

SIMATIC NET

Industrial Remote Communication - TeleControl TeleControl Server Basic

Operating Instructions

Preface

Application and functions

1

Requirements for operation

2

Installation and commissioning

3

The OPC server and access to process data

4

Notes on configuration and operation

5

Configuring and monitoring with the CMT

6

Diagnostics and statistics

7

Examples of the configuration data of SMS gateway providers

A

Documentation references

B

Version V3

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

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

WARNING

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

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

Purpose of this documentation

This manual supports you during the configuration, commissioning and operation of the TeleControl Server Basic V3 application.

Validity of this documentation Article numbers - licenses

This manual is valid for the following software version:

- **TeleControl Server Basic V3.1 Update 3**

The product is available with the following expansions and licenses:

Table 1 Basic licenses of TCSB V3

Product name	Article number	Number of connectable stations
TELECONTROL SERVER BASIC 8 V3.1	6NH9910-0AA31-0AA0	8
TELECONTROL SERVER BASIC 32 V3.1	6NH9910-0AA31-0AF0	32
TELECONTROL SERVER BASIC 64 V3.1 *	6NH9910-0AA31-0AB0	64
TELECONTROL SERVER BASIC 256 V3.1 *	6NH9910-0AA31-0AC0	256
TELECONTROL SERVER BASIC 1000 V3.1 *	6NH9910-0AA31-0AD0	1000
TELECONTROL SERVER BASIC 5000 V3.1 *	6NH9910-0AA31-0AE0	5000

* TCSB can be set up redundantly with two of these licenses.

Table 2 Powerpacks for upgrading the license size

Product name	Article number
PP TELECONTROL SERVER BASIC 8 ⇒ 32 V3.1	6NH9910-0AA31-0AB1
PP TELECONTROL SERVER BASIC 32 ⇒ 64 V3.1	6NH9910-0AA31-0AF1
PP TELECONTROL SERVER BASIC 64 ⇒ 256 V3.1	6NH9910-0AA31-0AC1
PP TELECONTROL SERVER BASIC 256 ⇒ 1000 V3.1	6NH9910-0AA31-0AD1
PP TELECONTROL SERVER BASIC 1000 ⇒ 5000 V3.1	6NH9910-0AA31-0AE1

Table 3 Upgrade licenses for migration of TCSB V2 or TCSB V3.0 to TCSB V3.1

Product name	Article number
TELECONTROL SERVER BASIC UPGR V3.1	6NH9910-0AA31-0GA0

Abbreviations/acronyms and terminology

- **TCSB**

In the remainder of the manual, the "TeleControl Server Basic" (version V3.1) software is abbreviated to "TCSB".

- **TCM**

The "Telecontrol Manager" is a central component of TCSB.

The TCM is responsible for monitoring TCSB itself, for communication of the internal TCSB components; see also section The components of TCSB (Page 16), for communication with the stations and the OPC server of TCSB and for inter-station communication between the stations.

- **CMT**

The "Configuration and Monitoring Tool", the configuration and monitoring user interface of TCSB.

- **Telecontrol server**

The TCSB software is installed on a PC connected to the telecontrol network. The PC on which the TCSB software is installed is known as the "telecontrol server".

- **CP**

The abbreviation applies to all supported CP types of the S7-1200 and the ET 200SP involved in the relevant context.

If the devices differ in the particular context, the full product name will be used.

- **MD720**

This abbreviation applies to the following devices if the content of the description applies equally to these devices in the relevant context:

- SINAUT MD720-3
- MODEM MD720

- **RTU**

This abbreviation applies to the following devices if the content of the description applies equally to these devices in the relevant context:

- RTU3010C
- RTU3030C
- RTU3031C
- RTU3041C

RTU303xC

- RTU3030C
- RTU3031C

If the devices differ in the particular context, the full product name will be used.

- **ES**

Engineering station, computer with STEP 7

- **Mobile wireless CP**

The term is used for the following CP types:

- CP 1242-7 (discontinued)
- CP 1242-7 GPRS V2
- CP 1243-7 LTE

- **CP with data point configuration**

The term is used for the following CP types:

- CP 1242-7 GPRS V2
- CP 1243-1
- CP 1243-7 LTE
- CP 1542SP-1 IRC

- **Station with data point configuration**

The term is used for stations that have one of the following devices with data point configuration:

- CP 1242-7 GPRS V2
- CP 1243-1
- CP 1243-7 LTE
- CP 1542SP-1 IRC
- RTU3010C
- RTU3030C
- RTU3031C
- RTU3041C

New in this release

New functions that are supported with the current software version:

- New operating systems
- Editorial revisions

For further information on the functions, refer to the section Application and systems (Page 13).

Replaced manual issue

Edition 01/2018

Compatibility with predecessor systems

TCSB is compatible with SINAUT MICRO SC systems.

TCSB (version V3.1) is largely compatible with the predecessor system TCSB (V2). You will find information on differences compared with the previous version in the section Incompatibilities with TCSB V2 (Page 21).

Required experience

To be able to configure and operate the system described in this document, you require experience of the following products, systems and technologies:

- SIMATIC NET - Telecontrol
- IP-based communication
- OPC DA / UA
- STEP 7 Basic / Professional
- SIMATIC S7

Current manual release on the Internet

You will also find the current version of this manual on the Internet pages of Siemens Industry Online Support:

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15918/man>)

Further information on the Internet

You will find further information on the Siemens telecontrol basic products such as the latest information, manuals, FAQs or software updates on the Internet on the pages of Siemens Industry Online Support:

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15915>)

There select the required information under "Entry type" (for example "Updates", "Manuals", "FAQs" etc.).

Examples of applications on the Internet

You will find various examples of applications on the Internet on the pages of Siemens Industry Online Support under the entry IDs listed below.

- Example of an application for wireless direct communication and inter-station communication of S7 stations with a CP 1242-7:

Link: (<https://support.industry.siemens.com/cs/ww/en/view/58099765>)

Link: (<https://support.industry.siemens.com/cs/ww/en/view/39863979>)

Link: (<https://support.industry.siemens.com/cs/ww/en/view/58638283>)

- Example of an application for TeleService access by an engineering station to an S7 station with a CP 1242-7 via the Internet:

Link: (<https://support.industry.siemens.com/cs/ww/en/view/56720905>)

- Application example of connecting an S7-300 to TCSB:

Link: (<https://support.industry.siemens.com/cs/ww/en/view/109475770>)

License conditions

Note

Open source software

Read the license conditions for open source software carefully before using the product.

You will find license conditions in the following documents on the supplied data medium:

- OSS_TCSB-V3_99.pdf

SIMATIC NET glossary

Explanations of many of the specialist terms used in this documentation can be found in the SIMATIC NET glossary.

You will find the SIMATIC NET glossary on the Internet at the following address:

Link: (<https://support.industry.siemens.com/cs/ww/en/view/50305045>)

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is

necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit

Link: (<http://www.siemens.com/industrialsecurity>)

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under

Link: (<http://www.siemens.com/industrialsecurity>)

For more detailed information, refer to section Security recommendations (Page 33).

Training, Service & Support

You will find information on Training, Service & Support in the multi--language document "DC_support_99.pdf" on the data medium supplied with the documentation.

Table of contents

	Preface	3
1	Application and functions	13
1.1	Application and systems	13
1.2	The components of TCSB	16
1.3	Functional overview of the CMT	17
1.4	Properties and configuration limits.....	18
1.5	Incompatibilities with TCSB V2.....	21
1.6	Configuration examples	22
2	Requirements for operation	27
2.1	Required devices	27
2.2	Required operating systems	28
2.3	Required software, licenses and connections	28
2.4	Required information.....	30
3	Installation and commissioning.....	33
3.1	Security recommendations	33
3.2	System setup and installation variants of the TCSB software	36
3.3	Installation of the software and licenses	38
3.4	Changing the port, network and DCOM settings	43
3.5	Connecting and setting up redundant TCSB computers	45
3.6	Setting up OPC clients.....	46
3.7	Exporting and importing a database backup copy.....	46
3.8	Uninstalling	48
4	The OPC server and access to process data.....	49
4.1	The OPC server of TCSB	49
4.2	Process OPC items.....	53
4.3	System OPC items.....	57
4.4	Syntax of the OPC items.....	66
4.5	Name space of the OPC server	70
5	Notes on configuration and operation	75
5.1	Virtualization software.....	75
5.2	Migration from SINAUT MICRO SC / TCSB V2 to TCSB V3	75

5.2.1	Migration from TCSB V2 to TCSB V3	75
5.2.2	Migration from SINAUT MICRO SC to TCSB V3.....	76
5.3	Start of the runtime system	76
5.4	Overview of configuration	76
5.5	Working with projects	78
5.6	The user concept	79
5.7	Redundancy	80
5.7.1	Structure of a redundant system.....	80
5.7.2	Generation of the virtual IP address by NLB	81
5.7.3	Addressing in the redundant TCSB system.....	83
5.7.4	Data management and system response of the redundant system	84
5.8	Connection establishment.....	89
5.9	Wake-up call and wake-up SMS (CP 1242-7, RTU303xC)	92
5.10	Delay times with connection establishment	94
5.11	Dial retry delay of the MD720	95
5.12	Monitoring time for read/write jobs of OPC clients.....	96
5.13	Connection monitoring	96
5.14	Process data access by TCSB and data management in the stations.....	97
5.14.1	S7-200/300: Data management and communication	97
5.14.2	CP 1242-7: Data management in the process images and communication	99
5.14.3	Station with data point configuration: Data management and communication.....	102
5.15	Program blocks for the CPU	103
5.16	Times of day in the system	103
5.17	TeleService functions.....	105
5.18	Overview of the passwords - system protection and authentication.....	106
6	Configuring and monitoring with the CMT.....	109
6.1	Windows and buttons of the CMT	110
6.1.1	Window layout and Editing.....	110
6.1.2	The buttons of the CMT	115
6.1.3	Menu bar	115
6.1.4	Individual adaptation of the window	116
6.1.5	Online help	117
6.2	Starting CMT - changing passwords.....	117
6.3	Importing HSPs	119
6.4	Transferring certificates	120
6.5	Projects	122
6.5.1	Working with projects	122
6.5.2	Creating and deleting projects	123
6.5.3	Configuring and activating projects.....	126
6.6	Connections and TeleService connections.....	129
6.6.1	Creating and deleting connections.....	129

6.6.2	Importing connection data from projects.....	136
6.6.3	Configuring connections	139
6.6.4	Sending a wake-up SMS message.....	146
6.6.5	"Process items", "System variables", "Activated parameters"	146
6.6.6	TeleService connections.....	147
6.7	Configuring inter-station communication	149
6.8	Users and administrators	151
6.9	Access rights in projects	152
6.10	TCSB system	154
6.10.1	"TCM" tab.....	155
6.10.2	"Database" tab	160
6.10.3	"OPC" tab.....	161
6.10.4	"Data buffer" tab.....	163
6.11	SMS gateway provider.....	164
6.12	SMTP server	167
6.13	System overview.....	167
7	Diagnostics and statistics	169
7.1	System variables.....	169
7.2	Monitoring and time response of wake-up SMS messages	170
7.3	Messages.....	172
7.4	The Web server	172
A	Examples of the configuration data of SMS gateway providers	179
B	Documentation references	181
B.1	/1/	181
B.2	/2/	182
B.3	/3/	182
B.4	/4/	182
B.5	/5/	182
B.6	/6/	182
B.7	/7/	183
B.8	/8/	183
B.9	/9/	183
B.10	/10/	183
B.11	/11/	183
B.12	/12/	184
	Index.....	185

Application and functions

1.1 Application and systems

Use of the TCSB software

TCSB connects up to 5000 SIMATIC controllers via LAN, via mobile wireless or via the Internet to a control center.

In the direction of the control center, TCSB is connected to OPC clients via its OPC interfaces on Ethernet. This means that widely distributed telecontrol solutions can be implemented in a variety of different sectors and applications.

The database-supported software allows distributed engineering and the management of many projects on one server.

Connectable SIMATIC systems

The following SIMATIC systems of a telecontrol network can be connected to TCSB:

- **SIMATIC RTU / RTU3010C**
- **SIMATIC RTU / RTU3030C**
- **SIMATIC RTU / RTU3031C**
- **SIMATIC RTU / RTU3041C**
- **S7-1200 / CP 1242-7 GPRS V2**
- **S7-1200 / CP 1243-1**
- **S7-1200 / CP 1243-7 LTE**
- **S7-1200 / CP 1242-7 (discontinued)**

The CP uses the block library "GPRSComm: CP1242-7" (STEP 7 Basic).

- **ET 200SP / CP 1542SP-1 IRC**
- **S7-200 / MD720(Secure)**

The station communicates via a MODEM MD720.

The CPU uses the block library "SINAUT MICRO SC SEC" (sinautmicrosc_sec.mwl).

Connection type in CMT: S7-200 / MD720(Secure)

- **S7-200 / MD720**

The station communicates optionally via one of the following modems:

- SINAUT MD720-3
- MODEM MD720

The CPU uses the block library "SINAUT MICRO SC" (sinautmicrosc.mwl).

Connection type in CMT: S7-200 / MD720

Note

No CP in S7-200

If you connect an S7-200 station with MD720 to TCSB, there must be no other CP plugged into the station.

- **S7-300 / MD720**

The station communicates optionally via one of the two following modems:

- SINAUT MD720-3
- MODEM MD720

The CPU uses the block library "MSC300_Library" and communicates via the MODEM MD720.

Telecontrol applications

- Communication with SIMATIC stations for connection to a control center
- Communication with the SIMATIC station via:
 - Industrial Ethernet
 - Mobile wireless: LTE (4G), UMTS (3G) with HSPA and HSPA+, EDGE/GPRS/GSM (2G)
- Communication with SIMATIC stations via standard APNs (mobile wireless Internet gateway) with normal mobile phone contracts
- Communication with SIMATIC stations via private APNs (mobile wireless network gateway) of the mobile wireless network provider (greater security)
- Central status monitoring of the connected stations
- Linking of the telecontrol stations to a control center via the OPC-DA or UA interface of the integrated OPC server

Diagnostics by access to the Web server of the S7-1200 CPU / ET 200SP CPU / RTU

Via the Web server of TCSB you can access the Web server of the following stations from a mobile phone or from a PC via HTTP/HTTPS.

- S7-1200

The CPU must support the Web server functionality and the CP the data point configuration.

- ET 200SP
- RTU

You will find the description of the requirements and the access to the Web server in the section The Web server (Page 172).

TeleService applications for mobile wireless CPs

The TeleService functions are started on an engineering station (ES).

The TeleService connections run over the telecontrol server, the Internet and the mobile wireless network.

Functions:

- Downloading project or program data from the STEP 7 project to the station
- Querying diagnostics data on the station

Protection concept

To protect the TCSB system from unauthorized access and therefore also to avoid transmission costs associated with such access, system access is protected in several ways:

- Users and passwords

The editors are assigned various roles. Access is password protected. You will find an overview of the passwords in the section Overview of the passwords - system protection and authentication (Page 106).

- User rights

Different permissions and rights are assigned to the various user types. You will find details in the section Access rights in projects (Page 152).

- Authorized phone numbers

Access to S7-1200 stations with a telecontrol CP is restricted to telephone numbers stored in the CP configuration. See also section SMS gateway provider (Page 164).

1.2 The components of TCSB

Main components of TCSB

TCSB is made up of the following main components:

- **Telecontrol Manager (TCM)**

The Telecontrol Manager manages the connections with communications partners. This is the communications center of all connected software components in the PC side and the process side. It controls the frames between the sender and destination address and has the logical connection information, system variables and configuration information.

The Telecontrol Manager is not visible to the user. The configuration of the access data is created using the CMT (see below).

- **Database**

The database stores the configuration data and log files of the system. The database is not visible to the user. The user interface to the database is CMT (see below).

The database has separate areas for the offline configuration data and for the online configuration data of the runtime system. With the Enable function in CMT, the configuration data is shifted from the offline to the online area of the runtime system.

- **OPC server**

The OPC interfaces of TCSB provide the data of the connected stations to one or more connected OPC clients.

- **Configuration and Monitoring Tool (CMT)**

The CMT is the program user interface with the following main functions:

- Configuration of the system and the connections to the stations
- Monitoring of the connections

- **Web server**

With the Web server of TCSB you can access the Web server of the following station types from a PC via Internet/mobile wireless.

- S7-1200 with data point configuration
- SIMATIC RTU
- ET200 SP

You will find the description in the section The Web server (Page 172).

1.3 Functional overview of the CMT

The Configuration and Monitoring Tool (CMT)

The Configuration and Monitoring Tool (CMT) is the program user interface of TCSB. It has two functional areas:

- **Configuring**

This functional area is used for configuring the telecontrol server:

- Configuration of the basic settings of the system, the users and their rights
- Configuration of the connections to the stations of the distributed telecontrol system
- Configuration of the archive variables for the "HistoryRead" method

- **Functions at runtime**

In the runtime system, the telecontrol server is connected to the telecontrol stations. The following functions are available:

- Monitoring of the connections to the remote stations
- Sending wake-up SMS messages to stations when connections are terminated
- Diagnostics of connections and stations based on status indications and system variables
- Making statistical data available for further evaluation

Configuring the telecontrol server

Among other things, you can configure the following objects and functions:

- Basic settings of the system
 - Settings of the system and address parameters of the hardware
 - Language of the program user interface
- Specifying users and their rights
 - Access permissions
 - Passwords

- Setting up projects

Large projects are clearly structured in the CMT using objects (logical groups).

A STEP 7 project corresponds to a TCSB project.

- Connection to the stations

This includes, for example, address information, the type of monitoring, cycle times etc.

- Enabling inter-station communication between stations of different projects
- Configuration of the SMS gateway provider
- Activating projects

With "Activate", the configured data is transferred to the runtime system.

1.4 Properties and configuration limits

Properties

- **Communication with telecontrol stations**

- Connection of telecontrol stations via Ethernet cables
- Connection of telecontrol stations via the Internet and mobile wireless network
- Connection to the mobile wireless network via standard APNs (mobile wireless Internet gateway)
- Connection to the Internet via private APNs
- Use of the data services in the mobile wireless network

- **Number of connectable stations**

The number of connectable stations is staggered according to the license sizes of TCSB. You will find these in Preface (Page 3).

- **Single or redundant structure**

- Single structure

TCSB can always be set up as a single system. The CMT can be installed on separate computers.

- Redundant structure

TCSB can be set up redundantly with some Windows operating systems and with OPC DA/UA with two licenses as of a size of 64 connectable stations. You will find information about the functions of a redundant system in the section Redundancy (Page 80).

You will find information about the installation and structure of the two variants in the section Installation and commissioning (Page 33).

- **Number of possible connections**

- Max. 5000
- Connections can be distributed in up to 2000 projects

- **OPC server**

- Makes data available using OPC Data Access (DCOM interface)

The "IOPCItemIO" interface of OPC Data Access V3.0 for writing and reading OPC items is not supported.

- Makes data available using OPC UA
- Simultaneous connection of up to five OPC clients
- Support of synchronous and asynchronous reading of data
- Hierarchical address browsing
- MonitoredItems function in OPC UA
- Item-specific archiving of process data in OPC UA for the "HistoryRead" method
- Item-specific buffering of process data in OPC UA

For a detailed description of the functions, refer to the section The OPC server and access to process data (Page 49).

You will find examples of the division of the maximum configuration in the following section.

- **Supported OPC Data Access specifications**

TCSB supports the following protocol versions:

- Data Access 2.05a
- Data Access 3.0

- **Supported OPC UA specifications**

TCSB supports the following specifications:

- IEC/TR 62541-1 (08-2012) OPC Unified Architecture - Part 1: Overview and Concepts
- IEC/TR 62541-2 (02-2009) OPC Unified Architecture - Part 2: Security Model
- IEC 62541-3 (08-2012) OPC Unified Architecture - Part 3: Address Space Model
- IEC 62541-4 (08-2012) OPC Unified Architecture - Part 4: Services
- IEC 62541-5 (08-2012) OPC Unified Architecture - Part 5: Information Model
- IEC 62541-6 (08-2012) OPC Unified Architecture - Part 6: Mappings
- IEC 62541-7 (09-2010) OPC Unified Architecture - Part 7: Profiles
- IEC 62541-8 (08-2012) OPC Unified Architecture - Part 8: Data Access
- IEC 62541-11 (08-2012) OPC Unified Architecture - Part 11: Historical Access

- **Support of large applications**

- Multiproject capability
It is possible to manage multiple telecontrol projects.
- Assignment of rights
Users can be assigned to different projects.
- Multiuser system
Several users can configure at the same time.

- **Monitoring of the connected stations**

- Group diagnostics of a single overall project
- Keepalive monitoring
- Status monitoring of the connection

The result of all these monitoring functions is displayed in the CMT and made available to connected OPC clients as system items.

- **Inter-station communication**

Communication between remote stations via the telecontrol server

For more detailed information on inter-station communication, refer to section Configuring inter-station communication (Page 149).

- **Optimized power requirements and minimized data volumes**

- Establishment of connections only when required (temporary connections with the RTU and CP 1242-7)
- Low data volumes due to event-oriented data transfer and optimized monitoring functions for permanent connections

- **Configuration**

- Simple configuration using the integrated user interface CMT
- Engineering capable of multiple users
Simultaneous configuration by multiple users in different projects possible
- Expansion of the system at runtime without interrupting operation

- **TeleService from S7-1200 stations with mobile wireless CPs**

Establishment of the TeleService connection from the station via the telecontrol server to the engineering station

Per project, 5 TeleService access points are made available (5 TeleService connections to stations). For the functions upload from device / download to device, an additional connection resource is occupied per function.

- **Compatibility with SINAUT MICRO SC**

- TCSB is compatible with all systems that use SINAUT MICRO SC.
- Support of the import of SINAUT MICRO SC connection data

Maximum configuration limits for OPC

The following maximum number of OPC items of the type BYTE is supported (alternatively):

- For OPC DA: Max. 500000
or
- For OPC UA: Max. 250000,
of which the following can be used:
 - For the MonitoredItems function: Max. 50000
 - For archiving process data (HistoryRead): Max. 50000

The size and structure of the memory for archive values are described in the section The OPC server of TCSB (Page 49).

- For buffering of process data: Max. 50000

The number of supported OPC items depends on various factors. The maximum number of OPC items is reduced by the following factors:

- Data types of the items
The use of items with larger data types reduces the maximum number of items.
- MonitoredItems
The use of the MonitoredItems function reduces the maximum number of items because additional memory space is required for this.
- HistoryRead
Reading historical data reduces the maximum number of items because additional memory space is required for this.

1.5 Incompatibilities with TCSB V2

Incompatibilities with the previous system TCSB V2

Below, you will find the most important incompatibilities of TCSB version V3 with the previous system TCSB version V2. You will find details about the differences in the following sections of this manual:

- The configuration limits (see above)
- For the supported data types, refer to the section Process OPC items (Page 53).
- OPC clients logging off has other effects than those in TCSB version 2, refer to the section Process OPC items (Page 53).
- For the extent and functionality of the system items, refer to the section System OPC items (Page 57).
- For the server password, refer to the section Overview of the passwords - system protection and authentication (Page 106).

- The functions of station monitoring are configured in the "Cyclic services" parameter group, refer to the section Configuring connections (Page 139).
- Automated installation is no longer supported.

1.6 Configuration examples

Telecontrol by a master station

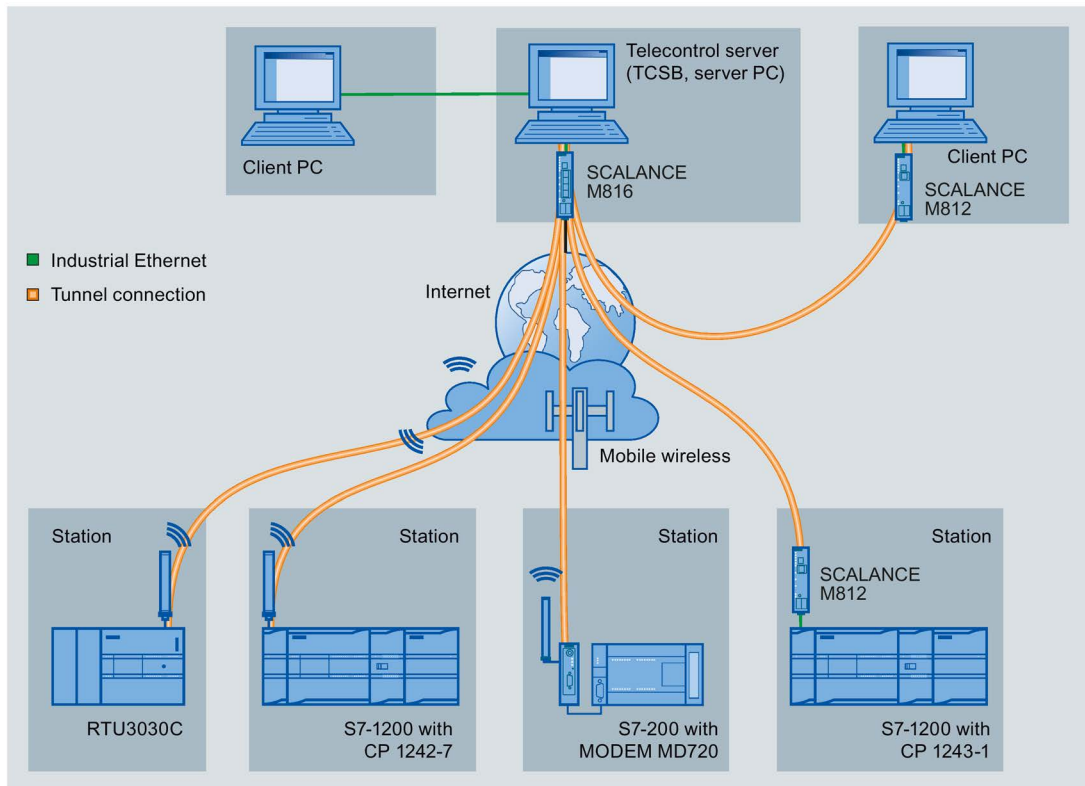


Figure 1-1 Communication between S7 stations and a master station (TCSB)

In telecontrol applications, SIMATIC S7 stations communicate with a master station via the mobile wireless network and the Internet.

- Telecontrol communication between station and master station

In this use case, data from the field is sent by the stations to the telecontrol server in the master station via the mobile wireless network and a public APN and via the Internet. The telecontrol server monitors the connections established by the remote stations.

- Communication between TCSB and OPC clients

As in the first case, the stations communicate with the telecontrol server. With the help of the OPC servers, TCSB exchanges the process data of the stations with one or more OPC clients (for example WinCC).

An OPC client can be installed on a separate computer or on the same computer as TCSB.

- Inter-station communication between stations of the same type via the telecontrol server

To allow inter-station communication, the telecontrol server forwards the messages of the sending station to the receiving station.

You will find an overview of the station types for inter-station communication in the section Configuring inter-station communication (Page 149).

Redundant operation of TCSB

The following figure shows a possible configuration of a redundant TCSB system.

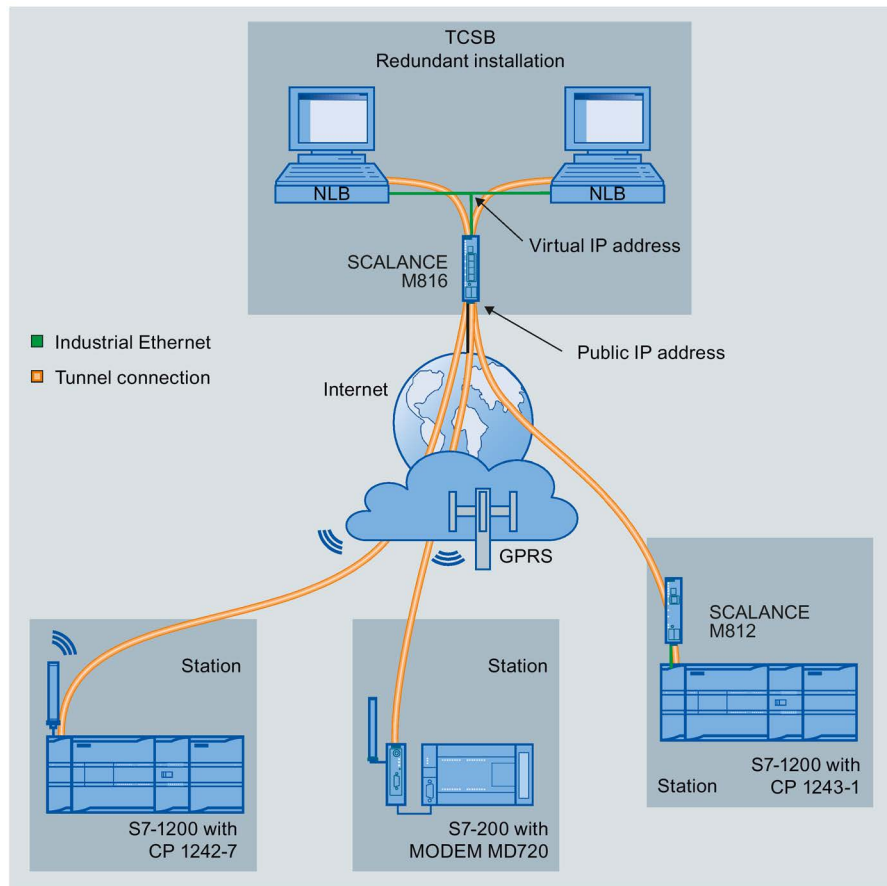


Figure 1-2 Redundant installation of TCSB

TeleService for mobile wireless CPs

TeleService is supported for S7-1200 stations with a mobile wireless CP.

In TeleService via the mobile wireless network, an engineering station on which STEP 7 is installed communicates via the mobile wireless network and the Internet with the CP in the S7-1200 station.

