developing solutions

FISCHER MESS- UND REGELTECHNIK

Operating manual

NK06

Conductive level probe

09015286 • BA_EN_NK06 • Rev. ST4-A • 09/20

Masthead

Manufacturer: **FISCHER Mess- und Regeltechnik GmbH**

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Version history

Rev. ST4-A 09/20	Version 1 (first edition)
Rev. ST4-B 01/26	Version 2 (DNV certificate updated)

Table of contents

1 Safety instructions

1.1 General

This operating manual contains basic instructions for the installation, operation and maintenance of the device that must be followed without fail. It must be read by the installer, the operator and the responsible specialist personnel before installing and commissioning the device.

This operating manual is an integral part of the product and therefore needs to be kept close to the instrument in a place that is accessible at all times to the responsible personnel.

The following sections, in particular instructions about the assembly, commissioning and maintenance, contain important information, non-observance of which could pose a threat to humans, animals, the environment and property.

The instrument described in these operating instructions is designed and manufactured in line with the state of the art and good engineering practice.

1.2 Personnel Qualification

The instrument may only be installed and commissioned by specialized personnel familiar with the installation, commissioning and operation of this product.

Specialized personnel are persons who can assess the work they have been assigned and recognize potential dangers by virtue of their specialized training, their skills and experience and their knowledge of the pertinent standards.

1.3 Risks due to Non-Observance of Safety Instructions

Non-observance of these safety instructions, the intended use of the device or the limit values given in the technical specifications can be hazardous or cause harm to persons, the environment or the plant itself.

The supplier of the equipment will not be liable for damage claims if this should happen.

1.4 Safety Instructions for the Operating Company and the Operator

The safety instructions governing correct operation of the instrument must be observed. The operating company must make them available to the installation, maintenance, inspection and operating personnel.

Dangers arising from electrical components, energy discharged by the medium, escaping medium and incorrect installation of the device must be eliminated. See the information in the applicable national and international regulations.

Please observe the information about certification and approvals in the Technical Data section.

1.5 Unauthorised Modification

Modifications of or other technical alterations to the instrument by the customer are not permitted. This also applies to replacement parts. Only the manufacturer is authorised to make any modifications or changes.

1.6 Inadmissible Modes of Operation

The operational safety of this instrument can only be guaranteed if it is used as intended. The instrument model must be suitable for the medium used in the system. The limit values given in the technical data may not be exceeded.

The manufacturer is not liable for damage resulting from improper or incorrect use.

1.7 Safe working practices for maintenance and installation work

The safety instructions given in this operating manual, any nationally applicable regulations on accident prevention and any of the operating company's internal work, operating and safety guidelines must be observed.

The operating company is responsible for ensuring that all required maintenance, inspection and installation work is carried out by qualified specialized personnel.

1.8 Pictogram explanation

⚠ DANGER

Type and source of danger

This indicates a **direct** dangerous situation that could lead to death or **serious injury** (highest danger level).

1. Avoid danger by observing the valid safety regulations.

⚠ WARNING

Type and source of danger

This indicates a **potentially** dangerous situation that could lead to death or **serious injury** (medium danger level).

1. Avoid danger by observing the valid safety regulations.

⚠ CAUTION

Type and source of danger

This indicates a **potentially** dangerous situation that could lead to slight or serious injury, damage or **environmental pollution** (low danger level).

1. Avoid danger by observing the valid safety regulations.

NOTICE

Note / advice

This indicates useful information of advice for efficient and smooth operation.

