SIEMENS

SIMATIC

ET 200SP
Digital output module
DQ 4x24VDC/2A ST
(6ES7132-6BD20-0BA0)

Manual

Preface

Documentation guide 1

Product overview 2

Wiring up 3

Parameters/address space 4

Interrupts/diagnostics alarms 5

Technical specifications 6

Parameter data record A

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Product overview

2

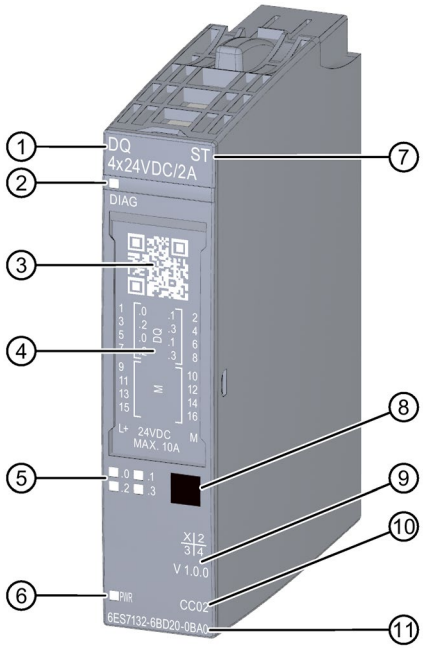
2.1 Properties

Article number

6ES7132-6BD20-0BA0 (packaging unit: 1 unit)

6ES7132-6BD20-2BA0 (packaging unit: 10 units)

View of the module



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

Image 2-1 View of the module DQ 4×24VDC/2A ST

Properties

The module has the following technical properties:

- Digital output module with 4 outputs
- Source output (PNP, P-switching)
- Supply voltage L+
- Output current 2 A (per channel)
- Total current 8 A (per module) (see derating: Technical specifications (Page 22))
- Configurable diagnostics (per module)
- Configurable substitute values (per channel)
- Suitable for solenoid valves, DC contactors, and indicator lights
- Safety-related shutdown

The module supports the following functions:

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

Table 2- 1 Version dependencies of other module functions

Function	Product version of the module as of	Firmware version of the module as of
Value status	1	V1.1.0

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

Accessories

The following accessories must be ordered separately:

- Labeling strips
- 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 (https://support.industry.siemens.com/cs/ww/en/view/91696622).

Wiring up

3

3.1 Wiring and block diagram

This section includes the block diagram of the DQ 4x24VDC/2A ST module with the terminal assignments for a 1-wire, 2-wire and 3-wire connection. You can use and combine the different wiring options for all channels.

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

Note

- The load group of the module must begin with a light-colored BaseUnit. Keep this in mind also during the configuration.

Note

The fuse integrated in BaseUnit type A1 may be triggered in the digital output module, rendering the terminals unusable.

