t bone

temperature | box | network

User Manual

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Introduction

t-bone watches over both the levels of temperature and power supply in rooms with sensitive equipment or goods. Additional four inputs for digital signals – including two voltage free inputs – offer further possibilities of surveillance. In the case of a power failure or deviations from the desired and pre-defined values, t-bone alarms the user via SMS, E-Mail and the integrated serial port.

The measured values and the power supply can be supervised via Internet or mobile phone. t-bone stores the daily maximum and minimum values and transfers them at regular intervals to an internet data base where they can be retrieved from wherever an internet access is available. Additionally, the box records the current values in 10-minute intervals and stores them over a period of two months. By means of a zoom-function the measured values can be downloaded and displayed via internet, making it possible for the user to anticipate aberrations and prevent damage of equipment or goods at an early stage.

t-bone continuously checks its own operability as well as the status of data communication and warns the user in case of malfunction. t-bone works both as a stationary and a mobile tool.

t-bone can easily be put into operation and adjusted to individual requirements even with poor technical knowledge.

Scope of delivery

- t-bone box including GSM-module, LCD-display and button with LED indicator
- 1 GSM antenna
- 4 temperature sensors (1m, 3m, 6m, 12m)
- 4 male connectors for digital inputs
- 1 power supply unit and 1 backup battery (9V)
- 1 serial cable (RJ45 <>RS232)
- software (Configurator/Monitor and firmware)
- user manual, quick reference

To start operation an activated SIM-card is needed (not included in the scope of delivery).

1. Quickstart - rapid initiation of the t-bone box by using default values

1.1 Assembly of components

- insert ***activated SIM-card*** and screw on ***GSM-antenna*** (see 2.5 and 2.6)
- connect ***sensors*** – if applicable, connect digital inputs (see 2.1 and 2.2)
- insert ***battery*** and connect ***power supply unit*** (see 2.7).
- connect PC to the t-bone box via ***COM-port*** (see 2.8).
- Now initialise by ***attaching the power supply unit***.

1.2 Setup configuration software and launch it via desktop icon

1.3 Configuration of the t-bone box (compulsory entries in ***italics***)

- Choice of language (see 3.2)
- ***PIN-code*** and ***type of SIM-card*** (see 3.2.1)
- ***Name*** and ***group*** of the t-bone box for identification (see 3.2.2)
  The default values are "t-bone_box" and "0001". Space characters are not allowed.
- ***Master telephone*** and optionally two additional SMS-compatible telephones (see 3.2.2 ⚠)
  Alarms go to all telephones; warnings and info are sent to the master phone only.
  Entry of telephone numbers must begin with the country code (e.g. **49*171***123456749)
- Upper and/or lower **alarm thresholds** of activated sensors (see 3.2.3).
  For each active sensor at least one alarm threshold must be defined.
  By default, only Sensor1 is activated; to activate additional sensors see 4.2.

1.4 Button [> t-bone] uploads the configuration into the t-bone box.

Initialisation and server registration of t-bone are fully automated.
A user ID (User/Password) for access via Internet is delivered to the master telephone.

t-bone is now ready for operation and starts its surveillance.

2. t-bone hardware

2.1 Sensors

Up to four sensors can be connected to the bottom side of the t-bone box.
The RJ-12 plug sockets are colour-coded. (Sensor1, Sensor2, Sensor3, Sensor4)
Every sensor can be named individually (factory setting from "Sensor1" to "Sensor4").

2.2 Digital Inputs

Up to four digital inputs – two of them are voltage free inputs – can be connected to the top side of the box.
Every digital input can be named individually (factory setting from " Digital1" to " Digital4").

2.3 LC Display (4 x 20 characters)

The LCD alternately reports the current configuration and the measured values.

- Current values, alarm thresholds and the current state of digital inputs.
- Date and time, GSM signal level, voltage of power supply unit and of battery backup.

2.4 Multifunctional RESET button with LED indicator

Functions of the button: RESET | SWITCH OFF | ERASE CONFIGURATION | SUPPRESS ALARM

- **RESET**
  Press button until "**RESET**" is displayed – then release button.
  The t-bone box interrupts surveillance and re-initialises itself. If configured accordingly, the box sends an info-SMS to the master whenever it is reset.

In order to avoid an unwanted reset the button has to be pressed for at least three seconds.

- **SWITCH OFF**
  Press the button until "**switch off t-bone?**" is displayed; then release the button and disconnect the power cable.
  If you do not release the button *and* disconnect the power cable within 3 seconds the box automatically performs a reset.
  (The box can be restarted by simply attaching the power supply unit.)

The mere removal of the power supply unit will not make the box switch off but will trigger an alarm.

- **SUPPRESS ALARM**
  If the power supply is interrupted under controlled conditions the activation of an alarm can be avoided. Before an alarm is sent, t-bone will ask the question "**suppress alarm?**" Press the button within 3 seconds in order to suppress the alarm. If the button is not pressed an alarm will be sent.

- **ERASE CONFIGURATION** for a general reset
  This procedure implies a completely new setup and is ***only necessary if the owner of the box changes***.
  Switch off the t-bone box and restart (see above) *with the button pressed*.
  Keep the button pressed until "**erase configuration?**" is displayed. Then release the button within 3 seconds. The entire configuration as well as the stored values will be erased. (If the button is not released within 3 seconds the box will perform a normal reset.)
  Now the box is in a virgin condition and can be registered anew if a new SIM-card is inserted.

A new owner ***must*** use a new SIM-card.

2.4.1 LED indicator (red/green)

green blinking,	slow	.....	surveillance is active
green blinking,	fast	.....	programming mode
red blinking,	very fast	.....	alarm
red blinking,	slow	.....	error (detailed description displayed on LCD)

2.5 GSM antenna

The antenna must be screwed on at left side of the top of the box.

2.6 SIM-slot

The SIM-card is to be inserted into the oval slot at the bottom side of the box.
Insert the card with the cut angle pointing top left so it catches in the slot and a click is heard.
The card can be released by another push (push-push mechanism).

t-bone can be operated both with regular and pre-paid SIM-cards.
The type of SIM-card cannot be selected or changed via Internet.

2.7 Power supply and battery

The operating voltage of the t-bone box is between ***9V*** and ***15V***. The plug socket for the power supply unit is located at the bottom side of the box.
Adaptors are available for mobile usage (e.g. in motor vehicles etc.).

Voltages higher than 15V can cause damage to the t-bone box.

In case of a power failure the box automatically switches over to battery operation and alarms the user via SMS and, if configurated accordingly, via E-mail or the integrated serial port (see 4.1 and 5.2).

The sending of the power alarm can be avoided by pressing the button. (see 2.4)

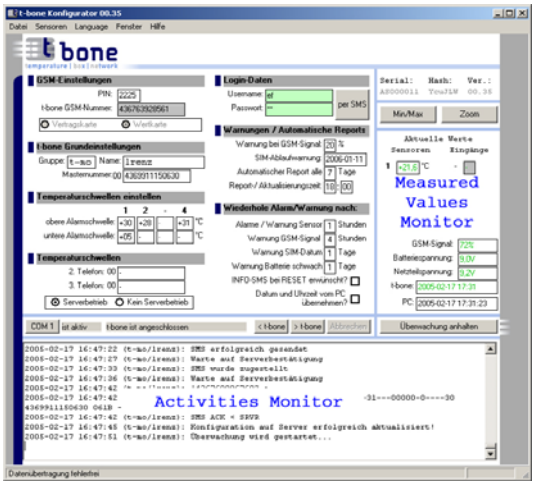
An alarm delay time can individually be configurated (see 4.2) if no alarm is to be sent in certain situations. During the delay time the alarming situation will be ignored.

