

Introduction

The K-System consists of wide range of isolated barriers suitable for mounting on 35 mm DIN rail. K-System is easy to specify, integrate and expand and has become synonymous with safety and reliability. Our extensive line of intrinsic safety isolators for hazardous location applications contains over 150 different models, each containing industry leading features and benefits.

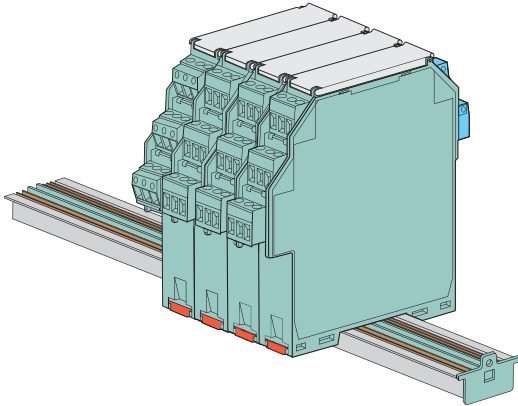


Figure 1 K-System on Power Rail

Housing types

Depending on the functionality and application, K-System has different housing widths. Whether it is the 12.5 mm KC modules or the well-proven 20 mm KF modules, the electrical and mechanical characteristics of the K-System are maintained. This collection of modules provides a wide range of interface barriers that can be combined on Power Rail.

KC module housing

Used for high signal integrity

- Compact housing, only 12.5 mm wide
- Single loop integrity
- Power loss only 0.8 W per device



Figure 2 12.5 mm housing (KC module)

KF module housings

Used for high channel density

- 20 mm housing
- Highest packing density on the market
- As low as 5 mm per channel

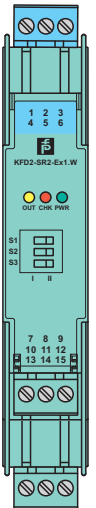


Figure 3 20 mm housing (KF module)

Used for applications with high functionality

- Logic controls determine and monitor speed, direction of rotation, slip, flow rates and time
- Analog controls monitor transmitter signals, strain gauges, temperature and load cells
- Configured using **PACT^{ware}**™ or by keypad
- Universal power supply

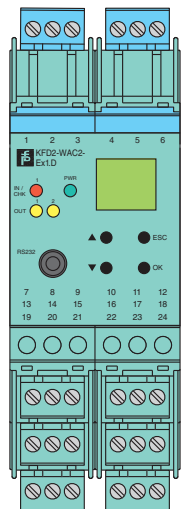


Figure 4 40 mm housing (KF module)

Supply voltage

K-System isolated barriers are available with different supply voltages. The most widely used rating is 24 V DC; however, 115 V AC and 230 V AC are also available for applications when DC power is not available. The universal supply units carry the complete range from 20 V DC to 90 V DC and 48 V AC to 230 V AC on the same input terminals. The supported supply voltage for each barrier is identified on the side plate.

Mounting

The K-System is mounted on a 35 mm DIN rail acc. to EN 60715. To reduce wiring and installation costs, Power Rail is the optimum solution.

Low heat dissipation allows vertical or horizontal mounting.

Power Rail

The Power Rail is a plastic insert into a standard DIN rail and contains two leads that deliver power to the modules. Power is sent through the rail by a power feed module that delivers 24 V DC at 4 A. The module uses a 5 A fuse to protect the barriers. The Power Rail virtually eliminates the risk of wiring faults and facilitates easy expansion. Power Rail is available in two versions:

- UPR-03: 3-lead version supplies two leads for power and one lead for error signal
- UPR-05: 5-lead version supplies two leads for power, one lead for error signal and two leads for serial data exchange.

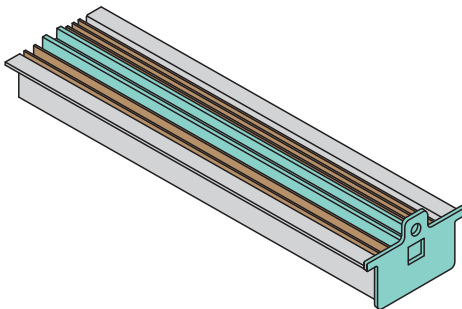


Figure 5 Universal Power Rail UPR-05

Mounting on Power Rail

As shown in the figure, the isolation modules are snapped onto the Universal Power Rail in a vertical downward movement.

