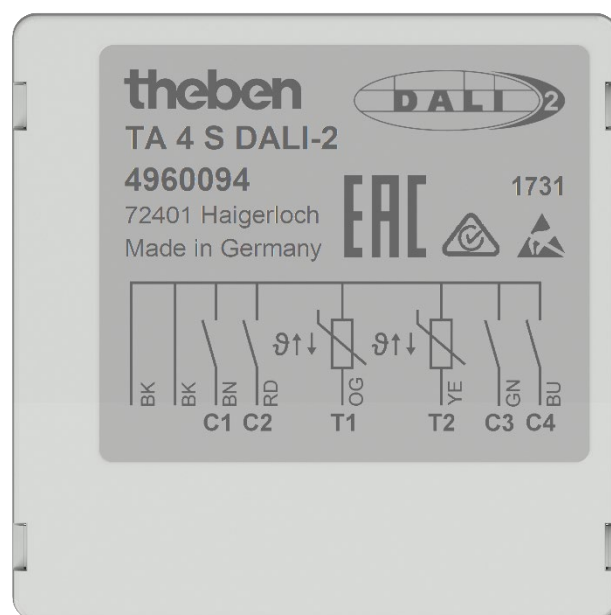


Manual
DALI button interface
TA 4 S DALI-2



TA 4 DALI-2 - 4960094

Contents

1	General	3
	1.1 Safety information	3
	1.2 Proper use	3
	1.3 Explanation of terms	3
2	Function description	4
	2.1 Application examples	4
	2.2 Overview of available instances	5
3	Technical data	6
4	Product characteristics	7
	4.1 Usage	7
	4.2 Functionality	7
	4.3 Dimensions	8
5	Connection	9
6	Installation	10
7	Settings	11
	7.1 Settings via the DALI bus	11
8	Operating modes	12
	8.1 Memory bank 2 – push button instance	12
	8.2 Memory bank 3 – absolute input device	13
	8.3 Assignment of short addresses	16
	8.4 Button function C1-C4	16
	8.5 Determining measurement values T1/T2 via the DALI bus	16
9	Accessories	18
10	Contact	20

1 General

1.1 Safety information



ATTENTION

Installation should only be carried out by a qualified electrician!

1.2 Proper use

The DALI button interface TA 4 S DALI-2 is a compact DALI-2 controller with 4 inputs for connecting potential-free buttons and 2 inputs for connecting variable resistors, e.g. sliders, potentiometers or various Theben temperature sensors. It can be easily installed in flush-mounted boxes and is intended for indoor installation.

TA 4 S DALI-2 is exclusively intended for use as contractually agreed between the manufacturer and the user. Any other use is considered to be unacceptable. The manufacturer does not accept liability for any resulting damages.

1.3 Explanation of terms

The TA 4 S DALI-2 DALI button interface is a push button processing unit of an input control device according to standard IEC 62386 Part 301 as well as an absolute input device according to standard IEC 62386 Part 302 and DiiA Guidelines "Clarifications & Recommendations for IEC 62386" Version 1.2, April 2020.

The term push button processing unit of an input control device is used in this document in the English spelling "push button input device", absolute input device as "absolute input device" and short address as "short address".

