



ELSHAFT-15

## ELSHAFT-15 SHAFT CONTROL, COMMUNICATION & SIGNALLING SYSTEM



CATEGORY:  
AUTOMATION  
SYSTEMS

CERTIFICATIONS



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ELSAP-05

# ELSAP-05 AUTOMATION CONTROL SYSTEM



CATEGORY:

AUTOMATION  
SYSTEMS

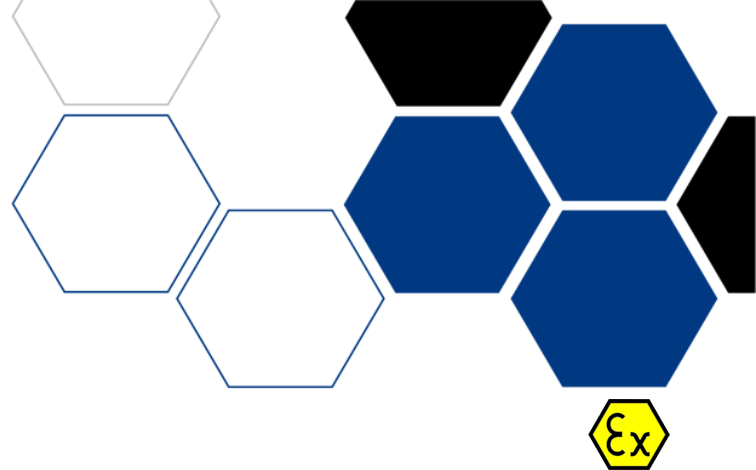
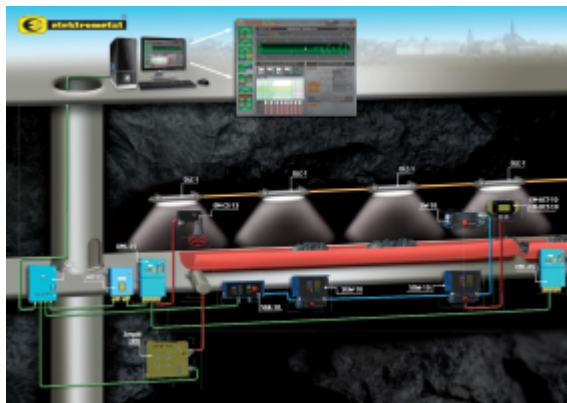
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# THE CONVEYOR AUTOMATION SYSTEM

The automation system is based on ELSAP-05, ELSAP-12, ELSAP-16 controllers and UGS-01/2 and UGS-10 communication systems. It is possible to supply devices as intrinsically safe or standard devices. The system can be built with a variety of devices of our production. The system allows to control conveyors of any size, drive solutions and mechanical design.

## Composition of sets

The most important devices included in the system are:

1. Control system
  1. Central controller type UMT-05/RGB
  2. Local Controller type UML-05 WYK. 1 RGB
  3. Local Controller of type UML-05/O
  4. Local Controller type UML-05 PO RGB
2. Loudspeaking system
  10. End Signaling Device type SGK-10.
  11. Switching off Loud Speaking Device type SGW-10
  12. Switching off Loud Speaking Device type SGW-S-10
  13. Switching off Loud Speaking Device type SGW-SN-10
  14. Switching off Box type SW-10
  15. Loud Speaking Device type SG-10
  16. Portable Loud Speaking Device type SGP-10
  17. End Signaling Device type SGK-01/2
  18. Switching off Loud Speaking Device type SGW-01/2
  19. Switching off box type SW-01/2
  20. End Box type SK-01/2
  21. Power Control Box type SKZ-01/2
  22. End Signaling Device type SKO-86/1
  23. Loud Speaking Device type SAO-86/1
3. Other devices
  1. Controller type SGA-16
  2. System Local Adapter type SAL-16
  3. System Collaboration Box type SWS-13
  4. System Cooperation Box type SWS-03
  5. Interlock Device type UBL-01/2
4. Power supplies
  1. Intrinsically Safe Power Supply type ZIS-X/04/X/X
  2. Intrinsically Safe Power Supply type ZIS-X/10/Y
  3. Intrinsically Safe Power Supply type ZISD-13
  4. Intrinsically Safe Power Supply type ZISD-15
  5. Intrinsically Safe Power Supply type ZIL-17
  6. Redundant Intrinsically Safe Power Supply type ZISR-18

CATEGORY:

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SYSTEMS**

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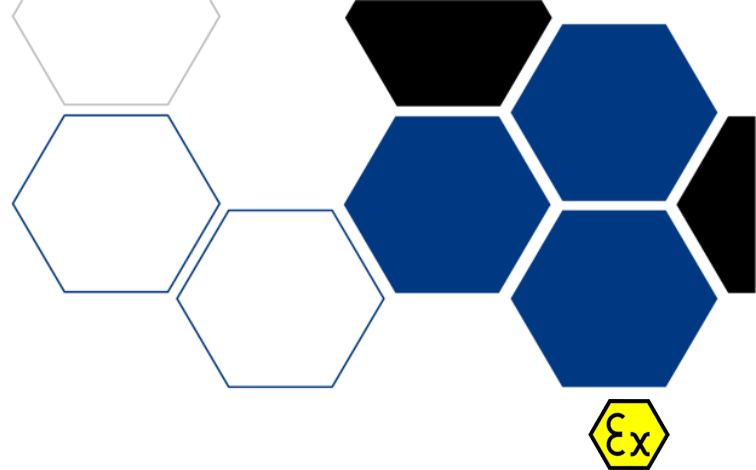


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## SKIP LOADING SYSTEM



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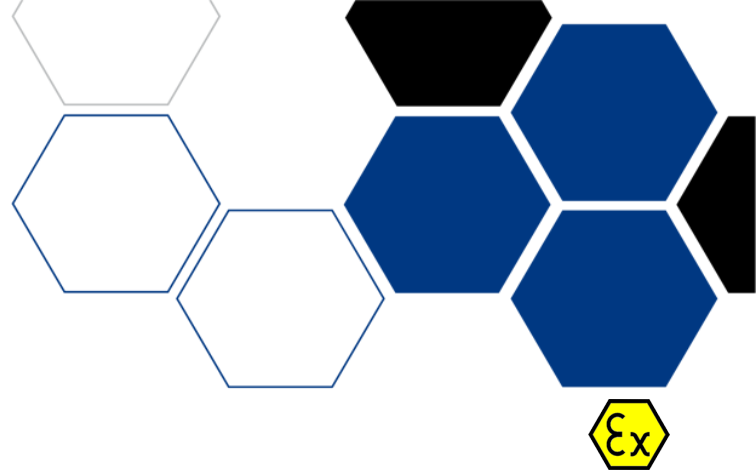
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# ELSAP-14 CONTROL SYSTEM

The ELSAP-14 system is the next generation of the universal, freely configurable and programmable intrinsically safe (IS) controller family. The solution is intended for use in methane and/or coal dust explosive atmospheres. With Cat. M1 design, the system power supply does not need to be shut down if an explosive atmosphere forms.

## Description

The ELSAP-14 system is the natural evolutionary step forward from the tested, tried, valued and widely used ELSAP-05 system. The modular design architecture is retained for an extremely flexibility and freedom of configuration. The new system also has full backward compatibility with the ELSAP-05 modules.

The ELSAP-14 extends the predecessor with new modules based on 32-bit microprocessors. Among them is a high-performance application module, a dedicated I/O module and a visualisation module, complete with a 5.6" full colour graphical display and a synoptic interface panel. Now the range of available enclosures features the new SM-300 family, as shown in the figure above.

Each ELSAP controller is based on dedicated and certified modules, which intercommunicate over the internal system bus. While the ELSAP-05 family was based on an RS-485 bus, the ELSAP-14 comes with an efficient CAN bus support. The system supports belong to specific functional groups: input modules, output modules, application modules, communication modules and visualisation modules.

The input modules can register virtually all typical signal types, including contacts, diode contacts, analogue voltage and current signals, resistance measurements, etc. A special module with a 24-bit transducer has also been designed for precision recording of analogue electric signals.

The registered signal is processed in the application module according to a preprogrammed operating algorithm. The processed outputs may e.g. switch over contacts in output modules, or generate message in the connected loudspeaking communication system.

If registered or processed data needs to be relayed to another controller or visualisation system, you can easily do this with our wide selection of communication modules. From the standard solutions based on serial transmission over copper twisted pair or fibre optic cables in MODBUS (with supported serial interfaces: RS-485, RS-422 or RS-232) to communication over an IS optical fibre Ethernet cable network built with the EFI-13 family of modules (see further herein).

The drivers can read and process increasing amounts of data by continuous development of the system. This increases the number of configuration options and the device configurability directly by the user.

A visualisation module has been developed to speed up the operation of the device. Furnished with a large 5.6" graphical display and a synaptic panel, the module presents a large amount of information in an easy and clear manner.

The number of input, output and communication modules is configured according to customer demands. The maximum amount of modules is limited by the enclosure capacity only and the power supply unit output.

## Usage

Modular design for an extremely flexible configuration of the controller

- Processing visualisation based on a large 5.6" graphic display and a synaptic control panel
- New, high-performance 32-bit application module
- Wide range of input and output modules
- Controller data exchange based on RS-485 (also with fibre optic cables) or an IS optical fibre Ethernet network in the EFI-13 family
- Wide selection of durable metal enclosures in various sizes
- Expandable to 32 controllers in the system
- Universal 12 V or 15 V IS voltage supply
- Cat. M1 IS enclosure

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## SLS-15 System

# SLS-15 SHAFT COMMUNICATION SYSTEM

The SLS-15 system is a means of shaft telephone communication intended for the organization of local communication in mine shafts where methane hazards of any concentration may occur.

## Description

### SLS-15 SHAFT COMMUNICATION SYSTEM

It is intended for use mainly in underground mines. It can be used in places where there is a methane and/or coal dust explosion hazard, in places with high noise intensity, salinity, dustiness or in high humidity conditions. It allows for telephone communication between the hoisting machine driver and the workplace crew located at different levels, and also enables the transmission of a threat report to the driver, transfer of information or signals by the driver to endangered places, or mutual communication of subscribers between levels. The SLS-15 shaft communication system is made in an intrinsically safe version [I] intended for plants at risk of methane and/or coal dust explosion and in a non-intrinsically safe [N] version intended for other plants and places where intrinsic safety is not required.



CATEGORY:

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## ZEUS

# "ZEUS" - TELEPHONE AND EMERGENCY BROADCAST COMMUNICATION SYSTEM

The ZEUS system is a means of telephone and emergency public address communications designed for use in harsh industrial environments, including underground mining plants and places requiring emergency communications. The system can be used in places at risk of methane and/or coal dust explosion, in places with high noise, salinity, dust or high humidity conditions. The system allows the realization of emergency communications between the crew of the workplace and the dispatcher. It makes it possible to transmit a report of danger to the dispatcher, to transmit information or signals by the dispatcher to endangered areas or to communicate with employees. The ZEUS system is made in an intrinsically safe version intended for plants at risk of methane and/or coal dust explosion, and a non-intrinsically safe version intended for other plants and places where intrinsic safety is not required.

## Description

### SYSTEM ZEUS

- can send alarm signals, evacuation, warning and information communications concerning possible hazards to a single or group of IKAR devices, as well as at the same time sending multiples signals and communications to IKAR devices;
- allows you to send information about arose danger to dispatcher from each IKAR device;
- allows you to make calls in normal or emergency mode;
- allows you to listen to surroundings of IKAR device(s);
- allows dispatcher to send alarm signals to IKAR devices during call with another user;
- allows you to control manually or automatically sending signals and communications;
- allows you to automatically make connection between IKAR device and AWIZO information and connection station if the handset is picked up and no number is selected in 10 s;
- is equipped in DMTF signaling system and FSK between ZEUS PBX and IKAR devices;
- is equipped in systems for automatic registration of all events in the system and recording of all calls. Recorded date is protected from interference of unauthorized personnel;
- allows independent operation on two stations of the dispatch panel and on one station available for system conservator as a system maintenance station (upgradeable to 8 pcs of dispatch panels and 8 pcs of maintenance stations)
- you can configure the dispatcher panel for specific needs – for example methanometry dispatcher can be configured for monitoring selected detection circuits
- equipped with IKAR devices with separate direct access buttons: that can be pressed to call dispatcher in the emergency (ALARM button) or normal ("D" button) mode, to call AWIZO station of facility PBX ("A" button), as well as additional programmable buttons
- enables system configuration, setting priorities, and archiving of emergency calls and emergency conditions in maintenance station;
- enables listening, sending alarm signals and voice messages to loudspeaking eg UGS devices (on the walls, on spoil hauls) using IKAR or SWHT-11 device (device shall be connected to apparatus in accordance with tech-operating documentation)
- enables connection between IKAR device and up to 4 two-state detectors, that can signal their operating conditions to ZEUS PD or ZEUS SZ panel.
- allows dispatcher to turn on additional signaling devices (e.g. emergency panels) connected to IKAR apparatus by two-way outputs
- allows to view on IKAR devices displays: time, its number, number or name of caller (CLIP), phone number dialed and location of the device.
- dispatcher can monitor through dispatch panel IKAR device irrespectively of the condition of handset, i.e. he can remotely "hang up" handset if it has been hung up improperly,
- enables signaling at maintenance station, including opening of main or terminal device

7/214



CATEGORY:

TELEPHONE  
COMMUNICATION  
SYSTEMS

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- compartments, device disconnection or failure
- Work over distances of a few meters up to 10 km
- Meets requirements of IT security
- Ensures system time synchronization
- Works with systems for underground mining facilities (facility telephone communications, telemetric systems (eg CST-40, CST-40A), with technological communication systems having interface compatible with dispatching systems.
- Compliant with EMC requirements

## System modules

### "IKAR" INTRINSIC MINING BROADCAST DEVICE

- ATEX certification I M1 Ex ia I Ma
- Enclosure IP65
- Temperature range - 20°C to + 40°C
- Reception and broadcast through the speakers with the volume min. 95 dB
- Casing: made of antistatic plastic with high mechanical performance
- Backlit keyboard, ALARM button
- Graphic display (current time, dialed numbers, CLIP, casing location, call duration, etc.)
- Two visual signalers facilitating device localization and displaying current device condition
- Direct call buttons (ALARM, AWIZO, DISPATCHER) and other remotely programmable buttons
- Broadcast and listening functions
- Remote "hang up" of handset
- Automatically connects to AWIZO information and connection station if the handset is picked up/thrown off and no number is dialed in 10 s;
- Possibility to connect additional external devices for loudspeaking industry communication
- 4 two-state inputs and outputs
- Weight: approx. 4,5 kg.
- Dimension: 375 x 195 x 120mm.

### AUI-3 INTRINSIC BARRIER

- ATEX Certification I (M1) [Ex ia Ma] I
- Power Supply 48VDC, 12VDC +/- 2%
- Operation temperature 0° to 40°C
- Maximum operation range of IKAR device from barrier 10 km

### INTRINSICALLY SAFE SEPARATION RACK SSI-2

- Power supply 230VAC - 20% +10%
- Operation temperature: 0 to 25°C
- Dimensions: Base 600x600mm, height depending on configuration (number of installed AUI barriers)
- Enclosure: IP 61

### DISPATCH PANEL

- Multi-touch display with computer and server containing special functions for dispatchers and personnel responsible for maintenance of ZEUS system

### MAC-6400 ZEUS SYSTEM PBX

- Scalable, module construction
- Local connection of PBX to computer through LAN, USB or RS-232
- Remote control via modem, LAN, Internet using PC
- Real-time monitoring of operating parameters from controlling application
- Configuration of system devices using application for controlling PBX
- ISDN network traffic service (2B+D, 30B+D),
- Possible installation of VoIP gateways (backup, possible communication [instead of ISDN PRA] with facility PBX)
- Wide range of authorization and subscriber services configurations
- Various groups of subscribers (including conference groups),
- Use of services by subscribers with verbal confirmation messages,
- EbdRec - Multi-channel call recording system
- Real-time remote control of PBX condition
- Internal buffer for system events
- Protocols enabling integration with external software
- Card protection from power surges
- Analogue port,
- Full functionality for DMTF devices,
- CLIP service
- System linking/linking with PBXs of other manufacturers (DSS1, QSIG, IAX, SIP, SSL)



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## Composition of sets

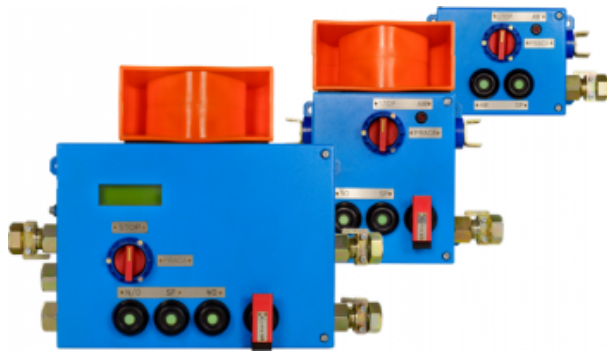
The most important devices included in the system are:

1. Telephone Switch of ZEUS System type MAC-6400
2. Intrinsic Mining Broadcast Device type „IKAR 2”
3. Intrinsically Safe Mining Telephone type ATI
4. Intrinsic Safety Barrier type BSI
5. Intrinsic Safety Cassette type KSI-1



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UGS-01/2

# UGS-01/2 - INTRINSICALLY SAFE SYSTEM FOR LOUD SPEAKING COMMUNICATION, SIGNALLING AND BLOCKING

The intrinsically safe system of loudspeaking communication, signalling and blocking UGS-01/2 is designed to be used in mining plants: in longwalls, along trains' routes, on haulage ways and in other places requiring loudspeaking communication. If the system is fed by the intrinsically safe feeders, it fulfils class M2, but after switching off the feeder it fulfils class M1 system.

## Functions

### Loudspeaking communication

- loudspeaking communication,
- communication with the dispatcher in normal or emergency mode,

### Signalling

- transmitting communication signals,
- emitting with priority warning signals before switching on machines and devices,

### Blocking

- disconnection and blocking the drivers of machines and devices,
- identification of drivers' stop and block place,
- signalling of activation of blockade and other working states of the system through verbal communication,

• signalling of blockade by LED diodes on the signalling device or box where the blockade has been activated,

**Additional functions**

- controlling the power supply voltage,
- testing the continuity of transmission line,
- controlling the charging status of the local power supply,
- location of the damaged section of the transmission line,
- connection of up to eight UGS-01/2 systems in straight or branched series,
- cooperation with the visualization system,
- cooperation with automation system (higher controller).

### SYSTEM CONSTRUCTION

System UGS-01/2 consists of following devices:

- final loudspeaking signalling device SGK-01/2 – 1 unit
- Switching off loudspeaking signalling device SGW-01/2- max. 8 units SGW-01/2 for feeder ZSI-94/1
- switching off box SW-01/2 – max. 60 units
- supply checking box SKZ-01/2 – 1 unit
- end box SK-01/2 – 1 unit
- blocking device UBL-01/2 – max. 4 units
- intrinsically safe feeder ZSI-94/1 – 1 pcs. for line up to 1000m, 2 pcs for line up to 2000m.

CATEGORY:

LOUDSPEAKING  
SYSTEMS

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#### FINAL LOUDSPEAKING SIGNALLING DEVICE SGK-01/2

The main box of communication and control. Device at the head of each conveyor. Apart from the functions of hands-free communication, signaling and blocking, it provides a full range of control functions and configurability of the system.

Characteristics of flameproof construction:

I M1/M2 Ex ia/ib I Ma/Mb

WE type test certificate no: FTZÚ 03 ATEX 0085X

#### SWITCHING OFF LOUDSPEAKING SIGNALLING DEVICE SGW-01/2

The box located along conveyor provides functions of loudspeaking, signalling and blocking device, identifies the site of disconnection of the drives, controls the supply voltage and continuity of transmission line.

Depending of the length of the belt there can be installed in total, a maximum of 8 units SGW-01/2 for a ZSI feeder.

Characteristics of flameproof construction: I M1/M2 Ex ia/ib I Ma/Mb

WE type test certificate no: FTZÚ 03 ATEX 0086X

#### SWITCHING OFF BOX SW-01/2

It ensures the following functions:

- communication signalling by conventional acoustic signals,
- switching off and blocking machines and devices drivers,
- llocalization of the damage of transmission line,
- sending the identification signal about the place of disconnection,
- setting the box identification number,
- optical signalling of localization of switch WORK-STOP.

Characteristics of flameproof construction: I M2 Ex ib I

WE type test certificate no: FTZÚ 03 ATEX 0088

#### END BOX SK-01/2

It ensures the following functions:

- checking the transmission line continuity,
- indication of continuity and state of the conductor,
- checking of the supply voltage,
- emergency switching off and blocking of motor starters.

Characteristics of flameproof construction: I M2 Ex ib I Mb

WE type test certificate no: FTZÚ 03 ATEX 0089

#### SUPPLY CHECKING BOX SKZ-01/2

It ensures the following functions:

- checking of the supply voltage Z1, Z2 presence at system supplying by two feeders,
- blockade of drivers in case of a lack of supply voltage.

Characteristics of flameproof construction: I M1 Ex ia I Ma

WE type test certificate no: FTZÚ 03 ATEX 0087

#### BLOCKING DEVICE UBL-01/2

It ensures the following functions:

- checking the states of four devices equipped with the contact components or generating tension signal - direct or alternating current,
- drive interlocking caused by controlled devices,
- transmission of the blocking device number,
- transmission of the blockade number to the mating system,
- visualisation of the inputs' states on LCD display.

Characteristics of flameproof construction: I M2 Ex ib I Mb

WE type test certificate no: FTZÚ 03 ATEX 0125

## Technical characteristics

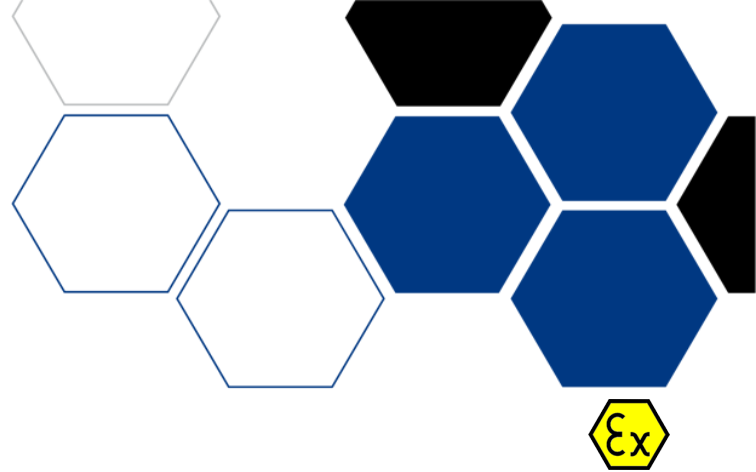
Supply voltage depending on the voltage type	42 V, 127 V, 230 V+10 % - 15
Supply voltage frequency	50 Hz or 60 Hz
Output voltage	15 V +/- 0,5 V
Rated discharged current	0,7 A
Output current ripples	≤10 mVpp
Output circuit parameters	Uo = 15,5 V, Io = 0,7 A, Lo = 130 uH, Co = 10μF,
Power consumption	≤40 VA
Protection level	IP 54
Operation temperature range	between +0°C and +40°C
Relative humidity in temperature +40°C	up to 95 %
External dimensions	425 x 315 x 122 mm
Weight	aprox. 14 kg



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# UGO-86/1 - INTRINSICALLY SAFE SYSTEM FOR LOUD SPEAKING COMMUNICATION AND SIGNALLING

The intrinsically safe system of loudspeaking communication and signalling UGS-86/1 is designed to be used in mining plants at any concentration of methane to ensure the loudspeaking communication and communicative signalling and cooperation with the conveyor automation system.

## Functions

System UGO-86/1 provides the following functions:

- simplex phonic communication and communication with conventional signals along haulage ways,
- warning signalling before starting the conveyors,
- collaboration with conveyors automation system,
- monitoring of continuity of conductors of a cable connecting the signalling device,
- control of battery charging conditions from a local source of power supply.

