

Infrared Temperature Transmitter MODEL: SB-TTIR

SMART BIENE.





MECHANICAL SPECIFICATIONS

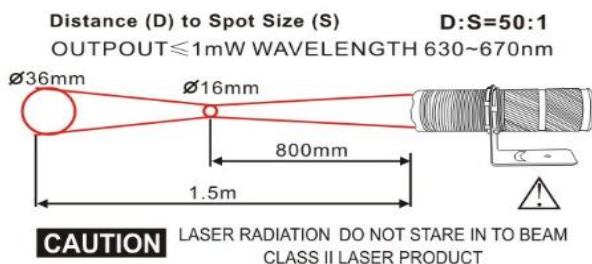
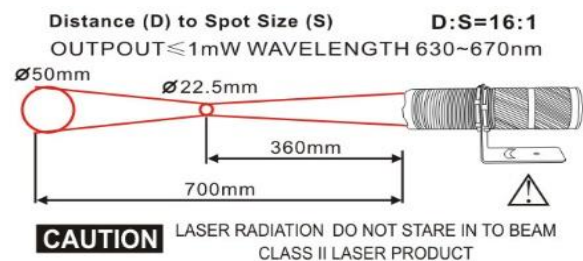
- Robust NEMA 4X (IP66) aluminum die cast housing.
- Easily rotatable display, 90° increments.
- Weight: ~ 1900 g.
- Mounting Accessories: U-Bolt with screw threads on both ends.
- Sensor Material: Aluminum alloy



Figure 1. Typical Temperature Transmitter

ENVIRONMENTAL CONDITIONS

- Operating temperature: 0 ...+50°C
- Storage temperature: -20 ...50°C
- Humidity: max. 95%
- Relative vibration: 2g (10...2000 Hz)
- Shock: 5g/ 8 ms.

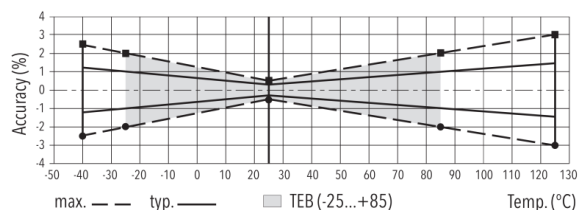
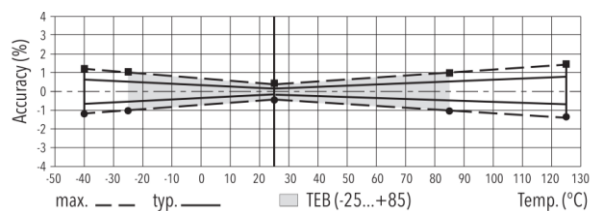


ELECTRICAL SPECIFICATIONS

- Display: 2.8 inch full-color TFT LCD with LED Backlight.
- Supply Voltage: 24VDC.
- Current Output: 0-10 , 0-20 , 4-20 mA , MAX Load: 500Ω
- Relays Outputs: 2 or 4 Relays, 0.5A-220VAC or 4A-30VDC.
- RS-485 2wire communication protocol.
- Insulation Resistance: 50Vdc (>100MΩ).
- All In-Out Ports: 30VDC Circuit Protected.
- CE Compliance: EMC Directive 2004/108/EC IEC/EN 61326-1: 2006 (EMI Class A/ EMS Table 2).

MEASURING SPECIFICATIONS

- Reference Condition: 23C (73F).
- Accuracy: +/-0.3% FS (URL).
- (URL) (Accuracy includes the effects of linearity, Hysteresis, and repeatability).
- Object Temperature Ranges: -50...300°C, -50...600°C, -50...1200°C, -50...1800°C
- Spectral Response: 8-14um
- Distance Spot Ratio: 50:1(-50...300°C is 16:1)
- Target size: no less than 16mm
- Response Time: 500msec.
- Output Resolution: 0.3% FS (URL)
- LCD Accuracy: ±0.3% FS (URL) + last digit





ESD CAUTION

- ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.



CAUTION

- It is dangerous to ignore the specified limits for the device or to use the device when it is not in its normal condition. Use the applicable protection and obey all safety precautions.
- Keep LCD away from direct sunlight.**
- Before you start an operation or procedure, make sure that you have the necessary skills (if necessary, with qualifications from an approved training establishment).
- Follow good engineering practice at all times.

