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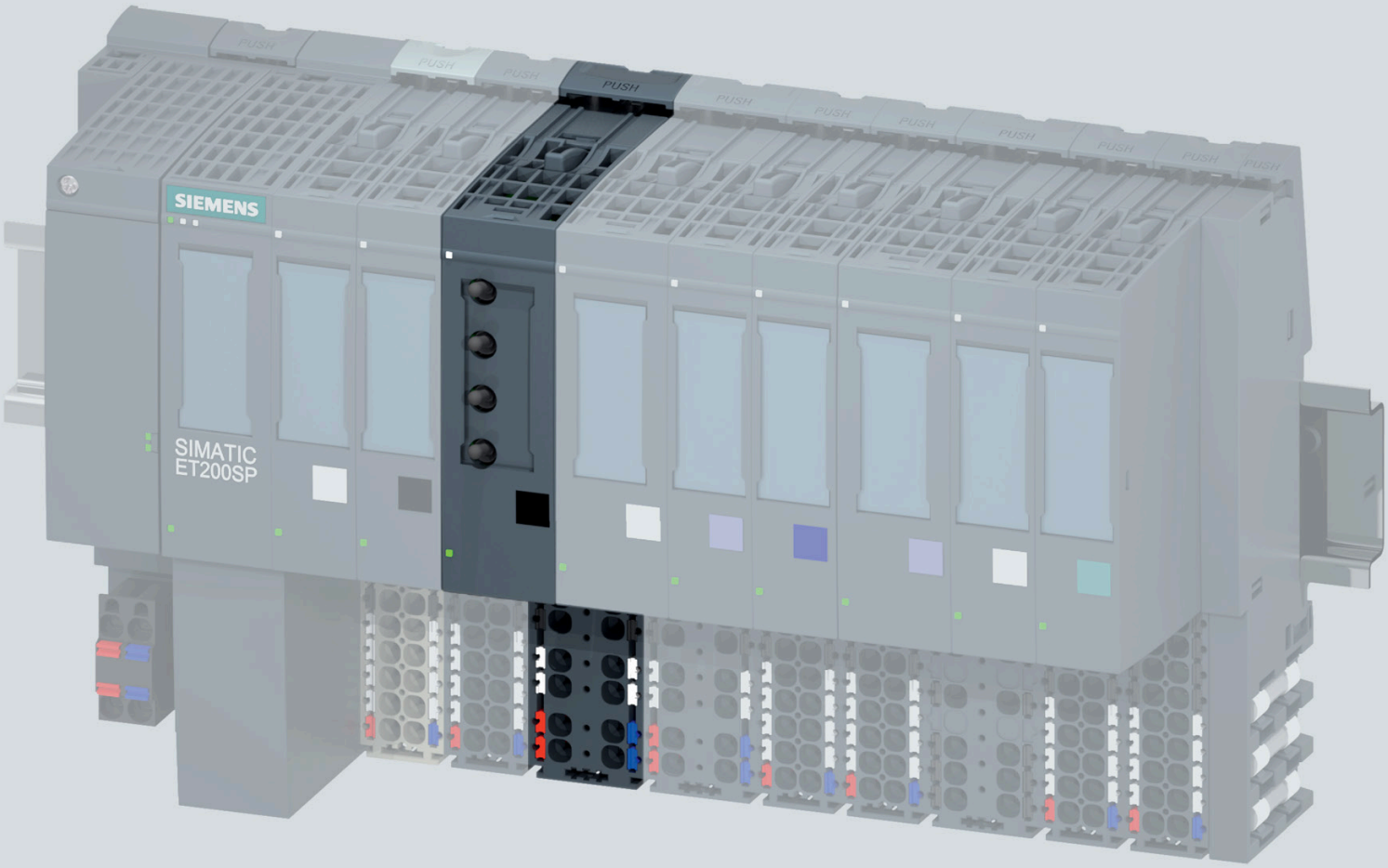

Manual

SIMATIC

ET 200SP

Digital output module
RQ 4x120VDC-230VAC/5A NO MA ST
(6ES7132-6MD00-0BB1)

Edition 06/2020

support.industry.siemens.com

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SIMATIC

ET 200SP
Digital output module RQ 4x120VDC-230VAC/5A NO MA ST (6ES7132-6MD00-0BB1)

Equipment Manual

A5E36107692-AB

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.

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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.

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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.

Siemens AG
Digital Industries
Postfach 48 48
90026 NÜRNBERG
GERMANY

A5E36107692-AB
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Preface

Purpose of the documentation

This manual supplements the ET 200SP distributed I/O system (https://support.automation.siemens.com/WW/view/en/58649293) 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.

