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Operation Manual for Sensor Interface SI-USB3



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2 Imprint

Manufacturer, Place	Lorenz Messtechnik GmbH, D-73553 Alfdorf.
Valid for...	SI-USB3 series
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Modification	Technical changes reserved.

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3 Remarks

3.1 Designation of the Remarks

If possible remaining dangers emerge during the operation with VS3, this will be indicated by the following symbols in this operation manual:



Note:
Important points to consider

3.2 Safety Notes

3.2.1 General References

The enclosed operating instruction is intended for technically qualified personnel who have corresponding knowledge in the field of measurement and industrial process & control technology.
The precise information about all safety notes contained in this operation manual and warnings, as well as its perfect technical implementation are precondition for the safe installation, the initiation, the secure operation and the maintenance of Lorenz Messtechnik GmbH technology devices. For this purpose it is absolutely necessary that all measures are carried out by qualified personnel. All persons concerned with the project planning, installation and service of Lorenz Messtechnik GmbH devices, must be familiar to the security concepts in automatic control and should be qualified in this sense.
For clarity reasons, the enclosed operating instruction cannot represent complete details in all conceivable cases of applications for the handling of Lorenz Messtechnik GmbH devices. Further, we cannot consider the entire types of installation, handling and maintenance. If you wish further information or if special problems occur, which were not, or not at length represented in this operating instruction, contact us, please.

The oblivion of the safety notes can and will lead to material damages, body injuries and death.

Lorenz Messtechnik GmbH devices may only be operated in accordance with the applications described in this operation manual. Built-in devices may only be operated in appropriate installations.

With the connection and the initiation of the device, the customer accepts the general sale and delivery conditions of Lorenz Messtechnik GmbH. Further, he accepts eventually incomplete operation manuals. The information described is without guarantee. Errors and changes are reserved.

3.2.2 Intended Purpose, Improper Usage

A Lorenz Messtechnik GmbH device is used for displaying, processing and controlling or regulation of processes. It shall not be used as the only tool for the prevention of dangerous states to machines and plants. Machines and plants must be constructed in such a way, that erroneous states cannot lead to a dangerous situation for the staff (e.g. by independent limit switches, mechanical locking devices). It must be guaranteed in particular that device-operating errors, its malfunction or its breakdown do not lead to great property damages or danger for the staff. Consequently, the device then can be used to prevent the machine or the technical installations from error conditions.
It is also important that the use of devices does not endanger precautions for the safety of technical installations.
Emergency-off settings must remain effective in all operation modes.

3.2.3 Installation Notes

Lorenz Messtechnik GmbH devices must be installed and connected by compliance with the relevant DIN- and VDE-norms. They must be installed in such manner that an unintentional use is adequately excluded. The corresponding hardware and software safety precautions are to be observed in such manner that an interruption of the supply and signal cables cannot lead to an undefined or dangerous state. Supply and signal cables must be installed in such way, that disturbing signals (e.g. inductive or capacitive intersperses) will not cause derogations to the function of Lorenz Messtechnik GmbH devices.

3.2.4 Disturbance, Maintenance and Repair Notes

The devices do not contain parts which can be maintained on the customer side. Repairs shall be carried out by Lorenz Messtechnik GmbH exclusively.
If assuming that a safe operation of the device is not possible anymore, it must be closed down and protected against unintentional handling immediately. This, in particular, applies:

- If the device shows visible damages
- If the device is no longer operative
- If parts of the device are loose or slack
- If the connection cables show visible damages

Furthermore, we point out that all obligations of Lorenz Messtechnik GmbH exclusively result from the respective sales contract in which the guarantee has been conclusively settled.

4 Preamble

4.1 Product Description

The power supply (DC) for the SI-USB3 is polarity-independent for both supply plugs!
The SI-USB3 is a measuring amplifier with up to 4 independent input channels.
Each input channel is displayed as a separate device on a PC (virtual serial interface). Each measuring channel can be individually set in the factory for a physical quantity or a sensor.

The following sensor signals are currently available:

- strain gauge signals: ±3 mV/V (corresponding to ±30000 digits)
- active signals with voltage input: ±5 V (corresponding to ±25000 digits)
- active signals with voltage input: ±10 V (corresponding to ±25000 digits)
- active signals with current input: 0 .. 20 mA (corresponding to 0 .. +20000 digits)

The amplifier variant is indicated on the type label and in the documentation.



