

### 3 Instructions/system description

#### 3.1 WE-/K-System and Remote Process Interface Operating Instructions

Refer to the additional Remote Process Interface system handbook for operating instructions. These instructions apply in conjunction with the respective data sheets.

**Types:**

Types KFA6(5)... Ex ...	With AC 230 (115) V power supply, intrinsically safe control circuit
KFA6(5)...	With AC 230 (115) V power supply, no explosion protection
KFD2 ... Ex ...	With DC 24 V power supply, intrinsically safe control circuit
KFD2 ...	With DC 24 V power supply, no explosion protection
KSD2 ... Ex ...	With DC 24 V power supply, intrinsically safe control circuit,
KSD2-GW ...	With DC 24 V power supply, bus control circuit is not intrinsically safe
KFD2-EB ...	With DC 24 V power supply,
KFD0 ... Ex ...	No separate power supply, intrinsically safe control circuit
KFD0 ...	No separate power supply, no explosion protection
WE ... Ex ...	AC 230 V power supply, intrinsically safe control circuit

**Application**

- MSR technology is used with the devices for galvanic separation of MSR signal for input signals of 20 mA and 10 V, for example or also for adjustment or to standardise signals. Devices which have intrinsically safe control circuits are used to operate field devices within hazardous areas.
- The data sheets of individual devices contain the electrical data for the EC Declaration of conformity and must be considered as an essential component of the instruction manual.
- WE-/K-system devices are not suitable for the isolation of signals in power engineering, unless this is specifically referred to in the respective data sheet.
- Applicable laws and regulations for use of or for the intended purpose of the devices in question must be observed.
- Devices that have been operated in general electrical systems must no longer be used after that in electrical systems that are associated with areas exposed to the danger of explosion.

**Commissioning and installation in connection with hazardous areas**

(commissioning and installation must only be performed by competent professionals trained for this purpose).

Installation of devices outside of hazardous areas

- The devices are constructed to satisfy the IP20 protection classification and must be protected accordingly from adverse environmental conditions such as water spray or dirt exceeding the pollution severity level 2.
- The devices must be installed outside the hazardous area!
- Depending on the ignition protection class, intrinsically safe circuits of devices (light blue marking on the devices) may be placed in hazardous areas. In this case, particular care must be taken to ensure secure separation from all non-intrinsically safe circuits. The installation of the intrinsically safe circuits is to be conducted in accordance with the relevant installation regulations.

- The respective peak values of the field device and the associated device with regard to explosion protection should be considered when connecting intrinsically safe field devices with the intrinsically safe circuits of WE-/K system devices (Demonstration of intrinsic safety). The provisions of EN 60079-14/IEC 60079-14 must be observed in this regard. The "National Foreword" of DIN EN 60079-14/VDE 0165 Part 1 must also be observed for the Federal Republic of Germany.
- When intrinsically safe circuits are used in areas made hazardous by dust (Ex-Zone "D") only appropriately certified field devices must be used.
- The EC Certificates of Conformity or the EC Declarations of Conformity must be observed. It is especially important to observe the "Special Conditions" where these are contained in the certificates.

Installation of devices within Zone 2 of the hazardous area:

- Only devices with the relevant statement of conformity from an approved test centre or covered by the manufacturer's declaration of conformity can be installed in Zone 2.
- The individual data sheets indicate whether these conditions are met .
- The devices should be installed in a switch or junction box to IP54 or better, in accordance with EN 60529.
- Depending on the ignition protection class, intrinsically safe circuits of devices (light blue marking on the devices) may be placed in hazardous areas. In this case, particular care must be taken to ensure secure separation from all non-intrinsically safe circuits.
- The installation of the intrinsically safe circuits is to be conducted in accordance with the relevant installation regulations.
- The respective peak values of the field device and the associated device with regard to explosion protection should be considered when connecting intrinsically safe field devices with the intrinsically safe circuits of WE-/K system devices (Demonstration of intrinsic safety). The provisions of EN 60079-14/IEC 60079-14 must be observed in this regard. The "National Foreword" of DIN EN 60079-14/VDE 0165 Part 1 must also be observed for the Federal Republic of Germany.
- When intrinsically safe circuits are used in areas made hazardous by dust (Ex-Zone "D"), only appropriately certified field devices must be used.
- The EC Certificates of Conformity, the EC Declarations of Conformity, the EC Statement of Conformity or the Manufacturer's Declaration of Conformity must be observed. It is especially important to observe the "Special Conditions" where these are contained in the certificates.

**Repair and maintenance**

The transfer characteristics of the devices remain stable, even over long periods of time, thus eliminating the need for regular adjustment. Maintenance is therefore not required.

**Fault elimination**

No changes can be made to devices which are operated in hazardous areas. Repairs to devices must only be carried out by specially trained and qualified personnel.

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### **Isolation Coordinates for devices Ex certificate in accordance with EN 50020**

The devices are designed for use in Accumulation Level 2 in accordance with EN 50178.

### **Isolation coordinates for information on galvanic separation in accordance with EN 50 178 and EN 61140**

Devices of the WE-/K system are built-in devices or electronic equipment for use in enclosed electrical operating locations to which only professional electronic personnel or personnel with electrotechnical instruction have access or admittance.

The devices are designed for use in accumulation level 2 in accordance with EN 50 178.

### **Ambient conditions**

For ambient temperature see data sheet

Storage temperature -25 °C...+70 °C (248 K ... 343 K)

Max. humidity 75 % rel. humidity without moisture condensation

## Instructions/system description

### Construction and installation (K-system)

Basically, the K-Series can be mounted in two ways:

1. Panel / wall mounting (K-system only)
  2. Mounting on a 35 mm standard DIN rail to DIN EN 50 022
- Panel mounting is only recommended if a very small number of isolating modules are involved.

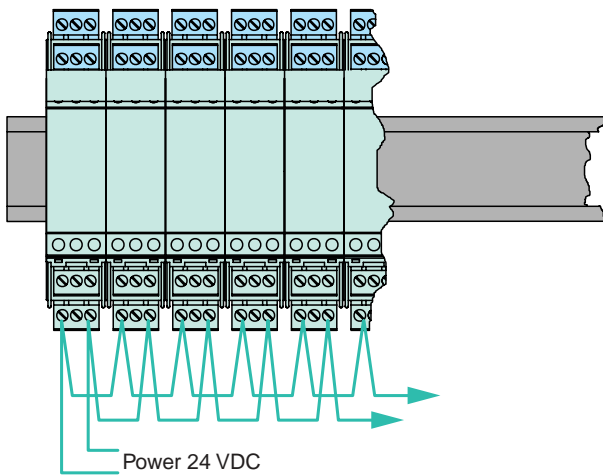
When mounting on the DIN rail, the units are simply snapped on. The expenditure on wiring for the power supply is significantly reduced by using P+F's "Power Rail" for the KF-Series.

### The KH-series, with integrated terminals, is being replaced by the KF-series with removable terminals.

The removable terminals simplify control cabinet construction and allow the units to be replaced while under power. **The screw-in self-opening apparatus terminals have a high-volume connection area for a wire cross-section of up to 2.5 mm<sup>2</sup>.** Connectors are coded, making it impossible for them to be confused. With the KF-CP coding profile, separately available connectors with test sockets or cage spring release terminals can be easily coded.

