MOUNTING AND INSTRUCTION MANUAL

DTS 4135.timeserver

Network – Time Server and Master Clock

Certification of the Producer

STANDARDS

The DTS 4135.timeserver was developed and produced in accordance with the EU Guidelines:

2014 / 30 / EU	EMC
2014 / 35 / EU	LVD
2008 / 57 / EU	Railway
2011 / 65 / EU	RoHS
1907 / 2006	REACH
2012/19/EU	WEEE

$C\epsilon$

CB Test Certification (IEC 60950-1, IEC 61000-3-2, IEC 61000-3-3, IEC 61000-6-2, IEC 61000-6-3) :

	Ref. Certif. No.
IEC IECEE CB SCHEME	CH-11023-M1

CB Test Certification (IEC 62368-1) :

	Ref. Certif. No.
IEC IECEE CB SCHEME	SE-104229

References to the Instruction Manual

1. The information in this Instruction Manual can be changed at any time without notice.
   The current version is available for download on www.mobatime.com.
2. The device software is continuously being optimized and supplemented with new options. For this reason, the newest software version can be obtained from the Mobatime website.
3. This Instruction Manual has been composed with the utmost care, in order to explain all details in respect of the operation of the product. Should you, nevertheless, have questions or discover errors in this Manual, please contact us.
4. We do not answer for direct or indirect damages, which could occur, when using this Manual.
5. Please read the instructions carefully and only start setting-up the product, after you have correctly understood all the information for the installation and operation.
6. The installation must only be carried out by skilled staff.
7. It is prohibited to reproduce, to store in a computer system or to transfer this publication in a way or another, even part of it. The copyright remains with all the rights with BÜRK MOBATIME GmbH, D-78026 VS-Schwenningen and MOSER-BAER AG – CH 3454 Sumiswald / SWITZERLAND.

Overview

Table of contents

APPENDIX

1 Safety

1.1 Safety instructions
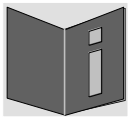
Read this chapter and the entire instruction manual carefully and follow all instructions listed. This is your assurance for dependable operations and a long life of the device.

Keep this instruction manual in a safe place to have it handy every time you need it.

1.2 Symbols and Signal Words used in this Instruction Manual

	Danger! Please observe this safety message to avoid electrical shock! There is danger to life!
	Warning! Please observe this safety message to avoid bodily harm and injuries!
	Caution! Please observe this safety message to avoid damages to property and devices!
	Notice! Additional information for the use of the device.
	Important information in the Manual! This information must be followed!

1.3 Intended Use

The **DTS 4135.timeserver** is a time server for the use in network environments. It can be synchronized from NTP and be used as NTP server. In addition, it can read the time from DCF or GPS (e.g. from GPS 4500).

It can operate as master clock for a self-setting IRIG clock line. The DTS 4135 has 2 such lines.

For additional functions, see the device descriptions in chapter 3.

The device is designed for 19" racks and intended to be installed in a 19" cabinet. Operate the device only in installed condition and with all connectors plugged in.

Use this product only as stated in this instruction manual. Any other use is considered improper use.

1.4 Observe operating safety!

Caution!

- Never open the housing of the device! This could cause an electric short or even a fire, which would damage your device. Do not modify your device!

- The device is not intended for use by persons (including children) with limited physical, sensory, or mental capacities or a lack of experience and/or knowledge.

- Keep packaging such as plastic films away from children. There is the risk of suffocation if misused.

1.5 Consider the installation site!

Caution!

- To avoid any operating problems, keep the device away from moisture and avoid dust, heat, and direct sunlight. Do not use the device outdoors.

- The device is designed for 19" racks and should only be operated installed in a 19" cabinet.

- Take care to provide sufficient fresh air for the device.

- Never install the devices in a completely closed rack. Otherwise the produced warm air in the rack cannot escape and the devices cannot be cooled.

Danger! Make sure
that you wait before using the device after any transport until the device has reached the ambient air temperature. Great fluctuations in temperature or humidity may lead to moisture within the device caused by condensation, which can cause a short.

1.6 Please observe the electromagnetic compatibility!

Caution!

- This device complies with the requirements of the EMC and the Low-voltage Directive.

- This product belongs to Class A in accordance with EN 55022.
  This equipment can lead to radio interference. In this case, measures must be taken by the user.

1.7 Network security

Caution!

- The default password shall be changed after the commissioning of the device.

- A reset of the password to default through hardware is not possible.
  Using MOBA-NMS the password can be modified.
  In case an access via MOBA-NMS is not possible, support effort will be needed or the device has to be sent back to the factory.

- Use encrypted services (SSH, SCP, SFTP)

- All unused services shall be deactivated: FTP, Telnet,…

- Refer to our Security Guidelines TE-801312 (see www.mobatime.com – Login area: > Customer_area > Product_Resources - 10_Timerserver_TimeCenter).

1.8 Pay attention to the instructions for the connection of the power supply

The connections are described in appendix "A Connection diagrams".

Danger! Absolutely pay attention:
Mounting, installation, commissioning and repairs of electrical devices must only be carried out by a licensed electrician. While the national installation regulations must be adhered.

For each power supply connection (**Mains)** / **(DC In)** / **(DC In2)** two fuses of 10A (13A) slow has to be provided (in both lines).
The used fuses for the DC- and battery supply have to be approved for DC.

Each power supply connection (**Mains)** / **(DC In)** / **(DC In2)** needs to be realized with an all-pole disconnection device, which is installed near to the device mentioned in this manual, which is clearly labeled and good accessible.

Before working on a device or on the electrical installations the corresponding circuits have to be switched off and secured against uncontrolled power on.

In case more than one supply voltage is used (**Mains)** / **(DC In)** / **(DC In2)**, all of them have to be disconnected before starting any maintenance work.

2 Maintenance

2.1 Troubleshooting: Repairs

Please read carefully Appendix "D Troubleshooting" if your device does not work properly.

If you cannot rectify the problems, contact your supplier from whom you have purchased the device.

Any repairs must be carried out at the manufacturer's plant.

Disconnect the power supply immediately and contact your supplier, if …

- liquid has entered your device

- the device does not properly work and you cannot rectify this problem yourself.

2.2 Cleaning

- Please make sure that the device remains clean especially in the area of the connections, the control elements, and the display elements.

- Clean your device with a damp cloth only.

- Do not use solvents, caustic, or gaseous cleaning substances.

2.3 Disposing

Device
At the end of its lifecycle, do not dispose of your device in the regular household rubbish. Return your device to your supplier who will dispose of it correctly.

Packaging
Your device is packaged to protect it from damages during transport.
Packaging is made of materials that can be disposed of in an environmentally friendly manner and properly recycled.

3 General Information: Introduction

3.1 Scope of Delivery

Please check your delivery for completeness and notify your supplier within 14 days upon receipt of the shipment, if it is incomplete.

The package you received contains:

- DTS timeserver

- Mounting set for rack mounting consisting of:
  - 4 pcs nuts for 19" housing
  - 4 screws M6 for the nuts
  - 4 plastic discs for screws M6

- Connector set
  - plug 3-pole black for power supply
  - 1 pcs spring terminal 8-pole orange
  - 1 pcs spring terminal 6-pole orange
  - 2 pcs spring terminal 5-pole orange
  - 3 pcs spring terminal 4-pole orange
  - 2 pcs spring terminal 2-pole orange

- 2 pcs mounting tools with spring terminals

3.2 Technical Data

See Appendix "G Technical data".

3.3 Device Description in this Manual

This instruction manual is for the master clocks DTS 4135.timeserver and DTS 4136.timeserver. Below both models (DTS 4135 and DTS 4136) will be referred to as DTS 4135 or DTS 413x with the exception of time-keeping.

3.4   Introduction

The DTS 4135.timeserver is a NTP Time Server for use in network environments. It can be synchronized by DCF or GPS (e.g. from GPS4500), AFNOR-A/C, IRIG-B[1] and NTP, and act as a NTP server in a network.

It can be used as a master clock for NTP slave clocks, synchronized via unicast or multicast with NTP and time zone table.

In addition, as a master clock the DTS 4135 provides two independent IRIG/AFNOR lines (each available as analog and digital (current loop and RS422) output), two independent serial interfaces for the output of time telegrams (programmable by script files), as well as two output lines for technical pulses (pulse/ frequency/ DCF).

As the "main" master clock, the DTS 4135 can synchronize other master clocks or other equipment with DCF and monitor with 1 alarm input.

The DTS 4135 can send both e-mails and SNMP traps for alerting purposes.

Using MOBA-NMS and SNMP, the DTS 4135 can be fully operated and its configuration and system status can be requested.

To maintain a redundant time source, two DTS 4135 can be linked by an optical link.

3.5   Device types

Model:	Features:	Product no.:
DTS 4135.timeserver	According above description with TCXO (temperature compensated quartz)	**117979**
DTS 4136.timeserver	Like DTS4135 but with OCXO („heated" quartz)	**117990**

Device descriptions:

Since the only difference between DTS 4135 and DTS 4136 is the quartz, no difference is made on the front plate. It always has DTS 4135.timeserver printed on it. The precise description is made on the identification label on the back.

---

[1] With IRIG-B synchronization the date must be set manually once or by another time source (GPS).

3.6   DTS distributed time system

The DTS (Distributed Time System) is a system developed by Moser-Baer AG to connect decentralized master clocks, slave clock lines and time servers. For communication, standard LAN (Ethernet) is used. The DTS can be centrally operated and monitored.
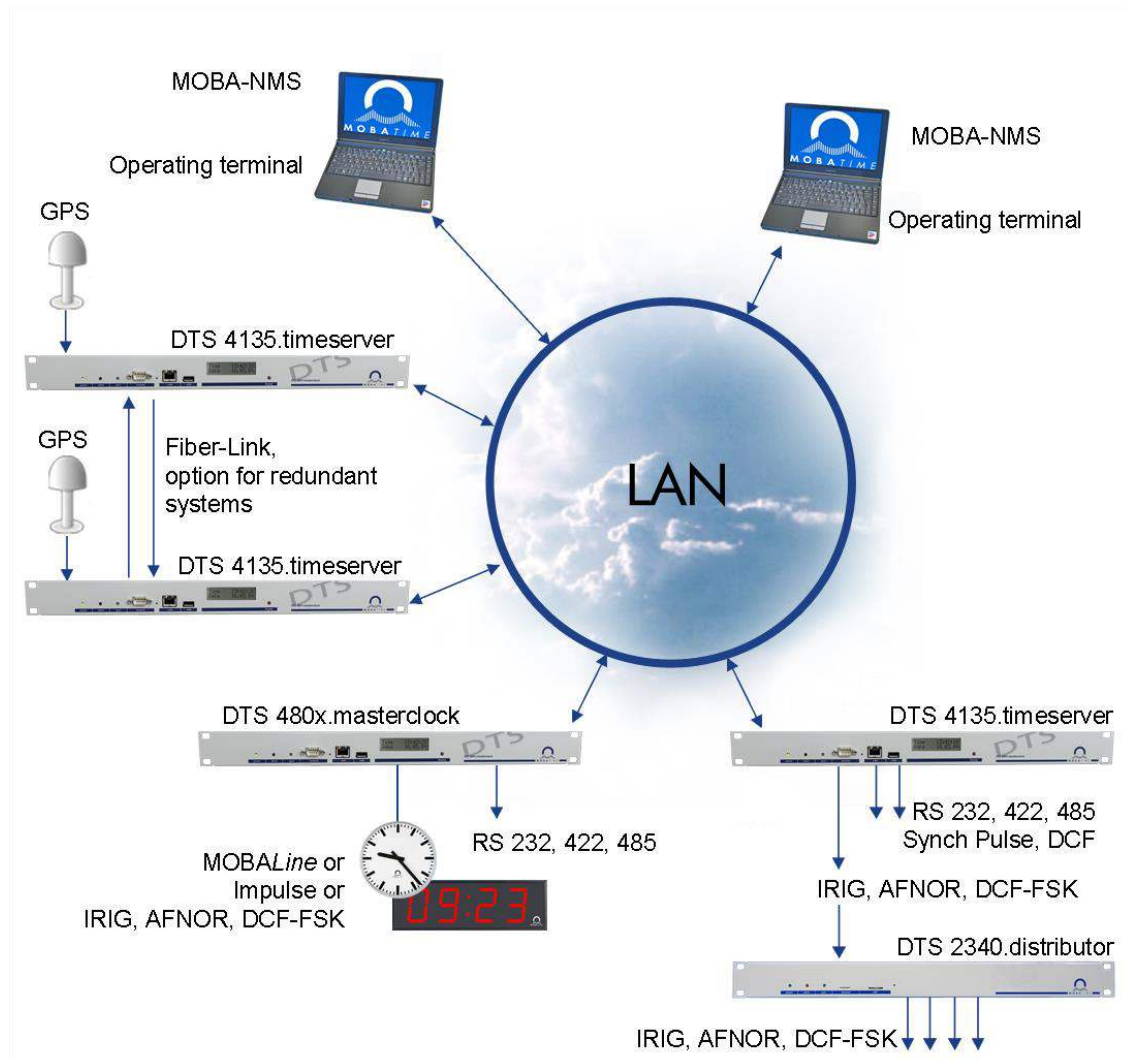
3.7   MOBA-NMS - Network Management System

MOBA-NMS is a software used for central management and inquiry of state and alarm information. It supports DTS devices as well as all MOBATime analog and digital network clocks and can handle a network with more than 1000 devices. This software provides extensive functions for the configuration, installation, back-up / recovery etc. especially for DTS devices.

Due to the DTS concept, MOBA-NMS can be installed multiple times in one network. With different user rights on the device and software level, the configuration abilities of different users can be set as required.

For DTS devices, all communication is conducted over SNMP V3. The SFTP protocol is used for broadcasting files.

Overview of the main functions

The main MOBA-NMS functions for DTS devices and network clocks are listed below:

- automatic device scan over multicast or IP range
- device management using user-defined device groups ➔ see chapter „3.7.2 Device management"
- intuitive user interface with input check for the device configuration
- status / alarm request and display on the device group level
- device firmware update for one or several devices (parallel)
- support for device commands, e. g. reset, restart etc.
- back-up / recovery of DTS devices
- transfer of the whole DTS configuration to another device
- user management with different access rights
- monitor for NTP and time zone packages
- editor for time zone files
- online help
- etc.

3.7.1

Device management

3.7.2

All MOBATime network devices are displayed in the so-called device view. Here, the devices can be grouped according to user-defined criteria. For this, the individual devices can simply be moved to the according groups and sorted using drag and drop. There is no limit to the number of groups and sub-groups.

Besides the organizational advantages (easier locating, better overview), a device group has the following advantages:

- commands and device updates can be applied to the whole group (including sub-groups).
- Alarms and errors of included devices are displayed on the group level.
- Complete groups can be moved / sorted among themselves.

The content of the device view can be saved and opened at a later time. The created structure and breakdown into groups is preserved.
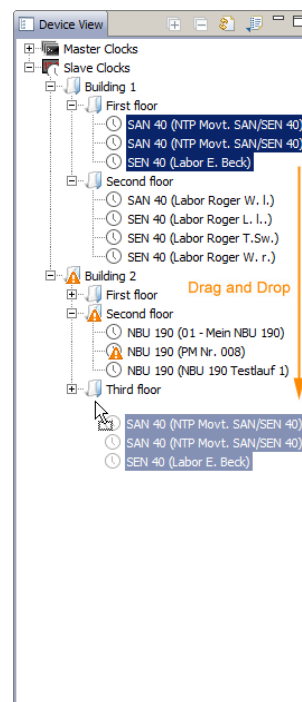
4 Displays

4.1 LED displays front side
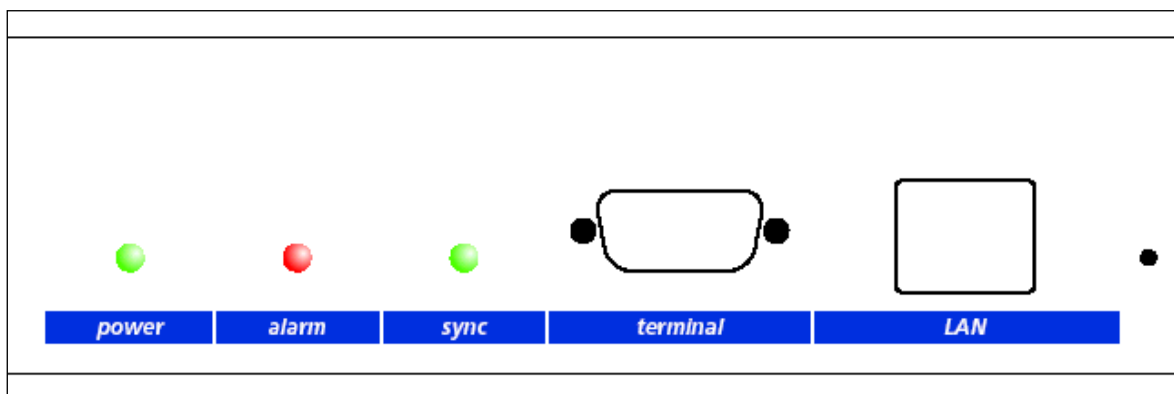
Description	Color	Status	Description
Power	Green	On	Mains or DC power supply is in order
		Off	No power supply
Alarm	Red	On	The alarm relay signalizes an alarm
		Off	No active alarms
Sync	Green	On	DTS 413x can read the time from a synchronization source
		Off	Synchronization source is not available
LAN control lamps:			
Left	Green	Blinking	Network activity
	Orange	Blinking	No connection to network
Right	Yellow	Off	10 Mbit
		On	100 Mbit

4.2 LED indication back side
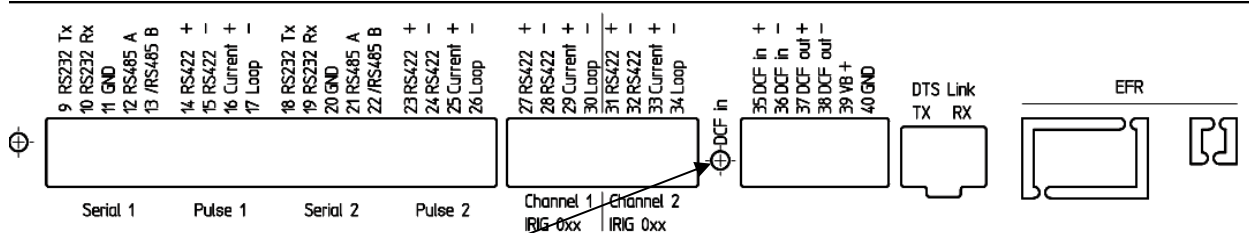
Description	Color	Status	Description
DCF reception	red	Blinking	DCF (GPS reception)

4.3 Display

Display showing the current status of the DTS 413x.timeserver.

```
Time      16:41:04
Date      22.04.10
```
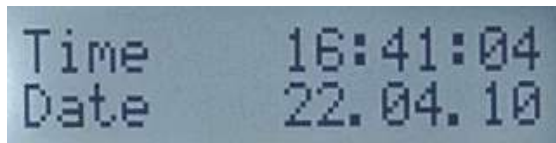
Display of: -Time, date
                     -Current time source
                     -Stratum of the DTS 413x.timeserver
                     -Software version
                     -IPv4 address
                     -IPv6 address
                     -Alarm summary
                     -Current alarms

The display can be operated by means of the corresponding "Display" button:

First press the button briefly: Switch on the background light
Other buttons to press briefly: Scroll through all displays
Press button longer (>3 sec):   Change to default display (time and date)

The display changes after approx. 3 min without pressing the button for the default display and the background light goes off.

If a USB stick has been plugged in, it will be displayed. Should only telegram files be copied, this can be activated directly with the button. (Press the button until the copy process starts).

5   Installation

5.1   Connections

The connections are specified in Appendix "A Connection diagrams".

Only connect the designated devices to the various inputs and outputs.

Please take care to security instructions in chapter 1.

5.2   Boot procedure of the DTS 4135.timeserver

The normal booting time of the DTS 4135 is approx. 60 sec. with pre-set IP or with DHCP. The booting procedure of the operating system is displayed on the serial console. After that, the text "starting" appears on the display (during the booting procedure the display is dark and empty). Without connection to a DHCP server, the first start up can take up to 75 seconds. After that, the DHCP option must be set to "off" in the network configuration.

The display "starting" remains until the time of output to the lines.
The duration, depending on the configuration, is 5-30 sec.

5.3   Firmware

It is recommended to install the current firmware on your device prior to the definite commissioning. The current firmware can be found under *www.mobatime.com* – Login area: > Customer_area > Product_Resources > Timerserver.

5.4 Basic settings (factory settings)

General	Internal time zone	MEZ
	Menu password	dts
	Power	single
	Language	English
Time source	Source	DCF-GPS (UTC)
	Alarm delay for failure	60 min
	Stratum	auto
	Error stratum	12
	DCF timeout	24hrs
	DCF correction	0ms
	Offset per stratum	50ms
	Max. offset time ok	50'000us
Time-keeping	Mode	Catch up
	Catch up speed	100'000ns/s
	Quartz type	0
	Synch only offset	800ms
Redundant operation		off
Lines	DCF77 output	on, UTC
	DCF77/pulse/freq. output 1	off
	DCF77/pulse/freq. output 2	off
	Serial interface 1	off
	Serial interface 2	off
	IRIG/AFNOR line 1	off
	IRIG/AFNOR line 2	off
	NTP slave clocks /	
	Time zone server	off
Network	DHCP	on
	DHCPv6	off
	Autoconf IPv6	off
	Link	auto
	Hostname	DTS4135
Alarm	Relay	all on
	Mail	off
	SNMP traps	off
NW Services	SSH	on
	Telnet	on
	FTP	on
SNMP	Modus	off
	RO-Community	romobatime
	RW-Community	rwmobatime
SNMP Traps	Mode	off
	Trap Community	trapmobatime

6 Operation

6.1 General

Operation occurs via a terminal menu or SNMP. SNMP operation is explained in chapter "9 SNMP". Operation with the terminal menu takes place either via Telnet, SSH, or via a serial terminal. The serial terminal is particularly used for the first configuration. After a connection has been set up, the login screen is displayed:
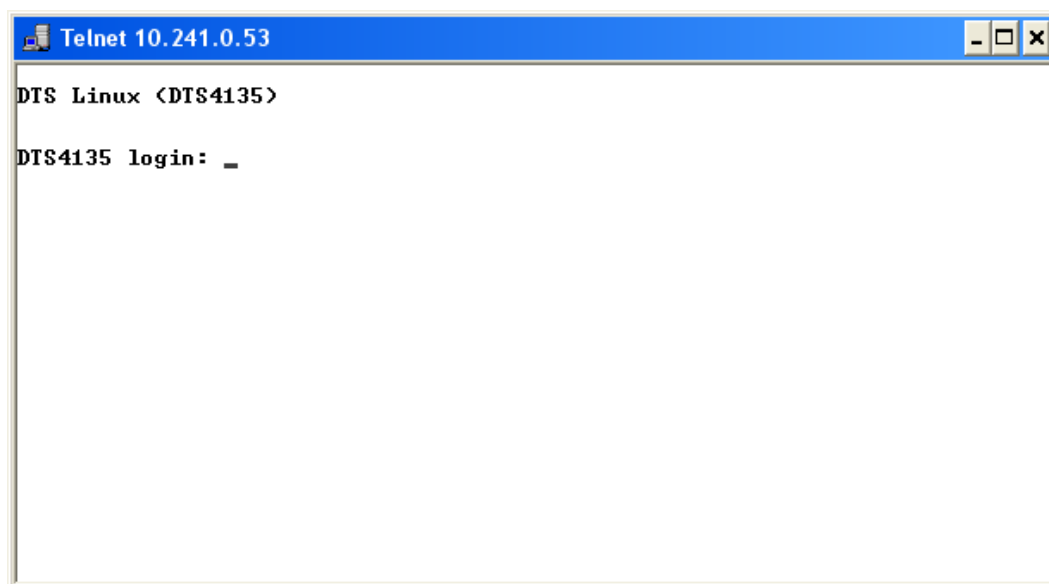
To start the menu, *dts* must be logged in as user. The standard password is *dts*. (Changing the password ➔ see chapter "6.5.19 General Settings").

Only one menu can be open at any time. The first menu started has priority. The menu is automatically closed after 10 min. without operation, and any possible connection via Telnet or SSH is interrupted.

Backspace:

Backspace must be set to "delete" with the serial terminal:

Local echo:

Some terminals (serial or Telnet) do not display the characters entered. It is, therefore, necessary to switch on the "local echo" in the terminal.

6.1.1   Serial connection

38400 Bauds, 8 data bits, no parity, 1 stop bit.

Windows 7, 8, 10:   Putty

Linux: Minicom

Switch off Xon/Xoff and hardware handshake.

After establishing the serial connection, the menu can be initialized with ENTER.
When rebooting, the boot process will be displayed on the serial console.

Warning: The serial connection should always be disconnected before switching off the operating PC (exit terminal program or pull out the RS232 plug).

