Configuration of SINAMICS and MICROMASTER Drives with Drive ES in PCS 7

SIMATIC PCS 7 V7.1

Application Example • September 2012
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SIMATIC PCS 7

Configuration of SINAMICS and MICROMASTER Drives with Drive ES in PCS 7

Application Example
Warranty and Liability

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1 Task Description and Solution

1.1 Task

The performance spectrum of modern drives offers far more than just turning the power on and off. In the field of process automation, the full integration of additional functions, such as diagnostics and fault messages, plays a major role.

For the seamless integration of drives from the SINAMICS and MICROMASTER 4 family into the SIMATIC PCS 7 process control system, Siemens offers a modern motor block library which makes the full range of drive functions available. Configuration and commissioning of the drives, as well as operator control and monitoring are performed in the PCS 7 environment as usual.

1.2 Solution

This application example describes the procedure for the configuration of a frequency converter of the MICROMASTER 4 and SINAMICS product families. You will be introduced to the solution templates based on standard functions of the Advanced Process Library (APL) and Drive ES Library, and which will help you to significantly reduce your engineering requirements, especially in the course of a first integration process.

The solutions described in this document are suitable for new configurations, as well as for the integration into existing projects.

Frequency-controlled motors are integrated in the Drive ES blocks by means of the motor-specific message frame 352. If required, this message frame may be extended or modified.

With this option of message frame adaptation, the templates described here can be used to read out frequency converter warning and error numbers and to display them directly in the faceplate. The delivery documentation includes a list of these numbers with a detailed description of all errors and warnings, as well as their possible causes and correction. This also helps to shorten the reaction time, if the Technical Support Service needs to be involved. With the help of the warning and error number, the Technical Support Service staff will be able to eliminate the fault more quickly and specifically.
Solution Templates

The solution templates include fully configured CFC charts in which the driver and function blocks of the Drive ES are logically interconnected with the APL function blocks and therefore offer a ready automation solution with the following functions:

- Standard faceplates in APL look and feel
- Integrated additional displays in the faceplates
- The messages in PCS 7 OS Runtime additionally include the specific warning and error numbers of the frequency converter.
- A counter that monitors the runtime of the motors
- Switchover between local and control room operation
- Reset button
- Simulation mode
1 Task Description and Solution

1.2 Solution

**Drive ES PCS 7 Engineering Package**

Using the Drive ES PCS 7 Engineering package and the Message text lists included in delivery provides the following advantages:

- Engineering and commissioning of the drives is performed in the familiar environment of the PCS 7 automation system.
- Joint data management
- Standard blocks to integrate the drive functionality into the PCS 7 process control system.
- Expanding the PCS 7 OS Runtime messages via message lists included in delivery.

**Configuration with STARTER**

For the configuration of the frequency converter we use the application STARTER which is integrable into PCS 7. For that purpose we provide you furthermore complete parameter lists.

Your benefits by using the STARTER:

- Call from PCS 7
- Direct configuration of the frequency converter via the central engineering station.
- Consistent data management
- Expanding the PCS 7 Runtime messages via specific warning and error numbers of the frequency converter.
- These error numbers can be looked up in manuals of the frequency converter and are used for faster error detection.

**1.2.1 Main contents**

As an example, three frequency converters are fully configured with the help of prepared solution templates, the Drive ES library and the STARTER.

The main focuses are:

- Installation and integration of the templates and text libraries
- Hardware configuration
- CFC engineering
- Configuration of the frequency converters with STARTR
1.2.2 Validity

This application is valid for PCS 7 V7.1 SP3 and PCS 7 V7.1 SP2 with APL V7.1 SP5.

Note

APL V7.1 SP5 can be downloaded free of charge under the following link:


The three provided solution templates are valid for all types of the following frequency converters:

- MICROMASTER 4xx
- SINAMICS G120 up to V3.x
- SINAMICS G120 from V4.x
- SINAMICS G130
- SINAMICS G150
- SINAMICS S120
- SINAMICS S150
- SINAMICS GM150
- SINAMICS GL150
- SINAMICS DCM
1 Task Description and Solution

1.2 Solution

You can find the suitable template for your frequency converter in the table below.

<table>
<thead>
<tr>
<th>Template</th>
<th>Supported device types</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Template 1</td>
<td>MICROMASTER 4xx</td>
<td>Template 1 is used to integrate devices of the MICROMASTER family of the 4th generation into the PCS 7 process control system. The standard functionalities of a MICROMASTER are integrated via the “SIMO_MM4” function block which also guarantees the control through a SIMATIC S7 and the operation and control of an operator station. The communication between the converter and the SIMATIC is via PROFIBUS DP.</td>
</tr>
<tr>
<td>Template 2</td>
<td>SINAMICS G120 up to V3.x</td>
<td>Template 2 is used to integrate the SINAMICS G120 into the PCS 7 process control system. The standard functionalities of a SINAMICS G120 are integrated via the “SINA_G120” function block which also guarantees the control through a SIMATIC S7 and the operation and control of an operator station. The communication between the converter and the SIMATIC is via PROFIBUS DP. For a SINAMICS G120 from V4.x use template 3</td>
</tr>
<tr>
<td>Template 3</td>
<td>SINAMICS G120 from V4.x</td>
<td>Template 3 is used to integrate devices of the SINAMICS G/S family (SINAMICS S120/150 and G130/150) into the PCS 7 process control system. The standard functionalities of a SINAMICS are integrated via the “SINA_GS” function block which also guarantees the control through a SIMATIC S7 and the operation and control of an operator station. The communication between the converter and the SIMATIC is via PROFIBUS DP. SINAMICS G130 SINAMICS G150 SINAMICS S120 SINAMICS S150 SINAMICS GM150 SINAMICS GL150 SINAMICS DCM</td>
</tr>
</tbody>
</table>
2 Hardware and Software Prerequisites

2.1 Test environment

This application was generated and tested with the following components:

Software

<table>
<thead>
<tr>
<th>Software package</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMATIC PCS 7</td>
<td>V7.1 SP2</td>
</tr>
<tr>
<td>Advanced Process Library (APL)</td>
<td>V7.1 SP2 HF5</td>
</tr>
<tr>
<td>Drive ES for PCS 7</td>
<td>V7.1</td>
</tr>
<tr>
<td>STARTER</td>
<td></td>
</tr>
<tr>
<td>Solution Templates</td>
<td></td>
</tr>
</tbody>
</table>

Hardware

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU 417-4H</td>
<td>V4.5.1</td>
</tr>
<tr>
<td>MICROMASTER 440</td>
<td>V2.1</td>
</tr>
<tr>
<td>SINAMICS G120 CU240S</td>
<td>V3.2</td>
</tr>
<tr>
<td>SINAMICS S120 CU310 DP</td>
<td>V2.6.2</td>
</tr>
</tbody>
</table>

2.2 Drive ES PCS 7 software and licensing

The Siemens frequency converters of the SINAMICS and MICROMASTER families provide a wide range of functions.

When implementing frequency converters and when using the full function scope in PCS 7, you are supported by the engineering package Drive ES PCS 7 with which you can configure, diagnose and commission Siemens drives.

Drive ES is provided in several product specifications.

This application example uses Drive ES PCS 7, which contains image and control blocks for integration into the SIMATIC PCS 7 process control system.

