



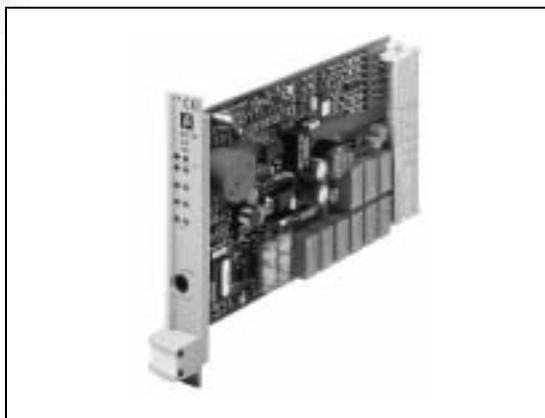
## MANUAL

ED2-SR-Ex8

ED2-SOT-Ex8

ED2-ST-Ex8

ISOLATED SWITCH AMPLIFIER



ISO9001

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These are published by the Central Association for the Electronics and Electrical Industries "Zentralverband Elektrotechnik and Elektroindustrie" (ZVEI) e.V.,  
The newest version applies, as well as the supplementary clause: "Extended reservation of title".

We at Pepperl+Fuchs recognize a duty to contribute to the future.  
For this reason, this printed matter is produced on paper bleached without the use of chlorine.

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### 1 Symbols used



**Warning**

*This symbol warns you of danger.*

*In the event the warning is ignored, the consequences may range from personal injury to death or from damage to equipment to destruction.*



**Attention**

*This symbol warns you of a possible malfunction*

*If the instruction given in this warning is not heeded, the device and any facility or systems connected to it could develop a fault or even fail completely.*



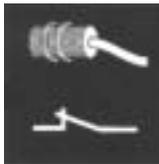
**Note**

*This symbol brings important information to your attention.*

### 2 Overview

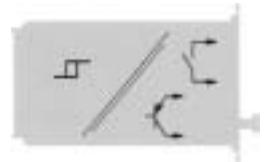
European cards of Pepperl+Fuchs E-System are used to transfer signals between field devices and the process guidance system or control system.

Cards that are identified with "Ex" in the type description are suitable for connecting to field devices from areas subject to the danger of explosions. Field currents for these cards are intrinsically safe and are galvanically isolated from non-intrinsically safe circuits. The cards thus form an electrical separation between the area subject to the danger of explosion and the safe area of a system.



The following 8-channel isolated switch amplifiers are described in this manual:

- ED2-SR-Ex8 with relay outputs
- ED2-SOT-Ex8 with passive electronic outputs and
- ED2-ST-Ex8 with active electronic outputs.



These cards transfer switch signals from sensors in accordance with IEC 60947-5-6 (NAMUR) and from mechanical contacts.

Assignment between input channels and output channels can be configured via a PC with PACTware™ (see chapter 7.3):

- Any desired input - output assignment
- Signal replication (one input is assigned to multiple outputs)
- Logical OR (multiple inputs are assigned to a single output)
- Specifying the direction of activation for each output
- Lead and lead short circuit monitoring for each input

### 3 Safety instructions



*The ED2-SR-Ex8, ED2-SOT-Ex8 and ED2-ST-Ex8 isolated switch amplifiers must only be operated by trained and qualified professionals in accordance with the available manual.*

Warnung



*Protection of operating personnel and the system is only ensured if the cards are used in accordance with the usage for which they are properly intended. Any other type of operation than what is described in this manual places the safety and functionality of the cards and systems connected to them in question.*

Warnung



*Cards should only be fitted, connected and configured **outside the hazardous area** by personnel with the appropriate electrical specialization*

Warnung



*If malfunctions cannot be corrected, the cards must be taken out of operation and protected from being placed back in operation accidentally. Cards may only be repaired directly at Pepperl+Fuchs' manufacturer site. Interfering with or making changes to the cards is dangerous and therefore not permitted. Such activities will void any claim under the warranty.*

Warnung



*The operator is responsible for adhering to local safety regulations and directives.*

Hinweis

### 4 Explosion protection

For matters concerning primary explosion protection, i.e. measures to prevent or restrict formation of a potentially explosive atmosphere, please refer to DIN EN 1127-1 or the corresponding national regulations.



