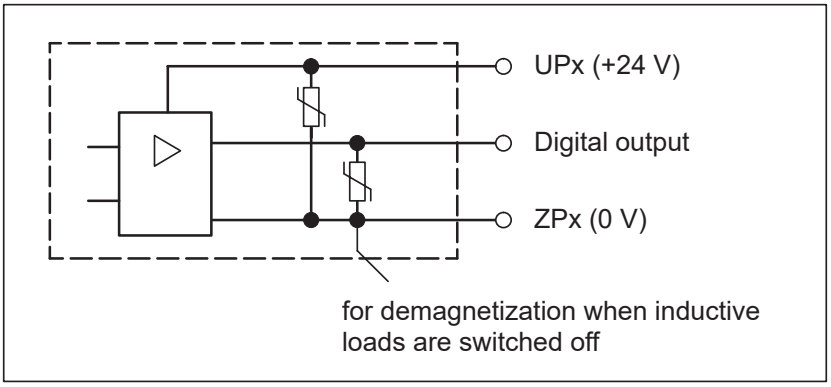


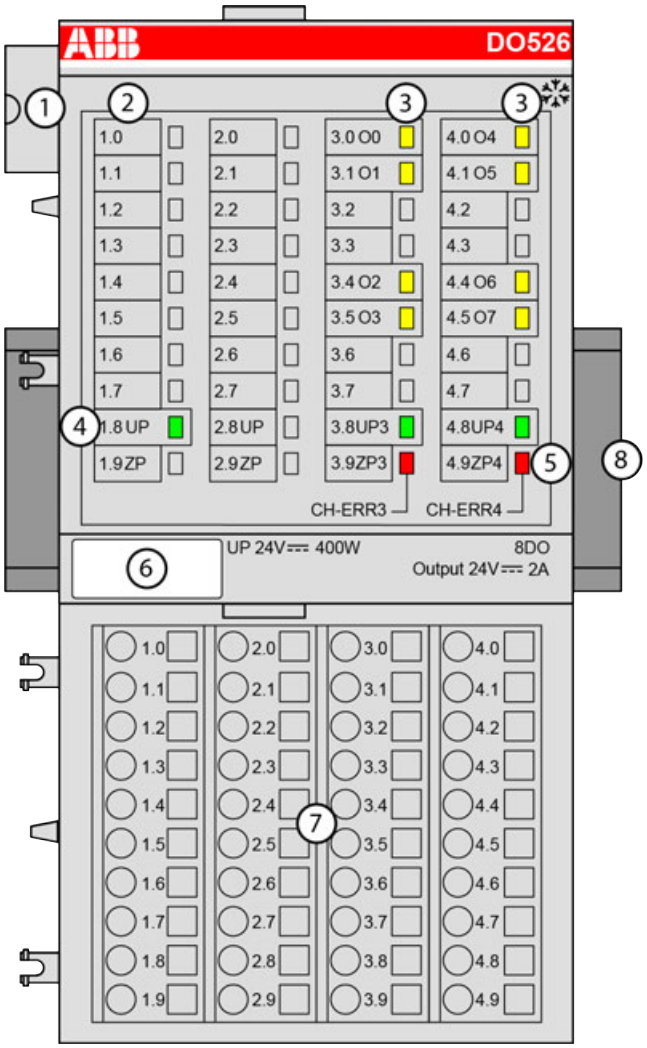

**Ordering data**

| Part no. | Description | Product life cycle phase *) |
|---|---|---|
| 1SAP 240 700 R0001 | DO524, digital output module, 32 DO, 24 V DC / 0.5 A, 1-wire | Active |
| 1SAP 440 700 R0001 | DO524-XC, digital output module, 32 DO, 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.*

#### 1.6.1.2.6 DO526 - Digital output module

- 8 digital outputs 24 V DC (O0 to O7) in 2 groups without short circuit and without overload protection.
- Module and group-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 8 yellow LEDs to display the signal states of the outputs O0 to O7
4 3 green LEDs to display the states of the process supply voltage UP, UP3 and UP4
5 2 red LEDs to display errors
6 Label
7 Terminal unit
8 DIN-rail
Sign for XC version

## Intended purpose

The device can be used as a decentralized I/O extension module for S500 communication iInterface modules (e. g. CI592-CS31, CI501-PNIO, CI541-DP, CI581-CN) or as a centralized extension module for AC500 CPUs.

