SIEMENS

Manual

SIMATIC

S7-1500 / ET 200MP

Digital output module
DQ 16x230VAC/2A ST Relay (6ES7522-5HF00-0AB0)

Edition 04/2020

support.industry.siemens.com

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SIMATIC

S7-1500/ET 200MP Digital output module DQ 16x230VAC/2A ST Relay (6ES7522-5HH00-0AB0)

Equipment Manual

04/2020

A5E34934019-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.

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⚠ 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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Qualified Personnel

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

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Note the following:

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Preface

Purpose of the documentation

This manual supplements the system manual S7-1500/ET 200MP (https://support.industry.siemens.com/cs/ww/en/view/59191792).

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

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

Changes compared to previous version

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

The module features a switching cycle counter as of firmware version V1.1.0.

Conventions

CPU: The term "CPU" is used in this manual both for the CPUs of the S7-1500 automation system and for interface modules of the ET 200MP 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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Open Source Software

Open-source software is used in the firmware of the I/O modules. Open Source Software is provided free of charge. We are liable for the product described, including the open-source software contained in it, pursuant to the conditions applicable to the product. Siemens accepts no liability for the use of the open source software over and above the intended program sequence, or for any faults caused by modifications to the software.

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Table of contents

Documentation guide

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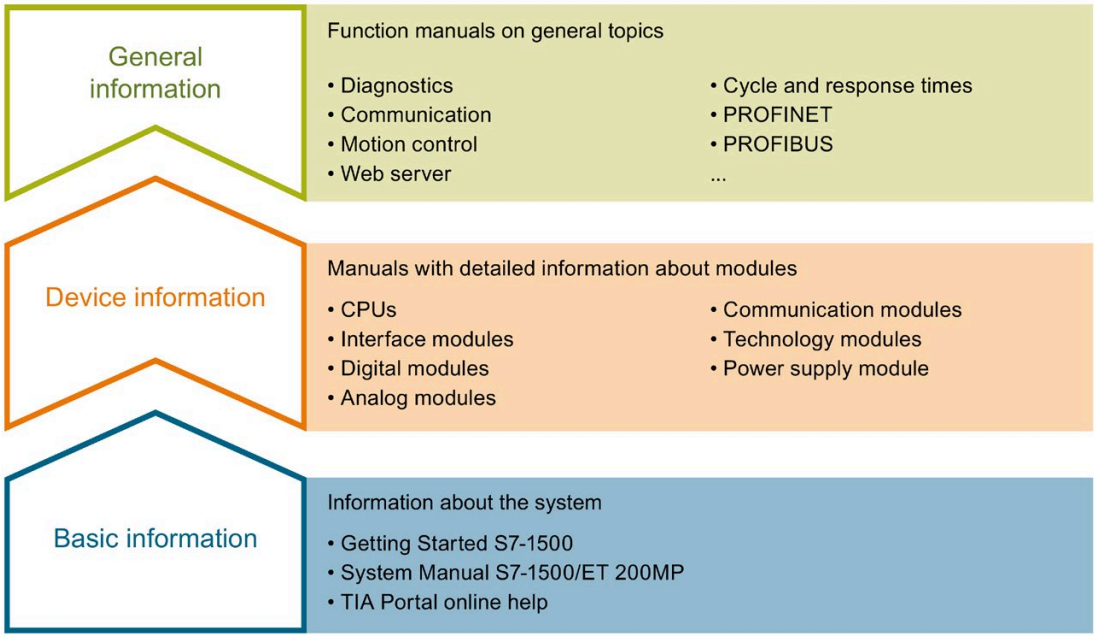
The documentation for the SIMATIC S7-1500 automation system and the SIMATIC ET 200MP distributed I/O system is arranged into three areas.
This arrangement enables you to access the specific content you require.



Basic information

The System Manual and Getting Started describe in detail the configuration, installation, wiring and commissioning of the SIMATIC S7-1500 and ET 200MP systems. 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 S7-1500 and ET 200MP systems, e.g. diagnostics, communication, motion control, Web server, OPC UA.

You can download the documentation free of charge from the Internet (https://support.industry.siemens.com/cs/ww/en/view/109742691).

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/68052815).

Manual Collection S7-1500/ET 200MP

The Manual Collection contains the complete documentation on the SIMATIC S7-1500 automation system and the ET 200MP distributed I/O system gathered together in one file.

You can find the Manual Collection on the Internet (https://support.industry.siemens.com/cs/ww/en/view/86140384).

SIMATIC S7-1500 comparison list for programming languages

The comparison list contains an overview of which instructions and functions you can use for which controller families.

You can find the comparison list on the Internet (https://support.industry.siemens.com/cs/ww/en/view/86630375).

"mySupport"

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

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

"mySupport" - Documentation

In the Documentation area in "mySupport" you can combine entire manuals or only parts of these to your own manual.
You can export the manual as PDF file or in a format that can be edited later.

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

"mySupport" - CAx data

In the CAx data area in "mySupport", you can access the current 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 on 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 on individual products.

You will 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 perform commissioning and maintenance activities simultaneously on various SIMATIC S7 stations as a bulk operation independent of the TIA Portal.

General function overview:

- Network browsing and creation of a table showing the accessible devices in the network.
- Flashing of device LEDs or HMI display to locate a device
- Downloading of addresses (IP, subnet, gateway) to a device
- Downloading the PROFINET name (station name) to a device
- Placing a CPU in RUN or STOP mode
- Setting the time in a CPU to the current time of your PG/PC
- Downloading a new program to a CPU or an HMI device
- Downloading from CPU, downloading to CPU or deleting recipe data from a CPU
- Downloading from CPU or deleting data log data from a CPU
- Backup/restore of data from/to a backup file for CPUs and HMI devices
- Downloading service data from a CPU
- Reading the diagnostics buffer of a CPU
- Performing a CPU memory reset
- Resetting devices to factory settings
- Downloading a firmware update to a device

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 PROFINET network during commissioning. PRONETA features two core functions:

- The topology overview independently scans PROFINET network 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

2.1 Properties

Article number

6ES7522-5HH00-0AB0

View of the module

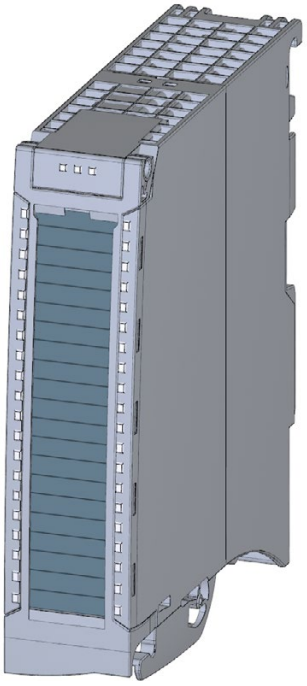


Figure 2-1 View of the DQ 16x230VAC/2A ST module

Properties

The module has the following technical properties:

- 16 digital outputs (relays)
- Supply voltage of the 24 V DC relay coils
- Rated output voltage 230 V AC (24 V DC up to 120 V DC/24 V AC up to 230 V AC)
- Rated output current 2 A per channel
- Configurable substitute values (per channel)
- Configurable diagnostics
- Switching cycle counter for relay contacts
- Suitable for solenoid valves, DC contactors, and indicator lights

The module supports the following functions:

Table 2- 1 Version dependencies of the module functions

Function	Firmware version of the module	Configuration software	
		STEP 7 (TIA Portal) as of V13 SP1 with HSP 0119	GSD file in STEP 7 (TIA Portal) as of V12 or STEP 7 V5.5 SP3 or higher
Firmware update	V1.0.0 or higher	X	--- / X
Identification data I&M0 to I&M3	V1.0.0 or higher	X	--- / X
Parameter assignment in RUN	V1.0.0 or higher	X	X
Module-internal Shared Output (MSO)	V1.0.0 or higher	X (PROFINET IO only)	X (PROFINET IO only)
Configurable submodules / submodules for Shared Device	V1.0.0 or higher	X (PROFINET IO only)	X (PROFINET IO only)
Switching cycle counter	V1.1.0 or higher	V15.1 or higher with HSP0282 • PROFINET IO only • Central operation with an S7-1500 CPU	X (PROFINET IO only)

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

Compatibility

The following table shows the compatibility of the modules and the dependencies between hardware functional status (FS) and firmware version (FW) used:

Hardware functional status	Firmware version	Note
FS01	V1.0.0	Upgrade to V1.1.0 not possible
FS02	V1.1.0	Upgrade and downgrade possible between V1.1.0 and higher

Accessories

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

- Labeling strips
- U connector
- Universal front door

Other components

For example, you order the front connector including the potential bridge and cable tie separately.

