



Single Axis Tilt Measuring System



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■ 1 General Information

To ensure reliable and safe operation, the measuring amplifier must be operated in compliance with the specifications according to this technical description only. These regulations must also be observed if accessories, which have been ordered from Althen Mess- & Sensortechnik GmbH together with the measuring amplifier, are being used.

Notice: Every person who is in charge for the start-up or service of this measuring amplifier must have read this technical manual and must have understood the safety instructions in particular.

■ 1.1 Safety Instructions

When using the amplifier, the legal- and safety regulations for each case of application must be observed. To avoid risks for the system or the operator the following points are to be considered.

- If any visual damage or malfunctions are noticed, the measuring system must be switched off and marked appropriately.
- Disconnect the supply voltage before opening the device.
- The complete measuring unit must be protected against contact and influence of unauthorised persons.
- In the case of a safety-relevant application, where a potential malfunction could cause damage to property or persons, it is imperative that an additional, independent monitor is provided.
- In combination with sensors, the maximum loads / pressures etc. must never be exceeded.

Disconnect all power source before opening the device. Beware of still charged capacitors.

Always let the system acclimate to new (esp. warmer) environments before switching it on.

If you have reasons to assume that safe operation is no longer possible, immediately take the device out of operation and secure it against unintentional operation.

■ 1.2 Qualified Personnel

This measuring system must be operated by qualified personnel and in compliance with the relevant technical specifications only. Qualified personnel include such persons who are conversant with the setting up, mounting and starting up of the measuring system and who have qualifications that are appropriate for the tasks they're about to perform.

■ 1.3 Intended Use

Amplifiers from Althen Mess- & Sensortechnik GmbH serve to measure the intended measurand and the evaluation thereof in combination with one or more sensors. Any other use over and above that is regarded as non-intended use.

■ 2 Instructions for use of the tilt measuring amplifier

Notice: The parameterizations, closer information concerning the scaling as well as the customized analogue output can be found on the additional sheet "Device-Configuration".

Since this amplifier is a highly sensitive measurement technology product, it must be used for its intended use as well as the described operating conditions only. Initial start-up and changes in setup and settings must be done by qualified personnel only. To prevent interventions / modifications made by unauthorized personnel, suitable measures must be taken. Both function and calibration must be checked regularly.

All connection cables and the amplifier must not be installed in proximity to disturbance emitting devices or cables. The amplifier must be operated with a separate power source used for measurement devices only. Shielded cables, preferably twisted in pairs should be used only.

Notice: Changes of the measuring system of any kind demand for the explicit approval of Althen Mess- & Sensortechnik GmbH. Changes of any kind done without that approval exclude all possible warranty and/or liability of Althen Mess- & Sensortechnik GmbH.

Please note that the tilt measuring system responds not to inclination changes only, but as well to vibrations and to acceleration forces. If necessary and been ordered, a low pass filter can be installed.

■ 3 Technical Description

This tilt measuring system serves to supply, readout and display of one servo-inclinometer, series LSOC-3. The external sensor is being supplied by the display-unit.

The measuring system, i.e. the display unit, displays the sensors output signal in mm, according to the angle (up to $\pm 3^\circ$) it is tilted and the length of the reference. There are 2 references programmed: 700 (36,7 mm @ 3°) and 900 mm (47,2 mm @ 3°). These 2 ranges can be chosen by a switch on the front of the unit. On said front is a display with a 3½-figure LED which shows the measured, scaled value. This value can also be picked up as an $\pm 5V$ (optional 4 ... 20 mA /max 500 Ohm) analogue output on the front.

Measuring range:	-3°	0	+3°	degrees of incline
Display:	-36.7	0	36.7	mm (@ length of 700 mm)
	-47.2	0	47.2	mm (@ length of 900 mm)
Test signal:	-5	0	5	V (max 1 mA)

An internal low-pass filter limits the sampling rate to 1 Hz., so possible high frequency fluctuations and noise is suppressed.