MODEL SELECTION

S B - T T I R - - - - 0 4 0 - 3 0 0 - - - - - U L - -

Device Type:

TTIR: Infrared Temperature Transmitter.

Output:

1: Current Output (0-20/4-20 mA) 0: NO Current Output

2: Two-Relay Output 4: Four-Relay Output

1: RS-485 Output 0: NO RS-485 Output

Range:

0: -50...300°C 1: -50...600°C

2: -50...1200°C 3: -50...1800°C

Emissivity:

00: Variable

Other: Fixed, emissivity value equal value/100

Options:

UL: USB Connection & Data Logger

T: External trimming Potentiometer.



TERMINAL WIRING

- 01. Current Output (+)
- 02. Current Output (-)
- 03. Sensor connection (+24VDC)
- 04. Sensor connection (GND)
- 05. RS-485 (Modbus-RTU): A
- 06. RS-485 (Modbus-RTU): B
- 07. -
- 08. -
- 09. -
- 10. -
- 11. Relay-1: COM
- 12. Relay-1: NC
- 13. Relay-1: NO
- 14. Relay-2: COM
- 15. Relay-2: NC
- 16. Relay-2: NO
- 17. Relay-3: COM
- 18. Relay-3: NC
- 19. Relay-3: NO
- 20. Relay-4: COM
- 21. Relay-4: NC
- 22. Relay-4: NO

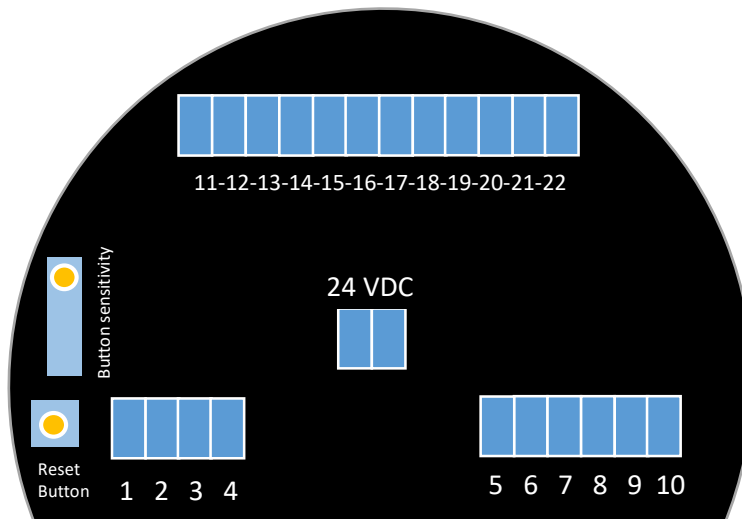


Figure 2. Panel Terminal Wiring

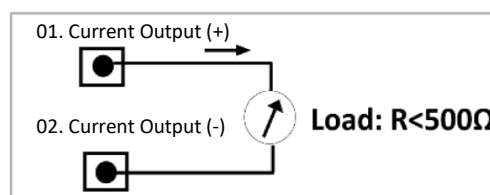


Figure 3. Current Output Wiring

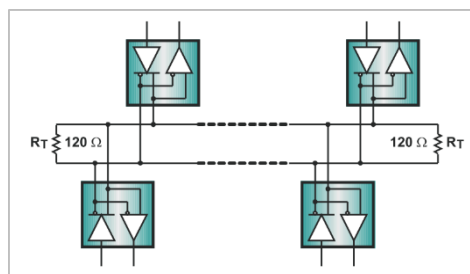
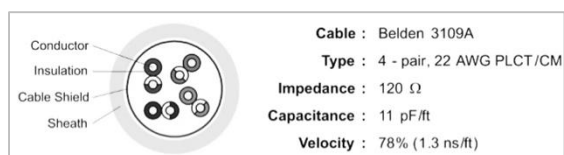


Figure 4. Daisy-chain RS-485 network

RS-485 NETWORK TOPOLOGY

RS-485 suggests its nodes to be networked in a daisy-chain, or bus topology. In this topology, the participating drivers, receivers, and transceivers connect to a main cable trunk via short network stubs.

The interface bus can be designed for half-duplex transmission.

