# **Drive System Application**

# applications & TOOLS

Directly controlling a MICROMASTER 4 / SINAMICS G120 / SINAMICS G120D from a SIMATIC HMI station via PROFIBUS-DP and PROFINET



Application description for SINAMICS G120/G120D and MICROMASTER 4

Directly controlling a MICROMASTER 4 / SINAMICS G120 / SINAMICS G120D from a SIMATIC HMI station via PROFIBUS-DP and PROFINET

ID-No:22072988

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Directly controlling a MICROMASTER 4 / SINAMICS G120 / SINAMICS G120D from a SIMATIC HMI station via PROFIBUS-DP and PROFINET

## Preposition

#### Aim of the application

This application has been created to show users how to control MICROMASTER 4 (MM4) and SINAMICS G120/G120D frequency inverters via PROFIBUS DP and PROFINET using a SIMATIC HMI station.

This application shows how, using an HMI panel, frequency inverter parameters can be displayed and changed.

#### Scope

The following core issues are discussed in this application:

- Example for controlling a frequency inverter using an HMI panel via PROFIBUS DP
- Example for controlling a frequency inverter using an HMI panel via PROFINET

#### Exclusion

This application does not include any description of the following

- The SIMATIC STEP 7 programming tool
- The WinCC Flexible programming tool
- The basic commissioning of the frequency inverter

It is assumed that readers have basic knowledge about these two subjects.

Due to differences in the parameter structure, this application cannot be used for SINAMICS CU230.

#### **Reference to the Automation and Drives Service & Support**

This article is from the Internet Application Portal of the Automation and Drives Service & Support. You can go directly to the download page of this document using this link.

http://support.automation.siemens.com/WW/view/en/22072988

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# **Application description**

This application shows how a MICROMASTER 4 (MM4) and a SINAMICS G120/G120D frequency inverter can be controlled from an HMI station.

Two examples for controlling the frequency inverter using an HMI station are described in this application:

- controlling two frequency inverters a MICROMASTER 440 frequency inverter and a SINAMICS G120 frequency inverter - with CU240S DP-F - via PROFIBUS;
- controlling two SINAMICS G120 frequency inverters equipped with CU240S PN (Control Unit) via PROFINET.

### 1 Task

In "Normal operation" the control commands and setpoints are transferred, using cyclic telegrams, from the SIMATIC control system via PROFIBUS-DP in the first example and via PROFINET in the second example.

In a so-called "Emergency mode" – when the cyclic PROFIBUS-DP/PROFINET is faulted, a drive operation is still to be guaranteed. For example, this situation can occur when commissioning the plant/system and the CPU goes into Stop.

The control (open-loop) and setpoint input should, in an "Emergency mode" be realized from a SIMATIC HMI station. This can mean, for example, from an Operator Panel (OP) or a Touch Panel (TP). In this case, it is necessary to use a SIMATIC OP or TP where the last digit is a 7. The reason for this is that these can directly access the drive as PROFIBUS master, Class 2 (non-cyclic services [utilities]). However, it should be noted that only parameter values can be accessed (comparable to the PKW part of the cyclic telegram) and not the cyclic PZD data - e.g. control word 1. This involves non-cyclic services [utilities]. This means that these are completely independent of the selected cyclic telegram types (PP0 or Siemens telegrams).

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### 2 Components required

Here you'll find an overview of the hardware and software components required for the function example.

### 2.1 Hardware components

#### Controlling via PROFIBUS-DP:

Table 2-1 Hardware components for the HMI control via PROFIBUS-DP

Component	Туре	Order No. [MLFB]/ordering data	No.	Manufacturer	
	S7 Contro	I			
Power supply	PS307 5A	6ES7307-1EA00-0AA0	1	SIEMENS	
S7-F CPU	CPU 317F-2 PN/DP	6ES7317-2FK13-0AB0	1		
Memory Card	MMC 8 MB	6ES7953-8LP11-0AA0	1		
	Drive				
SINAMICS G120 Control Unit	CU240S DP-F	6SL3244-0BA21-1PA0	1	SIEMENS	
SINAMICS G120 Power Module	PM240	6SL3224-0BE13-7UA0	1		
MICROMASTER 440	MICROMASTER 440	6SE6440-2AB11-2AA1	1		
PROFIBUS Module	MICROMASTER 4 PROFIBUS module	6SE6400-1PB00-0AA0	1		
PROFIBUS Cable 10m	SIMATIC NET, PB FC Standard Cable GP, 2-wire, shielded, min. ordering quantity: 20 m sold by the meter	6XV1830-0EH10	1		
PB connector	PB FC RS 485 PLUG 180, PB connector w. fast connect connector	6GK1500-0FC00	4		
PB connector	SIMATIC DP, bus connector for PROFIBUS up to 12 Mbit/s with tilted outgoing cable	6ES7972-0BA41-0XA0	2		
Motor	Asynchronous motor	1LA7060-4AB10	2		
Motor cable, 3m	Motor cable	6ES7194-1LA01-0AA0	1		
Line supply feeder cable	Line supply feeder cable	-	1	-	
HMI Device					
HMI Device TP177B PN/DP	SIMATIC TP 177B Touch Panel w. 5,7" STN-Display, PN/DP: Color (256 colours)	6AV6 642-0BA01-1AX0	1	SIEMENS	
	PG/PC				
PG/PC	SIMATIC Field PG M	6ES7712-1BB10-0AG2	1	SIEMENS	

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#### Controlling via PROFINET:

Component	Туре	Order No. [MLFB]/ordering data	No.	Manufacturer	
	S7 Control				
Power supply	PS307 5A	6ES7307-1EA00-0AA0	1	SIEMENS	
S7-F CPU	CPU 317F-2 PN/DP	6ES7317-2FK13-0AB0	1		
Memory Card	MMC 8 MB	6ES7953-8LP11-0AA0	1		
Ethernet Switch	Scalance X206-1	6GK5206-1BB10-2AA3	1		
	Drive				
SINAMICS G120 Control Unit	CU240S PN	6SL3244-0BA20-1FA0	2	SIEMENS	
SINAMICS G120 Power Module	PM240	6SL3224-0BE13-7UA0	2		
Ethernet Cable 10m	PROFINET Cable, min. ordering quantity: 20 m sold by the meter	6XV1870-2B	1		
Connector RJ45	PLUG 180 RJ45	6GK1901-1BB10-2AA0	9		
Connector RJ45	PLUG 145 RJ45	6GK1901-1BB30-0AA0	1		
Motor	Asynchronous motor	1LA7060-4AB10	2		
Motor cable, 3m	Motor cable	6ES7194-1LA01-0AA0	1		
Line supply feeder cable	Line supply feeder cable	-	1	-	
HMI Device					
HMI Device TP177B PN/DP	SIMATIC TP 177B Touch Panel w. 5,7" STN-Display, PN/DP: Color (256 colors)	6AV6 642-0BA01-1AX0	1	SIEMENS	
TCP/IP network					
Network adapter	USB/PCMCIA LAN Adapter	-	1	-	
	PG/PC				
PG/PC	SIMATIC Field PG M	6ES7712-1BB10-0AG2	1	SIEMENS	

#### Note:

The functionality was tested using the specified hardware components. Similar products can be used that however deviate from the list above. In such a case please be aware that possible changes may be required to the code used for this example (e.g. other addresses may have to be set).

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### 2.2 Software components

Table 2-3 Software components

Component	Туре	Order No. [MLFB]/ordering data	No.	Manufactur er
SIMATIC STEP 7	V5.4 + SP2	6ES7810-4CC08-0YA5	1	SIEMENS
STARTER	V4.1 + SP1	6SL3072-0AA00-0AG0 oder <u>Downloads</u>	1	
WinCC Flexible Compact	WinCC Flexible 2007 Compact Engineering-SW, Floating License License key on USB stick	6AV6611-0AA51-2CA5	1	
PROFIBUS GSD file	PROFIBUS file for SINAMICS G120 FW 3.0	Downloads	1	
PROFINET GSDML file	PROFINET file for SINAMICS G120 FW 3.0	<u>Downloads</u>	1	
PROFIBUS GSD file	PROFIBUS file for MICROMASTER 4	Downloads	1	

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# 3 PROFIBUS-DP control

### 3.1 Structure of the PROFIBUS net

Connect all of the PROFIBUS devices as shown in Fig. 3-1.



Figure 3-1 Control via PROFIBUS DP

### 3.2 Implementing the function

The main philosophy to implement the requested function is as follows:

- 1. Two command data sets (CDS) are parameterized in all of the frequency inverters:
  - command data set CDS0<sup>1</sup> for "Normal operation" (control and setpoint sources via fieldbus: P0700[0] = 6, P1000[0] = 6);
  - command data set CDS1<sup>2</sup> for "Emergency operation" (control source via terminals (P0700[1] = 2) and setpoint source via a fixed frequency (P1000[1] = 3)).

