

# INSTRUCTION MANUAL

## DTS 4128.timeserver

Network Time Server



## Certification of the Producer

### STANDARDS

The DTS 4128.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



### 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](http://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.
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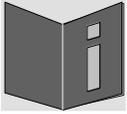
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# 1 Safety

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## 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

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

## 1.3 Intended Use

---

The **DTS 4128.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 GNSS 4500).

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.



**Caution!**

#### 1.4 Observe operating safety!

---

- 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.



**Caution!**

#### 1.5 Consider the installation site!

---

- 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.
- By operating the device, the heat sinks attached to the sides get warm. Make sure there is enough air circulation for the heat to dissipate. The device shuts off when overheated. After it has regained its normal operating temperature, it will restart automatically. The settings are saved.



#### **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.



**Caution!**

#### 1.6 Please observe the electromagnetic compatibility!

---

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



**Caution!**

#### 1.7 Network security

---

- 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 "<http://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 the power supply connection ( **DC In1** ), a fuse in according to the performance data has to be provided.

The used fuses for the DC-supply have to be approved for DC.

The power supply connection ( **DC In1** ) 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.

## 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 4128.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
  - 1 \* spring terminal 6-pole orange
  - 2 \* spring terminal 2-pole orange
- 2 pcs mounting tools with spring terminals

### 3.2 Technical Data

---

See Appendix F Technical data.

### 3.3 Introduction

---

The **DTS 4128.timeserver** is a NTP Time Server for use in network environments. It can be synchronized by DCF or GPS (e.g. from GNSS4500) and act as a NTP server in a network.

In addition, it can be used as a master clock for NTP slave clocks, synchronized via multicast with NTP and time zone table.

As a "main" master clock the DTS 4128 can synchronize further master clocks or other equipment by synthetic DCF.

The DTS 4128 can send e-mails as well as SNMP traps.

Via SNMP configuration and system status can be requested and the DTS 4128 can be operated.

To maintain a redundant time source, two DTS 4128 can be linked by an optical link.

### 3.4 Device types

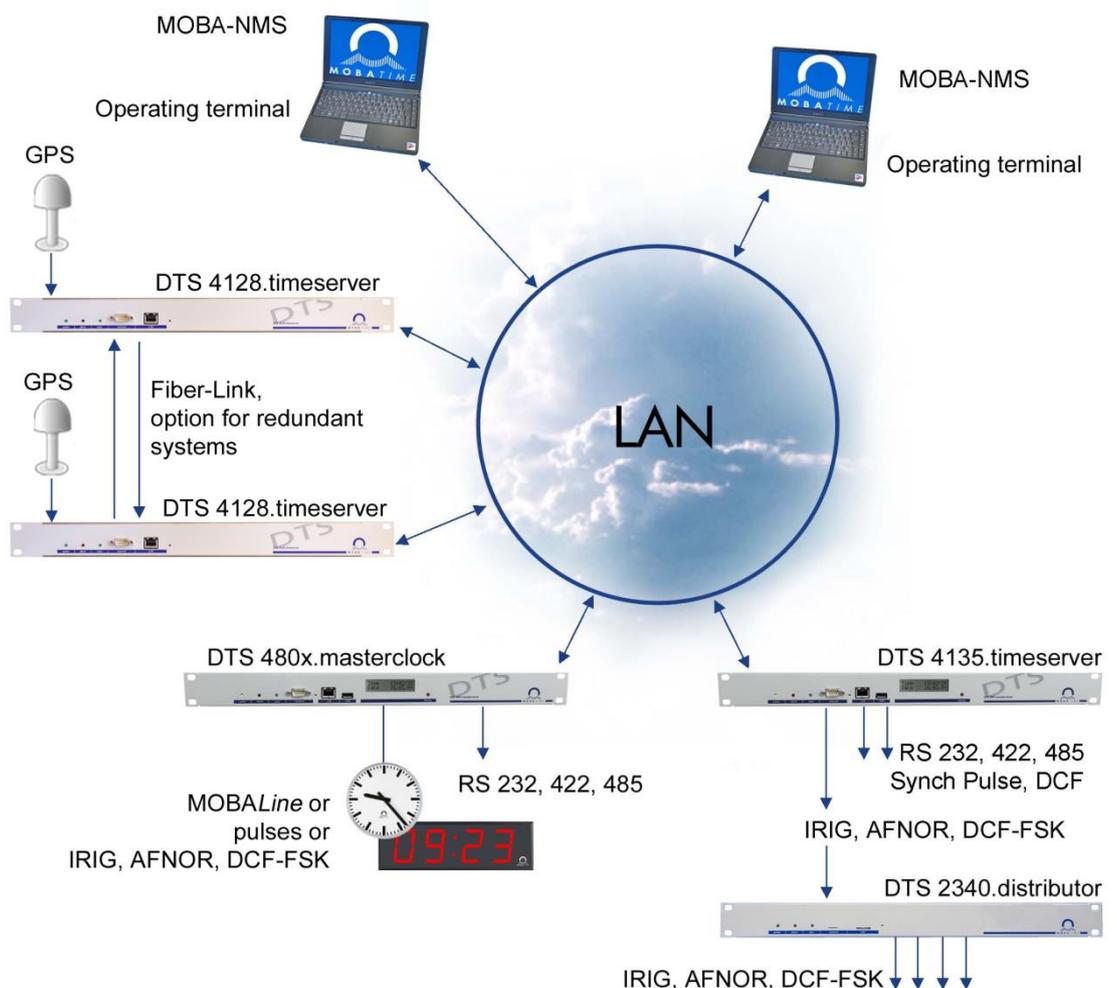
Model:	Product no.:
DTS 4128.timeserver	117973

#### Device descriptions:

The front plate always has DTS 4128.timeserver printed on it. The precise description is made on the identification plate on the back.

### 3.5 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.



## 3.6 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.

True 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.

### 3.6.1 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 „3.6.2 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.

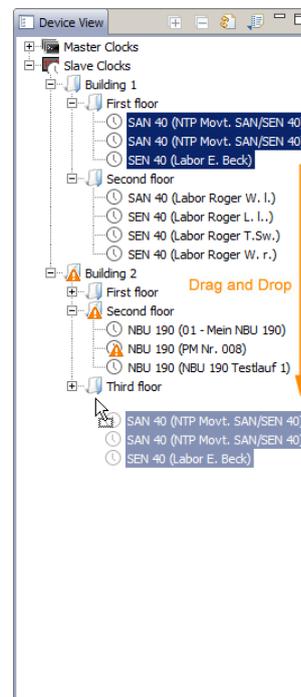
### 3.6.2 Device management

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:

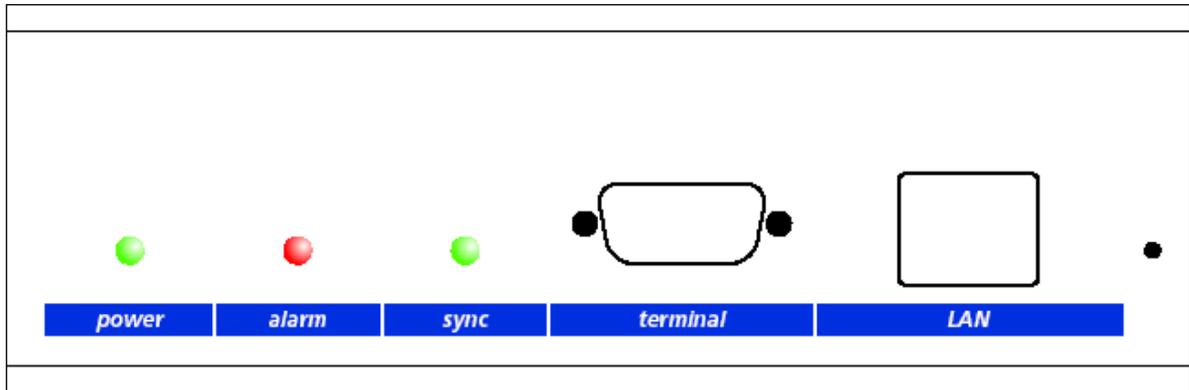
- commands and device updates can be applied to the whole group (including sub-groups).
- Alarms and errors of included devices are displayed on the group level.
- Complete groups can be moved / sorted among themselves.

