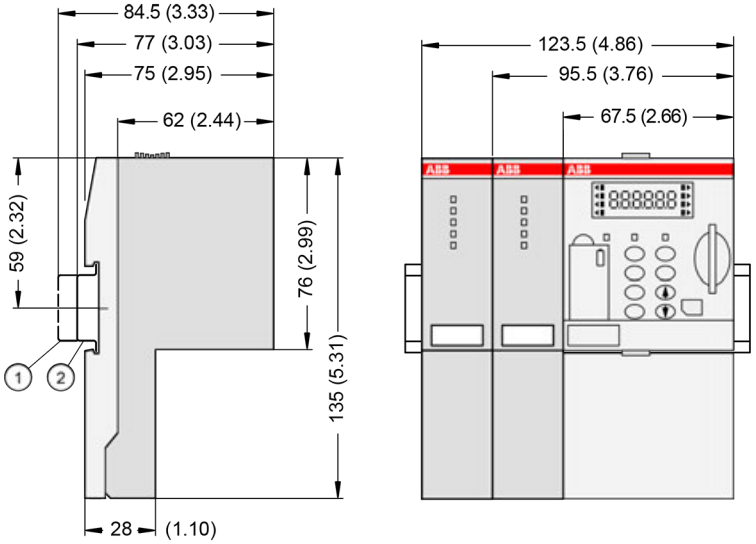
Dimensions



1 Din rail 15 mm
2 Din rail 7.5 mm

The dimensions are in mm and in brackets in inch.

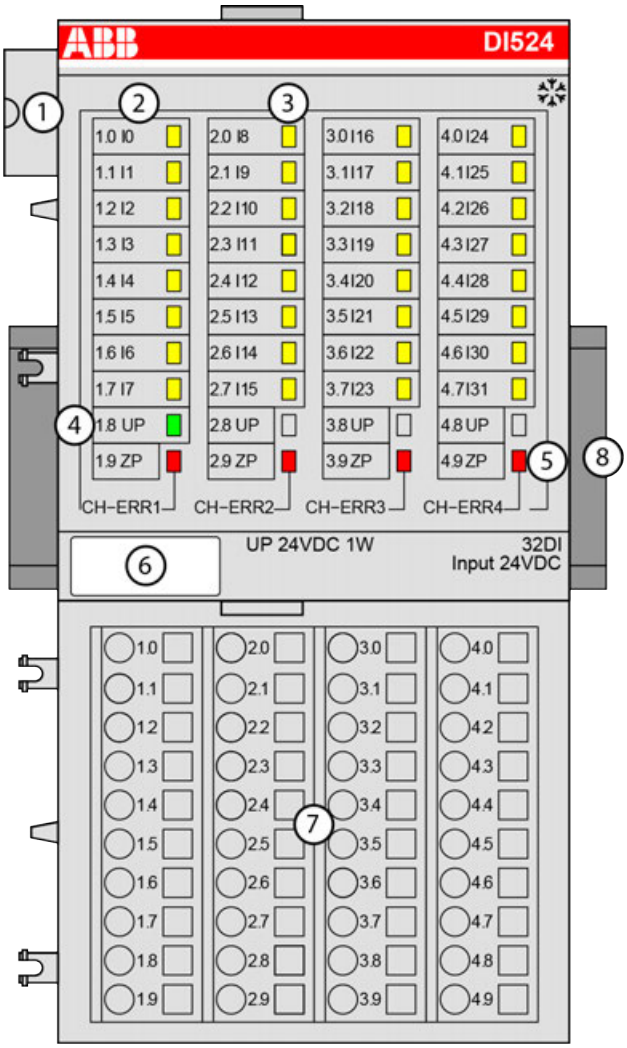
Ordering data

Part no.	Description	Product life cycle phase *)
1SAP 270 000 R0001	DC541-CM, digital input/output module, 8 DC, 24 V DC / 0.5 A, 1-wire	Active
1SAP 470 000 R0001	DC541-CM-XC, digital input/output module, 8 DC, 24 V DC / 0.5 A, 1-wire, XC version	Active