Since a firewall is normally closed for connection requests from the outside, a switching station between the remote station and the engineering station is required. This operator station is a telecontrol server. The switching station forwards the messages through the firewall. This allows access by the engineering station with Internet access to the S7-1200 via a router and via the APN of the network provider.

Configuration with TeleControl Server Basic:

The connection runs via the telecontrol server.

- The engineering station and telecontrol server are connected via the Internet (LAN).
- The applications for the engineering station and the switching station (TCSB) can be located on the same computer.
- The telecontrol server and remote station are connected via the Internet and via the mobile wireless network.

The engineering station and telecontrol server can also be the same computer; in other words, STEP 7 and TCSB are installed on the same computer.

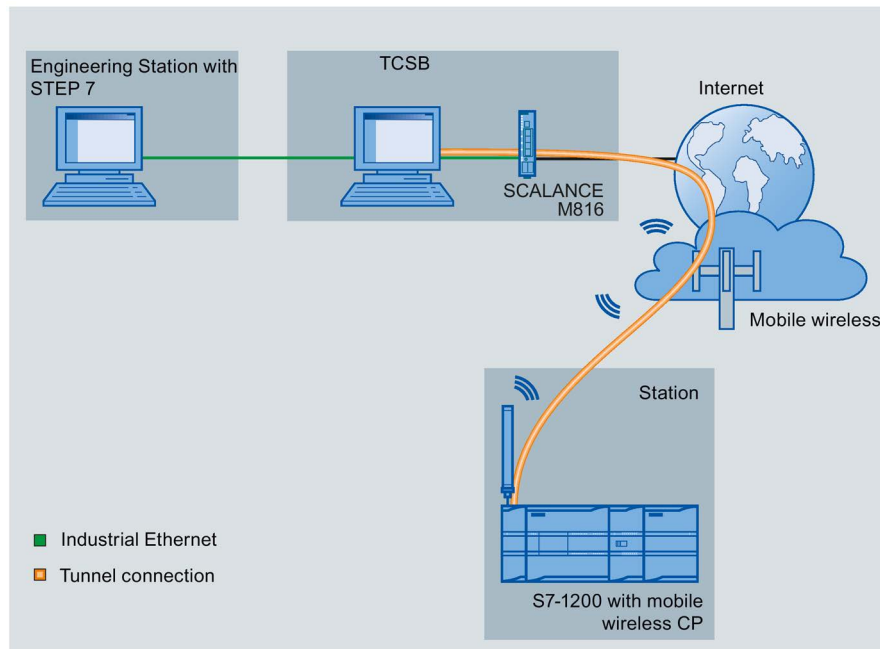


Figure 1-3 TeleService via the telecontrol server

Requirements for operation

2.1 Required devices

The devices, operating systems, software, licenses and information described below are required to operate TCSB.

Required devices

- To operate TCSB, you require a computer (PC) with the following modules:
 - DVD or Blu-ray drive
 - Network adapter for connecting to the Internet
 - Required work memory: At least 4 GB

This applies to the telecontrol server (computer with complete software)
- To connect to the Internet, they require a suitable router, for example SCALANCE M812/816.
- For the TeleService functions (engineering station) for S7-1200 stations, you require the telecontrol server.

Devices for redundant TCSB

To set up a redundant TCSB system, you require at least two computers as specified above. If you install the CMT on a separate computer, the number of computers increases accordingly.

Devices for client installation

If you choose the "Client PC" installation type, refer to the section System setup and installation variants of the TCSB software (Page 36), you require a further computer for each client PC as specified above.

2.2 Required operating systems

Compatible operating systems

TCSB can operate with the following operating systems:

- **Single installation**
 - Microsoft Windows 7 Professional, Ultimate, Enterprise + Service Pack 1 (64-bit)
 - Microsoft Windows 8.1 Professional (64-bit)
 - Microsoft Windows 10 Professional, Enterprise (64-bit)
 - Microsoft Windows 10 Enterprise LTSC (64-bit)
 - Microsoft Windows Server 2008 R2 Standard + Service Pack 1 (64-bit)
 - Microsoft Windows Server 2012 R2 Standard (64-bit)
 - Microsoft Windows Server 2016 Standard, Datacenter (64-bit)
- **Redundant installation**
 - Microsoft Windows Server 2008 R2 Standard + Service Pack 1 (64-bit)
 - Microsoft Windows Server 2012 R2 Standard (64-bit)
 - Microsoft Windows Server 2016 Standard, Datacenter (64-bit)

2.3 Required software, licenses and connections

Required software

- The TELECONTROL SERVER BASIC V3 software.
- On the engineering station from which you want to execute TeleService functions to S7-1200 stations, STEP 7 Basic / Professional as of version V13 is required.

Requirement for access to stations via HTTP/HTTPS

For access to the Web server of an S7-1200 (CPU + CP with data point configuration) via HTTP/HTTPS, the Web server must be activated in the configuration of the CP and the CPU.

Required licenses, contracts and connections

- A valid license for TCSB.

For a redundant installation of TCSB, you require two licenses for the required configuration limits of connectable stations.

You will find possible installation variants in the section System setup and installation variants of the TCSB software (Page 36).

- For the TeleService functions for S7-1200 stations, a STEP 7 license is required on the engineering station.

No additional license is necessary for the TeleService function.

- For the remote stations that communicate with TCSB using mobile wireless (CP 124x-7 / MD720) you require:

- Contracts with mobile wireless network providers

The contracts must include SIM cards for the CP / modem and allow access to the Internet. Generally, standard contracts are adequate.

- Internet access

- To send SMS messages (optional), you require:

- An SMS gateway for converting the wake-up e-mail of the telecontrol server into an SMS message

- An SMTP server (public or private) for sending e-mails

IP address for Internet access and DNS

For the Internet access of the telecontrol server, you require an IP address or a name that can be resolved by DNS. The IP address can be dynamic but a fixed IP address is better.

Note

Name that can be resolved with DNS

In particular with large systems, a name that can be resolved with DNS is advisable. This relates to the configuration of the Internet access of the mobile wireless CP if there is a change of network provider.

Reachability of the telecontrol server via the Internet - costs

Note

Avoid telecontrol server downtimes.

If the telecontrol server cannot be reached, the stations with the "permanent" setting repeatedly attempt to establish the connection to the telecontrol server. In stations that communicate via mobile wireless, this generates data volumes that may result in costs.

2.4 Required information

You will find information on the connection establishment attempts of the Cps or modems in the sections Delay times with connection establishment (Page 94) and Dial retry delay of the MD720 (Page 95).

2.4 Required information

Required information

To commission the telecontrol server and the telecontrol stations connected to it, the following information is required:

- Information about the Internet access of the telecontrol server for the stations
 - Port configuration of the router for the Internet access
 - Internet IP address of the router connected to the telecontrol server.or
 - Name of the router that can be resolved by DNS (if DNS is used)
 - Port number of the telecontrol server for port forwarding via the router
- Information about the SMTP server and SMS gateway to send wake-up SMS messages from the telecontrol server (for stations with a CP 1242-7 or RTU303xC).
- Information about the Configuration and Monitoring Tool of TCSB

You will find the preset administrator user name and password in the section Starting CMT - changing passwords (Page 117).

- Information on the connection establishment with the remote station with a mobile wireless CP, MD720 or RTU303xC
 - APN (Access Point Name)
 - User name for the APN
 - Password for the APN
 - Data of the DNS servers (S7-1200 CPs)

This information is configured in the STEP 7 project of the CP or in the program blocks of the S7-200 CPU or in the WBM of the RTU303xC.

- Information for TeleService functions (S7-1200 + mobile wireless CP)
 - TeleService user name (as configured for the CP)
Entry on the engineering station
 - TeleService password (as configured for the CP)
Entry on the engineering station
 - Server password
The server password is configured in TCSB. The configuration must be project specific.
Required for access by the engineering station to the telecontrol server
Entry on the engineering station
 - IP address of the telecontrol server or the router connected to the Internet
Entry on the engineering station

Installation and commissioning

3.1 Security recommendations

Keep to the following security recommendations to prevent unauthorized access to the system.

General

- You should make regular checks to make sure that the device meets these recommendations and other internal security guidelines if applicable.
- Evaluate your plant as a whole in terms of security. Use a cell protection concept with suitable products.
- Do not connect the device directly to the Internet. Operate the device within a protected network area.
- Check regularly for new features on the Siemens Internet pages.
 - Here you will find information on industrial security:
Link: (<http://www.siemens.com/industrialsecurity>)
 - Here you will find information on security in industrial communication:
Link: (<http://w3.siemens.com/mcms/industrial-communication/en/ie/industrial-ethernet-security/Seiten/industrial-security.aspx>)
 - You will find a publication on the topic of network security (6ZB5530-1AP02-0BA5) here:
Link:
(http://w3app.siemens.com/mcms/infocenter/content/en/Pages/order_form.aspx?nodeKey=key_518693&infotype=brochures)
Enter the following filter: 6ZB5530

Physical access

Restrict physical access to the device to qualified personnel. Use the security mechanisms of the operating system.

Security functions of the software

- Keep the software up to date. Check regularly for security updates for the product. Here you will find information on this:
Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15918/dl>)
- Keep the operating system up to date. Check regularly for security updates of the operating system and use them.
Use the options of the Windows firewall and the configuration options of the product.
- TCSB includes an automatic logging function. Check this information regularly for unauthorized access.

Passwords

- Define rules for the use of devices and assignment of passwords.
- Regularly update the passwords to increase security.
- Only use passwords with a high password strength. Avoid weak passwords for example "password1", "123456789" or similar.
- Make sure that all passwords are protected and inaccessible to unauthorized personnel.
- Do not use one password for different users and systems.

Protocols

Secure and non-secure protocols

- Only activate protocols that you require to use the system.
- Use secure protocols when access to the device is not prevented by physical protection measures.

The following protocols provide secure alternatives:

- OPC DA ⇒ OPC UA
- SINAUT MD720-3 ⇒ With connected S7-200 stations, whenever possible use secure transfer with the MODEM MD720 (successor to the SINAUT MD720-3 modem).
- Avoid or disable non-secure protocols, for example OPC DA. This protocol is still available for historical reasons.
 - As default in TCSB the DCOM interface for receiving OPC DA protocols is disabled (see also section TCSB system (Page 154)). We recommend that you do not make any changes to this setting.
 - Use the Windows options to restrict access to the TCSB computers via OPC DA.
 - If you do not use OPC DA, disable the ports used by OPC DA after installing TCSB.

Available protocols per port

The following table provides you with an overview of the open ports on this device. Keep this in mind when configuring a firewall.

Meaning of the column titles and table entries:

- **Protocol / function**

Protocols that the device supports.

- **Port number (protocol)**

Port number assigned to the protocol.

- **Default of the port**

- Open

After installing the operating system, the port is open.

- Closed

After installing the operating system, the port is closed.

- **Port status**

- Open

The port is always open and cannot be closed.

- Open according to configuration

The port is open if it has been configured.

- Open (login, when configured)

As default the port is open. After configuring the port, the communications partner needs to log in.

Note**Open ports with disabled protocols**

With some protocols the port may be open although the corresponding protocol is disabled, for example TFTP.

- **Authentication**

Specifies whether or not the protocol authenticates the communications partner during access.

Protocol / function	Port number (protocol)	Default of the port	Port status	Authentication
HTTP	80 (TCP)	Open	Open (login, when configured)	Yes
HTTPS	443 (TCP)	Open	Open (login, when configured)	Yes
DCOM	135 (TCP)	Open	Open after TCSB installation	Yes
TCSB framework port	1434 (TCP)	Open	Open after TCSB installation	Yes
OPC UA discovery port	4840 (TCP)	Open	Open after TCSB installation	Yes
TCSB core server port	4852 (TCP)	Open	Open after TCSB installation	Yes
TCSB database synchronization port	8000 (TCP)	Open	Open after TCSB installation	Yes
TCSB data port	26860 (TCP)	Open	Open after TCSB installation	Yes
TCSB control port	26861 (TCP)	Open	Open after TCSB installation	Yes
MSC listener port	26862 (TCP)	Open	Open after TCSB installation	Yes

TCSB port	26864 (TCP)	Open	Open after TCSB installation	Yes
TCSB database port	26865 (TCP)	Open	Open after TCSB installation	Yes
Data buffer port	26866 (TCP)	Open	Open after TCSB installation	Yes
Data buffer synchronization port	26867 (TCP)	Open	Open after TCSB installation	Yes
TCSB database redundancy port	26870 (TCP)	Open	Open after TCSB installation	Yes
ITP listener port	55097 (TCP)	Open	Open after TCSB installation	Yes
Listener ports for connection to CPU Web servers	26880 .. 26889 (TCP)	Open	Closed after TCSB installation	Yes

3.2 System setup and installation variants of the TCSB software

Computer types and options in the installation wizard software

During the installation of the TCSB software, an installation wizard opens in which you select the software components of TCSB to be installed. The components of the TCSB software are available as two options corresponding to the computer types of TCSB:

- **Server PC**

This computer contains the entire software with Telecontrol Manager, OPC server database and Configuration and Monitoring Tool (CMT).

A non-redundant TCSB system contains one server PC, a redundant TCSB system contains two server PCs.

Designation of the option in the installation wizard: "**Server PC**"

The license key is required for server PCs.

- **Client PCs**

These can be one or two additional computers of the TCSB system. They contain the Configuration and Monitoring Tool (CMT).

The advantage of multiple installations of the CMT on server PCs and additional client PCs is that the status of the connections can be monitored at different workstations or a wake-up call can be triggered and that it is possible to configure on multiple workstations (in different projects).

You also select the installation variant "Client PC" for installation on the computers of OPC clients if these are not located on the telecontrol server.

Designation of the option in the installation wizard: "**Client PC**"

No license key is required for client PCs.

Variants of the system configuration

The installation of the TCSB software differs depending on the setup of your system. The installation variants relate to the following variants of the system setup:

- **Non-redundant system**

You install TCSB as a non-redundant full system on only one computer.

All the functions of TCSB are located on one computer, the telecontrol server.

In the installation wizard, select the option "**Server PC**" for the server PC.

The use of client PCs is optional.

- **Redundant system**

You install TCSB as a redundant system on two computers, the server PCs.

With redundant installation, two server PCs work in a redundancy group.

In the installation wizard, select the installation option "**Server PC**" for each of the server PCs.

Note

Database password

Make sure that you assign an identical database password for the two computers during installation. You will find more detailed information on this in the next section.

You will find the description of the functions and setup of a redundant system in the section Redundancy (Page 80).

The use of client PCs is optional.

- **Client PC**

The use of 1 or 2 additional client PCs is optional.

For computers of OPC clients that are not located on the telecontrol server, you need to install the "**Client PC**" variant.

In the installation wizard, select the option "**Client PC**" for each client PC.

3.3 Installation of the software and licenses

Requirement for installation

You require Windows administrator privileges on the computers on which you want to install the TCSB software.

To install the software, you require the following components of the product package:

- The software DVD containing the "TeleControl Server Basic V3.1" software.
- USB stick containing the license key for installing TCSB.

You only require the license key for the "Server PC" installation option.

You do not require a license key for the Client PC installation option.

Firewall settings (ports)

Just as with any computer connected to the Internet or to another IP network, the telecontrol server should be protected at least by the firewall of the operating system and/or the connected router against attacks from the connected network.

Remember that during installation of the system, several ports need to be opened and other changes need to be made in your system. These settings are displayed during installation. You can print these settings during the installation or save them in a log file. See also section TCSB system (Page 154).

The installation wizard

After starting the installation, the installation wizard opens and supports you during the installation.

You can install TCSB on one or on different computers. You have the following options available for this in the installation wizard:

- **Server PC**

Telecontrol Server Basic V3.1

This option installs the complete "TeleControl Server Basic" software.

The PC becomes the telecontrol server including the database, OPC server, Telecontrol Manager (TCM) and Configuration and Monitoring Tool (CMT).

- **Client PC**

Client PC Telecontrol Server Basic V3.1

This option installs the Configuration and Monitoring Tool (CMT). The CMT is required if you want to configure TCSB via a second computer.

This option is also required for computers that need to be prepared for connection to the OPC server of the telecontrol server.

- **Tools**

- Automation License Manager V5.x

This option installs the Automation License Manager (ALM) for managing license keys. The ALM is only required when you want to install the entire software ("Server PC" option).

- SQL Server 2014 Express

This option installs the database. It is only required when you want to install the entire software ("Server PC" option).

If TELECONTROL SERVER (V2) is pre-installed on your computer, you have the option of continuing to use your previous data. The procedure is described in the section "Database settings and certificates".

During installation, keep in mind the computer types described in the previous section System setup and installation variants of the TCSB software (Page 36) on which the options in the installation wizard depend.

When setting up the users on the PCs for OPC server and OPC client, refer to the section Users and administrators (Page 151).

Certificates and installation sequence with the TCSB software

During the installation of a server PC, a certificate is generated in the background. This is used for the authentication of the various computers of a redundant system or of systems with client PCs. The certificate of the (first) server PC is later transferred to the other computers of the system, see also section Transferring certificates (Page 120).

In system setups with more than one computer, make sure that the TCSB software is installed in the following order:

- First install the TCSB software on the server PC if you are setting up additional client PCs.
- With a redundant system setup, first install the TCSB software on the first server PC (TCM 1) of the redundancy group.

Installation - procedure

Follow the steps below to install the program:

1. Insert the software DVD in the DVD drive of the computer.
2. In the file management of the DVD drive, go to the "setup.exe" file.
3. Start the installation by double clicking on the "setup.exe" file.

The installation wizard opens.

4. Select the relevant options:

- **Server PC**

Option for the server PCs of non-redundant and redundant systems

The "Automation License Manager" and "SQL Server 2014 Express" options are activated and installed automatically if they are not yet installed on the computer.

- **Client PC**

Option for additional client PCs and computers of OPC clients that are not located on the telecontrol server

5. Accept the change to the system settings.

During the installation, the "Database settings and certificates" dialog opens in which you make the settings for the database, refer to the following section.

"Database settings and certificates" dialog

In this dialog, you configure the following:

- Database password
- Use of an existing database of TELECONTROL SERVER V2 (TCSB V2)

If an older version TCSB V2 is installed on your computer, you have the option of using your previous data.

- Certificates for secure communication with client PCs

Database settings and certificates

Database password

Assign a password for your database:

Password

Repeat password

Keep to the following security guidelines:

- At least one lowercase letter
- At least one uppercase letter
- At least one special character (!*@\$%^+=)
- At least one digit
- Minimum length: 8 characters

Note: In the case of redundancy, the password must be identical on both PC

Import a TCSB database

Choose whether you want to import a database from TCSB V2

☒ Do not import database.

☐ Select the storage location of the file "Smsc.sqlite".

...

OK

Figure 3-1 "Database settings and certificates" dialog

Database password

In the box "Assign a password for your database" assign the database password for later access to the database of TCSB to be installed.

Note

Note down the database password

You only require this password if you want to access the database using Microsoft tools. You do not require the password for all activities in the TCSB system.

Redundant installation

Note down the password exactly. If you want to upgrade your system to a redundant installation or want to migrate your system to another computer later, you require the password. Without the password, these activities are no longer possible.

Note

Identical database password for redundant TCSB

If you install a redundant system, make sure that the database password is identical on both server PCs (TCM 1 and TCM 2).

Note the following: When installing the two server PCs of the redundancy group, if you accidentally assign different passwords, you set up two server PCs but these cannot be used for a redundancy group. In this case, follow the steps below:

1. Uninstall the database on one of the two computers with the normal operating system tools (Control Panel > Programs ...).

When uninstalling, select the entry "Microsoft SQL Server 2014". A wizard opens that guides you through the process of uninstalling. In the wizard, select all the options for uninstalling.

2. Then reinstall TCSB on this computer (it is not necessary to install TCSB first).

During installation, use the database password of the other PC whose database was not uninstalled.

If you have already saved configuration data on one of the two server PCs that do not have an identical database password, to avoid losing configuration data it is advisable to make this computer server PC TCM 1 and to uninstall the database of the other computer. When you uninstall the database, all TCSB configuration data is lost.

Import a TCSB V2 database

If there is already a TCSB V2 version on your computer, you have the option of continuing to use the data of your existing system. To do this, continue to use the database of the TCSB V2 system. You control this during the installation in the "Import a TCSB database V2" box.

In the "Import a TCSB V2 database" box, specify the use of the database using the following options:

- Do not import database

When the option is selected, you install the new database of the TCSB V3.1 system. By doing this you specify that a new empty system will be created. Existing data of an older system can no longer be used.

- Select the storage location of the file "Smsc.sqlite".

If the option is selected, you continue to use your previous data from the TCSB V2 system.

The preset path of the database in the file directory is displayed in the input box. If you have moved your database to another location, you will need to enter the correct path in the input box.

When all the options in the dialog are correctly set, confirm the dialog with OK. The installation is continued and completed.

Installing/uninstalling, upgrading or replacing licenses

During installation of the software, you will be prompted to install the license on the computer. Follow the on-screen instructions in the installation wizard.

Note

Uninstalling or replacing a license with an interruption in operation

While TCSB is running, it is not possible to uninstall a license in use from a server PC.

If you want to replace a license being used during operation with a license with lower or higher configuration limits and want to transfer the previously used license from the server PC to the USB stick in exchange for the new license, you need to interrupt TCSB operation.

Replacing (for example upgrading) licenses with interruption of operation

To replace a license, follow the steps below:

1. Open the ALM (Automation License Manager)
 2. Transfer the new (for example larger) license from the USB stick to the server PC.
 3. Stop the telecontrol manager by ending the "TSC Basic TCM Service" using the Windows Task Manager in the "Services" tab.
-

Note

Interruption of the communication

When you exit the TCM, remember that the entire communication with the stations will be interrupted.

4. Transfer the previously used (for example smaller) license from the server PC to the USB stick.
5. Start the telecontrol manager ("TSC Basic TCM Service") using the Windows Task Manager in the "Services" tab.

Note the following points: If you install more than one license with different configuration limits on a computer and start TCSB, the system will always use the largest license.

3.4 Changing the port, network and DCOM settings

Enabling network discovery

If you install TCSB on multiple computers, to allow DCOM operation you need to turn on network discovery and file sharing in the relevant network profiles (public, private, domain) so that the computers can see each other.

Follow these steps:

1. On all computers used by TCSB, open the window for making the sharing settings:
"Start" > "Control Panel" > "Network and Sharing Center" > "Advanced sharing settings"
Open the Control Panel in Windows 8.1, from the desktop or from the tile view with the key combination <Windows key+x>.
2. In the sharing options, open the "private" profile and profile relevant for your network "public" or "domain".
3. Enable the following options in the profiles:
 - "Turn on network discovery"
 - "Turn on file and printer sharing"

The computers must then be able to see each other under "Network" in the Explorer and should be reachable with a "PING".

Changing and opening ports

Changing port numbers

If you change port numbers, select ports only from the number range 1024 ... 65535. Select free ports that are not otherwise being used.

- Ports 0 ... 1023 are standardized (well known ports).
- Of the registered ports starting at 1024, no. 1024 is reserved, no. 1026 and 1029 are reserved for DCOM.
- Ports 26880 ... 26889 are reserved as listener ports for the Web server of TCSB.

You will also find an overview of the ports used by TCSB in the section Security recommendations (Page 33).

Opening a port automatically

For TLS encrypted communication between TCSB and an SMTP server, port 587 is released during installation.

Port 4852 is used by TCSB for OPC UA connections.

Preset numbers of the listener ports of the Telecontrol Manager (TCM)

For the internal communication of the components of TCSB and TCM with the stations, various ports are used whose numbers are preset by the system.

You can change the default port numbers in the CMT. The function of the ports and the presettings are described in the following section: TCSB system (Page 154) > TCSB system, "TCM" tab.

Settings for OPC

The required DCOM settings are made and access rights for OPC communication are assigned during installation of TCSB. During the installation you can save the detailed settings for opening the port in a readme file.

You will find further information on setting up OPC communication on a Windows computer in the manual *Commissioning PC Stations - Manual and Quick Start* (Page 183).

3.5 Connecting and setting up redundant TCSB computers

Setting up the redundant computers

1. Install the suitable operating system on both computers, refer also to the section *Required operating systems* (Page 28).
2. Install the "Server PC" variant of TCSB on both computers.

Refer to the information in the section *Installation of the software and licenses* (Page 38).

Connecting the redundant computers

1. Connect the two redundant computers to a common LAN using suitable Ethernet cables.

Use a switch for this.

When selecting the cables (crossover or patch cable) check whether the network adapters of the PCs support the autocrossover function.

2. Connection of the stations

Depending on the system configuration either only one or both of the following connection options can be used.

- Exclusive use of S7-1200 stations with a CP 1243-1 on a local LAN:

Connect the stations to the same LAN to which the redundant TCSB computers are connected.

- Connecting stations via the Internet (regardless of the station type):

Connect the DSL router (e.g. SCALANCE M) via its internal interface on the same LAN to which the redundant TCSB computers are also connected.

Connect the external interface of the router to the Internet.

To set up a computer network using Network Load Balancing (NLB) of the operating system, refer to the section *Data management and system response of the redundant system* (Page 84).

3.6 Setting up OPC clients

Note

Same user properties on PCs for OPC server and OPC client

If you want to access the OPC server of TCSB from a remote OPC client and both computers are in Windows workgroups mode, you will need to set up the same Windows user with the same Windows user name and the same password in the same workgroup. For more detailed information on setting up OPC communication on a Windows computer, refer to the manual /7/ (Page 183).

TCSB software on OPC client computers

If you set up OPC clients that are not located on the TCSB computers, you will need to install TCSB on the OPC client computers. To do this, select the installation variant "Client PC", refer to the section System setup and installation variants of the TCSB software (Page 36).

This enables the DCOM interface and the firewall on the OPC client computer.

The DCOM interface and the firewall can be enabled as an alternative by installing the SIMATIC NET software on OPC client computers. Connect the OPC client computer to the telecontrol server via Ethernet. As the interface on the OPC client computer, use a SIMATIC NET PC CP and install the SIMATIC NET PC software. You will find information on installing the software, its functions and on PC CPUs in the manual /7/ (Page 183).

3.7 Exporting and importing a database backup copy

Using backup copies of the database

Note

To be able to save and open a backup copy, you must be logged on as an administrator in CMT or have write or read permissions for the selected directory. It is recommended that you save the backup copy locally and not on a network drive.

You can use backup copies of the database for the following purposes:

- Sending a current backup copy of your database to Siemens Industry Online Support for service purposes
- Copying older versions of the database back to your TCSB system

This can be useful, for example, if data has accidentally been deleted and you want to return to an older version of your system.

To be able to do this, an older backup copy of your system must exist. As described below, you can make backup copies at any time yourself or automatically have them made regularly by the system, see CMT > "TCSB System" > "Database" tab.

- Copying the database to another server PC

Creating a backup copy (*.bak file)

1. To create a backup file (*.bak) of the database in the CMT open the menu "TCSB System" > "Database" tab in the CMT.
2. Click the "Export database" button.
3. In the next window, select the directory in which the backup copy will be saved. Standard: C:\Program Files (x86)\Siemens\TCSB-SQLServer\Microsoft SQL Server\MSSQL12.TCSB\MSSQL\Backup
Make sure that you have write permission for the directory.
4. Enter a file name for the backup copy.
5. Click the "Save" button.

A current backup copy is created as a *.bak file in the specified folder:

You can now copy the *.bak file for other purposes.

Inserting a backup copy of the database in TCSB

Requirements for use on a different computer from the original computer of the database:

- To use the database for a TCSB system on a new computer, TCSB must be installed on the new PC.
- Both TCSB installations must use an identical database password.

General requirement:

- Import a backup copy only on the computer of the TCM 1 and not on the computer of the TCM 2 or a client installation.

Procedure:

1. On the computer of TCM 1, open the menu "TSCB system > Database" in CMT.
2. Click the "Import database" button.
3. In the following window select the required backup copy. Default: C:\Program Files (x86)\Siemens\TCSB-SQLServer\Microsoft SQL Server\MSSQL12.TCSB\MSSQL\Backup

3.8 Uninstalling

4. Click the "Open" button.

The selected backup copy of the database is imported into your TCSB system.

5. Save the TCM settings.
6. In "TCSB system > TCM" check the IP configuration.
7. Perform a restart.

See also

TCSB system (Page 154)

"Database" tab (Page 160)

3.8 Uninstalling

Uninstalling the software

You can uninstall TCSB with the usual Windows tools: "Control Panel > Programs > Uninstall a program"

The OPC server and access to process data

4.1 The OPC server of TCSB

The OPC server of TCSB

The OPC server of TCSB allows OPC DA and UA clients access to the process values of controllers connected to TCSB and to status information of the individual connections to the connected stations.

The OPC server of TCSB is installed along with TCSB on the telecontrol server and is configured using the CMT.

Data access is via a COM server. Supported OPC specifications are OPC Data Access or OPC UA.

Note

The "IOPCItemIO" interface of OPC Data Access V3.0 for writing and reading OPC items is not supported.

The following methods / services are supported:

- Synchronous and asynchronous reading of data
- Synchronous and asynchronous writing of data
- OnDataChange
- MonitoredItems (OPC UA)
- HistoryRead (OPC UA)

Saving historical data of process items for access with the HistoryRead method

The OPC server supports hierarchical address browsing.

You will find information on the configuration limits in the section Properties and configuration limits (Page 18).

Supported S7 systems

You will find the types of the remote SIMATIC S7 systems whose data can be transferred via the OPC server by TCSB as OPC items to OPC clients in the section Application and systems (Page 13).

MonitoredItems

For OPC UA clients, TCSB supports item monitoring with the services of the MonitoredItems model in OPC UA.

4.1 The OPC server of TCSB

In OPC UA process values including time stamp and status code that are monitored by the OPC client as monitored items in a subscription are buffered intermediately (monitored item queue) by TCSB until they are published to the OPC client.

The buffer size (queue size) is specified by the OPC client application.

