SIEMENS
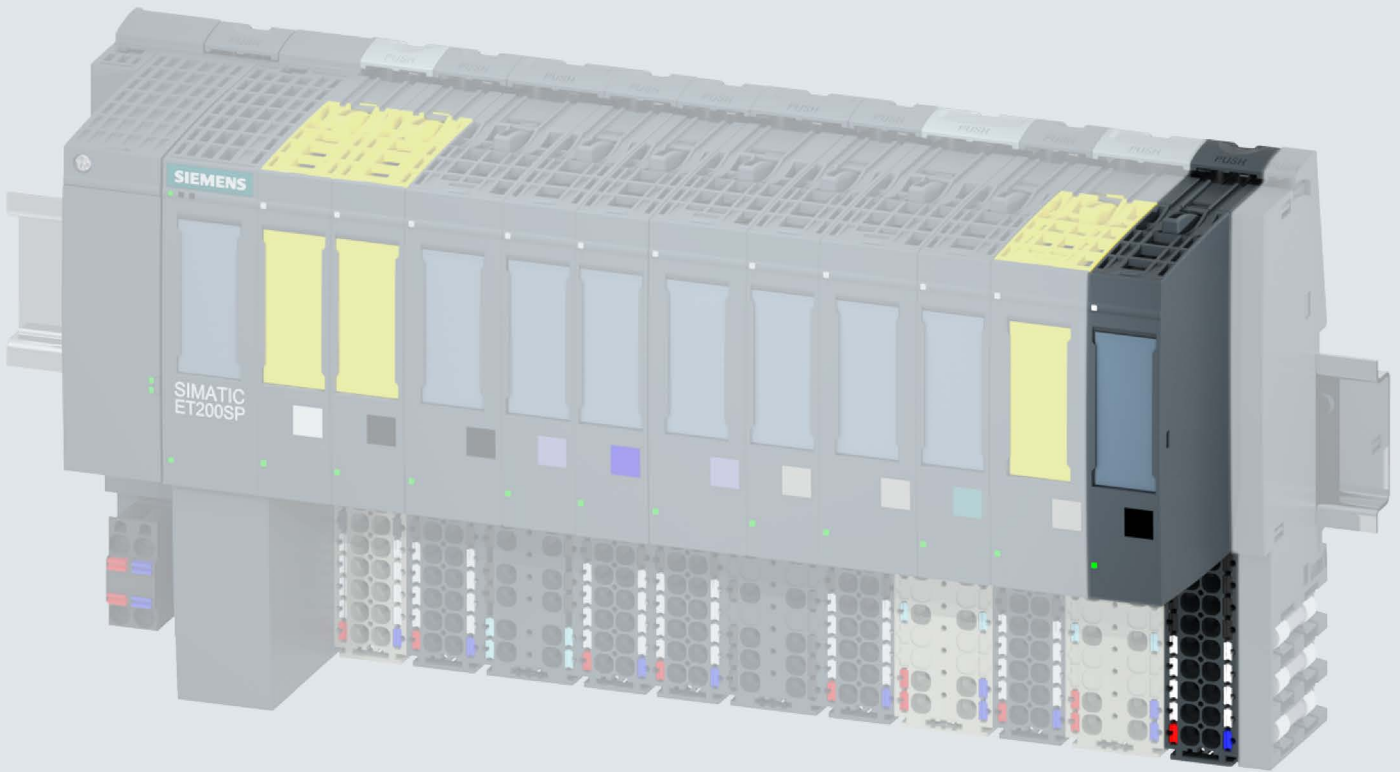
Manual

SIMATIC

ET 200SP

Digital input module
DQ 8x24VDC/0.5A HF (6ES7132-6BF00-0CA0)

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SIEMENS

SIMATIC

ET 200SP
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Manual

Legal information

Warning notice system

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

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

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

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

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

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

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

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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

Purpose of the documentation

This manual supplements the system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/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.

Changes compared to previous version

Compared to the previous version, this manual contains the following change:

Number in pack: 10 units (6ES7132-6BF00-2CA0)

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 distributed I/O system ET 200SP.

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.

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

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

For additional information on industrial security measures that may be implemented, please visit (https://www.siemens.com/industrialsecurity).

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.

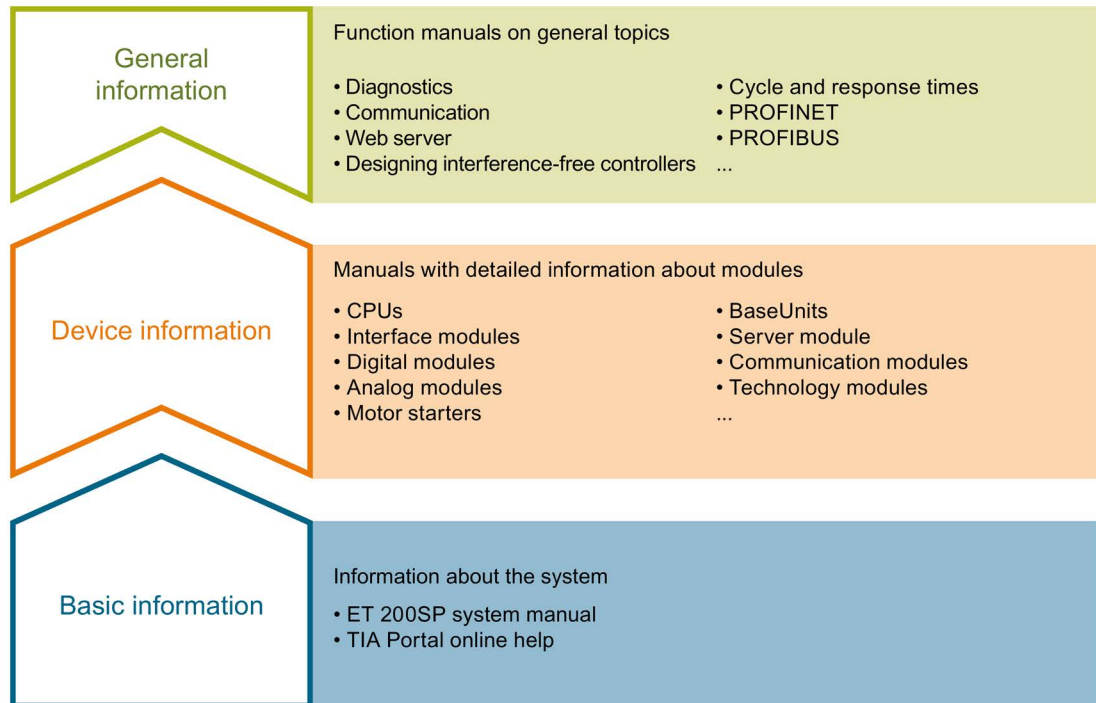To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under (https://www.siemens.com/industrialsecurity).

