SEIKO

ALL-IN-ONE MASTER CLOCK
QCN-1000

MOUNTING AND INSTRUCTION MANUAL

Network Timeserver and Master Clock

SEIKO TIME CREATION INC.

I-7836

【Revision History】

Rev.Number(Date)	Page	Comment
I-7836 (2024/04/23)	-	1st Revision

References to the Instruction Manual

1. The information in this Instruction Manual can be changed at any time without notice.
   The current version is available for download at www.seiko-stc.co.jp/en.
2. The device software is continuously being optimized and supplemented with new options. For this reason, the newest software version can be obtained from the SEIKO TIME CREATION website.
3. This Instruction Manual has been composed with the utmost care, in order to explain all details in respect of the operation of the product. Should you, however, have any questions or discover any errors in this Manual, please contact us.
4. We are not liable for any direct or indirect damages which could occur when using this Manual.
5. Please read the instructions carefully and only use the product, after you have correctly understood all the information for installation and operation.
6. The installation must only be carried out by skilled staff.
7.

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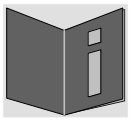
1 Safety

1.1 Safety instructions



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

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

1.2 Symbols and Signal Words used in this Instruction Manual

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

1.3 Intended Use

The **QCN-1000** is a master clock for the use in network environments. It can be synchronized from NTP and be used as NTP server. In addition, it can read the time from DCF or GPS (e.g. from GNS-1000).

It can operate as master clock for a self-setting clocks (with switching function e.g. for clock illumination, switching program and for world time function) or it can drive a line of impulse clocks or DCF active code clocks. It has 4 such lines (only the first one supports Self setting clocks).

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

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

1.4 Observe operating safety!

- Never open the housing of the device! This could cause an electric short or even a fire, which would damage your device. Do not modify your device!
- The device is not intended for use by persons (including children) with limited physical, sensory, or mental capacities or a lack of experience and/or knowledge.
- Keep packaging such as plastic films away from children. There is the risk of suffocation if misused.

1.5 Consider the installation site!

- To avoid any operating problems, keep the device away from moisture and avoid dust, heat, and direct sunlight. Do not use the device outdoors.
- The device is designed for 19" racks and should only be operated installed in a 19" rack.
- Take care to provide sufficient fresh air for the device.
- Never install the devices in a completely closed rack. Otherwise the produced warm air in the rack cannot escape and the devices cannot be cooled.

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

1.6 Please observe the electromagnetic compatibility!

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

1.7 Network security

- The default password shall be changed after the commissioning of the device.
- A reset of the password to default through hardware is not possible.
  In case an access is not possible, support effort will be needed or the device has to be sent back to the factory.
- All unused services shall be deactivated: FTP, Telnet,…
- Refer to our Security Guidelines Appendix "I QCN Security Guidelines”.

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

The connections are described in appendix "A" .

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

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

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

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

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

2 Maintenance

2.1 Troubleshooting: Repairs

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

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

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

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

- liquid has entered your device.
- the device does not properly work and you cannot rectify this problem yourself.

2.2 Cleaning

- Please make sure that the device remains clean especially in the area of the connections, the control elements, and the display elements.
- Clean your device with a damp cloth only.
- Do not use solvents, caustic, or gaseous cleaning substances.

2.3 Disposing

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

3 General Information: Introduction

3.1 Scope of Delivery

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

The package you received contains:

- QCN-1000
- AC Power Cable (Japan) 125V, 3m
- Mounting set for rack mounting consisting of:
  - 4 pcs cage nuts M6 for 19" housing
  - 4 screws M6 for the nuts
  - 4 plastic discs for screws M6
- Connector set
  - plug 3-pole black for power supply
  - 6x spring terminal 2-pole orange
  - 1x spring terminal 5-pole orange
  - 1x spring terminal 3-pole orange
  - 1x spring terminal 6-pole orange
- 2 pcs mounting tools for spring terminals and instruction manual
- Power plug 3 pins (for overseas use)

3.2 Technical Data

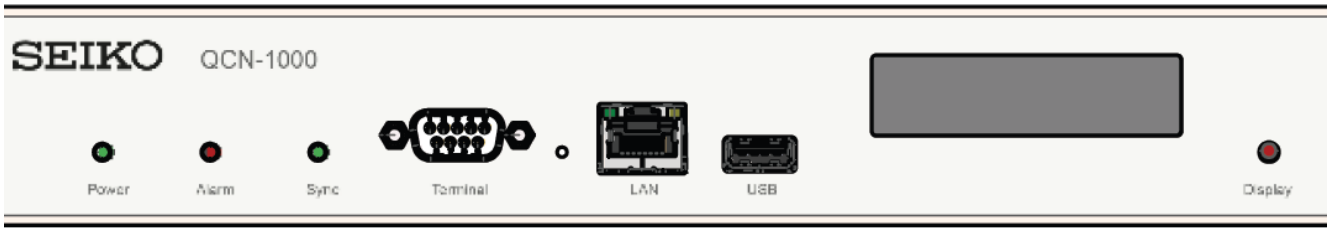
See Appendix “H” Technical data.

3.3 Device Description in this Manual

QCN-1000.

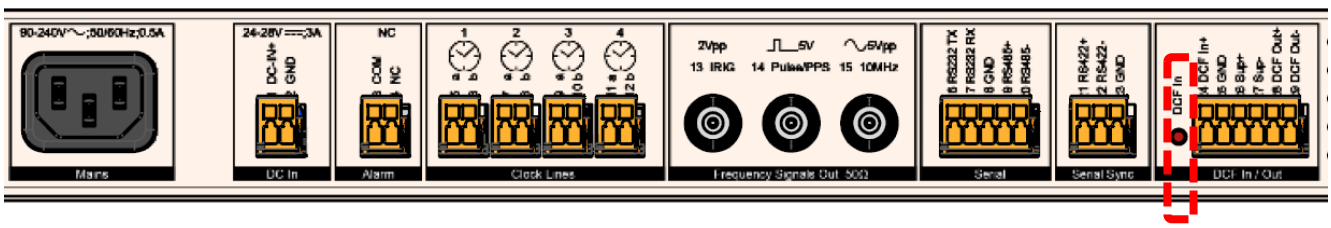
4 Displays

4.1 LED displays front view



Description	Color	Status	Description
Power	Green	On	Mains or DC power supply is connected
		Off	No power supply
Alarm	Red	On	The alarm relay signalizes an alarm
		Off	No active alarms
Sync	Green	On	QCN-1000 masterclock can read the time from a synchronization source
		Flashing	Time source internally (RTC) or manual time setting (flashing till "NTP synch. Lost" alarm appears or an external time source is available after restart)
		Off	Synchronization source is not available Off when alarm "Failure time source Str" occurs See chapter 6.5.14, menu 1: "Stratum limit for synchalarm" For DCF time source the delay for this alarm is defined in chapter 6.5.14, menu 7: "Stratum TO (0-16) DCF/GPS fail"
LAN control lamps:			
Left	Green	Blinking	Network activity
	Orange	Blinking	No connection to network
Right	Yellow	Off	10 Mbit
		On	100 Mbit

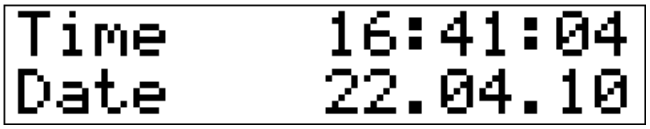
4.2 LED displays rear view



Description	Color	Status	Description
DCF in	red	blinking	DCF (GPS reception)

4.3 Display

Display showing the current status of the QCN-1000.



Display of:
- -Time, date
- -Current time source
- -Stratum of the QCN-1000
- -Line time of clock lines
- -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 and/or program files be copied, this can be activated directly with the button. (Press the button until the copy process starts).

5 Installation

5.1 Connections

The connections are specified in Appendix “A Connection diagrams”.

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

Please take care to security instructions in chapter 1.

5.2 Boot procedure of the QCN-1000

The normal booting time of the QCN-1000 is approx. 30 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 40 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 2-20 sec.

5.3 Firmware

It is recommended to install the current firmware on your device prior to the definite commissioning.

5.4 Basic settings (factory settings)

General	Internal time zone	Tokyo
	Menu password	adm
	Language	English
Time source	Source	DCF-GPS (UTC)
	Stratum	auto
	Error stratum	12
	DCF timeout	off
	DCF correction	0ms
	Offset per Stratum	50ms
	Synch only offset	off
Lines	DCF output	off, UTC
	Lines 1 to 4	off, Impulse, Tokyo
	NTP slave clocks /	
	Time zone server	off
	RS485 / telegram	off
	switching function	off
Network	DHCP	off
	DHCPv6	off
	Autoconf IPv6	off
	Link	auto
	Hostname	QCN1000
Alarm	Relay	all on
	Mail	off
	SNMP traps	off
NW Services	SSH	on
	Telnet	off
	FTP	off
SNMP	Mode	V3
	RO community	roseikostc
	RW community	rwseikostc
	SNMPv3 user	qcnUser1
	SNMPv3 pw	seikostc
	min lever	auth
SNMP Traps	Mode	off
	Trap community	trapseikostc

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:

```
QCN1000 login:
```

To start the menu, *adm* must be logged in as user. The standard password is *adm*. (Changing the password ➔ see Chapter “6.5.23 General Settings“).

Attention: The default password should be changed after receipt of the device!

Only one menu can be open at any time. The first menu started has priority. The menu is automatically closed after 15 min. without operation, and any possible connection via Telnet or SSH interrupted.

Backspace:

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

Localecho:

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

6.1.1 Serial connection

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

Windows 10, 11: Teraterm

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.

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

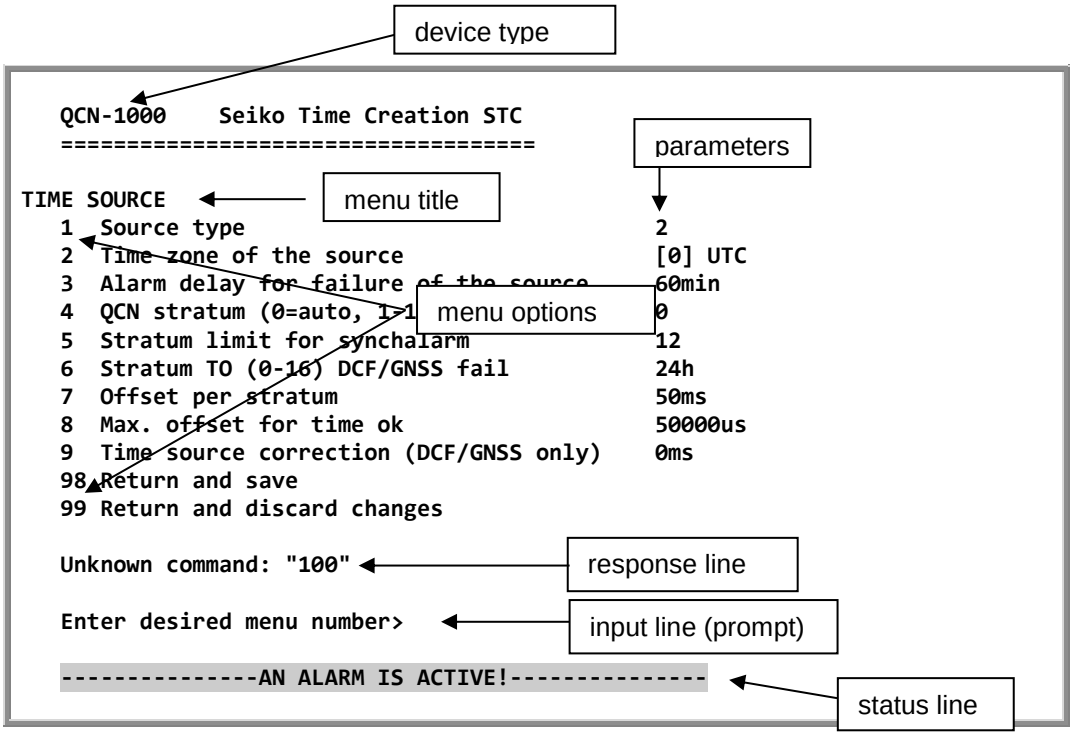
6.1.2 Telnet

Windows 7, 8, 10:	e.g. with Putty User: *adm* Standard password: *adm*
Linux:	Start console and enter "*telnet [IP-address]*

6.1.3 SSH

Windows 7, 8, 10:	e.g. with Putty User: *adm* Standard password: *adm*
Linux:	Start console and enter "*ssh adm@[IP-address]*" Password: **adm**

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 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.

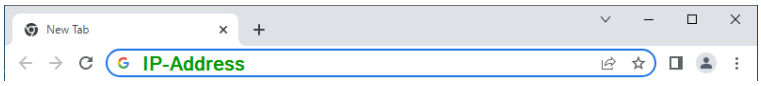
The numbers 98 and 99 are always used identically:

- With 98, the settings entered are saved and the menu exited. Depending on the change, the QCN-1000 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.

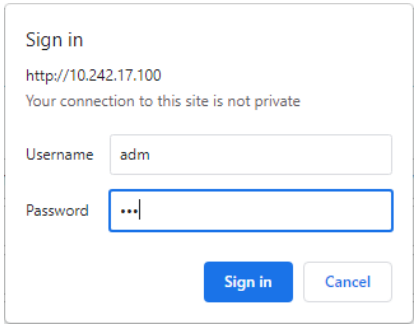
The current menu is updated, without any further entry, with Enter.

6.2 Web-Interface operation

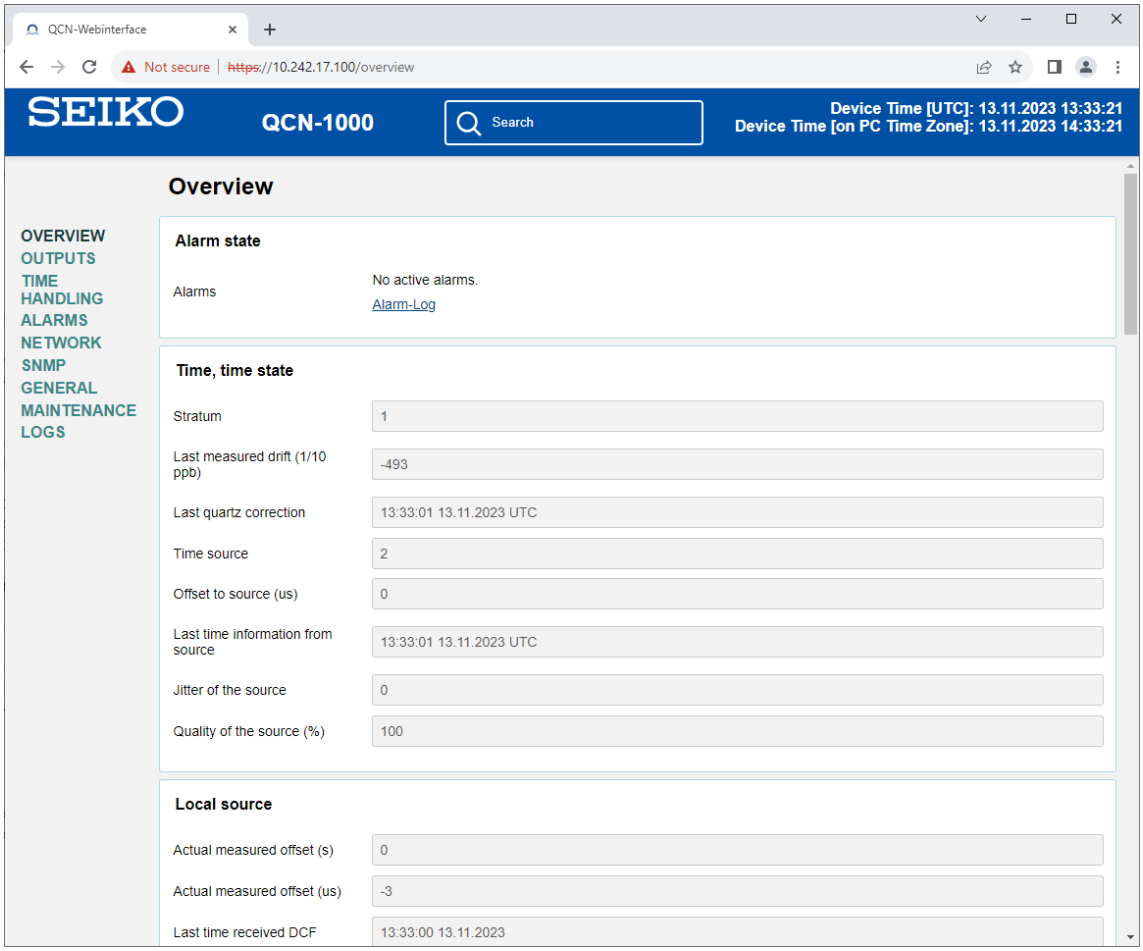
The Web interface of the QCN-1000 can be accessed by entering the IP-address of the device in address field.



Then a pop-up is shown where a login is needed.



Then the web interface of the QCN-1000 is shown. The changeable parameters can be edited directly in its field and the save by pressing the disc symbol on the top right corner of the parameter group.



6.3 Main menu

```
QCN-1000    Seiko Time Creation STC
===================================

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


99 Exit QCN menu

Enter desired menu number>
```

Menus:

Status	Display of various information regarding operation and environment See Chapter “6.4 Status menu“
Configuration	Configuration of the QCN-1000 See Chapter “6.5 Configuration menu“
Maintenance	Software update, backup and restore See Chapter “6.6 Maintenance menu“

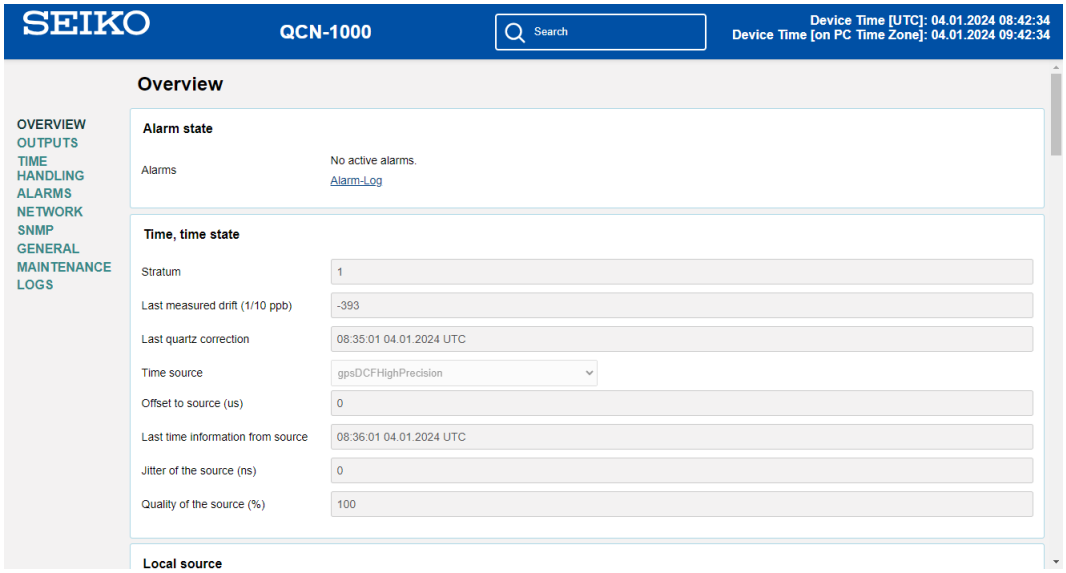
6.4 Status menu / Overview

The status menu consists of 2 pages.

Status menu page 1:

```
QCN-1000    Seiko Time Creation STC
===================================

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

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

Path: 1 Status



Web interface: Overview

The menu shows various information on the current operating status.

1. Requesting alarm status, display of all the QCN-1000 active errors.
   Display of the QCN-1000 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 QCN-1000 active alarms are displayed, masking (e-mail, traps, relay) only occurs later.
2. Alarm history display.
   Display of the QCN-1000 alarm record, newest alarm first. The ALARM RECORD menu pages can be scrolled through with Enter. The ALARM RECORD menu page can be exited with 99.
   Max. length of error report: 240 messages.
3. Current time and status display. See Chapter "6.4.1 Time information and status ".
4. Time source information display. See Chapter "6.4.2 Time source information ".

5. Power supply information display.
6. Current network configuration display. With Enter, a second page can be displayed with network information.
7. Internal system information display (internal status,..). This information is for support purposes only.
8. Product information's like serial number, firmware version etc.
9. All several software versions of the QCN-1000.

Status menu page 2:

```
QCN-1000    Seiko Time Creation STC
====================================

CLOCK STATE                          Page 2
11 NTP peer state (ntpq -np)
12 NTP state (ntpq -c rl)
13 State of the lines


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

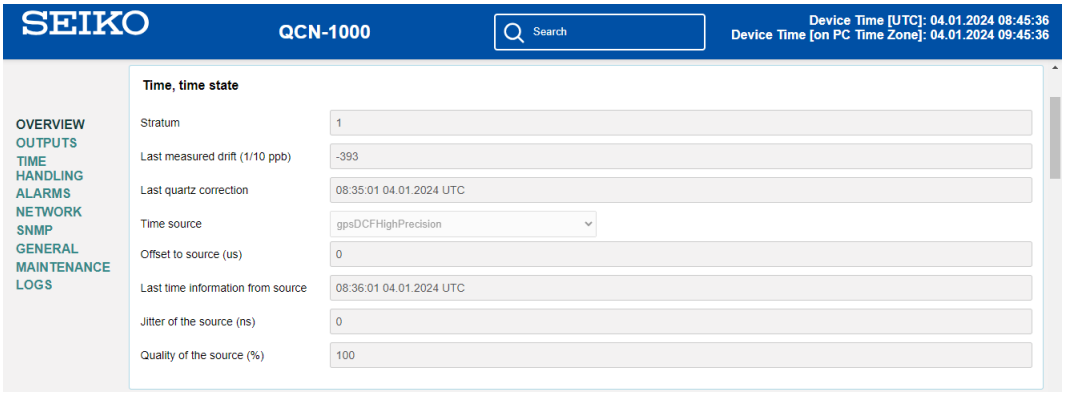
Path: 1 Status ➔ [Enter]

11. Display of information with regard to the sources for the NTP server.
12. Display of information with regard to the internal state of the NTP server.
13. Line information display (line time, status, line current).