2.8 Serial interface (COM)

Functions of the serial interface: CONFIGURATION / MONITORING / DATA TRANSFER

- **CONFIGURATION**
  Via the serial interface the t-bone box can be connected to a PC (cable enclosed). This enables the box to communicate with the configurator software.
  For *primary* setup the t-bone box *must* be configurated via the serial interface.
  Subsequent modifications can also be carried out via Internet.

- **MONITORING**
  The configurator software allows for the user to monitor the activities of the box and the values measured by t-bone. For detailed information an additional "Service Mode Monitor" can be accessed.



- **DATA TRANSFER** (advanced)
  If the configurator/monitor is not connected to t-bone, the box will output its current status in the form of continuous ASCII-character strings via the serial interface. These strings can be used for further processing (see 5.2) for purposes such as
  - output to a ***printing*** device
  - transfer of the data to a ***SNMP messaging system***
  - evaluation of the status by means of an ***individual software application***

Requests to the t-bone box can only be made by means of the configurator software.

3. First setup

3.1 *Installation of the configurator software*

The setup-programm installs the configurator-software.
Find enclosed the "***t-bone_configurator xx.xx setup***" (xx.xx = version number of the software).

Subsequent releases of t-bone software can be downloaded via Internet.

3.2 *Primary configuration of the t-bone box*

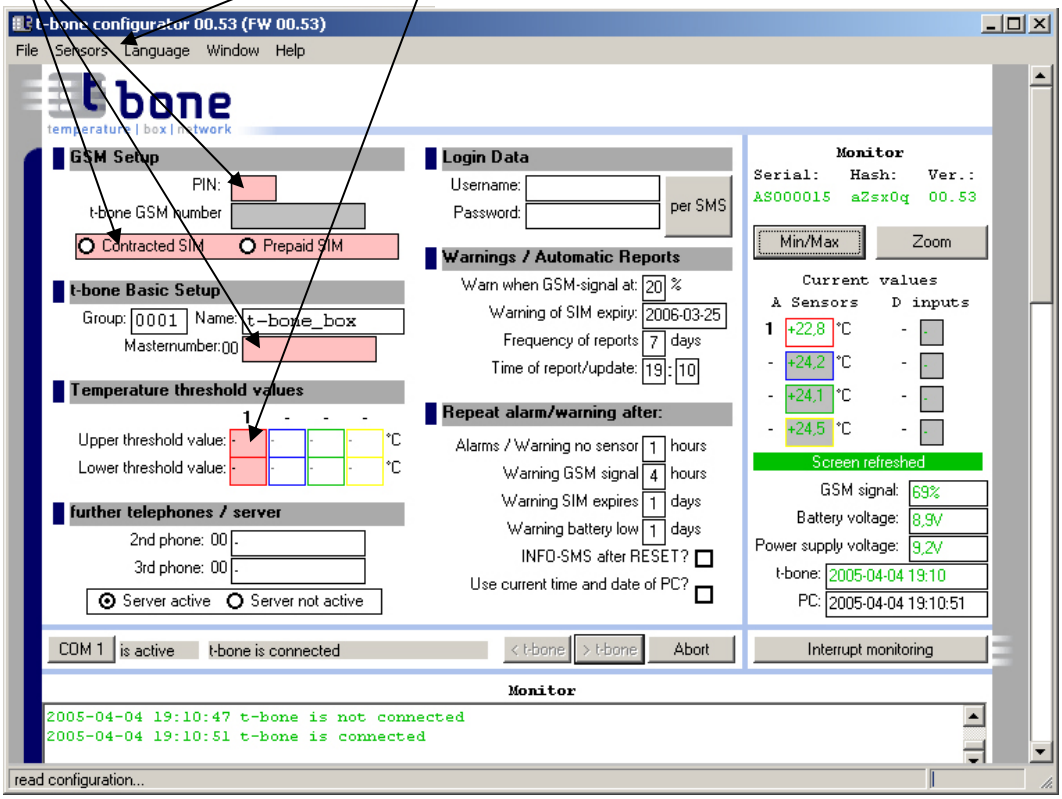
For the primary configuration the t-bone box must be connected to the PC via the serial interface. Subsequent modifications can also be carried out via Internet.

In order to put t-bone into operation, only few parameters *must* be entered. The according input fields are marked red. All the other parameters are default values; they can be taken over or modified.

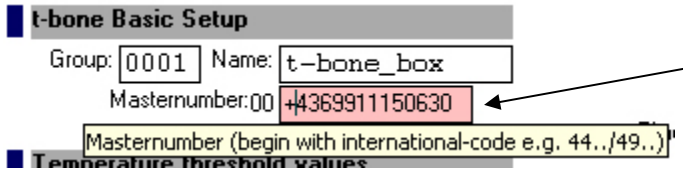
selection of language

entry obligatory in the red fields only

by default, sensor 1 is activated
in menu "sensors" additional sensors and digital inputs can be activated and configurated (see 4.2)



Main window before primary configuration

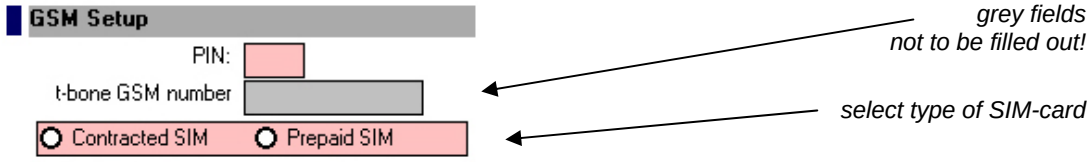


invalid entry will be marked red

additional info dispayed when mouse points to the entry field

3.2.1 GSM-setup

- enter **PIN** of the SIM-card or "-" if PIN deactivated
- select **type** of SIM-card (standard or prepaid)



Since prepaid SIM-cards have an expiry date, t-bone recommends the use of standard SIM-cards. If your card is "prepaid", t-bone provides two functions to ensure operability:

- ***SMS-account***: The number of feasible SMS (= "SMS-account") is calculated from the credit of the prepaid SIM and the fee charged per SMS. If, for instance, your credit is 20€ and your provider charges 10Cent per SMS, your current SMS-account amounts to 200. If you want to be warned by t-bone before your credit is exhausted you can enter your personal calculated value as shown in 6.3 (via Internet).
- ***Expiry date of the SIM-card***: You can use this function to remind you of the forthcoming expiry of your SIM. Enter the date on which you want to be warned as shown in 3.2.7 (via configurator) or in 6.3 (via Internet). You should edit this date whenever you reload your credit.

If you use a standard card, these security functions are deactivated.

Once the type of SIM-card is determined, the entry can only be changed if the configuration is erased (cf. 2.4) or the SIM-card itself is changed.

The SIM-card of a registered t-bone box cannot be used in a different t-bone box.

3.2.2 Basic setup

- **Group** (Default = "0001")

  Individually selectable code for easy identification of a t-bone box if more than one box is in use (up to 4 letters, digits, "-", "_", "/" and "#"; blanks not accepted).

- **Name**

  Individually selectable name of the t-bone box for easy identification when communicating with the box (up to 14 letters, digits, "-", "_", "/" and "#"; blanks not accepted).