Table of contents

Documentation guide

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.

General information

Function manuals on general topics

- Diagnostics
- Communication
- Web server
- Designing interference-free controllers

- Cycle and response times
- PROFINET
- PROFIBUS
- ...

Device information

Manuals with detailed information about modules

- CPUs
- Interface modules
- Digital modules
- Analog modules
- Motor starters

- BaseUnits
- Server module
- Communication modules
- Technology modules
- ...

Basic information

Information about the system

- ET 200SP system manual
- TIA Portal online help

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 (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).

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).
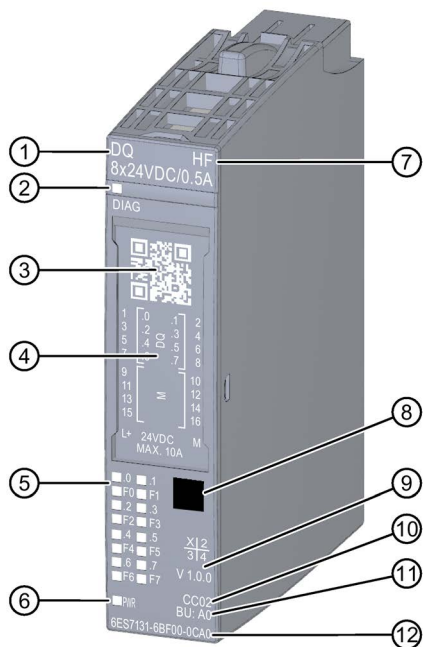
Product overview

2.1 Properties

Article number

6ES7132-6BF00-0CA0 (Number in pack: 1 unit)

6ES7132-6BF00-2CA0 (Number in pack: 10 units)

View of the module

①	Module type and name	⑦	Function class
②	LED for diagnostics	⑧	Color coding module type
③	2D matrix code	⑨	Function and firmware version
④	Wiring diagram	⑩	Color code for selecting the color identification labels
⑤	LEDs for channel status	⑪	BU type
⑥	LED for supply voltage	⑫	Article number

Figure 2-1   View of the module DQ 8x24VDC/0,5A HF

Properties

The module has the following technical properties:

- Digital output module with 8 outputs

- Source output (PNP, P-switching)

- Supply voltage L+

- Output current 0.5 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:

Table 2- 1   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 SP1 or higher	V5.5 SP3 or higher	X	X
Identification data I&M0 to I&M3	FS01	V1.0.0 or higher	V12 or higher	V5.5 SP3 or higher with HSP 0230 V1.0 or higher	X	X
Configuration in RUN	FS01	V1.0.0 or higher	V12 or higher	V5.5 SP3 or higher	X	X
PROFIenergy	FS01	V1.0.0 or higher	V14 SP1 or higher	V5.5 SP3 or higher	X	X
Value status	FS01	V1.1.0 or higher	V14 SP1 or higher	V5.5 SP3 or higher with HSP 0230 V2.0 or higher	X	X
Isochronous mode	FS01	V1.1.0 or higher	V14 SP1 or higher	V5.5 SP3 or higher	X	X
Module-internal shared input (MSI)	FS01	V1.2.0 or higher	V14 SP1 V13 or higher	V5.5 SP3 or higher	X	X
Configurable submodule/submodules for shared device	FS01	V2.0.0 or higher	V14 SP1 or higher	V5.5 SP3 or higher	X	X

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 manual Distributed I/O System ET 200SP.

See also

ET 200SP distributed I/O system (https://support.industry.siemens.com/cs/ww/en/view/58649293)

Wiring 3

3.1 Wiring and block diagram

This section includes the block diagram of the DQ 8x24VDC/0.5A 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.