## Design and operation

The UGO-86/1 system consists of the following devices:

- Signalling device for haulage ways SAO-86/1 (max. 99 units),

Explosion-proof mark:

I M1/M2 Ex ia/ib I Ma/Mb

No. Certificate examination type CE:

FTZÚ 04 ATEX 0115X

- End signalling device for haulage ways

SKO-86/1 (1 unit),

Explosion-proof mark:

I M1/M2 Ex ia/ib I Ma/Mb

No. Certificate examination type CE:

FTZÚ 04 ATEX 0114X

- Intrinsically safe feeder ZSI-94/1 (one feeder can feed max. 10 signalling devices and the length of feeding line cannot exceed 1 km).

Explosion-proof mark: I M2 Ex d mb [ib] I Mb

No. Certificate examination type CE: FTZÚ 04 ATEX 0130

CATEGORY:

LOUDSPEAKING  
SYSTEMS

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# UGS-10 - INTRINSICALLY SAFE SYSTEM FOR LOUD SPEAKING COMMUNICATION, SIGNALLING AND BLOCKING

The UGS-10 intrinsically safe (IS) loudspeaking, signalling and lockout system is intended for operation in mines: at mining longwalls, along the transport railways, in haulage ways and other locations which require loudspeaker communication. The safety integrity level is rated at SIL 1 for the shutdown and lockout functions. It is rated at Cat. M2 when powered from IS mains PSUs. When isolated from a mains PSU, the system is Cat. M1 powered from an internal backup battery.

## Device description

The UGS-10 is the latest generation of loudspeaking, signalling and lockout systems in our offer. Unlike its predecessors, it is digital. This permits calls not only over the entire system, but also directly between selected signalling devices. Up to three calls can be handled simultaneously in the system. The signalling devices feature extra analogue inputs and outputs. This allows connection of contact output sensors, e.g. temperature sensors or belt askew sensors.

Aside from the analogue connectors, the signalling devices feature digital RS-485 for communication with e.g. controllers or power cabinets. The system bus cable can be used for tunnel transmission of digital data between the system signalling devices, e.g. between a contactor switch connected to the last signalling device and an SGK signalling device. The solution eliminates the need for additional wiring along conveyor routes.

Extra inputs:

- Four (4) ZRK-equipped contact control inputs
- Two (2) contact outputs (contact or diode contact type)
- Analogue input for connection with the UGS-01/2 loudspeaking system
- Four (4) RS-485 digital connectors on the SGK-10 signalling unit, with one for other SG or SGW signalling devices.

Safety integrity levels of the UGS-10 loudspeaking, signalling and lockout system:

- SIL 3 for shutdown and lockout
- SIL 1 for warning signal broadcasting

## Functions

Loudspeaking communication:

- Simplex loudspeaker calls with digital sound compression and transmission
- Capable of handling calls between two selected signalling devices
- Handles up to 3 independent voice calls simultaneously
- Dispatch dialling and call in the normal mode
- Emergency dispatch dialling
- Dispatch message broadcasting,

Signalling:

- Transmission of communication signals
- Priority emission of equipment start warning signals
- Control of proper warning signal emission at each signalling device,

CATEGORY:  
LOUDSPEAKING  
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#### Lockout:

- Shutdown and lockout of equipment drives
- Identification of drive shutdown and lockout locations
- Voice message signalling of Lockout On and other system operating states
- Lockout LED indication on the signalling device or the lockout box at which the lockout has been activated,

#### Other functions:

- Supply voltage control
- Transmission line continuity check
- Local power source charge check
- Damaged transmission line section location indication
- Connectivity with up to ten (10) UGS-10 systems in straight or branched string
- System autodiagnostic functions
- Digital transmission of system data, connected automation system data and other connected equipment data

## Design and operation

### UGS-10 SYSTEM DEVICES

**SGK-10 - TERMINAL LOUDSPEAKING SIGNALLING DEVICE.** This is the master signalling device installed as the first device in the UGS-10 system. Apart from the loudspeaking communication, signalling and lockout, the device allows full configuration of the system. To facilitate operation, the loudspeaking communication module, as seen on the left side of the signalling device, is identical in operation and functionality to the SGW-10 signalling device. The system is configured with the right-hand module on the signalling device side.

Each system may include only one SGK-10 signalling device. It is most often installed near the drive end of a conveyor belt or push-plate conveyor. Other signalling devices or lockout boxes are connected to this master device. The device features a range of extra inputs and outputs for connectivity with additional devices or initiation of warning signal broadcasting.

**SG-10 - LOUDSPEAKING SIGNALLING DEVICE.** The device handles loudspeaking communication and warning signal broadcasting. The signalling device has two loudspeaker tubes on its sides for improved audibility of calls and messages along the route. The signalling device enables calls to the entire system or a selected signalling device. The signalling device features two connectors for inline connection with the system bus. Moreover, the contact and digital (RS-485) input and output block allows connecting other external devices, e.g. temperature sensors

**SGW-10 - LOCKOUT LOUDSPEAKING SIGNALLING DEVICE.** This device has the full functionality of the SG-10 signalling device, i.e. loudspeaking communication and warning signal broadcasting, extended by the lockout function. The device features an emergency stop mushroom button and an emergency stop cable. The lockout trigger is indicated in several ways: with a voice message, stating the triggered device number, backlighting the display in red and turning on the red LEDs on the device side panels.

**SW-10 - LOCKOUT BOX.** The lockout box is an equipment lockout device. The device features an emergency stop mushroom button and an emergency stop cable. The device is available in the passive and active version. The active lockout box features an additional BI-SW electronic module which enables exact location of the lockout trigger. The passive lockout box allows diagnosing the lockout trigger location down to the nearest system signalling device or active lockout box.

**SGW-S-10 - LONGWALL LOCKOUT LOUDSPEAKING SIGNALLING DEVICE.** This device is a smaller and simplified version of the SGW-10, and intended for longwall systems. The reduced number of keypad buttons has allowed a smaller enclosure form factor. The overall dimensions are smaller than in the original device (H x W x D):

- SGW-10: 337 x 370 x 173 mm
- GW-S-10: 269 x 360 x 173 mm

Other functions, including the extra inputs and outputs, have not been changed.

### SGW-SN-10 - LONGWALL LOW-FORM LOCKOUT LOUDSPEAKING SIGNALLING DEVICE

This is the smallest signalling device available in the UGS-10 system and optimised for use in longwall systems for mining thin coal seams. The overall dimensions are smaller than in other versions of the device (H x W x D):

- SGW-10: 337 x 370 x 173 mm
- SGW-S-10: 269 x 360 x 173 mm
- SGW-SN-10: 200 x 360 x 148 mm

This signalling device has no extra inputs or outputs. This is the only signalling device on offer with the bus cable connected with quick-release coupling



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### SGW-10 / 3 / S, SGW-10-S/3/S, SG-10/3/S - SEPARATING SIGNALLING DEVICES

These signalling devices are applied in extensive systems which require several IS PSUs. They boast the same functionality as their regular counterparts, and the only difference is that they separate the system bus power lines.

### SGP-10 - PORTABLE LOUDSPEAKING SIGNALLING DEVICE

The portable signalling device is handy for servicing, e.g. repairs of longwall cutters. The terminal box of the device facilitates inline connection with the system bus. The signalling device is connected over a cable and allows calling the entire UGS-10 system or a selected signalling device. The device features a low weight and compact dimensions.

### SWS-13- SYSTEM CONNECTION BOX

The product is intended to connect two loudspeaking communication systems with full galvanic isolation. The device enables calls and transmission of communication signals between the systems, and prioritizes the equipment start warning signal. The product interfaces the UGO-86/1 with the UGS-99/1, UGS-01/2 and UGS-10 systems. The box also enables connection of UGO-86/1, UGS-99/1, UGS-01/2 and UGS-10 with communication systems of other brands. The input signal parameters of both device sides are programmed with an user interface with a keypad and a graphic display.

During normal operation the device is powered by a PSU; upon mains outage, the operation is backed up by an IS power source (a battery). The RS-485 serial transmission port allows connection with a master control system.

**MŁG-11 - LOUDSPEAKING COMMUNICATION MODULE.** The loudspeaking communication module assures connectivity between the UGS-10 system and the mine phone exchange. The module enables calls between subscribers of a telephone network and the UGS-10 loudspeaking system users. The module functions include:

- Dialling PBX subscribers from any UGS-10 signalling device over DTMF.
- Dialling a UGS-10 signalling device or groups thereof by any PBX subscriber (over DTMF).
- semi-duplex calls between PBX subscribers and UGS-10 signalling device users.

The module is installed in the SGK-10 signalling device enclosure.



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## EMLOK-16

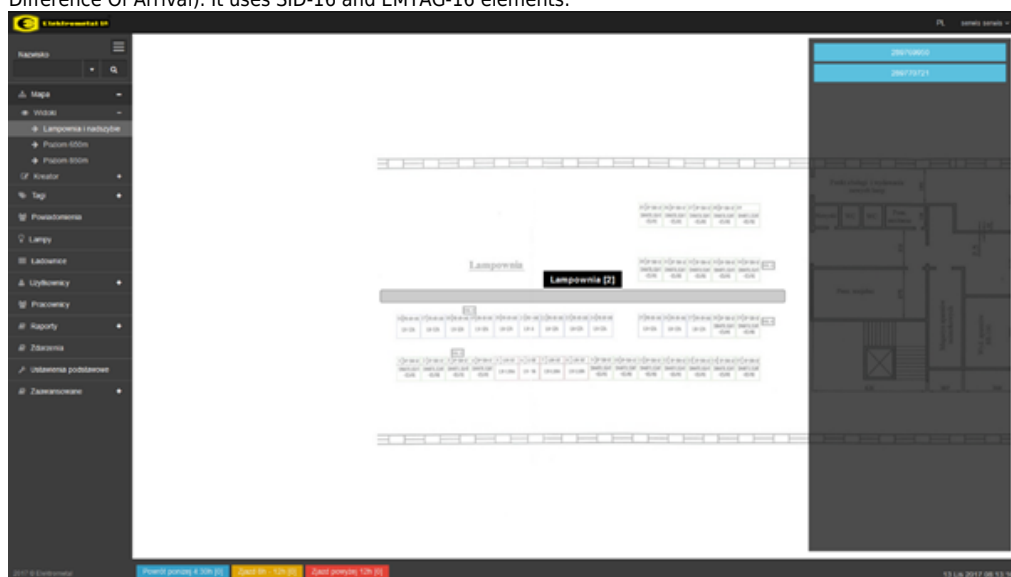
# MONITORING AND TRACKING SYSTEM EMLOK-16

EMLOK-16 is a security support system

In some situations, the ability to locate people effectively is one of the basic conditions for their safety. In mining / industrial facilities there may be places where hazardous substances are released as well as areas with very high or very low temperatures, and areas with potentially explosive atmospheres. People are not allowed to stay in such places for long periods of time. When a person is injured or loses consciousness, he or she needs help and thus needs to be located.

## Full description

EMLOK-16 is a security support system. It determines employee's location using the TDOA method (Time Difference Of Arrival). It uses SID-16 and EMTAG-16 elements.



CATEGORY:

MONITORING AND TRACKING

CERTIFICATIONS



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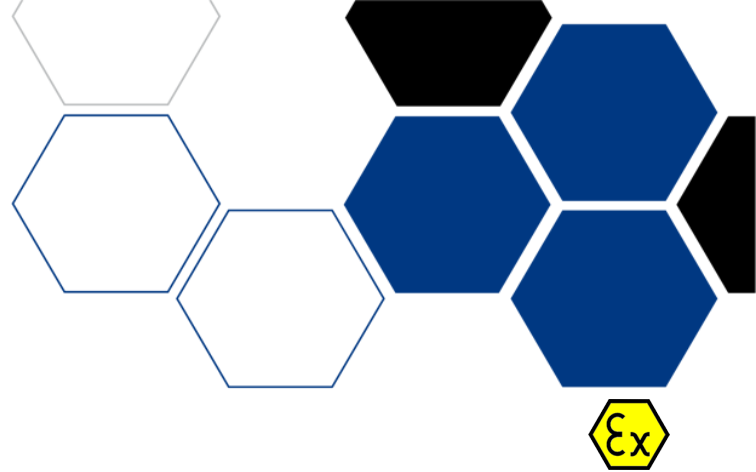


**Key functions:**

- Sending a text message to the employee (shown on the lamp display) with feedback when the message is received and read.
- Possibility to monitor the presence of employees in specific zones.
- Controlling the escape route by sending text messages and screening announcements on SLOGAN displays.
- Possibility to monitor the path taken by the employee.
- Full cooperation with SmartView.
- Ability to detect employee's immobility (collapse).
- Ability to send messages to SLOGAN alphanumeric displays installed underground.
- In the event of a catastrophe, information about **the last known location** of the miners.
- Synchronisation with external databases.
- Ability to report and export data to .pdf and .xls files.
- Possibility to adjust permissions to user needs.
- Possibility to limit access to personal data.
- Possibility to make data available to dispatch applications.
- Ability to synchronise employee's data with Time and Attendance Systems.
- Warning about exceeded number of employees in danger zones.
- Possibility to install EMTAG-16 modules in other devices (e. g. methanometers) and transfer measurement data wirelessly to the surface.







# THE TRAPPED MINERS SEARCHING SYSTEM MINSEARCH

The system that allows locating miners based on locating transmitters built into lamps. The system allows locating miners trapped underground.

## Design and operation

Transponder (active TAG) build in the mining cap lamp Smartlight-12. Tag transmits an unique ID to the readers. Certificate No.: FTZU 04 ATEX 0299, Marking: I M1 Ex ia I Ma

- Tag readers (Wireless Access Points) receive Tag's ID and consequently transmit it to the data concentrator by Wi-Fi signal. They also provide two-

-way communication with the cap lamp that has to be equipped with the receiver module with display. Certificate No.: FTZU 10 ATEX 0129, Marking: I M1 Ex ia I Ma

- Data concentrator that is based on the modules of system ELSAP transfers data from several readers to the PC in the control room on the surface.

The data is typically transmitted by telecommunication cable or fibre optic cable. If signalling devices (such as graphic alphanumeric LED display Slogan-SGA) are connected to the concentrator, the information generated by the system can be displayed at specific locations (e.g. at important Reader locations, mine entrances/exits etc.). The use of these displays improves the personnel and vehicle access control. Typical application is counting of personnel entering a mining section and warning if the number exceeds a preset limit.

Certificate No.: FTZU 06 ATEX 0184, Marking: I M1 Ex ia I SYST

CATEGORY:

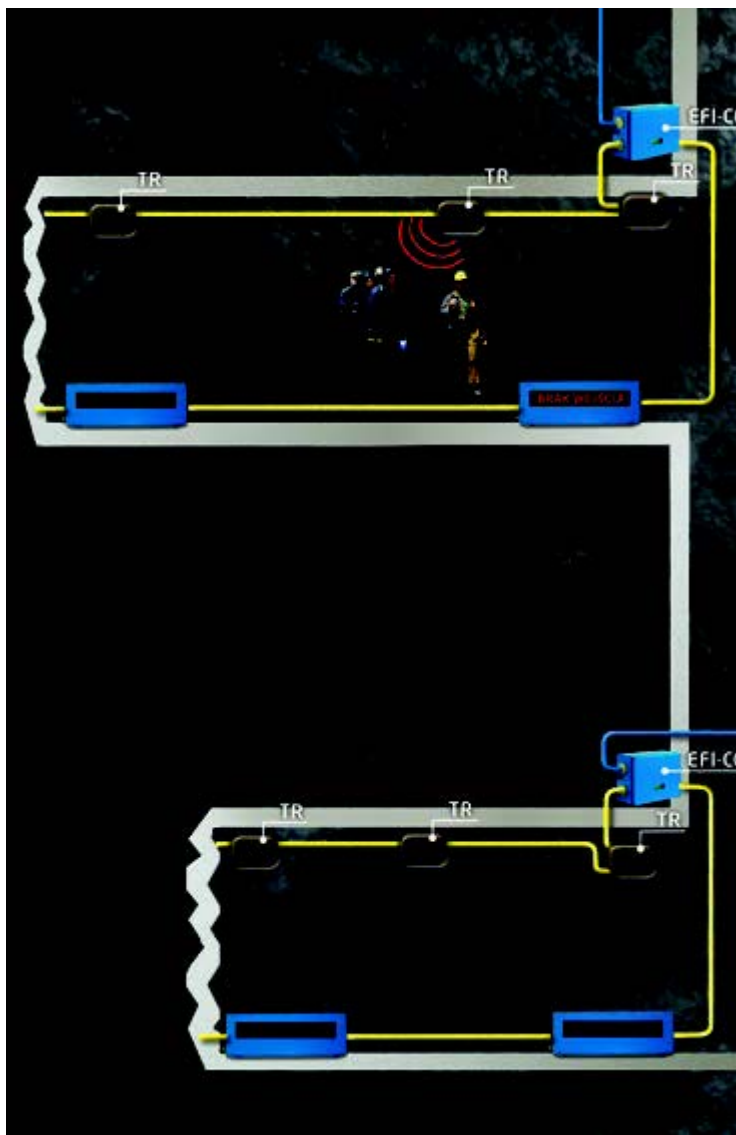
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CERTIFICATIONS



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## SOFTWARE

Software (SQL database and visualisation program). The primary display includes a list of all tags currently logged into the system. Each record clearly displays a tag number, the name of the tag holder, and the time and location of the last stay in vicinity of a reader. From the primary display screen users can also see the total number of tags and their location in the system.

Selecting a record from the primary display brings up the individuals details. Operator can also see how long the Tag's user is in the system and which Tags have been returned. There is also the possibility to export the data into .xls format for easy editing and maintaining.



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## Types of sets

The most important device included in the system are:

1. Location Receiver type MinSearch-15
2. Location Receiver type MinSearch-09
3. Cap Lamp type Smartlight-12PRO
4. Cap Lamp type Smartlight-05PRO
5. Cap Lamp type Smartlight-12
6. Cap Lamp type Smartlight-05/M1
7. Cap Lamp type Smartlight-05/M2/L
8. Location Transmitter type PGLR



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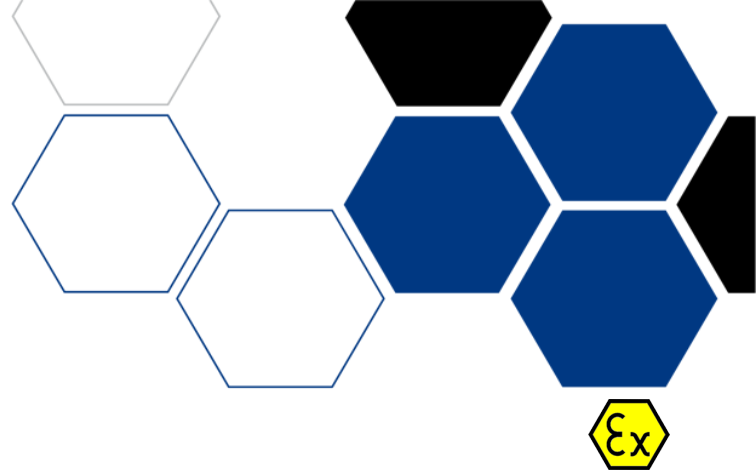
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Minsearch 08

## EMERGENCY POSITION FINDING SYSTEM MINSEARCH-08



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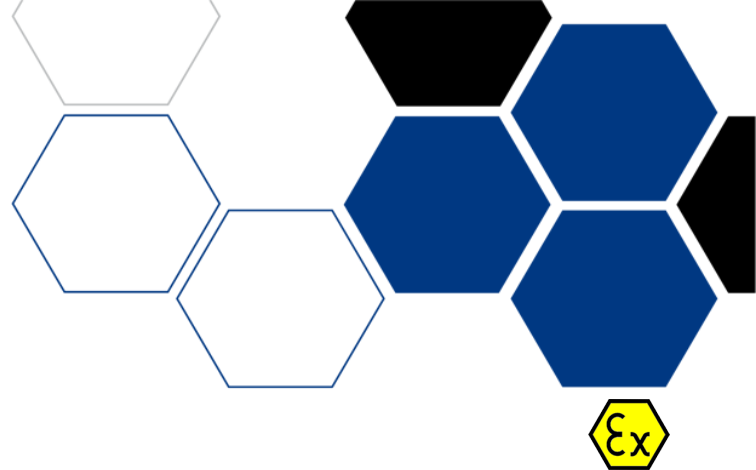
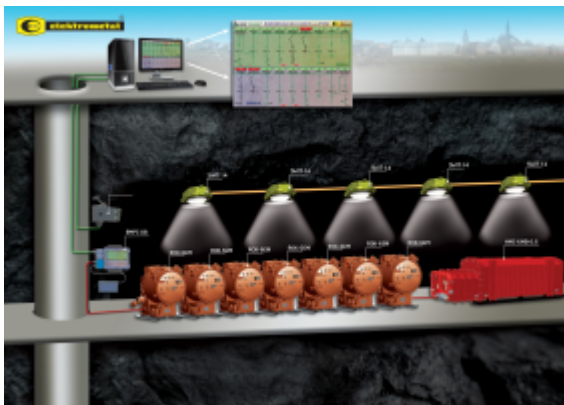
EMERGENCY  
POSITION FINDING

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# THE UNDERGROUND MEDIUM VOLTAGE SWITCHING STATION

The system makes it possible to build complete underground power switchgears in potentially explosive atmospheres. The system allows powering electrical equipment installed underground. Power switchboards can be monitored and controlled remotely from both underground and surface stations.

## Composition of sets

The most important equipment included in the system are:

1. Flameproof Switchgear type ROK-6EM/B
2. Flameproof Switchgear type ROK-8EM/B/X/X/WX/UX
3. Flameproof Computer type EMPC-15
4. Lamp type ŚWIT-14
5. Lamp type OLC-1

CATEGORY:

UNDERGROUND  
POWER SUPPLY

CERTIFICATIONS



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# THE POWER LINE COMMUNICATION SYSTEM

The system allows creation of TCP/IP networks using power cables without additional transmission wires. The PLC system is an alternative to the Ethernet network implemented via fiber optic or copper twisted pair cable. It is used wherever it is necessary to transmit data over a distance of up to 300m and where there is a very high exposure to mechanical damage.

## Composition of sets

The most important devices included in the system are:

1. Converter Bridge type PLC-BRI-16
2. Network Filter type PLC-FIL-16
3. Signal Amplifier type PLC-REG-16
4. Flameproof camera type ISK-11/M2 HD-PLC
5. Access Point type EFI-AP-22

CATEGORY:

FIBER OPTIC SYSTEMS

CERTIFICATIONS



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# THE UNDERGROUND FIBER OPTIC COMMUNICATION SYSTEM

Intrinsically safe system that allows the user to build underground TCP/IP networks. The proposed solution allows the user to connect devices communicating via Ethernet link in both wired and fiber optic versions.