Your benefit when using Drive ES PCS 7:

- Engineering and commissioning of the drives is performed in the familiar environment of the PCS 7 automation system.
- Joint data management.
- Standard blocks to integrate the drive functionality into the SIMATIC PCS 7 process control system.
2 Hardware and Software Prerequisites

2.2 Drive ES PCS 7 software and licensing

**Purchasing the Drive ES Software**

Drive ES PCS 7 APL is a PCS 7 add-on product which is available under the following order numbers:

**Package overview**

Table 2-3

<table>
<thead>
<tr>
<th>Order number</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>6SW1700-7JD00-1AA0</td>
<td>Drive ES PCS 7 V7.1, single license</td>
</tr>
<tr>
<td>6SW1700-7JD00-1AA4</td>
<td>Upgrade Drive ES PCS 7 V6.x/V7.x after V7.1 for single license</td>
</tr>
<tr>
<td>6SW1700-5JD00-1AC0</td>
<td>Runtime license for Drive ES PCS 7</td>
</tr>
<tr>
<td>6SW1700-0JD00-0AB2</td>
<td>Software maintenance service for the Drive ES PCS 7 single license</td>
</tr>
</tbody>
</table>

**Forms of delivery and license**

The single license is an engineering license that has to be purchased for each engineering station. It includes a runtime license that entitles the user to load the software on one CPU.

For more CPUs, additional runtime licenses have to be bought.

**Upgrade version**

An upgrade version from Drive ES PCS 7 V6.x/V7.x to V7.1 can be bought cheaply if one or more licenses have already been purchased.

**Note**

During the upgrade it is checked whether a previous version exists. If there is none, the upgrade is cancelled.

**Maintenance service**

A maintenance service guarantees the automatic delivery of all service packs and full versions for one year. This guarantees an up-to-date software version.

A fee is charged for this service.

**Note**

Users that have bought the maintenance service receive the new updates/upgrades automatically for one year.

**Runtime license**

The purchase of the runtime license for the Drive ES PCS 7 V7.1 includes the download and the operation of the Drive ES blocks in a CPU.

As proof of purchase for the runtime license the license label, included in delivery, can be stuck to the CPU or it can be stored in the respective documentations (e.g. machine logbook).
2.3 **STARTER software and compatibility list**

The frequency converter can be configured with the help of the STARTER which can be started directly through the frequency converter integrated into PCS 7.

The application at hand includes a parameter list which covers the largest part of the range of use of a frequency converter.

For project-specific adjustments you can change or complement the configuration. The online help and the product manual support you here.

Your benefit by using the STARTER:

- Call from PCS 7
- Direct configuration of the frequency converter from the engineering station
- Consistent data management

**Purchasing the STARTER software**

The current STARTER version can be ordered on DVD incl. license certificate stating the order number (MLFB) 6SL3072-0AA00-0AG0. It is available at a nominal fee.

The current STARTER Version (V4.1 SP5 HF1) respectively later versions can be downloaded under following link: [http://support.automation.siemens.com/WW/view/en/26233208](http://support.automation.siemens.com/WW/view/en/26233208)

The download can be used by all users who have already obtained a STARTER license certificate (any version).
## 2.3 STARTER software and compatibility list

<table>
<thead>
<tr>
<th>STARTER (Standalone/Drive ES Upgrade)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Version 4.0 SP1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 4.1 SP1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 4.1 SP2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 4.1 SP3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 4.2 and V4.2 HF1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 4.3 (estimated for March 2013)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drive ES Basic including STARTER</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Version 5.3 SP0 (STARTER Drive ES V3.2 SP1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.4 SP1 (STARTER Drive ES V4.0 SP1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.4 SP2 (STARTER Drive ES V4.1 SP1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.4 SP3 (STARTER Drive ES V4.1 SP2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.4 SP4 (STARTER Drive ES V4.1 SP3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.4 SP5 (STARTER Drive ES V4.1 SP4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.5 (STARTER Drive ES V4.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.5 SP1 (STARTER Drive ES V4.3_1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.5 SP2 (STARTER Drive ES V4.3_2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.5 SP3 (STARTER Drive ES V4.3_3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.5 SP4 (STARTER Drive ES V4.3_4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drive ES SMATIC (without STARTER)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Version 5.3 SP1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.4 SP1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.4 SP2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 5.5 SP1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drive ES PC Gi (without STARTER)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Version 6.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 6.1 SP1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 6.1 SP2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 7.0</td>
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<td></td>
</tr>
<tr>
<td>Version 7.0 SP1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 7.1</td>
<td></td>
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<tr>
<td>Version 7.1 SP1 (estimated for October 2013)</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIMOTION SCOUT</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Version 4.0 HF2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 4.1 SP1</td>
<td></td>
<td></td>
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<tr>
<td>Version 4.1 SP2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 4.1 SP4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version 4.2 SP1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Figure 2-1**

Compatibility lists for STARTER software and compatibility list.

Release Date: 17.08.2011
2.4 Solution Templates

The solution templates include fully configured CFC charts in which the driver and function blocks of the Drive ES PCS 7 are logically interconnected with the APL function blocks and therefore offer a ready automation solution with the following functions:

- APL standard faceplates
- Integrated additional displays in the faceplates
- The messages in PCS 7 OS Runtime additionally include the specific message numbers of the frequency converter
- Counter that monitors the runtime of the motors
- Switchover between local and control room operation
- Reset button
- Simulation mode

The solution templates are based on the PCS 7 APL and Drive ES PCS 7 APL blocks. To use the solution templates, you need the Drive ES PCS 7 product.

The solution templates will delivered with so called “dummy blocks” which only provide the interfaces but not the functions. The dummies can be replaced by the effective function blocks whilst maintaining the already carried out configurations.

This application describes how you replace these blocks by the original Drive ES blocks.

2.4.1 Obtaining the solution templates

The solution templates can be downloaded free of charged through the same entry ID like this document.

2.4.2 Integrating the solution templates and the text libraries

Integrating the solution templates and updating the process tags

1. Unzip the zip file (S7_Drive ES PCS 7-APL) in the SIMATIC Manager.
2. Copy the respective process tags into your user project or into your master data library.
3. Update the process tags by selecting the copied process tags and select “Options > Charts > Update block types” in the menu.
4. Follow the dialog to update the block types

User text library

In order for the message numbers of the frequency converter to be displayed in addition to the messages in PCS 7 OS Runtime, you have to copy the “user text library” into the user project.

For this purpose open the SIMATIC Manager and open the “DRVPCS7” library. Drag the respective text library from the “text library” folder into the S7 program of your CPU.

Table 2-4

<table>
<thead>
<tr>
<th>Frequency converter</th>
<th>Name of the text library</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICROMASTER 4xx</td>
<td>TextbibMM4</td>
</tr>
<tr>
<td>SINAMICS G120 up to V3.x</td>
<td>TextbibG120</td>
</tr>
<tr>
<td>SINAMICS G/S (SINAMICS G120 from V4.x, SINAMICS G130/G150, SINAMICS S120/S150, SINAMICS GM150, SINAMICS GL150, SINAMICS DCM)</td>
<td>TextbibSG</td>
</tr>
</tbody>
</table>

2 Hardware and Software Prerequisites

2.4 Solution Templates

Figure 2-3
3 Structure and Functionality of the Solution Templates

3.1 Functional overview

All the solution templates described in this application include the following joint functions:

- APL faceplates
- Additional integrated value displays in APL faceplate
  - Actual current value [A]
  - Actual power value [kW] or actual torque value [Nm]
- Display of error/message numbers of the frequency converter in the PCS 7 message texts
- Simulation
- Reset button (error) in PCS 7 OS Runtime
- Remote and local operation and switchover
- Start / stop / direction of rotation
- Setpoint frequency [Hz]
- Actual frequency value [Hz]
- Actual current value [A] with limit monitoring
- Actual power value [kW] or actual torque value [Nm]
- Interlock
  - Permit enable
  - Interlock
  - Interlock with acknowledgement (“Protect”)
- Operating hour counter
- Bus monitoring
3.2 Solution Template for MICROMASTER 4xx

The solution template at hand is used for frequency converters from the MICROMASTER 4xx family and is explained below:

Table 3-1

<table>
<thead>
<tr>
<th>Screenshot</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solution Template</strong></td>
<td>A solution template consists of a CFC chart which is made up of 6 sheets. A CFC chart is used for the automation of a process tag. The 6 sheets are used for the structural distribution of connected sub-functions such as, e.g. interlocks, drivers, counters, ...</td>
</tr>
<tr>
<td><strong>Sheet 1</strong></td>
<td>The function block of the MICROMASTER 4xx is connected through the driver with the process image. With the “or” block a logic is established that determines the status of the MICROMASTER 4xx.</td>
</tr>
<tr>
<td><strong>Sheet 2</strong></td>
<td>The three “Interlock” blocks are used for the preparation of a “Permit”, an “Interlock” and an interlock with acknowledgement “Protect”. The blocks are connected with the respective input of the “MotSpdCL” block</td>
</tr>
<tr>
<td><strong>Sheet 3</strong></td>
<td>Sheet 3 is reserved for own adjustments.</td>
</tr>
</tbody>
</table>
### 3.2 Solution Template for MICROMASTER 4xx

<table>
<thead>
<tr>
<th>Screenshot</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sheet 4</strong></td>
<td>Sheet 4 has the main blocks of the template. Here, the technological &quot;MotSpCL&quot; APL block is interconnected with the Drive ES motor block of the MICROMASTER 4xx &quot;SIMO_MM4&quot; in a way so that the MICROMASTER 4xx can be operated and monitored via the APL faceplate. All necessary feedback messages are pre-configured. Moreover, the MICROMASTER 4xx can be simulated with the Drive ES &quot;SIM_MM4&quot; simulation block.</td>
</tr>
</tbody>
</table>

| **Sheet 5** | In sheet 5 there is a counter that counts the operating hours of the motor. The MICROMASTER 4xx can be reset via the "OpTrig" block via the PCS 7 OS Runtime. |

| **Sheet 6** | In sheet 6 the additional associated values electricity and power of the MICROMASTER 4xx are calculated and displayed in the faceplate with the calculation blocks. |
3.3 Solution Template for SINAMICS G120 (V2.x and V3.x)

The solution template at hand for a frequency converter from the SINAMICS G120 group is explained below:

Table 3-2

<table>
<thead>
<tr>
<th>Screenshot</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Solution Template** | A solution template consists of a CFC chart which is made up of 6 sheets.  
A CFC chart is used for the automation of a process tag.  
The 6 sheets are used for the structural distribution of connected sub-functions such as, e.g. interlocks, drivers, counters, … |
| **Sheet 1** | The function block of the SINAMICS G120 is connected through the driver with the process image.  
With the "or" block a logic is established that determines the status of the SINAMICS G120. |
| **Sheet 2** | The three "Interlock" blocks are used for the preparation of a "Permit", an "Interlock" and an interlock with acknowledgement "Protect".  
The blocks are connected with the respective input of the "MotSpdCL" block |
| **Sheet 3** | Sheet 3 is reserved for own adjustments. |
### Sheet 4

Sheet 4 has the main blocks of the template. Here, the technological "MotSpCL" APL block is interconnected with the Drive ES motor block of the SINAMICS G120 "SINAG120" in a way so that the SINAMICS G120 can be operated and monitored via the APL faceplate. All necessary feedback messages are pre-configured. Moreover, the SINAMICS G120 can be simulated with the Drive ES "SIM_SINA" simulation block.

![Screenshot](image1.png)

### Sheet 5

In sheet 5 there is a counter that counts the operating hours of the motor. The SINAMICS can be reset via the "OpTrig" block via the PCS 7 OS Runtime.

![Screenshot](image2.png)

### Sheet 6

In sheet 6 the additional associated values electricity and torque of the SINAMICS G120 are calculated and displayed in the faceplate with the calculation blocks.

![Screenshot](image3.png)
3.4 Solution Template for SINAMICS G/S
(SINAMICS S120/S150, G130/G150, GM150, GL150, DCM, G120 from V4.2)

The solution template at hand for a frequency converter from the SINAMICS G/S group is explained below:

Table 3-3

<table>
<thead>
<tr>
<th>Screenshot</th>
<th>Description</th>
</tr>
</thead>
</table>
| Solution Template

A solution template consists of a CFC chart which is made up of 6 sheets.
A CFC chart is used for the automation of a process tag, e.g. a frequency converter.
The 6 sheets are used for the structural distribution of connected sub-functions such as, e.g. interlocks, drivers, counters, …

Sheet 1

The function block of the SINAMICS G/S is connected through the driver with the process image.
With the “or” block a logic is established that determines the status of the SINAMICS G/S.

Sheet 2

The three “Interlock” blocks are used for the preparation of a “Permit”, an “Interlock” and an interlock with acknowledgement “Protect”.
The blocks are connected with the respective input of the “MotSpdCL” block

Sheet 3

Sheet 3 is reserved for own adjustments.
### Sheet 4

Sheet 4 has the main blocks of the template. Here, the technological "MotSpCL" APL block is interconnected with the Drive ES motor block of the SINAMICS G/S “SINA_GS” in a way so that the SINAMICS G/S can be operated and monitored via the APL faceplate. All necessary feedback messages are pre-configured. Moreover, the SINAMICS G/S can be simulated with the Drive ES “SIM_SINA” simulation block.

### Sheet 5

In sheet 5 there is a counter that counts the operating hours of the motor. The SINAMICS G/S can be reset via the “OpTrig” block via the PCS 7 OS Runtime.

### Sheet 6

In sheet 6 the additional associated values electricity and torque of the SINAMICS G/S are calculated and displayed in the faceplate with the calculation blocks.
4 Configuration of a MICROMASTER 4xx

4.1 Hardware configuration

You can use the solution below either directly or you can adjust it to your needs.

For the configuration of a MICROMASTER 4xx, carry out the following steps:

4.1 Hardware configuration

Selecting profile

1. Open the hardware configuration and select the “DriveES” profile under profiles.

Selecting device

2. Open the product tree.
   “PROFIBUS DP > SIMOVERT > MICROMASTER 4”

3. From this folder select your MICROMASTER type and drag it via drag and drop to the respective PROFIBUS DP string.

Figure 4-1
4 Configuration of a MICROMASTER 4xx

4.1 Hardware configuration

Setting the DP address

4. Assign the DP address and confirm it with OK.

Figure 4-2

Selecting firmware version

5. Assign the respective firmware and confirm it with OK.

Figure 4-3
4 Configuration of a MICROMASTER 4xx

4.1 Hardware configuration

Selecting message frame

Select the required “PCS 7, PZD-4/4” message frame for the PCS 7 block under “Default”.