- **Master number**

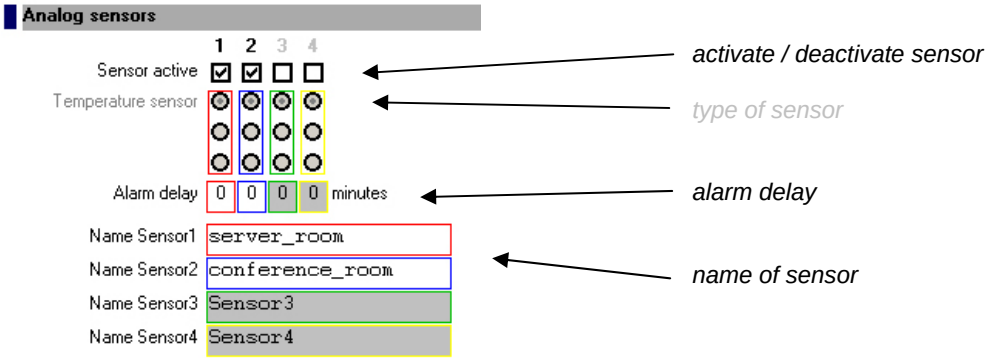
  A master phone number must be entered. All alarms, warnings and information will be sent to this phone.

Please be careful. In case of an erroneous entry of the master number you will not receive your login data and no information will be sent to your master phone.

The entry of all phone numbers must begin with the country code (do not enter the leading "00" or "+"!).
correct: 49171123456789
false: 0049171123456789, +49171123456789, ++49171123456789

3.2.3 Alarm thresholds

For every active sensor at least one alarm threshold must be defined.
Alarm thresholds can only be entered if the corresponding sensor has been activated. By default, sensor1 is activated. Additional sensors can be activated in the menu "sensors".



3.2.4 further telephones / server on/off

- **2. and 3. telephone**

  Additional telephones may be registered for the reception of alarms. Warnings and other information will only be sent to the master phone.

  The t-bone box can be queried from all *registered* telephones (see 7.).

The entry of all phone numbers must begin with the country code (do not enter the leading "00" or "+"!). (see 3.2.2)

- **Server** (default = "server on")

  Select "server on" or "server off".

  The connection to the server can be deactivated. In this case, however, SMS-transfer is only possible between the box and the registered phones.

If you choose to deactivate the server, the t-bone box cannot be communicated with via Internet.

3.2.5 Login data

- **Username** and **password (user ID)**

  For the primary setup of the t-bone box no user ID is required.
  In this case an ID will be generated by the server and sent to the master phone via SMS.

SMS: "t-bone 0001 my_box server registration successful. username: username password: password"

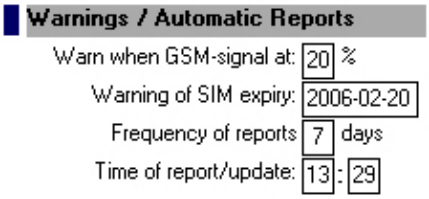
The user ID can be edited via Internet.
Subsequent modifications of the configuration can only be carried out with the correct user ID.

The user ID can be requested of the t-bone box by sending "USR" from a registered telephone. The box will answer thus:

SMS: "INFO username: xxxxxxxx password: xxxxxxxx"

Primary setup of further t-bone boxes:
Further t-bone boxes can be activated with an existing user ID. Boxes with the same user ID can be accessed simultaneously via Internet. In case of an erroneous entry the server will provide a new ID which can later on be adapted via Internet so all boxes can be accessed with *one* user ID.

3.2.6 Warnings / Automatic reports



- **Warning of low GSM-Signal** (default value = 20%)

  The t-bone bow will send a warning to the master phone if the signal level drops to the defined value:

SMS: "WARNING GSM signal low 20% - t-bone 0001 my_box"

This function can be deactivated by entering "-".

- **Warning of SIM expiry** (for use with prepaid SIM cards)

  On the defined date (see 3.2.1) the t-bone box will send an SMS to the master phone, warning of the expiry of the SIM-card. You should edit this date whenever you reload your credit.

SMS "WARNING validity of SIM-card expires - 2005-05-14 t-bone 0001 my_box"

Regardless of the type of SIM-card, the warning function can be activated or deactivated by "-".

- **Frequency of Reports** (default value = 7 days)

  The t-bone box will automatically send a report to the master phone in the defined interval. The report will be composed thus:

SMS: "REP t-bone 0001 my_box SEN1: +27,3C +30 +10 SEN2: +05,7C +10 - SEN3: - - - SEN4: -10.1C -05 -15 INP1: 0 INP2: 1 INP3: - INP4: - GSM 78% BAT 9,1V"

(For detailed explanation of the report see 7.)

The automatic report can be deactivated via Internet or in the configurator by entering "-".

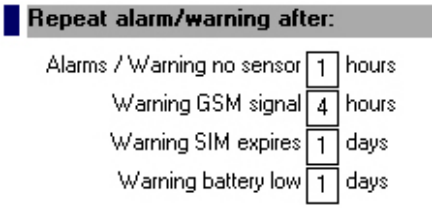
Additionally, the report can be requested of the t-bone box at any time by sending "ASK" from a registered telephone (see 7.).

- **Time of report/update** (default value = time of primary setup)

  Enter the time of day at which the automatic reports are to be sent to the master phone and the updates to the server.

The time of update can be edited; it cannot be deactivated since it is vital for the weekly server updates of the max./min. measured values per day.

3.2.7 Recurrence of alarms/warnings



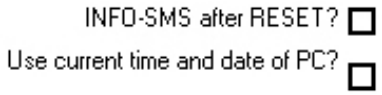
t-bone will continue to send alarms/warnings until the critical situation is resolved. Define the interval of alarms/warnings:

- all alarms; warning "sensor error" — default value = 1 h
- warning: low GSM-signal level — default value = 4 h
- warning: SIM expires soon — default value = 1 day
- warning: "battery low"; "battery down" — default value = 1 day

The server weekly receives an update from the t-bone box. In case it does not receive the update, the server will send a warning to the master phone such as the following:

SMS "WARNING t-bone does not react: t-bone 0001 my_box server_room - last update YYYY-MM-DD"

3.2.8 Reset info / Setting of date and time



- **Info-SMS after reset** (by default = not activated)

  If activated, the box will send an SMS to the user each time the RESET button is pressed.

- **Take over date and time of PC** (by default = not activated)

  If activated, t-bone will take over the current date and time of the PC.
  If not activated, t-bone will synchronise itself via SMS.

Now upload the configuration by clicking the button > t-bone

The t-bone box automatically registers at the server and starts its surveillance shortly afterwards.

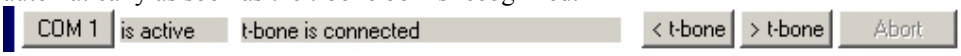
The master phone receives a user ID via SMS (cf. 3.2.5). From now on the current measured values can be supervised and the configuration can be edited via Internet.

4. Menu of the t-bone configurator

4.1 File

- **New**
  All entry fields are cleared and the default values are restored. This enables to configure the box anew.
- **Open …**
  Load a previously saved configuration file.
- **Save as …**
  Save the current configuration.
- **Interface (COM)**
  Select a COM port for the connection to the t-bone box.

