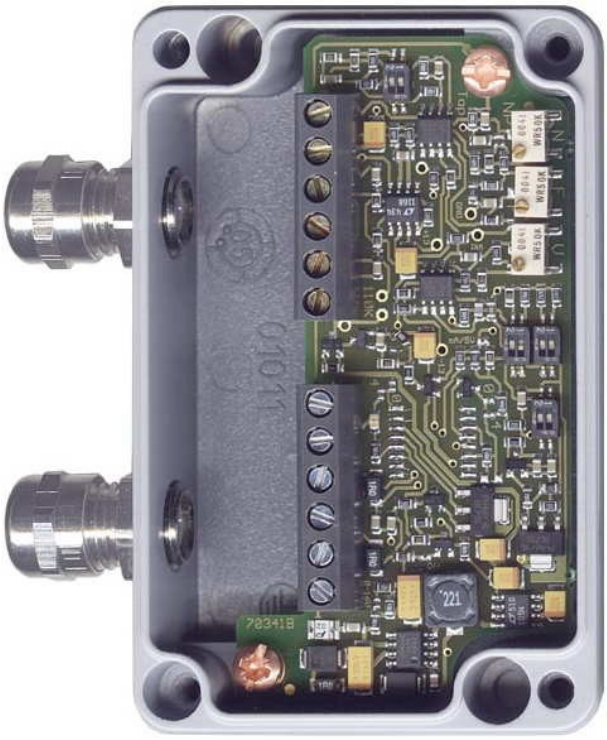
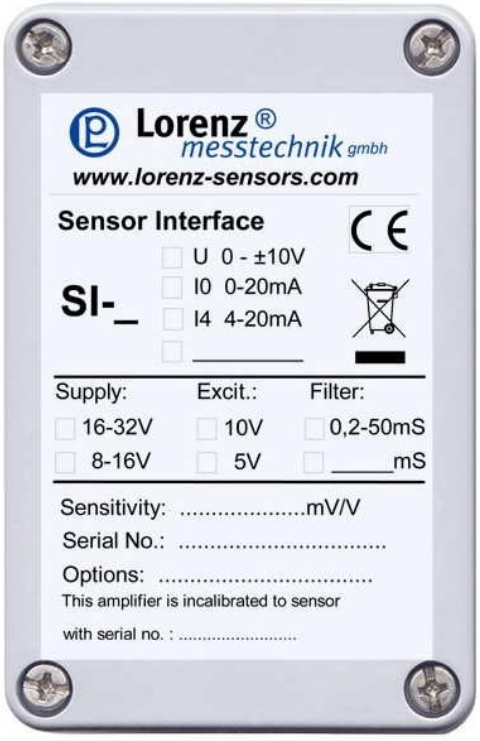
Operation Manual

Sensor-Interface

SI





1 Imprint

Manufacturer, Place	*Lorenz Messtechnik GmbH, D-73553 Alfdorf*
Valid for...	*Sensor-Interface SI*
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Change Notice	*Technical changes are reserved.*

2 Notes

2.1 General Notes

This operation manual is intended for technically qualified personnel with appropriate skills in the field of measurement and automatic control techniques. The information regarding all safety precautions and warnings in this manual as well as their flawless technical implementation is prerequisite for the safe installation, the commissioning, the safe operation and maintenance of **Lorenz Messtechnik GmbH** devices. Therefore it is imperative that all measures are carried out by qualified personnel, only. All persons involved with project planning, installation and operation of **Lorenz Messtechnik GmbH** devices must be familiar with the safety concepts in automation and control technology and qualified in the above mentioned sense.
For the sake of clarity, this operation manual may not constitute a detailed use of **Lorenz Messtechnik GmbH** devices in all possible applications. Also, not all possible types of installation, operation and maintenance are considered. If further information is required or should particular problems arise, which are not or not sufficiently detailed represented in this manual, please request this information from **Lorenz Messtechnik GmbH.**

The safety precautions must observed in order to prevent property damage, injuries and/or even death results.