For matters concerning secondary explosion protection, i.e. measures to prevent ignition of a potentially explosive atmosphere with electrical equipment, Pepperl+Fuchs are happy to provide their "Ex-Protection Manual" free of charge.

Please note in particular DIN EN 60079-10, DIN EN 60079-14, DIN EN 50014 and DIN EN 50020 or appropriate national requirements (requirements in the USA are listed in the Ex protection manual, Chapter 9, for example).

Pepperl+Fuchs also offers a video and seminar on the topic of "Explosion Protection via Intrinsic Safety".

Date of issue: 05.2002

# Isolated switch amplifier ED2-S□-Ex8 Explosion protection

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## 5 Mounting and connection

### 5.1 Mounting

Isolated switch amplifiers ED2-SR-Ex8, ED2-SOT-Ex8 and ED2-ST-Ex8 are single European cards in accordance with DIN 41494.



**Attention**

*Depending on their design, European cards are meant to be integrated into a card frame with a minimum protection type of IP20, for example BGT21/E... of Pepperl+Fuchs.*



**Attention**

*In case of adverse ambient conditions (water, small foreign objects), any cards contained in racks must also be protected by corresponding measures.*

Additional possibilities for mounting, e.g. using the Isolating Chamber System Ex-TKS, can be found in the European Card catalog or in the CD-ROM catalog of Pepperl+Fuchs.

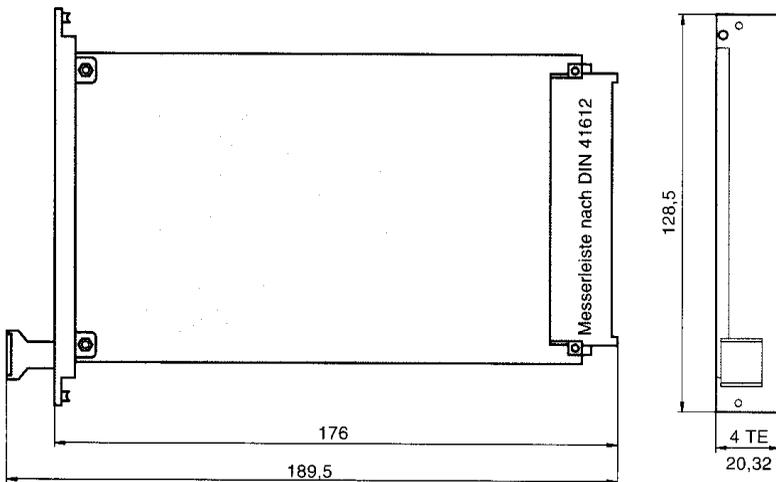


Figure 5.1: Dimensions of ED2-SR-Ex8, ED2-SOT-Ex8 and ED2-ST-Ex8 (in mm)

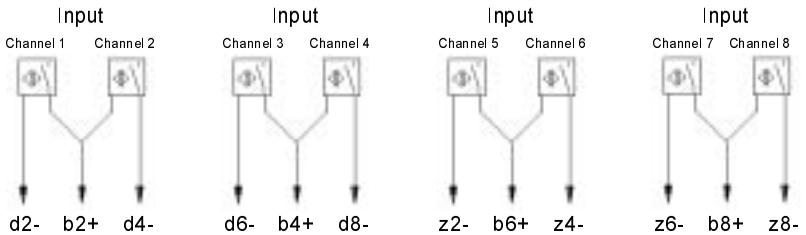
## 5.2 Connection

Like all cards in the E-System the isolated switch amplifiers ED2-SR-Ex8, ED2-SOT-Ex8 and ED2-ST-Ex8 have a secure contact through indirect plug-in with male multipoint connector in accordance with DIN 41612, Series 2, Version F. The contact assignment is z, b and d.

