

SINAMICS G120

Drive ES PCS7 block library DRVPCS7_APL APL_G120 block

Function Manual

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury will result if proper precautions are not taken.
--

WARNING
--

indicates that death or severe personal injury may result if proper precautions are not taken.

CAUTION
--

indicates that minor personal injury can result if proper precautions are not taken.
--

NOTICE

indicates that property damage can result if proper precautions are not taken.
--

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING
--

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.
--

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Fundamental safety instructions

1.1 General safety instructions



WARNING

Danger to life if the safety instructions and residual risks are not observed

If the safety instructions and residual risks in the associated hardware documentation are not observed, accidents involving severe injuries or death can occur.

- Observe the safety instructions given in the hardware documentation.
- Consider the residual risks for the risk evaluation.



WARNING

Malfunctions of the machine as a result of incorrect or changed parameter settings

As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect the parameterization against unauthorized access.
- Handle possible malfunctions by taking suitable measures, e.g. emergency stop or emergency off.

1.2 Warranty and liability for application examples

Application examples are not binding and do not claim to be complete regarding configuration, equipment or any eventuality which may arise. Application examples do not represent specific customer solutions, but are only intended to provide support for typical tasks.

As the user you yourself are responsible for ensuring that the products described are operated correctly. Application examples do not relieve you of your responsibility for safe handling when using, installing, operating and maintaining the equipment.

1.3 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit

<https://www.siemens.com/industrialsecurity> (<https://www.siemens.com/industrialsecurity>).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under

<https://www.siemens.com/industrialsecurity> (<https://new.siemens.com/global/en/products/services/cert.html#Subscriptions>).

Further information is provided on the Internet:

Industrial Security Configuration Manual (<https://support.industry.siemens.com/cs/ww/en/view/108862708>)



WARNING

Unsafe operating states resulting from software manipulation

Software manipulations, e.g. viruses, Trojans, or worms, can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Keep the software up to date.
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.
- Make sure that you include all installed products into the holistic industrial security concept.
- Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.
- On completion of commissioning, check all security-related settings.

Introduction

2.1 General

The control blocks and associated faceplates of Drive ES PCS7 APL integrate the SINAMICS drives into the SIMATIC PCS 7 process control system.

This manual describes the function and handling of the blocks of Drive ES PCS7 APL.

2.2 Requirements

Hardware

The product Drive ES PCS7 APL is an add-on product for SIMATIC PCS 7

For the prerequisites, refer to the readme file of SIMATIC PCS 7 for which this product has been released.

Software

The product Drive ES PCS7 APL is an add-on product for SIMATIC PCS 7

For the prerequisites, refer to the readme file of SIMATIC PCS 7 for which this product has been released.

References

Notes on the installation of SIMATIC PCS 7 is available in the product-specific readme file.

2.3 Installing Drive ES PCS7 APL

Note

Readme file

Also read the information in the readme file.

Procedure

1. Insert the CD Drive ES PCS7 APL in the CD-ROM drive of your PG/PC.
2. Double-click "Setup.exe".
All the other information you need will be provided during the installation process.
 - The control blocks of the automation system (AS) are installed in the directory of STEP 7 > "s7libs".
 - The components of the faceplates of the operator station (OS) are installed in the directory of SIMATIC WinCC.
3. You must carry out further steps before working with the faceplates. The detailed procedure for this can be found in the descriptions of the individual blocks.

Note

Execute setup on every computer

Execute the setup on every computer on which the faceplates are used. This means that the components of SIMATIC WinCC must be installed on all OS servers and OS clients. It is not sufficient to simply copy the project from the engineering station to the server/client.

2.4 General Data Protection Regulation

Compliance with the General Data Protection Regulation

Siemens respects the principles of data protection, in particular the data minimization rules (privacy by design).

For this product, this means:

The product does not process neither store any person-related data, only technical function data (e.g. time stamps). If the user links these data with other data (e.g. shift plans) or if he stores person-related data on the same data medium (e.g. hard disk), thus personalizing these data, he has to ensure compliance with the applicable data protection stipulations.

APL_G120 block

3.1 Overview

Area of application

The block integrates a device of the SINAMICS G120 into the SIMATIC PCS 7 process control system.

The following SINAMICS G120 products are supported:

- G120, with CU240 up to Version 3.x

Note

SINAMICS G120 Version 4.2 or higher, use block APL_GS

For the SINAMICS G120 Version 4.2 or higher, use the APL_GS block to ensure the correct assignment of the fault texts to the fault numbers in the message archive.

The block supports the standard functionality of a SINAMICS with respect to control by a SIMATIC S7 and operator control and monitoring from an operator station.

Communication between the converter and SIMATIC is handled via PROFIBUS DP or PROFINET IO, depending on the device design (DP/PN).

Type/number

FB1722

You can change the block number.

Calling OBs

- The cyclic interrupt OB, e.g. OB35.

The block must be installed with the same instance in the following OBs. Installation in the CFC takes place automatically:

- OB100
For start identification

Function

The APL_G120 block offers the following functionality:

- Transfer of the setpoints specified by the MotSpdCL block to the drive.
- Receipt of process values provided by the drive and transfer to the MotSpdCL block.
- Generate signals which trigger alarms for WinCC at the MotSpdCL block.

- Detailed information about drive faults.
- Simulation mode with additional inputs and outputs for the connection of an external drive simulation (a simulation block is included in the library).

Boundary condition

- You can use the block with SIMATIC PCS 7 Version 8.2 or higher.
- The block is CIR-capable. It should be noted that when inserting the block in a CFC chart, the input Restart is set to TRUE. The setting is necessary because the block has startup characteristics, see Chapter: Startup behavior (Page 20)
- The block is integrated into the SIMATIC PCS 7 module driver concept. The functionality of the block is only ensured this way, see Chapter: Module drivers/Maintenance station (Page 51)
- The communication interface between SIMATIC and SINAMICS comprises 6 words in both the send direction and receive direction. The interface contains exclusively process data. You also have the capability of exchanging more data, see Chapter: Adapting the telegram length (Page 61).
- You must configure a SINAMICS with Drive ES/SIMOTION interface in the hardware configuration of STEP 7. Installation of the slave object manager is a prerequisite for this. For this slave, you configure the Siemens telegram 352.
- Make sure that the I addresses and the O addresses begin at the same start address.
- To commission the fieldbus communication, parameter assignments for the bus address and the parameterization enable are required in the drive. Further information can be found in the SINAMICS Operating Manual.
- The process data must be "wired" by means of parameter assignment on the basic converter to permit data exchange between the fieldbus interface of the SINAMICS G120 and the basic unit itself. In this context, the first word sent from the SIMATIC to the converter is always connected as control word STW1. The first word sent from the converter to the SIMATIC is always connected as status word ZSW1, see Chapter: Process data interface (Page 28).
- For the assignment of the process data words and their "wiring" in SINAMICS, refer to the following Chapter: Process data interface (Page 28).
- The fault memory of the SINAMICS is read by acyclic access from the SIMATIC master in the case of a fault. The master must thus support the "data record read/write" communication services.
- The block does not provide a freely usable parameter assignment interface between SIMATIC and SINAMICS G120. If necessary, the interfaces can be implemented using the blocks PDAT_AC2 and PDAT_UD2. The blocks are included in the DRVDPS7 library.
- You can operate a SINAMICS drive in an H system following a Y link. If the drive is integrated in the hardware configuration as DP standard slave (via GSD file) from the "Standard" profile, acyclic communication is not possible. The module driver disables acyclic communication by presetting the block input AcStart = 0. If you enable acyclic communication nevertheless, an error message is output: SFBErr = 1.

3.2 Control block

3.2.1 Operating modes

The operating mode is selected via the APL motor block MotSpdCL.

The effective control parameters are applied through interconnection of the APL motor block to the corresponding control inputs, from which the control word is formed.

The following operating modes are available:

- Control room mode:
 - Manual/automatic (control word)
 - Internal/external setpoint
- Local mode

Control word

The control word is formed from the following input values.

Control word	Parameter/ fixed value	Data type	Type	Description
Bit 0	Fwd or Rev	BOOL	IN	ON/OFF1
Bit 1	Protect	BOOL	IN	OFF2, electrical OFF
Bit 2	Trip	BOOL	IN	OFF3, fast stop
Bit 3	TRUE	BOOL	IN	Inverter enable
Bit 4	TRUE	BOOL	IN	Ramp-function generator enable
Bit 5	TRUE	BOOL	IN	Start ramp-function generator
Bit 6	TRUE	BOOL	IN	Setpoint enable
Bit 7	RstLi or RstOp	BOOL	IN	Acknowledge
Bit 8	FALSE			Hard-coded status, see column "Parameter/ fixed value"
Bit 9	FALSE			Hard-coded status, see column "Parameter/ fixed value"
Bit 10	TRUE			Hard-coded status, see column "Parameter/ fixed value"
Bit 11	sb_L_DIR	BOOL	STAT	Direction of rotation
Bit 12	FALSE			Hard-coded status, see column "Parameter/ fixed value"
Bit 13	FALSE			Hard-coded status, see column "Parameter/ fixed value"

Control word	Parameter/ fixed value	Data type	Type	Description
Bit 14	FALSE			Hard-coded status, see column "Parameter/ fixed value"
Bit 15	FALSE			Hard-coded status, see column "Parameter/ fixed value"

The direction of rotation is specified, adapted to the behavior of a MASTERDRIVES, via the following inputs:

Parameter	Data type	Type	Description
Fwd	BOOL	IN	Enable positive direction of rotation
Rev	BOOL	IN	Enable negative direction of rotation

Fwd	Rev	Reaction in control word or setpoint
0	0	sb_L_DIR = 0; setpoint = 0
1	0	sb_L_DIR = 0; absolute value of the setpoint
0	1	sb_L_DIR = 1; absolute value of the setpoint
1	1	sb_L_DIR = 0; setpoint >= 0 sb_L_DIR = 1; setpoint < 0

3.2.2 Data interface status word

The block outputs the status word 1 of the drive at its output interface bit by bit.