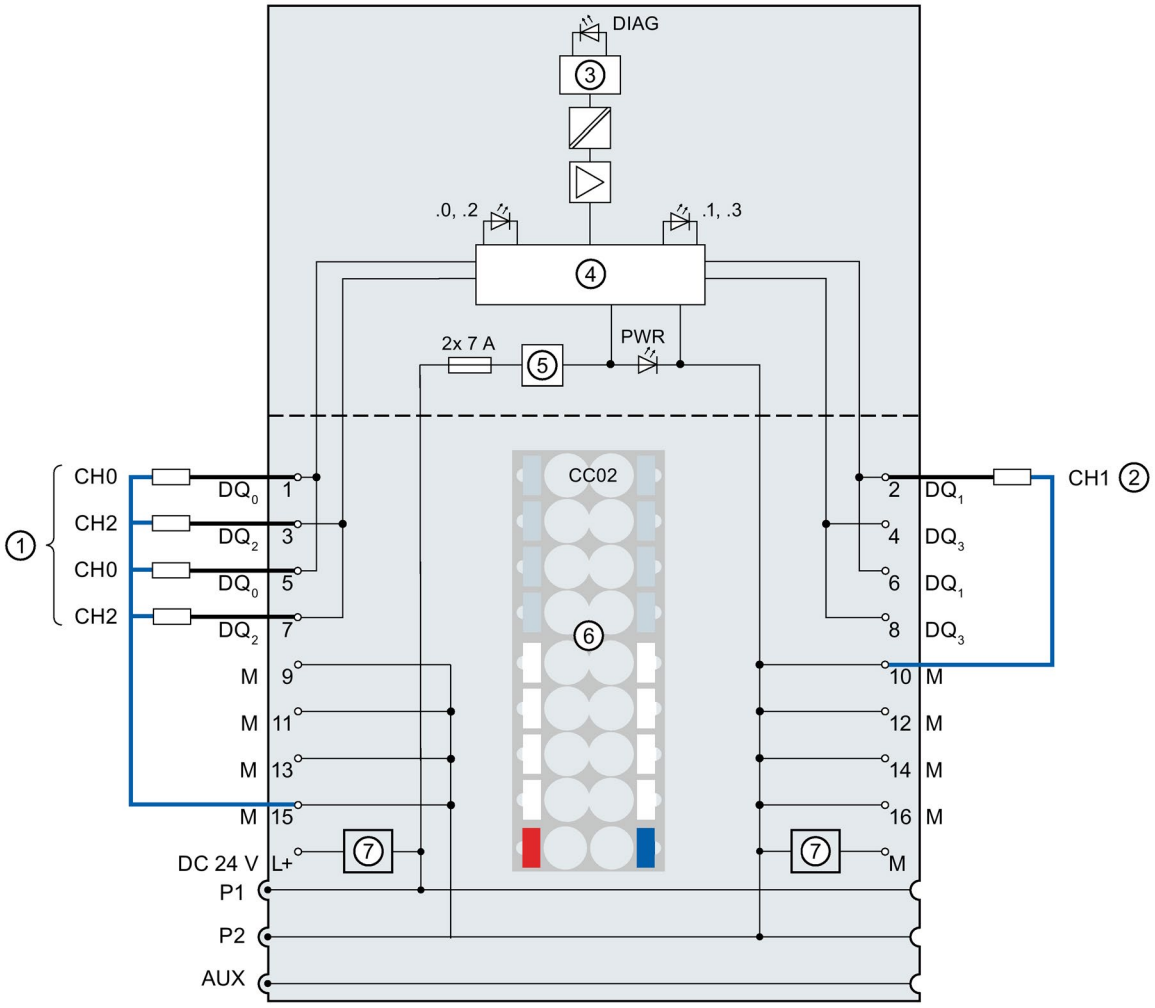
Note

Cross circuit at output

Be aware that voltage from a cross-circuit at the output can feed L+ to modules.

Wiring: 1 and 2-wire connection of actuators

The following figure shows an example of the terminal assignment of the digital output module DQ 4×24VDC/2A ST on the BaseUnit BU type A0 without AUX terminals (1- and 2-wire connection).