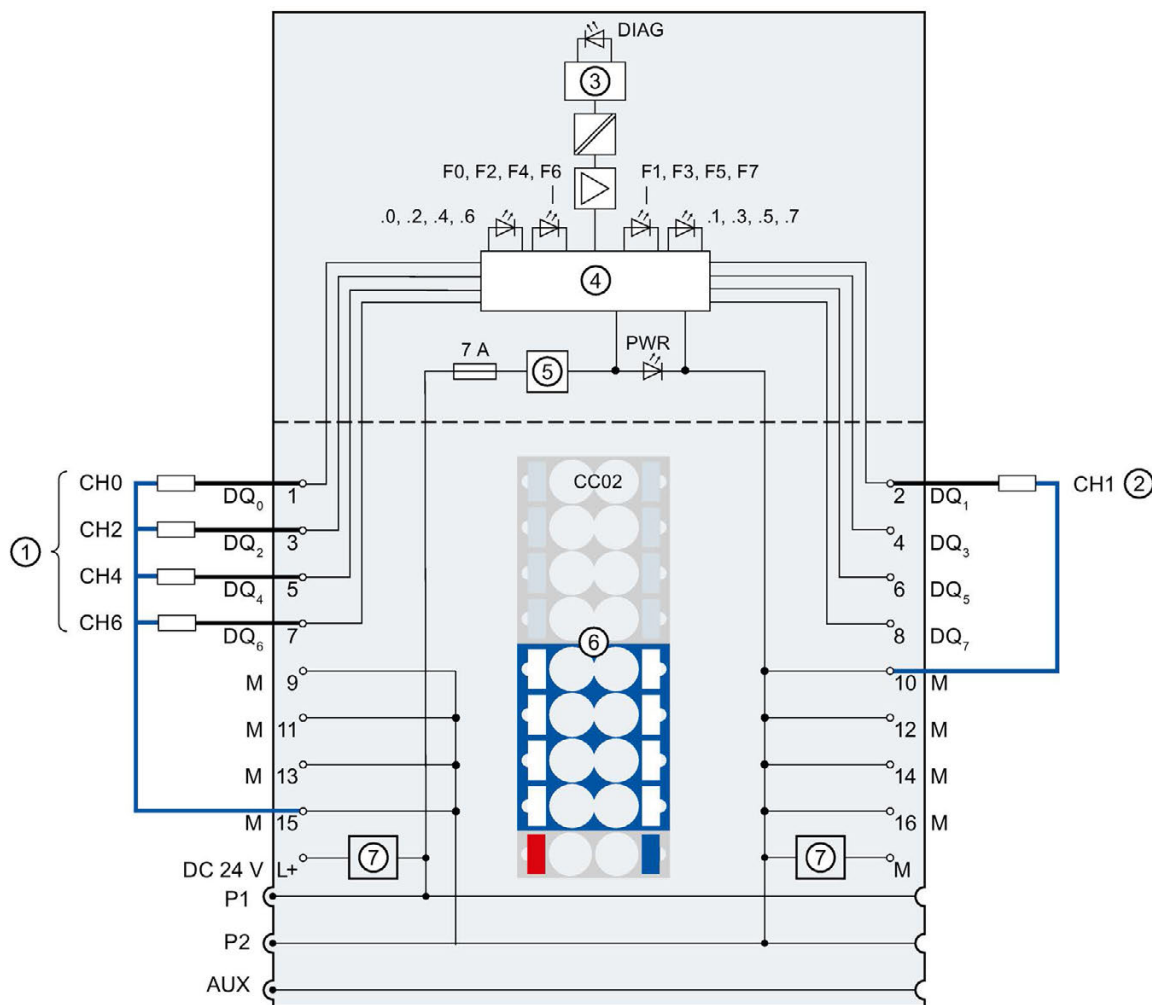You can find information on wiring the BaseUnit in the system manual Distributed I/O System ET 200SP (http://support.automation.siemens.com/WW/view/en/58649293).

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 8×24VDC/0.5A 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	DQ_n	Output signal, channel n
⑤	Polarity reversal protection	DIAG	Error or diagnostics LED (green, red)
⑥	Color-coded label with color code CC02 (optional)	.0 to .7	Channel status LED (green)
⑦	Filter connection supply voltage (only when light-colored BaseUnit is present)	F0 to F7	Channel fault LED (red)

| | PWR | Power LED (green) |

Figure 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 8×24VDC/0.5A HF on the BaseUnit BU type A0 with AUX terminals (3-wire connection).
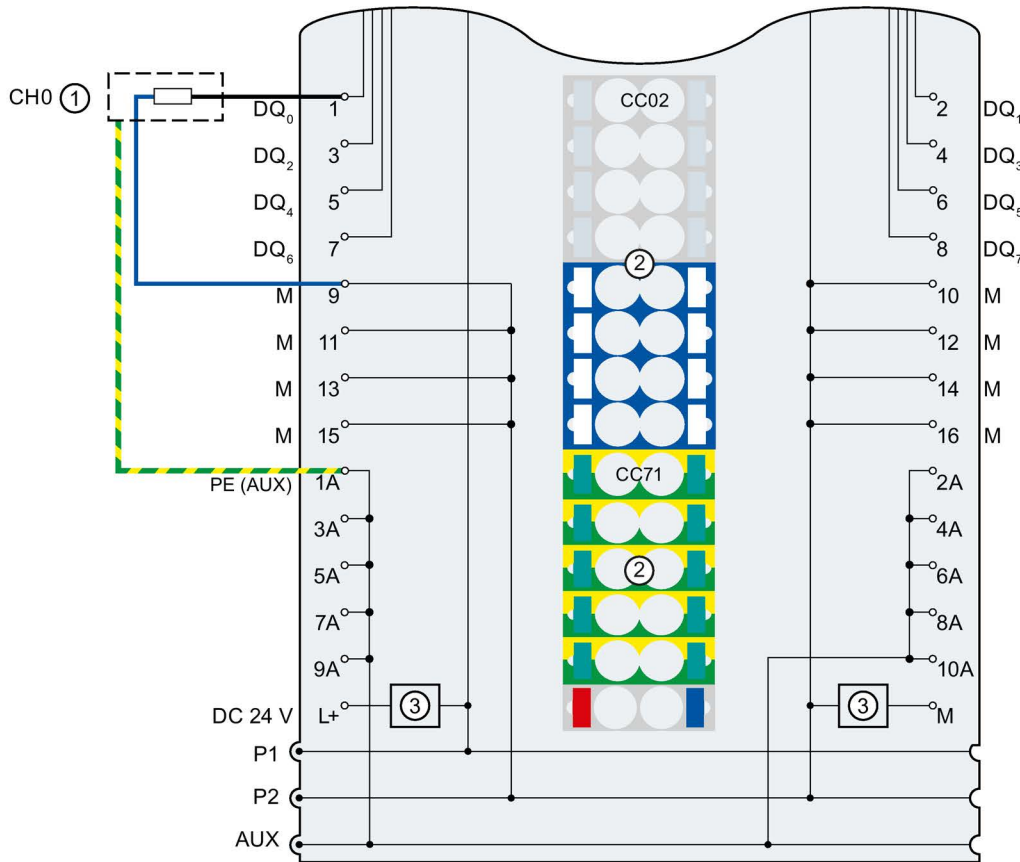
①	3-wire connection	1 A to 10 A	AUX terminals
②	Color-coded labels with color codes CC02 and CC71 (optional)	PE (AUX)	Protective conductor connection
③	Filter connection supply voltage (only when light-colored BaseUnit is present)	24 V DC	Supply voltage L+ (infeed for light-colored BaseUnit only)
DQn	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)