<sup>&</sup>lt;sup>1</sup> CDS0 bei CU240, CDS1 bei MM4

<sup>&</sup>lt;sup>2</sup> CDS1 bei CU240, CDS2 bei MM4

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> Using the HMI station, parameter P0810 (BI: CDS bit0 (manual/automatic)) is changed from 0 to 1 and therefore a changeover is made between the control and setpoint sources for the two operating modes ("Standard operation" and "Emergency operation").

A changeover is made between two command data sets [these are toggled between] which means that the BICO interconnections are kept. As a consequence, all of the parameter settings can be permanently parameterized in the frequency inverter for the "Emergency operation" mode.

3. In "Emergency operation", using the HMI station, parameter P0731[1] (BI: Function of digital output DO0<sup>1</sup>) is changed from 0 to 1; this means that digital output DO0<sup>1</sup> is set.

The frequency inverter can be powered-up by interconnecting the state of digital output  $DO0^1$  r0747.0 with parameter P0840[1].

The frequency inverter is powered-down by writing a value of "0" into parameter P0731[1].

For "Emergency operation" the setpoint is defined e.g. by the fixed frequency 1 (P1001[0]). In this case fixed frequency 1 is selected as steady-state (statically). To do this, parameter P1020[1] (BI: Fixed frequency selection, bit 0) is set to 1. The value of fixed frequency 1 can be changed via the HMI station.

<sup>&</sup>lt;sup>1</sup> Digital output 0 (DO0) for CU240, digital output 1 (DO1) for MM4

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### **3.3** Parameterization of the drives

Parameterize the frequency inverter. The parameterization is as follows:

#### Parameterization of the MICROMASTER 440:

Parameter No.	Designation	Parameter value	Note / comments
P0700[0]	Selection of command source, CDS1	6	6: PROFIBUS
P0700[1]	Selection of command source, CDS2	2	2: Terminals
P0701[1]	Function of digital input 1 (DI1), CDS2	99	99: Enable BICO parameterization
P0840[1]	BI: ON/OFF1, CDS2	r0747.0	Enable ON/OFF1 = Digital output 1
P1000[0]	Selection of frequency setpoint, CDS1	6	6: PROFIBUS
P1000[1]	Selection of frequency setpoint, CDS2	3	3: Fixed frequency
P1020[1]	BI: Fixed freq. selection Bit 0, CDS2	1	Fixed frequency 1 selected as steady-state (statically)
P2040	Fieldbus telegram off time	0	0: Watchdog disabled

Table 3-1 Parameterization of the MICROMASTER 440

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#### Parameterization of the CU240S DP-F:

Parameter No.	Designation	Parameter value	Note / comments
P0700[0]	Selection of command source, CDS0	6	6: PROFIBUS
P0700[1]	Selection of command source, CDS1	2	2: Terminals
P0701[1]	Function of digital input 0 (DI0), CDS1	99	99: Enable BICO parameterization
P0704[1]	Function of digital input 3 (DI3), CDS1	99	99: Enable BICO parameterization
P0840[1]	BI: ON/OFF1, CDS2	r0747.0	Enable ON/OFF1 = Digital output 1
P1000[0]	Selection of frequency setpoint, CDS1	6	6: PROFIBUS
P1000[1]	Selection of frequency setpoint, CDS2	3	3: Fixed frequency
P1020[1]	BI: Fixed freq. selection Bit 0, CDS2	1	Fixed frequency 1 selected as steady-state (statically)
P2040	Fieldbus telegram off time	0	0: Watchdog disabled

Table 3-2 Parameterization of the CU240S DP-F

### 3.4 Configuring in SIMATIC Manager

Open the SIMATIC Manager and create a new project

- Open the **SIMATIC Manager** and create a new project.
- Insert a **SIMATIC 300-Station** in the project.

#### Configuring HW-Config

• Open HW-Config and carry-out the following configuring (refer to Fig. 3-2):



Figure 3-2 Configuring HW-Config

#### Configuring the SIMATIC station

- Insert the rack **RACK-300** for SIMATIC-300, and
- Set-up the **SIMATIC station** (power supply and CPU).

#### **Creating the PROFIBUS subnet**

- Double click on the button "MPI/DP".
- In the properties window, under **"Type"** select the PROFIBUS interface and press on the **"Properties"** button.
- In the dialog box that is displayed, select a PROFIBUS address for the CPU (e.g. "2") and press the "New..." button.
- In the next dialog box, in the "**Network settings**" directory, select the data transfer rate (e.g. **1.5 Mbit/s**) and the "**DP**" profile of the PROFIBUS interface.
- Acknowledge all of the entries that you made with **"OK"** and then close all of the property windows.

#### Configuring the frequency inverter

#### Prerequisite

The PROFIBUS GSD files must have been installed in order that the MICROMASTER 4 and the Control Units CU240S/D DP/DP-F of the SINAMICS G120/G120D can be accessed via PROFIBUS:

- PROFIBUS GSD file for MICROMASTER 4
- PROFIBUS GSD file for SINAMICS G120 V3.0

#### Installing the GSD files

Install the PROFIBUS GSD files via the menu item "**Options -> Install GSD File...**" of HW-Config.

After you have installed the PROFIBUS GSD files the corresponding files appear in the HW Catalog under the "Standard Profile" in the folders "PROFIBUS DP \ Additional Field Devices \ Drives \ SIMOVERT \ MICROMASTER 4" and "PROFIBUS DP \ Additional Field Devices \ Drives \ SINAMICS \ SINAMICS G120 CU240S DP F v3.00".



Proceed as follows:

- Configure the MICROMASTER 440 frequency inverter with the GSD file from the directory "PROFIBUS DP \ Additional Field Devices \ Drives \ SIMOVERT \ MICROMASTER 4" of the HW Catalog (hardware Catalog).
- Configure the SINAMICS G120 frequency inverter with CU240S DP-F (Control Unit) with the GSD file from the directory "PROFIBUS DP \ Additional Field Devices \ Drives \ SINAMICS \ SINAMICS G120 CU240S DP F v3.00" of the HW Catalog (hardware Catalog).
- Configure PROFIBUS address 3 for MM440 and PROFIBUS address 4 for CU240S DP-F.
- For the MM440 frequency inverter and for the CU240S DP-F Control Unit, configure the telegram type "Standard Telegram 1".
- Save and compile your configuration and close the HW-Config.

#### Configuring organization block OB1

Open **OB1** and make the following entries (refer to Fig. 3-3):

"Normalbetri	eb": Cor	trollin	g two drives from a PLC
Network 1: T:	itle:		
Send Control	Word 1	and Mai	n Setpoint to the drives
L	MW	0	
Т	PQW	256	<pre>// Send Control Word 1 to the MICROMASTER 440</pre>
L	MW	2	
Т	PQW	258	// Send Main Setpoint to the MICROMASTER 440
L	MU	4	
T	PQW	260	// Send Control Word 1 to the SINAMICS G120
L	MW	6	
T	DOM	262	// Send Mein Setneint to the SINNMICS C120

Figure 3-3 Configuring organization block OB1



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#### Generating the variable table

Insert a **variable table** into the project, open it and make the following entries (refer to Fig. 3-4):

1 1 1	🕍 Yar - [YAT_1 HMI_Control_PROFIBUS\SIMATIC 300(1)\CPU 317F-2 PN/DP\S7 Pro 💻 🗖 🗙							
	🜃 Iable Edit Insert PLC Variable View Options Window Help 🗕 🗗 🗙							
-121		2			( 💁 🔒 💦	Sy 66' M>	60° 1 1/407	
	Add	ress	Symbol	Display format	Status value	Modify value		
1	// Co	ntrol	ing the MICR	OMASTER 440:				
2	// Se	nd C	ontrol Word	1 to the drive:				
3	MVV	0		HEX	VV#16#047E	VV#16#047E		
4	// Se	nd M	ain Setpoint	to the drive:				
5	MVV	2		HEX	VV#16#1000	VV#16#1000		
6								
7	// Co	ntrol	ing the SINA	MICS G120:				
8	// Se	nd C	ontrol Word	1 to the drive:				
9	MW	4		HEX	VV#16#047E	W#16#047E		
10	10 // Send Main Setpoint to the drive:							
11	MVV	6		HEX	VV#16#1000	VV#16#1000		
12								
			â	*				
HMI_	Control	PRO	FIBUS\SIMA	ATIC 300(1)\\S7 Program(1	)		. 11.	