Figure 4-4
Setting I/O address

6. Make sure that the input and the output address has the same value (1) and length (2).

Figure 4-5
4.2 Replacing dummy block

1. Copy the required “SIMO_MM4” block from the “DRVPCS7” library into the master data library of the SIMATIC Manager.
2. Open any CFC chart.
3. Select “Options > Block Types…” from the menu option.
4. Select your used “SIMO_MM4” dummy block from the “Block Types” dialog.
5. Update this block by clicking the “New Version…” button.
4.3 Module driver

1. Generate the process tag in the user project from the master data library.

   **Note**
   
   More information, how to generate process tags can be found in the PCS 7 documentation “Assigning/Creating Process Tags”

2. Select the “SIMO_MM4” block of the “VALUE” input and right click “Interconnection to Address…"

3. Select the input address that you assigned in the HW config.
Enabling / locking the direction of rotation

Enabling or locking the direction of rotation on the APL block (MotSpCl) is performed via the “OS_Perms” (bit 5 and bit 6) input.

Simulation

The simulation is enabled by setting the “SIM_ON” input to “1”.

Maintenance requirements

For the maintenance requirements of the frequency converter the inputs “MAIN_L” (maintenance requirement low) and “MAIN_M” (maintenance requirement medium) have to be configured.

Default values

MAIN_L: 100 days
MAIN_M: 200 days
4.4 Configuration

Configuring the frequency converter with STARTER

There are several options to configure the frequency converter.

We recommend the use of the STARTER software since it offers the largest range of functions. This is why below, the configuration is only carried out with the STARTER.

If you are using another configuration option, there may be differences.

Opening the STARTER

1. Open the hardware configuration.
2. Select the MICROMASTER 4xx and open its context menu.
3. Select “Open object with STARTER”.

The STARTER is now available.

PROFIBUS mode

For the PROFIBUS mode start the following configuration in the STARTER.

Table 4-1

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0927 = 15</td>
<td>Configuration master (PROFIBUS, BOP)</td>
</tr>
<tr>
<td>P0918 = e.g. 3</td>
<td>PROFIBUS address</td>
</tr>
<tr>
<td>P2040 = 20</td>
<td>Message frame failure monitoring</td>
</tr>
</tbody>
</table>

The technological block transfers 4 process data words cyclically (control word, setpoint values) to the MICROMASTER and receives 4 process data words (status word, actual value) from it cyclically.

For this purpose the following configurations have to be made in the drive:

Control room operation

Subsequently, configure the process data words that are transferred in control room operation by the technological block to the MICROMASTER:
4 Configuration of a MICROMASTER 4xx

4.4 Configuration

Table 4-2

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
<th>Data type</th>
<th>Message frame space</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control word</td>
<td>*</td>
<td>WORD</td>
<td>1st word</td>
<td>P0700.0** = 6</td>
</tr>
<tr>
<td>ON / OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OFF2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OFF3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enable inverter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enable ramp-function generator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start ramp-function generator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enable setpoint</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acknowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enable positive direction of rotation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enable negative direction of rotation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External fault 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Main setpoint (speed/frequency setpoint) for **automatic operation** | SP_EXT | REAL | 2nd word | P1000.0** = 6 |
|                                                                     |           |       |       |               |

Main setpoint (speed/frequency setpoint) for **manual operation** (evaluation of absolute value) | SP_INT | REAL | 2nd word | P1000.0** = 6 |
|                                                                     |           |       |       |               |

Freely selectable setpoint | PCD_3_IN | WORD | 3rd word |               |
Freely selectable setpoint | PCD_4_IN | WORD | 4th word |               |

Now configure the process data words that are transferred by the technological block to the MICROMASTER in control room operation:

Table 4-3

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
<th>Data type</th>
<th>Message frame space</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status word</td>
<td>*</td>
<td>WORD</td>
<td>1st word</td>
<td>P2051.0 = 52.0</td>
</tr>
<tr>
<td>Main actual value (speed/actual frequency value)</td>
<td>PV</td>
<td>REAL</td>
<td>2nd word</td>
<td>P2051.0 = 21.0</td>
</tr>
<tr>
<td>Actual current value</td>
<td>CPV</td>
<td>REAL</td>
<td>3rd word</td>
<td>P2051.2 = 27.0</td>
</tr>
<tr>
<td>Actual power value (default)</td>
<td>PCD_4</td>
<td>WORD</td>
<td>4th word</td>
<td>P2051.3 = 32***</td>
</tr>
</tbody>
</table>

* Control word and status word are made up by the block. The required bits are individually listed in the I/O bar.

** Only indicated for MICROMASTER 440.

*** PCD_4 can be freely configured

Local operation

If a switchover to “local operation” is to be executable on the drive, it is expedient to store a second command data record in the drive.

With an external signal (e.g. from the key switch in the converter cabinet) it can be switched over to the second data record.

The switch over of the command data record is performed via the parameter P810.
4 Configuration of a MICROMASTER 4xx

4.4 Configuration

Table 4-4

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P810 = 0</td>
<td>Command data record 1 is active</td>
</tr>
<tr>
<td>P810 = 1</td>
<td>Command data record 2 is active</td>
</tr>
</tbody>
</table>

The following configuration presents an example for the realization of local switchover. The actual value source and the control signals from Profibus (control room operation) are switched over to BOP (local operation). For this purpose the wiring listed below has to be carried out. The external switchover signal is applied to terminal "X".

**MM411, MM420**

Parameter P719 is available for the selection of the control command source.

Table 4-5

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P700 = 6</td>
<td>Local operation/control room operation via digital input. When input 0 =&gt; control room operation P719.0 active When input 1 =&gt; local operation P719.1 active</td>
</tr>
<tr>
<td>P719.0 = 00</td>
<td>BICO wiring valid</td>
</tr>
<tr>
<td>P719.1 = 11</td>
<td>Control via BOP and Motorpoti active</td>
</tr>
<tr>
<td>P1000 = 6</td>
<td></td>
</tr>
</tbody>
</table>

**MM430, MM440**

P700 is available for the selection of the control command source.

Table 4-6

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P700.0 = 6</td>
<td></td>
</tr>
<tr>
<td>P700.1 = 1</td>
<td></td>
</tr>
<tr>
<td>P701.0 = 99</td>
<td></td>
</tr>
<tr>
<td>P701.1 = 99</td>
<td></td>
</tr>
<tr>
<td>P810 = 722.0</td>
<td>Switchover Local / Remote</td>
</tr>
<tr>
<td>P1000.0 = 6</td>
<td></td>
</tr>
<tr>
<td>P1000.1 = 1</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

In order for the switchover to the local operation to be detected in the AS block and not only in the converter, the switchover signal (e.g. from the key switch in the converter cabinet) has to be additionally wired to a digital input of AS. The "REMOTE" input of the AS block has to be wired to this digital input.

**Automatic restart**

The restart automatic is configured with parameter P1210:
4.5 Standardization of the frequency converter

<table>
<thead>
<tr>
<th>Parameter P1210</th>
<th>Restart performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Locked</td>
</tr>
<tr>
<td>1</td>
<td>Error acknowledgement after ON</td>
</tr>
<tr>
<td>2</td>
<td>Restart after power failure</td>
</tr>
<tr>
<td>3</td>
<td>Restart after power supply undervoltage</td>
</tr>
<tr>
<td>4</td>
<td>Restart after power supply undervoltage</td>
</tr>
<tr>
<td>5</td>
<td>Restart after power failure and error</td>
</tr>
<tr>
<td>6</td>
<td>Restart after power supply undervoltage/power failure or error</td>
</tr>
</tbody>
</table>

More information can be found in the parameter list of the MICROMASTER 4xx user documentation.

The parameter lists are additionally provided on the internet on the Service and Support page:


Please select the document for the device (type, firmware) used.

**4.5 Standardization of the frequency converter**

The function block used has to be standardized according to the motor used and the type of control type.

