Remote I/O Systeme

Remote Process Interface

Edition 2003
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pepperl+Fuchs Documentation and Training</td>
<td>8</td>
</tr>
<tr>
<td>Introduction to Explosion Protection through Intrinsic Safety</td>
<td>9</td>
</tr>
<tr>
<td>System Description Remote Process Interface</td>
<td></td>
</tr>
<tr>
<td>Function overview Remote Process Interface</td>
<td>11</td>
</tr>
<tr>
<td>Overview</td>
<td>17</td>
</tr>
<tr>
<td>Type Code</td>
<td>19</td>
</tr>
<tr>
<td>Technical data</td>
<td></td>
</tr>
<tr>
<td>System description</td>
<td></td>
</tr>
<tr>
<td>Power Feed Concepts with Power Rail</td>
<td>23</td>
</tr>
<tr>
<td>Housing types (RPI system)</td>
<td>25</td>
</tr>
<tr>
<td>The KF-mouting accessory from Pepperl+Fuchs</td>
<td>26</td>
</tr>
<tr>
<td>Control Cabinet</td>
<td>27</td>
</tr>
<tr>
<td>Installation and Service</td>
<td>27</td>
</tr>
<tr>
<td>Application instructions</td>
<td></td>
</tr>
<tr>
<td>Installation and service</td>
<td>120</td>
</tr>
<tr>
<td>InduLine/EuroLine Modem</td>
<td>121</td>
</tr>
<tr>
<td>Accessories and Installation Techniques</td>
<td>132</td>
</tr>
<tr>
<td>Approvals</td>
<td></td>
</tr>
<tr>
<td>European Approvals</td>
<td>150</td>
</tr>
<tr>
<td>Non-European Approvals</td>
<td>152</td>
</tr>
<tr>
<td>Glossary</td>
<td>154</td>
</tr>
<tr>
<td>Type index in alphabetical order</td>
<td>155</td>
</tr>
<tr>
<td>Function Index</td>
<td>156</td>
</tr>
<tr>
<td>Pepperl+Fuchs GmbH worldwide</td>
<td>158</td>
</tr>
<tr>
<td>Notes</td>
<td>163</td>
</tr>
</tbody>
</table>
Pepperl+Fuchs Documentation and Training

CD-ROM Catalogue
The Pepperl+Fuchs CD-ROM catalogue Process Automation includes the data sheets of the division Process Automation, level control and the instructional program of Pepperl+Fuchs. A product search can be initiated either by a search tree or by model number. In the Process Automation menu data sheets for signal converters of the Pepperl+Fuchs group can be accessed and in the level control menu, data sheets for level control can be found. In the Training menu the complete training and teachware program can be found.

Training Packages
Pepperl+Fuchs offers instructional cases and extended assembly kits for training on sensors and the AS-Interface.

Seminars
Other seminars offered by Pepperl+Fuchs:
  - Explosion protection through intrinsic safety
  - Level Control
  - Signal Conditioners for Process Automation

The seminars take place regularly at Pepperl+Fuchs, at the "Haus der Technik e.V." in Essen, Berlin and Munich, on various TÜV academies and preferably on site at the customer's.

Ex-i Video "Preventing Explosions with Intrinsic Safety"
In Part 1 "Introduction to explosion protection", this video explains the important implications of the ATEX Directives 94/9/EG and 1999/92/EG and provides an overview of all the important European specifications that translate these two ATEX directives. Among these are the European standards EN 1127-1 and EN 60079-10 (Zone definition and Zone divisions), and the Europe-wide applicable installation specification EN 60079-14.

In addition, the new device identification system is presented. Part 1 concludes with an overview of the ignition protection categories. (22 minutes duration)

In Part 2 "Explosion protection through intrinsic safety" the principle of intrinsic safety protection is explained and the important installation regulations that are necessary to maintain the intrinsic safety are clarified. The demonstration of intrinsic safety is treated on the basis of some examples. (17 minutes duration).

This instructional film, which is not manufacturer-biased, is also available on CD-ROM. The package includes an accompanying book in German, English, French, Spanish and Russian, in the standard PAL/NTSC format.
Introduction to Explosion Protection through Intrinsic Safety

When introducing electrical equipment in a hazardous area, extensive regulations must be observed that are subdivided into European (EU) and national requirements. The European standards define the general specifications and the detailed guidelines for methods of protection against explosion. The national requirements primarily contain the installation criteria.

Electrical instruments for explosion groups I and II, as well as the T1 ... T6 temperature classifications, are grouped in DIN EN 50014 (see "Division of Hazards, Ignition Hazards due to Sparks and Hot Surfaces" in the following table). DIN EN 50020 presents categories, design and test specifications and type identification of intrinsically safe apparatus. Approvals for electrical instruments that are used in explosive environments are regulated by EG-Ex-Framework Guidelines 76/117/EWG and Guideline 94/9/EG.

The intrinsic safety method of explosion protection always relates to intrinsically safe circuitry that comprises an intrinsically safe apparatus, an appropriate electrical power source and the connecting cables. In intrinsically safe circuits, an explosive environment cannot be ignited by sparking or a thermal effect when operating normally under prescribed fault conditions. In an intrinsically safe circuit for category ia, 2 calculable faults (see definition EN 50020) must not cause an ignition and in category ib only 1 such fault is permissible. Limiting the power supply, total inductance and total capacitance within the intrinsically safe circuitry is the basic principle of the intrinsically safe explosion protection method.

The project manager or user has to compare the permissible internal limit values for intrinsically safe electrical apparatus with the permissible connection values of the associated electrical apparatus, in accordance with the following table:

<table>
<thead>
<tr>
<th>Intrinsically safe apparatus + cable</th>
<th>Demonstration of intrinsic safety</th>
<th>Associated apparatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>U₁</td>
<td>≥</td>
<td>U₀</td>
</tr>
<tr>
<td>I₁</td>
<td>≥</td>
<td>I₀</td>
</tr>
<tr>
<td>P₀</td>
<td>≥</td>
<td>P₀</td>
</tr>
<tr>
<td>L₀ + Lᵋ</td>
<td>≤</td>
<td>L₀</td>
</tr>
<tr>
<td>C₀ + Cᵋ</td>
<td>≤</td>
<td>C₀</td>
</tr>
</tbody>
</table>

These limit values are obtained from the prototype test certificate. The comparison of the limit values satisfies the requirements of DIN EN 60079-14 with regard to the demonstration of intrinsic safety. When installing complex intrinsically safe circuitry with more than one item of associated electrical apparatus, a calculated demonstration of intrinsic safety has to be carried out and this must then be referenced back to the explosion limit curves for DIN EN 50020 or to the tables that these curves represent.

In this case all the active associated electrical apparatus are combined in one complex associated electrical apparatus. "Active" refers to any apparatus that can provide power to the intrinsically safe circuit under normal or malfunctioning operating conditions.

For the intrinsically safe connection terminals of this complex apparatus, the effective values for:

- the maximum output voltage U₀,
- the maximum output current I₀,
- the maximum output power P₀,

are calculated as follows, depending on the combined circuitry of the individual associated apparatus:

For parallel circuits:

\[ I₀ = \text{sum of the individual currents}, \]

\[ U₀ = \text{from the maximum value of the individual voltages}. \]

For series connection:

\[ I₀ = \text{from the maximum value of the individual currents}, \]

\[ U₀ = \text{from the sum of the individual voltages}. \]

The individual values are taken from the certificates of conformity.

The maximum output power is calculated from the following formula for assigned apparatus with linear current-voltage output characteristics:

\[ P₀ = \frac{1}{4} \cdot U₀ \cdot I₀ \]

Based on the calculated maximum value, the intrinsic safety has to be checked using the ignition limit curves. DIN EN 60079-14 references limitations (PTB report W39 is to be used for associated apparatus with non-linear current-voltage characteristics) and safety factors.

In addition to this demonstration of intrinsic safety, the integrity of the intrinsically safe circuitry must also be assured against the ingress of energy from other electrical power sources. If both requirements are fulfilled, a safe power limit within the circuitry will not be exceeded, even if there is an interruption, a short circuit or grounding of the circuit (EN 60079-14). A detailed description of "Explosion protection through intrinsic safety" can be found in the handbook of the same name.

The previously valid national specifications will be replaced in the future by the following European standards:

- EN 1127-1 Machine Safety/combustion and explosion protection (Zone 0; 1; 2 for gas and steam; Zone 20; 21; 22 for dust)
- EN 60079-10 Installation of electrical systems in potentially explosive areas (division into areas)
- EN 60079-14 Installation of electrical systems in potentially explosive areas (installation specification)

The following table compares important general guidelines for explosion protection as applied in the European Union and North America.
## Introduction to Explosion Protection through Intrinsic Safety

<table>
<thead>
<tr>
<th>Classification of hazards</th>
<th>European Union</th>
<th>North America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosive mixture in</td>
<td>Group I: mines susceptible to fire-damp</td>
<td>Explosive mixtures of air and dusts</td>
</tr>
<tr>
<td>Group II: other areas outside of mines</td>
<td>CLASS I: Gases and vapours</td>
<td>CLASS II: Dusts</td>
</tr>
<tr>
<td></td>
<td>CLASS III: Fibres</td>
<td></td>
</tr>
</tbody>
</table>

### Ignition due to sparks

<table>
<thead>
<tr>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>Propane</td>
<td>Hydrogen, Acetylene</td>
</tr>
<tr>
<td>Ethylene</td>
<td>Hydrazine</td>
<td>Acetylene</td>
</tr>
</tbody>
</table>

### Sub-division of the class according to ignition energy:

<table>
<thead>
<tr>
<th>Class</th>
<th>Methane</th>
<th>Propane</th>
<th>Ethylene</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLASS I</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>CLASS II</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>CLASS III</td>
<td>G</td>
<td>H</td>
<td>I</td>
</tr>
</tbody>
</table>

### Ignition hazards due to hot surfaces

<table>
<thead>
<tr>
<th>Division</th>
<th>Temperature classes in accordance with IEC 60 079-8</th>
<th>Maximum surface temperatures with an ambient temperature of 40 °C, under fault conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 ≤ 450 °C</td>
<td>T2 ≤ 300 °C T3 ≤ 200 °C T4 ≤ 135 °C T5 ≤ 100 °C T6 ≤ 85 °C</td>
<td></td>
</tr>
</tbody>
</table>

### Division of hazardous areas

For gases, vapours, mists: (EN 1127-1)

<table>
<thead>
<tr>
<th>Zone</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>constant or long term</td>
</tr>
<tr>
<td>1</td>
<td>occasionally</td>
</tr>
<tr>
<td>2</td>
<td>seldom and short term</td>
</tr>
<tr>
<td>20</td>
<td>constant or long term</td>
</tr>
<tr>
<td>21</td>
<td>occasionally</td>
</tr>
<tr>
<td>22</td>
<td>short term or accumulation</td>
</tr>
</tbody>
</table>

For gases and dusts:

<table>
<thead>
<tr>
<th>Division</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Division 1</td>
</tr>
<tr>
<td>1</td>
<td>Division 2</td>
</tr>
</tbody>
</table>

### Safety characteristics

The characteristics of flammable gases and vapours as a basis for classification in respect of ignition energy and temperature/flashpoint are contained in:

- Redeker, Nabert, Schön/intrinsic safety characteristics of flammable gases and vapours
- NFPA 497 M
- CSA No. C22-1

### Approval authorities

- PTB Physikalisch-Technische Bundesanstalt
- DMT Deutsche Montan Technologie
- BASEEFA British Approvals Service for Electrical Equipment in Flammable Atmospheres
- UL Underwriters Laboratories, USA
- FM Factory Mutual Research, USA
- CSA Canadian Standards Association

### Installation requirements

- DIN EN 60079-14 (VDE 0165 Part 1) for explosive gas environments
- DIN EN 50281-1-2 (VDE 0165 Part 2) for environments with flammable dust
- NFPA 70 National Electrical Code Art. 500
- NFPA 493 Standard for Intrinsically safe operations...
System Description Remote Process Interface

The remote process interface (RPI) from Pepperl+Fuchs is an interface system for conditioning conventional measurement, control, and regulator signals between sensors, actuators and field devices on one hand, and a process control system or a PLC on the other hand, whereby the connection to the control system is made via a fieldbus interface. The signals are galvanically isolated using RPI. It is suitable for non-intrinsically safe and intrinsically safe signals within Zones 1 and 0. It can be used within a switching compartment in the safe area or in the field within explosion protection Zone 2.

Advantages

In using of the Pepperl+Fuchs Remote Process Interface (RPI) the investment cost for installation, planning and documentation are noticeably reduced. System accuracy is increased in comparison to conventional interface-systems. Due to the easy replacement of components and extensive system diagnosis system down time is decreased. This simplifies operation. Shunting the field circuit becomes unnecessary.

Areas of application

The signal currents for instrumentation and control and monitoring in production facilities often have to be preprocessed, before they are connected to the control system. This situation is to be found in many companies dealing with process automation, such as the chemical and petrochemical industries, on-shore and off-shore systems, pipelines etc. but also in factory automation in which explosive atmospheres can arise. In order to guarantee safety and proper function the signal circuits are arranged using intrinsic safety standards. In this method of ignition protection the signal conditioners are used as isolator modules, which are installed outside the hazardous area in the control room and which limit the electrical energy of the signal circuits in such a way as to prevent ignition also in the case of a fault. Pepperl+Fuchs has been the leading producer of such isolator modules for years. These secondary switching devices are available on Eurocards or in DIN-Rail housings (K-system). The remote process interface (RPI) from Pepperl+Fuchs is the consequence of the further development of rail mounted systems.

The Pepperl+Fuchs-Remote Process Interface is suited for use with process control systems, PLCs, as well as with PC based systems, e.g. SCADA systems.

Principle
Mechanical Installation

The installation of the Pepperl+Fuchs Remote Process Interface is based on the system characteristics:
1. within a switching compartment: in the switch cabinet, in a frame, on the wall.
2. in the field in a safe area: within an enclosure or junction box using IP54 or higher protection method.
3. in the field in hazardous areas: within zone 2 (in the USA: division 2) within an enclosure or junction box using IP54 or higher protection method.

Field signals

In all three mounting styles the sensor/actuator signals can be provided in the intrinsically safe category EEx ia or EEx Ib. These sensor/actuator signals are commonly those signals used in process automation. Depending on the function the RPI devices have one to four channels for

1. Analogue input 0/4 mA up to 20 mA with or without transmitter power, transfer of the HART protocol of the connected transmitter.

2. Analogue input for resistance thermometers, thermocouples, potentiometric recorders and mV-transmitters.

3. Analogue output 0/4 mA up to 20 mA, transfer of the HART protocol of the connected position controller.

4. Binary input for mechanical contacts and proximity switches to DIN EN 60947-5-6 (NAMUR sensors).

5. Binary output for solenoid valves.

6. Binary output potential-free relay contact.

Functional RPI system consists of:
1. DIN rail with Power Rail for mounting, voltage supply and internal bus connection.
2. Power feed module for coupling and monitoring the voltage supply. At 24 V DC power supply units are not necessary.
3. Gateway for connection to the external bus system.
4. Devices the function modules with intrinsically safe but also non-intrinsic safety field circuits.
5. Control display PACT™ for
   - Planning
   - Documentation
   - Configuration
   - Parameterisation
   - Installation
   - Commissioning
   - monitoring
   - diagnosis
   of the complete system.

6. PC adapter
7. System manual
Mounting
Components of the RPI System have removable device connectors with integrated self opening device terminals for leads with a diameter of up to 2.5 mm². These removable terminals simplify the installation of the enclosure greatly and allow the units to be swapped out during maintenance while the system is powered up.

As conventional systems RPI devices are simply snapped onto a rail, in which the Pepperl+Fuchs Power Rail used for powering the individual devices and for transferring signals is mounted. The mechanical structure allows the combined mounting of RPI modules and Pepperl+Fuchs K-system devices, and even third party components that can be rail mounted.

The rails can be mounted horizontally or vertically at any length. Thus RPI can be adapted to the characteristics of the system.

Space saving mounting systems are available, such as the KF module, which unites the cable trays, the individual lead connections, the rail and the Power Rail. Pepperl+Fuchs also offers suitable enclosures and switch cabinets.

All of the mounting spaces on the power rail are the same. Each device can be mounted at any site on the rail.

Voltage supply
RPI uses the 5-pin designs PR-05 or UPR-05 of the Power Rail, which is simply inserted in the DIN rail and mounted with it.

Power is supplied by means of two conductors on the power rail to the mounted devices. A contact is established to the power supply by simply snapping the component onto the DIN Rail. The need for wiring of one device to another in a "Daisy Chain" is eliminated. A power feed module provides the connection between a DC 24 V supply and the power rail. The RPI modules function in a voltage range of 20 V DC up to 30 V DC. Special power units are unnecessary. When higher power is required, the voltage supply via the Power Rail can be divided into individual segments, which are supplied separately.

Bus systems
In addition to the conductors for power supply the Power Rail has three other conductors, across which the measurement signals are transmitted in digital form from the devices to a gateway and vice versa through an internal serial data bus. The communication control is taken over by the gateway. This gateway simultaneously provides the interface to an external standard bus, e.g. PROFIBUS DP, MODBUS etc., through which the signals are transmitted to the control system and vice versa. By selecting the gateway, the adaptation to the various bus systems (e.g. PROFIBUS or MODBUS), as well as to various process control systems is possible, including customer specific connections.

Number of channels
Up to a max. of 125 devices with up to 4 channels can be connected to a gateway, corresponding to a maximum of 500 channels. Multiple gateways can be coupled on the external bus to the control system, in order to form larger units. In practice this can be e.g. up to 125 gateways on PROFIBUS DP, providing e.g. 62.500 binary inputs. Nevertheless, channel numbers below 30 can also be attained by means of simple DIN rail mounting. RPI functions as a "modular slave" in PROFIBUS DP. This means that a RPI segment with up to 125 devices, thus maximum 500 channels, occupies only one PROFIBUS DP address.
System Description Remote Process Interface

Cycle times

The internal CAN bus system of the RPI guarantees a time equidistant transfer of signals from and to the gateway. The cycle time is dependent on the function and number of devices on the gateway:

<table>
<thead>
<tr>
<th>Device</th>
<th>Cycle Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25 ms</td>
</tr>
<tr>
<td>125</td>
<td>60 ms</td>
</tr>
<tr>
<td>125</td>
<td>90 ms</td>
</tr>
<tr>
<td>125</td>
<td>75 ms</td>
</tr>
<tr>
<td>125</td>
<td>110 ms</td>
</tr>
</tbody>
</table>

The cycle time of the external bus depends on the transfer system used, the number of stations, the quantity of data that has to be transferred and baud rate. In most applications, the cycle time is within a range of hundred milliseconds or lower. For more information, please refer to RPI system manual and documentation for the bus master of the control system, the PLC or PCs.

Marshalling

All of the mounting spaces on the power rail are the same. Each device can be mounted at any site on the rail. Marshalling is therefore unnecessary, especially since there is no point-to-point wiring to the control system.

RPI Device Functions

Basic functions

RPI devices have an uncomparably higher range of functions than conventional interface modules:

- Selection switch markings (TAG-Nr.) can be stored in device
- Comments and notes can be stored
- Physical units are adjustable
- Lead monitoring
- 4 limit values in analogue devices
- Malfunction output status
- Status signals
- Diagnosis
- Simulation of the process signals and the diagnosis to the control system
- Simulation of the process signals to the field
- Clock function and time stamping for initial value detection in gateways

HART Protocol

HART compatible transmitters and position controllers are supported in many ways by RPI:

1. The 4 mA ... 20 mA signal is transmitted across the internal and external bus. The devices have additional, plug screw terminals in the safe area, to which the HART communication for monitoring and programming of the connected transmitters or position controllers is connected. Thus, a hand-held communicator does not have to be connected to the intrinsically safe field conductors.

2. By means of a PC and the HART-Multiplexer Master KFD2-HMM-16 in association with the KSD2-HC HART control module and the KSD2-SC-Ex.H or KSD2-SC-S-H SMART transmitter power feed modules and the analogue SMART Output Repeaters KSD2-SC-Ex.H or KSD2-SC-S-H a subordinate HART communication level that is independent of the transfer of measured data via the fieldbus, can be built up. Up to 250 field devices (sensors or actuators) can be addressed with this system via PC using current HARD configuration software, such as Cornerstone (Astec), AMS (Emerson) or PACT™. The RS 485-interfaces of the HART-Multiplexer and of the RPI-Gateway can be networked. Then the RPI software PACT™ and the HART software can be operated on the same PC. The subordinate HART communication level guarantees access to the field devices even if the external bus of the RPI system has failed. This finds particular application on PLCs and control systems, that do not support the HART protocol themselves.

3. The new gateway KSD2-GW2-PRO allows HART communication via the integrated RS 485-interface. This interface can be accessed by means of PACT™. Thus, up to 250 HART field devices can be addressed without additional expenditure.

4. The 4 mA ... 20 mA signal is transferred together with the HART Protocol via the internal and external bus, PROFIBUS DP. This function is planned and will be used for process control systems, which support the HART protocol and in which the bus master can handle the HART message integrated into the protocol of the external bus. Another possibility is a PROFIBUS Master Class 2, integrated into the PC, which has access to the HART field device via the cyclic PROFIBUS DP V1 communication.

Configuration and Programming By Way of the Control System:

Every function of all devices and gateways can be initiated with the engineering console of a control system across the external bus, if the control system supports these functions.

Directly at the devices:

Some basic functions can be accessed directly the gateway and the devices without PC or control system.

From the PC by means of the Human Machine Interface:

The functions, configuration and parameters of all devices can be operated from the gateway and the PC. The function of an engineering console is achieved for the RPI with PLC systems. In addition to the connection for the external standard bus the gateway has a parameterisation interface for the temporary or permanent connection of a PC. Usually it is a RS 232 interface, which is supported by any PC. If gateways with RS 485 programming interfaces are used, then multiple gateways can be connected to a common service network. Thus the RPI devices of all gateways can be centrally operated from one single PC by means of a RPI user interface. This software runs under the operating systems Windows 98, Windows NT and Windows 2000 and follows the directive VDI/VDE 2187, which was developed by users in the chemical and automation industry. The directive also establishes the procedures for password protection and access rights as „Maintenance“ and „Specialist“. The language may be changed from German to English and vice versa. RPI systems can be planned, configured, programmed, documented, commissioned, diagnosed and modified by the RPI software online and offline, independent of the control system. The projection data of all RPI devices are stored to PC data carriers by means of the RPI user interface and can also be printed on paper as a hard copy.
Electrical Safety
In relation to conventional systems the lower amount of wiring proportionally decreases the probability of wiring faults. All RPI devices and gateways are individually and internally short circuit protected. Group short circuit protection of the devices is performed by the fuse of the power feed module. Shorting of the fuse is indicated by LED and relay contact.

Availability
The Remote Process Interface devices are developed and produced by Pepperl+Fuchs according to high quality standards. Coupling to the process control system through bus systems increases overall system availability. Signal processing in the control system is eliminated. Interferences at the bus cables are detected and the protocols are repeated. With the wide range of diagnostic capabilities of the RPI interferences can be categorised and corrected quickly or they can be prevented from occurring.

Configuration data are stored in the EEPROMs of the RPI device safe from power outages and without the use of backup batteries. In addition the data of all connected devices and the configuration data of the gateway are stored in the same way. The project data for the RPI are stored on the PC.

Redundancy of the voltage supply
The DC 24 V power supply for the RPI system can be arranged redundantly. Two voltage supplies can be connected over separate power feed modules. As a rule the two power supplies must be decoupled in order to prevent interaction between them. For this purpose, special power feed modules with integrated decoupling diodes are available.

Redundancy of the internal bus system
The mechanical properties of the internal bus system on the Power Rail is very durable. Nevertheless, the internal bus system has a serial redundant design. If the internal path fails due to breakage, short circuit between the conductors or due to a defective bus coupler, the system switches automatically from push-pull operation to phased operation. The bus signals are transferred over the remaining conductor, such that the negative potential of the supply voltage serves as a reference. This process is automatically indicated to the operator. The operator has time to correct the fault while the communication continues.

Redundancy of the external bus system and of the gate-

Fault management

Effects of faults in the RPI system:
1. Faults are signalled.
2. Faults can be diagnosed in detail.
3. Predetermined signal values can be programmed, which are transferred to the process, in case communications are interrupted on the internal or external bus.
4. Predetermined signal values can be programmed which are transferred to the control system, in case a measurement signal has not been received from the field.
5. The communication of the uninterrupted measurement circuit continues unaltered!

Fault signalling and fault diagnosis is carried out

1. by means of LEDs on the devices and LCD at the gateway in a limited extent.
   In case of the new gateway, type GW2, a large text display is available.
2. via PC and RPI control software by diagnosis menus. Detailed diagnosis of faults associated with hardware, firmware and communication of the devices and for each channel of the device separately lead breakage, short circuit, limit alarms, overrange and underrange.
3. with the control system by means of status signals to the same extent as in the case of b).
4. Also the correction of a fault is indicated on all three levels, a), b) and c).

The correction of faults is accomplished
- in case of device faults by simple replacement of defective devices. Adjustments, configurations or programming are not necessary. The devices are fully pluggable and may be replaced during operation
- during gateway faults by replacement of defective gateways. The configuration is loaded in the new gateway from the PC or from the control system. In operation with a redundant gateway the RPI continues to function unchanged.

Commissioning

The commissioning of the RPI is simplified in comparison with conventional systems:
1. Practically no wiring of the voltage supply and the control system. The time-consuming search for wiring faults is avoided.
2. RPI has full "plug-in" and "snap-on" features. All plug-in connection sites on the Power Rail are identical. All switch cabinets in a system can be similarly assembled. The devices do not have to be snapped on until they are put into operation. System changes are quickly accomplished.
3. A wide range of diagnostic tools are available which simplify the search for installation faults.
System Description Remote Process Interface

Expansions
The Power Rail is designed for expansion by having adequate space for the placement of additional units. Expensive pre-planning, pre-cabling and complex mechanics are avoided. Provided that it is permitted by the external bus system, expansions during operation can be made by snapping-on the units to the rail. At the gateway and on the control system, a signal indicates that an additional device has been added to the system. The new device can then be included in the RPI communication through a simple keystroke.

Special applications
Due to the high flexibility of RPI and its compatibility with the conventional Pepperl+Fuchs K-system special applications may also be realised. In emergency shut down systems (ESD systems) the input signal from the field should be a conventional 4 mA ... 20 mA safe area-signal and it should be digitally transmitted across the bus to the control system. Such tasks can be resolved by combining K-system and RPI system modules. The customer then obtains a compact and simple mechanical configuration. The K-system modules can be even mounted on the same DIN rail and supplied with power across the same Power Rail as RPI modules.

Cost Savings
The main feature of Pepperl+Fuchs' Remote Process Interface (RPI) is the transmission of measurement signals across serial bus systems, whereby the wiring between the RPI and control system as well as the I/O cards in the control system is no longer necessary.

The installation of the Pepperl+Fuchs Remote Process Interface results in noticeable savings in investment, planning, commissioning, operation and maintenance.

Training, Support
Questions concerning planning, installation, configuration, operation, safety, detection and correction of faults are answered by the RPI system manual. For the interconnection with control systems and PLCs a selection of application instructions is available.