The outputs are group-wise galvanically isolated from each other.

All other circuitry of the module is galvanically isolated from the outputs.

Potential separation between the channel groups.

### Functionality

| Parameter | Value |
|---|---|
| LED displays | For signal states, errors and supply voltages |
| Internal power supply | Via I/O bus |
| External power supply | Via the terminals ZP, ZP3, ZP4, UP, UP3 and UP4 (process voltage 24 V DC) |
| Required terminal unit | TU542 *Chapter 1.5.2 “TU515, TU516, TU541 and TU542 for I/O modules” on page 126* |

The output module is plugged on the terminal unit TU542. Properly position the module and press until it locks in place. The terminal unit is mounted on a DIN rail or with 2 screws plus the additional accessory for wall mounting (TA526 *Chapter 1.8.2.6 “TA526 - Wall mounting accessory” on page 902*).

### Connections



*For a detailed description of the mounting, disassembly and connection of the module, please refer to the System Assembly, Construction and Connection chapter* *Chapter 2.6 “AC500 (Standard)” on page 971.*

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 to 2.8 and 1.9 to 2.9 are electrically interconnected within the I/O terminal unit and always have the same assignment, irrespective of the inserted module:

| | |
|---|---|
| Terminals 1.8 to 2.8: | Process voltage UP = +24 V DC |
| Terminals 1.9 to 2.9: | Process voltage ZP = 0 V |
| Terminal 3.8: | Process voltage UP3 = +24 V DC |
| Terminal 3.9: | Process voltage ZP3 = 0 V |
| Terminal 4.8: | Process voltage UP4 = +24 V DC |
| Terminal 4.9: | Process voltage ZP4 = 0 V |

| Terminals | Signal | Description |
|---|---|---|
| 3.0, 3.1, 3.4, 3.5 | O0 to O3 | 4 digital outputs |
| 4.0, 4.1, 4.4, 4.5 | O4 to O7 | 4 digital outputs |

The internal power supply voltage for the module's circuitry is carried out via the I/O bus (provided by a communication interface module or a CPU). Thus, the current consumption from 24 V DC power supply at the terminals L+/UP and M/ZP of the CPU/communication interface module increases by 2 mA per DO526.

The external power supply connection is carried out via the UP, UP3, UP4 (+24 V DC) and the ZP, ZP3, ZP4 (0 V DC) terminals.

