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Networking a SINUMERIK 828D SINUMERIK 828D, SW 4.5 SP3

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Table of contents

Warra	anty and	liability	2
1	Fast Data transfer with SINUMERIK		
	1.1	Overview	4
2	Network	king with SINUMERIK 828D	5
	2.1 2.1.1 2.1.2 2.1.3 2.2 2.2.1 2.2.2 2.2.3 2.2.3 2.2.4	Computer network settings Creating a user account Assigning an IP address Creating shared folders Activating the network option Setting the license Interface X130 SINUMERIK network settings Integrating a network drive into the SINUMERIK program	6 12 16 16 17 17
•	Orminat	manager	
3			
4	History.		23

1 Fast Data transfer with SINUMERIK

1.1 Overview

In job shops, frequently customer parts must be post machined quickly – and the last program version cannot be found anywhere in the workshop. In this case, the archive of the SINUMERIK control must be checked as to where the actual program version is located. This must then be imported into the CNC control system using an appropriate data carrier. This involves non-productive time.

Using a networked control system, no time is wasted, as data can be quickly exchanged throughout the complete network. For example, this functions using the integrated Ethernet interface, with which the SINUMERIK 828D system can be integrated into any Windows or Linux network. The network drives are displayed in the control system program manager, and can be used as usual. This procedure is now precisely described.



Figure 1-1 Working in a networked environment at a Sinumerik control

2 Networking with SINUMERIK 828D

An external computer and SINUMERIK 828D control system are networked with one another; the network structure is of secondary importance. The SINUMERIK interface used is the X130.

A target folder must be created and shared in the Windows operating system. The "Test" target folder is created in the current example. A new user account must be created for "Advanced sharing". The user account "Control" with password "test" is used. Further, when assigning the logical drive in SINUMERIK, this data is queried in order to uniquely identify the IP address.

After the user has uniquely assigned the IP address of the computer and control system, the content of the shared "Test" target folder on the computer can be read out in the SINUMERIK control system. This is possible in the HMI menu.

Advantages of this solution

Advantages of networked control systems include:

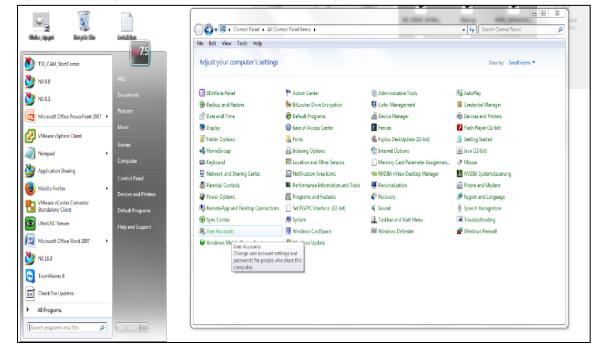
- Programs can be accessed from every CNC control
- Short data paths, as data does not have to be transferred using a data carrier
- The most up-to-date programs are available on the server, e.g. programs from CAM systems
- CNC control data can be backed up to the server, e.g. archive
- Modified programs can be saved to the server, where they are accessible to all authorized participants
- Programs can be assigned versions and archived on the server

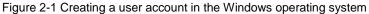
2.1 Computer network settings

The easiest way to exchange data is with the network share folders on the server. To do this, for example, a folder can be created on the Windows server, where all of the necessary programs are saved and can be accessed by the CNC machines. Using an example from Windows 7, it is shown how this functions.

2.1.1 Creating a user account

A new user account must be created under "Control panel" in the Windows operating system.





The newly assigned name of the user account is "Control" (Fig. 2-2). The password "test" is assigned for the newly created account (Fig. 2-4). The password and the name of the user account are required later in the HMI configuration menu when entering into the logical drive.

Figure 2-2 Assigning the "Control" name for the user account

Name the account and choose an acc	count type
This name will appear on the Welcome screen a Control	nd on the Start menu.
 Standard user Standard account users can use most softwar the security of the computer. 	re and change system settings that do not affect other users or
	computer and can make any desired changes. Based on asked to provide their password or confirmation before
We recommend that you protect every account	unt with a strong password.
Why is a standard account recommended?	
	Create Account Cancel

Figure 2-3 Creating a password name for the user account

Change the account name	
Create a password	Control
Change the picture	Standard user
Set up Parental Controls	
Change the account type	
Delete the account	
Manage another account	