6.4.1 Time information and status

```
QCN-1000    Seiko Time Creation STC
===================================

TIME INFORMATION AND STATUS
Internal time of the QCN (local time)        22:47:03 19.04.23
Stratum and state of QCN                     1  MASTER
Last measured drift                          -0.0238ppm
Last quartz correction                       13:42:01 19.04.23 UTC
Time source                                  GNSS (DCF)
Offset to source                             0us
Last time information from source            13:47:01 19.04.23 UTC
Jitter of the source                         1us
Quality of the source                        100%

99 Return


Enter desired menu number>
```

Path: 1 Status ➔ 3 Time, time state



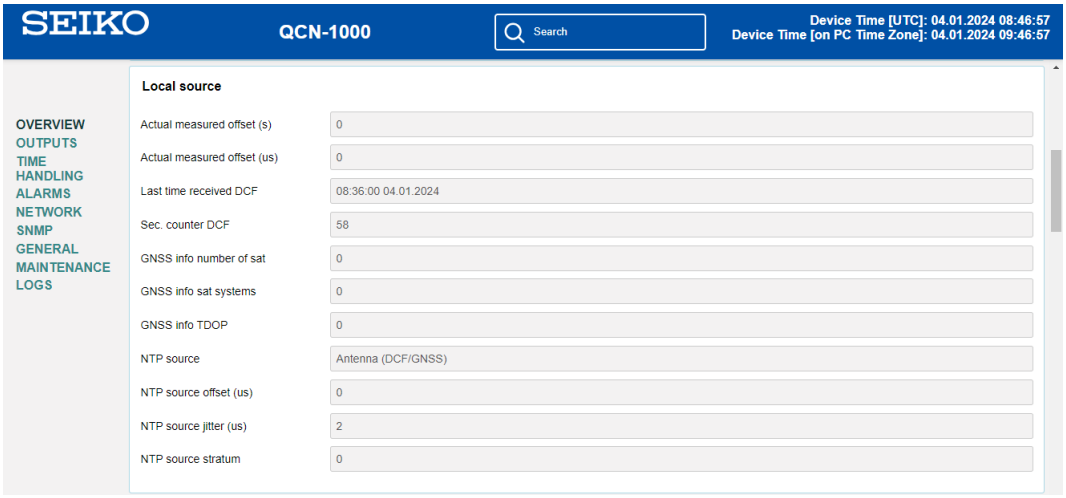
Web interface: Overview ➔ Time, time state

- Internal time of the QCN:	local time
- Stratum of QCN:	current stratum
- Last measured drift:	drift before the last quartz correction in ppm (frequency of NTP) only for support
- Last quartz correction:	time stamp of the last correction
- Time source:	current time source
- Offset to source:	offset to source (source – system time)
- Last time information from source	last received time stamp from the source
- Jitter of the source:	current jitter
- Quality of the source:	quality of the source

6.4.2 Time source information

```
QCN-1000    Seiko Time Creation STC
===================================

TIMESOURCE INFORMATION
Actual measured offset                      0us GNSS FPGA
Last time received DCF                      13:51:00 19.04.23
Sec. counter DCF, GNSS info                  4, none


NTP source                                  Antenna (DCF/GNSS)
NTP source offset                           0us
NTP source jitter                           2us
NTP source stratum                          0

99 Return

Enter desired menu number>
```

Path: 1 Status ➔4 Local Source



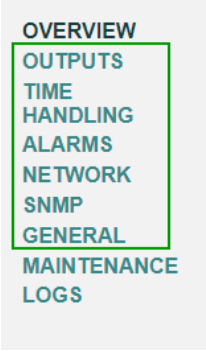
Web interface: Overview → local Source

- Currently measured offset: last measured offset
- Last time received DCF: last time received from DCF source
  In "()" information about number of available satellites (only with GNS 1000).
  With a DCF receiver this is a random value.
- Sec. counter DCF: the counter is incremented by 1 with each DCF pulse. For the minute marker, the counter is set to 0.
- Stratum of the source: stratum of the local time source can be defined with this value.
- NTP – Source: current time source (system-peer) of the NTP Server
  Antenna = DCF or GPS
- NTP source offset: current offset of the NTP Server
- NTP source jitter : jitter of the current source
- NTP source stratum: stratum of the current source

6.5 Configuration menu

```
QCN-1000    Seiko Time Creation STC
==================================

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


99 Return

Enter desired menu number>
```

Path: 2 Configuration



Web interface: directly select the sub menus

Configuration of the QCN-1000 via different sub-menus:

1. Configuration of the lines / outputs (Impulse line, DCF active code line, DCF out, RS485 line, serial telegrams, NTP slave clock lines, switch functionality) see chapter "6.5.1 Lines"
2. Configuration of the time source, time keeping, etc.
   See chapter "6.5.13 Time handling"
3. Alarm settings (alarm relais, e-mail, SNMP)
   See chapter "6.5.18 Alarms"
4. General settings for the QCN-1000 (language, time zone for alarms and display, password for menu...)
   See chapter "6.5.23 General settings"
5. Network settings
   See chapter "6.5.24 Network"
6. Services (switch network services such as FTP, Telnet, SSH on or off)
   See chapter "6.5.25 Services (Network services FTP, Telnet, SSH....)"
7. SNMP configuration for GET/PUT
   See chapter "6.5.26 SNMP" (Traps are described with in menu '2. Configuration' ➔ '3. Alarms' ➔ '3. Traps'. See also chapter 6.5.22 SNMP Traps)

6.5.1 Lines

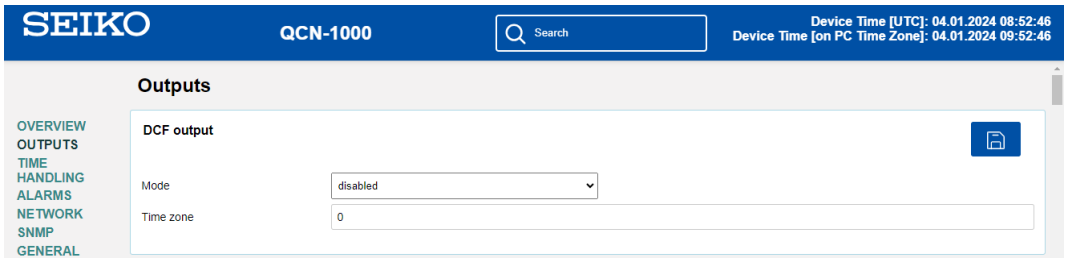
Under lines, the settings for the following 5 functions can be made:

• DCF main out	➔ see chapter “ DCF main Output
• DCF / Pulse / Frequency out 1…2	➔ see chapter “ DCF / Pulse Output“
• Serial Line 1…2	➔ see chapter “6.5.4 Serial Telegrams” ➔ see chapter “0 RS485 Clock Line”
• IRIG / AFNOR out	➔ see chapter “ IRIG / AFNOR out
• NTP slave clocks / time zone server	➔ see chapter “6.5.7 NTP Slave clocks / Time Zone Server“
• STSLine / Impulse line 1…4 / DCF active code line 1…4	➔ see chapter “6.5.2 STSLine“ ➔ see chapter “6.5.9 Impulse line“ ➔ see chapter “6.5.10 DCF active code line
• Switch functions	➔ see chapter “6.5.12 Switch Functions“

6.5.2 DCF main out

```
QCN-1000    Seiko Time Creation STC
===================================

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




98 Return and save
99 Return and discard changes

Enter desired menu number or press enter for next part>
```

Path: 2 Configuration ➔1 Outputs ➔1 DCF main out



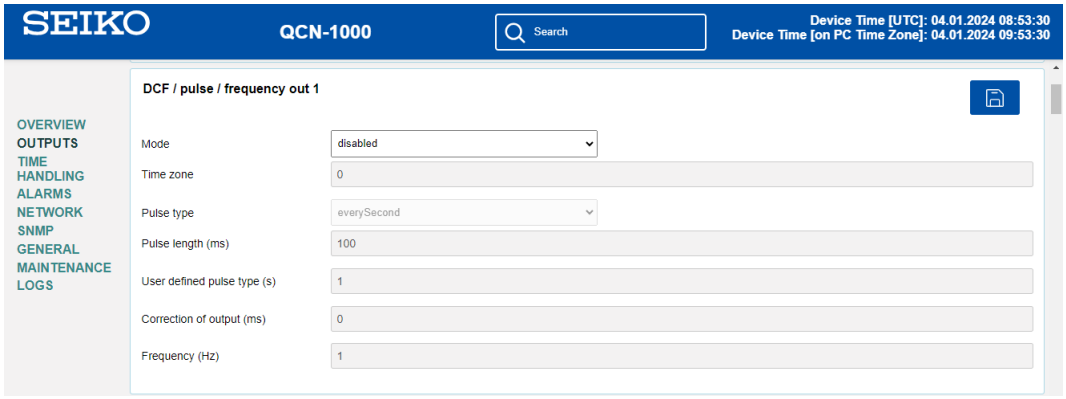
Web interface: Outputs ➔DCF output

1. Select line function: Line switched off or line DCF output.
2. Select time zone -> see chapter “6.5.29 Time zone selection“.

6.5.3 DCF / Pulse / frequency out 1 & 2

```
QCN-1000    Seiko Time Creation STC
===================================

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

98 Return and save
99 Return and discard changes

Enter desired menu number or press enter for next part>
```

Path: 2 Configuration ➔1 Outputs ➔2 DCF / pulse / frequency out 1



Web interface: Outputs ➔DCF / pulse / frequency out 1

1. Select line function: Line switched off, line DCF output, line pulse output.
2. Select time zone -> see chapter “6.5.29 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 25 sec.
   ➔ Pulse occurs: 00:00:00, 00:00:25, 00:00:50, 00:01:15, 00:01:40, 00:02:05 ...
   ... 00:59:35, 01:00:00, 01:00:25 ...
6. Output correction (-500ms...+500ms)
7. Frequency (1 Hz … 5 MHz)

Important: Only frequencies which fulfill the following requirements are to be used, otherwise, phase shifts occur:

20'000'000 / frequency = whole number value

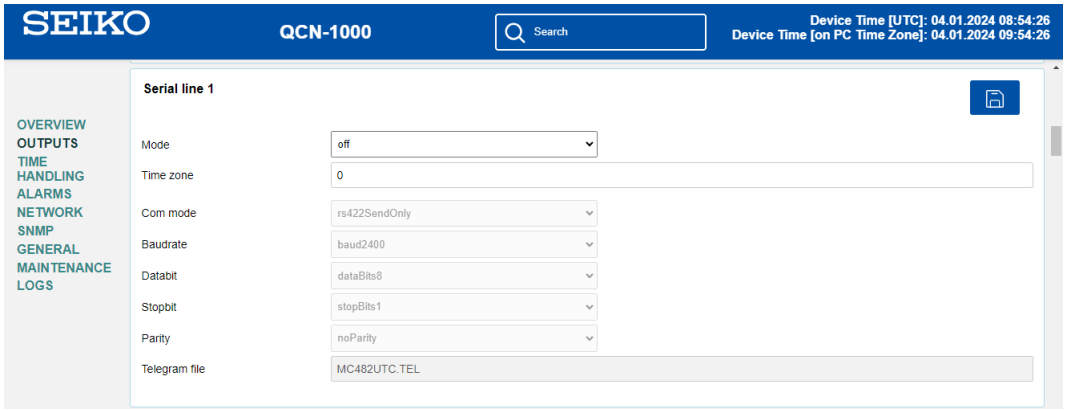
Important: Frequencies above 2 MHz are not sent out as a square-wave signal anymore.

6.5.4 Serial line 1

Serial telegram output via RS232 and RS 422

```
QCN-1000    Seiko Time Creation STC
====================================

SERIAL OUTPUT 1
1  Mode (0=off, 1=telegr 2=JSTout))                    0
2  Time zone
3  Com Mode
4  Baudrate
5  Databit
6  Stopbit
7  Parity
8  Telegram file

98 Return and save
99 Return and discard changes


Enter desired menu number>
```

Path: 2 Configuration ➔1 Outputs➔ 4 Serial line 1



Web interface: Outputs ➔ Serial line 1

1. Select mode: 0 = Line switched off, 1 = serial telegrams※1, 2 = JST out※2

   ※1 Telegram output is not supported.

   ※2 If you set Source type in "6.5.14 Time Source" to 4=serial, the serial output may be distorted.
2. Select time zone (see chapter “6.5.29 Time zone selection“)
3. Com mode:
   1 = out
   2 = in 232
   3 = in 485
   4 = 422 send
4. Baudrate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400
5. Data bit: 7 or 8
6. Stop bit: 1 or 2
7. Parity:
8. Selecting telegram file changes to the menu “SELECTION OF FILE“

The description of the telegram function and the telegram file can be found in Appendix “F”

Important: To set the parameters, the line type has to be selected first!

Notice: No flow control available.

Selection of the telegram file:

```
   QCN-1000    Seiko Time Creation STC
   ===================================

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

Enter requested file number, 99 = no file

   Press enter for next part, ESC to leave>


   Enter desired menu number>
```

Path: 2 Configuration➔ 1 Outputs ➔ 4 Serial line 1 ➔8 Telegram file

Web interface: Outputs ➔ Serial line 1 ➔ enter the telegram file name

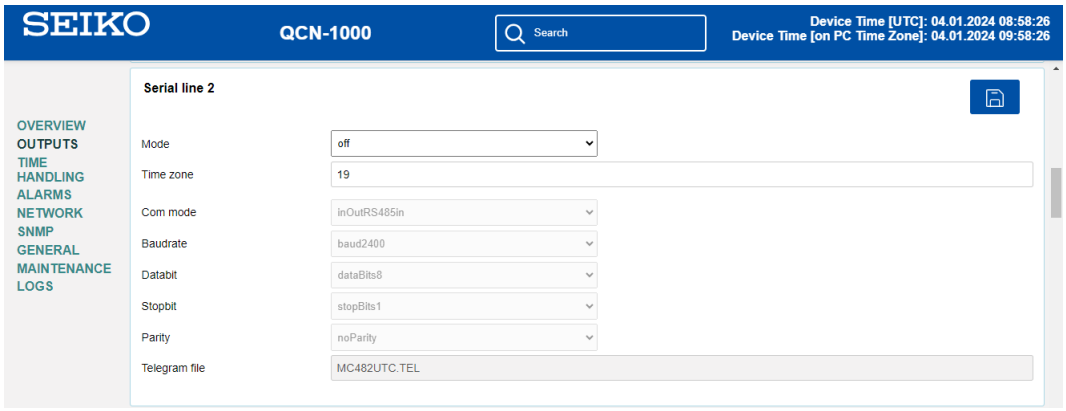
The copy procedure of telegram files is explained in chapter "7.11 Copying telegram or program files to QCN-1000 masterclock".

6.5.5 Serial line 2

Serial telegram output via RS232 and RS 422

```
QCN-1000    Seiko Time Creation STC
===================================

SERIAL OUTPUT 2
1  Mode (0=off, 1=telegr, 2=JSTout, 3=JSTin)          0
2  Time zone
3  Com Mode
4  Baudrate
5  Databit
6  Stopbit
7  Parity
8  Telegram file

98 Return and save
99 Return and discard changes


Enter desired menu number>
```

Path: 2 Configuration ➔1 Outputs➔ 5 Serial line 2



Web interface: Outputs ➔ Serial line 2

1. Select mode: 0 = Line switched off, 1 = serial telegrams※1, 2 = JST out※2, 3 = JST in

   ※1 Telegram output is not supported

   ※2 If you set Source type in "6.5.14 Time Source" to 4=serial, the serial output may be distorted.

2. Select time zone (see chapter “6.5.29 Time zone selection“)
3. Com mode:
   1 = out
   2 = in 232
   3 = in 485
   4 = 422 send
4. Baudrate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400
5. Data bit: 7 or 8
6. Stop bit: 1 or 2

7. Parity:
8. Selecting telegram file changes to the menu “SELECTION OF FILE“

The description of the telegram function and the telegram file can be found in Appendix “F Serial Telegrams (Not supported)”.

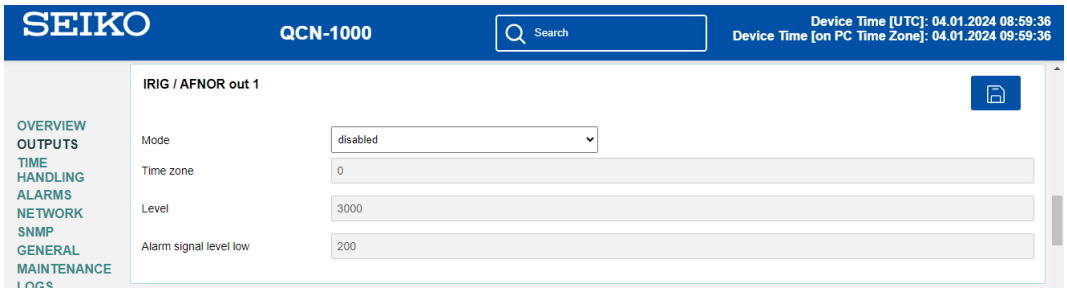
Important: To set the parameters, the line type has to be selected first!

Notice: No flow control available.

6.5.6 IRIG-B / AFNOR out

```
QCN-1000    Seiko Time Creation STC
===================================

IRIG / AFNOR OUTPUT 1
1  Mode                                    off
2  Time zone                               [0] UTC
3  Level (~Upp @ Ri=Rl=50Ohm)              3000mV
4  Alarm signal level low (~Ueff)          200mV

98 Return and save
99 Return and discard changes

Enter desired menu number or press enter for next part>
```

Path: 2 Configuration ➔1 Outputs ➔6 IRIG / AFNOR out 1



Web interface: Outputs ➔IRIG / AFNOR out 1

1. Select mode: see picture below.
2. Select time zone (see chapter “6.5.29 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.

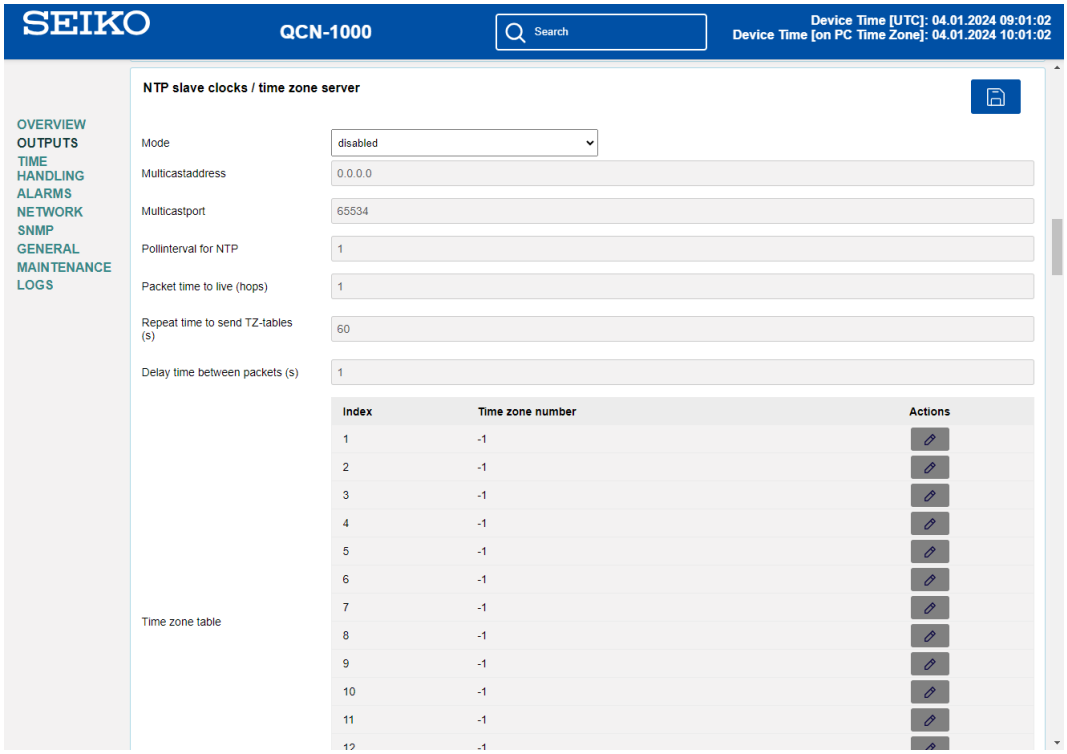
```
QCN-1000    Seiko Time Creation STC
===================================

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>
```

6.5.7 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.

```
QCN-1000    Seiko Time Creation STC
===================================

NTP SLAVE CLOCKS AND TIME ZONE SERVER
1  Mode(0=off 1=NTP 2=NTP+TZ 3=TZ 4=TZ req.) 0
2  Multicastaddress                          239.192.54.14
3  Multicastport                             65534
4  Pollinterval for NTP                      0
5  Packet time to live                       1 hops
6  Repeat time to send TZ-tables             60sec
7  Delay time between packets                60sec
8  Configure time zone table


98 Return and save
99 Return and discard changes

Enter desired menu number or press enter for next part>
```

Path: 2 Configuration➔ 1 Outputs ➔ 8 NTP slave clocks / time zone server



Web interface: Outputs ➔NTP slave clocks / time zone server

1. Mode of clock line: 0 = off, 1 = Send NTP multicast, 2 = Send NTP Multicast and time zone table, 3 = Send time zone table, 4 = Time zones on request, 5 (only for maintenance) = Send an empty time zone table and return to previous mode.
2. Multicast adress for NTP and time zone server: **239.192.54.x**
   Group address: x = 1..15 for Seiko devices.

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: 2^2 = 4 sec., poll-value = 5 ➔ interval: 2^5 = 32 sec. For redundant Multicast time servers see remark next page.
5. Packet time to Live (TTL) for NTP- and time-zone-Multicast-packets in hops. (Number of Routers in a network to transfer the packets through; for simple network without routing, enter value "1", for 1 Router enter "2").
6. Repeat time to send time zone table: 10 – 86400 sec.
7. Delay time between the sending of the individual time zone entries (one entry per Multicast packet) of the table: 1 – 60 sec.
8. Configuration of individual time zone entries. Displays menu “TIME ZONE TABLE“.

Important: Changes of multicast-address, poll interval and TLL lead to a **restart** of the NTP server!

Important: For the operation of a **Multicast** communication (NTP and Time Zone Server) **the configuration of a gateway is required** (see chapter 6.5.24 Network). The gateway can be set manually or by using DHCP.
If no gateway is available, the own IP can be set as gateway.

Important: **Redundant NTP Multicast time server:**
If in the same network two NTP servers should send NTP with the same Multicast IP address (redundancy), then the first time server has to be configured with a small **pollinterval** (e.g. 2 ➔ 4 sec.) and the second time server with a large poll interval (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 QCN-1000 masterclock with the more frequently NTP send rate gets higher priority for time reception).

