

Multipurpose Standard Time Server

Time Server TS-2335



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SEIKO SOLUTIONS INC.

Introduction

Thank you for purchasing a Seiko Solutions product.

To ensure the safe use of this product, be sure to read this instruction manual before use. After reading it, keep it in a safe location so that you can refer to it anytime.

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- Information in this manual is subject to change without notice.
- We are not responsible for any claim for loss or lost earnings arising out of the use of the product (including software) mentioned in this manual.
- The product (including software) described in this manual is designed for use in Japan. It does not comply with foreign standards. Seiko Solutions Inc. will not be held responsible if the product is used in a foreign country.
- Handle the product according to the information and instructions contained in this manual.

Observe the Following for Safe Use



This manual contains information that you should follow to use the product safely and properly so that injuries and damage to property can be prevented.

Understand this information well before reading the rest of this manual.








Keep this manual in a safe location so that you can refer to it anytime.

Meaning of indications and symbols

Indications used on the main unit and in this manual

 Warning	Indicates a hazard that may result in the loss of life or serious injury if this indication is neglected and the product is handled improperly.
 Caution	Indicates a hazard that may result in injury or physical damage to the product if this indication is neglected and the product is handled improperly.

Symbols used on the main unit and in this manual

	This symbol indicates that improper handling through the disregard of this indication may lead to the “danger” of an electric shock.
	This symbol indicates that disassembly is prohibited.
	This symbol indicates an action that is not allowed (prohibited matter).
	This symbol indicates matters that must be executed.
	This symbol indicates that the power plug must be removed from the electric outlet.
	This symbol indicates that the product must be grounded.
	This symbol indicates the useful information when using this equipment.

Indications and symbols used in the manual

Attention	Improper handling through the disregard of this indication disables the product from delivering its original performance and leads to breakdown.
NOTE!	This indication shows information useful for handling the product or preventing a mistake.

We are not responsible for any claim for loss or lost earnings arising out of the use of the product (including software) mentioned in this manual.

Some of the above indications and symbols may not be used for specific equipment or manuals.



Warning



Never attempt to disassemble (e.g., remove the screws, open the housing) or modify <this equipment>. Doing so can cause fire or electric shock.



Using <this equipment> when it is making abnormal sound or when it is hot can cause fire or electric shock. Immediately turn off the main unit power, disconnect the power plug from the outlet, and then ask our service center for inspection.



Using this equipment in an abnormal state, for instance, when it is producing smoke or an abnormal odor, can cause fire or electric shock. Immediately turn off the main unit power, disconnect the power plug from the outlet, make sure it no longer emits smoke, and then ask our service center for repair. Do not attempt to repair this equipment by yourself. Repair by unauthorized individuals is dangerous.



Use this equipment only with a <100-240V AC power source>. Also avoid branched wiring using a power strip, branched outlet, or branched socket. Failure to comply may cause fire or electric shock.



Do not damage, break, process, forcefully bend, yank, twist, or bind the <power cord>. In addition, the <power cord> can break if a heavy object is placed on it or if it is exposed to high heat, increasing the risk of fire or electric shock. If the <power cord> is damaged, ask our service center for repair.



In case a foreign object (a piece of metal, water, liquid, etc.) finds its way inside, first turn off the main unit power, remove the power plug from the outlet, and then contact our service center. Continuing to use the product in such condition can cause fire or electric shock.



Do not connect or disconnect the power plug with wet hands. Doing so can cause electric shock.



Caution



Do not place this equipment in an unstable location such as on a wobbly stand or on a slanted surface. Doing so may cause this equipment to fall or tip over, increasing the risk of injury.



Do not place flower vases, flower pots, cups, cosmetics, or any other container that contains chemicals, water, beverages, or small metal pieces on <this equipment>. Such objects dropped inside the equipment can cause fire or electric shock.



Do not use this equipment in humid places, such as in a bathroom or near a humidifier. Doing so can cause fire or electric shock.



When removing the plug, do not pull on the power cord. (Be sure to hold the plug.) Failure to comply can damage the power cord and increase the risk of fire or electric shock.



Before moving <this equipment>, be sure to disconnect the power plug from the outlet. Failure to comply can damage the power cord and increase the risk of fire or electric shock.



Insert the power plug all the way in. Not doing so can cause fire or electric shock.



In case <this equipment> is dropped or broken, turn off the main unit power, remove the power plug from the outlet, and then contact our service center. Continuing to use the product in such condition can cause fire or electric shock.

How to Use This Manual

- This document is the instruction manual for the Time Server TS-2335.
- It provides an overview of the TS-2335 hardware and describes the hardware operation.
- Other TS-2335 document includes the *GPS Antenna Connection Manual*.

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1 Safety

1.1 Intended Use

The **TS-2335** 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 GPS (e.g. from GPS 4500).





It can operate as master clock for a self-setting IRIG clock line. The TS-2335 has 2 such lines.








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

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

1.2 Checking Installation Environment

Please read the following warnings and cautions carefully.

 Warning	
	Do not expose <this product> to water, and do not allow it to get wet. Doing so can cause fire or electric shock.
	Do not place any heavy objects on <this product or its power cord>. Doing so may cause the internal circuits, parts, or <power cord> to break, increasing the risk of fire or electric shock.
	Do not insert or drop any foreign objects, including metal or flammable items, into <this product> through any opening, such as air vents. In case a foreign object finds its way inside, first turn off the main unit power, remove the power plug from the outlet, and then "Please contact the distributor where you purchased." Continuing to use the product in such condition can cause fire or electric shock.

 Caution	
	Do not place any thermal (heat generating) appliances near <this product or its power cord>. Doing so may cause the coatings of the internal circuits, parts, or <power cord> to melt, increasing the risk of fire or electric shock.
	Do not use this product in humid places, such as in a bathroom or near a humidifier. Doing so can cause fire or electric shock.
	Do not use this product in an oily or dusty environment. Using this product in such an environment can cause fire or electric shock.
	Do not use this product near acid or other corrosive agents, or where it may be affected by the strong magnetic field of other products. Using this product in such an environment can cause fire or electric shock.
	Do not use this product in a car. Do not expose this product to heavy vibration. Using this product in such an environment can cause fire or electric shock.
	Do not expose this product to direct sunlight or high temperature. Do not block the air vents on the front or side panels, or the fan on the rear panel. Blocked air vents can increase the inner temperature and cause fire.

When choosing the installation location, pay attention to the above warnings/cautions

and the conditions listed below.

Operation temperature	0 to 60°C
Operation humidity	10 to 90% RH (non-condensing)
Installation condition	Make room for the cables so that excess force will not be applied to the connectors. Do not stack the product.

1.3 Checking the Power Supply

Check the power supply (100 to 240 VAC).
Be sure to earth ground the TS-2335.

Warning



Using a damaged <power cord> (e.g., exposed core, broken wire) can cause fire or electric shock. Immediately turn off the main unit power, disconnect the power plug, and then “Please contact the distributor where you purchased.” for repair.

Caution



The power ground (earth) must be connected to an appropriately treated ground (earth) terminal. Do not connect it to a water pipe or gas pipe. Improper grounding can cause fire, electric shock, or malfunction.

1.4 Installation Tasks

This chapter provides suggestions and work descriptions for installing this product.

Warning



Never attempt to disassemble (e.g., remove the screws, open the housing) or modify <this product>. Doing so can cause fire or electric shock.



Do not damage, break, process, forcefully bend, yank, twist, or bind the <power cord>.
In addition, the <power cord> can break if a heavy object is placed on it or if it is exposed to high heat, increasing the risk of fire or electric shock. If the <power cord> is damaged, “Please contact the distributor where you purchased.” for repair.

Caution



Do not place flower vases, flower pots, cups, cosmetics, or any other container that contains chemicals, water, beverages, or small metal pieces on <this product>.
Such objects dropped inside the product can cause fire or electric shock.



Do not place <this product> face up, on its side, or upside down. Using <this product> in such orientations can block air vents, cause heat to accumulate inside, and cause fire or electric shock.



Do not get on <this product> or place heavy objects on top of the product. Doing so may cause this product to tip over or break, increasing the risk of injury.

1.5 Unpacking

Unpack the package and check the bundled items. (Refer to the list of bundled items in the "Read This First" section.) When removing this product from the packaging materials, always hold it with both hands. Place this product in a stable location (such as on a desk) where it will not slip off or tilt.

1.6 How to Install

When installing this product, pay attention to the following warnings and cautions.



Warning



Do not connect or disconnect the power plug with wet hands. Doing so can cause electric shock.



Avoid branched wiring using a power strip, branched outlet, or branched socket. Failure to comply may cause fire or electric shock.



Caution



To remove the power plug from the outlet, be sure to hold the plug. Pulling on the <power cord> can damage it and cause fire or electric shock.



If you do not plan to use the product for a long time, be sure to remove the plug from the outlet for safety reasons.



During a thunderstorm, remove the power plug from the outlet, and refrain from using the product. Lightning can cause fire or electric shock.



<This product> contains a lithium battery. When you dispose of the <This product>, observe the regulations of local government. For details, contact your local government.



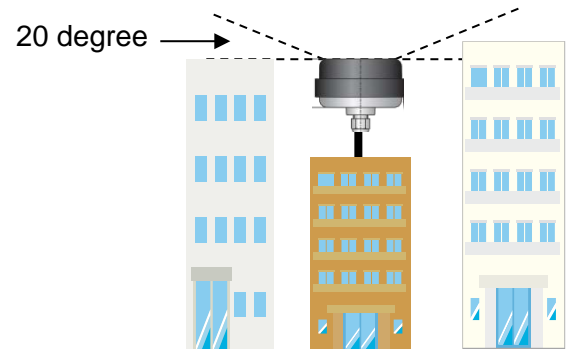
Securely tighten the screws.
Failure to do so may cause <this product> to fall, resulting in accident or damage.

Installation place of the GPS receiver “GPS 4500”

Basically the best reception is achieved when the antenna is installed in the place with a free view of the sky with no obstacles like buildings around.

However since it is generally not easy to find such a place please consider following points to install antenna.

- (1) There is a free view of 20 degree angular elevation above the horizontal.
- (2) There is no other antenna or lighting rod around.
- (3) Install the GPS antenna to be perpendicular to the horizontal ground surface.



The cable length of bundled antenna is 10 meters.

You can extend the cable up to 200 meters (10m+190m).


Please use the cable whose thickness is more than AWG23(0.25mm²).

When you use the option arrester “SP 4500”, the cable length between SP 4500 and TS-2335 is up to 190 meters.

1.7 Connecting the power supply

To use the TS-2335, connect the following power cord to the receptacle and to the outlet.

This product does not have the power switch. When you connect the power cord to the receptacle this product starts up.

Specification of the power cord of other than AC100V			
	Connector (TS-2335 side)	Cord	Plug (Outlet side)
Rating	250V、 More than 7A (Certified item under the Electrical Appliances and Material Safety Act)		
Shape	IEC C13 	Use a 3-core cord that satisfies the rating above.	Use a plug that matches the shape of outlet of the installation environment.



Warning



When you use the TS-2335, please prepare the power cord specified in Section 1.7 separately.

NOTE!

When you use the Uninterruptible Power Supply (UPS), please take care not to exceed the allowance (upper limit value) of the inrush current.

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.

3 General Information: Introduction

3.1 Scope of Delivery

The package you received contains:

- TS timeserver
- Mounting set for rack mounting consisting of:
 - 4 pcs nuts for 19" housing
 - 4 screws M6 for the nuts
 - 4 plastic discs for screws M6
- Connector set
 - plug 3-pole black for power supply
 - spring terminal 12-pole orange
 - spring terminal 8-pole orange
 - spring terminal 5-pole orange
 - spring terminal 2-pole orange
- 2 pcs mounting tools with spring terminals

3.2 Technical Data

See Appendix "F Technical data".

3.3 Device Description in this Manual

This instruction manual is for the master clocks TS-2335.

3.4 Introduction

The TS-2335 is a NTP time server for the use in network environments. It can be synchronized from GPS (GPS 4500), IRIG-B1 and NTP and operate as NTP server.

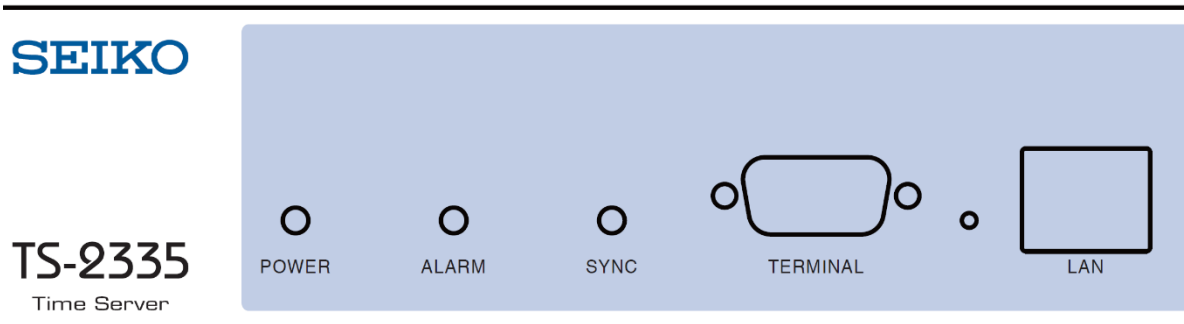
It can operate as master clock of slave clocks and make them synchronized by the method of unicast or multicast using NTP or Time zone table. And it has two IRIG lines (each line can be used as analog or digital (current loop and RS-422) output), serial interfaces (it can be programmed by script file) for telegram output and pulse/frequency output lines.

It can send both e-mail and SNMP Trap to notify an error. In addition, request the configuration and system status using SNMP. For keeping redundant time source, two TS-2335 can be linked each other using optical link.

¹ When IRIG-B synchronization, the date and time must be set manually or using other time source (GPS).

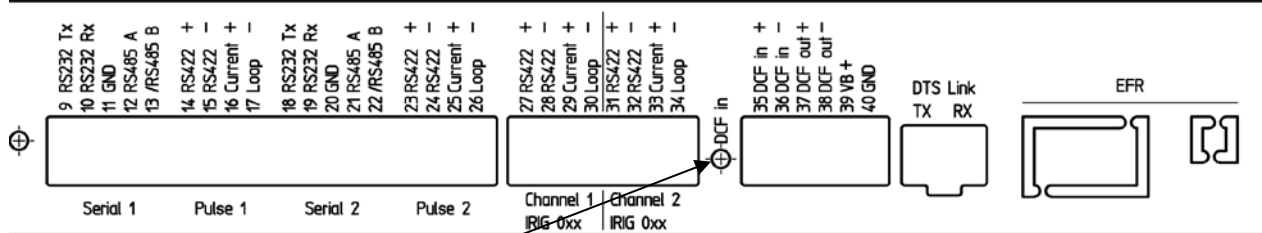
4 Displays

4.1 LED displays front side



Description	Color	Status	Description
Power	Green	On	Mains or DC power supply is in order
		Off	No power supply
Alarm	Red	On	The alarm relay signalizes an alarm
		Off	No active alarms
Sync	Green	On	TS-2335 can read the time from a synchronization source
		Off	Synchronization source is not available
LAN control lamps:			
	Green	Blinking	Network activity
	Orange	Blinking	No connection to network
	Yellow	Off	10 Mbit
		On	100 Mbit

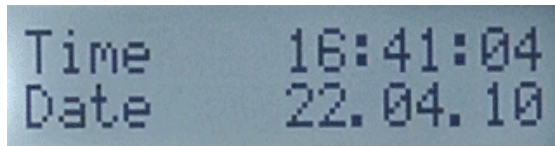
4.2 LED indication back side



Description	Color	Status	Description
DCF reception	red	Blinking	GPS reception

4.3 Display

Display showing the current status of the TS-2335.



Display of:

- Time, date
- Current time source
- Stratum of the TS-2335
- Software version
- IPv4 address
- IPv6 address
- Alarm summary
- Current alarms

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

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

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

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

5 Installation

5.1 Installation Guidelines

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 TS-2335

The normal booting time of the TS-2335 is approx. 60 sec. with pre-set IP or with DHCP. The booting procedure of the operating system is displayed on the serial console. After that, the text "starting" appears on the display (during the booting procedure the display is dark and empty). Without connection to a DHCP server, the first start up can take up to 75 seconds. After that, the DHCP option must be set to "off" in the network configuration.

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

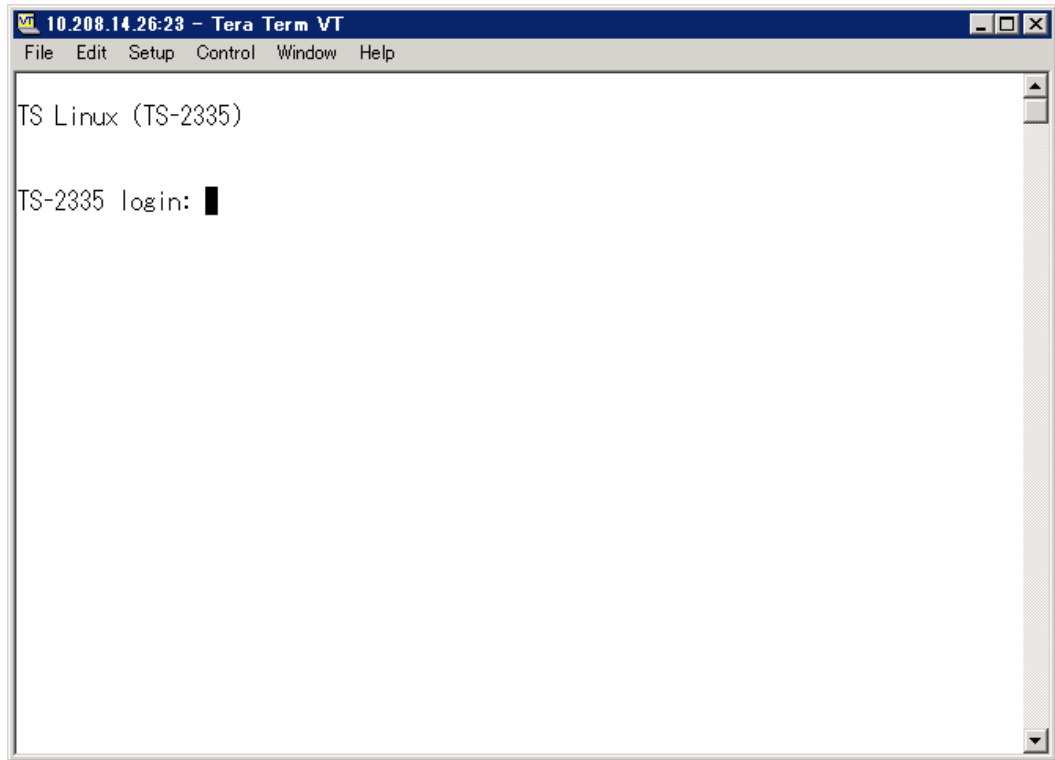
5.3 Basic settings (factory settings)

General	Internal time zone	JST
	Menu password	adm
	Power	single
	Language	English
Time source	Source	GPS (UTC)
	Alarm delay for failure	60 min
	Stratum	auto
	Error stratum	12
	DCF timeout	24hrs
	DCF correction	0ms
	Offset per stratum	50ms
	Max. offset time ok	50'000us
Time-keeping	Mode	set (setup)
	Quartz type	0
	Synch only offset	off
Redundant operation		off
Lines	Serial interface 1	off
	Serial interface 2	off
	IRIG/AFNOR line 1	off
	IRIG/AFNOR line 2	off
	NTP slave clocks /	
	Time zone server	off
Network	DHCP	on
	DHCPv6	off
	Autoconf IPv6	off
	Link	auto
	Hostname	TS-2335
Alarm	Relay	all on
	Mail	off
	SNMP traps	off
NW Services	SSH	on
	Telnet	on
	FTP	on
SNMP	Modus	off
	RO-Community	rossol
	RW-Community	rwssol
SNMP Traps	Mode	off
	Trap Community	trapssol

6 Operation

6.1 General

Operation occurs via a terminal menu or SNMP. SNMP operation is explained in chapter "9 SNMP". Operation with the terminal menu takes place either via Telnet, SSH, or via a serial terminal. The serial terminal is particularly used for the first configuration. After a connection has been set up, the login screen is displayed:



To start the menu, *adm* must be logged in as user. The standard password is *adm*. (Changing the password -> see chapter "6.4.19 General Settings").

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

Backspace:

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

For example, for **Hyperterminal** under "File -> Properties -> Settings - Backspace sends DEL" must be selected.

Local echo:

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

6.1.1 Serial connection

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

Windows 7/8: HyperTerminal

Linux: Minicom

Switch off Xon/Xoff and hardware handshake.

After establishing the serial connection, the menu can be initialized with ENTER.

When rebooting, the boot process will be displayed on the serial console.



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

6.1.2 Telnet

Windows 7/8: Start -> Run -> *telnet [IP address]*

Password: by default, no password

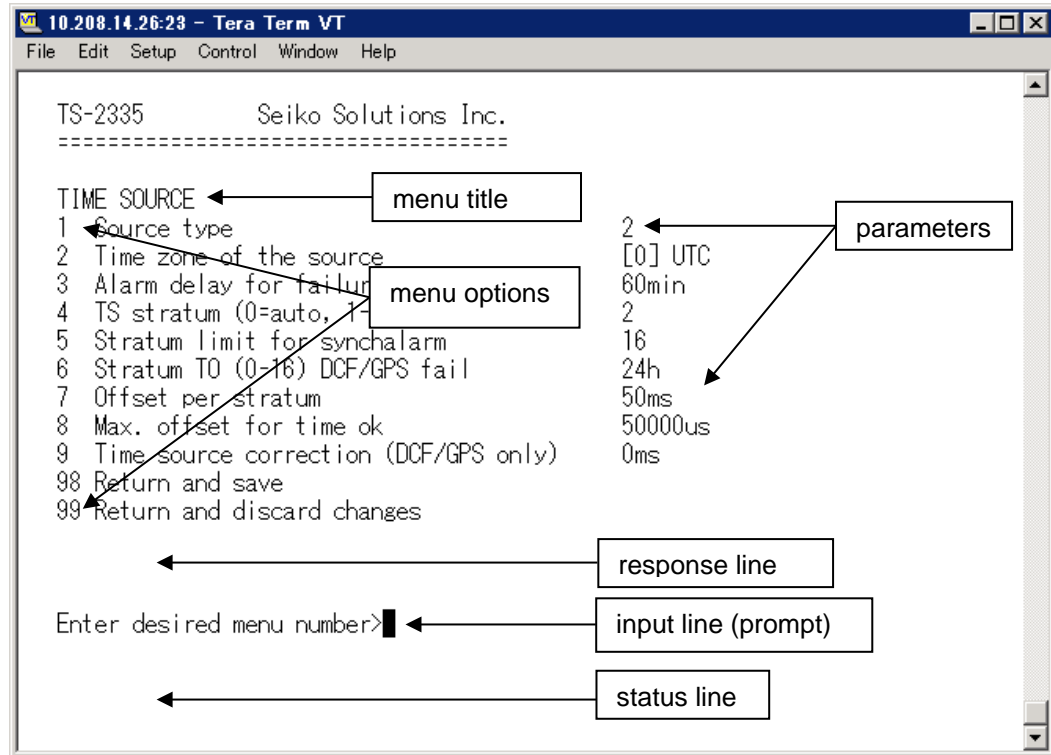
Linux: Start console and enter "*telnet [IP-address]*"

6.1.3 SSH

Windows 7/8: e.g. with Putty

Linux: Start console and enter "*ssh adm@[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).

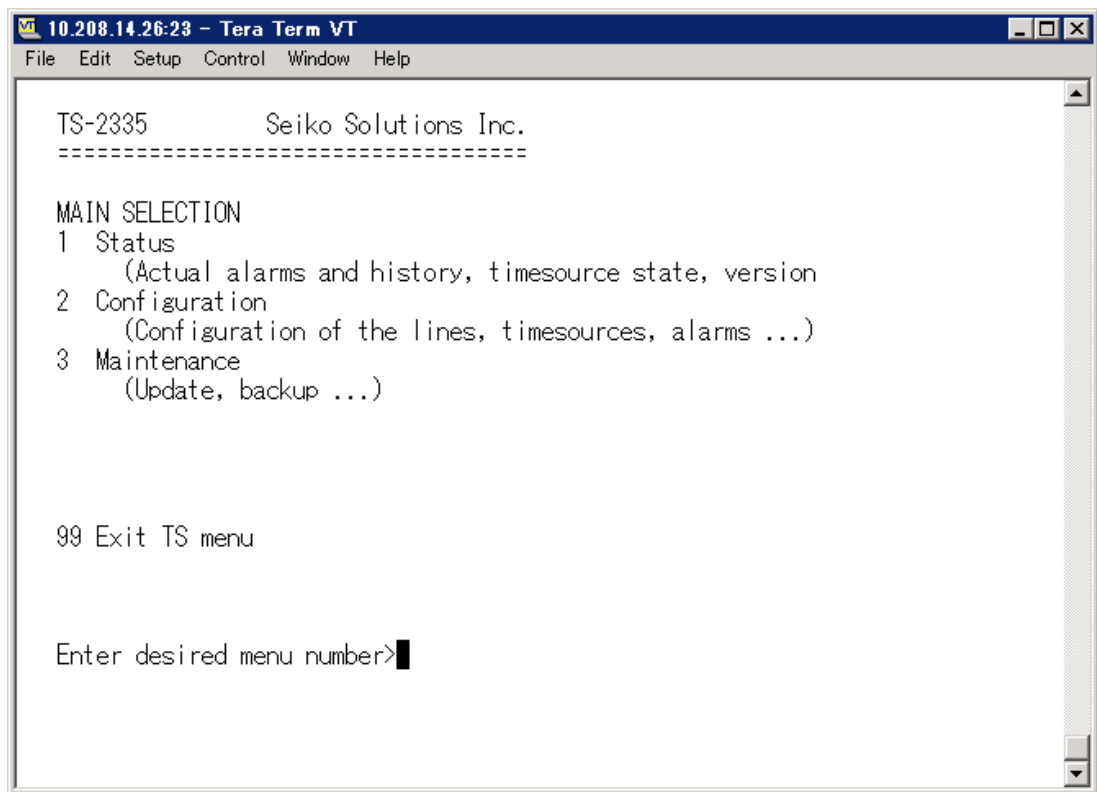
The desired menu can be selected with the relevant number.

