





### Series XC50, XC55 and XC75

Digital displays with PROFINET IO RT interface Quick start for TIA Portal Operating instructions

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#### 2 Legal note

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This operation manual has been prepared with the utmost care. However, we do not accept any liability for possible errors. We always appreciate your suggestions for improvement, corrections, comments and proposals. Please contact us: editing@siebert-group.com

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#### 3 Concept and applications

With the N1 extension module, the displays of the XC50, XC55 and XC75 series become PROFINET-RT-capable.

These instructions supplement the operating instructions for the standard displays and describe the extended range of functions of the displays with built-in expansion module compared to the standard version, which is still available in unchanged form.

#### Structure

The expansion module N1 with PROFINET interface is located on the left of the control computer in the display. It has two RJ45 sockets.



The RJ45 socket on the XC50/XC55-...-E1 control computer is used for Ethernet connection for parameterization and operation using the integrated web server. This functionality corresponds to the standard range of functions described in a separate operating manual. In addition, the display can be controlled via this socket with JSON data strings or the PLC Connector.

The RJ double socket is used for PROFINET control. The interface is Class-C capable and can therefore be used as a switch for line wiring of PROFINET devices.

Data is exchanged between the PROFINET extension module N1 and the control computer XC50/XC55-...-E1 via an internal bus system. The coupling between the PROFINET modules in the TIA Portal and the layout elements of the display takes place via a naming convention, which is explained later.

#### 4 Data connection

#### Separation of the data connection between PROFINET and Ethernet

By cabling PROFINET -N1 and Ethernet -E1 separately, the display can be operated completely independently of each other via the respective interface. This means that the display can also be controlled via physically separate networks. In this configuration, up to three network cables are fed into the display: one for PROFINET (or two for PROFINET line wiring) and one for PROFINET -E1.

Via the Ethernet connection, the display is parameterized and the layout is configured. Once these settings have been completed, the Ethernet connection can be disconnected from the network. The information to be displayed is received via PROFINET.



#### **PROFINET** and Ethernet via one cable

The internal switch on the PROFINET extension module enables Ethernet data to be forwarded to the XC50/XC55-...-E1 control computer via the data supply line to the PROFINET module. This reduces the wiring effort and the website of the display remains accessible.

Because one cable is now used, PROFINET and Ethernet are no longer physically separated.





#### 5 Quick-Start

This Quick Start applies to all alphanumeric displays of the XC50-...-N1, XC55-...-N1 and XC75-...-N1 series with firmware from V1.0.12 and device ID 0x0050. The firmware of a device can be checked in advance, e.g. with the PRONETA Basic software from SIEMENS:

Hersteller-ID	Geräte-ID	Firmwareversion	Hersteller-Name	Bestellnummer
0x0161	0x0050	V1.0.12	Siebert Industrieelektronik GmbH	XC50_55_75N1

The display is put into operation by following the steps below. The display then shows the values sent via PROFINET.

The screenshots were created with the hardware and software listed in the following table. The illustrations may differ for other engineering frameworks.

Display	XC50-096.032N1
Engineering-Framework	Siemens TIA Portal V17, Update 4
SPS	Siemens S7-1214C DC/DC/Rly, V4.4, 6ES7 214-1HG40-0XB0
Operating system	Microsoft Windows 10 Professional, 64 Bit

The Quick Start describes the parameterization of the display. Operation of the TIA Portal is a prerequisite.

The devices are delivered without PROFINET names.

The sample project from this Quick Start is available for download on the website www.siebertgroup.com.

#### Step 1: Open project

Open a new project in the engineering framework and define the CPU. The Siemens S7-1214C DC/DC/Rly with version 4.4 was used to create this Quick Start.

