

DEA 300

Digital Input and Output Modules

700-321-1BL00/-1BH02/-1BH50/-7BH01/-1EL00/-1FH00

700-322-1BL00/-1BH01/-1BF01

700-322-1HF10/-1HF20/-1HF01/-1HH01

700-323-1BL00/-1BH00

700-370-0AA01/-0AL01

Manual

Version 8: 14-06-2007



Manual Order Number: 900-321-1GB11/en

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Note:

We have checked the content of this manual for conformity with the hardware and software described. Nevertheless, because deviations cannot be ruled out, we cannot accept any liability for complete conformity. The data in this manual have been checked regularly and any necessary corrections will be included in subsequent editions. We always welcome suggestions for improvement.

Indication:

Use +60/75 °C copper wire only

Use Class 1 wire only or equivalent

Suitable for pollution degree 2 environment only

Connected to 5 V Bus only

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1 Safety Information

Please observe the safety information given for your own and other people's safety. The safety information indicates possible hazards and provides information about how you can avoid hazards.

The following symbols are used in this manual.



Caution, indicates hazards and sources of error



gives information



hazard, general or specific



danger of electric shock

1.1 General

The DEA 300 Digital Input and Output Modules are only used as parts of a complete system.



The operator of a machine system is responsible for observing all safety and accident prevention regulations applicable to the application in question.



During configuration, safety and accident prevention rules specific to the application must be observed.



Emergency OFF facilities according to EN 60204 / IEC 204 must remain active in all modes of the machine system. The system must not enter an undefined restart.



Faults occurring in the machine system that can cause damage to property or injury to persons must be prevented by additional external equipment. Such equipment must also ensure entry into a safe state in the event of a fault. Such equipment includes, for example, electromechanical safety buttons, mechanical interlocks, etc. (see EN 954-1, risk estimation).



Never execute or initiate safety-related functions using the modules.



Make sure in the software that uncontrolled restarts cannot occur.



Only authorized persons must have access to the modules!

1.2 Restriction of access

The modules are open equipment and must only be installed in electrical equipment rooms, cabinets, or housings. Access to the electrical equipment rooms, barriers, or housings must only be possible using a tool or key and only permitted to personnel having received instruction or authorization. See also Chapter 2.



During configuration it is imperative to observe the safety and accident prevention rules applicable in the particular application.

1.3 Information for the user

This manual is addressed to anyone wishing to configure, use, or install the DEA 300 modules.

It is intended to show the user how to operate the DEA 300 and explain the signaling functions. It provides the installing technician with all the necessary data.

The DEA 300 module is exclusively for use with an S7-300 programmable controller from Siemens or with a PAS 300 Profibus Slave Interface from Systeme Helmholtz GmbH.

DEA 300 modules are only used as part of a complete system. For that reason, the configuring engineer, user, and installing technician must observe the standards, safety, and accident prevention rules applicable in the particular application. The operator of the automation system is responsible for observing these rules.

1.4 Use as intended

The DEA 300 modules must only be used as a communication and signaling system as described in the manual.

1.5 Avoiding use not as intended!



Uncontrolled restarts must be prevented in the software.

Safety-related functions must not be controlled using the DEA 300 modules alone. Make sure in the software that uncontrolled restarts cannot occur. The modules must only be operated in slots connected to a 5 V data bus.



Before you start installation work, all system components must be disconnected from their power source.

1.6 Installation and mounting

Installation and mounting must be effected in compliance with VDE 0100 IEC 364. Because it is an IP20 (OPEN type) module, you must install it in a (switching) cabinet.

Ambient temperature: 0 °C – +60 °C.



During configuration, safety and accident prevention rules specific to the application must be observed.



Note these instructions:

- Use 60/75 °C copper wire only
- Use Class 1 wire only or equivalent
- Suitable for pollution degree 2 environment only
- Connected to 5 V bus only
- See manual for all output ratings

1.7 PROGRAMMABLE CONTROLLERS FOR USE IN HAZARDOUS LOCATIONS



WARNING

Do not disconnect while circuit is live unless area is known to be non-hazardous.

INSTALLATION AND OPERATING INSTRUCTIONS:

Installation and operating instructions are provided with each device. Installation instructions shall contain a statement that "Power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods [Article 501-4(b) of the National Electrical Code, NFPA 70] and in accordance with the authority having jurisdiction."

Installation instructions shall also contain a statement that peripheral equipment must be suitable for the location it is used in.

The instructions shall include the following information:

1. Suitable for use in Class I, Div. 2, Groups A, B, C and D Hazardous Locations or Nonhazardous locations only.
2. WARNING - Explosion Hazard - Substitution Of Components May Impair Suitability For Class I, Div. 2
3. WARNING - Explosion Hazard - Do Not Disconnect Equipment Unless Power Has Been Switched Off Or The Area Is Known To Be Nonhazardous.

2 Mounting

2.1 Foreword

This section describes planning of mechanical assembly, preparation of components for mounting, and final mounting itself.

2.2 Restriction of access



Only authorized persons must have access to the modules!

The AEA 300 module must be installed according to VDE 0100 IEC 364. The modules are open equipment and must only be installed in electrical equipment rooms, cabinets, or housings. Access to the electrical equipment rooms, barriers, or housings must only be possible using a tool or key and only permitted to personnel having received instruction or authorization. See also 1.6.



The modules can be mounted either vertically or horizontally.

2.3 Planning assembly

Permissible ambient temperature:

- for vertical mounting: from 0 to +40 °C
- for horizontal mounting: from 0 to +60 °C

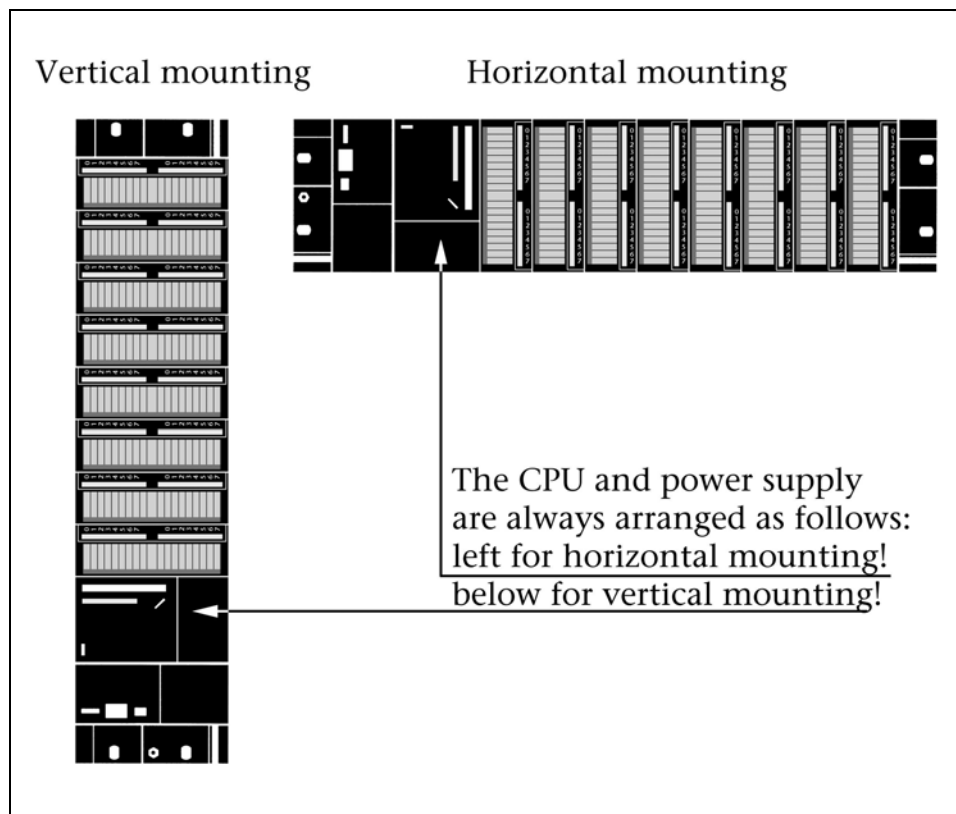


Fig. 2-1:
Vertical and horizontal
mounting

2.4 Minimum clearance

Minimum clearances must be observed because

- it ensures cooling of the DEA 300 modules
- it provides space to insert and remove modules
- it provides space to route cables
- it increases the mounting height of the module rack to 185 mm, although the minimum spacing of 40 mm must still be observed

Fig. 2-3 shows the minimum spacing between the module racks and between these and any adjacent cabinet walls, equipment, cable ducts, etc. for DEA 300s mounted in several module racks.

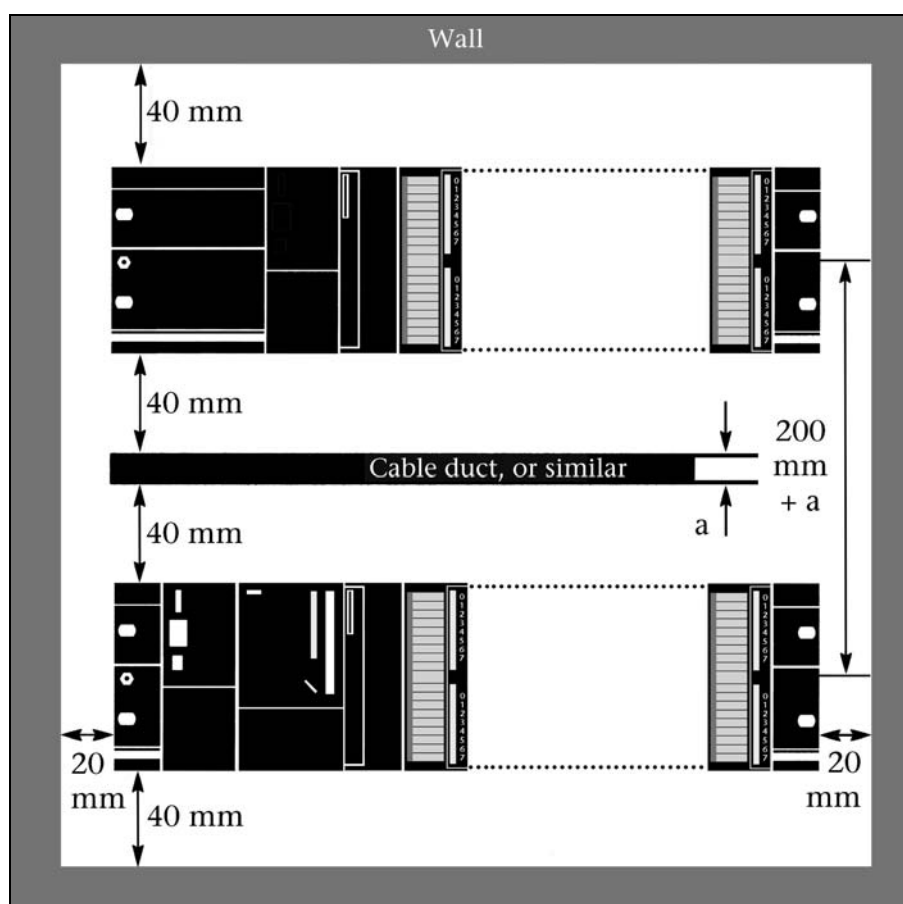


Fig. 2-2:
Minimum clearances for
mounting

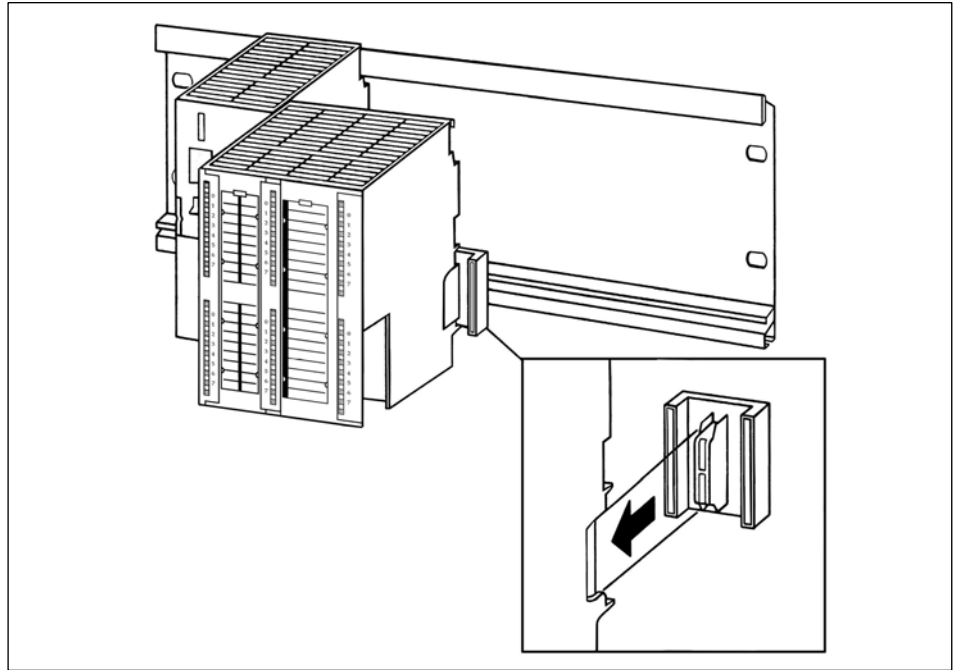
2.5 Mounting of the modules on the DIN rail

Sectional rail 700-390-1xxxx length see chapter 5 Ordering data.

A bus connector is included with each signal module but not with the CPU. When connecting the bus connector, always start with the CPU.

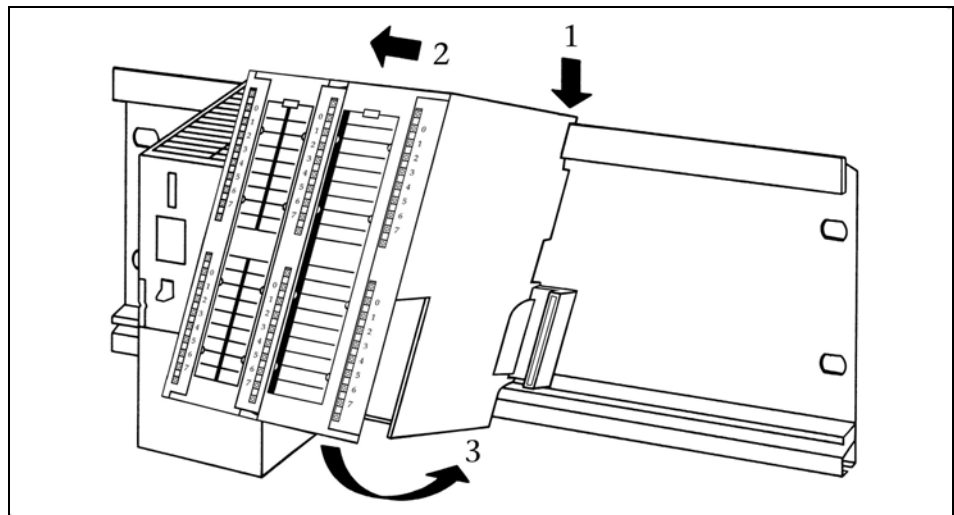
Take the bus connector off the last module and insert it into the CPU. Do not plug a bus connector into the last module of the tier.

Fig. 2-3:
Plugging in bus
connectors



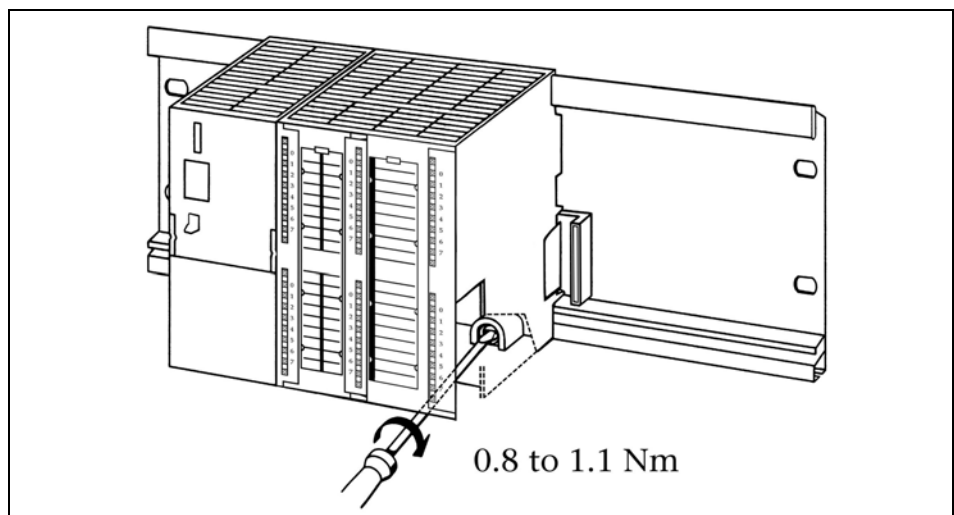
Hook on the modules (1), slide them up to the left module (2), and click them downward (3).

Fig. 2-4:
Using modules



Screw the modules on with a torque of 0.8 to 1.1 Nm.

Fig. 2-5:
Screwing modules
tight



3 Wiring

3.1 Protection from external electric interference

On all systems and plants in which the DEA 300 modules are installed, it is important to ensure that the system or plant is connected to a protective ground conductor to remove electromagnetic interference.

Makes sure that all supply, signal, and bus cables are correctly installed and that cable routing is correct.

Make sure, for all signal and bus cables, that a conductor or cable break cannot cause undefined states of the system or plant.



When dimensioning the cabinet make sure the temperature in the cabinet does not exceed 60 °C even if the outside temperature is high.

3.2 Current consumption and power loss

DEA 300 modules draw the power they require to operate from the backplane bus. Where required, they can be powered from an external source.

- The total current consumption of **all** signal modules drawn from the backplane bus must **not** exceed the current the CPU can supply to the backplane bus.
- The power loss of **all** modules used in a cabinet must not exceed the maximum cabinet power that can be dissipated.

For information about current consumption and power loss of a module, see the technical data of the module in question.



Isolated modules can be used irrespective of whether the reference potential of the controller is grounded or not.

3.3 Mounting isolated modules

In an assembly containing isolated modules, the reference potentials of the control circuit (GND internal) and the external load circuit (GND external) are mutually isolated.

Isolated modules are used for DC load circuits with a separate reference potential.

Examples of load circuits with a separate reference potential:

- DC load circuits whose sensors have different reference potentials, for example, if grounded sensors are used at a great distance from the controller making equipotential bonding between them impossible.
- DC load circuits, whose plus pole (L +) is grounded.

