



NVT-E

Operating/Assembly instructions

 KTR-Group	NVT-E Operating/Assembly instructions	KTR-N 42611 EN Sheet: 2 of 29 Edition: 7
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The level switches series NVT-E serve for monitoring level and temperature in tanks in fluid systems. Depending on the model, the level switches are equipped with a different number of switching outputs. Please find the configuration on the type plate. Here you will find our type description.

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Please observe protection note ISO 16016.	Drawn: 2026-06-08 Fes Verified: 2026-06-08 Fes	Replacing: KTR-N dated 2026-01-08 Replaced by:
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1 Technical data

Technical data

Operating pressure:	Max. 1 bar
Operating temperature:	-20 °C to +80 °C
Ambient temperature:	-20 °C to +70 °C
Weight:	Approx. 400g
Density of fluid:	Min. 0.8 kg/dm ³
Float:	PU
Immersion pipe:	MS
G 3/4 flange:	MS
Measuring resistor:	Reed chain
Resolution:	10 mm
Temperature sensor:	PT100 class B DIN 60751

Display and control unit

Display:	4-digit 7-segment LED display
Operation:	via 3 buttons
Memory:	Min. and max. value memory
Current consumption with starting:	Approx. 100 mA for 100 ms
Current consumption during operation:	Approx. 50 mA
Supply voltage (U _B):	10-32 V DC (nominal voltage 24 V DC)
Protection class:	IP 65
Display units:	Level: % , cm, L, i, Gal Temperature: -20 °C to +120 °C or -4 °F to 248 °F
Setting range:	Level: e. g. 0-100 % Temperature: 0 °C to +100 °C or 32 °F to 212 °F
Accuracy:	1 % of final value

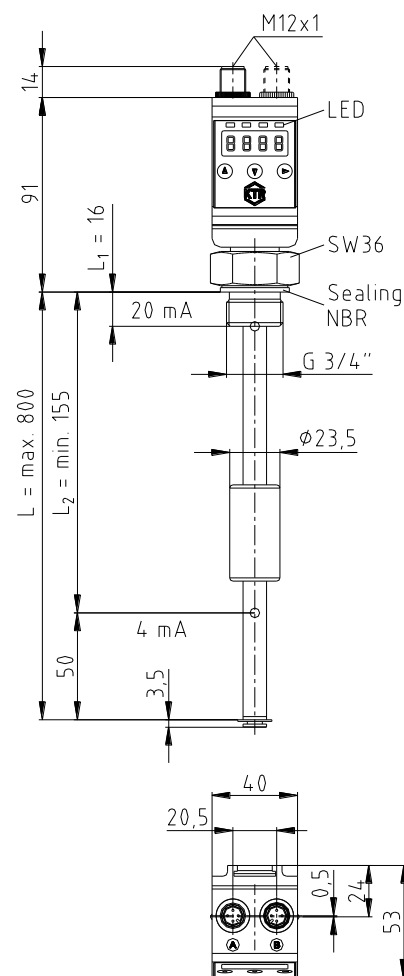
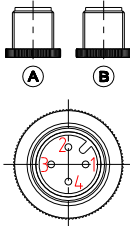
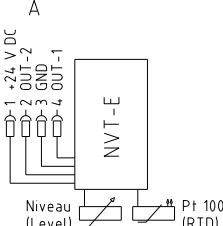
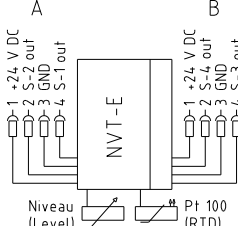
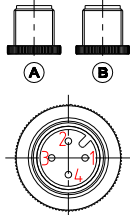
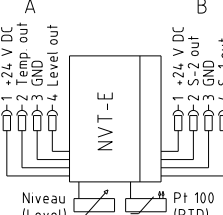
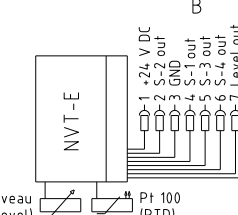


Illustration 1

Table 1: Pin assignment

Type	Special type	NVT-E ...-4-M12
PNP transistor output	2 time	4 time
Analogue output - level	---	---
Analogue output - temperature	---	---
		
Type	NVT-E ...-2NT-M12	Special type
PNP transistor output	2 time	4 time
Analogue output - level	1 time	1 time
Analogue output - temperature	1 time	1 time
		

2 Advice

2.1 General advice

Read carefully through these operating/assembly instructions before you assemble the level and temperature control.

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 temperature control. 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 temperature control it must be made sure that the entire drive train is secured against accidental switch-on. You may be seriously hurt by rotating parts. Make absolutely sure to read and observe the following safety instructions.

- All operations on and with the NVT-E must be performed taking into account "safety first".
- Make sure to switch off the power pack before you perform your work on the NVT-E.
- 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.
- Secure the rotating drive components against accidental contact. Provide for the necessary protection devices and covers.

2.4 Intended use

You may only assemble and disassemble the NVT-E if you

- have carefully read through the operating/assembly instructions and understood them
- are technically qualified and specifically trained (e. g. safety, environment, logistics)
- are authorized by your company

The NVT-E may only be used in accordance with the technical data (see chapter 1). Unauthorized modifications on the NVT-E 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 temperature control (NVT-E)** described in here corresponds to the state-of-the-art at the time of printing of these operating/assembly instructions.

**3 Assembly**

The level transmitters are supplied fully assembled and can be fixed to the tank by means of the screw-in thread. 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 must be made sure that the magnet inside the float is located 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 inside the float.

3.1 Start-up (General)

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

Connection

The mains voltage is connected to connector S6 or M12. Nominal voltage of devices is 24 V DC. For mounting dimensions and pin assignment please refer to chapter 1 *Technical Data*.

The switching outputs are designed as PNP transistor outputs (see illustration 2).