Time zone table for the NTP slave clock line:

```
QCN-1000    Seiko Time Creation STC
==================================

TIME ZONE - TABLE
Zone01: 2 [+1] Brussel             Zone02: -2 [+1] Brussel
Zone03: 0 [0] UTC                  Zone04: -5 [+2] Cairo
Zone05: 3 [+1] Athens              Zone06: -3 [+2] Athens
Zone07: -1 Not configured          Zone08: -1 Not configured
Zone09: -1 Not configured          Zone10: -1 Not configured
Zone11: -1 Not configured          Zone12: -1 Not configured
Zone13: -1 Not configured          Zone14: -1 Not configured
Zone15: -1 Not configured

Enter requested entry

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

Path: 2 Configuration ➔1 Outputs ➔ 8 NTP slave clocks / time zone server ➔ 8 Configure time zone table

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

Choose a zone number to change selected zone.

Time zone selection (see chapter “6.5.29 Time zone selection“).

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

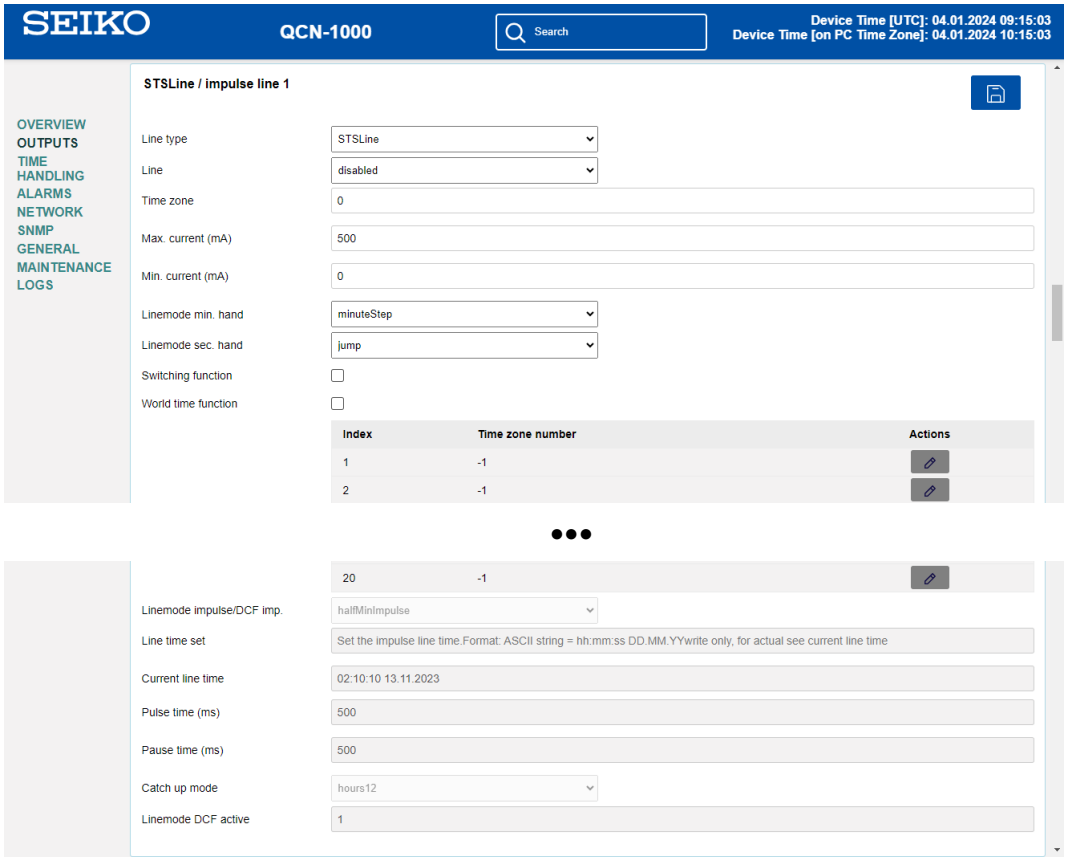
6.5.8 STSLine / Impulse line 1 (STSLine functionality is not available)

STSLine clock line with switch function for clock illumination, switch program and world time function. Display of line 1 to 4.

STSLine configuration page 1:

```
QCN-1000    Seiko Time Creation STC
===================================

STSLine                                          1      Page 1
1  Line type                                     STL
2  Line                                          off
3  Linemode (min)                                min
4  Linemode (sec)                                jump
5  Time zone                                     [0] UTC
6  Max. current                                  500mA
7  Min. current                                  0mA


98 Return and save
99 Return and discard changes

Enter desired menu number or press enter for next part>
```

Path: 2 Configuration➔ 1 Outputs➔ 11 STSLine / impulse line 1



Web interface: Outputs ➔ STSLine / Impulse line in STSLine mode

1. Select line type: 0 = STSLine, 1 = Impulse line, 2 = DCF active code line, 3 = DCF impulse line
2. Select line function: Line switched off, line switched on, let clocks run to 12:00.

3. Select STSLine minute mode: Minute steps, 30 second steps or cont. (10 sec. steps)
4. Select STSLine second mode: 0 = jump, 1 = continuous, 2 = continuous with stop, 3 = wobbling with stop
5. Select time zone (see chapter “6.5.29 Time zone selection“).
6. Select maximum current (0-500mA) on the line. The line will be switched off for as long as the overcurrent is connected.
7. Select minimum current (0-500mA) on the line. If the minimum current is underrun, the alarm 39 "Line x current too low" is activated.

STSLine configuration page 2:

```
QCN-1000    Seiko Time Creation STC
===================================

IMPULSE CLOCK LINE                          1      Page 2
9  Pulse time                               500ms
10 Pause time                               500ms
11 Catch up mode (0=12h, 1=24h, 2=week)     0

98 Return and save
99 Return and discard changes

Enter desired menu number or press enter for next part>
```

Path: 2 Configuration➔ 1 Outputs➔ 11 STSLine / impulse line 1 ➔ [Enter]

8. Switching function on or off
9. World time function on or off
10. Configure time zone table for world time

Important: Changes can only be undertaken when the clock line is switched off!

Time zone table for the world time function:

```
QCN-1000    Seiko Time Creation STC
===================================

TIME ZONE - TABLE
Zone01: -1 Not configured          Zone02: -2 [+1] Brussel
Zone03: -1 Not configured          Zone04: -8 [+3] Kuwait
Zone05: -1 Not configured          Zone06: -19 [+9] Tokyo
Zone07: -1 Not configured          Zone08: -1 Not configured
Zone09: -1 Not configured          Zone10: -1 Not configured
Zone11: -1 Not configured          Zone12: -1 Not configured
Zone13: -1 Not configured          Zone14: -1 Not configured
Zone15: -1 Not configured          Zone16: -1 Not configured
Zone17: -1 Not configured          Zone18: -1 Not configured
Zone19: -1 Not configured          Zone20: -1 Not configured


Enter requested entry

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

Path: 2 Configuration ➔1 Outputs ➔11 STSLine / impulse line 1 ➔10 Configure Time zone table

Display of all time zone entries (20) of the world time function for STSLine.

By entering a zone number, the particular entry can be changed.

Select time zone (see chapter “6.5.29 Time zone selection“).

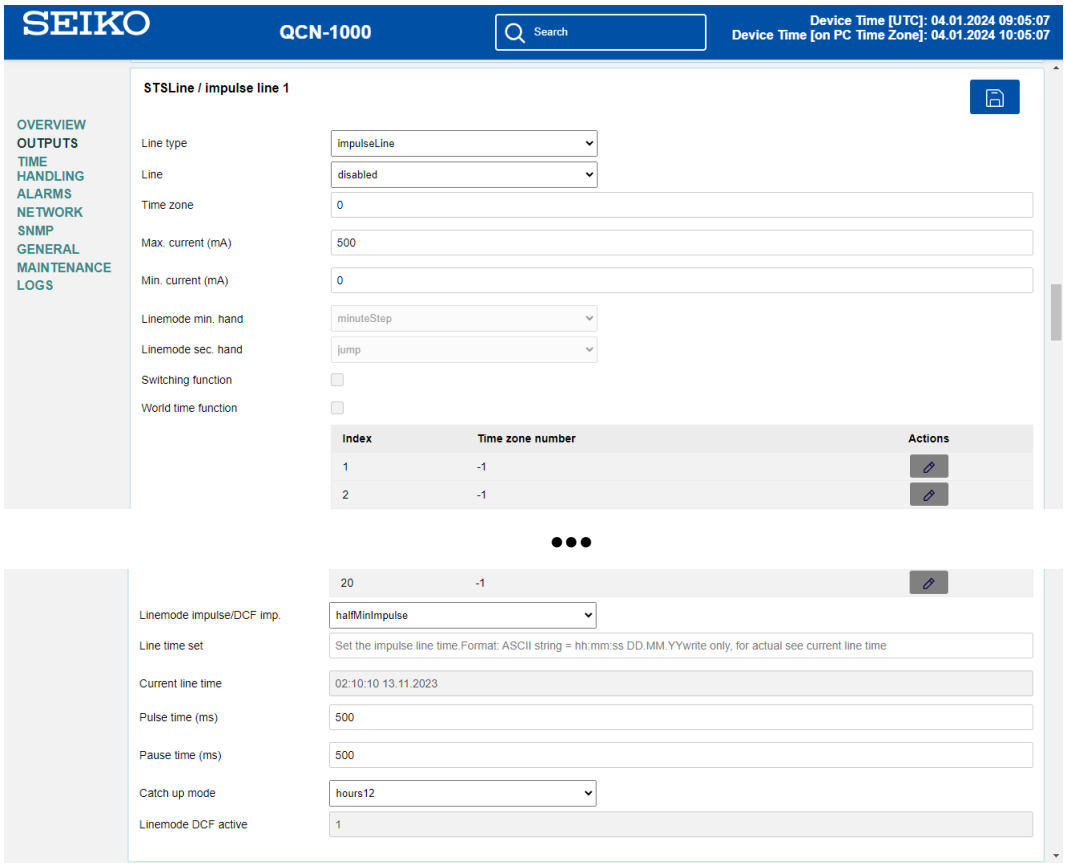
Exit the page with 99. The changes are first saved on the overlying menu page or reset.

6.5.9 Impulse line

Impulse clock line with display of the line number page 1:

```
QCN-1000    Seiko Time Creation STC
===================================

IMPULSE CLOCK LINE                          1      Page 1
1  Line type                                Imp.
2  Line                                     off
3  Linemode                                 1min

5  Time zone                                [+9] Tokyo
6  Max. current                             0mA
7  Min. current                             0mA
8  Line time                                00:00:00 01.01.70

98 Return and save
99 Return and discard changes

Enter desired menu number or press enter for next part>
```

Path: 2 Configuration ➔1 Outputs ➔11 STSLine / impulse line 1



Web interface: Outputs ➔ STSLine / Impulse line in Impulse mode

1. Select line type: 0 = STSLine, 1 = Impulse line, 2 = DCF active code line, 3 = DCF impulse line
2. Select line function: Line switched off, line switched on

3. Select line mode: Minute steps, 1/2 minute steps, 1/5 minute steps, 1/8 minute steps, second steps.
5. Select time zone (see chapter “6.5.29 Time zone selection“).
6. Select maximum current (0-500mA) on the line. The line will be switched off as long as the overcurrent is connected.
7. Select minimum current (0-500mA) on the line. If the minimum current is underrun, the alarm 39 current low is activated.
8. Line time with the format: “hh:mm:ss YY.MM.DD“.

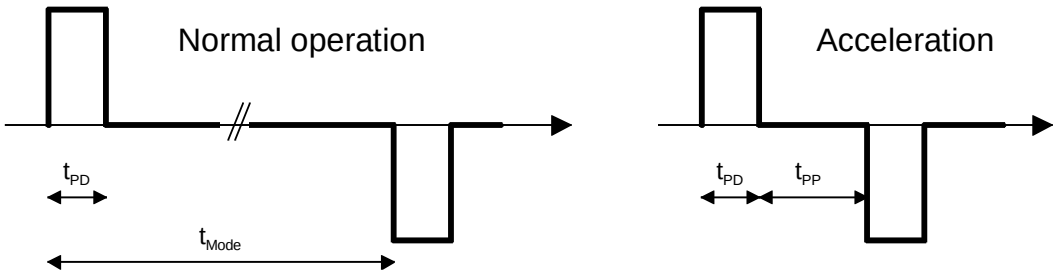
Impulse line configuration page 2:

```
QCN-1000    Seiko Time Creation STC
===================================

IMPULSE CLOCK LINE                          1      Page 2
9  Pulse time                               300ms
10 Pause time                               200ms
11 Catch up mode (0=12h, 1=24h, 2=week)     0

Enter desired menu number or press enter for next part>
```

Path: 2 Configuration➔ 1 Outputs➔ 11 STSline / impulse line 1 ➔ [Enter]

9. Pulse time (200-30000ms, resolution approx. 50ms).
10. Pause time in catch-up (200-30000ms, resolution approx. 50ms).
11. Catch-up mode: 12 hrs, 24 hrs, 1 week

Important: Changes can only be undertaken when the clock line is switched off!



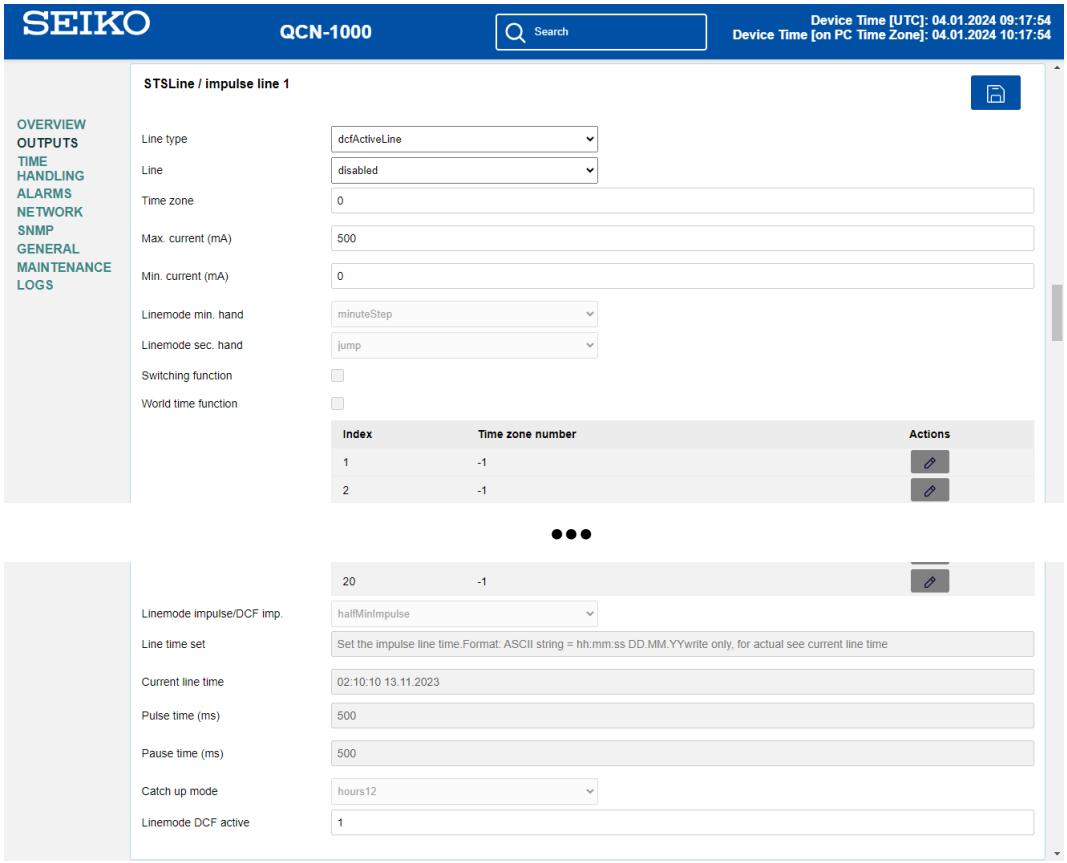
t_{PD}: Pulse time
t_{PP}: Pause time
t_{Mode}: Impulse interval is determined by the line mode (e.g. min = 1 minute)

6.5.10 DCF active code line

DCF active code line with display of the line number:

```
QCN-1000    Seiko Time Creation STC
===================================

DCF ACTIVE CLOCK LINE                          1
1  Line type                                   DCF
2  Line                                        off
3  Linemode                                    0
4  Time zone                                   [+1] Brussel
5  Max. current                                500mA
6  Min. current                                0mA


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔1 Outputs➔ 11 STSline / impulse line 1



Web interface: Outputs ➔ STSLine / Impulse line in DCF active mode

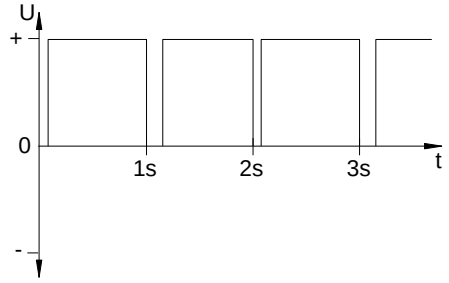
1. Select line type: 0 = STSLine, 1 = Impulse line, 2 = DCF active code line, 3 = DCF impulse line
2. Select line function: Line switched off, line switched on
3. Select line mode: See the diagrams on the next page
4. Select time zone (see chapter “6.5.29 Time zone selection“).

5. Select maximum current (0-1000mA) on the line. The line will be switched off as long as the overcurrent is connected and restarted only on the next minute.
6. Select minimum current (0-1000mA) on the line. If the minimum current is underrun, the alarm 39 current low is activated.

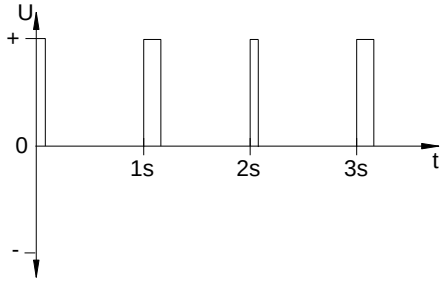
Important: Changes can only be undertaken when the clock line is switched off!

The six different DCF active code modes:

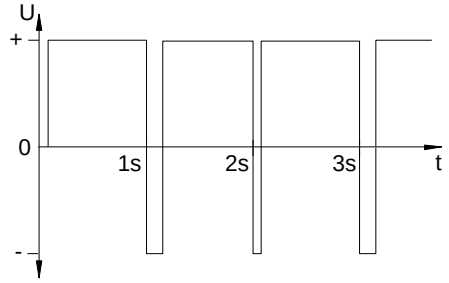
Mode 1



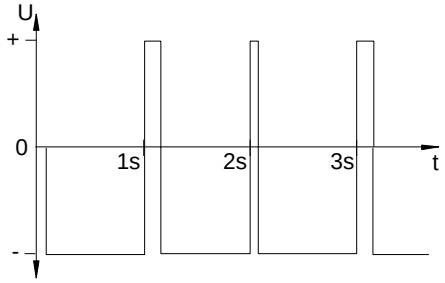
Mode 2



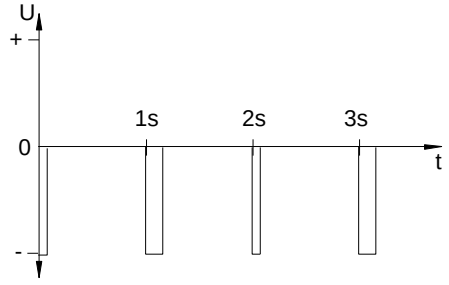
Mode 3



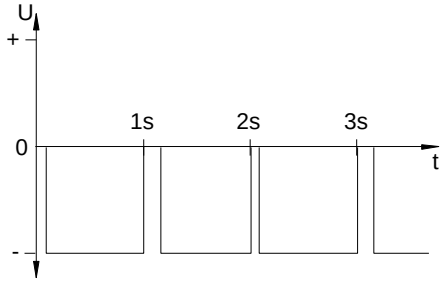
Mode 4



Mode 5:



Mode 6



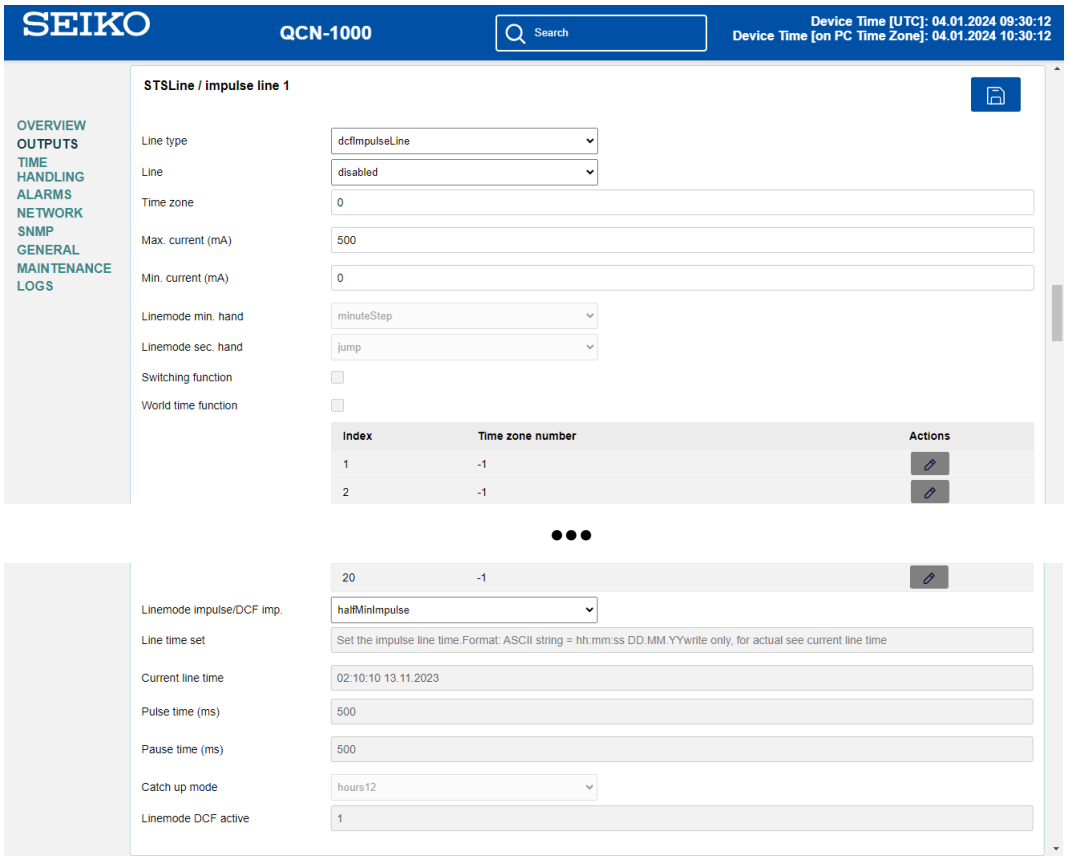
Mode 1/6, 2/5, 3/4 are equal. Their polarity only depends on how the line is connected to the QCN-1000 masterclock. The signal forms show the voltage measured from terminal a to terminal b.

6.5.11 Combined DCF-Impulse line

Combined DCF-Impulse line with display of the line number:

```
QCN-1000    Seiko Time Creation STC
===================================

DCF-IMPULSE CLOCK LINE                          1
1  Line type                                    DCF-Imp
2  Line                                         off
3  Linemode                                     1/2min
4  Time zone                                    [0] UTC
5  Max. current                                 500mA
6  Min. current                                 0mA
7  Line time                                    02:10:10 13.11.2023
98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔1 Outputs➔ 1 STSline / impulse line 1



Web interface: Outputs ➔ STSLine / Impulse line in DCF Impulse mode

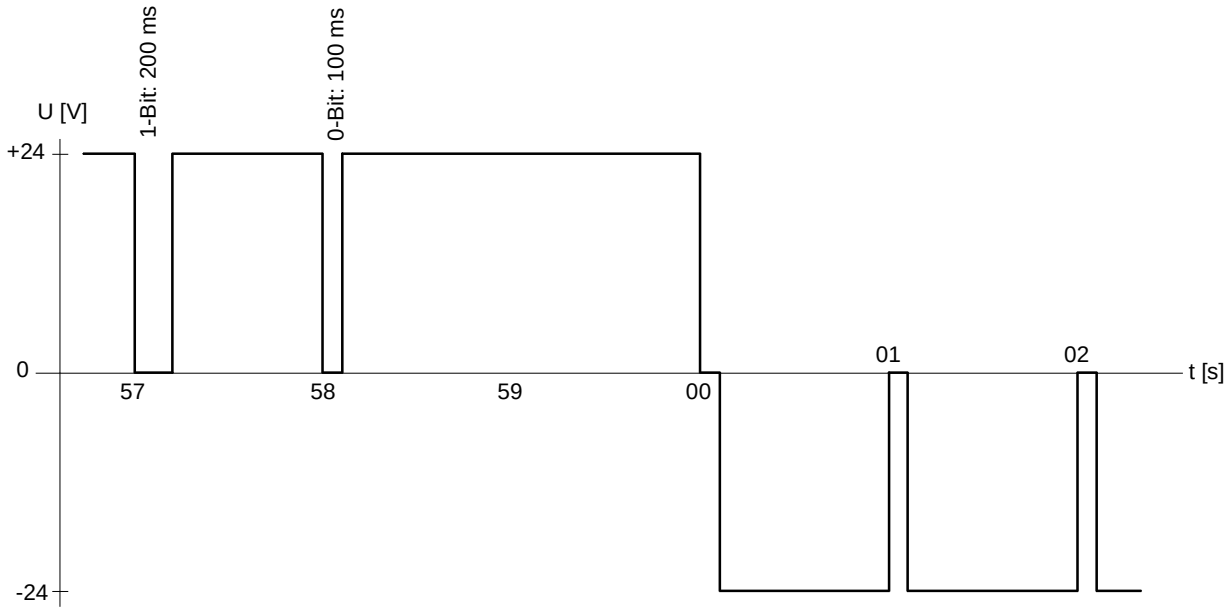
1. Select line type: 0 = STSLine, 1 = Impulse line, 2 = DCF active code line, 3 = DCF impulse line
2. Select line function: Line switched off, line switched on
3. Select line mode: Minute steps, 1/2 minute steps
4. Select time zone (see chapter “6.5.29 Time zone selection“).