The RPI software is self explanatory and has extensive help menus. Pepperl+Fuchs offers classes and workshops on Remote Process Interface and related subjects. The classes may also be given at the customers location. Pepperl+Fuchs has representatives in all parts of the world. They are willing to answer any questions that our customers might have. The “Network and Systems” group in Mannheim is at your disposal to answer special questions concerning RPI.

The following physical components can be set with the software:

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<thead>
<tr>
<th>Component</th>
<th>Unit</th>
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</table>
Function overview Remote Process Interface

Overview

The following overview will help you to quickly find the appropriate product for your application.

<table>
<thead>
<tr>
<th>Sensors and switch contacts</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 60947-5-6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rotational speed monitoring</th>
<th>Page</th>
</tr>
</thead>
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<tr>
<td>EN 60947-5-6</td>
<td></td>
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</table>

<table>
<thead>
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<th>Page</th>
</tr>
</thead>
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<tr>
<th>Valves</th>
<th>Page</th>
</tr>
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<tr>
<th>LEDs</th>
<th>Page</th>
</tr>
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</table>

Example

<table>
<thead>
<tr>
<th>Example</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trip amplifier KSD2-Bi-Ex4</td>
<td>page 38</td>
</tr>
<tr>
<td>Trip amplifier KSD2-Bi-4 (only mechanical contacts)</td>
<td>page 42</td>
</tr>
<tr>
<td>Frequency converter KSD2-FI-Ex</td>
<td>page 46</td>
</tr>
<tr>
<td>Frequency converter KSD2-FI-Ex</td>
<td>page 46</td>
</tr>
<tr>
<td>Solenoid driver KSD2-BO-Ex</td>
<td>page 54</td>
</tr>
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<td>Solenoid driver KSD2-BO-Ex</td>
<td>page 54</td>
</tr>
<tr>
<td>Function Overview Remote Process Interface</td>
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<td><strong>Overview</strong></td>
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### Audible alarms

- Solenoid driver
  - KSD2-BO-Ex
  - Page 54

### Transmitters

- Transmitter power supply
  - KSD2-Cl-S-Ex
  - Page 62

### SMART transmitters

- SMART transmitter power feed module
  - KSD2-Cl-S-Ex
  - Page 62

### Pt 100

- Universal temperature converter
  - KSD2-TI-Ex
  - Page 76

### Thermocouples

- Universal temperature converter
  - KSD2-TI-Ex
  - Page 76

### Current and voltage sources

- SMART-transmitter power supply
  - KSD2-Cl-S-Ex
  - Voltage converter
    - KSD2-MVI
    - KSD2-VI
    - Page 62
    - Page 84
    - Page 86

### I/P Converters, Positioners, SMART capable

- Analogue output repeater
  - KSD2-CO-S-Ex
  - Page 94
### Type identification code

<table>
<thead>
<tr>
<th>Position 1</th>
<th>Pos. 2</th>
<th>Pos. 3</th>
<th>Pos. 4</th>
<th>Pos. 5</th>
<th>Pos. 6</th>
<th>Pos. 7</th>
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<tr>
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<td>D</td>
<td>2</td>
<td>B</td>
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<td>F</td>
<td>S</td>
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<td>Number of channels, not applicable for single channel devices</td>
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<td>Construction</td>
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</tbody>
</table>

**K** = K-system  
**F** = Housing height (115 mm) with removable terminals  
**S** = Remote Process Interface (RPI)  
**D** = DC power supply  
**2** = up to 24 V  
**BI** = Trip amplifier  
**BO** = Solenoid driver  
**CI** = Transmitter power supply  
**CI-S** = SMART-transmitter power supply  
**CO** = Output repeater  
**CO-S** = SMART Output Repeater  
**EB.RPI** = Power Rail-Power Feed Module for RPI  
**EB.Rxx.RPI** = Redundant Power Rail-Power Feed Module for RPI (xx = max. mechanical load, e.g. 2A = 2 Ampere)  
**EB.MAR** = Redundant Power Rail-Power Feed Module for the use of RPI on ships  
**FI** = Frequency converter  
**GW** = Gateway  
**HC** = HART control module  
**MVI** = Voltage converter  
**RO** = Relay module  
**TI** = Temperature converter  
**VI** = Voltage converter  
**2 or 2.2** = 2 Channel  
**4 or 4.2** = 4-channel  
**CN** = for ControlNet  
**CN-485** = for ControlNet with RS 485 program interface  
**H** = HART communication  
**MOD** = for MODBUS  
**MOD-485** = for MODBUS with RS 485 program interface  
**MPL** = for MODBUS plus  
**MPL-485** = for MODBUS plus with RS 485 program interface  
**PRO** = for PROFIBUS  
**PRO-485** = for PROFIBUS with RS 485 program interface
System description

Intended use
- 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 standardisation of 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.
- Laws and/or regulations governing the use or intended usage goal 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 modules are constructed to satisfy protection class IP20 in accordance with EN 60529 and must accordingly be appropriately further protected in the case of adverse ambient conditions, such as water spraying or dirt in excess of pollution severity 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 must be undertaken in accordance with the relevant installation regulations.
- For the connection of intrinsically safe field devices with the intrinsically safe circuits of associated apparatus of the RPI system the respective peak values of the field device and of the associated apparatus with regard to explosion protection have to be observed (proof of intrinsic safety). The document that must be observed here is EN 60079-14/IEC 60079-14. In the case of the Federal Republic of Germany the "National foreword" in DIN EN 60079-14/VDE 0165 Part 1 must be observed.
- When intrinsically safe circuits are used in areas made hazardous by dust (Ex-Zone "D"), only appropriately certificated field devices must be used.
- The EU certificate of conformity, the EU prototype test certificate, the EU statement on conformity or the manufacturer's declaration of conformity should be observed. It is especially important to observe the "Special Conditions" where these are contained in the certificates.

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 the device must only be undertaken by specialist authorised personnel who have been trained for the task.
Construction type and mounting
The RPI system basically allows two different types of mounting:

1. Panel mounting
2. Mounting on a 35 mm standard DIN rail to DIN EN 50022.

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 Pepperl+Fuchs's "Power Rail" for the RPI-series.

KS 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 mm². The connectors are coded, so that it is not possible to make an incorrect connection. With the KF-CP coding profile, separately available connectors with test sockets or cage spring release terminals can be easily coded.

Wiring costs are very low when supplying power via the Power Rail. It is also possible to take advantage of a 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.
System description

Power Rail
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.

Two of three additional conductors serve for serial data transfer (UPR-05).

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

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
Power Feed Concepts for Power Rail

Redundant power supply

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

Electrical standards for the RPI system

Ex Signals/field circuit

- Transmitter power supply up to 17 V DC
- Current input max. 200 Ohm
- Pt100, in 2-, 3-, (4-) wire technology
- Resistance 0 Ohm ... 400 Ohm curve can be defined
- Thermocouple for each model, internal cold setting, external reference
- Current output min. 600 Ohm
- Binary input NAMUR DIN EN 60947-5-6
- Frequency input
- Binary output for Ex-i valves, short circuit protected (For details, see data sheet)
- Relay output

Mechanics of the Remote Process Interface

Mounting

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

removable connector with integrated self opening device terminals for leads of up to a max. of 1 x 2.5 mm²

Miscellaneous

KS series: Coded connectors

Reference operating conditions for calibration

22.5 °C ± 2.5 °C

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 and control circuit

- 0/4 mA ... 20 mA signal level in accordance with NE43
- Current output min. 550 Ohm
- Current input max. 200 Ohm
- Binary input for mechanical contacts
- Voltage input
- 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)
- Frequency input
System description

Other standards for the RPI system

General
Isolator modules with and without explosion protection, mostly with Ex ia IIC, international approvals
EMC in accordance with NAMUR NE21 and EN 50081-2, EN 61326
LEDs satisfying NAMUR NE44
Switch-on pulse suppression
Supply voltage min. 20 V ... 30 V DC
DC: Power Rail
Man/machine interface software to VDE/VDI 2187

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

Insulation coordination for use of galvanic insulation in accordance with DIN EN 50178 and DIN/VDE 0106
The RPI devices are built-in devices and electronic apparatus for installing in closed electrical operating areas, to which only qualified electrical specialists and technicians have access.
The devices are rated for use in pollution degree level 2 environments and overvoltage category II, in accordance with DIN EN 50178.

Insulation coordination for devices with Ex certification in accordance with EN 50020
The devices are rated for use in pollution degree level 2 environments in accordance with DIN EN 50178.
Housing Types

**Housing type A1**
Height: 93 mm
(without K1 and K4 terminals)

**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 B2**
Height: 100 mm
(without K1 terminal)

**Housing type C**

**Housing type G**
The KF-mounting rail from Pepperl+Fuchs

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.

What advantages does the KF profile offer?

Very tight packing density in control cabinet assemblies, since the cable trunking is integrated in the mounting profile.
Switch cabinet layout

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

1. Marshalling and interface modules in one control cabinet.
   Short cable paths and a compact assembly highlight this configuration.
   The system oriented (ungrouped) signals are wired via field cables and terminal strips and from there they are marshalled directly on the KS modules. Thus, the KS modules are a copy of the I/O plane. The fieldbus cable, which is connected to the gateway of the RPI system, provides the connection to the higher level 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 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.

Application instructions

Installation and service

The Remote Process Interface has been tested with a variety of common process control systems and PLCs.
In addition to the RPI system manual, Pepperl+Fuchs can provide appropriate instructions for the application of RPI in special connections to PLCs and control systems, which provide the user with the required detailed information for connecting RPI to the external bus and configuring the bus master.

On request, Pepperl+Fuchs will install, configure and program the RPI system in accordance with the customer’s specifications and will take facilitate connection of the process control system or PLC.
In addition, Pepperl+Fuchs can supply complete systems, fully installed in control cabinets, to the standardised specification or to suit the requirements of the user.

Please ask us for a firm quotation.
Application instructions

Accessories: Label carrier
(KFD0-LC1-XXX, KFD0-LC1-YYY)
For additional labeling (position numbers, signal names etc.) of the KS modules in the switch cabinet. The labelling strips are 0.5 m or 1 m in length. A labelling surface area of 20 x 30 mm is available per KF module. See section "Accessories and installation techniques" for more information (page 140).
**Technical data**

<table>
<thead>
<tr>
<th>Transformer Isolated Barriers</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-channel</td>
<td></td>
</tr>
<tr>
<td>KSD2-BI-Ex2</td>
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<tr>
<td>4-channel</td>
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<tr>
<td>KSD2-BI-Ex4</td>
<td>38</td>
</tr>
<tr>
<td>KSD2-BI-4</td>
<td></td>
</tr>
<tr>
<td>without Ex-i signal circuit</td>
<td>42</td>
</tr>
<tr>
<td>KSD2-BI-4.2</td>
<td></td>
</tr>
<tr>
<td>without Ex-i signal circuit</td>
<td>44</td>
</tr>
</tbody>
</table>

| Current Frequency Converter   |      |
| 1-channel                     |      |
| KSD2-FI-Ex                    | 46   |
| KSD2-FI                       |      |
| without Ex-i signal circuit   | 50   |

| Solenoid Drivers              |      |
| 1-channel                     |      |
| KSD2-BO-Ex                    | 54   |
| output voltage 24 V DC, output current 45 mA |

| Solenoid Drivers              |      |
| 2-channel                     |      |
| KSD2-BO-Ex2.2                 | 56   |
| Output voltage 23.8 V DC, output current 35 mA |

| Relay Modules                 |      |
| 2-channel                     |      |
| KSD2-RO-Ex2                   | 58   |
| KSD2-RO-2                     |      |
| without Ex-i signal circuit   | 60   |
## Technical data

**Transmitter power supplies**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KSD2-CI-S-Ex</td>
<td>SMART-transmitter power supply</td>
<td>62</td>
</tr>
<tr>
<td>KSD2-CI-S</td>
<td>SMART-transmitter supply isolator, without Ex-i signal circuit</td>
<td>66</td>
</tr>
<tr>
<td>KSD2-CI-S-Ex.H</td>
<td>HART transmitter power supply</td>
<td>68</td>
</tr>
<tr>
<td>KSD2-CI-S-H</td>
<td>HART-transmitter supply isolator, without Ex-i signal circuit</td>
<td>70</td>
</tr>
<tr>
<td>2-channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KSD2-CI-Ex2</td>
<td>SMART-transmitter power supply</td>
<td>72</td>
</tr>
<tr>
<td>KSD2-CI-2</td>
<td>SMART-transmitter supply isolator, without Ex-i signal circuit</td>
<td>74</td>
</tr>
</tbody>
</table>

**Converters**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KSD2-TI-Ex</td>
<td>Universal temperature converter</td>
<td>76</td>
</tr>
<tr>
<td>KSD2-TI</td>
<td>without Ex-i signal circuit</td>
<td>80</td>
</tr>
</tbody>
</table>

**Voltage converter**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KSD2-MVI</td>
<td>without Ex-i signal circuit</td>
<td>84</td>
</tr>
<tr>
<td>KSD2-VI</td>
<td>without Ex-i signal circuit</td>
<td>86</td>
</tr>
</tbody>
</table>
## Technical data

### Analogue Output Repeaters

#### 1-channel

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSD2-CO-Ex</td>
<td>Output repeater</td>
<td>88</td>
</tr>
<tr>
<td>KSD2-CO</td>
<td>without Ex-i signal circuit</td>
<td>92</td>
</tr>
<tr>
<td>KSD2-CO-S-Ex</td>
<td>SMART output repeaters</td>
<td>94</td>
</tr>
<tr>
<td>KSD2-CO-S</td>
<td>SMART output repeaters without Ex-i signal circuit</td>
<td>98</td>
</tr>
<tr>
<td>KSD2-CO-S-Ex.H</td>
<td>HART output repeaters.</td>
<td>100</td>
</tr>
<tr>
<td>KSD2-CO-S-H</td>
<td>HART output repeaters without Ex-i signal circuit</td>
<td>102</td>
</tr>
</tbody>
</table>

### Gateways

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSD2-GW-PRO</td>
<td>Gateway for PROFIBUS</td>
<td>104</td>
</tr>
<tr>
<td>KSD2-GW-PRO.485</td>
<td>Gateway for PROFIBUS with RS 485 program interface</td>
<td>106</td>
</tr>
<tr>
<td>KSD2-GW2-PRO</td>
<td>Gateway for PROFIBUS DP V1</td>
<td>108</td>
</tr>
<tr>
<td>KSD2-GW-MOD</td>
<td>Gateway for MODBUS</td>
<td>112</td>
</tr>
<tr>
<td>KSD2-GW-MOD.485</td>
<td>Gateway for MODBUS with RS 485 program interface</td>
<td>114</td>
</tr>
<tr>
<td>KSD2-GW-CN</td>
<td>Gateway for ControlNet</td>
<td>116</td>
</tr>
<tr>
<td>KSD2-GW-CN.485</td>
<td>Gateway for ControlNet with RS 485 program interface</td>
<td>118</td>
</tr>
<tr>
<td>KSD2-GW-MPL</td>
<td>Gateway for MODBUS plus</td>
<td>120</td>
</tr>
<tr>
<td>KSD2-GW-MPL.485</td>
<td>Gateway for MODBUS plus with RS 485 program interface</td>
<td>122</td>
</tr>
<tr>
<td>System accessories</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td><strong>KSD2-HC</strong></td>
<td>124</td>
<td></td>
</tr>
<tr>
<td>HART control module</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>KFD2-EB.RPI</strong></td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>Power Feed Module for RPI, maximum load 4 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>KFD2-EB.R2A.RPI</strong></td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>Redundant Power Feed Module for RPI, maximum load 2 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>KFD2-EB.MAR.RPI</strong></td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>Redundant Power Feed Module for the use of RPI on ships, maximum load 2 A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Isolated switch amplifiers

KSD2-BI-Ex2

Function

The KSD2-BI-Ex2 transfers digital input signals from the hazardous area into the safe area across the Power Rail bus. Proximity sensors in accordance with DIN EN 60947-5-6 (NAMUR) or mechanical contacts may be used as alarms. The inputs have a common positive reference and are galvanically isolated from the output and power per DIN EN 50020.

Composition

The transfer of digital input signals from proximity switches or dry contacts from the hazardous area to the PLC or the DCS.

Application

Electrical Connection

2-channel
Input EEx ia IIC
Device installation permissible in zone 2
24 V DC rated operational voltage
Lead breakage (LB) monitoring and short-circuit (SC) monitoring
Power Rail bus
EMC acc. to NAMUR NE 21

KSD2-BI-Ex2
### Technical Data

#### Supply
<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate <code>d</code> voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>1 W</td>
</tr>
</tbody>
</table>

#### Input
| Connection | terminals 2+, 3-, 5+, 6- |
| Rate `d` values | acc. to DIN EN 60947-5-6 (NAMUR, DIN 19234) |
| Switching point/Switching hysteresis | 1.2 ... 2.1 mA / approx. 0.2 mA |
| Pulse/Pause ratio | ≥ 20 ms / ≥ 20 ms |
| Lead monitoring | breakage I < 0.1 mA ; short-circuit I > 6 mA |

#### Output
| Connection | Power Rail |

#### Transfer characteristics
| Switching frequency | ≤ 10 Hz |

#### Electrical isolation
Input/Power supply, internal bus safe electrical isolation acc. to EN 50020, voltage peak value 375 V

#### Standard conformity
Climatic conditions acc. to DIN IEC 721

#### Directive conformity
Electromagnetic compatibility standards
Directive 89/336/EG EN 61326, EN 50081-2, NE 21

#### Ambient conditions
Ambient temperature -20 ... 60 °C (253 ... 333 K)

#### Mechanical specifications
Protection degree IP20

#### Data for application in conjunction with hazardous areas
| Electrical isolation | Input/Power supply, internal bus safe electrical isolation acc. to EN 50020, voltage peak value 375 V |
| Directives and standards | Directive conformity standards |
| Directive 94/9 EU EN 50014, EN 50020, EN 50021 |

#### Entity parameter
Certification number J.1.0045.AX
FM control drawing No. 116-0150
Suitable for installation in division 2 yes
Connection terminals 1, 2, 3; 4, 5, 6
Input I
| Current | 31.9 mA |
| Voltage | 10.6 V |
| Explosion group | A&B C&E D, F&G |
| Maximum external capacitance | 2.62 µF 7.86 µF 20.96 µF |
| Maximum external inductance | 33.75 mH 101.25 mH 270 mH |

#### Safety parameter
| CSA control drawing | LR 36087-18 |
| Control drawing | No. 116-0149 |
| Connection | terminals 1, 2, 3; 4, 5, 6 |
| Input I | |
| Voltage | 9.6 V |
| Explosion group | A&B C&E D, F&G |
| Maximum external capacitance | 3.5 µF 10.5 µF 28 µF |
| Maximum external inductance | 33 mH 119 mH 285 mH |

#### Supplementary information
EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com
Software functions:
Adjustable by the PACTpure™ human machine interface.
• Information on devices may be saved in PC memory
The following are separately adjustable for each channel:
• Tag numbers, 28 alphanumeric characters, can be programmed into device
• Commentary, may be saved in PC memory
• Input inversion
• Lead monitoring selectable
• Separate detection and indication of lead breakage and lead short circuit
• Malfunction output status
  • downscale
  • upscale
• Hold last value
• Simulation
  • of the input value
  • of the device diagnosis
  • of the process channel diagnosis

Notes
Isolated switch amplifiers

KSD2-BI-Ex4

Function

The KSD2-BI-Ex4 transmits digital input signals from the hazardous area into the safe area across the Power Rail bus. Proximity sensors in accordance with DIN EN 60947-5-6 (NAMUR) or mechanical contacts may be used as alarms. The inputs have a common positive reference and are galvanically isolated from the output and power per DIN EN 50020.

Composition

The transfer of digital input signals from proximity switches or dry contacts from the hazardous area to the PLC or the DCS.

Electrical Connection

4-channel
Input EEx ia IIC
Device installation permissible in zone 2
24 V DC rated operational voltage
Lead breakage (LB) monitoring and short-circuit (SC) monitoring
Power Rail bus
EMC acc., to NAMUR NE 21

The KSD2-BI-Ex4 electrical connection diagram shows the inputs EEx ia IIC, labeled as Input I, II, III, and IV. Each input has a range of 400 Ω ≤ R ≤ 2 kΩ with a 10 kΩ resistor. The diagram also illustrates the Power Rail bus and the bus µc, indicating the transfer of digital input signals from proximity switches or dry contacts from the hazardous area to the PLC or the DCS.
### Technical Data

#### Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power loss</td>
<td>0.8 W</td>
</tr>
<tr>
<td>Power consumption</td>
<td>1 W</td>
</tr>
</tbody>
</table>

#### Input

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 1-, 2+, 3-, 4-, 5+, 6-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated values</td>
<td>acc. to DIN EN 60947-5-6 (NAMUR, DIN 19234)</td>
</tr>
<tr>
<td>Switching point/switching hysteresis</td>
<td>1.2 ... 2.1 mA / approx. 0.2 mA</td>
</tr>
<tr>
<td>Pulse/Pause ratio</td>
<td>≥ 20 ms / ≥ 20 ms</td>
</tr>
<tr>
<td>Lead monitoring</td>
<td>brakeage I &lt; 0.1 mA; short-circuit I &gt; 6 mA</td>
</tr>
</tbody>
</table>

#### Output

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus</td>
</tr>
</tbody>
</table>

#### Transfer characteristics

| Switching frequency | ≤ 10 Hz |

#### Electrical isolation

| Input/Power supply, internal bus | safe electrical isolation acc. to EN 50020, voltage peak value 375 V |

#### Standard conformity

| Climatic conditions | acc. to DIN IEC 721 |

#### Directive conformity

| Electromagnetic compatibility standards | EN 61326, EN 50081-2, NE 21 |

#### Mechanical specifications

| Ambient temperature | -20 ... 60 °C (253 ... 333 K) |

#### Data for application in conjunction with hazardous areas

| EC-Type Examination Certificate | ZELM 99 ATEX 0012; for additional certificates see www.pepperl-fuchs.com |
| Entity parameter | Certification number |
| FM control drawing | No. 116-0150 |
| Conception | terminals 1, 2, 3, 4, 5, 6 |
| Input | Current | 31.9 mA |
| Voltage V_i | 10.6 V |
| Explosion group A & B | C & E | D, F & G |
| Max. external capacitance C_a | 2.62 µF | 7.86 µF | 20.96 µF |
| Max. external inductance L_a | 33.75 mH | 101.25 mH | 270 mH |

#### Safety parameter

| CSA control drawing | LR 36087-18 |
| Control drawing | No. 116-0149 |
| Conception | terminals 1, 2, 3, 4, 5, 6 |
| Input | Voltage V_OC | 9.6 V |
| Current | I_OC | 31.3 mA |
| Explosion group A & B | C & E | D, F & G |
| Max. external capacitance C_a | 3.5 µF | 10.5 µF | 28 µF |
| Max. external inductance L_a | 33 mH | 119 mH | 285 mH |

#### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com
Software functions:
Adjustable by the PACT® human machine interface.
- Information on devices may be saved in PC memory
The following are separately adjustable for each channel:
- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory
- Input inversion
- Lead monitoring selectable
- Separate detection and indication of lead breakage and lead short circuit
- Malfunction output status
  - downscale
  - upscale
- Hold last value
- Simulation
  - of the input value
  - of the device diagnosis
  - of the process channel diagnosis
**Transformer Isolated Barrier for the Connection of Passive Contacts**

**KSD2-BI-4**

**Function**

The KSD2-BI-4 transmits digital input signals across the Power Rail bus. Dry contacts are used as the transmitters. The inputs have a common positive reference and are galvanically isolated from the output and power per DIN EN 61010.

**Application**

The transfer of digital input signals from dry contacts to the PLC or the DCS.

**Composition**

- 4-channel
- 24 V DC nominal supply voltage
- Power Rail bus
- EMC acc. to NAMUR NE 21

The KSD2-BI-4 transmits digital input signals across the Power Rail bus. Dry contacts are used as the transmitters. The inputs have a common positive reference and are galvanically isolated from the output and power per DIN EN 61010.

**Application**

The transfer of digital input signals from dry contacts to the PLC or the DCS.
## Technical Data

### Supply
- **Connection**: Power Rail
- **Rated voltage**: 20 ... 30 V DC
- **Ripple**: < 10 %
- **Power consumption**: 1.2 W

### Input
- **Connection**: terminals 1-, 2+, 3-, 4-, 5+, 6-
- **Open loop voltage**: 24 V
- **Short-circuit current**: approx. 2 mA

### Output
- **Connection**: Power Rail
- **Interface**: CAN protocol via Power Rail bus

### Transfer characteristics
- **Switching frequency**: ≤ 10 Hz

### Electrical isolation
- **Input/Power supply, internal bus**: basic insulation acc. to DIN EN 50178, rated insulation voltage 300 V

### Standard conformity
- **Coordination of insulation**: acc. to DIN EN 50178
- **Electrical isolation**: acc. to DIN EN 50178
- **Climatic conditions**: acc. to DIN IEC 721

### Directive conformity
- **Electromagnetic compatibility standards**: Directive 89/336/EG
- **Ambient conditions**: EN 61326, EN 50081-2, NE 21

### Mechanical specifications
- **Protection degree**: IP20
- **Mass**: approx. 100 g

### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Notes

**Software functions:**

Adjustable by the PACT™ human machine interface.
- Information on devices may be saved in PC memory
- The following are separately adjustable for each channel:
  - Tag numbers, 28 alphanumeric characters, can be programmed into device
  - Commentary, may be saved in PC memory
  - Input inversion
  - Simulation
    - of the input value
    - of the device diagnosis
    - of the process channel diagnosis
Isolated switch amplifiers

KSD2-BI-4.2

Function

The KSD2-BI-4.2 transmits digital input signals across the Power Rail Bus. Proximity sensors in accordance with DIN EN 60947-5-6 (NAMUR) or mechanical contacts may be used as alarms.

The inputs have a common positive reference and are galvanically isolated from the output and power per DIN EN 50178.

Application

The transfer of digital input signals of proximity sensors or dry contacts to the PLC or the DCS.

