

# Solutions for Replacement of Eurocard Technology Chains

Whitepaper



Your automation, our passion.

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# 1 Technology

If Eurocards have to be replaced by modern systems, customer's existing infrastructure has to be documented and the conditions have to be covered. The project will be planned and realized on this basis.

## 1.1 Working points at technology exchange

### Determining the CURRENT status

- Identifying all signal types and functionalities
- Compiling the number of signals
- Compiling the technical documentation for the Eurocards in use

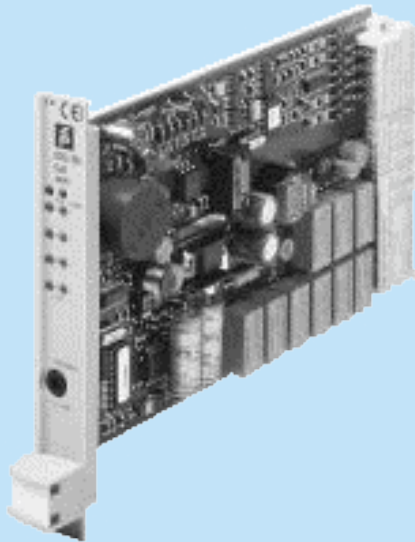
### Defining the framework

- Determining budget and implementation timeline
- Selecting/evaluating the new technology
- Determining time frame/shutdowns for technology replacement
- Determining whether the technology needs to be replaced during ongoing operation
- Assessing existing infrastructure and determining what needs to be retained
- Defining mandatory requirements, determining conditions that cannot be changed

### Replacing technology

- Adjusting circuit diagrams
- Adjusting parts lists
- Changing technical documentation
- Dismounting Eurocards
- Assembling and installing the alternative technology
- Checking the installation (loop check)
- Reviewing and updating Ex i certification
- Renewal of the field devices, if necessary

## 1.2 Alternatives to the E-System



**E-System**

### Technology replacement

The 19" technology will be replaced by a new technology, since there is no mechanically compatible successor technology. An interface technology, remote I/O, or fieldbus technology can be used for this. There are a variety of exchange scenarios. The required changes to and restructuring of the infrastructure and PCS-level also vary.



**K-System**



**H-System**



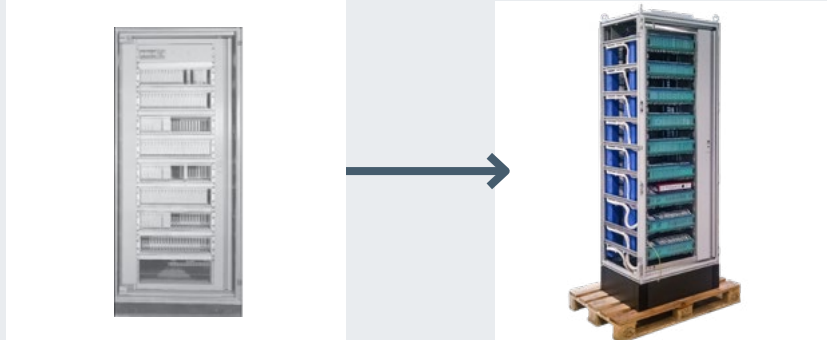
**Remote I/O**



**Fieldbus**

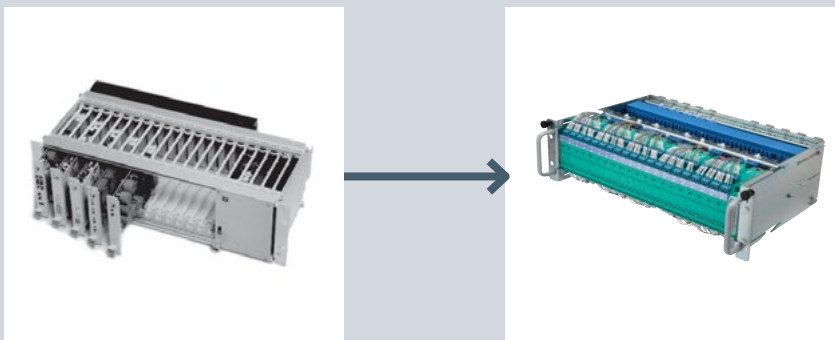
## Switch cabinet replacement

The entire cabinet is removed. Pepperl+Fuchs designs a new switch cabinet according to the customer's specifications. This is constructed, wired, and delivered to the customer. Ideally, the wires then just need to be connected to transfer terminals or boards. Such solutions have already been implemented.



