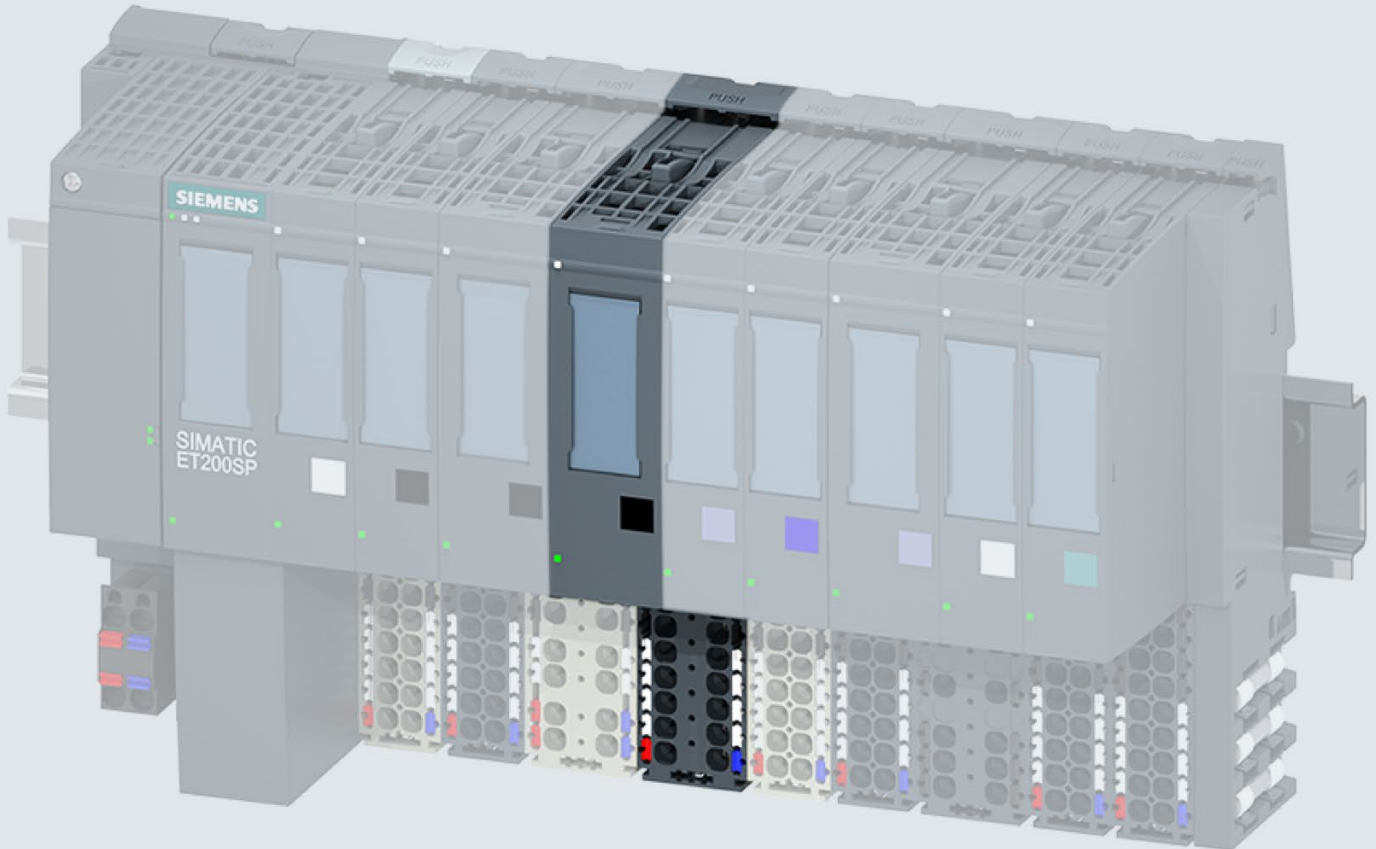


SIEMENS



Manual

SIMATIC

ET 200SP

Digital output module
DQ 4x24..230VAC/2A HF (6ES7132-6FD00-0CU0)

Edition

02/2018

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SIEMENS

SIMATIC

ET 200SP
DQ 4x24..230VAC/2A HF
digital output module
(6ES7132-6FD00-0CU0)

Manual

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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

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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.

Preface

Preface

Purpose of the documentation

This manual supplements the system manual ET 200SP distributed I/O system (<https://support.industry.siemens.com/cs/ww/en/view/58649293>).

Functions that generally relate to the system are described in this manual.

The information provided in this manual and in the system/function manuals supports you in commissioning the system.

Conventions

CPU: When the term "CPU" is used in this manual, it applies to the CPUs of the S7-1500 automation system as well as to the CPUs/interface modules of the ET 200SP distributed I/O system.

STEP 7: In this documentation, "STEP 7" is used as a synonym for all versions of the configuration and programming software "STEP 7 (TIA Portal)".

Please also observe notes marked as follows:

Note

A note contains important information on the product described in the documentation, on the handling of the product or on the section of the documentation to which particular attention should be paid.

Security information

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

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For additional information on industrial security measures that may be implemented, please visit (<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 customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under (<https://www.siemens.com/industrialsecurity>).

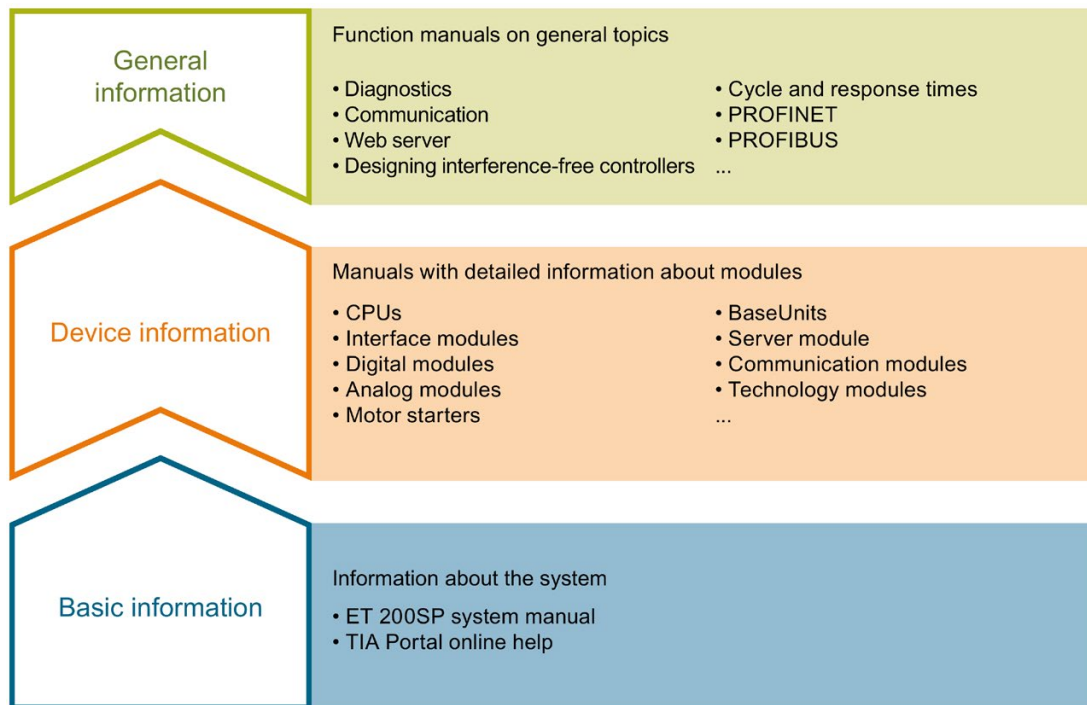
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Guide to documentation

The documentation for the SIMATIC ET 200SP distributed I/O system is arranged into three areas.

This arrangement enables you to access the specific content you require.



Basic information

The system manual describes in detail the configuration, installation, wiring and commissioning of the SIMATIC ET 200SP. distributed I/O system. The STEP 7 online help supports you in the configuration and programming.

Device information

Product manuals contain a compact description of the module-specific information, such as properties, wiring diagrams, characteristics and technical specifications.

General information

The function manuals contain detailed descriptions on general topics regarding the SIMATIC ET 200SP distributed I/O system, e.g. diagnostics, communication, Web server, motion control and OPC UA.

You can download the documentation free of charge from the Internet (<https://support.industry.siemens.com/cs/ww/en/view/109742709>).

Changes and supplements to the manuals are documented in a Product Information.

You can download the product information free of charge from the Internet (<https://support.industry.siemens.com/cs/us/en/view/73021864>).

Manual Collection ET 200SP

The Manual Collection contains the complete documentation on the SIMATIC ET 200SP distributed I/O system gathered together in one file.

You can find the Manual Collection on the Internet (<http://support.automation.siemens.com/WW/view/en/84133942>).

"mySupport"

With "mySupport", your personal workspace, you make the most of your Industry Online Support.

In "mySupport" you can store filters, favorites and tags, request CAx data and put together your personal library in the Documentation area. Furthermore, your data is automatically filled into support requests and you always have an overview of your current requests.

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In the Documentation area of "mySupport", you have the possibility to combine complete manuals or parts of them to make your own manual.

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You can find "mySupport" - Documentation in the Internet (<http://support.industry.siemens.com/My/ww/en/documentation>).

"mySupport" - CAx Data

In the CAx Data area of "mySupport", you can have access the latest product data for your CAx or CAe system.

You configure your own download package with a few clicks.

In doing so you can select:

- Product images, 2D dimension drawings, 3D models, internal circuit diagrams, EPLAN macro files
- Manuals, characteristics, operating manuals, certificates
- Product master data

You can find "mySupport" - CAx Data in the Internet (<http://support.industry.siemens.com/my/ww/en/CAxOnline>).

Application examples

The application examples support you with various tools and examples for solving your automation tasks. Solutions are shown in interplay with multiple components in the system - separated from the focus in individual products.

You can find the application examples on the Internet (<https://support.industry.siemens.com/sc/ww/en/sc/2054>).

TIA Selection Tool

With the TIA Selection Tool, you can select, configure and order devices for Totally Integrated Automation (TIA).

This tool is the successor of the SIMATIC Selection Tool and combines the known configurators for automation technology into one tool.

With the TIA Selection Tool, you can generate a complete order list from your product selection or product configuration.

You can find the TIA Selection Tool on the Internet (<http://w3.siemens.com/mcms/topics/en/simatic/tia-selection-tool>).

SIMATIC Automation Tool

You can use the SIMATIC Automation Tool to run commissioning and maintenance activities simultaneously on various SIMATIC S7 stations as a bulk operation independently of the TIA Portal.

The SIMATIC Automation Tool provides a multitude of functions:

- Scanning of a PROFINET/Ethernet network and identification of all connected CPUs
- Address assignment (IP, subnet, gateway) and station name (PROFINET device) to a CPU
- Transfer of the data and the programming device/PC time converted to UTC time to the module
- Program download to CPU
- Operating mode switchover RUN/STOP
- Localization of the CPU by means of LED flashing
- Reading out CPU error information
- Reading the CPU diagnostic buffer

- Reset to factory settings
- Updating the firmware of the CPU and connected modules

You can find the SIMATIC Automation Tool on the Internet (<https://support.industry.siemens.com/cs/ww/en/view/98161300>).

PRONETA

With SIEMENS PRONETA (PROFINET network analysis), you analyze the plant network during commissioning. PRONETA features two core functions:

- The topology overview independently scans PROFINET and all connected components.
- The IO check is a fast test of the wiring and the module configuration of a system.

You can find SIEMENS PRONETA on the Internet (<https://support.industry.siemens.com/cs/ww/en/view/67460624>).