Pay attention to the signal type of the sensor when connecting the sensor. Connecting the sensor with the wrong signal type can damage the amplifier and the sensor.

The Lorenz USB drivers are required for the operation on a PC. They are available for download on our website. Guidance is available in document no. 090235.

For the operation of the SI-USB3 we recommend the software VS3. It is available for download on our website. Guidance is available in document no 090367.

Among others, this software provides following functions:

- Configuration possibilities for the VS3
- Storage of sensor-related scaling and adjustment data
- Display for the presentation of measured data (actual value, tare value, minimum value and maximum value)
- Presentation of the measured data in a diagram
- Storage of measured data in CSV-format (output configurable)
- Storage of the diagram in BMP-format (output size adjustable)
- Print-out of the diagram (output size defined)
- Presentation of the sensor information

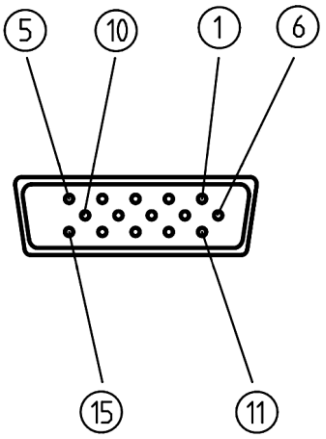
The communication protocol is available for the development of your own applications. The English protocol description is available in document no. 90110 on our website.

4.2 Safe and Correct Use



Observe the correct sensor adjustment.
Consider the correct VS2 configuration.
Choose a significant file identification/prefix when storing measured data.

5 Pin Assignment SI-USB3



Top View

SUBD (Female) 15-pole	Function	Type
1	Ground (supply) 4 V and 12 V	SI-USB3
2	Supply for active sensors 12 V	
3	n.c.	
4	reserved	
5	reserved	
6	Ground (supply) 4 V and 12 V	
7	n.c.	
8	Supply	
9	n.c.	
10	Control	
11	Signal+ (active or passive)	
12	Signal- (relating to signal input (internal to 0 V / GND))	
13	Shield	
14	n.c.	
15	+5V Reference	

5.1 Pin Assignment for Strain Gauge Sensors with mV/V Signal

Description	Pin (6 pole socket)	Color	Remark
0 V / GND	1	green	Ground reference for supply **4 V** and 12 V
4 V	2	brown	Supply for strain gauge sensors 4 V
Signal +	3	yellow	positive signal input
Signal -	4	white	negative signal input
Control	5	grey	if available in sensor
Shield	6	shielding	do not connect shield with sensor housing

5.2 Pin Assignment for Active Sensors with ±5 V or ±10 V Signal

Description	Pin (12 pole socket)	Color	Remark
0 V / GND	E	green	Ground reference for supply 4 V and **12 V**
12 V	F	brown	Supply for active sensors 12 V
Signal +	C	yellow	signal input
Signal –	D	white	relating to signal input (internal to 0 V / GND)
Control	K	grey	if available in sensor
Shield	M	shielding	do not connect shield with sensor housing

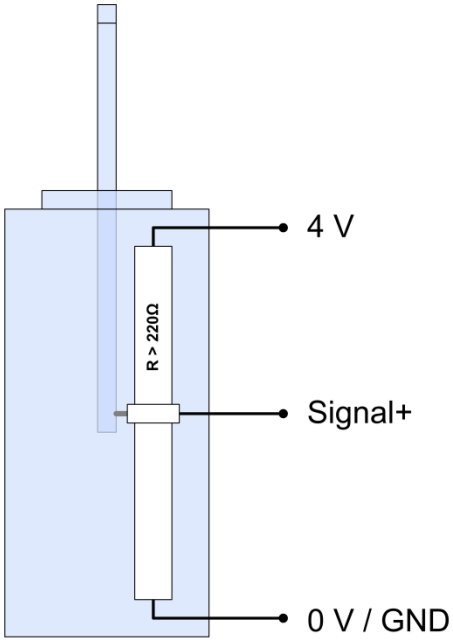
5.3 Pin Assignment for Active Current Sensors with 0 .. +20 mA Signal