If the switching output is measured with high-impedance measuring equipment or if used as a frequency output, connect a 10 kΩ resistor between output and ground to avoid faulty measurements.

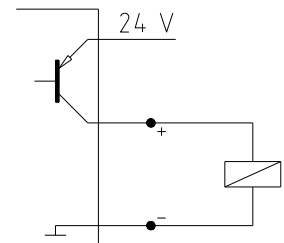


Illustration 2

4 Operation**4.1 Switching on**

If an error message appears in the display during normal operation, please refer to chapter 5 *Breakdowns, Causes and Elimination*. After connecting the device to the mains, the software version is displayed initially for a short time. Afterwards, the display switches to measurement display.

The functions of the display and control unit are explained in the following chapters.

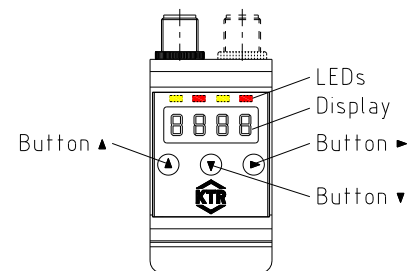


Illustration 3

4 Operation

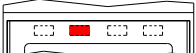
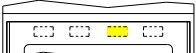
4.2 LED status display

Light emitting diodes above the measurement display indicate the status of the switch outputs. The LEDs are assigned to the switching outputs.



Table 2 shows the factory settings for the assignment of the switch outputs as level or temperature output.

Table 2: LED status display

LED display		2 switching outputs	4 switching outputs
	LED 1 - yellow indicates switching output 1	Level	Level
	LED 2 - red indicates switching output 2	Temperature	Level
	LED 3 - yellow indicates switching output 3	---	Temperature
	LED 4 - red indicates switching output 4	---	Temperature



The switching characteristics of the LEDs (illuminated with closed or opened switch contact) can be changed, please note chapter 4.7 *switching outputs*.

4.3 Button functions

Operation is performed via the buttons below the display.

Table 3: Button functions

Button	Mode	Function
	- Measurement display:	Switching the display (example):  (▶) 
	- Within the menu:	Switching to a submenu
	- At the end of the menu:	Switching to a superordinate menu  (Exit) indicates the end of the menu
	- After input/selection:	Accepting and saving a value entered or a feature selection
	- Measurement display:	Displaying the configuration
	- Within the menu:	Scrolling up the menu item, value or feature selection. Pressing the button changes the value continuously.
	- Measurement display:	Switching to the main menu
	- Within the menu:	Scrolling down the menu item, value or feature selection. Pressing the button changes the value continuously.
 *	- Within the menu:	Exiting the main, sub- or optional menu and returning to measurement display
 *	- Within the menu:	Switching to the superior menu level
60 s no action *	- Within the menu:	Exiting the main, sub- or optional menu

* The values that were modified are not stored if you exit the optional or setting menu.



A detailed explanation of the menu control is listed in the following chapters.

**4 Operation****4.3 Button functions**

To select a menu item and set the values proceed as follows:

- Open the main menu via the button ►.
- Select the submenu via the buttons ▼ and ▲ and open the submenu via the button ►.
- If applicable, select the next submenu via the buttons ▼ and ▲ and open it using the button ►.
- Select the requested menu item via the buttons ▼ and ▲ and open the parameter list via the button ►.
- Set the value using the buttons ▼ and ▲ and accept via the button ►.
The amended settings are saved and the device returns to the submenu.
- Exit the submenu by selecting menu item EXIT and press button ► to accept.
The device returns to the superordinate menu or measured value display, respectively.

4.4 Button lock active

If the button lock is activated, retrieving the menu via button ▼ shows the display



instead of the main menu. The active digit is marked by a dot.

- Enter the code via the buttons ▼ and ▲ and press the button ► to accept.
The active digit shifts to the right by one place. Having entered the 3rd digit the main menu is opened.



Having entered an incorrect code, the device returns to measurement display. If you have forgotten the password, enter the master code 287 to return to the menu.

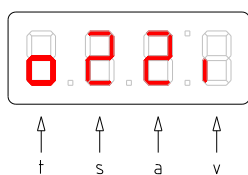
To unlock the button lock, reset the password with the input 000 in the menu item **L o c** in the submenu *Basic Settings Extended Functions* **b.E.F.**

4.5 Summary of menu

The menu structure is based on the VDMA standard 24574 and following.

The menu has a hierarchy structure. The highest menu level includes recording of the main menu, e. g. **o i L**, **t E n P**, **b.E.F.**, **d i A E**. Each main menu comprises further submenu items.

The menu items may vary depending on the configuration of the device. Your device may not provide all menu items described below. You can retrieve the configuration by pressing the button ▲ in the display mode. A 4-digit code is displayed, e. g.:

**Meaning of the 4-digit code tsav:**

t: type

s: number of switching outputs

a: number of analogue outputs

v: mounting of device

t = temperature measurement

o = level and temperature measurement

2 or 4

0 or 2

i = standard mounting (installation of tank)

**4 Operation****4.5 Summary of menu**

The different menu items are not displayed if the option is not available.

Example: With a=0 the menu items for setting the analogue output are not available. In this case you may skip the description of these items.

The structure of the main menu *filling level* (o i L) and *temperature* (t emp) is identical. These menus include all settings for the switching outputs or the analogue outputs (if available).

The basic settings of the device may be changed. General settings are made in the menu *Basic settings extended functions* (b.E F). These settings should be made first, since they affect displays and settings in the different menus. General settings are, for example, the units used and the assignment of the switching outputs for measurement of filling level and temperature. The assignment of the analogue outputs cannot be changed.

In addition the menu *Diagnostics* provides options of diagnostics.

