SIEMENS

SIMATIC

S7-1500

Digital output module DQ 16x24VDC/0.5A ST (6ES7522-1BH00-0AB0)

Manual

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SIMATIC

S7-1500/ET 200MP
DQ 16x24VDC/0.5A ST
Digital Output Module
(6ES7522-1BH00-0AB0)

Manual

Legal information

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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 **may** result if proper precautions are not taken.

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> indicates that minor personal injury 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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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:

Original texts of the license conditions and copyright notes for open-source software are available on the Internet as of 09/2016.

Conventions

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.

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.

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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.

For legal reasons, we are obliged to publish the original text of the license conditions and copyright notices. Please read the information relating to this on the Internet (https://support.industry.siemens.com/cs/ww/en/view/109741045).
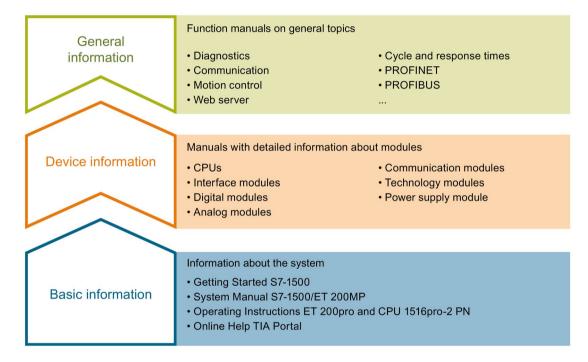
Table of contents

Documentation guide

The documentation for the SIMATIC S7-1500 automation system, the CPU 1516pro-2 PN based on SIMATIC S7-1500 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. For CPU 1516pro-2 PN you use the corresponding operating instructions. 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 (http://w3.siemens.com/mcms/industrial-automation-systems-simatic/en/manual-overview/Pages/Default.aspx).

Changes and supplements to the manuals are documented in a Product Information.

You can download the product information free of charge from the Internet (https://support.industry.siemens.com/cs/us/en/view/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).

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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 run commissioning and maintenance activities simultaneously on various SIMATIC S7 stations as a bulk operation independently of the TIA Portal.

The SIMATIC Automation Tool provides a multitude of functions:

● Scanning of a PROFINET/Ethernet network and identification of all connected CPUs

● Address assignment (IP, subnet, gateway) and station name (PROFINET device) to a CPU

● Transfer of the date and the programming device/PC time converted to UTC time to the module

● Program download to CPU

● Operating mode switchover RUN/STOP

● Localization of the CPU by means of LED flashing

● Reading out CPU error information

● Reading the CPU diagnostic buffer

● Reset to factory settings

● Updating the firmware of the CPU and connected modules

You can find the SIMATIC Automation Tool on the Internet (https://support.industry.siemens.com/cs/ww/en/view/98161300).

PRONETA

With SIEMENS PRONETA (PROFINET network analysis), you analyze the PROFINET network during commissioning. PRONETA features two core functions:

● The topology overview independently scans PROFINET and all connected components.

● The IO check is a fast test of the wiring and the module configuration of a system.

You can find SIEMENS PRONETA on the Internet (https://support.industry.siemens.com/cs/ww/en/view/67460624).

Product overview

<div style="text-align: right; font-size: 3em;">2</div>

2.1 Properties

Article number

6ES7522-1BH00-0AB0

View of the module

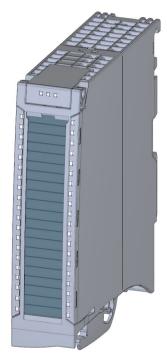Figure 2-1   View of the DQ 16x24VDC/0.5A ST module

Properties

The module has the following technical properties:

- 16 digital outputs, electrically isolated in groups of 8
- Rated output voltage 24 V DC
- Rated output current 0.5 A per channel
- Configurable substitute values (per channel)
- Assignable diagnostics (per channel group)
- 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)	GSD file in STEP 7 (TIA Portal) V12 or higher, or STEP 7 V5.5 SP3 or higher
Firmware update	V1.0.0 or higher	V12 or higher	--- / X
Identification data I&M0 to I&M3	V1.0.0 or higher	V12 or higher	X
Parameter assignment in RUN	V1.0.0 or higher	V12 or higher	X
Isochronous mode	V1.0.0 or higher	V12 or higher	---
Module-internal Shared Output (MSO)	V2.0.0 or higher	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)
Configurable submodules / submodules for Shared Device	V2.0.0 or higher	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)
Configurable after interface module IM 155-5 DP ST	V2.0.0 or higher	V13 or higher	X

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

Accessories

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

- Labeling strips
- U connector
- Universal front door

Other components

The following component can be ordered separately:

Front connectors, including potential jumpers and cable ties

You can find additional information on accessories in the system manual S7-1500/ET 200MP (https://support.industry.siemens.com/cs/ww/en/view/59191792).
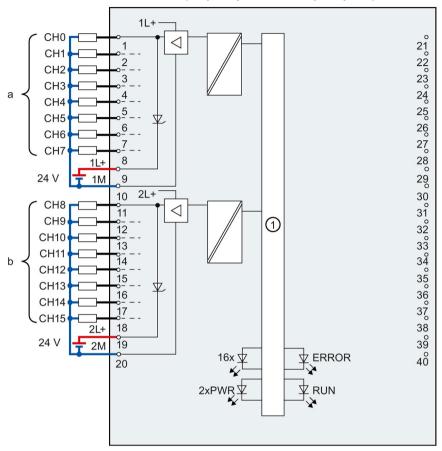
Wiring 3

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

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

Wiring and block diagram

The example in the following figure shows the terminal assignment and the assignment of the channels to the addresses (output byte a and output byte b).

①	Backplane bus interface	CHx	Channel or channel status LED (green)
xL+	Supply voltage 24 V DC	RUN	Status display LED (green)
xM	Ground	ERROR	Error display LED (red)
		PWR	POWER supply voltage LED (green)

Figure 3-1   Block diagram and terminal assignment

Note

When the 24 V supply voltage is switched on, there is a "1" signal at the module outputs for approx. 50 µs.

Tip: Using the potential jumpers

If you want to supply both load groups with the same potential (non-isolated), use the potential jumpers supplied with the front connector. 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

   – 9 and 29 (L+)

   – 10 and 30 (M)

   – 19 and 39 (L+)

   – 20 and 40 (M)

3. Insert the jumpers between terminals 29 and 39, as well as 30 and 40.

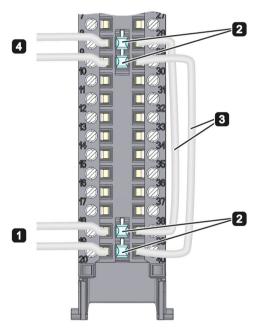4. Use the terminals 19 and 20 to distribute the potential to the next module.

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 16x24VDC/0.5 ST parameters

When you assign the module parameters in STEP 7, you use various parameters to specify the module properties. 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 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 using the WRREC instruction (parameter reassignment in RUN) and data records; see chapter Parameter assignment and structure of the parameter data records (Page 31).

Table 4- 1   Configurable parameters and their defaults

Parameters	Range of values	Default setting	Parameter assignment in RUN	Scope with configuration software, e.g., STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP
Diagnostics					
• Missing supply voltage L+	Yes/No	No	Yes	Channel group	Channel group
• Short circuit to M	Yes/No	No	Yes	Channel group	Channel group
Reaction to CPU STOP	• Turn off • Keep last value • Output substitute value 1	Turn off	Yes	Channel	Channel