**Transmission rate**

Enter the transmission rate of motor-machine on the “FACT_GU” input of the “SIMO_MM4” block.

**Reference current**

1. Open the STARTER
2. Read out the value of the reference current that is stored in parameter P2002 of the MICROMASTER.
3. Open the CFC chart, where the “SIMO_MM4” MICROMASTER block is located
4. Enter the read out value of parameter P2002 in the “FACT_CPV” input of the “SIMO_MM4” block.

**Standardization to frequency, speed or percent**

The frequency converters can be controlled via frequency, speed or percent.

Depending on the desired control, you have to make the following standardization on the “SIMO_MM4” CFC block.

a.) Frequency

The solution templates are preconfigured for the control of the frequency converter via the setpoint frequency. However, these settings should be checked.
4 Configuration of a MICROMASTER 4xx

4.5 Standardization of the frequency converter

1. Open the STARTER
2. Read out the value of the rated motor frequency that is stored in parameter P310 of the MICROMASTER.
3. Open the CFC chart, where the “SIMO_MM4” MICROMASTER block is located.
4. Enter the read out value of parameter P310 in the “FACT_PRM” input of the “SIMO_MM4” block.

b.) Speed

1. Open the STARTER
2. Read out the value of the rated motor speed that is stored in parameter P311 of the MICROMASTER.
3. Open the CFC chart, where the “SIMO_MM4” MICROMASTER block is located.
4. Enter the read out value of parameter P311 in the “FACT_PRM” input of the “SIMO_MM4” block.

c.) Percent

1. Open the CFC chart, where the “SIMO_MM4” MICROMASTER block is located.
2. Enter the read out value 100 in the “FACT_PRM” input of the “SIMO_MM4” block.
4.6 Result in PCS 7 OS Runtime

After the OS compilation the respective block icons and templates are automatically created in PCS 7 OS Runtime.

Figure 4-9
5 Configuration of a SINAMICS G120 (V2.x/V3.x)

You can use the solution below either directly or you can adjust it to your needs.

5.1 Hardware configuration

Selecting profile

1. Open the hardware configuration and select the “DriveES” profile under profiles.

Selecting device

2. Open the product tree.
   "PROFIBUS DP > SINAMICS > SINAMICS G120"

3. From this folder select your SINAMICS type and drag it via drag and drop to the respective PROFIBUS DP string.

Figure 5-1
5 Configuration of a SINAMICS G120 (V2.x/V3.x)

5.1 Hardware configuration

Setting the DP address

4. Assign the DP address and confirm it with OK.

Figure 5-2

Selecting firmware version

5. Assign the respective firmware and confirm it with OK.

Figure 5-3
Selecting message frame

Subsequently select the required “SIEMENS message frame 352, PZD-6/6” message frame for the PCS 7 block under “Default”.

Figure 5-4
5 Configuration of a SINAMICS G120 (V2.x/V3.x)

5.1 Hardware configuration

Setting I/O address

6. Make sure that the input and the output address have the same value (1).

Figure 5-5
5.2 Replacing dummy block

1. Copy the required “SINAG120” block from the DRVPCS7 library into the master data library of the SIMATIC Manager.

2. Open any CFC chart.

3. Select “Options > Block Types...” from the menu option.

4. Select your used “SINAG120” dummy block from the “Block Types” dialog.

5. Update this block by clicking the “New Version...” button.
5.3 Module driver

1. Generate the process tags in the user project from the master data library.

   **Note**
   
   More information, how to generate process tags can be found in the PCS 7 documentation “Assigning/Creating Process Tags”

2. Select the “SINAG120” block of the “VALUE” input and right click “Interconnection to Address…”

3. Select the input address that you assigned in the HW config.

   **Simulation**

   The simulation is enabled by setting the “SIM_ON” input to “1”.

![Diagram of Block Types]

---

Figure 5-7

![Diagram of Module driver](image)

Figure 5-8
Maintenance requirements

For the maintenance requirements of the frequency converter the inputs “MAIN_L” (maintenance requirement low) and “MAIN_M” (maintenance requirement medium) have to be configured.

Default values

MAIN_L: 100 days
MAIN_M: 200 days

Limit monitoring

The actual torque value can also be monitored, instead of monitoring the limit of the actual current value.

For this purpose, wire the “AV_Tech” output of the “AV_c” block to the “AV_T” block in subchart 6 of the process tag.

5.4 Configuration

Configuring the frequency converter

There are several options to configure the frequency converter.

We recommend the use of the STARTER software since it offers the largest range of functions. This is why below, the configuration is only carried out with the STARTER.

If you are using another configuration option, there may be discrepancies.

Opening the STARTER

1. Open the hardware configuration.
2. Select the SINAMICS G 120 and open its context menu.
3. Select “Open object with STARTER”.

The STARTER is now available.

Configuring the drive

Control room and local operation are each configured via an independent data record.

Control room operation (data record 0)

The technological block transfers 6 process data words cyclically (control word, setpoint values) to the SINAMICS G120 and receives 6 process data words (status word, actual values) from it cyclically.
Subsequently, configure the process data words that are transferred in control room operation by the technological block to the SINAMICS G120:

### Table 5-1

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
<th>Data type</th>
<th>Message frame space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control word</td>
<td>*</td>
<td>WORD</td>
<td>1. Word</td>
</tr>
<tr>
<td>Main setpoint</td>
<td>SP_EXT/SP_INT</td>
<td>REAL**</td>
<td>2. Word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_3_IN</td>
<td>WORD</td>
<td>3. Word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_4_IN</td>
<td>WORD</td>
<td>4. Word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_5_IN</td>
<td>WORD</td>
<td>5. Word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_6_IN</td>
<td>WORD</td>
<td>6. Word</td>
</tr>
</tbody>
</table>

Now configure the process data words that are transferred by the technological block to the SINAMICS G120 in control room operation:

### Table 5-2

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
<th>Data type</th>
<th>Message frame space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status word</td>
<td>*</td>
<td>WORD</td>
<td>1. Word</td>
</tr>
<tr>
<td>Main actual value</td>
<td>PV</td>
<td>REAL**</td>
<td>2. Word</td>
</tr>
<tr>
<td>Actual current value</td>
<td>CPV</td>
<td>REAL**</td>
<td>3. Word</td>
</tr>
<tr>
<td>Torque process value</td>
<td>TPV</td>
<td>REAL**</td>
<td>4. Word</td>
</tr>
<tr>
<td>Freely selectable actual value or warning number</td>
<td>PCD_5</td>
<td>WORD</td>
<td>5. Word</td>
</tr>
<tr>
<td>Freely selectable actual value or error number</td>
<td>PCD_6</td>
<td>WORD</td>
<td>6. Word</td>
</tr>
</tbody>
</table>

* Control word and status word are made up by the block. The required bits are individually listed in the I/O bar.

** sent/received as WORD

Commissioning the drive is performed via the STARTER or BOP.