$R_t = 120\Omega$



OPERATION

Touch Buttons:

Three infrared touch buttons are designed for device configuration. Under extremely rare case, the infra-red switches may respond unexpectedly in such conditions as sticking ball of water or extraneous substances on the surface of display panel glass according to the principle of infra-red switch operation. It is probability rises in such cases as sticking rain water by storm or other similar situation and washing up work near panel installation place. Either to illuminate or stop illuminating the infra-red switches by the flashlight may cause the miss-reaction. During data entry the device remains on-line, the Outputs continue to indicate the actual operating values. The individual key functions are described below:

Up Button: (▲)

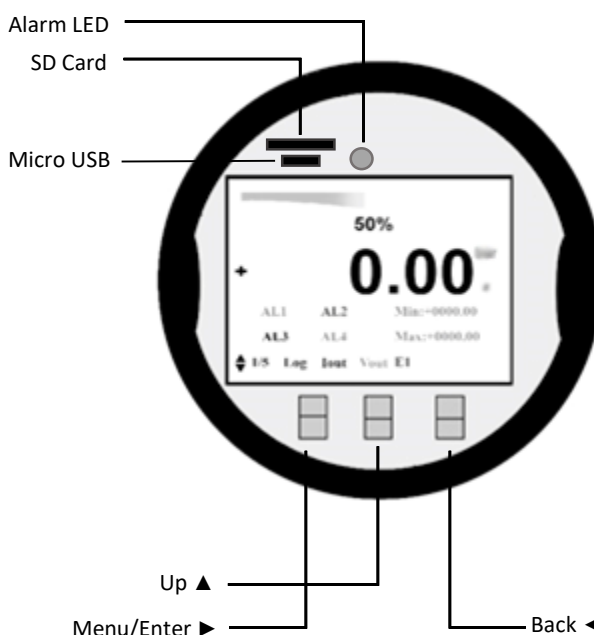
This key is one of the two arrow keys. It's Used for increasing digits, going up in Menu subpages, changing main pages, etc.

Menu / Enter Button: (►)

It's used for entering in menu (hold it 3SEC), Entering in submenus, Selecting digits, etc.

Back Button: (◄)

It's used for turning off the LCD back-Light (hold it 3sec), return to main Pages from menu, return from submenus In menu, etc.



NOTICE

- To improve sensitivity of touch buttons set the screw in terminal panel, which is mentioned on page 3. In electrical diagram section. **Reset device and use touch buttons setting.**
- Don't open the device front panel cover (keep clean inside surface of glass - that's vital)
- Operate the display unit under the condition where direct sunlight, etc... do not shine to the setting switches directly when the parameter setting operation is carried out.
- Use switches with panel glass cover.**
- If dirt, dust or other substances surfaces on the display panel glass, wipe them clean with a soft dry cloth.
- The operation with dirty gloves may cause a switch response error.
- If dirt, dust or other substances surfaces on the display panel glass, wipe them clean with a soft dry cloth.

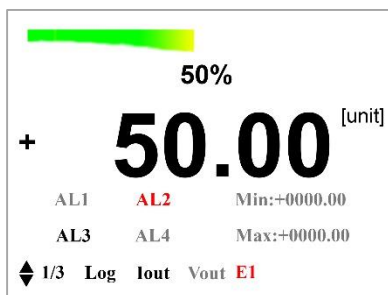
RESET FACTORY

- If it is necessary to restore all settings to the original factory configuration, touch and hold menu and back buttons (►◄ 3SEC) until the display asks for reset factory and then select YES.
Notice: In reset factory mode all settings return to it's default factory configuration and when you reset panel by power **off & on**, or by reset push-button in back end of panel all settings will not change.



MAIN PAGES

- 3 Main Pages are Designed for measuring parameters, output status, you can move between main pages by up button(▲):
 - MAIN PAGE 1/3:** measuring value and parameters, output status ...
 - ERRORS PAGE 2/3:** Describes errors which are shown in MAIN PAGES
 - INFO PAGE 3/3:** Describes some features and specifications of Device such as serial number, model code, measuring range...



MAIN PAGE (1/3)

- Alarms status:** Bold when Enabled, and red when excited.
- MIN & MAX values:** Bold when Enabled.
- Current Output (Iout) status:** Bold when Enabled.
- Data Logger (Log) status:** Bold when Enabled.
- Percent of Measuring Range (refer to info page) Graph:** 50% as show in fig.
- Errors status:** E1, (Refer to error page.)
- Measuring Unit:** unit as shown in fig.