Gerăt:	inner III III Soot III Soot
	CPU 1214C DC/DC/Rly
Artikel-Nr.:	6ES7 214-1HG40-0XB0
Version:	V4.4
Beschreibung	
Arbeitsspeiche mit DI14 x DC2 und AI2 on-boa Pulsausgänge on-board I/O; It für serielle Kor Signalmodule Controller, I-De secure Open U Kommunikatio	er 100KB; DC24V Stromversorgung 24V SINK/SOURCE, DQ10 x Relais ard; 6 schnelle Zähler und 4 on-board; Signalboard erweitert bis zu 3 Kommunikationsmodule mmunikation; bis zu 8 für I/O-Erweiterung; PROFINET IO- evice, Transportprotokoll TCP/IP, Jser Communication, S7- on, Webserver, OPC UA: Server DA

Set the settings for the IP address, name, protection level, etc..



#### Step 2: Install GSDML file of the display and add display

Install the GSDML file "GSDML-V2.43-Siebert-XC50\_55\_75-XX-..." of the display. You can find this on the data carrier included in the scope of delivery or on <u>www.siebert-group.com.</u> After installation, the display is listed in the hardware catalog.

In the device catalog, activate the checkbox 'Filter' and navigate to:

'General / Siebert Industrieelektronik GmbH / Siebert SX102/SX202/SX302'.

#### Step 3: Switch to project view and add device

Switch to 'Devices & networks / Network view'.

Drag the 'XC50/XC55/XC75' head module from the catalog to the 'Devices & networks / Network view' area.

XCPLUS_N1_Textausgabe-20	0230926 🕨 Geräte & Netze	_ # = ×	Hardware-Katalog
	🛃 Topologiesicht 🛗 Netzsicht	Gerätesicht	Optionen
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PLC 1	siebert-disp		Filter Profil: <alle></alle>
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			✓ Im PROFINET IO
			Em Dathem
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			<ul> <li>Tiebert Industrieelektronik GmbH</li> </ul>
			<ul> <li>Siebert XCPLUS</li> </ul>
			XC50/XC55/XC75
		2	▶ [ <u>m</u> 1/O
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		Ne la	

#### Step 4: Establish connection to the display

Ordnen Sie in der Netzsicht die Anzeige der gewünschten Steuerung zu. Danach wird die PROFINET-Verbindung als gestrichelte grüne Linie angezeigt.

XCPLUS_N1_Textausgabe-20	0230926 → Geräte & Netze
Vernetzen 7 Verbindungen	HMI-Verbindung 💌 📅 🖬 🖽 🛄 🔭 🖼
	IO-System: PLC_1.PROFINET IO-System (100)
PLC 1 CPU 1214C	siebert-disp XC50/XC55/ PLC_1
(	PLC_1.PROFINET IO



#### Step 5: Add sub-module to the display and define address range

In the network view, assign the display to the desired control. The PROFINET connection is then displayed as a dashed green line.

This specifies that the display expects the values to be displayed as an ASCII string. The module occupies 32 bytes in the IO area (in this example, addresses 64 to 95).

siebert-display (XC50/XC55/*)	ersicht	Baugr 0 0 0 0 0 0	Steck 0 0 X1 1 2 3 4	E-Adresse	A-Adres 6495	Typ XC50/XC55/XC75 siebert-display Text module	Artikelnummer XC50_55_75N1
stereretereteretereteretereteretereteret	pert-display DAP INTERFACE MODULE t module_1	Baugr 0 0 0 0 0 0 0 0	Steck 0 0 X1 1 2 3 4	E-Adresse	A-Adres 6495	Typ XC50/XC55/XC75 siebert-display Text module	Artikelnummer XC50_55_75N1
seberator	xert-display DAP INTERFACE MODULE t module_1	0 0 0 0 0	0 0 X1 1 2 3 4		6495	XC50/XC55/XC75 siebert-display Text module	XC50_55_75N1
	DAP INTERFACE MODULE t module_1	0 0 0 0	0 X1 1 2 3 4		6495	siebert-display Text module	
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						Display     Text	module

You can change the name specified by the TIA Portal individually.

A maximum of four 'Text modules' can be added.