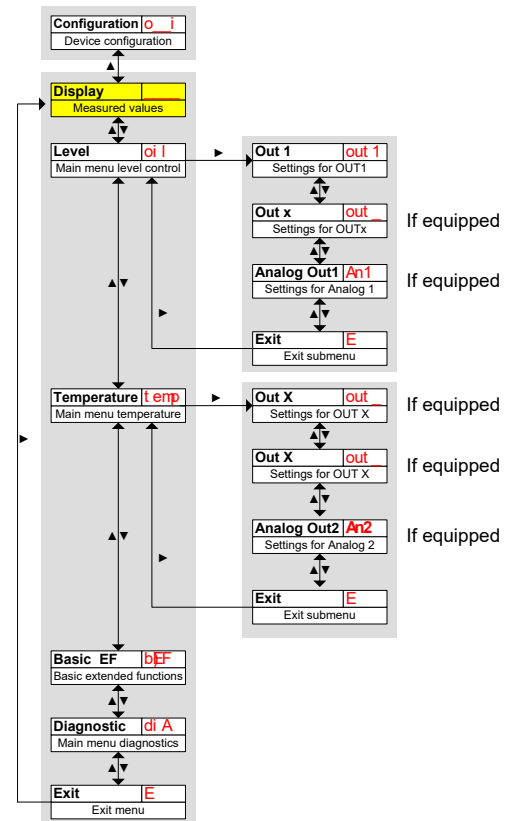


Illustration 4



A detailed explanation of the overall menu structure is shown at the end of these operating/assembly instructions.

4.6 Amendment of basic settings

In the menu *Basic settings extended functions* (b.E F) general basic settings are made. These settings affect the display of values in the measuring display as well as the options of settings in the menus *filling level* and *temperature*. It is possible to change the assignment of switching outputs for measurement of filling level and temperature (if available) in this menu, too.

- Press the button ▼ to open the main menu.
- Select the menu item **b.E F** via the buttons ▼ and ▲ and open the menu via the button ►.

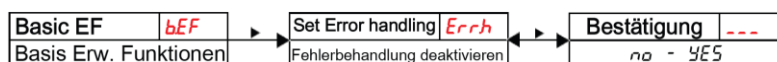
**4 Operation****4.6 Amendment of basic settings****4.6.1 Switching off normal failure processing**

Switching off normal failure processing and failure assessment may in some circumstances lead to hazardous operating conditions, hazards for operators or machines. Before using this option, check the hazard potential within your process. In the event of this setting, KTR Systems GmbH accepts no responsibility for damage to health or material that may occur as a result of this setting.

In this menu you can activate/deactivate the normal failure processing and failure assessment.

The function switching off failure processing (**E r r h**) deactivates normal failure processing and failure assessment.

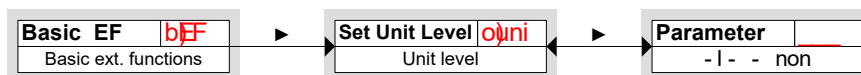
In some circumstances this may lead to hazards for operators and machines.



The following menu items are available:	
	Deactivates normal failure processing.
	Activates normal failure processing. (Standard setting)
Please note: If the measured value range is exceeded or sensor errors arise, the measured value is frozen and all six LEDs in the status bar flash. When the measured value is back within the valid range, flashing of the LEDs stops and the display is updated normally again.	

4.6.2 Defining filling level

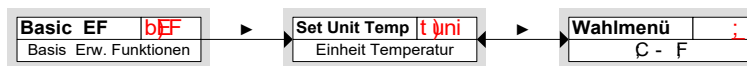
In this menu the displayed unit symbol for the filling level is defined.



The following menu items are available:					
Per cent	cm	Inch	Litre	Gallons	none
Please note: - If „no unit“ is selected, the measured values are scaled to a 4-digit display. - The measured values are not automatically converted. Having converted the unit the measurement range should be scaled, if necessary (see menu <i>filling level</i> o.H i and o.L o).					

**4 Operation****4.6 Amendment of basic settings****4.6.3 Defining temperature**

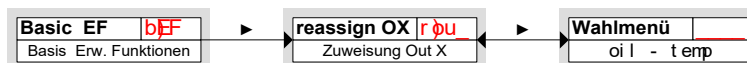
In this menu the displayed unit symbol for the temperature is defined.



	The following menu items are available:	
	 Degrees Celsius	 Degrees Fahrenheit
Please note: If changing the setting, all respective settings such as setting of switching points are amended accordingly.		

4.6.4 Reassignment of switching outputs

The amendment of assignment of the switching outputs is described here based on the example of switching output 1.



The switching outputs 1 to n can be assigned optionally to the measuring size of filling level or temperature. The assignment affects the appearance of the menu *filling level* and *temperature* . In the factory setting the switching output OUT 1 is assigned to the filling level.

Example: OUT 1 shall be assigned to temperature. For that purpose must be set to . As a result the setting menu is shifted from the menu *filling level* to the menu *temperature*. The procedure for amending the settings does not change.



With reassignment of the switching outputs all corresponding settings must be verified. The figures set before are not automatically adapted. The assignment of LEDs for status display does not change.

	The following menu items are available:	
	 Measurement of filling level	 Measurement of temperature



The other switching outputs for measurement of filling level or temperature are assigned in the same way as switching output 1. Perform the same steps as described for switching output OUT 1.

**4 Operation****4.6 Amendment of basic settings****4.6.5 Setting updating rate of display**

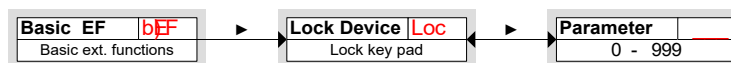
Depending on the application the updating rate of the display can be set. The display can be fully switched off as well. The function of LED continues to be operative.



The following menu items are available:				
	fast	medium	slow	display off
Please note: Error messages continue to be displayed in spite of the display being switched off.				

4.6.6 Activating/Deactivating button lock

To prevent unauthorized modifications of settings on the device, it is possible to activate a button lock.



The button lock is activated if at least one digit is set > 0. While entering the data the active digit is marked with a dot.