Description	Pin (12 pole socket)	Color	Remark
0 V / GND	E	green	Ground reference for supply 4 V and **12 V**
12 V	F	brown	Supply for active sensors 12 V
Signal +	C	yellow	signal input
Signal -	D	white	relating to signal input (internal to 0 V / GND)
Control	K	grey	if available in sensor
Shield	M	shielding	do not connect shield with sensor housing

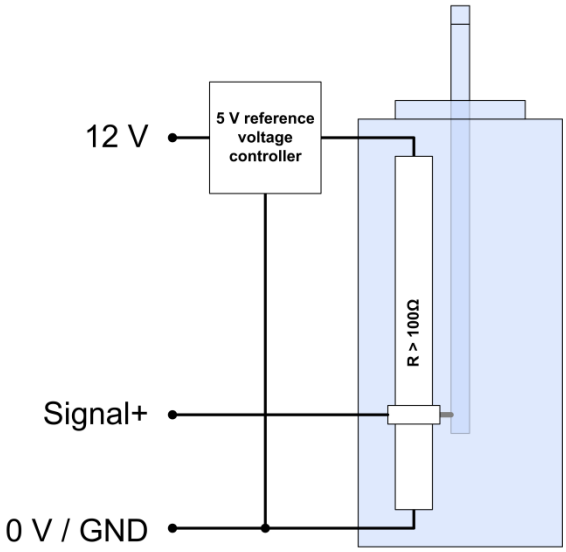
6 Application Example

6.1 Displacement Sensor Potentiometric (supplied by SI-USB3)

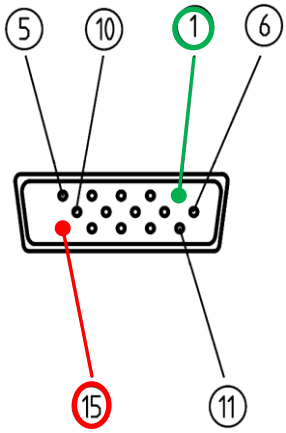
- With “active sensors”, only (type: U5).
- Accuracy is depending on the quality of the reference voltage.



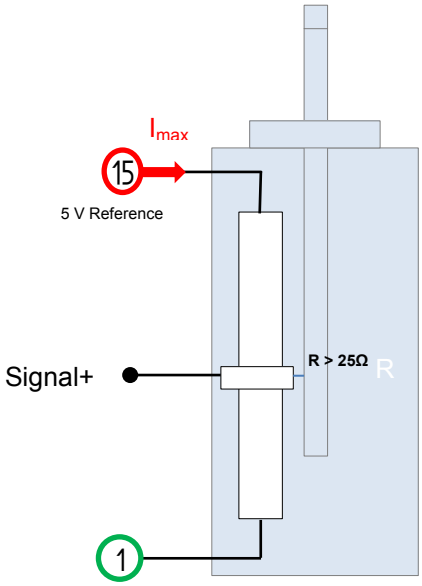
Output 0..20000 Digits



Output 0..25000 Digits



Front View



$I_{max} \leq 200mA$

Output 0..25000 Digits

7 Debugging

This chart helps to find frequent errors and the measures for debugging.

Error	Possible Cause	Debugging
Connection to the SI-USB3 is not possible.	Driver not or incorrectly installed.	Install driver package. The first start-up of the SI-USB3 must be carried out with administrator rights.
	Supply voltage is overstrained in such a way that it breaks down.	Check whether the connected sensor corresponds to the specifications of the SI-USB3. If the sensor requires higher current than available for the SI-USB3, this sensor can not be used together with the SI-USB3.
	Supply voltage is shortened.	Fix the short circuit.
Output signal remains at the positive or negative display stop device/dead stop	Active-Sensor or Current-Sensor connected to strain gauge input.	Check on type label which input type has been configured for the applied sensor connection.
	Supply voltage connected to sensor input.	Check/correct the pin assignment
Output signal highly fluctuates (strain gauge)	Open sensor input.	Connect sensor

8 Specifications

Type	LCV-USB2/DMS	LCV-USB2/U5	LCV-USB2/U10	LCV-USB2/I20
Article-No.	112311	112312	112705	112313
Input Range	±3 mV/V	±5 V	±10 V	0/4…20 mA