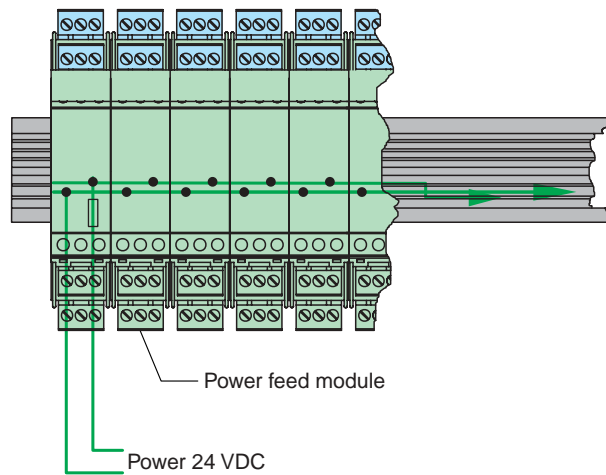


Power supply without power rail



The expense on wiring is higher with conventional power supplies for isolation modules.

Power supply with power rail



Wiring costs are significantly lower when supplying power via the Power Rail. It is also possible to take advantage of centralized error messages and redundant power supply. A power failure is indicated via the power supply module signal contacts. The power supply for the remote process interface is only possible using the power rail via a power supply module.

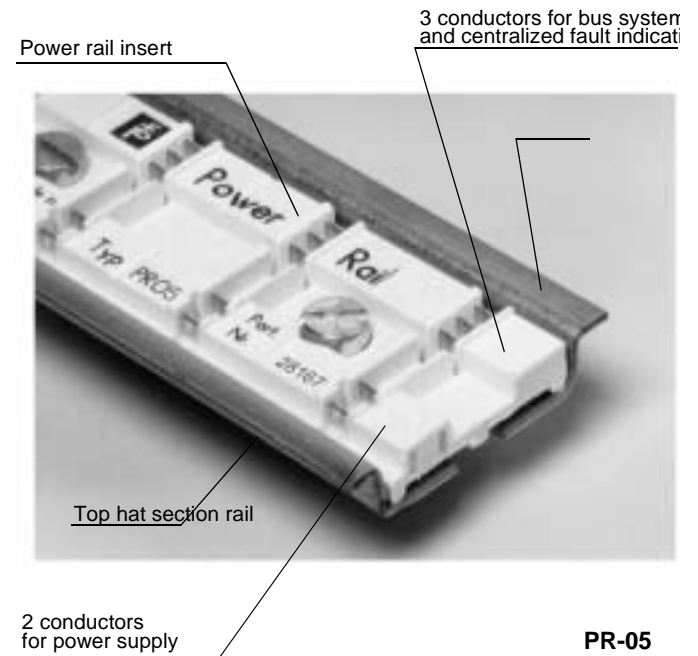
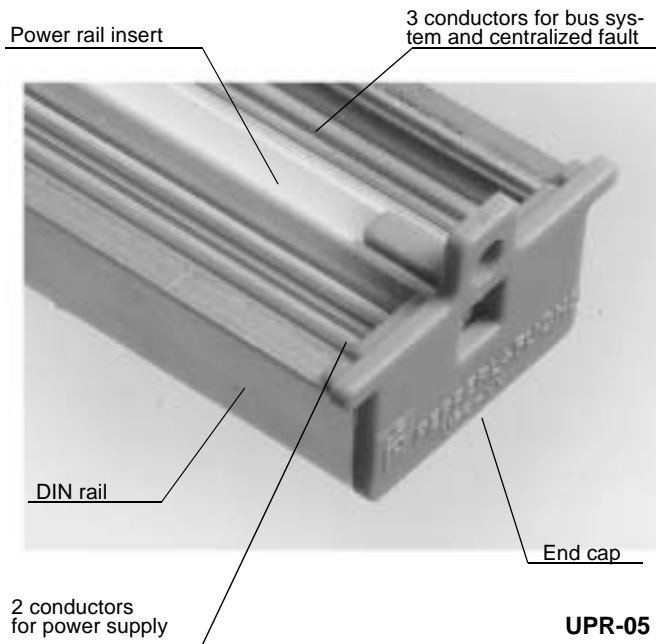
**Power Rail (K-system)**

The universal power rail is an insert for the standard 35 mm DIN rail. Power is supplied by a 24 V DC power supply module via 2 heavy duty conductors. The following variations of the power rail are available:

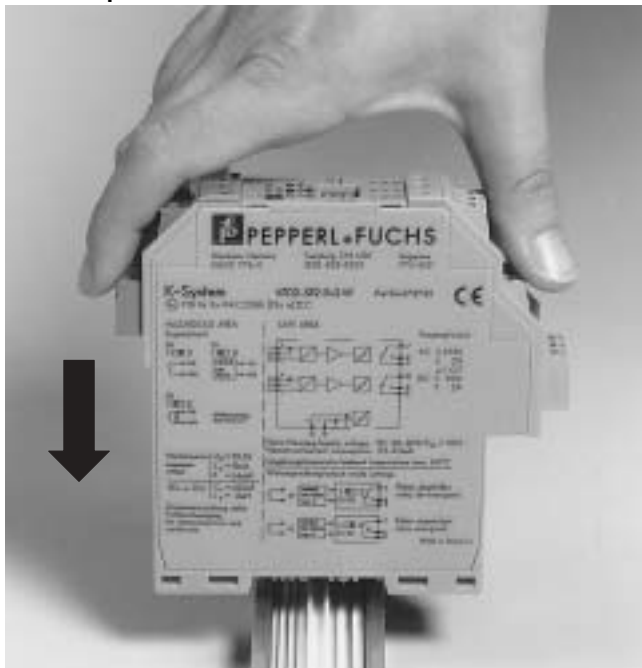
- Two leads for power supply (UPR-02)
- Five leads for power supply and serial data transfer for special functions or centralized error messages (UPR-05).

**In contrast to the PR... the new UPR ... does not have a mounting grid and should be used in new systems.**

Standard devices with the type designations KF... and KS... have gold plated contacts that provide the connection to the power rail. By snapping onto the rail, the unit is supplied with power. Separate wiring for the power supply is not required. Furthermore, any available reserve spaces on the rail are automatically connected to the power supply for future expansion. Lead breakages and short circuits are also eliminated through the use of a robust power rail.



As shown in the figure, the isolation modules are snapped onto the power rail in a vertical downward movement.