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



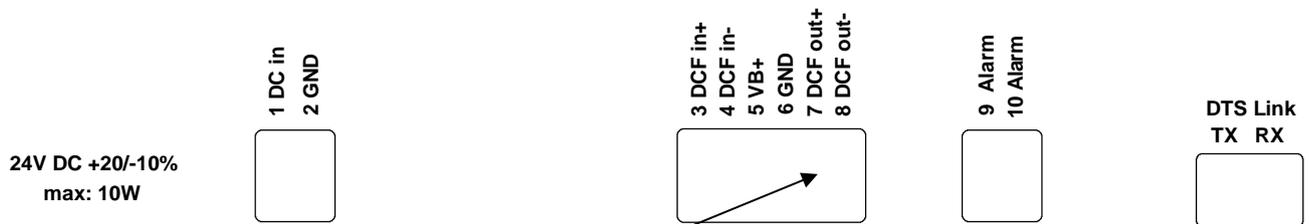
## 4 Displays

### 4.1 LED displays



Description	Color	Status	Description
Power	Green	On Off	Mains or DC power supply is in order No power supply
Alarm	Red	On Off	The alarm relay signalizes an alarm No active alarms
Sync	Green	On Off	DTS 4128 can read the time from a synchronization source Synchronization source is not available
LAN control lamps:			
Left	Green Orange	Blinking Blinking	Network activity No connection to network
Right	Yellow	Off On	10 Mbit 100 Mbit

### 4.2 LED indication back side



Description	Color	Status	Description
DCF reception	red	Blinking	DCF (GPS reception)

## 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.

### 5.2 Boot procedure of the DTS 4128.timeserver

---

The normal booting time of the DTS 4128 is approx. 20 sec. with pre-set IP or with DHCP. The booting procedure of the operating system is displayed on the serial console. After that, the 'sync' control lamp is switched off and only switched on again when time is received from the time source. Without any connection to a DHCP server, the first start up can take up to 30 seconds. Afterwards, the DHCP option must be set to "off" in the network settings.

### 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](http://www.mobatime.com) → *Customer Data* → *Product Ressources* → *Time Server*.

## 5.4 Basic settings (factory settings)

---

General	Language	English
	Internal time zone	MEZ
	Menu password	dts
Time source	Source	DCF-GPS (UTC)
	Alarm delay for failure	10 min
	DTS stratum	auto
	stratum limit	12
	stratum TO DCF fail	24hrs
	Offset per stratum	50ms
	Max. offset time ok	50'000us
	time source correction	0ms
Time-keeping	Mode	Catch up
	Catch up speed	100'000ns/s
	Quartz type	0
	Synch only offset	800ms
Redundant operation	Mode	off
	stratum limit	16
	Max. offset to slave	100000us
	Port for LAN link	14338
NTP Server	no server configured	
Lines	DCF output	on, UTC
	NTP slave clocks / Time zone server	off
Network	DHCP	on
	Autoconf IPv6	off
	DHCPv6	off
	Hostname	DTS4128
	Link	auto
Alarm	Relay	all on
	Mail	off
	SNMP traps	off
	Trap-Community	trapmobatime
NW Services	SSH	on
	Telnet	off
	FTP	off
SNMP	Modus	on
	RO-Community	romobatime
	RW-Community	rwmobatime

## 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:



```
DTS4128 login:
```

To start the menu, *dts* must be logged in as user. The standard password is *dts*. (Changing the password → see Chapter "6.5.15 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 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 10, 11: e.g. with 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.



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

### 6.1.2 Telnet

Windows 10, 11: e.g. with Putty

User: *dts*

Standard Passwort: *dts*

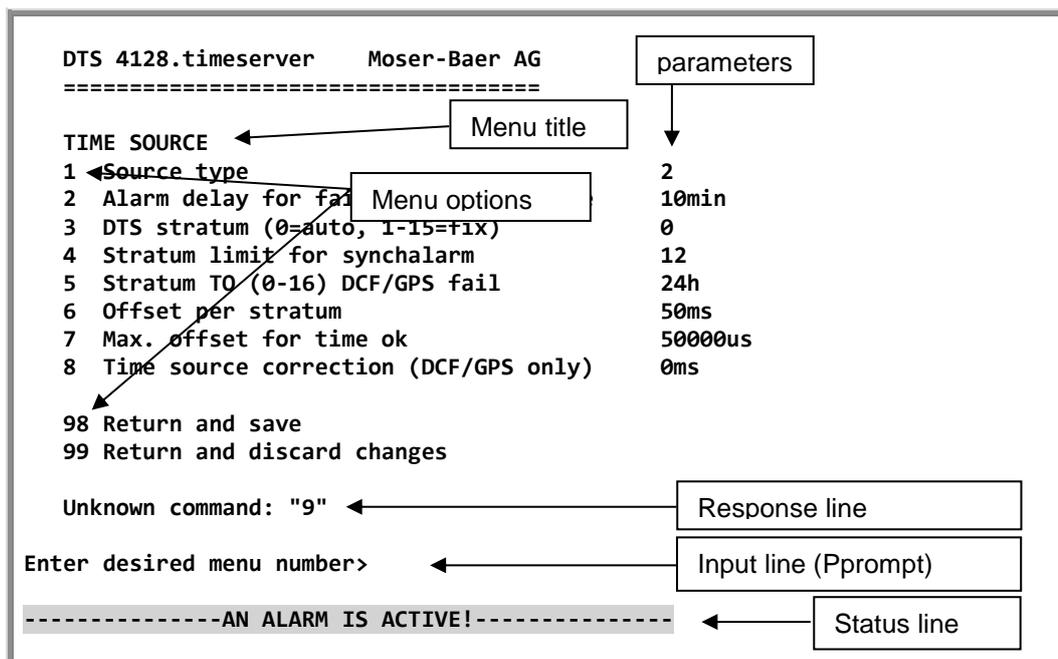
Linux: Start console and enter "*telnet [IP-address]*"

### 6.1.3 SSH

Windows 10, 11: z.B. mit Putty

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 4128, 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 „3.6 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 of a DTS 4128 timeserver:

The screenshot displays the MOBA-NMS web interface for a DTS 4128 device. The main header shows the device name 'DTS 4128' and its status 'OK'. Below this, there are several panels: 'List of active alarms' (currently empty), 'Network' (showing IPv4 settings like IP address 10.242.17.28 and gateway 10.240.2.1), and 'Power' (showing voltage supply 1 [V]: 23.8). A 'Time, time state' panel provides details on NTP status, including 'NTP request error!' and 'Stratum and status: 16 Not available'. A 'Source' panel shows 'Local' and 'NTP' options with measured offsets and received times. An 'NTP state' panel is also present with a 'Show NTP status details...' link. At the bottom, a navigation bar includes tabs for 'Overview', 'Outputs', 'Time handling', 'Alarms', 'Network', 'SNMP', and 'General, Services'. A 'Refresh' button is located in the bottom right corner.

configuration pages  
(tabs)

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



**Important:** In order for the communication between MOBA-NMS and the DTS devices to work, SNMP must be activated! Set terminal menu „Configuration → SNMP → SNMP Mode“ to „on“. SNMP is active by default.

## 6.3 Main menu

---

```
DTS 4128.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 4128  
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:

```
DTS 4128.timeserver      Moser-Baer AG
=====

STATE                                     Page 1
1 Alarm state
2 Alarm history
3 Time
4 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>
```

### Path: 1 Status

The menu shows various information on the current operating status.

1. Requesting alarm status, display of all the DTS 4128 active errors.  
Display of the DTS 4128 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 ESC. All DTS 4128 active alarms are displayed, masking (e-mail, traps, relay) only occurs later.
2. Alarm history display.  
Display of the DTS 4128 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. DTS applications software versions display.
6. Linux system software versions display.
7. Power supply information (voltage) display.
8. Current network configuration display.
9. DTS 4128 system information display (internal status, control voltage, quartz..). This information is for support purposes.

## Status menu page 2

```
DTS 4128.timeserver    Moser-Baer AG
=====

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

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

Path: 1 Status→ [Enter]

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

### 6.4.1 Time information and status

```
DTS 4128.timeserver    Moser-Baer AG
=====

TIME INFORMATION AND STATUS
Internal time of the DTS (local time)    09:10:52 26.08.21
Stratum and state of DTS                 1 MASTER
Last measured drift                       -0.0057ppm
Last quartz correction                    07:10:01 26.08.21
Time source                               GPS (DCF)
Offset to source                           0us
Last time information from source         07:10:01 26.08.21 UTC
Jitter of the source                       0us
Quality of the source                      100%

99 Return

Enter desired menu number>
```

Path: 1 Status→ 3 Time

- |                                 |  |
|---------------------------------|--|
| -Internal time of the DTS:      | local time   |
| -Stratum and status of the DTS: | current stratum,<br>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                                  |

## 6.4.2 Time source information

```
DTS 4128.timeserver Moser-Baer AG
=====

TIMESOURCE INFORMATION
Actual measured offset          0us GPS FPGA
Last time received DCF         07:18:00 26.08.20 UTC (10)
Sec. counter DCF               43
Last time received link        06:49:00 26.08.20 UTC
Sec. counter link              7
NTP source                     No menu entry available
NTP source offset              0us
NTP source jitter              2us
NTP source stratum             0

99 Return

Enter desired menu number>
```