## Composition of sets

The most important devices included in the system are:

1. Media Converter type EFI-BAR-13
2. Network Bridge type EFI-BRI-13
3. Converter type EFI-CON-13
4. Radio Module type MR-14/5G
5. Access Point type EFI-AP-22
6. Radio Telephone type RTL-14/5G
7. Smartphone type SMART - EX 02M
8. Intrinsically Safe Tablet type AEGEX-10

CATEGORY:

FIBER OPTIC SYSTEMS

CERTIFICATIONS



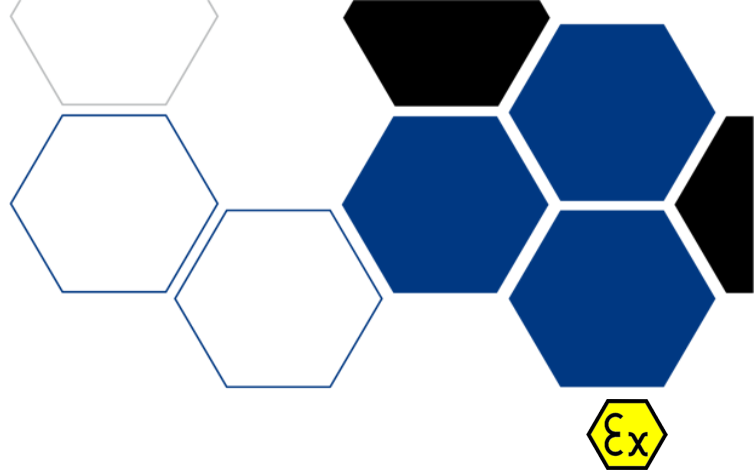
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UML-01/2

## UML-01/2 CONTROLLER



CATEGORY:

CONTROL DEVICES

CERTIFICATIONS



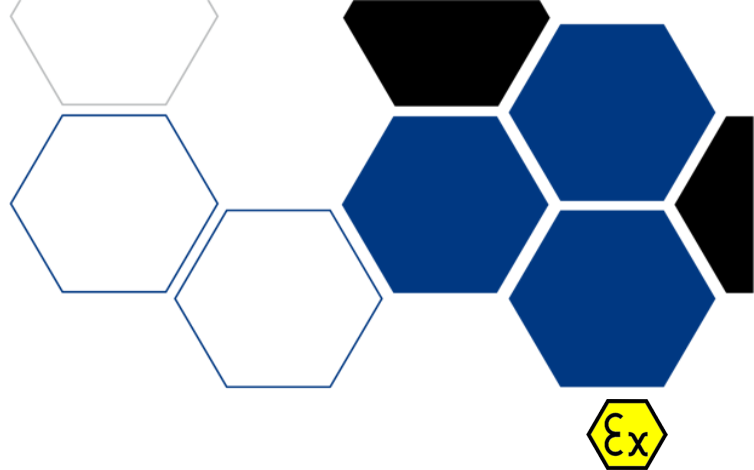
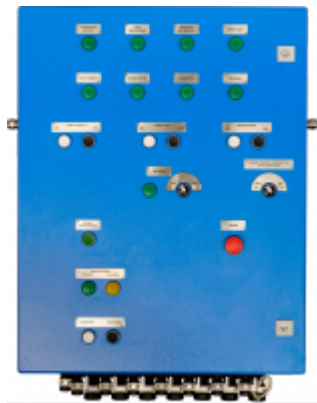
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PSL-3

## PSL-3 CONTROLLER

Part of Elshaft-15 system. Shaft control, communication & signalling system.



CATEGORY:

CONTROL DEVICES

CERTIFICATIONS



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PSL-4

## PSL-4 CONTROLLER

Part of Elshaft-15 system. Shaft control, communication & signalling system.



CATEGORY:

CONTROL DEVICES

CERTIFICATIONS



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SCUP-17

## SCUP-17 CONTROLLER

Part of Elshaft-15 system. Shaft control, communication & signalling system.



CATEGORY:

CONTROL DEVICES

CERTIFICATIONS

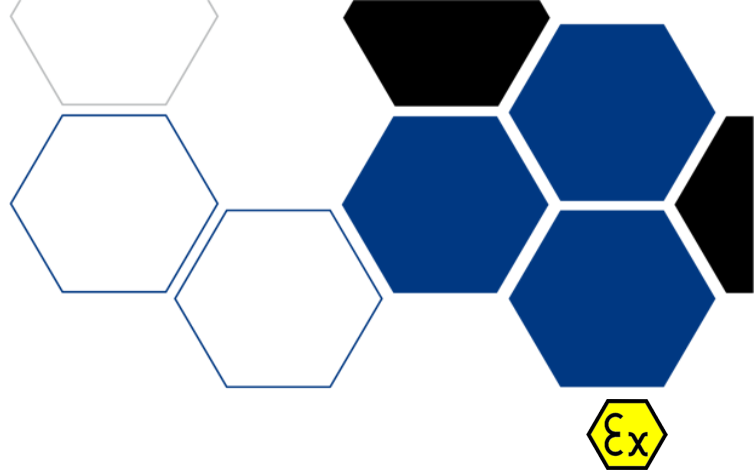


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PSU-PP-14

## PSU-PP-14 REMOTE CONTROLLER



CATEGORY:

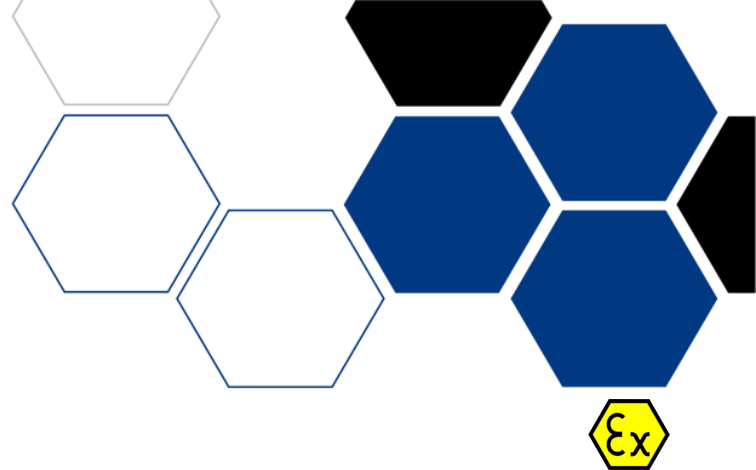
CONTROL DEVICES

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# UML-05/SZ CONTROLLER

## CONTROL DEVICES

CE



30/214

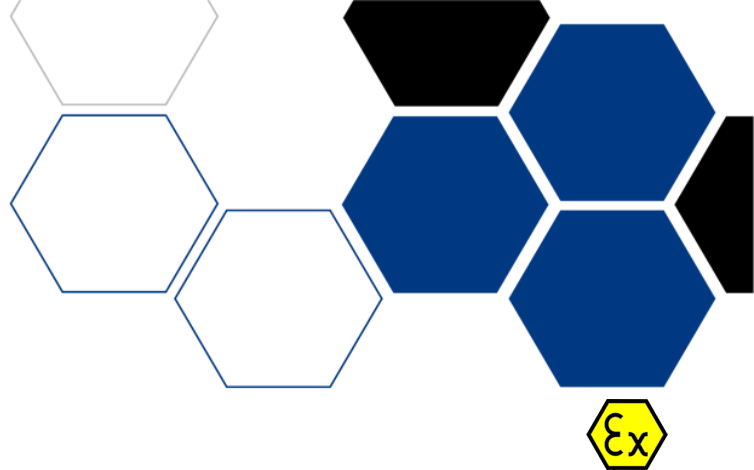




UML-05/PO

## UML-05/PO CONTROLLER

Controller designed for all types of conveyors.



CATEGORY:

CONTROL DEVICES

CERTIFICATIONS



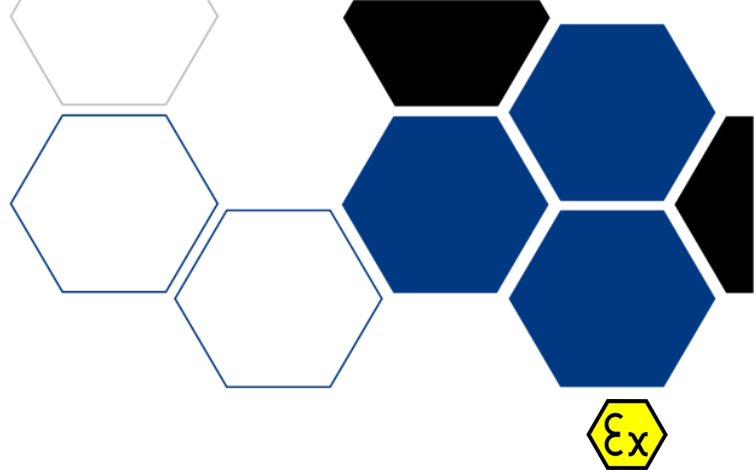
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UML-05/E

## UML-05/E CONTROLLER



CATEGORY:

CONTROL DEVICES

CERTIFICATIONS

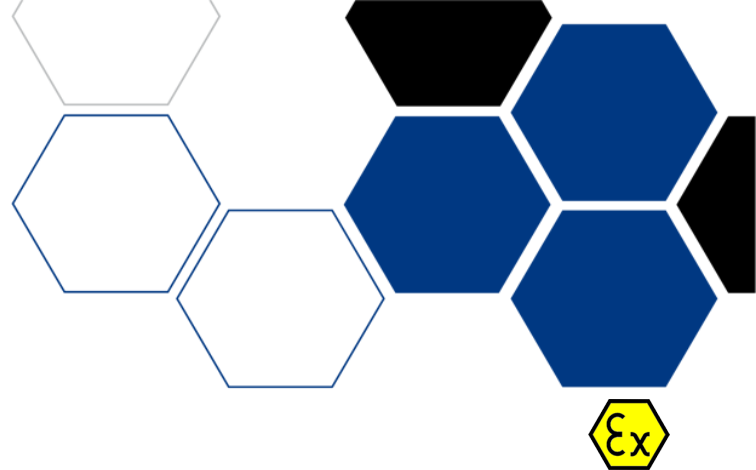


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UML-10

## UML-10 CONTROLLER



CATEGORY:

CONTROL DEVICES

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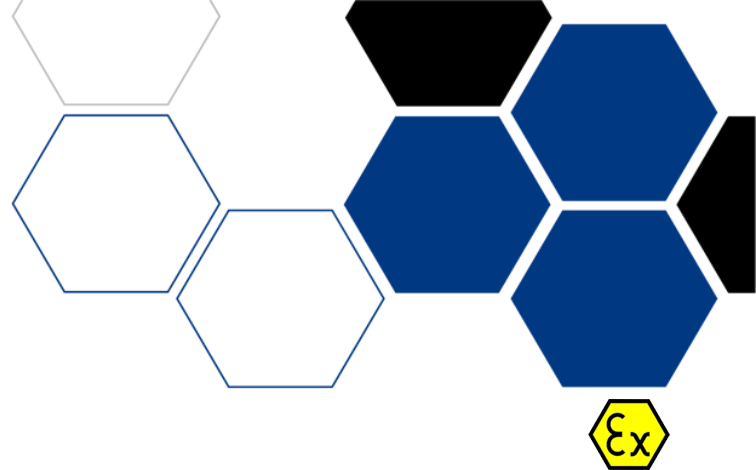


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UML-05/o

## UML-05/O CONTROLLER



CATEGORY:

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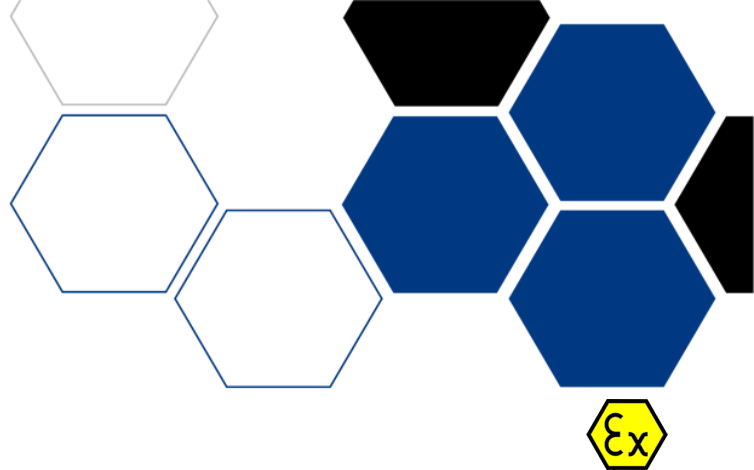
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SKS-10

## SKS-10 LONGWALL CONTROLLER

Controller designed to be used at the longwalls, to control mainly the armoured face conveyor (AFC), the beam stage loader (BSL) and the crusher.



CATEGORY:

CONTROL DEVICES

CERTIFICATIONS



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SGA-16

## SGA-16 CONTROLLER



CATEGORY:

CONTROL DEVICES

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# VISUALIZATION FOR AUTOMATION SYSTEMS ELSAP-05/P AND UGS

**ELSAPCONF CONFIGURATION SOFTWARE, ELSAPVIEW VISUALISATION SOFTWARE, SYSTEM DATABASE**

## Description

### ELSAPCONF CONFIGURATION SOFTWARE

Basic functions of the **ELSAPConf** application:

- communication with devices via **UMT-05**,
- configuration of the **UML-05** controller operating parameters,
- configuration of the **UBL-05** controller operating parameters for inputs and outputs, and additional modules for the **UML-05** controller, configuration of lockout sources,
- presentation of the current operating parameters of the conveyor: operating condition, speed, type of the conveyor, operation mode,
- signalling lockouts,
- ability to deactivate (block) the lockout source,
- remote switching on and off of the conveyor,
- archiving of events (condition of controllers, lockout occurrences, user actions),
- management of application user accounts,
- printing out the current settings.

### ELSAPVIEW VISUALISATION SOFTWARE

Basic functions of **ELSAPView** application:

- graphic diagram of the conveyor flight operation along with the branches,
- possibility to present many flights and branches on one dispatcher panel,
- dynamic configuration of the conveyor system and of additional elements presented in the diagram,
- presentation of belt conveyors and scraper conveyors,
- presentation of the condition of UGS and IS lockout systems,
- monitoring the operating parameters, state of inputs (standard, auxiliary and external sensors) and outputs related to a given conveyor,
- ability to deactivate the lockout source,
- possibility to operate on many visualisation stations simultaneously,
- independence from the operating system,
- preview of the image from video surveillance system cameras by ELEKTROMETAL SA.

### SYSTEM DATABASE

The system database stores information such as:

- system configuration,
- events in the system,
- users and their permissions,
- different versions of module software,
- detailed archive of system operation and of haulage

CATEGORY:

CONTROL DEVICES

CERTIFICATIONS



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UML-05

## UML-05 CONTROLLER



CATEGORY:

CONTROL DEVICES

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PSZP-17

## PSZP-17 CONTROLLER

CATEGORY:

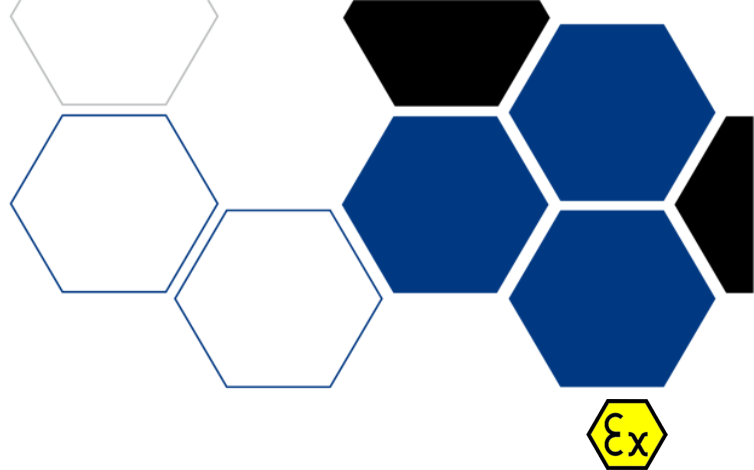
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# PSU XX/XXX CONTROL DESK

The universal control desk type PSU xx/xxx is designed for controlling and signalling in intrinsically-safe circuits. It may be compatible with circuits of any given devices, if such circuits are made as intrinsically-safe, of at least class ib.

## Functions

- controlling and signalling in intrinsically-safe circuits

Configuration of controlling and signalling elements built-in on the front plate of desk is arbitrary and dependent upon specific needs of the system and potential user's requests. The only limitations are the intervals between individual elements and the resultant maximal admissible filling up of the front plate.

CATEGORY:

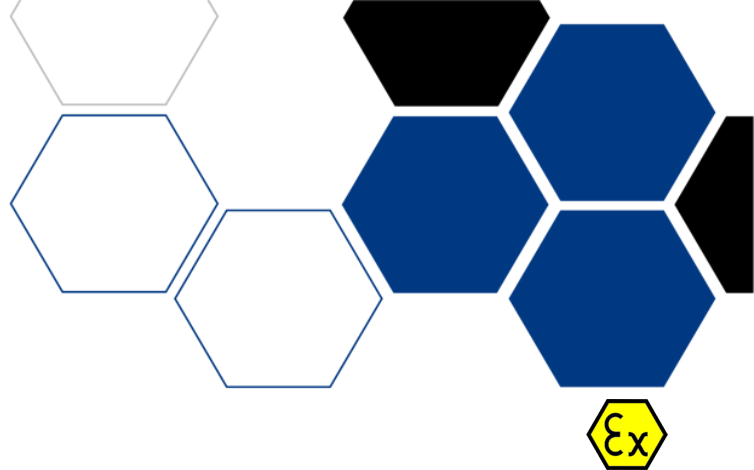
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WK-03

## MARGINAL BREAKER SWITCH WK-03

The WK-03 marginal breaker switch is designed to be used in mining plants, in rooms at any concentration of methane.

### Features/Technical specification

Rated voltage	60 V DC
Maximal current	0,2 A
Protection level	IP 54
Working temperature range	+5°C to +40°C
Admissible intersection of cables	0,35 to 2,5 mm <sup>2</sup>
Dimensions	330 x 190 x 155 mm
Weight	About 5,2 kg
Cable inlets	DP 6-10, DP 10-15, DP 14-21

### Functions

- emergency switching off a driver of the underslung cableway at railway access on the right or left side of a lever of the breaker switch.

The breaker switch possesses independent switching over contacts led out on the terminal strip. Switching off a driver is a result of contacts opening out by mechanism which is started by a lever made of elastic steel line. The line is clamped down by a trolley at railway access at a given place of a route. In the breaker switch there are resistors enabling the cooperation with systems of lines condition control.

### Execution

The WK-03 marginal breaker switch is mounted on a rail of the underslung cableway. There are two holes Ø22 mm adopted for holes of the cableway rail. Linking cables are inserted to a breaker switch through DP cable inlets mounted to the side of the breaker switch enclosure and to clamps type WAGO inside the enclosure.

CATEGORY:

CONTROL DEVICES

CERTIFICATIONS



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WK-97/1

## END BREAKER SWITCH WK-97/1

The WK-97/1 end breaker switch is designed to be used in control circuits. It is produced in three versions differing in extra equipment. It is also used to work in mining plants, in rooms at any concentration of methane.

### Functions

- emergency switching off and blocking a drive of the underslung cableway at arriving at the end of the route of a trolley.

Switching off a driver is a result of contacts opening out of a stable change over switch „PRACA-STOP” by a mechanism conjugated with the switch and switched on by elastic lever, where the trolley apply at the end of the route. Usage of twisting stable switch “PRACA-STOP” enables the direct or remote control. Next starting a cableway drive is possible after switching over a switch in output position.

### Technical characteristics

Protection level	IP 54
Type of cable inlet	DP 14-21; DP 6-10; DP 10-15
External diameter of linking cable	$14 \leq d \leq 21$ mm
Working temperature range	+5°C to +40°C
Necessary force to start the breaker switch with a line	150 N $\pm$ 30 N
Dimensions and weight	395 x 175 x 130 mm, about 5,4 kg

### Montage

The WK-97/1 final breaker switch may be installed on the right and left side of a rail of the underslung cableway, but it is necessary to mount a lever on the appropriate side of the breaker switch so that it could be possible a direct contact between a lever and a trolley of the narrow-gauge railway. To mount a breaker switch there are 2 holes Ø22 mm whose span should be adopted for the hole in a rail. Linking cables are inserted to the breaker switch through cable inlets DP 14-21 type.

### Execution

WK-97/1/1 inside the enclosure there is a terminal strip equipped with resistors used for systems' connections. To terminal strips there are inserted switching over contacts “ON-OFF” (a short -circuit and pulling apart contact).

- WK-97/1/2 Inside the enclosure there is a terminal strip to which are inserted two 2 switched over contacts of a change-over switch “ON-OFF”.
- WK-97/1/3 Inside the enclosure there is a terminal strip to which are inserted contacts of a change over switch “ON-OFF” and cables of ZID identification unit.
- Breaker switch WK-97/1 3rd version can cooperate with:

-- systems: UGS-86, UGS-99, UGS-99/1, UGS-01, UGS-01/1, UGS-01/2, ISB-89, ISB-89/1,  
-- devices: UML-01, UML-01/1, UZS-02/2.



CATEGORY:

CONTROL DEVICES

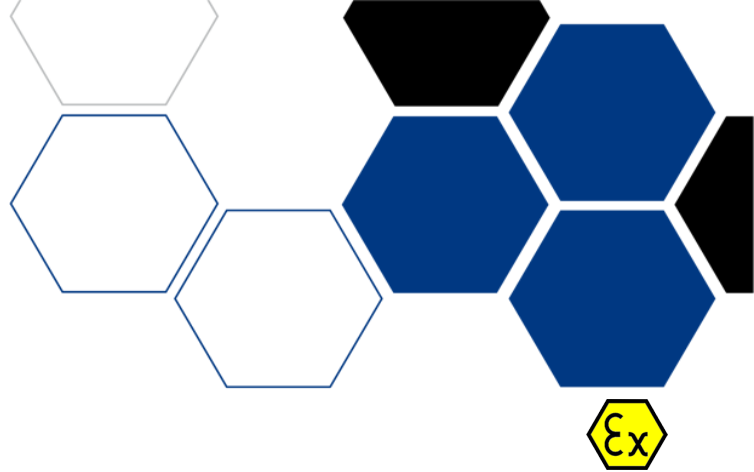
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## PULL-WIRE SWITCH WL-08

CATEGORY:

**CONTROL DEVICES**

## CERTIFICATIONS

CE

- 

- by pressing down the ON-OFF button located on its cover
- by jerking the emergency wire mounted to the switch link

Cable inlets	DP 14-21, DP 10-15, DP 6-10
Force needed for the pull-wire activation of switch	200 ± 50 N
Protection level	IP 54
Working temperature range	from -20°C to + 40°C
Dimensions	160 x 600 x 140 mm
Weight	approx. 6 kg
External diameter of connecting cable	14 ≤ d ≤ 21 mm dla DP14-21 15 ≤ d ≤ 10 mm dla DP10-15 10 ≤ d ≤ 6 mm dla DP6-10

Mounting of pull-wire switch is facilitated with 4 grips with holes dia. 11 mm for M-10 screws. Connecting cables are led in to the switch through cable inlets. Pull-wire tension should be set in switch neutral position with the help of a tightening bolt.

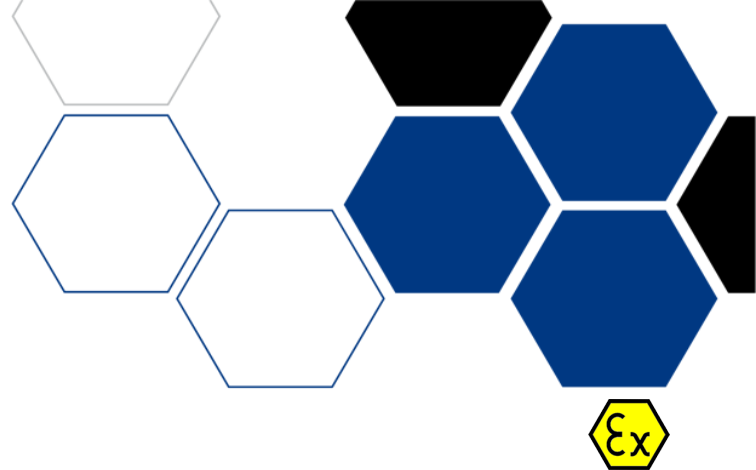
Pull-wire switch is produced in the following makes that differ among themselves by supplementary equipment:

- WL-08/1 – with resistors being led out into terminal strip, used to control the continuity and shorting of the line, and one normally closed and normally open contact, each.
- WL-08/2 – with two changeover contacts being led out into terminal strip,
- WL-08/3 – with identification unit conductors ZID and switch contacts being led out into terminal strip; it is compatible with the systems: UGS-86, UGS-99, UGS-99/1, UGS-01, UGS-01/1 and UGS-01/2 and with the devices: UML-01, UML-01/1 i UZS-02/2.