Changes compared to previous version

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

- Wiring and block diagram for 2-wire and 3-wire connection has been changed.
- The technical specifications have been updated.

Conventions

CPU: When the term "CPU" is used in the following, 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.

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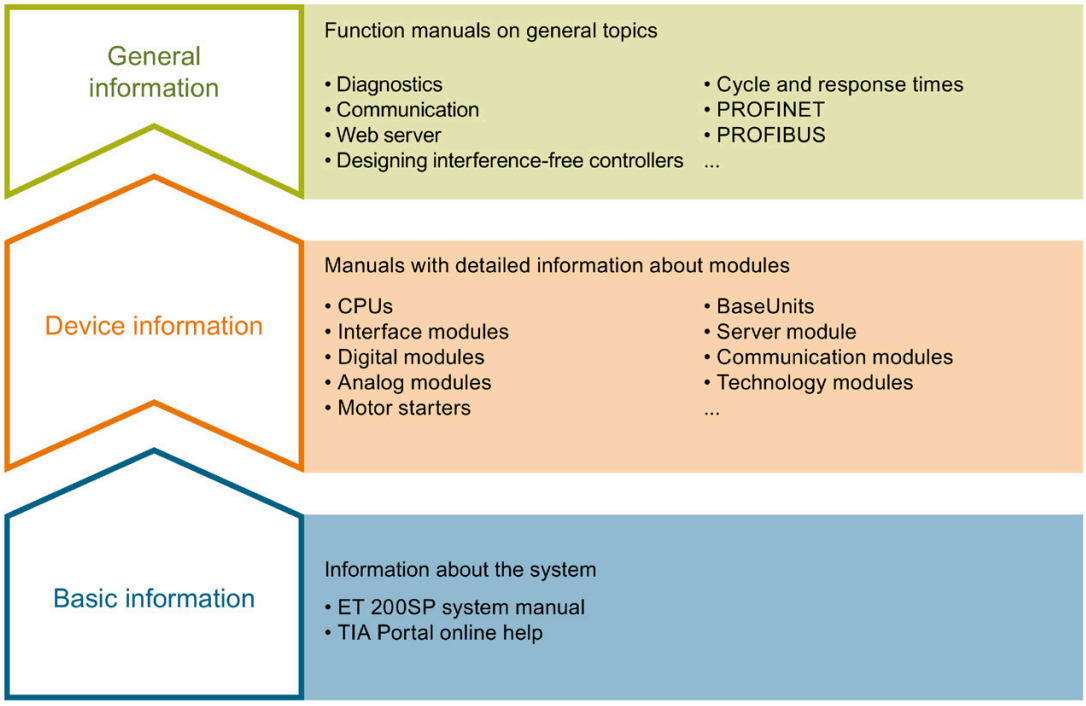
To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed visit (https://www.siemens.com/industrialsecurity).

Table of contents

ET 200SP 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).

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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

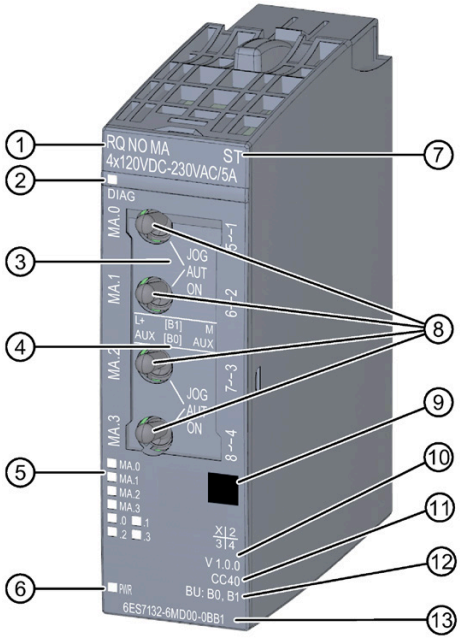
2

2.1 Properties

Article number

6ES7132-6MD00-0BB1

View of the module



① Module type and name

② LED for diagnostics

③ JOG (switch position up: jog)
AUT (switch position "middle": Automatic mode
ON (switch position down: Manual mode (MANUAL ON))

④ Wiring diagram

⑤ LEDs for channel status and manual mode

⑥ LED for supply voltage

⑦ Function class

⑧ Toggle/jog switch for manually controlling the relay

⑨ Color coding of module type

⑩ Function and firmware version

⑪ Color code for selection of the color coding labels

⑫ BU type

⑬ Article number

Figure 2-1 View of the module RQ 4×120VDC-230VAC/5A NO MA ST

Properties

The module has the following technical properties:

- Digital output module with 4 floating relay outputs
- Supply voltage L+
- Output current 5 A (per output)
- Normally open contact (NO: normally open)
- Configurable diagnostics (per module)
- Configurable substitute values (per channel)
- 4 toggle/jog switches (jog, automatic or manual mode (MANUAL ON)) for controlling the relay
- Suitable for solenoid valves, DC contactors, and indicator lights

The module supports the following functions:

- Firmware update
- I&M identification data
- Configuration in RUN
- PROFIenergy
- Value status

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

Note

When load voltage is present, the relays of the RQ 4x120VDC-230VAC/5A NO MA ST can also be activated via a manual switch even when they are in a non-configured state.

