

Setup, Network and Communication Manual ESTM / ESTM-L

17-88C1-*

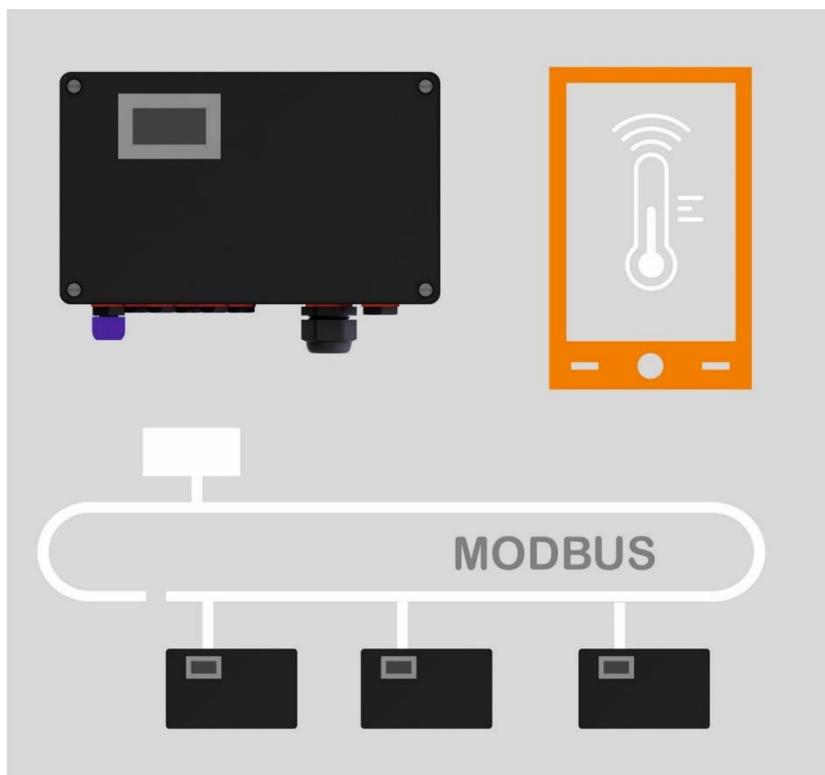


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1. Target Audience

These operating instructions are intended for qualified personnel such as service technicians, commissioning engineers and plc programmers.

All setting values must be given by persons who have experience and knowledge of the relevant standards and guidelines relevant to the use of the product. They must also know and be able to interpret the processes in relation to the product.

2. Safety

2.1 Safety marking

Particularly important points in these instructions are marked with a warning message:

DANGER

DANGER draws attention to a danger which will lead to death or serious injury if not avoided.

WARNING

WARNING draws attention to a danger which can lead to death or serious injury if not avoided.

CAUTION

CAUTION draws attention to a danger which can lead to minor or moderate injury if not avoided.

NOTICE

Important instructions and information on effective, economical & environmentally compatible handling.

2.2 Safety Instructions

The safety instructions given in this clause must be carefully observed.

DANGER

DANGER When using the BARTEC TRACE COMAND, make sure that the handheld device with the software installed on is suitable for the operating environment.

Your local BARTEC representative will help you to find a suitable device.

WARNING

If the BARTEC Trace Command is incorrectly executed, the settings of the connected ESTM/ESTM-L can be changed, affecting the operational reliability of the entire heating system! Only trained technical personnel may run the program in online mode.

WARNING

WARNING this manual is only an additional information for all technical details please observe the Installation instructions

NOTICE

Disclaimer
BARTEC GmbH shall not assume any liability for damage resulting from installation and use of the BARTEC Trace Command, and in particular no liability for personal injury or damage to property and pecuniary loss related directly or indirectly to use of the software.

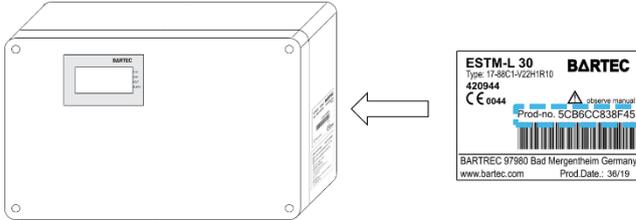
3. General information

3.1 About this manual

This manual is applicable for firmware version 3.4.6

3.2 Bluetooth ID

The serial number of the ESTM/ESTM-L is used to identify the device when connecting to Bluetooth. The serial number is equivalent to the MAC-Address of the Bluetooth-Module.



3.3 Factory set default device-password

ESTM-L

„Device pin (digits)“

⚠ WARNING

This password should be changed and only authorised persons should be supposed to know. Otherwise some unauthorized persons are able to change all settings. What might interrupted our processes or it can lead to a damage of system or equipment

Password change see: 4.8.8 System Data

3.4 Temporary Pin

Temporary Pin is 3 digit Password that is created by the ESTM / ESTM-L and shown on the display of the device. The hexadecimal numeric code is used for this password. That means the numbers from **0-9** and the charters **A-F** are used. This key is re-created each time a change is requested to the device.

That password will make sure that you have selected the correct device. And it will help to prevent unauthorised access to the System.

0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9

A	B	C	D	E	F
A	b	C	d	E	F

4. Bartec Trace Command General

4.1 General



The BARTEC TRACE COMAND the software-tool to set up and monitor all ESTM/ESTM-L devices with an android based handheld device.

Your local BARTEC reprehensive will provide the installation file and a suitable handheld device.

4.2 Installation

⚠ DANGER

DANGER When using the BARTEC TRACE COMAND, make sure that the handheld device with the software installed on is suitable for the operating environment.

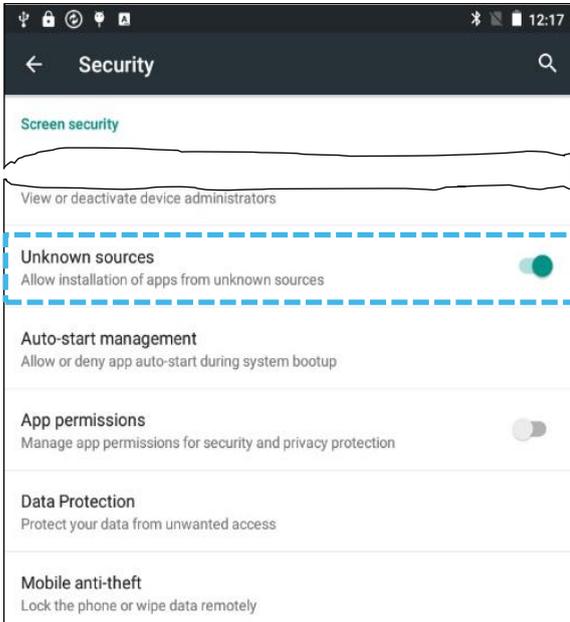
Your local BARTEC reprehensive will help you to find a suitable device.

Preparing for Installation

Transfer the *.apk file to your android device (USB/WIFI/Bluetooth/memory card etc. can be used)

Allow installation from unknown source

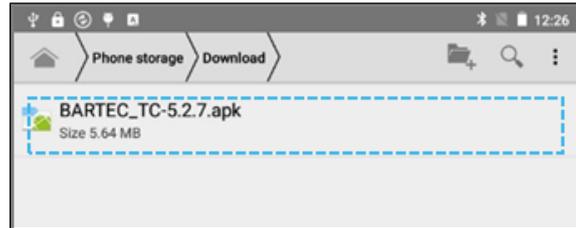
This setting can be found in the device settings of your Android System at the menu "Security". Depending on the Version of your Android it might look different.



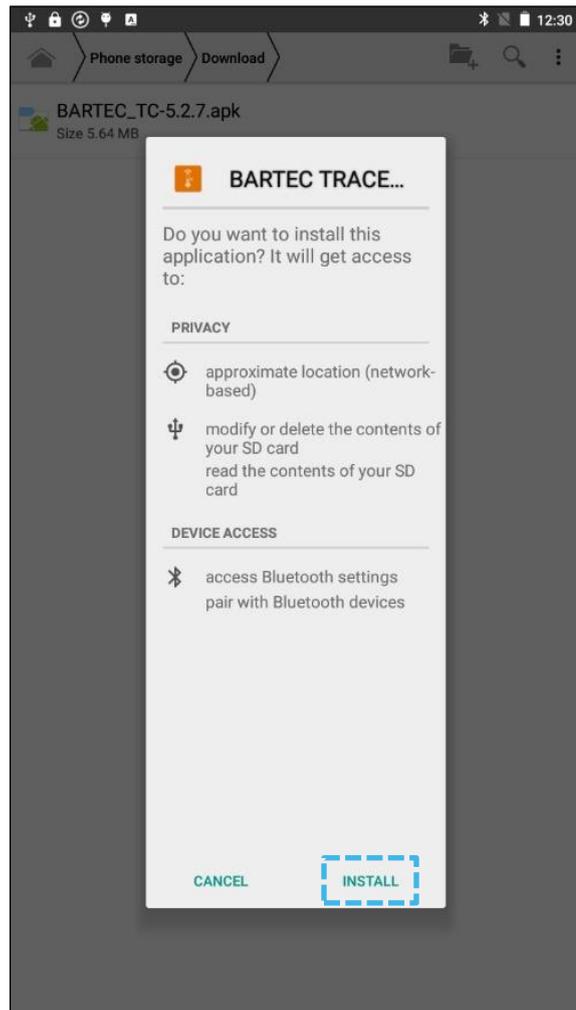
Installation from *.apk file

Open the folder at your Android device where you stored the *.apk.