The internal battery allows measurements for at least 3 hours without an external supply. A charging unit is provided (Ansmann ACS110). This charger can be operated with 115 or 230 Volt AC. See included manual of charger. The measuring system can also be operated with the external power supply (12 V, \pm 5%, 300 mA).

Notice: The charger cannot be used as an external supply. In order to use the unit w/o battery, an additional power supply is needed and can be ordered separately. While using the external supply, the battery is not being charged.

The status of the battery can be read out and is shown in the display in "V" by pressing the "Battery Test"- button on the front. In addition, 2 LED's signal the status of the battery:

LED-2 (yellow)	...	battery OK
LED-3 (red)	...	battery low (< 10.5 V)– DO NOT USE MEASURING SYSTEM The battery is to be loaded or the optional external power supply is to be used for measuring.
LED-1 (green)		external power supply is connected and operational

■ 4 Terminal Assignment

Conn. 2

6 pin male/female connector
Type LEMO EFA.3E.306.CLAC55ZN

PI N	Description
1	Excitation voltage LSOC-3° +15VDC
2	GND
3	Excitation voltage LSOC-3° -15VDC
4	+ Signal LSOC-3°
5	-Signal LSOC-3°
6	GND

Conn 1

5 pin mal connector
Type Binder Series 423

PI N	Description
1	External Power supply 12VDC
2	GND Power supply
3	Charging voltage rechargeable battery
4	Test signal ± 5 V (optional 4 ... 20 mA)
5	GND signal

■ 4.1 Supply voltage

The unit is being supplied either by the internal battery or an external power unit, sold separately. With the battery, the unit can be operated at least 3 hours. To protect the electronics an internal self-healing "polyswitch-resettable®" fuse is built in.

■ 4.2 Analogue Output

The measurement value can be picked up as a $\pm 5V$ (optional 4 ... 20 mA /max 500 Ohm) analogue output on the front:

-3°	0	+3°
-5 V	0	+5 V
4 mA	12 mA	20 mA

■ 5 Starting up

The object to measure is to be leveled horizontally. The sensor is to be mounted. If necessary, the zero point can be adjusted via the according potentiometer "Zero Adj."

After switching on the unit, the battery status is to be checked by pressing the according button. If battery is low (< 10.5 V), charge first, or use power supply.

Allow the unit a warm-up time of 15 minutes.

Measurement can begin.

Notice: Because each unit is adjusted to its own sensor according to the calibration certificate of it, the assignment unit/sensor is to be complied with! It is not necessary to adjust the potentiometers, as it is factory pre-set.

■ 6 Maintenance

The flawless function and calibration of the whole measuring system is to be checked regularly. This inspection is also necessary after every repair or change of any component of the measurement system.

■ 7 Old appliances disposal



According to European and German law, it is prohibited to dispose old electronic devices into household waste, but must be collected and disposed of separately.

Amplifiers and measurement units manufactured and sold by Althen Mess- & Sensortechnik GmbH serve B2B purposes only. Therefore, those old appliances must not be given to the communal disposer, but must be given back to the seller or disposed of properly. If you need any further information, please contact your local authorities.