	- Open the parameter menu by pressing the button ►: - Set the digit via the buttons ▼ and ▲ (0 to 9) and accept by pressing the button ►. The active digit shifts to the right by one digit. - Finally confirm the code by pressing the button ►. The device returns to the submenu.
	Please note: Enter 000 to deactivate the button lock.

**4 Operation****4.6 Amendment of basic settings****4.6.7 Scaling of charging level**

Scaling of the display range is effected between the highest and the lowest level of the float. The display accuracy and the resolution for defining the switching outputs for the charging level are affected by this scaling, too.

The factory setting of the switching point and the display is shown in illustration 5:

A: Factory settings

1: Measuring range

A: Types with analogue output:

The factory setting provides for an ascending display with the filling level rising so that 0% are displayed at the lowest possible level and 100% at the highest possible level. These values can be modified as described below.

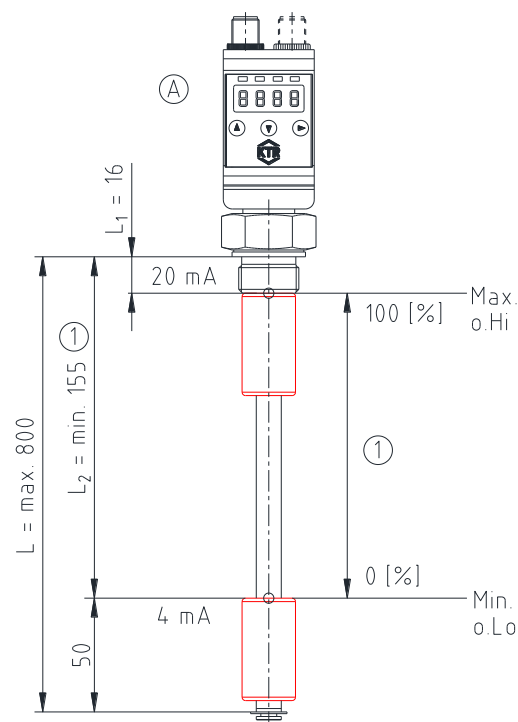
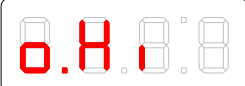
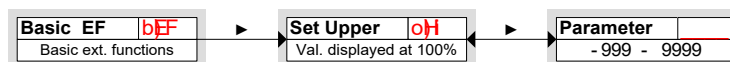


Illustration 5

4.6.8 Maximum displayed value of filling level

The displayed value (upper limit of the measurement range) for the maximum filling level is defined here.



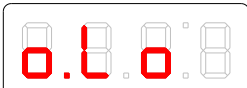
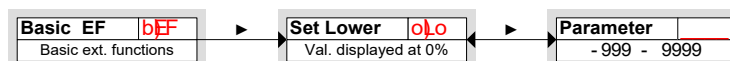
Setting range:
-999...9999

Assignment of the maximum displayed value (upper limit of the measurement range) to the maximum filling level**Please note:**

- To prevent misoperation, the settings of the level outputs should be reviewed or adapted after changing.

**4 Operation****4.6 Amendment of basic settings****4.6.9 Minimum displayed value of filling level**

The displayed value (lower limit of the measurement range) for the minimum filling level is defined here.



Setting range:
-999...9999

Assignment of the maximum displayed value (upper limit of the measurement range) to the maximum filling level**Please note:**

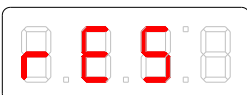
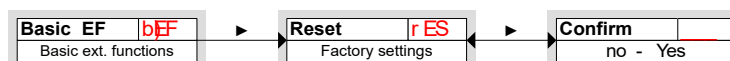
- To prevent misoperation, the settings of the level outputs should be reviewed or adapted after changing.

4.6.10 Resetting factory settings (Reset)

The function **Reset (r E S)** allows to reset the factory settings. Since the limit values are reset, too, it is not absolutely necessary to review the settings for the charging level and the temperature.



All modifications are lost when using the function RESET.

**The following menu items are available:**

Delivery status: NO.
The current settings are maintained.



Delivery status: Yes.
The settings are reset to the standard factory settings.

**4 Operation****4.6 Amendment of basic settings****4.6.11 Factory settings****Definitions of the factory settings set:**

SPx / rPx	Switching point / reset point x
dSx / drx	Delay for switching/delay for resetting for switching output x
Rx.Hi / Rx.Lo	Maximum and minimum measured value for output
A.o.uX	Signal characteristics of analogue output
o.uX	Switching characteristics of switching output x
o.un1 / t.un1	Unit for filling level/temperature
o.H1 / o.Lo	Maximum / minimum filling level
r.o.uX	Assignment of switching output x towards filling level or temperature monitoring
d1 S	Updating rate of display
Loc	Button lock
SJ.o.u	Recorded switching output
d.o.NN	Delay for recording the minimum/maximum charging level
d.t.NN	Delay for recording the minimum/maximum temperature



With customised parameters presetting by the factory may differ from the figures specified in here.

Table 4: Type with 4 switching outputs

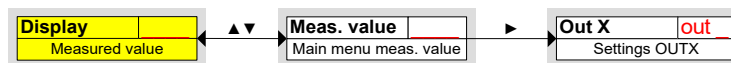
Switching outputs		Basic settings		Diagnosis	
SP1 / rP1	5% / 2%	o.un1	-I- (%)	SJ.o.u	o.ut1
dS1 / d r1 / o.u1	0 / 0 / H n o	t.un1	°C	d.o.NN	0.0
SP2 / rP2	15% / 12%	o.H1	100 %	d.t.NN	0.0
dS2 / d r2 / o.u2	0 / 0 / H n o	o.Lo	0 %		
SP3 / rP3	70 / 65 °X	r.o.u1	o1 L		
dS3 / d r3 / o.u3	0 / 0 / H n o	r.o.u2	o1 L		
SP4 / rP4	80 / 75 °X	r.o.u3	tENP		
dS4 / d r4 / o.u4	0 / 0 / H n o	r.o.u4	tENP		
		d1 S	FAST		
		Loc	000		

