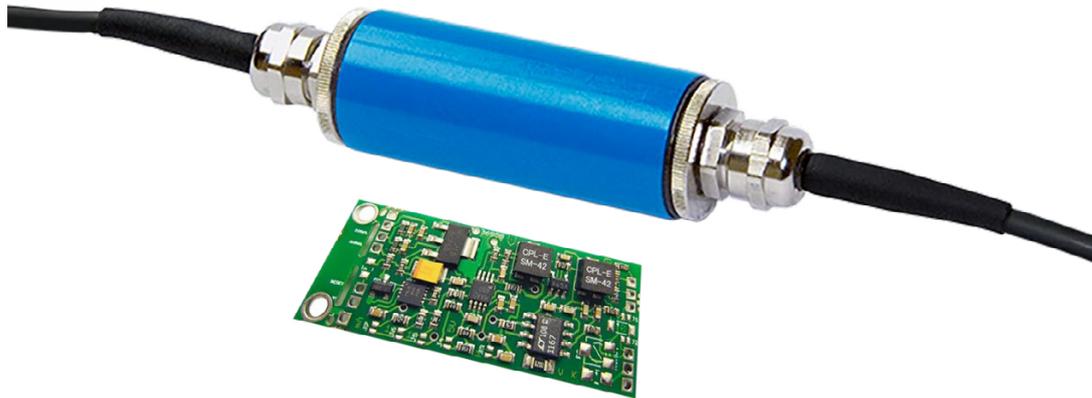


Strain Gauge Sensor-Interface LCV



Operation Instructions

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1 Imprint / Copyright

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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.

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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 is a DC voltage measuring amplifier for strain gauge sensors. With the LCV, the interference-prone SG signals are converted into standard signals, directly. The LCV supplies the sensor with a highly accurate reference voltage, and converts the sensor signals by means of a precision amplifier.

A current output and a voltage output are always available, however, only one signal output variant can be adjusted. Various current and voltage variations are configured via jumpers, for subsequent changes, however, a readjustment is required.

The LCV has a control input in order to activate the 100 % control signal in the sensor (if available).

4.2 Power Supply

Mains operation

Power supply:	12V to 28VDC, min. 300 mA, safe from reverse polarity
Ripple:	≤100 mV RMS
Fuse:	Self-resettable fuse 200 mA
Undershoot/overshoot:	Can lead to erroneous measurements or defects
Voltage peaks:	Are being discharged by fast protection components
Voltage dropouts:	Voltage dropouts up to 10 ms have no effect

Use only supply voltages with ground reference, switching power supplies without ground reference can cause measurement errors.

4.3 Safe and Proper Use



Protect the device against moisture, condensation, rain, snow, etc.



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.