The data of the MonitoredItems service is always read out of the process image of TCSB. An sampling interval set on the OPC client does not mean that data is read from the stations during this cycle.

When the stored values are transferred (published) to an OPC client, the transferred values are deleted from the buffer. If the maximum number of values is exceeded, older values in the buffer are overwritten.

If a connection between an OPC client and TCSB aborts, according to the OPC specification the session is retained and the queue remains filled.

HistoryRead - storing historical values

Historical values of process variables that were selected for storage in the archive for the "HistoryRead" method in OPC UA are stored continuously. The time stamp and quality are also stored along with the process value.

OPC UA clients can access these values using the HistoryRead function.

The archive consists of a maximum of 100 files. Each file stores the data of the items configured for the archive. The size of each file covers a period of 1 hour.

After system startup, the maximum number of 100 files is reached after approximately 4 days. When new archive files are created, the oldest files are then successively deleted.

Data buffer - storage of buffered values

Values of process variables that were selected for storage in the data buffer in the CMT are stored continuously. The time stamp and quality are also stored along with the process value.

For the data buffer of a station several files are created which must not exceed the maximum file size entered in the CMT. If the data buffer is activated for a further station, this also increases the number of files created in the data buffer. The period covered by the files depends on the data volume of the values of the relevant station to be buffered. If the maximum file size of a station is reached, the oldest files are deleted one after the other.

You will find further information in the section "Data buffer" tab (Page 163).

Item classes

TCSB provides the following item classes:

- **Process OPC items**

The data areas of the process data to be transferred to TCSB are configured in the S7 stations. The values are mapped to process OPC items in the OPC server of TCSB.

- **System OPC items**

These are OPC items supplied by the system or transferred by the connected stations. These can be grouped as follows:

- **Status system items**

These items are formed internally in TCSB. OPC clients only have read access to these.

- **Multicast items**

Multicast OPC items are system items with write access for entire projects; in other words, for groups of stations.

- **Connection-specific system items**

These items indicate the connection-specific status and can be displayed as system variables in the CMT for every connection.

- **TeleService connection items**

These are items that show the status of TeleService connections to CPs.

Name of the OPC server

The OPC server of TCSB has the following name:

OPC.SimaticNET.TCSB

This server name must be configured on the connected OPC client.

Connection establishment between OPC client and TCSB

The connection establishment between OPC client and TCSB is initiated by the OPC client.

In OPC UA, non-secure and secure connections can be established. With secure connections, TCSB automatically exchanges certificates.

A server certificate generated by TCSB loses its validity if you change the computer name of the telecontrol server later.

Server URL (OPC UA)

With the native binary TCP protocol, the OPC client has the following alternative options for addressing the UA server of TCSB:

- Direct addressing:
 - `opc.tcp://<hostname>:4852`
 - `opc.tcp://<IP-Adresse>:4852`
 - `opc.tcp://localhost:4852`

TCSB provides port 4852.

- Discovery

The Discovery service is a tool for listing all available server URLs. As an alternative, use one of the following server URLs:

- `opc.tcp://<hostname>:4840`
- `opc.tcp://<IP-Adresse>:4840`
- `http://<hostname>:52601/UADiscovery/`
- `http://<IP-Adresse>:52601/UADiscovery/`

Connections of the Discovery server run via port 4840 (TCP connections) and port 52601 (HTTP connections).

Endpoints and security modes (OPC UA)

TCSB supports secure communication using the TCP protocol based on encryption and signing. The secure modes should be preferred in productive operation.

The Discovery service on the addressed host signals the endpoints of the servers, in other words, their security requirements and protocol support.

The server URL "`opc.tcp://<hostname>:4852`" of TCSB provides the following endpoints:

- Endpoint in "SignAndEncrypt" security mode

A signature and encryption are required to communicate with the server. Communication is protected by exchanging certificates and entering a password.

In addition to the security mode, the security policy "Basic128Rsa15" is also displayed.

- Endpoint in "None" mode

In this mode, no security functions are required by the server (security policy "None"). This mode is suitable, for example for testing and commissioning.

The security policies "Basic128Rsa15" and "None" are in the UA specification Part 7 of the OPC Foundation

You will find more detailed information on the following Internet page:

(<http://www.opcfoundation.org/profilereporting/index.htm>)

> "Security Category" > "Facets" > "Security Policy"

4.2 Process OPC items

Creating process items

The creation of process items in TCSB differs depending on the station type:

- S7-1200 + CP 1243-1 / CP 1242-7 GPRS V2 / CP 1243-7 LTE, ET 200 + CP 1542SP-1 IRC, RTU

The process items are created during connection establishment by the configured data points.

Note

Creation of new items by OPC clients

If you want to create new items for CPs with data points in the OPC client application, do this only after the first connection establishment that transfers the data point configuration from the station to TCSB.

-
- S7-200, S7-300, S7-1200 + CP 1242-7

The process items are created by the connected OPC client.

Note

Saving item data on the OPC server

If you create items in the OPC client application, this item data is saved on the OPC server. Even after an OPC client logs off, the data of created items remains stored in TCSB.

If you create a large number of items with different data several times (e.g. same items but with a different data type), make sure you do not exceed the maximum supported number of items.

You will find the supported configuration limits for items in the section Properties and configuration limits (Page 18).

Syntax of OPC items

When assigning names and addressing OPC items make sure that you keep to the permitted syntax. You will find the syntax of the individual item classes in the section Syntax of the OPC items (Page 66).

Process data access by OPC items

Process OPC items transfer data from the station or to the station. They can have read, write or read and write access to the process data.

If you initiate a write or read job with an OPC DA client with a very large number of items (e.g. 500000), wait approximately 15 seconds before the next read or write job.

Activating MonitoredItems and HistoryRead functions

You assign items to the "MonitoredItems" service on the OPC client.

You assign items for archiving (HistoryRead) during the configuration of the connections in CMT.

How the stations make process data available

The process data is made available or addressed in different ways in the various SIMATIC families:

- **S7-1200 + CP 1243-1,
S7-1200 + CP 1242-7 GPRS V2,
S7-1200 + CP 1243-7 LTE
ET 200 + CP 1542SP-1 IRC
RTU**

The process data is addressed on the CP or on the RTU using data points.

For the communications tasks of the CP, you need to create PLC tags or data blocks in STEP 7 that access the process data to be transferred. The individual data points configured for the CP in STEP 7 reference these PLC tags or data blocks.

- **S7-1200 + CP 1242-7**

The process data is addressed directly in the memory area of the CPU using program blocks. Declaration of the process data in data block DB1 (from the perspective of TCSB).

- **S7-200 / S7-300 + MD720**

The process data is addressed directly in the memory area of the CPU using program blocks. Declaration of the process data in data block DB1 (from the perspective of TCSB).

You will find details of the configuration in the operating instructions of the specific CP, modem or the RTU. You will find further information on the configuration of the CPs and modems in the help systems of the configuration tools.

Note

Important information on process data access and data management in the stations

You will find important information on data management in the S7 stations and the associated consequences for access to the process data in the section Process data access by TCSB and data management in the stations (Page 97).

Writing items

Acknowledgment when writing data to the stations

If TCSB writes data to a station and the station receives the message, receipt is acknowledged immediately by the station. With S7 stations, only then is the data transferred to the CPU.

You can have the receipt of data by the CPU confirmed by setting up a mirroring mechanism that returns written data to the master station. You can achieve this, for example by re-storing newly written data to make it available for spontaneous transfer or to be read by an OPC client.

Writing items of substations with data point configuration during system startup

Items that write to data points in a station (output data points) do not yet have an initial value in TCSB during system startup. They are supplied with a value in the OPC server for the first write job.

Quality of items (quality code)

When values of items are read from the stations, TCSB sets a quality rating. Examples:

- **GOOD**

The quality rating of an item is set to 'good' by TCSB when the value can be read from the station as the result of a job.

- **BAD**

The quality rating of an item in a station with data points is set to 'BAD' by TCSB in the following situations:

- The data point was modified in the configuration of the CP / RTU.
- The "ONLINE" status bit of the data point on the CP is set to 0.

Cause: The PLC tag of the CPU cannot be reached.

- **UNCERTAIN**

For example, during system startup, items of a station with data points have the status 'UNCERTAIN' if no data has yet been transferred from the station. If there has been an overflow in the buffer application, this is indicated by an `UncertainSubstituteValue`.

Note

No 'bad' quality for a connection abort

If the connection to a station aborts and a message is acknowledged negatively or if the connection establishment to a temporary station fails, the quality is not set to 'BAD'.

This means that older values of the relevant items of this station sent to TCSB earlier remain GOOD.

More recent values buffered on the station in the meantime can be used later for example to fill in the archives of the OPC client when a connection establishment is possible again assuming this is permitted by the OPC client.

Time stamp of the process items and the messages of S7 stations

Time stamp of the messages

- **S7-1200 / RTU**

Messages of the S7-1200 CPs relating to process data are time stamped in the station:

- CP 1242-7

When a change to a value is entered in the read process image of the CP, the process values of the entire process image are time stamped.

- CP 1242-7 GPRS V2, CP 1243-1, CP 1243-7 LTE, ET 200 + CP 1542SP-1 IRC, RTU

Updated process values are time stamped when they are entered in the send buffer.

Items of output data points are time stamped by the TCSB PC when written.

Time stamps are output by the OPC server applications in UTC format (48 bits) and contain milliseconds.

- **S7-200 / S7-300**

- Messages of the S7-200 are time stamped in the station if this is programmed in the block (S7-200: WDC_SEND).

- If transfer without a time stamp is programmed in the block (WDC_SEND: CURRENTTIME = 0), TCSB automatically adds the time stamp for the OPC interface when the message is received.

Time stamp of the process items

The items in the process image of TCSB take the time stamp from the message sent by the station.

S7-200/300 items with CURRENTTIME = 0 are time stamped by TCSB.

Data types of the supported variables

Data type (TCSB) ¹⁾	Description / format	OLE data type (in TCSB)	Compatible S7 data types
B	Byte (number without sign)	VT_UI1	BYTE, USINT
CHAR	Byte (number with sign)	VT_I1	CHAR, BYTE
W	Word (number without sign)	VT_UI2	UINT, WORD
INT	Word (number with sign)	VT_I2	INT
D	Double word (number without sign)	VT_UI4	UDINT, DWORD
DINT	Double word (number with sign)	VT_I4	DINT
REAL	Floating-point number (32 bits)	VT_R4	REAL
STRING ²⁾	String with string length	VT_BSTR (array of byte)	ARRAY (CP 1242-7)
DT / DTL	Date and time of day ³⁾	VT_DATE ⁴⁾	DTL (CP 1242-7)
			DT (S7-200)
			DATE_AND_TIME (S7-300)

- 1) Data type of the variables that TCSB provides for the browser of an OPC client.
 - 2) The data type "String" may not be used for connections with S7-200/300 stations and the RTU.
 - 3) The times of day used by TCSB are described in the section Times of day in the system (Page 103).
 - 4) The accuracy of the time-of-day is supported by TCSB only down to milliseconds.
- You will find the data types supported in the manual of the relevant device (CP, modem, RTU).

Message memory of the CP when all the OPC clients log out

Due to the possibility of OPC clients accessing historical values in TCSB V3.1, the effects of all OPC clients logging out from the telecontrol server have been changed: When all OPC clients connected to TCSB log off, the CP does not store the messages in its send buffer (message memory).

This differs from the procedure in TCSB V2. If all OPC clients have logged out in TCSB V2, TCSB V2 no longer accepted any process data and the messages were stored on the stations.

In OPC UA, at a later point in time you can access historical data of items if this function was configured in TCSB V3.1 for the items of interest in CMT.

4.3 System OPC items

TCSB provides various system OPC items that are not dependent on the process data and return status and statistical information.

Saving and updating

The values of system items are stored as of when TCSB starts up. When the system is restarted, the values are lost.

The values of the connection-specific system items are updated by the following mechanisms:

- When a connection is established by a station
- When there is a connection abort
- By the activated option "Status data and time-of-day synchronization" in the "Cyclic services" parameter group
- Due to the multicast item "RefreshStatus"

System OPC item classes

The following classes of system items are provided by TCSB:

- **Status system items**

These items are formed internally in TCSB. OPC clients only have read access to these.

- **Writing multicast items**

Multicast OPC items are system items with write access for an entire TCSB project.

- **Connection-specific system items**

These items indicate the connection-specific status and can be displayed as system variables in the TCM for every connection.

- **TeleService connection items**

These items indicate whether TeleService connections in a project are established to stations. Per project, up to 5 TeleService connections can be established at one time.

Name and meaning of the system items

"CP 1243-x" in the tables means both "CP 1243-1" and "CP 1243-7 LTE".

Table 4- 1 Status system items

Item name	Description	OPC data type (variant data type)
BufferingDown	Buffer application not accessible: 0: Reachable 1: Not reachable	boolean (VT_BOOL)
DatabaseDown	Database not reachable: 0: Reachable 1: Not reachable	boolean (VT_BOOL)
OPCServerDown	OPC server not reachable: 0: Reachable 1: Not reachable	boolean (VT_BOOL)
OPCServerConnectedToBackupDB	OPC server connected to substitute database: 1) 2) 0: Not connected 1: Connected	byte (VT_UI1)
OPCServerConnectedToBuffering1	OPC server connected to buffer application on TCM 1: 1) 3) 0: Not connected 1: Connected	byte (VT_UI1)
OPCServerConnectedToBuffering2	OPC server connected to buffer application on TCM 2: 1) 3) 0: Not connected 1: Connected	byte (VT_UI1)

Item name	Description	OPC data type (variant data type)
OPCServerConnectedToMasterDB	OPC server connected to main database: ¹⁾ ²⁾ 0: Not connected 1: Connected	byte (VT_UI1)
OPCServerConnectedToTCM1	OPC server connected to TCM 1: ¹⁾ ³⁾ 0: Not connected 1: Connected	byte (VT_UI1)
OPCServerConnectedToTCM2	OPC server connected to TCM 2: ¹⁾ ³⁾ 0: Not connected 1: Connected	byte (VT_UI1)
RedundancyEnabled	Redundancy mode enabled (depending on configuration): 0: not activated ⁴⁾ 1: Activated	byte (VT_UI1)
RedundancyPossible	Redundancy mode possible: ⁵⁾ 0: Redundancy not possible 1: Redundancy possible	byte (VT_UI1)
TCM1ConnectedToTCM2	TCM1 connected to TCM2: ³⁾ 0: Not connected 1: Connected (redundancy mode)	byte (VT_UI1)
TCM1ConnectedToMasterDB	TCM1 connected to main database: ²⁾ ³⁾ 0: Not connected 1: Connected	byte (VT_UI1)
TCM1ConnectedToBackupDB	TCM1 connected to substitute database: ²⁾ ³⁾ 0: Not connected 1: Connected	byte (VT_UI1)
TCM2ConnectedToTCM1	TCM2 connected to TCM1: ³⁾ 0: Not connected 1: Connected (redundancy mode)	byte (VT_UI1)
TCM2ConnectedToMasterDB	TCM2 connected to main database: ²⁾ ³⁾ 0: Not connected 1: Connected	byte (VT_UI1)
TCM2ConnectedToBackupDB	TCM2 connected to substitute database: ²⁾ ³⁾ 0: Not connected 1: Connected	byte (VT_UI1)

¹⁾The OPC server of the server PC with which the OPC client is connected.

²⁾In redundancy mode, the main database is located on the computer with TCM1.

In redundancy mode, the substitute database is located on the computer with TCM2.

³⁾TCM1 and TCM2 are specified during configuration of the TCSB system.

⁴⁾The "RedundancyEnabled" item = 1, if the "RedundancyPossible" item = 1 and the two computers are interconnected, fully configured and have restarted. If the redundancy mode is possible but not activated, it is possible that the configuration of a computer is incomplete (IP address).

⁵⁾ The "RedundancyPossible" item = 1, if the operating system and license allow the redundancy mode. Other requirements for the redundancy mode are not checked.

4.3 System OPC items

Time stamp of the status system items

Status system items are given a time stamp by TCSB.

Table 4- 2 Multicast items (all items writing only)

Item name	Description	OPC data type (variant data type)	Item available for
RefreshStatus	1: Command of the OPC client to check the connection to the CPU. After executing the command, "PLC-Connected" indicates the current status. Note: The status query can result in costs. Writing the value 0 is rejected.	boolean (VT_BOOL)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU
RefreshValues	1: Command of the OPC client to read out the current values of all variables from the CPU. Writing the value 0 is rejected.	boolean (VT_BOOL)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU303xC
ResetStatus	1: Command for resetting the values of BytesReceived and BytesTransmitted to zero. Writing the value 0 is rejected.	boolean (VT_BOOL)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC RTU
WakeUp	1: With this command, the temporary stations of the project are requested to establish a connection to the telecontrol server. * Writing the value 0 is rejected.	boolean (VT_BOOL)	CP 1242-7 RTU303xC

* You should also refer to the information waking stations in the section Monitoring and time response of wake-up SMS messages (Page 170).

Table 4- 3 Connection-specific system items (all items reading only)

Item name	Description	OPC data type (variant data type)	Item available for:
BytesActualMonth	Monitored data volume per month Data volume of the connection accumulated in the current month (sent + received) in bytes The counter is reset when TCSB is restarted.	uLong (VT_UI8)	CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC RTU
BytesReceived	Counter for received bytes. Counted value from station. (Counter can be reset with ResetStatus.)	uInt (VT_UI4)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU

Item name	Description	OPC data type (variant data type)	Item available for:
BytesTotalReceived	Counter for total received bytes. Counted value calculated in TCSB.	uint (VT_UI4)	CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC RTU
BytesTransmitted	Counter for sent bytes. Counted value from station (counter can be reset with ResetStatus).	uint (VT_UI4)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU
BytesTotalTransmitted	Counter for total sent bytes. Counted value calculated in TCSB.	uint (VT_UI4)	CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC RTU
BytesTotal	Counter for total transferred bytes. Counter cannot be reset. If there is overflow (2^{32}) the counter starts again at 0.	uint (VT_UI4)	CP 1242-7 MD720
CellID	ID of the wireless cell in the area of the station	uint (VT_UI4)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-7 MD720 RTU303xC
ConnectionState	Connection to station 0: Station not yet connected (prior to first connection establishment) 1: Station connected to TCSB 2: Temporary connection correctly terminated 3: Station not reachable - Permanent connection: Connection incorrectly terminated - Temporary connection: Connection terminated due to: - Monitoring time exceeded - or - Wake-up not possible	byte (VT_UI1)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU
DataLost	Setting of the message memory on the CP / RTU ¹⁾ 1: Forced image mode activated 0: Forced image mode canceled	uint (VT_UI4)	CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC RTU
DatapointDiff	Difference between the data points configured on the CP / RTU and the data points stored in TCSB (CMT) 0: No difference n: Code number for difference ²⁾	ushort (VT_UI2)	CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC RTU

4.3 System OPC items

Item name	Description	OPC data type (variant data type)	Item available for:
DeviceID	Article number of the CP / RTU or device ID of the modem	STRING (VT_BSTR)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU
Firmware	Firmware version of the device	STRING (VT_BSTR)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU303xC
GPRSConnected	GPRS connection between station and TCSB 0: Station not yet connected (prior to first connection establishment) 1: Connected 2: Temporary connection correctly terminated 3: Station not reachable - Permanent connection: Connection incorrectly terminated - Temporary connection: Connection terminated due to: - Monitoring time exceeded or - Wake-up not possible	uInt (VT_UI4)	CP1242-7
	GPRS connection to station 0: Station not yet connected (prior to first connection establishment) 1: Connected 3: Station not reachable	boolean (VT_BOOL)	MD720
Limit1MonthVol	Monitoring limit value 1 (notification) of the monitored data volume per month (BytesActualMonth)	uLong (VT_UI8)	CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC RTU
Limit2MonthVol	Monitoring limit value 2 (warning) of the monitored data volume per month (BytesActualMonth)	uLong (VT_UI8)	CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC RTU
MaxMonthVol	Maximum expected data volume of the connection per month (as configured)	uLong (VT_UI8)	CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC RTU

Item name	Description	OPC data type (variant data type)	Item available for:
MonthVolState	Evaluation of the parameters for monitoring the monthly data volume ³⁾	uLong (VT_UI8)	CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC RTU
PLCConnected	Communication of CP/modem with CPU: 0: Communication disrupted (with CPs also 0, if the CP cannot be reached) 1: Communication error-free With the RTU always = 1	boolean (VT_BOOL)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU
PLCCpuState	CPU operating mode: 0 = STOP 1 = RUN Note: With the MD720, the displayed value is derived from: 0 (alternative): - Time of day message is not acknowledged - GPRSCONNECTED = 0 - ConnectionState = 3 1: PLCConnected = 1	uint (VT_UI4)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU
ServerConnectState	Status of the connection between station and telecontrol server 0: Not connected 1: Connected	boolean (VT_BOOL)	CP 1242-7 MD720
ServerNr	Number of the redundant telecontrol server (TCM) with which the station is connected or was last connected. 0: No connection established yet 1: Station is or was last connected to TCM 1. 2: Station is or was last connected to TCM 2.	uint (VT_UI4)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU
SignalQuality	Mobile wireless signal quality (field strength) at the station 0..11: Bad signal quality (-109 .. -91 dBm) 12..19: Medium signal quality (-89 .. -75 dBm) 20..31: Good signal quality (-73 .. -53 dBm)	byte (VT_UI1)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-7 MD720 RTU
TestsSuccessful	The counter indicates how often the status of this connection was successfully queried. A value that is still similar to the value of "TestsTotal" after a longer period of time indicates a good connection quality.	uint (VT_UI4)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU

4.3 System OPC items

Item name	Description	OPC data type (variant data type)	Item available for:
TestsTotal	The counter indicates how often the status of this station was queried. For the evaluation, see TestsSuccessful.	uint (VT_UI4)	CP 1242-7 CP 1242-7 GPRS V2 CP 1243-x CP 1542SP-1 IRC MD720 RTU
TmpPLCNextLoginTime	Time (local TCSB time) at which a temporary station will book in the next time. ⁴⁾ With permanent stations, the default status value "01.01.0001 01:00:00" is displayed.	time (VT_DATE)	CP 1242-7 RTU
WakeUpTimeout	Configured monitoring time during which the station should have connected following a wake-up SMS message (see "Message monitoring time"). * With permanent connections always = 0.	uint (VT_UI4)	CP 1242-7 RTU

¹⁾ In the forced image mode, all data messages including send buffer messages for events are treated as image messages. This means that with the forced image mode only 1 message is stored for send buffer messages in which the value is overwritten by the current value. This delays overflow of the message memory. You will find more details in the operating instructions of the CPs, refer to the Appendix.

²⁾ For information on forming the difference with DatapointDiff, see below.

³⁾ For information on the bit assignment of "MonthVolState" see below.

⁴⁾ See below, section "TmpPLCNextLoginTime".

* Refer to the information in the section Monitoring and time response of wake-up SMS messages (Page 170).

TmpPLCNextLoginTime

The value of the system item is formed differently in the two modules:

- CP 1242-7

For the CP the value calculated from the configured data on the CMT in the parameter group "Cyclic data exchange" is specified in local TCSB time.

- RTU

For the RTU, the value that is specified is based on the parameters configured in the WBM of the RTU, calculated by the RTU and passed on to the TCSB.

Time stamp of the connection-specific system items

- DataLost is time stamped by the relevant station.
- All other connection-specific system items are time stamped by TCSB at system startup or when the item changes.

If the value and quality do not change when transferred again, the time stamp is not updated in OPC DA.

Table 4- 4 TeleService connection items (S7-1200)

Item name	Description	Data type S7-1200	OPC data type (variant data type)
Status	Status of the TeleService connection 0: Not connected 1: Connected	BYTE / BYTE	byte (VT_UI1)

The value of the item shows status of the connection. The values have the following meaning:

- 1 = Connected
- 0 = Logged out (connection terminated) or status unknown

Forming the difference with DatapointDiff

Each time a connection is established to a station with data point configuration, TCSB compares its own data points of the connection stored in CMT with the data points transferred by the station. If there are deviations in the system item DatapointDiff, a reference number is output based on the calculation of the following conditions transferred by the station. The deviations are weighted with points and the sum of the points output as the reference number.

Condition no.	Type of deviation	Weighting
1	Changed name of a data point (corresponds to deleting a data point and creating a new data point).	2
2	Deleting a data point or creating a new data point	1
3	Changed data point type of a data point	1
4	Changed data type of the PLC tag of a data point	1
5	Changed data point index of a data point	1
6	Changed transfer mode (static/event) of a data point	1
7	Changed length of the value of a data point in blocks of data (e.g. 2 bytes instead of 4 bytes)	1

Example for calculating the code number. The following conditions exist (weighting in brackets):

- Condition 3: The data point type has changed for data point A. (1)
- Condition 6: The transfer mode has changed for data points B and C. (1+1)
- Condition 2: A new data point X was created. (1)
- Condition 1: Data point D was renamed data point E. (2)

The sum of the weighted conditions is 6. The code number 6 will be output.

4.4 Syntax of the OPC items

If a connection that transfers data of a changed data point remains up until the OPC client reads the value, the quality "bad" is displayed.

Note

No change detection with long read cycles and connection abort

If a connection with a changed data point aborts immediately after the change is shown by TCSB using the system item DatapointDiff and the connection is established again, DatapointDiff shows the value 0 for the later connection establishment although the quality value is "bad". The cause of this scenario cannot be recognized by an OPC client with a long read cycle.

Bit assignment of the system item "MonthVolState"

Bit number	Meaning
0	- reserved -
1	Monitoring limit value 1 (Limit1MonthVol) reached
2	Monitoring limit value 2 (Limit2MonthVol) reached
3	Maximum expected data volume of the connection (MaxMonthVol) reached
4	- reserved -
5	Start value (supplied by the station)
6	Default value if no status data has yet been returned by the station.
All others	- reserved -

If the function is turned off, zero is displayed. The monitoring is turned off by setting "Monthly data volume" to zero (CMT > configuration of the connections).

4.4 Syntax of the OPC items

Syntax: Permitted characters for OPC items

TCSB can process the following characters for the names of OPC items:

- ASCII characters 0x20 ... 0x7e with the exception of the characters listed below.
- The following are not supported:
 - 0x27 (apostrophe)
 - 0x2f (slash)
 - 0x5c (backslash)
 - 0x7c (pipe)

Forbidden characters for project name, station name and data point name are as follows

- 0x2e (period)
- 0x5b and 0x5d (square brackets)
- 0x20 (spaces) at the start or end

The syntax of the items is listed below according to item classes. First, you will find an explanation of the parts of the name.

Meaning of the parts of the name

- <protocol>

System ID as follows:

- TCS

System ID of TCSB

- MSC

The "MSC" ID for items of the S7-200 (SINAUT MICRO SC) is also supported.

- <projectname>

The project name configured in CMT

- <stationname>

The station name of the connection configured in CMT

- <slot>

Slot of the relevant module:

- For the S7-1200, the connection is specified via slot 101, 102 or 103 of the CP.
- For the MD720, the slot is always = 0.

- DP

Data point identifier, cannot be changed.

(Stations with data point configuration)

- <datapointname>

Data point name as configured in STEP 7 or on the RTU.

(Stations with data point configuration)

- DB<DB-no.>

Data block identifier (DB) and number of the data block in the user program of the CPU that contains the relevant process data. Only DB1 is supported.

(CP 1242-7 and MD720)

- <type>

Data type supported by TCSB

- <address>

Byte offset of the variable

4.4 Syntax of the OPC items

- **<length>**
Length of a string in bytes. Only necessary when using a string as the data type.
- **<quantity>**
Optional information only required when using arrays:
Number of array elements to be read starting at the start index specified in the "Address" parameter.
- **<itemname>**
Name of the particular system item
- **TS Access Point**
Fixed identifier of the system items of TeleService connections
<n> = number of the TeleService connection (1 ... 5)
- **Status**
Fixed identification of the status of a TeleService connection

You will find examples of the declaration of items below.

Syntax of the process OPC items

- **Items of the S7-1200 with CP 1242-7**

```
TCS:[<projectname>.<stationname>.<slot>]DB<DB-no.>,  
      <type><address>{.<length>}{,<quantity>}
```

Examples:

- TCS:[project1.station1.101]DB1,W32

Item from connection to project 1, station 1, slot 101, data block 1, data type "WORD", offset 32

- TCS:[project1.station1.102]DB1,STRING40.12

Item from connection to project 1, station 1, slot 102, data block 1, data type "string", offset 40, length 12 bytes

- **Items of the S7-1200 with CP with data point configuration and RTU303xC**

```
TCS:[<projectname>.<stationname>.<slot>]DP,<datapointname>
```

Example:

- TCS:[project1.station1.101]DP,tag17

Item from the connection to project 1, station 1, slot 101, data point ID (DP), data point name tag17

- **Items of the S7-200 / S7-300**

```
<protocol>:[<projectname>.<stationname>.<slot>]DB<DB-no.>,<type>,<address>{,<quantity>}
```

Example:

- MSC:[station1]DB1,W32

Item from connection to station 1, data block 1, data type "WORD", offset 32

Syntax of the status system items

```
<protocol>:[SYSTEM]<item name>
```

The protocol is always "TCS".

Example:

- TCS:[SYSTEM]DatabaseDown

Status system item "DatabaseDown"

Syntax of the multicast items

```
<protocol>:[<projectname>]<item name>
```

The protocol is always "TCS".

Example:

- TCS:[Project1]RefreshStatus

Multicast item "RefreshStatus"

Syntax of the connection-specific system items

`<protocol>:[<projectname>.<stationname>.<slot>]<item name>`

Examples:

- TCS:[project1.station1.101]BytesReceived
System item "BytesReceived" of the S7-1200 station no. 1 in project 1
- MSC:[station3]BytesReceived
System item "BytesReceived" of the S7-200 station no. 3

Syntax of the TeleService connection items

`<protocol>:[<projectname>.TS Access Point.<n>]status`

The protocol is always "TCS".

