Operating Instructions 11/2012

SICLOCK TC400
Plant Central Clock

SICLOCK

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SICLOCK® TC400
Plant Central Clock

Operating Instructions

11/2012

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Safety notices

This manual contains information that must be observed to ensure your personal safety and to prevent property damage. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring to property damage only, have no safety alert symbol. Depending on the hazard level, warnings are displayed in descending order as follows:

Danger

indicates that death or serious injury **will** result if proper precautions are not taken.

Warning

indicates that death or serious injury **may** result if proper precautions are not taken.

Caution

with a warning triangle indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a warning triangle means that material damage can occur if the appropriate precautions are not taken.

Notice

means an undesirable result or state can occur if the corresponding instruction is not followed.

In the event of a number of levels of danger prevailing simultaneously, the warning corresponding to the highest level of danger is always used. A warning with a warning triangle indicating risk of physical injury may also include a warning of the risk of damage to property.

Qualified personnel

The associated device/system may only be installed and used in conjunction with this documentation. Only **qualified personnel** should be allowed to commission and operate the device/system. For the purpose of the safety information in this documentation, a “qualified person” is someone who is authorized to energize, ground, and tag equipment, systems, and circuits in accordance with established safety procedures.

Intended use

Please note the following:

Warning

This equipment is only allowed to be used for the applications described in the catalog and in the technical description, and only in conjunction with non-Siemens equipment and components recommended by Siemens. Correct transport, storage, installation and assembly, as well as careful operation and maintenance, are required to ensure that the product operates safely and without faults.

Registered Trademarks

All designations with the trademark symbol ® are registered trademarks of Siemens AG. Other designations in this documentation may be trademarks whose use by third parties for their own purposes can violate the rights of the owner.

Disclaimer of liability

We have checked that the contents of this publication agree with the hardware and software described here. Nevertheless, we cannot assume responsibility for any deviations that may arise. The information given in this publication is reviewed at regular intervals and any corrections that might be necessary are made in the subsequent editions.

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Preface

This document is a compilation of the information required for the operation and parameterization of the SICLOCK TC400 plant central clock.

Scope

This manual is valid for the SICLOCK® TC400 product with firmware version V1.0 and processor version V1.0 in conjunction with the SICLOCK TC400 configuration tool as of Version 1.0.

Recycling and disposal

The SICLOCK TC400 is environmentally friendly and is thus recyclable. To recycle and dispose of your old device in an environmentally friendly way, please contact a company certified to deal with electronic waste.

Technical Assistance

If you have any technical questions, please contact Technical Assistance:

Phone: +49 (911) 895-59 00
Monday to Friday, 8 am – 5 pm CET

Fax: +49 (911) 895-59 07

E-Mail: siclock@siemens.com

The latest information on SICLOCK products, product support and FAQs can be found on the Internet:

- **http://www.siemens.de/siclock** (German)
- **http://www.siemens.com/siclock** (international)

Table of contents

Safety Information

1

Caution

Please observe the safety instructions on the back of the cover sheet of this documentation. You should not make any expansions to your device unless you have read the relevant safety instructions.

If you have questions about the validity of the installation in the planned environment, please contact your service representative.

Repairs

Only authorized personnel are permitted to repair the device.

Warning

Unauthorized opening and improper repairs can cause considerable damage to property or danger for the user.

System expansions

Only install system expansions intended for this device. If you install other upgrades, you may damage the system or violate the safety requirements and regulations for radio frequency interference suppression.

Contact your technical support team or where you purchased your device to find out which system expansion devices may safely be installed.

Caution

If you install or exchange system expansions and damage your device, the warranty becomes void.

Safety information

Siemens offers IT security mechanisms for its automation and drive product portfolio in order to support the safe operation of the plant/machine. Our products are also continuously developed further with regard to IT security. We therefore recommend that you keep yourself informed about updates and upgrades for our products and always use the latest version of each product. For information on this topic, refer to: Industry Online Support (http://www.siemens.com/automation/csi_de_WW). You can register for a product-specific newsletter here.

For the safe operation of a plant/machine, however, it is also necessary to integrate the automation components into an overall IT security concept for the entire plant/machine which corresponds to state-of-the-art IT technology. You can find information on this at: Industrial Security (http://www.siemens.com/industrialsecurity).

Products used from other manufacturers should also be taken into account here.

Network security

In order to protect the entire plant from attacks on network security, corresponding measures must be taken.

Caution

Failures or damage to your overall system

Unauthorized persons can gain entry into your network via the Ethernet ports and make changes to the SICLOCK TC400 parameterization. This can result in the time being adjusted. Individual or even all clients to be synchronized can be removed from the synchronization cycle. This has the potential to cause failures or damage throughout the plant.

Please adhere to the following safety measures:

- Ensure that your network is protected against unauthorized access by installing a firewall at all Ethernet ports.
- Change the default password immediately after commissioning.
- Limit the number of people to whom this password is known to the absolute minimum.
- Change the password regularly.

Battery

This device is equipped with a Lithium battery. Batteries may only be replaced by qualified personnel. See also **Battery** (Section 11.1).

Caution

There is the risk of an explosion if the battery is not replaced as directed. Replace only with the same type or with an equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with local regulations.

Warning

Risk of explosion and release of harmful substances!

Therefore, do not throw Lithium batteries into an open fire, do not solder or open the cell body, do not short-circuit or reverse polarity, do not heat up above 100° C, dispose as regulated and protected against direct exposure to sunlight, humidity and condensation.

ESD guidelines

Modules containing electrostatic sensitive devices (ESDs) can be identified by the following label:

Strictly follow the guidelines mentioned below when handling modules which are sensitive to ESD:

- Always discharge your body's static electricity before handling modules which are sensitive to ESD (for example, by touching a grounded object).
- All devices and tools must be free of static charge.
- Always pull the mains connector and disconnect the battery before you install or remove modules which are sensitive to ESD.
- Handle modules fitted with ESDs by their edges only.
- Do not touch any connector pins.

Description 2

Modern automation systems consist of a variety of computers, controllers and systems that exchange data with one another. For real-time operation of such plants, it is essential that the times of all components are synchronous. This applies especially for error tracing, when event messages receive a time stamp and when cause and effect have to be identified through a reliable chronological sequence.

As plant central clock, SICLOCK TC400 supplies the various plant components with the exact and reliable time, which is obtained from one or more external synchronizations with an official or legal time, usually GPS or DCF77 radio clocks.

The time is distributed via Ethernet, and also via point-to-point outputs.

Note

Use only one device as plant central clock to supply the time to all components throughout the plant.

Exception: redundant operation of the plant central clock.

2.1 Configuration of the SICLOCK TC400 hardware

The following figure shows a connection example of the SICLOCK TC400 to a SICLOCK GPS1000 as radio clock and an NTP server as an additional external synchronization.

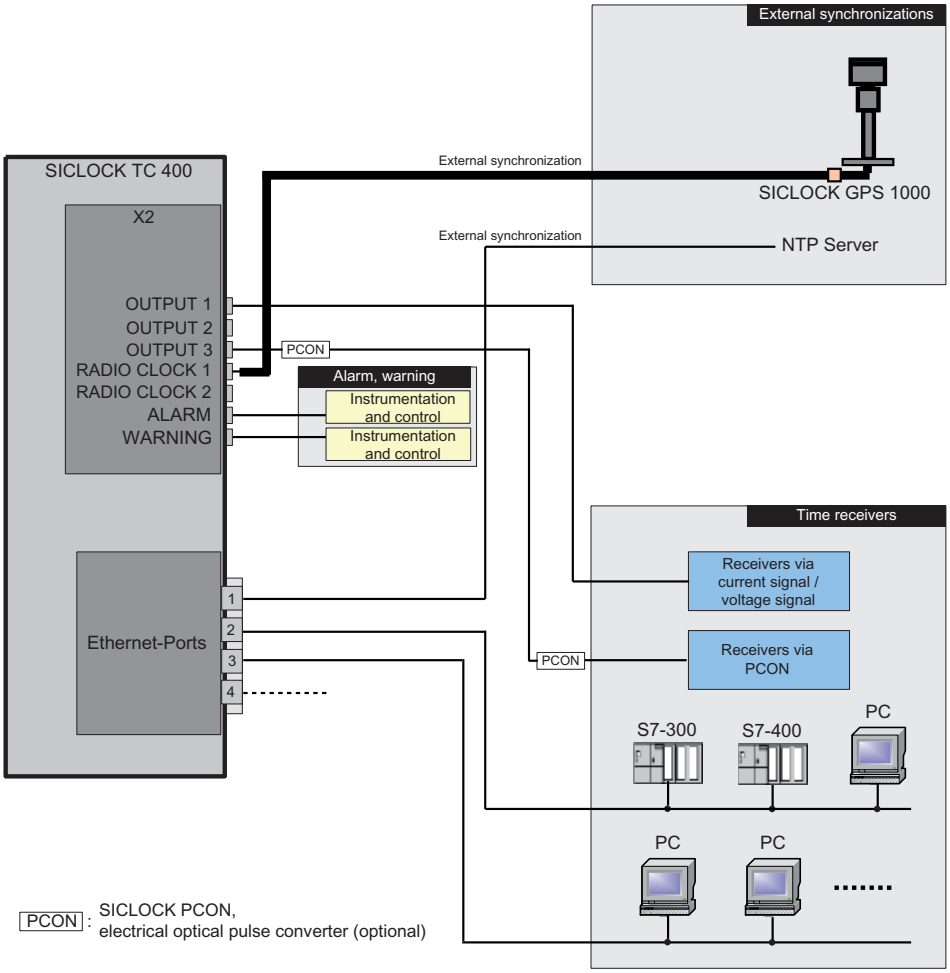

Figure 2-1 Application example

2.2 External synchronization

SICLOCK TC400 can be matched to the local official time or GMT via external synchronization in order to automate or restrict manual actions, such as daylight saving time switchovers and leap seconds, to a minimum.

External synchronizations can be GPS or DCF77 radio clocks, servers (e.g. time signal from an NTP server), further SICLOCK TC400 devices or other signal sources. They are connected to RADIO CLOCK 1 or RADIO CLOCK 2 or to one of the four Ethernet ports on the device.

NTP servers are supported as external synchronization on the Ethernet ports.

Possible radio clocks to RADIO CLOCK 1 and RADIO CLOCK 2:

- SICLOCK GPS1000
- SICLOCK GPSDEC
  (SICLOCK GPSDEC has been discontinued, please use SICLOCK GPS1000)
- SICLOCK DCFRS

Third-party products can be connected via TTY (passive). The following protocols are supported:

- Demodulated DCF77
- Serial:
  - Meinberg compatible (including time zones)
  - Meinberg compatible (not including time zones)
  - NMEA (0183/ZDA)

Further information

Linking the external synchronization (Section 9.1)

2.3 Time receivers

The time receivers of the plant can be connected via Ethernet or directly on the device via point-to-point connections.

2.3.1 Plant synchronization via Ethernet

Physical access

There are four Ethernet interfaces available as physical access to the network with the following specification:

- 100Base TX via RJ-45 socket

Protocols

The following protocols have been implemented:

- NTP server according to RFC2030
  - Any/unicast mode
  - Multicast mode
  - Multicast mode with local time
- Time synchronization with the SIMATIC method
  - PCS7-compatible mode
  - S5-compatible mode

  The time message frames can be transmitted to each Ethernet port individually either every second or every 10 seconds.

2.3.2 Plant synchronization via point-to-point connection

Non-networked plant equipment is synchronized via OUTPUTs 1 to 3 (point-to-point connections). They can be parameterized independently.

OUTPUTs 1 and 2

- Current signal: 20 mA active, floating

or

- Voltage signal: 24 V, floating

OUTPUT 3

RS422, floating

Output signal

- DCF77 with local time, invertible
- DCF77 with UTC, invertible
- Pulse per second, invertible
- Pulse per minute, invertible
- Serial telegram (parameterizable output telegram, see below)

Output telegram (setting applies to all three outputs)

- Meinberg compatible (including time zones)
- Meinberg compatible (not including time zones)
- NMEA (0183/ZDA)

2.4 Time management

Various functions are available in SICLOCK TC400 in order to generate the time valid for the plant from the external synchronization. This includes setting options for time zones as well as the parameterizable daylight saving time.

Time assurance through protected synchronization

If a discontinuity of more than 5 s occurs in the external synchronization, the protected synchronization is activated and, for safety reasons, the synchronization not performed.

Time assurance through microstepping mode

A time difference between the external synchronization and the device, which can occur through a temporary radio failure or switchover to a substitute synchronization, is automatically cleared unnoticeably in microstepping mode for the plant operation. There is no inconsistency in the time.

Further information and parameterization options for protected synchronization and the microstepping mode are described in Section **Synchronization** (Section 9.3.2).

Note

Only parameterize the plant time at one location within the synchronization hierarchy, ideally at the plant central clock.

2.5 Commissioning

The commissioning can be divided into the following steps:

1. **Installation** (Section 5)
2. **Connecting** (Section 6)
3. Assigning IP address on the device
   Parameterization and Operation on the Device (Section 8)
4. **Parameterization** (Section 9)

   With a few exceptions, the settings are made with the configuration tool, see **Configuration Tool** (Section 7).

2.6 Redundancy

Redundant external synchronization

Up to two radio clocks and up to four time servers can be operated on the SICLOCK TC400 for the external synchronization.

The priorities of the external synchronizations and therefore the redundancy behavior can be set via parameters, see **Redundancy** (Section 9.1.3).

Redundant SICLOCK TC400 plant central clock

A SICLOCK TC400 can be operated via various ports on a redundant network and several SICLOCK TC400 can be operated as servers on one network.

For further information, refer to Chapters **Configuration Tool** (Section 7) and **Parameter Table** (Section 10).

Redundant control of time receivers (output redundancy)

At least two SICLOCK TC400 are used for an output redundancy. With the appropriate parameterization, OUTPUTs 1 and 2 of the two devices can each be connected redundantly with the other.

For further information, refer to Sections **Redundant point-to-point connections** (Section 6.4.2) and **OUTPUT 1 and 2 redundant** (Section 9.2.4).

You can find more information on redundancy in „Application Note 0108“ on http://www.siemens.com/siclock under "FAQ".

Hardware Description

3

This chapter describes the hardware design with connections, the operator controls and displays.

3.1 External design

The following figures show the displays and operator controls as well as the connections of the SICLOCK TC400.

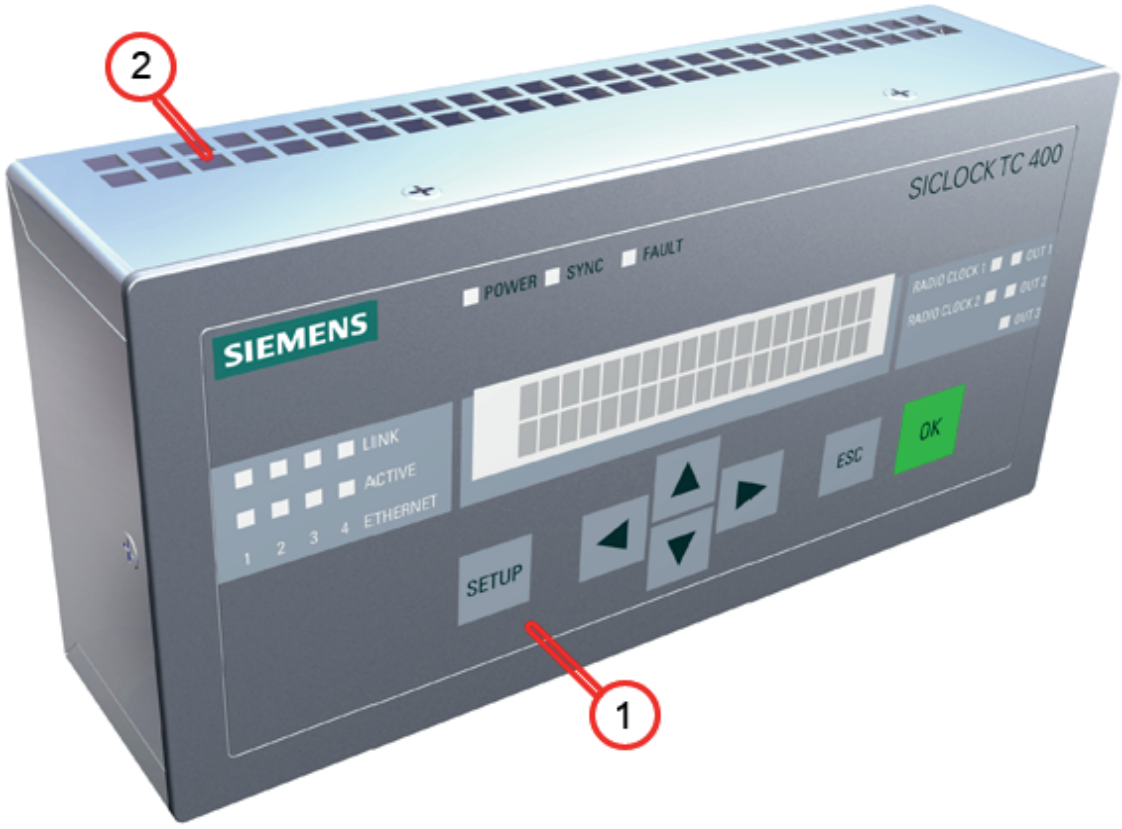

Figure 3-1 SICLOCK TC400 - perspective view with front panel and ventilation grille

(1) Panel with operator controls and displays

(2) Ventilation grille

3.2 Connection elements

The following figure shows the connections of the SICLOCK TC400.

