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

SIMATIC PCS 7 V8.0

Application Example • September 2012
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SIMATIC PCS 7 V8.0

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

Application Example

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Hardware and Software Requirements
Structure and Functionality of the Solution Templates
Configuration of a MICROMASTER 4
Configuration of a SINAMICS G120 (V2.x/V3.x)
Configuration of a SINAMICS G/S (SINAMICS S120/S150, G130/G150, GM150, GL150, DCM, G120 version V4.2 or later)
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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 4xx 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 4xx and SINAMICS product families. You will be introduced to the solution templates included in the Drive ES library, which are based on the standard functions of the Advanced Process Library (APL) and the new Drive ES PCS 7 APL, 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.
Figure 1-1

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, so as to offer a ready-made automation solution with the following functions:

- APL standard faceplates
- Additional integrated displays in the faceplates
- The OS messages include specific warning and error numbers of the frequency converter
- Integrated operating hours counter
- Switchover between local and control room operation
- Reset button
- Simulation mode
Drive ES PCS 7 APL Engineering Package

Using the Drive ES PCS 7 APL Engineering Package and the message texts included in the delivery provides the following advantages:

- Engineering and commissioning of the drives can be 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
- Expansion of the OS messages by the message lists included in the delivery

Configuration with STARTER

Configuration of the frequency converters is effected by using the STARTER application software which is suitable for integration into PCS 7 with the help of a full set of parameter lists.

Your benefits by using the STARTER software:

- Direct call from PCS 7
- The frequency converter can be configured directly via the central engineering station
- Consistent data management

1.2.1 Main contents

The three groups of frequency converters – MICROMASTER, SINAMICS G120 and SINAMICS G/S – are fully configured by the example of prepared solution templates of the Drive ES library and with the STARTER software.

The main focuses are:

- Installation and integration of the solution templates and text libraries
- Hardware configuration
- CFC engineering
- Configuration of the frequency converters with STARTER
1.2.2 Topics not covered by this application

This application does not cover the APL standard solution for PCS 7 integration of motors which support message frame 20.

The APL standard solution does not allow the display of warning and error numbers directly in the faceplate’s alarm line, so that the operator or service technician must read these numbers locally from the frequency converter. Furthermore, the message frame 20 cannot be modified or extended.

The table below shows the main differences between the two possible types of motor integration.

<table>
<thead>
<tr>
<th></th>
<th>Drive ES solution</th>
<th>APL standard solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message frame type</td>
<td>352</td>
<td>20</td>
</tr>
<tr>
<td>Message frame modifiable</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Message frame extendable</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Warning number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in the alarm line</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>in the faceplate</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>on the local display</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Error number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in the alarm field</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>in the faceplate</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>on the local display</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Utilization of the full range of functions</td>
<td>yes</td>
<td>no, only basic functions</td>
</tr>
<tr>
<td>Integration of standard drives</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Required software</td>
<td>Drive ES PCS 7 APL</td>
<td>APL standard blocks</td>
</tr>
<tr>
<td>Additionally required process object (PO) per drive</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Costs</td>
<td>chargeable</td>
<td>free of charge</td>
</tr>
</tbody>
</table>
1.2 Solution

1.2.3 Validity

This application is valid for PCS 7 V8.0 and the Drive ES PCS 7 APL V8.0 library.

Drive ES PCS 7 APL version 8.0 is a new version geared to PCS 7 V8.0 and the use of APL functions. The Drive ES PCS 7 APL blocks work as mere channel driver blocks. Control directly from the PCS 7 program, as well as operator control via faceplate are effected by means of the APL motor block “MotSpdCL”.

Due to these modifications, projects using Drive ES PCS 7 V7.1 cannot be upgraded as usual. The drives must be integrated anew.

As an alternative for the upgrading of projects based on Drive Es PCS 7 V7.1, we offer a Drive ES PCS 7 library which, however, does not include the new functions.

Upgrading without the new functions is described in the chapter “Upgrading”.

NOTICE

The Drive ES library “Drive ES PCS 7 APL-V8.0” is valid only for new configurations with PCS 7 version V8.0 or later.

It should not be confused with the Drive ES PCS 7 V8.0 library which is intended only for the upgrading of PCS 7 projects from version V7.1 to V8.0 and does not include the new features of Drive ES PCS 7 APL-V8.0.

The three solution templates are suitable for all drives supported by Drive ES PCS 7 APL V8.0:

- Supported MICROMASTER drives
  - MICROMASTER 420
  - MICROMASTER 440
  - MICROMASTER 430
  - MICROMASTER 411

- Supported SINAMICS drives
  - SINAMICS S110 CU305
  - SINAMICS S120 CU310
  - SINAMICS S120 CU310-2
  - SINAMICS S120 CU310-2 CRANES
  - SINAMICS S120 CU320
  - SINAMICS S120 CU320-2DP
  - SINAMICS SM120 CU320-2DP
  - SINAMICS S150
  - SINAMICS S150 CU320-2
1 Task Description and Solution

1.2 Solution

- SINAMICS SL150 CU320-2
- SINAMICS G120 CU230P-2DP
- SINAMICS G120 CU240S
- SINAMICS G120 CU240S F
- SINAMICS G120 CU240D
- SINAMICS G120 CU240D F
- SINAMICS G120 CU240B-2DP
- SINAMICS G120 CU240E-2DP
- SINAMICS G120 CU240E-2DP F
- SINAMICS G120C G120C-DP
- SINAMICS G120 CU240D-2DP
- SINAMICS G120 CU240D-2DP F
- SINAMICS G120 CU250D-2DP F
- SINAMICS G130
- SINAMICS G130 CU320-2
- SINAMICS G150
- SINAMICS G150 CU320-2
- SINAMICS GM150
- SINAMICS GM150 CU320-2
- SINAMICS GL150
- SINAMICS GL150 CU320-2

- Supported SINAMICS drives with F functionality and which are also supported by the F-module driver
  - SINAMICS G120 CU240S DP F
  - SINAMICS G120D CU240D DP F
  - SINAMICS G120 CU240D-2DP
  - SINAMICS G120 CU240D-2DP F
  - SINAMICS G120 CU250D-2DP F
  - SINAMICS G120 CU240E-2DP F
  - SINAMICS G120 CU240E-2DP
  - SINAMICS G120C G120C-DP
  - SINAMICS G130 CU320
  - SINAMICS G130 CU320-2DP
  - SINAMICS G150 CU320-2
1 Task Description and Solution

