Fluidcontrol

easyjust

Level- and temperature switch

Nivotemp NT 64, Nivovent NV 74

Installation and Operation Instructions

Original instructions

BE100020
02/2019

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Read this instruction carefully prior to installation and/or use. Pay attention particularly to all advises and safety instructions to prevent injuries. Bühler Technologies can not be held responsible for misusing the product or unreliable function due to unauthorised modifications.

Document information
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Version.....02/2019

Contents

1 Introduction

1.1 Intended Use

Level switches are used to monitor the liquid level and temperature in fluid systems.
Level switches must not be used in highly flammable or corrosive liquids.

The medium must not contain particles, particularly metallic particles, to prevent deposits on the float or between the float and switching tube. If necessary, filter the medium.

Please note the technical data in the appendix for the specific intended use, existing material combinations, as well as temperature limits.

WARNING

All device models are solely intended for industrial applications. They are **not safety components**. The devices must not be used if failure or malfunction thereof jeopardises the safety and health of persons.
Use in explosive areas is **prohibited**.

1.2 Functionality

1.2.1 Liquid level monitoring

The easyjust system on the Nivotemp NT64 and Nivovent NV74 allow the use of standardised immersion tube lengths for different size and shape oil tanks. The switching points can be configured to system needs at any time. The level contacts are inside closed housings. These are simply positioned on a contact strip with gold-plated contacts at the desired spacing. The minimum distance between two contacts is 40 mm, the grid is 10 mm.

The colour coded contacts ensure the terminal configuration for the connection is correct. The switching function as falling NC contact (NO) or as falling NO contact (NC) is determined by the position in which the contacts are installed. They can also be used as change-over contacts.

Signalling is entirely electronic, via the switching outputs.

1.2.2 Temperature monitor

The temperature is monitored via thermal element plugged into the end of the carrier board. Here the options are temperature contacts with fixed grading, a Pt 100 or a temperature transmitter with 4-20 mA outputs.

Please note the technical data in the appendix.

1.3 Design types

The level switch is equipped with different switching and analogue outputs based on the configuration. The outputs are freely programmable.

The Nivovent type can be equipped with the following options:

VS	Optical contamination indicator for the vent filter: analogue negative pressure display, display range 0.35 bar (5.1 PSI).
BFA*	Filling adapter incl. ribbed flange with screen insert: This option enables adding small amounts of oil through the vent filter housing. The selected version is built into the respective housing for this purpose.
SSR*	Stilling tube with centring disc and filling adapter: Just as with the BFA, this contains both the stilling tube option as well as the filler. The stilling tube is made from the same material as the selected immersion tube (MS/VA).
MT	for installation into the multiterminal: Here the basic version is built into the multiterminal (MT).
MTS	for installation into the multiterminal including stilling tube: In addition to the basic version, a stilling tube with centring disc is built into the multiterminal.
FCT	Fluidcontrolterminal: Here the fluid control terminal (FCT) is mounted directly onto the basic version.

* not in conjunction with FCT and MT/MTS option

The SSR option is available for the Nivotemp type.

Please refer to the type plate for your equipment configuration. In addition to the job number, this also contains the item number and type designation.

1.4 Model key NT64

NT 64-□□-□□-□□-nn-nn-□□-□□

Model designation

Version
MS Brass
VA float / VA immersion tube

Plug connector
M3
S6
M12
2M12

Length in mm
280
370
500

Level measurement
1-4 Number of contacts [1)]

Level contacts
K NC/NO
W change-over contact

Optional
SSR Stilling tube

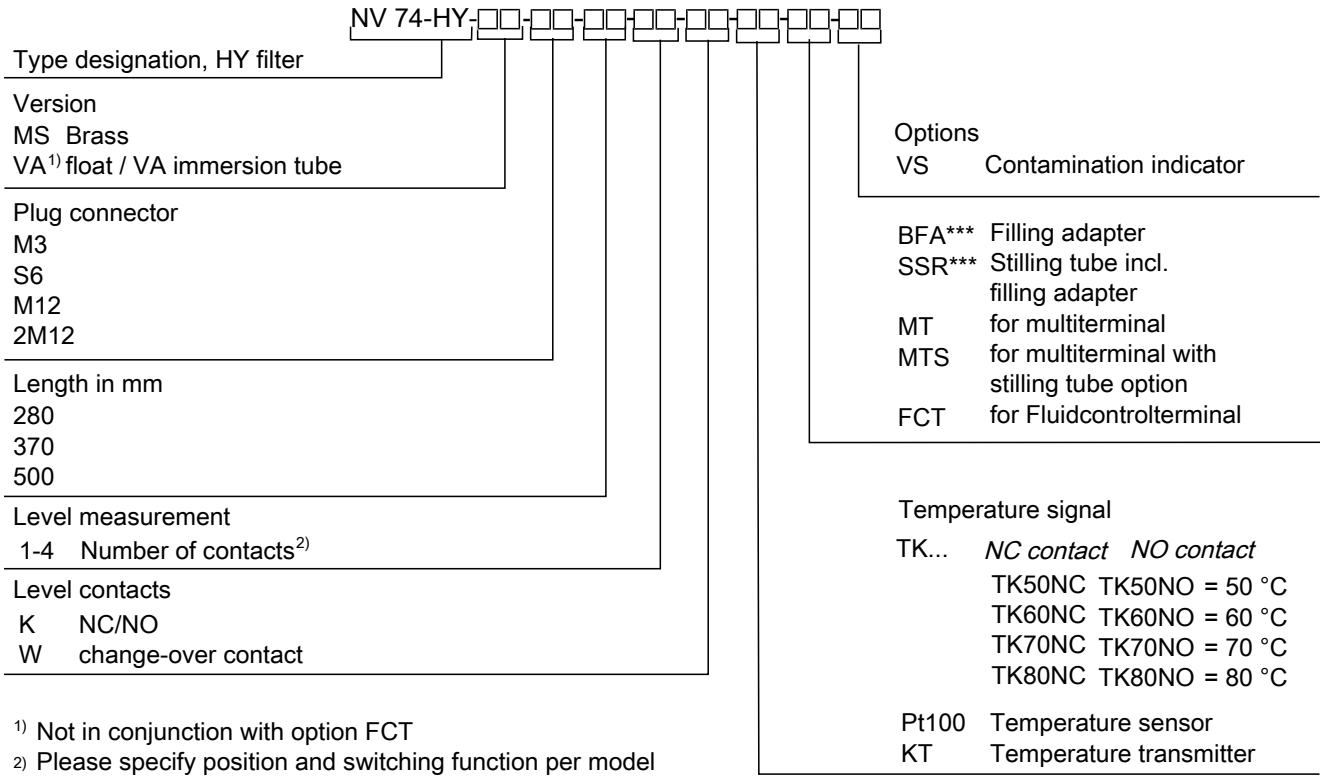
Temperature signal
TK... *NC contact* *NO contact*

TK50NC	TK50NO	= 50 °C
TK60NC	TK60NO	= 60 °C
TK70NC	TK70NO	= 70 °C
TK80NC	TK80NO	= 80 °C

Pt100 Temperature sensor
KT Temperature transmitter

1) Please specify position and switching function per model key, example: L1 = nnnmm NC

1.5 Model key NV74



[1] Not in conjunction with option FCT
[2] Please specify position and switching function per model key, Example: L1 = nnn mm NC
[3] Not in conjunction with FCT, MT or MTS option

1.6 Scope of Delivery

- Level switch
- Product documentation
- Connection/mounting accessories (optional)

2 Safety instructions

2.1 Important advice

Operation of the device is only valid if:

- the product is used under the conditions described in the installation- and operation instruction, the intended application according to the type plate and the intended use. In case of unauthorized modifications done by the user Bühler Technologies GmbH can not be held responsible for any damage,
- when complying with the specifications and markings on the nameplates.
- the performance limits given in the datasheets and in the installation- and operation instruction are obeyed,
- monitoring devices and safety devices are installed properly,
- service and repair is carried out by Bühler Technologies GmbH,
- only original spare parts are used.

This manual is part of the equipment. The manufacturer keeps the right to modify specifications without advanced notice. Keep this manual for later use.

Signal words for warnings

DANGER	Signal word for an imminent danger with high risk, resulting in severe injuries or death if not avoided.
WARNING	Signal word for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	Signal word for a hazardous situation with low risk, resulting in damaged to the device or the property or minor or medium injuries if not avoided.
NOTICE	Signal word for important information to the product.

Warning signs

These instructions use the following warning signs:

	Warns of a general hazard		Unplug from mains
	Voltage warning		Wear respiratory equipment
	Warns not to inhale toxic gasses		Wear a safety mask
	Warns of corrosive liquids		Wear gloves
	General information		

2.2 General hazard warnings

The equipment must be installed by a professional familiar with the safety requirements and risks.

Be sure to observe the safety regulations and generally applicable rules of technology relevant for the installation site. Prevent malfunctions and avoid personal injuries and property damage.

The operator of the system must ensure:

- Safety notices and operating instructions are available and observed,
- The respective national accident prevention regulations are observed,
- The permissible data and operational conditions are maintained,
- Safety guards are used and mandatory maintenance is performed,
- Legal regulations are observed during disposal.

Maintenance, Repair

Please note during maintenance and repairs:

- Repairs to the unit must be performed by Bühler authorised personnel.
- Only perform conversion-, maintenance or installation work described in these operating and installation instructions.
- Always use genuine spare parts.

Always observe the applicable safety and operating regulations in the respective country of use when performing any type of maintenance.

The method for cleaning the devices must be adapted to the IP protection class of the devices. Do not use cleaners which could damage the device materials.

DANGER **Toxic, acidic gases/liquids**

Protect yourself from toxic, corrosive gasses/liquids when performing any type of work. Wear appropriate protective equipment.

3 Transport and storage

Only transport the product inside the original packaging or a suitable alternative.

The equipment must be protected from moisture and heat when not in use. It must be stored in a covered, dry, dust-free room at room temperature.

4 Setup and connection

DANGER **Electric voltage**

Risk of electric shock

a) Always disconnect the unit from the mains before performing work.

b) Secure the equipment from accidental restarting.

c) The equipment may only be installed, maintained and put into operation by instructed, competent personnel.

d) Always observe the applicable safety regulations for the operating site.

DANGER **Toxic, acidic gases/liquids**

Protect yourself from toxic, corrosive gasses/liquids when performing any type of work. Wear appropriate protective equipment.

4.1 Installation

Please note before installing the level switch!

After transport and delivery of the level switch, the switching status of the bistable contacts may be different than required for proper operation.

Therefore slide the float for the level switch along the level switch tube from below immediately before installation.

This ensures all built-in bistable contacts have a clearly defined switching status (NC or NO).

For direct installation to the tank, insert the switching tube into the designated bore (per DIN 24557, Part 2) with rubberised cork seal on the tank. It secures to the flange using the included screws and seals. Please be sure the float can move freely and to leave enough space between the tank wall and add-ons.

After removing the float, where applicable, be sure the magnet inside the float is above the fluid level. This can easily be verified with a piece of iron to determine the magnet position inside the float.

DANGER **Electric voltage**

Risk of electric shock

When connecting devices, please note the maximum voltages and currents currents (see technical data) and use the correct wire cross-sections and circuit breakers.

When selecting the connection lines, also note the maximum operating temperatures of the devices.

Installation in special areas of application:

If the device will be installed outdoors or in wet areas, the maximum operating voltage is max. 16 V DC effective or 35 V DC.

4.2 Information on the correct operation of reed contacts in Bühler level switches

Based on their construction, reed contacts are very long lasting and reliable components. Yet the following should be considered when using them:

Life of reed switches

The life of reed switches can be up to 10^9 cycles. This is reduces by high stress and / or incorrect or the absence of protective circuits when switching inductive, capacitive or lamp loads.

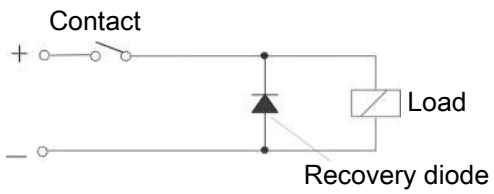
It's therefore important to ensure NEVER to exceed one or several of the maximum approved limits, even temporarily, and to install a contact protective circuit for loads which are not purely ohmic. Using test lamps when installing the devices is also prohibited, as these can temporarily allow too much current to flow, which can damage the reed contacts. In this case non-volatile testing equipment should always be used.

Contact protective circuits for reed switches

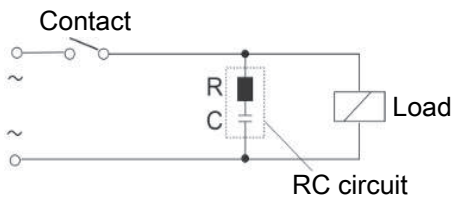
For direct current voltage a recovery diode per figure A must be connected parallel to the contact.

For alternating current voltage an RC circuit per Figure B and Table 1 must be connected parallel to the contact.

A



B



Load in VA	10		25		50	
Voltage at 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 note the max. voltage/load ratings of the respective level contacts!

Voltages and currents

All Bühler level contacts with reed switch can switch minimal Switching voltages of 10 µV and minimal switching currents of 1 µA.

The maximum values specified for the respective contact types apply.

Level contact with reed switches can therefore be used for SPS applications as well as for high loads (within the maximum limits) without hesitation.

Contact material

All reed switches in Bühler level contacts use rhodium as the contact material for the actual contact areas.

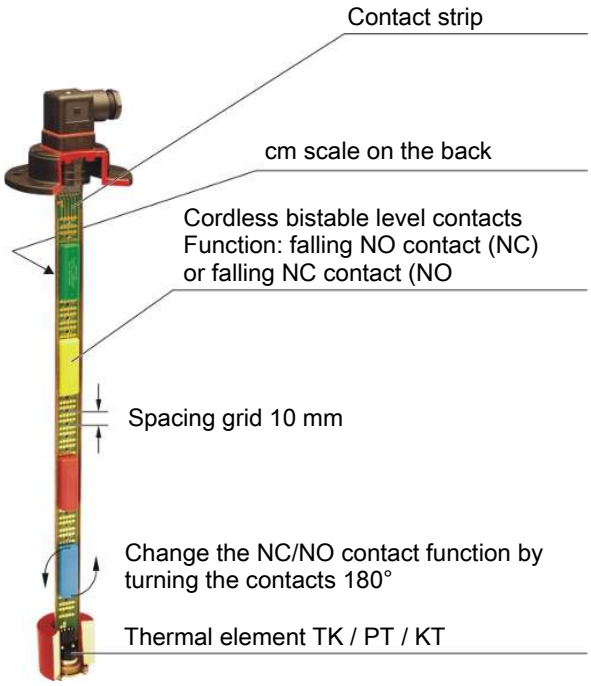
Magnetic fields

Avoid external magnetic fields, including from electric motors. These can interfere with the function of the reed switches.

Mechanical loads

Do not expose the level switch to strong blows or bending.

4.3 Adjusting the level contacts



The contacts required for the float are mounted to a galvanically gold-plated with cm scale with plastic screws. The contact housings have different colours and may only be mounted to the contact strip in the following order.

	NC contact / NO contact	Change-over contact
Top to bottom:	green	white
	yellow	black
	red	
	blue	

Any other order may result in malfunctions.

The level contacts are arranged per order specifications at the factory but may later be moved along a 10 mm (0.4") grid. The falling NC contact (NO) or falling NO contact (NC) contact function may also be changed by turning the contact housings 180°. The housing has two arrows. The arrow pointing up indicates the current contact function.

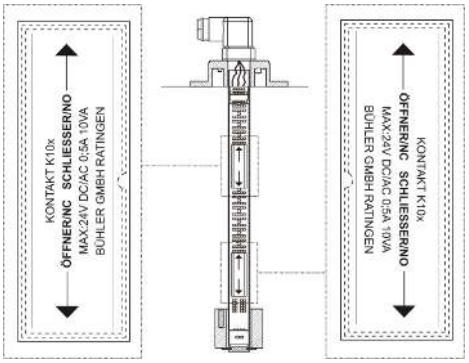
NOTICE

Only tighten the plastic screw at maximal 5 cNm!

Function NO:

NO contact with rising level

= NC contact with falling level



Function NC:

NC contact with rising level

= NO contact with falling level

The contact logic assumes the level switch is installed in an empty tank, i.e. it is only in the operating position once filled.

The reference point for the level switching point is at the middle of the EASYJUST level contact.

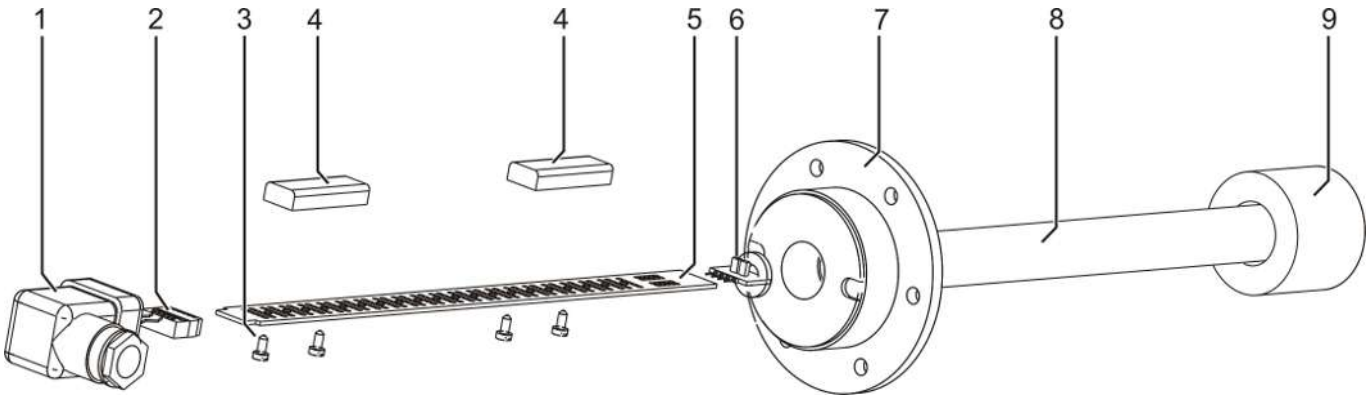
NT64:

- Disconnect the voltage supply.
- Disconnect the plug.
- Unscrew the display housing with base and carefully pull out the top along with the adapter plug and the contact strip.
- Loosen and reposition the plastic screws on the contacts (cm scale on the back of the contact strip). Minimum spacing: 40 mm (1.6").
- If necessary, turn 180° to change the contact function.
- Tighten the plastic screws for fastening the contact. Please note the maximum torque (max. 5 cNm).
- Slide the contact strip back into the protective tube and screw on the plug base.