When an output is set to manual control, the relay remains active during a firmware update.

Accessories

The following accessories must be ordered separately:

- Color identification labels
- Reference identification label
- Shield connector

See also

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

Wiring

3

3.1 Wiring and block diagram

This section includes the block diagram of the RQ 4x120VDC-230VAC/5A NO MA ST module with the terminal assignments for a 2-wire and 3-wire connection.

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

Note

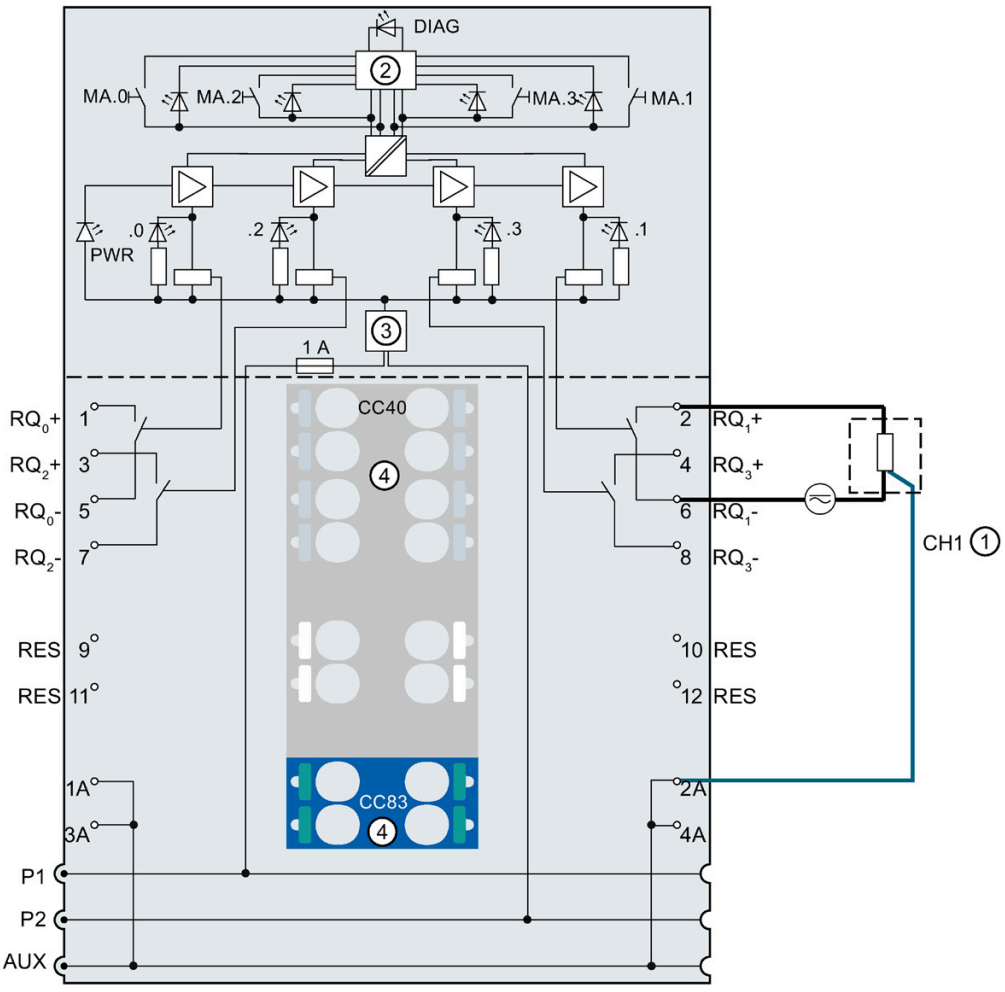
You can use and combine the different wiring options for all channels.

Note

- The relay contacts of the module can only switch identical voltage potential.
- The AUX terminals of the self-assembling voltage bus can be used for the connection of the protective conductor (PE) or for the same voltages up to a maximum of 24 V DC.
- The switch position of the toggle/jog switch is stored in the process image input (PII) and can be read there.