2 Product and functional description

2.1 Delivery scope

- NK06 according to specification (see order code)
- Operating Manual

2.2 Device versions

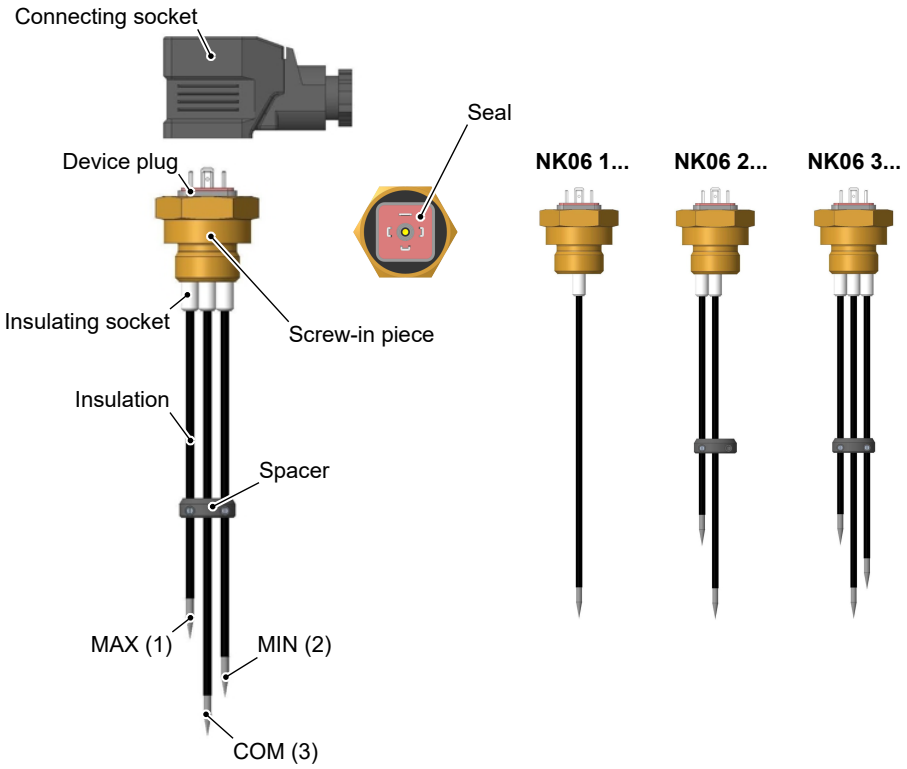


Fig. 1: Device versions

2.2.1 Type plate

The rating plate shown serves as an example of the information contained. For further information, please refer to the order code at the end of these instructions.

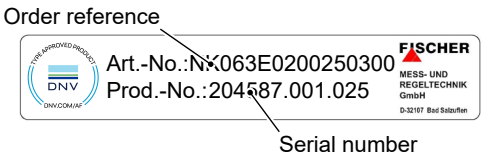


Fig. 2: Type plate

2.3 Intended use

Level probe NK06 is used (in connection with control relay ER76) for automatically controlling and regulating conductive liquid levels in containers. The probe can be used regardless of the container material.

2.4 Function diagram

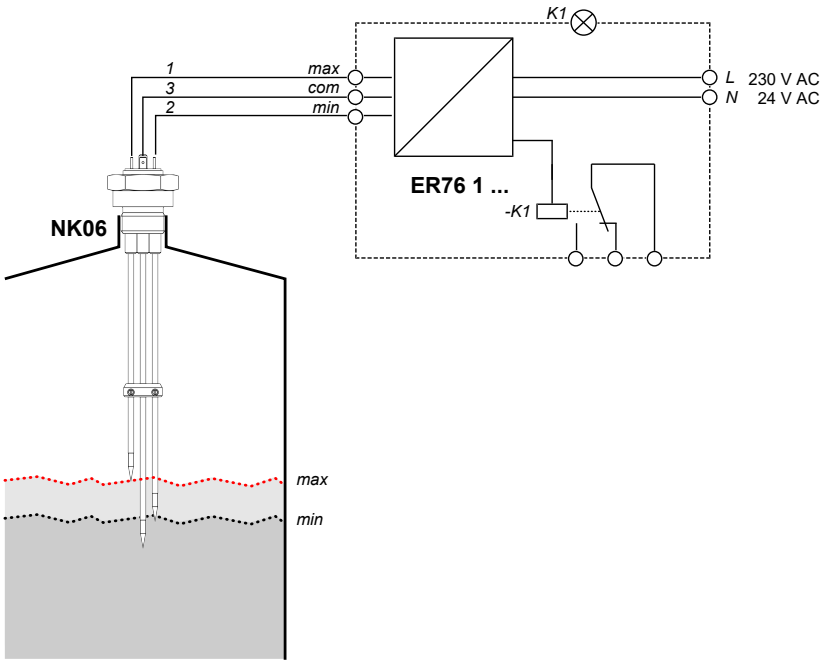


Fig. 3: MIN MAX Detection with NK06 and ER76

2.5 Design and mode of operation

NK06 probe does not have an integrated electronics module. The ER76 control relay is required to monitor or regulate filling levels in tank systems. However, comparable limit switches customary on the market can also be used.