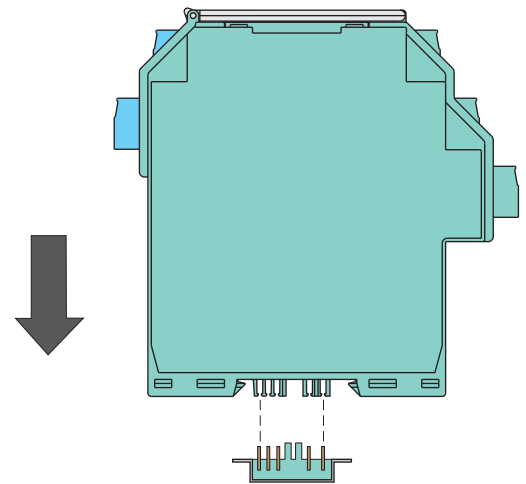


Figure 6 Proper K-System mounting

CORRECT: Device snapped on vertically.

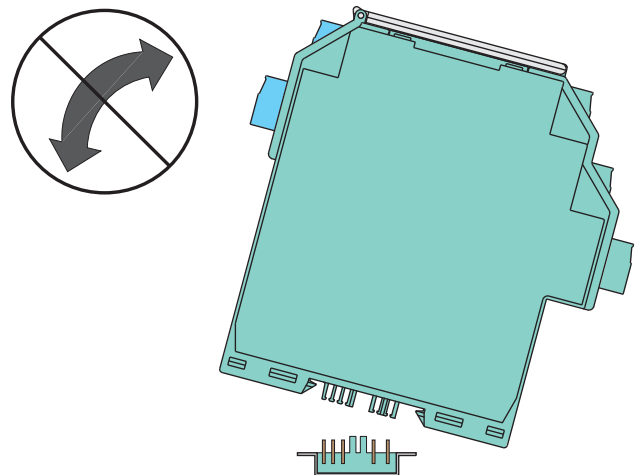


Figure 7 Improper K-System mounting

INCORRECT: Device snapped on from the side.

Power connection to K-System

Conventional power supply without Power Rail

Conventional power supplies create complicated and expensive wiring systems. After all isolated barriers are connected, there is a significant amount of wiring and more wiring must be added for features such as lead breakage and short-circuit monitoring.

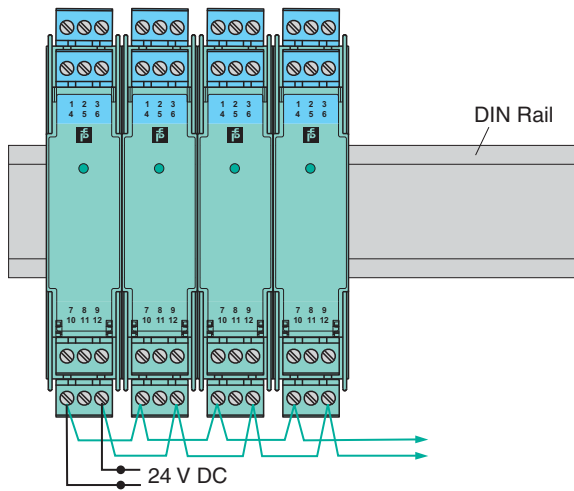


Figure 8 Conventional installation

Power supply with Power Rail

Supply with Power Feed Modules

The Pepperl+Fuchs Power Rail eliminates wiring hassles and reduces expense. The power feed module mounts on the Power Rail for easy and reliable distribution of power to all connected isolated modules. This method eliminates all of the parallel power wiring necessary on a conventional installation without Power Rail.