1.2 Solution

- SINAMICS G150 CU320-2DP
- SINAMICS S110 CU305 DP
- SINAMICS S120 CU310 DP
- SINAMICS S120 CU310-2
- SINAMICS S120 CU310-2 CRANES
- SINAMICS S120 CU320
- SINAMICS S120 CU320-2DP
- SINAMICS S150 CU320
- SINAMICS S150 CU320-2DP

Integration into the hardware configuration via GSD files is supported by the following drives:
- MICROMASTER4xx (F_SIxx80B5_.GSx)
- SINAMICS G120 CU240S (SIxx8116_.GSx)
- SINAMICS G120 CU240S F (SIxx8158_.GSx)
- SINAMICS G120 CU240D (SIxx8155_.GSx)
- SINAMICS G120 CU240D F (SIxx8156_.GSx)
- SINAMICS G120 CU230P-2DP from V4.2 or higher (SIxx816D_.GSx)
- SINAMICS G120 CU240x-2DP from V4.3 or higher (SIxx817B_.GSx)
- SINAMICS G120C DP (SIxx818B_.GSx)
- SINAMICS G120D CU240-2 (SIxx819F_.GSx)
- SINAMICS G120D CU250-2 DP (SIxx81A0_.GSx)
- SINAMICS G130 G150 (SIxx8105_.GSx)
- SINAMICS Sxxx (SIxx80E5_.GSx)
- SINAMICS S110 CU305 (SIxx816E_.GSx)
- SINAMICS GL150 (SIxx815D_.GSx)
- SINAMICS SL150 (SIxx816F_.GSx)
- SINAMICS GM150 (SIxx815C_.GSx)
- SINAMICS SM120 (SIxx817D_.GSx)
2 Hardware and Software Requirements

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>V8.0 Upd1</td>
</tr>
<tr>
<td>Advanced Process Library (APL)</td>
<td>V7.1 SP5</td>
</tr>
<tr>
<td>Drive ES PCS 7 APL</td>
<td>V8.0</td>
</tr>
<tr>
<td>STARTER</td>
<td></td>
</tr>
</tbody>
</table>

Hardware

<table>
<thead>
<tr>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU 417-4H</td>
</tr>
<tr>
<td>MICROMASTER 440</td>
</tr>
<tr>
<td>SINAMICS G120 CU240S</td>
</tr>
<tr>
<td>SINAMICS S120 CU310 DP</td>
</tr>
</tbody>
</table>

2.2 STARTER software

Configuration of the frequency converter is effected with the help of the software STARTER which can be started directly from the frequency converter integrated in PCS 7.

This application document includes a list of parameters which covers most of the application range of a frequency converter.

Project-specific adaptations can be realized by changing or supplementing the parameters accordingly. Use the online help or product manual for assistance.

Your benefits by using STARTER:

- Direct call from PCS 7
- The frequency converter can be configured directly via the central engineering station
- Consistent data management
2 Hardware and Software Requirements

2.3 Drive ES PCS 7 APL software and license

Purchasing the STARTER software

The latest STARTER version is available as DVD incl. license certificate under the order number (MLFB) 6SL3072-0AA00-0AG0. Only an order processing fee will be charged.

The latest STARTER version (V4.3 SP1 HF2) and the next higher versions are also available for download at the following link:

This download is available to everyone who owns a STARTER license certificate in any version.

2.3 Drive ES PCS 7 APL software and license

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

In the course of frequency converter implementation, the Drive ES PCS 7 APL Engineering Package will support you in the configuration, parameter assignment, diagnosis and commissioning of your Siemens drives.

The Drive ES library is available in several product variants.

This application example uses Drive ES PCS 7 APL which contains faceplates and channel driver blocks for integration into the SIMATIC PCS 7 process control system.

Your benefits by using Drive ES PCS 7 APL:

- 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 in the SIMATIC PCS 7 process control system.

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:

<table>
<thead>
<tr>
<th>Order number</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>6SW1700-8JD01-0AA0</td>
<td>Drive ES PCS 7 APL V8.0, single license</td>
</tr>
<tr>
<td>6SW1700-0JD00-0AB2</td>
<td>Software update service for Drive ES PCS 7 single license</td>
</tr>
<tr>
<td>6SW1700-5JD00-1AC0</td>
<td>Runtime license for Drive ES PCS 7 (independent of the version)</td>
</tr>
</tbody>
</table>

Single license

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

For further CPUs, additional runtime licenses have to be ordered.
Upgrade version

A Drive ES PCS 7 upgrade version, as offered for previous versions to upgrade from V7.x (classic style) to V8.0 (APL style), is no longer available. As a result of the conversion to APL style, the drives must be integrated anew in any case. For this reason, the product drive ES PCS 7 APL V8.0 is primarily intended for new projects.

CAUTION
Projects configured with PCS 7 V7.x and Drive ES V7.x, which shall be upgraded to PCS 7 V8 Update 1 but do not allow for a new integration of drives, may be handled with a special Drive ES (classic style) library which only comprises the usual classic style functionality for the function blocks and faceplates.

Update service

To ensure continuous availability of the latest software version, we offer a one-year update service with automatic delivery of all service packages and full versions.

This service is chargeable.

Note
Users who have paid for this update service will automatically receive the latest updates/upgrades for one year.

Runtime license

The purchase of a runtime license for Drive ES PCS 7 APL V8.0 entitles the buyer to download and operate the Drive ES blocks for 1 automation system (AS).

To prove the purchase of a runtime license, the license label included in the delivery can be affixed to the CPU or stored in the relevant documentation (e.g. in the machine journal).

Further information

**Drive ES PCS 7 APL V8.0 (APL style)**

Delivery release and further information:

**Drive ES PCS 7 V8.0 (classic style)**

Delivery release and further information:
2.4 Installation of Drive ES PCS 7 APL

1. Insert the CD “Drive ES PCS7 APL” into the CD drive of your PG/PC.
2. Open the CD directory and double click “Setup.exe” to start the program.
3. Select the following components:
   For an engineering system (ES):
   • “Drive ES PCS 7 APL-Lib AS (Step7)”
   • “Drive ES PCS 7 APL-Lib OS (WinCC)"
   For an operator station:
   • “Drive ES PCS 7 APL-Lib OS (WinCC)"

4. Follow the installation instructions.

Please note that Drive ES PCS 7 APL-Lib OS (WinCC) must be installed on each OS server and on each single station.