Overview

Status word	Parameter/ fixed value	Data type	Type	Description
Bit 0	ReadyOn	BOOL	OUT	=1: Ready to switch on
Bit 1	Op	BOOL	OUT	=1: Ready to operate
Bit 2	FbkRunOut	BOOL	OUT	=1: Operation released
Bit 3	GrErr	BOOL	OUT	=1: Group fault drive
Bit 4	ForceAct	BOOL	OUT	=1: No OFF2
Bit 5	TripAct	BOOL	OUT	=1: No OFF3
Bit 6	Lockout	BOOL	OUT	=1: Power-on inhibit active
Bit 7	sb_ALARM	BOOL	OUT	=1: Warning
Bit 8	SP_Dev	BOOL	OUT	=1: Speed setpoint/process value difference within tolerance
Bit 9	PCD	BOOL	OUT	=1: PLC control requested
Bit 10	Comp	BOOL	OUT	=1: Comparison value reached
Bit 11	NoCurLim_Act	BOOL	OUT	=1: No warning "Motor at current limit"
Bit 12	Brake	BOOL	OUT	=1: Motor brake not active
Bit 13	NoMotOver	BOOL	OUT	=1: No motor overload

Status word	Parameter/ fixed value	Data type	Type	Description	
Bit 14	Fwd_Rev	BOOL	OUT	=1:	Positive direction of rotation
				=0:	Negative direction of rotation
Bit 15	NoInvOver	BOOL	OUT	=1:	No converter overload

3.2.3 States

Overview

The following states are defined:

State	Description	Parameter
OFF	Drive is switched off, main contactor off, ON command not present	FbkOffOut
Fault	Group fault drive	GrErr
STOP	Drive ready for operation, main contactor on, inverter locked	FbkStopOut
Running	Inverter and setpoint are released	FbkRunOut
Switching on inhibited	Switching on of drive is inhibited	Lockout

3.2.4 Setpoint/process value normalization

The main and additional setpoint are converted to normalized values using a factor calculated in the startup routine. The setpoint is multiplied by this factor; the main process value is divided by this value.

The factor is calculated as follows: $16384/\text{FactorRPM}$.

If the motor speed deviates from the actual machine speed (gearbox), the gear ratio is specified by an factorGU. In this case, the factor for the setpoint and process value is made up as follows: $16384/(\text{FactorRPM} * \text{FactorGU})$.

You have to normalize the freely-selectable setpoints yourself.

The current and torque process values are also converted to a physical value using the factors calculated in the startup routine. The process values are divided by the respective factor.

The factor for the current is calculated as follows: $16384/\text{FactorCPV}$.

For the factor for the torque, the following applies accordingly: $16384/\text{FactorTPV}$.

The same applies to freely selectable process values as for freely-selectable setpoints.

Overview

In the startup routine, e.g. processing after restart, rack failure or setting the input restart, the factors are calculated as shown above.

The table below shows the parameters of the SINAMICS G120 that must be specified at the corresponding input parameters of the block.

Parameter	Data type	Type	Description
FactorRPM	REAL	IN	Reference speed/reference frequency, p2000
FactorGU	REAL	IN	Gear ratio
FactorCPV	REAL	IN	Reference current, p2002
FactorTPV	REAL	IN	Reference torque, p2003

Note

Faceplate display

- You define whether frequency, speed or % is displayed in the faceplate. At the FactorRPM input, you enter the value to which 16#4000 corresponds. I.e. if 3000 is at the FactorRPM input, then $3000 = 16\#4000$.
- If the speed of the machine is to be entered and displayed instead of the motor speed, specify 0.1 at the FactorGU input for a motor/machine transmission ratio of 10:1.

3.2.5 Error response

Overview

The following errors are signaled by the block:

Parameter	Data type	Type	Description
AcErrorNum	WORD	OUT	RET_VAL of SFB52/53, error number
MODF	BOOL	IN	=1: System detected a slave failure
PERAF	BOOL	IN	=1: System has detected an error while updating the process image
DatErr	BOOL	OUT	=1: Group error communication - SndErr - RcvErr - ReqErr - WdogErr - SFBErr
Err	BOOL	OUT	=1: Group error - ParErr - RackErrOut - MODF - PERAF - DatErr
GrErr	BOOL	OUT	=1: Drive fault
ParErr	BOOL	OUT	=1: Normalization factors = 0

Parameter	Data type	Type	Description
RackErrOut	BOOL	OUT	=1: Rack failure
RcvErr	BOOL	OUT	=1: Cyclic communication error
RcvErrorNum	WORD	OUT	Status SFC14: DPRD_DAT
RACKF	BOOL	IN	=1: System has detected a rack failure
ReqErr	BOOL	OUT	=1: Parameter assignment request (DS47) completed with errors: response ID = 0x81 = error during read job Possible cause: e.g. wrong axis ID Further possible causes can be found in the "Function Manual SINAMICS S120 Drive Functions" (FH1), Table 10-57
SndErr	BOOL	OUT	=1: Cyclic communication error
SndErrorNum	WORD	OUT	Status SFC15: DPWR_DAT
SFBErr	BOOL	OUT	=1: SFB error during data transmission with SFB52/53
WdogErr	BOOL	OUT	=1: No plausible response data within the monitoring time

If there are the following errors, the drive is no longer accessed:

- ParErr
- RackErrOut
- MODF
- PERAF

A restart in the block is only executed when this error has been eliminated.

Drive fault

If the drive reports "Fault" in the status word, GrErr = 1 is set and the fault memory of the drive is read. Thus you receive further information about the drive fault.

See the following Chapter: Coordination of acyclic communication (Page 27)

Data interface fault memory

The following fault information is read by the block and displayed in the "Drive fault" control field:

Parameter	Data type	Type	Description
ErrNum1	DINT	OUT	Fault number 1
ErrVal1	DWORD	OUT	Fault value for fault number 1
ErrNum2	DINT	OUT	Fault number 2
ErrVal2	DWORD	OUT	Fault value for fault number 2
ErrNum3	DINT	OUT	Fault number 3
ErrVal3	DWORD	OUT	Fault value for fault number 3
ErrNum4	DINT	OUT	Fault number 4
ErrVal4	DWORD	OUT	Fault value for fault number 4
ErrNum5	DINT	OUT	Fault number 5

Parameter	Data type	Type	Description
ErrVal5	DWORD	OUT	Fault value for fault number 5
ErrNum6	DINT	OUT	Fault number 6
ErrVal6	DWORD	OUT	Fault value for fault number 6
ErrNum7	DINT	OUT	Fault number 7
ErrVal7	DWORD	OUT	Fault value for fault number 7
ErrNum8	DINT	OUT	Fault number 8
ErrVal8	DWORD	OUT	Fault value for fault number 8

3.2.6 Startup behavior

Overview

- Read in the logical base address and the diagnostic address of the slave.
- Calculate the normalization factor from the reference variables, which are specified at the following inputs:
 - FactorRPM
 - FactorGU
 - FactorCPV
 - FactorTPV

You can also perform the tasks above by setting the Restart input. The Restart input is reset by the block.

After a restart, there is a wait period for a parameterizable number of cycles before you can operate the drive.

3.2.7 Time behavior

The block has no time behavior.

3.2.8 Message behavior

Message generation for SIMATIC WinCC is implemented via SFB 35 (ALARM_8P). This SFB is integrated in the block as instance.

Overview

Message number MotSpdCL	Block parameter APL_G120	Block parameter MotSpdCL	Default text	Message class
6	Gr_Err	Ext Msg 1	Fault drive no.: @4%d@; @4W%t#TextbibSG@	S
7	Alarm	Ext Msg 2	Warning drive no.: @5%d@; @5W%t#TextbibSG@	F
8	Err	Ext Msg 3	@6W%t#TextbibGen@	S

Message class	Description
F	AS control system message fault
S	AS control system message failure
A	Alarm message
W	Warning

The following associated values for message generation must be provided for the MotSpdCL block.

Block parameter APL_G120	Input associated value MotSpdCL	Use in message	Message class
ErrNum	ExtVal106	Ext Msg 3	S
AlarmNum	ExtVal105	Ext Msg 2	F
GrErrNum	ExtVal104	Ext Msg 1	S

The error texts of the drives are dynamically inserted into the message with the help of user text libraries. The associated value provides the index for the current text in the text library. A placeholder is entered at the location where the dynamic text is to be displayed.

The user text libraries are part of the library. Always copy these libraries into the projects as well.

The following text libraries are used:

Text library	Description
TextbibG120	Fault texts SINAMICS G120
TextbibGen	General error texts for all versions

You will find more information on user text libraries in the online help for SIMATIC PCS 7 under the keyword "User text libraries".

3.2.9 User-specific parameterization of the inputs

Overview

You must parameterize the block inputs listed below application-specifically:

Parameter	Data type	Type	Description
AxisId	BYTE	IN	Module ID of the drive object to be addressed See Chapter: Addressing the drive objects (parameter AxisId) (Page 43)
DADDR	INT	IN	Diagnostic address of the slave With the use of the module driver, the parameter is automatically provided with the corresponding values. See Chapter: Option for compiling the CFC (Page 40) Module drivers/Maintenance station (Page 51)
FactorCPV	REAL	IN	Reference current, p2002
FactorGU	REAL	IN	Gear ratio
FactorRPM	REAL	IN	Reference frequency, p2000
FactorTPV	REAL	IN	Reference torque, p2003
FautEn	BOOL	IN	=1: Fault number in PZD6
LADDR	INT	IN	Logical base address of the slave With the use of the module driver, the parameter is automatically provided with the corresponding values. See Chapter: Option for compiling the CFC (Page 40) Module drivers/Maintenance station (Page 51)
WH_MS_Days	INT	IN	Time until maintenance (M): low requirement
AH_MS_Days	INT	IN	Time until maintenance (M): medium requirement
MsgLen_PV	INT	IN	Telegram length process values See Chapter: Adapting the telegram length (Page 61)
MsgLen_SP	INT	IN	Telegram length setpoints See Chapter: Adapting the telegram length (Page 61)
RunUpCyc	INT	IN	Number of cycles to be waited after a restart before messages are generated and the drive can be started.
VALUE	WORD	IN	Input value: Start address of the first slot of the drive See Chapter: Module drivers/Maintenance station (Page 51)
WarnEn	BOOL	IN	=1: Warning number in PZD5

You have to parameterize the following inputs:

- VALUE
- DADDR
- LADDR

The remaining inputs have default values that can be changed specifically for the application.

The inputs WarnEn and FaultEn can be used to parameterize whether the following is to be transferred in the 5th and 6th word of the PZD communication:

Warning number:	WarnEn	= TRUE;	Warning number is transferred to WinCC in associated value 5.
Fault number:	FaultEn	= TRUE;	Fault number is transferred to WinCC in associated value 4.
Process values:	WarnEn	= FALSE;	0 is transferred to WinCC in associated value 5.
	FaultEn	= FALSE;	0 is transferred to WinCC in associated value 4.