For exact details on contact assignment, please refer to the data sheet.

### 5.2.1 Inputs

You will find the connection contacts for the field circuits (inputs) in the following illustration:

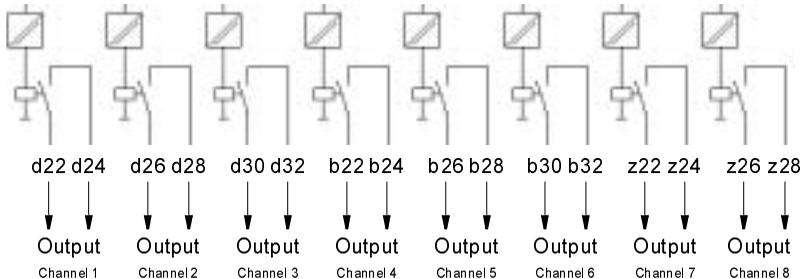


Intrinsically safe field currents may be directed with interface cables in accordance with DIN EN 60079-14 into the area subject to the danger of explosion. You can connect sensor in accordance with IEC 60947-5-6 (NAMUR) or mechanical contacts.

In the case of mechanical contacts, a parallel resistor of 10kΩ must be present for lead break monitoring. In addition, for lead short-circuit monitoring, a 1kΩ resistor must be connected in series to parallel operation. It must be fitted as close to the contact as possible.

### 5.2.2 Outputs ED2-SR-Ex8

You will find the connection contacts for the outputs of ED2-SR-Ex8 (1 relay per channel) in the following illustration:

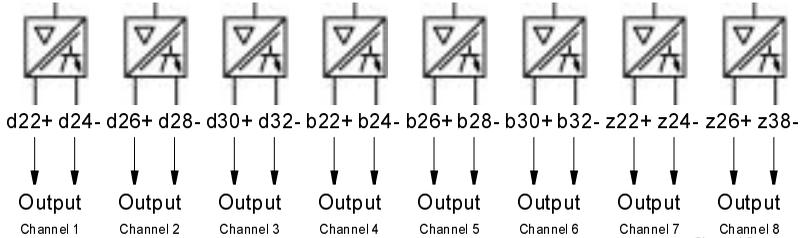


# Isolated switch amplifier ED2-S□-Ex8

## Mounting and connection

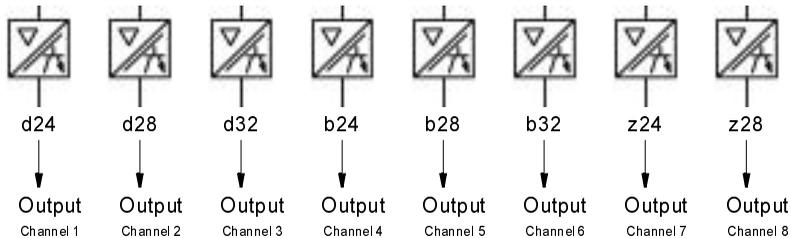
### 5.2.3 Outputs ED2-SOT-Ex8

You will find the connection contacts for the outputs of ED2-SOT-Ex8 (1 passive electronic output per channel) in the following illustration:



### 5.2.4 Outputs ED2-ST-Ex8

You will find the connection contacts for the outputs of ED2-ST-Ex8 (1 active electronic output per channel) in the following illustration:



### 5.2.5 Additional contacts

In addition to the inputs and outputs, the following contacts have the following functions:

- b18 / d18: Inversion of Outputs 1 - 8
  - Without jumper wire: Parameters for the direction of activation of Outputs 1 - 8 are as with PACTware™ (see chapter 7.3)
  - With jumper wire: All outputs 1 - 8 inverted.
- b20 / d20: switching off of LB/SC monitoring
  - Without jumper wire: Parameters of error messages for lead break / lead short circuit are as with PACTware™ (see chapter 7.3)
  - With jumper wire: No error messages for lead break / lead short circuit
- z14 (L-) / d14 (L+): 24 V DC power supply
- Fault signal output:
  - ED2-SR-Ex8: z30 / z32 (relay)
  - ED2-SOT-Ex8: z30+ / z32- (passive electronic output)
  - ED2-ST-Ex8: z32 (active electronic output)

The fault signal output is switched through in the normal operating state, but blocked in the event of faults (see chapter 5.4).

