

## Battery thermometer type BAT 2

**Technical  
specification,  
installation and  
connection**

**Certificate No.:**  
**FTZU 19 ATEX 0040X**

**Version 2.2**



This instruction manual is valid for thermometers of the third generation BAT 2 with battery power supply. The thermometer can be equipped with a recorder, which creates it's organic part. The manual specify the way of operation and at the same time it includes other basic information.

## 1. Terminology

The industrial battery thermometers of the third generation BAT 2 are designed for measuring, digital display of instant temperature value of the measured medium. For archiving of measured temperature values they can be equipped with a recorder – datalogger. Their sturdy construction predetermines them for use in industrial environment.

## 2. Generally

### Use and principle of BAT 2 operation

In general, the thermometer BAT 2 is battery equipment which enables display and recording of the measured temperature on eight-digit alphanumerical display. Together with instantaneous measured temperature value there is also relevant selected unit of the temperature. This unit can be selected by user, while the displayed temperature is automatically recalculated. The sturdy construction of the thermometer and possibility to increase the coverage as an option allows it to use also in adverse weather conditions.

All basic functions of the thermometer are possible to set with help of the front panel pushbuttons on the device. In case of thermometers equipped with datalogger it is possible to control and set all parameters needed for record function also with help of superordinate program DATA which is designed for PC. Communication with the thermometer and reading of stored data is possible wireless with Bluetooth communication or through interface Mini USB, or another agreed serial interface. It is possible to see recorded data also by means of the pushbuttons on thermometer front panel. There is also possibility to set display contrast, number of decimal points, filtration, to make calibration, to choose physical unit on display, to change access password, to set interval of automatic thermometer switch off or back illumination of the display. The thermometer can be continually turned on and illumination of the display can be also turned on continuously. All functions of the datalogger can be set, to see filling up of the recording memory, to erase the memory and to see information of the thermometer software.

**In time of temperature sampling the thermometer display can be switched off but measuring and writing of the measured data into the memory is not disconnected. If the thermometer is turned on and measured temperature is on display, than in time of writing to the memory there is always displayed information „ Saved! “ for a short time.**

**If you want to interrupt measuring and writing of the measured data into the memory, you need to set date or time of the following sample in the past time with help of the pushbuttons or PC software.**

The software designed for PC enables to set all functions of the datalogger, transmit the samples from memory to PC, their archiving and graphical visual presentation. The program enables also export of the data to XLS or ASCII, then to process them with relevant database program. The program is supplied as an optional accessory.

**At malfunction of the sensor, if the measured temperature exceed over the range of the thermometer or in another failure state, there will be EXTREME notice on the display.**

LED diodes 1 to 4 located on the front panel serve for indication of switching the Bluetooth communication on, if the thermometer is equipped with this, connection of the power adaptor or communication line, end of recharging and indication of charging internal batteries.

## Construction of BAT 2

The thermometer is built in a sturdy metal case made of aluminium alloy or stainless steel. It is connected into the measuring system by means of process connection. Electronic circuits are located on printed circuit boards.

**The thermometer is battery powered. The batteries are located under back housing of the manometer. The thermometer can be equipped also with detachable rechargeable accumulator.**

**Power supply in the Ex type of device is limited only to approved primary power cells or approved battery while casing of thermometer has to be connected to the ground and case from aluminium alloy has to be protected from spark generated from friction or by impact.**

Communication with the thermometer, if it is an option, is possible through USB, RS 485, RS 232, or by wireless connection Bluetooth, XBee, LoRaWAN, NB-IoT, Sigfox, WiFi, Beacon or another connection. The communication connector is located at the down side of the device.