6.1.2   Telnet

Windows 7, 8, 10:   e.g. with Putty
                             User: *dts*
                             Standard password: *dts*

Linux: Start console and enter "*telnet [IP-address]*

6.1.3   SSH

Windows 7, 8, 10:   e.g. with Putty
                             User: *dts*
                             Standard password: *dts*

Linux: Start console and enter "*ssh dts@[IP address]*"

6.1.4 Menu structure
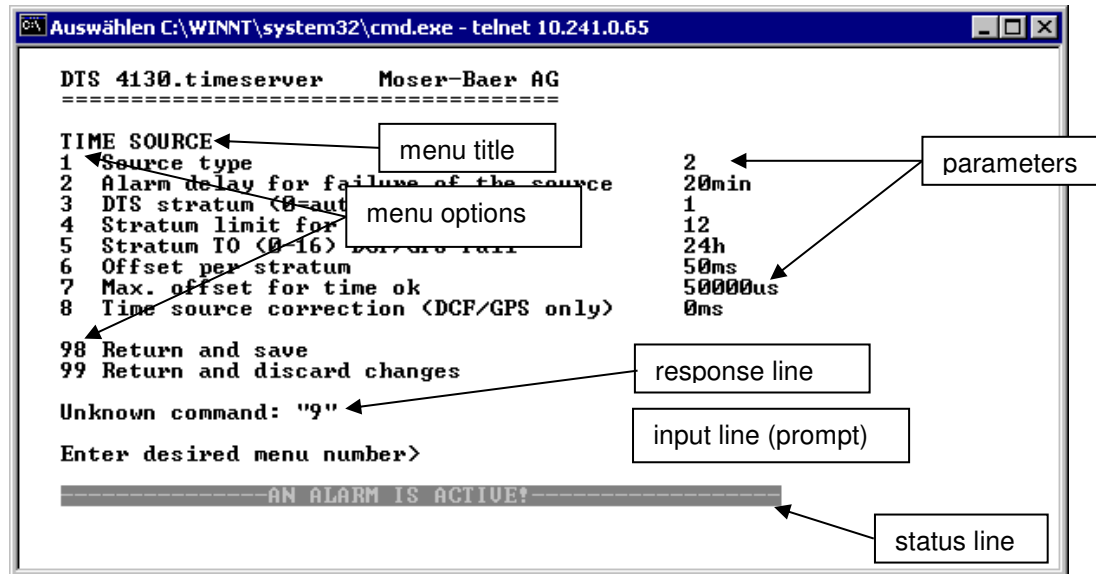
The current menu is always displayed in the **menu title**. The **menu options** show all the selectable menu functions. Provided the menu item is not a further menu, the set **parameters** are displayed. Error messages (e.g. invalid entries) or additional information to the selected menu items are displayed in the **response line.** The **input line** shows the current input values or options possible. The **status line** only appears, when an information has to be displayed, e.g. "An alarm is active".

All entries must be completed with ENTER (Return) (e.g. also ESC).

The menu window can always be exited with *Ctrl-C* (incl. termination of the Telnet and SSH connection).
The desired menu can be selected with the relevant number.

The numbers 98 and 99 are always used identically:

- With 98, the settings entered are saved and the menu exited. Depending on the change, the DTS 4135, or only partial functions, are rebooted.

- With 99, all changes to the menu are reversed and the menu exited.
  In the menus where data cannot be saved (command 98), the menu is only exited with 99, but any changes are not saved.

The current menu is updated, without any further entry, with ENTER.

6.2   MOBA-NMS operation

For the configuration of DTS devices via GUI, MOBA-NMS (see chapter „3.7 MOBA-NMS - Network Management System") can be used. All configuration possibilities are subordinated in different configuration pages (called „tabs"). These tabs are connected to the terminal menu and designated accordingly. Example: The terminal menu „Configuration ➜ Alarms" can be found in MOBA-NMS under the tab „Alarms".

Configuration example:

configuration pages (tabs)

For further details on the general MOBA-NMS operation, check the integrated online help (menu „Help ➜ Show help").

Important: To enable the communication between MOBA-NMS and the DTS devices, SNMP must be activated! Set terminal menu „Configuration ➜ SNMP ➜ SNMP Mode" to „on". SNMP is activated by default.

6.3   Main menu

```
Telnet 10.241.0.95                                      _ □ ×

   DTS 4135.timeserver    Moser-Baer AG
   ====================================

   MAIN SELECTION
   1   Status
       (Actual alarms and history, timesource state, version
   2   Configuration
       (Configuration of the lines, timesources, alarms ...)
   3   Maintenance
       (Update, backup ...)



   99 Exit DTS menu


   Enter desired menu number>_
```

Menus:

Status: Display of various information regarding operation and environment
                See chapter "6.4 Status Menu"

Configuration: Configuration of the DTS 4135
                See chapter "6.5 Configuration Menu"

Maintenance: Software update, backup and restore
                See chapter "6.6 Maintenance Menu"

6.4 Status menu

The status menu consists of 2 pages.

Status menu page 1:


```
Telnet 10.241.0.95                                          _ □ ×

   DTS 4135.timeserver    Moser-Baer AG
   ====================================

   CLOCK STATE                          Page 1
   1  Alarm state
   2  Alarm history
   3  Time, time state
   4  Local source
   5  Power
   6  Info network config.
   7  Internal state
   8  Product information
   9  Versions of the software



   Press enter for next part, 99 to leave>
```
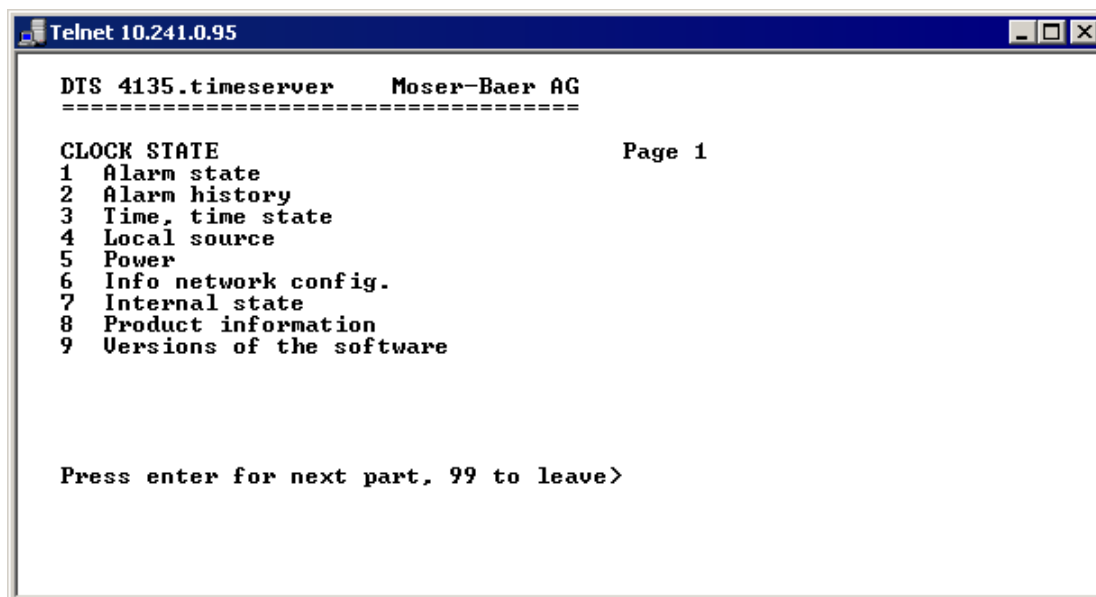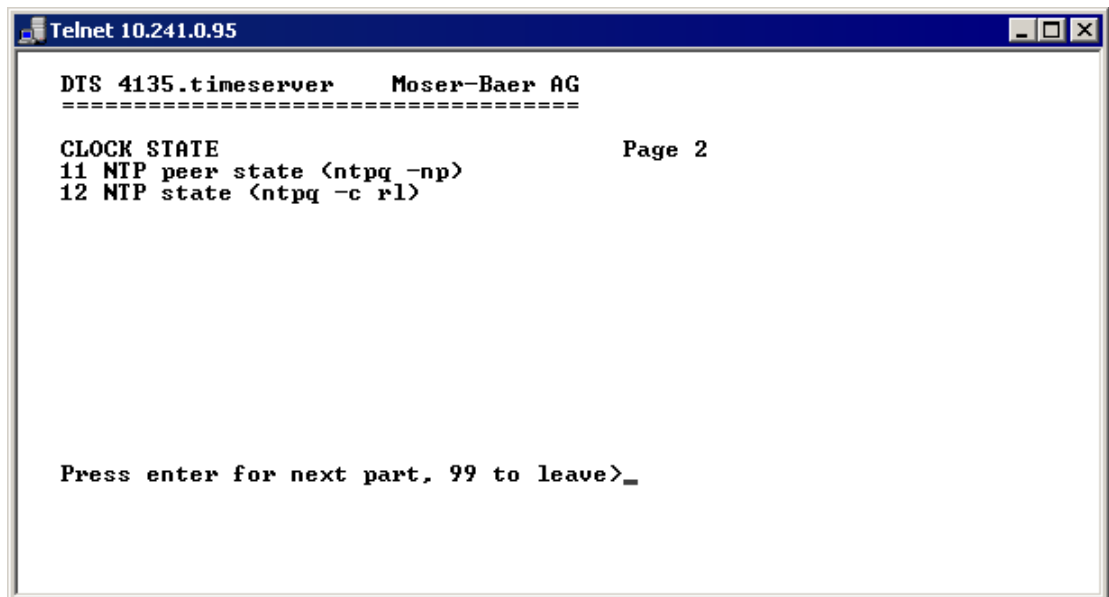
The menu shows various information on the current operating status.

1. Requesting alarm status, display of all the DTS 4135 active errors.
   Display of the DTS 4135 alarms (64) on 4 pages. The ALARM DETAIL menu pages can be scrolled through with ENTER. Active alarms are displayed with a *. The ALARM DETAIL menu page can be exited with 99. All DTS 4135 active alarms are displayed, masking (e-mail, traps, relay) only occurs later.

2. Alarm history display.
   Display of the DTS 4135 alarm record, newest alarm first. The ALARM RECORD menu pages can be scrolled through with ENTER. The ALARM RECORD menu page can be exited with ESC.

3. Current time and status display. See chapter 6.4.1 Time Information and Status"

4. Time source information display. See chapter "6.4.2 Time Source Information"

5. Power supply information (current, voltage) display.

6. Current network configuration display. With ENTER, a second page can be displayed with network information.

7. DTS 4135 system information display (internal status, regulation voltage of the quartz..). This information is for support purposes only.

8. Product information's like serial number, firmware version etc.

9. All several software versions of the DTS 4135.

Status menu page 2:

```
Telnet 10.241.0.95                                              _ □ ×

    DTS 4135.timeserver     Moser-Baer AG
    ===================================

    CLOCK STATE                             Page 2
    11 NTP peer state (ntpq -np)
    12 NTP state (ntpq -c rl)




    Press enter for next part, 99 to leave>_
```

Display of information with regard to the internal state of the NTP server.

Time information and status

```
Telnet 10.241.0.95                                                    _ □ X

    DTS 4135.timeserver    Moser-Baer AG
    ===================================

    TIME INFORMATION AND STATUS
    Internal time of the DTS (local time)          18:13:31 16.07.10
    Stratum and state of DTS                       1   MASTER
    Last measured drift                            -0.0037ppm
    Last quartz correction                         16:09:01 16.07.10 UTC
    Time source                                    GPS (DCF)
    Offset to source                               0us
    Last time information from source              16:13:01 16.07.10 UTC
    Jitter of the source                           0us
    Quality of the source                          100%

    99 Return


    Press enter for next part, 99 to leave>
```

6.4.1

-Internal time of the DTS:	local time
-Stratum and status of the DTS:	current stratum, status: MASTER, SLAVE, not defined
-Last measured drift:	drift before the last quartz correction
-Last quartz correction:	time of the last quartz correction
-Time source:	current time source
-Offset to source:	offset to source (source – system time)
-Last time info. from source:	time of the last information from source
-Jitter of the source:	current jitter
-Quality of the source:	quality of the source

Time source information

```
Telnet 10.241.0.95                                              _ □ X

   DTS 4135.timeserver    Moser-Baer AG
   ====================================

   TIMESOURCE INFORMATION
   Actual measured offset               0us GPS FPGA
   Last time received DCF               16:14:00 16.07.10 UTC
   Sec. counter DCF                     46
   Last time received link              00:00:00 01.01.70 UTC
   Sec. counter link                    0
   NTP source                           Antenna (DCF/GPS)
   NTP source offset                    0us
   NTP source jitter                    1us
   NTP source stratum                   0

   99 Return


   Press enter for next part, 99 to leave>_
```

6.4.2

- Currently measured offset:	last measured offset with source info and type of measurement (only needed for Moser-Baer support).
- Last time received DCF:	last time received from DCF source
- Sec. counter DCF:	the counter is incremented by 1 with each DCF pulse. For the minute marker, the counter is set to 0.
- Last time received link:	last time received from DTS Link
- Sec. counter link:	analogue sec. counter DCF
- NTP – Source:	current time source (system-peer) of the NTP Server Antenna = DCF or GPS
- NTP source offset:	current offset of the NTP Server
- NTP source jitter :	jitter of the current source
- NTP source stratum:	stratum of the current source

6.5 Configuration menu

```
Telnet 10.241.0.95                                    _ □ ✕

   DTS 4135.timeserver     Moser-Baer AG
   =================================

   CONFIGURATION
   1  Outputs
   2  Time handling
   3  Alarms
   4  General
   5  Network
   6  Services (FTP, telnet, SSH)
   7  SNMP


   99 Return


   Press enter for next part, 99 to leave>
```
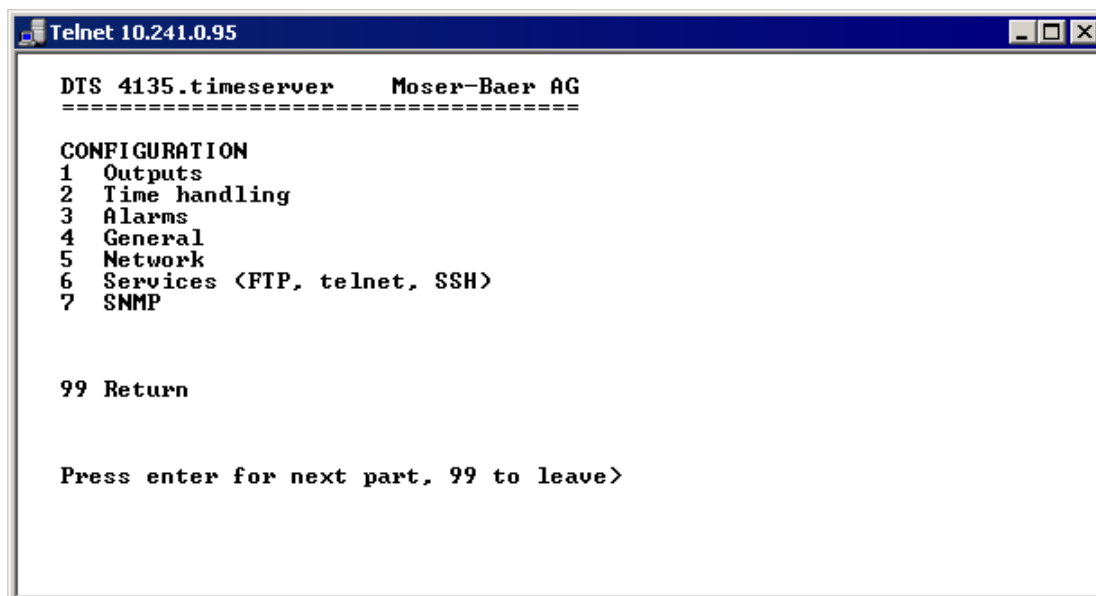
Configuring the DTS 4135 through various submenus:

1. Configuring the lines / outputs (DCF/pulse/frequency, serial interfaces, IRIG/AFNOR/DCF-FSK and NTP slave clock line) See chapter "6.5.1 Lines"

2. Configuring the time source, time-keeping etc.
    See chapter "6.5.7 Time Handling"

3. Alarm settings (alarm relay, e-mail, SNMP)
    See chapter "6.5.13 Alarms"

4. General settings of the DTS 4135 (language, time zone for alarms and display, password for menu, power supply monitoring...)
    See chapter "6.5.19 General Settings"

5. Network Settings
    See chapter "6.5.20 Network"

6. Services (switching network services such as FTP, Telnet, SSH on or off)
    See chapter "6.5.21 Services (Network services FTP, Telnet, SSH....)"

7. SNMP Configuration for GET/PUT.
    See chapter "6.5.22 SNMP" (Traps are described in menu '2. Configuration' ➔'3. Alarms' ➔ '3. Traps'. See also chapter 6.5.17 SNMP Traps)

Lines
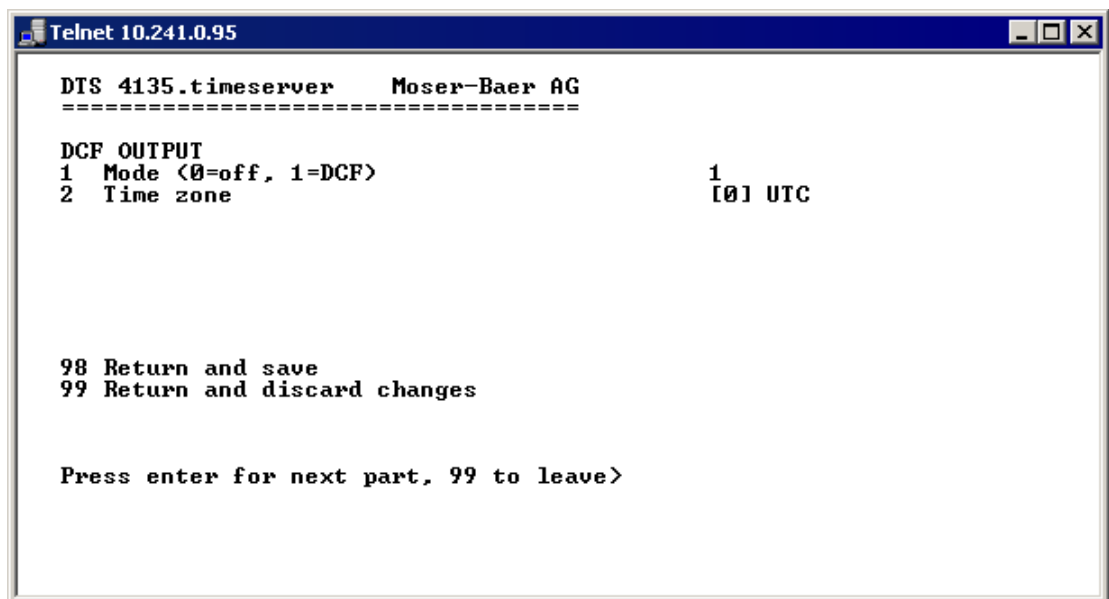
Under lines, settings can be undertaken for the following functions:

6.5.1

1	DCF - Output	→	see chapter 6.5.2
2	DCF / Pulse / Frequency output 1	→	see chapter 6.5.3
3	DCF / Pulse / Frequency output 2	→	see chapter 6.5.3
4	Serial Interface 1	→	see chapter 6.5.4
5	Serial Interface 2	→	see chapter 6.5.4
6	IRIG / AFNOR / DCF-FSK output 1	→	see chapter 6.5.5
7	IRIG / AFNOR / DCF-FSK output 2	→	see chapter 6.5.5
8	NTP slave clocks / time zone server	→	see chapter 6.5.6

DCF – output

The DTS 4135 is equipped with one DCF output line (DCF main out).
This line is available on the electrical current loop DCF output.

6.5.2


```
Telnet 10.241.0.95                                              _ □ ✕

    DTS 4135.timeserver    Moser-Baer AG
    ====================================

    DCF OUTPUT
    1   Mode (0=off, 1=DCF)                      1
    2   Time zone                                [0] UTC




    98 Return and save
    99 Return and discard changes


    Press enter for next part, 99 to leave>
```

1. Select line function: off or DCF on

2. Select time zone -> see chapter "6.5.25 Time Zone Selection"

DCF / Pulse / Frequency output 1 and 2

```
Telnet 10.241.0.95                                          _ □ ×

   DTS 4135.timeserver    Moser-Baer AG
   ====================================

   DCF / PULSE / FREQUENCY OUTPUT 1
   1   Mode (0=off, 1=DCF, 2=pulse, 3=frequency) 1
   2   Time zone                              [+1] Brussel
   3   Pulse type (0=sec 1=min 2=hour 3=user)    0
   4   Pulse length                           100ms
   5   User defined pulse type                1sec
   6   Correction of output                   0ms
   7   Frequency                              1000Hz


   98 Return and save
   99 Return and discard changes


   Enter desired menu number>
```

6.5.3

1. Select line function: Line switched off, line DCF output, line pulse output, line frequency output

2. Select time zone -> see chapter "6.5.25 Time zone selection "

3. Select pulse mode: every second, minute, hour or user-defined.
    (Only active with the pulse output function)

4. Select pulse length in ms (1-500ms)
    (Only active with the pulse output function)

5. User-defined pulse interval (1-3600 sec) only active with pulse type 3 (=user) (the value is also only then displayed). The pulse always occurs after a multiple of the pulse interval from the 0 second in the 0 minute, e.g.:
    – Pulse interval 960 sec. (16 min.)
    ➔ Pulse occurs: 00:00:00, 00:16:00, 00:32:00, 00:48:00, 01:00:00, 01:16:00 ...
    – Pulse interval 25sec
    ➔ Pulse occurs: 00:00:00, 00:00:25, 00:00:50, 00:01:15, 00:01:40, 00:02:05 ...
       ... 00:59:35, 01:00:00, 01:00:25 ...

6. Output correction (-500ms...+500ms)

7. Frequency (1 Hz … 5 MHz)

Important: Only frequencies which fulfill the following requirements are to be used, otherwise, phase shifts occur:
20'000'000 / frequency = whole number value

Important: Frequencies above 2 MHz are not sent out as a square-wave signal anymore.

Serial interface 1 and 2

Serial telegram output via RS232, RS422 or RS485.

6.5.4

```
Telnet 10.241.0.95                                         _ □ ✕

    DTS 4135.timeserver    Moser-Baer AG
    =====================================

    SERIAL OUTPUT 1
    1   Mode (0=off, 1=on)                     1
    2   Time zone                              [+1] Brussel
    3   Com Mode                               4
    4   Baudrate                               9600
    5   Databit                                7
    6   Stopbit                                1
    7   Parity                                 even
    8   Telegram file                          MC482STD.TEL

    98 Return and save
    99 Return and discard changes


    Enter desired menu number>_
```

1. Select mode: Line switched off / on

2. Select time zone (see chapter "6.5.25 Time zone selection")

3. Com mode:
    1 = send RS 232 (receive is not enabled)
    2 = send and receive RS232
    3 = send and receive RS485
    4 = send RS 422 (receive is not enabled)

4. Baudrate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400

5. Data bit: 7 or 8

6. Stop bit: 1 or 2

7. Parity: none, even, odd

8. Selecting telegram file changes to the menu "SELECT FILE"

Notice: To set the parameters, the line type has to be selected first.

Notice: No flow control available.

The description of the telegram function and the telegram file can be found in Appendix E Serial Telegrams.

Selection of the telegram file:

```
Telnet 10.241.0.95                                        _ □ ×

   DTS 4135.timeserver    Moser-Baer AG
   ====================================

   SELECTION OF FILE                              Page 1
   00: MC482STD.TEL                        01: MC482UTC.TEL




   Enter requested file number

   Press enter for next part, ESC to leave>_
```
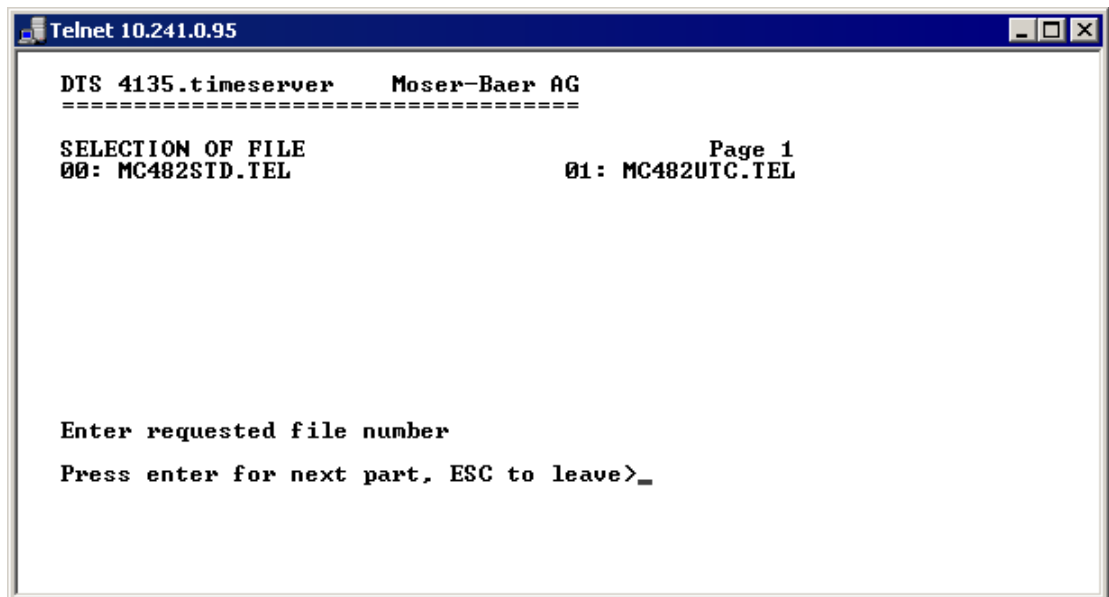
The copy procedure of telegram files is explained in chapter "7.11 Copying telegram files to DTS 4135.timeserver".

