



Single Axis Inclination Measuring System NM1-2L-420-ATEX



II 2 G

U_{Nenn} : 24 V
 U_i : 28 V
 C_i : negligibly small
 L_i : negligibly small
 I_i : 110 mA
 P_i : 770 mW
 T_a : -25°C...+60°C

Neigungswinkelmesssystem
 NM1-2L-420-ATEX-R90-3m

Ex ib IIB T4 Gb
 TÜV 99 ATEX 1469

Seriennummer: 09163a0011
 Messbereich: 0 ... 90°
 Baujahr: 2016

Althen GmbH
 Mess- und Sensortechnik
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<http://www.althen.de>



0044

Messachse


ALTHEN

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■ **ATEX-Inspection Certificate**

Translation
(1) **EU-Type Examination Certificate**



(2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 2014/34/EU**

(3) **Certificate Number** TÜV 99 ATEX 1469 **issue:** 01

(4) for the product: Tilt measuring system type NM1-2L-420-ATEX-xxxx

(5) of the manufacturer: ALTHEN GmbH Mess- und Sensortechnik

(6) Address: Dieselstrasse 2
65779 Kelkheim
Germany

Order number: 8000476207

Date of issue: 2018-10-26

(7) The design of this product and any acceptable variation thereto are specified in the schedule to this EU-Type Examination Certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH, Notified Body No. 0044, in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and the Council of 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The examination and test results are recorded in the confidential ATEX Assessment Report No. 17 203 207583.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2012 + A11:2013

EN 60079-11:2012

except in respect of those requirements listed at item 18 of the schedule.

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions for Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design, and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the product shall include the following:

II 2G Ex ib IIB T4 Gb

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body

Roder

Hanover office, Am TÜV 1, 30519 Hannover, Tel. +49 511 998-61455, Fax +49 511 998-61590

This certificate may only be reproduced without any change, schedule included.
Excerpts or changes shall be allowed by the TÜV NORD CERT GmbH



(13) **SCHEDULE**

(14) **EU-Type Examination Certificate No. TÜV 99 ATEX 1469 issue 01**

(15) Description of product

Tilt measuring system type NM1-2L-420-ATEX-xxxx is used to detect angles and angle changes in potential explosive atmospheres.

Type code:

NM1-2L-420-ATEX-xxxx

Instead of the "xxxx" will be in the full name letters or numbers that indicate the different versions.

Electrical Data:

Supply and signal circuit
(cable pigtail)

In type of protection Ex ib IIB

Only for connection to a certified intrinsically safe circuit with maximum values:

$U_i = 28 \text{ V}$

$I_i = 110 \text{ mA}$

$P_i = 770 \text{ mW}$

Effective internal capacitance:

C_i negligibly small

Effective internal inductance:

L_i negligibly small

Thermal data:

Ambient temperature range:

-25°C to +60°C

(16) Drawings and documents are listed in the ATEX Assessment Report No. 17 203 207583

(17) Specific Conditions for Use

none

(18) Essential Health and Safety Requirements

no additional ones

- End of Certificate -

■ 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.

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

The described amplifier from Althen Mess- & Sensortechnik GmbH serve to measure, monitor and evaluate inclination and it is fitted for explosion hazardous environments, according to ATEX-standard 2014/34/EU. Any other use over and above that is regarded as non-intended use.

■ 1.3.1 ATEX-Accreditation / EU-Type Examination Certificate

There's an EU-type examination certificate for the described amplifier for operating it in accordance with these regulations.

EU-type examination certificate name: TÜV 99 ATEX 1469

Under section „ATEX Inspection Certificate“ is a copy of the EU-type examination certificate. The specified data are by all means to be followed.

The electrical connections must be made inside a certified intrinsically safe circuit, with in the certificate stated limits only.

■ 2 Instructions for use of the measuring amplifier

Notice: The parameterizations, further information concerning the scaling as well as the customized analogue output can be found on the additional page "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.

The amplifier is contained in an aluminum housing which is equipped with an EMC- cover gasket as well as EMC-cable glands. This ensures IP-level 68 (1m, 1h) according to DIN EN 60529 (VE 0470).

Notice: The case / amplifier must not be opened! Otherwise the gasket will be damaged and the specified protection class / tightness will be reduced. If opened nonetheless, the gasket must be renewed professionally.

The whole construction must be potential-equalized. Under no circumstances are there any potential equalization currents over the cable shield allowed.

The housing is to be mounted on a grounded object / surface.

The tilt/ inclination measuring system must be connected to clean earth-potential. To avoid possible potential equalization currents over the shield of the cable to the following evaluation unit, this shield should be connected over a suitable capacitor (10 nF / 200 V).