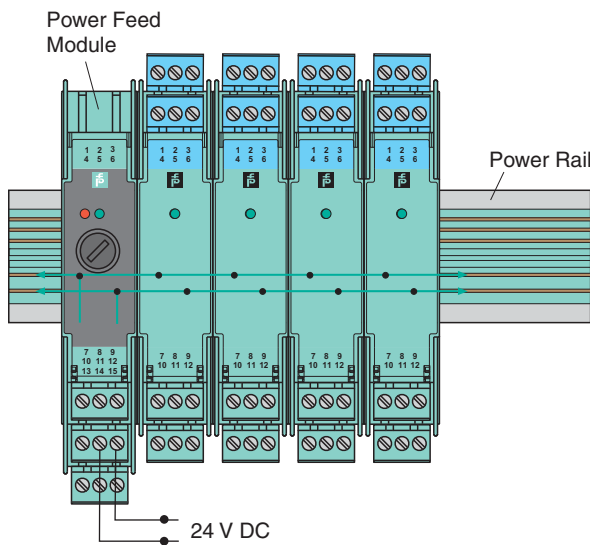


Figure 9 Power Rail installation

Redundant Supply with Power Feed Modules

Two power supplies or a redundant power supply with two power feed modules offers a high degree of safety and reliability. If a power supply is damaged or a fuse opens in a power feed module, the redundant supply continues to energize the isolator modules through their Power Rail connection.

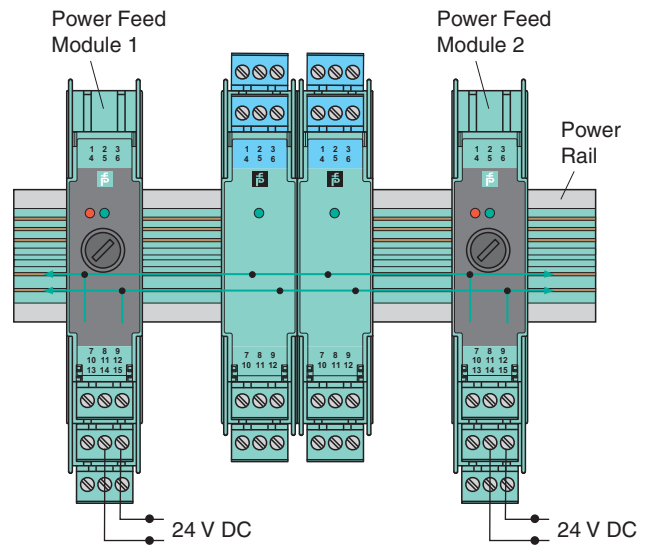


Figure 10 Redundant power connections

Direct Supply with Power Supplies

A complete power solution for a K-System installation is possible by using a 115/230 V AC to 24 V DC/4 A power supply with the KFA6-STR-1.24.4 or by using the KFA6-STR-1.24.500 that provides 24 V DC/500 mA. The power supplies snap-on the Power Rail to easily and efficiently distribute power to the isolated barriers.

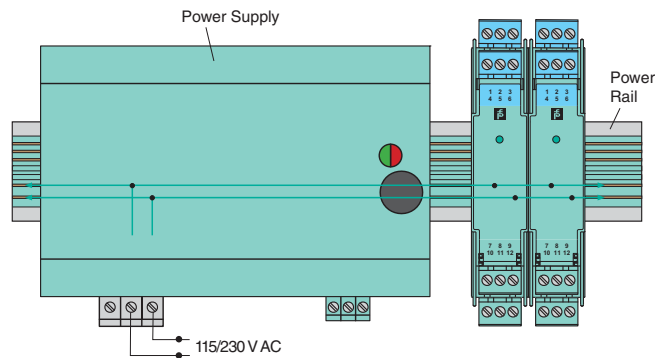


Figure 11 Integrated power supply (4 A)

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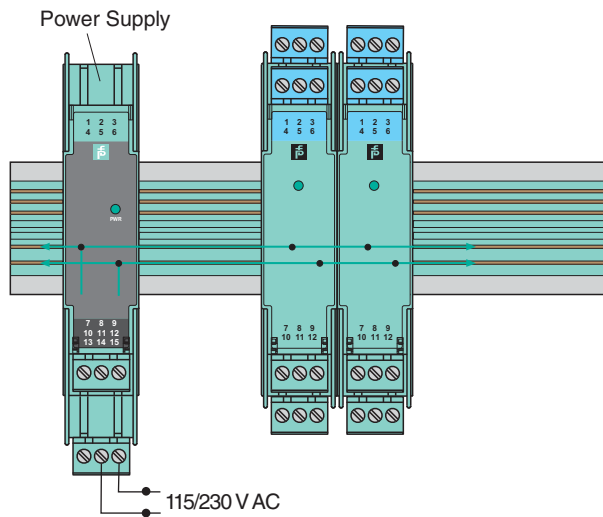


Figure 12 Integrated power supply (500 mA)

Collective error messaging

Collective error messaging enables lead breakage and short-circuit monitoring for isolator modules without additional wiring expenses. During a fault condition of the field circuit, an interrupt signal from an isolator module is transferred to the Power Rail. The power feed module evaluates the signal and transfers the interrupt signal to the control system via a relay contact.