NOTICE

Ensure the seals are positioned correctly. Replace defective seals immediately!

Example:



1	Plug connection M3 with plug base	6	Optional: Temperature contact (TK), Pt100 or 4-20 mA output
2	Adapter plug	7	Flange
3	Plastic screws	8	Switching tube
4	Level contacts	9	Float
5	Contact strip		

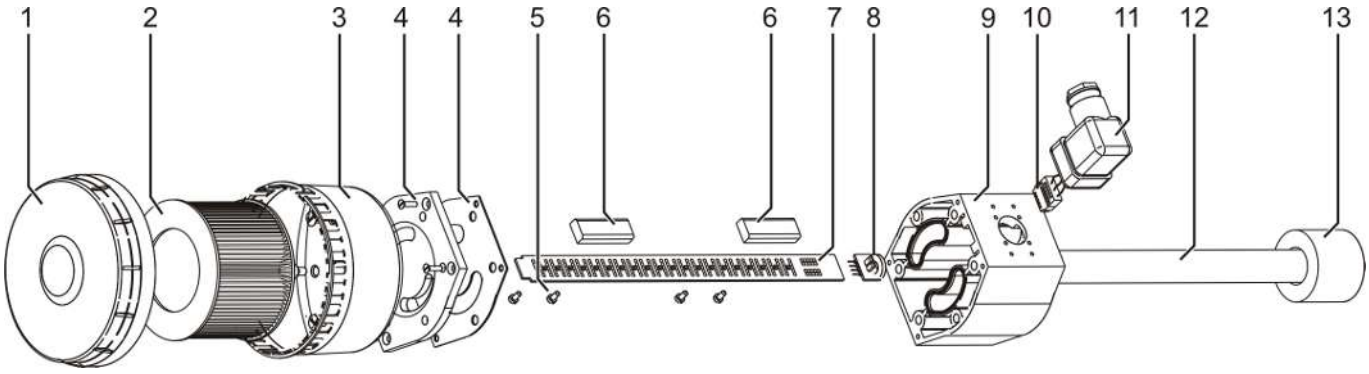
NV74:

- Disconnect the voltage supply.
- Unscrew the filter cover and remove the filter element.
- Loosen the mounting screws and remove the filter case.
- Loosen the screws for the flange cover and remove the cover with cover seal.
- Disconnect the adapter plug from the contact strip and carefully pull the contact strip out the top.
- Loosen and reposition the plastic screws on the contacts (cm scale on the back of the contact strip). Minimum spacing: 40 mm (1.6").
- If necessary, turn 180° to change the contact function.
- Tighten the plastic screws for fastening the contact. Please note the maximum torque (max. 5 cNm).
- Slide the contact strip back into the protective tube.
- Reattach the adapter plug to the contact strip the right way. The markings on the adapter flange and the contact strip must overlap.
- Fasten the flange cover incl. seal.
- Secure filter case, insert filter element and screw on filter cover.

NOTICE

Ensure the seals are positioned correctly. Replace defective seals immediately!

Example:



1	Filter cover	8	Optional: Temperature contact (TK) or Pt100
2	Filter element	9	Flange
3	Filter case and seal	10	Adapter plug
4	Flange cover and seal	11	Example: Plug connection M3 with plug base
5	Plastic screws	12	Switching tube
6	Level contacts	13	Float
7	Contact strip		

4.4 Retrofitting a temperature sensor

If necessary, the temperature sensor can be retrofitted. In this case, please contact our Service Department or your local representative. Please have the data in your type plate ready.

5 Operation and control

NOTICE

The device must not be operated beyond its specifications.

6 Cleaning and Maintenance

This device is maintenance-free.

The method for cleaning the devices must be adapted to the IP protection class of the devices. Do not use cleaners which could damage the device materials.

For versions with filter:

The filter element must be replaced as needed, at least 1x annually. In exceptional cases a small amount of oil can be added via the filter.

During maintenance, remember:

– The equipment must be maintained by a professional familiar with the safety requirements and risks.
– Only perform maintenance work described in these operating and installation instructions.
– When performing maintenance of any type, observe the respective safety and operation regulations.

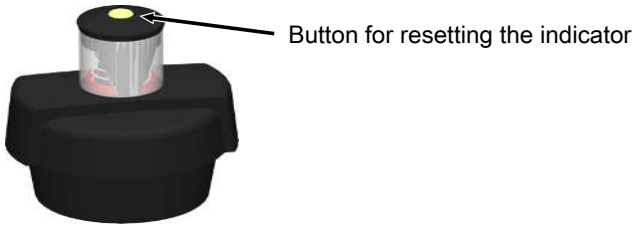
6.1 Replacing the filter element

Replace the filter element as follows:

– Temporarily shut down the system.
– The filter cover counter-clockwise to open.
– Remove the filter element and dispose according to legal regulations.
– Insert the new filter element. Be sure to use the correct filter fineness!
– Screw on the filter cover.
– For filters with optical contamination indicator: Set the display to zero.

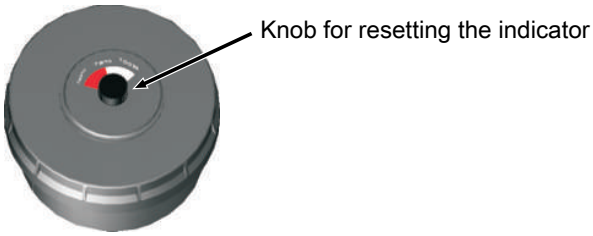
Hydac filter

When the maximum display value is reached, the red indicator piston will lock in place, indicating the filter service is required. Press the yellow Reset button to reset the display to zero.



Filtration Group filter

Filter contamination is indicated in percent (50%, 75% and 100 %). To reset the display to zero, turn the knob in the direction of the arrow until the red part of the indicator disc is turned all the way back.



6.2 Adding small amounts of oil

Nivovent type with BFA or SSR option only:

– Temporarily shut down the system.
– The filter cover counter-clockwise to open.
– Remove the filter element.
– Slowly add oil through the nodular holes.
– Reinsert the filter element and close the cover.
– Restart the system.

7 Service and repair

This chapter contains information on troubleshooting and correction should an error occur during operation.

Repairs to the unit must be performed by Bühler authorised personnel.

Please contact our Service Department with any questions:

Tel.: +49-(0)2102-498955 or your agent

If the equipment is not functioning properly after correcting any malfunctions and switching on the power, it must be inspected by the manufacturer. Please send the equipment inside suitable packaging to:

Bühler Technologies GmbH

- Reparatur/Service -

Harkortstraße 29

40880 Ratingen

Germany

Please also attach the completed and signed RMA decontamination statement to the packaging. We will otherwise be unable to process your repair order.

You will find the form in the appendix of these instructions, or simply request it by e-mail:

service@buehler-technologies.com.

7.1 Spare parts and accessories

Accessories

Item no.	Description
9144 05 0010	Connecting cable M12x1, 4-pin, 1.5 m, angular coupling and straight plug
9144 05 0046	Connecting cable M12x1, 4-pin, 3.0 m, angular coupling and straight plug
9144 05 0047	Connecting cable M12x1, 4-pin, 5.0 m, angular coupling and strands

8 Disposal

Dispose of parts so as not to endanger the health or environment. Follow the laws in the country of use for disposing of electronic components and devices during disposal.

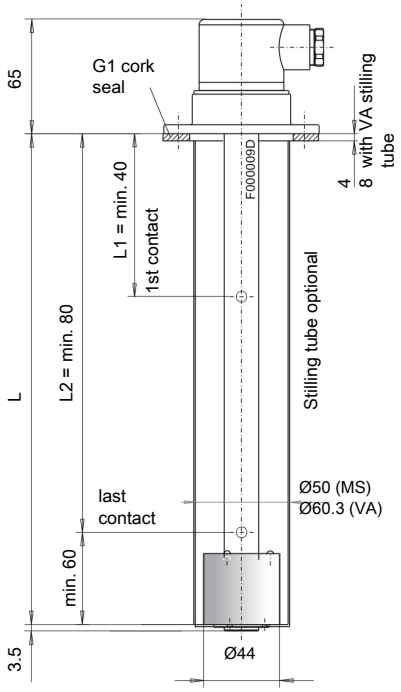
9 Appendices

9.1 Technical Data NT 64

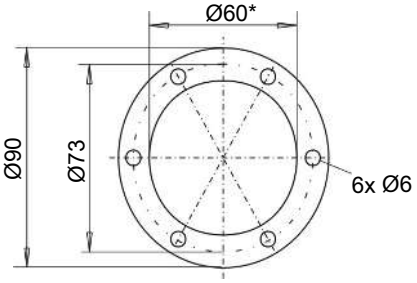
Basic unit

Version	**MS**	**VA**
Operating pressure	max. 1 bar	max. 1 bar
Operating temperature	-20 °C to +80 °C	-20 °C to +80 °C
Float	SK 610	SK 221
Min. fluid density	0.80 kg/dm³	0.85 kg/dm³
Lengths	280, 370, 500 mm (standard)	
Material/Version		
Float	rigid PU (SK 610)	1.4571 (SK 221)
Immersion tube	Brass	1.4571
Flange (DIN 24557)	PA	PA
Weight at L=280 mm Each 100 mm add	approx. 200 g approx. 30 g	approx. 300 g approx. 50 g
Includes:		
Mounting screws (quantity 6) and rubberised cork seal.		
Options		
Stilling tube (SSR)	Brass	VA
Level switching output	**K101-104**	**W101/102**
Function	NO/NC*	Change-over contact
Max. number	4	2
Voltage max.	30 V DC	30 V DC
Switching current max.	0.5 A	0.5 A
Contact load max.	10 VA	20 VA
Min. contact spacing	40 mm	40 mm
*NO= falling NC contact/NC = falling NO contact		
Optional temperature output		
Temperature contact	TK	
Voltage max.	30 V DC	
Switching current max.	2.5 A	
Contact load max.	100 VA	
Function	**NC***	**NO***
Switching point °C	50/60/70/80	50/60/70/80
Switching point tolerance	± 3 K	± 3 K
Hysteresis max.	10 K ± 3 K	10 K ± 3 K
* NC = NC contact/NO = NO contact, data for rising temperature		
Temperature sensor	Pt 100 Class B, DIN EN 60 751	
Tolerance	±0.8 °C	
Temperature transmitter	**KT**	
Temperature sensor	Pt 100 Class B, DIN EN 60 751	
Measuring range	0 °C to +100 °C	
Supply voltage (U_B)	10 - 30 V DC	
Output	4 - 20 mA	
Burden Ω max.	=(U_B -7.5 V)/0.02 A	
Accuracy	± 1 % from end value	
Other measuring ranges available upon request		

Basic model

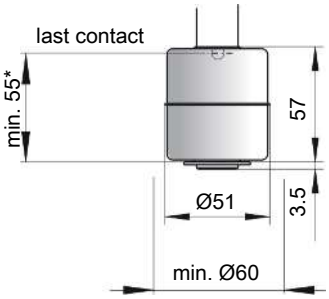


Flange drawing



*min. Ø61 for VA version with stilling tube

SK 221 Float



min. Ø61 with stilling tube
* min. 80 with temperature

9.2 Technical Data NV 74

Basic unit

Version	MS	VA*
Operating pressure	max. 1 bar	max. 1 bar
Operating temperature	-20 °C to +80 °C	-20 °C to +80 °C
Float	SK 610	SK 221
Min. fluid density	0.80 kg/dm³ with float	0.85 kg/dm³ with float
Lengths	280, 370, 500 mm (standard)	
*Not available in conjunction with FCT option		

Material/Version		
Float	rigid PU (SK 610)	1.4571 (SK 221)
Immersion tube	Brass	1.4571
Flange (DIN 24557)	PA	PA
Weight at L=280 mm Each 100 mm add	approx. 800 g approx. 30 g	approx. 900 g approx. 50 g

Includes:
Mounting screws (quantity 6) and rubberised cork seal.

Options		
Stilling tube (SSR)	Brass	VA

Vent filter	All versions HY type Hydac BF 7
Filter fineness	3 µm
Additional equipment	Filler cap – n/a with filling adapter

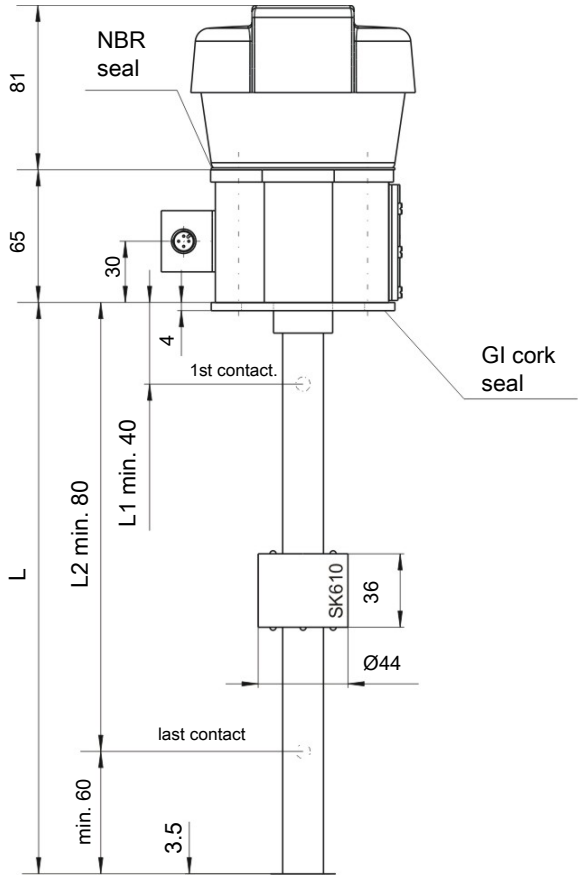
Level switching output	K101-104	W101/102
Max. number	4	2
Function	NO / NC*	Change-over contact
Voltage max.	30 V DC	30 V DC
Switching current max.	0.5 A	0.5 A
Contact load max.	10 V AC	20 V AC
Min. contact spacing	40 mm	40 mm
*NO= falling NC contact / NC = falling NO contact		

Temperature contact	TK	
Voltage max.	30 V DC	
Switching current max.	2.5 A	
Contact load max.	100 VA	
Function	**NC***	**NO***
Switching point °C	50 / 60 / 70 / 80	50 / 60 / 70 / 80
Switching point tolerance	± 3 K	± 3 K
Max. hysteresis	10 K ± 3 K	10 K ± 3 K
*NC NC contact / NO NO contact. All data for rising temperature)		

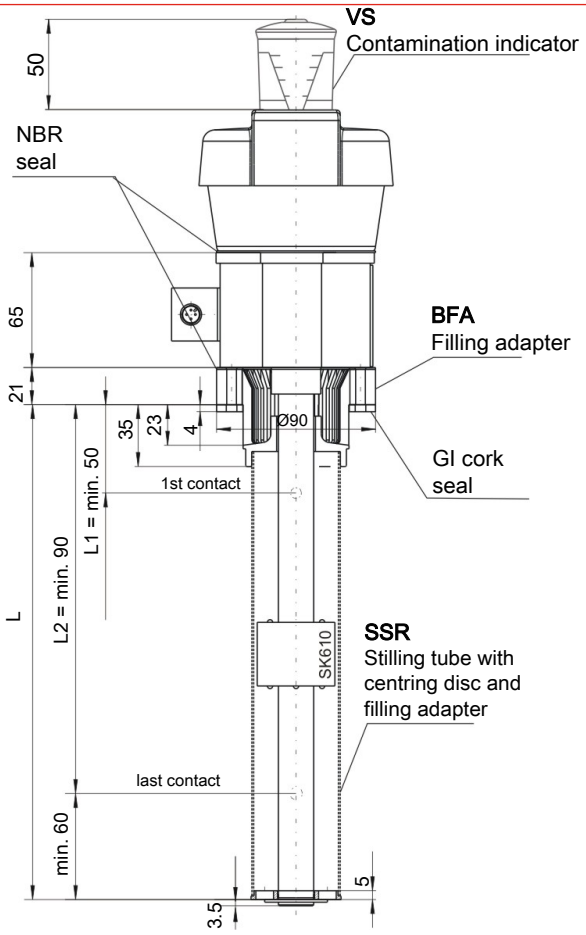
Temperature contact	TK
Temperature sensor	Pt 100 Class B, DIN EN 60 751
Tolerance	± 0.8 °C
Temperature transmitter	**KT**
Temperature sensor	Pt 100 Class B, DIN EN 60 751
Measuring range	0 °C to +100 °C
Supply voltage (U_B)	10 - 30 V DC
Output	4 - 20 mA
Max. burden Ω	=(U_B -7.5 V) / 0.02 A
Accuracy	± 1 % from end value
Other measuring ranges available upon request	