## 3. Technical parameters of BAT 2

<b>Connection</b>	down side of the device
<b>Display</b>	eight digit alphanumeric display
<b>Version</b>	standard, or Ex, other after agreement
<b>Temperature measurement range</b>	-50 to +50 ... 400 °C
<b>Possibility to change the range</b>	up to 1 : 10
<b>Ambient temperature:</b>	
• For standard surrounding	- 20 °C to + 60 °C
• <b>For Ex version to the potential explosive atmosphere:</b>	
For version N1	- 20 °C to + 55 °C
For version N2	- 10 °C to + 50 °C
For version N3	0 °C to + 50 °C
<b>Measuring resistance</b>	Pt 1000
<b>Maximal pressure</b>	2 MPa
<b>Accuracy of temperature measurement</b>	0,1 % of the range 0,25 % of the range 0,5 % of the range


### Electric parameters



#### Power supply

3 x internal monocell or detachable rechargeable accumulator,  
Power adaptor (optional accessory )

#### Power supply for Ex version

**Power supply for Ex version with potential explosive atmosphere – there can be used only approved kinds and types of primary battery cells and accumulators:**

- **Version N1 - Spark safety:**  **II 1G Ex ia IIB T4 Ga**  
**Primary cells:** Energizer AAA Power Seal Technology LR03 1,5V  
Duracell AAA Long Leasing Power LR03 1,5 V

- **Version N2 - Spark safety:**  **II 1G Ex ia IIB T3 Ga**  
**Primary cells:** AA Energizer E91-LR6-AM3-1,5V  
AA VARTA LONGLIFE Power
- **Version N3 - Spark safety:**  **II 1G Ex ia IIB T4 Ga**  
**Accumulators:** Accumulator set BP-1

#### Parameters of the recorder:

Number of recordings	up to 432 000
Sampling period	0,25 s to 24 hours












#### Communication:

Wireless communication	Bluetooth, LoRaWAN, NB-IoT, Sigfox, WiFi, XBee, Beacon
Serial communication	RS 485, or Mini USB, other after agreement

<b>Process connection</b>		M20x1,5; G½, other after agreement
<b>Case material</b>	standard	aluminium alloy
	option	DIN 1.4301; AISI 304
<b>Front panel material</b>		polypropylene
<b>Covering in conformity STN EN 60 529</b>	standard	IP 44
	option	IP 65
<b>Basic dimension of the thermometer</b>		fig.no. 1
<b>Of the thermometer</b>		cca. 0.5 / 1 kg

## 4. Marking






### Data on type label

-  Mark of the manufacturer and origin of the product
-  Type symbol
-  Communication
-  Range of measurement
-  Accuracy of measurement
-  Serial number
-  Protection covering
-  For version BAT 2...N to potentially explosive atmosphere:
  - **Spark safety**
    - **Pre N1**  **II 1G Ex ia IIB T4 Ga**
    - **Pre N2**  **II 1G Ex ia IIB T3 Ga**
    - **Pre N3**  **II 1G Ex ia IIB T4 Ga**
  - Certificate No.: **FTZU 19 ATEX 0040X**
  - Mark **CE**<sub>1026</sub>

## 5. Ordering

### Purchase order should include these data

-  Number and date of order

-  Address of the orderer (Including ID and VAT )
-  Bank contact
-  Specification according to the ordering table, number of units, required delivery time
-  Way of delivery
-  Possible requirement for option accessories

## 6. Packing, transport and delivery

Thermometers of the type BAT 2 are packed in cardboard boxes. Integral parts of every delivered device are technical specifications and certificate of warranty.

