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System settings	1
Configure the system network	2
Network configuration	3
Service and diagnostics	4

SINUMERIK 840D sl Operator components and networking (IM5)

Commissioning Manual

SINUMERIK

Valid for:

CNC software Version 2.7

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Table of contents

1	System	settings	5
	1.1	Settings for SINUMERIK solution line	5
	1.2	Thin Client Unit (TCU)	7
	1.3	Factory default settings	9
2	Configu	e the system network	. 11
	2.1	System boot with system network	11
	2.2	Synchronize DHCP server	13
	2.3	Commissioning TCU	16
	2.3.1	Using the TCU's main menu	16
	2.3.2	Using additional ICU menus	20
	2.3.3	Connecting up the SIMATIC Thin Client Touch Panel	30
	2.3.5	This is how you configure the SIMATIC Thin Client Touch Panel	35
	2.3.6	Settings in the "config.ini" file	36
	2.3.7	Settings in the "TCU.ini" file	38
	2.3.8	Displacement mechanism for TCUs	42
	2.3.9	Disable switchover between TCUs via PLC	44
	2.3.10	Example: How to select the behavior of the TCUs during boot up	46
	2.4	System Network Center (SNC)	47
	2.4.1	Function overview of the System Network Center	47
	2.4.2	SNC: "Adapter" tab	49
	2.4.3	SNC: OPS tab	50
	2.4.5	How to configure VNC connections	.52
	2.4.6	SNC: Configuring TCU support services	55
	2.4.7	SNC: Configuring "TCU mode"	57
	2.4.8	SNC: Configuring the X120 interface (System network)	59
	2.4.9	SNC: Configuring the X130 interface (Company network)	61
	2.4.10	SNC: Configuring parameters on the "System basics" tab	62
	2.4.11	SNC: "Scanned devices" tab	62
3	Network	configuration	. 67
	3.1	Permissible network topologies	67
	3.2	Networks without connection to the company network	68
	3.2.1	Configuration 1: NCU and TCU	68
	3.2.2	Configuration 2: NCU and PCU with direct OP	69
	3.3	Networks with NCU connection to the company network	70
	3.3.1	Configuration 3: NCU and TCU	70
	3.3.2	Configuration 4: NCU and PCU with direct OP	71
	3.3.3	Configuration 5: PCU with TCU on NCU	72
	3.3.4	Connecting the programming device (PG) to the NCU	73
	3.4	Application example	74

4	Service and diagnostics		
	4.1 4.1.1 4.1.2	Booting of the TCU Messages during booting Diagnostics options during booting	
	4.2	How to calibrate a touch panel	
	Index		

System settings

1.1 Settings for SINUMERIK solution line

Area of application

This description applies to NCU 7x0 with software V2.6 SP1 and PCU 50 with PCU base software V8.6 SP1.

Introduction

This manual describes the structure and commissioning of the system network with SINUMERIK solution line control and operator components with Ethernet-based communication. The fundamentals of the system network are described first, details and special cases are described in subsequent chapters.

Fundamentals

The system network for SINUMERIK solution line is structured as a star topology with a central Ethernet switch, to which all Ethernet-based components of the system are connected.

For an NCU the connection is executed via the X120 Ethernet socket, for PCU 50 it is executed via the "Ethernet 2" connection. There is no default for all other components with two Ethernet connections. These components have an internal 2-port switch and may be used to connect an additional operator component. Thus in this case there can be deviation from the strict star topology.

System network

In the system network the IP address 192.168.214.xxx with subnet mask 255.255.255.0 is pre-selected. Here, there is precisely one DHCP server with DNS that can run on one NCU or one PCU 50. The server ensures assignment of IP addresses to the Ethernet components in the system network (DHCP clients) from a specified address band.

The following rules apply for assignment of IP addresses in the system network:

- For all NCUs and PCUs the commissioning engineer assigns fixed IP addresses in the associated address bands, as well as appropriate computer names (host names). All other (operator) components are automatically assigned an IP address from the DHCP server. Its name is generated automatically (for MCP, MPP, HT 8), or is entered at commissioning (TCU).
- If there are multiple NCUs and/or PCUs in the system network the system automatically (depending on the start-up sequence) specifies the DHCP server and automatically ensures synchronization of all necessary data so that the next time the system boots any other NCU or PCU could take on the role of DHCP server. However it is a good idea to specify a DHCP master. This is an NCU or PCU in the system network that is available at each system boot and which regularly takes over the task of the DHCP server and DNS server.

1.1 Settings for SINUMERIK solution line

Synchronization of data takes place in any event so that any other NCU or PCU can take over this task. All non-master NCUs / PCUs wait in the system boot an adjustable length of time for availability of the master.

NOTICE

In a system network, on a boot server respectively - i.e. the NCU 7x0.2/PCU 50 which houses the active DHCP server - a maximum of 30 operator stations may be operated simultaneously with a TCU.

A maximum of 10 operator stations with a TCU may connect up simultaneously with the same HMI application when powering up.

Connection to a company network

Each NCU 7x0 can be connected via X130, and each PCU 50 can be connected via "Ethernet 1" to the company network. The company network is used to exchange HMI software data with servers or to execute part-programs directly from servers in the company network. Company network and system network should always be logically and also physically separated.

Service interface X127

The service interface X127 of the NCU 7x0 is used for direct connection of a programming device/PC for service purposes. Here access with STEP 7 to the PLC, and with NCU 730 PN to PROFINET as well is possible.

With direct connection (peer-to-peer) of a PG/PC to X127 it is absolutely necessary that as from V2.6 the PG is operated as a DHCP client.

1.2 Thin Client Unit (TCU)

TCU overview

The Thin Client Unit (TCU) for the distributed configuration permits spatial separation of the SINUMERIK operator panel front (OP/TP) and the SINUMERIK PCU or NCU. On the SINUMERIK solution line, the TCU is used to display the user interface of the PCU 50 or the NCU.

It is possible to connect one TCU to several PCUs. All TCUs and PCUs that are connected to one another via a switch form the "system network". The user interface of a PCU is copied to several OPs with one TCU each. In other words, all of the TCUs display the same screen. Operator actions can only be performed on one TCU at a time. This TCU then has user authorization. The PCU can also have its own OP connected directly to it.

An **example of a configuration with HMI Advanced** for a distributed configuration is shown below:



The mobile SINUMERIK HT 8 handheld terminal works on the thin client principle and combines the functions of an operator panel with a machine control panel.

The configuration and cabling of the whole plant system based on a permissible configuration is described in the chapter 'Network configurations".

Supplementary conditions

For operation of a TCU:

- In the system network, the number of active TCUs is limited:
 - a maximum of 2 TCUs: NCU 710.2 and 710.3 PN
 - a maximum of 4 TCUs: NCU 720.2 / 720.3 PN / 730.2 / 730.3 PN
 - a maximum of 4 TCUs: PCU

Any number of TCUs can be operated in the system network.

- CompactFlash Cards cannot be used on the TCU.
- A 16 bit or 32 bit depth of color setting may be selected.
- If a PC keyboard is connected to the TCU, it is not possible to ensure that all special keys, e.g., multi-media keys, will be transferred to the software of the NCU / PCU.

1.2 Thin Client Unit (TCU)

- Machine control panels connected via a PROFIBUS network are not supported for switchover.
- Distributed memory media that are connected to the TCU via USB can be used.

1.3 Factory default settings

Meaning of the symbols:

- Eth 1 as a DHCP client
- Eth 2 as a DHCP server
- Eth 2 with a fixed IP address

Preconfiguration of the TCU

The TCU is configured as a DHCP client and primarily accepts IP addresses from SINUMERIK components, from the DHCP server of such components that are inherent to SINUMERIK, for example, an NCU at X120 or a PCU on the system network or from a default DHCP server. The behavior of the TCU cannot be modified here.



A TCU is a SINUMERIK DHCP client.

The TCU has a single Ethernet connection.

A TCU executes a boot via the network. The boot server is the computer node from which the TCU also obtains its IP address.

Pre-configuration of the PCU

A PCU has two Ethernet interfaces with default settings suitable for use with SINUMERIK solution line:



Eth 1 is pre-selected as a default DHCP client for connection to a company network.

Eth 2 is pre-selected as a SINUMERIK DHCP server for connection to a system network. On Eth 2 the fixed IP address 192.168.214.241 is pre-selected.

A PCU with PCU Base software V8.0 or higher already contains the "PCU Base software Thin Client" when delivered. For retrofitting, the software is available in the D:\Update directory on the hard disk.

Preconfiguration of the NCU

On the X120, the NCU is preconfigured for the SINUMERIK DHCP protocol. The NCU is preselected here as a SINUMERIK DHCP server. On X120, the NCU occupies the fixed IP address 192.168.214.1 with the subnet mask 255.255.255.0 in its capacity as a DHCP server. The DHCP server of the NCU assigns IP addresses from the range 192.168.214.10 to 192.168.214.239. The behavior of the NCU on X120 cannot be modified. 1.3 Factory default settings

Restricting the available address band that is managed by the DHCP server of the NCU frees up IP addresses 192.168.214.2 to 192.168.214.9 as well as addresses 192.168.214.241 to 192.168.214.254 for network nodes with fixed IP addresses.



The NCU has three Ethernet connections:

- X120 to connect to the system network with an active DHCP server (Eth 2)

- X130 to connect to the company network as a default DHCP client (Eth 1)

- X127 as a service connection with an active DHCP server (Ibn 0)

On X130, the NCU is set as a default DHCP client for the address reference from a company network. The IP address received here is specified by the DHCP server from the company network.

On X127, an NCU is a standard DHCP server (in contrast to the SINUMERIK DHCP server). On X127, the NCU has the fixed IP address 192.168.215.1 with the subnet mask 255.255.255.224). The range 192.168.215.2 to 192.168.215.9 is reserved and can be used by network stations with a fixed IP address from this range. On X127, IP addresses in the range 192.168.215.10 to 192.168.215.30 are assigned via DHCP; e.g. to connect a programming device.

Reserved IP addresses for NCU and PCU

The following defaults apply on delivery:

• Connection to the system network with subnet mask 255.255.255.0:

IP address	Network station	Remark
192.168.214.1	NCU on X120	Default
192.168.214.2 – 9	For additional NCUs with a fixed IP address on the system network	Unassigned
192.168.214.10 – 239	For additional TCUs, subsequently for additional PCUs, NCUs, MCPs, MPPs	DHCP clients
192.168.214.240	Reserved for EKS (Electronic Key System)	Default
192.168.214.241	Fixed IP address of the PCU on Eth 2	Default
192.168.214.242 – 249	For additional PCUs with a fixed IP address	Unassigned
192.168.214.250 – 254	For PGs with a fixed IP address (service connection)	Unassigned

• Service connection with subnet mask 255.255.255.224:

IP address	Network station	Remark
192.168.215.1	NCU on X127	Default
192.168.215.2 – 9	For programming devices with a fixed IP address	Unassigned
192.168.215.10 – 30	E.g., for programming device	DHCP clients

Configure the system network

2.1 System boot with system network

System behavior at boot

As of NCU system software V2.4 SP1 and PCU-Basesoftware V8.1, system boot behavior is based on the following principle:

- For configuration of an NCU 7x0 with a PU 50, the default for a network configuration is as follows: The NCU keeps the default IP address 192.168.214.1 on X120, the PCU 50 keeps the default IP address 192.168.214.241 on Eth2.
- For a configuration of more than 1 NCU 7x0 without PCU, with one or several PCU 50, then a differentiation must be made between two cases:
 - At boot automatically all address conflicts and DHCP conflicts are resolved and the system is ready for operation. In this configuration there is **no** guarantee that all NCUs and PCUs will always receive the same IP address at each system boot.
 - If in the user's view there is a requirement that all NCUs, and possibly also the PCUs, get a defined constant IP address at each boot, for example because the IP address is entered in the respective PLC program, then the user must configure a fixed IP address for each NCU 7x0/PCU 50 in question, in the basesys.ini file.
- The user **can** specify a DHCP master in the basesys.ini file.
- Assigning names:
 - The user should assign meaningful names for all NCUs in the basesys.ini file; if not the names will be generated automatically.
 - A PCU 50 always has a computer name that can be changed as needed.
- The IP addresses of TCUs and MCPs are freely assigned within the specified address band at each boot. The MCPs are identified in the PLC via their DIP switch setting.

2.1 System boot with system network

Using DNS name service

Availability of the DNS (Domain Name System) name service offers the following advantages for system network administration:

- The name service enables easier configuration with names instead of IP addresses for management of operating units: All components in the system network can be addressed via a symbolic computer name. This name can to some extent be freely assigned, to some extent it is derived automatically from a DIP switch setting (MCP, MPP, EKS, HT 8, HT 2).
- A computer node in the system network (NCU, PCU, TCU, MCP, HT 8, etc.) can be addressed solely through assignment of the IP address, either via a freely selectable name or via an internally generated name in the system network, and thus becomes independent from its network address in the system network. Thus a change in the network address does not necessarily necessitate a series of additional setting changes.
- In addition, the name service is used by the system for address resolution for MCP/MPP, direct keys, and EKS when changing the user authorization.