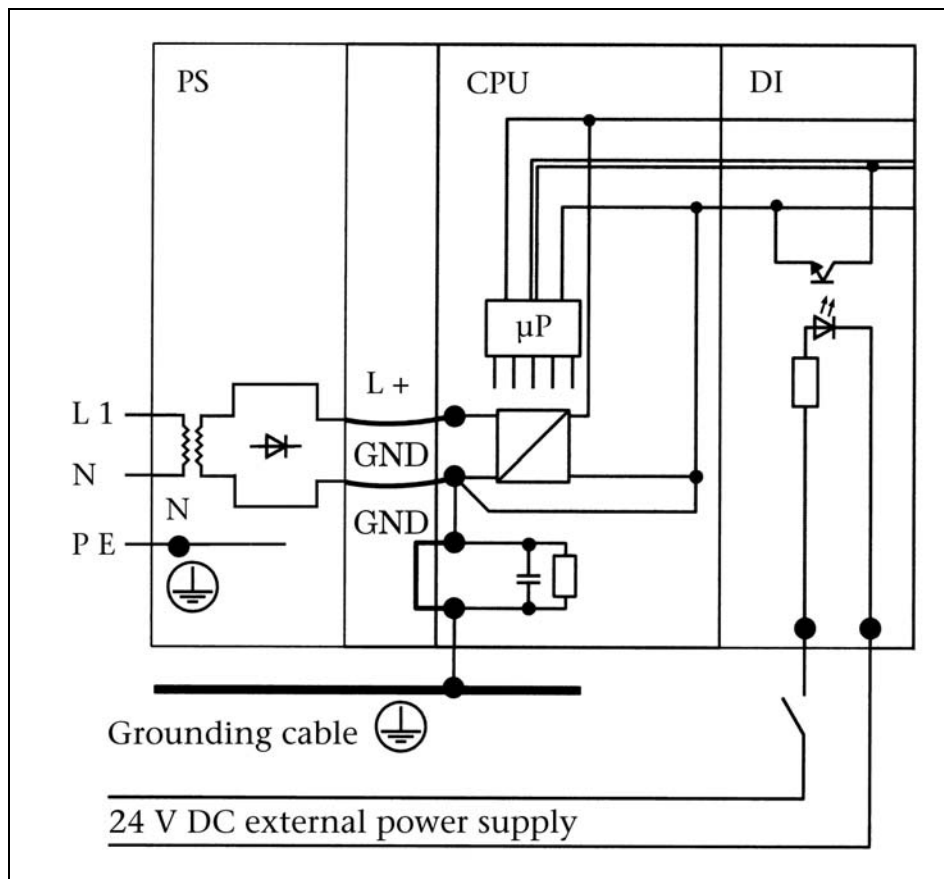


Fig. 3-1:
Potentials in an isolated
module assembly



*Lighting protection must
always be based on an
individual assessment of
the overall plant.*

3.4 Outdoor cable laying

- The same guidelines apply as for indoor cable laying.
- The cables must be laid on metal cable trays.
- Joints between cable trays must be conductively connected.
- Cable trays must be grounded.
- Adequate equipotential bonding between connected devices must also be ensured.
- Interior and exterior lightning protection must be ensured and such grounding measures must be taken as are suitable for the application in question.

3.5 Protection from inductive overvoltages



*The inductor supplier
will provide information
about the dimensioning
of overvoltage protection
equipment.*

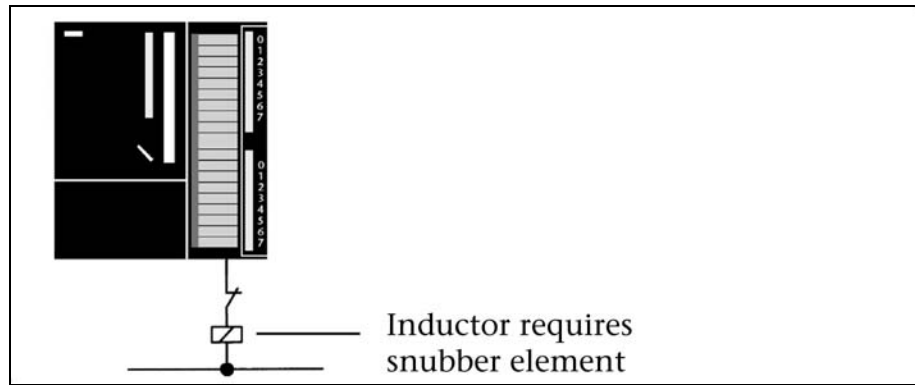
The DEA 300 digital output modules feature integrated overvoltage protection. Overvoltages arise when inductors are switched off, for example, relay solenoids and contactors.

Inductors only have to be provided with additional overvoltage protection if:

- the outputs can be switched off by additional built-in contacts, such as relay contacts.
- the inductors are not controlled by the modules.

Fig. 3-3 shows an example of an output circuit requiring additional overvoltage protection.

Fig. 3-2:
Relay contact for
EMERG. OFF in the
output circuit



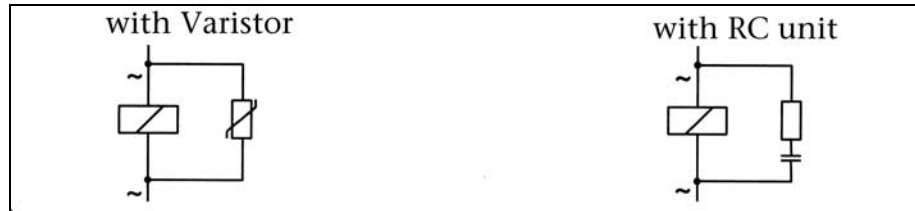
DC-operated solenoids must be connected with diodes or Zener diodes.

Fig. 3-3:
Relay with snubber
element



AC-operated solenoids are operated with varistors or RC elements.

Fig. 3-4:
Relay with snubber
element



3.6 Wiring the DEA 300 front connector

20-way front connector with screw-type terminal:

Order No 700-392-1AJ10

or identical but with screw or clamp terminal

40-way front connector with **EasyConnect**[®]:

Order No 700-392-1AM10

or identical but with screw-type or snap-in terminal

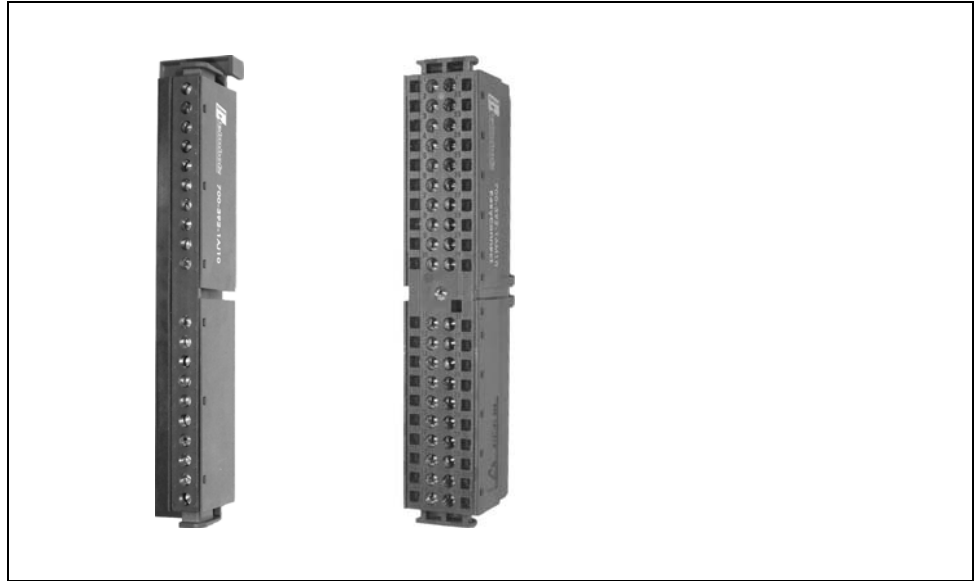


Fig. 3-5:
Helmholz 20- and 40-
way front connector

3.6.1 Wire 40-way connector with **EasyConnect**[®] clamp connection technique

Technical specifications

| | |
|------------------------------------|-----------------------------|
| Order number | 700-392-1AM10 |
| Number of terminals | 40 |
| Terminal type | Spring |
| Connectable cables | Flexible cables |
| Cross-section without end ferrules | 0.34 – 1 mm ² |
| Strip-back length | 8 – 10 mm |
| Wire end ferrules | Not required |
| Open terminal | 180° turn counter clockwise |
| Close terminal | 180° turn clockwise |
| Required torque, clamp | 0.15 Nm |
| Required torque, screw | 0.7 Nm |
| Weight | 60 g |



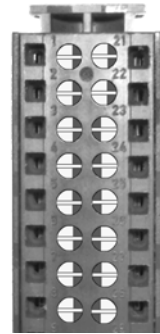
Tighten terminals with fingers only, do not use a power screwdriver!

The terminals are supplied closed.

The eccentric screws are marked with a beveled side. If the beveled – darker side – is turned toward the terminal, the terminal opens.

Counter clockwise - Open terminal
Clockwise - Close terminal

The figure shows Terminals 21 and 22 open.



To avoid material fatigue, always close unused terminals!

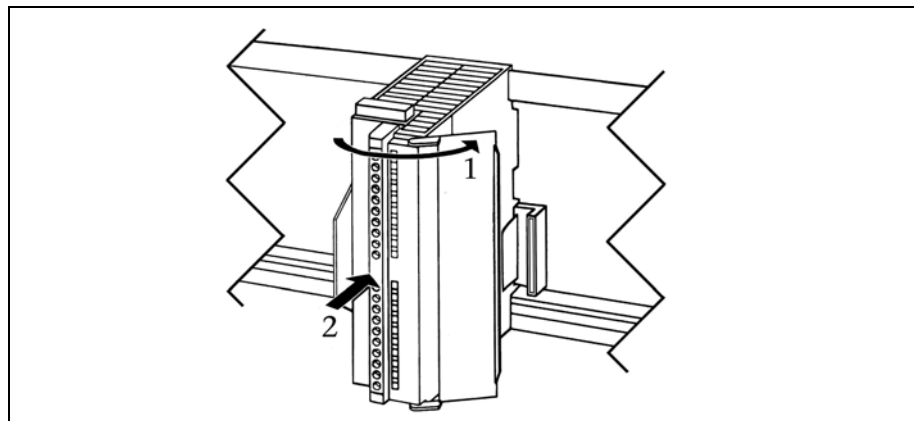
The eccentric screw is only used to open the terminal, it has no fixing function. Although the screw will still turn a few degrees on a closed terminal, this will not make the connection any more secure!

3.6.2 Wire 20-way connector

Technical specifications

| | |
|------------------------------------|----------------------------|
| Order number | 700-392-1AJ10 |
| Number of terminals | 20 |
| Terminal type | screw-type terminal |
| Connectable cables | Flexible cables |
| Cross-section without end ferrules | 0.25 – 1.5 mm ² |
| Strip-back length | 6 mm |
| Wire end ferrules | with or without |
| Required torque, screw | 0.5 ... 0.7 Nm |
| Weight | 60 g |

- Open the DEA 300 modules (1).
- Snap the front connector into the signal module (2)



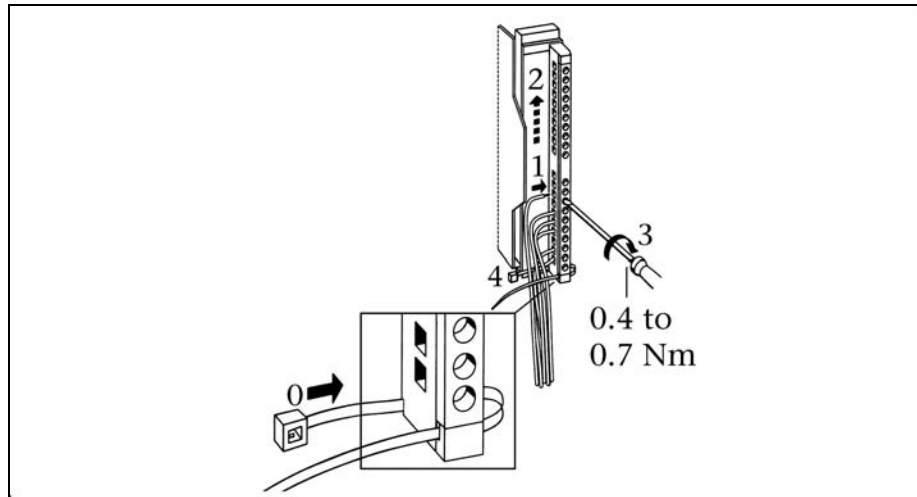
*Fig. 3-6:
Bringing the front
connector into the wiring
position*



CAUTION: When the power supply module and, in some cases, additionally, the load power supplies are turned on, make absolutely sure that nobody is able to come into contact with alive lines or cables.

- Strip the isolation from the cables.
- When using connector sleeves, crimp the sleeves with the cables.
- Insert the supplied strain relief for the loom of cables into the front connector (0).
- With the cables brought out from the module at the bottom, start with terminal 20 and then proceed wiring in the sequence of order terminal 20, 19, etc. (1) up to terminal 1 (2). Wiring front connectors

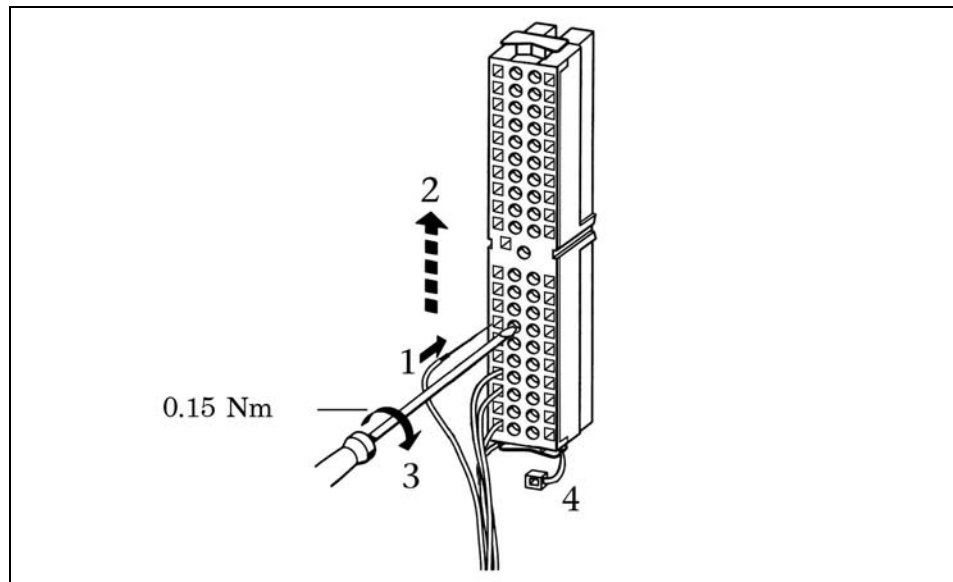
Fig. 3-7:
Wiring the 20-way front connector



- With the cables brought out from the module at the top, start with terminal 1 and then proceed wiring in the sequence of order terminal 1, 2, etc. up to terminal 20.
- In the case of screw-type terminals (3), screw tight also the connection screws of those screw-type terminals which are not wired.
- Tighten the strain relief for the loom of cables (4).
- Press the lock of the strain relief to the left inside so that the cable space can be utilised more efficiently.

3.6.3 Wire 40-way connector

- With the cables brought out from the module at the bottom, start with terminal 40 or 20 and then proceed wiring alternately, in the sequence of order terminal 39, 19, 38, 18 etc.
- Wire (1) up to terminal 29 and 1 (2).
- With the cables brought out from the module at the top, start with terminal 1 or 21 and then proceed wiring alternately in the sequence of order terminal 2, 22, 3, 23, etc. up to terminals 20 and 40.
- Close unused terminals.
- Lay the supplied strain relief around the cable loom and around the front connector.
- Screw the strain relief for the cable loom (4) tight, press the lock of the strain relief to the left inside so that the cable space can be utilised more efficiently.



*Fig. 3-8:
Wiring the 40-way front
connector*

4 Digital Modules

4.1 Foreword

Different digital modules are available for connection of sensors and encoders and/or loads and actuators.

This section provides the technical data of the digital modules. It also provides information about features, exceptions, module view, and block diagrams of the digital modules.

4.2 Digital input modules

The following digital input modules are described in this section:

- 700-321-1BL00 DI 32 x 24 V DC
- 700-321-1BH02 DI 16 x 24 V DC
- 700-321-7BH01 DI 16 x 24 V DC
- 700-321-7BH01 DI 16 x 24 V DC

4.2.1 DEA DI 32 x 24 V DC

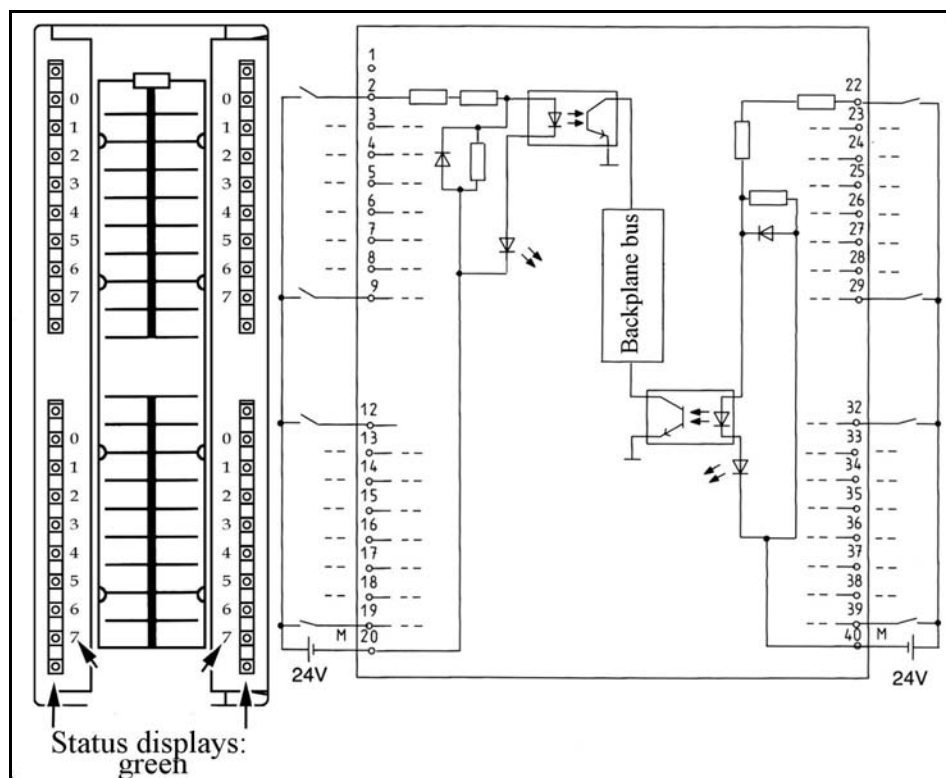
Order number: 700-321-1BL00

The DI 32 x 24 V DC has the following features:

- 32 inputs, isolated from the backplane bus
- Nominal input voltage 24 V DC
- Connection of 2-wire proximity switches is possible

Fig. 4-2 shows the block diagram of the DEA DI 32 x 24 V DC, followed by the technical data.