Table 5: Type with 2 switching outputs and 2 analogue outputs

Switching outputs		Basic settings		Diagnosis	
SP1 / rP1	5% / 2%	o.un1	-I- (%)	SJ.o.u	o.ut1
dS1 / d r1 / o.u1	0 / 0 / H n o	t.un1	°C	d.o.NN	0.0
SP2 / rP2	60 / 55 °X	o.H1	100 %	d.t.NN	0.0
dS2 / d r2 / o.u2	0 / 0 / H n o	o.Lo	0 %		
		r.o.u1	o1 L		
Analogue outputs		r.o.u2	tENP		
A1.H1 / A1.Lo / A.o.u1	0 / 100 / 1 1	d1 S	FAST		
A2.H1 / A2.Lo / A.o.u2	0 / 100 / 1 1	Loc	000		

**4 Operation****4.7 Switching outputs**

All switching outputs are set in the same way. Therefore, the number of the switching output is marked with x. Call up the switching output to be set via the menu of the corresponding measurement size (**0 L** or **1 E N P**).

**Table 6: Assignment of switching outputs (factory-provided)**

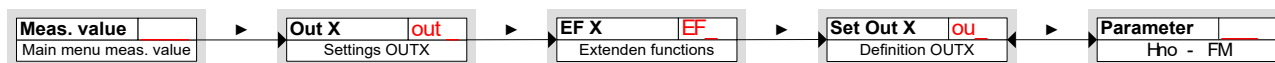
Switching output	Assignment with 2 switching outputs	Assignment with 4 switching outputs
1	Level	Level
2	Temperature	Level
3		Temperature
4		Temperature



The assignment of the switching outputs as well as further basic settings referring to all switching outputs can be modified in the menu **Basic settings extended functions**. The submenu **Extended functions** allows to make further settings for each switching output, for example, the switching characteristics of the output. Testing the output is possible here, too.

4.7.1 Definition of switching characteristics

The switching characteristics for the output are defined in the following menu:



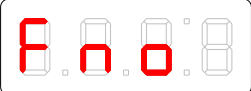
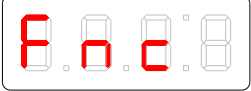
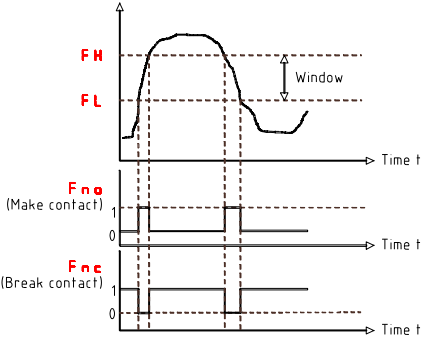
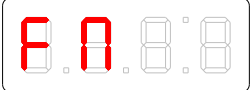
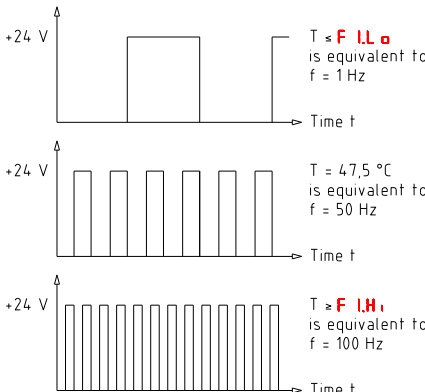
	The following menu items are available:	
Hysteresis function Hysteresis function make contact Hysteresis function break contact	Function of make contact or break contact setting the output signal when exceeding the switching point defined. If the reset point is fallen below, the output signal is deleted. Make contact means here that the PNP switching output is closed if the measured value is above the switching point 5 Px and is opened if the reset point 1 Px is fallen below. Break contact means here that the PNP switching output is open if the measured value is above the switching point 5 Px and is closed if the reset point 1 Px is fallen below. See explanations in the drawing below.	



4 Operation

4.7 Switching outputs

4.7.1 Definition of switching characteristics

Window function  Window function make contact  Window function break contact	Function of make contact or break contact defining a signal window. If the measure window is reached, the output signal is set and deleted once it is left. <i>Make contact</i> means here that the PNP switching output is closed if the measured value is within the window limits. Otherwise the switching output is open. <i>Break contact</i> means here that the PNP switching output is open if the measured value is within the window limits. Otherwise the switching output is closed. 
Frequency output  Frequency output	If the output is defined as a frequency output, a square wave signal with a frequency between 1 Hz and 100 Hz is given proportionally to the measured value. To increase the slew rate of the square wave signal, we recommend to load the switching output with a 10 kΩ resistance. Example: $F.I.L.o = 15\text{ °C}$, $F.I.H.i = 80\text{ °C}$ with temperature T and frequency f: 



The switching function may have different descriptions:

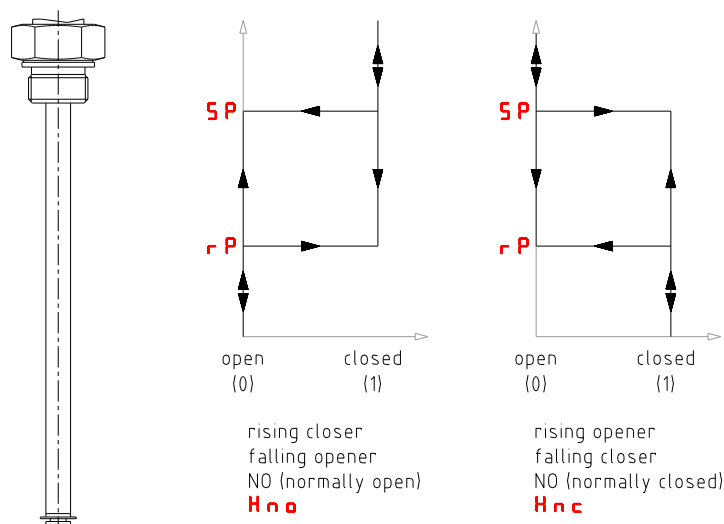


Illustration 6

**4 Operation****4.7 Switching outputs****4.7.2 Upper switching limit (set point)**

The upper switching limit for switching output OUT 1 is set in the following submenu:



Setting range: [o.L o] [o.H o]	Switching point for OUT x
	Please note: The switching point must be set within the measuring range (see menu <i>Basic settings extended functions</i>). - If the function window was assigned to the switching output OUT 1, is displayed. The value set corresponds to the upper window limit. - If the function frequency output was assigned to the switching output OUT 1, is displayed. The value set corresponds to the frequency 100 Hz.