9.3 Dimensions NV 74

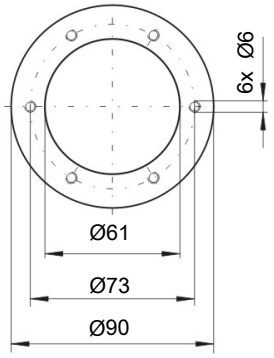
Basic version



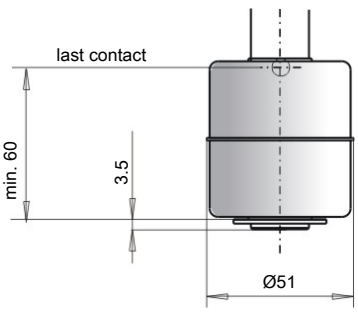
With options



Flange drawing

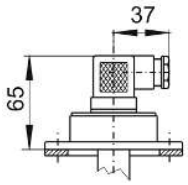
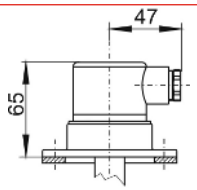
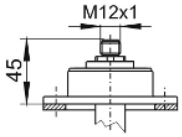
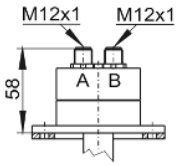


SK 221 float for NV 74-VA

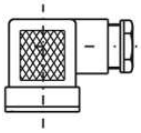
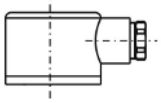
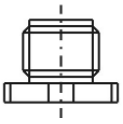
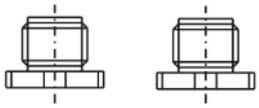
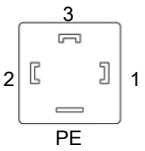
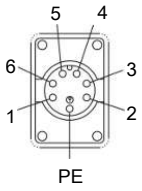
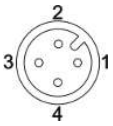
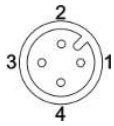
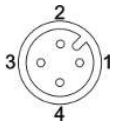
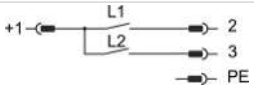
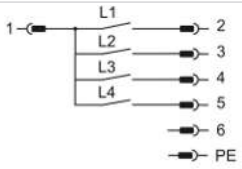
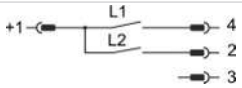
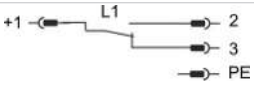
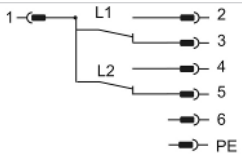
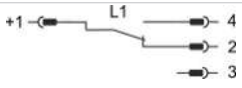
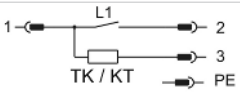
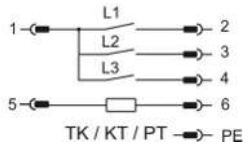
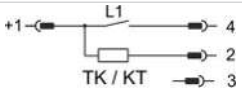
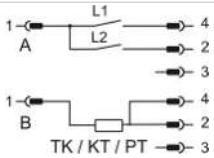
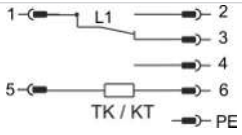
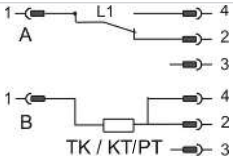


9.4 Standard pin assignment NT 64

Plug connection

	M3	S6	M12 (base)	2M12 (base)
Dimensions				
Number of pins	3-pin + PE	6-pin + PE	4-pin	4-pin / 4-pin
DIN EN	175301-803	175201-804	61076-2-101	61076-2-101
Voltage max.	30 V AC / V DC	30 V AC / V DC	30 V DC	30 V DC
Contact load max.	0.5 A per output	0.5 A per output	0.5 A per output	0.5 A per output
Degree of protection	IP65	IP65	IP67*	IP67*
Cable fitting	PG11	M20x1.5		
Max. number of contacts				
Level/temp. contacts	1 x K101 / 1 x TK - / -	3 x K101-104 / 1 x TK 1 x W101/102 / 1 x TK	1 x K101 / 1 x TK - / -	3 x K101-104 / 1 x TK 1 x W101/102 / 1 x TK
Level contacts only	2 x K101-102 1 x W101	4 x K101-104 2 x W101/102	4 x K101-102 2 x W101	4 x K101-104 1 x W101/102

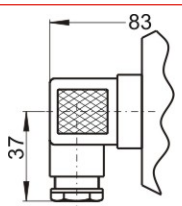
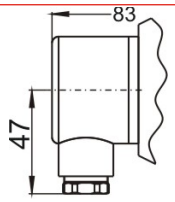
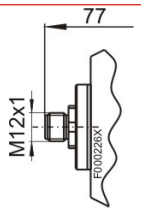
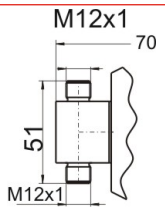
* With moulded cable box. Other plug connections available upon request

	M3	S6	M12 (base)	2 x M12 (base)	
					
Connection schematic				Plug A 	Plug B 
K101-104 Level contact(s)					
W101/102 Level contact(s)					
K101-104 Level contact(s) and Pt100					
W101/102 Level- and temperature contact(s)					

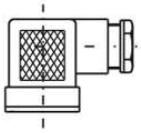
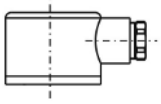
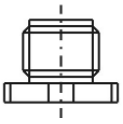
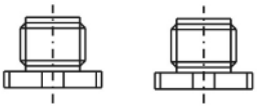
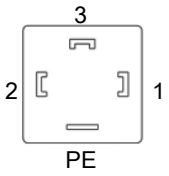
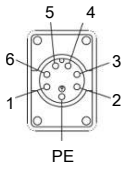
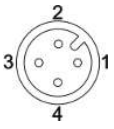
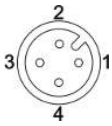
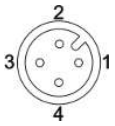
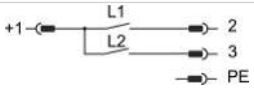
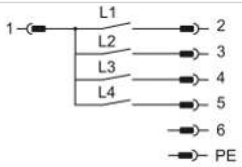
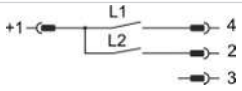
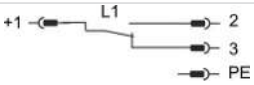
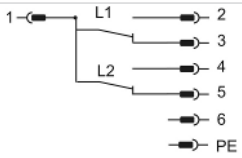
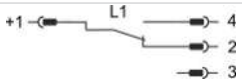
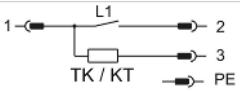
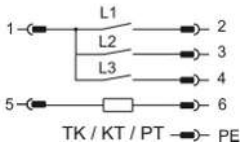
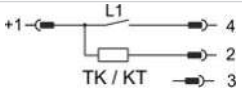
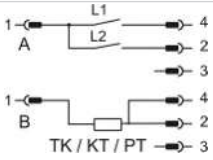
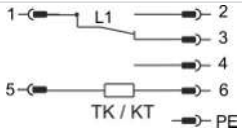
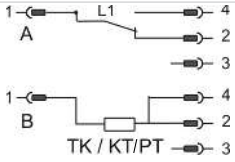
The standard assignment specified here applies to the max. number of contacts possible and contact function NO.

9.5 Standard pin assignment NV 74

Plug connection

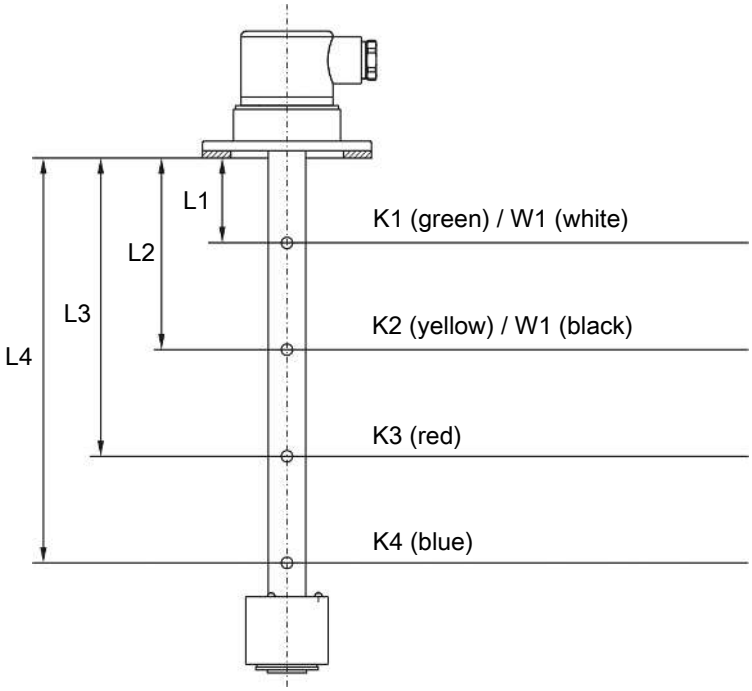
	M3	S6	M12 (base)	2M12 (base)
Dimensions				
Number of pins	3-pin + PE	6-pin + PE	4-pin	4-pin / 4-pin
DIN EN	175301-803	175201-804	61076-2-101	61076-2-101
Voltage max.	30 V AC / V DC	30 V AC / V DC	30 V DC	30 V DC
Contact load max.	0.5 A per output	0.5 A per output	0.5 A per output	0.5 A per output
Degree of protection	IP65	IP65	IP67*	IP67*
Cable fitting	PG11	M20x1.5		
Max. number of contacts				
Level/temp. contacts	1 x K101-104 / 1 x TK - / -	3 x K101-104 / 1 x TK 1 x W101/102 / 1 x TK	1 x K101-104 / 1 x TK - / -	3 x K101-102 / 1 x TK 1 x W101 / 1 x TK
Level contacts only	2 x K101-104 1 x W101/102	4 x K101-104 2 x W101/102	4 x K101-104 2 x W101/102	4 x K101-104 1 x W101/102

* With moulded cable box. Other plug connections available upon request.

	M3	S6	M12 (base)	2 x M12 (base)	
					
Connection schematic				Plug A 	Plug B 
K101-104 Level contact(s)					
W101/102 Level contact(s)					
K101-104 Level contact(s) and Pt100					
W101/102 Level- and temperature contact(s)					

The standard assignment specified here applies to the max. number of contacts possible and contact function NO.

9.6 Definitions



NO = NO contact

NC = NC contact

TK = thermal contact

KT = temperature transmitter

PT = temperature sensor Pt100

Note on the temperature transmitter: The analogue output can be loaded with max. +30 V DC.

10 Attached documents

- Declaration of conformity: KX100020
- RMA - Decontamination Statement

EU-Konformitätserklärung
EU-declaration of conformity

Hiermit erklärt Bühler Technologies GmbH, dass die nachfolgenden Produkte den wesentlichen Anforderungen der Richtlinie

Herewith declares Bühler Technologies GmbH that the following products correspond to the essential requirements of Directive

2014/30/EU
(Elektromagnetische Verträglichkeit / *electromagnetic compatibility)*

in ihrer aktuellen Fassung entsprechen.

in its actual version.

Produkt / products: Niveauschalter und –geber / *Level switches and gauges*
Typ / type: Nivotemp 61D, 63, 64, 64D, 67XP, MD, M-XP
Nivovent 71D, 73, 74, 74D, 77XP

Die Betriebsmittel dienen zur Überwachung des Füllstandes und der Temperatur in Fluidsystemen.
The equipment is designed for monitoring level and temperature in fluid systems.

Das oben beschriebene Produkt der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:
The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

EN 61326-1:2013

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.
This declaration of conformity is issued under the sole responsibility of the manufacturer.

Dokumentationsverantwortlicher für diese Konformitätserklärung ist Herr Stefan Eschweiler mit Anschrift am Firmensitz.
The person authorised to compile the technical file is Mr. Stefan Eschweiler located at the company's address.

Ratingen, den 20.04.2016

Stefan Eschweiler
Geschäftsführer – *Managing Director*

Frank Pospiech
Geschäftsführer – *Managing Director*

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen,
Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

RMA-Formular und Erklärung über Dekontaminierung
RMA-Form and explanation for decontamination

RMA-Nr./ RMA-No.

Die RMA-Nummer bekommen Sie von Ihrem Ansprechpartner im Vertrieb oder Service./ You may obtain the RMA number from your sales or service representative.

Zu diesem Rücksendeschein gehört eine Dekontaminierungserklärung. Die gesetzlichen Vorschriften schreiben vor, dass Sie uns diese Dekontaminierungserklärung ausgefüllt und unterschrieben zurücksenden müssen. Bitte füllen Sie auch diese im Sinne der Gesundheit unserer Mitarbeiter vollständig aus./ This return form includes a decontamination statement. The law requires you to submit this completed and signed decontamination statement to us. Please complete the entire form, also in the interest of our employee health.

Firma/ Company

Firma/ Company
Straße/ Street
PLZ, Ort/ Zip, City
Land/ Country

Ansprechpartner/ Person in charge

Name/ Name
Abt./ Dept.
Tel./ Phone
E-Mail

Gerät/ Device
Anzahl/ Quantity
Auftragsnr./ Order No.

Serien-Nr./ Serial No.
Artikel-Nr./ Item No.

Grund der Rücksendung/ Reason for return

☐ Kalibrierung/ Calibration
☐ Modifikation/ Modification
☐ Reklamation/ Claim
☐ Reparatur/ Repair
☐ andere/ other

bitte spezifizieren/ please specify

Ist das Gerät möglicherweise kontaminiert?/ Could the equipment be contaminated?

☐ Nein, da das Gerät nicht mit gesundheitsgefährdenden Stoffen betrieben wurde./ No, because the device was not operated with hazardous substances.

☐ Nein, da das Gerät ordnungsgemäß gereinigt und dekontaminiert wurde./ No, because the device has been properly cleaned and decontaminated.

☐ Ja, kontaminiert mit:/ Yes, contaminated with:

☐ explosiv/ explosive
☐ entzündlich/ flammable
☐ brandfördernd/ oxidizing
☐ komprimierte Gase/ compressed gases
☐ ätzend/ caustic
☐ giftig, Lebensgefahr/ poisonous, risk of death
☐ gesundheitsgefährdend/ harmful to health
☐ gesundheitsschädlich/ health hazard
☐ umweltgefährdend/ environmental hazard

Bitte Sicherheitsdatenblatt beilegen!/ Please enclose safety data sheet!

Das Gerät wurde gespült mit:/ The equipment was purged with:

Diese Erklärung wurde korrekt und vollständig ausgefüllt und von einer dazu befugten Person unterschrieben. Der Versand der (dekontaminierten) Geräte und Komponenten erfolgt gemäß den gesetzlichen Bestimmungen.

This declaration has been filled out correctly and completely, and signed by an authorized person. The dispatch of the (decontaminated) devices and components takes place according to the legal regulations.

Falls die Ware nicht gereinigt, also kontaminiert bei uns eintrifft, muss die Firma Bühler sich vorbehalten, diese durch einen externen Dienstleister reinigen zu lassen und Ihnen dies in Rechnung zu stellen.

Should the goods not arrive clean, but contaminated, Bühler reserves the right, to comission an external service provider to clean the goods and invoice it to your account.

Firmenstempel/ Company Sign

Datum/ Date

rechtsverbindliche Unterschrift/ Legally binding signature

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Internet: www.buehler-technologies.com

Die Analyse defekter Baugruppen ist ein wesentlicher Bestandteil der Qualitätssicherung der Firma Bühler Technologies.

Um eine aussagekräftige Analyse zu gewährleisten muss die Ware möglichst unverändert untersucht werden. Es dürfen keine Veränderungen oder weitere Beschädigungen auftreten, die Ursachen verdecken oder eine Analyse unmöglich machen.

Bei elektronischen Baugruppen kann es sich um elektrostatisch sensible Baugruppen handeln. Es ist darauf zu achten, diese Baugruppen ESD-gerecht zu behandeln. Nach Möglichkeit sollten die Baugruppen an einem ESD-gerechten Arbeitsplatz getauscht werden. Ist dies nicht möglich sollten ESD-gerechte Maßnahmen beim Austausch getroffen werden. Der Transport darf nur in ESD-gerechten Behältnissen durchgeführt werden. Die Verpackung der Baugruppen muss ESD-konform sein. Verwenden Sie nach Möglichkeit die Verpackung des Ersatzteils oder wählen Sie selber eine ESD-gerechte Verpackung.

Beachten Sie beim Einbau des Ersatzteils die gleichen Vorgaben wie oben beschrieben. Achten Sie auf die ordnungsgemäße Montage des Bauteils und aller Komponenten. Versetzen Sie vor der Inbetriebnahme die Verkabelung wieder in den ursprünglichen Zustand. Fragen Sie im Zweifel beim Hersteller nach weiteren Informationen.

Analysing defective assemblies is an essential part of quality assurance at Bühler Technologies.

To ensure conclusive analysis the goods must be inspected unaltered, if possible. Modifications or other damages which may hide the cause or render it impossible to analyse are prohibited.

Electronic assemblies may be sensitive to static electricity. Be sure to handle these assemblies in an ESD-safe manner. Where possible, the assembles should be replaced in an ESD-safe location. If unable to do so, take ESD-safe precautions when replacing these. Must be transported in ESD-safe containers. The packaging of the assemblies must be ESD-safe. If possible, use the packaging of the spare part or use ESD-safe packaging.

