Fluidcontrol

IO-Link

Display and control unit

Thermotronik TT-77

Installation and Operation Instructions

Original instructions

BE140013
07/2019

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

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
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
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Contents

1 Introduction

1.1 Intended Use

The display and control unit is used to monitor the temperature in fluid systems.

The level switch must not be used in highly flammable or corrosive liquids.

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 Design types

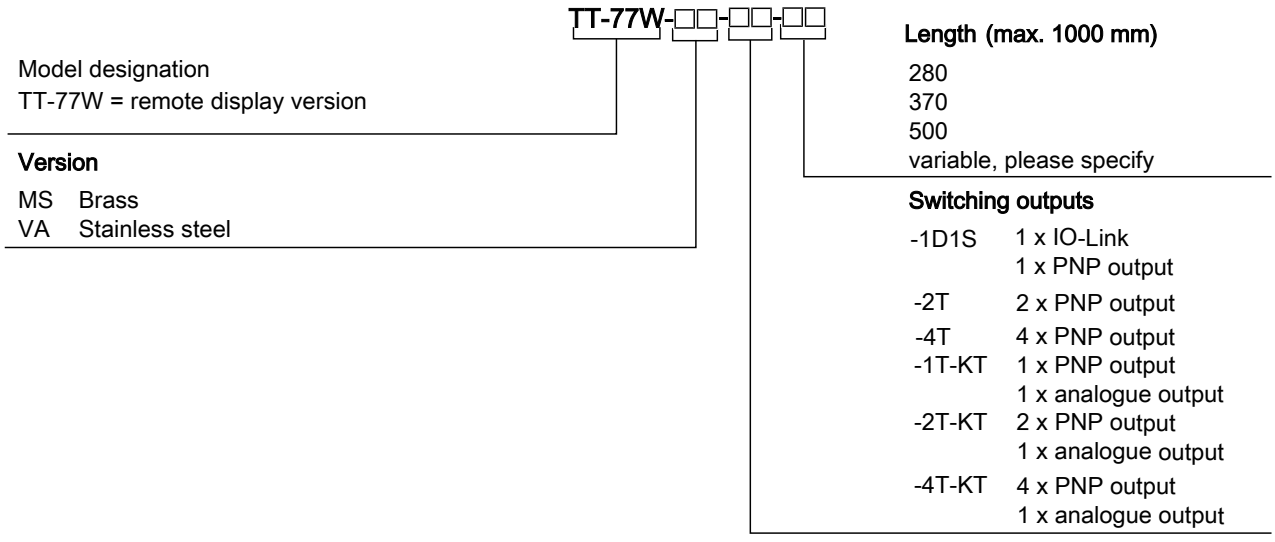
The Thermotronic is equipped with different switching and analogue outputs based on the configuration. The outputs are freely programmable.

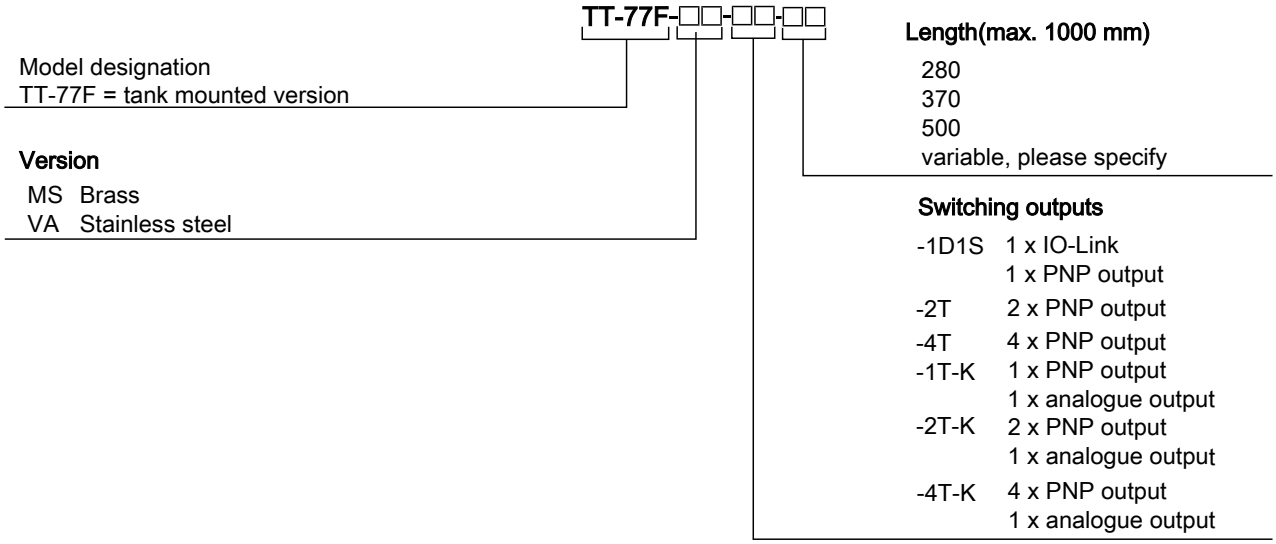
The available versions are:

TT77F...	The display and control unit can be mounted to the tank along with the switching tube.
TT77W...	The display and control unit can be mounted to a 35 mm (1.4") top-hat rail to be used as a remote display. With direct mounting, the display swivels 270°.

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

1.3 Model key





1.4 Contents

- Thermotronic
- 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.