4.7.3 Lower switching limit (reset point)

The lower switching limit for switching output OUT 1 is set in the following submenu:

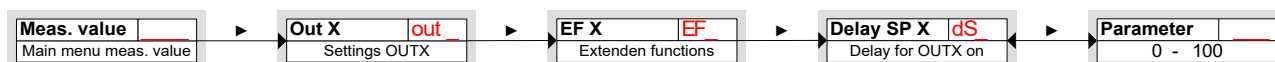


Setting range: [o.L o] [o.H o]	Reset point for OUT 1
	Please note: The reset point must be set within the measuring range. - If the function window was assigned to the switching output OUT 1, is displayed. The value set corresponds to the upper window limit. - If the function frequency output was assigned to the switching output OUT 1, is displayed. The value set corresponds to the frequency 1 Hz.

**4 Operation****4.7 Switching outputs****4.7.4 Delay for set point**

The menu *Extended functions* **E F_x** provides further settings for the switching output x. You can find the submenu on the second submenu level:

The delay time for set point and reset point prevents too many false alarms with turbulent conditions. The delay for the set point is set in the following menu:



Setting range:
0 100 seconds

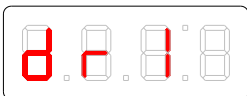
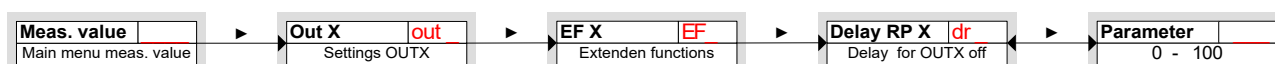
Time period in seconds during which the signal must remain continuous to allow the switching output to respond.

Please note:

- If the function *window* was assigned to the switching output OUT x, the value set corresponds to the delay for set point detecting when finally reaching the measurement window.
- If the function *frequency output* was assigned to the switching output OUT x, this value does not have any effect.

4.7.5 Delay for reset point

The delay for reset point is set in the following menu:



Setting range:
0 100 seconds

Delay for reset signal for OUT x

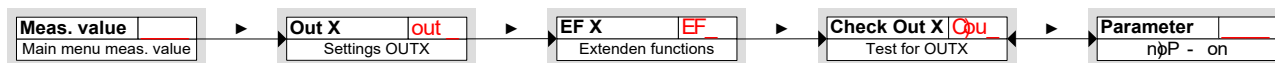
Time period in seconds during which the signal must remain continuous to allow the switching output to respond.

Please note:

- If the function *window* was assigned to the switching output OUT 1, the value set corresponds to the delay for set point detecting when the measurement window is actually left.
- If the function *frequency output* was assigned to the switching output OUT 1, this value does not have any effect.

**4 Operation****4.7 Switching outputs****4.7.6 Testing the switching output**

Testing the switching output can be started in the following menu:



	Testing options for the switching output Options for setting from ou 1 to H n o / H n c / F n o / F n c:		
	Normal operation of switching output	Switching off the switching output permanently	Switching on the switching output permanently
	Options for setting from ou 1 to F n		
	Normal operation as a frequency output	Output frequency 1 Hz	Output frequency 100 Hz



On completion of the tests make absolutely sure to set the function to normal operation **n.o.P.**

4.7.7 Changing display function of status LED

The switching status of the output is indicated by the LEDs in the display. The assignment of LEDs to the switching output is shown in the table below:

Table 7:

Numbering of LED	Switching output x	Assignment with 2 switching outputs	Assignment with 4 switching outputs
	1	LED 1 - yellow	LED 1 - yellow
	2	LED 2 - red	LED 2 - red
	3		LED 3 - yellow
	4		LED 4 - red

In the factory settings the LED displays the physical condition of the PNP switching output (switching output closed - LED is illuminated).

In some cases the logical function of the display is to act differently from the physical signal on the switching output. Therefore, the display in this menu item can also be reverted (switching output opened - LED is illuminated).

Example based on temperature:

Two switching outputs are available for temperature which are set as follows:

- Upper switching contact: maximum contact, ascending make contact. The LED is illuminated when the maximum value of temperature is exceeded and the temperature is beyond the requested range. Thus, the status displayed is "error" if the LED is illuminated.
- Lower switching contact: minimum contact, ascending break contact. The LED is illuminated with the factory settings when the minimum value of temperature is exceeded. In this case the LED would be illuminated if the status was in order.