2.2 Synchronize DHCP server

Synchronization in the system network

Synchronization of the DHCP servers makes it very easy to commission the system network: The complete system network consisting of NCU7x0, PCU, TCU, HT 8, MCP, MPP is configured dynamically when booting via the DHCP protocol and thus can be booted without any prior configuration processes.

Only one DHCP server may be active in a computer network.

Each of the components NCU7x0 and PCU is shipped with the DHCP server switched to active. With this setting simple systems as well as system networks are immediately ready for operation.

Configuration with 1 NCU and 1 PCU

To operate a PCU 50 which has V8.0 SP2 or higher of the PCU basic software installed on an NCU, the DHCP server on the NCU **must** be activated (NCU service command: "sc enable DHCPSvr -x120") and deactivated on the PCU.

To deactivate services DHCP, TFTP and FTP and activate service VNC on its own, proceed as follows:

- Start the "System Network Center" in the service mode of the PCU and set the default configuration in the "TCU support" tab to "No boot support".
- For MCP operation the entry "addrmode" in the mcp_client.ini file of the NCU must be set to (HWS). This is the default setting (see /card/siemens/sinumerik/mcp_client).
- If TCUs or HT 8 is available in the system and must be switched to the PCU (with HMI-Advanced) after booting, a "config" file (not config.ini !) must be created on the NCU for each TCU / HT 8 under /user/common/tcu/<TCU name>/common/tcu with the following contents:

VNCServer=192.168.214.241:0:password

This is the IP address of the PCU to which the TCU / HT 8 must connect when booting.

System redundancy

With the available redundancy of DHCP servers in the system, continued operation of the system is ensured in the following cases:

- Particularly when commissioning, the situation can occur that the computer node that takes on the role of DCHP server fails in operation or is switched off. In this case, an additional NCU 7x0 or PCU can take over the role of the DHCP server.
- Mobile components such as HT 8 and HT 2, that are accepted during system operation can be properly supplied by the system and execute their boot process.
- Because the DHCP server has also integrated the DNS name service necessary for operation of the MCP, MPP, and EKS systems, it is also possible to continue to operate these components on the system even if the original server should fail.

Note

Networking

- Important system and network settings for the NCU-Basesoftware are preset in the basesys.ini file in the /card/user/system/etc directory and can be modified in this file. The original basesys.ini file is called "template-basesys.ini" and can be found under /card/siemens/system/etc.
- Every NCU in the system network should be allocated a unique ("meaningful") computer name via the "Hostname=..." entry in basesys.ini. The name can include lower/upper case letters, digits, and minus signs.
- As a basic principle, the DHCP server for the NCU should be switched on.
- When upgrading SW 1.3/1.4, it is important to ensure there is no old mcp_client.ini file left in /card/user/sinumerik/mcp_client.

Configurations:

Configuration 1 NCU with TCU and MCP

No special settings are required in basesys.ini for this configuration.

DHCP server and internal HMI-Embedded remained switched on.

• Configuration 1 NCU with 1 PCU, MCP, and, if applicable, TCU

The following settings are required in the NCU's basesys.ini for this configuration:

```
Hostname = ....
SyncModeDHCPD SysNet = ON MASTER
```

The internal HMI-Embedded should usually be switched off, as it is only permissible to operate two HMI applications (HMI-Advanced and HMI-Embedded) on one NCU in exceptional circumstances.

We recommend that PCU Base software V8.1 SP3 or higher is used on PCU 50.3.

Select the "No boot support" default configuration on the "TCU support" tab in the System Network Center.

If there is a TCU (HT 8) in the system to be switched to the PCU by default, the following entries will have to be made on the NCU in the file called /card/user/common/tcu/<TCU name>/common/tcu/config.ini:

```
MaxHostIndex = 1
[host_1]
Address = <IP address for the PCU>
```

Configuration several NCUs and, if applicable, 1 or more PCUs, TCUs, MCPs

The following settings are required in the NCU's basesys.ini for this configuration:

```
Unique Hostname = .... for every NCU
Unique InternalIP= ....
The same InternalNetMask= ....
Precisely one NCU with SyncModeDHCPD_SysNet = ON_MASTER
```

PCU base software V8.1 SP3 or higher must be used on PCU 50.3.

Leave the "Complete TCU support" default configuration on the "TCU support" tab in the System Network Center. "Sync mode low priority" is the recommended option on the "DHCP settings" tab.

All the operator panels in the system network (TCUs, HT 8, PCU) are managed with "ON_MASTER" on the NCU. Consequently, this is where you will find the config.ini files relevant to the runtime and the .leases file containing all the IP addresses assigned within the system.

The config.ini files are distributed across all of the other NCUs/PCUs from the NCU, which is the DHCP server, using the "sc distribute tcudata" service command.

After the "sc clear dhcp" service command has been executed and the entire system has been switched off and on, the NCUs/PCUs receive their predetermined IP addresses. These addresses are then reassigned for TCUs and MCPs and the .leases file is distributed to all the other NCUs/PCUs.

Note

System Network Center → OPs tab

On every PCU, the config.ini files of all operator panels can be edited directly on the master NCU. Every time a change is made, data is distributed to all NCUs/PCUs in the system network automatically.

2.3 Commissioning TCU

2.3.1 Using the TCU's main menu

Key assignment

Functions of the keys and softkeys in the "Operator panel service system":

Softkey	Key on OP	External keyboard	Description
+	HSK1	<f1></f1>	Moves the cursor down a row
↑	HSK2	<f2></f2>	Moves the cursor up a row
Page↓	HSK3	<f3></f3>	Moves the cursor down a page
Page↑	HSK4	<f4></f4>	Moves the cursor up a page
Char↓	HSK5	<f5></f5>	Inserts text or digits
Chart	HSK6	<f6></f6>	Inserts text or digits
Cancel	VSK7	←	Cancel / Return
0k	VSK8	→	OK / Confirm
	NEXT WINDOW	Pos1	Moves the cursor to the top row
	END	End	Moves the cursor to the bottom row

Exceptions to the above are mainly the result of input fields. Where these are present, the left/right cursor keys move the input cursor rather than performing an OK/cancel function. The Return key takes you to the next field (like the "down" key) rather than closing the entire dialog with OK. There are also Backspace (deletes character to the left) and Delete (deletes character to the right) keys for editing text and numbers. The F5, F6, Backspace, Delete, and Select keys (between the cursor keys on the panel) can be used to switch between Yes/No fields.

With a touch screen, you can activate all the softkeys and even select rows in a menu simply by touching them.

Touch panels without any additional keys still have a special function which allows you to edit letters and numbers with HSK5/HSK6 by moving characters forwards or backwards.

See also: How to calibrate a touch panel (Page 82)

"Main menu"



The dialog "Main menu (TCU1)" is started with the menu back key and the key <MENU SELECT>:



Figure 2-1 TCU menu: Main menu

The main menu contains:

- A "Main menu" title followed by the TCU name in brackets
- A central area listing the servers from config.ini. This is followed by two more fixed items, "Select service session" and "Service this panel".
 - The penultimate menu item, "Select service session", triggers a server scan which detects all the VNC servers in the local (system) network. These are then displayed in a session menu which largely reflects the main menu.
 - The last menu item on the main menu, "Service this panel", opens the "Service menu for operator panel" submenu.
- The right-hand side of the menu has a column containing 8 softkeys for use on a contextspecific basis.
- The lower section of the menu has a row of 4 softkeys for navigating with the cursor.
- There is an error line for displaying error messages directly above the row of softkeys. Transient status messages also occasionally appear in this line.
- There is a further message line above this error line. The contents of this line can be set from the servers using HWS commands.

"Service Network" softkey

The System Network Center (SNC) (Page 47) opens when the "Service network" softkey is pressed.

The following message only appears if an error has occurred:



Figure 2-2 TCU menu: Fault signal

"Details" softkey

The following connection data for the selected device appears when the "Details" softkey is pressed:



Figure 2-3 TCU menu: Connection data

2.3.2 Using additional TCU menus

"Service sessions" dialog

When "Select service session" is selected from the main menu, the resulting process begins by triggering a server scan:



Figure 2-4 TCU menu: Scanning

After this, the following dialog appears:

Operator panel service system - Service sessions	
Show Conmand shell of ncu3 (192.168.214.1): VNC running	
Show System logfile of ncu3 (192.168.214.1): VNC running	
Show HMI on ncu2 (192.168.214.2): HNI running	
Show Command shell of ncu2 (192.168.214.2): VNC running	
Show System logfile of ncu2 (192.168.214.2): VNC running	
	Service network
	Details
	Back to main menu
	Ok
↓ † Page↓ Page↑	

Figure 2-5 TCU menu: Active sessions

Central area with the server list:

The individual server lines contain either "Show WHAT on NAME (IP)" or the IP address only where the name is unknown.

Session number	VNC server
Session 0	HMI
Session 4	Command shell
Session 5	System logfile
Session 6	System Network Center (SNC)
Session <n></n>	other server

These details are followed by a status message regarding the accessibility of the VNC server. "Connection not ok" appears if it is already impossible to access the VNC server from the IP side (if switched off, for example). If it can be accessed, a message shows whether an HMI-VNC server is also accessible ("HMI running/not running").

The VSK8, Return or right cursor keys can be used to launch a VNC viewer for the selected server.

Connection status:

Further details on the connection status can be called with the "Details" softkey. In the next dialog, "not ok" or "not running" are accompanied by an additional error message with more precise details on the reason for the loss of function. With more favorable scenarios, the session name for the VNC server will also be specified along with its resolution.

The connection and HMI status are monitored on a regular basis in the background. This may mean that these details change spontaneously if a change is made on the relevant server (for example, it may be switched off, the HMI may become available, etc.).

"Service menu for operator panel (TCU)" dialog

The following dialog appears when "Service this panel" is selected from the main menu:

Operator panel service system - service menu for operator panel (TCU)	
Show status	
Show local logfile	
Show logfile of remote devices	
Nodify operator panel settings	
Calibrate touchscreen	
Reboot	
	Cancel
	Ok
⊥ t Page↓ Paget	
Figure 2-6 TCU menu: Service menu	

The following menu items are available here:

• "Show status" displays status information including the software version, HW information, TCU network data, and the contents of the config.ini.

Operator panel service system - Operator panel status	
Software Version : L02.60.13.00	
Hardware	
Hardware-ID : 7.1.0.0 (TCU) Feature flags: 00000000 (no direct keys, 0 hand wheels) Panel size : 800x600, depth 16	_
Input devices: 1 keyboard, 1 mouse, 0 touchscreens	
Network Status	
Interface : 100 MBit, full duplex IP Address : 192.168.214.18	_
Netnask : 255.255.2 MAC Address : 08:00:06:73:5a:7a	
Boot Server : 192.168.214.1 Gateway : 192.168.214.1	
config.ini	
[Station]	
touIndex=1/2	
CKEnable=0	
Address = 192.168.214.1	
[Host_2] Address = 192.168.214.2	
	_
	Back
↓ † Page↓ Page†	
Figure 2-7 TCU menu: OP status	

• "Show local logfile" displays a filtered version of the system logfile in the /var/log/messages directory containing local TCU messages only.

Syslog messages received via the network are not displayed.

Operator panel service system - Local logfile	
<pre>00:06:06 syslogd started: BusyBox v1.00 (2008.10.14-21:56+0000) 00:06:05 kernel: process 'syslogd' is using obsolate setsockopt S0_BSDCOMPAT 00:06:06 udhcpc(821): Lease of 192.168.214.18 obtained, lease time 864800 00:06:09 subtpc(821): Lease of 192.168.214.18 (server: 192.168.214.1) 00:06:09 sntp[973]: using NTD server ? (192.168.214.1) 00:06:09 sntp[973]: using NTD server ? (192.168.214.1) 00:06:19 sntp[173]: using NTD server is unsynchronized 00:06:13 toodatad[1076]: i2c, write_1b: Input/output error 00:06:13 toodatad[1076]: have_eepron: fallure, assuning no EEPROM 00:06:13 toodatad[1076]: no EEPROM and no CF card, nothing to do 00:06:13 syslini: basis using for default server (192.168.214.1:0) being avail able 00:06:14 startvnc[1186]: waiting for default server (192.168.214.1:0) being avail able 00:06:14 startvnc[1186]: HWS connection to 192.168.214.2:0 established 00:06:14 startvnc[1186]: HWS connection to 192.168.214.1:0 established 00:06:14 startvnc[1186]: HWS connection to 192.168.214.1:0 established 00:06:14 startvnc[1186]: HWS connection to 192.168.214.1:0 established 00:06:15 syslin WTD server is unsynchronized 00:06:17 syslin WTD server is unsynchronized 00:06:19 startvnc[1186]: default server connection aborted nanually 00:07:59 sntp[973]: NTD server is unsynchronized 00:07:59 sntp[973]: NTD server is unsynchronized 00:0</pre>	• • • • • • • • • • • • • • • • • • •
	Back
↓ t Page↓ Page↑	
Figure 2-8 TCU menu: Local logfile	

• "Show logfile of remote devices" displays the logfile of the other devices in the network:

The syslog messages of devices in the system network which send syslog messages by broadcast, such as NCU 7x0, \dots

- "Modify operator panel settings" calls a further submenu. Please refer to the next section.
- "Calibrate touch screen" is only active if there is a touch screen. This menu item recalibrates the touch screen.
- "Reboot" restarts the TCU.