Path: 1 Status → 4 Source

- 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
- 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

```
DTS 4128.timeserver      Moser-Baer AG
=====

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

99 Return

Enter desired menu number>
```

Path: 2 Configuration

Configuring the DTS 4128 through various submenus:

1. Configuring the lines / outputs (DCF out, NTP slave clock line)  
See Chapter "6.5.1 Lines"
2. Configuring the time source, time-keeping etc.  
See Chapter "6.5.4 Time Administration"
3. Alarm settings (alarm relay, e-mail, SNMP)  
See Chapter "6.5.10 Alarms"
4. General settings of the DTS 4128 (language, time zone for alarms and display, password for menu, power supply monitoring...)  
See Chapter "6.5.15 General Settings"
5. Network Settings  
See Chapter "6.5.16 Network"
6. Services (switching network services such as FTP, Telnet, SSH on or off)  
See Chapter "6.5.17 Services (Network services FTP, Telnet, SSH....)"
7. SNMP Configuration for GET/PUT.  
See Chapter "6.5.18 SNMP" (Traps are dealt with in menu '2. Configuration' → '3. Alarms' → '3. Traps'. See also Chapter 6.5.14 SNMP Traps

### 6.5.1 Lines

Under lines, settings can be undertaken for the following 3 functions:

- 1 DCF - Output → see Chapter "6.5.2 DCF - Output"
- 2 NTP slave clocks / time zone server  
→ see Chapter "6.5.3 NTP Slave Clocks / Time Zone Server"

## 6.5.2 DCF – output

The DTS 4128 is equipped with one DCF output line.  
This line is available as an electrical current loop DCF output.

The settings of the DCF line:

```
DTS 4128.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

Enter desired menu number>
```

Path: 2 Configuration → 1 Line → 1 DCF out

1. Select line function: off or DCF on
2. Select time zone: see Chapter “6.5.21 Time Zone Selection”

### 6.5.3 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.

```
DTS 4128.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>
```

Path: 2 Configuration → 1 Line → 2 NTP slave clocks / time zone server

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 zone on request, 5 (only for maintenance) = Send an empty Time zone table and return to previous mode.
2. Multicast address for NTP and time zone server: **239.192.54.x**  
Group address: x = 1..15 for MOBATIME devices, e.g. NCI, SEN 00.
3. Multicast port for Time zone server (enter an arbitrary value, empty is not allowed !  
Value e.g.: 65530).
4. Poll-interval for NTP Multicast in 2<sup>poll-values</sup> in seconds (range: 1 – 16).  
E.g. poll-value = 2 → interval: 2<sup>2</sup> = 4 sec., poll-value = 5 → interval: 2<sup>5</sup> = 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".

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

**Important:** For the operation of a **Multicast** communication (NTP and Time Zone Server) **the configuration of a gateway is required** (see chapter 6.5.16 Network). The gateway can be set manually or by using DHCP.  
If there's no gateway available, it's possible to set the own IP as gateway.





**Important: Redundant Multicast time server:**

If in the same network two NTP server should send NTP with same Multicast IP address (redundancy), then the first time server has to be configured with a small **pollinterval** (e.g. 2 → sec.) and second time server with a large pollinterval (min. 100 x larger, e.g. 9 → 512 seconds). As long as the first time server is sending NTP Multicast packets, the packets from second time server are ignored. This configuration is needed, to reach a defined situation for the end devices (the DTS with the more frequently NTP send rate gets higher priority for time reception).

**Time zone table for the NTP slave clock line:**

```
DTS 4128.timeserver      Moser-Baer AG
=====

TIME ZONE - TABLE
Zone01: 2 [+1] Brussel           Zone02: 2 [+1] Brussel
Zone03: 0 [0] UTC                 Zone04: 19 [+9] Tokyo
Zone05: 3 [+1] Athens            Zone06: 8 [+3] Kuwait
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>
```

Path: 2 Configuration → 1 Line → 2 NTP slave clocks / time zone server → 8 Configure time zone table8

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 6.5.21 Time zone selection).

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

### 6.5.4 Time administration

Under time administration, settings can be undertaken for the following functions:

- Time source configuration → see chapter 6.5.5
- Time-keeping configuration → see chapter 6.5.6
- Redundant Operation → see chapter 6.5.7
- NTP Server → see chapter 6.5.8
- For setting the time manually / Leap second → see chapter 6.5.9

## 6.5.5 Time source

Time source configuration.

```
DTS 4128.timeserver      Moser-Baer AG
=====

TIME SOURCE
1 Source type                2
2 Alarm delay for failure of the source 10min
3 DTS stratum (0=auto, 1-15=fix)      0
4 Stratum limit for synchalarm      12
5 Stratum TO (0-16) DCF/GPS fail     24h
6 Offset per stratum              50ms
7 Max. offset for time ok          50000us
8 Time source correction (DCF/GPS only) 0ms

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration → 2 Time handling → 1 Time source setting1

1. Type of time source: 0=none, 1=DCF MEZ, 2=GPS-DCF (UTC), 4=NTP
2. Alarm delay at failure of time source (minutes):  
0 = off, 1-2'160min, default = 0  
Error: "loss of time source TO"
3. DTS stratum 0=Stratum is automatically calculated according to the time source.  
1-15=Stratum is manually set
4. Stratum limits for alarm Limits for alarm "Time source lost" (1-16)  
Error: "loss of time source stratum"
5. 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.
6. 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
7. Max. offset for time source to set valid time in μs at start up.  
(0-1'000'000μs)
8. Time source correction (only for DCF), +/-60'000ms

For description of time source see Chapter "8 Time administration "

## 6.5.6 Time-keeping

```
DTS 4128.timeserver Moser-Baer AG
=====

TIME ADJUSTMENT CONFIGURATION
1 Adjustmode (0=follow, 1=set)           0
2 Max. catch up speed                   100000ns/s
3 Time core type (0-255, default 0)     0
4 Synch. only offset                    0ms

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration → 2 Time handling → 2 Time adjustment setting

1. Adjust mode:           0=time is slowly adjusted (accord. to "Max. catch-up speed")  
                          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 great"

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

## 6.5.7 Redundant operation

```
DTS 4128.timeserver    Moser-Baer AG
=====

REDUNDANT OPERATION
1 Mode (0=single, 1=red., 2=red. LAN1-LAN2) 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>
```

Path: 2 Configuration → 2 Time handling → 3 Redundant operation

1. Mode: 0=single operation  
1=redundant operation of 2 DTS 4128 (Master-Slave operation)  
2=redundant operation of 2 DTS 4128 (Master-Slave operation) without LAN communication between the 2 devices
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 2<sup>nd</sup> DTS 4128. 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 "8.9 Redundant Operation of 2 DTS 4128.timeservers"



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

## 6.5.8 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 "8.3 Time acceptance from NTP".

Further two multicast or broadcast addresses can be configured.

```
DTS 4128.timeserver    Moser-Baer AG
=====

NTP SERVER CONFIGURATION
1 Configuration timeserver address 1      10.241.17.1
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)

99 Return

Enter desired menu number>
```

Path: 2 Configuration → 2 Time handling → 4 NTP server configuration

- 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:

```
DTS 4128.timeserver Moser-Baer AG
=====

ENTRY TIMESOURCE          1
1 Source                   10.241.17.1
2 Minpoll                  3
3 Maxpoll                  5
4 Server/Peer              server
5 Prefer                   no
6 Authentication key      off
```

```
98 Return and save
99 Return and discard changes
```

```
Enter desired menu number>
```

Path: 2 Configuration → 2 Time handling → 4 NTP server configuration → 1-4 Configuration timeserver address x

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  $2^{\text{poll value}}$  in seconds.  
0 = automatically  
e.g. poll value=3 → intervall 3:  $2^3 = 8\text{sec.}$ , poll value=5 → intervall 5:  $2^5 = 32\text{sec.}$   
Range of poll values (exponent): 1 – 16  
To get an 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 at point 6, 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 GNSS), no NTP source should be indicated as **prefer**!



**Notice:** Maxpoll should not be selected below 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:

```
DTS 4128.timeserver Moser-Baer AG
=====

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

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration → 2 Time handling → 4 NTP server configuration → 5-6 Configuration multi-  
/broadcast address

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<sup>x</sup>: 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



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

## Configuration of the NTP authentication:

The NTP authentication is described in chapter "8.8 NTP Authentication".

```
DTS 4128.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)             8
5 Control keys (ntpd)             15
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>
```

Path: 2 Configuration → 2 Time handling → 4 NTP server configuration → 7 NTP Authentication

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

**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 NTP query:  
0 = full access  
1 = local  
2 = no access (ntpq queries switched off)



## 6.5.9 Manual time set / Leap second

```
DTS 4128.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 01.07.00

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration → 2 Time handling → 5 Manual time adjustment / leap second

1. Set UTC time in the format "YY.MM.DD hh:mm:ss".  
**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 deleted at entered time
4. Set UTC time of leap second in format: "hh:mm:ss DD.MM.YY"

Operation of leap second see chapter "8.7 Leap second".

