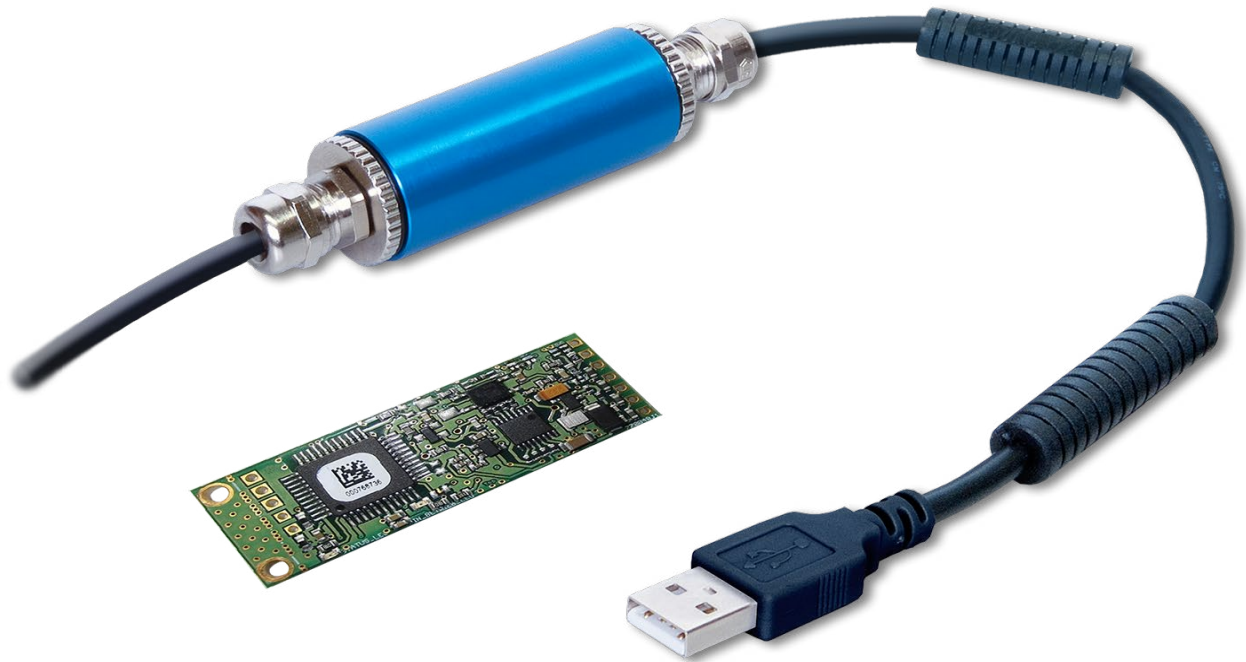


## USB-Sensor-Interface LCV-USB3



Operating Instructions

## Table of Content

<b>1</b>	<b>Imprint / Copyright</b>	<b>3</b>
<b>2</b>	<b>Important Notes / Keeping</b>	<b>3</b>
2.1	General Informations	3
2.2	Intended Use	5
2.3	General Hazards in the Event of non-compliance with the Safety Instructions	5
2.4	Residual Hazards	5
<b>3</b>	<b>Safety and Warning Notices</b>	<b>5</b>
3.1	Symbols	5
3.2	Health Protection and Safety	6
3.3	Conversions and Changes	6
3.4	CE Marking	6
<b>4</b>	<b>Preamble</b>	<b>6</b>
4.1	Product Description	6
4.2	Safe and Correct Use	7
<b>5</b>	<b>Connection Assignment</b>	<b>7</b>
5.1	Connection Assignment for Strain Gauge Sensors with mV/V Signal	8
5.2	Connection Assignment for Active Sensors with $\pm 5V$ or $\pm 10V$ Signal	8
5.3	Connection Assignment for Active Current Sensors with mA Signal	8
<b>6</b>	<b>Option Digital Input at Channel B</b>	<b>9</b>
6.1	Connection Assignment for Auxiliary Supply and Digital Input	9
<b>7</b>	<b>Application Example</b>	<b>10</b>
7.1	Displacement Sensor Potentiometric (supplied by LCV-USB3)	10
<b>8</b>	<b>Debugging</b>	<b>11</b>
<b>9</b>	<b>Technical Data</b>	<b>12</b>
9.1	Options	12
9.2	Calibrations mV/V	13
<b>10</b>	<b>Equipment disposal</b>	<b>13</b>
<b>11</b>	<b>Reference Information</b>	<b>13</b>

## 1 Imprint / Copyright

© 2019 Lorenz Messtechnik GmbH, D-73553 Alfdorf

These operating instructions do not constitute an agreed quality agreement or durability guarantee within the meaning of § 443 BGB (German Civil Code).