The content of the PROFINET text modules is assigned to the layout elements PN-Text-0, PN-Text-1, PN-Text-2 and PN-Text-3 of the XC50, XC55 and XC75 displays. To do this, the initialization parameter 'Logical Text number' must be set for each module.

ATTENTION: Each 'Text module' added must be uniquely assigned to a 'Logical text number'. If a 'Logical Text number' is used more than once, this will result in an error message when the program is started.

XCPLUS_N1_Textausgabe-2	0230926 🔸 Nicht gruppierte Gerä	ite 🔸 siebert-display [XC50/XC5	5/XC75]	Ì					∎×∎ •
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siebert-display [XC50/XC55	ve s 2 6 5 0 ' 4 🗍	Geräteübersicht							
ter	<u>^</u>	Y Modul	Baugr.	Steck	E-Adresse A-Adres	Тур	Artikelnummer	Firmware	-
Aispi		<ul> <li>siebert-display</li> </ul>	0	0		XC50/XC55/XC75	XC50_55_75N1	V1.01.05	^
orec		DAP INTERFACE MODULE	0	0 X1		siebert-display			
liebe		Text module_1	0	1	6495	Text module		1.0	
3		Text module_2	0	2	9612	Text module		1.0	
		Text module_3	0	3	1281	9 Text module		1.0	
		Text module_4	0	4	1601	1 Text module		1.0	
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		PN-Text-0							-11
		PN-Text-1							
		PN-Text-2							
		IN-Text-3							



ATTENTION: A text element with the same name must be defined in the display layout for each 'Text module' added. The data is sent from the PLC via PROFINET to the text modules and from there on to the text elements in the layout of the display. If the text elements are not present in the layout, the texts cannot be shown on the display.

admin xc-display	> Layout Input Adva	anced input
*	Layout Menu	^
Start	Layout tree	
~	▼ 🗄 Display (Matrix)	
	Aa PN-Text-0 (Text)	
Layout	Aa PN-Text-1 (Text)	
	Aa PN-Text-2 (Text)	
-	Aa PN-Text-3 (Text)	

#### Step 6: Assign the display a PROFINET device name

Now assign an IP address and a device name to the display. To do this, for example, call up the context menu of the Siebert display in the device view and click on 'Assign device name'.

After the data has been successfully transferred to the display, the configuration is displayed in the engineering tool as follows.

		Konfiguriert	es PRO	FINET-Gerät				
		PROFINET-Gerät	ename:	siebert-display-xcplus			-	
-		Ge	rätetyp:	XC50/XC55/XC75				
		Online-Zuga	ana					
		Typ der PG/PC-Schni	ittstelle:	PN/IE			-	
		PG/PC-Schn	ittstelle:	Intel(R) 82574L Gigab	it Ne	etwork Connection	•	9
		Gerätefilter						
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			greichen	yps anzeigen				
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	Erreichbare Teilr IP-Adresse 192.168.20.1	Nur falsch Nur falsch Nur Geräte Nehmer im Netzwerk: MAC-Adresse 40-ED-98-B0-25-6	parametrie ohne Narr Gerät XCPLUS	PROFINET-Gerätename siebert-display-xcplus	0	Status OK		
	Erreichbare Teilr IP-Adresse 192.168.20.1	Mur Geräte Nur Geräte Nur Geräte NAC-Adresse 40-ED-98-B0-25-6	parametrie ohne Narr Gerät XCPLUS	PROFINET-Gerätename siebert-display-xcplus	0	Status OK		
<b>I</b>	Erreichbare Teilr IP-Adresse 192.168.20.1	Nur falsch Nur Geräte Nur Geräte Nur Geräte MAC-Adresse 40-ED-98-B0-25-6	ohne Narr Gerät XCPLUS	PROFINET-Gerätename siebert-display-xcplus	0	Status OK		
<b>I</b>	Erreichbare Teilr IP-Adresse 192.168.20.1	Nur falsch Nur falsch Nur Geräte Nur Geräte MAC-Adresse 40-ED-98-B0-25-6	Gerät XCPLUS	PROFINET-Gerätename siebert-display-xcplus	•	Status OK		
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#### Step 7: Define text

To send a value to display, you can, for example, create a function chart with 'MOVE' instructions. In the following screenshot, the text 'Siebert' is sent. Two 'MOVE' blocks are required for this.