For the PROFIBUS operation the following STARTER configuration is required:

### Table 5-3

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p010 (CU240) = 30 (factory setting)</td>
<td>Only required to ensure the correct default setting for CDS1 (local operation)</td>
</tr>
<tr>
<td>p970 (CU240) = 1</td>
<td></td>
</tr>
<tr>
<td>p0918 = PROFIBUS address</td>
<td>It is recommended to set the address via the dip switch on the CU</td>
</tr>
<tr>
<td>p352</td>
<td>For this purpose set parameter p922 = 352.</td>
</tr>
</tbody>
</table>
5 Configuration of a SINAMICS G120 (V2.x/V3.x)

5.4 Configuration

Configuration of SINAMICS and MICROMASTER Drives

Table 5-4

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Save parameter p0971 (CU240) = 1</td>
<td>Failsafe parameter backup</td>
</tr>
<tr>
<td>Enabling the control via PROFIBUS according to operating instructions</td>
<td></td>
</tr>
<tr>
<td>Switching the electric voltage off and back on</td>
<td></td>
</tr>
</tbody>
</table>

Alternative configuration via BICO interconnection

Table 5-4

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p0922 = 1</td>
<td>Standard message frame 1</td>
</tr>
<tr>
<td>p0922 = 999</td>
<td>Free configuration of the SINAMICS G120</td>
</tr>
<tr>
<td>p2051.2 (drive/axis) = 27</td>
<td>Actual current value in word 3 to the AS</td>
</tr>
<tr>
<td>p2051.3 (drive/axis) = 31</td>
<td>Torque process value in word 4 to the AS</td>
</tr>
<tr>
<td>p2051.4 (drive/axis) = 2132</td>
<td>Warning number in word 5 to the AS</td>
</tr>
<tr>
<td>p2051.5 (drive/axis) = 2131</td>
<td>Error number in word 6 to the AS</td>
</tr>
<tr>
<td>Save parameter p0971 (CU240) = 1</td>
<td>Failsafe parameter backup</td>
</tr>
<tr>
<td>Enabling the control via PROFIBUS according to operating instructions</td>
<td></td>
</tr>
<tr>
<td>Switching the electric voltage off and back on</td>
<td></td>
</tr>
</tbody>
</table>

Local operation

If a switch-over to “local operation” is to be executable on the drive, it is expedient to use the CDS1 in the drive. With an external signal (e.g. from the key switch in the converter cabinet) it can be switched over to the second data record.

The following configuration presents an example for the realization of local switchover. The setpoint and part of the control signals are “wired” to the CU terminal strip. The external switchover signal is assigned to digital input 4 and the ON/OFF1 command to digital input 0.

The switchover from control room operation to local operation is not bumpless and should only be performed when the drive is in standstill.

For this purpose the following configuration steps are additionally necessary:

It is recommended to configure a bumpless switchover.

Table 5-5

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1070.1 = 1050</td>
<td>Setpoint speed value via Motorpoti</td>
</tr>
<tr>
<td>p0700.1 = 2 and p0701.1 = 99</td>
<td>ON/OFF command from DI 1</td>
</tr>
<tr>
<td>p0705.1 = 99 and p0810 = 722.4</td>
<td>Switchover of CDS via DI 4</td>
</tr>
</tbody>
</table>

The switchover of the actual values remains just as in control room operation.
5 Configuration of a SINAMICS G120 (V2.x/V3.x)

5.4 Configuration

**Note**

In order for the switchover to the local operation to be detected in the AS block and not only in the converter, the switchover signal (e.g. from the key switch in the converter cabinet) has to be additionally wired to a digital input of AS. The “REMOTE” input of the AS block has to be wired to this digital input.

Further information can be obtained in the operating instruction of the SINAMICS G120.

**Automatic restart**

The restart automatic is configured with parameter P1210:

<table>
<thead>
<tr>
<th>Parameter P1210 = ...</th>
<th>Restart performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Locked</td>
</tr>
<tr>
<td>1</td>
<td>Trip Reset after POWER ON, P1211 locked</td>
</tr>
<tr>
<td>2</td>
<td>Restart after power failure, P1211 locked</td>
</tr>
<tr>
<td>3</td>
<td>Restart enabled after power supply undervoltage or failure</td>
</tr>
<tr>
<td></td>
<td>P1211</td>
</tr>
<tr>
<td>4</td>
<td>Restart after undervoltage, P1211 locked</td>
</tr>
<tr>
<td>5</td>
<td>Restart after power failure or error, P1211 locked</td>
</tr>
<tr>
<td>6</td>
<td>Restart after power supply undervoltage, power failure or</td>
</tr>
<tr>
<td></td>
<td>error, P1211 enabled</td>
</tr>
</tbody>
</table>

The restart automatic requires a continuous ON command via a wired digital input.

**Note**

If P1210 > 2 is set, a restart of the motor can be carried out automatically without switching over an ON command!

More information can be found in the parameter list of the SINAMICS G120 user documentation.

The parameter lists are additionally provided on the internet on the Service and Support page:

Parameter list of SINAMICS G120


(Search term: list manual)

Please select the document for the device (type, firmware) used.
5.5 Standardization of the frequency converter

The function block used has to be standardized according to the motor used and the type of control type.

Transmission rate

Enter the motor-machine transmission ratio on the “FACT_GU” input of the “SINAG120” block.

Reference current

1. Open the STARTER
2. Read out the value of the reference current that is stored in parameter P2002 of the SINAMICS.
3. Open the CFC chart, where the “SINAG120” SINAMICS block is located
4. Enter the read out value of parameter P2002 in the “FACT_CPV” input of the “SINAG120” block.

Standardization to frequency, speed or percent

The frequency converters can be controlled via frequency, speed or percent. Depending on the desired control, you have to make the following standardization on the “SINAG120” CFC block.

a.) Frequency

The solution templates are preconfigured for the control of the frequency converter via the setpoint frequency. However, these settings should be checked.

1. Open the STARTER
2. Read out the value of the rated motor frequency that is stored in parameter P310 of the SINAMICS.
3. Open the CFC chart, where the “SINAG120” MICROMASTER block is located
4. Enter the read out value of parameter P310 in the “FACT_PRM” input of the “SINAG120” block.
5 Configuration of a SINAMICS G120 (V2.x/V3.x)

5.6 External power supply (24V)

b.) Speed
1. Open the STARTER
2. Read out the value of the rated motor speed that is stored in parameter P311 of the SINAMICS.
3. Open the CFC chart, where the “SINAG120” SINAMICS block is located
4. Enter the read out value of parameter P311 in the “FACT_PRM” input of the “SINAG120” block.

c.) Percent
1. Open the CFC chart, where the “SINAG120” SINAMICS block is located
2. Enter the read out value 100 in the “FACT_PRM” input of the “SINAG120” block.

5.6 External power supply (24V)

In the event of a power failure, the SINAMICS devices offer the option to ensure the power supply of the control unit via an external 24 volts power supply. As a result, the communication to the frequency converter is maintained in the event of a power failure.

For a SINAMICS G120 the external 24 volt power supply is provided via terminal 31 (24 V) and 32 (0 V).

For the SINAMICS G120C no external 24 volt power supply is possible.
5.7 Result in PCS 7 OS Runtime

After the OS compilation the respective block icons and templates are automatically created in PCS 7 OS Runtime.

Figure 5-9
6 Configuration of a SINAMICS G/S
(SINAMICS S120/S150, G130/G150, GM150, GL150, DCM, G120 from V4.2)
You can use the solution below either directly or you can adjust it to your needs.

6.1 Hardware configuration

Selecting profile
1. Open the hardware configuration and select the “DriveES” profile under profiles.

Selecting device
2. Open the product tree. “PROFIBUS DP > SINAMICS”
3. From this folder select your SINAMICS type and drag it via drag and drop to the respective PROFIBUS DP string.

Figure 6-1
Setting the DP address

4. Assign the DP address and confirm it with OK.

Figure 6-2
6.1 Hardware configuration

Selecting firmware version

5. Assign the respective firmware and confirm it with OK.

Figure 6-3
Selecting message frame

6. Subsequently select the required “SIEMENS message frame 352, PZD-6/6” SINAMICS message frame for the PCS 7 block under "Default".

