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Operation Manual

DC Voltage Measuring Amplifier

LCV



1 Imprint

Manufacturer, Place	*Lorenz Messtechnik GmbH, D-73553 Alfdorf*
Valid for...	*DC Voltage Measuring Amplifier LCV*
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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 DC Voltage Measuring Amplifier LCV

- 080699.pdf, data sheet of the DC Voltage Measuring Amplifier LCV

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5 Introduction

5.1 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).

5.2 Power Supply

Mains operation:

Power supply:	+12V - +28V DC min. 300mA, safe from reverse polarity
Ripple:	max. 100mV p-p
Fuse:	self-resettable fuse 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.

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

5.3 Safe and Proper Use

Caution:



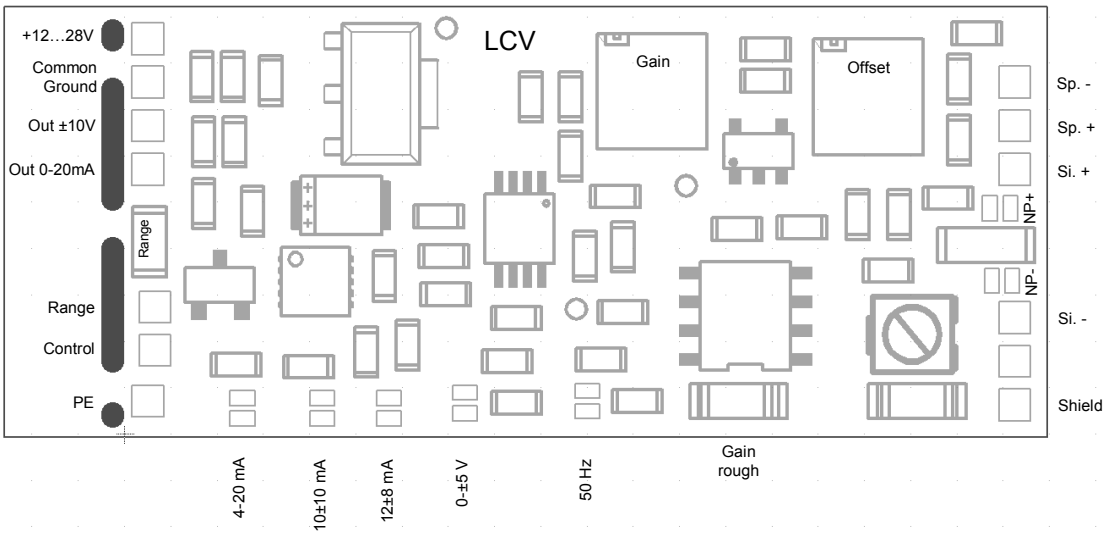
- Protect the device against moisture, condensation, rain, snow....
- Protect the device against direct solar radiation
- Protect the device against dust and pollution
- Protect the device against excessive ambient temperature
- Protect the device against excessive vibration