Date of issue: 06.05.2002

### 5.3 Front side of the isolated switch amplifier

On the front side of the isolated switch amplifier you will find:

- LED green to indicate power supply
- LED red to indicate a fault message (see chapter 5.4)
- LED 1 yellow to indicate Output 1 active
- ...
- LED 8 yellow to indicate Output 8 active
- RS 232 interface for connecting a PC to set parameters of the isolated switch amplifier with PACTware™ (via K-ADP1 cable, see chapter 6.1)

### 5.4 Behavior of the isolated switch amplifier upon malfunction

If an isolated switch amplifier detects a lead break or lead short-circuit in a field circuit,

- the red LED flashes,
- the fault signal output is blocked,
- the yellow LED of the input channel with the malfunction flashes (see Section 7.3,
- and all output channels assigned to the input with the malfunction are blocked.

On setting parameters for monitoring see chapter 7.3. If there is a jumper wire in place between contacts b20 / d20, no lead break or lead short-circuit will be detected (see chapter 5.2.5)

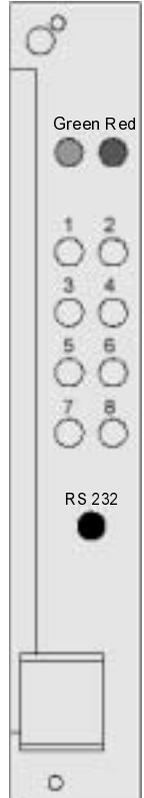
If there is a malfunction in the isolated switch amplifier

- the red LED is lit continuously,
- the fault signal output is blocked,
- and all output channels are blocked.

### 5.5 Verifying for default (factory) settings

When a restart is performed, the red LED of an isolated switch amplifier with default settings lights up (see chapter 7.4) only briefly (< 1 sec.).

If the parameter set of the isolated switch amplifier changes in comparison to the default (factory) settings, the red LED lights up for about 4 seconds upon restart.



## 6 Some characteristics of PACTware



Parameters can be set for the isolated switch amplifiers ED2-SR-Ex8, ED2-SOT-Ex8 and ED2-ST-Ex8 with the PACTware™ software program of Pepperl+Fuchs.

You can download the PACTware™ Edition 2 Online version at no cost from our Internet page <http://www.pepperl-fuchs.com>. Licensed versions are for sale.

Characteristics of the software common to all devices are described in the "PACTware™ Edition 2 - Frame Application" manual.

The following section contains device-specific information for isolated switch amplifiers ED2-SR-Ex8, ED2-SOT-Ex8 and ED2-ST-Ex8.

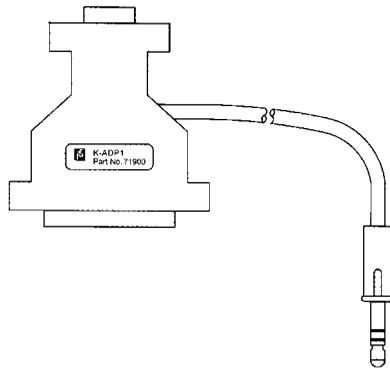
### 6.1 Installation and connection with the card

Install PACTware™ on a PC. You will find the system requirements and the installation instructions in the "PACTware™ Edition 2 - Frame Application" manual.

Connect the PC to the isolated switch amplifier using the K-ADP1 cable. You can order this cable as an accessory.

Insert the cable jack into the RS 232 interface on the front of the isolated switch amplifier and on the PC into the 9-pin or 25-pin connector of a free serial interface.

Start PACTware™ as described in the "PACTware™ Edition 2 - Frame Application" manual.