Overall the shield connections must be done properly to EMC-standards (as short as possible with large wire cross-section) and connected to a central point (star grounding). In order to not increase the disturbance sensitivity of the amplifier, all cables should be kept as short as possible and should not be

extended. Possible cable-bound disturbances (i.e. noise) must be blocked very near the cable ends (evaluation unit) by suitable measures.

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.

■ 3 Technical Description

For specifications, version and calibration of the measuring system, please refer to the additional page "Device Configuration". Potential options as well as special versions custom made are noted there.

This single axis, industrial tilt / inclination measuring system, which consists of one none-contact sensor and an electronic customized for said sensor, serves to measure accurate tilt angles in x-axis and it is intended for side wall mounting. Depending on the version the tilt angle can be between ± 3 up to $\pm 60^\circ$, or between $0 \dots 10^\circ$ to $0 \dots 90^\circ$.

Electrical connections are in 2-wire-technology.

The described amplifier from Althen Mess- & Sensortechnik GmbH serve to measure, monitor and evaluate inclination related to the horizontal. The montage of the system is to be done with the cable pointing down and not directly on a wall, but via an adapter, which allows a fine adjustment of the mounting position. Although it's been mentioned here in this manual, that it is not allowed to open the lid of the system: the inside potentiometers must not be touched, i.e. the calibration must not be changed.

With a supply voltage of 24 VDC a current / signal of 4 ... 20 mA is generated. This changing current can be read out over a shunt resistor, which can than be processed from the following evaluation unit.

When exceeding the measuring range, the current may go up over 20 mA, depending on the supply voltage and the shunt resistor.

Notice: Supply and signal current: In ignition protection type intrinsically safe Ex ib IIB to connect in a certified safe circuit with the following limits:

U _i	=	28 VDC	C _i	=	negligible
I _i	=	110 mA	L _i	=	negligible
P _i	=	770 mW			

Thermal:

Environmental temperature range: -25°C ... +60°C

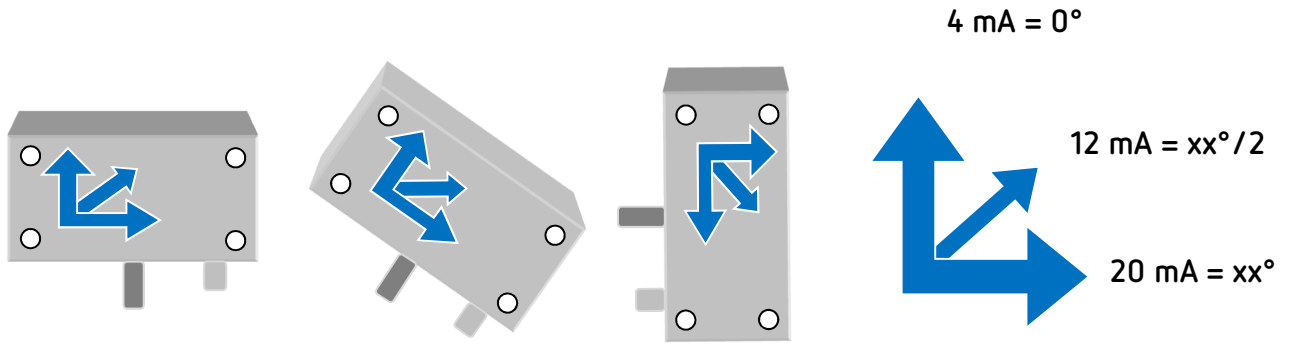


■ 4 Terminal Assignment

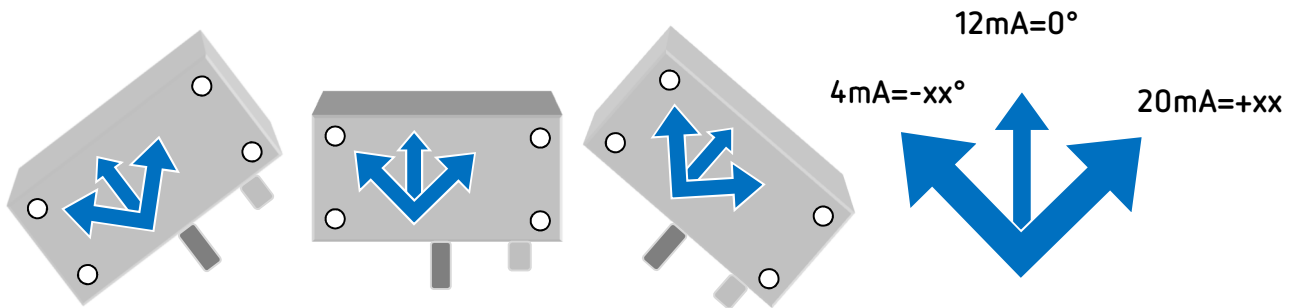
The electrical connections of the inclination measuring system are made via a cable (e.g. Unitronic-FD CP plus, 1x2x0,25mm², outer sheath: polyurethane mix), which, depending on version of the system may vary in length. The maximum of the length is 120 m. The cable shield is connected to the systems case. The cable has to be laid effectively protected against damages.