Lorenz Messtechnik GmbH devices may only be operated in accordance with the applications prescribed in this manual. Built-in appliances may be used professional installations, only.

With the connection and commissioning of the device, the buyer accepts the General Terms of Sale and Delivery of **Lorenz Messtechnik GmbH**. Furthermore, the buyer accepts possible incompleteness of the manual and that information described therein is subject to change. Errors and changes are reserved.

Provisions for Use

A **Lorenz Messtechnik GmbH** device is used for displaying, processing and controlling of processes. It may not be used as a sole instrument for the prevention of dangerous conditions of machines and plants. Machinery and equipment must be designed in a way that erroneous states do not lead to a dangerous situation for operators (e.g. by independent limit switches, mechanical interlocks). In particular, it must be ensured that an incorrect entry on the device, its malfunction or failure does not lead to property damage or cause hazard to persons. It is also important to prevent the evasion of the security provisions of a plant. Emergency stop equipment must always be active.

Installation Notes

Lorenz Messtechnik GmbH devices must be installed and connected in compliance with the relevant DIN and VDE Standards. They must be installed in a way that inadvertent operation is sufficiently excluded. In order to avoid an undefined or hazardous state caused by interruption of the supply and signal lines, the appropriate hardware and software-related safety precautions must be observed. Supply and signal lines must be installed in such way that impairment of function of **Lorenz Messtechnik GmbH** devices cannot be caused by interfering signals (such as inductive or capacitive interference).

Malfunction, Maintenance and Repair Notes

The devices do not contain parts which need or can be serviced by the user. Repairs may be carried out by **Lorenz Messtechnik GmbH**, exclusively. If assuming that safe operation of the device is no longer possible, it must be taken out of service and secured against inadvertent operation, immediately. This applies in particular, if:

- the device shows visible damage
- the device is no longer functional
- parts of the device are loose
- the connection lines show visible damage

It is also pointed out that all obligations of **Lorenz Messtechnik GmbH** are exclusively arising from the respective sales contract in which the warranty is conclusively settled.

2.2 Intended Use

Lorenz Messtechnik GmbH devices may only be used for measurement tasks and the directly related control tasks. Any other use is considered improper.

2.3 General Dangers by not following the Safety Precautions

The device complies with the state of current safety requirements. Residual risks can occur, if the device is improperly used and operated by untrained personnel. Any person commissioned with the installation, operation and maintenance of the device must have read and understood the operation manual and the safety precautions , in particular.

2.4 Residual Dangers

The device only covers part of the scope of measurement technology.
Safeguarding interests of the measurement technology must be planned and realized by the plant designer/supplier in a way to minimize residual dangers. The valid rules regulations and laws must be observed. Residual risks in connection with measurement technology must be pointed out.

2.5 Safety and Caution Symbols

If residual risks occur while working with the device, the following symbols in this operation manual must be noted:

Warning:
Warns of a potential risk of serious life-threatening injuries. The accident prevention regulations of the employer's liability insurance association must be considered.

Caution:
Warns of a potential danger of damage for the device, process, persons, or environment.

Note:
Supplemental information.

Important / Tip:
Reference to more detailed technical information.

2.6 Health Protection and Safety

To ensure that our products are safe and do not pose health hazard, following points must be considered:

1. All relevant sections of this manual must be read attentively in prior to the operation.
2. All warning labels on containers and packages must be noted.
3. Installation, operation and maintenance work may only be carried out by accordingly trained personnel under observance of the given instructions. If one of these instructions is not considered, the user of the product bears the complete responsibility for all consequences, occurring from the failure to comply.
4. Before opening the device, it must be disconnected from any power supply.

2.7 Qualified Personnel

Qualified personnel are persons who are familiar with the installation, operation and the maintenance of the device and have appropriate qualifications. The device shall only be used by qualified personnel according to the technical data in connection with the following safety regulations and rules. During the operation, legal and safety rules for the respective application case must be noted. The same applies for the use of accessories.

2.8 Changes

The device may not be changed constructively or safety-related without the explicit permission of **Lorenz Messtechnik GmbH**. Any modification shall exclude liability on our part for damages resulting from this. Repairs and changes to the circuit boards are prohibited.