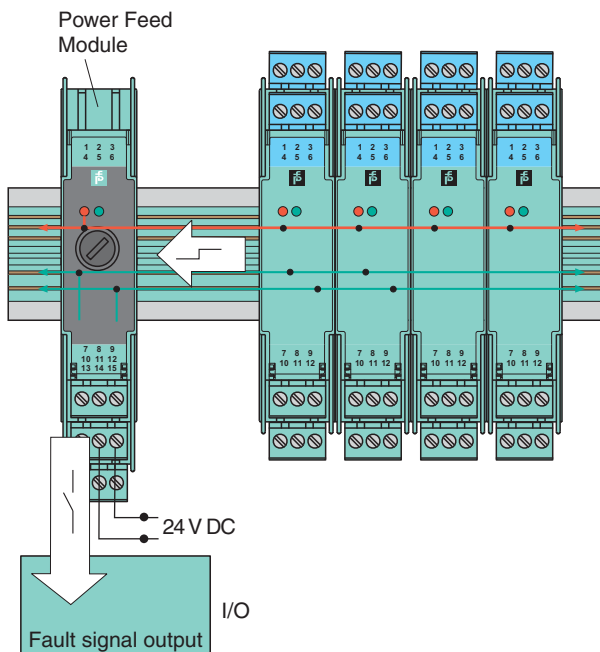


Figure 13 Collective error message via power feed module

Terminal blocks

Removable terminal blocks

The removable terminal blocks simplify control cabinet construction and allow the units to be replaced while they are energized. These screw-secured, cage clamp terminals allow space for the connection of leads with core cross-sections of up to 2.5 mm² (14 AWG). The connectors are coded with red pins so misconnection of a terminal block is eliminated. With the KF-CP coding pins (available separately), additional terminal block styles with test sockets or cage spring release can be easily coded and inserted into an isolated barrier.

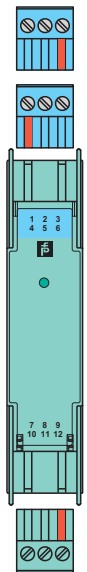


Figure 14 K-System removable terminal blocks

Terminal designation

Please reference appropriate model for terminal designation.

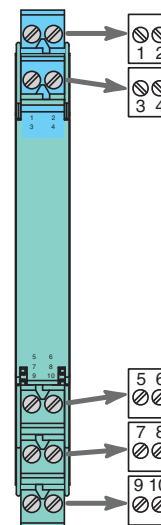


Figure 15 12.5 mm housing (KC module)

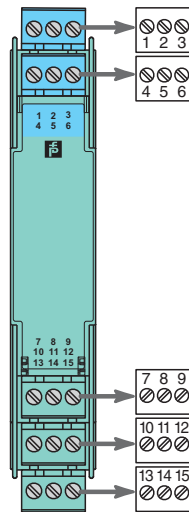


Figure 16 20 mm housing (KF module)

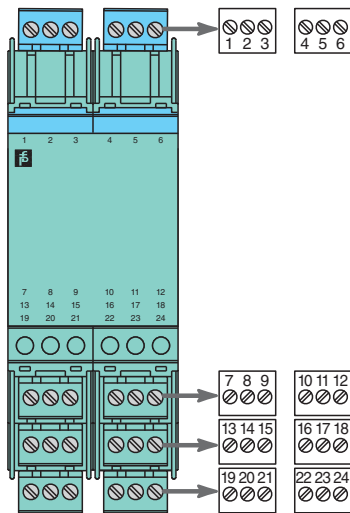


Figure 17 40 mm housing (KF module)

Color identification

The color identification of the devices has the following meaning:

- green indicates devices with DC power supply
- black indicates devices with AC power supply
- grey indicates devices with universal power supply of 20 V DC to 90 V DC or 48 V AC to 253 V AC