**CORRECT:** Unit snapped on vertically.



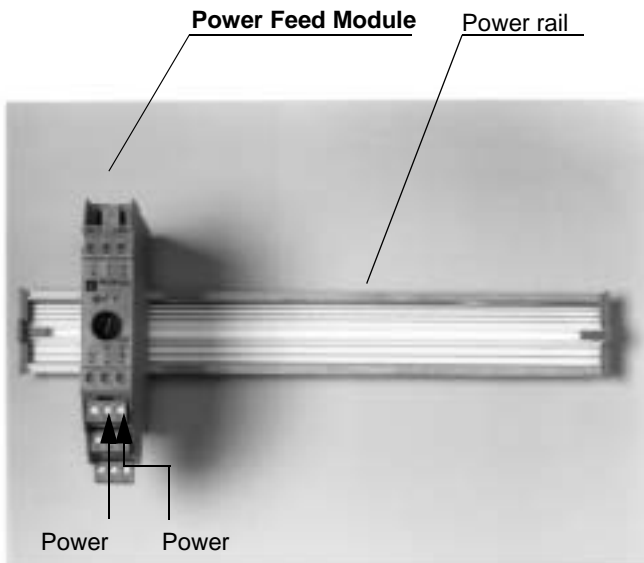
**INCORRECT:** Unit snapped on at an angle

## Instructions/system description

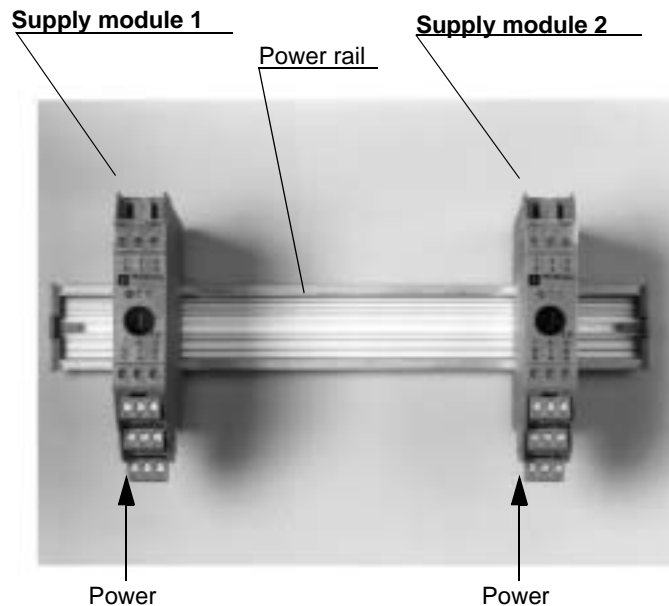
### Power supply concepts with power rail

#### Redundant power supply

KFD2-EB.D2A.B power supply module for redundant power supply



Power supply module KFD2-EB.R2A.B for redundant power supply of the power rail.



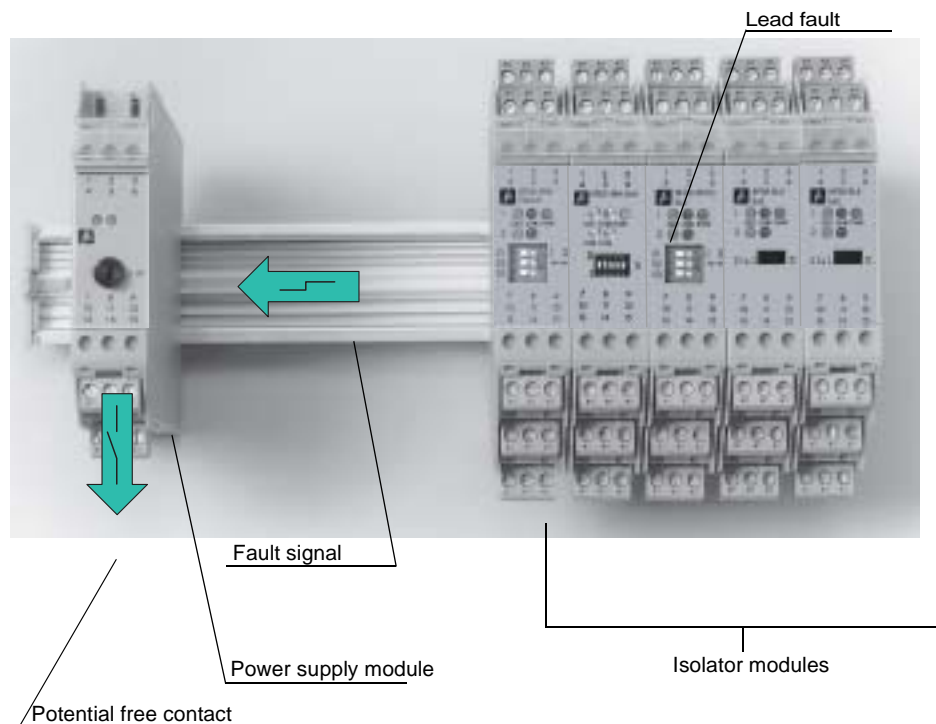
Two power supplies with one power supply module can be used as a redundant power supply for a power rail.

A redundant power supply to the power rail, with two supply modules, provides increased safety. If the fuse in one power supply module operates, the power supply is obtained via the second power supply module. Each power supply circuit is connected via its own power rail contact.

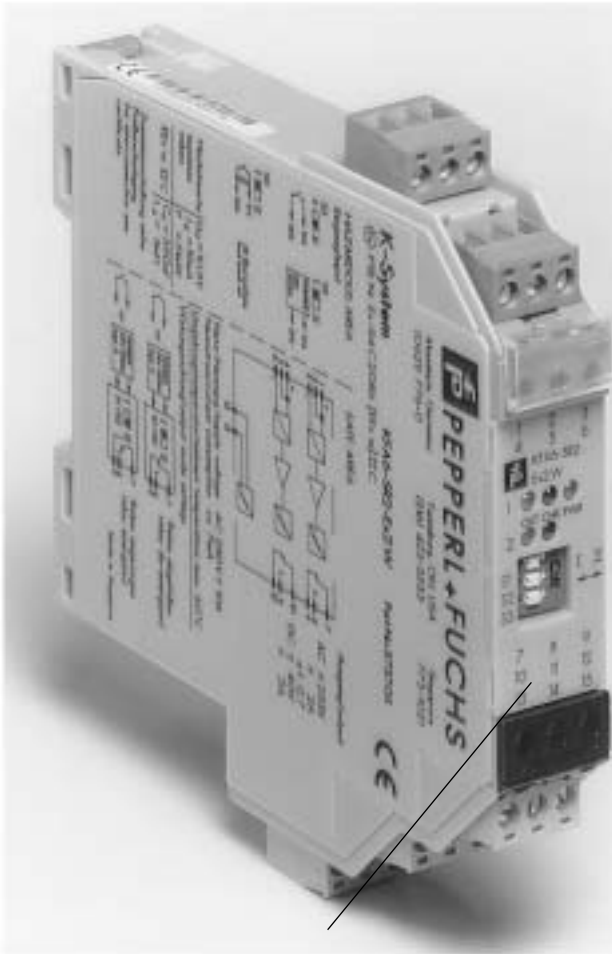
#### Collective fault indication (K-System only)

Collective fault indication enables lead breakage monitoring to be provided for many isolator modules without additional wiring costs.

In fault conditions, an interrupt signal from the isolator module (i.e. KFD2-SR2.Ex2.2S) is transferred to the power rail. The power supply module evaluates the signal and passes the fault information to the PLC / control system using a potential-free contact.