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

Parameters/address space

<div style="text-align: right; font-size: 2em;">4</div>

4.1 Parameters

Parameters of the DQ 8x24VDC/0.5A 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 35)).

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

Parameter	Value range	Default	Configuration in RUN	Scope with configuration software, e.g., STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP
Diagnostics No supply voltage L+	• Disable • Enable	Disable	Yes	Channel	Channel
Diagnostics Short-circuit to ground	• Disable • Enable	Disable	Yes	Channel	Channel [1]
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	Value range	Default	Configuration in RUN	Scope with configuration software, e.g., STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP
Reaction to CPU STOP	• Turn off • Keep last value • Output substitute value 1	Turn off	Yes	Channel	Module [1]
Potential group	• Use potential group of the left module (module plugged into a dark-colored 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, however, with data records 64 to 71 or data record 128, see Appendix "Parameter data record".

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. *

* as of module revision 05

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.

See also

See system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293).

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 8x24VDC/0.5A HF

You can configure the module with STEP 7 (TIA Portal) or with a GSD file. If you configure the module by means of a GSD file, the configurations are available under various short designations/module names; see the table below. 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. with 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 8-channel without value status	DQ 8x24VDC/0.5A HF V1.0	X	X	X
1 x 8-channel without value status	DQ 8x24VDC/0.5A HF V1.1	X	X	X
1 x 8-channel with value status	DQ 8x24VDC/0.5A HF V1.1, QI	X	X	---
1 x 8-channel without value status	DQ 8x24VDC/0.5A HF V1.2	X	X	X
1 x 8-channel with value status	DQ 8x24VDC/0.5A HF V1.2, QI	X	X	---
1 x 8-channel with value status for module-internal Shared Output with up to 4 submodules	DQ 8x24VDC/0.5A HF V1.2, MSO	X	X	---
1 x 8-channel without value status	DQ 8x24VDC/0.5A HF V2.0	---	X	X
1 x 8-channel with value status	DQ 8x24VDC/0.5A HF V2.0, QI	---	X	---
1 x 8-channel with value status for module-internal Shared Output with up to 4 submodules	DQ 8x24VDC/0.5A HF V2.0, MSO	---	X	---
2 x 4-channel without value status	DQ 8x24VDC/0.5A HF V2.0, S.2	---	X	---
2 x 4-channel with value status	DQ 8x24VDC/0.5A HF V2.0, S.2 QI	---	X	---
4 x 2-channel without value status	DQ 8x24VDC/0.5A HF V2.0, S.4	---	X	---
4 x 2-channel with value status	DQ 8x24VDC/0.5A HF V2.0, S.4 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 4- / 4 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 8x24VDC/0.5A HF QI
- DQ 8x24VDC/0.5A 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 8-channel DQ 8x24VDC/0.5A HF

The figure below shows the address space assignment for configuration as a 1 x 8-channel module without value status
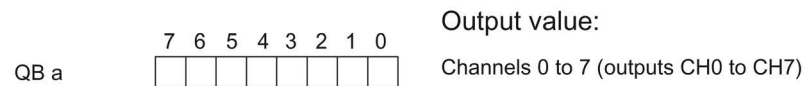
Assignment in the process image output (PIQ)

Output value:

Channels 0 to 7 (outputs CH0 to CH7)

Figure 4-1   Address space for configuration as 8-channel DQ 8x24VDC/0.5A HF, QI without value status

Address space for configuration as 1 x 8-channel DQ 8x24VDC/0.5A HF, QI

The following figure shows the assignment of the address space for the configuration as 1 x 8-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.
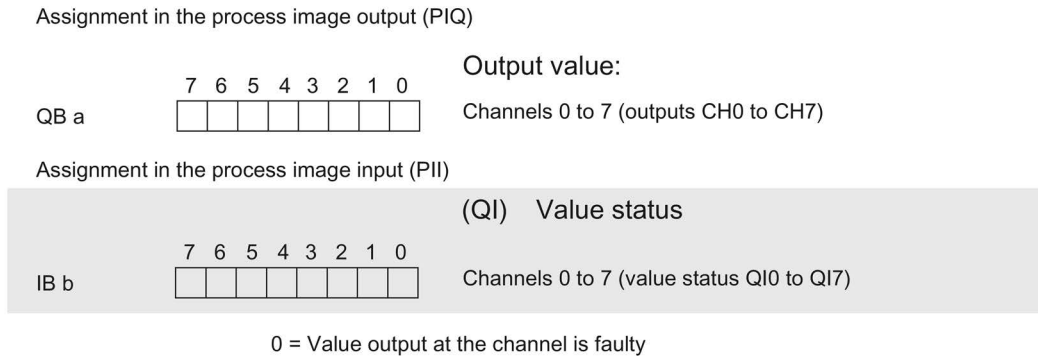
Assignment in the process image output (PIQ)