Figure 2-4 Selecting the password "test" for user account "Control"

word for Contro	ol's account		
antrol			
andard user	ol.		
	s-encrypted files,	personal certifi	cates and stored passwords for
ata in the future, ask	Control to make a	a password reset i	floppy disk.
	, they must be typ	ed the same way	/ every time.
l hint			
t will be visible to ev	eryone who uses t	his computer.	
	a password for Contro ontrol will lose all EFS twork resources. Sata in the future, ask contains capital letters strong password d hint	a password for Control. ontrol will lose all EFS-encrypted files, twork resources. Sata in the future, ask Control to make a contains capital letters, they must be typ strong password d hint	a password for Control. ontrol will lose all EFS-encrypted files, personal certifi twork resources. Sata in the future, ask Control to make a password reset f contains capital letters, they must be typed the same way strong password

2.1.2 Assigning an IP address

In order to integrate a control system into a network, configurations must be made directly at the control system, as well as at the network connection. An IP address must be permanently assigned at the computer and an IP address at the control in order that communication can be established. IP addresses can be automatically assigned or manually selected. In the current example, a unique IP address is manually entered. The selection is subsequently shown.

e Edit View Tools Help djust your computer's settings			
3DxWare Panel	Y Action Center	administrative Tools	📷 AutoPlay
Backup and Restore	💱 BitLocker Drive Encryption	👰 Color Management	Credential Manager
Date and Time	🝘 Default Programs	📇 Device Manager	Devices and Printers
Display	Sase of Access Center	5 Fences	📕 Flash Player (32-bit)
Folder Options	🗼 Fonts	🍓 Fujitsu DeskUpdate (32-bit)	🔒 Getting Started
8 HomeGroup	🚨 Indexing Options	🐑 Internet Options	📥 Java (32-bit)
Keyboard	🕅 Location and Other Sensors	Memory Card Parameter Assignmen	A Mouse
Network and Sharing Center	🔜 Notification Area Icons	🗠 NVIDIA nView Desktop Manager	🛃 NVIDIA Systemsteueru
Parental Controls	Reformance Information and Tools	Personalization	Phone and Modem
Power Options	Programs and Features	Recovery	🔗 Region and Language
RemoteApp and Desktop Connections	Set PG/PC Interface (32-bit)	🛋 Sound	Speech Recognition
Sync Center	1 System	🔔 Taskbar and Start Menu	Troubleshooting
User Accounts	📑 Windows CardSpace	🕍 Windows Defender	P Windows Firewall
Windows Mobile Device Center	🖑 Windows Update		

Figure 2-5 Navigation to the Network and Sharing Center

The status of "Local Area Connection" is shown in the "Network and Sharing Center" of the Windows control panel (Fig. 2-6).

nformation and set	up connections	
- 🌗 -	🎱	See full map
Netzwerk 8	Internet	
	Conn	ect or disconnect
	Com	et of disconnect
	Access type: Internet	g 2
ſ	📱 LAN-Verbindung 2 Status	×
n or network	General	
band, dial-up, ad hoc, or	Connection IPv4 Connectivity:	Internet
	Pv6 Connectivity:	No network access
o a wireless, wired, dial-c	Media State:	Enabled
d sharing options	Duration:	05:43:44
located on other netwo	Speed:	1.0 Gbps
	Details	
work problems, or get tr		
from prostering, or get u	Activity	
	Sent —	Received
	Bytes: 4.473.17	7 34.696.608
	🛞 Properties 🛛 🛞 Disable	Diagnose
		Close

Figure 2-6 Status of the Local Area Connection

Internet protocol version 4 (TCP/IPv4) can be selected under the properties of the "Local Area Connection". The IP address must be entered in the properties of the Internet protocol, version 4.

LAN-Verbindung 2 Status	23	LAN-Verbindung 2 Properties
General		Networking Sharing
Connection		Connect using:
IPv4 Connectivity:	Internet	Intel(R) PRO/1000 EB Network Connection with I/O Acce
IPv5 Connectivity: No net Media State: Duration:	Enabled 1 05:44:42	Configure This connection uses the following items:
Speed: Detais	1.0 Gbps	Place Standard S
Activity	Received	Internet Protocol Version 4 (TCP/IPv4) Link-Layer Topology Discovery Mapper I/O Driver
Bytes: 4.475.504	34.702.632	Description
Properties Brable Diagnose		Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
	Close	

Figure 2-7 Navigation to the Internet protocol, version 4

It must be ensured that a unique IP address is entered. The subnet mask must match that set at the control itself.

The following data is entered into the subnet mask.