IRIG / AFNOR / DCF-FSK Output 1 and 2

```
Telnet 10.241.0.95                                                    _ □ ✕

    DTS 4135.timeserver     Moser-Baer AG
    ===================================

    IRIG / AFNOR OUTPUT 1
    1   Mode                                AFNOR-A (NFS 87-500)
    2   Time zone                           [0] UTC
    3   Level (~Upp @ Ri=Rl=50Ohm)          2000mV
    4   Alarm signal level low (~Ueff)      200mV



    98 Return and save
    99 Return and discard changes


    Enter desired menu number>_
```

6.5.5

1. Select mode: see picture below

2. Select time zone (see chapter "6.5.25 Time zone selection"

3. Configuration of the output voltage level:
   The defined voltage corresponds to the expected output amplitude when power matching (impedance matching) with a load of 50 Ohms is fulfilled. The output voltage is not controlled, resp. it is not adjusted in case of a load change.

4. Configuration of the output voltage level supervision:
   When the output voltage falls below the defined voltage level, an alarm is released.

```
172.16.26.72 - PuTTY                                                  _ □ ✕

    DTS 4135.timeserver     Moser-Baer AG
    ===================================

    SELECTION IRIG/AFNOR CODE
      00: off
      01: IRIG-B (B122)
      02: IRIG-B 12h (B122)
      03: IRIG-B DIEM (B122)
    * 04: IRIG-B123
      05: AFNOR-A (NFS 87-500)
      06: AFNOR-C (NFS 87-500)
      07: DCF-FSK
      08: IRIG-E122 DIEM
      09: IRIG-B126
      10: IRIG-B126 IEEE1344-1995

    Enter requested audio code

    ESC to leave>
```

Notice: With the activation of one of this outputs, the modulated and the digital output are activated at the same time.
Example:
To activate IRIG-B002 output, the Code 01: IRIG-B (B122) has to be set for the corresponding output.

NTP slave clocks / time zone server

NTP slave clock line for operating slave clocks on the LAN (Ethernet). With this clock line, a world time function can be realized.

6.5.6

```
Telnet 10.241.0.95                                      _ □ X

   DTS 4135.timeserver    Moser-Baer AG
   ====================================

   NTP_SLAVE CLOCKS AND TIME ZONE SERVER
   1   Mode(0=off 1=NTP 2=NTP+TZ 3=TZ 4=TZ poll) 0
   2   Multicastaddress
   3   Multicastport                           65534
   4   Pollinterval for NTP                    0
   5   Packet time to live (hops)              1
   6   Repeat time to send TZ-tables (sec)     60
   7   Delay time between packets (sec)        1
   8   Configure time zone table

   98 Return and save
   99 Return and discard changes


   Enter desired menu number>_
```

1. Mode of clock line: 0 = off, 1 = Send NTP multicast, 2 = Send NTP Multicast and Time zone table, 3 = Send Time zone table, 4 = Time zones on request, 5 (only for maitenance) = Send an empty Time zone table and return to previous mode.

2. Multicast adress for NTP and time zone server: **239.192.54.x**
   Group address: x = 1..15 for MOBATIME devices, e.g. NMI, SEN 40.

3. Multicast port for Time zone server (enter an arbitrary value, empty is not allowed ! Value e.g.: 65534). The port is also needed for requesting Time zone entries (mode 4).

4. Poll-interval for NTP Multicast in 2^**poll-values** in seconds (range: 1 – 16).
   E.g. poll-value = 2 $\rightarrow$ interval: 2^2 = 4 sec., poll-value = 5 $\rightarrow$ interval: 2^5 = 32 sec.
   For redundant Multicast time servers see remark next page.

5. Packet time to Live (TTL) for NTP- and time-zone-Multicast-packets in hops.
   (Number of Routers in a network to transfer the packets through; for simple network without routing, enter value "1", for 1 Router enter "2").

6. Repeat time to send time zone table: 10 – 86400 sec

7. Delay time between the sending of the individual time zone entries (one entry per Multicast packet) of the table: 1 – 60 sec.

8. Configuration of individual time zone entries. Displays menu "TIME ZONE TABLE".

Notice: x Changes of multicast-address, pollinterval and TLL lead to a **restart** of the NTP server.

Notice: x For the operation of a **Multicast** communication (NTP and Time Zone Server) **the configuration of a gateway is required** (see chapter 6.5.20 Network). The gateway can be set manually or by using DHCP.
If there's no gateway available, it's possiible to set the own IP as gateway.

Time zone table for the NTP slave clock line:

```
Telnet 10.241.0.95                                             _ □ ✕

   DTS 4135.timeserver    Moser-Baer AG
   ====================================

   TIME ZONE - TABLE
   Zone01: 0 [0] UTC                Zone02: 2 [+1] Brussel
   Zone03: 3 [+2] Athens            Zone04: -1 Unknown season
   Zone05: -1 Unknown season        Zone06: -1 Unknown season
   Zone07: -1 Unknown season        Zone08: -1 Unknown season
   Zone09: -1 Unknown season        Zone10: -1 Unknown season
   Zone11: -1 Unknown season        Zone12: -1 Unknown season
   Zone13: -1 Unknown season        Zone14: -1 Unknown season
   Zone15: -1 Unknown season



   Enter requested entry

   Press enter for next part, 99 to leave>
```

Display of all time zone entries (15) of time zone servers for NTP slave clock lines.

Choose a zone number to change selected zone.

Time zone selection (see chapter 6.5.25 Time zone selection).

The page can be exited with 99. Changes are first stored or reset on the overlying menu page.

6.5.7 Time handling

Under time handling, settings can be made for the following functions:

- Time source configuration ➜ see chapter "6.5.8 Time Source"
- Time adjustment configuration ➜ see chapter "6.5.9 Time Adjustment / Time Keeping"
- Redundant Operation ➜ see chapter "6.5.10 Redundant Operation"
- NTP Server ➜ see chapter "0 NTP Server"
- For setting the time manually ➜ see chapter "6.5.12 Manual time set "

Time source

Time source configuration.

```
Telnet 10.241.0.95                                    _ □ ×

   DTS 4135.timeserver    Moser-Baer AG
   ====================================

   TIME SOURCE
   1   Source type                             2
   2   Time zone of the source                 [0] UTC
   3   Alarm delay for failure of the source   60min
   4   DTS stratum (0=auto, 1-15=fix)          0
   5   Stratum limit for synchalarm            12
   6   Stratum TO (0-16) DCF/GPS fail          24h
   7   Offset per stratum                      50ms
   8   Max. offset for time ok                 50000us
   9   Time source correction (DCF/GPS only)   0ms
   98  Return and save
   99  Return and discard changes


   Enter desired menu number>
```

6.5.8

1. Type of time source: 0=none, 1=DCF low quality (DCF 77 receiver, MET),
                            2=DCF high quality (GPS receiver, UTC),
                            3=NTP, 4=AFNOR-A/C or IRIG-B 12X

2. Time zone of the source: see chapter 6.5.25 Time zone selection

3. Alarm delay at failure of time source (minutes):
                            0 = off, 1-2'160min, default = 0
                            Error: "Time source fail TO"

4. DTS stratum: 0=Stratum is automatically calculated according to
                            the time source (see chapter 8.3).
                            1-15=Stratum is set on a fix value

5. Stratum limits for synch alarm: Limits for alarm "Time source fail stratum" (1-16)

6. Stratum TO (Timeout) 1-16 DCF/GPS fail:
    Duration of stratum change 1 to 16 in the case of time loss (1-999h),
    e.g. 24 hrs ➔ stratum counts up from 1 to 16 within 24 hrs.
    Default value: 12h

7. Offset per Stratum in ms (0-40'000ms). Stratum is calculated with this value when
    time is received again:
    Offset/Stratum = 30ms, offset of the time source 150ms ➔ Stratum = 5

8. Max. offset in μs compared with time source to set device time valid at start up.
    (0-1'000'000μs)

9. Time source correction (only for DCF), +/-60'000ms

For description of time source see chapter "8 Time Administration"

Time adjustment / Time-keeping

```
Telnet 10.241.0.59                                                  _ □ ×

    DTS 4135.timeserver    Moser-Baer AG
    =================================

    TIME ADJUSTMENT CONFIGURATION
    1  Adjust mode (0=follow, 1=set)              0
    2  Max. catch up speed                        10000000ns/s
    3  Time core type (0-255, default 0)          0
    4  Synch. only offset                         0ms
    5  RTC mode                                   1



    98 Return and save
    99 Return and discard changes


    Enter desired menu number>
```

6.5.9

1. Adjust mode: 0=time is slowly adjusted (accord. to "Max. catch-up speed")
                        (without time steps)
                    1=time is set immediately

2. Maximum catch up speed in ns/s (0-10'000'000).

3. Quartz type: Standard=0 (0-255)

4. Synch. only offset: 0=off
                    100-5000ms=Limits as from which time is no longer accepted
                    ➔ Alarm "Syn only diff too big"

5. RTC mode   0=RTC deactivated
                    1=ON, with initial time set, independent of the mode (1)
                    2=ON

Notice: **Explanation to the RTC mode:**
RTC mode 0:
After startup of the device the system time starts at 00:00. First of all, the device has to receive the time from its time source. The time adjust happens according to the
"1 Adjust mode".
RTC mode 1:
The internal real time clock (RTC) is activated. After startup of the device the system time is set with the RTC time.
The first takeover of the time from the time source happens in one step, independent from the Adjust mode (1) setting.
RTC mode 2:
The internal real time clock (RTC) is activated. After startup of the device the system time is set with the RTC time.
The time takeover from the time source happens according to the Adjust mode (1).
➔ Adjust mode = 0: time is slowly adjusted
   Adjust mode = 1: time is set immediately

Important! For the redundant operation, the RTC mode should be switched off!

For a description of time-keeping see chapter "8 Time administration"

Redundant operation

6.5.10

```
Telnet 10.241.0.59                                            _ □ ×

    DTS 4135.timeserver    Moser-Baer AG
    ====================================

    REDUNDANT OPERATION
    1   Mode (0=single, 1=redundant)            0
    2   Stratum limit (1-16)                     16
    3   Max. offset to slave source              100000us
    4   Port for LAN link                        14338
    5   IP address 2. timeserver
    6   Set master manual



    98 Return and save
    99 Return and discard changes



    Enter desired menu number>
```

1. Mode: 0=single operation,
   1= redundant operation of 2 DTS 4135 (Master-Slave operation)

2. Stratum limit to switch from slave to master. Standard 16 (1-16)

3. Max. offset of slaves to the slave time source for triggering the alarm "Offset Source (Slave)" (0-5'000'000us)

4. Port for LAN-Link. default 14338

5. IP address of the 2nd DTS 4135. Only required, if the optical link is not working. Format 10.241.23.99
   ENTER without entering an address will delete the entry.

6. Manual change from slave to master. The command is effected immediately. Saving with '98' is not required when exiting the menu.

For a description of redundant operation, see chapter "8.11 Redundant Operation of 2 DTS 4135.timeservers"

Important! In redundant operation, no NTP servers may be configured as backup sources.
The redundant operation only works with GPS synchronization!

Important! For the redundant operation, the RTC mode should be switched off!

Important! **LAN link in redundant mode:**
For the redundant operation with additional LAN link, only the LAN 1 can be used. If this is not possible, select redundant Mode 2.
The LAN link is only used for internal communication between the two servers. It is not a redundancy for the optical link.
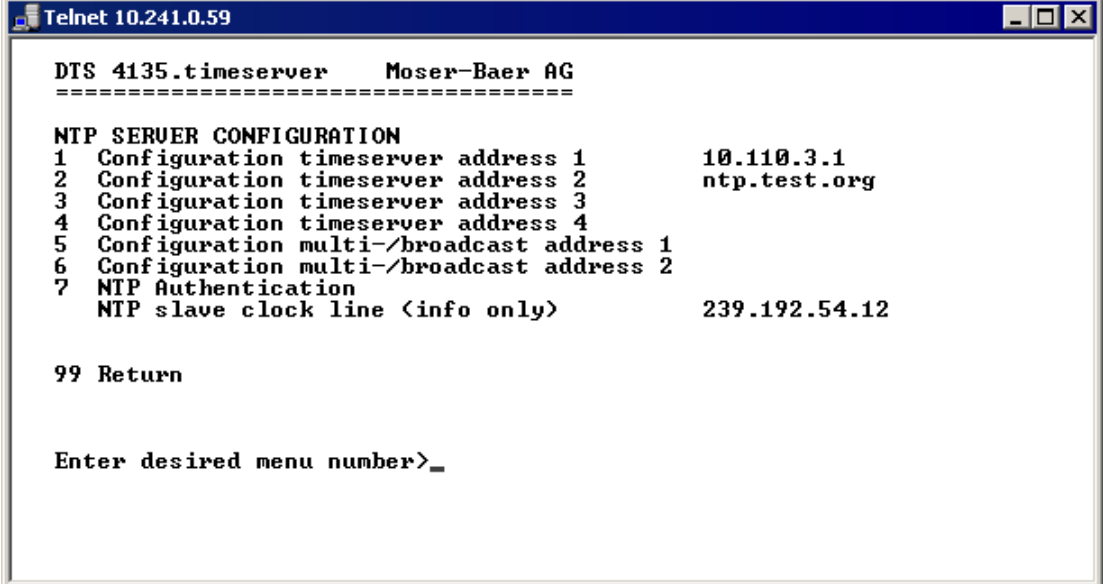
NTP server

NTP can run as server or combined as server/client. To run NTP as source (NTP as client), in the menu '2. Configuration' ➔ '2. Time handling' ➔ '1. Time source setting' ➔ '1. Source type' choose NTP and set at least one server. If NTP server is configured, but NTP is not indicated as time source, NTP only runs as backup time source (redundancy) to the actual time source.
The exact behavior of NTP time sources is described in chapter "8.5 Time acceptance from NTP".

6.5.11

Further two multicast or broadcast addresses can be configured.

```
Telnet 10.241.0.59                                           _ □ ×

   DTS 4135.timeserver    Moser-Baer AG
   ===================================

   NTP SERVER CONFIGURATION
   1   Configuration timeserver address 1        10.110.3.1
   2   Configuration timeserver address 2        ntp.test.org
   3   Configuration timeserver address 3
   4   Configuration timeserver address 4
   5   Configuration multi-/broadcast address 1
   6   Configuration multi-/broadcast address 2
   7   NTP Authentication
       NTP slave clock line (info only)          239.192.54.12


   99 Return



   Enter desired menu number>_

```

1.-4.   Summary about configured NTP – time sources. Select to configure.

5.-6.   Summary about configured NTP – broadcast addresses. Select to configure.

7.   NTP Authentication: Changes to the menu "NTP AUTHENTICATION"

Information about a multicast – address, configured for NTP slave clocks.

Configuration of the individual server/peer address is as follows:

```
Telnet 10.241.0.59                                             _ □ ✕

   DTS 4135.timeserver    Moser-Baer AG
   ===================================

   ENTRY TIMESOURCE                          2
   1  Source                                 ntp.test.org
   2  Minpoll                                2
   3  Maxpoll                                5
   4  Server/Peer                            server
   5  Prefer                                 off
   6  Authentication key                     off


   98 Return and save
   99 Return and discard changes


   Enter desired menu number>
```

1. Insert time sources (IP address or Name e.g. "ntp.metas.ch"
   ENTER without entry of an address will delete value.

2.-3. Configurations of **Minpoll** and **Maxpoll**: Inquiry interval 2^**poll value** in seconds.

   0 = automatically
   e.g. poll value=2 ➔ interval 2: 2^2 = 4sec., poll value=5 ➔ intervall 5: 2^5 = 32sec.
   Range of poll values (exponent): 1 – 16

   To get a exact synchronization it's better to limit Maxpoll to 6 (64 sec.).

4. Set type of inquiry: server or peer

5. Preferred source: on or off

6. Authentication key: off, key number, autokey

Notice: If a key number is entered, the entered key must also be added to the trusted keys.

Notice: All changes lead to a restart of the NTP server.

Notice: If NTP only runs as a backup (source DCF or GPS), no NTP source should be indicated as **prefer**.

Notice: Maxpoll should not be selected under 4 (16 sec), as otherwise, internal trimmung may be inaccurate.
Maxpoll and Minpoll on automatic can lead to insufficient synchronization accuracy. The specified accuracies were measured with Minpoll = 3 and Maxpoll = 6.
The configuration server should be used whenever possible.

Configuration of the Multi- / Broadcast address is as follows:

```
Telnet 10.241.0.59                                              _ □ ×

   DTS 4135.timeserver    Moser-Baer AG
   =====================================

   NTP MULTI- / BROADCAST-ENTRY                    1
   1  Multi- or  broadcast IP address             239.192.54.5
   2  Interval                                     8sec
   3  TTL (only for multicast)                     2hops
   4  Authentication key                           off




   98 Return and save
   99 Return and discard changes


   Enter desired menu number>
```

1. IP address of the destination network (multicast or broadcast).
    ENTER without entering an address will delete the entry.

2. Interval for sending out the NTP information in seconds.
    The interval is rounded after the entry to NTP standard, which only permits values
    of format 2^x: 1,2,4,8,16,32,64. Maximum 65536 seconds.

3. TTL (time to live) in hops. Only required for multicast.
    Number of routers over which the multicast packet should be transmitted: for
    simple networks without a router - enter 1, for 1 router - enter value 2.

4. Authentication key: off, key number, autokey

Notice: All changes lead to a restart of the NTP server.

Configuration of the NTP authentication:

The NTP authentication is described in chapter "8.10 NTP authentication".

```
Telnet 10.110.10.9                                              _ □ ×

  DTS 4135.timeserver    Moser-Baer AG
  ====================================

  NTP AUTHENTICATION
  1   Import keys (from /ram)
  2   Export keys (to /ram)
  3   Trusted (active) keys                   12,8,15
  4   Request keys (ntpq)                     1
  5   Control keys (ntpdc)                    2
  6   Autokey password                        Test1234
  7   Autokey command
  8   Access control for query               off

  98  Return and save
  99  Return and discard changes


  Enter desired menu number>
```

1. Import keys (from/ram directory)
   The file ntp.keys must first be copied into the directory /ram.

ℹ **Notice:** The file must be named exactly in this way and written entirely in small letters.

2. Export keys (to /ram directory)
   The current ntp.keys file is written in the directory /ram.

3. Select the trusted keys separated by commas or space

4. Select the request key

5. Select the control key

6. Set the auto key password

7. Execute for auto key commands:
   gen_iff   generate the IFF certificate
   gen_gq   generate the GQ certificate
   gen_mv   generate the MV certificate
   gen_all   generate all (IFF,GQ,MV) certificates
   gen_client   generate the client certificate
   update_server   update the server certificate
   update_client   update the client certificate
   export_iff   export the IFF server certificate to /ram. Parameter password of the client
   export_gq   export the GQ server certificate to /ram.
   export_mv   export the MV server certificate to /ram.
   import_iff   import the IFF server certificate from /ram.
   import_gq   import the GQ server certificate from /ram.
   import_mv   import the MV server certificate from /ram.
   clear_ram   delete the certificates in /ram
   clear_keys   delete the certificates in the NTP key directory
   Example: *export_iff myPassword* exports the IFF client certificate to /ram.

8. Access control for query: 0= full access (off)
                                    1 = access from local network allowed (local)
                                    2 = no access (on)

Manual time set / Leap second

```
Telnet 10.241.0.59                                              _ □ ×

   DTS 4135.timeserver    Moser-Baer AG
   ===================================

   MANUAL TIME SET
   1  Set time (UTC)
   2  Adjust time
   3  Leap second mode                        0
   4  Leap second date (UTC)                  00:00:00 01.01.11




   98 Return and save
   99 Return and discard changes



   Enter desired menu number>

```

6.5.12

1. Set UTC time in the format "hh:mm:ss DD.MM.YY ".
   Time is set with ENTER!

2. Correct time in ms (- = backwards). Range: +/-10'000ms
   Time is set with ENTER!

3. Leap second mode:
   0   off
   1   Additional second will be inserted at entered time
   -1   Second will be left out at entered time

4. Set UTC time of leap second in format: "hh:mm:ss DD.MM:YY"

For a description of the leap second, see chapter "8.9 Leap second".

6.5.13

Alarms

Under alarms, settings can be undertaken for the following functions:

- Alarm relays ➔ see chapter 6.5.14

- E-Mail ➔ see chapter 6.5.16

- SNMP traps ➔ see chapter 6.5.17

- Alarm input ➔ see chapter 6.5.18

Alarm relays

```
Telnet 10.241.0.59                                           _ □ ×

   DTS 4138.timeserver    Moser-Baer AG
   ===================================

   ALARM CONFIGURATION 2
   1  Alarmmask for relay




   98 Return and save
   99 Return and discard changes


   Enter desired menu number>_
```

1. Alarm mask for relay (see chapter "6.5.15 Alarm mask")

Alarm mask

```
Telnet 10.241.0.59                                           _ □ ×

   DTS 4135.timeserver    Moser-Baer AG
   ===================================

   ALARMMASK                                    Page 1
   [ ]=error disabled, [*]=error enabled
   [*] Bit00: DTS restart            [*] Bit01: Error bit1
   [*] Bit02: Supply voltage too low [*] Bit03: Failure supply 1
   [*] Bit04: Failure supply 2       [*] Bit05: Error voltage 5V
   [*] Bit06: Error voltage 2.5V     [*] Bit07: Error voltage 1.25V
   [*] Bit08: Wrong time zone DCF    [*] Bit09: Error Time Zone TC1
   [*] Bit10: Error Time Zone TC2    [*] Bit11: Alarm input
   [*] Bit12: Irig 1 output voltage  [*] Bit13: Irig 2 output voltage
   [*] Bit14: Error bit14            [*] Bit15: Error bit15


   Enter alarmnumber to alter mask

   Press ENTER for next part, 99 to leave>
```

Display of all the DTS 4135 alarms (64) on 4 pages. Pages can be scrolled through with ENTER.

An alarm on the current page can be switched on or off by entering an error number. The page can be exited with 99. The modifications will be saved or restored one menu level higher in "ALARM CONFIGURATION". All Alarms with "error bitxx" are not yet used.

A description of individual errors can be found in appendix "C Alarm list"...

The alarm masks for the various applications (E-Mail, SNMP, SNMP Traps, alarm relay) can differ.

E-mail

```
Telnet 10.241.0.59                                              [_][□][X]

    DTS 4135.timeserver    Moser-Baer AG
    ===================================

    MAIL CONFIGURATION
    1  Mailmode                                 on
    2  Alarmmask for mail                       ff ff ff ff ff ff ff ff
    3  Mailserver                               10.240.0.3
    4  Mailport (default 25)                    25
    5  Destination mail address1                mail1@test.org
    6  Destination mail address2
    7  Reply mail address                       mail2@test.org
    8  From mail address                        mail3@test.org

    98 Return and save
    99 Return and discard changes


    Enter desired menu number>
```

6.5.16

1. E-mail function on or off.

2. Alarm mask for e-mail notifications (see chapter "6.5.15 Alarm Mask")
   Changes are stored or reset on the overlying menu page "MAIL
   CONFIGURATION".

3. IP address of the mail server e.g. 10.249.34.5
   ENTER without entering an address will delete the entry.

4. Mail server port (often 25)

5.-6. Destination e-mail address.
   ENTER without entering an address will delete the entry.

7. Reply address (e.g. support, administrator...)
   ENTER without entering an address will delete the entry.

8. Sender address (important for authentication through the mail server)
   ENTER without entering an address will delete the entry.

Press ENTER to change to page 2.

Notice: Configuration of a gateway is required for sending e-mails (see chapter
"6.5.20 Network"). This can be set via DHCP or manually.