## 6.5.10 Alarms

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

- Alarm relays → see Chapter 6.5.11
- E-Mail → see Chapter 6.5.13
- SNMP-Traps → see Chapter 6.5.14

## 6.5.11 Alarm relay

```
DTS 4128.timeserver    Moser-Baer AG
=====

ALARM KONFIGURATION 2
1 Alarmmaske fuer Relais

98 Zurueck und speichern
99 Zurueck und Aend. verwerfen

Gewuenschte Nummer eingeben>
```

Path: 2 Configuration → 3 Alarms → 1 Alarm relay

1. Alarm mask for relay (see Chapter "6.5.12 Alarm mask")

## 6.5.12 Alarm mask

```
DTS 4128.timeserver      Moser-Baer AG
=====

ALARMASK                                Page 1
[ ]=error disabled, [*]=error enabled
[*] Bit00: DTS restart                  [*] Bit01: Error bit1
[*] Bit02: Supply voltage too low      [*] Bit03: Error bit3
[*] Bit04: Error bit4                   [*] Bit05: Error bit5
[*] Bit06: Error bit6                   [*] Bit07: Error bit7
[*] Bit08: Wrong time zone DCF          [*] Bit09: Error bit9
[*] Bit10: Error bit10                  [*] Bit11: Error bit11
[*] Bit12: Error bit12                  [*] Bit13: Error bit13
[*] Bit14: Error bit14                  [*] Bit15: Error bit15

Enter alarmnumber to alter mask

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

Path: 2 Configuration → 3 Alarms → 1 Alarm relay → 1 Alarmmask for relay

Display of all the DTS 4128 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.

The alarm masks only apply to the respective function, but not to the internal alarm recording (menu '1. State' → '1. Alarm state' and menu '1. State' → '2. Alarm history').

## 6.5.13 E-mail

```
DTS 4128.timeserver    Moser-Baer AG
=====

MAIL CONFIGURATION                                Page 1/2
1 Mailmode                                          off
2 Alarmmask for mail                               ff ff ff ff ff ff ff ff
3 Mailserver                                       10.241.0.3
4 Mailport (default 25)                           25
5 Destination mail address1                       mail1@test.org
6 Destination mail address2
7 Reply mail address                              mail1@test.org
8 From mail address                               mail1@test.org

98 Return and save
99 Return and discard changes

Enter desired menu number, Enter for next page>
```

Path: 2 Configuration → 3 Alarms → 2 E-Mail

1. E-mail function on or off.
2. Alarm mask for e-mail notifications (see Chapter "6.5.12 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.



**Important:** Configuration of a gateway is required for sending e-mails (see Chapter "6.5.16 Network"). This can be set via DHCP or manually.

## E-mail configuration page 2:

```
DTS 4128.timeserver   Moser-Baer AG
=====

MAIL CONFIGURATION2           Page 2/2
11 Authentication mode       1
12 User name                 User1
13 Password                  password
```

```
98 Return and save, enter for next page
99 Return and discard changes
```

```
Enter desired menu number>
```

Path: 2 Configuration → 3 Alarms → 2 E-Mail → Enter (switch to page 2)

### 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 <DTS4128 (10.241.0.30)>
```

## 6.5.14 SNMP traps

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

Traps are also designated as notifications (from SNMP V2)

```
DTS 4128.timeserver      Moser-Baer AG
=====

SNMP-TRAP CONFIGURATION
1  Trap mode                off
2  Alarmmask for trap      ff ff ff ff ff ff ff ff
3  Trap community string   trapmobatime
4  Configuration of destination 1  10.240.10.44
5  Configuration of destination 2  10.240.0.85
6  Time periode for alive message  300sec

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration → 3 Alarms → 3 Traps

1. Trap mode on or off
2. Alarm mask for SNMP trap messages (see Chapter "6.5.12 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



**Important:** General settings for SNMP can be found in menu '2. Configuration' → '7. SNMP'. See also Chapter "0 SNMP".

**Important:** Configuration of a gateway is required for sending SNMP traps (see Chapter 6.5.16 Network). This can be set via DHCP or manually.

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

## Configuration of the receiving systems

```
DTS 4128.timeserver      Moser-Baer AG
=====

SNMP-TRAP DESTINATION CONFIGURATION      1
1 Address trap destination                10.240.10.44
2 Port trap destination (default 162)    162
3 SNMP version                            2

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration → 3 Alarms → 3 Traps → 4-5 Configuration of destination

1. Address of the evaluation system e.g. 10.240.10.44.  
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



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

## 6.5.15 General settings

```
DTS 4128.timeserver    Moser-Baer AG
=====

GENERAL SETTINGS
1  Language                0
2  Timezone displayed times  [+1] Brussel
3  Password (menu)         dts

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration → 4 General

1. Setting the display language
2. Setting the time zone for the display, and also all alarm logs, e-mail and SNMP. (See chapter 6.5.21 Time Zone Selection)
3. Enter password for the menu (user *dts*) (max. 15 characters). A password must be configured.



**Caution:** The default password shall be changed after the commissioning of the device.

## 6.5.16 Network

```
DTS 4128.timeserver    Moser-Baer AG
=====

NETWORK GENERAL
1  IPV4 Configuration
2  IPV6 Configuration
3  Host name (Device name)          DTS4128
4  Domain name
5  Network Interface                auto

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration → 5 Network

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.'



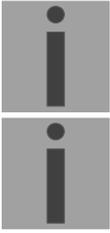
**Notice:** The menu is closed upon modifying the IP or the DHCP mode.



**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:**

```

DTS 4128.timeserver      Moser-Baer AG
=====

NETWORK IPV4
1  DHCP                  off
2  IP address            10.242.17.28
3  Subnet mask           255.240.0.0
4  Gateway                10.240.2.1
5  DNS server            10.240.0.42

98 Return and save
99 Return and discard changes

Enter desired menu number>

```

Path: 2 Configuration → 5 Network → 1 IPV4 Configuration

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.

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

## Network configuration IPv6:

DTS 4128.timeserver Moser-Baer AG  
=====

### NETWORK IPV6

1	Mode / Autoconf	off
2	DHCPv6	off
3	IP address 1 / Prefix	0::0/64
4	Gateway 1	0::0
5	DNS server	0::0

98 Return and save

99 Return and discard changes

Enter desired menu number>

Path: 2 Configuration → 5 Network → 2 IPV6 Configuration

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

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

Network services configuration:

```
DTS 4128.timeserver    Moser-Baer AG
=====

NETWORK SERVICES
1 telnet                off
2 ftp                   off
3 ssh                   on

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration → 6 Services (FTP, telnet, SSH)

1-3. Switch the individual services off or on.

## 6.5.18 SNMP

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

```
DTS 4128.timeserver      Moser-Baer AG
=====

SNMP CONFIGURATION
1  SNMP mode                V3
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>
```

Path: 2 Configuration → 7 SNMP

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

**Important:** 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 "6.5.14 SNMP Traps")

2. Alarm mask for SNMP status (see Chapter "6.5.12 Alarm mask"). The modifications will be saved or restored one menu level higher in "SNMP CONFIGURATION".
3. DTS Location information, which is displayed in the SNMP management tool.
4. Contact information, which is displayed in the SNMP management tool.
5. Configuration of SNMP V1 / V2 c (specific settings). See chapter "6.5.19 SNMP V1 / V2c"
6. Configuration of SNMP V3 (specific settings). See chapter "6.5.20 SNMP V3"

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



## 6.5.19 SNMP V1 / V2c

```
DTS 4128.timeserver   Moser-Baer AG
=====

SNMP V1/V2c CONFIGURATION
1 Readonly community string           romobotime
2 Read/write community string         rwmobotime

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration → 7 SNMP → 5 SNMP V1/V2c security configuration

1. Community string for **read only** (Group membership for GET).  
Standard: *romobotime*.
2. Community string for **read/write** (Group membership for GET/PUT).  
Standard: *rwmobotime*.