**) Modules in lifecycle Classic are available from stock but not recommended for planning and commissioning of new installations.*

1.6.1.2.5 DI524 - Digital input module

- 32 digital inputs 24 V DC in 4 groups (1.0 ... 1.7, 2.0 ... 2.7, 3.0 ... 3.7 and 4.0 ... 4.7)
- Fast counter
- Module-wise galvanically isolated
- XC version for use in extreme ambient conditions available



1 I/O bus
2 Allocation between terminal number and signal name
3 32 yellow LEDs to display the signal states at the digital inputs (I0 ... I31)
4 1 green LED to display the state of the process supply voltage UP
5 4 red LEDs to display errors
6 Label
7 Terminal unit
8 DIN rail
Sign for XC version

Intended use

The module can be used both on an AC500 processor module and on a communication interface module.

Unless expressly intended for this purpose, the following applications are prohibited:

- Use in explosion-proof areas.
- Use in environments with harmful oils, acids, gases, vapors, dusts and radiation.
- Operation under water.

Not to be used as a safety module.

Connections



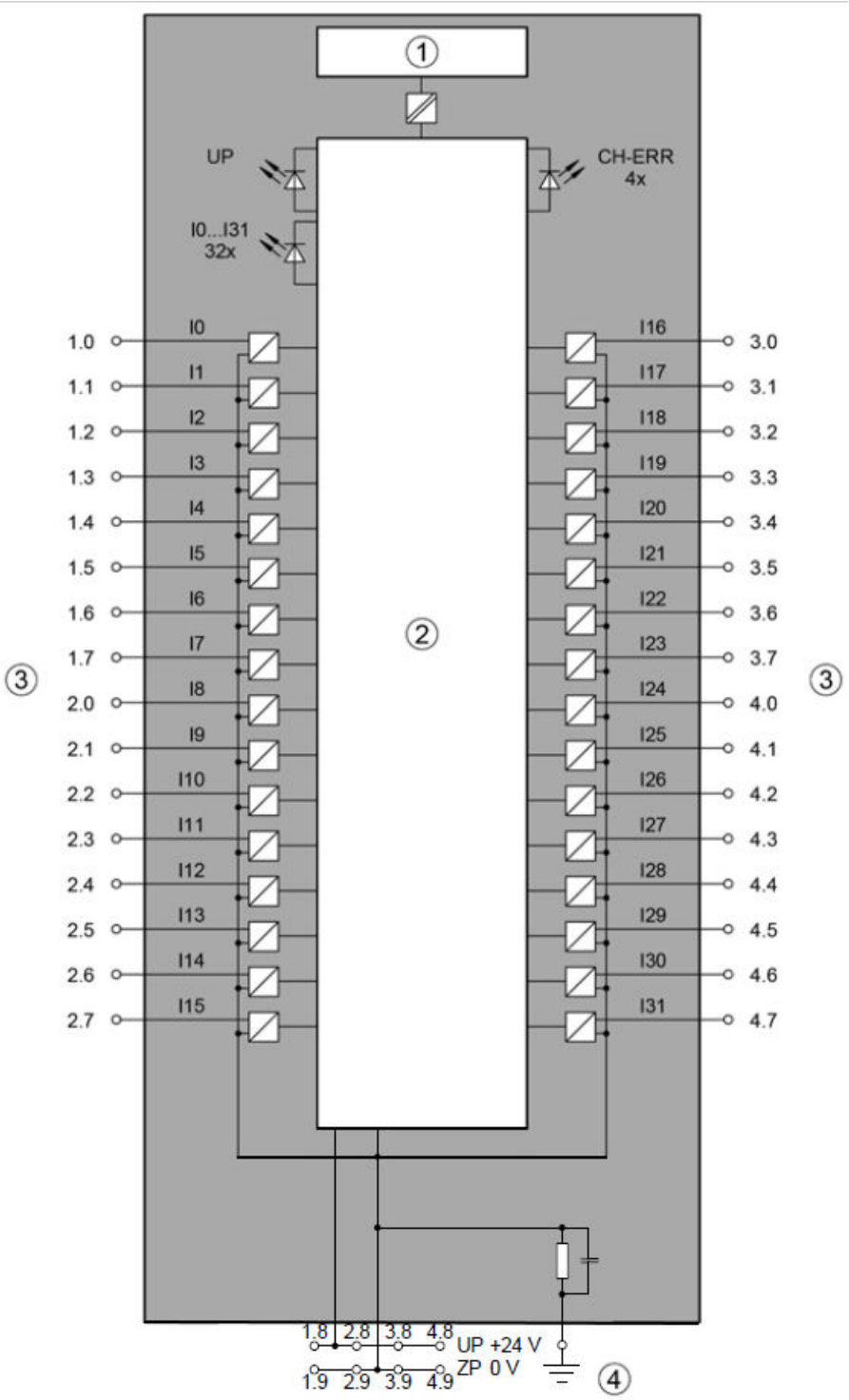
For a detailed description of the mounting, disassembly and connection of the module, please refer to the installation instructions.