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

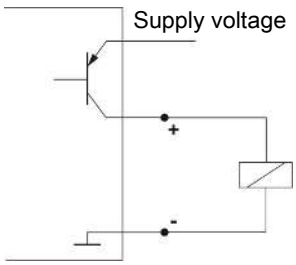
When installing directly to the tank, the sensor is screwed into the designated bore on the tank.

When installed with remote display, the display and control unit are mounted to a 35 mm (1.4") top-hat rail. The sensor connects with a line. The connector for the sensor is located at the bottom of the display and control unit. The plugs at the top supply power and output the signals.

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.

5 Operation and control

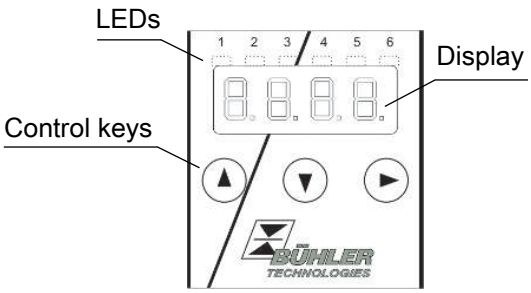
NOTICE

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:

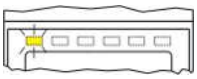
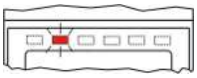
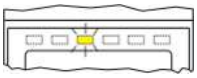
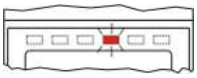


If an error message appears in the display during operation, please refer to the **Troubleshooting** table under chapter “Service and Repair”.

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:	Toggles the display unit.
	– 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.

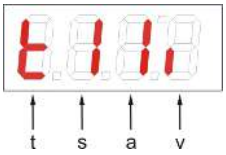
If the wrong code is entered, the device will return to the measurement display. If you forgot the password you can always enter master code 287 to access the menu.

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

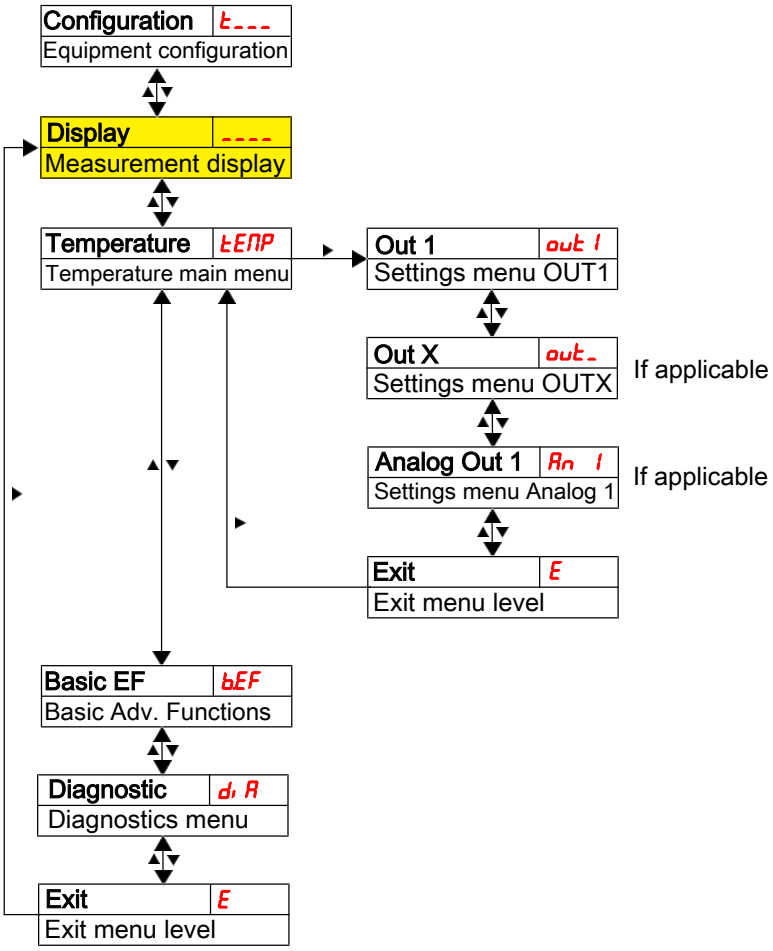
The menu structure is based on the VDMA standard sheet 24574-1. The menu structure is hierarchic. The top menu level contains the main menu items, e.g. tEMP, bEF, diA, E. Each main menu has additional submenu items.

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

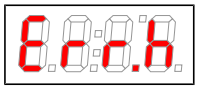
Disabling normal error handling and analysis could potentially cause dangerous operating states, dangers to the user or machines. Before using this option, review the hazard potential within the process. With this setting, Bühler Technologies GmbH assumes no liability for injuries to health or material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

5.6.3 Set supply cable length (wall mounting - optional)

For accurate temperature measurement when installed with remote display, the supply line length and cross-section must be entered to calculate the compensation of the lead resistance.

The lead length should be changed in the following menu:

Basic EF	bEF	→	Cable Length	tCL	↔	Selection menu	--n
Basic Adv. Functions			Pt100 lead length			0n - 20n	

Measuring cable length for compensating the Pt100 supply line resistance

Note:

– Since the go-and-return line must be considered, double the cable length!

Setting range:
0 m...20 m

5.6.4 Set supply cable cross-section (wall-mounting - optional)

Enter the line cross-section for the supply line here:

Basic EF	bEF	→	Cable Cross	tCS	↔	Selection menu	---11
Basic Adv. Functions			Pt100 cable cross-section			0.25|| - 1.5||	

Measuring cable cross-section for compensating the Pt100 supply line resistance

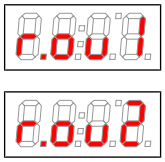
Setting range:
0.25|| to 1.5||

5.6.5 Define switching outputs

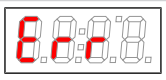
Here you can define the switching outputs.