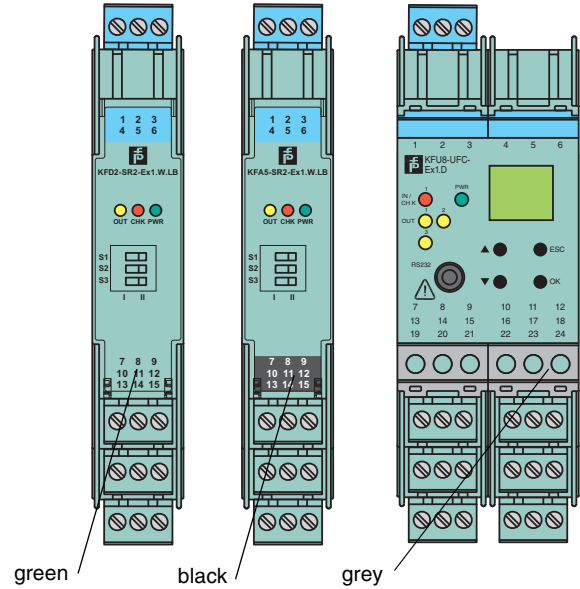
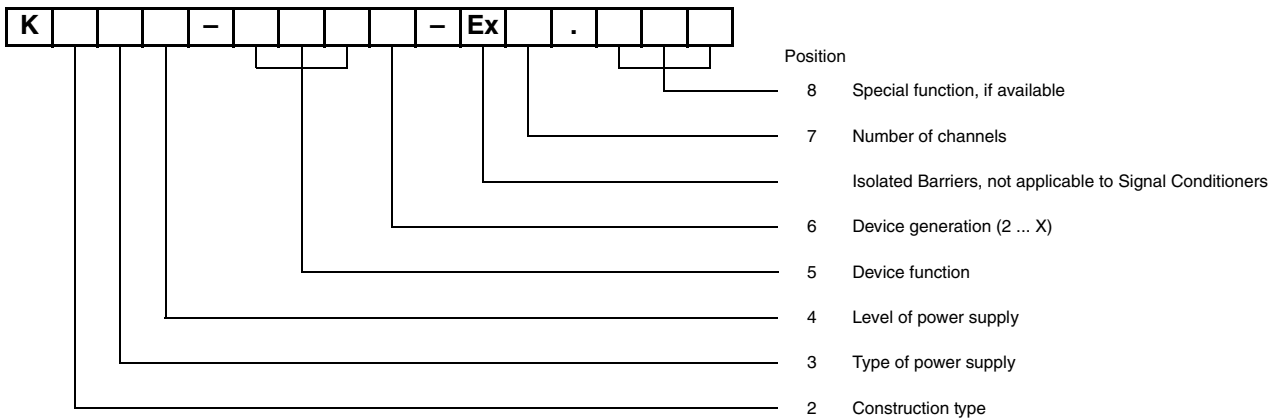


Figure 18 Color identification of devices

Model number description



Position 1	K	=	K-System
Position 2	C	=	Version with removable terminals, 12.5 mm width
	F	=	Version with removable terminals, 20 mm or 40 mm width
	H	=	Version without removable terminals, 20 mm or 40 mm width
Position 3	D	=	DC power supply
	A	=	AC power supply
	U	=	AC-/DC power supply
Position 4	0	=	without power supply
	2	=	24 V
	4	=	100 V
	5	=	115 V
	6	=	230 V
Position 5	8	=	20 V DC to 90 V DC, 48 V AC to 253 V AC
	CC	=	Converter for current/voltage
	CD	=	Current driver, active
	CR	=	Transmitter power supply device, current output
	CRG	=	Transmitter power supply device with limit value output
	CS	=	Current driver, passive
	DU	=	Switch amplifier, timer relay
	DWB	=	Rotational speed monitor, logic control unit
	EB	=	Power feed module
	ELD	=	Ground fault detection
	ER	=	Conductivity switch amplifier
	FF	=	RS 232 repeater
	GS	=	Trip amplifier for current/voltage
	GU	=	Universal trip amplifier
	GUT	=	Temperature converter with trip values
	HLC	=	HART Loop Converters
	HMM	=	HART Multiplexer Master
	HMS	=	HART Multiplexer Slave
	PT	=	Potentiometer converter
	RC	=	Converter for resistors
	RCI	=	Solenoid driver
	RO	=	Relay module
	RR	=	Repeater for resistance measuring sensor
	RSH	=	Relay module in safety application
	SCD	=	SMART current driver
	SCS	=	SMART current driver/repeater
	SD	=	Solenoid driver
	SH	=	Safety switch amplifier
	SL	=	Solenoid driver module with logic input
	SOT	=	Switch amplifier with passive, potential free transistor output
	SR	=	Switch amplifier with relay output
	SRA	=	Switch amplifier with relay output, 2:1 operation mode
	SRT	=	Switch amplifier with active transistor and relay output
	ST	=	Switch amplifier with active transistor output
	STC	=	SMART transmitter power supply with current output
	STR	=	Power supply
STV	=	SMART transmitter power supply with voltage output	
TR	=	Converter for resistance measuring sensor	
TT	=	Converter for thermocouple/mV	
UFC	=	Universal frequency converter	
UFT	=	Frequency converter with direction and synchronization monitoring	
USC	=	Universal signal converter with trip values	
UT	=	Universal temperature converter	
VC	=	Converter for current/voltage	
VCR	=	Transmitter power supply, repeater for current/voltage	
VD	=	Solenoid driver	
VM	=	Solenoid driver	
VR	=	Voltage repeater	
WAC	=	Converter for strain gauges	