5. Select maximum current (0-500mA) on the line. The line will be switched off as long as the overcurrent is connected and restarted only on the next minute.
6. Select minimum current (0-500mA) on the line. If the minimum current is underrun, the alarm 39 current low is activated.
7. Line time with the format: “hh:mm:ss YY.MM.DD“.

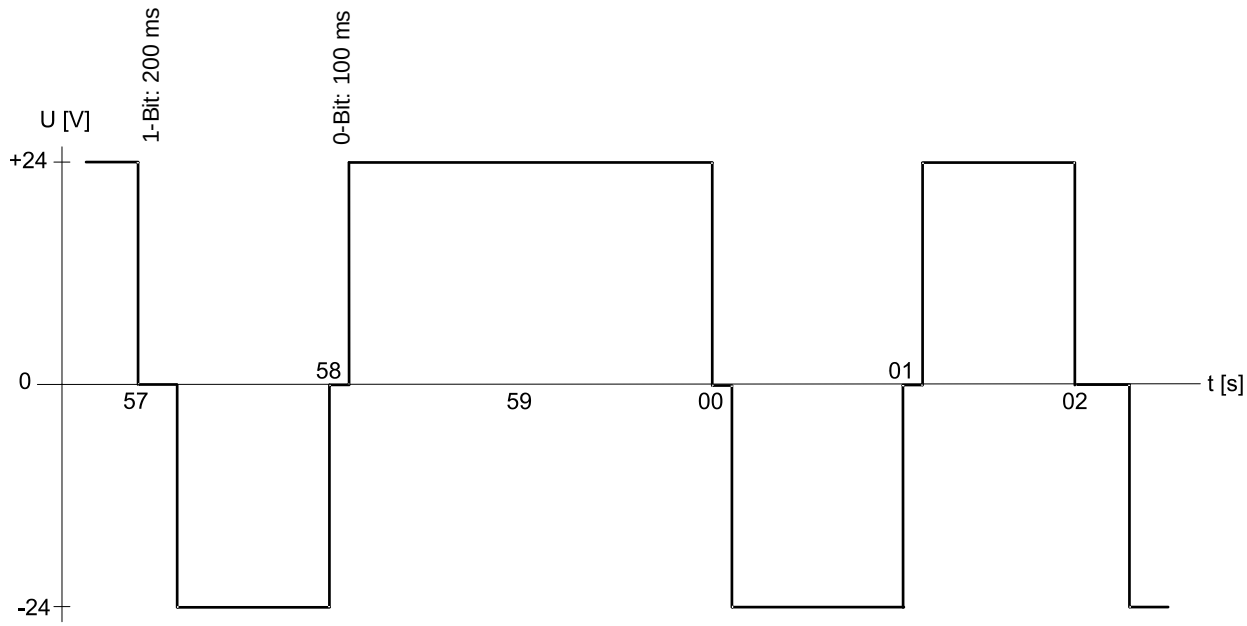
Important: Changes can only be undertaken when the clock line is switched off!

With the line type "DCF-Imp" it is possible to drive minute or 1/2 -minute impulse clocks and self-setting Active – DCF clocks on the same line. The following line modes are possible:

Line in normal operation: DCF time code output 24V, every minute / 1/2 -minute the polarity is changing.



Line in catch-up mode: DCF time code output 24V, every sec. the polarity is changing except at the minute change.



The following settings of the impulse line are fixed and cannot be modified:

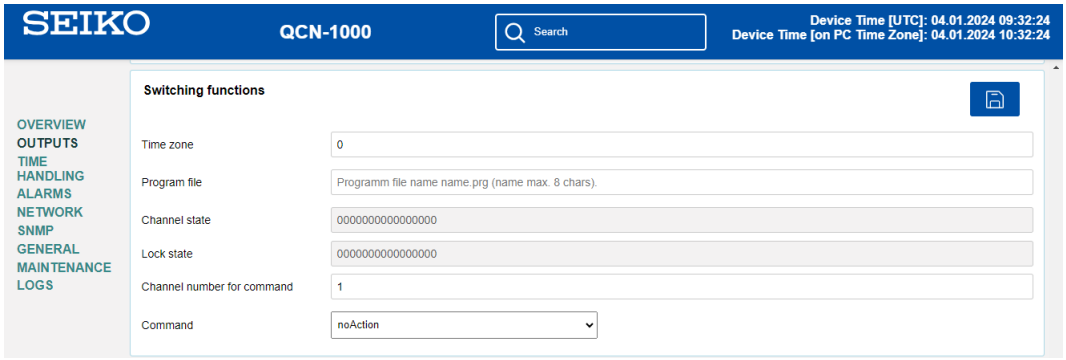
Pulse duration:	1.8 or 1.9 s
Pulse pause:	0.2 or 0.1 s
Catch-up periodicity:	12 hours

6.5.12 Switch function / Switch program (This feature is not available)

This feature is not available

```
QCN-1000    Seiko Time Creation STC
===================================

SWITCH FUNCTIONS
1  Time zone                                    [0] UTC
2  Program file
3  Switch function twilight
4  Actual channel conditions / manual control




98 Return and save
99 Return and discard changes


Enter desired menu number>
```

Path: 2 Configuration ➔ 1 Outputs ➔ [Enter] ➔ 15 Switching Functions



Web interface: Outputs ➔ Switching functions

6.5.13 Time handling

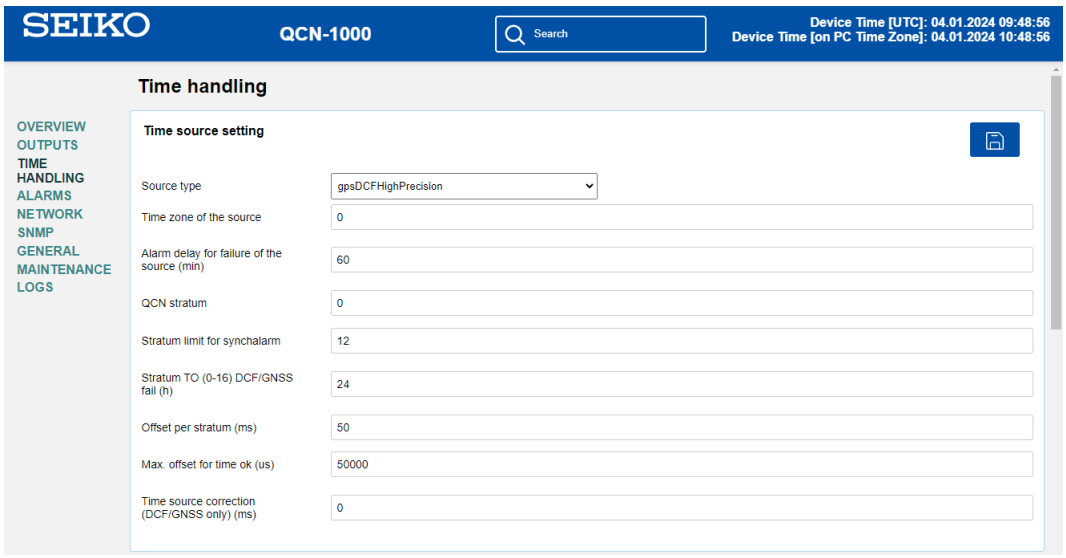
In the menu '2 Configuration ➔ 2 Time handling', settings can be made for the following functions:

- Time source setting ➔ see chapter “6.5.14 Time Source“
- Time adjustment setting ➔ see chapter “6.5.15 Time Adjustment“
- NTP Server ➔ See Chapter 6.5.16
- Manual time adjustment / leap second➔ See Chapter 6.5.17

6.5.14 Time source

```
QCN-1000    Seiko Time Creation STC
===================================

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



Enter desired menu number>
```

Path: 2 Configuration➔ 2 Time handling➔ 1 Time source setting



Web interface: Time handling ➔ Time source setting

1. Type of time source: 0=none, 1=DCF (low precision)
   2=GNSS-DCF
   3=NTP, 4=serial
2. Time zone of the source: see chapter 6.5.29 Time zone selection

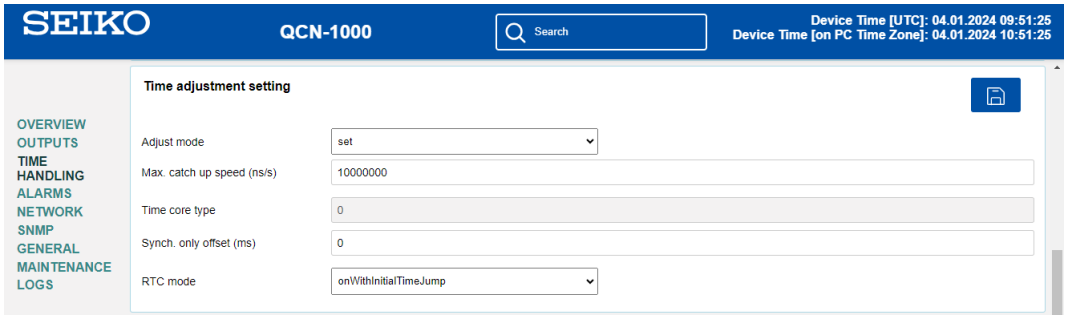
3. Alarm delay at failure of time source (minutes):
   0 = off, 1-2'160min, default = 60 min
   Error: “Time source fail TO”
4. QCN stratum: 0=Stratum is automatically calculated according to the time source (see chapter 8).
   1-15=Stratum is set on a fix value
5. Stratum limits for synch alarm: Limits for alarm “Time source fail stratum“ (1-16)
6. Stratum TO (Timeout) 1-16 DCF/GPS fail:
   Duration of stratum change 1 to 16 in the case of time loss (1-999h),
   e.g. 24 hrs ➔ stratum counts up from 1 to 16 within 24 hrs.
   Default value: 12h
7. Offset per Stratum in ms (0-40’000ms). Stratum is calculated with this value when time is received again:
   Offset/Stratum = 30ms, offset of the time source 150ms ➔ Stratum = 5
8. Max. offset in µs compared with time source to set device time valid at start up. (0-1’000’000µs)
9. Time source correction (only for GNSS-DCF), +/-60'000ms.

For description of time source see chapter “8 Time administration“.

6.5.15 Time adjustment

```
QCN-1000    Seiko Time Creation STC
===================================

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>
```

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



Web interface: Time handling ➔ Time adjustment setting

1. Adjust mode: 0=time is slowly adjusted (accord. to "Max. catch-up speed") (without time steps)
   1=time is set immediately
2. Maximum catch up speed in ns/s (0-10'000’000).
3. Quartz type: Standard=0 (0-255)
4. Synch. only offset: 0=off
   100-5000ms=Limits as from which time is no longer accepted
   ➔ Alarm “Syn only diff too big“
5. RTC mode 0=RTC deactivated
   1=ON, with initial time set, independent of the mode (1)
   2=ON

Notice: **Explanation to the RTC mode:**
RTC mode 0:
After startup of the device the system time starts at 00:00. First of all, the device has to receive the time from its time source. The time adjust happens according to the
"1 Adjust mode".
RTC mode 1:

The internal real time clock (RTC) is activated. After startup of the device the system time is set with the RTC time.
The first takeover of the time from the time source happens in one step, independent from the Adjust mode (1) setting.

RTC mode 2:

The internal real time clock (RTC) is activated. After startup of the device the system time is set with the RTC time.
The time takeover from the time source happens according to the Adjust mode (1).

➔ Adjust mode = 0: time is slowly adjusted
Adjust mode = 1: time is set immediately

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

For description of time source see chapter “8 Time administration“.

6.5.16 NTP server

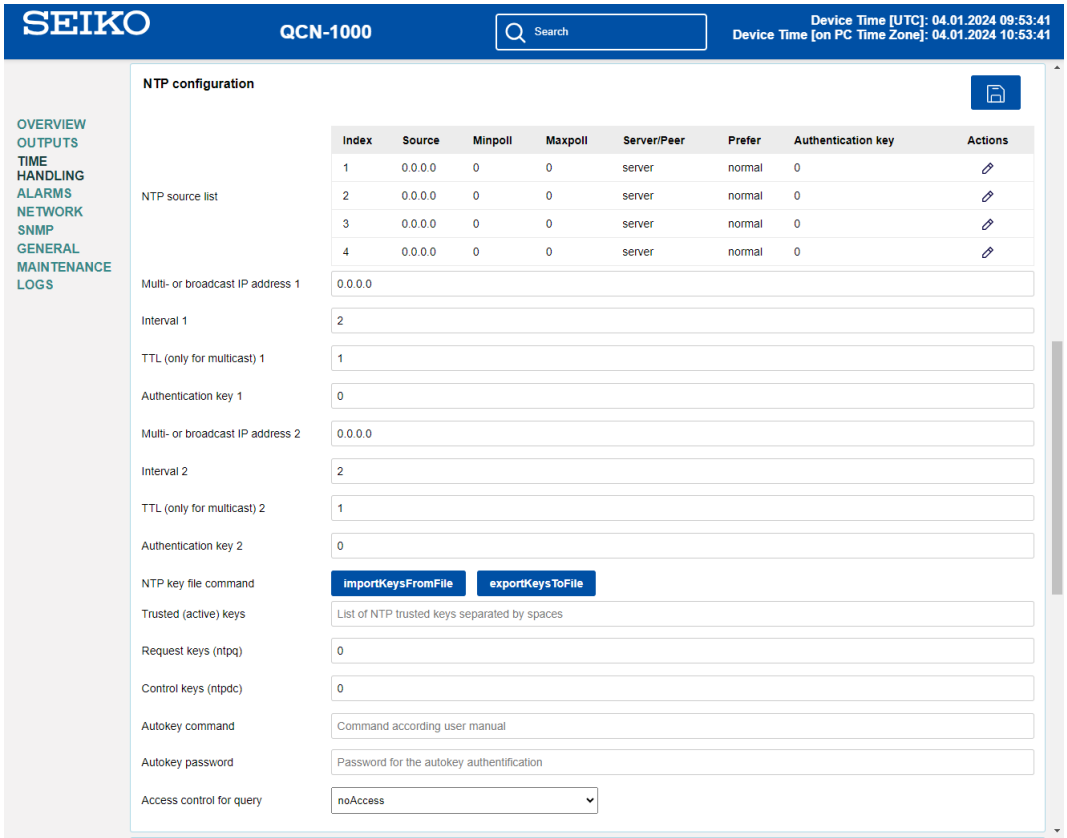
NTP can run as server or combined as server/client.
To run NTP as source (NTP as client), in the menu ’2 Configuration’ ➔ '2 Time handling' ➔ ’3 NTP Server / NTP Sources’ at least one server has to be set.

The exact behaviour of NTP time sources is described in chapter “8.2 Overview of NTP“.

Further 2 multicast or broadcast addresses can be configured:

```
QCN-1000    Seiko Time Creation STC
===================================

NTP SERVER CONFIGURATION
1  Configuration timeserver address 1          10.241.0.65
2  Configuration timeserver address 2          ntp.test.org
3  Configuration timeserver address 3
4  Configuration timeserver address 4
5  Configuration multi-/broadcast address 1    10.240.255.255
6  Configuration multi-/broadcast address 2
7  NTP Authentication
   NTP slave clock line (info only)            239.192.54.14


99 Return

Enter desired menu number>
```

Path: 2 Configuration➔ 2 Time handling ➔4 NTP server



Web interface: Time handling ➔ NTP configuration

1.-4. Summary about configured NTP – time sources. Select to configure and display changes to the menu "ENTRY TIMESOURCE".

5.-6. Summary about configured NTP – broadcast addresses. Select to configure and display changes to the menu “NTP MULTI- / BROADCAST-ENTRY“.

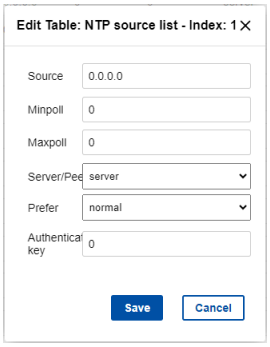
7. NTP Authentication: Changes to the menu “NTP AUTHENTICATION“

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

Configuration of the individual server/peer address:

```
QCN-1000    Seiko Time Creation STC
===================================

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


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔2 Time handling➔ 3 NTP server/NTP sources ➔ 1..4 Configuration timeserver address



Web interface: Time handling ➔ Time source setting ➔ pop-up window to configure the NTP server

1. Insert time sources (IP-address or Name e.g. “ntp.metas.ch”
   Enter without entry of an address will delete value.

2.-3.**Minpoll** and **Maxpoll**: Inquiry interval 2^**poll value** in seconds.
   0 = automatically
   e.g. poll value=2 ➔ interval 2: 2^2 = 4sec., poll value=5 ➔ interval 5: 2^5 = 32sec.
   Range of poll values (exponent): 1 – 16

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

4. Set type of inquiry: server or peer

5. Preferred source: on or off
   If possible, one source should always be preferred (even if only one source is defined), except if DCF is active.
6. Authentication key: off, key number, autokey

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

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

Important: 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 as far as possible.

Configuration of the Multi- / Broadcast address:

```
QCN-1000    Seiko Time Creation STC
==================================

NTP MULTI- / BROADCAST-ENTRY                1
1  Multi- or  broadcast IP address          10.240.255.255
2  Interval                                 4sec
3  TTL (only for multicast)                 1hops
4  Authentication key                       off


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔2 Time handling ➔3 NTP server➔ 5 Configuration multi-/broadcast address 1

Web interface: Time handling ➔ Time source setting ➔Multi-/broadcast settings

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

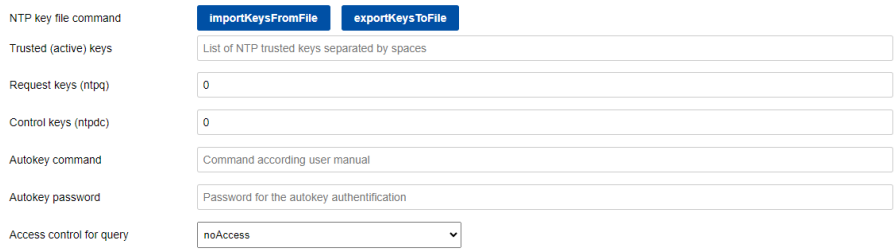
Important: All changes lead to a **restart** of the NTP server!

Configuration of the NTP authentication:

The NTP authentication is described in chapter “8.9 NTP authentication“.

```
QCN-1000    Seiko Time Creation STC
===================================

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

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration➔ 2 Time handling ➔3 NTP server ➔7 NTP Authentication



Web interface: Time handling ➔ Time source setting ➔NTP authentication settings

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

Attention: 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 spaces
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 status request (ntp-query)

   0 = all access allowed (default)

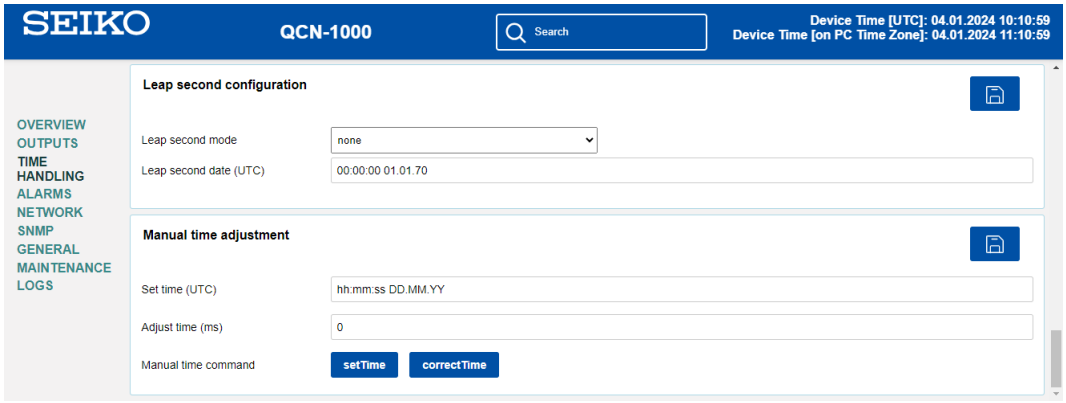
   1 = access from local network allowed

   2 = all access blocked

6.5.17 Manual time adjustment / leap second

```
QCN-1000    Seiko Time Creation STC
===================================

MANUAL TIME SET
1  Set time (UTC)
2  Adjust time
3  Leap second mode                          0
4  Leap second date (UTC)                    00:00:00 01.07.23


98 Return and save
99 Return and discard changes   99 Return

Enter desired menu number>
```

Path: 2 Configuration ➔2 Time handling ➔5 Manual time adjustment



Web interface: Time handling ➔ Leap Second configuration & Manual time adjustment

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 “8.8 Leap second”.

6.5.18 Alarms

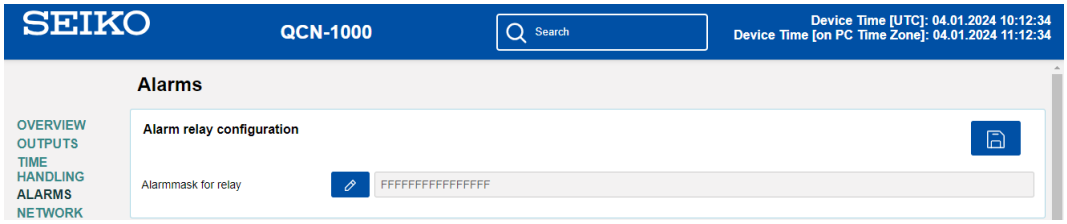
Under alarms, settings can be undertaken for the following functions:

- Alarm relays ➔ see chapter 6.5.19
- E-Mail ➔ see chapter 6.5.21
- SNMP-Traps ➔ see chapter 6.5.22

6.5.19 Alarm relays

```
QCN-1000    Seiko Time Creation STC
====================================

ALARM CONFIGURATION 2
1  Alarmmask for relay


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔3 Alarms ➔1 Alarm relay



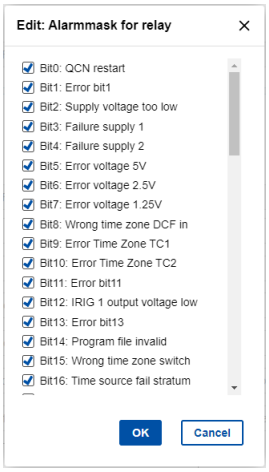
Web interface: Alarms ➔ Alarm relay configuration