Figure 3-4 Generating the variable table

#### Set PG/PC interface

Set the **PG/PC interface** by pressing on the button "**Options -> Set PG/PC Interface...**" in the menu of the SIMATIC Manager.

Select your communications processor for the PROFIBUS interface from the list (e.g. CP5611(PROFIBUS)).

#### Downloading the configured SIMATIC station into the CPU

Download the configured SIMATIC station into the CPU by selecting the SIMATIC

station in the project tree and then pressing on the **"Download"** button.



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#### **Configuring the SIMATIC HMI station**

A SIMATIC HMI station is configured in the following using the software package SIMATIC WinCC Flexible Compact.

It is possible to integrate an existing WinCC project into a STEP 7 project. To do this, the menu item of WinCC "**Project -> Integrate in STEP 7...**" is used.

This means that you can create a project in WinCC to control the frequency inverter using an HMI. You can then subsequently integrate this control into the STEP 7 project.

It is also possible to start configuring an HMI station from STEP 7. To do this, a SIMATIC HMI station must be inserted into the STEP 7 project.

Proceed as follows:

#### Inserting a SIMATIC HMI station

Insert a **SIMATIC HMI station** into the project by pressing on the **"Insert -> Station -> 5 SIMATIC HMI-Station"** button in the SIMATIC Manager menu (refer to Fig. 3-5):



Figure 3-5 Inserting a SIMATIC HMI station

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#### Select HMI device

In the dialog box that is displayed, select your operator control device (in our particular example, SIMATIC Touch Panel TP177B color PN/DP) and the version of this device (e.g. 1.1.0.0) and then close the window with **"OK"** (refer to Fig. 3-6).

TP 1708 mono     TP 1708 color     TP 1708 color     TP 1778 mono DP     OP 1778 color PN/DP     OP 1778 color PN/DP     OP 1778 color PN/DP     SIMATIC C7     B-SIMATIC C7     B-SIMATIC C7     Device version     Additional operating devices     Int.o.0		Select device by name and version	
Additional operating devices	H	- TP 1708 mono     - TP 1708 color     - TP 1778 mono DP     - TP 1778 color PN/DP     - OP 1708 mono     - OP 1778 mono DP     - OP 1778 mono DP     - OP 1778 color PN/DP     - OP 1778 color PN/DP     - OP 1778 color PN/DP     - SIMATIC C7     :- Sinumerik	
Additional operating devices 1.1.0.0			Device version
		Additional operating devices	1.1.0.0

Figure 3-6 Selecting an HMI device

Result: The "SIMATIC HMI-Station(1)" directory is displayed in the project tree.



Figure 3-7 SIMATIC HMI station in the project tree

### 3.5 Configuring in WinCC Flexible Compact

#### Start WinCC Flexible Compact

WinCC Flexible Compact must be started.

To do this, for example, in the SIMATIC Manager in the project tree select "SIMATIC HMI-Station(1) -> WinCC Flexible RT -> Communication -> Connections" - and then double click on the "Connections" button (refer to Fig. 3-8).



Figure 3-8 WinCC Flexible Compact - opening the "Connections" dialog box

#### Result:

**SIMATIC WinCC Flexible Compact** is started with the **"Connections"** Editor open (refer to Fig. 3-9).



#### Creating a new connection

uncc flexible Compact - HMI_Control_P	PROFIBUS - SIMATIC HMI Station(1)			
Project Edit View Insert Format Faceplate	es Options <u>Wi</u> ndow <u>H</u> elp			
ີ່ S <sup>®</sup> New 🔸 📂 🥅 ທ + ດ⊾ + 🗙 🚶 🖡	h 🛍 . 🖓 🖥 e 🐐 . 💷	🐘 . 🗶 ?= ?		
English (United States)	2 16 16 16 16 .			
Project (P) 🗙	"Connections			
Project				COMMECTIONS
SIMATIC HMI Station[1][1P 177B color PI				COMUECITOUS
Add Screen	Name Active	Communication driver Station P	artner Node Online 🔶 Ci	omment
	Connection_1 On	▼ SIMATIC 57 300/400 ▼ ▼	• • On •	
🖻 🨽 Communication				
Cycles				
Alarm Management				
Settings     Becipes				
E Peports				
Text and Graphics Lists      Buntime Liser Administration	Demonstern Area pointer			
E Cevice Settings	Parameters			
Canguage Settings     Project Languages				
	Interface			Station
Project Texts	TE1 B			
🗄 🧺 Version Management				
		HMI device	Network	PLC device
	Type Baud rate		Profile DP	Address 3
	0 R5232	-	Hinbest station address (HSA)	Expansion slot
	R5422 Address	1		
	R5485 Access point	S7ONLINE	31	Rack 0
	⊙ Simatic 🛛 🗹 Only mast	r on the bus	Number of masters 1	Cyclic operation
🖷 🤽 Object:				

Figure 3-9 Creating a new connection

Create a new connection (data link) for the communications between the HMI panel and the frequency inverter.

Proceed as follows (refer to Figs. 3-9 and 3-10):

- Select the first cell "Name" from the first line in the "Connections" Editor. The "Connection\_1" name then appears. When required, you can also change the names.
- Activate the connection (data link) by selecting "On" in the cell "Active".
- As communication driver select "SIMATIC S7 300/400".
- In the "Online" cell, select "On".



Figure 3-10 Creating a new connection

#### Making the settings for the configured connection

Make the following settings for the configured connection (refer to Fig. 3-11):

• In the pull down menu "Interface" select "IF1 B".

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- Make the following settings in the lefthand section "**HMI device**" of the window:
  - Set the **Baud rate** (e.g. set this to **1500000**).
  - Select the **PROFIBUS address** of the HMI station (e.g. "1").
  - As access point select **S7ONLINE**.
  - With the checkmark select "Only master on the bus".

TP 1778 color PN/DP Interface		Station	
HMI device	Network	P	LC device
Type Baud rate	Profile DP	Address	3
© R5232	Highest station address (H5A)	Expansion slot	0
R5422     Address     Access point     S7ONLINE	31	Rack	0
⊙ Simatic Only master on the bus	Number of masters	Cyclic operation	

Figure 3-11 Making the settings for the configured connection

- In "Network" in the center of the window under "Profile" select "DP".
- In "PLC device" in the righthand part of the window:
  - Set the **PROFIBUS address** of one of the two frequency converters (e.g. the PROFIBUS address of the MM440 frequency inverter = "3").
  - Remove the checkmark "Cyclic operation".



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#### Open the "Tags" Editor

Open the **"Tags"** Editor: In the project tree, select **"SIMATIC HMI-Station(1) -> Communication -> Tags"** and double click on the button **"Tags"** (refer to Fig. 3-12).



Figure 3-12 Opening the "Tags" Editor



Figure 3-13 Editor "Tags"

#### Setting-up and configuring variables

In our particular example, three variables must be set-up and configured to access drive parameters:

- Variable **P0731** to change parameter P0731[1] (drive ON/OFF)
- Variable P0810 to change parameter P0810 (operating mode: "Standard operation" / "EMERGENCY OPERATION")
- Variable P1001 to change parameter P1001[0] (setpoint input in "Emergency Operation")

The following simple rule applies when accessing drive parameters:

- parameter number = data block number
- parameter sub-index = data block offset

Make the following entries into the variable editor (refer to Table 3-3 and Fig. 3-14):

Table 3-3 Setting-up and configuring variables

Name	Connection	Data type	Symbol	Address	Array count	Acquisition cycle
P0731	Connection_1	DWord	<undefined></undefined>	DB731 DBD1	1	1s
P0810	Connection_1	DWord	<undefined></undefined>	DB810 DBD0	1	1s
P1001	Connection_1	Real	<undefined></undefined>	DB1001 DBD0	1	1s

								TAGS
	Name 🔺	Connection	Data type	Symbol	Address	Array count	Acquisition cyc Commer	ht
	P0731	Connection_1	DWord	<undefined></undefined>	DB 731 DBD 1	1	1 s	
	P0810	Connection_1	DWord	<undefined></undefined>	DB 810 DBD 0	1	1 s	
	P1001	Connection_1	🕶 Real 🔹	<ul> <li><undefined></undefined></li> </ul>	▼ DB 1001 DBD 0	<b>▼</b> 1	1 s 🔻	-
					Rang D DB	e DB B 123 1001 D 123 0		
<b>P1</b>	001 (Tag)						8	ŶX

Figure 3-14 Setting-up and configuring variables

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#### Note:

The data types of the variables depend on the addressed parameter values. Generally, the following matches apply to data types:

Table 3-4 Parameter data types and variable data types

Parameter data type	Significance	Variable data type
Unsigned8 (U8)	8-bit unsigned	Byte
Unsigned16 (U16)	16-bit unsigned	Word, Int
Unsigned32 (U32)	32-bit unsigned	DWord, DInt
Integer16 (I16)	16-bit integer	Int, Word
Integer32 (I32)	32-bit integer	DInt, DWord
Floating Point (Float)	Floating point	Real

#### Note:

Please take the parameter data types from the parameter lists associated with the corresponding frequency inverters.