Note

Where the contents of a line exceed the space available, the remaining text runs onto the next line so that you do not have to waste time scrolling across. When this occurs, the line has a right-facing arrow at its right edge.

"Modify settings for operator panel (TCU)" dialog

The following dialog appears when "Modify settings" is selected from the main menu:

Operator panel service system - Modify settings	for operator panel (TCU)	
Operator panel index - TCU [0-255]		
Machine control panel address - MCP [0-255]	192	
Electronic key system index - EKS [0-255]	0	
Enable direct keys	No	
		Ok
1 T	Charl Chart	
Finance 0.0 TOLL		

Figure 2-9 TCU menu: Settings

The central area is for setting the TCU parameters:

• "HT 8 individual mode" (yes/no)

This is only visible with HT 8, and is used to switch between Auto Mode and Individual Mode.

There is no need to make any settings if an HT 8 is in Auto Mode, as the name is determined automatically: ("DIP<n>") the MCP address and TCU index are determined by the DIP setting ("DIP<n>").

It is possible, however, that another device is registered for the name selected. Such situations may only prove to be temporary, as is the case when DIP settings or two HT 8 have been confused. For this reason, this status is not reported as an error immediately, but identified as a possible problem instead ("potential name/DIP setting collision"). The text will only read ("Name/DIP settings collision") if the situation remains unchanged after some time has elapsed.

The process itself is unaffected, as the changes only relate to how the warning or error is displayed. The explanatory text informs the user that they have probably assigned the same DIP number twice and suggests they change one of them before rebooting the HT 8.

"Operator panel index - TCU" (0-255)"

This specifies the TCU index. It matches the [Station] tcuIndex setting from the config.ini file.

• "Machine control panel address - MCP" (0-255)

This specifies the address of the associated MCP. It matches the [Station] mcpIndex setting from config.ini.

"Electronic key system index - EKS" (0-255)"

This specifies the index of the associated EKS. It matches the [Station] eksIndex setting from config.ini.

• "Enable direct keys" (yes/no)

This specifies whether direct keys (if present) should communicate with the PLC (yes) or be treated as ordinary keys (no).

"OK" saves any modified values to the config.ini file or to the Flashstore (HT 8 individual mode).

Parameters for the "config.ini" file

Two steps need to be performed:

- 1. Select "New" or "Replacement for existing panel".
- 2. Select what is to be replaced.

When an unknown TCU (i.e. not yet registered with the boot server) is started, a selection menu containing both the "New" and "Replacement for existing panel" items will appear. The accessibility of all the registered TCUs is tested in the background.

The status of this test process appears in the message line: "(0/3 panels inactive)".

Operator panel service system - new operator panel (TCU)	
This operator panel is not yet known	
New	
Replacement for existing panel	
It could be a new device, or a replacement for an existing operator panel. Please select.	Ok
(0/3 panels inactive)	
↓ t Page↓ Paget	
Figure 2-10 TCU menu: New TCU	

If all the TCUs are active, the new one cannot be a replacement. The system will then automatically switch to the name assignment phase after a set period of time has elapsed.

Operator panel service system - n	new operator panel (TCU)	
This opera because th	ntor panel (TCU) must be new, mere are no inactive panels.	
Name for this panel: TCU1		
	c	ancel
		Ok
1 T	Charl Chart	
Figure 2-11 TCU menu: Name	of TCU	

Replacing a device

If "Replacement" is selected, all the registered TCUs will appear in a selection menu. Those which are active in the network will be grayed out. (As these are functioning, there should be no question of replacing them.) The cursor automatically defaults to the first row for selection.

As the accessibility test is still running in the background, the active status of the rows may change if panels are switched on or off.

If a name is ultimately chosen, it will be applied to the new TCU along with the associated saved settings.

Operator pan	el service system - new operator panel (TCU)	
	Please select which operator panel (TCU) should be replaced	
TCU1 TCU2 TCU3 TCU4	(MAC 08:00:06:73:5a:7b) (MAC 08:00:06:73:5a:76) (MAC 08:00:06:73:55:81) (MAC 08:00:06:73:55:81) (MAC 08:00:06:73:5a:7c)	
		Lancel
		Ok
1	(2/4 panels inactive)	
Figure 2-12	TCU menu: Spare TCU	

Assigning a name

If, as described above, the system automatically follows the "New" path, an additional message will appear: "This operator panel (TCU) must be new, because there are no inactive panels." This message will not appear if "New" is selected manually.



Figure 2-13 TCU menu: Name of TCU

An available TCU name is suggested in the input field, although the user is able to change this. The default name is "TCU<N>", where <N> is the lowest number yet to be used. If, however, the name is already allocated after the OK softkey has been pressed (which may happen if a number of TCUs log on at the same time) and the suggestion has not changed, a new and unused name will be specified.

If the name selected was still available, this will now be allocated, and the TCU settings can still be adapted if required. To enable any changes to be made, a new dialog will appear in which all the parameters have been pre-assigned their default values. You can make any changes you like or just select "OK" to accept the existing values.

2.3.3 How to register a TCU on the system network

Preconditions

The boot server (NCU or PCU 50) defined in the system network as a DHCP master, must be switched on and be available in the network.

Sequence for a TCU

Procedure:

1. Connect TCU.

This opens the dialog "New operator panel (TCU)".

- 2. Select "New" to connect a new TCU and "OK" to confirm.
- 3. In the next dialog, accept the name suggested by the system or enter a name and confirm this with "OK".

The following parameters are pre-selected for the TCU:

Machine control panel address - MCP [0-255]192Electronic key system index - EKS [0-255]0Enable direct keysNo	Machine control panel address - MCP [0-255]192Electronic key system index - EKS [0-255]0Enable direct keysNo	Operator panel index - TCU [0-255]	1_
Electronic key system index - EKS [0-255] 0	Electronic key system index - EKS [0-255]0Enable direct keysNo	Machine control panel address - MCP [0-255]	192
Enable direct keys No	Enable direct keys No	Electronic key system index - EKS [0-255]	Θ
		Enable direct keys	No

- 4. Restart the TCU to apply the new settings.
- If you want to change the parameters, select "Main menu" → "Service this panel" → "Modify operator panel settings".

Sequence for the HT 8

Procedure:

1. Connect HT 8 to a connection module and calibrate the touch screen.

→ See also:How to calibrate a touch panel (Page 82)

Note

Additional softkeys are available for convenient touch panel operation:

- "OK" has the same effect as the <INPUT> key
- Select "DEF" to save the "Default" settings.
- "Edit" has the same effect as the <F10> or <MENU SELECT> key.
- 2. Select HT 8 Individual Mode:

According to the default setting for an HT 8, "HT 8 Individual Mode" is deselected with "No". This means "Auto" mode is activated for automatic detection in the system network. The HT 8 is automatically detected based on its name "DIP_". If "HT 8 Individual Mode" is activated with "Yes", the HT 8 is identified by its MAC address on the system network.

3. For an HT 8, confirm the "DIP..." name proposed by the system or adapt the name. You can select any other characters.

Press the <INPUT> key to apply the following values as default settings for the HT 8:

Operator panel index - TCU [0-255] Machine control panel address - MCP [0-255] Electronic key system index - EKS [0-255]	No
Machine control panel address - MCP [0-255] Electronic key system index - EKS [0-255]	10
Electronic key system index - EKS [0-255]	10
	0
Enable direct keys	No

The following message will then appear: "New TCU 'DIP10' registered."

Note

The TCU index is used to evaluate the direct keys. Direct keys can only be activated by appropriate devices. For an HT 8 the TCU index cannot be set, but is assigned by the system.

Activate direct keys

The signals from pressing the direct keys are sent directly to the PLC. In the PLC, the keys appear as 16 digital inputs.

Additional information on programming the PLC is provided in:

References: Function manual basic functions, basic PLC program (P3 sl)

Definition: Operator panel

The term operator panel designates a unit that consists of an OP/TP, a TCU or PCU and a machine control panel (MCP), that are connected to each other via Ethernet.

All TCUs and PCU 50 can be used along with OP/TP with "integrated TCU", e.g.: OP 08T, OP 015T, TP 015AT.

Specifying settings without machine control panel

If a PCU or a TCU has no Machine Control Panel (MCP), you must set one of the two following options:

• MCP address = 0 or no entry

After the change of user authorization, there is no switchover of the machine control panel; the previously active MCP remains active.

MCP address = 255

If the user authorization is transferred to this PCU or TCU, the previous machine control panel is deactivated and there is no active machine control panel from this point on.

Connecting a replacement TCU

Procedure:

1. Connect the new TCU.

The following dialog lists the TCUs on the system network along with their "active" or "inactive" status.

Operator pane	el service system - nev operator panel (TCU)	
	Please select which operator panel (TCU) should be replaced	
TCU1	(MAC 08:00:06:73:5a:7b)	
TCU2 TCU3 TCU4	(HAC 08:00:06:73:5a:76) (HAC 08:00:06:73:55:81) (HAC 08:00:06:73:5a:7c)	
		Cancel
		Ok
	(2/4 panels inactive)	
1	t Page∔ Paget	
Figure 2-14	TCU menu: New operator panel (TCU)	

2. Select the name previously assigned to the faulty TCU from the "New operator panel (TCU)" dialog. As a result, the new TCU is recognized on the network and acquires all of the configuration settings from the TCU that has been replaced.

2.3.4 Connecting-up the SIMATIC Thin Client Touch Panel

Registration in the system network

The SIMATIC Thin Client Touch Panel behaves just like a TCU when connecting-up. When registering in "Operator Panel Service System" enter a name in the system network. After this, the device is available in the "Service Network Center" with the hardware ID "SIMATIC TC":

Systen	n network cer	nter					X		x			_	Ð
Adapte Auailal	er OPs hle OPs of SIF	TCU suppo MENS-25	ort T C4E95 19	CU mode 92 168 21	Sys 4 241 (†	tem network his sustem):-	Compa	ny networ	k System	n basics	Sca	nned devic	4
St.	HW	h	lame		IP ac	idress	MAC	address	Res	olut.	MCP	DCK	T
1 📥	SIMATIC TC	TCU2		19	2.168.21	14.12	00:0e:8c:a	9:69:92	1824x70	68:16	192	disabled	1
2 📥	PCU	SIEMENS	-55	19	2.168.21	14.241	00:0e:8c:8	1:12:2b	800x60	0:1 6	previ	disabled	0
3 💥	TCU	TCU1		19	2.168.21	14.10	08:00:06:7	4:9f:2b			192	disabled	1
Pro UNC c	operties onnections (T	Ren CU2):	nove		Add					1			
	Server		Sess.	Pass	sword	Sus.loc	k Sus	.prio	Sta.prio	Scr	een	Channe	:
1 <det< th=""><th>fault></th><th>0</th><th></th><th>passwo</th><th>rd</th><th>0</th><th>1</th><th> 2</th><th></th><th></th><th></th><th>1</th><th></th></det<>	fault>	0		passwo	rd	0	1	2				1	
				1								M	
Pro	operties	Hen	nove		Add							Prove up	
Pro A	ipply	<u>D</u> iscard o	nove changes]	Add	Distribute <u>T</u> (U data		Invalida	te cache		Prove up <u>R</u> efresh vie	ω

Figure 2-15 SIMATIC Thin Client

See also

How to register a TCU on the system network (Page 30) Using the TCU's main menu (Page 16)

Note

Connection via USB at the rear

The SIMATIC Thin Client Touch Panel has a USB connection at the rear, which behaves just like the USB connection X204 of a TCU.

An external keyboard is recommended for commissioning and to operate the "Operator Panel Service System".

Operating the Touch Panel

To operate the Touch Panel, use the integrated keyboard:

Virtua	1 Keyba	band														
F1	F2	F3	; [-4	F5	F6	F7		F8	F9	F	10	F11	F12	Bac	kspace
Esc	! 1	@ 2		# 3	\$ 4	% 5	6		& 7	* 8	(9) 0	-	+ '	I ~~
Tab	C	į	W	E	R	: 1	r	Y	U	Ι		0	Р	{ [}]	Del
Cont	rol	Ĥ		S	D	F	G		Н	J	К	l	L	;;		Return
SI	hift		Z	Х	С	v		В	N	М		< ,	~ ·	? /	Sł	nift
xvkbd	Caps Lock		Alt							Alt	,	←	→	1	¥	Focus

Figure 2-16 Virtual Keyboard

The integrated keyboard is activated using the button to the far right on the start bar.