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43/214



WL-92/1

## LINE BREAKER SWITCH WL-92/1

The WL-92/1 line breaker switch is designed to be used in mining plants, in control circuits and machines' blocking and in devices working in rooms at any concentration of methane.

### Functions

- emergency switching off and blocking driver,
- remote control in automatics circuits.

Control of the contacts in the WL-92/1 line breaker switch is made in two ways by:

- switching over the twisted switch over placed on its cover,
- jerking with a emergency line mounted to a pull rod of the breaker switch,

### Technical characteristics

Parameter	Unit
Cable inlets	DP 14-21, DP 10-15, DP 6-10
Necessary force to start the breaker switch with a line	150 +/- 30 N
Protection level	IP 54
Working temperature range	from -20oC to + 40oC
Dimensions	395 x 175 x 130 mm
Weight	aprox. 5,4 kg
Max. parameters of input circuits	
- for quality work WL-92/1/1: 1-2, 5-6	Ui = 60 V, li = 0,2 A, Li = 0, Ci = 0
- for quality work WL-92/1/2 1-2-3, 10-11-12	Ui = 60 V, li = 0,2 A, Li = 0, Ci = 0
- for quality work WL-92/1/3 B, B1 - GND	Ui = 20 V, li = 30 mA, Li = 0, Ci = 0
Z+ - Z-	Ui = 15,8 V, Li = 0, Ci = 0

### Execution

The line breaker switch is manufactured in the following qualities of work differing in extra equipment:

- WL-92/1/1 - with led out resistors to the terminal strip. The resistors are used at continuity control and line short - circuits and with one short-circuiting contact and pulling apart contacts
- WL-92/1/2 - with led out two switching over contacts to the terminal strip
- WL-92/1/3 - with led out switching over contacts and cables of the ZID identification unit to the terminal strip; it can cooperate with the following systems: UGS-86, UGS-99, UGS-01 and UGS-01/1 and the following devices: UML-01, UML-01/1 and UZS-02/2

CATEGORY:

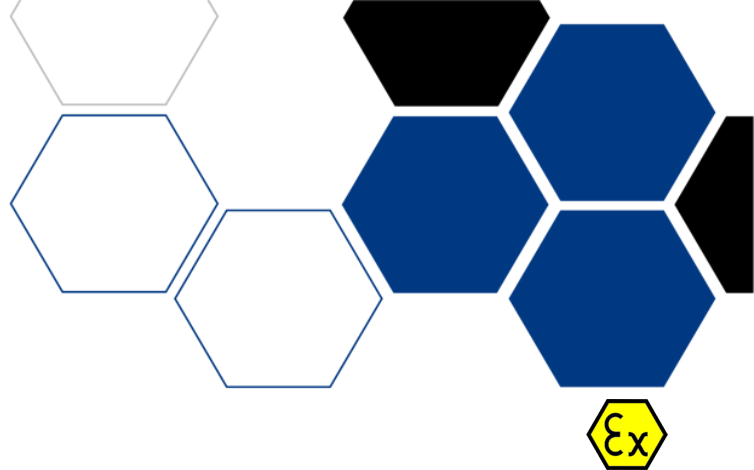
CONTROL DEVICES

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# MICROPROCESSOR CONTROL DEVICE MUS-04

The MUS-04 microprocessor control device is a fully programmable unit which makes possible to control selected devices or technological processes. It is an intrinsically safe unit and can be applied in rooms

- At any methane concentration level (when an intrinsically power pack is switched off, MUS -04 belongs to M1 category and its input and output circuits belong to ia category)
- At methane concentration level permitted by regulations for ib category (at power supply from an intrinsically power pack, MUS - 04 belongs to M2 category and its input and output circuits belong to ia category)

## Functions

It makes possible to control eight input circuits equipped with contacts, a contact series connected with a diode or an electronic key,

- It makes possible to control eight output circuits,
- It signals in a definite way the input conditions on emitting light LED diodes,
- It makes possible to generate the right communications on LCD display,
- It makes possible to programme devices directly from a keyboard,
- Thanks to the fact that the unit is equipped with RS 485 interface it makes possible to follow the process visualisation, which is controlled by MUS - 04 and recording right parameters to the computer

memory during its operation.

## Technical characteristics

Supply voltage		15 V DC $\pm$ 0,5 V
Guaranteed service life in local voltage supply		4 h
Number of Inputs/outputs		8 / 8
Ingress protection		IP 54
Working temperature range		+5°C $\leq$ Ta $\leq$ +40°C
Relative humidity of the air		max. 95%
Processor memory:		
Program memory		128 kB
Data memory		3840 B
EEPROM memory		1024 B
Max. circuits resistance connecting the unit to a control contact		500 $\Omega$
Min. resistance among line wires		30k $\Omega$
	with inlets 355 x 300 x 127 mm	475 x 345 x 127 mm
External dimensions: without inlets		
Weight with inlets		ok. 10 kg
Inlets weight: DP 14-21, DP 10-15, DP 6-10		0,33 kg, 0,255 kg, 0,245 kg

CATEGORY:

CONTROL DEVICES

CERTIFICATIONS



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# UMT-14 CONTROLLER

The ELSAP-14 controller is intended for automation of conveyor strings equipped with the UML-14 controllers. The solution is intended for use in methane and/or coal dust explosive atmospheres. This is Cat. M1 device and can operate continuously at all methane concentration levels.

## Usage

The primary function of the UMT-14 is to automate the control process of conveyor belts equipped with the UML-14 controllers. All controllers in the system, i.e. the UMT as the master and its slave UML controllers are interconnected with a LAP serial bus. This allows viewing the current operating status and a full remote configuration of all connected UML-14. This solution eliminates the need for tediously configuring each controller, especially when they are located at least several hundred meters apart.

A device of the ELSAP-14 family, it features a large 5.6" full colour graphic display. The display presents large amounts of data in an easy and clear manner. The configuration process of the controller, and thus its connected system, is simplified to the maximum.

Next to the display is the synaptic panel with three-colour LEDs (red, blue and green). The system performance critical data is always displayed irrespective of the contents actually on the screen.

The UMT-14 is a component which exchanges data with all connected controllers and thus it permits visualisation of the entire system.

The automation process is done by regrouping the conveyors into haulage strings under common control. A single UMT-14 controller can handle up to 8 conveyor strings, each equipped with up to 32

UML-14 units. At the contact points between the conveyor strings, i.e. most usually where two or more conveyors pour the output to a single common conveyor, the LAP bus must be branched. The branching function is supported by any of the UML-14 controllers online, allowing branching the LAP bus into three separate lines. The controller addressing in each branch line is automatic. Any of the UML-14 controllers can start and stop the authorised conveyor string to which it belongs.

## Functions

Automatic addressing of the UML-14 controllers

- Manual addition and removal of the UML-14 controllers to and from the system
- Status overview of all online UML-14
- Full configurability of all UML-14
- Relay of the centralised control authorisation signal UpC to a maximum of 8 conveyor strings
- Relay of signals from K-1 receiving conveyors to a maximum of 32 conveyors in one string
- Remote start of any UML-14 in the centralised control mode
- Output of all above functions to the visualisation system

## Technical characteristics

Rated supply voltage	from 12 up to 15VDC
Maximum current load	1400mA
Ambient temperature range	between -20°C and +40°C
Max. weight	18kg
Outer dimensions	550x340x220mm
ATEX mark	I M1 Ex ia I SYST

## Design and operation

CATEGORY:

CONTROL DEVICES

CERTIFICATIONS



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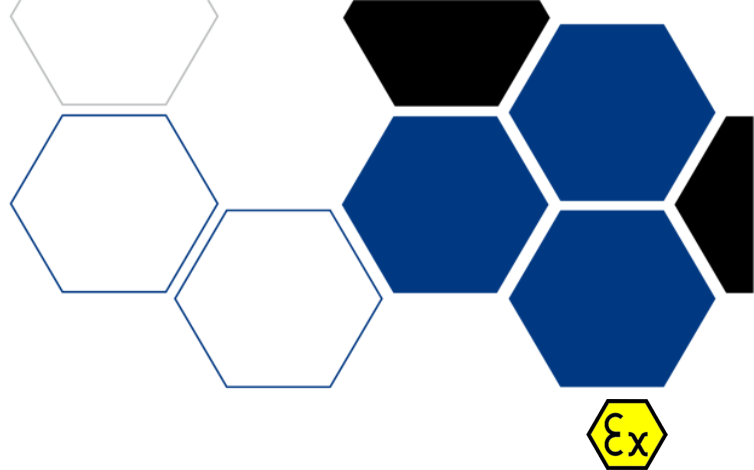
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# UML-14 CONTROLLER

The ELSAP-14 controller is dedicated for control of conveyor belts and push-plate conveyors. The solution is intended for use in methane and/or coal dust explosive atmospheres. This is Cat. M1 device and can operate continuously at all methane concentration levels.

## Description

The UML-14 controller is intended for automation of conveyor belts and push-plate conveyor. Unlike its predecessor, the UML-05, this model features modules with high-performance 32-bit processors and a visualisation module with a synoptic panel and a large 5.6" graphic display. The interfacing with the dedicated UGS-10 loudspeaking, signalling and lockout system. The controller also serves as an additional I/O block. This allows remote reading of sensors connected to on-off inputs, output status switchover, or communication with the devices connected to the RS-485 bus of the UGS-10 signalling devices.

The UML-14 controller may operate the connected conveyor in four modes:

- Centralised control
- Local control
- Inspection mode
- Personnel carriage

The controller features 16 on-off inputs, 8 relay outputs and 3 galvanic-separated serial data transmission connectors. When properly configured in the program, the on-off inputs may also register 0-15 V voltage signals, 0-50 mA current signals, resistance of up to 15 kΩ, or control diode circuits.

This facilitates e.g. measurement of conveyor belt speed, reading of temperature sensors or belt buckling sensors, or connection of belt pileup sensors. The relay outputs may control e.g. drives or brakes in any configuration desired. Each of the serial connections can be configured to operate in the RS-485, RS-232 or RS422 standard. They can also be used to e.g. control frequency converters or to communicate with sensors with digital outputs.

The controller can broadcast startup signals over the connected UGS-10 system. In the case of a lockout, the user is notified about its cause with voice messages.

The configuration and overview of current operating parameters is output in two ways. The first one is the large full colour graphic display, which comes with a set of selectable option group screens. The functional interaction resembles the one used on mobile phones. The other is a synaptic panel with 8 colour LEDs (red, blue and green) which indicate relevant assigned signals. This solution is a simple and clear communication of key system components.

The UML-14 controllers can be connected in strings. The control is enabled by voltage signals (K-1, K+1) or over the LAP transmission bus when the system is complete with the UMT-14 controller. The UMT-14 controller provides a number of extra options for configuring an entire sting of conveyors. See the UMT- 14 Controller Product Sheet for details.

## Features/Technical specification

Rated supply voltage	from 12 up to 15 VDC
Maximum current load	1115mA
Abient temperature range	between -20°C and +40°C
Max. weight	27kg
Outer dimensions	550x550x220mm
ATEX mark	I M1 Ex ia I SYST

CATEGORY:

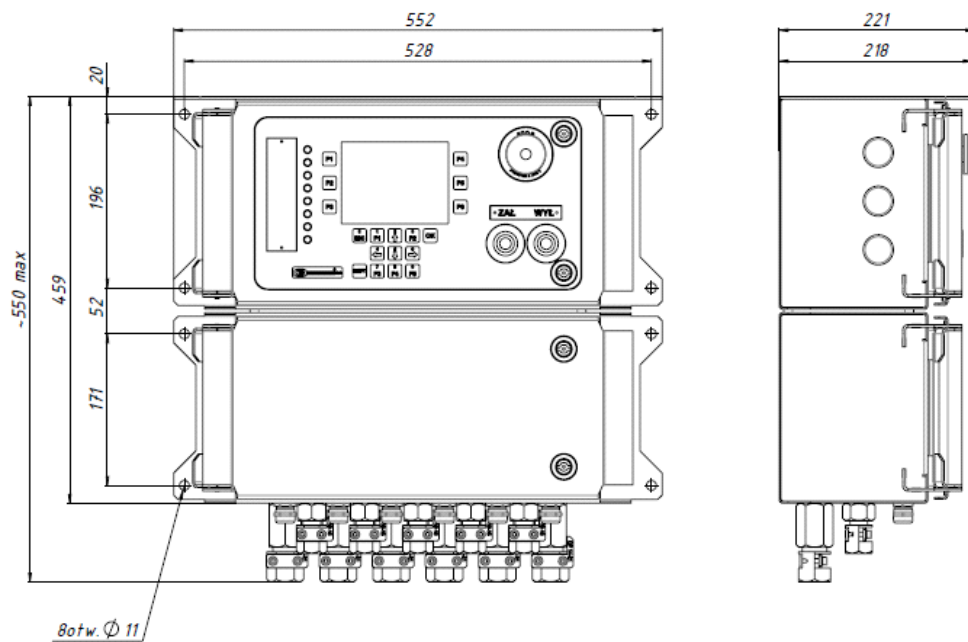
CONTROL DEVICES

CERTIFICATIONS



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## The most important features

- Controls conveyors in four modes: centralised control, local control, inspection mode and passenger carriage
- Reads on-off sensor states with line control
- Supports speed sensors
- Outputs warning signals and broadcasts voice messages with the reason of lockout
- Control of conveyors with various drive and brake configurations
- Reads sensors connected to the UGS-10 system
- Controls output in the UGS-10 system
- Reads and sends release voltage or LAP bus signals for conveyor strings
- Control and full configuration over data transmission bus (MODBUS)
- Displays all current parameters and lockouts on the graphic display
- Archives lockout causes and parameter changes
- Takes over the central controller functionality for switching conveyor strings on an off



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EM-XXX

## EM SERIES CONTROL MODULES

EM series modules (from EM-110 to EM-440), depending on its version, are designed to perform numerous control functions.

CATEGORY:

CONTROL MODULES

CERTIFICATIONS



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EMPC-15

## EMPC-15 FLAMEPROOF COMPUTER

The EMPC-15 computer is intended for visualization and control of technological processes in difficult weather conditions and in potentially explosive areas occurring at the coal mines.

### Description

The computer is most often used as a underground visualization position or monitor displaying image from several IP cameras.

Depending on the requirements, it is available in several different configuration options. It can be equipped with a 19" or 24" screen.

Communication with other devices is possible via the RS-485 serial port, via PLC modems via the power supply line or via 100BaseFX fiber optic Ethernet [op is].

As a standard, it can have from one to six fiber optic connectors, with the possibility of configuring connections in the RING topology (if necessary, guarantee a reliable connection with an external device).

Computers are powered by 42VAC or 127VAC to 230VAC guaranteeing full flexibility during installation.

The heart of the EMPC-15 computer is the central unit. It is a passively cooled industrial computer with an extended working temperature range and increased resistance to vibrations. Standard magnetic disks have been replaced by SSD disks with additional protection against sudden power loss.

Computers can be delivered with the Windows or Linux operating system installed.

Specially dedicated versions are also available for use in the underground chambers of the blasting shots. In this version, the computer is equipped with an additional QR code reader, WiFi network card and a double fiber-optic interface.

The computer may be equipped with an RFID card reader, then the user may log in to his account after reading the card correctly.

### Features/Technical specification

Parameter name	Value (unit)	
Name	EMPC-15	
Screen diagonal	19" LED	24" LED
Type of execution depending of the screen	EMPC-15/19"	EMPC-15/24"
Screen resolution	1280 x 1024	1920 x 1024
Nominal voltage: ver. 1,2,3,4,5,6,7,8,9 ver. 10	42V ±10% or 120 ÷ 230V -15% +8% 120 ÷ 230V -15% +8%	
Frequency	50/60Hz	
Power consumption	Max. 100W	
ATEX markings: ver. 1, 2, 6, 8 ver. 3, 4, 5, 10 ver. 7, 9	I M2(M1) Ex d [ib] [ia op is Ma] I Mb I M2(M1) Ex d [ib] [op is Ma] I Mb I M2(M1) Ex d [ib] [ia Ma] I Mb	
WE type certification number	TEST 15 ATEX 0018X	
International protection rating	IP65 - main chamber IP54 - connection chamber	
Ambient temperature range	0°C - 40°C	
Humidity (in temperature 40°C)	95%	
Weight	~130kg	~235kg
Dimensions	540 x 575 x 200/310mm	760 x 740 x 400mm
Power cable diameter	15-25mm	
Cable diameters for intrinsically outputs	gland M20: 6-8mm, 8-11mm, 11-15mm gland M25: 9.5-12.5mm, 12.5-16mm, 16-20.5mm	

517/214



CATEGORY:

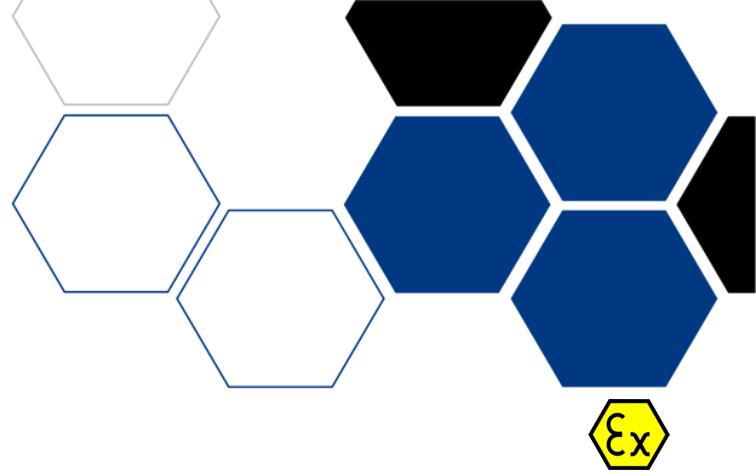
COMPUTER /  
ACCESSORIES

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## Keyboard KL-15

# COMPUTER KEYBOARD KL-15

Keyboard designed to cooperate (through a BK 81.316/2 barrier) with the flameproof computer EMPC-08 and EMPC-15. The keyboard is intended for rooms and excavation in areas classified as „a”, „b” and „c” class of methane explosion hazard or classified as A or B class of coal dust explosion hazard. The keyboard allows introducing signs (keys) and controlling the indicator of the PC's mouse.

The keyboard KL-15 is a M2 category device and its supply has to be disconnected in case of explosion endangered atmosphere.

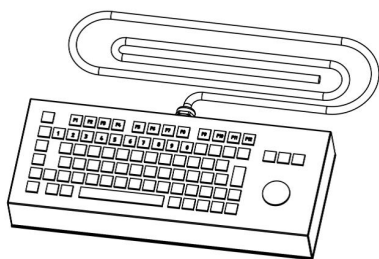
For the EMPC-15 computer the KL-15 is interchangeable with keyboard 72.474

## Features/Technical specification

Parameter	Value (unit)
Rated supply voltage	5V +/- 0,3V
Current consumption in stand-by mode	20mA
Current consumption while operating	55mA
Maximum current consumption	70mA
Dimensions	361 x 145 x 50 mm
Weight	3kg
ATEX marking	I M2 Ex ib I Mb
Ingress protection level	IP65
Temperature range	-20°C up to +40°C
Admissible humidity (at 40°C)	95%

## Design and operation

The keyboard is embodied in stainless casing and equipped with a 1,5 m length Chainflex cable. The keys of the keyboard are backlighted.



CATEGORY:

COMPUTER /  
ACCESSORIES

CERTIFICATIONS



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## Keyboard 72.474

# COMPUTER KEYBOARD 72.474

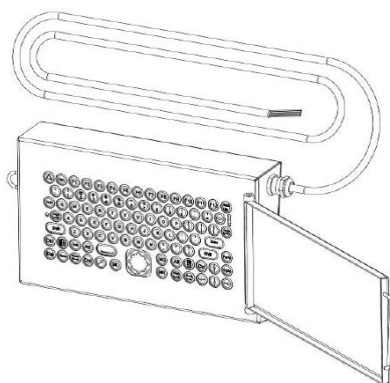
Keyboard designed to cooperate (through a BK 81.316 barrier) with the flameproof computer EMPC-08 and EMPC-15. The keyboard is intended for rooms and excavation in areas classified as „a”, „b” and „c” class of methane explosion hazard or classified as A or B class of coal dust explosion hazard. The keyboard allows introducing signs (keys) and controlling the indicator of the PC's mouse.

### Features/Technical specification

Parameter	Value (unit)
Rated supply voltage	5VDC
Rated current	0,2A
ATEX marking	I M2 Ex ib I Mb
Ingress protection level	IP54
Temperature range	+5°C up to 40°C
Admissible humidity (at 40°C)	95%
Weight	5kg
External dimensions	380 x 205 x 86 mm

### Design and operation

The keyboard is embodied in stainless casing with a cover and equipped with a 3m length Chainflex cable. The keys of the keyboard are backlit.



CATEGORY:

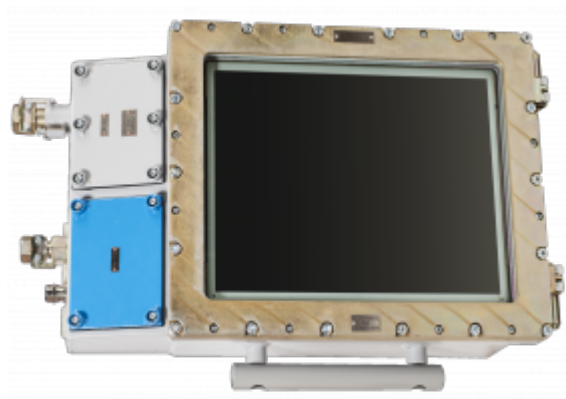
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EMPC-08

## FLAMEPROOF COMPUTER EMPC-08

The EMPC-15 computer is designed to visualize and control all technological processes carried out in a difficult environment or in areas endangered with explosion in the underground mines. The computer is intended for rooms and excavation in areas classified as „a”, „b” and „c” class of methane explosion hazard or classified as A or B class of coal dust explosion hazard.

### Features/Technical specification

#### General specification:

Parameter	Value (units)	
Product name	EMPC-15	
Matrix	19" LED	24" LED
Resolution	1280 x 1024	1920 x 1024
Rated supply voltage: Version: 1, 2, 3, 4, 5, 6, 7, 8, 9	42V ±10% or 120÷ 230V -15% +8%	
Version: 10	120÷ 230V -15% +8%	
Frequency	50/60Hz	
Power consumption	max. 100W	
ATEX marking	Ⓔ I M2(M1) Ex d [ib] [ia op is Ma] I Mb Ⓔ I M2(M1) Ex d [ib] [op is Ma] I Mb Ⓔ I M2(M1) Ex d [ib] [ia Ma] I Mb	
Ingress protection	IP65 - main chamber IP54 - auxiliary chambers	
Temperature range	0°C up to 40°C	
Admissible humidity (at 40°C)	95%	
Weight	aprox. 130 kg	aprox. 180 kg
External dimensions	540 x 575 x 200/310mm	760 x 740 x 400mm

#### Industrial computer specification:

Parameter	Value (units)
Processor	Intel Celeron N2930 (1,83GHz Quad Core)
Memory	4GB DDR3
Hard drive	SSD 120GB
Graphics	Intel HD Graphics
Network card	2 x Gigabit LAN card
Other	WLAN and/or Bluetooth

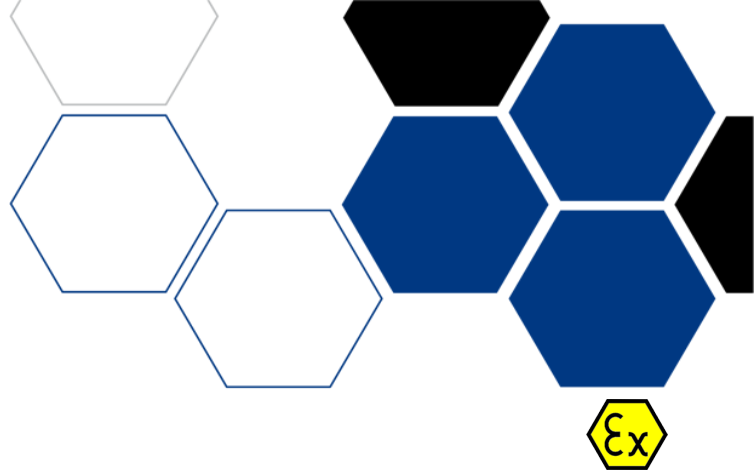
### Design and operation

The casing of the EMPC-15 computer consists of three chambers: the main one and two connection boxes. The main chamber, of “d” type construction, comprises all the electronic components of the computer. The ingress protection of the casing is 65. As an option, it is possible to equip the lateral side of the chamber with a viewport enabling a use of for example proximity cards reader.