Control relay ER76 supplies an alternating voltage which is applied to the probe rods. As soon as the electrodes are wetted by the liquid, a conductive connection is established to the COM electrode, which is evaluated by the control relay. The filling levels can be queried by a downstream process via the output relay status.

3 Assembly

3.1 General

⚠ CAUTION

Risks connected to medium or system

The builder or operator of the tank system must take suitable protective measures for installation and maintenance.

3.2 Process connection

- By authorized and qualified specialized personnel only.
- Assembly only with the delivered process connection.
- Note the maximum permissible operating pressure of 10 bar.
- Check that the device is compatible with the medium being measured.

The probe is equipped with a G1 thread connection. During assembly, make sure that the rods do not touch the container. The probe length is adapted to the limit level. A distance of at least 10 mm must be maintained between the probe rods and the tank bottom.

Limit level detection

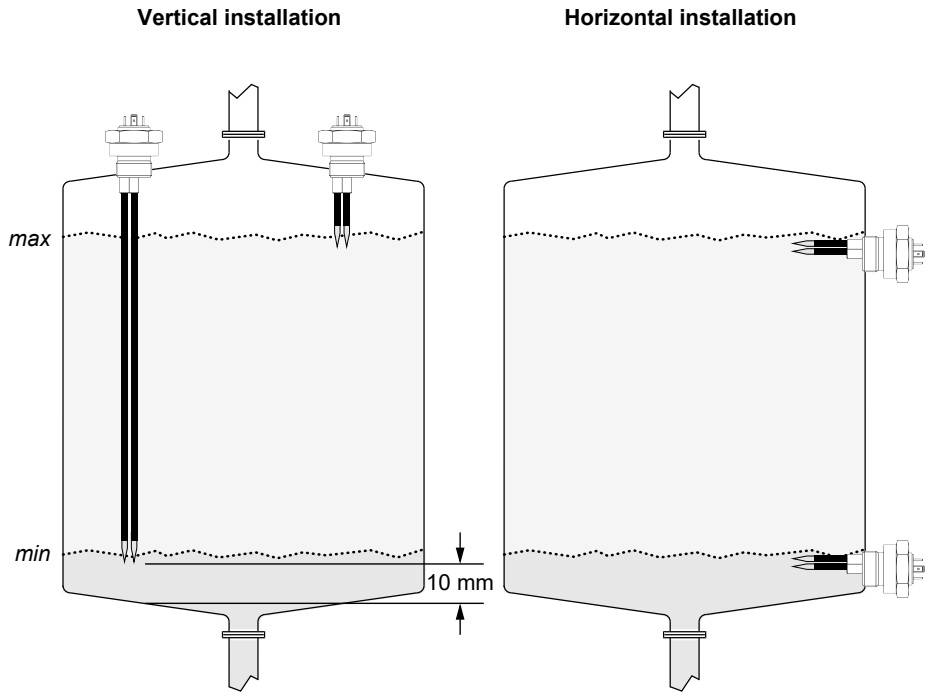


Fig. 4: Probe installation position

Limit level detection two-point control

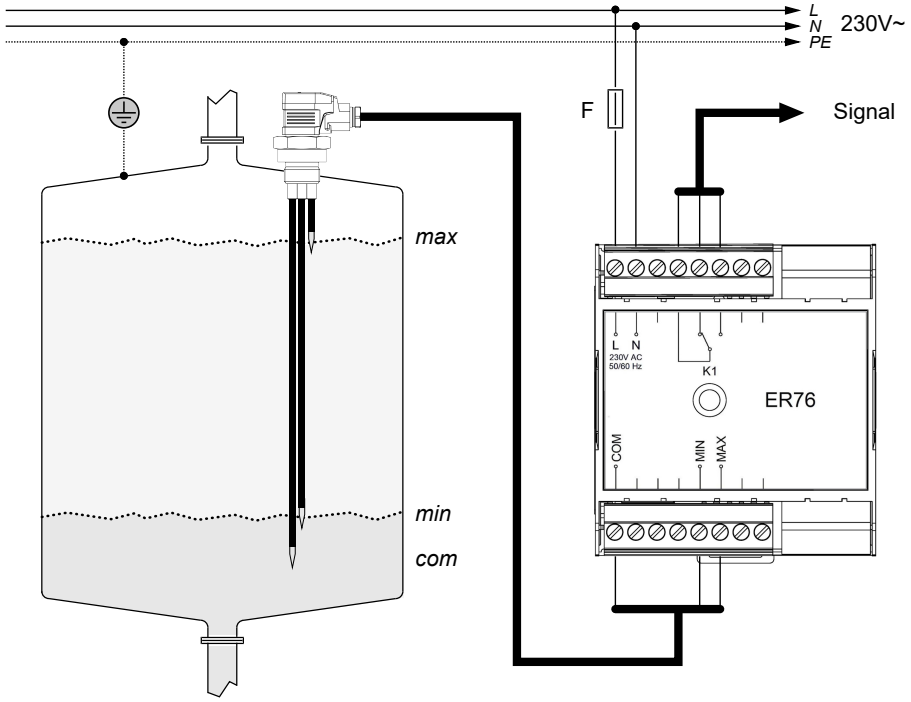


Fig. 5: Two-point control

Limit level detection MIN MAX

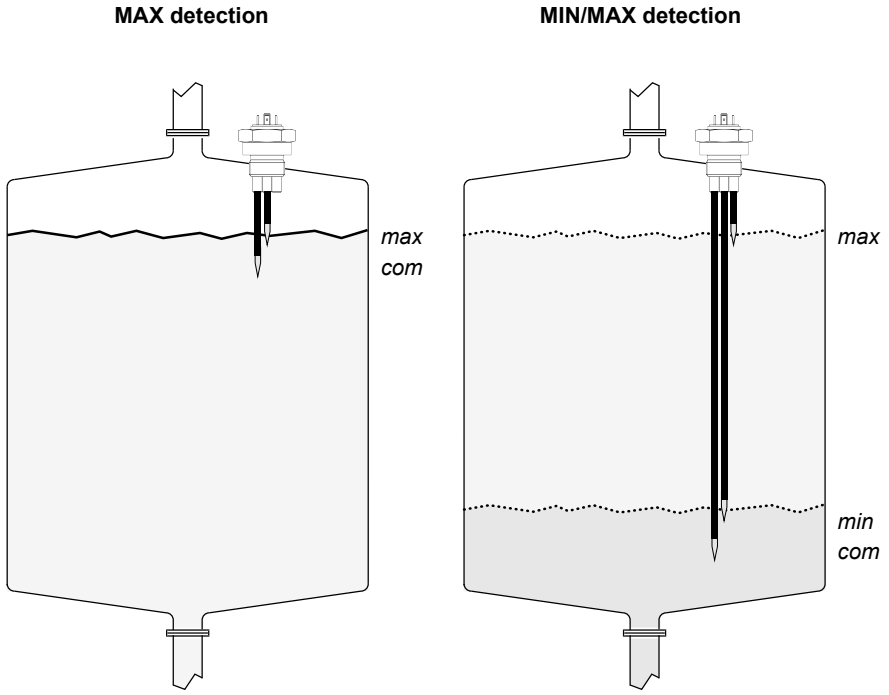


Fig. 6: MIN MAX detection

3.3 Electrical connections

- By authorized and qualified specialized personnel only.
- When connecting the unit, the national and international electro-technical regulations must be observed.
- Disconnect the system from the mains, before electrically connecting the device.
- Install the consumer-adapted fuses.
- Do not connect the connector if strained.

