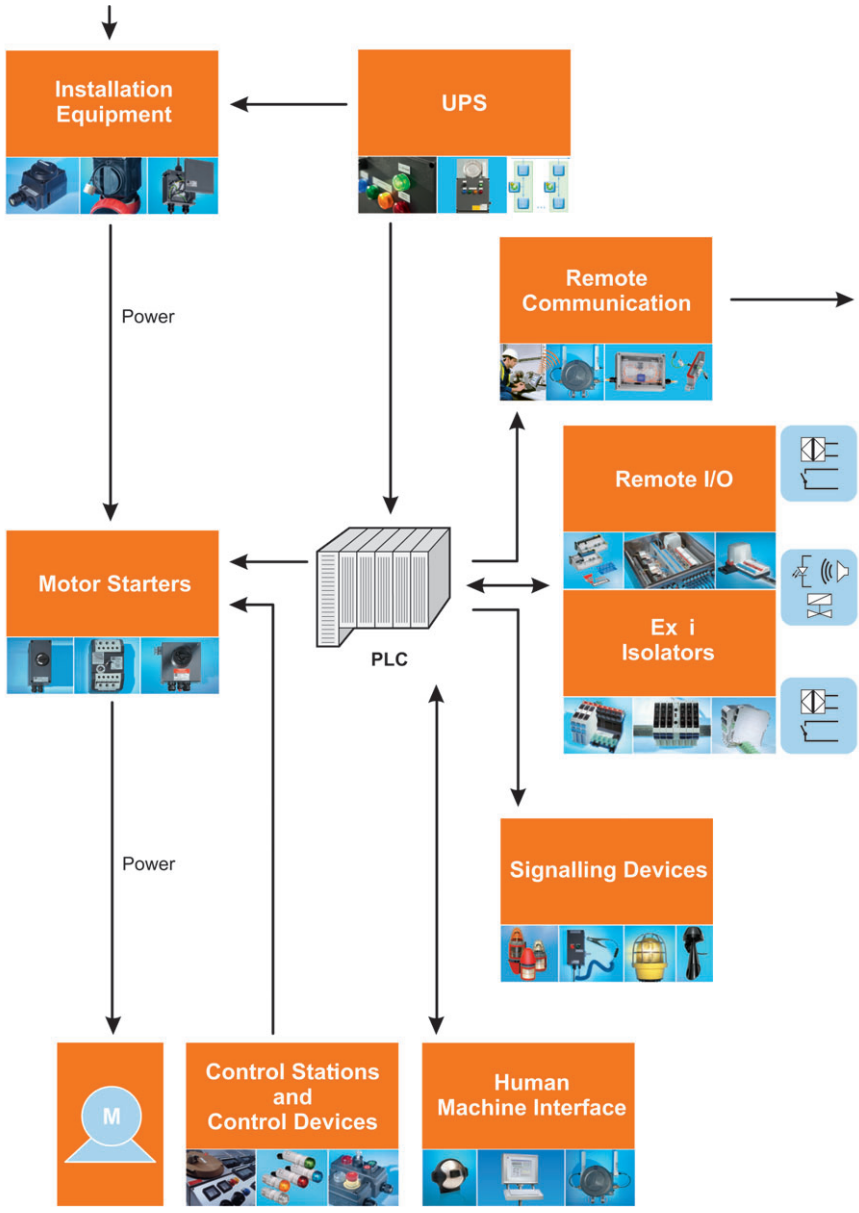
1. Machine Control



Design and assembly

Design and assembly of explosion protected control and distribution systems require considerable experience and careful consideration in all engineering and manufacturing processes. Based on technical specifications of the customer and taking into account national and international regulations and standards, it is possible to develop technically perfect, economically advantageous solutions. In addition to the Ex regulations IEC/EN 60 079-14, general regulations, in particular DIN VDE 0100, IEC/EN 60204-1 and IEC/EN 60439-1 must be observed during design and construction of control and distribution panels.