4.4 Dimensions / Weight

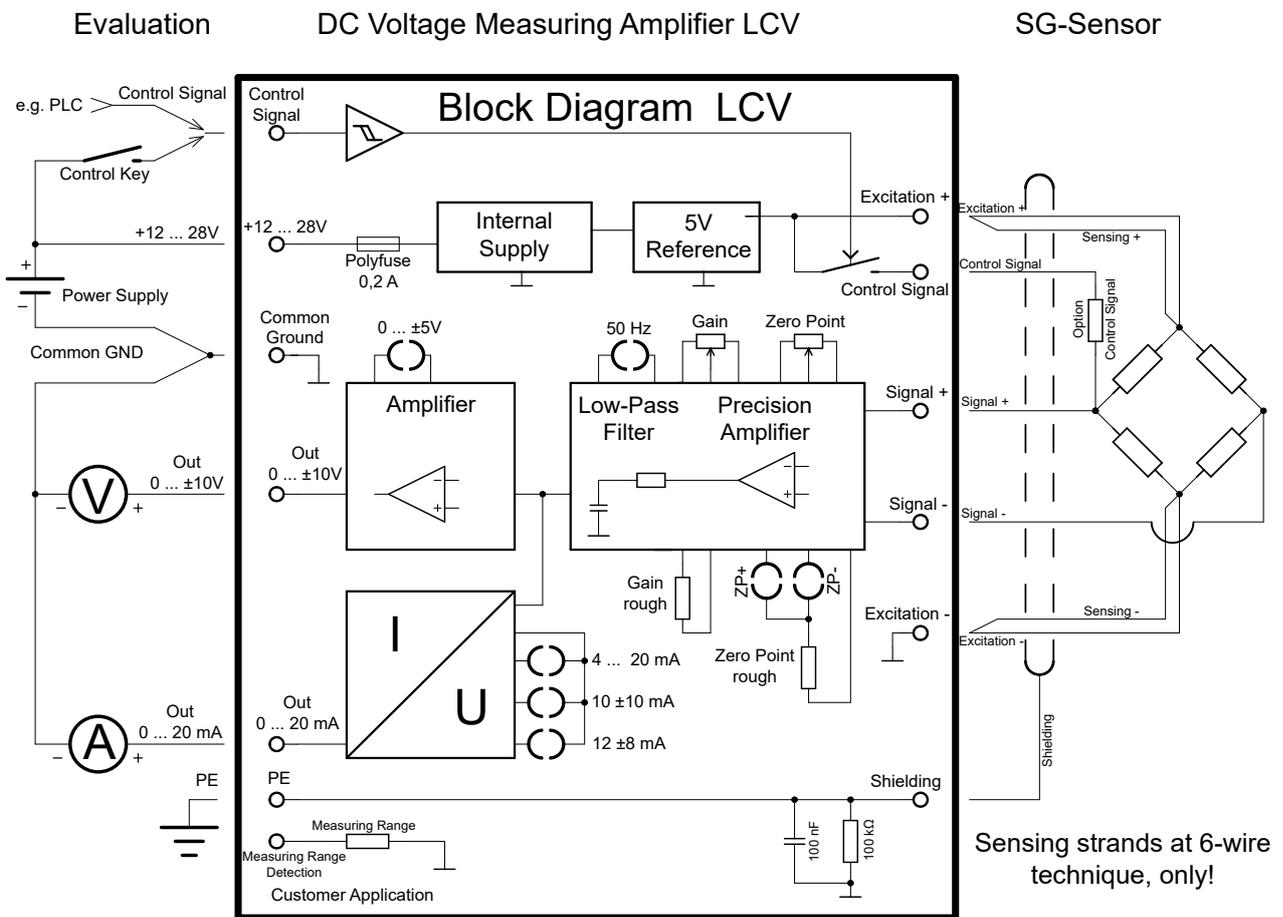
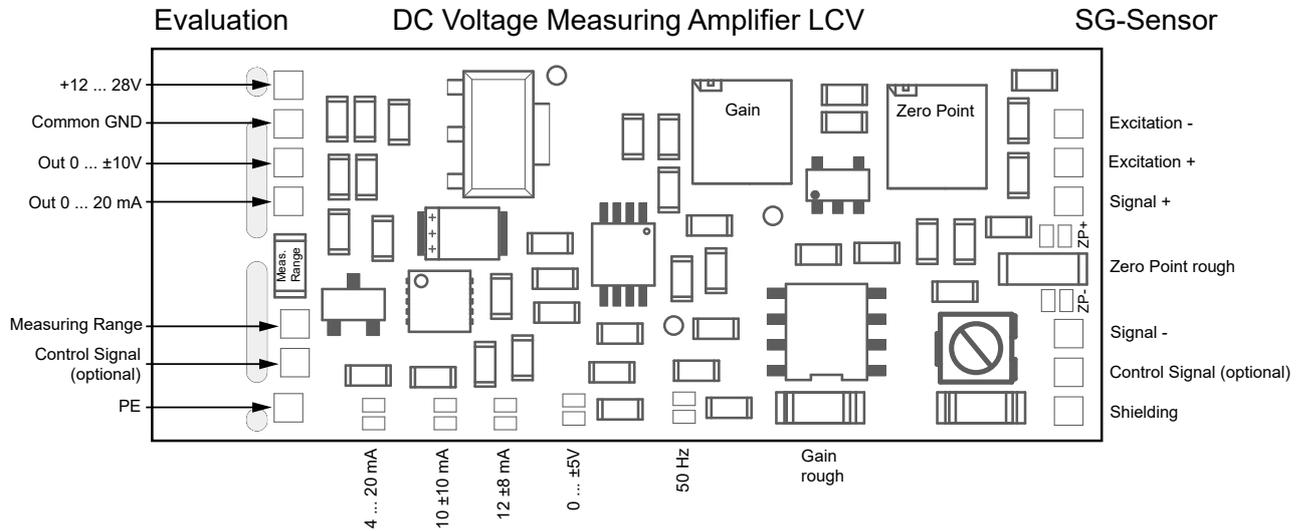
Device dimensions: L x W x H: 110 x 25 x 25mm

Weight: 0.1 kg

5 Instruction / Description of the Operating Mode

5.1 Connection Assignment

(see also chapter '5.4 Adjustment Description')



5.2 Switching the Device on

The device is switched on and ready to operate as soon as it is connected to the power supply.

