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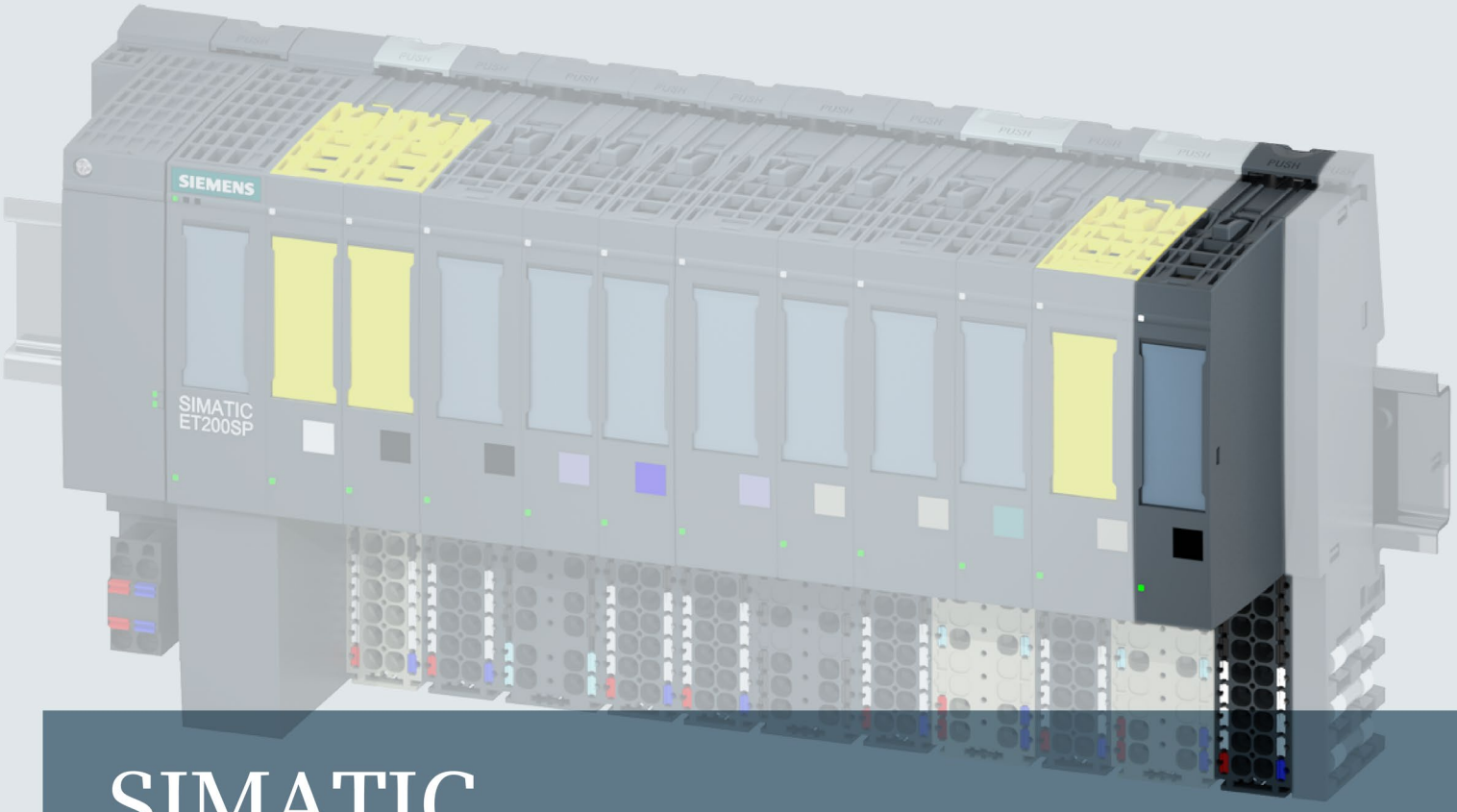

SIMATIC

ET 200SP

Digital output module DQ 4x24VDC/2A HF (6ES7132-6BD20-0CA0)

Manual

Edition 12/2015

Answers for industry.

SIEMENS

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ET 200SP
Digital output module
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Manual

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A5E32855695-AC

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.

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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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A5E32855695-AC
℗ 12/2015 Subject to change

Preface

Purpose of the documentation

This manual supplements the ET 200SP distributed I/O system (https://support.industry.siemens.com/cs/ww/en/view/91696622) system manual.

Functions that generally relate to the system are described in this system 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, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. You can find more information about industrial security on the Internet (http://www.siemens.com/industrialsecurity).

To stay informed about product updates as they occur, sign up for a product-specific newsletter. You can find more information on the Internet (http://support.automation.siemens.com).

Table of contents

Documentation guide

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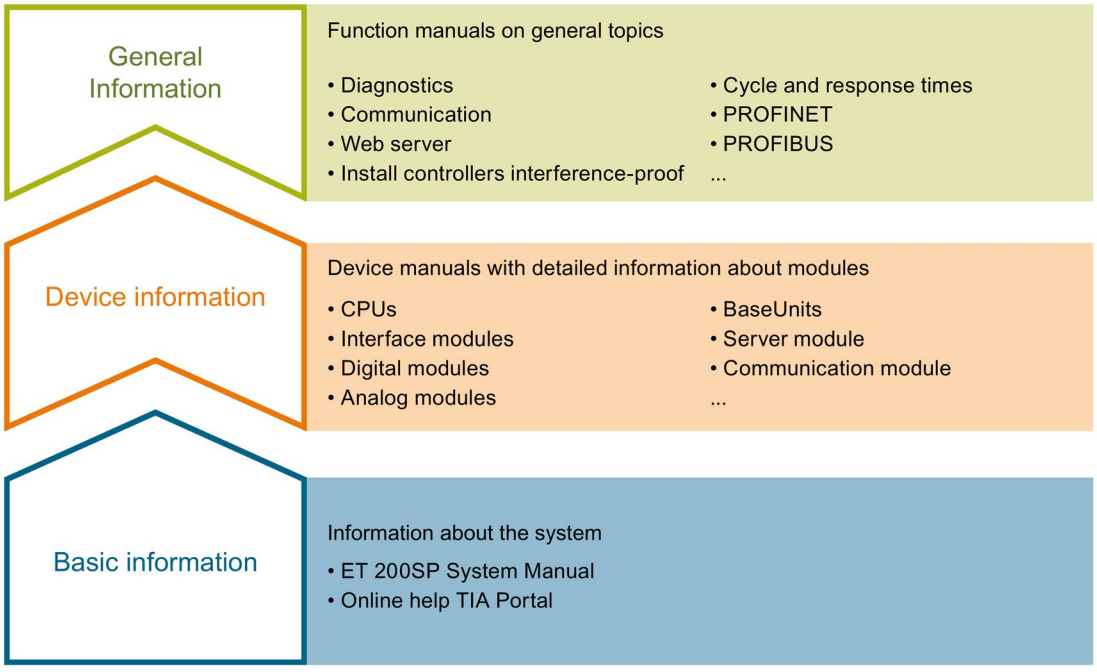
The documentation for the SIMATIC ET 200SP distributed I/O system is arranged into three areas.
This arrangement enables you to access the specific content you require.