E-mail configuration page 2:

```
Telnet 10.241.0.59                                                    _ □ ×

   DTS 4135.timeserver    Moser-Baer AG
   ====================================

   MAIL CONFIGURATION 2
   11 Authentication mode                          1
   12 User name                                    username
   13 Password                                     password




   98 Return and save
   99 Return and discard changes


   Enter desired menu number>_
```
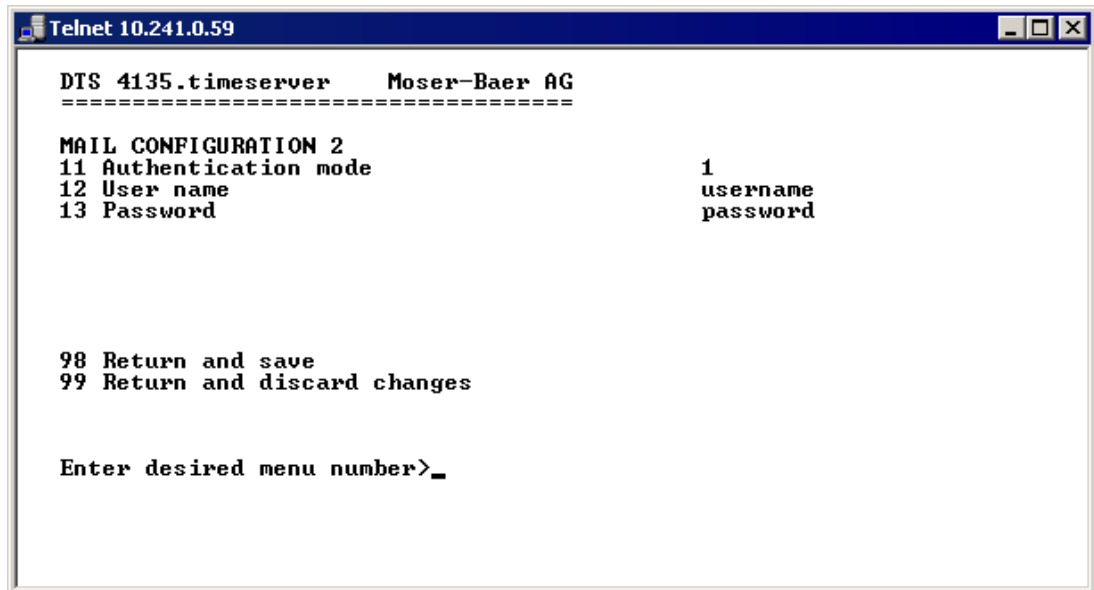
11. Authentication mode:
    0=off (sender e-mail address used for authentication)
    1=auto (tries CRAM-MD5, LOGIN- PLAIN in this sequence)
    2=PLAIN
    3=LOGIN
    4=CRAM-MD5

12. User name (only for authentication mode 1-4)

13. Password (only for authentication mode 1-4)

Press ENTER to change to page 1.
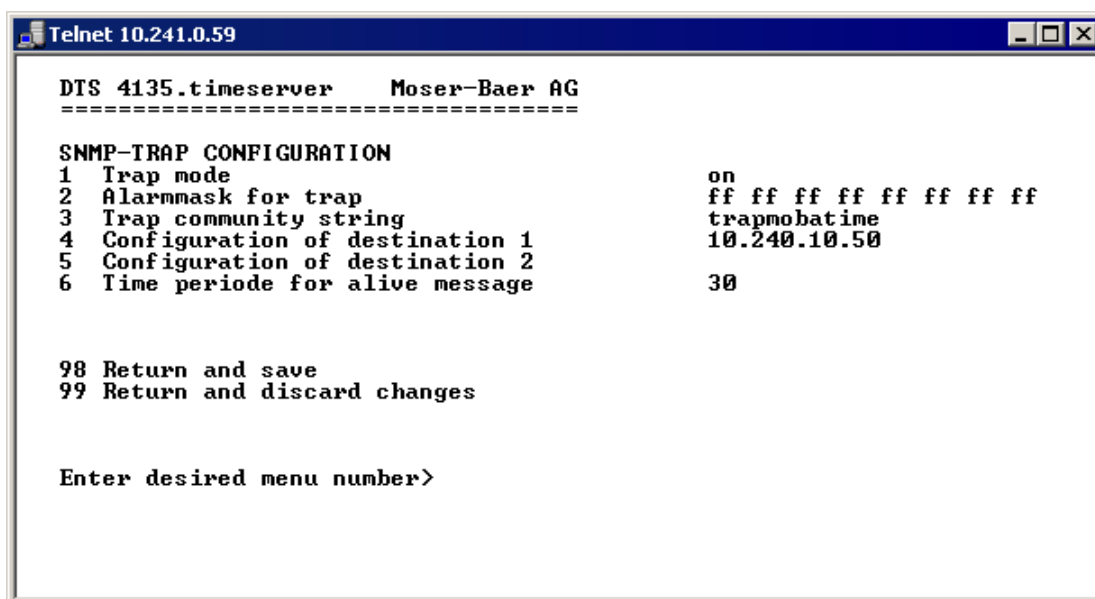
Format of an error message via E-Mail:

```
Event <Alarm 03 set: Power failure 1>
Time <11:26:45 10.01.07>
Hostname <DTS4135 (10.241.0.30)>
```

SNMP traps

For a description of SNMP functionality, see also chapter "9 SNMP".

6.5.17

```
Telnet 10.241.0.59                                          _ □ ✕

   DTS 4135.timeserver    Moser-Baer AG
   =====================================

   SNMP-TRAP CONFIGURATION
   1   Trap mode                              on
   2   Alarmmask for trap                     ff ff ff ff ff ff ff ff
   3   Trap community string                  trapmobatime
   4   Configuration of destination 1         10.240.10.50
   5   Configuration of destination 2
   6   Time periode for alive message         30


   98 Return and save
   99 Return and discard changes


   Enter desired menu number>
```

1. Trap mode on or off

2. Alarm mask for SNMP trap messages (see chapter "6.5.15 Alarm Mask")
   Changes are first stored or reset on the overlying menu page "SNMP TRAP CONFIGURATION".

3. Trap community string (group membership for traps).
   Standard: *trapmobatime*.

4. Configuration of the receiving system (trap sink) 1

5. Configuration of the receiving system (trap sink) 2

6. Time period for alive messages in seconds. 0 = no alive traps are sent
   Range: 1-7'200sec

Notice: General settings for SNMP can be found in menu '2. Configuration' ➔ '7. SNMP'. See also chapter "6.5.22 SNMP").

Notice: Configuration of a gateway is required for sending SNMP traps (see chapter "6.5.20 Network"). This can be set via DHCP or manually.

Notice: Each configuration change leads to a restart of the SNMP DTS Agent.

Configuration of the receiving systems


```
Telnet 10.241.0.59                                          _ □ ×

  DTS 4135.timeserver     Moser-Baer AG
  ====================================

  SNMP-TRAP DESTINATION CONFIGURATION          1
  1   Address trap destination                 10.240.10.50
  2   Port trap destination (default 162)      162
  3   SNMP version                             2




  98 Return and save
  99 Return and discard changes


  Enter desired menu number>_
```

1. Address of the evaluation system e.g. 10.240.10.50.
   ENTER without entering an address will delete the entry.

2. Port of the evaluation system (usually 162).

3. SNMP Version: 1=SNMP V1,   2=SNMP V2c

Notice: Each configuration change leads to a restart of the SNMP DTS Agent.

6.5.18

Alarm input

Description of the functionality of the alarm input.


```
Telnet 10.110.10.9                                          _ □ ×

  DTS 4135.timeserver     Moser-Baer AG
  ====================================

  ALARM INPUT CONFIGURATION
  1   Mode                                     off




  98 Return and save
  99 Return and discard changes


  Enter desired menu number>
```

1. Mode off, on oder inverted.

General settings

```
Telnet 10.241.0.95                                              _ □ ×

    DTS 4135.timeserver    Moser-Baer AG
    ==================================

    GENERAL SETTINGS
    1   Language                            0
    2   Timezone displayed times           [+1] Brussel
    3   Power (0=single, 1=red.)           0
    4   Password (menu)                    dts




    98 Return and save
    99 Return and discard changes


    Enter desired menu number>
```

6.5.19
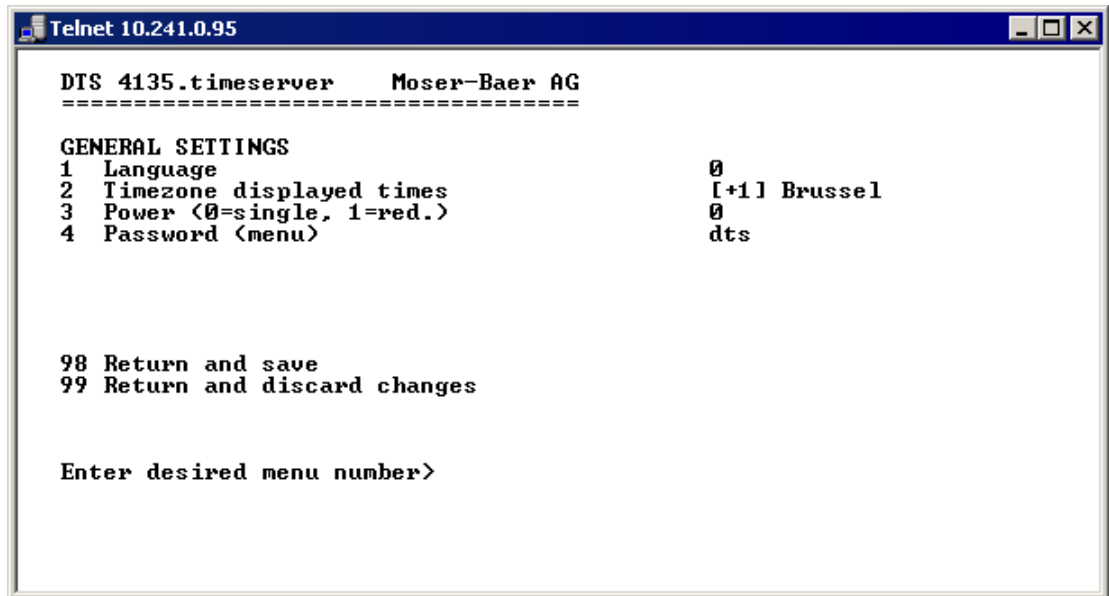
1. Setting the display language

2. Setting the time zone for the display, and also all alarm logs, e-mail and SNMP. (See chapter 6.5.25 Time Zone Selection)

3. Power: 0=simple power, 1=redundant power
   (See chapter "10 Power Supply Alternatives")

4. Enter password for the menu (user *dts*) (max. 15 characters).
   A password must be configured.

Network

```
Telnet 10.241.0.59                                          _ □ ✕

   DTS 4135.timeserver    Moser-Baer AG
   ===================================

   NETWORK GENERAL
   1  IPV4 Configuration
   2  IPV6 Configuration
   3  Host name (Device name)               DTS4135
   4  Domain name
   5  Network Interface                     auto



   98 Return and save
   99 Return and discard changes


   Enter desired menu number>_
```

1. Configuration of IPV4 parameters

2. Configuration of IPv6 parameters

3. Set host name.

Notice: **A host name must always be configured.**
Host names and their format are described in the Internet standards RFC 952 and RFC 1123:
Domains and host names may only contain letters (capitals or small letters) and numerals ("0-9"). In addition, the minus sign ("-") may also be used, as long as it is not at the end.
Everything else is not permitted!

4. Set domain e.g. test.org

5. Set network interface: Auto, 100/10Mbit, half-, full duplex.

View of the current network state in Menu: '1 Status' ➜ '6 Info network config.'

Notice: The menu is closed upon modifying the IP or the DHCP mode.
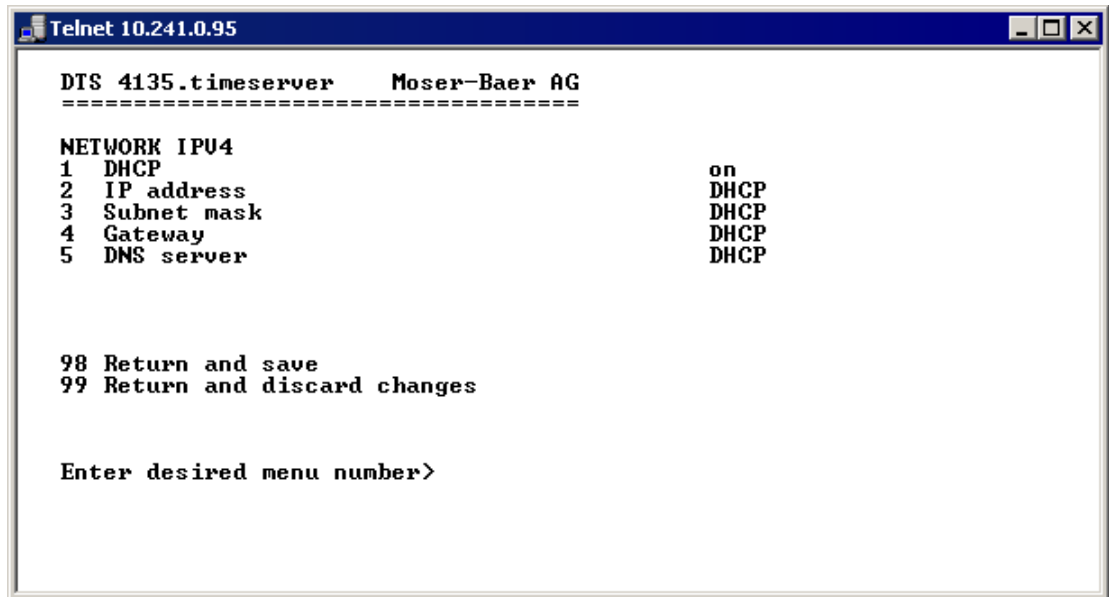
Notice: DHCP on/off, each change of this setting will result in a **restart** of the NTP server!

Notice: For the operation of a **Multicast** communication (NTP and Time Zone Server) **the configuration of a gateway is mandatory**. The gateway can be set manually or by using DHCP. If no gateway is available, the own IP address can be used.

Notice: Only one DNS server should be configured (IPv4 or IPv6).

Notice: Modifications to the network must be coordinated with the network administrator!

Network configuration IPv4:

```
Telnet 10.241.0.95                                              _ □ ×

   DTS 4135.timeserver    Moser-Baer AG
   ====================================

   NETWORK IPV4
   1   DHCP                                           on
   2   IP address                                     DHCP
   3   Subnet mask                                    DHCP
   4   Gateway                                        DHCP
   5   DNS server                                     DHCP



   98 Return and save
   99 Return and discard changes


   Enter desired menu number>
```

1. DHCP on or off, the following fields are not available in case of DHCP = on.
    A DHCP **renew** can also be triggered via this point.

Notice: DHCP on, if no DHCP server is available, leads to longer start-up time
                (<75 sec.) of the DTS 413x.

2.-5. Set IP address, subnet mask, gateway and DNS-Server. Format = 10.240.98.7

Network configuration IPv6:

```
Telnet 10.241.0.59                                          _ □ X

 DTS 4135.timeserver    Moser-Baer AG
 ====================================

 NETWORK IPV6
 1  Mode / Autoconf                        on
 2  DHCPv6                                 on
 3  IP address 1 / Prefix                  fd03:4432:4646:3454::2001/64
 4  Gateway 1                              fd03:4432:4646:3454::1
 5  DNS server                             fd03:4432:4646:3454::1



 98 Return and save
 99 Return and discard changes


 Enter desired menu number>
```
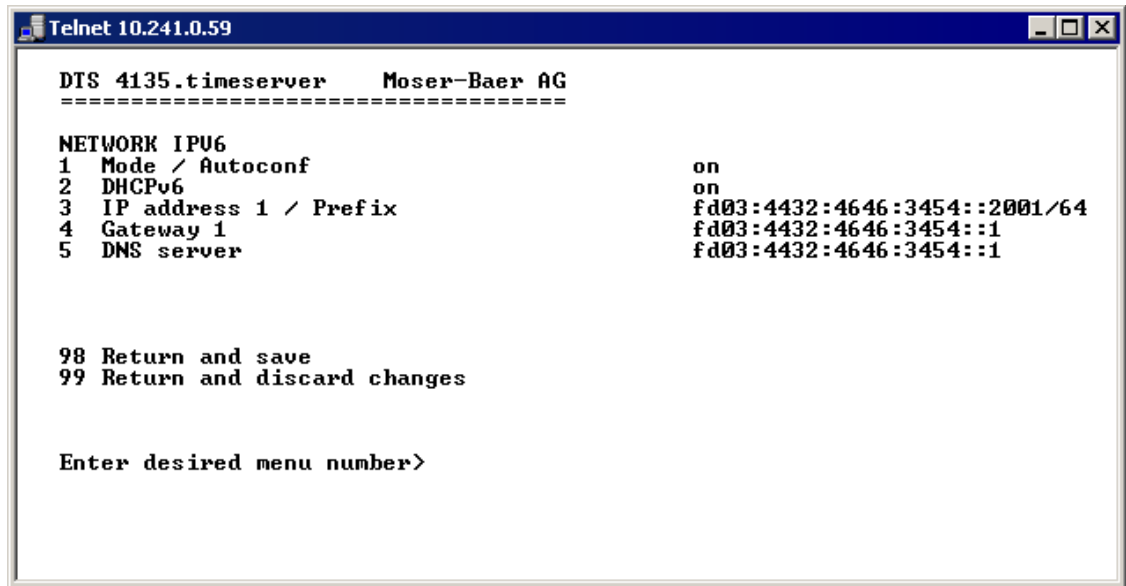
1. Autoconf on or off

2. DHCPv6 on or off

3. IP address with prefix in IPv6 format
    e.g. 2001:2345:6789::12:1:34/64

4. Gateway in IPv6 format

5. IPv6 DNS server

6.5.21

Services (network services FTP, telnet, SSH...)

Network services configuration:

```
Telnet 10.241.0.95                                          _ □ X

 DTS 4135.timeserver    Moser-Baer AG
 ====================================

 NETWORK SERVICES
 1  telnet                                 on
 2  ftp                                    on
 3  ssh, scp, sftp                         on




 98 Return and save
 99 Return and discard changes


 Enter desired menu number>
```
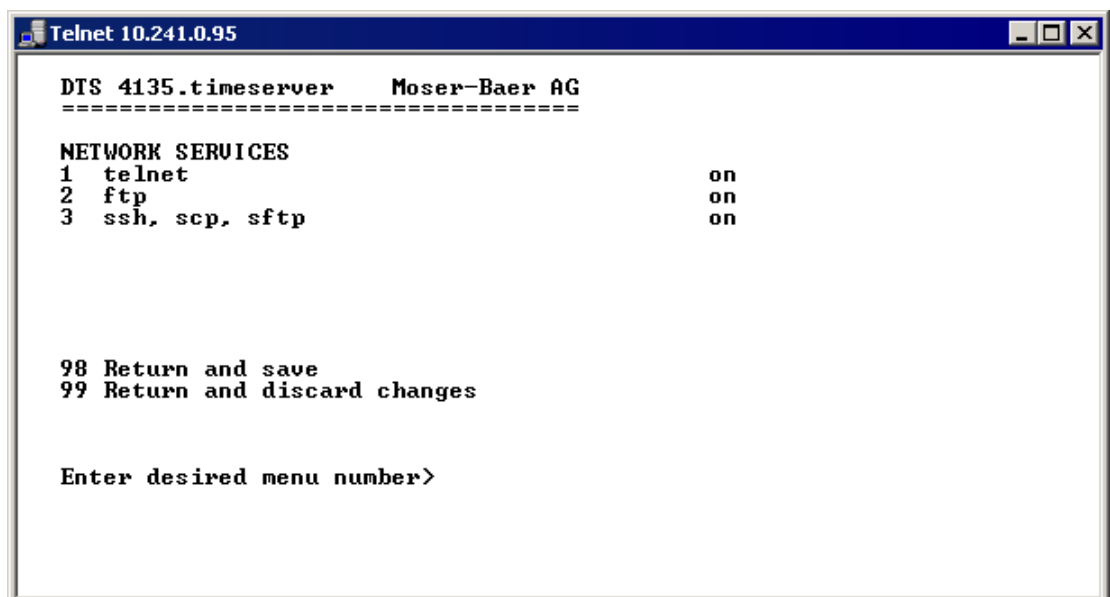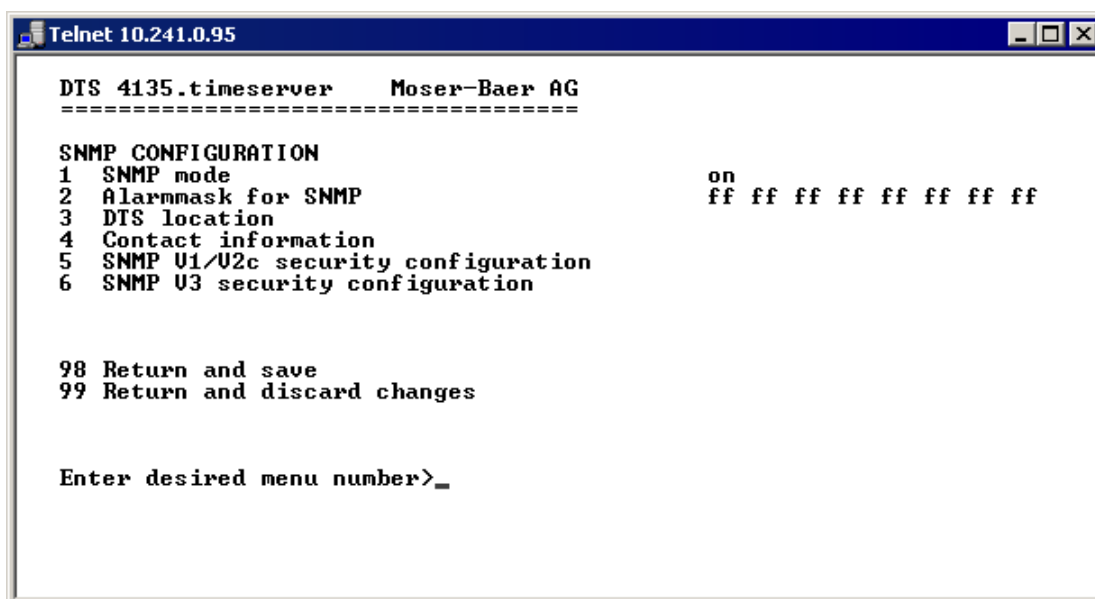
1.-3. Switch the individual services off or on.

SNMP

For a description of SNMP functionality, see also chapter "9 SNMP".

6.5.22

```
 Telnet 10.241.0.95                                      _ □ ✕

    DTS 4135.timeserver    Moser-Baer AG
    ====================================

    SNMP CONFIGURATION
    1   SNMP mode                                  on
    2   Alarmmask for SNMP                         ff ff ff ff ff ff ff ff
    3   DTS location
    4   Contact information
    5   SNMP V1/V2c security configuration
    6   SNMP V3 security configuration


    98 Return and save
    99 Return and discard changes


    Enter desired menu number>_
```

1. Mode. 0=off, 1=on. SNMP information of MIB 2 is always available.

Notice: To send out MIB-2 traps, the trap community and the destination address must at least be configured in menu '2. Configuration' ➔ '3. Alarms'➔ '3. Traps'. See also chapter "6.5.17 SNMP Traps")

2. Alarm mask for SNMP status (see chapter "6.5.15 Alarm mask"). The modifications will be saved or restored one menu level higher in "SNMP CONFIGURATION".

3. DTS Location information, which is displayed in SNMP management tool.

4. Contact information, which is displayed in SNMP management tool.

5. Configuration of SNMP V1 / V2c (specific settings). See chapter "6.5.23 SNMP V1 / V2c"

6. Configuration of SNMP V3 (specific settings). See chapter "6.5.24 SNMP V3"

Notice: Each configuration change leads to a restart of the DTS SNMP Agent.

SNMP V1 / V2c

```
Telnet 10.241.0.95                                          [_][□][X]

   DTS 4135.timeserver    Moser-Baer AG
   ====================================

   SNMP V1/V2c CONFIGURATION
   1   Readonly community string              romobatime
   2   Read/write community string            rwmobatime




   98 Return and save
   99 Return and discard changes


   Enter desired menu number>
```

6.5.23

1. Community string for **read only** (Group membership for GET).
   Standard: *romobatime.*

2. Community string for **read/write** (Group membership for GET/PUT).
   Standard: *rwmobatime.*

Notice: Each configuration change leads to a restart of the DTS SNMP Agent.

SNMP V3

```
Telnet 10.241.0.95                                            _ □ ✕

   DTS 4135.timeserver    Moser-Baer AG
   ===================================

   SNMP V3 CONFIGURATION
   1  User 1 configuration (dtsUser1)
   2  User 2 configuration (dtsUser2)
   3  Access 1 configuration (viewDTS1)
   4  Access 2 configuration (viewDTS2)



   99 Return


   Enter desired menu number>_

```

6.5.24

1. – 2.   Configuration of user-defined SNMP accounts dtsUser1 and dtsUser 2
3. – 4.   Configuration of user-defined SNMP access rights viewDTS1 and viewDTS2

Notice: Each configuration change leads to a restart of the DTS SNMP Agent.

User configuration SNMP V3:

```
Telnet 10.241.0.95                                            _ □ ✕

   DTS 4135.timeserver    Moser-Baer AG
   ===================================

   SNMP V3 USER CONFIGURATION            dtsUser1
   1  Password for authent. and privacy  mobatime
   2  Min security level                 auth
   3  Read access (read view)            _all_
   4  Write access (write view)          viewDTS1



   98 Return and save
   99 Return and discard changes


   Enter desired menu number>_

```

1. Password for authentication (MD5) and privacy (DES). 8 – 40 characters.

2. Minimal security level: 1=noauth (no authentication)
                             2=auth (only authentication)
                             3=priv (authentication and privacy)

3. SNMP read access: 0=none (no access)
                        1=all (full access)
                        2=DTS info (only DTS specific information)
                        3=user defined 1 (viewDTS1)
                        4=user defined 2 (viewDTS2)

4. SNMP write access   0=none (no access)
                        1=all (full access)
                        2=DTS info (only DTS specific information)
                        3=user defined 1 (viewDTS1)
                        4=user defined 2 (viewDTS2)

i   **Notice:**   Each configuration change leads to a restart of the DTS SNMP Agent.