(For details, see data sheet)



**Black indicates units with AC power supply  
AC supply, grey colour code for devices suitable for**

**AC powered devices with removable  
terminals (KFA \*)**

### Electrical standards for the K-Series

#### Ex signals or field circuit

Transmitter power supply up to 17 V DC  
Current input max. 200 Ohm  
Pt100, in 2-, 3-, (4-) wire technology  
Resistor 0 ... 400 Ohm, with freely definable characteristic  
Potentiometer  
Thermocouples of all types, internal cold junction, external reference  
Current output min. 600 Ohm  
Binary input NAMUR DIN EN 60947-5-6  
Binary output for Ex-i valves, short circuit protected

#### Mechanical data for the K-Series and Remote Process Interface

##### Mounting

1. Screwed fixing (K-System only):  
The lugs on the base of the modules must be extended and used for fixing purposes with 4 mm screws.
2. K-MS mounting base for screw attachment (K-System only).
3. Snap-on 35 mm standard DIN rail to DIN EN 50022. Can be mounted horizontally or vertically, side by side.

##### Housing material

Makrolon

##### Flammability classification

UL 94: V - 0

##### Connection options

KH-Series:

Self-opening connection terminals for max. core diameter of 1 x 2.5 mm<sup>2</sup>

KF-Series, KS-Series:

removable connector with integrated self opening device terminals for leads of up to a max. of 1 x 2.5 mm<sup>2</sup>

##### Other items

KF-Series, KS-Series: Coded connectors

##### Ambient conditions

##### Climatic conditions

in accordance with DIN IEC 721, Class 3K3

##### Ambient Temperature

see data sheet

##### Storage Temperature

-40 °C ... 90 °C

Protection class in accordance with DIN 40050 IP20

##### Humidity

max. 75% rel. humidity, 95% for many modules

##### Safe area signals or control circuit

0/4 ... 20 mA signal level in accordance with NE43

Current output min. 550 Ohm

Current input max. 200 Ohm

Binary output (active, passive electronic output) 100 mA / 30 V, short circuit protected

Relay output 2 A, minimum load 1 mA / 24 V

Logic level 24 V in accordance with IEC 946

Function isolation or safe isolation in accordance with EN 50 178 and NAMUR NE23

(For details, see data sheet)

### K-System and Remote Process Interface

#### Electrical standards

##### General

Isolator modules with and without explosion protection, mostly with EEx ia IIC, international approvals

EMC in accordance with NAMUR NE21 and EN 50081-2, EN 61326

LEDs satisfying NAMUR NE44

Software in accordance with NAMUR NE53 (K-System only)

Switch-on pulse suppression

Supply voltage min. 20 V ... 30 V DC

DC: Power Rail

Supply terminals (K-System only)

Fault signals via power rail

Supply voltage AC 115/230 V +/- 10 % (K-System only)

Man/machine interface software to VDE/VDI 2187

Safety devices in accordance with VDE 0660 T.209, AK's to DIN 19250 (K-System only)

##### Binary inputs/outputs in accordance with NAMUR

The standards references for this interface have changed many times:

German standard (old): **DIN 19234**: Electrical distance sensors - DC interface for distance sensors and switch amplifiers; 1990-06

European standard (old): **EN 50227**: Low voltage switch gear and control gear - control devices and switching elements - proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 1996-10

German version (old): **DIN EN 50227**: Low voltage switchgear - control devices and switching elements - proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 1997, German nomenclature VDE 0660 Part 212

**Current designation: DIN EN 60947-5-6**: Low voltage switchgear - control devices and switching elements - proximity switches, DC interface for proximity sensors and switch amplifiers (NAMUR), 2000, German nomenclature. VDE 0660 Part 212

**Current IEC designation: IEC 60947-5-6**: Low voltage switchgear and controlgear - Part 5-6: Control circuit devices and switching elements - DC interface for proximity sensors and switching amplifiers (NAMUR), 1999

### 3.2 Housing types (K-system)

#### Housing type A1

Height: 93 mm  
(without K1 and K4 terminals)

#### Housing type A2

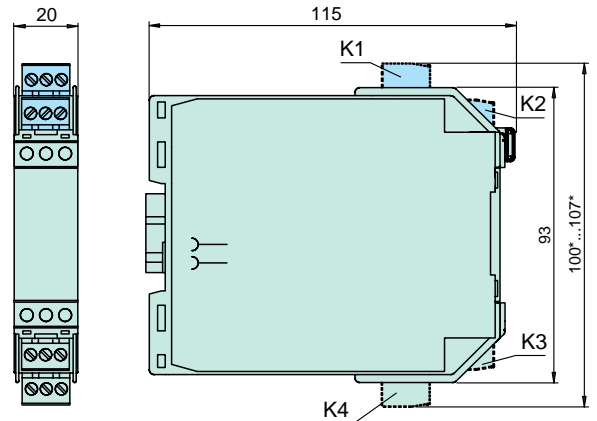
Height: 100 mm  
(without K1 terminal)

#### Housing type A3

Height: 100 mm  
(without K4 terminal)

#### Housing type A4

Height: 107 mm  
\*The unit is 102.5 ... 112 mm in height  
when using the KF-STP... connector



#### Housing type B1

Height: 93 mm  
(without K1 and K4 terminals)

#### Housing type B2

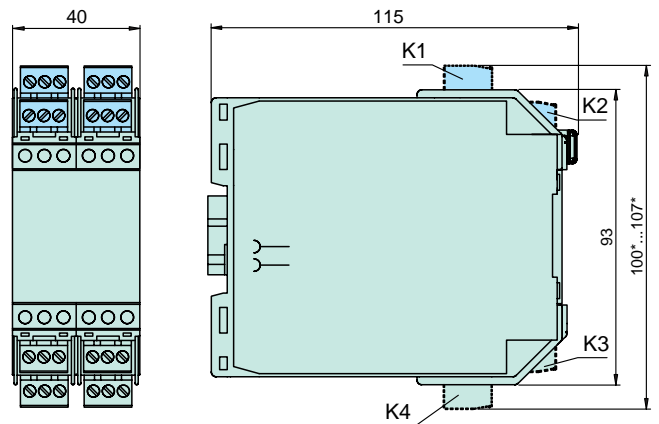
Height: 100 mm  
(without K1 terminal)

#### Housing type B3

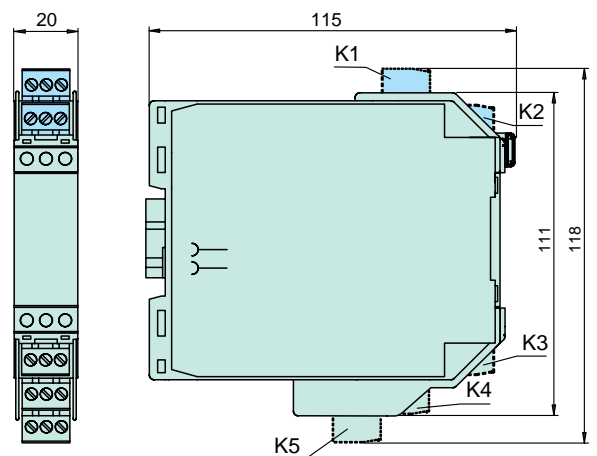
Height: 100 mm  
(without K4 terminal)

#### Housing type B4

Height: 107 mm  
\*The unit is 102.5 ... 112 mm in height  
when using the KF-STP... connector