You can find additional information on accessories and the article numbers in the system manual S7-1500/ET 200MP (https://support.industry.siemens.com/cs/ww/en/view/59191792).

2.2 Functions

2.2.1 Switching cycle counter

The "Switching cycle counter" function records the number of switching cycles of the integrated relay contact. When the "Limit value warning" maintenance alarm is configured and enabled, the "Limit value warning" maintenance alarm is triggered when the specified number of switching cycles is reached.

Typical areas of application:

- Recording the number of switching cycles of the integrated relay contacts
- Predictive maintenance so maintenance and service intervals are more predictable, for example

Advantages

- No programming required, because the switching cycle counter is integrated into the module.
- "Monitoring" of each individual channel is possible. Select which outputs are "monitored".
- The system configuration is flexible and individually adaptable.
- Increase in plant availability. You can foresee a module or actuator replacement in advance for the next maintenance cycle.

Requirement

Firmware version as of V1.1.0 of the module.

Configuration

The switching cycle counter for the integrated relay contacts is always activated.

Configure the maintenance alarm to monitor the channels with the following parameters:

- Trigger maintenance interrupt when the limit is reached
- Set limit for maintenance interrupt

How it works

The module counts the switching cycles by evaluating the rising edges of an output signal. If the module detects a rising edge, the switching cycle counter (24-bit) for the respective channel is incremented. The counter stops when the high limit is reached.

If you activate the "Maintenance switching cycles" parameter, the "Limit value warning" of the maintenance alarm is signaled when the limit is exceeded. Alternatively, activate the maintenance interrupt in the parameter data sets starting at DS 64.

The current counter states are stored on the module cyclically (approx. every 20 seconds) and retentively. The switching cycle counters are reset each time the module is restarted (power off/on). If there is no supply voltage, the switching cycle counter stops.

You can read the current counter states with data set DS 129 (Page 41). Data set DS 129 contains the counter status for each channel in UDINT format.

You can read the limits for each channel in UDINT format with data set DS 130 (Page 43).

You can set a limit for each switching cycle counter with the "Switching cycle limit" parameter or data set DS 131 (Page 45).

Note:

The number of permissible switching cycles depends on the type and size of the load. We recommend setting the switching cycle counter to 90% of the actual service life of the contacts, for example. You then still have adequate time to preemptively replace the module.

You can find the permissible number of switching cycles in theTechnical specifications (Page 30).

Wiring

3

This section contains the block diagram of the module and outlines various wiring options.

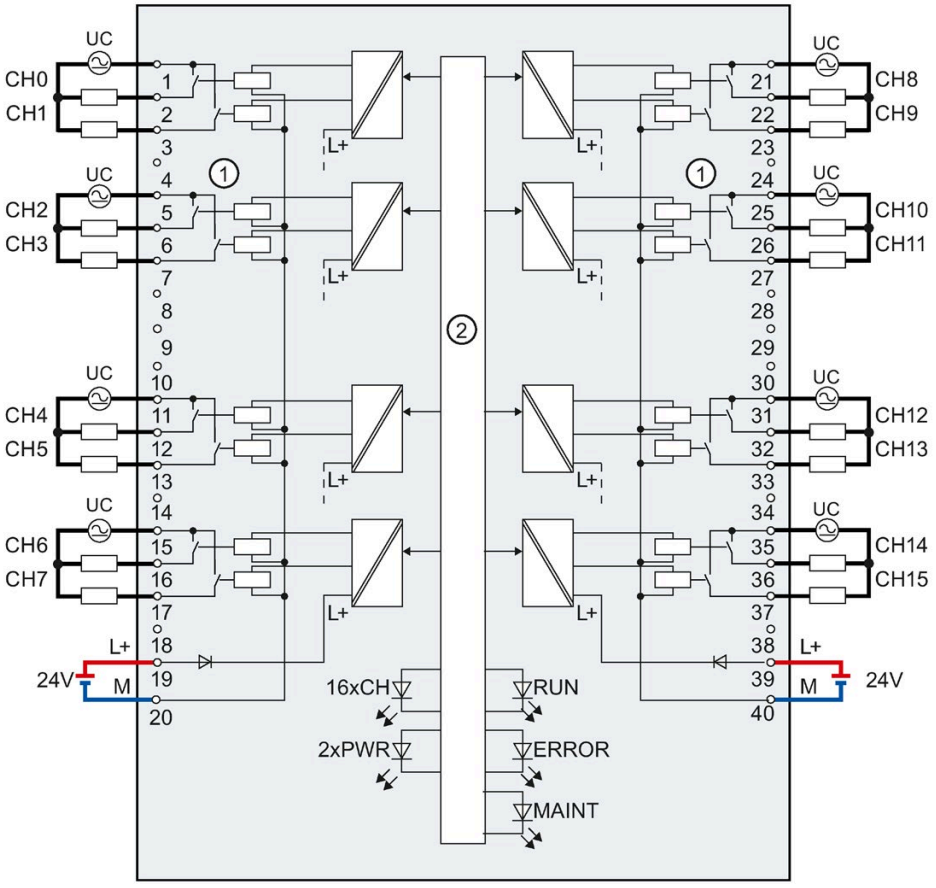
You will find information on wiring the front connector, establishing a cable shield, etc in the S7-1500/ET 200MP system manual (https://support.industry.siemens.com/cs/ww/en/view/59191792) in section Wiring.

Wiring and block diagram

The example in the following figure shows the terminal assignment and the assignment of the channels. The individual channels are connected with a relay.

Note

Note that the 24 V DC supply voltage for this module must always be supplied by terminals 19/20 **and** 39/40. Use the supplied potential jumpers for this purpose.



①	Relay 16x	CHx	Channel or channel status LED (green)
②	Backplane bus interface	RUN	Status display LED (green)
L+	Power supply 24 V DC for relay contacts	ERROR	Error display LED (red)
M	Ground	MAINT	LED maintenance display (yellow)
		PWR	POWER supply voltage LED (green)

Figure 3-1 Block diagram and terminal assignment

Tip: Using the potential jumpers

Use the potential jumpers supplied with the front connector if you want to distribute the 24 V DC supply voltage to a neighboring module. This helps you to avoid having to terminate two wires to one terminal.

Proceed as follows:

1. Connect the 24 V DC supply voltage to terminals 19 and 20.
2. Insert the potential jumpers between terminals 19 and 39 (L+) and between terminals 20 and 40 (M).
3. Use the terminals 39 and 40 to loop the potential to the next module.

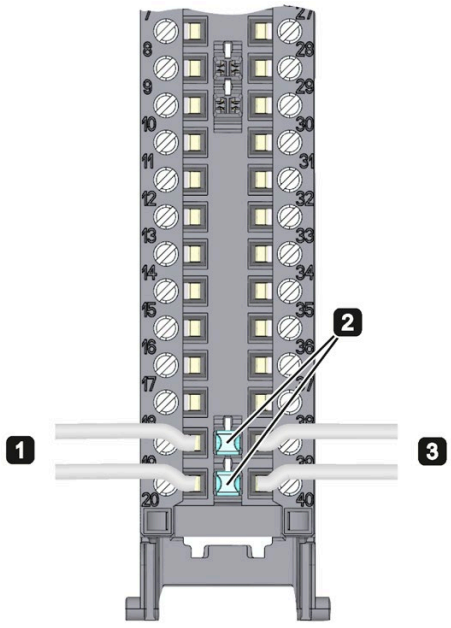


Figure 3-2 Using the potential jumpers

Note

Ensure that the maximum current load of 8 A per potential jumper is not exceeded.

Parameters/address space

4

4.1 Parameters

DQ 16x230VAC/2A ST parameters

When you assign the module parameters in STEP 7, you use various parameters to specify the module properties. The table below lists the parameters that can be set. The effective range of the configurable parameters depends on the type of configuration. The following configurations are possible:

- Central operation with a S7-1500 CPU
- Distributed operation on PROFINET IO in an ET 200MP system
- Distributed operation on PROFIBUS DP in an ET 200MP system

For parameter assignment in the user program, the parameters are transferred to the module with the WRREC instruction (reconfiguration in RUN) using data records; see section Parameter assignment and structure of the parameter data records (Page 38).

