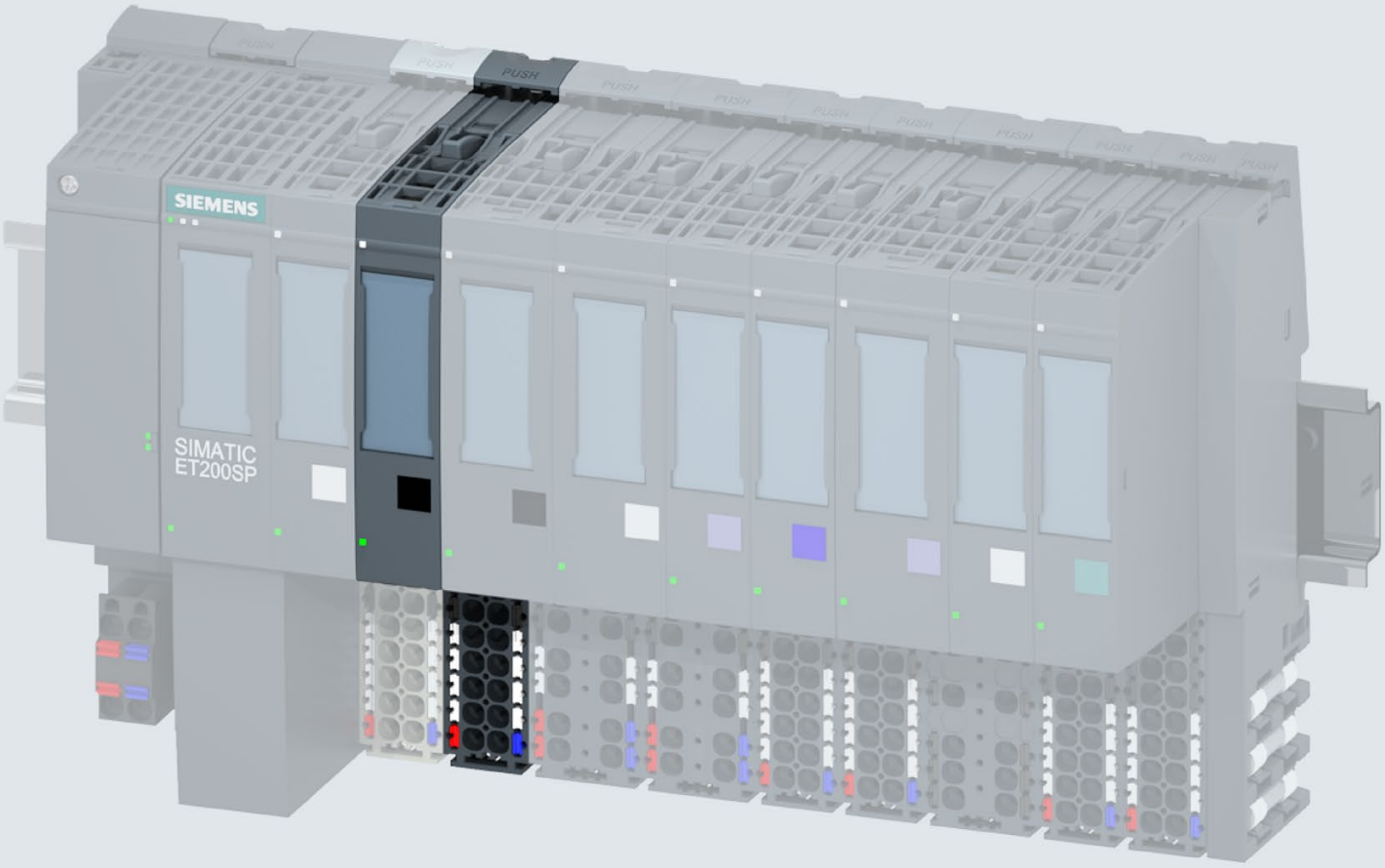
SIEMENS



Manual

SIMATIC

ET 200SP

Digital output module
RQ 4x24VUC/2A CO ST (6ES7132-6GD51-0BA0)

Edition 02/2019

support.industry.siemens.com

SIEMENS

SIMATIC

ET 200SP
Digital output module
RQ 4x24VUC/2A CO ST
(6ES7132-6GD51-0BA0)

Manual

02/2019
A5E32855952-AD

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.