Use the “Define switching outputs” function to define the switching outputs (rou 1 and rou2). The switching outputs can be configured as Err or tEMP .

Basic EF	bEF	→	SET Output	rou 1r2	↔	Selection menu	----
Basic Adv. Functions			Define switching outputs			Err-tEMP	



The options are:



Err

TEMP

Options:
[Err, 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 LEDs 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.

5.6.6 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	MEdi	SLo	oFF
fast	medium	slow	Display off

Note:

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

5.6.7 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

5.6.8 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
A xHi / 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
tcI *	00n
tcC*	0.50 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	
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
SP3 / rP3	70 / 65
dS3 / dr3 / ou3	0 / 0 / Hno
SP4 / rP4	80 / 75
dS4 / dr4 / ou4	0 / 0 / Hno

Version with analogue output:

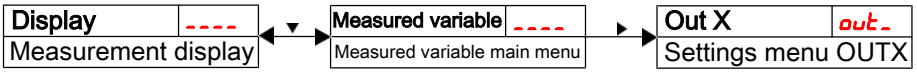
Analogue output	
A IHi / A ILo / Aou 1	0 / 100 / 0 1

Diagnostic settings:

Diagnostics	
SUou	out 1
dtMM	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.

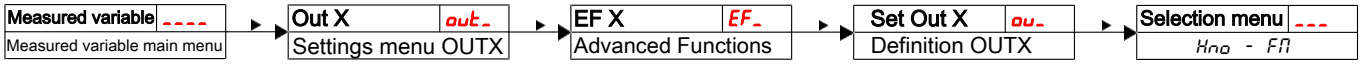


The switching output allocation and other basic settings related to all switching outputs can be configured in menu **Basic Settings Advanced Functions**.

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

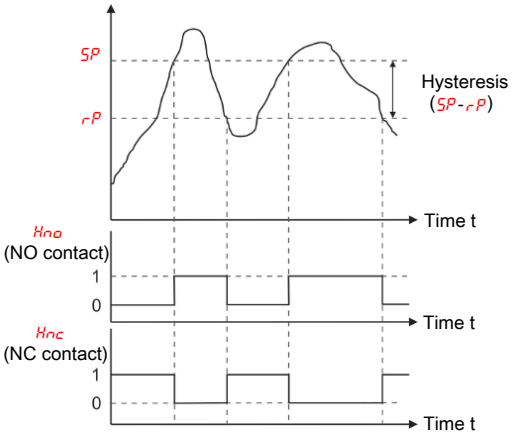
Hysteresis function as the NC contact

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

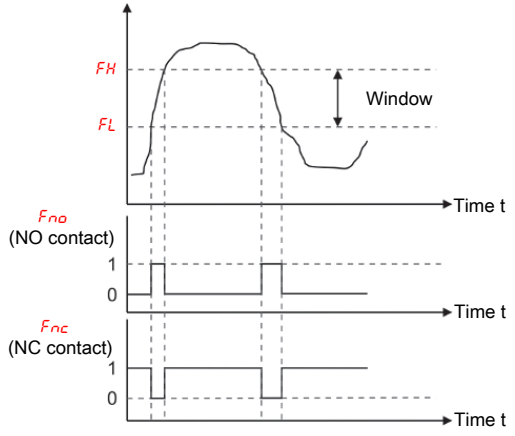
Window function as NO contact

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.

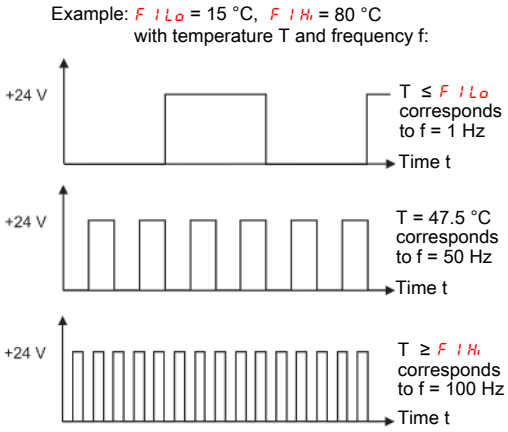


Frequency output

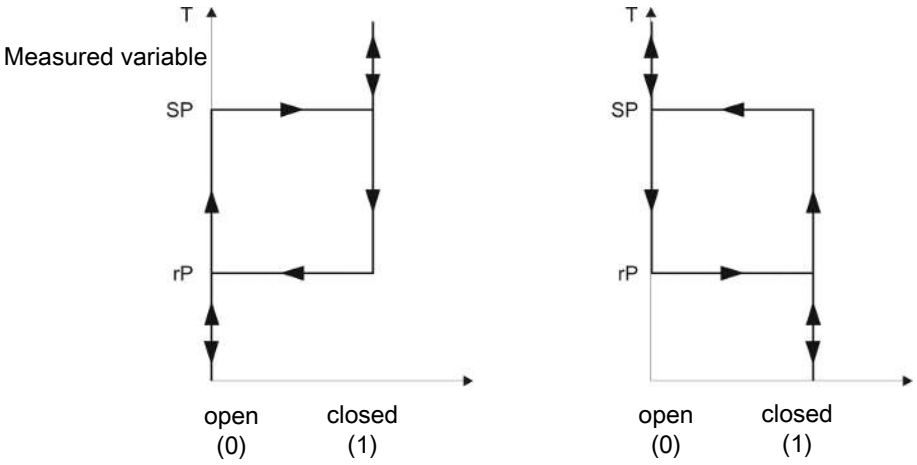
Frequency output

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:

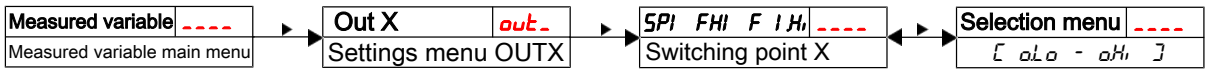


rising NO contact
falling NC contact
NO (normally open)
Hno

rising NC contact
falling NO contact
NC (normally closed)
Hnc

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:

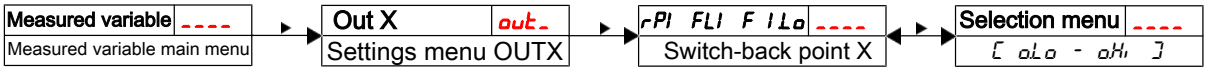
– The switching point must be set to within the range limits (see menu **Basic Settings Advanced Functions**).

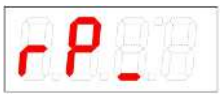
– If switching output OUT x was assigned the function **Window**,  will appear. The setting corresponds with the upper window limit.

– 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.

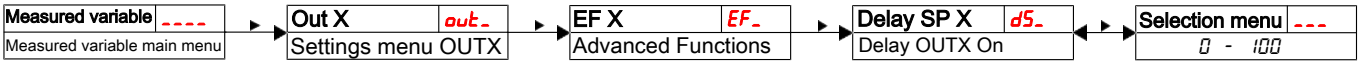
– If switching output OUT x was assigned the function **Window**,  will appear. The setting corresponds with the lower window limit.

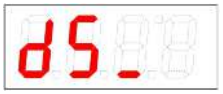
– If switching output OUT x was assigned the function **Frequency output**,  will appear. The setting corresponds to the frequency 1 Hz.

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:





Setting range:
0...100 seconds

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

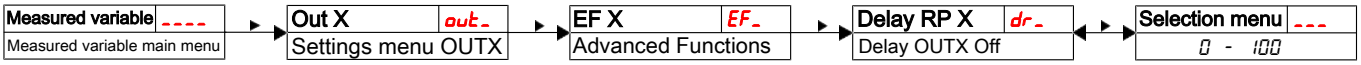
Note:

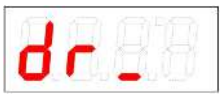
– If switching output OUT x was assigned the function **Window**, the setting corresponds to the switch-on delay which detects valid reaching of the measuring window.

– 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:





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.

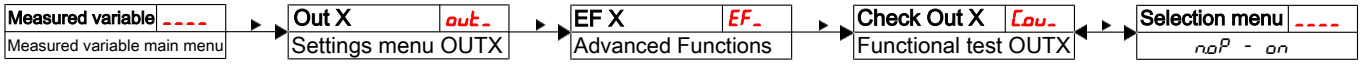
Note:

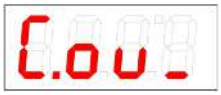
– If switching output OUT x was assigned the function **Window**, the setting corresponds to the switch-on delay which detects valid closing of the measuring window.

– 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:





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:

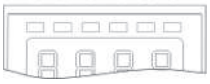
		
Normal mode as frequency output	Output Frequency 1 Hz	Output Frequency 100 Hz

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
LED 1 2 3 4 5 6 	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:

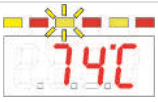
You have 2 switching outputs for the temperature, configured as:

– **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.

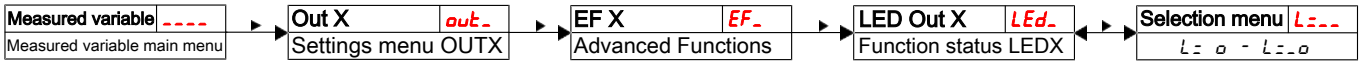
– **Switching output 2:** Min contact, rising NO contact. So in the factory setting, the LED lights up when exceeding the minimum temperature. So in this case the LED would light up if the status is okay.

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

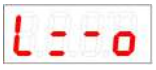
	Factory setting	Status function LED 3 inverted	State	Status
A	 LED3 ON	 LED3 OFF	Temperature rises to > 70 °C PNP switching output 3 closed	OK
B	 LED4 and LED3 ON	 only LED4 ON	Temperature rises to > 80 °C PNP switching output 4 closed	Error
C	 LED3 ON	 LED 3 OFF	Temperature falls to < 75 °C PNP switching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



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.

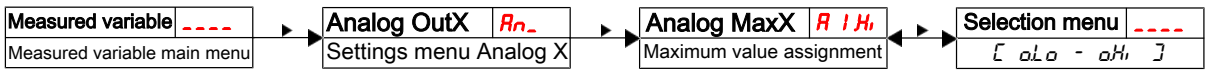
NOTICE

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:



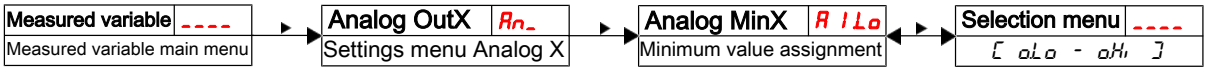
Setting range:
0 °C to 100 °C
(32 °F to 212 °F)

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:



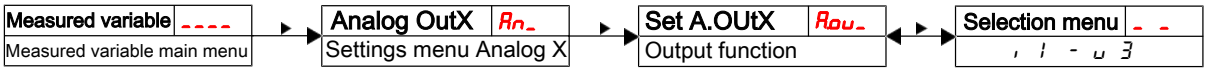
Setting range:
0 °C to 100 °C
(32 °F to 212 °F)

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:



The options are:

4 mA to 20 mA

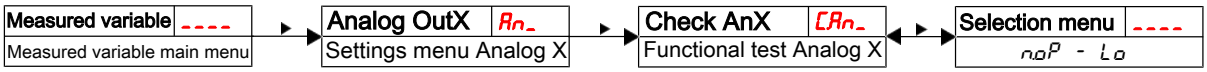
2 V to 10 V

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.