## Rack replacement

The basic framework and infrastructure remain in place. Individual racks with Eurocards are removed. Pepperl+Fuchs designs new racks with up-to-date interface technology. These solutions can range from simple to complex. Particular attention must be paid to the mechanical structure and connections. Depending on the initial situation, it may only be necessary to reconnect the cables. This can be a simple procedure using patch boards, for example. Such solutions have already been implemented.



## Customized solutions

Pepperl+Fuchs' individual solutions can range from minimal adaptations to a specially developed product to a complete package including integration or certification - depending on what you need in your application. No matter how extensive the adaptations and specific developments are, the basis of a solution is always individual consultation and regular exchange with our customers.

## 1.3 Switch Cabinet Replacement with the K-System

### Switch cabinet design and mechanical structure

- Can be fully constructed in standard switch cabinets (e.g., Rittal VX25 series):
  - Large selection of switch cabinet sizes and accessories
  - Both single and double-sided assembly possible
- K-DUCT available for convenient cable routing
- K components are supplied via Power Rail, either single or redundant
- All K-System widths (12.5/20/40 mm) can be integrated
- Up to 10 levels, each with approx. 20 standard modules (20 mm)
- Can be partially equipped with K-System components. Dummy modules can be installed as placeholders, including pre-wiring
- Complete wiring with module and wire identification to suit customers' needs
- Signal transmission methods can be chosen (transfer boards, patch terminals, vertical/horizontal patch boards)
- Additional fixtures possible (Power supply, Fuses, Fault evaluation)

### Advantages of switch cabinet with K-System components

- If a complete cabinet is replaced, the removed Eurocards are available as spares for the rest of the plant
- Free space in frameworks with existing infrastructure can be used for signal expansion by racks equipped with K-system
- New cabinet design in accordance with current directives
- Fully up-to-date documentation, with measuring point descriptors upon request
- System has current and sustainable interface technology
- Components comply with the latest versions of directives and standards
- Largest range of modules on the market
- SIL safety manuals available for all devices
- Standard types listed as "proven-in-use" in many plants
- Globally oriented range of certificates
- Standard components mean short delivery times
- FAT possible

## 1.4 Rack Replacement with the K-System

### Rack design and mechanical structure

- 19" standard width 84 HP (426 mm)
- Standard height 3 RU (132 mm)
- Variable rack mounting depths (e.g., 211 mm standard, 300 mm custom)
- Structure of the rack including Power Rail bars
- K component supply via Power Rail
- All K-System widths (12.5/20/40 mm) can be integrated
- Rack mechanical structures can be pulled out once installed
  - K components are easy to replace
  - Easily accessible measuring sockets on K components
- Serial number can be read when installed
- Engineered solutions partially equipped with K-System components can be created. Dummy modules can be installed as placeholders, including pre-wiring.
- Complete rack wiring with module and wire identification to suit customers' needs
- Signal transmission method can be chosen (vertical/horizontal patch board, mini terminals, etc.)

### Advantages of rack with K-System components

- If a complete rack is replaced, the removed Eurocards are available as spares for the rest of the plant
- Cable routing in the switch cabinet is retained
- No structural changes required
- System has current and sustainable interface technology
- Components comply with the latest versions of directives and standards
- Largest range of modules on the market
- SIL safety manuals available for all devices
- Standard types listed as "proven-in-use" in many plants
- Globally oriented range of certificates
- Standard components mean short delivery times

### Capacity of the 19" (426 mm) rack:

Width of K modules	UPR with 1 EB	UPR with 2 EB	DIN mounting rail without EB
12,5 mm	32	30	34
20 mm	20	19	21
40 mm	10	9	10

## 1.5 Explosion Protection When Replacing Eurocards

- Continued operation of old components (including non-ATEX) in the field
- Provision of intrinsic safety certificates

These two aspects are partly independent of each other. As usual, the ultimate responsibility lies with the operator. The operator is required to run the plant using the most up-to-date technology. Pepperl+Fuchs can provide assistance and information on this.