Observe the above specifications when installing the spare part. Ensure the part and all components are properly installed. Return the cables to the original state before putting into service. When in doubt, contact the manufacturer for additional information.

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BÜHLER TECHNOLOGIES

Fluidcontrol

easyjust

Level- and temperature switch

Nivotemp NT 64D, Nivovent NV 74D

Installation and Operation Instructions

Original instructions

BE100018
12/2019

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
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E-Mail: fluidcontrol@buehler-technologies.com

Read this instruction carefully prior to installation and/or use. Pay attention particularly to all advises and safety instructions to prevent injuries. Bühler Technologies can not be held responsible for misusing the product or unreliable function due to unauthorised modifications.

Document information
Document No..... BE100018
Version.....12/2019

Contents

1 Introduction

1.1 Intended Use

Level switches are used to monitor the liquid level and temperature in fluid systems.
Level switches must not be used in highly flammable or corrosive liquids.

The medium must not contain particles, particularly metallic particles, to prevent deposits on the float or between the float and switching tube. If necessary, filter the medium.

Please note the technical data in the appendix for the specific intended use, existing material combinations, as well as temperature limits.

WARNING

All device models are solely intended for industrial applications. They are **not safety components**. The devices must not be used if failure or malfunction thereof jeopardises the safety and health of persons.
Use in explosive areas is **prohibited**.

1.2 Functionality

1.2.1 Liquid level monitoring

The measuring tube is located inside the tank. The level switches are located inside the measuring tube. These are activated by a magnet inside the level switch float.

The contacts are screwed to the board, spaced as specified in the purchase order, but can easily be moved without tangled cables if necessary.

The status of the switching outputs for the liquid level will be output to one of the plugs.

1.2.2 Temperature monitor

Temperature is monitored via temperature sensor (Pt100) inside the sensor tube. Depending on the version, there are several switching outputs combined with one analogue output (4 - 20 mA). The temperature is shown in the display.

Please note the technical data in the appendix.

1.3 Design types

The level switch is equipped with different switching and analogue outputs based on the configuration. The outputs are freely programmable.

The Nivovent type can be equipped with the following options:

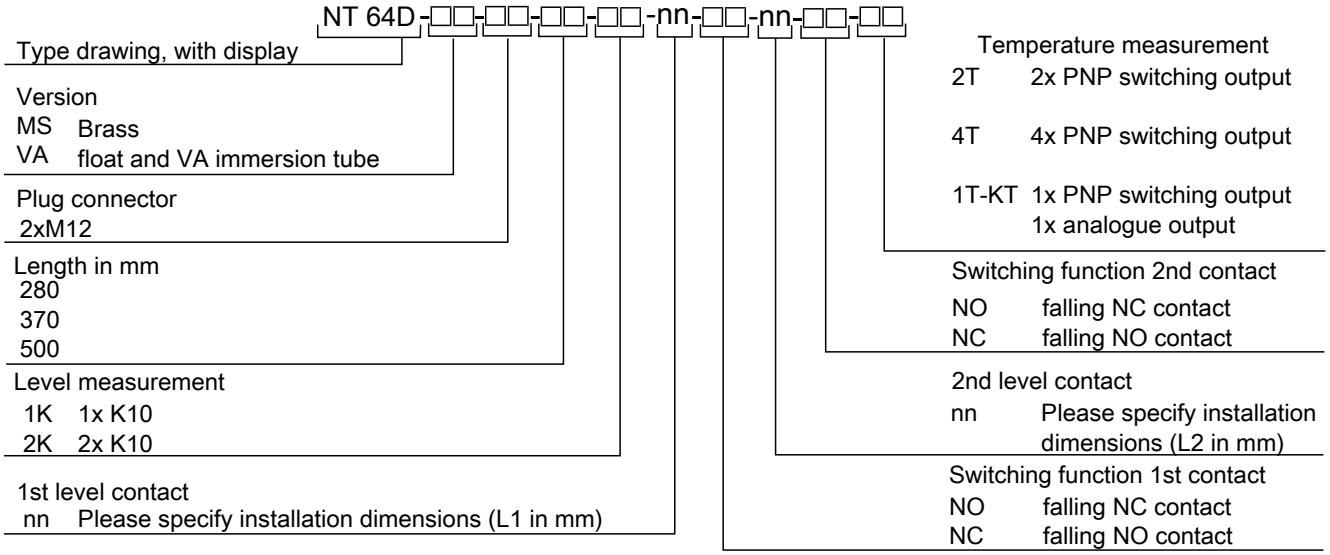
VS	Optical contamination indicator for the vent filter: analogue negative pressure display, display range 0.35 bar (5.1 PSI).
BFA*	Filling adapter incl. ribbed flange with screen insert: This option enables adding small amounts of oil through the vent filter housing. The selected version is built into the respective housing for this purpose.
SSR*	Stilling tube with centring disc and filling adapter: Just as with the BFA, this contains both the stilling tube option as well as the filler. The stilling tube is made from the same material as the selected immersion tube (MS/VA).
MT	for installation into the multiterminal: Here the basic version is built into the multiterminal (MT).
MTS	for installation into the multiterminal including stilling tube: In addition to the basic version, a stilling tube with centring disc is built into the multiterminal.
FCT	Fluidcontrolterminal: Here the fluid control terminal (FCT) is mounted directly onto the basic version.

* not in conjunction with FCT and MT/MTS option

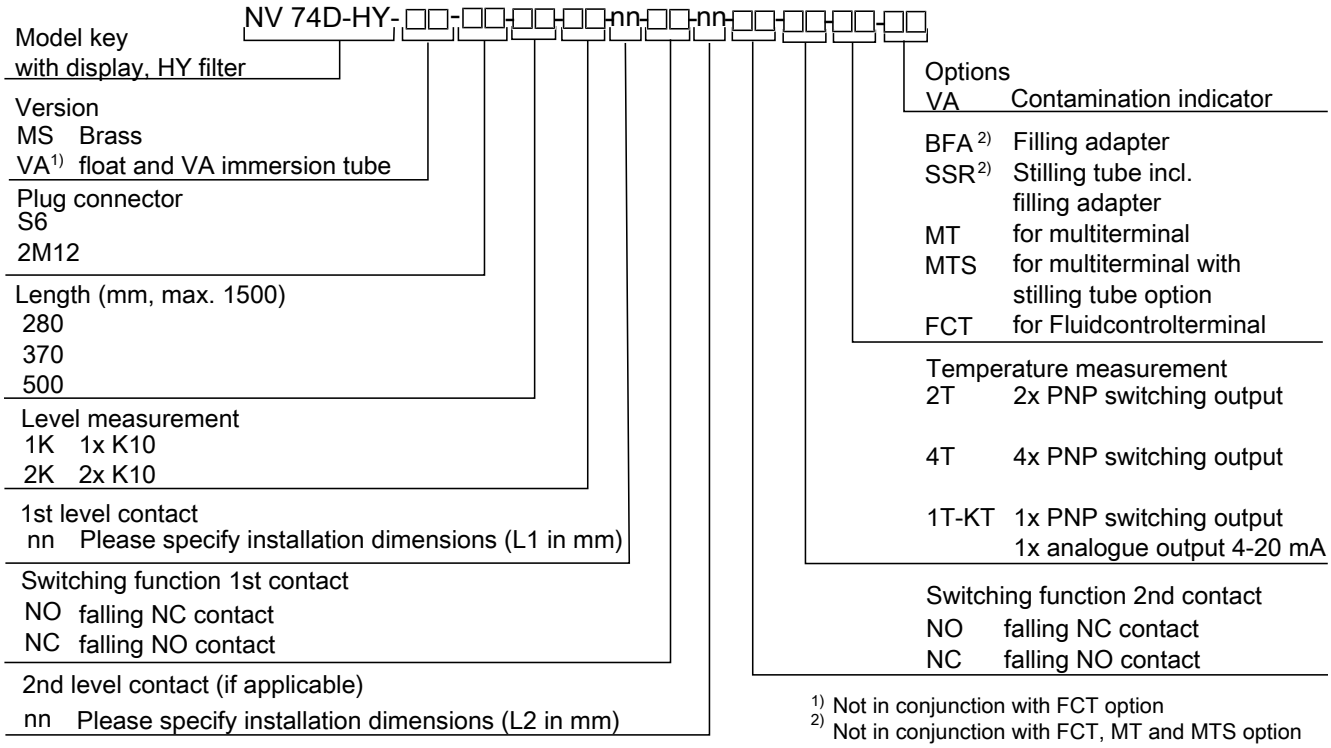
The SSR option is available for the Nivotemp type.

Please refer to the type plate for your equipment configuration. In addition to the job number, this also contains the item number and type designation.

1.4 Model key NT64D



1.5 Model key NV74D



1) Not in conjunction with FCT option
2) Not in conjunction with FCT, MT and MTS option

1.6 Scope of Delivery

- Level switch
- Product documentation
- Connection/mounting accessories (optional)

2 Safety instructions

2.1 Important advice

Operation of the device is only valid if:

- the product is used under the conditions described in the installation- and operation instruction, the intended application according to the type plate and the intended use. In case of unauthorized modifications done by the user Bühler Technologies GmbH can not be held responsible for any damage,
- when complying with the specifications and markings on the nameplates.
- the performance limits given in the datasheets and in the installation- and operation instruction are obeyed,
- monitoring devices and safety devices are installed properly,
- service and repair is carried out by Bühler Technologies GmbH,
- only original spare parts are used.

This manual is part of the equipment. The manufacturer keeps the right to modify specifications without advanced notice. Keep this manual for later use.

Signal words for warnings

DANGER	Signal word for an imminent danger with high risk, resulting in severe injuries or death if not avoided.
WARNING	Signal word for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	Signal word for a hazardous situation with low risk, resulting in damaged to the device or the property or minor or medium injuries if not avoided.
NOTICE	Signal word for important information to the product.

Warning signs

These instructions use the following warning signs:

	Warns of a general hazard		Unplug from mains
	Voltage warning		Wear respiratory equipment
	Warns not to inhale toxic gasses		Wear a safety mask
	Warns of corrosive liquids		Wear gloves
	General information		

2.2 General hazard warnings

The equipment must be installed by a professional familiar with the safety requirements and risks.

Be sure to observe the safety regulations and generally applicable rules of technology relevant for the installation site. Prevent malfunctions and avoid personal injuries and property damage.

The operator of the system must ensure:

- Safety notices and operating instructions are available and observed,
- The respective national accident prevention regulations are observed,
- The permissible data and operational conditions are maintained,
- Safety guards are used and mandatory maintenance is performed,
- Legal regulations are observed during disposal,
- compliance with national installation regulations.

Maintenance, Repair

Please note during maintenance and repairs:

- Repairs to the unit must be performed by Bühler authorised personnel.
- Only perform conversion-, maintenance or installation work described in these operating and installation instructions.
- Always use genuine spare parts.
- Do not install damaged or defective spare part. If necessary, visually inspect prior to installation to determine any obvious damage to the spare parts.

Always observe the applicable safety and operating regulations in the respective country of use when performing any type of maintenance.

The method for cleaning the devices must be adapted to the IP protection class of the devices. Do not use cleaners which could damage the device materials.

DANGER **Toxic, acidic gases/liquids**

Protect yourself from toxic, corrosive gasses/liquids when performing any type of work. Wear appropriate protective equipment.

3 Transport and storage

Only transport the product inside the original packaging or a suitable alternative.

The equipment must be protected from moisture and heat when not in use. It must be stored in a covered, dry, dust-free room at room temperature.

4 Setup and connection

DANGER **Electric voltage**

Risk of electric shock

a) Always disconnect the unit from the mains before performing work.

b) Secure the equipment from accidental restarting.

c) The equipment may only be installed, maintained and put into operation by instructed, competent personnel.

d) Always observe the applicable safety regulations for the operating site.

DANGER **Toxic, acidic gases/liquids**

Protect yourself from toxic, corrosive gasses/liquids when performing any type of work. Wear appropriate protective equipment.

4.1 Installation

Please note before installing the level switch!

After transport and delivery of the level switch, the switching status of the bistable contacts may be different than required for proper operation.

Therefore slide the float for the level switch along the level switch tube from below immediately before installation.

This ensures all built-in bistable contacts have a clearly defined switching status (NC or NO).

For direct installation to the tank, insert the switching tube into the designated bore (per DIN 24557, Part 2) with rubberised cork seal on the tank. It secures to the flange using the included screws and seals. Please be sure the float can move freely and to leave enough space between the tank wall and add-ons.

After removing the float, where applicable, be sure the magnet inside the float is above the fluid level. This can easily be verified with a piece of iron to determine the magnet position inside the float.

DANGER **Electric voltage**

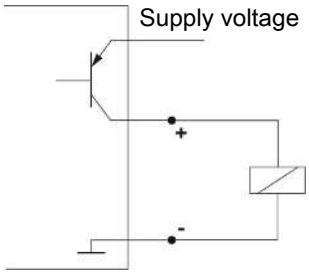
Risk of electric shock
When connecting devices, please note the maximum voltages and currents currents (see technical data) and use the correct wire cross-sections and circuit breakers.
When selecting the connection lines, also note the maximum operating temperatures of the devices.
Installation in special areas of application:
If the device will be installed outdoors or in wet areas, the maximum operating voltage is max. 16 V DC effective or 35 V DC.

The flange-mounted display units can be swivelled vertically by approx. 270° so they are easier to read. Please note the built-in swivel stop. You will notice more resistance when reaching the stop. Turning it beyond this stop may damage the display unit.

4.2 Electrical connections

Electricity is supplied via plug connectors. Please refer to the appendix for installation dimensions, nominal voltage and plug configuration.

The temperature switching outputs are PNP transistors (see illustration):



Note: When measuring the switching output with high-load measuring device inputs or when used as a frequency output, the load must be set to 10 kΩ between the output and earth (GND) to avoid faulty measurements.

4.3 Information on the correct operation of reed contacts in Bühler level switches

Based on their construction, reed contacts are very long lasting and reliable components. Yet the following should be considered when using them:

Life of reed switches

The life of reed switches can be up to 10^9 cycles. This is reduces by high stress and / or incorrect or the absence of protective circuits when switching inductive, capacitive or lamp loads.

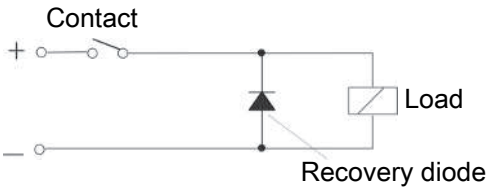
It's therefore important to ensure NEVER to exceed one or several of the maximum approved limits, even temporarily, and to install a contact protective circuit for loads which are not purely ohmic. Using test lamps when installing the devices is also prohibited, as these can temporarily allow too much current to flow, which can damage the reed contacts. In this case non-volatile testing equipment should always be used.

Contact protective circuits for reed switches

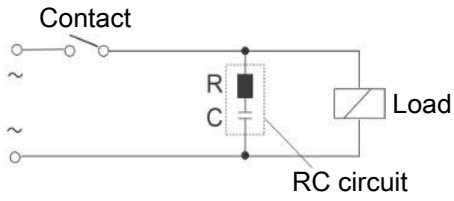
For direct current voltage a recovery diode per figure A must be connected parallel to the contact.

For alternating current voltage an RC circuit per Figure B and Table 1 must be connected parallel to the contact.

A



B



Load in VA	10		25		50	
Voltage at 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 note the max. voltage/load ratings of the respective level contacts!

Voltages and currents

All Bühler level contacts with reed switch can switch minimal Switching voltages of 10 µV and minimal switching currents of 1 µA.

The maximum values specified for the respective contact types apply.

Level contact with reed switches can therefore be used for SPS applications as well as for high loads (within the maximum limits) without hesitation.

Contact material

All reed switches in Bühler level contacts use rhodium as the contact material for the actual contact areas.

Magnetic fields

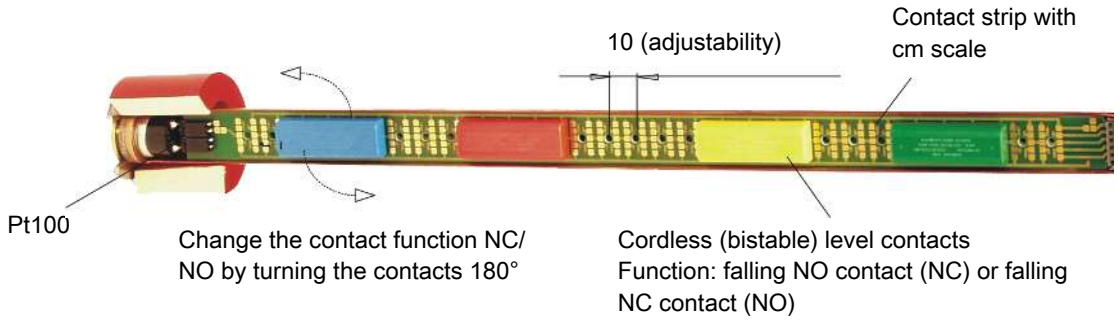
Avoid external magnetic fields, including from electric motors. These can interfere with the function of the reed switches.

Mechanical loads

Do not expose the level switch to strong blows or bending.

4.4 Adjusting the level contacts

(only yellow + green, max. 2 level contacts)



NOTICE

Only tighten the plastic screw at maximal 5 cNm!

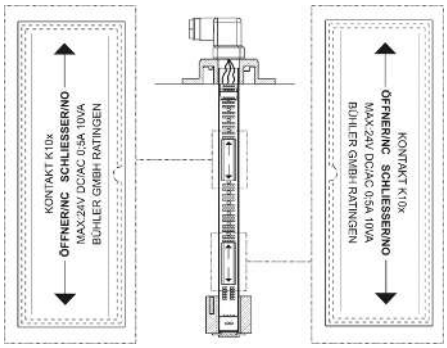
The contacts required for the float are mounted to a galvanically gold-plated with cm scale with plastic screws. The contact housings have different colours and may only be mounted to the contact strip in the following order.