1. Alarm mask for relay (see chapter "6.5.20 Alarm mask").

6.5.20 Alarm mask

```
QCN-1000    Seiko Time Creation STC
===================================

ALARMMASK                                   Page 1
[ ]=error disabled, [*]=error enabled
[*] Bit00: QCN restart              [*] Bit01: Error bit1
[*] Bit02: Supply voltage too low   [*] Bit03: Failure supply 1
[*] Bit04: Failure supply 2         [*] Bit05: Error voltage 5V
[*] Bit06: Error voltage 2.5V       [*] Bit07: Error voltage 1.25V
[*] Bit08: Wrong time zone DCF in   [*] Bit09: Error Time Zone TC1
[*] Bit10: Error Time Zone TC2      [*] Bit11: Error bit11
[*] Bit12: Irig 1 output voltage    [*] Bit13: Error bit13
[*] Bit14: Program file invalid     [*] Bit15: Wrong time zone switch


Enter alarmnumber to alter mask

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

Path: 2 Configuration ➔3 Alarms ➔1 Alarm relay➔ 1 Alarm mask



Web interface: Alarms ➔ Alarm relay configuration ➔ pop-up window for mask configuration

Display of all the QCN-1000 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 "D".

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

The alarm masks only apply to the corresponding function, but not for the internal alarm recording (Menu '1. Status' ➔ ’1. Alarm state’ and Menu '1. Status' ➔ ’2. Alarm history’).

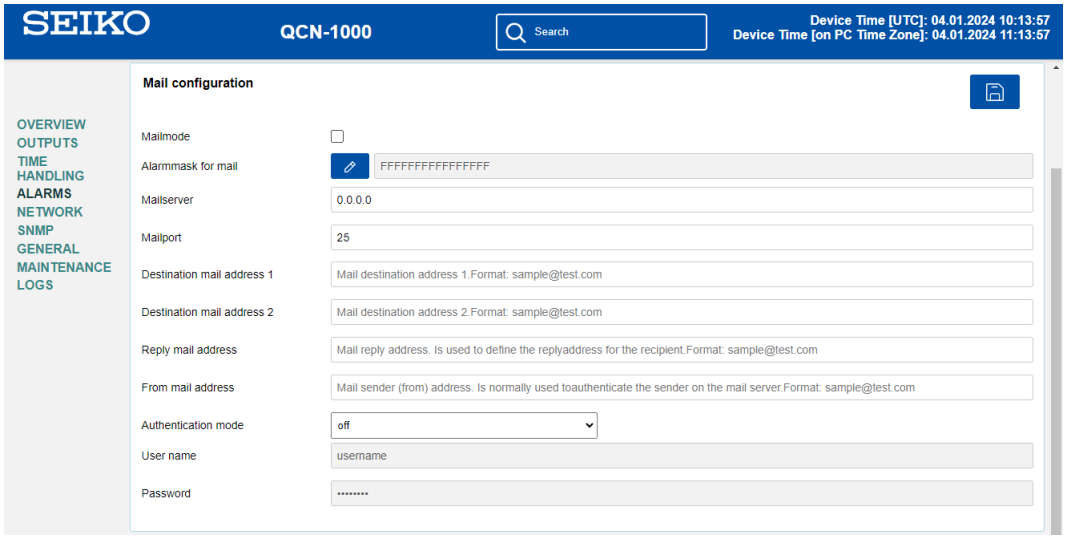
6.5.21 E-mail

E-mail alarm messages via SMTP.

E-mail configuration page 1:

```
QCN-1000    Seiko Time Creation STC
===================================

MAIL CONFIGURATION                              Page 1
1  Mailmode                                     off
2  Alarmmask for mail                           f0 ff ff ff ff ff ff ff
3  Mailserver                                   10.240.0.3
4  Mailport (default 25)                        25
5  Destination mail address1                    mail1@test.org
6  Destination mail address2
7  Reply mail address                           mail2@test.org
8  From mail address                            mail3@test.org

98 Return and save
99 Return and discard changes

Enter desired menu number or press enter for next part>
```

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



Web interface: Alarms ➔ Mail configuration

1. E-mail function on or off.
2. Alarm mask for e-mail notifications (see chapter "6.5.20 Alarm mask")
   Changes are stored or reset on the overlying menu page “MAIL CONFIGURATION".
3. IP address of the mail server e.g. 10.249.34.5
   Enter without entering an address will delete the entry.
4. Mail server port (often 25)

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

7. Reply address (e.g. support, administrator...)
   Enter without entering an address will delete the entry.
8. Sender address (important for authentication through the mail server)
   Enter without entering an address will delete the entry.

Press Enter to change to page 2.

Important: Configuration of a gateway is required for sending e-mails (see chapter "6.5.24 Network"). This can be set via DHCP or manually.

E-Mail configuration page 2:

```
QCN-1000    Seiko Time Creation STC
===================================

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


98 Return and save
99 Return and discard changes

Enter desired menu number or press enter for next part>
```

Path: 2 Configuration ➔3 Alarms➔ 2 E-Mail ➔ [Enter]

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:

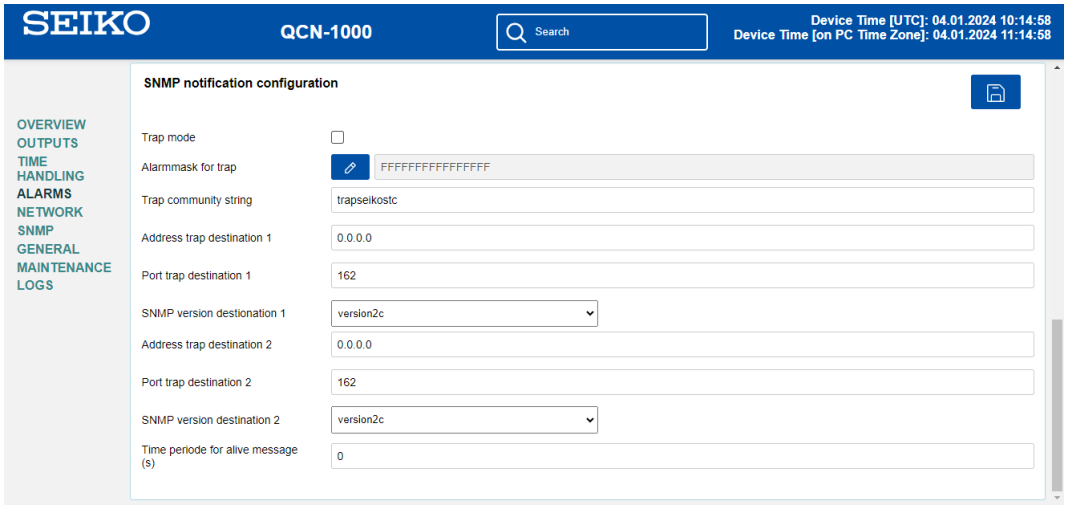
```
Event <Alarm 21 set: NTP does not run>
Time <13:34:34 06.02.09>
Hostname <QCN1000 (10.241.0.18)>
```

6.5.22 SNMP-Traps

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

```
QCN-1000    Seiko Time Creation STC
===================================

SNMP-TRAP CONFIGURATION
1  Trap mode                                off
2  Alarmmask for trap                       f0 ff ff ff ff ff ff ff
3  Trap community string                    trapseikostc
4  Configuration of destination 1           10.240.10.44
5  Configuration of destination 2           10.240.0.85
6  Time periode for alive message           300sec


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔3 Alarms ➔3 Traps



Web interface: Alarms ➔ SNMP notification configuration

1. Trap mode on or off
2. Alarm mask for SNMP trap messages (see chapter "6.5.20 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: *trapseikostc*.
4. Configuration of the receiving system (trap sink) 1
5. Configuration of the receiving system (trap sink) 2
6. Time period for alive messages in seconds. 0 = no alive traps are sent Range: 1-7'200sec

Important: General settings for SNMP can be found in menu ’2. Configuration’ ➔ ’7. SNMP’. See also chapter "6.5.26 SNMP").

Important: Configuration of a gateway is required for sending SNMP traps (see chapter 6.5.24 Network). This can be set via DHCP or manually.

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

Important: SNMP has to be activated for sending traps.

Configuration of the receiving systems

```
QCN-1000    Seiko Time Creation STC
====================================

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


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔3 Alarms ➔3 Traps➔ 4 Configuration of destination 1

Web interface: Alarms ➔ SNMP notification configuration ➔ destination configuration

Address of the evaluation system e.g. 10.241.0.15.
Enter without entering an address will delete the entry.

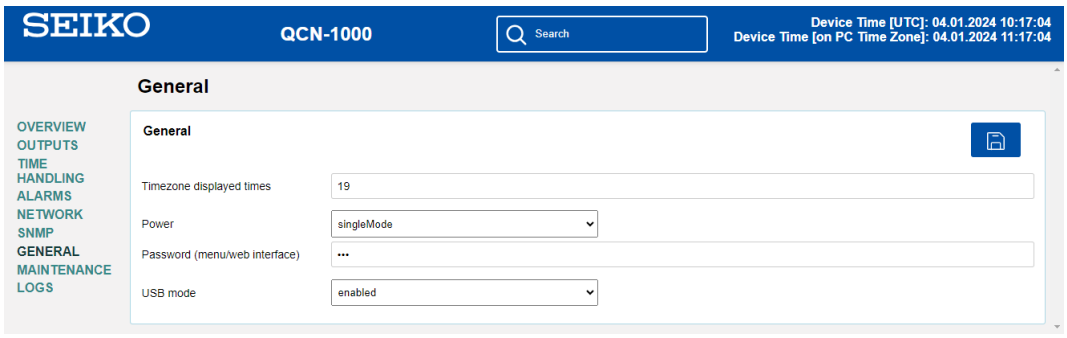
1. Port of the evaluation system (usually 162).
2. SNMP Version: 1=SNMP V1, 2=SNMP V2c

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

6.5.23 General settings

```
QCN-1000    Seiko Time Creation STC
===================================

GENERAL SETTINGS
1  Language                                0
2  Timezone displayed times                [+9] Tokyo
3  Power (0=single, 1=red.)                0
4  Password (menu)                         adm
5  USB mode                                on


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔4 General settings



Web interface: General ➔ General configuration

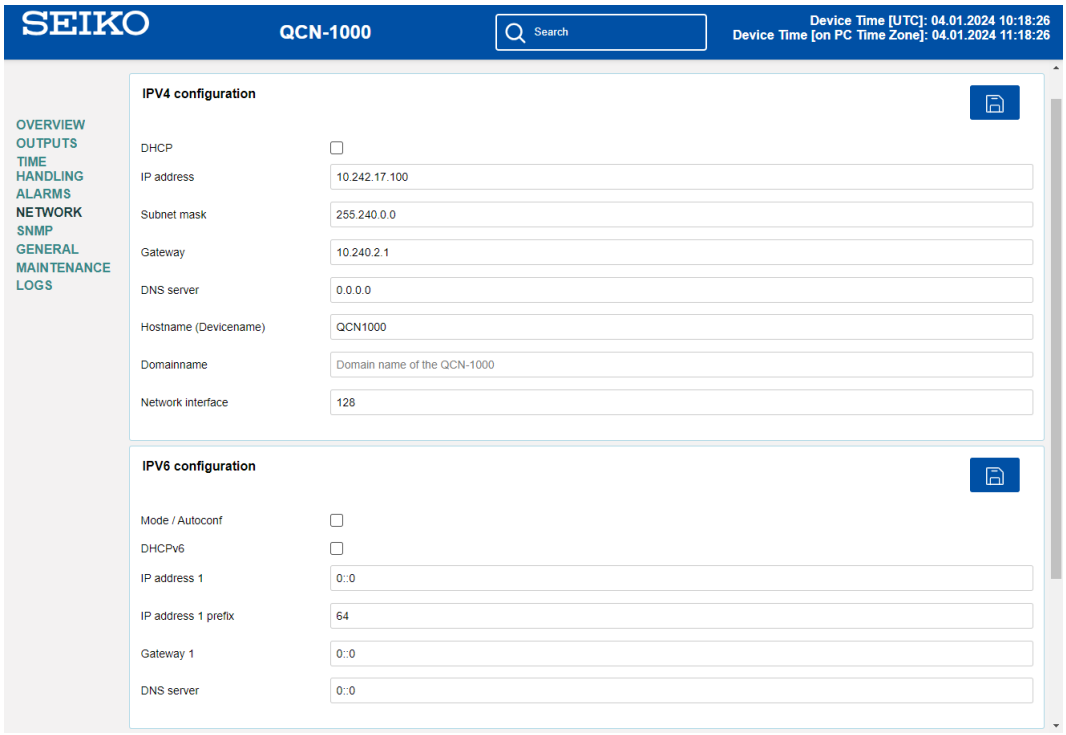
1. Setting the display language.
2. Setting the time zone for the display, and also all alarm logs, e-mail and SNMP. (See chapter “6.5.29 Time zone selection“)
3. Power: 0=simple power, 1=redundant power
4. Enter password for the menu (user *adm*) (max. 15 characters). A password must be configured.
5. USB host on the front: 0=off, 1=on

Attention: The default password should be changed after receipt of the device!

6.5.24 Network

```
QCN-1000    Seiko Time Creation STC
===================================

NETWORK GENERAL
1  IPV4 configuration
2  IPV6 configuration
3  Hostname (Devicename)                    QCN1000
4  Domainname
5  Network interface                        auto


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔5 Network



Web interface: Network

1. Configuration of IPV4 parameters.
2. Configuration of IPv6 parameters.
3. Set hostname.

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

4. Set domain e.g. test.org
5. Set network interface: Auto, 100/10Mbit, half-, full duplex.

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

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

Important: DHCP on/off, each change of this setting will result in a **restart** of the NTP server!

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

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

Attention: Settings to the network must be agreed with the network administrator!

Network configuration IPv4:

```
QCN-1000    Seiko Time Creation STC
==================================

NETWORK IPV4
1  DHCP                                    off
2  IP address                              10.99.3.2
3  Subnet mask                             255.240.0.0
4  Gateway                                 10.96.2.1
5  DNS server                              10.240.0.1


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔5 Network ➔1 IPv4 configuration

Web interface: Network ➔ IPV4 configuration

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

Important: DHCP on, if no DHCP server is available, leads to longer start-up time (<30 sec.) of the QCN-1000.

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

Network configuration IPv6:

```
QCN-1000    Seiko Time Creation STC
==================================

NETWORK IPV6
1  Mode / Autoconf                          on
2  DHCPv6                                   on
3  IP address 1 / Prefix                    fd03:4432:4646:3454::2000/64
4  Gateway 1                                fd03:4432:4646:3454::1
5  DNS server                               fd03:4432:4646:3454::1


98 Return and save
99 Return and discard changes


Enter desired menu number>
```

Path: 2 Configuration➔ 5 Network ➔2 IPV6 configuration

Web interface: Network ➔ IPv6 configuration

Autoconf on or off

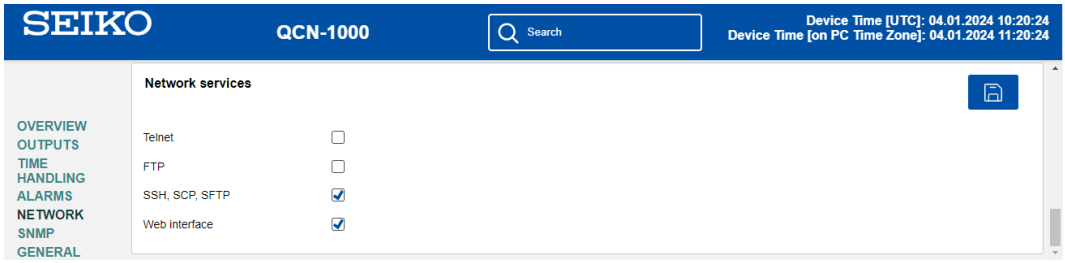
1. DHCPv6 on or off
2. IP address with prefix in IPv6 format
   e.g. 2001:2345:6789::12:1:34/64
3. Gateway in IPv6 format
4. IPv6 DNS server

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

Network services configuration:

```
QCN-1000    Seiko Time Creation STC
===================================

NETWORK SERVICES
1  telnet                                    off
2  ftp                                       off
3  ssh, scp, sftp                            on
4  web interface                             on


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration➔ 6 Services



Web interface: Network ➔ Network services

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

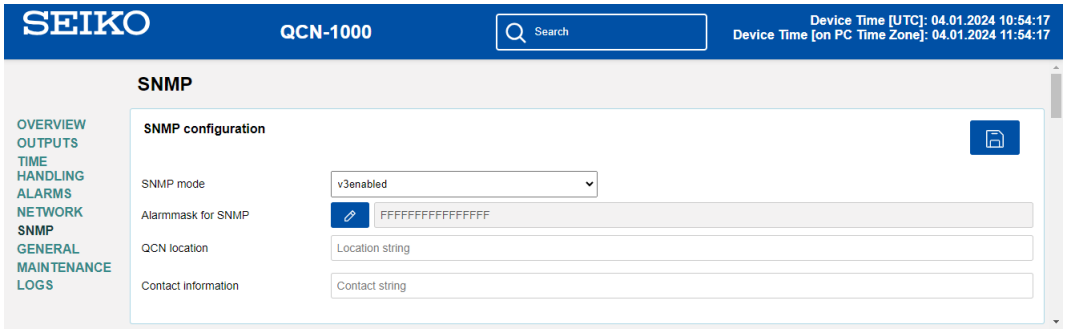
Attention: If the services are not used, FTP and Telnet should be switched off.

6.5.26 SNMP

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

```
QCN-1000    Seiko Time Creation STC
===================================

SNMP CONFIGURATION
1  SNMP mode                                V3
2  Alarmmask for SNMP                       ff ff ff ff ff ff ff ff
3  QCN location                             Communication center
4  Contact information                      test@test.org
5  SNMP V1/V2c security configuration
6  SNMP V3 security configuration


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔7 SNMP



Web interface: SNMP ➔ SNMP configuration

1. Mode 0=off, 1=V1/V2c/V3, 2=V2c/V3, 3=V3.
   SNMP information of MIB 2 is always available.

Important: To send out MIB-2 traps, the trap community and the destination address must at least be configured in menu ’2. Configuration’ ➔ ’3. Alarms’➔ ’3. Traps’ at least the trap community and the receiver must be configured. See also chapter “6.5.22 SNMP Traps").

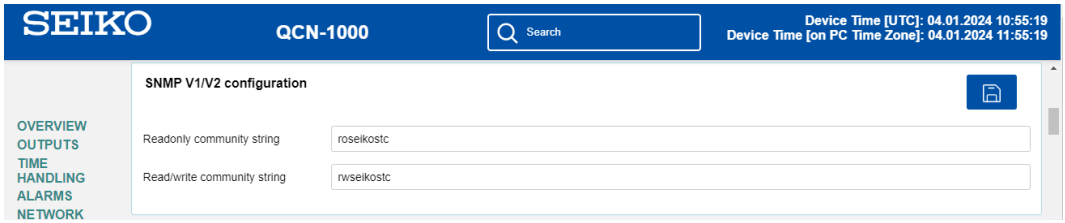
2. Alarm mask for SNMP status (see chapter "6.5.20 Alarm mask"). The modifications will be saved or restored one menu level higher in “SNMP CONFIGURATION".
3. Location information which is displayed in SNMP management tool.
4. Contact information which is displayed in SNMP management tool.
5. Configuration of SNMP V1 / V2 c (specific settings). See chapter “6.5.27 SNMP V1 / V2c“.
6. Configuration of SNMP V3 (specific settings). See chapter “6.5.28 SNMP V3“.

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

6.5.27 SNMP V1 / V2c

```
QCN-1000    Seiko Time Creation STC
===================================

SNMP V1/V2c CONFIGURATION
1  Readonly community string                roseikostc
2  Read/write community string              rwseikostc


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔7 SNMP➔ 5 SNMP V1/V2



Web interface: SNMP ➔ SNMP V1/V2 configuration

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

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

6.5.28 SNMP V3

```
QCN-1000    Seiko Time Creation STC
===================================

SNMP V3 CONFIGURATION
1  User 1 configuration (qcnUser1)
2  User 2 configuration (2)
3  Access 1 configuration (viewQCN1)
4  Access 2 configuration (viewQCN2)


99 Return

Enter desired menu number>
```

Path: 2 Configuration➔ 7 SNMP ➔6 SNMP V3

1. - 2. Configuration of user-defined SNMP accounts qcnUser1 and qcnUser2

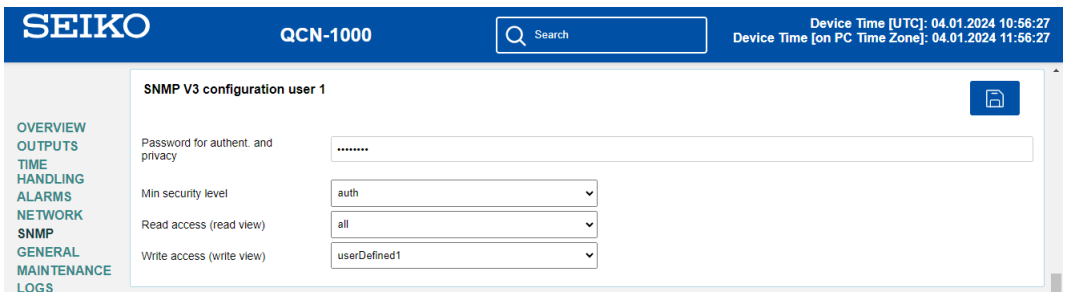
3. - 4. Configuration of user-defined SNMP access rights viewQCN1 and viewQCN2

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

User configuration SNMP V3:

```
QCN-1000    Seiko Time Creation STC
===================================

SNMP V3 USER CONFIGURATION                  qcnUser1
1  Password for authent. and privacy        seikostc
2  Min security level                       auth
3  Read access (read view)                  _all_
4  Write access (write view)                viewQCN1


98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔7 SNMP ➔6 SNMP V3 Configuration ➔ 3 User 1 configuration (qcnUser1)



Web interface: SNMP ➔ SNMP V3 configuration user 1

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

2. Minimal security level: 0=noauth (no authentication)
   1=auth (only authentication)
   2=priv (authentication and privacy)

3. SNMP read access: 0=none (no access)
   1=all (full access)
   2=QCN info (only QCN specific information)
   3=user defined 1 (viewQCN1)
   4=user defined 2 (viewQCN2)

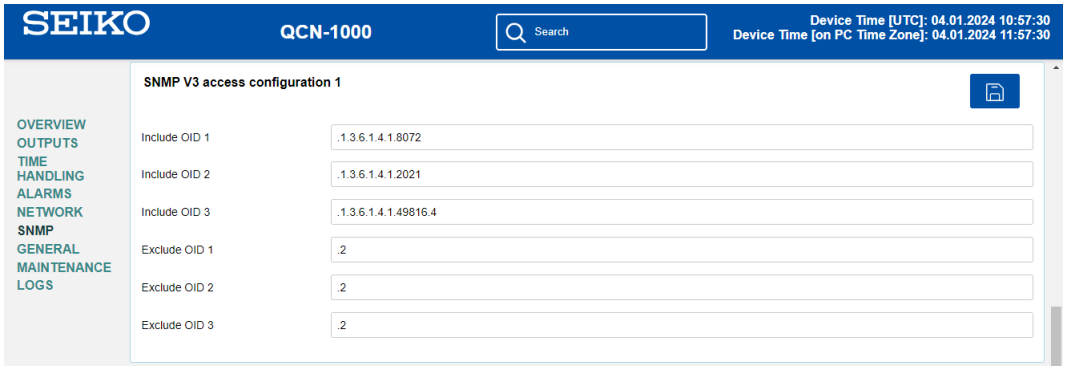
4. SNMP write access: 0=none (no access)
   1=all (full access)
   2=QCN info (only QCN specific information)
   3=user defined 1 (viewQCN1)
   4=user defined 2 (viewQCN2)