Reference

SIMATIC HMI, Operating instructions: Thin Client, Thin Client PRO

2.3.5 This is how you configure the SIMATIC Thin Client Touch Panel

Operating the start bar

The following functions are available in the start bar of the SIMATIC Thin Client: To select the SINUMERIK mode, press the button:

😺 🎇 M 📃 🎱 🛛	🔊 💫 📑 🚱	
-------------	---------	--

• The following buttons are important for operation as SINUMERIK operator panel:



To configure the SIMATIC Thin Client, press the button "Settings". You therefore open the "Operator panel service system":

М	Open
4	<u>S</u> ettings
\bigotimes	Close

To exit the SINUMERIK mode, press the button "Close".

• To make the configuration settings, press the button:



Select "Configure Thin Client":



To exit the SIMATIC configuration menu, press the button "Close".

Press the button to activate the integrated keyboard:



Preconditions

To make the following settings, you must be logged on as administrator. Press the "Settings" button:



1. Log on as a administrator using the specified password.

Result: As administrator you can see the complete menu of the SIMATIC Thin Client.

Note

All changes only become effective after pressing the "Enter" button on the "Virtual Keyboard" on the relevant side.

SINUMERIK mode when restarting

In order to return to the SINUMERIK mode automatically after a restart, proceed as follows:

- 1. In the "Applications" menu, select the "Autostart client application" tab.
- 2. Select the "SINUMERIK" option.

Calibrate Touch Panel

To calibrate the Touch Panel, proceed as follows:

- 1. In the "Device setup" menu, select the "Touch calibration" tab.
- 2. Follow the instructions and touch the Touch Screen at the appropriate points to calibrate.

2.3.6 Settings in the "config.ini" file

Boot server

The active boot server (DHCP server) is detected and displayed in the System Network Center (SNC). The boot server accesses this configuration file accordingly. Changes to the config.ini file do not become effective until the relevant TCU or PCU is next booted.

Note

Timeout

If too much time (> 15 min.) elapses between commands when the user is making entries (e.g. TCU name) as part of the initial TCU log-on process, the time-out error will be suppressed. No error message will appear and the FTP connection will be reopened.

Configuration of the config.ini file

The config.ini file has the following configuration:

	Range of values	Default	Meaning
[Station]			
tcuIndex = Number	0 255	DIP 1	for TCU
<pre>mcpIndex = Number</pre>	1 254	DIP 192	for MCP via Industrial Ethernet
eksIndex = Number	0 255	DIP 0	for EKS
dckEnable = 0	0 or 1	0	for DCK
	Range of values	Default	Meaning
-----------------------------------	------------------	--	--
MaxHostIndex = Number		Number of subserved subserved states Number of subserved states and severates a subserved states of the subserved states and	equent PCUs or NCUs to which over.
[DEFAULT]			
SessionNumber = Number			
Password = String			
SuspendLock = Number	0 or 1	0	0: No displacement disable
			1: Displacement disable set
SuspendPriority = Number	1 10	1	1: Lowest priority
			10: Highest priority
StartupPrio = Number			Boot sequence:
			The lower the number the higher the priority
ScreenOnFocus = String Number		Not relevant	
ChannelOnFocus = Number		Not relevant	
[host_1]			
Address = [hostname IP-Adresse]			From data file structure
SessionNumber = NUMBER			
Password = STRING			
SuspendLock = NUMBER	0 or 1	0	0: No displacement disable
SuspendPriority = NUMBER	1 10	1	1: Lowest priority
	110	I	10: Highest priority
StartupActive = 0	0 or 1		Display screen after boot
StartupPrio = NUMBER	0 not too high		Boot sequence:
-	o not too high		The lower the number the higher the priority
ScreenOnFocus = STRING NUMBER		Not relevant	
ChannelOnFocus = NUMBER		Not relevant	
[host_2]			
[host_MaxHostIndex]			
[T2M2N]			
SK1 = ch_grp x	2 x 8 characters	Empty	Softkey inscription (2 lines)
SK2 = ch_grp x	2 x 8 characters	Empty	Softkey inscription (2 lines)
SK3 = ch_grp y	2 x 8 characters	Empty	Softkey inscription (2 lines)
SK32 = ch_grp z	2 x 8 characters	Empty	Softkey inscription (2 lines)

2.3 Commissioning TCU

Note

Connecting an MCP via PROFIBUS

If an MCP is connected via PROFIBUS, then the MCP Index = 0 should be set.

Compatibility of software versions

If a "config" file is available for the TCU, the data file structures of older versions are transferred to the config.ini file and the data file structure is then deleted.

Comment

In the config.ini file comment lines are indicated by the # character preceding a line.

2.3.7 Settings in the "TCU.ini" file

Directories

The tcu.ini files is created in the following directories:

•	NCU	/siemens/system/etc/tcu.ini
		/user/system/etc/tcu.ini
		/oem/system/etc/tcu.ini
		/oem i/system/etc/tcu.ini
•	PCU	F:\addon base\system\etc\tcu.ini
-	1 00.	F:\user base\system\etc\tcu.ini
		F:\oem base\system\etc\tcu.ini

NOTICE

Only the following entries are evaluated by SINUMERIK Operate:

- VNCServer/VetoMode
- VNCServer/AlarmBoxTimeOut
- VNCServer/FocusTimeout
- VNCServer/AdaptResolution
- VNCServer/MaxActiveTCUs

and VNCViewer/ExternalViewerSecurityPolicy

Structure and content

In the tcu.ini file comment lines are indicated by the # character preceding a line.

[VNCServer]

- # VETO MODE
- # VetoMode enabled:
- # VNC server notifies the HMI regie before another
- # panel gets the focus.
- # VetoMode disabled:

Configure the system network 2.3 Commissioning TCU

```
# Focus timeout mode enabled (implicitly; see FOCUS TIMEOUT)
# (0=DISABLE, 1=ENABLE)
VetoMode=1
# FOCUS TIMEOUT
# Guaranteed time period (in sec) a panel can hold the
# focus at least before another panel can get the focus.
# The time period starts from the moment the panel has
# gained the focus.
FocusTimeout=10
# ALARMBOX TIMEOUT
# The time period (in sec) a messagebox is shown (i.e. is
# operable) in the case of VetoMode=1; no meaning else
AlarmBoxTimeOut=5
# RESOLUTION
0 = SYSTEM
1 = AUTO OP 1 (default)
2 = AUTO OP 2
3 = AUTO_MON_1
4 = AUTO MON 2
5 = 640 \times 480
6 = 800 \times 600
7 = 1024 \times 768
8 = 1280 \times 1024
# RESOLUTION ADAPTION
# AdaptResolution enabled:
# At system runtime, the system resolution is automatically
# adapted to the resolution of that panel which
# currently owns the focus.
# AdaptResolution disabled:
# The system resolution is set at system startup phase.
# At system runtime, system resolution remains unchanged
# whichever resolution the currently focused panel owns.
# (0=DISABLE, 1=ENABLE)
AdaptResolution=1
# COLOR DEPTH
# The value the system color depth is set at system
# startup phase
# ColorDepth SYSTEM:
# System color depth remains unchanged whichever value
# the color depth is currently set to.
# COlorDepth 16 BIT
# System color depth is set to 16 bit.
# COlorDepth 32 BIT
# System color depth is set to 32 bit.
# (0=SYSTEM, 1=16 BIT, 2=32 BIT)
ColorDepth=1
```

Operator components and networking (IM5) Commissioning Manual, 02/2011, 6FC5397-1AP40-0BA0

2.3 Commissioning TCU

```
# INIT TIMEOUT
# Guaranteed time period (in sec) the HMI manager waits
# for VNC server initialization.
InitTimeout=300
# PCU STARTUP TIMEOUT
# Attention: The parameter is only provided for a PCU
# configuration with local attached OP !
#
# The startup phase is completed if this timeout period
# has passed and no registration of a TCU has been car-
# ried out at this time.
PCUStartupTimeout = 90
# TCU STARTUP STEP TIME
# The startup phase starts at the first TCU registration.
# The startup phase is completed if the TCUStartupStepTime
# period has passed and no registration of another TCU has
# been carried out at this time.
TCUStartupStepTime = 30
[VNCViewer]
```

```
# EXTERNAL VIEWER MAX CONNECTIONS
# Maximum number of external Viewer Connections (1 or 2)
# ExternalViewerMaxConnections=2
ExternalViewerMaxConnections=1
# EXTERNAL VIEWER SECURITY POLICY
# The user rights, assigned to an external VNCViewer
# ExternalViewerSecurityPolicy=0 : no external viewers allowed
# ExternalViewerSecurityPolicy=1 : Guest Mode (View-Only)
# ExternalViewerSecurityPolicy=2 : Administrator Mode
# ExternalViewerSecurityPolicy=1
# EXTERNAL VIEWER MAX REFUSED REQUEST
# Number of refused external viewer requests, after which
# a timeout period is carried out for the viewer.
ExternalViewerMaxRefusedRequest=3
# EXTERNAL VIEWER CONNECTION TIMEOUT
# Timeout Period in seconds, after MaxRefusedRequest
# is reached. No viewer request is possible during the
# Timeout Period.
ExternalViewerConnectionTimeout=240
# EXTERNAL VIEWER REQUEST TIMEOUT
# The time period (in sec) the request-messagebox is shown (i.e. is
```

```
# operable)
```

```
ExternalViewerRequestTimeout=20
# EXTERNAL VIEWER REQUEST TIMEOUTMODE
# The behaviour if request-timeout elapsed
# ExternalViewerReqTimeoutMode=0 : dismiss request
# ExternalViewerReqTimeoutMode=1 : accept request
ExternalViewerReqTimeoutMode=1
# REMOTE ACCESS IP-ADDRESS
# IP-V4-format
X127RemoteAccessIP=192.168.215.29
# MODEM IP-ADDRESS
# IP-V4-format
X127ModemIP=192.168.215.30
# SERVICE HOST
# NCU with teleservice adapter on its X127 interface
# Use "Self" for your own X127 interface
```

IP-V4-format or DNS-Name or Self X127ServiceHost=Self

[PingService]

PING SERVICE MODE
(0=DISABLE, 1=ENABLE)
PingServiceMode=0

PING SERVER IP-ADDRESS
IP-V4-format
PingServerIP=

PING SENDING DATA
PingTransmissionData=

```
# PING SERVER PORT-NUMBER
PingServerPort=
```

```
# PING TRANSMISSION PERIOD
# Period in minutes, in which transmission data will be sent
PingTransmissionPeriod=2
```

```
# PING TRANSMISSION INTERVAL
# Time-interval in seconds between two pings
PingTransmissionInterval=5
```

[externalTcu]

EXTERNAL TCU IP-ADDRESSES

2.3 Commissioning TCU

```
# List of accepted TCUs in IP-V4-format (index 1 to maximal 16)
ExternalTcuIP_1=
[TCU_HWSService]
# TCU CONNECT TIMEOUT
# Guaranteed time period (in sec) the HMI manager waits
# for TCUs recognized as connected TCUs by the TCU_HWS
# service.
TCUConnectTimeout=30
# TCU CONNECT TIMEOUT FOR HEADLESS STARTUP
# Guaranteed time period (in sec) the HMI manager waits
# for TCUs recognized as connected TCUs by the TCU_HWS
# service, if a PCU panel doesn't exist and no TCUs are
# connected till now. This time period is effective ad-
# ditionally to the time period TCUConnectTimeout.
```

HeadlessTCUConnectTimeout=60

Note

External VNC Viewer

The "Operation without SINUMERIK OP" option is required when using more than 1 external VNC Viewer.

See also

SNC: Configuring "TCU mode" (Page 57)

2.3.8 Displacement mechanism for TCUs

Supplementary conditions

The following supplementary conditions apply when operating the TCU:

2 active TCU connected in parallel to NCU 710.2, 710.3 PN

4 active TCU connected in parallel to NCU 720.2, NCU 730.2, NCU 720.3 PN, NCU 730.3 PN

4 active TCU connected in parallel to PCU

To operate a machine with more operating stations then the maximum number the displacement mechanism ensures that **only the permitted number of TCUsare active** in shadowing grouping. The remaining TCUs are switched to a passive mode, which means they no longer represent a load relative to the resources. Thus the number of TCUs that can be connected to one HMI application is practically no longer limited, the limitation is the number of concurrently active TCUs.

Configuration

There are two new entries in the config.ini file for a TCU for the displacement mechanism:

• **SUSPENDLOCK:** controls whether the TCU can be displaced via the displacement mechanism.

SUSPENDLOCK = 0 means that a displacement disable is not set (preset), i.e. the TCU may be displaced by any other TCU.

SUSPENDLOCK=1 means that this TCU can never be displaced.