4.2   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 16x24VDC/0.5A ST

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

When you configure the module by means of the GSD file, the 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 (TIA Portal)	
		Integrated in hard-ware catalog STEP 7 (TIA Portal)	GSD file in STEP 7 (TIA Portal) V12 or higher or STEP 7 V5.5 SP3 or higher
1 x 16-channel without value status	DQ 16x24VDC/0.5A ST	V12 or higher	X
1 x 16-channel with value status	DQ 16x24VDC/0.5A ST QI	V12 or higher	X
2 x 8-channel without value status	DQ 16x24VDC/0.5A ST S	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)
2 x 8-channel with value status	DQ 16x24VDC/0.5A ST S QI	V13 Update 3 or higher (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 16x24VDC/0.5A ST MSO	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)

Value status (Quality Information, QI)

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

- DQ 16x24VDC/0.5A ST QI
- DQ 16x24VDC/0.5A ST S QI
- DQ 16x24VDC/0.5A 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).

Special characteristics of short-circuit to ground

If a channel is short-circuited, all bits of the corresponding value status input byte are set to 0. The module signals all channels of the relevant byte as faulty.

Address space for configuration as 16-channel DQ 16x24VDC/0.5A ST

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 d" 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 16x24VDC/0.5A ST with value status

Address space for configuration as 2 x 8-channel DQ 16x24VDC/0.5A ST S QI

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

The number of usable IO controllers depends on the interface module 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.

Assignment in the process image output (PIQ)

Output value:

	7 6 5 4 3 2 1 0		
QB a		Channels 0 to 7 (outputs CH0 to CH7)	1st submodule
	15 ... 8		
QB b		Channels 8 to 15 (outputs CH8 to CH15)	2nd submodule

Assignment in the process image input (PII)

(QI) Value status

	7 6 5 4 3 2 1 0		
IB i		Channels 0 to 7 (value status QI0 to QI7)	1st submodule
	15 ... 8		
IB j		Channels 8 to 15 (value status QI8 to QI15)	2nd submodule

0 = Read-in value for the channel is invalid

Figure 4-2   Address space for configuration as 2 x 8-channel DQ 32x24VDC/0.5A ST S QI with value status

Address space for configuration as 1 x 16-channel DQ 16x24VDC/0.5A 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 16 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 usable IO controllers depends on the interface module used. Please 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 involved.
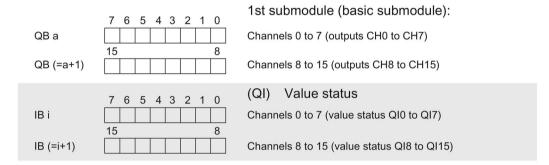
For the 1st submodule (=basic submodule), the value status 0 indicates that the value is incorrect or that the IO controller of the basic submodule is in STOP state.

For the 2nd to 4th submodule (=MSO submodule), the value status 0 indicates that the value is incorrect or one of the following errors has occurred:
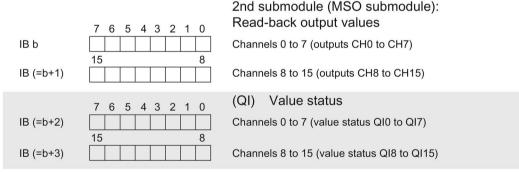
● The basic submodule is not yet configured (not ready).

● The connection between the IO controller and the basic submodule has been interrupted.

● The IO controller of the basic submodule is in STOP or POWER OFF state.

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

Assignment in the process image output (PIQ) for 1st submodule

1st submodule (basic submodule):

	7 6 5 4 3 2 1 0	
QB a		Channels 0 to 7 (outputs CH0 to CH7)
QB (=a+1)	15 ... 8	Channels 8 to 15 (outputs CH8 to CH15)

(QI)   Value status

	7 6 5 4 3 2 1 0	
IB i		Channels 0 to 7 (value status QI0 to QI7)
IB (=i+1)	15 ... 8	Channels 8 to 15 (value status QI8 to QI15)

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

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

	7 6 5 4 3 2 1 0	
IB b		Channels 0 to 7 (outputs CH0 to CH7)
IB (=b+1)	15 ... 8	Channels 8 to 15 (outputs CH8 to CH15)