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

Access configuration SNMP V3:

```
QCN-1000    Seiko Time Creation STC
===================================

SNMP V3 ACCESS CONFIGURATION                viewQCN1
1  Include OID 1                            .1.3.6.1.4.1.8072
2  Include OID 2                            .1.3.6.1.4.1.2021
3  Include OID 3                            .1.3.6.1.4.1.13842.4
4  Exclude OID 1                            .2
5  Exclude OID 2                            .2
6  Exclude OID 3                            .2

98 Return and save
99 Return and discard changes

Enter desired menu number>
```

Path: 2 Configuration ➔7 SNMP➔ 6 SNMP V3 ➔3 Access



Web interface: SNMP ➔ SNMP V3 access configuration 1

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

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

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

6.5.29 Time zone selection

```
QCN-1000    Seiko Time Creation STC
===================================

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


Enter requested time zone

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

Path: 2 Configuration ➔2 Time handling ➔2 Local time source setting ➔2 Time zone of the source

Web interface: the time zone is selected by its number

Display of all the QCN-1000 time zones (100) over several pages. The pages can be scrolled through with Enter.

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

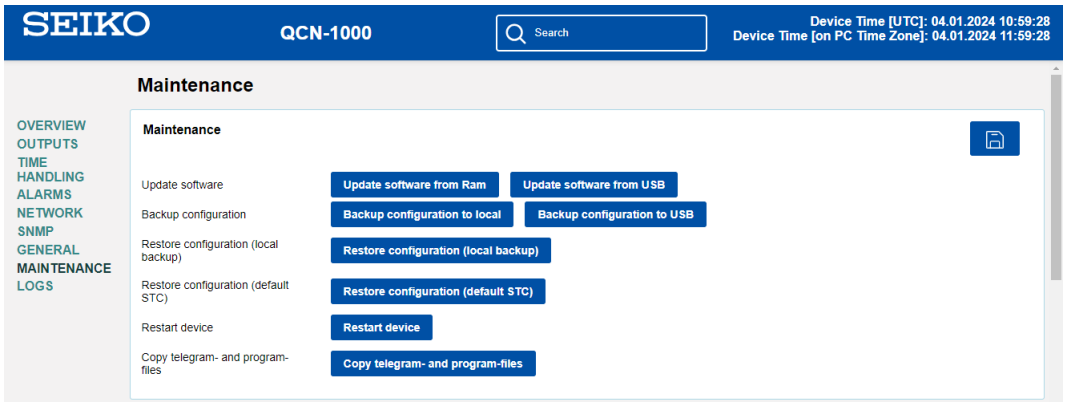
Only one time zone is selected at any time.

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

6.6 Maintenance menu