• **SUSPENDPRIORITY:** This entry specifies a priority for the displacement mechanism to the TCU. In a displacement process the TCUs among the active TCUs with the lowest priority that do not have a displacement disable will displaced. The priority is specified as numeric value in the range 1 - 10.

The preset is 1 (lowest priority).

Note

If you set a displacement disable for a TCU then specification of a displacement priority is unnecessary because it never is used due to the displacement disable.

Displacement rules

The TCU can assume the following states:

- The TCU is active and has user authorization: This can be identified as the TCU shows the screen of the operating software and the screen is bright.
- The TCU is active, however, in the monitoring mode (i.e. it presently has no user authorization): This can be identified as the TCU shows the screen of the operating software, however, it is darkened in comparison to the TCU with user authorization.
- The TCU is passive: The TCU shows the selection menu of the possible connections instead of a screen of the operating software, and the softkey for selection of the last active connection of the TCU is shown in color.

When a TCU boots, the TCU always attempts to establish the first connection specified in its config file. The TCUs from a shadowing group establish their specified connection one after the other as long as the maximum number of permissible active operator units is not exceeded.

If a TCU encounters the situation that this number is already reached in its power up, then it attempts to obtain a connection via the displacement mechanism. If it can displace a formerly active operator unit then it takes on the active status itself, otherwise it transitions to passive status immediately after booting.

2.3 Commissioning TCU

2.3.9 Disable switchover between TCUs via PLC

Overview

The TCU switchover disable offers the option of dynamically disabling switchover from one TCU to the next when the system is running via the PLC. For the duration of the disable, a user authorization request to change user authorizations between TCUs will be ignored by the system and rejected.

The rejected user authorization request causes a message to be output in the dialog line of the HMI, in the form of a feedback message for the requester. The message disappears after five seconds.

HMI ↔ PLC data interface

The "switchover disable" function is always active and does not have to be switched on explicitly. The function is controlled by a data bit in the PLC. The HMI transfers the active OP to the PLC, thus forming the basis of the control function in the PLC.

The control bits and control information for this function are stored in the m:n data interface of the PLC. In terms of m:n, this function can be operated separately for the currently overridden HMIs in both m:n online interfaces (DB19.DBW120 ff for HMI1 and DB19.DBW130 ff for HMI2). If a system is not running an m:n, only the first m:n online interface is used for this function.

Switchover disable is controlled by a TCU_SHIFT_LOCK bit, managed by the user, on each HMI in the PLC. The bit address for the first HMI is DB19.DBB126.6 and DB19.DBB136.6 for the second HMI.

The PLC m:n online interface is expanded so that byte DB19.DBB118 is still added to the first interface and byte DB19.DBB119 to the second. These bytes acquire the index of the active TCU (of the active OP) for the appropriate HMI. The byte is called TCU_INDEX. The appropriate HMI uses the TCU index configured for the active TCU to describe the TCU_INDEX byte.

The TCU_SHIFT_LOCK bit is monitored by the appropriate HMI. A value = 1 triggers the switchover disable; switchover is enabled if the value returns to 0. The TCU_SHIFT_LOCK bit can be set, for example, to the PLC by the user pressing a key or it can be managed by the PLC user program according to its own logic. The TCU_SHIFT_LOCK bit is managed in the PLC exclusively by the user; the HMI only accesses this bit in read-only mode.

The HMI assigns the configured index of the TCU or PCU whose OP currently possesses user authorization in the shadow grouping. If no OP is active, a value of 0 is entered in TCU_INDEX.

If no TCU index is configured for the active TCU (active OP), the value 255 = undefined is presented as the TCU index. This means that the values 0 and 255 may not be configured as the TCU index.

Configuration

The TCU index and machine control panel address (MCP address) are configured on the PCU. The TCU index is set in the "OP Properties" dialog of the "System Network Center" program.

Operating principle

If the TCU_SHIFT_LOCK bit is set for switchover disable, a user authorization request is not carried out independently of the mode set on the HMI for allocation of user authorizations (veto mode), i.e., a change of user authorization is rejected.

This message appears on all OPs for approximately 5 seconds:

"No switchover: Switchover disable set in current PLC."

While this message is displayed, operations on the OP with the user authorization can still be carried out unaffected.

Note

The switchover disable only relates to changing the user authorization on the OPs in a shadowing grouping on a PCU.

Active switching from one OP to another PCU is not prevented.

Special features

The following special cases should be noted:

- Even if switchover disable is set, the TCU_INDEX field value may change in the PLC. This is the case if:
 - The OP in possession of the user authorization is actively switched to another PCU. Depending on whether another TCU takes on the user authorization or whether no TCU is currently active, either the index of the TCU or the PCU itself (if its directly connected OP becomes active) is entered, in exactly the same way as when there is a user authorization switchover.

This can also be the value 255, if no TCU index is available for the OP. 0 is entered if an OP is no longer available in the shadow grouping.

- An m:n switchover is in progress. The HMI program of the incoming PCU deactivates the HMI program which is active on it. An OP from the shadow grouping of the new (incoming) PCU must receive the user authorization. The TCU index of this OP is entered in the TCU_INDEX field.
- A PCU is disconnected from a NCK/PLC in the context of m:n. No HMI program and, therefore, no OP with user authorization is then available on the exited NCK/PLC. This is signaled independently of a switchover disable by entering the value 0 into the TCU_INDEX field.
- If a TCU is actively switched over to another PCU, it can be deactivated there, i.e. it does not obtain the user authorization, if a switchover disable is set for the destination PCU.
- With an m:n PCU switchover the PCU is switched to another NCK and, therefore, to another PLC the PCU takes on the switchover disable settings of that PLC.
- The m:n interlock options on the PLC side have priority over the TCU switchover disable, so that a set TCU switchover disable cannot prevent an m:n switchover. If necessary, the m:n interference options should be synchronized here with those for the TCU in the PLC. It may, for example, be practical to set or remove the m:n displacement disable simultaneously with the TCU switchover disable.

2.3 Commissioning TCU

2.3.10 Example: How to select the behavior of the TCUs during boot up

Example: Distributing boot support across two PCUs

To distribute boot support over two PCUs, "Boot support runtime and configuration only (TFTP/FTP)" must be selected on PCU_1 and "Boot support IP address only (DHCP)" must be selected on PCU_2.

The "No boot support" configuration must be selected on PCU_3:

Table 2-1 I CO support settings	Table 2- 1	"TCU support"	settings
---------------------------------	------------	---------------	----------

TCU_1	TCU_2		TCU_3		TCU_4
192.168.214.10	192.168.214.11		192.168.214.12		192.168.214.13
VNC connections:	VNC connections:		VNC connections:		VNC connections:
192.168.214.241 192.168.214.242 192.168.214.243	192.168. 192.168.	214.241 214.243	192.168.214.241 192.168.214.243		192.168.214.241 192.168.214.242
		Switch to sys	stem network		
PCU_1		PCU_2		PCU_3	
192.168.214.241		192.168.214.242		192.168.2	214.243
Services:		Services:		Services:	
X DHCP		✓ DHCP	X DHCP		
✓ TFTP	ТЕТР Х ТЕТР		X TFTP		
✓ FTP X FTP			X FTP		
✓ VNC	VNC 🗸 VNC			✓ VNC	
		Compan	y network		

In this case, PCU_2 serves as the DHCP server which provides the IP addresses for the connected TCUs. PCU_3 is not involved in booting the TCUs, it is however displayed by the TCUs using VNC.

2.4.1 Function overview of the System Network Center

System Network Center (SNC) functions

The individual tabs are used to configure the system network:

Tab	PCU	NCU	Function
Adapter	~	\checkmark	The active network adapter (Page 49) is displayed.
OPs	~	~	A list of the known OPs (Page 50) and their codes are displayed: Status, name, IP address, resolution ,and depth of color, MAC address, the assigned MCP address and TCU index.
			The VNC connections available and the associated IP address of the boot server, displacement disable, and displacement priority are listed for each TCU.
TCU support	\checkmark		This tab is only active and available on a PCU.
			The services needed to operate a TCU (Page 55) can be started, stopped, and activated or deactivated.
TCU mode	~	\checkmark	TCU configuration (Page 57): "Veto mode", resolution adjustment, and the waiting times when booting.
System network	\checkmark	>	This tab is used for setting the X120 interface (Page 59).
Company network		\checkmark	This tab is only active and available on an NCU. This tab is used for setting the X130 interface (Page 61).
System basics		\checkmark	This tab is only active and available on an NCU. This tab is used for setting additional parameters (Page 62).
Scanned devices	~	\checkmark	The devices in the system network (Page 62) are displayed on this tab.

Start SNC



The "System Network Center" program is available on both the NCU and the PCU:

- Use this link on the PCU's desktop to start the "System Network Center" program.
- Use the "sc start snc" command on the NCU to call the "System Network Center" program. To operate it, you will need a mouse.

Using the SNC

The following softkeys are available when using the SNC:

Button	Meaning
"Apply"	Press "Apply" to accept the changed settings.
	This button restarts a TCU or HT 8. Where changes have been made on a PCU (to the MCP index, for example), the PCU will be need to be restarted manually.
"Discard changes"	Select "Discard changes" to discard the changes.
"Distribute TCU data"	"Distribute TCU data" distributes TCU data to other machines in the system network. The "Distribute TCU data" button is only active on the active DHCP server.
"Invalidate cache"	
"Refresh view"	The data belonging to a TCU is reloaded in the display by pressing "Refresh view".
"Exit"	Press "Exit" to exit the dialog.

Note

Response after selecting "Apply"

When "Apply" is used to confirm changes made to the settings for an OP, the OP will perform a restart to activate the changes.

During the boot sequence after the restart, the OP connects to the default server - which is SINUMERIK operate. The SNC does not start automatically during the boot sequence.

If you wish to change additional settings and/or parameters with the SNC, restart the SNC in the manner described above.

Integration in HMI PRO sl

Precondition: The option "Operation SW HMI PRO sl RT" is available.

For commissioning and network diagnostics in HMI PRO sl, integrate the "System Network Center" program in the operating software.

Procedure:

- 1. Open a DOS command shell with "Start menu" → "Run" and enter "cmd".
- 2. Enter, for example, the following command into the DOS command shell:
 - SNC -page scanned_devices -subpage all

Result: The "System Network Center" is opened with the tab page "Scanned devices" and the sub-tab "All" and can be edited. A mouse is recommended for operation.

Note

All tab pages can be specified. Spaces when labeling the tab page can be replaced in the command line using "_" underline.

Storage path for the "basesys.ini" file

Settings for the system network are also made in the "basesys.ini" file. In the current version note the following storage paths:

• On the PCU 50, the file is stored under E:\Siemens\system\etc and the user versions are stored under F:\user_base\system\etc.

In this basesys.ini file only the section [InternalInterface] is available.

• For a Linux basic system the original file can be found on the CompactFlash Card under the path /system/usr/etc. OEM versions are stored under /oem/system/etc, as well as user versions under /user/system/etc.

References

Commissioning Manual Base Software and Operating Software: "NCU Operating System"

2.4.2 SNC: "Adapter" tab

"Adapter" tab

Default setting:

- PCU delivery condition: "Ethernet 2 (System Network)"
- Only "Ethernet 1 (Company Network)" is available on the NCU.

System	network center		_ 🗆 ×
Adapter	OPs TCU support TCU mode System network	Company netwo	rk 🛛 System bas 🖣 🕨
Use adap	ter:		
Etherne 192.168	t 2 (System Network) .214.241		
Local ada	apter list:		
Use	Name	IP address	MAC address
1 🗸	Ethernet 2 (System Network)	192.168.214.241	00:0E:8C:8D:E9:F2
2	Ethernet 1 (Company Network)	10.113.150.225	00:0E:8C:8D:E9:F1
Â	pply Discard changes		<u>R</u> efresh view
Active DI	ICP low standby: S012266 (this system) SYNC:1 of 1		<u> </u>

Figure 2-17 "Adapter" tab (default)

The following slave states are displayed:

- The connection is selected and active.
- The connection is selected and not active because the TCU is not switched on for example.
- X The connection is not selected and cannot be accessed because e.g. no network cables are plugged in.