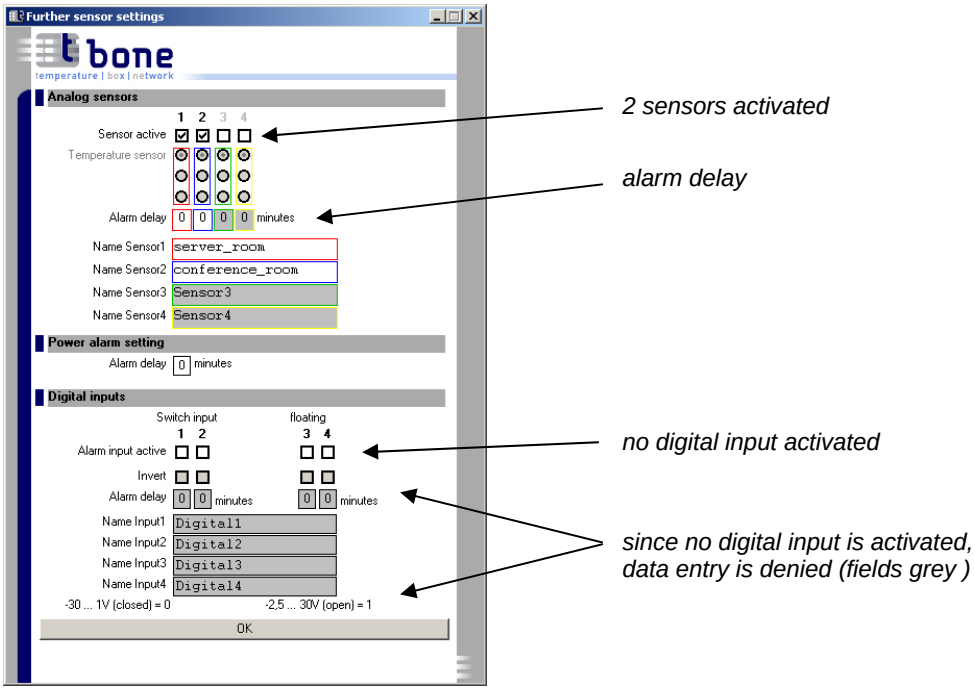
Click on the COM button to find the next active COM port of your PC. The t-bone configurator connects automatically as soon as the t-bone box is recognized.



- **Log – disc memory**
  Select a disc memory size for logging the activities of the t-bone box.
- **ASCII string**
  Select the frequency of the string output via COM port.
- **Firmware update …**
  Whenever a new configurator software is released, it comes with the according firmware. When the new configurator is installed (see 3.1) the according firmware is uploaded automatically. If, for any reason, the uploading process is interrupted, the upload has to be repeated manually.

4.2 Sensors

Activate, deactivate and configure the sensors and digital inputs.



4.3 Language

Select language for the configurator. In order to synchronise the LCD-display with the t-bone box, the language selection has to be uploaded to the box by clicking > t-bone

4.4 Window

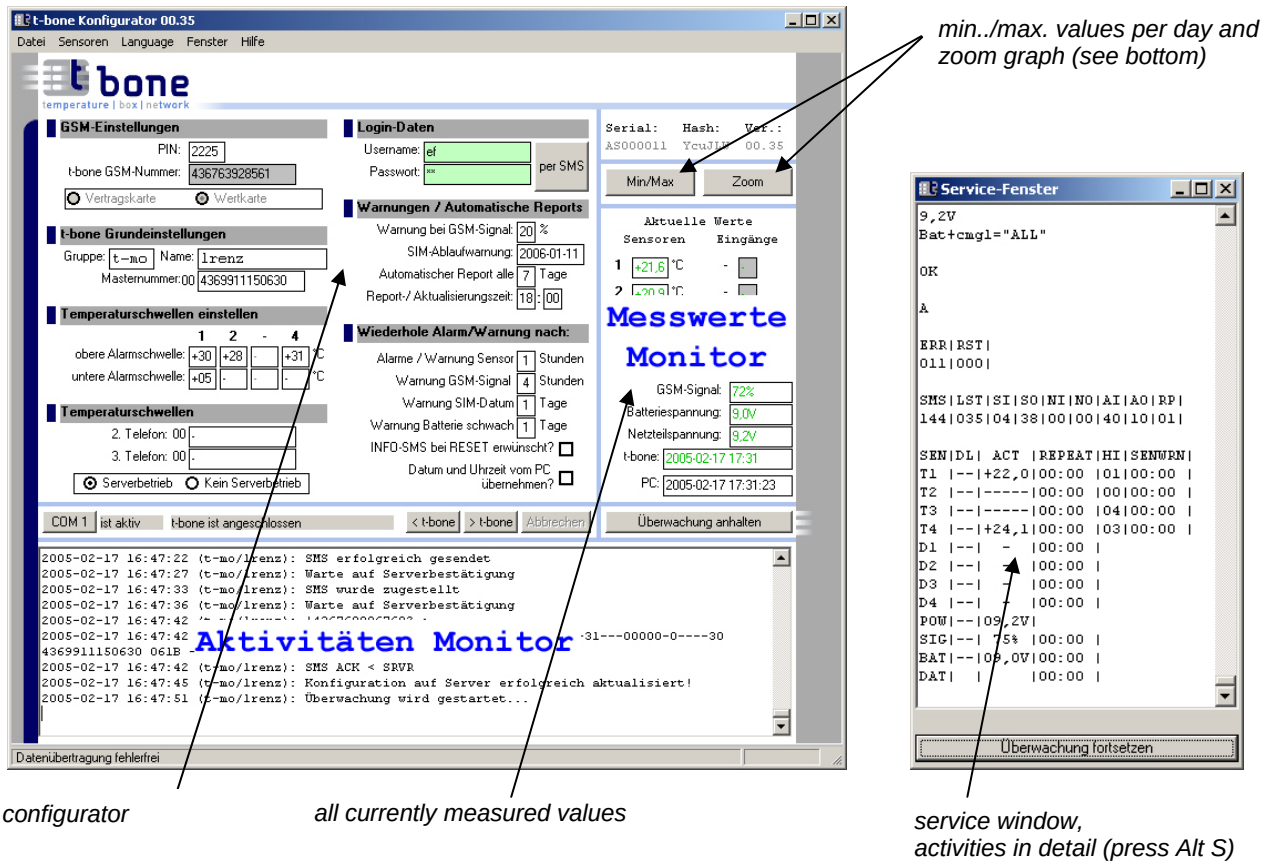
Save an individual position for the window or reload the standard window position.

4.5 Help

5. Monitor and data transfer

5.1 *Monitor*

In the configurator the current activities and measured values are displayed.



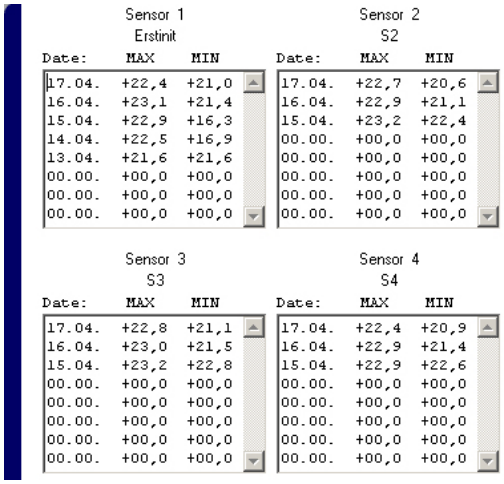
Activities Monitor: In the "Activities Monitor" the current (and previous) activities of the t-bone box are displayed.

The detailed activities are recorded in log-files on the *hard* disc (C:\Programme\t-bone konfigurator\Log).

Measured Values Monitor: Displays the currently measured values of the active sensors; the status of the digital inputs; the GSM-signal level; the battery voltage; the power supply voltage; and the date and time.

Click [Min/Max] to open a window with the daily min./max. measured values of all sensors.

Click [Zoom] to display a graph with the detailed values measured in a 10-minute interval.



Min./Max.-values

Zoom function

5.2 *Data transfer via COM-interface* (advanced; see 2.8)

If the configurator/monitor is not connected to t-bone, the box outputs one ASCII character string per minute.