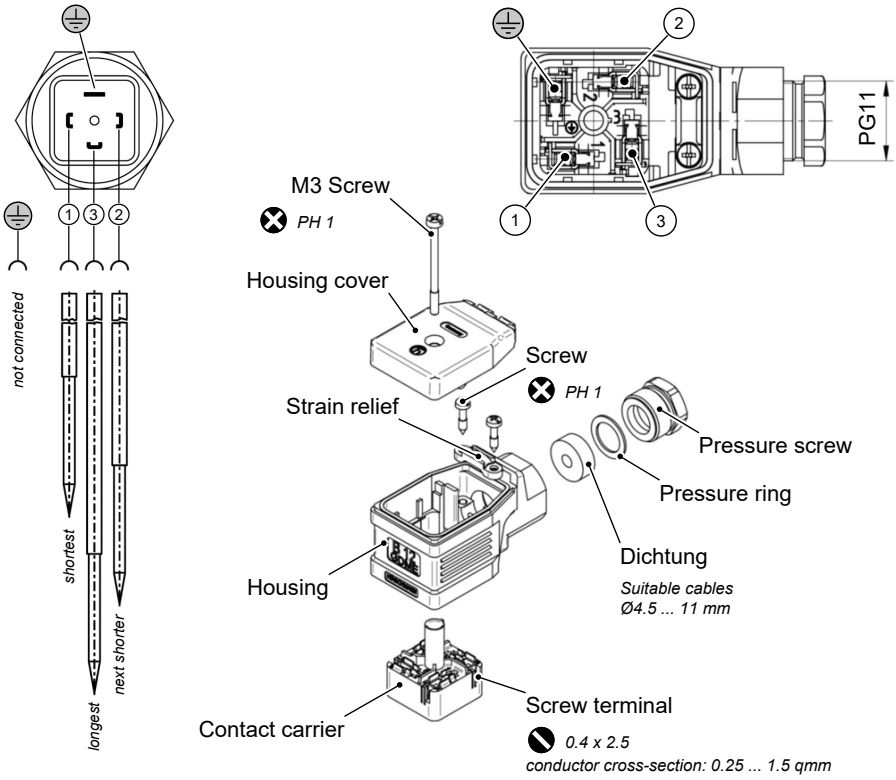


Fig. 7: Electrical connection

Allocation of the electrodes

The connector lug 3 is always assigned to the longest electrode, the connector lug 2 to the next shorter electrode and so on.

Connection cable

The probe is delivered without a cable as standard. For use in shipbuilding, the probe can be supplied with a hard-wired cable with DNV-GL approval (see accessories [▷ 14]).

4 Servicing

4.1 Maintenance

The instrument is maintenance-free. We recommend the following regular inspection to guarantee reliable operation and a long service life:

- Check the function in combination with downstream components.
- Check the leak-tightness of the pressure connection lines.
- Check the electrical connections.

The exact test cycles need to be adapted to the operating and environmental conditions. In combination with other devices, the operating instructions for the other devices also need to be observed.

4.2 Transport

The measuring device must be protected against impacts. It should be transported in the original packaging or a suitable transport container.

4.3 Service

All defective or faulty devices should be sent directly to our repair department. Please coordinate all shipments with our sales department.

⚠ WARNING

Process media residues

Process media residues in and on dismantled devices can be a hazard to people, animals and the environment. Take adequate preventive measures. If required, the devices must be cleaned thoroughly.

Return the device in the original packaging or a suitable transport container.

4.4 Disposal

Please help to protect the environment by always disposing of the work pieces and packaging materials in compliance with the valid national waste and recycling guidelines or reuse them.

5 Technical data

5.1 General

General information	
Type designation	NK06
Number of electrodes	1 to 3
Measurement principle	Conductive

5.2 Input variables

Measuring range	The measuring range is determined by the electrode length. The maximum length is 1000mm. Other lengths available on request.
Input signal	Probe rods covered: A current flows between the rods. Probe rods uncovered: No current flows between the rods.

5.3 Operating conditions

Ambient temperature range	-20 to +50 °C
Storage temperature range	-20 to +50 °C
Medium temperature range	max. 60 °C
Medium conductivity	Depending on the control relay used however, at least 5 µS/cm
Operating pressure	Max. 10 bar
Protection class IP	IP65
DNV	Cert. No. TAA00002BV

5.4 Construction design

Process connection	Screw-in pin G1
Electrical connection	Device plug according to DIN EN 175301-803-A, ISO 4400
Installation position	User-defined
Dimensions	According to customer specification

5.4.1 Materials

Materials of the parts that come into contact with the medium	
Electrode head	Brass
Sealant	NBR
Insulating socket	Delrin (Polyoxymethylen POM)
Electrode insulation	ECTFE (ethylene-chlorotrifluoroethylene), Kynar (polyvinylidene fluoride)
Spacer	Tekaform AH black (polyoxymethylene POM-C)
Probe rod	Stainless steel 1.4305

Materials of the parts that come into contact with the surroundings	
Line socket	PA GF
Sealant	NBR
Electrode head	Brass