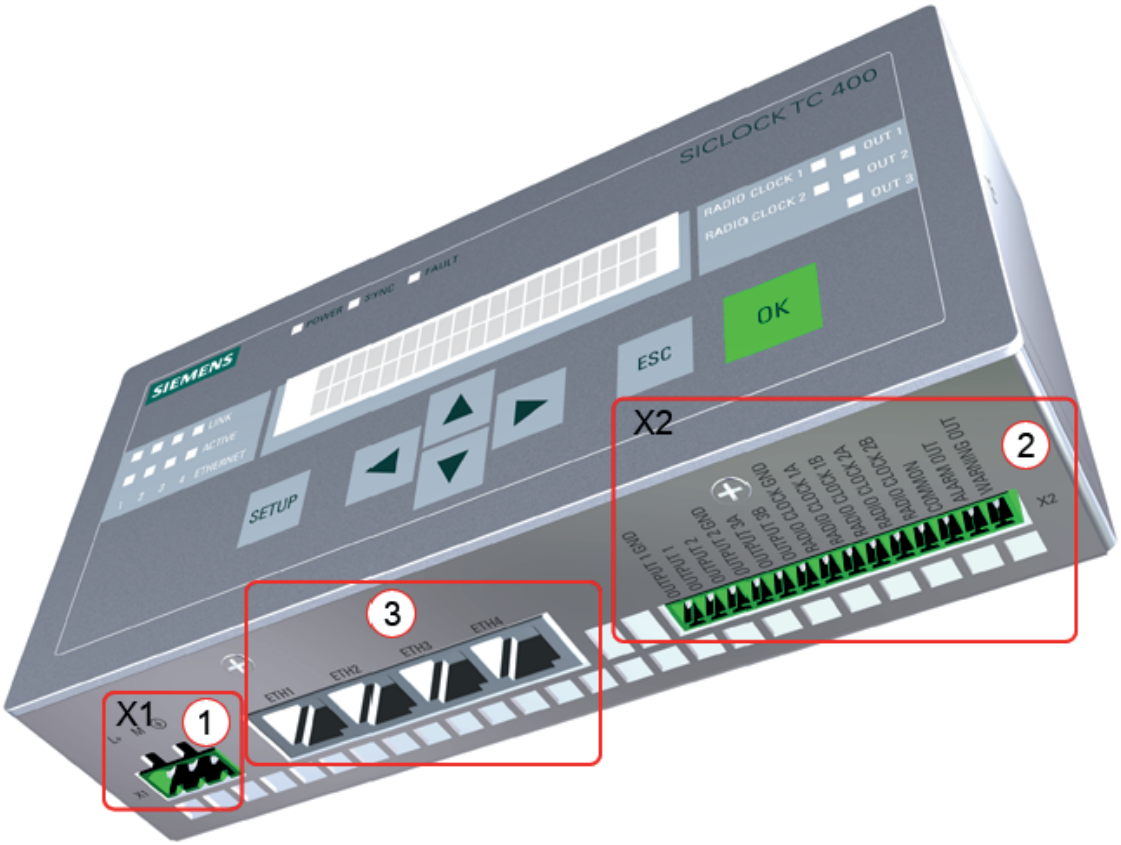

Figure 3-2 SICLOCK TC400 - arrangement of the connections

(1) Terminal X1 - 24 V power supply

(2) Terminal X2 - connecting terminal for radio clocks, outputs and alarm
See also **Terminal assignment** (Section 15.1).

(3) Four Ethernet ports

3.3 Operator controls and displays

The front panel shows the current mode in the display and with LEDs. The device can be operated directly via the keypad. A Web-based configuration tool is available for a wide range of configuration options, see **Configuration Tool** (Section 7).

Figure 3-3 SICLOCK TC400 front view

Table 3-1 Meaning of the displays and operator controls

Name	Color (LED)	Meaning
Displays		
POWER	Green	Ready to run
SYNC	Green	SICLOCK TC400 has been externally synchronized
FAULT	Red	Alarm The associated message text is shown in the display.
	Flashing red	Warning The associated message text is shown in the display.
LINK (Port 1-4)	Yellow	Physical connection has been established, possible to send and receive
ACTIVE (Port 1-4)	Green	Display of the data traffic for the respective port
RADIO CLOCK 1	Yellow	Receive signal of radio clock 1
RADIO CLOCK 2	Yellow	Receive signal of radio clock 2
OUT 1	Green	Output 1 Output signal at the terminal
OUT 2	Green	Output 2 Output signal at the terminal
OUT 3	Green	Output 3 Output signal at the terminal
Display		Display of time, date and synchronization or message text when an error occurs
Operator controls		
SETUP		Call of the password input or parameter list
↑ ↓ ← →		Navigation in the menus
ESC		• Cancellation of an entry and return to the call menu. • Switchover from an information message or warning to the mode display • Change to operator control for a limited period when a persistent message is pending.
OK		Accepting of entries and acknowledging of messages

For further information, see **Parameterization and Operation on the Device** (Section 8).

3.4 Scope of delivery

Table 3-2 Scope of delivery of the individual device versions

2XV9450-2AR01	
	SICLOCK TC400 single device with terminal strips connected at X1 and X2
2XV9450-2AR10 (SICLOCK TC400 standard package)	
	SICLOCK TC400 single device with terminal strips connected at X1 and X2
	SICLOCK GPS1000 radio clock complete with mounting frame and lightning protection
2XV9450-2AR20 (SICLOCK TC400 DCF77 package)	
	SICLOCK TC400 single device with terminal strips connected at X1 and X2
	SICLOCK DCFRS radio clock industrial version complete with mounting frame

Operation Planning

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4.1 Overview of operation planning

SICLOCK TC400 has been designed for weather-protected, stationary operation in an industrial environment.

The operating conditions surpass the requirements according to DIN IEC 60721-3-3:

- Class 3M3 (mechanical requirements)
- Class 3K3 (climatic requirements)

General information about operation

Caution

The device is approved for operation in closed rooms only. The guarantee is void if this stipulation is ignored.

Condensation

When transporting the device at low temperatures, ensure that no moisture forms on or in the device. This also applies if the device is subjected to extreme changes in temperature.

Commissioning

Allow the device to slowly adjust to room temperature before commissioning. Do not place the device near heat radiation. With large differences in temperature, harmful condensation can be avoided by leaving the device in the transport packaging.

If condensation occurs, wait at least about 12 hours before you switch on the device (for 20° C temperature difference). The waiting period is extended accordingly for greater temperature differences.

Avoid extreme ambient conditions. Protect your device against dust, moisture and heat. For further information, see Chapter **Technical Data** (Section 13).

Do not place the device in direct sunlight.

Use in residential areas and operation in the public network

If you operate the SICLOCK TC400 in residential areas or in the public network, you must ensure that it complies with the limit class B according to EN 55022 with regard to the emission of radio interference.

Note

This is a a class A device. The device may cause RF interference in residential areas or in the public network. In this case, the operator company may be held liable for taking appropriate measures.

The following measures are recommended to ensure the interference complies with limit class B:

- Installation of the SICLOCK TC400 in grounded control cabinets / control boxes
- Use of filters in electrical supply lines

Use with additional measures

Applications where the use of the SICLOCK TC400 or similar device requires additional measures:

- Locations with a high percentage of ionizing radiation
- Locations with extreme operating conditions, such as
  - dust accumulation
  - corrosive vapors or gases
  - strong electric or magnetic fields
  - damp and wet rooms
  - strong oscillations, shocks, vibrations
  - strong radiant heat
- In systems, which require special monitoring, such as
  - elevators
  - electrical plants in potentially hazardous areas

An additional measure, for example, would be to install the SICLOCK TC400 in a cabinet or housing.

4.2 Transport and storage conditions

Although the device is of rugged design, its internal components are sensitive to severe vibrations or shock. You must therefore protect the device against severe mechanical loads.

You should always use the **original packaging** for shipping and transporting the device.

Unpack the device at its final destination.

Do not transport the device when it is mounted.

Observe the notes about temporary storage in Chapter **Service and Maintenance** under **Battery** (Section 11.1).

The following information applies to modules transported and stored in the original packaging.

The climatic environmental conditions correspond to IEC 60721-3-2, Class 2K4 for transport

The mechanical environmental conditions correspond to IEC 60721-3-2, Class 2M2 for transport

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Caution

Risk of damage to the device!

If you are transporting the device in cold weather with large fluctuations in temperature, care must be taken to ensure that no moisture forms on or in the device (condensation).

If condensation has developed, wait at least 12 hours before you switch on the device.

Caution

Observe these conditions each time the device is transported, otherwise the guarantee is void.

Table 4-1 Transport and storage conditions

Type of condition	Permissible range
Free fall (in transport packaging)	<= 1 m
Temperature	-40° C to +70° C
Atmospheric pressure	1080 to 660 hPa (corresponds to an altitude of -1000 to 3500 m)
Maximum temperature change	20° C/h
Relative humidity	10 to 95% (at 25° C without condensation)

4.3 Unpacking and checking the delivery

The device has been completely assembled, tested and packed in the factory and has no internal transport locks.

If there are large temperature differences between the transport medium and the location where the device is unpacked, it is recommended that the device be left in the transport packaging in order to avoid harmful condensation.

Procedure

- Please check the packaging material for transport damage upon delivery.
- If any transport damage is present at the time of delivery, lodge a complaint at the shipping company in charge. Have the shipper confirm the transport damage immediately.
- Unpack the device.
- Keep the packaging material in case you have to transport the device again.

Caution

The packaging protects the device during transport and storage. Transport the device only in the original packaging!

- Please keep the enclosed documentation in a safe place. You will need the documentation when you commission the device for the first time.
- Check the package contents for completeness and any visible transport damage. Check for completeness using the enclosed "Contents of Delivery" list.
- Notify the delivery service in charge immediately if the package contents are incomplete or damaged.

Warning

Make sure that a damaged device is not installed and commissioned unintentionally.

4.4 Mounting position and fixing method

4.4.1 Installation instructions

Before installing the device, read the following general installation instructions.

Warning

Hazardous voltage

Isolate the power supply to the control cabinet before opening it. Ensure that the power to the control cabinet cannot be turned on accidentally.

- Position the device/display in an ergonomic position favorable to the user. Choose a suitable installation height.
- Position the device/display so that it is not subject to direct sunlight or other strong sources of light.
- Provide adequate volume in the control cabinet for air circulation and heat transport. Maintain a clearance of 100 mm above and below. This clearance is increased accordingly with connection cables.
- Position the device so that the air vents of the housing are not covered up following installation.
- Also provide enough free space for device expansions.
- Note the reinforcement in the control cabinet for stabilizing the installation cut-out. Install reinforcement if required.
- Install the device in such a way that there is no danger, for example, of it falling out.
- During assembly, please comply with the permissible mounting positions.

See also **Dimension Drawing** (Section 14).

4.4.2 Permitted mounting position

The only permissible mounting position is horizontal, i.e. the display is read horizontally. Adequate ventilation cannot be guaranteed in other mounting positions

Figure 4-1 Horizontal mounting position

4.4.3 Fixing method

The housing can be snapped onto DIN rails or fixed to SIMATIC S5 standard mounting rails.

See also **Installation overview** (Section 5.1).

Installation

5

5.1 Installation overview

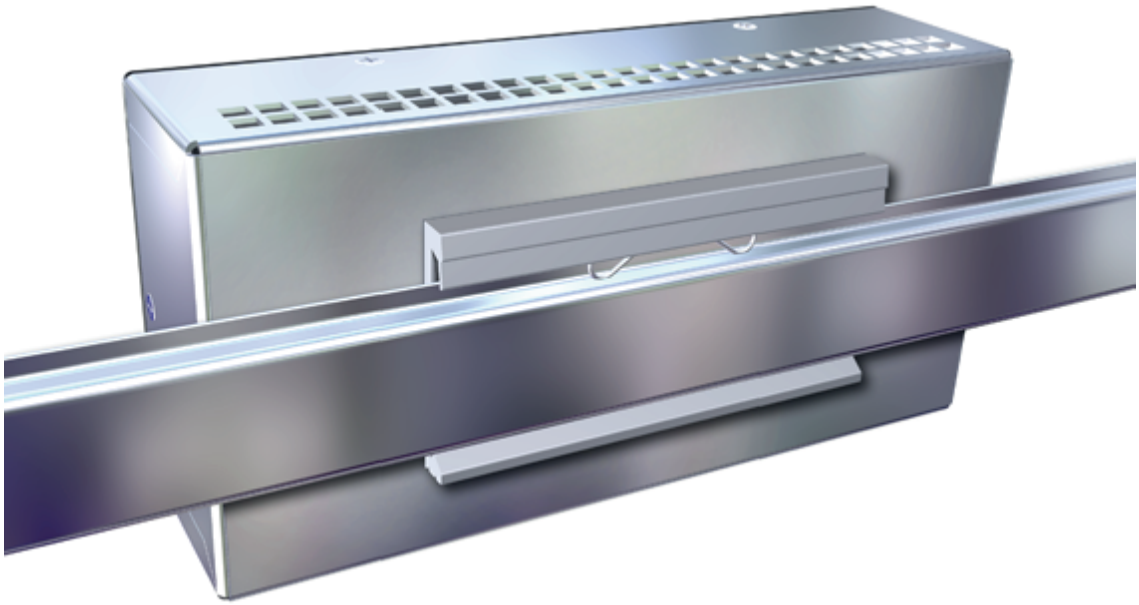


Figure 5-1 SICLOCK TC400 - installation view

The SICLOCK TC400 should be installed in the control cabinet at an easily accessible position.

The housing can be snapped onto DIN rails (**EN 50022-35**) or fixed to **SIMATIC S5 standard mounting rails (6ES5 710-8maxx)**.

There must be a space of 100 mm above the device for snapping the device on and off the DIN rail and for unobstructed heat dissipation.

There must be a space of at least 100 mm below the device for the process signal connectors.

It is recommended that a suitable cable duct be installed below this space.

Note

Ensure that the snap fasteners are correctly locked.

See also **Dimension Drawing** (Section 14).

Connecting 6

6.1 Connecting overview

Caution

Only connect I/O devices that are suitable for industrial use.

Caution

Strictly adhere to the specifications for I/O devices.

Note the following requirements for the setup:

- The device may only be connected to 24 VDC power supplies that meet the requirements of a functional extra-low-voltage with safe isolation (PELV). The cable cross-section must be chosen to ensure that no damage can result from a cable overheating in the event of a short-circuit in the SICLOCK TC400. For cable cross-section, see **Connecting the power supply** (Section 6.2).
- Avoid extreme environmental conditions as far as possible.
- Protect the device against dust, moisture, heat and severe vibration.
- Do not place the device in direct sunlight.
- Install the device in such a way that it does not present a hazard (e.g. by falling out).
- Do not cover the vent slots.
- **Permitted mounting position** (Section 4.4.2).

6.2 Connecting the power supply

The power supply is connected to the X1 terminal strip and must always be via a time-lag 1 A fuse. The device does not have a separate power switch.

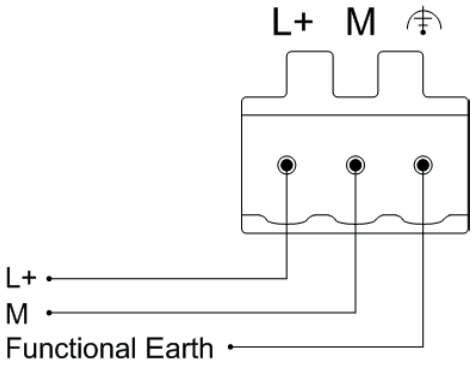


Figure 6-1 Connecting the power supply

Note before connecting

Warning

Only connect the device to 24 VDC power supplies that meet the requirements of a functional extra-low voltage with safe isolation (PELV); in addition, a protective conductor must also be connected. The cable cross-section must be matched to the short-circuit current of the 24 VDC power supply, so that with a short-circuit, damage is not caused by the cable. Only connect cables with a cross-section of minimum 0.25 mm^2 (AWG23) to maximum 2.50 mm^2 (AWG13).

Notice

The 24 VDC power supply must be adapted to the input data of the device, see **Technical Data** (Section 13).

Caution

Ensure that the functional ground is connected correctly.

Make sure the polarity is correct for DC voltage.

Functional check

After switching on, the POWER LED must show a green light.

6.3 Connecting the external synchronization

The signal of the connected radio clock is detected automatically and displayed in the /Inputs/Input 1/Status (0.20.02) parameter (or /Inputs/Input 2/Status (0.21.02) parameter).

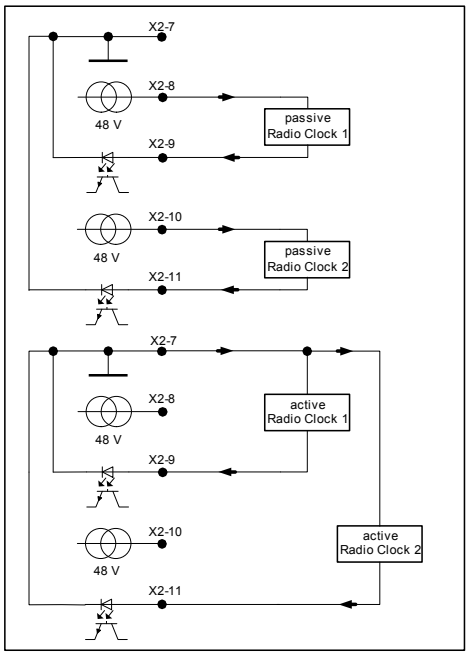


Figure 6-2 Circuit diagram for a passive and an active radio clock

Table 6-1 Terminal assignment of the radio clock inputs

Terminal	Designation
X2-7	RADIO CLOCK GND
X2-8	RADIO CLOCK 1A
X2-9	RADIO CLOCK 1B
X2-10	RADIO CLOCK 2A
X2-11	RADIO CLOCK 2B

Note

If you are operating two radio clocks, connect the preferred model to RADIO CLOCK 1.

Functional check

The receive signal of the radio clocks is displayed on the front panel with the "RADIO CLOCK 1" and "RADIO CLOCK 2" LEDs.

The status of the radio clock is displayed in the /Inputs/Input 1/Status (0.20.02) (or /Inputs/Input 2/Status (0.21.02)) parameter.

Possible states:

- **GPS** (SICLOCK GPS1000 and SICLOCK GPSDEC)
- **GPS (faulty)**
  The signal reception is temporarily faulty.
- **DCF77** (SICLOCK DCFRS and SICLOCK GPSDEC)
- **DCF77 (faulty)**
  The signal reception is temporarily faulty.
- Serial
  - **Meinberg**
    Receiving Meinberg format
  - **NMEA**
    Receiving NMEA format
  - **Telegram (faulty)**
    Fault detected in telegram or telegram failure
- **No signal**

The connection of individual sources to the external synchronization is described in the following.

6.3.1 SICLOCK GPS1000

The GPS1000 receiver is connected as shown in Fig. 6-3.

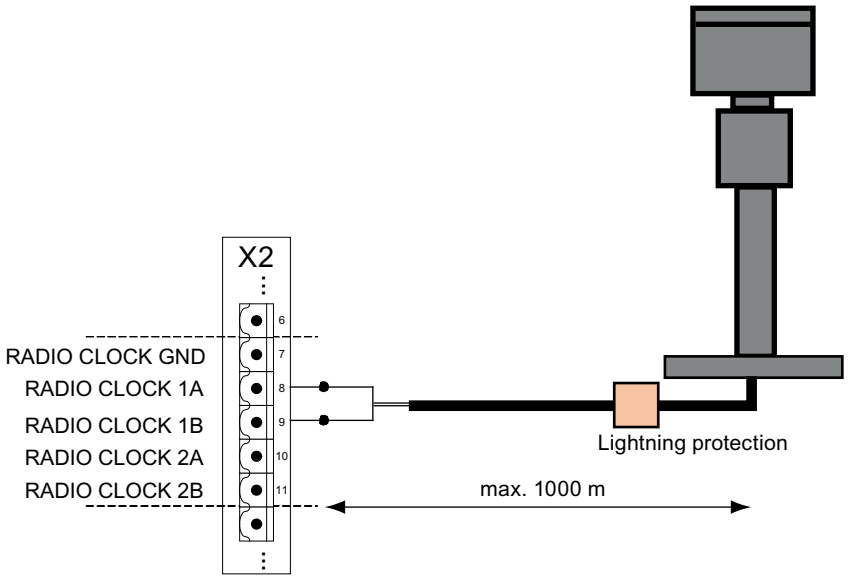


Figure 6-3 SICLOCK GPS1000 radio clock connection to RADIO CLOCK 1

We recommend a 2-wire, shielded cable, e.g. LiYCY 2x1 mm², as radio clock cable. The cable shield should be connected one-sided to a suitable place at the installation location.