The strings can be printed, transferred to an SNMP-system or evaluated by means of an individual software.
Length of the ASCII strings: ***132 characters***

```
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0
J J J J - M M - D D   H H : M M   0 0 0 1   m y _ b o x                 A 1
+ 2 7 , 1   0   1 0   A 2   + 2 0 , 5   1   0 0   A 3   - 1 0 , 3   0   0 0   A
4   - - - - -   -   - -   D 1   0   1   0 0   D 2   1   0   0 5   D 3   0   1
0 0   D 4   -   -   - -
```

A1 +27,1 1 10..... sensor 1 – currently measured value = +27,1°C – no alarm – alarm delay 10 minutes

A4 ----- - --..... sensor 4 is not active

D1 0 1 00 ..... digital input 1 – not inverted – alarm not cleared – no alarm delay

D2 1 0 05 ..... digital input 2 – inverted – no alarm – alarm delay 5 minutes

In case of alarms and warnings a different string is output to the COM interface:
Length of the ASCII strings: ***75 characters***

```
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0
K e y w d :   Y Y Y Y - M M - T T   H H : M M   0 0 0 1   m y _ b o x
        s e r v e r _ r o o m                 T   v a l u e
```

K e y w d : ... the keyword can stand for an alarm, a warning or an info
T : ..... type of alarm, warning or Info

Samples:

```
Alarm: 2005-03-22 14:32 Gr-1 IT          server_room          A +27,0
Alarm: 2005-03-22 14:32 Gr-2 IT          door_server_room     D 1
Alarm: 2005-03-22 14:32 Gr-3 green_house ___________________  P OFF

Warn : 2005-03-22 14:32 Gr-1 IT          server_room          S ERROR
Warn : 2005-03-22 14:32 Gr-2 IT          ___________________  B 9,1
Warn : 2005-03-22 14:32 Gr-3 green_house ___________________  G 20
Warn : 2005-03-22 14:32 Gr-3 green_house ___________________  D 2005-07-15

Info: 2005-03-22 14:32 Gr-3 green_house  ___________________  R
```

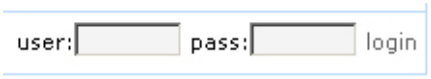
Description of the above samples:

Types of alarms:	A = temperature sensor (analog) D = digital input P = power alarm	
Types of warnings:	S = sensor B = battery G = GSM-signal D = SIM-expiry date	
Types of info:	R = reset button pressed	
Values	+27,0	= currently measured temperature
	1	= digital signal
	OFF	= power off
	ERROR	= sensor error
	9,1	= battery voltage 9,1V
	20	= GSM signal 20%
	2005-07-15	= warning of SIM expiry

The ***colours*** of some of the characters in the chart do ***not*** appear in the ASCII strings but are supposed to facilitate the interpretation of the chart!

6. t-bone via Internet (www.t-bone.at)

With your personal User ID you can access the t-bone box via Internet.

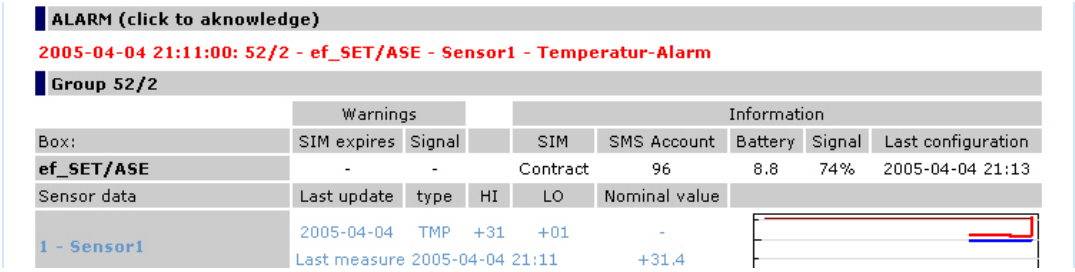


← *login and logout on every page of the t-bone website*

Your t-bone account consists of 3 pages:

- **Overview**: concise information about *all t-bone boxes* registered under your ID
- **Detailed view**: comprehensive, detailed information and other functions related to *one particular sensor or digital input* of your box
- **Configuration**: enables you to edit the *entire setting of the box*

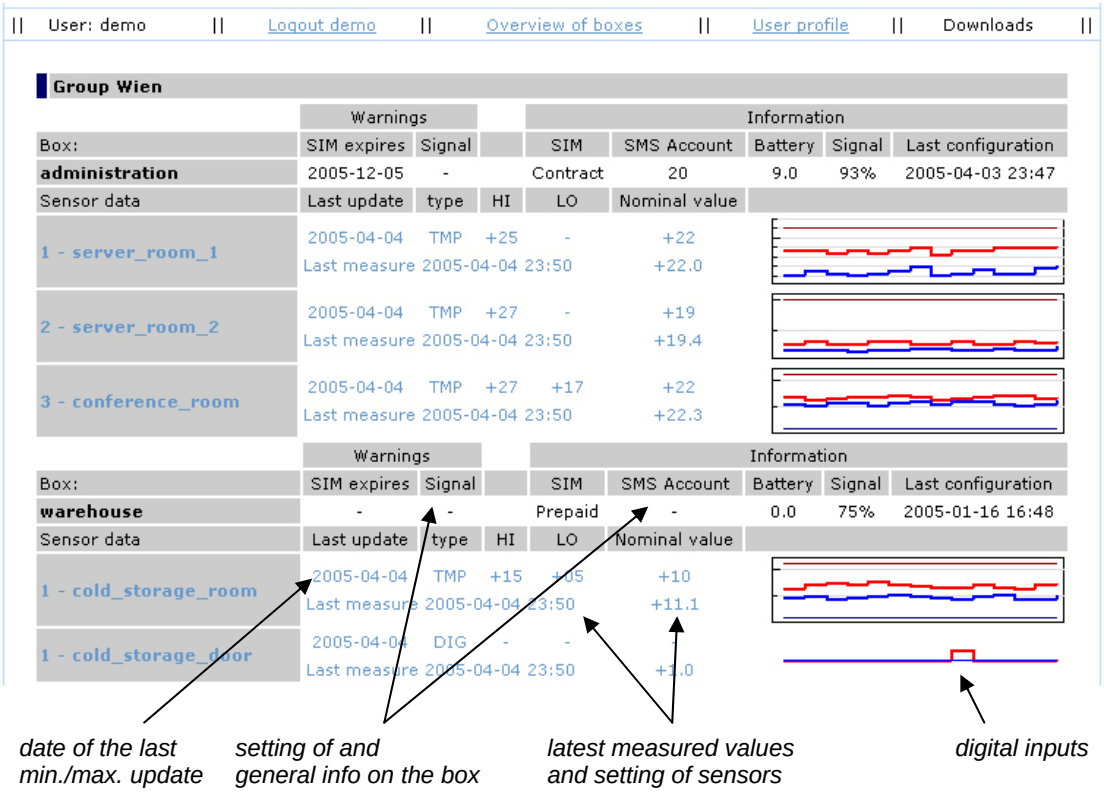
Alarms will be reported on top of each page as shown below:



6.1 *Overview*

This page gives concise information about the measured values and the configuration of all t-bone boxes registered under your ID.

