

Technical Description

PX8500

8-port relay output board for DIN rail



Product information

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Warning!

The following risks result from the improper implementation of the relay output board and from use contrary to the regulations:



Personal injury



Damage to the relay output board, the PC and peripherals



Pollution of the environment.

- Protect yourself, others and the environment!

- Read the safety precautions (yellow leaflet) carefully!

If this leaflet is not enclosed with the documentation, please contact us and ask for it.

- Observe the instructions of this manual!

Make sure that you do not forget or skip any step!

We are not liable for damages resulting from the wrong use of the relay output board.

- Pay attention to the following symbols:



NOTICE!

Designates hints and other useful information.



NOTICE!

Designates a possibly dangerous situation.

If the instructions are ignored, the relay output board, the PC and/or peripherals may be **destroyed**.



WARNING!

Designates a possibly dangerous situation.

If the instructions are ignored, the relay output board, the PC and/or peripherals may be **destroyed** and persons may be **endangered**.

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Chapter overview

In this manual, you will find the following information:

Chapter	Content
1	Important information on the application and the user of the relay output board
2	Description of the relay output board including layout diagram
3	Detailed information on the connection of the relay output board to the PC boards including pin assignment
4	Information on how to dismount the relay output board and replace the relays
5	Procedure for returning (repairing, etc.) or disposing of the relay output board
6	List of technical data and limit values of the relay output board
7	Appendix with glossary and index
8	Contact and support address

1 Definition of application, user, handling

1.1 Definition of application

1.1.1 Intended use

The relay output board **PX8500** serves for the construction of electrical systems which are used for electrical measurement, control and laboratory pursuant to the standard DIN EN IEC 61010-1.

The relay output board **PX8500** is intended only for the installation in equipment according to the standard DIN EN IEC 61439-1 (Low-voltage switchgear and controlgear assemblies).

1.1.2 Usage restrictions

The relay output board **PX8500** must not be used as a safety-related part (SRP).

The relay output board **PX8500** must not be used in potentially explosive atmospheres.

The relay output board **PX8500** is no equipment ready for use.

The relay output board **PX8500** must not be used without protection against dangerous voltage.

1.1.3 Limits of use

All safety information and the instructions in the manual must be followed to ensure proper intended use.

Uses of the relay output board beyond these specifications are considered as improper use.

The manufacturer is not liable for damages resulting from improper use.

The relay output board must remain in its anti-static packaging until it is installed.

Please do not delete the identification numbers of the relay output board or the warranty claim will be invalid.

1.2 User

1.2.1 Qualification

Only persons trained in electronics are entitled to perform the following works:

- Installation
- Commissioning
- Use
- Maintenance.

1.2.2 Country-specific regulations

Do observe the country-specific regulations regarding

- the prevention of accidents
- electrical and mechanical installations
- Electromagnetic compatibility (EMC).

1.3 Installation



Electrical shock hazard!

The relay output board **PX8500** conducts dangerous voltages. Improper handling and operation can cause mortal injury. Only persons trained in electronics are therefore allowed to install the relay output board. It may be used only with adequate protective measures for electric insulation.

1.4 Questions and updates

If you have any questions, do not hesitate to call us or to send us an e-mail:

Phone: +49 7229 1847-0

E-mail: info@addi-data.com

Manual and software download from the Internet

The latest version of the technical manual for the relay output board **PX8500** can be downloaded for free at: <https://drivers.addi-data.com>.



NOTICE!

Before using the relay output board or in case of malfunction during operation, check if there is an update (manual, etc.) available. Current data can be found on our website or contact us directly.

2 Layout

The relay output board **PX8500** is an external 8-port relay board for the connection to digital 24 V output boards. It can be cascaded in 16, 24 and 32 relays and mounted with its housing to DIN rails.

The change-over contacts of the relays are controlled via the 24 V signals of the PC board.

The excitation circuit is connected to the D-Sub female connector X1 of the relay output board (see Fig. 2-2). A green LED indicates the operating state of the relay output board once the external 24 V supply voltage is connected to the terminals. Yellow LEDs show if the relay contacts are open or closed.

To suppress high-frequency interfering signals, it is possible to ground the 37-pin cable shield on both sides. The 24 V supply voltage is protected by varistors and transil diodes.

The relay output board is suited for operation in the 220 V network. The dimensioning of the creeping distances (DIN EN IEC 61010-1) and conductor cross sections enables operations with high switching capacity (up to 2500 VA).

The relay output board **PX8500** can be connected to the following PC boards and MSX-E systems with **digital** signals:

Table 2-1: Boards and MSX-E systems with PX8500

PCI Express boards	APCLe-1502, APCLe-1516, APCLe-1532, APCLe-1564
PCI boards	APCI-1500, APCI-1516, APCI-1564, APCI-2016, APCI-2032
CompactPCI boards	CPCI-1500, CPCI-1564
CompactPCI Serial boards	CPCIs-1532, CPCIs-1564
MSX-E systems	MSX-E3121, MSX-E3701-DIO