2.4.3 SNC: "OPs" tab

Distribution

The "OPs" tab is divided into two areas:

P	yster	m netwo	rk center								System network center					
Adapter OPs TCU support TCU mode System network Company network System bas 🜗																
Available OPs of S012266 192.168.214.241 (this system):																
	St.	HW	Nam	e l	P address	MAC add	lress R	esolut.	MCP	DCK	TCU	EKS				
1	4	PCU	S01226	6 192.	168.214.241	00:0e:8c:8d	:e9:f2 10:	24x768:	193	disabl	1	0				
2	¥	HT8	DIP14	192.	168.214.13	00:1f:f8:01:	DO:f6	-		disabl		0				
U	NC c	onnectio Seru	UNC connections (DIP14):					Sta pri	in S	creen	Cha	nnel				
							- auprio									
1	<de< th=""><th>fault></th><th>01</th><th>0</th><th>password</th><th>0</th><th>1</th><th>2</th><th></th><th></th><th>1</th><th></th></de<>	fault>	01	0	password	0	1	2			1					
1 2	<de 192</de 	efault> 2.168.214	4.241	0 0	password password	0 0	1 1	2 2			1 1					
1	<de 192 Pr</de 	efault> 1.168.214 roperties	4.241	0 0 Remo	password password	0 0 Add	1	2 2		M	1 1 ove up)				
1	<de 192 Pr</de 	efault> 2.168.214 coperties Apply	4.241	0 0 Remo	password password we hanges D	0 0 Add istribute ICU	1 1 data	2 2 validate c	ache	M	1 1 ove ut) iew				

① In the top portion select an OP that you want to configure in the list of "Available OPs".

- ② In the lower portion select a VNC connection that you want to configure in the list of "VNC connections".
- ③ It is necessary to reboot all active TCUs for the changed data to become effective. To do this use the "Apply" button. Use the "Discard changes" button to discard the changes.

Figure 2-18 "OPs" tab

What will be displayed?

The "Available OPs" list contains all OPs that either have configuration data on the CPU or that are registered with the TCU hardware service. This produces the following states ("State" column) for an OP:

State	Meaning
√ PCU	The local OP is switched on (or registered with the TCU hardware service) and configuration data is present on the CPU.
	Within this state all columns of the list are filled out.
×	The TCU is switched on (or registered with the TCU hardware service) and configuration data is present on the PCU.
	Within this state all columns of the list are filled out.
*	The TCU is switched on (or registered with the TCU hardware service) however no configuration data is present on the PCU.
	Within this state the MAC address, the MCP address, the index, and all VNC connection data are not available. Moreover this TCU cannot be edited because the appropriate configuration data are not available.
×	The TCU is not switched on (or not registered with the TCU hardware service) however configuration data is present on the PCU.
	Within this state the IP address and the resolution are not available because these values cannot be determined for the TCU.
?	Question mark: the status of the device is unknown.

2.4.4 How to configure an OP

Configuring an OP

The "OPs" tab is divided into two areas.

All the devices in the system network are displayed under "Available OPs".

Use the following procedure:

- 1. To configure a TCU that has not yet been connected, use "Add".
- A TCU that is presumably no longer operated on this system can be deleted. To do this click on the "Remove" button. Deleting the configuration data is only possible if the TCU is not connected.
- 3. If you click on the "Properties" button the dialog box opens for configuring the settings of the selected components:

💻 Set/Modify	properties for '5012266'					<u>?</u> ×
Name:	S012266	Assig	nment of softkeys-			
MARY	00-0-0-04-00-60	SK1:	CH_GRP_0 🚊	SK17:	CH_GRP_0	• *
1140.	00.06.00.00.63.12	SK2:	CH_GRP_0 🚍	SK18:	CH_GRP_0	* *
Related MCP:	C Assign MCP: 1 🚊 (1254)	SK3:	CH_GRP_0 🚍	SK19:	CH_GRP_0	*
	C No MCP	SK4:	CH_GRP_0 🚊	SK20:	CH_GRP_0	*
	Previous MCP	SK5:	CH_GRP_0 🚍	SK21:	CH_GRP_0	* *
DCK enable:		SK6:	CH_GRP_0 🚍	SK22:	CH_GRP_0	* *
DOIL ON ON ON	C Yes	SK7:	CH_GRP_0 🚍	SK23:	CH_GRP_0	*
	• NO	SK8:	CH_GRP_0 🚍	SK24:	CH_GRP_0	*
TCU Index:	0 🚍 (0255)	SK9:	CH_GRP_0 🚍	SK25:	CH_GRP_0	* *
EKS Index:	0 🕂 (0255)	SK10:	CH_GRP_0 🚊	SK26:	CH_GRP_0	* *
Ilirtual	<u></u>	SK11:	CH_GRP_0 🚍	SK27:	CH_GRP_0	* *
keyboard:	• Never	SK12:	CH_GRP_0 🚍	SK28:	CH_GRP_0	*
	C Always	SK13:	CH_GRP_0 🚍	SK29:	CH_GRP_0	-
	• Auto	SK14:	CH_GRP_0 🗄	SK30:	CH_GRP_0	*
🗹 Configurati	on of T:M:N enabled	SK15:	CH_GRP_0 🚍	SK31:	CH_GRP_0	*
<u>0</u> k	<u>C</u> ancel	SK16:	CH_GRP_0 🗮	SK32:	CH_GRP_0	×.

Figure 2-19 "OP Properties" dialog

Parameter	Range of values	Meaning
Name	<tcu name=""></tcu>	The name of the TCU can be changed.
MAC		Displays the MAC address.
Related MCP	1 254	DIP switch setting will be transferred.
		Default setting: Previous MCP
DCK enable	<no></no>	Direct keys not activated (default setting).
	<yes></yes>	Direct key activated (only useful for appropriate devices).
TCU index	0 255	The TCU index is used to evaluate the direct keys (only practical for appropriate devices).
EKS idex	0 255	DIP switch setting will be transferred.

Parameter	Range of values	Meaning
Virtual keyboard	<never></never>	The virtual keyboard is never displayed.
	<always></always>	The virtual keyboard is always displayed.
	<auto></auto>	The virtual keyboard is displayed when required (default setting).
Configuration of T:M:N enabled		
Softkey text	<2 x 8 characters>	Softkey inscription (2 lines)

See also

Settings in the "config.ini" file (Page 36)

References:

t:m:n configuration

- Commissioning Manual Base Software and Operating Software (IM9)
- Commissioning Manual Base Software and HMI-Advanced (IM4

2.4.5 How to configure VNC connections

Configuring a VNC connection

The "OPs" tab is divided into two areas:

All the connections that the selected TCU can make with VNC servers are shown under "VNC connections". The servers are specified using their IP address.

NOTICE

The defaults for VNC connections cannot be deleted.

If a TCU or an HT 8 is operated via a PCU using direct keys or MCP, the IP address of the PCU and the IP address of the NCU must be entered under "VNC connections".

Use the following procedure:

- 1. To add a new connection use "Add".
- 2. If the selected TCU can no longer establish a connection to the selected VNC server, then delete the connection by clicking on the "Remove" button.

3. If you click on the "Properties" button the dialog box opens for configuring the VNC connection:

•

Figure 2-20 Dialog box "Edit VNC connection"

Parameters	Range of values	Meaning
Server list		IP address or name of a VNC server (NCU or PCU) consisting of a character string in accordance with the rules for hostname.
Password	password	Password, default setting: "password"
Suspend lock	0 or 1	0: No displacement disable
		1: Displacement disable set
Suspend priority	1 10	1: Lowest priority
		10: Highest priority
Start active	0 or 1	After power up a screen is displayed.
Start priority	0 not too high	Boot sequence: The lower the number the higher the priority
Screen on focus		
Channel on focus	0, 1 8	Default setting: 1

CAUTION

If the operator panels have been set up in such a way that several operator panels are connected to the same HMI after booting, it is not possible to predict which operator panel will be active after booting. This may occur under the following conditions:

- No assignment has taken place in the config.ini.
- The config.ini file specifies that several operator panels are connected to the same HMI.

"Scan devices" button

Scanning all devices in system network	<u>? ×</u>
Scanning object	
192.168.214.85	
Scanning result	
Reply from 192.168.214.241	
	Cancel



See also:

SNC: "Scanned devices" tab (Page 62)

2.4.6 SNC: Configuring TCU support services

"TCU support" tab

On the "TCU support" tab select which services will be started on the TCU at power up: The preset is the configuration "Complete TCU support".

System network center						
Adapter OPs TCU support	TCU mode System networ	k Company network	System bas ◀ ►			
Default configuration: Complete T	CU support		•			
Manual configuration						
Services						
All: Start Sta	op Restart	Enable	Disable			
DHCP: 🗸	running	Stop	Disable			
TFTP: 🗸	running	Stop	Disable			
FTP: 🗸	running	Stop	Disable			
UNC: 🗸	running	Stop	Disable			
Refresh view						
Active DHCP low standby: S012266	(this system) SYNC:1 of 1		<u>E</u> xit			

Figure 2-22 "TCU support" tab

Selecting a configuration

The following configurations are available under "Default configuration":

• Complete TCU support:

Complete TCU support is activated in these configurations and all the services listed below are carried out.

No boot support:

The services for booting connected TCUs are deactivated in these configurations. The TCU hardware service and the VNC service are executed. The TCUs can only be booted from another PCU or NCU.

• Boot support runtime and configuration only (TFTP/FTP):

DHCP services are deactivated in this configuration. The remaining services are carried out. The IP addresses of the connected TCUs must come from another PCU or NCU. Booting is however executed from this PCU. To do this, the PCU or NCU supplying the IP addresses must use this PCU as "boot server".

Boot support IP addresses only (DHCP):

TFTP and FTP services are deactivated in this configuration. The remaining services are executed.

The PCU provides the TCUs with IP addresses but the TCU must be booted by another PCU or NCU. A corresponding boot server must be specified for this purpose on the "DHCP settings" tab.

• Manual configuration:

With the manual configuration, each service can be started or stopped and activated or deactivated individually. The current status of the corresponding service is displayed in the status bar.

2.4.7 SNC: Configuring "TCU mode"

"TCU mode" tab

Set the following parameters on the "TCU mode" tab:

System network center		
Adapter OPs TCU support	TCU mode System network	Company network System bas ◀ ▶
☑ Veto mode Alarm bo	x timeout: 5 📩 sec.	TCU focus timeout: 10 📩 sec.
☑ Resolution adaption		
Color depth		
C System	● 16 bit	© 32 bit
External viewer security policy o no ext. viewers allowed Apply Discard cha	Guest Mode(View-Only)	Administrator Mode(operation mode) Reset to defaults Refresh view
Active DHCP low standby: S012266	(this system) SYNC:1 of 1	<u>E</u> xit

Figure 2-23 "TCU mode" tab

	Description	Relevant parameter in the tcu.ini file
ſ	Activate "Veto mode" on the TCU that loses the user	VetoMode
	authorization, a message will be output in this regard. The VNC service reports to HMI sequence control before another	FocusTimeOut
	operating device receives user authorization.	AlarmBoxTimeOut
	 Enter a time in seconds (Alarm box timeout) during which change of user authorization to a different TCU can be rejected. 	
	 If "Veto mode" is selected (this is the default setting), a user authorization request will appear. The user authorization request can be refused from the active OP. The "Veto mode" is only effective when the HMI program is active. "Veto mode" does not apply in "Service mode". 	

Description	Relevant parameter in the tcu.ini file
• If "Resolution Adaption" is activated (default) then during runtime the screen resolution is always adapted to the currently displayed operator panel.	AdaptResolution
• If "Resolution adaption" is deactivated, the zoom function will use the greatest resolution. In a worst-case scenario, the screen resolution may change from 15" to 8" and become difficult for the user to view.	
• The default setting for color depth is 16 bits. The color depth should only be changed where this is definitely demanded by an application.	Color depth
For an external VNC viewer on a PG/PC or PCU 50:	ExternalViewerSecurityPolicy
• no ext. viewer allowed: Maximum of 2 are permissible.	
Guest mode (view only): The user can only view.	
Administrator mode (operation mode): The user can also operate the system.	

NOTICE

Configuration

If the PCU has a directly connected OP, its resolution must be greater than or equal to the resolution of all the OPs on the TCUs.

This applies with and without "Resolution adaptation":

If a PCU does not have a directly connected OP, the greatest resolution of the active (switched on) TCUs/panels is determined and set during booting.

Advanced Settings (PCU only)

Use the "Advanced Settings" button to display additional setting possibilities. The changes made are saved in the tcu.ini file under F:\user_base\system\etc\tcu.ini.

