



## Level and level with temperature switch (NVT) Operating/Assembly instructions



The level and level with temperature switches (NVT) serve for monitoring both the level and level and temperature in simple hydraulic or lubrication units.

### Table of contents

<b>1</b>	<b>Technical data</b>	<b>2</b>
<b>2</b>	<b>Advice</b>	<b>3</b>
2.1	General advice	3
2.2	Safety and advice symbols	3
2.3	General hazard warnings	3
2.4	Intended use	3
<b>3</b>	<b>Storage, transport and packaging</b>	<b>4</b>
3.1	Storage	4
3.2	Transport and packaging	4
<b>4</b>	<b>Assembly</b>	<b>4</b>
4.1	Start-up	5
4.2	Adjusting the level contacts	5
4.3	Contact fuse	6
4.4	Selection of pin assignment	7
4.5	Information about temperature contacts	7
4.6	Pin assignment	7
<b>6</b>	<b>Disposal</b>	<b>8</b>
<b>7</b>	<b>Maintenance and cleaning</b>	<b>8</b>
<b>8</b>	<b>Spares inventory, customer service addresses</b>	<b>8</b>
<b>9</b>	<b>Enclosure A</b>	<b>9</b>
9.1	Type code	9
9.2	EU Certificate of conformity	10



1 Technical data

Switching tube

Operating pressure: max. 1 bar
Operating temperature: max. 80 °C
Density of fluid: Min. 0.8 kg/dm³
Float: PU
Switching tube: MS
Flange: MS

Level contacts

Function: NC (break contact)
Distance between contacts: 40 mm
Max. operating voltage: 230 V
Max. switching current: 0.5 A
Contact load: 10 VA

Temperature contacts

Function: NC (break contact)
Max. operating voltage: 250 V
Max. switching current: 2 A
Max. contact load: 100 VA
Break point: 60 °C/70 °C/80 °C
Tolerance of break point: ± 5 K
Switch-back difference: 18 K ± 5 K

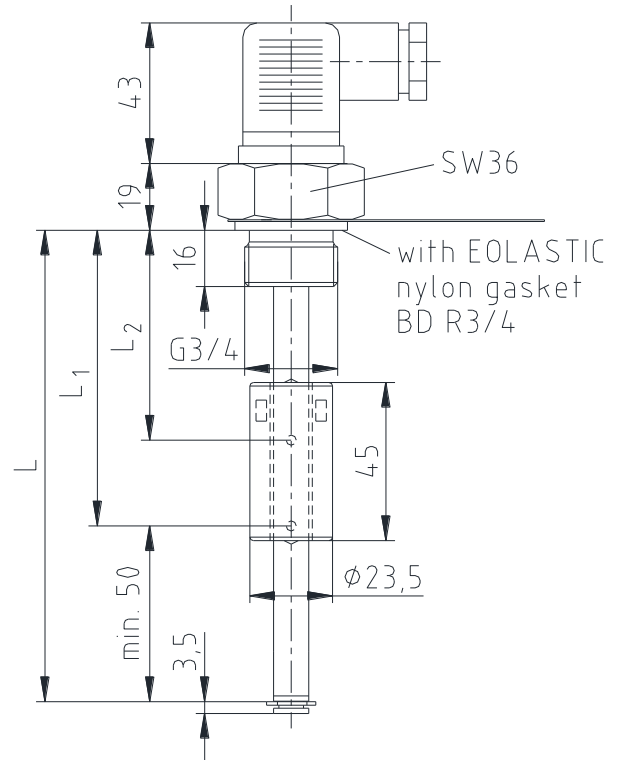


Illustration 1

Table 1: Dimensions

Table with 4 columns: Size, L, L1, L2. Rows for NVT22, NVT37, NVT45.

Plug-in connection:

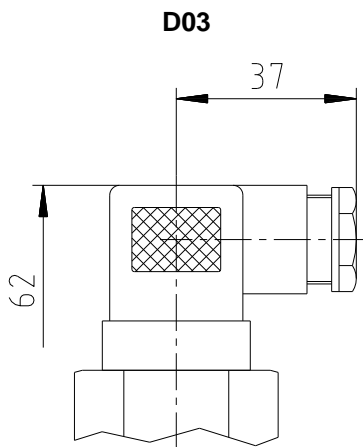


Illustration 2: plug-in connection D03 (3 poles) + PE, DIN 43650

Protection class IP65
Cable fitting PG11
Max. voltage 230 V AC/DC

DM12

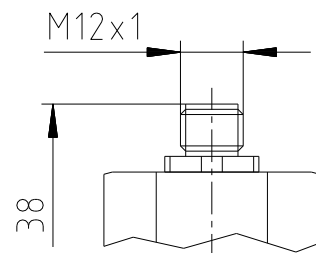


Illustration 3: plug-in connection DM12 (4 poles)

Protection class IP67\*\*
Max. voltage 24 V DC

\*\* with sealed cable socket

Table with 3 columns: Please observe protection note ISO 16016., Drawn/Verified dates, Replacing/Replaced by information.