#### Note:

Also read Section 6.5 "SIMATIC HMI (Human-Machine Interface)" of the Operating Instructions <u>MICROMASTER PROFIBUS Optional board</u>.

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#### Open the "Text Lists" Editor

Open the "Text Lists" Editor: And in the project tree select "SIMATIC HMI-Station(1) -> Text- and Graphics Lists -> Text lists" and then double click on the button "Text Lists" (refer to Fig. 3-15).



Figure 3-15 Opening the "Text Lists" Editor

WinCC flexible Compact - HMI_Control_	PROFIBUS - SIMATIC HMI Sta	tion(1)		
Project Edit View Insert Format Faceplate	es Options Window Help			
!= New • 📂 🧮 🖍 • ∩ • × 💥	h 🛍 . 🛛 🎝 🖨 🐐	• 🕴 • 🐘 • 🕅 🔗 🛝 (P073	31 💽 - 🧔 🖓 🖓 -	
English (United States)	≣≌ ∕* % % % .			
Project 💡 🗙	"S <sup>#</sup> Connections → Tag	S 2-Text lists		۲ کا ک
Project				7677117878
SIMATIC HMI Station[1][TP 17/B color PI				IEVI LTƏIƏ
Add Screen			Text lists	
Template	Name	Selection	Comment	
Screen_1	P0731	Range ()	•	-
Tags	P0810	Range ()		
S Connections				
Alam Management				
Analog Alarms			List optime	
	Dofault	Natuo 🔺 🖬	charles and a second se	
H A Settings			OFF	
🕀 🤧 Reports	0	65536 1:	ON	
E 🚝 Text and Graphics Lists				
Graphics Lists				
🕀 🛀 Runtime User Administration				
Certain Contractions	P0731 (Text list)			(Y (X)
Project Languages	General			General
- Graphics	Propercies	Settings		
Project Texts     Dictionaries				
🗄 🚝 Version Management			Name P0/31	
		S	election Range ()	-
📑 🔍 Object:				

Figure 3-16 Editor "Text Lists"



#### Setting-up and configuring text lists

One text list must still be set-up for each of the variables P0731 and P0810.

In our particular example, frequency inverter parameters P0731 and P0810 must be changed from 0 to 1 and vice versa using variables P0731[1] and P0810. This is the reason that two list entries must be configured for each of the text lists that have been set up: One for the value 0 and one for the value 1 (refer to Figs. 3-17 and 3-18).

#### Note:

Please note that the frequency inverter parameters P0731[1] and P0810 correspond to the value 1 and variables P0731 and P0810 correspond to the value 65536.

Set-up the following text lists:

Table 3-5 Setting-up text lists

Name	Selection
P0731	Range ()
P0810	Range ()

Configure the following list entries for the text lists that have been set-up:

Table 3-6 Configuring list entries

Text list	Value	Entry
P0731	0	0: OFF
	65536	1: ON
P0810	0	0: Normal Operation
	65536	1: Emergency Operation



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Figure 3-17 Entries for variable P0731



Figure 3-18 Entries for variable P0810



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#### Open the "Screens" Editor

Open the "Screens" Editor: In the project tree select "SIMATIC HMI-Station(1) -> Screens -> Screen\_1" and then double click on the "Screen\_1" button (refer to Fig. 3-19).



Figure 3-19 Opening the "Screens" Editor

(? (x 5" car	ellere en Tapi (2 Terl lett) Soven, 1		COS Tools
CHMI Stakor(1)[TP 1778 color PI ema Add Screen Templata Screen, 1	EMENS	SIMATIC PANEL	Eimple Ofgenty - Une - Ine
Teo Construits Construits Construits Construits Discuss Annue Discuss Annue Construit Annue Construits Discuss Listen Construits Discuss Listen Discuss List			<ul> <li>○ Stress</li> <li>○ Conta</li> <li>○ Activity</li> <li>A Textingli</li> <li>Is practical to a subscription of the su</li></ul>
Statutes Barren Prope Arman	1 (Screen) er 72 Settings New (cree, 1	Ge	neral

Figure 3-20 Editor "Screens"

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#### Setting-up and configuring buttons to changeover (toggle) between slaves

Set-up the two buttons to changeover (toggle) between slaves. Drag this from the tool window and drop it in the window for the HMI display (refer to Fig. 3-21).



Figure 3-21 Setting-up and configuring buttons for the changeover

Configure the buttons as follows:

- In the properties window, select the "General" tab
- As type, select the "Text" button
- Enter a matching text for each button (e.g. "Slave 3" and "Slave 4")



The buttons must now be assigned to a function that can be used to changeover (toggle) between slaves.

The **"ChangeConnection"** function can be used for this purpose. It interrupts the connection to the control that is being used (in our particular case, the frequency inverter) and establishes a new connection to the specified control (frequency inverter).

Proceed as follows (refer to Figs 3-22 and 3-23):

- Select one of the buttons.
- In the properties window, change to the "Events" tab.
- Select the "Click" sub-tab.
- Insert the "ChangeConnection" function into the first line of the function list: Select this in the pull down menu under "System functions -> Settings -> ChangeConnection".
- Set the connection to "Connection\_1".
- Set the PROFIBUS address to 3 (MM440).
- Enter a "0" as slot and subrack.
- Use the same settings for the second button with the exception of the PROFIBUS address. Set this (the PROFIBUS address) to 4 (CU240S DP-F).

s		Function
ns 1	ChangeConnection	
<u> </u>	Connection	Connection_1
	MPI/PROFIBUS address	3
	Slot	0
	Rack	0
2	<no function=""></no>	

Figure 3-22 Setting-up the ChangeConnection function for button 1 (slave 3)

X			Function
1	ChangeConnection		
_	Connection	Connection_1	
	MPI/PROFIBUS address	4	
	Slot	0	
	Rack	0	
2	<no function=""></no>		

Figure 3-23 Setting-up the ChangeConnection function for button 2 (slave 4)



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#### Setting-up and configuring input/output fields for the variables

Set-up two symbolic I/O fields for the variables P0810 or P0731 and an I/O field for the variable P1001 (refer to Fig. 3-24).

"S <sup>#</sup> Connections ⊲≣ Tag	s 12 Text lists Screen_1		Tools (P) 🗙
SIEMEN	SIMATIC PANEL	Î	Simple Objects Simple Objects Line Polyline Polyline Office Rectangle A TextField Of Field
C	Slave 3 Slave 4 Slave 3 Slave 4 Operating method (P0810): O: Normal Operation ON/OFF (P0731.1): O: OFF Setpoint (P1001): 00.00		Graphic D Field     Graphic D Field     Graphics View     Graphics View     Graphics View     Graphics View     Button     Bar
IO Field_1 (IO Fiel	d)	<b>?</b>	
General Properties Animations Events	Type     Format       Mode Input/output     Image: Second	General	Enhanced Objects Graphics Library Drop any object here to delete it.

Figure 3-24 Setting-up and configuring input / output fields for the variables

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Configure the I/O field for variable P0810 as follows (refer to Fig. 3-25):

- In the "General" tab, as mode, select "Input/Output" ("Settings" block).
- Select **P0810** as **Tag** ("Process" block).
- Select P0810 as Text list ("Display" block).

Symbolic IO Fie	łd_1 (Symbolic IO Field)	( <b>9</b> 🗴
General Properties Animations Events	Settings     Process       Mode     Input/output       Display     Tag       P0810     Cycle       Text list     P0810       Field length     20       Number of visible items     3	General

Figure 3-25 Configuring the I/O field for the variable P0810

Configure the I/O field for variable P0731 as follows (refer to Fig. 3-26):

- In the tab "General" as Mode, select "Input/Output" ("Settings" block).
- As Tag, select P0731 ("Process" block).
- As Text list, select P0731 ("Display" block).

Symbolic IO Fie	ld_2 (Symbolic IO Field)	( <b>?</b> ×
General Properties Animations Events	Settings     Process       Mode     Input/output     Tag       Display     Cycle     Is       Text list     P0731     Bit number       Field length     20     1       Number of visible items     3     1	General

Figure 3-26 Configuring the I/O field for the variable P0731



Configure the I/O field for variable P1001 as follows (refer to Fig. 3-27):

- In the tab "General" as Mode, select "Input/Output" ("Settings" block).
- As Tag, select P1001 ("Process" block).
- As Format type, select Decimal and as Format pattern, 99,99 ("Display" block).