5.4.2 Dimension drawings

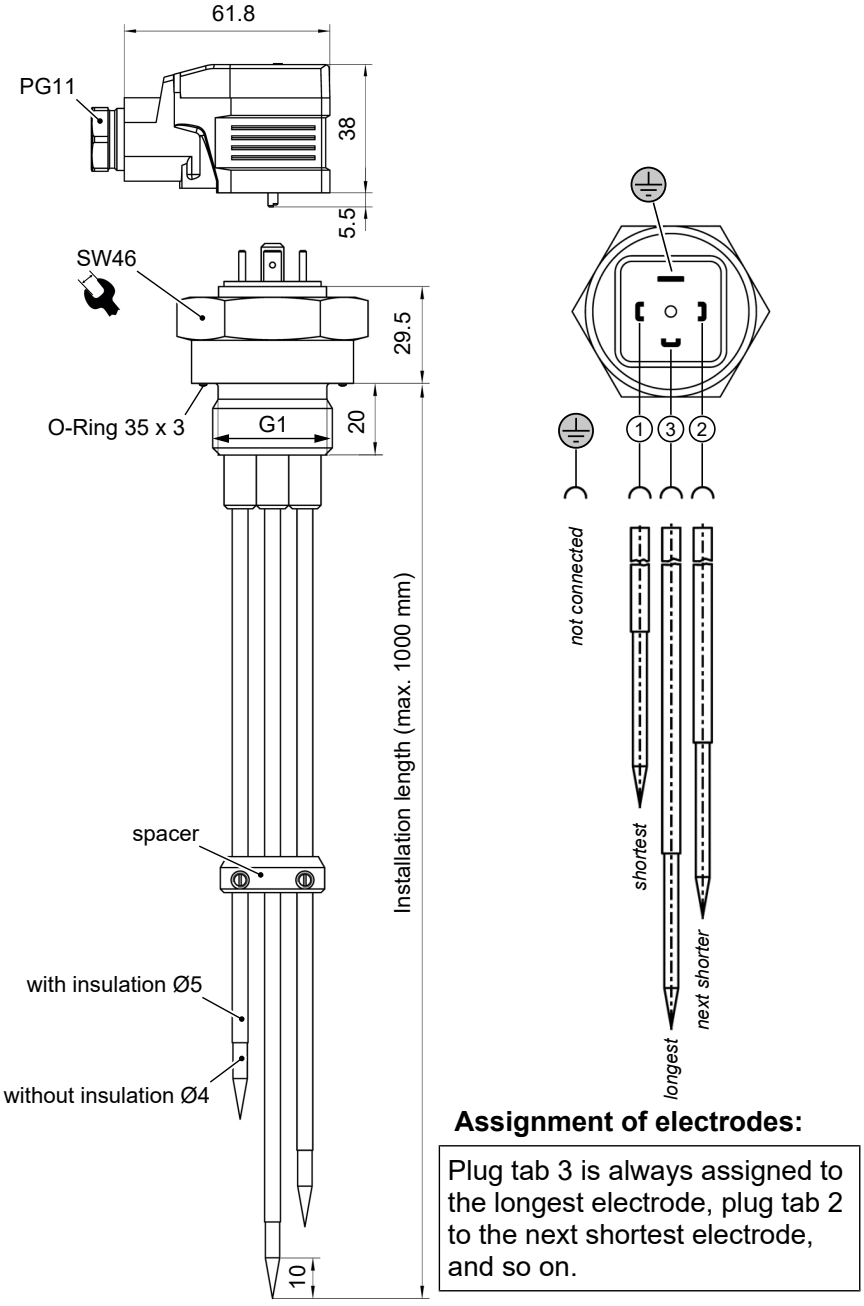
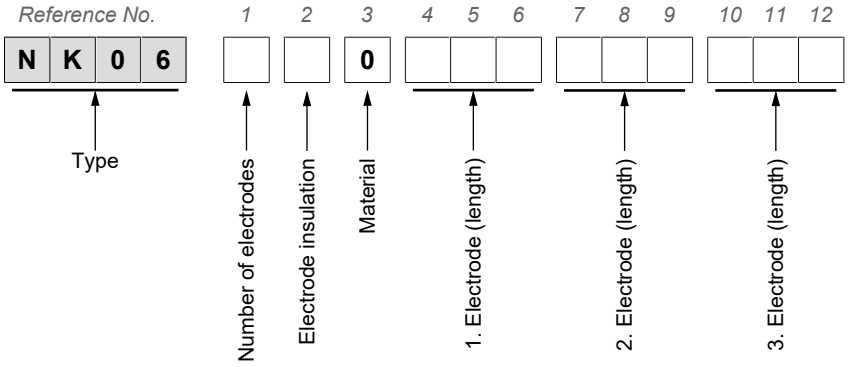