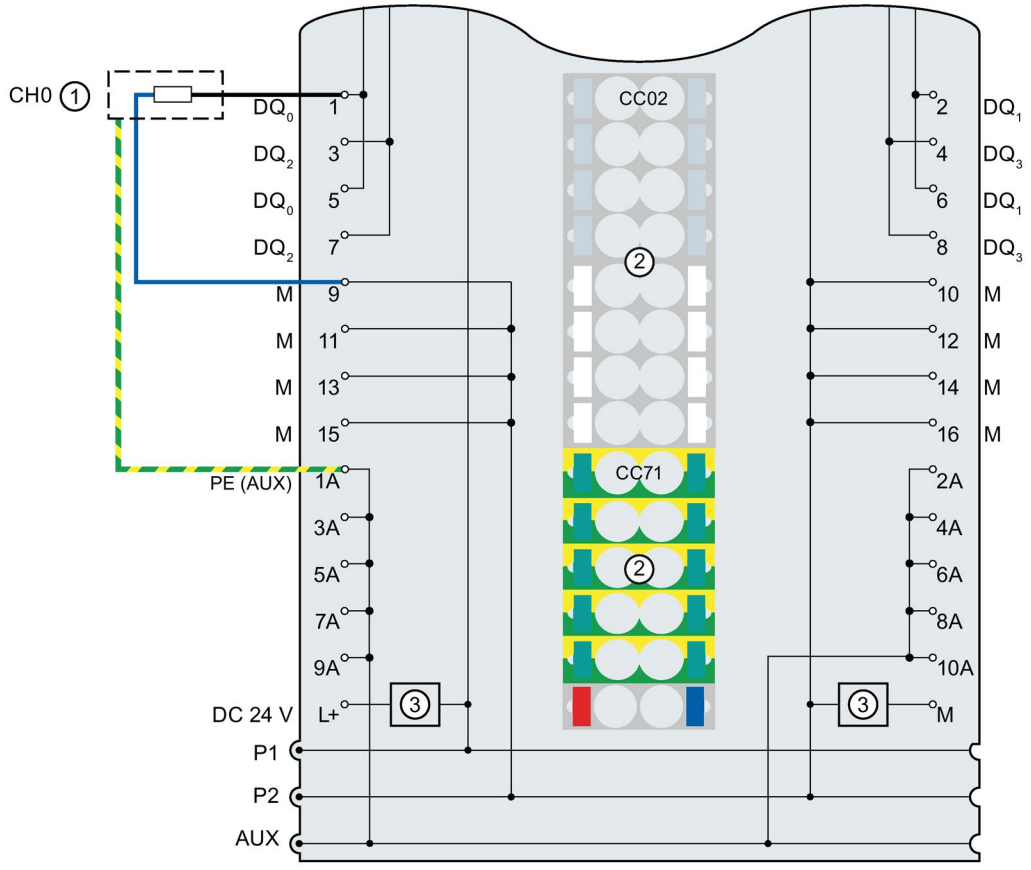


①	1-wire connection	DQ_n	Output signal, channel n
②	2-wire connection	24 V DC	Supply voltage L+ (infeed for light-colored BaseUnit only)
③	Backplane bus interface	M	Ground
④	Output electronics	P1, P2, AUX	Internal self-assembling voltage buses Connection to left (dark-colored BaseUnit) Connection to left interrupted (light-colored BaseUnit)
⑤	Polarity reversal protection	DIAG	Error or diagnostics LED (green, red)
⑥	Color-coded label with color code CC02 (optional)	.0 to .3	Channel status LED (green)
⑦	Filter connection supply voltage (only when light-colored BaseUnit is present)	PWR	Power LED (green)

Image 3-1 Block diagram and terminal assignment for 1- and 2-wire connection of actuators

Wiring: 3-wire connection of actuators

The following figure shows an example of the terminal assignment of the digital output module DQ 4×24VDC/2A ST on the BaseUnit BU type A0 with AUX terminals (3-wire connection).



①	3-wire connection	1 A to 10 A	AUX terminals
②	Color-coded labels with color codes CC02 and CC71 (optional)	PE (AUX)	Protective conductor connection
③	Filter connection supply voltage (only when light-colored BaseUnit is present)	24 V DC	Supply voltage L+ (infeed for light-colored BaseUnit only)
DQ_n	Output signal, channel n	M	Ground
		P1, P2, AUX	Internal self-assembling voltage buses Connection to left (dark-colored BaseUnit) Connection to left interrupted (light-colored BaseUnit)

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

Parameters/address space

4

4.1 Parameters

Parameters for DQ 4x24VDC/2A 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 27).

The following parameter settings are possible:

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

Parameters	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
Diagnostics: Short-circuit to ground	• Enable • Disable	Disable	Yes	Module	Module
Diagnostics: Short-circuit to L+	• Enable • Disable	Disable	Yes	Module	Module
Diagnostics: Wire break	• Enable • Disable	Disable	Yes	Module	Module
Channel activated	• Enable • Disable	Enable	Yes	Channel	Channel

Parameters	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.