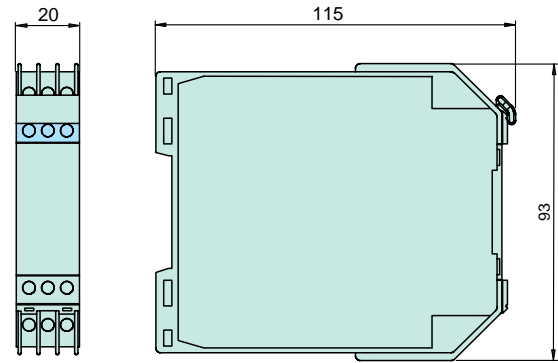


#### Housing type C

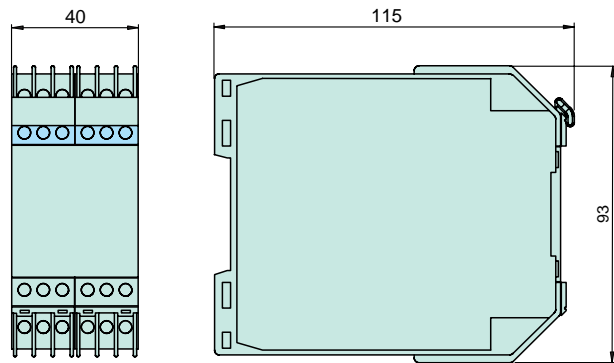


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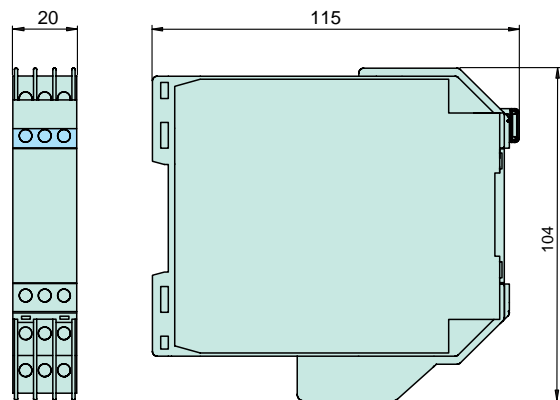
### Housing type D



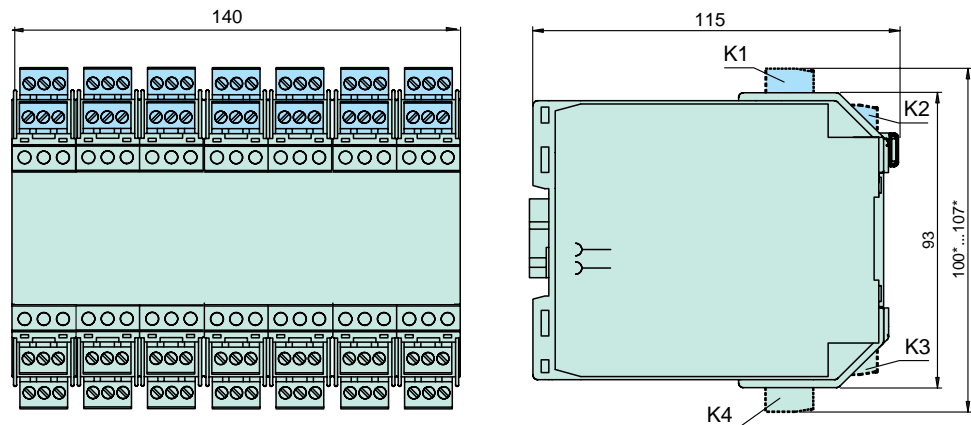
### Housing type E



### Housing type F

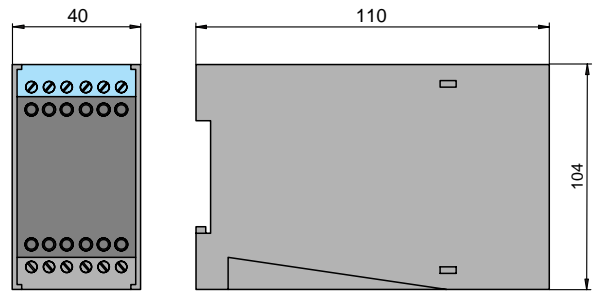


### Housing type G

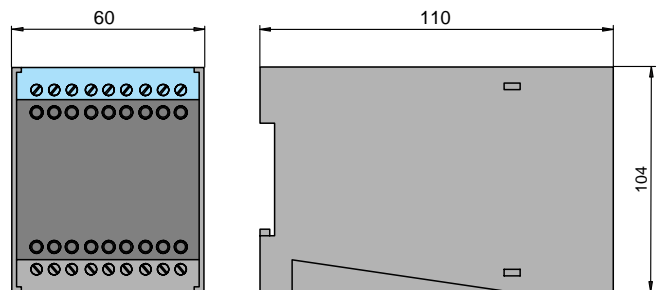


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Housing type W1

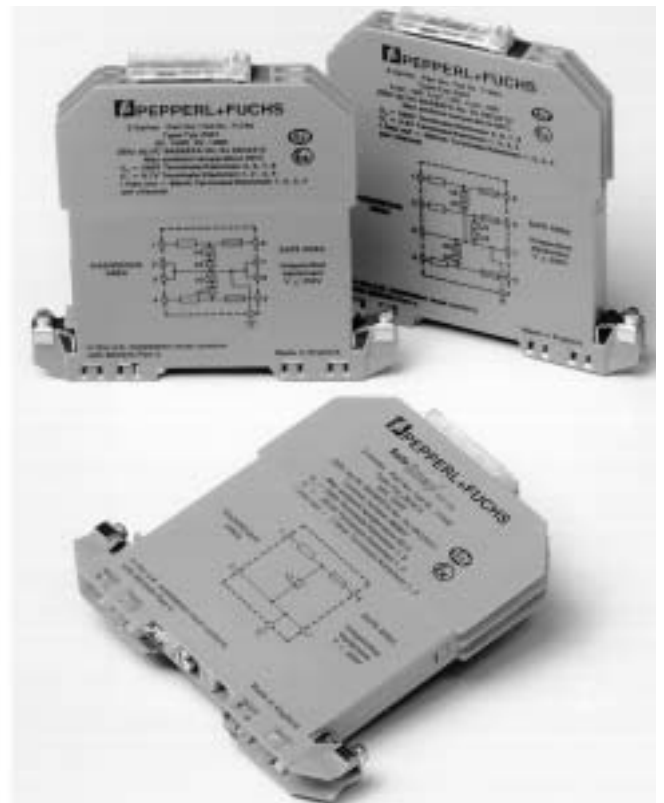
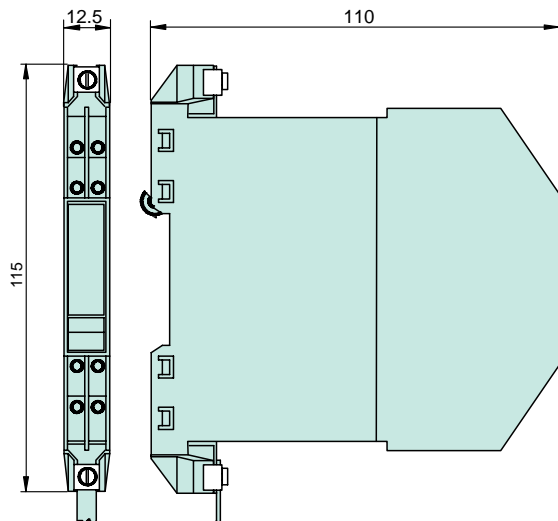