The connection of the I/O channels is carried out using the 40 terminals of the I/O terminal unit. I/O modules can be replaced without re-wiring the terminal units.

The terminals 1.8 ... 4.8 and 1.9 ... 4.9 are electrically interconnected within the I/O terminal unit and always have the same assignment, irrespective of the inserted module:

Terminals 1.8 ... 4.8: process voltage UP = +24 V DC

Terminals 1.9 ... 4.9: process voltage ZP = 0 V DC



1 I/O bus interface to the CPU or communication interface module
2 Internal logic and I/O circuits of the module
3 Digital inputs
4 Functional earth connection between terminal unit and DIN rail

WARNING!

Removal/Insertion under power

Removal or insertion under power is permissible only if all conditions for hot swapping are fullfilled.

Conditions for hot swap

“Conditions for hot swap” on page 1152

The devices are not designed for removal or insertion under power when the conditions for hot swap do not apply. Because of unforeseeable consequences, it is not allowed to plug in or unplug devices with the power being ON.

Make sure that all voltage sources (supply and process voltage) are switched off before doing any of the following actions:

– Connect or disconnect any signal or terminal block.
– Remove, mount or replace a module.

Disconnecting any powered devices while they are energized in a hazardous location could result in an electric arc, which could create an ignition source resulting in fire or explosion.

Prior to proceeding, make sure that power is disconnected and that the area has been thoroughly checked to ensure that flammable materials or ignitable concentrations are not present.

The devices must not be opened when in operation. The same applies to the network interfaces.

CAUTION!