The page is refreshed once per minute.



date of the last min./max. update

setting of and general info on the box

latest measured values and setting of sensors

digital inputs

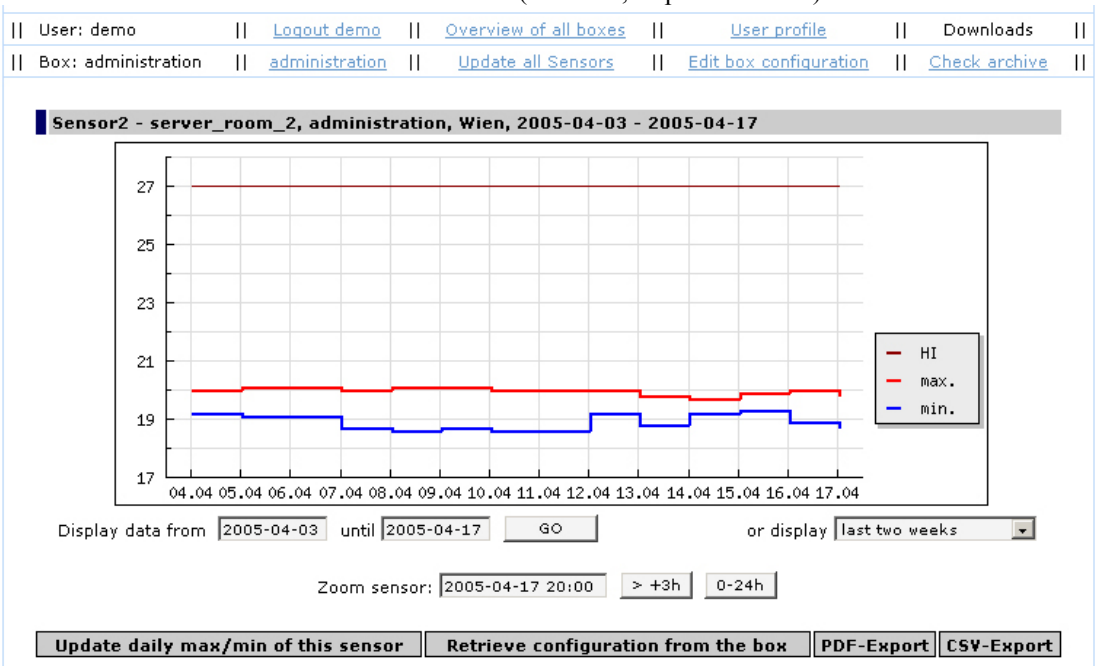
Click on a graph to select the detailed view of a sensor or digital input.

6.2 *Detailed view*

6.2.1 *Daily max./min. values*

This page shows the daily max./min. temperature values as measured by a particular sensor during the 14 days prior to the latest update. This time frame can be altered individually.

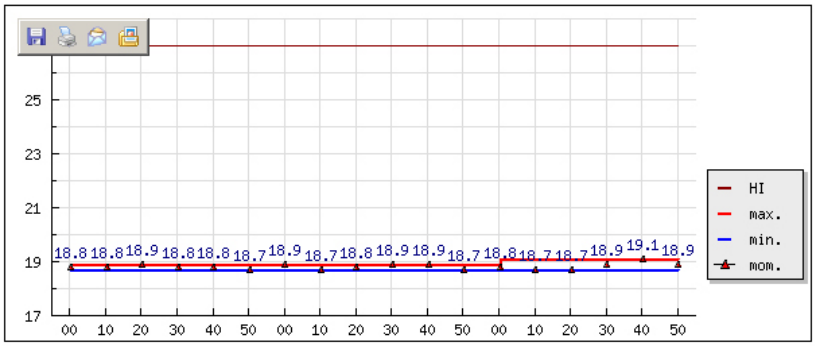
Since the automatic update is carried out once per week, you might want to make a manual update in order to receive the latest state of the measured values (see 6.2.3, "Update Sensor").



Standard view plus options for individual choice of time frame as well as zoom-function.

6.2.2 *Zoom function*

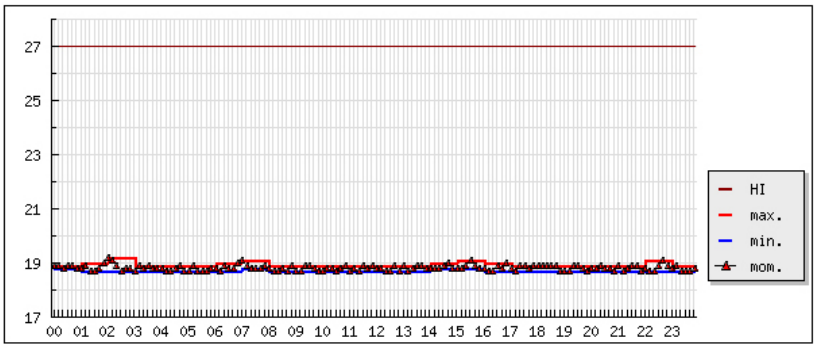
Zoom Sensor: The zoom function always shows the course of temperature in a 10-minute interval.



> +3h

enter date and time and click the button to check the ***3 hours following the chosen point in time***

click the button only to check the ***3 hours prior to the present time***



0-24h

enter date and click the button to check the ***24 hours of the chosen day***

click the button only to check the ***present day***

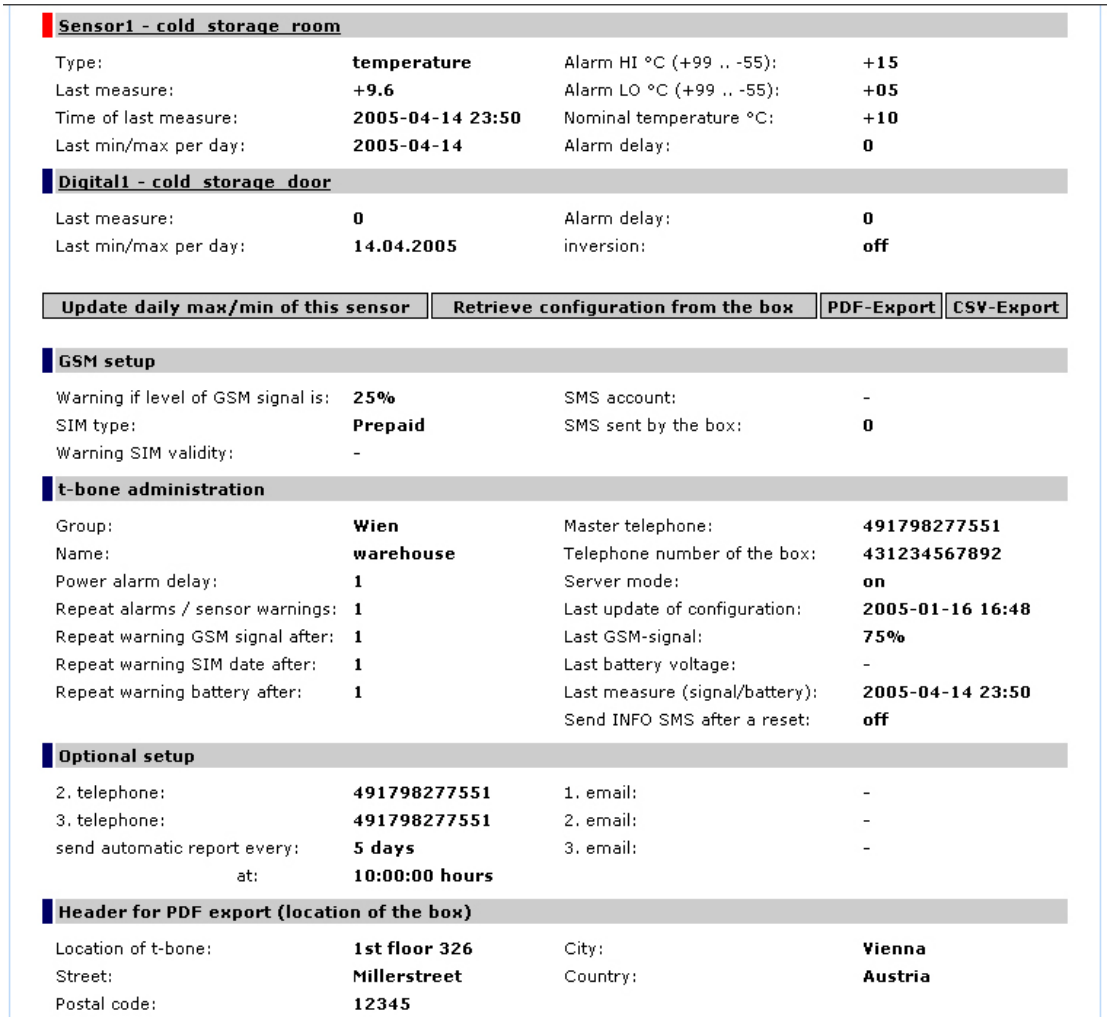
Zoom Digital Signal: If a digital input is used the status of the signal is shown in a 10-minute interval.