Fig. 2-1: Switching principle of the relays

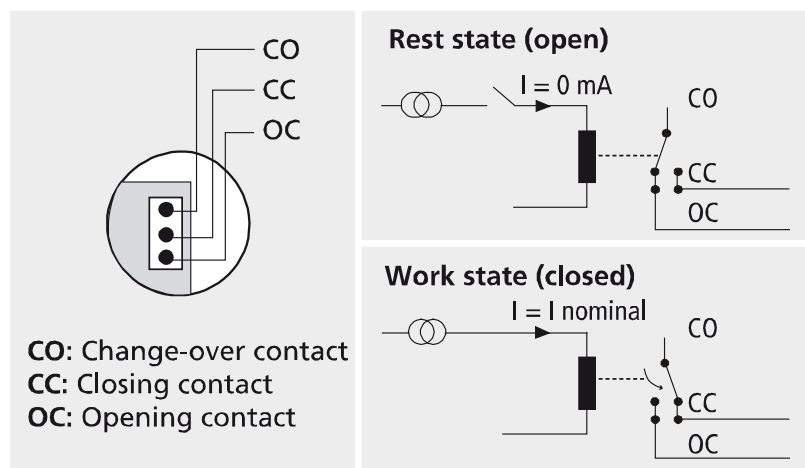
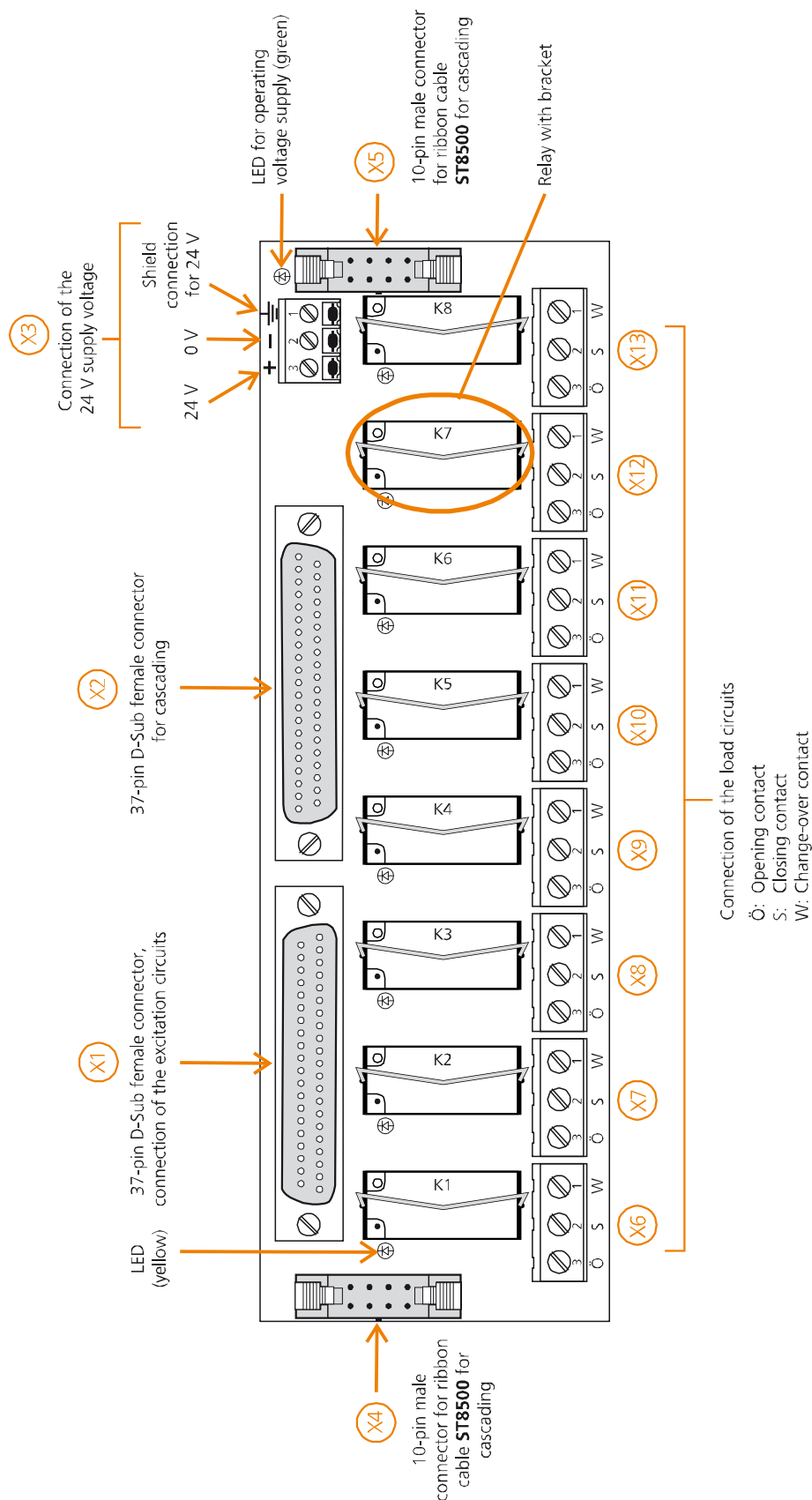


Fig. 2-2: PX8500: Layout diagram



3 Connection to the PC boards

**Electrical shock hazard!**

The relay output board **PX8500** conducts dangerous voltages. Improper handling and operation can cause mortal injury. Only persons trained in electronics are therefore allowed to install the relay output board. It may be used only with adequate protective measures for electric insulation.

- Before the installation or connection of the relay output board, disconnect all devices safely from the power network.
- Disconnect all connection cables from external devices.

**Risk of injury!**

Please follow the safety precautions!
The relay output **PX8500** board may be operated only if all safety requirements are met, and for its intended purpose, with **accessories recommended** by ADDI-DATA. Otherwise, property damage and injury may be incurred.