Access configuration SNMP V3:

1. – 3.   Include View path, form: *.1.3..6.1.4.1.13842.4* (e.g. DTS) or *.iso*
          (complete SNMP ISO path).

4. – 6.   Exclude View path: analogue include.

i   **Notice:**   Each configuration change leads to a restart of the DTS SNMP Agent.

Time zone selection

```
Telnet 10.241.0.59                                                   _ □ ×

    DTS 4135.timeserver     Moser-Baer AG
    ====================================

    TIME ZONE - TABLE
    Zone01: 0 [0] UTC                  Zone02: 2 [+1] Brussel
    Zone03: 5 [+2] Cairo               Zone04: 19 [+9] Tokyo
    Zone05: 1 [0] London               Zone06: -1 Unknown season
    Zone07: -1 Unknown season          Zone08: -1 Unknown season
    Zone09: -1 Unknown season          Zone10: -1 Unknown season
    Zone11: -1 Unknown season          Zone12: -1 Unknown season
    Zone13: -1 Unknown season          Zone14: -1 Unknown season
    Zone15: -1 Unknown season


    Enter requested entry

    Press enter for next part, 99 to leave>
```

6.5.25
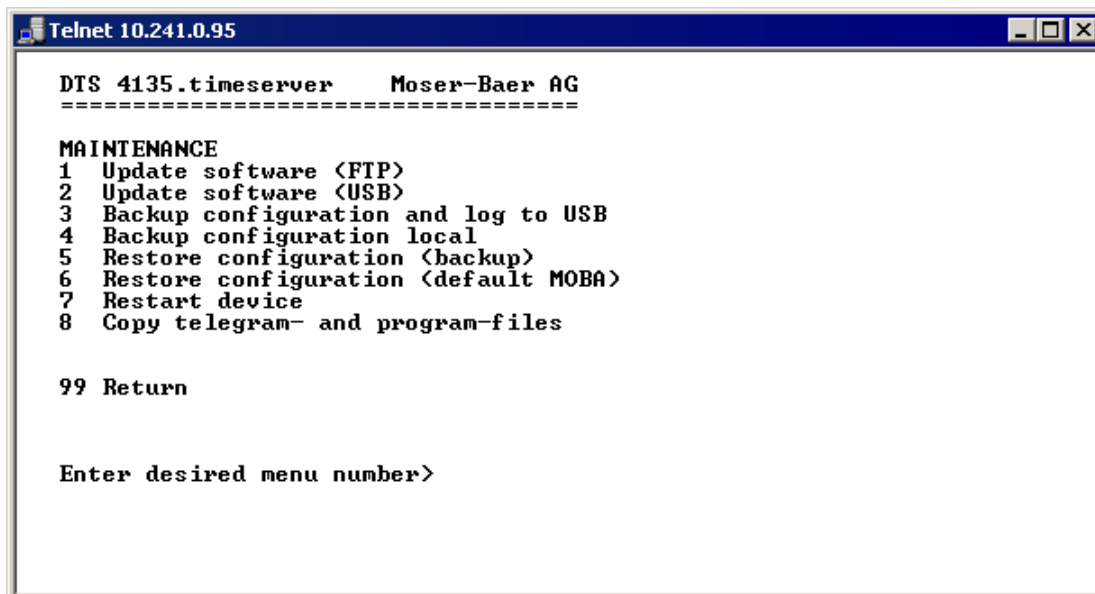
Display of all the DTS 4135 time zones (100) over several pages. The pages can be scrolled through with ENTER.

A time zone can be selected on the actual page by entering a time zone number.

Only one time zone can be selected.

Press ESC to leave the page. The modifications will be saved or restored one menu level higher.

6.6   Maintenance menu

```
Telnet 10.241.0.95                                    _ □ ×

    DTS 4135.timeserver    Moser-Baer AG
    =================================

    MAINTENANCE
    1  Update software (FTP)
    2  Update software (USB)
    3  Backup configuration and log to USB
    4  Backup configuration local
    5  Restore configuration (backup)
    6  Restore configuration (default MOBA)
    7  Restart device
    8  Copy telegram- and program-files


    99 Return


    Enter desired menu number>
```

1. Initiating a software update (files must have been copied by FTP into the directory */ram* of the DTS 413x.timeserver before). ➜ See chapter "7 Updates".
    The command always leads to a restart of the DTS 413x (even if no files were copied for update)

    Notice: Possibly save configuration first.

2. Initiate a software update (files must first be put on to a USB stick in the DTS 413x.timeserver). ➜ See chapter "7 Updates".
    The command always leads to a restart of the DTS 413x (even if no files were copied for update)

    Notice: Possibly save configuration first.

3. Save the entire configuration (incl. telegram files) and the log files on a USB stick . Also generates a diagnosis file (dts4135system_xxxxxxxxxxxx.log) in the directory /ram which is also copied on to the USB stick or which can be downloaded per FTP (only for support).

4. Backup the entire configuration locally (➜ file dts413x.conf.bkp is created).

5. Restore the entire configuration from a backup stored locally.

6. Restore the entire configuration to factory settings.

7. Restart DTS 413x.

8. Copy telegram files onto the DTS 413x.
    ➜ See chapter "7.11 Copying telegram files onto the DTS 4135.timeserver ".

See also chapter "7 Updates".

7 Updates

7.1 Image and file names

The image and file names differ between device versions:

Devices	DTS 4135 V1	DTS 4135 V2
Name Image		
Device application	dtsapp.img	dts4135app.ubifs
RootFS image	rootfs.img	dts4135rootfs.ubifs
Boot image	u-boot.bin	dts4135u-boot.imx
zImage	uImage26	dts4135zImage
Configuration	dtscfg.img	dts4135cfg.ubifs
Devicetree file	n/a	dts4135devicetree.dtb
Checksum file	dtscheck.md5	dts4135check.md5
Name File		
Application	dts4135	dtsapp
Menu	dts4135menu	dtsmenu
NTP	ntpd	ntpd
Driver module	dts4135mod.ko	dtsdriver.ko
Configuration	dts4135.conf	dts4135.conf

7.2 Updating images with MOBA-NMS

Steps for updating images using MOBA-NMS:

1. Select DTS device(s) in the device view.

2. Menu 'Edit' ➜ 'Commands' ➜ Select 'Firmware Update…'.

3. Enter the path to the file 'dtscheck.md5' or select it using the 'Browse…' button.

4. Enter further paths to images or select them using the 'Browse…' button.

5. Optionally: Check the box 'Backup device(s) configuration before update' and enter the destination directory for the backup file(s). If a destination folder is selected, the whole device configuration will be saved before the backup. Additionally, if the image 'dtscfg.img' is written too, the saved configuration can be automatically restored after the update. For this, check the box 'restore configuration after update'.

6. By clicking the 'OK' button, the update is initiated.

Important: The update procedure (item 6) can take some time (<5 min.) and may not be interrupted under any circumstances. In case of an interruption, the software on the DTS 413x is destroyed and it can only be repaired in the factory.

7.3 Updating images with FTP

Images according to table in chapter 7.1. Additionally the file dts4135check.md5 must exist.
➔ **all file names are case-sensitive.**

Steps for updating images:

1. Connect a FTP client software to the DTS 413x.timeserver e.g. with Windows file Explorer enter: *ftp://**dts@**[**IP address**]*) (as user dts).
   See also chapter "7.7 FTP-Connection"

2. If an update of the image **dtscfg.img** is made, the configuration of the DTS 413x.timeserver and the telegram files are overwritten. In order to store the configuration, the file *dts413x.conf* from the directory /**etc** and any possible telegram files must be saved from the directory /**var**/**local**/**dts**. After the update, the file can again be written on the DTS 413x.timeserver in accordance with chapter "7.4 Updating applications or configurations via FTP".

3. Change to the directory */ram*.

4. Copy the image into the directory */ram*.

5. Close FTP connection.

6. The update procedure can be started on DTS 413x.timeserver by selecting the menu '3. Maintenance' ➔ '1. Update software (FTP)' and press ENTER.
   The message "Update in progress" appears and at the same time, "Please wait!>" is shown in the command line. All images are copied. The DTS 413x.timeserver is automatically restarted on completion of the update.
   The Telnet or SSH session has to be restarted.

Notice: The update procedure (point 6) may take longer time depending on the type and number of images (<5 min) and must not be interrupted under any circumstances. If interrupted, the software on the DTS 413x will be destroyed and it has to be returned to the manufacturer for repairing.

Starting up after an update can also take some minutes (<10 min), or it can result in an additional restart, as the file systems have to be checked first.

To eliminate any mistakes during update procedure, the versions should be verified after the update.

7.4 Updating applications or configurations with FTP

To update individual files as listed in the table in chapter 7.1 on the DTS 413x, the following steps are carried out
➔ **all file names are case-sensitive**:

1. Connect a FTP client software to the DTS 413x.timeserver e.g. with Windows file Explorer enter: *ftp://**dts@**[**IP address**]*) (as user dts). See also chapter 7.7 FTP-Connection

2. Change to the directory */ram*.

3. Copy all the files to be updated into the directory */ram*.

4. Close FTP connection.

5. The update procedure can be started on DTS 413x.timeserver by selecting the menu '3. Maintenance' ➔ '1. Update software (FTP)' and press ENTER.
   The message "Update in progress" appears and at the same time, "Please wait!>"

is shown in the command line. All images are copied. The DTS 413x is automatically restarted on completion of the update. The Telnet or SSH session has to be restarted.

Notice: The update procedure (point 5) may take longer time depending on the type and number of images (<5 min) and must not be interrupted under any circumstances. If interrupted, the software on the DTS 413x will be destroyed and it has to be returned to the manufacturer for repairing.

To eliminate any mistakes during update procedure, the versions should be verified after the update.

7.5 Updating images via USB

Images according to table in chapter 7.1. Additionally the file dts4135check.md5 must exist.
➔ **all file names are case-sensitive.**

Steps for updating images:

1. Copy images to the USB stick

2. Plug the stick in the DTS 413x.timeserver

Important: USB stick plugged in:
Do **NOT** press the red button, after insering the USB stick.
Start update, before main display appears again (timeout).

3. If an update of the **dts4135cfg.ubifs** image is made, the configuration of the DTS 413x.timeserver and the telegram files are overwritten. In order to store the configuration, the file *dts413x.conf* from the directory /**etc** and any possible telegram files must be saved from the directory /**var**/**local**/**dts**. After the update, the file can again be written on the DTS 413x.timeserver in accordance with chapter "7.4 Updating applications or configurations via FTP".

4. The update procedure can be started on DTS 413x by selecting the menu '3. Maintenance' ➔ '2. Update software (USB)' and press ENTER.
The message "Update in progress" appears and at the same time, "Please wait!>" is shown in the command line. All images are copied. The DTS 413x is automatically restarted on completion of the update.
The Telnet or SSH session has to be restarted.

5. As soon as the DTS 413x is restarted, remove the USB stick.

Notice: The update procedure (point 4) may take longer time depending on the type and number of images (<5 min) and must not be interrupted under any circumstances. If interrupted, the software on the DTS 413x will be destroyed and it has to be returned to the manufacturer for repairing.

Starting up after an update can also take some minutes (<10 min), or it can result in an additional restart, as the file systems have to be checked first .

To eliminate any mistakes during update procedure, the versions should be verified after the update.

7.6   Updating applications or configurations via USB

To update individual files as listed in the table in chapter 7.1 on the DTS 413x, the following steps are carried out
➔ **all file names are case-sensitive, all names with 4135**:

1. Copy applications (or configuration) to the USB stick

2. Plug the stick in the DTS 413x

Important: USB stick plugged in:
Do **NOT** press the red button, after insering the USB stick.
Start update, before main display appears again (timeout).

3. The update procedure can be started on DTS 413x.timeserver by selecting the menu '3. Maintenance' ➔ '2. Update software (USB)' and press ENTER.
The message "Update in progress" appears and at the same time, "Please wait!>" is shown in the command line. All applications are copied. The DTS 413x is automatically restarted on completion of the update.
The Telnet or SSH session has to be restarted.

4. As soon as the DTS 413x is restarted, remove the USB stick.

Notice: The update procedure (point 0) may take longer time depending on the type and number of images (<5 min) and must not be interrupted under any circumstances. If interrupted, the software on the DTS 413x will be destroyed and it has to be returned to the manufacturer for repair.

To eliminate any mistakes during the update procedure, the versions should be verified after the update.

Important: USB stick recognition:
After removing the USB stick, wait approx. 1 min. before re-inserting the it again. Otherwise it can be, that the USB stick is not recognized.

7.7 FTP connection

Establish anonymous connection:
   ftp://[IP address of DTS 413x]
   to directly reach the sub-directory   /**ram**, e.g. Explorer *ftp://10.241.0.5*

Establish connection as/with a user:
   ftp://dts@[IP address of DTS 413x].
   e.g. with Windows file Explorer enter: *ftp://dts@10.241.0.5*
   Password: **dts** resp. the defined password for the menu.
   To directly reach the sub-directory */ram*, you can also enter
   ftp://dts@[IP address]/ram.

Establish connection with IPv6:
   The address **must** be written in brackets [ ]:
   e.g. with Windows file Explorer enter: *ftp://dts@[fd03:4432:4646:3454::2000]*

Notice: The file has to be copied in binary mode (not ASCII).

FTP tools

	Windows 7, 8, 10	Linux (Suse, Redhat)
Integrated in the system (file manager):	Windows File Explorer Start ➔ Execute: Explorer	Konqueror
Programs (examples)	CuteFTP	Kbear

7.8 SFTP connection

SFTP= SSH File Transfer Protocol

SFTP-Tools

	Windows 7, 8, 10	Linux (Suse, Redhat)
Integrated in the system (file manager):	-	Konqueror
Programs (examples)	WinSCP	-

7.9 SCP connection

SCP = Secure Copy Protocol

Notice: SCP connection can only be established when no menu (operation) is open.

The following error message can be ignored. There is no influence in the functionality of the operation:

```
Command 'groups'
failed with termination code 127 and error message
-sh: groups: not found.
```

SCP tools

	Windows 7, 8, 10	**Linux (Suse, Redhat)**
Integrated in the system (file manager):	-	With command line
Programs (examples)	WinSCP	-

7.10 Save configuration externally

(for backup or copy to another DTS 4135)

Save the current configuration via MOBA-NMS:

1. Select DTS device in the device view.
2. Menu 'Edit' ➔ Select 'Backup configuration…'.
3. Select the elements that are to be saved. (In case of doubt, select everything)
4. Click button 'Next >'.
5. Indicate destination file by clicking the 'Browse…' button.
6. Optionally: enter a free backup comment. E.g. reason for the backup, use, etc. This comment will then be shown during the restoration of the backup.
7. By clicking the 'Finish' button, the backup is created.
8. At the end of the backup, an overview of the process is shown. It shows which elements were saved and which ones are not available or could not be saved.

Save the current configuration via FTP:

1. Connect a FTP client software to the DTS 413x (with Windows file Explorer enter: ***ftp://dts@"IP address"***) (as user dts).
2. Change to the DTS 4135 directory */etc*.
3. Save the file ***dts4135.conf*** (configuration) to the user PC (e.g. copy the file to the Desktop or to the directory *My Documents*).
4. Additionally also save possible telegram files from the directory /**var**/**local**/**dts**.

Save the current configuration via USB-Stick:

The whole procedure can be analogously done with an USB stick. The copy procedure to the USB stick can be started on DTS 413x by selecting the menu '3. Maintenance' ➔ '3. Backup configuration and log to USB' and press ENTER. All files (including telegram files) will be copied into the root directory of the USB stick.

Copy configuration to another DTS 413x:

In order to copy the entire configuration or elements of it from a DTS device to another, the according assistant in MOBA-NMS can be used. For this, select the source device (from which the configuration shall be transferred) and start the assistant in the menu 'Edit' ➔ 'Transfer configuration…'. It will lead you through the individual steps.

Without MOBA-NMS, perform the procedure explained in chapter 7.4 resp. 7.6.

Notice: When copying the configuration from one DTS 413x to an other, the IP address may have to be changed after the download by serial connection.

7.11 Copying Telegram files to the DTS 4135.timeserver

Analogously to the previously described procedures telegram files can be copied via FTP or USB stick to the DTS 413x.timeserver.

The copy procedure can be started on DTS 413x by selecting the menu '3. Maintenance' ➔ '8. Copy telegram-files' and press ENTER. Afterwards, select again in the menu "6.5.4 Serial interface 1 and 2" and reload.

The files are stored in the directory /**var**/**local**/**dts** and can be deleted or copied via FTP.

Special case USB stick:
If the DTS recognizes the insertion of an USB stick, it is shown on the display. By pressing the red button the copy procedure can be released (analogously to the above described procedure). The button has to be pressed until the copy procedure is started.

Management with MOBA-NMS:
With MOBA-NMS, the files do not need to be copied manually via FTP or USB stick, since this is already integrated in the MOBA-NMS operation. At every file selection, the 'Change…' link can be clicked. This opens a file dialog which shows all files and allows new files to be loaded onto the device or existing ones to be deleted.

Example of a program file choice:

Program file: haustec1.prg ▼ Change…

Link for opening the file dialog for editing the file list.

Notice: After the file copy procedure, the output of the telegram files are re-started (take over of the files).

Notice: The **file name** is limited to **8 characters** before the dot, e.g. **IF482Std.tel**

8 Time administration

8.1 Concept of time administration

The internal master clock as well as the real-time clock runs with UTC (Universal Time Coordinated). The synchronisation inputs, the time shown on the display, as well as all outputs are linked via a time zone entry with the master clock time, i.e. all inputs and outputs can be individually allocated to a specific time zone.
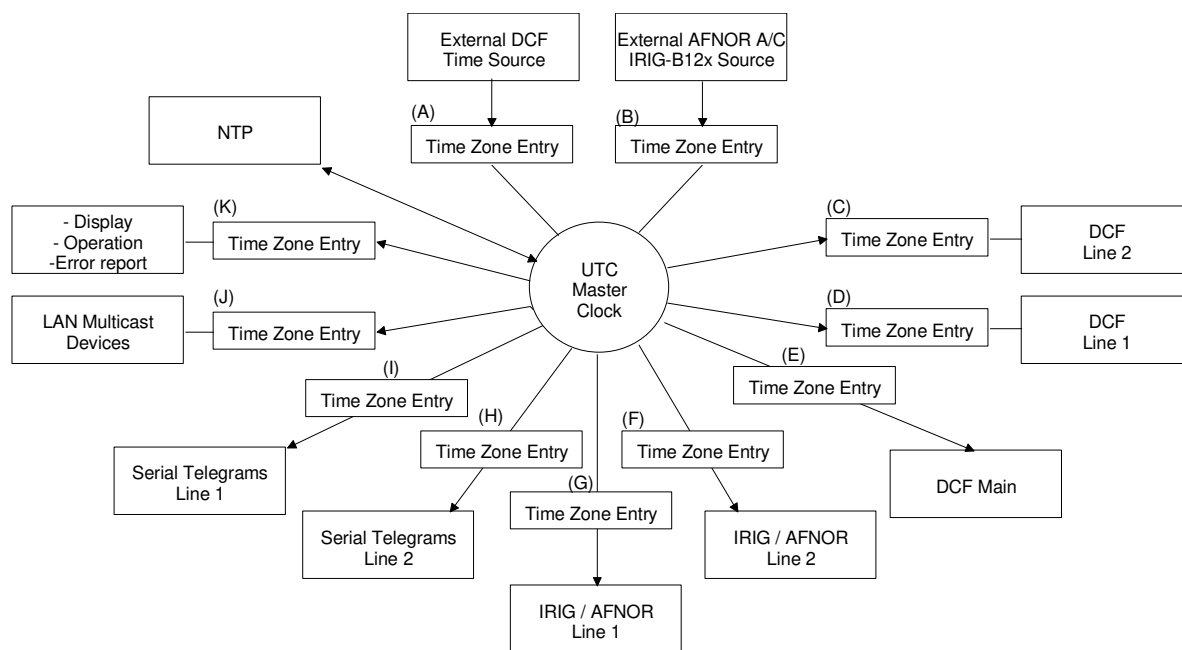
Configurable time zones:

(A)   chapter 6.5.8 Time source

(B)   chapter 6.5.8 Time source

(C)   chapter 6.5.3 DCF / Pulse / Frequency output 1 and 2

(D)   chapter 6.5.3 DCF / Pulse / Frequency output 1 and 2

(E)   chapter 6.5.2 DCF – output

(F)   chapter 6.5.5 IRIG / AFNOR / DCF-FSK Output 1 and 2

(G)   chapter 6.5.5 IRIG / AFNOR / DCF-FSK Output 1 and 2

(H)   chapter 6.5.4 Serial interface 1 and 2

(I)   chapter 6.5.4 Serial interface 1 and 2

(J)   chapter 6.5.6 NTP slave clocks / time zone server

(K)   chapter 6.5.19 General settings

             NTP always UTC

8.2 Time acceptance

Variants of time synchronization
- Adjusting:
  After starting the DTS 4135, the time is set for a first time (from source or manually). Afterwards, the time will only be aligned with maximum adjusting speed if deviating from the source ➜ **no time steps possible.**
  Configuration: see chapter "6.5.9 Time-keeping"
- Setting:
  Time deviations are always corrected in full immediately: Seconds are set immediately; partial seconds are corrected with 50ms/s.

Manual time set:
- The time is always set immediately. The stratum is set to 1 or pre-set to a fix stratum. If new source time information is available, the time will be adjusted again and the stratum set accordingly.

8.3 Time acceptance from an external source (DCF or GPS)

Acceptance from an external source (DCF input):
- At least 2 minutes reception (DCF-GPS) is required, before the NTP server is available.
  Time source stratum = 0 ➜ stratum of the DTS 4135 = 1

Stratum normal, synchronized operation:
- The stratum value behaves as follows for synchronization from the time source:
  If $St\_fix > 0$: then stratum = St_fix (particularly for manually set time) applies
  If $St\_fix = 0$: then stratum = 1

Stratum in case of error:
- The stratum value behaves as follows in the case of external time source loss:
  If $St\_fix > 0$: then stratum = St_fix applies
  If $St\_fix = 0$:
  then stratum = MIN(($t\_current$ - $t\_lastsynch$)/(To * 255), St_max) applies

- Adjusting the clock after identifying a leap in time:
  If $St\_fix > 0$:   then stratum = St_fix applies
  If $Tst > 0$ AND $St\_fix = 0$:   then stratum = MIN(Tdiff/Tst, St_max) applies
  If $Tst = 0$ AND $St\_fix = 0$:   then stratum = 1 (auto) applies

Legend:

To:	Stratum TO <0-16>, Stratum error timeout time 1-999 [h], for loss of the external source
St_fix:	0..15, configurable stratum, 0 = auto
St_max:	16
t_current [s]:	current time
t_lastsynch [s]:	time of the last synchronization
Tst:	Offset per stratum, 0..40'000 [ms], parameter time deviation for stratum alteration by 1
Tdiff:	current time difference in ms

8.4   Time acceptance from external AFNOR-A/C, IRIG-B12x source

The stratum value is calculated same as with DCF/GPS synchronization (chapter 8.3). As IRIG-B120 to 123 timecodes do not provide information about the current year, the DTS 4135 has to be synchronized first from an other time source or the date has to be set manually. The DCF input and the IRIG input cannot be used at the same time for the synchronization (redundant time source with DCF and IRIG synchronization is not possible).
AFNOR and IRIG-B126 contains the **time and date** information.

Attention: After more than 5 days without power, the DTS 4135 loses the date information. When synchronized with IRIG-B120 to 123 it has to be set again manually.

8.5   Time acceptance from NTP

Acceptance:
- As NTP RFC 1305, RFC 5905   (www.ntp.org)
  (see http://ntp.isc.org/bin/view/Servers/WebHome for internet-server)

Stratum in normal, synchronized operation:
- Stratum value of DTS is always one step higher then the actual NTP timeserver

Stratum in case of an error
- As NTP RFC 1305, RFC 5905 (www.ntp.org)

8.6   NTP as backup

If the DTS 4135 is synchronized with a DCF or GPS source, the NTP can be used as redundancy source. This function is active, as soon as at least one timeserver is configured in menu '2. Configuration' ➜ '2. Time handling ➜ '4. NTP server').

Stratum in normal, synchronized operation:
- Equal Stratum value "Time Acceptance from an external source (DCF or GPS)"

Behavior in case of an error:
- Failure of primary Source:
  "St. est":Means: Expected NTP Stratum of the NTP sources
  "St. est" = MAX(Stratum NTP candidates)
  ➜ Means: "St. est" contains the stratum value of the poorest NTP source.
  If internal Stratum > "St. est" + 1, then change to NTP as source takes place (internal stratum is one step higher then the poorest available NTP source).
  As soon as the primary source is available again, the changes are set back.

8.7   Time server

- NTP v4 (compatible with v3) as per RFC 1305, RFC 5905 (Port 123)

- SNTP (UDP), RFC2030 (Port 123)

- TIME (TCP/UDP), RFC 868 (Port 37)

- DAYTIME (TCP/UDP), RFC 867 (Port 13)

8.8   Time accuracy, time-keeping

See appendix G, Technical Data.