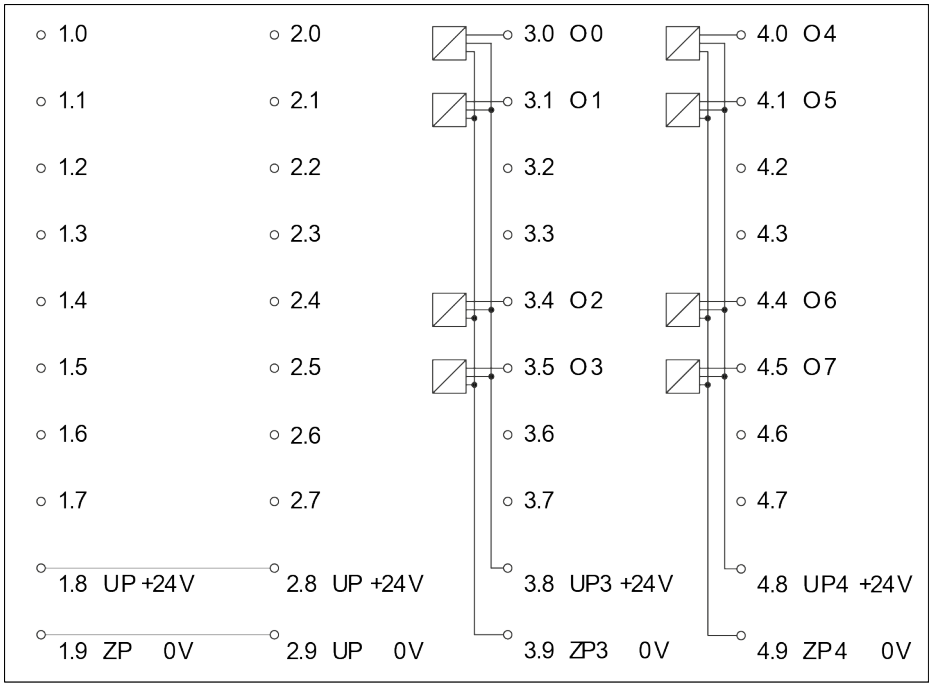
**NOTICE!**

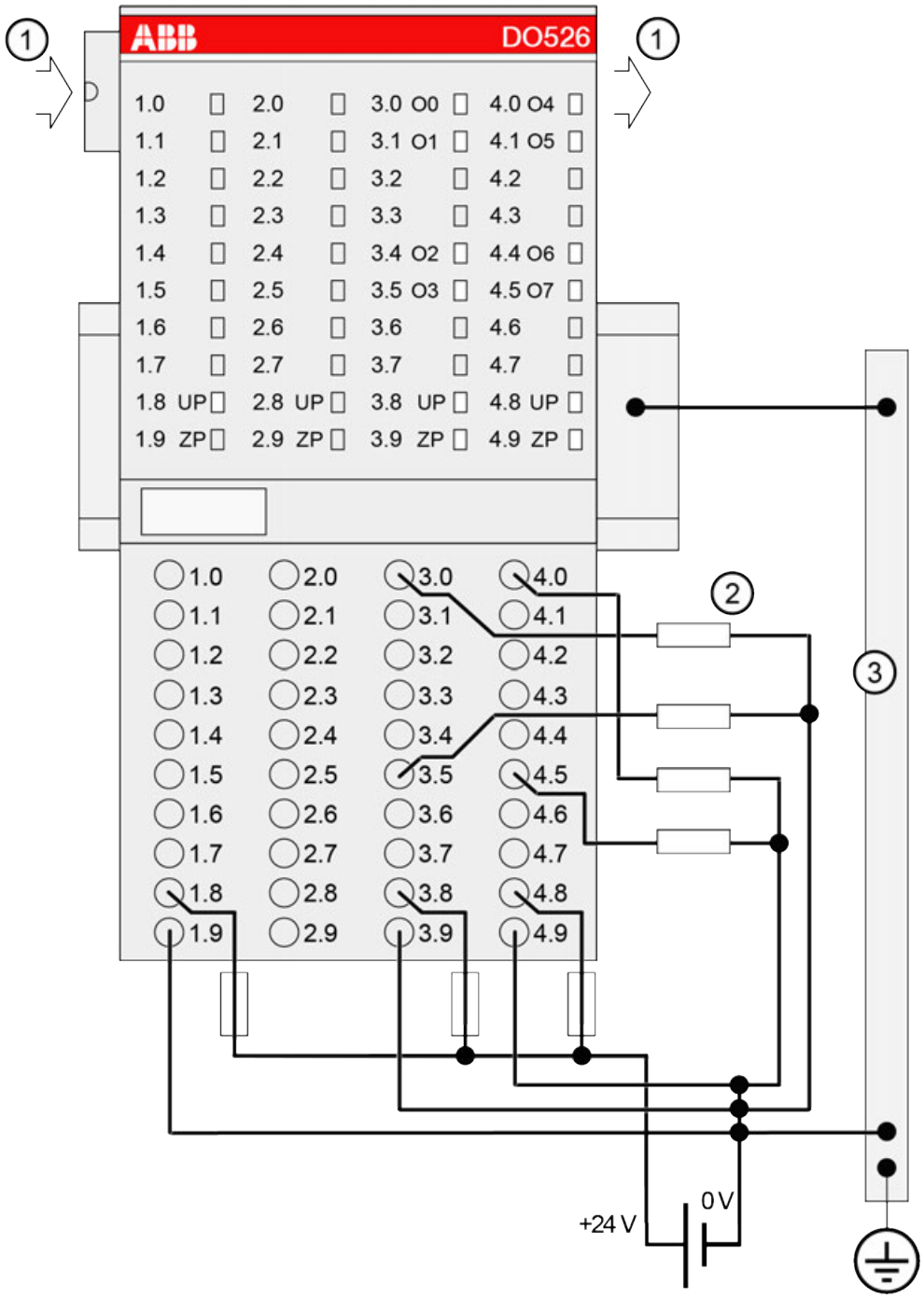
**Risk of damaging the PLC modules!**

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.