	NC contact / NO contact
Top to bottom:	Green
	Yellow

Any other order may result in malfunctions.

The level contacts are arranged per order specifications at the factory but may later be moved along a 10 mm (0.4") grid. The falling NC contact (NO) or falling NO contact (NC) contact function may also be changed by turning the contact housings 180°. The housing has two arrows. The arrow pointing up indicates the current contact function.

Function NO:
NO contact with rising level
= NC contact with falling level



Function NC:
NC contact with rising level
= NO contact with falling level

The contact logic assumes the level switch is installed in an empty tank, i.e. it is only in the operating position once filled.

The reference point for the level switching point is at the middle of the EASYJUST level contact.

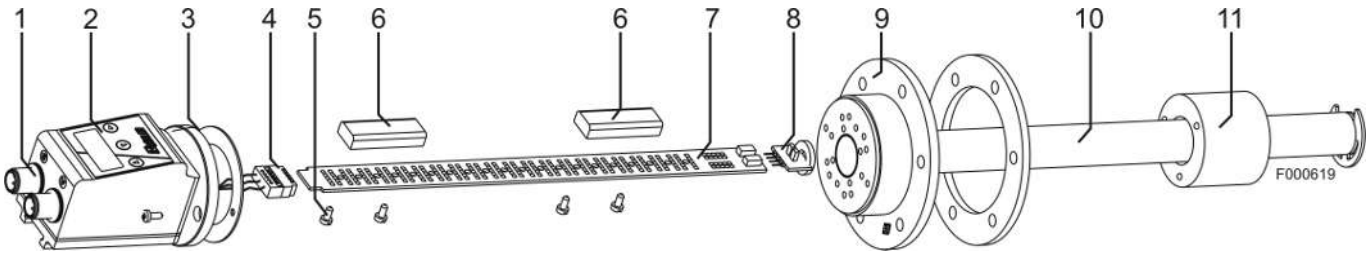
NT64D:

- Disconnect the voltage supply.
- Disconnect the plug.
- Unscrew the display housing with base and carefully pull out the top along with the adapter plug and the contact strip.
- Loosen and reposition the plastic screws on the contacts (cm scale on the back of the contact strip). Minimum spacing: 40 mm (1.6").
- If necessary, turn 180° to change the contact function.
- Tighten the plastic screws for fastening the contact. Please note the maximum torque (max. 5 cNm).
- Slide the contact strip back into the protective tube and screw on the display housing with base.

NOTICE

Ensure the seals are positioned correctly. Replace defective seals immediately!

Example:



1	Plug connection M12	7	Contact strip
2	Display housing	8	Pt100
3	Base	9	Flange
4	Adapter plug	10	Switching tube
5	Plastic screws	11	Float
6	Level contacts		

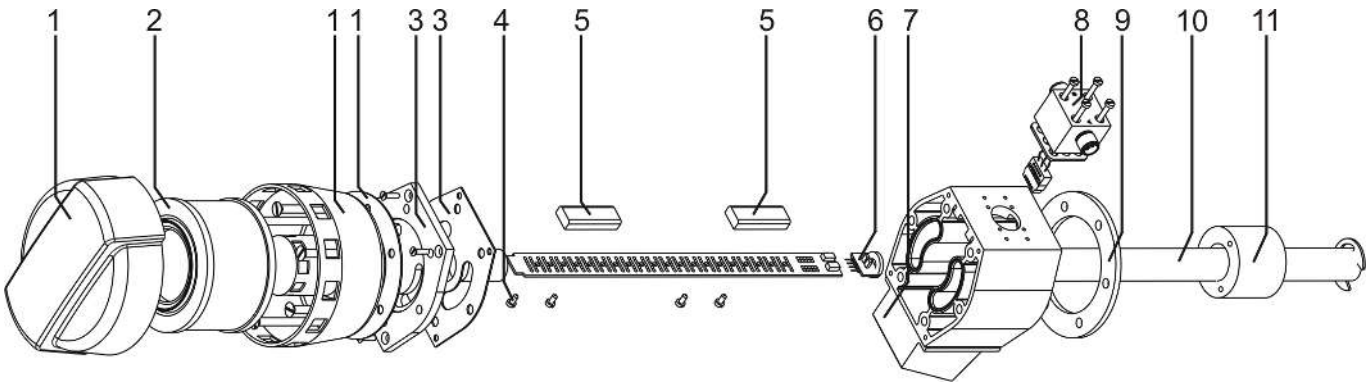
NV74D:

- Disconnect the voltage supply.
- Unscrew the filter cover and remove the filter element.
- Loosen the mounting screws and remove the filter case.
- Loosen the screws for the flange cover and remove the cover with cover seal.
- Disconnect the adapter plug from the contact strip and carefully pull the contact strip out the top.
- Loosen and reposition the plastic screws on the contacts (cm scale on the back of the contact strip). Minimum spacing: 40 mm (1.6").
- If necessary, turn 180° to change the contact function.
- Tighten the plastic screws for fastening the contact. Please note the maximum torque (max. 5 cNm).
- Slide the contact strip back into the protective tube.
- Reattach the adapter plug to the contact strip the right way. The markings on the adapter flange and the contact strip must overlap.
- Fasten the flange cover incl. seal.
- Secure filter case, insert filter element and screw on filter cover.

NOTICE

Ensure the seals are positioned correctly. Replace defective seals immediately!

Example:



1	Filter cover with filter case and seal	7	Display housing
2	Filter element	8	Plug connection 2M12
3	Flange cover and seal	9	Flange
4	Plastic screws	10	Switching tube
5	Level contacts	11	Pt100
6	Pt100		

5 Operation and control

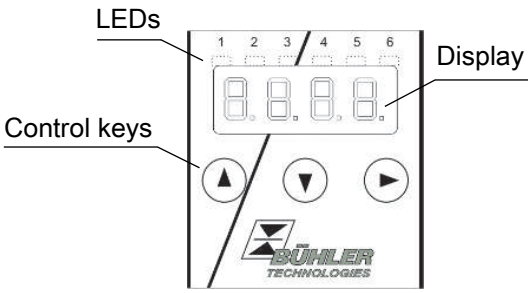
NOTICE

The device must not be operated beyond its specifications.

5.1 Start-up procedure

The device will automatically switch on when connected to power. It will first briefly display the software version, at which time the device will also check the built-in components. The display will then switch to displaying measurements.

The following describes the function of the display and control unit:

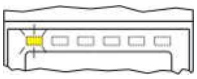
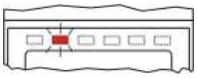
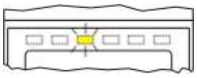
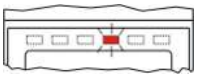


If an error message appears in the display during operation, please refer to the **Troubleshooting** table under chapter “Service and Repair”.

5.2 LED statuses

LEDs above the measurement display indicate the status of the temperature switching outputs. The LEDs are permanently assigned to the switching outputs.

The following table shows the factory settings:

	LED 1 – yellow Status switching output 1
	LED 2 - red Status switching output 2 (if applicable)
	LED 3 – yellow Status switching output 3 (if applicable)
	LED 4 – red Status switching output 4 (if applicable)

The switching characteristics of the LED (on if switching contact closed or open) can be changed.

5.3 General key functions

The keys below the display are used for operation.

The menu controls are detailed in the following chapters.

Key	Mode	Function
▶	– Measurement display:	Change measured variables displayed.
	– In the menu:	Move down one menu level. Move up one menu level.
	– At the end of the menu:	 The display indicates the end of the menu.
	– Following input/selection:	Confirm and save a numerical value entered or a function selection. The display will flash if a parameter has been changed.
▲	– Measurement display:	Displays the configuration.
	– In the menu:	Scroll up menu item, numerical value or function selection. Holding the key will continuously scroll.
▼	– Measurement display:	Go to main menu.
	– In the menu:	Scroll down menu item, numerical value or function selection. Holding the key will continuously scroll.
▼ + ▶	– In the menu:	Exit the main / sub / drop-down menu and return to displaying the measurement without saving changes to the parameters.
▲ + ▶	– In the menu:	Move to the next higher menu level.
60 s no action	– In the menu:	Exit the main / sub/ drop-down menu.

To select a menu item and to enter values:

- Open the main menu with the ▼ key.
- Select the submenu with the ▼ and ▲ keys and open the submenu with the ▶ key.
- If necessary, select the next submenu with the ▼ and ▲ keys and open with the ▶ key.
- Select the desired menu item with the ▼ and ▲ keys and open the list of values with the ▶ key.
- Set the value with the ▼ and ▲ keys and confirm with the ▶ key. The new settings will the saved and the device will return to the submenu.
- Select the menu item EXIT to exit the submenu and confirm with the ▶ key. The device will return to the next menu level up or to the measurement display.

5.4 Keylock enabled

With the keylock enabled, selecting the menu with the ▼ key will display  in place of the main menu. The active digit will be indicated by a dot.

- Use the ▲ and ▼ keys to enter the code and confirm with the ▶ key. The active digit will move one place to the right. After entering the 3rd digit the main menu will open.

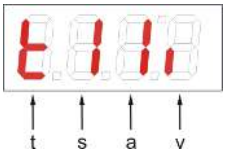
If the wrong code is entered, the device will return to the measurement display. If you forgot the password you can always enter master code 287 to access the menu.

You can cancel the keylock under Loc in submenu **Basic Settings Advanced Options** bEF and enter 000 to reset the code.

5.5 Menu overview

The menu structure is based on the VDMA standard sheet 24574-1. The menu structure is hierarchic. The top menu level contains the main menu items, e.g. tEMP, bEF, diA, E. Each main menu has additional submenu items.

The menu items may vary depending on the device configuration. Not all menu items described below will necessarily apply to your device. Press the ▲ key in display mode to open the configuration. A 4-digit code will appear, e.g.



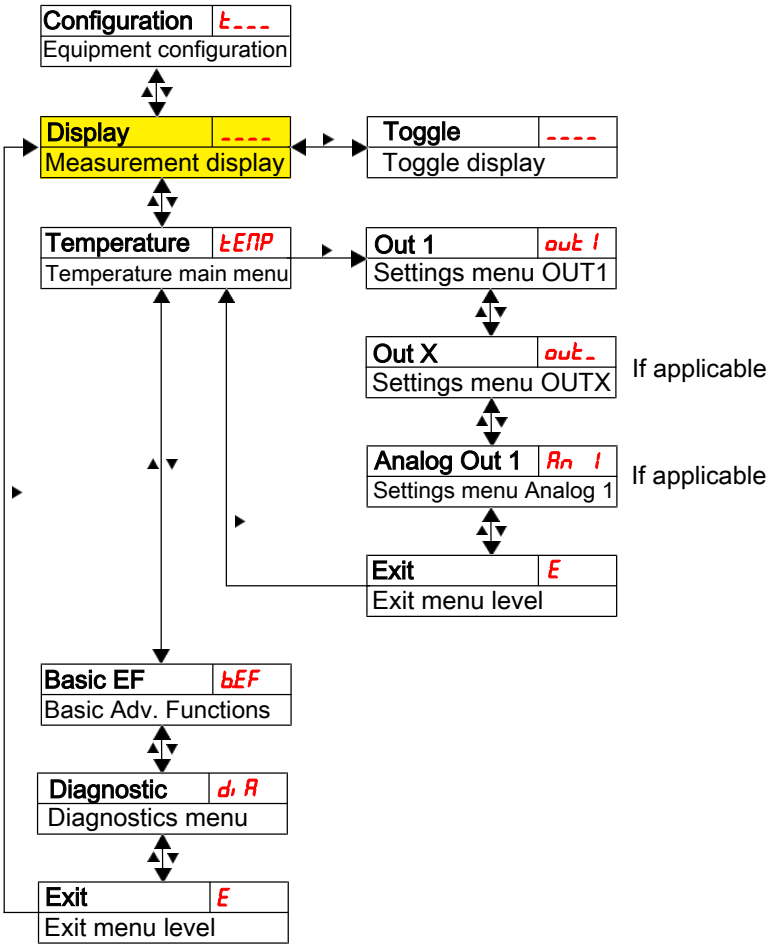
With the 4 digits tsav meaning:

t: Model
t = temperature measurement

s: Number of switching outputs
1, 2 or 4

a: Number of analogue outputs
0 for 1

v: Device installation type
i = standard installation (tank installation)
F = remote display



The individual menu items will not be shown if the option does not apply. Example: With a=0 the menu items for configuring the analogue output does not apply. You can then skip the description for this item.

The switching outputs or analogue outputs can be configured in the **Temperature** (tEMP) main menu.

The basic device settings can be changed. General settings can be configured under **Basic Settings Advanced Functions** (bEF). These settings should be configured first, as they affect the displays and settings for the individual menus. These settings are e.g. the units used.

The **Diagnostic** (diA) menu further contains diagnostics options.

For the detailed illustration of the entire menu structure please refer to the original operating instructions at the end of this chapter.

5.6 Changing basic settings

The general basic settings can be changed under menu **Basic Settings Extended Functions** (bEF). These settings will affect the measurement display and the configuration options in the various main menus. Here you can also change the switching output assignment.

– Press the ▼ key to open the main menu.
– Select menu item (EF) using the ▼ and ▲ keys and open the menu with the ▶ key.

NOTICE

Disabling normal error handling

Disabling normal error handling and analysis could potentially cause dangerous operating states, dangers to the user or machines. Before using this option, review the hazard potential within the process. With this setting, Bühler Technologies GmbH assumes no liability for injuries to health or material damage caused by this setting.

5.6.1 Disabling normal error handling

Here you can enable/disable normal error handling and analysis

The function Disable error handling (Errh) is used to disable normal error handling and analysis. This may pose dangers to the user or machine.

Basic EF	bEF	→	Set error handling	Errh	↔	Confirm	---
Basic ext. functions			Disable error handling			no - YES	

The options are:

	
Disables normal error handling.	Enables normal error handling (default)

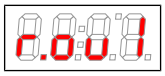
Important note: When exceeding the measuring range or if sensor errors occur, the measurement will be frozen and all six LEDs in the status bar will blink. When the measurement returns to the permissible range the LEDs will stop blinking and the display will refresh again as usual.

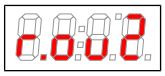
5.6.2 Define switching outputs

Here you can define the switching outputs.

Use the “Define switching outputs” function to define the switching outputs (rou1 and rou2). The switching outputs can be configured as Err, oil and tEMP .

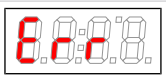
Basic EF	bEF	→	SET Output	rou1/2	→	Selection menu	----
Basic Adv. Functions			Define switching outputs			Err - oil - tEMP	





Options:
[Err, oil, tEMP]

The options are:

		
Err	oil	TEMP

Note:

– Switching outputs 1 and 2 can alternatively be wired as error indicators. In this case the output will be connected as a NC contact which opens when exceeding the range or if an error occurs. The LED assigned to this output will generally not be activated, as all 6 LED's in the status bar will blink if an error occurs.
– When defining a switching output as an error indicator it will no longer be an option for normal switching output settings.

5.6.3 Set temperature unit

This is where the unit symbol for the temperature is configured:

Basic EF	bEF	▸	Set Unit Temp	tuni	◂▸	Selection menu	
Basic Adv. Functions			Temperature unit			°C - °F	

The options are:

Degrees Celsius

Degrees Fahrenheit

Note:

– Values are automatically converted and the measuring range adjusted. However, always check the respective switching points and switch-back points.

5.6.4 Set display refresh rate

The refresh rate of the display can be changed based on the application. The display can also be completely disabled. The LEDs will remain functional.

Basic EF	bEF	▸	Display Rate	di S	◂▸	Selection menu	
Basic Adv. Functions			Display rate			FASt - oFF	

The options are:

fast

medium

slow

Display off

Note:

– Error messages will still appear, even with the display off.

5.6.5 Enable/disable keylock

The keylock can be enabled to prevent unauthorised changes to the device settings.

Basic EF	bEF	▸	Lock Device	Loc	◂▸	Selection menu	
Basic Adv. Functions			Locks the keys			0 - 999	

The keylock will be enabled after entering at least one digit > 0. A dot indicates the active digit during this input.

Setting range:
000 to 999

– Use the ▶ key to open the list of values: 

– Enter the digit using the ▼ and ▲ keys (0 to 9) and press the ▶ key to confirm. The active digit will move one place to the right.
– Lastly, press the ▶ key to confirm the code.
The device will now return to the submenu.

Note:

– To disable the keylock enter: 000

5.6.6 Restore factory settings (Reset)

Use the Reset function (rES) to restore the factory settings. All changes will be lost. Since this will also reset the limits, you must check the temperature settings.

Basic EF	bEF	→	Reset	rES	↔	Confirm	---
Basic Adv. Functions			Factory setting			no - YES	

The options are:

	
Original status: No, keep current settings	Original status: Yes, reset settings to the factory defaults.

The factory settings are:

Definitions:

SP x / rPx	Switching point / switch-back point x
dS x / dr x	Switch-on delay / switch-back delay for switching output x
AxHi / AxLo	Maximum and minimum measurement for output
Aou x	Analogue output signal type
ou x	Switching characteristic for switching output x
tuni	Temperature unit
di S	Display refresh rate
Loc	Keylock
Sdou	Switching output logged
dtMM	Delay for recording the minimum / maximum temperature

Note: For customer-specific specifications the factory preset may vary from those listed here.