TABLE NO. 1. SPECIFICATION OF TECHNICAL PARAMETERS AND REQUIREMENTS




CODE	DESCRIPTION	
<b>BAT 2</b>	Angle battery thermometer – with bottom connection	
	<b>BACKLIGHT</b>	
<b>Z</b>	Orange	
<b>B</b>	White	
	<b>MEASUREMENT RANGE</b>	
<b>01</b>	0 °C to + 100 °C	
<b>02</b>	0 °C to + 200 °C	
<b>03</b>	0 °C to + 300 °C	
<b>04</b>	0 °C to + 400 °C	
<b>55</b>	-50 °C to + 50 °C	
<b>XXXX</b>	Other range	
	<b>TYPE OF CONSTRUCTION</b>	
<b>S</b>	Standard version, to the BNV environment	
<b>N1</b>	<b>Ex Version – Spark safety:</b>  <b>II 1G Ex ia IIB T4 Ga</b> Operating temperature - 20 °C to + 55 °C	
<b>N2</b>	<b>Ex Version – Spark safety:</b>  <b>II 1G Ex ia IIB T3 Ga</b> Operating temperature - 10 °C to + 50 °C	
<b>N3</b>	<b>Ex Version – Spark safety:</b>  <b>II 1G Ex ia IIB T4 Ga</b> Operating temperature 0 °C to + 50 °C	
<b>NC</b>	<b>Ex Version – Spark safety</b> <b>3G Ex ic</b>	
<b>NA</b>	<b>Ex Version – Spark safety</b> <b>3G Ex nA</b>	
<b>X</b>	Other	
	<b>OUTPUT SIGNAL</b>	
<b>Q0</b>	Without output signal	
<b>50</b>	Wireless communication XBee	<b>No for N1, N2 and N3</b>
<b>60</b>	Wireless communication Bluetooth	
<b>61</b>	Wireless communication LoRaWAN	<b>No for N1, N2 and N3</b>
<b>62</b>	Wireless communication NB-IoT	<b>No for N1, N2 and N3</b>
<b>63</b>	Wireless communication Sigfox	<b>No for N1, N2 and N3</b>
<b>64</b>	Wireless communication WiFi	<b>No for N1, N2 and N3</b>
<b>65</b>	Wireless communication Beacon	<b>No for N1, N2 and N3</b>
<b>80</b>	RS-485	Max. transfer rate 115 kBd
<b>90</b>	USB mini	
<b>XX</b>	Other output	

TABLE NO. 1 CONTINUE ON NEXT PAGE

TABLE NO. 1 CONTINUE

ACCURACY			
W	Selection 0,1 % of the range		
V	Selection 0,25 % of the range		
S	Standard 0,4 % of the range		
OPERATING TEMPERATURE			
0	Standard	0...+ 60°C	calibration at 22 °C
1	Extended	- 20...+ 60°C	calibration at 22 °C
CONNECTION THREAD			
M	Thread M20 x 1,5		
G	Thread G½"		
X	Other		
LENGHT OF THE EXTENSION „ M “			
Q	26 mm		
0	45 mm		
1	95 mm		
2	125 mm		
X	Other		
DIAMETER AND MATERIAL OF THE STEM „ P “			
D	6 mm		
S	10 mm		
X	Other		
IMMERSION „L“			
10	100 mm		
16	160 mm		
25	250 mm		
40	400 mm		
X	Other		
MEMORY			
Q0	Without memory – without recording		
32	32 megabit		
XX	Other – after agreement		
RECOMMENDED ACCESSORIES			
QQ	Without accessories		
NA	Power supply adaptor / changer		
KK	Communication cable		
PC	Service program for PC		
BP	Detachable rechargeable accumulator - batterypack		
SPECIAL REQUIREMENTS			
Q0	Without special requirements		
05	Protection covering IP65 in compliance with STN EN 60 529		
08	Stainless steel version		
11	Protection housing for the thermometer		
XX	Other		

X to XXXX – specify in order

**Example:** BAT 2 Z 01 S 60 S 0 M Q D 10 32 NA PC Q0

Digital thermometer BAT 2; angle; orange backlight; measured range 0 to 100 °C; standard version; Bluetooth output; accuracy 0,5 % of the range; operating temperature 0 to 60 °C; connection thread M20x1,5; without extension; diameter of the stem 6 mm; immersion 100 mm; memory 32 megabit; power supply adaptor, communication program

## 7. Installation

The thermometer is screwed on with appropriate wrench into the inner thread at the measured place, corresponding with the thread of the thermometer. Tightness of the connection must be ensured by appropriate gasket – this is not object of the delivery. **The body of the thermometer is not allowed to use for screwing the unit on.**

The thermometers BAT 2...N (into the environment with potentially explosive atmosphere) can be used in compliance with specifications and regulations which are valid for this environment and with conformity declaration issued by the company BD Sensors Ltd.