Example:

- TCS:[Project1.TS Access Point.2]Status
Status item for TeleService connection in project 1, TeleService access point 2

4.5 Name space of the OPC server

The name space of TCSB

The name space of the OPC server of TCSB can be displayed by connected OPC clients and searched using browsing.

The following figures show examples of the namespace of the TCSB OPC server in SIMATIC NET OPC Scout V10.

The OPC server of TCSB is displayed with the name "OPC.SimaticNET.TCSB". Its data and information are structured hierarchically.

Structure of the "OPC.SimaticNET.TCSB" OPC server

- **Project1**
 - Process Stations
 - . . .
 - TS Access Points
 - . . . (System items for TeleService connections)
 - RefreshStatus (multicast item)
 - RefreshValues (multicast item)
 - ResetStatus (multicast item)
 - WakeUp (multicast item)
- **Project2**
 - . . .
- **Project3**
 - . . .
- **Project n**
 - . . .
- **Server Status** (status items of the OPC server)
 - DatabaseDown
 - OPCServerConnectedToBackupDB
 - OPCServerConnectedToMasterDB
 - . . .
 - . . .
 - TCM2ConnectedToTCM1

4.5 Name space of the OPC server

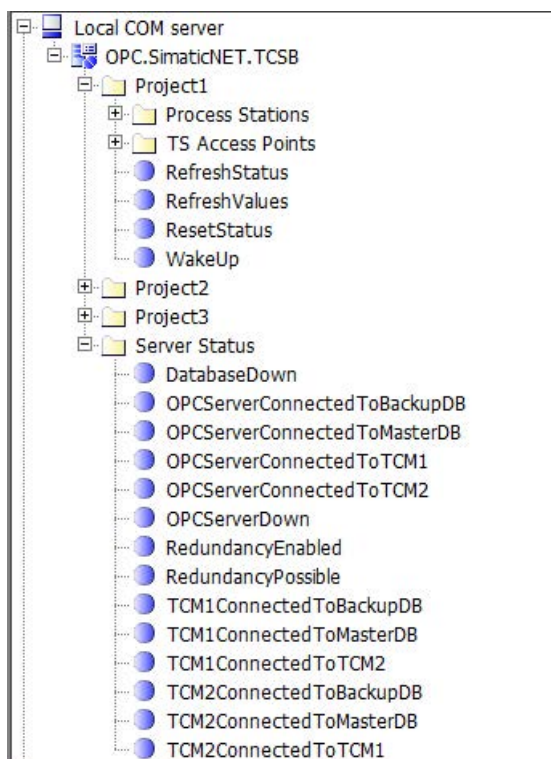


Figure 4-1 Namespace of the TCSB OPC server multicast items and server status items

Structure of a project

The individual TCSB projects have the following structure:

Process Stations

- **Station 1** (connection to CP 1242-7 or MD720)
 - Objects
 - DB
 - DB1 (contains the process items of this connection)
 - System Data (contains the system items of this connection)
- **Station 2** (connection to CP 1242-7 or MD720)
- **Station 3**
- **Station n**

TS Access Points

Contains system items for 5 TeleService connections per project.

Presentation of the process OPC items under DB1(CP 1242-7 / MD720)

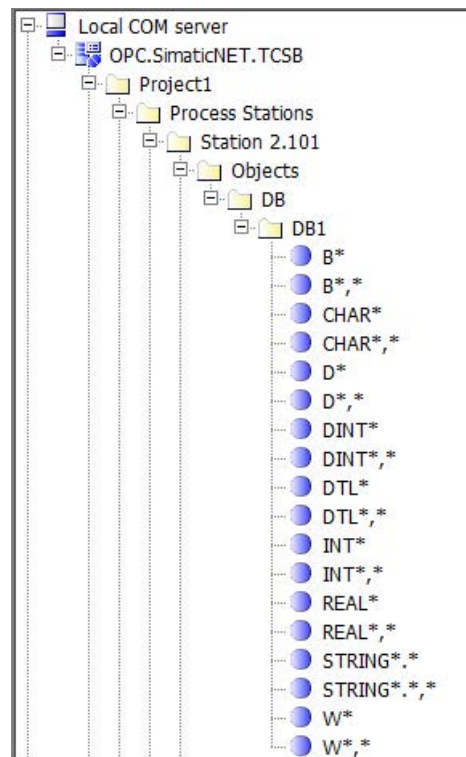


Figure 4-2 Namespace of the TCSB OPC server - process items of a CP 1242-7

Process OPC items that have not yet had parameters assigned are displayed under ... "Objects" > "DB" > "DB1" as follows (examples):

- B*
Variable with data type byte
- B*,*
Array variable with data type byte
- CHAR*
Variable with data type character
- CHAR*,*
Array variable with data type character
- STRING*,*
Variable with data type string
- STRING*,*,*
Array variable with data type string

The asterisks (*) are placeholders for address, length and quantity (array).

Examples:

- "String"
 - STRING*,* (item without parameter assignment)
 - STRING5.7,2 (item with parameter assignment)
Parameter assignment of address = 5, length = 7 and quantity = 2
- "Character"
 - CHAR*,* (item without parameter assignment)
 - CHAR5,2 (item with parameter assignment)
Parameter assignment of address = 5, and quantity = 2

Presentation of the process OPC items under a CP with data point configuration

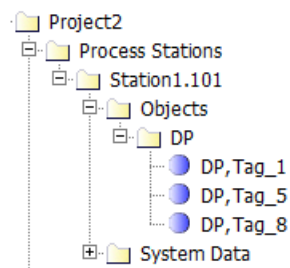


Figure 4-3 Namespace of the TCSB OPC server - process items of a CP with data point configuration

Notes on configuration and operation

Note

Costs when the telecontrol server is unreachable

If the telecontrol server cannot be reached, the stations (MD720; RTU, CP in the "permanent" connection mode, CP 1243-1) repeatedly attempt to establish the connection to the telecontrol server. This creates data volumes that can mean costs.

5.1 Virtualization software

Operation of the TCSB is released for the following virtualization software:

- VMware ESXi
- Hyper-V

5.2 Migration from SINAUT MICRO SC / TCSB V2 to TCSB V3

5.2.1 Migration from TCSB V2 to TCSB V3

Upgrading from TCSB version V2.0 to TCSB V3.0

If you upgrade your telecontrol system from TELECONTROL SERVER BASIC (version V2.0) to TeleControl Server Basic version V3.0 and want to continue using your existing data, refer to the instructions in the section Installation of the software and licenses (Page 38).

Note the following special features:

- New connections are not adopted in a project that has already been activated.
- Projects that are not activated will not be adopted.

5.2.2 Migration from SINAUT MICRO SC to TCSB V3

Migration from MICRO SC to TCSB V3

If you upgrade your telecontrol system from SINAUT MICRO SC to TeleControl Server Basic version V3.1, you must first create a project for this data in TCSB V3. You then import the data exported from MICRO SC into the project created in TCSB V3, refer to the section Importing connection data from projects (Page 136).

5.3 Start of the runtime system

Startup of the PC for the runtime system

Start the TCSB computer manually.

The automatic startup of the PC with preset user data can lead to errors when starting the services required for TCSB.

5.4 Overview of configuration

Configuration of the remote stations

S7-200 stations are configured in STEP 7-Micro/WIN.

S7-300 and 1200 stations are configured in SIMATIC STEP 7.

The RTU303xC is configured in the integrated Web application (WBM).

For the various station types (S7-200, S7-1200), make sure that you have the required version of the configuration tool.

You will find more detailed information on modems, CPs, RTUs and the OPC routing software SINAUT MICRO SC in the relevant manual (see References in the appendix of the manual).

Configuring TCSB with CMT

TCSB is configured with the CMT tool, see section Configuring and monitoring with the CMT (Page 109).

Here, all the basic settings of the system, the users and their rights and the connections to the remote stations are configured.

Transfer of configuration data to the runtime system

When the configuration of the TCSB system or parts of the system is completed, the data can be transferred to the runtime system. Here, the following mechanisms come into effect:

- **General (all CPs / modems)**

Transfer of the configuration data directly from the CMT (selection of a project > "Save & activate")

The configuration data is always transferred to the runtime system for an entire project, not for individual stations or for multiple projects.

After transferring the configuration data to the runtime system, productive operation starts immediately.

Even after transferring changed data, the system does not need to be restarted.

Do not transfer the modified data to the runtime system until you are sure that all the modified data is correct.

- **(Stations with data point configuration)**

In addition to this, the configuration data of the station is compared with the data stored in TCSB after every connection establishment and differences are indicated by the system item DatapointDiff.

Changing configuration data during operation

If you change configuration data during operation, this has an influence on productive operation.

To avoid configuration errors, you can compare the modified configuration data with the productive data in the runtime system. You can see the most important stored data of an activated project for each connection in the "Activated parameters" tab.

5.5 Working with projects

The project is an organizational unit

In TCSB, management of all connections to the remote stations is structured in projects. In terms of the following properties, projects form an organizational unit:

- Access rights for project editors

Several users can be created for a project. Only one user can change data within a project at any one time.

You will find the rights of users and roles in the section Access rights in projects (Page 152).

- Transfer of data to the runtime system

When project data is activated, the data of the entire project is always transferred to the runtime system.

- Project import from "SINAUT MICRO SC"

Imported data from SINAUT MICRO SC is imported into the selected TCSB project. This function is described in the section Importing connection data from projects (Page 136).

The "Projects" entry therefore comes first in the system navigation of the CMT. This is the highest organizational level of the TCSB system.

Note

Station number of stations with MD720

For stations connected via an MD720, the station number of the individual stations throughout all projects must be unique (different).

Importing projects from "SINAUT MICRO SC"

TCSB provides the option of importing data from "SINAUT MICRO SC". Prior to importing from SINAUT MICRO SC, the data does not need to be edited.

Following import, the stations of the previous MICRO SC project can be managed immediately by TCSB.

Multiproject and multi-user capability

The architecture of the TCSB system structured in independent projects means that, in particular in systems with a large number of stations, the configuration can be created at the same time in various projects and that the configuration can be performed by different editors in the various projects.

Multiple users at one time - interlock

Parallel processing is possible only if you have multiple installations of the CMT on several computers.

- **Configuration**

Simultaneous configuration of several users is only possible in different projects.

- **System monitoring**

It is possible for several people to monitor the TCSB system at the same time.

5.6 The user concept

Graduated user concept

For configuration and management of small but also extremely large systems, a graduated user concept was introduced with rights assigned as suitable for the various tasks:

- **Administrators**

One or more administrators can install and set up the system. They create the projects, set up the SMS gateway providers and the inter-station communication. Administrators have all rights and set up the users.

- **Users**

Within individual projects, the administrators assign different access rights to the users:

- Read
- Wake up
- Change
- Full access

You will find the individual functions assigned to these access rights in the section Access rights in projects (Page 152).

5.7 Redundancy

5.7.1 Structure of a redundant system

Redundant configurations

TCSB can be set up redundantly for configurations with more exacting requirements for the availability of process data for control centers or OPC clients. These can be configurations with individual or redundant OPC clients.

Note

S7-200 stations in redundant systems

With S7-200 stations when reading the jobs, they are read singly (variable-specific). In redundant systems this leads to doubly reading of the data and can cause overload.

In this case, increase the cycle time for read access.

Requirements

The following requirements must be met for a redundant installation of TCSB:

- Computer
 - Each unit of the redundancy group is installed on 1 computer (server PC), in total 2 computers.
 - In addition to this, up to 2 client PCs can be connected to the redundancy group for the installation of the CMT.
- Operating system for server PCs: See section Required operating systems (Page 28)
- OPC version: OPC DA, OPC UA
- Number of TCSB licenses: 2
- TCSB license size: As of 64 connectable stations

Note

License size and number of stations

Make sure that both licenses have the required size for the 2 server PCs and that they will cover the number of stations you want to connect.

For details of the requirements, refer to the section Requirements for operation (Page 27).

Redundant system setup with 2 server PCs

In its simplest form, a redundant TCSB system is installed on 2 computers:

- Server PC 1
- Server PC 2

Each server PC of the redundancy group, see also Installation type "Server PC" in the section System setup and installation variants of the TCSB software (Page 36), contains the following components:

- Telecontrol Manager (TCM)
 - Server PC 1 with TCM1
 - Server PC 2 with TCM2
- Database
- OPC server
- Configuration and Monitoring Tool (CMT)

You will find a possible configuration illustrated in the section Configuration examples (Page 22).

Redundant system setup with additional client PCs

In addition to the structure of a redundant TCSB system with 2 server PCs described above, up to two client PCs can be installed that are connected to the server PCs.

- Number of computers: Maximum 4, of which:
 - 2 computers for the server PCs
For the components included, see above.
 - Optional: 1 or 2 computers for client PCs
The client PCs contain only the CMT.

5.7.2 Generation of the virtual IP address by NLB

Network Load Balancing (NLB)

When a station establishes a connection, the connection is established to a server PC of the TCSB redundancy group. To select the computer, the "Network Load Balancing" (NLB) function of the Windows Server 2008 R2 SP1 / Windows Server 2012 R2 / Windows Server 2016 operating system is used. This controls data traffic based on the principles of network load balancing.

In NLB, the two server PCs are assigned a common virtual IP address. This means that the IP address of the individual TCSB computers does not need to be known by the stations.

The synchronization of the process data between the two computers of the TCSB redundancy group is handled by the TCMs of the two TCSB computers. Each message

received from a station is transferred immediately after receipt by one server PC to the other server PC.

Requirement

In the menu "Start > Control Panel > Network and Internet > Network and Sharing Center > Change advanced sharing settings", activate the option "Turn on network discovery"

Release services automatically

If you cannot turn network discovery on, you need to set the start type to "automatic" for the following services:

- DNS client
- Function Discovery Resource Publication
- SSDP Discovery
- UpnP Device Host

Follow the steps outlined below:

1. Open the menu "Start > System and Security > Administrative Tools > Services".
All the services on the system are displayed.
2. Right-click on the required service.
3. Select the "Properties" entry in the shortcut menu.
4. In the "General" tab as the "Start type" select the entry "automatic".

The services now start automatically when Windows starts up. In the service management the services with the status "Started" are displayed.

Configuration of the group and the virtual IP address in NLB

The configuration described below is only possible if the two server PCs are physically connected.

Follow the steps below to configure the computer network and the common virtual address of the two server PCs in NLB:

1. Install NLB on both computers as follows:
"Start > Server Manager > Add features > Network Load Balancing > Install"
2. Open NLB on one of the computers as follows:
"Start > All Programs > Administrative Tools > Network Load Balancing Manager"
3. Click "New Cluster".
4. Enter your own computer IP address in the dialog that opens.
5. Then enter the common virtual IP address of the redundancy group with "Cluster IP Address > Enter Virtual IP Address".
While doing this, select the "Multicast" and "All Ports" options.
6. Then add the second host (second server PC) to the cluster using its IP address.

5.7.3 Addressing in the redundant TCSB system

Addressing of the redundant telecontrol server

If redundancy is used, IPv4 addresses must be configured for both computers (TCM 1 / TCM 2). If IPv6 is enabled on the network adapters the IPv6 addresses must also be configured for both computers (TCM 1 / TCM 2).

- **Addressing of the TCSB redundancy group by the stations using one IP address**

In the LAN in the master station to which the TCSB server PCs and the DSL router (e.g. SCALANCE M) are connected, the Network Load Balancing (NLB) of the computer operating system will assign a common virtual IP address to the two server PCs.

This IP address is configured depending on the network setup:

- If only CP 1243-1 modules without a DSL router are connected, the virtual address assigned by the NLB must be configured in the CPs as the IP address of the telecontrol server.
- If a DSL router is used, only one IP address will be configured to address the redundant telecontrol server in the stations, the public address of the DSL router.

Set the port forwarding on the DSL router so that the public IP address (external network) is led to the virtual IP address of the TCSB server PCs (internal network).

Only the public IP address is reachable from the Internet. The station does not therefore receive any information telling it which of the two computers of the redundancy group it is connected to.

- **Addressing the TCSB redundancy group by OPC clients**

The individual server PCs are addressed by the OPC clients directly using the computer name or the IP address of the server PCs; these are assigned to the server PCs when setting up the system. The virtual IP address assigned by the NLB is not used by the OPC clients.

This means that an OPC client always connects to a defined server PC of the redundancy group.

- **Addressing the server PCs by client PCs**

If you have connected other client PCs to the redundancy group to allow configuration of TCSB, the connection partner is specified by the configuration of TCM1 and TCM2 in the CMT of the client PCs.

5.7.4 Data management and system response of the redundant system

Configuration of a redundant TCSB system

The following figure shows an example of a configuration with a redundant TCSB system.

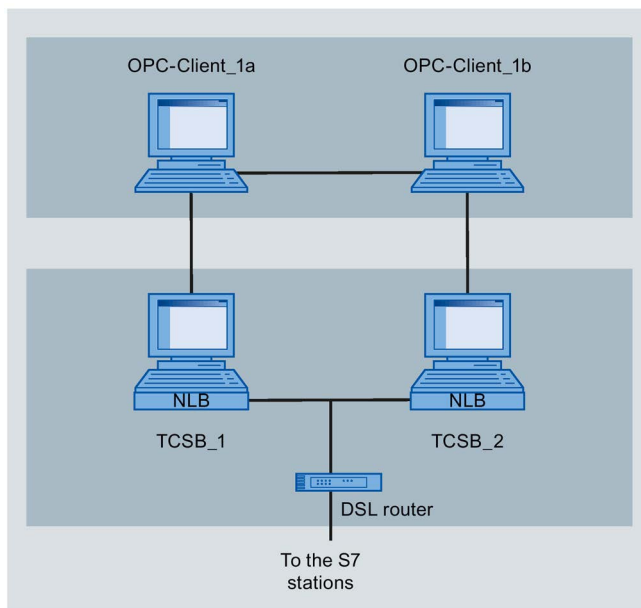


Figure 5-1 Example of the redundant setup of TCSB with 2 OPC clients

Example:

Two OPC clients "OPC-Client_1a" and "OPC-Client_1b" are connected to the two computers of the TCSB redundancy group ("TCSB_1" and "TCSB_2").

Using their common virtual IP address, the two servers have the following connections:

- Connection to the stations

Both TCSB computers are connected to the DSL router. The connections to the remote stations all run via this DSL router.

(In configurations with only CP 1243-1 modules, the stations can be connected without a DSL router.)

- Connections to OPC clients

In the example shown, OPC_client_1a has logged on to TCSB_1 and OPC_client_1b has logged on to TCSB_2

In the example shown, it is assumed that the two OPC clients synchronize their data using a mechanism implemented by the customer to ensure continuous data management.

Failure of a TCSB computer: detection

You can diagnose the failure of the TCSB redundancy group during operation on the OPC clients by evaluating the following system items:

- TCM1ConnectedToTCM2
- TCM2ConnectedToTCM1

You can recognize the failure of individual components of the TCSB redundancy group and internal system connections based on the values of the following system items:

- OPCServerConnectedToTCM1
- OPCServerConnectedToTCM2
- OPCServerConnectedToMasterDB
- OPCServerConnectedToBackupDB
- TCM1ConnectedToMasterDB
- TCM1ConnectedToBackupDB
- TCM2ConnectedToMasterDB
- TCM2ConnectedToBackupDB

You will find the meaning of the system items in the section System OPC items (Page 57).

Data management of the redundant TCSB in normal operation

In normal operation when both TCSB computers are running error-free, data management is handled as follows:

- **Configuration data**

When setting up the system, the configuration data of TCSB is stored identically in both databases.

Changes to the configuration data during operation are stored in both redundant databases after activation.

- **Messages**

Messages are stored separately on each computer of the redundancy group. They are not synchronized between the two computers.

- **Process data of the stations for OPC**

- **Read jobs of an OPC client**

The read job of a client is forwarded via the connected TCSB computer (TCSB_1 or TCSB_2) to the station.

The response message of the station is sent to the telecontrol server and forwarded by NLB to one of the two TCSB computers. The TCM of the TCSB computer that receives the message forwards this to the other redundant computer. This ensures that the OPC client receives the requested data.

- **Write jobs of an OPC client**

The write job is forwarded via the connected TCSB computer (TCSB_1 or TCSB_2) to the station.

The acknowledgement of the station is sent to the telecontrol server and forwarded by NLB to one of the two TCSB computers. The TCM of the TCSB computer that receives the acknowledgment forwards this to the other redundant computer. This ensures that the OPC client receives the requested acknowledgment.

- **MonitoredItems (OPC UA)**

The data for the buffer of the MonitoredItems function is stored on the server PC with which the OPC client has logged on. The stored data is therefore not identical on the two server PCs.

- **HistoryRead (OPC UA)**

The identical historical data is stored on both server PCs.

Data management if a TCSB computer fails

If one TCSB computer fails the second redundant TCSB computer takes over all the tasks of the redundant TCSB system.

The data that accumulates between the failure and return of a computer is handled as follows:

- **Configuration data**

- Failure of database 1 (on TCSB_1 computer)

It is no longer possible to configure in the CMT. The system can only be monitored.

- Failure of database 2 (on TCSB_2 computer)

It is possible to continue configuring in the CMT. Changes to the configuration data that have occurred in the meantime are copied to database 2 when the failed TCSB_2 computer returns.

- **Process data of the stations for OPC**

If the connection between TCM1 (computer TCSB_1) and TCM2 (computer TCSB_2) is interrupted, only the server PC that still has an intact connection to the stations via the DSL router can reach the stations.

The jobs or data are handled as follows:

- **Read and write jobs**

Read and write jobs of the OPC client logged on to the failed TCSB computer are not processed between the failure and return of the connected TCSB computer.

When the two OPC clients synchronize themselves, after recognizing the computer failure (see above), the other OPC client can take over the tasks of the OPC client connected to the failed TCSB computer.

The responses to write/read jobs of an OPC client that are still open at the time of the failure of the connected TCSB computer are transferred to the other TCSB computer. When the two OPC clients synchronize themselves, no data is lost.

- **MonitoredItems - OPC UA**

The data requested by the connected OPC client between failure and return of the connected TCSB computer cannot be called up.

After return of the failed TCSB computer, there is a gap in the data between the time of the failure and return. On return of the failed TCSB computer, the last data stored in its process image is used for the MonitoredItems.

- **HistoryRead - OPC UA**

The data that accumulates between the failure and return of a failed TCSB computer is stored on the second TCSB computer but is not copied to the failed computer when it returns. There is a gap in the data in the buffer of the historical data on the failed TCSB computer for the period between failure and return.

Forms of redundancy in OPC communication

The form of redundancy of a control system consisting of OPC clients and the OPC servers of redundant TCSB is decided by the configuration of the OPC clients:

- **Cold redundancy**

An example of this form of redundancy is illustrated in the following configuration.

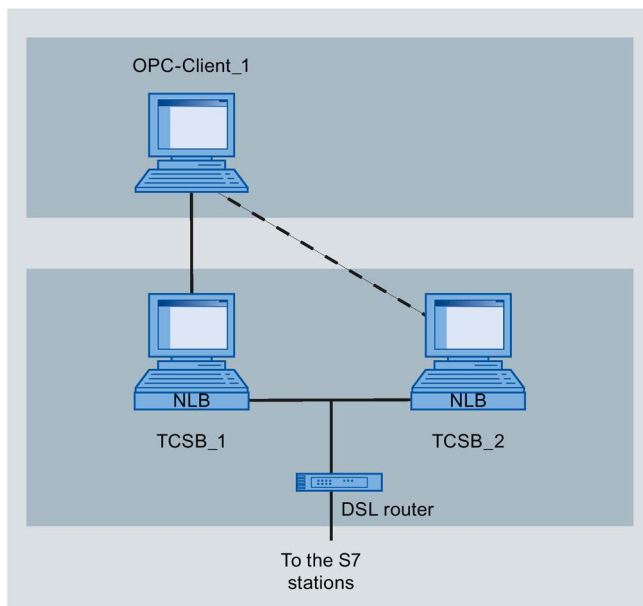


Figure 5-2 Redundant setup of TCSB (example of cold redundancy)

An OPC client "OPC_client_1" is connected to both redundant TCSB computers. The OPC client only logs in to TCSB_1 and normally only communicates with TCSB_1.

If computer TCSB_1 fails, the OPC client logs in to the TCSB_2 computer that has not failed.

In this configuration, there is a loss of read and write jobs between the failure and return of a TCSB computer or until the point in time at which the client logs on to the TCSB computer that has not failed after recognizing the failure of the other.

- **Hot redundancy**

An example of this form of redundancy is illustrated in the following configuration.

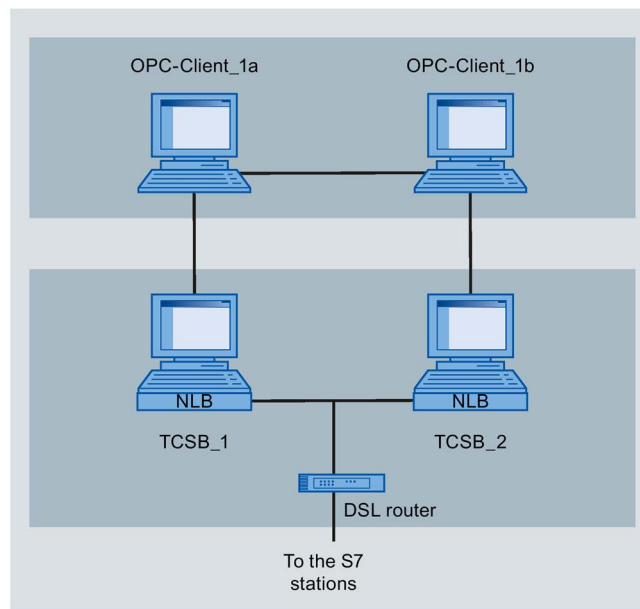


Figure 5-3 Redundant setup of TCSB (example of hot redundancy)

The two OPC clients "OPC_client_1a" and "OPC_client_1b" of a client redundancy group log in to one of the two TCSB computers.

If one of the TCSB computers fails, continuous data flow is guaranteed if OPC_client_1a and OPC_client_1b update each other continuously.

Mixed forms of the two redundancy schemes described above depend on the performance of the OPC clients used.

5.8 Connection establishment

Connection establishment

A connection is always established by the station (CP, modem, RTU). During connection establishment, among other things passwords for authorization are exchanged.

The sending of process data is possible as soon as the station has started up, a connection has been established and process data is available for transfer.

Note

Connection interrupted by the mobile wireless network provider

Remember that existing connections can be interrupted by mobile wireless network providers for maintenance purposes.

Connection modes

- **MD720**

The MD720 does not have any different connection modes.

For all S7 stations with an MD720, the connection configuration is specified in the program blocks of the "SinautMicroSC" or "SinautMicroSC_sec" library on the CPU. If these blocks are configured and called on the CPU, the modem immediately connects to the configured telecontrol server.

After the station has started up and the connection has been established the first time, there is a permanent TCP connection to the telecontrol server.

- **CP 1242-7**

The CP can be configured for the following connection modes.

- "Permanent" connection mode

Following connection establishment, there is a permanent TCP connection to the telecontrol server even if data is not transferred permanently.

If a connection established by the CP is interrupted, the CP automatically attempts to re-establish the connection.

- "Temporary" connection mode

A connection to the telecontrol server is only established when data is available for transfer and the transfer conditions are met or as a result of waking the CP.

- **CP 1242-7 GPRS V2, CP 1243-1, CP 1542SP-1 IRC, CP 1243-7 LTE**

After the station has started up and the connection has been established the first time, there is a permanent TCP connection to the telecontrol server.

If a connection established by the CP is interrupted, the CP automatically attempts to re-establish the connection.

- **RTU**

The RTU can be configured for the following connection modes.

- "Permanent" connection mode

Following connection establishment, there is a permanent TCP connection to the telecontrol server even if data is not transferred permanently.

If a connection established by the RTU is interrupted, the RTU automatically attempts to re-establish the connection.

- "Temporary" connection mode

A connection to the telecontrol server is only established when data is available for transfer and the transfer conditions are met or as a result of waking the RTU.

The criteria for connection establishment are configured on the RTU. You will find further options for connection establishment in the following section.

Triggering connection establishment for temporary stations (CP 1242-7, RTU)

With "temporary" stations, connection establishment can be triggered by the following events:

- Events in the local CPU that lead to a single connection establishment (for example alarms or commands from the operator).
- Writing of the multicast item "WakeUp" by an OPC client

Note: The write or read job of a OPC client alone does not lead to connection establishment.

- Wake-up call / wake-up SMS message (not with RTU3010C))

- Wake-up SMS of the telecontrol server

The wake-up SMS message can be triggered spontaneously in the CMT or cyclically by configuring the cyclic services in the CMT.

With the RTU, there is the further option of waking up by the Web server of TCSB.

- Telephone wake-up call

The wake-up call can be sent from a telephone with an authorized phone number. The telephone must support the CLIP function (transfer of its own call number).

Connection establishment with the telecontrol server is triggered.

- Mobile phone wake-up SMS

The wake-up SMS message can be sent from a mobile phone with an authorized phone number. The telephone must support the CLIP function (transfer of its own call number) and the sending of SMS messages.

The connection establishment with the telecontrol server specified in the SMS is triggered.

The following device-specific options are available for establishing a connection:

- RTU: Wake up via the Web server of TCSB

An RTU to which no connection is established, can be woken via the Web server of TCSB.

- CP 1242-7: Request for TeleService by an engineering station

The request switched by the telecontrol server does not need to be evaluated in the program by the CPU.

Note on the RTU:

To initiate connection establishment, note the necessary settings in the configuration of the operating modes of the RTU (sleep mode > turning on the mobile wireless interface).