### 6.2 Device list

For a new isolated switch amplifier project, first add the *com-KE* communication driver to the device list. The only parameter of this driver is the PC interface that is being used. Adjust the parameter in this manner:

- *Select com-KE driver* with the mouse
- Edit button
- Parameters properties tab
- Select the interface to be used
- Close button

You can also bring up the *Parameters* properties tab with the right mouse button.

## Isolated switch amplifier ED2-S□-Ex8 Some characteristics of PACTware

To add a new isolated switch amplifier to your project, select the *com-KE driver* of the project and add the desired isolated switch amplifier to the device list for a device driver (DTM). Then select this device driver.

You will find more information on these steps in the "PACTware™ Edition 2 - Frame Application" manual.

### 6.3 Monitor function

If you select the monitor function in PACTware™ for an isolated switch amplifier, (see "PACTware™ Edition 2 - Frame Application" manual), the following window appears for monitoring the isolated switch amplifier:



For *Inputs* you will find the status of inputs 1 - 8:

- Yellow = active
- Gray = passive
- Red = fault
  - LB = Lead break
  - SC = Lead short circuit

## Isolated switch amplifier ED2-S□-Ex8 Some characteristics of PACTware

For *Hardware jumper wires* you will find the states of jumper wires between the following contacts

- b20 / d20: *LB/SC switch-off* (see chapter 5.2.5)
- b18 / d18: *Outputs inverted* (see chapter 5.2.5)

The meaning is  = jumper wire present,  = jumper wire not present.

For *Outputs* you will find the state of Outputs 1 - 8 and the state of the fault signal output (*Alarm*):

- Yellow = active
- Gray = passive (outputs 1 - 8)
- Red = fault (i.e. fault signal output passive, see chapter 5.4)

To *Update* the display, please click on the corresponding button or select *Cyclic Update* ()

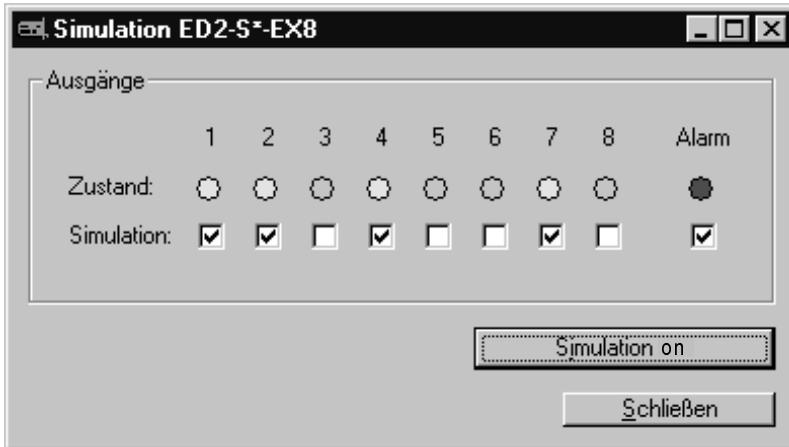


**Attention**

*The cyclic update of the monitor display reduces the processing speed of the card. If signals are processed at high frequencies Cyclic Update should be deselected ()!*

### 6.4 Simulation function

If you select the simulation function in PACTware™ for an isolated switch amplifier (see "PACTware™ Edition 2 - Frame Application" manual), the following window appears:



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## Isolated switch amplifier ED2-S□-Ex8

### Some characteristics of PACTWare

You can assign the state for outputs 1 - 8 and for the fault signal output for test purposes independently of the state of the inputs:

- Outputs 1 - 8: switched through = , blocked =
- Fault signal output: Alarm (output blocked) = , switched through =  (see chapter 5.4)



*The simulation interrupts the normal functioning of the card!  
Before starting the simulation, make certain that no dangerous state can be caused in the system as a result.*

#### Warning

The simulation can be started with the *Simulation On* button:

- The outputs assume the defined state.
- The status of the outputs LEDs on the front of the isolated switch amplifier is displayed in the simulation window.
- The red LED on the front of the isolated switch amplifier flashes during simulation.