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 TS-2335, 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 Main menu



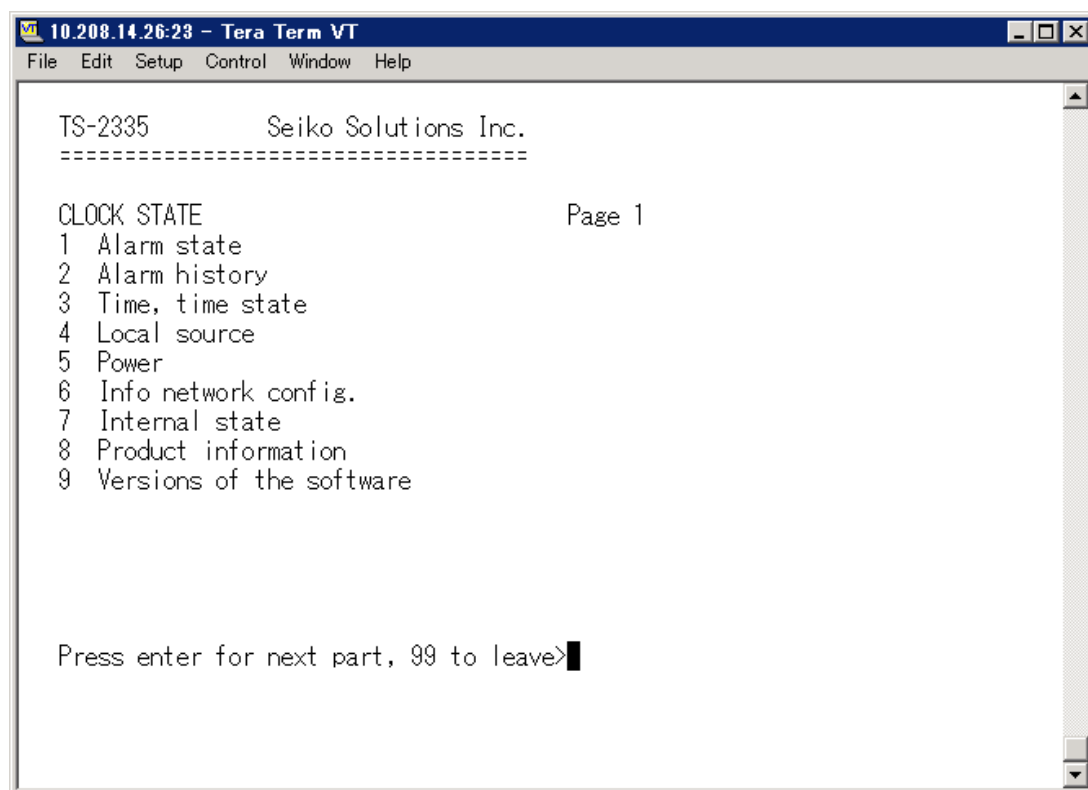
Menus:

- | | |
|----------------|---|
| Status: | Display of various information regarding operation and environment
See chapter "6.3 Status Menu" |
| Configuration: | Configuration of the TS-2335
See chapter "6.4 Configuration Menu" |
| Maintenance: | Software update, backup and restore
See chapter "6.5 Maintenance Menu" |

6.3 Status menu

The status menu consists of 2 pages.

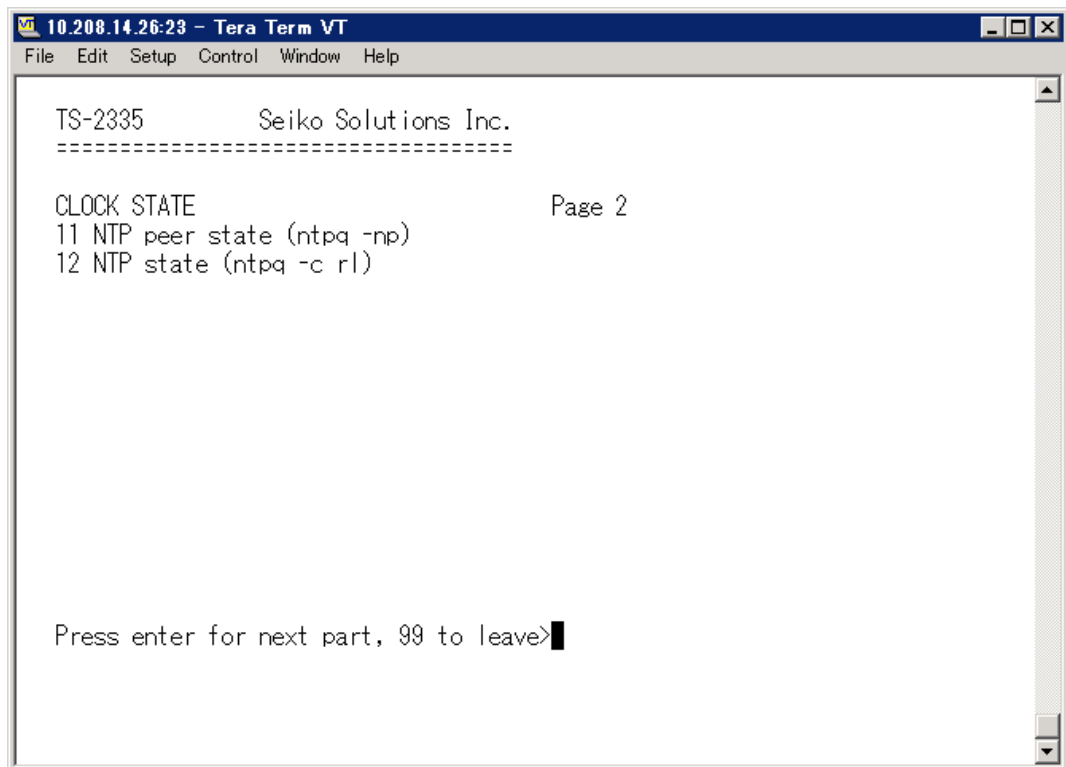
Status menu page 1:



The menu shows various information on the current operating status.

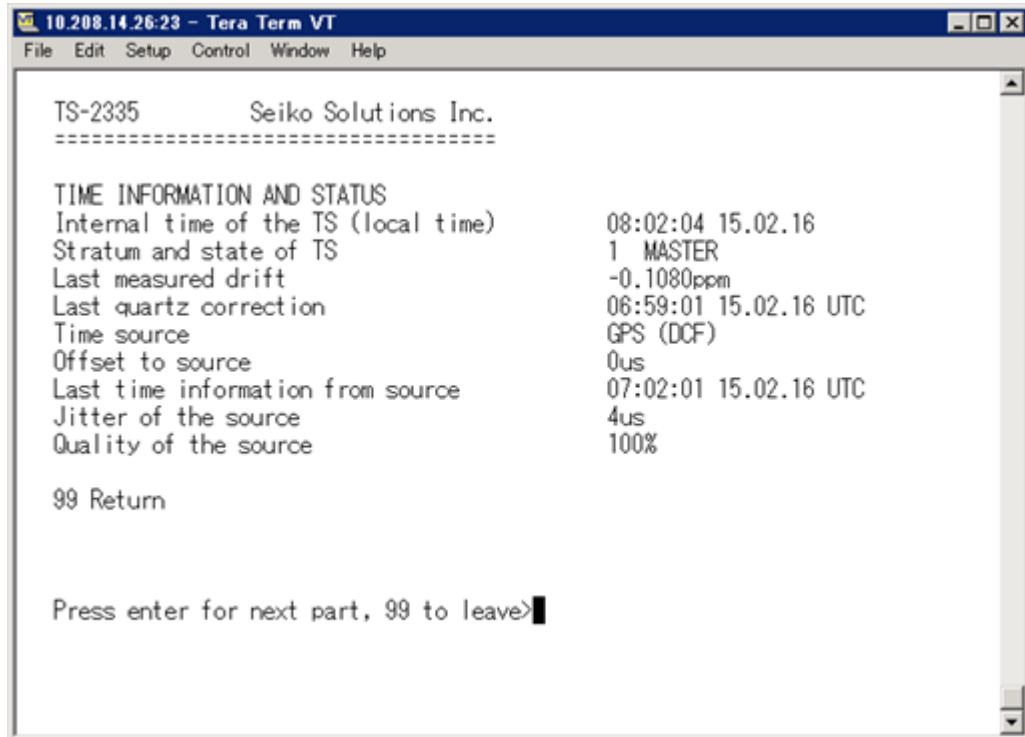
1. Requesting alarm status, display of all the TS-2335 active errors.
Display of the TS-2335 alarms (64) on 4 pages. The ALARM DETAIL menu pages can be scrolled through with ENTER. Active alarms are displayed with a *. The ALARM DETAIL menu page can be exited with 99. All TS-2335 active alarms are displayed, masking (e-mail, traps, relay) only occurs later.
2. Alarm history display.
Display of the TS-2335 alarm record, newest alarm first. The ALARM HISTORY menu pages can be scrolled through with ENTER. The ALARM HISTORY menu page can be exited with ESC.
3. Current time and status display. See chapter 6.3.1 Time Information and Status"
4. Time source information display. See chapter "6.3.2 Time Source Information"
5. Power supply information (current, voltage) display.
6. Current network configuration display. With ENTER, a second page can be displayed with network information.
7. TS-2335 system information display (internal status, regulation voltage of the quartz..). This information is for support purposes only.
8. Product information's like serial number, firmware version etc.
9. All several software versions of the TS-2335.

Status menu page 2:



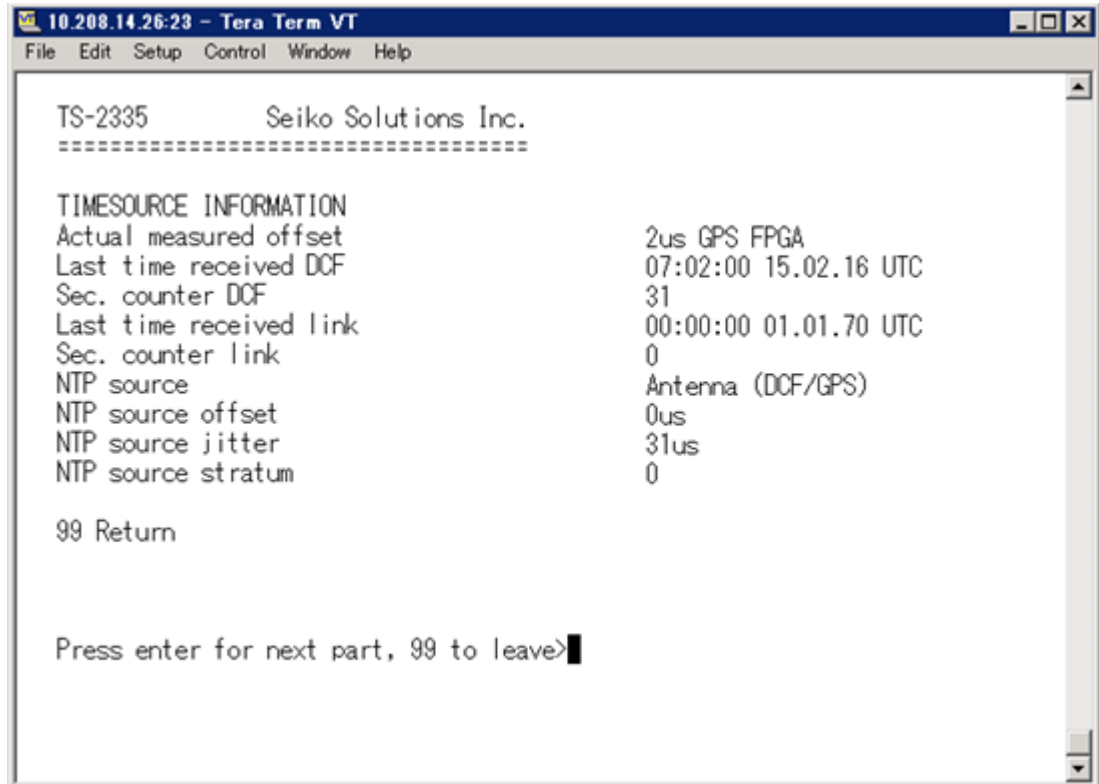
Display of information with regard to the internal state of the NTP server.

6.3.1 Time information and status



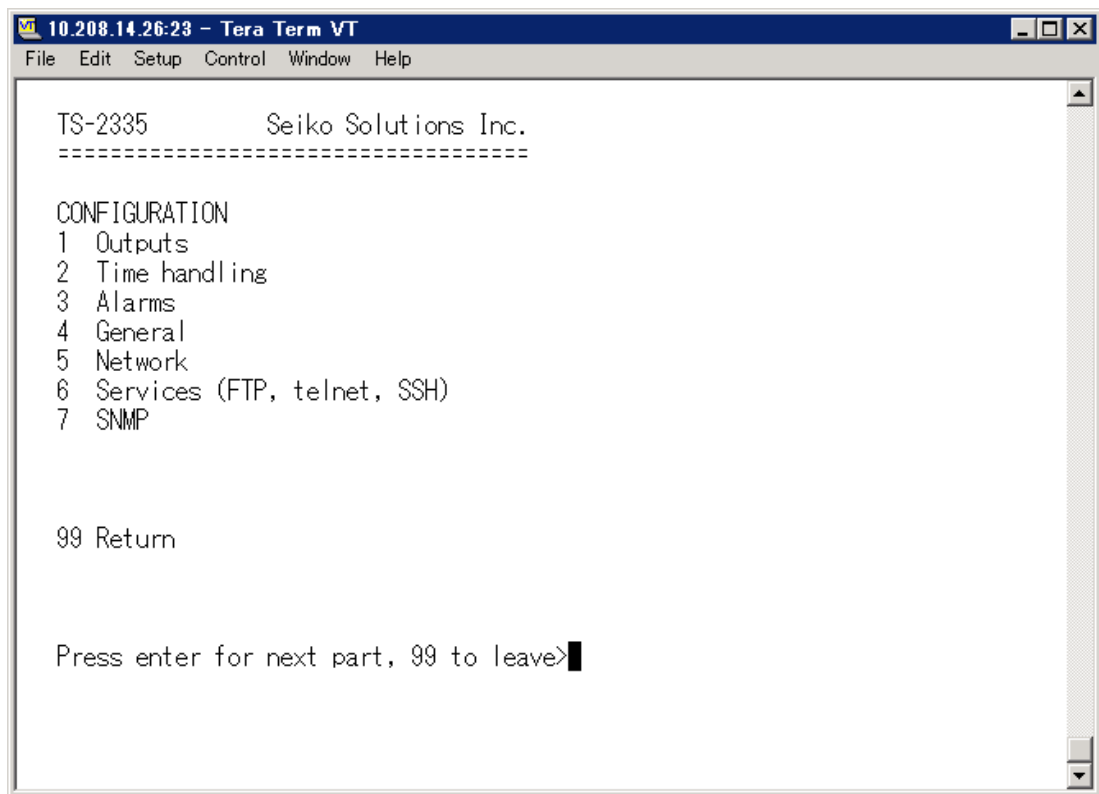
- | | |
|--------------------------------|--|
| -Internal time of the TS: | local time (hh:mm:ss DD.MM.YY) |
| -Stratum and status of the TS: | current stratum,
status: MASTER, SLAVE, not defined |
| -Last measured drift: | drift before the last quartz correction |
| -Last quartz correction: | time of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

6.3.2 Time source information



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

6.4 Configuration menu



Configuring the TS-2335 through various submenus:

1. Configuring the lines / outputs (DCF/pulse/frequency, serial interfaces, IRIG/ NTP slave clock line) See chapter "6.4.1 Lines"
2. Configuring the time source, time-keeping etc.
See chapter "6.4.7 Time Administration"
3. Alarm settings (alarm relay, e-mail, SNMP)
See chapter "6.4.13 Alarms"
4. General settings of the TS-2335 (language, time zone for alarms and display, password for menu, power supply monitoring...)
See chapter "6.4.19 General Settings"
5. Network Settings
See chapter "6.4.20 Network"
6. Services (switching network services such as FTP, Telnet, SSH on or off)
See chapter "6.4.21 Services (Network services FTP, Telnet, SSH....)"
7. SNMP Configuration for GET/PUT.
See chapter "6.4.22 SNMP" (Traps are dealt with in menu '2. Configuration' -> '3. Alarms' -> '3. Traps'. See also chapter 6.4.17 SNMP Traps)

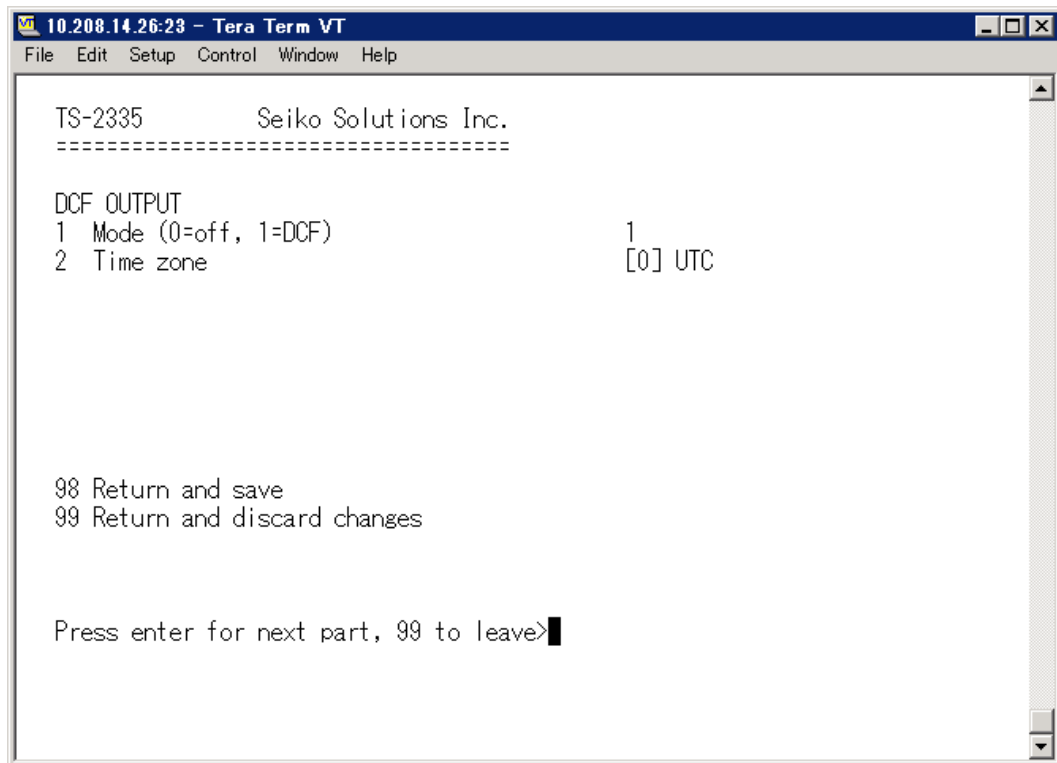
6.4.1 Lines

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

- | | | |
|---|-------------------------------------|----------------------|
| 1 | DCF - Output | -> see chapter 6.4.2 |
| 2 | DCF / Pulse / Frequency output 1 | -> see chapter 6.4.3 |
| 3 | DCF / Pulse / Frequency output 2 | -> see chapter 6.4.3 |
| 4 | Serial Interface 1 | -> see chapter 6.4.4 |
| 5 | Serial Interface 2 | -> see chapter 6.4.4 |
| 6 | IRIG / AFNOR / DCF-FSK output 1 | -> see chapter 6.4.5 |
| 7 | IRIG / AFNOR / DCF-FSK output 2 | -> see chapter 6.4.5 |
| 8 | NTP slave clocks / time zone server | -> see chapter 6.4.6 |

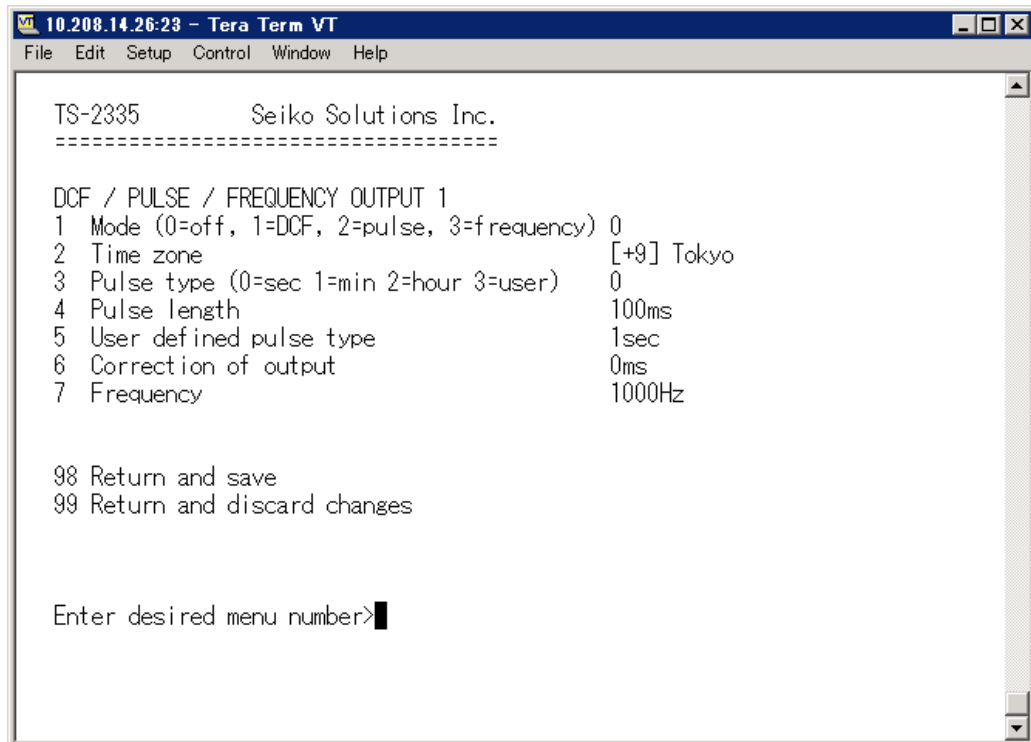
6.4.2 DCF – output (Not Supported)

The TS-2335 is equipped with one DCF output line (DCF main out). This line is available on the electrical current loop DCF output.



1. Select line function: off or DCF on
2. Select time zone -> see chapter "6.4.25 Time Zone Selection"

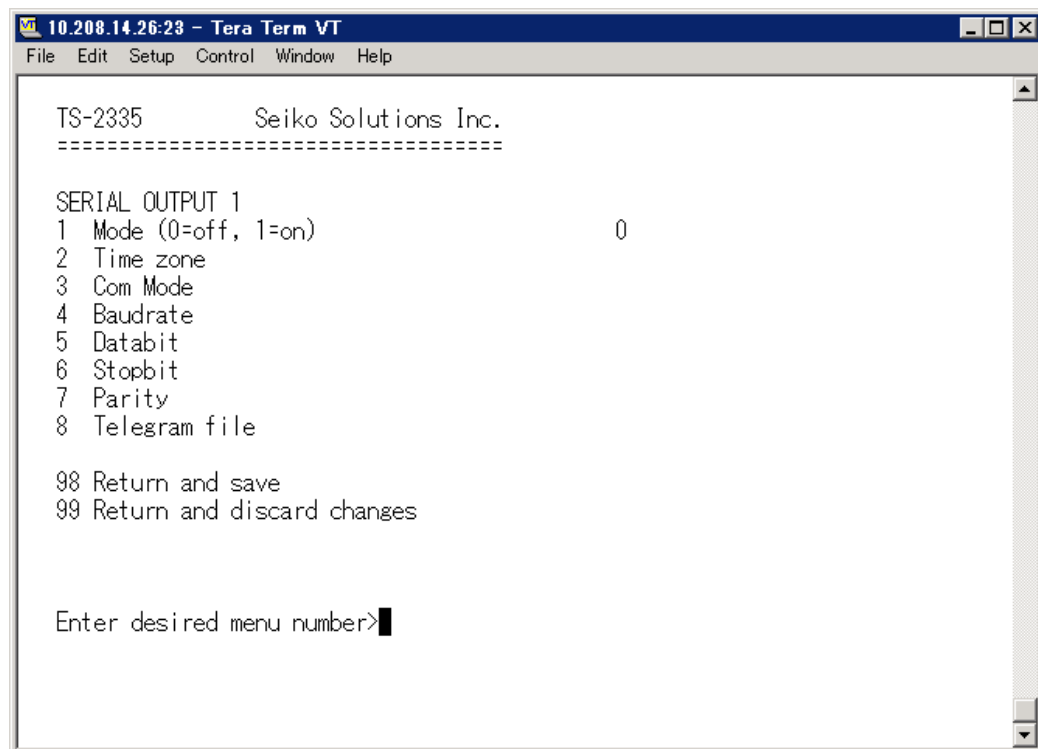
6.4.3 DCF / Pulse / Frequency output 1 and 2



1. Select line function: Line switched off, line DCF output, line pulse output, line frequency output
2. Select time zone -> see chapter "6.4.25 Time zone selection"
3. Select pulse mode: every second, minute, hour or user-defined.
(Only active with the pulse output function)
4. Select pulse length in ms (1-500ms)
(Only active with the pulse output function)
5. User-defined pulse interval (1-3600 sec) only active with pulse type 3 (=user) (the value is also only then displayed). The pulse always occurs after a multiple of the pulse interval from the 0 second in the 0 minute, e.g.:
 - Pulse interval 960 sec. (16 min.)
-> Pulse occurs: 00:00:00, 00:16:00, 00:32:00, 00:48:00, 01:00:00, 01:16:00 ...
 - Pulse interval 25sec
-> Pulse occurs: 00:00:00, 00:00:25, 00:00:50, 00:01:15, 00:01:40, 00:02:05 ...
... 00:59:35, 01:00:00, 01:00:25 ...
6. Output correction (-500ms...+500ms)
7. Frequency (1...5000Hz)

6.4.4 Serial interface 1 and 2

Serial telegram output via RS232, RS422 or RS485.