5.9 Wake-up call and wake-up SMS (CP 1242-7, RTU303xC)

Waking up the station

Wake-up by the telecontrol server

When waking one of the following communication modules by the telecontrol server, the server sends an e-mail:

- CP 1242-7
CP 1242-7 GPRS V2
CP 1243-7 LTE
- RTU303xC

The e-mail is sent to an SMS gateway via an SMTP server. The SMS gateway converts the e-mail into an SMS message and transfers this to the station.

The SMS gateway is configured in the telecontrol server (CMT), see section TCSB system (Page 154).

Wake-up with a mobile phone

If the wake-up SMS message is sent from a phone, the phone number must be authorized in the STEP 7 configuration of the receiving CP or in the WBM configuration of the RTU303xC. This authorizes the phone to wake the station. The telephone must support the CLIP function (transfer of its own call number) and the sending of SMS messages.

When the station is woken up by a wake-up call, it establishes a connection to the telecontrol server.

When the station is woken up by a wake-up SMS message, it behaves as described in the next section.

Texts for the wake-up SMS message

Depending on the communications partner with which the connection will be established, the following text must be transferred in the wake-up SMS message of the mobile phone:

Waking a CP

- **For telecontrol connections**

- Text for the wake-up SMS message for establishing a connection to the telecontrol server:

TELECONTROL

You configure the telecontrol server for the CP here in STEP 7:

- "Telecontrol interface > Mode"

- **For TeleService connections**

- Text for the wake-up SMS message for establishing a connection to the first configured TeleService server:

TELESERVICE

or

TELESERVICE 1

- Text for the wake-up SMS message for establishing a connection to the second configured TeleService server:

TELESERVICE 2

You configure the TeleService server for the CP here in STEP 7:

- "Telecontrol interface > TeleService settings"

Wake-up of RTU303xC

- **For telecontrol connections**

- Text for the wake-up SMS message for establishing a connection to the telecontrol server:

TELECONTROL

With this SMS text the RTU only establishes a connection to the telecontrol server and transfers pending data.

- **For connections to the configuration PC**

- Text for the wake-up SMS message for establishing a connection to the PC for PC access:

TELESERVICE

With this SMS text you wake the RTU to establish a connection from the configuration PC via HTTP/OpenVPN.

Monitoring and time response of wake-up SMS messages

For more information, refer to section Monitoring and time response of wake-up SMS messages (Page 170).

5.10 Delay times with connection establishment

Configurable delay times

Note

Possible costs with mobile wireless transmission

If the Telecontrol server cannot be reached, connection establishment via the mobile wireless network can take several minutes. This may depend on the particular network and current network load.

Depending on your contract, costs may result from each connection establishment attempt.

Parameters

With the following parameters you configure the intervals of repeated connection establishment attempts for CPs and the RTU:

- **Redial delay**

Valid only for the CP 1242-7

Configuration in STEP 7: "Operating mode" parameter group

- **Connection establishment delay**

Valid for stations with data point configuration

- Data point CPs: Configuration in STEP 7 > parameter group "Advanced options"
- RTU: Configuration in the WBM "Operating mode" > "Operating modes" > "Communication mode"

Function of the parameters

The delay time is the waiting time between the connection establishment attempts if the telecontrol server cannot be reached.

Function with the RTU

With the RTU, the waiting time is specified in the configuration of the communication mode. Depending on the configured settings of the communication cycle and the transmission settings, the waiting time differs.

Function with CPs (in general) and with the RTU if the option "Always ready to receive" is activated (permanent readiness to receive)

A basic value is configured for the waiting time before the next connection establishment attempt. Starting at the basic value, the current value is doubled in each case after 3 unsuccessful retries up to a maximum value of 900 s. Range of values for the basic value: 10 to 600 s.

Example: The basic value 20 results in the following intervals for connection establishment attempts:

- three times 20 s
- three times 40 s
- three times 80 s
- etc. up to max. 900 s

Only with CPs: If a second router is configured for the Internet access of the telecontrol server, the 4th time the station attempts to connect via the second path.

Function with the RTU if "Always ready to receive" is deactivated

If the option "Always ready to receive" is disabled in the WBM, within a basic cycle a maximum of three connection establishment attempts are made with a fixed waiting time of 10 seconds.

5.11 Dial retry delay of the MD720

After it is turned on and the transfer of configuration data by the CPU or after a connection abort, the MODEM MD720 immediately starts in OPC mode to connect to the OPC server (TeleControl Server Basic or SINAUT MICRO SC).

The connection establishment attempts are according to the following scheme:

- Turn on (startup in approx. 35 seconds)
- 3 connection establishment attempts one directly after the other if the first and second attempt are unsuccessful (takes approx. 90 seconds)

If connection establishment fails, there are further connection establishment attempts following the sequence described below.

- 2 minutes waiting time
- 3 attempts in succession
- 4 minutes waiting time
- Restart (requires approx. 1 ... 3 minutes)
- 3 attempts in succession
- 15 minutes waiting time
- Restart
- 3 attempts in succession
- 15 minutes waiting time

...

The last three steps are repeated until connection establishment is successful.

5.12 Monitoring time for read/write jobs of OPC clients

Monitoring time in TCSB

Read and write jobs of the OPC clients are completed by TCSB after 5 minutes with a timeout message if TCSB does not receive a reply from the remote station during this time.

Note that frame delay times between remote stations and an OPC client cannot be predicted due to network properties of mobile wireless networks (WAN) and their unknown network load.

If a monitoring time for read/write jobs can be set in the connected OPC clients, this should not be shorter than 5 minutes.

Note

Computer time as the basis for the monitoring time

The computer time is the basis for the monitoring time for read/write jobs of the OPC clients. If you change the computer time by putting it forward while read/write jobs are open, this can lead to timeout messages.

5.13 Connection monitoring

Communication monitoring during operation

Following connection establishment, both communications partners (CP/modem and telecontrol server) check that they can reach each other using the following mechanisms.

Connection monitoring

The connection monitoring is based on keepalive frames sent cyclically by the station (modem/CP) to the telecontrol server.

The connection monitoring is used to monitor permanent and temporary connections.

- **Keepalive timeout**

When there is a keepalive timeout, the station (CP/modem) sends a keepalive message if there was no communication before the keepalive timeout occurred. The length of the keepalive time is configured on the telecontrol server and the station (CP/modem) is informed of this during connection establishment.

- **The tolerance time**

The telecontrol server expects a data or keepalive message within a configured keepalive monitoring time. In addition to this, the tolerance time is also configured. The tolerance time is used to take into account transfer times via the mobile wireless network.

Note

Configuring the tolerance time

Depending on the properties of the networks in between and the load on the system, the receipt of a keepalive frame may be delayed. For this reason, make sure you take this into account in the tolerance time. The tolerance time is set to 1 minute as default.

If the telecontrol server has not received a message from the station within the keepalive monitoring time and tolerance time, it assumes that the connection has aborted.

Temporary connections (CP 1242-7, RTU): Connection termination

If the keepalive monitoring time and the tolerance time for temporary connections elapse without further data being transferred, the connection is terminated. A terminated connection means either that neither of the two communications partners has data waiting for transfer or that the connection is disrupted.

5.14 Process data access by TCSB and data management in the stations

Note

Recommendation

Using an acknowledgement mechanism in the user program, make sure that values of the CPU written by the master station are mirrored back to the control system.

5.14.1 S7-200/300: Data management and communication

Process images for TCSB and S7-200 CPU

The values of OPC items are transferred unchanged from an OPC client via TCSB and the MD720 to the S7-200 CPU. Here, the modem is only an intermediary.

5.14 Process data access by TCSB and data management in the stations

When all value changes of the station are transferred to the telecontrol server, the process image of TCSB and the process data in the data block of the CPU match. This applies both to the spontaneous sending of values and cyclic data exchange as well as reading from the device.

If the address information (specified offset or length of the data area) of a read or write job is higher than the process image, the entire job is acknowledged negatively and no data is transferred.

Memory area for user data with an S7-200

Note

Memory area for user data

The user data of the S7-200 CPUs that can be read or written by OPC clients using TCSB has the following maximum size:

- CPU 221 / CPU 222: 2047 bytes
 - CPU 224: 8191 bytes
 - CPU 224XP / CPU 224XPsi / CPU 226: 10239 bytes
-

Access to process data by OPC clients using the correct data type

Make sure that OPC clients access the process data of a station with the correct data type. Access should be oriented on the data type-specific data limits of the individual items.

Negative example: If the first two items have the data type DWORD, this means that they occupy bytes 0 - 3 and bytes 4 - 7, OPC clients should not, for example access bytes 2 - 3 or bytes 2 - 5.

Frequency of the write jobs to S7-200

Do not send write jobs to the S7-200 more frequently than every 500 ms.

Message size for communication with S7-200/300

Maximum message size of 230 bytes

The maximum message size for communication with S7-200 and S7-300 is 230 bytes.

Read/write data areas > 230 bytes in multiple messages

Remember that memory areas (arrays) larger than 230 bytes are processed in more than one message and therefore in different CPU cycles.

5.14.2 CP 1242-7: Data management in the process images and communication

Access to process data by OPC clients using the correct data type

Make sure that OPC clients access the process data on the CP with the correct data type. Access should be oriented on the data type-specific data limits of the individual items.

Negative example: If the first two items have the data type DWORD, this means that they occupy bytes 0 - 3 and bytes 4 - 7, OPC clients should not, for example access bytes 2 - 3 or bytes 2 - 5.

2 process images of the CP 1242-7

For stations with a CP 1242-7, separate the CPU data areas for writing and reading items.

Note

Writing and reading OPC items with separate CPU data areas (CP 1242-7)

If you both write and read with an item, it is possible that the value stored on the OPC server will differ from the value in the process image following a write job.

For stations with a CP 1242-7, use OPC items either for write or for read access. Writing and reading items must access different CPU data areas.

Reason:

For read and write communication with the CPU, the CP 1242-7 has two process images (reading and writing) and uses two different program blocks with one or more data blocks that access the process data of the CPU.

Send and receive process image of the CP

The process images on the CP are created for communication with the OPC server of the telecontrol server.

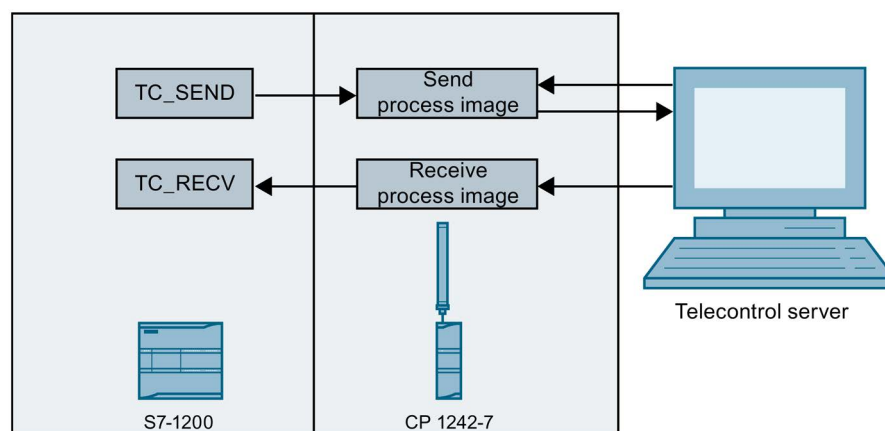


Figure 5-4 Process images of the CP 1242-7

5.14 Process data access by TCSB and data management in the stations

In contrast to the CPU or the telecontrol server, the CP 1242-7 manages the process data in two process images:

- **Send process image (read direction of the control system)**

The send process image of the CP is set up by the TC_SEND program block.

After the startup or restart of a station, the TC_SEND program block sets up the send process image of the CP in the program of the CPU to be able to supply it with data. To achieve this, it may be necessary to call the block several times.

Data sent to the telecontrol server is read from the send process image. This affects:

- Spontaneous transfer of data
- Read jobs of an OPC client (via TCSB)
- Cyclic data exchange with TCSB (regardless of OPC client requirements)

- **Receive process image (write direction of the control system)**

The receive process image of the CP is created or enlarged by write jobs of an OPC client (via TCSB).

Using a write job from TCSB, data is written to the receive process image of the CP.

The TC_RECV program block reads the data out of the receive process image and writes it to the memory areas of the CPU.

Behavior during data exchange

Differences when reading and with unsolicited transfer

- When reading items of the CP 1242-7, precisely the requested items are transferred to TCSB.
- With the spontaneous transfer of data by the CP 1242-7, the entire process image of the CP is always transferred to TCSB.

Behavior when reading and writing and during cyclic data exchange

Note the following special points:

- Different address ranges for reading and writing on the CP

The data transfer between the two process images of the CP and the process data of the CPU is handled by two blocks TC_SEND and TC_RECV.

- Different sizes of the send and receive process image

The size of the send process image and the receive process image on the CP may differ.

These system properties can lead to the following behavior:

- **Different values when writing and reading**

If an OPC client writes items to the station and then reads the same items (read from device), under certain circumstances, values will be read for these items that differ from those written earlier. Reason: Compared with the currently written receive process image, the send process image of the CP may contain different values.

- **Negative acknowledgement when reading outside the send process image**

If an OPC client reads items located outside the send process image, the read job is negatively acknowledged.

If the TCSB cyclic reading wants to access items located outside the send process image, the job is not executed, any values stored previously in the process image of TCSB retain their value and cyclic reading is stopped.

Remember that connected OPC clients are not informed of this.

Synchronization of the process images of the CP

Synchronize the receive and send process image of the CP using the user program to ensure that TCSB accesses current process data. To do this, transfer each written value from the receive process image with the same offset to the send process image:

1. Copy the data received by TC_RECV from the data block of TC_RECV to the data block of TC_SEND.
2. Transfer the data to send process image of the CP using TC_SEND.

This ensures the following:

- The send process image is at least as large as the receive process image.
- After a write job of the OPC client, when this is followed by a read request and during cyclic data exchange, the previously written values are read and transferred to TCSB.

Recommendation for the structure of the process images

- Place all process data intended for write or read access in the lower address range (small offset).
- Place the process data intended only for read access in the upper address range (larger offset).
- Make sure that the send process image of the CP set up by the TC_SEND program block is larger than the receive process image of the CP that is created by write access by the OPC clients.

Possible data loss for archives of OPC clients during cyclic data exchange

During cyclic data exchange, the CP always transfers its entire process image to TCSB.

Data can be lost in the following scenario:

- Cyclic data exchange was enabled in TCSB for the connection to a CP 1242-7.
- Due to a temporary connection termination, the data that the CP could not send to TCSB is stored in the send buffer.
- If an OPC client now sends a read job, this is handled with priority and the current data is read from the process image of the CP.
- If older process data is then read from the send buffer of the CP for unsolicited sending, this is discarded for filling the archive if the OPC client rejects data older than the data it currently has stored.

5.14.3 Station with data point configuration: Data management and communication

Data loss when reading or writing

Read

When reading data it is possible that although all the values were read from the stations, there is no guarantee that all the values are transferred to the OPC client. When the message memory of the station is emptied, several values of the same item can be transferred to TCSB in one message. The values of events are always sent by the station to the communications partner strictly chronologically.

If one message contains several values of the same item, when the message is received the stored value in TCSB is updated with the first value and sent to the OPC client. The other values of the item in the message overwrite the first transferred value one after the other within a few milliseconds. If the update rate of the OPC client is set to 100 ms and assuming there were 3 values transferred in the message, the first value is transferred to the OPC client and after the update time has elapsed the third value is sent. The second value is lost.

This behavior affects OPC DA clients and OPC UA clients and conforms to the specification.

In OPC UA, this data loss can be avoided by using the data buffer.

Write

If an OPC client writes data at very short intervals to a station, data may be lost if the data is written to the CP faster than the CP can forward it to the CPU. In this case the values of items written to the CP will be overwritten with new values faster than they can be forwarded from the CP to the CPU.

5.15 Program blocks for the CPU

Communication between CPU and modem/CP

For communication between the CPU and MD720 or CP 1242-7, program blocks are required for the CPU. The program block allow the connection establishment and termination, the sending and receiving of data and other communications tasks.

You will find the description of the blocks in the following manuals; refer to the References in the appendix of this manual:

- MD720: /4/ (Page 182) and /12/ (Page 184)
- CP 1242-7: /2/ (Page 182)

You will also find information on the telecontrol blocks for the S7-1200 CPU in the STEP 7 online help.

The program blocks for the S7-200 can be used in the following CPU types:

- SinautMicroSC / SinautMicroSC_sec
CPU 224 / 224XP / 226

5.16 Times of day in the system

Times of day used in the system

Note**Changing the PC time**

Remember that changing the PC time on the TCSB computer can have far-reaching consequences:

Changing the PC time on the TCSB computer affects the time-of-day synchronization of the stations. With the CP 1242-7 this affects the system item "TmpPLCNextLoginTime".

Note**Computer time as the basis for the monitoring time**

The computer time is the basis for the monitoring time for read/write jobs of the OPC clients. If you change the computer time by putting it forward while read/write jobs are open, this can lead to timeout messages.

5.16 Times of day in the system

The telecontrol server uses the following times:

- Local time of the time zone in which the telecontrol server is located.

The local time it is set on the PC using the tools of the operating system. It may differ from UTC.

Local time for system item "TmpPLCNextLoginTime"

The system OPC item "TmpPLCNextLoginTime" specifies the time at which a temporary station logs in the next time (CP 1242-7, RTU).

With the CP the item is calculated from the cycle time and start time ("Cyclic data exchange" parameter group) in local TCSB time.

With the RTU, the item reflects the point in time of the next connection establishment calculated from the configuration of the RTU.

This time of day is specified as the local time of the telecontrol server and not as UTC.

- UTC (Universal Time Coordinated)

The time of day is output by the telecontrol server on the following interfaces as UTC. This time is not the same as the local time set on the server:

- On the OPC interface

The time stamps of all OPC items are output as UTC.

Remember this for the time of day handling on the connected OPC clients.

For information on the only exception "TmpPLCNextLoginTime", see above.

- For the time-of-day synchronization of the remote stations

The S7-1200-CP, the MD720 and the RTU synchronize themselves with the telecontrol server in UTC format. All time stamps of the remote stations are output as UTC.

Time-of-day synchronization of the PCs with a redundant system setup

To avoid the times of day of the two server PCs of a TCSB redundancy group deviating from each other, it is advisable to synchronize them using an external server.

Time-of-day synchronization of the S7 stations

With S7-200/300 stations, make sure that the time of day is synchronized regularly between the MD720 and the CPU.

With the S7-1200 CP, the MD720 and the RTU30x0C, the time of day of the CP is synchronized by TCSB with each connection establishment.

Adopting the time stamp from TCSB on the OPC client

If you want to use the TCSB time stamp of the items for the OPC client WinCC, you need to set this on the client.

To adopt the TCSB time stamp in WinCC, make the following settings for the archive tags:

Table 5- 1 "Tag Logging"

Parameter	Value
Type of acquisition	On change
Archiving / display cycle	1 day

For information on the time stamps of the items and messages, refer to the section Process OPC items (Page 53).

5.17 TeleService functions

TeleService for S7-1200 with mobile wireless CP

The TeleService functions for the mobile wireless CP are described in the manual of the CP (refer to the references) and in the online help of STEP 7.

TCSB automatically provides one access point for each project for TeleService. This means that up to 1 TeleService user can access the stations of a project.

An engineering station is required for each TeleService connection.

Per station, 1 TeleService session is possible. In an existing TeleService session, a second connection resource of the engineering station is used to load the project data.

Monitoring times when establishing TeleService connections

When a TeleService connection is established, the following monitoring times are used:

- Establish TeleService connection but no online connection: An interrupted connection is detected after 1 minute.
- Disconnection of a TeleService connection:
 - Follow-up time of approx. 5 minutes

The connection between the telecontrol server and CP is maintained within the follow-up time.

If a new TeleService connection is established during the follow-up time, no new wake-up SMS is sent to the station.

If a TeleService connection aborts, a new TeleService connection is not established automatically.

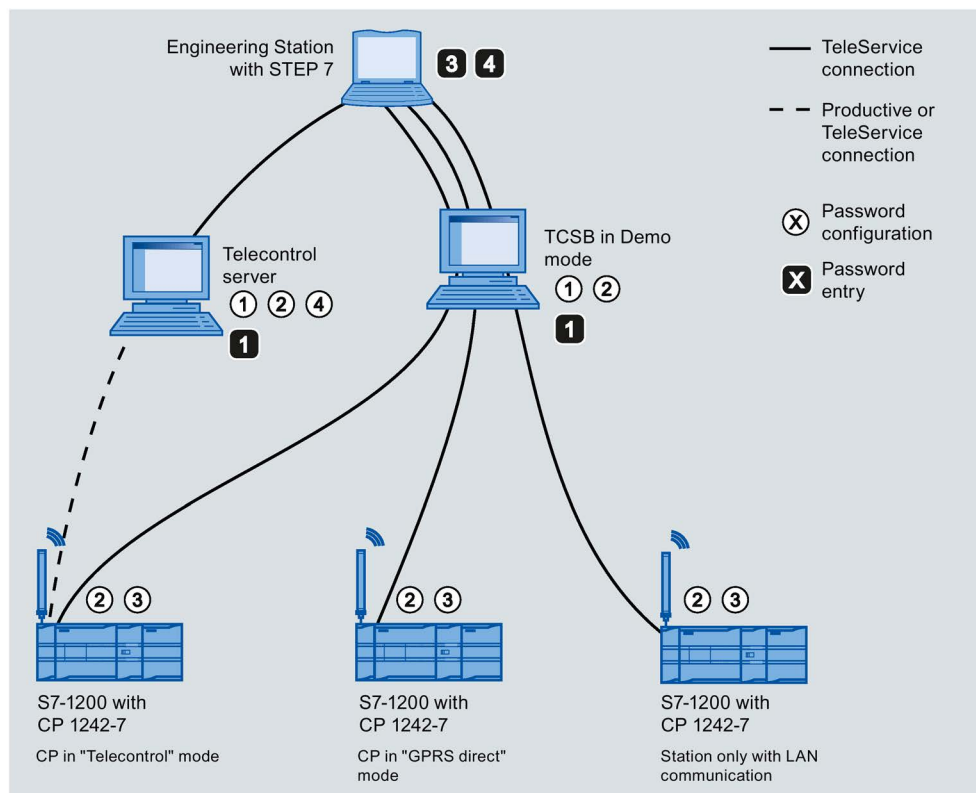
5.18 Overview of the passwords - system protection and authentication

Overview of the passwords used during operation (without the database password)

Below, you will find an overview of the passwords used in TCSB / TCSB mode.

No.	Password	Password configuration in ...	Password entry in ...	Function
①	User password / administrator password	CMT in TCSB	CMT (at startup)	Protection of TCSB from unauthorized access
②	Telecontrol password *	- CP 124x-x, MD720 (modem password) - Per station in CMT	--	Authentication of the CP/MD720 (protection of TCSB)
③	TeleService password	CP 1242-7 (obligatory)	STEP 7 (TeleService startup)	Protection from access to the CP in TeleService
④	Server password	CMT: Obligatory assignment per project	STEP 7 (TeleService startup)	Protection from access to TCSB in TeleService

* For information on assigning the telecontrol password, refer to the following section "System protection".



Overview of the passwords used. The numbers correspond to those in the table.

Other passwords required by the mobile wireless network provider, SMTP server provider or SMS gateway provider are not listed here.

System protection

Note

Different telecontrol passwords

Due to inconsistencies in the configuration (e.g. system consisting of multiple STEP 7 projects) or unwanted manipulation, it is possible that two S7-1200 stations with the same access data exist in a telecontrol system. If two stations have identical data for the project number, station number, slot and telecontrol password, the following scenario is conceivable: When a station logs in to TCSB and the second station then logs in to TCSB with the identical data, TCSB accepts the second connection establishment. As a result there is a danger of inconsistency.

To prevent this, it is advisable to use different telecontrol passwords in different stations.

Configuring and monitoring with the CMT

The Configuration and Monitoring Tool (CMT) is the program user interface of TCSB.

- You will find an overview of the functions in the section Functional overview of the CMT (Page 17).
- You will find the description of the layout of the program user interface and the possible settings in the section Window layout (Page 110).
- The functions for configuration and monitoring of the system are described in the sections below.
- You will find the description of the diagnostics options provided by the CMT in the section Diagnostics and statistics (Page 169).

Note

Configuration of projects from beginning to end

To allow you to configure projects from beginning to end, first create the users with the required rights and configure the SMS gateway provider.

6.1 Windows and buttons of the CMT

6.1.1 Window layout and Editing

Layout of the user interface

The program user interface of the CMT is divided into the following areas:

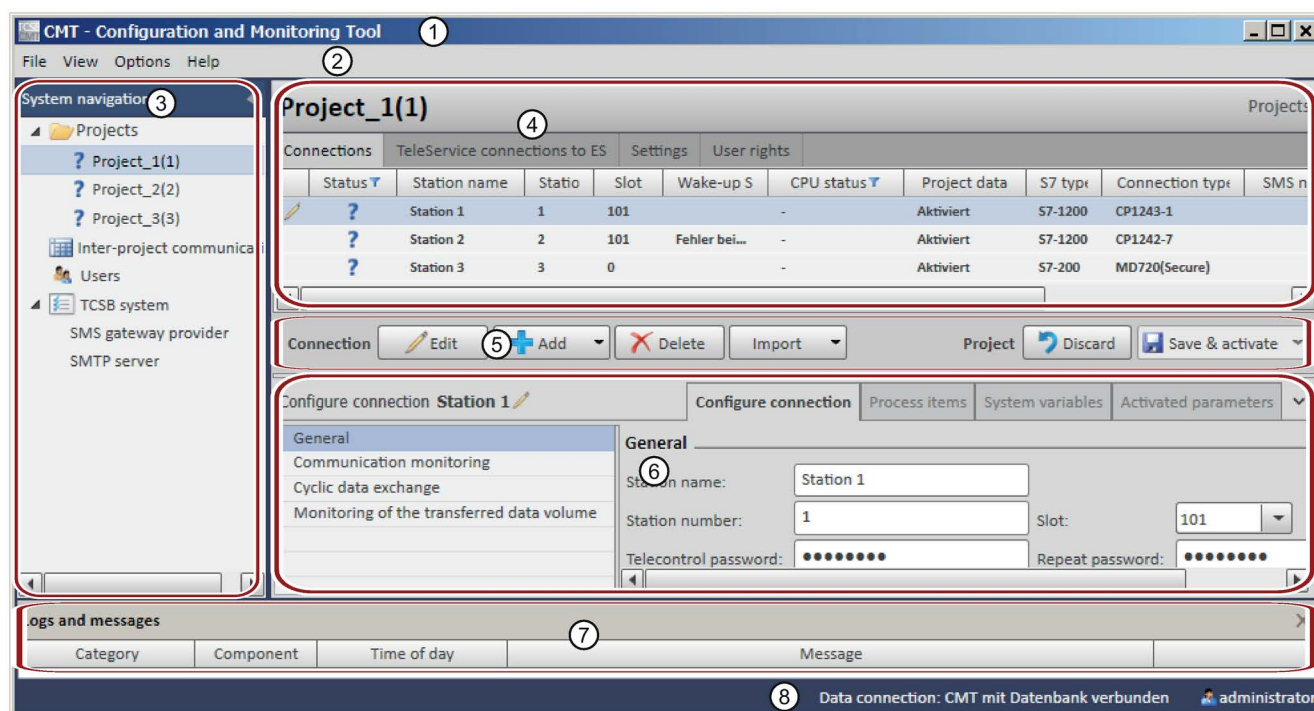


Figure 6-1 Window layout of the CMT

The subareas have the following functions:

No.	Area / subarea	Function
①	Title bar	Display of the name of the program
②	Menu bar	Contains the menus
③	System navigation	Display of the structure of the configured telecontrol system and entries for the system settings *) With the triangle at the top right, the area can be hidden and shown again.

No.	Area / subarea	Function
④	Object area	Depending on the entry selected in the system navigation, the following content is displayed: • Projects and their parameters • Connections, TeleService connections, user rights • The displayed parameters in the parameter area differ depending on the selected object (project, station, user etc.). • Projects assigned for inter-station communication • Users and administrators of the system • TCSB system settings, configured SMS gateway providers and SMTP servers The content displayed depends on the rights of the logged-on user.
⑤	Command bar	Contains buttons for functions in the context of the particular object area
⑥	Parameter area	Depending on the selected object (project, station, user etc.) and the rights of the logged-on user, the content is displayed in different tabs and parameter groups: • Parameters of projects • Parameters of a connection selected in the object area with the following tabs: – Configure connection – Process items – System variables – Activated parameters (Parameters that were passed on to the runtime system.) • Parameters of users • Parameters of the system settings
⑦	Message window	Displays the accumulated system messages. The window is opened using the "View" > "Messages" menu and is closed again using the 'X' icon at the top right.
⑧	Status bar	Shows the connection status of CMT and the logged in users.

System navigation

The system navigation shows the structure of the TCSB system and is used to select an object. The editing functions are available in the object area and in the parameter area.

The following entries are displayed in the system navigation:

- Projects
 - Project with status icon and (project number)
- Inter-station communication

- Users
- TCSB system with the following subentries:
 - SMS gateway provider
 - SMTP server
 - System overview

Object area - general contents

The following content is displayed if you select the relevant entry in the system navigation.

- Projects
 - Display of all or one of the projects selected in the system navigation
- Inter-station communication
 - Display of the projects available for inter-station communication
- Users
 - Display of the properties of the created users
- TCSB system
 - Here, an administrator can make the system settings of the TCSB.
- SMS gateway provider
 - Displays the configured SMS gateway provider
- SMTP server
 - Display of the configured SMTP server
- System overview
 - Number of different activated settings

Object area - project-specific contents

The following contents of the object area are displayed if you select the "Projects" entry or select one of the individual projects in system navigation.

- Status icon

The connection status for monitoring an object is indicated by the status icon.

- Detailed display of the subobjects of an object selected in the navigation area

Examples:

- The "Projects" entry is selected in the navigation area: The object area shows all projects of the system with additional information.
- A project is selected in the navigation area: The object area shows the individual stations of the project.