Table 4- 1 Configurable parameters and their defaults

Parameter	Range of values	Default	Reconfiguration in RUN	Range of effectiveness with configuration software, e.g. STEP 7	
				GSD file PROFINET IO	GSD file PROFIBUS DP
Diagnostics					
No supply voltage L+	Yes/No	No	Yes	Module	Module
Reaction to CPU STOP	• Turn off • Keep last value • Output substitute value 1	Turn off	Yes	Channel	Channel
Maintenance switching cycle counter	Yes/No	No	Yes	Channel	---
Switching cycle limits					
Switching cycle counter limit	0 to 16777214	0	Yes	Channel	---

4.2 Declaration of parameters

No supply voltage L+

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

Reaction to CPU STOP

Determines the reaction of the output to the CPU going into STOP state or when the connection to the CPU is interrupted.

Maintenance switching cycles

You use this parameter to enable the maintenance alarm "Limit value warning" when the switching cycle counter limit is violated.

You configure the limit with the parameter "Switching cycle limit" for each channel CHx.

Switching cycle limit

Defines the limit value channel-by-channel. If this value is exceeded, the "Limit value warning" maintenance alarm is signaled.

Enter an integer value between 0 and 16777214.

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 16x230VAC/2A ST

You can configure the module with STEP 7 or with a GSD file.

When you configure the module by means of the GSD file, the configurations are available under different short designations/module names.

The following configurations are possible:

Table 4- 2 Configuration options

Configuration	Short designation/module name in the GSD file	Configuration software, e.g., STEP 7	
		Integrated in hardware catalog STEP 7 V13, SP1 or higher with HSP 0119	GSD file in STEP 7 as of V12 or STEP 7 as of V5.5 SP3
1 x 16-channel without value status	DQ 16x230VAC/2A ST	X	X
1 x 16-channel with value status	DQ 16x230VAC/2A ST QI	X	X
2 x 8-channel without value status	DQ 16x230VAC/2A ST S	X (PROFINET IO only)	X (PROFINET IO only)
2 x 8-channel with value status	DQ 16x230VAC/2A ST S QI	X (PROFINET IO only)	X (PROFINET IO only)
1 x 16-channel with value status for module-internal Shared Output with up to 4 submodules	DQ 16x230VAC/2A ST MSO	X (PROFINET IO only)	X (PROFINET IO only)

Note

Substitute value behavior in shared device operation with the following configuration (V1.0 only):

- **2 x 8-channel with / without value status**

If the system is in shared device mode and one of the IO controllers involved goes into STOP or fails due to a communication failure, for example, all submodules of the output module perform the configured substitute value reaction (e.g. shutdown).

This means that even when only one IO controller fails, the other IO controllers associated with the shared device no longer control the assigned submodule of the output module.

Value status (Quality Information, QI)

The value status is always activated for the following modules:

- DQ 16x230VAC/2A ST QI
- DQ 16x230VAC/2A ST S QI
- DQ 16x230VAC/2A ST 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).

Note

Limit value warning

The maintenance alarm "Limit value warning" has no effect on the value status.

Address space for configuration as 16-channel DQ 16x230VAC/2A ST QI

The following figure shows the assignment of the address space for the configuration as a 16-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.

The letters "a to b" are printed on the module; "QB a", for example, stands for module start address output byte a.

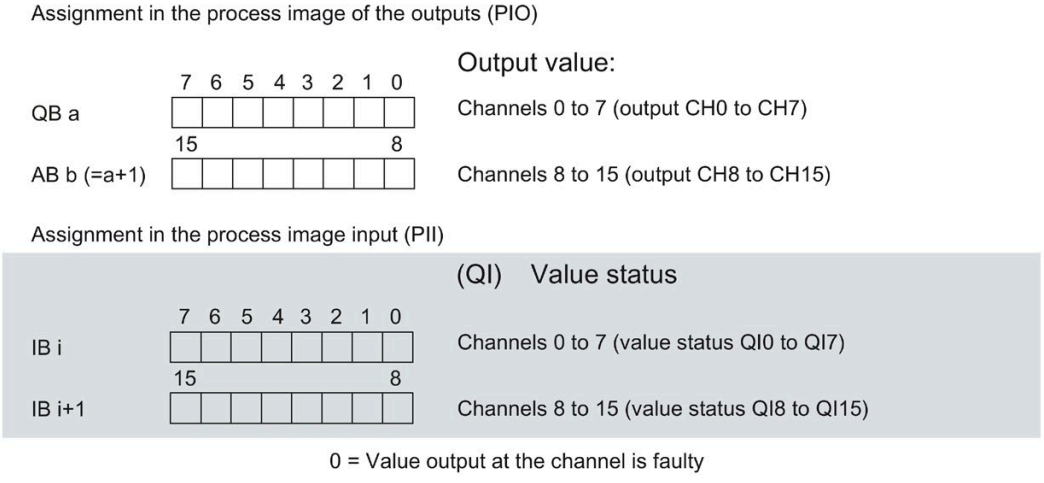


Figure 4-1 Address space for configuration as 16-channel DQ 16x230VAC/2A ST QI with value status

Address space for configuration as 2 x 8-channel DQ 16x230VAC/2A ST S QI

For the configuration as a 2 x 8-channel module, the channels of the module are divided into two submodules. The submodules can be assigned to different IO controllers when the module is used in a shared device.

The number of IO controllers depends on the interface module being used. Please observe the information in the manual for the particular interface module.

Unlike the 1 x 16-channel module configuration, each of the two submodules has a freely assignable start address. The addresses for the respective value status of a submodule can also be assigned by the user.

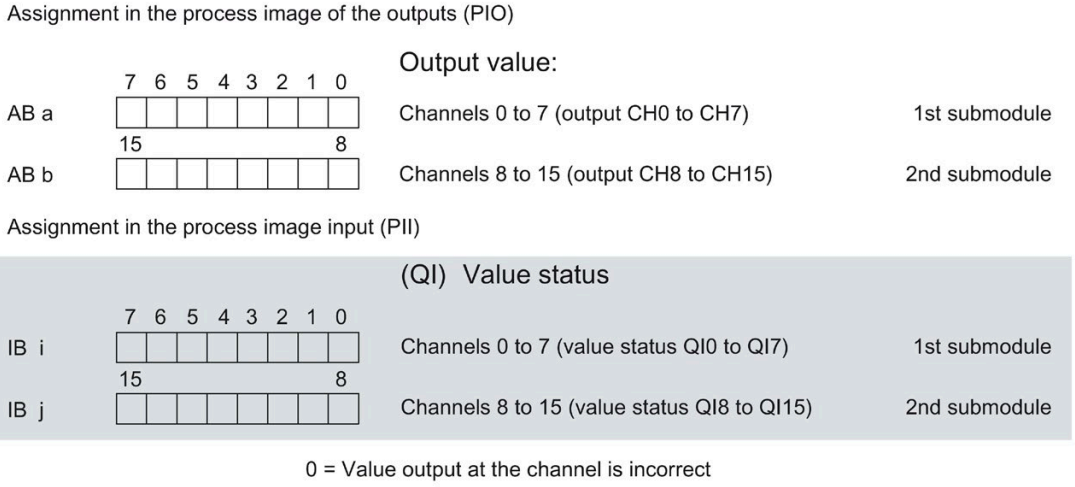


Figure 4-2 Address space for configuration as 2 x 8-channel DQ 16x230VAC/2A ST S QI with value status

Address space for configuration as 1 x 16-channel DQ 16x230VAC/2A ST MSO

For the configuration as a 1 x 16-channel module (module-internal Shared Output, MSO), channels 0 to 15 of the module are copied to multiple submodules. Channels 0 to 15 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 15.
- The IO controllers to which submodule 2, 3, or 4 is assigned have read access to outputs 0 to 15.

The number of IO controllers depends on the interface module being used. Observe the information in the manual for the particular interface module.

Value status (Quality Information, QI)

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

For the first 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 figure below shows the assignment of the address space for submodules 1 and 2 and the value status.