Technical changes, errors and misprints excepted.

No part of this publication may be reprinted without the written permission of Lorenz Messtechnik GmbH, Alfdorf.

## 2 Important Notes / Keeping

Before installing and commissioning the device, these operating instructions, and in particular the corresponding safety instructions, must be read. The device may only be used as described in this manual to prevent injury or damage.

The operating instructions have been drawn up in accordance with EN 82079-1 and must be kept in a safe place.

### 2.1 General Informations

These operating instructions are intended for technically qualified personnel who have appropriate knowledge in the field of measurement and control technology. Qualified personnel are persons who are familiar with the installation, operation, maintenance and repair of the device and have the appropriate qualifications. The personnel must have knowledge of the legal and safety regulations and be able to apply them.

The device may only be used by qualified personnel in accordance with the technical data in connection with the safety regulations and rules set out below. During operation, the legal and safety regulations required for the respective application must also be observed. This also applies analogously to the use of accessories.

The exact information about all safety instructions and warnings contained in these operating instructions as well as their correct technical implementation are prerequisites for the safe installation, commissioning, safe operation and maintenance of Lorenz Messtechnik GmbH devices. All measures must only be carried out by qualified personnel. All persons involved in the project planning, installation and operation of Lorenz Messtechnik GmbH devices must be familiar with the safety concepts in the automation technology and be qualified in the above-mentioned sense.

For reasons of clarity, these operating instructions cannot cover all details and information and not all applications for the handling of devices from Lorenz Messtechnik GmbH. Nor can all conceivable types of installation, operation and maintenance must be taken into account.

If further information is desired or required, or if special problems occur which are not described in detail in these operating instructions, please contact Lorenz Messtechnik GmbH.

The devices of Lorenz Messtechnik GmbH may only be operated in accordance with the applications described in these operating instructions. Built-in devices may only be operated if they are properly installed.

By connecting and commissioning the device, the purchaser accepts the General Terms and Conditions of Sale and Delivery of Lorenz Messtechnik GmbH. Furthermore, the buyer accepts the possible incompleteness of this operating manual and that the information contained therein may not be complete and informations are without guarantee. Errors, misprints and changes excepted.

### **Intended Use, not intended Use**

A device from Lorenz Messtechnik GmbH is used for display, processing and control of processes. It must not be used as the sole means of averting dangerous conditions on machines and systems. Machines and systems must be designed in such a way that faulty states cannot lead to a dangerous situation for the operating personnel (e. g. through independent limit value-switches or mechanical interlocks). In particular, it must be ensured that a the device, its malfunction or its failure does not lead to damage to property or a loss of that can lead to danger to people. It is also important to prevent the precautions that are taken from being cannot be circumvented for the safety of a plant. Emergency stop devices must remain effective at all times.

### **Installation Instructions**

Devices from Lorenz Messtechnik GmbH must be installed and connected in compliance with the relevant DIN and VDE standards. They must be installed in such a way that unintentional operation is sufficiently excluded. To prevent an interruption of the supply and signal lines from leading to an undefined or dangerous state, appropriate hardware and software safety precautions must be observed. Supply and signal lines must be installed in such a way that they do not interfere with the function of the Lorenz Messtechnik GmbH by interfering signals (such as inductive or capacitive interferences).