3 Continuative Documents

Following documents contain reference information about the SI-Sensor Interface

- 080527.pdf, data sheet of the SI-Sensor Interface

4 Contents

5 Introduction

5.1 Product Description

The SI-Sensor Interface is used for the interface adaption between sensor and evaluation. The interference-prone output signals of strain gauge sensors are raised to a high level. The measurement reliability and accuracy is thus increased significantly. The analog outputs of ±10V or 0/4...20mA allow direct signal processing with a PLC. The sensor is supplied with a stabilized DC voltage, which is obtained from the unregulated power supply (16...32 V DC). The downstream precision amplifier converts the output signals of the sensor into standardized signals. A universal and simple adaption to various sensors is possible through a wide range of zero point adjustment and the gain by setting the coarse adjustment via switches and the fine adjustment through potentiometers. Transients of the measured signal can be reduced by an input filter. The activation of an optional control signal (if available in the sensor) can be done externally by activating a circuit via a switching signal . Thus, the adjustment and the following evaluation can be checked at any time.

5.2 Power Supply

Mains operation:

Power supply:	16…32 V DC min. 300mA, safe from inverse polarity
Ripple:	< 10%
Fuse:	self-resetting fuse of 200mA
Undershoot/overshoot:	can lead to erroneous measurements or defects.
Voltage peaks:	are being discharged by fast protection components.
Voltage dropouts:	voltage dropouts up to 10ms have no effect.

5.3 Safe and Proper Use

Caution:

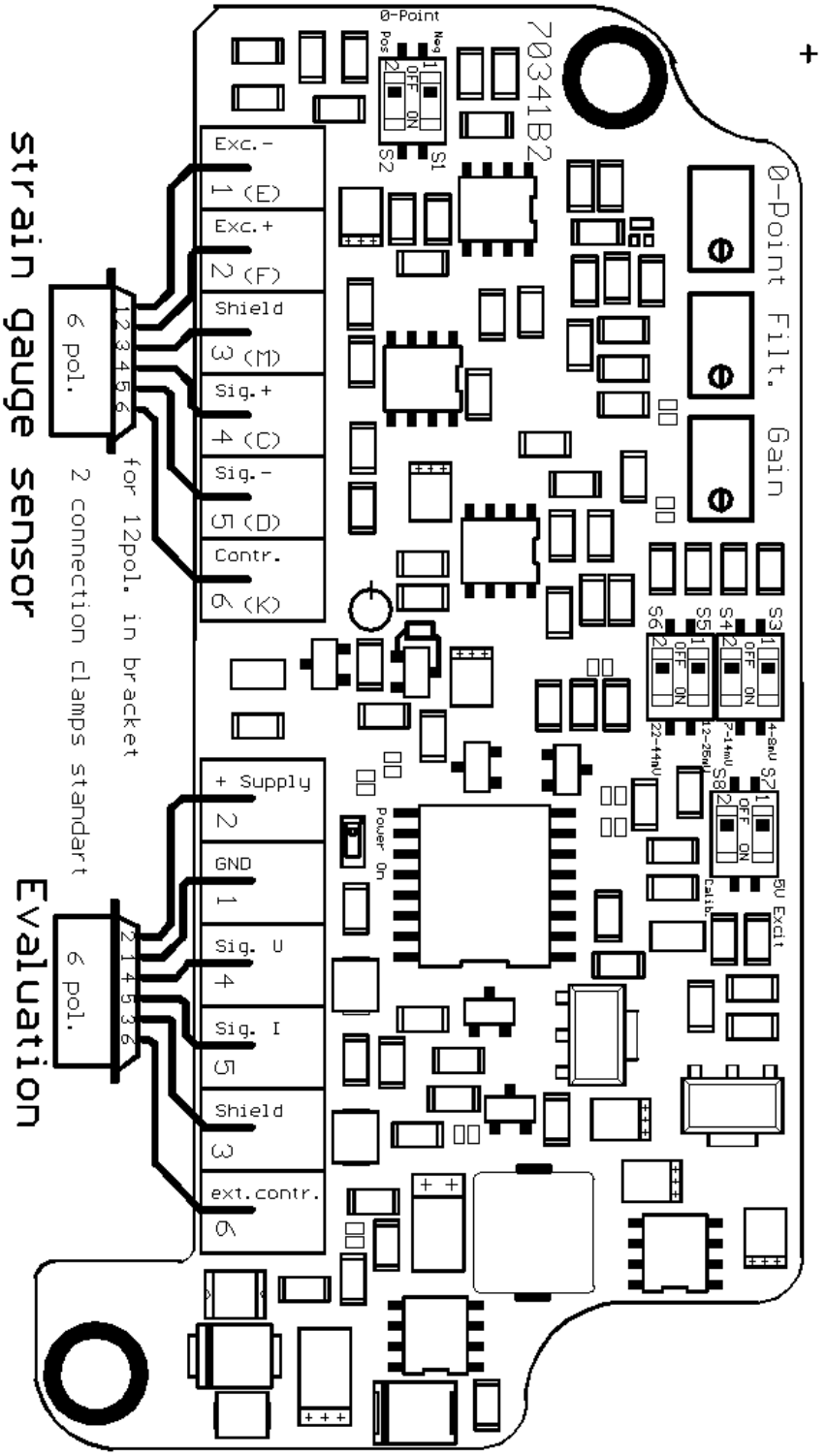
- Protect the device against moisture, condensation, rain, snow....
- Protect the device against direct solar radiation
- Protect the device against dust and pollution
- Protect the device against excessive ambient temperature
- Protect the device against excessive vibration