Siemens AG
Digital Industries
Postfach 48 48
90026 NÜRNBERG
GERMANY

A5E32855952-AD
℗ 05/2019 Subject to change

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:

Technical specifications: Ambient temperature in horizontal and vertical mounting position, extended to min. -30 °C.

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 can be implemented, please visit (http://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.

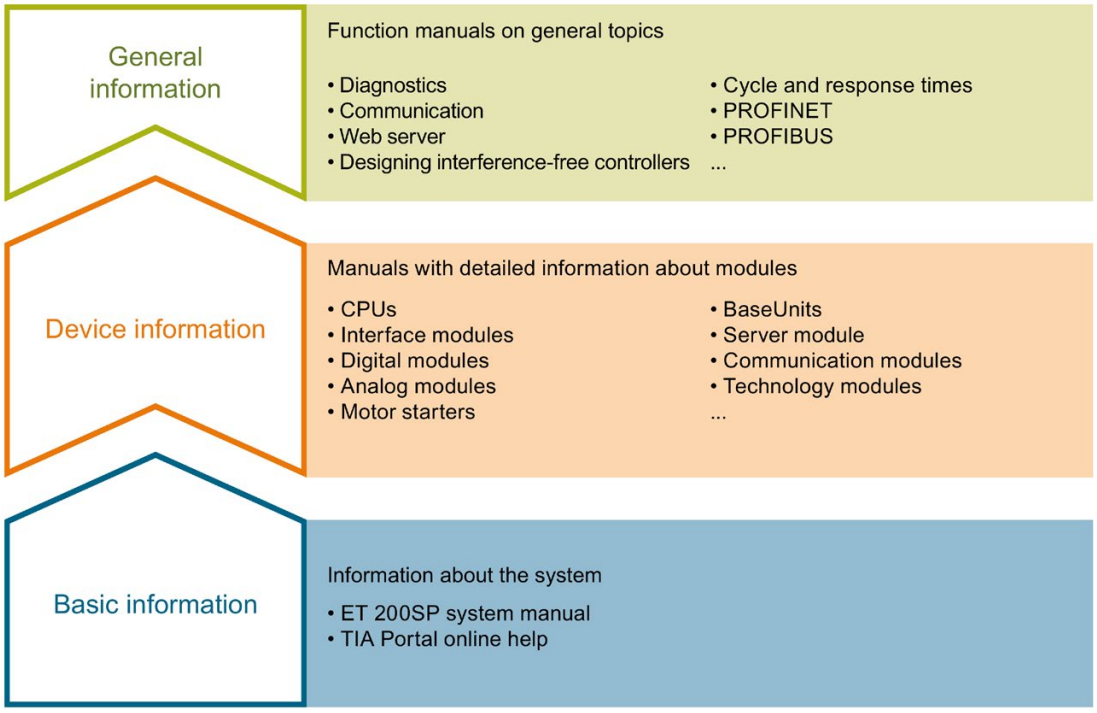
To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed visit (http://www.siemens.com/industrialsecurity).

Table of contents

Documentation guide

1

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 and Getting Started describe 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 (https://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).

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).

Product overview

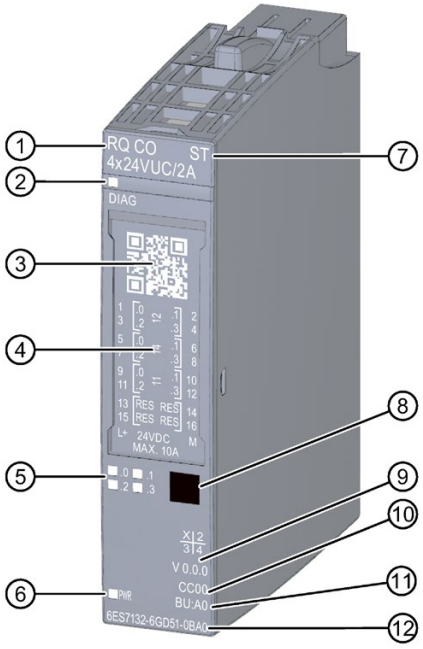
2

2.1 Properties

Part number

6ES7132-6GD51-0BA0

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
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 BU type
⑫ Article number