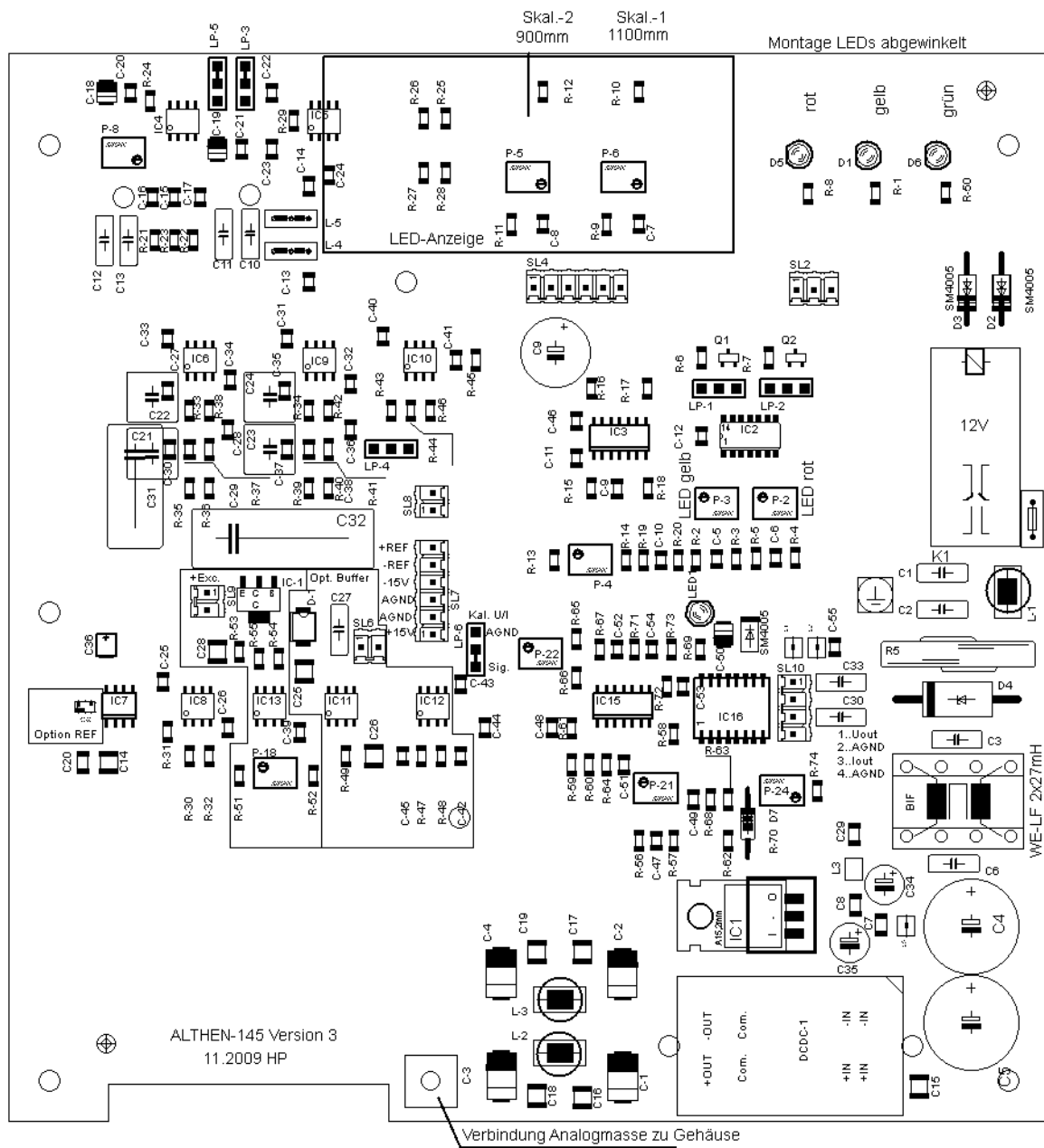
These measures serve to protect the environment and allow recycling and recovery of valuable materials. Furthermore, do electronic devices contain substances that may cause damage to the environment if burned or dumped with normal household waste.