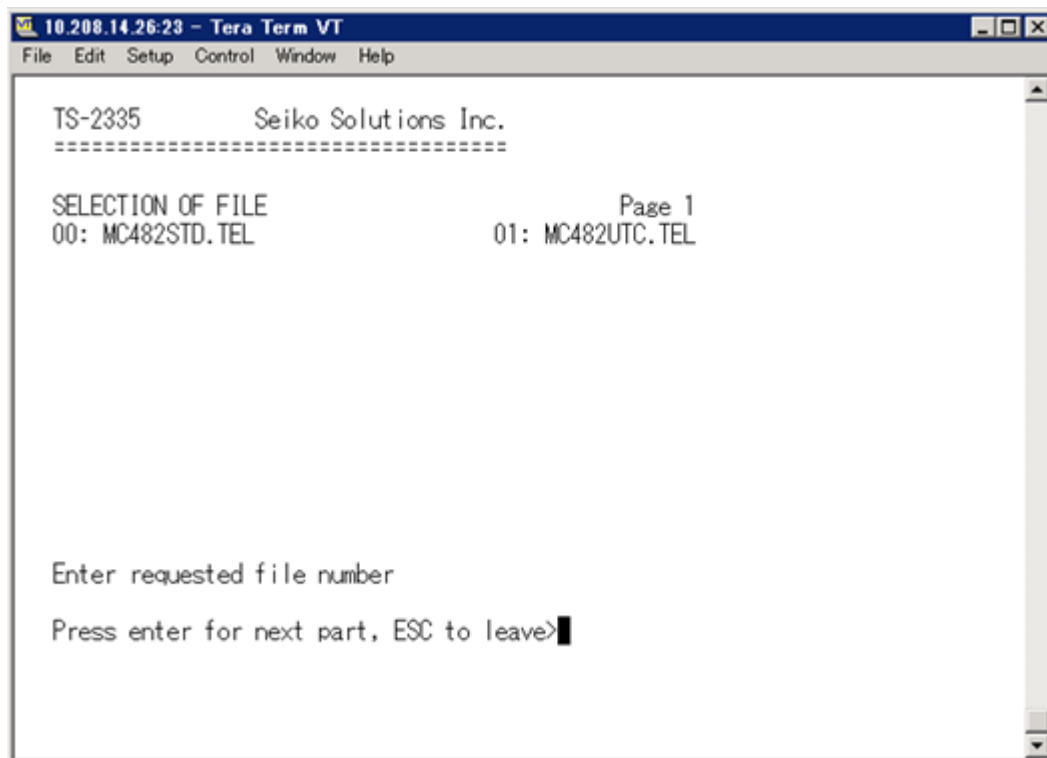


1. Select mode: Line switched off / on
2. Select time zone (see chapter "6.4.25 Time zone selection")
3. Com mode:
 - 1 = send RS 232 (receive is not enabled)
 - 2 = send and receive RS232
 - 3 = send and receive RS485
 - 4 = send RS 422 (receive is not enabled)
4. Baudrate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400
5. Data bit: 7 or 8
6. Stop bit: 1 or 2
7. Parity: none, even, odd
8. Selecting telegram file changes to the menu "SELECT FILE"

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



Selection of the telegram file:



SELECTION OF FILE

Page 1

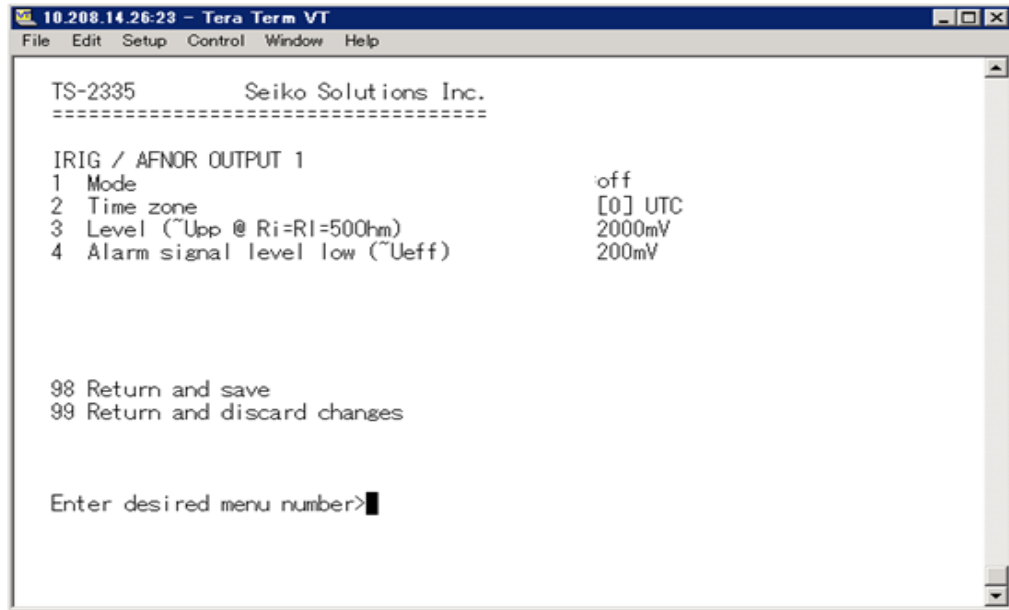
00: MC482STD.TEL

01: MC482UTC.TEL

Enter requested file number

Press enter for next part, ESC to leave>

6.4.5 IRIG / AFNOR / DCF-FSK Output 1 and 2



```
10.208.14.26:23 - Tera Term VT
File Edit Setup Control Window Help

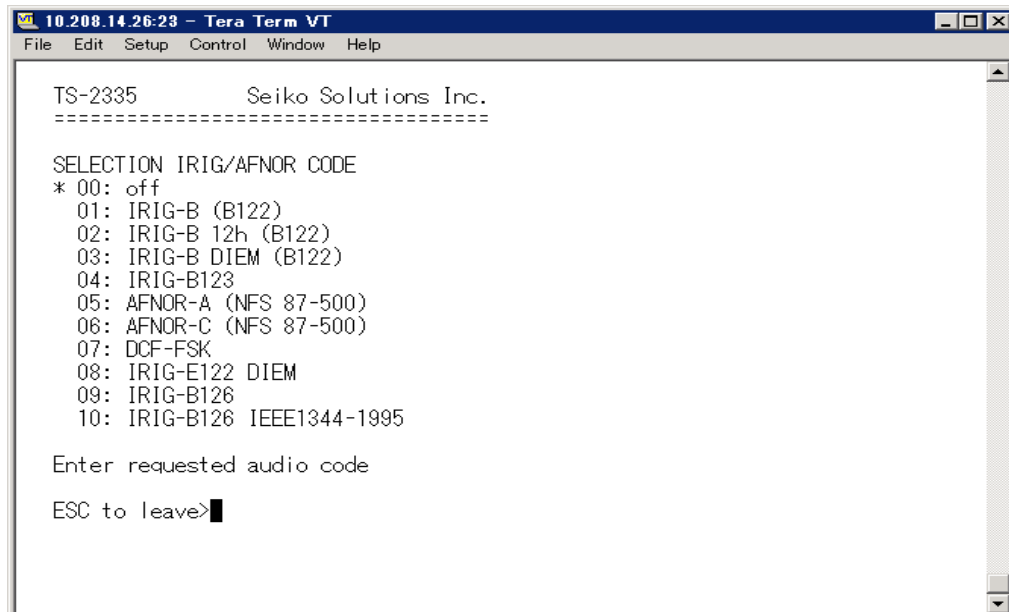
TS-2335      Seiko Solutions Inc.
=====

IRIG / AFNOR OUTPUT 1
1 Mode                      off
2 Time zone                 [0] UTC
3 Level (~Upp @ Ri=RI=500hm) 2000mV
4 Alarm signal level low (~Ueff) 200mV

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

1. Select mode: see picture below
2. Select time zone (see chapter “6.4.25 Time zone selection”)
3. Configuration of the output voltage level:
The defined voltage corresponds to the expected output amplitude when power matching (impedance matching) with a load of 50 Ohms is fulfilled. The output voltage is not controlled, resp. it is not adjusted in case of a load change.
4. Configuration of the output voltage level supervision:
When the output voltage falls below the defined voltage level, an alarm is released.



```
10.208.14.26:23 - Tera Term VT
File Edit Setup Control Window Help

TS-2335      Seiko Solutions Inc.
=====

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

Enter requested audio code

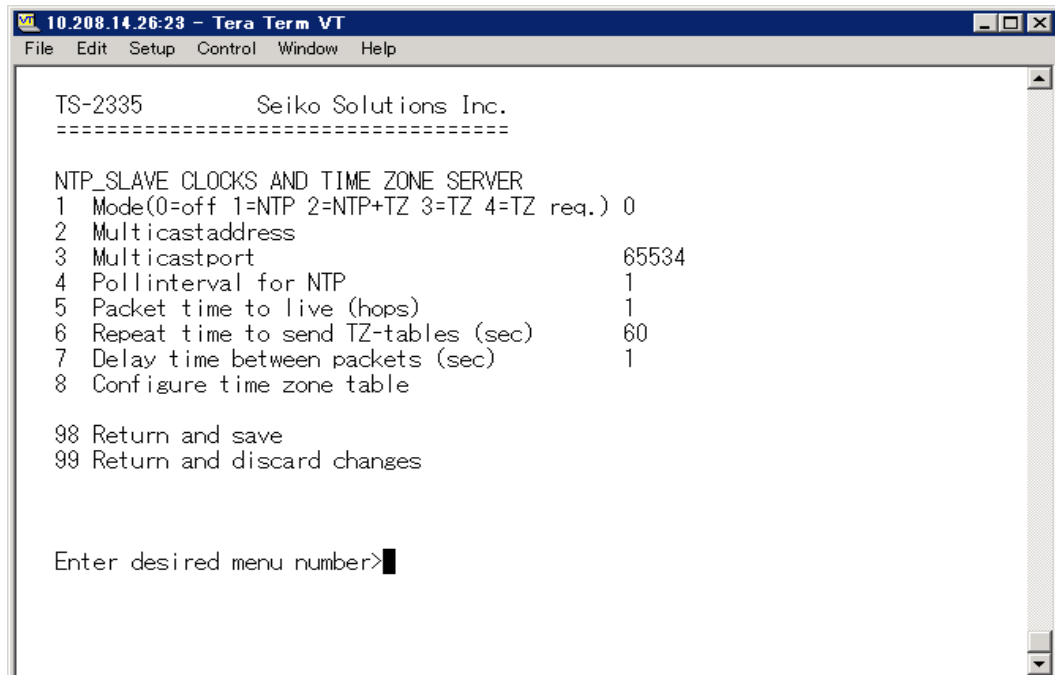
ESC to leave>
```



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

6.4.6 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.



```
10.208.14.26-23 - Tera Term VT
File Edit Setup Control Window Help

TS-2335      Seiko Solutions Inc.
=====

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

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

1. Mode of clock line: 0 = off, 1 = Send NTP multicast, 2 = Send NTP Multicast and Time zone table, 3 = Send Time zone table, 4 = Time zones on request, 5 (only for 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, e.g. NCI, SEN 40.
3. Multicast port for Time zone server (enter an arbitrary value, empty is not allowed ! Value e.g.: 65534). The port is also needed for requesting Time zone entries (mode 4).
4. Poll-interval for NTP Multicast in 2^{poll-values} in seconds (range: 1 - 16).
E.g. poll-value = 2 -> interval: 2² = 4 sec., poll-value = 5 -> interval: 2⁵ = 32 sec.
For redundant Multicast time servers see remark next page.
5. Packet time to Live (TTL) for NTP- and time-zone-Multicast-packets in hops.
(Number of Routers in a network to transfer the packets through; for simple network without routing, enter value "1", for 1 Router enter "2").
6. Repeat time to send time zone table: 10 - 86400 sec
7. Delay time between the sending of the individual time zone entries (one entry per Multicast packet) of the table: 1 - 60 sec.
8. Configuration of individual time zone entries. Displays menu "TIME ZONE TABLE".



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

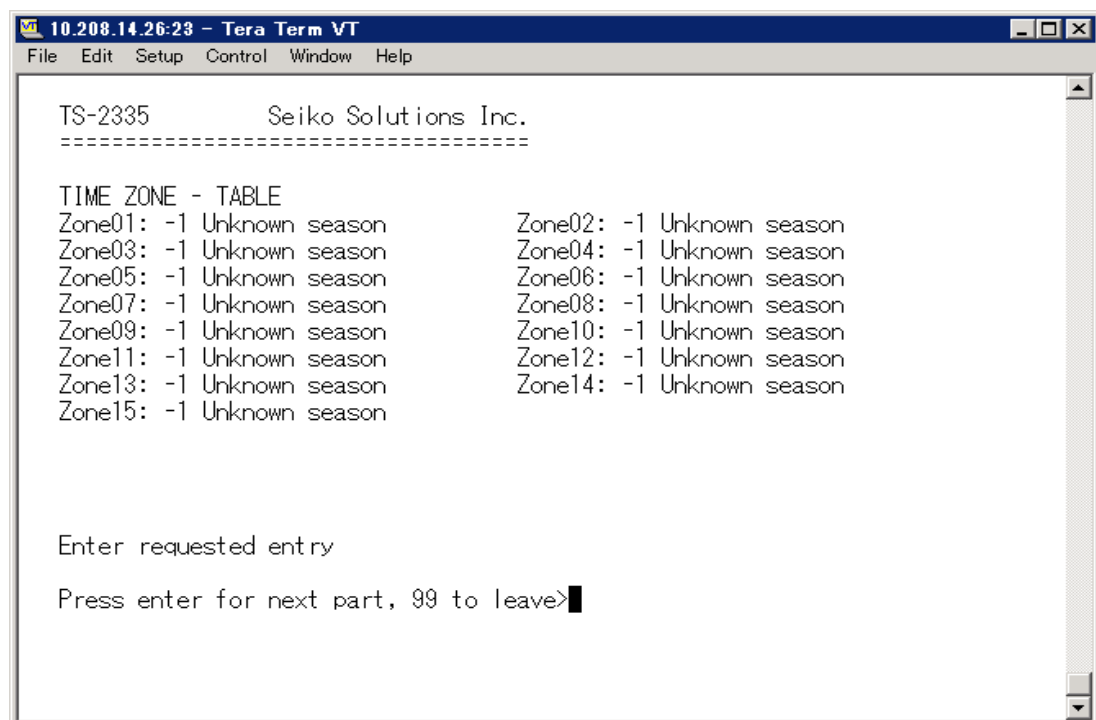
Notice: For the operation of a **Multicast** communication (NTP and Time Zone Server) **the configuration of a gateway is required** (see chapter 6.4.20 Network). The gateway can be set manually or by using DHCP.
If there's no gateway available, it's possible to set the own IP as gateway.



Notice: 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 -> 4 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 TS with the more frequently NTP send rate gets higher priority for time reception).

Time zone table for the NTP slave clock line:



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 6.4.25 Time zone selection).

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

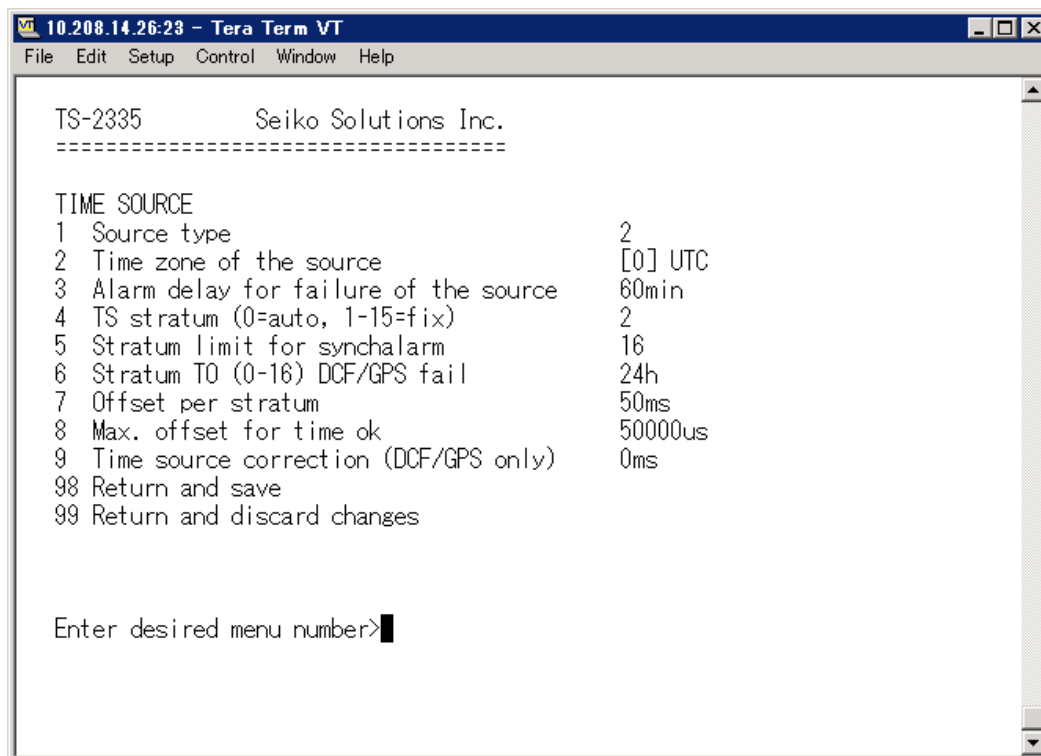
6.4.7 Time administration

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

- Time source configuration -> see chapter "6.4.8 Time Source"
- Time adjustment configuration -> see chapter "6.4.9 Time Adjustment / Time Keeping"
- Redundant Operation -> see chapter "6.4.10 Redundant Operation"
- NTP Server -> see chapter "6.4.11 NTP Server"
- For setting the time manually -> see chapter "6.4.12 Manual time set / Leap second"

6.4.8 Time source

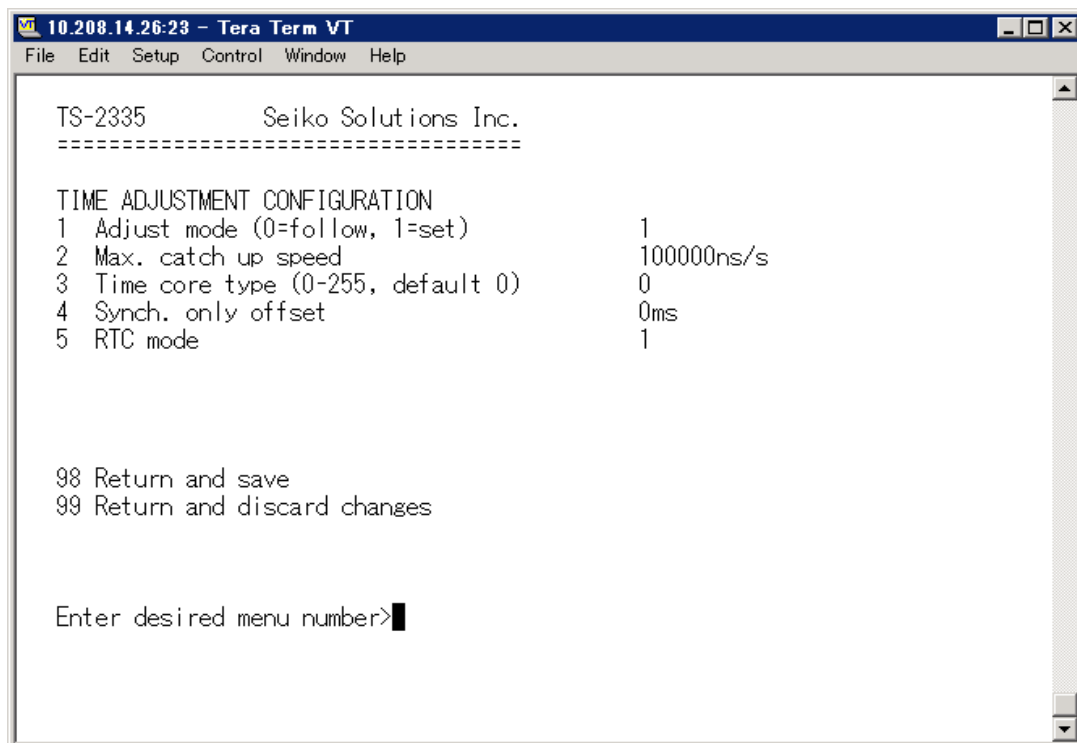
Time source configuration.



1. Type of time source: 0=none, 1=DCF low quality (Not supported), 2=DCF high quality (GPS receiver, UTC), 3=NTP, 4=AFNOR-A/C or IRIG-B 12X
When changing the time source setting, please reboot the TS-2335 to apply the change.
2. Time zone of the source: see chapter 6.4.25 Time zone selection
3. Alarm delay at failure of time source (minutes):
0 = off, 1-2,160min, default = 0
Error: "loss of time source TO"
4. TS stratum: 0=Stratum is automatically calculated according to the time source.
1-15=Stratum is manually set
5. Stratum limits for alarm: Limits for alarm "Time source stratum lost" (1-16)
6. Stratum TO (Timeout):
Duration of stratum change 1 to 16 in the case of time loss (1-999h), e.g. 24 hrs -> stratum counts up from 1 to 16 within 24 hrs.
Default value: 24h
7. Offset per Stratum in ms (0-40,000ms). Stratum is calculated with this value when time is received again:
Offset/Stratum = 30ms, offset of the time source 150ms -> Stratum = 5
8. Max. offset for time source to set valid time in μ s at start up.
(0-1,000,000 μ s)
9. Time source correction (only for DCF), +/-60,000ms