General	•	General
Animations	Type Format	
Events	Mode Input/output Tormat type Decimal	
	Process Format pattern	
	Tag P1001 99.99	Ī
	Cycle 1 s Shift decimal point 0 🚍	
	String field length 5 🕂	

Figure 3-27 Configuring the I/O field for variable P1001



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#### Setting-up and configuring the button to exit the project presently running

A button can be set-up and configured to exit the project that is presently running; however, this button isn't absolutely necessary.

Sets-up a new button (refer to Fig. 3-28).

SIEMENS	SIMATIC PANEL		
HMI Slave selection: Slave 3 Operating method (P0810 ON/OFF (P0731.1 Setpoint (P1001	Control Slave 4 D: 0: Normal Operation D: 0: OFF CO.00 Exit		

Figure 3-28 Setting-up a button to exit the project presently running

Application description PROFIBUS-DP control

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Configure the button as follows (refer to Fig. 3-29):

- In the properties window, select the tab "General".
- As type, select the **"Text"** button.
- Enter an appropriate text for this button (e.g. "Exit").
- Go to the "Events" tab in the properties window.
- Select the "Click" sub-tab.
- Insert the "StopRuntime" function in the first line of the function list: Select this in the pull down menu under "System functions -> Other functions -> StopRuntime".

General     Properties		Function List
Animations	1 StopRuntime	
	Mode	Runtime
Press	2 <no function=""></no>	
Release		
<ul> <li>Activate</li> <li>Descrivate</li> </ul>		
Change		
- change		

Figure 3-29 Configuring a button to exit the project presently running

#### Saving a WinCC project

You can now save the project. In the WinCC menu, select "**Project -> Save**" or press on the "**Save current project**" 🔲 button in the menu bar.

### 3.6 PROFIBUS DP settings of the HMI device

Switch on the power supply for the HMI device. The Loader opens once the operating system has started (refer to Fig. 3-30).

Loader		
	Transfer	
	Start	
	Control Panel	
	Taskbar	
		_

Figure 3-30 Loader

Press "Control Panel" to open the HMI device Control Panel (refer to Fig. 3-30).

a. 🗐

Open the **"Transfer Settings"** dialog with the **"Transfer"** Transfer icon (refer to Fig. 3-31).

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Proceed as follows (refer to Fig. 3-31):

- Activate the respective data channel with the **"Enable Channel"** check box in the **"Channel 1"** or **"Channel 2"** group (in the example **"Channel 2"**).
- Configure the automatic transfer for the data channel 2.
   Check the "Remote Control" check box to turn on the automatic transfer.
- As protocol, enter "MPI/Profibus" for "Channel 2".
   Touch the selection field. A selection list is displayed.

OK ×

Figure 3-31 "Transfer Settings" dialog

• Press the "Advanced" button (refer to Fig. 3-31).

OK ×

Figure 3-32 "S7-Transfer Settings" dialog

• Select the PROFIBUS network and press the "**Properties...**" button (refer to Fig. 3-32).

The following dialog is displayed (refer to Fig. 3-33). Proceed as follows:

- Activate the check box "Panel is the only master on the bus".
- Enter the bus address for the HMI device in the "Address" input field (in the example "1").

Touch the input field. The symbolic screen keyboard is displayed.

• Enter a Baud Rate for the HMI device in the "Transmission Rate" input field (in the example 1.5 Mbit/s).

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Touch the selection field. A selection list is displayed.

- Select the highest station address on the bus in the "Highest Station Address" field (in the example, the factory setting "31" is kept).
   Touch the selection field. A selection list is displayed.
- Select the profile "**DP**" from the "**Profile**" selection field. Touch the selection field. A selection list is displayed.

	PROFIBUS	ок 🗙
/	Station Parameters Panel is the only master Address: Time-out:	er on the bus
	Network Parameters — Transmission <u>R</u> ate: Highest <u>S</u> tation Address: <u>P</u> rofile	1,5 Mbits\s 31 DP Bus Parameters

Figure 3-33 PROFIBUS settings

 Close the dialogs "PROFIBUS", "PROFIBUS", S7-Transfer Settings" and "Transfer Settings" with OK to save your entries.



#### Result:

The PROFIBUS DP settings of the HMI device have been changed.

Close the Control Panel of the HMI device with X. The loader is displayed. Press the "**Transfer**" button to start the "**Transfer**" operating mode (refer to Fig. 3-34).

Loader		
	Transfer	
	Start	
	Control Panel	
	Taskbar	

Figure 3-34 Starting the transfer operation at the operator unit

The transfer operation must now be started from WinCC.

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### 3.7 Transfer project in the HMI device

In the WinCC menu, select "**Project -> Transfer -> Transfer Settings...**" (refer to Fig. 3-35).



Figure 3-35 Transferring project in the HMI device



The following window opens - "Select devices for transfer". Here, as Mode, select "MPI/DP" and set the station address (the PROFIBUS address of the operator control device, in this particular example "1"). Then press the "Transfer" button (refer to Fig. 3-36).

Select devices for transfer	Settings for SIMATIC HM	I Station(1) (TP 177B color PN	N/DP)	×
			Transfer to Flash	C RAM
	Mode MF	1/DP	Delta transfer –	C Off
	Station address		Enable back tra	ansfer
			Overwrite pass     Overwrite regin	word list
				e data recolds
			Transfer App	ly Cancel

Figure 3-36 Selecting devices for transfer

The message - "Do you want to overwrite the existing password list on the device?" please acknowledge this with "Yes" (refer to Fig. 3-37).

Password list		×
?	Do you want to overwrite the existing password list on the device?	
Yes	No	

Figure 3-37 Overwriting the existing password list on the device

#### Result:

The transfer operation is started. After the project has been successfully transferred into the operator control device, the project is started at the operator control device.

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### 3.8 Controlling the drives

#### Normal Operation: Control from the S7 control

In "Normal Operation", the drive inverters are controlled from the S7 control (S7 PLC). The control commands and setpoints are sent to the drives through the variable table (refer to Fig. 3-38).

The drive is started by sending the typical control word 047E, followed by 047F (edge of bit 0: ON). Word 047E should be sent to the drive to stop it (edge of bit 0: OFF).

The frequency setpoint and actual value are normalized so that 4000(hex) corresponds to 50Hz. The highest value that should be sent is 7FFF. The normalization frequency (reference frequency) can be changed in P2000 (default 50Hz).

₩¥ v	ar - [¥/	۲ <u>_</u>	1 HMI_C	ontrol_PROFIBUS\SIMAT	TC 300(1)\CPU 31	7F-2 PN/DP\57	Pro 🗆 🗙
*	<u>T</u> able ļ	Edit	Insert Pl	_C Variable <u>V</u> iew Option:	s <u>W</u> indow <u>H</u> elp		_ 8 ×
-124		2			( 💁 🖁 💦	Sø 66° 🗤	60° 1 42 ///
1	📥 Addr	ess	Symbol	Display format	Status value	Modify value	
1	// Cor	ntroll	ing the MICR	OMASTER 440:			
2	// Ser	nd C	ontrol Word	1 to the drive:			
3	MW	0		HEX	VV#16#047E	W#16#047E	
4	// Ser	nd M	ain Setpoint	to the drive:			
5	MW	2		HEX	VV#16#1000	VV#16#1000	
6							
7	// Cor	ntroll	ing the SINA	MICS G120:			
8	// Ser	nd C	ontrol Word	1 to the drive:			
9	MW	4		HEX	VV#16#047E	W#16#047E	
10	// Ser	nd M	ain Setpoint	to the drive:			
11	MW	6		HEX	VV#16#1000	VV#16#1000	
12							
HMI_	Control_	PRC	FIBUS\SIM4	ATIC 300(1)\\S7 Program(1	)	🔹 🔍 RUN	1.

Figure 3-38 Controlling the drive inverter from the S7 control

# Emergency Operation: Controlling the frequency inverter from the HMI operator control device

In "Emergency Operation" the frequency inverters are controlled from the HMI operator control device.

It is possible to change between (toggle) the two slaves (frequency inverter) and control these.

Proceed as follows (refer to Fig. 3-39):

- Select one of the two inverters (slave 3 or slave 4).
- Change to "Emergency Operation": In the pull down menu for parameter P0810 select **"1: Emergency Operation"**.
- Enter a setpoint into the frequency inverter by pressing the I/O field for the P1001. The numerical keypad is displayed.
- Power-up the drive inverter by selecting "1: ON" in the pull down menu for P0731.1.
- Power-down the frequency inverter by selecting **"0: OFF"** in the pull down menu for P0731.1.
- The project presently running can be terminated/ended by pressing the "Exit" button.