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Safety information

The corresponding data sheets, the Declaration of Conformity, the EC-Type Examination Certificate and applicable certificates (see data sheet) are an integral part of this document.

Intended use

Laws and regulations applicable to the usage or planned purpose of usage must be observed. Devices are only approved for proper usage in accordance with intended use. Improper handling will result in voiding of any warranty or manufacturer's responsibility.

These devices are used in C&I technology for the galvanic isolation of C&I signals, such as 20 mA and 10 V unit signals, and also for the adaptation and/or standardization of signals. Devices which have intrinsically safe control circuits are used to operate field devices within hazardous areas.

The devices are not suitable for the isolation of signals in power engineering, unless this is specifically referred to in the respective data sheet.

Protection of operating personnel and the system is not ensured if the product is not used in accordance with its intended use.

Intrinsic safety circuits that were operated with circuits of other types of protection may not be used as intrinsically safe circuits afterwards.

Installation and commissioning

Commissioning and installation must be carried out by specially trained and qualified personnel only.

Installation of the interface devices in the safe area

The devices are constructed to satisfy the IP20 protection classification and must be protected from adverse environmental conditions such as water spray or dirt exceeding the pollution degree 2.

The devices must be installed outside the hazardous area!

Depending on the level of protection, the intrinsically safe circuits of the devices (light blue identification on the device) can be located in the hazardous area. It is especially important to ensure that the intrinsically safe circuits are safely separated 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 K-System devices (demonstration of intrinsic safety). EN 60079-14/ IEC 60079-14 or NEC and CEC electrical codes for US and Canada respectively must be observed (where appropriate). If available, also the product certification control drawing must be observed.

If more channels of one device are to be connected in parallel, it must be ensured that the parallel connection is made directly at the terminals. For the demonstration of intrinsic safety, the maximum values of the parallel connection are to be regarded.

The EC-Type Examination Certificates or standard certificates/approvals should be observed. It is especially important to observe the "special conditions" if these are included in the certificates.

Installation and commissioning of the interface devices within Zone 2/Div. 2 of the hazardous area

Only devices with the corresponding manufacturer's Declaration of Conformity or separate certificate of conformity can be installed in Zone 2/Div. 2.

The individual data sheets indicate whether these conditions are met.

For US and Canada installations, in Zone 2/Div. 2 follow the NEC and CEC wiring methods. The enclosure must be able to accept Zone 2/Div. 2 wiring methods. The referenced product certification control drawing must be observed.

For all other applications, the devices should be installed in a switch or junction box that:

- meets at least IP54 in accordance to EN 60529.
- meets to the requirements of resistance to light and resistance to impact according to EN 60079-0/ IEC 60079-0.
- meets to the requirements of thermal endurance according to EN 60079-15/IEC 60079-15.
- must not cause ignition danger by electrostatic charge during intended use, maintenance and cleaning.

Depending on the level of protection, the intrinsically safe circuits of the devices (light blue identification on the device) can be located in the hazardous area. It is especially important to ensure that the intrinsically safe circuits are safely separated 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 K-System devices (demonstration of intrinsic safety). EN 60079-14/ IEC 60079-14 or NEC and CEC electrical codes for US and Canada respectively must be observed (where appropriate). If available, also the product certification control drawing must be observed.