2 Function description

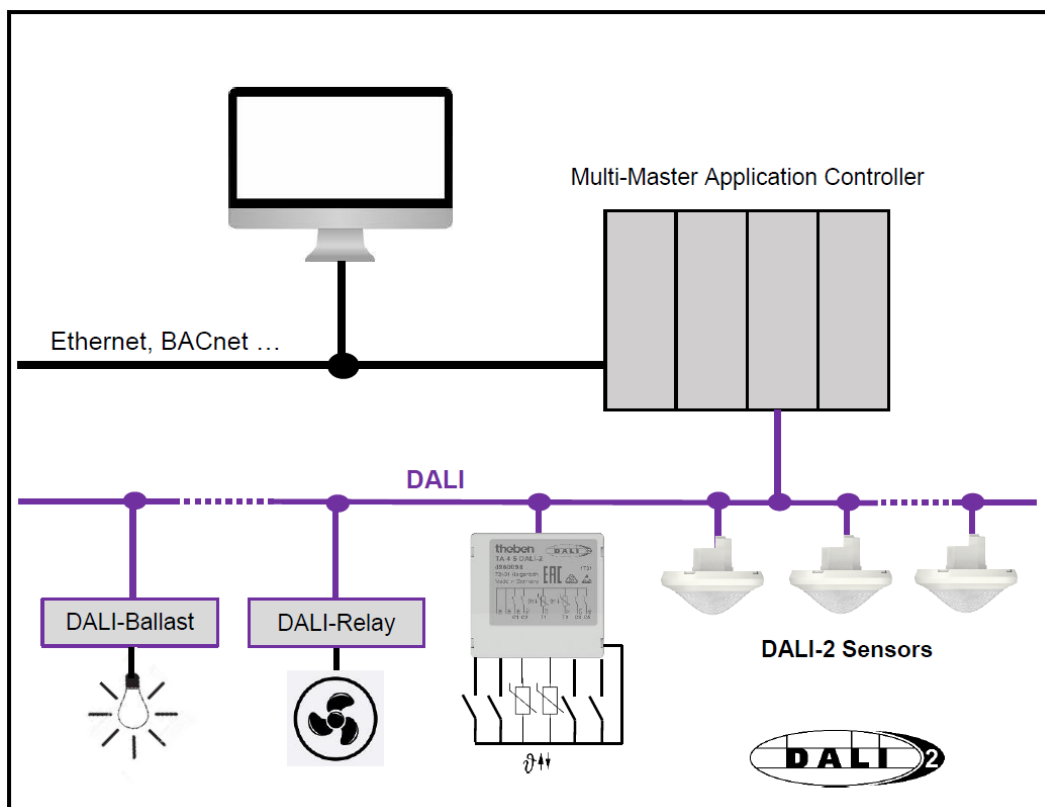
The TA 4 S DALI-2 button interfaces are integrated into a DALI system. Thanks to the DALI-2 standard, an application controller from any manufacturer may be used. This controller must support standard IEC 62386 Parts 101/103/301 – and if variable resistors or temperature sensors are used – also Part 302.

The TA 4 S DALI-2 button interfaces and other DALI components are connected to the DALI line. The DALI supply is provided by the application controller or an external DALI supply. The assignment of the short addresses (random addressing) for the button interfaces is carried out via the application controller.

After start-up, the TA 4 S DALI-2 button interface captures the binary states of the connected buttons and transmits this information to the higher-level controller (application controller) as a DALI telegram. If variable resistors or temperature sensors are connected, the measured values are transmitted to the higher-level controller as a DALI telegram (absolute input device).