The following block diagram shows the internal construction of the digital outputs:






1 I/O bus
2 4.0 - 4.7: Connected with UP (switch) -> Input;
Connected with ZP (load) -> Output
3 Switchgear cabinet earth

**CAUTION!**
The process supply voltage must be included in the grounding concept (e. g. grounding of the negative pole).

The module provides several diagnosis functions .

### Internal data exchange

| | |
|---|---|
| Digital inputs (bytes) | 0 |
| Digital outputs (bytes) | 1 |

### I/O configuration

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.*

### Parameterization

The arrangement of the parameter data is performed with Automation Builder software, versions ≥ 1.2.3.

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...7

| Name | Value | Internal value | Internal value, type | Default | Min. | Max. | Max. |
|---|---|---|---|---|---|---|---|
| Module ID | Internal | 1105<br>[1]) | WORD | 1105<br>0x0451 | 0 | 65535 | 0x0Y01 |
| Ignore module<br>[2]) | No<br>Yes | 0<br>1 | BYTE | No<br>0x00 | | | not for FBP |
| Parameter length | Internal | 6 | BYTE | 6-CPU<br>6-FBP | 0 | 6 | 0x0Y02 |
| Check supply | Off<br>on | 0<br>1 | BYTE | On<br>0x01 | 0 | 1 | 0x0Y03 |
| Reserve | 0...255 | 0...0xff | BYTE | On<br>0x01 | 0 | 1 | 0x0Y04 |
| Behaviour of outputs at communication errors | Off<br>Last value<br>Substitute value | 0<br>1+(n*5)<br>2+(n*5),<br>n ≤ 2 | BYTE | Off<br>0x00 | 0 | 2 | 0x0Y05 |

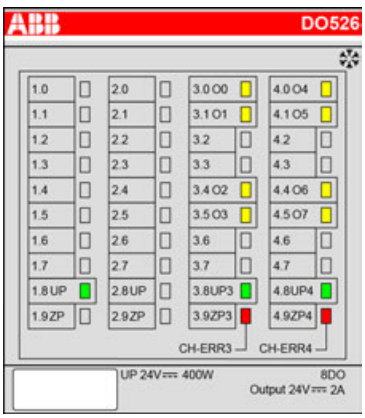
| Name | Value | Internal value | Internal value, type | Default | Min. | Max. | Max. |
|---|---|---|---|---|---|---|---|
| Substitute value at outputs<br>Bit 7 = Output 7<br>Bit 0 = Output 0 | 0...255 | 0...0xff | BYTE | 0x00 | 0 | 255 | 0x0Y06 |
| Reserve | 0...255 | 0...0xff | BYTE | 0x00 | 0 | 255 | 0x0Y07 |
| Reserve | 0...255 | 0...0xff | BYTE | 0x00 | 0 | 255 | 0x0Y08 |
| [1]) With CS31 and addresses smaller than 70 and FBP, the value is increased by 1<br>[2]) Not with FBP | | | | | | | |

GSD file:

| | |
|---|---|
| Ext_User_Prm_Data_Len = | 10 |
| Ext_User_Prm_Data_Const(0) = | 0x04, 0x51, 0x00, 0x06, 0x01, 0x01, 0x00, 0x00, 0x00, 0x00 |