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

## 6.5.20 SNMP V3

```
DTS 4128.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>
```

Path: 2 Configuration → 7 SNMP → 6 SNMP V3 security configuration

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



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

## User configuration SNMP V3:

```
DTS 4128.timeserver Moser-Baer AG
=====

SNMP V3 USER CONFIGURATION          dtsUser1
1 Password for authent. and privacy  mobatime
2 Min security level                 priv
3 Read access (read view)           viewDTS1
4 Write access (write view)         viewDTS2

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration → 7 SNMP → 6 SNMP V3 security configuration → 1-2 User configuration

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)



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

## Access configuration SNMP V3:

```
DTS 4128.timeserver      Moser-Baer AG
=====
```

```
SNMP V3 ACCESS CONFIGURATION          viewDTS1
1 Include OID 1                        .1.3.6.1.4.1.8072
2 Include OID 2                        .1.3.6.1.4.1.2021
3 Include OID 3                        .1.3.6.1.4.1.13842.4
4 Exclude OID 1                        .2
5 Exclude OID 2                        .2
6 Exclude OID 3                        .2
```

```
98 Return and save
99 Return and discard changes
```

```
Enter desired menu number>
```

Path: 2 Configuration → 7 SNMP → 6 SNMP V3 security configuration → 3-4 Access configuration

1. – 3. Include View path, form: .1.3.6.1.4.1.13842.4 (DTS) or .iso (complete SNMP ISO path).
4. – 6. Exclude View path: analogue include.



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

## 6.5.21 Time zone selection

```
DTS 4128.timeserver      Moser-Baer AG
=====

SELECTION TIME ZONE                                Page 1
00: [0] UTC                                         01: [0] London
* 02: [+1] Brussel                                  03: [+2] Athens
04: [+2] Bucharest                                  05: [+2] Cairo
06: [+2] Amman                                       07: [0] UTC
08: [+3] Kuwait                                       09: [-1] Cape Verde
10: [0] UTC                                           11: [+4] Abu Dhabi
12: [+4.5] Kabul                                       13: [-8] Pitcairn Is.
14: [+5] Tashkent                                      15: [+5.5] Mumbai
16: [+6] Astana                                       17: [+7] Bangkok
18: [+8] Singapore                                    19: [+9] Tokyo

Enter requested time zone

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

Path: 2 Configuration → 4 General → 2 Timezone displayed times

Display of all the DTS 4128 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 is selected at any time.

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

## 6.6 Maintenance menu

---

```
DTS 4128.timeserver    Moser-Baer AG
=====

MAINTENANCE
1 Update software
2 Backup configuration
3 Restore configuration (backup)
4 Restore configuration (default MOBA)
5 Restart device

99 Return

Enter desired menu number>
```

Path: 3 Maintenance

1. Initiating a software update (files must have been copied into the directory */ram* of the DTS 4128 before). → See Chapter "7 Updates"
2. Backup the entire configuration
3. Restore the entire configuration from the saved backup.
4. Restore the entire configuration to factory settings.
5. Restart DTS 4128

See also Chapter "7 Updates".

## 7 Updates

---

### 7.1 Image- und Filenames

---

The Image files and the filenames are different for the two device versions:

File description	DTS 4128 V1	DTS 4128 V2
Boot image	dts4128u-boot.bin	dts4128u-boot.imx
RootFS image	dts4128rootfs.img	dts4128rootfs.ubifs
Devicetree	n/a	dts4128devicetree.dtb
Kernel Image	dts4128ulmage26	dts4128zImage
Geräte-Applikation	dts4128dtsapp.img	dts4128app.ubifs
Geräte-Konfiguration	dts4128dtscfg.img	dts4128cfg.ubifs
Checksummen Datei	dts4128check.md5	dts4128check.md5

### 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 device configuration image 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.



**Caution:** 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 4128 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 dts4128check.md5 must exist.

→ all file names are case-sensitive.

Steps for updating images:

1. Connect a FTP client software (binary format) to the DTS 4128 (e.g. with Internet Explorer enter: **ftp://dts@[IP address]**) (as user dts).
2. During an update of the device the configuration of DTS 4128 is overwritten. To save existing configuration, save file *dts4128.conf* / *dtsdevice.conf* from directory /etc. After updating, rewrite the file to DTS 4128 (see chapter 5.2 Updating applications or configurations).

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 the DTS 4128 by selecting the menu '3. Maintenance' → '1. Update Software' and press ENTER. The message "Update in progress" appears and at the same time, "Please wait!>" is shown in the command line. All files are copied. The DTS 4128 is automatically restarted on completion of the update.

The telnet or SSH session has to be restarted.



**Caution:** 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 4128 will be destroyed and it has to be returned to the manufacturer for repairing.



**Important:** Only for DTS 4128 V1 devices:  
With this update procedure **the whole configuration of the DTS is lost**. Therefore after the update the current IP address (set from DHCP) has to be read again via a serial connection, before via FTP the earlier saved file ***dts4128.conf/ dtsdevice.conf*** can be copied back (see procedure in chapter 7.4).

## 7.4 Updating configurations

---

To update the configuration on the DTS 4128 the following procedure has to be used.

→ **all file names must be written in small letters.**

1. Connect a FTP client software to the DTS 4128 (e.g. with Internet Explorer enter: ***ftp://dts@[IP address]***) (as user dts).
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 4128 by selecting the menu '3. Maintenance' → '1. Update Software' and press ENTER. The message "Update in progress" appears and at the same time, "Please wait!>" is shown in the command line. All files are copied. The DTS 4128 is automatically restarted on completion of the update.

The telnet or SSH session has to be restarted.



**Caution:** The copy procedure (point 5) may take longer 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 4128 will be destroyed and it has to be returned to the manufacturer for repairing.

## 7.5 FTP connection

---

Connect a FTP client software (binary format) by entering **ftp://dts@[IP address of the DTS 4128]** (e.g. with Internet Explorer enter: **ftp://dts@10.241.0.5**).

To directly reach the sub-directory **/ram**, you can enter **ftp://dts@[IP address]/ram**.



**Caution:** The FTP client must be set to binary mode. An update with images transferred in ASCII mode may destroy the DTS device.

### FTP-Tools

	Windows 10, 11	Linux (Suse, Redhat)
Integrated in the system (file manager):	Windows Explorer <i>Start</i> → <i>Execute</i> : Explorer	Konqueror
Programs (examples)	CuteFTP	KBear

## 7.6 Save Configuration externally

---

(for backup or copy to another DTS 4128)

### 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. Am Ende des Backup-Vorgangs wird eine Übersicht über den Verlauf angezeigt. Daraus ist ersichtlich, welche Elemente gesichert wurden und welche nicht vorhanden sind oder nicht gesichert werden konnten.

### Save the current configuration via FTP:

1. Connect a FTP client software to the DTS 4128 (e.g. with Internet Explorer enter: **ftp://dts@[IP address]**) (as user dts).
2. Change to the DTS 4128 directory **/etc**.
3. Save the **dts4128.conf** / **dtsdevice.conf** (configuration) to the user PC (e.g. copy the file to the Desktop or to the directory *My Documents*).

### Copy configuration to another DTS 4128:

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.



**Important:** When copying the configuration from one DTS 4128 to another, the IP address may have to be changed after the download by serial connection.



**Important:** There is no compatibility between the configuration of a hardware V1 and V2 DTS 4128 device. The configuration can not be transferred .

## 8 Time administration

---

### 8.1 Time acceptance

---

#### Variants of time synchronization

- Adjusting:  
After starting the DTS 4128, 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.  
Configuration, see Chapter "0 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.

### 8.2 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 4128 = 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  $stratum = stratum\ of\ the\ source + 1$  applies

#### Stratum in case of error:

- The stratum value behaves as follows in the case of external time source loss:  
To: Timeout time 1-999 [h], configured for the external source  
St\_fix: 0..15, configurable stratum, 0 = auto  
St\_max: 1..16, configurable max. stratum in the case of synchronization loss

If  $St\_fix > 0$ : then  $stratum = St\_fix$  applies

If  $St\_fix = 0$ :

then  $stratum = \text{MIN}((t\_current - t\_lastsynch)/(To * 255), St\_max)$  applies

whereby:  $t\_current$  [s]: current time

$t\_lastsynch$  [s]: time of the last synchronization

- Adjusting the clock after identifying a leap in time:  
Tst: 0..60'000 [ms], parameter time deviation for stratum alteration by 1  
Tdiff: current time difference in ms

If  $St\_fix > 0$ : then  $stratum = St\_fix$  applies

If  $Tst > 0$  AND  $St\_fix = 0$ : then  $stratum = \text{MIN}(Tdiff/Tst, St\_max)$  applies

If  $Tst = 0$  AND  $St\_fix = 0$ : then  $stratum = 1$  (auto) applies

### 8.3 Time acceptance from NTP

---

**Acceptance:**

- As NTP RFC 1305 ([www.ntp.org](http://www.ntp.org))  
(see <http://ntp.isc.org/bin/view/Servers/WebHome> for internet-server)

**Stratum normal, synchronized operation:**

- Stratum value of DTS is always one step higher than the actual NTP timeserver

**Stratum in case of an error**

- As NTP RFC 1305 ([www.ntp.org](http://www.ntp.org))

### 8.4 NTP as backup

---

If DTS 4128 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 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.: expected NTP Stratum  
St. est = MAX(Stratum NTP candidates)  
If Stratum > St. est + 1, then change to NTP as source takes place (internal stratum is one step higher than the poorest available NTP source).  
As soon as the primary source is available again, the changes are set back.