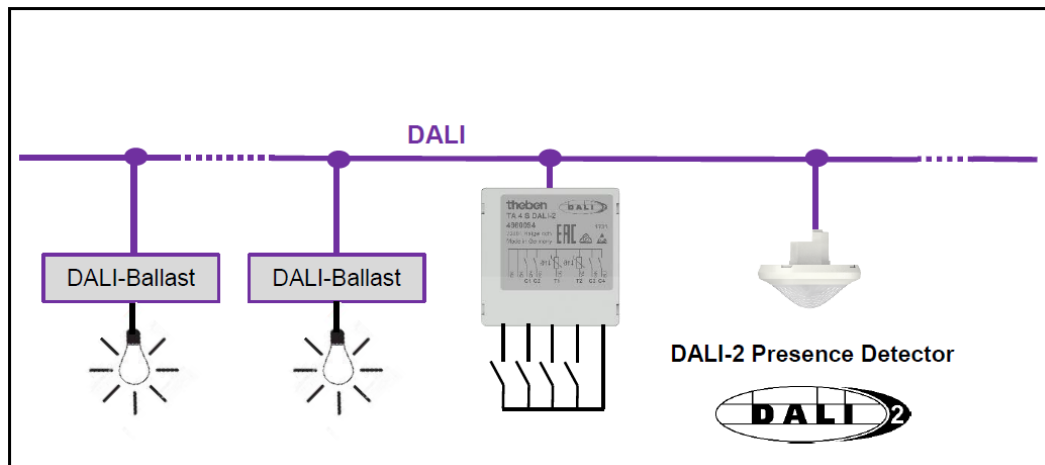
2.1 Application examples

Application with a higher-level controller



Conventional buttons, sliders and Theben temperature sensors can be connected to the TA 4 S DALI-2 button interface for the desired application, also for blinds, lighting control, heating control, etc.

Application with a DALI-2 presence detector



For switching or dimming lamps, conventional buttons are connected to the TA 4 S DALI-2 button interface.

2.2 Overview of available instances

Instance no.	Instance name	Instance type	Standard	Memory bank
0	Absolute input device T1	2	IEC 62386-302	3
1	Absolute input device T2	2	IEC 62386-302	3
2	Button C1	1	IEC 62386-301	2
3	Button C2	1	IEC 62386-301	2
4	Button C3	1	IEC 62386-301	2
5	Button C4	1	IEC 62386-301	2

3 Technical data

Operating voltage	DALI (in accordance with IEC 62386-101): 10 V – 22.5 V
Power input	max. 10 mA
Type of installation ¹	Flush-mounted box according to DIN 49073
Type of contact	NO contact or opening contact, potential-free
Contact voltage	5 V
Contact current	0.5 mA (5 mA peak)
Output voltage	5 V DC
Debounce time	50 ms
Resistance range for slider or potentiometer	0 ... 100 kΩ
Max. temperature measurement range ²	- 25 °C ... + 75 °C or 0 °C ... + 85 °C
Protection rating	IP 20 (IP 40 when installed)
Protection class	II (subject to designated use)
Ambient temperature	-15 °C ... + 50 °C
Pollution degree	2
Rated impulse voltage	4 kV
Connection type DALI	Screw terminals
Cable cross-section	0.14 – 1.5 mm ² one wire 0.14 – 1.5 mm ² fine wire 0.25 – 0.5 mm ² fine wire with crimp terminal (with and without plastic sleeve)
Length of connecting wires for buttons or temperature sensor	25 cm
Max. cable length for buttons or temperature sensor	30 m
CE Declaration of Conformity	This device corresponds to EN 60669-1/-2-1/-2-5
RCM conformity	This device is compliant with the ACMA guidelines.
DALI conformity	IEC 62386-101/103/301/302

¹ can be installed with conventional buttons/switches in flush-mounted boxes

² Measurement range depends on the temperature sensor used. Further information can be found in chapter 8.2 Memory bank 3 – absolute input device.


4 Product characteristics

4.1 Usage

The button interface TA 4 S DALI-2 can be used in many different ways. It can be used for applications such as blinds control, lighting control, heating control, etc.

The focus is on applications in residential and commercial construction:

- Office building
- Schools
- Hospitals
- Hotels
- Sports halls or warehouses

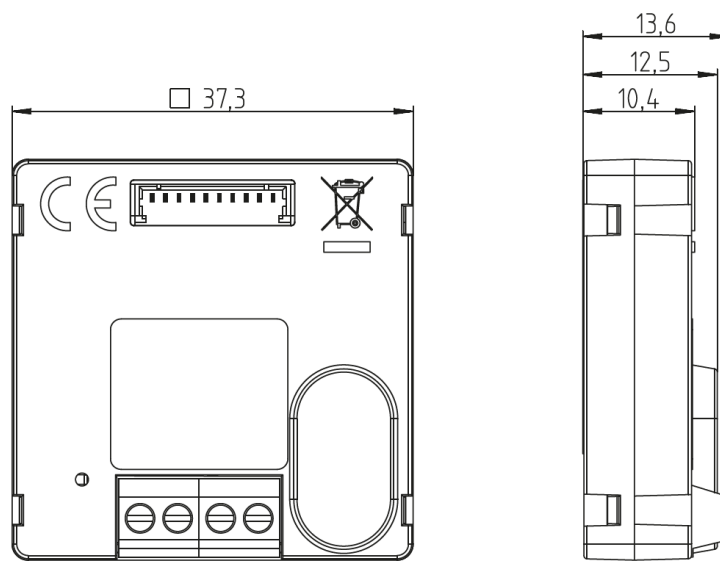
 Only for use in closed and dry rooms.