The first auxiliary chamber, also of “d” type construction is equipped with two certified cable gland sets which enable the supply connection. The chamber is also equipped with a switch which allows disconnect the supply without the need of opening the chamber.

The second chamber is equipped with a terminal strip for connecting the intrinsically safe input and output circuits and the keyboard.

The computer is equipped with a set of intrinsically safe inputs/outputs by cable and fiber optic. The number and type of connections depends on the computer version.



CATEGORY:

COMPUTER /  
ACCESSORIES

CERTIFICATIONS



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EMPC-15 is designed to cooperate with keyboards:

- 72.474 Elektrometal keyboard
- KL-15 Elektrometal keyboard
- ISK-01 keyboard by Timler

## Execution

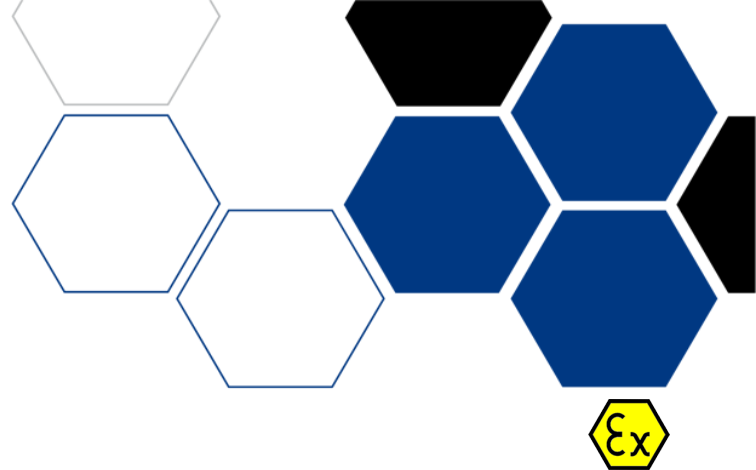
Version	Intrinsically safe input/output connectors	Additional functions
Ver. 1	<ul style="list-style-type: none"><li>• 2x RS-485</li><li>• 2x Fiber optic Ethernet 100BaseFX</li></ul>	<ul style="list-style-type: none"><li>• Embodied Serial port server</li></ul>
Ver. 2	<ul style="list-style-type: none"><li>• 2x RS-485</li><li>• 3x Fiber optic Ethernet 100BaseFX</li></ul>	<ul style="list-style-type: none"><li>• Embodied Serial port server</li><li>• Possibility of configuring one of the fiber optics inputs to operate in RING net mode</li></ul>
Ver. 3	<ul style="list-style-type: none"><li>• 6x Fiber optic Ethernet 100BaseFX</li></ul>	
Ver. 4	<ul style="list-style-type: none"><li>• 2x Fiber optic Ethernet 100BaseFX</li></ul>	<ul style="list-style-type: none"><li>• Additional viewport by lateral side</li><li>• Embodied barcode reader</li></ul>
Ver. 5	<ul style="list-style-type: none"><li>• 2x Fiber optic Ethernet 100BaseFX</li></ul>	<ul style="list-style-type: none"><li>• Additional viewport by lateral side</li><li>• Embodied proximity card reader</li></ul>
Ver. 6	<ul style="list-style-type: none"><li>• 2x RS-485</li><li>• 1x Fiber optic Ethernet 100BaseFX</li></ul>	
Ver. 7	<ul style="list-style-type: none"><li>• 2x RS-485</li></ul>	<ul style="list-style-type: none"><li>• Embodied Serial port server</li></ul>
Ver. 8	<ul style="list-style-type: none"><li>• 2x RS-485</li><li>• 2x Fiber optic Ethernet 100BaseFX</li></ul>	<ul style="list-style-type: none"><li>• Embodied Serial port server</li><li>• Additional viewport by lateral side</li><li>• Embodied proximity card reader</li></ul>

Other computer configurations possible at client's request.



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# FERPI-5 INTRINSICALLY SAFE ELECTRO-PNEUMATIC CONTROL VALVE

FERPI-5 intrinsically safe electro-pneumatic control valves are intended for electric control of direction of compressed air flow to receiving units, such as pneumatic cylinders and motors used in machinery and equipment operating in underground workings of mining facilities:

- categorised as class "b" or "c" of methane explosion hazard,
- categorised as class A and B of coal dust explosion hazard.

FERPI-5 intrinsically safe electro-pneumatic control valves are category M1 devices, and therefore their power supply does not need to be switched off whenever explosive atmosphere occurs.

## Execution

The FERPI-5/2-1-S intrinsically safe electro-pneumatic control valves is a five-way two-position control valves electromagnetically controlled by a single intrinsically safe electromagnet.

The FERPI-5/2-1 intrinsically safe electro-pneumatic control valves is a five-way two-position control valves electromagnetically controlled by two intrinsically safe electromagnets.

The distributors may also be manually controlled by means of a push-button to be found at the electromagnet. The fact of voltage being supplied to the coil is signalled by a red LED.

CATEGORY:

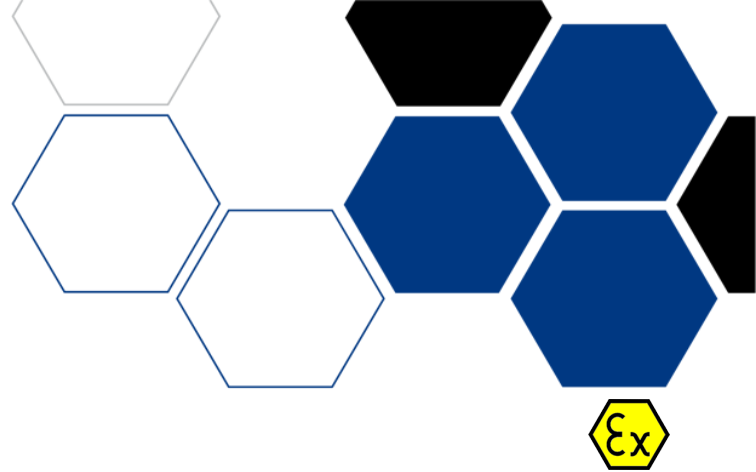
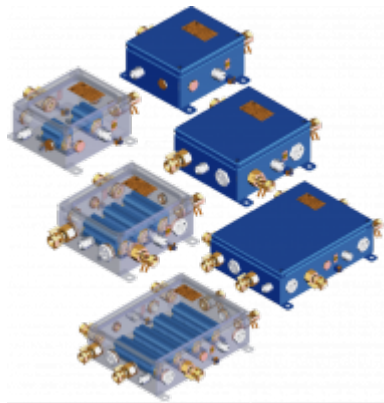
PNEUMATICS

CERTIFICATIONS



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# UNIVERSAL CONNECTING BOX SRU XX/XXX

The universal switch boxes SRU xx/xxx are designed to connect cables and conductors in intrinsically-safe circuits of any equipment, if such circuits are made as intrinsically-safe of at least class ib.  
The universal switch box SRU-31/S is designed to branching connect in fibre optic installations.

## Features/Technical specification

	SRU 31/xxx	SRU 21/xxx	SRU 11/xxx	SRU 31/Sxx
Overall dimensions: - width (mm), - length (mm), - depth (mm)	340 250 80-120	225 190 80-120	190 155 80-120	340 250 max. 150
Number of sleeves for optoteletechnical cable duct	-	-	-	max 4
Number of terminals 0.5-4 mm <sup>2</sup> (pcs)	max. 88	max. 40	max. 20	-
Cable inlets (pcs): - type DP xx, - with metric thread	18 24	12 18	8 12	4 4
No of KSP casket (concern SRU-31/S)	-	-	-	1
Weight - without inlets	5.8kg	3.5kg	2.8kg	5.8kg
Working temperature range	between -20°C and +40°C			
Protection level	IP 65			
Voltage Ui - for a single circuit	60V DC			
Current Ii - for a single circuit	4A			
Power Pi - for a single circuit	40W			

## Execution

The connecting box can be furnished with any terminal strips and cable inlets, which depends on the needs of a given circuit and wishes of a potential user. Mutual distances between individual elements and resulting maximum acceptable mounting of terminal strip sections on the backplane and cable inlets on the side walls of the housing are the only limitations. Maximum number of elements mounted is determined in the table for each housing size.

CATEGORY:

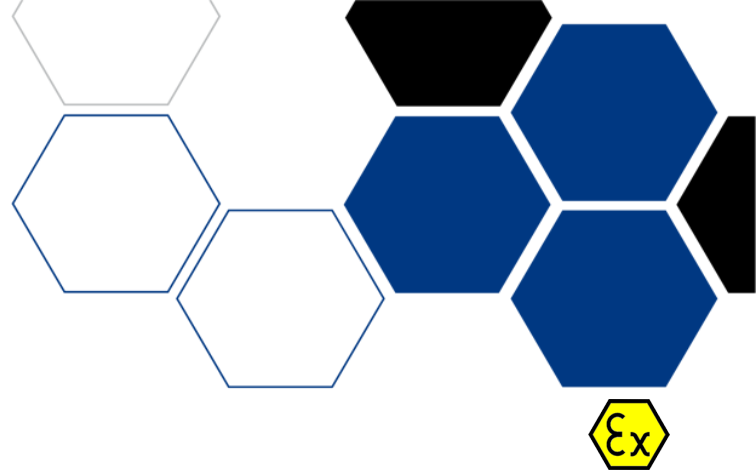
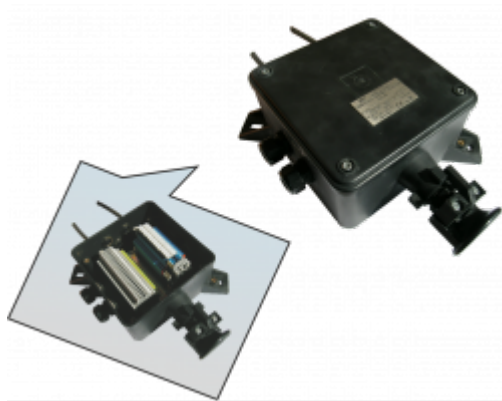
JUNCTION BOXES

CERTIFICATIONS



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USR-07

## UNIVERSAL DISTRIBUTION BOX USR-07

USR-07 Distribution Box makes possible the making of straight-through and distributive connections in intrinsically-safe circuits of telecommunication engineering, signalling, measuring and control installations. It is designed for using at mining plants with open-cast and underground seams, in rooms of any given methane concentration and prone to coal dust explosion hazard.

### Functions

The universal distribution box type USR-07 makes possible the making of, both, straight-through, and distributive connections in intrinsically-safe circuits of telecommunication engineering, signalling, measuring and control installations. These circuits should be made as intrinsically-safe, at least of class ib.

The provision of box with terminal connectors and cable glands is arbitrary and dependent upon specific needs of system and potential user's requests. The only limitations are the intervals between cable glands in body wall, wall and chassis, and the resultant maximal admissible filling up of the chassis with the segments of terminal connectors.

Not compromising on explosion-proof safety and with no requirements of changing admittance conditions, the USR-07 box may be used in place of other boxes operating in intrinsically-safe circuits.

Connection is to be realized as per the principles of explosion-proof construction and appropriate systemic standards.

### Technical characteristics

Protection level		IP 65
Parameters for single circuits	Max. $U_i$	60V
	Current $I_i$	4A
	Power $P_i$	40 W
Capacitance $C_1$		negligible
Inductance $L_i$		negligible
Working temperature range		from $-10^{\circ}\text{C}$ to $+40^{\circ}\text{C}$
Relative humidity		up to 93%
Cable glands	type Pg 13.5 or -M20x1,5	Max. 20 units
	type Pg 16 or -M25x1,5	Max. 16 units
	type Pg 21; D P6-10,(10-15;14-21) or M32x1,5	Max. 12 units
	type Pg 29 or M40x1,5	Max. 8 units
	factory inlets in box walls	Max. 4 units (1 for each wall)
Number of terminals		max. 120
Dimensions: (length x width x height)		210 x 210 x 117 mm
Maximal weight (no connecting blocks)		2 kg

CATEGORY:

JUNCTION BOXES

CERTIFICATIONS



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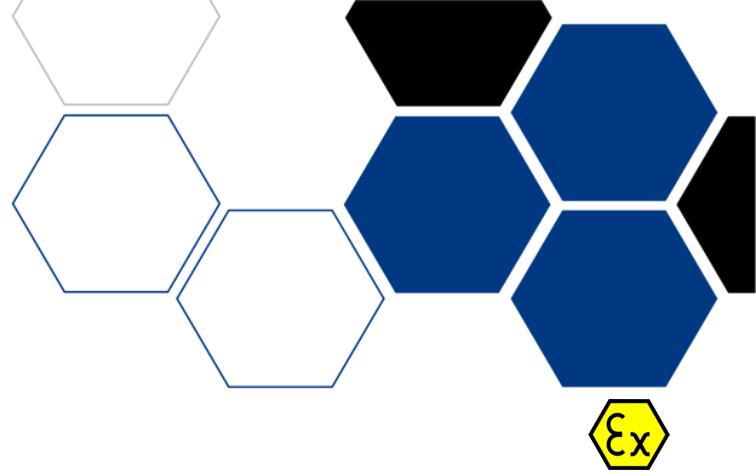
## Montage

The box is mounted onto a ready-made supporting structure with screws M8 or M10, while applying flat washers under the head of screw inserted to the hole of box body bracket and nuts M8 or M10, respectively, and spring washers from the side of supporting structure or on Rawlplugs in the base by means of appropriate screws for Rawlplugs. Next, conductors should be lead in through cable glands to the inside of box body and formed. The formed conductors should be connected as per the assembly diagram in terminal connectors.



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# JUNCTION BOX ISR-94/1

The ISR-94/1 branch connection box is designed to be used in mining plants, in methane fields classified as "b", "c" class of explosion hazard. The ISR-94/1 can also be used in excavations at concentration of carbon dust admitted by regulations A or B.

## Functions

Enables branch connections in intrinsically safe installations.

## Types of workmanship

Branch connection box is made in four following versions:

- 28 clamps (single box)
- 56 clamps (double box)

Application of tab terminals connected electrically with clamps of connecting strips determines making of fixed connections only on the surface of a mine.

CATEGORY:

JUNCTION BOXES

CERTIFICATIONS



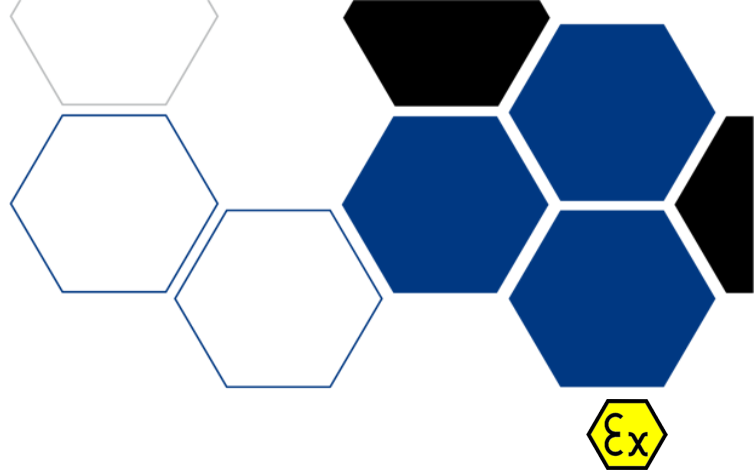
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SGW-S-10

## SGW-S-10 LONGWALL LOCKOUT SIGNALLING DEVICE



CATEGORY:

LOUDSPEAKING  
COMMUNICATION  
SIGNALLING AND  
BLOCKING

CERTIFICATIONS



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UBL-01/2

## UBL-01/2 BLOCKING DEVICE

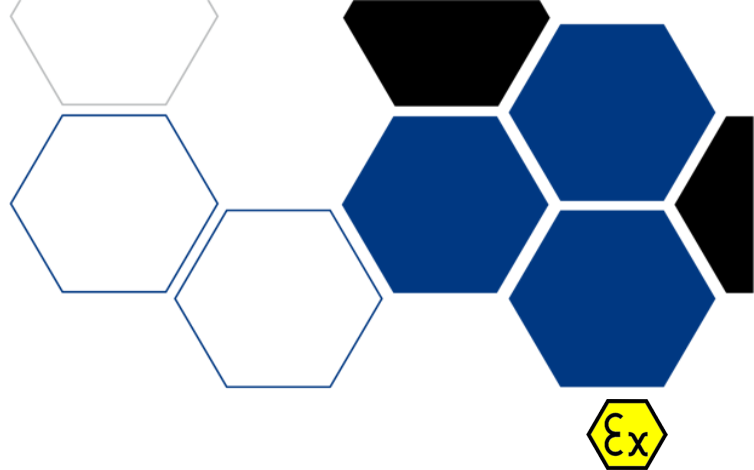
It ensures the following functions:

- checking the states of four devices equipped with the contact components or generating tension signal - direct or alternating current,
- drive interlocking caused by controlled devices,
- transmission of the blocking device number,
- transmission of the blockade number to the mating system,
- visualisation of the inputs' states on LCD display.

### Features/Technical specification

Characteristics of flameproof construction: **I M2 Ex ib I Mb**

WE type test certificate no: **FTZÚ 03 ATEX 0125**



CATEGORY:

LOUDSPEAKING  
COMMUNICATION  
SIGNALLING AND  
BLOCKING

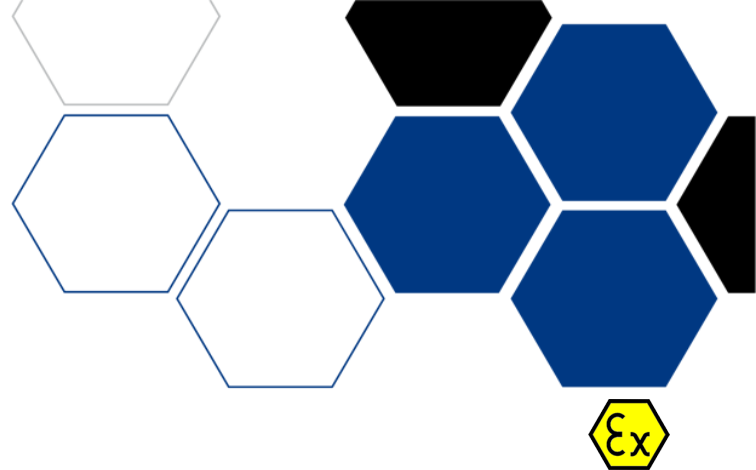
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SW-01/02

## SW-01/2 SWITCHING OFF BOX

It ensures the following functions:

- communication signalling by conventional acoustic signals,
- switching off and blocking machines and devices drivers,
- localization of the damage of transmission line,
- sending the identification signal about the place of disconnection,
- setting the box identification number,
- optical signalling of localization of switch WORK-STOP.

## Features/Technical specification

### Characteristics of flameproof construction: I M2 Ex ib I

WE type test certificate no: **FTZÚ 03 ATEX 0088**

CATEGORY:

## LOUDSPEAKING COMMUNICATION SIGNALLING AND BLOCKING

## CERTIFICATIONS



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SK-01/2

## SK-01/2 END BOX

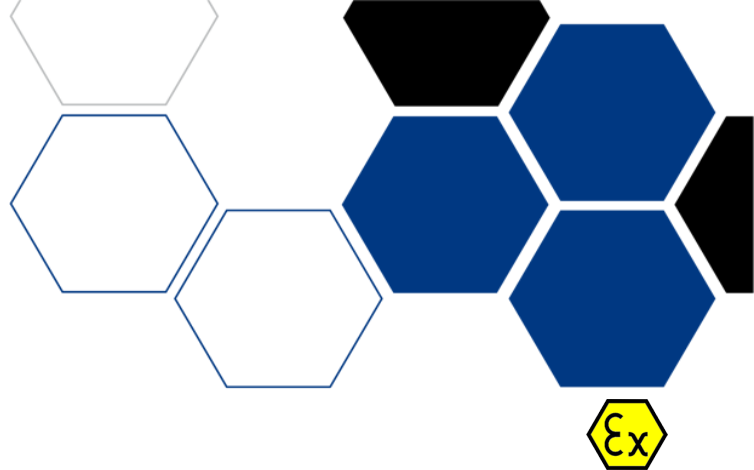
It ensures the following functions:

- checking the transmission line continuity,
- indication of continuity and state of the conductor,
- checking of the supply voltage,
- emergency switching off and blocking of motor starters.

### Features/Technical specification

Characteristics of flameproof construction: **I M2 Ex ib I Mb**

WE type test certificate no: **FTZÚ 03 ATEX 0089**



CATEGORY:

LOUDSPEAKING  
COMMUNICATION  
SIGNALLING AND  
BLOCKING

CERTIFICATIONS



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SGW-01/2

## SGW-01/2 SWITCHING OFF LOUDSPEAKING & SIGNALLING DEVICE

The box located along conveyor provides functions of loudspeaking, signalling and blocking device, identifies the site of disconnection of the drives, controls the supply voltage and continuity of transmission line. Depending of the length of the belt there can be installed in total, a maximum of 8 units SGW-01/2 for a ZSI feeder.

### Features/Technical specification

Characteristics of flameproof construction: **I M1/M2 Ex ia/ib I Ma/Mb**

WE type test certificate no: **FTZÚ 03 ATEX 0086X**

### Functions

- loudspeaking communication
- transmitting communication signals
- emitting with priority warning signals before switching on machines and devices
- disconnection and blocking the drivers of machines and devices
- setting the identification number of the signalling device
- identification of drivers' stop and block place
- signalling of activation of blockade and other working states of the system through verbal communication
- signalling of blockade by LED diodes on the signalling device or box where the blockade has been activated
- controlling the power supply voltage,
- testing the continuity of transmission line,
- controlling the charging status of the local power supply
- location of the damaged section of the transmission line
- communication with the dispatcher in normal or emergency mode
- dispatch message broadcasting

CATEGORY:

LOUDSPEAKING  
COMMUNICATION  
SIGNALLING AND  
BLOCKING

CERTIFICATIONS



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SGK-01/2

## SGK-01/2 FINAL LOUDSPEAKING & SIGNALLING DEVICE

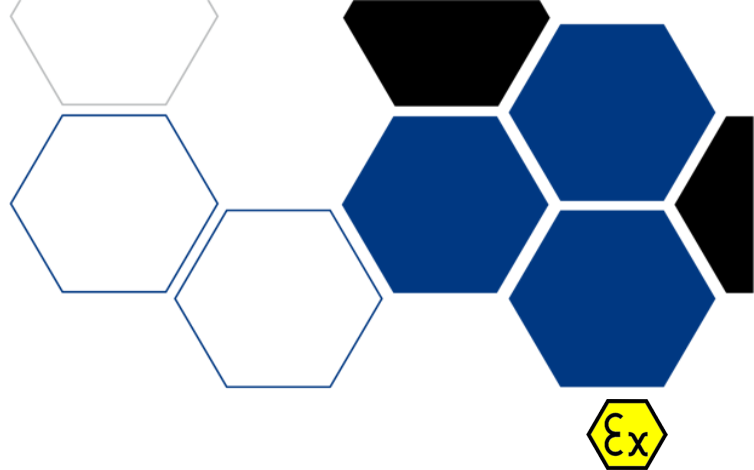
The main box of communication and control. Device at the head of each conveyor. Apart from the functions of hands-free communication, signaling and blocking, it provides a full range of control functions and configurability of the system.