Figure 2-1 View of the RQ 4×24VUC/2A CO ST module

Properties

The module has the following technical properties:

- 4 digital outputs with floating relay changeover contacts
- Supply voltage L+
- Output current per output 2 A
- Normally open contact (NO: normally open) and normally closed contact (NC: normally closed)
- Assignable substitute values (per channel)
- Configurable diagnostics (per module)
- Suitable for resistive load

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
Identification data I&M0 to I&M3	FS01	V0.0.0 and higher	V14 or higher with HSP 0222	V5.5 SP3 or higher with HSP 0232 V7.0	X	X
Configuration in RUN	FS01	V0.0.0 and higher	V14 or higher with HSP 0222	V5.5 SP3 or higher with HSP 0232 V7.0	X	X
PROFIenergy	FS01	V0.0.0 and higher	V14 or higher with HSP 0222	V5.5 SP3 or higher with HSP 0232 V7.0	X	X
Value status	FS01	V0.0.0 and higher	V14 or higher with HSP 0222	V5.5 SP3 or higher with HSP 0232 V7.0	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 ET 200SP Distributed I/O System (https://support.automation.siemens.com/WW/view/en/58649293) system manual.

Wiring

3

3.1 Wiring and block diagram

This section includes the block diagram of the RQ 4x24VUC/2A CO ST module with the terminal assignments for a 3-wire connection.

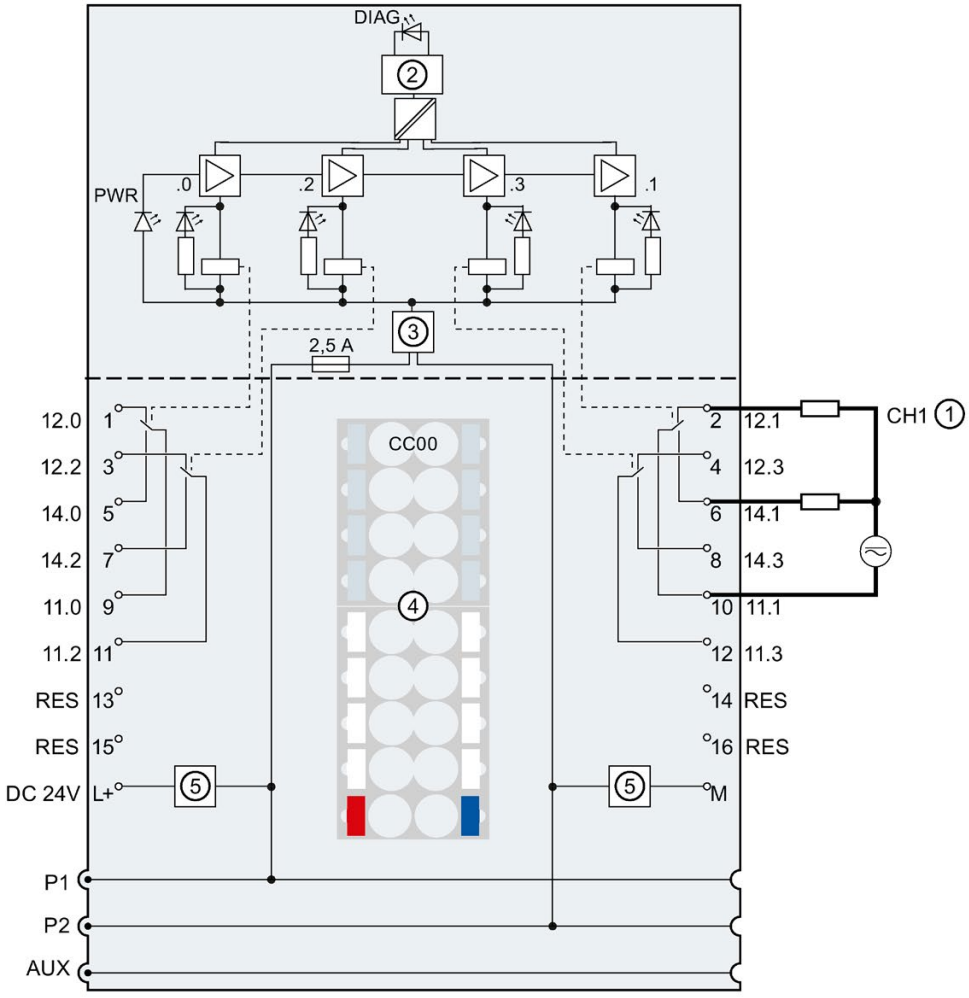
You can find information on wiring the BaseUnit in the ET 200SP distributed I/O system (https://support.automation.siemens.com/WW/view/en/58649293) system manual.