8.9 Leap second

The announcement of the switching second is put out by DCF and NTP each time 1 hour before the defined time.

8.10 NTP Authentication

NTP provides two variants for authentication in version 4:

- NTP symmetric keys (i.e. symmetric keys)
- NTP autokeys

NTP authentication assures a correct time source and prevents manipulation of NTP information. NTP data itself is, however, not encoded.

8.10.1 NTP symmetric keys

A 32-bit key ID and a cryptographic 64/128-bit check sum of the packet is attached to each NTP IP packet.
The following algorithms are used for this purpose:

- Data Encryption Standard (DES)
  (partly restricted in North America and no longer integrated into new NTP variants (>V4.2))
- Message Digest (MD5)

The DTS 4135 only supports the MD5 procedure.

The receiving NTP service calculates the check sum with an algorithm and compares it with the one contained in the packet. Both NTP services must have the same encryption key and the same corresponding key ID for this purpose.
Packets with a wrong key or wrong check sum will not be used for synchronization .
The DTS 4135 must be correspondingly configured to be able to use NTP authentication (chapter 0 NTP Server). The NTP service of the other equipment (e.g. server, PC...) must also be configured. In the case of standard NTP, this occurs via the ntp.conf file:

```
# path for key file
keys /etc/ntp/ntp.keys
trustedkey 1 2 3 4 5 6# define trusted keys
requestkey 4 # key (7) for accessing server variables
controlkey 5 # key (6) for accessing server variables

server ntp1.test.org key 2
server ntp2.test.org key 6
server 192.168.23.5 key 3
```

The description of the ntp.conf file can be accessed via the corresponding man-page, or consulted at http://www.eecis.udel.edu/~mills/ntp/html/authopt.html

The authentication mode is automatically activated when a key is used and the paths for the keys have been correspondingly configured.

`trustedkey` defines all keys currently permitted

`requestkey` defines the key for the ntpq help tool.

`controlkey` defines the key for the ntpdc help tool.

The keys are located in the ntp.keys file defined with `keys`. This has the following format:

```
1    M     TestTest
2    M     df2ab658
15   M     I_see!
498  M     NTPv4.98
```

The key ID is in the first column of the file, the format of the keys in the second defined column, and the key itself in the third. There are four key formats, however, nowadays only the MD5 is still used ➜ M. The letter M is no longer written for new NTP variants (>V4.2) and is only necessary for backwards compatibility.
The signs ' ', '#', '\t', '\n' and '\0' are not used in the MD5 ASCII key! Key 0 is reserved for special purposes and should, therefore, not be used here.

ntp.keys: man page for ntp.keys to be noted (check the internet)

8.10.2 NTP Autokey

The validity of the time received to the NTP clients is assured by symmetric keys. For a higher degree of certainty, exchanging the keys used regularly is, however, necessary to obtain protection, e.g. from replay attacks (i.e. attacks in which recorded network traffic is simply played back).

The autokey procedure was introduced as the exchange is very involved in a large network. A combination of group keys and public keys enables all NTP clients to check the validity of the time information which they receive from servers in their own autokey group.

NTP Autokey is relatively complex in its use and studying the functionality is definitely necessary beforehand.

Autokey is descrbied at *http://www.cis.udel.edu/~mills/proto.html* or on the NTP homepage *http://www.ntp.org*.

Autokey is currently defined in an IETF draft.
http://www.ietf.org/internet-drafts/draft-ietf-ntp-autokey-04.txt

The configuration of Autokey is explained in
http://support.ntp.org/bin/view/Support/ConfiguringAutokey or in
http://www.ntp.org/ntpfaq/NTP-s-config-adv.htm#S-CONFIG-ADV-AUTH.

8.11   Redundant operation of 2 DTS 4135.timeservers

For redundant operation two DTS 4135 devices are synchronized via optical fibers. For this purpose, a mini GBIC module is plugged into both devices and connected via optical fibers (see Appendix G, Technical Data):

mini GBIC Module

Both devices have a GPS receiver in redundant operation. Both devices are configured for the redundant mode, but are basically equal and work out the master/slave role among themselves. The slave is always synchronized to the master in operation. The slave supervises the system time on the basis of its own GPS time and generates an error message, should the time difference amount exceed the configurable value of n milliseconds.
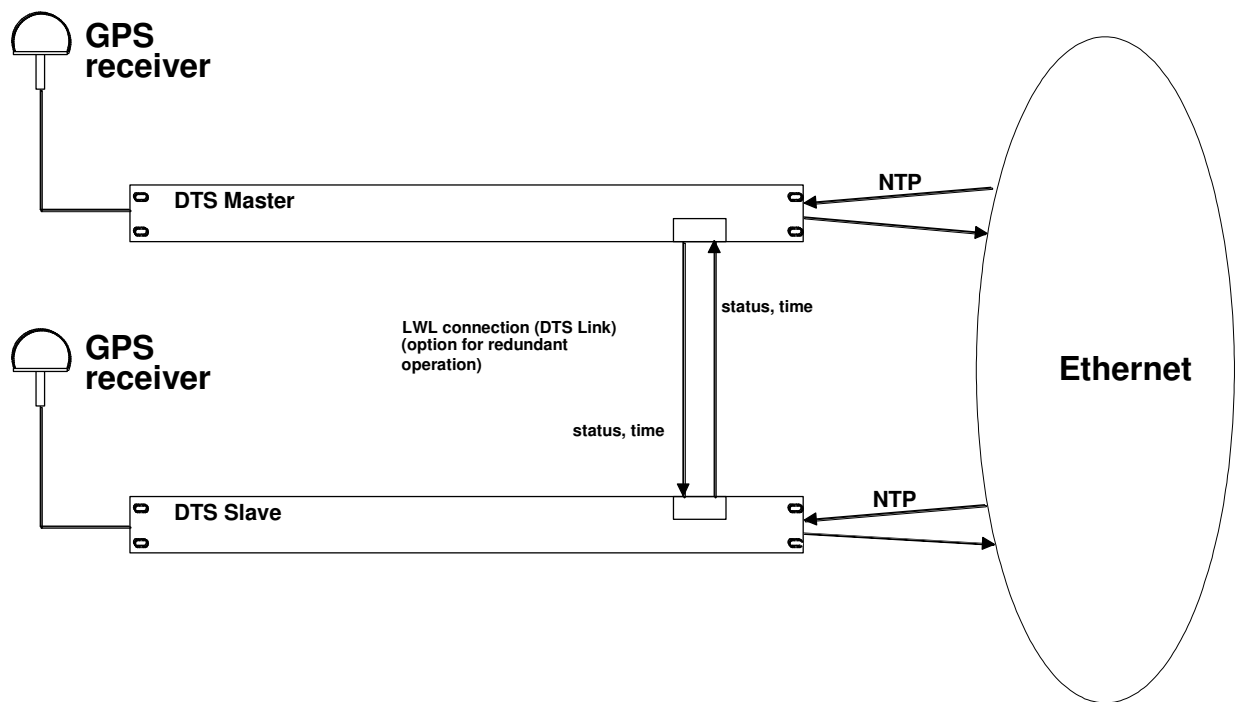
- Starting the devices with fiber optic connection
  The devices work out among themselves which is the master (normally the one synchronized first)

- Starting the devices without fiber optic connection
  The devices do not send out any time information until there is an LWL connection, or the devices are reconfigured.

- The slave synchronizes to the master.
  Whereby stratum/slave = stratum/master +1
  The time of the slave is always set immediately to the master time (no fine adjustment).

- In case of loss of the master GPS, the master stratum increases on the basis of the configurable parameters up to the maximum stratum. The slave follows, i.e. the slave stratum is always 1 higher. The slave takes over the master role from a configurable stratum value (if the status of the slave is better than that of the master) and synchronizes to its own GPS. The previous master becomes the slave. This distribution of roles remains until the new master loses GPS synchronization.

- In the case of a loss of the master, the slave takes over the master function.

- If the former master is working again, it takes over the actual time of the current master and remains in slave mode.

- In the case of an fiber optic connection loss, the slave checks the status of the master over the network and remains in slave mode as long as the master is accessible and is working normally. If the master is no longer accessible, no longer sends out any NTP, or has a worse status, the slave takes over the master function.

NTP

The NTP clients select the server with the lower stratum.

DCF77 coded (fiber optic output)

No redundancy

---

9 SNMP

9.1 General

The SNMP version **V2c** or **V3** for *Get*, *Set* and **V1** or **V2c** for *Notification* (Trap) is used.

A full SNMP agent is implemented on the DTS (MIBII, DTS4135).

For SNMP V2c, following standard *Communities* are used:
Read only :   *romobatime*
Read/write: *rwmobatime*
Trap: *trapmobatime*

For SNMP V3, following standard *User I Passwords* are used:
dtsUser1:   *mobatime*
dtsUser2:   *mobatime*
dtsInfo: *mobatime*   *(not changeable, read only)*

DtsUser1 and dtsUser2 have full read/write access on all objects. With SNMP V3 rules, access can be reduced. Changes of the rules can only be modified over the DTS menu but not via SNMP.

SNMP V3 agent supports user validation (authentication MD5) and encoding (encryption DES).

MIBII values like sysDescr, sysContact, sysName, or sysLocation can only be modified over the DTS menu but not via SNMP.

The following MIB definitions are used:

SNMPv2-SMI, SNMPv2-MIB, SNMPv2-CONF, SNMPv2-TC, SNMPv2-TM, SNMP-FRAMEWORK-MIB, SNMP-MPD-MIB, SNMP-NOTIFICATION-MIB, SNMP-TARGET-MIB, SNMP-USER-BASED-SM-MIB, SNMP-VIEW-BASED-ACM-MIB, RFC1213-MIB, IF-MIB, IP-MIB, IP-FORWARD-MIB, TCP-MIB, UDP-MIB, HOST-RESOURCES-MIB, HOST-RESOURCES-TYPES, DISMAN-EVENT-MIB, NOTIFICATION-LOG-MIB, UCD-SNMP-MIB, NET-SNMP-MIB, NET-SNMP-TC

SNMP V2c,V3:
DTS-COMMON   (File: DTS-COMMON-MIB.TXT)
   General DTS definition, always required
DTS4135   (DTS4135-MIB.TXT)
   Device specific DTS definitions

SNMP V1:
DTS-COMMON   (File: DTS-COMMON-MIBv1.TXT)
   General DTS definition, always required
DTS4135   (DTS4135-MIBv1.TXT)
   Device specific DTS definitions

The MIB files can be copied from the DTS 4135 with FTP (For FTP use, see chapter "7.7 FTP Connection"):
DTS-MIB: /etc/snmp/mibs/
Standard MIBS: /usr/share/snmp/mibs/

9.2 Device configuration with SNMP

If one or several variables are set with *Put* in a configuration group, the variable *dts4135????ConfigCmd* must be set at the end to 1 in the corresponding group. The values of the entire configuration group are assumed from the DTS with this command (1=accept).

As long as the accept command has not been set, the changed variables can be restored to the old values by setting the *dts4135????ConfigCmd* variable to 2 (2=undo, restore).

After sending the accept command, a dts4135ConfigChanged *Notification* is sent.

The definitions of the available variables can be taken from the MIB files.

Example:

Management-System		DTS
Put dts4135FTPMode=1	→	Variable is set to 1 internally
Put dts4135NetServicesConfigCmd=1	→	Configuration group is assumed
	←	Sends dts4135ConfigChanged *Notification*
		with the new time dts4135NetConfigChangedTime

9.3 DTS subagent SNMP notification

Protocol: SNMPv2c Notification

For *Notifications* to be sent out, SNMP must be switched on. In addition, at least one receiver system must be configured.

9.3.1 Start up   [dts4135StartUp]

Sent out when the subagent for the DTS is started.

This *Notification* is always sent out, as soon as SNMP is activated and a destination address is configured.

9.3.2 Shutdown   [dts4135Shutdown]

Sent out when the subagent for the DTS is stopped.

This *Notification* is always sent out, as soon as SNMP is activated and a destination address is configured.

9.3.3 Status changed [dts4135StatusChanged]

Sent out when the subagent detects a status change in the DTS application process. The following variables are monitored for changes:

dts4135SysStatus, dts4135SysTimeSource, dts4135SysStratum, dts4135SysMasterMode

This *Notification* is always sent out, as soon as SNMP is activated, and a destination address is configured.

The *Notification* sent out contains the following data:

Field	Type	Size	Description	Example
dts4135SysStatus	Unsigned Int	4 Bytes	Contains the internal system status	`66309`
dts4135SysOffset	Integer	4 Bytes	Actual time offset of the system [us]	`-1523` → `-1.523ms`
dts4135SysStratum	Byte	1 Byte	Actual system stratum level	`1`
dts4135NTPInfoCurrent Source	Byte	1 Byte	Current NTP time source (system peer)	`2`

9.3.4 Configuration changed [dts4135ConfigChanged]

Sent out when the subagent detects a configuration change in the DTS application processes.

This *Notification* is always sent out, as soon as SNMP is activated and a destination address is configured.

The *Notification* sent out contains the following data:

Field	Type	Size	Description
dts4135SysConfigChangedTime	TimeTicks	4 Bytes	Contains the TimeTicks value of the last change in 1/100tth seconds
dts4135NetServicesConfigChangedTime	TimeTicks	4 Bytes	
dts4135NetConfigChangedTime	TimeTicks	4 Bytes	
dts4135RedOpConfigChangedTime	TimeTicks	4 Bytes	
dts4135TSConfigChangedTime	TimeTicks	4 Bytes	
dts4135NTPConfigChangedTime	TimeTicks	4 Bytes	
dts4135OutLine1DCFConfigChangedTime	TimeTicks	4 Bytes	
dts4135OutLine2DCFConfigChangedTime	TimeTicks	4 Bytes	
dts4135OutLine1SerialChangedTime	TimeTicks	4 Bytes	
dts4135OutLine2SerialChangedTime	TimeTicks	4 Bytes	
dts4135OutLine1IRIGChangedTime	TimeTicks	4 Bytes	
dts4135OutLine1IRIGChangedTime	TimeTicks	4 Bytes	
dts4135OutLineTZServerConfigChangedTime	TimeTicks	4 Bytes	
dts4135RelayConfigChangedTime	TimeTicks	4 Bytes	
dts4135MailConfigChangedTime	TimeTicks	4 Bytes	
dts4135SnmpConfigChangedTime	TimeTicks	4 Bytes	

The *ConfigChangedTime* variables show the time of the last change of the relevant configuration group. The management system can decide on the basis of these time values, which configurations need to be reloaded.

Configuration group table

Configuration group	Variable
dts4135SysConfigChangedTime	dts4135Language dts4135Timezone dts4135Password dts4135DisplayTimezone dts4135DisplayTimeFormat dts4135PowerSupply
dts4135NetConfigChangedTime	dts4135IPAddr dts4135IPMask dts4135IPGateway dts4135IPNameserver dts4135Hostname dts4135Domain dts4135DHCPMode dts4135EthernetLinkMode dts4135IPv6AutoConf dts4135IPv6DHCPMode dts4135IPv6Addr1 dts4135IPv6Prefix1 dts4135IPv6Gateway1 dts4135IPv6Addr2 dts4135IPv6Prefix2 dts4135IPv6Gateway2 dts4135IPv6Nameserver
dts4135NetServicesChangedTime	dts4135TelnetMode dts4135FTPMode dts4135SSHMode
dts4135TSConfigChangedTime	dts4135TSType dts4135TSStratumMode dts4135TSStratumErrorLimit dts4135TSTimeout dts4135TSStratumTimeout1 dts4135TSOffsetPerStratum dts4135TSMaxOffsetForTimeValid dts4135TSDCFAdjusment dts4135TSAdjusmentMode dts4135TSMaxAdjusmentSpeed dts4135TSQuartzType dts4135TSOffsetSynchOnly dts4135TSLeapSecMode dts4135TSLeapSecDate
dts4135RedOpConfigChangedTime	dts4135RedOpMode dts4135RedOpSwitchOverStratum dts4135RedOpMaxOffsetSlaveTimeSource dts4135RedOp2ndDTSIPAddress dts4135RedOp2ndDTSIPPort
dts4135NTPConfigChangedTime	dts4135NTPBroadcastAddr1 dts4135NTPBroadcastInterval1 dts4135NTPBroadcastTTL1 dts4135NTPBroadcastKey1 dts4135NTPBroadcastAddr2 dts4135NTPBroadcastInterval2 dts4135NTPBroadcastTTL2 dts4135NTPBroadcastKey2 dts4135NTPSourceTable (Address, min/max poll, mode, prefer)
dts4135RelayConfigChangedTime	dts4135RelayAlarmMask
dts4135MailConfigChangedTime	dts4135MailMode dts4135MailAlarmMask dts4135MailServerIPAddress

	dts4135MailServerPort dts4135MailAddrDestination1 dts4135MailAddrDestination2 dts4135MailAddrReply dts4135MailAddrFrom dts4135MailUser dts4135MailPassword dts4135MailAuthMode
dts4135SnmpConfigChangedTime	dts4135SnmpMode dts4135SnmpAlarmMask dts4135SnmpROCommunity dts4135SnmpRWCommunity dts4135SnmpTrapMode dts4135SnmpTrapAlarmMask dts4135SnmpTrapCommunity dts4135SnmpTrapListenerIPAddress1 dts4135SnmpTrapListenerPort1 dts4135SnmpTrapVersion1 dts4135SnmpTrapListenerIPAddress2 dts4135SnmpTrapListenerPort2 dts4135SnmpTrapVersion2 dts4135SnmpTrapAliveMsgInterval dts4135SnmpLocation dts4135SnmpContact dts4135SnmpV3UserPassword1 dts4135SnmpV3UserLevel1 dts4135SnmpV3UserRead1 dts4135SnmpV3UserWrite1 dts4135SnmpV3UserPassword2 dts4135SnmpV3UserLevel2 dts4135SnmpV3UserRead2 dts4135SnmpV3UserWrite2 dts4135SnmpV3View11 dts4135SnmpV3View12 dts4135SnmpV3View13 dts4135SnmpV3View14 dts4135SnmpV3View15 dts4135SnmpV3View16 dts4135SnmpV3View21 dts4135SnmpV3View22 dts4135SnmpV3View23 dts4135SnmpV3View24 dts4135SnmpV3View25 dts4135SnmpV3View26
dts4135OutLineTZServerConfigChangedTime	dts4135OutLineTZServerMode dts4135OutLineTZServerMCastAddr dts4135OutLineTZServerMCastPort dts4135OutLineTZServerNTPInterval dts4135OutLineTZServerTTL dts4135OutLineTZServerTableInterval dts4135OutLineTZServerEntryInterval dts4135OutLineTZServerTable (TZ entry number)
dts4135OutLine1DCFConfigChangedTime	dts4135OutLine1DCFTimezone dts4135OutLine1DCFPulseType dts4135OutLine1DCFPulseTime dts4135OutLine1DCFPulsePeriod dts4135OutLine1DCFPulseCorrection dts4135OutLine1DCFFrequency
dts4135OutLine2DCFConfigChangedTime	dts4135OutLine2DCFTimezone dts4135OutLine2DCFPulseType dts4135OutLine2DCFPulseTime dts4135OutLine2DCFPulsePeriod dts4135OutLine2DCFPulseCorrection dts4135OutLine2DCFFrequency

dts4135OutLine1SerialConfigChangedTime	dts4135OutLine1SerialMode dts4135OutLine1SerialTimezone dts4135OutLine1SerialComMode dts4135OutLine1SerialComParam dts4135OutLine1SerialTeleFile
dts4135OutLine2SerialConfigChangedTime	dts4135OutLine2SerialMode dts4135OutLine2SerialTimezone dts4135OutLine2SerialComMode dts4135OutLine2SerialComParam dts4135OutLine2SerialTeleFile
dts4135OutLine1IRIGConfigChangedTime	dts4135OutIRIG1IRIGMode dts4135OutLine1IRIGTimezone dts4135OutLine1IRIGOutputLevel dts4135OutLine1IRIGAlarmLevel
dts4135OutLine2IRIGConfigChangedTime	dts4135OutIRIG2IRIGMode dts4135OutLine2IRIGTimezone dts4135OutLine2IRIGOutputLevel dts4135OutLine2IRIGAlarmLevel

9.3.5 Alive notification [dts413xAlive]

Sent out in a configurable interval.

This *Notification* is always sent out, as soon as SNMP and the alarm traps are activated and a destination address is configured.

The *Notification* sent out contains the following data:

Field	Type	Size	Description	Example
dts413xSysStatus	Unsigned Int	4 Bytes	Contains the internal system status	66309
dts413xSysAlarms	Byte Array	8 Bytes	64 Bit Alarm flags 1.Byte Bit 0..7 2.Byte Bit 8..15 :: 8.Byte Bit 56..63	FFF870FF.FFFFFFFF ¦ ¦ ¦ ¦ ¦ 5.Byte ¦ 2.Byte 1.Byte

9.3.6 Alarm notification [dts413xAlarm]

Sent out if alarm status changes, i.e. *Notification* is sent out when an alarm flag is set or deleted.

This *Notification* is always sent out, as soon as SNMP and the alarm traps are activated and a destination address is configured.

The *Notification* sent out contains the following data:

Field	Type	Size	Description	Example
dts413xTrapAlMsgErrorNr	Byte	1 Byte	No. of the alarm bit (0..63)	3
dts413xTrapAlMsgErrorState	Byte	1 Byte	0 = alarm bit was deleted 1 = alarm bit was set	1
dts413xTrapAlMsgErrorTime	Unsigned Int	4 Bytes	PC-time in seconds since 01.01.1970 00:00:00	946684805
dts413xTrapAlMsgErrorText	Text	59 Bytes	Error text	Failure supply 1

10 Power supply variants

The DTS 413x.timeserver permits 3 different power supply alternatives:

1. Mains supply with 90 – 240 V / 50 - 60 Hz

Notice: In the menu: '2 Configuration' ➜ '4 General' ➜ '3 Power' must be set to '0=single'.

2. DC power supply with 24VDC +20% / -10% to DC in 1 or DC in 2

Notice: In the menu: '2 Configuration' ➜ '4 General' ➜ '3 Power' must be set to '0=single'.

3. Redundant power supply
with the following variants:

	Supply1:	**Supply2:**
Variant 1	Mains supply	DC in 2
Variant 2	DC in 1	DC in 2

Supply is checked once per minute for correct functioning. The alarm 'loss of power 1' or 'loss of power 2' is set in case of error.

Notice: In the menu: '2 Configuration' ➜ '4 General' ➜ '3 Power' must be set to '1=redundant'.

Block diagram of power supply:
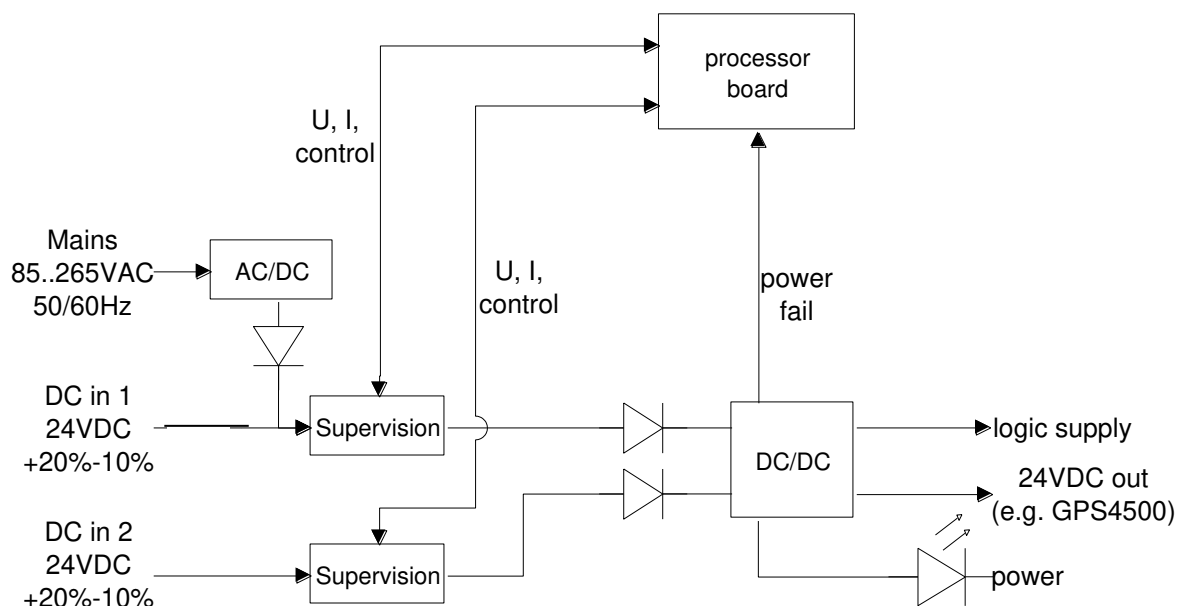
The mains supply and the DC in 1 input are internally linked, but protected against "Back powering".