Cards in the simulation mode are shown highlighted in the project tree of PACTWare™.

You can exit simulation with the *Simulation Off* button, which appears instead of *Simulation On*. The isolated switch amplifier then immediately takes on its normal function again, which means that it responds to states on the inputs in the manner specified by the parameters set.



#### Note

*You can close the simulation window with the Windows-standard  button on the upper right corner. The card **remains** in simulation mode, however, until you select Simulation Off.*

If the power supply to the card is interrupted, simulation ends.

## 7 Edit device data

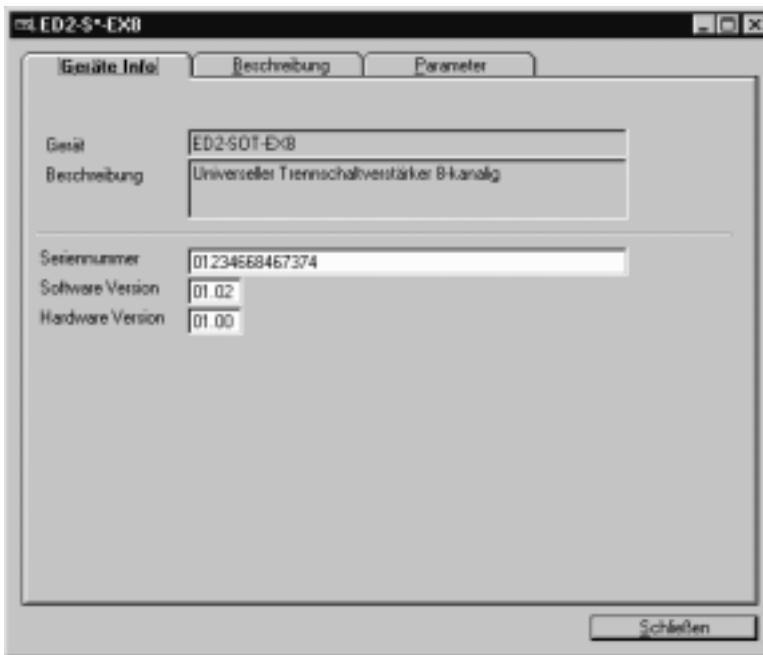


*A change in the device data changes the function of the card!  
Before transferring new data to the card, make certain that this cannot  
result in any dangerous state for the system.*

### Warning

If you select the software programming functions for an isolated switch amplifier in PACTware™ (see "PACTware™ Edition 2 - Frame Application" manual), a window will appear with the three properties tabs *Device Info*, *Description* and *Parameters*.

### 7.1 Device Info



The information on the *Device Info* properties tab is read from the isolated switch amplifier or is generated automatically. You cannot change the information on this properties tab.