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, terminal 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, designing interference-free controllers.

You can download the documentation free of charge from the Internet (http://w3.siemens.com/mcms/industrial-automation-systems-simatic/en/manual-overview/tech-doc-et200/Pages/Default.aspx).

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.

You need to register once to use the full functionality of "mySupport".

You can find "mySupport" in the Internet (https://support.industry.siemens.com/My/ww/en).

"mySupport" - Documentation

In the Documentation area of "mySupport", you have the possibility to combine complete manuals or parts of them to make your own manual.
You can export the manual in PDF format or in an editable format.

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).

Product overview

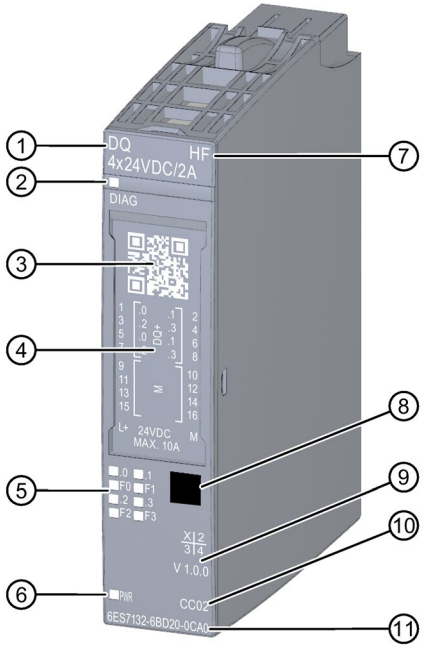
2

2.1 Properties

Article number

6ES7132-6BD20-0CA0

View of the module



① Module type and name
② LED for diagnostics
③ 2D matrix code
④ Wiring diagram
⑤ LEDs for channel status/channel fault
⑥ LED for supply voltage
⑦ Function class
⑧ Color coding module type
⑨ Function and firmware version
⑩ Color code for selecting the color identification labels
⑪ Article number

Image 2-1 View of the module DQ 4×24VDC/2A HF

Properties

The module has the following technical properties:

- Digital output module with 4 outputs
- Source output (PNP, P-switching)
- Supply voltage L+
- Output current 2 A (per channel)
- Configurable diagnostics (per channel)
- Configurable substitute values (per channel)
- Suitable for solenoid valves, DC contactors, and indicator lights
- Safety-related shutdown

The module supports the following functions:

- Firmware update
- I&M identification data
- Configuration in RUN
- PROFIenergy
- Value status
- Isochronous mode
- Module-internal Shared Output (MSO)

Table 2- 1 Version dependencies of other module functions

Function	Product version of the module as of	Firmware version of the module as of
Configurable submodules/ submodules for shared device	1	V2.0.0

You can configure the module with STEP 7 (TIA Portal) and with a GSD file.

Accessories

The following accessories are supplied with the module and can also be ordered separately as spare parts:

- Labeling strips
- Color identification labels
- Reference identification label
- Shield connector

See also

You can find additional information on the accessories in the system manualET 200SP distributed I/O system (https://support.industry.siemens.com/cs/ww/en/view/91696622).

Wiring

3

3.1 Wiring and block diagram

This section includes the block diagram of the DQ 4x24VDC/2A HF module with the terminal assignments for a 1-wire, 2-wire and 3-wire connection. You can use and combine the different wiring options for all channels.

You can find information on wiring the BaseUnits in the system manual Distributed I/O System ET 200SP (http://support.automation.siemens.com/WW/view/en/58649293).

Note

- The load group of the module must begin with a light-colored BaseUnit. Keep this in mind also during the configuration.