Output value:

```
        7  6  5  4  3  2  1  0
QB a    [  ][  ][  ][  ][  ][  ][  ][  ]     Channels 0 to 7 (outputs CH0 to CH7)
```

Assignment in the process image input (PII)

(QI)   Value status

```
        7  6  5  4  3  2  1  0
IB b    [  ][  ][  ][  ][  ][  ][  ][  ]     Channels 0 to 7 (value status QI0 to QI7)
```

0 = Value output at the channel is faulty

Figure 4-2   Address space for configuration as 8-channel DQ 8x24VDC/0.5A HF, QI with value status

Address space for configuration as 1 x 8-channel DQ 8x24VDC/0.5A HF, MSO

For the configuration as a 1 x 8-channel module (module-internal Shared Output, MSO), channels 0 to 7 of the module are copied to up to four submodules. Channels 0 to 7 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 7.

- The IO controllers to which submodule 2, 3, or 4 is assigned have read access to outputs 0 to 7.

Value status (Quality Information, QI)

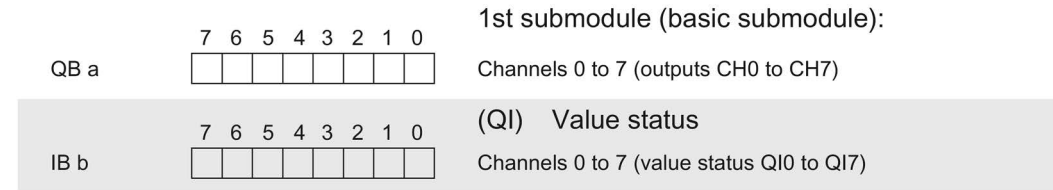The meaning of the value status depends on the submodule on which it occurs.

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:
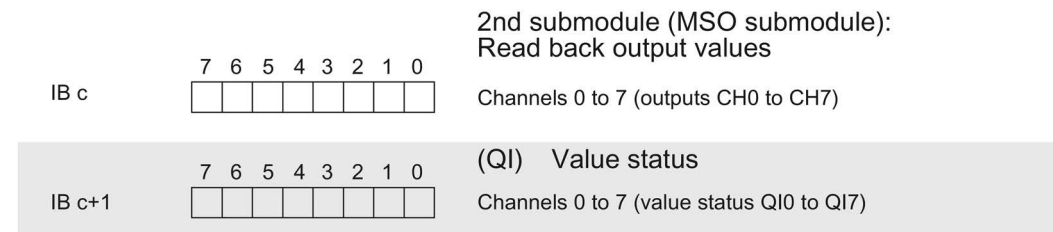
- The basic submodule is not yet configured (not ready).

- 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.
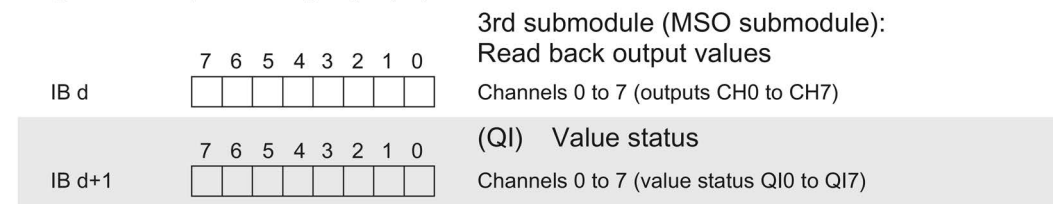
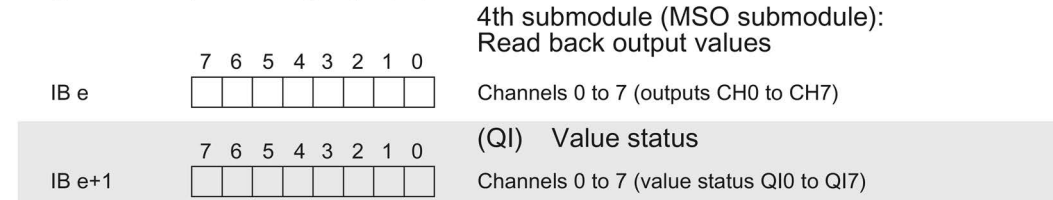Assignment in the process image output (PIO) for 1st submodule

QB a   7 6 5 4 3 2 1 0

1st submodule (basic submodule):
Channels 0 to 7 (outputs CH0 to CH7)

IB b   7 6 5 4 3 2 1 0

(QI)   Value status
Channels 0 to 7 (value status QI0 to QI7)

Assignment in the process image input (PII) for 2nd submodule

IB c   7 6 5 4 3 2 1 0

2nd submodule (MSO submodule):
Read back output values

Channels 0 to 7 (outputs CH0 to CH7)

IB c+1   7 6 5 4 3 2 1 0

(QI)   Value status
Channels 0 to 7 (value status QI0 to QI7)

Assignment in the process image input (PII) for 3rd submodule

IB d   7 6 5 4 3 2 1 0

3rd submodule (MSO submodule):
Read back output values
Channels 0 to 7 (outputs CH0 to CH7)

IB d+1   7 6 5 4 3 2 1 0

(QI)   Value status
Channels 0 to 7 (value status QI0 to QI7)

Assignment in the process image input (PII) for 4th submodule

IB e   7 6 5 4 3 2 1 0

4th submodule (MSO submodule):
Read back output values

Channels 0 to 7 (outputs CH0 to CH7)

IB e+1   7 6 5 4 3 2 1 0

(QI)   Value status
Channels 0 to 7 (value status QI0 to QI7)

0 = Value output at the channel is faulty

Figure 4-3   Address space for configuration as 1 x 8-channel DQ 8x24VDC/0.5A HF MSO with value status

Address space for configuration as 2 x 4-channel DQ 8x24VDC/0.5A HF V2.0, S.2

The figure below shows the address space assignment for configuration as a 2 x 4-channel module without value status.