Composition

Electrical Connection

Input I

Input II

Input III

Input IV

without SC

without LB, without SC

1-

10 kΩ

2+ 400 Ω ≤ R ≤ 2 kΩ

10 kΩ

3-

10 kΩ

5+

10 kΩ

2+

2+

2+

2+

3-

3-

3-

3-

4-

4-

4-

4-

5+

5+

5+

5+

6-

6-

6-

6-

without SC

without LB, without SC

1-

10 kΩ

2+

2+

2+

2+

3-

3-

3-

3-

4-

4-

4-

4-

5+

5+

5+

5+

6-

6-

6-

6-

μc

Bus

Power supply

Power Rail
## Technical Data

<table>
<thead>
<tr>
<th><strong>Supply</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection</strong></td>
<td>Power Rail</td>
</tr>
<tr>
<td><strong>Rated voltage</strong></td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td><strong>Ripple</strong></td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>1 W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Input</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection</strong></td>
<td>terminals 1-, 2+, 3-, 4+, 5-, 6-</td>
</tr>
<tr>
<td><strong>Rated values</strong></td>
<td>acc. to DIN EN 60947-5-6 (NAMUR, DIN 19234)</td>
</tr>
<tr>
<td><strong>Pulse/Pause ratio</strong></td>
<td>≥ 20 ms / ≥ 20 ms</td>
</tr>
<tr>
<td><strong>Lead monitoring</strong></td>
<td>Load I &lt; 0.1 mA; Short-circuit I &gt; 6 mA</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Output</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection</strong></td>
<td>Power Rail</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>CAN protocol via Power Rail bus</td>
</tr>
<tr>
<td><strong>Transfer characteristics</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Switching frequency</strong></td>
<td>≤ 10 Hz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Electrical isolation</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output/Power supply, in teinal bus</strong></td>
<td>basic insulation acc. to DIN EN 50178, rated insulation voltage 300 V&lt;sub&gt;eff&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Standard conformity</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Climatic conditions</strong></td>
<td>acc. to DIN IEC 721</td>
</tr>
<tr>
<td><strong>Directive conformity</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Electromagnetic compatibility standards</strong></td>
<td>EN 61326, EN 50081-2, NE 21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Ambient conditions</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>-20 ... 60 °C (253 ... 333 K)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Mechanical specifications</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protection degree</strong></td>
<td>IP20</td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>approx. 100 g</td>
</tr>
</tbody>
</table>

## Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

## Notes

**Software functions:**
Adjustable by the PACT<sup>™</sup> Human Machine Interface.
- Information on devices may be saved in PC memory
- The following are separately adjustable for each channel:
  - Tag numbers, 28 alphanumeric characters, can be programmed into device
  - Commentary, may be saved in PC memory
  - Input inversion
  - Lead monitoring selectable
  - Separate detection and indication of lead breakage and lead short circuit
  - Malfunction output status
    - downscale
    - upscale
    - Maintenance of the last accepted value
  - Simulation
    - of the input value
    - of the device diagnosis
    - of the process channel diagnosis
Frequency converter

KSD2-FI-Ex

Function

The KSD2-FI-Ex transfers frequencies of digital input signals across the Power Rail bus from the hazardous areas into the safe area. Inputs for both channels can be DIN EN 60947-5-6 (NAMUR) proximity sensors, which register the rotation speed of flow switches. Optocouplers and mechanical contacts can also be linked to the module.

Depending on its configuration, the KSD2-FI-Ex can serve as a dual channel frequency meter, signal rate meter, a flow control gauge when using rotary encoders, a rotation direction indicator, rotation speed monitor, standstill monitor or a batch controller.

The KSD2-FI-Ex has a signal input and an additional auxiliary input which is only used for rotation and flow determination. Lead monitoring checks both the leads of the signal input and the auxiliary signal input. Lead monitoring and/or mode of operation is indicated by the yellow LED IN/CHK. Both inputs have a common reference (plus) and are galvanically isolated from the output and power per DIN EN 50020.

Composition

Electrical Connection

The diagram shows the inputs EEx ia IIC, pulse input, auxiliary signal input, power supply, and the connections for the hazardous area zone 2 and safe area or hazardous area zone 2.
## Technical Data

### Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>1 W</td>
</tr>
</tbody>
</table>

### Input

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 2+, 3-, 5+, 6-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated values</td>
<td>acc. to DIN EN 60947-5-6, (NAMUR, DIN 19234)</td>
</tr>
<tr>
<td>Switching point/Switching hysteresis</td>
<td>1.2 ... 2.1 mA / approx. 0.2 mA</td>
</tr>
<tr>
<td>Pulse/Pause ratio</td>
<td>40 ... 60 % of period at 1000 Hz; 10 ... 90 % of period at 250 Hz</td>
</tr>
<tr>
<td>Lead monitoring</td>
<td>breakage I &lt; 0.1 mA; short-circuit I &gt; 6 mA</td>
</tr>
</tbody>
</table>

### Output

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
</table>

### Interface

- CAN protocol via Power Rail bus

### Transfer characteristics

- Deviation: < 0.1 %
- Switching frequency: 0.3 ... 1500 Hz (If the maximum input frequency of 1500 Hz is exceeded, the signal value is undefined! No further messages.)
- Rotation direction detection: < 350 Hz

### Electrical isolation

- Input/Power supply, internal bus: safe electrical isolation acc. to EN 50020
- Electromagnetic compatibility: acc. to DIN EN 60947-5-6
- Directive conformity: EN 61326, EN 50081-2, NAMUR NE 21
- Ambient conditions: acc. to DIN IEC 721
- Ambient temperature: -20 ... 60 °C (253 ... 333 K)

### Mechanical specifications

- Protection degree: IP20
- Mass: approx. 100 g

### Data for application in conjunction with hazardous areas

- EC-Type Examination Certificate: ZELM 99 ATEX 0012; for additional certificates see www.pepperl-fuchs.com
- Group, category, type of protection, Temperature classification: II (1) G [EEx ia] IIC
- Voltage: 9.6 V
- Current: 16 mA
- Power: 38 mW (linear characteristic)
- Group, category, type of protection: II 3 G EEx nA II T4
- Electrical isolation: safe electrical isolation acc. to EN 50020
- Directive conformity: EN 50014, EN 50020, EN 50021

### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Application

Frequency measurement, signal rate measurement, flow measurement with rotary encoders, rotation direction monitoring, flow direction monitoring, rotation speed monitoring, standstill monitoring or batch controller.
Notes

Software functions:
Adjustable by the PACT™ human machine interface.
- Information on devices may be saved in PC memory
- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory
- Physical units are adjustable
- For a list see System Description RPI
- Lead monitoring selectable
- Collective lead monitoring for both signal input and auxiliary signal input
- Separate detection and indication of lead breakage and lead short circuit
- Malfunction output status
- User defined
- Maintenance of the last accepted signal value

- Simulation
  - of the measurement value
  - of the device diagnosis
  - of the process channel diagnosis
- The signal value is undefined when the maximum input frequency of 1500 Hz is exceeded! In this case, no further reports are displayed.

Frequency measurement, signal rate measurement, flow measurement, rotation speed monitoring
Only the input signal is evaluated.
- Conversion of the input frequency into various signal ranges, i.e. 0 l/s ... 20 l/s or 10 kg/min ... 500 kg/min
- 4 limit values
  - Upper alarm level limit
  - Upper warn level limit
  - Lower warn level limit
  - Lower alarm level limit

Rotation direction monitoring, flow direction monitoring with flow control measurement, pulse rate measurement, flow control measurement, rotation direction monitoring
- Functions such as frequency measurement, however, the pulse input as well as the auxiliary signal input are evaluated. The frequency is determined by the signal input. In addition, the phase relationship of the input signal is checked at the auxiliary signal input for the determination of the rotation direction monitoring.
- The measurement signal is evaluated with the sign:
  - positive = forward, signal input is damped first, LED IN/CHK illuminates yellow
  - negative = backward, auxiliary signal input is damped first, LED IN/CHK is not illuminated

Batch controller
Only the input signal is evaluated.
- Conversion of the input frequency into various signal ranges, i.e. 0 ... 20 l/s or 10 ... 500 kg/min
- 4 limit values
  - Upper alarm level limit
  - Upper warn level limit
  - Lower warn level limit
  - Lower alarm level limit
- 2 summary counters, resettable
- Batch Controller with pre-set warnings and pre-set alarm
- Entry of the pre-set alarm limit
- Entry of the pre-set warning limit
- Start of the counter process and deactivation of the alarm signals through the set command, as long as the shut-down values are not exceeded
- Activation of the alarm signals through stop command
- Reset of the counter process and activation of the alarm signals through the set command
- After activation of the alarm signals, input signals continue to be registered in the counter
- Entry of the shut-down values and the control commands from the control system via the external bus or via a PC with the RPI software connected to the parameterization interface of the gateway.

Batch controller with rotation direction monitoring, flow direction monitoring
Functions as in the case of batch controller, however the signal input as well as the auxiliary signal input are evaluated.
- The direction of the input signal is indicated:
  - positive = forward, signal input is damped first, LED IN/CHK yellow, batch controller is incremented
  - negative = backward, auxiliary power input is damped first, LED IN/CHK is not illuminated, batch controller is decremented
- Negative counting is possible.

Standstill monitoring
- In all modes of operation, such as frequency measurement, rotation direction signalling and batch controller, a standstill monitoring can be achieved by setting the 4 limit values accordingly.
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**KSD2-FI**

**Function**

The KSD2-FI transfers frequencies of digital input signals from the field to the control system via the Power Rail bus. Inputs for both channels can be DIN EN 60947-5-6 (NAMUR) proximity sensors, which register the rotation speed of flow switches. Optocouplers and mechanical contacts can also be linked to the module. The KSD2-FI is used for signal processing. Depending on its configuration, the device can serve as a frequency meter, pulse-rate meter, a flow meter when using rotary encoders, a rotation direction indicator, rotation speed monitor, standstill monitor or a batch controller.

The KSD2-FI has a signal input and an additional auxiliary signal input which is only used for rotation and flow direction indication. Lead monitoring checks both the leads of the signal input and the auxiliary signal input. Lead monitoring and/or mode of operation is indicated by the yellow LED IN/CHK.

Both inputs have a common positive reference (plus) and are galvanically isolated from the output and power supply.
### Technical Data

#### Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>1 W</td>
</tr>
</tbody>
</table>

#### Input

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 2+, 3; 5+, 6-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated values</td>
<td>acc. to DIN EN 60947-5-6 (NAMUR, DIN 19234)</td>
</tr>
<tr>
<td>Switching point/</td>
<td>1.2 ... 2.1 mA / approx. 0.2 mA</td>
</tr>
<tr>
<td>Switching hysteresis</td>
<td></td>
</tr>
<tr>
<td>Pulse/Pause ratio</td>
<td>40 ... 60 % of period at 1000 Hz; 10 ... 90 % of period at 250 Hz</td>
</tr>
<tr>
<td>Lead monitoring</td>
<td>Load I &lt; 0.1 mA; Short-circuit I &gt; 6 mA</td>
</tr>
</tbody>
</table>

#### Output

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus</td>
</tr>
</tbody>
</table>

#### Transfer characteristics

<table>
<thead>
<tr>
<th>Deviation</th>
<th>&lt; 0.1 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching frequency</td>
<td>0.3 ... 1500 Hz</td>
</tr>
<tr>
<td>Rotation direction detection</td>
<td>&lt; 350 Hz Phase difference between pulse input signal and auxiliary pulse signal min. ± 700 µs (= ± 90° at 350 Hz)</td>
</tr>
</tbody>
</table>

#### Electrical isolation

| Input/Power supply, internal bus | basic insulation acc. to DIN EN 50178, rated insulation voltage 300 V SELV |

#### Standard conformity

<table>
<thead>
<tr>
<th>Electromagnetic compatibility</th>
<th>acc. to EN 50081-2 / EN 50082-2, NAMUR NE 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climatic conditions</td>
<td>acc. to DIN IEC 721</td>
</tr>
</tbody>
</table>

#### Directive conformity

| Directive 89/336/EG          | EN 61326, EN 50081-2, NE 21 |

#### Mechanical specifications

| Ambient temperature          | -20 ... 60 °C (253 ... 333 K) |
| Mass                          | approx. 100 g |

#### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

#### Application

Frequency measurement, signal rate measurement, flow measurement with rotary encoders, rotation direction monitoring, flow direction monitoring, rotation speed monitoring, standstill monitoring or batch controller.

#### Notes

Software functions:

The software functions are adjustable by the PACT®Ware Human Machine Interface.

- Information on devices may be saved in PC memory
- Tag numbers, 28 alphanumerical characters, can be programmed into device
- Commentary, may be saved in PC memory
- Physical units are adjustable
- List see "The RPI system"
- Lead monitoring selectable
- Collective lead monitoring for both signal input and auxiliary signal input
- Separate detection and indication of lead breakage and lead short circuit
- Malfunction output status
  - User defined
  - Maintenance of the last accepted signal value
- Simulation
  - of the measurement value of the device diagnosis
  - of the measurement value of the process channel device diagnosis

The signal value is undefined when the maximum input frequency of 1500 Hz is exceeded! In this case, no further reports are displayed.

Frequency measurement, signal rate measurement, flow measurement, rotation speed monitoring

Only the signal input is evaluated.

- Conversion of the input frequency into various signal ranges, i.e. 0 l/s ... 20 l/s or 10 kg/min ... 500 kg/min
- 4 limiting values: Upper and lower alarm level limit and warn level limit
Rotation direction monitoring, flow direction monitoring with frequency measurement, signal rate measurement, flow measurement, rotation speed monitoring

- For functions such as frequency measurement both the pulse input as well as the auxiliary signal input are evaluated. The frequency is determined by the signal input. In addition, the phase relationship of the input signal is checked at the auxiliary signal input for the determination of the rotation direction monitoring.
- The measurement signal is evaluated with the sign:
  - positive = forward, signal input is damped first, LED IN/CHK illuminates yellow
  - negative = backward, auxiliary signal input is damped first, LED IN/CHK is not illuminated

**Batch controller**

Only the signal input is evaluated.

- Conversion of the input frequency into various signal ranges, i.e. 0 l/s ... 20 l/s or 10 kg/min ... 500 kg/min
- 4 limiting values:
  - Upper alarm level limit
  - Upper warn level limit
  - Lower alarm level limit
  - Lower warn level limit
- 2 summary counters, resettable
- Batch Controller with pre-set warnings and pre-set alarm
- Entry of the pre-set alarm limit
- Entry of the pre-set warning limit
- Start of the counter process and deactivation of the alarm signals through the set command, as long as the shut-down values are not exceeded.
- Activation of the alarm signals through stop command
- Reset of the counter process and activation of the alarm signals through the set command
- After activation of the alarm signals, input signals continue to be registered in the counter

**Standstill monitoring**

- In all modes of operation, such as frequency measurement, rotation direction signalling and batch controller, a standstill monitoring can be achieved by setting the 4 limit values accordingly.
KSD2-BO-Ex

Function

The KSD2-BO-Ex supplies and switches the intrinsically safe solenoid valve in the hazardous area. Lead breakage or short circuiting of field circuits is indicated by a flashing red LED. The output is galvanically isolated from the input and the power supply.

Application

Supply and control of a solenoid valve, an audible and optical alarm etc.

Composition

Electrical Connection

- 1-channel
- Output EEx ia IIC
- Device installation permissible in zone 2
- 24 V DC rated operational voltage
- Lead breakage (LB) monitoring and short-circuit (SC) monitoring
- Power Rail bus
- EMC acc. to NAMUR NE 21

The KSD2-BO-Ex supplies and switches the intrinsically safe solenoid valve in the hazardous area. Lead breakage or short circuiting of field circuits is indicated by a flashing red LED. The output is galvanically isolated from the input and the power supply.

Supply and control of a solenoid valve, an audible and optical alarm etc.
### Technical Data

#### Supply
- **Connection**: Power Rail
- **Rated voltage**: 20 ... 30 V
- **Ripple**: < 10 %
- **Power loss**: 1.5 W
- **Power consumption**: 2 W

#### Input
- **Connection**: Power Rail
- **Interface**: CAN protocol via Power Rail bus

#### Output
- **Limit**: current: ≥ 45 mA; voltage: 23.8 V at mA; 12.5 V at 45 mA
- **Connection**: terminals 2-, 3+
- **Switching frequency f**: 10 Hz
- **Lead monitoring**: short-circuit message only when the output is activated $R_b < 30 \text{ Ohm}$; lead breakage $> 15 \text{ kOhm}$

#### Electrical isolation
- **Output/Power supply, in temal bus**: safe electrical isolation acc. to EN 50020

#### Standard conformity
- **Climatic conditions**: acc. to DIN IEC 721
- **Directive conformity**: Electromagnetic compatibility standards
  - Directive 89/336/EG
  - EN 61326, EN 50081-2, NE 21
- **Ambient conditions**: Ambient temperature -20 ... 60 °C (253 ... 333 K)
- **Mechanical specifications**: Protection degree IP20
- **Mass**: approx. 100 g

#### Data for application in conjunction with hazardous areas
- **EC-Type Examination Certificate**: ZELM 00 ATEX 0030; for additional certificates see www.pepperl-fuchs.com
- **Group, category, type of protection**: II (1) GD [EEx ia] IIC
- **Voltage $U_0$**: 26 V
- **Current $I_0$**: 110 mA
- **Power $P_0$**: 715 mW
- **Group, category, type of protection, Temperature classification**: II 3 G EEEx nA II T4
- **Supply**: Safety maximum voltage $U_{\text{m}}$: 40 V DC
- **Electrical isolation**: Output/Power supply, intern al bus safe electrical isolation acc. to EN 50020
- **Directive conformity standards**: Directive 94/9 EU
  - EN 50014, EN 50020, EN 50021

#### Supplementary information
- EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

#### Notes

**Software functions:**
- Adjustable by the PACT Human Machine Interface.
- TAG numbers, 28 alphanumeric signs, can be programmed into device
- Commentary, may be saved in PC memory
- Information on devices may be saved in PC memory
- Output inversion
- Lead monitoring selectable
- Separate detection and indication of lead breakage and lead short circuit
- Malfunction output status
  - Logic zero
  - Logic one
  - Hold last value
  - Simulation
    - Of the output value
    - Of the device diagnosis
    - Of the process channel diagnosis

**Output characteristic**

Output voltage (V)

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.8</td>
<td></td>
</tr>
<tr>
<td>12.5</td>
<td></td>
</tr>
</tbody>
</table>

Output current (mA)
KSD2-BO-Ex2.2

Function

The KSD2-BO-Ex2.2 supplies and switches the intrinsically safe solenoid valve in hazardous areas. Lead breakage or short-circuiting of field circuits is indicated by a flashing red LED. The output is galvanically isolated from the input and the power supply.

Application

Supply and control of two intrinsically safe solenoid valves, audible and optical alarms etc.

Composition

Electrical Connection

Outputs EEx ia IIC

-+ 2- 3+ 5- 6+

Power Rail bus

Bus

Power supply

Hazardous area zone 0, zone 1

Safe area or hazardous area, zone 2

Lead breakage (LB) monitoring and short-circuit (SC) monitoring

Power Rail bus

EMC acc. to NAMUR NE 21

- 2-channel
- Output EEx ia IIC
- Device installation permissible in zone 2
- 24 V DC rated operational voltage
- Lead breakage (LB) monitoring and short-circuit (SC) monitoring
- Power Rail bus
- EMC acc. to NAMUR NE 21
### Technical Data

#### Supply

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection</td>
<td>Power Rail</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power loss</td>
<td>1.7 W</td>
</tr>
<tr>
<td>Power consumption</td>
<td>2.8 W</td>
</tr>
</tbody>
</table>

#### Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection</td>
<td>Power Rail</td>
</tr>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus</td>
</tr>
</tbody>
</table>

#### Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit</td>
<td>current $I_2 &gt; 35 \text{ mA}$; voltage: 23.8 V at 0 mA; 15 V at 35 mA</td>
</tr>
<tr>
<td>Connection</td>
<td>output I: terminals 2-, 3+; output II: terminals 5-, 6+</td>
</tr>
<tr>
<td>Switching frequency $f$</td>
<td>10 Hz</td>
</tr>
<tr>
<td>Lead monitoring</td>
<td>short-circuit message only when the output is activated $R_B &lt; 30 \text{ Ohm}$; lead breakage &gt; 15 kOhm</td>
</tr>
</tbody>
</table>

#### Electrical isolation

- Output/Power supply, internal bus: safe electrical isolation acc. to EN 50020

#### Standard conformity

- Climatic conditions: acc. to DIN IEC 721
- Directive conformity: Electromagnetic compatibility standards
- Directive 89/336/EG, EN 61326, EN 50081-2, NE 21

#### Ambient conditions

- Ambient temperature: -20 ... 60 °C (253 ... 333 K)

#### Mechanical specifications

- Protection degree: IP20
- Mass: approx. 100 g

#### Data for application in conjunction with hazardous areas

- EC-Type Examination Certificate: ZELM 00 ATEX 0030; for additional certificates see www.pepperl-fuchs.com
- Group, category, type of protection: II (1) G D [EEx ia] IIC
- Voltage $U_2$: 28 V
- Current $I_2$: 110 mA
- Power $P_2$: 715 mW
- Group, category, type of protection, Temperature classification: II 3 G EEx nA II T4

#### Supply

- Safe maximum voltage $U_m$: 40 V DC

#### Electrical isolation

- Output/Power supply, internal bus: safe electrical isolation acc. to EN 50020

#### Directive conformity

- Directive 94/9 EU: EN 50014, EN 50020, EN 50021

### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Notes

**Software functions**

Adjustable by the PACT ware Human Machine Interface.

- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory
- Information on devices may be saved in PC memory
- Output inversion
- Lead monitoring separately selectable for each channel
- Separate detection and indication of lead breakage and lead short circuit
- Malfunction output status
  - Downscale
  - Upscale
  - Hold last valid value
- Simulation
  - of the input value
  - of the device diagnosis
  - of the process channel diagnosis

#### Output characteristic

<table>
<thead>
<tr>
<th>Output voltage (V)</th>
<th>Output current (mA)</th>
</tr>
</thead>
</table>
Relay module

**Electrical Connection**

- 2-channel
- Device installation permissible in zone 2
- Relay output suitable for controlling explosion-proof, encapsulated valves
- Relay output suitable for switching circuits in general
- Relay output also suitable for EEx ia IIC circuits
- Reliable electrical isolation of the relay contacts from each other and from the other circuits
- 24 V DC rated operational voltage
- Power Rail bus
- EMC acc. to NAMUR NE 21

**KSD2-RO-Ex2**

**Function**

The KSD2-RO-Ex2 allows for switching of 2 field devices. The change-over contacts are galvanically isolated from each other and from the circuit per EN 50020 and they are suited for controlling intrinsically safe or pressure resistant solenoid valves and alarms in the hazardous area.

**Application**

Relay change-over contacts for controlling of non-intrinsically safe devices and valves and intrinsically safe solenoid valves, audible and optical alarms.

**Composition**

Front View

Removable terminals blue

Housing type A3 (see system description)

LED green: Power supply

LED yellow: Output check channel I

LED red: Fault signal

LED red: Output check channel II

Subject to reasonable modifications due to technical advances.

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## Technical Data

### Supply
- **Connection**: Power Rail
- **Rated voltage**: 20 ... 30 V
- **Ripple**: < 10 %
- **Power consumption**: 1 W

### Input
- **Connection**: Power Rail
- **Interface**: CAN protocol via Power Rail bus

### Output
- **Connection**
  - Output I: terminals 1, 2, 3
  - Output II: terminals 4, 5, 6
- **Output I**: terminals 1, 2, 3
- **Output II**: terminals 4, 5, 6
- **Contact loading**
  - Use in hazardous area: 55 V
  - Use in safe area: 250 V AC / 1 A / \cos \phi > 0.7; 30 V DC / 2 A resistive load
- **Energised/De-energised delay**: approx. 10 ms / approx. 10 ms
- **Mechanical life**: 10⁶ switching cycles

### Transfer characteristics
- **Switching frequency**: < 10 Hz

### Electrical isolation
- **Output I and II**: basic insulation according to DIN EN 50178, rated insulation voltage 253 V\(_{eff}\)
- **Output/Power supply, internal bus**: safe electrical isolation acc. to EN 50020, voltage peak value 375 V

### Standard conformity
- **Coordination of insulation**: acc. to DIN EN 50178
- **Climatic conditions**: acc. to DIN IEC 721

### Directive conformity
- **Electromagnetic compatibility**:
  - Directive 89/336/EG
  - EN 61326, EN 50081-2, NE 21

### Ambient conditions
- **Ambient temperature**: -20 ... 60 °C (253 ... 333 K)

### Mechanical specifications
- **Protection degree**: IP20
- **Mass**: approx. 100 g

### Data for application in conjunction with hazardous areas
- **EC-Type Examination Certificate**: PTB No. Ex-97.D.2138; for additional certificates see www.pepperl-fuchs.com
- **Group, category, type of protection**
  - [EEx ia] IIC
  - 
  - Voltage \( U_i \)
    - 55 V
    - 40 V
    - 37 V
  - Current \( I_i \)
    - 0.8 A
    - 1.5 A
    - 2 A
- **Group, category, type of protection, Temperature classification**
  - II 3 G EEx nAC IIC T4
- **Supply**
  - Safe maximum voltage \( U_{m} \)
    - 253 V AC or 125 V DC
- **Electrical isolation**
  - **Output/Power supply, internal bus**: safe electrical isolation acc. to EN 50020, voltage peak value 375 V
  - **Output I and II**: safe electrical isolation acc. to EN 50020, voltage peak value 60 V
- **Directive conformity**
  - Directive 94/9 EU
  - EN 50014, EN 50020, EN 50021

### Supplementary information
- EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Notes
- **Software functions:**
  - Adjustable by the PACT \textsuperscript{TM} human machine interface.
  - Information on devices may be saved in PC memory
  - The following are separately adjustable for each channel:
    - Tag numbers, 28 alphanumeric characters, can be programmed into device
    - Commentary, may be saved in PC memory
    - Output inversion
    - Malfunction output status
    - Relay de-energised
    - Relay energised
    - Hold last value
    - Simulation
    - Off the output
    - Of the device diagnosis
    - Of the process channel diagnosis

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**Function**

The KSD2-RO-2 allows for switching of 2 field devices. The change-over contacts are galvanically isolated from each other and from the circuit per DIN EN 50178 and they are suited for controlling solenoid valves, contactors and alarms.

**Application**

Relay with changeover contacts for the control of non-intrinsically safe devices, contactors, valves as well as audible and optical alarms.

**Composition**

- Front View
- Housing type A3 (see system description)
- LED green: Power supply
- LED red: Fault signal
- LED yellow: Output check channel I
- LED yellow: Output check channel II

**Electrical Connection**

- 2-channel
- Relay output suitable for controlling valves
- Relay output suitable for switching circuits in general
- Reliable electrical isolation of the relay contacts from each other and from the other circuits
- 24 V DC rated operational voltage
- Power Rail bus
- EMC acc. to NAMUR NE 21
- Spark absorbers 82Ω/22 nF

KSD2-RO-2
Technical Data

Software functions:
Adjustable by the PACT™ Human Machine Interface.
- Information on devices may be saved in PC memory
- The following are separately adjustable for each channel:
  - Tag numbers, 28 alphanumeric characters, can be programmed into device
  - Commentary, may be saved in PC memory
- Output inversion
- Malfunction output status
  - Relay de-energised
  - Relay energised
  - Hold last value
- Simulation
  - of the output
  - of the device diagnosis
  - of the process channel diagnosis

Supply
| Connection | Power Rail |
| Rated voltage | 20 ... 30 V DC |
| Ripple | < 10 % |
| Power consumption | 1 W |

Input
| Connection | Power Rail |
| Interface | CAN protocol via Power Rail bus |

Output
| Connection | output I: terminals 1, 2, 3
| Output I and II | signal, relay |
| Contact rating | 250 V AC / 1 A / cos ϕ > 0.7; 30 V DC / 2 A resistive load |
| Mechanical life | 10⁶ switching cycles |
| Energised/De-energised delay | approx. 10 ms / approx. 10 ms |
| Spark absorber | 82 Ω / 22 nF per channel, deactivateable or NO/NC switchable by means of Jumpers. |

Transfer characteristics
| Switching frequency | < 10 Hz |

Electrical isolation
| Output I and II: | basic insulation acc. to DIN EN 50178, rated insulation voltage 253 Vₐₘ AC |
| Output/Power supply, internal bus | basic insulation acc. to DIN EN 50178, rated insulation voltage 253 Vₐₘ |

Directive conformity
| Electromagnetic compatibility standards | Directive 89/336/EG
| EN 61326, EN 50081-2, NE 21 |

Ambient conditions
| Ambient temperature | -20 ... 60 °C (253 ... 333 K) |

Mechanical specifications
| Protection degree | IP20 |
| Mass | approx. 100 g |

Supplementary information
EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

Notes
SMART Transmitter Supply Isolator

**KSD2-CI-S-Ex**
Successor KSD2-CI-S-Ex.H

### Function

The KSD2-CI-S is designed for the connection of 2- or 3-wire transmitters. It may also be used as a repeater for 0/4 mA ... 20 mA signals (current source). With a supply voltage > 20 V DC it is guaranteed that at least 14.7 V at 20 mA is available in the hazardous area. The circuit (terminal 3+, 1-) is monitored for lead faults.