5.4 Dimensions – Weight

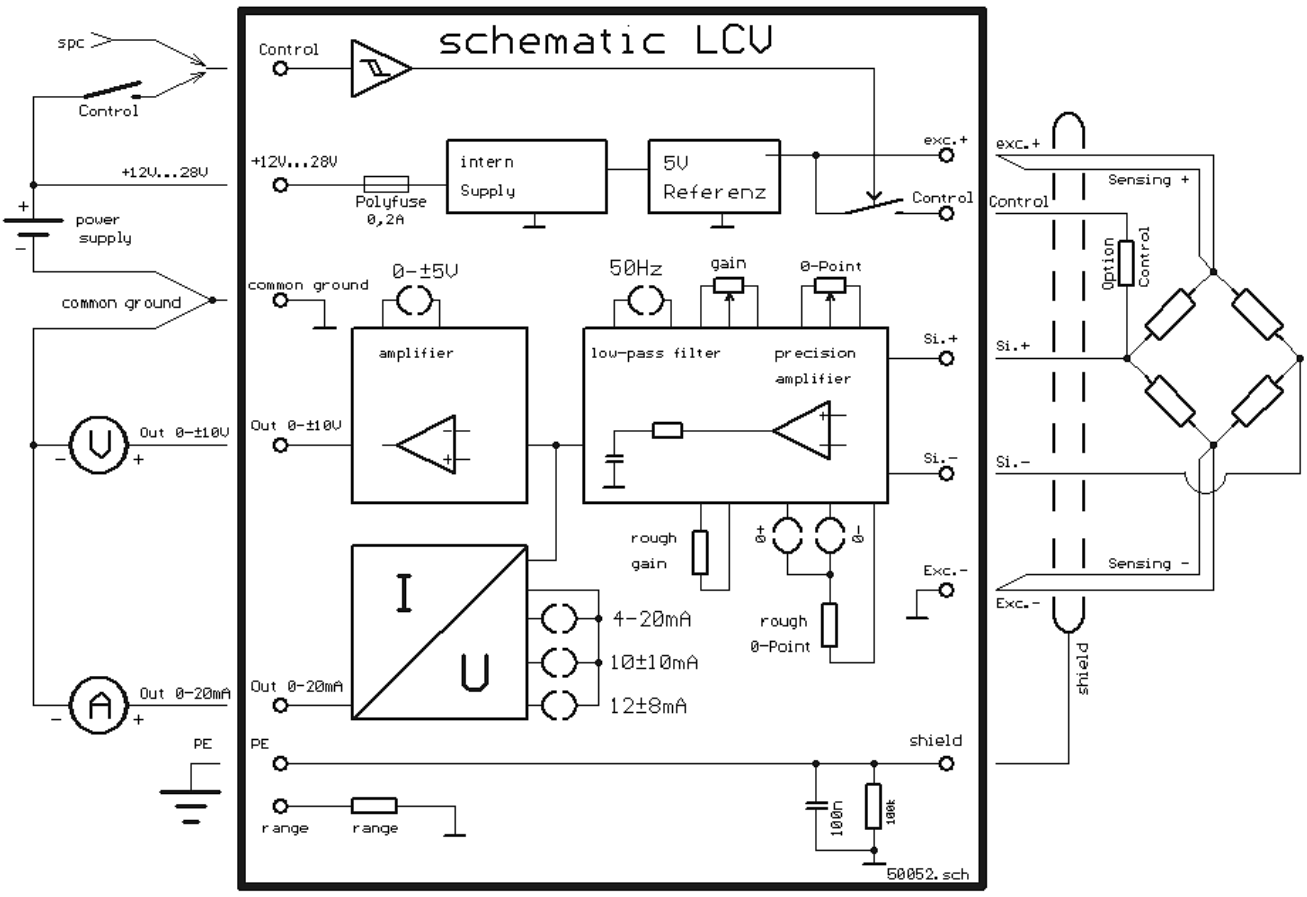
Device dimensions in mm: L x W x H: 110x25x25 Weight: 0,1 kg

6 Instruction / Description of the Operating Mode

6.1 Pin Assignment



Evaluation: **DC Voltage Measuring Amplifier LCV** **SG-Sensor**



Sensing leads at 6-wire technique, only!

6.2 Switching-On

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

6.3 Adjustments:

6.3.1 Presetting's of the Sensor Output:

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

Only one signal output variant can be adjusted!

6.3.2 Presetting's of the Sensitivity:

The LCV may be calibrated by the factory default to approximately 2 mV / V. Deviates from the Rec the sensor from this value, the resistance "Boost. roughly "to be replaced. First, the sensitivity of the sensor from the data sheet, certificate, sticker, etc. sensor determines then multiply this value by the 312th Insert the next value from resistance ¬ row E24, small deviation can be correct with the potentiometer

By factory default, the LCV is adjustable to approx. 2mV/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., then multiply this value by **312**. Then, insert the next value from resistance row E24, small deviations can be corrected with the pot.

Example 1: 0,7mV/V * 312 = 220 Ohm Accuracy 1%, Design 0805 or 1206, TC max:50ppm
Example 2: 1,0mV/V * 312 = 300 Ohm Accuracy 1%, Design 0805 or 1206, TC max:50ppm
Example 3: 2,0mV/V * 312 = 620 Ohm Accuracy 1%, Design 0805 or 1206, TC max:50ppm

6.3.3 "Zero Point Rough"

If the zero point of the sensor is shifted by preload etc. in such way that it cannot be corrected with the potentiometer, a ZP+ or ZP- jumper must be bridged depending on the direction, and a decade resistor must be soldered to "zero rough". The decade resistor is detuned until the output value is near zero. The ascertained value is soldered in; a small deviation can be corrected with the pot.