Wiring: 3-wire connection of actuators

The following figure shows the block diagram and an example of the terminal assignment of the digital output module RQ 4x120VDC-230VAC/5A NO MA ST on the BaseUnit BU type B0.

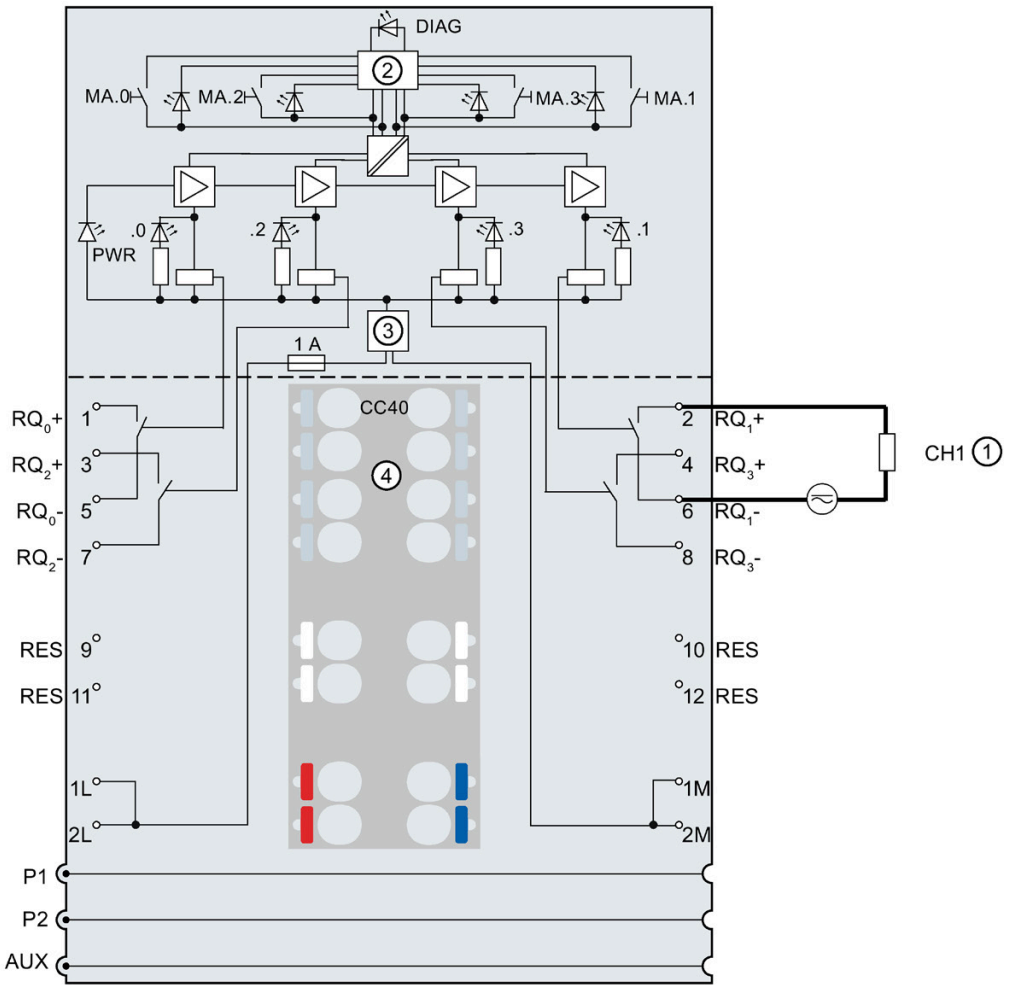


①	3-wire connection	RES	Reserve, must remain unused for future function extensions
②	Backplane bus interface	1A to 4A	AUX terminals
③	Polarity reversal protection	DIAG	Diagnostics LED (green, red)
④	Color-coded label with color codes CC40 and CC83 (optional)	MA .0 .. .3	LED MANUAL ON and automatic
RQn+, RQn-	Channel n	.0, .1, .2, .3	Channel status LED (green)
P1, P2, AUX	Internal self-assembling voltage buses Connection to left (dark-colored BaseUnit)	PWR	Power LED (green)

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

Wiring: 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 4x120VDC-230VAC/5A NO MA ST on the BaseUnit BU type B1.