Characteristics of flameproof construction: I M1/M2 Ex ia/ib I Ma/Mb

WE type test certificate no: FTZÚ 03 ATEX 0085X

### Functions

- loudspeaking communication
- transmitting communication signals
- emitting with priority warning signals before switching on machines and devices
- disconnection and blocking the drivers of machines and devices
- identification of drivers' stop and block place
- signalling of activation of blockade and other working states of the system through verbal communication
- signalling of blockade by LED diodes on the signalling device or box where the blockade has been activated
- controlling the power supply voltage,
- testing the continuity of transmission line,
- controlling the charging status of the local power supply
- location of the damaged section of the transmission line
- communication with the dispatcher in normal or emergency mode
- connection of up to eight UGS-01/2 systems in straight or branched series
- cooperation with the visualization system
- cooperation with automation system (higher controller)



CATEGORY:

LOUDSPEAKING  
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SIGNALLING AND  
BLOCKING

CERTIFICATIONS



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SAO-86/1

## SAO-86/1 COMMUNICATION & SIGNALLING DEVICE

System SAO-86/1 provides the following functions:

- simplex phonic communication and communication with conventional signals along haulage ways,
- warning signalling before starting the conveyors,
- colaboration with conveyors automation system,
- control of battery charging conditions from a local source of power supply.

### Features/Technical specification

Explosion-proof mark: **I M1/M2 Ex ia/ib I Ma/Mb**

No. Certificate examination type CE: **FTZÚ 04 ATEX 0115X**



CATEGORY:

LOUDSPEAKING  
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SKO-86/1

## SKO-86/1 TERMINAL LOUDSPEAKING, COMMUNICATION & SIGNALLING DEVICE

System SKO-86/1 provides the following functions:

- simplex phonic communication and communication with conventional signals along haulage ways,
- warning signalling before starting the conveyors,
- colaboration with conveyors automation system,
- monitoring of continuity of conductors of a cable connecting the signalling device,
- control of battery charging conditions from a local source of power supply.

### Features/Technical specification

Explosion-proof mark: **I M1/M2 Ex ia/ib I Ma/Mb**

No. Certificate examination type CE: **FTZÚ 04 ATEX 0114X**



CATEGORY:

LOUDSPEAKING  
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SGP-10

## SGP-10 PORTABLE LOUDSPEAKING & SEGINALLING DEVICE

The portable signalling device is handy for servicing, e.g. repairs of longwall cutters.

The terminal box of the device facilitates inline connection with the system bus. The signalling device is connected over a cable and allows calling the entire UGS-10 system or a selected signalling device.

The device features a low weight and compact dimensions.



CATEGORY:

LOUDSPEAKING  
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SIGNALLING AND  
BLOCKING

CERTIFICATIONS



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SGW-SN-10

# SGW-SN-10 LONGWALL LOW-FORM LOCKOUT LOUDSPEAKING & SIGNALLING DEVICE

This is the smallest signalling device available in the UGS-10 system and optimised for use in longwall systems for mining thin coal seams.

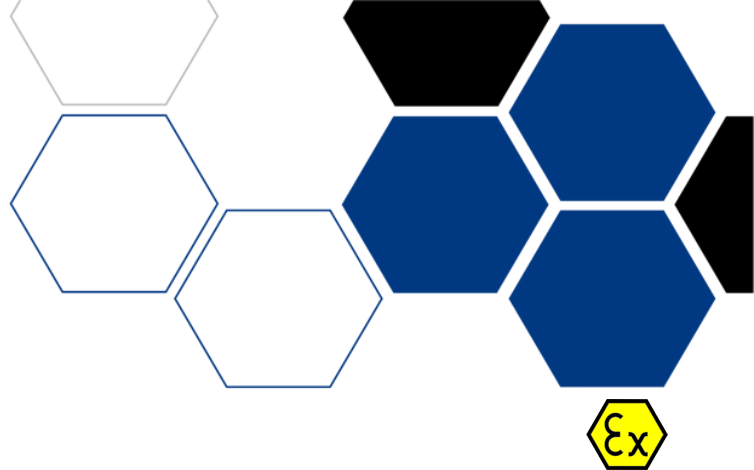
The overall dimensions are smaller than in other versions of the device (H x W x D):

- SGW-10: 337 x 370 x 173 mm
- SGW-S-10: 269 x 360 x 173 mm
- SGW-SN-10: 200 x 360 x 148 mm

This signalling device has no extra inputs or outputs. This is the only signalling device on offer with the bus cable connected with quick-release coupling.

## Functions

- Simplex loudspeaker calls with digital sound compression and transmission
- Capable of handling calls between two selected signalling devices
- Priority emission of equipment start warning signals
- Control of proper warning signal emission at each signalling device
- Shutdown and lockout of equipment drives
- Identification of drive shutdown and lockout locations
- Transmission of communication signals
- Lockout LED indication on the signalling device or the lockout box at which the lockout has been activated
- Supply voltage control
- Local power source charge check
- Transmission line continuity check
- Damaged transmission line section location indication
- Dispatch dialling and call in the normal mode
- Emergency dispatch dialling
- Dispatch message broadcasting
- Visualization of the status on the LCD



CATEGORY:

LOUDSPEAKING  
COMMUNICATION  
SIGNALLING AND  
BLOCKING

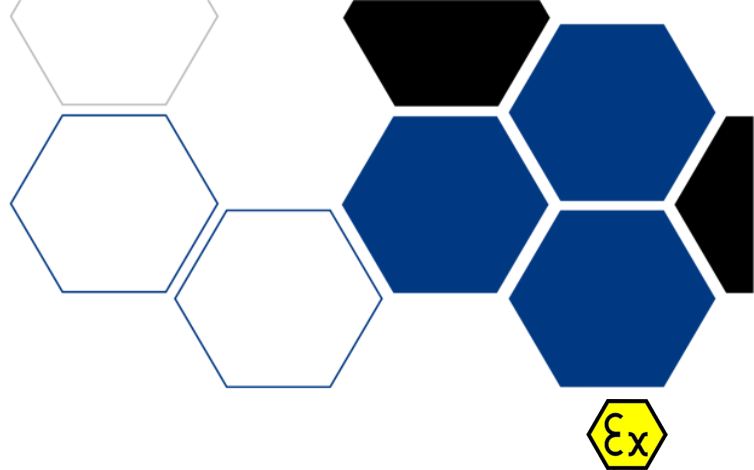
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SW-10

## SW-10 LOCKOUT BOX

The lockout box is an equipment lockout device. The device features an emergency stop mushroom button and an emergency stop cable. The device is available in the passive and active version. The active lockout box features an additional BI-SW electronic module which enables exact location of the lockout trigger. The passive lockout box allows diagnosing the lockout trigger location down to the nearest system signalling device or active lockout box.

### Functions

- Shutdown and lockout of equipment drives
- Identification of drive shutdown and lockout locations
- Voice message signalling of Lockout On and other system operating states
- Optical switch position indication WORK-STOP
- Configurable as system lockout terminator

CATEGORY:

LOUDSPEAKING  
COMMUNICATION  
SIGNALLING AND  
BLOCKING

CERTIFICATIONS



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SGW-10

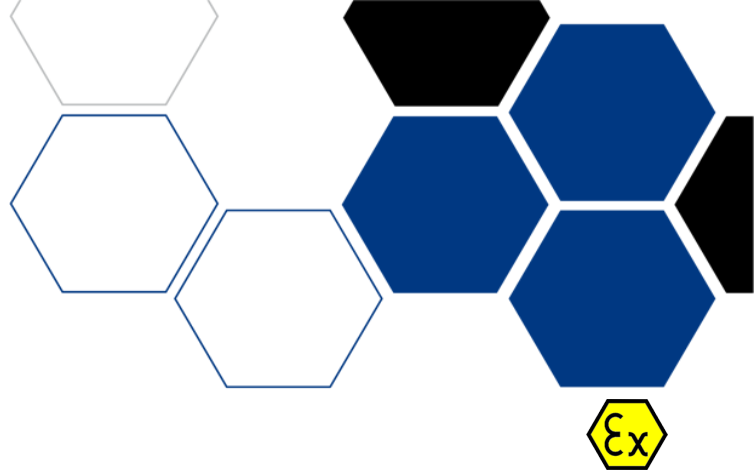
## SGW-10 LOCKOUT LOUDSPEAKING & SIGNALLING DEVICE

This device has the full functionality of the SG-10 signalling device, i.e. loudspeaking communication and warning signal broadcasting, extended by the lockout function. The device features an emergency stop mushroom button and an emergency stop cable.

The lockout trigger is indicated in several ways: with a voice message, stating the triggered device number, backlighting the display in red and turning on the red LEDs on the device side panels.

### Functions

- Simplex loudspeaker calls with digital sound compression and transmission
- Capable of handling calls between two selected signalling devices
- Priority emission of equipment start warning signals
- Control of proper warning signal emission at each signalling device
- Shutdown and lockout of equipment drives
- Identification of drive shutdown and lockout locations
- Transmission of communication signals
- Supply voltage control
- Local power source charge check
- Transmission line continuity check
- Dispatch dialling and call in the normal mode
- Emergency dispatch dialling
- Dispatch message broadcasting
- Lockout LED indication on the signalling device or the lockout box at which the lockout has been activated
- Connectivity with up to ten (10) UGS-10 systems in straight or branched string
- cooperation with the automation system (controller)
- Serial transmission input for connecting additional equipment or branching
- Four analog inputs for connecting additional sensors
- Two outputs for connecting additional devices
- Visualization of the status on the LCD
- Open architecture allowing for the extension of the signaling device eg cooperation with a radio communication system



CATEGORY:

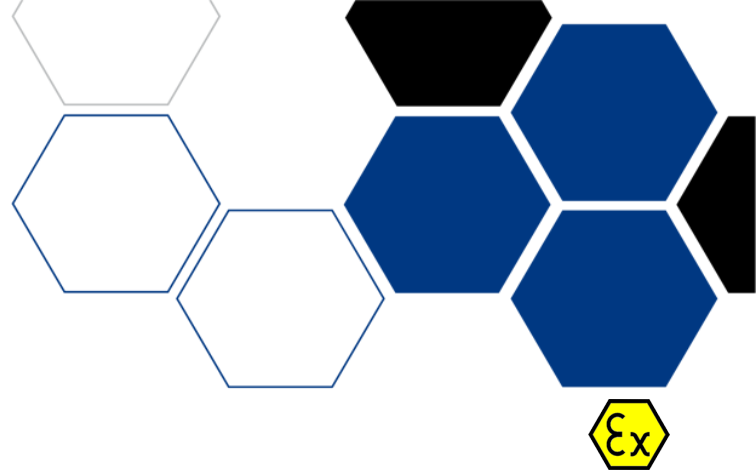
LOUDSPEAKING  
COMMUNICATION  
SIGNALLING AND  
BLOCKING

CERTIFICATIONS



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SG-10

## SG-10 LOUDSPEAKING & SIGNALLING DEVICE

The device handles loudspeaking communication and warning signal broadcasting. The signalling device has two loudspeaker tubes on its sides for improved audibility of calls and messages along the route. The signalling device enables calls to the entire system or a selected signalling device.

The signalling device features two connectors for inline connection with the system bus. Moreover, the contact and digital (RS-485) input and output block allows connecting other external devices, e.g. temperature sensors.

### Functions

- Simplex loudspeaker calls with digital sound compression and transmission
- Capable of handling calls between two selected signalling devices
- Priority emission of equipment start warning signals
- Control of proper warning signal emission at each signalling device
- Identification of drive shutdown and lockout locations
- Transmission of communication signals
- Supply voltage control
- Local power source charge check
- Transmission line continuity check
- Ambient temperature measurement
- Damaged transmission line section location indication
- Dispatch dialling and call in the normal mode
- Emergency dispatch dialling
- Dispatch message broadcasting
- Connectivity with up to ten (10) UGS-10 systems in straight or branched string
- Cooperation with the automation system (controller)
- Serial transmission input for connecting additional equipment or branching
- Four analog inputs for connecting additional sensors
- Two outputs for connecting additional devices
- Visualization of the status on the LCD
- Open architecture allowing for the extension of the signaling device eg cooperation with a radio communication system

CATEGORY:

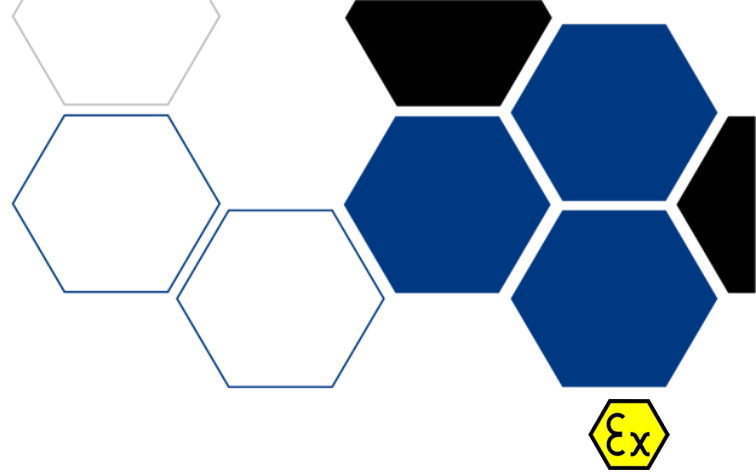
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# SGK-10 TERMINAL LOUDSPEAKING & SIGNALLIG DEVICE

Each system may include only one SGK-10 signalling device. It is most often installed near the drive end of a conveyor belt or push-plate conveyor. Other signalling devices or lockout boxes are connected to this master device.

CATEGORY:

## LOUDSPEAKING COMMUNICATION SIGNALLING AND BLOCKING

## CERTIFICATIONS



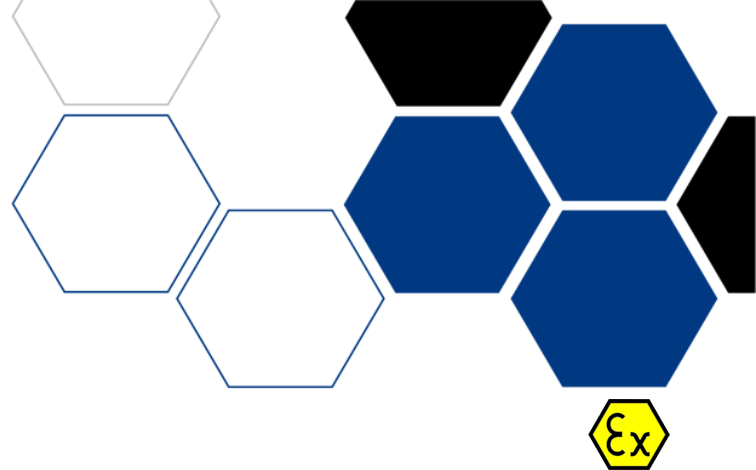
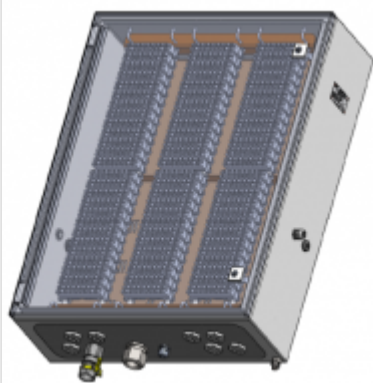
## Functions

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OBIU-T

## TELETECHNICAL DISTRIBUTION BOX OBIU-T

Teletechnical distribution boxes, type OBIU-xx/T/xxx, are intended for installing teletechnical connectors (or rail connectors) inside them and are used for mutual connection and making cross connections of teletechnical cables in intrinsically safe circuits.

### Description

Distribution boxes type OBIU-xx/T/xxx can be used interchangeably with distribution boxes type STP, STK (manufactured by TELVIS), SRI, SRN, STI, RTI (manufactured by CARBOAUTOMATYKA), type ELTEL (manufactured by ELTEL), type RSI (produced by ZEG Tychy) and other approved for use in intrinsically safe networks.

As a standard, in the OBIU-xx/T/xxx enclosure, KRONE HIGHBAND 8 telecommunication connectors are used, mounted on brackets with a round cross-section of 12mm in diameter or KRONE LSA-PLUS 2/10 (when connecting LSA-PLUS 2/10, 1 free terminal should be left between the circuits to maintaining the required insulation distances)

It is possible to use other connectors mounted on a rail placed on a mounting plate or on dedicated brackets.

The number of terminals in the terminal strip/number of terminal strips is limited by the dimensions of the housing.

Main types of connectors used in OBIU-xx/T/xx enclosures

- KRONE HIGHBAND 8 or KRONE LSA-PLUS 2/10
- KVA-1/a, ZT-56GP, E20 (on dedicated brackets)
- MT 1.5BU, UK2.5 BU, Viking (on a rail mounted on a bracket or directly on a plate)

In justified cases (after consulting the manufacturer) the user can increase the number of installed rail connectors within one mounting rail. The added connectors must be of the same type as installed in the device.

CATEGORY:

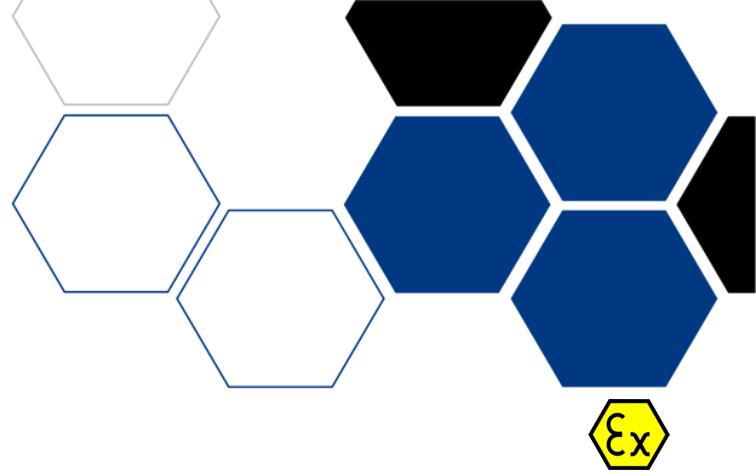
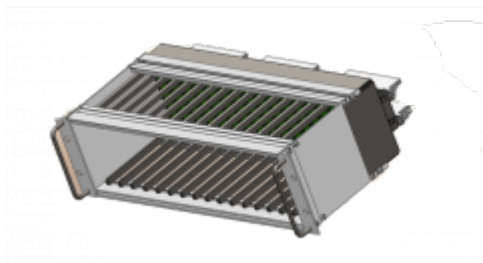
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KSI-1

## INTRINSIC SAFETY CASSETTE KSI-1 (MINING)

Designed for installation outside the hazardous area, the intrinsic safety cassette is an auxiliary device used to install intrinsic safety barriers (e.g. BSI), which, in turn, are used to power equipment installed in potentially explosive atmospheres. The KSI-1 cassette is designed for installation in 19" racks having the IP rating of at least IP20.

ATEX

 I (M1) [Ex ia Ma] I

### Description

Cassette consisting of a control device with 64-pin controllers, in a body made of aluminum profiles with auxiliary guides for installation of intrinsically safe barriers (push-on).

### Features/Technical specification

The cassette in the rear part has three corpses of connectors:

- intrinsically safe connectors for connecting intrinsically safe lines to receivers
- connectors on the non-intrinsically safe side intended for connecting the control panel line (or non-intrinsically safe automation)
- non-intrinsically safe power connector -48VDC

Parameter name	Value (unit)
Power supply	U = 42-60Vdc, typically 48Vdc. (Um=250V - for intrinsically-safe analysis). Voltage stems from the range of input voltages of the BSI barriers used.
Number of barriers	Max. 16
Dielectric strength of insulation	500V
ATEX marking	I (M1) [Ex ia Ma] I
EC-type examination certificate	TEST 17 ATEX 0037X
Ambient temperature	-20 °C to 60 °C
Permitted humidity (at 60°C)	95%
IP rating	IP00
Weight	Approx. 2.5 kg
External dimensions	Max. 480x130x200 mm

The cassette allows the removal and insertion of the barriers under voltage (Hot Swap)

If it is necessary to connect more barriers, multiple KSI-1 cassettes connected to one power supply (of appropriate power) can be used in a 19" cabinet.

### Design and operation

The cassette has an electronic board with 64-pin connectors, which is installed in the body made of aluminum profiles with rails for mounting intrinsically safe barriers (by press fitting).

CATEGORY:

TELEPHONE  
COMMUNICATION

CERTIFICATIONS



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BSI


## INTRINSIC SAFETY BARRIER BSI (MINNING)

The BSI intrinsic safety barrier is a device installed individually between non-intrinsically safe telecommunications links (switchboard subscriber links) and non-intrinsically safe circuits for devices in the hazardous area i.e.:

- ATI intrinsically safe telephone
- IKAR broadcast telephone
- Lamps powered by a telecommunications line.
- Other compatible devices

The device is used to transfer telephone calls between non-hazardous and hazardous areas and to apply safety voltage to devices.

ATEX

 I (M1) [Ex ia Ma] I

### Description

The device is used as an intermediary in the transfer of telephone calls between the non-hazardous and hazardous zones and for supplying devices with safe voltage.

The task of the device is:

- Galvanic separation between the telecommunications link circuit from the PBX side and the intrinsically safe part of the link, i.e. the cable route and the telephone set or telephone-signalling device located in the hazardous zone
- Two-way transmission of signals: talk, DTMF, FSK
- Supplying telephone sets or lamps with safe voltage

The BSI barrier is designed to power intrinsically safe devices of group I, category M1 or M2 (exit from category "ia"). The BSI barrier is an accompanying device, mounted on the surface in spaces not at risk of an explosive atmosphere. Alternatively, it is allowed to install BSI barriers in underground mines, where there is a risk of an explosive atmosphere inside an appropriate certified enclosure made in the form of a flameproof enclosure with a minimum protection level of IP 54

The barriers are mounted in Euro 19" KSI-1 cassette

Each of the barriers, regardless of the version, can be connected to any intrinsically safe device (i.e. ATI apparatus, IKAR apparatus, lamps). In order to match the specific solution, the jumper located on the side of the barrier should be moved to the appropriate position.

### Features/Technical specification

#### Technical data ATI

Parameter name	Value (unit)
Powering the device	48V DC (42 - 62 VDC)
Telephone exchange	Any telephone exchange with analog lines and DTMF signals
The ringing voltage from the telephone exchange	U = 90V AC
Output voltage to intrinsically safe device	37VDC +/- 1V
Maximum input current (inrush) typ.	85mA
Maximum output current	36mA (ring), 25mA (talk) +/- 20%

77/214



CATEGORY:

TELEPHONE  
COMMUNICATION

CERTIFICATIONS



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Forwarding ringing signals	By changing the polarity of the output side line
max. range from BSI to device	10 km mining (for a cable with min. parameters $R=70\Omega/\text{km}$ , $C=60\text{nF}/\text{km}$ )
Input voltage (panel line)	$U_{\text{max}} = 95\text{VAC}$
ATEX	I (M1) [Ex ia Ma] I
EC type examination certificate number	TEST 17 ATEX 0032X
Ambient temperature range	-20 C do 60 C
Permissible humidity (at 60 C)	95%
Level of security	IP00
Weight	approx 0,4kg
External dimensions	Max. 180x100x25,4 mm

The barrier does not have a special switch and operates in the e HOT SWAP mode. It is activated automatically when the barrier cassette is inserted into the appropriate guides.

## Design and operation

The BSI intrinsic safety barrier is made of an aluminum front plate of an eurocassette and an electronic board installed on it. The front plate comes with an external handle that allows the barrier to be inserted into/removed from a barrier cassette. In addition, each barrier has screws that can be driven to the cassette in order to protect the barrier from being accidentally removed from the cassette. The electronic board comes with a plate that protects electronic components from damage or touching other components, which could cause a short-circuit.