ERROR PAGE (2/3)

- E1: this error appears when data logging is impossible such as the absence of SD-Card, full memory, or any other problems.
- E2: this error appears when sensor connection to device has problem such as disconnecting, short circuit or any damage to sensor cables.
- E3: this error appears when measured value exceeds the measuring range of sensor. This error can result in damage of device.
- E4: this error appears when measuring value is out of measuring outputs. For example, if 20 mA configured equal to 50°C and measured value is more than 50°C, this error appears.

Errors:

E1: Logging Data Problem

E2: Sensor Connection Problem

E3: Out of Analogue Output Range

E4: Out Of Measuring Range of Sensor

◆ 2/3 Log Iout Vout E1

INFO PAGE (3/3)

- Tag ID: you can change Tag ID **only** by PC Software of device or modbus.
- Serial Number, Model code, sensor range and production data are Factory registered information.
- NOTICE:** percentage value in main page 1 is based on sensor range. Min-Max of range is equal to 0-100%.

Info:



Tag id:xxxxxxxxxxxxxxxxxxxxxx

Serial Number:-----

Model:-----

Production Date:yyyy/mm

Sensor Range:x...y C

Web Site:www.SmartBiene.com

◆ 3/3 Log Iout Vout E1



MENU QUICK GUIDE

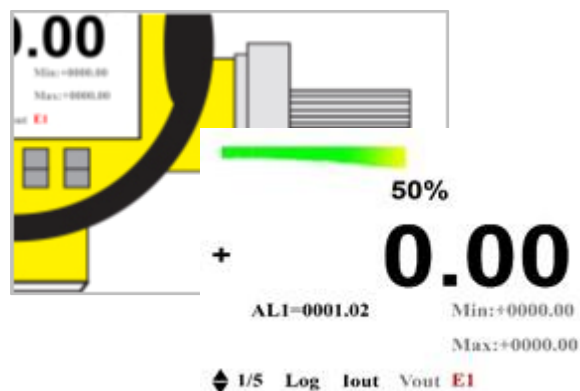




EXTERNAL TRIMPOT

External trimming Potentiometer can be used for External Configuration of ALARM Value:

- Don't need to Enter in Menu.
- You can see alarm value in main page 1.
- User friendly for machine operators.



RESET FACTORY - RESET PASSWORD

- If it is necessary to restore all menu settings to the original factory configuration, touch and hold menu and back buttons (►◄ 3SEC) until the display ask for reset factory and then select YES.

HOW TO ENTER MENU

- Touch and hold menu button for 3sec and enter password. (► 3SEC)
- Use menu button to move between digits. (►)
- Use up button to increase digits. (▲)
- Touch and hold menu button for 3sec to enter menu (if password is correct). (► 3SEC)
- If you have forgotten password, touch and hold menu and back buttons to reset factory (►◄ 3SEC)

Menu:

Please Enter Password :

000

Press&hold menu after entering password

Menu:

Unit:

C

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD DT DL CP

UNIT SELECTION

After enter in menu, first setting is measuring unit:

- Touch menu to enter units (►)
- Use up button to move between temperature units. (▲)
- Touch menu again to select the unit. (►)
- Touch back button to exit from unit setting. (◄)

Menu:Unit:

C F

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD DT DL CP

**Menu:****Alarm1 Settings**

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD DT DL CP

ALARM SETTING

Based on relay selection you can configure two or four relays setting in menu:

Alarm x setting:

- Touch up to select Alarm x settings. (▲)
- Touch menu. (►)
- **Enable or disable:** you can disable or enable alarm (relay). Use up to move and finally use menu button to select disable or enable. (▲►)
- **Value:** Touch up button and then menu to change alarm value, use menu to move between digits and up change values. (▲►)
- **High or low:** Touch up button and then menu button to select High or Low setting for alarm:
 - **High:** when measured value exceeds alarm value, then relay excites.
 - **Low:** when measured value lessens than alarm value, then relay excites.
- **Hysteresis:** you can define up and down hysteresis values for alarm value: Touch up button and then menu button to change hysteresis values, use menu to move between digits and up to change values. (▲►)
 - **Up hysteresis:** when alarm is in low mode, and relay is excited; when measured value exceeds alarm value + up hysteresis, relay returns to its normal status.
 - **Down hysteresis:** when alarm is in high mode, and relay is excited; when measured value lessens alarm value - down hysteresis, relay returns to its normally situation.
- **Delay:** you can define on and off delay for alarms, you can define up and down hysteresis values for alarm value: Touch up button and then menu to change hysteresis values, use menu to move between digits and up to change values. (▲►)
 - **Delay on:** delay for relay excitation.
 - **Delay off:** delay for relay to return to its normal status.
- Touch back button to return to the main menu