SINETPLAN

SINETPLAN, the Siemens Network Planner, supports you in planning automation systems and networks based on PROFINET. The tool facilitates professional and predictive dimensioning of your PROFINET installation as early as in the planning stage. In addition, SINETPLAN supports you during network optimization and helps you to exploit network resources optimally and to plan reserves. This helps to prevent problems in commissioning or failures during productive operation even in advance of a planned operation. This increases the availability of the production plant and helps improve operational safety.

The advantages at a glance

- Network optimization thanks to port-specific calculation of the network load
- Increased production availability thanks to online scan and verification of existing systems
- Transparency before commissioning through importing and simulation of existing STEP 7 projects
- Efficiency through securing existing investments in the long term and optimal exploitation of resources

You can find SINETPLAN on the Internet (<https://www.siemens.com/sinetplan>).

Product overview

2.1 Properties

Article number

6ES7132-6FD00-0CU0

View of the module

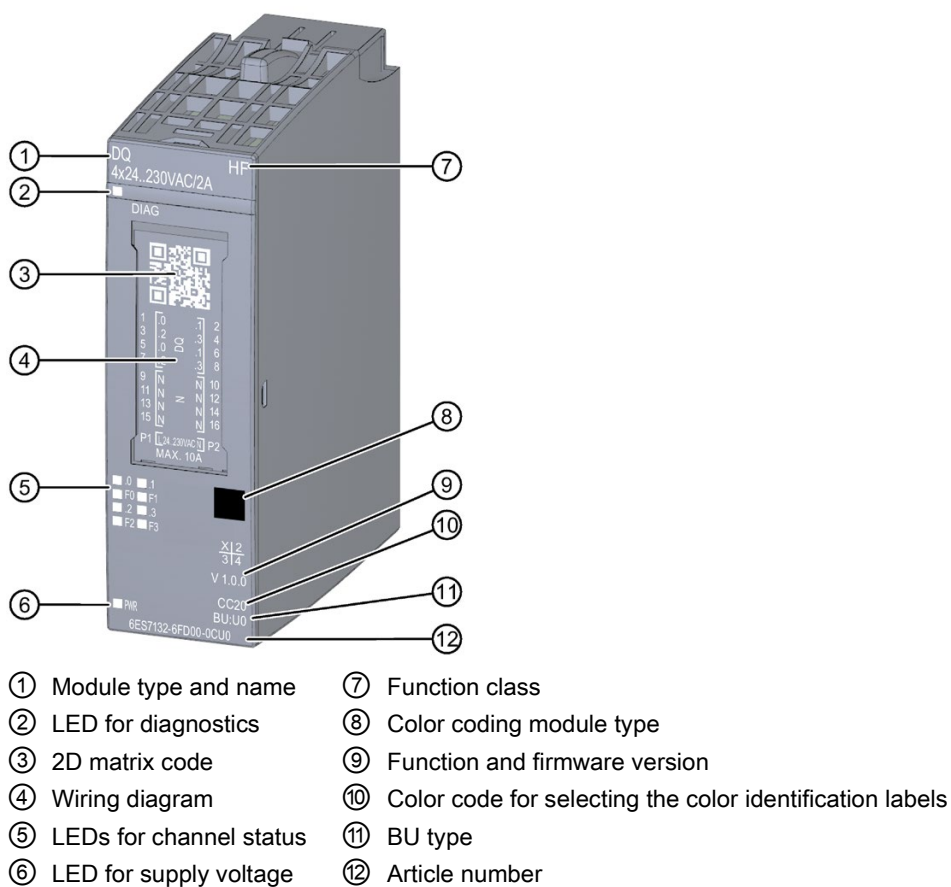


Figure 2-1 View of the module DQ 4x24..230VAC/2A HF

Properties

The module has the following technical properties:

- Digital output module with 4 outputs (TRIAC)
- Output current 2 A per channel (max. 4 A), total current max. 8 A (see derating: Technical specifications (Page 44))
- Power rating max. 900 W
- Configurable diagnostics (per channel)
- Configurable substitute values (per channel)
- Suitable for power control of heating systems or infrared sources in drying processes
- Wave packet control to prevent harmonic components
- Startup delay per channel to reduce system loads
- Output filter per channel for soft start or soft stop
- Two operating modes:
 - DQ
 - PC (PowerControl)
- with one of four control types each:
 - Phase control - phase-angle proportional (default)
 - Phase control - power-proportional
 - Wave packet control - half waves
 - Wave packet control - full waves

Table 2- 1 Operating modes of the DQ 4x24..230VAC/2A HF

Property		Operating mode			
		DQ		PC (PowerControl)	
		Without value status (QI)	With value status (QI)	Without value status (QI)	With value status (QI)
Number of channels		4			
Control type selection		Yes			
Configurable temperature shutdown		Yes			
Configurable startup delay		0 ms ... 10 s			
Configurable output filter down/up		0 ms ... 60 s			
Data length	Inputs	0 bytes	1 byte	0 bytes	1 byte
	Outputs	1 byte	1 byte	8 bytes	8 bytes

The module supports the following functions:

Table 2- 2 Version dependencies of the functions

Function	HW version	FW version	STEP 7		GSD file	
			TIA Portal	V5.x	PROFINET IO	PROFIBUS DP
Firmware update	FS01	V1.0.0 or higher	V14 or higher with HSP 0240	V5.5 SP3 or higher with HSP 0230 V8.0 or higher	X	X
Identification data I&M0 to I&M3	FS01	V1.0.0 or higher	V14 or higher with HSP 0240	V5.5 SP3 or higher with HSP 0230 V8.0 or higher	X	X
Reconfiguration in RUN	FS01	V1.0.0 or higher	V14 or higher with HSP 0240	V5.5 SP3 or higher with HSP 0230 V8.0 or higher	X	X
PROFInergy	FS01	V1.0.0 or higher	V14 or higher with HSP 0240	V5.5 SP3 or higher with HSP 0230 V8.0 or higher	X	X
Value status	FS01	V1.0.0 or higher	V14 or higher with HSP 0240	V5.5 SP3 or higher with HSP 0230 V8.0 or higher	X	X

Accessories

The following accessories must be ordered separately:

- Labeling strips
- Color identification labels
- Reference identification label

You can find more information on accessories in the ET 200SP distributed I/O system (<https://support.industry.siemens.com/cs/ww/en/view/58649293>) system manual.

2.2 Functions

Introduction

Two operating mode are available for the module DQ 4x24..230VAC/2A HF:

- DQ mode
- PC mode (PowerControl)

In PC mode, control of the module outputs is analog. The value range is 0..1000_D (= 0.1% increments). The resolution of the process value is 16 bits per channel.

In DQ mode, output control is binary.

You configure the channels with the functions described below.

Control types

In PC mode, you can assign one of four control types to all channels of the module; you use these control types to control different processes in your plant.

The control the power in the control types:

- Phase control - power-proportional
- Wave packet control (half waves)
- Wave packet control (full waves)

You can use these control types, for example, for power control of heating systems or infrared sources in drying processes.

You control the average switch-on duration in the control type:

- Phase control - phase-angle proportional

You can use this control type, for example, to dim lamps that offer this feature.

You also assign the control types in DQ mode. The resolution of the process value here is only 1 bit per channel.

PC mode (PowerControl) operating principles

Phase control

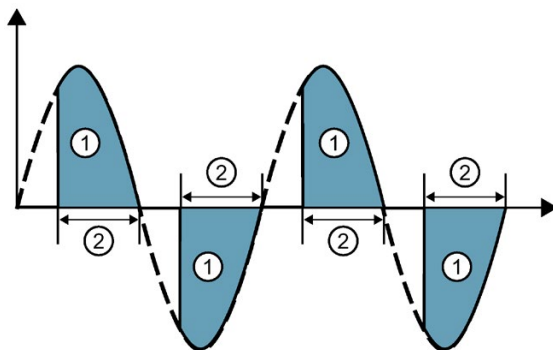
The load voltage is reduced through phase control and raised from the starting voltage up to mains voltage in the zero crossing.

Depending on the application, phase control offers advantages compared to wave packet control, such as even heating or prevention of radiation source flickering in case of low setpoints.

You can configure the following during each half wave:

- For phase control - phase-angle proportional: The switch-on duration in proportion to the process value.
- For phase control - power-proportional: The output power.

The following graphic schematically shows the principle of phase control:



- ① Average power 80%, corresponds to a process value of 800 (power proportional)
- ② Average switch-on duration 67%, corresponds to a process value of 670 (phase angle proportional)

Figure 2-2 Principle of phase control

Note

Use of filters

To observe the EMC guidelines, you must filter the faults caused by phase control in the plant. A suitable filter, for example, is EPCOS SIFI-C B84113C.

For additional information about electromagnetic compatibility of the module, see the section Technical specifications (Page 44).

Phase control - power-proportional

This control type enables you to control the output power in the phase control in proportion to the maximum power.

This means, for example, that a 500 W heating element ideally consumes about 50 W of its maximum power at a process value of 10.0%.

Note that infrared sources may consume more power. The deviation from the setpoint is at its lowest in case of a linear and purely ohmic load.

Wave packet control

In case of wave packet control, the module connects the load voltage through to the load for entire half or full waves starting at the zero crossing.

The wave packets to be output are calculated dynamically. Unlike with fixed wave packet patterns, the changes of the output value are taken into consideration faster while ensuring the absence of direct voltage in the output voltage at the same time. This allows for the implementation of controllers with shorter dead times.

The process value hereby refers to the average switch-on duration over multiple alternating voltage periods of the load voltage.

The graphics below show you how basic wave packet control for half waves or full waves works.

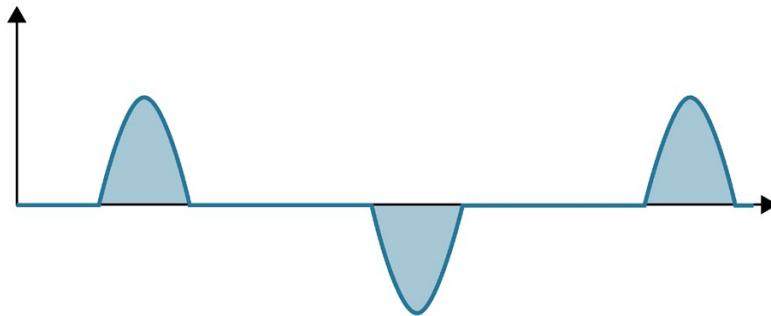


Figure 2-3 Principle of wave packet control - half waves

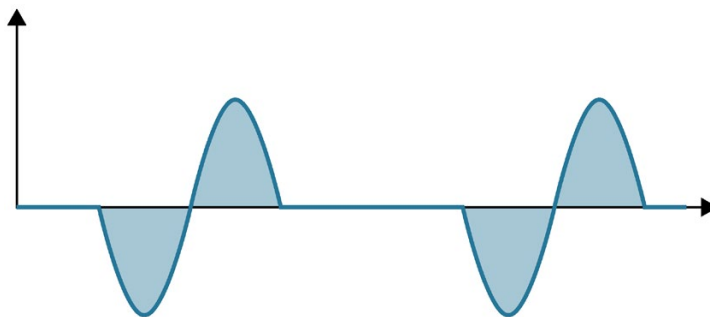


Figure 2-4 Principle of wave packet control - full waves

DQ mode

3.1 Wiring

3.1.1 Wiring and block diagram

This section includes the block diagram of the DQ 4x24..230VAC/2A HF module with the terminal assignments for a 1-wire and 2-wire connection.

You can use the different connection options for all channels and combine them at random.

You can find information on wiring the BaseUnit in the ET 200SP distributed I/O system (<https://support.industry.siemens.com/cs/ww/en/view/58649293>) system manual.