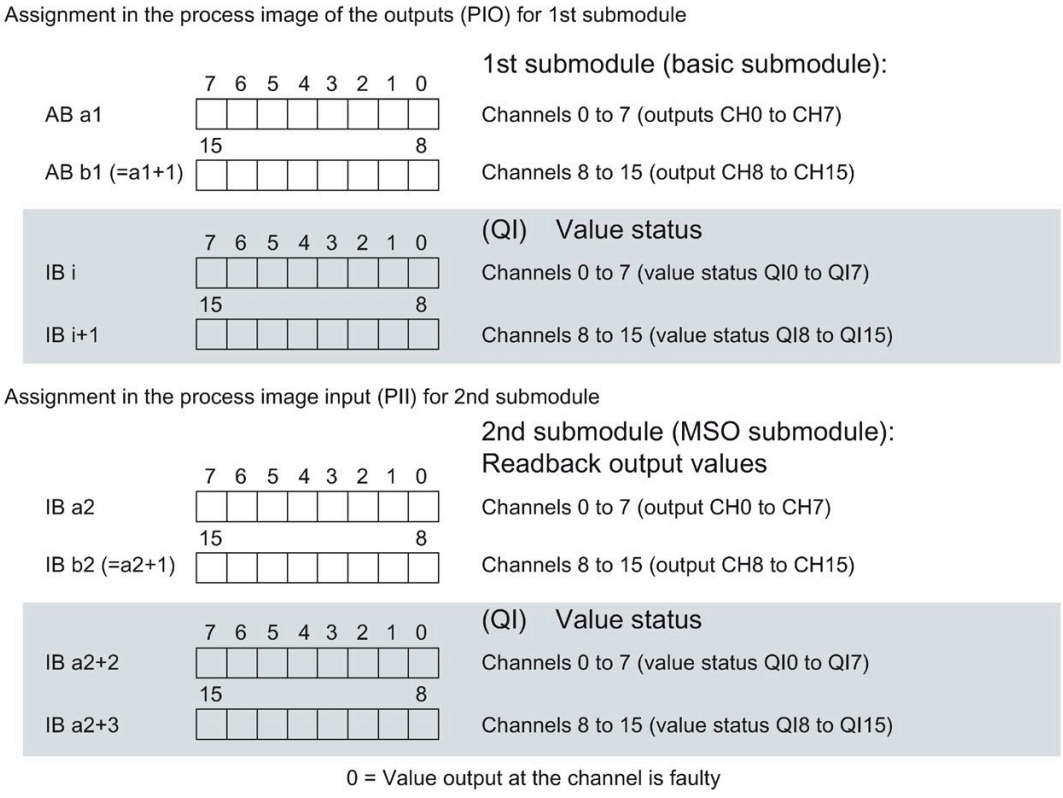


Figure 4-3 Address space for configuration as 1 x 16-channel DQ 16x230VAC/2A ST MSO with value status

The figure below shows the assignment of the address space for submodules 3 and 4 and the value status.

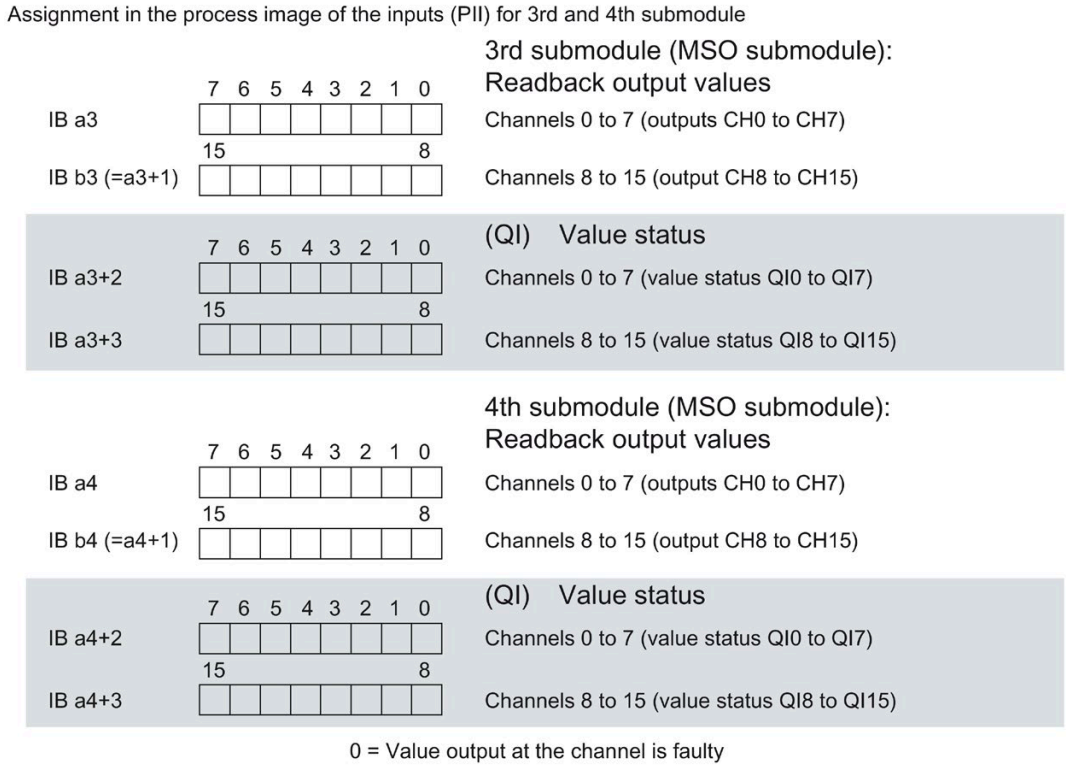


Figure 4-4 Address space for configuration as 1 x 16-channel DQ 16x230VAC/2A ST MSO with value status

Reference

You can find information on the module-internal shared input/shared output (MSI/MSO) function in the section Module-internal shared input/shared output (MSI/MSO) of the function manual PROFINET with STEP 7 V15 (http://support.automation.siemens.com/WW/view/en/49948856).

Interrupts/diagnostics alarms

5

5.1 Status and error displays

LED displays

The figure below shows the LED displays (status and error displays) of the DQ 16x230VAC/2A ST.

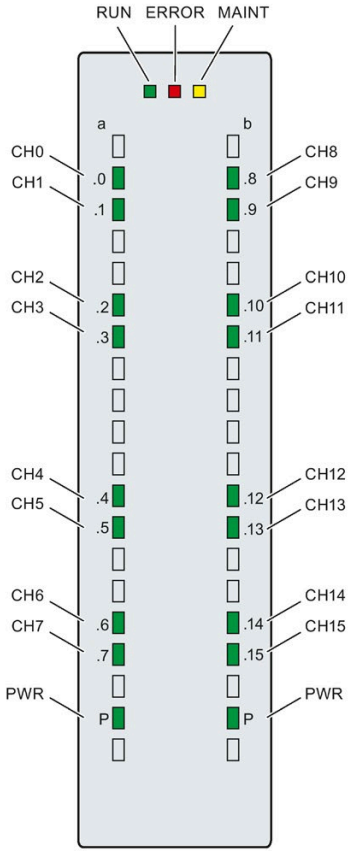


Figure 5-1 LED displays of the DQ 16x230VAC/2A ST module

Meaning of the LED displays

The following tables explain the meaning of the status and error displays. Corrective measures for diagnostics alarms can be found in the section Diagnostics alarms (Page 29).

RUN and ERROR LED

Table 5- 1 RUN and ERROR status and error displays

LED		Meaning	Solution
RUN	ERROR		
Off	Off	Voltage missing or too low at backplane bus	• Switch on the CPU and/or the system power supply modules. • Verify that the U connectors are inserted. • Check whether too many modules are inserted.
Flashes	Off	The module starts and flashes until the valid parameter assignment is set.	---
On	Off	Module parameters assigned	
On	Flashes	Indicates module error because supply voltage L+ is missing	Check the supply voltage L+ at the terminals 19 and 20 or 39 and 40.
Flashes	Flashes	Hardware defective	Replace the module.

LED MAINT

Table 5- 2 MAINT status display

LED MAINT	Meaning	Solution
Off	0 = No maintenance interrupt is pending.	---
On	1 = The maintenance interrupt "Limit value warning" is pending.	Perform maintenance.

PWR LED

Table 5- 3 PWR status display

LED PWR	Meaning	Solution
□ Off	Supply voltage L+ too low or missing	Check the supply voltage L+ at the terminals 19 and 20 or 39 and 40.
■ On	Supply voltage L+ is present and OK	---

CHx LED

Table 5- 4 CHx status display

LED CHx	Meaning	Solution
□ Off	0 = Status of the output signal	---
■ On	1 = Status of the output signal	---

5.2 Interrupts

The digital output module DQ 16x230VAC/2A ST supports diagnostics interrupts and maintenance alarms.

Diagnostic interrupt

The module generates a diagnostic interrupt at the following event:

- Missing supply voltage L+
- Parameter assignment error

Maintenance alarm

The module generates a maintenance alarm at the following event: Limit value warning.