Using the 37-pin D-Sub female connector and the standard cable **ST010** and **ST011** respectively, or **ST021**, the relay output board can be connected to digital output boards and to the Ethernet systems **MSX-E3121** and **MSX-E3701-DIO**. In terms of electromagnetic compatibility (EMC), the cable has the following properties:

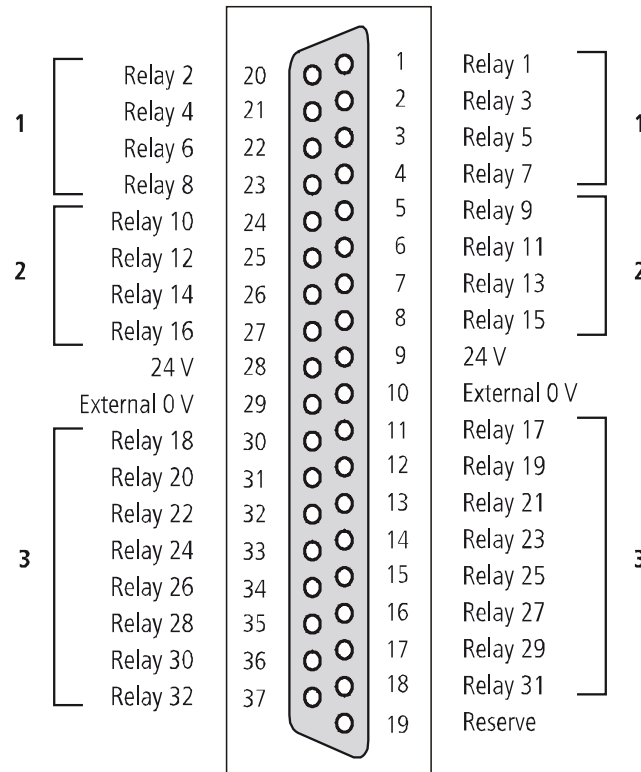
- Metallised connector housing
- Shielded cable
- Cable shield folded back over insulation and firmly screwed on both sides to the connector housing.

The different connection possibilities of the relay output board are shown in Chapter 3.4.

3.1 Pin assignment

3.1.1 Connection of the excitation circuits

Fig. 3-1: 37-pin D-Sub female connector X1



- 1: Connection to the load circuits K1 to K8
- 2: Cascading via **ST8500** cable
- 3: Connection of the excitation circuits

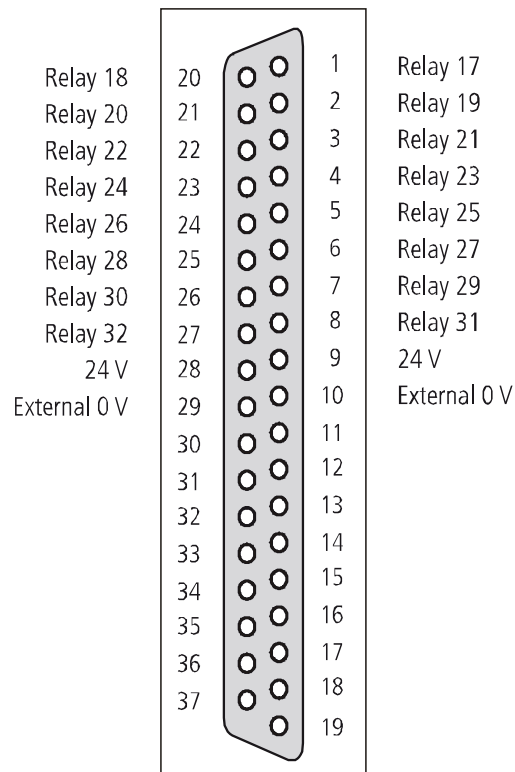


NOTICE!

For cascading, the ribbon cable **ST8500** may be connected only between the **connector X5** of the relay output board and the **connector X4** of the connected relay output board (see Fig. 2-2).

3.1.2 Cascading (ST022 cable)

Fig. 3-2: 37-pin D-Sub female connector X2



3.2 Connections

The following table contains the connections that are required to operate the **PX8500**.

Table 3-1: PX8500: Required connections

Electric circuit	Connection unit
Supply voltage of the PC board	24 V mains unit
24 V excitation circuit	PC + PC board or MSX-E system from Table 2-1
Load circuit (220 V network)	e.g. motor

3.2.1 Connection of the voltage supply

1. Connect the excitation circuit and the 24 V supply voltage to the relay output board.

Table 3-2: Connection of the excitation circuit and the supply voltage

Connection	Recommended cables	Recommended tools	Cable fixing
Excitation circuit to APCLe-/APCI-1564, CPCI-/CPCIs-1564, APCI-2032	ST010/ST011	Screwdriver	Tighten the cable connector on both sides (see Fig. 3-1)
Excitation circuit to APCLe-1502, APCLe-/APCI-1516, APCLe-/CPCIs-1532, APCI-/CPCI-1500, APCI-2016, MSX-E3121, MSX-E3701-DIO	ST021		
Supply voltage (24 V)	AWG 18-14 lead end sleeves	Screwdriver or electric screwdriver type DMS2 grade 2	Strip 7 mm of insulation off the lead, fit lead end sleeve, insert it in clamping unit and tighten it (see Fig. 2-2)

2. Switch on the 24 V supply voltage and the PC.
3. Check if the green LED on the relay output board lights up. The board is thus ready for operation.

3.2.2 Connection of the load circuit



Electrical shock hazard!

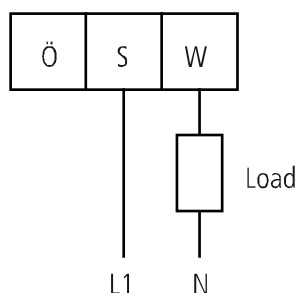
Due to electrical shock hazard, the load circuits may be connected only if the relay output board is disconnected from the power network.