6.2.3 *Control Block*:

- Update the daily min./max.-values of the selected sensor
- Retrieve configuration
- create a PDF for printing the recorded data of the chosen period
- create a CSV file (comma delimited)

6.2.4 *Display of all parameters and of the latest measured values*:

The display comprises all active sensors and digital inputs, the entire setup of the box, the header for PDF printing as well as a list of all confirmed alarms.



Sensor1 - cold_storage_room

Type:	**temperature**	Alarm HI °C (+99 .. -55):	**+15**
Last measure:	**+9.6**	Alarm LO °C (+99 .. -55):	**+05**
Time of last measure:	**2005-04-14 23:50**	Nominal temperature °C:	**+10**
Last min/max per day:	**2005-04-14**	Alarm delay:	**0**

Digital1 - cold_storage_door

Last measure:	**0**	Alarm delay:	**0**
Last min/max per day:	**14.04.2005**	inversion:	**off**

Update daily max/min of this sensor | Retrieve configuration from the box | PDF-Export | CSV-Export

GSM setup

Warning if level of GSM signal is:	**25%**	SMS account:	-
SIM type:	**Prepaid**	SMS sent by the box:	**0**
Warning SIM validity:	-		

t-bone administration

Group:	**Wien**	Master telephone:	**491798277551**
Name:	**warehouse**	Telephone number of the box:	**431234567892**
Power alarm delay:	**1**	Server mode:	**on**
Repeat alarms / sensor warnings:	**1**	Last update of configuration:	**2005-01-16 16:48**
Repeat warning GSM signal after:	**1**	Last GSM-signal:	**75%**
Repeat warning SIM date after:	**1**	Last battery voltage:	-
Repeat warning battery after:	**1**	Last measure (signal/battery):	**2005-04-14 23:50**
		Send INFO SMS after a reset:	**off**

Optional setup

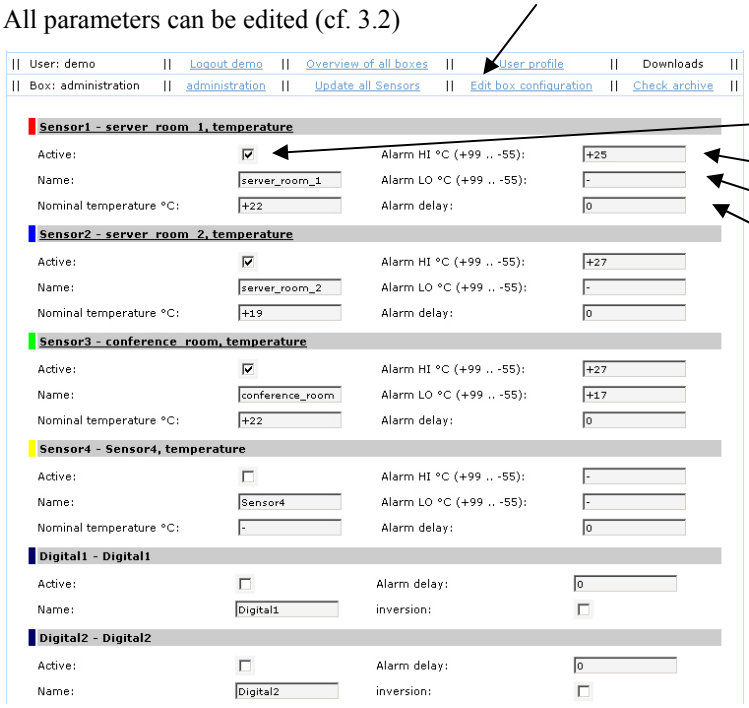
2. telephone:	**491798277551**	1. email:	-
3. telephone:	**491798277551**	2. email:	-
send automatic report every:	**5 days**	3. email:	-
at:	**10:00:00 hours**		

Header for PDF export (location of the box)

Location of t-bone:	**1st floor 326**	City:	**Vienna**
Street:	**Millerstreet**	Country:	**Austria**
Postal code:	**12345**		

6.3 *Configuration*

This page can be opened with the link || Edit box configuration ||
All parameters can be edited (cf. 3.2)

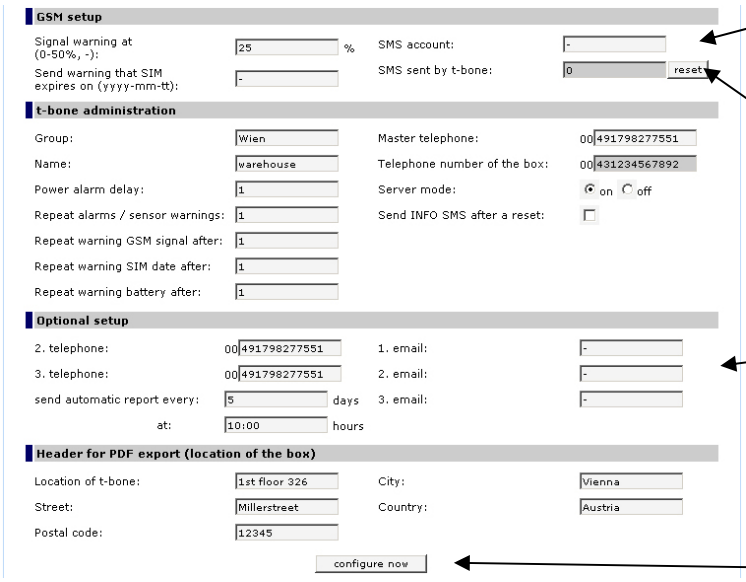


activate/deactivate sensor

upper alarm threshold

lower alarm threshold

alarm delay



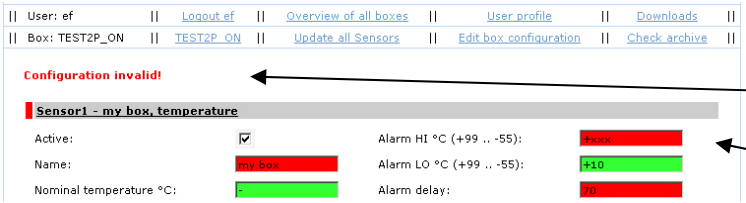
SMS-account for prepaid SIM-cards: enter the number of SMS that can be sent with your credit (see 3.2.1)

counter of SMS sent by the box counter can be reset to zero

counter and account can only be accessed via Internet

enter up to 3 E-mail addresses which will receive alarms and warnings

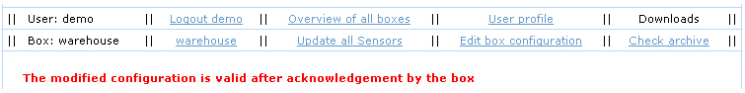
send configuration to the box



erroneous configurations will not be sent to the box

erroneous entries are highlighted red

The server displays the activity in red letters. After acknowledgement by the box the new configuration will be displayed.