Menu: AI1 Settings:

ED
VL
HL
UH
DH
OD
FD

Disable

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD DT DL CP

Menu: AI1 Settings:

ED
VL
HL
UH
DH
OD
FD

Value:

+ 0 0 0 0 . 0 0 [unit]

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD DT DL CP

Menu: AI1 Settings:

ED
VL
HL
UH
DH
OD
FD

Low

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD DT DL CP

Menu: AI1 Settings:

ED
VL
HL
UH
DH
OD
FD

Down Hysteresis:

+ 0 0 0 0 . 0 0 [unit]

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD DT DL CP

Menu: AI1 Settings:

ED
VL
HL
UH
DH
OD
FD

Up Hysteresis:

+ 0 0 0 0 . 0 0 [unit]

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD DT DL CP

Menu: AI1 Settings:

ED
VL
HL
UH
DH
OD
FD

On Delay:

0 0 : 0 0

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD DT DL CP



ANALOGUE OUTPUTS

There is analogue output for device:

- Touch up and menu to enter in an analogue output setting: (▲►)
- Touch up and menu to select 0-20mA settings: (▲►)
- **0-20mA:**
 - You can disable or enable 0-20mA output. Use up to move and finally use menu button to select disable or enable. (►)
 - **point Value & point mA:**

For this output type you can define a linear relation between measured value (between measuring range) and current output (between 0 to 20mA) by means of two points. Thus we have:

Point 1 value ↔ point1 mA

Point 2 value ↔ point2 mA

Thus you can have 4-20mA or 0-20mA ... current outputs for your measurement range!

Touch up button and then menu to change alarm value, use menu to move between digits and up to change values. (▲►)

Menu:

Analogue Outputs

UN AL1 AL2 AL3 AL4 [AO] RS
STA MM ZO OC LCD DT DL CP ▼

Menu:Analogue Outputs:

mA
V

0-20mA

UN AL1 AL2 AL3 AL4 [AO] RS
STA MM ZO OC LCD DT DL CP ▼

Menu:Analogue Outputs:mA

mA
V

Point1 Value:

+ 0 0 0 0 . 0 0 [unit]

ED
P1
P1A
P2
P2A

UN AL1 AL2 AL3 AL4 [AO] RS
STA MM ZO OC LCD DT DL CP ▼

Menu:Analogue Outputs:mA

mA
V

Point1 mA:

0 0 . 0 0 mA

ED
P1
P1A
P2
P2A

UN AL1 AL2 AL3 AL4 [AO] RS
STA MM ZO OC LCD DT DL CP ▼



Modbus

Based on model order Modbus RTU communication protocol is possible for device, Touch up button and then menu to change address value. (▲►)

- Refer to **Modbus-RTU Map Register manual** for transmitter.
- In menu you can define device as a slave with address 001 to 247.

Menu:

Modbus Address:

001

UN AL1 AL2 AL3 AL4 AO TS **MD**
STA MM OC LCD ME DT DL CP ▼

SAMPLES TO AVERAGE

You can define number of samples to average for measuring algorithms:

- Increasing samples to average, damp noise of measured value and increase response time of device.

Menu:

Samples To Average:

05

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD DT DL CP ▼

MAX & MIN

- you can record and display max and min of measured value in main page 1:
 - **Enable or disable:** in Min & Max menu, Use up to move and finally use menu button to select disable or enable. (▲►)
 - **Erase:** in Min & MAX menu, Use up to move and finally use menu button to select Erase and then select Yes to erase and reset Max & Min values displayed in main page 1. (▲►)

Menu:

Max & Min

UN AL1 AL2 AL3 AL4 AO RS
STA **MM** ZO OC LCD DT DL CP ▼

TWO POINT CALIBRATION

You can use this setting for field calibration of device:

- Connect reference, fixed temperature to device sensor (2 points).
- Insert reference values in P1 and P2 and then touch menu to calibrate.
- In this calibration method you have linear relation between displayed or output values and input signal.