### 8.5 Time server

---

- NTP v4 (compatible with v3) as per RFC 1305 (Port 123)
- SNTP (UDP), RFC2030 (Port 123)
- TIME (TCP/UDP), RFC 868 (Port 37)
- DAYTIME (TCP/UDP), RFC 867 (Port 13)

### 8.6 Time accuracy, time-keeping

---

See technical data Appendix F.

### 8.7 Leap second

---

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

### 8.8 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.

## 8.8.1 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 4128 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 4138 must be correspondingly configured to be able to use NTP authentication (chapter 6.5.8 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)

### 8.8.2 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 described 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>.

## 8.9 Redundant operation of 2 DTS 4128.timeservers

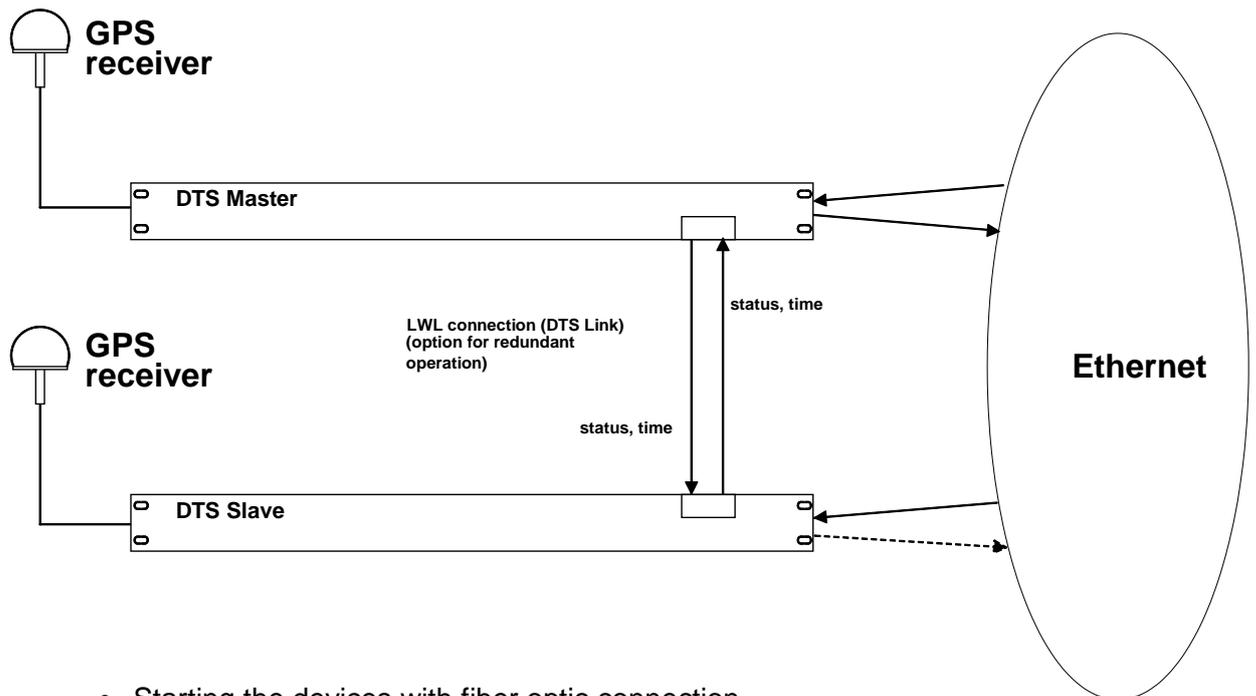
---

For redundant operation two DTS 4128 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 F, 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  $\text{stratum/slave} = \text{stratum/master} + 1$   
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.
- The slave assumes the master function in the case of a loss of the master.
- If the former master is working again, it assumes 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 SINEC telegrams, or has a worse status, the slave assumes the master function.

### NTP

The NTP clients select the server with the lower stratum.

### 9.1 General

---

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

A full SNMP agent is implemented on the DTS (MIBII, DTS4128).

For SNMP V2c, following standard *Communities* are used:

Read only :        *romobatetime*  
Read/write:        *rwmobatetime*  
Trap:                *trapmobatetime*

For SNMP V3, following standard *User / Passwords* are used:

dtsUser1:         *mobatetime*  
dtsUser2:         *mobatetime*  
dtsInfo:            *mobatetime*        (*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

DTS4128            (DTS4128-MIB.TXT)

  Device specific DTS definitions

SNMP V1:

DTS-COMMON        (File: DTS-COMMON-MIBv1.TXT)

  General DTS definition, always required

DTS4128            (DTS4128-MIBv1.TXT)

  Device specific DTS definitions

The MIB files can be copied from the DST 4128 with FTP (For FTP use, see Chapter "7.5 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 *dts4128????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 *dts4128????ConfigCmd* variable to 2 (2=undo, restore).

After sending the accept command, a *dts4128ConfigChanged Notification* is sent.

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

Example:

Management-System		DTS
<i>Put</i> dts4128FTPMODE=1	→	Variable is set to 1 internally
<i>Put</i> dts4128NetServicesConfigCmd=1	→	Configuration group is assumed
	←	Sends <i>dts4128ConfigChanged Notification</i> with the new time <i>dts4128NetConfigChangedTime</i>

## 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

[**dts4128StartUp**]

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

[**dts4128Shutdown**]

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

[dts4128StatusChanged]

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

dts4128SysStatus, dts4128SysTimeSource, dts4128SysStratum, dts4128SysMasterMode

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
dts4128SysStatus	Unsigned Int	4 Bytes	Contains the internal system status	66309
dts4128SysOffset	Integer	4 Bytes	Actual time offset of the system [us]	-1523 → -1.523ms
dts4128SysTimeSource	Byte	1 Byte	Actual time source	2
dts4128SysStratum	Byte	1 Byte	Actual system stratum level	1
dts4128SysMasterMode	Byte	1 Byte	Master/slave mode	1

### 9.3.4 Configuration changed

[dts4128ConfigChanged]

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
dts4128SysConfigChangedTime	TimeTicks	4 Bytes	Contains the TimeTicks value of the last change in 1/100 <sup>th</sup> seconds
dts4128NetConfigChangedTime	TimeTicks	4 Bytes	
dts4128TSConfigChangedTime	TimeTicks	4 Bytes	
dts4128RedOpConfigChangedTime	TimeTicks	4 Bytes	
dts4128RelayConfigChangedTime	TimeTicks	4 Bytes	
dts4128MailConfigChangedTime	TimeTicks	4 Bytes	
dts4128SnmpConfigChangedTime	TimeTicks	4 Bytes	
dts4128NTPConfigChangedTime	TimeTicks	4 Bytes	
dts4128OutLineDCFCConfigChangedTime	TimeTicks	4 Bytes	
dts4128OutLineTZServerConfigChangedTime	TimeTicks	4 Bytes	
dts4128NetServicesConfigChangedTime	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
dts4128SysConfigChangedTime	dts4128Language dts4128Timezone dts4128Password dts4128PowerSupply
dts4128NetConfigChangedTime	dts4128IP4Addr dts4128IP4Mask dts4128IP4Gateway dts4128IP4Nameserver dts4128Hostname dts4128Domain dts4128DHCPMode dts4128EthernetLinkMode dts4128IPv6AutoConf dts4128IPv6DHCPMode dts4128IPv6Addr1 dts4128IPv6Prefix1 dts4128IPv6Gateway1 dts4128IPv6Addr2 dts4128IPv6Prefix2 dts4128IPv6Gateway2 dts4128IPv6Nameserver
dts4128NetServicesChangedTime	dts4128TelnetMode dts4128FTPMMode dts4128SSHMode
dts4128TSConfigChangedTime	dts4128TSType dts4128TSStratumMode dts4128TSStratumErrorLimit dts4128TSTimeout dts4128TSStratumTimeout1 dts4128TSOffsetPerStratum dts4128TSMaxOffsetForTimeValid dts4128TSDCFAdjusment dts4128TSAjusementMode dts4128TSMAXAdjusmentSpeed dts4128TSQuartzType dts4128TSOffsetSynchOnly dts4128TSLepSecMode dts4128TSLepSecDate
dts4128RedOpConfigChangedTime	dts4128RedOpMode dts4128RedOpSwitchOverStratum dts4128RedOpMaxOffsetSlaveTimeSource dts4128RedOp2ndDTSIPAddress dts4128RedOp2ndDTSIPPort
dts4128NTPConfigChangedTime	dts4128NTPBroadcastAddr1 dts4128NTPBroadcastInterval1 dts4128NTPBroadcastTTL1 dts4135NTPBroadcastKey1 dts4128NTPBroadcastAddr2 dts4128NTPBroadcastInterval2 dts4128NTPBroadcastTTL2 dts4135NTPBroadcastKey2 dts4128NTPSourceTable (Address, min/max poll, mode, prefer)
dts4128RelayConfigChangedTime	dts4128RelayAlarmMask
dts4128MailConfigChangedTime	dts4128MailMode dts4128MailAlarmMask dts4128MailServerIPAddress dts4128MailServerPort dts4128MailAddrDestination1 dts4128MailAddrDestination2 dts4128MailAddrReply dts4128MailAddrFrom dts4128MailUser dts4128MailPassword dts4128MailAuthMode
dts4128SnmpConfigChangedTime	dts4128SnmpMode