Detailed information

You can find detailed information on the event in the error organization block with the "RALRM" instruction (read alarm status information) and in the STEP 7 online help.

5.3 Diagnostics alarms

Diagnostics alarms

A diagnostic interrupt is generated and the ERROR LED flashes on the module for each diagnostics message. You can read out the diagnostics interrupts, for example, in the diagnostics buffer of the CPU. You can evaluate the error codes with the user program.

If the module is operated distributed with PROFIBUS DP in an ET 200MP system, you have the option to read out diagnostics data with the instruction RDREC or RD_REC using data record 0 and 1. The structure of the data records is available in the "Manual for interface module IM 155-5 DP ST (6ES7155-5BA00-0AB0)" on the Internet (https://support.industry.siemens.com/cs/ww/en/view/78324181).

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

Diagnostics alarm	Error code	Meaning	Corrective measures
Parameter assignment error	10_H	The module cannot evaluate parameters for the channel Incorrect parameter assignment	Correct the parameter assignment
No load voltage	11_H	Supply voltage L+ of the module is missing	Connect supply voltage L+ to module/channel
Limit value warning	17_H	The configured limit for switching cycles has been exceeded.	• Replace module / actuator as a precautionary measure

Technical specifications

6

Technical specifications of the DQ 16x230VAC/2A ST

The following table shows the technical specifications as of 04/2020. You will find a data sheet including daily updated technical specifications on the Internet (https://support.industry.siemens.com/cs/ww/en/pv/6ES7522-5HH00-0AB0/td?dl=en).

Article number	6ES7522-5HH00-0AB0
General information	
HW functional status	From FS02
Firmware version	V1.1.0
• FW update possible	Yes
Product function	
• I&M data	Yes; I&M0 to I&M3
• Isochronous mode	No
Engineering with	
• STEP 7 TIA Portal configurable/integrated as of version	V13 SP1 / -
• STEP 7 configurable/integrated as of version	V5.5 SP3 / -
• PROFIBUS as of GSD version/GSD revision	V1.0 / V5.1
• PROFINET as of GSD version/GSD revision	V2.3 / -
Operating mode	
• DQ	Yes
• DQ with energy-saving function	No
• PWM	No
• Oversampling	No
• MSO	Yes
• Integrated operating cycle counter	Yes; FW V1.1.0 or higher
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	20.4 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes

Article number	6ES7522-5HH00-0AB0
Input current	
Current consumption, max.	185 mA
Output voltage	
Rated value (AC)	230 V; 24 V DC to 120 V DC / 24 V AC to 230 V AC
Power	
Power available from the backplane bus	0.8 W
Power loss	
Power loss, typ.	5 W
Digital outputs	
Type of digital output	Relays
Number of digital outputs	16
Current-sinking	Yes
Current-sourcing	Yes
Digital outputs, parameterizable	Yes
Short-circuit protection	No
Controlling a digital input	Yes
Size of motor starters according to NEMA, max.	5
Switching capacity of the outputs	
• on lamp load, max.	50 W (230 V AC), 5 W (24 V DC)
Output current	
• for signal "1" rated value	2 A
• for signal "1" permissible range, min.	10 mA; 10 V
• for signal "1" permissible range, max.	2 A; thermal continuous current
• for signal "0" residual current, max.	0 A
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.	1 Hz
• with inductive load, max.	0.5 Hz
• on lamp load, max.	1 Hz
Total current of the outputs	
• Current per channel, max.	2 A; see additional description in the manual
• Current per group, max.	4 A; see additional description in the manual
• Current per module, max.	32 A; see additional description in the manual

Article number	6ES7522-5HH00-0AB0
Relay outputs	
• Number of relay outputs	16
• Rated supply voltage of relay coil L+ (DC)	24 V
• Current consumption of relays (coil current of all relays), typ.	185 mA
• external protection for relay outputs	Miniature circuit breaker B10 / B16
• Contact connection (internal)	No
• Number of operating cycles, max.	see additional description in the manual
• Relay approved acc. to UL 508	No
Switching capacity of contacts	
– with inductive load, max.	2 A; see additional description in the manual
– with resistive load, max.	2 A; see additional description in the manual
Cable length	
• shielded, max.	1 000 m
• unshielded, max.	600 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
Diagnostics indication LED	
• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
• MAINT LED	Yes; Yellow LED
• Monitoring of the supply voltage (PWR-LED)	Yes; green LED
• Channel status display	Yes; green LED
• for channel diagnostics	No
• for module diagnostics	Yes; red LED

Article number	6ES7522-5HH00-0AB0
Potential separation	
Potential separation channels	
• between the channels	No
• between the channels, in groups of	2
• between the channels and backplane bus	Yes
• Between the channels and load voltage L+	Yes
Permissible potential difference	
between different circuits	250 V AC between the channels and the supply voltage L+; 250 V AC between the channels and the backplane bus; 500 V AC between the channels
Isolation	
Isolation tested with	Between channels: 3 100 V DC; between channels backplane bus: 3 100 V DC; between L+ and backplane bus: 707 V DC (type test)
Standards, approvals, certificates	
Suitable for safety functions	No
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-25 °C; From FS02
• horizontal installation, max.	60 °C
• vertical installation, min.	-25 °C; From FS02
• vertical installation, max.	40 °C
Decentralized operation	
Prioritized startup	Yes
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	350 g

Details on the number of switching cycles

The following tables list the permissible number of switching cycles depending on the applied voltage and current load. Different values apply in each case to resistive and inductive loads.

Table 6- 1 Switching capacity and service life of relay contacts for resistive load

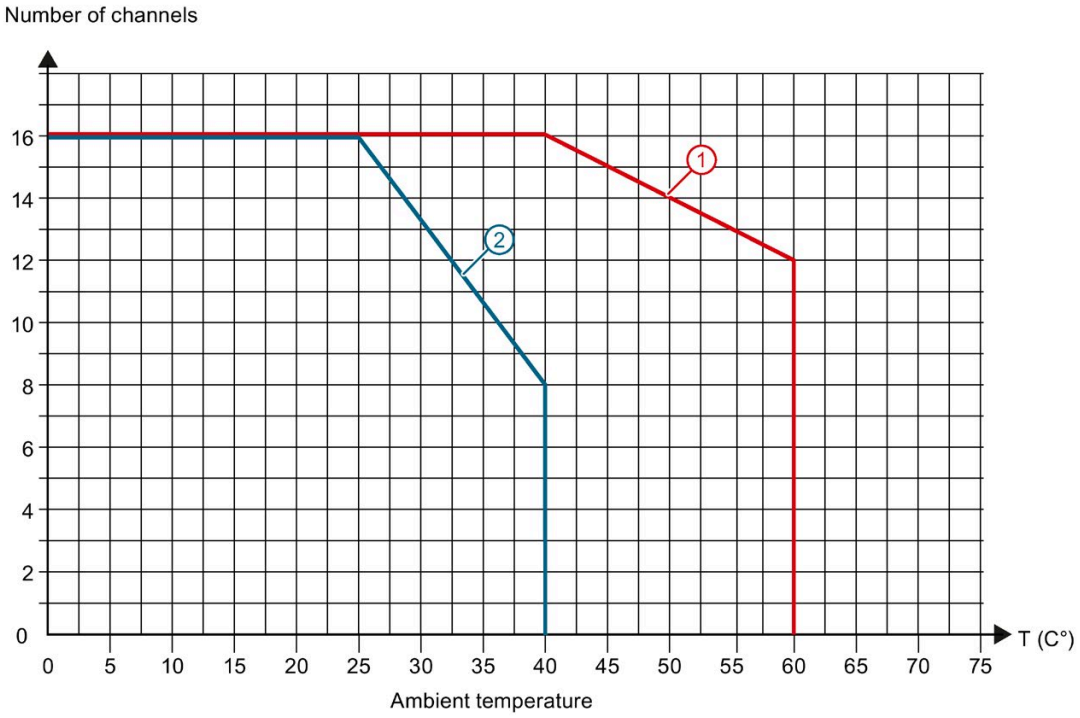
For resistive load		
Voltage	**Current**	**Number of switching cycles (typ.)**
24 V DC	2.0 A	0.1 million
	1.0 A	0.2 million
	0.5 A	1.0 million
60 V DC	0.5 A	0.2 million
120 V DC	0.2 A	0.6 million
24 V AC	1.5 A	1.5 million
48 V AC	1.5 A	1.5 million
60 V AC	1.0 A	1.5 million
120 V AC	2.0 A	1.0 million
	1.0 A	1.5 million
	0.5 A	2.0 million
230 V AC	2.0 A	1.0 million
	1.0 A	1.5 million
	0.5 A	2.0 million

Table 6- 2 Switching capacity and lifetime of the relay contacts for inductive load

For inductive load		
Voltage	**Current**	**Number of switching cycles (typ.)**
24 V DC	2.0 A	0.05 million
	1.0 A	0.1 million
	0.5 A	0.5 million
60 V DC	0.5 A	0.1 million
120 V DC	0.2 A	0.3 million
24 V AC	1.5 A	1.0 million
48 V AC	1.5 A	1.0 million
60 V AC	1.5 A	1.0 million
120 V AC	2.0 A	0.7 million
	1.0 A	1.0 million
	0.5 A	1.5 million
230 V AC	2.0 A	0.7 million
	1.0 A	1.0 million
	0.5 A	1.5 million

Power reduction (derating) of outputs according to number of channels

The following graphs show the number of usable channels in relation to the mounting position of the S71500 automation system/ET 200MP distributed I/O system and the ambient temperature. The total current of the outputs remains unaffected.