A more extensive example using SCL is described in the following chapter.

#### Step 8: Load hardware configuration and program into the control system

After switching on the display, the preset layout is displayed.

As soon as the configuration and the program module are loaded into the control, the control connects to the display via PROFINET and the display shows the text 'Siebert' on the layout element 'PN-Text-0'.



#### 6 Example SCL

As an alternative to using the Move blocks, the display can, for example, also be written in SCL.

This changes step 7 of the Quickstart.

You can copy the following SCL program parts from this document, save them as a text file on your computer and import them into your project using the 'External sources / Add new external file' option.

#### SCL 1: Define data block R\_TRIG\_DB

This data block is used to call the actual program once per second.

```
DATA_BLOCK "R_TRIG_DB"
{InstructionName := 'R_TRIG';
LibVersion := '1.0';
S7_Optimized_Access := 'TRUE' }
AUTHOR : Siebert
FAMILY : BIT
NAME : R_TRIG
VERSION : 1.0
NON_RETAIN
R_TRIG
BEGIN
```

END DATA BLOCK

#### SCL 2: Define data type for the texts

The output data can be easily assigned via the custom data type.

```
TYPE "XC50_55_75_Texte"
VERSION : 1.1
STRUCT
Text : Array[0..31] of Byte;
END_STRUCT;
```

END\_TYPE



#### **SCL 3: Define function**

The auxiliary variables are first defined in the SCL\_Test function. Then, controlled via R\_TRIG\_DB, the four texts are calculated once per second. Each text consists of a counter that changes every second and a fixed part that identifies the text.

Each text must be terminated with a zero byte. Without this null byte, parts of longer texts sent earlier may still be displayed.

```
FUNCTION "SCL Test" : Void
TITLE = Strings für XC50 XC55 und XC75
{ S7 Optimized Access := 'TRUE' }
VERSION : 1.1
  VAR TEMP
    chrcnt : UInt;
    cnt : Byte;
    str5bytes : String[5];
    Text 0 : String[30];
    Text 1 : String[30];
    Text 2 : String[30];
    Text 3 : String[30];
    Trig 1Hz : Bool;
  END VAR
BEGIN
  "R TRIG DB" ( CLK := "Clock 1Hz",
                Q => #Trig 1Hz );
  IF (#Trig 1Hz = true)
  THEN
    "counterwert" := "counterwert" + 1;
    // The PLC variable countervalue, which is automatically increment,
    // is of type Word. For the individual digits of the XC50 Bytes are
    // required, hence the conversion function INT TO BYTE.
    #cnt := INT TO_BYTE("counterwert");
    #str5bytes := INT TO STRING(#cnt);
```



```
// Terminate text with $00
 #Text 0 := CONCAT(IN1 := #str5bytes, IN2 := ' T0$00');
 #Text 1 := CONCAT(IN1 := #str5bytes, IN2 := ' T1$00');
 #Text 2 := CONCAT(IN1 := #str5bytes, IN2 := ' T2$00');
 #Text 3 := CONCAT(IN1 := #str5bytes, IN2 := ' T3$00');
 Strg TO Chars(Strg := #Text 0,
                pChars := 0,
                Cnt => #chrcnt,
                Chars := "xc50 t0".Text);
 Strg TO Chars(Strg := #Text 1,
                pChars := 0,
                Cnt => #chrcnt,
                Chars := "xc50 t1".Text);
 Strg_TO_Chars(Strg := #Text_2,
                pChars := 0,
                Cnt => #chrcnt,
                Chars := "xc50_t2".Text);
 Strg TO Chars(Strg := #Text 3,
                pChars := 0,
                Cnt => #chrcnt,
                Chars := "xc50 t3".Text);
```

END\_IF; END\_FUNCTION



#### SCL 4: Importing SCL code into the TIA Portal

In the TIA Portal, you can open the Windows file selection under 'External sources' by double-clicking on 'Add new external source' and import the text file SCL-Example-XC50.scl, which consists of the code parts SCL 1 to SCL 3.