Note
ES PCS 7 APL-Lib OS (WinCC) must be installed on each engineering system, each OS server and each single station.
2.5 Solution templates

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

- APL standard faceplates
- Additive add-on faceplate which can be called via the block “MotSpdCL” and with the following functions:
  - display of detailed error information in case of a drive fault
  - acknowledgement of the drive fault
  - operating hours counter and a corresponding maintenance message
- Switchover between local and control room operation
- Simulation mode

Presently, there are three solution templates available which help to facilitate the engineering of Siemens frequency converters from the MICROMASTER 4xx, SINAMICS S and SINAMICS G series.

The solution templates are based on the PCS 7 APL and Drive ES PCS 7 APL blocks.

Obtaining the solution templates

The solution templates are part of Drive ES PCS 7 APL delivery and need not be installed in an extra step.

Template selection

Please refer to the table below to find the right template for your frequency converter.

<table>
<thead>
<tr>
<th>Template</th>
<th>Supported device types</th>
<th>Description</th>
</tr>
</thead>
</table>
| Template 1 | MICROMASTER 4xx | Template 1 is used to integrate devices of the MICROMASTER family of the 4th generation into the PCS 7 process control system. The functions of a MICROMASTER drive are integrated via the Drive ES channel driver block “APL_MM4” and the APL function block “MotSpdCL”, which also ensures operation and monitoring from an operator station. Additional inputs and outputs at the “APL_MM4” enable an extended simulation mode with the help of a drive simulation block. An additional add-on faceplate called via MotSpdCL provides the following functions:
  - Display of detailed warning and error numbers including detailed information in case of drive faults.
  - Acknowledgement of drive faults.
  - Operating hours counter and the corresponding maintenance messages. Communication between the converter and SIMATIC is effected via PROFIBUS DP. |
2 Hardware and Software Requirements

2.5 Solution templates

<table>
<thead>
<tr>
<th>Template</th>
<th>Supported device types</th>
<th>Description</th>
</tr>
</thead>
</table>
| Template 2 | SINAMICS G120 up to V3.x | Template 2 is used to integrate a SINAMICS G120 into the PCS 7 process control system. The functions of a MICROMASTER drive are integrated via the Drive ES channel driver block “APL_G120” and the APL function block “MotSpdCL”, which also ensures control via a SIMATIC S7 and operation and monitoring from an operator station. Additional inputs and outputs at the “APL_G120” enable an extended simulation mode with the help of a drive simulation block. An additional add-on faceplate called via MotSpdCL integrates the following functions:  
- Display of detailed warning and error numbers including detailed information in case of drive faults.  
- Acknowledgement of drive faults.  
- Operating hours counter and the corresponding maintenance messages. Communication between the converter and SIMATIC is effected via PROFIBUS DP. |
| Note | When using a SINAMICS G120 version V4.x or higher, or a SINAMICS G120 drive with a CU2xx-2, the block “APL_GS” must be selected (template 3). |
| Template 3 | SINAMICS G120, V4.x or higher, SINAMICS G130, SINAMICS G150, SINAMICS S110, SINAMICS S120, SINAMICS S150, SINAMICS GM150, SINAMICS GL150, SINAMICS DCM | Template 3 is used to integrate devices of the SINAMICS G/S family (SINAMICS S110/S120/150 and G120/G130/150) into the PCS 7 process control system. The functions of a MICROMASTER drive are integrated via the Drive ES channel driver block “APL_GS” and the APL function block “MotSpdCL”, which also ensures operation and monitoring from an operator station. Additional inputs and outputs at the “APL_GS” enable an extended simulation mode with the help of a drive simulation block. An additional add-on faceplate called via MotSpdCL provides the following functions:  
- Display of detailed warning and error numbers including detailed information in case of drive faults.  
- Acknowledgement of drive faults.  
- Operating hours counter and the corresponding maintenance messages. Communication between the converter and SIMATIC is effected via PROFIBUS DP. |

CAUTION SINAMICS G120 drives with a CU2xx-2 require the use of block “APL_GS”, not “APL_G120”.

SINAMICS G120 drives of version V4.x or higher require the block “APL_GS”, not “APL_G120”.
2 Hardware and Software Requirements

2.6 Compatibility

Integrating the solution templates

1. Copy the respective process tags into your user project or master data library.

2. Update the process tags by selecting the copied process tags and then the menu command “Options > Charts > Update block types”.

3. Follow the dialog instructions for updating the block type.

2.6 Compatibility

The compatibility tool helps you to combine suitable software products or to check previous configurations with regard to their compatibility:

3 Structure and Functionality of the Solution Templates

All solution templates described in this application share the following functions:

- APL faceplate
- Additional integrated value displays in the APL faceplate
  - Actual current value [A]
  - Actual power value [kW] or actual torque value [Nm]
- An additive add-on faceplate called via MotSpdCL providing the following functions:
  - Display of detailed warning and error numbers including detailed information in case of drive faults
  - Acknowledgement of drive faults
  - Operating hours counter and associated maintenance messages
- Simulation mode
- 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]
- Operating hours counter
- Bus monitoring
3.1 MICROMASTER 4

The solution template “APL_MM4” links the APL motor function block “MotSpdCL” with the process image via the channel driver block “APL_MM4” of MICROMASTER 4.

The technological APL block “MotSpCL” is linked with the Drive ES channel driver block “APL_MM4” of the MICROMASTER 4, so that the MICROMASTER 4 can be operated and monitored via the APL faceplate.

The “or” blocks are used to produce a logic which determines the status of the MICROMASTER 4.

All required feedback responses are preconfigured.

Furthermore, the Drive ES simulation block “SIM_MM4” can be used to simulate the MICROMASTER 4.
3.2 SINAMICS G120

In solution template “APL_G120”, the APL motor function block “MotSpdCL” is linked with the process image via channel driver block “APL_G120” of the SINAMICS G120.

The technological APL block “MotSpCL” is linked with the Drive ES channel driver block “APL_G120” of SINAMICS G120, so that the SINAMICS G120 can be operated and monitored via the APL faceplate.

The “or” blocks are used to produce a logic which determines the status of the SINAMICS G120.

All required feedback responses are preconfigured.

Furthermore, the Drive ES simulation block “SIM_SINA” can be used to simulate the SINAMICS G120.
3.3 SINAMIGS G/S

In solution template “APL_GS”, the APL motor function block “MotSpdCL” is linked with the process image via channel driver block “APL_GS” of the SINAMICS G/S.

The technological APL block “MotSpCL” is linked with the Drive ES channel driver block “APL_GS” of the SINAMICS G/S, so that the SINAMICS G/S can be operated and monitored via the APL faceplate.

The “or” blocks are used to produce a logic which determines the status of the SINAMICS G/S.

All required feedback responses are preconfigured.

Furthermore, the Drive ES simulation block “SIM_SINA” can be used to simulate the SINAMICS G/S.