4

Operation

4.7

Switching outputs

4.7.7

Changing display function of status LED

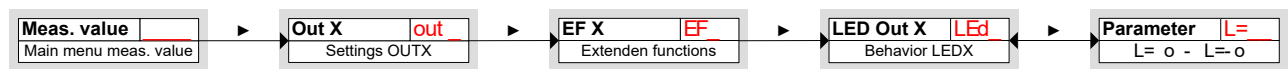
The table shows an example with factory settings and with inverted status function for LED3.
The switching points are defined as follows:

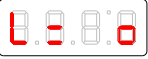
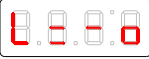
$$\begin{array}{ll} SP3 = 70\text{ }^{\circ}\text{C}, & \neg P3 = 65\text{ }^{\circ}\text{C} \\ SP4 = 80\text{ }^{\circ}\text{C}, & \neg P4 = 75\text{ }^{\circ}\text{C} \end{array}$$

Table 8:

	Factory settings	Status function LED3 inverted	Condition	Status
A	 LED3 on	 LED3 off	Temperature rising to > 70 °C PNP switching output 3 is closed	OK
B	 LED4 and LED3 on	 only LED4 on	Temperature rising to > 80 °C PNP switching output 4 is closed	Error
C	 LED3 on	 LED3 off	Temperature dropping to < 75 °C PNP switching output 4 is opened	OK
D	 LED3 off	 LED3 on	Temperature dropping to < 65 °C PNP switching output 3 is opened	Error

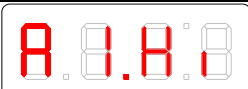
Here you can invert the status function of LED for a contact: the LED is illuminated when the contact is opened, thus falls below the minimum temperature, and when the LED is illuminated the status „error“ is displayed. Especially the recording of incidents depends on the illumination of LED (see chapter 4.9 *Diagnosis*, .



The following menu items are available:	
	 LED = output; the LED is illuminated when the PNP switching output is closed.  LED = -output; the LED is illuminated when the PNP output is opened.
Please note: Especially the recording of incidents depends on the illumination of LED (see chapter 4.9 <i>Diagnosis</i> , ).	

**4 Operation****4.8 Analogue outputs****4.8.1 Assignment of upper limit**

The assignment is defined as to which filling level is necessary to display the maximum analogue signal. The setting is made in the following menu:



Setting range:
[o.L o] [o.H]

Please note:

- The output range set must not be smaller than 10% of the measurement range:
 $A\ I.H\ -\ A\ I.L\ o \geq 10\% * (o.L\ o - o.H\)$.
- If the range selected is too small, the analogue output value may have steps.

4.8.2 Assignment of lower limit

The assignment is defined as to which filling level is necessary to display the minimum analogue signal. The setting is made in the following menu:



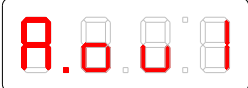
Setting range:
[o.L o] [o.H]

Please note:

- The output range set must not be smaller than 10% of the measurement range:
 $A\ I.H\ -\ A\ I.Lo \geq 10\% * (o.L\ o - o.H\)$.
- If the range selected is too small, the analogue output value may have steps.

4.8.3 Defining the type of signal

The analogue output can be defined as voltage or current output with different value ranges. The setting is made in the following menu:

**The following menu items are available:**

4 mA to 20 mA

2 V to 10 V

0 V to 10 V

0 V to 5 V

**4 Operation****4.8 Analogue outputs****4.8.4 Testing the analogue output**

The analogue output can be tested, too. The highest, the average and the smallest analogue value can be displayed one after another. The setting is made in the following menu:



The following menu items are available:	
Normal operation	Output of highest analogue value
Output of average analogue value	Output of lowest analogue value



On completion of the tests make absolutely sure to set the function to normal operation
n.ø P.

4.9 Diagnosis

The device is in a position to record the details for a switching output. A result is defined as an illumination of the LED. Accordingly, recording of the switching processes depends on the setting of the switching function of LEDs. The settings and the evaluation can be performed as follows:



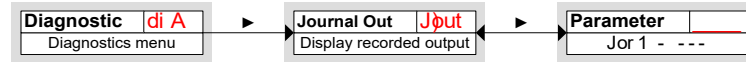
It is only possible to record one switching output. The switching output to be recorded is set in the menu item switching output Log Alarm **S.L A.**

Press the button ▼ to open the main menu.
Select the menu item **d i A** via the buttons ▼ and ▲.

	Please note: This menu provides various diagnosis values and recordings for monitoring of filling level and temperature. Open the menu via the button ►. Now you are in a position to amend or retrieve the settings for diagnosis.
--	---

**4 Operation****4.9 Diagnosis****4.9.1 Opening the journal**

The last 6 incidents recorded of the switching output can be retrieved or deleted here.



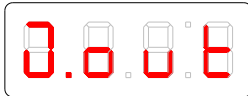
The journal entries are indicated in the following way:

- Latest incident **Jor 1** took place x hours ago (h) / days ago (d)
- Incidents 2 to 5 took place x hours / days ago
- Latest incident took place **Jor 6** x hours / days ago
- Delete (- - -).

* not yet recorded, only 4 incidents have taken place

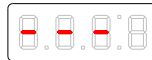
Example:

Jor 1 ⇔ **1.3 h**, Button ▼
Jor 2 ⇔ **2.4 h**, Button ▼, ▲
Jor 3 ⇔ **6.1 h**, Button ▼, ▲
Jor 4 ⇔ **8.2 h**, Button ▼, ▲
Jor 5 ⇔ **non***, Button ▼, ▲
Jor 6 ⇔ **non***, Button ▼, ▲
- - -, Button ▲; ► = delete



The display toggles between the index of recording x and the time when it occurred, e. g. **Jor 1** ⇔ **1.4 h** for the latest incident 1.4 hours ago.

Accepting the display



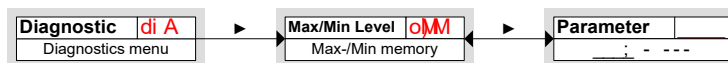
via the button ► deletes the journal and returns to the submenu.

Please note:

- If no incident was recorded, the display toggles between **Jor x** and **non**.
- The data stored are overwritten after 6 months.

**4 Operation****4.9 Diagnosis****4.9.2 Maximum/minimum filling level**

In this menu the maximum and minimum filling level saved is displayed or deleted.

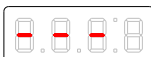


The values are displayed as follows:

- Maximum value of filling level,
- reached x hours/days ago,
- minimum value of filling level,
- reached x hours/days ago,
- delete function.