Click on the File to start the Installation



Allow the App to access Bluetooth and other device functions by pressing **INSTALL**



4.3 Start Menu



When you start the app you will find the following options

Connect device:

To connect to a field device see 4.4 Start and Connection

Documentation:

In this menu you find the user manual of the ESTM/ESTM-L (pdf reader is required)

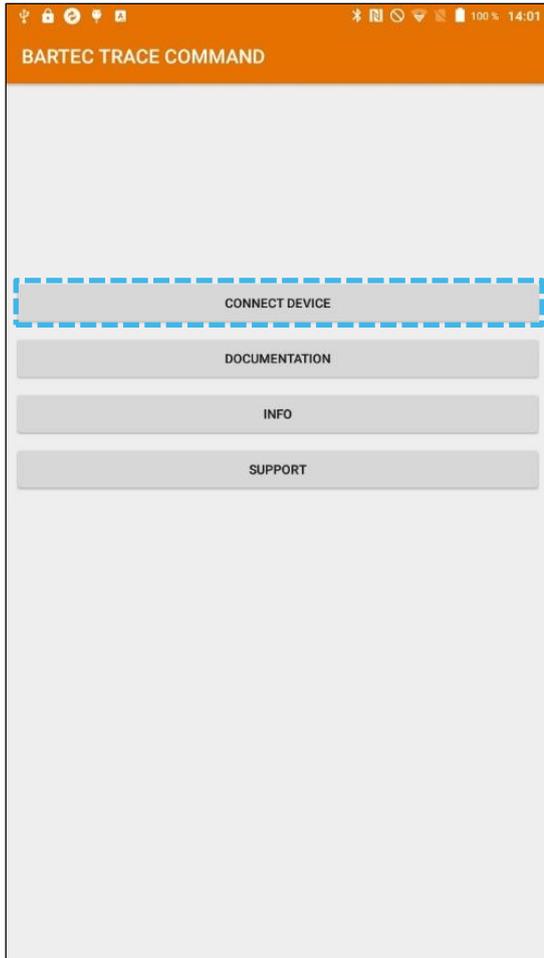
Info:

Shows the revision of the app

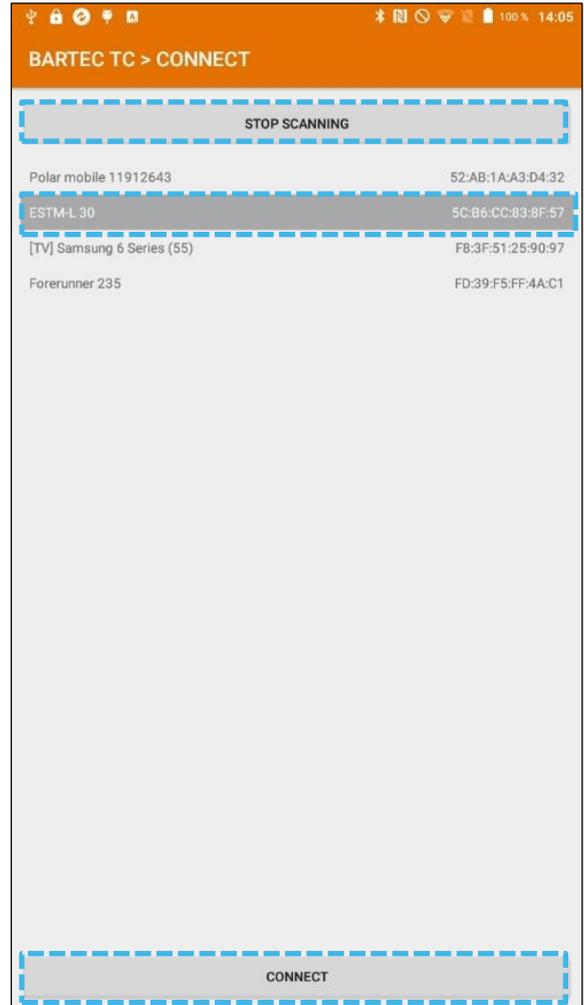
Support:

Contact date to your local BARTEC office

4.4 Start and Connection



Choose **CONNECT DEVICE** on the start screen



Press **SCAN** and wait for the Bluetooth device appearing

Select device

e.g. "ESTM-L 5CB6CC838F5C"

Press **CONNECT**

4.5 Parameter / Functions / App Menus

All values / Stats and alarms will be described here. For the Modbus address see chapter 5 Modbus RTU / RS485 Interface.

4.5.1 General Operation

Top Line information



1 Device Name (to identify via the Connected System)

2 Active menu item

3 General STATUS indication:
Shows if the load relays are closed or opened see 4.8.1 Controller also MODBUS Status bit #72bit2

The device is in operation. no faults indicated. load is switched off. See also 4.8.1 Controller Modbus Status Bit #72.2

The device is in operation. no faults indicated. load is switched on. See also 4.8.1 Controller Modbus Status bit #72.2

Some fault or alarm is active check in the Alarm menu 4.8.5 Alarm Status.

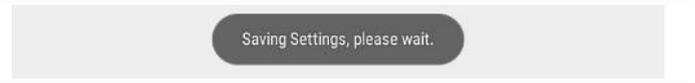
control buttons



1 Active, Selectable function. By pressing such a button, the Option can be activated or the next sub menu will be opened.

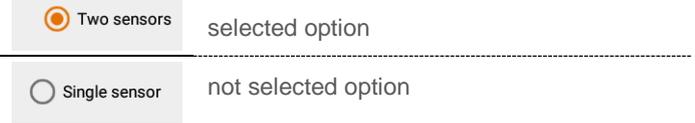
2 Inactive, unselectable function. Those can't be used, they are blocked for some reason.

Action Information's



The App shows action information in the bottom line read them carefully.

option selector



Parameters, control values and indications

Sensor 1 Actual Value	21 °C	1
Sensor 2 Actual Value	48 °C	
Sensor 1 and 2 average Value	34 °C	
Set point	42 °C	2
Hysteresis	3	
Min Alarm Sensor 1	22 °C	MIN 3
Pre Alarm Sensor 1	150 °C	OK

1 21 °C Not adjustable value (physical Value)
not underlined, font colour light grey

2 42 °C Adjustable value (set points, etc.)
underlined, font colour black

3 STATUS indication:
the colour shows the good, warning or alert condition, the text informs you more detailed

OK Green Coloured Symbols are indicating the good condition.
(no fault or warning status at those Value)

MIN Yellow coloured Symbols are indicating the warning condition.
(those states are to be aware of a might upcoming fault status)

MAX! Red Coloured Symbols are indicating an ALARM condition.

WARNING

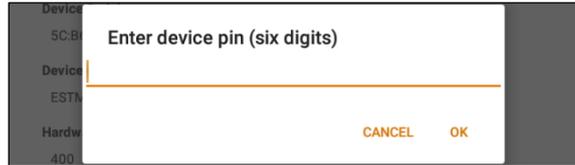
If a red symbol is displayed, a parameter has been exceeded. This can have several reasons. It is necessary to check in detail what actions are to be carried out. If such a condition remains for a longer period of time, there might be a risk of system breakdown.

Change and Save

To save all changes, always press the **SAVE CHANGES** button before leaving the submenu.

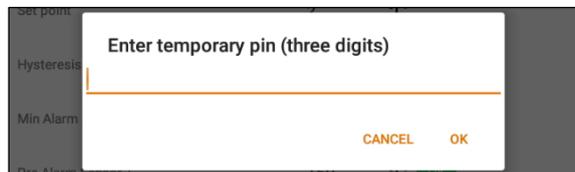


The first time after each Bluetooth connection the device password is requested (default ESTM-L).



Enter your Password and confirm with **OK**

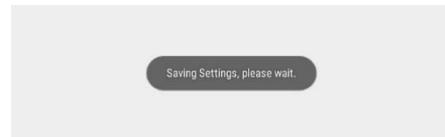
Now the Temporary Pin (see 4 General information) is required it will be shown on the device display.



Enter temporary pin and confirm with **OK**

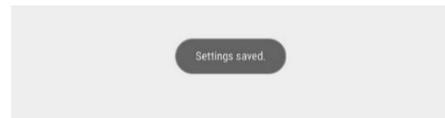
The app shows at the bottom Line:

“Saving Settings, please wait.”