①	2-wire connection	1M, 2M	Ground
②	Backplane bus interface	DIAG	Diagnostics LED (green, red)
③	Polarity reversal protection	MA .0 .. .3	LED MANUAL ON and automatic
④	Color-coded label with color code CC40 (optional)	.0, .1, .2, .3	Channel status LED (green)
RQn+, RQn-	Channel n	PWR	Power LED (green)
RES	Reserve, must remain unused for future function extensions	P1, P2, AUX	Internal self-assembling voltage buses Connection to left (dark-colored BaseUnit)
1L, 2L	24 V DC supply voltage		

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

Toggle/jog switch for controlling the relay

You can switch the relay using the toggle/jog switch to jog, MANUAL ON (manual mode) or automatic mode for each channel. In manual mode, the state set by the output data is ignored.

The 4 toggle/jog switches are located on the front of the electronic module.

- JOG (switch position "up": job mode): Short-term manual operation (MANUAL ON), while jogged.
- AUT (switch position "middle" or "not activated": Automatic mode): Each channel is activated via the user program (normal operation).
- ON (switch position "down": Manual mode (MANUAL ON) permanently): Each channel is switched on ("1" signal) independent of the activation of the user program (and substitute values).

Parameters/address space

4

4.1 Parameters

Parameters for RQ 4x120VDC-230VAC/5A NO MA ST

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 on 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 using the data records; refer to section Parameter assignment and structure of the parameter data record (Page 29).

The following parameter settings are possible:

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

Parameter	Range of values	Default	Parameter reassignment in RUN	Effective range with configuration software, e.g. STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP [1]
Diagnostics: No supply voltage L+	• Enable • Disable	Disable	Yes	Module	Module
Channel activated	• Enable • Disable	Enable	Yes	Channel	Channel

Parameter	Range of values	Default	Parameter reassignment in RUN	Effective range 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-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 at a maximum of 244 bytes per ET 200SP station with a PROFIBUS GSD configuration, the configuration options are restricted. If required, you can assign these parameters using data record 128 as described in the "GSD file PROFINET IO" column (see table above). The parameter length of the I/O module is 4 bytes.

4.2 Explanation of the 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

The load or supply voltage is fed module by module. The voltage buses P1, P2 and AUX are looped through the module from the left to the right neighboring module without tap.

See also

You can find additional information in the 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 RQ 4×120VDC-230VAC/5A NO MA ST

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 4-channel without value status	RQ 4×120VDC-230VAC/5A NO MA ST	X	X	X
1 x 4-channel with value status	RQ 4×120VDC-230VAC/5A NO MA ST, QI	X	X	-

Evaluating the value status

An additional byte is allocated in the input address space if you enable the value status for the digital module. Bits 0 to 3 in this byte 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 deactivated or there is a fault on the module.

If a fault 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 4×120VDC-230VAC/5A NO MA ST with value status (Quality Information (QI)). The addresses for the value status are only available if the value status is enabled.

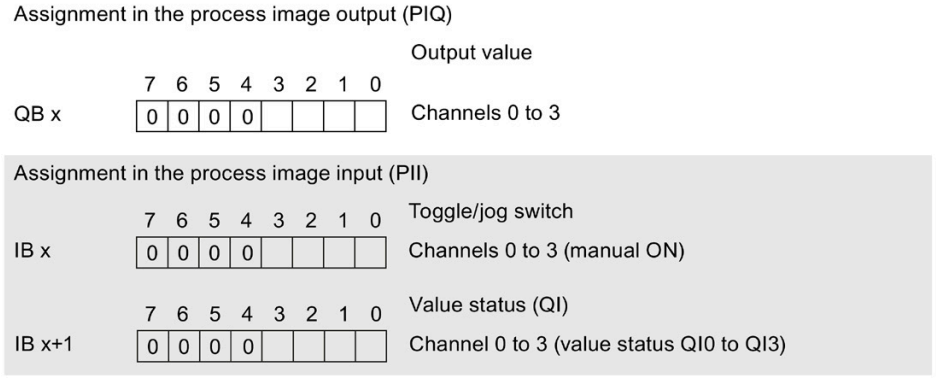


Figure 4-1 Address space of RQ 4×120VDC-230VAC/5A NO MA ST with value status

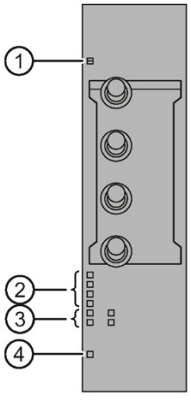
Interrupts/diagnostics alarms

5

5.1 Status and error display

LED display

The following figure shows you the LED display of the RQ 4x120VDC-230VAC/5A NO MA ST.



① DIAG (green/red)
② MA .0 .. .3 (yellow)
③ Channel status (green)
④ PWR (green)

Figure 5-1 LED display

Meaning of the LEDs

The following tables show the meaning of the status and error displays. Corrective measures for diagnostics alarms can be found in section Diagnostics alarms (Page 21).