Fig. 4-1:
View of module and
block diagram of
DI 32 x 24 V DC



Technical data

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Order number | 700-321-1BL00 |
| Number of inputs | 32 |
| Isolation (from backplane bus) in groups of | yes (via optocoupler) 16 |
| Input voltage <ul style="list-style-type: none"> • nominal value • for signal "0" • for signal "1" | DC 24 V -3 ... +5 V +13 ... +30 V |
| Input current <ul style="list-style-type: none"> • for signal "1" | typ. 7 mA |
| Delay time | typ. 1.2 ... 4.8 ms |
| Connection of 2-wire initiator permissible quiescent current for signal "0" | yes max. 1.5 mA |
| Cable length unshielded | max. 600 m |
| Cable length shielded | max. 1000 m |
| Current consumption <ul style="list-style-type: none"> • internal • external | typ. 20 mA - |
| Power loss (nominal operation) | typ. 6.8 W |
| Permissible ambient conditions <ul style="list-style-type: none"> • ambient temperature (during operation) • temperature during transport and storage | 0 °C ... +60 °C -25 °C ... +75 °C |

| | |
|---------------------------|----------------|
| Weight | 260 g |
| Dimensions W x H x D [mm] | 40 x 125 x 117 |
| Front connector | 40-way |

4.2.2 DEA DI 16 x 24 V DC

Order number: 700-321-1BH02

The DI 16 x 24 V DC has the following features:

- 16 inputs, isolated from the backplane bus
- Nominal input voltage DC 24 V
- Connection of 2-wire proximity switches is possible

Fig. 4-3 shows the block diagram of the DEA DI 16 x 24 V DC, followed by the technical data.

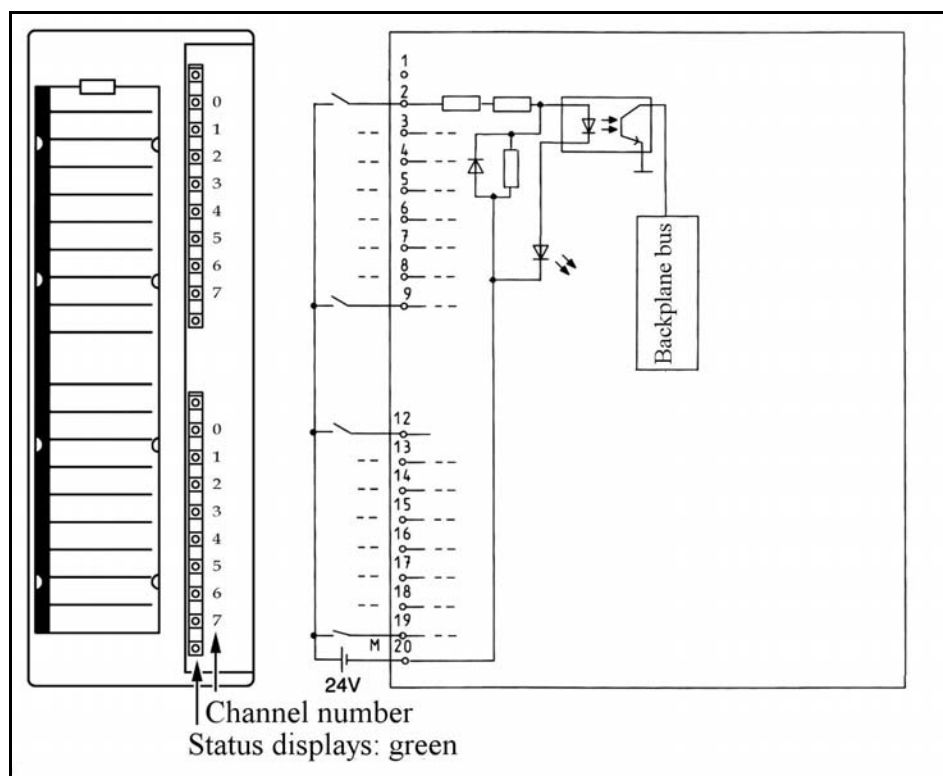


Fig. 4-2:
View of module and
block diagram of
DI 16 x 24 V DC

Technical data

| | |
|------------------------------------------------|-----------------------------|
| Order number | 700-321-1BH02 |
| Number of inputs | 16 |
| Isolation (from backplane bus) in groups of | yes (via optocoupler) 16 |
| Input voltage | |
| • nominal value | DC 24 V |
| • for signal "0" | -3 ... +5 V |
| • for signal "1" | +13 ... +30 V |
| Input current | |
| • for signal "1" | typ. 7 mA |

| | |
|------------------------------------------------|---------------------|
| Delay time | typ. 1.2 ... 4.8 ms |
| Connection of 2-wire initiator | yes |
| • permissible quiescent current for signal "0" | max. 1.5 mA |
| Cable length unshielded | max. 600 m |
| Cable length shielded | max. 1000 m |
| Current consumption | |
| • internal | typ. 30 mA |
| Power loss (nominal operation) | typ. 3.5 W |
| Permissible ambient conditions | |
| • ambient temperature (during operation) | 0 °C ... +60 °C |
| • temperature during transport and storage | -25 °C ... +75 °C |
| Weight | 180 g |
| Dimensions W x H x D [mm] | 40 x 125 x 117 |
| Front connector | 20-way |

4.2.3 DEA DI 16 x 24 V DC Source Input

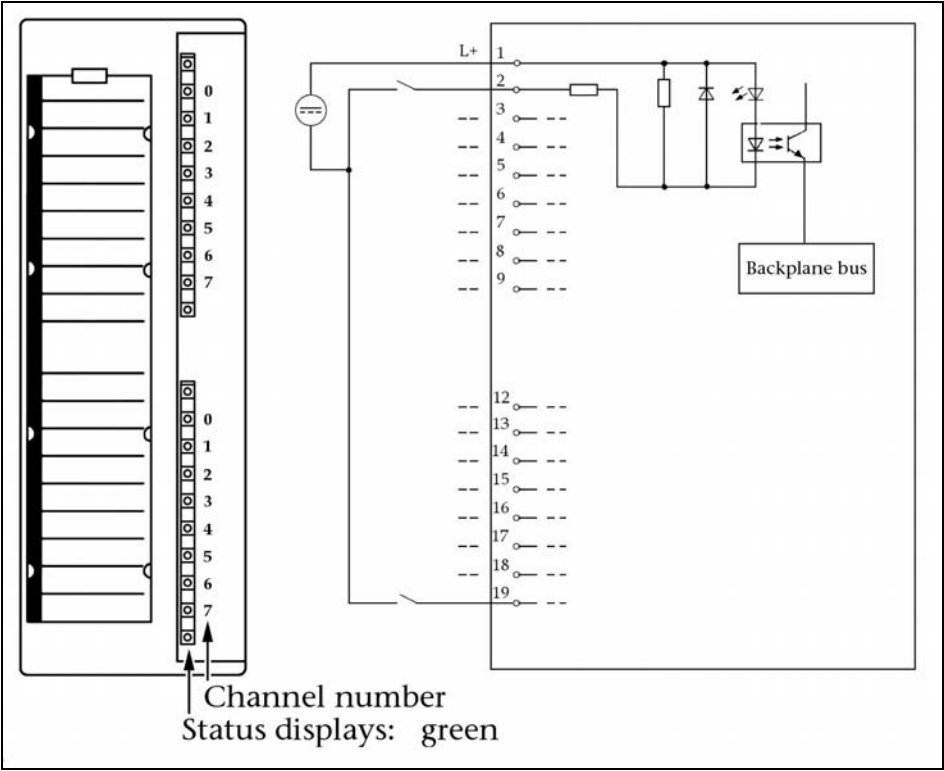
Order number: 700-321-1BH50

The DI 16 x 24 V DC source input has the following features:

- 16 inputs, source input, isolated in groups of 16
- 24 V DC rated input voltage
- Suitable for switches and two / three / four-wire proximity switches (BEROs)

Fig. 4-4 shows the block diagram of the DI 16 x 24 V DC (source input), followed by the technical data.

Fig. 4-3:
 View of module and
 block diagram of
 DI 16 x 24 V DC
 (source input)



Technical data

| | |
|------------------------------------------------|-----------------------------|
| Order number | 700-321-1BH50 |
| Number of inputs | 16 |
| Isolation (from backplane bus) in groups of | yes (via optocoupler) 16 |
| Input voltage, reference potential L+ | |
| • nominal value | 24 V DC |
| • for signal "0" | +30 ... -5 V |
| • for signal "1" | -13 ... -30 V |
| Input current | |
| • for signal "1" | typ. 7 mA |
| Delay time | typ. 1,2 ... 4,8 ms |
| Connection of 2-wire initiator | yes |
| • permissible quiescent current for signal "0" | max. 1,5 mA |
| Cable length unshielded | max. 600 m |
| Cable length shielded | max. 1000 m |
| Current consumption | |
| • internal | typ. 10 mA |
| Power loss (nominal operation) | typ. 3,5 W |
| Permissible ambient conditions | |
| • ambient temperature (during operation) | 0 ... +60 °C |
| • temperature during transport and storage | -25 ... +75 °C |
| Weight | 180 g |
| Dimensions W x H x D [mm] | 40 x 125 x 117 |
| Front connector | 20-way |

4.2.4 DEA DI 16 x 24 V DC with Hardware and Diagnostic Interrupts

Order number: 700-321-7BH01

The DI 16 x 24 VDC with hardware and diagnostic interrupts has the following features:

- 16 inputs, isolated in one group
- 24 VDC rated input voltage
- Input characteristic curve according to IEC 61131, Type 2
- Suitable for switches and two / three / four-wire BEROs (proximity switches)
- 2 short-circuit-proof sensor supplies for 8 channels each
- External redundant power supply possible to supply sensors
- "Sensor supply (Vs)" status display
- Group error display (SF)
- Supports the "parameter changing during the RUN" function

- Programmable diagnostics
- Programmable diagnostic interrupt
- Programmable hardware interrupt
- Programmable input delays

Fig. 4-5 shows the block diagram of the DEA DI 16 x 24 VDC with hardware and diagnostic interrupts, followed by the technical data.

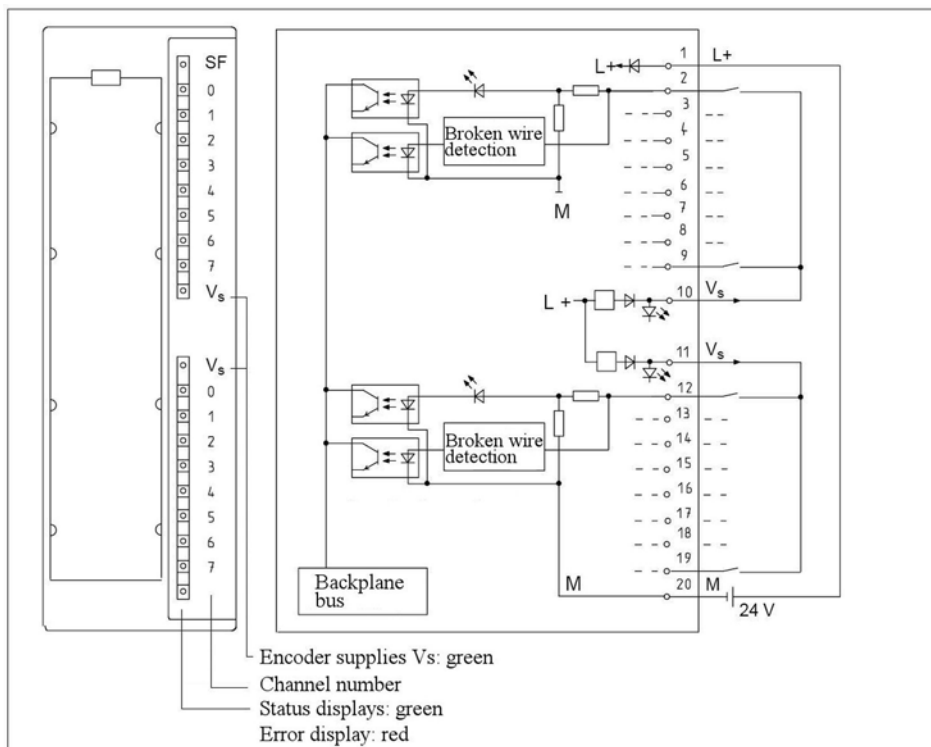


Fig. 4-4: View of module and block diagram of DI 16 x 24 VDC with hardware and diagnostic interrupts

Technical data

Order number

700-321-7BH01

Number of inputs

16

Isolation (from backplane bus)
in groups of

yes (via optocoupler)
16

Supports clocked operation

no

Parameter changing during the RUN is
possible

yes

Behavior of the non parameterized
inputs

gives the last valid
output value before the
parameterization

Interrupts

- Diagnostic interrupt
- Hardware interrupt

Parameters can be
assigned
Parameters can be
assigned

Diagnostic functions

- Group error display
- Diagnostics information read-out

Parameters can be
assigned
Red LED (SF)
Possible

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Status display | |
| <ul style="list-style-type: none"> • Inputs • Sensor power supplies (Vs) | Green LED per channel Green LED per output |
| Monitoring of Wire-break | yes, at $I < 1 \text{ mA}$ |
| Power rated voltage of the electronics and encoder L+ | DC 24 V |
| Sensor Power Supply Outputs | |
| <ul style="list-style-type: none"> • Number of outputs • Output voltage with load • Output current - Rated value • Output current - Permitted range • Additional redundant supply • Short-circuit protection | 2 min. L+ (-2,5 V) 120 mA 0 ... 150 mA Permitted Yes, electronic |
| Input voltage | |
| <ul style="list-style-type: none"> • Rated value • For signal "1" • For signal "0" | DC 24 V -30 ... +5 V +13 ... +30 V |
| Input current | |
| <ul style="list-style-type: none"> • At signal "1" | typ. 7 mA |
| Input characteristic curve | According to IEC 61131, type 2 |
| Connection of Two-Wire BEROs | Possible |
| Permitted bias current for Signal "0" | max. 2 mA |
| Resistive circuit of the sensor for detecting broken wires | 10 ... 18 k Ω |
| Length of cable unshielded | max. 600 m |
| Length of cable shielded | max. 1000 m |
| Time/Frequency | |
| Internal processing time for status processing (in non synchronous operation) | |
| <ul style="list-style-type: none"> • Release of process and diagnosis alarm | < 2 μs |
| Input delay (EV) | |
| <ul style="list-style-type: none"> • Parameters can be assigned • Rated value | yes typ. 0,1/0,5/3/15/20 ms |
| Current consumption | |
| <ul style="list-style-type: none"> • internal • From load voltage L + without sensor supply V_s | max. 130 mA max. 90 mA |
| Power loss (nominal operation) | typ. 4 W |
| Permissible ambient conditions | |
| <ul style="list-style-type: none"> • ambient temperature (during operation) • temperature during transport and storage | 0 ... +60 $^{\circ}\text{C}$ -25 ... +75 $^{\circ}\text{C}$ |
| Weight | 200 g |
| Dimensions W x H x D (in millimeters) | 40 x 125 x 117 |
| Front connector | 40-way |

4.2.4.1 Parameterising the module

Use STEP 7® to parameterise the digital module for 16 x 24 V DC with process and diagnostic interrupts. The parameterisation must be performed with the CPU in the STOP condition.

Once all parameters are defined, they can be loaded from the PG (programming device) into the CPU. When the mode state of the CPU changes from STOP to RUN, the parameters are transferred to the relevant digital modules.

4.2.4.2 Static and dynamic parameters

The parameters are divided into static and dynamic parameters.

The static parameters are set with the CPU in the STOP condition, as described above.

The dynamic parameters can also be modified in the currently running user program of the S7® control via SFC. In this case, please note that after a RUN → STOP / STOP → RUN change of the CPU the parameters set using STEP 7 are valid again.

| Parameter | Settable with | CPU Operating State |
|-----------|----------------------------|---------------------|
| Static | PG (STEP 7® HW CONFIG) | STOP |
| Dynamic | PG (STEP 7® HW CONFIG) | STOP |
| Dynamic | SFC 55 in the user program | RUN |

4.2.4.3 Terminal assignment for redundant supply of encoders

The figure below shows how encoder can additionally be supplied by means of Vs with a redundant voltage source, for example, via another module.

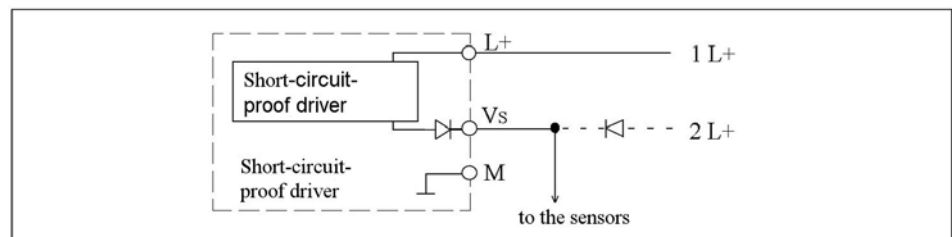


Fig. 4-5: Terminal assignment for redundant supply of encoders

4.2.4.4 Terminal assignment for resistive circuit of the encoder

In order to detect a broken wire, it is necessary to wire the encoder contact with a resistor.

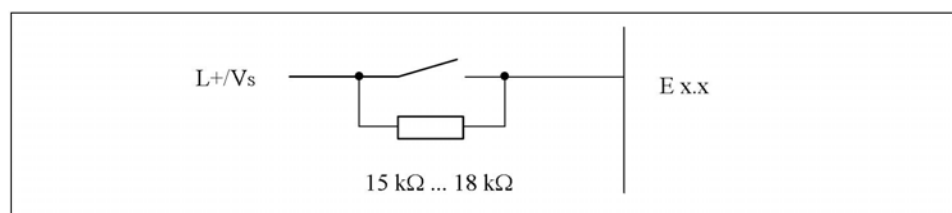


Fig. 4-6: Terminal assignment for resistive circuit of the encoder

4.2.4.5 Parameterisable and non-parameterisable diagnostic messages

Parameterisable and non-parameterisable diagnostic messages

A distinction is made between parameterisable and non-parameterisable diagnostic messages.

Parameterisable diagnostic messages are only available if diagnosis has been enabled by way of parameterisation. The parameterisation is performed in the parameter block "Diagnosis" in STEP 7®.

The non-parameterisable diagnostic messages are always provided by the digital module, irrespective of whether or not diagnostics are enabled.

Actions after a diagnostic message in STEP 7®

Each diagnostic message results in the following actions:

- The diagnostic message is entered in the diagnostics for the digital module and transferred to the CPU.
- The SF LED on the digital module lights up.
- If "Enable diagnostic interrupt" has been parameterised using STEP 7®, a diagnostic interrupt is triggered, and OB 82 is called.

Reading out diagnostic messages

The individual diagnostic messages can be read out in detail using SFCs in the user program.

The corresponding error causes can be displayed in the module diagnostics of STEP 7® (see STEP 7® online help).