Basic settings:

Basic Settings	
tuni	C
di S	FASt
Loc	000
tcl *	00n
tcC*	0501 1

*for wall-mounting only

Version with 1 switching output:

Switching outputs	
SP 1 / rP 1	50 / 45
dS 1 / dr 1 / ou 1	0 / 0 / Hno

Version with 2 switching outputs:

Switching outputs	
SP 1 / rP 1	50 / 45
dS 1 / dr 1 / ou 1	0 / 0 / Hno
SP2 / rP2	60 / 55
dS2 / dr2 / ou2	0 / 0 / Hno

Version with 4 switching outputs:

Switching outputs	
SP1 / rP1	50 / 45
dS1 / dr1 / ou1	0 / 0 / Hno
SP2 / rP2	60 / 55
dS2 / dr2 / ou2	0 / 0 / Hno
SP3 / rP3	70 / 65
dS3 / dr3 / ou3	0 / 0 / Hno
SP4 / rP4	80 / 75
dS4 / dr4 / ou4	0 / 0 / Hno

Version with analogue output:

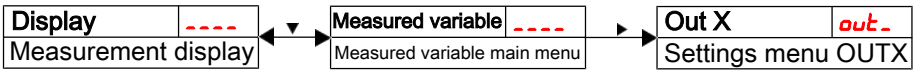
Analogue output	
AInH / AInL / Aou1	0 / 100 / 1

Diagnostic settings:

Diagnostics	
Sdou	out1
dtNN	00

5.7 Switching outputs

All switching outputs are configured the same way. The switching output number is therefore represented by x. Open the switching output to be configured from the menu for the respective measured variable.

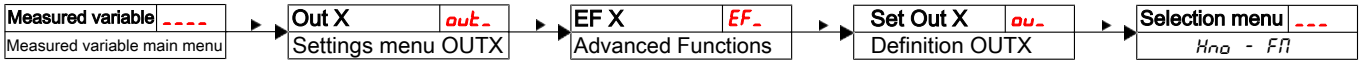


The switching output allocation and other basic settings related to all switching outputs can be configured in menu **Basic Settings Advanced Functions**.

Use submenu **Advanced Functions** to configure additional settings for each individual switching output which e.g. affect the switching characteristics of the output. The output can also be tested here.

5.7.1 Switching output x: Definition of the switching characteristic

The switching characteristic for the output can be configured under the following menu:



The options are:

Hysteresis Function

Hysteresis function as the NO contact

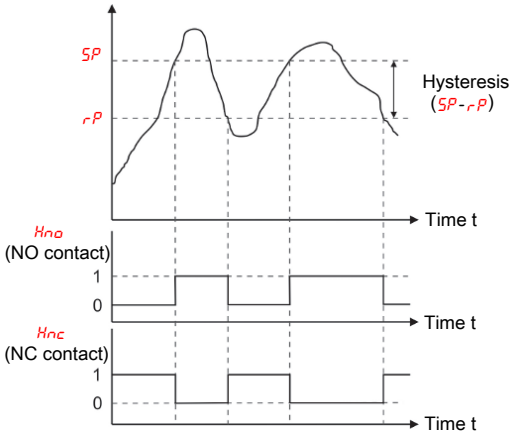
Hysteresis function as the NC contact

NO contact or NC contact function when the output signal is set when exceeding the configured switching point. The output signal will be deleted if the value is below the configured switch-back point.

Here, NO contact (Hno) means the PNP switching output is closed above switching point SPx and opens below switching point rPx.

Here, NC contact (Hnc) means the PNP switching output is open above switching point SPx and closes below switching point rPx.

Also see the explanation in the drawing below.



Window function

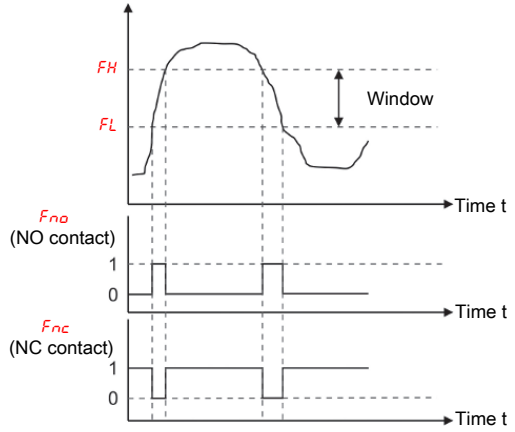
Window function as NO contact

Window function as NC contact

NO contact or NC contact function defining a signal window. When the measuring window is reached the output signal is set and deleted upon exiting.

Here, NO contact (Fno) means the PNP switching output is closed if the value is within the window. Otherwise the switching output will be open.

Here, NC contact (Fnc) means the PNP switching output is open if the value is within the window. Otherwise the switching output will be closed.

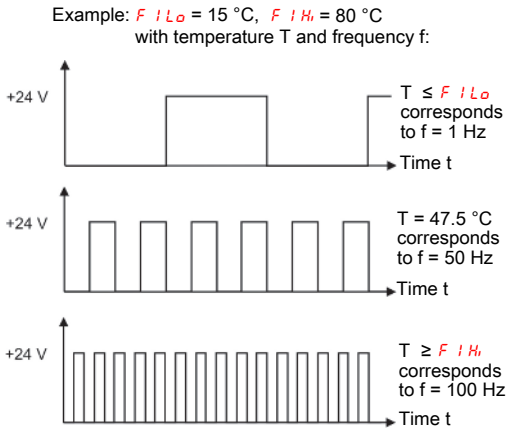


Frequency output

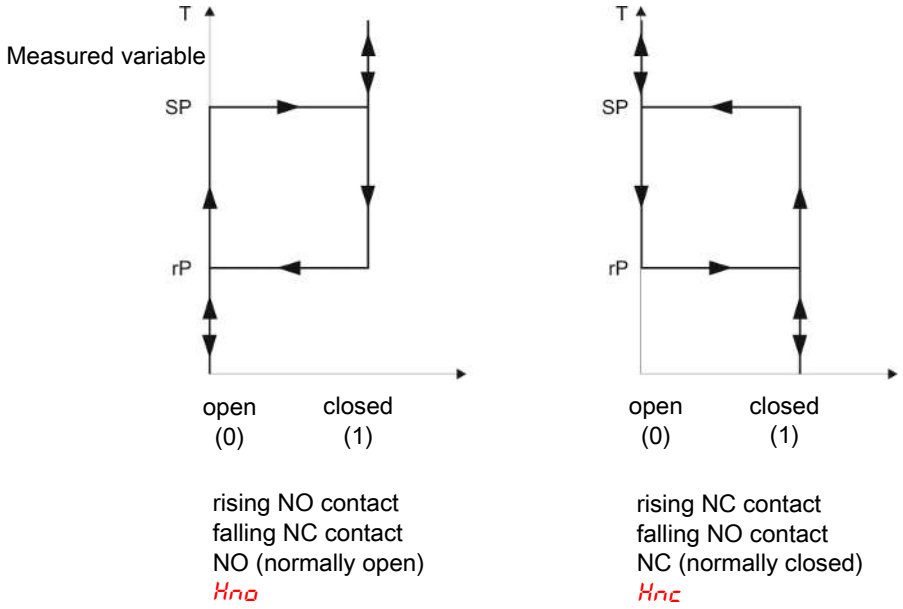
Frequency output

If the output is defined as a frequency output, a square wave signal with a frequency between 1 Hz and 100 Hz proportional to the measurement will be output.

Note: To increase the slew rate of the square wave signal, we recommend loading the switching output with an load of 10 kΩ.

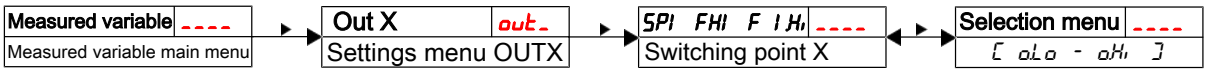


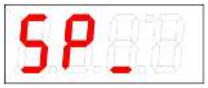
Note: The designation of the switching function may vary:



5.7.2 Switching output x: Upper switching limit (switching point)

The upper switching limit for switching output Out x can be defined with the following submenu:





Setting range:
0 °C to 100 °C
(32 °F to 212 °F)

Switching point for OUT x

Note:

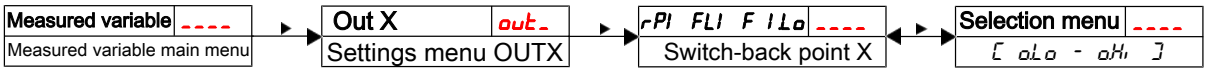
– The switching point must be set to within the range limits (see menu **Basic Settings Advanced Functions**).

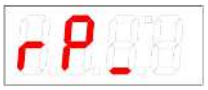
– If switching output OUT x was assigned the function **Window**,  will appear. The setting corresponds with the upper window limit.

– If switching output OUT x was assigned the function **Frequency output**,  will appear. The setting corresponds to the frequency 100 Hz.

5.7.3 Switching output x: Lower switching limit (switch-back point)

The lower switching limit for switching output Out x can be defined with the following submenu:





Setting range:
0 °C to 100 °C
(32 °F to 212 °F)

Switch-back point for OUT x

Note:

– The switch-back point must be set to within the range limits and must always be lower than the switching point.

– If switching output OUT x was assigned the function **Window**,  will appear. The setting corresponds with the lower window limit.

– If switching output OUT x was assigned the function **Frequency output**,  will appear. The setting corresponds to the frequency 1 Hz.

5.7.4 Switching output x: Switch-on delay

The menu **Advanced Functions** EFx is used to configure additional settings for switching output x. The submenu is at the second submenu level.

The switching and switch-back delay prevents the alarm being triggered too frequently in unstable conditions. The switching delay can be configured with the following menu:

Measured variable ----	→	Out X out_	→	EF X EF_	→	Delay SP X dS_	↔	Selection menu ---
Measured variable main menu		Settings menu OUTX		Advanced Functions		Delay OUTX On		0 - 100

Setting range:
0...100 seconds

Time span in seconds during which the signal must be continuously present for the switching output to respond.

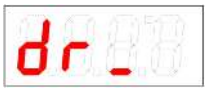
Note:

- If switching output OUT x was assigned the function **Window**, the setting corresponds to the switch-on delay which detects valid reaching of the measuring window.
- If switching output OUT x was assigned the function **Frequency output**, this value will have no affect.

5.7.5 Switching output x: Switch-back delay

The switch-back delay can be configured with the following menu:

Measured variable ----	→	Out X out_	→	EF X EF_	→	Delay RP X dr_	↔	Selection menu ---
Measured variable main menu		Settings menu OUTX		Advanced Functions		Delay OUTX Off		0 - 100



Setting range:
0...100 seconds

Switch-back signal delay for OUT x.

Time span in seconds during which the signal must be continuously present for the switching output to respond.

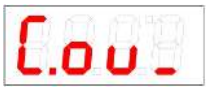
Note:

- If switching output OUT x was assigned the function **Window**, the setting corresponds to the switch-on delay which detects valid closing of the measuring window.
- If switching output OUT x was assigned the function **Frequency output**, this value will have no affect.

5.7.6 Switching output x: Testing the switching output

The switching output test can be started with the following menu:

Measured variable ----	→	Out X out_	→	EF X EF_	→	Check Out X Cou_	↔	Selection menu ----
Measured variable main menu		Settings menu OUTX		Advanced Functions		Functional test OUTX		noP - on



Switching output test option

Options when setting ou 1 to Hno / Hnc / Fno / Fnc:

Normal switching output operation

Switching output permanently off disabled

Switching output permanently activated

Options when setting ou 1 to Fn:

Normal mode as frequency output

Output Frequency 1 Hz

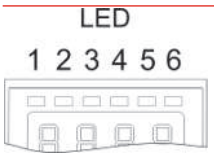
Output Frequency 100 Hz

Note:

- **After completing the test, set the function to normal mode noP.**

5.7.7 Change status LED display function

The LEDs in the display indicate the switching status of the output. The following table shows how LEDs are allocated to the switching output:

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

In the factory setting the LED indicates the physical status of the PNP switching output (switching output closed – LED on).

The logical indicator function may need to be different from the physical signal on the switching output. You can therefore also reverse this indication with this menu (switching output open – LED on).

Example:

You have 2 switching outputs for the temperature, configured as:

- **Switching output 1:** Max contact, rising NO contact. The LED lights up when exceeding the maximum temperature and the temperature is higher than the desired range. So this LED lighting up indicates an “Error” status.
- **Switching output 2:** Min contact, rising NO contact. So in the factory setting, the LED lights up when exceeding the minimum temperature. So in this case the LED would light up if the status is okay.

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

SP3 = 70 °C, rP3 = 65 °C
SP4 = 80 °C, rP4 = 75 °C

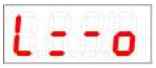
	Factory setting	Status function LED 3 inverted	State	Status
A	 LED3 ON	 LED3 OFF	Temperature rises to > 70 °C PNP switching output 3 closed	OK
B	 LED4 and LED3 ON	 only LED4 ON	Temperature rises to > 80 °C PNP switching output 4 closed	Error
C	 LED3 ON	 LED 3 OFF	Temperature falls to < 75 °C PNP switching output 4 open	OK
D	 LED3 OFF	 LED3 ON	Temperature falls to < 65 °C PNP switching output 3 open	Error

Here you can reverse the LED status function for a contact: the LED lights up if the contact is open, so below the minimum temperature, and the LED lighting up again indicates an “Error” status.

Measured variable ---- → Measured variable main menu
→ Out X out_ → Settings menu OUTX
→ EF X EF_ → Advanced Functions
→ LED Out X LEd_ → Function status LEDX
↔ Selection menu L:__ → L: o - L:-o

The options are:

LED = output;
the LED lights up when the PNP switching output is closed.



LED = -output;
the LED lights up when the PNP switching output is open.

NOTICE

The display function of the status LED affects event logging! Please note chapter “Diagnostic options”.

5.8 Analogue outputs

5.8.1 Analogue output x: Assigning the upper limit

Used to configure at which temperature to output the maximum analogue signal. This is configured in menu:

Measured variable ---- → Measured variable main menu
→ Analog OutX An_ → Settings menu Analog X
→ Analog MaxX A1Hi → Maximum value assignment
↔ Selection menu ---- → [oLo - oHi]

Setting range:
0 °C to 100 °C
(32 °F to 212 °F)

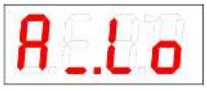
Note:

- The output range setting must not be less than 10 % of the measuring range: A1Hi – A1Lo >= 10%
- If the range is set too low, the analogue value output may have grades.

5.8.2 Analogue output x: Lower limit assignment

Used to configure at which temperature to output the minimum analogue signal. This is configured in menu:

Measured variable ---- → Measured variable main menu
→ Analog OutX An_ → Settings menu Analog X
→ Analog MinX A1Lo → Minimum value assignment
↔ Selection menu ---- → [oLo - oHi]



Setting range:
0 °C to 100 °C
(32 °F to 212 °F)

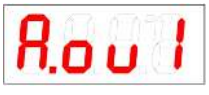
Note:

- The output range setting must not be less than 10 % of the measuring range: A1Hi – A1Lo >= 10%
- If the range is set too low, the analogue value output may have grades.

5.8.3 Analogue output x: Signal type assignment

The analogue output can be defined as a voltage or current output with different value ranges. This is configured in menu:

Measured variable ---- → Measured variable main menu
→ Analog OutX An_ → Settings menu Analog X
→ Set A.OUtX Aou_ → Output function
↔ Selection menu _ _ → , 1 - u 3



The options are:

4 mA to 20 mA

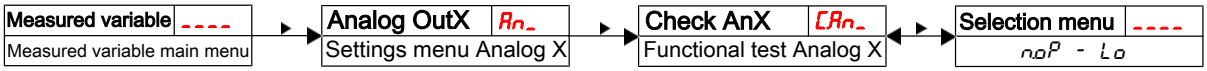
2 V to 10 V

0 V to 10 V

0 V to 5 V

5.8.4 Analogue output x: Testing the analogue output

The analogue output can be tested. The highest, mean and lowest analogue value can be output successively. This is configured in menu:



The options are:

	
Normal mode	Highest analogue value output
	
Mean analogue value output	Lowest analogue value output

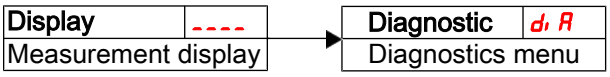
Note:

– **After completing the test, set the function to normal mode** noP.

5.9 Diagnostic options

The device is able to log events for a switching output. The LED lighting up is considered an event. The logging of switching procedures therefore depends on how the LED switching function is configured.

The configuration and analysis can be carried out here.



NOTICE

Only one switching output can be logged. The switching output to be logged is configured in menu item **Set Journal Out** (SJou).

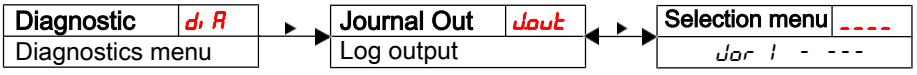
– Press the ▼ key to open the main menu.
– Select menu item di A with the ▼ and ▲ keys.

From here you will be able to access various diagnostic values and measurement monitoring logs.

– Open the menu with the ▶ key.
  You can now change or view the diagnostic settings.