Figure 6-4
Setting I/O address

7. Make sure that the input and the output address have the same value (1).

Figure 6-5
6.2 Replacing dummy block

1. Copy the block “SINA_GS” from the DRVPCS7 library into the master data library of the SIMATIC Manager.

2. Open any CFC chart.

3. Select “Options > Block Types…” from the menu option.

4. Select your used “SINA_GS” dummy block from the “Block Types” dialog.

5. Update this block by clicking the “New Version…” button.

6.3 Module driver

1. Generate the process tags in the user project from the master data library.
6 Configuration of a SINAMICS G/S

6.3 Module driver

2. Select the “SINA_GS” block of the “VALUE” input and right click “Interconnection to Address…”

![Figure 6-8](image)

3. Select the input address that you assigned in the HW config.

Enabling / locking the direction of rotation

Enabling or locking the direction of rotation on the APL block (“MotSpCl”) is performed via the “OS_Perm” (bit 5 and bit 6) input.

Simulation

The simulation is enabled by setting the “SIM_ON” input to “1”.

Maintenance requirements

For the maintenance requirements of the frequency converter the inputs “MAIN_L” (maintenance requirement low) and “MAIN_M” (maintenance requirement medium) have to be configured.

Default values

MAIN_L: 100 days
MAIN_M: 200 days

Limit monitoring

The actual torque value can also be monitored, instead of monitoring the limit of the actual current value.

For this purpose, wire the “AV_Tech” output of the “AV_c” block to the “AV_T” block in subchart 6 of the process tag.
6.4 Configuration

Configuring the frequency converter with STARTER

There are several options to configure the frequency converter. We recommend the use of the STARTER software since it offers the largest range of functions. This is why below, the configuration is only carried out with the STARTER.

If you are using another configuration option, there may be discrepancies.

Opening the STARTER

1. Open the hardware configuration.
2. Select the SINAMICS G/S and open its context menu.
3. Select "Open object with STARTER".

The STARTER is now available.

Configuring the drive

Control room and local operation are each configured via an independent data record.

Control room operation (data record 0)

The block transfers 6 process data words cyclically (control word, setpoint values) to the SINAMICS and receives 6 process data words (status word, actual values) from it cyclically.

Subsequently, configure the process data words that are transferred in control room operation by the technological block to the SINAMICS G/S:

Table 6-1

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
<th>Data type</th>
<th>Message frame space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control word</td>
<td>*</td>
<td>WORD</td>
<td>1. Word</td>
</tr>
<tr>
<td>Main setpoint</td>
<td>SP_EXT/SP_INT</td>
<td>REAL**</td>
<td>2. Word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_3_IN</td>
<td>WORD</td>
<td>3. Word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_4_IN</td>
<td>WORD</td>
<td>4. Word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_5_IN</td>
<td>WORD</td>
<td>5. Word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_6_IN</td>
<td>WORD</td>
<td>6. Word</td>
</tr>
</tbody>
</table>

Now configure the process data words that are transferred to the technological block by the SINAMICS G/S in control room operation:
6 Configuration of a SINAMICS G/S

6.4 Configuration

Table 6-2

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
<th>Data type</th>
<th>Message frame space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status word</td>
<td>*</td>
<td>WORD</td>
<td>1. Word</td>
</tr>
<tr>
<td>Main actual value</td>
<td>PV</td>
<td>REAL**</td>
<td>2. Word</td>
</tr>
<tr>
<td>Actual current value</td>
<td>CPV</td>
<td>REAL**</td>
<td>3. Word</td>
</tr>
<tr>
<td>Torque process value</td>
<td>TPV</td>
<td>REAL**</td>
<td>4. Word</td>
</tr>
<tr>
<td>Freely selectable actual value or warning number</td>
<td>PCD_5</td>
<td>WORD</td>
<td>5. Word</td>
</tr>
<tr>
<td>Freely selectable actual value or error number</td>
<td>PCD_6</td>
<td>WORD</td>
<td>6. Word</td>
</tr>
</tbody>
</table>

* Control word and status word are made up by the block. The required bits are individually listed in the I/O bar.

Commission the drive via STARTER or AOP.

For the PROFIBUS operation the following STARTER configuration is required:

Table 6-3

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p009 (CU3x0) = 30 (factory setting)</td>
<td>Only required to ensure the correct default setting for CDS1 (local operation).</td>
</tr>
<tr>
<td>p0918 = profibus address</td>
<td>It is recommended to set the address via the dip switch on the CU</td>
</tr>
<tr>
<td>Save parameter p0977 (CU3x0) = 1</td>
<td>Failsafe parameter backup</td>
</tr>
</tbody>
</table>

The interconnection from FW V2.4 onwards for S devices of the “Vector” type and G devices can preferably be also directly set by assigning message frame 352 in parameter 922. Enabling the control via PROFIBUS according to operating instructions Switching the electric voltage off and back on

Alternative configuration via BICO interconnection

Table 6-4

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p0922 = 1</td>
<td>Standard message frame 1</td>
</tr>
<tr>
<td>p0922 = 999</td>
<td>Free configuration of the SINAMICS</td>
</tr>
<tr>
<td>p2051.2 (drive/axis) = 68</td>
<td>Actual current value in word 3 to the AS</td>
</tr>
<tr>
<td>p2051.3 (drive/axis) = 80</td>
<td>Torque process value in word 4 to the AS</td>
</tr>
<tr>
<td>p2051.4 (drive/axis) = 2132</td>
<td>Warning number in word 5 to the AS</td>
</tr>
<tr>
<td>p2051.5 (drive/axis) = 2131</td>
<td>Error number in word 6 to the AS</td>
</tr>
<tr>
<td>Save parameter p0977 (CU3x0) = 1</td>
<td>Failsafe parameter backup</td>
</tr>
</tbody>
</table>

Enabling the control via PROFIBUS according to operating instructions Switching the electric voltage off and back on
Local operation

If a switch-over to “local operation” is to be executable on the drive, it is expedient to use the CDS1 in the drive. With an external signal (e.g. from the key switch in the converter cabinet) it can be switched over to the second data record.

The following configuration presents an example for the realization of local switchover. The setpoint and partly the control signals are “wired” on the terminal strip module (TM31) for the G150/S150 and for the G130/S120 either on the CU terminal strip or the TM31 terminal strip. The external switchover signal is assigned to digital input 4 and the ON/OFF1 command to digital input 0. Bumpless switchover from control room operation to local operation is performed by transferring the current actual value to the setpoint value channel of the Motorpotis. The following configuration is required:

Table 6-5

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1070.1 = 1050</td>
<td>Setpoint speed value via Motorpoti</td>
</tr>
<tr>
<td>p1043.1 = 4022.4</td>
<td>Set signal for Motorpoti via TM31, here DI4</td>
</tr>
<tr>
<td>p1043.1 = 722.4</td>
<td>Set signal for Motorpoti via CU, here DI4</td>
</tr>
<tr>
<td>p1044.1 = 63</td>
<td>Set value for Motorpoti setpoint, here actual speed value</td>
</tr>
</tbody>
</table>

The switchover of the actual values remains just as in control room operation.

Further information can be obtained in the operating instruction of the SINAMICS.

Note

In order for the switchover to the local operation to be detected in the AS block and not only in the converter, the switchover signal (e.g. from the key switch in the converter cabinet) has to be additionally wired to a digital input of AS. The "REMOTE" input of the AS block has to be wired to this digital input.