### 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 |
|---|---|---|---|---|---|---|
|  | Outputs O0...O7 | Digital output | Yellow | Output = OFF | Output = ON [2]) | -- |
| | UP | Process supply voltage 24 V DC via terminal | Green | Process supply voltage is missing | Process supply voltage OK | -- |
| | UP3 | Process supply voltage outputs 0...3 24 V DC via terminal | Green | Process supply voltage is missing | Process supply voltage OK | -- |
| | UP4 | Process supply voltage outputs 4...7 24 V DC via terminal | Green | Process supply voltage is missing | Process supply voltage OK | -- |

| LED | | State | Color | LED = OFF | LED = ON | LED flashes |
|---|---|---|---|---|---|---|
| | CH-ERR3 | Channel Error, error messages in groups (digital outputs combined into the groups 3, 4) | Red | No error or process supply voltage is missing | Severe error within the corresponding group | Error on in the corresponding group |
| | CH-ERR4 | | Red | | | |
| | CH-ERR [1]) | Module Error | Red | -- | Internal error | -- |
| | [1]) All of the LEDs CH-ERR3 to CH-ERR4 light up together<br>[2]) The state of the LEDs corresponds to the logic state of the output. In case of missing or low process supply voltage UP3 or UP4, the signal on the output terminal is off even though the LED is on. | | | | | |

### Technical data

The system data of AC500 and S500 *Chapter 2.6.1 “System data AC500” on page 971* are applicable to the standard version.

The system data of AC500-XC *Chapter 2.7.1 “System data AC500-XC” on page 1023* are applicable to the XC version.

Only additional details are therefore documented below.

The technical data are also applicable to the XC version.

| Parameter | | Value |
|---|---|---|
| Process supply voltage UP, UP3 and UP4 | | |
| | Connections | Terminals 1.8 and 2.8 for +24 V (UP) as well as 1.9 and 2.9 0 V (ZP)<br>Terminals 3.8 for +24 V (UP3) as well as 3.9 for 0 V (ZP3)<br>Terminals 4.8 for +24 V (UP4) as well as 4.9 for 0 V (ZP4) |
| | Rated value | 24 V DC |
| | Max. ripple | 5 % |
| | Protection against reversed voltage | Yes |
| | Rated protection fuse on UP, UP3 and UP4 | 10 A fast (for each process supply voltage) |
| | Galvanic isolation | Yes, per module and per output channel groups |
| Current consumption | | |
| | 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 / with outputs | Ca. 20 mA + 1.5 mA per output |
| | From UP3 or UP4 at normal operation / with outputs | Ca. 0.01 A + max. 2 A per output |
| | Inrush current from UP (at power up) | 0.015 $A^2s$ |

| Parameter | | Value |
|---|---|---|
| | Inrush current from UP3 or UP4 (at power up) | 0.005 $A^2s$ (without output load) |
| Max. power dissipation within the module | | 6 W |
| Weight (without terminal unit) | | Ca. 135 g |
| Mounting position | | Horizontal<br>Or vertical 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 switchgear cabinet. |

**NOTICE!**
**Attention:**
All I/O channels (digital and analog) are protected against reverse polarity, reverse supply and continuous overvoltage up to 30 V DC.

**No effects of multiple overloads**

No effects of multiple overloads on isolated multi-channel modules occur, as every channel is protected individually by an external fuse.

**Technical data of the digital outputs**

| Parameter | | Value |
|---|---|---|
| Number of channels per module | | 8 outputs (with transistors, non-latching type) |
| Distribution of the channels into groups | | 2 groups of 4 channels |
| Connection of the channels | | |
| | O0 to O3 | Terminals 3.0, 3.1, 3.4, 3.5 |
| | O4 to O7 | Terminals 4.0, 4.1, 4.4, 4.5 |
| Indication of the output signals | | 1 yellow LED per channel, the LED is ON if the output signal is high (signal 1) |
| Power supply voltage for the module | | Terminals 1.8 and 2.8 (positive pole of the process supply voltage, signal name UP) |
| Reference potential for module power supply | | Terminals 1.9 and 2.9 (negative pole of the process supply voltage, signal name ZP) |
| Power supply voltage for the outputs O0 to O3 | | Terminal 3.8 (positive pole of the process supply voltage, signal name UP3) |
| Reference potential for the outputs O0 to O3 | | Terminal 3.9 (negative pole of the process supply voltage, signal name ZP3) |
| Power supply voltage for the outputs O4 to O7 | | Terminal 4.8 (positive pole of the process supply voltage, signal name UP4) |
| Reference potential for the outputs O4 to O7 | | Terminal 4.9 (negative pole of the process supply voltage, signal name ZP4) |
| Output voltage for signal 1 | | UP (-0.4 V) |
| Output delay (0->1 or 1->0) | | On request |
| Output current | | |
| | Rated value, per channel | 2 A at UP3 or UP4 = 24 V |