4.2 Functionality

- Compact DALI-2 controller with 4 inputs for the connection of potential-free buttons according to standard IEC 62386 Part 301.
- Buttons of contact type "NO contact" or "opening contact" can be used. The contact type can be set in the memory bank.
- Additionally, 2 inputs are available to connect variable resistors, e.g. sliders, potentiometers or various Theben temperature sensors according to standard IEC 62386 Part 302. The sensor is selected in the memory bank.
- The measurement values can be corrected with an adjustable offset if, for example, the measurement deviates from a reference instrument.
- For the inputs for variable resistors or temperature sensors, an adjustable filter is available for noise suppression.
- The DALI bus load of the event telegrams of the measurement values can be flexibly reduced by means of hysteresis.
- The TA 4 S DALI-2 is a DALI bus participant and can be correspondingly addressed according to IEC 62386 Part 103.
- The identification of the button interface is indicated by the LED.
- The TA 4 S DALI-2 button interface is supplied via the DALI bus.
- Easy installation in conventional flush-mounted boxes.

All of the product characteristics are described in detail in the following sections.

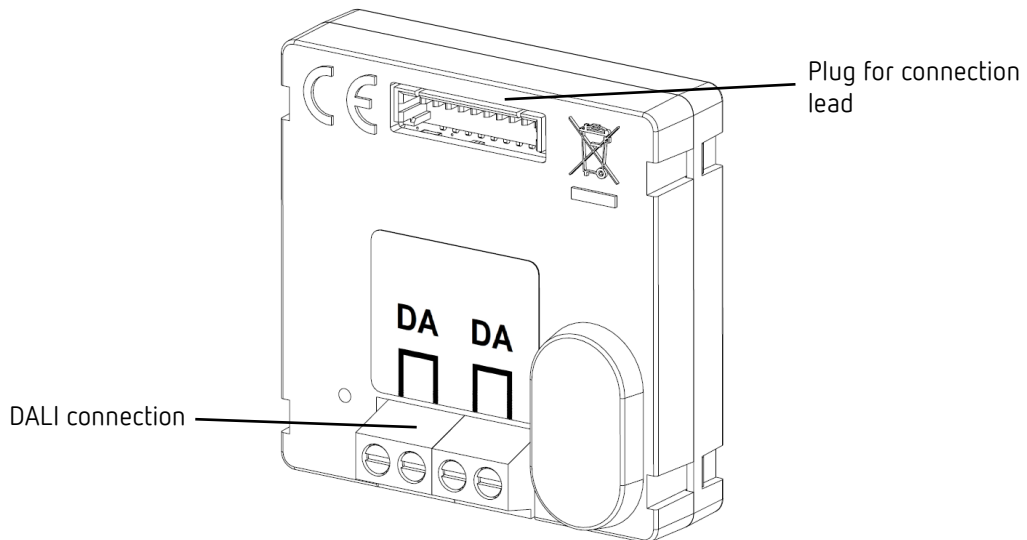
4.3 Dimensions



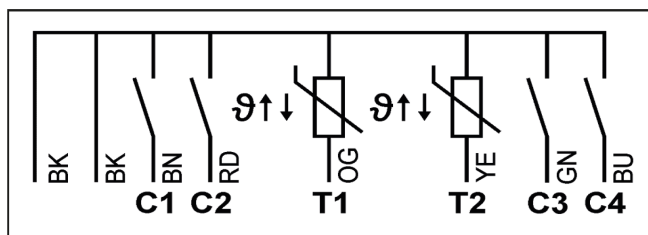
5 Connection

The TA 4 S DALI-2 button interfaces are connected to the DALI line.