And

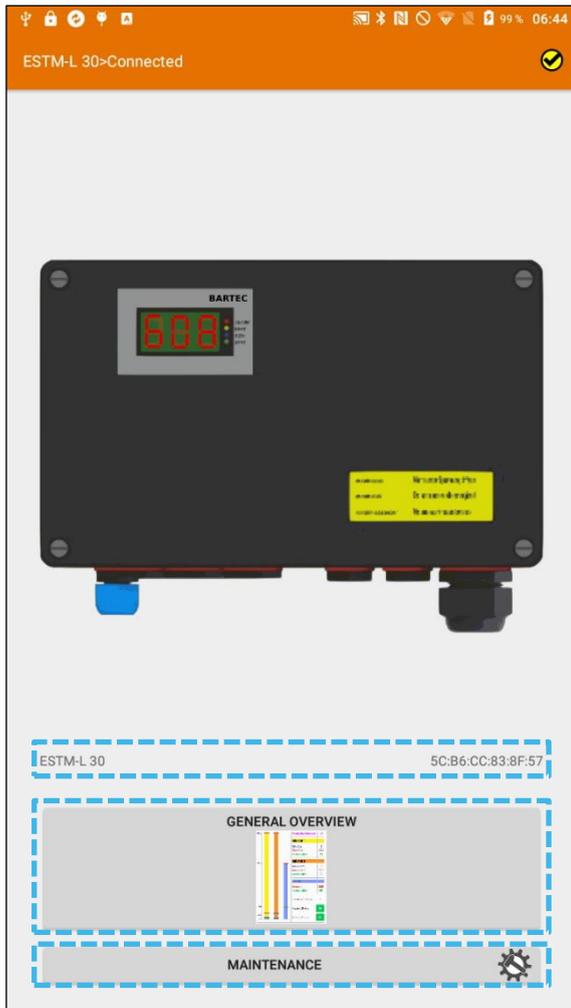
“Settings saved”



Now the settings are saved to the device.

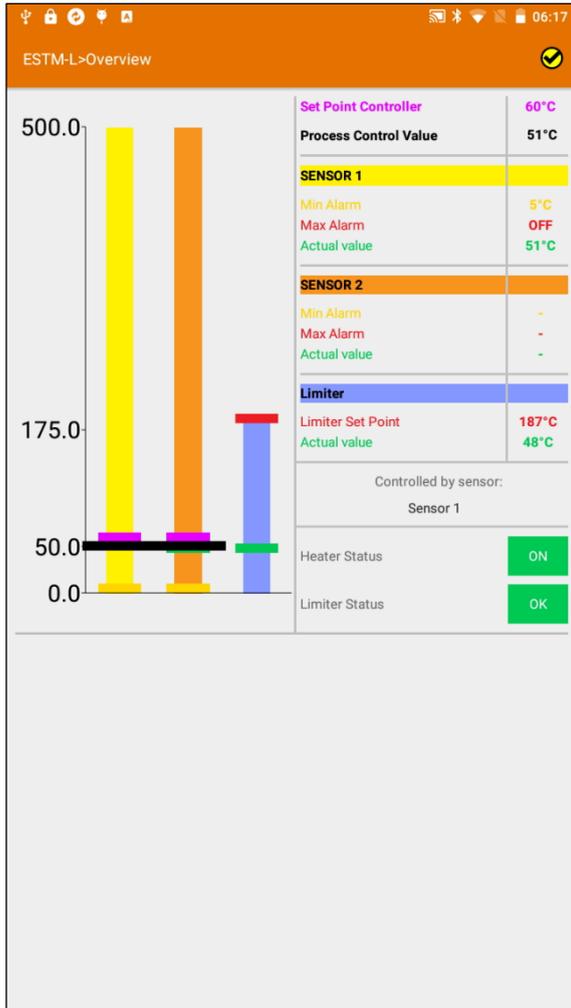
If an incorrect password is used, an error message is displayed instead.

4.6 Connected Device



Function	Description	action / - effects on / valid values ranges
Device name / serial number	With the device name the particular device can be identified easily. The device name can be changed by the user. The serial number is unique and can't be changed. This number is equivalent to the MAC address of the Bluetooth module.	See: 4.8.7 Trace Maintenance
General Overview:	In this menu you will find all important data at a single glance.	See: 4.7 General Overview
Maintenance	In this menu you will find all settings and functions in separate categories.	See: 4.8 Maintenance Menu

4.7 General Overview



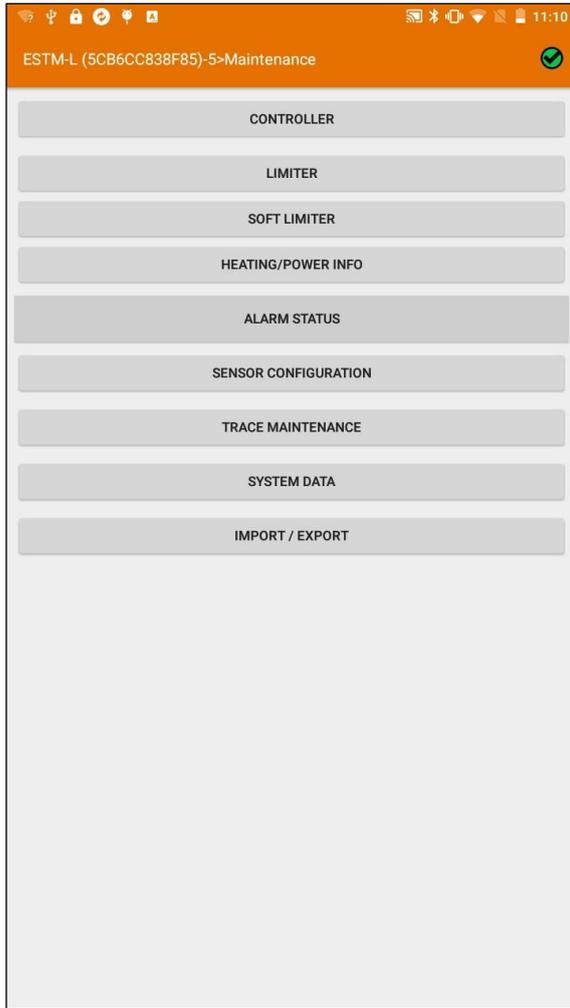
In this overview the most important controller data are available on one page.

The bar graph shows the individual limit values and actual measured values.

Using the table next to it, the individual values can be assigned in colour and the respective value can be read off.

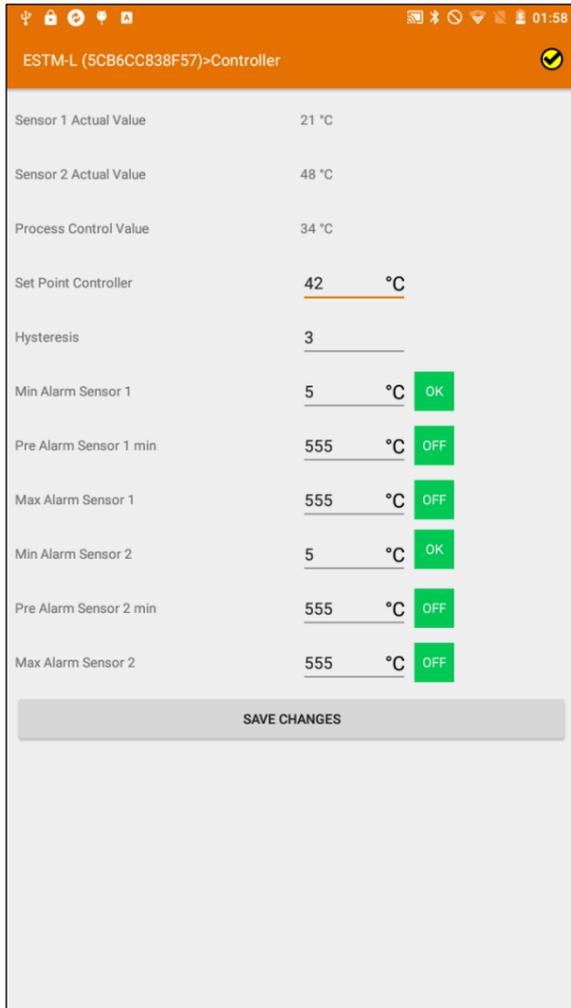
The controller and limiter switching states are shown below the table. The individual values and their respective effects can be found on the following pages.

4.8 Maintenance Menu



Function	Description	action / - effects on / valid values ranges
Controller	Adjustable thresholds, set point and condition of the controller Function	Open sub menu see: 4.8.1 Controller
Limiter	Adjustable pre alarm and Check status / setting of the limiter.	Open sub menu see: 4.8.2 Limiter
Soft limiter	Adjustable pre alarm and Check status / setting of the soft limiter.	Open sub menu see: 4.8.3 Soft limiter
heating/power information	Adjustable thresholds and condition of the Heating device (Current)	Open sub menu see: 4.8.4 Heating/Power information
Alarm Status	List of active alarms	Open sub menu see: 4.8.5 Alarm Status If an alarm is active the button is shown in red
Sensor Setup	Setup Sensor and Controller mode	Open sub menu see: 4.8.6 Sensor Setup
trace maintenance	settings AHC / Remote maintenance	Open sub menu see: 4.8.7 Trace Maintenance
System Data	Setup data MODBUS, Bluetooth, password, device info's	Open sub menu see: 4.8.7 Trace Maintenance
Import / Export	*.txt file import and export function	Open sub menu see: 4.8.9 Import Export

4.8.1 Controller



Controller Response:

Asymmetric hysteresis up two point controller.