■ Appendix

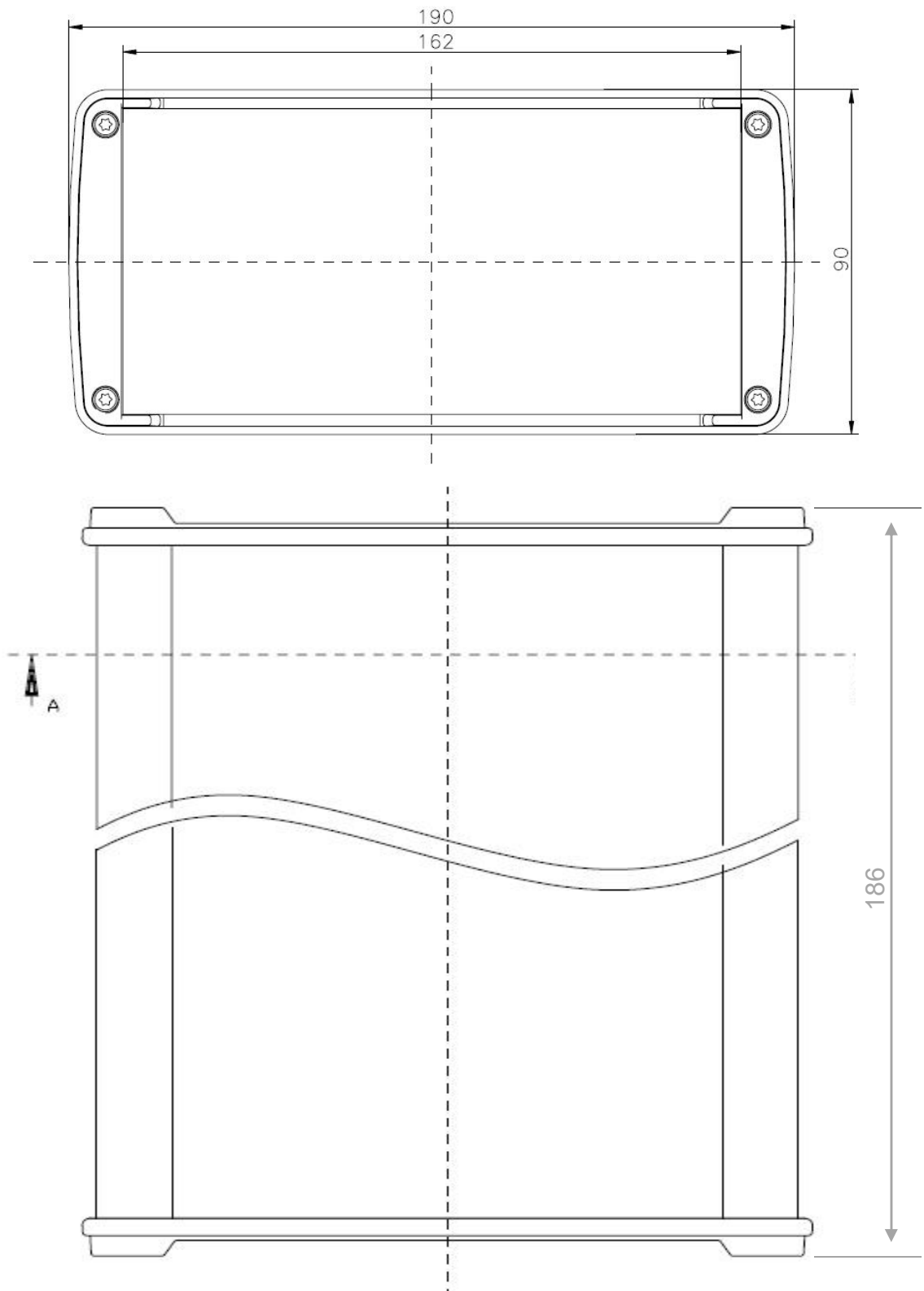
■ Datasheet

Number of measuring channels	1	Internal rechargeable battery
Power supply:	12 VDC	measurement for a period of at least 3 hours
Power consumption:	max. 6 W	
Inclinometer Excitation voltage:	15 VDC (max. 30 mA)	
Analogue output:	± 5 V (max. 1 mA)	optional 4 ... 20 mA (max 500 Ohm)
Limit frequency (-3 dB):	1 Hz	
Input resistance:	>3 MΩ	
Non-Linearity:	±0,05 % F.S.	
Electrical connections:	Plug and socket connection on front-side	
Enclosure:	EMC-aluminum enclosure (IP20)	
Dimensions (W x H x D):	190 x 90 x186 mm without electrical connections	
Weight:	2700 g	
Store temperature range:	-20°C ... +60°C	
Operating temperature range:	0°C ... +50°C	

■ Component diagram



■ Housing dimensions



Subject to modifications.
All information describes our products in general form.