See also

Settings in the "TCU.ini" file (Page 38)

2.4.8 SNC: Configuring the X120 interface (System network)

"System network" tab

Set the following parameters for X120 on this tab:

Qt	Sys	tem network cent	er		- 0 ×		
OPs TCU sup	port TCU mode	System network	Compa	ny network	System basics		
DHCP IP address allocation (X120)							
Range start: 1	129 . 80 . 7	. 10 Sta	tic IP:	129 . 80	. 4 . 2		
Range end: 1	29 . 80 . 7	. 239 Sut	net mask:	255 . 25	5.0.0		
Subnet type: 1	16 bits network part	▼ Alia	s IP:	0.0	.0.0		
Subnet mask: 2	255 . 255 . 0	. 🛛 🛛 Sut	net mask:	255 . 25	5.255.0		
DHCP server syn	chronisation (X120) —						
Sync mode: 🤇	O Off	🔾 low priority	high	priority	○ master priority		
Timeout for waitir	ng for master 120	🔹 sec.	\odot clier	nt sync	○ client no sync		
Miscellaneous							
DNS Domain:	localtest						
PN station name:							
NAT routing:	X120 and X127 to X	130 enabled		•			
Host name:	NCU3			valid on X1	20, X130 and X127		
<u>A</u> pply	Discard changes	<u>C</u> lear DHCP	Distr	ibute D <u>H</u> CP	<u>R</u> efresh view		
Active DHCP master: PCU2 SYNC:3 of 3							

Figure 2-24 "System network" tab on NCU

Configure the system network

2.4 System Network Center (SNC)

System network center		_ 8 ×
Adapter OPs TCU support TCU mode System network	k Company network System basics Scanned o	levic 🔹 🕨
Range start:	192 . 168 . 214 . 10	
Range end:	192 . 168 . 214 . 239	
Subnet type:	24 bits network part 💌	
Subnet mask:	255 . 255 . 255 . 0	
DHCP server synchronisation (X120)		
Sync mode: C Off C low priority	⊙ high priority — ○ master priority	
Timeout for waiting for master 128 🚊 sec.	C client sync C client no sync	
Miscellaneous		
DNS Domain: local		
Apply Discard changes Clear DHCP Disc	tribute D <u>H</u> CP <u>R</u> efresh	ı view
Active DHCP server: could not be detected	<u>_</u>	kit

Figure 2-25 "System network" tab on PCU

Description	Relevant parameter in the basesys.ini file
DHCP IP address allocation	
• This is used to specify the address range from which the clients	InternalDynRangeStart
of the DHCP server are supplied with IP addresses. The default range is sufficient for most cases	InternalDynRangeEnd
 The default setting for "Subnet type" is "24 bits network part". 	InternallP
	InternalNetMask
DHCP server synchronisation	
• As default synchronization of the DHCP server is activated.	SyncModeDHCPD_SysNet
The "master priority" option only needs to be activated if a preferred server is to take over the role of the active server.	DHCPDNoMasterWait
• Under "Timeout for waiting for master" set the time period that is allowed for the intended DHCP master to become the active DHCP server, regardless of whether it is switched off shortly afterwards or takes longer to boot than other controllers.	
Miscelaneous	
• The default for the DNS service is ".local" and can be edited.	InternalDNSDomain

"Clear DHCP" button

The "Clear DHCP" button is only active on the active DHCP server: It is used to execute the "sc clear dhcp [-X120]" command: This clears the status of the DHCP server at the specified interface (default setting: system network). It is reset to its starting status.

"Distribute DHCP" button

The button "Distribute DHCP" is only active at the active DHCP server: It is used to execute the "sc distribute dhcp" command:

2.4.9 SNC: Configuring the X130 interface (Company network)

"Company network" tab

Set the following parameters for X130 on this tab:

<u>@</u>			Syste	em network center		_ [ð] ×		
ter	0Ps	TCU support	TCU mode	System network	Company network	System basics ()		
DH	DHCP client (X130): 🗷 enabled							
St	tatic setti	ngs for compan	y network (X1	30) (most of them ar	e only valid, if DHCP	client is disabled)		
Sta	atic IP:	0.	0.0). 🕕				
Su	bnet mas	sl 255 . 2	55 . 255). 🛛				
Ga	teway:	0.	0.0]. 🕕				
Ho	ost name:			valid on X1	20, X130 and X127			
DN	lS servei	r: 1: 🕕 . 🗌	0.0). O Time sei	rver 1: 0 . 0	. 0 . 0		
		2: 🚺 . 🗌	0.0	. 🛛	2: 0 . 0	. 0 . 0		
		3: 🚺 . 🗌	0.0]. 🛛	3: 0 . 0	. 0 . 0		
DN	IS Domai	ir 🗌 🗌						
	<u>A</u> pply	u <u>D</u> isc:	ard changes			<u>R</u> efresh view		
Acti	ive DHCP) high standby: 1	ncu1 (this syst	em) SYNC:1 of 1		<u>E</u> xit		

Figure 2-26 "Company network" tab

[See basesys.ini: parameter InternalDNSDomain]

2.4.10 SNC: Configuring parameters on the "System basics" tab

"System basics" tab

Set the following parameters on this tab:

<mark>@</mark>			5,	istem network center		_ @ ×	
ter	OPs	TCU support	TCU mode	e System network	Company network	System basics 🔸	
	BN network (X127) settings Forwarding to system network: enabled Forwarding from system network: enabled						
P	System basics PLC time sync: Calcatable timesance						
M	anual tin	nezone:		TC Properties of loca	l time zone: names, off	set, start and end day	
Fi	rewall ur rewall ur	blocks external blocks UNC view	HMI: 🗙 Jer: 🗙	ort TCP/102 is ope port TCP/5900 is op	ned via X130 ened via X130		
A	Additional firewall open ports: TCP/5906 Protocol/Port pairs to open in the firewall (e.g. 'TCP/5900 UDP/514')						
R	esulting f	irewall open por	ts: T	CP/5900 TCP/102			
	<u>Apply</u> <u>Discard changes</u> <u>R</u> efresh view						
Ac	Active DHCP high standby: ncu1 (this system) SYNC:1 of 1						

Figure 2-27 "System basics" tab

[See basesys.ini: parameter EnableSysNetToIBNForwarding]

2.4.11 SNC: "Scanned devices" tab

"Scanned devices" tab

The devices in the system network are displayed on this tab.

The following parameters are set for each device: name, IP address, and MAC address. If a fault occurs during the production cycle, it is possible to check whether all the configured devices are also accessible online and whether they have the defined attributes. Any deviations from the target state will become immediately apparent.

Saving the system configuration as the target configuration

In order to check (once a scan of the accessible stations has been performed) whether all the devices belonging to the system can also be accessed, a target configuration based on the accessible stations is defined and saved. This target configuration determines which devices belong to the system and (given this) must always be present.

When the target configuration is saved, a check is performed to see whether one already exists. If this is the case, a prompt asks whether it should be overwritten. It is always saved in a separate subdirectory of the active DHCP server's TCU directory. This has the advantage of allowing the target configuration to be transferred to the standby servers as well.

System network center												
9	e System network Compa			ny network		System basics	Scanned devices	About SNC				
S	Scan devices of system network:											
	DHCP server All MCP			UNC-HMI]						
Γ		H	0	Name		ΗW	IP	Δ	MAC	Comm	ent	
	1	•	0	NCU1	D4:	25	129.8).4.1	08:00:06:73:4C:F3	Text1		
	2	✓	0	NCU3	NC	U730	129.8).4.2	00:1F:F8:00:4A:35	Text2		- 11
	3	✓	\bigcirc	PCU2	PC	U50	129.8).5.244	00:0E:8C:9E:C9:BF	Text3		- 11
	4	✓	\bigcirc	TCU1	kei	ne HWID	129.8).7.11	08:00:06:73:49:58	Langer Text mit v	ielen Zeichen	- 11
	5	✓	\bigcirc	DIP6	HT	8	129.8).7.12	08:00:06:73:81:32			- 11
												- 11
												- 11
												- 11
												- 11
												- 11
B	аг	ige:	129	. 8	0	. 4	-	7	. 1 - 254			
Load project Save project Herify project Evact scan												
Â	Active DHCP master: PCU2 (this system) SYNC:1 of 1											

Figure 2-28 "Scanned devices" tab

Provided there is no preexisting target configuration before the scan is performed, the devices will appear on the screen against a light gray background as it is not yet clear whether they will be accessible in the system network. Editable table cells have a white background.

Button	Effect
Save project	Saves the target configuration (with callback, if applicable)
Load project	Loads the target configuration
Start scanning	Starts the scanning process.
→ Verify project	Aligns the target and actual states if there is a preexisting target configuration

Devices which do not log onto the DNS server cannot be detected during scanning. This includes SIMATIC devices, for example. The cells in the table containing the name and HW type can still be edited; data can be inserted by double-clicking these cells.

NOTICE

A target configuration can only be saved after all the devices selected have been given their own **unique** form of identification. This means each should have a unique name **and** IP address/MAC address.

Data type and storage location

The target configuration is always stored in a separate subdirectory of the active DHCP server's TCU directory. This does not apply if systems do not have an active DHCP server or if this server cannot be accessed. In such cases, an attempt is made to access a target configuration from the TCU directory on the local computer.

The target configuration is stored under:

PCU:	F:\user_base\common\tcu\\$soll\\$soll.ini
NCU:	/user/common/tcu/\$soll/\$soll.ini

The target configuration is saved as an INI file and has the following structure:

A central section [SOLL] containing:

- A scanning range for all 4 address bytes, a start and an end
- "NUMBER_DEVICES", the number of devices

For each device, there is a section [DEVICE_x] containing the following entries:

- "NAME", the name of the device (only if this was determined by the system)
- "ALIAS", the alias for the device (only if the system was unable to determine a name and the operator entered a name instead)
- "IP", the IP address for the device
- "MAC", the MAC address for the device
- "HWID", the HWID for the device (only if this was determined by the system)
- "HW_TYPE", the HW type for the device (only if the system was unable to determine a HWID and the operator entered a HW type instead)

Example for the target configuration

The file's contents might look like this:

[SOLL] RANGE_START_1=192 RANGE_START_2=168 RANGE_END_2=168 RANGE_START_3=214 RANGE_START_3=214 RANGE_END_3=214 RANGE_START_4=1 RANGE_END_4=254 NUMBER_DEVICES=2 [DEVICE_1] NAME="PCU1" IP=192.168.214.241 MAC=08:00:06:12:34:56 HWID=2.0.0.0 [DEVICE_2] ALLAS="PLC1"

ALIAS="PLC1" IP=192.168.214.4 MAC=08:00:06:11:22:33 HW TYPE=S7-300

Target/actual comparison

For set/actual comparison, a check is made as to whether the devices configured in the system network can be reached: If a target configuration has been saved already, this information is retained and will be automatically loaded during any subsequent sessions. The operator can only perform a target/actual comparison if a target configuration has been saved already. This involves rescanning the defined range and comparing it with the existing list. Different colors are used to highlight deviations:

- Green: Problem-free devices which are configured and can also be accessed online.
- Red: Missing devices which are configured but cannot be accessed online.
- Yellow: Additional devices, which are not configured but can be accessed online.

Modified system configurations can only be saved if the green and yellow entries are selected by activating the corresponding check boxes.

System network center											
,	e System network Compan				k Compa	ny network	System basics	Scanned devices About SNC			
S	Scan devices of system network:										
	DHCP server All MCP				All MCP	UNC-HMI	1				
Γ	🕞 😣 Nam		Name	ΗW	IP 🛆	MAC	Comment				
	1		\odot	NCU1	D425	129.80.4.1	08:00:06:73:4C:F3	Text1			
	2		\odot	NCU3	NCU730	129.80.4.2	00:1F:F8:00:4A:35	Text2			
	3		\odot	PCU2	PCU50	129.80.5.244	00:0E:8C:9E:C9:BF	Text3			
	4	🗹 🕢 TCU1 🛛 ke		keine HWID	129.80.7.11	08:00:06:73:49:58	Langer Text mit vielen Zeichen				
	5	i 🗆 😣 DIP6 🛛 H1		HT8	129.80.7.12	08:00:06:73:81:32					
									- 11		
									- 11		
									- 11		
									- 11		
									- 11		
Range: 129 . 80 . 4 - 7 . 1 - 254											
Load project Save project Uerify project Exact scan											
Active DHCP master: PCU2 (this system) SYNC:3 of 3											

Figure 2-29 Result of the comparison

Note

Descriptive text

In addition, a descriptive text for the device can be entered under the "All" tab in the "Comment" column so that the device can be more easily identified.

Result

A device (HT 8) was not found. Possible causes for this are:

- The device is not switched on.
- The device was not connected to the system network.
- By loading a new PLC project, the device has been allocated an IP address, which does not lie in the scanned address range.

3.1 Permissible network topologies

This chapter provides an overview of the permissible network topologies.

Ethernet connection

A SINUMERIK 840 D sI can only be operated as a network within which the individual components communicate with one another via Ethernet connections. This network must be set up.

The individual components are factory-set so that the most frequently occurring standard configurations can be operated without changing the settings related to the network.

Division into system network and company network

On the SINUMERIK solution line, the components are generally split into a company network on the one hand and a system network on the other.

The connection to the company network provides access to the network drives, for example. On the system network, process data communication and image transmission runs from the components with operator software to the display units - the TCUs.

This split is performed physically by means of the prescribed use of the Ethernet interfaces on the components:

- A TCU is connected exclusively to the system network.
- An NCU is always connected to the system network via X120.
- Ethernet interface Eth 2 of the PCU is preconfigured for connection to the system network; while Ethernet interface Eth 1 is used for connection to the company network.
- An NCU is connected to the company network via X130.

