

Operation Manual

Portable Strain Gauge Measuring Amplifier

GM 77





1 Imprint

<i>Manufacturer, Place</i>	<i>Lorenz Messtechnik GmbH, D-73553 Alfdorf</i>
<i>Valid for...</i>	<i>Portable SG Measuring Amplifier GM 77</i>
<i>Copyright Note</i>	<i>© 2012 Lorenz Messtechnik GmbH, Alfdorf</i>
<i>Interdiction of Reprint</i>	<i>Reprint in whole or in part with written permission, only.</i>
<i>Change Notice</i>	<i>Technical changes are reserved.</i>



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 be 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 in 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 Portable SG Measuring Unit GM 77

- 080625.pdf, data sheet of the Portable SG Measuring Unit GM 77



4 Contents

1	Imprint.....	2
2	Notes.....	3
2.1	General Notes.....	3
2.2	Intended Use.....	4
2.3	General Dangers by not following the Safety Precautions	4
2.4	Residual Dangers.....	4
2.5	Safety and Caution Symbols.....	5
2.6	Health Protection and Safety	5
2.7	Qualified Personnel.....	5
2.8	Changes.....	5
3	Continuative Documents	6
4	Contents.....	7
5	Introduction	8
5.1	Product Description.....	8
5.2	Power Supply.....	8
5.3	Safe and Proper Use.....	9
5.4	Dimensions – Weight	9
6	Instruction / Description of the Operating Mode	10
6.1	Connection Description	10
6.2	Switching the Device on	11
6.3	Settings:	11
6.3.1	Sensitivity Presettings:.....	11
6.3.2	Maximum value memory (P/ON):.....	11
6.3.3	Signal inversion (+/-):.....	11
6.3.4	100% control signal activation (CAL):	11
6.3.5	Battery/Accumulator voltage: (LOW BATTERY):	11
6.4	Adjustment Description	12
6.4.1	Adjustment to a sensor:	12
6.4.2	Adjustment examples:.....	12
6.5	Interfaces and Connections	13
6.5.1	Connection for SG sensors:	13
6.5.2	Visual evaluation:.....	13
6.6	Terms Definition	13
6.7	Troubleshooting	13
7	Product Phases.....	14
7.1	Transportation.....	14
7.2	Commissioning and Installation.....	14
7.3	Standard Operation.....	14
7.4	Maintenance and Cleaning	15
7.5	Safe Disposal.....	16



5 Introduction

5.1 Product Description

The GM 77 is a portable hand-held measuring unit with an easily readable 4½-digit display. It is designed for passive strain gauge sensors with a sensitivity of 0,35-3,5mV/V. Through its compact design and economical battery operation, it is particularly suitable for mobile use. However, mains operation is possible with an optional AC adapter which also charges the inserted batteries at the same time. Easy and quick adjustment to sensors is ensured through the 2-point scaling via pots, a simple decimal point adjustment and the control signal activation (if available in the sensor) at any time. By special functions such as max. value memory, signal inversion and integrated battery charger, this device is very suitable for many applications .

5.2 Power Supply

Mains operation:

Power supply:	+6V DC min. 600mA, safe from reverse polarity
Ripple:	max. 100mV p-p
Fuse:	self-resettable fuse 500mA
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.

Battery- / accumulator operation:

Warning:



Batteries must be removed during mains operation!

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

Battery- / Accumulator operation:

Battery operation:	4 x type: Micro AAA (LR03) with 1,5V.
Accu operation:	4 x type: NiMH Micro AAA (LR03) with min. 600mAh and 1,2V.

When used with an AC adapter, the charging time for battery capacity of 1Ah is approx. 6-7h; the constant charging current at empty batteries is max. 160mA. At full batteries, the end of the charging process is detected by a MinusDeltaPeak method (overcharge protection). For fast battery charging we recommend an external battery charger (e.g. Ansmann 4-6). The batteries are being charged, when the GM 77 is on or off.



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

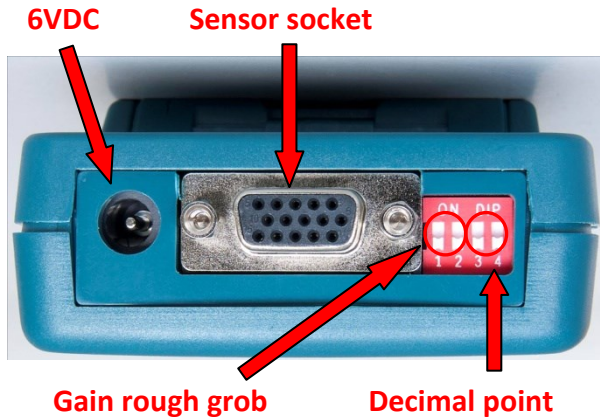
Device dimensions in mm: 125 x 80 x 40

Weight: 0,25 kg



6 Instruction / Description of the Operating Mode

6.1 Connection Description



6VDC:
Mains connector:
2,1mm barrel connector; inside: +6VDC; outs. 0V

Sensor socket:
Type: 15pol. SUB-D HD (High Density)

Assignm.	Pin 1:	supply -
	Pin 8:	supply +
	Pin 10:	100% control sig.
	Pin 11:	signal +
	Pin 12:	signal -
	Pin 13:	shield

Gain rough:

With switches S1 and S2 (s. chap. 6.3.1) the amplification depending on the sensitivity of the bridge is adjusted.

Decimal point:

The decimal point is adjusted with switches S3 and S4 (s. chap. 6.3.1).



Pot: Gain fine
With pot "amp. fine", the rough amp. Is adjusted to „fine“.

Pot: Zero:
With pot "zero", the zero point is adjusted.