Display	----	→	Diagnostic	di A
Measurement display			Diagnostics menu	

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

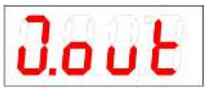
The last 6 events for the switching output being logged can be viewed here and all entries deleted:

Diagnostic	di A	→	Journal Out	Jout	↔	Selection menu	----
Diagnostics menu			Log output			Jor 1 - ---	

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 ⇔ 2.4h, 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.

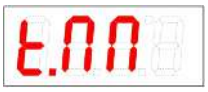
5.9.2 Maximum and minimum temperature

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			---- - ---	

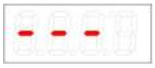
The journal entries will be displayed as:
- Maximum temperature,
- occurred x hours / days ago,
- Minimum temperature,
- occurred x hours / days ago,
- Delete function

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	SJou	◀▶	Selection menu	out_
Diagnostics menu			Output monitoring			Out 1 - Out_	

Options:
out 1 to outX

Switching output logging.

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.

Diagnostic	di A	▶	Delay MM	dtMM	◀▶	Selection menu	---
Diagnostics menu			Min/Max Delay			0 - 100	

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.

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

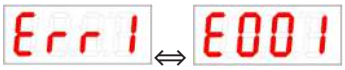
Germany

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)	– Replace Pt100 cable – Send device in for repair
	Error 008	– Pt100 defective (cable break)	– Replace Pt100 cable – 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 CAnX: „Test Analogue Output“ to ensure normal mode

7.2 Spare parts and accessories

Item no. 4-pin	Item no. 5-pin	Item no. 8-pin	Description
9144 05 0010	9144 05 0016	9144 05 0048	Connecting cable M12x1, 1.5 m, angular coupling and straight plug
9144 05 0046	9144 05 0017	9144 05 0049	Connecting cable M12x1, 3.0 m, angular coupling and straight plug
9144 05 0047	9144 05 0018	9144 05 0033	Connecting cable M12x1, 5.0 m, angular coupling and strands

8 Disposal

The applicable national laws must be observed when disposing of the products. Disposal must not result in a danger to health and environment.

The crossed out wheelie bin symbol on Bühler Technologies GmbH electrical and electronic products indicates special disposal notices within the European Union (EU).

The crossed out wheelie bin symbol indicates the electric and electronic products bearing the symbol must be disposed of separate from household waste. They must be properly disposed of as waste electrical and electronic equipment.

Bühler Technologies GmbH will gladly dispose of your device bearing this mark. Please send your device to the address below for this purpose.

We are obligated by law to protect our employees from hazards posed by contaminated devices. Therefore please understand that we can only dispose of your waste equipment if the device is free from any aggressive, corrosive or other operating fluids dangerous to health or environment. **Please complete the "RMA Form and Decontamination Statement", available on our website, for every waste electrical and electronic equipment. The form must be applied to the packaging so it is visible from the outside.**

Please return waste electrical and electronic equipment to the following address:

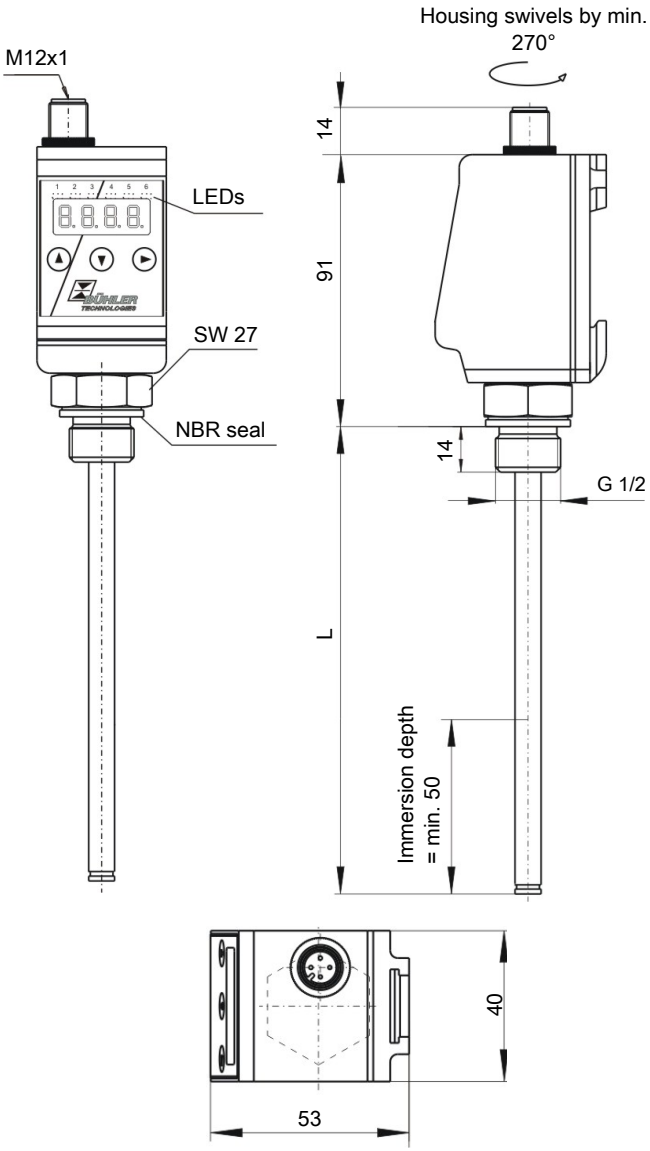
Bühler Technologies GmbH
WEEE
Harkortstr. 29
40880 Ratingen
Germany