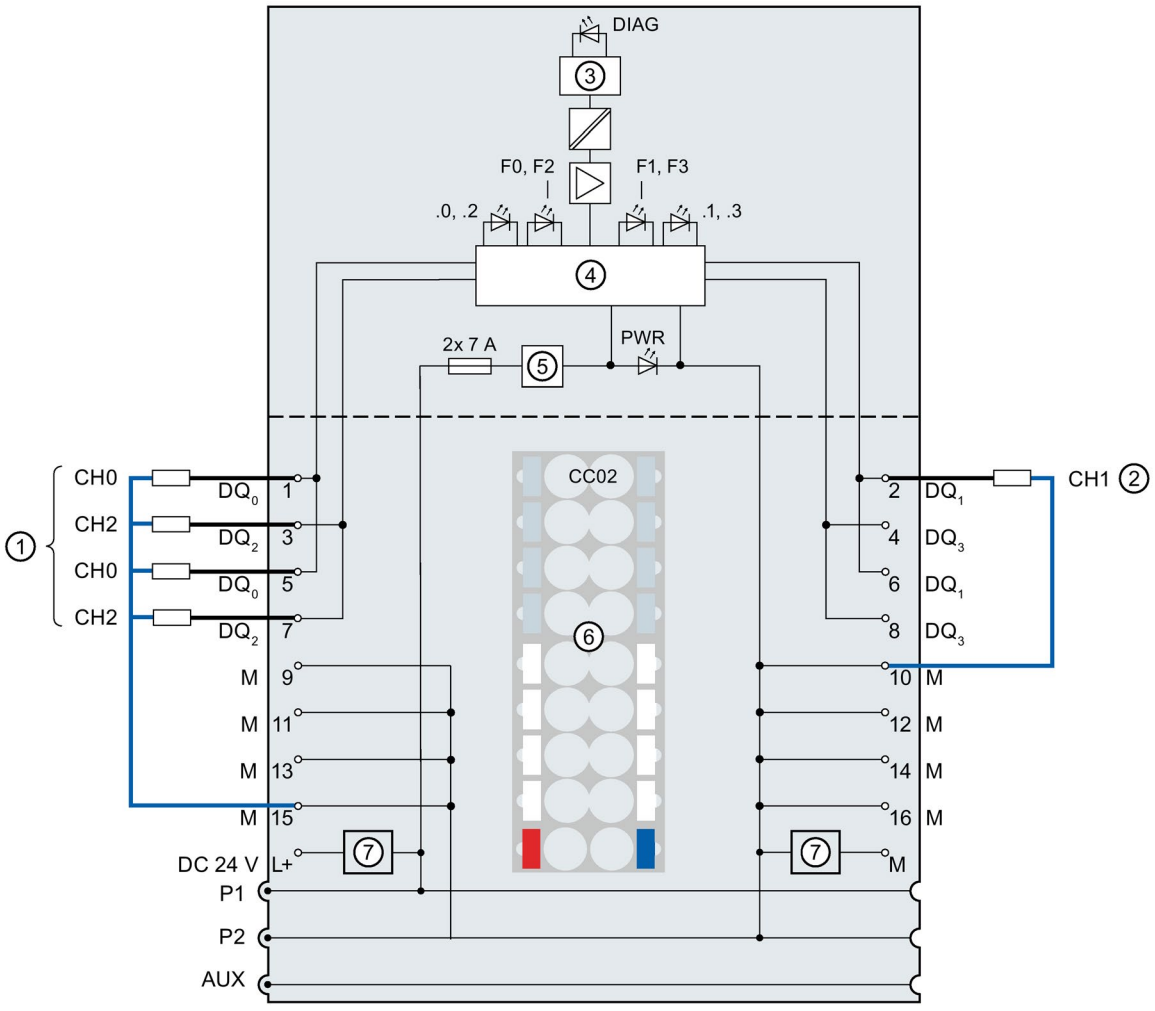
Note

Cross circuit at output

Be aware that voltage from a cross-circuit at the output can feed L+ to modules.

Wiring: 1 and 2-wire connection of actuators

The following figure shows an example of the terminal assignment of the digital output module DQ 4×24VDC/2A HF on the BaseUnit BU type A0 without AUX terminals (1- and 2-wire connection).

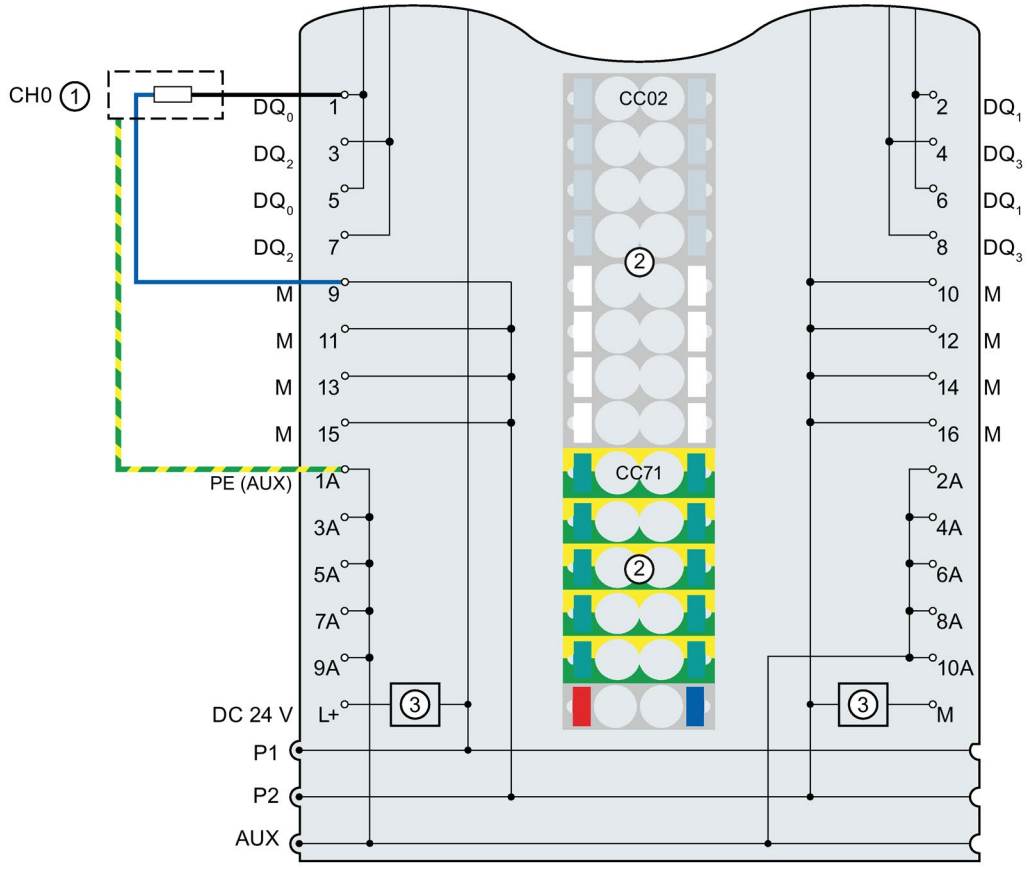


①	1-wire connection	24 V DC	Supply voltage L+ (infeed for light-colored BaseUnit only)
②	2-wire connection	M	Ground
③	Backplane bus interface	P1, P2, AUX	Internal self-assembling voltage buses Connection to left (dark-colored BaseUnit) Connection to left interrupted (light-colored BaseUnit)
④	Output electronics	DIAG	Error or diagnostics LED (green, red)
⑤	Polarity reversal protection	.0 to .3	Channel status LED (green)
⑥	Color-coded label with color code CC02 (optional)	F0 to F3	Channel fault LED (red)
⑦	Filter connection supply voltage (only when light-colored BaseUnit is present)	PWR	Power LED (green)
DQ_n	Output signal, channel n		

Image 3-1 Block diagram and terminal assignment for 1- and 2-wire connection of actuators

Wiring: 3-wire connection of actuators

The following figure shows an example of the terminal assignment of the digital output module DQ 4×24VDC/2A HF on the BaseUnit BU type A0 with AUX terminals (3-wire connection).