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 diagnostics
Flashes	Module parameters assigned and module diagnostics

LED MA 1..4

Table 5- 2 Status display of the LED MA .0 .. .3 (manual mode)

Channel status LED	Meaning
Off	Automatic
On	Manual ON (toggle/jog switch) = Manual mode Output enabled at specific channel

Channel status LED

Table 5- 3 Status display of the channel status LED

Channel status LED	Meaning
Off	Channel deactivated or activated and process signal = 0
On	Channel activated and process signal = 1

PWR LED

Table 5- 4 Status display of the PWR LED

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

5.2 Interrupts

The digital output module RQ 4×120VDC-230VAC/5A NO MA ST supports diagnostics interrupts.

Diagnostics interrupts

The module generates a diagnostic interrupt at the following events:

- Parameter assignment error
- Supply voltage missing
- Channel temporarily unavailable

5.3 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.

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

Diagnostics alarm	Error code	Meaning	Solution
Parameter assignment error	10H	• The module cannot evaluate parameters for the channel. • Incorrect parameter assignment.	Correct the parameter assignment
Supply voltage missing	11H	Missing or insufficient supply voltage L+	• Check supply voltage L+ on the BaseUnit • Check BaseUnit type
Channel 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

Technical specifications

6

6.1 Technical specifications

Technical specifications of the RQ 4×120VDC-230VAC/5A NO MA ST

The following table shows the technical specifications as of 06/2020. You will find a data sheet including daily updated technical specifications on the Internet (https://support.industry.siemens.com/cs/ww/en/pv/6ES7132-6MD00-0BB1/td?dl=en).

Article number	6ES7132-6MD00-0BB1
General information	
Product type designation	RQ 4x120 V DC ... 230 V AC/5 A NO MA ST
HW functional status	From FS03
Firmware version	
• FW update possible	Yes
usable BaseUnits	BU type B0, B1
Color code for module-specific color identification plate	CC40
Product function	
• I&M data	Yes; I&M0 to I&M3
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	V13 SP1
• STEP 7 configurable/integrated from version	V5.5 SP3 / -
• PROFIBUS from GSD version/GSD revision	One GSD file each, Revision 3 and 5 and higher
• PROFINET from GSD version/GSD revision	GSDML V2.3
Operating mode	
• DQ	Yes
• DQ with energy-saving function	No
• PWM	No
• Oversampling	No
• MSO	No
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

Article number	**6ES7132-6MD00-0BB1**
Input current	
Current consumption, max.	100 mA; without load
Power loss	
Power loss, typ.	1.5 W
Address area	
Address space per module	
• Inputs	1 byte; With QI
• Outputs	1 byte
Hardware configuration	
Automatic encoding	Yes
• Mechanical coding element	Yes
• Type of mechanical coding element	type C
Selection of BaseUnit for connection variants	
• 2-wire connection	BU type B1
• 3-wire connection	BU type B0
Digital outputs	
Type of digital output	Relays
Number of digital outputs	4
Short-circuit protection	No
Switching frequency	
• with resistive load, max.	2 Hz
• with inductive load, max.	0.5 Hz
• on lamp load, max.	2 Hz
Total current of the outputs	
• Current per channel, max.	5 A
• Current per module, max.	20 A
Total current of the outputs (per module)	
horizontal installation	
– up to 50 °C, max.	20 A
– up to 60 °C, max.	16 A
vertical installation	
– up to 40 °C, max.	20 A
– up to 50 °C, max.	16 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
• external protection for relay outputs	Yes, with miniature fuse max. 6 A tripping current and quick-response tripping characteristic

Article number	**6ES7132-6MD00-0BB1**
• Number of operating cycles, max.	7 000 000; see additional description in the manual
Switching capacity of contacts	
– with inductive load, max.	2 A; see additional description in the manual
– with resistive load, max.	5 A; see additional description in the manual
– Thermal continuous current, max.	5 A
– Switching current, min.	100 mA; 5 V DC
– Rated switching voltage (DC)	24 V DC to 120 V DC
– Rated switching voltage (AC)	24V AC to 230V AC
Cable length	
• shielded, max.	1 000 m
• unshielded, max.	200 m
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
• 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	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
Permissible potential difference	
between channels and backplane bus/supply voltage	240 V AC
Isolation	
Isolation tested with	2 500 V DC (type test)

Article number	6ES7132-6MD00-0BB1
tested with	
• between channels and backplane bus/supply voltage	2 500 V DC
• between backplane bus and supply voltage	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	20 mm
Height	73 mm
Depth	58 mm
Weights	
Weight, approx.	45 g

Note

External fuse for relay outputs

The outputs have to be protected by an external fuse.