Note

You may use and combine the different wiring options for all channels.

Connection: 2-wire connection of actuators

The following figure shows the block diagram and an example of the terminal assignment of the digital output module RQ 4x24VUC/2A CO ST on the BaseUnit BU type A0.



①	2-wire connection	11.n	Common contact
②	Backplane bus interface	12.n	Normally closed contact
③	Reverse polarity protection	14.n	Normally open contact
④	Color-coded label CCxx (optional)	n	Channel
⑤	Filter connection supply voltage (only when light-colored BaseUnit is present)	DIAG	Diagnostics LED (green, red)
P1, P2, AUX	Internal self-assembling voltage buses Connection to left (dark-colored BaseUnit)	L+	24 V DC (infeed only with light-colored BaseUnit)
.0, .1, .2, .3	Channel status LED (green)	PWR	Power LED (green)
		M	Ground

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

Parameters/address space

4

4.1 Parameters

RQ 4x24VUC/2A CO ST parameters

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 23)).

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

Parameter	Value range	Default	Reconfiguration 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	Module	Module
Channel activated	• Disable • Enable	Enable	Yes	Channel	Channel
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-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 configuration options are restricted. The parameter length of the I/O module is 4 bytes with PROFIBUS GSD configuration. If necessary, you can set this parameter, however, with data record 128, see appendix "Parameter data record".

4.2 Explanation of parameters

Diagnostics: No supply voltage L+

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

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 of the inputs.

Configuration options of RQ 4x24VUC/2A CO ST

You can configure the module with STEP 7 (TIA Portal) or with a GSD file. If you configure the module using 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 hardware catalog STEP 7	GSD file PROFINET IO	GSD file PROFIBUS DP
1 x 4-channel without value status	RQ 4x24VUC/2A CO ST V0.0	V14, SP1 or higher with HSP 0222	X	X
1 x 4-channel with value status	RQ 4x24VUC/2A CO ST V0.0, QI	V14, SP1 or higher with HSP 0222	X	---

Evaluating the value status

An additional two bytes are allocated in the input address space if you enable the value status for the digital module. Bits 0 to 3 in these bytes are assigned to a channel. They provide information about the validity of the digital value.

Bit = 1: No fault is present on the channel.

Bit = 0: Channel is disabled or there is a fault/error on the module.

If a fault/error occurs on a channel with this module, the value status for all channels is 0.

Address space

The following figure shows the assignment of the address space for the RQ 4x24VUC/2A CO ST with value status (Quality Information (QI)). The addresses for the value status are only available if the value status is enabled.