DANGER

Dangerous voltage. Risk of death or serious injury.

You must always disconnect the system and module from the power supply before commencing work.

Note

Limiting overvoltage

You must ensure overvoltage of the encoder supply is limited to 1 kV.

Note

Power limitation

To limit power, each input voltage must have a fuse with a maximum rating of 10 A tripping current. The fuse must be a quick-acting microfuse.

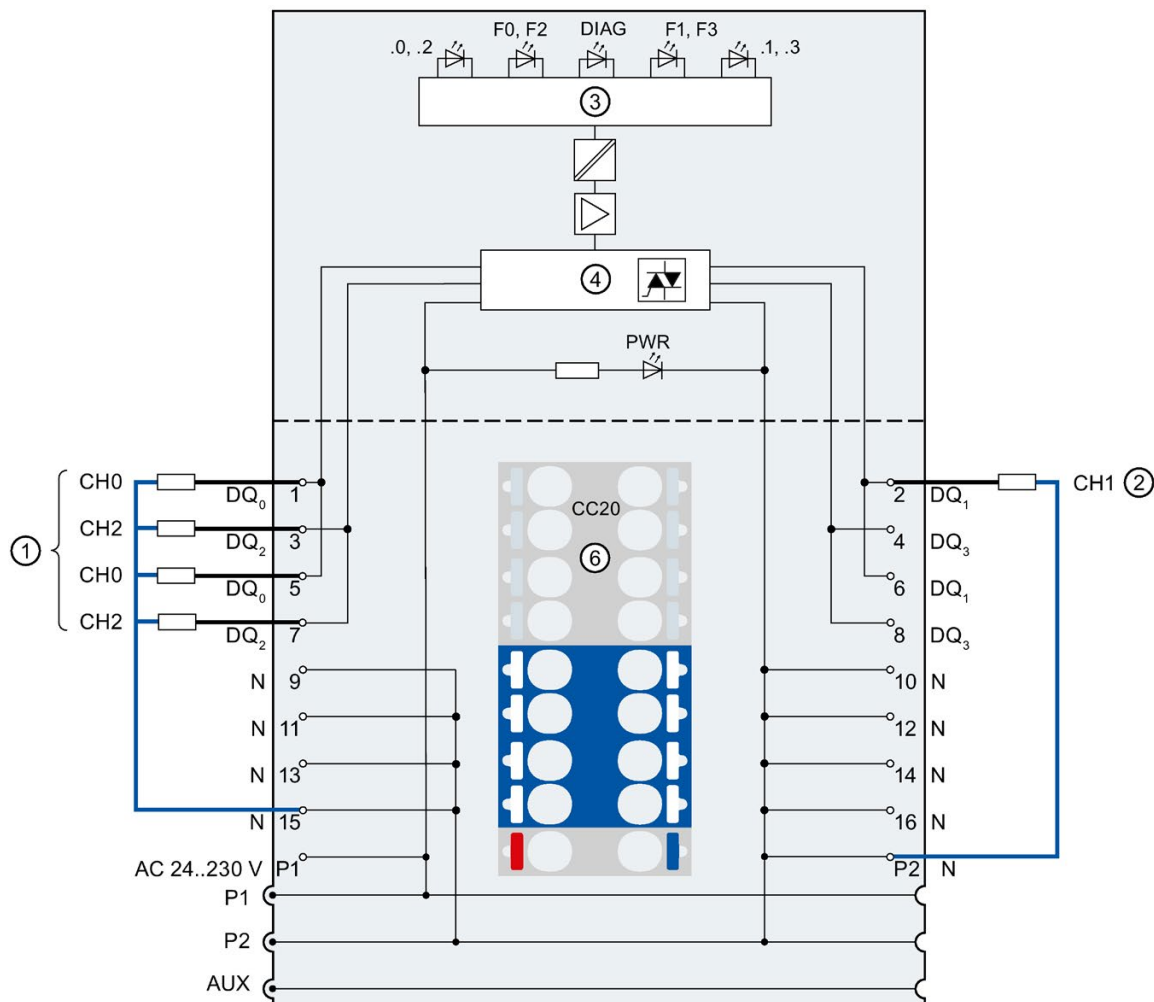
Note

Three-phase loads

Do not connect any three-phase loads to the module. The digital output is not suitable for three-phase loads.

Connection: 1-wire and 2-wire connection of actuators

The following figure shows the block diagram and an example of the terminal assignment of the digital output module DQ 4x24..230VAC/2A HF on the BaseUnit BU type U0.



①	1-wire connection	24..230 V AC	Supply voltage L (infeed for light-colored BaseUnit only)
②	2-wire connection	P1, P2, AUX	Internal self-assembling voltage buses Connection to left (dark-colored BaseUnit) Connection to left interrupted (light-colored BaseUnit)
③	Backplane bus interface	N	Neutral
④	Output electronics	DIAG	Error or diagnostics LED (green, red)
⑤	Polarity reversal protection	.0 to .3	Channel status LED (green)
⑥	Color-coded label CC20 (optional)	F0 to F3	Channel fault LED (red)
DQ _n	Output signal, channel n	PWR	Power LED (green)

Figure 3-1 Wiring and block diagram for 1-wire and 2-wire connection of actuators.

3.2 Parameters/address space

3.2.1 Parameters

Parameters of the DQ 4x24..230VAC/2A HF

The following table lists the configurable parameters in DQ mode.

The effective range of the configurable parameters depends on the type of configuration. The following configurations are possible:

- Central operation with an ET 200SP CPU
- Distributed operation on PROFINET IO in an ET 200SP system
- Distributed operation with PROFIBUS DP in an ET 200SP system

When performing the configuration in the user program, use the "WRREC" instruction to transfer the parameters to the module using data records (refer to the section Parameter assignment and structure of parameter data record (Page 51)).

The following parameter settings are possible:

Table 3- 1 Configurable parameters and their defaults (GSD file)

Parameter	Range of values	Default	Reconfiguration in RUN	Effective range with configuration software, e.g. STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP ¹
Module parameters					
Control type	<ul style="list-style-type: none"> • Phase control - phase-angle proportional • Phase control - power-proportional • Wave packet control - half waves • Wave packet control - full waves 	Phase control - phase-angle proportional	Yes	Module	Module

Parameter	Range of values	Default	Reconfiguration in RUN	Effective range with configuration software, e.g. STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP ¹
Channel parameters					
Diagnostics No supply voltage L	<ul style="list-style-type: none"> • Disable • Enable 	Disable	Yes	Channel	Module
Diagnostics Overtemperature	<ul style="list-style-type: none"> • Disable • Enable 	Disable	Yes	Channel	Module
Diagnostics Wire break ²	<ul style="list-style-type: none"> • Disable • Enable 	Disable	Yes	Channel	Module
Channel activated	<ul style="list-style-type: none"> • Disable • Enable 	Enable	Yes	Channel	Channel
Temperature shut- down	<ul style="list-style-type: none"> • Output active even under overtempera- ture conditions • Output disabled under overtempera- ture conditions 	Output active even under overtempera- ture conditions	Yes	Channel	Module
Reaction to CPU STOP	<ul style="list-style-type: none"> • Turn off • Keep last value • Output substitute value 1 	Turn off	Yes	Channel	Module
Channel startup delay	<ul style="list-style-type: none"> • No delay • 100 ms • 1 s • 2 s • 3 s • 4 s • 5 s • 10 s 	No delay	Yes	Channel	-
Channel output filter down	<ul style="list-style-type: none"> • No filter • 500 ms • 1 s • 5 s • 10 s • 30 s • 60 s 	No filter	Yes	Channel	-

3.2 Parameters/address space

Parameter	Range of values	Default	Reconfiguration in RUN	Effective range with configuration software, e.g. STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP ¹
Channel output filter up	<ul style="list-style-type: none"> • No filter • 500 ms • 1 s • 5 s • 10 s • 30 s • 60 s 	No filter	Yes	Channel	-
Potential group					
Potential group	<ul style="list-style-type: none"> • Use potential group of the left module (module plugged into a dark BaseUnit) • Enable new potential group (module plugged into light-colored BaseUnit) 	Use potential group of the left module	No	Module	Module

¹ Due to the limited number of parameters of a maximum of 244 bytes per ET 200SP station with a PROFIBUS GSD configuration, the parameter assignment options are restricted. The parameter length of the I/O module is 7 bytes with PROFIBUS GSD configuration. If necessary, you can set this parameter by using the data record 128, see the appendix "Parameter data set".

² For physical reasons, a wire break cannot be detected for actuators with two inputs and shared reference point. In this case, deactivate the diagnostics.

3.2.2 Explanation of parameters

Control type

At the module level, specifies the control type in which the module's channels are operated.

- Phase control - phase-angle proportional (default)
- Phase control - power-proportional
- Wave packet control - half waves
- Wave packet control - full waves

Diagnostics No supply voltage L

Enabling of the diagnostics for no or insufficient supply voltage L.

Diagnostics Overtemperature

Diagnostics enabled when overtemperature occurs in the module.

When you enable the Overtemperature diagnostics and the module detects that the maximum permissible module temperature is exceeded, the Overtemperature diagnostics is output.

Diagnostics Wire break

Enabling of the diagnostics if the line to the actuator is broken.

Channel activated

Determines whether a channel is enabled or disabled.

Temperature shutdown

Determines whether a channel remains activate or is deactivated in case of overtemperature.

When the module has detected that the maximum permissible module temperature has been exceeded, the channel is either deactivated or remains active depending on the configuration.

To prevent damage to the module, the channel is automatically deactivated when temperature shutdown is configured.

You cannot control the channel until the temperature is once again in the valid range.

Reaction to CPU STOP

Determines the behavior of the module in the event of a CPU STOP.

Channel startup delay

Specifies the duration of the startup delay of a channel.

You can set startup delays with values ranging from 100 ms to 10 s. This means the channels cannot be controlled before the set startup delay has expired.

Configure different startup delays for each channel to decouple the starting currents and thus reduce the network load.

Startup delays are also in effect when the module is to output substitute values. The startup delay starts after the module was started and when the load voltage returns.

This means that depending on your process, the initial switch on of lamps is always delayed by the configured time.

Channel output filter down/up

Specifies the down or up output filter of a channel.

For smooth operation or to increase the interference immunity of your application, use down or up output filters with values from 500 ms to 60 s.

Quick changes of the filter input values are converted into smoother signal changes at the filter output. This means, for example, that extreme currents in the heating phase of infrared sources are limited.

In addition, you can also use output filters to reduce shifts in the zero crossings of the power supply that can occur in isolating transformers.

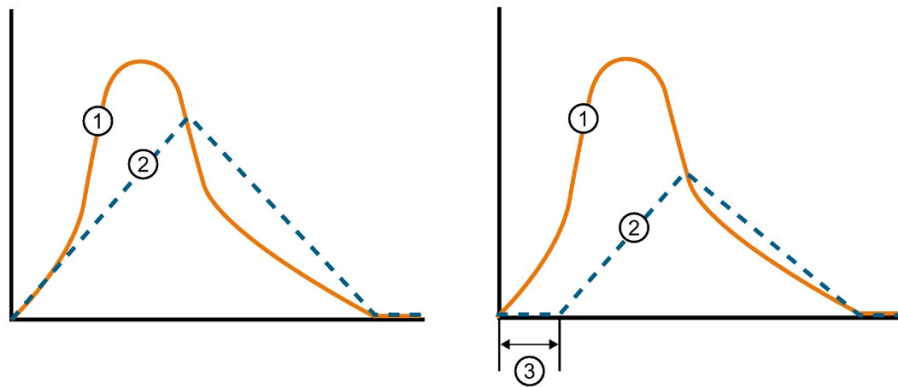
This increases the accuracy of the module.