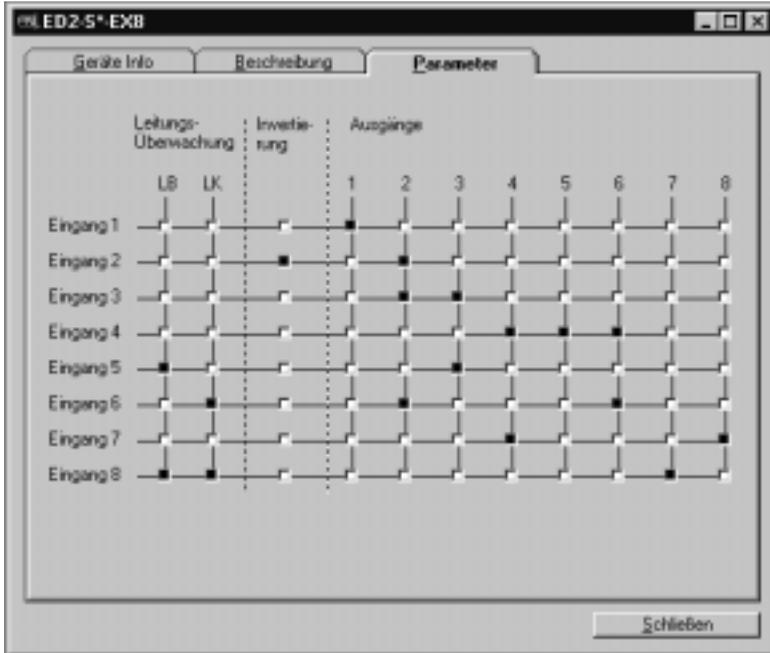
## 7.2 Description

The screenshot shows a software window titled "msi ED2-S\*-EX8" with three tabs: "Geräte Info", "Beschreibung", and "Parameter". The "Beschreibung" tab is active. Under the heading "Tagnamen", there are eight input fields: "Gerät" (max 10 Z.), "Eingang1" through "Eingang8" (each max 8 Z.). Below these is a warning message: "Die Eingabe, die Sie in diesem Feld machen, wird nicht im Gerät gespeichert!". Underneath is a text area for "Beschreibung" containing the text: "Dies ist eine beliebige Beschreibung, die nur im PC, nicht jedoch im Gerät gespeichert wird." A "Schließen" button is located at the bottom right of the window.

You can select any names you want for the device (maximum of 10 characters) and the inputs (maximum of 8 characters) and save them on the card.

You can edit the *description* in the lower part of the window as necessary and save it in the project file. The *description* is not saved on the card.

### 7.3 Parameters



You can adjust the following parameters by clicking with the mouse:

- Assignment of input to output (black rectangular ■ at the intersection point of the corresponding lines):
  - In the factory setting, each input is assigned to the output with the same number. In the illustration, for example, Input 1 is assigned to Output 1.
  - It is possible to assign an input to an output with another number. In the illustration, for example, Input 8 is assigned to Output 7.
  - It is possible to assign an input to multiple outputs. In the illustration, for example, Input 7 is assigned to Outputs 4 and 8.  
In this case, a signal on the input results in a signal on both outputs (signal replication; but note in certain cases the inversion of the output, see below).
  - It is possible to assign multiple inputs to a single output. In the illustration, for example, Input 3 and Input 5 are assigned to Output 3.  
This involves a logical OR link: There will be a signal on the output if there is a signal on at least one of the inputs (on one or on both of the inputs; but note in certain cases the inversion of the input, see below).

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- Inversion of an input (field ■ filled in):

It is possible to invert the direction of activation of an input. For example in the illustration this is the case with Output 2.

If there is a jumper wire between contacts b18 / d18, all inputs will be inverted (see chapter 5.2.5).

In this case, in the parameter window fields ■ are filled in for all inputs and cannot be changed. A message to this effect appears in the lower part of the parameter window.
- Monitoring:
  - Lead break monitoring (black rectangle ■ first column):

For Input 5 in the illustration, for example
  - Lead short-circuit monitoring (black rectangle ■ second column):

For Input 8 in the illustration, for example

If there is a jumper wire in place between contacts b20 / d20, no lead break or lead short-circuit will be detected(see chapter 5.2.5).

In this case the first two columns are shown hatched in the parameter window. White rectangles © appear everywhere which cannot be changed. A message to this effect appears in the lower part of the parameter window.

In the case of mechanical contacts, a parallel resistor of 10kΩ must be present for lead break monitoring. In addition, for lead short-circuit monitoring, a 1kΩ resistor must be connected in series to parallel operation .

### 7.4 Factory settings

- Input 1 to Output 1
- ...
- Input 8 to Output 8
- Non-inverted direction of activation for all inputs:
- Lead break monitoring for all inputs
- Lead short-circuit monitoring for all inputs



The general terms of delivery for products and services produced or provided by the electrical industry as published by the Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V. in its most recent edition as well as the supplementary proviso: "Extended property proviso" are applicable.

We at Pepperl+Fuchs feel obligated to contribute to the future;  
this publication is, therefore, printed on paper bleached without the use of chlorine.

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- in different technologies
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- Oil, gas and petrochemical industry
- PLC and process control systems
- Engineering companies for process systems

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