1. Switch off the PC and the 24 V supply voltage.
2. Disconnect the power plug of the PC and the 24 V supply voltage.
3. Make sure that the connection lines of the relay output board are disconnected from the 220 V network and conduct no dangerous voltage.
4. Connect the load circuits to the relay output board (see the following table).

Table 3-3: Connection of the load circuit

Connection	Recommended cables	Recommended tools	Cable fixing
Load circuit	AWG 18-14 lead end sleeves	Screwdriver or electric screwdriver type DMS2 grade 2	Strip 7 mm of insulation off the lead, fit lead end sleeve, insert it in clamping unit and tighten it (see Fig. 2-2)

Fig. 3-3: Load circuit (example)



When the relay is excited, the L1 phase is switched to the load via the closing contact. Without excitation, the load circuit is closed by the opening contact. The load is then separated from the power network.

5. Add a protective circuit to the load.



NOTICE!

By connecting inductive or capacitive loads without any protective circuit, the relays may wear excessively or may be damaged.

3.2.3 Checking the connections

1. Check if all conducting lines are screwed firmly to the clamping unit.
2. Check which contact circuits are closed at rest and which ones are closed when the relays are excited.
3. Check if all conducting lines are protected against overload through protective devices (fuses).



Fire hazard!

In case of short-circuit of the load circuits, there is a fire hazard. The protective devices should therefore be able to interrupt the short-circuit current flowing in the line before the line reaches a dangerous temperature.

For example, PVC-insulated lines with a permissible operating temperature of 70 °C may heat only from 70 °C to 160 °C when the short-circuit current flows (duration: 5 s max.).

4. For the load circuits, use the prepared connection lines (AWG 14 at maximum load).

3.3 Installing the relay output board

1. Mount the relay output board on the DIN rail and close its housing.
2. Switch on the 24 V supply voltage and the PC.
3. Check if all connected units are ready for operation.

3.4 Connection examples



NOTICE!

For cascading, the ribbon cable **ST8500** may be connected only between the **connector X5** of the relay output board and the **connector X4** of the connected relay output board.

3.4.1 Digital output boards

Fig. 3-4: Board with 16 outputs

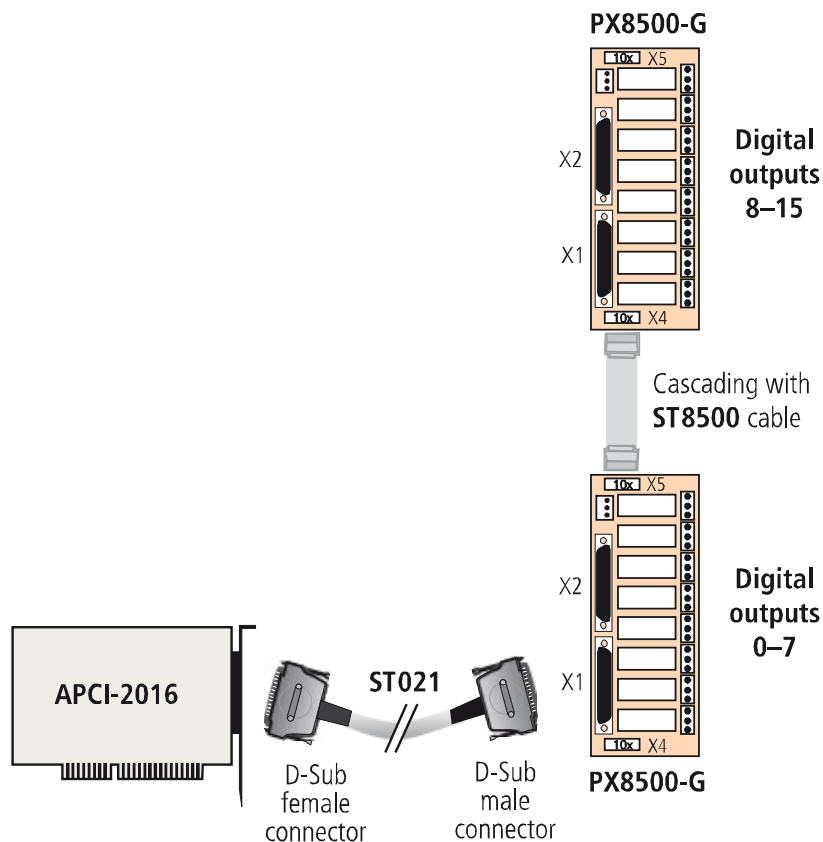
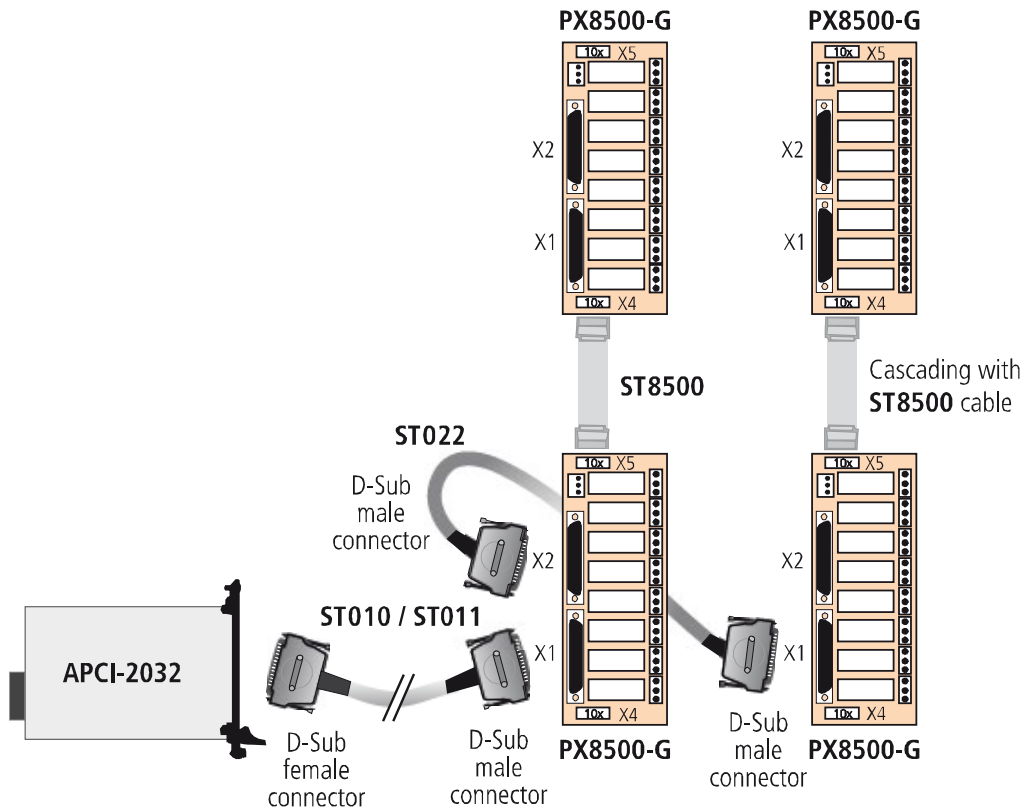