Housing type W2



3.3 Zener barriers

The zener barrier housing is 12.5 mm wide and can be snapped easily onto the standard 35 mm rail in accordance with DIN EN 50022. Leads with a core cross-section of up to 2 x 2.5 mm<sup>2</sup> can be connected to the self opening terminals. For further information see "Zener barrier operating instructions", see Seite 448



### 3.4 Alternative mounting arrangements for the K-Series

The interface modules are basically connections to an upper level controller system (PLC/Process control system), combined in multi-channel function groups. An important aspect of this interface is its efficient and safe operating design. Pepperl+Fuchs offers two mounting concepts:

#### Motherboard

Standard motherboards are available for 4, 8, 12 and 16 KF-modules. These can accommodate modules with 1, 2 or 4 channel modules, as required. The power source features a redundant design, thus increasing the reliability of the system. The operating status of the power supply is monitored and reported via a relay output.

The motherboards are available with permanent functions (DI, DO, AI, AO).

They are connected directly to the I/O cards of the respective automation system via special adapter circuit boards and the system cable.

The KF modules are connected with the motherboard on the non-Ex side via 2 to 6 pin codeable cable connectors. The motherboard circuit board is mounted on a stable metal mounting plate, enabling the boards to be simply and quickly mounted on a standard 35 mm rail to DIN EN 50022.

Pepperl+Fuchs offers standard adaptations for automation systems from the following manufacturers:

ABB-Elsag-Bailey-Hartmann+Braun, Allen Bradley, Fisher-Rosemount, Foxboro, Honeywell, Modicon, Moore, Siemens, Simrad, Yokogawa and Triconex.

Special solutions can be devised on request.

Detailed documentation on the individual adaptations is also available on request.

The Pepperl+Fuchs motherboard offers the following advantages:

1. Packing density has been increased by integrating the power feed module and system connectors.
2. The redundant power supply and the system cable interface for upper level controller systems increase functional safety and reduce remote wiring costs.
3. The motherboard is matched to an upper level controller system via an adapter circuit board with the corresponding system connector.

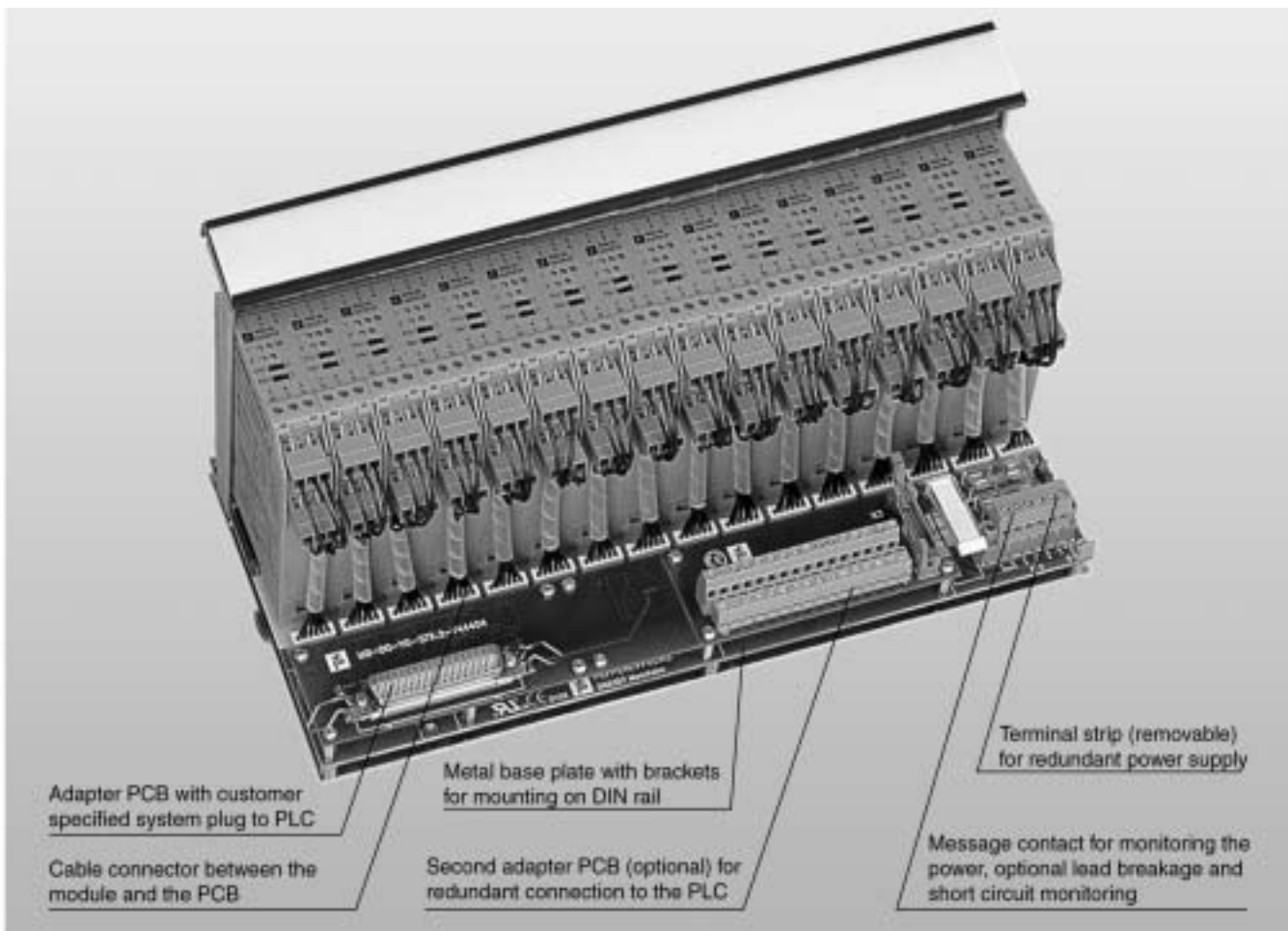


Abbildung 3.1: Motherboard

**The Pepperl+Fuchs KF mounting rail**

The KF mounting rail from Pepperl+Fuchs has an overall length of 1.8 m, and can be used to provide space-saving mounting for up to 90 KF module and accommodate the associated wiring. The system and field cables for Ex and non-Ex signals are easily installed in the integral cable ducts of the KF rail. Thus no additional cable guides are necessary.

The power supply to the individual modules is preferably provided via the power rail that can be integrated into the system. The power supply can in fact be achieved in two different ways:

1. If a 24 V DC supply is available, the supply to the modules can be by means of a KFD2-EB...power supply. It is also possible to build up various function groups and to supply these separately via power supply modules. If required, a redundant power supply to the KF modules can also be provided.
2. If a 230 V AC supply is available, the KFA... power supply module is used.