5.3 Adjustments

5.3.1 Presettings of the Sensor Output

Out: $\pm 10V$ The output voltage can be switched over by closing jumper $\pm 5V$.
Out: 0 ... 20 mA The current output can be switched to 4 ... 20 mA / 10 ± 10 mA / 12 ± 8 mA
by closing the respective jumper.

Only one signal output variant can be adjusted.

5.3.2 Presettings of the Sensitivity

By factory default, the LCV is adjustable to approx. 2 mV/V. If the sensitivity of the sensor deviates from this value, the resistance 'Gain rough' must be replaced. First, the sensitivity of the sensor must be determined by the data sheet, test certificate, sensor label, etc. and multiply this value by 312. Then, insert the next value from resistance row E24, small deviations can be corrected with the pot.

Example 1: 0.7 mV/V * 312 = 220 Ohm Accuracy 1 %, Design 0805 or 1206, TC max 50 ppm

Example 2: 1.0 mV/V * 312 = 300 Ohm Accuracy 1 %, Design 0805 or 1206, TC max 50 ppm

Example 3: 2.0 mV/V * 312 = 620 Ohm Accuracy 1 %, Design 0805 or 1206, TC max 50 ppm

5.3.3 Zero Point Rough

If the zero point of the sensor is further shifted by preload or similar and can therefore not be corrected with the potentiometer, a 'ZP+' or 'ZP-'-jumper must be bridged and a resistance decade must be soldered to 'Zero Point rough', depending on the direction. The resistance decade is detuned until the output value is close to zero. This determined value is soldered in - a small deviation can then be corrected with the potentiometer.

5.3.4 Filter

The dynamic is set to approx. 1 kHz ... -3 dB, with jumper 50 Hz, the dynamic gets reduced. The filter is useful, if interferences are on the measuring signal. This can occur if frequency converters or power electronics are in the vicinity, or if the sensor cables were laid parallel to power lines.

5.3.5 Measuring Range

This function is only available on request with details of the measurement range resistance.

5.4 Adjustment Description

5.4.1 Adjusted and Calibrated LCV with Sensor, integrated or as a DC Voltage Cable Measuring Amplifier

The complete unit was adjusted and calibrated as a measurement chain, all relevant data and pin assignments can be found on the test certificate. If option control signal is available, it can be switched on by a positive control signal or push-button. Thus, the adjustment and the calibration of the measurement chain and also subsequent measuring instruments can be checked at any time.



Warning: If the connection between sensor and LCV is changed, the adjustment and thus the calibration is invalid.

Connection Assignment

Green	Common Ground (GND)
Shielding	PE
Brown	Excitation +
Yellow	Signal +
Gray	Control signal (option)

5.4.2 Pre-adjusted LCV as a Board or Kit

All sensor cables must be connected to the LCV, use only shielded cables and keep the sensor lines as short as possible. Connect the supply and the pre-adjusted current or voltage output. If the option control signal is available, it can be switched on via a positive control signal or a push-button. Now, only a fine adjustment must be carried out by using the potentiometer.

Kit: Housing close-up, see mounting manual.

Board: Touch-safe, mechanically protected, low-vibration mounting, with non-tension leads. If in doubt, please contact the factory.

5.4.3 Not adjusted LCV as a Board or a Kit

All sensor cables must be connected to the LCV, use only shielded cables and keep the sensor lines as short as possible. Connect the evaluation side, connect current or voltage output according requirement. In order to take this LCV into operation later, the signal output variant and the sensor sensitivity must be pre-configured, first.

5.4.4 Adjustment to the Sensor

Once all settings have been made, and the LCV is connected to the sensor and the evaluation device, an adjustment can be performed. After a warm-up period of about 5 min., the built-in sensor is unloaded and the zero value e. g. 0.00V (0 mA) is set by the zero point potentiometer. If the zero point potentiometer is not sufficient, see chapter '5.3.3 Zero Point Rough'.