Fig. 3-5: Board with 32 outputs



3.4.2 Digital input/output boards

Fig. 3-6: Board with 8 inputs/outputs each

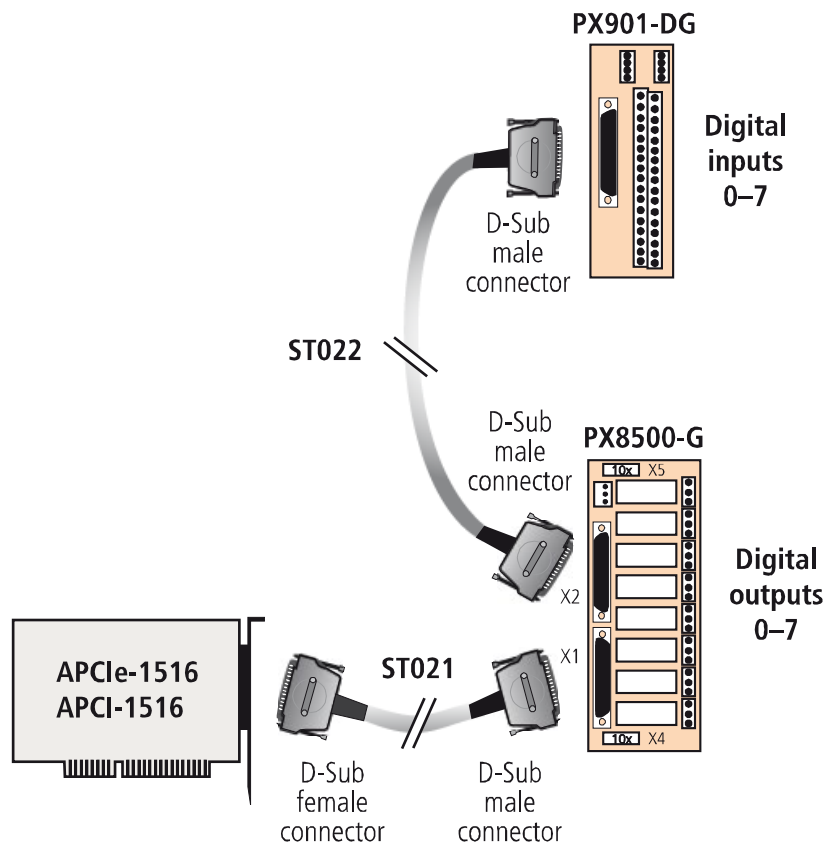
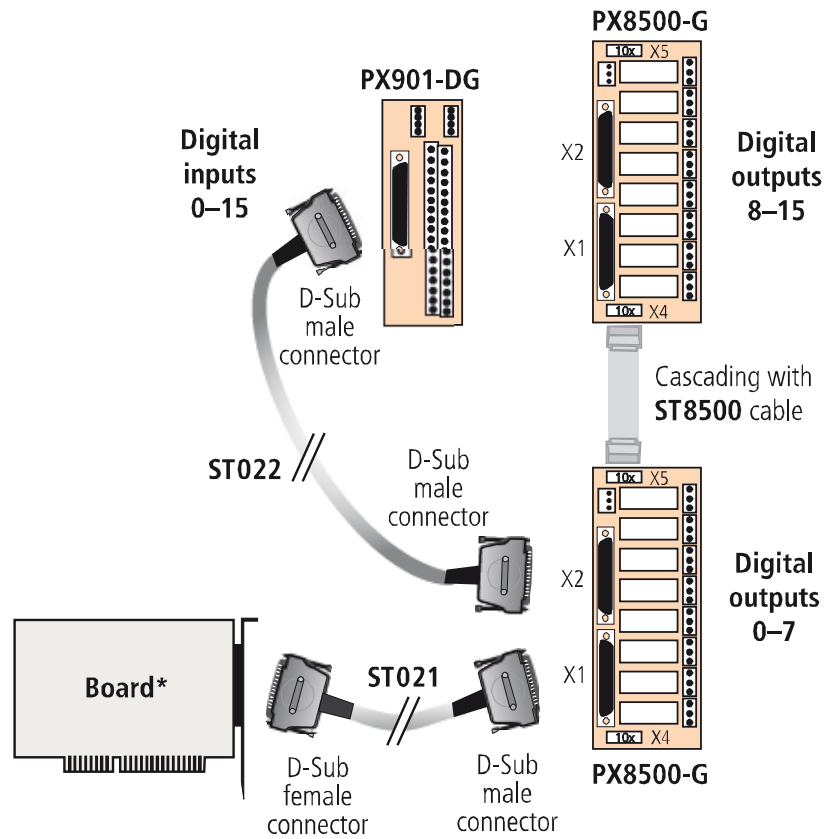
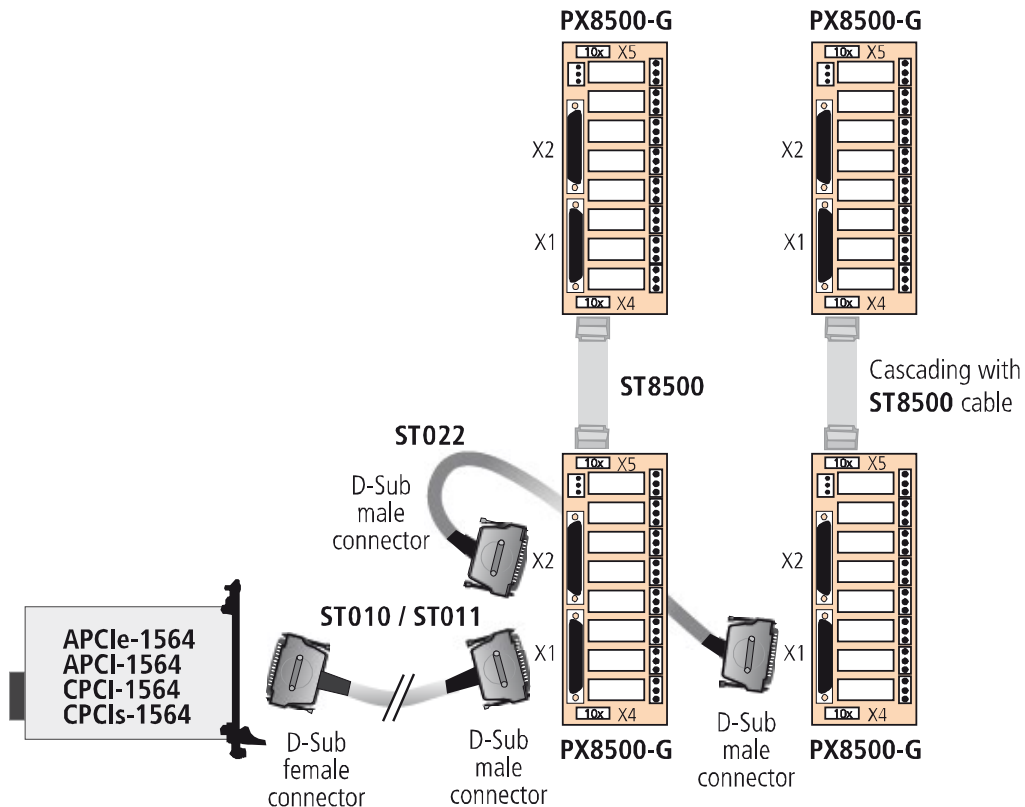