### **Notes on Malfunctions, Maintenance and Repair**

The devices do not contain any parts that require or can be serviced by the user. Repairs may only be carried out by Lorenz Messtechnik GmbH. If it can be assumed that safe operation of the device is no longer possible, it must be put out of operation immediately and secured against unintentional operation. This applies in particular if:

- The device is visibly damaged
- The device is no longer functional
- Parts of the appliance are loose
- The connecting lines are visibly damaged

In addition, we would like to point out that all obligations of Lorenz Messtechnik GmbH arise exclusively from the respective purchase contract in which the warranty is conclusively stated.

## 2.2 Intended Use

Devices from Lorenz Messtechnik GmbH are to be used exclusively for measuring tasks and the directly associated control tasks. Any use beyond this is considered to be improper.

The valid legal and safety regulations must be observed during measurement. The instrument is not a safety component in the sense of its intended use and it is transported and stored properly. The installation and commissioning, the operation and the disassembly must be carried out professionally.

## 2.3 General Hazards in the Event of non-compliance with the Safety Instructions

The device complies with the current safety requirements. Residual dangers can emanate from the device if it is improperly used and operated by untrained personnel. Any person entrusted with the installation, operation, maintenance and repair of the device must read and understand the operating instructions and, in particular, the safety instructions.

Incorrect use (e. g. by untrained personnel) may result in residual hazards. The operating instructions must be read and understood by all persons involved in the installation, commissioning, maintenance, repair, operation and dismantling of the device is trusted. The device must not be used if visible damage is visible.

## 2.4 Residual Hazards

The system planner, equipment supplier and operator must plan, implement and be responsible for the safety of the equipment. Other hazards must be minimized. The residual dangers of the measurement technology must be pointed out and human error must be taken into account. The design of the system must be suitable for avoiding hazards - a hazard analysis must be carried out for the system. The applicable regulations and laws are as follows to note.

# 3 Safety and Warning Notices

## 3.1 Symbols



**Warning:** There is a risk of injury to persons. Damage to the machine is possible. The accident prevention regulations of the employer's liability insurance association must be observed.



**Note:** Important points to be observed. A note that indicates a possible danger of damage to the product, process, person or the environment.



Additional information or reference to other important detailed information.

### 3.2 Health Protection and Safety

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

1. Read all relevant sections of this manual carefully before starting work.
2. All warning signs on containers and packaging must be observed.
3. Installation, operation, maintenance and repair work may only be carried out by suitably trained personnel and in accordance with the instructions given. If one of these instructions is not followed, the user of the product bears full responsibility for any consequences that may occur.
4. Disconnect the appliance from any power supply before opening it.
5. The safety instructions must be strictly observed in order to avoid damage to property and bodily injury - possibly even fatal ones.

### 3.3 Conversions and Changes

The device may not be modified in terms of design or safety without the express consent of Lorenz Messtechnik GmbH. Any modification excludes any liability on our part for damages resulting therefrom. Repairs and modifications are prohibited.

### 3.4 CE Marking

With the CE marking, Lorenz Messtechnik GmbH guarantees that its product meets the requirements of the relevant EC directives.

## 4 Preamble

### 4.1 Product Description

The LCV-USB3 is a measurement amplifier for the conversion of analog signals into digital measured values. These measured data can be requested through the Computer via the USB-interface.

The LCV-USB3 is supplied from the USB-interface. No external mains adaptor is needed.

The LCV-USB3 is designed for four types of sensor signals (specifications see data sheet):

Strain gauge signals:	$\pm 3 \text{ mV/V}$	(corresponds $\pm 30000$ digits)
Active signals with voltage input:	$\pm 5 \text{ V}$	(corresponds $\pm 25000$ digits)
Active signals with voltage input:	$\pm 10 \text{ V}$	(corresponds $\pm 25000$ digits)
Active signals with current input:	$0 \dots 20 \text{ mA}$	(corresponds $0 \dots 20000$ digits)
Active signals with current input:	$4 \dots 20 \text{ mA}$	(corresponds $0 \dots 20000$ digits)

The amplifier type and the resolution are declared on the type label, a type modification is only authorized by the manufacturer. Therefore only the corresponding sensor type may be connected.



**Warning:** Please pay attention to the signal type. Connecting the wrong type of signal may cause damage.

The measuring data are signed in integer format (see above in brackets).

If the LCV-USB3 is calibrated together with the sensor, you can take the output values from the test certificate.