Power supply in the Ex type of device is limited only to approved primary power cells or approved battery while casing of thermometer has to be connected to the ground and case from aluminium alloy has to be protected from spark generated from friction or by impact.




Where the temperature of the surroundings is specified:

For Version N1 - 20 °C to + 55 °C

For Version N2 - 10 °C to + 50 °C

For Version N3 0 °C to + 50 °C

For version to the surroundings with potentially explosive atmosphere – Ex it is possible to use only approved kinds and types primary cells and accumulators:

- **Version N1 - Spark safety:**  **II 1G Ex ia IIB T4 Ga**  
**Power supply – primary cells:** Energizer AAA Power Seal Technology LR03 1,5V  
Duracell AAA Long Leasing Power LR03 1,5 V
- **Version N2 - Spark safety:**  **II 1G Ex ia IIB T3 Ga**  
**Power supply – primary cells:** AA Energizer E91-LR6-AM3-1,5V  
AA VARTA LONGLIFE Power
- **Version N3 - Spark safety:**  **II 1G Ex ia IIB T4 Ga**  
**Power supply - accumulators:** Accumulator set BP-1


After setting of the temperature samples the thermometer can be switched off while measurement and recording of the measured data into the memory remain uninterrupted. If the thermometer is switched on and there is measured temperature on the display, there will be displayed notice „ Saved! “ for a short time.

If you want to interrupt the measurement and recording of the measured data into the memory you need to set the date or time of the following sample in past time with pushbuttons on PC software.

Notice **EXTREME** on the display indicates malfunction or failure of the input sensor or exceeding of the range set by the manufacturer.

There is indicated instantaneous value of the temperature together with selected physical unit on the display. If it is not possible to display measured value of the temperature at the same time

with physical unit, in such a case only the measured temperature will be displayed, without the physical unit, it is necessary to preset number of decimal places.

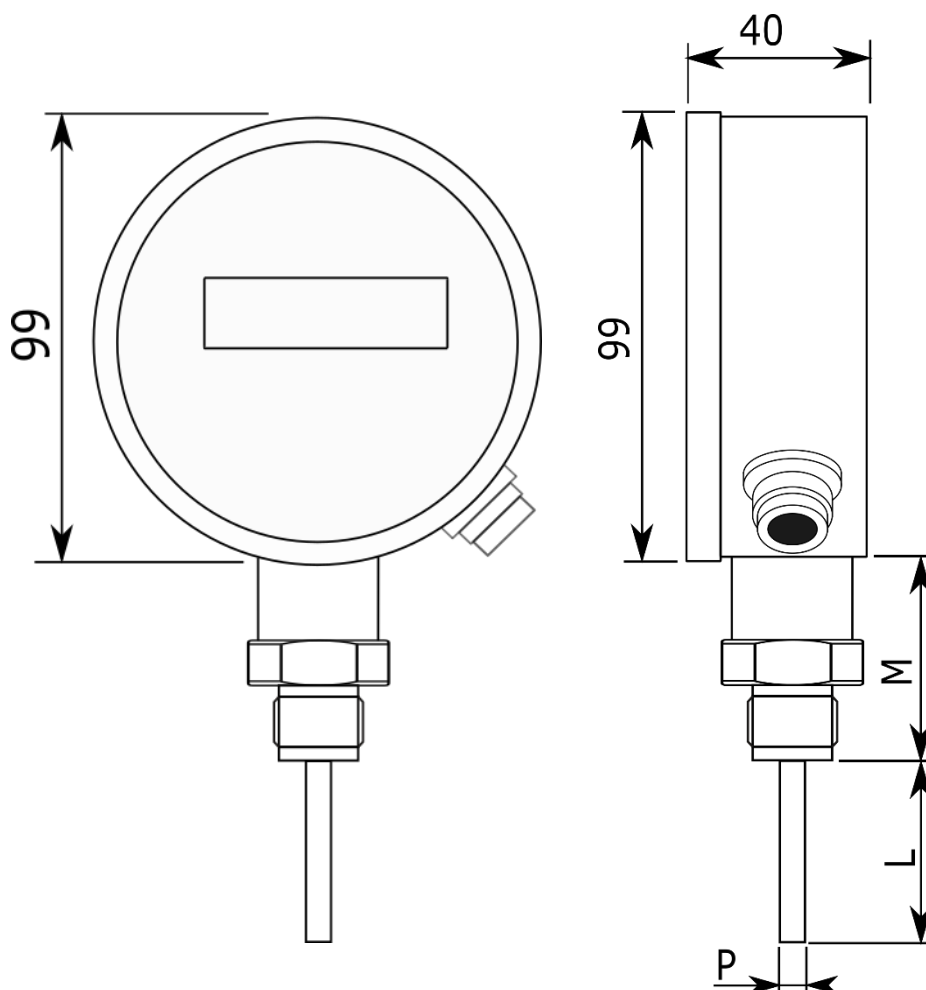
If the required number of displayed figures together with value sign and decimal point is greater than 8, in such a case the display shows notice .