①	3-wire connection	1 A to 10 A	AUX terminals
②	Color-coded labels with color codes CC02 and CC71 (optional)	PE (AUX)	Protective conductor connection
③	Filter connection supply voltage (only when light-colored BaseUnit is present)	24 V DC	Supply voltage L+ (infeed for light-colored BaseUnit only)
DQ_n	Output signal, channel n	M	Ground
		P1, P2, AUX	Internal self-assembling voltage buses Connection to left (dark-colored BaseUnit) Connection to left interrupted (light-colored BaseUnit)

Image 3-2 Terminal assignment for 3-wire connection of actuators

Parameters/address space

4

4.1 Parameters

Parameters of the DQ 4x24VDC/2A HF

Specify the module properties with the various parameters in the course of your STEP 7 configuration. The following table lists the configurable parameters. 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 assigning parameters in the user program, use the "WRREC" instruction to transfer the parameters to the module by means of data records (see chapter Parameter assignment and structure of the parameter data record (Page 31)).

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

Parameter	Range of values	Default	Parameter reassignment in RUN	Scope with configuration software, e.g., STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP [1]
Diagnostics No supply voltage L+	• Disable • Enable	Disable	Yes	Channel	Channel
Diagnostics: Short-circuit to ground	• Disable • Enable	Disable	Yes	Channel	Channel
Diagnostics: Short-circuit to L+	• Disable • Enable	Disable	Yes	Channel	
Diagnostics: Wire break	• Disable • Enable	Disable	Yes	Channel	Channel
Channel activated	• Disable • Enable	Enable	Yes	Channel	Channel

Parameter	Range of values	Default	Parameter reassignment in RUN	Scope with configuration software, e.g., STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP [1]
Reaction to CPU STOP	• Turn off • Keep last value • Output substitute value 1	Turn off	Yes	Channel	Module
Potential group	• 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] Only when configuring using a PROFIBUS GSD file; does not apply to configuration with STEP 7 via HSP. The parameter assignment options are limited because PROFIBUS GSD configuration limits the number of parameters to a maximum of 244 bytes for each ET 200SP station. If required, you can still assign the parameters using data records 64 to 67 as described in the column "GSD file PROFINET IO" (see table above). The parameter length of the I/O module is 7 bytes.

Note

If one of the two parameters "Diagnostics: Short-circuit to L+" or "Diagnostics: Wire break" is enabled and one of these diagnostics occurs, the affected channel is switched off to avoid triggering an undefined load. Note that a diagnostic interrupt can only be generated when diagnostics are enabled. [1]

[1] as of module revision 04

4.2 Explanation of parameters

Diagnostics: No supply voltage L+

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

Diagnostics: Short-circuit to ground

Enabling of the diagnostics if a short-circuit of the actuator supply to ground occurs.

Diagnostics: Short-circuit to L+

Enabling of the diagnostics if a short-circuit of the actuator supply to L+ occurs.

Diagnostics: Wire break

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

Channel activated

Determines whether a channel is activated or deactivated.

Reaction to CPU STOP

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

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.

4.3 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 DQ 4×24VDC/2A HF

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 abbreviations/module names. The following configurations are possible:

Table 4- 2 Configuration options with GSD file

Configuration	Abbreviation/module name in the GSD file	Configuration software, e.g. STEP 7 (TIA Portal)		
		Integrated in the hardware catalog STEP 7, as of V13, SP1	GSD file PROFINET IO	GSD file PROFIBUS DP
1 x 4-channel without value status	DQ 4×24VDC/2A HF V1.0	X	X	X
1 x 4-channel with value status	DQ 4×24VDC/2A HF V1.0, QI	X	X	---
1 x 4-channel with value status for module-internal Shared Output with up to 4 submodules	DQ 4×24VDC/2A HF V1.0, MSO	X	X	---
1 x 4-channel without value status	DQ 4×24VDC/2A HF V2.0	---	X	---
1 x 4-channel with value status	DQ 4×24VDC/2A HF V2.0, QI	---	X	X
1 x 4-channel with value status for module-internal Shared Output with up to 4 submodules	DQ 4×24VDC/2A HF V2. 0, MSO	---	X	---
2 x 2-channel without value status	DQ 4×24VDC/2A HF V2.0, S.2	---	X	---
2 x 2-channel with value status	DQ 4×24VDC/2A HF V2.0, S.2 QI	---	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

2 x 2-channel configuration

For the configuration, the channels of the module are divided into multiple submodules. The submodules can be assigned to different IO controllers when the module is used in a Shared Device.

The number of usable submodules is dependent on the interface module used. Read the information in the manual for the particular interface module.

Value status (quality information, QI)

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

- DQ 4×24VDC/2A HF QI
- DQ 4×24VDC/2A HF MSO

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 4×24VDC/2A HF V1.0

The figure below shows the address space assignment for configuration as a 4-channel module without value status.

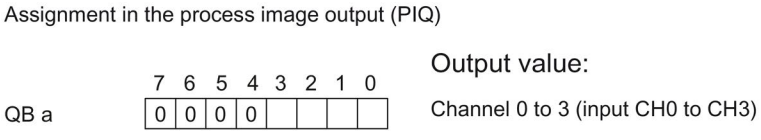


Image 4-1 Address space for configuration as 1 x 4-channel DQ 4×24VDC/2A HF, QI without value status

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

The following figure shows the assignment of the address space for the configuration as a 4-channel module with value status. You can freely assign the start address for the module. The addresses of the channels are derived from the start address.

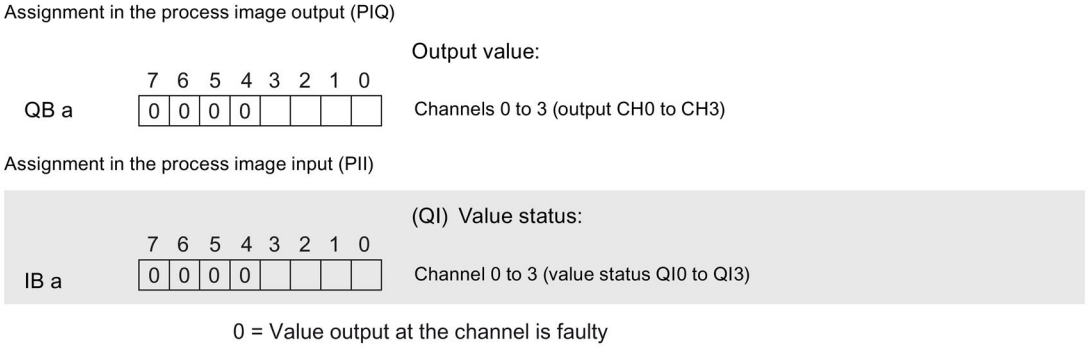


Image 4-2 Address space for configuration as 1 x 4-channel DQ 4×24VDC/2A HF, QI with value status

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

For the configuration as a 1 x 4-channel module (module-internal shared output, MSO), channels 0 to 3 of the module are copied to up to four submodules. Channels 0 to 3 are then available with identical values in various submodules. These submodules can be assigned to up to four IO controllers when the module is used in a shared device:

- The IO controller to which submodule 1 is assigned has write access to outputs 0 to 3.
- The IO controller to which submodule 2, 3, or 4 is assigned has read access to outputs 0 to 3.