**2-wire transmitters** are connected to terminals 2- and 3+. The input for the signal current is terminal 2. 2-wire transmitters with SMART-Communications are connected to terminals 3+ and 2-.

The KSD2-CI-S is delivered standard with the KF-STP-GN device connectors. These connectors are equipped with 2.3 mm jacks which may be used for connecting a SMART-Communicator.

The KFD2-HMM-16 or KFD0-HMS-16 HART multiplexers can be connected to terminals 11+ and 10-.

**3-wire transmitters** are connected to terminals 3+, 2- and 1-. The transmitter power is supplied through the terminals 3+ and 1-. The signal input is terminal 2. **Current sources** which produce a signal in the range of 0/4 mA ... 20 mA are connected to terminals 2+ and 1-. Therefore, the current flows in the signal input and can be transmitted in the safe area.

### Composition

**Front View**

- **LED green:** Power supply
- **LED red:** Fault signal
- **Removable terminal green KA-STP-GN**
- **Removable terminal blue KA-STP-BU**

**Housing type A4** (see system description)
## Technical Data

### Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power loss</td>
<td>1 W</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 1.3 W</td>
</tr>
</tbody>
</table>

### Input

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 1, 2, 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input signal</td>
<td>0 ... 20 mA or 4 ... 20 mA</td>
</tr>
<tr>
<td>Input resistance</td>
<td>approx. 105 Ω, terminals 1, 2</td>
</tr>
<tr>
<td>Transmitter supply voltage</td>
<td>&gt; 14.7 V at 20 mA</td>
</tr>
<tr>
<td>Lead monitoring</td>
<td>breakage I &lt; 50 µA; short-circuit I &gt; 25 mA</td>
</tr>
</tbody>
</table>

### Output

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus</td>
</tr>
</tbody>
</table>

### Transfer characteristics

| Deviation | 0.1 % of output signal range at 20 °C (293 K) |
| Temperature | 0.01 % / K of output signal range |

### Electrical isolation

| Input/Power supply, internal bus | safe electrical isolation acc. to EN 50020, voltage peak value 375 V |

### Standard conformity

| Climatic conditions | acc. to DIN IEC 721 |
| Directive conformity | |
| Electromagnetic compatibility | standards |
| Directive 89/336/EG | EN 61326, EN 50081-2, NE 21 |

### Ambient conditions

| Temperature | -20 ... 60 °C (253 ... 333 K) |

### Mechanical specifications

| Protection degree | IP20 |
| Mass | approx. 100 g |

### Data for application in conjunction with hazardous areas

| EC-Type Examination Certificate | BAS 99 ATEX 7182; for additional certificates see www.pepperl-fuchs.com |
| Group, category, type of protection | II [1] G [EEEx ia] IC [T<sub>min</sub> = -20 °C to +60 °C] |
| Equipment | terminals 3, 2, 1 and 3, 2 |
| Voltage | 25.4 V 3.6 V |
| Current | 93 mA 0 mA |
| Power | 570 mW 0 mW |
| Group, category, type of protection, Temperature classification | II 3 G EEx nA II T4 |
| Electrical isolation | safe electrical isolation acc. to EN 50020, rated insulation voltage 300 V<sub>eff</sub> |

### Directive conformity

| Directive 94/9 EU | EN 50014, EN 50020, EN 50021 |

### Entity parameter

| Certification number | J I.2D0A6.AX |
| FM control drawing | No. 116-0150 |
| Suitable for installation in division 2 | yes |
| Input I | terminals 2, 3 |
| Voltage | 26.1 V |
| Current | 92 mA |
| Explosion group | A&B C&E D, F&G |
| Max. external capacitance | 0.17 µF 0.5 µF 1.35 µF |
| Max. external inductance | 4.33 mH 17.3 mH 35.4 mH |
| Input II | terminals 2, 1 |
| Voltage | 3.5 V |
| Current | 0 mA |
| Explosion group | A&B C&E D, F&G |
| Max. external capacitance | 1000 µF 3000 µF 8000 µF |
| Max. external inductance | 1000 mH 1000 mH 1000 mH |
| Input III | terminals 1, 2, 3 |
| Voltage | 26.1 V |
| Current | 96 mA |
| Explosion group | A&B C&E D, F&G |
| Max. external capacitance | 0.17 µF 0.5 µF 1.35 µF |
| Max. external inductance | 3.97 mH 16 mH 35.2 mH |

### Safety parameter

| Control drawing | No. 116-0149 |
| Connection | terminals 1, 2, 3 |
## Technical Data

<table>
<thead>
<tr>
<th>Input I</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage $V_{OC}$</td>
<td>25.4 V</td>
</tr>
<tr>
<td>Current $I_{SC}$</td>
<td>93 mA</td>
</tr>
</tbody>
</table>

### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

## Application

- The supply of power to 2- or 3-wire transmitters and the transfer of the measurement current
- Current signal repeater
- The supply of SMART transmitters in the hazardous area and the transfer of the analogue measurement current in the safe area. The interface allows a bidirectional communication between the transmitter and a handheld terminal or a HART multiplexer. These devices can be connected in the safe area. The bus transfers exclusively the digitised signal current.
- Suited for the following SMART-Systems: ABB, Chessel, Endress+Hauser, Emerson, Foxboro, Smar, Yokogawa

## Notes

**Software functions:**
- Adjustable by the PACTware™ human machine interface.
- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory
- Information on devices may be saved in PC memory
- Physical units are adjustable
- List see “System Description Remote Process Interface”
- Lead monitoring selectable
- Separate detection and indication of lead breakage and lead short circuit
- 4 limit values
- Upper alarm level limit
- Upper warn level limit
- Lower alarm level limit
- Lower warn level limit
- Hysteresis adjustable
- Lower scale value and upper scale value of the measurement range
- Overrange and underrange alarm
- Malfunction output status
- User defined
- Min.
- Max.
- Hold last value
- Simulation of the input value, of the device diagnosis and the process channel diagnosis

**List see** “System Description Remote Process Interface”
SMART Transmitter Supply Isolator

KSD2-CI-S

Successor KSD2-CI-S-H

Function

The KSD2-CI-S is designed for the connection of 2- or 3-wire transmitters. It may also be used as a repeater for 0/4 mA ... 20 mA signals (current source). With a supply voltage > 20 V DC it is guaranteed that a voltage of at least 14.7 V at 20 mA is available to the transmitter in the hazardous area. The circuit (terminal 3+, 1-) is monitored for lead faults.

2-wire transmitters are connected to terminals 2- and 3+. The input for the signal current is terminal 2.

2-wire transmitters with SMART-Communications are connected to terminals 3+ and 2-.

The KSD2-CI-S is delivered standard with the KF-STA-GN device connectors. These connectors are equipped with 2.3 mm jacks which may be used for connecting a SMART-Communicator.

The KFD2-HMM-16 or KFD0-HMS-16 HART Multiplexers can be connected to terminals 11+ and 10-.

3-wire transmitters are connected to terminals 3+, 2- and 1-. The transmitter power is supplied through the terminals 3+ and 1-. The signal input is terminal 2.

Current sources which produce a signal in the range of 0/4 mA ... 20 mA are connected to terminals 2+ and 1. Therefore, the current flows in the signal input and can be transmitted to the safe area.

Composition

Electrical Connection

Input

3-wire transmitter

2-wire transmitter

2-wire current source

Programming socket for handheld terminal or HART multiplexer

Power supply
### Technical Data

<table>
<thead>
<tr>
<th><strong>Supply</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection</strong></td>
<td>Power Rail</td>
</tr>
<tr>
<td><strong>Rated voltage</strong></td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td><strong>Ripple</strong></td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>&lt; 1.3 W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Input</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection</strong></td>
<td>terminals 1, 2, 3</td>
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<tr>
<td><strong>Input signal</strong></td>
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<td><strong>Input resistance</strong></td>
<td>approx. 105 Ω, terminals 1, 2</td>
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<td><strong>Transmitter supply voltage</strong></td>
<td>&gt; 14.7 V at 20 mA</td>
</tr>
<tr>
<td><strong>Lead monitoring</strong></td>
<td>Load I ≤ 50 µA; Short-circuit I &gt; 25 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Output</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection</strong></td>
<td>Power Rail</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>CAN protocol via Power Rail bus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Transfer characteristics</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deviations</strong></td>
<td>0.1 % of output signal range at 20 °C (293 K)</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>0.01 % /K of output signal range</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Electrical isolation</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input/Power supply, internal bus</strong></td>
<td>basic insulation acc. to DIN EN 50178, voltage peak value 375 V</td>
</tr>
<tr>
<td><strong>Standard conformity</strong></td>
<td>acc. to DIN IEC 721</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Directives conformity</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electromagnetic compatibility standards</strong></td>
<td>Directive 89/336/EG EN 61326, EN 50081-2, NE 21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Ambient conditions</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>-20 ... 60 °C (253 ... 333 K)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Mechanical specifications</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Protection degree</strong></td>
<td>IP20</td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>approx. 100 g</td>
</tr>
</tbody>
</table>

### Supplementary Information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com)

### Application

- The supply of power to 2- or 3-wire transmitters and the transfer of the measurement current
- Current signal repeater
- The supply of SMART transmitters and transfer of the analogue measurement current. The interface allows a bidirectional communication between the transmitter and a handheld terminal or a HART multiplexer. The bus transfers exclusively the digitised signal current.
- Suits the following SMART-Systems:
  - ABB
  - Chesel
  - Endress+Hauser
  - Emerson
  - Foxboro
  - Smar
  - Yokogawa

### Notes

**Software functions**
Adjustable by the PACT™ Human Machine Interface.
- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory
- Information on devices may be saved in PC memory
- Physical units are adjustable
- List see "System Description Remote Process Interface"
- Lead monitoring selectable
- Separate detection and indication of lead breakage and lead short circuit
- 4 limit values
  - Upper alarm level limit
  - Upper warn level limit
  - Lower alarm level limit
  - Lower warn level limit
- Hysteresis adjustable
- Lower scale value and upper scale value of the measurement range
  - for the determination of the overflow and underflow range
  - for the configuration of the analogue monitor of the Human Machine Interface
  - Overrange and underrange alarm
- Malfunction output status
  - User defined
  - Min.
  - Max.
  - Maintenance of the last accepted measurement value
- Simulation
  - of the input value
  - of the device diagnosis
  - of the process channel diagnosis
HART Transmitter Supply Isolator

KSD2-CI-S-Ex.H

**Function**

The KSD2-CI-S-Ex.H is designed for the connection of 2- or 3-wire transmitters. It may also be used as a repeater for 0/4 mA ... 20 mA signals (current source). With a supply voltage > 20 V DC it is guaranteed that at least 14.7 V at 20 mA is available in the hazardous area. The circuit (terminal 3+, 1-) is monitored for lead faults.

2-wire transmitters are connected to terminals 2- and 3+. The input for the signal current is terminal 2. 2-wire transmitters with HART communication are connected to terminals 3+ and 2-. The KSD2-CI-S-Ex.H is delivered standard with the KF-STP-... device connectors, which are equipped with 2.3 mm jacks which may be used for connecting a HART communicator.

A handheld terminal can be connected to terminals 11+ und 10-. The device supports also the HART communication via the Power Rail bus.

3-wire transmitters are connected to terminals 3+, 2- and 1-. The transmitter power is supplied through the terminals 3+ and 1-. The signal input is terminal 2. Current sources which produce a signal in the range of 0/4 mA ... 20 mA are connected to terminals 2+ and 1-.

Therefore, the current flows in the signal input and can be transmitted in the safe area.

**Composition**
## Technical Data

### Supply
- **Connection**: Power Rail
- **Rated voltage**: 20 ... 30 V DC
- **Ripple**: < 10%
- **Power consumption**: < 1.3 W

### Input
- **Connection**: terminals 1, 2, 3
- **Input signal**: 0 ... 20 mA or 4 ... 20 mA
- **Input resistance**: approx. 105 Ω, terminals 1, 2
- **Transmitter supply voltage**: > 14.7 V at 20 mA
- **Lead monitoring**: breakage I ≤ 50 μA; short-circuit I > 25 mA

### Output
- **Connection**: Power Rail
- **Interface**: CAN protocol via Power Rail bus
- **Transfer characteristics**
  - Deviation: 0.1 % of the input signal range at 20 °C (293 K)
  - Temperature: 0.01 %/K of the input signal range

### Electrical isolation
- **Input/Power supply, internal bus**: safe electrical isolation acc. to EN 50020, voltage peak value 375 V

### Standard conformity
- **Climatic conditions**: acc. to DIN IEC 721
- **Electromagnetic compatibility standards**: Directive 89/336/EG
- **Ambient temperature**: -20 ... 60 °C (253 ... 333 K)

### Mechanical specifications
- **Protection degree**: IP20
- **Mass**: approx. 100 g

### Data for application in conjunction with hazardous areas
- **EC-Type Examination Certificate**: BAS 99 ATEX 7182; for additional certificates see www.pepperl-fuchs.com
- **Directive conformity standards**: Directive 94/9 EU
- **Directive conformity, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Supplementary information

### Application
- **Notes**
  - Lead monitoring selectable
  - Separate detection and indication of lead breakage and lead short circuit
  - 4 limiting values
  - Upper alarm level limit
  - Upper warn level limit
  - Lower alarm level limit
  - Lower warn level limit
  - Hysteresis adjustable
  - Lower scale value and upper scale value of the measurement range
  - For the determination of the overflow and underflow range
  - For the configuration of the analogue monitor of the Human Machine Interface
  - Overrange and underrange alarm
  - Malfunction output status
  - User defined
  - Min.
  - Max.
  - Hold last value
  - Simulation of the input value
  - of the device diagnosis
  - of the process channel diagnosis

### Software functions:
- Adjusted by the PACTbus™ Human Machine Interface.
- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory
- Information on devices may be saved in PC memory
- Physical units are adjustable
- For a list see System Description RPI

### Notes

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Date of issue: 2003-07-29
HART Transmitter Supply Isolator

KSD2-CI-S-H

Function

The KSD2-CI-S-H is designed for the connection of 2- or 3-wire transmitters. It may also be used as a repeater for 0/4 mA ... 20 mA signals (current source). With a supply voltage > 20 V DC it is guaranteed that a voltage of at least 14.7 V at 20 mA is available to the transmitter in the hazardous area.

The circuit (terminal 3+, 1-) is monitored for lead faults.

2-wire transmitters are connected to terminals 2- and 3+. The input for the signal current is terminal 2.

2-wire transmitters with HART communication are connected to terminals 3- and 2-.

The KSD2-CI-S-H is delivered with the connectors KF-STP-GN. The 2.3 mm jacks are integrated in this connector for use with HART Communicators.

A handheld terminal can be connected to the terminals 11+ and 10-. The device supports also the HART communication via the Power Rail bus.

3-wire transmitters are connected to terminals 3+, 2- and 1-.

The transmitter power is supplied through the terminals 3+ and 1-. The signal input is terminal 2.

Current sources which produce a signal in the range of 0/4 mA ... 20 mA are connected to terminals 2+ and 1-.

Therefore, the current flows in the signal input and can be transmitted to the safe area.

Composition

Electrical Connection

- 1-channel
- 24 V DC rated operational voltage
- Lead breakage (LB) monitoring and short-circuit (SC) monitoring
- 4 limit values
- Transfer of HART signals via the Power Rail bus or from handheld terminal
- Power Rail bus
- EMC acc. to NAMUR NE 21

KSD2-CI-S-H replaces type KSD2-CI-S
Technical Data

Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 1.3 W</td>
</tr>
</tbody>
</table>

Input

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 1, 2, 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input signal</td>
<td>0 ... 20 mA or 4 ... 20 mA</td>
</tr>
<tr>
<td>Input resistance</td>
<td>approx. 105 Ω, terminals 1, 2</td>
</tr>
<tr>
<td>Transmitter supply voltage</td>
<td>&gt; 14.7 V at 20 mA</td>
</tr>
<tr>
<td>Lead monitoring</td>
<td>Load I ≤ 50 µA, Short-circuit I &gt; 25 mA</td>
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</tbody>
</table>

Output

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus</td>
</tr>
<tr>
<td>Transfer characteristics</td>
<td></td>
</tr>
<tr>
<td>Deviation</td>
<td>0.1 % of the input signal range at 20 °C (293 K)</td>
</tr>
<tr>
<td>Temperature</td>
<td>0.01 %/K of the input signal range</td>
</tr>
</tbody>
</table>

Electrical isolation

| Input/Power supply, internal bus | basic insulation acc. to DIN EN 50178, voltage peak value 375 V |

Standard conformity

<table>
<thead>
<tr>
<th>Directive conformity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electromagnetic compatibility</td>
</tr>
<tr>
<td>Directive 89/336/EG</td>
</tr>
</tbody>
</table>

Ambient conditions

| Ambient temperature | -20 ... 60 °C (253 ... 333 K) |

Mechanical specifications

| Protection degree | IP20 |
| Mass | approx. 100 g |

Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

Application

- The supply of power to 2 or 3 wire transmitters and the transfer of the measurement current
- Current signal repeater
- Supply of HART transmitters and the transfer of the analogue measurement current. The interface allows a bidirectional communication between the transmitter and the handheld terminal. The bus transfers the digital value of the signal current to the HART communication.

Notes

Software functions

Adjustable by the PACT™ Human Machine Interface.  
- Tag numbers, 28 alphanumeric characters, can be programmed into device  
- Commentary, may be saved in PC memory  
- Information on devices may be saved in PC memory  
- Physical units are adjustable  
- List see "System Description Remote Process Interface"  
- Lead monitoring selectable  
- Separate detection and indication of lead breakage and lead short circuit  
- 4 limiting values  
- Upper alarm level limit  
- Upper warn level limit  
- Lower alarm level limit  
- Lower warn level limit  
- Hysteresis adjustable  
- Lower scale value and upper scale value of the measurement range  
- for the determination of the overflow and underflow range  
- for the configuration of the analogue monitor of the Human Machine Interface  
- Overrange and underrange alarm  
- Malfunction output status  
- User defined  
- Min.  
- Max.  
- Maintenance of the last accepted measurement value  
- Simulation  
- of the input value  
- of the device diagnosis  
- of the process channel diagnosis
Transmitter supply isolator

**Function**

The KSD2-CI-Ex2 is designed for the connection of 2- or 3-wire transmitters. It may also be used as a repeater for 0/4 mA ... 20 mA signals (current source). With a supply voltage > 20 V DC it is guaranteed that at least 15 V is available to the transmitter in the hazardous area at a current of 20 mA. The supply circuits (terminal 3+, 1- or 6+, 4-) are monitored for lead faults.

The two inputs are galvanically connected and have a common negative potential. They are galvanically isolated from the Bus and the power supply.

**2-wire transmitters** are connected to terminals 2- and 3+ or 5- and 6+. The input for the signal current is terminal 2 or 3. **3-wire transmitters** are connected to terminals 3+, 2- and 1- or 6+, 5- and 4-. The transmitter power is supplied through terminals 3+ and 1- or 6+ and 4-. The signal input is terminal 2 or 5.

**Current sources** which produce a signal in the range of 0/4 mA ... 20 mA, are connected to terminals 2+ and 1- or 5+ and 4-. Therefore, the current flows in the signal input and can be transferred to the safe area.

**Application**

- The supply of power to the 2- or 3-wire transmitters installed in the hazardous area and the transfer of the measurement current to the safe area
- Current signal repeaters
## Technical Data

### Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 1.9 W</td>
</tr>
</tbody>
</table>

### Input

| Connection | terminals 1, 2, 3, 4, 5, 6 |
| Input signal | 0/4 ... 20 mA |
| Available voltage | > 15 V at 20 mA |
| Lead monitoring | breakage I ≤ 2 mA; short-circuit U < 4 V |

### Output

| Connection | Power Rail |
| Interface | CAN protocol via Power Rail bus |

### Transfer characteristics

| Deviation | 0.1 % of output signal range at 20 °C (293 K) |
| Temperature | 0.01 % / K of output signal range |

### Electrical isolation

| Input/Power supply, internal bus | safe electrical isolation acc. to EN 50020, voltage peak value 375 V |

### Standard conformity

| Climatic conditions | acc. to DIN IEC 721 |
| Directive conformity | Electromagnetic compatibility standards |
| Directive | 89/336/EG EN 61326, EN 50081-2, NE 21 |

### Ambient conditions

| Ambient temperature | -20 ... 60 °C (253 ... 333 K) |

### Mechanical specifications

| Protection degree | IP20 |
| Mass | approx. 100 g |

### Data for application in conjunction with hazardous areas

| EC-Type Examination Certificate | PTB 00 ATEX 2010; for additional certificates see www.pepperl-fuchs.com |
| Group, category, type of protection | II (1) G [EX ia] IIC |
| Equipment | terminals 1, 2, 3, 4, 5, 6 terminals 1, 2 or 4, 5 |
| Voltage | U0 25.2 V 3.5 V |
| Current | I0 93 mA 0.7 mA |
| Power | P0 585 mW 0.6 mW |
| Type of protection [EEEx ib] | linear characteristic |
| Explosion group | IIB IIC IIB IIC |
| External capacitance | 815 nF 105 nF ≥ 249 nF ≥ 99 nF see prototype test certificate |
| External inductance | 16.8 mH 4.5 mH 9.8 mH 1.8 mH |
| Group, category, type of protection, Temperature classification | II 3 G EEEx nA II T4 |
| Electrical isolation | safe electrical isolation acc. to EN 50020, voltage peak value 375 V |
| Directive conformity | EN 50014, EN 50020, EN 50021 |

### Supplementary information

**EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com**

### Notes

**Software functions**

- Adjustable by the PACTware™ Human Machine Interface.
  - Information on devices may be saved in PC memory.
  - The following are separately adjustable for each channel:
    - Selection switch markings (TAG-No.), 28 alphanumeric markings, can be programmed into device.
    - Commentary, may be saved in PC memory.
    - Physical characteristics are adjustable.
    - List see “System Description Remote Process Interface”
  - Lead monitoring optional.
  - Separate detection and indication of lead breakage and lead short circuit.
  - 4 limit values.
    - upper alarm limit
    - upper warning limit
    - lower warning limit
    - lower alarm limit.
  - hysteresis adjustable.
  - Start value and end value of the measurement range.
  - for determination of the overflow and underflow range.
  - for the configuration of the analogue value indicator of the control display.
  - Signalling of having exceeded or fallen short of the measurement range.
  - Determining the behaviour in the case of an error.
  - Signal value optional.
  - Start value of the measurement range.
  - End value of the measurement range.
  - Maintenance of the last accepted measurement value.
  - Simulation.
    - of the output value.
    - of the device diagnosis.
    - of the process channel diagnosis.
KSD2-CI-2

Function

The KSD2-CI-2 is suited for the connection of 2- and 3-wire transmitters. It may also be used as a repeater for 0/4 mA ... 20 mA signals (current source). With a rated operational voltage of > 20 V DC it is guaranteed that for a transmitter with a current conduction of 20 mA at least 15 V is available. The circuit (terminals 1-, 2-, 3+, 4-) is monitored for lead fault. The two inputs are galvanically connected and have a common negative potential.

2-wire transmitters are connected to terminals 2- and 3+ or 5- and 6+. The input for the signal current is terminal 2 or 5.

3-wire transmitters are connected to terminals 3+, 2- and 1- or 6+, 5- and 4-. The transmitter power is supplied through terminals 3+ and 1- or 6+ and 4-. The signal input is terminal 2 or terminal 5.

Current sources which generate a signal in the range of 0/4 mA ... 20 mA, are connected to terminals 2+ and 1- or 5+ and 1-. Thus the current flows into the signal input and is transmitted to the output.

Composition

Application

- The supply of power to 2- or 3-wire transmitters and the transfer of the measurement current
- Current signal repeater
## Technical Data

### Supply

<table>
<thead>
<tr>
<th></th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 1.9 W</td>
</tr>
</tbody>
</table>

### Input

<table>
<thead>
<tr>
<th></th>
<th>terminals 1, 2, 3, 4, 5, 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input signal</td>
<td>0/4 ... 20 mA</td>
</tr>
<tr>
<td>Available voltage</td>
<td>&gt; 15 V at 20 mA</td>
</tr>
<tr>
<td>Lead monitoring</td>
<td>Load I ≤ 2 mA; Short-circuit U &lt; 4 V</td>
</tr>
</tbody>
</table>

### Output

<table>
<thead>
<tr>
<th></th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus</td>
</tr>
</tbody>
</table>

### Transfer characteristics

| Deviation        | 0.1 % of output signal range at 20 °C (293;K) |
| Temperature      | 0.01 % / K of output signal range |

### Electrical isolation

| Input/Power supply, internal bus | basic insulation acc. to DIN EN 50178, rated insulation voltage 300 V ef f |

### Standard conformity

<table>
<thead>
<tr>
<th>Climatic conditions</th>
<th>acc. to DIN IEC 721</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directive conformity</td>
<td>standards</td>
</tr>
<tr>
<td>Directive 89/336/EG</td>
<td>EN 61326, EN 5 0081-2, NE 2 1</td>
</tr>
</tbody>
</table>

### Ambient conditions

| Ambient temperature | -20 ... 60 °C (253 ... 333 K) |

### Mechanical specifications

<table>
<thead>
<tr>
<th>Protection degree</th>
<th>IP20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>approx. 100 g</td>
</tr>
</tbody>
</table>

## Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

## Notes

### Software functions

Adjustable by the PACT™ Human Machine Interface.
- Information on devices may be saved in PC memory
- The following are separately adjustable for each channel:
  - Tag numbers, 28 alphanumeric characters, can be programmed into device
  - Commentary, may be saved in PC memory
  - Physical units are adjustable
  - List see “System Description Remote Process Interface”
  - Lead monitoring selectable
  - Separate detection and indication of lead breakage and lead short circuit
  - 4 limit values
    - Upper alarm level limit
    - Upper warn level limit
    - Lower warn level limit
    - Lower alarm level limit
  - Hysteresis adjustable
  - Lower scale value and upper scale value of the measurement range
  - for the determination of the overflow and underflow range
  - for the configuration of the analogue monitor of the Human Machine Interface
  - Overrange and underrange alarm
  - Malfunction output status
    - User defined
    - Min.
    - Max.
    - Maintenance of the last accepted measurement value
  - Simulation
    - of the input value
    - of the device diagnosis
    - of the process channel diagnosis
Universal temperature converter

KSD2-TI-Ex

Function

The KSD2-TI-Ex is designed for the connection of RTDs and thermocouples. The input signal of the temperature sensor is linearised.

The configuration may be over the internal Power Rail bus. A red flashing LED and a signal through the bus indicates burnout detection.

RTDs can be connected in 2-, 3- or 4-wire mode.

Internal cold junction compensation can be selected for thermocouples. For this purpose, a RTD is integrated in the K-CJC terminal block (available as an accessory). Cold junction compensation is also possible externally.