### Meaning of LED diodes located on front panel

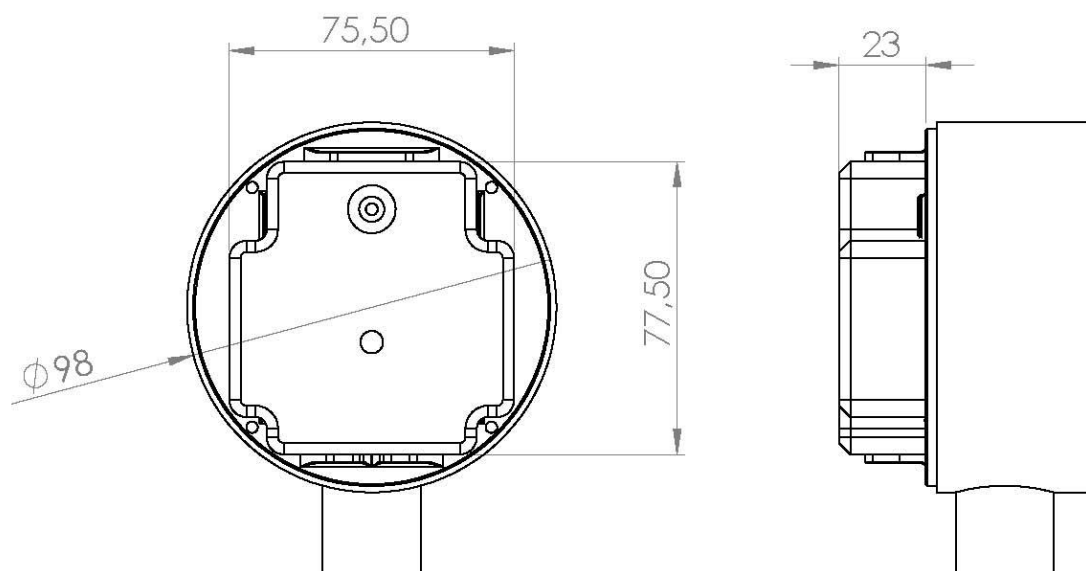
LED 1	blue	turning on the Wireless communication, if thermometer equipped with this
LED 2	orange	connection of the power adaptor or communication cable
LED 3	green	
LED 4	red	

### Connection of the connector K1:

No. pin	Connection of the serial line connector
	RS-485
1	+U (max. 5 V)
2	0 V
3	A
4	B
5	Not connected



Picture No. 1 Basic dimensions of the thermometer – internal batteries



**Picture No. 2 Basic dimensions of the thermometer – accumulator set BP-1**



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