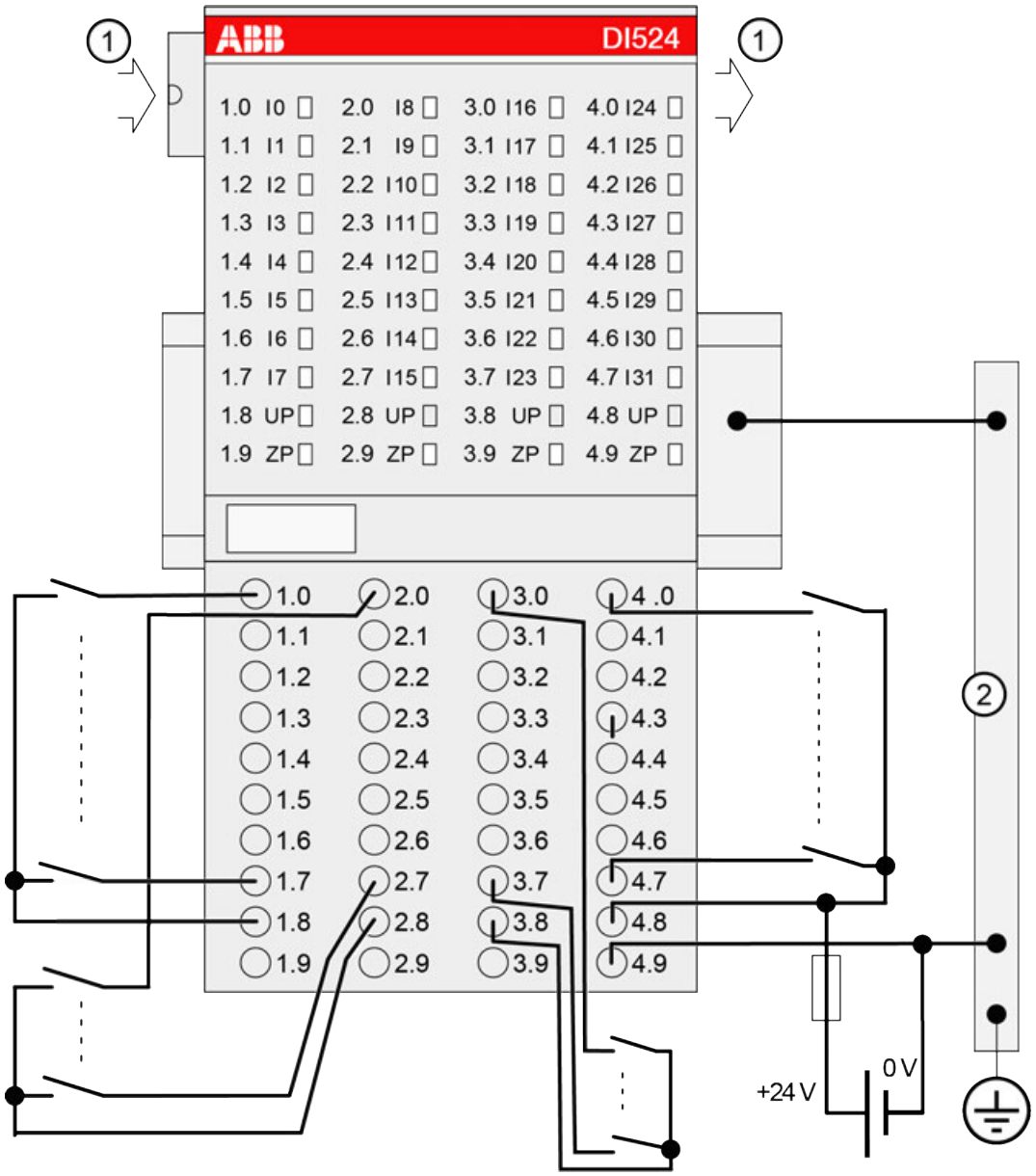
The process supply voltage must be included in the grounding concept (e. g. grounding of the negative terminal).

NOTICE!

Risk of damaging the PLC modules!

Overvoltages and short circuits might damage the PLC modules.

– Make sure that all voltage sources (supply voltage and process supply voltage) are switched off before you begin with operations on the system.
– Never connect any voltages or signals to reserved terminals (marked with ---). Reserved terminals may carry internal voltages.



1 I/O bus
2 Control cabinet earth

The module provides several diagnosis functions.

Internal data exchange

	Without the fast counter	With the fast counter (only with AC500)
Digital inputs (bytes)	4	6
Digital outputs (bytes)	0	2
Counter input data (words)	0	4
Counter output data (words)	0	8

Parameterization

The module itself does not store configuration data. It receives its parameterization data from the master device of the I/O bus (CPU or communication interface module) during power-up of the system.

Hence, replacing I/O modules is possible without any re-parameterization via software.



If the external power supply voltage via UP/ZP terminals fails, the I/O module loses its configuration data. The whole station has to be switched off and on again to re-configure the module.