All parameters and configurations are transferred over the internal Power Rail bus.

Application

- Temperature measurement are performed by resistance temperature sensors or thermocouples.
- Detection of position through low Ohmic potentiometric repeater.
- Detection of mV signals.

Composition

Electrical Connection

1-channel

Input EEx ia IIC

Device installation permissible in zone 2

24 V DC rated operational voltage

Connection of resistance thermometers Pt100 or N100 in 2-, 3- or 4-wire connection

Connection of thermocouples, type B, E, J, K, L, N, R, S or T

Cold junction compensation

Connection of other resistive sensors, mV sources or thermocouples possible.

Linearisation adjustable via software

4 limit values

Power Rail bus

EMC acc. to NAMUR NE 21

KSD2-TI-Ex
### Technical Data

#### Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 1.5 W</td>
</tr>
</tbody>
</table>

#### Input

| Connection                              | terminals 1, 2, 3, 6 suitable for Pt100, Ni100, other resistive sensors, thermocouples type B, E, J, K, L, N, R, S, T and mV sources |
| Lead resistance                         | per lead ≤ 50 Ω     |
| Current for sensor burn out detection   | approx. 48 nA       |
| Measuring current                       | approx. 400 µA with resistance measuring sensor |
| Lead monitoring                         | resistive sensors, Pt100, Ni100; lead breakage and short-circuit detection for all leads (4-leads: lead breakage at terminal 3 is detected as short-circuit); threshold for short-circuit detection ≤ 10 Ω |
|                                        | mV sources, thermocouples; lead breakage detection; sensor burnout and short-circuit detection for cold junction compensation K-CJC |

#### Output

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
</table>

#### Transfer characteristics

<table>
<thead>
<tr>
<th>Deviation</th>
<th>Pt100, Ni100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2- and 3-wire: ± 0.4 K</td>
</tr>
<tr>
<td></td>
<td>4-wire: ± 0.35 K</td>
</tr>
<tr>
<td>Thermocouples, except type B</td>
<td>± 1 K, ± 0.5 K deviation on the cold junction compensation in addition</td>
</tr>
<tr>
<td>Thermocouple B</td>
<td>± 1 K in the range &gt; 600 °C</td>
</tr>
<tr>
<td></td>
<td>± 3 K in the remaining area</td>
</tr>
<tr>
<td></td>
<td>± 0.5 K deviation of the cold junction compensation in addition</td>
</tr>
<tr>
<td>Resistance type sensor, mV sensor</td>
<td>± 0.1 % of output signal range</td>
</tr>
</tbody>
</table>

#### Error: Temperature

<table>
<thead>
<tr>
<th>Pt100, Ni100</th>
</tr>
</thead>
<tbody>
<tr>
<td>± (0.0015 % of the measured value in K + 0.006 % of the measurement range)/K</td>
</tr>
<tr>
<td>Thermocouples</td>
</tr>
<tr>
<td>± (0.2 K + 0.004 % of the measured value in °C + 0.006 % of the measurement range)/K</td>
</tr>
<tr>
<td>Resistance type sensor, mV sensor</td>
</tr>
</tbody>
</table>

#### Electrical isolation

| Input/Power supply, internal bus         | Safe electrical isolation acc. to EN 50020, voltage peak value 375 V |

#### Directive conformity

<table>
<thead>
<tr>
<th>Electromagnetic compatibility standards</th>
<th>Directive 89/336/EG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directive 89/336/EG</td>
<td>EN 61326, EN 5 0081-2, NE 21</td>
</tr>
</tbody>
</table>

#### Ambient conditions

| Ambient temperature | -20 ... 60 °C (253 ... 333 K) |

#### Mechanical specifications

| Protection degree | IP20 |
| Mass             | approx. 100 g |

#### Data for application in conjunction with hazardous areas

<table>
<thead>
<tr>
<th>EC-Type Examination Certificate</th>
<th>BAS 99 ATEX 7187</th>
<th>for additional certificates see <a href="http://www.pepperl-fuchs.com">www.pepperl-fuchs.com</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Group, category, type of protection</td>
<td>II [1] G D [Ex ia] IIIC (Ta rb = -20 °C to +60 °C)</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>U0 = 11 V</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>I0 = 33 mA</td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>P0 = 90 mW</td>
<td></td>
</tr>
<tr>
<td>Group, category, type of protection, Temperature classification</td>
<td>II 3 G Ex nA II T4</td>
<td></td>
</tr>
<tr>
<td>Electrical isolation</td>
<td>Safe electrical isolation acc. to EN 50020, voltage peak value 375 V</td>
<td></td>
</tr>
<tr>
<td>Directive conformity</td>
<td>Standard</td>
<td></td>
</tr>
<tr>
<td>Directive 94/9 EU</td>
<td>EN 50014, EN 5 0020, EN 50021</td>
<td></td>
</tr>
</tbody>
</table>

#### Entity parameter

| Certification number           | 3000845          |
| Suitable for installation in division 2 | Yes |
| Connection                     | terminals 1, 3, 2, 6 |

#### Safety parameter

| CSA control drawing           | LR 36087-18      |
| Control drawing               | No. 116-0149     |
| Input i                        |                   |
| Voltage VDC                   | 10.5 V           |
| Current ISC                   | 32 mA            |
| Explosion group               | A&B C&E D F&G    |
| Max. external capacitance Csa | 2.7 µF 8.1 µF 21.6 µF |
| Max. external inductance Lsa  | 33 mH 119 mH 285 mH |
Supplyfunction:
Adjustable by the PACT™ human machine interface.
- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory
- Information on devices may be saved in PC memory
- Physical units are adjustable
- Input for potentiometric recorder: °C, °F, K, Ohm, none
- Input for thermocouple and mV-source: °C, °F, K, mV, none
- Lead monitoring selectable
- Separate detection and indication of lead breakage and lead short circuit
- 4 limit values
  - Upper alarm level limit
  - Upper warn level limit
  - Lower alarm level limit
  - Lower warn level limit
- Hysteresis adjustable
- Lower scale value and upper scale value of the measurement range
  - for the determination of the overflow and underflow range
  - for the configuration of the analogue monitor of the human machine interface
- Overrange and underrange alarm
- Malfunction output status
  - User defined
  - Min.
  - Max.
  - Hold last value
- Simulation
  - of the input value
  - of the device diagnosis
  - of the process channel diagnosis

Accessories
Cold junction compensation K-CJC-BU for thermocouples, pluggable
Universal temperature converter

KSD2-TI

Function

The KSD2-TI is designed for the connection of RTDs and thermocouples. The input signal of the temperature sensor is linearised.

The configuration may be over the internal Power Rail Bus. A red flashing LED and a signal through the Bus indicates burnout detection.

RTDs can be connected in 2-, 3- or 4-wire mode.

Internal cold junction compensation can be selected for thermocouples. For this purpose, a RTD is integrated in the K-CJC terminal block (available as an accessory). Cold junction compensation is also possible externally.

All parameters and configurations are transferred over the internal Power Rail Bus.

Composition

Application

- Temperature measurement are performed by resistance temperature sensors or thermocouples.
- Detection of position through low Ohmic potentiometric repeater.
- Detection of mV signals.

mV-source

Thermocouple

Cold junction compensation K-CJC

RTD, Resistive sensor

Signal Processor

Bus

Power Rail

Power supply

Removable terminals green

LED green: Power supply

LED yellowed: Input check

LED red: Fault signal

Front View

Housing type A3 (see system description)

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### Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 1.5 W</td>
</tr>
</tbody>
</table>

### Input

| Connection | terminals 1, 2, 3, 6 suitable for Pt100, N100, other resistive sensors, thermocouples type B, E, J, K, L, N, R, S, T and mV sources |
| Lead resistance | ≤ 50 Ω per lead |
| Current for sensor burn out detection | approx. 48 nA |
| Measuring current | approx. 400 µA with resistance measuring sensor |
| Lead monitoring | resistive sensors, Pt100, Ni100; lead breakage and short-circuit detection for all leads (4-leads: lead breakage at terminal 3 is detected as short-circuit); threshold for short-circuit detection ≤ 10 Ω mV sources, thermocouples; lead breakage detection; sensor burnout and short-circuit detection for cold junction compensation KOCJC |

### Output

| Connection | Power Rail |
| Interface | CAN protocol via Power Rail bus |

### Transfer characteristics

| Deviation | Pt100, N100: ± 0.4 K 2- and 3-wire; ± 0.35 K 4-wire |
| Thermocouples, except type B | ± 1 K, ± 0.5 K deviation on the cold junction compensation in addition |
| Thermocouple B | ± 1 K in the range > 600 °C ± 3 K in the remaining area ± 0.5 K deviation of the cold junction compensation in addition |
| Resistance type sensor, mV sensor | ± 0.1 % of the measurement range |

### Error: Temperature

| Pt100, N100 | ± (0.0015 % of the measured value in K + 0.006 % of the measurement range)/K |
| Thermocouples | ± (0.2 K + 0.004 % of the measured value in °C + 0.006 % of the measurement range)/K |
| Resistance type sensor, mV sensor | ± 0.01 % of measuring range / K |
| Influence of the power supply | ± 0.1 % of the measurement range |

### Electrical isolation

| Input/Power supply, internal bus | basic insulation acc. to DIN EN 50178, voltage peak value 375 V |

### Directive conformity

| Electromagnetic compatibility standards | Directive 89/336/EG EN 61326, EN 50081-2, NE 2.1 |

### Mechanical specifications

| Protection degree | IP20 |
| Mass | approx. 100 g |

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**Supplementary information**

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com
Software functions:
Adjustable by the PACTware™ Human Machine Interface.
• TAG numbers, 28 alphanumeric signs, can be stored in device
• Commentary, may be saved in PC memory
• Information on devices may be saved in PC memory
• Physical units are adjustable
• Input for resistance type sensor: °C, °F, K, ohm, none
• Input for thermocouple, mV source: °C, °F, K, mV, none
• Lead monitoring selectable
• Separate detection and indication of lead breakage and lead short circuit
• 4 limit values
  • Upper alarm level limit
  • Upper warn level limit
  • Lower alarm level limit
  • Lower warn level limit
• Hysteresis adjustable
• Lower scale value and upper scale value of the measurement range
• For the determination of the overrange and underrange alarm
• For the configuration of the analogue monitor of the Human Machine Interface
• Overrange and underrange alarm
• Malfunction output status
• User defined
• Min.
• Max.
• Hold last value
• Simulation
• Of the input value
• Of the device diagnosis
• Of the process channel diagnosis

Accessories
Cold junction compensation K-CJC-GN for thermocouples, pluggable
**Function**

The KSD2-MVI is suitable for the connection of analogue input signals with a voltage range 0 mV ... 50 mV. The measurement value is transferred in digital form to the control system or to the memory programmable control system. The 4 limit values can also be set with the PC-programming software.

**Composition**

*Front View*

- Housing type A3 (see system description)
- Removable terminal green
- LED green: Power supply
- LED yellow/red: Input check
- LED red: Fault signal
### Technical Data

**Supply**
- **Connection**: Power Rail
- **Rated voltage**: 20 ... 30 V DC
- **Ripple**: < 10 %
- **Power consumption**: < 1 W

**Input**
- **Connection**: terminals 2, 1
- **Input signal**: 0 ... 50 mV
- **Input resistance**: 1 kΩ ... 2 kΩ

**Output**
- **Connection**: Power Rail
- **Interface**: CAN protocol via Power Rail bus

**Transfer characteristics**
- **Deviation**: 0.5 % input signal range at 20 °C (293 K)
- **Temperature**: 0.05 %/K of input signal range

**Electrical isolation**
- Input/Power supply, internal bus: basic insulation according to DIN EN 50178, rated insulation voltage 300 V_{eff}

**Directive conformity**
- Electromagnetic compatibility: standards
- Directive 89/336/EG
- EN 61326, EN 50081-2, NE 21

**Ambient conditions**
- **Temperature**: -20 ... 60 °C (253 ... 333 K)

**Mechanical specifications**
- **Protection degree**: IP20
- **Mass**: approx. 100 g

### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Application
- Converter for analogue input voltages

### Notes

- **Software functions**: Adjustable by the PACT\textsuperscript{w} Human Machine Interface.
  - Tag numbers, 28 alphanumeric characters, can be programmed into device
  - Commentary, may be saved in PC memory
  - Information on devices may be saved in PC memory
  - Physical units are adjustable
  - List see "System Description Remote Process Interface"
  - 4 limit values
  - Upper alarm level limit
  - Upper warn level limit
  - Lower alarm level limit
  - Lower warn level limit
  - Hysteresis adjustable
  - Lower scale value and upper scale value of the measurement range
- for the determination the overflow and underflow range
- for the configuration of the analogue monitor of the Human Machine Interface
- Overrange and underrange alarm
- Malfunction output status
- User defined
- Min.
- Max.
- Held last value
- Simulation
  - of the input value
  - of the device diagnosis
  - of the process channel diagnosis
The KSD2-VI is suitable for connecting analog input signals with a voltage range 0/2 V...10 V. The measurement value is transferred in digital form to the control system or to the memory programmable control system. Lead monitoring can be turned off with the PC-programming software. The 4 limit values can also be set with the PC-programming software.
### Technical Data

#### Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 1 W</td>
</tr>
</tbody>
</table>

#### Input

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 2, 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead monitoring</td>
<td>Load U &lt; 0.025 V; Short-circuit U &lt; 0.025 V</td>
</tr>
<tr>
<td>Input signal</td>
<td>0 ... 10 V or 2 ... 10 V</td>
</tr>
<tr>
<td>Input resistance</td>
<td>≥ 100 kΩ</td>
</tr>
</tbody>
</table>

#### Output

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus</td>
</tr>
</tbody>
</table>

#### Transfer characteristics

<table>
<thead>
<tr>
<th>Deviation</th>
<th>0.5 % input signal range at 20 °C (293 K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>0.01 %/K of the input signal range</td>
</tr>
</tbody>
</table>

#### Electrical isolation

- Input/Power supply, internal bus: basic insulation according to DIN EN 50178, rated insulation voltage 300 V eff

#### Directive conformity

- Electromagnetic compatibility standards
- Directive 89/336/EG
- EN 61326, EN 50081-2, NE 2 1

#### Ambient conditions

- Ambient temperature: -20 ... 60 °C (253 ... 333 K)

#### Mechanical specifications

<table>
<thead>
<tr>
<th>Protection degree</th>
<th>IP20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>approx. 100 g</td>
</tr>
</tbody>
</table>

### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Application

- Converter for analogue input voltages

### Notes

#### Software functions

- Can be set with the control display **PACTware™**
- Selection switch markings (TAG-No.), 28 alphanumeric markings, can be programmed into device
- Commentary, may be saved in PC memory
- Information on devices may be saved in PC memory
- Physical characteristics are adjustable
- List see "System Description Remote Process Interface"
- Lead monitoring selectable
- 4 limit values
  - Upper alarm limit
  - Upper warning limit
  - Lower alarm limit
  - Lower warning limit
  - Adjustable hysteresis
- Start value and end value of the measurement range
  - to determine the overflow and underflow range
  - for configuring analogue value display in the graphical user interface
- Signalling of having exceeded or fallen short of the measurement range.
- Determining the behaviour in the case of an error
  - Signal value optional
  - Start value of the measurement range
  - End value of the measurement range
  - Maintenance of the last accepted measurement value
- Simulation
  - of the output value
  - of the device diagnosis
  - of the process channel diagnosis
• 1-channel
• Output EEx ia IIC
• Device installation permissible in zone 2
• 24 V DC rated operational voltage
• Lead breakage (LB) monitoring and short-circuit (SC) monitoring
• 4 limit values
• Power Rail bus
• EMC acc. to NAMUR NE 21

KSD2-CO-Ex

Function
The KSD2-CO-Ex transmits a 0/4 mA ... 20 mA current signal to the hazardous area. Loads between 30 Ohms ... 750 Ohms can be connected. The output is galvanically isolated from the bus and power supply. The output field circuit is monitored for lead breakage and short circuit conditions.

Application
The control of pneumatic positioners (I/P-converter) and intrinsically safe solenoid valves.

Composition

Electrical Connection

![Electrical Connection Diagram]

Output EEx ia IIC

2-

3+

Bus

Power supply

Power Rail

Removable terminal blue

LED green: Power supply

LED red: Fault signal

LED yellow/red: Output check

Housing type A3 (see system description)
**Technical Data**

### Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>1.3 W</td>
</tr>
</tbody>
</table>

### Input

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus</td>
</tr>
</tbody>
</table>

### Output

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 2, 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>0/4 ... 20 mA</td>
</tr>
<tr>
<td>Load</td>
<td>30 ... 750 Ω</td>
</tr>
<tr>
<td>Residual ripple</td>
<td>&lt; 0.25 %</td>
</tr>
</tbody>
</table>

### Transfer characteristics

- **Deviation**: 0.1 % of output signal range at 20 °C (293 K)
- **Temperature**: 0.01 % / K of output signal range

### Electrical isolation

- Safe electrical isolation acc. to EN 50020, voltage peak value 375 V

### Directive conformity

- Electromagnetic compatibility: Directives 89/336/EG, EN 61326, EN 50081-2, NE 21

### Ambient conditions

- Ambient temperature: -20 ... 60 °C (253 ... 333 K)

### Mechanical specifications

- Protection degree: IP20
- Mass: approx. 100 g

### Data for application in conjunction with hazardous areas

**EC-Type Examination Certificate**

- ZELM 99 ATEX 0013; for additional certificates see www.pepperl-fuchs.com

**Group, category, type of protection**

- II (1) G [EEx ia] IIC

**Voltage**

- $U_0 = 24.2$ V

**Current**

- $I_0 = 91$ mA

**Power**

- $P_0 = 547$ mW (linear characteristic)

### Directive conformity

- Standards: Directives 94/9 EU, EN 50014, EN 50020, EN 50021

### Entity parameter

- Certification number: J.I.0024.AX
- FM control drawing: No. 116-0150
- Suitable for installation in division 2: yes
- Connection: terminals 2, 3
- Input I
  - Voltage $V_{OC} = 24.8$ V
  - Current $I = 92$ mA

### Safety parameter

- CSA control drawing: LR 36087-18
- Control drawing: No. 116-0149
- Connection: terminals 2, 3
- Input I
  - Safe I
  - Voltage $V_{OC} = 24.2$ V / 270 Ohm
  - Current $I_{SC} = 91$ mA

### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com
Notes

Software functions:
Adjustable by the PACT™ human machine interface.
- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory
- Information on devices may be saved in PC memory
- Physical units are adjustable
  - List see "System Description Remote Process Interface".
- Lead monitoring selectable
- Separate detection and indication of lead breakage and lead short circuit
- Lower scale value and upper scale value of the measurement range
- for the determination of the overflow and underflow range
- for the configuration of the analogue monitor of the human machine interface
- Overrange and underrange alarm
- Malfunction output status
  - User defined
    - Min.
    - Max.
  - Hold last value
  - Simulation
    - of the input value
    - of the device diagnosis
    - of the process channel diagnosis
Electrical Connection

- 1-channel
- 24 V DC rated operational voltage
- Lead breakage (LB) monitoring and short-circuit (SC) monitoring
- 4 limit values
- Power Rail bus
- EMC acc. to NAMUR NE 21

KSD2-CO

Function

The KSD2-CO transmits a 0/4 mA ... 20 mA current signal. Loads between 30 Ohms ... 750 Ohms can be connected. The output is galvanically isolated from the bus and power supply. The output field circuit is monitored for lead breakage and short circuit conditions.

Application

The control of pneumatic positioners (I/P converters) and solenoid drivers.

Composition

Front View

Housing type A3 (see system description)

LED yellow/red: Output check

Removable terminal green

LED green: Power supply

LED red: Fault signal

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# Technical Data

## Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>1.3 W</td>
</tr>
</tbody>
</table>

## Input

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus</td>
</tr>
</tbody>
</table>

## Output

| Connection | terminals 2, 3 |
| Current | 0/4 ... 20 mA |
| Load | 30 ... 750 Ω |
| Residual ripple | ≤ 0.25 % |
| Lead monitoring | possible for \(I_{\text{nominal}} \geq 1\) mA; breakage \(I < 3.6\) mA; short-circuit, load < 30 Ohm |

## Transfer characteristics

| Deviation | 0.1 % of output signal range at 20 °C (293;K) |
| Temperature | 0.01 % / K of output signal range |

## Electrical isolation

| Output/Power supply, internal bus | basic insulation acc. to DIN EN 50178, rated insulation voltage 300 V eff |

## Directive conformity

| Electromagnetic compatibility | standards |
| Directive 89/336/EG | EN 61326, EN 5 0081-2, NE 2 1 |

## Ambient conditions

| Ambient temperature | -20 ... 60 °C (253 ... 333 K) |

## Mechanical specifications

| Protection degree | IP20 |
| Mass | approx. 100 g |

---

### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Notes

#### Software functions

Adjustable by the PACT ware™ Human Machine Interface.
- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory
- Information on devices may be saved in PC memory
- Physical units are adjustable
- List see "System Description Remote Process Interface".
- Lead monitoring selectable
- Separate detection and indication of lead breakage and lead short circuit
- Lower scale value and upper scale value of the measurement range
- for the determination of the overflow and underflow range
- for the configuration of the analogue monitor of the Human Machine Interface
- Overrange and underrange alarm
- Malfunction output status
  - User defined
  - Min.
  - Max.
  - Maintenance of the last accepted measurement value
- Simulation
  - of the input value
  - of the device diagnosis
  - of the process channel diagnosis

---

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Analogue SMART Output Driver/Repeater

KSD2-CO-S-Ex

Successor KSD2-CO-S-Ex.H

Function

The KSD2-CO-S-Ex transmits a 0/4 mA ... 20 mA current signal into the hazardous area. Loads between 30 Ohms ... 750 Ohms can be connected. The output is galvanically isolated from the bus and power supply.

The output field circuit is monitored for lead breakage and short circuit conditions. The device allows for monitoring and programming of positioners, which support the HART Protocol.

The KSD2-CO-S-Ex is delivered standard with the KF-STP-... device connectors. The 2.3 mm jacks are integrated in this connector for use with HART Communicators. The KFD2-HMM-16 or KFD0-HMS-16 HART multiplexers can be connected to terminals 11+ and 10-.

Composition

Application

The control of intrinsically safe solenoid valves and positioners. The interface allows a bidirectional communication between the position controller and a handheld terminal or a HART multiplexer. These devices can be connected in the safe area. The bus transfers the digital control signal exclusively.
## Technical Data

### Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
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<tr>
<td>Ripple</td>
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<td>Power consumption</td>
<td>1.3 W</td>
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</tbody>
</table>

### Input

<table>
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<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
</table>

### Output

<table>
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<tr>
<th>Connection</th>
<th>terminals 2, 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
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</tr>
<tr>
<td>Load</td>
<td>30 ... 750 Ω</td>
</tr>
<tr>
<td>Residual ripple</td>
<td>≤ 0.25 %</td>
</tr>
<tr>
<td>Lead monitoring</td>
<td>possible for</td>
</tr>
<tr>
<td></td>
<td>breakage</td>
</tr>
</tbody>
</table>

### Transfer characteristics

| Deviation | 0.1 % of output signal range at 20 °C (293;K) |
| Temperature | 0.01 % / K of output signal range |

### Electrical isolation

- Output/Power supply, internal bus: safe electrical isolation acc. to EN 50020, voltage peak value 375 V
- Directive conformity: EN 50020, EN 50081-2, NE 21

### Ambient conditions

- Ambient temperature: -20 ... 60 °C (253 ... 333 K)

### Mechanical specifications

- Protection degree: IP20
- Mass: approx. 100 g

#### Data for application in conjunction with hazardous areas

- EC-Type Examination Certificate: ZELM 99 ATEX 0013; for additional certificates see [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com)
- Group, category, type of protection: II (1) G [EEEx ia] IIC
- Voltage \( U_0 \): 24.2 V
- Current \( I_0 \): 91 mA
- Power \( P_0 \): 547 mW (linear characteristic)
- Directive conformity: EN 50014, EN 50020, EN 50021

### Entity parameter

- Certification number: J.I.002A4.AX
- FM control drawing: No. 116-0150
- Suitable for installation in division 2: yes
- Input I
  - Voltage \( V_{OC} \): 24.8 V
  - Current \( I_{SC} \): 92 mA
  - Explosion group: A&B C&E D, F&G
  - Max. external capacitance \( C_a \): 0.19 µF 0.57 µF 1.54 µF
  - Max. external inductance \( L_a \): 4.3 mH 17.2 mH 35.2 mH

### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com)
Software functions:
Adjustable by the PACT™ human machine interface.
- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory Information on devices may be saved in PC memory
- Physical units are adjustable
  - List see "System Description Remote Process Interface".
- Lead monitoring selectable
- Separate detection and indication of lead breakage and lead short circuit
- Lower scale value and upper scale value of the measurement range
  - for the determination of the over flow and underflow range
  - for the configuration of the analogue monitor of the human machine interface
- Overrange and underrange alarm
- Malfunction output status
  - User defined
  - Min.
  - Max.
  - Hold last value
- Simulation
  - of the input value
  - of the device diagnosis
  - of the process channel diagnosis
Analogue SMART Output Driver/Repeater

### Function

Der KSD2-CO-S transmits a 0/4 mA ... 20 mA current signal. Loads between 30 Ohms ... 750 Ohms can be connected. The output is galvanically isolated from the bus and power supply. The output field circuit is monitored for lead breakage and short circuit conditions. The device allows for monitoring and programming of positioners, which support the HART protocol.

The KSD2-CO-S is delivered standard with the KF-STP-GN device connectors. The 2.3 mm jacks are integrated in this connector for use with HART Communicators. The KFD2-HMM-16 or KFD0-HMS-16 HART multiplexers can be connected to terminals 11+ and 10-.

### Composition

The control of solenoid drivers and positioners. The interface allows a bidirectional communication between the position controller and a handheld terminal or a HART- multiplexer. The Bus transfers the digital control signal exclusively.

### Electrical Connection

![Electrical Connection Diagram]

- 1-channel
- 24 V DC rated operational voltage
- Lead breakage (LB) monitoring and short-circuit (SC) monitoring
- 4 limit values
- Transfer of HART signals via the Power Rail bus or from handheld terminal
- Power Rail bus
- EMC acc. to NAMUR NE 21

**KSD2-CO-S**

Successor KSD2-CO-S-H
Technical Data

Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>1.3 W</td>
</tr>
</tbody>
</table>

Input

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus</td>
</tr>
</tbody>
</table>

Output

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 2, 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>0/4 ... 20 mA</td>
</tr>
<tr>
<td>Load</td>
<td>30 ... 750 Ω</td>
</tr>
<tr>
<td>Residual ripple</td>
<td>≤ 0.25 %</td>
</tr>
<tr>
<td>Lead monitoring</td>
<td>possible for (I_{\text{nominal}} \geq 1) mA; breakage (I &lt; 3.6) mA; short-circuit, load &lt; 30 Ohm</td>
</tr>
</tbody>
</table>

Transfer characteristics

| Deviation | 0.1 % of output signal range at 20 °C (293 K) |
| Temperature | 0.01 % / K of output signal range |

Electrical isolation

| Output/Power supply, in terminal bus | basic insulation acc. to DIN EN 50178, rated insulation voltage 300 V aC |

Directive conformity

| Electromagnetic compatibility | EN 61326, EN 50081-2, NE 21 |

Ambient conditions

| Ambient temperature | -20 ... 60 °C (253 ... 333 K) |

Mechanical specifications

| Protection degree | IP20 |
| Mass | approx. 100 g |

Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

Notes

Software functions

Adjustable by the PACTware™ Human Machine Interface.
- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory
- Information on devices may be saved in PC memory
- Physical units are adjustable
  - List see "System Description Remote Process Interface".
- Lead monitoring selectable
- Separate detection and indication of lead breakage and lead short circuit
- Lower scale value and upper scale value of the measurement range
  - for the determination of the overflow and underflow range
  - for the configuration of the analogue monitor of the Human Machine Interface
- Overrange and underrange alarm
- Malfunction output status
  - User defined
  - Min.
  - Max.
  - Maintenance of the last accepted measurement value
- Simulation
  - of the input value
  - of the device diagnosis
  - of the process channel diagnosis

Notes
Analogue HART Output Driver/Repeater

KSD2-CO-S-Ex.H

Function

The KSD2-CO-S-Ex.H transfers a 0-4 mA to 20 mA current signal into the hazardous area. Loads between 30 Ohms and 750 Ohms can be connected. The output is galvanically isolated from the bus and power supply. The output field circuit is monitored for lead-breakage and short-circuit conditions. The device allows for monitoring and programming of positioners, which support the HART Protocol.