```
QCN-1000    Seiko Time Creation STC
===================================

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

99 Return

Enter desired menu number>
```

Path: 3 Maintenace



Web interface: Maintenance

1. Initiating a software update (files must have been copied by FTP into the directory */ram* of the QCN-1000 before). ➔ See chapter "7 Updates". The command always leads to a restart of the QCN-1000 (even if no files were copied for update).

Important: Possibly save configuration first.

2. Initiate a software update (files must first be put on to a USB memory in the QCN-1000). ➔ See chapter "7 Updates". The command always leads to a restart of the QCN-1000 masterclock (even if no files were copied for update)

Important: Possibly save configuration first.

3. Save the entire configuration (incl. program and telegram files) and the log files on a USB memory . Also generates a diagnosis file (QCN1000system_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).

Important: When performing backup operations, be sure to insert the empty USB memory first. If the USB memory is not inserted, backup data will not be saved.

When the backup operation is complete, a file will be displayed in web browser indicating that the backup is complete and all the log files are available on the USB memory (see also chapter 6.6.1 for more detais about the files).

If the backup fails, an error message will be displayed and no files will be saved to the USB.

4. Backup the entire configuration locally (to the device) .
5. Restore the entire configuration from a backup stored locally (on the device). After the restore the QCN-1000 is automatically restarted.
6. Restore the entire configuration to factory settings. After the restore the QCN-1000 is automatically restarted.
7. Restart QCN-1000 masterclock.
8. Copy telegram or program files on to the QCN-1000 masterclock. ➔ See chapter "7.11 Copying telegram or program files on to the QCN-1000 masterclock".

See also chapter "7 Updates".

6.6.1 List of most relevant log files for support and maintenance

Filename	Description
dts.log	General logs of the QCN-1000 device and application
dtserror.log	Alarm history of the device
device.conf	Configuration of the device
messages	Last information from the system core
snmp.log / dts-snmpd-xxxx	Log files of the SNMP agent
ntp.log	Log of the NTP service
ProductVersion.txt	Identification of the device
trim.log	Information about the trimming
qcn1000system_xxxxxxxx	Summary log of the current running state of the device
msbn.tbl	time zone table
usern.tbl	Customer time zone table

Further files are available which are less relevant for the support and maintenance team.

Files with the ending “.old“ are holding the older data of the corresponding “.log” file.

7 Updates

7.1 Image and file names

Name Image

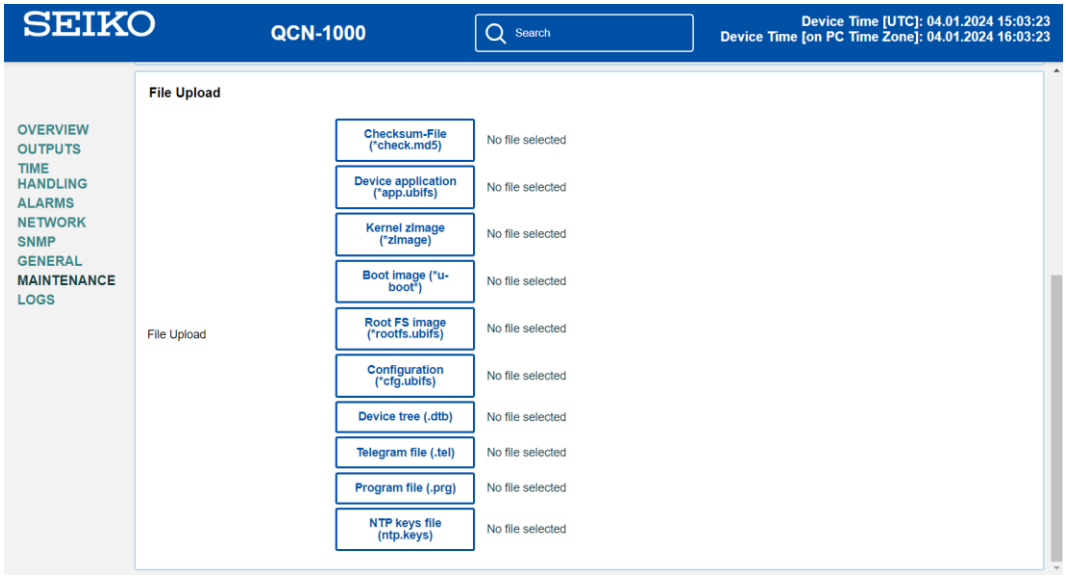
Device application	QCN1000app.ubifs
RootFS image	QCN1000rootfs.ubifs
Boot image	QCN1000u-boot.imx
zImage	QCN1000zImage
Configuration	QCN1000cfg.ubifs
Devicetree file	QCN1000devicetree.dtb
Checksum file	QCN1000check.md5

Name File

Application	QCNapp
Menu	QCNmenu
NTP	ntpd
Driver module	QCNdriver.ko
Configuration	QCNdevice.conf

7.2 File upload via web interface

Images, configurations, telegram- and program files and NTP key can be uploaded directly through the web interface.



Web interface: Maintenance ➔ File Upload

By clicking the corresponding button, the file browser is opened to select the file for the upload.

The successfully uploaded file is shown after the upload:

Web interface: Maintenance ➔ File Upload ➔ successful upload

7.3 Updating images via FTP

The images according to the table in chapter 7.1 can be updated using FTP. Additionally the file QCN1000check.md5 must exist.
➔ all image names are case-sensitive.

Steps for updating images via FTP:

1. Connect a FTP client software **(binary)** to the QCN-1000 masterclock e.g. with Windows file Explorer enter: ***ftp://QCN@[IP address]***) (as user QCN). See also chapter "7.7 FTP-Connection".
2. If an update of the image **QCN1000cfg.ubifs** is made, the configuration of the QCN-1000 and the program and telegram files are overwritten. In order to store the configuration, the file QCNdevice.conf from the directory /etc and any possible program and telegram files must be saved from the directory /var/local/QCN. After the update, the file can again be written on the QCN-1000 in accordance with chapter "7.4 Updating applications or configurations via FTP". **Impulse lines** should be stopped before the update with QCN1000.ubifs and separated from the QCN-1000 (after the update, the line starts with STSLine).
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 QCN-1000 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 QCN-1000 is automatically restarted on completion of the update. The Telnet or SSH session has to be restarted.

Attention: 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 QCN-1000 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 FTP

To update individual files as listed in the table in chapter 7.1. on the QCN-1000, the following steps are carried out:

➔ All file names are case-sensitive.

1. Connect a FTP client software **(binary)** to the QCN-1000 e.g. with Windows file Explorer enter: ***ftp://QCN@[IP address])*** (as user QCN). See also chapter 7.7 FTP-Connection.
2. Change to the directory */ram*.

3. Copy all the files to be updated into the directory */ram*.
4. Close FTP-Connection.
5. The update procedure can be started on QCN-1000 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 QCN-1000 is automatically restarted on completion of the update.
   The Telnet or SSH session has to be restarted.

Attention: 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 QCN-1000 will be destroyed and it has to be returned to the manufacturer for repairing.

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

7.5 Updating images via USB

The images as shown in the table in chapter 7.1 can be updated via USB.
Additionally the file QCN1000check.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 QCN-1000 masterclock.

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

3. If an update of the **QCN1000cfg.ubifs** image is made, the configuration of the QCN-1000 and the program and telegram files are overwritten. In order to store the configuration, the file *QCNdevice.conf* from the directory /etc and any possible program and telegram files must be saved from the directory /var/local/QCN. After the update, the file can again be written on the QCN-1000 in accordance with chapter "7.4 Updating applications or configurations via FTP". **Impulse lines** should be stopped before the update with QCNcfg.img and separated from the QCN-1000 (after the update, the line starts with STSLine).
4. The update procedure can be started on QCN-1000 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 QCN-1000 is automatically restarted on completion of the update. The Telnet or SSH session has to be restarted.
5. As soon as the QCN-1000 is restarted, remove the USB stick.

Attention: 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 QCN-1000 will be destroyed and the QCN-1000 has to be returned to the manufacturer for repairing.

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

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

7.6 Updating applications or configurations via USB

To update individual files as shown in the table in chapter 7.1 on the QCN-1000, 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 QCN-1000.

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

3. The update procedure can be started on QCN-1000 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 QCN-1000 is automatically restarted on completion of the update.
   The Telnet or SSH session has to be restarted.
4. As soon as the QCN-1000 is restarted, remove the USB stick.

Attention: 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 QCN-1000 will be destroyed and it has to be returned to the manufacturer for repair.

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

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

7.7 FTP connection

Establish anonymous connection:
ftp://"IP address of QCN-1000"
to directly reach the sub-directory ***/***ram, e.g. Windows file Explorer *ftp://10.241.0.5*

Establish connection as/with a user:
ftp://QCN@"IP address of QCN-1000".
e.g. with Windows file Explorer enter: *ftp://QCN@10.241.0.5*
Password: **QCN** resp. the defined password for the menu.
To directly reach the sub-directory */ram*, you can also enter *ftp://QCN@10.241.0.5/ram*.

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

Important: By default only SFTP is enabled for security reasons. If FTP should be used, it needs to be enbled (see chapter 6.5.25)

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

FTP-Tools

	Windows 7, 8, 10
Integrated in the system (file manager):	Windows File Explorer *Start* ➔ *Execute:* Explorer
Programs (examples)	CuteFTP

7.8 SFTP Connection

SFTP = SSH File Transfer Protocol

SFTP-Tools

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

7.9 SCP Connection

SCP = Secure Copy Protocol

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

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

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

SCP-Tools

	Windows 7, 8, 10
Integrated in the system (file manager):	With command line

File Upload

1. Connect the SCP client software to QCN-1000.
   (Open Windows Command Prompt and enter command)
   scp [file you want to copy] adm@[IP address]:[save destination path]
   Ex: scp testfile.txt adm@192.168.0.100:/ram/testfile.txt

2. Enter Password:(adm)

File Download

1. Connect the SCP client software to QCN-1000.
   (Open Windows Command Prompt and enter command)
   scp adm@[IP address]:[File you want to copy] [File name to save]
   Ex: scp adm@192.168.0.100:/ram/ProductVersion.txt ProductVersion.txt

2. Enter Password:(adm)

7.10 Save configuration externally

(for backup or copy to another QCN-1000)

Save the current configuration via FTP:

1. Connect a FTP client software to the QCN-1000 (with Windows file Explorer enter: ***ftp://QCN@[IP address]***) (as user QCN).
2. Change to the QCN-1000 directory ***/etc***.
3. Save the file ***QCNdevice.conf*** (configuration) to the user PC (e.g. copy the file to the Desktop or to the directory *My Documents*).
4. Additionally also save possible telegram and program files from the QCN-1000 directory /**var/local/QCN**.

Save the current configuration via USB-Stick:

The whole procedure can be analogously done with an USB stick. The copy procedure to the USB stick can be started on QCN-1000 by selecting the menu '3. Maintenance' ➔ '3. Backup configuration and log to USB' and press Enter. All files (including program and telegram files) will be copied into the root directory of the USB stick.

7.11 Copying Telegram or Program files to the QCN-1000.masterclock

Analogously to the previously described procedures telegram and program files can be copied via FTP (**/ram** directory) or USB stick to the QCN-1000.

The copy procedure can be started by selecting the menu '3. Maintenance' ➔ '8. Copy telegram- and program-files' and press Enter.

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

In addition to the program files (*.prg), ***.mbs3** files (SwitchEditor) can also be copied to the device and also be read again later from there.

Special case USB stick:
If the QCN 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). For this, the button has to be pressed until the copy procedure is started.

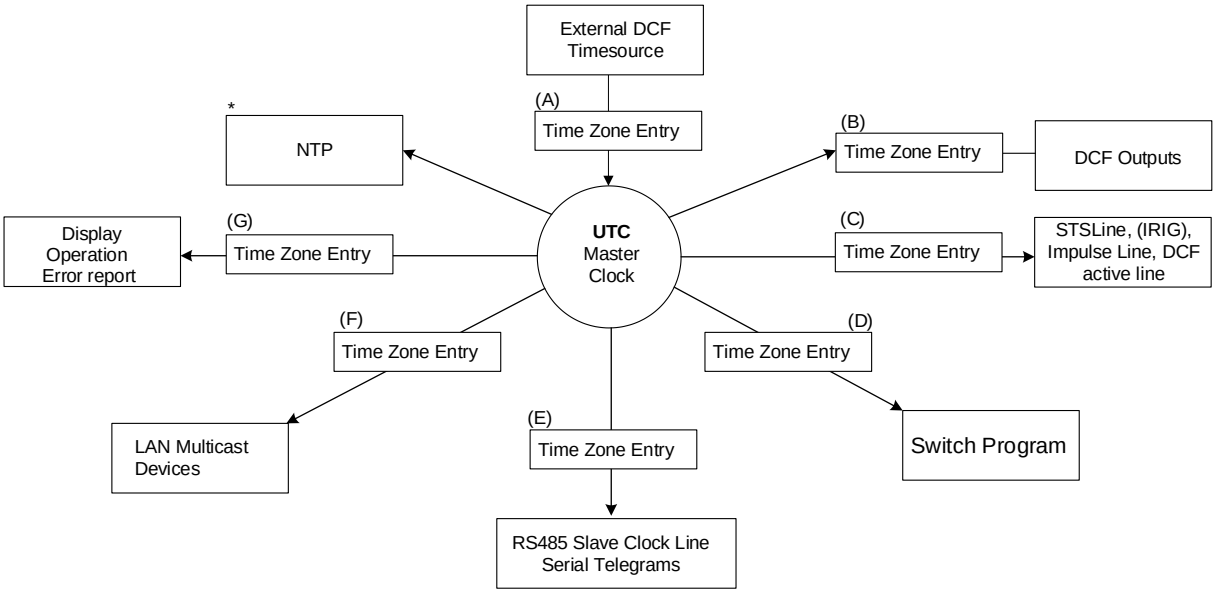
Important: After the file copy procedure, the output of the telegram files and the treatment of the switch programs are re-started (take over of the files).

Important: 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 time of the QCN-1000 is based on UTC (Universal Time Coordinated). The synchronisation inputs, the time shown on the display, as well as all outputs are linked via a time zone entry with the internal master clock time, i.e. all inputs and outputs can be individually allocated to a specific time zone.



8.2 Overview of NTP

Generally NTP as per RFC 5905 (RFC 1305).

- Reference clock for DCF/GPS and internal time
- Up to 4 NTP sources (peers)

The reference clock can be configured as follows:

- DCF/GPS reception
- Internal time without DCF/GPS reception
- Off

Each time source as well as the QCN-1000 device itself has a **stratum value** (RFC 5905). The stratum value of the device corresponds to the stratum value of the time source + 1. If no time source is available, stratum value of the device equals to 16 (unsynchronized).

8.3 Fix stratum for local time source synchronizing multicast clocks

In operation with NTP time sources and the parameter "Local time source = off", the behaviour of the NTP server is that of a standard NTP server (chapter 8.4.3). When the time sources are no longer available or invalid, the NTP server becomes unsynchronized (stratum = 16) after a short time as per NTP algorithm.

To provide **multicast NTP** for slave clock lines, the NTP server has to remain synchronized. An unsynchronized server does not send out any time. The slave clocks in this case will run to the 12 o'clock position.

Therefore, in this case it is recommended to set the **Fix stratum** value **unequal to 0.** If only NTP time sources are in use for the synchronization of the QCN-1000 (chapter 8.4.4), set the local time source to **internal**, if DCF/GPS synchronization is being used (chapter 8.4.1, 8.4.2), set the local time source to **DCF/GPS**.

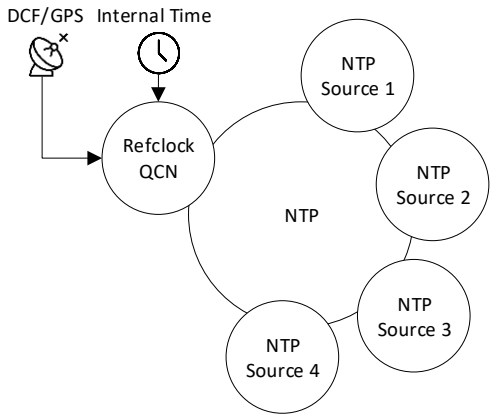
8.4 Configuration and Use Cases

The configuration is done according to chapter “6.5.13 Time handling”. Each change of the configuration triggers a restart of NTP. If the time source changes from one to another, the QCN-1000 may lose its synchronization for a short time.

8.4.1 DCF/GPS with NTP

Use case: system with DCF/GPS reception and 1 up to 4 NTP time sources. The NTP sources serve as a backup, if DCF/GPS reception is lost. If the system must stay synchronized even if NTP or DCF/GPS reception are not available, a fixed stratum value has to be set > 0.

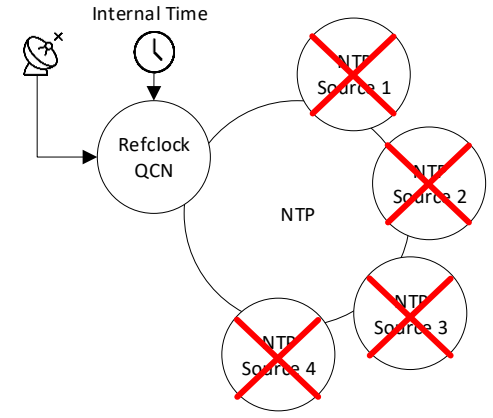
Important: The behaviour as described in this section is only true if qualitatively good time sources are used. This is especially the case for DCF 77 signals. The following products are recommended for synchronization: GNS-1000 or synchronization with a synthetic DCF signal generated by another timeserver/master clock. For information on the latest products, visit www.seiko-sts.co.jp/e/.



DCF ok:	Stratum QCN-1000 always 1, time always from DCF
DCF nok:	If NTP is available, stratum QCN 1000 = Stratum NTP source + 1
Else:	Stratum is increased as per set stratum timeout value until QCN1000 is unsynchronized (stratum = 16) or stratum = fix stratum + 1

8.4.2 DCF/GPS without NTP

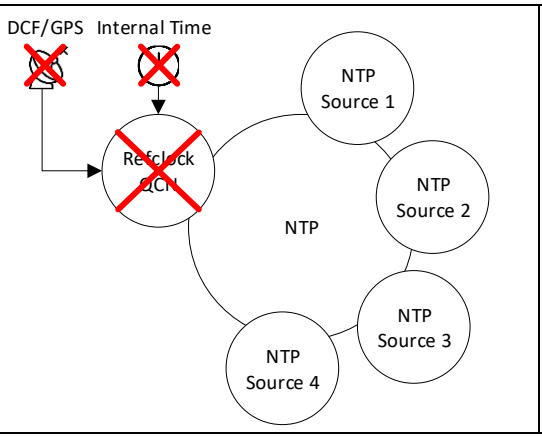
Use case: system with DCF/GPS reception without NTP time sources. If the system must stay synchronized even if DCF/GPS reception is not available, a fixed stratum value has to be set > 0.



DCF ok:	Stratum QCN-1000 always 1, time always from DCF
DCF nok:	Stratum is increased as per set stratum timeout value until QCN1000 is unsynchronized (stratum = 16) or stratum = fix stratum + 1

8.4.3 Off with NTP (standard NTP server RFC 5905)

Use case: system with standard NTP behaviour (without local time source). Up to 4 NTP servers can be configured. Configuration of the fix stratum doesn't have any influence on the behaviour of the NTP server.

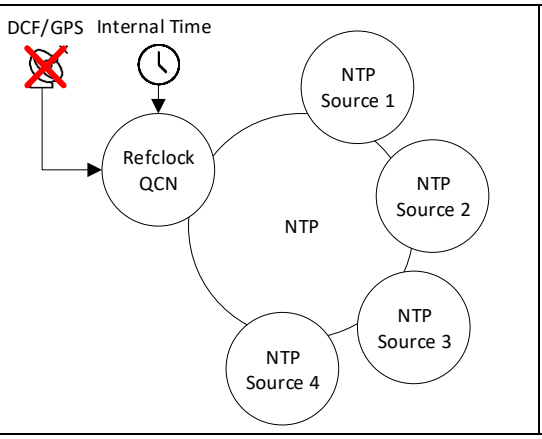


NTP ok: Stratum QCN-1000 = current NTP source + 1

NTP nok: NTP server is unsynchronized according to NTP algorithm (stratum= 16)

8.4.4 Internal with NTP

Use case: system with standard NTP behaviour but with the option to set a fix stratum value. Up to 4 NTP servers can be configured.



NTP ok: Stratum QCN-1000 = current NTP source + 1

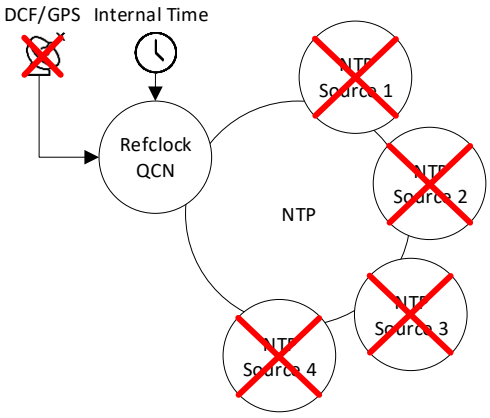
NTP nok: NTP server is unsynchronized (stratum= 16) or stratum QCN-1000 = fix stratum + 1

Attention: After the booting sequence, the stratum of the local time source is increasing as per set stratum timeout value. If the QCN-1000 is running on the internal source (NTP nok) during this time, this stratum of the QCN-1000 is increasing stepwise (up to stratum 16 or fix stratum + 1).

Important: Always set a fix stratum if the local time source is set to internal. Otherwise the behaviour is not defined. If no fix stratum is used, set the local time source to off (chapter 8.4.3).

8.4.5 Internal without NTP

Use case: only for testing purpose of a system with a QCN-1000 with valid time but without any time source.



The stratum of the QCN-1000 starts from 3 to unsynchronized (stratum = 16) or to fix stratum +1 as per set stratum timeout value.

8.5 Time take over

Time take-over from DCF:

- At least 3 minutes of DCF reception are required before the NTP server is available when used with DCF synchronization.
  Stratum of the time source = 0 ➔ Stratum of QCN-1000 = 1.

Time take-over from NTP:

- As per NTP RFC 5905 (www.ntp.org)
  (see http://support.ntp.org/bin/view/Servers/WebHome for servers on internet)

Time take-over from RTC (internal time):

- The NTP server is started with stratum 3, if the local time source is not switched off (source type = internal or DCF/GPS). As soon as a time source delivers the time, the stratum is set accordingly.
  If there is no local time source configured (source type = off), the NTP server will only start when it receives the time from another NTP server.

Manual time setting:

- The NTP server is started with stratum 3, if the local time source is not switched off (source type = internal or DCF/GPS). As soon as a time source delivers the time, the stratum is set accordingly.
  If there is no local time source configured (source type = off), the NTP server will only start when it receives the time from another NTP server.

Error cases:

- **DCF failure:**
  Depending on the setting of the “Stratum TO (Timeout)”, the stratum will be counted upwards, till it reaches 16.
  When the stratum reaches the value "Stratum limit for synch alarm", the alarm "Failure time source Str" occurs (fix delay of 1 min) and the sync LED turns off.
  When the time source is available again, the stratum will immediately be set according to the time source (stratum time source + 1).

- **DCF failure with NTP as backup time source:**
  Depending on the setting of the “Stratum TO (Timeout)”, the stratum will be counted upwards, till it reaches 16.
  In case the stratum limit is reached and a NTP server with a better stratum is

available, the QCN-1000 synchronizes from NTP.
When the time source is available again, the stratum will immediately be set according the time source (stratum time source + 1).

- **NTP failure:**
  The failure of the/all NTP source/s without a defined fix stratum and without DCF. Normally, it takes 8 * the poll interval of the current source until the peer is recognized as invalid (source can no longer be reached) and NTP loses synchronization. The length of time, with the exception of the poll interval, also depends on the jitter measured, number of sources, length of synchronization and source deviation, and can thus deviate enormously in individual cases.

Exception for time take-over:
After a software update, the first time take over can last distinctly longer (> 8 minutes).

8.6 Time server

- NTP v4 (compatible with v3) as per RFC 1305, RFC 5905 (Port 123)
  NTP Authentication with MD5 Key / Autokey
- SNTP (UDP), RFC2030 (Port 123)
- TIME (TCP/UDP), RFC 868 (Port 37)
- DAYTIME (TCP/UDP), RFC 867 (Port 13)

8.7 Time accuracy, time-keeping

See Appendix “H”.

8.8 Leap second

Manual mode

Notification of the leap second is always issued 1 hour before the period of time set via DCF and NTP*.

*Notification is only transmitted via NTP if the local source is not switched off (local source = internal or DCF/GPS). If only an NTP source/s is configured (local source = off), the state of the source will be passed on.

Automatic mode

In automatic mode, the source is checked for 1 hour before the time of the possible leap second (DCF or NTP) for any possible notification. If notification is recognized, it will be passed on via NTP and DCF output and the leap second added.

8.9 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 coded.

8.9.1 NTP symmetric keys

A 32-bit key ID and a cryptographic 64/128-bit hash value 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 QCN-1000 only supports the MD5 procedure.

The receiving NTP service calculates the hash value 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 hash value will not be used for synchronization.
The QCN-1000 must be correspondingly configured to be able to use NTP authentication (chapter 6.5.16 NTP Server). The NTP service of the other equipment (e.g. server, PC...) must also be configured. In the case of standard NTP, this occurs via the ntp.conf file:

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

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

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

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

`trustedkey` defines all keys currently permitted

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

`controlkey` defines the key for the ntpdq 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)

8.9.2 NTP Autokey

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

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

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

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

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

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

9 SNMP

9.1 General

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

A full SNMP agent is implemented on the QCN-1000 masterclock (MIB II, QCN1000).

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

Read only:	*roseikostc*
Read/write:	*rwseikostc*
Trap:	*trapseikostc*

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

qcnUser1:	*seikostc*
qcnUser2:	*seikostc*
qcnInfo:	*seikostc (not changeable, read only)*

QCNUser1 and QCNUser2 have full read/write access on all objects. With SNMP V3 rules, access can be reduced. But the access can be restricted with corresponding SNMP V3 rules.

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

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:

QCN-COMMON (File: QCN-COMMON-MIB.TXT)
General QCN definition, always required

QCN1000 (QCN1000-MIB.TXT)
Device specific QCN definitions

The MIB files can be copied from the QCN-1000 masterclock with FTP (for FTP use, see chapter “7.7 FTP Connection“):

QCN-MIB:	/etc/snmp/mibs/
Standard MIBS:	/etc/snmp/mibs/

9.2 Device configuration with SNMP (Not supported)

If one or several variables are set with *Put* in a configuration group, the variable *qcn1000????ConfigCmd* must be set at the end to 1 in the corresponding group. The values of the entire configuration group are assumed from the QCN 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 *qcn1000????ConfigCmd* variable to 2 (2=undo, restore).

After sending the accept command, a QCN1000ConfigChanged *Notification* is sent.

The definitions of the available variables can be taken from the MIB files and from the menu descriptions of this manual.

Example:

Management System		**QCN**
Put qcn1000FTPMode=1	→	Variable is set to 1 internally
Put qcn1000NetServicesConfigCmd=1	→	Configuration group is assumed
	←	Sends qcn1000ConfigChanged *Notification*
		with the new time qcn1000NetConfigChangedTime

9.3 QCN Subagent SNMP Notification

Protocol: SNMPv2c Notification

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

9.3.1 Startup [qcn1000StartUp]

Sent out when the subagent for the QCN is started.

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

9.3.2 Shutdown [qcn1000Shutdown]

Sent out when the subagent for the QCN 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 [qcn1000StatusChanged]

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

qcn1000SysStatus, qcn1000SysTimeSource, qcn1000SysStratum, qcn1000SysMasterMode

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
qcn1000SysStatus	Unsigned Int	4 Bytes	Contains the internal system status	66309
qcn1000SysOffset	Integer	4 Bytes	Actual time offset of the system [us]	-1523 → -1.523ms
qcn1000SysTimeSource	Byte	1 Bytes	Actual time source	2
qcn1000SysStratum	Byte	1 Bytes	Actual system stratum level	1

9.3.4 Configuration changed(Not supported) [qcn1000ConfigChanged]

Sent out when the subagent detects a configuration change in the QCN 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
qcn1000SysConfigChangedTime	TimeTicks	4 Bytes	qcn1000System
qcn1000NetConfigChangedTime	TimeTicks	4 Bytes	qcn1000Network
qcn1000NetServicesConfigChangedTime	TimeTicks	4 Bytes	qcn1000NetServices
qcn1000TSConfigChangedTime	TimeTicks	4 Bytes	qcn1000TimeSource
qcn1000NTPConfigChangedTime	TimeTicks	4 Bytes	qcn1000TimeNTPServer
qcn1000OutLineClock1ConfigChangedTime	TimeTicks	4 Bytes	qcn1000OutLineClock1
qcn1000OutLineClock2ConfigChangedTime	TimeTicks	4 Bytes	qcn1000OutLineClock2
qcn1000OutLineClock3ConfigChangedTime	TimeTicks	4 Bytes	qcn1000OutLineClock3
qcn1000OutLineClock4ConfigChangedTime	TimeTicks	4 Bytes	qcn1000OutLineClock4
qcn1000OutLineClock5ConfigChangedTime	TimeTicks	4 Bytes	qcn1000OutLineClock5
qcn1000OutLineClock6ConfigChangedTime	TimeTicks	4 Bytes	qcn1000OutLineClock6
qcn1000OutLineDCFConfigChangedTime	TimeTicks	4 Bytes	qcn1000OutLineDCF
qcn1000OutLineSerialConfigChangedTime	TimeTicks	4 Bytes	qcn1000OutLineSerial
qcn1000OutLineTZServerConfigChangedTime	TimeTicks	4 Bytes	qcn1000OutLineTZServer
qcn1000OutLineSwitchConfigChangedTime	TimeTicks	4 Bytes	qcn1000OutLineSwitchFct
qcn1000RelayConfigChangedTime	TimeTicks	4 Bytes	qcn1000AlarmRelayConfig
qcn1000MailConfigChangedTime	TimeTicks	4 Bytes	qcn1000AlarmMailConfig
qcn1000SnmpConfigChangedTime	TimeTicks	4 Bytes	qcn1000SnmpConfig
qcn1000SystemVoltageChangedTime	TimeTicks	4 Bytes	qcn1000SystemVoltageConfig

The *ConfigChangedTime* variables show the time (TimeTicks value 1/100 seconds) 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
qcn1000System	qcn1000Language qcn1000Timezone qcn1000Password qcn1000DisplayTimezone qcn1000DisplayTimeFormat
qcn1000Network	qcn1000IPAddr qcn1000IPMask qcn1000IPGateway qcn1000IPNameserver qcn1000Hostname qcn1000Domain qcn1000DHCPMode qcn1000EthernetLinkMode qcn1000IPv6AutoConf qcn1000IPv6DHCPMode qcn1000IPv6Addr1 qcn1000IPv6Prefix1 qcn1000IPv6Gateway1 qcn1000IPv6Addr2 qcn1000IPv6Prefix2 qcn1000IPv6Gateway2 qcn1000IPv6Nameserver
qcn1000NetServices	qcn1000TelnetMode qcn1000FTPMode qcn1000SSHMode
qcn1000TimeSource	qcn1000TSLocalMode qcn1000TSLocalTimezone qcn1000TSLocalTimeout qcn1000TSLocalFixStratum qcn1000TSLocalCorrection qcn1000TSLocalStratumTimeou qcn1000TSOffsetSynchOnly qcn1000TSErrorStratum qcn1000TSLeapSecMode qcn1000TSLeapSecDate qcn1000TSCanMode
qcn1000TimeNTPServer	qcn1000NTPBroadcastAddr1 qcn1000NTPBroadcastInterval1 qcn1000NTPBroadcastTTL1 qcn1000NTPBroadcastKey1 qcn1000NTPBroadcastAddr2 qcn1000NTPBroadcastInterval2 qcn1000NTPBroadcastTTL2 qcn1000NTPBroadcastKey2 qcn1000NTPSourceTable (1..4) qcn1000NTPSourceAddr qcn1000NTPSourceMinPoll qcn1000NTPSourceMaxPoll qcn1000NTPSourceMode qcn1000NTPSourcePrefer qcn1000NTPSourceKey)
qcn1000TimeManualSet	qcn1000ManualTimeSetUTC qcn1000ManualTimeSetDiff

qcn1000OutLineClockx x=[1…6]	qcn1000OutLineClockxType qcn1000OutLineClockxMode qcn1000OutLineClockxTimezone qcn1000OutLineClockxAlCurrent qcn1000OutLineClockxMBLFunction qcn1000OutLineClockxMBLSwitch qcn1000OutLineClockxMBLWorldtime qcn1000OutLineClockxMBLTZTable (1..20) (qcn1000OutLineClockxMBLTZTableEntryNumber) qcn1000OutLineClockxImpFunction qcn1000OutLineClockxImpLinetime qcn1000OutLineClockxImpWidth qcn1000OutLineClockxImpPause qcn1000OutLineClockxImpCatchUp
qcn1000OutLineDCFMode	qcn1000OutLineDCFMode qcn1000OutLineDCFTimezone qcn1000OutLineDCFPulseType qcn1000OutLineDCFPulseTime qcn1000OutLineDCFPulsePeriod qcn1000OutLineDCFPulseCorrection qcn1000OutLineDCFConfigCmd
qcn1000OutLineSerial	qcn1000OutLineSerialMode qcn1000OutLineSerialTimezone qcn1000OutLineSerialComMode qcn1000OutLineSerialComParam qcn1000OutLineSerialTeleFile qcn1000OutLineRS485Mode qcn1000OutLineRS485Devices qcn1000OutLineRS485DevNameTable(1..32) (qcn1000OutLineRS485DevName) qcn1000OutLinesRS485Switch