Menu:2PCalibration:

Value P1:

+ 0 0 0 0 . 0 0

Press Menu To Calibrate P1

UN AL1 AL2 AL3 AL4 AO MD
STA MM **CAL** LCD DT DL CP ▼



LCD POWER OFF TIME

You can define a power off time for LCD Backlight:

- Values form 1 to 60 minutes.
- Also you can select disable for continuously LCD Backlight ON. **Not Recommended!**

Menu:

LCD Power Off Time:

05 min

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC **LCD** DT DL CP

DATE & TIME

For Data Logger option, you can set date and time, use menu to move between digits and up to change values. (▲►)

- Use CR2032- 3Vbattery on electrical board behind LCD.
- For normal operation, life of battery is 2 years.
- If don't use battery, date and time will reset by device power off.

Menu:

Date & Time:

2012/12/27

14:48

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD **DT** DL CP

DATA LOGGER

With this option you can measure and record data to SD-Card:

- Recording Data on 2GB SD-Card with date and time Tag. Saving data in a TEXT file.
- **Sampling period:** change sampling period from 1sec to 9999 sec. use menu to move between digits and up to change values. (▲►)

Menu:DataLogger:

ED
ST

0 0 0 1 Sec

UN AL1 AL2 AL3 AL4 AO RS
STA MM ZO OC LCD DT **DL** CP

CHANGE PASSWORD

You can change Password for entering menu:

- Enter menu: change password
- Enter old password
- Enter new password
- Confirm new password, enter new password again.
- Password changed!

If you have forgotten password, use reset factory option.

Menu:ChangePassword:

Please Enter New Password

0 0 0

Menu:ChangePassword:

Please Confirm New Password

0 0 0



Modbus-RTU Map Register

Format of the master message

Each message sent by the master obey the following format:

Device Address	Function code	n byte parameters (optional)	CRC16_L	CRC16_H
----------------	---------------	---------------------------------	---------	---------

Device Address: Address of the device.

Address 0 is reserved for broadcasting.

Addresses 1 to 247 can be used for this device

Function code: Function number

This function code use for read or write data.

Parameters: parameters different based on function

CRC16: 16-bit checksum to verify that data received correctly

Format of the slave message

A message transmitted by the slave obey the following format:

Device Address	Function code	n byte parameters (optional)	CRC16_L	CRC16_H
----------------	---------------	---------------------------------	---------	---------

- Device Address: **Address of the device.**
- Function code: **The function number is same to the function number sent by the master.**
- Data: **Any data requested via the function follow here. If error accrued function code ORed with 0x80 and returned**
- CRC16

Exception errors

If message has been received correctly (no transmission error has occurred), but the transmitted function number and/or the parameters are invalid. **The slave responds an exception error**, unless the message has been received in broadcasting mode.

The message transmitted as a response by the slave has the following format:

Device Address	Function code	Exception code	CRC16_L	CRC16_H
----------------	---------------	----------------	---------	---------

Modbus RTU Frame Layout

> 3.5 char Delay time	8 bit address	8 bit Function code	n*(8 bit data)	CRC16	> 3.5 char Delay time
--------------------------	---------------	------------------------	----------------	-------	--------------------------

The entire message frame must be transmitted continuously. If an interval of more than 1.5 character times occurs between two characters, the message frame is declared incomplete and discarded by the receiver.

Description of MODBUS functions

F3: Read registers on MODBUS address space

F6: Write single register on MODBUS address space

F8: MODBUS Echo function

F16: Write multiple registers on MODBUS address space

Function 3: MODBUS Read Register

Read single or multiple registers in the MODBUS address space starting with Start Address. Note, that the data returned based on "MODBUS Register Map".

**Request:**

Device Address	0x03	Start addr H	Start addr L	#Reg H	#Reg L	CRC16_L	CRC16_H
----------------	------	--------------	--------------	--------	--------	---------	---------

Response:

Device Address	0x03	# Bytes	Data H	Data L	...	CRC16_L	CRC16_H
----------------	------	---------	--------	--------	-----	---------	---------

Error:

Device Address	0x83	Error	CRC16_L	CRC16_H
----------------	------	-------	---------	---------

Function 6: MODBUS Write Single Register

This function is similar to F16, but writes only 1 register. Note, that the data will be written based on “MODBUS Register Map”.