Value status (Quality Information,QI)

The meaning of the value status depends on the submodule on which it occurs.

For the 1st submodule (= basic submodule), the value status 0 indicates that the value is incorrect or that the IO controller of the basic submodule is in STOP state.

For the 2nd to 4th submodule (= MSO submodule), the value status 0 indicates that the value is incorrect or one of the following errors has occurred:

- The basic submodule is not yet configured (not ready).
- The connection between the IO controller and the basic submodule has been interrupted.
- The IO controller of the basic submodule is in STOP or POWER OFF state.

The following figure shows the assignment of the address space for submodules 1, 2, 3, and 4 and the value status.

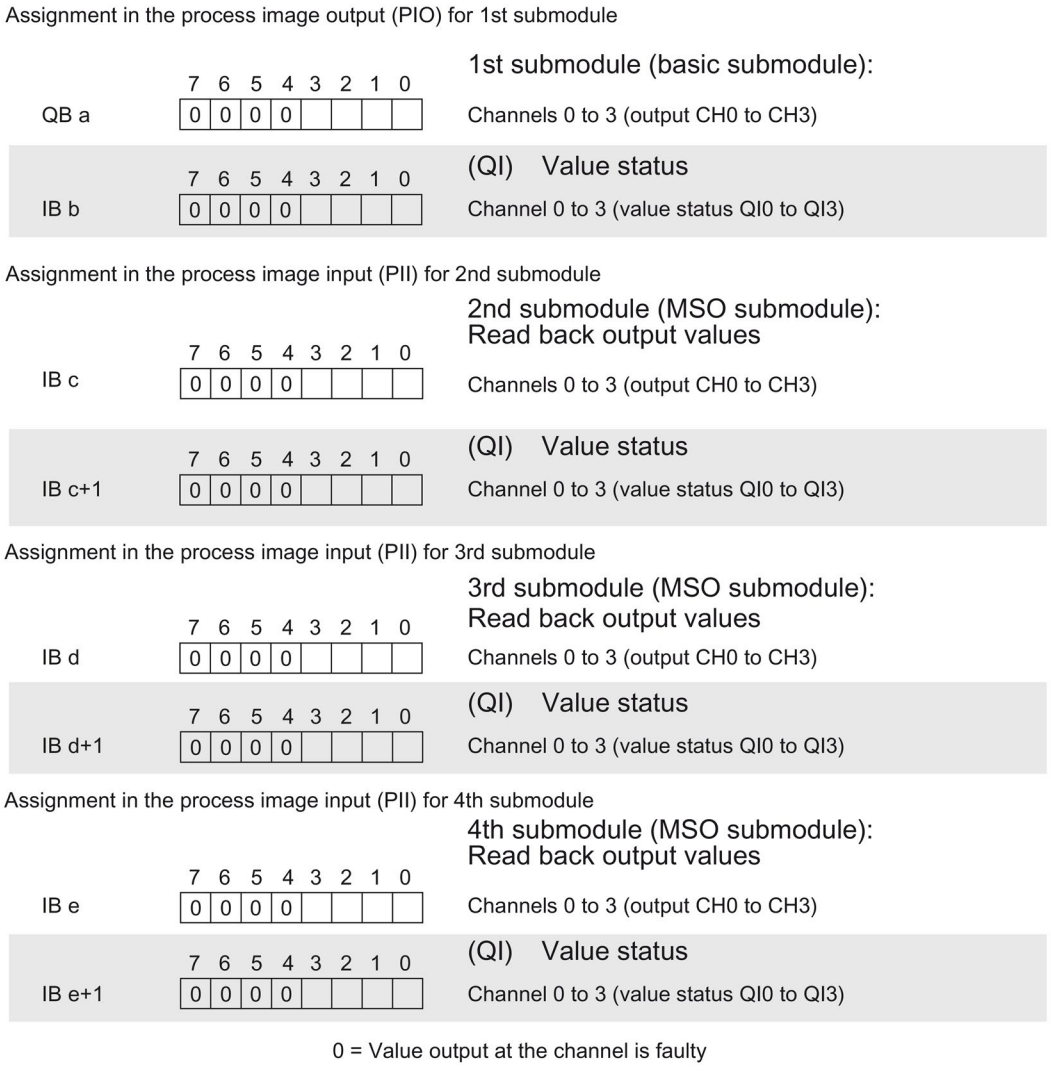


Image 4-3 Address space for configuration as 1 x 4-channel DQ 4×24VDC/2A HF, MSO with value status

Address space for configuration as 2 x 2-channel DQ 4×24VDC/2A HF, S.2

The figure below shows the address space assignment for configuration as a 2 x 2-channel module without value status.

Each of the two submodules has a freely assignable start address.

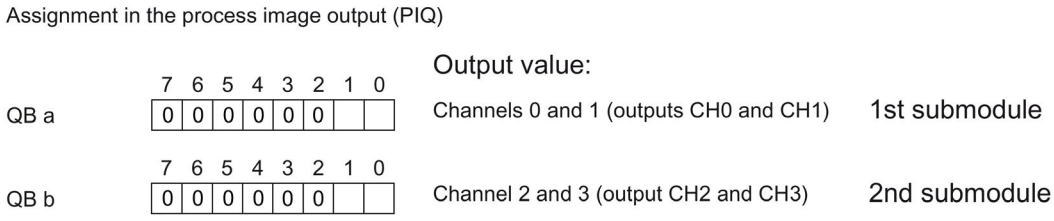


Image 4-4 Address space for configuration as 2 x 2-channel DQ 4×24VDC/2A HF, S.2 without value status

Address space for configuration as 2 x 2-channel DQ 4×24VDC/2A HF, S.2 QI

The figure below shows the address space assignment for configuration as a 2 x 2-channel module with value status.

Each of the two submodules has a freely assignable start address.