Please also observe data protection regulations and remember you are personally responsible for the returned waste equipment not bearing any personal data. Therefore please be sure to delete your personal data before returning your waste equipment.

9 Appendices

9.1 Technical Data TT-77

Material / Version		
Version	MS	VA
Operating pressure	max. 5 bar	max. 10 bar
Operating temperature	-40°C to +100°C	-40°C to +100°C
Lengths	280, 370, 500 mm (standard) variable from 70 to max. 1000 mm	
Probe material (immersion tube)	Brass	1.4571
Connection (flange)	G 1/2	G 1/2
Weight at L=280 mm Each 100 mm add	approx. 390 g approx. 15 g	approx. 390 g approx. 15 g
Degree of protection	IP65	IP65
Analysis 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) / with IO-Link 18 – 30 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	
Measured variables	Temperature	
Principle of measurement	Pt 100 Class B, DIN EN 60751	



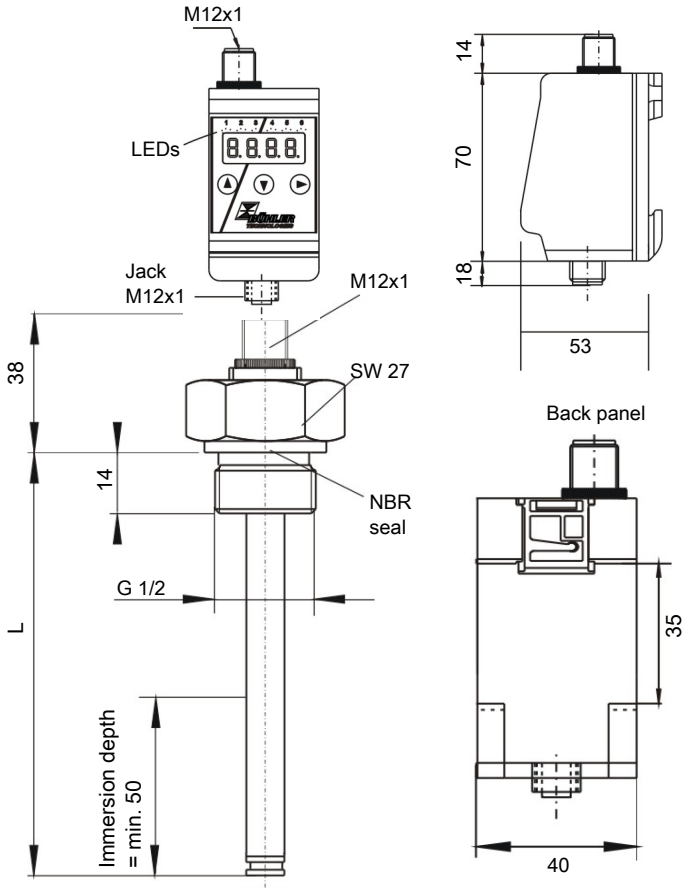
Optional temperature switching outputs: Choose from the following switching outputs

	-1D1S	-2T	-4T
Plug (base)	M12 – 4-pin	M12 – 4-pin	M12 – 8-pin
Switching outputs	IO-Link and 1x freely programmable	2x freely programmable	4x freely programmable
Alarm memory	with 1 x assignable to alarm logbook		with 1 x assignable to alarm logbook
max. switching current*	0.5 A per output continuous short-circuit protected (*Output 1 max. 0.2 A.)		
Contact load	max. 1 A total		

	-1T-KT	-2T-KT	-4T-KT
Plug (base)	M12 – 4-pin	M12 – 5-pin	M12 – 8-pin
Switching outputs	1x freely programmable	2x freely programmable	4x freely programmable
Alarm memory	with 1 x assignable to alarm logbook	with 1 x assignable to alarm logbook	with 1 x assignable to alarm logbook
max. switching current*	0.5 A per output continuous short-circuit protected (*Output 1 max. 0.2 A.)		
Contact load	max. 1 A total		
Analogue output	1 x 4 – 20 mA / 2-10 V DC, 0-10 V DC, 0-5 V DC		
Max. load Ω as current output	$=(U_B$ -8 V) / 0.02 A	$=(U_B$ -8 V) / 0.02 A	$=(U_B$ -8 V) / 0.02 A
Min. input load as voltage output	10 kΩ	10 kΩ	10 kΩ

9.2 Technical Data TT-77W

Material / Version		
Version	MS	VA
Operating pressure	max. 5 bar	max. 10 bar
Operating temperature	-40°C to +100°C	-40°C to +100°C
Lengths	280, 370, 500 mm (standard) variable from 70 to max. 1000 mm	
Probe material (immersion tube)	Brass	1.4571
Connection (flange)	G 1/2	G 1/2
Plug connection	M12 (base)	M12 (base)
Weight at L=280 mm Each 100 mm add	approx. 270 g approx. 15 g	approx. 270 g approx. 15 g
Degree of protection	IP65	IP65
Analysis 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) / with IO-Link 18 – 30 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	
Measured variables	Temperature	
Principle of measurement	Pt 100 Class B, DIN EN 60751	
Tolerance	± 0.8 °C	