Request:

Device Address	0x06	Start addr H	Start addr L	Data H	Data L	CRC16_L	CRC16_H
----------------	------	--------------	--------------	--------	--------	---------	---------

Response:

Device Address	0x06	Start addr H	Start addr L	Data H	Data L	CRC16_L	CRC16_H
----------------	------	--------------	--------------	--------	--------	---------	---------

Error:

Device Address	0x86	Error	CRC16_L	CRC16_H
----------------	------	-------	---------	---------

Function 8: MODBUS Echo Test

This function used to perform a quick line check. It returns the data that received.

Request:

Device Address	0x08	0	0	Data H	Data L	CRC16_L	CRC16_H
----------------	------	---	---	--------	--------	---------	---------

Response:

Device Address	0x08	0	0	Data H	Data L	CRC16_L	CRC16_H
----------------	------	---	---	--------	--------	---------	---------

Error:

Device Address	0x88	Error	CRC16_L	CRC16_H
----------------	------	-------	---------	---------

Function 16: MODBUS WRITE Register

Write multiple registers on the MODBUS address space starting with Start Address. Note, that the data will be written based on “MODBUS Register Map”.

Request:

Device Address	0x10	Start addr H	Start addr L	# Reg H	# Reg L	# Bytes	Data H	Data L	...	CRC16_L	CRC16_H
----------------	------	--------------	--------------	---------	---------	---------	--------	--------	-----	---------	---------

**Response:**

Device Address	0x10	Start addr H	Start addr L	# Reg H	#Reg L	CRC16_L	CRC16_H
----------------	------	--------------	--------------	---------	--------	---------	---------

Error:

Device Address	0x90	Error	CRC16_L	CRC16_H
----------------	------	-------	---------	---------

RTU character framing

Start bit	1	2	3	4	5	6	7	8	Even parity	Stop bit
-----------	---	---	---	---	---	---	---	---	-------------	----------

Note that this device only support baud rate 9600.

Register Map-SB-TTIR

word	name	R/W
0,1(Float IEEE754)	Min measuring range	R
2,3(Float IEEE754)	Max measuring range	R
4,5(Float IEEE754)	Temperature Value	R
6(bit)	0-E1 1-E2 2-E3 3-E4 5-AI1On 6-AI2On 7-AI3On 8-AI4On	R
7-12(char)	Model ID	R
13-18(char)	Serial Number	R
19	Uint 0-C 1-F	R
20-31(char)	Tag ID	R/W



SOFTWARE

SB-TT (01) is a Portable device software, you can connect your device to computer with USB Cable (USB to Micro-USB) and configure your device or see measured value plots, save data,....

Min System Requirement:

- CPU: 2GHz.
- Memory: 2GB RAM.
- Hard Drive: 80 MB available in the hard disk.
- Windows 8 or superior.
- USB2 Port.

Software consists of three tabs:

- **DATA (Real Time):** Display measured value with a real time graph. Start, pause and erase data logging. Saving text file or a plot image from logged data. Display alarms status, errors, main and max values of measured value.
- **Configuration:** In this tab you can get device configuration or change configuration and set them to device, also you can reset device using reset factory.
- **Info:** In info tab you can change Tag ID of device. You can see device serial number registered by **Smart Biene**.

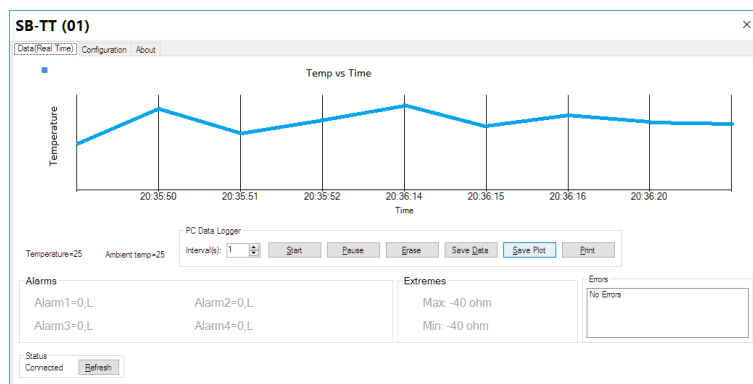


Figure 5. SB-TT(01) DATA(Real Time) tab.