### Continued operation of old components

Replacing Ex isolation technology does not necessarily mean that field devices must be replaced. No standards or guidelines require this. This applies in particular to “pre-ATEX” devices, since the ATEX Directive governs placing on the market. If a device remains in use in its application, it is not necessary to test the device’s compliance with current guidelines.

The operator must review and evaluate the suitability of all components in use, including the old field devices, as part of regular hazard assessments. Conducting such a hazard assessment is prompted by actions including but not limited to replacement of the associated apparatus (interaction is assumed).

If a damaging event that brings potential civil or criminal consequences should occur, a determining factor will be whether the event would very likely have been avoided through the use of newer devices.

### Provision of intrinsic safety certificates

Put simply: the same steps need to be followed as when commissioning a plant. All evidence must be provided again, taking into account the type examination certificates for the newly installed components. This is to be documented accordingly.

It is not necessary for all type examination certificates to comply with an ATEX directive to provide sufficient evidence. This applies to old field devices in particular:

- These devices were state-of-the-art at the time of being placed on the market
- The certificates issued at the time also met all normative requirements and were issued by notified bodies
- The statements made therein are still technically accurate
- They contain all of the information necessary to be used as evidence today

The personnel entrusted with providing evidence are sufficiently qualified to interpret the historically inconsistent terminology and structures in type examination certificates or to seek clarification.

Possible difficulties may arise from changes to the way capacitances and inductances are viewed:

- In the past, these were considered individually. Simultaneous occurrence was not normally considered.
- The latter is covered by the 50 % rule today.
- Because of this, it is possible that the evidence is not sufficient for a particular combination of cable types and lengths.
- It may therefore be necessary to modify the cables (type and length).



## 1.6 Cable Routing for Racks

### Open contact points

The distance between open contact points in intrinsically safe and non-intrinsically safe circuits must be at least 50 mm. This can include terminals, terminal blocks, and patch boards. The specific details are governed by 60079-14 16.5.4 and 60079-11 6.2.1.

### Wires and cables

The fundamental standard is 60079-14. The topic of cables and wiring is governed in Section 16.2.2.5. The basic principle is that it is necessary to ensure that intrinsically safe wires cannot be accidentally connected to non-intrinsically safe wires. A multi-wire cable must not carry both intrinsically safe and non-intrinsically safe signals. Intrinsically safe and non-intrinsically safe cables must be routed separately or separated by:

- Insulated separation
- Grounded metal separation

Separation is not necessary if a type of wire featuring metallic coating or shielding is used (shielded cable).

# 2 Customized solutions

## 2.1 Switch Cabinet Replacement: 19" Replacement Cabinets

### Background

- Switch cabinets with Eurocards in a swivel frame
- Input and output signals wired internally on signal transfer boards

### Goals

- Replacement of complete cabinet while maintaining incoming and outgoing signals
- Customer states that only the cabinet must be replaced during plant down time without further engineering
- Removal of the old switch cabinets → Installation of the new, pre-assembled switch cabinets → Connect signal transfer plug

### Implementation

- Same switch cabinet layout (Swivel frame, Transfer boards on the inside of the back panel)
- Recoding to functionally equivalent components from the K-System
- Use of the same or equivalent signal transfer boards
- Wiring on signal transfer boards according to customer specifications
- Plug with incoming and outgoing signals can be inserted 1:1
- For approx. 180–200 devices, each 20 mm