6.3.4 "Filter"

The dynamic is set to approx. 1kHz –3dB, with jumper 50Hz, 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.

6.3.5 "Measuring Range"

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

6.4 Adjustment Description

6.4.1 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.

Pin Assignment:

Green:	com. ground	Brown:	+ supply	Yellow:	+ signal
Shield:	PE	Grey:	control signal (option)		

6.4.2 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 pots, see adjustment.

Kit:	housing close-up, see mounting manual.
Board:	touch-safe, mechanically protected, low-vibration mounting, with non-tension leads! If in doubt, contact the company!

6.4.3 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.

6.4.4 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 (0mA) is set by the zero point pot. If the zero point pot is not sufficient, see chapter “Zero Point Rough”.
Then, 100% load is applied, or 100% control signal is switched and the 100% value e.g. 10,00V (20,00mA) is adjusted by the gain pot. After this, the zero point must be controlled and if necessary, the adjustment must be repeated.

6.5 Interfaces and Connections

6.5.1 Connection for SG-Sensors:

Supply via LCV:	5,00V max. 20mA, short-circuit protected
Bridge resistance:	min. 350 Ohm, only full bridge, 4- or 6-wire
Sensitivity:	up to 0,3mV/V - 3,5mV/V, other values upon request
100% control signal:	is switched via the control input

6.5.2 Evaluation Connection:

Voltage output	:	±10V or ±5V max. 5mA output resistance < 1Ohm
Current output:		0-20mA, 4-20mA, 12±8mA, 10±10mA, impedance max. 400Ohm

Only one signal output variant can be adjusted

Note:



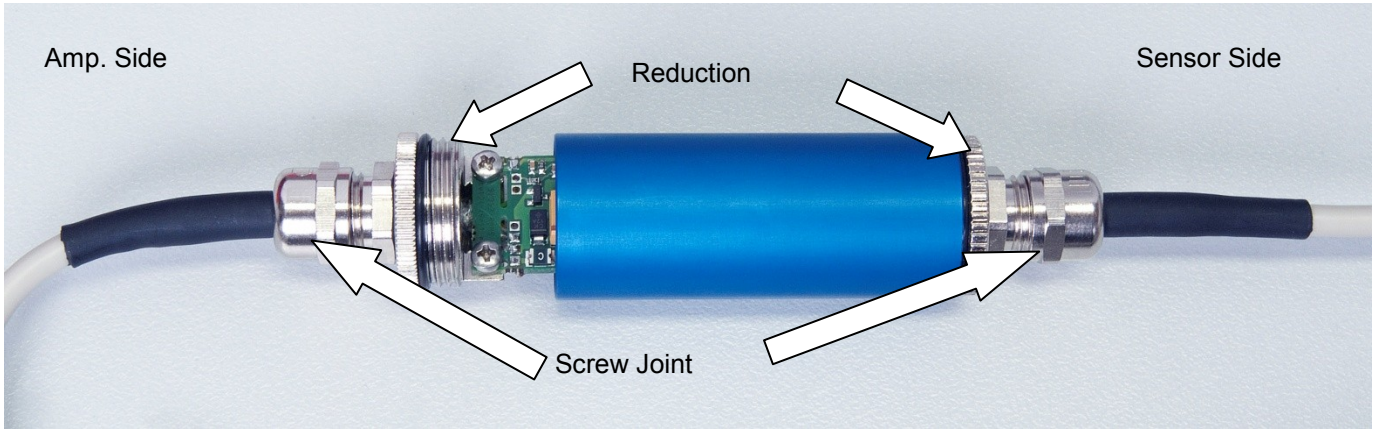
The device must be disconnected from mains during any connection procedures. Note the safety precautions.

6.5.3 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.

6.6 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 at the same time.
- 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 screw, 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 at the same time.
- tighten the screw joint.

6.7 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, or was the sensor overloaded?

Inverted Output Signal:
- signal lines inverted?

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!