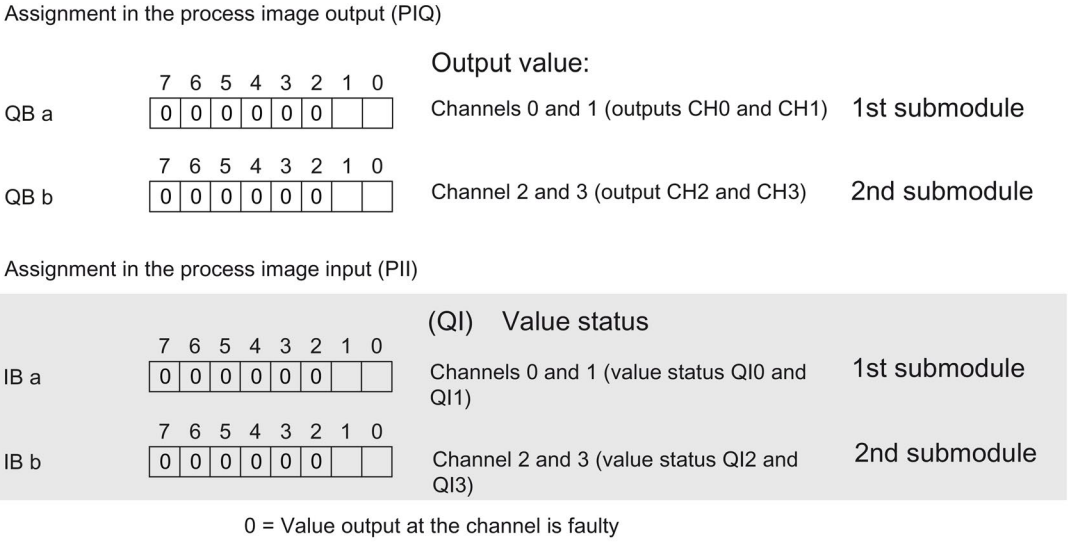


Image 4-5 Address space for configuration as 2 x 2-channel DQ 4×24VDC/2A HF V2.0, S.2 QI with value status

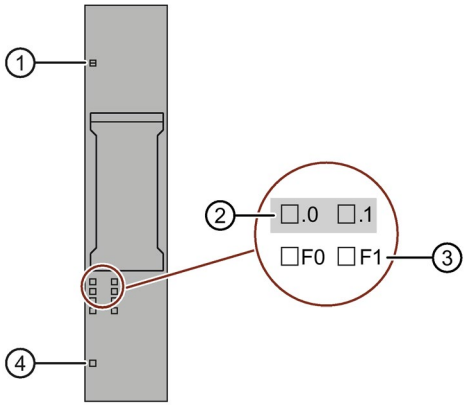
Interrupts/diagnostics alarms

5

5.1 Status and error displays

LED displays

The figure below shows the LED displays (status and error displays) of the DQ 4x24VDC/2A HF.



① DIAG (green/red)
② Channel status (green)
③ Channel error (red)
④ PWR (green)

Image 5-1 LED display

Meaning of the LEDs

The tables below explain the meaning of the Status and error displays. Remedial measures for diagnostics alarms can be found in section Diagnostics alarms (Page 24).

DIAG LED

Table 5- 1 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 5- 2 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
On	Off	Channel activated and no channel diagnostics
Off	On	Channel activated and channel diagnostics

PWR LED

Table 5- 3 Status display of the PWR LED

PWR LED	Meaning
Off	Missing supply voltage L+
On	Supply voltage L+ present

5.2 Interrupts

The DQ 4×24VDC/2A HF digital output module supports diagnostics interrupts.

Diagnostics interrupts

The module generates a diagnostic interrupt at the following events:

- Short-circuit
- Wire break
- Parameter assignment error
- Supply voltage missing
- Channel temporarily unavailable

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

5.3 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.

Note

You can connect 2 actuators per output.

The diagnostics of the two actuators influenced each other in the case of duplicate wiring.

This means:

- a wire break is only signaled if both actuators are affected
- a single short-circuit affects both actuators

Note

Parallel connection of two outputs

For parallel connection of two outputs for redundant control of a load, the channel diagnostics "Short-circuit to L+" and "Wire break" must be deactivated.

Table 5- 4 Diagnostics alarms, their meaning and corrective measures

Diagnostics alarms	Error code	Meaning	Solution
Short-circuit	1_H	• Short-circuit of actuator supply to ground [1] • Short-circuit of actuator supply to L+ [2]	Correct the process wiring
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
		Wire break between the module and actuator	Connect the cable
		Channel not connected (open)	• Disable diagnostics • Connect a resistor to the actuator contacts in the load resistance range
Parameter assignment error	10_H	• 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+	• Check supply voltage L+ on 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.	• Wait for firmware update. • Restart the firmware update.

[1] only in switched state (output value 1)

[2] only in non-switched state (output value 0)

Note

In case of a short-circuit of the actuator supply to L+ at the activated channel, load distributions can occur which result in wire break diagnostics.

Technical specifications

6

6.1 Technical specifications

Technical specifications of the DQ 4×24VDC/2A HF

	6ES7132-6BD20-0CA0
General information	
Product type designation	ET 200SP, DQ 4x24VDC/2A HF, PU 1
Firmware version	V2.0
• FW update possible	Yes
Usable BaseUnits	BU type A0
Color code for module-specific color identification label	CC02
Product function	
I&M data	Yes; I&M0 to I&M3
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V13 SP1 / -
STEP 7 can be configured/integrated as of version	V5.5 / -
PROFIBUS as of GSD version/GSD revision	GSD revision 5
PROFINET as of GSD version/GSD revision	GSDML V2.3
Operating mode	
DQ	Yes
DQ with energy-saving function	No
PWM	No
Oversampling	No
MSO	Yes
Supply voltage	
Rated value (DC)	24 V
Valid range, low limit (DC)	19.2 V
Valid range, high limit (DC)	28.8 V
Polarity reversal protection	Yes
Output voltage	
Rated value (DC)	24 V
Power loss	
Power loss, typ.	1 W