Figure 3-39 Controlling the frequency inverter from the HMI operator control device

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# 4 **PROFINET** control

### 4.1 Structure of the PROFINET

Connect all of the PROFINET devices as shown in Fig. 4-1.

#### Note:

The following restrictions apply to the PROFINET connection of the HMI device: The HMI device should not be connected without a switch or a comparable device to a public Ethernet network.

In this particular example, a Scalance X206-1 is used as switch.

#### Note:

You require a TCP/IP network adapter in order to be able to connect your PG/PC to PROFINET.



Figure 4-1 Control via PROFINET

### 4.2 Implementing the function

Refer to Chapter 3.2.

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### 4.3 **Parameterization of the drives**

Parameterize the CU240S PN Control Units as follows:

#### Parameterization of the CU240S PN:

Parameter No.	Designation	Parameter value	Note / comments
P0700[0]	Selection of command source, CDS0	6	6: PROFIBUS
P0700[1]	Selection of command source, CDS1	2	2: Terminals
P0701[1]	Function of digital input 0 (DI0), CDS1	99	99: Enable BICO parameterization
P0704[1]	Function of digital input 3 (DI3), CDS1	99	99: Enable BICO parameterization
P0840[1]	BI: ON/OFF1, CDS2	r0747.0	Enable ON/OFF1 = Digital output 1
P1000[0]	Selection of frequency setpoint, CDS1	6	6: PROFIBUS
P1000[1]	Selection of frequency setpoint, CDS2	3	3: Fixed frequency
P1020[1]	BI: Fixed freq. selection Bit 0, CDS2	1	Fixed frequency 1 statically selected
P8840	Fieldbus telegram off time	0	0: Watchdog disabled

Table 4-1 Parameterization of the CU240S PN

### 4.4 Configuring in SIMATIC Manager

#### Set PG/PC interface

Open the **SIMATIC Manager** and create a new project.

Set the **PG/PC interface** by pressing on the button "**Options -> Set PG/PC Interface...**" in the menu of the SIMATIC Manager.

Select your network adapter for the TCP/IP network from the list.

#### Note

It is very important that in this case you select TCP/IP (Auto)!

#### **Editing Ethernet Node**

As a next step, you must enter the IP addresses as well as the PROFINET device names of all of the nodes (PLC, Control Units, Switch). These settings are made in the dialog box **"Edit Ethernet Node"**.

In the SIMATIC Manager menu, press on the button "PLC -> Edit Ethernet Node...".

For more information please refer to the Application Article ID: 29157692 "SINAMICS G: Reading from and writing to parameters of the Control Units CU240S/D PN/PN-F of the SINAMICS G120/G120D via PROFINET & PROFIBUS" (Section 2.3 "Editing Ethernet Node").

You can skip this chapter if you have already assigned IP addresses and PROFINET device names to the Ethernet Nodes, or if your devices already have these.

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#### **Configuring HW-Config**

- Insert a SIMATIC 300-Station in the project.
- Open **HW Config** and make the following configurations (refer to Fig. 4-2):

Image: Serie Series       Image: S	HW Config - [SIMATIC 300(1) (           Image: Station Edit Insert PLC View	(Configuration) HMI_Contr w Options <u>W</u> indow <u>H</u> elp	ol_PROFINET	]			_ _	
Ethenel(1): PROFINET 40. System (100)         Profile:         Profile:         Standard degram         Standard degram         Standard degram         Standard degram         Addiese:         Direct2         Standard degram         Standard degram         Standard degram         Standard degram         Addiese:         Direct2         Standard degram         Standard degram         Addiese:         Direct2         Standard degram         Standard degram         Addiese:         Direct2         Standard degram         Standard degram         Direct2         Standard degram         Standard degram         Direct2         Standard degram         Direct2         S	0 🛩 🗣 🗣 🥵 🎒 🗈	C.    🟜 🏜 📳 📼   😤	<b>k?</b>					
Image: Single Control Contrel Control Control Control Control Control Control C	Image: Constraint of the second sec		Ethemet(1): PR	OFINE T-10-Sy	stem (100)	<u> </u>		
Stot         Module         Order Number         I Address         Q address         Diagnostic address         Comment           //ref	<ul> <li>(2) Drive02</li> </ul>					• •		
Stot         Module         Urder Number         LAddress         U address         Diagnostic address         Lomment           0		[	1	1.0.11	[m	10 1	👔 🚡 🚡 SINAMICS S120 CBE20	
0         Direct         05L3 244 0802U-1780         0782*           Intel         PROFINET         8787*         9787*           X1         Pant 2         8787*         9787*           1         Standard Telegramm 1         8178*         978*           1.1         Farandard Telegramm 1         8178*         978*           1.2         Standard Telegramm 1         8178*         978*           1.2         Standard Telegramm 1         280253         8178*           1.2         Standard Telegramm 1         280253         8178*           1.3         Standard Telegramm 1         8178*         9000000000000000000000000000000000000	Slot Module	Urder Number	Address	U address	Diagnostic address	Comment	I SINAMICS S120 CU310 PN	
Image         Control         Control <thcontrol< th=""> <thcontrol< th=""> <thco< th=""><th>U DIIYEU2</th><th>DSLS 244-UBAZU-IFAU</th><th></th><th></th><th>0102"</th><th></th><th>SINAMICS S150 CBE20</th><th></th></thco<></thcontrol<></thcontrol<>	U DIIYEU2	DSLS 244-UBAZU-IFAU			0102"		SINAMICS S150 CBE20	
X2         Font 2         600           1         Standard Telegramm 1         8178*           1.1         Standard Telegramm 1         8178*           1.2         Standard Telegramm 1         282263           1.2         Standard Telegramm 1         282263	X1 Fault				8180*		Lateway	
1     Standard Telegramm     8178°       1.1     Parameter Access Pairi     8178°       1.2     Standard Telegramm 1     260263	X2 Bat 2		1		8179*			
1.1     Parameter Access Rvint     87.78°       1.2     Standard Telegramm 7     260263       Standard Telegramm 7     260263       Standard Telegramm 7     260263	1 Standard Telegramm 1		1		8178*		Network Components	
1.2         Standard Telegramm 1         260263         260263         Image: Standard Telegramm 1         Image: Standard Telegramm 1           1.2         Standard Telegramm 1         260263         260263         Image: Standard Telegramm 1         Image: Standard Telegra	1.1 Parameter Access Point				81.78"		E Sensors	
Siemens AG PROFILEET ID Device SINAMICS G120 CU240D PN, Drive ES/SIMOTIONHTerface, cyclic and acyclic	1.2 🚺 Standard Telegramm 1		280263	260263			THE SIMATIC 300	<b>-</b>
							SSL3 544-0FA20-1FA0 Siemens AG PRIDINET ID Device SINAMICS G120 CU240D PN, Drive ES/SIMOTION-Interface, cyclic and acyclic	Ť <u></u>

Figure 4-2 Configuring HW-Config

#### Configuring the SIMATIC station

- Insert the rack RACK-300 for SIMATIC-300, and
- Set-up the SIMATIC station (power supply and CPU).

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#### Creating the Ethernet subnet

When you insert the CPU the window for the settings of the Ethernet interface opens.

Proceed as follows:

- Set the IP address for the CPU that you had assigned to it (**192.168.0.1**).
- Enter "255.255.255.0" as subnet mask.
- Select as gateway: "Do not use router".
- Press the button "New...".
- The "**Properties New subnet Industrial Ethernet**" window opens. Here, you can assign a name to the subnet or leave the default setting.
- Close the window with "**OK**".
- In the previous window select the subnet that you created and close the window with "OK".

For more information please refer to the Application Article ID: 29157692 "SINAMICS G: Reading from and writing to parameters of the Control Units CU240S/D PN/PN-F of the SINAMICS G120/G120D via PROFINET & PROFIBUS" (Section 3.2 "Creating the Ethernet subnet").

#### **Configuring frequency inverters**

#### Prerequisite

<u>PROFINET GSDML files for SINAMICS G120 V3.0</u> must have been installed in order that the Control Unit CU240S PN can be accessed via PROFINET.

#### Installing the GSDML file

Install the PROFINET GSDML file via the menu item "**Options -> Install GSD File...**" of HW-Config.

After you have installed the PROFINET GSDML file the corresponding files appear in the HW Catalog under the "**Standard Profile**" in the folder "**PROFINET IO** > **Drives > SINAMICS > GSD**".