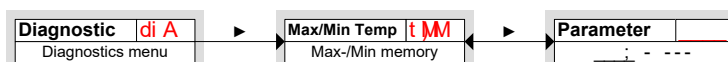
Example:

150, Button ▼
8.4 h, Button ▼, ▲
60, Button ▼, ▲
2.1 h, Button ▼, ▲
- - -, Button ▲; ► = delete

 Menu order: Max. value, time Min. value, time delete	 Accepting the display via the button ► deletes the journal and returns to the submenu. Please note: • The data stored are overwritten after 6 months.
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4.9.3 Maximum/minimum temperature

In this menu the maximum and minimum temperature saved is displayed or deleted.

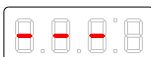


The values are displayed as follows:

- Maximum value of temperature,
- reached x hours/days ago,
- minimum value of temperature,
- reached x hours/days ago,
- delete function.

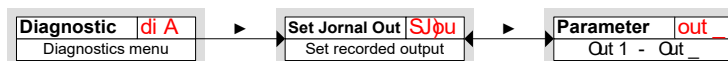
Example:

12°C, Button ▼
8.4 h, Button ▼, ▲
22°C, Button ▼, ▲
2.1 h, Button ▼, ▲
- - -, Button ▲; ► = delete

 Menu order: Max. value, time Min. value, time delete	 Accepting the display via the button ► deletes the journal and returns to the submenu. Please note: • The data stored are overwritten after 6 months.
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**4 Operation****4.9 Diagnosis****4.9.4 Assigning the switching output for recording**

In this menu the switching output for recording is selected. It is only possible to record one switching output.



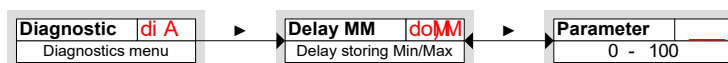
Selection:
out 1 to out x

Please note:

- The figures are saved from the volatile memory to the nonvolatile memory about every three hours.
- The data stored are overwritten after 6 months.

4.9.5 Delay for min./max. saving (filling level)

To record reliable values with a fluctuating filling level, a delay period to save the minimum and maximum charging level can be set. Here the period in seconds is set during which the signal must remain continuous before the charging level is recorded.



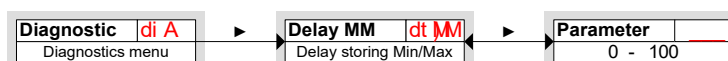
Setting range:
0 100 seconds

Please note:

- Open the parameter menu by pressing the button ►.
- Set the value via the buttons ▼ and ▲ and accept via the button ► (e. g. 5 (seconds)).
The device returns to the submenu.

4.9.6 Delay for min./max. saving (temperature)

To record reliable values in case of fluctuating temperature, a delay period to save the minimum and maximum temperature can be set. Here the period in seconds is set during which the signal must remain continuous before the temperature is recorded.



Setting range:
0 100 seconds

Please note:

- Open the parameter menu by pressing the button ►.
- Set the value via the buttons ▼ and ▲ and accept via the button ► (e. g. 5 (seconds)).
The device returns to the submenu.

**5 Breakdowns, causes and elimination**

The errors listed can only be clues to search for the failures. When searching for the failure the adjacent components must generally be considered.

In case of breakdown all outputs are set dead-voltage. The four LEDs are illuminated. The failures are saved in the device until it is switched off.

Breakdowns	Causes	Elimination
(no display)	No supply voltage	1) Inspect cable and replace, if necessary
↔	Error message in the display toggles between, e. g. Err- and E---	
Error 01	Ambient temperature too low	1) Observe limit values
Error 02	Ambient temperature too high	1) Observe limit values
Error 04	Pt 100 defective (short circuit)	1) Replace feed cable Pt 100 2) Send device for repair
Error 08	Pt 100 defective (cable break)	1) Replace feed cable Pt 100 2) Send device for repair
Error 16	Reed chain defective (short circuit)	1) Replace feed cable 2) Send device for repair
Error 32	Reed chain defective (feed cable open)	1) Replace feed cable 1) Send device for repair
Error 1024	Power supply on second connector missing, internal error	1) Check power supply at second connector 2) Please contact the technical support

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 resp. standards that apply.

- Gaskets**

Gaskets can be disposed of by residual waste.

- Electric components**

Electric components must be treated as electric waste.

- Hydraulic oil**

Hydraulic oils must be collected in suitable tanks and disposed of by a waste disposal company.

7 Maintenance and service

NVT-E is a maintenance-free level and level with temperature switch. We recommend to perform a visual inspection and an operational testing on the NVT-E **at least once a year**.



If you find out any irregularities, please consult with KTR.

 KTR-Group	NVT-E Operating/Assembly instructions	KTR-N 42611 EN Sheet: 28 of 29 Edition: 7
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8 Spares inventory, customer service addresses

We recommend to store major spare parts on site to ensure the readiness for use of the machine in case of failure of the level and temperature control (NVT-E).

Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage at 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.

KTR Systems GmbH
Carl-Zeiss-Str. 25
D-48432 Rheine
Phone: +49 5971 798-0
E-mail: mail@ktr.com

Please observe protection note ISO 16016.	Drawn: 2026-06-08 Fes Verified: 2026-06-08 Fes	Replacing: KTR-N dated 2026-01-08 Replaced by:
---	---	---



9 Enclosure A

9.1 EU Declaration of conformity

EU Declaration of conformity

according to EU directive 2014/30/EU dated April 26, 2014

The manufacturer - KTR Systems GmbH, D-48432 Rheine - states that the below-mentioned product

Electronic level and temperature controller (NVT-E)

complies with the major requirement of directive 2014/30/EU (Directive for electromagnetic compatibility) as last amended.

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 61326-1:2013 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

2026-03-11
Date

ppa. 
Dr. Norbert Partmann
Head of Engineering and R&D

i. V. 
Christoph Bettmer
Product Manager