### 9.3.6 Alarm notification

[dts4128Alarm]

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

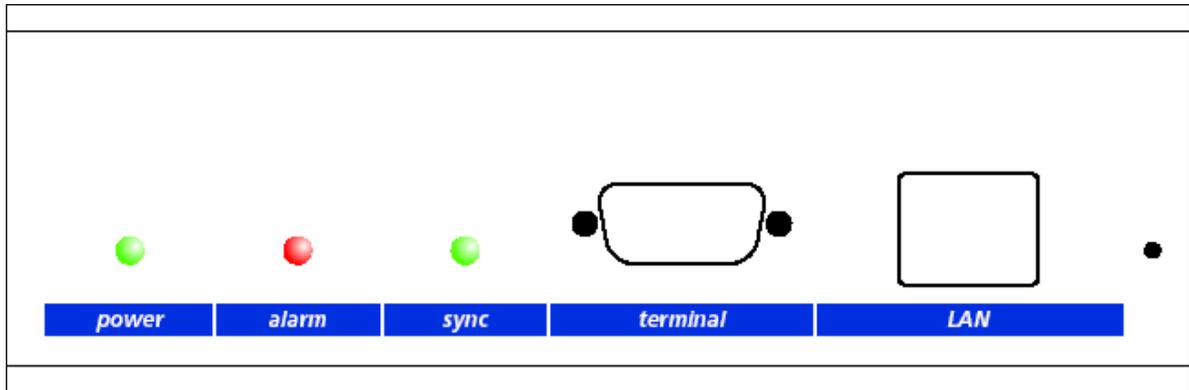
This *Notification* is always sent out, as soon as SNMP and the alarm traps are activated and a destination address is configured.

The *Notification* sent out contains the following data:

Field	Type	Size	Description	Example
dts4128TrapAMsgErrorNr	Byte	1 Bytes	No. of the alarm bit (0..63)	3
dts4128TrapAMsgErrorState	Byte	1 Bytes	0 = alarm bit was deleted 1 = alarm bit was set	1
dts4128TrapAMsgErrorTime	Unsigned Int	4 Bytes	PC-time in seconds since 01.01.1970 00:00:00	946684805
dts4128TrapAMsgErrorText	Text	59 Bytes	Error text	Failure supply 1

# 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 4128 – 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)

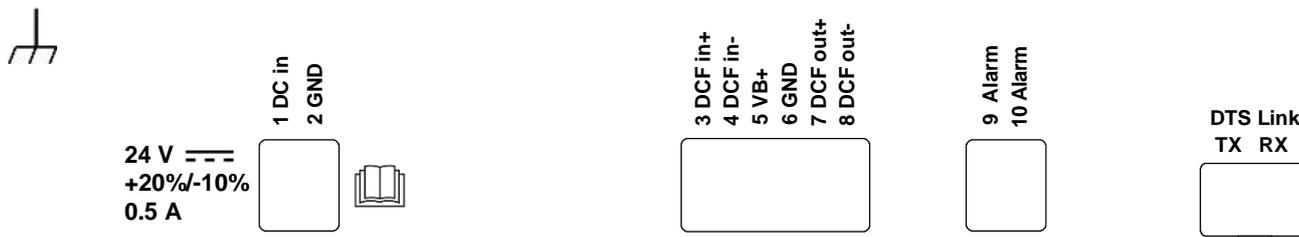
	SUB-D 9 / 1	SUB-D 9 / 2	
Receive Data *	2	3	Transmit Data
Transmit Data *	3	2	Receive Data
Data Terminal Ready	4	1 & 6	Data Set Ready & Carrier Detect
System Ground *	5	5	System Ground
Data Set Ready & Carrier Detect	1 & 6	4	Data Terminal Ready
Request to Send	7	8	Clear to Send
Clear to Send	8	7	Request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

\* At least needed connections.

### LAN Connection:

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

## A.2 Connections (rear view)



### DTS 4128.timeserver connections

For technical data see in Appendix "F Technical data"

Clamp	Connection	Description
	Earth connection	
1	DC in power supply +	Input for external DC supply
2	DC in power supply GND	Ground
3	DCF input +	DCF input, e.g. for connection of a GPS 4500– or DCF– receiver with current loop output.
4	DCF input -	
5	DC output +	DC output for GPS 4500
6	DC output GND	DC in voltage -2V, max. 400mA
7	DCF output +	DCF output, current loop passive, U <sub>max</sub> = 30VDC, I <sub>on</sub> = 10..15mA, I <sub>off</sub> < 1mA @20VDC
8	DCF output -	
9	Alarm relay	Alarm contact, open when alarm is active 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
10	Alarm relay	
	DTS link	Optical connection to a 2 <sup>nd</sup> DTS 4128.timeserver Mini GBIC plug-in

### A.3 Plug-in spring terminals

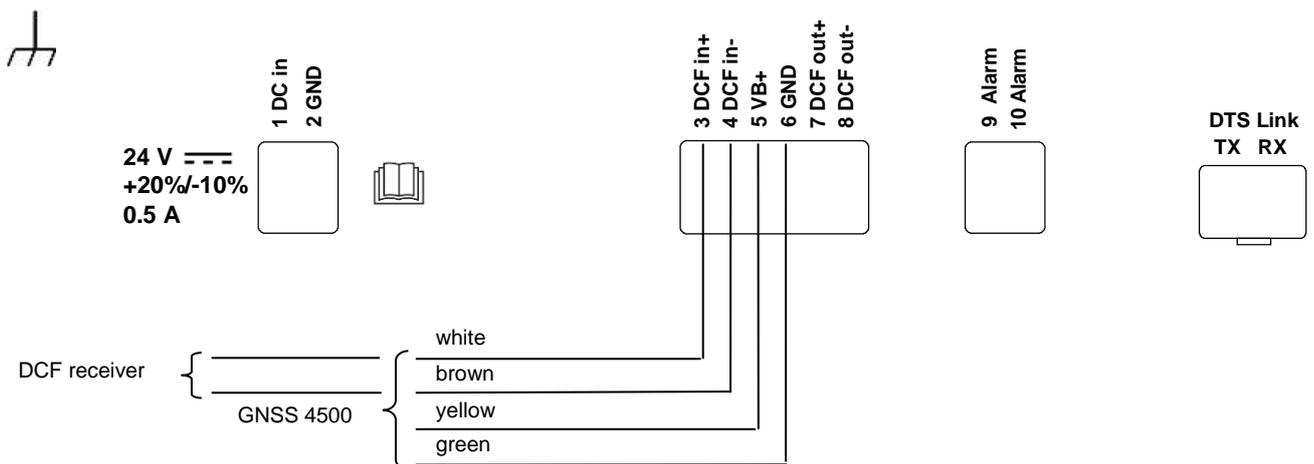
multiple contact strip 100% protected against wrong plug;  
WAGO CAGE CLAMP®-connection  
Cross section of 0,08 mm<sup>2</sup> to 1,5 mm<sup>2</sup> (from AWG 28 to AWG 14)  
Voltage CSA 300 V / current CSA 10 A  
Rated voltage: EN 250 V  
Rated surge voltage: 2,5 kV  
Nominal current: 10 A  
Strip length: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

Pulled off spring terminal with operation tool:



2 operation tools are delivered with the accessory bag.