- i** For operation of the TA 4 S DALI-2, an external DALI supply is required. This DALI supply must be able to ensure a reliable power supply for all connected DALI participants.
- i** A minimum current of 10 mA per TA 4 S DALI-2 device must be provided.



A connection lead with plug is supplied for connecting buttons C1 to C4, variable resistors or Theben temperature sensors T1 and T2. The cable length is 25 cm and can be extended up to max. 30 m if required.



Connection of buttons C1 to C4

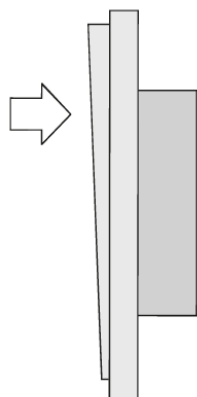
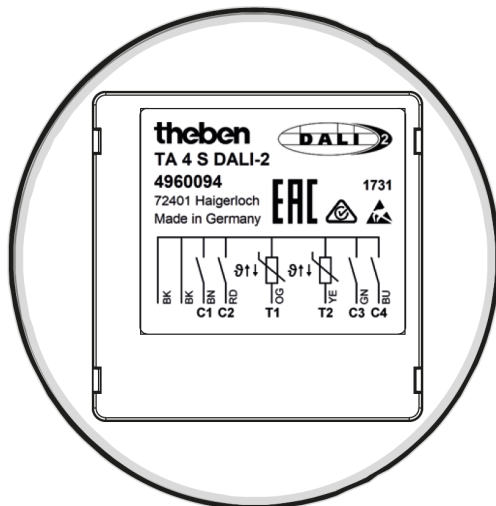
Connection of variable resistors or Theben temperature sensors T1 and T2

BK = Black; BN = Brown; RD = Red; OG = Orange, YE = Yellow; GN = Green; BU = Blue

- i** Only connect potential-free buttons.
- i** Do not connect 230 V to the device. Otherwise the device will be destroyed.

6 Installation

The TA 4 S DALI-2 button interfaces are installed in conventional flush-mounted boxes according to DIN 49073.



7 Settings

All settings are configured via the DALI bus.

 In its initial delivery condition, the TA 4 S DALI-2 button interface does not yet have a short address.

7.1 Settings via the DALI bus

All parameters and configuration commands are set by the application controller via the DALI bus. The TA 4 S DALI-2 button interface supports the parameters and configuration commands according to IEC 62386* Part 103/301/302.

Parameters which are not defined by the standard are stored in the memory bank. The default values of the parameters in the factory settings are also according to standard IEC 62386* Part 103/301/302.

* incl. DiiA Guidelines „Clarifications & Recommendations for IEC 62386“, version 1.2, April 2020

8 Operating modes

The TA 4 S DALI-2 button interface is a push button input device according to standard IEC 62386 Part 301 and an absolute input device according to standard IEC 62386 Part 302.

The TA 4 S DALI-2 button interface is delivered and operated with operating mode 0x00 ex works. The operating mode cannot be changed.

8.1 Memory bank 2 – push button instance

In memory bank 2, the button contact type of push button instances 2 to 5 is stored.

Memory bank 2

Address	Instance	Description	Default value (factory)	RESET value	Value range	Memory type
0x00		Address of last position in this memory bank	0x03	no change	-	ROM
0x01		Indicator byte (defined by manufacturer) – version of the memory bank	0x01	no change	-	ROM
0x02		Memory bank lock byte	0xFF	0xFF	0xFF / 0x55	RAM
0x03	2	Type of contact of button C1	0x00	0x00	0x00 / 0xFF	NVM
0x04	3	Type of contact of button C2	0x00	0x00	0x00 / 0xFF	NVM
0x05	4	Type of contact of button C3	0x00	0x00	0x00 / 0xFF	NVM
0x06	5	Type of contact of button C4	0x00	0x00	0x00 / 0xFF	NVM
0x07-0xFF		Not implemented / reserved	Response NO	no change	-	ROM

Value range of button contact type:

- 0x00: NO contact (factory setting)
- 0xFF: opening contact NC

8.2 Memory bank 3 – absolute input device

The parameters of absolute input device instances 0 and 1, which are not defined by DALI-2, are stored in memory bank 3.