Display of diagnostic messages via the SF LED

Errors on digital modules which are capable of performing self-diagnostics are displayed using the SF LED (group error LED). The SF LED is lit as soon as a diagnostic message is triggered by the digital module. It goes out once all errors are rectified.

The SF LED will also light up in case of external errors (short-circuit of the encoder supply), irrespective of the operating condition of the CPU (with POWER ON).

Diagnostic messages interrupt processing by the digital modules

See Section 4.2.4.8.

4.2.4.6 Parameters of the 700-321-7BH01 DI 16 x DC 24 V

The table below provides an overview of the parameters which can be set, with their default settings for the module

700-321-7BH01 DI 16 x DC 24 V.

The default settings are only effective if no parameterisation has been performed with STEP 7®.

| Parameter | Value Range | Default Settings | Parameter Type | Scope |
|--------------------------------|--------------------------------------------------------------|------------------|----------------|---------------|
| Enable | | | | |
| • Diagnostic interrupt | Yes/no | No | Dynamic | Module |
| • Hardware interrupt | Yes/no | No | Dynamic | Module |
| Input delay/voltage type | 0,1 ms DC 0,5 ms DC 3 ms DC 15 ms DC 20 ms DC/AC | 3 ms DC | Static | Module |
| Diagnostics | | | | |
| • Sensor supply missing | Yes/no | No | Static | Module |
| • Wire-break | Yes/no | nein | Static | Module |
| Trigger for hardware interrupt | | | | |
| • Rising edge | Yes/no | No | Dynamic | Channel group |
| • Falling edge | Yes/no | No | Dynamic | Channel group |

Assignment of the encoder supplies to the channel groups

The two encoder supplies for the module serve as the power supplies for two channel groups:

- Inputs 0 to 7;
- Inputs 8 to 15.

The diagnosis for this encoder supply is also parameterised in these channel groups.

Assigning interrupt parameters to channel groups

The table below shows the channels that can be combined to create a channel group if you would like to parameterize interrupt processing.

The channel group number is needed to set the parameters in the user program with an SFC.

| Parameter | Can Be Set in Following Channel Groups | Channel Group Number |
|-----------------------------|----------------------------------------|----------------------|
| Hardware interrupt | 0 and 1 | 0 |
| for falling, rising or both | 2 and 3 | 1 |
| types of pulse | 4 and 5 | 2 |
| edges | 6 and 7 | 3 |
| | 8 and 9 | 4 |
| | 10 and 11 | 5 |
| | 12 and 13 | 6 |
| | 14 and 15 | 7 |
| Diagnostic interrupt | 0 to 7 | - |
| for missing sensor supply | 8 to 15 | - |
| Diagnostic interrupt | 0 and 1 | 0 |
| for wire-break | 2 and 3 | 1 |
| | | : |

Tolerances of the programmable input delays

| Programmed Input delay | Tolerance |
|------------------------|-------------------|
| 0,1 ms | 60 to 140 μ s |
| 0,5 ms | 400 to 900 ms |
| 3 ms (preset) | 2,6 to 3,3 ms |
| 15 ms | 12 to 15 ms |
| 20 ms | 17 to 23 ms |

4.2.4.7 Behavior and Diagnostics of the Module 700-321-7BH01 DI 16 x DC 24 V

Effect of operating and mode supply voltage on the input values

The input values of the Module 700-321-7BH01 DI 1 x DC 24 V depend on the operating mode of the CPU and on the supply voltage of the module.

| CPU Operating State | | Power Supply L+ to Digital Module | Input Value of Digital Module |
|---------------------|------|-----------------------------------|-------------------------------|
| POWER ON | RUN | L+ exists | Process value |
| | | L+ missing | 0 signal |
| | STOP | L+ exists | Process value |
| | | L+ missing | 0 signal |
| POWER OFF | – | L+ exists | – |
| | | L+ missing | – |

4.2.4.8 Diagnostic Messages of the Module 700-321-7BH01 DI 16 x DC 24 V

| Diagnostics Message | LED | Scope of the Diagnostics | Parameters can be assigned |
|-----------------------------------|-----|--------------------------|----------------------------|
| Sensor supply missing | SF | Channel group | Yes |
| Wire-break | SF | Channel group | Yes |
| Module not parameterized | SF | Channel group | Yes |
| External auxiliary supply missing | SF | Module | No |
| Internal auxiliary power missing | SF | Module | No |
| Fuse blown | SF | Module | No |
| Incorrect parameter on module | SF | Module | No |
| Hardware interrupt lost | SF | Module | No |



Note

If any errors are to be detected and displayed by way of parameterisable diagnostic messages, the digital module must be parameterised accordingly in STEP 7®.

Behavior upon failure of the supply voltage

A failure of the supply voltage of the Module 700-321-7BH01 DI 16 x DC 24 V is always indicated by the SF LED on the module. In addition to the SF LED, this information is made available on the module.

The input value is initially held for 20 to 40 ms before the 0 signal is transferred to the CPU. Supply voltage dips < 20 ms do not modify the process value.



Failure of the supply voltage with redundant encoder incoming supply

If an external redundant power supply is provided for the encoder supply (Vs), no failure of the encoder supply is signalled in case of failure of the supply voltage L+. However, a failure of the internal and/or external auxiliary voltage and/or a tripped fuse will be signalled.

Short-circuit of sensor supply Vs

In case of a short-circuit of the encoder supply Vs, the relevant Vs LED goes out, irrespective of the parameterisation.

Causes of error and remedial measures

| Diagnostics Message | Possible Error Cause | Remedy |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lack of encoder supply | Overload of sensor supply | Eliminate overload |
| | Short circuit of sensor supply to M | Eliminate short circuit |
| External auxiliary voltage missing | Power supply L+ to module missing | Feed supply L+ |
| Internal auxiliary voltage missing | Power supply L+ to module missing | Feed supply L+ |
| | Fuse in module defective | Replace module |
| Fuse blown | Fuse in module defective | Replace module |
| Wrong parameters in module | One parameter or the combination of parameters is not plausible | Reassign module parameter |
| Hardware interrupt lost | The module cannot send an interrupt, since the previous interrupt was not acknowledged; configuration error possible | Change interrupt processing in CPU and reconfigure module parameters, if Required. The error continues until the module is configured with new parameters. |
| Module not parameterized | Fault during startup | Reassign module parameters |

4.2.4.9 Interrupts of the Module 700-321-7BH01 DI 16 x DC 24 V

The interrupts are divided into:

- Diagnostic interrupt
- Hardware interrupt

Enabling interrupts

The interrupts are not preset – in other words, they are inhibited without appropriate parameter assignment. Assign parameters to the Interrupt Enable in STEP 7®

Diagnostic interrupt

If diagnostic interrupts are enabled, then active error events (initial occurrence of the error) and departing error events (message after troubleshooting) are reported by means of an interrupt.

The CPU interrupts the execution of the user program and processes the diagnostic interrupt block (OB 82).

In the user program, you are able to call SFC 51 or SFC 59 in OB 82 to obtain more detailed diagnostic information from the module.

This diagnostic information is logical until such time as OB 82 is exited. When OB 82 is exited, the diagnostic interrupt is acknowledged on the module.

Hardware interrupt

The module 700-321-7BH01 DI 16 x DC 24 V can trigger a hardware interrupt for every channel group with a rising or falling edge, or both, of a signal status change.

Perform parameter assignment one channel group at a time. It can be modified at any time. In RUN mode using the user program.

Pending hardware interrupts trigger hardware interrupt processing in the CPU (OB 40). The CPU interrupts the execution of the user program or of the priority classes with low priority.

In the user-program of the hardware interrupt OB (OB 40) it can be established how the programmable logic controller has to react to should react to a flank-change. The process-alarm is acknowledged to with the abandonment of the Prozeßalarm-OBs on the module.

The module 700-321-7BH01 DI 16 x DC 24 V can buffer one interrupt per channel. If no higher priority run-time levels are waiting to be processed, the buffered interrupts of all modules are serviced one after the other by the CPU in accordance with the order in which they occurred.

Hardware interrupt lost

A diagnostic interrupt “hardware interrupt lost” will be triggered, if an interrupt has been buffered for a channel and another interrupt occurs on that channel before it has been processed by the CPU.

Further interrupts on this channel are not acquired until processing of the interrupt buffered on this channel has been executed.

Interrupt-triggering channels

The channel triggered by the hardware interrupt is entered in the start information of the OB 40 in the OB40_POINT_ADDR variable. Fig. 4-8 shows the assignment of the bits to the local data double word 8.

| Byte | Variable | Data type | | Description |
|--------|-----------------|-----------|--------------|--------------------------------------------|
| 6/7 | OB40_MDL_ADDR | WORD | B#16#0 | Address of the interrupt triggering module |
| from 8 | OB40_POINT_ADDR | DWORD | See Fig. 4-8 | Display of the interrupt triggering inputs |

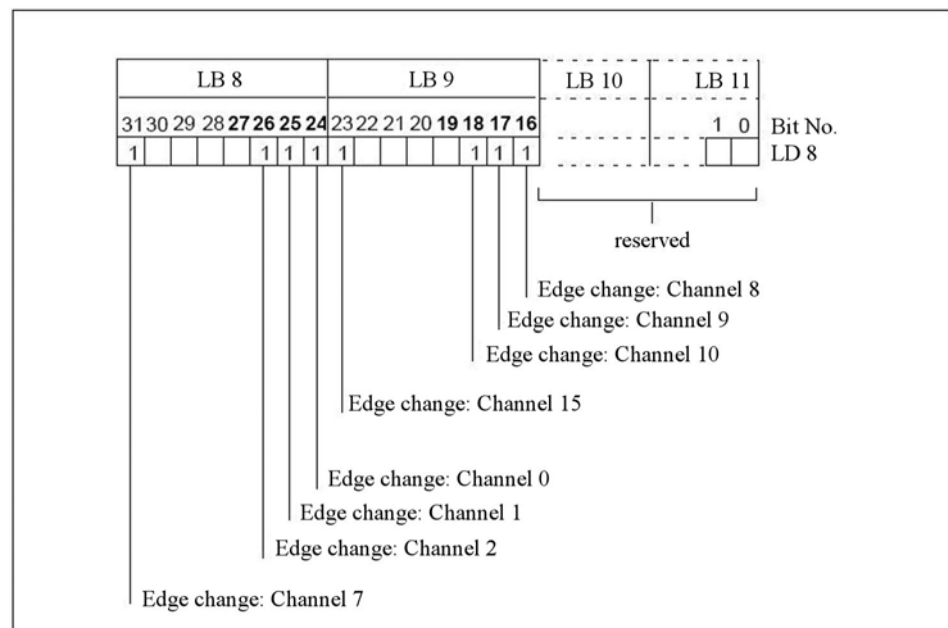


Fig. 4-7:
Start information of
OB 40

4.2.5 DEA DI 32 x 120 V AC

Order number: 700-321-1EL00

The DI 32 x 120 V AC has the following features:

- 32 inputs, isolated in 4 groups of 8 inputs, isolated from the backplane bus in 4 groups
- Nominal input voltage 120 V AC
- Inputs suitable for switches
- Inputs suitable for 2/3-wire proximity switches (AC)

Fig. 4-8 shows the block diagram of the DEA DI 16/DO 16 x 24 V DC/0.5 A, followed by the technical data.

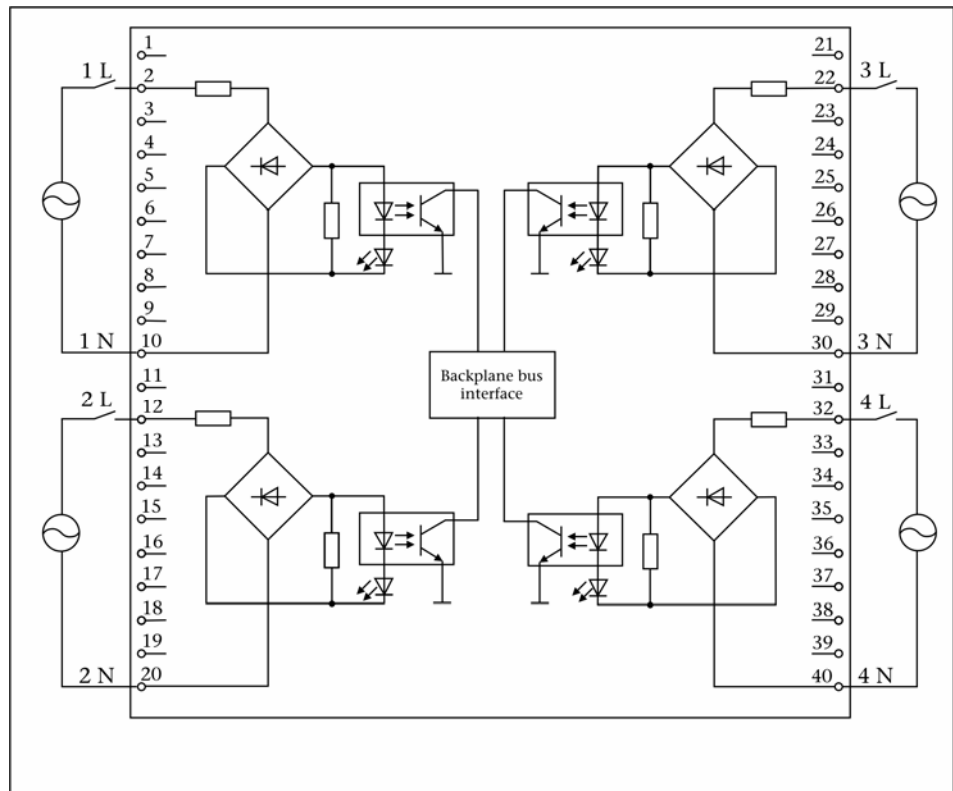


Fig. 4-8:
View of module and block
diagram of DI 32 x 120 V
AC

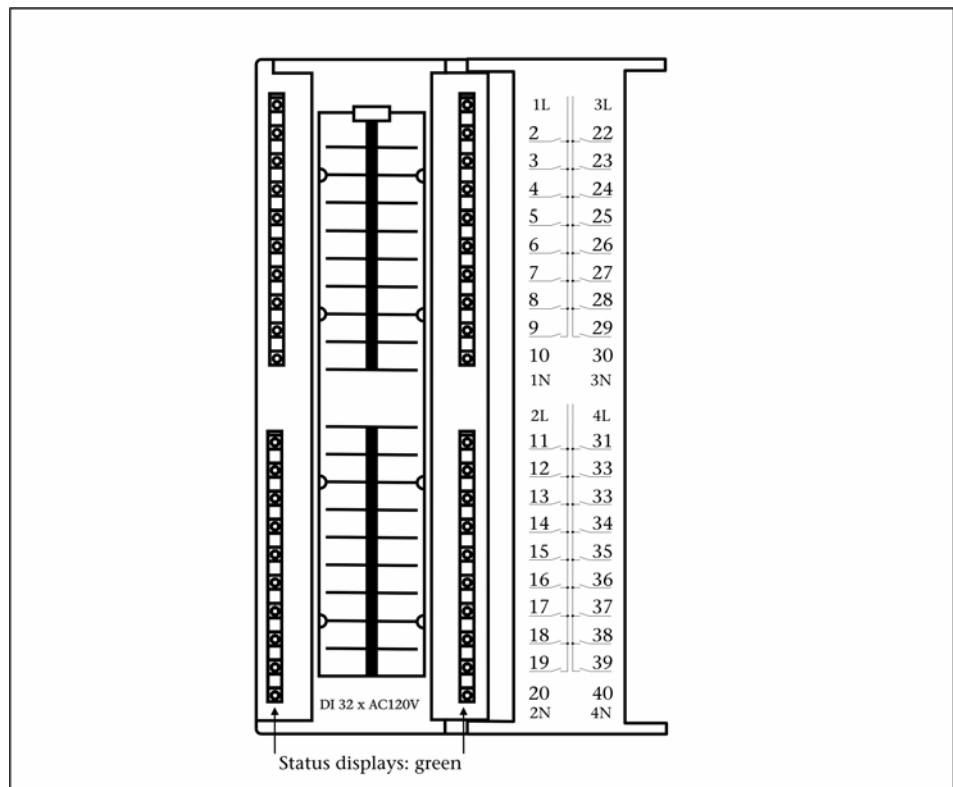


Fig. 4-9:
Module view of
DI 32 x 120 V AC

Technical specifications

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Order number | 700-321-1EL00 |
| Number of outputs | 32 |
| Isolation from backplane bus in groups of | Yes (optocoupler) 8 |
| Input voltage <ul style="list-style-type: none">• nominal value• for signal "0"• for signal "1"• Frequency range | 120 V AC 0 ... 20 V 74 ... 132 V 47 ... 63 Hz |
| Input current for signal "1" <ul style="list-style-type: none">• 120 V, 60 Hz | typ. 22 mA |
| Delay time <ul style="list-style-type: none">• form "0" to "1"• from "1" to "0" | typ. 15 ms typ. 25 ms |
| Supports clocked operation | nein |
| Connection of 2-wire initiator <ul style="list-style-type: none">• permissible quiescent current for signal "0" | ja max. 4 mA |
| Input characteristic curve | According to IEC 61131, type 2 |
| Cable length unshielded | max. 600 m |
| Cable length shielded | max. 1000 m |
| Permissible potential difference <ul style="list-style-type: none">• between GND_{internal} and the inputs• between the inputs of different groups | 120 V AC 250 V AC |
| Status display, Alarm, Diagnostic funktionen | |
| Status display | green LED per channel |
| Alarm | no |
| Diagnostic functions | none |
| Current consumption internal | typ. 16 mA |
| Power loss (nominal operation) | typ. 5,8 W |
| Permissible ambient conditions <ul style="list-style-type: none">• ambient temperature (during operation) horizontal or vertical mounting number of inputs that can be triggered simultaneously• ambient temperature (during operation) only vertical mounting number of inputs that can be triggered simultaneously• temperature during transport and storage | 0 ... +40 °C 32 0 ... +60 °C 24 -25 ... +75 °C |
| Weight | 240 g |
| Dimensions W x H x D [mm] | 40 x 125 x 117 |
| Front connector | 40-way |

4.2.6 DEA DI 16 x 120/230 V AC

Order number: 700-321-1FH00

The DI 16 x 120/230 V AC has the following features:

- 16 inputs, isolated in 4 groups of 4 inputs, isolated from the backplane bus in 4 groups
- Nominal input voltage 120/230 V AC
- Inputs suitable for 2/3-wire proximity switches (AC)

Fig. 4-10 shows the block diagram of the DEA DI 16 x 120/230 V AC, followed by the technical data.