A   Connection diagrams

A.1   Front connections
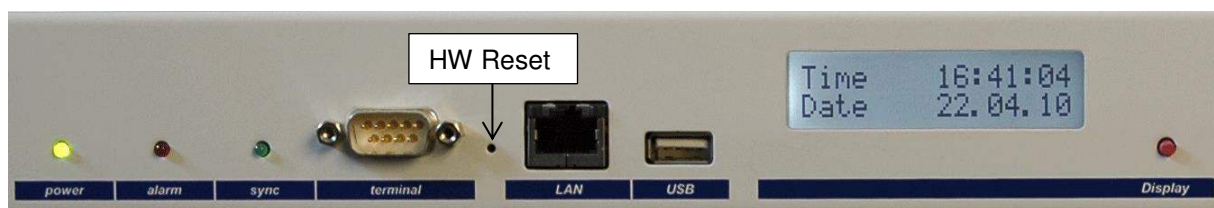
PC - Terminal Connection:

Type of connector: Sub-D 9p connector (male)
Interface: RS232
Baud rate: 38400 Bauds
Data Bits: 8
Parity: no
Stop Bit: 1
Flow control: no

Cable DTS 413x – PC: Crossed cable, female – female connectors (null modem)
 (DTE-DTE)   Max. length of the connection 3m

Connections between female connector 1 (SUB-D 9 / 1) and female connector 2 (SUB-D 9 / 2)

	SUB-D 9 / 1	SUB-D 9 / 2	
Receive Data *	2	3	Transmit Data
Transmit Data *	3	2	Receive Data
Data Terminal Ready	4	1 & 6	Data Set Ready & Carrier Detect
System Ground *	5	5	System Ground
Data Set Ready & Carrier Detect	1 & 6	4	Data Terminal Ready
Request to Send	7	8	Clear to Send
Clear to Send	8	7	Request to Send

* At least needed connections.

LAN Connection:

Plug: RJ45
Interface: Ethernet, 10/100Mbit half or full duplex
Use only shielded cables!

USB Connection:

Plug: USB-Host

Notice: Only permitted for the operations with a USB stick!

A.2 Connections (rear view)
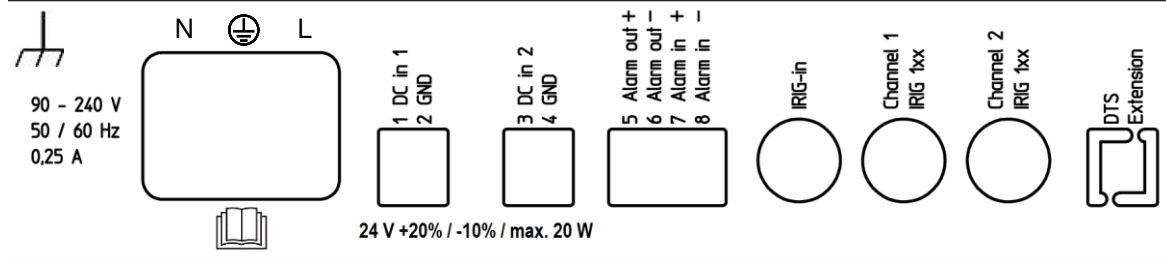
DTS 4135 connections
For technical data see in Appendix "G Technical data"

Clamp	Connection	Description
⏚	Earth connection	
L	Mains connection phase	Mains power input with rubber connector
⏚	Mains connection earth	*Break point: by disconnecting the rubber connector*
N	Mains connection neutral	See Appendix G
1	DC in 1 power supply +	Input for external DC supply
2	DC in 1 power supply GND	Ground
3	DC in 2 power supply +	Input for external DC supply
4	DC in 2 power supply GND	Ground
5	Alarm relay	Alarm contact, open when alarm is active
6	Alarm relay	Switching load: 30 W (125 VDC or 1 A), e.g. 1 A @ 30 VDC or 60 VA (150 VAC or 1 A), e.g. 0.5 A @ 120 VAC
7	Alarm input +	Nominal 24 VDC, max. 100 mA
8	Alarm input -	Alarm input: e.g. for external closing contact between Alarm_in + and Alarm_in - . Or voltage input: 18-36 VDC, max. 6mA Voltage level "high" (24V available) or external contact closed ➔ configurable: alarm or no alarm.
IRIG-In	BNC	AFNOR-A/C, IRIG-B12x synchronization input
IRIG 12x Channel 1	BNC: IRIG-B12x output	AFNOR-A/C, IRIG-B12x and DCF-FSK output for IRIG-Line 1
IRIG 12x Channel 2	BNC: IRIG-B12x output	AFNOR-A/C, IRIG-B12x and DCF-FSK output for IRIG-Line 2
DTS Extension	DTS-Extension	DTS-Extension-Bus

RS232 Tx 9 | RS232 Rx 10 | GND 11 | RS485 A 12 | RS485 B 13 | RS422 + 14 | RS422 – 15 | Current + 16 | Loop – 17 | RS232 Tx 18 | RS232 Rx 19 | GND 20 | RS485 A 21 | RS485 B 22 | RS422 + 23 | RS422 – 24 | Current + 25 | Loop – 26 | RS422 + 27 | RS422 – 28 | Current + 29 | Loop – 30 | RS422 + 31 | RS422 – 32 | Current + 33 | Loop – 34 | DCF in + 35 | DCF in – 36 | DCF out + 37 | DCF out – 38 | VB + 39 | GND 40

Serial 1 | Pulse 1 | Serial 2 | Pulse 2 | Channel 1 IRIG 0xx | Channel 2 IRIG 0xx | DCF in | DTS Link TX RX | EFR
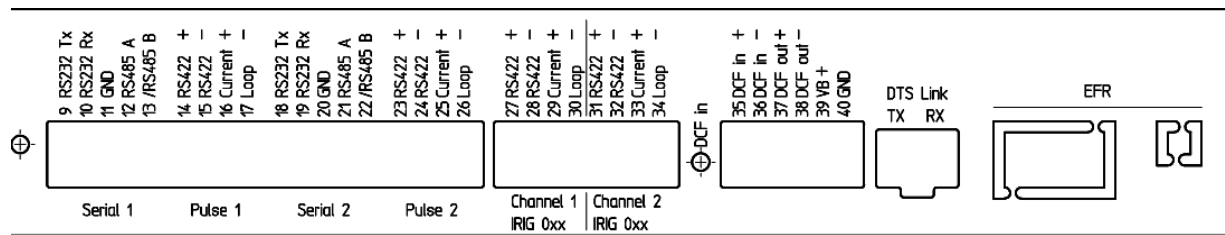
Clamp	Connection	Description
9	RS232 Tx	RS232 interface of line 1 (Exclusive to the RS485 interface line 1; internally the same interface)
10	RS232 Rx	
11	GND	
12	RS485 A	RS485 interface of line 1 (Exclusive to the RS232 interface line 1; internally the same interface)
13	RS485 B	
14	RS422 + Pulse 1	RS422 output line 1 for DCF, pulse and frequency output (internally the same source of signal like for the current loop output)
15	RS422 – Pulse 1	
16	CL + Pulse 1	Current loop line 1 for DCF, pulse and frequency output ("Current loop" passive, optocoupler: U_{max}= 50VDC, I_{max} = 10mA)
17	CL – Pulse 1	
18	RS232 Tx	RS232 interface of line 2 (Exclusive to the RS485 interface line 2; internally the same interface)
19	RS232 Rx	
20	GND	
21	RS485 A	RS485 interface of line 2 (Exclusive to the RS232 interface line 2; internally the same interface)
22	RS485 B	
23	RS422 + Pulse 2	RS422 output line 2 for DCF, pulse and frequency output (internally the same source of signal like for the current loop output)
24	RS422 – Pulse 2	
25	CL + Pulse 2	Current loop line 1 for DCF, pulse and frequency output ("Current loop" passive, optocoupler: U_{max}= 50VDC, I_{max} = 10mA)
26	CL – Pulse 2	
27	RS422 +	Digital IRIG-B signal (00x) of the IRIG line 1 See Appendix A.5
28	RS422 –	
29	Current Loop +	Digital IRIG-B signal (00x) of the IRIG line 1 as current-loop ("Current loop" passive, optocoupler: U_{max}= 50VDC, I_{max} = 10mA)
30	Current Loop –	
31	RS422 +	Digital IRIG-B signal (00x) of the IRIG line 2 See Appendix A.5
32	RS422 –	
33	Current Loop +	Digital IRIG-B signal (00x) of the IRIG line 2 as current-loop ("current loop" passive, optocoupler: U_{max}= 50VDC, I_{max} = 10mA)
34	Current Loop –	
35	DCF input +	DCF input e.g. for the connection of a GPS 4500- or DCF-receiver with "current loop" output.
36	DCF input -	
37	DCF output +	DCF output, "current loop" passive, U_{max}= 30VDC, I_{on} = 10..15mA, I_{off} < 1mA @20VDC
38	DCF output -	
39	DC output + (VB+)	DC output for GPS 4500 28 VDC, max. 400 mA (or according to the DC in voltage)
40	DC output GND	
	DTS-Link	Optical connection to a 2nd DTS 4135.timeserver Mini GBIC plug-in
	EFR	Option, for special applications only

A.3   Plug-in spring terminals

multiple contact strip 100% protected against wrong plug;
WAGO CAGE CLAMP®-connection
Cross section of 0,08 mm² to 1,5 mm² (from AWG 28 to AWG 14)
Voltage CSA 300 V / current CSA 10 A
Rated voltage: EN 250 V
Rated surge voltage: 2,5 kV
Nominal current: 10 A
Strip length: 7 mm (0,28 in)

Pulled off spring terminal with operation tool:

2 operation tools are delivered with the accessory bag.

A.4   Connection GPS 4500 or DCF 4500
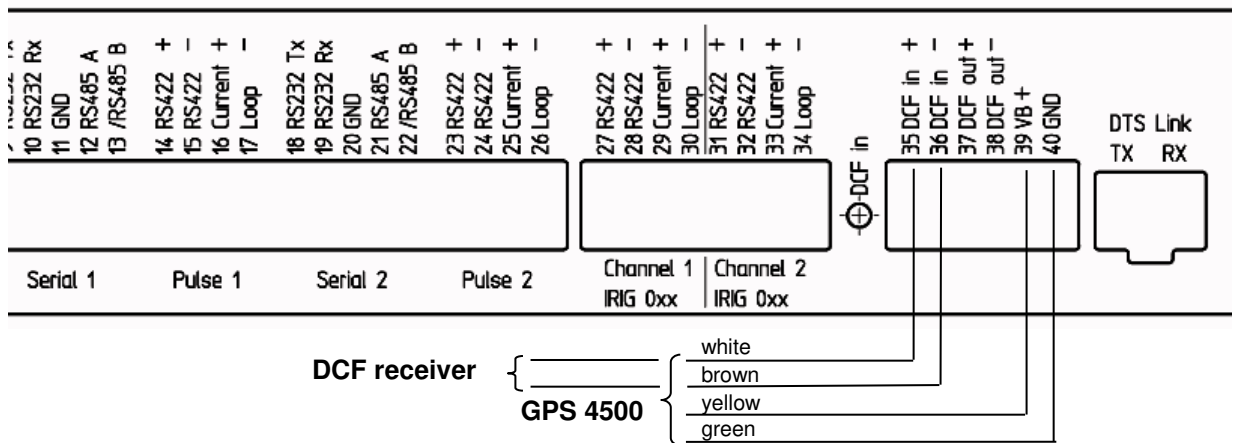
A.5   IRIG-B00x Digital Output TTL connection

B   Time zone table

Time zone entries in the standard season table (version 10.2).

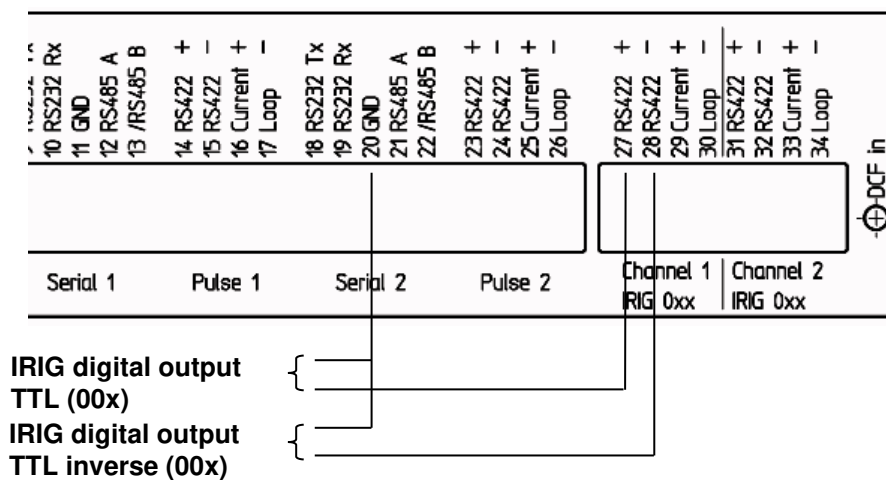| No.	City / State	UTC Offset	DST	Standard → DST	DST → Standard
00	UTC (GMT), Monrovia	0	No		
01	London, Dublin, Lisbon	0	Yes	Last Sun. Mar. (01:00)	Last Sun. Oct. (02:00)
02	Brussels, Amsterdam, Berlin, Bern, Copenhagen, Madrid, Oslo, Paris, Rome, Stockholm, Vienna, Belgrade, Bratislava, Budapest, Ljubljana, Prague, Sarajevo, Warsaw, Zagreb	+1	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
03	Athens, Helsinki, Riga, Tallinn, Sofia, Vilnius	+2	Yes	Last Sun. Mar. (03:00)	Last Sun. Oct. (04:00)
04	Bucharest	+2	Yes	Last Sun. Mar. (03:00)	Last Sun. Oct. (04:00)
05	Pretoria, Harare, Kaliningrad	+2	No		
06	Amman	+2	Yes	Last Thu. Mar. (23:59)	Last Fri. Oct. (01:00)
07	UTC (GMT)	0	No		
08	Istanbul, Kuwait City, Minsk, Moscow, Saint Petersburg, Volgograd	+3	No		
09	Praia, Cape Verde	-1	No		
10	UTC (GMT)	0	No		
11	Abu Dhabi, Muscat, Tbilisi, Samara	+4	No		
12	Kabul	+4.5	No		
13	Adamstown (Pitcairn Is.)	-8	No		
14	Tashkent, Islamabad, Karachi, Yekaterinburg	+5	No		
15	Mumbai, Kolkata, Chennai, New Delhi, Colombo	+5.5	No		
16	Astana, Thimphu, Dhaka, Novosibirsk	+6	No		
17	Bangkok, Hanoi, Jakarta, Krasnoyarsk	+7	No		
18	Beijing, Hong Kong, Singapore, Taipei, Irkutsk	+8	No		
19	Tokyo, Seoul, Yakutsk	+9	No		
20	Gambier Island	-9	No		
21	South Australia: Adelaide	+9.5	Yes	1st Sun. Oct (02:00)	1st Sun. Apr. (03:00)
22	Northern Territory: Darwin	+9.5	No		
23	Brisbane, Guam, Port Moresby, Vladivostok	+10	No		
24	Sydney, Canberra, Melbourne, Tasmania: Hobart	+10	Yes	1st Sun. Oct. (02.00)	1st Sun. Apr. (03:00)
25	UTC (GMT)	0	No		
26	UTC (GMT)	0	No		
27	Honiara (Solomon Is.), Magadan, Noumea (New Caledonia)	+11	No		
28	Auckland, Wellington	+12	Yes	Last Sun. Sep. (02:00)	1st Sun. Apr. (03:00)
29	Majuro (Marshall Is.), Anadyr	+12	No		
30	Azores	-1	Yes	Last Sun. Mar. (00:00)	Last Sun. Oct. (01:00)
31	Middle Atlantic	-2	No		
32	Brasilia	-3	Yes	3rd Sun. Oct. (00:00)	3rd Sun. Feb. (00:00)
33	Buenos Aires	-3	No		
34	Newfoundland	-3.5	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
35	Atlantic Time (Canada)	-4	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
36	La Paz	-4	No		
37	Bogota, Lima, Quito	-5	No		
38	New York, Eastern Time (US & Canada)	-5	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
39	Chicago, Central Time (US & Canada)	-6	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)

40	Tegucigalpa, Honduras	-6	No		
41	Phoenix, Arizona	-7	No		
42	Denver, Mountain Time	-7	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
43	Los Angeles, Pacific Time	-8	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
44	Anchorage, Alaska (US)	-9	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
45	Honolulu, Hawaii (US)	-10	No		
46	Midway Islands (US)	-11	No		
47	Mexico City, Mexico	-6	Yes	1st Sun. Apr. (02:00)	Last Sun. Oct. (02:00)
48	Adak (Aleutian Is.)	-10	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
49	UTC (GMT)	0	No		
50	UTC (GMT)	0	No		
51	UTC (GMT)	0	No		
52	UTC (GMT)	0	No		
53	UTC (GMT)	0	No		
54	Ittoqqortoormiit, Greenland	-1	Yes	Last Sun. Mar. (00:00)	Last Sun. Oct. (01:00)
55	Nuuk, Qaanaaq,Greenland	-3	Yes	Last Sat. Mar. (22:00)	Last Sat. Oct. (23:00)
56	Not used				
57	Western Australia: Perth	+8	No		
58	Caracas	-4.5	No		
59	CET standard time	+1	No		
60	Not used				
61	Not used				
62	Baku	+4	Yes	Last Sun. Mar. (04:00)	Last Sun. Oct. (05:00)
63	UTC (GMT)	0	No		
64	UTC (GMT)	0	No		

In countries where the DST switch date changes annually (e.g. Iran, Israel), the time zone has to be defined manually in the user time zone table (entries 80 – 99).

Legend:
UTC: Universal Time Coordinate, equivalent to GMT
DST: Daylight Saving Time
DST Change: Daylight Saving Time changeover
Standard → DST: Time change from Standard time (Winter time) to Summer time
DST → Standard: Time change from Summer time to Standard time (Winter time)
Example:
2nd last Sun. Mar. (02:00)   Switch over on the penultimate Sunday in March at 02.00 hours local time.

Notice: The Time Zone Table is usually updated as needed. The current table is available for download under the following address: *www.mobatime.com* ➔ *Customer Area* ➔ *Customer Support* ➔ *Support Resources* ➔ *Time Zone Table*. In case your device is equipped with a newer version than shown in this manual, the current time zone settings should be checked.

Modifications / updating the time zone table:

The time zone tables are filed in the */etc/mbsn.tbl* (standard table) and */etc/usersn.tbl* (user table) files.
The user table can be changed with Moser-Baer AG software such as ETCW or MOBA-NMS.
Using MOBA-NMS, it can be downloaded from there, otherwise, it must be copied on to the DTS 4135 in accordance with the update instructions (chapter "7.4 Updating Applications and Configurations").

Notice: The file names **mbsn.tbl** und **usersn.tbl** must be written in small letters.

C   Alarm list

Number	Error message	Description / Action
0	Reboot DTS	DTS 413x restarted, no intervention required
1	Error bit1	Not used
2	Supply voltage too low	Power failure (internally measured) -> support
3	Failure supply 1	Power failure supply 1 (only if redundant supply is on)
4	Failure supply 2	Power failure supply 2 (only if redundant supply is on)
5	Error voltage 5V	Power failure (internally measured) -> support
6	Error voltage 2.5V	Power failure (internally measured) -> support
7	Error voltage 1.25V	Power failure (internally measured) -> support
8	Wrong time zone DCF	Check DCF configuration
9	Error time zone TC1	Error in time zone calculation TC1
10	Error time zone TC2	Error in time zone calculation TC2
11	Alarm input	Error from external device
12	IRIG 1 output voltage low	Low voltage on analogue AFNOR/IRIG-B output 1
13	IRIG 2 output voltage low	Low voltage on analogue AFNOR/IRIG-B output 2
14	Error bit14	Not used
15	Error bit15	Not used
16	Time source fail stratum	Stratum too high: check time source
17	Time source fail TO	No time information from the selected time source within the configured timeout: Check time source. In slave mode: check link.
18	No valid time	20 min after starting no valid time -> Check time source
19	NTP synch lost	Check NTP source
20	Error software trim	Quartz error or poor source quality
21	NTP failed	Check NTP configuration
22	NTP backup active	Check primary source
23	Syn. only diff too big	Check synchronization and source
24	No mail server	Check e-mail configuration
25	SNMP not working	Check SNMP and trap configuration
26	Error bit26	Not used
27	Error bit27	Not used
28	Error bit28	Not used
29	Error bit29	Not used
30	No DTS link (optical)	No connection via DTS link (optical link) in redundant operation. Check connection.
31	No DTS link (LAN)	No connection via LAN link in redundant operation. Check LAN connection.
32	Change slave -> master	Switch over slave -> master has occurred. Optionally, check the time source of current slave.
33	Offset source (slave)	In slave mode only: check time sources Difference between slave and local time source too large
34	Fail local source	In slave mode only: check time sources
35	Error bit35	Not used

36	Error bit36	Not used
37	Error bit37	Not used
38	Tele.-file invalid	Check telegram file: the file name is longer than 8 digits or the file type is not TEL, Tel or tel; alternatively, syntax error in telegram file
39	Wrong time zone serial	Check serial time zone configuration
40	Error bit40	Not used
41	Error bit41	Not used
42	Error bit42	Not used
43	Error bit43	Not used
44	Error bit44	Not used
45	Error bit45	Not used
46	Error bit46	Not used
47	Error bit47	Not used
48	Error bit48	Not used
49	Error bit49	Not used
50	Error bit50	Not used
51	Error bit51	Not used
52	Error bit52	Not used
53	Error bit53	Not used
54	Error bit54	Not used
55	Error bit55	Not used
56	Error bit56	Not used
57	Error bit57	Not used
58	Error bit58	Not used
59	Error bit59	Not used
60	Error bit60	Not used
61	Error bit61	Not used
62	Error bit62	Not used
63	Error bit63	Not used

D   Troubleshooting

	Error	→	→	Solution / possible cause
1	DTS does not accept time	Does the reading change (approx. every 3 sec) *Sec counter DCF* in *Status → Source →*TIME SOURCE INFORMATION?	No, but 20 min. have not yet passed since the last reboot.	After new installation or powers supply failure, it may take up to 20 min. until the GPS receiver (e.g. GPS 4500) sends out valid telegrams. Wait for this time to pass.
2			No, for more than 20 minutes.	• Check DCF reception LED • Check polarity cabling to GPS. • Check positioning of the GPS receiver
3		Error-Bit 23 (*Syn only diff too big*) in *Status → Alarm status* set		The deviation to the received time is beyond the maximal allowed time correction. In the menu *Configuration→Time administration → Time-keeping configuration →* TIME ADJUSTMENT CONFIGURATION, set the parameter *synch. only offset* (4) to 0 (=deactivated). The time is now adjusted independently of the deviation's extend. It is however recommended to set a limit in normal operation (default 800ms).
4		*Offset to source* in *Status →Time→* TIME INFORMATION AND STATUS always shows the same offset		• If Error-Bit 23 set, see point 3 • The deviation is that big, that offset changes cannot be seen due to the displayed resolution.
5		Configuration has just been changed		In the case of configuration changes, particularly if the time configuration is concerned, it can take several minutes for the change to appear correctly.
6	Error-Bit 16 set (*time source fail stratum*)			See 1
7	Error-Bit 17 set (*time source fail TO*)			See 1
8	Error-Bit 23 set (*Syn only diff too big*)			See 1
9	DTS 413x.timeserver is restarting continuously.			Check, if the network settings are correct, especially the hostname and the gateway has to be configured (when no gateway is available, the own IP address can be used).
10	LAN LED (left one) is flashing orange.	No connection to the network.		Check network cabling.
11	Opening the menu via Telnet is not possible or DTS 413x. timeserver is not or no longer reachable via network.			Check network settings in menu 2 Configuration –> 5 Network (only possible with serial connection): - IP-Address, Subnet mask and Gateway must be set correctly - Interface should be set to Auto - Check connection with "Ping" - When earlier the menu was not correctly exited (e.g. LAN cable removed), the menu can be blocked up to 15 minutes.
12	Drift (ppm) of quartz too high	The drift displayed in the menu *Status →Time →*TIME INFORMATION AND STATUS is bigger than stated in the data sheet.		• The quartz drift is measured and corrected continuously. After initial operation, it may take up to 24 hours until optimal accuracy is reached (with GPS reception). • Very large temperature change (outside the specification) • Time correction was carried out manually.

13	System software update			The system software can be updated using FTP client software or a USB stick (s. chapter 7 Updates). Your MOBATIME service informs you of use and necessity of a software update. If necessary, they can provide the needed firmware file.
14	Needed information to contact your MOBATIME service			**Device type, part number, production number and serial number:** This details are given on the adhesive type label. **The following files must be provided for the analysis:** **All files (in .zip folders, separate for each device)** from the directories /**var**/**log**/ and /**etc**/ and the file: /**ram**/**trim.log**. To copy this files use FTP, e.g. Windows Explorer with ftp://[IP-Adresse], see chapter 0 . **If the log files cannot be copied, please read out the current software version:** The software version can be queried in the menu `1 STATUS/9 Versions of the software` **Place and date of purchase and of commissioning of the device.** **Most comprehensive possible details of the malfunction:** Describe the problem, possible causes, measures taken, the system environment / operating mode and configuration, etc.