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

6.4.9 Time adjustment / Time-keeping



```
10.208.14.26:23 - Tera Term VT
File Edit Setup Control Window Help

TS-2335      Seiko Solutions Inc.
=====

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

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

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



Notice: Explanation to the RTC mode:

RTC mode 0:

After startup of the device the system time starts at 00:00. First of all, the device has to receive the time from its time source. The time adjust happens according to the "1 Adjust mode".

RTC mode 1:

The internal real time clock (RTC) is activated. After startup of the device the system time is set with the RTC time.

The first takeover of the time from the time source happens in one step, independent from the Adjust mode (1) setting.

RTC mode 2:

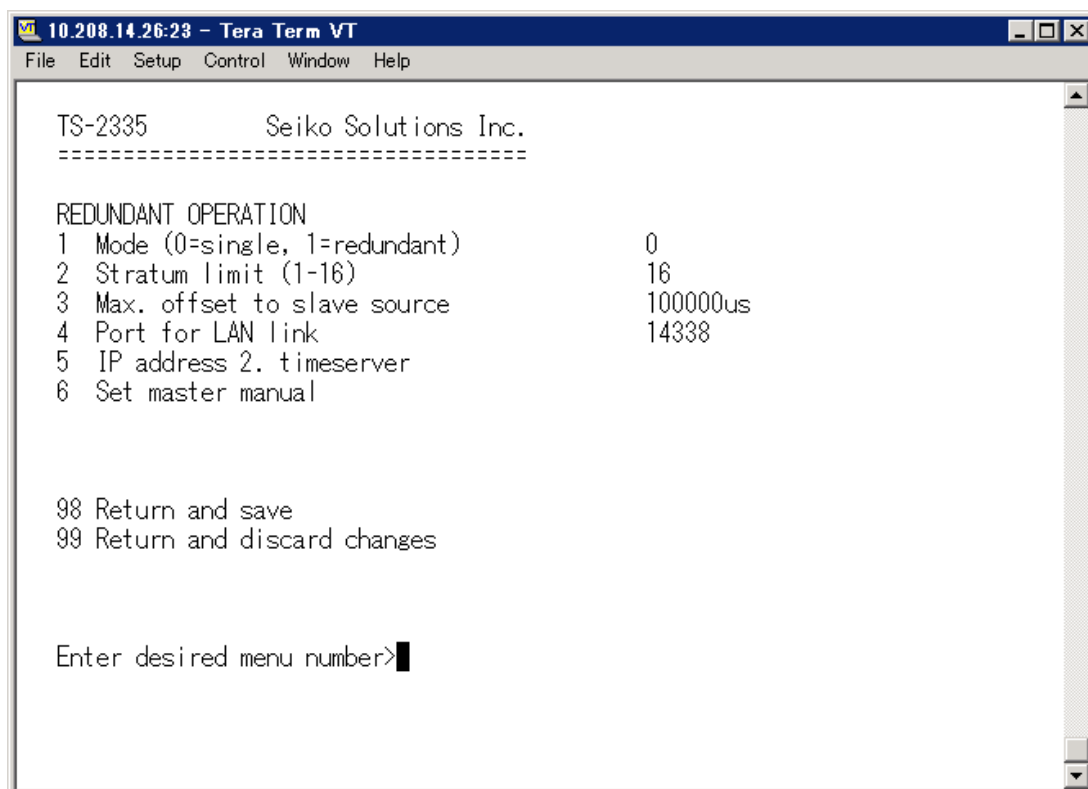
The internal real time clock (RTC) is activated. After startup of the device the system time is set with the RTC time.

The time takeover from the time source happens according to the Adjust mode (1).

-> Adjust mode = 0: time is slowly adjusted

Adjust mode = 1: time is set immediately

6.4.10 Redundant operation



1. Mode: 0=single operation, 1=operation in combination with a 2nd TS-2335
2. Stratum limit to switch from slave to master. Standard 16 (1-16)
3. Max. offset of slaves to the slave time source for triggering the alarm "Offset Source (Slave)" (0-5,000,000us)
4. Port for LAN-Link. default 14338
5. IP address of the 2nd TS-2335. Only required, if the optical link is not working.
Format 10.241.23.99
ENTER without entering an address will delete the entry.
6. Manual change from slave to master. The command is effected immediately.
Saving with '98' is not required when exiting the menu.

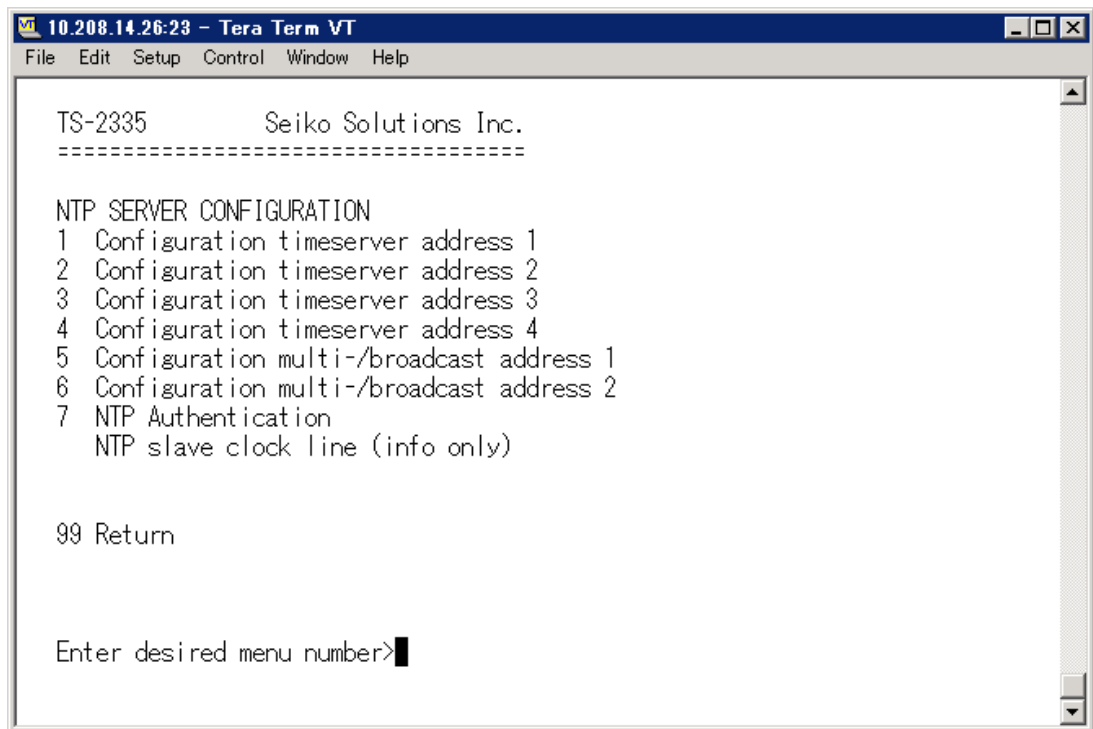
For a description of redundant operation, see chapter "8.11 Redundant Operation of 2 TS-2335".

6.4.11 NTP server

NTP can run as server or combined as server/client. To run NTP as source (NTP as client), in the menu '2. Configuration' -> '2. Time handling' -> '1. Time source setting' -> '1. Source type' choose NTP and set at least one server. If NTP server is configured, but NTP is not indicated as time source, NTP only runs as backup time source (redundancy) to the actual time source.

The exact behavior of NTP time sources is described in chapter "8.5 Time acceptance from NTP".

Further two multicast or broadcast addresses can be configured.



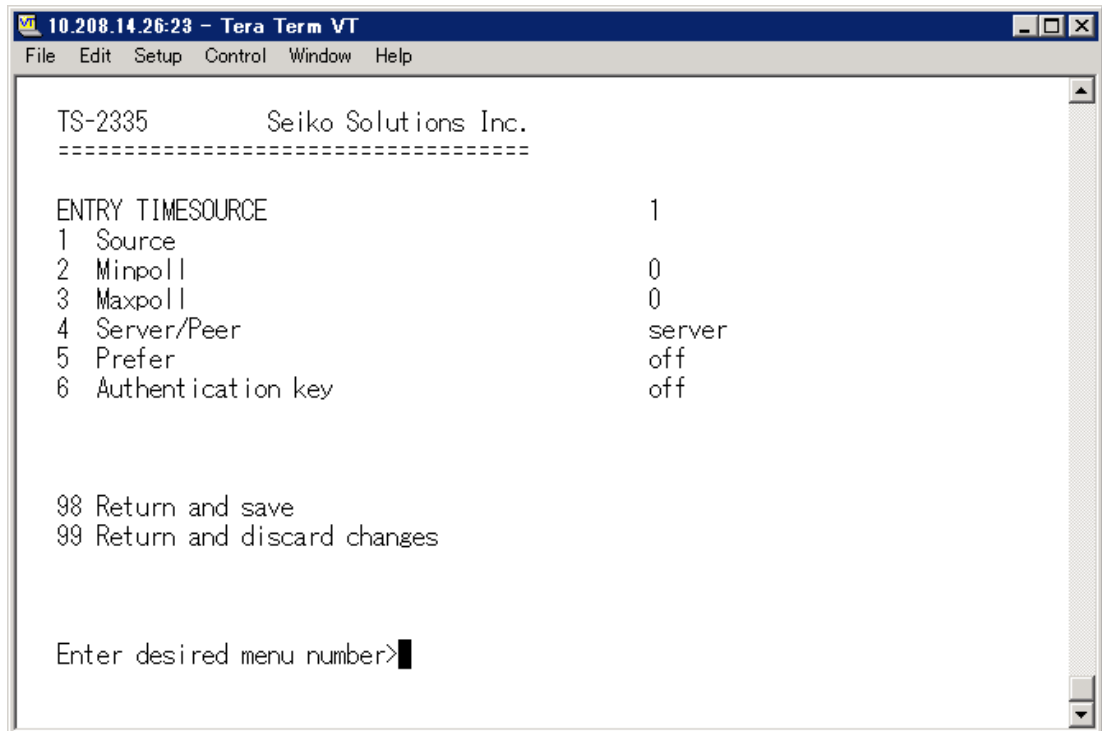
1.-4. Summary about configured NTP - time sources: Select to configure.

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:



```
10.208.14.26:23 - Tera Term VT
File Edit Setup Control Window Help

TS-2335      Seiko Solutions Inc.
=====

ENTRY TIMESOURCE      1
1 Source
2 Minpoll              0
3 Maxpoll              0
4 Server/Peer          server
5 Prefer               off
6 Authentication key   off

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

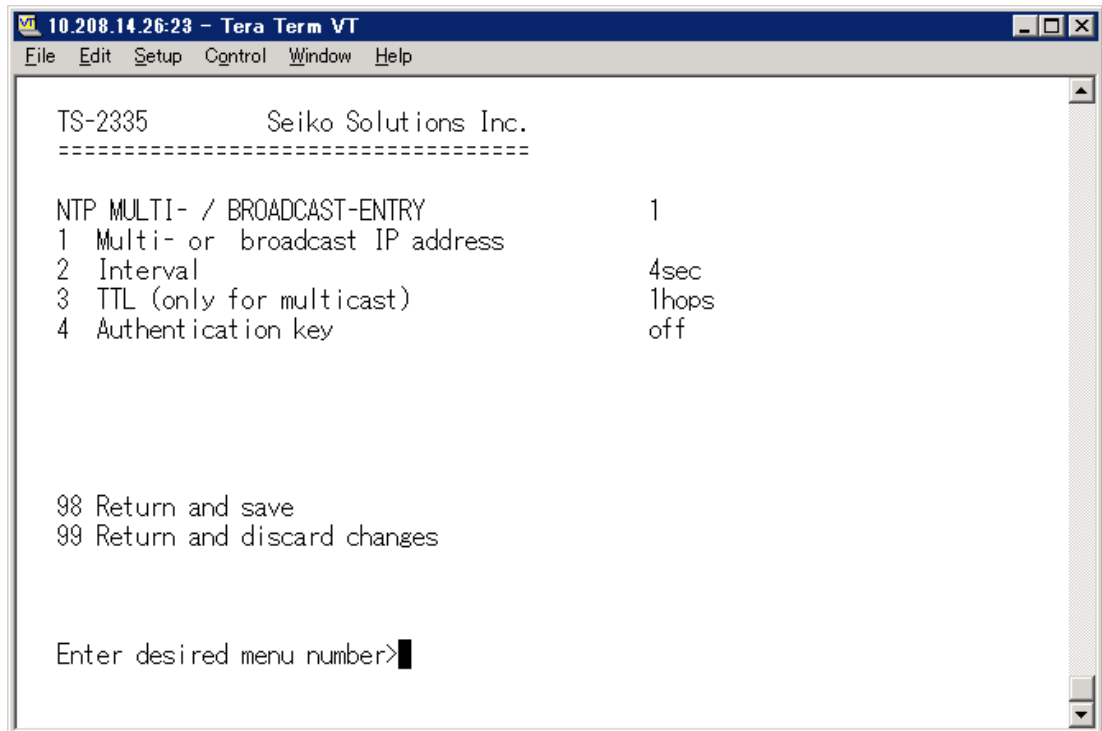
1. Insert time sources (IP address or Name e.g. "ntp.metas.ch")
ENTER without entry of an address will delete value.
- 2.-3. Configurations of **Minpoll** and **Maxpoll**: Inquiry interval $2^{\text{poll value}}$ in seconds.
0 = automatically
e.g. poll value=2 -> interval 2: $2^2 = 4\text{sec.}$, poll value=5 -> interval 5: $2^5 = 32\text{sec.}$
Range of poll values (exponent): 1 - 16
To get a exact synchronization it's better to limit Maxpoll to 6 (64 sec.).
4. Set type of inquiry: server or peer
5. Preferred source: on or off
6. Authentication key: off, key number, autokey

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

Notice: If NTP only runs as a backup, no NTP source should be indicated as **prefer**.

Notice: Maxpoll should not be selected under 4 (16 sec), as otherwise, internal trimming 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:



```
10.208.14.26:23 - Tera Term VT
File Edit Setup Control Window Help

TS-2335      Seiko Solutions Inc.
-----

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>
```

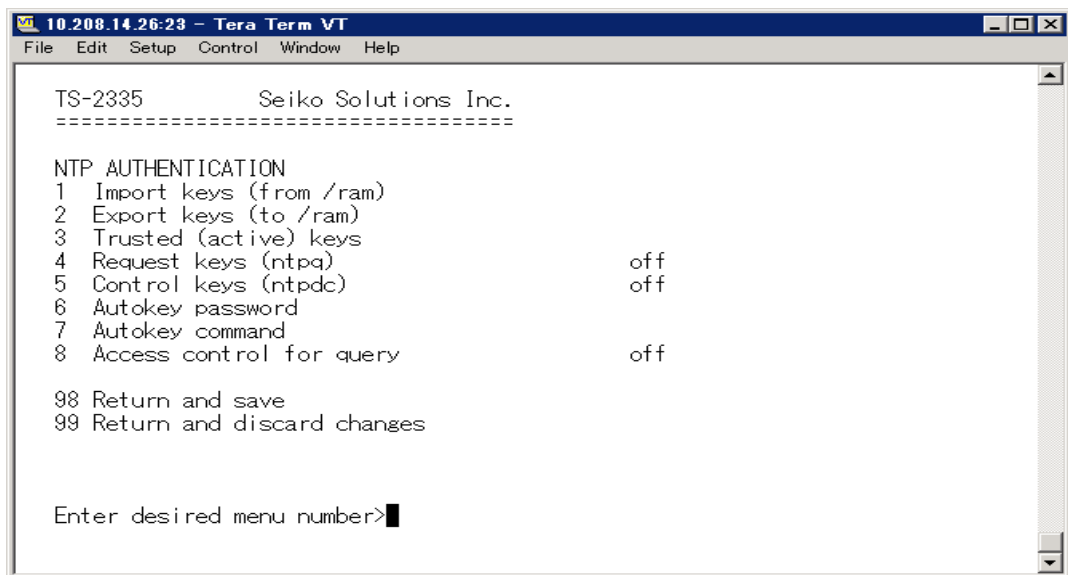
1. IP address of the destination network (multicast or broadcast).
ENTER without entering an address will delete the entry.
2. Interval for sending out the NTP information in seconds.
The interval is rounded after the entry to NTP standard, which only permits values of format 2^x : 1,2,4,8,16,32,64. Maximum 65536 seconds.
3. TTL (time to live) in hops. Only required for multicast.
Number of routers over which the multicast packet should be transmitted: for simple networks without a router - enter 1, for 1 router - enter value 2.
4. Authentication key: off, key number, autokey



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

Configuration of the NTP authentication:

The NTP authentication is described in chapter “8.10 NTP authentication”.



```
10.208.14.26:23 - Tera Term VT
File Edit Setup Control Window Help

TS-2335      Seiko Solutions Inc.
=====

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

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

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

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

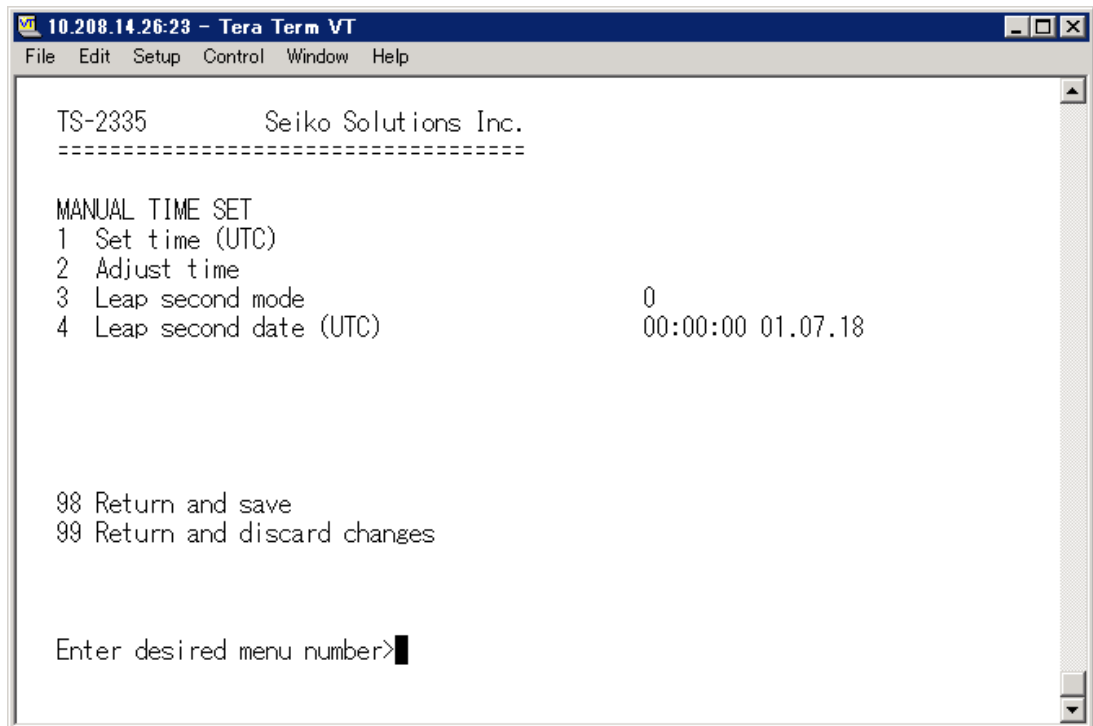
2. Export keys (to /ram directory)
The current ntp.keys file is written in the directory /ram.
3. Select the trusted keys separated by commas or space
4. Select the request key
5. Select the control key
6. Set the auto key password
7. Execute for auto key commands:

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

Example: *export_iff myPassword* exports the IFF client certificate to /ram.
8. Access control for query:

0= full access (off)
1 = access from local network allowed (local)
2 = no access (on)

6.4.12 Manual time set / Leap second



1. Set UTC time in the format "hh:mm:ss DD.MM.YY ".
Time is set with ENTER!
2. Correct time in ms (- = backwards). Range: +/-10,000ms
Time is set with ENTER!
3. Leap second mode:
0 off
1 Additional second will be inserted at entered time
-1 Second will be left out at entered time
4. Set UTC time of leap second in format: "hh:mm:ss DD.MM:YY"

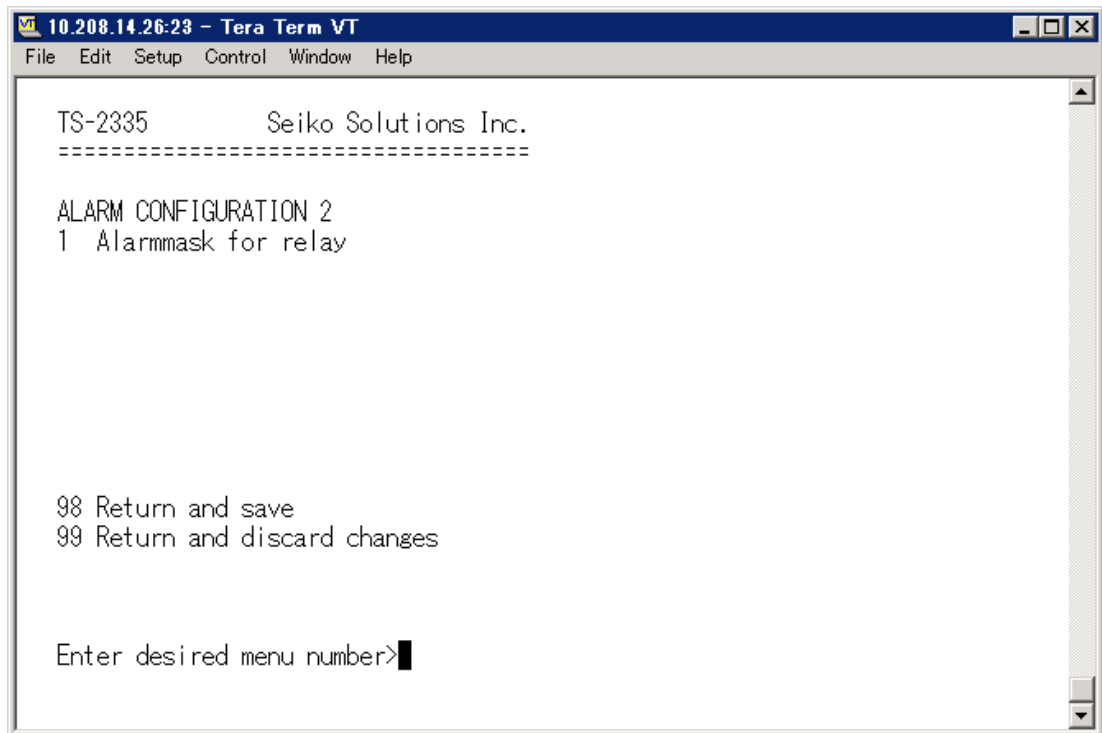
For a description of the leap second, see chapter "8.9 Leap second".

6.4.13 Alarms

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

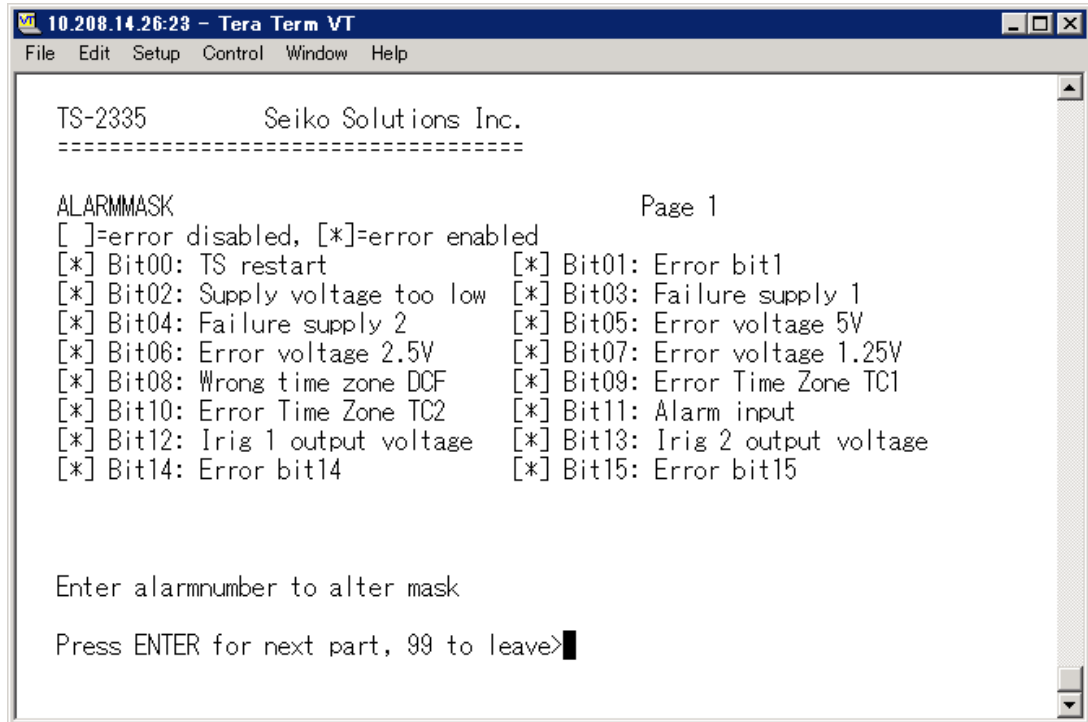
- Alarm relays -> see chapter 6.4.14
- E-Mail -> see chapter 6.4.16
- SNMP traps -> see chapter 6.4.17
- Alarm input -> see chapter 6.4.18

6.4.14 Alarm relays



1. Alarm mask for relay (see chapter "6.4.15 Alarm mask")

6.4.15 Alarm mask



Display of all the TS-2335 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.

6.4.16 E-mail

```
10.208.14.26:23 - Tera Term VT
File Edit Setup Control Window Help

TS-2335      Seiko Solutions Inc.
=====

MAIL CONFIGURATION
1 Mailmode                                     off
2 Alarmmask for mail                         ff ff ff ff ff ff ff ff
3 Mailserver
4 Mailport (default 25)                       25
5 Destination mail address1
6 Destination mail address2
7 Reply mail address
8 From mail address

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

1. E-mail function on or off.
2. Alarm mask for e-mail notifications (see chapter "6.4.15 Alarm Mask")
Changes are stored or reset on the overlying menu page "MAIL CONFIGURATION".
3. IP address of the mail server e.g. 10.249.34.5
ENTER without entering an address will delete the entry.
4. Mail server port (often 25)
- 5.-6. Destination e-mail address.
ENTER without entering an address will delete the entry.
7. Reply address (e.g. support, administrator...)
ENTER without entering an address will delete the entry.
8. Sender address (important for authentication through the mail server)
ENTER without entering an address will delete the entry.

Press ENTER to change to page 2.



Notice: Configuration of a gateway is required for sending e-mails (see chapter "6.4.20 Network"). This can be set via DHCP or manually.

E-mail configuration page 2:

10.208.14.26:23 - Tera Term VT

File Edit Setup Control Window Help

TS-2335 Seiko Solutions Inc.
=====

MAIL CONFIGURATION 2

11 Authentication mode 0

12 User name

13 Password

98 Return and save

99 Return and discard changes

Enter desired menu number>

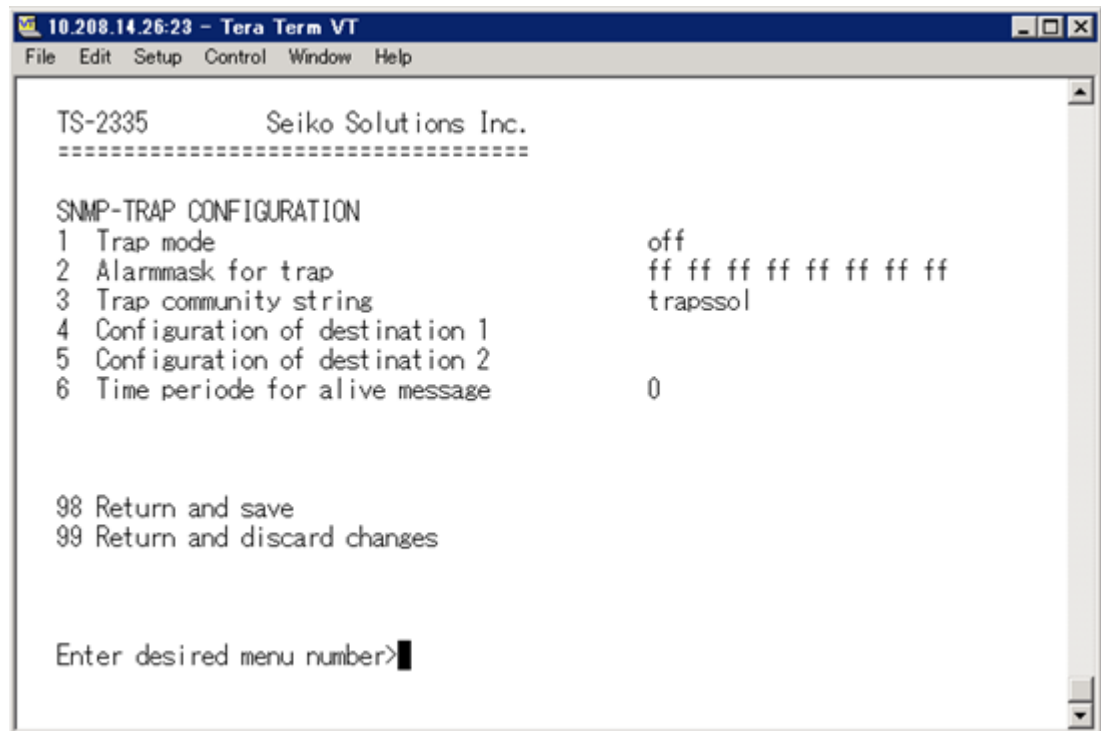
11. Authentication mode:
- 0=off (sender e-mail address used for authentication)
 - 1=auto (tries CRAM-MD5, LOGIN- PLAIN in this sequence)
 - 2=PLAIN
 - 3=LOGIN
 - 4=CRAM-MD5
12. User name (only for authentication mode 1-4)
13. Password (only for authentication mode 1-4)
- Press ENTER to change to page 1.