### A.4 Connection GNSS 4500 or DCF 450



## 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	1 <sup>st</sup> Sun. Oct (02:00)	1 <sup>st</sup> 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	1 <sup>st</sup> Sun. Oct. (02:00)	1 <sup>st</sup> 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)	1 <sup>st</sup> 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	Brasília	-3	Yes	3 <sup>rd</sup> Sun. Oct. (00:00)	3 <sup>rd</sup> Sun. Feb. (00:00)
33	Buenos Aires	-3	No		
34	Newfoundland	-3.5	Yes	2 <sup>nd</sup> Sun. Mar. (02:00)	1 <sup>st</sup> Sun. Nov. (02:00)
35	Atlantic Time (Canada)	-4	Yes	2 <sup>nd</sup> Sun. Mar. (02:00)	1 <sup>st</sup> Sun. Nov. (02:00)
36	La Paz	-4	No		
37	Bogota, Lima, Quito	-5	No		
38	New York, Eastern Time (US & Canada)	-5	Yes	2 <sup>nd</sup> Sun. Mar. (02:00)	1 <sup>st</sup> Sun. Nov. (02:00)
39	Chicago, Central Time (US & Canada)	-6	Yes	2 <sup>nd</sup> Sun. Mar. (02:00)	1 <sup>st</sup> Sun. Nov. (02:00)

40	Tegucigalpa, Honduras	-6	No		
41	Phoenix, Arizona	-7	No		
42	Denver, Mountain Time	-7	Yes	2 <sup>nd</sup> Sun. Mar. (02:00)	1 <sup>st</sup> Sun. Nov. (02:00)
43	Los Angeles, Pacific Time	-8	Yes	2 <sup>nd</sup> Sun. Mar. (02:00)	1 <sup>st</sup> Sun. Nov. (02:00)
44	Anchorage, Alaska (US)	-9	Yes	2 <sup>nd</sup> Sun. Mar. (02:00)	1 <sup>st</sup> Sun. Nov. (02:00)
45	Honolulu, Hawaii (US)	-10	No		
46	Midway Islands (US)	-11	No		
47	Mexico City, Mexico	-6	Yes	1 <sup>st</sup> Sun. Apr. (02:00)	Last Sun. Oct. (02:00)
48	Adak (Aleutian Is.)	-10	Yes	2 <sup>nd</sup> Sun. Mar. (02:00)	1 <sup>st</sup> 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:**

2<sup>nd</sup> last Sun. Mar. (02:00) Switch over on the penultimate Sunday in March at 02.00 hours local time.



**Important:**

The Time Zone Table is usually updated as needed. The current table is available for download under the following address: [www.mobatime.com](http://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, e.g. ETCW.

If not changed using MOBA-NMS, it must be copied onto the DTS 4128 in accordance with the update instructions (Chapter“7.4 Updating Applications and Configurations“).



**Important:**

The file names *mbsn.tbl* and *usersn.tbl* must be written in small letters.

## C Alarm list

Number	Error message	Description / Action
0	Reboot DTS	DTS 4128 restarted, no intervention required
1	Error bit1	Not used
2	Supply voltage too low	Power failure (internally measured) -> support
3	Error bit3	Not used
4	Error bit4	Not used
5	Error bit5	Not used
6	Error bit6	Not used
7	Error bit7	Not used
8	Wrong time zone DCF	Check DCF configuration
9	Error bit9	Not used
10	Error bit10	Not used
11	Error bit11	Not used
12	Error bit12	Not used
13	Error bit13	Not used
14	Error bit14	Not used
15	Error bit15	Not used
16	Time source lost	Stratum too high: check time source
17	Failure time source 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	Software trimming	Quartz error or poor source quality
21	NTP not working	Check NTP configuration
22	Offset source (slave)	Only as slave: check source
23	Syn only diff too great	Check synchronization and source
24	Mail config. wrong	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 opt. link	No connection via DTS link (optical link) in redundant operation. Check connection.
31	No link (LAN)	No connection via LAN link in redundant operation. Check LAN connection.
32	Switch over slave -> master	Switch over slave -> master is occurred. Check ev. the time source of current slave.
33	Difference between slave and local time source too large	In slave mode only: check time sources
34	Local time source lost	In slave mode only: check time sources
35 - 63	Error bit35 - 63	Not used

## D Troubleshooting

	Error	→	→	Solution / possible cause
1	DTS does not accept time	Does the reading change (approx. every 3 sec) <i>Sec counter DCF</i> in <i>Status</i> → <i>Source</i> → 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. GNSS 4500) sends out valid telegrams. Wait for this time to pass.
2			No, for more than 20 minutes.	<ul style="list-style-type: none"> <li>• Check DCF reception LED</li> <li>• Check polarity cabling to GPS.</li> <li>• Check positioning of the GPS receiver</li> </ul>
3		Error-Bit 23 ( <i>Syn only diff too big</i> ) in <i>Status</i> → <i>Alarm status</i> set		The deviation to the received time is beyond the maximal allowed time correction. In the menu <i>Configuration</i> → <i>Time administration</i> → <i>Time-keeping configuration</i> → TIME ADJUSTMENT CONFIGURATION, set the parameter <i>synch. only offset</i> (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		<i>Offset to source</i> in <i>Status</i> → <i>Time</i> → TIME INFORMATION AND STATUS always shows the same offset		<ul style="list-style-type: none"> <li>• If Error-Bit 23 set, see point 3</li> <li>• The deviation is that big, that offset changes cannot be seen due to the displayed resolution.</li> </ul>
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 ( <i>time source fail stratum</i> )			See 1
7	Error-Bit 17 set ( <i>time source fail TO</i> )			See 1
8	Error-Bit 23 set ( <i>Syn only diff too big</i> )			See 1
9	Drift (ppm) of quartz too high	The drift displayed in the menu <i>Status</i> → <i>Time</i> → TIME INFORMATION AND STATUS is bigger than stated in the data sheet.		<ul style="list-style-type: none"> <li>• 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).</li> <li>• Very large temperature change (outside the specification)</li> <li>• Time correction was carried out manually.</li> </ul>
10	Needed information to contact your MOBATIME service			<p><b>Device type, part number, production number and serial number:</b> Details are given on the adhesive type label.</p> <p><b>The following files must be provided for the analysis:</b> <b>All files (in .zip folders, separate for each device)</b> from the directories <i>/var/log/</i> and <i>/etc/</i> and the file: <i>/ram/trim.log</i>. To copy this files use FTP, e.g. Windows Explorer with ftp://[IP address], see chapter 7.5 .</p> <p><b>If the log files cannot be copied, please read out the current software version:</b> The software version can be queried in the menu 1 STATUS/9 Versions of the software .</p> <p><b>Place and date of purchase and of commissioning of the device.</b></p> <p><b>Most comprehensive possible details of the malfunction:</b> Describe the problem, possible causes, measures taken, the system environment / operating mode and configuration, etc.</p>

## E Copyright notice

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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	V1.30.1	GPL version 2	LICENSE
NTP	NTP	4.2.8p15	Free	COPYRIGHT
pure-ftp	FTP server	1.0.48	Free, partly BSD	COPYING
NetSNMP	SNMP agent	5.8	BSD	COPYING
OpenSSL	SSL Lib.	1.1.1c	BSD style	LICENSE
OpenSSH	SFTP server	8.0p1	BSD	LICENSE
dropbear	SSH server	v2020.81	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
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rssh	Restrict SSH access	2.3.4	BSD style	LICENSE
Binutils Gdb	Versioning	2.34	GNU V2	COPYING

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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!

## F Technical data

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Dimensions	19" Rack, 1HE x 28TE (H x W x D [mm]) = 483 x 44 x 125	
Weight	approx. 1.2 kg	
Ambient temperature	0 to 60°C, 10-90% relative humidity, without condensation	
Operation	Serial interface (via RS 232) or Telnet/SSH (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
	NTP to internal time	typical < +/- 100 µs



**Important:** NTP reception (DTS 4128 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)	<ul style="list-style-type: none"><li>- Synchronized with GPS: +/-10 µs to UTC</li><li>- Holdover (free run): After at least 12 hours synchronization from the time source &lt; +/- 0.01 sec. / day (&lt; 0.1ppm) (measured over 24 h), at 20°C +/- 5°C. &lt; +/- 1 ms / day (&lt; 0.01ppm) (measured over 24 h), at constant temperature.</li><li>- After reboot without synchronization: &lt; +/- 0.25 sec. / day (&lt; 2.5ppm) (measured over 24 h), at 20°C +/- 5°C.</li></ul>	
Redundant operation	- Master to slave (optical DTS link):	typical < +/- 1 µs
Time server	NTP V4 (fully V3 compatible), RFC 1305 (Port 123) 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: > 1500 requests / sec.	
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 (PC Software Tool)	

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
Serial interface	D-Sub 9: (38400, 8, n, 1, no flow control) Cable length max. 3m.
DCF Input	DCF77 or DCF from GNSS receiver, active current loop Time zone selectable Nominal 28 VDC, max. 32mA, response threshold 8mA
DCF Output	DCF time code, time zone selectable Max. time deviation with GNSS source: +/- 10 $\mu$ s, jitter < 10 $\mu$ s - DCF time code, passive current loop interface: Vmax = 30 VDC, I <sub>on</sub> = 10..15 am, I <sub>off</sub> < 0.1 mA @20VDC
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
DTS Link	Plug-in position for mini GBIC module ( <b>GigaBit Interface Converter</b> ) 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 $\mu$ m: max. 550 m -Multimode fiber with a diameter of 62.5 $\mu$ m: max. 275 m With LX standard longer cables can be achieved.
DC power supply	24 VDC +20% / -10% / max. 10 W / 0.5 A
Power supply output	DC in voltage -2 V, max. 400 mA

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