You can re-parameterize the message such that no associated value is shown in the message text.

Further information can be found in the following chapter: Message behavior (Page 20)

3.2.10 Application-specific interconnecting of the inputs

Overview

You must interconnect the block inputs listed below application-specifically:

Parameter	Data type	Type	Description
AcStart	BOOL	IN	Interlock "Read out fault memory"
			=0: Acyclic communication channel to the drive is used by another application. Fault memory may not be read out.
			=1: Acyclic communication channel to drive is free. Fault memory may be read out.
Fwd	BOOL	IN	Enable positive direction of rotation: clockwise rotation
Rev	BOOL	IN	Enable negative direction of rotation: counter-clockwise rotation
RstMSLi	BOOL	IN	Interconnectable input to reset maintenance requirement. The operating hours counter is reset to 0.
RstLi	BOOL	IN	Acknowledge
Protect	BOOL	IN	OFF2 (electrical OFF)
InvEn	BOOL	IN	Inverter enable (bit 3 in the control word)
MODF	BOOL	IN	=1: System detected a slave failure. With the use of the module driver, the parameter is automatically interconnected. See Chapter: Option for compiling the CFC (Page 40)
Trip	BOOL	IN	OFF3 (quick stop)
PERAF	BOOL	IN	I/O access error when the system updates the process image. With the use of the module driver, the parameter is automatically interconnected. See Chapter: Option for compiling the CFC (Page 40)

Parameter	Data type	Type	Description
RACKF	BOOL	IN	Rack failure With the use of the module driver, the parameter is automatically interconnected. See Chapter: Option for compiling the CFC (Page 40)
SP	REAL	IN	External setpoint

If the input "Protect" = FALSE, an OFF2 command (electrical OFF) is sent to the drive.

If the input "Trip" = FALSE, an OFF3 command (quick stop) is sent to the drive.

The "Read fault memory" function can be interlocked via the "AcStart" input. This interlocking is necessary if several blocks use the acyclic communication channel to the same drive, because otherwise communication errors may occur. An example is the SINAMICS S120 with infeed module and several axes.

If there is no further acyclic communication in the project, set the "AcStart" input to "1", see Chapter: Coordination of acyclic communication (Page 27)

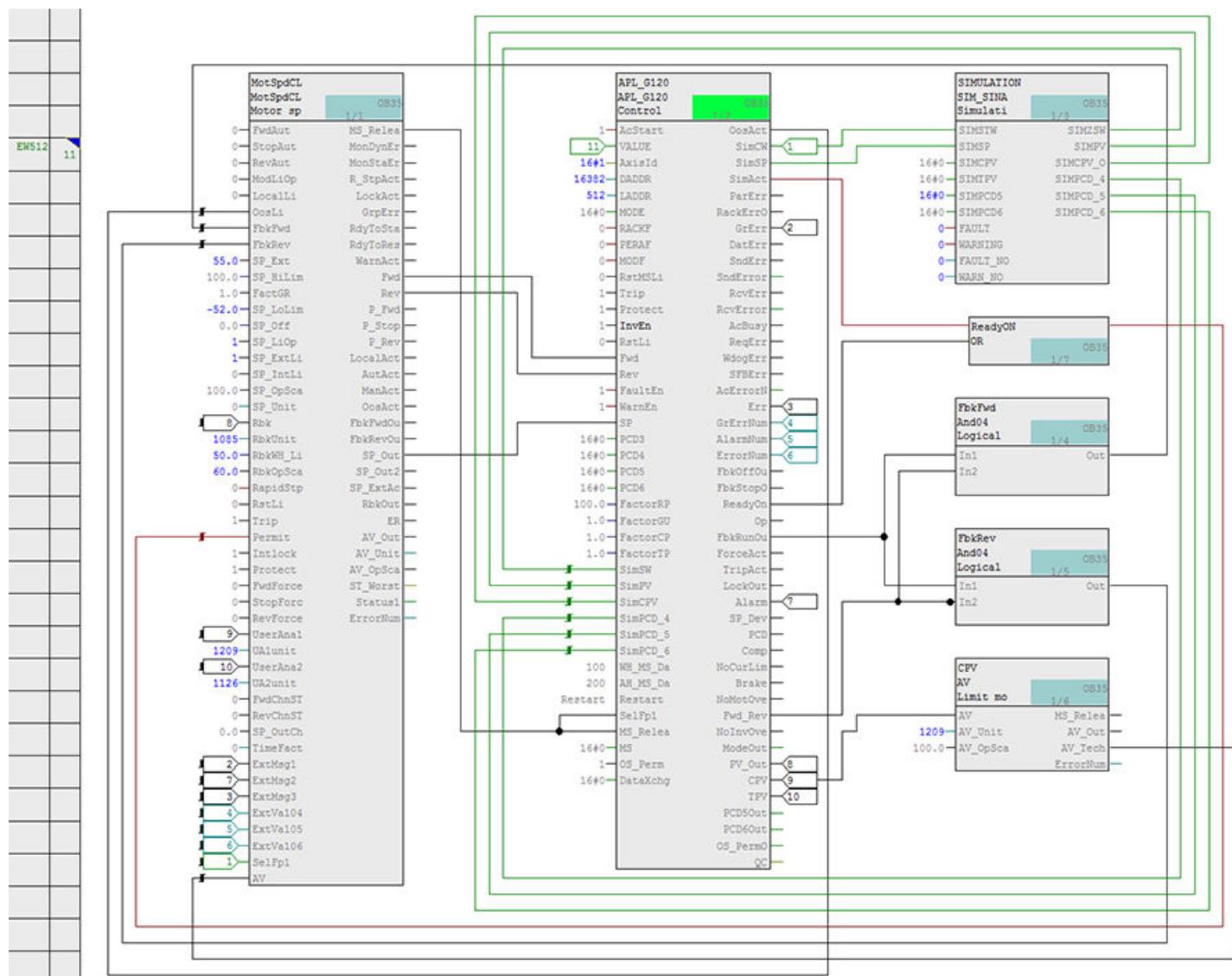
It is possible to specifically operate and control the inverter enable, especially for large converter outputs, via the "InvEn" input, see also FAQ with the entry ID 109483253 (<https://support.industry.siemens.com/cs/ww/en/view/109483253>).

The following conditions must be met in order to use the "InvEn" input:

- If necessary, switch the "DvFdAct" and "Feature" parameters to visible in the object properties of the MotSpdCL block.
- Switch the "Feature.Bit15" and "Feature.Bit8" parameters to "1"
- Interconnect the "DvFdAct" parameter of the MotSpdCL block with the "InvEn" parameter of the APL_GS block.

Interconnection of the blocks

Below you can see how the APL_G120 block has to be interconnected with the MotSpdCL block using the logic components.



3.2.11 Changing the language for the display device

The block supports the following languages:

- German
- English
- French

- Spanish
- Italian

Before changing the language, open the properties dialog of the control block and switch to the "Connections" tab. Replace the English contents of the columns "Designation", "Unit", "Text0" and "Text1" of the block with the respective German, French, Spanish or Italian texts.

Procedure

1. Select the block.
2. Select "Edit" in the menu bar.
3. Select "Object properties".
4. Open the "Connections" tab and change the descriptions in the "Designation", "Unit", "Text0" and "Text1" columns.
5. Double-click the column borders to automatically increase the width of the column. This will enable the complete headings and contents of the column to be displayed.

Alternatively, you can also change the texts for all of the designators in the columns "Designation", "Unit", "Text0" and "Text1" in the SIMATIC WinCC text library.

Now it is possible to switch between languages as often as desired without having to change the designators in the CFC again.

References

If you switch SIMATIC PCS 7 to a different language, set the language in STEP 7 and in SIMATIC WinCC.

Further information can be found in the configuration manual: Process Control System PCS 7; Engineering System

German

The following table shows the affected I/O parameters and the translated texts for German.

Parameter	Identifier	Unit	Text0	Text1
RstOp	–	–	0	Reset
RstMSOp	–	–	0	Reset

French

The following table shows the affected I/O parameters and the translated texts for French.

Parameter	Identifier	Unit	Text0	Text1
RstOp	–	–	0	Réinit
RstMSOp	–	–	0	Réinit

Spanish

The following table shows the affected I/O parameters and the translated texts for Spanish.

Parameter	Identifier	Unit	Text0	Text1
RstOp	–	–	0	Reset
RstMSOp	–	–	0	Reset

Italian

The following table shows the affected I/O parameters and the translated texts for Italian.

Parameter	Identifier	Unit	Text0	Text1
RstOp	–	–	0	Reset
RstMSOp	–	–	0	Reset

3.2.12 Coordination of acyclic communication

The "Read fault memory" function of this block uses the acyclic communication channel to the drive. This channel must only be used by one application for the same drive at any given time.

Overview

With the input AcStart you enable acyclic communication. If the input is set to "TRUE", the channel for acyclic communication is currently not being used by other applications. The channel can be used by this block. If the block occupies the acyclic channel, the AcBusy output is set to TRUE. No other application must use the acyclic channel now.

The GrErr output can be used to give the "Read fault memory" function priority over other applications. This output has the TRUE status as long as an unacknowledged drive fault is pending.

You coordinate the access to this channel with the following parameters:

Parameter	Data type	Type	Description
AcStart	BOOL	IN	Interlock "Read out fault memory"
			=0: Acyclic communication channel to the drive is used by another application. Fault memory may not be read out.
			=1: Acyclic communication channel to drive is free. Fault memory may be read out.
AcBusy	BOOL	OUT	=1: Fault memory is being read
GrErr	BOOL	OUT	=1: Drive fault

3.2.13 Process data interface

Parameterize drive

Control room mode (data record 0)

The block transfers 6 process data words (control word, setpoints) cyclically to the SINAMICS G120 and receives 6 process data words (status word, process values) cyclically from the drive.

See Chapter: Adapting the telegram length (Page 61)

SIMATIC > SINAMICS G120

Description	Parameter	Data type	Telegram location
Control word	Control word and status word are formed by the block. The required bits are set individually at the I/O bar.	WORD	1st word
Main setpoint	SP	REAL Is sent/received as WORD	2nd word
Freely selectable setpoint	PCD3	WORD	3rd word
Freely selectable setpoint	PCD4	WORD	4th word
Freely selectable setpoint	PCD5	WORD	5th word
Freely selectable setpoint	PCD6	WORD	6th word

SINAMICS G120 > SIMATIC

Description	Parameter	Data type	Telegram location
Status word	Control word and status word are formed by the block. The required bits are set individually at the I/O bar.	WORD	1st word
Main process value	PV_Out	REAL Is sent/received as WORD	2nd word
Current process value	CPV	REAL Is sent/received as WORD	3rd word
Torque process value	TPV	REAL Is sent/received as WORD	4th word

Freely selectable process value or Warning number	PCD5Out	WORD	5th word
Freely selectable process value or Fault number	PCD6Out	WORD	6th word

Procedure for PROFIBUS mode

For PROFIBUS mode, the following parameterization is required.