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Proceed as follows:

- Configure the SINAMICS G120 frequency inverter with CU240S PN using the GSD file from the directory "PROFINET IO \ Drives \ SINAMICS \ GSD \ SINAMICS G120 CU240S PN" of the hardware Catalog.
- Assign the Control Unit the name that you allocated to them when editing the Ethernet nodes (e.g. **Drive01** and **Drive02**).
- Configure the PROFINET addresses for the CU240S PN Control Unit (e.g. 192.168.0.35 and 192.168.0.36).
- For the two CU240S PN control units, configure the "Standard Telegram 1" telegram type.
- Save and compile your configuration and close the HW-Config.

For more information please refer to the Application Article ID: 29157692 "SINAMICS G: Reading from and writing to parameters of the Control Units CU240S/D PN/PN-F of the SINAMICS G120/G120D via PROFINET & PROFIBUS" (Section 3.3 "Configuring the frequency inverter").

#### Configuring organization block OB1

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.4** "Configuring in the SIMATIC Manager").

#### Creating a variable table

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.4** "Configuring in the SIMATIC Manager").

#### Downloading the configured SIMATIC station into the CPU

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.4** "Configuring in the SIMATIC Manager").

#### **Configuring the SIMATIC HMI station**

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.4** "Configuring in the SIMATIC Manager").

#### Select HMI device

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.4** "Configuring in the SIMATIC Manager").

### 4.5 Configuring in WinCC Flexible Compact

#### Starting WinCC Flexible Compact

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.5** "Configuring in WinCC Flexible Compact").

#### Creating a new connection

Establish two new connections (**"Connection\_1**" and **"Connection\_2**") for communications between the HMI panel and the two frequency inverters (refer to Fig. 4-3).

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.5** "Configuring in WinCC Flexible Compact") for additional information.

14	Name	Active	Communication driver	Station	Partner	Node	Online	Comment
	Connection_1	On	SIMATIC 57 300/400				On	
	Connection_2	On 👻	SIMATIC 57 300/400	-	-	-	On	

Figure 4-3 Creating new connections

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#### Making the settings for the configured connections

Make the following settings for the configured connections (refer to Fig. 4-4):

- In the pull down menu "Interface" select "Ethernet".
- Make the following settings in the lefthand section "HMI device":
  - Select the PROFINET address of the HMI station (e.g. "192.168.0.45").
  - Select S7ONLINE as access point.



Fig. 4-4 Making the settings for the configured connections

- In the righthand Section "PLC device" of the window:
  - Select the **PROFINET addresses** of the Control Unit (**192.168.0.35** for the first frequency inverter, for "**Connection\_1**" and **192.168.0.36** for the second frequency inverter for "**Connection\_2**").
  - Remove the checkmark "Cyclic operation".

#### Open the "Tags" Editor

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.5 "Configuring in WinCC Flexible Compact"**).

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#### Setting-up and configuring variables

In our particular example, three variables must be set-up and configured for each Control Unit; these three variables are to access drive parameters:

- Variables P0731\_1 and P0731\_2 to change the parameter P0731[1] of the two Control Units (drive ON/OFF)
- Variables P0810\_1 and P0810\_2 to change the parameter P0810 of the two Control Units (operating mode: "Normal operation" / "EMERGENCY OPERATION")
- Variables **P1001\_1** and **P1001\_2** to change the parameter P1001[0] of the two Control Units (setpoint input in "Emergency Operation")

Make the following entries in the variable Editor (refer to Table 4-2 and Fig. 4-5):

Table 4-2 Setting-up and configuring variables

Name	Connection	Data type	Symbol	Address	Array count	Acquisition cycle
P0731_1	Connection_1	DWord	<undefined></undefined>	DB731 DBD1	1	1s
P0810_1	Connection_1	DWord	<undefined></undefined>	DB810 DBD0	1	1s
P1001_1	Connection_1	Real	<undefined></undefined>	DB1001 DBD0	1	1s
P0731_2	Connection_2	DWord	<undefined></undefined>	DB731 DBD1	1	1s
P0810_2	Connection_2	DWord	<undefined></undefined>	DB810 DBD0	1	1s
P1001_2	Connection_2	Real	<undefined></undefined>	DB1001 DBD0	1	1s

	Name 🔺	Connection	Data type	Symbol	Address	Array count	Acquisition cyc	Comment
T	P0731_1	Connection_1	DWord	<undefined></undefined>	DB 731 DBD 1	1	1 5	
	P0810_1	Connection_1	DWord	<undefined></undefined>	DB 810 DBD 0	1	1 s	
	P1001_1	Connection_1	Real	<undefined></undefined>	DB 1001 DBD 0	1	1 s	
	P0731_2	Connection_2	DWord	<undefined></undefined>	DB 731 DBD 1	1	1 s	
	P0810_2	Connection_2	DWord	<undefined></undefined>	DB 810 DBD 0	1	1 s	
	P1001_2	Connection_2	▼ Real	<ul> <li><undefined></undefined></li> </ul>	▼ DB 1001 DBD 0	- 1	1 s 🔻	-
					Rang D DB	pe DB B 1231001 D 1230		
P1	001_2 (Ta	g)					×	( <b>?</b> 🗙

Figure 4-5 Setting-up and configuring variables

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Directly controlling a MICROMASTER 4 / SINAMICS G120 / SINAMICS ID-No:22072988 G120D from a SIMATIC HMI station via PROFIBUS-DP and PROFINET

Also refer to the Section "**Setting-up and configuring variables**" of the PROFIBUS example (Chapter **3.5 "Configuring in WinCC Flexible Compact"**) for additional information.

#### Opening the "Text Lists" Editor

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.5** "Configuring in WinCC Flexible Compact").

#### Setting-up and configuring text lists

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.5** "Configuring in WinCC Flexible Compact").

#### Opening the "Screens" Editor

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.5** "Configuring in WinCC Flexible Compact").

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#### Setting-up and configuring input/output fields for the variables

Set-up four symbolic I/O fields for variables P0810\_1, P0731\_1, P0810\_2 and P0731\_2 and two I/O fields for variables P1001\_1 and P1001\_2 (refer to Fig. 4-6).

aS <sup>™</sup> Connections <sub>RE</sub> Tag	s 12 Text lists Screen_1		Tools 💡 🗴
SIEMEN	SIMATIC PANEL	<u>^</u>	Simple Objects
	HMI Control Drive 1 (IP: 192.168.0.35): Departing method (P0810): ①: Normal Operation ▼ ON/OFF (P0731.1): ①: OFF Setpoint (P1001): 00.00 Drive 1 (IP: 192.168.0.36): Departing method (P0810): ①: Normal Operation ▼ ON/OFF (P0731.1): ①: OFF Setpoint (P1001): 00.00 Exit		<ul> <li>Polygon</li> <li>Ellipse</li> <li>Circle</li> <li>Rectangle</li> <li>A TextField</li> <li>IO Field</li> <li>Graphic IO Field</li> <li>Graphics View</li> <li>Button</li> <li>Switch</li> <li>Bar</li> </ul>
Symbolic IO Field	4 (Symbolic IO Field)	<b>()</b>	
Properties     Animations     Events	Settings     Process       Mode     Input/output     Imput/output       Display     Cycle     Is       Text list     P0731     Imput/output       Field length     20     Imput/output       Number of visible items     3     Imput/output	eneral	Enhanced Objects Graphics Library Drop any object here to delete it.

Figure 4-6 Setting-up and configuring input/output fields for the variables

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Configure the I/O field for variable P0810\_1 as follows (refer to Fig. 4-7):

- In the tab "General" as Mode, select "Input/Output" ("Settings" block).
- As Tag, select P0810\_1 ("Process" block).
- As Text list, select P0810 ("Display" block).

General	•	General
Animations Events	Settings Process	
	Display Cycle 1s	
	Text list p0610 Bit number 0 -	•

Figure 4-7 Configuring the I/O field for variable P0810\_1

Configure the I/O field for variable P0731\_1 as follows (refer to Fig. 4-8):

- In the tab "General" as Mode, select "Input/Output" ("Settings" block).
- As Tag, select P0731\_1 ("Process" block).
- As Text list, select P0731 ("Display" block).