The KSD2-CO-S-Ex.H is delivered standard with the connectors KF-STP-... The 2.3 mm jacks are integrated in this connector for use with HART Communicators. A handheld terminal can be connected to the terminals 11+ and 10-. The device supports also the HART communication via the Power Rail bus.

Composition

Application

The control of intrinsically safe solenoid valves and positioners. The interface allows a bidirectional communication between the position controller and the handheld terminal. The device can be connected in the safe area. The bus transfers the digital value of the control signal to the HART communication.
# Technical Data

<table>
<thead>
<tr>
<th>Supply</th>
<th>KSD2-CO-S-Ex.H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection</td>
<td>Power Rail</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>1.3 W</td>
</tr>
</tbody>
</table>

## Input

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus</td>
</tr>
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</table>

## Output

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 2, 3</th>
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<tbody>
<tr>
<td>Current</td>
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<td>Load</td>
<td>30 ... 750 Ω</td>
</tr>
<tr>
<td>Residual ripple</td>
<td>≤ 0.25 %</td>
</tr>
</tbody>
</table>

### Transfer characteristics

- Deviation: 0.1 % of output signal range at 20 °C (293;K)
- Temperature: 0.01 % / K of output signal range

## Electrical isolation

Output/Power supply, internal bus: safe electrical isolation acc. to EN 50020, voltage peak value 375 V

## Standard conformity

- Climatic conditions: acc. to DIN IEC 721
- Directive conformity: EN 61326, EN 50081-2, NE 21

## Ambient conditions

- Ambient temperature: -20 ... 60 °C (253 ... 333 K)

## Mechanical specifications

- Protection degree: IP20
- Mass: approx. 100 g

## Data for application in conjunction with hazardous areas

- EC-Type Examination Certificate: ZELM 99 ATEX 0013; for additional certificates see www.pepperl-fuchs.com
- Group, category, type of protection: II (1) G [EEx ia] IIC
- Voltage: 24.2 V
- Current: I0 91 mA
- Power: PO 547 mW (linear characteristic)
- Group, category, type of protection, Temperature classification: II 3 G EEx nA II T4

## Supplementary information

- Directive conformity: EN 50014, EN 50020, EN 50021
- Directive 94/9 EU

## Notes

**Software functions:**

- Adjustable by the PACT software™ human machine interface.
- Tag numbers, 28 alphanumeric characters, can be programmed into device.
- Commentary, may be saved in PC memory.
- Information on devices may be saved in PC memory.
- Physical units are adjustable.
- List see "System Description Remote Process Interface".
- Lead monitoring selectable.
- Separate detection and indication of lead breakage and lead short circuit.
- Lower scale value and upper scale value of the measurement range.
- For the determination of the overflow and underflow range.
- For the configuration of the analogue monitor of the human machine interface.
- Overrange and underrange alarm.
- Malfunction output status.
- User defined.
- Min.
- Max.
- Hold last value.
- Simulation.
- Of the input value.
- Of the device diagnosis.
- Of the process channel diagnosis.

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An Analogue HART Output Driver/Repeater

**KSD2-CO-S-H**

KSD2-CO-S-H replaces type KSD2-CO-S

### Function

The KSD2-CO-S-H transfers a 0/4 mA ... 20 mA current signal. Loads between 30 Ohms ... 750 Ohms can be connected. The output is galvanically isolated from the bus and power supply. The output field circuit is monitored for lead breakage and short-circuit conditions. The device allows for monitoring and programming of positioners, which support the HART Protocol. The KSD2-CO-S-H is delivered with the connectors KF-STP-GN. The 2.3 mm jacks are integrated in this connector for use with HART Communicators. A handheld terminal can be connected to the terminals 11+ and 10-. The device supports additionally the HART communication via the Power Rail bus.

### Composition

**Front View**

- Housing type A4 (see system description)
- LEDs green: Power supply
- LEDs yellow/red: Output check
- Removable terminal green KF-STP-GN

**Removable terminal green KF-STP-GN**

### Application

The control of solenoid drivers and positioners. The interface allows a bidirectional communication between the position controller and the handheld terminal. The bus transfers the digital value of the control current and the HART communication.

### Electrical Connection

- 1-channel
- 24 V DC rated operational voltage
- Lead breakage (LB) monitoring and short-circuit (SC) monitoring
- Transfer of HART signals via the Power Rail bus or from handheld terminal
- Power Rail bus
- EMC acc. to NAMUR NE 21

The 1-channel delivers a current signal of 0/4 mA ... 20 mA. Loads from 30 Ohms ... 750 Ohms are connected. The output is galvanically isolated from the bus and power supply. The output field circuit is monitored for lead breakage and short-circuit conditions. The device allows for monitoring and programming of positioners, which support the HART Protocol. The KSD2-CO-S-H is delivered with the connectors KF-STP-GN. The 2.3 mm jacks are integrated in this connector for use with HART Communicators. A handheld terminal can be connected to the terminals 11+ and 10-. The device supports additionally the HART communication via the Power Rail bus.

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Date of issue: 2003-07-29
# Technical Data

## Supply

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<tr>
<th>Connection</th>
<th>Power Rail</th>
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<tbody>
<tr>
<td>Rated voltage</td>
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<tr>
<td>Ripple</td>
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## Input

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<td>Interface</td>
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## Output

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<td>Lead monitoring</td>
<td>possible for ( I_{\text{nominal}} \geq 1 \text{ mA} ); breakage ( I &lt; 3.6 \text{ mA} ); short-circuit, load &lt; 30 Ohm</td>
</tr>
</tbody>
</table>

## Transfer characteristics

| Deviation | 0.1 % of output signal range at 20 °C (293;K) |
| Temperature | 0.01 % / K of output signal range |

## Electrical isolation

Output/Power supply, internal bus basic insulation acc. to DIN EN 50178, rated insulation voltage 300 V eff

## Standard conformity

Climatic conditions acc. to DIN IEC 721

## Directive conformity

Electromagnetic compatibility standards

Directive 89/336/EG EN 61326, EN 50081-2, NE 21

## Ambient conditions

Ambient temperature -20 ... 60 °C (253 ... 333 K)

## Mechanical specifications

Protection degree IP20

Mass approx. 100 g

## Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

## Notes

**Software functions**

Adjustable by the PACT ace™ Human Machine Interface.

- Tag numbers, 28 alphanumeric characters, can be programmed into device
- Commentary, may be saved in PC memory
- Information on devices may be saved in PC memory
- Physical units are adjustable
  - List see "System Description Remote Process Interface".
- Lead monitoring selectable
- Separate detection and indication of lead breakage and lead short circuit
- Lower scale value and upper scale value of the measurement range
  - for the determination of the overflow and underflow range
  - for the configuration of the analogue monitor of the Human Machine Interface
- Overrange and underrange alarm
- Malfunction output status
  - User defined
  - Min.
  - Max.
  - Maintenance of the last accepted measurement value
- Simulation
  - of the input value
  - of the device diagnosis
  - of the process channel diagnosis

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PROFIBUS Gateway

KSD2-GW-PRO

Electrical Connection

Function

The KSD2-GW-PRO translates the protocols of the internal CAN bus into the PROFIBUS DP protocols of the external bus system and vice versa. Up to 125 devices can be connected to a gateway via the Power Rail.

Application

Connection of the RPI with the control system/PLC/PC via PROFIBUS.

Composition

Connection of the Remote Process Interface to the control system/PLC/PC via PROFIBUS

- Couples the internal CAN bus to the external PROFIBUS
- Device installation permissible in zone 2
- Master function for the internal CAN bus
- External bus: PROFIBUS DP
- External baud rate up to 1.5 MBd
- Separate RS 232 connection on front side for system configuration, also directed to terminals for creating a subordinate monitoring system
- 24 V DC rated operational voltage
- Redundant gateway possible
- EMC acc. to NAMUR NE 21

KSD2-GW-PRO
Successor KSD2-GW2-PRO

Subject to reasonable modifications due to technical advances.

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Technical Data

**Directive conformity**

| Directive 89/336/EG | EN 61326, EN 50081-2, NE 21 |

**Electromagnetic compatibility**

| Standards |

**Supply**

| Connection | Power Rail |
| Rate d voltage | 20 ... 30 V DC |
| Ripple | < 10 % |
| Power consumption | 2.8 W |

**Internal bus**

| Connection | Power Rail |
| Interface | CAN protocol via Power Rail bus with up to 125 units |
| Cycle time | 1 device 25 ms |
| | 125 devices with discrete input 60 ms |
| | 125 devices with discrete output 90 ms |
| | 125 devices with analogue input 75 ms |
| | 125 devices with analogue output 110 ms |

**External bus**

| Connection | terminals 10, 11, 12, 16, 17, 18 |
| Interface | PROFIBUS acc. to DIN EN 50170/2 |

**Service interface**

| Connection | terminals 7, 8, 9 and jack bush |
| Interface | RS 232 |

**Redundancy**

| Option | through the use of a second gateway |

**Electrical isolation**

| Internal/External bus | basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V AC |
| Internal bus/Power supply | not available |
| External bus/Power supply | basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V AC |
| Service interface/internal bus | basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V AC |
| Service interface/external bus | basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V AC |
| Service interface/supply | basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V AC |

**Ambient conditions**

| Ambient temperature | -20 ... 60 °C (253 ... 333 K) |

**Mechanical specifications**

| Protection degree | IP20 |
| Mass | approx. 100 g |

**Data for application in conjunction with hazardous areas**

| Group, category, type of protection, Temperature classification | II 3 G EEx nA II T4 |
| Directive conformity | standards |
| Directive 94/9 EU | EN 50021 |
| Entity parameter | Certification number 3000845 |
| FM control drawing | No. 116-0150 |
| Suitable for installation in division 2 | yes |
| Control drawing | CSA control drawing LR 36087-21 |
| Control drawing | No. 116-0149 |

**Supplementary information**

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

**Notes**

**Operation**

The configuration, parameterisation, addressing, operation and fault detection are performed by PC and human machine interface via RS 232-interface (see RPI system manual). Limited operation without a PC is possible with the control elements of the gateway and the devices.

**Operating components**

Jacks for the connection of a PC across K-ADP2 adapter for the configuration and parameterisation of the system. The PC may alternatively be connected to the plug-in screw terminals 7, 8, 9 in case, e. g. that a PC-based separate monitor level is to be installed. The jack on the front panel and the screw terminals 7, 8, 9 may not be used simultaneously.
The KSD2-GW-PRO.485 translates the protocols of the internal CAN bus into the PROFIBUS DP protocols of the external bus system and vice versa. Up to 125 devices can be connected to a gateway via the Power Rail.

The gateways of multiple RPI segments can be continuously networked with one of the control system's or PLC's independent service levels over the RS 485 program interface in addition to the PROFIBUS connection. The operator has access independent of the control system, to the configuration data and parameters of all connected gateways and RPI devices by means of a PC and the RPI control display.

Application

Connection of the RPI with the control system/PLC/PC via PROFIBUS.
Configuration interface for the RPI devices.
## Technical Data

### Directive conformity
- Electromagnetic compatibility: Standards
- Directive 89/336/EG: EN 61326, EN 50081-2, NE 21

### Supply
- Connection: Power Rail
- Rated voltage: 20 ... 30 V DC
- Ripple: < 10 %
- Power consumption: 2.8 W

### Internal bus
- Connection: Power Rail
- Interface: CAN protocol via Power Rail bus with up to 125 units
- Cycle time:
  - 1 device: 25 ms
  - 125 devices with discrete input: 60 ms
  - 125 devices with discrete output: 90 ms
  - 125 devices with analogue input: 75 ms
  - 125 devices with analogue output: 110 ms

### External bus
- Connection: terminals 10, 11, 12, 16, 17, 18
- Interface: PROFIBUS acc. to DIN EN 50170/2

### Service interface
- Connection: terminals 7, 8, 9
- Interface: RS 485

### Redundancy
- Option: through the use of a second gateway

### Electrical isolation
- Internal/External bus: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- Internal bus/Power supply: not available
- External bus/Power supply: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- Service interface/internal bus: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- Service interface/external bus: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- Service interface/supply: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC

### Ambient conditions
- Ambient temperature: -20 ... 60 °C (253 ... 333 K)

### Mechanical specifications
- Protection degree: IP20
- Mass: approx. 100 g
- Data for application in conjunction with hazardous areas
  - Group, category, type of protection, Temperature classification: II 3 G Ex nA II T4
  - Directive conformity: Standards
  - Directive 94/9 EU: EN 50021
- Entity parameter
  - Certification number: 3000845
  - FM control drawing: No. 116-0150
  - Suitable for installation in division 2: yes
- Safety parameter
  - CSA control drawing: LR 36087-21
  - Control drawing: No. 116-0149

### Supplementary information
EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Notes
**Operation**
The configuration, parameterisation, addressing, operation and fault detection are performed by PC and human machine interface via RS 485 interface (see RPI system manual). Limited operation without a PC is possible with the control elements of the gateway and the devices.

**Operating components**
Connection of a PC for the configuration and parameterisation of the system via K-ADP4 adapter to the plug-in screw terminals 7, 8, 9.
- Connects the Remote Process Interface by means of PROFIBUS with DCS/PLC/PC
- External Baudrate up to 1.5 MBd
- Installation permissible in zone 2
- Supports acyclic tasks in acc. with PROFIBUS DP V1
- So configuration and parameterisation by means of PROFIBUS possible
- Configuration and parameterisation by means of FDT-conforming control display for use with RPI-DTM, e.g. PACTware
- Integrated HART-Multiplexer
- HART communication by means of PROFIBUS DP V1 or integrated RS 485-interface
- Compatible to PACTware, AMS a. o.
- DC 24 V supply voltage
- Gateway redundancy possible
- EMC acc. to NAMUR NE 21
- 24 V DC rated operational voltage

**KSD2-GW2-PRO**

replaces models

KSD2-GW-PRO,
KSD2-GW-PRO.B,
KSD2-GW-PRO.485,
KSD2-GW-PRO.485B

**Application**

Connection of the RPI with the control system/PLC/PC over PROFIBUS. Configuration interface for the RPI devices. HART communication with field devices connected to RPI devices by means of an integrated HART multiplexer system or with an external PROFIBUS DP V1.
**Technical Data**

<table>
<thead>
<tr>
<th>Directive conformity</th>
<th>Electromagnetic compatibility standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directive 89/336/EG</td>
<td>EN 61326, EN 50081-2, NE 21</td>
</tr>
</tbody>
</table>

**Supply**

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate d voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>2.8 W</td>
</tr>
</tbody>
</table>

**Internal bus**

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus with up to 125 units</td>
</tr>
<tr>
<td>Cycle time</td>
<td>1 device 25 ms</td>
</tr>
<tr>
<td>125 devices with discrete input 60 ms</td>
<td></td>
</tr>
<tr>
<td>125 devices with discrete output 90 ms</td>
<td></td>
</tr>
<tr>
<td>125 devices with analogue input 75 ms</td>
<td></td>
</tr>
<tr>
<td>125 devices with analogue output 110 ms</td>
<td></td>
</tr>
</tbody>
</table>

**External bus**

| Connection | terminals 10, 11, 12; 16, 17, 18 |
| Interface | PROFIBUS acc. to EN 50 170 |
| Service interface | RS 422-Interface: terminals 7+, 8-, 9 screen |
|  | RS 232-Interface: Ø3.5 mm jack bush |

**Redundancy**

| Option | through the use of a second gateway |

**Electrical isolation**

| Internal/External bus | basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC |
| Internal bus/Power supply | not available |
| External bus/Power supply | basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC |
| Service interface/internal bus | basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC |
| Service interface/external bus | basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC |
| Service interface/supply | basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC |

**Ambient conditions**

| Ambient temperature | -20 ... 60 °C (253 ... 333 K) |

**Mechanical specifications**

| Protection degree | IP20 |
| Mass | approx. 100 g |

**Data for application in conjunction with hazardous areas**

| Group, category, type of protection, Temperature classification | II 3 G EEx nA II T4 |

**Directive conformity**

| Directive 94/9 EU | EN 50021 |

**Entity parameter**

| Certification number | 3000845 |
| FM control drawing | No. 116-0150 |
| Suitable for installation in division 2 | yes |

**Safety parameter**

| CSA control drawing | LR 36087-21 |
| Control drawing | No. 116-0149 |

**Supplementary information**

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

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Notes

Operating principle
The KSD2-GW2-PRO is the interface between the external PROFIBUS DP V1 and the RPI-internal CAN bus. As many as 125 RPI modules can be managed and connected over the Power Rail. The configuration and parameterisation of the system can be performed either with the PROFIBUS DP V1, the RS 485 or the RS 232 service interface. The configuration and parameterisation can be performed by any FDT-compliant user interface, for example PACTware™, as long as RPI-DTM has been integrated. Configuration or parameterisation by means of K-SK1 is not possible.

HART telegrams are received by the Gateway through the integrated RS 485 service interface, and are forwarded on to the corresponding RPI modules (KSD2-CI-S-H, KSD2-CI-S-Ex.H, KSD2-CO-S-H and KSD2-CO-S-Ex.H). The HART multiplexers integrated for this purpose can manage as many as 250 intelligent field devices. HART communication works bidirectionally. HART communication can also be performed by means of an FDT-compliant HART configuration software package such as PACTware™, or AMS. A prerequisite is integration of an appropriate HART DTM.

Operation
Configuration, parameterisation, address assignment, commissioning and troubleshooting are performed by PC and user interface with an RS 232 or RS 485 interface or with a PROFIBUS DP V1 (see RPI system manual). Limited operation without a PC is possible with the control elements of the Gateway and the devices.

Operating components
Socket for connecting a PC with K-ADP2 adapter for configuration and parameterisation of the system with an RS 232 interface. In addition, the PC can also be connected to plug-in screw terminals 7, 8, 9 if you want to install a separate PC-based monitoring level with the RS 485 interface. The front-side jack bush and screw terminals 7, 8, 9 can be used at the same time.
**Function**

The KSD2-GW-MOD translates the protocols of the internal CAN Bus into the Modbus-RTU protocols of the external bus system and vice versa. Up to 125 devices can be connected to a gateway via the Power Rail.

**Composition**

Connection of the RPI with the control system/PLC/PC via Modbus.

Configuration interface for the RPI devices.
## Technical Data

### Directives conformity

<table>
<thead>
<tr>
<th>Electromagnetic compatibility</th>
<th>standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directive 89/336/EG</td>
<td>EN 61326, EN 50081-2, NE 21</td>
</tr>
</tbody>
</table>

### Supply

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>2.4 W</td>
</tr>
</tbody>
</table>

### Internal bus

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>CAN protocol via Power Rail bus with up to 125 units</td>
</tr>
<tr>
<td>Cycle time</td>
<td>1 device 25 ms</td>
</tr>
<tr>
<td></td>
<td>125 devices with discrete input 60 ms</td>
</tr>
<tr>
<td></td>
<td>125 devices with discrete output 90 ms</td>
</tr>
<tr>
<td></td>
<td>125 devices with analogue input 75 ms</td>
</tr>
<tr>
<td></td>
<td>125 devices with analogue output 110 ms</td>
</tr>
</tbody>
</table>

### External bus

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 10, 11, 12, 16, 17, 18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>Modbus profile RTU, RS 485</td>
</tr>
</tbody>
</table>

### Service interface

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 7, 8, 9 and jack bush</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>RS 232</td>
</tr>
</tbody>
</table>

### Redundancy

<table>
<thead>
<tr>
<th>Option</th>
<th>through the use of a second gateway</th>
</tr>
</thead>
</table>

### Electrical isolation

<table>
<thead>
<tr>
<th>Internal/External bus</th>
<th>basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal bus/Power supply</td>
<td>not available</td>
</tr>
<tr>
<td>External bus/Power supply</td>
<td>basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V AC</td>
</tr>
<tr>
<td>Service interface/internal bus</td>
<td>basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V AC</td>
</tr>
<tr>
<td>Service interface/external bus</td>
<td>basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V AC</td>
</tr>
<tr>
<td>Service interface/supply</td>
<td>basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V AC</td>
</tr>
</tbody>
</table>

### Ambient conditions

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>-20 ... 60 °C (253 ... 333 K)</th>
</tr>
</thead>
</table>

### Mechanical specifications

<table>
<thead>
<tr>
<th>Protection degree</th>
<th>IP20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>approx. 100 g</td>
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</tbody>
</table>

### Data for application in conjunction with hazardous areas

<table>
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<tr>
<th>Group, category, type of protection, Temperature classification</th>
<th>II 3 G EEx nA II T4</th>
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<tbody>
<tr>
<td>Directive conformity</td>
<td>standards</td>
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### Entity parameter

<table>
<thead>
<tr>
<th>Certification number</th>
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<tbody>
<tr>
<td>FM control drawing</td>
<td>LR 36087-21</td>
</tr>
<tr>
<td>Suitable for installation in division 2</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Control drawing

<table>
<thead>
<tr>
<th>No.</th>
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</tr>
</thead>
</table>

## Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

## Notes

### Operation

The configuration, parameterisation, addressing, operation and fault detection are performed by PC and human machine interface via RS 232-interface (see RPI system manual). Limited operation without a PC is possible with the control elements of the Gateway and the devices.

### Operating components

Jacks for the connection of a PC across K-ADP2 adapter for the configuration and parameterisation of the system. The PC may alternatively be connected to the plug-in screw terminals 7, 8, 9 in case, e.g. that a PC-based separate monitor level is to be installed. The jack on the front panel and the screw terminals 7, 8, 9 may not be used simultaneously.
The KSD2-GW-MOD.485 translates the protocols of the internal CAN bus into the Modbus-RTU protocols of the external bus systems and vice versa. Up to 125 devices can be connected to a gateway via the Power Rail. The gateways of multiple RPI segments can be continuously networked with one of the control system’s or PLC’s independent service levels over the RS 485 program interface in addition to the Modbus connection. The operator has access independent of the control system, to the configuration data and parameters of all connected gateways and RPI devices by means of a PC and the RPI human machine interface.

Application
Connection of the RPI with the control system/PLC/PC via Modbus. Configuration interface for the RPI devices.

Electrical Connection

Function
The KSD2-GW-MOD.485 translates the protocols of the internal CAN bus into the Modbus-RTU protocols of the external bus systems and vice versa. Up to 125 devices can be connected to a gateway via the Power Rail. The gateways of multiple RPI segments can be continuously networked with one of the control system’s or PLC’s independent service levels over the RS 485 program interface in addition to the Modbus connection. The operator has access independent of the control system, to the configuration data and parameters of all connected gateways and RPI devices by means of a PC and the RPI human machine interface.

Application
Connection of the RPI with the control system/PLC/PC via Modbus. Configuration interface for the RPI devices.
## Technical Data

### Directive conformity

- Electromagnetic compatibility standards
- Directive 89/336/EG: EN 61326, EN 50081-2, NE 21

### Supply

- **Connection**: Power Rail
- **Rated voltage**: 20 ... 30 V DC
- **Ripple**: < 10 %
- **Power consumption**: 2.4 W

### Internal bus

- **Connection**: Power Rail
- **Interface**: CAN protocol via Power Rail bus with up to 125 units
- **Cycle time**: 1 device 25 ms
  - 125 devices with discrete input 60 ms
  - 125 devices with discrete output 90 ms
  - 125 devices with analogue input 75 ms
  - 125 devices with analogue output 110 ms

### External bus

- **Connection**: terminals 10, 11, 12; 16, 17, 18
- **Interface**: Modbus profile RTU, RS 485

### Service interface

- **Connection**: terminals 7, 8, 9
- **Interface**: RS 485

### Redundancy

- Option through the use of a second gateway

### Electrical isolation

- **Internal/External bus**: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- **Internal bus/Power supply**: not available
- **External bus/Power supply**: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- **Service interface/internal bus**: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- **Service interface/external bus**: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- **Service interface/supply**: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC

### Ambient conditions

- **Ambient temperature**: -20 ... 60 °C (253 ... 333 K)

### Mechanical specifications

- **Protection degree**: IP20
- **Mass**: approx. 100 g

### Data for application in conjunction with hazardous areas

- **Group, category, type of protection, Temperature classification**: II 3 G Ex nA II T4
- **Directive conformity**: standards
- **Directive 94/9 EU**: EN 50021

### Other specifications

- **Certification number**: 3000845
- **FM control drawing**: No. 116-0150
- **Suitable for installation in division 2**: yes
- **CSA control drawing**: LR 36087-21
- **Control drawing**: No. 116-0149

## Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

## Notes

### Operation

The configuration, parameterisation, addressing, operation and fault detection are performed by PC and human machine interface via RS 485 interface (see RPI system manual). Limited operation without a PC is possible with the control elements of the gateway and the devices.

### Operating components

Connection of a PC for the configuration and parameterisation of the system via K-ADP4 adapter to the plug-in screw terminals 7, 8, 9.
ControlNet Gateway

Electrical Connection

- Connects the Remote Process Interface to the control system/PLC/PC via ControlNet
- Couples the internal CAN bus to the external ControlNet
- Device installation permissible in zone 2
- Master function for the internal CAN bus
- External bus: ControlNet
- External baud rate 5 MBd
- Separate RS 232 connection on front side for system configuration, also directed to terminals for creating a subordinate monitoring system
- 24 V DC rated operational voltage
- External bus is always media-redundant
- Redundant gateway possible
- EMC acc. to NAMUR NE 21

KSD2-GW-CN

Function

The KSD2-GW-CN translates the protocols of the internal CAN-Bus into the ControlNet protocols of the external bus system and vice versa. Up to 125 devices can be connected to a Gateway via the Power Rail.