Note

If one of the two parameters "Diagnostics: Short-circuit to L+" or "Diagnostics: Wire break" is enabled and one of these diagnostics occurs, the affected channel is switched off to avoid triggering an undefined load. Note that a diagnostic interrupt can only be generated when diagnostics are enabled. [1]

[1] as of module revision 06

4.2 Explanation of the parameters

Diagnostics: No supply voltage L+

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

Diagnostics: Short-circuit to ground

Enabling of the diagnostics if a short-circuit of the actuator supply to ground occurs.

Diagnostics: Short-circuit to L+

Enabling of the diagnostics if a short-circuit of the actuator supply to L+ occurs.

Diagnostics: Wire break

Enabling of the diagnostics if the line to the actuator is broken.

Channel activated

Determines whether a channel is activated or deactivated.

Reaction to CPU STOP / substitute value

Determines the behavior of the module in the event of a CPU STOP.

Potential group

A potential group consists of a group of directly adjacent I/O modules within an ET 200SP station, which are supplied via a common supply voltage.

A potential group begins with a light-colored BaseUnit through which the required voltage is supplied for all modules of the potential group. The light-colored BaseUnit interrupts the three self-assembling voltage buses P1, P2 and AUX to the left neighbor.

All additional I/O modules of this potential group are plugged into dark-colored BaseUnits. You take the potential of the self-assembling voltage buses P1, P2 and AUX from the left neighbor.

A potential group ends with the dark-colored BaseUnit, which follows a light-colored BaseUnit or server module in the station configuration.

4.3 Address space

The module can be configured differently in STEP 7; see following table. Depending on the configuration, additional/different addresses are assigned in the process image output/input.

Configuration options of DQ 4x24VDC/2A 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	DQ 4x24VDC/2A ST V1.0	X	X	X
1 x 4-channel without value status	DQ 4x24VDC/2A ST V1.1	X	X	X
1 x 4-channel with value status	DQ 4x24VDC/2A ST V1.1, 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 DQ 4×24VDC/2A ST with value status (Quality Information (QI)). The addresses for the value status are only available if the value status is enabled.

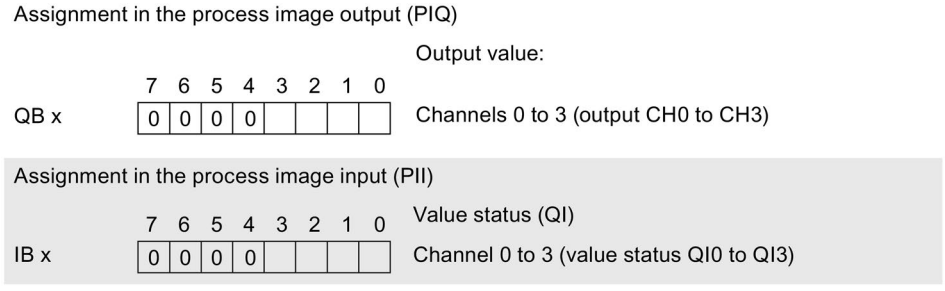


Image 4-1 Address space of the DQ 4×24VDC/2A ST with value status

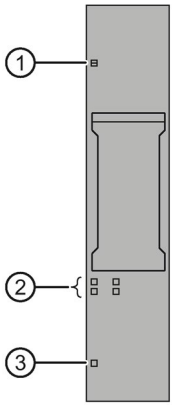
Interrupts/diagnostics alarms

5

5.1 Status and error display

LED display

The figure below shows the LED displays of the DQ 4x24VDC/2A ST.



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

Image 5-1 LED display

Meaning of the LED displays

The following tables show the meaning of the status and error displays. Measures for dealing with diagnostics alarms can be found in the section Diagnostics alarms (Page 20).