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ATI

# INTRINSICALLY SAFE MINING TELEPHONE ATI (MINNING)

An intrinsically safe telephone is intended for voice communication in a hostile environment in which reliability, performance and safety are of paramount importance. Telephone prepared for work in a wide temperature range, resistant to weather conditions, explosion hazard, noise, dustiness, high humidity or mechanical exposure.

ATEX

 I M1 Ex ia I Ma

## Description

The most important functionalities:

- Possibility to connect to any telephone exchange / server with analogue lines through BSI intrinsically safe barriers
- Effortless operation over a distance of 10km
- Easy to find the camera in difficult conditions (intense blinks of the main LED every 6 seconds and backlit emergency button)
- Possibility of programming 17 speed dial numbers in non-volatile memory
- Automatic connection to the programmed number after picking up / dropping the handset (programmable time 0-10s.)
- LCD display for easy operation and programming of the camera
- Two large buttons on the housing (including one backlit), enabling direct connection to the dispatcher / driver's station in alarm and ordinary mode
- Direct connection to the Awizo position (telephone operator position or any other)
- Programming the telephone (including speed dial numbers and camera parameters) without opening the case - directly from the keyboard
- Strong sound signal and intensive LED signaling of incoming calls
- Dustproof and waterproof to IP65
- Protecting the cable of the microchip with a protective armor
- Low telephone weight

## Features/Technical specification

Parameter name	Value (unit)
The maximum power supply	45V
Call level	min. 90dB from distance 1m
Selection	Tone (DTMF), frequency (FSK) - option
Phone input resistance	800Ω +/- 25%
Phone input impedance	600Ω +/- 25%
Frequency response	300Hz - 3400Hz
Reference attenuation for transmitting	-4dB - +4dB
reference attenuation for receive	-8dB - +0dB
The intensity of the ringing tone	min. 90dB
Electrical insulation strenght	500V

79/214

CATEGORY:

TELEPHONE COMMUNICATION

CERTIFICATIONS



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ATEX marking	I M1 Ex ia I Ma
Abient temperature range	-40 to +60 °C
Permissible humidity (at 60 ° C)	95%
Degree of protection	IP65
Weight	about 3,5kg
External dimensions	Max. 375x195 (with handset) x 120 mm



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SLS-15 CS

## SLS-15 CENTRAL STATION



CATEGORY:

TELEPHONE  
COMMUNICATION

CERTIFICATIONS



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# INTRINSIC MINING BROADCAST DEVICE "IKAR 2"

IKAR functions as both a telephone and an alarm / broadcast alarm. It is designed for use in very difficult industrial environments, particularly in mining operations where methane and / or coal dust is potentially explosive. It can be used in places with high noise levels, salinity, dustiness or humidity conditions.

## Description

### MOST IMPORTANT COMPONENTS:

- Lightweight, robust housing
- 20-button, backlit keyboard with very high mechanical durability
- Additional backlit ALARM button
- The internal battery provides the right acoustics
- Microphone for hands-free talking in the phone housing
- Large, illuminated, graphical display showing, among others. Current time synchronized with the control panel, Dialed number, Caller's number (CLIP), Time units, alarm system location, ALARM, etc.
- The large, three-color optical beacon on the front panel indicates the current functional status of the device: blue - broadcast, green - listens, red - alarm and additionally flashes blue every 30 seconds. Facilitating the location of the phone in the dark
- Additional red light at the top of the camera allowing the headlight to be heard. Alternative glowing diodes during the connection used to improve visibility.
- Special hermetic connection chamber located at the bottom of the camera.
- Place to save key information (reusable)

## Features/Technical specification

### MOST IMPORTANT FEATURES OF THE PHONE:

- Conducting telephone conversations in standard mode (via handset)
- Conducting telephone conversations in hands-free mode (duplex)
- Receive a 95 dB call signal with optical signaling
- Direct connect with the dispatcher in normal mode via the D button
- Direct call with the dispatcher in alarm mode via the ALARM button
- Repeat the last dialed number with the R (Redial)
- Automatic connection to any panel number if, after picking up the handset within 10 seconds and not be selected any number
- Remote programming of phone settings
- Listen to the surroundings of your phone
- Listening to verbal messages broadcast by phone speakers
- 4 inputs and 4 digital outputs - notifications of each state change.
- Obtain information about the status of all devices connected to four binary inputs
- Remote control of output circuits, due to the change of the state of digital inputs
- Information on the opening of the main compartment, and on the discharge state of the battery
- Line state information and handset status.
- Remote handset hang up
- Possibility of connecting external devices for cooperation with technological hands-free communication systems, e.g. UGS
- output for external optical and/or acoustic siren

CATEGORY:

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## Design and operation

Power supply - from intrinsically safe separation units or directly from the control panel

Communication - FSK and DTMF

Signal volume of 1m - min. 95dB

Weight - about 4.5kg

Dimensions - 375 x 195 (with microplate 260) x 120 mm

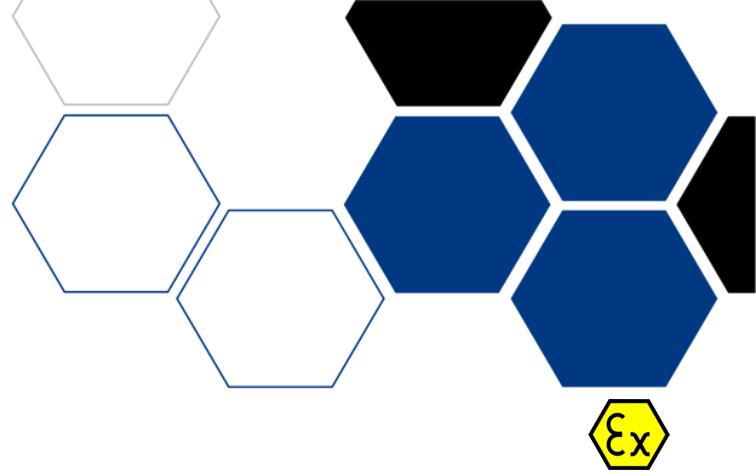
Temperature range - -20 °C to + 40 °C

Degree of protection - IP65



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## Media Converter

# EFI-BAR-13

The **EFI-BAR-13** module is of ordinary construction with an intrinsically safe fiber optic output. It performs the role of a converter between a non-intrinsically safe Ethernet network using a standard copper twisted pair (RJ45 connector) and an intrinsically safe fiber-optic Ethernet network (SC connector).

## Description

The **EFI-BAR-13** module is an Ethernet converter of the transmission medium from copper twisted-pair to single-mode fiber - communication can be done using a pair of fibers or a single fiber (depending on the version).

The module is an accompanying device. Due to the construction, the module can be used as an explosion-proof transmission barrier between potentially explosive and non-hazardous areas. The module can be installed in potentially explosive atmospheres only if protected with another type of explosion-proof construction.

## Features/Technical specification

Parameter	Value (unit)
Nominal voltage	12÷24VDC
Maximum current	120mA
Quantities of Ethernet connection - TX standard	1
Quantities of Ethernet connection - SC connection	1
Maximum fiber length for a two-fiber transceiver - N2 option	30km (see Note)
Maximum fiber length for single fiber transceivers - N3 and N5 option	15km (see Note)
Maximum cable diameter for Combicon connector	2,5mm <sup>2</sup>
Operating temperature range	-20°C ÷ +60°C
International Protection Rating	IP 20
Classification of fiber optic transmitters	Class1
ATEX markings	⚠ I (M1) [Ex op is Ma] I
WE type certification number	TEST 13 ATEX 0039X
Dimensions	114,5 x 99 x 22,6mm
Weight	0,25kg

### Note:

The maximum fiber lengths given in the table above correspond to the parameters included in the fiber optic transceiver manufacturer's catalog sheets .

## Montage

The module is ready for operation after connecting the power supply - it does not require any configuration. During installation, assembly and disassembly, remember to put on the protective cap if the fiber optic connector is not used.

CATEGORY:

MEDIA CONVERTERS

CERTIFICATIONS



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## Multi-port Ethernet switch

# EFI-BRI-13

The **EFI-BRI-13** module is a multi-port Ethernet switch. It can be used as:

- 5-port Ethernet switch (3 x TX, 2 x FX),
- Ethernet medium converter from copper twisted pair to optical fiber,
- Ethernet medium converter from fiber optic transmission using two optical fibers to fiber optic transmission using single optical fiber.

The module in the **EFI-BRI-13 / B** version (apart from the abovementioned functionality) is equipped with a power backup system that allows the module to work uninterruptedly (for a specified period of time) after the main supply voltage has disappeared.

The module can be used as an accompanying device with "op is" fiber optic outputs (version 2) or as an intrinsically safe device (version 1).

## Description

The module is available in both intrinsically safe and ordinary construction. Regardless of the version, it plays the role of a 5-port switch. It is equipped with three RJ-45 connectors and two SC fiber connectors. It enables loop-through connection to an fiber-optic Ethernet network and connection of additional devices via RJ45 connectors.

- intrinsically safe - all connectors are intrinsically safe connectors,
- normal construction - only fiber optic connectors are intrinsically safe connectors.

## Features/Technical specification

### Basic parameters of EFI-BRI-13 module

Parameter		Value (unit)
Nominal voltage	version 1	12÷15VDC
	version 2	12÷24VDC
Maximum current		350mA
Quantities of Ethernet connection - TX standard		3
Quantities of Ethernet connection - SC connection		2
Maximum fiber length for a two-fiber transceiver - N2 option		30km (see Note)
Maximum fiber length for single fiber transceivers - N3 and N5 option		15km (see Note)
Maximum cable diameter for Combicon connector		2,5mm <sup>2</sup>
Operating temperature range	version 1	-20°C ÷ +40°C
	version 2	-20°C ÷ +60°C
International Protection Rating		IP 20
Classification of fiber optic transmitters		Class 1
ATEX markings	version 1	Ex I M1 Ex ia [op is Ma] I Ma
	version 2	Ex I (M1) [Ex op is Ma] I
WE type certification number		TEST 13 ATEX 0040X
Dimensions		114,5 x 99 x 45,2mm
Weight		0,25kg

CATEGORY:

MEDIA CONVERTERS

CERTIFICATIONS



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#### Basic parameters of EFI-BRI-13/B module

Parameter		Value (unit)
Nominal voltage	version 1	12÷15VDC
	version 2	12÷24VDC
Maximum current		400mA
Type of battery used		Li-Ion
Minimal battery life		8h
Maximum battery charging time		72h
Quantities of Ethernet connection – TX standard		3
Quantities of Ethernet connection – SC connection		2
Maximum fiber length for a two-fiber transceiver – N2 option		30km (see Note)
Maximum fiber length for single fiber transceivers – N3 and N5 option		15km (see Note)
Maximum cable diameter for Combicon connector		2,5mm <sup>2</sup>
Operating temperature range	version 1	0°C ÷ +40°C
	version 2	0°C ÷ +45°C
International Protection Rating		IP 20
Classification of fiber optic transmitters		Class 1
ATEX markings	version 1	Ex I M1 Ex ia [op is Ma] I Ma
	version 2	Ex I (M1) [Ex op is Ma] I
WE type certification number		TEST 13 ATEX 0040X
Dimensions		114,5 x 99 x 45,2mm
Weight		0,6kg

#### Note:

The maximum fiber lengths given in the table above correspond to the parameters included in the fiber optic transceiver manufacturer's catalog sheets .

## Types of workmanship

### Design 1

The EFI-CON-13 module is powered by an intrinsically safe power supply with the "ia" protection level. It is an M1 one category device with the "ia" intrinsically safe protection level and can operate in potentially explosive atmospheres. The module can be used in underground pits of mining plants:

- with no methane explosion hazard classified under the "a" class, with methane explosion hazard classified under the "b" or "c" class, and with no coal dust explosion hazard;
- with coal dust explosion hazard of the "A" and "B" class.

The module should be mounted in a housing with min. IP54 protection level.

### Design 2

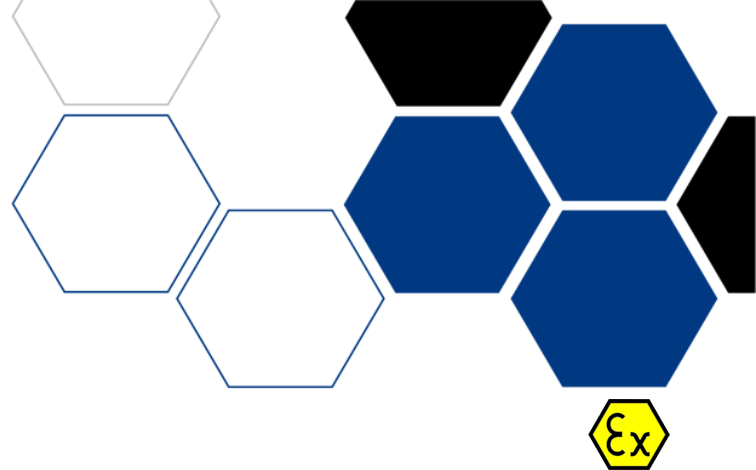
The EFI-CON-13 module, powered by a non-intrinsically safe power supply, is an accompanying device with "op is" fibre optic output. The module can be used as an flameproof transmission barrier between a potentially explosive area and a non-explosive area. The module can be mounted in potentially explosive areas only if it is protected by another type of flameproof construction.



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## Data converter

# EFI-CON-13

The **EFI-CON-13** module performs the function of a data converter sent with various communication standards. It can be used as:

- RS-232/422/485 serial ports server with Ethernet output via twisted pair or optical fiber,
- Ethernet medium converter from copper strand to single-mode fiber - communication can be done using a pair of fibers or a single fiber (depending on the version),
- device realizing redundant Ethernet (ring) network connection based on available Ethernet interfaces.

The module in the **EFI-CON-13 / B** version (apart from the above-mentioned functionality) is equipped with a power backup system, enabling the module to work uninterruptedly (for a specified time) after the main supply voltage has disappeared.

## Description

**EFI-CON-13** module is a configurable module equipped with RJ45 connector, SC fiber optic connector and five RS serial connectors (3x RS-485, 1x RS-232/422, 1x RS-232). Allows devices with serial connectors to be connected to the Ethernet network. Additionally, it allows creating RING networks. Configuration of the operating mode is carried out via a web browser.

- intrinsically safe - all connectors are intrinsically safe connectors,
- normal construction - only fiber optic connectors are intrinsically safe connectors.

## Features/Technical specification

The **EFI-CON-13** module (or **EFI-CON-13 / B**) is a module used to convert the Ethernet standard (100Base-TX or 100Base-FX) to serial transmission in the RS-485, RS-422 or RS-232 standard. It can also act as a converter of the transmission medium between the 100Base-TX and 100Base-FX Ethernet standards. Appropriate design allows two-way optical fiber communication using two single-mode fibers as well as using a single single-mode fiber at two different electromagnetic wavelengths.

The module is equipped with a single RJ45 type Ethernet connector, a single SC type fiber optic connector and a Combicon type connector with the following interfaces:

- three RS-485 interfaces - two-wire,
- one RS-485 / RS-422 interface - four-wire,
- one RS-232 interface - three-wire.

### Basic parameters of EFI-CON-13 module

Parameter		Value (unit)
Nominal voltage	version 1	12÷15VDC
	version 2	12÷24VDC
Maximum current		320mA
Quantities of RS-485 2-wired		3
Quantities of RS-485/RS-422 4-wired		1
Quantities of RS-232		1
Quantities of Ethernet connection - TX standard		1
Quantities of Ethernet connection - SC connection		1
Maximum fiber length for a two-fiber transceiver - N2 option		30km (see Note)

CATEGORY:

MEDIA CONVERTERS

CERTIFICATIONS



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Maximum fiber length for single fiber transceivers - N3 and N5 option		15km (see Note)
Maximum cable diameter for Combicon connector		2,5mm <sup>2</sup>
Operating temperature range	version1	-20°C ÷ +40°C
	version2	-20°C ÷ +60°C
International Protection Rating		IP 20
Classification of fiber optic transmitters		Class 1
ATEX markings	version 1	⚠ I M1 Ex ia [op is Ma] I Ma
	version 2	⚠ I (M1) [Ex op is Ma] I
WE type certification number		TEST 13 ATEX 0041X
Dimensions		114,5 x 99 x 45,2mm
Weight		0,25kg

#### Basic parameters of EFI-CON-13/B module

Parameter		Value (unit)
Nominal voltage	version 1	12+15VDC
	version 2	12+24VDC
Maximum current		370mA
Type of battery used		Li-Ion
Minimal battery life		8h
Maximum battery charging time		72h
Quantities of RS-485 2-wired		3
Quantities of RS-485/RS-422 4-wired		1
Quantities of RS-232		1
Quantities of Ethernet connection - TX standard		1
Quantities of Ethernet connection - SC connection		1
Maximum fiber length for a two-fiber transceiver -N2 option		30km (see Note)
Maximum fiber length for single fiber transceivers - N3 and N5 option		15km (see Note)
Maximum cable diameter for Combicon connector		2,5 mm <sup>2</sup>
Operating temperature range	version1	0°C ÷ +40°C
	version2	0°C ÷ +45°C
International Protection Rating		IP 20
Classification of fiber optic transmitters		Class 1
ATEX markings	version1	⚠ I M1 Ex ia [op is Ma] I Ma
	version2	⚠ I (M1) [Ex op is Ma] I
WE type certification number		TEST 13 ATEX 0041X
Dimensions		114,5 x 99 x 90,2mm
Weight		0,7kg

#### Note:

The maximum fiber lengths given in the table above correspond to the parameters included in the fiber optic transceiver manufacturer's catalog sheets .

## Types of workmanship

### Design 1

The EFI-CON-13 module is powered by an intrinsically safe power supply with the "ia" protection level. It is an M1 one category device with the "ia" intrinsically safe protection level and can operate in potentially explosive atmospheres. The module can be used in underground pits of mining plants:

- with no methane explosion hazard classified under the "a" class, with methane explosion hazard classified under the "b" or "c" class, and with no coal dust explosion hazard;
- with coal dust explosion hazard of the "A" and "B" class.

The module should be mounted in a housing with min. IP54 protection level.

### Design 2

The EFI-CON-13 module, powered by a non-intrinsically safe power supply, is an accompanying device with "op is" fibre optic output. The module can be used as an flameproof transmission barrier between a potentially



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explosive area and a non-explosive area. The module can be mounted in potentially explosive areas only if it is protected by another type of flameproof construction.



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Cable for UGS-10

## CABLE FOR UGS-10 ON QUICK-FIT GLAND

CATEGORY:

COMMUNICATION -  
ADDITIONAL DEVICES

CERTIFICATIONS



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DP

## CABLE GLAND DP 6-10; 10-15; 14-21



CATEGORY:

COMMUNICATION -  
ADDITIONAL DEVICES

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DPT

## PLASTIC CABLE GLANDS DPT 6-10; 10-15; 14-21

CATEGORY:

COMMUNICATION -  
ADDITIONAL DEVICES

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qfcg

## QUICK FIT CABLE GLAND FOR EM UGS-10 SYSTEM

CATEGORY:

COMMUNICATION -  
ADDITIONAL DEVICES

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SKZ-01/2

## SKZ-01/2 SUPPLY CHECKING BOX

It ensures the following functions:

- checking of the supply voltage Z1, Z2 presence at system supplying by two feeders,
- blockade of drivers in case of a lack of supply voltage.

### Features/Technical specification

Characteristics of flameproof construction: **I M1 Ex ia I Ma**

WE type test certificate no: **FTZÚ 03 ATEX 0087**



CATEGORY:

COMMUNICATION -  
ADDITIONAL DEVICES

CERTIFICATIONS



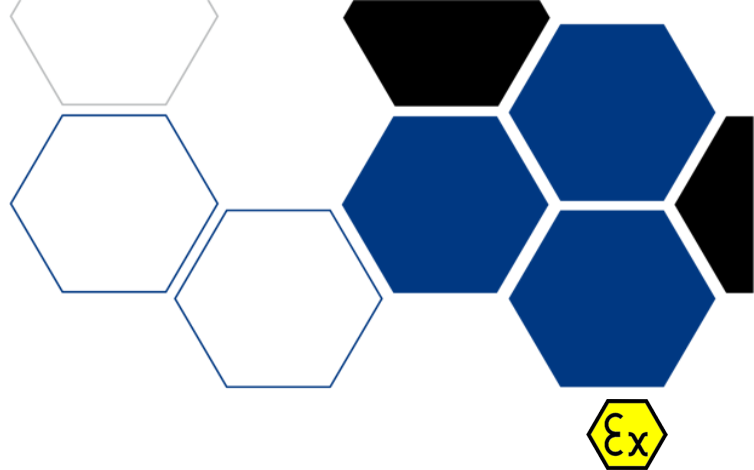
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RTL-14

# RTL-14 MOBILE RADIO-TELEPHONE



CATEGORY:

COMMUNICATION -  
ADDITIONAL DEVICES

CERTIFICATIONS



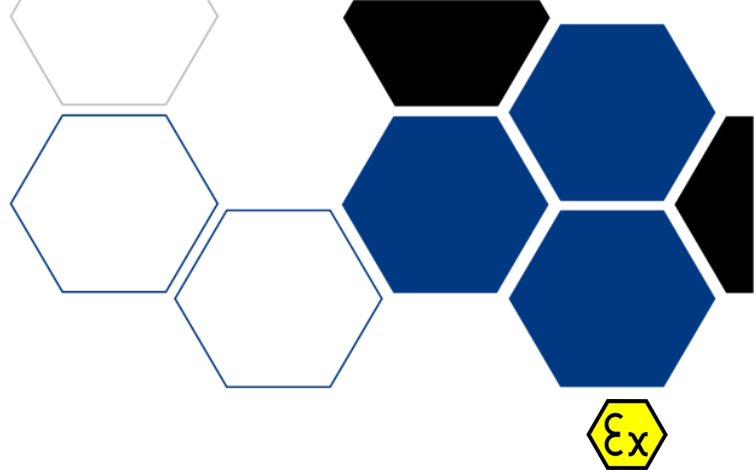
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MR-14

## MR-14 RADIO MODULE



CATEGORY:

COMMUNICATION -  
ADDITIONAL DEVICES

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MLG-11

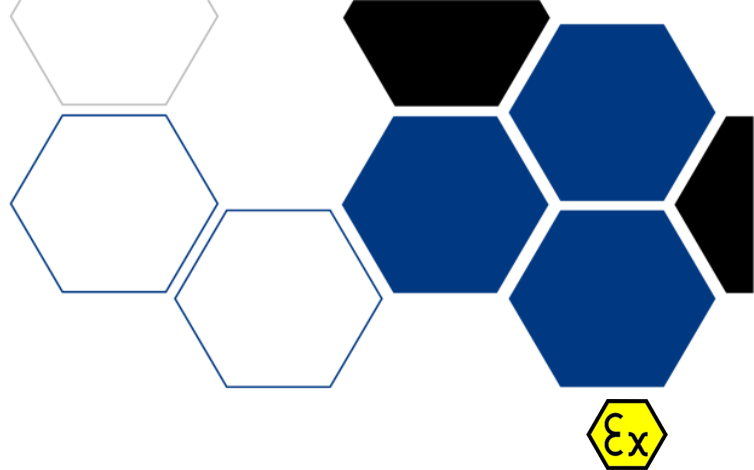
## MLG-11 LOUDSPEAKING COMMUNICATION DEVICE

The loudspeaking communication module assures connectivity between the UGS-10 system and the mine phone exchange. The module enables calls between subscribers of a telephone network and the UGS-10 loudspeaking system users.

The module functions include:

- Dialling PBX subscribers from any UGS-10 signalling device over DTMF.
- Dialling a UGS-10 signalling device or groups thereof by any PBX subscriber (over DTMF).
- Semi-duplex calls between PBX subscribers and UGS-10 signalling device users.

The module is installed in the SGK-10 signalling device enclosure.