Figure 3-3
4 Configuration of a MICROMASTER 4

4.1 Hardware configuration

The solution described in the following can either be used directly or you may adapt it to your specific requirements.

For the configuration of a MICROMASTER 4, proceed as follows:

4.1 Hardware configuration

Selecting a profile

1. Open the hardware configuration and select the “DriveES” profile from the list of profiles.

Selecting the device

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

3. Select your type of MICROMASTER from this folder and drag & drop it to the respective PROFIBUS DP string.

Figure 4-1
Setting the DP address

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

Figure 4-2

Selecting the firmware version

5. Define the corresponding firmware and confirm it with OK.

Figure 4-3
Selecting the message frame

6. Then select the required message frame “PCS 7, PZD-4/4” from the “Default” selection list.

Figure 4-4
4.2 CFC configuration

Template

8. Create a CFC chart.
9. Open the library “DRVPCS7_APL”.
10. Copy the template “APL_MM4”.
11. Add the template “APL_MM4” to the CFC chart.

Note

For further information on how to generate process tags please refer to the PCS 7 documentation under “Assigning/Creating Process Tags”.

12. Select the “VALUE” input of the block “APL_MM4” and click “Interconnection to Address…” with your right mouse button.
13. Select the input address you previously assigned in HW Config.

Enabling / locking the direction of rotation

The direction of rotation can be enabled / locked at the APL block "MotSpCL" using the input "OS_Perm" (bit 5 and bit 6).

Simulation

Simulation is activated at block “MotSpdCL” by setting the input “SimOn” to “1”.
4.3 Parameter configuration

Configuring the frequency converter with STARTER

The frequency converter can be configured in different ways.

We recommend the use of the STARTER software, since it offers the largest range of functions. For this reason, all configuration steps described in the following are carried out with STARTER.

Configuration in a different manner may lead to deviations from the described procedure.

Opening the STARTER program

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

The STARTER program is now ready for use.

PROFIBUS mode

For operation with PROFIBUS, define the parameters in STARTER as follows:

Table 4-1

<table>
<thead>
<tr>
<th>Parameter setting</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 (control word, setpoint values) to the MICROMASTER at cyclic intervals and, in turn, receives 4 process data words (status word, actual value) from the MICROMASTER, also in a cyclic manner.
Control room operation

In a next step you define the process data words to be transferred from the technological block to the MICROMASTER in control room operation mode:

Table 4-2

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
<th>Data type</th>
<th>Message frame position</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-up function</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start ramp-up function</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>
<tr>
<td>Main setpoint (speed/frequency setpoint) for automatic operation</td>
<td>SP_EXT</td>
<td>REAL</td>
<td>2nd word</td>
<td>P1000.0** = 6</td>
</tr>
<tr>
<td>Main setpoint (speed/frequency setpoint) for manual operation (evaluated as absolute value)</td>
<td>SP_INT</td>
<td>REAL</td>
<td>2nd word</td>
<td>P1000.0** = 6</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_3_IN</td>
<td>WORD</td>
<td>3rd word</td>
<td></td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_4_IN</td>
<td>WORD</td>
<td>4th word</td>
<td></td>
</tr>
</tbody>
</table>

Now, configure the process data words to be transferred from the MICROMASTER to the technological block in control room operation:

Table 4-3

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
<th>Data type</th>
<th>Message frame position</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>P2051.1 = 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 generated by the block. The required bits are listed individually in the I/O bar.

** Indicated only with MICROMASTER 440.

*** PCD_4 can be freely configured
Local operation

If switchover to "local operation" shall be possible, it is advisable to store a second command data record in the drive. This enables to switch over to the second data record by using an external signal (e.g. from the key switch in the converter cabinet). Switching over of the command data record is effected by parameter P810.

<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 parameter settings present an example for the realization of a switchover to local operation. 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 has to be carried out as described below. The external switchover signal is applied to terminal "X".

**MM411, MM420**

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P700 = 6</td>
<td></td>
</tr>
<tr>
<td>P701 = 21</td>
<td>Local operation/control room operation via digital input.</td>
</tr>
<tr>
<td></td>
<td>If the input is set to 0 =&gt; control room operation P719.0 is active</td>
</tr>
<tr>
<td></td>
<td>If the input is set to 1 =&gt; local operation P719.1 is active</td>
</tr>
<tr>
<td>P719.0 = 00</td>
<td>BICO wiring is valid</td>
</tr>
<tr>
<td>P719.1 = 11</td>
<td>Control via BOP and Motorpoti is 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>
<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

To make sure that the switchover to local operation will be identified not only in the converter, but also in the AS block, the switchover signal (e.g. from the key switch in the converter cabinet) must also be wired to a digital input of the AS. The “LocalLi” input of the AS block must then be connected with this digital input.

Automatic restart

The automatic restart function is configured with parameter P1210:

Table 4-7

<table>
<thead>
<tr>
<th>Parameter P1210 = …</th>
<th>Restart behavior</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>

For further information, please see the list of parameters in the user documentation of MICROMASTER 4xx.

The parameter lists are also available over the Internet on the Service and Support page:


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

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

Transmission rate

Enter the motor-machine transmission rate at the “FactorGu” input of the block “APL_MM4”.

Reference current

1. Open the STARTER program.
2. Read out the value of the reference current which is stored in parameter P2002 of the MICROMASTER.
3. Open the CFC chart where the MICROMASTER block “APL_MM4” is located.
4. Enter the read out value of parameter P2002 at the “FactorCPV” input of the block “APL_MM4”.

Standardization to frequency, speed or percent

Control of the frequency converters can be based on frequency, speed or percent. Depending on the desired type of control, you have to define the following standardization at the CFC block “APL_MM4”.

a.) Frequency

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

1. Open the STARTER program.
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 MICROMASTER block “APL_MM4” is located.
4. Enter the read out value of parameter P310 in the “FactorRPM” input of the block “APL_MM4”.

b.) Speed

1. Open the STARTER program.
2. Read out the value of the rated motor frequency that is stored in parameter P311 of the MICROMASTER.
3. Open the CFC chart where the MICROMASTER block “APL_MM4” is located.
4. Enter the read out value of parameter P311 in the “FactorRPM” input of the block “APL_MM4”.
4.5 Result in PCS 7 OS Runtime

c.) Percent
1. Open the CFC chart where the MICROMASTER block “APL_MM4” is located.
2. Enter the value 100 in the “FactorRPM” input of the block “APL_MM4”.

4.5 Result in PCS 7 OS Runtime

After OS compilation, the associated block icons and faceplates in PCS 7 OS Runtime will be generated automatically.