Cable Unitronic-FD CP plus, 1x2x0,25 mm²

Clamp	Description	Color
1	+24VDC	white
2	Signal	brown



Version 0 ... Rxx° (example shows 0...90°)



Version 0 ... Bxx° (example shows ±45°)

■ 4.1 Supply Voltage

The supply voltage can be 18 ... 28 VDC. But it is to be taken into consideration, that the supply voltage dictates the maximum load resistance.

With a supply voltage of:

...24 VDC the load resistance can be max. 500 Ohms.

...18 VDC the load resistance can be max. 200 Ohms.

Notice: A Zener barrier reduces the max. possible load resistance. The resistance of the barrier is to be taken into consideration when calculating the overall load resistance.



Notice: Supply and signal current: In ignition protection type intrinsically safe Ex ib IIB to connect in a certified safe circuit with the following limits:

$U_i = 28 \text{ VDC}$

$C_i = \text{negligible}$

effective inner capacity

$I_i = 110 \text{ mA}$

$L_i = \text{negligible}$

effective inner inductivity

$P_i = 770 \text{ mW}$

■ 5 Mounting

The inclination measuring system is to be mounted according to standard EN6079-14. The system has to be mounted, so that all labels are readable and all connections are within reach. The cable has to be laid effectively protected against damages. By false application and operation of the system there's danger of explosion on site or surrounding area. In order to avoid that, it's to be made sure that:

- no equalization currents must flow over the system.
- maintenance instructions are followed.
- the system is not installed near operating equipment or material, which operating temperature exceeds the allowed environment temperature of the system.
- The cable length doesn't exceed 120 m.

For further information please refer to chapter 3 "technical description".

■ 5.1 Starting Up

After a correct mounting as well as correct electrical connecting, a slight adjustment of the zero-point may be necessary. For that, the measurement object must be leveled exactly horizontally and the measuring system must be adjusted to either 4 mA, or 12 mA, depending on the version.

The measuring signal can be between circa 3,8 and 22 mA (whereas the upper value is depending on the supply voltage).

After adjusting the zero point, the functionality and calibration of the whole system is to be checked.

Version	Zero-point	Multimeter range
-xx° ... 0° ... +xx°	12 mA	Range 20 mA DC
0 ... (+xx/2)° ... +xx°	4 mA	Range 20 mA DC

Notice: The case / amplifier must not be opened! Otherwise the gasket will be damaged and the specified protection class / tightness will be reduced. If opened nonetheless, the gasket must be renewed professionally.

■ 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 of 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 axis:	1
Supply voltage:	18 ... 28 VDC, Protected against voltage reversal
Power consumption:	< 1 W
Analogue output / Capacity:	4 ... 20 mA (2-wire), Max. impedance depending on voltage
Frequency (-3dB):	0,5 Hz
Preferred masuring ranges	±3°, ±5°, ±10°, ±15°, ± 20°, ±30°, ±45°, ±60° 0 ... 10°, 0 ... 30°, 0 ... 45°, 0 ... 60°, 0 ... 90° Other ranges on request
Accuracy at 23°C:	Bis ±10°: ±0,1° Bis ±30°: ±0,2° Bis ±60°: ±0,25°
Electrical connections:	Cable: FD CP plus 2 x 0,25 mm ² , Outer sheath: polyurethane-mix Length as requested by customer
Cross-sensitivity	< 1,5% with 30° cross slope
Temperature drift of sensitivity	< -0,25 %/K
Temperature drift of zero-point	< ± 0,1 mV/K
Enclosure	EMC-aluminum die-cast
Protection class:	IP68 DIN EN 60529 (VDE 0470), checking conditions: 1 h, 1 m water depth An additional protection against jet-water is advised.
Dimensions (W x H x D):	115 x 64 x 35 mm (not counting the cable glands and grounding screw)
Weight:	Ca. 800g incl. 10m cable
Storage temperature range:	-25 ... +60 °C
Operating temperature range:	-25 ... +60 °C