1. Restore the factory settings: The setting is only required to ensure that the correct default is set for CDS1 (local mode).
Set the following:
 - For CU240: p0010 = 30
 - For CU240: p0970 = 1
2. Commission the drive via the BOP or the STARTER according to the operating instructions.
3. Set the address using the address switch on the CU:
 - p0918 = PROFIBUS address.

Alternatively, if the telegram 352 cannot be selected, you can parameterize the drive as follows:

1. Set p0922 = 1 (standard telegram 1)
This sends the ZSW1 in Word 1 and speed process value in Wort 2 to the PLC.
2. Set p0922 = 999, free parameterization of the SINAMICS G120
3. Set p2051.2 (drive/axis) = 27, current process value in Word 3 to the PLC
4. Set p2051.3 (drive/axis) = 31, torque process value in Word 4 to the PLC
5. Set p2051.4 (drive/axis) = 2132, warning number in Word 5 to the PLC
6. Set p2051.5 (drive/axis) = 2131, fault number in Word 6 to the PLC
7. Set p0971 (CU240) = 1, fail-safe parameter backup
8. Activate the control via PROFIBUS according to the operating instructions.
9. Switch the circuitry voltage off and back on again.

Procedure for PROFINET mode

For PROFINET mode, the following parameterization is required:

1. Restore the factory settings: The setting is only required to ensure that the correct default is set for CDS1 (local mode).
Set the following:
 - For CU240: p0010 = 30
 - For CU240: p0970 = 1
2. Commission the drive via the STARTER according to the operating instructions.

Alternatively, if the telegram 352 cannot be selected, you can parameterize the drive as follows:

1. Set p0922 = 1 (standard telegram 1)
2. Set p0922 = 999, free parameterization of the SINAMICS
3. Set p2051.2 (drive/axis) = 27, current process value in Word 3 to the PLC
4. Set p2051.3 (drive/axis) = 31, torque process value in Word 4 to the PLC
5. Set p2051.4 (drive/axis) = 2132, warning number in Word 5 to the PLC
6. Set p2051.5 (drive/axis) = 2131, fault number in Word 6 to the PLC
7. Set p0971 (CU240) = 1, fail-safe parameter backup
8. Activate the control via PROFINET according to the operating instructions.
9. Switch the circuitry voltage off and back on again.

Local mode

If it is to be possible to switch to local mode on the drive, it is advisable to use the CDS1 in the drive for this purpose. On the CDS1, you switch over using an external signal, e.g. from the key-operated switch in the converter cabinet.

The following parameter settings are an example of the implementation for switching to local mode. The setpoint and in part the control signals are wired to the CU terminal block. The external switchover signal is applied to digital input 4 and the ON/OFF1 command to digital input 0.

NOTICE
Setting when drive is in standstill
The switchover from control room to local mode is not bumpless and should only be carried out when the drive is in standstill!

The following parameterization is still required for this:

- p1070.1 = 1050, speed setpoint via motorized potentiometer
- p0700.1 = 2 and p0701.1 = 99, (ON/OFF command from DI1
- p0705.1 = 99 and p0810 = 722.4, switchover of the CDS via DI4

The interconnection of the process values is retained as with control room mode.

Note

Wiring the block from the automation system (AS)

To not only detect the switchover to local mode in the converter, but also in the AS block, the switchover signal (e.g. from the key-operated switch in the converter cabinet) must also be wired to a digital input of the AS. You interconnect the REMOTE input of the AS block with this digital input.

Alternatively, you can also transfer the value of the parameter r0722 as additional process value in the PZD data. The following parameterization is required for this:

- Hardware configuration:
 - Instead of selecting the telegram 352, a user-defined configuration (6 setpoints and 7 process values) must be performed.
- CFC:
 - Change the value at parameter ME_LE_AV of the SINA_GS block from 6 to 7.
 - Interconnect the output PZD_7 with a converter block which transforms a word into 16 bits.
 - Connect the output in which the information of the digital input, which is used/ transferred for the data record switchover, with the input LocalLi of the MotSpdCL block. Also observe the information in the online help of the MotSpdCL block for the local mode.
- SINAMICS:
 - Set p0922 = 999, free parameterization of the SINAMICS
 - p2051.6 (axis/drive) = 722, status of digital inputs in Word 7 to the PLC

3.2.14 I/O bar

The as-supplied state of the block representation in CFC is marked in the "Default" column:

Parameter name **bold** = connection is visible

Parameter name normal = connection is not visible

Connections

Parameter	Type	Type	Default	Comment	S7_m_c:=TRUE X=Parameter can be operat- ed and moni- tored
AcBusy	STRUCT	OUT	-	=1: Upread of fault memory in process	
	• ST: BYTE		16#80		
	• Value: BOOL		FALSE		
AcErrorNum	WORD	OUT	0	SFB52/53 RET_VAL, error number	
AcStart	BOOL	IN	TRUE	=1: Upread of fault memory enabled	

Parameter	Type	Type	Default	Comment		S7_m_c:=TRUE X=Parameter can be operat- ed and moni- tored
AH_MS_Days	INT	IN	200	Time interval for maintenance middle [day]		
Alarm	STRUCT	OUT	-	=1:	Alarm	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
AlarmNum	DINT	OUT	0	Error number of drive warning		X
AxisID	BYTE	IN	0	Axis addressing for multi-axis drives		
Brake	STRUCT	OUT	-	=1:	No motor holding brake active	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
Comp	STRUCT	OUT	-	=1:	Comparison value reached	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
CPV	STRUCT	OUT	-	Current process value		
	• ST: BYTE		16#80			
	• Value: REAL		0.0			
DADDR	INT	IN	16382	Diagnostic address of DP-slave		
DADDR_Out	WORD	OUT	0	Diagnostic address of DP-slave		
DataXchg	DWORD	INOUT	0	Data exchange		
DatErr	STRUCT	OUT	-	=1:	Data error appeared	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
EN	BOOL	IN	TRUE			
ENO	BOOL	OUT	FALSE			
Err	STRUCT	OUT	-	=1:	Group error	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
ErrNum1	DINT	OUT	0	Error number of error 1		X
ErrNum2	DINT	OUT	0	Error number of error 2		X
ErrNum3	DINT	OUT	0	Error number of error 3		X
ErrNum4	DINT	OUT	0	Error number of error 4		X
ErrNum5	DINT	OUT	0	Error number of error 5		X
ErrNum6	DINT	OUT	0	Error number of error 6		X
ErrNum7	DINT	OUT	0	Error number of error 7		X
ErrNum8	DINT	OUT	0	Error number of error 8		X
ErrorNum	DINT	OUT	0	Error number of group error		X
ErrVal1	DWORD	OUT	0	Error value of error 1		X
ErrVal2	DWORD	OUT	0	Error value of error 2		X
ErrVal3	DWORD	OUT	0	Error value of error 3		X

Parameter	Type	Type	Default	Comment		S7_m_c:=TRUE X=Parameter can be operat- ed and moni- tored
ErrVal4	DWORD	OUT	0	Error value of error 4		X
ErrVal5	DWORD	OUT	0	Error value of error 5		X
ErrVal6	DWORD	OUT	0	Error value of error 6		X
ErrVal7	DWORD	OUT	0	Error value of error 7		X
ErrVal8	DWORD	OUT	0	Error value of error 8		X
FactorCPV	REAL	IN	1.0	Conversion factor for current process value, p2002		
FactorGU	REAL	IN	1.0	Conversion factor for gear unit		
FactorRPM	REAL	IN	100.0	Conversion factor for RPM or frequency, p2000		
FaultEn	BOOL	IN	TRUE	=1:	Drive error in 6th PZD word	
FbkOffOut	STRUCT	OUT	-	=1:	Motor OFF	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
FbkRunOut	STRUCT	OUT	-	=1:	Running	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
FbkStopOut	STRUCT	OUT	-	=1:	Motor STOP	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
ForceAct	STRUCT	OUT	-	=1:	OFF2	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
Fwd	STRUCT	IN		Linkable Input: Clockwise motor direction		
	• ST: BYTE					
	• Value: BOOL					
Fwd_Rev	STRUCT	OUT	-	=1:	Forward	
	• ST: BYTE		16#80	=0:	Reverse	
	• Value: BOOL		FALSE			
GrErr	STRUCT	OUT	-	=1:	Drive group error	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
GrErrNum	DINT	OUT	FALSE	Error number of drive group error		X
InvEn	STRUCT	IN		Linkable input: Inverter enable		
	• ST: BYTE					
	• Value: BOOL					
LADDR	INT	IN	0	Logical address of module		
LADDROut	WORD	OUT	0	Logical address of module		

Parameter	Type	Type	Default	Comment		S7_m_c:=TRUE X=Parameter can be operat- ed and moni- tored
LockOut	STRUCT	OUT	-	=1:	Lockout function	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
MODE	DWORD	IN	0	Parameter OMODE of DES_DIAG		
ModeOut	DWORD	OUT	0	Status MODE		
MODF	BOOL	IN	FALSE	=1:	Module failure	
MS	DWORD	IN	0	Maintenance state		
MS_Days	INT	IN	19	Backup of days since last maintenance		X
MS_Release	STRUCT	IN		Maintenance release		
	• ST: BYTE					
	• Value: BOOL					
MsgLen_PV	INT	IN	6	Message length of actual value		
MsgLen_SP	INT	IN	6	Message length of setpoint		
NoCurLim_Act	STRUCT	OUT	-	=1:	No warning: motor current limit	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
NoInvOver	STRUCT	OUT	-	=1:	No inverter overload	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
NoMotOver	STRUCT	OUT	-	=1:	No motor overload	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
OosAct	STRUCT	OUT	-	Drive out of service, maintenance in progress		
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
Op	STRUCT	OUT	-	=1:	Ready	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
OS_Perm	STRUCT	IN		Operator permission		X
OS_PermLog	DWORD	OUT	0	Operator permissions: Output for OS		X
OS_PermOut	DWORD	OUT	0	Operator Permissions: Output for OS		X
ParErr	STRUCT	OUT	-	=1:	Parameter assignment error	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
PCD	STRUCT	OUT	-	=1:	PLC control requested	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
PCD3	WORD	IN	0	Optional setpoint 1		