## 2 Advice

### 2.1 General advice

Please read through these operating/assembly instructions carefully before you assemble the level and level with temperature switch.

Please pay special attention to the safety instructions!

The operating/assembly instructions are part of your product. Please store them carefully and close to the level and level with temperature switch. The copyright for these operating/assembly instructions remains with KTR.

### 2.2 Safety and advice symbols



**Warning of personal injury**

This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death.



**Warning of product damages**

This symbol indicates notes which may contribute to preventing material or machine damage.



**General advice**

This symbol indicates notes which may contribute to preventing adverse results or conditions.

### 2.3 General hazard warnings



**With assembly and disassembly of the level and level with temperature switch it has to be made sure that the entire drive train is secured against accidental switch-on. You may be seriously hurt by rotating parts. Please make absolutely sure to read through and observe the following safety indications.**

- All operations on and with the NVT have to be performed taking into account "safety first".
- Please make sure to switch off the power pack before you perform your work on the NVT.
- Secure the power pack against accidental switch-on, e. g. by providing warning signs at the place of switch-on or removing the fuse for current supply.
- Do not reach into the operation area of the machine as long as it is in operation.
- Remove the fuse for power supply before you perform your work on the NVT.

### 2.4 Intended use

You may only assemble and disassemble the NVT if you

- have carefully read through the operating/assembly instructions and understood them
- had technical training
- are authorized by your company

The NVT may only be used in accordance with the technical data (see chapter 1). Unauthorized modifications on the NVT are not admissible. We will not assume liability for any damage that may arise. In the interest of further development we reserve the right for technical modifications.

The **level and level with temperature switch (NVT)** described in here corresponds to the technical status at the time of printing of these operating/assembly instructions.



**3 Storage, transport and packaging**

**3.1 Storage**

The level and level with temperature switches are supplied in preserved condition and can be stored at a dry and roofed place for 6 - 9 months.

The features of the NVT remain unchanged for up to 5 years with favourable storage conditions.



**The storage rooms must not include any ozone-generating devices like e. g. fluorescent light sources, mercury-vapour lamps or electrical high-voltage appliances. Humid storage rooms are not suitable. Please make sure that condensation is not generated. The best relative air humidity is less than 65 %.**

**3.2 Transport and packaging**



**In order to avoid any injuries and any kind of damage please always make use of proper transport and lifting equipment.**

The NVT are packed differently each depending on size, number and kind of transport. Unless otherwise contractually agreed, packaging will follow the in-house packaging specifications of KTR.

**4 Assembly**

After transport and supply of the level switches the bistable contacts may have a switching status different from the one projected for intended use during operation.

That is why the float of the level switch has to be shifted on the level switching tube from below immediately before installation.

This measure makes sure that all bistable contacts installed have a clearly defined switching status.

The level switch is supplied fully assembled and can be fastened on the tank via screw-in threads or screw-in flanges and fixing screws. In this context please make sure that the float can move freely and sufficient distance to the tank walls and to other equipment is kept.

If the float has possibly been disassembled it has to be made sure that the magnet inside the float is positioned above the fluid level. This can easily be inspected by means of a piece of iron which allows to find out the position of the magnet in the float.



**Please note the following items:**

**Danger of electric shock**

**When connecting the equipment the maximum permissible voltages and currents (see technical data) have to be noted and the cable cross sections and circuit breakers have to be adapted accordingly.**

**With the selection of the connection cables the maximum permissible operating temperatures of the equipment must be observed.**

**Assembly in specific applications:**

**If the device is mounted outdoors or in the wet area, a maximum of 16 V AC effectively or 35 V DC as operating voltage is permissible.**

Please observe protection note ISO 16016.	Drawn: 2018-02-21 Kb/Ha	Replacing: KTR-N 41026
	Verified: 2018-02-26 Kb	Replaced by:



4 Assembly

4.1 Start-up



The electrical connection may be performed by trained technical staff only.



The device must not be operated beyond its specification!

Connection:

For the pin assignment of your NVT see selection tables on page 6 and 7. For electrical data about plugs and contacts see page 7.