If the LCV-USB3 is calibrated without a sensor, you can take the output values as described above. In this case, they are pre-calibrated with a high precision source.

The Lorenz USB drivers are required on the PC to operate the SI-USB3. These can be downloaded from our website. Instructions are available under Document No. 090198.

This VS3 Software supports the 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, minimal value and maximal 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 with date and definable superscription
- Presentation of the sensor information

The communication protocol is disclosed for the development of own applications. An English protocol description is available on our website under Document No. 90110.

## 4.2 Safe and Correct Use



**Warning:** Observe the correct sensor adjustment.



Consider the correct VS3 configuration.

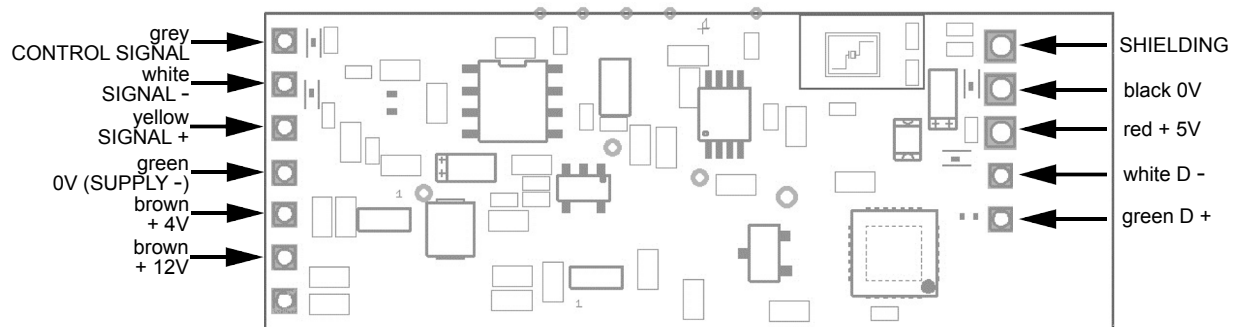


Choose a significant file identification/prefix when storing measured data.

## 5 Connection Assignment

Connection assignment sensor

Connection assignment USB





## 5.1 Connection Assignment for Strain Gauge Sensors with mV/V Signal

Description	Pin (6 pin socket)	Color	Remark
0V / GND	1	Green	Ground of supply voltage 4V
4V	2	Brown	Supply for strain gauge sensors 4V
Shield	3	Shielding	Connect shield with sensor housing
Signal +	4	Yellow	Positive signal input
Signal -	5	White	Negative signal input
Control signal	6	Gray	If available in sensor

## 5.2 Connection Assignment for Active Sensors with $\pm 5V$ or $\pm 10V$ Signal

Description	Pin (12 pin socket)	Color	Remark
0V / GND	E	Green	Ground of supply voltage 12V
12V	F	Brown	Supply for active sensors 12V
Signal +	C	Yellow	Signal input
Signal -	D	White	Relating to signal input (internal to 0V / GND)
Control signal	K	Gray	If available in sensor
Shield	M	Shielding	Connect shield with sensor housing