Figure 4-7
5 Configuration of a SINAMICS G120 (V2.x/V3.x)

The solution described in the following can either be used directly or you may adapt it to your specific requirements.

For the configuration of a SINAMICS G120 (V2.x / V3.x), proceed as follows:

5.1 Hardware configuration

Selecting a profile

1. Open the hardware configuration and select the “DriveES” profile from the list of profiles.

Selecting the device

2. Open the product tree and select: “PROFIBUS DP > SINAMICS > SINAMICS G120”

3. Select your type of SINAMICS from this folder and drag & drop it 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. Define the DP address and confirm it with OK.

Figure 5-2

Selecting the firmware version

5. Select the corresponding firmware version and confirm it with OK.

Figure 5-3
Selecting the message frame

6. Then select the message frame “SIEMENS message frame 352, PZD-6/6” required for the PCS 7 block from the “Default” selection list.

Figure 5-4

![Image of DP slave properties with configuration settings]
5 Configuration of a SINAMICS G120 (V2.x/V3.x)

5.1 Hardware configuration

Defining the I/O address

7. Make sure that the value and length of the input and output addresses are identical.

Figure 5-5
5.2 CFC configuration

Template

8. Create a CFC chart.
9. Open the library “DRVPCS7_APL”.
10. Copy the template “APL_G120”.
11. Add the template “APL_G120” to the CFC chart.

Note
For further information on how to generate process tags please refer to the PCS 7 documentation under “Assigning/Creating Process Tags”.

12. Select the “VALUE” input of the block “APL_G120” and click “Interconnection to Address…” with your right mouse button.

Figure 5-6

13. Select the input address you previously assigned in HW Config.

Simulation
Simulation is activated by setting the input “SimOn” to “1”.
5.3 Parameter configuration

Configuring the frequency converter

The frequency converter can be configured in different ways.

We recommend the use of the STARTER software, since it offers the largest range of functions. For this reason, all configuration steps described in the following are carried out with the STARTER software.

Configuration in a different manner may lead to deviations from the described procedure.

Opening the STARTER program

1. Open the hardware configuration window.
2. Select SINAMICS G120 and open its context menu.
3. Select "Open object with STARTER".

The STARTER program is now ready for use.

Configuring the drive

Control room and local operation are configured individually in separate data records.

Control room operation (data record 0)

The technological block transfers 6 process data words (control word, setpoint values) to the SINAMICS G120 at cyclic intervals and, in turn, receives 6 process data words (status word, actual value) from the SINAMICS G120, also in a cyclic manner.

In a next step you define the process data words to be transferred from the technological block to the SINAMICS G120 in control room operation mode:

Table 5-1

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
<th>Data type</th>
<th>Message frame position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control word</td>
<td>*</td>
<td>WORD</td>
<td>1st word</td>
</tr>
<tr>
<td>Main setpoint</td>
<td>SP_EXT/SP_INT</td>
<td>REAL **</td>
<td>2nd word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_3_IN</td>
<td>WORD</td>
<td>3rd word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_4_IN</td>
<td>WORD</td>
<td>4th word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_5_IN</td>
<td>WORD</td>
<td>5th word</td>
</tr>
<tr>
<td>Freely selectable setpoint</td>
<td>PCD_6_IN</td>
<td>WORD</td>
<td>6th word</td>
</tr>
</tbody>
</table>
Now, configure the process data words to be transferred from the SINAMICS G120 to the technological block in control room operation mode:

### Table 5-2

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
<th>Data type</th>
<th>Message frame position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status word</td>
<td>*</td>
<td>WORD</td>
<td>1st word</td>
</tr>
<tr>
<td>Main actual value</td>
<td>PV</td>
<td>REAL**</td>
<td>2nd word</td>
</tr>
<tr>
<td>Actual current value</td>
<td>CPV</td>
<td>REAL**</td>
<td>3rd word</td>
</tr>
<tr>
<td>Torque process value</td>
<td>TPV</td>
<td>REAL**</td>
<td>4th word</td>
</tr>
<tr>
<td>Freely selectable actual value</td>
<td>PCD_5</td>
<td>WORD</td>
<td>5th word</td>
</tr>
<tr>
<td>Freely selectable actual value</td>
<td>PCD_6</td>
<td>WORD</td>
<td>6th word</td>
</tr>
</tbody>
</table>

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

** Sent/received as WORD

Commissioning of the drive is performed with STARTER or BOP.

PROFIBUS operation requires the following STARTER parameter settings:

### Table 5-3

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p010 (CU240) = 30 (factory setting)</td>
<td>Required only to ensure 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>We recommend to set the address by using the dip switches of the CU.</td>
</tr>
<tr>
<td>The required interconnections</td>
<td>For this purpose, set parameter p922 = 352.</td>
</tr>
<tr>
<td>save parameter p0971 (CU240) = 1</td>
<td>Failsafe parameter backup</td>
</tr>
<tr>
<td>Enable of control via PROFIBUS</td>
<td>Enable of control via PROFIBUS according to the operating instructions.</td>
</tr>
<tr>
<td>Switch the electronics voltage</td>
<td>Switch the electronics voltage off and back on.</td>
</tr>
<tr>
<td>off and back on.</td>
<td></td>
</tr>
</tbody>
</table>
5 Configuration of a SINAMICS G120 (V2.x/V3.x)

5.3 Parameter configuration

Alternative configuration by 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 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>Enable control via PROFIBUS according to the operating instructions.</td>
<td></td>
</tr>
<tr>
<td>Switch the electronics voltage off and back on.</td>
<td></td>
</tr>
</tbody>
</table>

Local operation

If switchover to "local operation" shall be possible, it is advisable to use the CDS1 in the drive. This enables to switch over to the second data record by using an external signal (e.g. from the key switch in the converter cabinet).

The following configuration presents an example of how switchover to local operation can be realized. 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.

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

For this purpose, the following additional configuration steps are necessary:

We recommend 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 actual values remain interconnected in the same way as for control room operation.

Note

To make sure that switchover to local operation will be identified not only in the converter, but also in the AS block, the switchover signal (e.g. from the key switch in the converter cabinet) must additionally be wired to a digital input of the AS. The "LocalLi" input of the AS block must then be connected with this digital input.

For further information, please refer to the SINAMICS G120 operating instructions.
Automatic restart

The automatic restart function is configured with parameter P1210:

Table 5-6

<table>
<thead>
<tr>
<th>Parameter P1210 = …</th>
<th>Restart behavior</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 after power supply undervoltage or failure, P1211 enabled</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 error, P1211 enabled</td>
</tr>
</tbody>
</table>

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

Note

If P1210 > 2 is set, the motor can be automatically restarted without changing the ON command!