Format of an error message via E-Mail:

Event <Alarm 03 set: Power failure 1>
Time <11:26:45 10.01.07>
Hostname <TS-2335 (10.241.0.30)>

6.4.17 SNMP traps

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



1. Trap mode on or off
2. Alarm mask for SNMP trap messages (see chapter "6.4.15 Alarm Mask")
Changes are first stored or reset on the overlying menu page "SNMP TRAP CONFIGURATION".
3. Trap community string (group membership for traps).
Standard: *trapssol*.
4. Configuration of the SNMP manager (trap sink) 1
5. Configuration of the SNMP manager (trap sink) 2
6. Time period for alive messages in seconds. 0 = no alive traps are sent
Range: 1-7,200sec

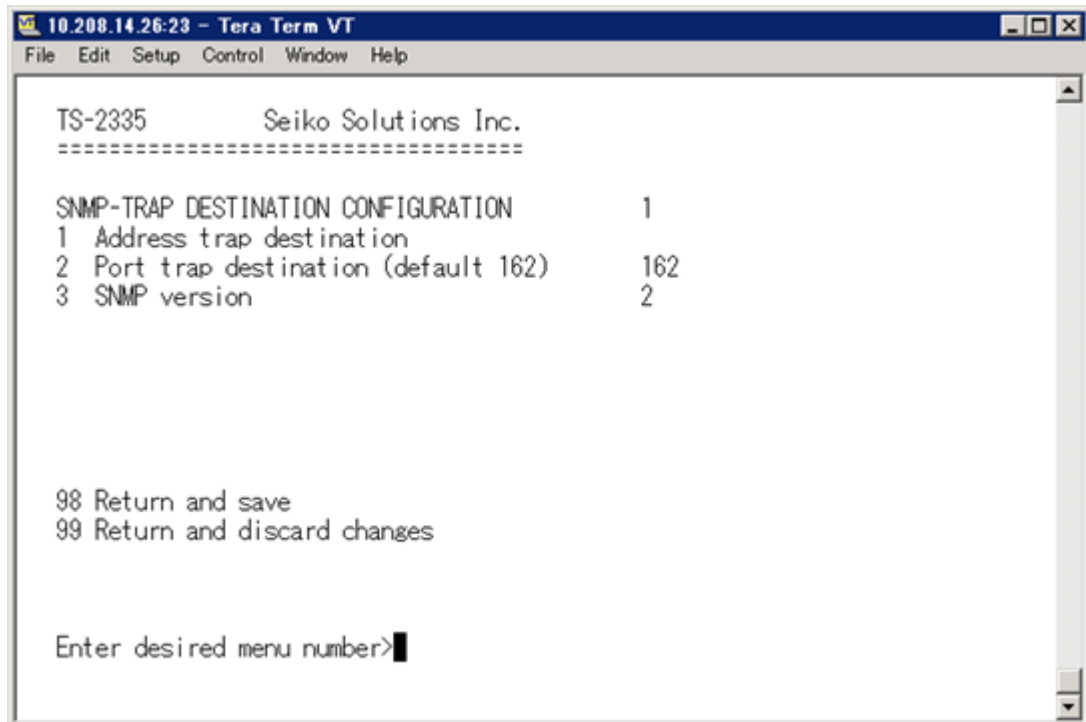


Notice: General settings for SNMP can be found in menu '2. Configuration' -> '7. SNMP'. See also chapter "6.4.22 SNMP").

Notice: Configuration of a gateway is required for sending SNMP traps (see chapter "6.4.20 Network"). This can be set via DHCP or manually.

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

Configuration of the SNMP manager



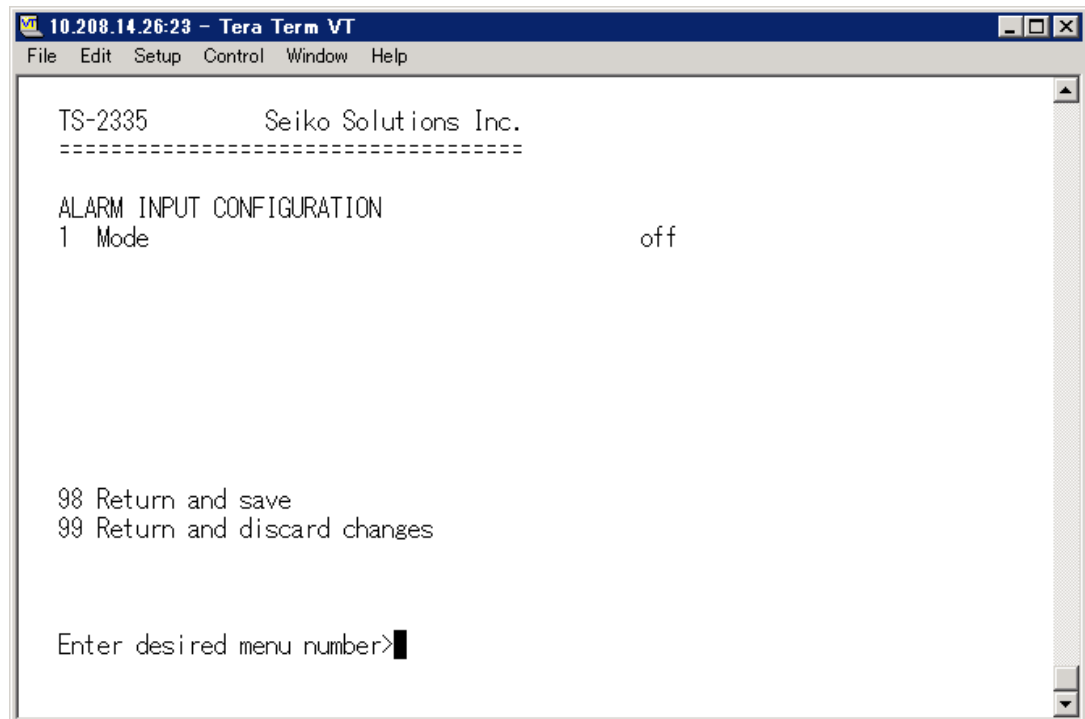
1. Address of the evaluation system e.g. 10.240.10.50.
ENTER without entering an address will delete the entry.
2. Port of the evaluation system (usually 162).
3. SNMP Version: 1=SNMP V1, 2=SNMP V2c



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

6.4.18 Alarm input

Description of the functionality of the alarm input.



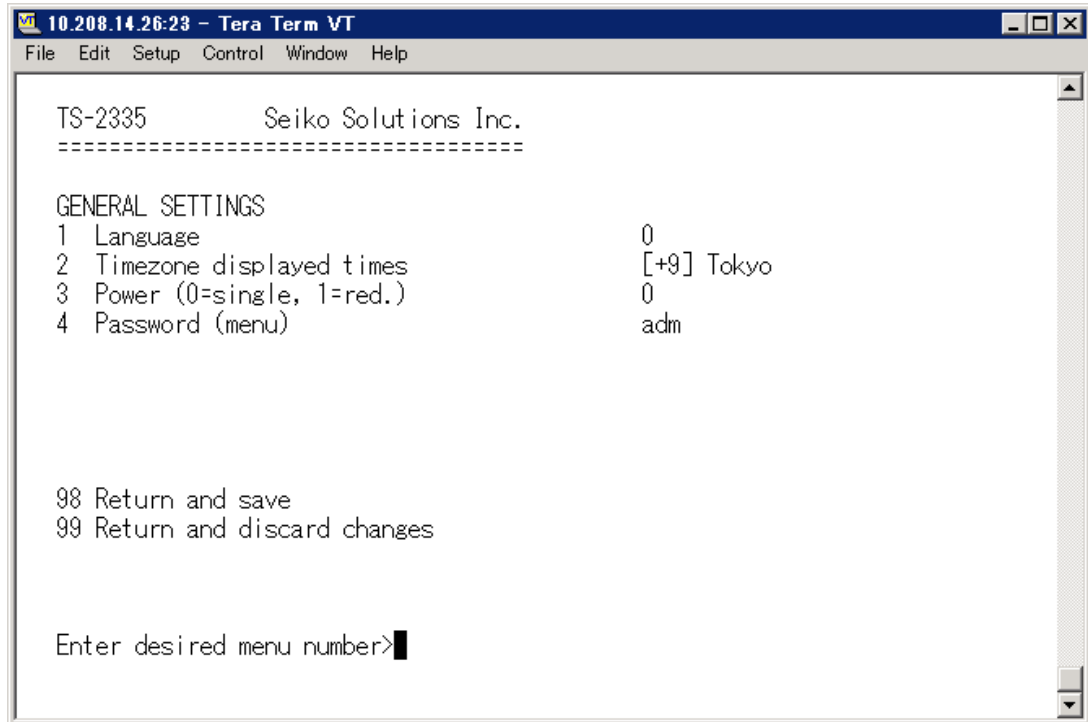
1. Configuration of the mode

0:off

1:on

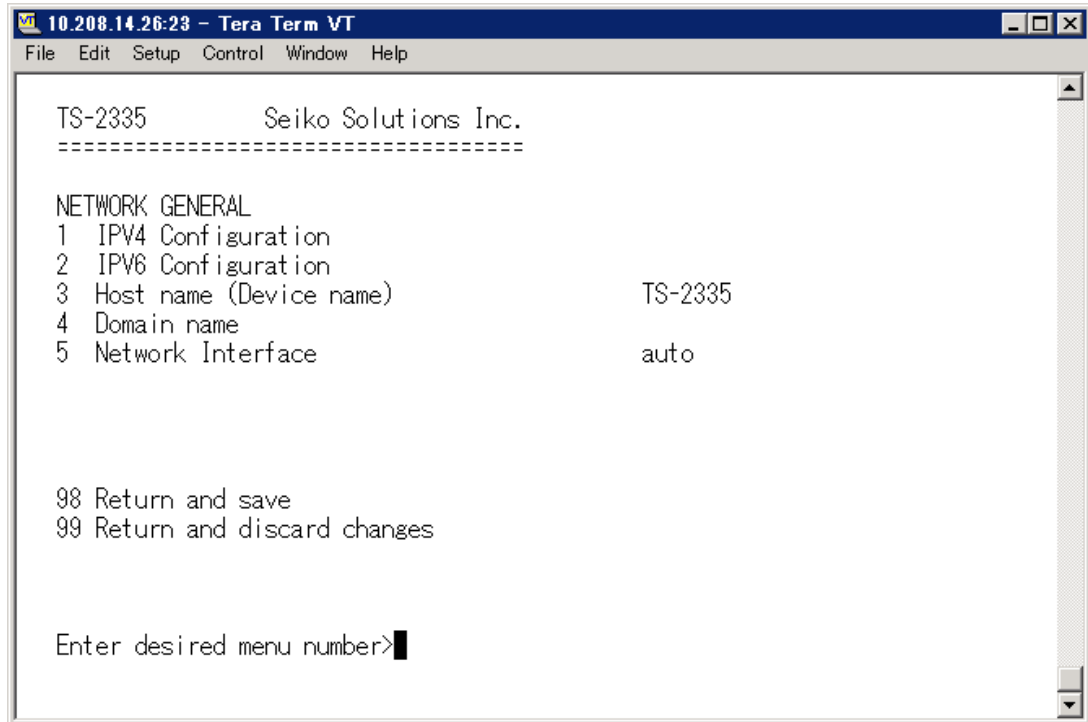
2:inverted.

6.4.19 General settings



1. Setting the display language (0: English, 1:German)
2. Setting the time zone for the display, and also all alarm logs, e-mail and SNMP.
(See chapter 6.4.25 Time Zone Selection)
3. Power: 0=simple power, 1=redundant power
(See chapter "10 Power Supply Alternatives")
4. Enter password for the menu (user **adm**) (max. 15 characters).
A password must be configured.

6.4.20 Network



1. Configuration of IPV4 parameters
2. Configuration of IPv6 parameters
3. Set host name.

Notice: A host name must always be configured.

Domains and host names may only small letters("a-z") and numerals ("0-9"). In addition, the minus sign ("-") may also be used, as long as it is not at the beginning and end.

Everything else is not permitted!

4. Set domain e.g. test.org
5. Set network interface:
0:10Mbit half, 1:100Mbit half, 2:10Mbit full, 3:100Mbit full, 4:Auto

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

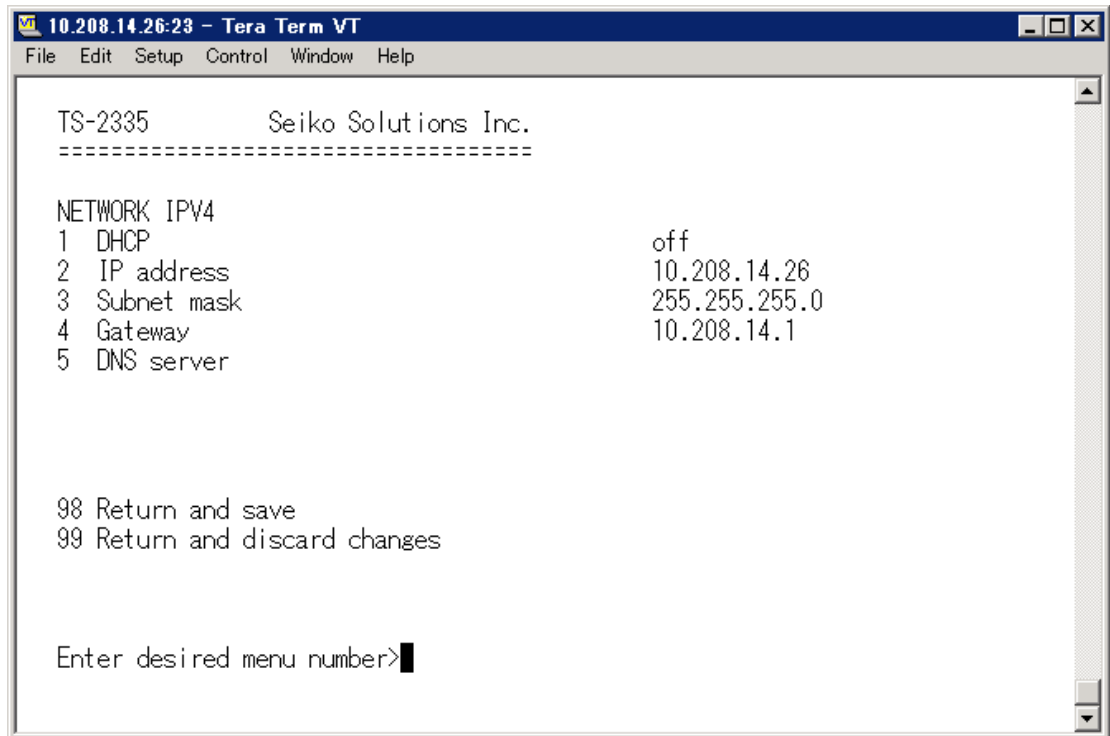
Notice: The menu is closed upon modifying the IP or the DHCP mode.

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).

Network configuration IPv4:



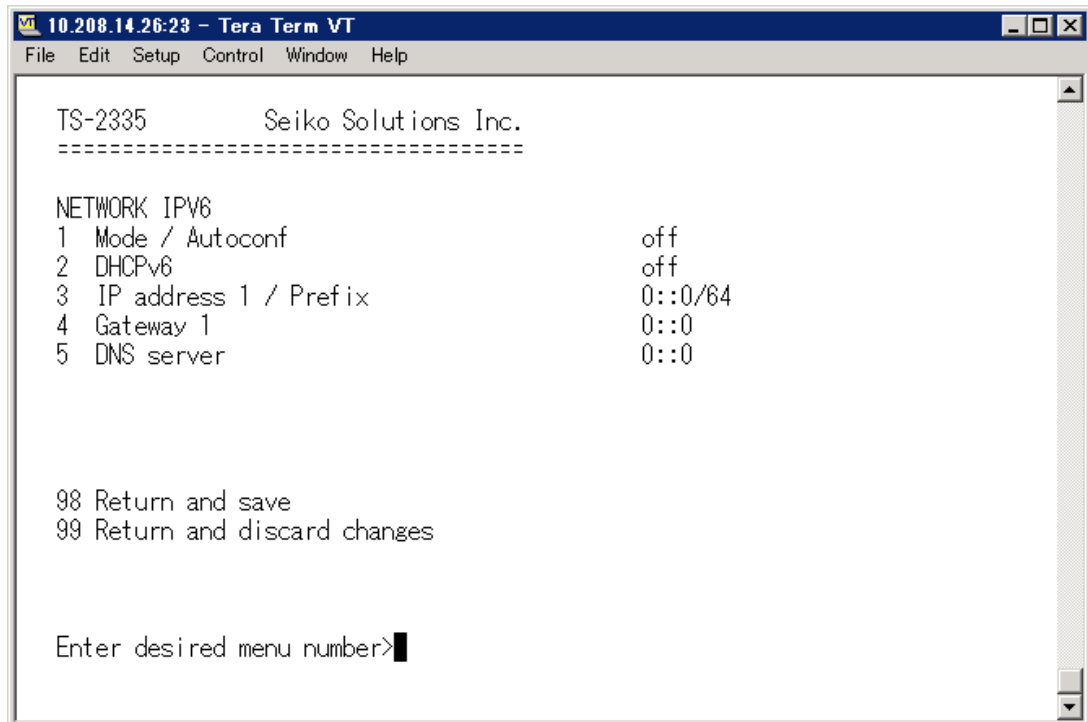
1. DHCP on or off, the following fields are not available in case of DHCP = on.
A DHCP **renew** can also be triggered via this point.

Notice: DHCP on, if no DHCP server is available, leads to longer start-up time (>75 sec.) of the TS-2335.

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



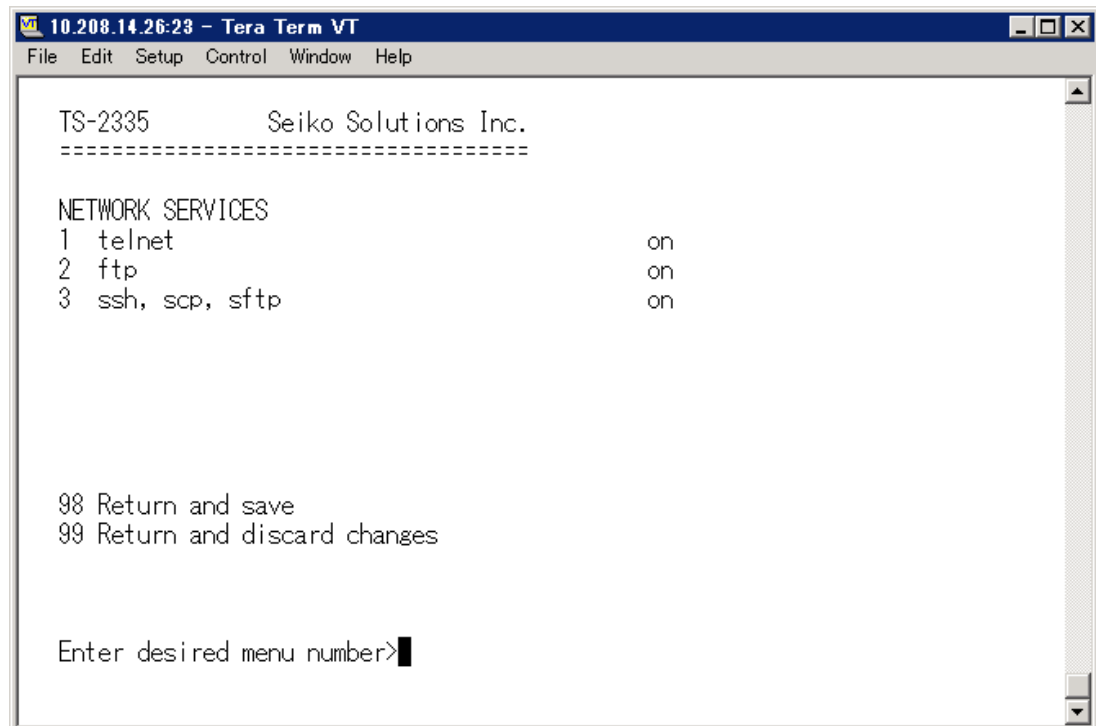
Network configuration IPv6:



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

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

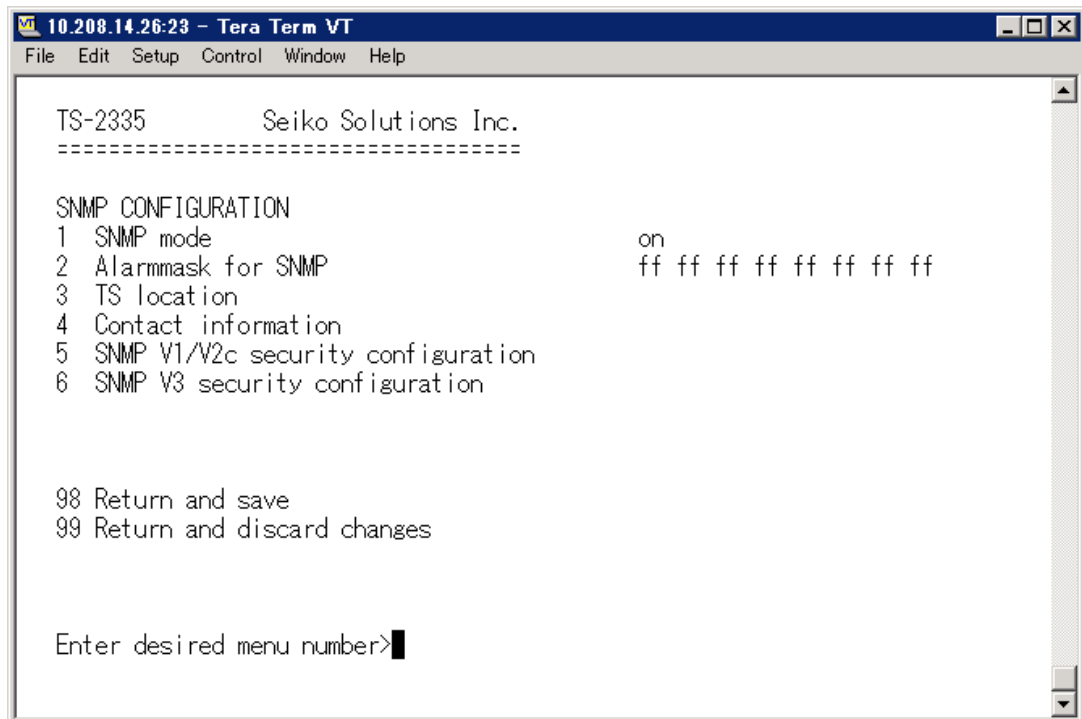
Network services configuration:



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

6.4.22 SNMP

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



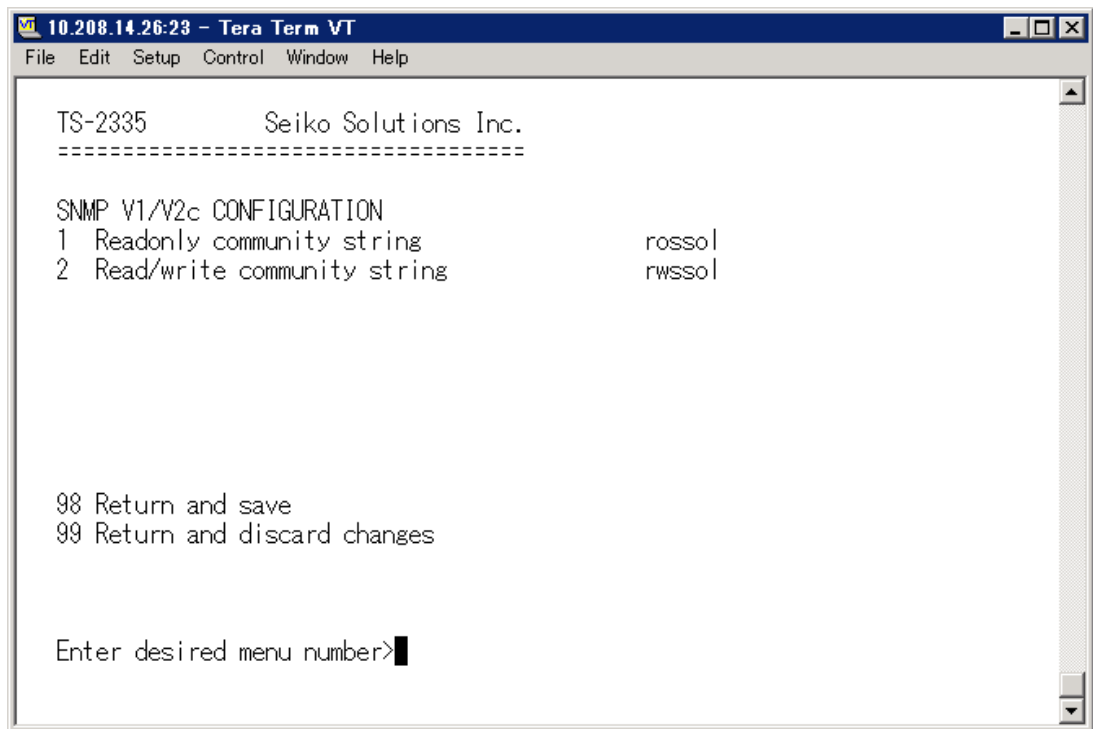
1. Mode. 0=off, 1=on. SNMP information of MIB 2 is always available.