(QI)   Value status

	7 6 5 4 3 2 1 0	
IB (=b+2)		Channels 0 to 7 (value status QI0 to QI7)
IB (=b+3)	15 ... 8	Channels 8 to 15 (value status QI8 to QI15)

0 = Read-in value for the channel is invalid

Figure 4-3   Address space for configuration as 1 x 16-channel DQ 16x24VDC/0.5A ST S MSO with value status

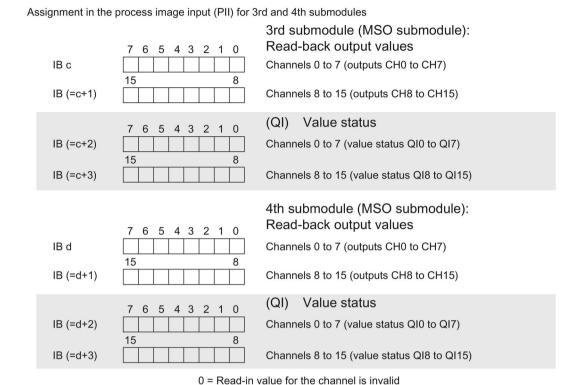The following figure shows the assignment of the address space with submodules 3 and 4 and the value status.

Assignment in the process image input (PII) for 3rd and 4th submodules

3rd submodule (MSO submodule):
Read-back output values

IB c — 7 6 5 4 3 2 1 0 — Channels 0 to 7 (outputs CH0 to CH7)

IB (=c+1) — 15 ... 8 — Channels 8 to 15 (outputs CH8 to CH15)

(QI)   Value status

IB (=c+2) — 7 6 5 4 3 2 1 0 — Channels 0 to 7 (value status QI0 to QI7)

IB (=c+3) — 15 ... 8 — Channels 8 to 15 (value status QI8 to QI15)

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

IB d — 7 6 5 4 3 2 1 0 — Channels 0 to 7 (outputs CH0 to CH7)

IB (=d+1) — 15 ... 8 — Channels 8 to 15 (outputs CH8 to CH15)

(QI)   Value status

IB (=d+2) — 7 6 5 4 3 2 1 0 — Channels 0 to 7 (value status QI0 to QI7)

IB (=d+3) — 15 ... 8 — Channels 8 to 15 (value status QI8 to QI15)

0 = Read-in value for the channel is invalid

Figure 4-4   Address space for configuration as 1 x 16-channel DQ 16x24VDC/0.5A ST S MSO with value status

Reference

You can find information on the Shared Input/Output (MSI/MSO) function in the section Module-Internal Shared Input/Output (MSI/MSO) of the PROFINET with STEP 7 V13 (https://support.industry.siemens.com/cs/ww/en/view/49948856) function manual.

Interrupts/diagnostics alarms

5

5.1 Status and error displays

LED displays

The following figure shows the LED displays (status and error displays) of DQ 16x24VDC/0.5A ST.
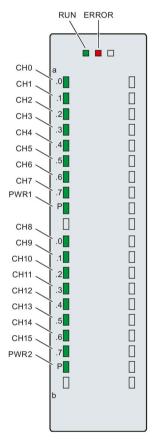

Figure 5-1   LED displays of the module DQ 16x24VDC/0.5A ST

Meaning of the LED displays

The following tables explain the meaning of the status and error displays. Remedial measures for diagnostic alarms can be found in section Diagnostic alarms (Page 24).

RUN and ERROR LED

Table 5- 1   Status and error displays RUN and ERROR

LED		Meaning	Remedy
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 to see if too many modules are inserted.
☼ Flashes	□ Off	The module starts and flashes until the valid parameter assignment is set.	---
■ On	□ Off	Module is configured	
■ On	☼ Flashes	Indicates module errors (at least one error at one channel, e.g., short-circuit to ground).	Evaluate the diagnostics data and eliminate the error (e.g., check the cables).
☼ Flashes	☼ Flashes	Hardware defective	Replace the module.