- IP address: 192.168.10.103
- Subnet mask: 255.255.255.0

ew roots melp	22		
LAN-Verbindung 2 Status		tion and set up connecti	ions
General		and set up connect	See full map
Connection	LAN-Verbindung 2 Properties	<u> </u>	V
IPv4 Connectivity:	Networking Sharing		Internet
IPv6 Connectivity:	Connect using:		0
Media State:	Intel(R) PRO/1000 EB Network 0	Internet Protocol Version 4 (T)	CP/IPv4) Properties
Duration:		General	
Speed:		deneral .	
Details	This connection uses the following item		ned automatically if your network supports ou need to ask your network administrator
Activity	Pie and Printer Sharing for Mic Anitel (R) Advanced Network Se Anitel (R) Advanced Network Se Anitemet Protocol Version 6 (TO Anitemet Protocol Version 6 (TO Anitemet Protocol Version 4 (TO	for the appropriate IP setting Obtain on IP address or Use the following IP add	utomatically
Sen	Link-Layer Topology Discover	IP address:	192.168.10.103
Bytes: 4.4	Link-Layer Topology Discover	Subnet mask:	255, 255, 255, 0
o picco in t	•	Default gateway:	
😵 Properties 😵 Di	Install Uninstall - Description Transmission Control Protocol/Interne wide area network protocol that prov	Obtain DNS server addr Obtain DNS server addr Obtain DNS server addr	
	across diverse interconnected netwo	Preferred DNS server:	
		Alternate DNS server:	
l		Validate settings upon	exit Advanced
p		-	OK Cancel
ions			Cances
rewall			
obile Device Center			

Figure 2-8 Entering the IP address and the subnet mask

Note It is not permissible that addresses 192.168.215.xxx and 192.168.214.xxx are used. These are reserved for the system.

2.1.3 Creating shared folders

Using Windows Explorer, a new folder should be created on the local drive on the server, e.g. "Test". This can be simply generated by pressing the right-hand mouse key under "New" and "Folder". The folder is shared using the "Properties" shortcut menu.

Figure 2-9 Selecting the properties of the test folder

	Open	
	Zur VLC Media Player Wiedergabeliste hinzufügen	
Recycle	Mit VLC Media Player wiedergeben	
3	Agent Ransack	
	Fuelude this issue forms Fernand suitebuilde	
	Exclude this icon from Fences' quick-hide	
78	Show this folder on the desktop	
	Suche mit dem OfficeScan Client	
	Share with	•
•	WinMerge	
	Zum Archiv hinzufügen	
	Zu "Test-rar" hinzufügen	
	Packen und als E-Mail versenden	
	Zu "Test.rar" hinzufügen und als E-Mail versenden	
	Restore previous versions	
	Create ISO image file	
	Include in library	•
	Send to	•
	Cut	
	Сору	
	Create shortcut	
	Delete	
	Rename	
	Properties	
Test		

Click on "Share this folder" under the "Advanced Sharing" tab The folder name is displayed under "Share Name" (example "Test").

Figure 2-10 Sharing the test folder

L Test Properties
General Sharing Security Previous Versions Customize
Network File and Folder Sharing
Lest Shared
Network Path: \\\\X-PC-1\Users\\VX\Desktoo\Test
Share
Advanced Sharing
Set custom permissions, create multiple shares, and set other advanced sharing options.
Advanced Sharing
Password Protection
People must have a user account and password for this computer to access shared folders.
To change this setting, use the <u>Network and Sharing Center</u> .
OK Cancel Apply

Click on the "Allow" button (Fig. 2-11). All groups and user names are displayed there, which should be able to access the folder.

Figure 2-11 Advanced sharing of the test folder

L Test Properties
Advanced Sharing
Share this folder
Settings
Share name:
Test
Add Remove
Limit the number of simultaneous users to: 20 🜩
Comments:
Permissions Caching
OK Cancel Apply
OK Cancel Apply

L T	est Properties		22
A	Permissions for Test		x
	Share Permissions		
	Group or user names:		
		Add	Remove
	Permissions for Jeder Full Control	Allow	Deny
	Change	V	
	Read	V	
	Learn about access control and	permissions	
	OK	Cancel	Apply
ų	Ser V		. 449

Figure 2-12 Access rights for the test folder

When the folder is shared, this can be seen in the network. Permission (privilege) must now be assigned. In the current example, the newly created user "Control" has full access rights to this folder (Fig. 2-12 & Fig. 2-13).

If the PC is operated in a company network, the settings must be coordinated with the network administrator; the same is true for the antivirus software and firewall settings.