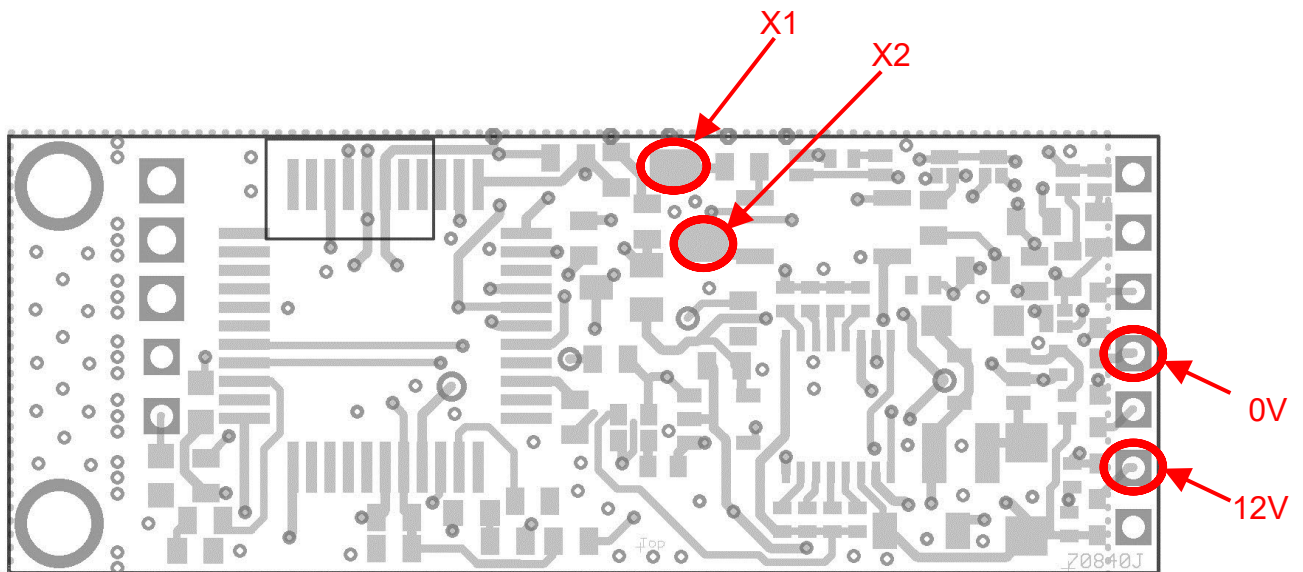
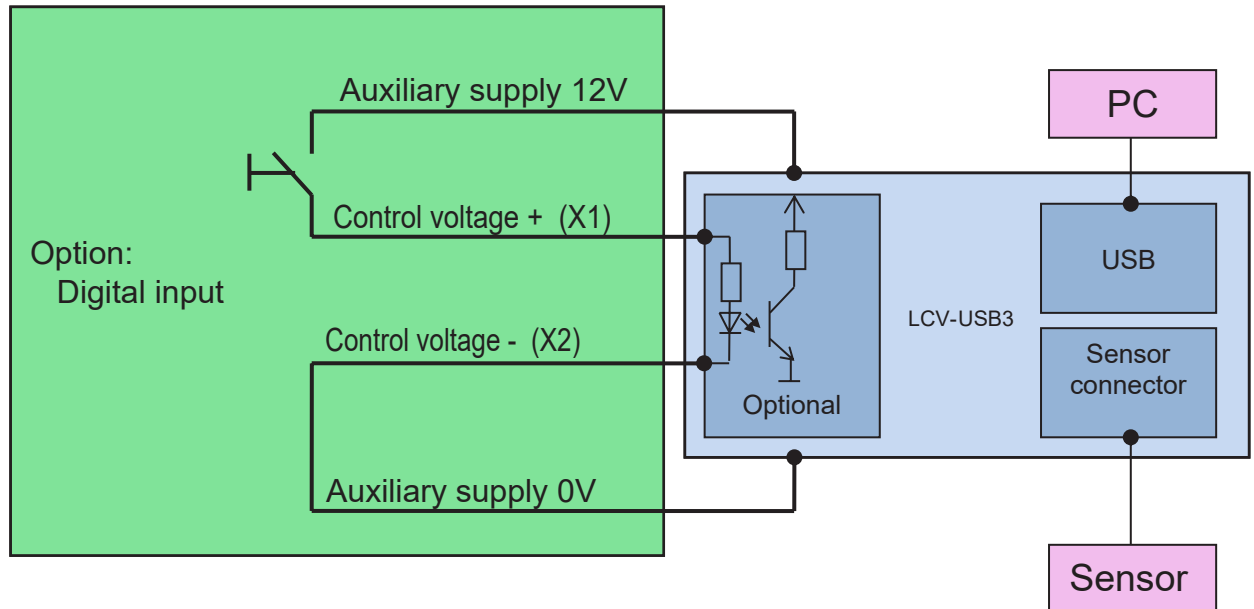
## 5.3 Connection Assignment for Active Current Sensors with mA Signal