Evaluation Side

Power supply[1] Output power supply Supply voltage SI-USB3	Voltage	100 .. 240 VAC 24 VDC, 1,25 A 10 .. 30 VDC ≤880 mA
Excitation Sensor	Strain Gauge/PT100 U5/U10/I20	5 V ≤20 mA 12 V ≤80 mA
Measured Values	Strain Gauge/PT100 U5/U10 I20 Potentiometer	±3 mV/V = ±30000 Digits ±5 V/±10 V = ±25000 Digits 0/4…20 mA = 0/4000…20000 Digits 5V/10V = 25000 Digits
Resolution	Strain Gauge/PT100 U5/Potentiometer U10/Potentiometer I20	1 mV/V = 10000 Digits 1 V = 5000 Digits 1 V = 2500 Digits 1 mA = 1000 Digits
Zero Point	Strain Gauge/U5/U10/I20	0 Digits
Output Format		16 Bit Signed Int.
Input Resistance	Strain Gauge/U5/U10 I20 burden	>1 MΩ 62 Ω
Lowpassfilter 2.Order	Hz	30/300/1000/3000
Measuring Rate		max. 5000 Meas./s
Temperature Drift		4 Bit/10 K
Linearity Error		±32 Digits
Accuracy		±32 Digits

Miscellaneous

Cable Length LCV-USB2-Evaluation	2 m
Cable Length LCV-USB2-Sensor	1 m (max. 3 m)
Nominal Temperature Range	10 … 40 °C
Service Temperature Range	0 ... 50 °C
Storage Temperature Range	-10 ... 70 °C
Dimensions (Ø x L)	25 x 115 mm (incl. screw joint)
Weight	250 g
Level of Protection	IP20

Options/ Accessories

Article-No.	Type	Designation
115134	mV/V/±10V/0/4...20mA	Adjustment measuring amplifier with simulator
113591	LCV-USB2/-USB3/SI-USB/-USB3/-RS485/-ETH/4,5mV/V	Sensitivity ±4,5 mV/V per channel
116620	SI-USB3/WB	Wall mounting
116621	SI-USB3/TF	Towerfoot
113273	USB-A-Plug/ USB-B-Plug, 1,8 m/PVC	USB Interface-cable
10309	KDSH15	D-SUB-Socket, High Density, 15-pole
10477	KDM5/A-KSSH15/A-3m/PVC	Passive Sensors, Cable-Socket 5-pole min., D-SUB-Plug, High Density, 15-pole
10365	KDM7/A-KSSH15/A-3 m/PVC	Passive Sensors, Cable-Socket 7-pole min., D-SUB-Plug, High Density, 15-pole
10269	KD6/A-KSSH15/A-3 m/PVC	Passive Sensors, Cable-Socket 6-pole, D-SUB-Plug, High Density, 15-pole
10312	KD12/A-KSSH15/A-3 m/PVC	Passive Sensors, Cable-Socket 12-pole, D-SUB-Plug, High Density, 15-pole
103075	KDM8/A-KSSH15/A-3 m/PVC	Active Sensors, Cable-Socket 8-pole min., D-SUB-Plug, High Density, 15-pole
10268	KD12/B-KSSH15/A-3 m/PVC	Active Sensors, Cable-Socket 12-pole, D-SUB-Plug, High Density, 15-pole

Option Calibrations mV/V

Artikel-Nr.	Bezeichnung	Stufen	Norm
401010	Factory Calibration	10	ISO 10012
401011	Factory Calibration	20	

[1] Interface cable SI-USB3 for evaluation on initial delivery included, cable length 1,8 m.

9 Continuative Documents

Following documents contain reference information about the SI-USB3 / LCV-USB2:

- Document number 090232, “Operation Manual for Sensor Interface LCV-USB2” (German 090205).
- Document number 080727, data sheet “Sensor-Interface with USB” (German 080726).
- Document number 090367 “Operation Manual for Configuration an Evaluation Software VS3” (German 090366).
- Document number 090313, “Operation Manual for Configuration and Evaluation Software VS2“ (German 090312).
- Document number 090235, “Driver Installation Description for Sensor-Interface and LCV-USB2, SI-USB and Sensors with USB Interface (USB Driver.exe)“ (German 090198).
- Document number 090110 Lorenz protocol “A flexible command set for digital sensors and interfaces“.

10 Notes