DIAG LED

Table 5- 1 DIAG LED fault/error display

DIAG LED	Meaning
☐ off	Backplane bus supply of the ET 200SP not OK
☼ Flashes	Module parameters not assigned
■ on	Module parameters assigned and no module diagnostics
☼ Flashes	Module parameters assigned and module diagnostics

Channel status LED

Table 5- 2 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- 3 Status display of the PWR LED

PWR LED	Meaning
☐ off	No supply voltage L+
■ on	Supply voltage L+ present

5.2 Interrupts

The DQ 4×24VDC/2A ST digital output module supports diagnostics interrupts.

Diagnostics interrupts

The module generates a diagnostic interrupt at the following events:

- Short-circuit
- Wire break
- Parameter assignment error
- Supply voltage missing
- Channel temporarily unavailable

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.

Note

You can connect 2 actuators per output.

The diagnostics of the two actuators influenced each other in the case of duplicate wiring.

This means:

- a wire break is only signaled if both actuators are affected
- a single short-circuit affects both actuators

Note

Parallel connection of two outputs

For parallel connection of two outputs for redundant control of a load, the channel diagnostics "Short-circuit to L+" and "Wire break" must be deactivated.

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

Diagnostics alarm	Error code	Meaning	Solution
Short-circuit	1_H	• Short-circuit of actuator supply to ground • Short-circuit of actuator supply to L+	Correct the process wiring
Wire break	6_H	Actuator circuit impedance too high	Use a different actuator type or modify the wiring, e.g. use cables with larger cross-section
		Wire break between the module and actuator	Connect the cable
		Channel not connected (open)	• Disable diagnostics • Connect a resistor to the actuator contacts in the load resistance range
Parameter assignment error	10_H	• The module cannot evaluate parameters for the channel. • Incorrect parameter assignment.	Correct the parameter assignment
Supply voltage missing	11_H	Missing or insufficient supply voltage L+	• Check supply voltage L+ on the BaseUnit • Check BaseUnit type
Channel temporarily unavailable	$1F_H$	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 DQ 4×24VDC/2A ST

	6ES7132-6BD20-0BA0
General information	
Product type designation	ET 200SP, DQ 4x24VDC/2A ST, PU 1
Firmware version	V1.1
• FW update possible	Yes
Usable BaseUnits	BU type A0
Color code for module-specific color identification label	CC02
Product function	
I&M data	Yes; I&M0 to I&M3
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V11 SP2 / V13
STEP 7 can be configured/integrated as of version	V5.5 SP3 / -
PCS 7 can be configured/integrated as of version	V8.1 SP1
PROFIBUS as of GSD version/GSD revision	GSD revision 5
PROFINET as of GSD version/GSD revision	GSDML V2.3
Operating mode	
DQ	Yes
DQ with energy-saving function	No
PWM	No
Oversampling	No
MSO	No
Supply voltage	
Rated value (DC)	24 V
Valid range, low limit (DC)	19.2 V
Valid range, high limit (DC)	28.8 V
Polarity reversal protection	Yes
Input current	
Current consumption, max.	60 mA; no load
Output voltage	
Rated value (DC)	24 V

	6ES7132-6BD20-0BA0
Power loss	
Power loss, typ.	1 W
Address area	
Address space per module	
Address space per module, max.	1 byte; + 1 byte for QI information
Digital outputs	
Number of outputs	4
Sinking output	No
Sourcing output	Yes
Short-circuit protection	Yes
• Response threshold, typ.	2.8 ... 5.2 A
Limitation of inductive shutdown voltage to	Typ. L+ (-50 V)
Control of a digital input	Yes
Switching capacity of outputs	
With resistive load, max.	2 A
With lamp load, max.	10 W
Load resistance range	
Low limit	12 Ω
High limit	3400 Ω
Output current	
For signal "1" rated value	2 A
For signal "0" residual current, max.	0.1 mA
Output delay with resistive load	
"0" to "1", typ.	50 µs
"0" to "1", max.	50 µs
"1" to "0", typ.	100 µs
"1" to "0", max.	100 µs
Parallel connection of two outputs	
For increased performance	No
For redundant control of a load	Yes
Switching frequency	
With resistive load, max.	100 Hz
With inductive load, max.	2 Hz
With lamp load, max.	10 Hz
Total current of the outputs	
Current per channel, max.	2 A
Current per module, max.	8 A