An additional parameterization of the GPS1000 is not required.

Warning

Use lightning protection for the outdoor GPS antenna.

Functional check

When the GPS1000 is receiving correctly, the "RADIO CLOCK 1" or "RADIO CLOCK 2" LED on the front panel should flash at approx. 1 Hz.

After receiving for approximately three minutes the /Inputs/Input 1/Status (0.20.02) or /Inputs/Input 2/Status (0.21.02) parameter must change to "GPS".

6.3.2 SICLOCK DCFRS industrial version

The industrial version of the SICLOCK DCFRS radio clock contained in the DCF77 package is connected as shown in Fig. 6-4. The polarity is not important here.

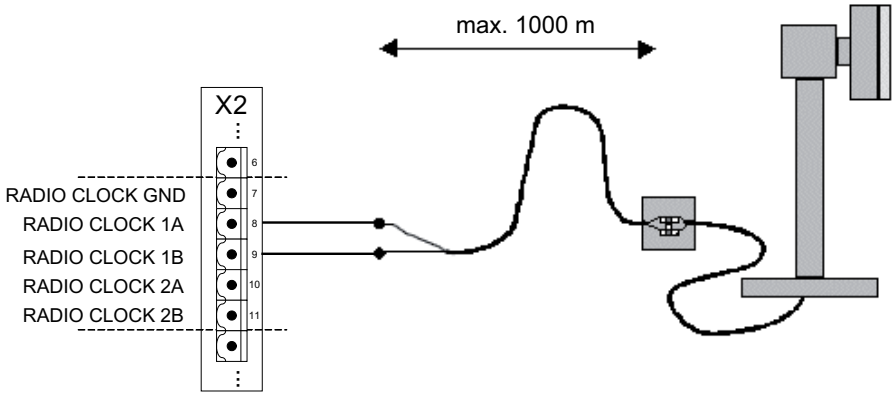


Figure 6-4 SICLOCK DCFRS industrial version radio clock connection to RADIO CLOCK 1

Warning

Lightning protection must also be installed when used outdoors.

Note

The radio clock cable shield should be connected one-sided to a suitable place at the installation location.

Functional check

When the SICLOCK DCFRS is receiving correctly, the "RADIO CLOCK 1" or "RADIO CLOCK 2" LED on the front panel should flash at approx. 1 Hz.

After receiving for approximately three minutes the /Inputs/Input 1/Status (0.20.02) or /Inputs/Input 2/Status (0.21.02) parameter must change to "DCF77".

Note

When selecting the location for the antenna, it is especially important that there is as little electromagnetic interference on the DCF77 carrier frequency as possible. Do not mount the antenna close to drives, neon lamps, monitors and other emitters of interference.

6.3.3 SICLOCK GPSDEC

(SICLOCK GPSDEC has been discontinued, please use SICLOCK GPS1000)

A SICLOCK GPSDEC decoder is connected as shown in Fig. 6-5.

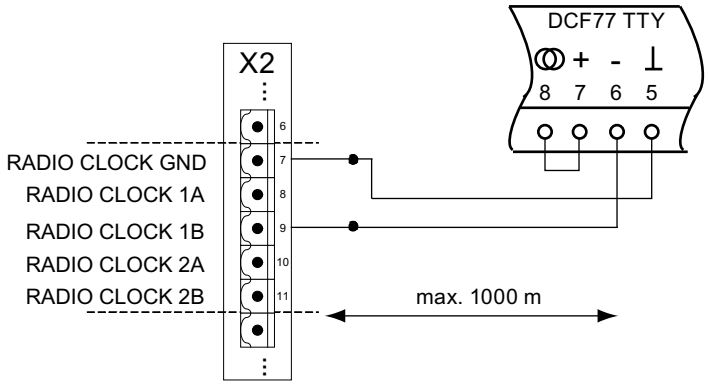


Figure 6-5 SICLOCK GPSDEC radio clock connection to RADIO CLOCK 1

Caution

The SICLOCK GPSDEC may only be operated as active radio clock.

Operation as passive radio clock results in the destruction of the SICLOCK GPS-DEC.

Table 6-2 Recommended parameterization of the GPSDEC decoder for the SICLOCK TC400 synchronization

Parameter	Setting
Time difference compared to GMT	00:00
Switchover to daylight saving time	"None"
X1.5-8 (DCF77TTY)	"DCF without ZZB"

Functional check

When the GPSDEC is receiving correctly, the "RADIO CLOCK 1" or "RADIO CLOCK 2" LED on the front panel should flash at approx. 1 Hz.

After receiving for approximately three minutes the /Inputs/Input 1/Status (0.20.02) or /Inputs/Input 2/Status (0.21.02) parameter must change to "GPS" or "DCF77".

6.3.4 Third-party systems

Third-party systems that fulfill the following requirements can be sued for the external synchronization of the SICLOCK TC400.

Requirements

- Active radio clock signal with 20 mA rated current
- Supported signals:
  - Demodulated DCF77
  - Serial:
    Meinberg compatible (including time zones)
    Meinberg compatible (not including time zones)
    NMEA (0183/ZDA)

Functional check

After receiving for approximately three minutes the /Inputs/Input 1/Status (0.20.02) or /Inputs/Input 2/Status (0.21.02) parameter must change to "Meinberg", "NMEA" or "DCF77".

6.4 Connecting the time receivers

Time receivers can be connected via point-to-point connections (OUTPUT 1 to 3) or via Ethernet.

Four Ethernet ports are available for the Ethernet connection and can be parameterized accordingly.

A redundant point-to-point connection can be implemented via OUTPUTs 1 and 2 when two SICLOCK TC400s are used.

6.4.1 Point-to-point connections via OUTPUT 1 to 3

Current signal – low-resistance receiver (e.g. optocoupler)

Point-to-point connections via an active current interface can be connected to OUTPUTs 1 and 2 as shown in Fig. 6-6.

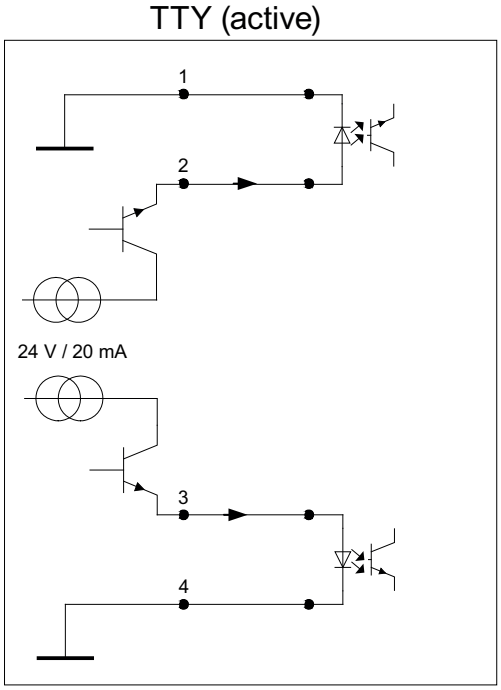


Figure 6-6 OUTPUTs 1 and 2 as current interface

Table 6-3 Terminals of OUTPUTs 1 and 2

Terminal	Designation
1	OUTPUT 1 GND
2	OUTPUT 1
3	OUTPUT 2
4	OUTPUT 2 GND

24 V voltage signal – high-resistance receiver (greater than 1.2 kOhm)

A high-resistance receiver can also be connected directly. The output then functions as a 24 V voltage output.

Connection as in Fig. 6-6.

RS422

An RS422 interface is available at OUTPUT 3 for a high-precision point-to-point connection. The connection is made as shown in Fig. 6-7.

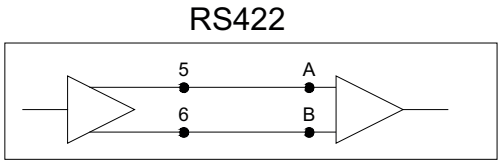


Figure 6-7 OUTPUT 3 RS422

Table 6-4 OUTPUT 3 terminals

Terminal	Designation
5	OUTPUT 3A
6	OUTPUT 3B

6.4.2 Redundant point-to-point connections

OUTPUT 1 and OUTPUT 2 of the devices are decoupled internally so that one output of each device can be connected in parallel to the same time receiver.

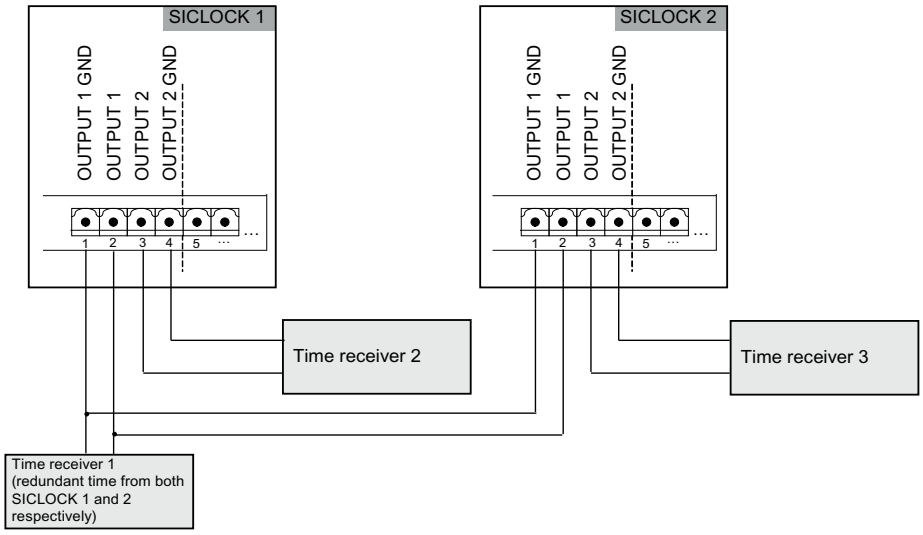


Figure 6-8 Example with redundant time reception at OUTPUT 1

Further information

Redundancy (Section 2.6)

OUTPUT 1 and 2 redundant (Section 9.2.4)

6.5 Connecting an alarm output and a warning output

The SICLOCK TC400 automatically performs various functional tests during operation. When an error occurs, the appropriate messages are generated on the display. A distinction is made between alarms and warnings.

An alarm output and a warning output are available on terminal X2 for the external monitoring.

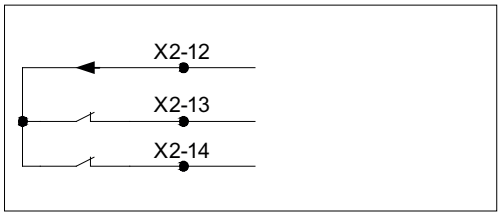


Figure 6-9 Alarm output X2-13 and warning output X2-14

Table 6-5 Parameters that influence the alarm response

/Synchronization/Advanced/Monitoring/monitor status of synchronization (0.09.14)
/Network Settings/Ethernet 1/Advanced Settings Adapter 1/monitor link state (0.05.09)
/Network Settings/Ethernet 2/Advanced Settings Adapter 2/monitor link state (0.05.10)
/Network Settings/Ethernet 3/Advanced Settings Adapter 3/monitor link state (0.05.11)
/Network Settings/Ethernet 4/Advanced Settings Adapter 1/monitor link state (0.05.12)
/NTP Client/Monitoring/monitor server (0.18.04)
/Inputs/Input 1/Monitoring/monitor input (0.20.01)
/Inputs/Input 2/Monitoring/monitor input (0.21.01)
/Environment/Advanced/Temperature/monitoring (0.24.01)

Example:

The alarm output is to be set when no external synchronization is available.

With the configuration tool, set the parameter entry /Synchronization/Advanced/Monitoring/monitor status of synchronization (0.09.14) = "Alarm" to activate the monitoring / alarm output when an error occurs.

Note

The contacts are designed as fail-safe NC contacts. The appropriate contact is opened when an alarm or a warning is pending.

Configuration Tool

7

The SICLOCK TC400 configuration tool is available for the easy parameterization and configuration of the SICLOCK TC400. The tool can be called as up Web interface via an Internet browser.

With the configuration tool, you can view and change parameters online and offline, view archives and perform searches in them with filter criteria and load, save and change the parameterization of the SICLOCK TC400 device.

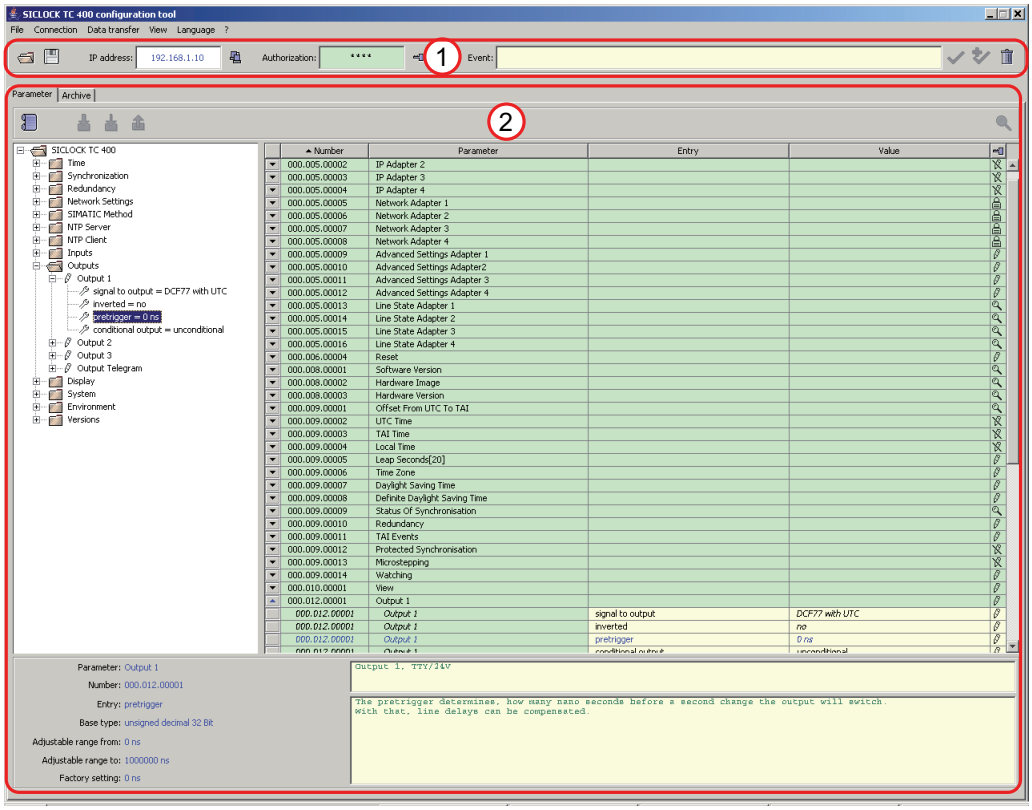


Figure 7-1 SICLOCK TC400 configuration tool

(1) Toolbar of the configuration tool

(2) Working area of the configuration tool
You can make settings and assign parameters in the **Parameters tag**
You can check states and search for events in the **Archives tag**

Requirements

PC

- Screen resolution of at least 1280x1024 pixels
- Java Runtime, at least V1.4.0 or higher
- Web browser, e.g. Microsoft Internet Explorer
- Connection via one of the four Ethernet ports of the device

SICLOCK TC400

- Assignment of an IP address on the device

  A valid IP address must be assigned for the Ethernet port of the device that is to be used for the configuration.

  Default addresses as delivered each with subnet mask 255.255.255.0:

  – Port 1: 192.168.1.10

  – Port 2: 192.168.2.20

  – Port 3: 192.168.3.30

  – Port 4: 192.168.4.40

  PC must be in the same subnet.

Parameters, entries and lists

A parameter is considered as a group of associated values. Each value is designated as an entry of its parameter.

Parameters of the same kind can form a list. Such lists are displayed as [ ].

Notice

Entries can be edited individually, but not read or written individually. The parameter is always read or written with all its entries. If a list is being considered, the entire list is read or written.

Parameters are identified by their unique parameter number. The parameter number is always in three parts, e.g. 0.05.12.

Example of the /Display/View (0.10.01) parameter with the entries "Language" and "Time":

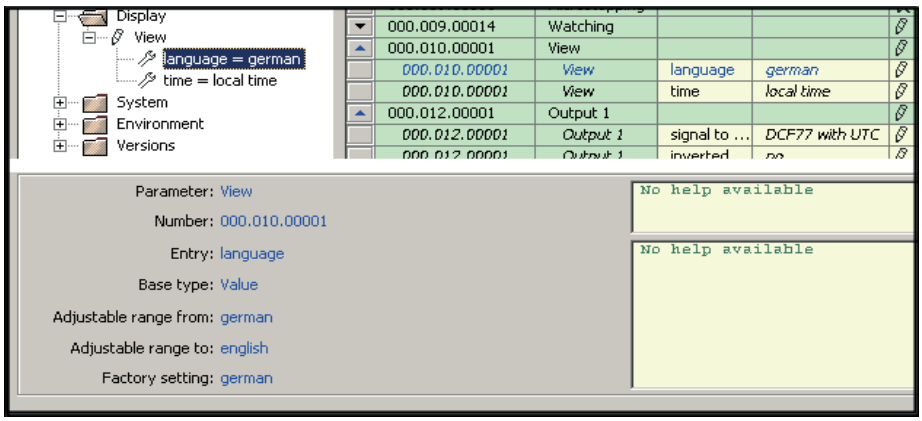


Figure 7-2 Parameter view

Working with the configuration tool

To start the configuration tool:

1. Open the Web browser.
2. Enter the address of the device port, e.g. 192.168.1.10
3. If necessary, confirm the installation and execution of the applet with "Yes" or "Always".

   –> The configuration tool is started and displayed in the browser.

Note

Note the information in your browser about restrictions because of strict safety settings.

To parameterize the SICLOCK TC400 with the configuration tool:

1. Connect the configuration tool to the SICLOCK TC400 with the  button.
2. For a new parameterization of the device, load the parameters to the configuration tool with the  button or open an existing parameter file (*.u600) with the  button.
3. Parameterize the SICLOCK TC400 according to your hardware configuration and your requirements.
   In online mode, changes take effect immediately on the device.
4. Save the configuration as parameter file (*.u600) on your PC with the  button.

Note

In order to be able to access the last version of the SICLOCK TC400 parameterization, we recommend that you save the current parameterization of SICLOCK TC400 as *.u600 file before you make any changes.