When installed in a danger area according to the National Electric Code (NEC), the fuse must only be removed with the correct tool when the module is not in an explosion-proof zone.

Derating trend

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

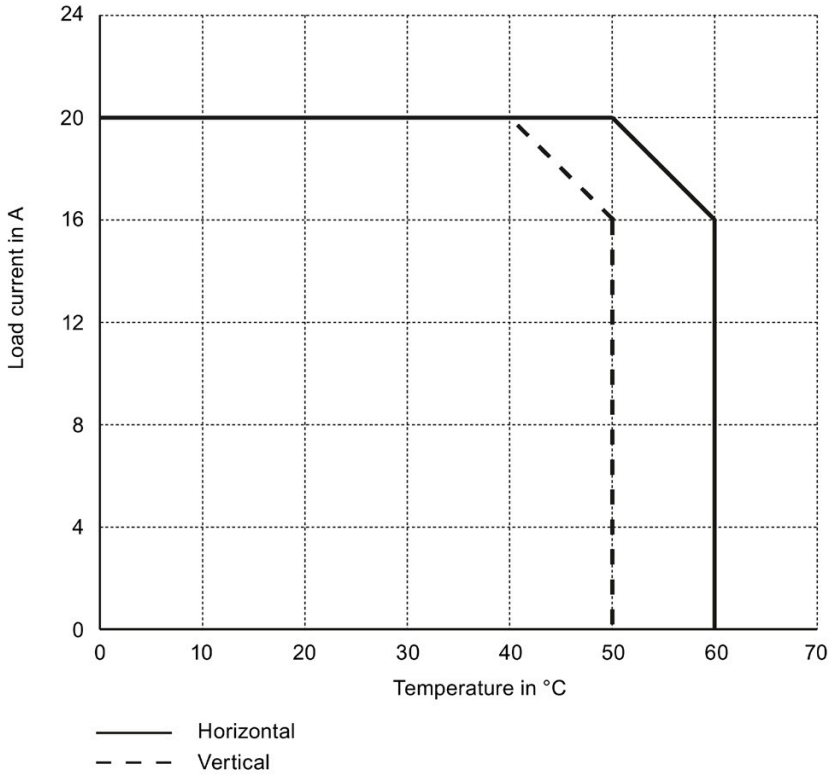


Figure 6-1 Load current for mounting position

Dimension drawing

See manual ET 200SP BaseUnits
(http://support.automation.siemens.com/WW/view/en/59753521)

6.2 Switching cycles

Switching capacity and lifetime of the contacts

With an external protective circuit, the contacts will last longer than specified in the table. This table shows the switching capacity and lifetime of the relay contacts:

Table 6- 1 Switching capacity and lifetime of the relay contacts

Resistive load	Voltage	Current	Switching cycles (typical)
For resistive load	24 V DC	5.0 A	0.1 million
		4.0 A	0.2 million
		2.0 A	0.5 million
		1.0 A	1.6 million
		0.5 A	4 million
		0.1 A	7 million
	60 VDC	0.5 A	1.6 million
	120 VDC	0.2 A	1.6 million
	48 VAC	2.0 A	1.6 million
	60 VAC	2.0 A	1.2 million
	120 VAC	5.0 A	0.1 million
		3.0 A	0.2 million
		2.0 A	0.4 million
		1.0 A	0.8 million
		0.5 A	1.5 million
	230 VAC	5.0 A	0.1 million
		3.0 A	0.2 million
		2.0 A	0.4 million
		1.0 A	0.8 million
		0.5 A	1.5 million
For inductive load in accordance with IEC 947-5-1 DC 13/ AC15	24 V DC	2.0 A	0.1 million
		1.0 A	0.2 million
		0.5 A	0.5 million
	60 VDC	0.5 A	0.2 million
	120 VDC	0.2 A	0.5 million
	48 VAC	1.0 A	0.7 million
	60 VAC	1.0 A	0.5 million
	120 VAC	2.0 A	0.1 million
		1.0 A	0.3 million
		0.5 A	1 million
		0.1 A	2 million
For inductive load in accordance with IEC 947-5-1 DC 13/ AC15	230 VAC	2.0 A	0.1 million
		1.0 A	0.3 million
		0.5 A	1 million

Note

Tests of mechanical environmental conditions

Shock tested according to IEC 60068-2-27. Shock intensity: 100 m/s^2 peak value, 11 ms duration

Parameter data record

A

A.1 Parameter assignment and structure of the 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 can change the parameters of the module in RUN.

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 that the parameters set in STEP 7 will be valid again after a restart.

Output parameter STATUS

If errors occur when transferring parameters with the "WRREC" instruction, the module continues operation with the previous parameter assignment. 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.