Symbolic IO Fie	ld_2 (Symbolic IO Field)	( <b>?</b> ( <b>x</b>
General Properties Animations Events	Settings     Process       Mode     Input/output     Imput/output       Display     Cycle     1 s       Text list     P0731     Imput/output       Field length     20     1       Number of visible items     3     1	General

Figure 4-8 Configuring the I/O field for variable P0731\_1



Configure the I/O field for variable P1001\_1 as follows (refer to Fig. 4-9):

- In the tab **"General"** as **Mode**, select **"Input/Output"** ("Settings" block).
- As Tag, select P1001\_1 ("Process" block).
- As Format type, select Decimal and as Format pattern, 99,99 ("Display" block).

eld)	( <b>?</b> 🗙
Type     Format       Mode     Input/output       Process     Format pattern       Tag     P1001_1       Cycle     1 s	General
	Type     Format       Mode     Input/output       Process     Format pattern       Tag     P1001_1       Cycle     1 s       Shift decimal point     String field length

Figure 4-9 Configuring the I/O field for variable P1001\_1

Configure the I/O field for variable P0810\_2 as follows (refer to Fig. 4-10):

- In the tab "General" as Mode, select "Input/Output" ("Settings" block).
- As Tag, select P0810\_2 ("Process" block).
- As Text list, select P0810 ("Display" block).

(Y (X
General

Figure 4-10 Configuring the I/O field for variable P0810\_2

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Configure the I/O field for variable P0731\_2 as follows (refer to Fig. 4-11):

- In the tab **"General"** as **Mode**, select **"Input/Output"** ("Settings" block).
- As Tag, select P0731\_2 ("Process" block).
- As Text list, select P0731 ("Display" block).

General	•	Genera
Animations	Settings Process	
Events	Mode Input/output	
	Display Cycle 1 s	
	Text list P0731 Bit number 0 📑	
	Field length 20 🚊	
	Number of visible items 3	

Figure 4-11 Configuring the I/O field for variable P0731\_2

Configure the I/O field for variable P1001\_2 as follows (refer to Fig. 4-9):

- In the tab "General" as Mode, select "Input/Output" ("Settings" block).
- As Tag, select P1001\_2 ("Process" block).
- As Format type, select Decimal and as Format pattern, 99,99 ("Display" block).

IO Field_2 (IO	Field)	( <b>?</b> ×
General Properties Animations Events	Type     Format       Mode     Input/output     ▼       Process     Format pattern       Tag     P1001_2       Cycle     I s	General
	String field length  5 🚊	

Figure 4-12 Configuring the I/O field for variable P1001\_2



#### Setting-up and configuring the button to exit the project presently running

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.5** "Configuring in WinCC Flexible Compact").

#### Saving the WinCC project

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.5** "Configuring in WinCC Flexible Compact").

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### 4.6 **PROFINET** settings of the HMI device

Switch on the power supply for the HMI device. The Loader opens once the operating system has started (refer to Fig. 4-13).

Loader		
	Transfer	]
	Start	]
	Control Panel 🔫	
	Taskbar	]

Figure 4-13 Loader

Press "Control Panel" to open the HMI device Control Panel (refer to Fig. 4-13).



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Directly controlling a MICROMASTER 4 / SINAMICS G120 / SINAMICS ID-No:22072988 G120D from a SIMATIC HMI station via PROFIBUS-DP and PROFINET

Open the "PROFINET" dialog with the "PROFINET"



Figure 4-14 Enable PROFINET IO

- Activate the "PROFINET IO enabled" check box.
- Enter a name for the HMI device in the "Device name" input field (for example "TP177B").
- Close the dialog with OK to save your entries.

ī,	

Open the **"Transfer Settings"** dialog with the **"Transfer"** Transfer icon (refer to Fig. 4-15).

Proceed as follows (refer to Fig. 4-15):

- Activate the respective data channel with the "Enable Channel" check box in the "Channel 1" or "Channel 2" group (in the example "Channel 2").
- Configure the automatic transfer for the data channel 2.

Check the "Remote Control" check box to turn on the automatic transfer.

• As protocol, enter **"ETHERNET**" for **"Channel 2**". Touch the selection field. A selection list is displayed.

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Transfer S	ок 🗙	
Channel	Directories	
[ <sup>Channel</sup>	1:	
Serial: via RS232/PPI Multi-Master Cable		
Enable Channel E Remote Control		
Channel	2:	
ETHER		
🔽 Ena	ble Channel 🔽 Remote Control	Advanced

Figure 4-15 "Transfer Settings" dialog

• Press the "Advanced" button (refer to Fig. 4-15).

Network Configuration	OK	×		
Adapters Identification				
Lists the network drivers installed on your device.				
AsyncMac1: AsyncMac1 NDISWAN Adapter				
	•			
MAC-Address: 08-00-06-2b-ad-c3 Propertie	s			

Figure 4-16 "Network Configuration" dialog

- Touch "SMSC100FD1: Onboard LAN Ethernet Driver"
- Touch the "Properties" button (refer to Fig. 4-16).
   The "Onboard LAN Ethernet Driver" dialog is displayed.

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- Select the manual address assignment "Specify an IP address".
- Enter a PROFINET address for the HMI device in the **"IP Address**" input field (in the example **"192.168.0.45**").
- Enter the subnet mask "255.255.255.0" in the "Subnet Mask" input field.

'Onboard LAN Ethernet Dr OK 🗙				
IP Address Name 9	Gervers			
An IP address can be automatically assigned to this computer.				
O Obtain an IP address via DHCP				
Specify an IP address				
IP Address:	192.168.0 .45			
Subnet Mask:	255,255,255,0			
Default Gateway:				

Figure 4-17 "Onboard LAN Ethernet Driver" dialog, "IP Address" register

Close the dialogs "Onboard LAN Ethernet Driver", "Network
 Configuration" and "Transfer Settings" with OK to save your entries.

#### **Result:**

The PROFINET settings for the HMI device have now been set.

Close the Control Panel of the HMI device with  $\times$ . The loader is displayed. Press the **"Transfer**" button to start the **"Transfer**" operating mode (refer to Fig. 3-34).

The transfer operation must now be started from WinCC.

### 4.7 Transfer project in the HMI device

In the WinCC menu, select **"Project -> Transfer -> Transfer Settings…**" (refer to Fig. 3-35).

The **"Select devices for transfer**" window opens. Here, as **Mode**, select **"Ethernet**" and set the PROFINET address of the operator control device (in our particular example this is **"192.168.0.45**"). Then press the **"Transfer**" button (refer to Fig. 4-18).

Select devices for transfer				×
SIMATIC HMI Station(1) (T	Settings for SIMATI	IC HMI Station(1) (TP 1778 color PN/DP)	Transfer to	C RAM
			Oelta transfer     On     Foreble beel, beel	© Off
	or IP address	192.168.0.45	Overwrite passu     Overwrite recipe	vord list e data records
		L	Transfer Appl	y Cancel

Figure 4-18 Selecting devices for transfer

Acknowledge the message - **"Do you want to overwrite the existing password list on the device?"** with **"Yes"** (refer to Fig. 3-37).

#### Result:

The transfer operation is started. After the project has been successfully transferred into the operator control device, the project is started at the operator control device.

### 4.8 Controlling the drives

#### Normal Operation: Control from the S7 control (PLC)

Refer to the Section of the PROFIBUS example with the same name (Chapter **3.8 "Controlling the frequency inverter"**).

#### Emergency Operation: Control from the HMI operator control device

In "Emergency Operation" the frequency inverters are controlled from the HMI operator control device.

Proceed as follows (refer to Fig. 4-19):

- For one of the frequency inverters, select "Emergency Operation": In the pull down menu for parameter P0810, select **"1: Emergency Operation**".
- Enter a setpoint for one of the frequency inverters by pressing the I/O field for P1001. The numerical keypad is displayed.
- Power-up the frequency inverter by selecting **"1: ON**" in the pull down menu for P0731.1.
- Power-down the frequency inverter by selecting **"0: OFF**" in the pull down menu for P0731.1 .
- The project that is presently running can be exited by pressing the "Exit" button.



Figure 4-19 Controlling the frequency inverter from the HMI operator control device

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### Appendix and references

### 5 References

### 5.1 Internet link data

This list is in no way complete and only reflects a selection of suitable references.

Table 5-1		
	Subject area	Title
\1\	Manual	TP 177A, TP 177B, OP 177B (WinCC flexible)
\2\	Manuals	MICROMASTER 4
\3\	Manual	MICROMASTER PROFIBUS Optional Board
\4\	Manuals	SINAMICS G120
\5\	Manuals	SINAMICS G120D
\6\	Application note	SINAMICS G: Reading from and writing to parameters of the Control Units CU240S/D PN/PN-F of the SINAMICS G120/G120D via PROFINET & PROFIBUS
\7\	Application note	ET 200S FC: Application sample for diagnosis and set up of ET200S FC via Touchpanel TP170B

### 5.2 History

#### Table 5-2 History

Version	Date	Change
V1.0	16.09.2005	First edition
V2.0	July 2008	Revised, a detailed description for PROFIBUS DP and the PROFINET control has been generated, a project examples have been generated
V2.1	Sept. 2009	ID-number reviesed
V2.2	Jan. 2010	Exclusion of CU230