When you have configured a startup delay, the output filter is held at the reset state during this delay.

Once the startup delay has expired, the output filter starts its linear ramp directly at the value that was held during the startup delay.

Note that the configured filter times always refer to the process value jumps from 0% to 100% or from 100% to 0%.

This means the settling time of the filter is shorter for smaller jumps.



- ① Power without output filter
- ② Power with output filter (max. slope according to Output filters parameter)
- ③ Startup delay

Figure 3-2 Power trend or average switch-on duration in case of phase control phase-angle proportional with and without output filter

Each channel has its own output filters. These output filters always work with maximum resolution.

Output filters are also in effect when the module is to output substitute values, for example, after CPU STOP or in case of a communication failure.

This means all transitions are still smooth and infrared sources for hot gluing spots do not fail immediately, for example, but are shut down slowly to ensure that the surface of the gluing spots does not tear due to sudden cooling.

If you do not want to use output filters, use the parameter setting "No filter".

Potential group

A potential group consists of a group of directly adjacent I/O modules within an ET 200SP station, which are supplied via a common supply voltage.

A potential group begins with a light-colored BaseUnit through which the required voltage is supplied for all modules of the potential group. The light-colored BaseUnit interrupts the three self-assembling voltage buses P1, P2 and AUX to the left neighbor.

All additional I/O modules of this potential group are plugged into dark-colored BaseUnits. You take the potential of the self-assembling voltage buses P1, P2 and AUX from the left neighbor.

A potential group ends with the dark-colored BaseUnit, which follows a light-colored BaseUnit or server module in the station configuration.

3.2.3 Address space

The module can be configured differently in STEP 7; see following table. Depending on the configuration, additional/different addresses are assigned in the process image output/input.

Configuration options of the DQ 4×24..230VAC/2A HF in DQ mode

You can configure the module with STEP 7 (TIA Portal) or with a GSD file. When you configure the module by means of the GSD file, the configuration is available under different short designations/module names. The following configurations are possible:

Table 3- 2 Configuration options with GSD file

Configuration	Short designation/module name in the GSD file	Configuration software, e.g. STEP 7 (TIA Portal)		
		Integrated in the hardware catalog STEP 7, V14 or higher	GSD file PROFINET IO	GSD file PROFIBUS DP
1 x 4-channel without value status	DQ 4×24..230VAC/2A HF V1.0	X	X	X
1 x 4-channel with value status	DQ 4×24..230VAC/2A HF V1.0, QI	X	X	---

Note

The following functions are only fully available when the submodule X.1 is configured and the IO controller to which submodule X.1 is assigned has established a connection to the IO device.

- Firmware update
- I&M identification data
- PROFIenergy

Value status (quality information, QI)

The value status is always activated for the following module names:

- DQ 4×24..230VAC/2A HF V1.0, QI

An additional bit is assigned to each channel for the value status. The bit for the value status indicates if the output value specified by the user program is actually pending at the module terminal (0 = value is incorrect).

Address space for configuration as 1 x 4-channel DQ 4×24..230VAC/2A HF V1.0

The figure below shows the address space allocation for the configuration **without** value status in DQ mode (DQ 4×24..230VAC/2A HF V1.0).

Assignment in the process image of the outputs (PIQ)

	7	6	5	4	3	2	1	0	
QB x	0	0	0	0					Output values at channels 0 to 3

Figure 3-3 Address space for configuration as 1 x 4-channel DQ 4×24..230VAC/2A HF V1.0 without value status

Address space for configuration as 1 x 4-channel DQ 4×24..230VAC/2A HF V1.0, QI

The figure below shows the address space allocation for the configuration **with** value status in DQ mode (DQ 4×24..230VAC/2A HF V1.0, QI).

Assignment in the process image of the outputs (PIQ)

	7	6	5	4	3	2	1	0	
QB x	0	0	0	0					Output values at channels 0 to 3

Assignment in the process image input (PII)

	7	6	5	4	3	2	1	0	
IB x	0	0	0	0					Value status (QI) at channels 0 to 3

0: Value output at channel is incorrect

Figure 3-4 Address space for configuration as 1 x 4-channel DQ 4×24..230VAC/2A HF V1.0 with value status

3.3 Interrupts/diagnostics alarms

3.3.1 Status and fault displays

LED display

The following figure shows you the LED display of the DQ 4x24..230VAC/2A HF.

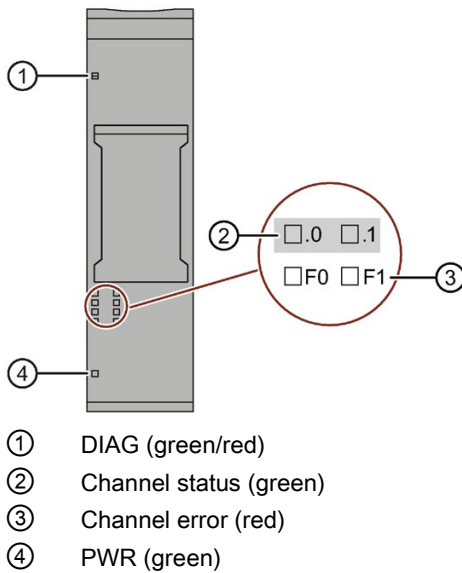


Figure 3-5 LED displays

Meaning of the LEDs

The following tables explain the meaning of the status and error displays.

DIAG LED

Table 3-3 Error display of the DIAG LED

DIAG LED	Meaning
□ Off	Backplane bus supply of the ET 200SP not OK
⚡ Flashes	Module parameters not assigned
■ On	Module parameters assigned and no module/channel diagnostics
⚡ Flashes	Module parameters assigned and module/channel diagnostics

LED channel status/channel error

Table 3- 4 Status / error display of the LED channel status / channel error

Channel status LED	LED channel error	Meaning
□ Off	□ Off	Channel deactivated or process signal = 0 and no channel diagnostics
■ On	□ Off	Channel activated and process signal = 1 and no channel diagnostics
□ Off	■ On	Channel activated and channel diagnostics

PWR LED

Table 3- 5 Status display of the PWR LED

PWR LED	Meaning
□ Off	No supply voltage L
■ On	Supply voltage L present

3.3.2 Interrupts

The digital output module DQ 4x24...230VAC/2A HF supports diagnostic interrupts.

Diagnostics interrupts

In DQ mode, the module generates a diagnostics interrupt for the following events:

- Overtemperature
- Wire break
- Parameter assignment error
- Supply voltage missing
- Channel/component temporarily unavailable

Detailed information on the event is available in the STEP 7 online help.

3.3.3 Diagnostics alarms

Diagnostics alarms

A diagnostics alarm is generated and the DIAG-LED flashes on the module for each diagnostics event. You can read out the diagnostics alarms, for example, in the diagnostics buffer of the CPU. You can evaluate the error codes with the user program. In DQ mode, the module outputs the following diagnostic alarms:

Table 3- 6 Diagnostics alarms, their meaning and corrective measures

Diagnostics alarms	Error code	Meaning	Solution
Overtemperature	5 _H	Possible causes: <ul style="list-style-type: none"> • Short-circuit or overload at the digital outputs • Ambient temperature outside the specification 	<ul style="list-style-type: none"> • Correct the process wiring • Improve cooling • Check controlled loads
Wire break	6 _H	Actuator circuit impedance too high	Use a different actuator type or modify the wiring, for example, use cables with larger cross-section
		Wirebreak between the module and actuator	Connect the cable
		Channel not connected (open)	Disable diagnostics
Parameter assignment error	10 _H	<ul style="list-style-type: none"> • The module cannot evaluate parameters for the channel. • Incorrect parameter assignment. 	Correct the parameter assignment
Supply voltage missing	11 _H	No or insufficient supply voltage L	<ul style="list-style-type: none"> • Check supply voltage L at the BaseUnit • Check BaseUnit type
Channel/component temporarily unavailable	1F _H	Firmware update is currently in progress or has been canceled. The module does not output any process or substitute values in this state.	<ul style="list-style-type: none"> • Wait for firmware update. • Restart the firmware update.

PC mode

4.1 Wiring

4.1.1 Wiring and block diagram

This section includes the block diagram of the DQ 4x24..230VAC/2A HF module with the terminal assignments for a 1-wire and 2-wire connection. You can use the different connection options for all channels and combine them at random.

You can find information on wiring the BaseUnit in the ET 200SP distributed I/O system (<https://support.industry.siemens.com/cs/ww/en/view/58649293>) system manual.

DANGER

Dangerous voltage. Risk of death or serious injury.

You must always disconnect the system and module from the power supply before commencing work.

Note

Limiting overvoltage

You must ensure overvoltage of the encoder supply is limited to 1 kV.

Note

Power limitation

To limit power, each input voltage must have a fuse with a maximum rating of 10 A tripping current. The fuse must be a quick-acting microfuse.

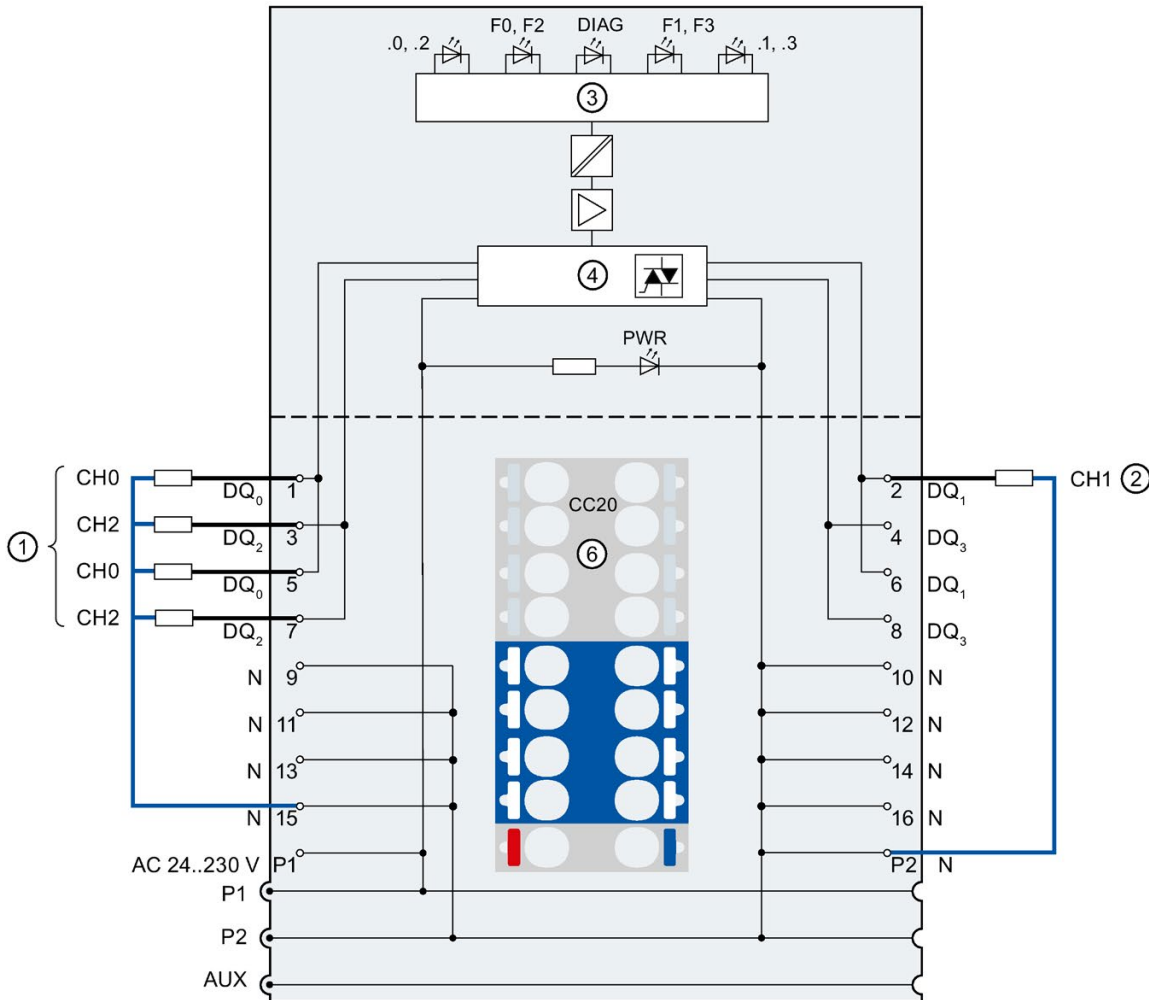
Note

Three-phase loads

Do not connect any three-phase loads to the module. The digital output is not suitable for three-phase loads.