Firmware version	Configuration
Firmware version > V2.0.0	The arrangement of the parameter data is performed by Control Builder Plus/ Automation Builder software.

The parameter data directly influences the functionality of modules.

For non-standard applications, it is necessary to adapt the parameters to your system configuration.

Module: Module slot address: Y = 1 ... 10

Name	Default	Internal value	Values in menu
Ignore module	No	0	No
		1	Yes
Check supply	On	0	Off
		1	On
Input delay	8 ms	0	0.1 ms
		1	1 ms
		2	8 ms
		3	32 ms

Diagnosis

E1 ... E4	**d1**	**d2**	**d3**	**d4**	**Identifier 000 ... 063**	**AC500 display**	**<− Display in**	
Class	**Comp**	**Dev**	**Mod**	**Ch**	**Err**	**PS501 PLC browser**		
Byte 6 Bit 6 ... 7	**-**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6 Bit 0 ... 5**	**FBP diagnosis block**		
Class	**Interface**	**Device**	**Module**	**Channel**	**Error identifier**	**Error message**		**Remedy**
	[1])	[2])	[3])	[4])				
Module error								
3	14	1 ... 10	31	31	19	Checksum error in the I/O module		Replace I/O module

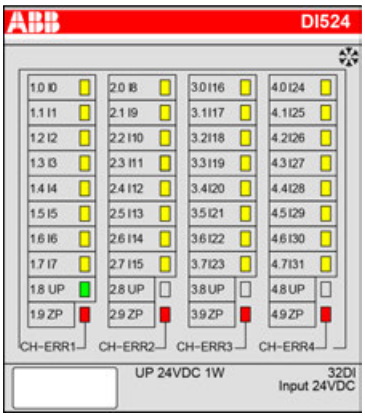
E1 ... E4	**d1**	**d2**	**d3**	**d4**	**Identifier** **000 ... 063**	**AC500 display**	**<− Display in**	
Class	**Comp**	**Dev**	**Mod**	**Ch**	**Err**	**PS501 PLC browser**		
Byte 6 **Bit 6 ... 7**	**-**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6** **Bit 0 ... 5**	**FBP diag-nosis block**		
Class	**Interface**	**Device**	**Module**	**Channel**	**Error identifier**	**Error message**		**Remedy**
	[1])	**[2])**	**[3])**	**[4])**				
	11 / 12	ADR	1 ... 10					
3	14	1 ... 10	31	31	3	Timeout in the I/O module		Replace I/O module
	11 / 12	ADR	1 ... 10					
3	14	1 ... 10	31	31	40	Different hard-/firmware versions in the module		Replace I/O module
	11 / 12	ADR	1 ... 10					
3	14	1 ... 10	31	31	43	Internal error in the module		Replace I/O module
	11 / 12	ADR	1 ... 10					
3	14	1 ... 10	31	31	36	Internal data exchange failure		Replace I/O module
	11 / 12	ADR	1 ... 10					
3	14	1 ... 10	31	31	9	Overflow diagnosis buffer		New start
	11 / 12	ADR	1 ... 10					
3	14	1 ... 10	31	31	26	Parameter error		Check master
	11 / 12	ADR	1 ... 10					
3	14	1 ... 10	31	31	11	Process voltage too low		Check process voltage
	11 / 12	ADR	1 ... 10					
4	14	1 ... 10	31	31	45	Process voltage is switched off (ON −> OFF)		Process voltage ON
	11 / 12	ADR	1 ... 10					

Remarks:

[1])	In AC500 the following interface identifier applies: 14 = I/O bus, 11 = COM1 (e.g. CS31 bus), 12 = COM2. The FBP diagnosis block does not contain this identifier.
[2])	With "Device" the following allocation applies: 31 = module itself, 1 ... 10 = decentralized communication interface module 1 ... 10, ADR = hardware address (e.g. of the DC551)
[3])	With "Module" the following allocation applies depending on the master: Module error: I/O bus or FBP: 31 = module itself; COM1/COM2: 1 ... 10 = expansion 1 ... 10
[4])	In case of module errors, with channel "31 = module itself" is output.