Fig. 3-7: Board with 16 inputs/outputs each



* **APC1e-1532, APC1e-1502**
APCI-1500
CPCI-1500
CPCIs-1532

Fig. 3-8: Board with 32 inputs/outputs each



The digital inputs are connected to a screw terminal panel via the pin header of the board and the supplied ribbon cable.

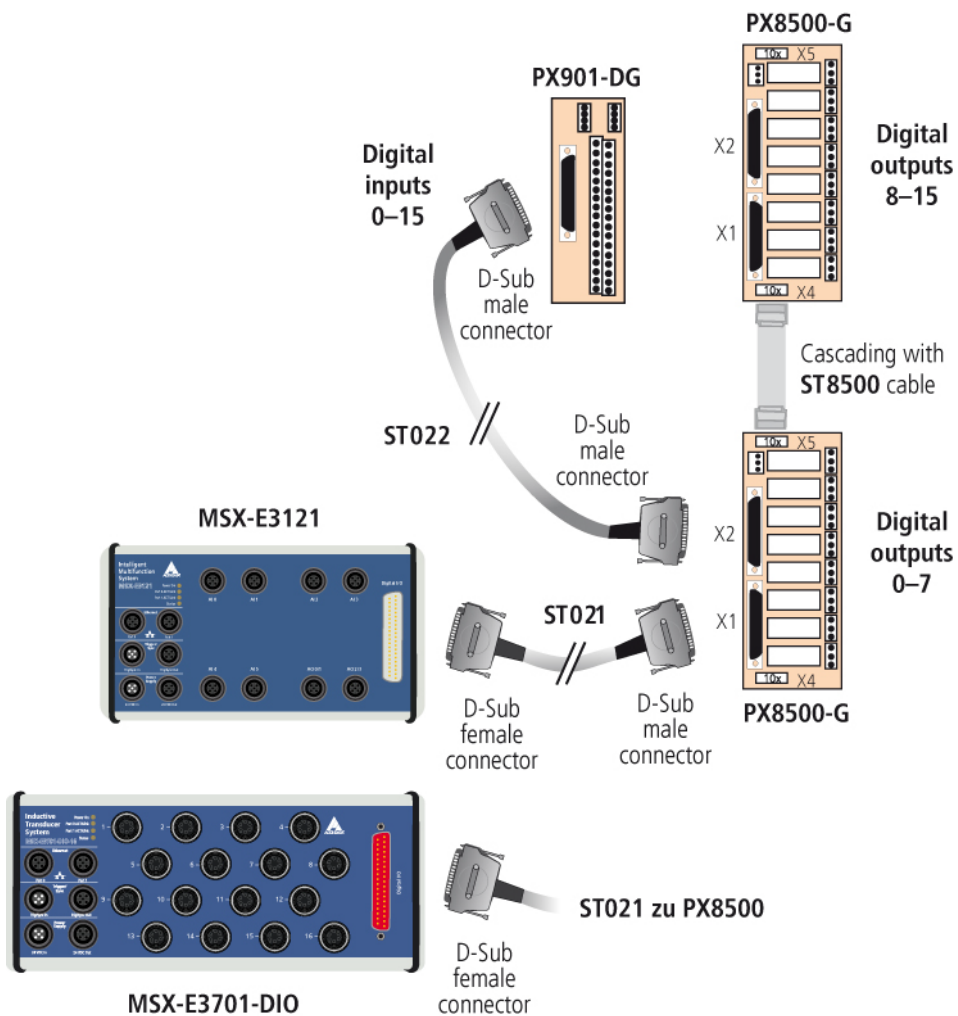


Electrical shock hazard!

The ribbon cable must be installed in such a way that contact to lines which conduct dangerous voltages will not be possible.

3.4.3 Ethernet systems

Fig. 3-9: Ethernet system with 16 inputs/outputs each



4 Maintenance



Electrical shock hazard!

The relay output board **PX8500** conducts dangerous voltages. Improper handling and operation can cause mortal injury. Only persons trained in electronics are therefore allowed to maintain the relay output board. It may be used only with adequate protective measures for electric insulation.

4.1 Dismounting the relay output board

4.1.1 Switching off the system

1. First switch off the control equipment (e.g. PC).
2. Disconnect the load and excitation circuits from the power network.
3. Switch off the 24 V voltage supply.

4.1.2 Removing the connection lines



Electrical shock hazard!

Connection lines disconnected on one side only may cause short-circuits and may conduct dangerous voltages. Therefore, the connection lines must be disconnected on both sides.

- Remove the connection lines first on the voltage supply side and then on the load circuit side.

4.2 Replacing the relays

The used relays have a life of 100,000 operations at maximum ohmic load and an ambient temperature of 20 °C.



NOTICE!

A relay may be replaced only by a relay of the same type.
Type designation: JW 1FSN-24V

If you want to replace the relays, you have to proceed as follows:

1. Push aside the bracket over the relay.
2. Pull out the relay.
3. Insert the new relay.
4. Push the bracket to the middle so that it is placed over the relay again.

5 Return or disposal

5.1 Return

If you need to return your relay output board, you should read the following checklist before.

Checklist for returning the relay output board

- Specify the reason for returning your relay output board (e.g. exchange, modification, repair), the serial number of the relay output board, the contact person in your company including his/her telephone extension and e-mail address, as well as the mailing address for a potential new delivery. You do not have to indicate the RMA number.