Connection: 1-wire and 2-wire connection of actuators

The following figure shows the block diagram and an example of the terminal assignment of the digital output module DQ 4x24..230VAC/2A HF on the BaseUnit BU type U0.



- ① 1-wire connection 24..230 V AC Supply voltage L (infeed for light-colored BaseUnit only)
- ② 2-wire connection P1, P2, AUX Internal self-assembling voltage buses
Connection to left (dark-colored BaseUnit)
Connection to left interrupted (light-colored BaseUnit)
- ③ Backplane bus interface N Neutral
- ④ Output electronics DIAG Error or diagnostics LED (green, red)
- ⑤ Polarity reversal protection .0 to .3 Channel status LED (green)
- ⑥ Color-coded label CC20 (optional) F0 to F3 Channel fault LED (red)
- DQ_n Output signal, channel n PWR Power LED (green)

Figure 4-1 Wiring and block diagram for 1-wire and 2-wire connection of actuators.

4.2 Parameters/address space

4.2.1 Parameters

Parameters of the DQ 4x24..230VAC/2A HF

The following table lists the configurable parameters in PC mode.

The effective range of the configurable parameters depends on the type of configuration. The following configurations are possible:

- Central operation with an ET 200SP CPU
- Distributed operation on PROFINET IO in an ET 200SP system
- Distributed operation with PROFIBUS DP in an ET 200SP system

When performing the configuration in the user program, use the "WRREC" instruction to transfer the parameters to the module using data records (refer to the section Parameter assignment and structure of parameter data record (Page 51)).

The following parameter settings are possible:

Table 4- 1 Configurable parameters and their defaults (GSD file)

Parameter	Range of values	Default	Reconfiguration in RUN	Effective range with configuration software, e.g. STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP ¹
Module parameters					
Control type	<ul style="list-style-type: none"> • Phase control - phase-angle proportional • Phase control - power-proportional • Wave packet control - half waves • Wave packet control - full waves 	Phase control - phase-angle proportional	Yes	Module	Module

4.2 Parameters/address space

Parameter	Range of values	Default	Reconfiguration in RUN	Effective range with configuration software, e.g. STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP ¹
Channel parameters					
Diagnostics No supply voltage L	<ul style="list-style-type: none"> • Disable • Enable 	Disable	Yes	Channel	Module
Diagnostics Overtemperature	<ul style="list-style-type: none"> • Disable • Enable 	Disable	Yes	Channel	Module
Diagnostics Wire break ²	<ul style="list-style-type: none"> • Disable • Enable 	Disable	Yes	Channel	Module
Diagnostics Overflow ³	<ul style="list-style-type: none"> • Disable • Enable 	Disable	Yes	Channel	Module
Channel activated	<ul style="list-style-type: none"> • Disable • Enable 	Enable	Yes	Channel	Channel
Temperature shut-down	<ul style="list-style-type: none"> • Output active even under overtemperature conditions • Output disabled under overtemperature conditions 	Output active even under overtemperature conditions	Yes	Channel	Module
Reaction to CPU STOP	<ul style="list-style-type: none"> • Turn off • Keep last value • Output substitute value 	Turn off	Yes	Channel	Module
Channel startup delay	<ul style="list-style-type: none"> • No delay • 100 ms • 1 s • 2 s • 3 s • 4 s • 5 s • 10 s 	No delay	Yes	Channel	-
Channel output filter down	<ul style="list-style-type: none"> • No filter • 500 ms • 1 s • 5 s • 10 s • 30 s • 60 s 	No filter	Yes	Channel	-

Parameter	Range of values	Default	Reconfiguration in RUN	Effective range with configuration software, e.g. STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP ¹
Channel output filter up	<ul style="list-style-type: none"> No filter 500 ms 1 s 5 s 10 s 30 s 60 s 	No filter	Yes	Channel	-
Channel substitute value [0.1%] ²	0...1000	0	Yes	Channel	Channel
Potential group					
Potential group	<ul style="list-style-type: none"> Use potential group of the left module (module plugged into a dark BaseUnit) Enable new potential group (module plugged into light-colored BaseUnit) 	Use potential group of the left module	No	Module	Module

- ¹ Due to the limited number of parameters of a maximum of 244 bytes per ET 200SP station with a PROFIBUS GSD configuration, the parameter assignment options are restricted. The parameter length of the I/O module is 7 bytes with PROFIBUS GSD configuration. If necessary, you can set this parameter by using the data record 128, see the appendix "Parameter data set".
- ² For physical reasons, a wire break cannot be detected for actuators with two inputs and shared reference point. In this case, deactivate the diagnostics.
- ³ The Overflow and Channel substitute value [0.1%] diagnostics are only available if you configured the module in PC mode.

4.2.2 Explanation of parameters

Control type

At the module level, specifies the control type in which the module's channels are operated.

- Phase control - phase-angle proportional (default)
- Phase control - power-proportional
- Wave packet control - half waves
- Wave packet control - full waves

Diagnostics No supply voltage L

Enabling of the diagnostics for no or insufficient supply voltage L.

Diagnostics Overtemperature

Diagnostics enabled when overtemperature occurs in the module.

When you enable the Overtemperature diagnostics and the module detects that the maximum permissible module temperature is exceeded, the Overtemperature diagnostics is output.

Diagnostics Wire break

Enabling of the diagnostics if the line to the actuator is broken.

Diagnostics overflow

Enabling of the diagnostics when the permitted value range of the process value is exceeded.

Channel activated

Determines whether a channel is enabled or disabled.

Temperature shutdown

Determines whether a channel remains activate or is deactivated in case of overtemperature.

When the module has detected that the maximum permissible module temperature has been exceeded, the channel is either deactivated or remains active depending on the configuration.

To prevent damage to the module, the channel is automatically deactivated when temperature shutdown is configured.

You cannot control the channel until the temperature is once again in the valid range.

Reaction to CPU STOP

Determines the behavior of the module in the event of a CPU STOP.

Channel startup delay

Specifies the duration of the startup delay of a channel.

You can set startup delays with values ranging from 100 ms to 10 s. This means the channels cannot be controlled before the set startup delay has expired.

Configure different startup delays for each channel to decouple the starting currents and thus reduce the network load.

Startup delays are also in effect when the module is to output substitute values. The startup delay starts after the module was started and when the load voltage returns.

This means that depending on your process, the initial switch on of lamps is always delayed by the configured time.

Channel output filter down/up

Specifies the down or up output filter of a channel.

To increase the interference immunity of your application, use down or up output filters with values from 500 ms to 60 s.

Quick changes of the filter input values are converted into smoother signal changes at the filter output. This means, for example, that extreme currents in the heating phase of infrared sources are limited.

In addition, you can also use output filters to reduce shifts in the zero crossings of the power supply that can occur in isolating transformers.

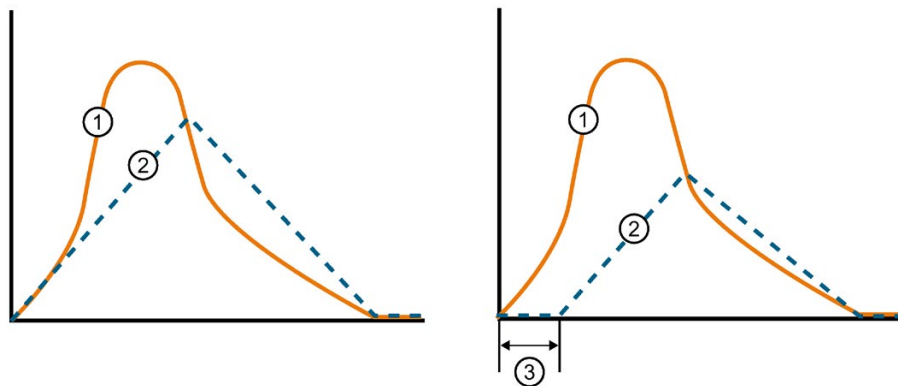
This increases the accuracy of the module.

When you have configured a startup delay, the output filter is held at the reset state during this delay.

Once the startup delay has expired, the output filter starts its linear ramp directly at the value that was held during the startup delay.

Note that the configured filter times always refer to the process value jumps from 0% to 100% or from 100% to 0%.

This means the settling time of the filter is shorter for smaller jumps.



- ① Power without output filter
- ② Power with output filter (max. slope according to Output filters parameter)
- ③ Startup delay

Figure 4-2 Power trend or average switch-on duration in case of phase control phase-angle proportional with and without output filter

Each channel has its own output filters. These output filters always work with maximum resolution.

Output filters are also in effect when the module is to output substitute values, for example, after CPU STOP or in case of a communication failure.

This means all transitions are still smooth and infrared sources for hot gluing spots do not fail immediately, for example, but are shut down slowly to ensure that the surface of the gluing spots does not tear due to sudden cooling.

If you do not want to use output filters, use the parameter setting "No filter".

Channel substitute value [0.1%]

Defines the substitute value that is output when a CPU STOP occurs and the setting "Output substitute value" is selected in the "Reaction to CPU STOP" parameter.

Potential group

A potential group consists of a group of directly adjacent I/O modules within an ET 200SP station, which are supplied via a common supply voltage.

A potential group begins with a light-colored BaseUnit through which the required voltage is supplied for all modules of the potential group. The light-colored BaseUnit interrupts the three self-assembling voltage buses P1, P2 and AUX to the left neighbor.

All additional I/O modules of this potential group are plugged into dark-colored BaseUnits. You take the potential of the self-assembling voltage buses P1, P2 and AUX from the left neighbor.

A potential group ends with the dark-colored BaseUnit, which follows a light-colored BaseUnit or server module in the station configuration.

4.2.3 Address space

The module can be configured differently in STEP 7; see following table. Depending on the configuration, additional/different addresses are assigned in the process image output/input.

Configuration options of the DQ 4x24..230VAC/2A HF in PC mode

You can configure the module with STEP 7 (TIA Portal) or with a GSD file. When you configure the module by means of the GSD file, the configuration is available under different short designations/module names. The following configurations are possible:

Table 4- 2 Configuration options with GSD file

Configuration	Short designation/module name in the GSD file	Configuration software, e.g. STEP 7 (TIA Portal)		
		Integrated in the hardware catalog STEP 7, V14 or higher	GSD file PROFINET IO	GSD file PROFIBUS DP
1 x 4-channel without value status	DQ 4x24..230VAC/2A HF PC V1.0	X	X	X
1 x 4-channel with value status	DQ 4x24..230VAC/2A HF PC V1.0, QI	X	X	---

Note

The following functions are only fully available when the submodule X.1 is configured and the IO controller to which submodule X.1 is assigned has established a connection to the IO device.