Structure of data record 128

Note

Channel 0 includes the diagnostics enable for the entire module.

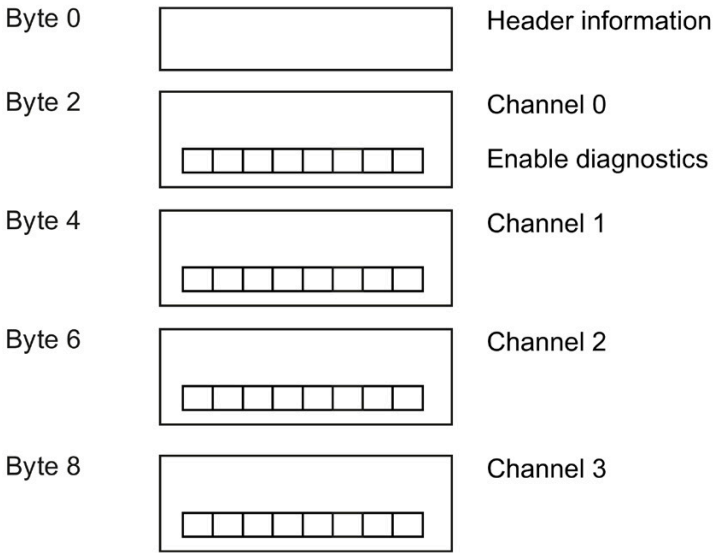


Figure A-1 Structure of data record 128

Header information

The figure below shows the structure of the header information.

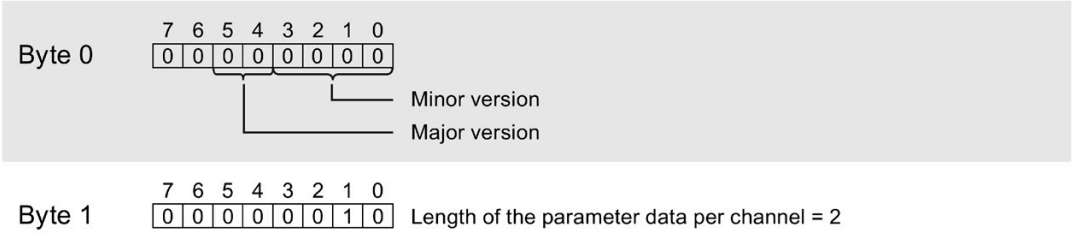


Figure A-2 Header information

Parameters

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

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

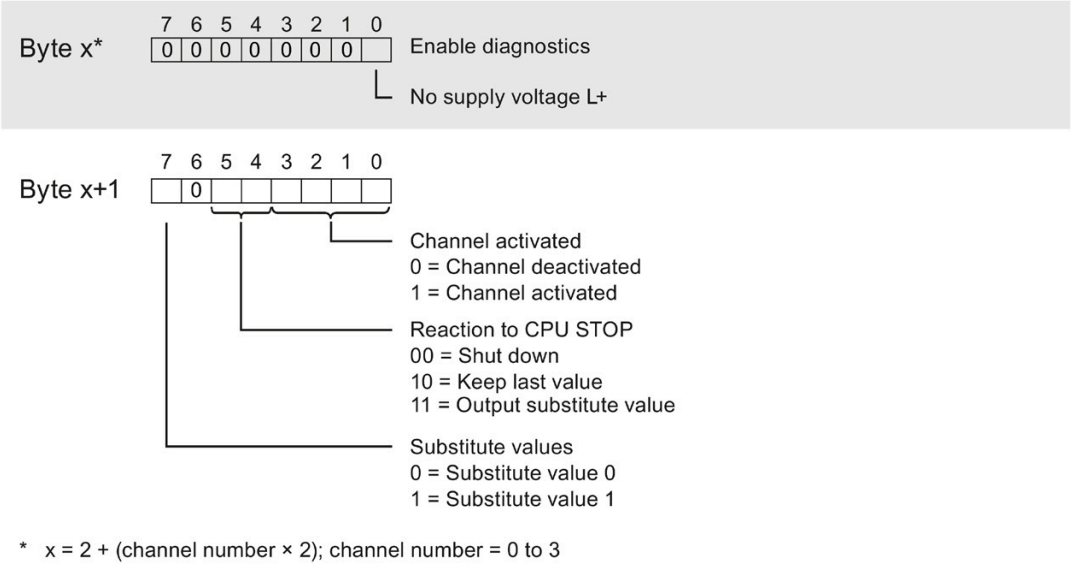


Figure A-3 Structure byte x to x+1 for the channels 0 to 3

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