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Address area	
Address space per module	
Address space per module, max.	4 bytes; 2 channels per submodule + QI information
Digital outputs	
Number of outputs	4
Sinking output	No
Sourcing output	Yes
Short-circuit protection	Yes
• Response threshold, typ.	2.8 ... 5.2 A
Limitation of inductive shutdown voltage to	L+ -(37 to 41V)
Control of a digital input	Yes; minimum current consumption 7 mA
Switching capacity of outputs	
With resistive load, max.	2 A
With lamp load, max.	10 W
Load resistance range	
Low limit	12 Ω
High limit	3400 Ω
Output current	
For signal "1" rated value	2 A
For signal "0" residual current, max.	0.1 mA
Output delay with resistive load	
"0" to "1", typ.	50 µs
"1" to "0", typ.	100 µs
Parallel connection of two outputs	
For increased performance	No
Switching frequency	
With resistive load, max.	100 Hz
With inductive load, max.	2 Hz
With lamp load, max.	10 Hz
Total current of the outputs	
Current per channel, max.	2 A
Current per module, max.	8 A
Total current of the outputs (per module)	
Horizontal installation	
• Up to 40 °C, max.	8 A
• Up to 50 °C, max.	6 A
• Up to 60 °C, max.	4 A
Vertical installation	
• Up to 30 °C, max.	8 A
• Up to 40 °C, max.	6 A
• Up to 50 °C, max.	4 A

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Cable length	
Shielded, max.	1000 m
Unshielded, max.	600 m
Isochronous mode	
Isochronous mode (application synchronized up to terminal)	Yes
Bus cycle time (TDP), min.	500 µs
Jitter, max.	8 µs
Interrupts/diagnostics/status information	
Substitute values can be applied	Yes
Interrupts	
Diagnostics interrupt	Yes
Diagnostics alarms	
Diagnostics	Yes
Monitoring of the supply voltage	Yes
Wire break	Yes; channel-based
Short-circuit	Yes; channel-based
Group error	Yes
Diagnostics indicator LED	
Monitoring of the supply voltage (PWR LED)	Yes; green PWR LED
Channel status display	Yes; green LED
For channel diagnostics	Yes; red LED
For module diagnostics	Yes; green/red DIAG LED
Electrical isolation	
Electrical isolation of channels	
Between the channels	No
Between the channels and backplane bus	Yes
Permitted potential difference	
Between different circuits	75 V DC / 60 V AC (basic insulation)
Insulation	
Insulation tested with	707 V DC (type test)
Dimensions	
Width	15 mm
Weights	
Weight, approx.	30 g

Safety-related shutdown

Note

The digital output module DQ 4x24VDC/2A HF supports safety-related shutdown in connection with a fail-safe power module F-PM-E 24VDC/8A PPM ST:

- SIL according to IEC 61508: 2
- Highest attainable safety class in safety mode, performance level according to EN ISO 13849-1: d

Residual current for signal state "0"

Note

Residual current for signal state "0"

Due to the Diagnostics: Wire break function, there is a low level of residual current in the "0" signal state at the output, which may cause the display diodes to flicker.

This residual current does not depend on the setting for the Diagnostics: Wire break parameter.

Derating trend

The following figure show the load current derating with horizontal and vertical mounting positions.

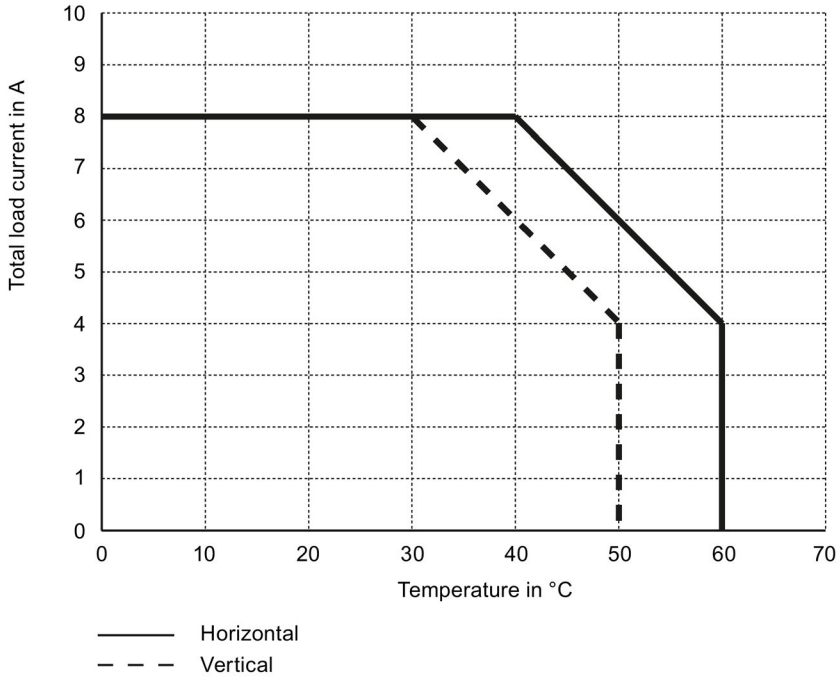


Image 6-1 Load current for mounting position

Dimension drawing

See manual ET 200SP BaseUnits
(http://support.automation.siemens.com/WW/view/en/58532597/133300)

Parameter data record

A

A.1 Parameter assignment and structure of parameter data record

The data record of the module has 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.

You can configure the individual channels with data records 64 to 67.

Parameter assignment in the user program

You can reassign the module parameters in RUN (e.g. "Switch on diagnostics" can be changed in RUN).

Changing parameters in RUN

The WRREC instruction is used to transfer the parameters to the module using data record 128 or data records 64 to 67. The parameters set in STEP 7 are not changed in the CPU, which means that the parameters set in STEP 7 will be valid again after a restart.

If you reconfigure a module and diagnostics are pending prior to the reconfiguration, these diagnostics are not signaled as "outgoing".

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, the STATUS output parameter contains a corresponding error code.

You will find a description of the "WRREC" instruction and the error codes in the STEP 7 online help.