5.4 Dimensions – Weight

Device dimensions in mm: L x W x H: 98 x 64 x 36 Weight: 0,26kg

6 Instruction / Description of the Operating Mode

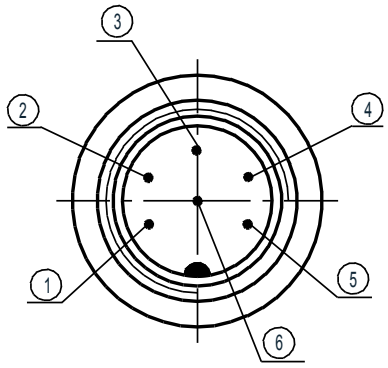
6.1 Pin Assignment



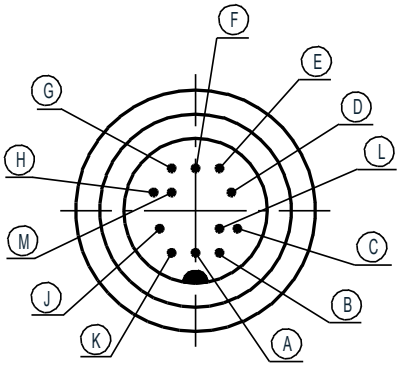
Pin Assignment Strain Gauge Sensor (optionally 2. Sensor Socket parallel)

4-Wire	6-Wire	Function	6-pole Socket- Terminal Assignment	12-pole Socket-Terminal Assignment
Green	Green/Blue	Excitation -	1	E
Brown	Brown/Grey	Excitation +	2	F
Netting	Netting	Shield	3	M
Yellow	Red	Signal +	4	C
White	White	Signal -	5	D
Grey	Pink	Control	6	K

6pole Socket



12-pole Socket



Pin Assignment Evaluation

	Function	6-pole Connector / Term.
16-32V DC	Supply (option 8-16V DC)	2
GND	Common ground	1
Sig.U	Voltage output ±10V (optional ±5V)	4
Sig. I	Option: current output 0-20mA / 4-20mA / 10±10mA, 12±8mA with 10V supply, only	5
	Shielding	
Shield	Control signal 0-2V = Off, 8-28V = On	3
Control	Supply (option 8-16V DC)	6

6.2 Switching-On

The device is switched on and ready to operate as soon as it is connected to the power is applied. The operational availability is indicated by the Power-LED.