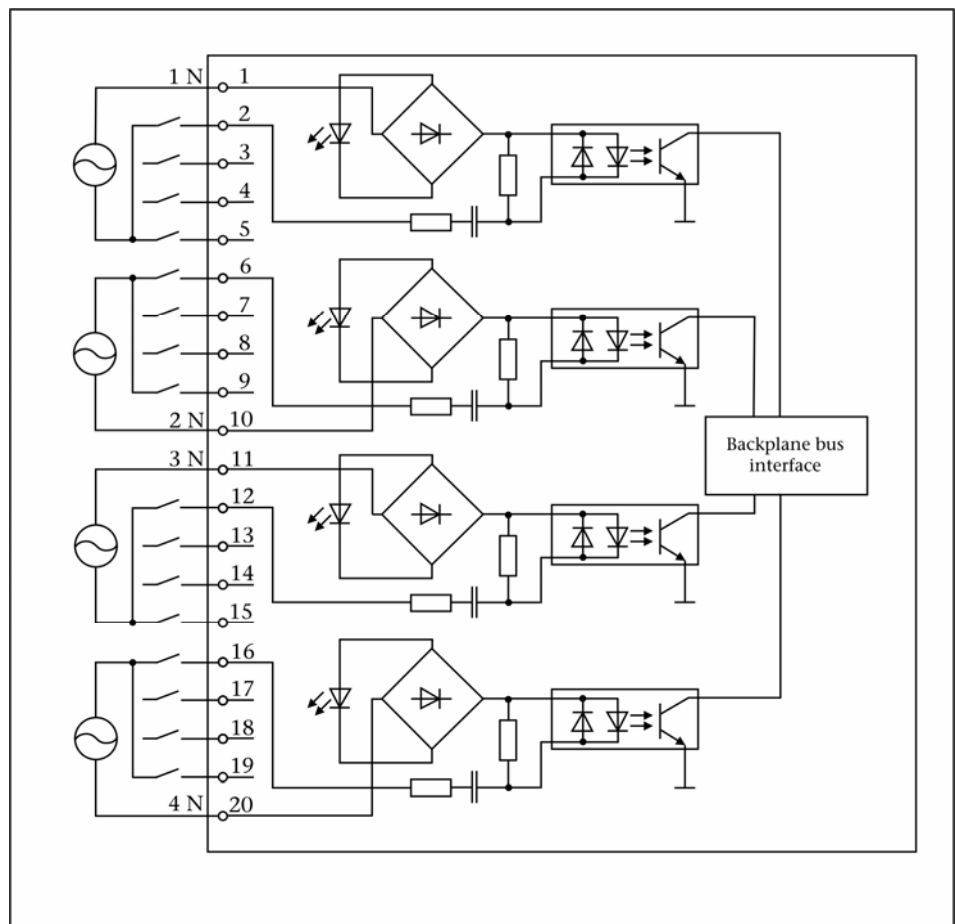


Fig. 4-10:
View of module and block
diagram of
DI 16 x 120/230 V AC

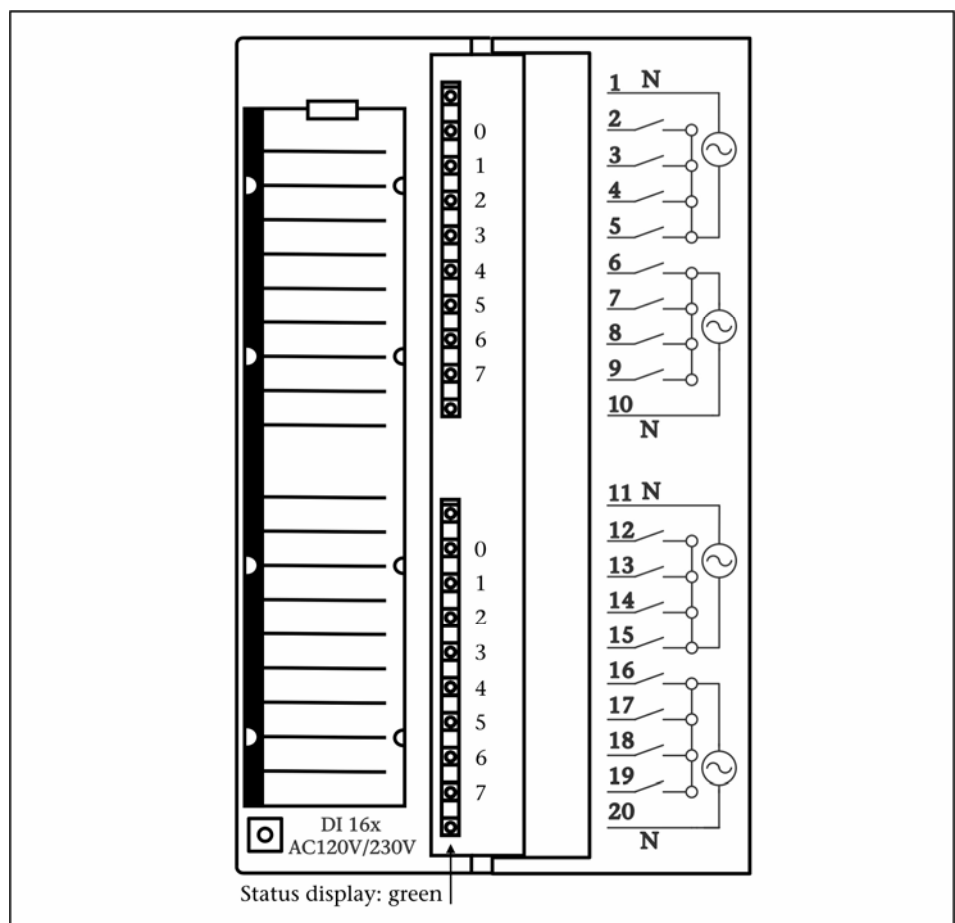


Fig. 4-11:
Module view of
DI 16 x 120/230 V AC

Technical specifications

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Order number | 700-321-1FH00 |
| Number of outputs | 16 |
| Isolation from backplane bus in groups of | Yes (optocoupler) 4 |
| Input voltage <ul style="list-style-type: none"> • nominal value • all load voltages must be of the same phase • for signal "0" • for signal "1" • Frequency range | 120/230 VAC 0 ... 40 V 79 ... 264 V 47 ... 63 Hz |
| Input current for signal "1" <ul style="list-style-type: none"> • 120 V, 60 Hz • 230 V, 50 Hz | typ. 8,0 mA typ. 13 mA |
| Delay time <ul style="list-style-type: none"> • from "0" to "1" • from "1" to "0" | typ. 25 ms typ. 25 ms |
| Input characteristic curve | According to IEC 61131, type 2 |
| Supports clocked operation | nein |
| Connection of Two-Wire proximity switches <ul style="list-style-type: none"> • permissible quiescent current for signal "0" | yes max. 2 mA |
| Cable length unshielded Cable length shielded | max. 600 m max. 1000 m |
| Current consumption internal Power loss (nominal operation) | typ. 30 mA typ. 4,5 W |
| Isolation <ul style="list-style-type: none"> • Between channels and backplane bus • Between channelsIn groups of | yes 4 |
| Permissible potential difference <ul style="list-style-type: none"> • between GND_{internal} and the inputs • between the inputs of different groups | 500 VAC 230 VAC |
| Status display, Alarm, Diagnostic funkions | |
| Status display | green LED per channel |
| Alarm | no |
| Diagnostic functions | none |
| Permissible ambient conditions | |
| <ul style="list-style-type: none"> • ambient temperature (during operation) horizontal or vertical mounting number of inputs that can be triggered simultaneously | 0 ... +40 °C 32 |
| <ul style="list-style-type: none"> • ambient temperature (during operation) only vertical mounting number of inputs that can be triggered simultaneously | 0 ... +60 °C 24 |
| <ul style="list-style-type: none"> • temperature during transport and storage | -25 ... +75 °C |
| Weight | 240 g |
| Dimensions W x H x D [mm] | 40 x 125 x 117 |
| Front connector | 20-way |

4.3 Digital output modules

This section describes the following digital output modules:

- 700-322-1BL00 DO 32 x 24 V DC /0.5 A
- 700-322-1BH01 DO 16 x 24 V DC /0.5 A

4.3.1 DEA DO 32 x 24 V DC/0.5 A

Order number: 700-322-1BL00

The DO 32 x 24 V DC/0.5 has the following features:

- 32 outputs, isolated from the backplane bus
- Output current 0.5 A
- Nominal output voltage DC 24 V
- Suitable for solenoid valves, contactors, small-power motors, etc.

Fig. 4-12 shows the block diagram of the DEA DO 32 x 24 V DC/ 0.5 A, followed by the technical data.

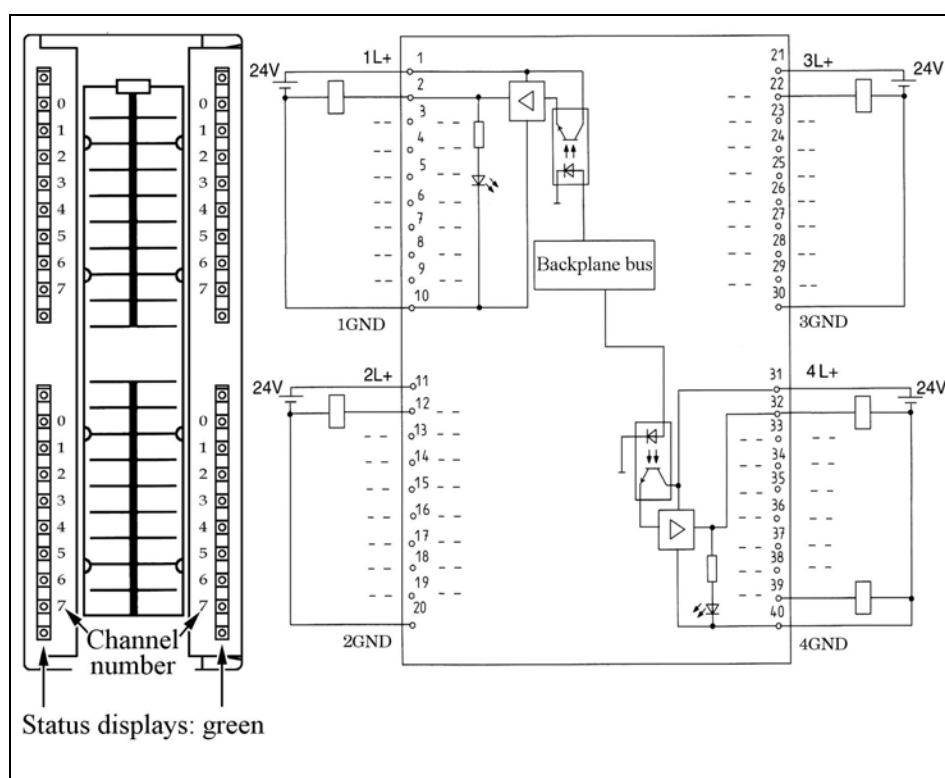


Fig. 4-12:
View of module and
block diagram of
DO 32 x 24 V DC/0.5 A

Technical data

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Order number | 700-322-1BL00 |
| Number of outputs | 32 |
| Isolation (from backplane bus) in groups of | yes (via optocoupler) 8 |
| Supply voltage U_p , U_s <ul style="list-style-type: none">• nominal value• ripple V_{pp}• permissible range (with ripple)• value at $1 < 10$ ms | DC 24 V max. 3.6 V 20 ... 30 V max. 50 V |
| Output current <ul style="list-style-type: none">• nominal value• residual current | 0.5 A max. 0.5 mA |
| Short circuit protection | electronic |
| Limitation of inductive interrupting voltage to | -48 V |
| Cable length unshielded Cable length shielded | max. 600 m max. 1000 m |
| Current consumption <ul style="list-style-type: none">• internal• external without load | typ. 125 mA max. 200 mA |
| Power loss | typ. 6.8 W |
| Permissible ambient conditions <ul style="list-style-type: none">• ambient temperature (during operation)• temperature during transport and storage | 0 °C ... +60 °C -25 °C ... +75 °C |
| Weight Dimensions W x H x D [mm] Front connector | 260 g 40 x 125 x 117 40-way |

4.3.2 DEA DO 16 x 24 V DC/0.5 A

Order number: 700-322-1BH01

The DO 16 x 24 V DC/0.5 has the following features:

- 16 outputs, isolated from the backplane bus
- Output current 0.5 A
- Nominal output voltage DC 24 V
- Suitable for solenoid valves, contactors, small-power motors, etc.

Fig. 4-13 shows the block diagram of the DEA DO 16 x 24 V DC/0.5 A, followed by the technical data.

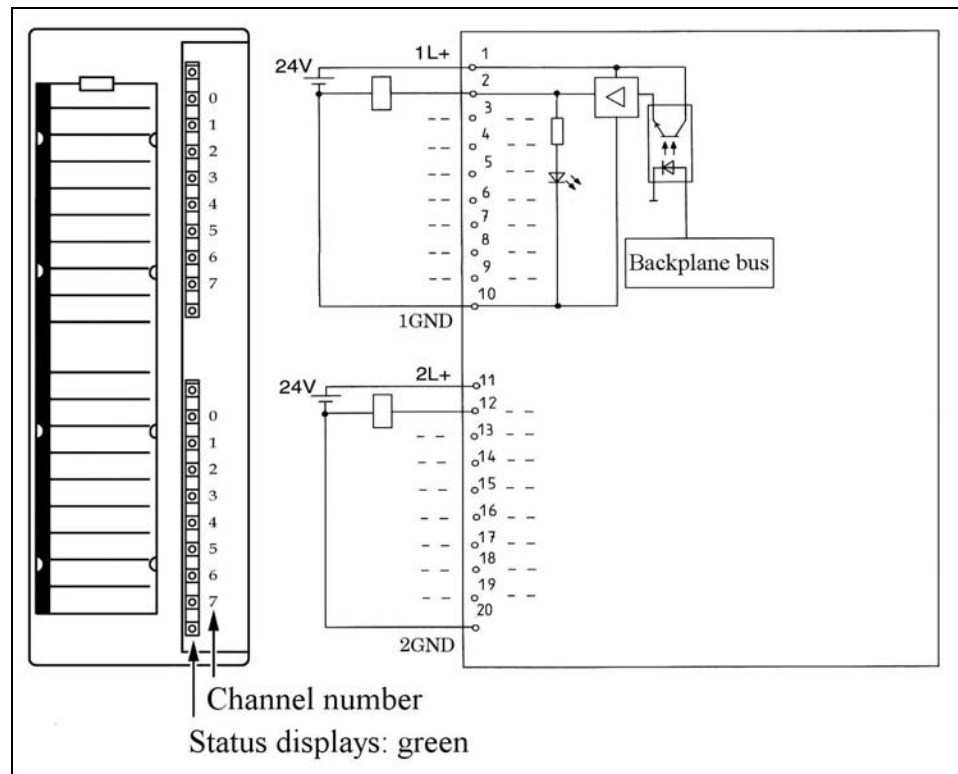


Fig. 4-13:
View of module and
block diagram of DO 16
x 24 V DC/0.5 A

Technical data

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Order number | 700-322-1BH01 |
| Number of outputs | 16 |
| Isolation (from backplane bus) in groups of | yes (via optocoupler) 8 |
| Supply voltage U_p , U_s <ul style="list-style-type: none">• nominal value• ripple V_{pp}• permissible range (with ripple)• value at $1 < 10$ ms | DC 24 V max. 3.6 V 20 ... 30 V max. 50 V |
| Output current <ul style="list-style-type: none">• nominal value• residual current | 0.5 A max. 0.5 mA |
| Short circuit protection | electronic |
| Limitation of inductive interrupting voltage to | -48 V |
| Cable length unshielded Cable length shielded | max. 600 m max. 1 000 m |
| Current consumption <ul style="list-style-type: none">• internal• external without load | typ. 100 mA max. 120 mA |
| Power loss | typ. 5 W |
| Permissible ambient conditions <ul style="list-style-type: none">• ambient temperature (during operation)• temperature during transport and storage | 0 °C ... +60 °C -25 °C ... +75 °C |
| Weight | 200 g |
| Dimensions W x H x D [mm] | 40 x 125 x 117 |
| Front connector | 20-way |

4.3.3 DEA DO 8 x 24 V DC/2.0 A

Order number: 700-322-1BF01

The DO 8 x 24 V DC/2.0 A has the following features:

- 8 outputs, isolated from the backplane bus
- Output current 2.0 A
- Nominal output voltage 24 V DC
- Inputs suitable for solenoid valves, contactors, small-power motors, etc.

Fig. 4-14 shows the block diagram of the DEA DO 8 x 24 V DC/2.0 A, followed by the technical data.