Composition

Application

Connection of the RPI with the control system/PLC/PC via ControlNet. Configuration interface for the RPI devices.
### Technical Data

#### Directive conformity
- **Electromagnetic compatibility standards**
  - Directive 89/336/EG
  - EN 61326, EN 50081-2, NE 21

#### Supply
- **Connection** Power Rail
- **Rated voltage** 20 ... 30 V DC
- **Ripple** < 10 %
- **Power consumption** 3.6 W

#### Internal bus
- **Connection** Power Rail
- **Interface** CAN protocol via Power Rail bus
- **Cycle time**
  - 1 device 25 ms
  - 125 devices with discrete input 60 ms
  - 125 devices with discrete output 90 ms
  - 125 devices with analogue input 75 ms
  - 125 devices with analogue output 110 ms

#### External bus
- **Connection** BNC A, B NAP
- **Interface** ControlNet

#### Service interface
- **Connection** terminals 22, 23, 24 and jack bush
- **Interface** RS 232

#### Redundancy
- **Option** through the use of a second gateway

#### Electrical isolation
- **Internal/Internal bus** basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V_{eff} AC
- **Internal bus/Power supply** not available
- **External bus/Power supply** basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V_{eff} AC
- **Service interface/internal bus** basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V_{eff} AC
- **Service interface/external bus** basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V_{eff} AC
- **Service interface/supply** basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V_{eff} AC

#### Ambient conditions
- **Ambient temperature** -20 ... 60 °C (253 ... 333 K)

#### Mechanical specifications
- **Protection degree** IP20
- **Mass** approx. 520 g

#### Data for application in conjunction with hazardous areas
- **Group, category, type of protection, Temperature classification** II 3 G Ex nA II T4
- **Directive conformity standards**
- **Directive 94/9 EU** EN 50021

#### Entity parameter
- **Certification number** 3000845
- **FM control drawing** No. 116-0150
- **Suitable for installation in division 2** yes

#### Safety parameter
- **CSA control drawing** LR 36087-21
- **Control drawing** No. 116-0149

### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Notes

#### Operation
The configuration, parameterisation, addressing, operation and fault detection is performed by means of PC and the Human Machine Interface via the RS 232 interface. Limited operation without a PC is possible with the control elements of the Gateway and the devices.

#### Operating components
Jacks for the connection of a PC across K-ADP2 adapter for the configuration and parameterisation of the system. The PC may alternatively be connected to plug-in screw terminals 22, 23, 24, in case, e.g. that a PC-based separate monitor level is to be installed. The jack on the front panel and the screw terminals 22, 23, 24 may not be used simultaneously.
**Function**

The KSD2-GW-CN.485 translates the protocols of the internal CAN bus into the ControlNet protocols of the external bus system and vice versa. Up to 125 devices can be connected to a Gateway via the Power Rail.

The gateways of multiple RPI segments can be continuously networked with one of the control system's or PLC's independent service levels over the separate RS 485 program interface in addition to the ControlNet connection. The operator has access independent of the control system, to the configuration data and parameters of all connected gateways and RPI devices by means of a PC and the RPI Human Machine Interface.

**Composition**

**Application**

Connection of the RPI with the control system/PLC/PC via ControlNet.

Configuration interface for the RPI devices.
### Technical Data

#### Directive conformity

<table>
<thead>
<tr>
<th>Electromagnetic compatibility</th>
<th>EN 61326, EN 50081-2, NE 21</th>
</tr>
</thead>
</table>

#### Directive 89/336/EG

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
</table>

#### Standards

<table>
<thead>
<tr>
<th>Directive 89/336/EG</th>
<th>EN 61326, EN 50081-2, NE 21</th>
</tr>
</thead>
</table>

#### Supply

- **Connection**: Power Rail
- **Rated voltage**: 20 ... 30 V DC
- **Ripple**: < 10 %
- **Power consumption**: 3.6 W

#### Internal bus

- **Connection**: Power Rail
- **Interface**: CAN protocol via Power Rail bus
- **Cycle time**:
  - 1 device: 25 ms
  - 125 devices with discrete input: 60 ms
  - 125 devices with discrete output: 90 ms
  - 125 devices with analogue input: 75 ms
  - 125 devices with analogue output: 110 ms

#### External bus

- **Connection**: BNC A, B, NAP
- **Interface**: ControlNet

#### Service interface

- **Connection**: terminals 22, 23, 24
- **Interface**: RS 485

#### Redundancy

- **Option**: through the use of a second gateway

#### Electrical isolation

- **Internal/External bus**: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- **Internal bus/Power supply**: not available
- **External bus/Power supply**: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- **Service interface/internal bus**: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- **Service interface/external bus**: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- **Service interface/supply**: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC

#### Ambient conditions

- **Ambient temperature**: -20 ... 60 °C (253 ... 333 K)

#### Mechanical specifications

- **Protection degree**: IP20
- **Mass**: approx. 520 g

#### Data for application in conjunction with hazardous areas

- **Group, category, type of protection, Temperature classification**: II 3 G Ex nA II T4
- **Directive conformity**: standards
- **Directive 94/9 EU**: EN 50021

#### Entity parameter

- **Certification number**: 3000845
- **FM control drawing**: No. 116-0150
- **Suitable for installation in division 2**: Yes

#### Safety parameter

- **CSA control drawing**: LR 36087-21
- **Control drawing**: No. 116-0149

### Supplementary information

- EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Notes

#### Operation

The configuration, parameterisation, addressing, operation and fault detection is performed by means of PC and the Human Machine Interface via the RS 485 interface. Limited operation without a PC is possible with the control elements of the Gateway and the devices.

#### Operating components

Connection of a PC for the configuration and parameterisation of the system via K-ADP4 adapter to the plug-in screw terminals 22, 23, 24.
Modbus Plus Gateway

KSD2-GW-MPL

Function

The KSD2-GW-MPL translates the protocols of the internal CAN bus into the Modbus Plus protocols of the external bus system and vice versa. Up to 125 devices can be connected to a Gateway via the Power Rail.

Composition

Connection of the RPI with control system/PLC/PC via Modbus Plus. Configuration interface for the RPI devices.

Electrical Connection

- Connects the Remote Process Interface to the control system/PLC/PC via Modbus Plus
- Couples the internal CAN bus to the external Modbus Plus
- Device installation permissible in zone 2
- Master function for the internal CAN bus
- External bus: Modbus Plus
- External baud rate 1 MBd
- Standard interface RS 485
- Separate RS 232 connection on front side for system configuration, also directed to terminals for creating a subordinate monitoring system
- 24 V DC rated operational voltage
- Redundant gateway possible
- EMC acc. to NAMUR NE 21

KSD2-GW-MPL
## Technical Data

**KSD2-GW-MPL**

### Directive conformity

- **Electromagnetic compatibility standards**
- **Directive 89/336/EG**

### Supply

- **Connection** Power Rail
- **Rated voltage** 20 ... 30 V DC
- **Ripple** < 10 %
- **Power consumption** 4.8 W

### Internal bus

- **Connection** Power Rail
- **Interface** CAN protocol via Power Rail bus with up to 125 units
- **Cycle time**
  - 1 device: 25 ms
  - 125 devices with discrete input: 60 ms
  - 125 devices with discrete output: 90 ms
  - 125 devices with analogue input: 75 ms
  - 125 devices with analogue output: 110 ms

### External bus

- **Connection** 9-pin sub-D socket
- **Interface** Modbus Plus, RS 485 interface

### Service interface

- **Connection** terminals 22, 23, 24 and jack bush
- **Interface** RS 232

### Redundancy

- **Option** through the use of a second gateway

### Electrical isolation

- **Internal/External bus**
  - basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V_{eff} AC
- **Internal bus/Power supply** not available
- **External bus/Power supply**
  - basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V_{eff} AC
- **Service interface/internal bus**
  - basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V_{eff} AC
- **Service interface/external bus**
  - basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V_{eff} AC
- **Service interface/supply**
  - basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V_{eff} AC

### Ambient conditions

- **Ambient temperature** -20 ... 60 °C (253 ... 333 K)

### Mechanical specifications

- **Protection degree** IP20
- **Mass** approx. 505 g

### Data for application in conjunction with hazardous areas

- **Group, category, type of protection, Temperature classification** II 3 G EEx nA II T4
- **Directive conformity standards**
- **Directive 94/9 EU**
- **EN 50021**

### Entity parameter

- **Certification number** 3000845
- **FM control drawing** No. 116-0150
- **Control drawing** No. 116-0149
- **Suitable for installation in division 2** yes
- **Safety parameter**
- **CSA control drawing** LR 36087-21
- **Control drawing** No. 116-0149

### Supplementary information

**EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com**

### Notes

**Operation**

The configuration, parameterisation, addressing, operation and fault detection is performed by means of PC and Human Machine Interface PACT via the RS 232 interface. Limited operation without a PC is possible with the control elements of the Gateway and the devices.

**Operating components**

Jacks for the connection of a PC across K-ADP2 adapter for the configuration and parameterisation of the system. The PC may alternatively be connected to plug-in screw terminals 22, 23, 24, in case, e.g. that a PC-based separate monitor level is to be installed. The jack on the front panel and the screw terminals 22, 23, 24 may not be used simultaneously.
The KSD2-GW-MPL.485 translates the protocols of the internal CAN Bus into the Modbus-plus-protocols of the external Bus system and vice versa. Up to 125 devices can be connected to a Gateway via the Power Rail. The gateways of multiple RPI segments can be continuously networked with one of the control systems’s or PLC’s independent service levels using the RS 485 parameter interface in addition to the Modbus Plus connection. The operator has access independent of the control system, to the configuration data and parameters of all connected gateways and RPI devices by means of a PC and the RPI Human Machine Interface.

Function
The KSD2-GW-MPL.485 translates the protocols of the internal CAN Bus into the Modbus-plus-protocols of the external Bus system and vice versa. Up to 125 devices can be connected to a Gateway via the Power Rail. The gateways of multiple RPI segments can be continuously networked with one of the control systems’s or PLC’s independent service levels using the RS 485 parameter interface in addition to the Modbus Plus connection. The operator has access independent of the control system, to the configuration data and parameters of all connected gateways and RPI devices by means of a PC and the RPI Human Machine Interface.

Application
Connection of the RPI with control system/PLC/PC via Modbus Plus. Configuration interface for the RPI devices.
## Technical Data

### Directive conformity
- Electromagnetic compatibility: standards
- Directive 89/336/EG: EN 61326, EN 50081-2, NE 2 1

### Supply
- Connection: Power Rail
- Rated voltage: 20 ... 30 V DC
- Ripple: < 10 %
- Power consumption: 4.8 W

### Internal bus
- Connection: Power Rail
- Interface: CAN protocol via Power Rail bus with up to 125 units
- Cycle time:
  - 1 device: 25 ms
  - 125 devices with discrete input: 60 ms
  - 125 devices with discrete output: 90 ms
  - 125 devices with analogue input: 75 ms
  - 125 devices with analogue output: 110 ms

### External bus
- Connection: 9-pin sub-D socket
- Interface: Modbus Plus, RS 485 interface

### Service interface
- Connection: terminals 22, 23, 24
- Interface: RS 485

### Redundancy
- Option: through the use of a second gateway

### Electrical isolation
- Internal/External bus: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- Internal bus/Power supply: not available
- External bus/Power supply: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- Service interface/internal bus: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC
- Service interface/external bus: basic insulation acc. to DIN EN 50178, rated insulation voltage 50 V eff AC

### Ambient conditions
- Ambient temperature: -20 ... 60 °C (253 ... 333 K)

### Mechanical specifications
- Protection degree: IP20
- Mass: approx. 505 g

### Data for application in conjunction with hazardous areas
- Group, category, type of protection, Temperature classification: II 3 G Ex nA II T4
- Directive conformity: standards
- Directive 94/9 EU: EN 50021

### Entity parameter
- Certification number: 3000845
- FM control drawing:
  - No. 116-0150
- Suitable for installation in division 2: yes

### Safety parameter
- CSA control drawing:
  - LR 36087-21
- Control drawing:
  - No. 116-0149

### Supplementary information

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

### Notes

**Operation**
The configuration, parameterisation, addressing, operation and fault detection is performed by means of PC and Human Machine Interface via the RS 485 interface. Limited operation without a PC is possible with the control elements of the gateway and the devices.

**Operating components**
Connection of a PC for the configuration and parameterisation of the system via K-ADP4 adapter to the plug-in screw terminals 22, 23, 24.
- Control of the HART communication with up to 250 field devices
- Coupling of the KFD2-HMM-16 HART multiplexer to the RPI without complex wiring
- Device installation permissible in zone 2
- 24 V DC rated operational voltage
- Power Rail bus
- 14-core ribbon cable for connection of the KFD2-HMM-16 HART multiplexer
- EMC acc. to NAMUR NE 21

**KSD2-HC**

**Function**

Field devices, sensors and actuators are often configured, parameterised and monitored via HART communication. With the HART control module KSD2-HC and the HART multiplexer KFD2-HMM-16 the RPI is completed by a HART communication level that is independent from the measurement data transfer via the field bus. The HART control module KSD2-HC is snapped on the rail with the Power Rail of the RPI system, next to it the HART multiplexer KFD2-HMM-16. It is connected with the HART control module by means of the 14-pin ribbon cable without further wiring. Only the HART multiplexer master is used. By this system one gets HART access to up to 250 field devices with HART communication, which are connected to the HART transmitter supply isolators KSD2-CI-S-Ex.H or KSD2-CI-S-H and the analogue HART output drivers/repeaters KSD2-CO-S-Ex.H or KSD2-CO-S-H of the RPI system. The access is accomplished via RS 485 interface of the HART multiplexer by means of PC and software such as Cornerstone (Astec), AMS (Emerson), or PACTware (see datasheet HART multiplexer). The RS 485 interfaces of the HART multiplexer and of the RPI gateway can be networked. Then, the RPI software K-SK1 or PACTware and the HART software can be run with the same PC.

**Composition**

**Front View**

- LED green: Power
- LED red: Fault signal

**14 pin connector**

- HART
- Power supply
- Bus
- Power Rail
## Supply Data

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>20 ... 30 V DC</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>1.2 W</td>
</tr>
</tbody>
</table>

## Directive conformity

Electromagnetic compatibility:

- Directive 89/336/EG
  - EN 61326, EN 50081-2, NE 21

## Input

Connection:

- 14-pin ribbon cable from the KFD2-HMM-16 master

## Output

Connection:

- Power Rail

Interface:

- CAN protocol via Power Rail bus

## Standard conformity

Climatic conditions:

- acc. to DIN IEC 721

## Ambient conditions

- Ambient temperature: -20 ... 60 °C (253 ... 333 K)

## Mechanical specifications

- Protection degree: IP20
- Mass: approx. 100 g

## Data for application in conjunction with hazardous areas

- Group, category, type of protection, Temperature classification:
  - II 3 G Ex nA II T4

## Directive conformity

- Directive 94/9 EU
  - EN 50021

**Supplementary information**

EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity and instructions have to be observed. This information can be found under www.pepperl-fuchs.com

**Application**

HART communication level for RPI

**Notes**

**Software functions**

The device does not need any parameterisation. K-system modules with collective error signals via Power Rail cannot be operated on the same Power Rail segment with the HART communication.

**Diagram:**

- HART Field devices
- DIN rail with Power Rail
- KFD2-HMM-16
- KSD2-HC
- KSD2-GW-*.485*
- 14-pin flat cable (included in the delivery package)
- PC with RPI human machine interface and HART software
- RS 485 network
The power feed module KFD2-EB.RPI supplies the Power Rail with a voltage of 24 V DC and a 4 A maximum current. The application of the supply voltage is indicated on the front panel by means of a green LED (POWER ON). In a fault condition, the relays switch open and the fault is indicated by means of a red LED on the front panel. The mode of operation can be adjusted with a plug-in jumper.

The dual designed power feed terminals have the ability to loop the supply (up to a max. of 10 A).

On the KFD2-EB2.RPI, the 3 poles of the Power Rails for the bus connection are separately arranged on terminals 13, 14 and 15.

The breakdown diode connected between terminals 8+, 11+ and 9-, 12- provides transient overvoltage protection per IEC 801-5.
### Technical Data

**Supply**
- **Connection**: terminals 11+, 12-, terminals 8+, 9-
- **Rated voltage**: 20 ... 30 V DC, the max. rated operational voltage of the devices plugged onto the Power Rail must not be exceeded.

**Output**
- **Power Rail feed output current**: ≤ 4 A
- **Fault signal relay output**: NO
- **Contact loading**: 24 V AC, 1 A / 24 V DC, 1 A
- **Energised/De-energised delay**: approx. 20 ms / approx. 20 ms

**Ambient conditions**
- **Ambient temperature**: -25 ... 60 °C (248 ... 333 K)

**Mechanical specifications**
- **Protection degree**: IP20
- **Mass**: approx. 100 g

**Data for application in conjunction with hazardous areas**
- **Group, category, type of protection, Temperature classification**: II 3 G Ex nAC IIC T4

### Notes

The jumper is visible on the circuit board after removing the cover and the left component.

---

**Adjustment of the jumpers**

![Diagram of KFD2-EB.RPI with jumpers](image-url)
**Function**

The power feed module KFD2-EB.R2A.RPI supplies the Power Rail with a voltage of 24 V DC and a maximum current of 2 A. The application of the supply voltages is indicated on the front panel by means of a green LED (POWER ON). The integrated fault evaluation detects shorts.

In a fault condition, the relays switch closed and the fault is indicated by means of a red LED on the front panel. The mode of operation can be adjusted with a plug-in jumper. The dual designed power feed terminals have the ability to loop the supply (up to a max. of 10 A). The 3 poles of the Power Rails for the bus connection are separately arranged on terminals 13, 14 and 15. The breakdown LED connected between terminals 8+, 11+ and 9-, 12- provides transient overvoltage protection per IEC 801-5.

**Composition**

Two power feed modules can be used on a Power Rail as a redundant supply through the Reverse Diode "R".

---

**Diagram**

The diagram illustrates the electrical connection of the power feed module with the Power Rail and the bus terminals, showing the supply, output, and bus connections.
**Technical Data**

**Supply**

<table>
<thead>
<tr>
<th>Connection</th>
<th>terminals 11+, 12- terminals 8+, 9-</th>
</tr>
</thead>
</table>

**Rated voltage**

Rated voltage: 20 ... 30 V DC, the max. rated operational voltage of the devices plugged onto the Power Rail must not be exceeded.

**Output**

<table>
<thead>
<tr>
<th>Power Rail feed</th>
<th>output current: ≤ 2 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault signal</td>
<td>relay output: NO</td>
</tr>
<tr>
<td>Contact loading</td>
<td>24 V AC; 1 A / 24 V DC; 1 A</td>
</tr>
<tr>
<td>Energised/De-energised delay</td>
<td>approx. 20 ms / approx. 20 ms</td>
</tr>
</tbody>
</table>

**Ambient conditions**

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>-25 ... 60 °C (248 ... 333 K)</th>
</tr>
</thead>
</table>

**Mechanical specifications**

<table>
<thead>
<tr>
<th>Protection degree</th>
<th>IP20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>approx. 100 g</td>
</tr>
</tbody>
</table>

**Data for application in conjunction with hazardous areas**

<table>
<thead>
<tr>
<th>Group, category, type of protection, Temperature classification</th>
<th>II 3 G EEx nAC IIC T4</th>
</tr>
</thead>
</table>

**Notes**

The jumper is visible on the circuit board after removing the cover and the left component.
Power Rail feed module for redundant supply, with bus terminals

**Function**

The power feed module KFD2-EB.MAR.RPI is especially designed for the use on ships. It supplies the Power Rail with a voltage of 24 V DC and a maximum current of 2 A. The application of the supply voltages is indicated on the front panel by means of a green LED (POWER ON). The integrated fault evaluation detects shorts.

In a fault condition, the relays switch closed and the fault is indicated by means of a red LED on the front panel. The mode of operation can be adjusted with a plug-in jumper. The dual designed power feed terminals have the ability to loop the supply (up to a max. of 10 A). The 3 poles of the Power Rails for the bus connection are separately arranged on terminals 13, 14 and 15. The breakdown LED connected between terminals 8+, 11+ and 9-, 12- provides transient overvoltage protection per IEC 801-5.

**Composition**

Two power feed modules can be used on a Power Rail as a redundant supply through the Reverse Diode "R".

---

- 24 V DC rated operational voltage
- Supply current ≤ 2 A
- Bus access via terminals
- Redundant supply
- Fault signal output with adjustable mode of operation
- EMC acc. to NAMUR NE 21
- For applications on ships

KFD2-EB.MAR.RPI

---

**Diagram**

[Diagram of electrical connection and components]
### Technical Data

#### Supply
- **Connection**: terminals 11+, 12-, terminals 8+, 9- grounding cable
- **Rated voltage**: 20 ... 30 V DC, the max. rated operational voltage of the devices plugged onto the Power Rail must not be exceeded.

#### Output
- **Power Rail feed**: output current: \( \leq 2 \) A
- **Fault signal**: relay output: NO
- **Contact loading**: 24 V AC; 1 A / 24 V DC; 1 A
- **Energised/De-energised delay**: approx. 20 ms / approx. 20 ms

#### Ambient conditions
- **Ambient temperature**: -5 ... 60 °C (268 ... 333 K)

#### Mechanical specifications
- **Protection degree**: IP20
- **Mass**: approx. 100 g

#### Notes
- The jumper is visible on the circuit board after removing the cover and the left component.
- Power Rail supply and bus
- The jumper is visible on the circuit board after removing the cover and the left component.
- Connection to earth
## Accessories and Installation Techniques

### UPR-05
Power Rail with 2 conductors for power supply and 3 conductors for bus connections/centralised fault indication ........................................... 134

### UPR-E
End cap for UPR-03 and UPR-05 ................................................................. 124

### PR-05
Power Rail with 2 conductors for power supply and 3 conductors for bus connections/centralised fault indication ........................................... 135

### VE-PR
Connection element for PR-03 and PR-05 .................................................... 135

### TS35 Type 12
End terminal ................................................................................................. 135

### KFD0-LGH
Dummy ........................................................................................................... 136

### KFD0-LGH-Y34868
Dummy (empty housing without connector) .................................................. 136

### K-CJC-**
Connector with internal cold junction compensation ..................................... 137

### KF-FKC-**
Connector with cage tension spring terminals ............................................. 137

### KF-STP-**
Connector with screw terminals ................................................................... 137

### K-250R0%1-GN
Measurement resistor 250 Ohm 0.1 % ......................................................... 137

### KF-CP
Coding pin for KF connectors (100 x 6 each) ................................................. 138

### K-ADP 2 and K-ADP 4
Programming adaptor, connection of a gateway with a PC .......................... 144

### BMKL 18x8
Self-adhesive label 18 mm x 8 mm. ............................................................... 138

### KF-SEAL
Adhesive film for securing programming switches and jacks in the front ...... 138

### KF Profile
including mounting accessories, without Power Rail .................................... 139

### KFD0-LC-**
Label holder ................................................................................................. 140
IS01
Initiator simulator ................................................................. 141

RPI system manual ................................................................ 144

PACT\textsuperscript{\textregmark} Edition 2
User interface ........................................................................... 145

InduLine/EuroLine Modem
Modem for remote monitoring/remote configuration of RPI ........... 148
Accessories and Installation Techniques

Universal Power Rail

- Nominal current 4 A
- Standard length 2 m, may be cut

UPR-05

- with 2 conductors for power supply, 2 conductors for bus connections and one conductor for HART signal transmission.

*Please use this standard type for new systems.*

The universal Power Rail is a plastic insert that has been specifically designed to seat into the DIN rail. Devices that can be mounted on a standard rail in accordance with DIN EN 50022, can be easily mounted on the DIN rail.

The Power Rail has 2 conductors for supplying the modules, 1 conductor for HART-signal transfer and 2 conductors for bus connections. These 2 conductors are used on Remote Process Interface, for the internal bus system, for the transfer of digital information. The devices of the Remote Process Interface are supplied with power via the 2 conductors on the Power Rail.

Gold plated contacts are provided to ensure secure electrical contact.

The UPR-05 is not segmented. Modules of any width can be mounted on these rails. This ensures that it will be possible to mount future component designs on the same rail. The TS35 Type 12 end terminal is used as a termination when the devices are mounted vertically.

The cover serves as a means of mechanical and electrical protection for exposed conductors. It is possible to remove the installed Power Rail from the DIN rail using the UPR-E end cap. The universal Power Rail, the cover and the DIN rail are delivered in a standard length of 2 m and can be cut with a saw to any required length.

**Delivery package UPR-05:**
Universal Power Rail, DIN Rail made of aluminium, cover plate, 2 end caps UPR-E. The UPR-E end caps can be ordered separately (in packs of 10).

UPR-E
End Cap for UPR-05 (see graphic)
in packs of 10
**Power Rail**

- Nominal current 4 A
- Easy to install
- can be extended in 50 cm steps
- can be shortened in 4 cm steps
- The end caps supplied provide insulation

**PR-05**

- with 2 conductors for power supply, 2 conductors for bus connections and one conductor for HART signal transmission

*For newer systems please use model UPR-05.*

The Power Rail is a simple plastic insert for the standard rail in accordance with DIN EN 50022. It solves all of the power supply wiring problems involved when mounting terminal blocks.

A wide range of RPI modules is available, supplied with power by simply snapping them onto the Power Rail. The supply of power to the 2 Power Rail conductors is achieved either by means of a power supply module, or via the terminal strip of a mother board.

By comparison, the interface module power supply connections are only suitable for the supply of the individual modules. They are not suitable for the supply of the Power Rail or to further conduct the Power Rail voltage.

On the PR-05 Power Rail two poles for the bus connection of the RPI modules and one conductor for HART signal transmission are available.

The standard length of the rail is 500 mm. It has to be cut at the identified positions at a distance of 40 mm to meet any individual requirements. Gold plated contacts are provided to ensure secure electrical contact.

**VE-PR**

Connection element for PR-05 (see graphic)

**End terminal TS35 Type 12**

The TS35 Type 12 end terminals are used as terminations when KF or KH devices are mounted on the DIN rail in accordance with DIN EN 50 022.

This component is not supplied by Pepperl+Fuchs. Supplier: Wago
**Dummy KFD0-LGH**

The KFD0-LGH is a module for use in laying cables. It improves accessibility and compactness within a control cabinet. By means of solder bridges, optional DIP-switches, different configurations are possible.

- Intrinsically safe circuits of up to 40 V can be connected to terminals 1, 2 and 3 or 4, 5 and 6. Terminals 1 to 6 are linked.
- Safe area circuits up to 50 V can be connected to terminals 7, 8 and 9 or 10, 11 and 12.

**Dummy KFD0-LGH-Y34868**

The KFD0-LGH-Y34868 is a module, which is used for covering unused connections (expansion sites). Thus the free connectors of the cable tree can be mechanically fixed, clearly and easily.

- Intrinsically safe circuits of up to 40 V can be connected to terminals 1, 2 and 3 or 4, 5 and 6. Terminals 1 to 6 are linked.
- Safe area circuits up to 50 V can be connected to terminals 7, 8 or 9, 10, 11 and 12.
KF-STP-**
SMART transmitter/repeater units and the isolated transformers are supplied as standard with the KF-STP- terminal connectors. Handheld terminals can be connected to the integrated test jacks. The connections can be made in the hazardous area or in the safe area by means of 2/2.3 mm standard test jacks. Only certified devices should be connected in the hazardous area. If test sockets are required on other KF modules, then these device connectors can be used.

Order code:
KF-STP-BU (blue)
KF-STP-GN (green)

KF-FKC-**
If required, K-system devices can be converted to have screwless terminals with spring retention.

Order code:
KF-FKC-3G2B (3St. green, 2 St. blue)*
KF-FKC-5B (5 St. blue)*
KF-FKC-5G (5 St. green)*
* units per package

Note:
Each set contains the items required for coding.