6.3 Adjustments

6.3.1 Adjustment of the coding switches

S1	ON	Zero point drift preload (tare) negative.
S2	ON	Zero point drift preload (tare) positive.
S3-S6	OFF	Input sensitivity 2,2-4,4mV
S3	ON	Input sensitivity 4-8 mV
S4	ON	Input sensitivity 7-14 mV
S5	ON	Input sensitivity 12-25 mV
S6	ON	Input sensitivity 22-44mV
S7	ON	Sensor supply 5V
	OFF	Sensor supply 10V
S8	ON	Control signal activation

6.3.2 Adjustment of the input voltage

The sensitivity (mV/V) is indicated in mV/V on the data sheet of the sensor.
From this information and the supply voltage, the input voltage can be determined.

Example:

Sensitivity	x	Excitation	=	Input Voltage
1 mV/V	x	10V	=	10mV

In this case, range 7-14mV must be selected. (S4 ON)

6.3.3 External control signal activation (option)

By switching voltage between 5 and 30V DC, the control in the sensor (if available, see data sheet) can be turned on externally (e.g. SPS, keys....).

6.3.4 Adjustment of the input filter

The cut-off frequency of the 3 dB input filter is adjusted by the filter poti.

CCW-Dead-Stop:	CW-Dead-Stop:
Cut-off frequency = 1kHz	Cut-off frequency = 10Hz

The use of the filter is appropriate if disturbances are on the measuring signal.
This can occur if the frequency converter or other power electronics are located close to the measuring device. Or if sensor leads in cable channels were installed parallel to power lines. Nevertheless, the response time should not be chosen to high because this will reduce the dynamic of the measuring system.

6.4 Adjustment Description

6.4.1 Adjustment to 100% control signal

1.) Connect voltage output ±10V and digital voltmeter measuring range 19,999V to 0V.
2.) Apply operating voltage.
3.) Adjust output to 0,000V with zero point potentiometer.
4.) Activate 100% control signal with S8. Set output to 10,000V with potentiometer gain.
5.) Switch-off 100% control signal and check zero point – if necessary repeat the adjustment.

6.4.2 Adjustment by nominal load

1.) Connect voltage output and digital voltmeter measuring range 19,999V to 0V.
2.) Apply operating voltage.
3.) Adjust output to 0,000V with zero point potentiometer. (It must be ensured that the sensor is in unloaded condition.)
4.) Apply 100% nominal load. Set output to 10,000V with potentiometer gain.
5.) Unload sensor and check zero point – if necessary repeat the adjustment.

6.4.3 Adjustment with preload

1.) Calculation of the actual sensor signal:

$$\frac{\text{Nominal signal (mV/V) x Supply voltage (V) x Measuring range (kg,kN…)}}{\text{Nominal range of the sensor (kg, kN...)}}$$

In order to obtain an expedient measurement result, the preload should not be greater than 30 % of the nominal range.

2.) Connect voltage output and digital voltmeter measuring range 19,999V to 0V.
3.) Adjust gain range of the actual sensor signal (S3-S6).
4.) Apply operating voltage.
5.) Adjust output to 0,000V with zero point potentiometer. If the setting is not sufficient, an additional offset can be inserted with S1 or S2.
6.) Apply rated load (weight, ...)
7.) Adjust the output to 10,0V with the gain potentiometer.

6.4.4 Adjustment with option current output 0-20mA or 4-20mA

The adjustment with current output is the same procedure as the adjustment of the voltage output. However, the digital measuring device with current range of 20,0mA must be connected to terminals 0V and sig. I. For voltage values 0V and +10V, currents 0 and/or 4 and 20mA are applied.

6.5 Interfaces and Connections

6.5.1 Connection for SG sensors

Supply via SI:	10V/90mA (standard), 5V/60mA (option factory-made adjustable)
Bridge resistance:	min. 350 Ohm, only full bridge, 4- or 6-wire
Input voltage:	2,2mV - 44mV
100% control signal:	is activated by the SI via S8

The supply voltage should be as large as possible. However, it may not exceed the supply voltage which was specified for the sensor (see sensor data sheet).