For further information, please see the list of parameters in the user documentation of SINAMICS G120.

The parameter lists are also available over the Internet on the Service and Support page:

Parameters list for SINAMICS G120
(Search item: list manual)

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

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

Transmission rate

1. Enter the motor-machine transmission rate at the “FactorGU” input of the block “APL_G120”.

Reference current

2. Open the STARTER program.
3. Read out the value of the reference current which is stored in parameter P2002 of the SINAMICS.
4. Open the CFC chart where the SINAMICS block “APL_G120” is located.
5. Enter the read out value of parameter P2002 at the “FactorCPV” input of the block “APL_G120”.

Standardization to frequency, speed or percent

Control of the frequency converters can be based on frequency, speed or percent. Depending on the desired type of control, you have to define the following standardization at the CFC block “APL_G120”.

a.) Frequency

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

1. Open the STARTER program.
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 SINAMICS block “APL_G120” is located.
4. Enter the read out value of parameter P310 in the “FactorRPM” input of the block “APL_G120”.

b.) Speed

1. Open the STARTER program.
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 SINAMICS block “APL_G120” is located.
4. Enter the read out value of parameter P311 in the “FactorRPM” input of the block “APL_G120”.
5.5 External power supply (24V)

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

With SINAMICS G120, the external 24 volts power supply is effected via the terminals 31 (24 V) and 32 (0 V).

With SINAMICS G120C an external 24 volts power supply is not possible.

c.) Percent
1. Open the CFC chart where the SINAMICS block “APL_G120” is located.
2. Enter the value 100 in the “FactorRPM” input of the block “APL_G120”.

5.5 External power supply (24V)
5.6 Result in PCS 7 OS Runtime

After OS compilation, the associated block icons and faceplates in PCS 7 OS Runtime will be generated automatically.

Figure 5-7
6 Configuration of a SINAMICS G/S
(SINAMICS S120/S150, G130/G150, GM150, GL150, DCM, G120 version V4.2 or later)

The solution described in the following can either be used directly or you may adapt it to your specific requirements. For the configuration of a SINAMICS G/S, proceed as follows:

6.1 Hardware configuration

Selecting a profile

1. Open the hardware configuration and select the “DriveES” profile from the list of profiles.

Selecting the device

2. Open the product tree and select: “PROFIBUS DP > SINAMICS”.

3. Select your type of SINAMICS from this folder and drag & drop it to the respective PROFIBUS DP string.

Figure 6-1
Setting the DP address

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

Figure 6-2
Selecting the firmware version

5. Select the corresponding firmware version and confirm it with OK.

Figure 6-3
Selecting the message frame

6. Then select the message frame “SIEMENS message frame 352, PZD-6/6” required for the PCS 7 block from the “Default” selection list.

Figure 6-4
6.2 CFC configuration

Template

8. Create a CFC chart.
9. Open the library “DRVPCS7_APL”.
10. Copy the template “APL_GS”.
11. Add the template “APL_GS” to the CFC chart.

Note

For further information on how to generate process tags please refer to the PCS 7 documentation under “Assigning/Creating Process Tags”.

12. Select the “VALUE” input of the block “APL_GS” and click “Interconnection to Address…” with your right mouse button.

Defining the I/O address

7. Make sure that the value of the input and output addresses are identical (1).

Figure 6-5
13. Select the input address you previously assigned in HW Config.

**Enabling / locking the direction of rotation**

The direction of rotation can be enabled / locked at the APL block "MotSpCL" using the input “OS_Perm” (bit 5 and bit 6).

**Simulation**

Simulation is activated by setting the input “SimOn” to “1”.

### 6.3 Parameter configuration

**Configuring the frequency converter with STARTER**

The frequency converter can be configured in different ways.

We recommend the use of the STARTER software, since it offers the largest range of functions. For this reason, all configuration steps described in the following are carried out with the STARTER software.

Configuration in a different manner may lead to deviations from the described procedure.

**Opening the STARTER program**

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

The STARTER program is now ready for use.
Configuring the drive

Control room and local operation are configured individually in separate data records.

Control room operation (data record 0)

The block transfers 6 process data words (control word, setpoint values) to the SINAMICS at cyclic intervals and, in turn, receives 6 process data words (status word, actual values), also in a cyclic manner.

In a next step you define the process data words to be transferred from the technological block to the SINAMICS G/S in control room operation mode:

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

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

Commissioning of the drive is performed with STARTER or BOP.
PROFIBUS operation requires the following STARTER parameter settings:

Table 6-3

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p009 (CU3x0) = 30</td>
<td>(factory setting) Required only to ensure correct default setting for CDS1 (local operation).</td>
</tr>
<tr>
<td>p0918 = Profibus address</td>
<td>We recommend to set the address by using the dip switches of the CU</td>
</tr>
<tr>
<td>Save parameter p0977 (CU3x0) = 1</td>
<td>Failsafe parameter backup</td>
</tr>
<tr>
<td></td>
<td>Since FW version V2.4 or later, the interconnection of S devices of type &quot;Vector&quot; and G devices should be set preferably by the direct assignment of message frame 352 in parameter 922.</td>
</tr>
<tr>
<td></td>
<td>Enable of control via PROFIBUS according to the operating instructions.</td>
</tr>
<tr>
<td></td>
<td>Switch the electronics voltage off and back on.</td>
</tr>
</tbody>
</table>

Alternative configuration through 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 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>
<tr>
<td></td>
<td>Enable of control via PROFIBUS according to the operating instructions.</td>
</tr>
<tr>
<td></td>
<td>Switch the electronics voltage off and back on.</td>
</tr>
</tbody>
</table>

Local operation

If switchover to "local operation" shall be possible, it is advisable to use the CDS1 in the drive. This enables a switchover operation by using an external signal (e.g. from the key switch in the converter cabinet).

The following configuration presents an example of how switchover to local operation can be realized. The setpoint and part of 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 to local operation is performed by transferring the current actual value to the setpoint channel of the Motorpoti. This requires the following parameter settings:
6.3 Parameter configuration

### 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 actual values remain interconnected in the same way as for control room operation.

For further information, please refer to the SINAMICS operating instructions.

### Note

To make sure that switchover to local operation will be identified not only in the converter, but also in the AS block, the switchover signal (e.g. from the key switch in the converter cabinet) must additionally be wired to a digital input of the AS. The “LocalLi” input of the AS block must then be connected with this digital input.