WebCode MAS8A

1. Machine Control

Components installation

10246E00

Standard industrial electrical equipment of any type can be built into flameproof enclosures. However, the component installation is subject to a "type test" by an authorised inspection body. R. STAHL has certificates (issued by the PBT) that authorise to build explosion-protected switchgear and distribution systems for all standard applications. Every switching panel manufactured by R. STAHL is subject to product conformity inspection, which ensures that all relevant directives and regulations have been observed during system construction and the system is suitable for use in hazardous areas.

2. Motor Starters

Motor protection

Explosion protection of overloaded Ex e motors depends on the tripping characteristic of the motor protection units used. This is why in explosion-protected areas only motor protection units that have been certified by an authorised inspection body may be used. Our certificates (issued by the PTB) cover many designs and versions of PTB-approved motor protection units.

12899E00

Coldplate: The coldplate technology can be used to dissipate undesired energy (heat).

03658E00

Motor controller equipped with several motor starters, timer relay, control transformer, control fuses and a current transformer for measuring the main motor current.

04631E00

14110E00

Motor controller with contactors, motor protection relays, fuses and an upstream load switch with a positive interlocking cover lock.

3. Installation Equipment

Switch sockets

11163E00

11722E00

The plugs and sockets series SolConeX and CES comply with European standards IEC/EN 60079-7. The ability to plug the Ex plug into non-Ex sockets is guaranteed.

4. Control Devices

Actuating elements

09842E00

The switches are operated via rotary actuators. They are coupled to the actuator levers via flameproof axle bushings. These axle bushings can be led through the enclosure cover or wall if necessary. Their number depends on the size of built-in switches and the actuator levers used. Switch actuators are available in several sizes and are used for all standard switches. The pushbuttons are suitable for reclosing tripped motor protection relays.

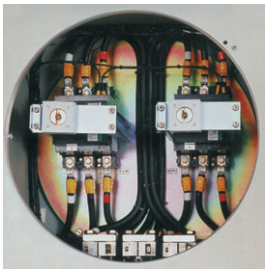
Actuators

12912E00

The switches are operated via rotary actuators. They are coupled to the actuator levers via flameproof axle bushings. These axle bushings can be led through the enclosure cover or wall as desired. Their number depends on the size of built-in switches and the actuator levers used. Switch actuators are available in several sizes and are used for all standard switches. The pushbuttons are suitable for reclosing tripped motor protection relays.

4. Control Devices

Actuators



01255E00

01253E00

The main switch is especially important for explosion protection. As in normal switchgear construction it is used as mains isolator but at the same time it has the task of switching off the voltage when the enclosure cover is opened, via a positive interlocking mechanism, and guarantees this disconnection for as long as the enclosure is open. Main switches can be designed as load or motor switches. The switches are operated via rotary actuators. They are coupled to the actuator levers via flameproof axle bushings. These axle bushings can be led through the enclosure cover or wall as desired. A maximum of 3 switch actuators can be assembled in an enclosure cover. Their number depends on the size of built-in switches and the actuator levers used. Actuator levers are available in 2 sizes:

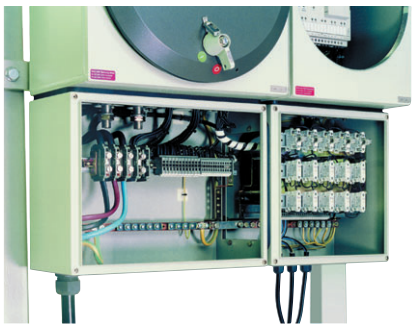
- Small switching handles for switches with nominal currents ≤ 200 A
- Large switching handles for switches with rated currents ≥ 250 A

Pushbutton- or potentiometer-type actuators can be fitted in Ex d enclosures as well as switch spindles. In addition to actual command action, these pushbuttons are suitable for reclosing tripped motor protection relays. Potentiometer-type actuators cannot be led through the enclosure cover, they must be built into an enclosure wall.

Connection chamber of Series 8125 with assembled indicating lamps 8010 and control devices 8082 and terminals.

07510E00

Enclosure with covers in place



01689E00

Enclosure with covers removed

5. Signalling Devices

In the hazardous area, early signalling of alarms and display of malfunctions or system failures is a great help for ensuring the safety of the personnel and guaranteeing operational safety. The signalling devices from R. STAHL meet highest requirements in terms of explosion protection and also operational safety of the devices.