qcn1000OutLineTZServerConfigChangedTime	qcn1000OutLineTZServerMode qcn1000OutLineTZServerMCastAddr qcn1000OutLineTZServerMCastPort qcn1000OutLineTZServerNTPInterval qcn1000OutLineTZServerTTL qcn1000OutLineTZServerTableInterval qcn1000OutLineTZServerEntryInterval qcn1000OutLineTZServerTable (1..15) (qcn1000OutLineTZTableEntryNumber)
qcn1000OutLineSwitchFct	qcn1000OutLineSwitchTimezone qcn1000OutLineSwitchProgFile qcn1000OutLineSwitchFctChannel qcn1000OutLineSwitchFctComb qcn1000OutLineSwitchFctLongitude qcn1000OutLineSwitchFctLatiitude qcn1000OutLineSwitchFctLeadSun1 qcn1000OutLineSwitchFctFolSun1 qcn1000OutLineSwitchFctLeadSun2 qcn1000OutLineSwitchFctFolSun2 qcn1000OutLineSwitchFctState qcn1000OutLineSwitchInpChan1 qcn1000OutLineSwitchInpComb1 qcn1000OutLineSwitchInpChan2 qcn1000OutLineSwitchInpComb2 qcn1000OutLineSwitchInpChan3 qcn1000OutLineSwitchInpComb3 qcn1000OutLineSwitchInpChan4 qcn1000OutLineSwitchInpComb4 qcn1000OutLineSwitchState qcn1000OutLineSwitchLockState qcn1000OutLineSwitchCmdChannel qcn1000OutLineSwitchCmdFunction
qcn1000RelayConfigChangedTime	qcn1000RelayAlarmMask

qcn1000MailConfigChangedTime	qcn1000MailMode qcn1000MailAlarmMask qcn1000MailServerIPAddress qcn1000MailServerPort qcn1000MailAddrDestination1 qcn1000MailAddrDestination2 qcn1000MailAddrReply qcn1000MailAddrFrom qcn1000MailUser qcn1000MailPassword qcn1000MailAuthMode
qcn1000SnmpConfigChangedTime	qcn1000SnmpMode qcn1000SnmpAlarmMask qcn1000SnmpROCommunity qcn1000SnmpRWCommunity qcn1000SnmpTrapMode qcn1000SnmpTrapAlarmMask qcn1000SnmpTrapCommunity qcn1000SnmpTrapListenerIPAddress1 qcn1000SnmpTrapListenerPort1 qcn1000SnmpTrapVersion1 qcn1000SnmpTrapListenerIPAddress2 qcn1000SnmpTrapListenerPort2 qcn1000SnmpTrapVersion2 qcn1000SnmpTrapAliveMsgInterval qcn1000SnmpLocation qcn1000SnmpContact qcn1000SnmpV3UserPassword1 qcn1000SnmpV3UserLevel1 qcn1000SnmpV3UserRead1 qcn1000SnmpV3UserWrite1 qcn1000SnmpV3UserPassword2 qcn1000SnmpV3UserLevel2 qcn1000SnmpV3UserRead2 qcn1000SnmpV3UserWrite2 qcn1000SnmpV3View11 qcn1000SnmpV3View12 qcn1000SnmpV3View13 qcn1000SnmpV3View14 qcn1000SnmpV3View15 qcn1000SnmpV3View16 qcn1000SnmpV3View21 qcn1000SnmpV3View22 qcn1000SnmpV3View23 qcn1000SnmpV3View24 qcn1000SnmpV3View25 qcn1000SnmpV3View26
qcn1000SystemVoltageChangedTime	qcn1000SystemVoltage qcn1000SystemVoltageType qcn1000SystemVoltageConfigMode

9.3.5 Alive Notification [qcn1000Alive]

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
qcn1000SysStatus	Unsigned Int	4 Bytes	Contains the internal system status	66309
qcn1000SysAlarms	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 [qcn1000Alarm]

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
qcn1000TrapAlMsgErrorNr	Byte	1 Bytes	No. of the alarm bit (0..63)	8
qcn1000TrapAlMsgErrorState	Byte	1 Bytes	0 = alarm bit was deleted 1 = alarm bit was set	1
qcn1000TrapAlMsgErrorTime	Unsigned Int	4 Bytes	PC-time in seconds since 01.01.1970 00:00:00	946684805
qcn1000TrapAlMsgErrorText	Text	59 Bytes	Error text	Line current too high

10 Description of the switch function (This feature is not available)

This feature is not available

11 Power supply variants

The Masterclock 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

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

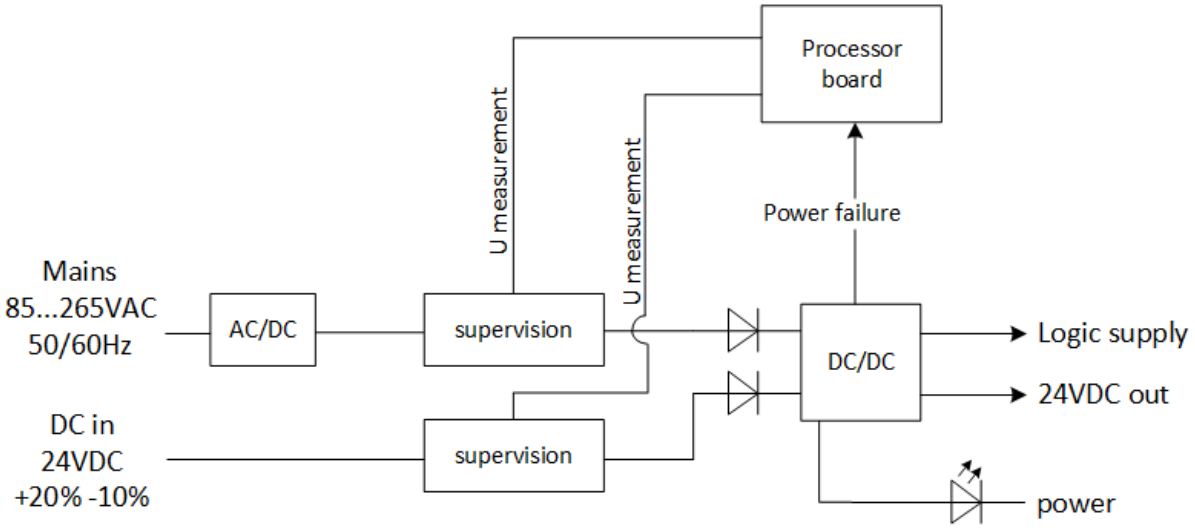
3. Redundant power supply:

Supply1:	**Supply2:**
Mains supply	DC in

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'.

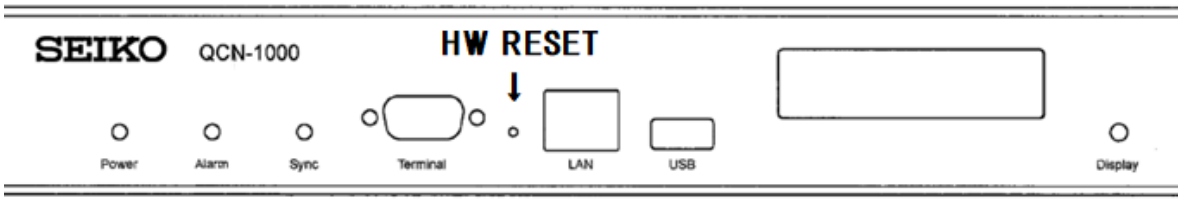
Block diagram of power supply:



12 Appendix

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 QCN-1000 – PC: (DTE-DTE) Crossed cable, female – female connectors (null modem)
Max. length of the connection 3m

Verbindungen zwischen Buchse 1 (SUB-D 9 / 1) and Buchse 2 (SUB-D 9 / 2)

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

* At least needed connections.

LAN Connection:

Plug:	RJ45
Interface:	Ethernet, 10/100Mbit half or full duplex

Use only shielded cables!

USB Connection:

Plug:	USB-Host

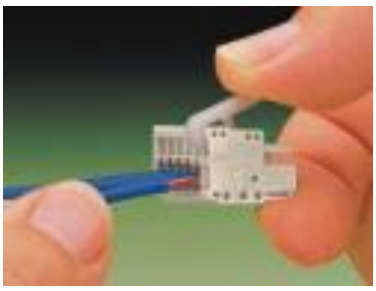
Important: Only permitted for the operations with a USB stick!

A.2 Connections (rear view)

Clamp	Connection	Description
⏚	Earth connection	
L	Mains connection phase	Mains power input with rubber connector *Break point: by disconnecting the rubber connector* See Appendix “H”, section "Mains power supply"
⏚	Mains connection earth	
N	Mains connection neutral	
1	DC in power supply +	Input for external DC supply Ground
2	DC in power supply GND	
3	Alarm relay	Alarm contact, open when alarm is active Max. load: 30 W (60 VDC or 1A) or 60 VA (30 VAC or 1A)
4	Alarm relay	
5	Slave clock line a 1	Output for STSLine , impulse line or DCF active line 1
6	Slave clock line b 1	
7	Slave clock line a 2	Output for STSLine , impulse line or DCF active line 2
8	Slave clock line b 2	
9	Slave clock line a 3	Output for STSLine , impulse line or DCF active line 3
10	Slave clock line b 3	
11	Slave clock line a 4	Output for STSLine , impulse line or DCF active line 4
12	Slave clock line b 4	
13	BNC: IRIGb	AFNOR-A/C, IRIG-B12x output
14	BNC: pulse output	1 PPS (Pulse per second) output 50 Ohms (no load: 5 V, with 50 Ohms load: 2.5 V)
15	BNC: frequency output	10MHz output 50 Ohms (no load: 5 V, with 50 Ohms load: 2.5 V)
16	RS232 TX	RS485 / RS232 output
17	RS232 RX	
18	GND	
19	RS485 +	
20	RS485 -	
21	RS 422 +	RS 422 Sync input
22	RS 422 -	
23	GND	
24	DCF input +	DCF input e.g. for the connection of a GPS or DCF- receiver with "current loop“ output.
25	DCF input -	
26	Sup +	DC output for Receiver 28 VDC, max. 400 mA (or according to the DC in voltage)
27	Sup -	
28	DCF output +	DCF output, “current loop” passive, Umax= 30VDC, Ion = 10..15mA, Ioff < 1mA @20VDC
29	DCF output -	

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)

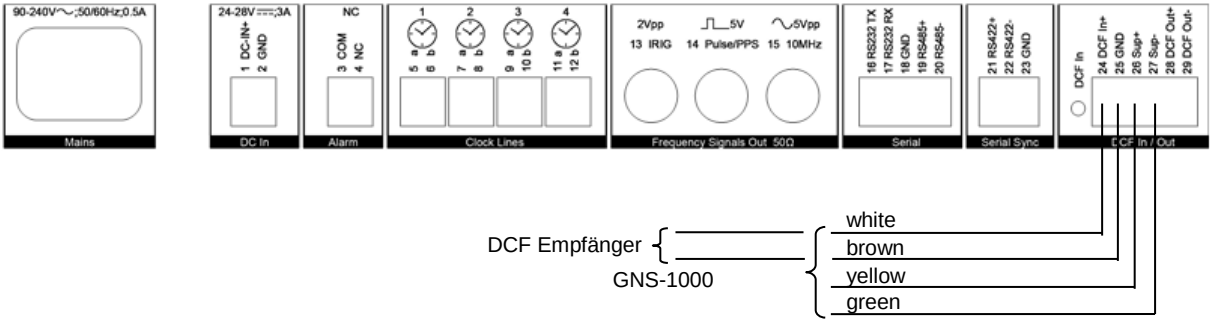


Pulled out spring terminal with operation tool:

2 operation tools are delivered with the accessory bag.

A.4 Connection of GNS-1000

Connection of DCF or GPS receiver to QCN 1000:



B Serial Output Signal

B.1 Output format and communication settings

Output format

RS-422

Communication settings

Time data consisting of year (last two digits), month, date, day-of-the-week, hour, minute and seconds is output every second.

1. Transmission rate — 2,400 bps
2. Synchronization system — Asynchronous
3. Transmission format — Start bit … 1 bit
   Data bit … 8 bit
   Parity bit … None
   Stop bit … 1 bit

B.2 Data format and output data timing

Time/calendar data (fixed at 15 bytes)

Data order	Details of data	Character	ASCII code
1	Start	STX	02H
2	Tens digit of year	0～9	30H～39H
3	Units digits of year	0～9	30H～39H
4	Tens digit of month	0～1	30H～31H
5	Units digits of month	0～9	30H～39H
6	Tens digit of date	0～3	30H～33H
7	Units digits of date	0～9	30H～39H
8	Day of the week	0～6※	30H～36H
9	Tens digit of hour	0～2	30H～32H
10	Units digits of hour	0～9	30H～39H
11	Tens digit of minute	0～5	30H～35H
12	Units digits of minute	0～9	30H～39H
13	Tens digit of second	0～5	30H～35H
14	Units digits of second	0～9	30H～39H
15	Stop	ETX	03H

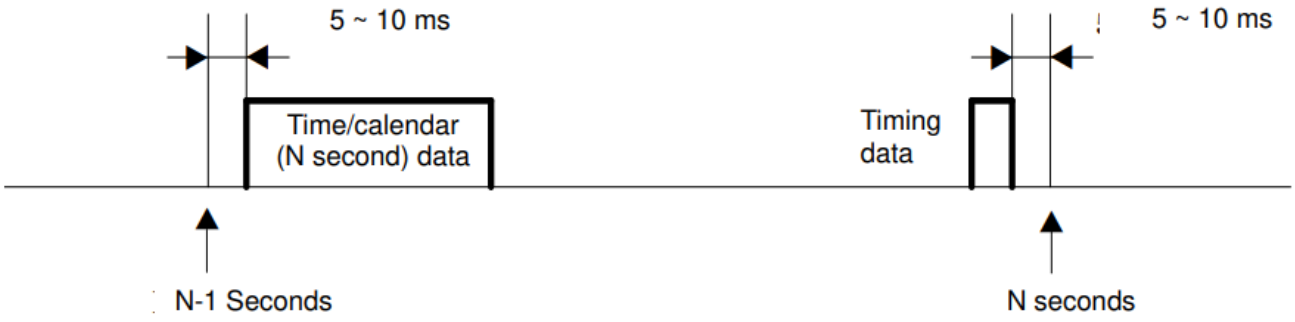
Day of the week(※1)

Character	0	1	2	3	4	5	6
Details	SUN	MON	TUE	WED	THU	FRI	SAT

Timing data (fixed at 3 bytes)

Data order	Details of data	Character	ASCII code
1	Start	STX	02H
2			E5H
3	Stop	ETX	03H

Output data timing



C Time Zone Table

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

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

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

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

Legend:

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

Example:

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

Important: The Time Zone Table is usually updated as needed. The current table is available for download under the following address: *www.seiko-stc.co.jp/en/*. In case your device is equipped with a newer version than shown in this manual, the current time zone settings should be checked.

Modifications / updating the time zone table:

The time zone tables are filed in the */etc/mbsn.tbl* (standard table) and */etc/usersn.tbl* (user table) files. The user table can be updated in accordance with the update instructions (chapter “7.4 Updating applications and configuration via FTP" or 7.6“ Updating applications or configurations via USB) .

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

D Alarm List

Number	Error message	Description / Action
0	Reboot QCN	QCN 1000 restarted, no intervention required
1	Error bit1	Not used
2	Supply voltage too low	Power failure (internally measured) -> support
3	Failure supply 1	Power failure supply 1 (only if redundant supply is on)
4	Failure supply 2	Power failure supply 2 (only if redundant supply is on)
5	Error voltage 5V	Power failure (internally measured) -> support
6	Error voltage 2.5V	Power failure (internally measured) -> support
7	Error voltage 1.25V	Power failure (internally measured) -> support
8	Wrong time zone DCF	Check DCF configuration
9	Error time zone TC1	Error in time zone calculation TC1
10	Error time zone TC2	Error in time zone calculation TC2
11	Error bit11	Not used
12	IRIG 1 output voltage low	Low voltage on analogue AFNOR/IRIG-B output 1
13	Error bit13	Not used
14	Swtich program file invalid	Check switch program file: The file name has more than 8 characters or the file type is not PRG, Prg or prg.
15	Wrong time zone sw. prog.	Check time zone configuration switch function.
16	Time source fail stratum	Stratum too high: check time source
17	Time source fail TO	No time information from the selected time source within the configured timeout: Check time source. In slave mode: check link.
18	No valid time	20 min after starting no valid time -> Check time source
19	NTP synch lost	Check NTP source
20	Error software trim	Quartz error or poor source quality
21	NTP failed	Check NTP configuration
22	NTP backup active	Check primary source
23	Syn. only diff too big	Check synchronization and source
24	No mail server	Check e-mail configuration
25	SNMP not running	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	Error bit30	Not used
31	Error bit31	Not used
32	Error bit32	Not used
33	Error bit33	Not used
34	Error bit34	Not used
35	Error bit35	Not used
36	Error bit36	Not used
37	Error bit37	Not used

38	Tele.-file invalid	Check telegram file: the file name is longer than 8 digits or the file type is not TEL, Tel or tel; alternatively, syntax error in telegram file
39	Wrong time zone serial	Check serial time zone configuration
40	Error bit40	Not used
41	Line 1 current too high	Check STSLine / Impulse line / DCF active line. Alarm disappears only, if alarm is removed.
42	Line 1 wrong time zone	Check time zone setting in (STSLine / Impulse line)
43	Line 2 current too high	Check STSLine / Impulse line / DCF active line. Alarm disappears only, if alarm is removed.
44	Line 2 wrong time zone	Check time zone setting in (STSLine / Impulse line)
45	Line 3 current too high	Check STSLine / Impulse line / DCF active line. Alarm disappears only, if alarm is removed.
46	Line 3 wrong time zone	Check time zone setting in (STSLine / Impulse line)
47	Line 4 current too high	Check STSLine / Impulse line / DCF active line. Alarm disappears only, if alarm is removed.
48	Line 4 wrong time zone	Check time zone setting in (STSLine / Impulse line)
49	Line 1 current too low	Check STSLine / Impulslinie / DCF-Aktivlinie. Line current is lower than set minimum current.
50	Line 2 current too low	Check STSLine / Impulslinie / DCF-Aktivlinie. Line current is lower than set minimum current.
51	Line 3 current too low	Check STSLine / Impulslinie / DCF-Aktivlinie. Line current is lower than set minimum current.
52	Line 4 current too low	Check STSLine / Impulslinie / DCF-Aktivlinie. Line current is lower than set minimum current.
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

E Troubleshooting

#	Error / Indication:	Possible case / Solution
1	sync LED is flashing:	DCF / GPS time source does not receive time –> 2
2	Reception problem with DCF/GPS:	In menu *1 Status –> 4 Source* check, if DCF seconds-counter is counting up continuously from 0 – 59 (corresponding to the current second, value is updated about every 3 seconds. When counter is wrong ➔ check receiver and cabling. Check "DCF In" LED on backside of the QCN masterclock.
3	No NTP time, despite of manual time setting ➔ sync LED is off!	The local time source **DCF/GPS** or **local** has to be configured, otherwise NTP cannot set the time.
4	General time reception problem	If the time difference between QCN-1000.masterclock and the time source (NTP or DCF) is large (> 5 min), the NTP time synchronization may last quite long (> 30 min). To solve the problem, set the time manually.
5	QCN-1000.masterclock restarts all the time.	Check network configuration, Hostname has to be configured and Gateway has to be set (if no Gateway is available in the network, the own IP address of the QCN masterclock can be used as Gateway).
6	LAN LED (left side) is flashing orange.	No connection to the network. Check cabling.
7	Opening the menu via Telnet is not possible or QCN-1000.masterclock is not or no longer reachable via network.	Check network settings in menu *2 Configuration –> 5 Network* (only possible with serial connection): - IP-Address, Subnet mask and Gateway must be set correctly - Interface should be set to **Auto** - Check connection with "Ping" - When earlier the menu was not correctly exited (e.g. LAN cable removed), the menu can be blocked up to 15 minutes.
8	Update of the system software.	The system software can be updated by using FTP client software or via a USB stick (see chapter 7). Your service office will advise you of the benefits and necessity of updates. The firmware file needed can be obtained from that office.
9	Information required to contact your support service.	**Device type, part number, production number and serial number:** This detail are given on the adhesive type label. **The following files must be provided for the analysis:** **All files (in .zip folders, separate for each device)** from the directories **/var/log** and **/etc/**. To copy this files use FTP, e.g. Windows file Explorer with ftp://[IP address], see chapter 7.7 or copy file to a USB stick (chapter 0). **If the log files cannot be copied, read out the current software version:** The software versions can be queried in the menu `1 STATUS/9 Software Versions` **Place and date of purchase and of commissioning of the device.** **Most comprehensive possible details of the malfunction:** Describe the problem, possible causes, measures taken, the system environment, etc.

F Serial Telegrams (Not supported)

F.1 General

A serial interface can be used in two different modes:

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

Output modes

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

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

Telegram format

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

Telegram time

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

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

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

Example:

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

Name of the telegram file

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

F.2 Syntax of the telegram configuration file

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

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

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

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

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

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

        ;-- Possible variables:
        ;
        ;Name:  Description:           Range:    Format:
        ;-------|----------------------|-----------|------
        ;
        ;MSE    (Millisecond)           (0..999)    1W
        ;HSE    (Hundredth of a second) (0..99)     1B
        ;ZSE    (Tenth of a second)     (0..9)      1B
        ;SEK    (Second)                (0..59)     1B
        ;MIN    (Minute)                (0..59)     1B
        ;STD    (12h or 24h format)     (0..12)
        ;                              or(0..24) 1B (see !PM!)
        ;JAR    (Year)                  (0..99)     1W
        ;                              or (1990..2089)
        ;MTG    (Day of the month)      (1..31)     1B
        ;JTG    (Day of the year)       (1..366)    1W
        ;WTG    (Day of the week)       (0..6)      1W Text table !WT!
        ;                              (Su..Sa)
        ;DOW    (Day of the week)       (0..7)      1B !DW!
        ;KAW    (Calendar week)         (1..53)     1B (according to Din ISO 8601)
        ;MON    (Month)                 (1..12)     1W Text table !MO!
        ;MNT    (Month)                 (1..12)     1B
        ;
        ;AMF    (am/pm flag)            (0/1)       1W Text table !AM!
        ;TMQ    (synchronization qual.) (0..255
        ;                               or A..Z) 1B (see !TQ!)
        ;SAI    (Season)                (0..2)      1W Text table !SA!
        ;                                       (Win/Sum/UTC)
        ;AKS    (Season change          (0/1)       1W Text table !AK!
        ;       announcement)
        ;AMF    (am/pm-Flag)            (0/1)       1W Text table !AM!
        ;SST    (Season status)         (0..3)      1W Text table !ST!
```

```
        ;       (Bit 0 = Early warning bit)
        ;       (Bit 1 = Summer bit)
        ;SYA    (Synch. alarm)            (0/1)       1W Texttabelle !SY!
        ;       (0:synch ok, 1: synch alarm -> Alarm Nr.16, 17 or 19)
        ;CHS    (Check sum)             (0..255)    1B
        ;XCH    (XOR Check sum)         (0..255)    1B
        ;X1C    (XOR Check sum low nibble in ASCII) (0..9, A..F)   1B
        ;X2C    (XOR Check sum high nibble in ASCII)(0..9, A..F)   1B
        ;         Definitions:
        ;         CHS = (Sum of all bytes up to CHS) AND h'FF
        ;         XCH = XOR link of all bytes up to CHS

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

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

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

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

;-- Synchronization mode ----------------------------------------
!TC!mmm!
        ;Pretiming of the telegram in ms (-90..995). To synchronize the telegram
        ;end with the second start the TC has to be set according to the telegram
        ;length and the transmission format. If TC is set, it will be performed.
        ;
        ;e.g.   Telegram start 120ms before the start of the second:
        ;       !TC!120!
;---------------------------------------------------------------------
```

```
;-- Format time quality ------------------------------------------
!TQ!MAX VALUE!STEP!
        ;If this entry is absent, the byte value of TMQ is
        ;outputted
        ;MAX VALUE corresponds to the byte value for 1
        ;MAX VALUE+STEP corresponds to the byte value for 2
        ;MAX VALUE+2*STEP corresponds to the byte value for 3 ...
        ;
        ;Example:  Stratum 1 = A
        ;          Stratum 2 = B
        ;          Stratum 3 = C
        ;          ...
        ;
        ;         !TQ!1!1!
;-------------------------------------------------------------------

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

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

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

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

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

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

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

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

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

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

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

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

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



;-- File End ---
!EE!

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

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

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Designation	Description	Version	License	License Description (file)
U-Boot	Boot loader	2016.11	GPL version 2	COPYING
Linux	Operating system	4.9.76	GPL version 2	COPYING
Busybox	System environment	1.28.4	GPL version 2	LICENSE
NTP	NTP	4.2.8p15	Free	COPYRIGHT
pure-ftp	FTP server	1.0.47	Free, partly BSD	COPYING
NetSNMP	SNMP agent	5.7.3	BSD	COPYING
OpenSSL	SSL Lib.	1.0.2n	BSD style	LICENSE
OpenSSH	SFTP server	7.6.p1	BSD	LICENCE
dropbear	SSH server	v2017.75	MIT style: Free, party BSD	LICENSE
wide-dhcpv6	DHCPv6 client	20080615	Free	COPYRIGHT
flex	Flex Lib.	2.6.4	BSD adapted	COPYING
zlib	Compress lib.	1.2.11	Free	README
mailsend	E-mail client	1.19	GPL	COPYRIGHT

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The source code of the open source projects running under GPL can be requested from SEIKO TIME CREATION Inc. (www.seiko-sts.co.jp/e/ -> Contact). Handling costs will be charged.

H 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 60ºC, 10-90% relative humidity, without condensation	
Operation	SSH / HTTP In addition, operation is also possible with SNMP.	
Accuracy	GPS (DCF input) to NTP server: GPS (DCF input) to DCF output: NTP to internal time: GPS (DCF) input or NTP client to clock line:	typical < +/- 100 µs typical < +/- 10 µs typical < +/- 100 µs typical < +/- 10 ms

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

Time keeping (internal)	Synchronized with GPS:	+/-10 µs to UTC
	Synchronized with RS422	+/-10 mms to source signal
Holdover (free run):	After at least 12 hours synchronization from the time source:	
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	

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: > 1500 requests / sec. (e.g. client request every 60 sec. ➔ >90’000 clients)	
NTP mode	Server, Peer, Broadcast, Multicast	
NTP slave clock lines:	1 line with up to 15 different time zone entries. Communication through multicast: -RFC 3376: Internet Group Management Protocol, Version 3 -RFC 1112: Host extensions for IP multicasting -RFC 4601: Protocol Independent Multicast - Sparse Mode (PIM-SM) -RFC 3973: Protocol Independent Multicast - Dense Mode (PIM-DM)	
Time zones	Up to 80 predefined and programmable entries	
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
	SSH	TCP, Port 22	operation

SCP	via SSH	update
SFTP	via 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“
HTTP	TCP, Port 80	operation

SNMP

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

E-mail

Alarm reporting via SMTP.
Authentication at the mail server:
- with sender address
- with username/password SMTP-Auth with LOGIN, PLAIN (RFC 4954) or CRAM-MD5 (RFC 2195)

no “POP before SMTP“ possible

Serial interface (front side)

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

DCF input

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

RS422 input telegrams

RS 422 synchronization Input as time reference with “JST SEIKO format”

Time signal outputs

NTP V4 for slave clocks (unicast and multicast)
1x IRIG-B output (analog)
1x 10MHz output
1 x DCF current loop interface passive
1 x Script files configurable time telegrams on RS 232 (only send) and RS 485
1 x Script files configurable time telegrams “with “JST SEIKO format” on RS 422 (only send)
4 x clock line output (STSLine / Impulse line / active DCF line are selectable)

IRIG-B output

IRIG line, available as analog signal
Max. time deviation to GPS (with GPS source):
Modulated: < +/- 200 µs
Jitter modulated at carrier frequency: ≤ 1%
Line mode: IRIG-B122, IRIG-B Std 12h (B122), IRIG-B123, IRIG-B DIEM, AFNOR A, AFNOR C, IRIG-B126 (127),

Output voltage level
(R_L=50 Ohm): 0.1 – 5.5 Vpp (configurable)
$SNR_{|dB}$: typical >= 40dB
Impedance: Ri < 50 Ω

Pulse output

Output for technical impulses: 1 PPS (Pulse per second)
BNC connector 50 Ohms (no load: 5 V, with 50 Ohms load: 2.5 V)

10 MHz output

Output for technical impulses: 10MHz
BNC connector 50 Ohms (no load: 5 V, with 50 Ohms load: 2.5 V)

DCF output	DCF time code, time zone selectable Max. time deviation with GPS source: +/- 10 µs, jitter < 10 µs DCF time code passive current loop interface: Vmax = 30 VDC, I_{on} = 10..15 am, I_{off} < 0.1 mA @20VDC
RS232 interface (back side)	RS232 line for telegram output 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
RS422 interface (back side)	RS422 line for telegram output 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
Clock line output (4x) line) mode:	The 4 clock lines can be set to Impulse, DCF active or STSLine (only 1 mode:
	impulse clock line Max. current: up to 500 mA impulse current (per line) Voltage: 24 VDC (polarized) (depending on power supply) Line modes: 1 min., 1/2 -min., 1/5-min., 1/8-min., 1 sec Impulse length: 200 – 30'000 ms, approx. 50 ms resolution Pause length: 200 – 30'000 ms, approx. 50 ms resolution Acceleration modes: 12 h, 24 h, 1 week Max. time deviation against internal time: +/- 1 ms With DC power supply at least 23.5 VDC required
	DCF active clock line Max. current: up to 500 mA impulse current (per line) Voltage: 24 VDC (polarized) (depending on power supply) Line modes: 6 differen modes are supported Max. time deviation (pulse start) against internal time: +/- 1 ms With DC power supply at least 23.5 VDC required.
	STSLine (only 1 line) Max. current: up to 350 mA eff. (per line) Voltage: without load ≈ 17 VAC, typical 15 VAC Line modes: 10 sec.-, ½ min.- or 1 min. steps Max. time deviation against internal time. +/- 10 ms With switching function, switching function for clock illumination and World time function available. With DC power supply at least 28 VDC required
USB plug	USB host for USB stick, used to upload new FW and to download log and configuration files.
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 see Alarm contact E-mail see E-mail SNMP notification see SNMP trap Display see Display Alarm-LED see LEDs
Configuration	Terminal Menu accessible through Serial connection, SSH or HTTP Web interface. SNMP set/get commands.

Display	2 lines with up to 16 characters for the display of status information: - Time, date - Current time source - NTP Stratum - Software version - IPv4 address - IPv6 address - Alarm summary - Current alarms
LEDs	3 LEDs showing the status of the masterclock: - Power (green) → on = power ok / off = no power - Alarm (red) → on = active alarm / off= no alarm - sync status (green) → on = Sync / off = no Sync
DC power supply	24 V DC (24V-28V) / 3A
Mains power supply	90 – 240 V / 50 - 60 Hz / 50W 0.5 A
Power supply output	Nominal 24 VDC, max. 100 mA (respectively according to power supply)

I QCN Security Guidelines

I.1 Change Default passwords

QCN user (menu, ftp, scp)

All QCN devises have a built-in default user for configuration and management.

Username: adm

➔ Change the default password via “Configuration -> General Settings” configuration section

SNMPv3 Users

For SNMPv3 the QCN device has two predefined users:

Usernames: qcnUser1, qcnUser2

➔ Change the default passwords in the “Configuration -> SNMP -> SNMPv3” configuration section

I.2 Disable unused network services

Disable unused network services:

- Telnet
- FTP
- SNMP
- Disable unused IP protocols (IPv4, IPv6) and configurations (static, DHCP, autoconfigure / RA)

If you NOT plan to commission your device over LAN, you can disable also the following services:

- SSH, SCP, SFTP

Restrict SNMP version to SNMPv3 only:

- Disable SNMPv1, SNMPv2c
- Enable SNMPv3 authentication and privacy

Restrict NTPQ requests

- Restrict NTPQ requests (NTP Mode 6+7 packets). Please refer the QCN user manual.

I.3 Prefer encrypted communication services

Commissioning

- Use SSH, SCP, SFTP for configuration and management
- Use SNMPv3 for management

➔ Telnet, FTP, SNMPv1, SNMPv2c do not use encrypted communication. This means passwords are transferred as plain text over the network.

I.4 Use NTP authentication

- Configure NTP authentication on Server and Clients

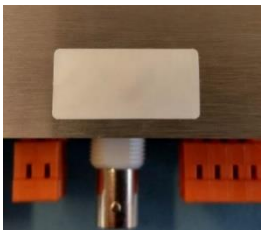
I.5 Physical device access

- Install device in a lockable cabinet

I.6 Validate “Warranty Void” sticker

The QCN device has a “Warranty Void” sticker (see picture below).

Do not use the device if this sticker is broken



For inquiries and repair requests regarding this product, please contact us from the website below.

https://www.seiko-stc.co.jp/en

SEIKO TIME CREATION INC.