Parameter	Type	Type	Default	Comment	S7_m_c:=TRUE X=Parameter can be operat- ed and moni- tored
PCD4	WORD	IN	0	Optional setpoint 2	
PCD5	WORD	IN	0	Optional setpoint 3	
PCD5Out	WORD	OUT	0	Optional process value, default: Warn- ing number	
PCD6	WORD	IN	0	Optional setpoint 4	
PCD6Out	WORD	OUT	0	Optional process value, default: Fault number	
PCD7	WORD	IN	0	Optional setpoint 5 See Chapter: Adapting the telegram length (Page 61)	
PCD7Out	WORD	OUT	0	Optional process value 7 See Chapter: Adapting the telegram length (Page 61)	
PCD8	WORD	IN	0	Optional setpoint 6 See Chapter: Adapting the telegram length (Page 61)	
PCD8Out	WORD	OUT	0	Optional process value 8 See Chapter: Adapting the telegram length (Page 61)	
PCD9	WORD	IN	0	Optional setpoint 7 See Chapter: Adapting the telegram length (Page 61)	
PCD9Out	WORD	OUT	0	Optional process value 9 See Chapter: Adapting the telegram length (Page 61)	
PCD10	WORD	IN	0	Optional setpoint 8 See Chapter: Adapting the telegram length (Page 61)	
PCD10Out	WORD	OUT	0	Optional process value 10 See Chapter: Adapting the telegram length (Page 61)	
PCD_11	WORD	IN	0	Optional setpoint 9 See Chapter: Adapting the telegram length (Page 61)	
PCD11Out	WORD	OUT	0	Optional process value 11 See Chapter: Adapting the telegram length (Page 61)	
PCD12	WORD	IN	0	Optional setpoint 10 See Chapter: Adapting the telegram length (Page 61)	
PCD12Out	WORD	OUT	0	Optional process value 12 See Chapter: Adapting the telegram length (Page 61)	

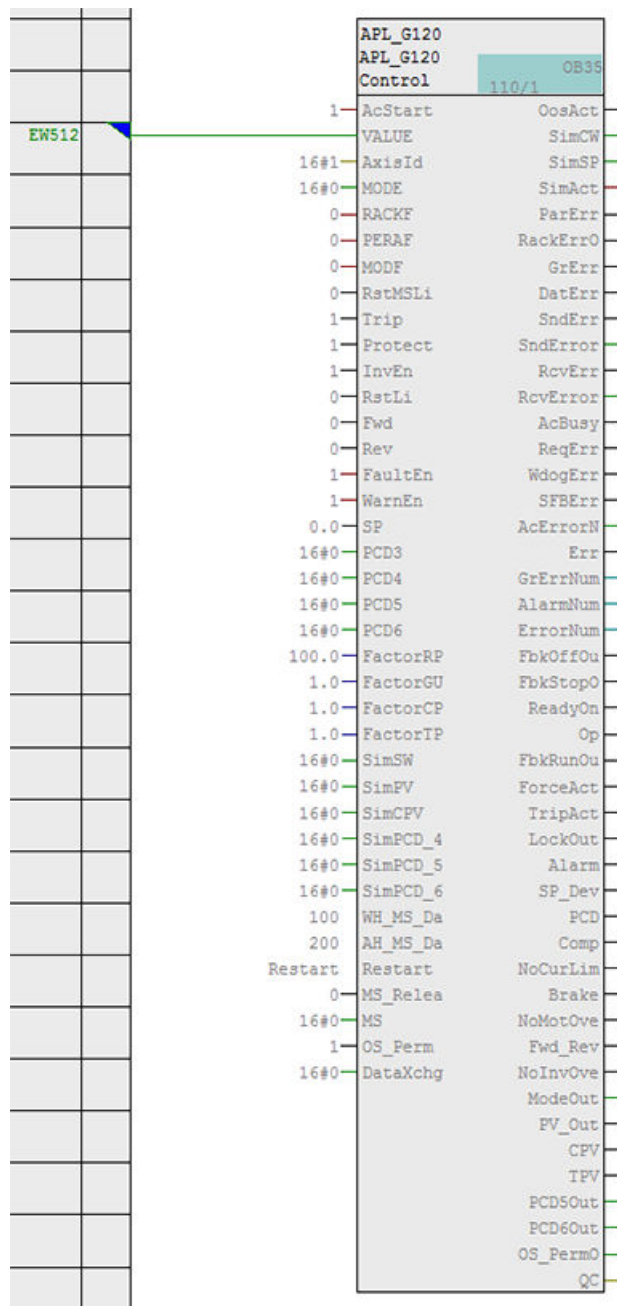
Parameter	Type	Type	Default	Comment	S7_m_c:=TRUE X=Parameter can be operat- ed and moni- tored
PCD13	WORD	IN	0	Optional setpoint 11 See Chapter: Adapting the telegram length (Page 61)	
PCD13Out	WORD	OUT	0	Optional process value 13 See Chapter: Adapting the telegram length (Page 61)	
PCD14	WORD	IN	0	Optional setpoint 12 See Chapter: Adapting the telegram length (Page 61)	
PCD14Out	WORD	OUT	0	Optional process value 14 See Chapter: Adapting the telegram length (Page 61)	
PCD15	WORD	IN	0	Optional setpoint 13 See Chapter: Adapting the telegram length (Page 61)	
PCD15Out	WORD	OUT	0	Optional process value 15 See Chapter: Adapting the telegram length (Page 61)	
PCD16	WORD	IN	0	Optional setpoint 14 See Chapter: Adapting the telegram length (Page 61)	
PCD16Out	WORD	OUT	0	Optional process value 16 See Chapter: Adapting the telegram length (Page 61)	
PERAF	BOOL	IN	FALSE	Access error	
Protect	STRUCT	IN	-	Linkable Input:	
	• ST: BYTE		16#80	=0: OFF2	
	• Value: BOOL		FALSE	=1: Operating condition	
PV_Out	STRUCT	OUT	-	Process Value (speed or frequency)	
	• ST: BYTE		16#80		
	• Value: REAL		0.0		
QC	BYTE	OUT	0	Drive state for MS	
RackErrOut	STRUCT	IN	-	=1: Rack failure	
	• ST: BYTE		16#80		
	• Value: BOOL		FALSE		
RACKF	BOOL	IN		Rack error	
RcvErr	STRUCT	OUT	-	SFC14 error	
	• ST: BYTE		16#80		
	• Value: BOOL		FALSE		
RcvErrorNum	WORD	OUT	0	SFC14 RET_VAL, error number	

Parameter	Type	Type	Default	Comment		S7_m_c:=TRUE X=Parameter can be operat- ed and moni- tored
ReadyOn	STRUCT	OUT	-	=1:	Ready to start	
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
ReqErr	STRUCT	OUT	-	Parameter request erro, fault memory		
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
Restart	BOOL	IN	FALSE	=1:	Manual restart of this block	
Rev	STRUCT	IN		Linkable input: Counterclockwise mo- tor direction		
	• ST: BYTE					
	• Value: BOOL					
RstLi	STRUCT	IN	-	Linkable Input: Error reset		
	• ST: BYTE		16#80	Signal status		
	• Value: BOOL		FALSE	Value		
RstMSLi	STRUCT	IN	-	Linkable Input: Maintenance reset		
	• ST: BYTE		16#80	Signal status		
	• Value: BOOL		FALSE	Value		
RstMSOp	BOOL	IN	FALSE	Operator Input: Maintenance reset		X
RstOp	BOOL	IN	FALSE	Operator Input: Error reset		X
RunUpCyc	INT	IN	3	Lag: Number of run up cycles		
SampleTime	REAL	IN	0.1	Sample time [s], OB cycle time		
SelfP1	ANY	IN		Select faceplate 1		
SelfP2	ANY	IN		Select faceplate 2		
SFBErr	STRUCT	OUT	-	SFB52/53 error		
	• ST: BYTE		16#80			
	• Value: BOOL		FALSE			
SimAct	BOOL	OUT	FALSE	=1:	Simulation active See Chapter: Simulation (Page 65)	
SimCPV	WORD	IN		Current process value, simulation See Chapter: Simulation (Page 65)		
SimCW	WORD	OUT	0	Control word, simulation See Chapter: Simulation (Page 65)		
SIMPCD_4	WORD	IN		Optional process value, simulation See Chapter: Simulation (Page 65)		
SIMPCD_5	WORD	IN		Optional process value, simulation See Chapter: Simulation (Page 65)		
SIMPCD_6	WORD	IN		Optional process value, simulation See Chapter: Simulation (Page 65)		

Parameter	Type	Type	Default	Comment		S7_m_c:=TRUE X=Parameter can be operat- ed and moni- tored	
SIMPV	WORD	IN	0	Process value, speed or frequency, simulation See Chapter: Simulation (Page 65)			
SimSP	WORD	OUT	0	Setpoint, speed or frequency, simula- tion See Chapter: Simulation (Page 65)			
SimSW	WORD	IN		Status word, simulation See Chapter: Simulation (Page 65)			
SndErr	STRUCT	OUT	-	SFC15 error			
	• ST: BYTE		16#80	Signal status			
	• Value: BOOL		FALSE	Value			
SndErrorNum	WORD	OUT	0	SFC15 RET_VAL, error number			
SP	STRUCT	IN		External setpoint			
	• ST: BYTE						
	• Value: REAL						
SP_Dev	STRUCT	OUT	-	=1:	No setpoint-actual value differ- ence		
	• ST: BYTE		16#80				
	• Value: BOOL		FALSE				
ST_Worst	BYTE	OUT	16#80	Worst signal status		X	
Status1	DWORD	OUT	0	Statusword See Chapter: Status1 (Page 69)		X	
TPV	STRUCT	OUT	-	Torque process value			
	• ST: BYTE		16#80				
	• Value: REAL		0.0				
Trip	STRUCT	IN	-	Linkable input:			
			=0:	OFF3			
	• ST: BYTE		16#80	=1:	Operating condition		
	• Value: BOOL		TRUE				
TripAct	STRUCT	OUT	-	=1:	OFF3		
	• ST: BYTE		16#80				
	• Value: BOOL		FALSE				
UserStatus	WORD	IN	0	User STATUS bits			
VALUE	WORD	IN	0	Input value			
WarnEn	BOOL	IN	TRUE	=1:	Drive warning in 5th PZD word		
WdogErr	STRUCT	OUT	-	Watchdog error, fault memory			
	• ST: BYTE		16#80				
	• Value: BOOL		FALSE				
WH_MS_Days	INT	IN	50	Time interval for maintenance low [day]			