- Firmware update
- I&M identification data
- PROFIenergy

Value status (quality information, QI)

The value status is always activated for the following module names:

- DQ 4x24..230VAC/2A HF PC V1.0, QI

An additional bit is assigned to each channel for the value status. The bit for the value status indicates if the output value specified by the user program is actually pending at the module terminal (0 = value is incorrect).

Address space for configuration as 1 x 4-channel DQ 4x24..230VAC/2A HF PC V1.0

The figure below shows the address space allocation for the configuration **without** value status in PC mode (DQ 4x24..230VAC/2A HF PC V1.0).

Assignment in the process image of the outputs (PIQ)

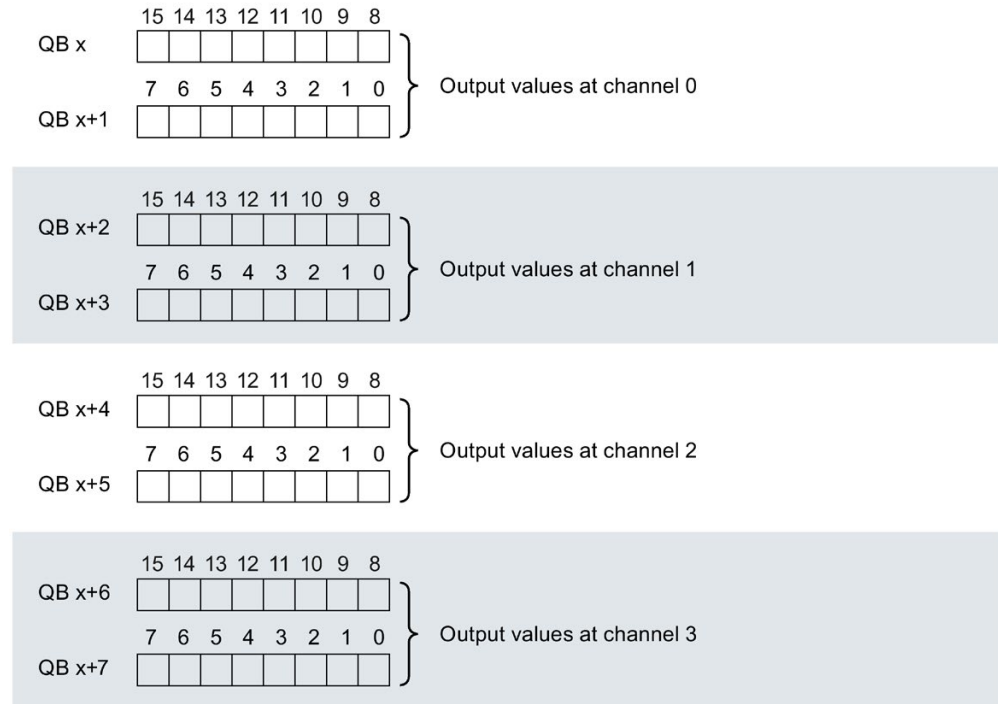
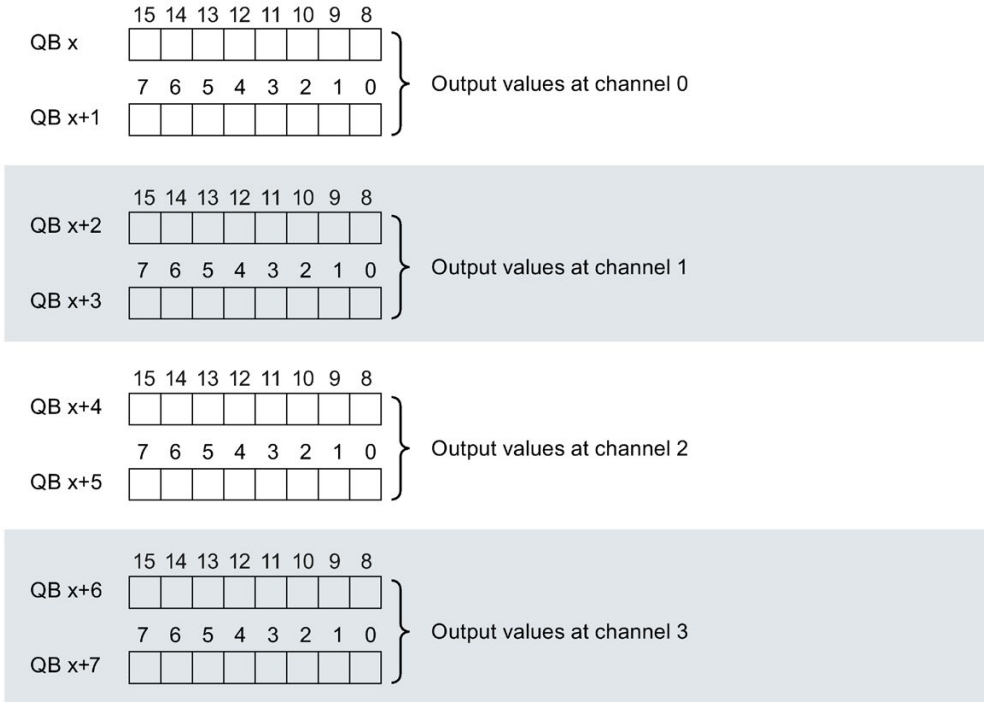


Figure 4-3 Address space for configuration as 1 x 4-channel DQ 4x24..230VAC/2A HF PC V1.0 without value status

Address space for configuration as 1 x 4-channel DQ 4x24..230VAC/2A HF PC V1.0, QI

The figure below shows the address space allocation for the configuration **with** value status in PC mode (DQ 4x24..230VAC/2A HF PC V1.0, QI).

Assignment in the process image of the outputs (PIQ)



Assignment in the process image input (PII)

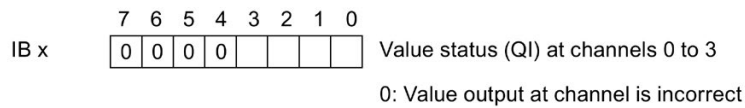


Figure 4-4 Address space for configuration as 1 x 4-channel DQ 4x24..230VAC/2A HF PC V1.0 with value status

4.3 Interrupts/diagnostics alarms

4.3.1 Status and fault displays

LED display

The following figure shows you the LED display of the DQ 4x24..230VAC/2A HF.

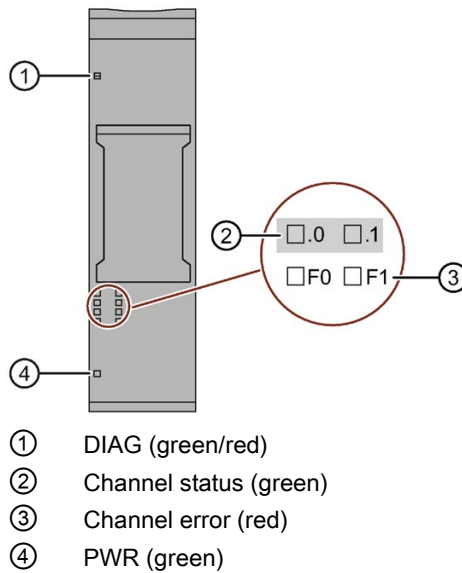


Figure 4-5 LED displays

Meaning of the LEDs

The following tables explain the meaning of the status and error displays.

DIAG LED

Table 4-3 Error display of the DIAG LED

DIAG LED	Meaning
□ Off	Backplane bus supply of the ET 200SP not OK
⚡ Flashes	Module parameters not assigned
■ On	Module parameters assigned and no module/channel diagnostics
⚡ Flashes	Module parameters assigned and module/channel diagnostics

LED channel status/channel error

Table 4- 4 Status / error display of the LED channel status / channel error

Channel status LED	LED channel error	Meaning
□ Off	□ Off	Channel deactivated or process signal = 0 and no channel diagnostics
■ On	□ Off	Channel activated and process signal = 1 and no channel diagnostics
□ Off	■ On	Channel activated and channel diagnostics

PWR LED

Table 4- 5 Status display of the PWR LED

PWR LED	Meaning
□ Off	No supply voltage L
■ On	Supply voltage L present

4.3.2 Interrupts

The digital output module DQ 4x24...230VAC/2A HF supports diagnostic interrupts.

Diagnostics interrupts

In PC mode, the module generates a diagnostic interrupt for the following events:

- Overtemperature
- Wire break
- High limit violated
- Parameter assignment error
- Supply voltage missing
- Channel/component temporarily unavailable

Detailed information on the event is available in the STEP 7 online help.

4.3.3 Diagnostics alarms

Diagnostics alarms

A diagnostics alarm is generated and the DIAG-LED flashes on the module for each diagnostics event. You can read out the diagnostics alarms, for example, in the diagnostics buffer of the CPU. You can evaluate the error codes with the user program.

In PC mode, the module outputs the following diagnostic alarms:

Table 4- 6 Diagnostics alarms, their meaning and corrective measures

Diagnostics alarms	Error code	Meaning	Solution
Overtemperature	5H	<ul style="list-style-type: none"> Short-circuit or overload at the digital outputs Ambient temperature outside the specification 	<ul style="list-style-type: none"> Correct the process wiring Improve cooling Check controlled loads
Wire break	6H	Actuator circuit impedance too high	Use a different actuator type or modify the wiring, for example, use cables with larger cross-section
		Wirebreak between the module and actuator	Connect the cable
		Channel not connected (open)	Disable diagnostics
High limit violated	7H	The permitted value range of the process value is exceeded.	Correct the output value (0 to 1000)
Parameter assignment error	10H	<ul style="list-style-type: none"> The module cannot evaluate parameters for the channel. Incorrect parameter assignment. 	Correct the parameter assignment
Supply voltage missing	11H	No or insufficient supply voltage L	<ul style="list-style-type: none"> Check supply voltage L at the BaseUnit Check BaseUnit type
Channel/component temporarily unavailable	1FH	Firmware update is currently in progress or has been canceled. The module does not output any process or substitute values in this state.	<ul style="list-style-type: none"> Wait for firmware update. Restart the firmware update.