State LEDs

During the power ON procedure, the module initializes automatically. All LEDs (except the channel LEDs) are ON during this time.

LED		State	Color	LED = OFF	LED = ON	LED flashes
	Inputs I0 ... I31	Digital input	Yellow	Input = OFF	Input = ON [1])	--
	UP	Process supply voltage 24 V DC via terminal	Green	Process supply voltage is missing	Process supply voltage OK	--
	CH-ERR1	Channel error, error messages in groups (digital inputs combined into the groups 1, 2, 3, 4)	Red	No error or process supply voltage is missing	Severe error within the corresponding group	Error on one channel of the corresponding group
	CH-ERR2		Red			
	CH-ERR3		Red			
	CH-ERR4		Red			
	CH-ERR [2])	Module error	Red	--	Internal error or module not configured	--
	[1]) Indication LED is ON even if an input signal is applied to the channel and the supply voltage is off. In this case the module is not operating and does not generate an input signal.					
	[2]) All of the LEDs CH-ERR1 to CH-ERR4 light up together					

Technical data

Technical data of the module

The AC500 and S500 system data is applicable to the standard version.

Chapter 2.6.1 “System data AC500” on page 1194

The AC500-XC system data is applicable to the XC version.

Chapter 2.7.1 “System data AC500-XC” on page 1263

Only deviating specifications are therefore described here.

The technical data is also applicable to the XC version.

Parameter		Value
Process supply voltage UP		
	Rated value	24 V DC
	Max. ripple	5 %
	Protection against reversed voltage	Yes
	Rated protection fuse for UP	10 A fast
	Galvanic isolation	Yes, per module
Current consumption		

Parameter		Value
	From 24 V DC power supply at the terminals UP/L+ and ZP/M of the CPU/ communication interface module	ca. 2 mA
	From UP at normal operation	0.15 A
	Inrush current from UP (at power up)	0.008 A^2s
Weight (without terminal unit)		ca. 105 g
Mounting position		• Horizontal mounting or • Vertical mounting with derating (output load reduced to 50 % at +40 °C per group)
Cooling		The natural convection cooling must not be hindered by cable ducts or other parts in the control cabinet.
LED displays		For signal states, errors and supply voltage
Internal power supply		Via the I/O bus interface (I/O bus)
External power supply		Via the terminals ZP and UP (process voltage 24 V DC)
Required terminal units		TU515 or TU516 ↳ *TU515, TU516*
Effect of incorrect input terminal connection		Wrong or no signal detected, no damage up to 35 V
Galvanic isolation		
Between the channels		No
Between the channels and I/O bus		Yes
Between the channels and process supply voltage (UP, ZP)		No



NOTICE!
All I/O channels (digital and analog) are protected against reverse polarity, reverse supply, short circuit and temporary overvoltage up to 30 V DC.

Technical data of the digital inputs

Parameter	Value
Number of channels per module	32
Distribution of the channels into groups	1 group of 32 channels
Reference potential for all inputs	Terminals 1.9, 2.9, 3.9 and 4.9 (negative pole of the process supply voltage, signal name ZP)
Indication of the input signals	One yellow LED per channel, the LED is ON when the input signal is high (signal 1)
Monitoring point of input indicator	LED is part of the input circuitry
Input type acc. to EN 61131-2	Type 1
Input delay (0 -> 1 or 1 -> 0)	Typ. 8 ms, configurable from 0.1 ... 32 ms
Input signal voltage	24 V DC