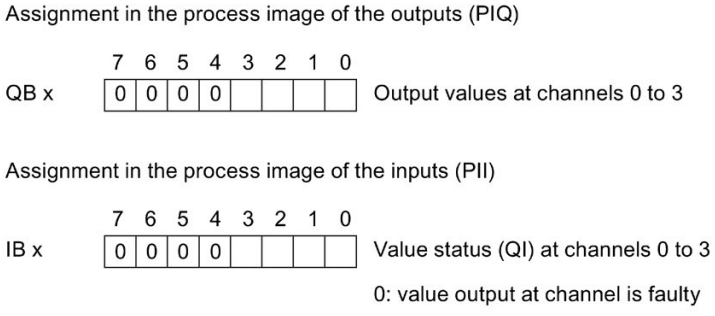


Figure 4-1 Address space of the digital output module RQ 4x24VUC/2A CO ST

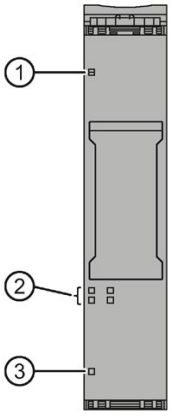
Interrupts/diagnostics alarms

5

5.1 Status and error displays

LED displays

The figure below shows the LED displays (status and error displays) of the RQ 4x24VUC/2A CO ST.



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

Figure 5-1 LED display

Meaning of the LED displays

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 17).

LED DIAG

Table 5- 1 Error display of the LED DIAG

LED DIAG	Meaning
Off	Backplane bus supply of the ET 200SP not OK
Flashes	Module not ready for operation (no parameters assigned)
On	Module parameters assigned
Flashes	Module diagnostics is available

LED channel status

Table 5- 2 Status display of the LED channel status

LED channel status	Meaning
Off	Channel deactivated or activated and process signal = 0
On	Channel activated

LED PWR

Table 5- 3 Status display of the LED PWR

LED PWR	Meaning
Off	No supply voltage L+
On	Supply voltage L+ present

5.2 Interrupts

The RQ 4×24VUC/2A CO ST digital output module supports diagnostics alarms.

Diagnostics interrupts

The module generates a diagnostic interrupt at the following event:

- Parameter assignment error
- No supply voltage

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

5.3 Diagnostics alarms

Diagnostics alarms

A diagnostic 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.

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

Diagnostics alarm	Error code	Meaning	Remedy
Parameter assignment error	10_H	The module cannot evaluate parameters for the channel	• Incorrect parameter assignment • Correct the parameter assignment
No supply voltage	11_H	No or insufficient supply voltage L+	• Check supply voltage L+ on the potential group • Check BaseUnit

Technical specifications

6

6.1 Technical specifications

Technical specifications of the RQ 4x24VUC/2A CO ST

The following table shows the technical specifications as of 02/2019. You will find a data sheet including daily updated technical specifications on the Internet (https://support.industry.siemens.com/cs/ww/en/pv/6ES7132-6GD51-0BA0/td?dl=en).

Article number	6ES7132-6GD51-0BA0
General information	
Product type designation	RQ CO 4x24VDC/2A ST
HW functional status	From FS02
Firmware version	V0.0
• FW update possible	No
usable BaseUnits	BU type A0
Color code for module-specific color identification plate	CC00
Product function	
• I&M data	Yes; I&M0 to I&M3
Engineering with	
• STEP 7 TIA Portal configurable/integrated as of version	V14
• STEP 7 configurable/integrated as of version	V5.5 SP3
• 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	No
Redundancy	
• Redundancy capability	Yes

Article number	6ES7132-6GD51-0BA0
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
Input current	
Current consumption (rated value)	50 mA
Power loss	
Power loss, typ.	1.2 W
Address area	
Address space per module	
• Inputs	+ 1 byte for QI information
• Outputs	1 byte
Hardware configuration	
Automatic encoding	Yes
• Mechanical coding element	Yes
Digital outputs	
Type of digital output	Relays
Number of digital outputs	4
Current-sinking	Yes
Current-sourcing	Yes
Digital outputs, parameterizable	Yes
Short-circuit protection	No
Parallel switching of two outputs	
• for logic links	Yes
• for uprating	No
• for redundant control of a load	Yes
Switching frequency	
• with resistive load, max.	2 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