If more channels of one device are to be connected in parallel, it must be ensured that the parallel connection is made directly at the terminals. For the demonstration of intrinsic safety, the maximum values of the parallel connection are to be regarded.

The EC-Type Examination Certificates, standard certificates/approvals or the manufacturer's Declaration of Conformity should be observed. It is especially important to observe the "special conditions" if these are included in the certificates.

Repair and maintenance

The transfer characteristics of the devices remain stable over long periods of time. This eliminates the need for regular adjustment. Maintenance is not required.

Fault elimination

No changes can be made to devices that are operated in hazardous areas. Repairs on the device are not allowed.

Isolation coordinates for devices with Ex-certificate according to EN 50020 and EN 60079-11

The devices are assessed for pollution degree 2 and overvoltage category II according to EN 50178.

Isolation coordinates for installations for galvanic isolation according to EN 50178 and EN 61140

The devices of the K-System are electronic equipment for use in secluded electrical operating sites where only skilled personnel or electrically instructed personnel will have admission or access.

The devices are assessed for pollution degree 2 and overvoltage category II according to EN 50178.

Connect only power supplies to power feed modules, which provide protection against direct contact (e. g. SELV or PELV).

For additional details, see data sheets.

Technical data

Electrical data

Safe area signals and control circuit

- 0/4 mA to 20 mA signal level acc. to NE43
- Current output HART compatible
- Current input HART compatible
- Digital output: active or, passive electronic output 100 mA/30 V, short circuit protected
- Relay output 2 A, minimum load 1 mA/24 V
- Logic level 24 V acc. to IEC 60946
- Functional isolation or safe isolation acc. to EN 50178 and NAMUR NE23

For additional details, see data sheets.

Ex-signals and field circuit

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

For additional details, see data sheets.

Mechanical data

Mounting

- Snap-on 35 mm standard DIN rail acc. to EN 60715. Can be mounted horizontally or vertically, side by side.
- Panel mount: The lugs on the base of the modules must be extended and used for mounting purposes with 3 mm screws.
- K-MS mounting base for screw attachment

Housing material

Polycarbonate (PC)

Dimensions

Housing drawings please refer to www.pepperl-fuchs.com.

Protection degree

IP20 acc. to EN 60529

Connection

- KH*-modules:
self-opening connection terminals for max. core diameter of 1 x 2.5 mm² (14 AWG)
- KF*-and KC*-modules:
removable connector with integrated self opening device terminals for leads of up to a max. of 1 x 2.5 mm² (14 AWG)

Fire protection class

Housing: V2 according to UL 94 standard. (Unless stated otherwise all details relate to the reference conditions.)

Labeling

place for labeling on the front side, label:

- KC-modules (12.5 mm): 22 mm x 9 mm
- KF-modules (20 mm): 22 mm x 16.5mm
- KF-modules (40 mm): 18 mm x 8 mm

Ambient conditions

Ambient temperature

-20 °C to 60 °C (253 K to 333 K)

Exceptions see data sheets.

Storage temperature

-40 °C to 90 °C (233 K to 363 K)

Reference conditions for adjustment

20 °C (293 K)

Relative humidity

max. 95 % without moisture condensation

Vibration resistance

acc. to EN 60068-2-6, 10 Hz to 150 Hz, 1 g, high crossover frequency

Shock resistance

acc. to EN 60068-2-27, 15 g, 11 ms, half-sine

Conformity with standards and directives

General

- Isolator modules with explosion protection, mostly with Ex ia IIC/Class I Div. 1, international approvals
- EMC acc. to NAMUR NE21 and EN 61326
- LEDs acc. to NAMUR NE44
- Software acc. to NAMUR NE53
- Switch-on pulse suppression
- Devices K*D2:
 - Supply voltage 20 V DC to 30 V DC via Power Rail or supply terminals
 - Fault signals via Power Rail
- Devices K*A and K*U:
 - Supply voltage 115 V/230 V AC ±10 %
- Safety devices acc. to VDE 0660 T.209, AK acc. to DIN 19250

Digital 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 switch gear – 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 switch gear – 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 switch gear and control gear – part 5-6: Control circuit devices and switching elements – DC interface for proximity sensors and switching amplifiers (NAMUR), 1999