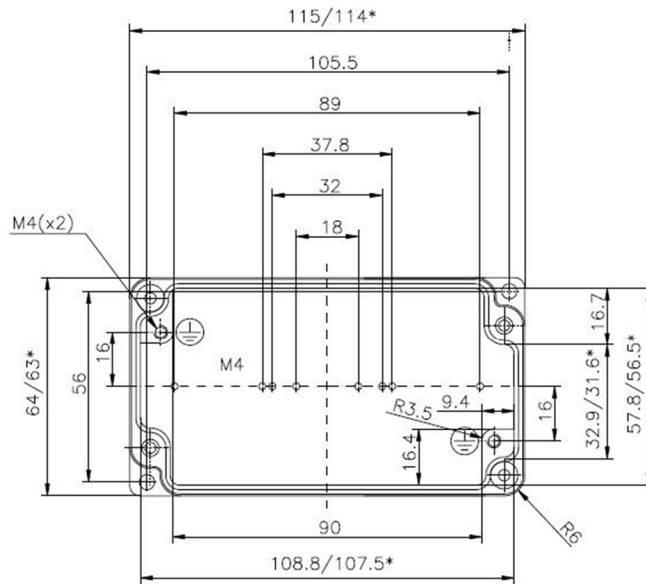


Notice: During operation of the system in an explosion hazardous environment the data of the „EU-Baumusterprüfbescheinigung“ are to be followed.

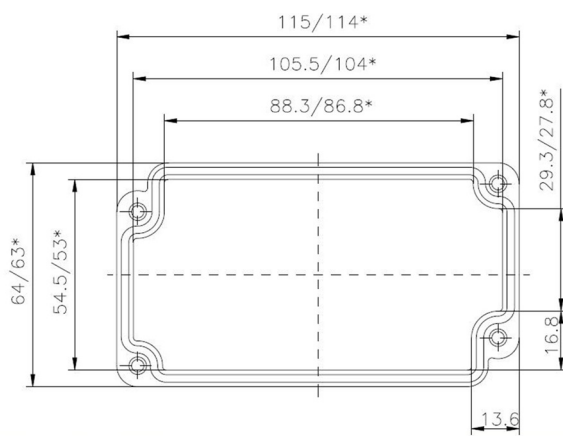
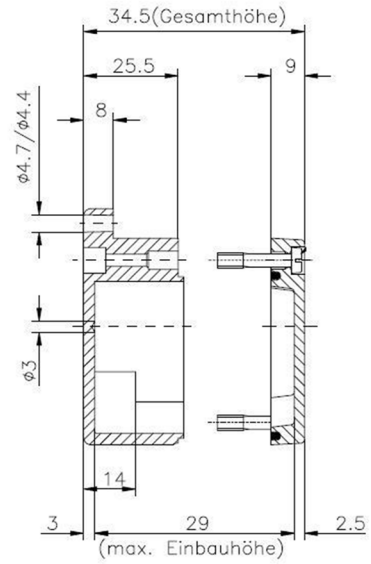
■ Order Designation

NM1-2L-420-ATEX...	1-axis inclination measuring system suitable for explosion hazardous environment with ATEX-inspection certificate
...-Bxx-...	Bidirectional, xx=inclination measuring range, e.g. B45 = ±45 °
...-Lxx-...	Left-handed, xx= inclination measuring range, e.g. L30 = 0 ... -30°
...-Rxx-...	Right-handed, xx= inclination measuring range, e.g. R30 = 0 ... 30°
...-y m	Cable length (1-120m) customer request

■ Housing Dimensions



base



lid

■ Declaration Of Conformity

EG-KONFORMITÄTSERKLÄRUNG / EC Declaration of Conformity

Serien-Nr.: CE1606-131

ALTHEN GmbH, Meß- und Sensortechnik
Frankfurter Straße 150-152
D-65779 Kelkheim

erklären hiermit, daß das folgende Produkt /declares that the following product:

Neigungsmesssystem NM1-2L-420-ATEX-...

in Übereinstimmung ist mit den folgenden Normen und technischen Spezifikationen
oder Teilen von diesen, die für diese Konformitätserklärung zur Anwendung gelangt sind
/ fulfils the below mentioned requirements and specifications or parts of them.

- Spezifikationen gemäß Angebot
sowie Technischer Dokumentation
- DIN EN 61326-1 (2013-07)
(Elektr. Mess-, Regel- und Laborgeräte)

Ort : Kelkheim
Datum : 07.06.2016
Leiter EngineeringAnhang: Bei dem angegebenen Produkt handelt es sich um ein empfindliches messtechnisches
Gerät. Die Inbetriebnahme darf nur durch einen entsprechend geschulten Mitarbeiter
vorgenommen werden.

Die Technische Dokumentation ist zu beachten.
Alle Mess- und Steuerleitungen sind geschirmt auszuführen.
Das Gehäuse ist mit sauberem Erdpotential zu verbinden.
Die Montage/Inbetriebnahme ist unter Beachtung der EMV-Anforderungen für
empfindliche messtechnische Geräte vorzunehmen.

Dieses Gerät darf nicht als alleiniges Mittel zur Abwendung gefährlicher Zustände an
Maschinen und Anlagen eingesetzt werden. Bei sicherheitsrelevanten Anwendungen,
bei denen eine Fehlfunktion einen Personen- oder Sachschaden verursachen kann, ist
eine zusätzliche, unabhängige Überwachung vorzusehen.

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