Pepperl+Fuchs can also supply prefabricated system cables for both the MB technology and for KF rail assemblies. This significantly reduces the installation and commissioning work required. These cables, which are readily available in arbitrary lengths, are factory-tested, so that faults on connection of automation systems are practically excluded.

What advantages does the KF-Profile offer?

1. Very tight packing density in control cabinet assemblies, since the cable trunking is integrated in the mounting profile.
2. By using pre-configured system cables, an extremely short commissioning/start-up time is possible.
3. The prefabricated cables are equipped with the appropriate system connector. Thus the number of connections from the interface module to the control system is reduced to a minimum.

Both mounting options can be coupled with control systems from the following manufacturers:

- ABB
- AEG
- Elsac-Bailey
- Foxboro
- Hartmann+Braun
- Honeywell
- Siemens
- Yokogawa

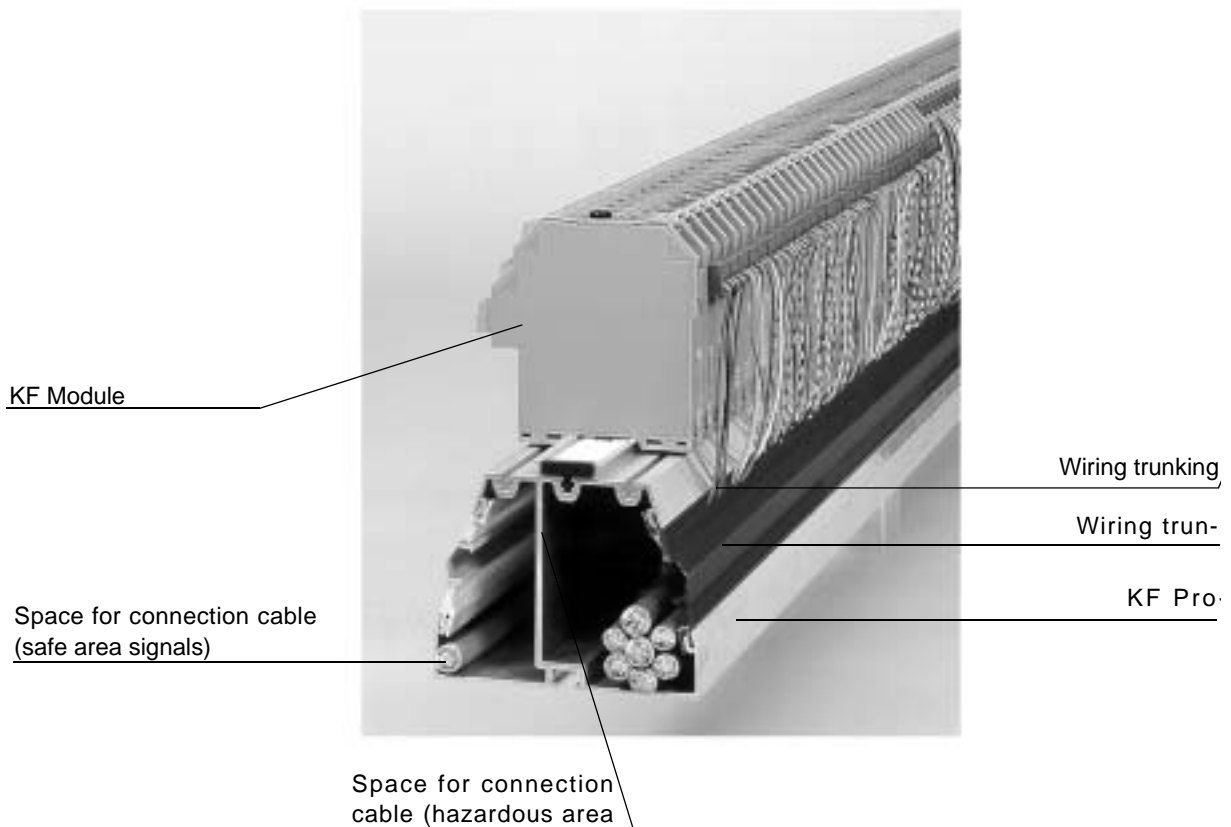


Abbildung 3.2: KE Profile

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### 3.5 Switch cabinet layout

Pepperl+Fuchs offers two different ways of laying out a control cabinet:

#### 1. Marshalling and interface modules in one control cabinet.

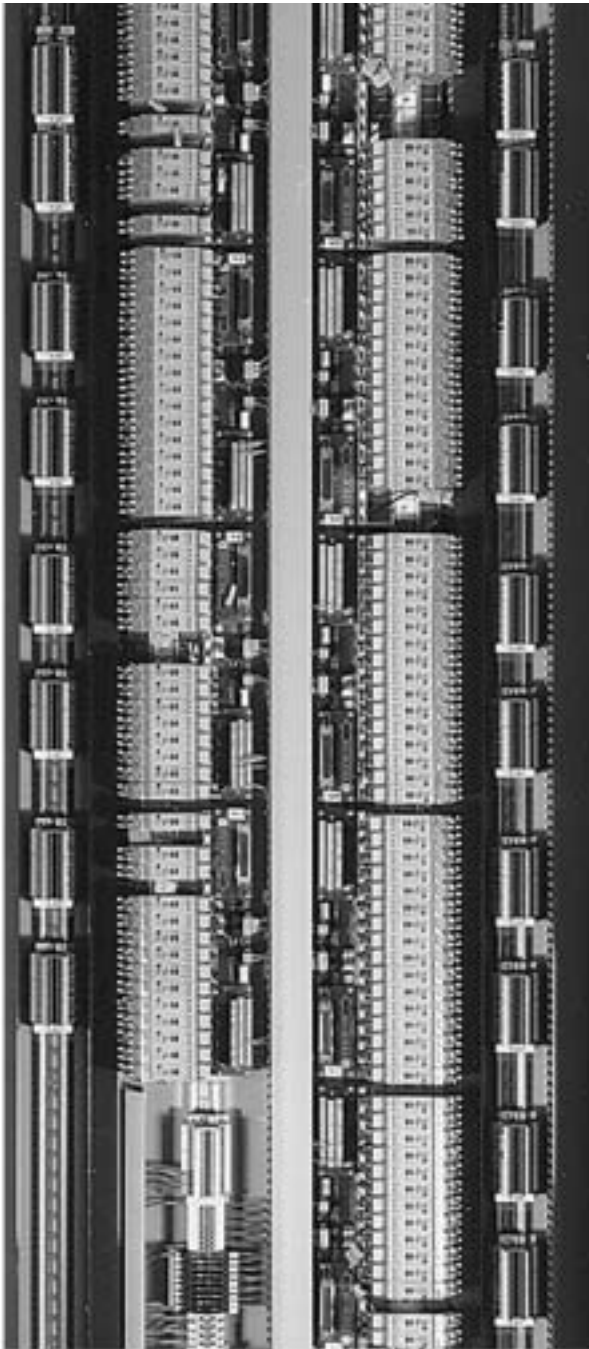
This configuration is characterised by short cable paths and a compact layout.

Ungrouped signals are wired through field cables to terminal strips. From there they are marshalled directly to KF modules. The non-function oriented signals (grouped according to function: DI, DO, AI, AO) are run to the system cable connector on the non-Ex side. The system cable provides the connection to the higher level control system. The KF modules are thus an image of the I/O level of the higher order control system.