PWR1 and PWR2 LED

Table 5- 2   PWR1 and PWR2 status indication

LED PWRx	Meaning	Remedy
□ Off	Supply voltage L+ too low or missing	Check the L+ supply voltage.
■ On	Supply voltage L+ is present and OK	---

CHx LED

Table 5- 3   CHx status display

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

5.2   Interrupts

Digital output module DQ 16x24VDC/0.5A ST supports diagnostic interrupts.

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

Diagnostic interrupt

The module generates a diagnostic interrupt at the following events:

- Missing supply voltage L+
- Short circuit to ground
- Parameter assignment error

5.3   Diagnostics alarms

Diagnostics alarms

A diagnostics alarm is generated and the ERROR 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.

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 on the Internet in the "Manual for interface module IM 155-5 DP ST (6ES7155-5BA00-0AB0)".

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

Diagnostics alarm	Error code	Meaning	Corrective measures
Short circuit to ground	1_H	Short-circuit or overload at the channel	Check the wiring/actuator. Check the ambient temperature.
Parameter assignment error	10_H	- The module cannot evaluate parameters for the channel - Incorrect parameter assignment	Correct the parameter assignment
Load voltage missing	11_H	Supply voltage L+ of the module is missing	Connect supply voltage L+ to module/channel

Technical specifications 6

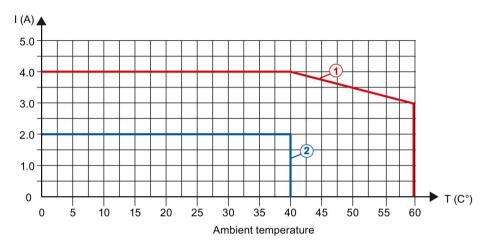## Technical specifications of the DQ 16x24VDC/0.5A ST

	6ES7522-1BH00-0AB0
General information	
Product type designation	DQ 16x24VDC/0,5A ST
Hardware functional status	E01
Firmware version	V2.0.0
Product function	
I&M data	Yes; I&M0 to I&M3
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V12 / V12
STEP 7 can be configured/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	
MSO	Yes
Supply voltage	
Rated value (DC)	24 V
Valid range, low limit (DC)	20.4 V
Valid range, high limit (DC)	28.8 V
Reverse polarity protection	Yes; through internal protection with 7 A per group
Input current	
Current consumption, max.	30 mA
Output voltage	
Rated value (DC)	24 V
Power	
Power consumption from the backplane bus	1.1 W
Power loss	
Power loss, typ.	2 W
Digital outputs	
Number of outputs	16
Sourcing output	Yes
Short-circuit protection	Yes; electronic clocking
• Response threshold, typ.	1 A
Limitation of inductive shutdown voltage to	L+ (-53 V)
Control of a digital input	Yes

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Switching capacity of outputs	
With resistive load, max.	0.5 A
With lamp load, max.	5 W
Load resistance range	
Low limit	48 Ω
High limit	12 kΩ
Output voltage	
For signal "1", min.	L+ (-0.8 V)
Output current	
For signal "1" rated value	0.5 A
For signal "1" permitted range, max.	0.5 A
For signal "0" residual current, max.	0.5 mA
Output delay with resistive load	
"0" to "1", max.	100 μs
"1" to "0", max.	500 μs
Parallel connection of two outputs	
For logic operations	Yes
For increased performance	No
For redundant control of a load	Yes
Switching frequency	
With resistive load, max.	100 Hz
With inductive load, max.	0.5 Hz; according to IEC 60947-5-1, DC-13
With lamp load, max.	10 Hz
Total current of outputs	
Current per channel, max.	0.5 A; see additional description in the manual
Current per group, max.	4 A; see additional description in the manual
Current per module, max.	8 A; see additional description in the manual
Cable length	
shielded, max.	1000 m
unshielded, max.	600 m
Isochronous mode	
Isochronous mode (application synchronized up to terminal)	Yes
Execution and activation time (TCO), min.	70 μs
Bus cycle time (TDP), min.	250 μs
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Substitute values can be applied	Yes
Interrupts	
Diagnostic interrupt	Yes
Diagnostics alarms	
Monitoring of supply voltage	Yes
Wire break	No
Short-circuit	Yes
Fuse blown	No