3.2.15 Block call

Call in the CFC

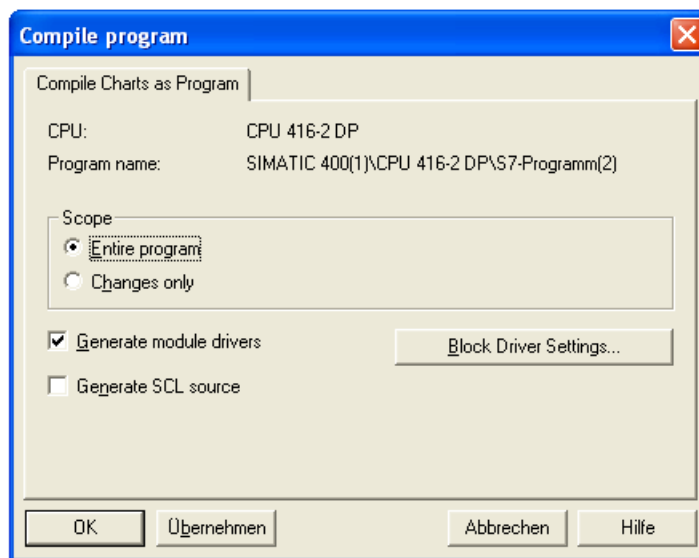


3.2.16 Option for compiling the CFC

Select the checkbox "Generate module drivers" to, prior to compilation from the driver generation, create the module drivers for the existing signal-processing blocks and interconnect them with it.

Note**Set option**

Set this option if during initial configuration or since the last compilation the configuration of the signal-processing blocks and the configuration of the associated hardware was changed. For all other changes of the program that require compiling, do not set this option, because the total compilation time is reduced.



3.3 Faceplate

The faceplate supports the following functions:

- Display of detailed fault information for a drive fault
- Acknowledgement of the drive fault
- Maintenance notification
- German, English, French, Spanish, and Italian as display language

Requirement

- To obtain a full representation of the control fields, select the following:
 - Control Panel > Display > Settings > Advanced > Font size: select small fonts.

"Maintenance" area

If a low or medium maintenance requirement is indicated on the maintenance station (MS), you reset the operating hours counter using the "Reset" button after performing the maintenance work.

The "Reset" button can only be operated if the operator has been assigned the operating level "High-level process operation" and at least a "low" maintenance requirement is pending.

The operating hours are displayed in days.

"Faults" area

In the "Faults" area, you can see up to 8 drive faults of a fault case, with fault number and, if applicable, fault value.

This information is retrieved via corresponding variables from the automation system (AS). The AS reads this data acyclically from the converter:

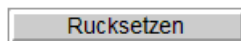
- P947 fault number
- P949 fault value

The fault text is stored, depending on the language, in the global functions of SIMATIC WinCC:

Drvpcs7_G120_Err_txt_D.fct, Drvpcs7_G120_Err_txt_E.fct,
 Drvpcs7_G120_Err_txt_F.fct, Drvpcs7_G120_Err_txt_S.fct,
 Drvpcs7_G120_Err_txt_I.fct

Nr.	Störung	Störungstext	Störwert
1	4	Umrichter-Übertemperatur	90
2	15	Kein Motor-Temperatursignal	0

Structure of message line



Click the "Reset" button to acknowledge the fault in the drive.
The acknowledgment does not have to be confirmed.

3.4 Addressing the drive objects (parameter AxisId)

Enter "1" at the AxisId input on the APL_G120 block to read the fault memory.

3.5 Block data

Block		FB1722
Name		APL_G120
Version		8.3
Programming language		SCL
Length	Local data	116
	MC7 code	8076
	Load memory	9870
	Working memory	8112
Length of instance DB	Load memory	1980
	Working memory	728
Mapped variables		22
Nesting depth		1
Called blocks		ALARM_8P RD_SINFO DPRD_DAT DPWR_DAT BLKMOV FILL WRREC RDREC

General information on faceplates

4.1 Calling from the faceplate

The operation is performed using the standard mechanisms provided by APL.

APL faceplate

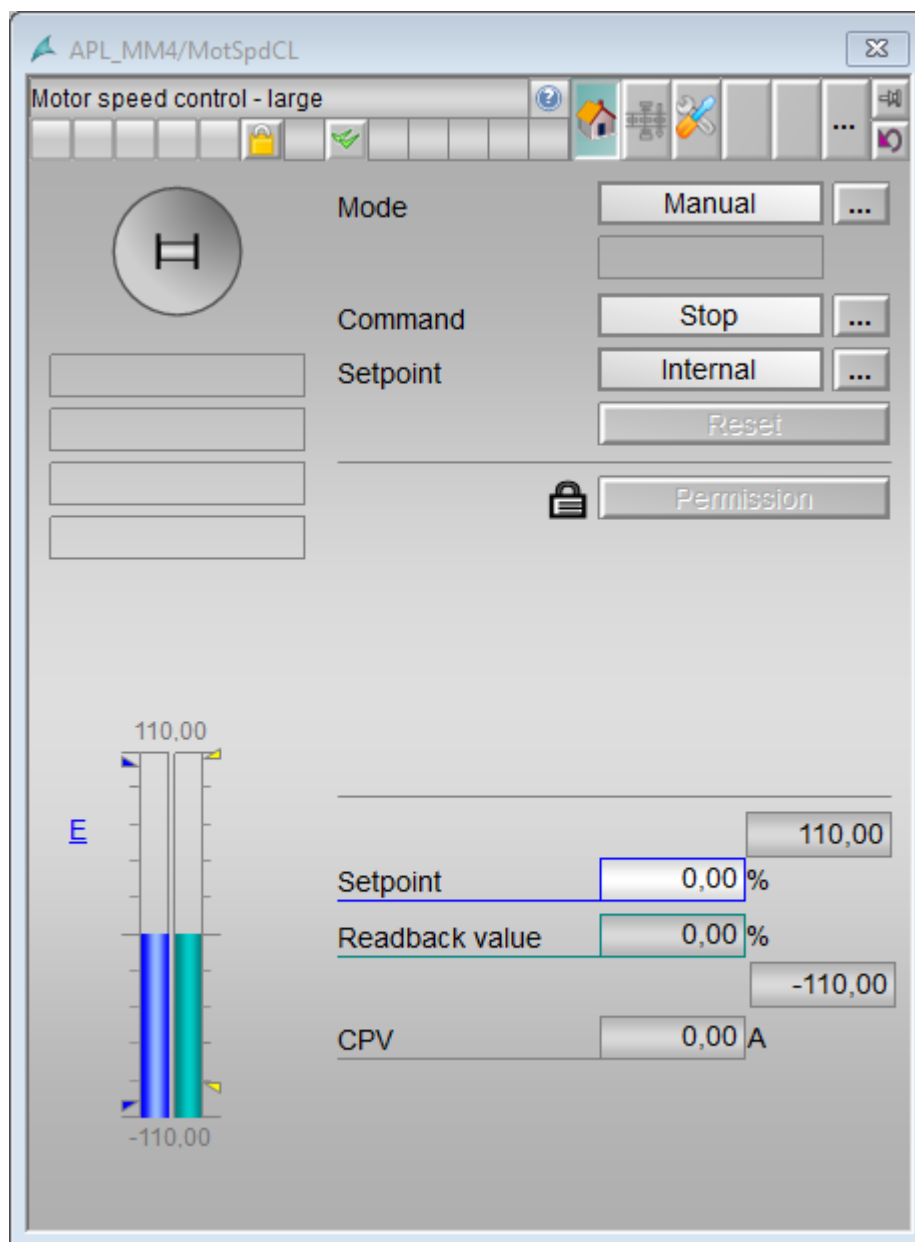
The APL faceplate opens the corresponding APL faceplate, here e.g. "MotSpdCL".

To display the content specific to Drive ES, click on the corresponding button in the area for calling up block views:



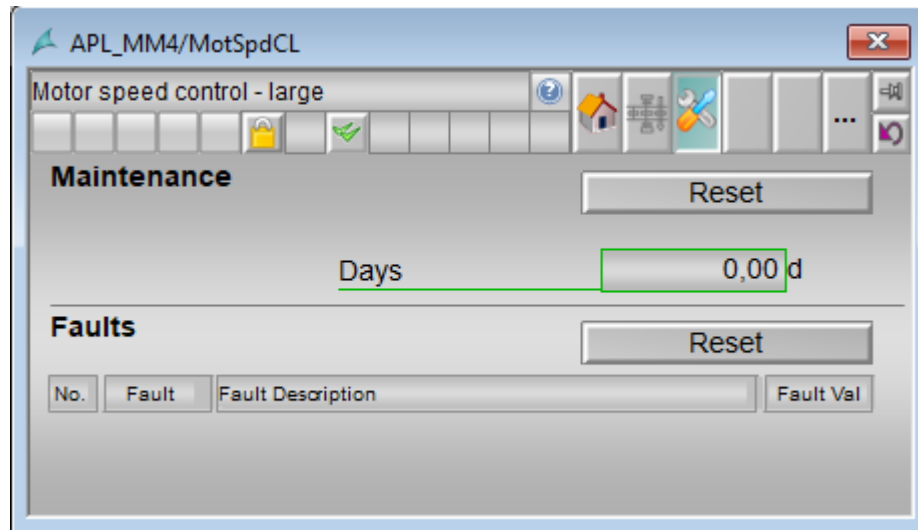
You will see an example illustration with the APL_MM4-Faceplate "MotSpdCL" below:

4.1 Calling from the faceplate



Faceplate of the Drive ES blocks

You will see an example illustration with the APL_MM4-Faceplate below:



4.2 Scripts

The following global C scripts are used to display the associated fault text for each fault number. The setup installs all scripts.

The scripts "Drvpcs7_Sina_Err*" are used by the APL_GS block and the scripts "Drvpcs7_G120*" are used by the block APL_G120.

Description: Global C scripts

Drvpcs7_Sina_Err_txt_D1.fct / Drvpcs7_Sina_Err_txt_D2.fct / Drvpcs7_Sina_Err_txt_D3.fct

The functions "Drvpcs7_Sina_Err_txt_D1.fct / Drvpcs7_Sina_Err_txt_D2.fct / Drvpcs7_Sina_Err_txt_D3.fct" determine, based on the transferred fault number of the SINAMICS, the German fault text stored in it.