Description	Pin (12 pin socket)	Color	Remark
0V / GND	E	Green	Ground of supply voltage 12V
12V	F	Brown	Supply for active sensors 12V
Signal +	C	Yellow	Signal input
Signal -	D	White	Relating to signal input (internal to 0V / GND)
Control signal	K	Gray	If available in sensor
Shield	M	Shielding	Connect shield with sensor housing



## 6 Option Digital Input at Channel B

### Scheme



### 6.1 Connection Assignment for Auxiliary Supply and Digital Input

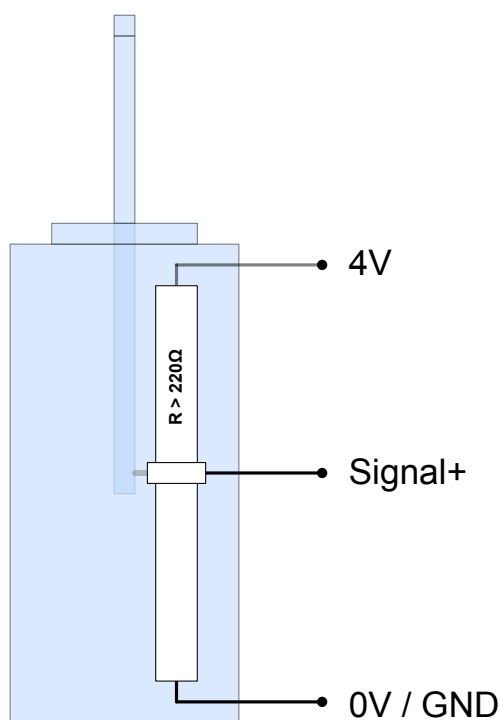
#### Description

Auxiliary supply:	12V (brown)
Auxiliary supply:	0V (green)
Control voltage:	+ (yellow)
Control voltage:	- (white)

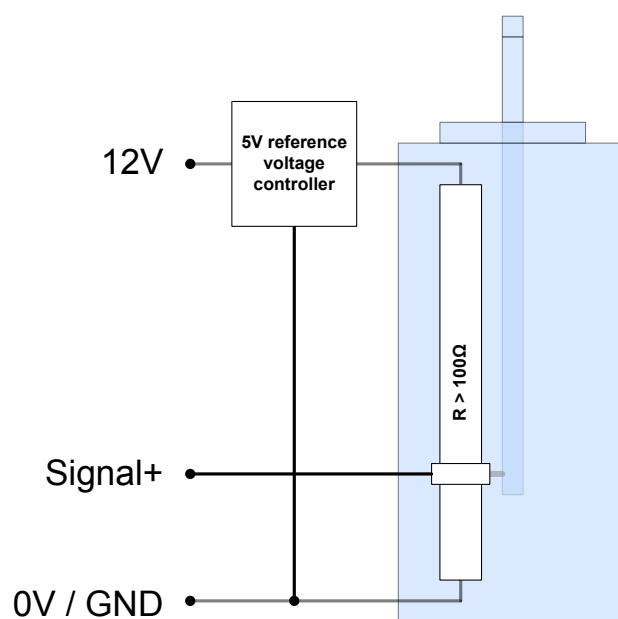
## 7 Application Example

### 7.1 Displacement Sensor Potentiometric (supplied by LCV-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**

## 8 Debugging

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

Error	Possible cause	Debugging
A connection to the LCV-USB3 is not possible	Driver not or incorrectly installed	<ul style="list-style-type: none"> <li>• Install driver package</li> <li>• The first start-up of the LCV-USB3 must be carried out with administrator rights</li> </ul>
	Supply voltage is overstrained in such a way that it breaks down	<ul style="list-style-type: none"> <li>• Check whether the connected sensor corresponds to the specifications of the LCV-USB3</li> <li>• If the sensor requires higher current than available for the LCV-USB3, this sensor can not be used together with the LCV-USB3</li> </ul>
	Supply voltage is shortened	<ul style="list-style-type: none"> <li>• Fix the short circuit</li> </ul>
Output signal remains at the positive or negative display stop device/dead stop	Active sensor connected to strain gauge input	<ul style="list-style-type: none"> <li>• Check on type label which input type has been configured for the applied sensor connection</li> </ul>
	Supply voltage connected to sensor input	<ul style="list-style-type: none"> <li>• Check/correct the pin assignment</li> </ul>
Output signal highly fluctuates (strain gauge)	Open sensor input	<ul style="list-style-type: none"> <li>• Connect sensor</li> </ul>