Address	Instance	Description	Default value (factory)	RESET value	Value range	Memory type
0x00		Address of last position in this memory bank	0x03	no change	-	ROM
0x01		Indicator byte (defined by manufacturer) – version of the memory bank	0x01	no change	-	ROM
0x02		Memory bank lock byte	0xFF	0xFF	0xFF / 0x55	RAM
0x03	0	Sensor type of sensor T1	0x03	0x03	0x00 – 0x03	NVM
0x04	0	Offset of sensor T1	0x80	0x80	0x01 – 0xFF	NVM
0x05	0	Range of sensor T1	0x00	0x00	0x00 / 0x01	NVM
0x06	0	Hysteresis of sensor T1	0x00	0x00	0x00 – 0xFF	NVM
0x07	0	Filter of sensor T1	0x02	0x02	0x00 – 0x0B	NVM
0x08	0	Beta low of sensor T1	0xE4	0xE4	0x00 – 0xFF	NVM
0x09	0	Beta high of sensor T1	0x11	0x11	0x00 – 0xFF	NVM
0x0A	1	Sensor type of sensor T2	0x03	0x03	0x00 – 0x03	NVM
0x0B	1	Offset of sensor T2	0x80	0x80	0x01 – 0xFF	NVM
0x0C	1	Range of sensor T2	0x00	0x00	0x00 / 0x01	NVM
0x0D	1	Hysteresis of sensor T2	0x00	0x00	0x00 – 0xFF	NVM
0x0E	1	Filter of sensor T2	0x02	0x02	0x00 – 0x0B	NVM
0x0F	1	Beta low of sensor T2	0xE4	0xE4	0x00 – 0xFF	NVM
0x10	1	Beta high of sensor T2	0x11	0x11	0x00 – 0xFF	NVM
0x11-0xFF		Not implemented / reserved	Response NO	no change	-	ROM

Value range of sensor type:

- 0x00: Theben sensors, see table below
- 0x01: Theben sensor 9070191
- 0x02: any 100 k Ω NTC with known B or beta [K] (see also value range of parameter beta low/beta high)
- **0x03: 100 k Ω variable resistor (factory setting)**

Theben sensors	Recommended measurement range	Max. measurement range		Sensor type
		Range 0x00	Range 0x01	
9070191, wall installation temperature sensor	0 °C ... 40 °C	0 °C ... 75 °C	-25 °C ... 75 °C	0x01
9070321, floor sensor	0 °C ... 40 °C	0 °C ... 85 °C	-25 °C ... 75 °C	0x00
9070459, room temperature sensor	-10 °C ... 50 °C	0 °C ... 85 °C	-25 °C ... 75 °C	0x00
9070489, contact temperature sensor	0 °C ... 80 °C	0 °C ... 85 °C	-25 °C ... 75 °C	0x00
9070496, Flush-mounted temperature sensor	0 °C ... 40 °C	0 °C ... 85 °C	-25 °C ... 75 °C	0x00

Value range of offset

The offset can be used to correct the measurement value if, for example, the measurement deviates from a reference device.

- The setting range is 0x01 to 0xFF; this corresponds to an offset range of
 - {-12.7 °C to +12.7 °C} or
 - {-12.7 kΩ to +12.7 kΩ}
- One unit corresponds to 0.1 °C or 100 Ω

Offset	Sensor type	
	0x00, 0x01, 0x02	0x03
0x01: corresponds to	-12.7 °C	-12.7 kΩ
0x02: corresponds to	-12.6 °C	-12.6 kΩ
.....
0x80: factory setting	0 °C	0 Ω
0x81: corresponds to	+0.1 °C	+0.1 kΩ
.....
0xFF: corresponds to	+12.7 °C	+12.7 kΩ

Value range "Range":

The "Range" parameter can be used to select temperature sensors with a positive or negative temperature range.