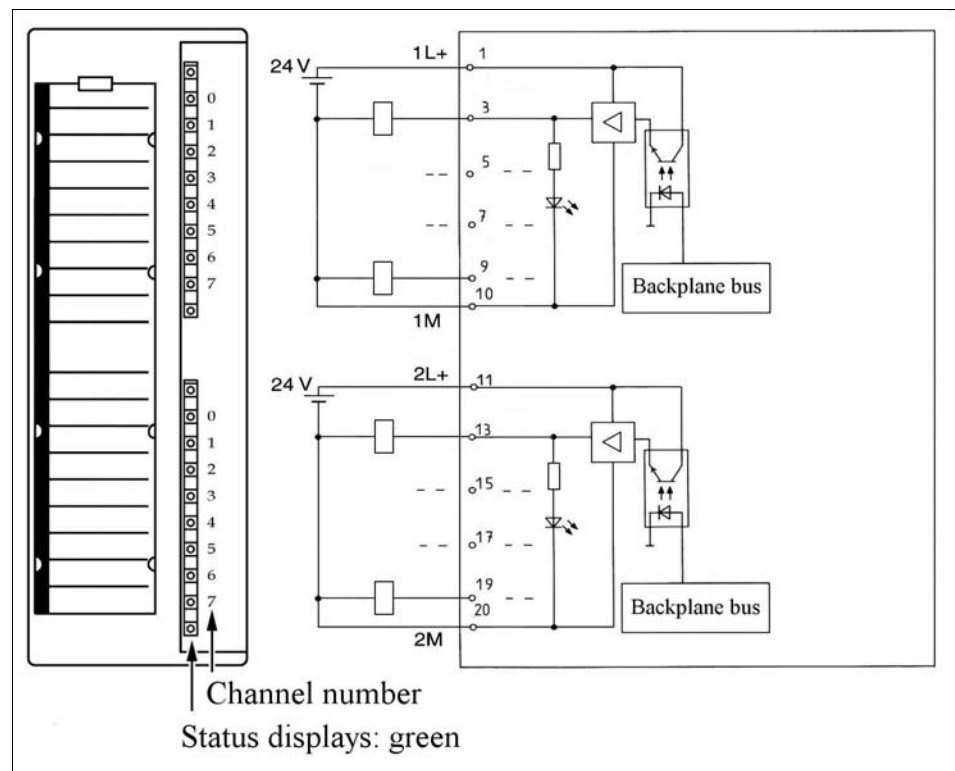


Fig. 4-14:
View of module and
block diagram of DEA
DO 8 x 24 V DC/2.0 A

Technical data

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Order number | 700-322-1BF01 |
| Number of Outputs | 8 |
| Isolation (from backplane bus) in groups of | yes (via optocoupler) 4 |
| Supply voltage U_p , U_s <ul style="list-style-type: none">• nominal value• ripple V_{pp}• permissible range (with ripple) | DC 24 V max. 3.6 V 20 ... 30 V |
| Short circuit protection Short circuit current - switched-mode Limitation of inductive interrupting voltage to | electronic typ. 12 A -23 V |
| Cable length unshielded Cable length shielded | max. 600 m max. 1000 m |
| Current consumption <ul style="list-style-type: none">• internal• external without load | typ. 40 mA max. 60 mA |
| Power loss | typ. 6.8 W |
| Permissible ambient conditions <ul style="list-style-type: none">• ambient temperature (during operation)• temperature during transport and storage | 0 °C ... +60 °C -25 °C ... +75 °C |
| Weight Dimensions W x H x D [mm] Front connector | 190 g 40 x 125 x 117 20-way |
| Output voltage <ul style="list-style-type: none">• at signal "1" | min. L + (-0.8 V) |
| Output current <ul style="list-style-type: none">• at signal "1" rated valuepermitted range• at signal "0" (leakage current) | 2 A 5 mA to 2.4 A max. 0.5 mA |
| Output delay (for resistive load) <ul style="list-style-type: none">• from "0" to "1"• from "1" to "0" | max. 100 µs max. 500 µs |
| Load resistance range Lamp load | 12 Ω to 4 kΩ max. 10 W |
| Parallel connection of 2 outputs <ul style="list-style-type: none">• for redundant triggering of a load• to increase performance | possible (only outputs of the same group) not possible |
| Triggering a digital input | possible |
| Switch rate max. <ul style="list-style-type: none">• for resistive load• Inductive loads according to IEC 947-5-1, DC 13• For lamp load | max. 100 Hz max. 0.5 Hz max. 10 Hz |

4.4 Digital input/output modules

This section describes the following digital input/output modules:

- 700-323-1BL00 DI 16/DO 16 x 24 V DC / 0.5 A
- 700-323-1BH00 DI 8/DO 8 x 24 V DC / 0.5 A

4.4.1 DEA DI 16/DO 16 x 24 V DC/0.5 A

Order number: 700-323-1BL00

The DI 16/DO 16 x 24 V DC/0.5 has the following features:

- 16 inputs, isolated from the backplane bus
- 16 outputs, isolated from the backplane bus
- Nominal input voltage DC 24 V
- Nominal output voltage 2 DC 4 V
- Inputs suitable for switches and 2-wire proximity switches (BEROs)
- Inputs suitable for solenoid valves, contactors, small-power motors, etc.

Fig. 4-15 shows the block diagram of the DEA DI 16/DO 16 x 24 V DC/0.5 A, followed by the technical data.

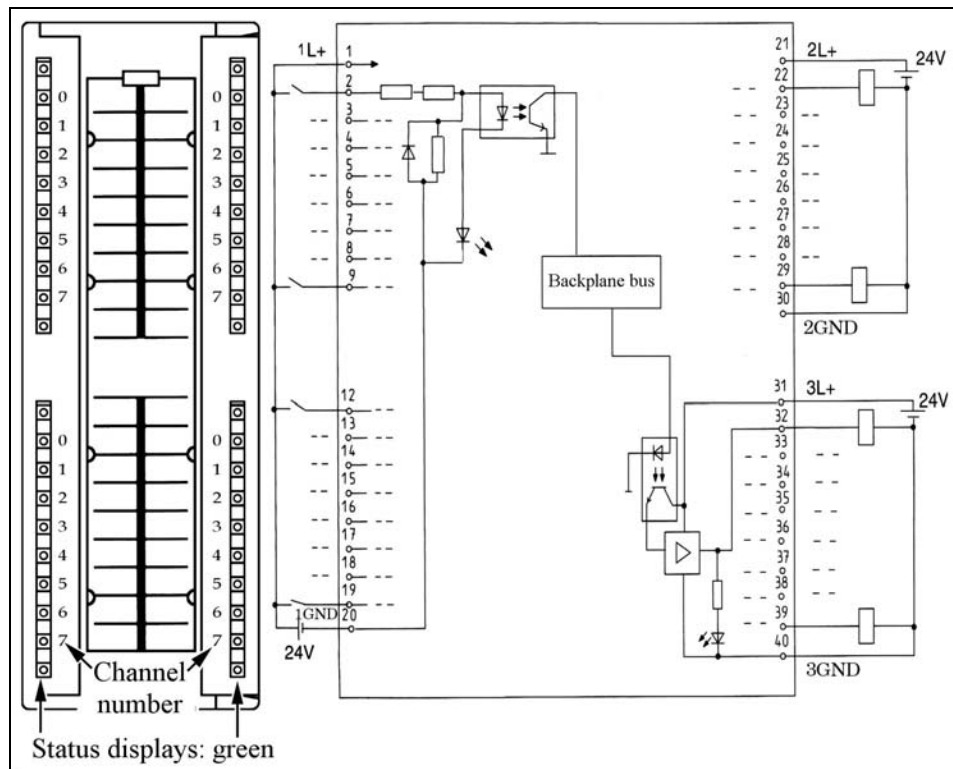


Fig. 4-15:
View of module and
block diagram of
DI 16/DO 16 x 24 V
DC/0.5 A

Technical data

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Order number | 700-323-1BL00 |
| Number of inputs | 16 |
| Isolation (from backplane bus) in groups of | yes (via optocoupler) 16 |
| Input voltage <ul style="list-style-type: none">• nominal value• for signal "0"• for signal "1" | DC 24 V -3 ... +5 V +13 ... +30 V |
| Input current <ul style="list-style-type: none">• for signal "1" | typ. 7 mA |
| Delay time | typ. 1.2 ... 4.8 ms |
| Connection of 2-wire initiator permissible quiescent current for signal "0" | yes max. 1.5 mA |
| Number of outputs | 16 |
| Isolation (from backplane bus) in groups of | yes (via optocoupler) 8 |
| Supply voltage U_p , U_s <ul style="list-style-type: none">• nominal value• ripple V_{pp}• permissible range (with ripple)• value at $1 < 10$ ms | DC 24 V max. 3.6 V 20 ... 30 V max. 50 V |
| Output current <ul style="list-style-type: none">• nominal value• residual current | 0.5 A max. 0.5 mA |
| Short circuit protection Limitation of inductive interrupting voltage to | electronic -48 V |
| Cable length unshielded Cable length shielded | max. 600 m max. 1000 m |
| Current consumption <ul style="list-style-type: none">• internal• external without load | typ. 90 mA max. 120 mA |
| Power loss | typ. 6.8 W |
| Permissible ambient conditions <ul style="list-style-type: none">• ambient temperature (during operation)• temperature during transport and storage | 0 °C ... +60 °C -25 °C ... +75 °C |
| Weight Dimensions W x H x D [mm] Front connector | 260 g 40 x 125 x 117 40-way |

4.4.2 DEA DI 8/DO 8 x 24 V DC/0.5 A

Order number: 700-323-1BH01

The DI 8/DO 8 x 24 V DC/0.5 has the following features:

- 8 inputs, isolated from the backplane bus
- 8 outputs, isolated from the backplane bus
- Nominal input voltage 24 V DC
- Nominal output voltage 24 V DC
- Inputs suitable for switches and 2-wire proximity switches (BEROs)
- Inputs suitable for solenoid valves, contactors, small-power motors, etc.

Fig. 4-16 shows the block diagram of the DEA DI 8/DO 8 x 24 V DC/0.5 A, followed by the technical data.

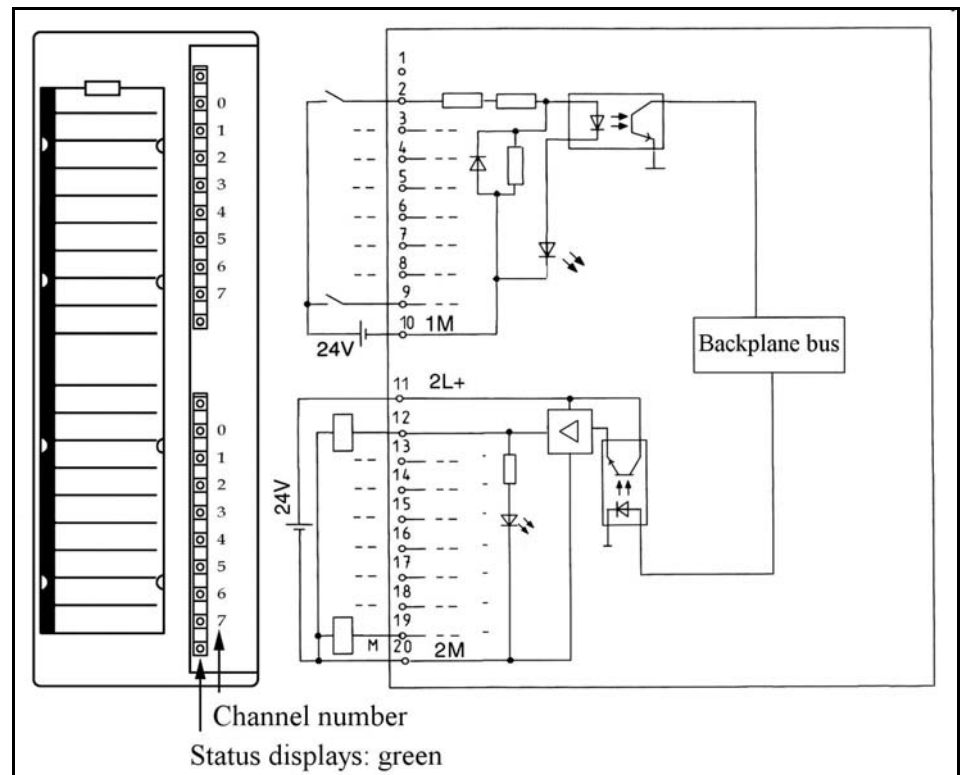


Fig. 4-16:
View of module and
block diagram of
DI 8/DO 8 x 24 V
DC/0.5 A

Technical data

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Order number | 700-323-1BH01 |
| Number of inputs | 8 |
| Isolation (from backplane bus) in groups of | yes (via optocoupler) 8 |
| Input voltage <ul style="list-style-type: none">• nominal value• for signal "0"• for signal "1" | DC 24 V -3 ... +5 V +13 ... +30 V |
| Input current <ul style="list-style-type: none">• for signal "1" | typ. 7 mA |
| Delay time | typ. 1.2 ... 4.8 ms |
| Connection of 2-wire initiator <ul style="list-style-type: none">• permissible quiescent current for signal "0" | yes max. 1.5 mA |
| Number of outputs | 8 |
| Isolation (from backplane bus) in groups of | yes (via optocoupler) 8 |
| Supply voltage U_p, U_s <ul style="list-style-type: none">• nominal value• ripple V_{pp}• permissible range (with ripple)• value at $1 < 10$ ms | DC 24 V max. 3.6 V 20 ... 30 V max. 50 V |
| Output current <ul style="list-style-type: none">• nominal value• residual current | 0.5 A max. 0.5 mA |
| Short circuit protection Limitation of inductive interrupting voltage to | electronic -48 V |
| Cable length unshielded Cable length shielded | max. 600 m max. 1000 m |
| Current consumption <ul style="list-style-type: none">• internal• external without load | typ. 55 mA max. 60 mA |
| Power loss | typ. 3.5 W |
| Permissible ambient conditions <ul style="list-style-type: none">• ambient temperature (during operation)• temperature during transport and storage | 0 °C ... +60 °C -25 °C ... +75 °C |
| Weight Dimensions W x H x D [mm] Front connector | 200 g 40 x 125 x 117 20-way |

4.5 Relay output modules

This section deals with the following relay output modules:

- 700-322-1HF10 8 outputs relay 5 A
- 700-322-1HF20 8 outputs relay 5 A with suppressor
- 700-322-1HH01 16 outputs relay 2 A
- 700-322-1HF01 8 outputs relay 2 A

4.5.1 DEA relay output module 8 relays 230 V AC/5 A

Order number: 700-322-1HF10

The 700-322 DO 8 230 V AC/5 A has the following properties:

- 8 outputs, floating in groups of 1
- Load voltage DC 24 V to 120 V; AC 48 V to 230 V
- Suitable for AC/DC solenoid valves, contactors, motor starters, small-power motors, and indicator lights

Fig. 4-17 shows the block diagram of the DEA DO 8 relays 230 V/5 A AC, followed by the technical specifications.

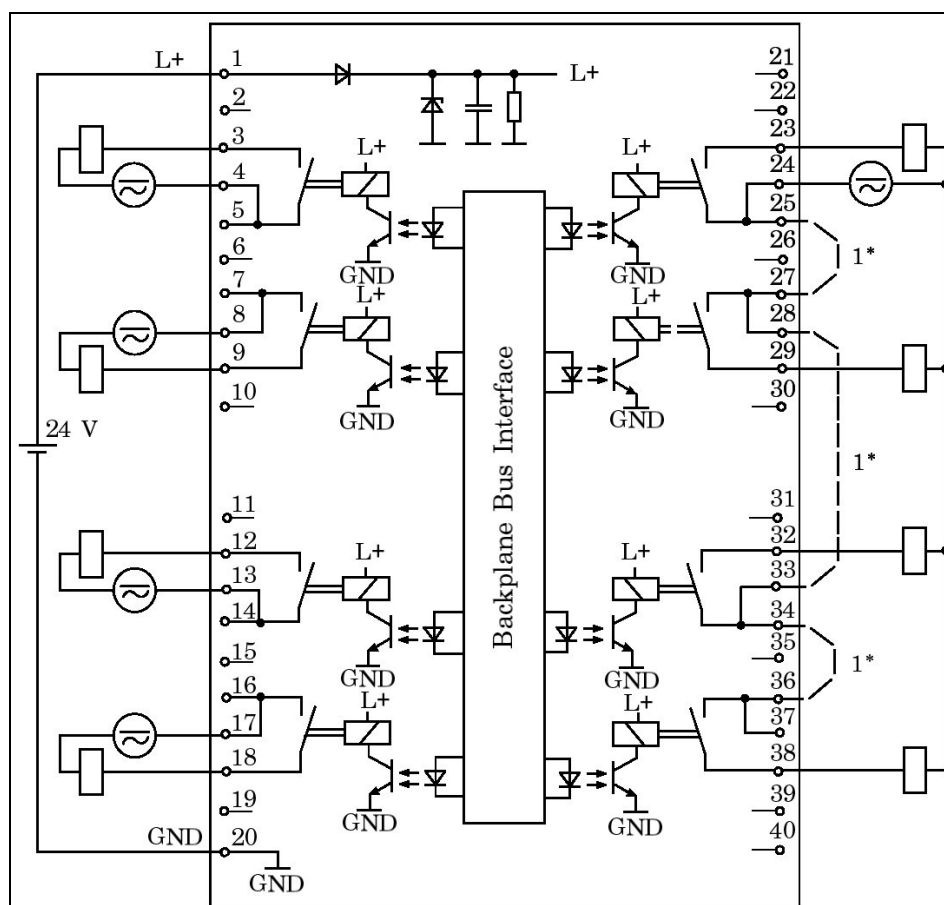


Fig. 4-17:
View of module
and block diagram of
DO 8 x 230 V AC/5 A

1* Further wiring of the contact supply:
Total current ≤ 8 A at ambient temperature ≤ 30 °C
Total current ≤ 5 A at ambient temperature ≤ 60 °C

Technical specifications

| | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Order number | 700-322-1HF10 |
| Number of outputs | 8 |
| Isolation from backplane bus | Yes (optocoupler) |
| Supply voltage of the relays L+ | DC 24 V |
| Contact voltages | DC 24 to 120 V AC 48 to 230 V |
| Continuous thermal current | 5 A per group |
| Horizontal mounting up to +30 °C | max. 8 A |
| up to +60 °C | max. 5 A |
| Vertical mounting up to +40 °C | max. 5 A |
| Minimum load voltage/load current | 10 V/5 mA |
| Operation of a digital input | Possible |
| Short-circuit current acc. to IEC 947-5-1 with circuit-breaker with characteristic B | cos φ 1.0: 600 A cos φ 0.5...0.7: 900 A with fuse Diazed 8 A: 1000 A |
| Contact connection (internal) | none |
| Parallel connection of 2 outputs | |
| • for redundant operation of the load | Possible |
| • for power increase | Not possible |
| Operation of a digital input | Possible |
| Switching frequency | |
| • mechanical | max. 10 Hz |
| • with ohmic load | max. 2 Hz |
| • with inductive load, acc. to IEC947-5-1, DC13/AC15 | max. 0.5 Hz |
| • with lamp load | max. 2 Hz |
| Cable length unshielded | max. 600 m |
| Cable length shielded | max. 1000 m |
| Current consumption | |
| • internal | typ. 40 mA |
| • external | max. 125 mA |
| Power loss | typ. 4.2 W |
| Supports clocked operation | no |
| Status display | green LED per channel |
| Alarm | no |
| Diagnostic functions | none |
| Permissible ambient conditions | |
| • Ambient temperature (during operation) | 0 °C to +60 °C |
| • Transportation and storage temperature | -25 °C to +75 °C |
| Dimensions W x H x D [mm] | 40 x 125 x 120 |
| Weight | approx. 350 g |
| Front connector | 40-way |

Permissible potential difference

- between GND_{internal} and supply voltage of the relays DC 75 V/ AC 60 V
- between GND_{internal} or supply voltage of the relays and the outputs AC 250 V
- between the outputs of different groups AC 500 V

Insulation test

- between GND_{internal} and supply voltage of the relays AC 500 V
- between GND_{internal} or supply voltage of the relays and the outputs AC 1500 V
- between the outputs of different groups AC 1500 V



Relay contact life can be extended using an external suppressor circuit.