Notice: To send out MIB-2 traps, the trap community and the destination address must at least be configured in menu '2. Configuration' -> '3. Alarms' -> '3. Traps'. See also chapter "6.4.17 SNMP Traps")

2. Alarm mask for SNMP status (see chapter "6.4.15 Alarm mask"). The modifications will be saved or restored one menu level higher in "SNMP CONFIGURATION".
3. TS Location information, which is displayed in SNMP management tool.
4. Contact information, which is displayed in SNMP management tool.
5. Configuration of SNMP V1 / V2c (specific settings). See chapter "6.4.23 SNMP V1 / V2c"
6. Configuration of SNMP V3 (specific settings). See chapter "6.4.24 SNMP V3"

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

6.4.23 SNMP V1 / V2c



```
10.208.14.26:23 - Tera Term VT
File Edit Setup Control Window Help

TS-2335      Seiko Solutions Inc.
=====

SNMP V1/V2c CONFIGURATION
1 Readonly community string      rossol
2 Read/write community string    rwssol

98 Return and save
99 Return and discard changes

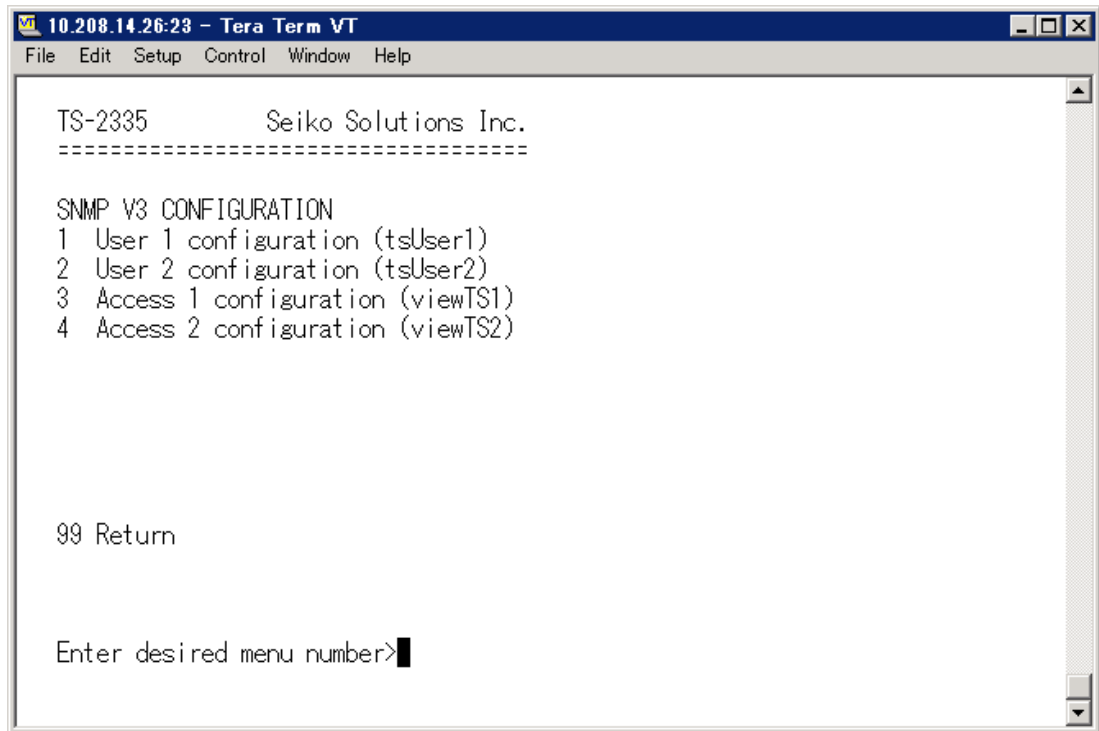
Enter desired menu number>
```

1. Community string for **read only** (Group membership for GET).
Standard: *rossol*.
2. Community string for **read/write** (Group membership for GET/PUT).
Standard: *rwssol*.
(Caution: TS-2335 does not support this function.)



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

6.4.24 SNMP V3



The screenshot shows a Tera Term VT window with a title bar indicating the connection to 10.208.14.26:23. The window contains a menu for TS-2335 (Seiko Solutions Inc.). The menu options are:

```
TS-2335      Seiko Solutions Inc.
=====

SNMP V3 CONFIGURATION
1  User 1 configuration (tsUser1)
2  User 2 configuration (tsUser2)
3  Access 1 configuration (viewTS1)
4  Access 2 configuration (viewTS2)

99 Return

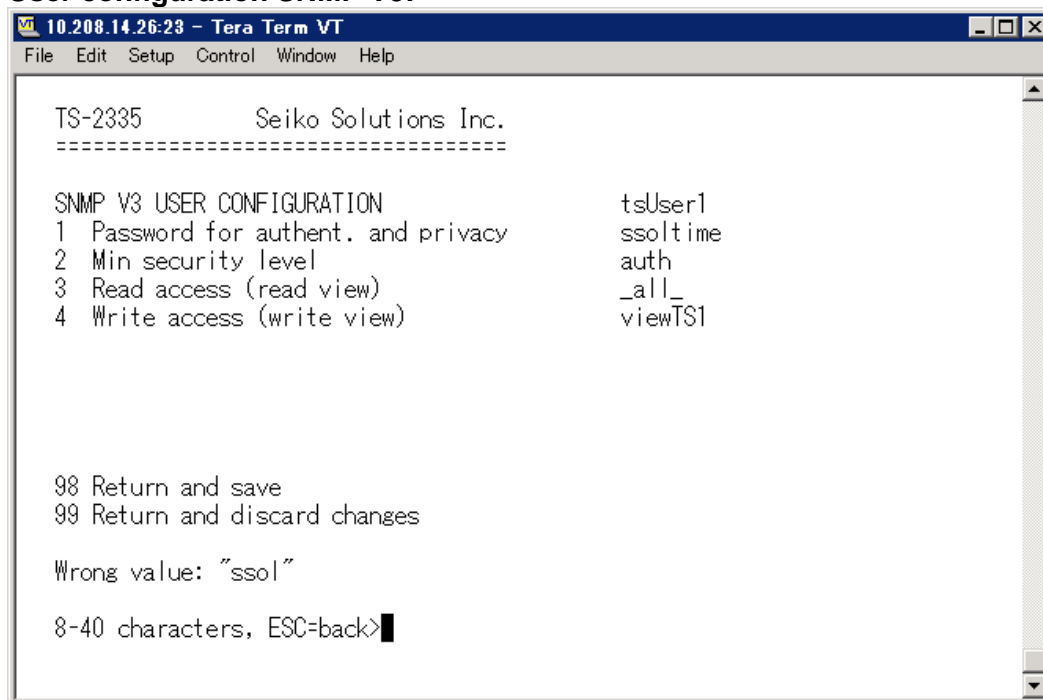
Enter desired menu number>
```

- 1. - 2. Configuration of user-defined SNMP accounts tsUser1 and tsUser 2
- 3. - 4. Configuration of user-defined SNMP access rights viewTS1 and viewTS2



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

User configuration SNMP V3:



```
10.208.14.26:23 - Tera Term VT
File Edit Setup Control Window Help

TS-2335      Seiko Solutions Inc.
=====

SNMP V3 USER CONFIGURATION          tsUser1
1 Password for authent. and privacy  ssoltime
2 Min security level                 auth
3 Read access (read view)            _all_
4 Write access (write view)          viewTS1

98 Return and save
99 Return and discard changes

Wrong value: "ssol"

8-40 characters, ESC=back>
```

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=TS info (only TS specific information)
 - 3=user defined 1 (viewTS1)
 - 4=user defined 2 (viewTS2)
4. SNMP write access
 - (Not supported)
 - 0=none (no access)
 - 1=all (full access)
 - 2=TS info (only TS specific information)
 - 3=user defined 1 (viewTS1)
 - 4=user defined 2 (viewTS2)



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

Access configuration SNMP V3:

```
10.208.14.26:23 - Tera Term VT
File Edit Setup Control Window Help

TS-2335      Seiko Solutions Inc.
=====

SNMP V3 ACCESS CONFIGURATION          viewTS1
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                        .1.3.6.1.4.1.955.1.5.7
4 Exclude OID 1                        .2
5 Exclude OID 2                        .2
6 Exclude OID 3                        .2

98 Return and save
99 Return and discard changes

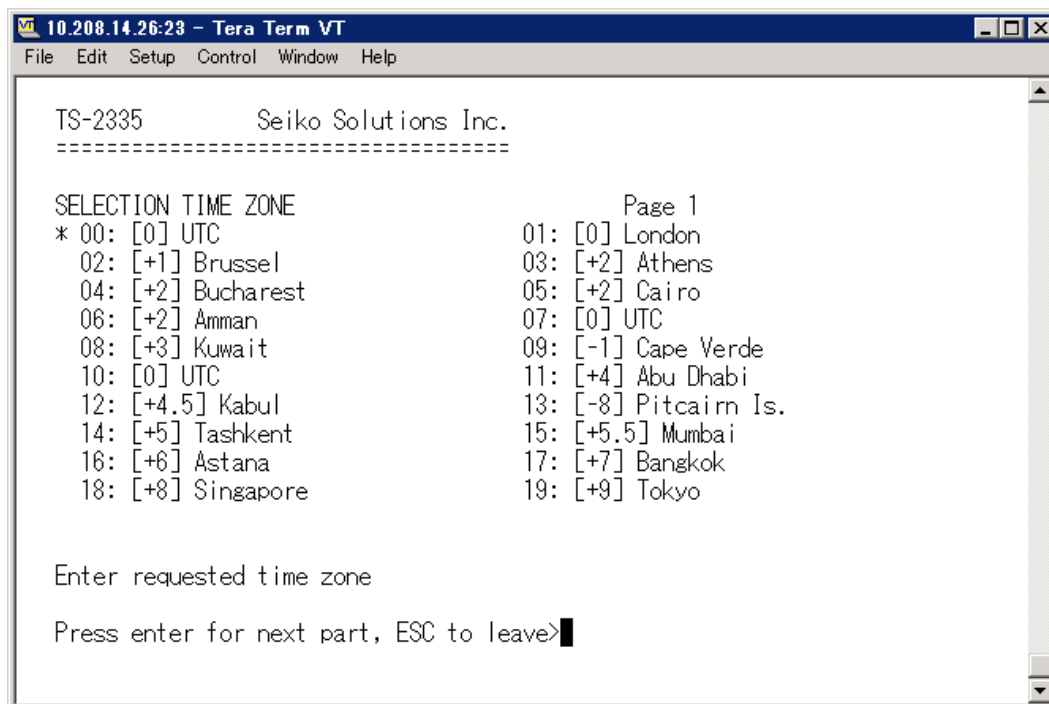
Enter desired menu number>
```

- 1. - 3. Include View path, form: `.1.3..6.1.4.1.13842.4` (e.g. TS) or `.iso` (complete SNMP ISO path).
- 4. - 6. Exclude View path: analogue include.



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

6.4.25 Time zone selection



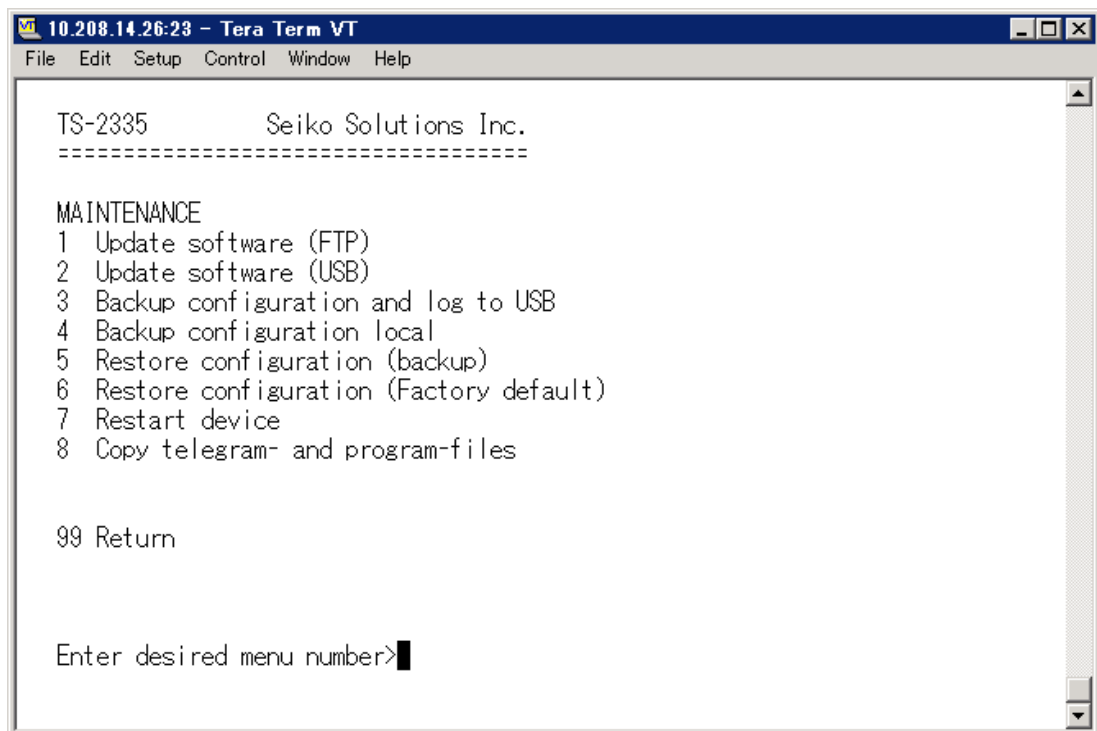
Display of all the TS-2335 time zones (100) over several pages. The pages can be scrolled through with ENTER.

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

Only one time zone can be selected.

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

6.5 Maintenance menu



The screenshot shows a terminal window titled "10.208.14.26:23 - Tera Term VT". The menu text is as follows:

```
TS-2335      Seiko Solutions Inc.
=====

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

99 Return

Enter desired menu number>
```

1. Initiating a software update (files must have been copied by FTP into the directory /ram of the TS-2335 before). -> See chapter "7 Updates".
The command always leads to a restart of the TS-2335 (even if no files were copied for update)



Notice: All configuration are deleted when updating a software.
Possibly save configuration first.

2. Initiate a software update (files must first be put on to a USB stick in the TS-2335). -> See chapter "7 Updates".
The command always leads to a restart of the TS-2335 (even if no files were copied for update)



Notice: All configuration are deleted when updating a software.
Possibly save configuration first.

3. Save the entire configuration (incl. telegram files) and the log files on a USB stick. Also generates a diagnosis file (TS-2335system_XXXXXXXXXXXX.log) in the directory /ram which is also copied on to the USB stick or which can be downloaded per FTP (only for support).
4. Backup the entire configuration locally (-> file TS-2335.conf.bkp is created).
5. Restore the entire configuration from a backup stored locally.
6. Restore the entire configuration to factory settings.
7. Restart TS-2335.
8. Copy telegram files onto the TS-2335.
-> See chapter "7.8 Copying telegram files onto the TS-2335".

See also chapter "7 Updates".

7 Updates

7.1 Updating images with FTP

Possible images are: u-boot.bin, rootfs.img, ulimage26, tsapp.img, tscfg.img. Additionally the file ts2335check.md5 must exist.

->**all file names are case-sensitive.**

Steps for updating images:

1. Connect a FTP client software to the TS-2335 e.g. with Internet Explorer enter: **ftp://adm@[IP address]** (as user adm). See also chapter "7.5 FTP-Connection"
2. If an update of the image **tscfg.img** is made, the configuration of the TS-2335 and the telegram files are overwritten. In order to store the configuration, the file *ts2335.conf* from the directory **/etc** and any possible telegram files must be saved from the directory **/var/local/TS**. After the update, the file can again be written on the TS-2335 in accordance with chapter "7.2 Updating applications or configurations via FTP".
3. Change to the directory **/ram**.
4. Copy the image into the directory **/ram**.
5. Close FTP connection.
6. The update procedure can be started on TS-2335 by selecting the menu '3. Maintenance' -> '1. Update software (FTP)' and press ENTER. The message "Update in progress" appears and at the same time, "Please wait!>" is shown in the command line. All images are copied. The TS-2335 is automatically restarted on completion of the update. The Telnet or SSH session has to be restarted.



Notice: The update procedure (point 6) may take longer time depending on the type and number of images (<5 min) and must not be interrupted under any circumstances. If interrupted, the software on the TS-2335 will be destroyed and it has to be returned to the manufacturer for repairing.

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

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

7.2 Updating applications or configurations with FTP

To update individual files such as, e.g. *ts2335.conf*, etc. on the TS-2335, the following steps are carried out

-> **all file names are case-sensitive:**

1. Connect a FTP client software to the TS-2335 e.g. with Internet Explorer enter: **ftp://adm@[IP address]** (as user adm). See also chapter 7.5 FTP-Connection
2. Change to the directory **/ram**.
3. Copy all the files to be updated into the directory **/ram**.
4. Close FTP connection.

5. The update procedure can be started on TS-2335 by selecting the menu '3. Maintenance' -> '1. Update software (FTP)' and press ENTER.
The message "Update in progress" appears and at the same time, "Please wait!>" is shown in the command line. All images are copied. The TS-2335 is automatically restarted on completion of the update. The Telnet or SSH session has to be restarted.



Notice: The update procedure (point 5) may take longer time depending on the type and number of images (<5 min) and must not be interrupted under any circumstances. If interrupted, the software on the TS-2335 will be destroyed and it has to be returned to the manufacturer for repairing.

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

7.3 Updating images via USB

Possible images are: u-boot.bin, rootfs.img, ulimage26, tsapp.img, tscfg.img.
Additionally the file ts2335check.md5 must exist.

-> **all file names are case-sensitive.**

Steps for updating images:

1. Copy images to the USB stick
2. Plug the stick in the TS-2335
3. If an update of the **tscfg.img** image is made, the configuration of the TS-2335 and the telegram files are overwritten. In order to store the configuration, the file *ts2335.conf* from the directory **/etc** and any possible telegram files must be saved from the directory **/var/local/TS**. After the update, the file can again be written on the TS-2335 in accordance with chapter "7.2 Updating applications or configurations via FTP".

4. The update procedure can be started on TS-2335 by selecting the menu '3. Maintenance' -> '2. Update software (USB)' and press ENTER.
The message "Update in progress" appears and at the same time, "Please wait!>" is shown in the command line. All images are copied. The TS-2335 is automatically restarted on completion of the update.
The Telnet or SSH session has to be restarted.
5. As soon as the TS-2335 is restarted, remove the USB stick.



Notice: The update procedure (point 4) may take longer time depending on the type and number of images (<5 min) and must not be interrupted under any circumstances. If interrupted, the software on the TS-2335 will be destroyed and it has to be returned to the manufacturer for repairing.

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

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

7.4 Updating applications or configurations via USB

To update individual files, e.g. ts2335.conf, etc. on the TS-2335, the following steps are carried out

-> **all file names are case-sensitive.**

1. Copy applications (or configuration) to the USB stick
2. Plug the stick in the TS-2335
3. The update procedure can be started on TS-2335 by selecting the menu '3. Maintenance' -> '2. Update software (USB)' and press ENTER.
The message "Update in progress" appears and at the same time, "Please wait!>" is shown in the command line. All applications are copied. The TS-2335 is automatically restarted on completion of the update.
The Telnet or SSH session has to be restarted.
4. As soon as the TS-2335 is restarted, remove the USB stick.



Notice: The update procedure (point 3) 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 TS-2335 will be destroyed and it has to be returned to the manufacturer for repair.

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

7.5 FTP connection

Establish anonymous connection:

ftp://[IP address of TS-2335]

to directly reach the sub-directory **/ram**, e.g. Explorer *ftp://10.241.0.5*

Establish connection as/with a user:

ftp://adm@[IP address of TS-2335].

e.g. with Internet Explorer enter: *ftp://adm@10.241.0.5*

Password: **adm** resp. the defined password for the menu.

To directly reach the sub-directory **/ram**, you can also enter

ftp://adm@[IP address]/ram.

Establish connection with IPv6:

The address **must** be written in brackets []:

e.g. with Internet Explorer enter: *ftp://adm@[fd03:4432:4646:3454::2000]*

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



7.6 SFTP connection

SFTP= SSH File Transfer Protocol

It becomes the same as FTP.

7.7 SCP connection

SCP = Secure Copy Protocol



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

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

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

7.8 Copying Telegram files to the TS-2335

Analogously to the previously described procedures telegram files can be copied via FTP or USB stick to the TS-2335.

The copy procedure can be started on TS-2335 by selecting the menu '3. Maintenance' -> '8. Copy telegram-files' and press ENTER. Afterwards, select again in the menu "6.4.4 Serial interface 1 and 2" and reload.

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

Special case USB stick:

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



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

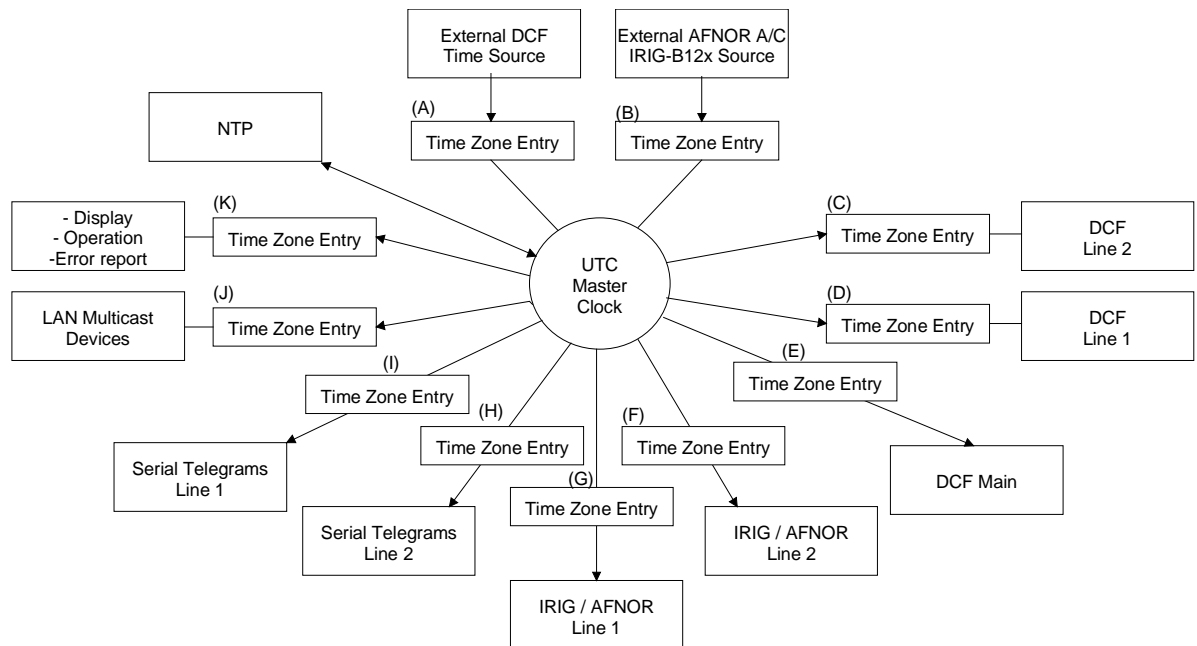


Notice: The **file name** is limited to **8 characters** before the dot, e.g. **IF482Std.tel**

8 Time administration

8.1 Concept of time administration

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



Configurable time zones:

- (A) chapter 6.4.8
- (B) chapter 6.4.8
- (C) chapter 6.4.3
- (D) chapter 6.4.3
- (E) chapter 6.4.2
- (F) chapter 6.4.5
- (G) chapter 6.4.5
- (H) chapter 6.4.4
- (I) chapter 6.4.4
- (J) chapter 6.4.6
- (K) chapter 6.4.19

8.2 Time acceptance

Variants of time synchronization

- Adjusting:
After starting the TS-2335, 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 "6.4.9 Time-keeping"
- Setting:
Time deviations are always corrected in full immediately: Seconds are set immediately; partial seconds are corrected with 50ms/s.

Manual time set:

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

8.3 Time acceptance from an external source (GPS)

Acceptance from an external source:

- At least 2 minutes reception (GPS) is required, before the NTP server is available.
Time source stratum = 0 -> stratum of the TS-2335 = 1

Stratum normal, synchronized operation:

- The stratum value behaves as follows for synchronization from the time source:
If $St_fix > 0$: then $stratum = St_fix$ (particularly for manually set time) applies
If $St_fix = 0$: then $stratum = 1$

Stratum in case of error:

- The stratum value behaves as follows in the case of external time source loss:
If $St_fix > 0$: then $stratum = St_fix$ applies
If $St_fix = 0$:
 then $stratum = \text{MIN}((t_current - t_lastsynch)/(To * 255), St_max)$ applies
- Adjusting the clock after identifying a leap in time:
If $St_fix > 0$: then $stratum = St_fix$ applies
If $Tst > 0$ AND $St_fix = 0$: then $stratum = \text{MIN}(Tdiff/Tst, St_max)$ applies
If $Tst = 0$ AND $St_fix = 0$: then $stratum = 1$ (auto) applies

Legend:

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

8.4 Time acceptance from external IRIG-B12x source

The stratum value is calculated same as with GPS synchronization (chapter 8.3). As IRIG-B120 to 123 timecodes do not provide information about the current year, the TS-2335 has to be synchronized first from another time source or the date has to be set manually.