P/ON:

Key P/ON turns the device on. Max. value memory activate/deactivate

+/-:

Signal inversion

CAL:

100% control signal activation

Display:

4,5-digit display with decimal point



6.2 Switching the Device on

The device is activated and ready to operate as soon as key P/ON was pressed. After 10-15min. the device switches off automatically to save power.

6.3 Settings:

6.3.1 Sensitivity Presettings:

Presetting for sens. with S1 and S2

mV/V	100% display	S1	S2
0,35 – 1,00	1000	open	closed (ON)
0,90 – 1,80	1000	open	open
0,35 – 2,10	2000	open	closed (ON)
2,00 – 3,50	2000	open	open
0,35 – 0,55	5000	closed (ON)	closed (ON)
0,50 – 0,90	5000	closed (ON)	open
0,88 – 3,50	5000	open	closed (ON)
0,35 – 1,10	10000	closed (ON)	closed (ON)
1,00 – 1,82	10000	closed (ON)	open
1,75 – 3,50	10000	open	closed (ON)
0,35 – 2,20	19999	closed (ON)	closed (ON)
2,00 – 3,50	19999	closed (ON)	open

Decimal point setting with S3 and S4

S 3	S4	Display
open	open	1888,8
closed (ON)	open	188,88
open	closed (ON)	18,888
closed (ON)	closed (ON)	18888

6.3.2 Maximum value memory (P/ON):

The maximum value memory and the corresponding LED is turned on by the P/ON switch. Now, the highest measured value will be displayed. The function will be switched off by pressing the switch again and can be immediately re-activated by repeatedly pressing.

6.3.3 Signal inversion (+/-):

The signal inverse function and the respective LED are switched on by key +/- . In order to determine the highest measured value, a negative measured value is converted into a positive measured value through the max. value memory. Repeatedly pressing of the key switches the function off.

6.3.4 100% control signal activation (CAL):

With this key, 100 % control signal can be switched on in the sensor (if available, see data sheet of the sensor). Thus, an easy control of the system is possible. By pressing this key, the characteristic value of the sensor must be displayed.

6.3.5 Battery/Accumulator voltage: (LOW BATTERY):

If the permissible battery/accumulator voltage falls below, "LOW BATTERY" will blink on the display. Please change the batteries/accumulators immediately, otherwise no proper measurements can be ensured!



6.4 Adjustment Description

6.4.1 Adjustment to a sensor:

Switch the device on, connect sensor, signal inversion and max. memory must be switched off. Determine sensor sensitivity (mV/V) and 100% value (e.g. 500N.m) from the sensor data sheet and carry out the basic settings according to the table. Unload the sensor and set the display to 0 with pot "zero". Activate 100% control signal and keep it pressed, or apply 100% load, adjust 100% (e.g. 500,0) with pot "gain fine". Control zero point – finished.

6.4.2 Adjustment examples:

Adjustment example 1: with 100% control signal

Torque sensor, 50N.m, 2mV/V.

Display at 100% = 50,00, in this case decimal point setting: S3 closed, S4 open.

Presetting for 5000 and 2mV/V, S1 is open and S2 is closed.

Then adjust to = 0 by zero-pot at unloaded sensor condition.

Press control and adjust to 50,00 by gain pot.

Adjustment Example 2: with 100 % Load - without 100% control signal

Force sensor 10N, 1mV/V.

Display at 100% = 10,000, in this case decimal point setting: S3 open, S4 closed.

Presetting for 10000 and 1mV/V, S1 and S2 is closed.

Then adjust to = 0 by zero-pot at unloaded sensor condition.

Apply 100 % load and adjust to 10,000 by gain pot.

Adjustment Example 3: with e.g. 123kg part load - without 100% control signal

Force sensor 200kg, 1,6mV/V.

Display at 100% = 199,99, in this case decimal point setting: S3closed, S4open (high resolution).

Presetting for 19999 and 1,6 mV/V, S1 and S2 are closed.

200,0 so decimal point setting: S3 open, S4 open (can measure more than 200kg).

Presetting for 2000 and 1,6 mV/V S1 is open and S2 is closed.

Then adjust to = 0 by zero-pot at unloaded sensor condition.

Apply 123kg load and adjust to 123,00 by gain pot.



6.5 Interfaces and Connections

6.5.1 Connection for SG sensors:

Supply via GM 77:	4,00V max. 15mA, short-circuit resistant
Bridge resistance:	min. 350 Ohm, only full bridge, 4- or 6-wire
Sensitivity:	0,35mV/V - 3,5mV/V, other values on request
100% control signal:	activated from the GM 77 via control input.

6.5.2 Visual evaluation:

Display: 4,5-digit display with decimal point.

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.

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 GM 77.

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.

6.7 Troubleshooting

Display in control limit:

- Signal input not connected?
- Sensitivity presettings or sensor supply configured incorrectly?
- Open circuit in the sensor cable or sensor overloaded?

Output Signal does not go back to 0:

- was the sensor overloaded or installed tensed?

Measured values are instable:

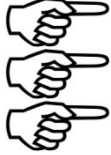
- Interferences induce via sensor cable! Connect the cable shield with ground!
- SMPS without ground? Connect 0V with ground (also possible via 100kΩ // 100nF)
- Sensor cable too close to power electronics?
- Sensor grounded?



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.

Please remove the batteries during storage.



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

Changing the batteries:

Caution:



Note the correct polarity of the batteries.

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

//TODO...Battery disposal:

End users are required to return used batteries by law (battery ordinance); the disposal with normal waste is prohibited. The used batteries/rechargeable batteries can be returned to our company free of charge, to collecting communities or any place where batteries are sold.

!

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!