Drvpcs7_Sina_Err_txt_E1.fct / Drvpcs7_Sina_Err_txt_E2.fct / Drvpcs7_Sina_Err_txt_E3.fct

The functions "Drvpcs7_Sina_Err_txt_E1.fct / Drvpcs7_Sina_Err_txt_E2.fct / Drvpcs7_Sina_Err_txt_E3.fct" determine, based on the transferred fault number of the SINAMICS, the English fault text stored in it.

Drvpcs7_Sina_Err_txt_F1.fct / Drvpcs7_Sina_Err_txt_F2.fct / Drvpcs7_Sina_Err_txt_F3.fct

The functions "Drvpcs7_Sina_Err_txt_F1.fct / Drvpcs7_Sina_Err_txt_F2.fct / Drvpcs7_Sina_Err_txt_F3.fct" determine, based on the transferred fault number of the SINAMICS, the French fault text stored in it.

Drvpcs7_Sina_Err_txt_I1.fct / Drvpcs7_Sina_Err_txt_I2.fct / Drvpcs7_Sina_Err_txt_I3.fct

The functions "Drvpcs7_Sina_Err_txt_I1.fct / Drvpcs7_Sina_Err_txt_I2.fct / Drvpcs7_Sina_Err_txt_I3.fct" determine, based on the transferred fault number of the SINAMICS, the Italian fault text stored in it.

Drvpcs7_Sina_Err_txt_S1.fct / Drvpcs7_Sina_Err_txt_S2.fct / Drvpcs7_Sina_Err_txt_S3.fct

The functions "Drvpcs7_Sina_Err_txt_S1.fct / Drvpcs7_Sina_Err_txt_S2.fct / Drvpcs7_Sina_Err_txt_S3.fct" determine, based on the transferred fault number of the SINAMICS, the Spanish fault text stored in it.

Drvpcs7_G120_Err_txt_D.fct

The function "Drvpcs7_G120_Err_txt_D.fct" determines, based on the transferred fault number of the SINAMICS G120, the German fault text stored in it.

Drvpcs7_G120_Err_txt_E.fct

The function "Drvpcs7_G120_Err_txt_E.fct" determines, based on the transferred fault number of the SINAMICS G120, the English fault text stored in it

Drvpcs7_G120_Err_txt_F.fct

The function "Drvpcs7_G120_Err_txt_F.fct" determines, based on the transferred fault number of the SINAMICS G120, the French fault text stored in it.

Drvpcs7_G120_Err_txt_I.fct

The function "Drvpcs7_G120_Err_txt_I.fct" determines, based on the transferred fault number of the SINAMICS G120, the Italian fault text stored in it.

Drvpcs7_G120_Err_txt_S.fct

The function "Drvpcs7_G120_Err_txt_S.fct" determines, based on the transferred fault number of the SINAMICS G120, the Spanish fault text stored in it.

4.2 Scripts

Module drivers/Maintenance station

5.1 Additional parameters at the control blocks

Description

Parameter	Description
VALUE	The VALUE parameter makes the control block recognizable to the module driver. The parameter must be interconnected with the first input word of the drive axis to be addressed. Procedure: 1. Select the parameter VALUE. 2. Press the <F3> key. 3. Enter the address, e.g. EW512.
WH_MS_Days AH_MS_Days MS_Days	The WH_MS_Days and AH_MS_Days parameters of the control blocks determine the maintenance alarms for the maintenance station. To deactivate the maintenance alarm, "0" must be set at the corresponding input. The MS_Days parameter reads back the time until the next maintenance alarm from the automation system to avoid losing this time when a complete download occurs. Also refer to the notes in the online help of the CFC.
RstMSOp RstMSLi	The internal counter and the maintenance alarm are reset after completing maintenance work with the RstMSOp or RstMSLi parameter.
QC	The QC parameter supplies the field device status to the downstream driver block MOD_PAX0 or MOD_PAL0. This status is used to display symbols on the maintenance station according to the definition.
MODE ModeOut	The MODE parameter obtains the module status from the upstream DES_DIAG driver block. This status is forwarded to the ModeOut parameter. The ModeOut parameter supplies the module status to the downstream driver block MOD_PAX0 or MOD_PAL0. This status is used to display symbols on the maintenance station according to the definition.

Note

Running of operating hours counter

If the MOD_PAX0 or MOD_PAL0 blocks issue the message "Maintenance: medium requirement" or "Maintenance: low requirement" in interaction with a drive, the operating hours counter of the block must be checked for running and reset if necessary. This is done in the faceplate of the Drive ES block (see also "Maintenance" area in the faceplate (Page 41)). The time until the corresponding message is issued is set via parameters WH_MS_Days and AH_MS_Days.

5.2 Symbols and their meaning

The following table shows the meaning of the standardized symbols on the maintenance station in relation to the drives and how they are formed.

Description

Symbol	Meaning	Converter status	Implementation	Message	Priority
	Simulation active	Converter is simulated	Simulation is detected at the set input SimAct.	Message	1
	Out of service	Higher-level error (rack failure = FC not on PB)	Status is detected in the controller: Parameter RACKF = 1 or PERAF = 1 or MODF = 1	Message requires acknowledgement	2
	Local operation	Automatic/local control switchover	Parameter at block: QREMOTE = 0	Message	3
	Maintenance: high requirement	Fault in device	ZSW: Error bit = 1 Warning bit = 0 ZSW: Error bit = 1 Warning bit = 1	Message requires acknowledgement	4
	Maintenance: medium requirement	Freely parameterizable time on block (type of operating hours counter)	Additional input at the block, at which the user can specify an appropriate time depending on the application. Format: Integer/unit:days Dependency on bit 2 in ZSW 1 (operation enabled): ZSW 1 Bit 2 = TRUE → START operating hours counter ZSW 1 Bit 2 = FALSE → STOP operating hours counter	Message requires acknowledgement	5
	Maintenance: low requirement	Freely parameterizable time on block (type of operating hours counter)	Additional input at the block, at which the user can specify an appropriate time depending on the application Format: Integer/unit: Days Dependency on bit 2 in ZSW 1 (operation enabled): ZSW 1 Bit 2 = TRUE → START operating hours counter ZSW 1 Bit 2 = FALSE → STOP operating hours counter	Message requires acknowledgement	6

5.2 Symbols and their meaning

	Good	No error, warning is pending	ZSW: Error bit = 0 Warning bit = 1	Message	7
	Good	No error, no warning is pending	ZSW: Error bit = 0 Warning bit = 0	No mes- sage	8

5.3 DES_DIAG block

Area of application

The block is installed automatically by the module driver and appropriately interconnected.

Type/number

FB628

The block number can be changed.

Function

The block evaluates all acyclic events that affect the drive:

- I/O access error
- Rack failure
- Module fault

It reports these to the downstream blocks:

- APL_GS
- APL_G120
- APL_MM4

The block also transfers the value status or, if available, the diagnostic information of the field device to the standard blocks MOD_PAX0 (drive behind master system) or MOD_PAL0 (drive behind Y-link).

Calling OBs

The cyclic interrupt OB in which you install the block, e.g. OB32 must be integrated in the run sequence in the following OBs:

1. OB1 cyclic processing
2. OB82 diagnostic interrupt
3. OB83 hot swap interrupt
4. OB85 program execution error
5. OB86 rack failure
6. OB100 restart

Startup behavior

The block determines the startup and reports it to the OMODE output.

Message behavior

The block does not send any messages.

5.4 I/O bar

Connections

The as-supplied state of the block representation in CFC is marked in the "Default" column:

Parameter name **bold** = connection is visible

Parameter name normal = connection is not visible

Table 5-1 Parameters DES_DIAG

Parameter	Type	Type	Default	Comment		S7_m_c :=TRUE
ACC_ID	BOOL	INOUT	TRUE	=1:	Accept new mode settings	
DADDR	INT	IN	0	Diagnostic address of module		
DELAY	INT	IN	15	Alarm delay (sec)		
EN_DIAG	BOOL	IN	FALSE	=1:	Enable read diagnostic data	
LADDR	INT	IN	0	Logical address of module		
MODE	WORD	IN	0	Parameter OMODE of SMC_DIAG		
OMODE	DWORD	OUT	0	Status MODE		
PA_DIAG	DWORD	OUT	0	Diagnostic information for maintenance		
QEN_RDWR	BOOL	OUT	TRUE	=1:	Enable read / write record	
QERR	BOOL	OUT	FALSE	=1:	Error	
QMODF	BOOL	OUT	FALSE	=1:	Module failure	
QPERAF	BOOL	OUT	FALSE	Access error		
QRACKF	BOOL	OUT	FALSE	=1:	Rack failure	
RACK_NO	BYTE	IN	16#00	Rack number		
RACK1ERR	BOOL	OUT	FALSE	=1:	DP slave system failure (primary)	
RACK2ERR	BOOL	OUT	FALSE	=1:	DP slave system failure (redundant)	
RACKF	BOOL	IN	FALSE	=1:	Rack failure	
SUBN_TYP	BOOL	IN	FALSE	=1:	External DP interface	
SUBN1_ID	BYTE	IN	16#FF	ID of primary subnet		
SUBN1ERR	BOOL	IN	FALSE	=1:	Slave 1 failure	
SUBN2_ID	BYTE	IN	16#FF	ID of redundant subnet		
SUBN2ERR	BOOL	IN	FALSE	=1:	Slave 2 failure	

5.5 Block data

Block		FB628
Name		DES_DIAG
Version		7.1
Programming language		SCL
Length	Local data	172
	MC7 code	1552
	Load memory	2156
	Working memory	1588
Length of instance DB	Load memory	830
	Working memory	402
Mapped variables		-
Nesting depth		1
Called blocks		RALARM RDREC RD_SINFO RDSYSST TIME_TCK

5.5 Block data

Feature bits of the APL block

The APL block MotSpdCL is used as the visualization interface for all drive blocks. Its behavior can be customized using the feature bits.