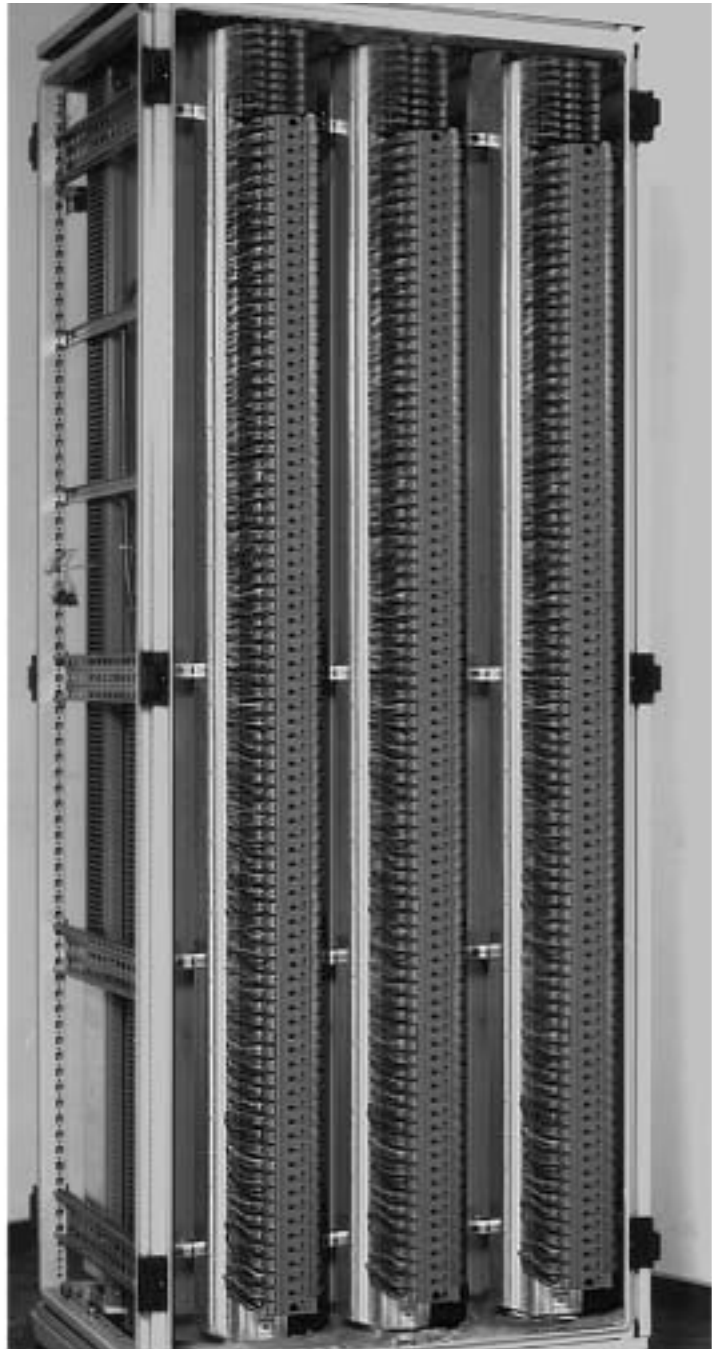
#### 2. Marshalling and interface modules divided in two cabinets.

The advantages: simplified installation of the field cables and the unified terminal structure (isolation between Ex and non-Ex). There is more space available in the marshalling cabinet for cabling. Special field cables (e.g. armoured cables with larger diameters) can be connected more easily to the terminal strips in the marshalling cabinet. An additional terminal strip is required per marshalled group, with the associated system cable for the interface cabinet. This means higher material and planning costs compared to layout 1 above.

Other concepts for structuring control cabinets to customer specific requirements can be obtained from our project management department.



Control cabinet with marshalling



Control cabinet without marshalling

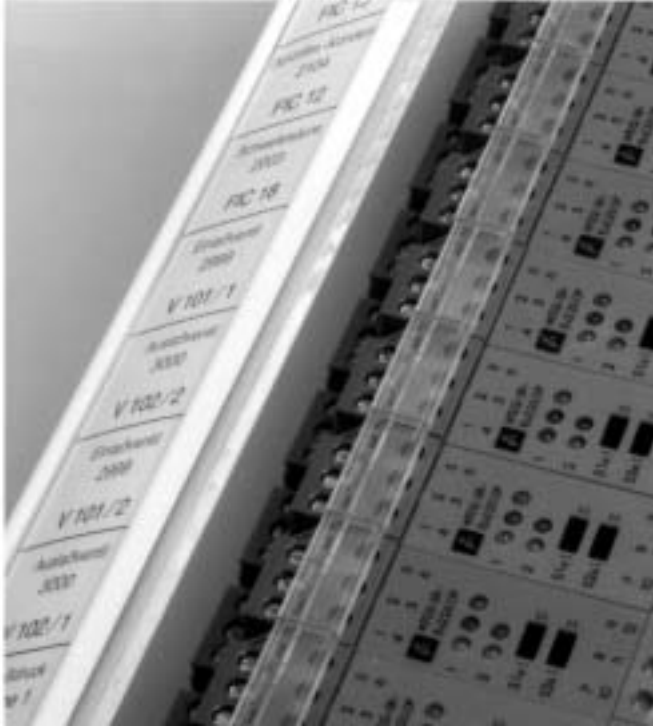
**Accessories: Label holder**  
(KFD0-LC-0.5, KFD0-LC-1)

For additional labeling (position numbers, signal names, etc.) of KF modules in the switch cabinet. The labelling strips are 0.5

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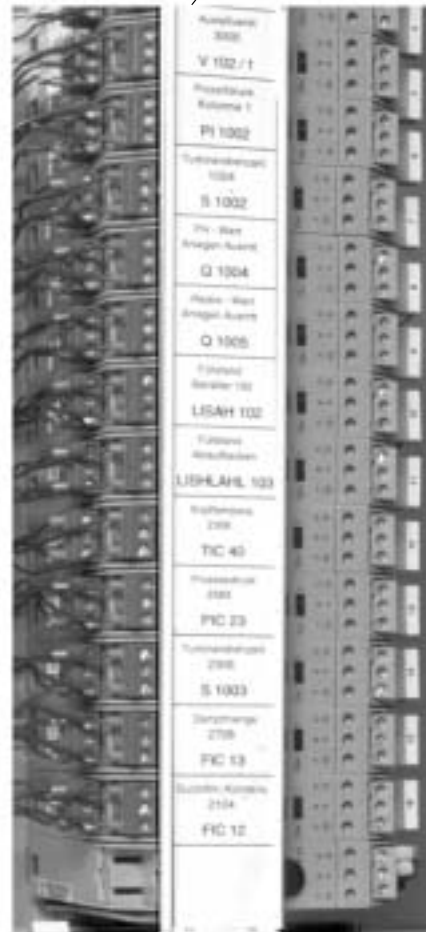
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m or 1 m in length. A labelling surface area of 20 x 30 mm is available per KF module.  
 Additional information see Seite 482



Label holder

Label holder



Label holder