7.1 Menus

Table 7-1 Menus in the configuration tool

Menu/Function		Meaning/Note
File		
	Open	Load a parameterization/archive from the local file system See also **General functions** (Section 7.2).
	Save	Save of a parameterization/archive to the local file system See also **General functions** (Section 7.2).
	Exit	Exit the application
Connection		See also **Establish/disconnect online connection** (Section 7.2.1).
	Connect	Connect to a device
	Disconnect	Disconnect from a device
Data transfer (online connection required)		See also **Establish/disconnect online connection** (Section 7.2.1).
	Download parameters from device	Download all parameters from a connected device to the PC See also **Parameters** (Section 7.3).
	Refresh parameters from device	Refresh all parameters previously loaded to the PC with the values of the connected device See also **Parameters** (Section 7.3).
	Upload parameters to device	Write all parameters from the PC to the connected device See also **Parameters** (Section 7.3).
	Download archive	Download the entire archive from the connected device to the PC See also **Archive** (Section 7.4).
	Refresh archive	Re-request/refresh the archive of a connected device See also **Archive** (Section 7.4).
View		
	Parameters	Change to the Parameters view See also **Parameters** (Section 7.3).
	Archive/Events	Change to the Archive/Events view See also **Archive** (Section 7.4).
Language		Selection of the languages available for the user interface Depending on the version, several languages may be offered for selection • English (standard language) • German The language/naming of the parameters and archives is supplied by the device. If the language set in the configuration tool is known to the device, then the parameter/archive is displayed in this language. If the language is not known to the device, the display is in the standard language.

Table 7-1 Menus in the configuration tool

Menu/Function		Meaning/Note
?		
	Help...	Call the help system
	Version…	Display the version information of the configuration tool

7.2 General functions

The toolbar of the configuration tool provides general functions for the parameters and the archive. You can also acknowledge events and authorize yourself on the configuration tool.

Table 7-2 Operator options and displays in the toolbar of the configuration tool

Field/Button	Meaning/Instruction
 **Open**	Load a parameterization/archive from the local file system The file must be present in U600 format (*.u600). When opening, the parameterization and the archive are loaded from the file. **Notice** The currently loaded data (parameterization and archive) is overwritten.
 **Save**	Save of a parameterization/archive to the local file system The data (parameterization and archive) is saved in U600 format (*.u600).
 **IP address**	IP address of the SICLOCK TC400 You enter the IP address of the device here.
 **Connect to device**  **Disconnect from device**	Connect to a device The connection is established to the device with the specified IP address. Disconnect from device The established connection is disconnected. See also **Establish/disconnect online connection** (Section 7.2.1).
 **Authorization - password**	Password input to activate a higher access level Password of the device as delivered: "2222" See also **Authorization** (Section 7.2.2).
 **Authorize**	Perform the authorization with the entered password
 **Event** **(online connection required)**	Events currently pending in the device Events pending on the device (e.g. warnings, alarms, …) are displayed in online mode No information is displayed in offline mode.
 **Acknowledge event** **(online connection required)**	Acknowledge pending event In online mode, an acknowledgement for the pending event is sent to the device. If acknowledgeable, the device clears the event from the display. Events that cannot be acknowledged (persistent messages) remain in the display.

Table 7-2 Operator options and displays in the toolbar of the configuration tool

Field/Button	Meaning/Instruction
 **Acknowledge all events**	Acknowledge all pending events In online mode, an acknowledgement for all pending events is sent to the device. There is an acknowledgement even when the cause of the event is still present. In this way it is possible, for example, to clear persistent alarms.
 **Ignore event**	Discard the pending event The event display is cleared without interaction with the device.

7.2.1 Establish/disconnect online connection

To establish an online connection to the SICLOCK TC400:

1. Enter the IP address of the device in the toolbar.

2. Start the connection build-up by clicking the  icon next to the IP address field.

   –> The configuration tool changes to online mode:

To disconnect the online connection to the SICLOCK TC400:

1. Click the  icon next to the IP address field.

   –> The configuration tool changes to offline mode:

Note

The device is disconnected if there have not been any operator actions for approx. two hours

7.2.2 Authorization

There are authorization levels for each parameter, which permit or prohibit read and write access to the parameter. The user interface starts with the lowest authorization level, which usually only permits read access to parameters.

More rights can be obtained by entering the appropriate password.

The password can be changed by the user:

- /System/Authorization For Standard Protection (2.06.02) parameter

Note

The combination "0000" is not permitted as a password. Setting the password to "0000" disables access with this authorization level. Access is then only possible using the service password. The service password can be requested from Technical Assistance by an authorized person.

As delivered, the password on the device is "2222"

The current authorization level is indicated by the color of the password field.

Write protection - red entry field

At this authorization level, the user typically only has read access to standard parameters.

Standard protection - green entry field

At this authorization level, the user typically also has read access to advanced parameters and write access to standard parameters.

Online mode

Authorization is performed directly on the device, i.e. the device assigns an appropriate authorization level.

Offline mode

You can authorize yourself for a higher authorization level with a password, when this is contained in the loaded offline authorization parameters.

Note

It is not possible to authorize yourself in offline mode with a password that is available on the device, but is not contained in the offline authorization parameters.

7.3 Parameters

You can set and transfer parameters of the SICLOCK TC400 in offline and online mode in the Parameters tab of the configuration tool.

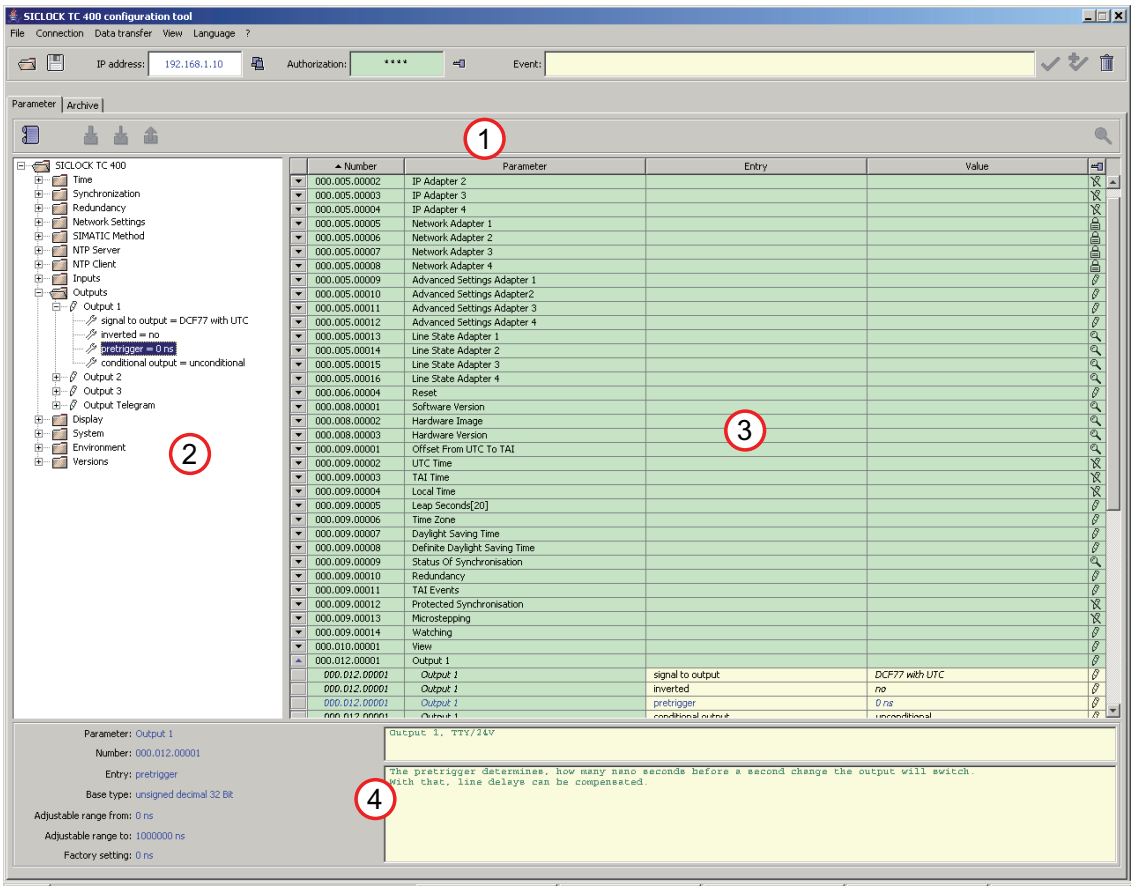


Figure 7-3 SICLOCK TC400 configuration tool - parameters

(1) Toolbar of the Parameters tab

(2) Parameter tree

(3) Parameter table

(4) Parameter information

Table 7-3 Operator options and displays in the Parameters tab

Field/Button	Meaning/Instruction
 **Print table to text file**	Output of the parameterization to a text file The currently displayed parameterization is output to a text file. The data can, for example, be further edited with Excel. **Notice** Parameterizations cannot be restored from these text files. To restore a parameterization, it must first have been saved in U600 format. See Open/Save in **General functions** (Section 7.2).
 **Download parameters (online connection required)**	Download parameters of the connected device The parameters of the connected device including the description data (e.g. texts in all languages) are downloaded. This can take several minutes. Implicitly the parameterization is downloaded again from the device. **Notice** The displayed parameterization data is overwritten. The archive data is not taken over from the device, i.e. the displayed archive data is retained. See also **Establish/disconnect online connection** (Section 7.2.1).
 **Refresh parameters (online connection required)**	Download parameters of the connected device without parameter description The parameters of a connected device are downloaded without the description data. This can take several minutes. **Notice** The displayed parameterization data is overwritten. The archive data is not taken over from the device, i.e. the displayed archive data is retained. See also **Establish/disconnect online connection** (Section 7.2.1).
 **Upload parameters (online connection required)**	Transfer writeable values of the loaded parameters to the connected device The following values/parameters are not transferred to the device: • Value of write-protected parameters • Critical operating parameters • Display parameters • Command parameters An online connection must be established for the transfer of the parameters and the configuration tool must have the appropriate authorization. See also **Establish/disconnect online connection** (Section 7.2.1) and **Authorization** (Section 7.2.2).
 **Monitor actual values (online connection required)**	Monitor current value/status of actual values After the monitoring is activated, the current values or states are cyclically read from the device and the display in the parameter tree and parameter table is refreshed. See also **Establish/disconnect online connection** (Section 7.2.1).

Table 7-3 Operator options and displays in the Parameters tab

Field/Button	Meaning/Instruction
Parameter tree	Tree display of the parameters The parameters are divided between the individual menus and submenus in the tree. **Online mode:** In online mode, you can open a context menu by right-clicking the parameter/entry. The following functions are available: • Read parameter individually • Write parameter individually • Reset parameter to factory setting See **Reading parameters / writing parameters / resetting parameters to factory settings** (Section 7.3.4). **Symbols:** • Write protection – the parameter cannot be edited The current authorization level does not permit write access to this parameter. • Unrestricted access The current authorization level permits reading, editing and writing of the parameter • Unrestricted access without upload – critical operating parameter The current authorization level permits reading, editing and writing of the parameter To protect such parameters in the device, the parameter must be explicitly selected and written individually. See **Reading parameters / writing parameters / resetting parameters to factory settings** (Section 7.3.4) • Display parameters Display parameters can only be read and are typically actual values. To refresh the actual value display, activate the automatic update  . • Entry – this is a parameter entry
Parameter table	Tabular display of the parameters You can edit the parameter values in this view, see **Editing parameters** (Section 7.3.3). **Online mode:** In online mode, you can open a context menu by right-clicking the parameter/entry. The following functions are available: • Read parameter individually • Write parameter individually • Reset parameter to factory setting See **Reading parameters / writing parameters / resetting parameters to factory settings** (Section 7.3.4).

Table 7-3 Operator options and displays in the Parameters tab

Field/Button		Meaning/Instruction
	Number	Unique, three-part parameter number, e.g. 000.005.00012
	Parameter	Associated values are grouped under a parameter. Parameter lists are shown with square brackets after the parameter name, e.g. "Leap second[20]".
	Entry	The individual values of a parameter are each called an entry of a parameter. **Note** Entries can be edited individually, but not read or written individually. The entire parameter is always read or written with all its entries. If a list is being considered, the entire list is read or written.
	Value	Numeric value or setting of the parameter entry
		• Write protection – the parameter cannot be edited The current authorization level does not permit write access to this parameter. • Unrestricted access The current authorization level permits reading, editing and writing of the parameter • Unrestricted access without upload – critical operating parameter The current authorization level permits reading, editing and writing of the parameter To protect such parameters in the device, the parameter must be explicitly selected and written individually. See **Reading parameters / writing parameters / resetting parameters to factory settings** (Section 7.3.4). • Display parameters Display parameters can only be read and are typically actual values. To refresh the actual value display, activate the automatic update  .
Parameter info		Information about the selected parameter Information about the selected parameter/entry is displayed here.

Note

If the configuration tool is not authorized or operated with a low authorization level, not all parameters are displayed. This restriction affects, for example, settings under "System".

The access rights also change with the authorization level.

7.3.1 Sorting the parameter table

To sort the parameter table according to number or parameter:

1. Click the "Number" or "Parameter" column.

   –> The table is sorted in alphabetical order according to the clicked column.

2. Click the "Number" or "Parameter" column again to reverse the alphabetical order.

   –> Depending on the current sorting, the alphabetical order is reversed to either ascending or descending alphabetical order.

The current sorting order is indicated by an arrow next to the column title:
▲ Parameter

7.3.2 Showing/hiding parameter table entries

To show or hide parameter entries:

1. Click the ▼ symbol at the left side of the table next to the parameter.

   –> The parameter entries are shown.

2. Click the ▲ symbol at the left side of the table next to the parameter.

   –> The parameter entries are hidden.

	Number	▲ Parameter	
▲	000.018.00003	Active Server	
	000.018.00003	*Active Server*	IP address
▼	000.005.00009	Advanced Settings Adapter 1	
▼	000.005.00011	Advanced Settings Adapter 3	

Figure 7-4 Parameter table with shown and hidden entry

7.3.3 Editing parameters

Requirement for the editing of a parameter entry

- It must be a writeable entry ( ).

To change the value of a parameter entry:

1. Show the values of the desired parameter in the parameter table, see **Showing/hiding parameter table entries** (Section 7.3.2).
2. Click the "Value" column of the parameter entry.

   –> The dialog box to edit the entry is opened.

The input can be aborted with ESC.

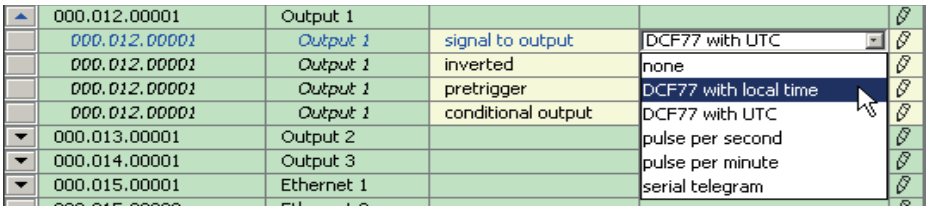


Figure 7-5 Example of edit dialog box drop-down list

For parameters with units, you can also enter the new value without unit. Any units that are entered are ignored, only the numeric value is accepted.

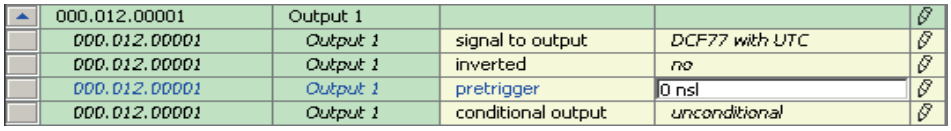


Figure 7-6 Example of edit dialog box numeric entry

Note

In online mode, the value is sent to the device when the input is completed.

To check whether the value has been accepted by the device:

1. In online mode, select the entry of the changed parameter, as described above.

   –> The current value in the device is displayed.

Note

Depending on the parameter/entry and operation status, the device checks whether the value change has been accepted. If the device rejects the new value, the old value is reset.

7.3.4 Reading parameters / writing parameters / resetting parameters to factory settings

In **online mode**, you can individually read, write and reset parameters to their factory settings.

To initiate the "Read parameter", "Write parameter" or "Reset parameter to factory setting" function:

1. Make sure that the configuration tool is connected to the device. See **Establish/disconnect online connection** (Section 7.2.1).
2. Select the desired parameter/entry in the parameter tree or parameter table.
3. Right-click the parameter or entry.

   –> The context menu opens.

   Left-click the desired function.

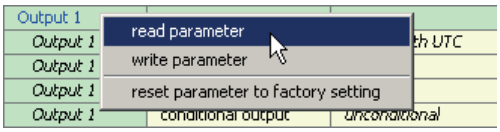


Figure 7-7 Context menu to read, write or reset parameter

7.4 Archive

You can load archive data from the device and save it as a file as well as evaluate and search the data with filter functions in the Archive tab of the configuration tool.