| Parameter | | Value |
|---|---|---|
| | Maximum value (channels O0 to O3) | 8 A |
| | Maximum value (channels O4 to O7) | 8 A |
| Leakage current with signal 0 | | < 0.1 mA |
| Rated protection fuse on UP | | 10 A fast |
| Demagnetization when inductive loads are switched off | | With clamp diode in output high side driver |
| Switching frequency | | |
| | With resistive load | On request |
| | With inductive loads | Max. 2 Hz |
| | With lamp loads | Max. 11 Hz with max. 48 W |
| Short-circuit proof / overload proof | | No (should be done externally) |
| Overload message | | No |
| Output current limitation | | No (should be done externally) |
| Resistance to feedback against 24 V signals | | Yes to UP3 or UP4. No to outputs in same group. |
| Max. cable length | | |
| | Shielded | 1000 m |
| | Unshielded | 600 m |

**Ordering data**

| Part no. | Description | Product life cycle phase *) |
|---|---|---|
| 1SAP 240 800 R0001 | DO526, digital output module, 8 DO, 24 V DC / 2 A, 1-wire | Active |
| 1SAP 440 800 R0001 | DO526-XC, digital output module, 8 DO, 24 V DC / 2 A, 1-wire, XC version | Active |
| 1SAP 213 200 R0001 | TU542, I/O terminal unit, 24 V DC, spring terminals | Active |
| 1SAP 413 200 R0001 | TU542-XC, I/O terminal unit, 24 V DC, spring terminals, XC version | Active |

### 1.6.1.2.7 DX522 - Digital input/output module

- 8 digital inputs 24 V DC, module-wise galvanically isolated
- 8 relay outputs
- Fast counter
- XC version for use in extreme ambient conditions available

**NOTICE!**
Improper voltage level or frequency range which cause damage of AC inputs:
– AC voltage above 264 V
– Frenquency below 47 Hz or above 62.4 Hz

**NOTICE!**
Improper connection leads cause overtemperature on terminals.
PLC modules may be destroyed by using wrong cable type, wire size and cable temperature classification.

| Parameter | | Value |
|---|---|---|
| Temperature | | |
| | Operating | 0 °C...+60 °C: Horizontal mounting of modules.<br>0 °C...+40 °C: Vertical mounting of modules. Output load reduced to 50 % per group. |
| | Storage | -40 °C...+70 °C |
| | Transport | -40 °C...+70 °C |
| Humidity | | Max. 95 %, without condensation |
| Air pressure | | |
| | Operating | > 800 hPa / < 2000 m |
| | Storage | > 660 hPa / < 3500 m |
| Ingress protection | | IP20 |

### 2.6.1.2 Creepage distances and clearances

The creepage distances and clearances meet the requirements of the overvoltage category II, pollution degree 2.

### 2.6.1.3 Insulation test voltages, routine test

**According to EN 61131-2**

| Parameter | Value | |
|---|---|---|
| 230 V circuits against other circuitry | 2500 V | 1.2/50 µs |
| 120 V circuits against other circuitry | 1500 V | 1.2/50 µs |
| 120 V...240 V circuits against other circuitry | 2500 V | 1.2/50 µs |
| | | |
| 24 V circuits (supply, 24 V inputs/outputs, analog inputs/outputs), if they are galvanically isolated against other circuitry | 500 V | 1.2/50 µs |

*Table 200: Immunity against the influence of radiated (CW radiated), according to IEC 61000-4-3, zone B, criterion A*

| Parameter | Value |
|---|---|
| Test field strength | 10 V/m |

*Table 201: Immunity against fast transient interference voltages (burst), according to IEC 61000-4-4, zone B, criterion B*

| Parameter | Value |
|---|---|
| Supply voltage units (DC) | 2 kV |
| Supply voltage units (AC) | 2 kV |
| Digital inputs/outputs (24 V DC) | 1 kV |
| Digital inputs/outputs (120 V AC...240 V AC) | 2 kV |
| Analog inputs/outputs | 1 kV |
| CS31 bus | 1 kV |
| Serial RS-485 interfaces (COM) | 1 kV |
| Serial RS-232 interfaces (COM, not for PM55x and PM56x) | 1 kV |
| Ethernet | 1 kV |
| I/O supply (DC-out) | 1 kV |