WARNING

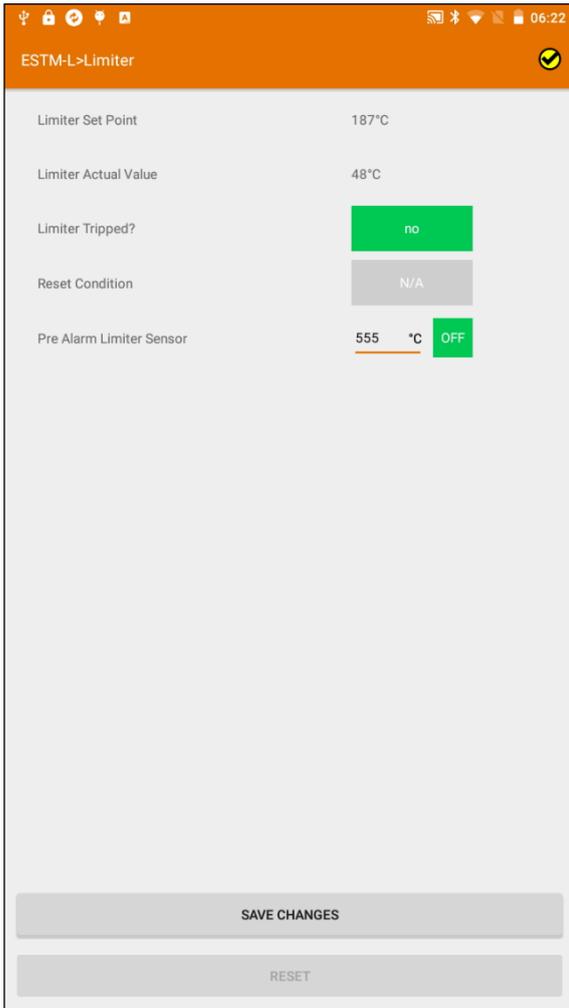
If the hysteresis is set, too low, increased contact abrasion may result. This will significantly reduce the lifetime of the device.

If the hysteresis is set too high, the temperature of the heater or the work piece may increase. This can lead to an exceeding of the process temperature.

Set the hysteresis as low as necessary and as high as possible.

Function	Description	action / - effects on / valid values ranges
Sensor 1 actual value:	Measured value at Pt 100 terminal "TC1"	-50°C to 500°C / 58°F to 932°
Sensor 2 actual value:	Measured value at Pt 100 terminal "TC2"	fault indication: 999 see: 4.8.5 Alarm Status
Process control value	Depending on the Sensor setup calculated Value to be controlled	-50°C to 500°C / -58°F to 932° see: 4.8.6 Sensor Setup
set point controller	When the "Process control Value" is below this value the Heater will switch on	-50°C to 500°C / -58°F to 932° - Control relays
Hysteresis	switch off heating if Process control Value above Set point + Hysteresis	3K-15K - Control relays
Min alarm sensor 1	Adjustable alarm value low temperature alarm sensor 1 If measured Temp @ sensor 1 "Sensor 1 actual value" is lower than "Min alarm sensor 1". Then alarm and the corresponding flag will activate.	- open failure contact - alarm LED local display - Modbus Input Register 71.1 (faults) 555°C / 1031°F = alarm off
Pre alarm sensor 1 min	Adjustable warning value low temperature warning sensor 1 If measured Temp @ sensor 1 "Sensor 1 actual value" is lower than "Pre alarm sensor 1 min". Then alarm and the corresponding flag will activate.	- Modbus Input Register 72.3 (status) 555°C / 1031°F = alarm off
Max alarm sensor 1	high temperature alarm sensor 1 If measured Temp @ sensor 1 "Sensor 1 actual value" is higher than "Max alarm sensor 1" then alarm and the corresponding flag will activate. The load contact is also switched off.	- open failure contact - alarm LED local display - load contact off - Modbus Input Register 70.6 (faults) 555°C / 1031°F = alarm off
Min alarm sensor 2	Equivalent to sensor 1	- Modbus Input Register 71.2
Pre alarm sensor 2 min	Equivalent to sensor 1	- Modbus Input Register 72.4
Max alarm sensor 2	Equivalent to sensor 1	- Modbus Input Register 70.7

4.8.2 Limiter



The Limiter option is only available with an ESTM-L.

The limiter of the ESTM-L follows the requirements for Controlled design of the IEC/IEEE/EN 60079-30-1.

SIL II Limiter:

The Limiter value is set by an coding element. Coding element will be connected to a marked terminal in the enclosure. Only use Original BARTEC coding element. For detailed information see Installation manual.

To reset the limiter see table below.

The limiter is not adjustable by software to meet the Requirements of SIL 2

WARNING

The function “pre alarm limiter sensor” is just an adjustable Alarm value. It will not trip the Limiter. Only an alarm will be send by Modbus.

Function	Description	action / - effects on / valid values ranges
Limiter Set point	Returns coding element value of limiter.	- Control relays and Limiter relays
Limiter Actual Value	Returns measured temperature limiter Sensor.	- - 50°C to 500°C / 58°F to 932° - fault indication: 999 - see: 4.8.5 Alarm Status
Limiter Tripped	Trip indication of the limiter: The limiter can be tripped on several reasons: “Limiter Actual Value” higher than “Limiter Actual Value” Sensor limiter high or low fault Coding element high or low fault “Internal power circuit hotspot” exited	- open failure contact - alarm LED local display - Modbus Input Register 70.1 (faults) - see: 4.8.5 Alarm Status
Reset condition	If the limiter is triggered and all condition to reset are given it will be indicated here Reset conditions: “Limiter Actual Value” lower than “Limiter Actual Value”-5K No Sensor limiter high or low fault No Coding element high or low fault “Internal power circuit hotspot” not exited No remote maintenance active	- Modbus Input Register 72.12 (status)
Pre alarm limiter Sensor	Is an Adjustable warning level, it can be used as an warning level before the limiter trips hard. If measured Temp @ Limiter sensor 1 “Limiter Actual Value” is higher than “Pre alarm limiter Sensor” Then alarm the corresponding flag will activate.	- Modbus Input Register 72.5 (status) 555°C / 1031°F = alarm off

4.8.3 Soft limiter

This function is available for firmware version 4.0.0 or higher.

ESTM-L (5CB6CC838F85)-5>SoftLimiter

Soft Limiter Status: ON

Set Point Soft Limiter: 50 °C

Actual Value Soft Limiter: 31°C

Hysteresis Soft Limiter: 3

Soft Limiter Tripped: no

Pre Alarm S. Limiter: 40 °C OK

RESET

Smart Limiter

Smart Reset function:

T-Off delay: 300 sec

Remaining T-Off delay: 329 sec

Smart Reset Status: Disabled

SAVE CHANGES

WARNING

Use of the Soft Limiter function as a limiter is not permitted for ATEX and IECEx applications according to IEC/IEEE 60079-30-1.

Explosion protection is not ensured by this function.

Use hardware limiter of ESTM-L (SIL II) as limiter for ATEX and IECEx applications according to IEC/IEEE 60079-30-1.

To activate the smart limiter set the Sensor Mode to *both* and the Controller mode to *soft limiter* see also chapter 4.8.6 Sensor Setup.

If the set temperature limit value (Set Point Soft Limiter) is exceeded, the load relay or the load is switched off permanently until a reset is done. This reset can be done by the user or by means of the smart reset function.

Reset is possible if actual temperature (Actual Value Soft Limiter) at the sensor 2 (TC2) is lower than the set point (Set Point Soft Limiter) minus the set hysteresis (Hysteresis Soft Limiter).

Sensor errors (wire breakage, short circuit, etc.) are detected automatically. In the case of a sensor error, the load relay or the load is switched off permanently until a reset is done by the user.

Smart Limiter Reset

The Smart Reset function automatically resets the soft limiter when the actual temperature (Actual Value Soft Limiter) at the sensor 2 (TC2) is lower than the set point (Set Point Soft Limiter) minus the set hysteresis (Hysteresis Soft Limiter) and Smart Reset Status is active.

T-Off delay is the time that must have passed after the load is switched off to enable the Smart Reset.

Remaining T-Off delay shows the remaining time until the Smart Reset can be enabled.

The Smart Reset status *Enabled* means that the Remaining T-Off delay time has expired or the load has been switched off by the controller.

The smart reset status *Wait* means Wait until the Remaining T-Off time has passed.

The Smart Reset status *Disabled* means that Smart Reset is not possible because the load is switched on or the Remaining T-Off delay time has not passed.