- **0x00: Temperature sensors with a positive temperature range (factory setting)**
- 0x01: Temperature sensor with a negative temperature range

See also **chapter 8.5 Measurement values T1/T2**

Value range "Hysteresis":

The "Hysteresis" parameter can be used to reduce the DALI bus load. The event telegrams are not sent until the measurement value has changed by the value of the set hysteresis.

- The setting range is 0x00 to 0xFF; this corresponds to a hysteresis range of
 - {0.1 °C to 25.5 °C} or
 - {100 Ω to +25.5 kΩ}
- One unit corresponds to 0.1 °C or 100 Ω

Hysteresis	Sensor type	
	0x00, 0x01, 0x02	0x03
0x00: factory setting	0.1 °C	100 Ω
0x01: corresponds to	0.1 °C	100 Ω
0x02: corresponds to	0.2 °C	200 Ω
.....
0x80: corresponds to	12.8 °C	12.8 kΩ
.....
0xFF: corresponds to	25.5 °C	25.5 kΩ

Value range "Filter":

For noise reduction, the filter level can be adjusted. The filter number determines from how many measurement values the average value is calculated.

- The setting range is 0x00 to 0x0B

Filter number	Measurement value
0x00 factory setting	each measurement value is transmitted unchanged
0x01	Average value from 2 measurement values (2^1)
0x02	Average value from 4 measurement values (2^2)
0x03	Average value from 8 measurement values (2^3)
.....
0x09	Average value from 512 measurement values (2^9)
0x0A	Average value from 1024 measurement values (2^{10})
0x0B	Average value from 2048 measurement values (2^{11})



The filter delays the measurement. With a filter number of 0x02, the delay is about 0.2 seconds and with 0x0A about 51.2 seconds.

$$\text{delay [ms]} = 2^{\text{filter number}} * 50 \text{ ms.}$$

Value range "beta low/beta high":

If 0x02 has been selected at the sensor type parameter "NTC with known B or Beta", the associated B or Beta [K] should be set here. B or Beta is a four digit number in [K], which can be found in the NTC sensor data sheet. In order to be stored in the memory bank, the four-digit number must first be converted to hex format and then stored in the beta low and beta high bytes.

Example: B or Beta = 4580 which corresponds to Hex 11E4

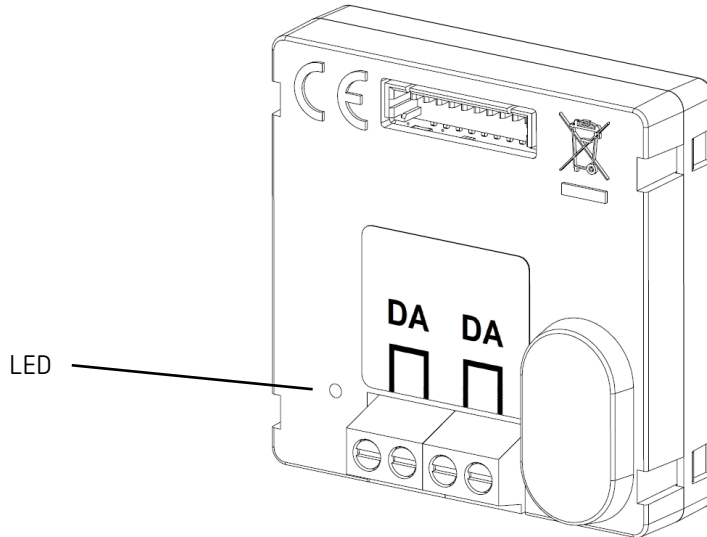
- **Beta low = 0xE4 factory setting**
- **Beta high = 0x11 factory setting**
- The setting range for beta low is 0x00 to 0xFF and for beta high 0x00 to 0xFF.