*Table 202: Immunity against the influence of line-conducted interferences (CW conducted), according to IEC 61000-4-6, zone B, criterion A*

| Parameter | | Value |
|---|---|---|
| Test voltage | | 3V zone B, 10 V is also met. |
| High energy surges | | According to IEC 61000-4-5, zone B, criterion B |
| | Power supply DC | 1 kV CM / 0.5 kV DM [2]) |
| | DC I/O supply | 0.5 kV CM / 0.5 kV DM [2]) |
| | Communication Lines, shielded | 1 kV CM [2]) |
| | AC I/O unshielded [3]) | 2 kV CM / 1 kV DM [2]) |
| | I/O analog, I/O DC unshielded [3]) | 1 kV CM / 0.5 kV DM [2]) |
| Radiation (radio disturbance) | | According to IEC 55011, group 1, class A |

[2]) CM = Common Mode, DM = Differential Mode

[3]) When DC I/O inputs are used with AC voltage, external filters limiting high energy surges to 1 kV CM / 0.5 DM are required to meet requirements according IEC 61131-2.

#### 2.6.1.6 Mechanical data

| Parameter | Value |
|---|---|
| Mounting | Horizontal |
| Degree of protection | IP 20 |
| Housing | Classification V-2 according to UL 94 |

| Parameter | Value |
|---|---|
| Vibration resistance acc. to EN 61131-2 | all three axes<br>2 Hz...8.4 Hz, continuous 3.5 mm<br>8.4 Hz...150 Hz, continuous 1 g (higher values on request) |
| Shock test | All three axes<br>15 g, 11 ms, half-sinusoidal |
| **Mounting of the modules:** | |
| DIN rail according to DIN EN 50022 | 35 mm, depth 7.5 mm or 15 mm |
| Mounting with screws | Screws with a diameter of 4 mm |
| Fastening torque | 1.2 Nm |

#### 2.6.1.7 Approvals and certifications

Information on approvals and certificates can be found in the corresponding chapter of the *Main catalog, PLC Automation*.

## 2.6.2 Mechanical dimensions

### 2.6.2.1 Switchgear cabinet assembly



*Information on EMC-conforming assembly and construction is provided within the overall functions section ↳ Chapter 2.4.4 “EMC-conforming assembly and construction” on page 918.*

**PLC enclosure**



**NOTICE!**

**PLC damage due to wrong enclosures**

Due to their construction (degree of protection IP 20 according to EN 60529) and their connection technology, the devices are suitable only for operation in enclosed switchgear cabinets.

To protect PLCs against:

- unauthorized access,
- dusting and pollution,
- moisture and wetness and
- mechanical damage,

switchgear cabinet IP54 for common dry factory floor environment is suitable.

Maintain spacing from:

- enclosure walls
- wireways
- adjacent equipment

Allow a minimum of 20 mm clearance on all sides. This provides ventilation and galvanic isolation.