Data record structure

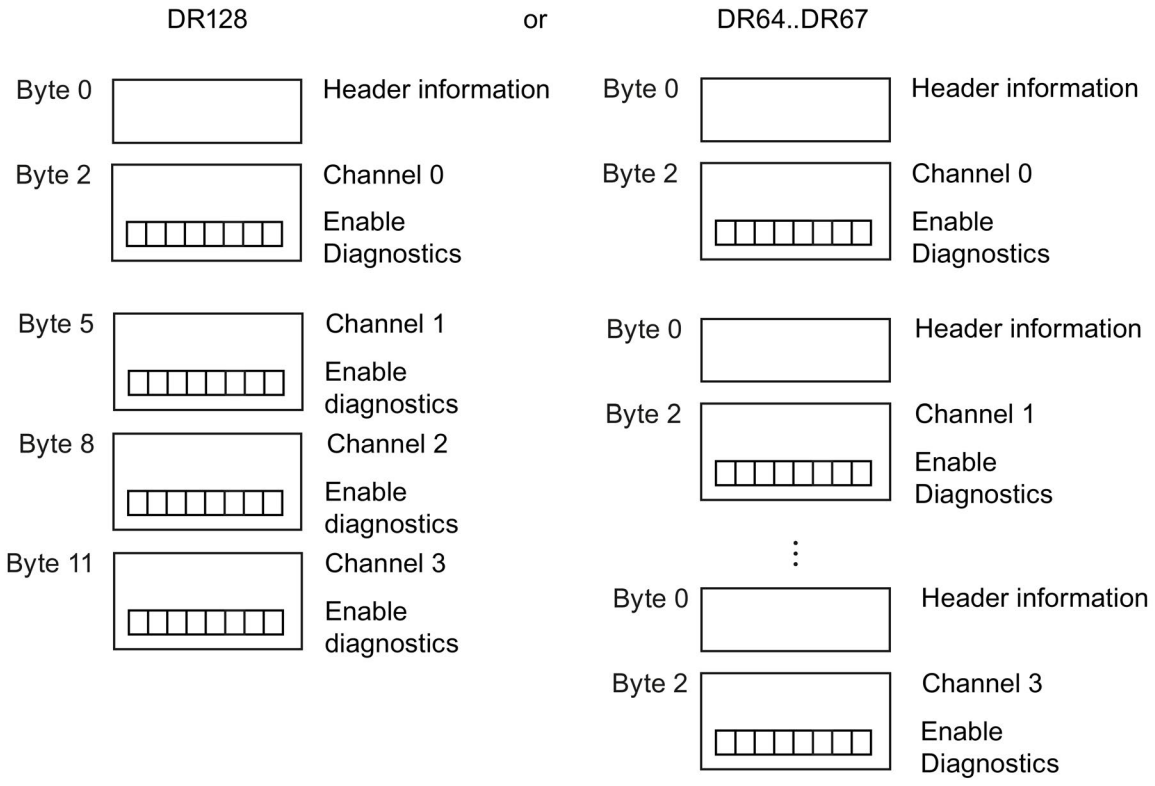


Image A-1 Structure of data record 128 or data records 64 to 67

Header information

The figure below shows the structure of the header information.

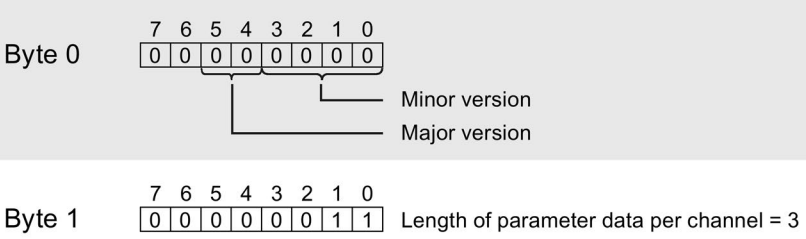
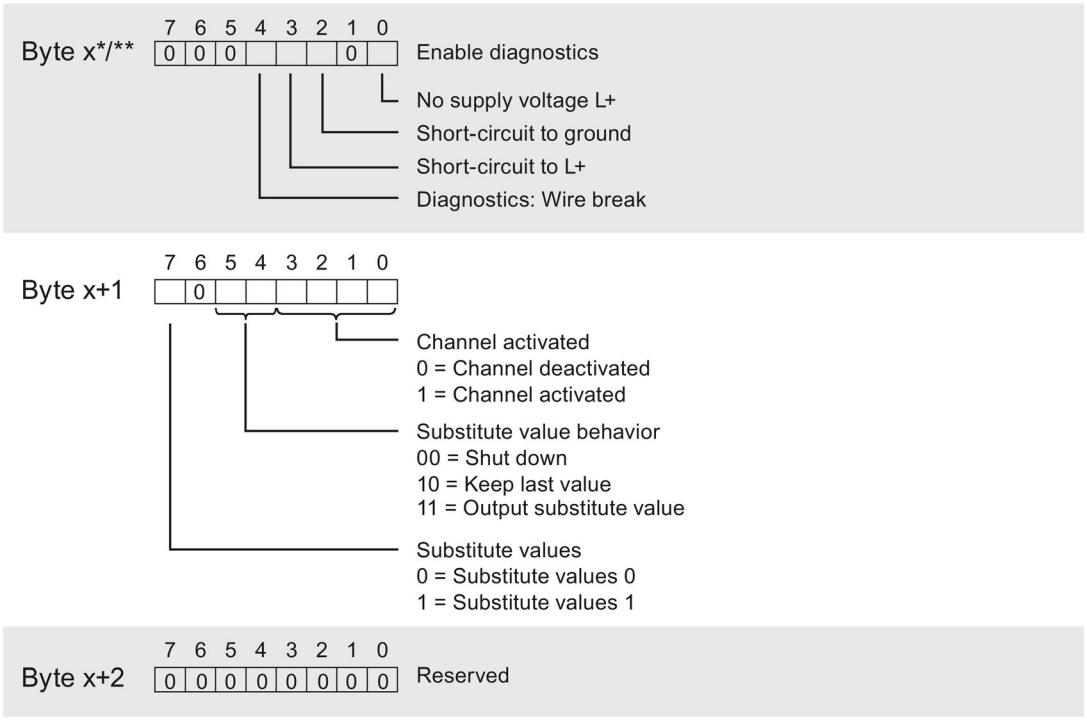


Image A-2 Header information

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 = 2 + (channel number × 3); channel number = 0 to 3 for DR 128
** x =2 for DR 64 to DR 67

Image A-3 Structure of byte x to x+2 for channels 0 to 3

Error transmitting the data record

The module always checks all values of the data record to be sent. The module applies the values from the data record only when all values have been transmitted without errors.

The WRREC instruction for writing data records returns the appropriate error code if there are errors in the STATUS parameter.

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

Error code in the STATUS parameter (hexadecimal)				Meaning	Solution
Byte 0	Byte 1	Byte 2	Byte 3		
DF	80	B0	xx	Number of the data record unknown	Enter valid number for data record.
DF	80	B1	xx	Length of the data record incorrect	Enter valid value for data record length.
DF	80	B2	xx	Slot invalid or unavailable	• Check the station to determine whether the module is plugged in or pulled. • Check assigned values for the parameters of the WREC 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	xx	Parameter error	Check the parameters of the module