E   Serial Telegrams

E.1   General

A serial interface can be used in two different modes:

- Send out time of telegrams automatically (periodically)
- Receive command, send time telegram (on request)

Output modes

Auto   Periodic transmission of a time telegram or a command at the end of a second, minute, hour, or at a max. of 6 programmable times of the day, or definable output – periodicity.

on request Telegram is transmitted on request. The 'request' strings can be defined.
            The following requests are possible:
            - stop output
            - output telegram at once (singly)
            - output telegram at the next second (singly)
            - output every second / minute / hourly / daily or switch to auto-mode.

Telegram format

Any character sequence. Fill characters ASCII or binary.
Variable display: ASCII decimal, ASCII hexadecimal or binary. Different variables are assigned to strings in text tables (e.g. month: Jan, Feb..). Syntax for the telegram string analogous to the print command in the programming language "C". See chapter E.2 Syntax of the telegram configuration file.

Telegram time

The telegram always contains the time information for the "next" second for periodical telegram output. The telegram content is valid at the send time of the first character. The send time of the telegram can be shifted with the parameter TC (e.g. the standard IF 482 telegram valid at the end of the telegram).

The transmission time of a time telegram can be calculated with the following table. According to the transmission format set, the transmission time in ms for one character is read from the table and multiplied by the number of telegram characters:

		7 data bits				8 data bits			
parity		none		odd/even		none		odd/even	
stopp byte		1	2	1	2	1	2	1	2
		ms per transmited byte							
300	bit/s	30.00	33.33	33.33	36.67	33.33	36.67	36.67	40.00
600	bit/s	15.00	16.67	16.67	18.33	16.67	18.33	18.33	20.00
1200	bit/s	7.50	8.33	8.33	9.17	8.33	9.17	9.17	10.00
2400	bit/s	3.75	4.17	4.17	4.58	4.17	4.58	4.58	5.00
4800	bit/s	1.88	2.08	2.08	2.29	2.08	2.29	2.29	2.50
9600	bit/s	0.94	1.04	1.04	1.15	1.04	1.15	1.15	1.25
19200	bit/s	0.47	0.52	0.52	0.57	0.52	0.57	0.57	0.63
38400	bit/s	0.23	0.26	0.26	0.29	0.26	0.29	0.29	0.31

Example:

9600 Bit/s, 8 data bits, none, 1 stop bit, the telegram has 20 characters.
Transmission time for the entire telegram:
20 x 1.04 ms = 20.8 ms

Name of the telegram file

The telegram file name is limited to 8 characters and its extension has to be TEL, Tel or tel, e.g. IF482Std.tel.

E.2   Syntax of the telegram configuration file

```
!TEL
        ;telegram type also !CTC or !MTS possible
;-- Start of the file (always on the first line) -----------------------

;DEFINITIONS CONFIGURATION FILE FOR PRECISION MASTER CLOCK
;************************************************************


;Customer:
;Date:
;Author:
;File:
;Interface:

;-- Output string ---------------------------------------------------
;    the output string has a similar format to the print command in the
;    programming language 'C'.
;    !TS! - String with format information
;    !TV! – Variables list in output sequence
;    The formats and variables available can be seen below:
:
!TS!"........%d....%d..."  ;String with Format information
!TV!var1,var2,..          ;Variables list

        ;-- Control and special characters
        ;    "       ->      String beginning/end
        ;    \"      ->      "
        ;    \xFE    ->      h'FE   (Byte binary)
        ;    \\      ->      \
        ;    \n      ->      new line <CR> <LF> (h'0D h'0A)
        ;    %%      ->      %
        ;    %...    ->      Format information (see below)

        ;-- Possible formats:
        ;%dn ascii-dez  where n=1/2/3/4 (number of decimal points, max. 3 places received)
        ;    e.g. variable value d'40    => 40  @ n=2
        ;                                 => 040 @ n=3
        ;%X  ascii-hex
        ;    e.g. variable value d'40    => 28
        ;%c  char (binary)
        ;    e.g. variable value d'40    => h'28
        ;%s  string (always up to,(comma) see text tables
        ;    e.g. string      Jan,   => Jan
        ;%b  hex-output of an asciihex-string  (always up to(comma)see
        ;    text tables
        ;    e.g. string      120A,  => h'12 h'0A

        ;-- Possible variables:
        ;
        ;Name: Description:            Range:     Format:
        ;-------|----------------------|-----------|------
        ;
        ;MSE    (Millisecond)          (0..999)   1W
        ;HSE    (Hundredth of a second) (0..99)   1B
        ;ZSE    (Tenth of a second)    (0..9)     1B
        ;SEK    (Second)               (0..59)    1B
        ;MIN    (Minute)               (0..59)    1B
        ;STD    (12h or 24h format)    (0..12)
        ;                              or(0..24) 1B (see !PM!)
        ;JAR    (Year)                 (0..99)    1W
        ;                              or (1990..2089)
```

```
        ;MTG    (Day of the month)        (1..31)     1B
        ;JTG    (Day of the year)         (1..366)    1W
        ;WTG    (Day of the week)         (0..6)      1W Text table !WT!
        ;                                 (Su..Sa)
        ;DOW    (Day of the week)         (0..7)      1B !DW!
        ;KAW    (Calendar week)           (1..53)     1B (according to Din ISO 8601)
        ;MON    (Month)                   (1..12)     1W Text table !MO!
        ;MNT    (Month)                   (1..12)     1B
        ;
        ;AMF    (am/pm flag)              (0/1)       1W Text table !AM!
        ;TMQ    (synchronization qual.) (0..255
        ;                                 or A..Z) 1B (see !TQ!)
        ;SAI    (Season)                  (0..2)      1W Text table !SA!
        ;                                        (Win/Sum/UTC)
        ;AKS    (Season change            (0/1)       1W Text table !AK!
        ;       announcement)
        ;AMF    (am/pm-Flag)              (0/1)       1W Text table !AM!
        ;SST    (Season status)           (0..3)      1W Text table !ST!
        ;       (Bit 0 = Early warning bit)
        ;       (Bit 1 = Summer bit)
        ;SYA    (Synch. alarm)            (0/1)       1W Texttabelle !SY!
        ;       (0:synch ok, 1: synch alarm -> Alarm Nr.16, 17 or 19)
        ;CHS    (Check sum)               (0..255)    1B
        ;XCH    (XOR Check sum)           (0..255)    1B
        ;X1C    (XOR Check sum low nibble in ASCII) (0..9, A..F)   1B
        ;X2C    (XOR Check sum high nibble in ASCII)(0..9, A..F)   1B
        ;         Definitions:
        ;          CHS = (Sum of all bytes up to CHS) AND h'FF
        ;          XCH = XOR link of all bytes up to CHS

        ;e.g.   time telegram with following format (36 ASCII characters)
        ;
        ;        "Date: tt:mm:yy Time: hh:mm:ss,mmm<CR><LF>"
        ;
        ;!TS!"Date: %d2:%s:%d2 time: %d2:%d2:%d2,%d3\n"
        ;!TV!MTG,MON,JAR,STD,MIN,SEK,MSE
;-----------------------------------------------------------------

;-- Send offset automatic telegram output ----------------------
!SO!hh:mm:ss!
        ;
        ;Send offset from midnight 00:00:00 at periodic time
        ;output (!CS!a!...).
        ;
        ;hh =   hour   ('00..23')
        ;mm =   minute ('00..59')
        ;ss =   second ('00..59')
        ;
        ;e.g.   the periodic time output should start at 06:00:00
        ;       in each case:
        ;
        ;       !SO!06:00:00!
        ;
;-----------------------------------------------------------------

;-- Interval automatic telegram output -----------------------
!TI!p!hh:mm:ss!
        ;
        ;Interval from send offset of the periodic time output.
        ;
        ;s  =   every second
        ;m  =   every minute
        ;h  =   hourly
        ;d!hh:mm:ss! daily (max. 6 entries)
        ;p!hh:mm:ss! constant
        ;hh =   hour   ('00..23')
        ;mm =   minute ('00..59')
        ;ss =   second ('00..59')
        ;
        ;e.g.1  telegram output every second
        ;       !TI!s!
        ;
        ;e.g.2  telegram output daily at 13:00:00 hours
        ;       !TI!d!13:00:00!
        ;
        ;e.g.3: the interval of the periodic time output should be 5 seconds:
        ;       !TI!p!00:00:05!
;-----------------------------------------------------------------
```

```
        ;-- Hours format ----------------------------------------------------
        !PM!
                ;Hours format 12h with am/pm flag
                ;without this entry:   24h format
        ;--------------------------------------------------------------------


        ;-- Synchronization mode --------------------------------------------
        !TC!mmm!
                ;Pretiming of the telegram in ms (-90..249). To synchronize the telegram
                ;end with the second start the TC has to be set according to the telegram
                ;length and the transmission format. If TC is set, it will be performed.
                ;
                ;e.g.   Telegram start 120ms before the start of the second:
                ;       !TC!120!
        ;--------------------------------------------------------------------


        ;-- Format time quality ---------------------------------------------
        !TQ!MAX VALUE!STEP!
                ;If this entry is absent, the byte value of TMQ is
                ;outputted
                ;MAX VALUE corresponds to the byte value for A
                ;MAX VALUE-STAGE corresponds to the byte value for B
                ;MAX VALUE-2*STAGE corresponds to the byte value for C ...

                ;Example:  A for values >=120..101
                ;          B for values =100..81
                ;          C for values = 80..61 ...
                ;
                ;          !TQ!120!20!
        ;--------------------------------------------------------------------


        ;-- Command Strings -------------------------------------------------
        !CS!n!l!"ss..."!   or   !CS!n!ll!"ss..."!
                ;
                ;n  =   Number of the command ('2...9')
                ;       n=2 Quit (no telegram output)
                ;       n=3 Telegram output immediately(singly)
                ;       n=4 Telegram output at the next second(singly)
                ;       n=5 Telegram every second
                ;       n=6 Telegram every minute
                ;       n=7 Telegram hourly
                ;       n=8 Telegram daily (-> entry: !TI!d!xx..)
                ;       n=9 Output command (Request for external time source)
                ;       n=a Telegram output periodic according to !TI!p! and !SO!
                ;
                ;l or   ll = Command length in bytes ('01...20')
                ;       l=0 Command not active
                ;
                ;ss...  Command string
                ;       (max. 20 characters – must conform with 'l' or  'll')
                ;       Wildcards can be set with the '?' sign.
                ;       This serves as wildcard for any character.
                ;       Characters can also be outputted in AsciiHex format:
                ;       e.g.   \xFE    d.h <FE>=(h'FE) is inserted
                ;              \\      d.h '\' is inserted

                ;e.g. Definition of a commando for immediate telegram
                ;       output after a request (command n=3) :
                ;       'time<CR>' (characters ll=05)
                ;       !CS!3!05!"time?"!
                ;       !CS!3!5!"time\x0D"!
        ;--------------------------------------------------------------------


        ;-- Area for check sum calculation-----------------------------------
        !CK!aa,bb!
                ;aa = first character considered (telegram start position: 0)
                ;bb = last character considered + 1

        ;Missing !CK! in this case the check sum is formed via the whole telegram up to the
        ;check sum position.
        ;--------------------------------------------------------------------
```

```
;=======================================================================
;General info about the text tables:
;   Name of the table:          !xx!
;   Separating character of the entries:  , (comma)
;   Maximal 16 characters pro Entry
;   Warning:    , do not forget(comma) after the last entry!
;=======================================================================

;-- Text table day of the week (WTG Su..Sa) 7 entries -------------------
!WT!Sunday,Monday,Tuesday,Wednesday,Thursday,Friday,Saturday,
;-----------------------------------------------------------------------

;-- Weekday modus 1 entry ----------------------------------------
!DW!0..3
                    ; 0 : 0 = Sunday, 1 = Monday,... 6 = Saturday
                    ; 1 : 1 = Sunday, 2 = Monday,... 7 = Saturday
                    ; 2 : 6 = Sunday, 0 = Monday,... 5 = Saturday
                    ; 3 : 7 = Sunday, 1 = Monday,... 6 = Saturday
;-----------------------------------------------------------------------

;-- Text table months (Jan..Dec) 12 entries -----------------------
!MO!Jan,Feb,Mar,Apr,May,Jun,Jul,Aug,Sep,Oct,Nov,Dec,
;-----------------------------------------------------------------------

;-- Text table season (Win,Sum,UTC) 3 entries --------------------
!SA!Win,Som,UTC,
;-----------------------------------------------------------------------

;-- Text table season change announcement --------------------
;-- (no announcement, announcement) 2 entries
!AK!0,1,
;-----------------------------------------------------------------------

;-- Text table season status ------------------------------------
;-- (0 = no announcement, winter
;--  1 = announcement, winter
;--  2 = no announcement, summer
;--  3 = announcement, summer) 4 entries
!ST!A,B,C,D,
;-----------------------------------------------------------------------

;-- Text table AM/PM flag 2 entries -----------------------------
!AM!am,pm,
            ;1.Entry  AM/PM flag=0 d.h. 00:00..11:59
            ;2.Entry  AM/PM flag=1 d.h. 12:00..23:59
;-----------------------------------------------------------------------

;-- Text table synchronization alarm 2 entries --------------------
!SY!ok,alarm,
            ;1.Entry  synchronization ok
            ;2.Entry  synchronization s-failure
;-----------------------------------------------------------------------



;-- File End ---
!EE!

;-- Name of the file (optional) ----
@nnn...
            ;nnn... File name, maximum 12 characters and a final
            ;       <CR>. The name can also be omitted, in this
            ;       case CTC 'NONAMEx.TEL'appears in the directory.
            ;
            ;IMPORTANT:
            ;       1) The name must stand AFTER the file end!EE!.
            ;
            ;       2) If a file with the same name is loaded on to the
            ;          CTC, such as one stored on the CTC, the stored one
            ;          will be OVERWRITTEN.
            ;
            ;
            ;e.g.     !EE!
            ;         @TELEDEF.TEL
            ;          ;last line
;-----------------------------------------------------------------------

;last line (guarantees a <CR> after the file name)
```

F   Copyright notice

All rights of the software remain the property of Moser-Baer AG.

Existing software (OpenSource) with their own licences were partly used:

Designation	Description	Version	License	License Description (file)
U-Boot	Boot loader	2016.11	GPL version 2	COPYING
Linux	Operating system	4.9.76	GPL version 2	COPYING
Busybox	System environment	1.28.4	GPL version 2	LICENSE
NTP	NTP	4.2.8p13	Free	COPYRIGHT
pure-ftp	FTP server	1.0.47	Free, partly BSD	COPYING
NetSNMP	SNMP agent	5.7.3	BSD	COPYING
OpenSSL	SSL Lib.	1.0.2n	BSD style	LICENSE
OpenSSH	SFTP server	7.6.p1	BSD	LICENCE
dropbear	SSH server	v2018.76	MIT style: Free, party BSD	LICENSE
wide-dhcpv6	DHCPv6 client	20080615	Free	COPYRIGHT
flex	Flex Lib.	2.6.4	BSD adapted	COPYING
zlib	Compress lib.	1.2.11	Free	README
mailsend	E-mail client	1.19	GPL	COPYRIGHT

The complete license descriptions can be referred to in the file indicated in the respective original source code on the corresponding project page.

Licence text GPL, BSD and MIT:

GPL version 2:   http://www.gnu.org/licenses/gpl-2.0.html

BSD: http://www.opensource.org/licenses/bsd-license.php

MIT   http://www.opensource.org/licenses/with-license.php

The source code of the open source projects running under GPL can be requested from Moser-Baer AG (support@mobatime.com). Handling costs will be charged!

G   Technical data

Dimensions	19" Rack, 1HU x 28PU (H x W x D [mm]) = 44 x 483 x 125
Weight	approx. 1.8 kg
Ambient temperature	0 to 60ºC, 10-90% relative humidity, without condensation
Operation	Serial interface (via RS 232) or Telnet / SSH / MOBA-NMS (via LAN) In addition, operation is also possible with SNMP.

Accuracy	GPS (DCF input) to NTP server:	typical < +/- 100 μs
	GPS (DCF input) to DCF output:	typical < +/- 10 μs
	IRIG input to DCF output:	typical < +/- 50 μs
	NTP to internal time	typical < +/- 100 μs

Notice: NTP reception (DTS 413x as client or as server to external clients) can be influenced by the network traffic load and network devices (Hub, Switch, Router, Firewall...). If many clients request simultaneously, the typical accuracy may not be reached.

Time keeping (internal)	Synchronized with GPS:	+/-10 μs to UTC
Holdover (free run):	After at least 12 hours synchronization from the time source:	
DTS 4135 -> TCXO:	at 20°C +/- 5°C:	< +/- 10 ms / day (< 0.1ppm) *
	at constant temperature*:	< +/- 1 ms / day (< 0.01ppm) *
DTS 4136 -> OCXO:	at 20°C +/- 5°C:	< +/- 1 ms / day (< 0.01ppm) *
Generally:	During power break (based on internal RTC): at 20°C +/- 5°C: < 5 ppm, but with jitter of +/- 15 ms * After a power failure the RTC time is available during at least 5 days (RTC buffered through a SuperCAP).	
	*measured over 24 h	

Redundant operation	- Master to slave (optical DTS link):	typical < +/- 1 μs

Time server	NTP V4	(V3 compatible), (UDP), RFC 1305, RFC 5905 (Port 123) NTP Authentication with MD5 key / Autokey
	SNTP	(UDP), RFC 2030 (Port 123)
	TIME	(TCP/UDP), RFC 868 (Port 37)
	DAYTIME	(TCP/UDP), RFC 867 (Port 13)
	Max. number of NTP and SNTP client requests:	
	Typical:	**3000 req. / sec. long term (with >99% req. answered)**
	Max.:	**15'000 req. / s (short time, e.g. max. 1 minute)**
	(e.g. client request every 10 sec. ➜ >30'000 clients)	

NTP Mode	Server, Peer, Broadcast, Multicast
NTP slave clock lines:	1 line with up to 15 different time zone entries. Communication through multicast: -RFC 3376: Internet Group Management Protocol, Version 3 -RFC 1112: Host extensions for IP multicasting -RFC 4601: Protocol Independent Multicast - Sparse Mode (PIM-SM) -RFC 3973: Protocol Independent Multicast - Dense Mode (PIM-DM)
Time zones (see App. B)	Up to 80 predefined, 20 programmable entries (MOBA-NMS)
Network interface	10BaseT / 100BaseTX (IEEE 802.3) Data transmission rate: Auto-negotiation / manual Connection: RJ-45 Only shielded cables permitted.
IP Configuration	DHCP, Static IP, IPv4, IPv6

Network services	NTP	UDP, Port 123	see timeserver
	SNTP	UDP, Port 123	see timeserver
	TIME	TCP/UDP, Port 37	see timeserver
	DAYTIME	TCP/UDP, Port 13	see timeserver
	Telnet	TCP, Port 23	operation
	SSH	TCP, Port 22	operation
	SCP	über SSH	update
	SFTP	über SSH	update
	FTP	TCP, Port 21	update
	SNMP	UDP, Port 161	operation
		UDP, Port selectable (162)	alarm notification, see SNMP
	SMTP	TCP, Port selectable (25)	alarm mail see E-Mail
	DHCP	UDP, Port 68	dyn. address allocation (client)
	DNS	TCP/UDP, Port 53	address resolution (client)
	DHCPv6	only IPV6	
	ECHO	ICMP	"Ping"

| SNMP | V1, V2c, V3 with MD5 for authentication and DES for encryption (privacy). |

E-mail	Alarm reporting via SMTP.
	Authentication at the mail server:
	- with sender address
	- with username/password SMTP-Auth with LOGIN,
	PLAIN (RFC 4954) or CRAM-MD5 (RFC 2195)
	no "POP before SMTP" possible

| Serial interface (front side) | D-Sub 9 (male): (RS232, 38400, 8, n, 1, no flow control) |
| | Cable length max. 3 m. |

| USB plug | USB Host for USB stick |

Synchronization Inputs:

DCF Input	DCF receiver or DCF from GPS, active current loop
	Time zone: selectable
	Nominal 28 VDC, max. 32mA, response threshold 8mA

| AFNOR-A/C, IRIG-B12x input: | Upp: 100mV – 5500mV |

DTS Link	Plug-in position for mini GBIC module (**G**iga**B**it **I**nterface **C**onverter))
	1000Mbps, 3,3V (with LC connector)
	e.g. D-Link DEM-311GT, SX 850 nm, 1.25 Gbps/MM/3.3 V
	Maximal cable length depends on type of cable:
	-Multimode fiber with a diameter of 50 µm: max. 550 m
	-Multimode fiber with a diameter of 62.5 µm: max. 275 m
	With LX standard, longer cables can be achieved.

Time signal output:

Time signal lines	NTP V4 for slave clocks (unicast and multicast)
	2 x IRIG-B output (analog and digital)
	2 x DCF, programmable impulse / frequency output over RS 422 and
	opto coupler (current loop passive)
	1 x DCF current loop interface passive
	2 x Script files configurable time telegrams on RS 232, RS 422 (only send)
	and RS 485

DCF output (1x)	DCF timecode, time zone selectable
	Max. time deviation with GPS source: +/- 10 µs, jitter < 10 µs
	DCF time code passive current loop interface:
	Vmax = 30 VDC, I_{on} = 10..15 am, I_{off} < 0.1 mA @20VDC

DCF / impulse / frequency outputs (2x)	2 line for technical impulses: time zone selectable, output signal correction possible (DCF and impulse) Max. time deviation with GPS source: +/- 10 µs, Jitter < 10 µs Rise time typical: 100 ns
	Mode: - DCF time code - impulses: sec., min., h., or user-defined - frequency: 1Hz.. 5MHz (no square signal possible above 2MHz) 2 different electrical outputs with the same signal: - passive current loop output, opto coupler: $I_{max.}$=10 mA / $U_{max.}$=50 VDC - RS422 output
IRIG-B outputs (2x)	2 high precision IRIG lines, both available as analog and digital signals Max. time deviation to GPS (with GPS source): DC level: < +/- 10 µs Modulated: < +/- 200 µs
	Accuracy of the signal according to standard: DC level pulse rise time between the 10% and 90% amplitude points: ≤ 1 µs Jitter modulated at carrier frequency: ≤ 1% DC level jitter pulse-to-pulse: ≤ 200 ns
	Line mode: IRIG-B122, IRIG-B Std 12h (B122), IRIG-B123, IRIG-B DIEM, AFNOR A, AFNOR C, DCF-FSK IRIG-B126 (127), IRIG-B IEEE 1344 (without control function CF) IRIG-B002, IRIG-B003, IRIG-B006
	Output voltage level (R_L=50 Ohm): 0.1 – 5.5 Vpp (configurable) $SNR_{|dB}$: typical >= 40dB Impedance: $R_i < 50\ \Omega$ Opto coupler outputs: $I_{max.}$=10 mA / $U_{max.}$=50 VDC RS422 outputs: U = typical 3.3 VDC
Serial interface (2x) (back side)	2 lines for telegram output RS232, RS422 or RS485 Max. time deviation against internal time: +/- 10 ms, jitter < 10 ms 300-38400 Bauds, 7 or 8 Data bits, Parity: no, even, odd, Stop bit: 1 or 2, no flow control The description of the telegram functions is provided in Appendix E.
Alarm contact	Opening relay contact (Alarm active ➜ contact open). Switching load: 30 W (125 VDC or 1 A), e.g. 1 A @ 30 VDC or 60 VA (150 VAC or 1 A), e.g. 0.5 A @ 120 VAC
Alarm reporting / Error reporting	Alarm contact see Alarm contact E-Mail see E-Mail SNMP-Notification see SNMP-Trap Display see display Alarm LED -
Alarm inputs	18 – 36 VDC, max. 6 mA, for external closing contact Function configurable
Display	2 lines with up to 16 characters for the display of status information.
DC power supply	24 VDC +20% / -10% / 20 W
Mains power supply	90 – 240 V / 50 - 60 Hz / 0.25 A
Power supply output	Nominal 24 VDC, max. 400 mA (respectively according to power supply)

H   Index

I   Connection table (to fill in)

Line	Type	Description

Example:

Line	Type	Description
DCF	DCF out	*DCF for master clock ETC1*

Headquarters/Production

MOSER-BAER AG | Spitalstrasse 7 | CH-3454 Sumiswald
Tel. +41 34 432 46 46 | Fax +41 34 432 46 99
moserbaer@mobatime.com | www.mobatime.com

Sales Worldwide

MOSER-BAER SA EXPORT DIVISION
19 ch. du Champ-des-Filles | CH-1228 Plan-les-Ouates
Tel. +41 22 884 96 11 | Fax + 41 22 884 96 90
export@mobatime.com | www.mobatime.com

Sales Switzerland

MOBATIME AG | Stettbachstrasse 5 | CH-8600 Dübendorf
Tel. +41 44 802 75 75 | Fax +41 44 802 75 65
info-d@mobatime.ch | www.mobatime.ch

MOBATIME SA | En Budron H 20 | CH-1052 Le Mont-sur-Lausanne
Tél. +41 21 654 33 50 | Fax +41 21 654 33 69
info-f@mobatime.ch | www.mobatime.ch

Sales Germany/Austria

BÜRK MOBATIME GmbH
Postfach 3760 | D-78026 VS-Schwenningen
Steinkirchring 46 | D-78056 VS-Schwenningen
Tel. +49 7720 8535 0 | Fax +49 7720 8535 11
buerk@buerk-mobatime.de | www.buerk-mobatime.de