Function	Description	action / - effects on / valid values ranges
Soft Limiter Status	Status display Soft Limiter	ON/OFF
Set Point Soft Limiter	Temperature setpoint Soft Limiter	0-500°C
Actual Value Soft Limiter	Actual Value Soft Limiter	
Hysteresis Soft Limiter	Hysteresis Soft Limiter	2-25K
Soft Limiter tripped	Switching Status Soft Limiter	
Pre Alarm Soft Limiter	Pre Alarm Temperature Soft Limiter	0 – Soft Limiter Set point -2K
Reset	Reset Soft Limiter	
Smart Reset Function	Smart Limiter Reset Function	ON/OFF
T-Off delay	Switch-off delay	300-3600 sec
Remaining T-Off delay	Remaining time Switch-off delay	
Smart Reset Status	Smart Limiter Reset Status	

4.8.4 Heating/Power information

Parameter	Value	Unit	Action
Load Contact Status	ON		
Load Current	0.0	A	
Leakage Current	0	mA	
Load Voltage	219	V	
Min Alarm Load Current	0.0	A	OK
Pre Alarm Load Current max	0.0	A	OK
Max Alarm Load Current	30.0	A	OK
Pre Alarm Leakage Current	300	mA	OK
Max Alarm Leakage Current	300	mA	OK

SAVE CHANGES

Function	Description	action / - effects on / valid values ranges
Heater Status	Shows the status of the Heater relays (switched ON / OFF)	- Modbus Input Register 72.2 (status)
Load current	Measured load current	0-30,0A
Leakage current	Measured leakage current	0-300mA
Heater Voltage	Measured load voltage at heating circuit	50-440V
Min Alarm load current	If Load current is lower this Value and heater is switched on	- open failure contact - alarm LED local display - Modbus Input Register 70.3 (faults) 555°C / 1031°F = alarm off
Pre alarm load current min	If Load current is lower this Value and heater is switched on	- Modbus Input Register 72.8 (status) 555°C / 1031°F = alarm off
Max Alarm Load current	If Load current is higher this Value and heater is switched on	- open failure contact - alarm LED local display - Modbus Input Register 70.4 (faults) 555°C / 1031°F = alarm off
Max Alarm leakage current	When leakage current is higher than Value and heater is switched on	- open failure contact - alarm LED local display - Modbus Input Register 70.5 (faults) 555°C / 1031°F = alarm off
Pre Alarm Leakage current	When leakage current is higher than Value and heater is switched on	- Modbus Input Register 72.6 (status) 555°C / 1031°F = alarm off

4.8.5 Alarm Status



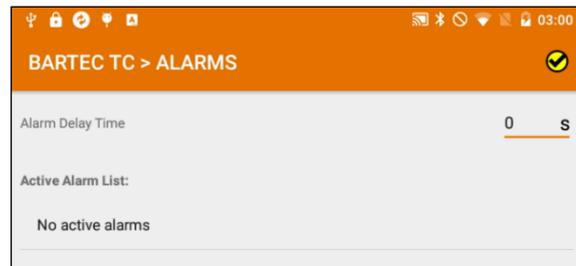
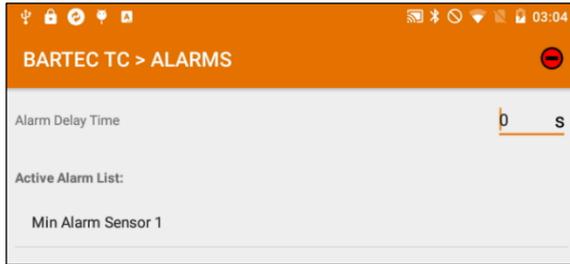
In the Active alarm list all Active alarms are displayed.

Alarm and Status History:

Tracking of previous alarms: The time displayed is the time passed since the last alarm change

Function	Description	action / - effects on / valid values ranges
alarm delay	Minimum time in an alarm condition must be active until the alarm is activated. Except the hardcoded limiter alarm.	valid range: 3-30s except the hardcoded limiter alarm
Active alarm list	All active alarm are listed here.	
Alarm History List Status History List	All older alarm are listed here additional with the system time.	

Overview of all active alarms and warnings



DANGER

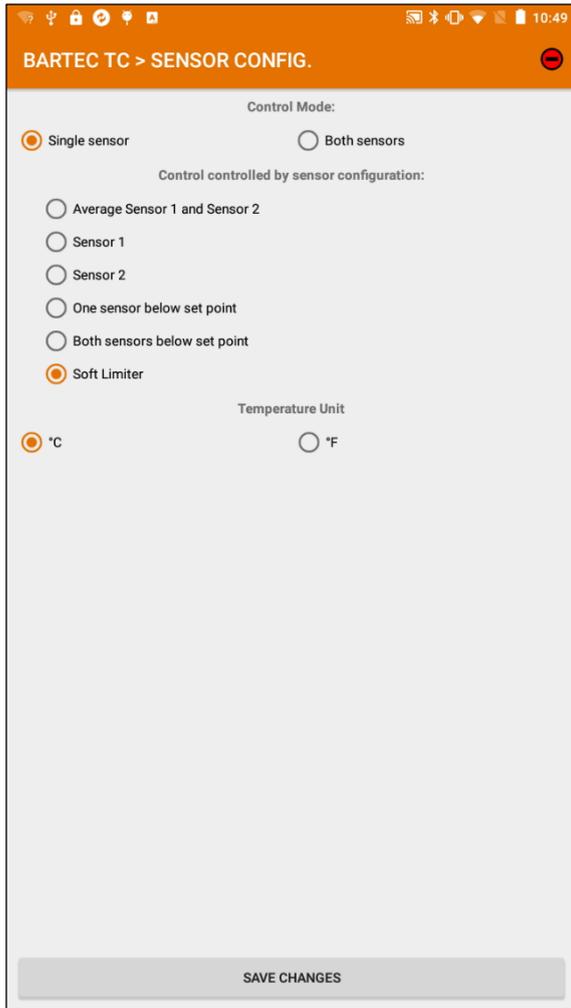
When troubleshooting, the supplied OPERATING INSTRUCTIONS, the safety instructions contained there in and the generally applicable safety rules must be observed.

List of Alarm and status messages

ALARM TEXT	Information / trouble shooting	Manual reference
Coding element fault high	Incorrectly connected, defective or missing coding element Check the Coding element	
Coding element fault low	Incorrectly connected, defective or missing coding element Check the Coding element	
Internal hardware fault	Internal hardware fault flowed by an bit please contact your Local BARTEC represented.	
Internal power circuit hotspot 125°C	To prevent a high temperature breakdown in case of a malfunction (temperature at load power circuit higher the 125°C) the device will override the controller relays and force switching off. This is a self-protection-function of the device. It should prevent the irreparable blow of the temperature fuse, that is placed at the internal hotspot.	
Internal power circuit hotspot 135°C	To prevent a high temperature breakdown in case of a malfunction (temperature at load power circuit higher the 135°C) the device will override the limiter and force trip. This is a self-protection-function of the Device. It should prevent the irreparable blow of the internal temperature fuse, that is placed at the internal hotspot.	
Limiter reset condition		see 4.8.2 Limiter
Limiter tripped		see 4.8.2 Limiter
Max alarm leakage current		see 4.8.4 Heating/Power information
Max alarm load current		see 4.8.4 Heating/Power information
Max alarm sensor 1		see 4.8.1 Controller
Max alarm sensor 2		see 4.8.1 Controller
Min alarm load current		see 4.8.4 Heating/Power information
Pre alarm load current min		see 4.8.4 Heating/Power information
Min alarm sensor 1		see 4.8.1 Controller
Min alarm sensor 2		see 4.8.1 Controller
Pre alarm leakage current		see 4.8.4 Heating/Power information
Pre alarm limiter high		see 4.8.2 Limiter
Pre alarm sensor 1 min		see 4.8.1 Controller
Pre alarm sensor 2 min		see 4.8.1 Controller
Sensor 1 fault high	The measured value of the temperature sensor is out of valid range. This could be due to the following reasons:	
Sensor 1 fault low	Sensor not connected Sensor incorrectly connected	
Sensor 2 fault high	Incorrect sensor type used wire break	

Sensor 2 fault low	short circuit	
Sensor limiter fault high		
Sensor limiter fault low		
Soft Limiter tripped		see 4.8.3 Soft limiter

4.8.6 Sensor Setup



Sensor mode:

Selection if one or both sensors are used

Controlled by

Sets the to be controlled value (Process control Value). Defines the way the to be controlled value (Process control Value) is calculated or which of both sensors is active.

Temperature Unit

Temperature unit selection. If you toggle it, all set values are converted to the respective unit.

Sensor mode

Function	Description	action / - effects on / valid values ranges
Single Sensor	At the single sensor mode only one sensor is activated the. There is no need to connect a sensor to a not used input. The fault detection for this input is switched off	Process control Value see 4.8.1 Controller
Both Sensors	At the two sensor mode, booth sensor are activated then. At both TC Inputs a Pt100 must be attached. Both are monitored by the Sensor fault detection	

Controlled by

Function	Description	action / - effects on
Average:	Booth measured values are summed up in divided by two to get the Actual value for the Control	only in availed sensor mode both sensors Process control Value see 4.8.1 Controller
Sensor 1:	sensor TC1 is used for Control. Sensor TC2 (If both sensor mode is active) is just an additional measurement without any effect to the controller	Process control Value see 4.8.1 Controller
Sensor 2:	sensor TC2 is used for Control. Sensor TC1 (If both sensor mode is active) is just an additional measurement without any effect to the controller	Process control Value see 4.8.1 Controller
One sensor below	The lower value of the TC1 and TC2 sensors is used for control	only in availed sensor mode both sensors Process control Value see 4.8.1 Controller
Both sensors below	The higher value of the TC1 and TC2 sensors is used for control	only in availed sensor mode both sensors Process control Value see 4.8.1 Controller
Soft Limiter	Sensor TC1 is used for Control. Sensor TC2 is used as an software based limiter. See 4.8.3 Soft limiter	only in availed sensor mode both sensors see 4.8.3 Soft limiter

WARNING

Use of the Soft Limiter function as a limiter is not permitted for ATEX and IECEx applications according to IEC/IEEE 60079-30-1.