6. Machine Automation

Isolators ISpac

14156E00

Point-to-point connections to conventional Ex i isolators represent an economical and effective solution for many applications. In this area, R. STAHL offers a complete proven range of products. The ISpac isolators provide a solution for any field signal.

- Galvanic isolation in its most compact form - one or two channels on 17.6 mm
- Time-saving connection and assembly in a single step using the unique pac-Bus system.
- 3-way signalling of line errors by means of LED, relay contact and collective message via pac-Bus
- Can be used for functional safety up to SIL 3
- Robust design, for use in machine rooms of ships
- Joint use of isolators in enclosures containing motor starters and PLC

Remote I/O IS1

10167E00

11672E00

In mechanical engineering, the trend goes increasingly towards digital technology. In particular, remote I/O with Profibus DP or Ethernet is used in this area. A particular challenge is its mechanical integration into the machine control. We are able to assemble different types of protection in a compact machine control. A particular challenge are the isolating distances between intrinsically safe and non-intrinsically safe circuits and possible inductive interferences from load switch devices. This results in optimum use of the enclosures without technical restrictions both functionally and in terms of explosion protection.

7. HMI

Open HMI

07833E00

The panel PC systems can run any software and can be used as Thin Clients in a Remote Terminal environment.
- Stainless steel enclosure IP66
- System-integrated touch screens with 150 language layouts
- Backup/Recovery via USB
- LWL or CAT 5 Ethernet
- Ready-to-Run with any operating system

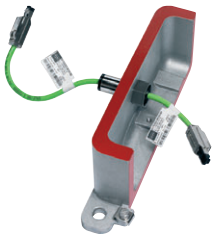
Operator Interfaces Eagle / Falcon

14116E00

The universal operator interfaces with high functionality, including simple process visualisation, are used in tough industrial use, including that on ships.
- Direct connection to automation systems
- Card reader systems that are easy to integrate (Mifare, RFID, Wiegand)
- Engineering with PLCPlusWIN
- Extended temperature range

8. Communication

Copper-bound transmission



11976E00

The copper-bound transmission solutions from R. STAHL fulfill two tasks. The first one is to convert the bus signal to an intrinsically safe bus signal for use in the hazardous area. Their second task is that of a repeater. The performance and availability of bus systems can be substantially increased by using isolating repeaters. Dividing the transmission distance into short segments multiplies the transmission speed.

Transmission by fibre optics

14121E00

FO fibre optics Series 8186 splice box in Ex e enclosure

Large data transmission distances can be effectively covered by using fibre optics. In addition, they are insensitive to electromagnetic interference fields. R. STAHL offers a system of FO isolating repeaters, which are distinguished by easy handling, a very compact structure and high availability. The electrical equipment is integrated into flameproof enclosures.
The connection of the fibre optics inside the flameproof enclosure has been solved by using special type-tested cable glands. The field cables are connected in the connection chamber in the type of protection Ex op pr. This meets the requirements of easy installation and safe implementation of explosion protection.

Wireless transmission

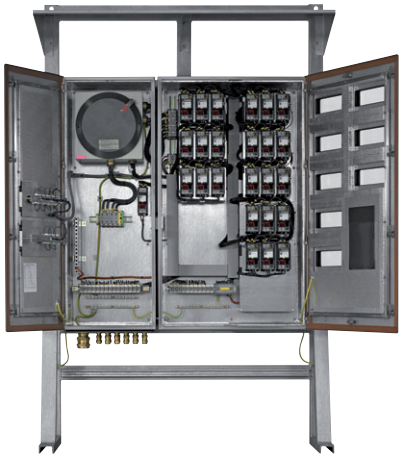
11308E00

WLAN Access Point for Zone 1

Data transmission by radio technologies, like WLAN, Bluetooth or Wireless HART, opens up new alternatives, allowing the installation costs to be lowered significantly compared with line-bound transmission. Using the solutions offered by R. STAHL allows you to use the advantages of this technology in the hazardous area.
The customer-specific planning, design and installation of the radio solutions can draw on the broad technical knowledge and extensive range of components, including comprehensive services.