① Horizontal mounting of the system
② Vertical mounting of the system

Figure 6-1 Information on power reduction of outputs according to number of channels

Dimensional drawing

A

The dimension drawing of the module on the mounting rail, as well as a dimension drawing with open front cover, are provided in the appendix. Always observe the specified dimensions for installation in cabinets, control rooms, etc.

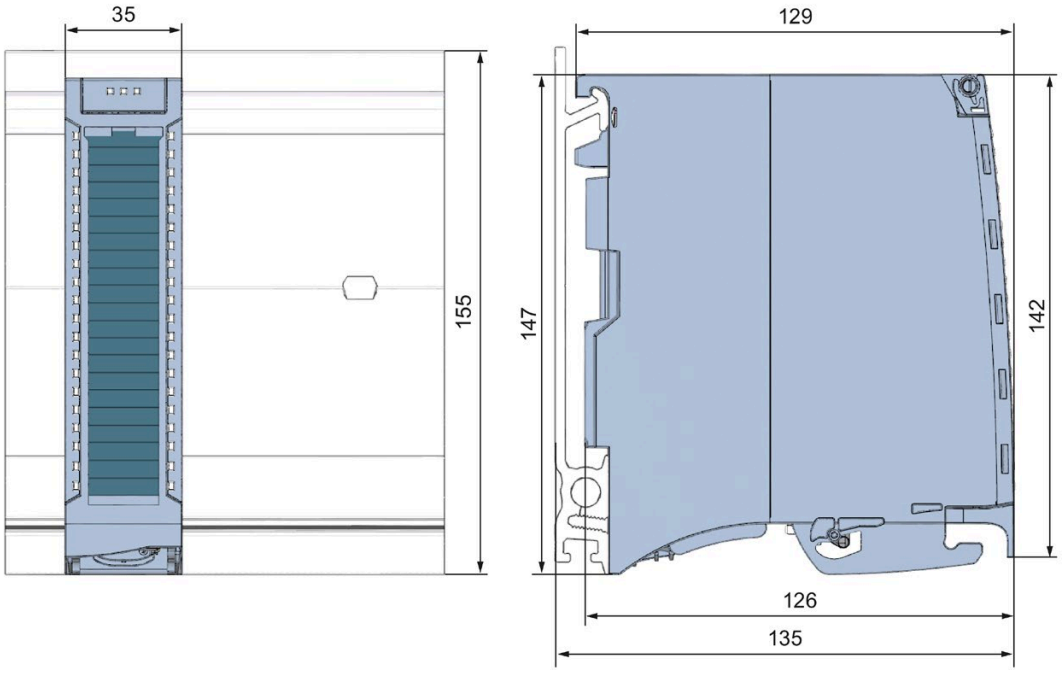


Figure A-1 Dimension drawing of the DQ 16x230VAC/2A ST module

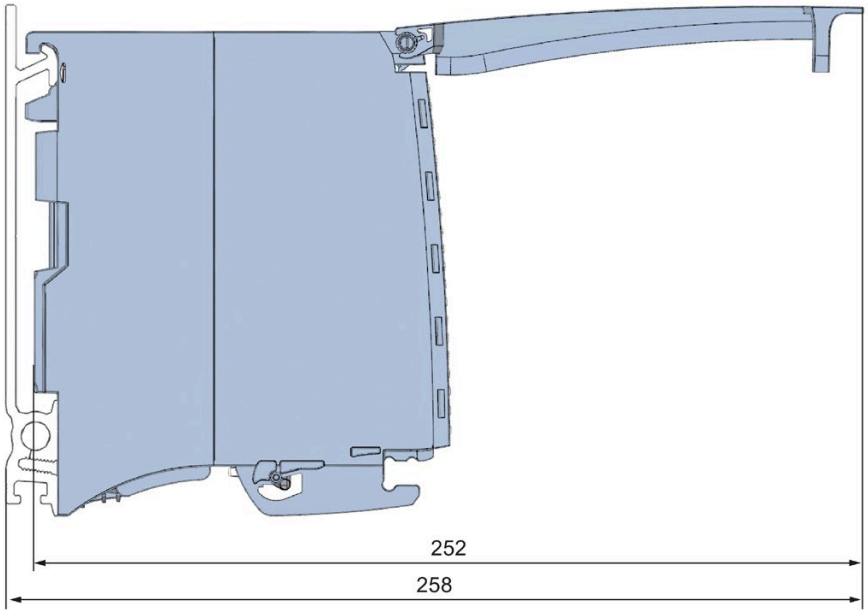


Figure A-2 Dimension drawing of the DQ 16x230VAC/2A ST module, side view with open front cover

Parameter data records

B

B.1 Parameter assignment and structure of the parameter data records

The data records of the module have an identical structure, regardless of whether you configure the module with PROFIBUS DP or PROFINET IO.

Dependencies for configuration with GSD file

When a GSD file is used to configure a module, dependencies can arise when "assigning the parameters".

There are no dependencies for this module. You can assign the individual parameters in any combination.

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 records 64 to 79. The parameters set in STEP 7 are not changed in the CPU, which means the parameters set in STEP 7 are valid again after a restart.

The parameters are only checked for plausibility by the module after the transfer.

STATUS output parameter

The module ignores errors that occurred 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.

Operation of the module behind a PROFIBUS DP interface module

If the module is operated behind a PROFIBUS DP interface module, the parameter data records 0 and 1 are not read back. You obtain the diagnostics data records 0 and 1 with the read back parameter data records 0 and 1. You can find additional information in the Interrupts section of the manual for the PROFIBUS DP interface module in the Internet (http://support.automation.siemens.com/WW/view/en/78324181).

Assignment of data record and channel

For the configuration as a 1 x 16-channel module, the parameters are located in data records 64 to 79 and are assigned as follows:

- Data record 64 for channel 0
- Data record 65 for channel 1
- …
- Data record 78 for channel 14
- Data record 79 for channel 15

For the configuration as a 2 x 8-channel module, the module has 2 submodules with eight channels each. The parameters for the channels are located in data records 64 to 71 and are assigned as follows:

- Data records 64 to 71 for channels 0 to 7 (submodule 1)
- Data records 64 to 71 for channels 8 to 15 (submodule 2)

Address the respective submodule for data record transfer.

Assignment of data record for the switching cycle counter

The parameters for the switching cycle counter are located in the data records 129 to 130 and are assigned as follows:

Data record 129 for channels 0 to 15 to read the counter values

Data record 130 for channels 0 to 15 to read the limit values

For the configuration as a 2 x 8-channel module, the module has 2 submodules with eight channels each. The parameters for the switching cycle counter are located in the data records 129 to 130 and are assigned as follows:

- Data records 129 for channels 0 to 7 (submodule 1) and channels 8 to 15 (submodule 2)
- Data records 130 for channels 0 to 7 (submodule 1) and channels 8 to 15 (submodule 2)

Address the respective submodule for data record transfer.

B.2 Structure of data sets 64 to 79

Data record structure

The figure below shows the structure of data record 64 for channel 0 as an example. The structure is identical for channels 1 to 16. The values in byte 0 and byte 1 are fixed and may not be changed.