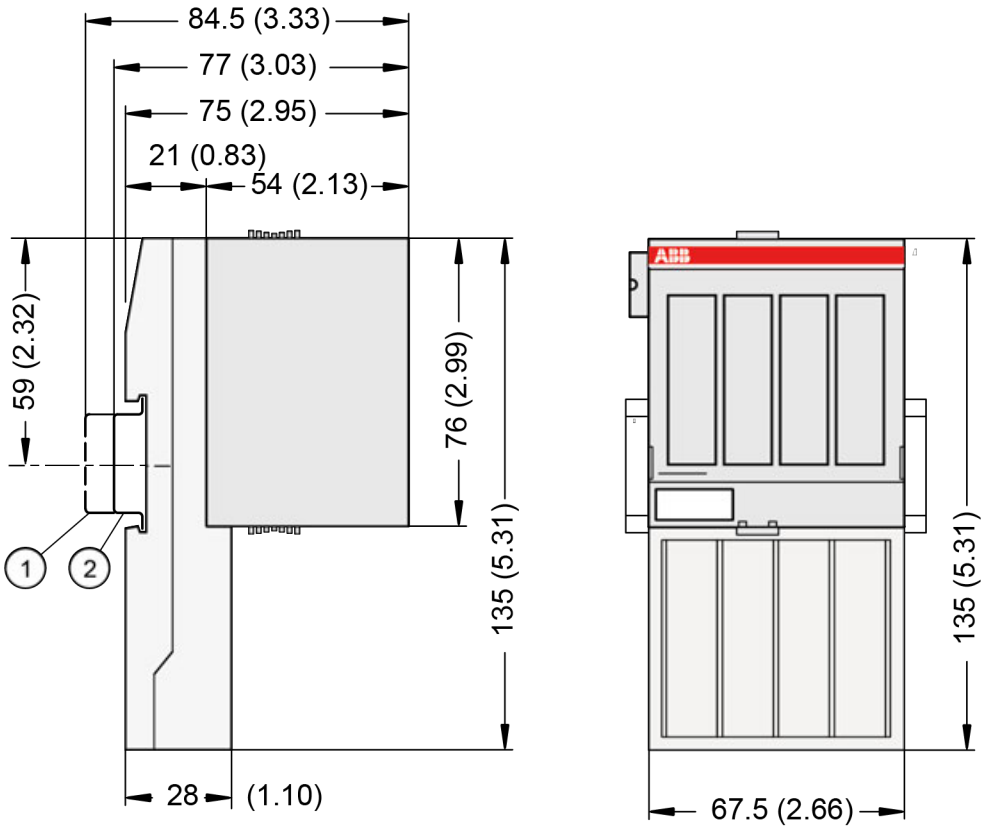



*Fig. 185: Terminal units and S500 modules, side view and front view*

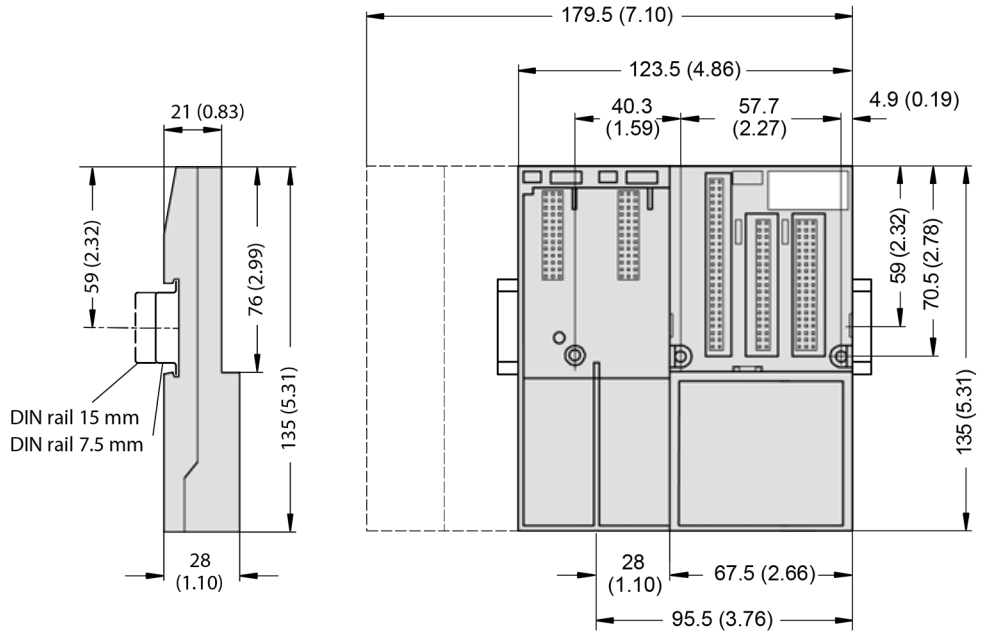



*Fig. 186: Terminal base (for comparison)*

*All dimensions are in mm (in.). Hole spacing tolerance: ±0.4 mm (0.016 in.)*