4.2 Adjusting the level contacts

The contacts for level measurement are clamped on an edge rod inside the protective tube. They are positioned following the specifications given in the order, but can be infinitely adjusted, if necessary.



Please absolutely observe chapter 2.3 before you perform any kind of work on the level and level with temperature switch.

- Break the voltage supply.
- Delete any connections and pull out the plug.
- Screw off the plug socket.
- Carefully pull out the edge rod along with the contacts upwards.



The ground wire is led as a loop and soldered on the protective tube internally in direction of insertion. In order to avoid tearing off the ground wire, it should not be pulled out completely.

- Mark the original contact position.



Never try to take the contacts out of the edge rod forwards, since the glass body is damaged in this way. Do not pull on the wires.

- Carefully shift the contacts on the edge rod to the requested positions. For that purpose make use of a small screwdriver or something similar. If the contacts are fully tightened, use a drop of oil. Make sure to observe the minimum distances.

If the contacts are designed as make contact (NO) or brake contact (NC), the contact function can be reversed by rotating the contacts by 180°. Symbols for make contact and break contact and an arrow are shown on the housing. The arrow pointing upwards when being mounted indicates the contact function that is valid. The logic of contacts assumes that the level switch is installed in an empty tank, i. e. it is in operating position only after filling.

**Red mark on top**      **Red mark at the bottom**  
 Function of make contact with decreasing level (NC)      Function of break contact with decreasing level (NO)

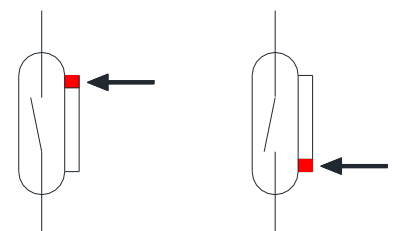


Illustration 4: Function

Please observe protection note ISO 16016.	Drawn: 2018-02-21 Kb/Ha	Replacing: KTR-N 41026
	Verified: 2018-02-26 Kb	Replaced by:

## 4 Assembly

### 4.2 Adjusting the level contacts

- For reversing the switching function pull the contact upwards or downwards out of the edge rod. Insert the contacts rotated by 180°C and shift them in the requested position.
- First insert the ground wire in the protective tube, if the wire was pulled out of the protective tube.
- In addition form one wire length as a loop and carefully shift on the edge rod.

### 4.3 Contact fuse

Subject to their design Reed contacts are very long-lasting and reliable components. Nevertheless note the following with the operation:

#### Service life of Reed switches:

The service life of Reed switches can be up to  $10^9$  switching cycles. It is reduced by high load and/or incorrect or unavailable protective circuits when switching inductive, capacitive or lamp load.

That is why it must be assured that one or several of the maximum permissible limit values are never exceeded, not even for short-term, and that contact protection wiring is installed with not purely resistive loads. The use of test lamps with the installation of devices is not permissible, either, since too high current may flow through them which may damage the Reed contacts. Powerless testing devices should be used here in every case.

#### Contact protection wiring for Reed switches:

With DC voltage a free-wheeling diode as per illustration 5 must be connected in parallel with the contact.

With AC voltage an RC element as per illustration 6 and table 2 must be connected in parallel with the contact.

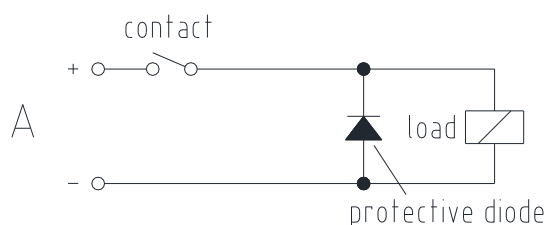


Illustration 5: contact - A

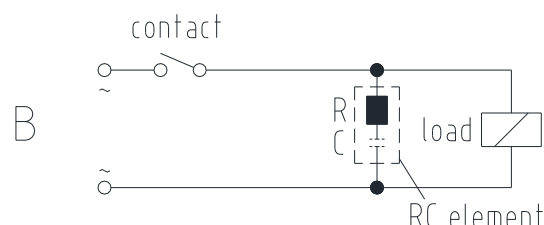


Illustration 6: contact - B

Table 2:

Load in VA	10		25		50	
Voltage on contact V	R/Ohm	C/μF	R/Ohm	C/μF	R/Ohm	C/μF
24	22	0.022	1	0.1	1	0.47
60	120	0.0047	22	0.022	1	0.1
110	470	0.001	120	0.0047	22	0.022
230	470	0.001	470	0.001	120	0.0047

Please observe the max. permissible voltages/loads of the respective level contacts!