5.9.1 View logbook

The last 6 events for the switching output being logged can be viewed here and all entries deleted:



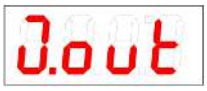
The journal entries will be displayed as:

– Most recent event Jor 1 occurred x hours (h) / days (d) ago,
– Events 2 to 5 occurred x hours / days ago,
– The oldest event Jor6 occurred x hours / days ago,
– Delete function (---)

Example:

Jor 1 ⇔ 13h, key ▼
Jor2 ⇔ 24h, key ▼, ▲
Jor3 ⇔ 6.1h, key ▼, ▲
Jor4 ⇔ 82h, key ▼, ▲
Jor5 ⇔ non 8., key ▼, ▲
Jor6 ⇔ non 8., key ▼, ▲
---, key ▲; ▶ = delete

* not yet populated, only 4 events have occurred



The information displayed will alternate between the index and time for entry x, e.g. Jor 1 ⟺ 1.4h for the most recent event 1.4 hours ago.

Press the ▶ key to return to the submenu or use ▼, ▲ to select the next journal entry.

Confirming the information  with the ▶ key will delete the list of events and return to the submenu.

Note:

– If no events have been logged, the display will alternate between Jor X and non.

5.9.2 Maximum and minimum temperature

Used to view or delete the saved maximum and minimum temperature:

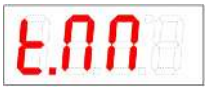
Diagnostic	di A	→	Max/Min Temp	tMM	↔	Selection menu	----
Diagnostics menu			Max/Min Memory			---- - ---	

The journal entries will be displayed as:

– Maximum temperature,
– occurred x hours / days ago,
– Minimum temperature,
– occurred x hours / days ago,
– Delete function

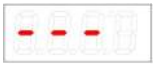
Example:

72 C, key ▼
8.4h, key ▼, ▲
22 C, key ▼, ▲
2.1h, key ▼, ▲
---, key ▲; ▶ = delete



Menu order:
Max. value,
time
min. value
time
delete (reset)

Press the ▶ key to return to the submenu or use ▼, ▲ to select the next Journal entry.

Confirming the information  with the ▶ key will delete the list of events and return to the submenu.

5.9.3 Define switching output to log

Used to select the switching output to be logged. Only one switching output can be logged.

Diagnostic	di A	→	Set Journal Out	Sdou	↔	Selection menu	out_
Diagnostics menu			Output monitoring			Out 1 - Out_	

Switching output logging.

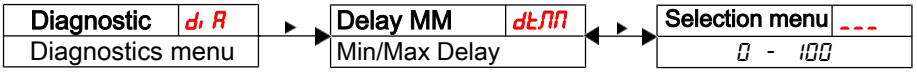
Options:
out 1 to outX

NOTICE

Values are backed up from volatile to non-volatile memory approx. every three hours.

5.9.4 Delay for storing the Min/Max Temperature

A delay time for saving the minimum and maximum temperature can be set to record reliable values when temperatures fluctuate. Here, enter the time span in seconds during which the signal must be continuously present before the temperature is logged.



Setting range:
0...100 seconds

– Use the ▶ key to open the list of values.
– Set the value with the ▼ and ▲ keys and use the ▶ key to confirm (e.g. 5 (seconds). The device will return to the submenu.

6 Cleaning and Maintenance

This device is maintenance-free.

The method for cleaning the devices must be adapted to the IP protection class of the devices. Do not use cleaners which could damage the device materials.

For versions with filter:

The filter element must be replaced as needed, at least 1x annually. In exceptional cases a small amount of oil can be added via the filter.

During maintenance, remember:

– The equipment must be maintained by a professional familiar with the safety requirements and risks.
– Only perform maintenance work described in these operating and installation instructions.
– When performing maintenance of any type, observe the respective safety and operation regulations.

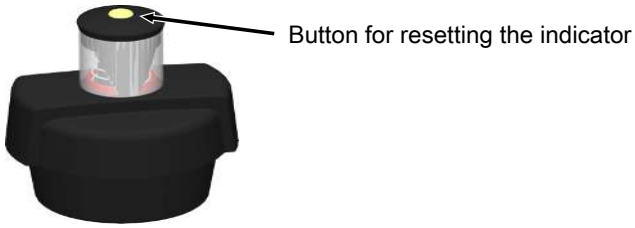
6.1 Replacing the filter element

Replace the filter element as follows:

– Temporarily shut down the system.
– The filter cover counter-clockwise to open.
– Remove the filter element and dispose according to legal regulations.
– Insert the new filter element. Be sure to use the correct filter fineness!
– Screw on the filter cover.
– For filters with optical contamination indicator: Set the display to zero.

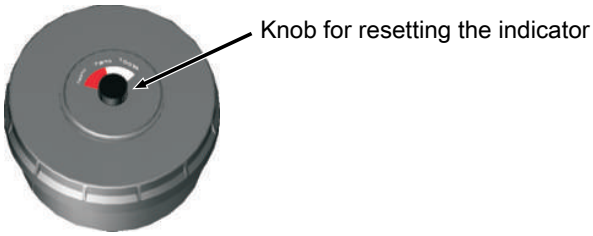
Hydac filter

When the maximum display value is reached, the red indicator piston will lock in place, indicating the filter service is required. Press the yellow Reset button to reset the display to zero.



Filtration Group filter

Filter contamination is indicated in percent (50%, 75% and 100 %). To reset the display to zero, turn the knob in the direction of the arrow until the red part of the indicator disc is turned all the way back.



6.2 Adding small amounts of oil

Nivovent type with BFA or SSR option only:

– Temporarily shut down the system.
– The filter cover counter-clockwise to open.
– Remove the filter element.
– Slowly add oil through the nodular holes.
– Reinsert the filter element and close the cover.
– Restart the system.

7 Service and repair

This chapter contains information on troubleshooting and correction should an error occur during operation.

Repairs to the unit must be performed by Bühler authorised personnel.

Please contact our Service Department with any questions:

Tel.: +49-(0)2102-498955 or your agent

If the equipment is not functioning properly after correcting any malfunctions and switching on the power, it must be inspected by the manufacturer. Please send the equipment inside suitable packaging to:

Bühler Technologies GmbH

- Reparatur/Service -

Harkortstraße 29

40880 Ratingen

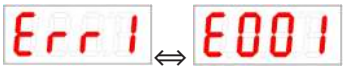
Germany

Please also attach the completed and signed RMA decontamination statement to the packaging. We will otherwise be unable to process your repair order.

You will find the form in the appendix of these instructions, or simply request it by e-mail:

service@buehler-technologies.com.

7.1 Troubleshooting

Problem / Malfunction		Possible cause	Action
No display		– No supply voltage	– Check cable and replace, if necessary
Error messages on the display: Alternating between Err and Exxx: e.g. 			
	Error 001	– Ambient temperature too low	– Maintain limits
	Error 002	– Ambient temperature too high	– Maintain limits
	Error 004	– Pt100 defective (short-circuit)	– Send device in for repair
	Error 008	– Pt100 defective (cable break)	– Send device in for repair
	Error 1024	– Internal error	– Please contact customer service

Possible errors

Problem / Malfunction	Possible cause	Action
Switching output not triggering when exceeding limits	– Switching output configured incorrectly	– In submenu CouX: “Test Switching Output“ to ensure normal mode
	– Switching output defect	– In submenu CouX: “Test Switching Output” to test the desired switching output
Switching output constantly switching	– Switching output configured incorrectly	– In submenu CouX: “Test Switching Output“ to ensure normal mode
	– Switching output defect	– In submenu CouX: “Test Switching Output” to test the desired switching output
The analogue doesn’t receive the full/correct output current	– Wrong signal type set	– In submenu RouX: Check and if necessary set the correct signal type (current/voltage output)
	– Load too high (current output)	– Reduce load to permissible value
Analogue output doesn’t change the output signal when the input signal changes	– Analogue output configured incorrectly	– In submenu CRnX: „Test Analogue Output“ to ensure normal mode

7.2 Spare parts and accessories

Accessories

Item no. 4-pin	Item no. 8-pin	Description
9144 05 0010	9144 05 0048	Connecting cable M12x1, 1.5 m, angular coupling and straight plug
9144 05 0046	9144 05 0049	Connecting cable M12x1, 3.0 m, angular coupling and straight plug
9144 05 0047	9144 05 0033	Connecting cable M12x1, 5.0 m, angular coupling and strands

8 Disposal

Dispose of parts so as not to endanger the health or environment. Follow the laws in the country of use for disposing of electronic components and devices during disposal.

9 Appendices

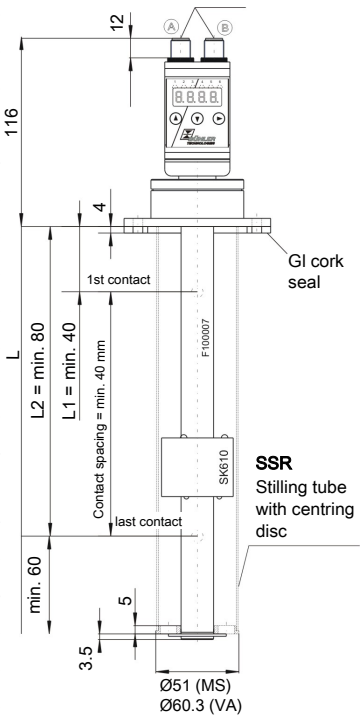
9.1 Technical Data NT 64D

Basic unit

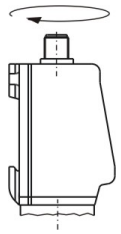
Version	**MS**	**VA**
Operating pressure	max. 1 bar	max. 1 bar
Operating temperature	-20 °C to +80 °C	-20 °C to +80 °C
Float	SK 610	SK 221
Min. fluid density	0.80 kg/dm³ with float	0.85 kg/dm³ with float
Lengths	280, 370, 500 mm (standard)	
Material/Version		
Display housing	PA	PA
Float	rigid PU	1.4571
Immersion tube	Brass	1.4571
Flange (DIN 24557)	PA	PA
Weight at L=280 mm Each 100 mm add	approx. 300 g approx. 30 g	approx. 400 g approx. 50 g
Degree of protection	IP65	IP65
Includes: Mounting screws (quantity 6) and rubberised cork seal.		
Options		
Stilling tube (SSR)	Brass	VA
Temperature display electronics		
Display	4 character 7 segment LED	
Operation	Via 3 keys	
Memory	Min. / Max. Data memory	
Starting current input	approx. 100 mA for 100 ms	
Current input during operation	approx. 50 mA (without current- and switching outputs)	
Supply voltage (U_B)	10 – 30 V DC (nominal voltage 24 V DC)	
Ambient temperature	-20 °C to +70°C	
Display units	Temperature °C / °F	
Display range	-20 °C to +120 °C	
Alarm setting range	0 °C to 100 °C	
Display accuracy	± 1 % from end value	
Temperature sensor	Pt100 Class B, Din EN 60751	
Level switching output	**K10**	
Max. number	2	
Function	NC / NC*	
Voltage max.	30 V DC	
Switching current max.	0.5 A	
Contact load max.	10 VA	
Min. contact spacing	40 mm	

*NO= falling NC contact / NC = falling NO contact

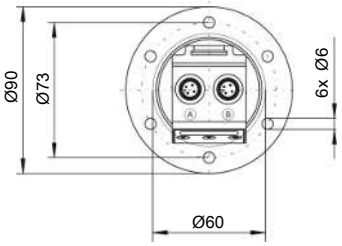
Basic model



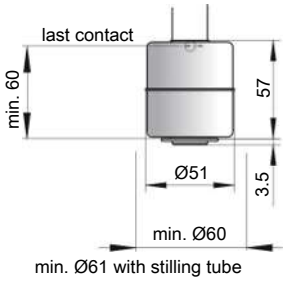
Housing swivels 270°



Flange drawing



SK 221 float for NT 64D-VA



min. Ø61 with stilling tube

Temperature outputs

Choose from the following temperature outputs

	-2T	-1T-KT	-4T
Plug (base)	2 x M12 – 4-pin	2 x M12 – 4-pin	1 x M12 – 4-pin 1 x M12 – 8-pin
Switching outputs	2 x freely programmable*	1 x freely programmable*	4 x freely programmable
max. switching current**	0.5 A per output continuous short-circuit protected	0.5 A per output continuous short-circuit protected	0.5 A per output continuous short-circuit protected
Contact load	max. 1 A total	max. 1 A total	max. 1 A total
Analogue output		1 x 4 – 20 mA, 2- 10 V 0-10 V, 0-5 V	
Max. burden Ω as current output		= (U_B -8 V) / 0.02 A	
Min. input load as voltage output		10 kΩ	
Options			
Stilling tube (SSR)	Same material as immersion tube		

*also programmable as frequency output

**Output 1 max. 0.2 A.

9.2 Technical Data NV 74D

Basic unit

Version	MS	VA
Operating pressure	max. 1 bar	max. 1 bar
Operating temperature	-20 °C to +80 °C	-20 °C to +80 °C
Float	SK 610	SK 221
Min. fluid density	0.80 kg/dm³	0.85 kg/dm³
Lengths	280, 370, 500 mm (standard)	

Material/Version		
Display housing	PA	PA
Float	rigid PU (SK 610)	1.4571 (SK 221)
Immersion tube	Brass	1.4571
Flange (DIN 24557)	PA	PA
Weight at L=280 mm Each 100 mm add	approx. 850 g approx. 30 g	approx. 950 g approx. 50 g

Includes:
Mounting screws (quantity 6) and rubberised cork seal.

Options		
Stilling tube (SSR)	Brass	VA

Vent filter	All versions HY type Hydac BF 7
Filter fineness	3 µm
Additional equipment	Filler cap – n/a with filling adapter

Temperature display electronics	
Display	4 character 7 segment LED
Operation	Via 3 keys
Memory	Min. / Max. Data memory
Starting current input	approx. 100 mA for 100 ms
Current input during operation	approx. 50 mA (without current- and switching outputs)
Supply voltage (U_B)	10 – 30 V DC (nominal voltage 24 V DC)
Ambient temperature	-20 °C to +70°C
Display units	Temperature
	°C / °F
Display range	-20 °C to +120 °C
Alarm setting range	0 °C to 100 °C
Display accuracy	± 1 % from end value

Temperature sensor	Pt 100 Class B, DIN EN 60751 Resolution 0.5 °C

Level switching output	K101-104
Max. number	2
Function	NC / NC*
Voltage max.	30 V DC
Switching current max.	0.5 A
Contact load max.	10 VA
Min. contact spacing	40 mm

*NO= falling NC contact / NC = falling NO contact

Temperature outputs

Choose from the following temperature outputs

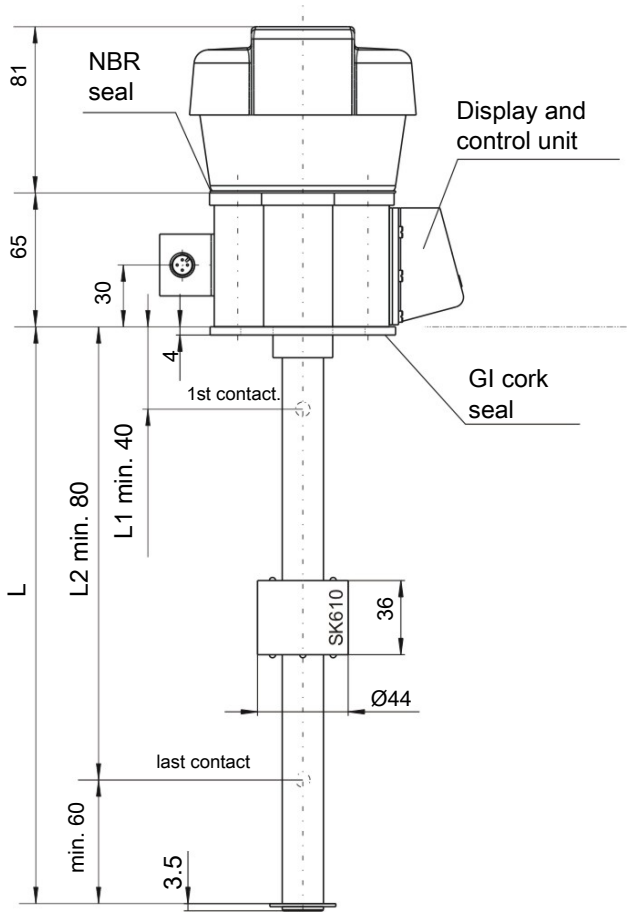
	-2T	-1T-KT	-4T
Plug (base)	2 x M12 – 4-pin	2 x M12 – 4-pin	1 x M12 – 4-pin 1 x M12 – 8-pin
Switching outputs	2 x freely programmable*	1 x freely programmable*	4 x freely programmable
max. switching current**	0.5 A per output continuous short-circuit protected	0.5 A per output continuous short-circuit protected	0.5 A per output continuous short-circuit protected
Contact load	max. 1 A total	max. 1 A total	max. 1 A total
Analogue output		1 x 4 – 20 mA, 2- 10 V 0-10 V, 0-5 V	
Max. burden Ω as current output		$=(U_B$ -8 V) / 0.02 A	
Min. input load as voltage output		10 kΩ	

*also programmable as frequency output

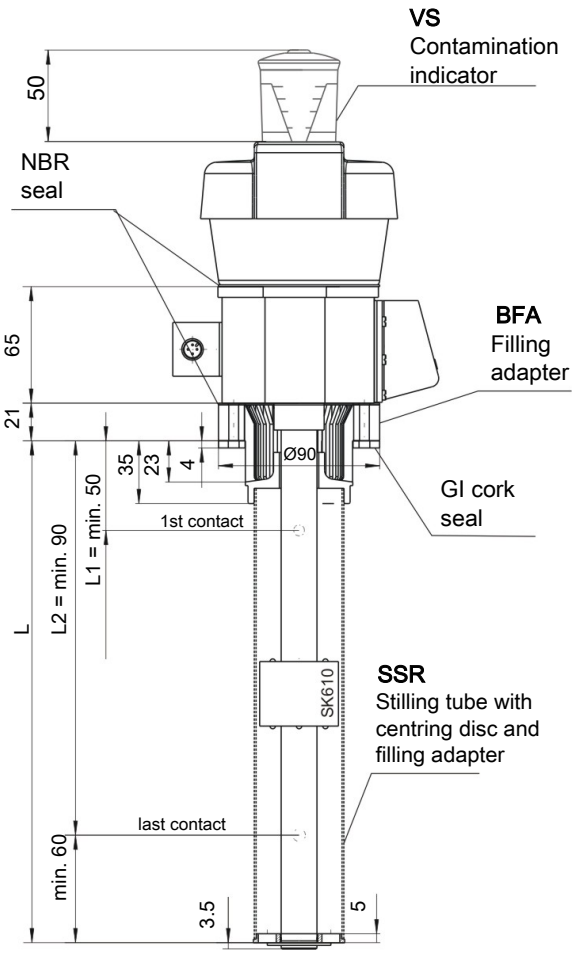
**Output 1 max. 0.2 A.