6.5.2 Evaluation connection

Voltage output: ±10V or ±5V (switchable by coding switch S7)
max. 5mA output resistance < 1Ohm

Current output (option factory-made adjustable): 0-20mA, 4-20mA, 12±8mA, 10±10mA, impedance max. 400Ω

The exact device configuration is shown on the front side of the SI. If a SI is ordered in connection with a sensor, it will be adjusted to the sensor; only the zero point must be corrected.

Note:

The device must be disconnected from mains during any connection procedures. Note the safety precautions.

6.6 Terms Definition

Nominal Load: e.g. 100kN, 63Nm, ... is indicated on the sensor and on the test certificate. The nominal load is the upper limit of the measuring range.

Sensitivity: is the sensor signal at 100 % nominal load of a SG sensor. Indicated in mV/V. See sensor type label or test certificate.

6-Wire Connection: Some sensors have two additional sensing lines, which are connected to the respective SG supply.

100% Control Signal: by a control resistance, a signal is simulated in the sensor which produces the exact same value as at 100 % nominal load.
This value can be activated in the SI.

Nominal Impedance: max. resistance load at current measurement.

SG-Supply: The SG supply is the supply of a SG sensor and must be of highest quality.

Bridge Resistance: the bridge resistance is the ohmic resistance of the complete measurement bridge.

Output Signal: e.g.: ±5V / ±10V / 0-20mA / 4-20mA / 12±8mA / 10±10mA
the first value (±5V) is the output signal for the unloaded sensor.
the second value (±5V) is the output signal for 100% loaded sensor.
the leading sign (±5V) indicates the possible signal direction.
The adjusted sensor direction (e.g. tension, see test certificate) results in a positive output signal.
Only one load direction is possible at 0-20mA and 4-20mA.

6.7 Troubleshooting

No output signal available:
- No supply voltage _ Power LED must be on.
- Sensor not connected or open circuit in the sensor cable?

Voltage or current output in control limit:
- Signal input is not connected or wrongly connected?
- Open circuit in the sensor cable.
- Was the sensor overloaded?

Output signal does not go back to 0:
- Was the sensor overloaded?
- Was the sensor installed tensed?
- Control switch on “ON”?
- Was the sensor connected correctly?
- Open circuit in the sensor cable?

Current output is not linear:
- Nominal impedance of max. 500 Ohm was exceeded.

7 Product Phases

7.1 Transportation

Note:

Please pack the equipment suitable for transportation

The equipment may not be able to move back and forth in the package

Please protect the equipment against moisture

7.2 Commissioning and Installation

Safety measures before the installation:

Caution:

The device may not be connected to the power supply system, directly. The specifications of the supply voltage in chapter 5.2 must be considered.

Cable connections:

Caution:

Never connect voltage levels to unoccupied pins!

7.3 Standard Operation

EMC:

Caution:

The device may not be exposed to higher EMS transients than determined by the standard.

Cable:

Caution:

Never disconnect the connectors by pulling the cables. Always separate the connector at the plug, directly.

Storage

Note:

Store the device in dry and dust-free spaces, only.

7.4 Maintenance and Cleaning

Cleaning:

Warning:

Please disconnect the device from the power supply before cleaning.

Caution:

Clean the housing with a soft and slightly moisturized cloth. Never use solvents, as they may damage the front panel labeling and the display panel.
While cleaning, ensure that no liquids enter the device or the connections

Preventive maintenance and inspection:

Note:

Check the plug connections.

Repair:

Note:

The device does not contain any parts which must or can be serviced by the user. Repairs may be carried out by **Lorenz Messtechnik GmbH**, exclusively. If assuming that safe operation of the device is no longer possible, it must be taken out of service and secured against inadvertent operation, immediately.
This applies in particular, if:

- the device shows visible damage
- the device is no longer functional
- parts of the device are loose
- the connection lines show visible damage

7.5 Safe Disposal

Equipment disposal:

Please dispose obsolete equipment in accordance with the applicable statutory provisions. By this, you meet the legal obligations and also contribute to the environmental protection!