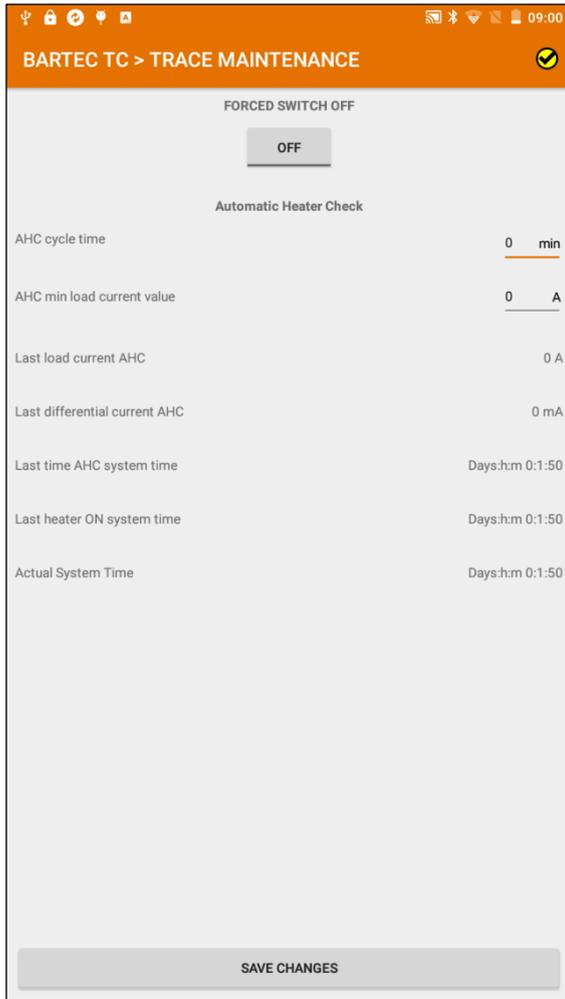
Explosion protection is not ensured by this function.

Use hardware limiter of ESTM-L (SIL II) as limiter for ATEX and IECEx applications according to IEC/IEEE 60079-30-1.

Temperature Unit

Function	Description	action / - effects on
°C / °F	Switch to the other SI unit (all values are converted to the respective unit)	

4.8.7 Trace Maintenance



CAUTION

If you activate this function, it will be enabled to reset after 5 minutes, this is to prevent misuse. During these 5 minutes the device is blocked as described below.

Function	Description	action / - effects on / valid values ranges
Forced switch off	This function is the classic steam cleaning function. With this function, the load contact, limiter contact is switched off and the alarm contact is open. Alarm messages (Modbus) are blocked. If this function is switched off the limiter is reset (if the reset conditions are fulfilled).	Minimum activation period 5 minutes If you activate this function, it will be enabled to reset after 5 minutes, this is to prevent misuse. During these 5 minutes the device is blocked as described below.
Automatic heater check	Periodically switching on of the heating during inactivity period. This function can be used to evaluate the condition of the electrical trace heating during the inactivity period of the trace heating. The timer for this function is reset if a "normal" heater ON condition occurs.	
AHC cycle time	Time in minute between measuring cycles (one measuring cycle equals 30 sec.)	300 min to 10800 0 = OFF
AHC min load current value	Minimum load current to be reached during the measuring cycle.	0 = OFF
Operating time	see: 4.8.8 System Data	
Last load current AHC	During the last AHC cycle measured load current	
Last differential current AHC	During the last AHC cycle measured differential current	
Last Time AHC Operating time	start time of the last AHC cycle (Operating time)	
Last Heater On Operating time	time when the heating was last activated	

4.8.8 System Data

ESTM-L>SystemData

Bluetooth Name	ESTM-L
Modbus Address	1
Password	
Actual System Time	0:1:49
Device Serial	5C:B6:CC:83:8F:57
Device Name/Type	ESTM(-L)
Hardware Revision	400
Firmware Version	v3.3.8

REBOOT

CHANGE PASSWORD FACTORY RESET

SAVE CHANGES

Here you will find all important information about the device. These can be helpful in case of troubleshooting and maintenance.

WARNING

WARNING If you start the reboot function, the device will shut down and restart. The load circuit is disconnected and the fault contact opens. Furthermore, all communication channels will be interrupted. There is no access to the unit until the respective connection is re-established.

WARNING

WARNING This password should be changed and only authorised persons should be supposed to know. Otherwise some unauthorized persons are able to change all settings. What might interrupt our processes or it can lead to a damage of system or equipment

Function	Description	action / - effects on / valid values ranges
Bluetooth Name	Can be selected as required e.g. heating circuit number. It should be individual.	Max length: 30 characters detailed information see following pages
Modbus Address	Bus address of the device	0= Modbus switched off 1-255 = modbus address detailed information see following pages
Password	Secures access to store configuration changes	Exact 6 characters detailed information see following pages
Device Serial	Individual identification number of the device and the MAC address of the Bluetooth module.	Hexadecimal: e.g. 5C:B6:CC:83:8F:45 see also: 3.2 Bluetooth ID
Device NAME / TYPE	Type of the device	ESTM or ESTM-L
Hardware Revision	Version of the Hardware	
Firmware Revision	Software version of the device Also shown on start up at the display	
Actual system time	The Operating time is an Operating time counter, this serves to improve the traceability of events.	System-Runtime of the device since first power on.
Reboot	Restarts the Device (all communication interfaces will be interrupted)	On local display the device show a countdown from 3 to 0. Then device is shut down and restarted. Detailed information see following pages.
Factory reset	All settings including device Password is reset to factory settings.	detailed information see following pages

Bluetooth Name:

CAUTION

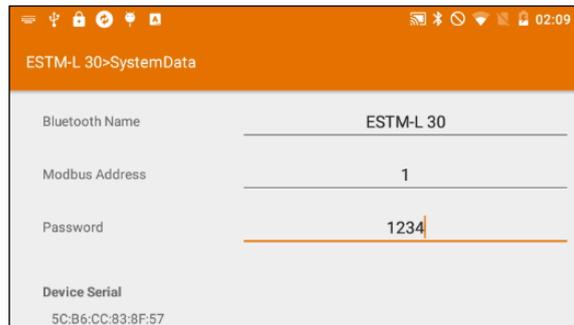
CAUTION if the Bluetooth name is changed, the Bluetooth connection will be disconnected. It can be reconnected immediately.

The Bluetooth Name can be change to a string of 30 characters.

Change Password:

WARNING

WARNING It is important to make sure that the password is not got lost or that a faulty entry will be made when changing it. If the password gets lost, changes are no longer possible. In this case you can contact your BARTEC Service partner how will provide help.

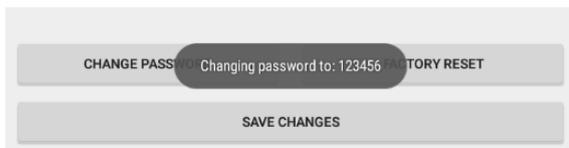


Enter new password (length 6 characters)

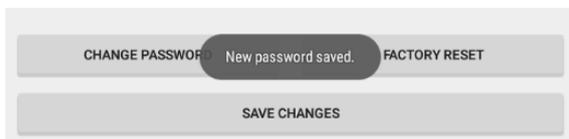
Press Change Password and enter if requested old device password and temporary Pin.

The device will show:

Changing password to: *****



And:



Now the New Password is saved.

Factory Reset:

WARNING

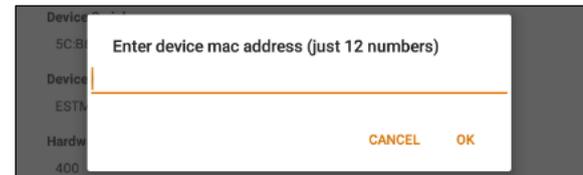
If you reset the unit to factory settings, all settings will be lost: Uncontrolled switching of the connected heater may result. Make sure here that neither persons nor processes can be affected.

CAUTION

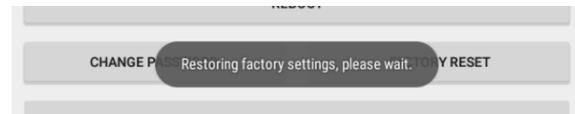
CAUTION After a factory reset, the device is set to Forced switch off mode. This prevents the device from switching itself on without purpose. You can reset this mode after a waiting period of 5 minutes. See: 4.8.7 Trace .



Press the reset button min 8 sec and the release it.



Enter the MAC Address (see 3.2 Bluetooth ID) of the device and confirm with OK.(capital letters only / no colons) Enter temporary Pin the device will reset to factory settings.