If a project is selected in the navigation area, the object area has three tabs:

- Connections

Shows details of the connections to the stations of the project.

- Settings

Shows the basic settings of the projects

- TeleService access points to ES

This shows a maximum of 5 TeleService access points for the selected project with the IP address of the ES and the connection status.

- User rights

Here, the assigned users are displayed per project. The rights of the users are specified by an administrator.

- Executing actions using the command bar

In some settings, the object area includes a command bar with which various actions can be executed.

Command bar: Edit, Save & activate, Add, Delete, Wake up

The command bar provides buttons for various functions.

The buttons depend on the entry selected in the navigation or object area. The functions are explained in the description of the individual objects.

Parameter area - Editing objects

The parameter area shows the parameters of the object selected in the object area. The individual parameters are described in the sections that follow.

The following applies generally:

- The displayed parameters depend on the object selected in the object area.
- The configuration of objects depends on rights.

Configuration data can only be edited if you have the necessary rights.

- As default, all the parameter boxes are grayed out and cannot be edited.
To be able to edit permitted boxes, prior to editing, the "Edit" button (see below) must be enabled.
- The configuration must be consistent (for example the SMS number of a station must not be assigned more than once).
- If an input box is intended only for certain types of character, other types of character will be rejected.
Example: Letters cannot be entered in input boxes for phone numbers.
- While they are being entered and prior to being transferred to the runtime system, parameters are checked for plausibility.
- Invalid parameters
Incomplete input boxes and input boxes containing forbidden characters are declared invalid during the plausibility check and shown on a red background (see figure).

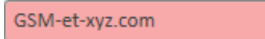


Figure 6-2 Marking of input boxes with forbidden content

- Objects with bad parameters are given the configuration status "invalid".



Figure 6-3 Marking of objects with invalid parameters

Invalid parameters are not stored in the database.

Editing objects

Before boxes can be edited, an object must first be enabled using the "Edit" button.

After editing has been enabled, the editing icon (✓) appears in the left-hand column in the object area.

After saving, edited boxes are grayed out again and the editing icon (✓) disappears.

If a user has enabled an object for editing, this object is locked even for administrators.

Grayed out boxes: Lack of rights or not editable

If a user does not have all the rights required to operate the system, individual configurable boxes or buttons may be grayed out in the program user interface. Detailed information about user rights can be found in the section Access rights in projects (Page 152).

6.1.2 The buttons of the CMT

The most important buttons in the CMT

After starting the CMT, all the input boxes in the program user interface are locked. Configuration is only possible and other buttons can only be selected after clicking the "Edit" button. The buttons described below can be found in most views of the CMT.

- **Edit**
Enables the objects or parameters displayed in the object or parameter area for configuration.
- **Add**
Generates a new object in the particular view.
- **Delete**
Deletes the selected object
- **Discard**
Discards all the changes made in the current view and restores the status as it was after the last save.
- **Save**
To avoid changed data being lost when you exit a view, you need to save any changes you have made.
In some views, you can only "Save & activate"; this means that the changed data is transferred to the runtime system when you save.
- **Save & activate**
Relevant for connection and project data
Before the configured data of connections takes effect in the runtime system, the relevant project must be activated. The configured data can only be transferred to the runtime system for entire projects.
If you have not yet saved the configuration data, the configuration data is saved first in the database prior to activation.

6.1.3 Menu bar

The menu bar contains the following menus:

"File" menu

Menu command	Function
Import HSP	Opens the file system to import an *.xml file.
Export TCSB certificate	Opens the file system to save a *.cer file.

Menu command	Function
Import TCSB certificate	Opens the file system to import a *.cer file.
Exit	Closes the CMT.

"View" menu

Menu command	Function
Messages	Shows the messages of the system below the parameter area.

"Options" menu

Menu command	Function
Language	Opens a drop-down list for setting the language used by the CMT.

"Help" menu

Menu command	Function
About	Shows version information of the program.
Online help	Opens the online help of the CMT.

6.1.4 Individual adaptation of the window

Adapting the view

The following options are available for adapting the program user interface:

- Changing the size of areas
By moving the dividing line between the individual areas, you can change the size of the areas in the window.
- Changing the column width in the object area *)
By moving the dividing lines in the table header with the mouse, you can change the width of the columns in the object area.
- Sorting entries in the object area
If you click on a column header, you can sort the entries in the table in ascending or descending order according to this column.
- Changing the column order
By selecting a column header and moving it while holding down the mouse button, you can move the column to the right or left.

*) This also applies the system variables in the parameter area.

6.1.5 Online help

Opening online help

You open the online help of CMT with the menu "Help" > "Online help".

6.2 Starting CMT - changing passwords

Starting the CMT

To start the CMT, click the corresponding link on the desktop.

When the CMT starts up, remember whether you are logging on to a server PC or a client PC. You will find a description of the installation options "Server PC" and "Client PC" in the section System setup and installation variants of the TCSB software (Page 36).

Logging on

After the program has started, the logon window of the CMT is displayed.

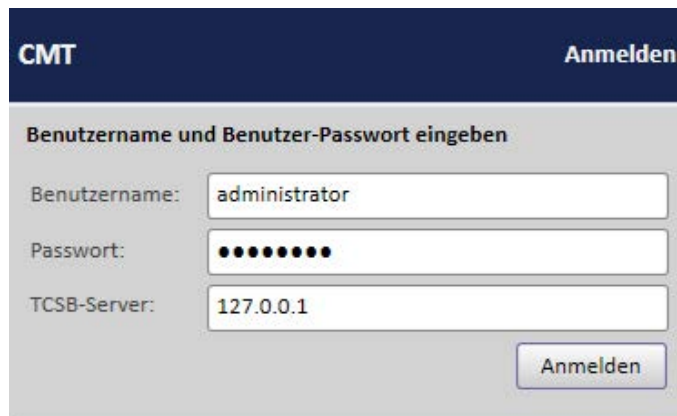


Figure 6-4 Logon window of the CMT

1. Enter a configured user name or leave the default user name.
You will find information on the first login in the next section.
2. Enter the corresponding password.
You will find information on the first login in the next section.

3. Enter the IP address or a name for the telecontrol server that can be resolved by DNS:
 - Computer name
 - or
 - IP address (the default IP address is 127.0.0.1)

If you log in to the CMT of a client PC, enter the computer name or the IP address of the server PC connected via the LAN.

4. If you log on the first time to the CMT of a client PC, you first import the certificate of the server PC, refer to the section Transferring certificates (Page 120).

With all subsequent logons, you go to the next point "Logon".

5. Click the "Logon" button.

When you log on for the first time, you need to change the password immediately. Make sure you read the notes below.

During all subsequent logons, the same window of the CMT opens.

Initial logon: User name and password

The following user data is set in the factory:

User data	Default values set in the factory
User name	administrator
Password	0000

Entering the wrong user name or password

If you enter a user name that is not configured, an error message is displayed regardless of the password entered. One or a variety of incorrect user names can be entered any number of times without the system being locked.

Note

Loss of the administrator password

Note down a newly assigned or modified administrator password and keep this in a safe place.

If only one administrator is set up, the loss of the administrator password means that no more administrator tasks can be performed.

There is no way in which the system can be reset to the factory-set administrator password.

Note**Incorrect entry of the password**

- When entering the default user name:
If you enter an incorrect password with the default user name (see above) an error message is displayed. You can attempt to enter the factory-set password any number of times to log on with the system.
If you enter an incorrect password, a lock out time begins that is extended with each attempt to logon with an incorrect password.
 - When entering a configured user name:
If you enter an incorrect password along with a configured user name, an error message is displayed.
If you enter an incorrect password, a lock out time begins that is extended with each attempt to logon with an incorrect password.
-

Formats and lengths for user names and passwords

- **User names**

Length (characters): Minimum 1, maximum 32

The following ASCII characters are permitted (digits, lowercase letters, uppercase letters, many special characters):

- 0x20 ... 0x7e
- 0x80 ... 0xff

The user name "system" is not permitted.

- **Passwords**

Length (characters): Minimum 8, maximum 32

The following ASCII characters are permitted (digits, lowercase letters, uppercase letters, many special characters):

- 0x20 ... 0x7e
- 0x80 ... 0xff

6.3 Importing HSPs

The Hardware Support Packages (HSPs) contain the software components for integrating a device with its properties in TCSB. Depending on the version of TCSB the devices are already integrated or are missing. You obtain the HSP as an *.exe file via the Internet pages of Siemens Industry Online Support or via the hotline.

The HSP import must be performed individually for each TCSB computer.

Importing HSPs

1. Start the *.exe file.
You obtain the file in .xml format.
2. Open CMT.
3. Select the file with the "File" > "Import HSP" menu command.
4. After importing perform a restart.

6.4 Transferring certificates

The certificate generated during the software installation of the first server PC is required for secure communication between all the computers of the TCSB system.

Requirements for transferring the certificate

The TCSB software must be installed on all computers involved in the transfer of certificates.

To transfer the certificate, the computers involved must be connected to the same LAN and turned on.

The certificate can only be transferred by one server PC.

The transfer of the certificate differs depending on the type of destination computer.
Destination computers can be as follows:

- Client PCs
To transfer the certificate to the client PC, you need to export the certificate using the CMT of the server PC.
- The second server PC (TCM 2) of a redundancy group.
You initiate the transfer of the certificate from server PC 1 to server PC 2 using the CMT of server PC 1.

The procedure is described in the sections that follow.

Exporting the certificate for client PCs

To transfer the certificate, you require a mobile data medium for example a USB stick.

1. Log on to the CMT of the server PC (first server PC 'TCM 1' in a redundant setup).
2. Open the "File > Export TCSB certificate" menu.

The Export wizard opens.

3. Save the certificate on the inserted USB stick and confirm the dialog.
4. Then copy the certificate from the USB stick to the file systems of all client PCs being used.

Importing the certificate into TCSB of the client PC

For the transfer, you have already copied the exported certificate from the USB stick to the file system of the client PC (see section above).

1. Start the CMT of the client PC with Windows administrator rights.
2. In the logon window of the CMT, enter the user name, the password and the IP address of the TCSB server.
3. Open the "File > Import TCSB certificate" menu.

The Import wizard opens.

4. Select the previously copied certificate in the file system of the client PC and confirm the dialog.

The certificate is imported.

5. In the logon window of the CMT, click "Logon".

Transferring the certificate to the second server PC of a redundancy group

1. Log on as TCSB administrator to the CMT of the first server PC (TCM 1).
2. Select the "TCSB system" entry in the navigation area.

The "TCM" tab opens in the object area.

3. Assign the address of TCM 1, the server PC at which you are currently logged on.
4. Assign the address of TCM 2, the second server PC of the redundancy group.
5. Click the "Save & activate" button.

If the requirements named at the beginning are met, the certificate will be transferred via the LAN from server PC 1 to server PC 2.

6.5 Projects

6.5.1 Working with projects

The project is an organizational unit

In TCSB, management of all connections to the remote stations is structured in projects. In terms of the following properties, projects form an organizational unit:

- Access rights for project editors

Several users can be created for a project. Only one user can change data within a project at any one time.

You will find the rights of users and roles in the section Access rights in projects (Page 152).

- Transfer of data to the runtime system

When project data is activated, the data of the entire project is always transferred to the runtime system.

- Project import from "SINAUT MICRO SC"

Imported data from SINAUT MICRO SC is imported into the selected TCSB project. This function is described in the section Importing connection data from projects (Page 136).

The "Projects" entry therefore comes first in the system navigation of the CMT. This is the highest organizational level of the TCSB system.

Note

Station number of stations with MD720

For stations connected via an MD720, the station number of the individual stations throughout all projects must be unique (different).

Importing projects from "SINAUT MICRO SC"

TCSB provides the option of importing data from "SINAUT MICRO SC". Prior to importing from SINAUT MICRO SC, the data does not need to be edited.

Following import, the stations of the previous MICRO SC project can be managed immediately by TCSB.

Multiproject and multi-user capability

The architecture of the TCSB system structured in independent projects means that, in particular in systems with a large number of stations, the configuration can be created at the same time in various projects and that the configuration can be performed by different editors in the various projects.

Multiple users at one time - interlock

Parallel processing is possible only if you have multiple installations of the CMT on several computers.

- **Configuration**

Simultaneous configuration of several users is only possible in different projects.

- **System monitoring**

It is possible for several people to monitor the TCSB system at the same time.

6.5.2 Creating and deleting projects

The required roles or rights for the following functions can be found in the section Access rights in projects (Page 152).

View when the "Projects" entry is selected in the navigation area

With this selection, the CMT displays the following screen:

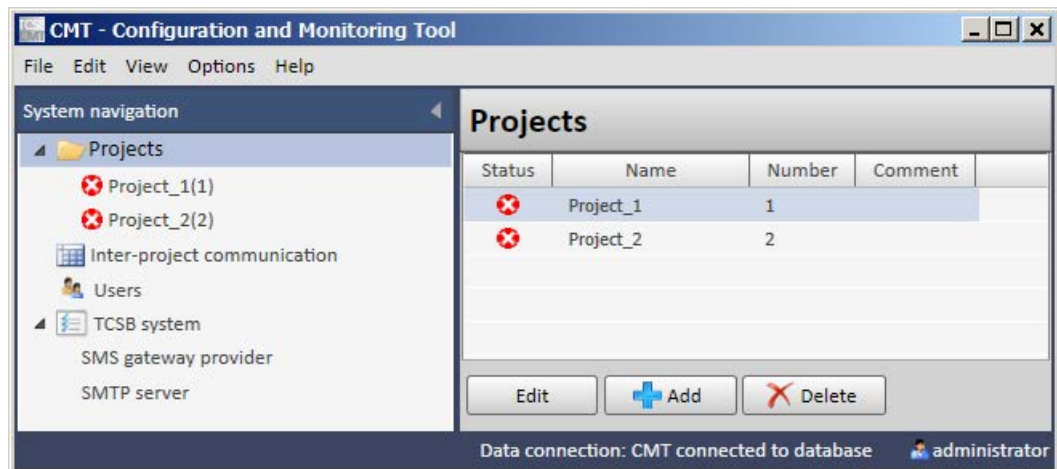


Figure 6-5 Object area when the "Projects" entry is selected in the navigation area

In the object area with the title "Projects", you will see the most important basic data of the individual projects in the form of a table.

The first project is selected automatically.

Parameters in the object area

The columns contain the following parameters:

- **Status**

Group status of the project

The status of a project is derived from the status information of the individual connections of the project. The meaning of the statuses is as follows:

Symbol	Meaning
	Connected The telecontrol server has a connection to all stations of the project whose configuration data has been transferred to the runtime system ("File" > "Activate" menu).
	Not connected At least one connection in the project is terminated. Note on temporary connections: Temporary connections display this status when there is no connection established although a connection ought to be established based on the configured monitoring time.
	Logged off The following conditions are met: • All connections of the project are temporary. • No temporary station currently has a connection to the telecontrol server (normal status).
	CPU not reachable The modem or the CP of at least one station in the project has a connection to the telecontrol server but no connection to the CPU.
	Status unknown All the connections of the selected project have an unknown status. No information about the connections has yet been reported.
- no icon -	Connections not activated All connections of the selected project have been reconfigured and have not yet been activated.

- **Name**
Name of the project
- **Number**
Unique project number assigned during the configuration of the S7-1200 CPs in STEP 7.
- **Comment**
Comments (max. 200 characters)
- **Activated connections**
Number of activated connections.

Command bar

The command bar contains the following elements:

- "Edit" button

If you click the button, the project selected in the object area is enabled for editing. In the object area, the project is open at the "Settings" tab and you can edit the basic data of the project; in other words configure. The parameters are described in the following section.

- "Add" button

Creates a new project.

- "Delete" button

Deletes the selected project.

Creating projects

Create new projects as follows:

1. Select the "Projects" entry in the navigation area.
2. Click the "Add" button in the command bar.

The new project appears in the navigation area and in the object area.

The next steps in configuration are described in the following section.

Deleting projects

Only administrators can delete projects.

- Deleting inactive projects

If the project to be deleted contains no or only new data records (the project has not yet been activated), it is deleted immediately.

- Deleting projects that have already been activated

If the project to be deleted already contains activated data records, deleting initially changes it to the "To delete" status. To delete the configuration data from the runtime system, it must then be activated. Only then is the entire delete procedure completed.

To delete a project, follow the steps outlined below:

1. Select the "Projects" entry.
2. Select the project in the object area.
3. Click the "Delete" button.
 - The project disappears if it contains no or only new data records.
In this case, deleting is completed.
 - The project changes to the "To delete" status if it was previously activated (configuration data in the runtime system).
4. Activate the project that has the "To delete" status.

The project is finally deleted.

Editing at the same time

You will find notes on the simultaneous editing of projects by multiple users in the section Working with projects (Page 122).

6.5.3 Configuring and activating projects

"Settings" tab: Configuring the basic data of a project

Select a project in the navigation panel or object area and click on the "Settings" tab. CMT displays the following screen:

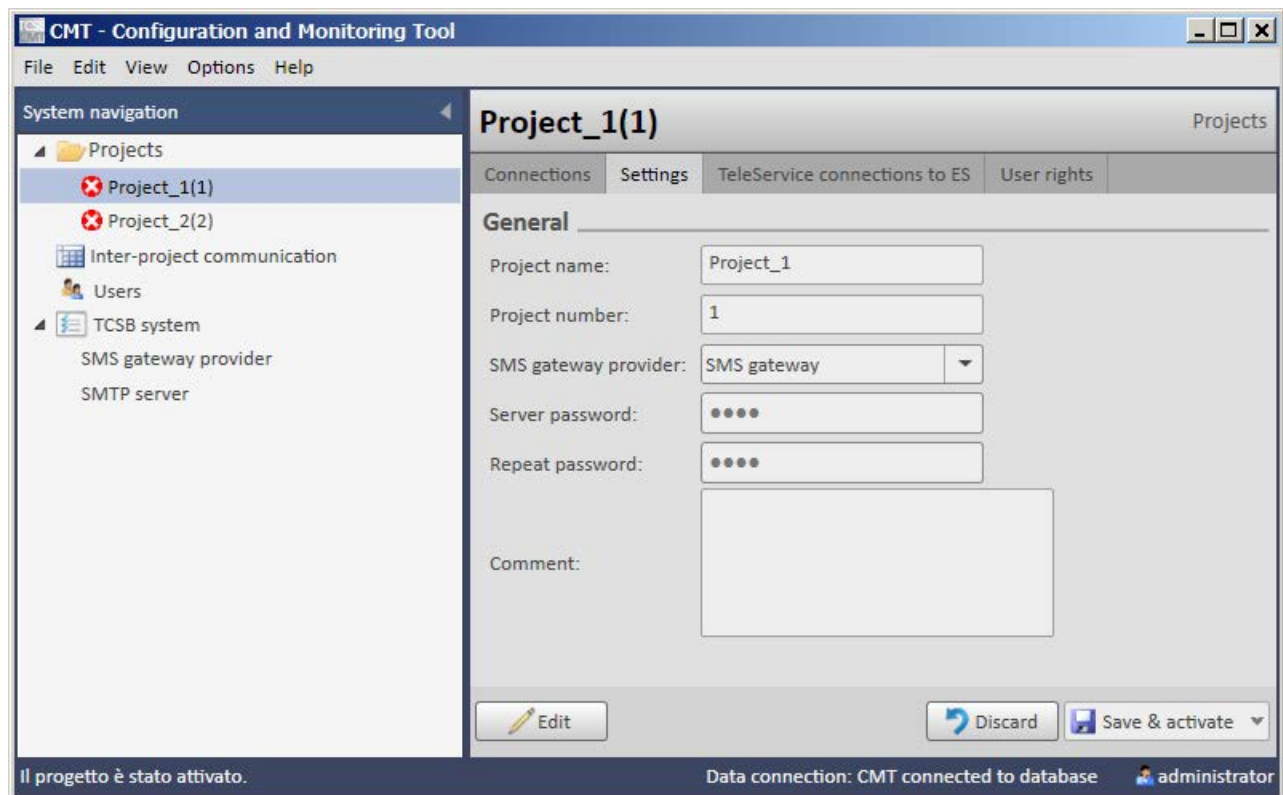


Figure 6-6 The "Settings" tab when selecting a project

Parameters of projects

The mandatory parameters "Project name" and "Project number" of the project must be completed by the administrator.

- **Project name**

Assign a project name.

The ASCII characters 0x2e (period) and 0x5b and 0x5d (square brackets) are not permitted.

The mandatory parameter is checked for consistency when it is entered.

If the entry it is inconsistent, the input box is shown with a red frame.

Note**Project names and names of the OPC items**

After changing project names, the names of the corresponding OPC items also need to be changed.

- **Project number**

Assign the project number.

The mandatory parameter is checked for consistency when it is entered.

If the entry it is inconsistent, the input box is shown with a red frame.

As long as no project number has been entered, the input box has a red frame and the configuration cannot be saved.

Note**Consistency with the STEP 7 project**

The project number assigned here must be identical to the project number of the S7-1200 CP in STEP 7 because it forms part of the address of the connections.

Check and agree the project number with the configuration engineer of the STEP 7 project.

- **SMS gateway provider**

From the drop-down list, select the SMS gateway provider via which you want to send a wake-up SMS message to the remote stations.

- **Server password**

Password for authentication of the engineering station on the telecontrol server.

With the server password, free access from engineering stations to the telecontrol server is blocked. This allows unauthorized access and potential costs due to the data volume to be prevented.

The assignment of a password is mandatory. The password is entered when a TeleService connection is requested in the "Connect" of STEP 7.

- **Comment**

Optional: If necessary, enter a comment (max. 200 characters).

Note

Saving configuration data

Following configuration, save the project otherwise the configuration data is lost.

When you save, the configuration data is saved in the database but is not transferred to the runtime system.

Activating projects

Once you have completed the configuration in the CMT, you need to transfer the modified data to the runtime system using the "Save & activate" button so that the configuration data becomes effective for the connection establishment. Configuration data can only be transferred for entire projects not for individual stations.

"Connections" and "TeleService connections to ES" tabs

For a description, refer to the section "Connections and TeleService connections (Page 129)".

"User rights" tab

Here, you assign at least one user with full access to the project. The user with full access can assign other users to the project and assign their project-specific rights. Administrators cannot be assigned.

1. To assign a user, click the "Add" button in the "User rights" tab.

The following information is also displayed:

User name	First name	Name	Phone number	Mobile phone number	E-mail	User rights
BenUtzer1	Ben	Utzer	0123456789	0123456789	ben@utzer.com	Read

2. Assign the required rights to the user using the "User rights" drop-down list.

Only an administrator can change user rights. You will find detailed information about creating users and administrators in the section Access rights in projects (Page 152).

Detailed information about the individual rights can be found in the section Users and administrators (Page 151).

6.6 Connections and TeleService connections

6.6.1 Creating and deleting connections

The required roles or rights for the following functions can be found in the section Access rights in projects (Page 152).

Editing at the same time

For information on interlocking when there are multiple editors, see section Creating and deleting projects (Page 123).

View of the user interface

Select a project in the navigation area. With this selection, the CMT displays a screen with a layout similar to the one below:

The screenshot shows the 'Project_1(1)' interface. At the top, there's a header bar with 'Project_1(1)' and 'Projects'. Below it is a table with columns: Status, Station name, Station number, Slot, Wake-up SMS, CPU status, Project data, S7 type, Connection type, SMS, and Connection mode. The table lists three stations, all with a red 'X' status icon and 'STOP' CPU status. Below the table is a toolbar with 'Edit', 'Add', 'Delete', and 'Import' buttons. To the right of the toolbar are 'Project', 'Discard', and 'Save & activate' buttons. Below the toolbar is a configuration panel for 'Station 1' with tabs: 'Configure connection', 'Process items', 'System variables', and 'Activated parameters'. The 'Configure connection' tab is active, showing fields for 'Station name', 'Station number', 'Slot', 'Telecontrol password', 'Repeat password', and 'Comment'.

Figure 6-7 Object and parameter area when a project is selected, Connections tab

Parameters in the object area

The columns contain the following parameters:

- - Column without title -

The symbols have the following meaning:

Symbol	Meaning
	The connection is released for editing.
	There is an error message for the connection.
	The maximum data volume per month was exceeded for the connection.
#DP	The data point configuration has changed.

- Status

The status of a connection shows the status of the connection between the TCSB computer and the station. There are various statuses with the following meanings:

Symbol	Meaning
	Connected The station has a connection to the telecontrol server. The CPU of the station can be reached by TCSB.
	Not connected The station has no connection to the telecontrol server. Temporary connections display this status when there is no connection established although a connection ought to be established based on the configured monitoring time.
	Logged off The station has the "temporary" connection mode and does not currently have a connection to the telecontrol server. This is a normal status.
	CPU not reachable The CP / modem has a connection to the telecontrol server but no connection to the CPU.
	Status unknown The connection has an unknown status. No status data about the connection has yet been reported.
- no icon -	Connection not activated The connection has been configured and not yet activated.

- **Station name**
Name to identify the connection
- **Station number**
A station number must be assigned for every connection.

S7-1200 / RTU: The station number must match the station number from the configuration of the device if further connections are set up in the project that are handled via a CP or an RTU.
- **Slot**
Slot of the modem or CP

- **Wake-up SMS**

The statuses that can be displayed after sending a wake-up e-mail have the following meanings:

- Transferred

The wake-up job was transferred to the TCM.

- Sent {n} seconds ago

The message was sent to the SMS gateway. The message monitoring time has been running for {n} seconds.

- Negative reply

The SMS gateway has not received the message.

- Timeout

The station could not establish a connection within the message monitoring time.

- - empty / no display -

If the station was able to establish a connection within the message monitoring time, the status in the "Wake-up SMS" column is deleted.

For more detailed information, refer to section Monitoring and time response of wake-up SMS messages (Page 170).

- **CPU status**

This function is supported as of firmware version V2 of the CPU.

The CPU status is recognized by the CP and transferred to the telecontrol server as a system variable:

- RUN

The station (CPU) can be reached.

- STOP

The station (CPU) can be reached but the modem/CP does not have a connection to the CPU (CPU in "STOP" mode).

This status is also displayed if there is no connection to the station (see connection status).

- - / no display

CPU status not obtainable / connection not activated

- **Project data**

Configuration status of the station:

- Activated

The configuration data of the connection was activated; in other words, was transferred to the runtime system. TCSB works in the productive mode with the configuration data of the connection.

- New

The configuration data of the connection was entered but not yet activated. The runtime system does not recognize the connection.

- Changed

The configuration data of a previously activated connection has been modified and saved but not yet transferred to the runtime system (not activated).

- To delete

A delete job was created for an already activated connection and this will be transferred to the runtime system the next time the project is activated.

- Inconsistent

The connection configuration is incomplete or contains invalid parameters. The data will not be stored in the database.

- **S7 type**

SIMATIC S7 family

The selection options that you will find in the drop-down list "Add" in the command bar when creating new connections result from the combination "S7 type" and "Connection type".

- **Connection type**

The communications partner (CP type / modem) and possibly the protocol used for the connection is displayed here:

Connections with MD720 and S7-1200 CPs differ from each other in the way the addresses are formed internally in the system. In the telecontrol network, no inter-station communication is possible between stations with an MD720 at one end and S7-1200 stations at the other end.

The difference in the way the address is formed means that the station name and the connection number of connections using the MD720 must be unique throughout the system.

- **Encryption**

Shows the selected encryption algorithm.

- **SMS number**

Phone number of the SIM card in the mobile wireless CP of the remote station.

- **Connection mode**
Connection mode of the CP (permanent/temporary)
- **Comment**
Comments (max. 200 characters)

Command bar

Apart from the buttons described above, the command bar includes the following elements:

- **Add**
Adds a new connection.
You select the station type for the new connection using the drop-down list. The following station types are available:
 - S7-1200 / CP 1243-1
 - S7-1200 / CP 1242-7
 - S7-1200 / CP 1242-7 GPRS V2
 - S7-1200 / CP 1243-7 LTE
 - ET 200SP / CP 1542SP-1 IRC
 - S7-200 / MD720
 - S7-200 / MD720(Secure)
 - S7-300 / MD720
 - SIMATIC RTU / RTU3010C
 - SIMATIC RTU / RTU3030C
 - SIMATIC RTU / RTU3031C
 - SIMATIC RTU / RTU3041C
- **Import**
With this button, you import connection data from a SINAUT-MICRO SC project.
- **Wake up**
The button is only available for station types that support the function "Wake-up SMS". With this button TCSB sends a wake-up SMS message to the station of the connection selected in the object area.

If the station supports the function a wake-up time (date/time of day) can be specified. The wake-up time depends on the local system time in the CMT computer. It specifies when the station establishes a connection to TCSB. The station can also be woken immediately.

The functions of the individual buttons items are described in the following sections.

Filtering connections

You have the option of filtering connections according to their status or the CPU status.

1. Click on the blue filter in the column title "Status" or "CPU status". 

A dialog box with check boxes opens.

2. Select one or more check boxes to match your requirements.

The connections are filtered according to these criteria.



Figure 6-8 Filtering connections

If no check box is selected, all connections are displayed.

Sorting connections

Click on a column header. The connections are sorted in ascending or descending order according to the criterion of this column.

Creating a connection

Create new connections as follows:

1. In the navigation area, select a project for which you want to create a new connection.
2. Click the "Add" button in the command bar and select the required connection type from the drop down list box.

The selection supports adding multiple connections to the same station types.

The assignment is necessary since communication differs in the various connection types.

3. Click "OK".

The new connection appears in the object area.

Deleting a connection

Deleting connections differs somewhat depending on whether you are deleting connections that are new and have not been activated or connections that have already been activated.

- New non activated connections

If a new connection that has not been activated is deleted, the data record is deleted in the database.

If the modified (not activated) parameter assignment of any connection is deleted or any delete job for a connection is deleted, the modified data record or the delete job is deleted.