Automatic restart for SINAMICS G120 from firmware V4.x

The restart automatic is configured with parameter P1210: Table 6-6

<table>
<thead>
<tr>
<th>P1210 = …</th>
<th>Start performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Lock restart automatic.</td>
</tr>
<tr>
<td>1</td>
<td>Acknowledge all errors without restart.</td>
</tr>
<tr>
<td>4</td>
<td>Restart after power failure without further restart attempts.</td>
</tr>
<tr>
<td>6</td>
<td>Restart after fault with other restart attempts.</td>
</tr>
<tr>
<td>14</td>
<td>Restart after power failure after manual error acknowledgement.</td>
</tr>
<tr>
<td>16</td>
<td>Restart after fault after manual error acknowledgement.</td>
</tr>
<tr>
<td>26</td>
<td>Acknowledgement of all faults and restart after ON command.</td>
</tr>
</tbody>
</table>
More information can be found in the parameter list of the SINAMICS G120 user documentation.

The parameter lists are additionally provided on the internet on the Service and Support page.

(Search term: parameter list)

Please select the document for the device (type, firmware) used.

Automatic restart for SINAMICS S110, S120, SM120, S150, SL150, G130, G150, GL150, GM150

The restart automatic serves as automatic restart of the drive/drive unit in the event of a restored network after a power failure. All pending errors are automatically acknowledged and the drive is restarted. Since the function is not only restricted to network failures it can also be used for automatic fault acknowledgement and restart of the motor after any fault shutdowns. To be able to enable a connection of the drive to a still rotating motor shaft, the "flying restart" function is to be enabled via p1200.

Mode at restart automatic

<table>
<thead>
<tr>
<th>P1210 = ...</th>
<th>Mode</th>
<th>Start performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Lock restart automatic</td>
<td>Restart automatic inactive</td>
</tr>
<tr>
<td>1</td>
<td>Acknowledge all errors without restart.</td>
<td>For p1210 = 1 all pending errors are automatically acknowledged if their cause has been removed. If errors occur again after successful error acknowledgement, they are again automatically acknowledged. Between successful error acknowledgement and renewed occurrence of an error, a time of at least p1212 + 1s has to pass if the signal ON/OFF1 (control word 1, bit 0) is set to HIGH level. If the ON/OFF1 signal is on LOW level, the time between the successful error acknowledgement and a further fault has to be at least 1 s. For p1210 = 1 no error F07320 is created if the attempt to acknowledge the error fails, for example, due to errors that occur too frequently.</td>
</tr>
</tbody>
</table>
6. Configuration of a SINAMICS G/S

6.5 Standardization of the frequency converter

<table>
<thead>
<tr>
<th>P1210 = …</th>
<th>Mode</th>
<th>Start performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Restart after power failure, no other start-up attempts</td>
<td>For p1210 = 4 an automatic restart is only executed if the error F30003 has additionally occurred on the motor module or if a HIGH signal is pending on the p1208[1] binector input or if the F06200 error has occurred in the event of a drive object feed (x_Infeed). If other errors are pending, these errors are also acknowledged and if this is successful the start-up attempt is continued. Failure of the 24-V power supply of the CU is interpreted as power failure.</td>
</tr>
<tr>
<td>6</td>
<td>Restart after any error with other restart attempts</td>
<td>For p1210 = 6 an automatic restart is executed after any error or for p1208[0] = 1. If the errors occur one after, then the number of start-up attempts is specified via p1211. Time monitoring can be set with p1213.</td>
</tr>
</tbody>
</table>

More information can be found in the parameter lists of the SINAMICS S110, S120, G130, G150 user documentation.

The parameter lists are additionally provided on the internet on the Service and Support page.

Parameter list of SINAMICS G1x0:  
(Search term: list manual)

Parameter list of SINAMICS S1x0:  
(Search term: list manual)

Please select the document for the device (type, firmware) used.

6.5 Standardization of the frequency converter

The function block used has to be standardized according to the motor used and the type of control type.

Transmission rate

1. Enter the transmission ratio of motor-machine on the “FACT_GU” input of the “SIMA_GS” block

Reference current

1. Open the STARTER
2. Read out the value of the reference current that is stored in parameter P2002 of the SINAMICS.
3. Open the CFC chart, where the “SINA_GS” SINAMICS block is located
4. Enter the read out value of parameter P2002 in the “FACT_CPV” input of the “SINA_GS” block.

Standardization to frequency, speed or percent

The frequency converters can be controlled via frequency, speed or percent.

Depending on the desired control, you have to make the following standardization on the “SINA_GS” CFC block.
6 Configuration of a SINAMICS G/S

6.5 Standardization of the frequency converter

a.) Frequency

The solution templates are preconfigured for the control of the frequency converter via the setpoint frequency. However, these settings should be checked.

1. Open the STARTER

2. Read out the value of the rated motor frequency that is stored in parameter P310 of the SINAMICS.

3. Open the CFC chart, where the “SINA_GS” SINAMICS block is located

4. Enter the read out value of parameter P310 in the “FACT_PRM” input of the "SINA_GS" block.
b.) Speed
1. Open the STARTER
2. Read out the value of the rated motor speed that is stored in parameter P311 of the SINAMICS.
3. Open the CFC chart, where the “SINA_GS” SINAMICS block is located
4. Enter the read out value of parameter P311 in the “FACT_PRM” input of the “SINA_GS” block.

c.) Percent
1. Open the CFC chart, where the “SINA_GS” SINAMICS block is located
2. Enter the read out value 100 in the "FACT_PRM" input of the "SINA_GS" block.

6.6 External power supply (24V)

In the event of a power failure, the SINAMICS devices offer the option to ensure the power supply of the control unit via external 24 volts. As a result, the communication to the frequency converter is maintained in the event of a power failure.

The external 24 volt voltage supply is provided via the following terminals:

SINAMICS G120: terminal 31 (24 V) and 32 (0 V)
SINAMICS S120: terminal X124

For the SINAMICS G120C devices, an external 24 volt power supply is not possible
6.7 Result in PCS 7 OS Runtime

After the OS compilation the respective block icons and templates are automatically created in PCS 7 OS Runtime.

Figure 6-9
7 Internet Links

The following list is by no means complete and only provides a selection of appropriate sources.

Table 7-1

<table>
<thead>
<tr>
<th>Topic</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>3\ Link to this document</td>
<td><a href="http://support.automation.siemens.com/WW/view/en/58007228">http://support.automation.siemens.com/WW/view/en/58007228</a></td>
</tr>
<tr>
<td>4\ Siemens Industry Online Support</td>
<td><a href="http://support.automation.siemens.com">http://support.automation.siemens.com</a></td>
</tr>
</tbody>
</table>
## 8 History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.0</td>
<td>01/2012</td>
<td>First issue</td>
</tr>
<tr>
<td>V1.1</td>
<td>02/2012</td>
<td>Parameters corrected in the following chapters:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Chapter 4.4 “Standardization of the frequency converter”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Chapter 5.4 “Standardization of the frequency converter”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Chapter 6.4 “Standardization of the frequency converter”</td>
</tr>
<tr>
<td>V1.2</td>
<td>08/2012</td>
<td>Revision of the following chapters:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Chapter 1.1 “Task”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Chapter 1.2 “Solution”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Chapter 4.2 “Replacing dummy blocks”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Chapter 5.2 “Replacing dummy blocks”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Chapter 6.2 “Replacing dummy blocks”</td>
</tr>
</tbody>
</table>