Article number	6ES7132-6GD51-0BA0
– up to 50 °C, max.	4 A
Relay outputs	
• Number of relay outputs	4
• Rated supply voltage of relay coil L+ (DC)	24 V
• Current consumption of relays (coil current of all relays), max.	40 mA
Switching capacity of contacts	
– with resistive load, max.	2 A
– Thermal continuous current, max.	2 A
– Switching current, min.	1 mA; 5 V DC
– Rated switching voltage (DC)	24 V
– Rated switching voltage (AC)	24 V
Cable length	
• shielded, max.	1 000 m
• unshielded, max.	200 m
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	
• Monitoring the supply voltage	Yes
• Wire-break	No
• Short-circuit	No
Diagnostics indication LED	
• Monitoring of the supply voltage (PWR-LED)	Yes; green PWR LED
• Channel status display	Yes; Green LED
• for channel diagnostics	No
• for module diagnostics	Yes; green/red DIAG LED
Potential separation	
Potential separation channels	
• between the channels	Yes
• between the channels and backplane bus	Yes
• between the channels and the power supply of the electronics	Yes

Article number	6ES7132-6GD51-0BA0
Isolation	
Isolation tested with	707 V DC (type test)
Standards, approvals, certificates	
Suitable for safety functions	No
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-30 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
Dimensions	
Width	15 mm
Height	73 mm
Depth	58 mm
Weights	
Weight, approx.	30 g

Derating trend

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

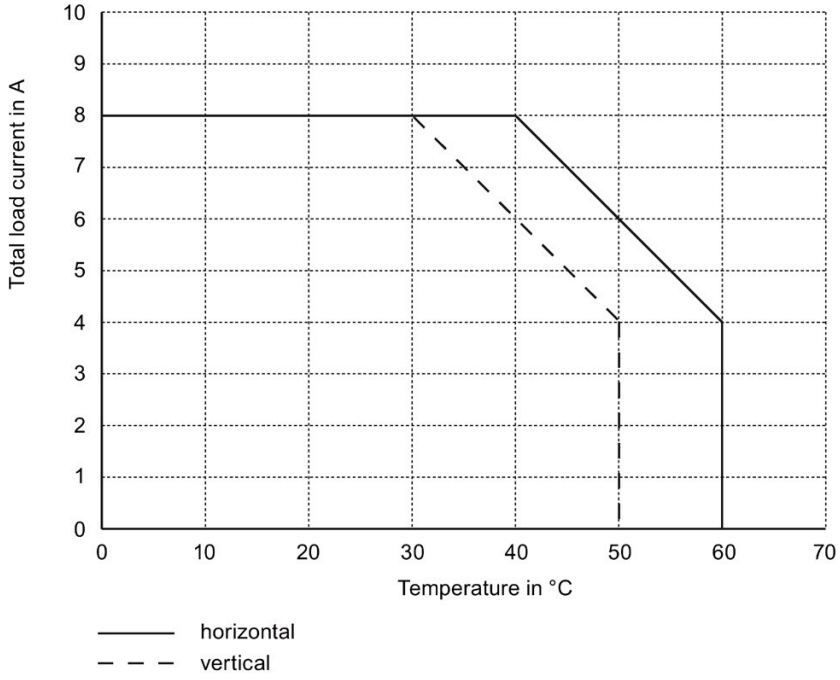


Figure 6-1 Load current for mounting position

Dimension drawing

See the 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.

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 in STEP 7 are not changed in the CPU, which means the parameters set in STEP 7 will be valid again 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

Note

Channel 0 includes the diagnostics enable for the entire module.