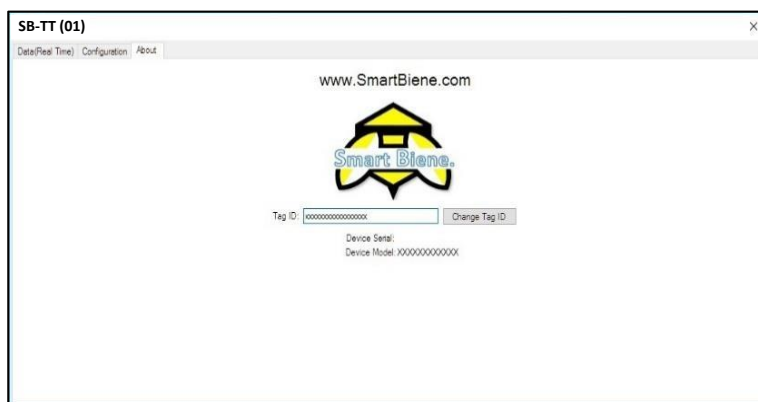
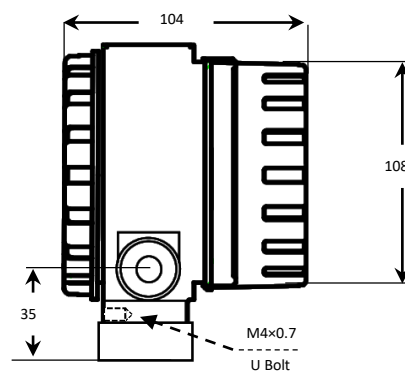
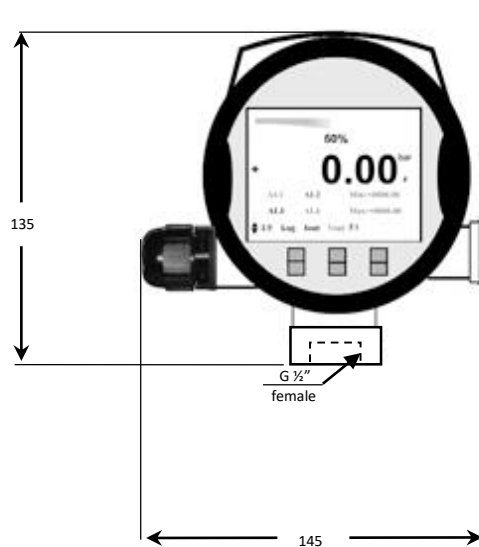


Figure 6. SB-TT(01) Info tab.



DIMENSIONAL DRAWING & INSTAALLATION

Dimensions in mm.





WARRANTY & DISCLAIMER

Smart Biene ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 12 months from date of purchase. **Smart Biene's** WARRANTY adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that **Smart Biene's** customers receive maximum coverage on each product. If the unit malfunctions, it must be returned to the factory for evaluation. **Smart Biene's** Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by **Smart Biene**, if the unit is found to be defective, it will be repaired or replaced at no charge. **Smart Biene's** WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of **Smart Biene's** control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and Relays. **Smart Biene** is pleased to offer suggestions on the use of its various products. However, **Smart Biene** neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by **Smart Biene**, either verbal or written. **Smart Biene** warrants only that the parts manufactured by the company will be as specified and free of defects.

Smart Biene MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

However, no responsibility is assumed by **Smart Biene** for using Device.

LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of **Smart Biene** with respect to this order, whether based on contract, warranty, negligence, indemnification, and strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based.

In no event shall **Smart Biene** be liable for consequential, incidental or special damages:

CONDITIONS: Equipment sold by **Smart Biene** is not intended to be used, nor shall it be used (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, **Smart Biene** assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify **Smart Biene** and hold **Smart Biene** harmless from any liability or damage what's over arising out of the use of the Product(s) in such a manner General — Information in this document is believed to be accurate and reliable. However, **Smart Biene** does not give any representations or

Warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to make changes — **Smart Biene** reserves the right to make Changes to information published in this document, including without

Limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — **Smart Biene** products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of a **Smart Biene** product can reasonably be expected.

WWW.SMARTBIENE.COM

Smart Measurement.

All specifications are subject to change without notice.

All sales subject to standard terms and conditions.

Smart Biene

Email: info@smartbiene.com