## 2.2 Rack Replacement: Short Rack (Pivoting Frame)

### Background

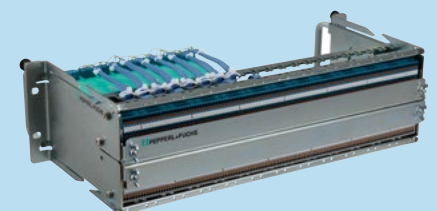
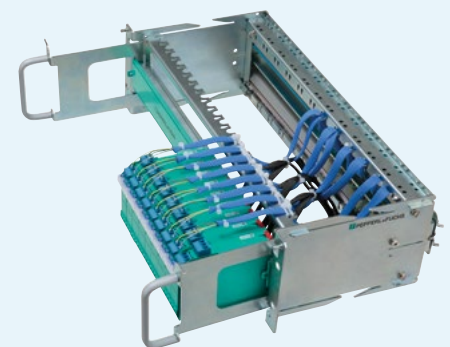
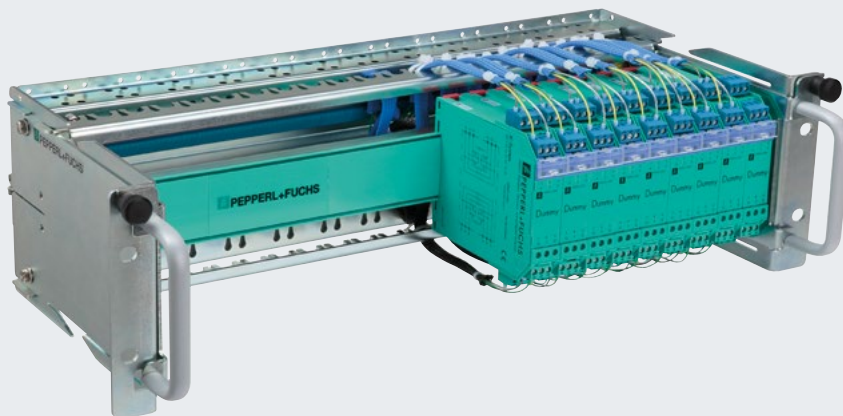
- 19" racks arranged close together, meaning low (vertical) distance between racks
- Installed in a pivoting frame
- Special wiring design:
  - 211 mm depth
  - Patch board for connecting the signal lines to the E-System and control panel on the rear of the rack
  - Signal line feed from rear
  - To remove the rack, existing wiring must be disconnected

### Implementation

- Use of the K-System due to space requirements
- Electronic mount point can be pulled out:
  - Components can be maintained and replaced without removing the rack
  - Serial number can be read during ongoing operation
- K-System with power feed modules on PR
- Input/output signals wired to patch board or alternative adaptation possibilities

### Goals

- Conversion to modern isolators
- Pre-equipped and pre-wired rack
- Signal transfer should be implemented with new patch boards
- Replacing individual modules should be possible without completely removing the rack



## 2.3 Rack Replacement: Long Rack (Open Framework)

### Background

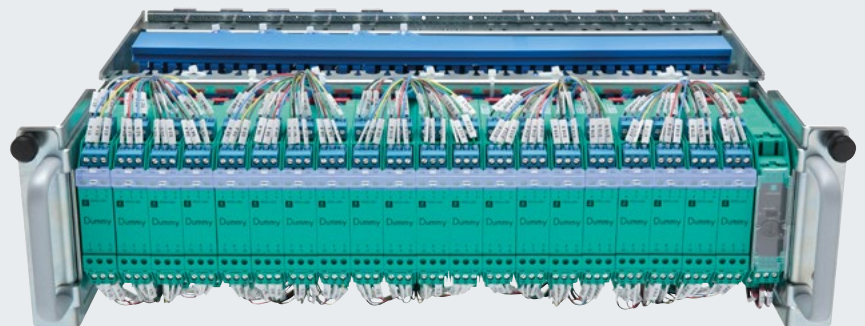
- 19" racks arranged close together, meaning low (vertical) distance between racks
- Installed in an open framework
- Special wiring design:
  - 300 mm depth
  - Patch board for connecting the signal lines to the E-System and control panel on the rear of the rack
  - Signal line feed from rear
  - To remove the rack, existing wiring must be disconnected

### Implementation

- Use of the K-System due to space requirements
- Electronic mount point can be pulled out:
  - Components can be maintained and replaced without removing the rack
  - Serial number can be read during ongoing operation
- K-System with power feed modules on PR
- Input/output signals wired to patch board or alternative adaptation possibilities

### Goals

- Conversion to modern isolators
- Pre-equipped and pre-wired rack
- Signal transfer should be implemented with new patch boards
- Replacing individual modules should be possible without completely removing the rack



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## Explosion Protection

- Intrinsic Safety Barriers
- Signal Conditioners
- FieldConnex® Fieldbus Infrastructure
- Remote I/O Systems
- Electrical Explosion Protection Equipment
- Purge and Pressurization Systems
- HMI Systems
- Mobile Computing and Communications
- HART Interface Solutions
- Surge Protection
- Wireless Solutions
- Level Measurement

## Industrial Sensors

- Proximity Sensors
- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- Industrial Ethernet
- AS-Interface
- IO-Link
- Identification Systems
- Displays and Signal Processing
- Connectivity

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