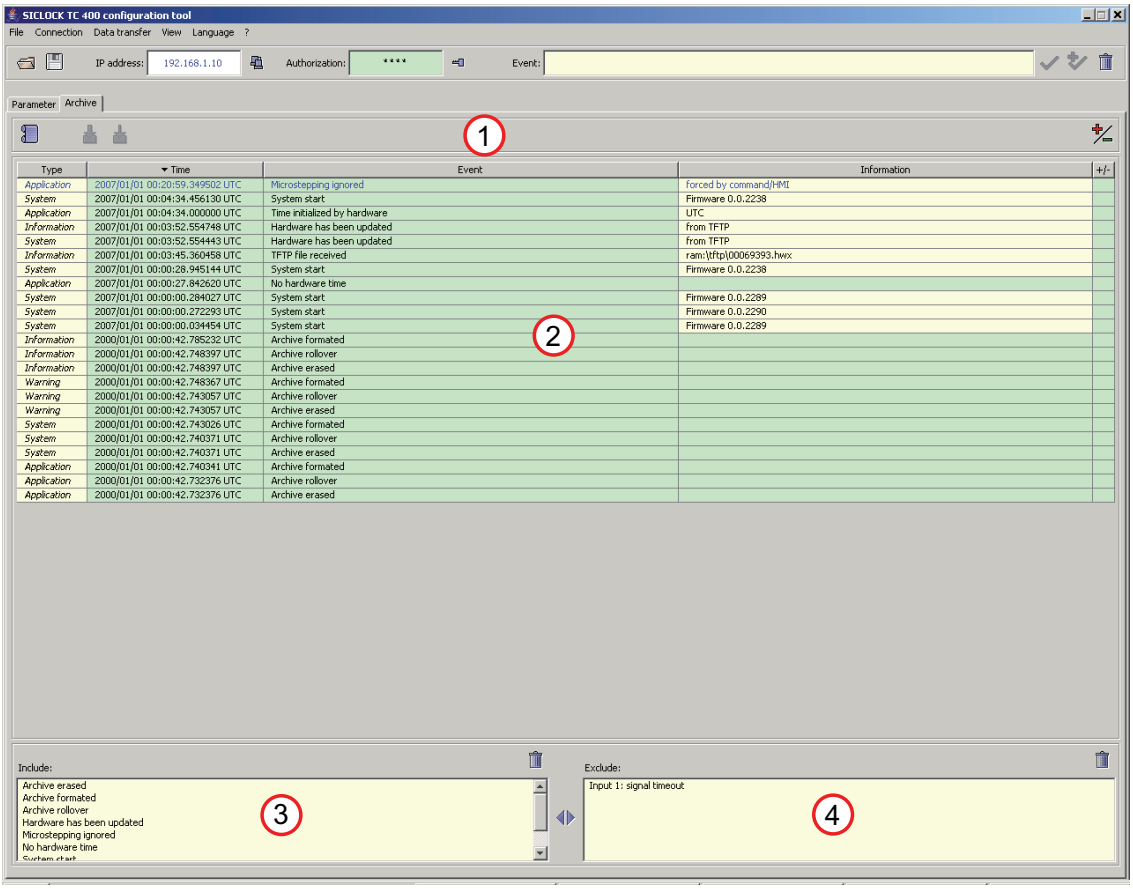


Figure 7-8 SICLOCK TC400 configuration tool - archives

(1) Toolbar of the Archive tab

(2) Archive table

(3) Include filter (show events)

(4) Exclude filter (hide events)

Table 7-4 Operator options and displays in the Archive tab

Field/Button	Meaning/Instruction
 **Print table to text file**	Output of the archive to a text file The currently displayed archive table is output to a text file. Events hidden via the filter are not output. The data can, for example, be further edited with Excel. **Notice** Archives cannot be restored from these text files. To restore an archive, it must first have been saved in U600 format. See Open/Save in **General functions** (Section 7.2).
 **Download archive (online connection required)**	Download archive of the connected device The archive of the connected device including the description data (e.g. texts in all languages) is downloaded. This can take several minutes. Implicitly the parameterization is downloaded again from the device. **Notice** The currently loaded data (parameterization and archive) is overwritten. See also **Establish/disconnect online connection** (Section 7.2.1).
 **Refresh archive (online connection required)**	Download archive of the connected device without parameter description The archive of a connected device is downloaded without the description data. The download without description data is faster than "Download archive". Implicitly the parameterization is downloaded again from the device. **Notice** The currently loaded data (parameterization and archive) is overwritten. See also **Establish/disconnect online connection** (Section 7.2.1).
 **Collapse view to coming/going**	Display only coming and going events Only persistent messages (typically alarms) are displayed in the archive table. This provides a compact overview of the important operational faults. The hidden events are displayed in the exclude window of the filter. To display all the events again, clear the include filter. See **Filter** (Section 7.4.2).
 **Change exclude-include view**	Move event from the include to the exclude filter and vice versa The events selected in the include and exclude filters are moved respectively to the other filter. See **Filter** (Section 7.4.2).
 **Clear include filter**	Remove all events from the include filter The events are moved to the exclude filter. See **Filter** (Section 7.4.2).
 **Clear exclude filter**	Remove all events from the exclude filter The events are moved to the include filter. See **Filter** (Section 7.4.2).

Table 7-4 Operator options and displays in the Archive tab

Field/Button		Meaning/Instruction
Archive table		Events are displayed in tabular form Persistent messages trigger a coming and going event and are highlighted in color: • red = coming • green = going Typically alarms in the device are implemented as persistent messages.
	Type	Event type: • System • Application • Information • Warning **Note:** Each event type is managed in the device in a separate buffer. When a buffer is full, the next message of this type overwrites the oldest message in the buffer. See also **Messages** (Section 12).
	Time	Time when triggered in the device, UTC time base
	Event	Message triggered by the device The sum of all the events forms the archive of the device.
	Information	Optional accompanying information to the event
	+/-	• **++** (coming) Event marked as coming (persistent message, e.g. alarm) • **--** (going) Event marked as going (persistent message, e.g. alarm)
Include filter		Events that are displayed in the archive table See **Filter** (Section 7.4.2).
Exclude filter		Events that are not displayed in the archive table See **Filter** (Section 7.4.2).

7.4.1 Sorting the archive table

To sort the archive table according to time or event:

1. Click the "Time" or "Event" column.

   –> The table is sorted in alphabetical order according to the clicked column.

2. Click the "Time" or "Event" column again to reverse the alphabetical order.

   –> Depending on the current sorting, the alphabetical order is reversed to either ascending or descending alphabetical order.

The current sorting order is indicated by an arrow next to the column title:

7.4.2 Filter

You can specifically show and hide events via a filter to facilitate searching in the archive. All events listed in the include window are displayed in the archive table, all events listed in the exclude window are not displayed.

Changing the assignment of an event in the filter from include to exclude (or vice versa):

1. Click the event in the include window (or exclude window).

   –> The event is highlighted in blue.

2. Click  .

   –> The event is transferred from the include to the exclude filter (or vice versa).

To select and exchange several events in the filters:

1. Press the CTRL while you are selecting the events in the filter per mouse click.

   –> The event is highlighted in blue and the already selected events also remain highlighted in blue.

2. Click  .

   –> The event is transferred from the include to the exclude filter (or vice versa).

To select and exchange several successive events in the filters:

1. Click the first element of the event group.
2. Click the last element of the event group while simultaneously pressing the SHIFT key.

   –> The two events and all the events in between are selected.

3. Click  .

   –> The event is transferred from the include to the exclude filter (or vice versa).

To remove all events from the include or exclude filter:

1. Click the  button above the include or exclude filter.

   –> The include or exclude filter is cleared. The cleared events are now in the opposite filter for selection.

7.5 Troubleshooting

The following is a list of FAQs and problem solutions for the SICLOCK TC400 configuration tool.

Table 7-5 Problem solutions for the configuration tool

Question/Problem	Cause/Remedy
Authorization not possible in offline mode	
	The data does not contain authorization parameters. You must perform an online authorization. See **Authorization** (Section 7.2.2).
A connection cannot be established to the device	
	• Check whether the correct IP address has been set in the configuration tool. • Check whether there is a network connection. • Check whether the TCP:2155 port has been released for the connection or already being used by another application. See also **Establish/disconnect online connection** (Section 7.2.1).
An event cannot be acknowledged.	
	This is a persistent message pending on the device. See also **General functions** (Section 7.2).
No interaction with the device in online mode (hourglass)	
	The connection to the device has been separated and must be established again. See also **Establish/disconnect online connection** (Section 7.2.1).
Parameter cannot be edited	
	• The parameter is a display parameter See **Parameters** (Section 7.3) • The current authorization level is too low See **Authorization** (Section 7.2.2) • The parameter does not have a parameter value In this case, the parameter must be read from the device again.
Parameters and archives are displayed in a language other than the user interface	
	The language set in the configuration tool is not available in the device. See **Menus** (Section 7.1)
Parameter is not written during the upload	
	It is a critical operating parameter that is explicitly excluded from an upload. Such parameters must be written individually. See **Parameters** (Section 7.3) and **Reading parameters / writing parameters / resetting parameters to factory settings** (Section 7.3.4).

Table 7-5 Problem solutions for the configuration tool

Question/Problem	Cause/Remedy
Parameters are displayed without value	
	The authorization level has been raised after a download so that higher authorized parameters are now shown. However, no value was supplied for these parameters in the lower authorized request. You can refresh these values with the  button or read them individually. See **Parameters** (Section 7.3), **Authorization** (Section 7.2.2) and **Reading parameters / writing parameters / resetting parameters to factory settings** (Section 7.3.4).

Parameterization and Operation on the Device 8

The SICLOCK TC400 has a 2-line, alphanumeric backlit LCD display and automatic contrast control for the display of date and time, messages and status.

You can change important parameters for the commissioning and acknowledge messages via an integrated keypad.

Figure 8-1 SICLOCK TC400 front view

8.1 Operating display

When the device is switched on, there is no operating and status display for a short ramp-up time.

```
SICLOCK TC400
......
```

Figure 8-2 Display of the device ramp-up after switching on

The time, date and the current synchronization status are displayed during operation.

```
09:48:26          →NTP
Tue, 19. Sept 2007
```

Figure 8-3 Example of the display during operation

Table 8-1 Possible synchronization states

Display	Meaning
→Q	No external synchronization
→NTP	External synchronization via NTP is active
→DCF1[1)] →DCF2[1)]	External synchronization via DCF signal at RADIO CLOCK 1 or RADIO CLOCK 2 is active
→GPS1[1)] →GPS2[1)]	External synchronization via GPS signal at RADIO CLOCK 1 or RADIO CLOCK 2 is active
→MBG1 →MBG2	External synchronization via Meinberg telegram at RADIO CLOCK 1 or RADIO CLOCK 2 is active
→NME1 →NME2	External synchronization via NMEA telegram at RADIO CLOCK 1 or RADIO CLOCK 2 is active
→SER1 flashing →SER2 flashing	Currently a valid serial telegram is not being received
--1 flashing[2)] --2 flashing[2)]	The external synchronization at RADIO CLOCK 1 or RADIO CLOCK 2 has not supplied a signal for longer than 30 min (default setting) and there has been no switchover yet to a substitute synchronization.

1) If the display is flashing, currently no valid signal is being received.

2) This is the case when the timeout for the switchover to the substitute synchronization has been selected larger than the monitoring timeout of the external synchronization.

The timeout for the switchover to the substitute synchronization can be set via the following parameter entry:
/Redundancy/Redundancy/timeout (0.09.10)

The timeout of the external synchronization can be set via the following parameter entry:
/Inputs/Input 1/Monitoring/timeout (0.20.01) or
/Inputs/Input 2/Monitoring/timeout (0.21.01)

Operating display with pending message

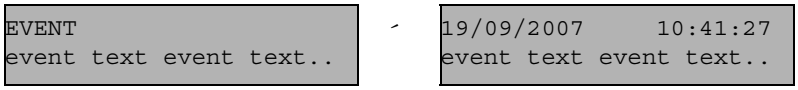


Figure 8-4 Example of the display during operation with an error

In the top line, the message type and the date/time are displayed alternately. In the bottom line, the message text is displayed in scrolled form.

When a message occurs, the backlighting is automatically switched on for 10 minutes.

Table 8-2 Possible message types

Display	Meaning
INFO	Current message is an information message
WARNING	Current message is a warning
EVENT	Other messages, e.g. an alarm

Note

Pending messages can be acknowledged with OK.

If a persistent message that cannot be acknowledged is pending, you can change to the operating display temporarily with the ESC key.

Backlighting

The display backlighting is switched on for 10 minutes every time a key is pressed

8.2 Operation and parameterization

The following figure shows the basic operating sequence on the device. The initial situation is either the operating display or the message display on the device.

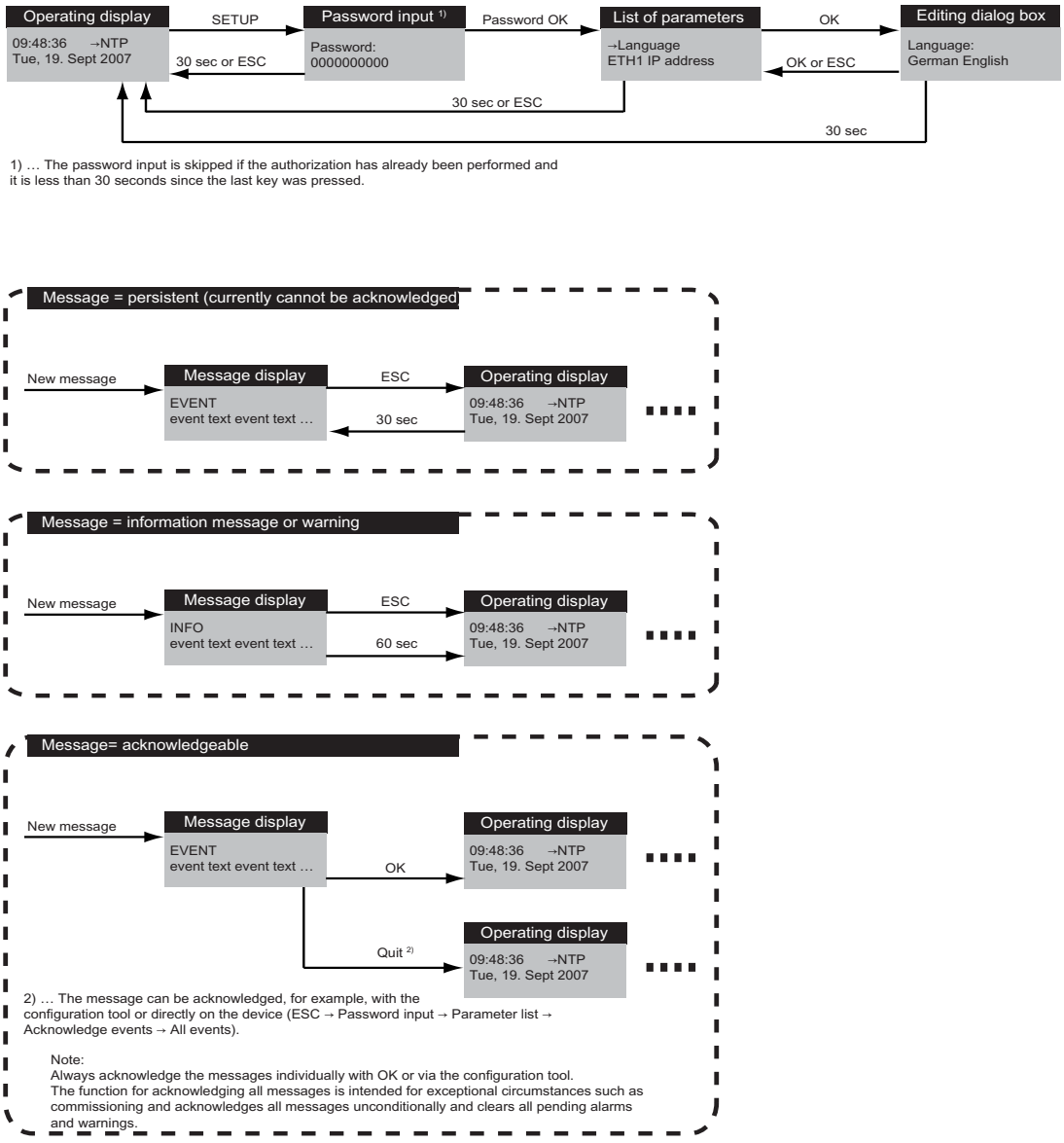


Figure 8-5 Operating sequence

8.2.1 Authorization (enter password)

A password in the form of a 10-digit decimal number must be entered so that the operator can make entries on the device.

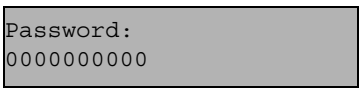
You can operate the device after successful authorization.

If no entry is made for 30 seconds, the display automatically switches to the operating display and you have to log on again in order to make entries.

To enter the password on the device:

1. Press the SETUP key.

   –> The entry dialog box for the password appears.

2. Enter the password with the arrow keys ↑ ↓ ← → and confirm the input with OK.

   – Password was correct

     –> the parameter list is displayed. You can operate the device in accordance with your authorization level.

   – Display has switched to operating display

     –> The password input is automatically cancelled 30 seconds after the last key is pressed.

     Repeat your password input.

   – Password was incorrect and is not accepted by the device

     –> A message appears that the password has not been accepted. Repeat the input with a correct password.

The password input can be aborted at any time with ESC.

8.2.2 Parameter list

The parameter list is displayed after successful authorization, see **Authorization (enter password)** (Section 8.2.1).

Table 8-3 Parameter list

Language
ETH1 IP Address
ETH1 IP Subnet
ETH1 IP Gateway
ETH2 IP Address
ETH2 IP Subnet
ETH2 IP Gateway
ETH3 IP Address
ETH3 IP Subnet
ETH3 IP Gateway
ETH4 IP Address
ETH4 IP Subnet
ETH4 IP Gateway
Acknowledge events
Version

Note

The TC400's four Ethernet ports must be on different subnets.

Optionally, the parameters can be set and checked via the configuration tool:

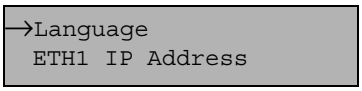
- Language
  /Display/View/language (0.10.01)
- Ethernet settings
  /Network Settings/Ethernet 1/IP Adapter 1 (0.05.01)
  /Network Settings/Ethernet 2/IP Adapter 2 (0.05.02)
  /Network Settings/Ethernet 3/IP Adapter 3 (0.05.03)
  /Network Settings/Ethernet 4/IP Adapter 4 (0.05.04)
- Version
  /Versions/Software Version (0.08.01)
  /Versions/Hardware Version (0.08.03)

See also **Parameterization** (Section 9), **Parameter Table** (Section 10) and for acknowledging messages **General functions** (Section 7.2).

To select a parameter for editing:

1. Navigate with the arrow keys ↑ ↓ to the desired parameter.

   –> Depending on which key is pressed, the parameter list is scrolled up or down in an endless loop.
   The currently selected parameter is indicated by the ∀→" sign.



2. Switch to the edit mode by pressing OK.

   –> The editing dialog box is displayed.

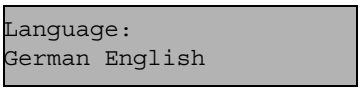
Note

If no entry is made for 30 seconds, the display automatically switches to the operating display and you have to log on again in order to make entries.

8.2.3 Editing dialog box

Language

If you have selected "Language" in the parameter list, the following editing dialog box appears:



All texts in the display are shown in the language set here.

To change the language:

1. Select the desired language with the arrow keys ← →.

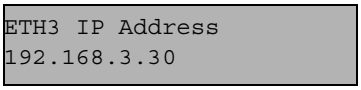
   –> The currently selected language flashes.

2. Accept the selected language with OK.

   –> The new setting is accepted and the parameter list is displayed again for selection.

Ethernet settings

If you have selected an Ethernet setting in the parameter list, the following editing dialog box appears, e.g. for "ETH3 IP Address":



To change the address:

1. Select the decimal place to be changed with the arrow keys ← →.

   –> The currently selected decimal place flashes.

2. Select the new number with the arrow keys ← →.

   –> The new number flashes.

3. Repeat steps 1) and 2) for all the numbers to be changed.

4. Accept the new address with OK.

   –> The new address is accepted and the parameter list is displayed again for selection.

Acknowledge events

If you have selected "Acknowledge events" in the parameter list, the following editing dialog box appears:

```
Acknowledge events:
All events
```

The "All events" text flashes.

To acknowledge all events:

1. Confirm the acknowledgement of all events with OK.

   –> The events are acknowledged and the parameter list is displayed again for selection.

Note

All messages are acknowledged unconditionally with this function.

Version

If you have selected "Version" in the parameter list, the following dialog box appears:

```
Version:
Firmware: 1.0.0014
```

-

```
Version:
Processor: 1.0.0005
```

The display alternates between the firmware and the processor version.