Optional temperature switching outputs: Choose from the following switching outputs

	-1D1S	-2T	-4T
Plug (base)	M12 – 4-pin	M12 – 4-pin	M12 – 8-pin
Switching outputs	IO-Link and 1 x freely programmable	2 x freely programmable	4 x freely programmable*
Alarm memory	with 1 x assignable to alarm logbook		with 1 x assignable to alarm logbook
max. switching current**	0.5 A per output continuous short-circuit protected (Output 1 max. 0.2 A)		
Contact load	max. 1 A total		

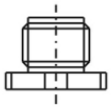
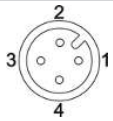
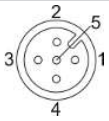
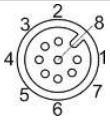
	-1T-KT	-2T-KT	-4T-KT
Plug (base)	M12 – 4-pin	M12 – 5-pin	M12 – 8-pin
Switching outputs	1 x freely programmable	2 x freely programmable	4 x freely programmable
Alarm memory	with 1 x assignable to alarm logbook	with 1 x assignable to alarm logbook	with 1 x assignable to alarm logbook
max. switching current**	0.5 A per output continuous short-circuit protected (Output 1 max. 0.2 A)		
Contact load	max. 1 A total		
Analogue output	1 x 4 – 20 mA / 2-10 V DC, 0-10 V DC, 0-5 V DC		
Max. load Ω as current output	$=(U_B$ -8 V) / 0.02 A	$=(U_B$ -8 V) / 0.02 A	$=(U_B$ -8 V) / 0.02 A
Min. input load as voltage output	10 kΩ	10 kΩ	10 kΩ

*also programmable as frequency output

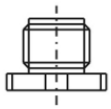
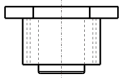
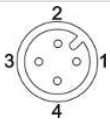
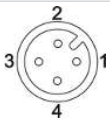
**Output 1 max. 0.2 A.

9.3 Standard pin assignment TT-77F

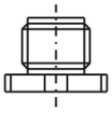
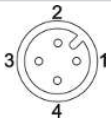
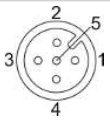
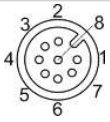
Plug connection

Version	-1D1S	-2T	1T-KT	2T-KT	-4T	-4T-KT
	M12 (base)					
	4-pin	4-pin	4-pin	5-pin	8-pin	8-pin
						
Panel plug						
Pin						
1	+24 V DC	+24 V DC	+24 V DC	+24 V DC	+24 V DC	+24 V DC
2	T2 (PNP)	T2 (PNP)	Analogue	T2 (PNP)	T2 (PNP)	T2 (PNP)
3	GND	GND	GND	GND	GND	GND
4	C/Q (IO-Link)	T1 (PNP)	T1 (PNP)	T1 (PNP)	T1 (PNP)	T1 (PNP)
5				Analog out	T3 (PNP)	T3 (PNP)
6					T4 (PNP)	T4 (PNP)
7						Analog out

9.4 Standard pin assignment TT-77W

	Pt100 temperature sensor M12x1	Sensor input remote display M12x1
	4-pin	4-pin
		
Panel jack		
Pin		
1	Pt100	Pt100
2	Pt100	Pt100

Plug connection

Version	-1D1S	-2T	1T-KT	2T-KT	-4T	-4T-KT
	M12 (base)					
	4-pin	4-pin	4-pin	5-pin	8-pin	8-pin
						
Panel plug						
Pin						
1	+24 V DC	+24 V DC	+24 V DC	+24 V DC	+24 V DC	+24 V DC
2	T2 (PNP)	T2 (PNP)	Analogue	T2 (PNP)	T2 (PNP)	T2 (PNP)
3	GND	GND	GND	GND	GND	GND
4	C/Q (IO-Link)	T1 (PNP)	T1 (PNP)	T1 (PNP)	T1 (PNP)	T1 (PNP)
5				Analog out	T3 (PNP)	T3 (PNP)
6					T4 (PNP)	T4 (PNP)
7						Analog out