9. Project Examples

Explosion-protected control panel



12001E00

The built-in components in the flameproof enclosure are arranged at three mounting levels. The mounting level at the enclosure cover and the top mounting level in the enclosure can be folded down via hinges.

Data for the Layout of Control and Distribution Panels

Compliance with relevant regulations and installation options of components in explosion-protected enclosures require specialised knowledge. Therefore, we design systems to suit your requirements on the basis of technical data you supply us with. Please observe the instructions and information regarding design given below.

Explosion protection

- ☑ Required minimum type of protection according to IEC/EN 60079-0
- ☑ Where appropriate, give information on explosive atmosphere on site

Circuit diagrams

- ☑ General or detailed wiring diagram
- ☑ Circuit diagram for control panels

Electrical data

- ☑ Operating / control voltage
- ☑ Frequency
- ☑ Short-circuit current at the installation point
- ☑ Short-circuit protection, assembly
  - – Within the control panel or
  - – Outside the hazardous area
- ☑ Diversity factor in case of several outgoing circuits
- ☑ Rated power and rated currents of the connected consumers

Built-in components

The number and type of the devices to be installed, for example contactors, load switches, circuit breakers, fuses, motor protection relays, measuring instruments, terminals etc.

Switch

- ☑ Motor or load switching capacity
- ☑ With or without locking mechanism

Contactors

- ☑ Switching conditions according to service categories AC-1 ... AC-4
- ☑ Information on consumers, for example a crane, ventilator, heater, possibly jog mode, sluggish starting etc.

Motor protection relay, motor protection switch, motor data

- ☑ Information on the motor to be protected
  - – Ex e or Ex d design
  - – Rated current I_e
  - – Starting current I_A
  - – Temperature rise time t_E with appropriate temperature classes T1 ... T6

Miniature circuit breakers

- ☑ B-, C- or D characteristic
- ☑ Electrical consumer information

Busbars (built into the connection chamber)

- ☑ Copper busbars
- ☑ Rated current 400/630 A
- ☑ Short-circuit current I_K (kAeff)
- ☑ Number of conductors L1, L2, L3, N, PE

Data on intrinsically safe circuits

For devices with intrinsically-safe circuits which are provided for installation we require:

- ☑ Inspection certificate of a recognised state inspection body containing all information required to comply with intrinsic safety.

Ingoing/outgoing circuits

- ☑ Number of cables and conductors
- ☑ Cable type and cross-section

Cable glands

- ☑ Number and position of cable entries (from the top, bottom, side, centre)
- ☑ Type of cable entries:
  - – Cable glands
  - – Cable glands with strain relief
  - – Cable glands (for armoured cables)

Wiring of incoming and outgoing cables

- ☑ On terminal blocks
- ☑ Directly to bushings (for stud-type bushings)
  Project guidelines:
  - • Ensure that there is enough space for separation of cable cores with large cross-section.
  - • During installation ensure that the required minimum degree of protection for the connection chamber Ex e, IP54, is complied with.

Effects of the environment

- ☑ Degree of protection (minimum degree of protection IP54)
- ☑ Ambient temperature
- ☑ Corrosive effects
- ☑ Atmosphere
- ☑ Indoor location
- ☑ Outdoor location
- ☑ Protective roof

Dimensions

- ☑ Maximum height, width, depth
- ☑ Separation points at the distribution panel, transportable parts
- ☑ Transport method

Type of installation

- ☑ Free-standing
- ☑ Wall mounting

10. Container

13181E00

13185E00

- Uniform Operating consoles for
  - Pump systems
  - Compressor systems
  - Turbine systems
  - Loading arm systems
  - Package units

08222E00

- Overall solutions for the electrical system with:
  - Electrical engineering
  - Consulting
  - Software Engineering
  - Production of prototypes
  - Documentation
  - Mechanical construction
  - Manufacturing
  - Programming
  - Testing - QA / Factory Acceptance Test
  - Certification
  - Commissioning