IRIG-B126 contains the **time and date** information.



Attention: After more than 5 days without power, the TS-2335 loses the date information. When synchronized with IRIG-B120 to 123 it has to be set again manually.

8.5 Time acceptance from NTP

Acceptance:

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

Stratum in normal, synchronized operation:

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

Stratum in case of an error

- As NTP RFC 1305 (www.ntp.org)

8.6 NTP as backup

If the TS-2335 is synchronized with a GPS source, the NTP can be used as redundancy source. This function is active, as soon as at least one timeserver is configured in menu '2. Configuration' -> '2. Time handling -> '4. NTP server'.

Stratum in normal, synchronized operation:

- Equal Stratum value "Time Acceptance from an external source (GPS)"

Behavior in case of an error:

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

8.7 Time server

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

8.8 Time accuracy, time-keeping

See appendix F, Technical Data.

8.9 Leap second

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

8.10 NTP Authentication

NTP provides two variants for authentication in version 4:

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

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

8.10.1 NTP symmetric keys

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 TS-2335 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 TS-2335 must be correspondingly configured to be able to use NTP authentication (chapter 6.4.11 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.

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

trustedkey defines all keys currently permitted

requestkey defines the key for the ntpq help tool.

controlkey defines the key for the ntpdc help tool.

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

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

The key ID is in the first column of the file, the format of the keys in the second defined column, and the key itself in the third. There are four key formats, however, nowadays only the MD5 is still used -> M. The letter M is no longer written for new NTP variants (>V4.2) and is only necessary for backwards compatibility.

The signs ' ', '#', '\t', '\n' and '\0' are not used in the MD5 ASCII key! Key 0 is reserved for special purposes and should, therefore, not be used here.

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

8.10.2 NTP Autokey

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

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

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

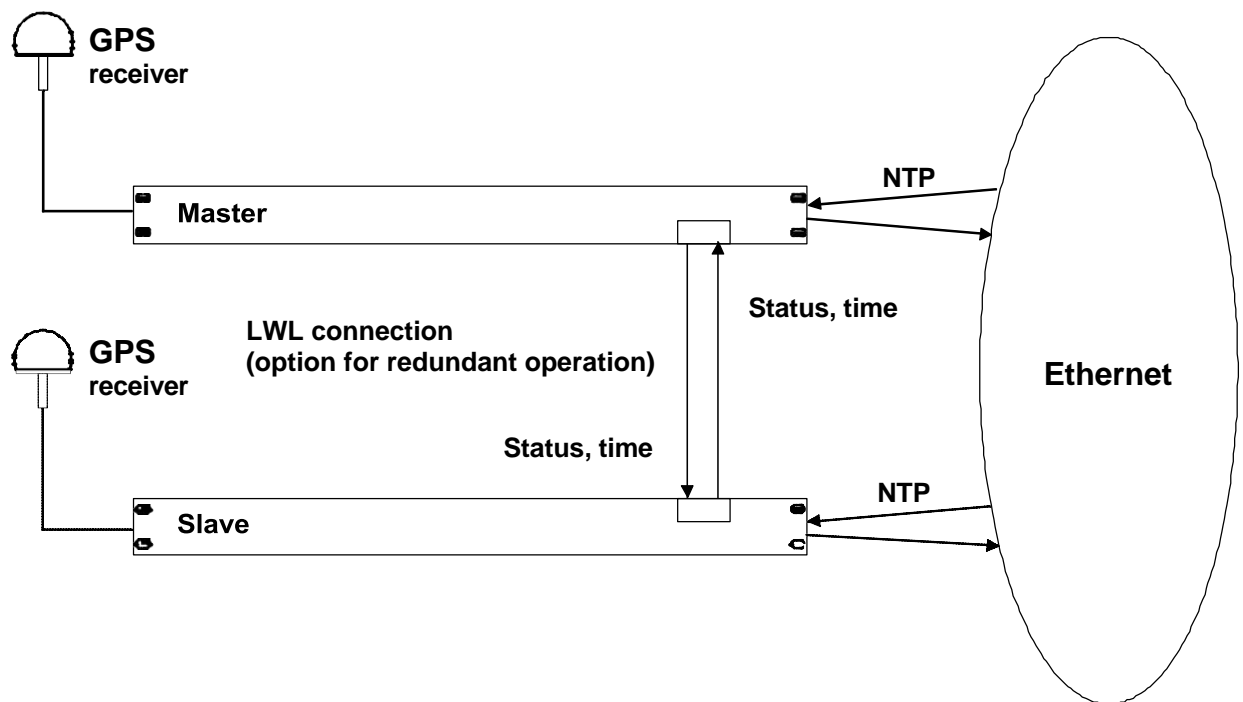
8.11 Redundant operation of 2 TS-2335

For redundant operation two TS-2335 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.
- In the case of a loss of the master, the slave assumes the master function.
- 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 NTP, 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 TS (MIBII, TS-2335).

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

Read only :	<i>rossol</i>
Read/write:	<i>rwssol</i> (<i>Caution:TS-2335 does not support "write" function.</i>)
Trap:	<i>trapssol</i>

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

TSUser1:	<i>ssol</i>
TSUser2:	<i>ssol</i>
TSInfo:	<i>ssol</i> (<i>not changeable, read only</i>)

TSUser1 and TSUser2 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 TS 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 TS 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:

TS-COMMON (File: tsCOMMON-MIB.TXT)

General TS definition, always required

TS-2335 (ts2335-MIB.TXT)

Device specific TS definitions

The MIB files can be copied from the TS-2335 with FTP (For FTP use, see chapter “7.5 FTP Connection”):

TS-MIB: /etc/snmp/mibs/

Standard MIBS: /usr/share/snmp/mibs/

9.2 Device configuration with SNMP (Caution: TS-2335 does not support this function.)

If one or several variables are set with *Put* in a configuration group, the variable *TS-2335????ConfigCmd* must be set at the end to 1 in the corresponding group. The values of the entire configuration group are assumed from the TS 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 *TS-2335????ConfigCmd* variable to 2 (2=undo, restore).

After sending the accept command, a *TS-2335ConfigChanged Notification* is sent.

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

Example:

Management-System		TS
<i>Put</i> TS-2335FTPMODE=1	→	Variable is set to 1 internally
<i>Put</i> TS-2335NetServicesConfigCmd=1	→	Configuration group is assumed
	←	Sends <i>TS-2335ConfigChanged Notification</i> with the new time <i>TS-2335NetConfigChangedTime</i>

9.3 TS 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 [TS-2335StartUp]

Sent out when the subagent for the TS is started.

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

9.3.2 Shutdown [TS-2335Shutdown]

Sent out when the subagent for the TS 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 [TS-2335StatusChanged]

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

TS-2335SysStatus, TS-2335SysTimeSource, TS-2335SysStratum, TS-2335SysMasterMode

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
TS-2335SysStatus	Unsigned Int	4 Bytes	Contains the internal system status	66309
TS-2335SysOffset	Integer	4 Bytes	Actual time offset of the system [us]	-1523 (-1.523ms)
TS-2335SysTimeSource	Byte	1 Byte	Actual time source	2
TS-2335SysStratum	Byte	1 Byte	Actual system stratum level	1
TS-2335SysMasterMode	Byte	1 Byte	Master/slave mode	1

9.3.4 Configuration changed [TS-2335ConfigChanged] (Caution:TS-2335 does not support "write" function.)

Sent out when the subagent detects a configuration change in the TS 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
TS-2335SysConfigChangedTime	TimeTicks	4 Bytes	Contains the TimeTicks value of the last change in 1/100 th seconds
TS-2335NetServicesConfigChangedTime	TimeTicks	4 Bytes	
TS-2335NetConfigChangedTime	TimeTicks	4 Bytes	
TS-2335RedOpConfigChangedTime	TimeTicks	4 Bytes	
TS-2335TSConfigChangedTime	TimeTicks	4 Bytes	
TS-2335NTPConfigChangedTime	TimeTicks	4 Bytes	
TS-2335OutLine1DCFCConfigChangedTime	TimeTicks	4 Bytes	
TS-2335OutLine2DCFCConfigChangedTime	TimeTicks	4 Bytes	
TS-2335OutLine1SerialChangedTime	TimeTicks	4 Bytes	
TS-2335OutLine2SerialChangedTime	TimeTicks	4 Bytes	
TS-2335OutLine1IRIGChangedTime	TimeTicks	4 Bytes	
TS-2335OutLine1IRIGChangedTime	TimeTicks	4 Bytes	
TS-2335OutLineTZServerConfigChangedTime	TimeTicks	4 Bytes	
TS-2335RelayConfigChangedTime	TimeTicks	4 Bytes	
TS-2335MailConfigChangedTime	TimeTicks	4 Bytes	
TS-2335SnmpConfigChangedTime	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
TS-2335SysConfigChangedTime	TS-2335Language TS-2335Timezone TS-2335Password TS-2335DisplayTimezone TS-2335DisplayTimeFormat TS-2335PowerSupply
TS-2335NetConfigChangedTime	TS-2335IPAddr TS-2335IPMask TS-2335IPGateway TS-2335IPNameserver TS-2335Hostname TS-2335Domain TS-2335DHCPMode TS-2335EthernetLinkMode TS-2335IPv6AutoConf TS-2335IPv6DHCPMode TS-2335IPv6Addr1 TS-2335IPv6Prefix1 TS-2335IPv6Gateway1 TS-2335IPv6Addr2 TS-2335IPv6Prefix2 TS-2335IPv6Gateway2 TS-2335IPv6Nameserver
TS-2335NetServicesChangedTime	TS-2335TelnetMode TS-2335FTPMode TS-2335SSHMode
TS-2335TSConfigChangedTime	TS-2335TSType TS-2335TSStratumMode TS-2335TSStratumErrorLimit TS-2335TSTimeout TS-2335TSStratumTimeout1 TS-2335TSOffsetPerStratum TS-2335TSMaxOffsetForTimeValid TS-2335TSDCFAdjustment TS-2335TSAdjustmentMode TS-2335TSMaxAdjustmentSpeed TS-2335TSQuartzType TS-2335TSOffsetSynchOnly TS-2335TSLeapSecMode TS-2335TSLeapSecDate
TS-2335RedOpConfigChangedTime	TS-2335RedOpMode TS-2335RedOpSwitchOverStratum TS-2335RedOpMaxOffsetSlaveTimeSource TS-2335RedOp2ndTSIPAddress TS-2335RedOp2ndTSIPPort
TS-2335NTPConfigChangedTime	TS-2335NTPBroadcastAddr1 TS-2335NTPBroadcastInterval1 TS-2335NTPBroadcastTTL1 TS-2335NTPBroadcastKey1 TS-2335NTPBroadcastAddr2 TS-2335NTPBroadcastInterval2 TS-2335NTPBroadcastTTL2 TS-2335NTPBroadcastKey2 TS-2335NTPSourceTable (Address, min/max poll, mode, prefer)
TS-2335RelayConfigChangedTime	TS-2335RelayAlarmMask
TS-2335MailConfigChangedTime	TS-2335MailMode TS-2335MailAlarmMask TS-2335MailServerIPAddress

	TS-2335MailServerPort TS-2335MailAddrDestination1 TS-2335MailAddrDestination2 TS-2335MailAddrReply TS-2335MailAddrFrom TS-2335MailUser TS-2335MailPassword TS-2335MailAuthMode
TS-2335SnmpConfigChangedTime	TS-2335SnmpMode TS-2335SnmpAlarmMask TS-2335SnmpROCommunity TS-2335SnmpRWCommunity TS-2335SnmpTrapMode TS-2335SnmpTrapAlarmMask TS-2335SnmpTrapCommunity TS-2335SnmpTrapListenerIPAddress1 TS-2335SnmpTrapListenerPort1 TS-2335SnmpTrapVersion1 TS-2335SnmpTrapListenerIPAddress2 TS-2335SnmpTrapListenerPort2 TS-2335SnmpTrapVersion2 TS-2335SnmpTrapAliveMsgInterval TS-2335SnmpLocation TS-2335SnmpContact TS-2335SnmpV3UserPassword1 TS-2335SnmpV3UserLevel1 TS-2335SnmpV3UserRead1 TS-2335SnmpV3UserWrite1 TS-2335SnmpV3UserPassword2 TS-2335SnmpV3UserLevel2 TS-2335SnmpV3UserRead2 TS-2335SnmpV3UserWrite2 TS-2335SnmpV3View11 TS-2335SnmpV3View12 TS-2335SnmpV3View13 TS-2335SnmpV3View14 TS-2335SnmpV3View15 TS-2335SnmpV3View16 TS-2335SnmpV3View21 TS-2335SnmpV3View22 TS-2335SnmpV3View23 TS-2335SnmpV3View24 TS-2335SnmpV3View25 TS-2335SnmpV3View26
TS-2335OutLineTZServerConfigChangedTime	TS-2335OutLineTZServerMode TS-2335OutLineTZServerMCastAddr TS-2335OutLineTZServerMCastPort TS-2335OutLineTZServerNTPInterval TS-2335OutLineTZServerTTL TS-2335OutLineTZServerTableInterval TS-2335OutLineTZServerEntryInterval TS-2335OutLineTZServerTable (TZ entry number)
TS-2335OutLine1DCFConfigChangedTime	TS-2335OutLine1DCFTimezone TS- 2335OutLine1DCFPulseType TS-2335OutLine1DCFPulseTime TS-2335OutLine1DCFPulsePeriod TS-2335OutLine1DCFPulseCorrection TS-2335OutLine1DCFFrequency
TS-2335OutLine2DCFConfigChangedTime	TS-2335OutLine2DCFTimezone TS- 2335OutLine2DCFPulseType TS-2335OutLine2DCFPulseTime TS-2335OutLine2DCFPulsePeriod TS-2335OutLine2DCFPulseCorrection TS-2335OutLine2DCFFrequency

TS-2335OutLine1SerialConfigChangedTime	TS-2335OutLine1SerialMode TS-2335OutLine1SerialTimezone TS-2335OutLine1SerialComMode TS-2335OutLine1SerialComParam TS-2335OutLine1SerialTeleFile
TS-2335OutLine2SerialConfigChangedTime	TS-2335OutLine2SerialMode TS-2335OutLine2SerialTimezone TS-2335OutLine2SerialComMode TS-2335OutLine2SerialComParam TS-2335OutLine2SerialTeleFile
TS-2335OutLine1IRIGConfigChangedTime	TS-2335OutLine1IRIGMode TS-2335OutLine1IRIGTimezone TS-2335OutLine1IRIGOutputLevel TS-2335OutLine1IRIGAlarmLevel
TS-2335OutLine2IRIGConfigChangedTime	TS-2335OutLine2IRIGMode TS-2335OutLine2IRIGTimezone TS-2335OutLine2IRIGOutputLevel TS-2335OutLine2IRIGAlarmLevel

9.3.5 Alive notification [TS-2335Alive]

Sent out in a configurable interval.

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

The *Notification* sent out contains the following data:

Field	Type	Size	Description	Example
TS-2335SysStatus	Unsigned Int	4 Bytes	Contains the internal system status	66309
TS-2335SysAlarms	Byte Array	8 Bytes	64 Bit Alarm flags 1.Byte Bit 0..7 2.Byte Bit 8..15 .. 8.Byte Bit 56..63	FFF870FF.FFFFFFFF 5.Byte 2.Byte 1.Byte

9.3.6 Alarm notification [TS-2335Alarm]

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
TS-2335TrapAlMsgErrorNr	Byte	1 Byte	No. of the alarm bit (0..63)	3
TS-2335TrapAlMsgErrorState	Byte	1 Byte	0 = alarm bit was deleted 1 = alarm bit was set	1
TS-2335TrapAlMsgErrorTime	Unsigned Int	4 Bytes	PC-time in seconds since 01.01.1970 00:00:00	946684805
TS-2335TrapAlMsgErrorText	Text	59 Bytes	Error text	Failure supply 1

10 Power supply variants

The TS-2335 permits 3 different power supply alternatives:

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



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

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



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

3. Redundant power supply
with the following variants:

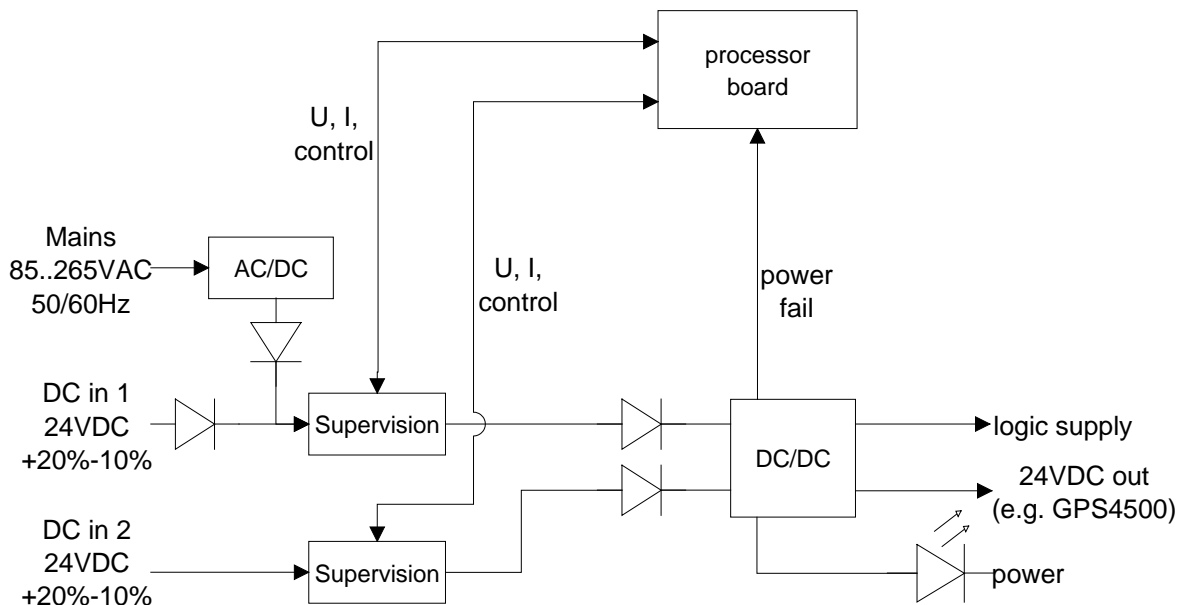
	Supply1:	Supply2:
Variant 1	Mains supply	DC in 2
Variant 2	DC in 1	DC in 2

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



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

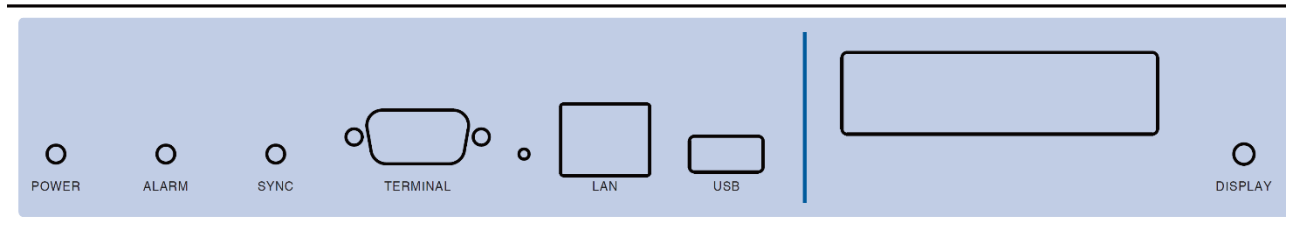
Block diagram of power supply:



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

A Connection diagrams

A.1 Front connections



PC - Terminal Connection:

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

Cable TS-2335 - 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

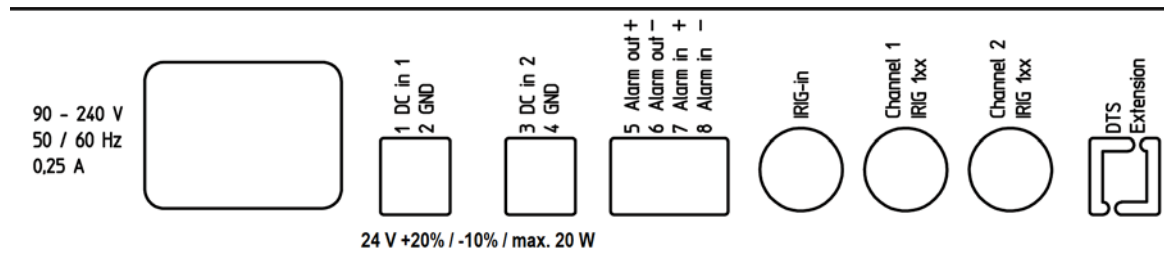
USB Connection:

Plug: USB-Host




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

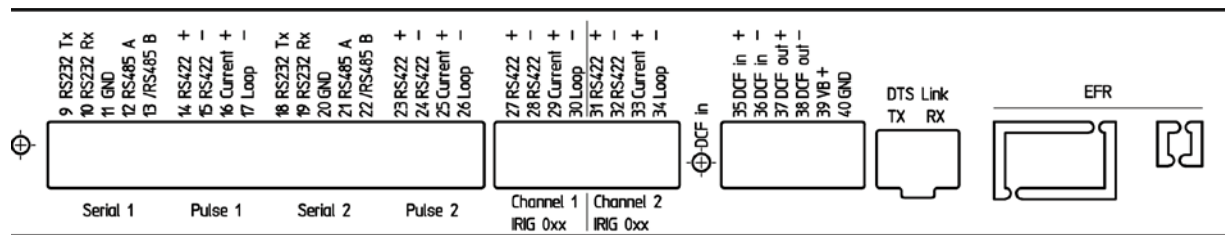
A.2 Connections (rear view)



TS-2335 connections

For technical data see in Appendix "F Technical data"

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



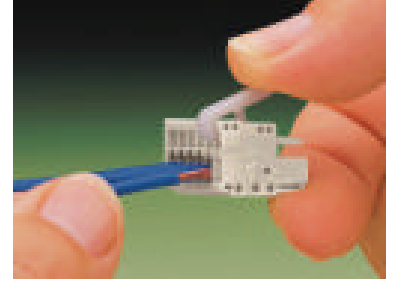
Clamp	Connection	Description
9	RS232 Tx	RS232 interface of line 1 (Exclusive to the RS485 interface line 1; internally the same interface)
10	RS232 Rx	
11	GND	
12	RS485 A	RS485 interface of line 1 (Exclusive to the RS232 interface line 1; internally the same interface)
13	RS485 B	
14	RS422 + Pulse 1	RS422 output line 1 for DCF, pulse and frequency output (internally the same source of signal like for the current loop output)
15	RS422 – Pulse 1	
16	CL + Pulse 1	Current loop line 1 for DCF, pulse and frequency output ("Current loop" passive, optocoupler: $U_{max}= 50VDC$, $I_{max}= 10mA$)
17	CL – Pulse 1	
18	RS232 Tx	RS232 interface of line 2 (Exclusive to the RS485 interface line 2; internally the same interface)
19	RS232 Rx	
20	GND	
21	RS485 A	RS485 interface of line 2 (Exclusive to the RS232 interface line 2; internally the same interface)
22	RS485 B	
23	RS422 + Pulse 2	RS422 output line 2 for DCF, pulse and frequency output (internally the same source of signal like for the current loop output)
24	RS422 – Pulse 2	
25	CL + Pulse 2	Current loop line 1 for DCF, pulse and frequency output ("Current loop" passive, optocoupler: $U_{max}= 50VDC$, $I_{max}= 10mA$)
26	CL – Pulse 2	
27	RS422 +	Digital IRIG-B signal (00x) of the IRIG line 1 See Appendix A.5
28	RS422 –	
29	Current Loop +	Digital IRIG-B signal (00x) of the IRIG line 1 as current-loop ("Current loop" passive, optocoupler: $U_{max}= 50VDC$, $I_{max}= 10mA$)
30	Current Loop –	
31	RS422 +	Digital IRIG-B signal (00x) of the IRIG line 2 See Appendix A.5
32	RS422 –	
33	Current Loop +	Digital IRIG-B signal (00x) of the IRIG line 2 as current-loop ("current loop" passive, optocoupler: $U_{max}= 50VDC$, $I_{max}= 10mA$)
34	Current Loop –	
35	DCF input +	DCF input e.g. for the connection of a GPS 4500- or DCF-receiver with "current loop" output.
36	DCF input -	
37	DCF output +	DCF output, "current loop" passive, $U_{max}= 30VDC$, $I_{on}= 10..15mA$, $I_{off} < 1mA$ @20VDC
38	DCF output -	
39	DC output + (VB+)	DC output for GPS 4500 28 VDC, max. 400 mA (or according to the DC in voltage)
40	DC output GND	
	TS-Link	Optical connection to a 2 nd TS-2335 Mini GBIC plug-in
	EFR	Option, for special applications only

A.3 Plug-in spring terminals

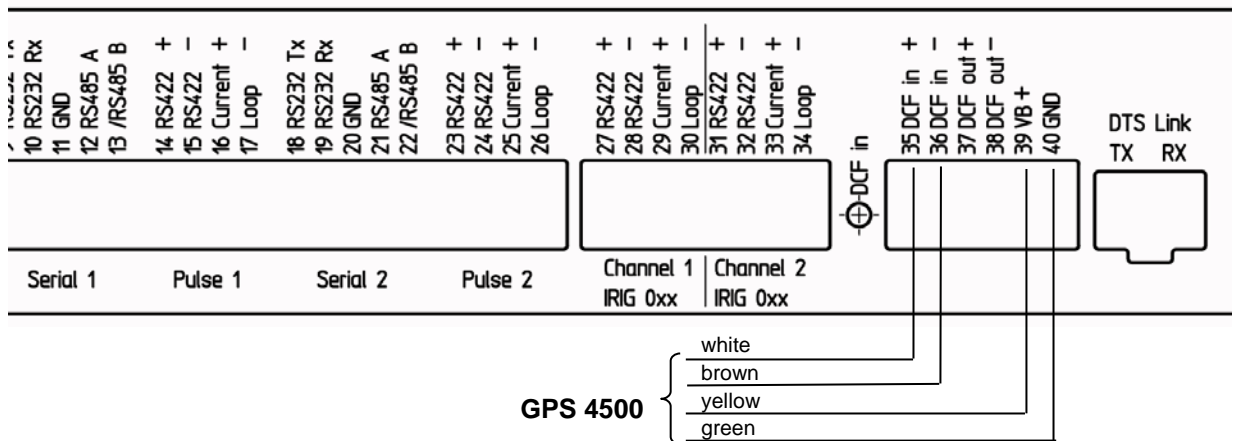
multiple contact strip 100% protected against wrong plug;
WAGO CAGE CLAMP®-connection
Cross section of 0,08 mm² to 1,5 mm² (from AWG 28 to AWG 14)
Voltage CSA 300 V / current CSA 10 A
Rated voltage: EN 250 V
Rated surge voltage: 2,5 kV
Nominal current: 10 A
Strip length: 7 mm (0,28 in)

Pulled off spring terminal with operation tool:

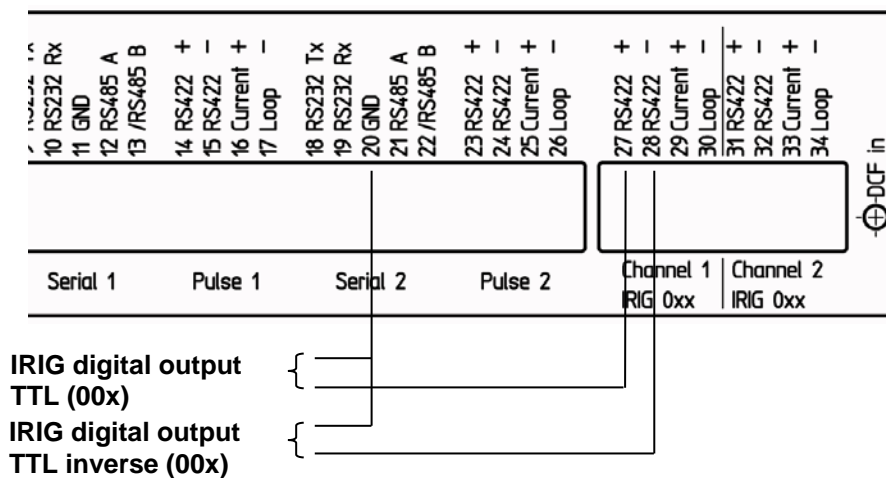
2 operation tools are delivered with the accessory bag.