Make/break capacity and life of contacts

| • for ohmic load | Voltage/current | | Number of switching cycles, typical value [mill.] |
|----------------------------------------------------|-----------------|-------|---------------------------------------------------|
| | | | |
| | DC 24 V | 8.0 A | 0.1 |
| | | 4.0 A | 0.3 |
| | | 2.0 A | 0.7 |
| | | 0.5 A | 4.0 |
| | DC 60 V | 0.5 A | 4.0 |
| | DC 120 V | 0.2 A | 1.6 |
| | AC 48 V | 8.0 A | 0.1 |
| | | 2.0 A | 1.6 |
| | AC 60 V | 8.0 A | 0.1 |
| | | 2.0 A | 1.2 |
| | AC 120 V | 8.0 A | 0.1 |
| | | 4.0 A | 0.3 |
| | | 2.0 A | 0.5 |
| | | 1.0 A | 0.7 |
| | AC 230 V | 0.5 A | 1.5 |
| | | 8.0 A | 0.1 |
| | | 4.0 A | 0.3 |
| | | 2.0 A | 0.5 |
| | | 1.0 A | 0.7 |
| • for inductive load acc. to IEC 947-5-1 DC13/AC15 | DC 24 V | 0.5 A | 1.5 |
| | | 2.0 A | 0.3 |
| | | 1.0 A | 0.5 |
| | DC 60 V | 0.5 A | 0.5 |
| | | 0.3 A | 1.0 |
| | DC 120 V | 0.2 A | 0.5 |
| | AC 48 V | 3.0 A | 0.5 |
| | | 1.5 A | 1.0 |
| | AC 60 V | 3.0 A | 0.3 |
| | | 1.5 A | 1.0 |
| | AC 120 V | 3.0 A | 0.2 |
| | | 2.0 A | 0.3 |
| | | 1.0 A | 0.7 |
| | | 0.5 A | 2.0 |
| | AC 230 V | 3.0 A | 0.1 |
| | | 2.0 A | 0.3 |
| | | 1.0 A | 0.7 |
| | | 0.5 A | 2.0 |

| Lamp load AC 230 V | Power | Number of switching cycles Typical value |
|-------------------------------------------------------------------|-----------|---------------------------------------------|
| | 1000 W | 25,000 |
| | 1500 W | 10,000 |
| Low-energy lamps/ fluorescent lamps with electronic ballast | 10 * 58 W | 25,000 |
| Fluorescent lamps with conventional correction | 1 * 58 W | 25,000 |
| Fluorescent lamps uncorrected | 10 * 58 W | 25,000 |



*Operation with safety
extra-low voltage*

Operation with safety extra-low voltage

If the 322-1HF10 relay output module is used with isolated safety extra-low voltage, the following special aspect must be observed:

If a terminal is operated with isolated safety extra-low voltage, the (horizontally) adjacent terminal must only be operated with a nominal voltage of max. DC 120 V.

When operated with a voltage above DC 120 V, the clearances and creepage distances of the 40-way front connectors do not comply with the SELV requirements for safe electrical isolation.



*Caution!
Special requirement of
mixed operation with
safety extra-low voltage.*

If a terminal is operated with safety extra-low voltage, the horizontally adjacent terminal must be operated with no more than DC 120 V!

Example:

Output 0

Output 4



4.5.2 DEA Relay output module DO 8 relays 230 V AC/5 A with suppressor

Order number: 700-322-1HF20

The 700-322 DO 8 x rel. 230 V AC/5 A has the following properties:

- 8 outputs, floating in groups of 1
- Load voltage DC 24 V to 120 V; AC 24 V to 230 V
- Suitable for AC/DC solenoid valves, contactors, motor starters, small-power motors and indicator lights
- RC snubbers can be connected via jumper SJ to protect the contacts

Fig. 4-18 shows the block diagram of the DEA DO 8 x relay 230 V AC/5 A, followed by the technical specifications.

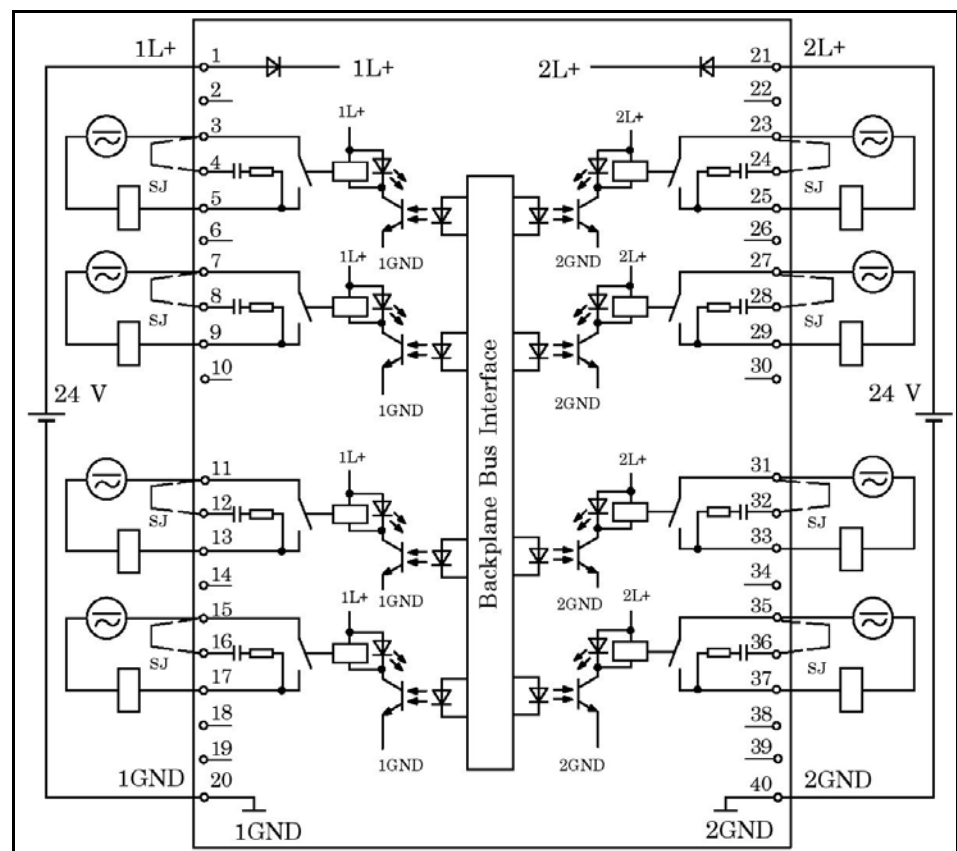


Fig. 4-18:
View of module
and block diagram
of DO 8 x 230 V AC/5 A
with suppressor

Technical specifications

| | |
|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Order number | 700-322-1HF20 |
| Number of outputs | 8 |
| Isolation from backplane bus | Yes (optocoupler) |
| Supply voltage of the relays L+ | DC 24 V |
| Contact voltages | DC 24 to 120 V AC 48 to 230 V |
| Continuous thermal current | 5 A per group |
| Horizontal mounting up to +30 °C | max. 8 A |
| up to +60 °C | max. 5 A |
| Vertical mounting up to +40 °C | max. 5 A |
| Minimum load voltage/load current without jumper "RJ" | 10 V/5 mA |
| Residual current with AC load voltage | |
| • with jumper "SJ" | 11.5 mA |
| • without jumper "SJ" | 0 mA |
| Operation of a digital input | Possible |
| Short-circuit current acc. to IEC 947-5-1 with circuit-breaker with characteristic B | cos φ 1.0: 600 A cos φ 0.5...0.7: 900 A with fuse Diazed 8 A: 1000 A RC snubber 330 Ω, 0.1 μF |
| Contact connection (internal) | |
| Parallel connection of 2 outputs | |
| • for redundant operation of the load | Possible |
| • for power increase | Not possible |
| Operation of a digital input | Possible |
| Switching frequency | |
| • mechanical | max. 10 Hz |
| • with ohmic load | max. 2 Hz |
| • with inductive load, acc. to IEC947-5-1, DC13/AC15 | max. 0.5 Hz |
| • with lamp load | max. 2 Hz |
| Cable length unshielded | max. 600 m |
| Cable length shielded | max. 1000 m |
| Current consumption | |
| • internal | typ. 40 mA |
| • extern | max. 125 mA |
| Power loss | typ. 4.2 W |
| Supports clocked operation | no |
| Status display | green LED per channel |
| Alarm | no |
| Diagnostic functions | none |



Relay contact life can be extended using the internal suppressor circuit - insert jumper "RJ"



Residual current of the RC snubber (with jumper SJ) can cause incorrect signal states on connection of an IEC type 1 input!

| | |
|------------------------------------------|------------------|
| Permissible ambient conditions | |
| • Ambient temperature (during operation) | 0 °C to +60 °C |
| • Transportation and storage temperature | -25 °C to +75 °C |

| | |
|---------------------------|----------------|
| Dimensions W x H x D [mm] | 40 x 125 x 120 |
| Weight | approx. 360 g |
| Front connector | 40-way |

Permissible potential difference

| | |
|-----------------------------------------------------------------------------------|-------------------|
| • between GND _{internal} and supply voltage of the relays | DC 75 V / AC 60 V |
| • between GND _{internal} or supply voltage of the relays and the outputs | AC 250 V |
| • between the outputs of different groups | AC 500 V |

Insulation test

| | |
|-----------------------------------------------------------------------------------|-----------|
| • between GND _{internal} and supply voltage of the relays | AC 500 V |
| • between GND _{internal} or supply voltage of the relays and the outputs | AC 1500 V |
| • between the outputs of different groups | AC 1500 V |



Relay contact life can be extended using an external suppressor circuit.

Make/break capacity and life of contacts

| | Voltage/current | | Number of switching cycles, typical value [mill.] |
|----------------------------------------------------|-----------------|-------|---------------------------------------------------|
| • for ohmic load | DC 24 V | 8.0 A | 0.1 |
| | | 4.0 A | 0.3 |
| | | 2.0 A | 0.7 |
| | | 0.5 A | 4.0 |
| | DC 60 V | 0.5 A | 4.0 |
| | DC 120 V | 0.2 A | 1.6 |
| | AC 48 V | 8.0 A | 0.1 |
| | | 2.0 A | 1.6 |
| | AC 60 V | 8.0 A | 0.1 |
| | | 2.0 A | 1.2 |
| | AC 120 V | 8.0 A | 0.1 |
| | | 4.0 A | 0.3 |
| | | 2.0 A | 0.5 |
| | | 1.0 A | 0.7 |
| | | 0.5 A | 1.5 |
| | AC 230 V | 8.0 A | 0.1 |
| | | 4.0 A | 0.3 |
| | | 2.0 A | 0.5 |
| | | 1.0 A | 0.7 |
| | | 0.5 A | 1.5 |
| • for inductive load acc. to IEC 947-5-1 DC13/AC15 | DC 24 V | 2.0 A | 0.3 |
| | | 1.0 A | 0.5 |
| | | 0.5 A | 1.0 |
| | DC 60 V | 0.5 A | 0.5 |
| | | 0.3 A | 1.0 |
| | DC 120 V | 0.2 A | 0.5 |
| | AC 48 V | 3.0 A | 0.5 |
| | | 1.5 A | 1.0 |
| | AC 60 V | 3.0 A | 0.3 |
| | | 1.5 A | 1.0 |

| | | |
|----------|-------|-----|
| AC 120 V | 3.0 A | 0.2 |
| | 2.0 A | 0.3 |
| | 1.0 A | 0.7 |
| | 0.5 A | 2.0 |
| AC 230 V | 3.0 A | 0.1 |
| | 2.0 A | 0.3 |
| | 1.0 A | 0.7 |
| | 0.5 A | 2.0 |

| Lamp load AC 230 V | Power | Number of switching cycles |
|-------------------------------------------------------------------|-----------|----------------------------|
| | | Typical value |
| Low-energy lamps/ fluorescent lamps with electronic ballast | 1000 W | 25,000 |
| | 1500 W | 10,000 |
| | 10 * 58 W | 25,000 |
| | | |
| Fluorescent lamps with conventional correction | 1 * 58 W | 25,000 |
| Fluorescent lamps uncorrected | 10 * 58 W | 25,000 |

Operation with safety extra-low voltage

If the 322-1HF20 relay output module is used with isolated safety extra-low voltage, the following special aspect must be observed:

If a terminal is operated with isolated safety extra-low voltage, the (horizontally) adjacent terminal must only be operated with a nominal voltage of max. DC 120 V.

When operated with a voltage above DC 120 V, the clearances and creepage distances of the 40-way front connectors do not comply with the SELV requirements for safe electrical isolation.



Caution!
Special requirement of
mixed operation with
safety extra-low voltage.

If a terminal is operated with safety extra-low voltage, the horizontally adjacent terminal must be operated with no more than DC 120 V!

Example:

Output 0

Output 4



4.5.3 DEA Relay output module DO 16 relays 230 V AC/2 A

Order number: 700-322-1HH01

The 700-322 DO 16 x rel. 230 V AC/2 A has the following properties:

- 16 Outputs, floating in groups of 2
- Load voltage DC 24 V to 120 V; AC 48 V to 230 V
- Suitable for AC/DC solenoid valves, contactors, motor starters, small-power motors and indicator lights

Fig. 4-19 shows the block diagram of the DEA DO 16 x Relay 230 V AC/2 A, followed by the technical specifications.

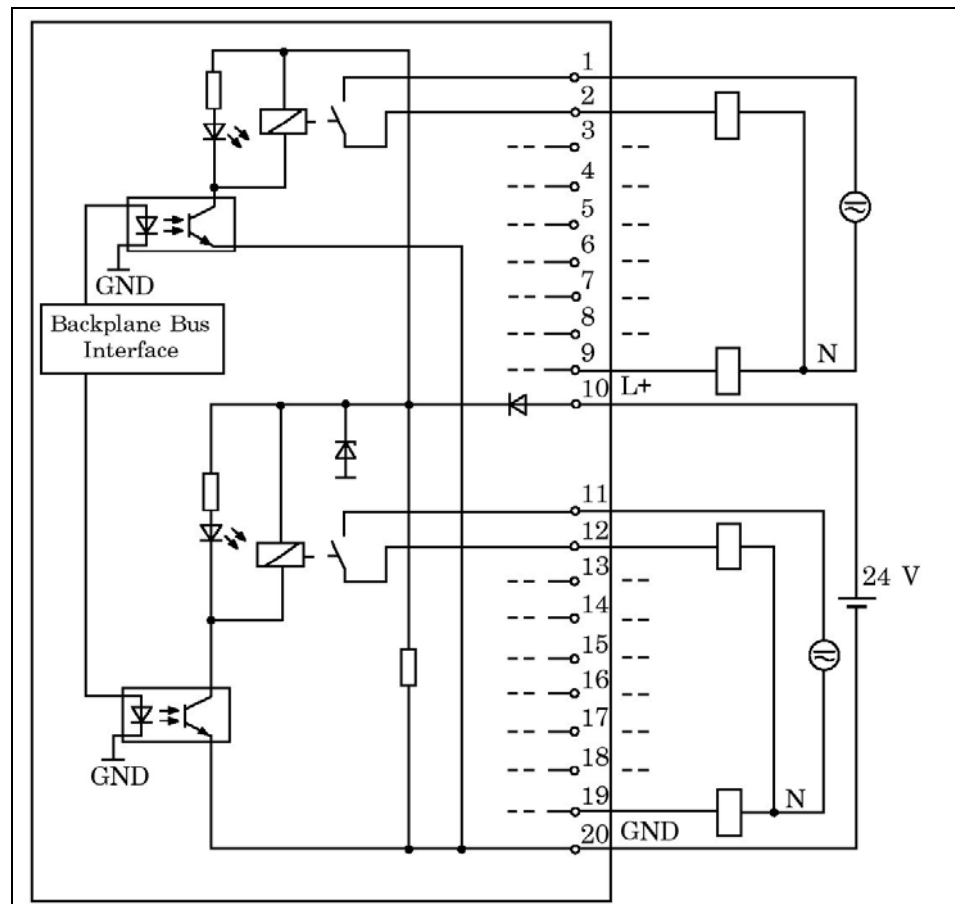


Fig. 4-19:
View of module
and block diagram
of DO 16 x 230 V AC/2 A

Technical specifications

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Order number | 700-322-1HH01 |
| Number of outputs | 16 |
| Isolation from backplane bus | Yes (optocoupler) |
| Supply voltage of the relays L+ | DC 24 V |
| Contact voltages | DC 24 to 120 V AC 48 to 230 V |
| Continuous thermal current | max. 2 A per output max. 8 A per group |
| Operation of a digital input | Possible |
| Short-circuit current acc. to IEC 947-5-1 with circuit-breaker with characteristic B | 200 A, with circuit-breaker B10/B16 |
| Contact connection (internal) | none |
| Parallel connection of 2 outputs <ul style="list-style-type: none"> • for redundant operation of the load • for power increase | Possible only outputs of the same group! Not possible |
| Operation of a digital input | Possible |
| Switching frequency <ul style="list-style-type: none"> • mechanical • with ohmic load • with inductive load, acc. to IEC947-5-1, DC13/AC15 • with lamp load | max. 10 Hz max. 1 Hz max. 0.5 Hz max. 1 Hz |
| Cable length unshielded | max. 600 m |
| Cable length shielded | max. 1000 m |
| Current consumption <ul style="list-style-type: none"> • internal • extern | typ. 70 mA max. 250 mA |
| Power loss | typ. 4.5 W |
| Supports clocked operation | no |
| Status display | green LED per channel |
| Alarm | no |
| Diagnostic functions | none |
| Permissible ambient conditions <ul style="list-style-type: none"> • Ambient temperature (during operation) • Transportation and storage temperature | 0 °C to +60 °C -25 °C to +75 °C |
| Dimensions W x H x D [mm] | 40 x 125 x 117 |
| Weight | approx. 240 g |
| Front connector | 20-way |



Relay contact life can be extended using an external suppressor circuit.

Permissible potential difference

- between GND_{internal} and supply voltage of the relays DC 75 V / AC 60 V
- between GND_{internal} or supply voltage of the relays and the outputs AC 230 V
- between the outputs of different groups AC 500 V

Insulation test

- between GND_{internal} and supply voltage of the relays AC 500 V
- between GND_{internal} or supply voltage of the relays and the outputs AC 1500 V
- between the outputs of different groups AC 1500 V



Relay contact life can be extended using an external suppressor circuit.

Make/break capacity and life of contacts

| | Voltage/current | Number of switching cycles, typical value [mill.] |
|----------------------------------------------------|-----------------|---------------------------------------------------|
| • for ohmic load | DC 24 V | 2.0 A 0.1 |
| | | 1.0 A 0.2 |
| | | 0.5 A 1.0 |
| | DC 60 V | 0.5 A 0.2 |
| | DC 120 V | 0.2 A 0.6 |
| | AC 24 V | 1.5 A 1.5 |
| | AC 48 V | 1.5 A 1.5 |
| | AC 60 V | 1.5 A 1.5 |
| | AC 120 V | 2.0 A 1.0 |
| | | 1.0 A 1.5 |
| | | 0.5 A 2.0 |
| | AC 230 V | 2.0 A 1.0 |
| | | 1.0 A 1.5 |
| | | 0.5 A 2.0 |
| • for inductive load acc. to IEC 947-5-1 DC13/AC15 | DC 24 V | 2.0 A 0.05 |
| | | 1.0 A 0.1 |
| | | 0.5 A 0.5 |
| | DC 60 V | 0.5 A 0.1 |
| | DC 120 V | 0.2 A 0.5 |
| | AC 24 V | 1.5 A 1.0 |
| | AC 48 V | 1.5 A 1.0 |
| | AC 60 V | 1.5 A 1.0 |
| | AC 120 V | 2.0 A 0.7 |
| | | 1.0 A 1.0 |
| | | 0.5 A 1.5 |
| | AC 230 V | 2.0 A 0.7 |
| | | 1.0 A 1.0 |
| | | 0.5 A 1.5 |

Lamp load

| Power | Number of switching cycles Typical value |
|---------------|---------------------------------------------|
| AC 230 V 50 W | 25,000 |
| DC 24 V 5 W | 10,000 |

Motor starter acc. to NEMA

max. size 5



Operation with safety extra-low voltage

Operation with safety extra-low voltage

The 700-322-1HF01 module can be used with safety extra-low voltage without any restrictions.