Technical specifications

Technical specifications of the DQ 4x24...230VAC/2A HF

Article number	6ES7132-6FD00-0CU0
General information	
Product type designation	DQ 4x24 ... 230 V AC/2 A HF, PU 1
Firmware version	V1.0
<ul style="list-style-type: none"> FW update possible 	Yes
usable BaseUnits	BU type U0
Color code for module-specific color identification plate	CC20
Product function	
<ul style="list-style-type: none"> I&M data 	Yes; I&M0 to I&M3
Engineering with	
<ul style="list-style-type: none"> STEP 7 TIA Portal configurable/integrated as of version 	V14
<ul style="list-style-type: none"> STEP 7 configurable/integrated as of version 	STEP 7 V5.5 or higher
<ul style="list-style-type: none"> PROFIBUS as of GSD version/GSD revision 	GSD as of Revision 5
<ul style="list-style-type: none"> PROFINET as of GSD version/GSD revision 	GSDML V2.3
Operating mode	
<ul style="list-style-type: none"> DQ 	Yes
<ul style="list-style-type: none"> DQ with energy-saving function 	Yes
<ul style="list-style-type: none"> PWM 	No
<ul style="list-style-type: none"> Oversampling 	No
<ul style="list-style-type: none"> MSO 	No
<ul style="list-style-type: none"> Phase control 	Yes; Control area: 8.5 ... 100% of the phase angle
<ul style="list-style-type: none"> Trailing-edge phase 	No
<ul style="list-style-type: none"> Half-wave 	Yes
<ul style="list-style-type: none"> Full-wave 	Yes
Supply voltage	
Rated value (AC)	230 V; 47 ... 63 Hz, max. rate of change of frequency 1 mHz/s

Article number	6ES7132-6FD00-0CU0
Input current	
Current consumption (rated value)	8 mA; without load
Output voltage	
Rated value (AC)	230 V; 24V AC to 230V AC
Power loss	
Power loss, typ.	9 W; Active power, load voltage 230 V, all outputs loaded with 2 A, 50 Hz
Address area	
Address space per module	
• Inputs	+ 1 byte for QI information
• Outputs	8 byte
Hardware configuration	
Automatic encoding	Yes
• Mechanical coding element	Yes
Selection of BaseUnit for connection variants	
• 1-wire connection	BU type U0
• 2-wire connection	BU type U0
• 3-wire connection	BU type U0 + Potential isolation module
Digital outputs	
Number of digital outputs	4
Current-sinking	No
Current-sourcing	Yes
Short-circuit protection	No; external fusing necessary
Open-circuit detection	Yes; channel by channel
• Response threshold, typ.	1 mA; 40 V AC or more
Overload protection	No; A miniature fuse with 10 tripping current and tripping characteristic "quick response" must be provided in the module supply
Controlling a digital input	Yes
Switching capacity of the outputs	
• with resistive load, max.	2 A; Max. 4 A, see additional description in manual
• with inductive load, max.	2 A
• on lamp load, max.	100 W; Tungsten rating in accordance with UL; for thermistors with higher power ratings, see the notes in the manual
Output voltage	
• for signal "1", min.	20.4 V
Output current	
• for signal "1" rated value	2 A
• for signal "1" permissible range, min.	10 mA

Article number	6ES7132-6FD00-0CU0
<ul style="list-style-type: none"> for signal "1" permissible range, max. for signal "0" residual current, max. 	<p>4 A; Note derating data in the manual</p> <p>3 mA</p>
Output delay with resistive load	
<ul style="list-style-type: none"> "0" to "1", max. "1" to "0", max. 	<p>40 ms; 2 AC cycles</p> <p>20 ms; 1 AC cycle</p>
Parallel switching of two outputs	
<ul style="list-style-type: none"> for logic links for uprating for redundant control of a load 	<p>No</p> <p>No</p> <p>Yes</p>
Switching frequency	
<ul style="list-style-type: none"> with resistive load, max. with inductive load (acc. to IEC 60947-5-1, AC15), max. on lamp load, max. 	<p>10 Hz; Applies to DQ mode; limited by line frequency in PC mode</p> <p>10 Hz; Applies to DQ mode; limited by line frequency in PC mode</p> <p>1 Hz; Applies to DQ mode; limited by line frequency in PC mode</p>
Total current of the outputs	
<ul style="list-style-type: none"> Current per channel, max. Current per module, max. 	<p>2 A; Max. 4 A, see additional description in manual</p> <p>8 A</p>
Total current of the outputs (per module)	
horizontal installation	
<ul style="list-style-type: none"> up to 40 °C, max. up to 50 °C, max. up to 60 °C, max. 	<p>8 A; Applicable for current channels up to 2 A. For current channels between 2 A and 4 A, note derating data in the manual</p> <p>8 A; Applicable for current channels up to 2 A. For current channels between 2 A and 4 A, note derating data in the manual</p> <p>8 A; Applicable for current channels up to 2 A. For current channels between 2 A and 4 A, note derating data in the manual</p>
vertical installation	
<ul style="list-style-type: none"> up to 30 °C, max. up to 40 °C, max. up to 50 °C, max. 	<p>8 A; Applicable for current channels up to 2 A. For current channels between 2 A and 4 A, note derating data in the manual</p> <p>8 A; Applicable for current channels up to 2 A. For current channels between 2 A and 4 A, note derating data in the manual</p> <p>8 A; Applicable for current channels up to 2 A. For current channels between 2 A and 4 A, note derating data in the manual</p>
Cable length	
<ul style="list-style-type: none"> shielded, max. unshielded, max. 	<p>1 000 m</p> <p>600 m</p>

Article number	6ES7132-6FD00-0CU0
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	No
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Substitute values connectable	Yes
Alarms	
• Diagnostic alarm	Yes
Diagnostic messages	
• Diagnostic information readable	Yes
• Monitoring the supply voltage	Yes
• Wire-break	Yes; channel by channel
• Short-circuit	No
• Group error	Yes
Diagnostics indication LED	
• Monitoring of the supply voltage (PWR-LED)	Yes; green PWR LED
• Channel status display	Yes; Green LED
• for channel diagnostics	Yes; red Fn LED
• for module diagnostics	Yes; green/red DIAG LED
Potential separation	
Potential separation channels	
• between the channels	No
• between the channels and backplane bus	Yes
• between the channels and the power supply of the electronics	No
Isolation	
Isolation tested with	2 545 V DC/2 s (routine test)
Dimensions	
Width	20 mm
Height	73 mm
Depth	58 mm
Weights	
Weight, approx.	50 g

Derating

The figures below show the maximum permissible total current for the derating, depending on the ambient temperature for horizontal and vertical mounting position, with channel currents of 2 A or 4 A.

The following values apply to channel currents up to 2 A for the utilization category AC-15 (IEC 60947-5-1).

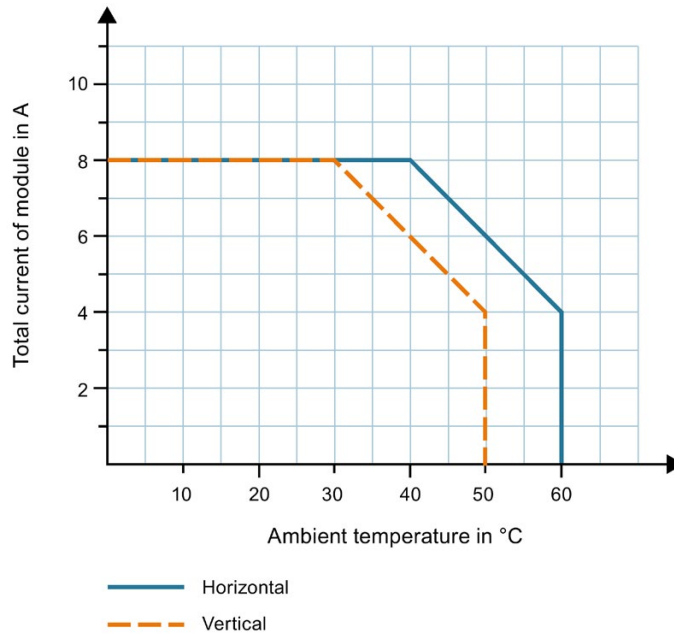


Figure 5-1 Derating depending on ambient temperature - channel current 2 A

The following values apply to channel currents of 2 A to 4 A for the utilization category AC-12 (IEC 60947-5-1):

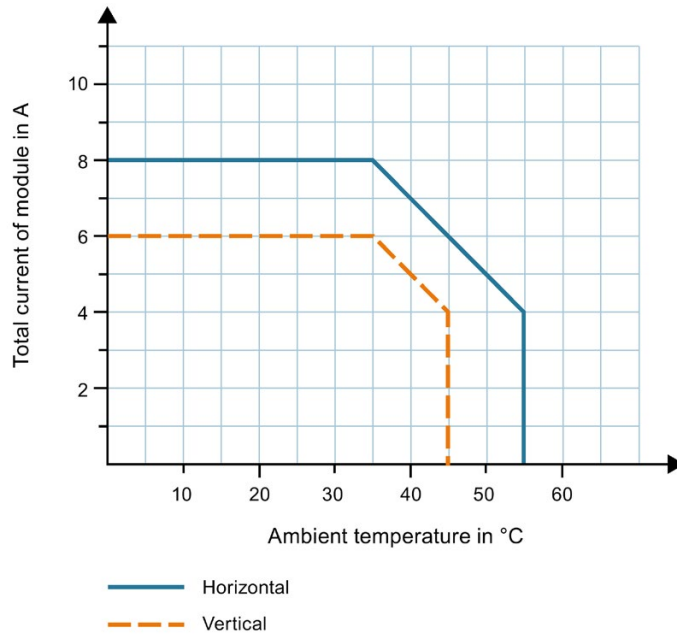


Figure 5-2 Derating depending on ambient temperature - channel current 4 A

Note that the rms values are in effect for the channel and total currents.

Note

Loads with PTC thermistor properties

For PTC thermistors up to 4 A continuous current and power ratings above 100 W (e.g. infrared sources), you must observe the significantly higher inrush current.

Ensure that the switch-on peak current does not exceed 15 A.

To reduce the inrush current, preheat the load or use the function "Output filter with phase control".

This slowly increases the switch-on duration of the load and the inrush current of the load being heated is limited.

Use an output filter time of 5 s or a preheating with 25 ° phase control, for example, for a PTC thermistor with a power rating of 900 W and an estimated factor 10 of the inrush current overshoot.

If you want to connect multiple PTC thermistors per module at the same time, use the "Startup delay" function.

By doing so, you connect the channels at different times so that the inrush current overshoots do not overlap and the fuse is not overloaded.

Electromagnetic compatibility

The control of loads in the control types phase control power-proportional or phase-angle proportional results in strong electromagnetic effects on the power supply network. To observe the limits in accordance with EMC Directives, you must filter the load supply of the module with phase control in PC mode or when using the function "Output filter with phase control" in DQ mode.

Conformity was measured with filters of the type "EPCOS SIFI-C B84113C". Use this type of filter or a filter with the same characteristic curve or with a characteristic curve with greater damping.

You must ensure conformity with the values in the tables below.

Interference emission in accordance with EN 61000-6-4:2007 + A1:2011 and IEC 61131-2:

Table 5- 1 Interference emission of electromagnetic fields

Frequency	Interference emission
Test environment OATS or SAC (measured at a distance of 10 m) <ul style="list-style-type: none"> • 30 MHz to 230 MHz • 230 MHz to 1000 MHz 	<ul style="list-style-type: none"> • <40 dB (μV/m) Q • <47 dB (μV/m) Q
Test environment FAR (measured at a distance of 3 m) <ul style="list-style-type: none"> • 30 MHz to 230 MHz • 230 MHz to 1000 MHz 	<ul style="list-style-type: none"> • 45 to 52 dB (μV/m) Q • <52 dB (μV/m) Q
Test environment OATS, SAC or FAR (measured at a distance of 3 m) <ul style="list-style-type: none"> • 1 GHz to 3 GHz • 3 GHz to 6 GHz 	<ul style="list-style-type: none"> • <76 dB (μV/m) P / <56 dB (μV/m) M • <80 dB (μV/m) P / <60 dB (μV/m) M

Table 5- 2 Interference emission via the AC power supply

Frequency	Interference emission
0.15 MHz to 0.5 MHz	<79 dB (μV/m) Q <66 dB (μV/m) M
0.5 MHz to 30 MHz	<73 dB (μV/m) Q <60 dB (μV/m) M

Dimension drawing

See the manual ET 200SP BaseUnits

(<http://support.automation.siemens.com/WW/view/en/59753521>)

Parameter data record

A.1 Parameter assignment and structure of parameter data record

The data records of the module have an identical structure, regardless of whether you configure the module with PROFIBUS DP or PROFINET IO. With data record 128, you can reconfigure the module in your user program regardless of your programming. This means that you can use all the functions of the module even if you configured it via PROFIBUS-GSD.

Parameter assignment in the user program

You have the option to re-configure the module in RUN (e.g. the response of selected channels to the CPU STOP state can be changed in RUN without having an effect on the other channels).

Changing parameters in RUN

The "WRREC" instruction is used to transfer the parameters to the module using data record 128. The parameters set with STEP 7 are not changed in the CPU, which means the parameters set in STEP 7 will be valid after a restart.

Output parameter STATUS

The module ignores errors that occur during the transfer of parameters with the "WRREC" instruction and continues operation with the previous parameter assignment. However, a corresponding error code is written to the STATUS output parameter.