Parameter		Value
	Signal 0	-3 V ... +5 V
	Undefined signal	> +5 V ... < +15 V
	Signal 1	+15 V ... +30 V
Ripple with signal 0		Within -3 V ... +5 V
Ripple with signal 1		Within +15 V ... +30 V
Input current per channel		
	Input voltage +24 V	Typ. 5 mA
	Input voltage +5 V	> 1 mA
	Input voltage +15 V	> 5 mA
	Input voltage +30 V	< 8 mA
Max. cable length		
	Shielded	1000 m
	Unshielded	600 m

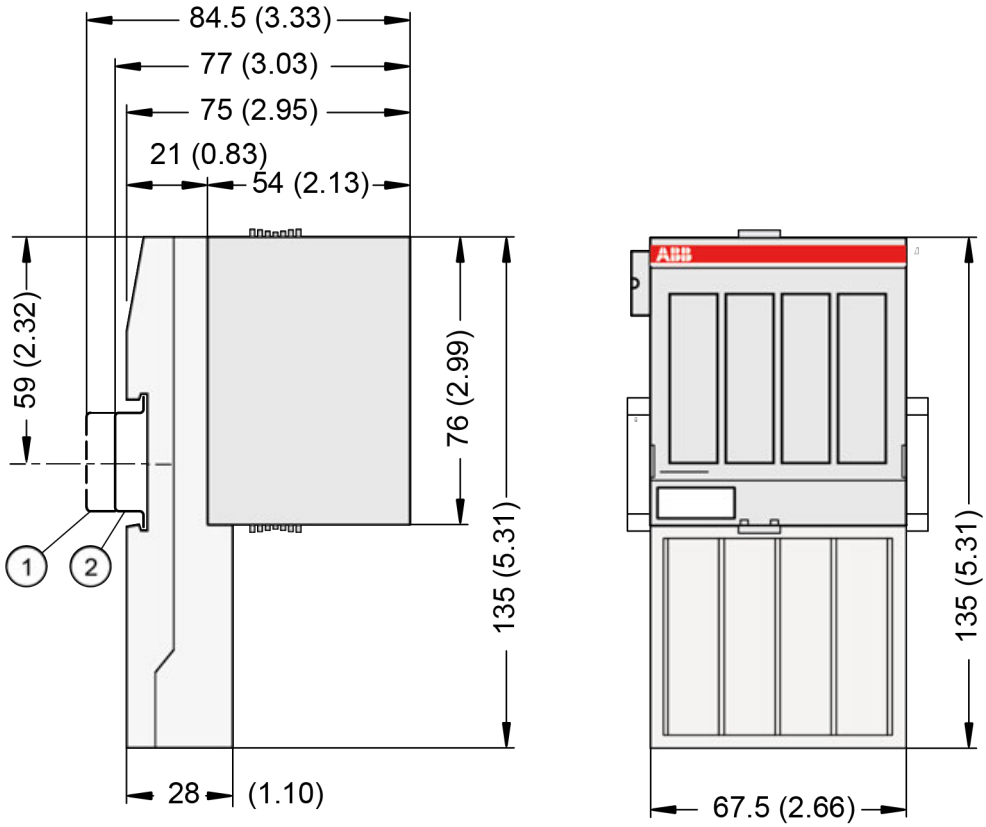
Technical data of the fast counter



The fast counter of an IO module can only be used when the module is connected to a IO-Bus master (CPU or Interface module) which supports fast counter on the attached IO modules

Parameter	Value
Used inputs	I24 / I25
Used outputs	None
Counting frequency	Max. 50 kHz

Dimensions



1 Din rail 15 mm
2 Din rail 7.5 mm

The dimensions are in mm and in brackets in inch.

Ordering data

Part no.	Description	Product life cycle phase *)
1SAP 240 000 R0001	DI524, digital input module, 32 DI, 24 V DC, 1-wire	Active
1SAP 440 000 R0001	DI524-XC, digital input module, 32 DI, 24 V DC, 1-wire, XC version	Active

**) Modules in lifecycle Classic are available from stock but not recommended for planning and commissioning of new installations.*