Fig. 5-1: Serial number



- Note down the serial number of the relay output board.
- Place the relay output board in an ESD protective cover. Then pack it in a cardboard box so that it is well-protected for shipping. Send the packed relay output board together with your details to:
ADDI-DATA GmbH
Airpark Business Center
Airport Boulevard B210
77836 Rheinmünster
Germany
- If you have any questions, do not hesitate to contact us:
Phone: +49 7229 1847-0
E-mail: info@addi-data.com

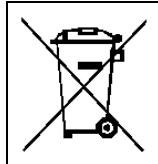
5.2 Disposal of ADDI-DATA waste equipment

ADDI-DATA organises the disposal of ADDI-DATA products that were put on the German market after 13 August 2005.

If you want to return waste equipment, please e-mail your request to: info@addi-data.com.

Relay output boards that were delivered after 13 August 2005 can be recognised by the following label:

Fig. 5-2: Disposal: Label



This symbol indicates the disposal of waste electrical and electronic equipment. It is valid in the European Union and in other European countries that have a separate collection system. Products carrying this symbol must not be treated as household waste.

For more detailed information on the recycling of these products, please contact your local citizens' office, your household waste collection service, the shop where you bought this product or the distributor you purchased this product from.

If you dispose of this product correctly, you will help to prevent damage that could be caused to the environment and to human health by inappropriate disposal. The recycling of materials will help to conserve our natural resources.

Disposal in other countries than Germany

Please dispose of the product according to the country-specific regulations.

6 Technical data and limit values

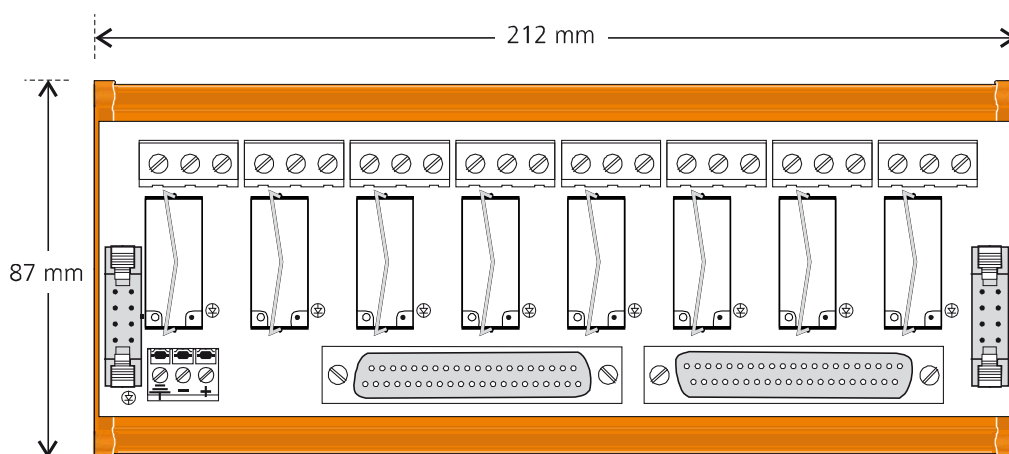
6.1 Electromagnetic compatibility (EMC)

The relay output board **PX8500** complies with the European EMC directive. The tests were carried out by a certified EMC laboratory in accordance with the standard DIN EN IEC 61326-1. The limit values as set out by the European EMC directive for an industrial environment are complied with.