Fig. 8: Dimension drawing

To prevent the bars from vibrating, a spacer is installed from a bar length of 300 mm. From 800 mm a second is added in the middle. With very different rod lengths, the spacer may not be able to be set at all or it may be in a different position.

The probe rod length is limited to 1000 mm. However, special dimensions can also be produced on request.

6 Order codes



Number of electrodes:

[1]	*(Code no.)*
1	1 electrode
2	2 electrodes
3	3 electrodes

Electrode insulation:

[2]	*(Code no.)*
0	Without insulation
E	With ECTFE coating
K	With Kynar (shrink-fit tubing)

Material:

[3]	*(Code no.)*
0	Electrode head made of brass Electrode rods made of stainless steel 1.4305

1. Electrode:

[4-6]	*(Code no.)*
###	Length in mm from the sealing surface

2. Electrode:

[7-9]	*(Code no.)*
###	Length in mm from the sealing surface

3. Electrode:

[10-12]	*(Code no.)*
###	Length in mm from the sealing surface

From a length of 1000 mm, electrodes are only available on request.

6.1 Accessories

Control relay for level sensors (with DNV-GL approval)

Order no.	Relay	Supply
ER76 10000001	1	230V AC
ER76 10000004	1	24V AC
ER76 20000001	2	230V AC
ER76 20000004	2	24V AC

7 Attachment

DNV

TYPE APPROVAL CERTIFICATE

Certificate no.:
TAA00002BV
Revision No:
1

This is to certify:

that the Level Switches

with type designation(s)
NK06

issued to
Fischer Meß- und Regeltechnik GmbH
Bad Salzuflen, Nordrhein-Westfalen, Germany

is found to comply with
DNV rules for classification – Ships, offshore units, and high speed and light craft

Application:

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Location classes:

Temperature	**B**
Humidity	**B**
Vibration	**A**
EMC	**--**
Enclosure	**Required protection according to DNV Rules shall be provided upon installation on board**

Issued at **Hamburg** on **2024-06-03**

This Certificate is valid until **2029-06-02**.
DNV local unit: **Hamburg**

Approval Engineer: **Heinz Scheffler**

for **DNV**

Digitally signed by
Elter, Frederik Tore
Location: DNV
Høvik, Norway

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Fig. 9: DNV_EN_NK06_TAA00002BV_page_1

Job ID: **262.1-030918-2**
Certificate no.: **TAA00002BV**
Revision No: **1**

Product description

Electronic Level Switch
Type: NK06

- Number electrodes: 1 ... 3
- Working pressure: max. 10 bar
- Media temperature: max.60°C
- Ambient temperature: -20°C ... 50°C
- Material electrode head: brass
- Material electrode: stainless steel 1.4305
- Length of electrode: max. 1000 mm
- Screwed plug: G1"A
- Conductivity min.: 5 @S/cm (min.)
- Appliance plug: GDME 3011

To be used with level circuit electronic type ER76 = GT76.
In case of several electrodes rods with a length of > 500 mm spacers have to be used.

Application/Limitation

The Type Approval covers hardware listed under Product description. When the hardware is used in applications to be classed by DNV, documentation for the actual application is to be submitted for approval by the manufacturer of the application system in each case. Reference is made to DNV Rules for Ships Pt.4 Ch.9 Control and Monitoring Systems.

Type Approval documentation

Data sheet: NK06 DB_EN_NK06, Rev. ST4-A
Part list no. NK06 Dwg.-no. 06554.V, Rev. AC
Drawing no: NK06 Dwg.-no. 26514, Rev. h
Test Report: Test report: 6N 1 to 4 V

Tests carried out

Applicable tests according to DNV Class Guideline CG-0339, August 2021.

Marking of product

The products to be marked with:

- Model name
- Manufacturer name
- Serial number

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE

Fig. 10: DNV_EN_NK06_TAA00002BV_page_2

Notes

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