Figure 2-13	Assigning a	all rights for a	a created user account
-------------	-------------	------------------	------------------------

L Test Properties	S	
A Dermissions for Test	22	7
Select Users or Groups		8 x
Select this object type:		
Users, Groups, or Built-in security principals		Object Types
From this location:		
NX-PC-1		Locations
Enter the object names to select (<u>comples</u>): NX-PC-1\Control		Check Names
Advanced	ОК	Cancel
Learn about access control and permissions		
OK Cancel	Apply	J

The process is completed by pressing "Apply" followed by "OK" (Fig. 2-14).

1	1	Fest Properties		22
ľ	4	🗼 Permissions for Test		x
		Share Permissions		
	Ш	Group or user names:		
	l	Control (NX-PC-1\Control)		
	l			
	L		Add	Remove
	Ш	Permissions for Control	Allow	Deny
	Ш	Full Control		
	ш	Change		
G G		Read	V	
	Г	Learn about access control and	permissions	
		ОК	Cancel	Apply

Figure 2-14 Acknowledging the permission (privilege) for user account "Control"

2.2 Activating the network option

2.2.1 Setting the license

The precondition to establish a network structure with the SINUMERIK control is that the "Manage Network Drives" option is activated. The navigation in the licensing dialog to set option (Fig. 2-15 & Fig. 2-16) is subsequently shown.

Figure 2-15 Navigation to activate the options



Figure	2-16	Setting	the	license	"Manage	Network	Drives"

			06/02/15 17:3 PM
Licensing: All options			Overview
Option	Set	Licensed 🗅	
TRANSMIT and peripheral surface transformation 6FC5800-0AM27-0YB0			All
Bidirectional compensation 6FC5800-0AM54-0YB0			options
Sag compensation, multi-dimensional 6FC5800-0AM55-0YB0			Missing lic./opt.
ESR (drive-based) 6FC5800-0AM60-0YB0			
Generic Coupling 'CP-STATIC' 6FC5800-0AM75-0YB0			Search
Replacement tools for tool management 6FC5800-0AM78-0YB0			Reset
Network drive management 6FC5800-0AP01-0YB0			(po)
residual material detection and machining 6FC5800-0AP13-0YB0			Exp. license requirement
Extended operating functions 6FC5800-0AP16-0YB0			Set option
ShopTurn/ShopMill 6FC5800-0AP17-0YB0			acc. lic.
Measurement of machine kinematic 6FC5800-0AP18-0YB0			« Back
Setup Li- Net- archive censes work	(A) Satetu I - ··	vivel ata	

2.2.2 Interface X130

Ethernet port X130 located at the rear of the SINUMERIK 828D. The control is connected with the network via this interface X130.

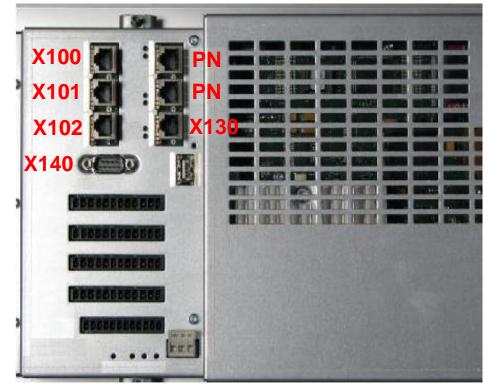


Figure 2-16 Interfaces at the rear of the SINUMERIK 828D

2.2.3 SINUMERIK network settings

Ethernet interface X130 can be configured. This means that it can be permanently assigned an IP address, or can be automatically obtained under "Obtain an IP address automatically". Interface X130 is intended to establish a connection to company networks. Changes at this location can impact the complete network. This is the reason that all of the existing X130 settings must be documented before changes are made.

Note It is not permissible that addresses 192.168.215.xxx and 192.168.214.xxx are used. These are reserved for the system.

There are two options for making the network settings for a SINUMERIK control. The classic approach is realized using "Diagnostics". From software release 4.5, it is possible to directly enter the IP configuration in the commissioning menu.

TCP/IP diagnostics

In the "Diagnostics" operating area, using the menu forward key, softkey "TCP/IP bus" > "TCP/IP diagnostics" > "TCP/IP config." must be pressed to set the parameters for communication via X130.

The settings for NCU company network X130 are changed using the "Change" softkey. The operator must enter address type "Manual" so that the IP address of the SINUMERIK control is not automatically assigned by the DHCP server, but instead can be permanently entered. IP address and subnet mask must be entered as subsequently shown.