Note:
The removable terminals KF-STP-*, KF-FKC-* guarantee protection from direct contact by means of a strong insulation. This applies to rated insulation voltage in the case of maximum overvoltage in accordance with Overvoltage Category III of EN 50178 (1500 V AC).

The voltage is to be switched off in case of rated insulation voltages greater than 50 V AC before connecting or disconnecting the device connectors.

K-CJC-*
Removable terminals with integrated thermometers for cold junction compensation for thermocouples

Order code:
K-CJC-BU (blue)
K-CJC-GN (green)

K-250R0%1
The resistance is compatible for KF screw terminals and is connected with the connection lead.

- Conversion of 4 mA ... 20 mA/ 1 V ... 5 V
- Series resistor for HART/SMART power loops

Measurement resistor 250 Ohm, 0.1 %, TK10
**Accessories and Installation Techniques**

**KF-CP**
KF connectors can be coded with an encoder pin. This is accomplished by inserting the encoder pin into the slot of the connector.
in packs of: 100 x 6 pieces

**BMKL 18x8**
Self-adhesive labels made of polyester in 18 x 8 mm format are also suitable for labelling documentation carriers.
BMKL 18x8 with 288 pieces per DIN A4 sheet suitable for commercially available laser printers or pens.
Supplier: Phoenix Contact

You will find a text mask in the form of a Word file on our Internet page at: www.pepperl-fuchs.com/pa/service/downloads/textmaske

**KF-SEAL**
Adhesive foil
- destructive, removable Scotchmark sticker 3812, white, matt
- rectangular shape 16 mm x 13 mm
- for securing front-side programming switches and sockets as well as potentiometers suitable for K system

Packing size: sheet similar to DIN A4 with approx. 150 pieces of adhesive sticker
KF Profile without Shunting Bridge

1) KS module
2) Wiring comb for direct wiring to the KS modules
3) Comb cap
4) KF module
5) Space for connection cable: field cable for the hazardous and safe areas
7) Mounting plate
9) Power Rail

KF Profile with Shunting Bridge

1) KS module
2) Wiring comb for direct wiring to the KS-modules
3) Comb cap
4) KF module
5) Space for connection cable: field cable for the hazardous and safe areas
6) Spacer bolts for mounting in cabinets
7) Mounting plate
8) Terminal
9) Power Rail
Accessories and Installation Techniques

1) Label field
2) Holder

Length up to 500 mm:
KFD0-LC1-XXX

Length 510 mm ... 1000 mm:
KFD0-LC1-YYY

Universal label holder for the K-system.
The mounting is carried out on the KF module, by means of the claw clamp (accessory). It can also be attached to a mounting plate using an M4 screw.
Various lengths are available as standard, up to 1000 mm (see table).

Special lengths can be ordered:
Please always state length required!

Label carrier

<table>
<thead>
<tr>
<th>Length</th>
<th>Part. No.</th>
<th>Type designation</th>
<th>Remarks</th>
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</thead>
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<tr>
<td>up to 500 mm</td>
<td>108878</td>
<td>KFD0-LC1-XXX-Y108878</td>
<td>(*) customer-specific (XXX = length in cm)</td>
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<td>510 mm ... 1000 mm</td>
<td>108879</td>
<td>KFD0-LC1-YYY-Y108879</td>
<td>(*) customer-specific (YYY = length in cm)</td>
</tr>
</tbody>
</table>

(*) Please state when ordering. Delivery: 2 to 4 weeks.
Instruction manual

These instructions are only valid in connection with the corresponding data sheets

Marking
The initiator simulator IS01 is marked as follows.

Pepperl+Fuchs

CE-marking

Type IS01

Number and year of manufacture see test badge

Identification to avoid explosions II 1 G Ex ia IIB T4

Electrical parameters

$U_i = 16 \text{ V DC}$

$I_i = 55 \text{ mA}$

$P_i = 245 \text{ mW}$

$C_i = 125 \text{ nF}$

$L_i = 0 \text{ mH}$

$T_U \leq +50 ^\circ C$

Ambient temperature:

Commissioning for use in explosive atmospheres
(Commissioning must only be performed by particularly trained specialists)

- The initiator simulator IS01 is designed in the IP20 protection class in accordance with EN 60529 and must be appropriately protected against adverse environmental conditions such as splashed water or dirt beyond accumulation level 2.
- The initiator simulator IS01 is an intrinsically safe electrical apparatus and can be operated within hazardous areas, in zone 0, zone 1 and zone 2. The initiator simulator IS01 must only be connected to intrinsically safe circuits. The maximum permissible values of the initiator simulators IS01 have to be observed.
- A legible copy of the EC-Type Examination Certificate DMT 02 ATEX E 008 is an essential component of this instruction manual. The electrical data of section 15 of the prototype test certificate have to be observed.

Maintenance
The function of the initiator simulator IS01 is stable, even over long periods, 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 the device must only be undertaken by specialist authorised personnel who have been trained for the task.

The initiator simulator IS01 is rated for the use in pollution degree 2, in accordance with EN 50178.

Ambient conditions
Ambient temperature see datasheet
Humidity max. 75 % relative humidity without condensation
• Intrinsically safe EEx ia IIB T4
• Test device for isolated switch amplifier and other devices connected in series to the NAMUR input
• Display of the correct voltage of NAMUR input
• Simulation of switching function and line short-circuit
• Quartz-precision square-wave generator for testing rotational speed controllers and frequency-current converters
• No batteries necessary, always ready for operation

IS01
### Technical Data

**Supply**
- **Input voltage**: 8 V DC (R\textsubscript{i} approx. 1 kOhm); \( \leq \) 30 V DC

**Directive conformity**
- Electromagnetic compatibility standards
- Directive 89/336/EG
- EN 61326, EN 50081-2, NE 21

**Output**
- **Rated values**: acc. to IEC 60947-5-6 (NAMUR, DIN 19234), see system description for electrical data

**Ambient conditions**
- **Ambient temperature**: 0 ... 50 °C (273 ... 323 K)
- **Storage temperature**: -25 ... 70 °C (248 ... 343 K)

**Mechanical specifications**
- **Protection degree**: IP00, according to EN 60529
- **Mass**: 70.5 g
- **Construction type**: ABS - handheld housing, grey

**Data for application in conjunction with hazardous areas**
- **EC-Type Examination Certificate**: DMT 02 ATEX E 008 , for additional certificates see www.pepperl-fuchs.com
- **Group, category, type of protection, Temperature classification**: II 1G EEx ia IIB T4 [circuit(s) in zone 0/1/2]
- **Voltage U\textsubscript{i}**: 16 V DC
- **Current I\textsubscript{i}**: 55 mA
- **Power P\textsubscript{i}**: 245 mW
- **Internal capacitance (EEx ia)**: 125 nF
- **Internal inductance (EEx ia)**: 0 mH

**Directive conformity**
- Directive 94/9 EU
- EN 50014, EN 50020

**Notes**

**Operation:**
The simulator is used instead of a sensor and is connected to an input to DIN EN 60947-5-6 NAMUR.
Three different test functions may be selected using the function switch.

**Switch position "NAMUR voltage"**
The voltage of the control circuit can be tested according to DIN EN 60947-5-6 NAMUR. In this case the initiator simulator has an internal resistance of 1 kOhm.

**Function switch position "sensor static"**
- Switch position 1: control circuit J > 2,1 mA (Initiator not damped)
- Switch position 2: control circuit J about 0,4 mA (Initiator damped)
- Switch position 3: control circuit J > 7,0 mA (Lead short circuit)

**Function switch position "sensor dynamic"**
A quartz controlled rectangular wave controller produces a signal with a duty ratio of 50 % : 50 %.
The frequency can be adjusted from 0.1 Hz up to 1 kHz using the slide switch.
Accessories and Installation Techniques

RPI system manual

Can be downloaded (free of charge):
http://www.pepperl-fuchs.com

Adaptor K-ADP2
Adaptor for gateways with RS 232 service interface.

Adaptor K-ADP4
Adaptor for gateways with RS 485 service interface.
PACTware™ Edition 2

Manufacturer and fieldbus independent configuration tool with FDT interface (Field Device Tool)

- Based on FDT technology
- Device Type Manager (DTMs) available for all Pepperl+Fuchs devices and systems
- Commissioning, configuration and parameter assignment independent of the process control system
- Communication DTMs available for serial interfaces and fieldbus systems
- Maintenance, diagnostics and error correction
- Suited for PCs running Windows 98, Windows NT, Windows 2000 and Windows XP
- In accordance with VDI/VDE 2187

Architecture and Configuration

PC with Pentium II 200_MHz processor and at least 64_MByte user memory.

Operating System

Windows 98, Windows NT4.0 from Service Pack 4, Windows 2000 and Windows XP.

Languages

German, English and French can be selected.

Licencing

The packages point-to-point Interface Technology, point-to-bus Remote I/O, point-to-bus HART and Level can be downloaded separately or altogether (http://www.pepperl-fuchs.com/pa/accessories/pactware/main.html) in a BASIC version without the functions printing and storage.

The BASIC version can also be obtained on CD-ROM from Pepperl+Fuchs. The release of the functions printing and storage requires a licence number. The licences with the functionality quoted in the table (page 146) can be ordered at Pepperl+Fuchs.

Schematic Representation of the System Configuration

Graphic representation of all communication and device DTMs in the tree structure. In case of online operation colour code for identification of defective units and simulation operation. Multiple windows can be open simultaneously. It is therefore possible to view the set device parameters, to monitor the measurement value and to display the device diagnostic simultaneously.

System Planning, Application Processing

Generation of a configuration by means of a graphical application processing menu. Editing of available projects. Selection switch markings for each channel. Offline configuration, saving of project data to hard disk or disk. Automatic comparison of the project plan to the actual available system when establishing connections on the device and parameter levels.
## Accessories and Installation Techniques

### PACTware BASIC version

<table>
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<tr>
<th>Model</th>
<th>Functionality</th>
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<tr>
<td>PW2-BASIC</td>
<td>all available DTMs of the Pepperl+Fuchs K and E devices, HART-Multiplexer, Remote I/O systems RPI and IS-RPI and level control devices. Reduced functionality: no printing, no storing</td>
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### Licences

<table>
<thead>
<tr>
<th>Licence</th>
<th>Description</th>
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<tr>
<td>PW2-P.LEVEL</td>
<td>Professional Level licence for all available DTMs of the Pepperl+Fuchs level control devices</td>
</tr>
<tr>
<td>PW2-P.RIO100</td>
<td>Professional RIO100 licence for the connection of 100 measurement circuits to the Pepperl+Fuchs Remote I/O systems RPI and IS-RPI including HART-Multiplexer.</td>
</tr>
<tr>
<td>PW2-P.RIO500</td>
<td>Professional RIO500 licence for the connection of 500 measurement circuits to the Pepperl+Fuchs Remote I/O systems RPI and IS-RPI including HART-Multiplexer.</td>
</tr>
<tr>
<td>PW2-ENTERPRISE</td>
<td>Enterprise licence for all available DTMs of the Pepperl+Fuchs K and E devices, HART-Multiplexer, Remote I/O systems RPI and IS-RPI and level control devices. Unlimited number of devices, measurement circuits and systems within a project can be operated.</td>
</tr>
</tbody>
</table>

### Device parameterisation

Access to all device parameters via a serial interface, via HART communication or via acyclic fieldbus communication.

### Indication of measured value

Online monitoring of arbitrary process values
**Trend indication**
Indication of trends of arbitrary process values

**Simulation**
Simulation of all measured variables and diagnostic data

**Diagnosis**
All diagnostic information is accessible via PACTware™
InduLine/EuroLine Modem

InduLine/EuroLine modems are used for remote monitoring and remote configuration of the RPI. The Gateway parameter data are transmitted from their parameterisation interfaces, via the modem/telephone network, to the remote PC with the RPI user (i.e. man/machine) interface K-SK1 installed on it and vice versa. In the case of gateways with an RS 232 parameterisation interface there is thereby a point-to-point connection. By using gateways with RS 485 parameterisation interfaces several RPI segments can be controlled simultaneously.
### RS 232 modem cable

<table>
<thead>
<tr>
<th>signal</th>
<th>gateway connection</th>
<th>PIN Sub-D-plug</th>
</tr>
</thead>
<tbody>
<tr>
<td>RxD</td>
<td>terminal 7</td>
<td>3</td>
</tr>
<tr>
<td>TxD</td>
<td>terminal 8</td>
<td>2</td>
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<tr>
<td>GND</td>
<td>terminal 9</td>
<td>7</td>
</tr>
</tbody>
</table>

### RS 485 modem cable

<table>
<thead>
<tr>
<th>signal</th>
<th>gateway connection</th>
<th>PIN Sub-D-plug</th>
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<tbody>
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<td>RxD/TxD-P</td>
<td>terminal 7</td>
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<tr>
<td>GND</td>
<td>terminal 9</td>
<td>1</td>
</tr>
</tbody>
</table>

### Commissioning

1. Connect InduLine modem to PC (PACTware™).
2. Call menu level "Options/Initialise modem". "Dialog COM-Port" appears on the screen. Select baudrate and modem type (InduLine ...). O.K. Return. The modem is initialised with the appropriate parameters.
3. Disconnect the InduLine modem from the PC. Connect the InduLine modem to the Gateway.
4. Connect Euroline Modem to PC (PACTware™).
5. Call menu level "Options/Initialise modem". "Dialog COM-Port" appears on the screen. Select Modem Type (EuroLine ...).
6. Mark COM Port in the project tree. Select menu level "Device data/COM-Port settings". Select baudrate. Insert x against "Make connection via Modem".

### Types of modem

- InduLine-Modem IL-33K6/RS232
- InduLine-Modem IL-33K6/RS485
- Euroline Modem EL-33K6 SA

### Modem reference source

Allied Data Technologie GmbH
Rheinstraße 7, 41836 Hückelhoven
Tel.: +49 (0) 24 33 - 93 83 50
Fax.: +49 (0) 24 33 - 93 82 46
e-mail: bme.sales@t-online.de
## Approval list

<table>
<thead>
<tr>
<th>Type designation</th>
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Subject to reasonable modifications due to technical advances.
### European approvals

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## Approval list

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Subject to reasonable modifications due to technical advances.
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Subject to reasonable modifications due to technical advances.
Glossary

The manufacturer certifies that the product meets the fundamental safety requirements under EC regulations by the application of a registration number to this product.

The following apply to Pepperl+Fuchs products:

Regulations:
73/23/EWG Low Voltage Directive
89/336/EWG EMC Directive
89/392/EWG Machine Directive
94/9/EG Devices and Safety Systems for Hazardous Areas

Definition of Contamination Level 2 per EN 50178
Under normal circumstances, only non-conductive contamination occurs. Occasionally however, short-term conductance may be expected through condensation when the device is not being operated. This applies to the immediate surrounding conditions of the electronic device.

Insulation Coordination
The assignment of the insulation characteristics of an apparatus in accordance with:
1. The expected over voltages,
2. The characteristic values of the overvoltage precautions,
3. The expected surrounding conditions,
4. The protective measures against contamination.

Overvoltage Category
The assignment of an electrical apparatus in accordance with the expected over voltage.

Table:
The assignment of rated operating voltages to the rated surge voltages

| Rated operating voltage (V) for alternating voltage systems in accordance with DIN IEC 38 | Rated surge voltage in V for overvoltage category |
|---|---|---|---|---|
| 230/400/277/480\(^1\) | I | II | III | IV |
| 1500 | 2500 | 4000 | 6000 |
| 2500 | 4000 | 6000 | 8000 |
| 4000 | 6000 | 8000 | 12000 |

\(^1\) Rated operating voltage of 500 V is set.

Maximum Output Power (P_O)
The highest electrical power in an intrinsically safe circuit that can be received from the electronic device.

Maximum Output Voltage (U_O)
The highest output voltage (AC or DC peak value) in an intrinsically safe circuit which can occur, under open circuit conditions, at the connection components of the electronic device with each applied voltage up to the maximum voltage and including U_m and U_i

Observation: When more than one voltage is applied, the maximum output voltage is the only one to appear of the unfavorable combination of applied voltages.

Maximum External Inductance (L_O)
The highest inductive value in an intrinsically safe circuit which can be connected to the terminal blocks of the device without affecting the intrinsic safety.

Maximum External Capacitance (C_O)
The highest capacitance value in an intrinsically safe circuit which can be connected to the terminal blocks of the device without affecting the intrinsic safety.

Maximum Input Voltage (U_i)
The highest voltage (AC or DC peak values) which may be applied to the terminal blocks of the intrinsically safe device without affecting the intrinsic safety.

Maximum Internal Inductance (L_i)
Effective replacement inductance at the device terminal blocks for the internal inductances.

Maximum Internal Capacitance (C_i)
Effective replacement capacitance at the device’s terminal blocks for the internal capacitances.

Maximum Output Current (I_O)
The highest current (AC or DC current peak values) in an intrinsically safe circuit which may be received from the device’s terminal blocks.

Maximum Effective Value of AC or Maximum DC (U_m)
The highest voltage which can be applied to the non-intrinsically safe terminal blocks of the device without affecting the overall intrinsic safety. Observation: The U_m value may vary between the different groups of terminal blocks.

Maximum Input Current (I_i)
The highest current (AC or DC current peak value), which can be supplied across the terminal blocks to the circuit without affecting the intrinsic safety.
## Type index in alphabetical order

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<thead>
<tr>
<th>Ordering code</th>
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<tr>
<td>KSD2-CO-S-H</td>
<td>102</td>
</tr>
<tr>
<td>KSD2-Fl</td>
<td>50</td>
</tr>
<tr>
<td>KSD2-Fl-Ex</td>
<td>46</td>
</tr>
<tr>
<td>KSD2-GW2-PRO</td>
<td>108</td>
</tr>
<tr>
<td>KSD2-GW-CN</td>
<td>116</td>
</tr>
<tr>
<td>KSD2-GW-CN.485</td>
<td>118</td>
</tr>
<tr>
<td>KSD2-GW-MOD</td>
<td>112</td>
</tr>
<tr>
<td>KSD2-GW-MOD.485</td>
<td>114</td>
</tr>
<tr>
<td>KSD2-GW-MPL</td>
<td>120</td>
</tr>
<tr>
<td>KSD2-GW-MPL.485</td>
<td>122</td>
</tr>
<tr>
<td>KSD2-GW-PRO</td>
<td>104</td>
</tr>
<tr>
<td>KSD2-GW-PRO.485</td>
<td>106</td>
</tr>
<tr>
<td>KSD2-HC</td>
<td>124</td>
</tr>
<tr>
<td>KSD2-MVI</td>
<td>84</td>
</tr>
<tr>
<td>KSD2-RO-2</td>
<td>60</td>
</tr>
<tr>
<td>KSD2-RO-Ex2</td>
<td>58</td>
</tr>
<tr>
<td>KSD2-TI</td>
<td>80</td>
</tr>
<tr>
<td>KSD2-Ti-Ex</td>
<td>76</td>
</tr>
<tr>
<td>KSD2-VI</td>
<td>86</td>
</tr>
<tr>
<td>PACTware™ Edition 2</td>
<td>145</td>
</tr>
<tr>
<td>PR-05</td>
<td>135</td>
</tr>
<tr>
<td>RPI system manual</td>
<td>144</td>
</tr>
<tr>
<td>UPR-05</td>
<td>134</td>
</tr>
<tr>
<td>UPR-E</td>
<td>134</td>
</tr>
<tr>
<td>VE-PR</td>
<td>135</td>
</tr>
</tbody>
</table>
## Function Index

<table>
<thead>
<tr>
<th>Function</th>
<th>Model</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output repeater</td>
<td>1-channel, analogue</td>
<td>KSD2-CO-Ex</td>
</tr>
<tr>
<td>Output repeater</td>
<td>1-channel, analogue, without Ex-i signal circuit</td>
<td>KSD2-CO</td>
</tr>
<tr>
<td>Output repeater</td>
<td>1-channel, analogue, SMART</td>
<td>KSD2-CO-S-Ex</td>
</tr>
<tr>
<td>Output repeater</td>
<td>1-channel, analogue, SMART, without Ex-i signal circuit</td>
<td>KSD2-CO-S</td>
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<tr>
<td>Output repeater</td>
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<td>KSD2-CO-S-Ex-H</td>
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<td>1-channel, analogue, HART, without Ex-i signal circuit</td>
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<td>User interface</td>
<td>PACTware Edition 2</td>
<td>PACTware™</td>
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<tr>
<td>Label carrier</td>
<td>Length up to 500 mm:</td>
<td>KFD0-LC1-XXX</td>
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<tr>
<td>Label carrier</td>
<td>Length 510 mm... 1000 mm</td>
<td>KFD0-LC1-YYY</td>
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<td>Coding pin</td>
<td>for KF-connector, items per pack: 100 x 6 pieces</td>
<td>KF-CP</td>
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<tr>
<td>Dummy</td>
<td>empty housing with internal wiring option</td>
<td>KFD0-LGH</td>
</tr>
<tr>
<td>Dummy</td>
<td>empty housing without connector</td>
<td>KFD0-LGH.Y34868</td>
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<td>Power supply module</td>
<td>for Power Rail, for use of RPI on ships</td>
<td>KFD2-EB-MAR.RPI</td>
</tr>
<tr>
<td>Power supply module</td>
<td>for Power Rail, for redundant supply of the power rail, bus terminal, 24 V DC/2 A</td>
<td>KFD2-EB.R2A.B</td>
</tr>
<tr>
<td>Power supply module</td>
<td>for power rail, with bus terminal, 24 V DC/4 A</td>
<td>KFD2-EB.RPI</td>
</tr>
<tr>
<td>End cap</td>
<td>for Power Rail UPR-05</td>
<td>UPR-E</td>
</tr>
<tr>
<td>End terminal</td>
<td>termination for the mounting of devices on a DIN rail</td>
<td>TS35 Type 12</td>
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<td>Label</td>
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<td>BMKL 18x8</td>
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<td>1-channel</td>
<td>KSD2-FI-Ex</td>
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<td>Frequency converter</td>
<td>1-channel, without Ex-i signal circuit</td>
<td>KSD2-FI</td>
</tr>
<tr>
<td>Gateway</td>
<td>for ControlNet</td>
<td>KSD2-GW-CN</td>
</tr>
<tr>
<td>Gateway</td>
<td>for ControlNet with additional RS 485-interface</td>
<td>KSD2-GW-CN.485</td>
</tr>
<tr>
<td>Gateway</td>
<td>for MODBUS</td>
<td>KSD2-GW-MOD</td>
</tr>
<tr>
<td>Gateway</td>
<td>for MODBUS with RS 485-interface</td>
<td>KSD2-GW-MOD.485</td>
</tr>
<tr>
<td>Gateway</td>
<td>for MODBUS</td>
<td>KSD2-GW-MPL</td>
</tr>
<tr>
<td>Gateway</td>
<td>for MODBUS with RS 485-interface</td>
<td>KSD2-GW-MPL.485</td>
</tr>
<tr>
<td>Gateway</td>
<td>for PROFIBUS</td>
<td>KSD2-GW-PRO</td>
</tr>
<tr>
<td>Gateway</td>
<td>for PROFIBUS with RS 485-interface</td>
<td>KSD2-GW-PRO.485</td>
</tr>
<tr>
<td>Gateway</td>
<td>for PROFIBUS DP V1</td>
<td>KSD2-GW2-PRO</td>
</tr>
<tr>
<td>Device connector</td>
<td>with internal cold junction compensation</td>
<td>K-CJC-*</td>
</tr>
<tr>
<td>Device connector</td>
<td>Cage clamp terminals, with test jacks</td>
<td>KF-FKC.-**</td>
</tr>
<tr>
<td>Device connector</td>
<td>Device connector with test jacks</td>
<td>KF-STR.-**</td>
</tr>
<tr>
<td>HART control module</td>
<td>HART communication, multiplexer connection</td>
<td>KSD2-HC</td>
</tr>
<tr>
<td>HART transmitter power supply</td>
<td>1-channel, HART</td>
<td>KSD2-CI-S-Ex.H</td>
</tr>
<tr>
<td>HART transmitter power supply</td>
<td>1-channel, HART, without Ex-i signal circuit</td>
<td>KSD2-CI-S-H</td>
</tr>
<tr>
<td>Initiator simulator</td>
<td>test device for transformer isolated barrier with NAMUR input</td>
<td>IS01</td>
</tr>
<tr>
<td>KF Profile</td>
<td>1.8 m long including mounting accessories, without power rail</td>
<td>KF Profile</td>
</tr>
<tr>
<td>Adhesive foil</td>
<td>for securing programming switches and jacks at the front, as well as potentiometers, suitable for the K-system</td>
<td>KF-SEAL</td>
</tr>
<tr>
<td>Measurement resistor</td>
<td>250 Ohm 0.1 %</td>
<td>K-250R0%-1</td>
</tr>
<tr>
<td>Modem</td>
<td>Modem for remote monitoring/remote configuration of RPI</td>
<td>IndLine/Euroline Modem</td>
</tr>
<tr>
<td>Function</td>
<td>Model</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------</td>
<td>------</td>
</tr>
<tr>
<td>Power Rail</td>
<td>PR-05</td>
<td>135</td>
</tr>
<tr>
<td>Power Rail</td>
<td>UPR-05</td>
<td>134</td>
</tr>
<tr>
<td>Programming adaptor</td>
<td>K-ADP2</td>
<td>144</td>
</tr>
<tr>
<td>Programming adaptor</td>
<td>K-ADP4</td>
<td>144</td>
</tr>
<tr>
<td>Relay module</td>
<td>KSD2-RO-Ex2</td>
<td>58</td>
</tr>
<tr>
<td>SMART-transmitter power supply</td>
<td>KSD2-CI-2</td>
<td>74</td>
</tr>
<tr>
<td>SMART-transmitter power supply</td>
<td>KSD2-CI-Ex2</td>
<td>72</td>
</tr>
<tr>
<td>SMART-transmitter power supply</td>
<td>KSD2-CI-S</td>
<td>66</td>
</tr>
<tr>
<td>SMART-transmitter power supply</td>
<td>KSD2-CI-S-Ex</td>
<td>62</td>
</tr>
<tr>
<td>Voltage converter</td>
<td>KSD2-MVI</td>
<td>84</td>
</tr>
<tr>
<td>Voltage converter</td>
<td>KSD2-VI</td>
<td>86</td>
</tr>
<tr>
<td>Temperature converter</td>
<td>KSD2-TI-Ex</td>
<td>76</td>
</tr>
<tr>
<td>Temperature converter</td>
<td>KSD2-TI</td>
<td>80</td>
</tr>
<tr>
<td>Trip amplifier</td>
<td>KSD2-BI-4</td>
<td>42</td>
</tr>
<tr>
<td>Trip amplifier</td>
<td>KSD2-BI-Ex2</td>
<td>34</td>
</tr>
<tr>
<td>Trip amplifier</td>
<td>KSD2-BI-Ex4</td>
<td>38</td>
</tr>
<tr>
<td>Solenoid driver</td>
<td>KSD2-BO-Ex</td>
<td>54</td>
</tr>
<tr>
<td>Solenoid driver</td>
<td>KSD2-BO-Ex2</td>
<td>56</td>
</tr>
<tr>
<td>Connector element</td>
<td>VE-PR</td>
<td>135</td>
</tr>
<tr>
<td>Country</td>
<td>Address</td>
<td>Phone Numbers</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------------------------------</td>
<td>---------------------------------</td>
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</table>

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