If no acknowledgement is received, the changes in the configuration will be discarded.

7. How to query the t-bone box via mobile phone

With a registered mobile phone you can query your t-bone box at any time.
The registered phones are: the master phone (see 3.2.2) and two optional phones (see 3.2.4).
Queries sent from non-registered phones will be ignored by the box.

Both capital letters and lower case are acceptable (e.g. "ASK", "ask", "aSK", etc.).

Possible queries and the corresponding replies are:

- **ASK** (general query)

The reply comprises:
name of the box – currently measured temperature values and defined alarm thresholds of active sensors – current status of active digital inputs – current level of GSM-signal – voltage of backup battery

SMS: "REP t-bone 0001 my_box SEN1: +21,5C +27 +05 SEN2: +05,7C +10 - SEN3: - - - SEN4: -10,1C -05 -15 INP1: 0 INP2: 1 INP3: - INP4: - GSM 78% BAT 9,1V"

In the above sample the sensors 1, 2 and 4 as well as the digital inputs 1 and 2 are active. The currently measured temperature value of sensor 1 is +21,5°C, the upper alarm threshold is +27°C, the lower alarm threshold is +05°C. For sensor 2 no lower alarm threshold has been defined. Sensor 3 is not active. The current GSM-signal level is 78%, and the voltage of the backup battery is 9,1V.

For automatic reports to the master phone, see 3.2.6.

- **SEN** (query *all* sensors)

The reply comprises:
number of the sensor – name of the sensor – currently measured temperature value – upper and lower alarm threshold – alarm delay

SMS: "SEN 1:server_room +27,3C +30 +10 20 2:green_house +05,7C +10 -05 00 3:Sensor3 - - - - 4:Sensor4 - - - -"

In the above sample sensors 1 and 2 are active. Sensor1 is named "server_room", the currently measured temperature value is +27,3°C, the upper alarm threshold is +30°C, the lower alarm threshold is +10°C, and the alarm delay time is 20 minutes.

- **SENn** (query one particular sensor; n = sensor number)

The reply comprises:
max.- and min.-values of today and the preceding 7 days – current GSM-signal level – voltage of backup battery – currently measured temperature value

SMS: "SEN1 0122 +28,1 +23,4 0121 +27,8 +23,2 0120 +27,1 +23,5 ..... 0115 +26,2 +24,8 68% 9,2V +25,3C"

In the above sample the current day`s ("0122" = January 22nd) max. temperature value is +28,1°C, the min. temperature value is +23,4°C. Subsequently, the daily max./min. temperature values of the preceding 7 days are shown ("0121" – "0115"). The current GSM-signal level is 68%, the voltage of the backup battery is 9,2V, and the currently measured temperature value is 25,3°C.

- **INP** (query the status of the digital inputs)

The reply comprises:
number of the digital input – name of the digital input – current status of the signal – alarm delay

SMS: "INP 1:door_server_room ACTIVE 0 15 2:window ACTIVE 1 00 3:Digital3 INACTIVE - - 4:Digital4 INACTIVE - -"

In the above sample the digital inputs 1 and 2 are active. Input 1 is named "door_server_room"; its current status of the signal is 0, the alarm delay time is 15 minutes. The current signal of input 2 ("window") is 1. The digit 1 is indicating an alarm condition.

- **USR** (query user name and password)

The reply comprises:
username – password

SMS: "INFO USERNAME: username PASSWORT: password"

The t-bone box will reply to registered telephones only (see 3.2.2 and 3.2.4).

8. Automatic alarms, warnings and other info

When the temperature reaches a predefined treshold or in case of a power failure the t-bone box will inform you via SMS, E-mail (see 6.3) and serial interface (see 5.2).

Alarms

- **Temperature alarm**

A temperature alarm comprises:
the keyword "ALARM" – time of the alarm – the critical temperature – name of the sensor – group and name of the box – upper and lower threshold – date of alarm

SMS: "ALARM 14:27 +30,0C critical temperature – server_room t-bone 0001 my_box +30 -05 2005-01-19"

In the above sample a temperature alarm has been sent at 14:27hrs; the critical temperature of +30°C was measured by the sensor "server_room" of the box "0001 my_box". The alarm thresholds are set at +30°C and -05°C. The date of the alarm is 2005-01-19.


After each alarm the data of the sensor are automatically updated in the Internet.

- **Power alarm and "all-clear"**

A power alarm comprises:
the keyword "ALARM" – time of the alarm – "power off – battery activated" – group and name of the box – date of alarm

SMS: "ALARM 23:10 POWER OFF - battery activated t-bone 0001 my_box 2005-01-19"

In the above sample a power alarm has been sent at 23:10hrs; the battery has been activated. The power failure was recorded by the box "0001 my_box". The date of the alarm is 2005-01-19. (see also 2.4)


As soon as the power supply is restored you will receive an "all clear":

SMS: "INFO 23:26 POWER ON - battery deactivated - t-bone 0001 my_box 2005-01-19"

Warnings and Info

- **Sensor error**

If an activated sensor is not attached to the proper socket or if defective, you will be warned thus:

SMS: "WARNING temperature sensor server_room ERROR - t-bone 0001 my_box"

- **Battery low / battery down**

SMS: "WARNING battery low 8,5V - t-bone 0001 my_box"
SMS: " WARNING battery down 8,0V - t-bone 0001 my_box "

- **Low GSM-signal**

SMS: "WARNING GSM-signal low 20% - t-bone 0001 my_box"

The warning will only be sent if this function is activated (see 3.2.6)

- **Validity of prepaid SIM-card expires**

SMS: "WARNING SIM-card expires soon 2005-04.23 - t-bone 0001 my_box"

The warning will only be sent if a date was defined (see 3.2.6).

- **SMS-account low / exhausted**

SMS: "INFO SMS-account low: 20 - t-bone 0001 my_box"
SMS: "WARNING SMS-account exhausted: 10 - t-bone 0001 my_box"

The warning will only be sent if this function is activated (see 3.2.1)

- **Warning: t-bone does not react** (see 3.2.7)

SMS: "WARNING t-bone does not react - t-bone 0001 my_box server_room - last update YYYY-MM-DD"

- **Info-SMS after reset**

SMS: "INFO RESET 2005-05-12 10:30 - t-bone 0001 my_box"

The warning will only be sent if this function is activated (see 3.2.8)

9. Technical data

Material

- box: stainless steel
- dimension [mm]: W x H x D = 283 x 160 x 68
- weight [g]: 1950

Supply voltage

- 9-15V DC via power supply unit
- backup battery, 9V

Connectors

- RJ45 plug socket or serial port
- 4 RJ12 plug sockets for thermo sensors
- 4 screw sockets for digital inputs
- socket for power supply unit
- screw socket für GSM antenna
- slot for SIM-card (push-push)

Diplay units

- LCD display (4x20 characters), backlighted
- button with red/greeen LED

thermo sensors

- DS18S20 (NTC)

Measuring range

- from -55°C to +99°C

Resolution

- 0,1°C

Precision

- typical: +/-0,2°C between +5°C and +50°C
- minimal: +/-0,5°C between -10°C and +85°C

Serial interface (COM)

- serial port, RS232
- 19200 baud
- 8 data bits
- 1 stop bit
- no parity

Ambient temperature

- storage: from +5°C to +50°C
- operation: from +5°C to +45°C
  Allow for the t-bone box to adapt to the ambient temperature before starting operation in order to aviod condensation.

GSM dualband:

- 900/1800 MHz