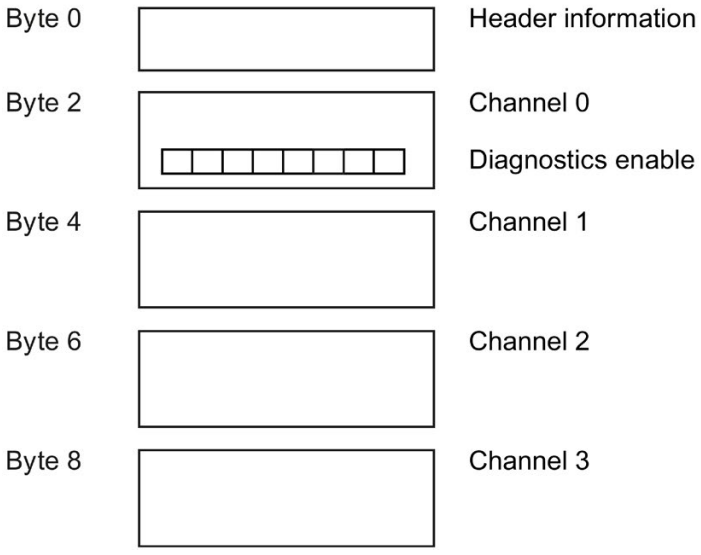


Figure A-1 Structure of data record 128

Header information

The figure below shows the structure of the header information.

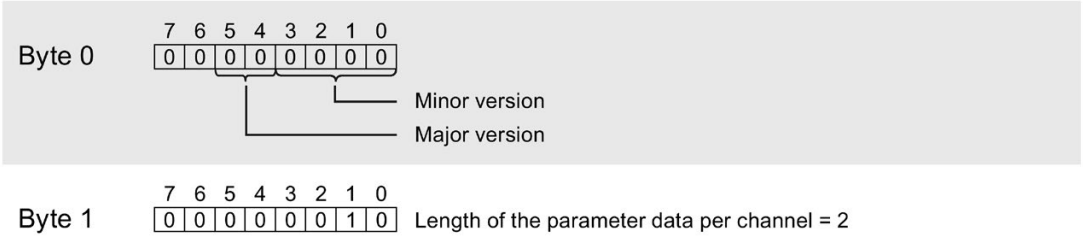
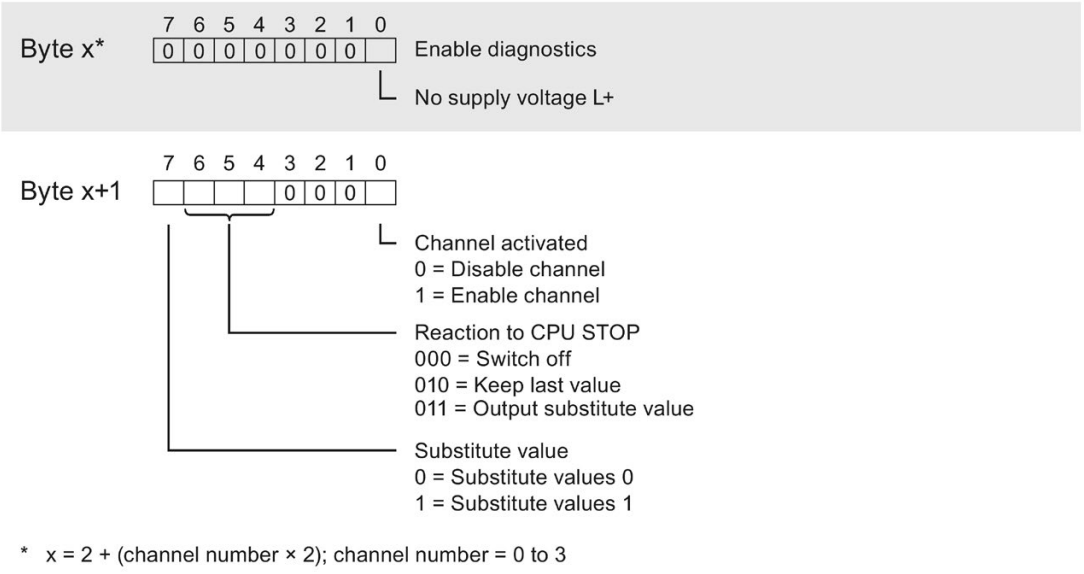


Figure A-2 Header information

Parameters

The figure below shows the structure of the parameters in data record 128.

Enable a parameter by setting the corresponding bit to "1".



* x = 2 + (channel number × 2); channel number = 0 to 3

Figure A-3 Structure byte x to x+1 for the channels 0 to 3

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.	• 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	06	Invalid coding for substitute value behavior.	Check the parameters of the module.