- Already activated connections

If you want to delete an activated connection, a delete data record is first created for this connection.

The connection remains in the object area with the "To delete" ID in the "Project data" column.

The connection is only completely deleted when the project is activated.

Delete a connection as follows:

1. Select the connection you want to delete in the navigation area.
2. Click the "Delete" button.

The display of the various connections reacts as follows:

- Data records of stations with the configuration status "New" are deleted immediately from the data management.

This completes the delete procedure.

- For data records of stations with the configuration status "Activated", "Changed" or "To delete" a delete job is created.

These connections are given the "To delete" ID in the "Project data" column.

To delete the connections completely, you need to activate the project (step 3).

3. Click the "Activate" button so that the delete jobs are transferred to the runtime system.

Save

Save the changes so that the modified data is not lost when you change the view.

6.6.2 Importing connection data from projects

To import existing configuration data from SINAUT MICRO SC you require at least the "Full access" right.

You can import configuration data of an existing project created with the SINAUT MICRO SC system into an existing CMT project. The MICRO SC connection data is created when imported into the CMT as connections of the type "S7-200 / MD720".

Importing projects from SINAUT MICRO SC

When importing from MICRO SC project data, consistency of the station numbers is necessary within TCSB and not only within the individual project.

Note

Changes after importing multiple MICRO SC projects

If station number or station name conflicts need to be resolved after importing several MICRO SC projects, this also means that changes must be made in the configuration of the remote stations.

Uniqueness of the station type

The station type cannot be changed when importing. If, for example, there is an existing station equipped with a SINAUT MD720-3 modem in the MICRO SC project and this needs to be replaced with a MODEM MD720 from the block library "SINAUT MICRO SC SEC", the connection needs to be recreated in TCSB.

To import stations of a MICRO SC project into an existing CMT project, follow the steps below:

1. Create a new project in CMT.
To avoid address and naming collisions, the project should be empty prior to the import.
2. Select the project into which you want to import the MICRO SC configuration data in the navigation area.
3. Click the "Import" button in the command bar.
4. In the dialog box, select the required XML file of the MICRO SC project.
5. Click the "Open" button.

The import Wizard opens and guides you through the procedure.

If there are conflicts, for example with existing connection numbers or station names, the import will be rejected. Details are displayed in the import dialog.

Every successfully imported connection is shown in a report that can be saved.

Information in the Import dialog

- Station name
- Station number
- Slot number
- Import possible

A check mark shows that import is possible.

- Messages

If there is a conflict, the cause of the error is described.

Unconfigured or differently configured parameters in MICRO SC

The following parameters that are configured in TCSB for the connections cannot be configured in MICRO SC projects, are changed or are configured in different units. These parameters are handled as follows when importing in CMT:

- Comments

The import is rejected if a connection has a comment > 200 characters in a MICRO SC station.

- Station name

The station name is not changed.

- "Communication monitoring" parameter group

- Keepalive timeout

MICRO SC: The value of 1 minute preset in TCSB is adopted.

- Tolerance time

The value of 1 minute preset in TCSB is adopted.

- "Cyclic data exchange" parameter group

- Cycle time

The value configured in MICRO SC is converted as follows in TCSB:

A configured value ≤ 60 seconds becomes 1 minute in TCSB.

A configured value ≥ 86400 seconds becomes 1440 minutes in TCSB (corresponds to 24 hours).

A configured value ≥ 60 and ≤ 86400 seconds is divided by 60 in TCSB. The calculated value in minutes is rounded to the next minute value configurable in TCSB from the following range of values:

1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 18, 20, 24, 30, 32, 36, 40, 45, 48, 60, 72, 80, 90, 96, 120, 144, 160, 180, 240, 288, 360, 480, 720, 1440

(Example: A value of 440 seconds configured in MICRO SC becomes 8 minutes in TCSB.)

- Start time

The start time that cannot be configured in MICRO SC is set to 00:00 during import.

You will find the parameters listed above along with their defaults and units in the section Configuring connections (Page 139).

Saving and activating

1. Save the changes so that the modified data is not lost when you change the view.
2. Activate the project to transfer the data to the runtime system.

6.6.3 Configuring connections

The required roles or rights for the following functions can be found in the section Access rights in projects (Page 152).

Configuring a connection

If you select a connection in the object area and the "Connections" tab is selected in the object area, various parameter groups will be displayed for this connection in the parameter area. The number of parameter groups and parameters may be different for different connection types.

Duplicating connections

To duplicate an already configured connection, select the connection from the list and click the entry "Duplicate" in the shortcut menu.

"General" parameter group

- **Station name**

Name to identify the connection

The ASCII characters 0x2e (period) and 0x5b and 0x5d (square brackets) are not permitted.

Note

Connection names and names of the OPC items

Keep connection names as short as possible if you connect an OPC client to TCSB. After changing connection names, the names of the corresponding OPC items must also be changed.

- For connections with an MD720, the Station name must be unique among all connections of TCSB.
A station name that has already been assigned for a MD720 connection can no longer be used for a CP or RTU connection.
- For connections with a CP or an RTU, the Station name must be unique within a project only in combination with the slot number.
The station name of the connection with a CP or an RTU cannot be used for a connection with an MD720 within this project.
- Within a project, the combination of station name and slot number must always be unique.
The project name and slot number are included in the addressing.

- **Station number**

Number of the connection

Range of values: 1...8000 (throughout the entire TCSB system)

- For connections with an MD720, the station number must be unique in all projects and among all connections of TCSB for each individual connection.
The station number in TCSB corresponds to the consecutive number of the block parameter "MODEM_NAME" of the WDC_INIT program block.
- For connections with a CP or an RTU, the station number must be different for each RTU and each CP within a project.

A station number that has already been assigned for an MD720 connection can no longer be used for a connection with a CP or an RTU.

A station number that has already been assigned for a CP or RTU connection can no longer be assigned to an MD720 connection within this project.

- **Slot**

Selecting the slot

- For connections with CP, the slot number of the CP from the STEP 7 configuration must be entered.
- For connections with an MD720 or an RTU zero (0) is assigned by the system.

- **Telecontrol password**

Password for authentication of the CP on the telecontrol server. The password is configured for the CP in STEP 7.

The telecontrol password does not need to be different for every connection. All the connections of the project can have the same password.

However, refer also to the information in the section Overview of the passwords - system protection and authentication (Page 106).

- **SMS number / alias**

Phone number or alias of the SIM card in the mobile wireless CP of the remote station or in the RTU303xC.

A wake-up SMS message is sent to the CP to establish a connection to the telecontrol server. Receipt of wake-up SMS messages followed by connection establishment is supported only by stations with a CP 1242-7 and the RTU303xC.

- **Comment**

Optional: If necessary, enter a comment (max. 200 characters). The comment has no effect on the runtime system.

Note

Moving an existing connection to an existing station

If you have created a connection and want to move this to a free slot of another existing station by changing the station number and station name, this is prevented by CMT. You need to create a new connection.

The connections of an S7 station on different slots are treated in CMT as a unit. An individual connection cannot be assigned to a different S7 station later.

"Encryption" parameter group

Here set the encryption for the transport protocol.

- **None or HC-128:** With this selection it does not matter with which encryption the station logs on, the server accepts the connection.
- **HC-128** The server only accepts HC-128 encrypted connections.

Encryption for RTU

The RTU is the only station for which the encryption can be adapted. If the RTU is connected to TCSB via OpenVPN, select "None or HC-128".

"Connection mode" parameter group

Depending on the station the following connection mode is supported:

- **Permanent**

Continuous connection between the remote station and the telecontrol server.

Once the connection has been established, it should remain permanently established. If the connection is interrupted, the remote station automatically attempts to re-establish the connection.

- **Temporary**

The connection is only established when required to send data. The connection is terminated again if the transmission of the frames was successful. This connection type is ideal for stations that only send data occasionally.

"Communication monitoring" parameter group

Connection monitoring

With the connection monitoring, the connections can be monitored in the system:

- **Keepalive timeout**

With the CP 1242-7, the corresponding parameter is called "Watchdog monitoring time".

The keepalive timeout (monitoring time) configured in CMT is transferred from TCSB to the CP after the connection is established the first time. The connection monitoring time configured on the CP is overwritten by the value of the keepalive timeout.

When sending a message to TCSB, the CP or the MD720 starts the monitoring time. If the CP or the MD720 do not receive a reply from TCSB within the monitoring time, they send a ping packet to TCSB:

If there is no communication with the station, TCSB expects a ping or renewed data communication from the station within this monitoring time plus the tolerance time (see below). No status or process data is transferred with a ping.

In SINAUT MICRO SC, the Keepalive timeout cannot not be configured and is always set to 15 minutes.

- If the telecontrol server replies to the ping within the monitoring time, TCSB is classed as being reachable.
- If the telecontrol server does not reply to the ping within the monitoring time, TCSB is classed as being unreachable.

With temporary connections, the connection monitoring is used for connection termination. If the keepalive monitoring time and the tolerance time for temporary connections elapse twice without data being transferred, the connection is terminated.

The default keepalive timeout is 15 minutes.

- **Tolerance time**

If TCSB has not received a message from the station when the keepalive monitoring time plus the tolerance time have elapsed, the station is classed as unreachable (status symbol "Not connected").

The tolerance time is used to take into account transfer times via the mobile wireless network.

Depending on the network load and the size of the TCSB system, messages may be delayed. To prevent the connection being prematurely classed as aborted by the station, a suitable tolerance time can and should be set. The default setting in CMT is 1 minute.

"Cyclic services" parameter group

- **Cycle time:**

The following cyclic services to be configured are worked through in the cycle configured here. With the RTU make sure that the settings you make here in the CMT are consistent with the configuration of the RTU.

The default cycle time is 360 minutes.

- **Start time:**

The time of day for the start of cyclic data exchange between the station and telecontrol server is configured with start time.

The default start time is 00:00 h.

- **Message monitoring time:**

With the message monitoring time, you configure the interval at which TCSB expects connection establishment by the station. This relates to the connection establishment of temporary stations after sending a wake-up SMS message. If there is no connection establishment during this time, the station is classed as unreachable.

Please note: Depending on the network load, the transfer of the SMS message can be considerably delayed.

The message monitoring time is set to 1 minute as default.

Cyclic services

The cyclic services that can be enabled depend on the CP type / modem.

- **Cyclic exchange of process data**

If the option is enabled, TCSB reads the data from the station and writes the data to the station for which items were registered by OPC clients.

The start of cyclic data exchange is initiated by the telecontrol server.

If the station is unreachable, write/read jobs of the OPC client are acknowledged negatively by the OPC server of TCSB.

Due to the cyclic data exchange, no request for connection establishment is triggered if a connection aborts.

Note

Data loss with a CP 1242-7

With the CP 1242-7 with cyclic data exchange enabled, remember the risk of data loss with certain OPC clients, refer to the manual, section "Process data access by TCSB and data management in the stations".

- **Status data and time-of-day synchronization**

If the option is enabled, TCSB queries the status data of the CP and sends a time-of-day message to the station. With the time of day, the CP can set its time of day.

The telecontrol server transfers the time of day in UTC format.

- **Send wake-up message if no connection is established.**

If the option is enabled, TCSB sends a wake-up SMS message to a CP 1242-7 with a temporary connection to an RTU303xC if there is no connection established. Connection establishment triggers the transfer of the process data.

"Monitoring of the transferred data volume" parameter group

For the following stations you make the setting for monitoring the data volume per connection: CP 1247 GPRS V2, CP 1243-x, RTU303xC

- **Monthly data volume**

Enter the data volume that should not be exceeded per month.

The default monthly data volume is 10 MB.

- **Monitoring value 1 (notice)**

If the percentage of the monthly data volume entered here is exceeded this appears as a notice in the System variables (Page 146) tab.

Monitoring value 1 has a default setting of 80%.

- **Monitoring value 2 (warning)**

If the percentage of the monthly data volume entered here is exceeded this appears as a warning in the System variables (Page 146) tab.

Monitoring value 2 has a default setting of 90%.

"Process items", "System variables" and "Activated parameters" tabs

For a description of the functions, refer to the section "Process items", "System variables", "Activated parameters" (Page 146).

6.6.4 Sending a wake-up SMS message

Sending a wake-up SMS message (CP 1242-7, RTU303xC)

Regardless of the connection mode of the CP or the RTU, you can send a wake-up SMS message. If an active connection already exists, a new connection establishment is not necessary.

If a temporary connection is currently terminated or if a connection is interrupted, you can send a wake-up SMS message with the request for connection establishment to the station as follows:

1. Select a connection in the navigation area.
With <Ctrl>, you can select several connections.
2. Click to the "Send wake-up message" button in the command bar.

Note

The time at which the wake-up SMS message will be sent to the station cannot be predicted precisely and depends on the current network load. Due to special events, an SMS message can take a long time to arrive. Take this into account when you send the wake-up SMS message.

See also section Monitoring and time response of wake-up SMS messages (Page 170).

6.6.5 "Process items", "System variables", "Activated parameters"

"Process items" tab

Configuring archiving and buffering of process data

In this tab, you configure the archiving function for items (HistoryRead) and the data buffer function.

With connections to stations with data point configuration, all process items of the station are displayed. This is only possible when the connection has already been established at least once. If you want to archive values of certain process items, select the check box for these items in the "Archive" column.

Enable the connection using the "Edit" button and insert the items you intend for archiving in the list using the "Add new item" button.

In large systems, remember that archiving takes up memory and reduces the overall configuration limits.

If you intend the values of certain process items for the data buffer, select the check box for these items in the "Data buffer" column.

Note**Data loss**

Even if you have selected process items for the data buffer, loss of process data is possible. For this reason in "TCSB system" in the "OPC" tab enter one or two leading OPC UA clients whose process data must not be lost under any circumstances.

"System variables" tab

This tab shows all system variables of the selected connection with current values.

You will find detailed information on the individual system variables in the diagnostics data in the section System variables (Page 169).

"Activated parameters" tab

The "Activated parameters" tab allows you to check changes to the configuration of connections. Here, you can compare activated data that has already been transferred to the runtime system with the currently displayed data.

If the comparison reveals that you have changed too many or the wrong parameters in the modified data record, you can enter the already activated data in the changed data record again. Remember, however, that all the parameters are adopted so you will need to make all the required modifications again.

See also

"Data buffer" tab (Page 163)

6.6.6 TeleService connections

TeleService for mobile wireless CPs

With remote stations that communicate via a mobile wireless CP, it is possible to connect to the station from the engineering station (ES) via the telecontrol server and to configure or run diagnostics.

The TeleService functions for the S7-1200 with a mobile wireless CP are described in the manual of the CP (refer to the references) and in the online help of STEP 7.

When project is created, 5 TeleService access points are created. This allows up to 5 TeleService subscribers from 5 different engineering stations (with the STEP 7 project) to

access five different stations of the TCSB project at the same time. A CP can only establish one TeleService connection at any one time.

Without the use of load functions, one access point is occupied per TeleService session. If you load data from the CP to the ES (load from device), a second access point is occupied.

Notes on configuration and connections

In STEP 7, up to two TeleService servers can be configured per CP.

In redundant installations of TCSB, the two TeleService servers that were configured for the CP in STEP 7 have their counterparts in the two servers TCM1 and TCM2. There is a fixed assignment of TeleService connections:

- 1. TeleService server (in the CP configuration) always relates to the connection to TCM1.

The text of the wake-up SMS message sent by TCM1 is:

TELESERVICE

or with redundant systems:

TELESERVICE 1

The CP establishes the connection to the TCM1 server.

- 2. TeleService server (in the CP configuration) always relates to the connection to TCM2.

The text of the wake-up SMS message sent by TCM2 is:

TELESERVICE 2

The CP establishes the connection to the TCM2 server.

View of the TeleService access points

1. Select a project in the navigation area.
2. Select the "TeleService connections to ES" tab in the object area.

With this selection, the CMT displays the following screen:

The "TeleService connections to ES" tab shows the data of the TeleService connections in the form of a table:

- **Status**

Status of the availability of the TeleService access point:

- ?

The status of the TeleService access point is unknown. After starting TCSB no connection has yet been created. The system items have not yet been created.

- Connected

TeleService is currently active via this access point. The access ID of the TeleService subscriber is displayed.

- Logged off

The TeleService connection was disconnected. The access point is not in use and can be used for a TeleService connection.

- **Number**

Consecutive number of the TeleService access point

6.7 Configuring inter-station communication

Inter-station communication

In inter-station communication, two stations exchange data with each other. Which data is transferred is configured in the particular station.

Inter-station communication between two stations is always via the telecontrol server that serves as an intermediary.

Within a project, the inter-station communication between stations is possible without it needing to be enabled.

Inter-station communication between stations in different projects is blocked in the basic setting. This must be enabled by an administrator (see below). This ensures that inter-project data exchange can only be enabled by the administrator and the person responsible for the project.

Options for inter-station communication

For inter-station communication, three groups of station types are available. Inter-station communication is possible only between two station types that are both in the same group:

- Group 1
 - S7-1200 / CP 1242-7
- Group 2
 - S7-1200 / CP 1242-7 GPRS V2
 - S7-1200 / CP 1243-1
 - S7-1200 / CP 1243-7 LTE
 - ET 200 / CP 1542SP-1 IRC
- Group 3
 - S7-200 / MD720
 - S7-300 / MD720

Inter-station communication between two station types in different groups is not possible.

Lists for configuring inter-station communication between projects

Select the "Inter-station communication" entry in the navigation area.

The following lists are displayed in the parameter area for project selected in the object area:

- Left: "Available projects" list
Projects with which inter-station communication is possible.
- Right: "Inter-station communication with" list
Projects with which inter-station communication is enabled for the project selected in the object area.



Figure 6-9 Dialog box for configuring "inter-station communication"

The configuration always produces project pairs for which inter-station communication is valid in both directions. The result is stored in the database.

When you select a new project, the new project reads the inter-station relationships from the database.

Creating inter-station communication between projects

Follow the steps below to enable inter-station communication between projects:

1. Select the "Inter-station communication" entry in the navigation area.
2. Select a project "A" in the object area.

In terms of inter-station communication, the projects listed in the parameter area relate to the project "A" selected at the top in the object area.

3. In the "Available projects" list, select a project in order to specify the partner projects with which inter-station communication will be possible.
4. In the "Inter-station communication with" list, click on the partner projects with which the project selected on the left can use inter-station communication.
5. Save the changes.

Canceling inter-station communication between projects

Remove projects to which inter-station communication needs to be canceled by selecting a project in the "Available projects" list and deactivating the activated projects in the "Inter-station communication with" list on the right.

6.8 Users and administrators

The "Administrator" and "User" roles

Under the "Users" entry in the navigation pane, the "User" and "Administrator" roles are created, configured, modified or deleted. To create users and administrators, you must have the "Administrator" role.

At least 1 administrator must be created, multiple administrators can also be set up. An administrator has the right to access all functions. The administrator has technical responsibility for the system. The individual rights and how to enable them for certain user groups can be found in the section Access rights in projects (Page 152).

Only an administrator can set up the TCSB system.

User data and user rights are relevant only for the CMT. These data records have no configuration status and are immediately valid as soon as they are saved in the database.

As an administrator, select the "Users" entry in the navigation area. When you select this, the CMT shows all the entered administrators and users and their essential parameters.

Creating administrators or users

When creating new administrators or users, select the required role from the drop-down list and click the "Add" button.

"General" parameter group

The following data needs to be completed by the administrator for all users and administrators:

- **User name**

User name of an administrator or user. The user name must be unique throughout the system.

Note

User name cannot be changed

After creating a user, the user name can no longer be modified.

If a user name needs to be changed, the administrator must delete the user and create a new user.

- **Password**

The password assigned by the administrator can be changed later by the relevant user.

Note

IMPORTANT: Assignment and loss of the administrator password

You will find important notes on assigning, modifying and loss of the administrator password in the section Starting CMT - changing passwords (Page 117).

The first name and name can be filled out by the user.

"Contact information" parameter group

The following contact information is optional and can be entered and modified by the administrator or by users themselves:

E-mail address, phone number, mobile phone number, address

Deleting administrators or users

Only an administrator can delete administrators or users.

If you delete an administrator or a user and the entry of the user disappears, you still need to click the "Save & activate" button so that the delete procedure is completed.

6.9 Access rights in projects

Assigning rights for individual projects

Several users with different rights can be assigned to a project.

These rights are assigned during configuration of the individual projects as described in the section Configuring and activating projects (Page 126).

Only an administrator can assign rights.

You assign rights to users in each individual project.

Functions of the user rights

One of the following user rights can be assigned to a user within a project.

Meaning of the symbols for the functions:

- X = function supported
- - = Function not supported
- ¹⁾, ²⁾: See table footnote

Table 6- 1 Access rights of users

Function	User right			
	Full access	Change	Wake up	Read
Viewing a project	¹⁾	¹⁾	¹⁾	¹⁾
Changing project settings	X	-	-	-
Creating/deleting a project				
Wake up	X	X	X	- ²⁾
Changing connection parameters (not connection name, connection number or slot number)	X	X	-	-
Creating/deleting/activating a connection	X	-	-	-
Assigning SMS gateway provider	X	-	-	-
Importing SINAUT MICRO SC projects	X	-	-	-
Creating, changing, deleting users	X	- ³⁾	- ³⁾	- ³⁾

¹⁾ Only projects for which the user is entered are visible. Users are visible for these projects.

²⁾ Wake up via the CMT is not possible. Wake up via the Web server is possible.

³⁾ Only administrators are visible.

Assigning users and rights

Follow the steps below to assign rights to a user for a project:

1. Select the required project for which the user will be responsible in the navigation area.
2. Go to the "User rights" tab in the object area.

6.10 TCSB system

3. Select an existing user from the drop-down list of the "Add" button.
4. In the object area, select the right you want to assign to the user from the "User rights" drop-down list.

Deleting user assignment

To cancel the assignment of the user to a project, select the user in the object area and click the "Remove" button in the command bar.

6.10 TCSB system

Note

Same user properties on PCs for OPC server and OPC client

If you want to access the OPC server of TCSB from a remote OPC client and both computers are in Windows workgroups mode, you will need to set up the same Windows user with the same Windows user name and the same password in the same workgroup. You will find further information on setting up OPC communication on a Windows computer in the manual "Commissioning PC Stations".

Selection of the navigation entry "TCSB system"

Under this entry, you will find the parameters to make settings for the following system components:

- TCM
- Database
- OPC
- Data buffer

Only administrators can make the settings for the system. The settings made apply to all projects and connections.

If you expand the "TCSB system" entry, the following further entries will be visible and these are described in the following sections:

- SMS gateway provider
- SMTP server
- System overview

See also

Changing the port, network and DCOM settings (Page 43)

Security recommendations (Page 33)

Exporting and importing a database backup copy (Page 46)

6.10.1 "TCM" tab**TCSB system, "TCM" tab****"General" box**

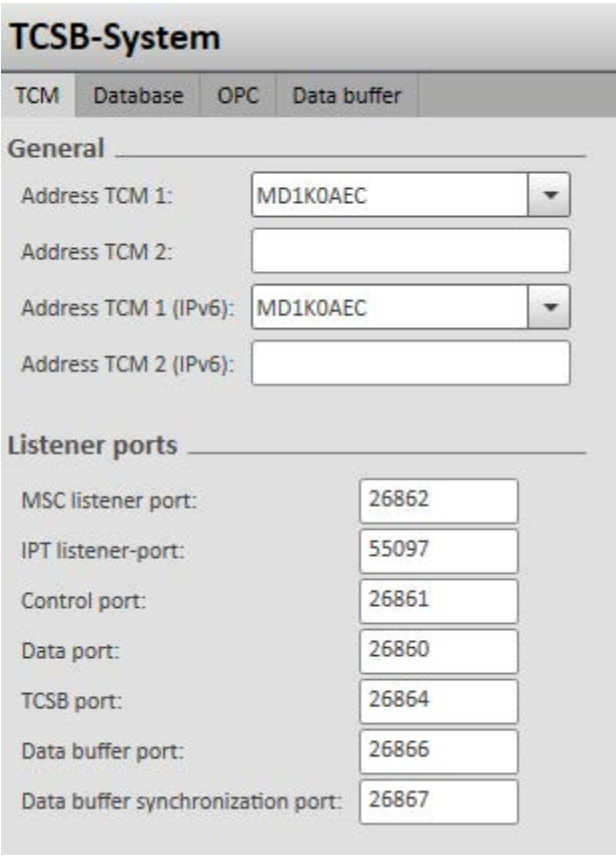
Here, you configure the address data of the telecontrol server either in a single or redundant system.

In a single system, you configure only TCM 1.

In a redundant configuration, the following assignment applies:

- TCM 1 becomes server PC 1.
- TCM 2 becomes server PC 2.

If you have a redundant configuration, always configure the first server PC (TCM 1) first.



TCSB-System

TCM Database OPC Data buffer

General

Address TCM 1: MD1K0AEC

Address TCM 2:

Address TCM 1 (IPv6): MD1K0AEC

Address TCM 2 (IPv6):

Listener ports

MSC listener port: 26862

IPT listener-port: 55097

Control port: 26861

Data port: 26860

TCSB port: 26864

Data buffer port: 26866

Data buffer synchronization port: 26867

Figure 6-10 The "TCSB system" > "TCM" dialog

Here, the IP address and the ports of the telecontrol server are configured.

The configuration of an IPv4 address is mandatory. IPv4 addresses are given preference by TCSB. The configuration of an IPv6 address is necessary if stations that use the IPv6 standard are connected to TCSB.

As default the computer name of the relevant PC is entered in the input box of the IPv6 address of TCM 1.

Depending on the configuration - redundant or non-redundant, with or without client PCs - configure the IP address of the telecontrol server as follows:

- **Address TCM1**

Configurations without client PC:

Enter the following in the "Address TCM 1" input box:

- The displayed computer name
- The computer name that can be resolved by DNS
- The actual IP address of the computer

Configuration with client PC:

- Entering the address at the server PC

On the computer of the server PC, as described above, here enter the address (IP address or computer name) of the server PC.

- Entering the address at the client PC

If the client PC is connected to the same LAN as the server PC in a non-redundant setup, here enter the address (IP address or computer name) of the server PC.

If the client PC is connected to the same LAN as the server PCs with a redundant system set up, here enter the virtual IP address of the server PCs generated by NLB.

If the client PC is connected to the telecontrol server via the Internet, here enter the public IP address of the SCALANCE M in the master station.

- **Address TCM2**

Only if you want to set up a redundant installation, enter the IP address of the second server PC (TCM 2) in the "TCM 2 address" input box of both server PCs.

After entering an address for TCM 2, the redundancy group is prepared. If both computers of the redundancy group are connected to the same LAN and turned on, after entering the address of TCM 2, when the "Save & activate" button is clicked, the certificate is transferred via the LAN from the computer TCM 1 to the computer TCM 2.

If redundancy is used, IPv4 addresses must be configured for both computers (TCM 1 / TCM 2). If IPv6 is enabled on the network adapters the IPv6 addresses must also be configured for both computers (TCM 1 / TCM 2).

Note

Consistency with the STEP 7 project or block configuration

The address data to be configured here is also configured in the STEP 7 project (CP) or in the program blocks (MD720).

In addition to the addresses in IPv4 format, you can also specify the addresses in IPv6 format.

"Listener ports" box

If necessary, you can change the default numbers of listener ports of the system here.

Note

Port numbers used

If you change port numbers, note the information in the section Changing the port, network and DCOM settings (Page 43).

- **MSC listener port**

Listener port for stations of the type S7-200 and S7-300

The port must be opened for communication with remote stations of the type S7-200 with MD720.

Default port number: 26862

- **ITP listener port**

Listener port for stations of the type S7-1200

The port must be opened for communication with the engineering station and with remote stations of the type S7-1200.

Default port number: 55097

- **Control port**

The port must be opened in redundant systems for the transfer of system data by the two telecontrol managers.

Default port number: 26861

- **Data port**

The port must be opened in redundant systems for the transfer of process data (process items) by the two telecontrol managers.

Default port number: 26860

- **TCSB port**

The port must be open for communication between the TCM and the CMT and the internal OPC server.

Default port number: 26864

- **Data buffer port**

The port must be open for communication between the internal OPC server and the data buffer.

Default port number: 26866

- **Data buffer synchronization port**

The port must be open in redundant systems to allow synchronization between the data buffers. Via this port during startup and at runtime data storage on the hard disk is synchronized.

Default port number: 26867

Note

After changing and saving the port numbers, a restart is necessary for the changes to take effect.

6.10.2 "Database" tab

TCSB system, "Database" tab

- **Authorized phone number**

Here, enter the string of numbers of the phone number that authorizes the telecontrol server to establish a connection with the CP 1242-7 or the RTU303xC.

This number configured for the CP or RTU is transferred to the CP with the wake-up SMS message.

The phone number entered here must be configured in the STEP 7 project of the CPs in the list of phone numbers under the "Authorized phone number" parameter.

With the RTU, the phone number and the wake-up right are configured in the "User" parameter group.

Note

Permitted character set

Keep to the permitted ASCII character set for the parameter: 0x20...0x7e and 0x80...0xff.

The hash '#' (0x23) must not be used.

- **Regular backup**

For archiving purposes or if you want to transfer the configuration to another computer, you can use this function to make regular copies of the entire database.

Select the interval at which backup copies of the database will be created.

The backup copies are saved as *.bak files in the following directory:

C:\Program Files (x86)\Siemens\TCSB-SQLServer\Microsoft SQL Server
MSSQL12.TCSB\MSSQL\Backup

Backup copies are always created at 00:00h.

So as not to reduce the storage capacity of your hard disk too much, if you have short backup intervals, you should delete older backup copies from time to time or move them to a different data storage medium.

In addition to this in the "Max. number of backup copies" box, you can enter the maximum number of backup copies of the database that can be stored in the directory. When the maximum number is reached, the oldest backup copy is deleted before a new one is created.