The respective EMC test report is available on request.

6.2 Mechanical structure

Fig. 6-1: PX8500: Dimensions



Dimensions (L x W x H):	212 x 87 x 72 mm
Weight:	approx. 390 g
Connection to peripherals:	
Connector:	2 x 37-pin D-Sub female connector (for the connection to the PC board and for cascading)
Accessories: ¹	
Cables:	see Chapter 3 ST010 (2 m), ST011 (5 m) ST021, ST022, ST8500



NOTICE!

The connection lines must be installed in such a way that they are protected against mechanical loads.

¹ Not included in standard delivery

6.3 Versions

The relay output board **PX8500** is available in the following versions:

Table 6-1: Versions

Version	Features
PX8500-G	With housing for mounting on DIN rail (degree of protection: IP 20)
PX8500-VtG	With varistors and housing for mounting on DIN rail (degree of protection: IP 20)

The specific version name can be found on the type label of your relay output board.

6.4 Limit values



NOTICE!

Please observe the limit values of the connected peripherals (PC board, MSX-E system)!

Height:	2000 m over NN
Operating temperature:	0-60 °C
Storage temperature:	-25 °C to +70 °C
Relative air humidity	50 % at +40 °C
at indoor installation:	80 % at +31 °C
Energy demand:	
Operating voltage:	+24 V
Current consumption:	210 mA typ.

6.4.1 Relay

Contact part	
Number of relays:	8
Relay type:	relay with change-over contact
Max. switching voltage:	30 VDC / 277 VAC
Max. switching current:	10 A
Max. switching capacity:	300 W / 2500 VA
Contact resistance:	< 100 mΩ
Contact material:	Ag-plated
Response time:	15 ms
Release time:	5 ms
Mechanical life:	5 x 10 ⁶ operations
Electrical life (at rated load):	10 ⁵ operations
Control part	
Switching behaviour:	monostable
Operating voltage:	24 VDC
Operating capacity:	533 mW

Switching frequency (at max. load):	20 switchings per minute
Coil data	
Nominal voltage:	24 VDC
Response voltage (at +20 °C):	16.8 V
Release voltage (at +20 °C):	2.4 V
Max. operating voltage (at +60 °C):	31.2 V
Resistance (at +20 °C):	1.1 kΩ
Terminals (relay)	
Cross section of the connection lines to the relay:	0.75 mm ² to 2.5 mm ²
Nominal torque (screwdriver):	0.5 Nm
Printed circuit board	
Optical isolation:	1000 V (between coil and contacts and between the single contacts)
Creeping distance:	≥ 3.2 mm
Insulation system according to DIN VDE 0110:	group C / 250 VAC / 330 VDC

7 Appendix

7.1 Glossary

Change-over contact

A change-over contact is a contact arrangement, with which a contact point closes, when it is operated, as another contact point opens. The change-over contact is connected to the closing contact when the relay is accessed and with the opening contact in the rest position.

Closing contact

With a make or closing contact, a contact is made after activation of the relay. When the relay is no longer accessed, the contact is opened again.

Digital signal

A digital signal is a digital representation of a constantly changing value or other piece of information. Digital signals consist of a finite number of values. The smallest possible difference between two digital values is referred to as the resolution. Digital signals are discontinuous in terms of value and time ranges.

EMC

= Electromagnetic Compatibility

According to the European EMC Directive, electromagnetic compatibility is "the ability of equipment to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to other equipment in that environment."

ESD

= Electrostatic Discharge

On non-conductive surfaces, an electric charge is conducted away very slowly. If the dielectric strength is overcome, there is a fast potential equalisation between the surfaces involved. The often very sudden equalisation process is referred to as electrostatic discharge (ESD). Currents of up to 20 A may occur in this process.

Limit value

Exceeding the limit values, even for a short time, can easily result in the destruction of the component or the (temporary) loss of functionality.

Opening contact

The relay contact closed in the rest position is the break or opening contact.

Operating voltage

The operating voltage is the voltage to the device in sustained operation. It must not exceed the maximum sustained voltage, and all unfavourable operating conditions, such as possible mains power surges for over a minute when the device is switched on, must be taken into account.

Optical isolation

Optical isolation means that there is no flow of electrical current between the circuit to be measured and the measuring system.

Protective circuit

A protective circuit is set up on the actuator side to protect the control electronics and provide adequate EMC safety. The simplest protective circuit involves connecting a resistor in parallel.

Protective diode

A protective diode is a diode used at the entrance of integrated MOS (metal oxide semiconductor) circuits which operates in the reverse range with allowed input voltages. In the event of overvoltage, it works in the transition range and thus protects the input transistors of the circuits from damage.

Relay

A relay is an electromagnetically operated switch for switching circuits on, off or over. It consists of a coil with an iron core. If electricity flows through the coil, a magnetic field is created, which causes the contacts to open or close.

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