Default setting

Below you see the default settings that are suitable for most use cases:

Name	I/O	Typ	Wert	Verschaltung	Forcen an...	Force...	Fo...	SF...	Kommentar
Feature.Bk0	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Setting the startup response
Feature.Bk1	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reaction to the out of service mode
Feature.Bk2	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Resetting the commands for changing the mode
Feature.Bk3	IN	BOOL	1	<nicht verschaltbar>	☐	☐		☐	Enabling resetting of commands for the control settings
Feature.Bk4	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Setting switch or button mode
Feature.Bk5	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk6	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk7	IN	BOOL	1	<nicht verschaltbar>	☐	☐		☐	Enabling direct changeover between forward and reverse
Feature.Bk8	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk9	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Resetting the interlock via input signals
Feature.Bk10	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Exiting local mode
Feature.Bk11	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk12	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk13	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk14	IN	BOOL	1	<nicht verschaltbar>	☐	☐		☐	1 = Enable rapid stop
Feature.Bk15	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk16	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk17	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Enabling bumpless changeover to automatic mode for valve...
Feature.Bk18	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk19	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk20	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk21	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk22	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	1 = Enable message state actualization
Feature.Bk23	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk24	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk25	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk26	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk27	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk28	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	1 = Disable switching points if MsgLock = 1
Feature.Bk29	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	1 = Signal value = 0 (0 active) if limit is violated
Feature.Bk30	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved
Feature.Bk31	IN	BOOL	0	<nicht verschaltbar>	☐	☐		☐	Reserved

Adapting the telegram length

If the number of PZDs transferred by default is not sufficient, then the blocks provide the option of increasing the number of PZDs. The number of the transferred PZDs can be parameterized differently for setpoints and process values.

The telegram length is parameterized as follows:

- For the setpoint channel via the input MsgLen_SP
- For the process value channel via the input MsgLen_PV

These parameters are only read in and checked during startup. If the parameterized value is less than the minimum value, then the minimum value is used for the telegram length. If the value is too high, then the maximum value for the telegram length is used. No error message will be generated.

In addition, you must parameterize the appropriate telegram length in the hardware configuration and in the converter.

Number of PZDs

The table below shows the minimum/maximum number of PZDs that can be transferred:

Block	Minimum number PZD (setpoints/process values)	Maximum number of PZDs (setpoints/process values)
APL_G120	6 / 6	16 / 16

WebClient

If you use the blocks not only in an environment of SIMATIC WinCC, but also in an environment of WebClient, you must convert the global functions of Drive ES into project functions.

Procedure

1. In SIMATIC WinCC, open the following directory: "<Installation directory>" > "aplib".
2. Select the directory "DriveES".
3. Move the directory "DriveES" into the directory "<Installation directory>" > "wincproj" > "OS-Name" > "library".
4. Open the C-Editor in the "Global Script" directory.
5. Choose "Options" > "Re-generate header" to re-generate the header.

Simulation

If the block MotSpdCL is switched to simulation mode, this information is transferred to the Drive ES PCS7 APL blocks via the quality code of the output parameters.



WARNING

Exiting simulation mode

When exiting simulation mode, **no** OFF1 command is sent to the converter during manual mode for the blocks from Drive ES PCS7 APL compared to the blocks from Drive ES PCS7.

Please remember to trigger an OFF1 command **before** exiting simulation mode. This OFF1 command prevents the converter starting automatically if the ON command pending in simulation mode is sent to the converter.

Function

In simulation mode, the values of the following input parameters are used instead of the data received from the drive.

- SimSW = Status word 1
- SimPV = Main process value
- SimCPV = Current process value
- SimPCD_x = Data that is transferred to PCD4 - PCD6

The above-named inputs are dependent on the actual quantity of data received from the drive. The data which is transferred to the drive during normal operation is output at the outputs SIMSTW (control word 1) and SIMSP (main setpoint). An external simulation block which emulates the State Machine of the drive can be connected via the inputs and outputs referred to above.

The simulation has highest priority. If the block is in simulation mode, QSIM = TRUE is set. There is no longer any communication with the drive. The internal operating hours counter for preventive maintenance is stopped.

In the block library DRVPCS7_APL, there is a simulation block for each supported drive. This block, which is integrated into a project analog to the following figure, can simulate a drive.

A simple State Machine of the corresponding drive is integrated in the simulation blocks. The block evaluates the bits of the STW 1, which are operated via the faceplate: STW 1 bit 0 - 3 and 7 and the direction of rotation bits.

This allows the simulation block to create the corresponding ZSW 1 so that all displayed statuses are correctly supplied in the faceplate. In addition, the setpoint is directly (without acceleration and deceleration ramp) fed back to the process value. For all other actual process data, only inputs are provided on the simulation block which are written to the corresponding outputs. There is no further processing of these values in the block.

In addition, there are inputs to create faults and warnings with their respective error numbers:

- FAULT
- WARNING
- FAULT_NO
- WARN_NO

The block does not check if the specified error numbers are correct. The error numbers are only transmitted from the simulation block to the driver block and integrated in the message there. A pending fault triggers a closing lockout in the operating state "Operation". An error is acknowledged via the faceplate. The error number is not displayed in the "Drive fault" control field.

The following inputs are reset once the error has been acknowledged:

- FAULT
- FAULT_NO

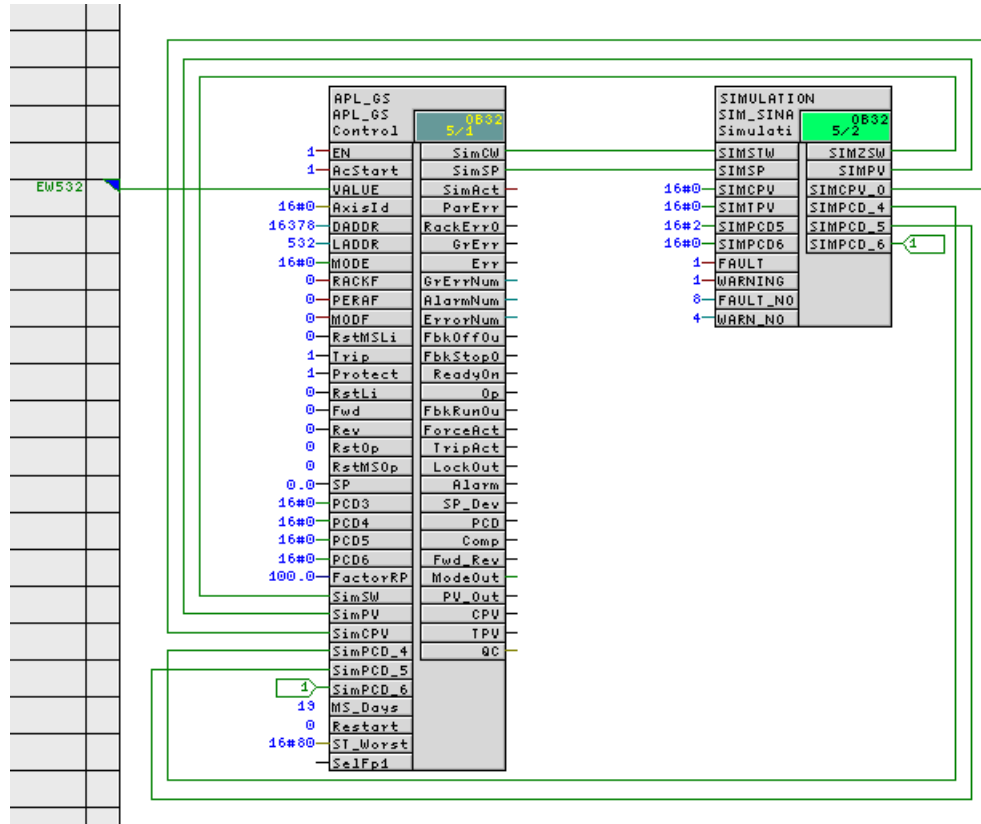
The input "WARNING" is automatically reset as long as the input is WARN_NO = 0.

If the input WARN_NO does not exist on the simulation block (FB1711 (SIM_MM4) and FB1714 (SIM_VIKN)), then you must manually reset the input WARNING.

The block is stored as an SCL source in the source container of the library and can be modified as required.

Interconnection

The following shows an example of how the drive block is interconnected with an external simulation block.



Appendix

A.1 Status1

Status 1 (High Word)															
.31	.30	.29	.28	.27	.26	.25	.24	.23	.22	.21	.20	.19	.18	.17	.16
UserStatus															

Status 1 (Low Word)															
.15	.14	.13	.12	.11	.10	.9	.8	.7	.6	.5	.4	.3	.2	.1	.0
		MODF	PERAF	RackErrOut: Value	FbkOffOut: Value	FbkRunOut: Value		SwitchAct: Value	Fwd_Rev: Value	Lockout: Value		GrErr: Value			

A.2 Tips and tricks

Reading the fault memory by acyclic communication in the blocks is delayed by an adjustable time. The delay time has a default value of 1 second, which is reduced by the cycle time of the respective cyclic interrupt OB in which the block is called up. The fault memory is only read if this time is ≤ 0 . If the time set is too long or too short, it can be changed via "Monitor/control variables".

Procedure

1. Establish the address of the static variables "sr_ERR_TIME_INI" in the instance data block.
2. You assign a symbolic name to the associated instance data block so that not only the address but also the symbolic name of the variables will appear in the variable table.
3. Open the variable table and enter the established address.
4. Enter the desired time as a control value and activate this value.

List of abbreviations

B.1 Abbreviations

ALM	Active Line Module
AOP	Advanced Operator Panel
APL	Advanced Process Library
AS	Automation System (here: SIMATIC S7-400)
BOP	Basic Operator Panel
CBE20	Communication Board PROFINET IO
CBP	COMBOARD PROFIBUS
	PROFIBUS communication module for SIMOVERT MASTERDRIVES and SIMOREG
CDS	Command Data Set
CFC	Control Function Chart: tool for the graphical interconnection of blocks in a chart
DCM	SIMOREG DC-MASTER
Drive ES	Drive Engineering Software
ES	Engineering Station
FB	Function Block
MC	SIMOVERT MASTERDRIVES Motion Control
MD	Drive type SIMOVERT MASTERDRIVES
MM	MICROMASTER
MS	Maintenance Station
UL	Measuring range upper limit value
OS	Operator Station
PIV	Parameter Identifier Value
	Protocol for access to drive parameters according to the PROFIBUS profile for variable-speed drives (PNO Order No. 3.071).
PPO	Parameter Process Data Object: combined data object with PIV portion and process data for cyclic transfer to PROFIBUS profile for variable-speed drives (PNO Order No. 3.071).
PROFIBUS DP	Distributed I/O: PROFIBUS DP (according to IEC61158)
PROFINET IO	Industrial Ethernet standard (according to IEC61158)
PV	Process value
SP	Setpoint
STW 1.x	Control word 1 bit x)
LL	Measuring range lower limit value
VC	SIMOVERT MASTERDRIVES Vector Control

B.1 Abbreviations

WR	Inverter
ZSW 1.x	Control word 1 bit x