### Automatic restart for SINAMICS G120 from firmware V4.x or higher

The automatic restart function is configured with parameter P1210:

### Table 6-6

<table>
<thead>
<tr>
<th>P1210 = ...</th>
<th>Restart behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Lock automatic restart function.</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 including 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>Acknowledge all faults and restart after ON command.</td>
</tr>
</tbody>
</table>
6 Configuration of a SINAMICS G/S (SINAMICS S120/S150, G130/G150, GM150, GL150,
6.3 Parameter configuration

Automatic restart function

<table>
<thead>
<tr>
<th>Automatic restart (AR) mode</th>
<th>Start-up behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No AR</strong></td>
<td>Automatic restart function inactive.</td>
</tr>
<tr>
<td>Acknowledge faults automatically.</td>
<td></td>
</tr>
<tr>
<td>Do not switch off motor automatically.</td>
<td></td>
</tr>
<tr>
<td>Switch on motor automatically.</td>
<td></td>
</tr>
<tr>
<td>After power failure</td>
<td></td>
</tr>
<tr>
<td><strong>p1210 = 0</strong></td>
<td></td>
</tr>
<tr>
<td><strong>p1210 = 1</strong></td>
<td></td>
</tr>
<tr>
<td><strong>p1210 = 4</strong></td>
<td></td>
</tr>
<tr>
<td><strong>p1210 = 6</strong></td>
<td></td>
</tr>
<tr>
<td><strong>p1210 = 14</strong></td>
<td></td>
</tr>
<tr>
<td><strong>p1210 = 16</strong></td>
<td></td>
</tr>
<tr>
<td><strong>p1210 = 26</strong></td>
<td></td>
</tr>
</tbody>
</table>

Further information

For further information, please see the list of parameters in the user documentation of SINAMICS G120.

The parameter lists are also available over the Internet on the Service and Support page:

Parameters list for SINAMICS G120
(Search item: parameter list)

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

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

The automatic restart function ensures an automatic restart of the drive or drive unit in the event of network restoration after a power breakdown. All pending errors will be automatically acknowledged and the drive will be restarted. Since this function is not restricted to network failures, it may also be used for automatic fault acknowledgement and restart of the motor after any fault shutdowns. To enable the connection of the drive to a still rotating motor shaft, the “flying restart” function must be activated with p1200.

Automatic restart modes:

Table 6-7

<table>
<thead>
<tr>
<th>P1210 = ...</th>
<th>Mode</th>
<th>Start-up behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Lock automatic restart</td>
<td>Automatic restart function inactive.</td>
</tr>
<tr>
<td>1</td>
<td>Acknowledge all errors without restart</td>
<td>If p1210 = 1, all pending errors will be automatically acknowledged, provided the cause of failure has been eliminated. If there are further errors after successful error acknowledgement, these will also be acknowledged automatically. If the signal ON/OFF1 (control word 1, bit 0) is set to HIGH level, a period of at least p1212 + 1s must have elapsed between the successful acknowledgement and recurrence of an error. If the ON/OFF1 signal is set to LOW level, the period between successful acknowledgement and recurrence of an error must be at least 1s. If p1210 = 1 and after an attempt to acknowledge the error has failed, no F07320 error will be generated, for example,</td>
</tr>
</tbody>
</table>
## 6.3 Parameter configuration

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

### Further information

For further information, please see the list of parameters in the user documentation of SINAMICS S110, S120, G130 and G150.

The parameter lists are also available over the Internet on the Service and Support page.

Parameters list for SINAMICS G1x0


(Search item: list manual)

Parameters list for S1x0


(Search item: list manual)

Please select the document for the relevant device (type, firmware).
6 Configuration of a SINAMICS G/S (SINAMICS S120/S150, G130/G150, GM150, GL150,
6.4 Standardization of the frequency converter

6.4 Standardization of the frequency converter

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

Transmission rate

1. Enter the motor-machine transmission rate at the “FactorGU” input of the block
“APL_GS”.

Reference current

1. Open the STARTER program.
2. Read out the value of the reference current which is stored in parameter P2002
of the SINAMICS.
3. Open the CFC chart where the SINAMICS block “APL_GS” is located.
4. Enter the read out value of parameter P2002 at the “FactorCPV” input of the
block “APL_GS”.

Standardization to frequency, speed or percent

Control of the frequency converters can be based on frequency, speed or percent.
Depending on the desired type of control, you have to define the following
standardization at the CFC block “APL_GS”.

a.) Frequency

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

1. Open the STARTER program.
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 SINAMICS block “APL_GS” is located.
4. Enter the read out value of parameter P310 in the “FactorRPM” input of the
block “APL_GS”.


b.) Speed
1. Open the STARTER program.
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 SINAMICS block “APL_GS” is located.
4. Enter the read out value of parameter P311 in the “FactorRPM” input of the block “APL_GS”.

c.) Percent
1. Open the CFC chart where the SINAMICS block “APL_GS” is located.
2. Enter the value 100 in the “FactorRPM” input of the block “APL_GS”.

6.5 External power supply (24V)

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

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

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

With devices of type SINAMICS G120C an external 24-V voltage supply is not possible.
6.6 Result in PCS 7 OS Runtime

After OS compilation, the associated block icons and faceplates in PCS 7 OS Runtime will be generated automatically.

Figure 6-7
Drive ES PCS 7 Product Variants

The Drive ES PCS 7 library is available in several product variants. This helps, on the one hand, to comply with the different PCS 7 versions and, on the other hand, to meet the new requirements of APL Styleguide.

Furthermore, PCS 7 version V8.0 or higher offers a universal motor driver block which enables the connection of frequency-controlled motors and provides all necessary basic functions.

The table below shows a list of all product variants including a brief description. This additional information is intended to help you find the right product variant.