You cannot make any settings in this dialog box. Press ESC or OK to return to the display of the parameter list.

Parameterization

9

The following is a description of the frequently required settings.

Further information

Parameter Table (Section 10)

Configuration Tool (Section 7)

9.1 Linking the external synchronization

The external synchronizations can be linked via Ethernet as NTP server and/or as radio clock via point-to-point connections to the SICLOCK TC400.

Prerequisite for operation is at least one external synchronization. Additional external synchronization can be used as substitute synchronizations if a fault occurs, see **Redundancy** (Section 2.6).

External synchronizations can be GPS or DCF77 radio clocks, cabled distribution systems, atomic clocks or other signal sources.

Further information

Synchronization (Section 9.3.2).

9.1.1 Radio clocks via terminals

Only two radio clocks can be connected at the same time, see also **Terminal assignment** (Section 15.1).

Certain redundancy mechanisms enable an automatic switchover to the second radio clock when a fault occurs, see **Redundancy** (Section 9.1.3).

Monitoring

The /Inputs/Input 1/Monitoring (0.20.01) parameter for radio clock 1 or the /Inputs/Input 2/Monitoring (0.21.01) parameter for radio clock 2 can be used to monitor the input signal of the radio clocks and after expiry of the monitoring time, an alarm or a warning output.

Status display

See **Connecting the external synchronization** (Section 6.3).

Serial formats

The /Inputs/Input 1/Framing (0.20.03) parameter displays the automatically detected framing for serial formats.

There are entries for baud rate, data bits, parity and stop bits.

9.1.2 Operation as NTP client

Four IP addresses of NTP servers can be assigned for SICLOCK TC400 as NTP client.

The servers are polled regularly and, on the basis of a strict selection strategy, a preferred server is selected.

For the strategy when a server fails, see **Redundancy** (Section 2.6).

NTP client

You can activate the client service with the /NTP Client/NTP Client (0.18.01) parameter.

IP address of the NTP servers

Four IP addresses of the NTP servers can be assigned with the /NTP Client/NTP Server List[4] (0.18.02) parameter. Address 0.0.0.0 means that no server has been entered.

DNS names are not supported.

Current NTP server

The /NTP Client/Active Server (0.18.03) parameter displays the currently selected NTP server. Address 0.0.0.0 means that no server has been entered.

Monitoring the servers

The /NTP Client/Monitoring/monitor server (0.18.04) parameter can be used to set up the monitoring of the NTP servers.

9.1.3 Redundancy

The preference when an external synchronization fails depends on the setting of the /Redundancy/Redundancy (0.09.10) parameter:

- "Master (prefer radio clocks to NTP)" setting
  - RADIO CLOCK 1 is always accepted.
  - RADIO CLOCK 2 is used when RADIO CLOCK 1 is not available.
  - NTP is used when RADIO CLOCK 1 and RADIO CLOCK 2 are not available.
- "Slave (prefer NTP to radio clocks)" setting
  - RADIO CLOCK 1 is used when NTP is not available.
  - RADIO CLOCK 2 is used when NTP and RADIO CLOCK 1 are not available.
  - NTP is always accepted.
- The four Ethernet ports must be operated on different subnets to give IP-network redundancy. Configuring more than one Ethernet port for the same subnet is not permitted.

9.2 Linking the time receivers

The following options are available for the linking of the radio receivers:

- Ethernet link via **NTP server**
- Ethernet link via **SIMATIC method**
- **OUTPUTs 1 to 3 via terminals** (direct point-to point-connection to SICLOCK TC400)

The following section describes the parameterization options:

9.2.1 NTP server service

The NTP server is available on all four Ethernet ports and supports the any/unicast and multicast modes in accordance with RFC2030.

Any/unicast (standard mode)

This mode is used, for example, by PCs and is available globally for all ports.

The parameter entry /NTP Server/NTP Server/operation (0.16.01) = "on" activates the NTP server in any/unicast mode. The setting options "off" and "only if synchronized" are also possible.

Conditional operation is possible with the setting "only if synchronized". The server service only functions if the device is externally synchronized.

Multicast

This mode must be set explicitly for each subnet.

You can set multicast mode for up to four subnets with the /NTP Server/Multicast[4]/Multicast[x]/mode (0.16.02) parameter

The parameter entry "Multicast address" specifies the multicast IP address to be used, e.g. 192.168.2.255".

Setting options for the parameter entry mode:

- **off**
- **10 s** – standard operation, i.e. the coded time does no include time zones
- **60 s** – standard operation, i.e. the coded time does no include time zones
- **10 s with local time** – for receivers that do not have a calendar
- **60 s with local time** – for receivers that do not have a calendar

The parameter entry "Multicast address" specifies the multicast IP address to be used.

9.2.2 SIMATIC method

The four Ethernet ports support the SIMATIC method with four protocols:

- PCS7-compatible mode
- S5-compatible mode

A parameter is available for each Ethernet port.

- /SIMATIC Method/Ethernet 1 (0.15.01) parameter
- /SIMATIC Method/Ethernet 2 (0.15.02) parameter
- /SIMATIC Method/Ethernet 3 (0.15.03) parameter
- /SIMATIC Method/Ethernet 4 (0.15.04) parameter

Mode

The parameter entry /SIMATIC Method/Ethernet 1/mode (0.15.01) sets the send clock between 0 s, 1 s and 10 s.

Send condition

The parameter entry /SIMATIC Method/Ethernet 1/send condition (0.15.01) specifies whether the signal should always be output or only if synchronized.

Destination address

The parameter entry /SIMATIC Method/Ethernet 1/destination address (0.15.01) specifies the send address of the SIMATIC method. Typically the broadcast address FF:FF:FF:FF:FF:FF is set.

9.2.3 OUTPUT 1 to 3 via terminals

Three parameterizable outputs are available on the terminals:

- /Outputs/Output 1 (0.12.01) parameter as current or voltage signal
- /Outputs/Output 2 (0.13.01) parameter as current or voltage signal
- /Outputs/Output 3 (0.14.01) parameter as RS422 signal

Output signal

The following output signals can be set via the parameter entry "Signal to output":

- DCF77 with local time
- DCF77 with UTC
- Pulse per second
- Pulse per minute
- Serial telegram

  See **Output telegram (for OUTPUT 1 to 3)** (Section 9.2.5).

Inverted

You can invert the signal with the parameter entry "Inverted".

Pretrigger

The parameter entry "Pretrigger" is used to set how many nanoseconds before the second change the output should switch. With that, line delays can be compensated.

Conditional output

The parameter entry "Conditional output" specifies whether the signal should always be output or only if synchronized. The required setting for the redundant configuration of the outputs is described in **OUTPUT 1 and 2 redundant** (Section 9.2.4).

Further information

Terminal assignment (Section 15.1)

9.2.4 OUTPUT 1 and 2 redundant

A redundant point-to-point connection can be implemented with two SICLOCK TC400 devices. Both devices must be synchronous. Typically, this is ensured by device 2 using device 1 as external synchronization (e.g. device 2 as NTP client and device 1 as NTP server).

See also **Redundancy** (Section 2.6) and **Redundant point-to-point connections** (Section 6.4.2).

The output for OUTPUT 1 or 2 of device 1 is set to "only if synchronized", the output for OUTPUT 1 or 2 of device 2 to "send unconditional".

Example:

OUTPUT 1 of both devices is to be operated redundantly.

Device 1:
Parameter entry /Outputs/Output 1/conditional output (0.12.01) = "only if synchronized"

Device 2:
Parameter entry /Outputs/Output 1/conditional output (0.12.01) = "send unconditional"

Table 9-1 Redundancy response in various situations

	Synchronization		Response
	Device 1	Device 2	
External synchronization	Radio clock	Device 1	The time receiver receives the signal from both devices. The lack of definition is in the µs range and can be ignored.
External synchronization	None	Radio clock	The time receiver receives the signal from device 2. (Because of the setting "Only if synchronized", device 1 does not supply the time in this case.)
External synchronization	None	None	The time receiver receives the signal from device 2. (Because of the setting "Only if synchronized", device 1 does not supply the time in this case.)
External synchronization	Radio clock	Radio clock	If the device 1 – device 2 connection is faulted, the time receiver receives the signal from both devices. There is a lack of definition in the accuracy of the external synchronization which is usually in the µs range and can be ignored. Large inaccuracies can occur when an external synchronization also supplies a faulty signal.

9.2.5 Output telegram (for OUTPUT 1 to 3)

If the output signal is defined as a serial telegram, you can specify the settings for the data transfer with the /Outputs/Output Telegram (0.19.01) parameter.

Format

The parameter entry /Outputs/Output Telegram/format (0.19.01) offers the following telegram formats for selection:

- Meinberg compatible (including time zones)
- Meinberg compatible (not including time zones)
- NMEA (0183/ZDA)

Baud rate

You can set the following values with the parameter entry /Outputs/Output Telegram/baud rate (0.19.01):
1200 Bd, 2400 Bd, 4800 Bd, 9600 Bd, 19200 Bd, 38400 Bd, 57600 Bd, 115200 Bd

Data width

You can specify the number of data bits with the parameter entry /Outputs/Output Telegram/data bits (0.19.01):
7 bits or 8 bits

Parity

You can specify the parity with the parameter entry /Outputs/Output Telegram/parity (0.19.01):
none, even, uneven

Stop bits

You can specify the number of stop bits with the parameter entry /Outputs/Output Telegram/stop bits (0.19.01):
1 bit or 2 bits

Further information

OUTPUT 1 to 3 via terminals (Section 9.2.3)

9.3 General settings on the device

Important general settings are described in the following, e.g. the time adjustment, the synchronization response, etc.

You can find a list of all setting options in **Parameter Table** (Section 10).

9.3.1 Time management

Note

Only make changes to the plant time at one central location, ideally at the plant central clock.

Setting the time manually

Optionally, you can set the time in the device via one of the following parameters:

- /Time/Local Time (0.09.04) parameter
- /Time/UTC Time (0.09.02) parameter (universal time)
- /Time/TAI Time (0.09.04) parameter (atomic time)

Time zone

The /Time/Time Zone (0.09.06) parameter is used to specify the offset from UTC to local zone time without possible daylight saving time.

Note

If the external synchronization already contains a time zone (e.g. DCF77 contains CE/CEDST), this is already taken into account when received.

If the time zone is not defined by the external synchronization (e.g. serial telegram), no further correction is made for the time zone.

Difference between TAI and UTC

You can read out the difference between atomic time TAI and world time UTC in seconds with the /Time/Advanced/Atomic Time TAI/Offset From UTC To TAI (0.09.01) parameter.

Daylight saving time

The daylight saving time changeover is automatically performed by the device at the parameterized times.

/Time/Advanced/Daylight Saving Time (0.09.07) parameter

Note

The preset changeover times correspond to the present valid regulations of the European Community.

With the setting "enable = no", the time changeover is suppressed and the plant is operated with standard time.

The calendrical regulation for the daylight saving time changeover can be specified worldwide via a parameter.

Leap seconds

Use the /Time/Advanced/Leap Seconds[20] (0.09.05) parameter to specify the calendar of leap seconds.

9.3.2 Synchronization

Synchronization status

You can read out different information about the current synchronization status via the /Synchronization/Status of Synchronization (0.09.09) parameter.

Protected synchronization

If a discontinuity of more than 5 s occurs in the external synchronization, the protected synchronization is activated. The synchronization is suppressed and an alarm issued which is present as long as there is a discontinuity in the external synchronization.

The pending synchronization suppression can be ignored once and the "Protected synchronization" alarm cleared with the parameter entry /Synchronization/Advanced/Protected Synchronization/ignore /clear alarm (0.09.12) = "yes".

Notice

This initiates an unconditional synchronization to the external time and an inconsistency in the time distribution to the plant can result.

If required, disconnect the active external synchronization first or delete the server address for the NTP client operation from the /NTP Client/NTP Server List[4] (0.18.02) parameter.

Microstepping

If during operation a difference occurs between the input synchronization (e.g. radio clock) and the device up to a tolerance of some seconds, that difference will not be set immediately, since that would cause an inconsistency in the time distribution.

This difference is corrected with microstepping which is significantly below the time resolution of typical pants and therefore remains unnoticed in the plant operation. This may take up to several hours.

The correction of the time difference with microstepping can be interrupted once with the parameter entry /Synchronization/Advanced/Microstepping/ignore/cancel (0.09.13) = "yes".

This initiates an immediate synchronization to the external time **resulting in an inconsistency in the time distribution to the plant**.

Note

Avoid inconsistencies in the time distribution to the plant.

The Ignore microstepping command is suitable, for example, for the first input synchronization during the commissioning.

Monitoring

The /Synchronization/Advanced/Monitoring (0.09.14) parameter specifies whether the device should output an alarm or a warning when there is no external synchronization.

9.3.3 Display

You can change the language and the display of the time with the /Display/View (0.10.01) parameter. The time can be displayed as UTC, local time or TAI.

9.3.4 System

You can specify or change the password for the standard protection with the /System/Authorization For Standard Protection (2.06.02) parameter.

You can reset the parameters to the factory settings with the /System/Reset (0.06.04) parameter. Exceptions are parameters such as network addresses, authorizations, etc.

9.3.5 Temperature

You activate the monitoring of the module temperatures with the parameter entry /Environment/Advanced/Temperature/monitoring (0.24.01).

You can set the following values:

- Alarm
- Warning
- No monitoring

The current module temperature is displayed in the parameter entry /Environment/Status/temperature (0.24.02).

9.3.6 Battery

You can specifically disconnect the battery when storing and therefore significantly increase the battery life with the parameter entry /Environment/Advanced/Battery/disconnect (0.25.01).

During power up, the SICLOCK TC400 checks once whether the battery has been disconnected after at least 30 minutes of operation. If required, the battery is then automatically connected and a message output.

Notice

If the battery is disconnected, hardware time and archives are lost when the power supply for the SICLOCK TC400 is switched off.
This command may only be performed by qualified personnel.

See also **Battery** (Section 11.1).

Parameter Table

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Table 10-1 List of the parameters of SICLOCK TC400

Access[1] / No.	Parameter	Entry	Value Range / Default
Time			
0.09.04	**Local Time**	time and date	
0.09.02	**UTC Time**	time and date	
0.09.06	**Time Zone**	offset from UTC to zone time	Min: UTC-12:00 h Max: UTC+14:00 h Default: UTC+01:00 h
Time/Advanced			
0.09.07	**Daylight Saving Time**	enable	Min: Yes Max: No Default: Yes
		time when changing over from standard time to daylight saving time	Min: February, third Sunday, 00:00 Max: apply a definite date and time Default: March, last Sunday, 02:00
		time when changing back from daylight saving time to standard time	Min: February, third Sunday, 00:00 Max: apply a definite date and time Default: October, last Sunday, 03:00
		hours	Min: +1 h Max: +2 h Default: +1 h
0.09.08	**Definite Daylight Saving Time**	definite time and date when changing back from daylight saving time to standard time	
		definite time and date when changing over from standard time to daylight saving time	
0.09.05	**Leap Seconds[20]**	time and date	
		size	Min: -1 s Max: +1 s Default: +0 s

Table 10-1 List of the parameters of SICLOCK TC400

Access[1] / No.	Parameter	Entry	Value Range / Default
Time/Advanced/Atomic Time TAI			
0.09.03	**TAI Time**	time and date	
0.09.01	**Offset From UTC To TAI**	offset	Min: -32768 s Max: +32767 s Default: +0 s
0.09.11	**TAI Events**	enable (log messages from the TAI domain in the event log)	Min: Yes Max: No Default: No
Synchronization			
0.09.09	**Status of Synchronization**	status	Min: not synchronized (oscillator) Max: radio clock 2 Default: not synchronized (oscillator)
		synchronized at least once	Min: yes Max: no Default: no
		last synchronization	
		current time difference	Min: -2147483.648 s Max: +2147483.647 s Default: +0.000 s
		adjusted drift	Min: -2147483.648 ppm Max: +2147483.647 ppm Default: +0.000 ppm
		input jitter	Min: 0.000 ms Max: 4294967.295 ms Default: 0.000 ms
Synchronization/Advanced			
0.09.12	**Protected Synchronization**	ignore / clear alarm	Min: yes Max: no Default: no
0.09.13	**Microstepping**	ignore/cancel	Min: yes Max: no Default: no
0.09.14	**Monitoring**	monitor status of synchronization	Min: off Max: alarm Default: off

Table 10-1 List of the parameters of SICLOCK TC400

Access[1] / No.	Parameter	Entry	Value Range / Default
Redundancy			
0.09.10	**Redundancy**	preference	Min: Master Max: Slave Default: Master
		timeout	Min: 10 min Max: 720 min Default: 30 min
Network Settings/Ethernet 1			
Note: The TC400's four Ethernet ports must be on different subnets.			
0.05.01	**IP Adapter 1**	IP address	Min: 0.0.0.0 Max: 255.255.255.255 Default: 192.168.1.10
		subnet mask	Min: 0.0.0.0 Max: 255.255.255.255 Default: 255.255.255.0
		gateway	Min: 0.0.0.0 Max: 255.255.255.255 Default: 0.0.0.0
0.05.05	**Network Adapter 1**	hardware address	Min: 00.00.00.00.00.00 Max: FF.FF.FF.FF.FF.FF Default: 00.00.00.00.00.00
0.09.13	**Line State Adapter 1**	link	Min: --- Max: down Default: ---
		linespeed	Min: --- Max: 100 Mb/s Default: ---
		duplex	Min: --- Max: half duplex Default: ---
0.05.09	**Advanced Settings Adapter 1**	monitor link state	Min: off Max: alarm Default: off
Network Settings/Ethernet 2			
Note: The TC400's four Ethernet ports must be on different subnets.			
0.05.02	**IP Adapter 2**	IP address	Min: 0.0.0.0 Max: 255.255.255.255 Default: 192.168.2.20
		subnet mask	Min: 0.0.0.0 Max: 255.255.255.255 Default: 255.255.255.0
		gateway	Min: 0.0.0.0 Max: 255.255.255.255 Default: 0.0.0.0

Table 10-1 List of the parameters of SICLOCK TC400

Access[1] / No.	Parameter	Entry	Value Range / Default
0.05.06	**Network Adapter 2**	hardware address	Min: 00.00.00.00.00.00 Max: FF.FF.FF.FF.FF.FF Default: 00.00.00.00.00.00
0.09.14	**Line State Adapter 2**	link	Min: --- Max: down Default: ---
		linespeed	Min: --- Max: 100 Mb/s Default: ---
		duplex	Min: --- Max: half duplex Default: ---
0.05.10	**Advanced Settings Adapter 2**	monitor link state	Min: off Max: alarm Default: off
Network Settings/Ethernet 3			
Note: The TC400's four Ethernet ports must be on different subnets.			
0.05.03	**IP Adapter 3**	IP address	Min: 0.0.0.0 Max: 255.255.255.255 Default: 192.168.3.30
		subnet mask	Min: 0.0.0.0 Max: 255.255.255.255 Default: 255.255.255.0
		gateway	Min: 0.0.0.0 Max: 255.255.255.255 Default: 0.0.0.0
0.05.07	**Network Adapter 3**	hardware address	Min: 00.00.00.00.00.00 Max: FF.FF.FF.FF.FF.FF Default: 00.00.00.00.00.00
0.09.15	**Line State Adapter 3**	link	Min: --- Max: down Default: ---
		linespeed	Min: --- Max: 100 Mb/s Default: ---
		duplex	Min: --- Max: half duplex Default: ---
0.05.11	**Advanced Settings Adapter 3**	monitor link state	Min: off Max: alarm Default: off