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

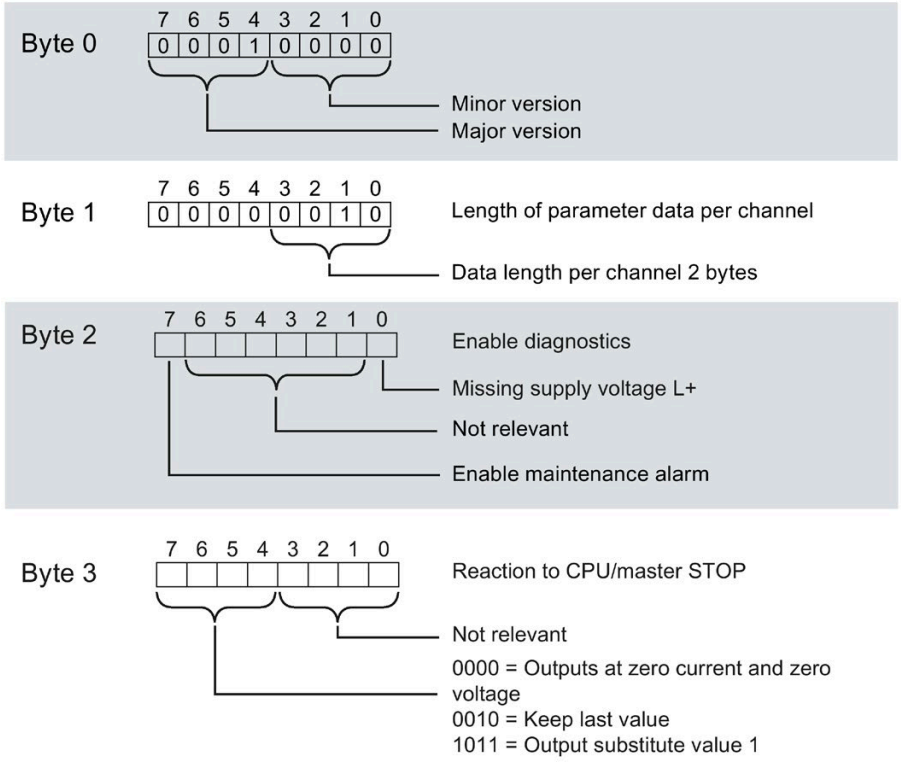


Figure B-1 Structure of data record 64: Bytes 0 to 3

B.3 Structure of data set DS 129

Structure of data set 129

You can read the current states of the switching cycle counters with data set 129. The counter status is supplied for each channel in UDINT format. The length of the data set results from the number of channels in the selected submodule.

The following figure shows you the structure of data set 129 for 16 channels.

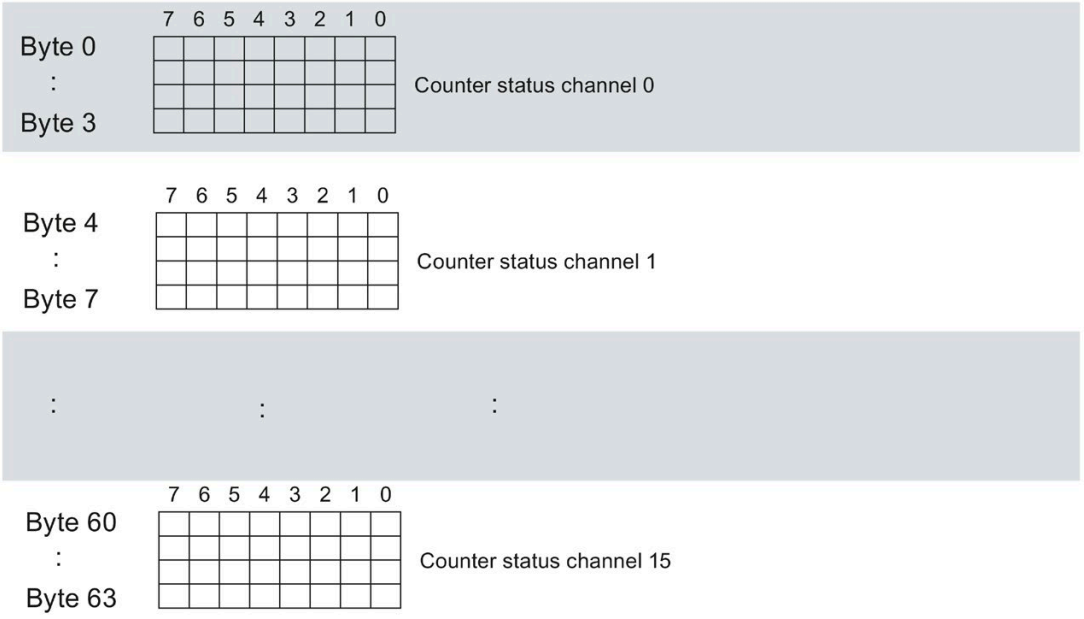


Figure B-2 Structure of data set 129: Byte 0 to 63

The following figure shows you the structure of data set 129 for 2 submodules with 8 channels each.

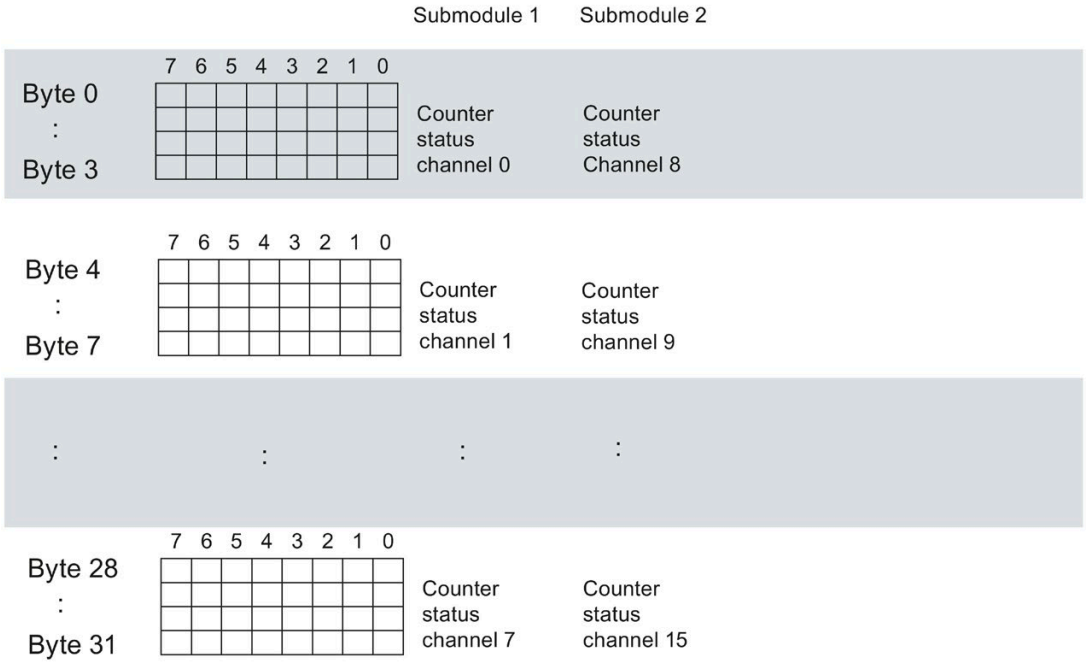


Figure B-3 Structure of data set 129: Byte 0 to 31

B.4 Structure of data set DS 130

Structure of data set 130

The limits of the switching cycle counters are read out with data set 130. The set value is supplied for each channel in UDINT format. The length of the data set results from the number of channels in the selected submodule.

The following figure shows you the structure of data set 130 for 16 channels.