### Table 7-1

<table>
<thead>
<tr>
<th>PCS 7 version</th>
<th>Required Drive ES library</th>
<th>Description</th>
<th>Advantages and disadvantages</th>
</tr>
</thead>
</table>
| V7.1                  | Drive ES PCS 7 V7.1       | The Drive ES add-on library is the only Siemens solution for the integration of SINAMICS and MICROMASTER drives in PCS 7 V7.1. The application document "Configuration of SINAMICS and MICROMASTER Drives with Drive ES in PCS 7 V7.1" (ID: 58007228) describes the engineering procedure in PCS 7 V7.1 and includes some fully configured and tested templates. | • Engineering and commissioning of the drives in the familiar PCS 7 environment  
  • Expansion of PCS 7 OS Runtime messages by the provision of additional text lists  
  • Siemens add-on product  
  • Operator control and monitoring via APL faceplates  
  • Additionally required process object (PO) for each drive  
  • Chargeable |
| V7.1 ▶ V8.0           | Drive ES PCS 7 V8         | This Drive ES library is exclusively aimed at enabling a PCS 7 upgrade from version V7.1 to version V8.0 without additional engineering requirements. In contrast to Drive ES PCS 7 APL V8, this version does not include any new functions. Engineering and commissioning are described in the application document "Configuration of SINAMICS and MICROMASTER Drives with Drive ES in PCS 7 V7.1" (ID: 58007228). | • Engineering and commissioning of the drives in the familiar PCS 7 environment  
  • Expansion of PCS 7 OS Runtime messages by the provision of additional text lists  
  • Siemens add-on product  
  • Operator control and monitoring via APL faceplates  
  • Additionally required process object (PO) for each drive  
  • Chargeable  
  • The faceplates included in the delivery must be deactivated |
## 7 Drive ES PCS 7 Product Variants

### 6.6 Result in PCS 7 OS Runtime

<table>
<thead>
<tr>
<th>PCS 7 version</th>
<th>Required Drive ES library</th>
<th>Description</th>
<th>Advantages and disadvantages</th>
</tr>
</thead>
</table>
| V7.1 ► V8.0 With new functions | Drive ES PCS 7 APL V8 | This Drive ES library is the result of a major overhaul and further development with special consideration to APL Styleguide. The Drive ES blocks now function as pure channel blocks and form one unit with the APL standard motor block "MotSpdCL". It also supports the new SINAMICS drives. Due to these changes, the drives must be configured anew. Engineering and commissioning of the drives is described in this documentation. | • Engineering and commissioning of the drives in the familiar PCS 7 environment  
• Expansion of PCS 7 OS Runtime messages by the provision of additional text lists  
• Due to the design as pure channel driver, no additional process object (PO) is required  
• Siemens add-on product  
• Operator control and monitoring via APL faceplates  
• Pure channel blocks  
• Chargeable |
| V8.0 New configuration with Drive ES | Drive ES PCS 7 APL V8 | This Drive ES library is the result of a major overhaul and further development with special consideration to APL Styleguide. The Drive ES blocks now function as pure channel blocks and form one unit with the APL standard motor block "MotSpdCL". It also supports the new SINAMICS drives. The documentation presented here describes the engineering and commissioning of the drives and includes some fully configured and tested templates. | • Engineering and commissioning of the drives in the familiar PCS 7 environment  
• Expansion of PCS 7 OS Runtime messages by the provision of additional text lists  
• Due to the design as pure channel driver, no additional process object (PO) is required  
• Siemens add-on product  
• Operator control and monitoring via APL faceplates  
• Pure channel blocks  
• Chargeable |
| V8.0 New configuration without Drive ES | APL standard motor block “FbDrive” | In addition to the above-described Drive ES product variants, the APL library includes the universally deployable driver block “FbDrive” for frequency-based motors. With this driver block, all frequency-based motors can be linked to the standardized message frame 20. | • PCS 7 standard motor block  
• Available from now on for all new PCS 7 versions  
• Not restricted only to Siemens motors  
• No additional installation or license required  
• No additional PO  
• Free of charge |
8 Upgrading from Drive ES V7.1 to V8.0

8.1 Upgrade with new functions

Drive ES PCS 7 APL V8.0 is a new product version which has been consistently designed with consideration to the APL Styleguide. The Drive ES blocks function as pure channel driver blocks. Control via the PCS 7 program and faceplate-based operation are activated by means of the APL motor block “MotSpdCL”.

Because of these changes, previous projects using Drive ES PCS 7 version V7.1 cannot be upgraded to PCS 7 version V8.0 as usual. This means that the drives must be integrated anew.

As an alternative for the updating of projects using Drive ES PCS 7 V7.1, Siemens offers a special Drive ES PCS 7 which does not require additional engineering efforts. This library, however, does not include any new functions.

8.1 Upgrade with new functions

The Drive ES PCS 7 APL version V8.0 includes pure motor driver blocks. Control via the PCS 7 program and the display of the faceplates are activated by means of the APL motor block “MotSpdCL”.

The usual parameter and signal inputs and outputs required for integrated faceplates have been removed, so that the block requires less resources. Furthermore, it is no longer regarded as a process object (PO).

Due to the changed interfaces and block names, the drives have to be integrated anew. The required steps are identical with the procedure described in the PCS 7 instructions for software updating and are also described in this application document.

1. Update your PCS 7 in compliance with the PCS 7 software updating/upgrading instructions
2. Uninstall Drive ES PCS 7 V7.1 by using the relevant function in Windows.
3. Install Drive ES PCS 7 APL V8.0 with the provided setup program.
4. Integrate the existing drives anew by using the new solution templates and in compliance with this application documentation.
5. Delete all previous templates and CFC charts.

Note

Detailed information and brief instructions for the updating/upgrading of the PCS 7 software are available under the following link:

8.2 Upgrade without new functions

The upgrading without new functions complies with the procedure for a PCS 7 upgrade.

Detailed information and brief instructions for the updating/upgrading of the PCS 7 software are available under the following link:

9 Internet Links

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

Table 9-1

<table>
<thead>
<tr>
<th>Topic</th>
<th>Link</th>
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<tr>
<td>Siemens Industry Online Support</td>
<td><a href="http://support.automation.siemens.com">http://support.automation.siemens.com</a></td>
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## 10 History

### Table 10-1

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Revisions</th>
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<tbody>
<tr>
<td>V1.0</td>
<td>01/2012</td>
<td>First issue</td>
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<tr>
<td>V1.1</td>
<td>02/2012</td>
<td>Parameters corrected in the following chapters:</td>
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<tr>
<td></td>
<td></td>
<td>• Chapter 4.4 “Standardization of the frequency converter”</td>
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<tr>
<td></td>
<td></td>
<td>• Chapter 5.4 “Standardization of the frequency converter”</td>
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<td>• Chapter 6.4 “Standardization of the frequency converter”</td>
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<td>V2.0</td>
<td>08/2012</td>
<td>Update to PCS 7 V8.0 Upd1</td>
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<td>Supplemented chapters:</td>
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<td>• Chapter 1.2.2 “Topics not covered by this application”</td>
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<tr>
<td></td>
<td></td>
<td>• Chapter 8 “Upgrading from Drive ES V7.1 to V8.0”</td>
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<td></td>
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<td>• Chapter 8.1 “Upgrade with new functions”</td>
</tr>
<tr>
<td></td>
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<td>• Chapter 8.1 “Upgrade without new functions”</td>
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