Table 10-1 List of the parameters of SICLOCK TC400

Access[1] / No.	Parameter	Entry	Value Range / Default
Network Settings/Ethernet 4			
Note: The TC400's four Ethernet ports must be on different subnets.			
0.05.04	**IP Adapter 4**	IP address	Min: 0.0.0.0 Max: 255.255.255.255 Default: 192.168.4.40
		subnet mask	Min: 0.0.0.0 Max: 255.255.255.255 Default: 255.255.255.0
		gateway	Min: 0.0.0.0 Max: 255.255.255.255 Default: 0.0.0.0
0.05.08	**Network Adapter 4**	hardware address	Min: 00.00.00.00.00.00 Max: FF.FF.FF.FF.FF.FF Default: 00.00.00.00.00.00
0.09.16	**Line State Adapter 4**	link	Min: --- Max: down Default: ---
		linespeed	Min: --- Max: 100 Mb/s Default: ---
		duplex	Min: --- Max: half duplex Default: ---
0.05.12	**Advanced Settings Adapter 4**	monitor link state	Min: off Max: alarm Default: off
SIMATIC Method			
0.15.01	**Ethernet 1**	mode	Min: off Max: S5-compat., every 10 s Default: off
		send condition	Min: --- Max: only if synchronized Default: ---
		destination address	Min: 00.00.00.00.00.00 Max: FF.FF.FF.FF.FF.FF Default: FF.FF.FF.FF.FF.FF

Table 10-1 List of the parameters of SICLOCK TC400

Access[1] / No.	Parameter	Entry	Value Range / Default
0.15.02	**Ethernet 2**	mode	Min: off Max: S5-compat., every 10 s Default: off
		send condition	Min: --- Max: only if synchronized Default: ---
		destination address	Min: 00.00.00.00.00.00 Max: FF.FF.FF.FF.FF.FF Default: FF.FF.FF.FF.FF.FF
0.15.03	**Ethernet 3**	mode	Min: off Max: S5-compat., every 10 s Default: off
		send condition	Min: --- Max: only if synchronized Default: ---
		destination address	Min: 00.00.00.00.00.00 Max: FF.FF.FF.FF.FF.FF Default: FF.FF.FF.FF.FF.FF
0.15.04	**Ethernet 4**	mode	Min: off Max: S5-compat., every 10 s Default: off
		send condition	Min: --- Max: only if synchronized Default: ---
		destination address	Min: 00.00.00.00.00.00 Max: FF.FF.FF.FF.FF.FF Default: FF.FF.FF.FF.FF.FF
NTP Server			
0.16.01	**NTP Server**	operation	Min: on Max: only if synchronized Default: on
0.16.02	**Multicast[4]**	mode	Min: off Max: 60 s with local time Default: off
		multicast address	Min: 0.0.0.0 Max: 255.255.255.255 Default: 0.0.0.0

Table 10-1 List of the parameters of SICLOCK TC400

Access[1] / No.	Parameter	Entry	Value Range / Default
NTP Client			
0.18.01	**NTP Client**	operation	Min: off Max: on Default: off
0.18.02	**NTP Server List[4]**	IP address	Min: 0.0.0.0 Max: 255.255.255.255 Default: 0.0.0.0
0.18.03	**Active Server**	IP address	Min: 0.0.0.0 Max: 255.255.255.255 Default: 0.0.0.0
0.18.04	**Monitoring**	monitor server	Min: off Max: alarm Default: off
Inputs/Input 1			
0.20.02	**Status**	signal	Min: no signal Max: telegram (faulty) Default: no signal
0.20.01	**Monitoring**	monitor input	Min: off Max: alarm Default: alarm
		timeout	Min: 5 min Max: 1440 min Default: 30 min
0.20.03	**Framing**	baud rate	Min: 0 Bd Max: 4294967295 Bd Default: 0 Bd
		data bits	Min: 0 Max: 8 Default: 0
		parity	Min: none Max: odd Default: none
		stop bits	Min: 0 Max: 2 Default: 0

Table 10-1 List of the parameters of SICLOCK TC400

Access[1] / No.	Parameter	Entry	Value Range / Default
Inputs/Input 2			
0.21.02	**Status**	signal	Min: no signal Max: telegram (faulty) Default: no signal
0.21.01	**Monitoring**	monitor input	Min: off Max: alarm Default: off
		timeout	Min: 5 min Max: 1440 min Default: 30 min
0.21.03	**Framing**	baud rate	Min: 0 Bd Max: 4294967295 Bd Default: 0 Bd
		data bits	Min: 0 Max: 8 Default: 0
		parity	Min: none Max: odd Default: none
		stop bits	Min: 0 Max: 2 Default: 0
Outputs			
0.12.01	**Output 1**	signal to output	Min: off Max: serial telegram Default: off
		inverted	Min: no Max: yes Default: no
		pretrigger	Min: 0 ns Max: 1000000 ns Default: 0 ns
		conditional output	Min: send unconditional Max: only if synchronized Default: send unconditional

Table 10-1 List of the parameters of SICLOCK TC400

Access[1)] / No.	Parameter	Entry	Value Range / Default
0.13.01	**Output 2**	signal to output	Min: off Max: serial telegram Default: off
		inverted	Min: no Max: yes Default: no
		pretrigger	Min: 0 ns Max: 1000000 ns Default: 0 ns
		conditional output	Min: send unconditional Max: only if synchronized Default: send unconditional
0.14.01	**Output 3**	signal to output	Min: off Max: serial telegram Default: off
		inverted	Min: no Max: yes Default: no
		pretrigger	Min: 0 ns Max: 1000000 ns Default: 0 ns
		conditional output	Min: send unconditional Max: only if synchronized Default: send unconditional
0.19.01	**Output Telegram**	format	Min: no output Max: NMEA (1083/ZDA) Default: no output
		baud rate	Min: 1200 Bd Max: 115200 Bd Default: 9600 Bd
		data bits	Min: 7 Max: 8 Default: 8
		parity	Min: none Max: odd Default: none
		stop bits	Min: 1 Max: 2 Default: 1

Table 10-1 List of the parameters of SICLOCK TC400

Access[1] / No.	Parameter	Entry	Value Range / Default
Display			
0.10.01	**View**	language	Min: German Max: English Default: German
		time	Min: local time Max: atomic time TAI Default: local time
System			
2.06.01	**Authorization For Standard Protection**	authorization	Min: 0 Max: 4294967295 Default: 2222
0.6.04	**Reset**	factory settings	Min: yes Max: no Default: no
Environment			
0.24.02	**Status**	temperature	Min: -10° C Max: +125° C Default: + 25° C
Environment/Advanced			
0.24.01	**Temperature**	monitoring	Min: no monitoring Max: alarm Default: no monitoring
0.25.01	**Battery**	disconnect	Min: no Max: yes Default: No
Versions			
0.08.01	**Firmware Version**	A2B number	Min: 0 Max: 4294967295 Default: 0
		version number	Min: 0.0.0 Max: 65535.65535.65535 Default: 0.0.0
0.08.02	**Processor Version**	A2B number	Min: 0 Max: 4294967295 Default: 0
		version number	Min: 0.0.0 Max: 65535.65535.65535 Default: 0.0.0

Table 10-1 List of the parameters of SICLOCK TC400

Access[1] / No.	Parameter	Entry	Value Range / Default
0.08.03	**Hardware Version**	A2B number	Min: 0 Max: 4294967295 Default: 0
		release number	Min: 0 Max: 65535 Default: 0
		serial number	

1) The access symbols display the access possibility at the highest authorization level.

Note

If the configuration tool is not authorized or operated with a low authorization level, then not all parameters are displayed. This restriction affects, for example, settings under "System".

The access rights also change with the authorization level.

Further information

List of Symbols (Section C)

Authorization (Section 7.2.2)

Service and Maintenance 11

11.1 Battery

An integrated battery supplies the clock block and the archive memory during phases without power.

The battery can be specifically disconnected for storage which significantly increases the battery life.

During power up, the SICLOCK TC400 checks once whether the battery has been disconnected after at least 30 minutes of operation. If required, the battery is then automatically connected and a message output.

Service life of a disconnected battery during storage: > 12 years

Service life of a connected battery during storage: Approximately 6 years

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Notice

If the battery is disconnected, hardware time and archives are lost when the power supply for the SICLOCK TC400 is switched off.

Note

The battery may only be replaced by the Siemens factory.

Please contact the Product Support.

See also **Battery** (Section 9.3.6).

11.2 Restoring the factory settings

Restoring individual parameters

Reading parameters / writing parameters / resetting parameters to factory settings (Section 7.3.4)

Restoring parameters

You can reset the parameters to the factory settings with the /System/Reset (0.06.04) parameter. Exceptions are parameters such as network addresses, authorizations, etc.

11.3 Software update

You can obtain information and any software updates for your SICLOCK TC400 from the Product Support.

See also **Preface**.

Messages

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The messages are divided into four different event types:

- System (capacity for approx. 1500 entries)
- Application (capacity for approx. 4500 entries)
- Information (capacity for approx. 21500 entries)
- Warning (capacity for approx. 3000 entries)

Messages for which a going event is also triggered, are called persistent messages. Persistent messages are, for example, alarms.

Note

Each event type is managed in the device in a separate buffer. When a buffer is full, the next message of this type overwrites the oldest message in the buffer.

The buffer for information is sufficient for approx. 45 days of operation. This is an average empirical value. Depending on the operating conditions and plant configuration, the number of messages can differ from this value.

For further information, see also **Archive** (Section 7.4).

Table 12-1 Message overview with event type and brief description

Recording of an input synchronization	
Information	The recording of an input synchronization is pending as the threshold value has been exceeded.
Battery has been disconnected	
Application	A user has disconnected the battery for storage via the configuration tool. See also **Battery** (Section 9.3.6).
Battery has been connected automatically	
Application	The battery has been connected automatically after a minimum period of operation See also **Battery** (Section 9.3.6).
Bootloader has been updated	
System and information	The bootloader has been successfully installed.
Bootloader has NOT been updated	
System and information	The bootloader could not be installed.

Table 12-1 Message overview with event type and brief description

Default processor loaded	
Warning	The default processor has been loaded when starting
Input 1, 2: DCF77 OK	
Information	Correct DCF reception has been detected again after a fault.
Input 1, 2: DCF77 signal faulty	
Information	A fault has been detected in the DCF77 signal during stable reception.
Input 1, 2: GPS OK	
Information	Correct GPS reception has been detected again after a fault.
Input 1, 2: GPS signal faulty	
Information	A fault has been detected in the GPS signal during stable reception.
Input 1, 2: signal timeout	
Application (alarm)	A signal has not been received within the parameterized timeout during activated monitoring. Check the status display, see **Radio clocks via terminals** (Section 9.1.1). If "no signal" is displayed in the status, check the wiring.
Input 1, 2: telegram OK	
Information	A serial format has been detected (for the first time after a failure).
Input 1, 2: telegram cannot be decoded	
Information	The serial format cannot be decoded.
Firmware has been updated	
System and information	A firmware update has been performed and the firmware has been updated.
Firmware has NOT been updated	
System and information	A firmware update has been performed, but the firmware could not be updated.
Flash file system has been formatted	
System	The file system has been formatted.
Protected Synchronization	
Application (alarm)	The protected synchronization has been activated as a discontinuity has been detected in the external synchronization. The message indicates an error of the external synchronization. See also **Synchronization** (Section 9.3.2).
Internal error, please contact the support	
System	The exact specification of the error is contained in the message text and may be of importance for the support (hotline).
Processor has been updated	
System and information	A processor update has been performed and the processor has been updated.

Table 12-1 Message overview with event type and brief description

Processor has not been updated	
System and information	A processor update has been performed, but the processor could not be updated.
Hardware time set	
Information	The SICLOCK TC400 internal hardware clock has been set.
No useable NTP server	
Information	A preferred server has not been found.
No hardware time	
Application	A valid time could not be read from the hardware.
Critical temperature exceeded	
Application	The critical module temperature has been exceeded See also **Temperature** (Section 9.3.5).
Link down EHT1, Link down EHT2, Link down EHT3, Link down EHT4	
Application	The monitoring of the link status has determined the "Link down" status. The tripping of an archive entry or alarm can be set, for example, for Ethernet 1 via the following parameter: /Network Settings/Ethernet 1/Advanced Settings Adapter 1/monitor link state (0.05.09)
Microstepping ignored	
Application	A microstepping has been avoided once by the user. See also **Synchronization** (Section 9.3.2).
NTP server selected	
Information	An NTP server has been selected.
NTP server unreachable	
Information	The server is no longer available.
Parameter has been reset to factory setting by HMI	
Information	A parameter has been reset to the factory setting by the HMI. The parameter number is specified in the message text.
Parameter has been written by HMI	
Information	A parameter has been written by the HMI. The parameter number is specified in the message text.
Sector in parameter memory cleared	
System	An automatic data clearance has been performed in the parameter memory.
Stabilized synchronization	
Information	New stabilizer data is available and is displayed in the message.
Synchronization inconsistent	
Information	The consistency check of an external synchronization was negative. The external synchronization and the negatively checked offset are displayed.

Table 12-1 Message overview with event type and brief description

Density of synchronization	
Information	Specifies the number of input synchronizations per interval. The message is output cyclically and is used to judge the reception quality.
Synchronization status	
Information	The message is output cyclically (e.g. every 12 hours) in order to document the current external synchronization in the archive.
Status of synchronization (changeover)	
Information	The synchronization status has changed.
System start	
System	The system has been started. The message is triggered when the system starts.
TFTP file requested	
Information	A TFTP file has been requested. (E.g. firmware update, Web data update, etc.)
TFTP file received	
Information	A file has been loaded via TFTP. (E.g. firmware update, Web data update, etc.)
TFTP file transferred	
Information	A file has been transferred from the device via TFTP. (E.g. firmware update, Web data update, etc.)
Time initialized by hardware	
Application	An initial synchronization of the clock module has been performed.
Time set by HMI	
Application	Time domain(s) has(have) been changed via HMI

Technical Data

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Table 13-1 Technical data of the SICLOCK TC400

Dimensions	180.0 x 88.9 x 47.0 (WxHxD in mm)
Weight	Approximately 750 g
Supply voltage	24 VDC (-15% to +20%) at X1
Power supply	Continuous current max. 0.7 A
Transient voltage interruption	Max. 3 ms (at 20.4 V to 28.8 V)
Power consumption	Max. 15 W
Power loss	Typ. 7.5 W
Fuse (external)	1 A time-lag
Degree of protection	IP 20
Mounting type	35 mm DIN rail DIN rail EN 50022-35 (15 mm high) or SIMATIC standard mounting rail
Safety	
Product standard	EN 61131-2 (environment)
Test voltage	Circuits with nominal voltage Ue <50 V relative to other circuits or ground, test voltage 500 VDC
Protection class	Protection class III according to EN 60536
Electrical safety	EN 60950-1
Time properties	
Accuracy with regard to the GPS signal	< 50 µs
Accuracy with regard to the DCF77 signal	< 1000 µs
Accuracy if GPS signal fails	$< 50x10^{-9}$
Accuracy if DCF77 signal fails	$< 1x10^{-6}$
Accuracy if power supply fails	$< 4x10^{-6}$
Time correction through micro-stepping	< 50 µs/s
Jitter during GPS operation	< 200 ns/s
Reserve power	See battery
Battery	
Service life during operation	> 12 years
Service life during storage, disconnected	> 12 years

Table 13-1 Technical data of the SICLOCK TC400

Service life during storage, connected	< 6 years, see **Battery** (Section 11.1)
Electromagnetic compatibility (EMC)	
Interference emission	EN 55022 Class A, FCC Class A
Immunity to interference	EN 55024
Environmental properties	
During operation	EN 60721-3-3 (weather-protected stationary use) Class 3K3
During storage/transport	EN 60721-3-2 Class 2K4
Climatic conditions	
Temperature during operation	0° C to 55° C
Temperature during storage/transport	-40° C to 70° C
Temperature gradient	Max. 10° C/h during operation, 20° C/h during storage, no condensation
Relative humidity - during operation - storage/transport	Tested to IEC 60068-2-78, IEC 60068-2-30 10% to 95% at 25° C (no condensation) 10% to 95% at 25° C (no condensation)
Atmospheric pressure	1080 to 795 hPa (corresponds to an altitude of -1000 to 2000 m)
Mech. ambient conditions	
During operation	EN 60721-3-3, Class 3M3
During storage/transport	EN 60721-3-2, Class 2M2
Interfaces (see also **Connecting (Section 6)**)	
Ethernet connection	Four separate Ethernet ports 10/100 MBit/s, autonegotiation
14-pin terminal strip (see also **Terminal assignment** (Section 15.1))	
2x radio clock inputs (short-circuit proof)	Rated current 20 mA to 40 mA, supply voltage 48 V for the connection of SICLOCK GPS1000, SICLOCK GPSDEC or SICLOCK DCFRS Radio clock interfaces are isolated from the remaining electronics.
2x outputs 24 V voltage interface / 20 mA current interface (short-circuit proof)	20 mA / 24 V for DCF77, pulses, cycle clocks, telegrams The outputs are isolated from the remaining electronics.
1x RS422 / 5 V output	For DCF77, pulses, cycle clocks, telegrams
1x NC relay output for WARNING signal	Max. 0.06 A, 48 VDC
1x NC relay output for ALARM signal	Max. 0.06 A, 48 VDC

Table 13-1 Technical data of the SICLOCK TC400

Status displays on the device	
Display	2-line, alphanumeric backlit LCD display and temperature-compensated contrast control
LEDs	4x orange LEDs for Ethernet port link-up 4x green LEDs for Ethernet port activity 2x green LEDs for radio clock status 3x green LEDs for output 1x green LED for POWER 1x green LED for SYNC status 1x red LED for FAULT status
Operator controls on the device	
Keys	1x SETUP key 4x CURSOR keys 1x ESC key 1x OK key