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

Assignment in the process image output (PIQ)

Output value:

	7 6 5 4 3 2 1 0		
QB a	0 0 0 0	Channels 0 to 3 (output CH0 to CH3)	1st submodule
QB b	0 0 0 0	Channel 4 to 7 (output CH4 to CH7)	2nd submodule

Figure 4-4   Address space for configuration as 2 x 4-channel DQ 8x24VDC/0.5A HF V2.0, S.2 without value status

Address space for configuration as 2 x 4-channel DQ 8x24VDC/0.5A HF V2.0, S.2 QI

The figure below shows the address space assignment for configuration as a 2 x 4-channel module with value status.

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

Assignment in the process image output (PIQ)

Output value:

	7 6 5 4 3 2 1 0		
QB a	0 0 0 0	Channels 0 to 3 (output CH0 to CH3)	1st submodule
QB b	0 0 0 0	Channel 4 to 7 (output CH4 to CH7)	2nd submodule

Assignment in the process image input (PII)

(QI)   Value status

	7 6 5 4 3 2 1 0		
IB c	0 0 0 0	Channel 0 to 3 (value status QI0 to QI3)	1st submodule
IB d	0 0 0 0	Channel 4 to 7 (value status QI4 to QI7)	2nd submodule

0 = Value output at the channel is faulty

Figure 4-5   Address space for configuration as 2 x 4-channel DQ 8x24VDC/0.5A HF V2.0, S.2 QI with value status

Address space for configuration as 4 x 2-channel DQ 8x24VDC/0.5A HF V2.0, S.4

The figure below shows the address space assignment for configuration as a 4 x 2-channel module without value status.

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

Assignment in the process image output (PIQ)

Output value:

		7 6 5 4 3 2 1 0			
QB a		0 0 0 0 0 0	Channels 0 and 1 (outputs CH0 and CH1)	1st submodule
QB b		0 0 0 0 0 0	Channel 2 and 3 (output CH2 and CH3)	2nd submodule
QB c		0 0 0 0 0 0	Channel 4 and 5 (output CH4 and CH5)	3rd submodule
QB d		0 0 0 0 0 0	Channel 6 and 7 (output CH6 and CH7)	4th submodule

Figure 4-6   Address space for configuration as 4 x 2-channel DQ 8x24VDC/0.5A HF V2.0, S.4 without value status

Address space for configuration as 4 x 2-channel DQ 8x24VDC/0.5A HF V2.0, S.4 QI

The figure below shows the address space assignment for configuration as a 4 x 2-channel module with value status.

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

Assignment in the process image output (PIQ)

Output value:

	7 6 5 4 3 2 1 0		
QB a	0 0 0 0 0 0	Channels 0 and 1 (outputs CH0 and CH1)	1st submodule
QB b	0 0 0 0 0 0	Channel 2 and 3 (output CH2 and CH3)	2nd submodule
QB c	0 0 0 0 0 0	Channel 4 and 5 (output CH4 and CH5)	3rd submodule
QB d	0 0 0 0 0 0	Channel 6 and 7 (output CH6 and CH7)	4th submodule

Assignment in the process image input (PII)

(QI)   Value status

	7 6 5 4 3 2 1 0		
IB e	0 0 0 0 0 0	Channels 0 and 1 (value status QI0 and QI1)	1st submodule
IB f	0 0 0 0 0 0	Channel 2 and 3 (value status QI2 and QI3)	2nd submodule
IB g	0 0 0 0 0 0	Channel 4 and 5 (value status QI4 and QI5)	3rd submodule
IB h	0 0 0 0 0 0	Channel 6 and 7 (value status QI6 and QI7)	4th submodule

0 = Value output at the channel is faulty

Figure 4-7   Address space for configuration as 4 x 2-channel DQ 8x24VDC/0.5A HF V2.0, S.4 QI with value status

Interrupts/diagnostics alarms

<div align="right">5</div>

5.1 Status and error displays

LED displays

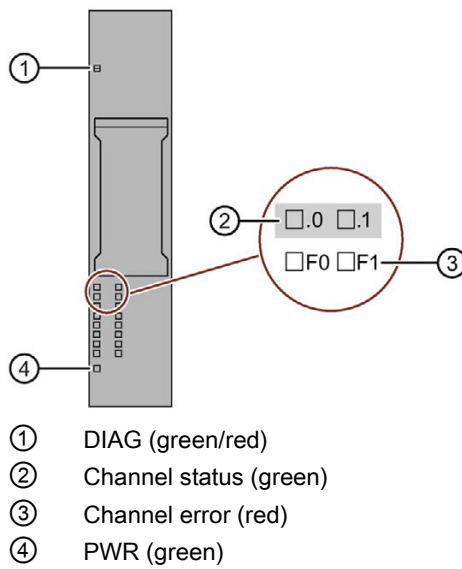The figure below shows the LED displays (status and error displays) of the DQ 8x24VDC/0.5A HF:

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

Figure 5-1   LED displays

Meaning of the LEDs

The tables below explain the meaning of the status and error displays. Corrective measures for diagnostics alarms can be found in section Diagnostics alarms (Page 30).