“Wait device is restoring factory settings”



Now the factory reset completed

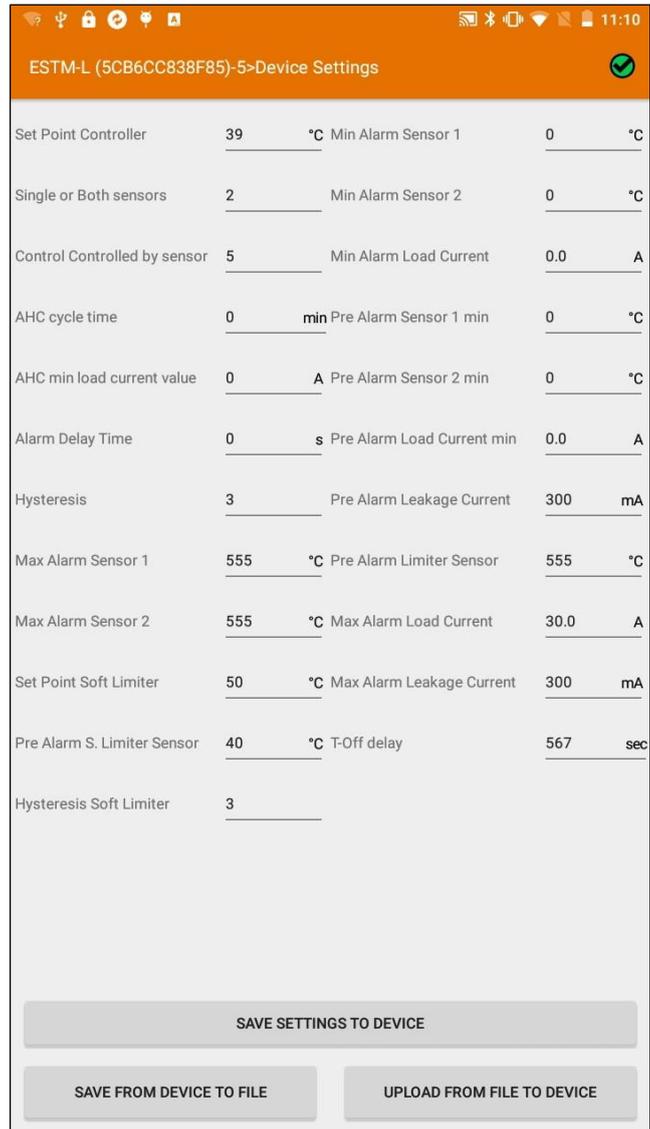
4.8.9 Import Export

The device has an import and export function. Using this, it is possible to save, reload or copy settings on other devices. For this a simple text file is used.

The file can either be loaded from a device and adapted or the structure shown here may be used.

```

setPointController:10
SingleOrBothSensors:1
ControlControlledBySensor:1
AHC_cycle_time_value:0
AHC_min_Load_Current_Value:0
alarmDelayTime:0
hysteresis:3
minAlarm_SENSOR_1:5
minAlarm_SENSOR_2:5
minAlarm_LOAD_CURRENT:0
preAlarm_SENSOR_1min:555
preAlarm_SENSOR_2min:555
preAlarm_LOAD_CURRENTmax:0
preAlarm_DIFFERENTIAL_CURRENT:300
preAlarm_LIMITER_SENSOR:555
maxAlarm_SENSOR_1:555
maxAlarm_SENSOR_2:555
maxAlarm_LOAD_CURRENT:300
maxAlarm_DIFFERENTIAL_CURRENT:300
temperature_Unit:C
setPointSoftLimiter:500
softLimiterPreAlarmValue:500
softLimiterHysteresis:2
softLimiterDelayTime:300
    
```



⚠ CAUTION

During import the Modbus address, the device PIN and the Bluetooth name are unchanged. These need to be changed individually.

In addition to the file import, all values of the device can be changed here at one place.

⚠ CAUTION

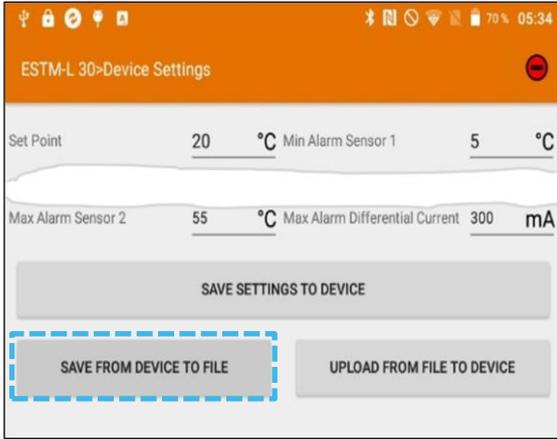
With this function, many settings can be adjusted and influenced at once. Errors in the adjustment can lead to the failure of the device or stop of your process.

Save date from device:

To export the data to a File press the **SAVE FROM DEVICE TO FILE**

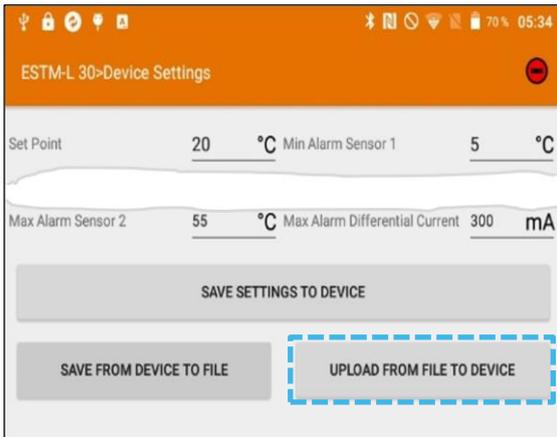
The exported *.txt document is saved in the download folder of the mobile device.

The file name is the combination of the Bluetooth device name and a sequential number e.g. ESTM-L30_1.txt.

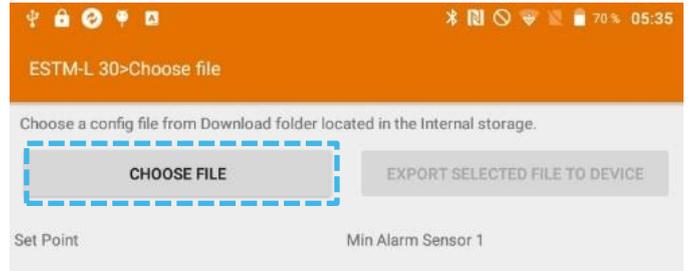


Restore date to device:

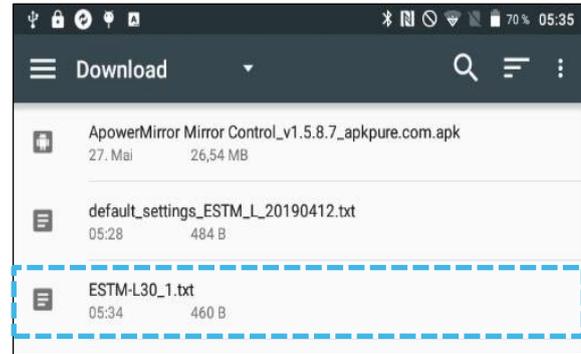
1) select **UPLOAD FROM FILE TO DEVICE**



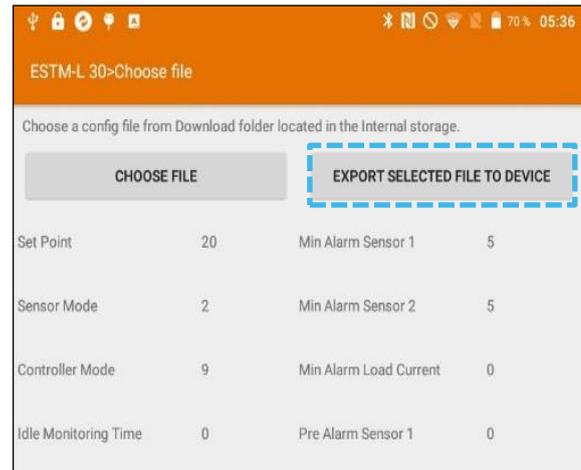
select **CHOOSE FILE**



select Your File



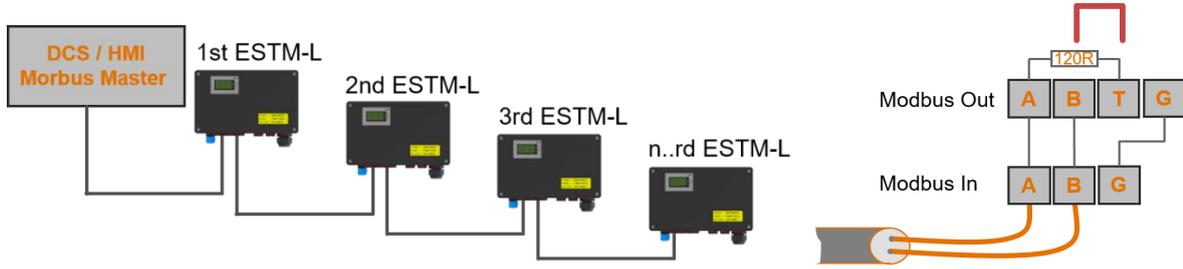
verify the selected data



Please double check your imported information's, then correct Press **EXPORT SELECTED FILE TO DEVICE** the Device will ask you to enter the Passwords and the temporary PIN.

5. Modbus RTU / RS485 Interface

5.1 Line



For daisy chaining the ESTM/ESTM-L provides one in and one out Modbus terminal. For end termination, a resistor is already included. To terminate the bus at the last device, a jumper needs to be installed at the “Modbus Out” terminal between Terminal “B” and “T”.

5.2 RS 485 Interface

The controllers are provided with a RS485 serial communication interface.