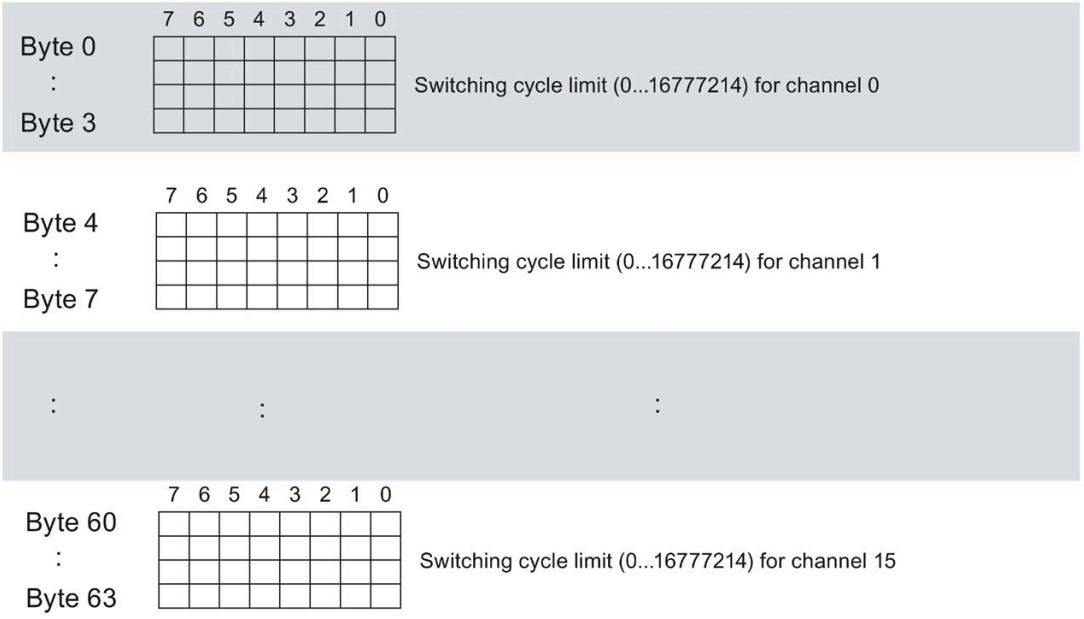


Figure B-4 Structure of data set 130: Byte 0 to 63

The following figure shows you the structure of data set 130 for 2 submodules with 8 channels each.

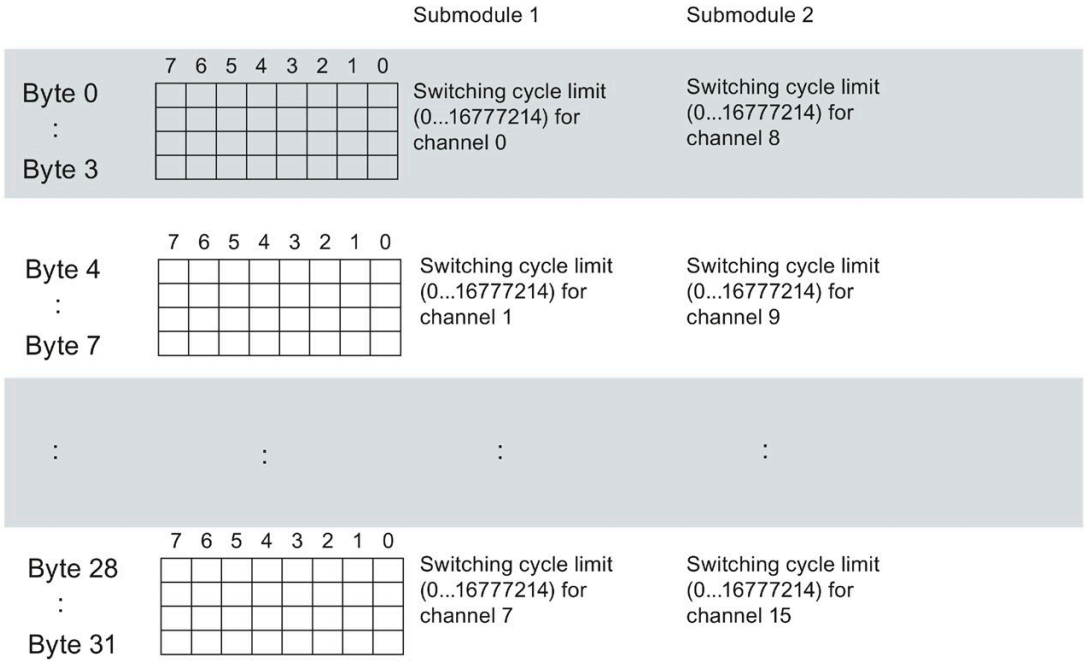


Figure B-5 Structure of data set 130: Byte 0 to 31

B.5 Structure of data set DS 131

Structure of data set 131

The following figure shows you the structure of data set 131 for 16 channels.

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

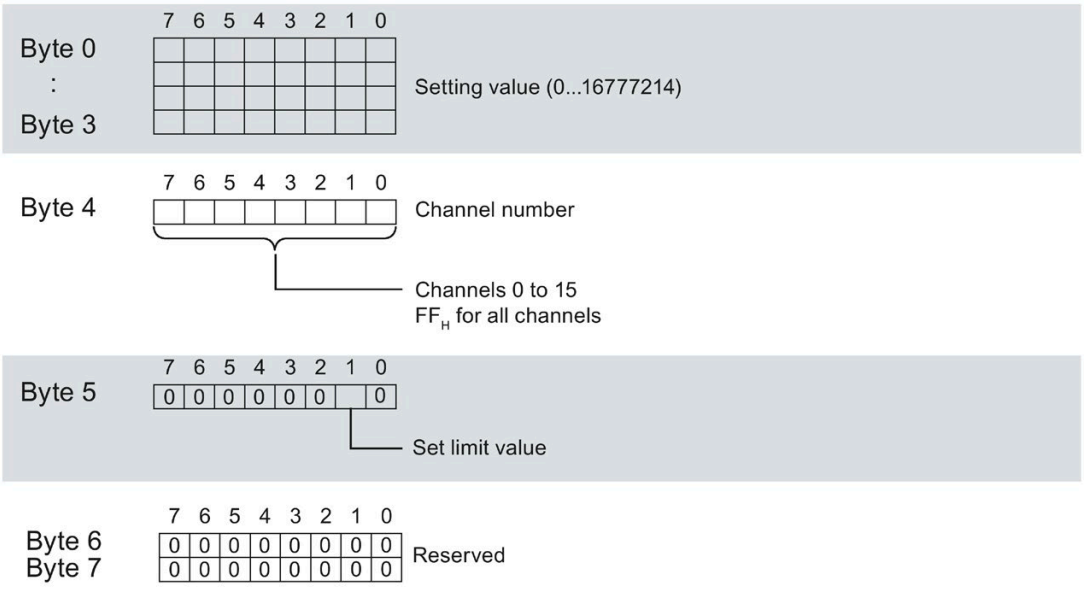


Figure B-6 Structure of data set 131: Bytes 0 to 7

The following figure shows you the structure of data set 131 for 2 submodules with 8 channels each.

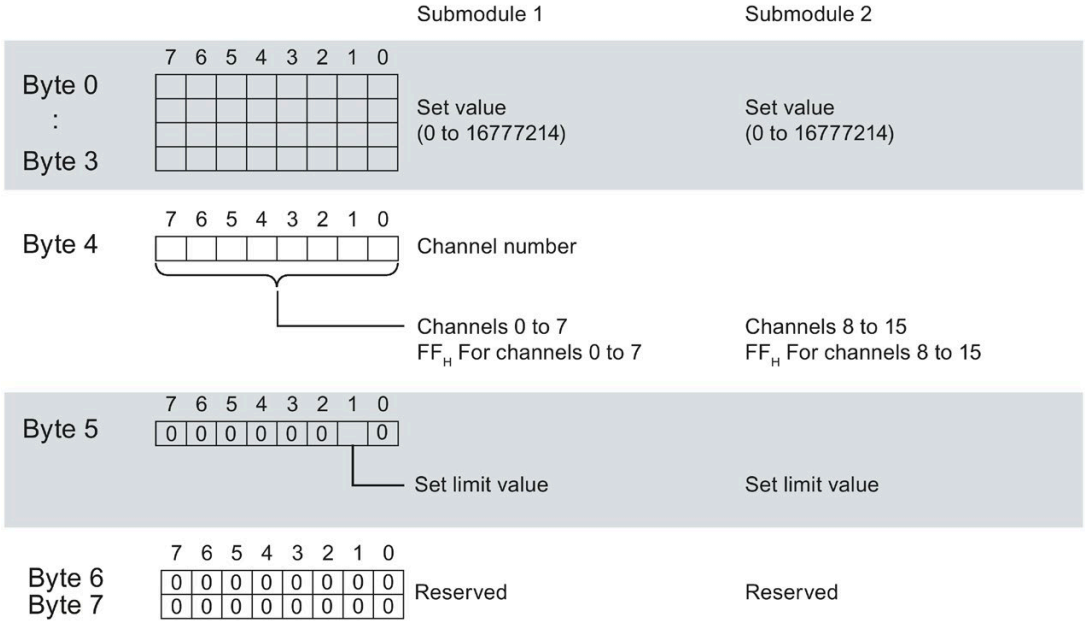


Figure B-7 Structure of data set 131: Bytes 0 to 7