Figure 2-17 Configuring the network settings via the diagnostics menu

		06/02/15 17:6 PM
TCP/IP configuration		
	NCU company network X130	NCU service X127
Ø Availability	0.00%	0.00%
Cmpt. name:	-	
DNS name	-	ncu-ibn
MAC address	00:1c:06:26:ec:d4	00:1c:06:26:ec:d5
Address type	Manually	DHCP – Server (Default)
IP address assigned Requested	192.168.10.251	192.168.215.1
Subnet mask assigned Requested	255.255.255.0	255.255.255.224
DHCP server	-	-
Status DHCP server	-	-
Mode DHCP synchron.	-	_ × Cancel
DNS server 1	-	-
DNS server 2		
Cotor iou		> OK
Bus TCP/IP		. System 🛶 Drive

The control must be restarted so that the changes that have been made become effective.

Network

In the commissioning menu under "Network", precisely the same network settings can be made as under TCP/IP diagnostics.

It should also be ensured that the DHCP server automatically retrieves an IP address. A defined IP address is entered under Manual. The entries are confirmed with "OK". The manual entry of an IP address and the subnet mask of the current example are subsequently shown.

Figure 2-18 Configuring the network settings via the commissioning menu

				06/02 17:5
etwork settings overview				Overvieu
NCU				
Adapter	IP address	Subnet mask	MAC address	
X130 Company DHCP client	192.168.10.251	255.255.255.0	00:1C:06:26:EC:D4	
X127 Service network	192.168.215.1	255.255.255.224	00:1C:06:26:EC:D5	Compan network
				Save NC settings
				octaniga
				Change
			>	K Back
Setup Li- Li-	Net-	🛆 Safety S	Gwivel	

After the configuration has been carried out, the control must be restarted so that the changes become effective.

2.2.4 Integrating a network drive into the SINUMERIK program manager

After the configuration has been completed, the new network drive must be integrated into the program manager.

Softkeys "HMI" > "Log. Drive" must be selected in the "Startup" operating area. In the window that is displayed, the USB interface is configured as standard at position 1; this should not be changed. The next free area is position 2. You can navigate in the screen using the cursor and select keys. The following settings must be made:

- Type: Network type, "NW Windows"
- Path: The IP address of the server and the name of the shared folder is entered in the path. It involves the same name that the operator defined when configuring under Windows, e.g. "//192.168.10.103/Test"
- Access level_key-operated switch 0
- Softkey text and softkey icon: text and icon displayed in the program manager: test; sk_network_drive.png

User name: The user name entered under Windows must be called → "Control"

Password: The associated password is called \rightarrow "test"

By actuating softkey "Activate drive", the drive is displayed under the "test" name in the program manager and can be used.

				04/21/15 10:17 AM
Configure drives				
Type:	USB local 🗸 🗸	Device:		
Connection:	Front 🗸	Partition:	1	
Path:				
Access level:	Key switch 0 🛛 🗸]		Activate
Softkey text:	SL_PM_SK_LOCAL_TCU_	Softkey icon:	sk_usb_front.png 🛛 Y	drive
Text file:	slpmdialog	User name:		
Text context:	SIPmDialog	Password:		
2		1		
Туре:	NW Windows 🗹	Device:		
Connection:	×	Partition:		
Path:	//192.168.10.250/Test	1		
Access level:	Key switch 0 🗹			
Softkey text:	test	Softkey icon:	sk_network_drive.png 🔽 🖵	×
Text file:		User name:	Steuerung	Cancel
Text context:		Password:	****	
				nr 🕺
Mash	During		>	
MD Mach. data	NC Drive system		HMI HMI HMI	Øptim./

Figure 2-19 Setting up a drive in the HMI menu

Files can be transferred to or from the control system. This is realized using the "Copy" or "Insert" softkeys.

The new "test" folder is displayed in the "Program manager" area. This means that it is simple to externally save files, such as archives and NC programs. A folder name can be freely selected in SINUMERIK (softkey text/Fig. 2-19), and does not have to match the folder name selected under Windows.

Figure 2-20 System data in the commissioning menu

	5				04/21/15 10:29 AM
Name	Туре	Length	Date	Time	Execute
🖶 🗖 Part programs	DIR		03/24/15	8:16:36 AM	Extorato
Image: Constraint of the second se	DIR DIR		03/24/15 03/24/15	8:16:36 AM 1:17:13 PM	
			,,		New
					Open
					Mark
					Сору
					Paste
					Cut
NC				Free: 2.4 MB	
	4				
NC Local & USB		🚽 test	tes	12	

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4 History

Table 4-1

Version	Date	Modifications
V1.0	06/2015	First version