9.5 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		

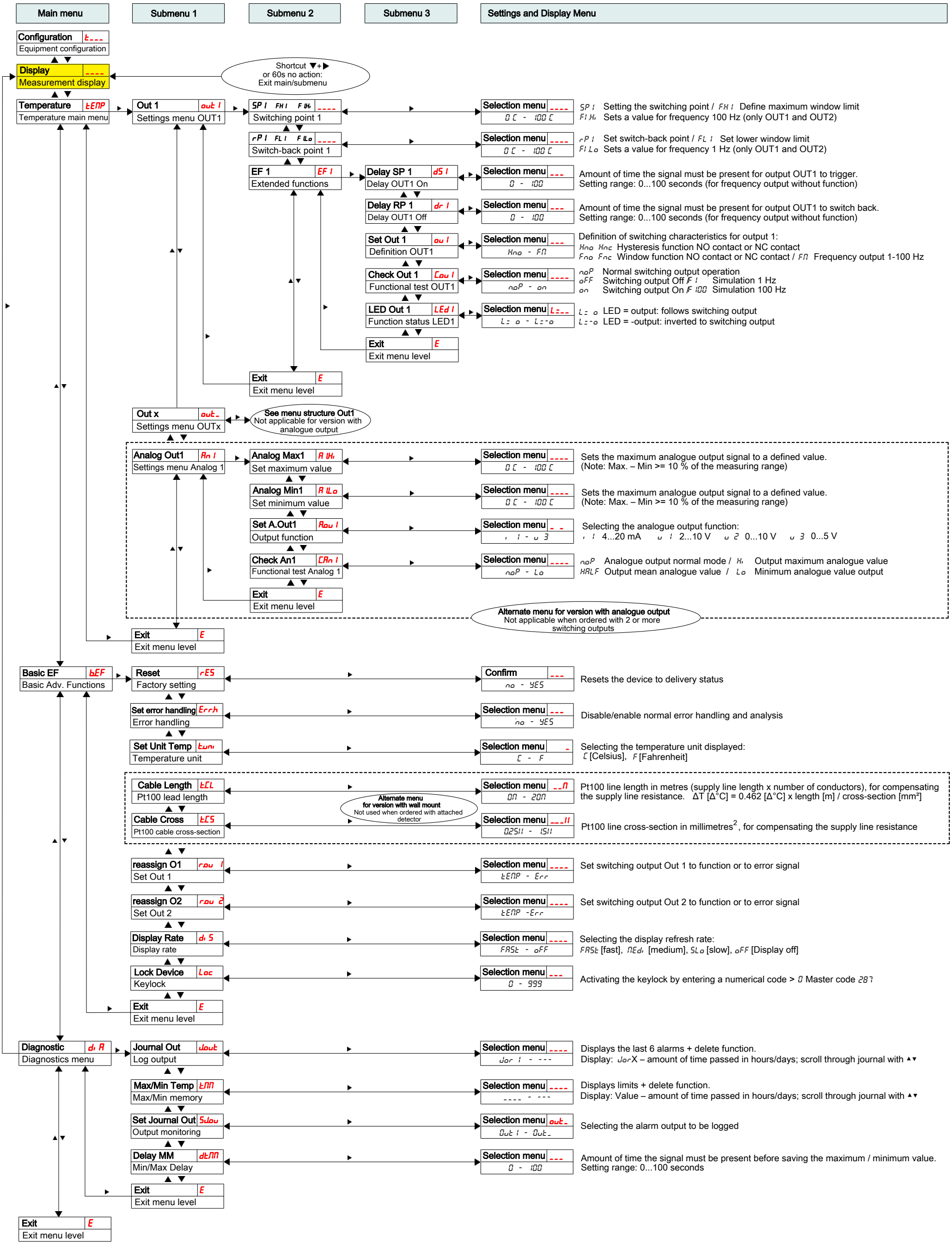
*for wall-mounting only

Date: _____ Signature: _____

9.6 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
		N/A		
none	non	none	-1000	9999
none	non 1	none	-100.0	999.9
none	non2	none	-10.00	99.99

9.7 Menu Sequence Overview



9.8 Display resolution

Range x = |Max - Min|

°C, °F (up to 1 decimal place)		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

10 Attached documents

– Declaration of conformity: KX110020
– 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: Temperaturmessgeräte und –anzeigen / *Temperature sensors and display*
Typ / type: Thermotronik 77

Die Betriebsmittel dienen zur Überwachung der Temperatur in Fluidsystemen.
The equipment is intended for monitoring the 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

UK Declaration of Conformity

The manufacturer Bühler Technologies GmbH declares, under the sole responsibility, that the product complies with the requirements of the following UK legislation:

Electromagnetic Compatibility Regulations 2016

Product: Temperature sensors and display
Type: Thermotronik 77

The equipment is intended for monitoring the temperature in fluid systems.

The object of the declaration described above is in conformity with the relevant designated standards:

EN 61326-1:2013

Ratingen in Germany, 01.11.2022

Stefan Eschweiler
Managing Director

Frank Pospiech
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-Nr. bekommen Sie von Ihrem Ansprechpartner im Vertrieb oder Service. Bei Rücksendung eines Altgeräts zur Entsorgung tragen Sie bitte in das Feld der RMA-Nr. "WEEE" ein./ You may obtain the RMA number from your sales or service representative. When returning an old appliance for disposal, please enter "WEEE" in the RMA number box.

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
- ☐ Elektroaltgerät/ Waste Electrical & Electronic Equipment (WEEE)
- ☐ 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

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

Vermeiden von Veränderung und Beschädigung der einzusendenden Baugruppe

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

Umgang mit elektrostatisch sensiblen Baugruppen

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.

Einbau von Ersatzteilen

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.

Einsenden von Elektroaltgeräten zur Entsorgung

Wollen Sie ein von Bühler Technologies GmbH stammendes Elektroprodukt zur fachgerechten Entsorgung einsenden, dann tragen Sie bitte in das Feld der RMA-Nr. „WEEE“ ein. Legen Sie dem Altgerät die vollständig ausgefüllte Dekontaminierungserklärung für den Transport von außen sichtbar bei. Weitere Informationen zur Entsorgung von Elektroaltgeräten finden Sie auf der Webseite unseres Unternehmens.

Avoiding alterations and damage to the components to be returned

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

Handling electrostatically conductive components

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.

Fitting of spare parts

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.

Returning old electrical appliances for disposal

If you wish to return an electrical product from Bühler Technologies GmbH for proper disposal, please enter "WEEE" in the RMA number box. Please attach the fully completed decontamination declaration form for transport to the old appliance so that it is visible from the outside. You can find more information on the disposal of old electrical appliances on our company’s website.

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