## 9 Technical Data

USB-Sensor-Interface LCV-USB3							
Type LCV-USB3/...	DMS	U5	U10	I0	I4	I10	I12
Article-No. board <sup>1</sup>	117721	117722	117723	117724	117923	117924	117925
Article-No. LCV-USB3 in the measuring line	117725	117726	117727	117728	117926	117927	117928
Input range	±3 mV/V	±5V	±10V	0 ... 20 mA	4 ... 20 mA	10 ±10 mA	12 ±8 mA
Evaluation Side							
Measured values	±30000 digits	±25000 digits		0 ... 20000 digits			
Resolution	1 mV/V ± 10000 digits	1V ± 5000 digits	1V ± 2500 digits	1 mA ± 1000 digits			
Zero point	0 digits						
Output format	16 bit signed Int.						
Input resistance	>1 MΩ			-			
Rated burden	-			62 Ω			
Measuring rate	max. 5000 meas./s						
Temperature drift	4 bit/10 K						
Linearity error	±32 digits						
Accuracy	±32 digits						
Supply from USB	4 ... 6VDC ≤350 mA						
Cable length LCV-USB3 - evaluation	2 m						
Sensor Side							
Sensor supply	4V ≤20 mA	12V ≤80 mA					
Cable length LCV-USB3 - sensor	1 m (max. 3 m)						
Miscellaneous							
Rated temperature range	10 ... 40 °C						
Operating temperature range	0 ... 50 °C						
Storage temperature range	-10 ... 70 °C						
Dimension (Ø x L)	25 x 115 mm (incl. screw joint)						
Level of protection	IP67						
Weight of LCV-USB3 in the measuring line	0.3 kg						

<sup>1</sup> Integrable in large sensors

### 9.1 Options

Article-No.	Description	Type
115134	Adjustment amplifier with simulator	mV/V / ±10V / 0/4 ... 20 mA
110120	Digital input at channel B	LCV-USB3/TR-EXT
113591	Input range ±4.5 mV/V per channel	LCV-USB3/SI-USB/- RS485/-ETH/SI-USB3/4.5 mV/V
114104	Sensor exc. LPM 4V max. 20 mA, input range LPM 5V	LCV-USB3/LPM
115125	Adjustment linear potentiometer	LCV-USB3/SI-USB/SI-USB3/LPM

## 9.2 Calibrations mV/V<sup>2</sup>

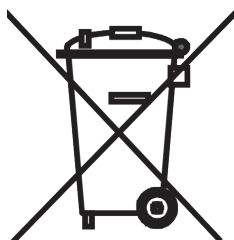
Article-No.	Description	
401010	Proprietary calibration acc. to ISO 10012	10 steps
401011	Proprietary calibration acc. to ISO 10012	20 steps

<sup>2</sup> Lorenz-Standard:

- Supply voltage 5V, calibration range  $\pm 1$  mV/V in 10 steps, calibration range  $\pm 2$  mV/V in 10 or 20 steps
- Language of the Certificate: German and English
- Calibration at DC: Normal K3608, if so display above Keithley 2000 or Lorenz VS3 (Lorenz amplifier with USB interface)
- Calibration at 225 Hz: Normal K3608, if so display above HBM MGCplus + ML38
- Calibration at 225 Hz: Normal BN100A, if so display above HBM DMP40

## 10 Equipment disposal

The device must be disposed of in accordance with the applicable legal regulations - see also our 'General Terms and Conditions of Delivery and Sale' at [www.lorenz-messtechnik.de](http://www.lorenz-messtechnik.de)



## 11 Reference Information

- Document number 090373, German Manual
- Document number 080991, data sheet 'Sensor-Interface with USB' (German 080990)
- Document number 090367 'Operation Manual for Configuration and Evaluation Software VS3' (German 090366)
- Document number 090235, 'Driver Installation Description for Sensor-Interfaces SI-USB3, LCV-USB3, LCV-USB2, LCV-USB, 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'