The description of the "WRREC" instruction and the error codes is available in the STEP 7 online help.

Structure of data record 128

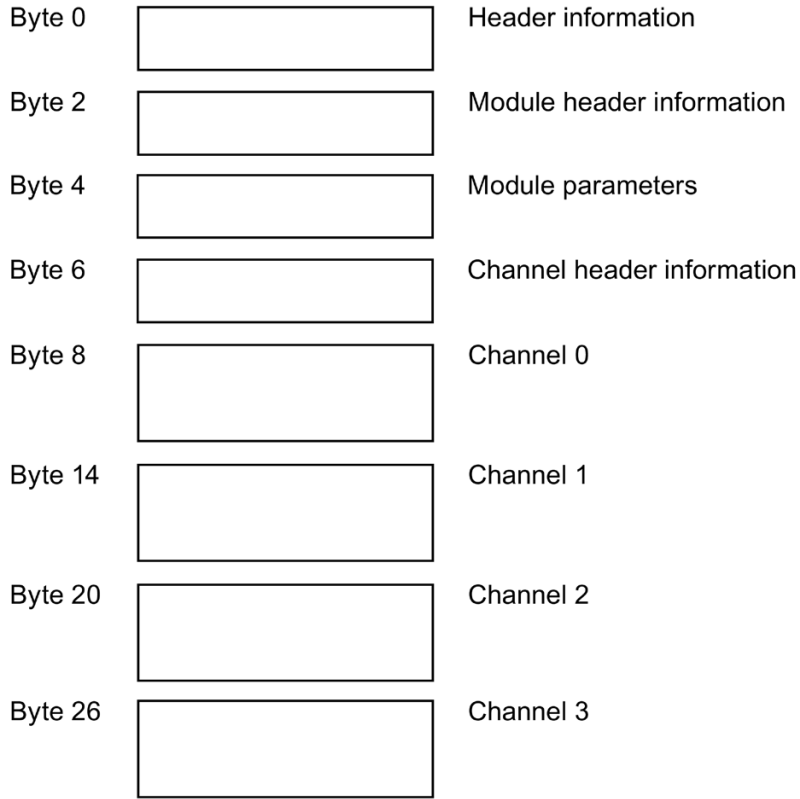


Figure A-1 Structure of data record 128

Header information

The figure below shows the structure of the header information.

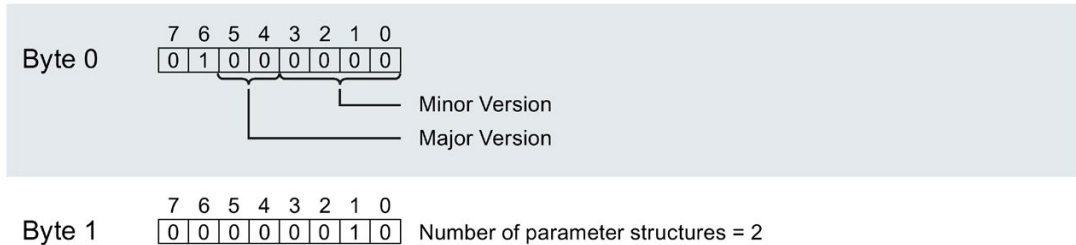


Figure A-2 Header information

Module header information

The figure below shows the structure of the module header information.

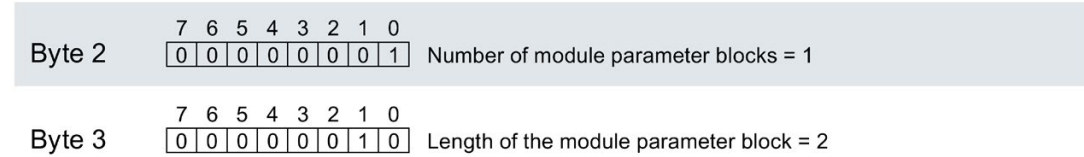


Figure A-3 Module header information

Module parameter block

The figure below shows the structure of the module parameter block for channels 0 to 7. You enable a parameter by setting the corresponding bit to "1".

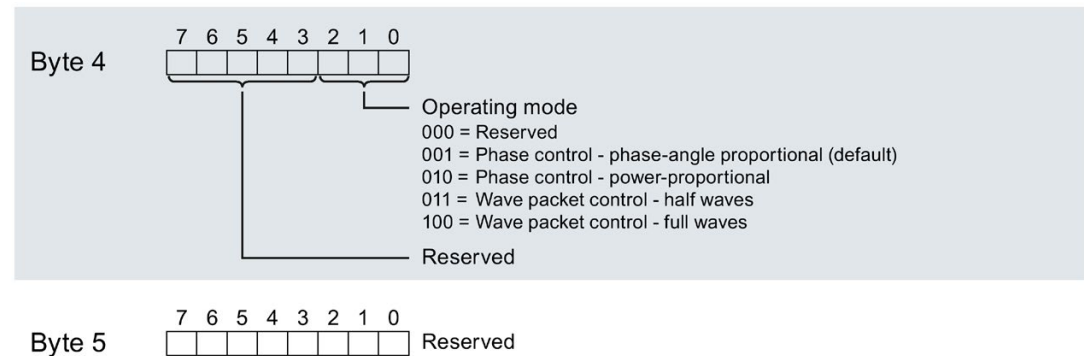


Figure A-4 Module parameter block

Channel header information

The figure below shows the structure of the channel header information.

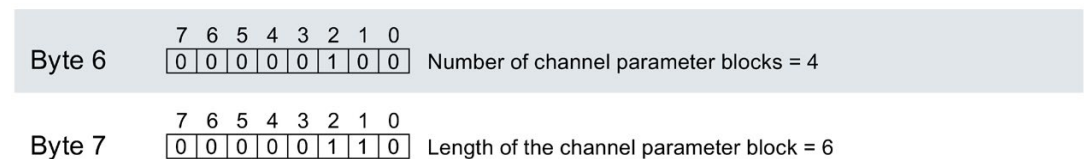
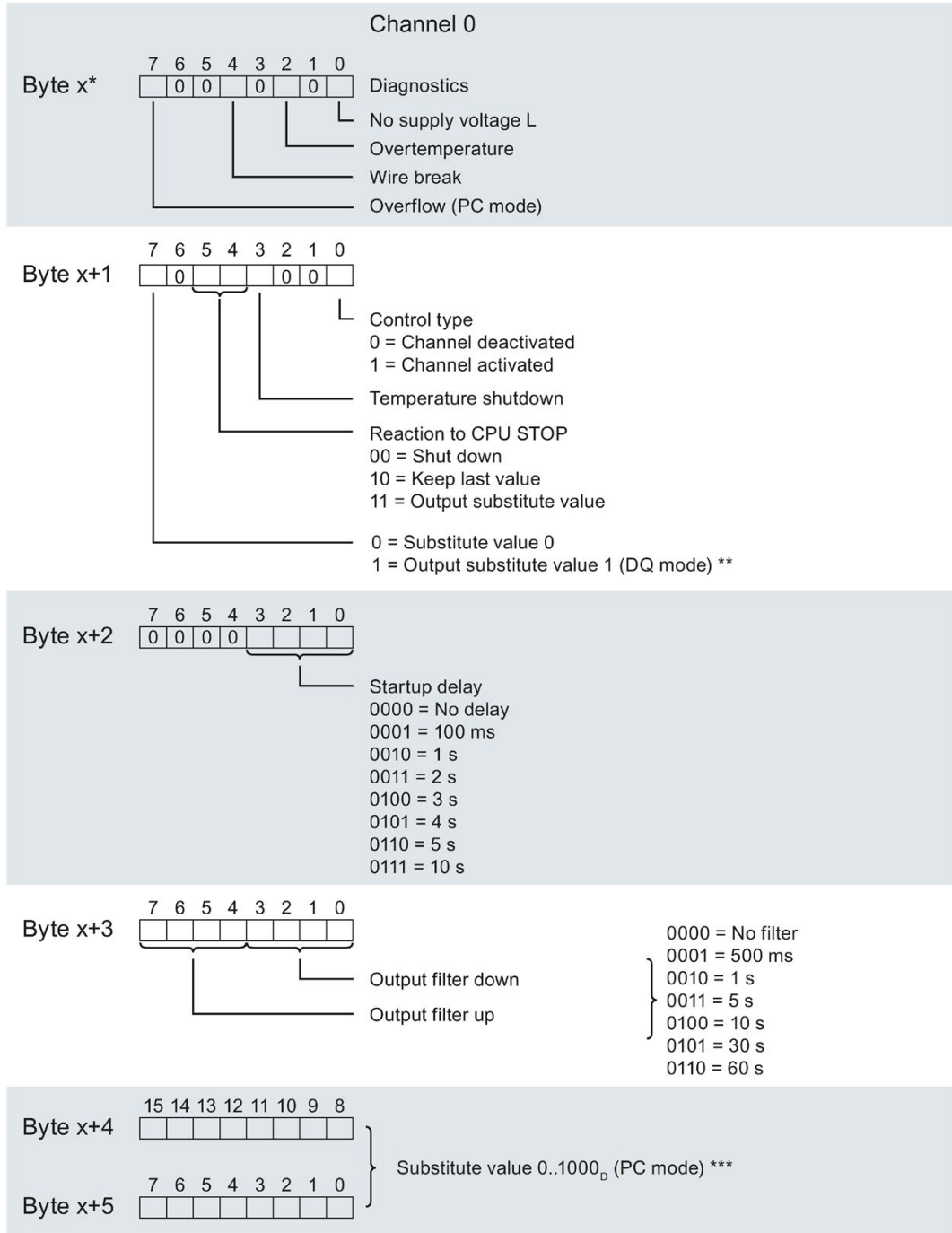


Figure A-5 Channel header information

Parameters

The figure below shows the structure of the parameters for channels 0 to 3. You enable a parameter by setting the corresponding bit to "1".



* x = 8 + (channel number × 6); channel number = 0 to 3
 ** is ignored in PC mode
 *** is ignored in DQ mode

Figure A-6 Structure byte x up to x+5 for the channel 0 to 3

A.2 Error transferring the data record DQ

Error transferring the data record

The module always checks all the values of the transferred data record. Only if all the values were transferred without errors does the module apply the values from the data record.

The WRREC instruction for writing data records returns corresponding error codes when errors occur in the STATUS parameter. (See also the description of the "STATUS" parameter in the STEP 7 online help).

The following table shows the module-specific error codes and their meaning for the parameter data record 128.

Error code in STATUS parameter (hexadecimal)				Meaning	Solution
Byte 0	Byte 1	Byte 2	Byte 3		
DF	80	B0	xx	Number of the data record unknown.	Enter a valid number for the data record.
DF	80	B1	xx	Length of the data record incorrect.	Enter a valid value for the data record length.
DF	80	B2	xx	Slot invalid or cannot be accessed.	<ul style="list-style-type: none"> Check the station whether the module is plugged or drawn. Check the assigned values for the parameters of the WRREC instruction.
DF	80	E0	xx	Wrong version or error in the header information.	Correct the version, length and number of parameter blocks.
DF	80	E1	01	At least one reserved bit is set to "1".	Set all reserved bits to "0".
DF	80	E1	02	Overflow diagnostics is enabled even though DQ mode is active.	Block all Overflow diagnostics or switch to PC mode.
DF	80	E1	05	Invalid coding for operating mode.	Check module parameters.
DF	80	E1	06	Invalid coding for substitute value behavior.	Check all channel parameters.
DF	80	E1	20	Invalid coding for startup delay.	Check all channel parameters.
DF	80	E1	21	Invalid coding for output filter up or down.	Check all channel parameters.