#### Voltages and currents

All level contacts with Reed switches can switch minimum switching voltages of 10 μV and minimum switching currents of 1 μA.

The maximum figures specified for the respective contact types apply.

That is why level contacts with Reed switches can promptly be used both for SPS applications and high loads (within the framework of the maximum limit values).

Please observe protection note ISO 16016.	Drawn: 2018-02-21 Kb/Ha	Replacing: KTR-N 41026
	Verified: 2018-02-26 Kb	Replaced by:



**4 Assembly**

**4.3 Contact fuse**

**Contact material**

On all Reed switches in KTR level switches rhodium is used as a contact material in the area of the original contact surfaces.

**4.4 Selection of pin assignment**

Considering the lengths the contacts have to be read from bottom to top (see illustration 7).

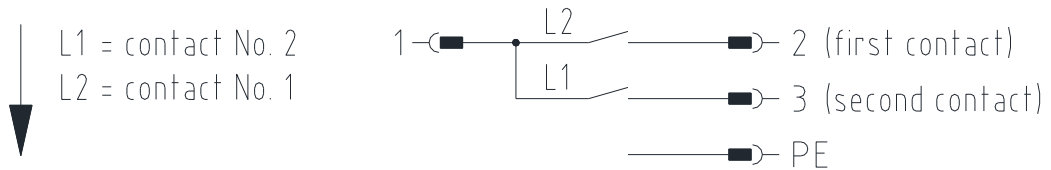


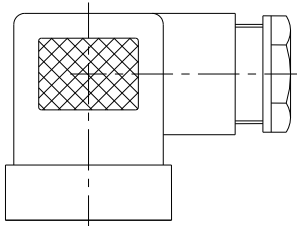
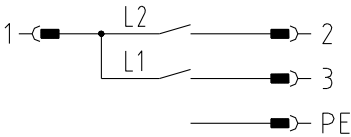
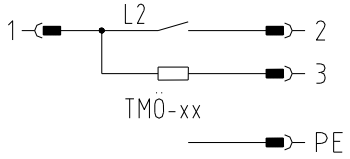
Illustration 7: Pin assignment of contacts

**4.5 Information about temperature contacts**

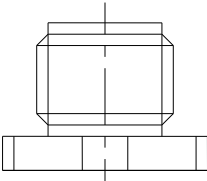
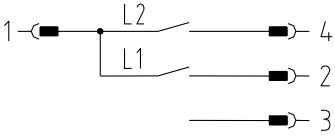
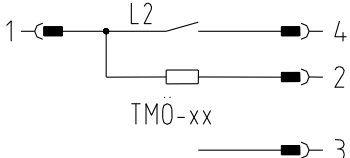
The temperature contact is a temperature contact serving as break contact (TMÖ). For technical details please refer to page 7.

**4.6 Pin assignment**

**Table 3: NVT with plug connection D3**

Plug type	Type	Part No.	Type	Part No.
 <p>Illustration 8: Plug connection D03</p>	NVT xx-1-0-D3	261xx0100100	NVT xx-2-60-D3	261xx0260100
			NVT xx-2-70-D3	261xx0270100
			NVT xx-2-80-D3	261xx0280100
	 <p>Illustration 9: Pin assignment</p>		 <p>Illustration 10: Pin assignment</p>	

**Table 4: NVT with plug connection DM12**

Plug type	Type	Part No.	Type	Part No.
 <p>Illustration 11: Plug connection DM12</p>	NVT xx-1-0-DM12	261xx0100200	NVT xx-2-60-DM12	261xx0260200
			NVT xx-2-70-DM12	261xx0270200
			NVT xx-2-80-DM12	261xx0280200
	 <p>Illustration 12: Pin assignment</p>		 <p>Illustration 13: Pin assignment</p>	

Please observe protection note ISO 16016.	Drawn: 2018-02-21 Kb/Ha	Replacing: KTR-N 41026
	Verified: 2018-02-26 Kb	Replaced by:



**6 Disposal**

In respect of environmental protection we would ask you to dispose of the products on termination of their service life in accordance with the legal regulations and standards that apply, respectively.

**7 Maintenance and cleaning**

**NVT** is a maintenance-free level and level with temperature switch.



Do not use any detergents which may corrode the materials used.  
**The way of cleaning the equipment must be adapted to the IP protection class of the equipment.**

**8 Spares inventory, customer service addresses**

A basic requirement to ensure the readiness for use of the level and level with temperature switch (NVT) is a stock of the most important spare parts on site.

Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage at [www.ktr.com](http://www.ktr.com).



**KTR does not assume any liability or warranty for the use of spare parts and accessories which are not provided by KTR and for the damages which may incur as a result.**

Please observe protection note ISO 16016.	Drawn: 2018-02-21 Kb/Ha	Replacing: KTR-N 41026
	Verified: 2018-02-26 Kb	Replaced by:



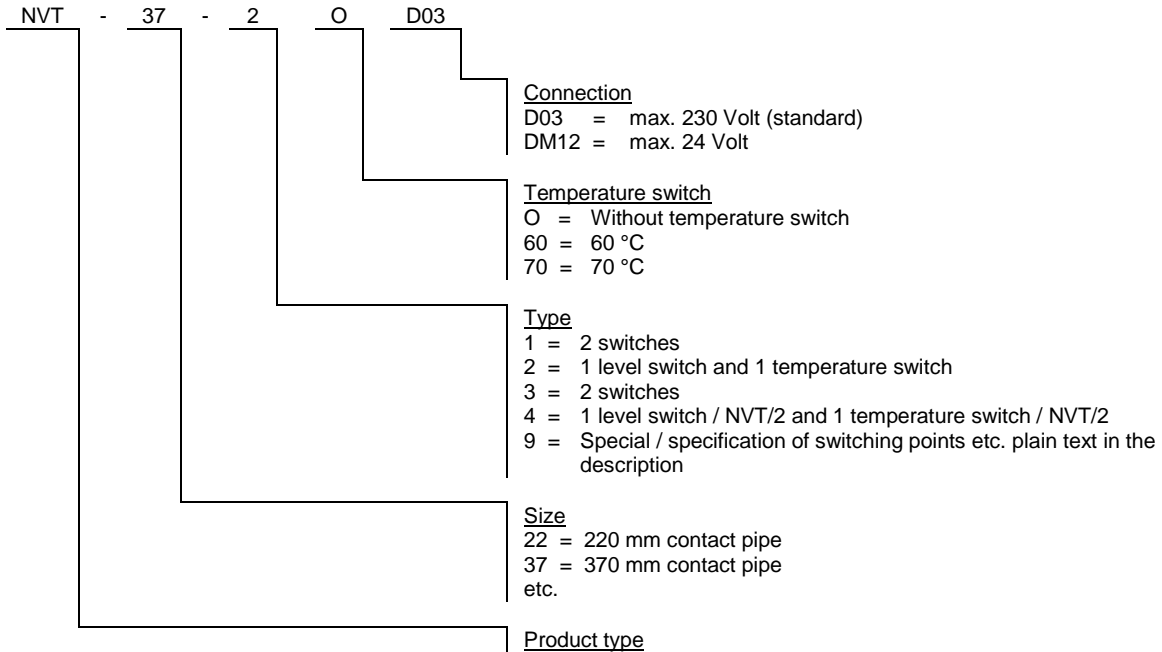


9 Enclosure A

9.1 Type code

Extract from KTR standard 02610 sheet 1 (edition 1):

Level and level with temperature switch (NVT)



Types of level switches:

Level switch type D03

- NVT xx-1-0-D3
- NVT xx-2-60-D3
- NVT xx-2-70-D3
- NVT xx-2-80-D3

Level switch type DM12

- NVT xx-1-0-DM12
- NVT xx-2-60-DM12
- NVT xx-2-70-DM12
- NVT xx-2-80-DM12



9 Enclosure A

9.2 EU Certificate of conformity

## EU Certificate of Conformity

in accordance with EU directive 2014/35/EU dated February 26, 2014

The manufacturer - KTR Systems GmbH, D-48432 Rheine - states that the below-mentioned product  
**level and level with temperature switch (NVT)**  
complies with the major requirement of directive 2014/35/EU (Low-Voltage Directive) as last amended.

The level and level with temperature switch complies with the specifications of the following standards/guidelines:

2014/30/EU Directive for electromagnetic compatibility (EMV directive)

The equipment serves for monitoring level and temperature in tanks for fluid systems.

The a. m. product of the declaration complies with the relevant harmonisation directives of the Union.

DIN EN 61010-1 Safety regulations for electrical measuring, control and laboratory equipment  
DIN EN 61326-1 Electrical measuring, control and laboratory equipment - EMC specifications

This Declaration of Conformity is issued under the sole responsibility of the manufacturer.  
The persons in charge of this Declaration of Conformity is Mr. Christoph Bettmer having his address at the company's headquarters.

Rheine,  
Place

2018-01-24  
Date

i. V.   
Christoph Bettmer  
Product Manager