A.4 Connection GPS 4500



A.5 IRIG-B00x Digital Output TTL connection



B Time zone table

Time zone entries in the standard season table (version 10.1).

Time zone	City / State	UTC Offset	DST Change	Standard → DST	DST → Standard
00	UTC (GMT), Monrovia, Casablanca	0	No		
01	London, Dublin, Edinburgh, 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, Istanbul, Helsinki, Riga, Tallinn, Sofia, Vilnius	+2	Yes	Last Sun. Mar. (03:00)	Last Sun. Oct. (04:00)
04	Bucharest, Romania	+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	Kuwait City, Minsk, Moscow, St. 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, Calcutta, Madras, New Delhi, Colombo	+5.5	No		
16	Astana, Thimphu, Dhaka, Novosibirsk	+6	No		
17	Bangkok, Hanoi, Jakarta, Krasnoyarsk	+7	No		
18	Beijing, Chongqing, Hong kong, Singapore, Taipei, Urumqi, Irkutsk	+8	No		
19	Tokyo, Osaka, Sapporo, Seoul, Yakutsk	+9	No		
20	Gambier Island	-9	No		
21	South Australia: Adelaide	+9.5	Yes	1 st Sun. Oct (02:00)	1 st Sun. Apr. (03:00)
22	Northern Territory: Darwin	+9.5	No		
23	Brisbane, Guam, Port Moresby, Magadan, Vladivostok	+10	No		
24	Sydney, Canberra, Melbourne, Tasmania: Hobart	+10	Yes	1 st Sun. Oct. (02:00)	1 st Sun. Apr. (03:00)
25	UTC (GMT)	0	No		
26	UTC (GMT)	0	No		

27	Honiara (Solomon Is.), Noumea (New Caledonia),	+11	No		
28	Auckland, Wellington	+12	Yes	Last Sun. Sep. (02:00)	1 st Sun. Apr. (03:00)
29	Majuro (Marshall Is.), , Anadyr	+12	No		
30	Azores	-1	Yes	Last Sun. Mar. (00:00)	Last Sun. Oct. (01:00)
31	Middle Atlantic	-2	No		
32	Brasilia	-3	Yes	3 rd Sun. Oct. (00:00)	3 rd Sun. Feb. (00:00)
33	Buenos Aires, Santiago	-3	No		
34	Newfoundland, Labrador	-3.5	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
35	Atlantic Time (Canada)	-4	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
36	La Paz	-4	No		
37	Bogota, Lima, Quito, Easter Island, Chile	-5	No		
38	New York, Eastern Time (US & Canada)	-5	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
39	Chicago, Central Time (US & Canada)	-6	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
40	Tegucigalpa, Honduras	-6	No		
41	Phoenix, Arizona	-7	No		
42	Denver, Mountain Time	-7	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
43	Los Angeles, Pacific Time	-8	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
44	Anchorage, Alaska (US)	-9	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
45	Honolulu, Hawaii (US)	-10	No		
46	Midway Islands (US)	-11	No		
47	Mexico City, Mexico	-6	Yes	1 st Sun. Apr. (02:00)	Last Sun. Oct. (02:00)
48	Adak (Aleutian Is.)	-10	Yes	2 nd Sun. Mar. (02:00)	1 st 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	Scoresbysund, 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	Qaanaaq, Greenland (old)	-4	Yes	2 nd Sun. Mar. (02:00)	1 st Sun. Nov. (02:00)
57	Western Australia: Perth	+8	No		
58	Caracas	-4.5	No		
59	CET standard time	+1	No		
60	Santiago, Chile (old)	-4	Yes	2 nd Sun. Oct. (00:00)	2 nd Sun. Mar. (00:00)
61	Chile, Easter Island (old)	-6	Yes	2 nd Sat. Oct. (22:00)	2 nd Sat. Mar. (22:00)
62	Baku	+4	Yes	Last Sun. Mar. (04:00)	Last Sun. Oct. (05:00)
63	UTC (GMT)	0	No		
64	UTC (GMT)	0	No		

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

Legend:

UTC: Universal Time Coordinate, equivalent to GMT
DST Daylight Saving Time
DST Change: Daylight Saving Time changeover
Standard → DST: Time change from Standard time (Winter time) to Summer time
DST → Standard: Time change from Summer time to Standard time (Winter time)

Example:

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

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.



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

C Alarm list

Number	Error message	Description / Action
0	Reboot TS	TS-2335 restarted, no intervention required
1	Error bit1	Not used
2	Supply voltage too low	Power failure (internally measured) -> support
3	Power failure 1	Power failure 1 (only if redundant supply is on)
4	Power failure 2	Power failure 2 (only if redundant supply is on)
5	Error voltage 5V	Power failure (internally measured) -> support
6	Error voltage 2.5V	Power failure (internally measured) -> support
7	Error voltage 1.25V	Power failure (internally measured) -> support
8	Wrong time zone DCF	Check DCF configuration
9	Wrong time zone TC1	Error in time zone calculation TC1
10	Wrong time zone TC2	Error in time zone calculation TC2
11	Alarm input	Error from external device
12	Low voltage IRIG1	Low voltage on analogue AFNOR/IRIG-B output 1
13	Low voltage IRIG2	Low voltage on analogue AFNOR/IRIG-B output 2
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	NTP backup active	Check primary source
23	Syn only diff too large	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 TS 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 has occurred. Optionally, check the time source of current slave.
33	Offset source (slave)	In slave mode only: check time sources Difference between slave and local time source too large
34	Local time source lost	In slave mode only: check time sources
35	Error bit35	Not used

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

D Troubleshooting

	Error	→	→	Solution / possible cause
1	TS 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. GPS 4500) sends out valid telegrams. Wait for this time to pass.
2			No, for more than 20 minutes.	<ul style="list-style-type: none"> • Check DCF reception LED • Check polarity cabling to GPS. • Check positioning of the GPS receiver
3		Error-Bit 23 (<i>Syn only diff too big</i>) in <i>Status</i> → <i>Alarm status</i> set		<p>The deviation to the received time is beyond the maximal allowed time correction.</p> <p>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).</p>
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"> • If Error-Bit 23 set, see point 3 • The deviation is that big, that offset changes cannot be seen due to the displayed resolution.
5		Configuration has just been changed		In the case of configuration changes, particularly if the time configuration is concerned, it can take several minutes for the change to appear correctly.
6	Error-Bit 16 set (<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	TS-2335 is restarting continuously.			Check, if the network settings are correct, especially the hostname and the gateway has to be configured (when no gateway is available, the own IP address can be used).
10	LAN LED (left one) is flashing orange.	No connection to the network.		Check network cabling.
11	Opening the menu via Telnet is not possible or TS-2335 is not or no longer reachable via network.			<p>Check network settings in menu 2 Configuration → 5 Network (only possible with serial connection):</p> <ul style="list-style-type: none"> - IP-Address, Subnet mask and Gateway must be set correctly - Interface should be set to Auto - Check connection with "Ping" - When earlier the menu was not correctly exited (e.g. LAN cable removed), the menu can be blocked up to 15 minutes.
12	Drift (ppm) of quartz too high	The drift displayed in the menu <i>Status</i> → <i>Time</i> → TIME INFORMATION AND STATUS is bigger than stated in the data sheet.		<ul style="list-style-type: none"> • The quartz drift is measured and corrected continuously. After initial operation, it may take up to 24 hours until optimal accuracy is reached (with GPS reception). • Very large temperature change (outside the specification) • Time correction was carried out manually.

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

E Copyright notice

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

Designation	Description	Version	License	License Description (file)
U-Boot	Boot loader	1.1.4	GPL version 2	COPYING
Linux	Operating system	2.6.18	GPL version 2	COPYING
Busybox	System environment	1.13.2	GPL version 2	LICENSE
NTP	NTP	4.2.8p2	Free	COPYRIGHT
pure-ftp	FTP server	1.0.21	Free, partly BSD	COPYING
NetSNMP	SNMP agent	5.4.2.1	BSD	COPYING
OpenSSL	SSL Lib.	0.9.8i	BSD style	LICENSE
OpenSSH	SFTP server	5.2.p1	BSD	LICENCE
dropbear	SSH server	0.52	MIT style: Free, party BSD	LICENSE
wide-dhcpv6	DHCPv6 client	20080615	Free	COPYRIGHT
flex	Flex Lib.	2.5.4e	BSD adapted	COPYING
zlib	Compress lib.	1.2.3	Free	README
mailsend	E-mail client	1.15b5	GPL	-

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

Licence text GPL, BSD and MIT:

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

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

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

F Technical data

Dimensions	19" Rack, 1HU x 28PU (H x W x D [mm]) = 483 x 44 x 125		
Weight	approx. 1.8 kg		
Ambient temperature	0 to 60°C, 10-90% relative humidity, without condensation		
EMI	VCCI-A certification		
Operation	Serial interface (via RS 232) or Telnet / SSH In addition, operation is also possible with SNMP.		
Time keeping (internal)	Synchronized with GPS: +/-1ms to UTC		
Holdover (free run):	After at least 12 hours synchronization from the time source:		
TS-2335 -> TCXO:	at 20°C +/- 5°C:	< +/- 10 ms / day (< 0.1ppm) *	
	at constant temperature*:	< +/- 1 ms / day (< 0.01ppm) *	
Generally:	During power break (based on internal RTC):		
	at 20°C +/- 5°C:	< 5 ppm, but with jitter of +/- 15 ms *	
	After a power failure the RTC time is available during at least 5 days (RTC buffered through a SuperCAP).		
	*measured over 24 h		
Redundant operation	- Master to slave (optical TS link): typical < +/- 1 µs		
Time server	NTP V4	(fully V3 compatible), RFC 1305, RFC 5905 (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: > 1250 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)	The maximum pre-defined entries is 80.		
Network interface	10BaseT / 100BaseTX (IEEE 802.3)		
	Data transmission rate:	Auto-negotiation / manual	
	Connection:	RJ-45	
	Only shielded cables permitted.		
IP Configuration	DHCP, Static IP, IPv4, IPv6		
Network services	NTP	UDP, Port 123	see timeserver
	SNTP	UDP, Port 123	see timeserver
	TIME	TCP/UDP, Port 37	see timeserver
	DAYTIME	TCP/UDP, Port 13	see timeserver
	Telnet	TCP, Port 23	operation
	SSH	TCP, Port 22	operation
	SCP	über SSH	update
	SFTP	über SSH	update
	FTP	TCP, Port 21	update
	SNMP	UDP, Port 161	operation
		UDP, Port selectable (162) alarm notification, see SNMP	

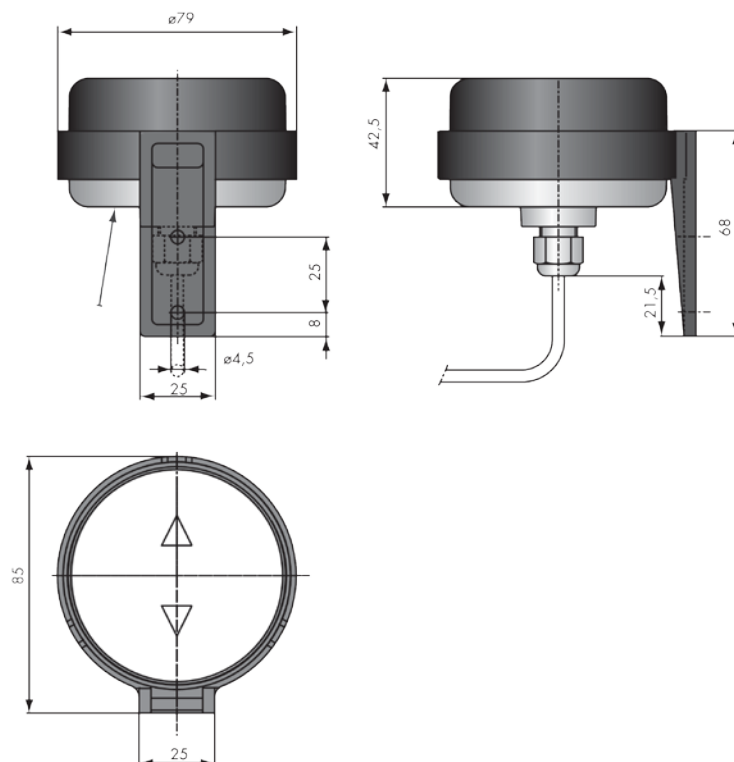
	SMTP	TCP, Port selectable (25)	alarm mail see E-Mail
	DHCP	UDP, Port 68	dyn. address allocation (client)
	DNS	TCP/UDP, Port 53	address resolution (client)
	DHCPv6	only IPV6	
	ECHO	ICMP	"Ping"
SNMP	V1, V2c, V3 with MD5 for authentication and DES for encryption (privacy).		
E-mail	Alarm reporting via SMTP. Authentication at the mail server: <ul style="list-style-type: none"> - with sender address - with username/password SMTP-Auth with LOGIN, PLAIN (RFC 4954) or CRAM-MD5 (RFC 2195) no "POP before SMTP" possible 		
Serial interface (front side)	D-Sub 9 (male): (RS232, 38400, 8, n, 1, no flow control) Cable length max. 3 m.		
IRIG-B12x input:	Upp: 100mV - 5500mV		
Time signal outputs	NTP V4 for slave clocks (unicast and multicast) 2 x IRIG-B output (analog and digital) 2 x DCF, programmable impulse / frequency output over RS 422 and opto coupler (current loop passive) 1 x DCF current loop interface passive 2 x Script files configurable time telegrams on RS 232, RS 422 (only send) and RS 485		
DCF output (1x) impulse / frequency outputs (2x)	Not supported 2 line for technical impulses: time zone selectable, output signal correction possible (impulse) Max. time deviation with GPS source: $\pm 10 \mu\text{s}$, Jitter $< 10 \mu\text{s}$ Mode: <ul style="list-style-type: none"> - impulses: sec., min., h., or user-defined - frequency: 1Hz.. 5MHz (no square signal possible above 2MHz) 2 different electrical outputs with the same signal: <ul style="list-style-type: none"> - passive current loop output, opto coupler: $I_{\text{max.}}=10 \text{ mA}$ / $U_{\text{max.}}=50 \text{ VDC}$ - RS422 		
IRIG-B outputs (2x)	2 high precision IRIG lines, both available as analog and digital signals Max. time deviation to GPS (with GPS source): DC level: $< \pm 10 \mu\text{s}$ Modulated: $< \pm 200 \mu\text{s}$ Accuracy of the signal according to standard: DC level pulse rise time between the 10% and 90% amplitude points: $\leq 1 \mu\text{s}$ Jitter modulated at carrier frequency: $\leq 1\%$ DC level jitter pulse-to-pulse: $\leq 200 \text{ ns}$ Line mode: IRIG-B122, IRIG-B Std 12h (B122), IRIG-B002, IRIG-B003, IRIG-B123, IRIG-B DIEM, AFNOR A, AFNOR C, DCF-FSK IRIG-B126, IRIG-B IEEE 1344 Output voltage level ($R_L=50 \text{ Ohm}$): $0.1 - 5.5 \text{ Vpp}$ (configurable) SNR_{dB} : typical $\geq 40\text{dB}$ Impedance: $R_i < 50 \Omega$ Opto coupler outputs: $I_{\text{max.}}=10 \text{ mA}$ / $U_{\text{max.}}=50 \text{ VDC}$ RS422 outputs: $U = \text{typical } 3.3 \text{ VDC}$		

Serial interface (2x) (back side)	2 lines for telegram output RS232 or RS485 Max. time deviation against internal time: +/- 10 ms, jitter < 10 ms 300-38400 Bauds, 7 or 8 Data bits, Parity: no, even, odd, Stop bit: 1 or 2, no flow control The description of the telegram functions is provided in Appendix E.	
USB plug	USB Host for USB stick	
Alarm contact	Opening relay contact (Alarm active -> contact open). Breaking capacity: max. 30 W (DC) or 60 VA (AC) max. 60 VDC or 1 A / 30 VAC or 1 A	
Alarm reporting / Error reporting	Alarm contact E-Mail SNMP-Notification Display Alarm LED	see Alarm contact see E-Mail see SNMP-Trap see display -
Alarm inputs	18 - 36 VDC, max. 6 mA, for external closing contact Function configurable	
TS Link	Plug-in position for mini GBIC module (GigaBit Interface Converter) 1000Mbps, 3,3V (with LC connector) e.g. D-Link DEM-311GT, SX 850 nm, 1.25 Gbps/MM/3.3 V Maximal cable length depends on type of cable: -Multimode fiber with a diameter of 50 µm: max. 550 m -Multimode fiber with a diameter of 62.5 µm: max. 275 m With LX standard, longer cables can be achieved.	
Display	2 lines with up to 16 characters for the display of status information.	
DC power supply	24 VDC +20% / -10% / 20 W	
Mains power supply	90 - 240 V / 50 - 60 Hz / 0.25 A	
Power supply output	Nominal 24 VDC, max. 400 mA (respectively according to power supply)	

G Technical data (Option:GPS Receiver GPS4500)

Reception properties GPS module	frequencies	GPS: L1 C/A	
	channels	max. 56 satellites traceable	
	Sensitivity	-160dBm	
	Accuracy time pulse signal	RMS	30 ns
		99%	60 ns
	Time output	min. 3 satellites traceable Automatic stop of the signal output during insufficient reception	
Interfaces / connections	Connection allocation	white	DCF+
		brown	DCF-
		yellow	V+ (Supplied 24V from TS-2335)
		green	GND
Length of synchronization	Cold start	< 5 minutes (typical)	
Status display	LEDs	LEDs visible from below (cable side)	
		Power supply OK:	LED blinks in 5s tact ⁽¹⁾
		Synchronization OK:	LED blinks once per second (signal output)
		Synchronization lost:	LED blinks in 5s tact ⁽¹⁾
Electrical properties	Input voltage	10 - 40 VDC	
	Power consumption	< 0.4W (< 40mA @ 10V)	
Mechanical properties	Housing material	POM (polyester, UV resistant); black upper, milky white lower	
	Measurements	85 x 80 x 86 mm (L x B x H) (L = distance to wall)	
	Weight	approx. 200g	
	Cable	10m, UV protected, 4-wire, 0.25mm ² (AWG 23), ext. up to 200m possible	
Environmental requirements	Protection class	IP 65	
	Temperature range	-30 °C to +70 °C	

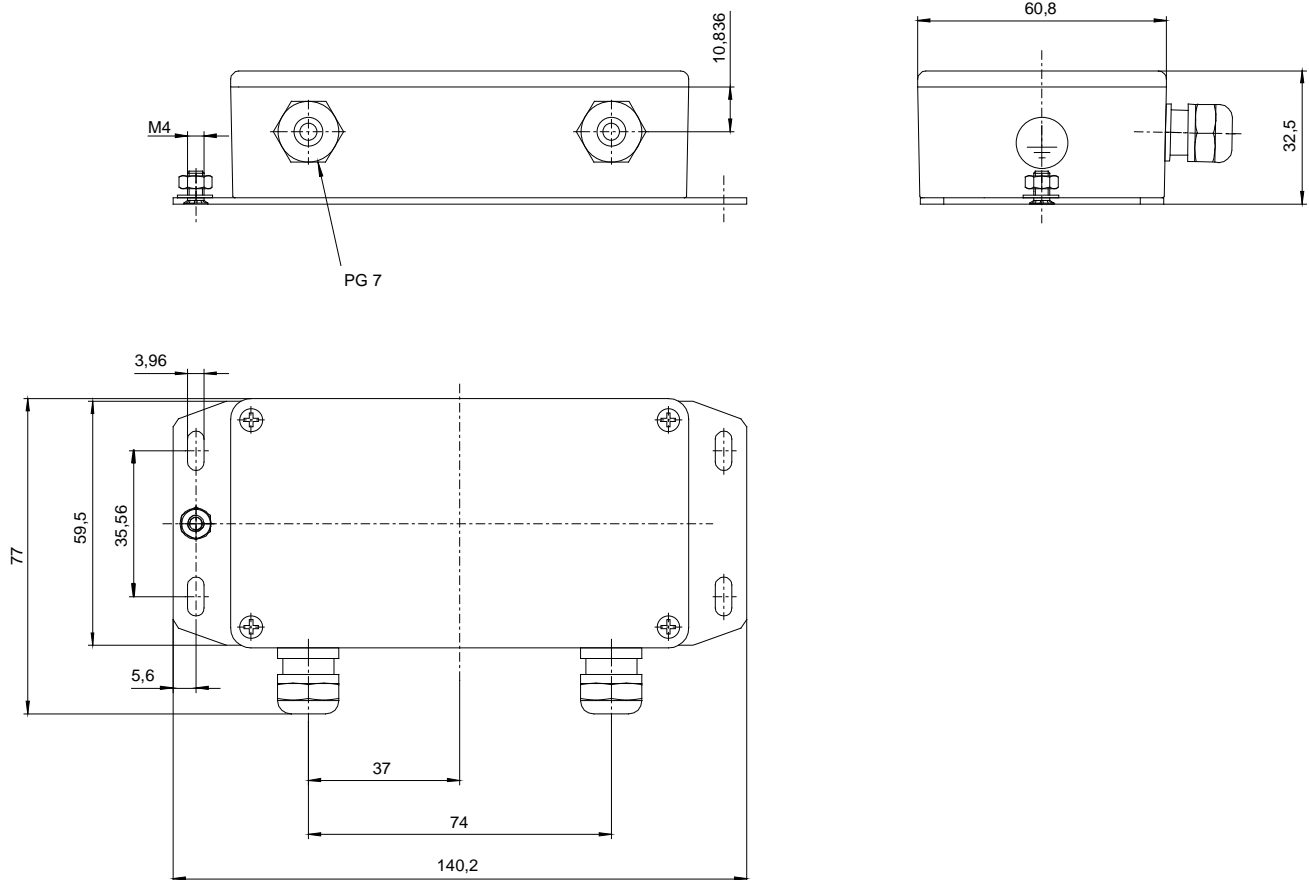
Dimensions



H Technical data (Option:Arrester SP4500)

Mechanical properties	Housing material	Aluminum die-cast
	Measurements	140 x 77 x 33 mm (W x D x H)
	Weight	approx. 180g
Environmental requirements	Protection class	IP 65
	Temperature range	-30 °C to +70 °C

Dimensions



An arrester SP 4500(Option) protects the master clock from a dangerous voltage fluctuation(surge).

To protect an antenna from the lightning, it needs to be protected by the lightning protection system on the building.

The earth screws of a case of SP 4500 is connected to the earth system of the building(ground), and needs to be the same earth(electrical potential) with the connected metal part of the roof.

Please install SP 4500 at just behind the cable inlet of the building.

You can use 2.5 mm² earth cable when its length is less than 3 meters, and 4 mm² or 6mm² earth cable when its length is more than 3 meters.



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