Dimension Drawing

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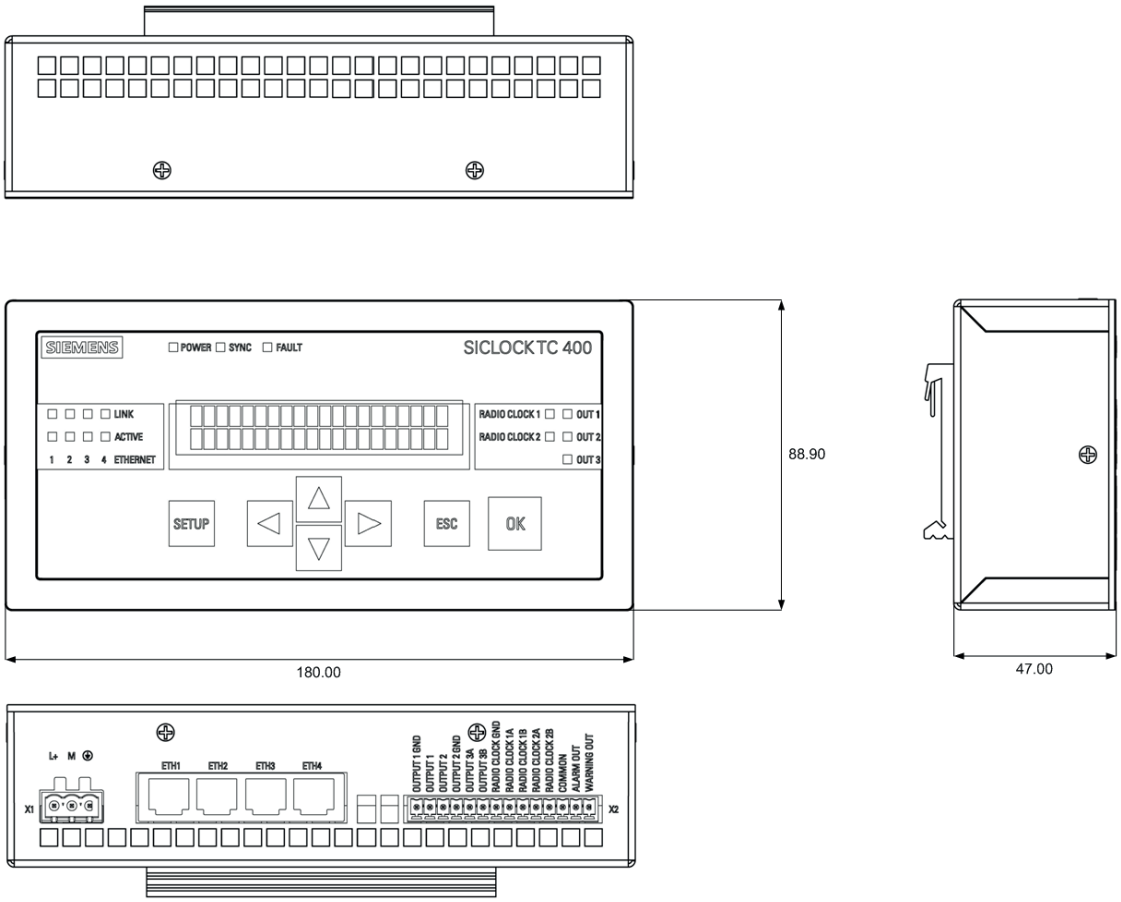

Figure 14-1 Dimension drawing

Circuit Diagrams 15

15.1 Terminal assignment

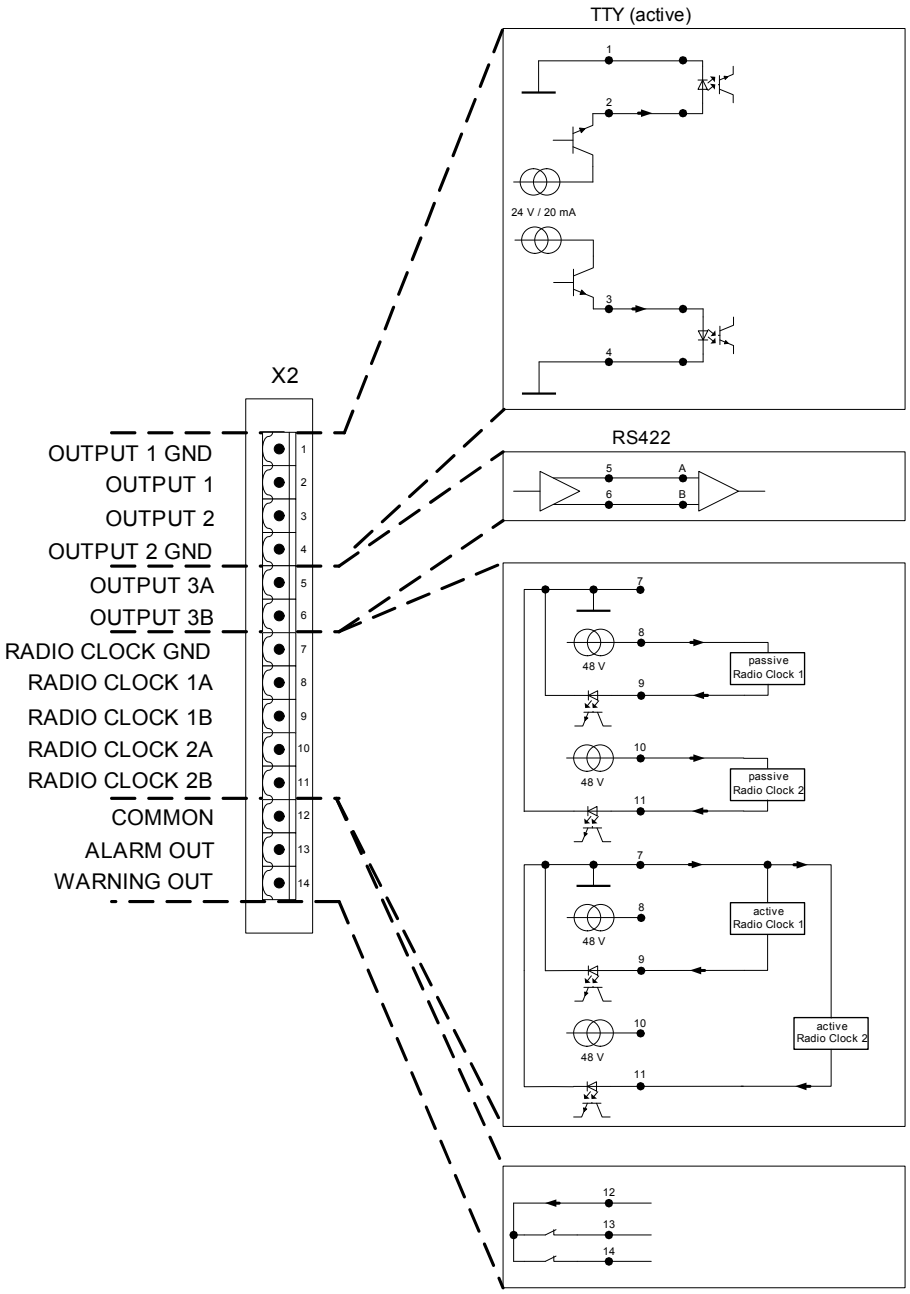

Figure 15-1 Terminal assignment of the SICLOCK TC400

Spare Parts / Accessories

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Table 16-1 Spare parts and accessories with order numbers

	Order number
Single device	
SICLOCK TC400 single device	2XV9450-2AR01
Packages	
SICLOCK TC400 standard package, contains GPS1000	2XV9450-2AR10
SICLOCK TC400 DCF77	2XV9450-2AR20
Spare parts for GPS1000	
GPS1000	E10433-E9910-H100
Mounting frame for GPS1000	2XV9450-1AR03
Lightning protection module for GPS1000	2XV9450-1AR83
DCF77	
Active DCF77 antenna with TTY interface	2XV9450-1AR16
Mounting frame for antenna	2XV9450-1AR03
Signal distribution / accessories	
Products for the time distribution, such as electrical-optical pulse converter as well as further accessories can be found at http://www.siemens.com/siclock.	

Appendix A

A.1 Directives and declarations

Notes on CE marking

CE The following applies for the product described in this documentation:

EMC directive

The devices fulfill the requirements for the EC directive ™89/336/EEC Electromagnetic Compatibility™, and are designed for the following fields of application corresponding to the CE marking:

Table A-1 Fields of application

Field of application	Requirement for	
	Interference emission	Immunity to interference
Industrial applications	EN 61000-6-4: 2001	EN 61000-6-2: 2001

Declaration of conformity

The EC declaration of conformity and the corresponding documentation are made available to authorities in accordance with the EC directives stated above. Your sales representative can provide these on request.

Observing installation guidelines

The installation guidelines and safety instructions in this documentation must be followed during commissioning and operation.

Connection of I/O devices

The requirements regarding noise immunity according to EN 61000-6-2:2001 are met when you connect an I/O device suitable for an industrial environment. I/O devices may only be connected via shielded cables.

A.2 Certificates and approvals

DIN ISO 9001 certificate

The quality assurance system for the entire product process (development, production, and marketing) at Siemens fulfills the requirements of DIN EN ISO 9001.

This has been certified by DQS (the German society for the certification of quality management systems).

Note

The approval or approbation is located on the type plate.

EMC

Table A-2 EMC Directives USA

USA	
General	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1 This device may not cause harmful interferences. 2 This device must accept any interference received, including interference that may cause undesired operation.
Shielded Cables	The use of shielded I/O cables is required when connecting this equipment to any and all optional peripheral or host devices. Failure to do so may violate FCC rules.
Modifications	Siemens AG is not responsible for any radio television interference caused by unauthorized modifications of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Siemens AG. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user.
Canadian Notice	This class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conformé à la norme NMB-003 du Canada.

ESD Guidelines

B

B.1 Electrostatic sensitive devices

Definition

All electronic modules are equipped with large-scale integrated ICs or components. Because of the technology used, these electronic components are very sensitive to overvoltages and thus to discharge of static electricity.

The acronym **ESD** has become the established designation for such **E**lectrostatic **S**ensitive **D**evices. This is also the international abbreviation for such devices.

Electrostatic sensitive devices are identified by the following symbol:

Figure B-1 Electrostatic sensitive devices

Caution

Electrostatic sensitive devices can be irreparably damaged by voltages that are far lower than anything a person can perceive. These voltages occur if you touch a component or the electrical connection of a module without having previously discharged any static from your body. Any damage that occurs to a module as a result of overvoltage is generally not recognized immediately and only comes to light after the equipment has been operating for some time.

B.2 Electrostatic charging of persons

Charging

Anyone who is not conductively connected to the electrical potential of their environment can accumulate an electrostatic charge.

The figure below shows the maximum electrostatic voltages that can accumulate on a person who is operating equipment when he/she comes into contact with the materials indicated. These values comply with the specifications in IEC 801-2.

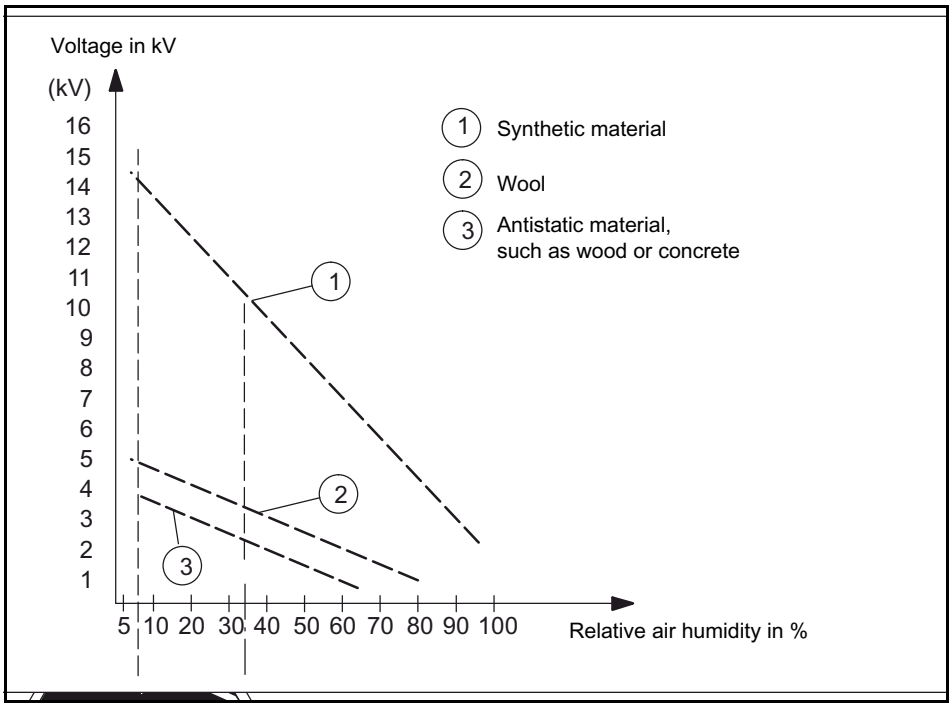

Figure B-2 Electrostatic voltage that can accumulate on operating personnel

B.3 Basic measures to protect against the discharge of static electricity

Ensure sufficient grounding

When working with electrostatic sensitive devices, make sure that the you, your workstation, and the packaging are properly grounded. This prevents the accumulation of static electricity.

Avoid direct contact

You should only touch ESD components if this is unavoidable (for example, during maintenance work). Handle the modules without touching any chip pins or PCB traces. If you follow these instructions, electrostatic discharge cannot reach or damage sensitive components.

If you have to take measurements on a module, make sure that you first discharge any static that may have accumulated in your body. To do this, touch a grounded metal object. Only use grounded measuring instruments.

List of Symbols

C

Table C-1

Symbol	Meaning
Toolbar of the configuration tools (see also **General functions** (Section 7.2))	
	**Open** Load a parameterization/archive from the local file system
	**Save** Save of a parameterization/archive to the local file system
	**Connect to device**
	**Disconnect from device**
	**Authorize**
	**Acknowledge event**
	**Acknowledge all events**
	**Ignore event** Discard the pending event
Parameters tab (see also **Parameters** (Section 7.3))	
	**Print table to text file**
	**Download parameters** Download parameters of the connected device
	**Refresh parameters** Download parameters of the connected device without parameter description
	**Upload parameters** Transfer writeable values of the loaded parameters to the connected device
	**Monitor actual values** Refresh actual value display
	**Write protection**

Table C-1

Symbol	Meaning
	**Unrestricted access**
	**Unrestricted access without upload** critical operating parameter
	**Display parameters**
	**Entry** This refers to a parameter entry
Archive tab (see also **Archive** (Section 7.4))	
	**Print table to text file**
	**Download archive** Download archive of the connected device
	**Refresh archive** Download archive of the connected device without parameter description
	**Collapse view to coming/going** Display only coming and going events
	**Change exclude-include view** Move event from the include to the exclude filter and vice versa
	**Clear include filter** / **Clear exclude filter** Remove all events from the include/exclude filter

Glossary

D

Alarm

Alarms are events with coming and going status.

See **Persistent message**.

Plant central clock

The plant central clock is the central component for the time synchronization of plants. It synchronizes all time components of the plant via its interfaces.

Plant components, automation units, computers

Plant components is the general term for the devices that have to be synchronized. Depending on the degree of detail they can also be called automation units or computers.

Typical networked plant components are, for example, PCs, SIMATIC S7.

Typical non-networked plant components are, for example, protective relays, fault recorders.

Archive

The archive contains relevant events with additional information from the device. Searches can be performed for specific events in the archive with a filter.

See **Filter**.

Atomic time (TAI)

The atomic time is defined in standards of some protocols (PTP, PTCP) as time domains. A calendar of leap seconds is required for the calculation of the atomic time.

Authorization

In order to be able to change parameter entries in the device using the configuration tool, the user must log on to the configuration tool with a password. There are various authorization levels.

The current authorization status is displayed in the password entry field in different colors; red is the lowest authorization level.

See **Password**.

Persistent message

Persistent messages are events that have a coming and going status, e.g. alarms.

See **Event**.

Entry

An entry contains a value or a selection (combo box). Depending on the entry type, the value/selection can be changed by the user.

Related entries are grouped into a parameter.

See **Parameter**.

Event

An event is triggered by the device and displays a message or a state of the device.

See **Persistent message**.

Event type

Events are classified in various types:

- System
- Application
- Information
- Warning

External synchronization

External time source that is used for the synchronization of the SICLOCK TC400.

Filter

Searches can be performed for specific events in the archive with an include and exclude filter.

See **Archive**.

Radio clock

All SICLOCK products that receive the time via an antenna are called radio clocks. The SICLOCK products SICLOCK DCFRS, SICLOCK GPSDEC, SICLOCK GPS1000 and packages contain radio clocks. The received radio signal can be preset for more exact delimitation:

- GPS radio clock for GPS and
- DCF radio clock for DCF77

Device

The SICLOCK TC400 plant central clock is described as a device.

Pulse converter

All products of the SICLOCK range that convert physical levels without changing the information are designated as pulse converters.

Examples of pulse converters:
SICLOCK EOPC, SICLOCK PCON, SICLOCK DCFHF, SICLOCK DCFS7 interface.

Local area network (LAN)

A local area network describes the networking of different components for a common data exchange.

Non-networked plant equipment

Non-networked plant equipment describes all those plant components that are not time-synchronized via the local area network, but via point-to-point connections.

See **Point-to-point connection**.

NTP - Network Time Protocol

Standard for the synchronization in computer systems via packet-based communication networks.

Offline mode

There is no connection between the configuration tool and the device.

The current status is displayed in the IP address entry field in different colors; in online mode, the IP address is green.

Online mode

There is a connection between the configuration tool and the device.

The current status is displayed in the IP address entry field in different colors; in online mode, the IP address is green.

Parameter

Related values/settings are combined into a parameter. A parameter contains one or more entries.

See **Entry**.

Password

Authorization may be required for access to parameters. Passwords for various authorization levels can be defined with the configuration tool.

Initial password on the device: "2222"

See **Authorization**.

Point-to-point connection

A point-to-point connection describes the synchronization of exactly one non-networked plant component via a dedicated cable, e.g. one output of a plant central clock.

See **Non-networked plant equipment**.

SICLOCK DCFRS

Industrial version of the SICLOCK DCFRS radio clock with integrated DCF77 receiver.

SICLOCK GPS1000

Radio clock as GPS receiver

SICLOCK GPSDEC

GPS complete package with SICLOCK GPSDEC decoder.

SICLOCK TC400 configuration tool

Web interface for the parameterization and searching in the archive of a SICLOCK TC400 device via an Internet browser.

u600 file

The configuration tool can open and save parameters and archives in the form of *.u600 files.

UTC

UTC stands for Universal Time Coordinated. It is a combination of the international atomic time TAI and the universal time UT. Time zones are specified as a positive or negative difference to UTC.

TAI

See **Atomic time (TAI)**.

Volatile parameters

Volatile parameters are parameters containing values/states that continuously change during operation.

Time synchronization

The time of all plant components, automation units and computers is adjusted exactly to the reference time of the plant central clock via time synchronization.

Time synchronization of plants

The term Time synchronization of plants is always used to describe when several components of a plant are synchronized with products of the SICLOCK range.

Zone time

The zone time is the zone time derived from UTC.

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