9.3 Dimensions NV 74D

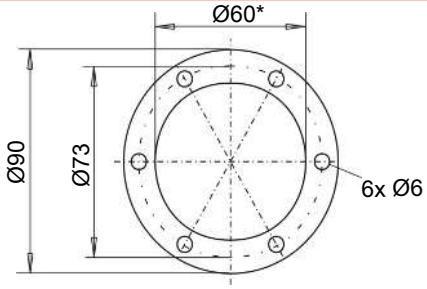
Basic version



With options

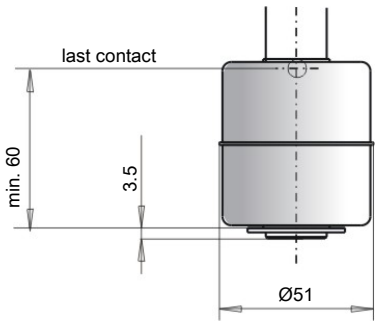


Flange drawing



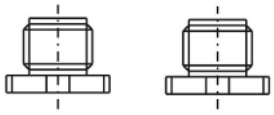
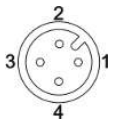
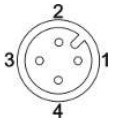
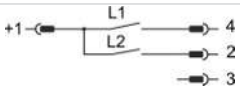
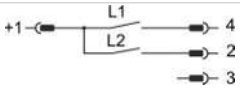
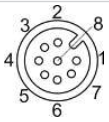
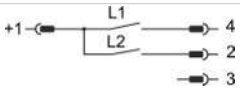
*min. Ø61 for VA version with stilling tube

SK 221 float for NV 74-VA



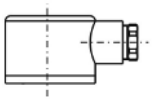
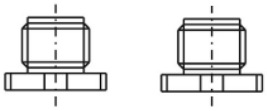
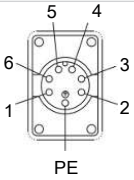
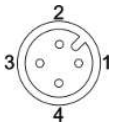
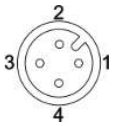
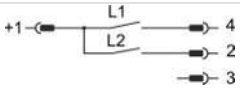
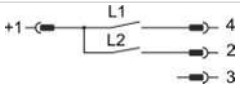
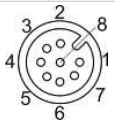
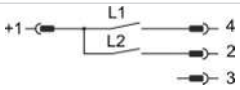
9.4 Standard pin assignment NT 64D

Plug connection

	2 x M12 (base)		
Panel plug			
Connection schematic	Plug A (level) 	Plug B (Temperature) 	
2T		**Pin**	
2 x temperature output		1 2 3 4	+24V DC S2 (PNP) GND S1 (PNP)
1T-KT		**Pin**	
1 x Temperature output 1 x Analogue output		1 2 3 4	+24 V DC Analogue (out) GND T1 (PNP)
Connection schematic			
4T		**Pin**	
4 x Temperature output		1 2 3 4 5 6	+24 V DC S2 (PNP) GND S1 (PNP) S3 (PNP) S4 (PNP)

9.5 Standard pin assignment NV 74D

Plug connection

	S6		2 x M12 (base)		
					
Connection schematic			Plug A (level) 		Plug B (temperature) 
2T	**Pin**			**Pin**	
2 x temperature output	1 2 3 4 5 6	+24 V DC GND T1 (PNP) T2 (PNP) L1 (L2)		1 2 3 4	+24 V DC S2 (PNP) GND S1 (PNP)
1T-KT	**Pin**			**Pin**	
1 x Temperature output, 1 x Analogue output	1 2 3 4 5 6	+24 V DC GND T1 (PNP) Temp 4-20 mA L1 (L2)		1 2 3 4	+24 V DC Analogue (out) GND S1 (PNP)
Connection schematic					
4T				**Pin**	
4 x Temperature output				1 2 3 4 5 6	+24 V DC S2 (PNP) GND S1 (PNP) S3 (PNP) S4 (PNP)

9.6 Current settings

Switching outputs	Basic Settings	Diagnostics
SP 1 / rP 1	ouni	SUou
dS 1 / dr 1 / ou 1	tuni	dtNN
SP2 / rP2	oHi	
dS2 / dr2 / ou2	oLo	
SP3 / rP3	rou 1	
dS3 / dr3 / ou3	rou2	
SP4 / rP4	rou3	
dS4 / dr4 / ou4	rou4	
	di S	
	Loc	
Analogue outputs	tc1 *	
A1Hi / A1Lo / Rou 1	tcC*	
A2Hi / A2Lo / Rou2		

*for wall-mounting only

Date: _____ Signature: _____

9.7 Display ranges

Name	Menu/Unit	Display	Range from/ with unit	Range to/ with unit
		Temperature		
°C	C	C	-100 °C	999 °C
°F	F	F	-100 °F	999 °F
		Without		
none	non	none	-1000	9999
none	non 1	none	-100.0	999.9
none	non2	none	-10.00	99.99

9.8 Display resolution

Range x = |Max - Min|

°C, °F (up to 1 decimal)		none (non 1) (1 fixed-point number)	
Range x	**Resolution**	**Range** x	**Resolution**
x < 50	0.1	x < 50	0.1
50 <= x < 100	0.2	50 <= x < 100	0.2
100 <= x < 200	0.5	100 <= x < 200	0.5
200 <= x < 500	1	200 <= x < 500	1
500 <= x < 1000	2	500 <= x < 1000	2
1000 <= x	5	1000 <= x	5

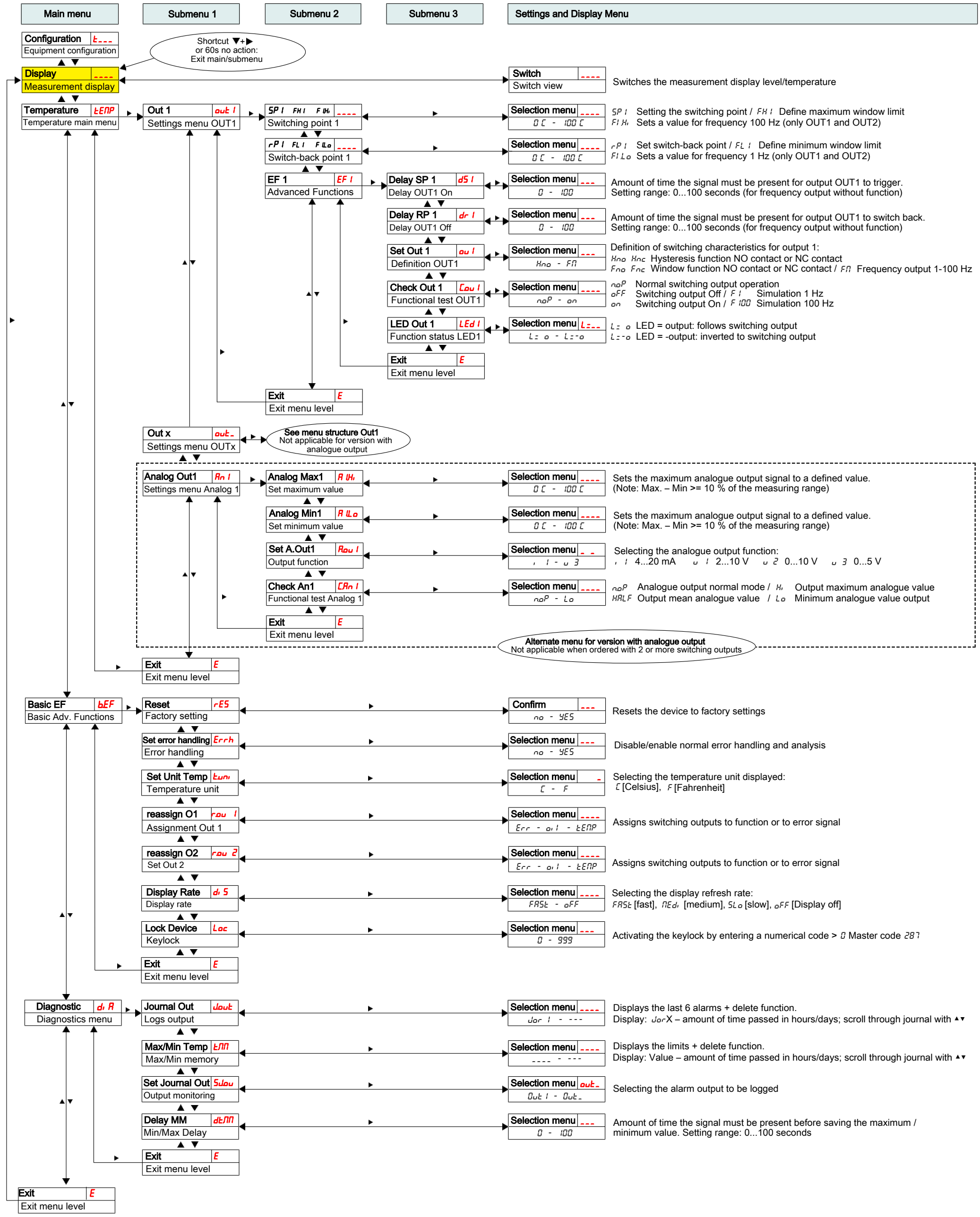
none (non2)
(2 fixed-point numbers)

Range x	**Resolution**
x < 5	0.01
5 <= x < 10	0.02
10 <= x < 20	0.05
20 <= x < 50	0.1
50 <= x < 100	0.2
100 <= x	0.5

Example no unit: Min = 100, Max = 1500 -> x = 1500 - 100 = 1400 -> Resolution = 5

Example Temperature: Min = 0°C, Max = 100°C -> x = 100°C - 0°C = 100°C -> Resolution = 0.5°C

9.9 Menu Sequence Overview



10 Attached documents

- Declaration of conformity: KX100020
- RMA - Decontamination Statement

EU-Konformitätserklärung
EU-declaration of conformity

Hiermit erklärt Bühler Technologies GmbH, dass die nachfolgenden Produkte den wesentlichen Anforderungen der Richtlinie

Herewith declares Bühler Technologies GmbH that the following products correspond to the essential requirements of Directive

2014/30/EU
(Elektromagnetische Verträglichkeit / *electromagnetic compatibility)*

in ihrer aktuellen Fassung entsprechen.

in its actual version.

Produkt / products: Niveauschalter und –geber / *Level switches and gauges*
Typ / type: Nivotemp 61D, 63, 64, 64D, 67XP, MD, M-XP
Nivovent 71D, 73, 74, 74D, 77XP

Die Betriebsmittel dienen zur Überwachung des Füllstandes und der Temperatur in Fluidsystemen.
The equipment is designed for monitoring level and temperature in fluid systems.

Das oben beschriebene Produkt der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:
The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

EN 61326-1:2013

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.
This declaration of conformity is issued under the sole responsibility of the manufacturer.

Dokumentationsverantwortlicher für diese Konformitätserklärung ist Herr Stefan Eschweiler mit Anschrift am Firmensitz.
The person authorised to compile the technical file is Mr. Stefan Eschweiler located at the company's address.

Ratingen, den 20.04.2016

Stefan Eschweiler
Geschäftsführer – *Managing Director*

Frank Pospiech
Geschäftsführer – *Managing Director*

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RMA-Formular und Erklärung über Dekontaminierung
RMA-Form and explanation for decontamination

RMA-Nr./ RMA-No.

Die RMA-Nummer bekommen Sie von Ihrem Ansprechpartner im Vertrieb oder Service./ You may obtain the RMA number from your sales or service representative.

Zu diesem Rücksendeschein gehört eine Dekontaminierungserklärung. Die gesetzlichen Vorschriften schreiben vor, dass Sie uns diese Dekontaminierungserklärung ausgefüllt und unterschrieben zurücksenden müssen. Bitte füllen Sie auch diese im Sinne der Gesundheit unserer Mitarbeiter vollständig aus./ This return form includes a decontamination statement. The law requires you to submit this completed and signed decontamination statement to us. Please complete the entire form, also in the interest of our employee health.

Firma/ Company

Firma/ Company
Straße/ Street
PLZ, Ort/ Zip, City
Land/ Country

Ansprechpartner/ Person in charge

Name/ Name
Abt./ Dept.
Tel./ Phone
E-Mail

Gerät/ Device
Anzahl/ Quantity
Auftragsnr./ Order No.

Serien-Nr./ Serial No.
Artikel-Nr./ Item No.

Grund der Rücksendung/ Reason for return

- ☐ Kalibrierung/ Calibration
- ☐ Modifikation/ Modification
- ☐ Reklamation/ Claim
- ☐ Reparatur/ Repair
- ☐ andere/ other

bitte spezifizieren/ please specify

Ist das Gerät möglicherweise kontaminiert?/ Could the equipment be contaminated?

☐ Nein, da das Gerät nicht mit gesundheitsgefährdenden Stoffen betrieben wurde./ No, because the device was not operated with hazardous substances.

☐ Nein, da das Gerät ordnungsgemäß gereinigt und dekontaminiert wurde./ No, because the device has been properly cleaned and decontaminated.

☐ Ja, kontaminiert mit:/ Yes, contaminated with:

☐ explosiv/ explosive	☐ entzündlich/ flammable	☐ brandfördernd/ oxidizing	☐ komprimierte Gase/ compressed gases	☐ ätzend/ caustic	☐ giftig, Lebensgefahr/ poisonous, risk of death	☐ gesundheitsgefährdend/ harmful to health	☐ gesundheitsschädlich/ health hazard	☐ umweltgefährdend/ environmental hazard

Bitte Sicherheitsdatenblatt beilegen!/ Please enclose safety data sheet!

Das Gerät wurde gespült mit:/ The equipment was purged with:

Diese Erklärung wurde korrekt und vollständig ausgefüllt und von einer dazu befugten Person unterschrieben. Der Versand der (dekontaminierten) Geräte und Komponenten erfolgt gemäß den gesetzlichen Bestimmungen.

This declaration has been filled out correctly and completely, and signed by an authorized person. The dispatch of the (decontaminated) devices and components takes place according to the legal regulations.

Falls die Ware nicht gereinigt, also kontaminiert bei uns eintrifft, muss die Firma Bühler sich vorbehalten, diese durch einen externen Dienstleister reinigen zu lassen und Ihnen dies in Rechnung zu stellen.

Should the goods not arrive clean, but contaminated, Bühler reserves the right, to comission an external service provider to clean the goods and invoice it to your account.

Firmenstempel/ Company Sign

Datum/ Date

rechtsverbindliche Unterschrift/ Legally binding signature

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Die Analyse defekter Baugruppen ist ein wesentlicher Bestandteil der Qualitätssicherung der Firma Bühler Technologies.

Um eine aussagekräftige Analyse zu gewährleisten muss die Ware möglichst unverändert untersucht werden. Es dürfen keine Veränderungen oder weitere Beschädigungen auftreten, die Ursachen verdecken oder eine Analyse unmöglich machen.

Bei elektronischen Baugruppen kann es sich um elektrostatisch sensible Baugruppen handeln. Es ist darauf zu achten, diese Baugruppen ESD-gerecht zu behandeln. Nach Möglichkeit sollten die Baugruppen an einem ESD-gerechten Arbeitsplatz getauscht werden. Ist dies nicht möglich sollten ESD-gerechte Maßnahmen beim Austausch getroffen werden. Der Transport darf nur in ESD-gerechten Behältnissen durchgeführt werden. Die Verpackung der Baugruppen muss ESD-konform sein. Verwenden Sie nach Möglichkeit die Verpackung des Ersatzteils oder wählen Sie selber eine ESD-gerechte Verpackung.

Beachten Sie beim Einbau des Ersatzteils die gleichen Vorgaben wie oben beschrieben. Achten Sie auf die ordnungsgemäße Montage des Bauteils und aller Komponenten. Versetzen Sie vor der Inbetriebnahme die Verkabelung wieder in den ursprünglichen Zustand. Fragen Sie im Zweifel beim Hersteller nach weiteren Informationen.

Analysing defective assemblies is an essential part of quality assurance at Bühler Technologies.

To ensure conclusive analysis the goods must be inspected unaltered, if possible. Modifications or other damages which may hide the cause or render it impossible to analyse are prohibited.

Electronic assemblies may be sensitive to static electricity. Be sure to handle these assemblies in an ESD-safe manner. Where possible, the assembles should be replaced in an ESD-safe location. If unable to do so, take ESD-safe precautions when replacing these. Must be transported in ESD-safe containers. The packaging of the assemblies must be ESD-safe. If possible, use the packaging of the spare part or use ESD-safe packaging.

Observe the above specifications when installing the spare part. Ensure the part and all components are properly installed. Return the cables to the original state before putting into service. When in doubt, contact the manufacturer for additional information.

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