Then, 100 % load is applied, or 100 % control signal is switched and the 100 % value e. g. 10.00V (20.00 mA) is adjusted by the gain potentiometer. After this, the zero point must be controlled and if necessary, the adjustment must be repeated.

5.5 Interfaces and Connections

5.5.1 Connection for SG-Sensors

Supply via LCV:	5.00V, max. 20 mA, short-circuit protected
Bridge resistance:	Min. 350 Ohm, only full bridge, 4- or 6-wire
Sensitivity:	Up to 0.3 mV/V - 3.5 mV/V, other values upon request
100 % control signal:	Is switched via the control input

5.5.2 Evaluation Connection

Voltage output:	$\pm 10V$ or $\pm 5V$, max. 5 mA, output resistance < 1 Ohm
Current output:	0 ... 20 mA, 4 ... 20 mA, 12 ± 8 mA, 10 ± 10 mA, burden max. 400 Ohm

Only one signal output variant can be adjusted.



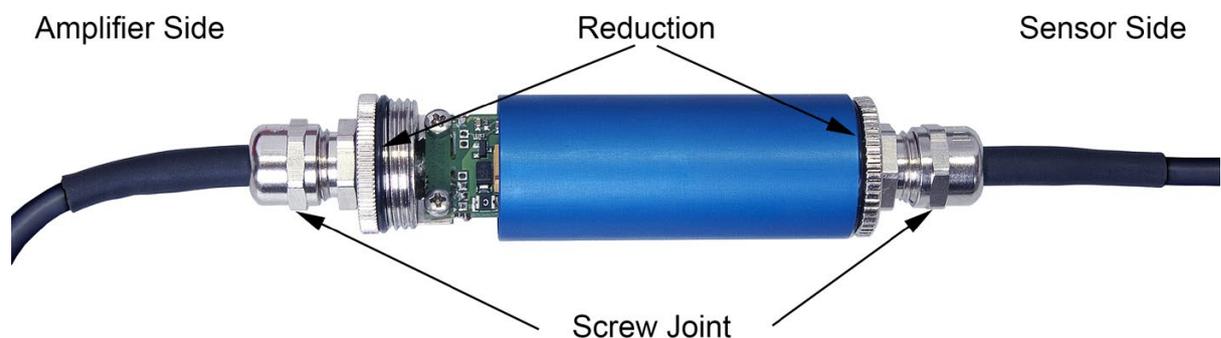
Note: The device must be disconnected from mains during any connection procedures. Note the safety precautions.

5.5.3 Control Input, Switch-on Control Signal

By the control signal on the LCV, the 100 % control signal in the sensor (if available / see sensor data sheet) can be switched on. The sensor electrically simulates a 100 % value (like 100 % load). Thus, re-adjustment and system control of subsequent evaluation systems is possible, without having to use a highly precise reference weight or torque on the sensor.

Control signal on:	5V ... 28V
Control signal off:	0V ... 2V or if no device is connected

5.6 Mounting Instructions



Make sure that the amplifier side and the sensor side can be clearly assigned. Check the data sheet, if necessary.

Disassembly

- Detach the cable screw joint on the sensor side
- Turn the blue housing part of the reduction on the amplifier side without turning the cable on the sensor side
- Then, gently pull the housing over the cable on the sensor side

Assembly

- Shift the blue housing part with the sensor sided bolted reduction, but open cable screw joint over the board and carefully pull the sensor cable
- Screw the blue housing part with the reduction on the amplifier side without turning the sensor cable with the blue housing part
- Tighten the screw joint

5.7 Troubleshooting

No Output Signal available

- No supply voltage
- 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
- Sensor was overloaded

Inverted Output Signal

- Signal lines have been swapped

6 Product Phases

6.1 Transportation



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

6.2 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 4.2 must be considered.

 **Cable connections:** Never connect voltage levels to unoccupied pins

6.3 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

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

6.4 Maintenance and Cleaning



Warning: The device must be disconnected from the power supply before cleaning!

Clean the housing with a soft and slightly moisturized cloth. While cleaning, ensure that no liquids enter the device or the connections

Preventive maintenance and inspection

 Check the plug connections

7 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



8 Reference Information

080987: Data sheet of the strain gauge sensor-interface LCV.