4.5.4 DEA Relay output module DO 8 relays 230 V AC/2 A

Order number: 700-322-1HF01

The 700-322 DO 8 x rel. 230 V AC/2 A has the following properties:

- 8 Outputs, floating in groups of 2
- Load voltage DC 24 V to 120 V; AC 48 V to 230 V
- Suitable for AC/DC solenoid valves, contactors, motor starters, small-power motors and indicator lights

Fig. 4-20 shows the block diagram of the DEA DO 8 x relay 230 V AC/2 A, followed by the technical specifications.

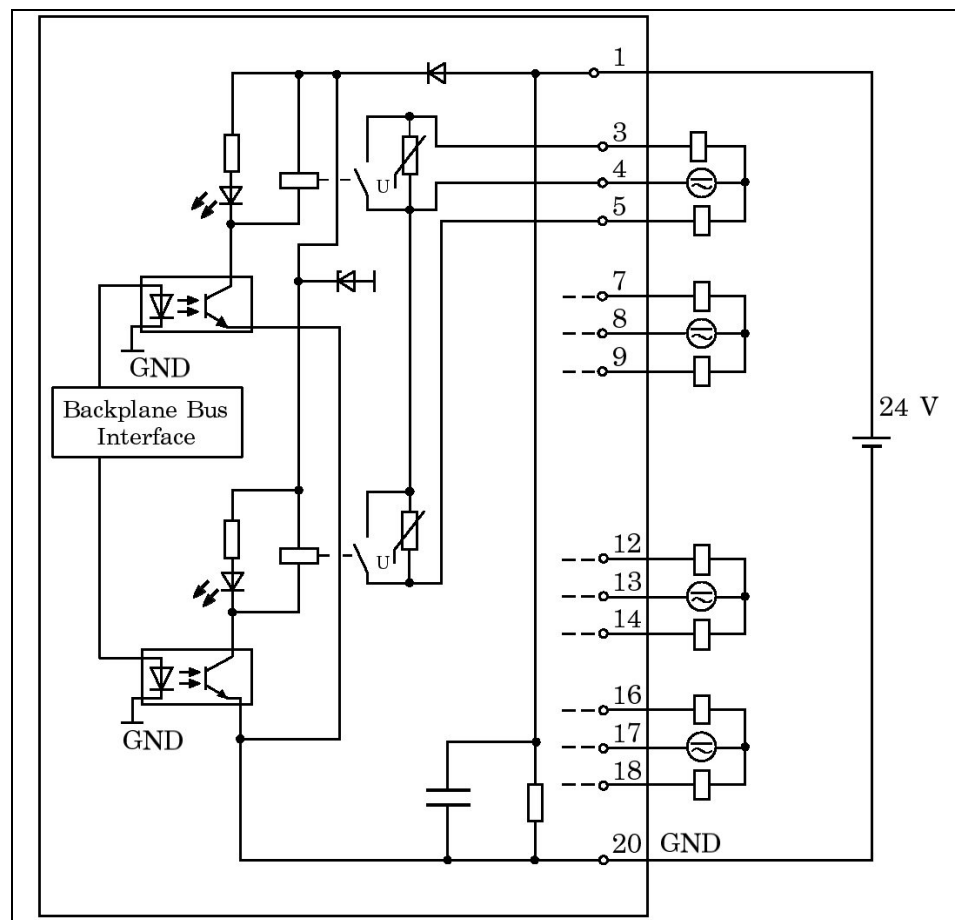


Fig. 4-20:
View of module
and block diagram
of DO 8 x 230 V AC/2 A

Technical specifications

| | |
|---------------------------------|----------------------------------|
| Order number | 700-322-1HF01 |
| Number of outputs | 8 |
| Isolation from backplane bus | Yes (optocoupler) |
| Supply voltage of the relays L+ | DC 24 V |
| Contact voltages | DC 24 to 120 V AC 48 to 230 V |

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Continuous thermal current | max. 3 A per output max. 4 A per group |
| Operation of a digital input | Possible |
| Short-circuit current acc. to IEC 947-5-1 with circuit-breaker with characteristic B | cos φ 1.0: 600 A cos φ 0.5...0.7: 900 A with fuse Diazed 8 A: 1000 A Varistor K275 |
| Contact connection (internal) | |
| Parallel connection of 2 outputs <ul style="list-style-type: none"> • for redundant operation of the load • for power increase | Possible only outputs of the same group! Not possible |
| Operation of a digital input | Possible |
| Switching frequency <ul style="list-style-type: none"> • mechanical • with ohmic load • with inductive load, acc. to IEC947-5-1, DC13/AC15 • with lamp load | max. 10 Hz max. 2 Hz max. 0.5 Hz max. 2 Hz |
| Cable length unshielded | max. 600 m |
| Cable length shielded | max. 1000 m |
| Current consumption <ul style="list-style-type: none"> • internal • extern | typ. 40 mA max. 160 mA |
| Power loss | typ. 3.2 W |
| Supports clocked operation | no |
| Status display | green LED per channel |
| Alarm | no |
| Diagnostic functions | none |
| Permissible ambient conditions <ul style="list-style-type: none"> • Ambient temperature (during operation) • Transportation and storage temperature | 0 °C to +60 °C -25 °C to +75 °C |
| Dimensions W x H x D [mm] | 40 x 125 x 117 |
| Weight | approx. 240 g |
| Front connector | 20-way |
| Permissible potential difference <ul style="list-style-type: none"> • between GND_{internal} and supply voltage of the relays • between GND_{internal} or supply voltage of the relays and the outputs • between the outputs of different groups | DC 75 V / AC 60 V AC 230 V AC 500 V |
| Insulation test <ul style="list-style-type: none"> • between GND_{internal} and supply voltage of the relays • between GND_{internal} or supply voltage of the relays and the outputs • between the outputs of different groups | AC 500 V AC 1500 V AC 1500 V |



Relay contact life can be extended using an external suppressor circuit.

Make/break capacity and life of contacts

| | Voltage/current | Number of switching cycles, typical value [mill.] |
|-------------------------------------------------------------------|-----------------|---------------------------------------------------|
| • for ohmic load | | |
| | DC 24 V 2.0 A | 0.7 |
| | 1.0 A | 1.6 |
| | 0.5 A | 4.0 |
| | DC 60 V 0.5 A | 1.6 |
| | DC 120 V 0.2 A | 1.6 |
| | AC 48 V 2.0 A | 1.6 |
| | 6 AC 0 V 2.0 A | 1.2 |
| | AC 120 V 2.0 A | 0.5 |
| | 1.0 A | 0.7 |
| | 0.5 A | 1.5 |
| | AC 230 V 2.0 A | 0.5 |
| | 1.0 A | 0.7 |
| | 0.5 A | 1.5 |
| • for inductive load acc. to IEC 947-5-1 DC13/AC15 | | |
| | DC 24 V 2.0 A | 0.3 |
| | 1.0 A | 0.5 |
| | 0.5 A | 1.0 |
| | DC 60 V 0.5 A | 0.5 |
| | DC 120 V 0.2 A | 0.3 |
| | AC 48 V 1.5 A | 1.0 |
| | AC 60 V 1.5 A | 1.0 |
| | AC 120 V 2.0 A | 0.2 |
| | 1.0 A | 0.7 |
| | 0.7 A | 1.0 |
| | 0.5 A | 2.0 |
| | AC 230 V 2.0 A | 0.3 |
| | 1.0 A | 0.7 |
| | 0.5 A | 2.0 |
| Lamp load AC 230 V | Power | Number of switching cycles Typical value |
| | 1000 W | 25,000 |
| | 1500 W | 10,000 |
| Low-energy lamps/ fluorescent lamps with electronic ballast | 10 x 58 W | 25,000 |
| Fluorescent lamps with conventional correction | 1 x 58 W | 25,000 |
| Fluorescent lamps uncorrected | 10 x 58 W | 25,000 |



Operation with safety extra-low voltage

Operation with safety extra-low voltage

The 700-322-1HF01 module can be used with safety extra-low voltage without any restrictions.

4.6 Other modules

4.6.1 Dummy Module DM 370

Order number: 700-370-0AA01 20-pin
700-370-0AL01 40-pin

The dummy module DM 370 reserves a slot for a module not parameterised. It can be used as a dummy for:

- interface modules, without reserving address space
- non-parameterised signal modules, with reserved address space
- modules that occupy 2 slots, with reserved address space

When replacing the dummy module with another module from the S7-300*, the mechanical design and the address assignment or address allocation remain unchanged for the complete device.

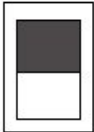
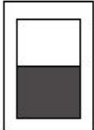
Configuring with STEP 7

When working with STEP 7, the dummy module DM 370 must only be configured if the module is to reserve a slot for a parameterised signal module. If the module is to reserve a slot for an interface module, the module DM 370 need not be configured.

Modules occupying 2 slots

For modules occupying 2 slots, it is imperative to plug 2 dummy modules. In this case, only the dummy module plugged into slot "x" reserves the address space, but not the module plugged into slot "x + 1" (see table).

Max. 8 modules (SM/FM/CP) may be plugged into one subrack. If, however, 2 dummy modules reserve a slot for a module 80 mm in width, 7 further modules (SM/FM/CP) may nevertheless be plugged, since the dummy module only occupies the address space for 1 module.

| Switch Position | Function | Application |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NA  A | The dummy module reserves one slot. The module will not be configured and does not occupy any address space. | <ul style="list-style-type: none">• Without active backplane bus: A slot is reserved only physically, with electrical connection to the backplane bus.• With active backplane bus: no |
| NA  A | The dummy module reserves one slot. The module must be configured and occupies 1 byte address space (with specification from the system outside the process image). | <ul style="list-style-type: none">• A slot with address is reserved. |

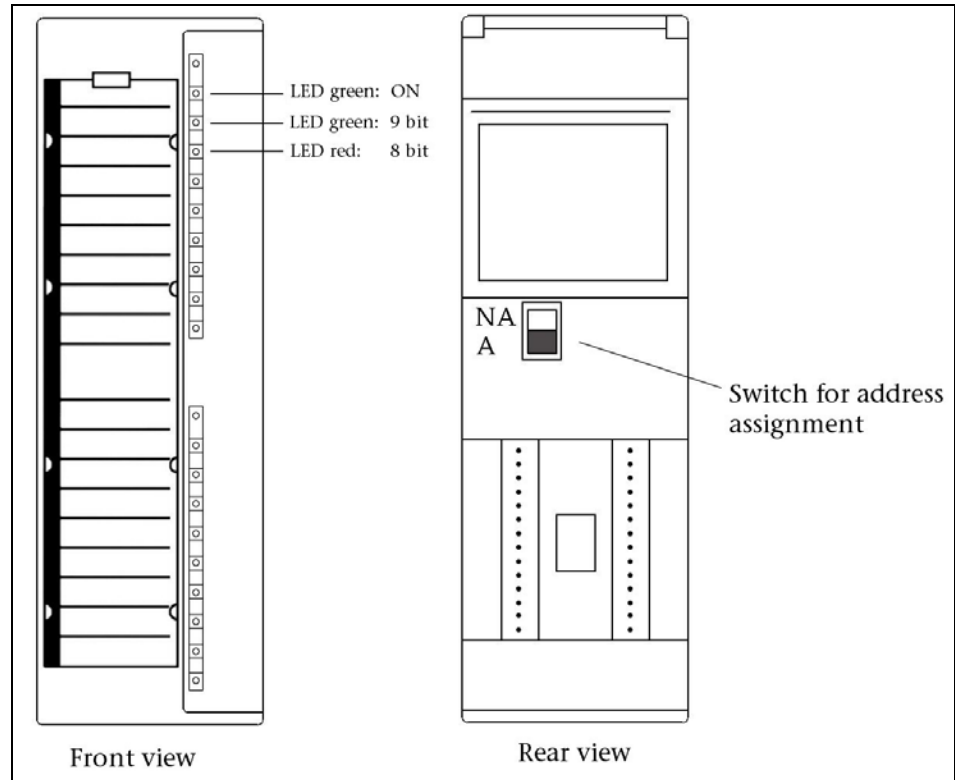


Fig. 4-21:
Module view of
the dummy module
front connector 20-way

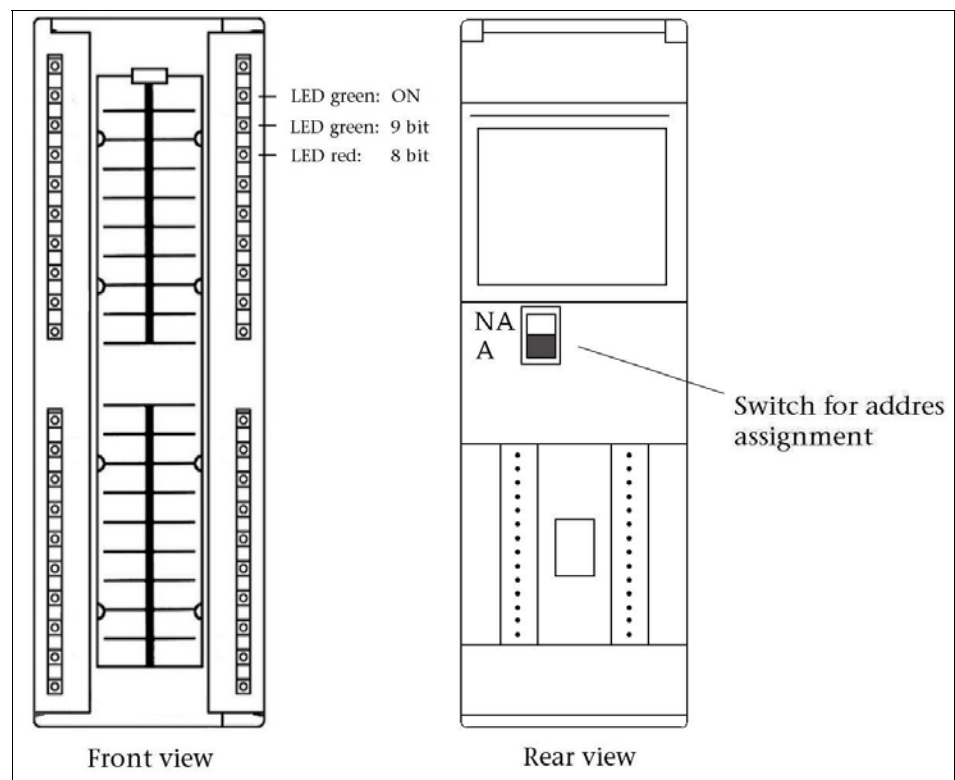


Fig. 4-22:
Module view of
the dummy module
front connector 40-way

Technical specifications

Order number

Front connector 20-way

700-370-0AA01

Front connector 40-way

700-370-0AL01

Current consumption (from backplane bus)

ca. 5 mA

Power loss

typ. 0.03 W

Dimensions W x H x D [mm]

40 x 125 x 117

Weight

ca. 180 g

Permissible ambient conditions

- Ambient temperature (during operation)
- Transportation and storage temperature

0 °C to +60 °C

-25 °C to +75 °C

Meaning of the 8/9-bit display of the dummy module

There are two different methods for transmission of the data along the S7 300* backplane bus:

- Without parity bit
Only the data bytes (8 bits) are transmitted. This method is obsolete; errors in the data transmission cannot be recognised, and errors may occur in the I/O modules.
- With parity bit
This newer, better method transmits a parity bit (9 bits per byte) in addition to the useful data. Thus, transmission errors can be recognised and errors can be avoided.

The CPUs are able to use both transmission methods. All I/O modules that handle the 9-bit transmission method can additionally switch back to the 8-bit method. This happens whenever one or several modules using the obsolete, less reliable 8-bit method are plugged into the system.

The 8/9-bit LEDs indicate the transmission method currently used by the entire system.

The 9-bit method was introduced shortly after introduction of the S7-300* to the market. For reasons of downwards compatibility, however, new CPUs are still also able to use the 8-bit method.

Systeme Helmholtz modules generally use the more reliable 9-bit transmission method.

There are, however, modules that only use the 8-bit method. To ensure a reliable data transmission on the backplane bus and to avoid errors in the I/O modules, we recommend not using such modules any longer. The presence of 8-bit modules can be recognised from the red LED on the dummy module, see Fig. 4-21 and Fig. 4-22.



*If any 8-bit module is used, **all** 9-bit modules connected to the backplane bus will revert to using the 8-bit transmission method.*

5 Ordering data

| | Systeme-Helmholz Order No. |
|---------------------------------------------------------|-------------------------------|
| Sectional rail | |
| Sectional rail length 160 mm | 700-390-1AB60 |
| Sectional rail length 482 mm | 700-390-1AE80 |
| Sectional rail length 530 mm | 700-390-1AF30 |
| Sectional rail length 830 mm | 700-390-1AJ30 |
| Sectional rail length 2000 mm | 700-390-1BC00 |
| Front connector | |
| 20-way front connector with screw terminals | 700-392-1AJ10 |
| 20-way front connector with spring-loaded terminals | 700-392-1BJ00 |
| 40-way front connector with EasyConnect® | 700-392-1AM10 |
| 40-way front connector with screw terminals | 700-392-1AM00 |
| Digital input modules | |
| DI 32 x 24 V DC | 700-321-1BL00 |
| DI 16 x 24 V DC | 700-321-1BH02 |
| DI 16 x 24 V DC Source Input | 700-321-1BH50 |
| DI 16 x 24 V DC with Hardware and Diagnostic Interrupts | 700-321-7BH01 |
| DI 32 x 120 V AC | 700-321-1EL00 |
| DI 16 x 120/230 V AC | 700-321-1FH00 |
| Digital output modules | |
| DO 32 x 24 V DC/0.5 A | 700-322-1BL00 |
| DO 16 x 24 V DC/0.5 A | 700-322-1BH01 |
| DO 8 x 24 V DC/2.0 A | 700-322-1BF01 |
| Digital input/output modules | |
| DI 16/DO 16 x 24 V DC/0.5 A | 700-323-1BL00 |
| DI 8/DO 8 x 24 V DC/0.5 V | 700-323-1BH00 |
| Relay output modules | |
| DO 8 x Rel. AC 230 V/5 A | 700-322-1HF10 |
| DO 8 x Rel. AC 230 V/5 A with suppressor | 700-322-1HF20 |
| DO 8,x Rel. AC 230 V/2 A | 700-322-1HF01 |
| DO 16 x Rel. AC 230 V/2 A | 700-322-1HH01 |
| Other modules | |
| Dummy Module 20-pin | 700-370-0AA01 |
| Dummy Module 40-pin | 700-370-0AL01 |