TCSB restart:

When TCSB is restarted, the counter for the time of creation of the backup copies is reset and the period is counted starting from the time of the restart. This changes the time at which the backup copies are made. If you have configured the creation of backup copies and restart the TCSB computer, the backup copies will be created at the configured intervals again starting from the day of the restart.

- **Export /import of a backup copy (*.bak file)**

You will find detailed information on exporting/importing a backup copy in the section Exporting and importing a database backup copy (Page 46).

6.10.3 "OPC" tab

TCSB system, "OPC" tab

OPC DCOM

Decide whether the DCOM interface of the integrated OPC server should be activated or deactivated for receiving process values. It is recommended that you deactivate the OPC DA interface to prevent the transfer of non-secure OPC DA data.

Behavior when installing new and upgrading

When TCSB is newly installed, the DCOM interface is automatically deactivated. Since the OPC client still attempts to access the OPC server via the DCOM interface, an error message appears within the SIMATIC OPC server. Following an upgrade the DCOM interface is not deactivated and no error message appears.

OPC UA

- No transfer on change of
Select which events should lead to transfer of the values to the OPC UA interface:
 - Value or quality: There is a transfer as soon as the value or quality changes.
 - Value, quality or time stamp: There is a transfer even if the value and quality have not changed, but only their time stamp.
- IP address of the server URL
Select the hostname or virtual IP address that will be used to transfer the data.
If "IP address" is selected, the virtual IP address is entered automatically.
- Port of the server URL
Enter the port via which the data is to be transferred.

Security policy OPC UA

If you enable several options, then depending on the settings on the communications partner (client), the server selects the profile with the the highest possible security.

Here you specify the security profiles and access options for the OPC UA server.

- No security profile
Enabled: The security profile "None" is used.
- Basic128Rsa15 - sign
This corresponds to the security profile "Basic128Rsa15" of the OPC UA specification.
- Basic128Rsa15 - sign and encrypt
This corresponds to the security profile "Basic128Rsa15" of the OPC UA specification.
- Basic256 - sign
This corresponds to the security profile "Basic256" of the OPC UA specification.
- Basic256 - sign and encrypt
This corresponds to the security profile "Basic256" of the OPC UA specification.

- Basic256Sha256 - sign

This corresponds to the security profile "Basic256Sha256" of the OPC UA specification.

- Basic256Sha256 - sign and encrypt

This corresponds to the security profile "Basic256Sha256" of the OPC UA specification.

User rights with OPC UA access

If you use the access option "sign" or "sign and encrypt", depending on the assigned role, the following access rights result in TCSB:

- Administrator: May access all projects via OPC UA: Read/write/monitor/browse
- User: May access the projects assigned to him/her via OPC UA regardless of the rights assigned to him/her for this project in TCSB: Read/write/monitor
The user can also browse in all projects without restrictions.

Anonymous access

- Select whether or not anonymous access to the OPC UA server is permitted. If the function is enabled the anonymous user has read and write access to the data of the OPC UA server without logging on with a user name and password.

OPC UA certificates

When TCSB is installed, the OPC UA certificate "OPC.SimaticNET.TCSB" is automatically installed. The certificate is displayed in the "Issued by" box. In the "DNS name" box the DNS name of the computer at the time the certificate was created is displayed. With the shortcut menu you can accept, reject or delete the certificate. With the "Show details" entry you can obtain further information such as the date of validity of the certificate.

Updating the certificate after changing the computer name

If you change the computer name, you do not need to reinstall TCSB. Follow the steps below to obtain an up-to-date certificate:

1. Right-click on the certificate.
2. Select the "Delete" entry.
3. Close CMT.
4. Change the computer name.
5. Restart the computer.
6. Open CMT > "TCSB system", "OPC" tab again.

The certificate is displayed with the current computer name.

Note

Accepting certificates with new OPC UA clients

If an OPC UA client establishes a connection to the TCSB server, all certificates are automatically rejected. You first need to release new OPC UA clients with the entry "Accept certificate" in the shortcut menu before you can access the data.

See also

"Process items", "System variables", "Activated parameters" (Page 146)

6.10.4 "Data buffer" tab

Note**Notes on the data buffer**

- The data buffer is only available for input data points.
 - Access to buffered data points via OPC DCOM is not possible.
-

Function

In the data buffer the process data selected in the "Process items" tab, see section "Process items", "System variables", "Activated parameters" (Page 146), are saved temporarily on the hard disk and forwarded to the server. If there is a brief interruption on the connection between the OPC UA client and the TCSB OPC UA server, the data remains available in the data buffer. Even with OPC UA clients that do not support the "HistoryRead" function, there is no loss of data even when a large amount of data is received by the station all at once.

Note**Querying the current value with data buffering**

If the OPC UA client is to read out the current value instead of the values from the data buffer, in the station create two data points that receive the same values. One data point is then used for the data buffer the other supplies the current value directly.

Leading OPC UA clients

Specify one or two "leading OPC UA clients" for which the process data will be buffered. The values are deleted from the data buffer only after the leading OPC UA clients have read out the values from the OPC server. Non leading clients can also access the values in the data buffer. The values are, however, then not deleted from the data buffer. If no leading clients are set, there is no guarantee that no data is lost for any client.

In some cases, the values can be transferred again, e.g. when a new client is added or the computer is rebooted. The values are then not deleted from the data buffer because not all leading clients have read out the values.

TCSB system, "Data buffer" tab

Enter the URI of the OPC UA client. Example:
Computername:Siemens.Automation.WinCC.UA.Client

6.11 SMS gateway provider

You will find the URI of the OPC UA client, for example in the details of the OPC UA certificate:

1. Navigate to the "TCSB system > OPC" menu.
2. In "OPC UA certificate" select the required certificate and open the selection "Show details" by right clicking.
3. Open the "Details" tab.

The URI is displayed in the "Subject Alternative Name" box.

Save files in

Enter the directory in which the files will be saved on the hard disk.

Maximum file size

Using the slide control set the size per connection that files in the data buffer may have in total. This is specified in MB.

In addition to this you can also see the total file size in MB for the activated connections with process items to be buffered.

6.11 SMS gateway provider

Only an administrator can setup and configure SMS gateway providers.

Function

The SMS gateway provider forwards a wake-up SMS message to the remote stations. The sequence of transmission is as follows:

1. The telecontrol server sends an e-mail.
2. The e-mail is sent to an SMS gateway via an SMTP server.
3. The SMS gateway converts the e-mail into an SMS message and transfers this to the station.

View

Select the "SMS gateway provider" entry in the navigation area.

Name	Address
Vodafone	<SMS-NO>@vodafone-sms.de
E-Plus	<SMS-NO>@smsmail.eplus.de
O2	<SMS-NO>@o2online.de
SMS gateway	sms@gateway.com

Configure SMS gateway provider **SMS gateway** Configure SMS gateway provider ▼

General

Name: Placeholder: <SMS-NO> <MSG>
 Address:
 Re:
 Text:

Figure 6-11 Dialog box for configuring an SMS gateway provider

The names and e-mail addresses of the SMS gateway providers that have already been created are displayed in the object area.

The data of the provider selected above is configured in the parameter area.

Identification: Authorized phone number

To allow the CP 1242-7 or the RTU303xC to identify the telecontrol server as the sender of the wake-up SMS message, a computer ID is transferred in the e-mail. This ID must be configured in the system settings as an "authorized phone number" before the sender of the SMS will be accepted by the CP. The "authorized phone number" is configured in the system settings, refer to the section TCSB system (Page 154).

Configuring the parameters of the SMS gateway provider

Note

Parameters and placeholders

Remember that the SMS gateway providers have different requirements for the parameters of the e-mail. You will find examples in appendix Examples of the configuration data of SMS gateway providers (Page 179). There, you will also find the significance of the following placeholders:

- <SMS-NO>

Placeholder for the phone number of the CP / RTU

- <MSG>

Placeholder for the content of "Re" and "Text" of the e-mail that is automatically entered in the e-mail by TCSB.

The data of the providers is entered in the parameter area:

- Name

Here, enter the name of the SMS gateway provider (can be selected freely).

- Address

E-mail address of the SMS gateway provider.

You will find the address in the agreement documents of your provider.

- Re

Enter a suitable reference here.

With some providers, the text field contains the information indicating to the recipient what needs to be done. The field can also include further job-specific information to allow use of special services of a provider.

With some providers, the "authorized phone number" is entered here.

Ask your provider about the reference.

- text

Enter a suitable text here.

Ask your provider about the text.

6.12 SMTP server

SMTP server

A wake-up SMS message of the telecontrol server is sent as an e-mail. The SMTP server forwards the e-mail to the SMS gateway.

In this dialog, you can configure up to two SMTP servers:

- Server 1
Main server to which all e-mails are sent.
- Server 2
Substitute server to which the e-mails are sent if the main server is not obtainable.

The following parameters must be configured. Take the data from the agreement documents of your SMTP server provider.

- Mail server
Address of the SMTP server
- Port number
Port number of the SMTP server
- User name
- Password
- E-mail address
E-mail address of the telecontrol server
- Activate TLS
For the communication between TCSB and the SMTP server the TLS protocol is used.

6.13 System overview

System overview

In this window you obtain an overview of the maximum possible data that is used in all activated projects. These include:

- Number of activated projects
- Number of activated connections
- Number of activated users
- Number of activated items for the archive (HistoryRead)
- Number of activated items for the data buffer

Diagnostics and statistics

7.1 System variables

System variables

System variables display the data of a connection that can be used for statistical and diagnostics purposes. The system variables are also made available to connected OPC clients as system items.

The values of system variables are saved as of when TCSB starts up. When the system is restarted, the values are lost.

The system variables of a selected connection are displayed in the "System variables" tab in parameter area.

The number and type of the system variables depends on the type of connected station:

- Variable name
Name of the system variable
- S7 type
S7 data type
- Value
Last data value of the system variable
- Time stamp (UTC)
Time (UTC) at which the system variables were last acquired

Note

New time stamp even with unchanged value

The station assigns a time stamp to the system variables. Each time they are transferred from the station, they are given a new time stamp. This also applies if the value and quality have not changed.

Note the different response of the system items on the OPC interface (new time stamp only with new value).

- Description
Meaning of the system variables

You will find the description of the system variables with the same names as the system OPC items in the section System OPC items (Page 57).

Diagnostics of connection problems using system variables / system items

If you suspect problems on the connection to a station, for example when values on the OPC client have not been updated for a longer period of time, you can check the connection step-by-step using the statuses of the following system variables:

1. ConnectionState

With these system variables, you check the connection status between TCSB and the CP/modem.

2. PLCConnected

With these system variables, you check the connection status between the CP/modem and CPU.

3. PLCCpuState

With these system variables, you check the operating mode of the CPU.

7.2 Monitoring and time response of wake-up SMS messages

Possible causes of unsuccessful attempts to wake up stations with a CP 1242-7 / RTU303xC

If a station with a CP 1242-7 or an RTU303xC cannot be woken up, there are different possible reasons for this.

First note the following:

Note

Time blocks of SMS gateway providers

You trigger wake-up SMS messages that are generated from a wake-up e-mail in the SMS gateway as follows:

- In the CMT of the telecontrol server by clicking the "Send wake-up SMS" button
- From the OPC client by writing the system item "WakeUp"

As a defense against spam, some service providers filter out SMS messages with the same content sent to the same subscriber within a limited time (for example 1 minute).

If you repeatedly try to wake up a station because it does not establish a connection within a short time, wait a suitable time between repetitions. If necessary, check with your network provider.

If the situation outlined above can be excluded, then check the status display of the "Wake-up SMS" column of the relevant connection in the CMT.

The following statuses are possible:

- Transferred

The wake-up job was transferred to the TCM.

If this remains displayed for a longer period, TCSB cannot execute the wake-up job.

Check the TCSB system and the connections of the system, as well as the connection to the Internet.

- Negative reply

The SMS gateway has not received the message.

The success of sending a wake-up e-mail to the SMS gateway can be recognized by an acknowledgement. If the acknowledgement is not received and this status is displayed, there is a disruption on the path between the telecontrol server and the SMS gateway.

- Sent {n} seconds ago

The message was sent to the SMS gateway. The message monitoring time has been running for {n} seconds.

- Timeout

The station could not establish a connection within the message monitoring time.

The delivery of the wake-up SMS message by the SMS gateway via the mobile wireless network to the station cannot be monitored. If the message monitoring time elapses and the station has not yet established a connection, the reason may be one of the following:

- The message monitoring time is too short. The transfer of the messages takes longer than the configured time.
- There is a disruption in the mobile wireless network.

One possible reason may be that the network infrastructure has been turned off for several hours for maintenance purposes.

- Power failure in the station. In this case, the CP cannot establish a connection.

- - empty / no display -

If the station was able to establish a connection within the message monitoring time, the status in the "Wake-up SMS" column is deleted.

7.3 Messages

Messages

You can display the messages about important system events using the "View > Messages" menu. Messages relating to the following events are displayed:

- Changes to the status of connections
The information, for example "1/1/101" means "project number/station number/slot".
- Establishment and termination of internal system connections
Examples: Connections between TCM, CMT, database or OPC server
- System error

The meaning of the columns is as follows:

- Category
Message category:
 - Errors: Warnings and system errors
 - Information: Information such as the time of the establishment and termination of connections
- Component
TCSB component responsible
- Time of day
Time of day (UTC) the message was generated
- Message
Message text

You close the message window with the cross (x) at the top right.

7.4 The Web server

The Web server of TCSB

To diagnose a station from a PC, the Web server of TCSB can be used.

Web server access is only possible when the PC is connected to the telecontrol server via LAN. The firewall rules of TCSB do not permit a WAN connection.

In total, connections can be established to the Web servers of a maximum of 10 stations. For this, ports 26880 ... 26889 are reserved in TCSB as listener ports for the Web server of TCSB.

Station types and requirements

Access to the Web server of TCSB for reading status and diagnostics data of a station is connected to HTTP/HTTPS access to the station. This access must be enabled in the configuration of the S7 stations.

Requirements for the stations

A connection can be established to the Web servers of the following station types.

- **S7-1200**

The connection can be established with HTTP or HTTPS.

- CPU

The CPU must support the Web server functionality.

In the configuration of the CPU ("Web server") the Web server must be activated and communication using HTTP or HTTPS must be allowed.

You will find further Information on the Web server of the CPU in the manual /11/ (Page 183).

- CP

The CP must support data point configuration.

At least firmware version V2.1 must be loaded on the CP.

In the configuration of the CP ("Access to the Web server"), the Web server must be activated.

Note

CP 1243-7 LTE: No HTTPS connection between the engineering station and TCSB

When you establish a connection to the CP from an engineering station with STEP 7 via the telecontrol server, despite activated security settings in the CP configuration only a non-secure HTTP connection is established between the PC of the engineering station and TCSB.

- **RTU**

The connection can be established with HTTP and HTTPS.

You will find further Information on the Web server in the manual /10/ (Page 183).

Further requirements

The following requirements must be met to be able to access the Web server of the station:

- A Web server with at least the specified version is installed on the PC:
 - Mozilla Firefox version 38.0.2
 - Google Chrome version 43
 - Microsoft Internet Explorer version 11

For projects with more than 1000 stations, Mozilla Firefox or Google Chrome is recommended, because the update time of the browser is in the minutes range when there are changes.

- The PC is connected to the LAN (or intranet) on which the telecontrol server is also located.

Access to the Web server is only permitted from the local network.

- The station is connected to the telecontrol server.

A temporary station (CP 1242-7, RTU303xC) can be woken up by the Web server.

Establishing a connection to the Web server of TCSB

Follow the steps below to connect the PC to the Web server of TCSB:

1. Open the Web browser.
2. Enter the address (IP address / host name) of the telecontrol server (or the router) in the address line of the Web browser either via the HTTP or HTTPS protocol:
 - http://<Address>
 - https://<Address>

Note

Web server access with redundant TCSB

If you have a redundant installation of TCSB and want to access the Web server of TCSB from a PC via LAN, you need to enter the fixed IP address of one of the two TCSB computers in the address bar of the Web browser. Access via the NLB address is not possible.

When selecting the protocol, make sure that it is enabled in the configuration of the S7 station.

Generally when you log in the first time, a warning appears that the Web page is not secure or that the certificate is not trustworthy. If you are sure that you have entered the correct address, ignore the message. If necessary add the connection to the exceptions (depending on the Web browser).

The login window of the Web server of TCSB opens.

3. In the "User name" input box, enter the name of a user or administrator configured in the CMT.

The rights assigned to the CMT user apply.

4. Enter the corresponding password in the "Password" input box.
5. Click the "Log on" button.

The Web server opens with the overview page of the first TCSB project.

View of the Web server

In the navigation area on the left hand side, the activated TCSB projects are listed. Here, select the project with whose stations you want to establish a Web server connection.

The configured connections are listed in the main part of the window.

Connections										
Status	Station name	Station number	Slot	CPU status	Station type	Connection type	SMS number	Connection mode	Comment	Actions
✓	Station 1	1	0	RUN	SIMATIC RTU	RTU3030C		Temporary		
✗	Station 2	2	101	STOP	S7-1200	CP1242-7 V2		Permanent		
✗	Station 3	3	101	RUN	S7-1200	CP1242-7	12345678	Permanent		
✗	Station 4	4	101	RUN	S7-1200	CP1242-7		Permanent		
✗	Station 5	5	0	STOP	S7-300	MD720-3 Secure		Permanent		
✗	Station 7	7	0	STOP	S7-200	MD720-3 Secure		Permanent		
✗	Station 8	8	0	STOP	SIMATIC RTU	RTU3030C	12345678	Temporary		
✓	Station 40	40	0	RUN	S7-200	MD720-3		Permanent		
✓	Station 42	42	0	RUN	S7-200	MD720-3		Permanent		
✓	Station 104	104	102	RUN	S7-1200	CP1243-7		Permanent		 

Figure 7-1 Example of the connection overview in the Web server of TCSB

The following parameters of the connections are displayed:

- Status (symbol of the connection status)
- Station name
- Station number
- Slot
- CPU status
- S7 type
- Connection type

- SMS number
- Connection mode
- Comment
- Actions (symbols for the connection establishment)

Establishing a connection to the station

Connection status

Via the Web server of TCSB you can connect to the Web server of the station if a connection is established between TCSB and the station. You can recognize whether or not a station is connected by the symbol of the connection status. When a station is connected, a blue check mark is shown.

Waking temporary stations

If a temporary station with Web capability is not connected, you can wake it by clicking on the corresponding symbol, see below.

Establishing a connection to the Web server

Click on the symbol in the right column of the actions to connect to the Web server of the station via HTTP or HTTPS.

The symbols have the following meaning:

Symbol	Meaning
	Wake up station
	Establish HTTPS connection
	Establish HTTP connection

After a short time, the start page of the Web server of the station opens.



Figure 7-2 Start page of the Web server of an S7-1200-CPU

Terminating a connection to the station

If you want to terminate the connection from your PC to the Web server of TCSB, clic the "Log off" button. If a Web server connection is not terminated manually, it is terminated automatically after the monitoring time elapses (see below).

Monitoring time

If the connection to a station is inactive for 15 minutes, TCSB terminates the connection after this time.

When the maximum number of Web server connections to 10 stations is reached and the connection to an 11th station needs to be established, the connection that is first to reach an inactive time of 15 minutes is automatically terminated. The released resource can then be used for a new connection.

Examples of the configuration data of SMS gateway providers



Examples of the configuration data of SMS gateway providers

The following table contains several examples of the configuration of the SMS gateway providers on the CMT. See also section SMS gateway provider (Page 164).

You can find out from your SMS gateway provider how to configure the e-mail for the wake-up SMS message.

Table A- 1 SMS gateway provider-related e-mail structures

SMS network provider	E-mail address of the SMS gateway provider *	Re **	Text **
E-Plus	<SMS-NO>@smsmail.eplus.de	<MSG>	<MSG>
O2	<SMS-NO>@o2online.de ***	<MSG>	<MSG>
Smstrade	<SMS-NO>@email2sms.smstrade.de	<MSG>	#Identifikationkey #Sendroute #Sender#
T-Mobile	<SMS-NO>@t-mobile-sms.de	<MSG>	<MSG>
Vodafone	<SMS-NO>@vodafone-sms.de	<MSG>	<MSG>

* <SMS-NO>

When configuring the e-mail address of the SMS gateway provider in the "Address" box, enter the placeholder "<SMS-NO>". TCSB then automatically enters the call number of the SIM card of the CP that originates from the CP configuration in STEP 7 and is transferred in the frame of the engineering station.

** All cells of the table with the entry "<MSG>"

Enter the placeholder "<MSG>" in the "Re" or "Text" box. TCSB then automatically enters the correct message that is stored in the system and understood by the CP 1242-7 or RTU303xC. (Note: This is the same text that is transferred in a wake-up SMS as the message text.)

*** The call number of the SIM card may only be entered in STEP 7 without the international country dialing code.

Activating the e-mail address

To receive the e-mail, a personal mobile e-mail address needs to be activated with some network providers. To do this, send an activation SMS with a short number to your SMS network provider that you will find in the table below "Activation and deactivation SMS".

You will receive a reply SMS message with your personal mobile e-mail address that is made up of your phone number and the gateway name of your SMS network provider, for example: 0123412345678@providersms.com

To activate your personal mobile e-mail address, send the special activation text to a short number of your SMS network provider.

You will find examples of activation texts and short numbers of SMS network providers in the following table.

Note

Check with your network provider whether or not it is necessary to send activation and deactivation SMS messages. Your network provider will inform you of the texts and short number.

Table A- 2 Activation and deactivation SMS (examples)

	E-Plus	O₂ Germany	T-Mobile	Vodafone
Gateway name	smsmail.eplus.de	o2online.de	t-mobile-sms.de	vodafone-sms.de
Enabling Send SMS with text to short number	Text: START Short number: 7676245	Text: OPEN Short number: 6245	Text: OPEN Short number: 8000	Text: OPEN Short number: 3400
Deactivating Send SMS with text to short number	Text: STOP Short number: 7676245	Text: STOP Short number: 6245	Text: CLOSE Short number: 8000	Text: CLOSE Short number: 3400

Documentation references

Where to find Siemens documentation

- Article numbers

You will find the article numbers for the Siemens products of relevance here in the following catalogs:

- SIMATIC NET - Industrial Communication / Industrial Identification, catalog IK PI
- SIMATIC - Products for Totally Integrated Automation and Micro Automation, catalog ST 70

You can request the catalogs and additional information from your Siemens representative. You will also find the product information in the Siemens Industry Mall at the following address:

Link: (<https://mall.industry.siemens.com>)

- Manuals on the Internet

You will find SIMATIC NET manuals on the Internet pages of Siemens Industry Online Support:

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15247/man>)

Go to the required product in the product tree and make the following settings:

Entry type "Manuals"

- Manuals on the data medium

You will find manuals of SIMATIC NET products on the data medium that ships with many of the SIMATIC NET products.

- You will find links to application examples in the preface of the manual, see Preface (Page 3).

B.1 /1/

SIMATIC NET

TeleControl Server Basic (Version V3)

Operating Instructions

Siemens AG

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15918/man>)

B.2 /2/

SIMATIC NET
CP 1242-7
Operating Instructions
Siemens AG

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15921/man>)

B.3 /3/

SIMATIC NET
CP 1243-1
Operating Instructions
Siemens AG

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15922/man>)

B.4 /4/

SIMATIC NET
MODEM MD720
Operating Instructions
Siemens AG

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15923/man>)

B.5 /5/

SIMATIC NET
GPRS/GSM modem SINAUT MD720-3
system manual
Siemens AG

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15923/man>)

B.6 /6/

SIMATIC NET
SINAUT MICRO SC
system manual
Siemens AG

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15919/man>)

B.7 /7/

SIMATIC NET
Commissioning PC Stations - Manual and Quick Start
Configuration Manual
Siemens AG
Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15362/man>)

B.8 /8/

SIMATIC NET
CP 1242-7 GPRS V2
Operating Instructions
Siemens AG
Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15921/man>)

B.9 /9/

SIMATIC NET
CP 1243-7 LTE
Operating Instructions
Siemens AG
Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15924/man>)

B.10 /10/

SIMATIC
RTU3000C
Operating instructions
Siemens AG
Link: (<https://support.industry.siemens.com/cs/ww/en/ps/21767/man>)

B.11 /11/

SIMATIC
S7-1200 Automation System
system manual
Siemens AG
Link: (<https://support.industry.siemens.com/cs/ww/en/ps/13683/man>)

B.12 /12/

SIMATIC NET

Program block library MSC300_Library

Siemens AG

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15923/man>)

Index

A

- Abbreviations/acronyms, 4
- Activate, 1
- Activated parameters, 1
- Administrator password, 1
 - Loss, 1
- Administrator privileges, 1
- Article number, 3
- ASCII characters
 - Item names, 6
 - Users + passwords, 1
- Authorized phone number, 1

B

- Backup copy, 4
- Browsing, 7
- Buffer, 5

C

- Certificate, 3
- certificates - client / server, 51
- Changing configuration data, 7
- Character set
 - OPC items, 6
 - Users + passwords, 1
- Compatibility
 - MICRO SC, 5
 - TCSB, 5
- Computer: Failure, 8
- Configuring archiving (HistoryRead), 1
- Connection attempts (MD720), 95
- Connection establishment delay, 9
- Connection interrupted, 89
- Connection mode, 90
- Connection monitoring, 1
- Connection problems - diagnostics, 1
- CP type, name, 4
- Cyclic data exchange, 1
- Cyclic services, 1

D

- Data block DB1, 5
- Data block for process items, 67
- Data buffer, 5
- Data buffer - configuring items, 1
- Data types, 5
- Database, 16
- Database password, 4
- DB1, 54, 67
- DCOM settings, 44
- Definition of terms, 4
- DNS, 29
- Duplicating a connection, 1

E

- Edit, 1
- Editing at the same time, 79, 123
- Encryption, 141
- Examples of applications, 7
- Export certificate, 115, 117
- Export database, 47

F

- Failure of a computer: detection, 8
- Firewall settings, 3
- Forced image mode, 6

G

- Glossary, 7
- Grayed out boxes, 1

H

- HC-128, 1
- HistoryRead, 5
- HistoryRead - configuring items, 1
- HSP, 1

I

- Image message, 60
- Image on the CP, 9
- Import certificate, 116
- Import database, 4
- Importing projects, 7
- Input data points, 163
- Installing / upgrading a license, 4
- Interlock when editing at same time, 79, 123
- Invalid parameters, 113
- Items, syntax, 6

K

- Keepalive timeout, 97, 143

L

- Leading clients, 1
- Licenses (TCSB), 3

M

- Memory areas in the S7 stations, 54
- Memory areas S7-200/1200, 9
- Message memory (CP) - logout of OPC clients, 5
- Message size 230 bytes (S7-200/300), 9
- Migration MICRO SC → TCSB V3, 7
- Migration TCSB V2 → TCSB V3.0, 75
- MonitoredItems, 49
- Monitoring time of the stations, 9
- Multiproject capability, 78, 122
- Multi-user capability, 78, 122

N

- Name space, 7
- Network Load Balancing, 81
- Network settings, 43
- NLB, 8

O

- OPC
 - Protocol specifications, 19
- OPC client - installation, 3
- OPC clients - logout, 5
- OPC items
 - Maximum number, 21

- OPC server

 - Name, 51

- OPC UA certificate, 162, 164

- Operating system, 28

P

- Password

 - Administrator, 118

 - Invalid entry, 118

 - Loss, 118

 - Users, 15

- Passwords, overview, 106

- Permanent, 90, 90, 142

- Port 587, 44

- Ports

 - Numbers, 44, 158

 - Opening, 44

- Process data, 54

- Process image, 97, 99

- Project

 - STEP 7, 17

 - TCSB, 17

- Project import, 78, 122

- Protection concept, 15

- Protection of the system, 107

Q

- quality code, 55

- Quality of items, 55

R

- Read (OPC client), 100

- Receive process image, 99

- Redial delay, 94, 95

- Rights, 15

- Role (CMT), 151

- Runtime system, 16, 17, 77

S

- S7-200, number of modems/CPs, 13

- Save, 128

- Send buffer message, 60

- Send process image, 99

- Server password, 128

- Service & Support, 8

- Setting up OPC communication, 44

SIMATIC NET glossary, 7
 SIMATIC systems, connectable, 13
 SINAUT MICRO SC, 78, 122, 137
 SMS gateway, 92, 92
 SMS gateway provider, 164
 SMTP server, 92, 167
 Station name, 140
 Station number, 140
 Station number, MD720, 78, 122
 Syntax
 OPC items, 66
 Syntax, items, 67
 System variables, 147, 169

T

TC_RECV, 100
 TC_SEND, 100
 TCM (Telecontrol Manager), 16
 Telecontrol Manager, 16
 Telecontrol password, 107
 Telecontrol server, 4
 TeleService, 15
 Connections, 147
 TeleService via mobile wireless, 24
 Temporary, 90, 90, 142
 Temporary connection, 20
 Connection termination, 97
 Time stamp - messages, 56
 Time stamp - Process items, 56
 Time stamp - system items, 60, 64
 Time stamp - system variables, 169
 Time stamp (client), 104
 Time-of-day (dial-up), 103
 Time-of-day synchronization, 103, 145
 TLS, 167
 TLS authentication, 44
 Tolerance time, 97
 Training, 8
 Transferring configuration data, 77

U

Uninstalling a license, 43
 Updating OPC UA certificate, 162
 Upgrading TCSB V2 → V3.0, 75
 User name: Invalid entry,
 User rights, 15

V

Validation, 113
 Virtual IP address, 83
 Virtualization software, 75

W

Wake up, 146
 Unsuccessful attempts, 170
 Wake-up call, 92
 Wake-up SMS, 92, 146, 164
 Wake-up SMS message with a temporary connection
 (configuration), 145
 Web server, 15
 Write (OPC client), 100
 Wrong entry, user name, 118