Description	Data
Data bit:	8 bit
Parity:	NO parity
Stop bit:	ONE stop bit
Baud rate:	9600

5.3 Modbus Specifications

5.3.1 Modbus Function Code

Modbus uses Different function codes to transfer data between master and Slave device. The ESTM/ESTM-L uses the following function codes for data transfer:

Modbus Function code	Description
FC 1	read coil
FC 3	read holding register
FC 4	read input register
FC 5	write single coil
FC 6	write holding register

5.3.2 Bit Numbering

MSB	to	LSB
1	0 0 0 0 0 0 0	1

5.3.3 Data Types

Data types	Description
bool	true/false [1=true; 0=false]
int 16	signed integer 16 bit [-32768 to 32767]
uint 16	unsigned integer 16 bit [0 to 65535]
uint 32	unsigned integer 32 bit [0 to 4.294.967.295]

5.4 Modbus Values

5.4.1 Discrete Input Coil (bit)

ModBus Register (DEC)	Data Type	r/w	description intern	alarm contact action	fault flag / status flag
0	bool	r	Remote maintenance active		

5.4.2 Discrete Output Coil (bit)

ModBus Register (DEC)	Data Type	r/w	description intern	alarm contact action	fault flag / status flag
0	bool	r/w	Remote maintenance		
1	bool	r/w	SIL II limiter reset		
2	bool	r/w	NOT USED		
3	bool	r/w	NOT USED		
4	bool	r/w	SOFT limiter reset (available since firmware version 4.0.0)		
5	bool	r/w	enable smart reset (available since firmware version 4.0.0)		

WARNING

When using the reset limiter function via Modbus. Protect the reset function against unauthorised use (e.g. password protection or user level authorisation).

WARNING

The Modbus discrete output coil 1 (reset limiter) shall be send only one Modbus cycle. The reset function may only be carried out manually. Automatic resetting is not permitted. Resetting the limiter automatically or bypassing it can lead to a risk of explosion.

WARNING

The Modbus discrete output coil 1 (reset limiter) shall be send only one Modbus cycle. The reset function may only be carried out manually. Automatic resetting is not permitted. Resetting the limiter automatically or bypassing it can lead to a risk of explosion.

5.4.3 Input Registers

ModBus Register (DEC)	Data Type	r/w	description intern	alarm contact action	range / additional
1	int 16	r	Sensor 1 actual value		-50°C to 500°C
2	int 16	r	Sensor 2 actual value		-58°F to 932°
3	int 16	r	Limiter actual value		fault indication: 999
4	int 16	r	Limiter set point value		
5	int 16	r	Process control value		
15	uint 16	r	Load current value		0-300 [0-30,0A]
16	uint 16	r	Leakage current value		0-300 [0-300mA]
22	uint 16	r	Load voltage value		[V]
48	uint 32	r	actual Operating time		[min]
70	uint 16	r	Low fault byte value (16bit)		
	0		Limiter fault		
	1		Limiter tripped		
	2		Alarm sensor 1 above limiter set point		
	3		Min alarm load current		OFF=0
	4		Max alarm load current		OFF=300
	5		Max alarm leakage current		OFF=300
	6		Max alarm sensor 1		
	7		Max alarm sensor 2		
	8		Alarm sensor 2 above limiter set point		
	9		Sensor 1 fault high		
	10		Sensor 2 fault high		
	11		Sensor limiter fault high		
	12		Coding element fault high		
	13		Internal hardware fault bit 13		
	14		NOTUSED		
	15		Software-Limiter tripped (available since firmware version 4.0.0)		
71	uint 16	r	High fault byte value (16bit)		
	0		NOTUSED		
	1		Min alarm sensor 1		
	2		Min alarm sensor 2		
	3		NOTUSED		
	4		NOTUSED		
	5		NOTUSED		
	6		Internal power circuit hotspot 125°C		
	7		Internal power circuit hotspot 135°C		
	8		Internal hardware fault bit 24		
	9		Internal hardware fault bit 25		
	10		Internal hardware fault bit 26		
	11		Sensor 1 fault low		
	12		Sensor 2 fault low		
	13		Sensor limiter fault low		
	14		Coding element fault low		
	15		NOTUSED		

ModBus Register (DEC)	Data Type	r/w	description intern	alarm contact action	range / additional
72	uint 16	r	Status byte (16bit)		
0			AHC action active		
1			Remote maintenance		
2			Load contact status		0= opened 1= closed
3			Pre alarm sensor 1 min		
4			Pre alarm sensor 2 min		
5			Pre alarm limiter high		
6			Pre alarm leakage current		
7			Build in limiter found		
8			Pre alarm load current min		
9			NOT USED		
10			NOT USED		
11			NOT USED		
12			Limiter reset condition		0=NO 1=YES
13			Modbus communication active		
14			Bluetooth communication active		
15	NOT USED				
73	uint 16		Last load current AHC		[A]
74	uint 16		Last differential current AHC		[mA]
75	uint 32		Last Time AHC Operating time		[min]
77	uint 32		Last Heater On Operating time		[min]
100	uint 16		Soft limiter Status byte (16bit) (available since firmware version 4.0.0)		
0			Soft Limiter Status		0=OFF 1=ON
1			Heater on load contact closed		Status information load contact 0=open 1=close
2			Smart reset enable		
3			Smart reset waiting		
4			Pre Alarm Soft Limiter		0=Off 1=Active
5			Soft Limiter tripped		Alarm contact open
6			Smart Reset Function Active		
7			NOT USED		
8			NOT USED		
9			NOT USED		
10			NOT USED		
11			NOT USED		
12			NOT USED		
13			NOT USED		
14			NOT USED		
15	NOT USED				
101	int 16		Soft Limiter Sensor 2 actual value (available since firmware version 4.0.0)		
102	uint 16		Remaining T-Off delay (available since firmware version 4.0.0)		

The information Smart Reset Status can be emulated via Modbus using the variables Smart reset enable (input register 100.2) and Smart reset waiting (input register 100.3).

The values of the corresponding variables are:

		Smart Reset status			
		Enabled	Wait	Disabled	N/A
2	Smart reset enable	1	0	0	1
3	Smart reset waiting	0	1	0	1

See also chapter 4.8.3 Soft limiter.

Device internal status and fault logging of the last conditions			
161	uint 32	High fault / Low fault [0]	See below
163	uint 32	High fault / Low fault [1]	
165	uint 32	High fault / Low fault [2]	
167	uint 32	High fault / Low fault [3]	
169	uint 32	High fault / Low fault [4]	
171	uint 32	Operating time [0]	See below
173	uint 32	Operating time [1]	[min]
175	uint 32	Operating time [2]	
177	uint 32	Operating time [3]	
179	uint 32	Operating time [4]	
181	uint 16	Status[0]	See below
182	uint 16	Status[1]	
183	uint 16	Status[2]	
184	uint 16	Status[3]	
185	uint 16	Status[4]	
200	uint 16	Firmware version	

Device internal status and fault logging of the last conditions

The last 5 states of the variables "Low fault byte value", "High fault byte value" and "Status byte" are stored in order to get a review of the past error states. This is achieved in the variable "High fault / Low fault [0]...[4]" and "Status [0]...[4]". The end number can also be used to determine the time of the event "Operating time [0]...[4]". A new entry will be created if there is a change in Modbus register #70 or #71 (faults) only.

5.4.4 Holding Registers

ModBus Register (DEC)	Data Type	r/w	description intern	alarm action	contact	fault flag / status flag
5	int 16	r/w	Set point controller value			-50°C to 500°C -58°F to 932°F
6	int 16	r/w	Min alarm sensor 1 value	YES		-50°C to 500°C
7	int 16	r/w	Max alarm sensor 1 value	YES		-58°F to 932°
8	int 16	r/w	Min alarm sensor 2 value	YES		555°C / 1031°F = alarm off
9	int 16	r/w	Max alarm sensor 2 value	YES		
10	int 16	r/w	Pre alarm limiter value	NO		
11	int 16	r/w	Pre alarm sensor 1 value min	NO		
12	int 16	r/w	Pre alarm sensor 2 value min	NO		
17	int 16	r/w	Min alarm load current value	YES		0 to 300
18	int 16	r/w	Min pre alarm load current value	NO		[0-30,0A]
19	int 16	r/w	Max alarm load current value	YES		0 = alarm off
20	int 16	r/w	Pre alarm leakage current value	NO		0 to 300
21	int 16	r/w	Max alarm leakage current value	YES		[0-300mA] 0 = alarm off
24	uint 16	r/w	AHC cycle time value [min]			0=OFF 300-10800 [min]
25	uint 16	r/w	AHC min load current value	YES		value 0 to 300 [0-30,0A]
26	int 16	r/w	alarm delay	NO		3-30 [3-30sec]
32	int 16	r/w	Hysteresis value			3-15K
43	uint 16	r/w	Control mode controlled by sensor			Average=0 Sensor 1=1 Sensor 2=2 One sensor below =3 Both sensors below =4 Soft Limiter = 5
60	uint 16	r/w	Temperature unit			°C=0 °F=1
61	uint 16	r/w	Sensor configuration			1=one 2=both
100	uint 16	r/w	Set Point Soft Limiter (available since firmware version 4.0.0)			0-500
101	uint 16	r/w	Hysteresis Soft Limiter (available since firmware version 4.0.0)			2-25
102	uint 16	r/w	Pre Alarm Soft Limiter (available since firmware version 4.0.0)			0 – Soft Limiter Set point -2K
103	uint 16	r/w	T-Off delay (available since firmware version 4.0.0)			300 – 3600 sec

WARNING

Use of the Soft Limiter function as a limiter is not permitted for ATEX and IECEx applications according to IEC/IEEE 60079-30-1.

Explosion protection is not ensured by this function.

Use hardware limiter of ESTM-L (SIL II) as limiter for ATEX and IECEx applications according to IEC/IEEE 60079-30-1.

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