	6ES7132-6BD20-0BA0
Total current of the outputs (per module)	
Horizontal installation	
• Up to 30 °C, max.	8 A
• Up to 40 °C, max.	8 A
• Up to 50 °C, max.	6 A
• Up to 60 °C, max.	4 A
Vertical installation	
• Up to 30 °C, max.	8 A
• Up to 40 °C, max.	6 A
• Up to 50 °C, max.	4 A
• Up to 60 °C, max.	4 A
Cable length	
Shielded, max.	1000 m
Unshielded, max.	600 m
Isochronous mode	
Isochronous mode (application synchronized up to terminal)	No
Interrupts/diagnostics/status information	
Substitute values can be applied	Yes
Interrupts	
Diagnostics interrupt	Yes
Diagnostics alarms	
Diagnostics	Yes
Monitoring of the supply voltage	Yes
Wire break	Yes; module by module
Short-circuit	Yes; module by module
Group error	Yes
Diagnostics indicator 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
Electrical isolation	
Electrical isolation of channels	
Between the channels	No
Between the channels and backplane bus	Yes
Permitted potential difference	
Between different circuits	75 V DC / 60 V AC (basic insulation)
Insulation	
Insulation tested with	707 V DC (type test)
Dimensions	
Width	15 mm
Weights	
Weight, approx.	30 g

Safety-related shutdown

Note

The digital output module DQ 4x24VDC/2A ST supports safety-related shutdown in connection with a fail-safe power module F-PM-E 24VDC/8A PPM ST:

- SIL according to IEC 61508: 2
- Highest attainable safety class in safety mode, performance level according to EN ISO 13849-1: d

Residual current for signal state "0"

Note

Residual current for signal state "0"

Due to the Diagnostics: Wire break function, there is a low level of residual current in the "0" signal state at the output, which may cause the display diodes to flicker.

This residual current does not depend on the setting for the Diagnostics: Wire break parameter.

Derating trend

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

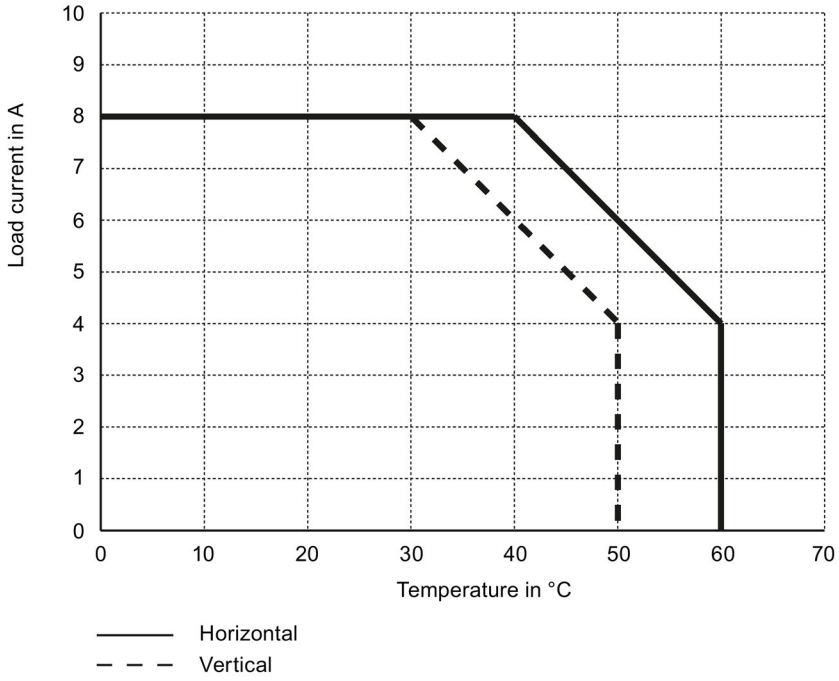


Image 6-1 Load current for mounting position

Dimension drawing

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