Summary of setting options for parameters

Sensor type	Offset	Range	Hysteresis	Filter	Beta low/high
0x00	x	x	x	x	
0x01	x	x	x	x	
0x02	x	x	x	x	x
0x03	x		x	x	

8.3 Assignment of short addresses

The assignment of short addresses for the TA 4 S DALI-2 button interface is carried out according to IEC 62386-103. The identification of the button interface is indicated by the LED according to IEC 62386 Part 103.



8.4 Button function C1-C4

The TA 4 S DALI-2 button interface has four instances to the button states:

- Instance 2 supplies the state of button C1
 - Instance 3 supplies the state of button C2
 - Instance 4 supplies the state of button C3
 - Instance 5 supplies the state of button C4
- on the DALI bus in accordance with IEC 62386 Part 301.

8.5 Determining measurement values T1/T2 via the DALI bus

The TA 4 S DALI-2 button interface has 2 instances to the measurement values of the connected sensors:

- Instance 0 supplies the measurement value of sensor T1
 - Instance 1 supplies the measurement value of sensor T2
- on the DALI bus in accordance with IEC 62386 Part 302.

According to DALI standard IEC 62386-103/302, the value of an absolute input device instance is obtained either by querying directly or by evaluating the events.

8.5.1 Direct queries

The following steps must be carried out in order to query the value directly:

1. Address the DALI telegram "QUERY INPUT VALUE" to the desired device and with the desired instance number of an absolute input device.
2. Multiply the returned value by 4 and save it in a variable of at least 16 bits.
3. Address the DALI telegram "QUERY INPUT VALUE LATCH" to the previous device with the previous instance number.
4. Divide the returned value by 64 and add it to the previous variable.

Example as pseudo code:

Input value = QUERY_INPUT_VALUE ()

Variable = input value × 4

Input value = QUERY_INPUT_VALUE_LATCH ()

Variable = variable + input value ÷ 64

8.5.2 Evaluating events

An event of an absolute input device can be triggered cyclically or at a certain change of the value. Depending on the type of sensor used, the following steps are necessary to display the obtained value:

Temperature sensor with a positive temperature range:

Setting in memory bank 3: sensor type = [0x00], [0x01] or [0x02]

Setting in memory bank 3: range = [0x00]

Temperature measurement value [°C] = event info / 10

Temperature sensor with a negative temperature range:

Setting in memory bank 3: sensor type = [0x00], [0x01] or [0x02]

Setting in memory bank 3: range = [0x01]

Temperature measurement value [°C] = (event info – 250) / 10

Variable resistor:

Setting in memory bank 3: sensor type = [0x03]

Measurement value [Ω] = event info × 100

9 Accessories

Wall installation temperature sensor
Recommended measurement range: 0 °C ... 40 °C
Item no.: 9070191
Details > www.theben.de/en



Floor sensor
Recommended measurement range: 0 °C ... 40 °C
Item no.: 9070321
Details > www.theben.de/en



Room temperature sensor
Protection rating IP 65
Recommended measurement range: -10 °C ... 50 °C
Item no.: 9070459
Details > www.theben.de/en



Contact temperature sensor
In cover flap housing for measuring the
temperature at pipes and curved
surfaces
Recommended measurement range: 0 °C ... 80 °C
Item no.: 9070489
Details > www.theben.de/en



Flush-mounted temperature sensor
For flush-mounting
Recommended measurement range: 0 °C ... 40 °C
Item no.: 9070496
Details > www.theben.de/en



10 Contact

Theben AG

Hohenbergstr. 32
72401 Haigerloch, Germany
GERMANY
Phone +49 7474 692-0
Fax +49 7474 692-150

Hotline

Phone +49 7474 692-369
hotline@theben.de
Addresses, telephone numbers, etc.
www.theben.de/en