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Diagnostics indicator LED	
RUN LED	Yes; green LED
ERROR LED	Yes; red LED
Monitoring of supply voltage (PWR LED)	Yes; green LED
Channel status display	Yes; green LED
For channel diagnostics	No
For module diagnostics	Yes; red LED
Electrical isolation	
Electrical isolation of channels	
Between the channels	No
Between the channels, in groups of	8
Between the channels and backplane bus	Yes
Insulation	
Insulation tested with	707 V DC (type test)
Distributed operation	
Prioritized startup	Yes
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	230 g

Power reduction (derating) to aggregate current of outputs (per group)

The following derating graphs show the loading capacity of the outputs in relation to the mounting position of the S71500 automation system/ET 200MP distributed I/O system and the ambient temperature.

①   Horizontal mounting of the system

②   Vertical mounting of the system

Figure 6-1   Details on aggregate current of outputs (per group)

Dimensional drawing

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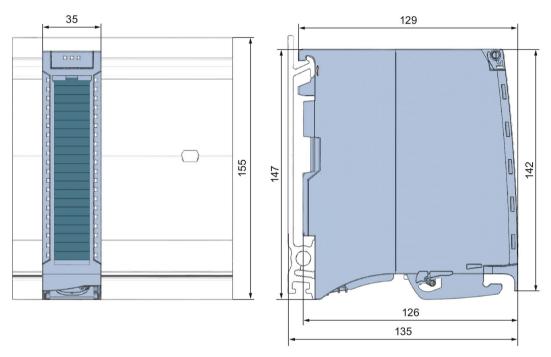

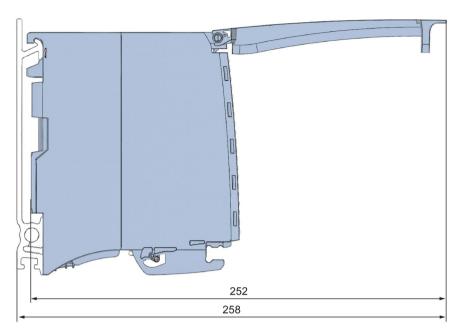Figure A-1   Dimensional drawing of the DQ 16x24VDC/0.5A ST module

Figure A-2   Dimensional drawing of the DQ 16x24VDC/0.5A ST module, side view with open front cover

Parameter data records

<div style="text-align: right; font-size: large;">**B**</div>

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 modules 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)

Parameter assignment in RUN

The WRREC instruction is used to transfer the parameters to the module using data records 64 to 78. The parameters set in STEP 7 do not change in the CPU, which means the parameters set in STEP 7 are still valid after a restart.

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

Output parameter STATUS

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 get the diagnostics data records 0 and 1 for the read back parameter data records 0 and 1. You can find more information in the Interrupts section of the PROFIBUS DP interface module device manual on 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.

Data record structure

The example in the following figure shows the structure of data record 64 for channel 0. The structure of channels 1 to 15 is identical. The values in byte 0 and byte 1 are fixed and may not be changed.

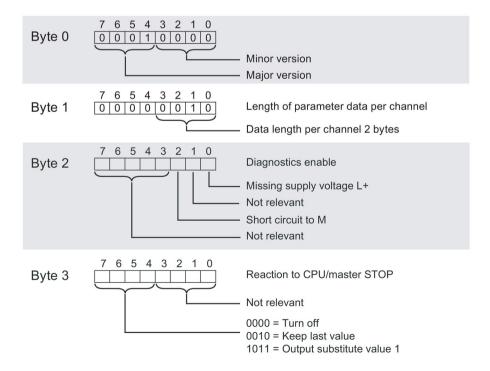Enable a parameter by setting the corresponding bit to "1".

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