Afterwards, the item 'Generate blocks from source' can be called up in the context menu.



#### SCL 5: Define output variables

In the SCL file with the function calls  $Strg_TO_Chars$  the variables are described.

"xc50\_t0".Text "xc50\_t1".Text "xc50\_t2".Text "xc50\_t3".Text

These variables must now also be defined in the standard variable table. Due to the initially defined data type 'xc50\_55\_75\_Texte' the 32 bytes are created automatically. The start address must be %Qnn.0.

	xc50_t0	"XC50_55_75_Texte"	%Q64.0		
-	xc50_t1	"XC50_55_75_Texte"	%Q96.0		
-	xc50_t2	"XC50_55_75_Texte"	%Q128.0		
-	xc50_t3	"XC50_55_75_Texte"	%Q160.0 💌		



#### SCL 6: Loading the program onto the PLC

After compiling and uploading to the controller, the display should show the following information. The numbers change once per second and the texts T0, T1, T2 and T3 are constant and show which text it is.



A layout consisting of four text elements with the appropriate names is defined on the display on delivery.

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$\leftarrow \rightarrow$ C $\textcircled{a}$ O	8 169.254.6.90:8080/#!layout/ed	ditor		\$	රු ≡
🌣 Meistbesucht 🔞 Erste Schritte	dige ich wo? 🖸 Siebert Intranet: Hom	ne 📙 SPS 4 You 🖸 XC55			D Weitere Lesezeichen
e siebert'					
admin > Layout	Input Advanced in	nput Quick select	Editor		
Layout Menu	0		Options •		
Cayout tree		Layout	Layout	items	Î
→ E Display	/ (Matrix)				ayout
Aa PN-T Lavout Aa PN-T	ext-0 (Text) ext-1 (Text)	0 <sup>0</sup> →×	c	ortainer Text	
Aa PN-1	ext-2 (Text)	J 138 TR	-138 T2		
	ext-3 (Text)	-138 T1	- <b>139 T3</b> ,	lumeric Bargraph.	
Data					at
3/				Clock Rectangle	
Utilities		*	<		

The position, size, font, color, scrolling text and all other properties of the text elements are defined via the display web page in the layout editor. They cannot be changed via PROFINET.

The text elements must be located at the top level. Elements in containers or pagers cannot be accessed via PROFINET.



The display is updated internally once per second. It is also possible to specify a text via the website. However, this is overwritten by the content of the PROFINET variables after one second at the latest.

It is also possible to send the data more quickly via PROFINET. In this case, not all texts are displayed, but only exactly the data that is actually current at the time of the second-by-second query.

The layout can also contain any other layout elements, e.g. images, additional texts, date and time. These are either updated automatically by the display, e.g. date, time, temperature, or must be updated by the user either via the website, via JSON or one of the other options.

#### 7 Display messages

The data traffic via PROFINET is indicated with status LEDs on both RJ45 sockets. The meaning is the same for both ports.

LED green	LED yellow	Meaning
off	off	<ul><li>no power supply</li><li>no network connection</li></ul>
on	ons	<ul> <li>network connection exists</li> </ul>
on	flashing	<ul><li>initialization phase</li><li>application relation is set up</li></ul>
on	on	<ul> <li>application relation is established</li> </ul>

If the connection can not be established or faults occur during operation the display shown the error messages. Possible causes are IP problems due to incorrect network parameters, multiple device names, command of undefined properties or other fieldbus errors.