Meaning of the connections:

- 0 Eth 1 as a DHCP client
 - Eth 2 as a DHCP server
- Eth 2 with a fixed IP address

Uncrossed Ethernet cable Green connection Gray connection

Crossed Ethernet cable (crossover)

3.2 Networks without connection to the company network

3.2 Networks without connection to the company network

3.2.1 Configuration 1: NCU and TCU

Description



A direct Ethernet connection is used to connect a TCU to X120 of the NCU. NCU and TCU are suitably preconfigured with IP addresses.

The IP addresses are not significant for further operation.

The TCU is connected to the NCU via a crossed Ethernet cable.

The direct connection of the NCU via X120 to the TCU automatically forms a simple system network consisting of two computer nodes.

3.2 Networks without connection to the company network

3.2.2 Configuration 2: NCU and PCU with direct OP

Description



The NCU and PCU are connected via a **crossed** Ethernet cable.

The NCU is the DHCP server with the IP address 192.168.214.1.

For this Eth 2 configuration, the PCU is assigned a fixed IP address in the range 192.168.214.241 – 192.168.214.249 with a subnet mask 255.255.255.0.

3.3 Networks with NCU connection to the company network

3.3 Networks with NCU connection to the company network

3.3.1 Configuration 3: NCU and TCU

Description



The TCU is connected to the NCU (directly) using a **crossed** Ethernet cable. On X130, the NCU is connected to a switch to the company network with a straight cable.

As in configuration 1, there is a direct Ethernet connection between a TCU and X120 of the NCU. NCU and TCU are suitably preconfigured with IP addresses. The IP addresses used here are not significant for further operation.

IP configuration: DHCP server on the company network

On X130, the NCU is set to the address reference via DHCP. If the company network has a DHCP server that provides the NCU with an IP address (IP configuration), the NCU is integrated into the company network.

Depending on the infrastructure available or the level of network administration of the company network, the following network parameters must be set for the NCU on X130:

- Computer name on the company network
- Address of a DNS server
- Address of a gateway (default router)

The IP address of the NCU to this connection is also assigned via network administration.

3.3 Networks with NCU connection to the company network

If the company network offers a low level of administration (in the worst case scenario the network has only one DHCP server that assigns the addresses from a predefined address range) the NCU receives an IP address that is initially unknown.

3.3.2 Configuration 4: NCU and PCU with direct OP

Description



The NCU and PCU are connected via a crossed Ethernet cable.

On X120, the NCU occupies the fixed IP address 192.168.214.1 in its capacity as a DHCP server (not used in this configuration). For this Eth 2 configuration, the PCU is assigned a fixed IP address in the range 192.168.214.241 – 192.168.214.249 with a subnet mask 255.255.255.0.

The observations made for configuration 3 also apply here in relation to the connection to the company network. The connection to a switch on the company network is made via a **non-crossed** Ethernet cable.

3.3 Networks with NCU connection to the company network

3.3.3 Configuration 5: PCU with TCU on NCU

Description



In this configuration, a switch is also required for the system network. All components are connected using straight Ethernet cables.

In terms of address allocation and the settings that need to be made, this configuration is identical to that of configuration 4. However, in this case, the DHCP server of the NCU actually supplies the TCU with an IP address and serves as a boot server for the TCU.

The observations made for configuration 3 also apply here in relation to the connection to the company network. The connection to a switch on the company network is made via a **straight** Ethernet cable.

To connect one TCU to both HMI systems you must create an additional connection to the NCU for the TCU, as described in the following chapter:

See also

How to configure VNC connections (Page 53)
3.3 Networks with NCU connection to the company network

3.3.4 Connecting the programming device (PG) to the NCU

Description



A programming device is connected to the NCU on X127 as a standard DHCP client. An NCU is a standard DHCP server on X127. On X127, the NCU occupies the fixed IP address 192.168.215.1 with the subnet mask 255.255.255.224.

The range 192.168.215.2 – 192.168.215.9 is reserved and can be used by network stations with a fixed IP address from this range. On X127, IP addresses in the range 192.168.215.10 – 192.168.215.30 are assigned via DHCP, for example to connect a programming device.

3.4 Application example

Application

The configuration is suitable for the following application: Machine with concurrent operating option to two operator panels, a full-featured operating panel with PCU and an operator panel reduced to tool management.

Parallel operation of HMI-Advanced or SINUMERIK Operate on the PCU 50.3 and SINUMERIK Operate as component of the CNC software on the SINUMERIK 840D sI NCU:

Any OP connected to PCU 50.3 and any OP connected to the NCU can be simultaneously operated: in the example, OP 08T.



Figure 3-1 Configuration example

Proceed as follows

To configure the application example, proceed as follows:

1. PCU 50.3 with HMI Advanced

Deactivate the DHCP server on the PCU: For this select the option "Boot support runtime and configuration only (TFTP/FTP)" on the "TCU support" tab of the "System Network Center" program (SNC: Configuring TCU support services (Page 55))

2. SINUMERIK 840D sl from CNC software, version 2.4 and higher

The ${\tt system configuration.ini}$ configuration file is included on the SINUMERIK 840D sI product DVD.

3. OP 08T operator panel

Once the installation of the OP 08T operator panel with SINUMERIK Operate has been completed, copy the <code>systemconfiguration.ini</code> file from the

/Siemens/sinumerik/hmi/appl/systemconfig/tm/ directory to the /oem/sinumerik/hmi/cfg/ directory. After this, a system restart is necessary.

NOTICE

Configuration changes at SINUMERIK Operate

Once the file has been copied, no further settings (e.g. changing language) can be implemented on the SINUMERIK Operate. If you want or need to implement changes later, the systemconfiguration.ini file can be renamed (e.g., as systemconfiguration.save). After this, a system restart is necessary. Following the restart, the full functional scope of SINUMERIK Operate is available once again.

Network configuration

3.4 Application example

Service and diagnostics

4.1 Booting of the TCU

4.1.1 Messages during booting

Messages when booting

While the TCU is booting, progress is displayed after the BIOS has booted and before the operating system is loaded. In addition to messages, the current booting status is also indicated by a progress bar. While the IP address is being determined via DHCP and the TFTP is being downloaded (boot image), a progress bar indicates that booting of the TCU is not yet complete, or that a fault has occurred.

The structure of these messages is shown below:

Siemens AG Thin Client Boot V 01.00.02.00	: loader
IP address	
<f1> diagnosis window</f1>	

You can see the current boot phase in the third line. Below that you are told whether you can call up information via <F1> if a fault occurs.

4.1.2 Diagnostics options during booting

In the following cases, the diagnostics window is displayed and booting of the TCU is interrupted:

- When the <F1> function is selected during booting
- When a warning message is displayed
- When a fault occurs

Note

You can select the <F1> to <F8> functions shown below using the horizontal softkeys on the OP. For example, to select <F7>, press the horizontal softkey 7.

4.1 Booting of the TCU

Calling up the diagnostics window with <F1>

Siemens AG Thin Client Boot Lo	oader	V	01.00.02.00
Boot progress:			
BIOS V 00.00.03.00 MAC address IP address		06/08/2004 11 08:00:06:00:0 received 192. DHCP 192. TFTP 192.	:45:07 00:00 168.214.40 168.214.1 168.214.1
OS boot loader (nonfree/linx_t	tcu.bin)	done	
<f1>details</f1>	<f6>boot menu</f6>	<f6>continue</f6>	<f8>reboot</f8>

Further functions:

Function	Effect
F1	Display detailed information
F7	Continue booting of the TCU
F8	Restart the TCU

Press <F1> to continue

If you select function <F1> in the diagnostics window, the following window opens:

Detail messages: (level 3)	Siemens AG Thin Client Boot Loade	er V 01.00.02.00
*** Siemens AG Thin Client H Bldr16>32: V 00.00.03.00 (addresses 0xFFF Bldr16>32: bldr32 at addres	Boot Loader Start (real to protected mode) [06/08/2004 11.45.07 FE34F 0xFFFFE2ED 0xFFFFE2E0 ss 0xFFFB0000 length 43008	01.00.02.00] ***
Bldr16>32: RLE header BLDR	_TCU_RLE 69632 42640 0x3A61F8B3	
PCI: found ethernet adapter	(dp83815/16) [address 0000EF00, irq 00000009), type 00000005]
DHCP: send DHCP_V_DISCOVER [s	server IP address 0x00000000 XID 0x6050004]	
DHCP: received DHCP_ACK [serv	ver IP address 0x01D6A8C0]	
DHCP: IP 192.168.214.40		
<f1>up <f2>down</f2></f1>	<f3>page up <f4>page down</f4></f3>	<f5>home <f6>end</f6></f5>
<f7>more details</f7>	<f8>less details</f8>	<f9>recall</f9>

Further functions:

Function	Effect
F1 to F6	Navigate within the window
	(alternatively, the relevant keys on the OP can be used).
F7	Display more information
F8	Display less information
F9	Return to diagnostics window

Press <F7> to continue

If you select function <F7> in the diagnostics window, booting of the TCU continues: If booting is not yet complete, you can interrupt the boot procedure again with <F1>.

4.1 Booting of the TCU

The diagnostics window is displayed automatically in the event of a fault:



Further functions:

Function	Effect
F1	Display detailed information
F8	Restart the TCU

If the diagnostics window is already active and a warning message appears, it is displayed inside the window.

Siemens AG Thin Client Boot Loader	V 01.00.02.00
Boot progress:	
BIOS V 00.00.03.00 MAC address IP address	06/08/2004 11:45:07 08:00:06:00:00:00
Warning: connection established - no DHC	P server available
<f1>renewed break</f1>	

Further functions:

Function	Effect
F1	Display detailed information

4.2 How to calibrate a touch panel

4.2 How to calibrate a touch panel

HT 8: Calibrate touch screen

CAUTION

Do not touch the operating elements of the display with pointed or hard objects. This may considerably reduce their service lives.

Each device is supplied with a HT 8-Touchpen (order no. 6FC5348-0AA08-4AA0). This should be used for calibration purposes and during operation.

The calibration is automatically started after switching on HT 8.

- 1. Follow the instructions on the screen:
- 2. Press the three calibration items one after the other.

This completes the calibration.

3. Press the corresponding horizontal softkey on the touch screen to close the command shell and to re-establish the connection to the desired PCU.

Note

The calibration process on the HT 8 can alternatively be started with the following key combination: <Recall> + <MENU SELECT> and then the <U> key

4.2 How to calibrate a touch panel

Recalibrate touch screen

Procedure:

1. The key combination below can be used to initiate further TCU calibration during operation, if required: <F9> + <F10>.

This corresponds to the key combination on an OP: Menu back key + <MENU SELECT>.



Figure 4-1 Starting the calibration process

4.2 How to calibrate a touch panel

2. Select the menu item "Calibrate touch screen" to start calibration.



Note

The "Touchware" program, which is available with Windows XP, is deactivated on the TCU.

Obtaining user authorization

On a TCU that has no user authorization, the first key that is pressed serves exclusively to request the user authorization, i.e. this key is not evaluated by the operating software.

The settings for the right to veto are stored in file tcu.ini and are only effective if the operating software is installed on the PCU. At the OP of the TCU, the operating software can be operated in exactly the same way as an OP directly connected to the PCU.

Note

These operator input sequence steps must only be carried out by qualified personnel!

Index

Α

Advanced settings, 58

В

Boot server, 72

С

Calibrate touch panel HT 8, 82 TCU, 83 Calibrate Touch Panel, 36 Color depth, 58 CompactFlash Card, 7 Company network, 6 Configuration file basesys.ini, 49 config.ini, 26, 36 tcu.ini, 38, 58 Connecting a PG, 73

D

DCK (Direct Control Keys), 31 DHCP client, 9 DHCP server, 9 Direct control keys, 31 DNS (Domain Name System), 12

Ε

Ethernet connection, 67 Ethernet interface, 67

F

Factory default settings, 9 Faults when booting, 77

Н

HT 8

Operator components and networking (IM5) Commissioning Manual, 02/2011, 6FC5397-1AP40-0BA0 Calibrate, 82 Rotary coding switch, 30

I

IP address Client, 59 PG, 73

Μ

Messages during TCU boot up, 77

Ν

Network topology, 67

R

Replacement TCU, 32

S

Screen resolution, 58 SIMATIC Thin Client, 33 SINUMERIK DHCP client, 9 SINUMERIK DHCP server, 9 SINUMERIK mode, 36 SNC Adapter, 49 Company network, 61 OPs, 50 Scanned devices, 62 System basics, 62 System network, 59 TCU support, 55 Veto Mode TCU mode, 57 SNC (System Network Center), 47 Star structure, 5 Start bar, 35 Switchover disable, 44 System Boot behavior, 11 Redundancy, 13 System network, 59 Configuring, 30, 47

Т

Target configuration, 63 Target/actual comparison, 65 TCU Assign index, 44 Assign names, 30 Boot-up configuration, 56 Boot-up messages, 77 Main menu, 17 Settings, 30 Supplementary conditions, 7 Thin Client Unit, 7 TCU diagnostics, 77

U

User authorization, 7, 57, 84

V

Validity, manual, 5 VNC connection, 53