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 not ready for operation (no parameters 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

LED channel status	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 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 8×24VDC/0.5A 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

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 alarm	Error code	Meaning	Solution
Short-circuit	1H	• Short-circuit of actuator supply to ground [1] • Short-circuit of actuator supply to L+ [2]	Correct the process wiring
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
		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	10H	• 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+	• Check supply voltage L+ on 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.	• 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 8x24VDC/0.5A HF

Article number	6ES7132-6BF00-0CA0
General information	
Product type designation	DQ 8x24 V DC/0.5 A HF
Firmware version	V2.0
• FW update possible	Yes
usable BaseUnits	BU type A0
Color code for module-specific color identification plate	CC02
Product function	
• I&M data	Yes; I&M0 to I&M3
Engineering with	
• STEP 7 TIA Portal configurable/integrated as of version	V13 SP1 / -
• STEP 7 configurable/integrated as of version	V5.5 / -
• PCS 7 configurable/integrated as of version	V8.1 SP1
• PROFIBUS as of GSD version/GSD revision	One GSD file each, Revision 3 and 5 and higher
• 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
Redundancy	
• Redundancy capability	Yes

Article number	6ES7132-6BF00-0CA0
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Output voltage	
Rated value (DC)	24 V
Power loss	
Power loss, typ.	1 W
Address area	
Address space per module	
• Address space per module, max.	8 byte; 2 channels per submodule + QI infor-mation
Digital outputs	
Type of digital output	Source output (PNP, current-sourcing)
Number of digital outputs	8
Current-sinking	No
Current-sourcing	Yes
Short-circuit protection	Yes
• Response threshold, typ.	0.7 to 1.3 A
Limitation of inductive shutdown voltage to	Typ. L+ (-50 V)
Controlling a digital input	Yes
Switching capacity of the outputs	
• with resistive load, max.	0.5 A
• on lamp load, max.	5 W
Load resistance range	
• lower limit	48 Ω
• upper limit	12 kΩ
Output current	
• for signal "1" rated value	0.5 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 switching of two outputs	
• for uprating	No
• for redundant control of a load	Yes

Article number	6ES7132-6BF00-0CA0
Switching frequency	
• with resistive load, max.	100 Hz
• with inductive load, max.	2 Hz
• on lamp load, max.	10 Hz
Total current of the outputs	
• Current per channel, max.	0.5 A
• Current per module, max.	4 A
Total current of the outputs (per module)	
horizontal installation	
– up to 60 °C, max.	4 A
vertical installation	
– up to 50 °C, max.	4 A; in all other mounting positions
Cable length	
• shielded, max.	1 000 m
• unshielded, max.	600 m
Isochronous mode	
Isochronous operation (application synchronized up to terminal)	Yes
Execution and activation time (TCO), min.	48 µs
Bus cycle time (TDP), min.	500 µs
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Substitute values connectable	Yes
Alarms	
• Diagnostic alarm	Yes
Diagnostic messages	
• Monitoring the supply voltage	Yes
• Wire-break	Yes; channel by channel
• Short-circuit	Yes; channel by channel
• 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 LED
• for module diagnostics	Yes; green/red DIAG LED

Article number	6ES7132-6BF00-0CA0
Potential separation	
Potential separation channels	
• between the channels	No
• between the channels and backplane bus	Yes
Isolation	
Isolation tested with	707 V DC (type test)
Dimensions	
Width	15 mm
Height	73 mm
Depth	58 mm
Weights	
Weight, approx.	30 g

Safety-related shutdown

> **Note**
>
> The digital output module DQ 8x24VDC/0.5A 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.

Dimension drawing

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

Parameter data record

<div style="text-align: right; font-size: 3em;">A</div>

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.

With data records 64 to 71, you can configure individual channels.

Parameter assignment in the user program

You have the option to reconfigure 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 or data records 64 to 71. 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.
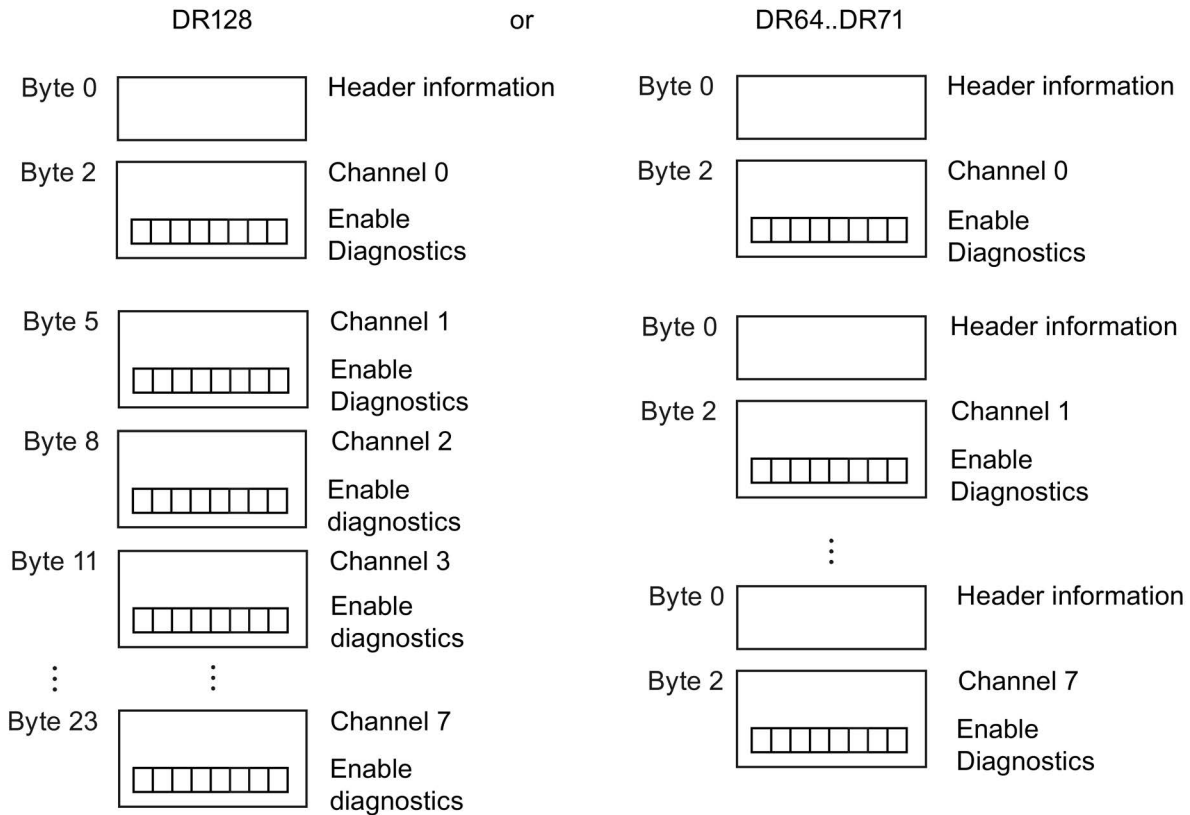
Data record structure

Figure A-1   Structure of data record 128 or data records 64 to 71

Header information

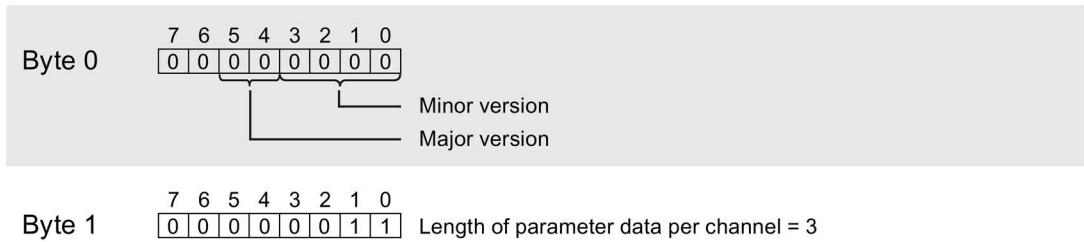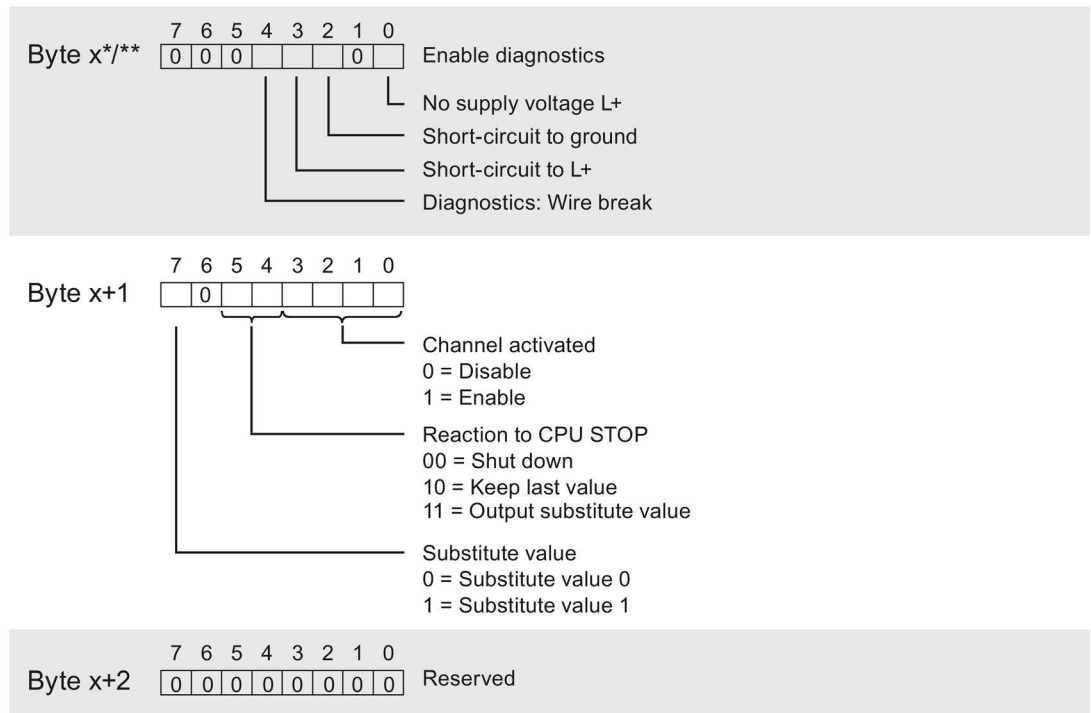The figure below shows the structure of the header information.

Figure A-2   Header information

Parameter

The figure below shows the structure of the parameters for channels 0 to 7.

You enable a parameter by setting the corresponding bit to "1".

* x = 2 + (channel number × 3); channel number = 0 to 7 for DR 128
** x =2 for DR 64 to DR 71

Figure A-3   Structure of byte x to x+2 for channels 0 to 7

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 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 unavailable	• Check the station to determine whether the module is plugged 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