CATEGORY:

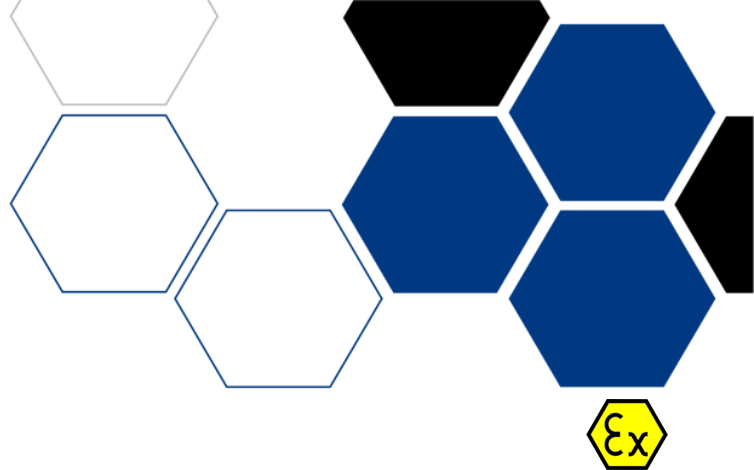
COMMUNICATION -  
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SWS-13

## SWS-13 SYSTEM CONNECTION BOX

The product is intended to connect two loudspeaking communication systems with full galvanic isolation. The device enables calls and transmission of communication signals between the systems, and prioritizes the equipment start warning signal.

The product interfaces the UGO-86/1 with the UGS-99/1, UGS-01/2 and UGS-10 systems. The box also enables connection of UGO-86/1, UGS-99/1, UGS-01/2 and UGS-10 with communication systems of other brands.

The input signal parameters of both device sides are programmed with an user interface with a keypad and a graphic display.

During normal operation the device is powered by a PSU; upon mains outage, the operation is backed up by an IS power source (a battery).

The RS-485 serial transmission port allows connection with a master control system.

CATEGORY:

COMMUNICATION -  
ADDITIONAL DEVICES

CERTIFICATIONS



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SSK-11

## SOFTWARE SSK-11

SSK-11 application is designed for carrying conversation between the surface and the underground using the UGS-10 system.



CATEGORY:

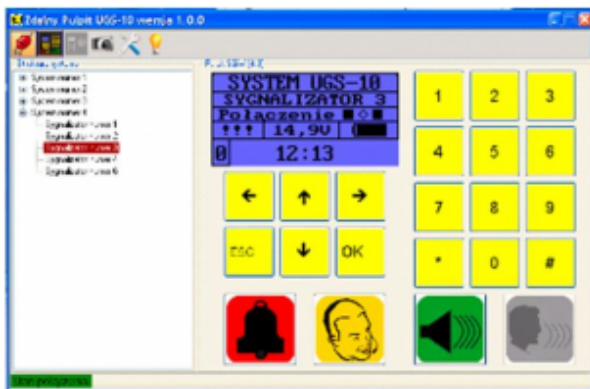
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SOFTWARE

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ZPUGS-10

## ZPUGS-10 REMOTE CONTROL SOFTWARE

CATEGORY:

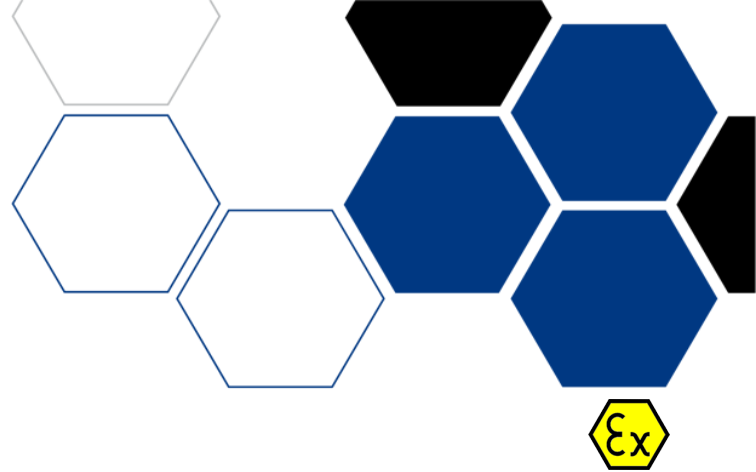
COMMUNICATION -  
SOFTWARE

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PSO-10

## PSO-10 PORTABLE SIGNALING DEVICE

The Portable Signaling Device PSO-10 is intended for use during transport on floor-mounted and suspended monorails and as a warning light signaling about works being carried out on transport routes.

### Description

The Portable Signaling Device consists of: a battery container, a sound signaling unit (option) and a transparent cover with power LEDs.

Depending on the version, the Portable Signaling Device can be equipped with red, white or two red and two white power LEDs. The siren can operate in the following modes (depending on the software)

Pressing the button on the cover causes the following:

- turning on power LEDs (20% of nominal power),
- blinking power LEDs (100% of nominal power) and generating an acoustic signal (if the siren is equipped with an acoustic transducer),

or

Pressing the button in the cover causes the following:

- flashing power LEDs (100% nominal power),
- flashing of the power LEDs (100% nominal power) and generation of an acoustic signal (if the alarm device is equipped with an acoustic transducer),

If the button is pressed for more than 2 seconds, all LEDs are switched off and the acoustic signal is switched off. It can be switched on again by pressing the button.

### Features/Technical specification

Nominal supply voltage	3,6 V
Maintenance-free dry type battery	3 x NiMH min 9Ah
Number of battery operating cycles	800 cycles
Light source	4 power LEDs 1W, 1 LED nom. 70mW
Durability of light sources	50 000 h
Minimalny czas świecenia (dla naładowanego akumulatora)	24 h
Ingres protection level	IP 54
Dimensions and weight	140 x 130 x 48 mm, 1,3kg
Operating temperature range	-5°C to + 40°C

### Usage

The PSO-10 Portable Signaling Device can be used in underground mine plants:

- not endangered by methane explosion with the "a" degree of explosion hazard,
- under the threat of methane explosion with the degree of explosion hazard "b" or "c",
- not endangered by coal dust explosion,

CATEGORY:

WARNING

CERTIFICATIONS



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- class A and B coal dust explosion hazard.

## Montage

The PSO-10 Portable Signaling Device is delivered to the customer with the battery disconnected from the electronics. Remove the top cover and connect it to the electronics in the housing using a cable terminated with a plug.



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SB-13

## SB-13 VISUAL SIGNALLIGN DEVICE



CATEGORY:  
WARNING

CERTIFICATIONS

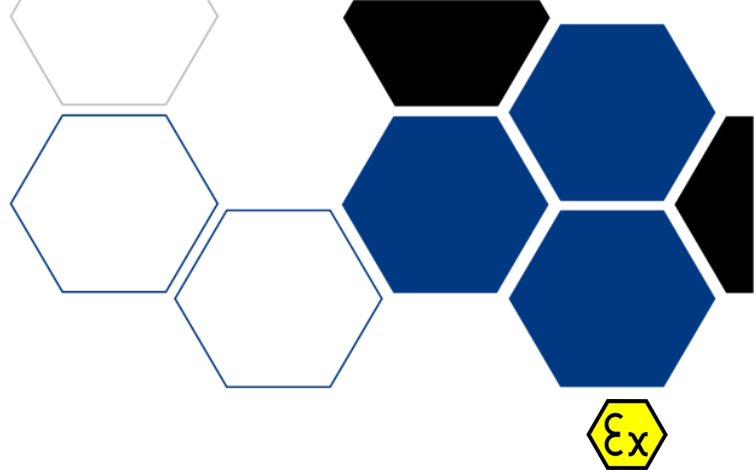


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SB-04

## SB-04 VISUAL SIGNALLING DEVICE



CATEGORY:

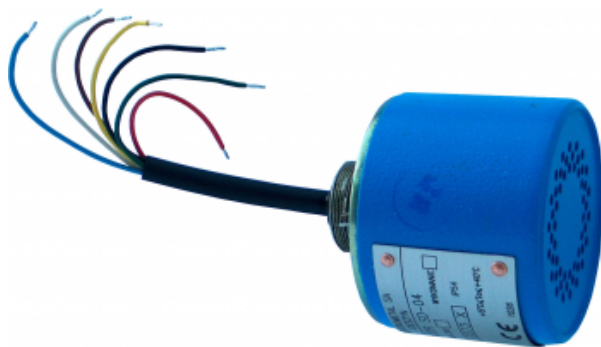
WARNING

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SD-04

## SD-04 ACOUSTIC SIGNALLING DEVICE



CATEGORY:  
WARNING

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SDL-99/1

## SDL-99/1 SIGNALLING DEVICE

The SDL-99/1 signalling device is designed to be used in mining excavations with potentially explosive atmosphere (e.g. methane).

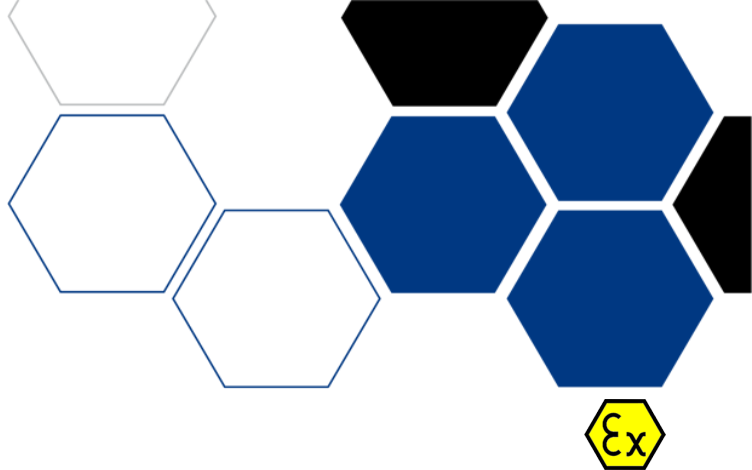
### Functions

Emitting of signals:

- acoustic
- light - acoustic
- light

### Technical characteristics

Working temperature range	-20°C to +40°C
Protection level	IP 54
Dimensions	260 x 200 x 80 mm ( Version 1)
	310 x 200 x 80 mm ( Version 2)
	360 x 200 x 80 mm ( Version 3)
	225 x 200 x 80 mm ( Version 4)
	270 x 200 x 80 mm ( Version 5)
Weight	about 2,2 kg



CATEGORY:  
WARNING

CERTIFICATIONS



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SDL-13

## SDL-13 SIGNALLING DEVICE

The SDL-13 signalling device is intended to generate light and sound warning signals. The safety integrity level of the device is SIL 1. The solution is intended for use in methane and/or coal dust explosive atmospheres. The Cat. M1 enclosure makes the product usable in explosive atmospheres.

### Functions

The SDL-13 is the successor to the widely acclaimed SDL-99/1. Similar to the predecessor, the device can generate warning flashing lights, sound warnings, or flash and sound warning signals. The device comprises a connection chamber with two holes for mounting the SD-13 sound signal device and/or the SB-13 flashing signal device. The design permits five configurations (versions) of the product:

- Two sound signal devices: Version 1
- Flash and sound signal device: Version 2
- Two flashing signal devices: Version 3
- One sound signal device: Version 4
- One flashing signal device: Version 5

The SD-13 sound signalling device can output seven warning signals. The specific sound signal is selected by earthing the control inputs.

The SB-13 flashing signal device may, depending on the version, emit one of the preset light colours: red, green, blue or yellow.

An evolution from the SDL-99/1 are the extra outputs which confirm that the warning signal is generated.

This has assured the safety integrity level of SIL 1.

The SDL-13 can replace the SDL-99/1 without reducing the explosion safety or performance parameters of the solutions. The mounting hole spacing has not changes, while the connection chamber width has been slightly increased.

### The most important features

Generates sound and light warning signals

- Seven different sound signals
- Four signal light colours
- Replaces SDL-99/1
- Safety integrity level: SIL 1

CATEGORY:

**WARNING**

CERTIFICATIONS



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SZS-17

## MANAGEMENT SYSTEM FOR SIGNALLING DEVICES SZS-17

The SZS-17 system is used to control underground railway semaphores. It makes it possible to control semaphore colours (red/green) and monitor the state of communication with individual semaphores. The system retrieves the configuration from the central CSZ controller and updates the local database on an ongoing basis.

### Description

#### Key functionalities:

- Ability to load your own map in .jpg / .bmp / .png file format.
- Editing the arrangement of semaphores on the map (Drag&Drop mechanism).
- Editing semaphore names.
- Possibility to resize semaphores (adjustment to map resolution).
- Monitoring the state of communication with the central CSZ controller and WSS semaphore controllers.

CATEGORY:

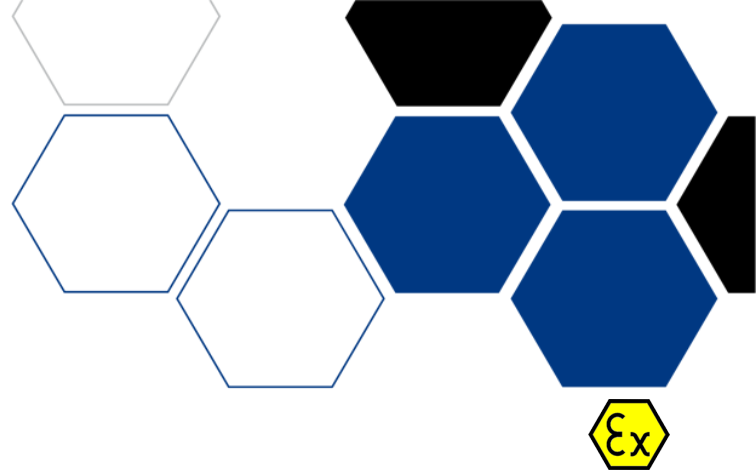
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## VERBAL ANNOUNCEMENT GENERATOR GZS-04

Verbal announcement generator GZS-04 is designed for emitting of a selected sound signal through built-in loudspeakers with an option of transmitting it to the systems: UGO-86/1, UGS-99/1, UGS-01/2.

Signal emission is confirmed by the shorting of control contact. Generator may be used in excavations with methane concentration as permissible by the rules of law (for mains power – category ib, for power from a built-in source – ia).

### Features/Technical specification

Supply voltage	15 V DC + 0,5V- 1,5V
Maximal power consumption	0,10 A
Loudness of audible signals	≥90dB
Protection level	IP 54
Working temperature range	from -20°C to +40°C
Overall dimensions	300 x 225 x 125 mm
Weight	~ 5 kg
Operation time after power is switched off (with signal emission for 1/5 of the time, with the source 9ZZI-1,5/03/MH)	8 hours
Total time of recorded signals	480s
Length of individual signals	multiplicity of 200msec

### Functions

- emission of a selected sound signal through built-in loudspeakers
- generator control is administered via a serial interface of standard RS-485 (as an option)

CATEGORY:

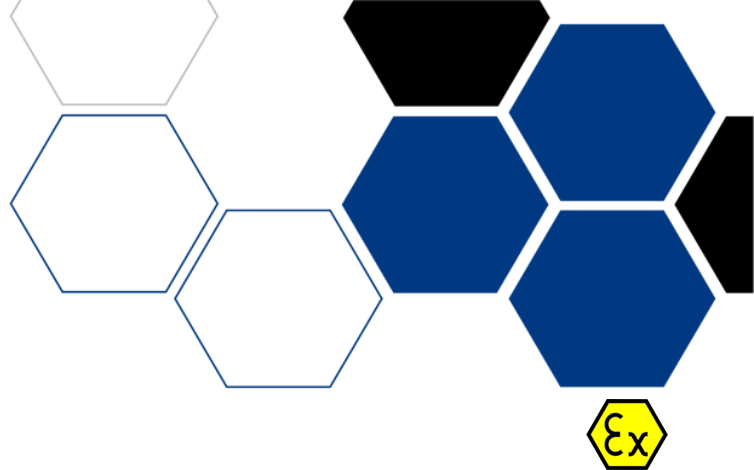
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# CONTACT CONTROL DEVICE UKS-95/1

The UKS-95/1 contacts control device is designed to be used in excavation in mining plants. Intrinsic safety enables its using in rooms at any concentration of methane admitted by regulations for ib category.

## Functions

- enables multiplication of a contact controlling work of other devices ensuring full galvanic separation of an input circuit from output circuits.
- ensures the possibility of checking line damages from a monitoring device.
- enables creating logical structures for controlling work of other devices adopted for the cooperation with intrinsically safe circuits (as effect of using relay contacts or the identification set as output

components).

The output contact can be led out as: a change over switch contact, a contact with a diode and contact equipped in a set of final resistors. The UKS-95/1 inputs and outputs can cooperate only with intrinsically safe circuits of admitted type.

The UKS-95/1 is a universal device which fulfils the following tasks owing to the usage of electronic systems:

- operation conversion of controlled contact,
- delayed working and dropout according to an output signal,
- conversion of short pulses of an input signal,
- identification of a device where the input contact was activated.

## Technical characteristics

Voltage supply from intrinsically safe external feeder	15 V DC + 0,5- 1,5 V
Maximal resistance of a 1 wire of cable connecting the UKS-95/1 with an intrinsically safe feeder	10 W
Maximal current consumption	200 mA
Maximal resistance of a 1 wire of cable connecting the UKS-95/1 with the controlled contact	250 W
Minimal resistance among line wires	30 kW
Maximal number of contacts working with a delay	2 switching over units
Maximal number of contacts working immediately	6 switching over units
A delay of working and releasing	0-15 sec. every 1 sec.
Tolerance of delays	25 %
Delay of short impulses endurance	~ 1 sec.
Identification unit: possibility of setting up of the identification number	1 to 99
Maximal distance from the SBI signalling device	10 km
Protection level	IP 54
Working temperature range	+5°C to +40°C
Relative humidity at temperature +40°C	95 %
External dimensions: without inlets	265 x 230 x 120 mm
with inlets	325 x 265 x 120 mm
Weight without inlets	5,75 kg
Weight of inlets: DP 14-21, DP 10-15, DP 6-10	0,33 kg, 0,255 kg, 0,245 kg

CATEGORY:

INFORMATION

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## Montage

To install the UKS-95/1 device there are handles with holes  $\varnothing 11$  mm for the M-10 bolts. Supplying cables are inserted to a device through DP cable inlets which a user orders with the box and mounts in closed holes in the walls of the enclosure.

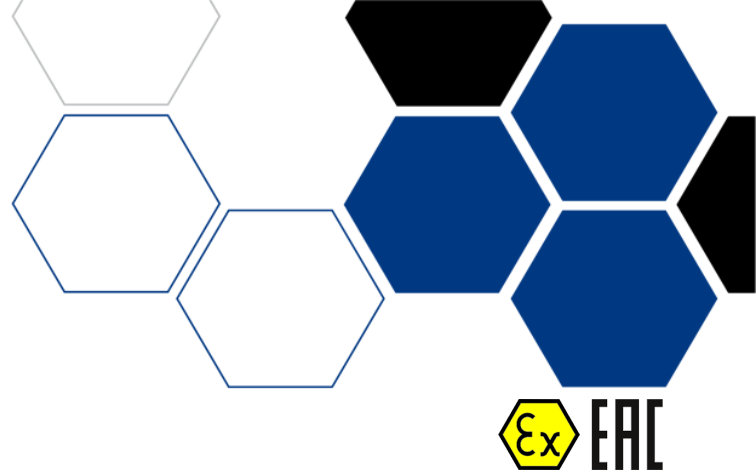
According to cables diameter in holes there is a possibility of installing the following types of inlets: DP 14-21 (14-21 mm), DP 10-15 (10-15 mm), DP 6-10 (6-10 mm).

The UKS-95/1 device is fed from an intrinsically safe external feeder 15 V DC.



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# SIGNAL LIGHT SLOGAN-SS/08

The signal light is designed for projecting optic signals "stop" or "go" on underground railway routes. It is an electric device for methane mines (group I). Intrinsically safe construction enables its application in the mining workings with a methane concentration permitted by the rules.

## Features/Technical specification

Voltage supply (clamps a, b connector Z2)	11 - 15,8V
Maximum current consumption (clamps a,b connector Z2)	80mA
Control supply (clamp b connector Z1 and b Z2):	11 - 15,8 V
Control current consumption (clamp b connectors Z1 i b Z2)	20mA
External diameter of additive wires	6 -12mm
Cross-section of a single additive wire	1,5mm <sup>2</sup>
Working temperature range	-20°C - +40°C
Relative humidity at temperaure 40°	Up to 95%
Protection level	IP 54
Feeding	feeder Ex (ZSI-94/1)
Dimensions	430 x 265 x 80mm
Weight	~ 8 kg

## Design and operation

The device is ready to work after connected with supply and both steering and confirmation signal. Control of the signal light is by a steering input. If input voltage is equal to a supply voltage (11-15,8V) green signal "go" will switch on. Red signal will switch on when input voltage will be 0V voltage according to circuit mass or if a steering wire is damaged (broken).

The signal light enables getting feedback information about actually lighten optic signal. If the red signal is lightened, the feedback signal has a level equal with the level of supply. In case if the green signal is lightened, the feedback signal achieves a level 0V with according to circuit mass.

## Montage

External wires should be connected with P1 connector.

CATEGORY:

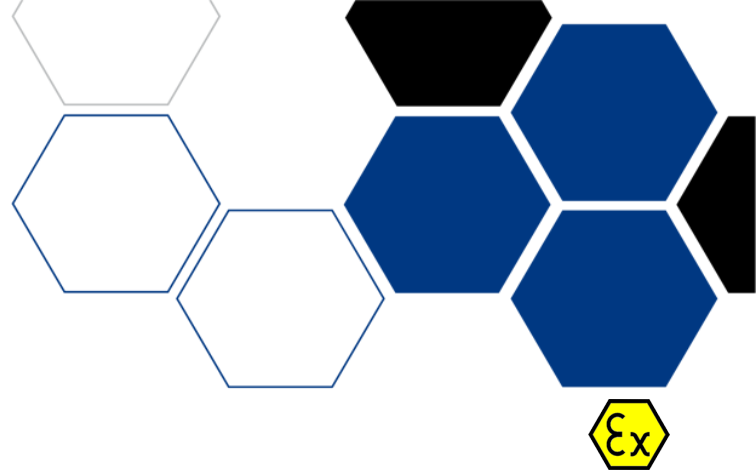
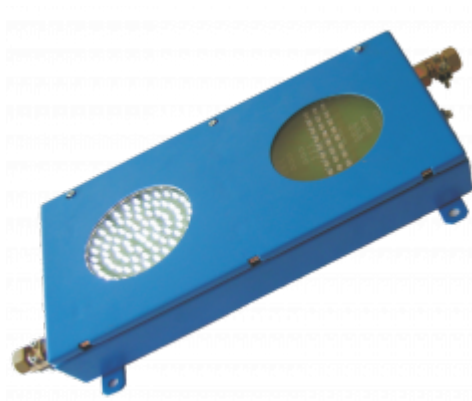
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# GRAPHIC SIGNALLING DEVICE SLOGAN-SG2/08

Signalling device is designed for displaying optical signals (rectangle and circle) on routes of underground railways. It is an electric device used in methane mines (group 1). Intrinsically-safe embodiment makes it applicable in excavations with methane concentration permissible by relevant provisions

## Features/Technical specification

Supply voltage (terminals a, b of Z2 connector)	11 - 15,8V
Maximal power consumption (terminals a, b of Z2 connector)	80mA
Control voltage (terminal b of Z1 connector and b of Z2)	11 - 15,8V
Consumption of control current (terminal b of Z1 connector and b of Z2)	20mA
External diameter of connecting cables	10 to 15mm
Cross-section of cables' conductor	1,5mm <sup>2</sup>
Working temperature range	-20°C - +40°C
Relative humidity at 40o temp.	up to 95%
Protection level	IP 54
Power supply	feeder EX (ZSI-94/1)
Dimensions	430 x 265 x 80mm
Weight	~ 8 kg

## Design and operation

The device is ready for operation once it is supplied with power and once command signal, as well as acknowledgement signal are connected. The control of signalling device is enacted via control input. If voltage equal to supply voltage (11-15.8V) is fed to this input, a signal - a circle will be lit, depending on the elements installed. On the other hand, the rectangle signal will light in a situation when this input is fed with voltage 0V in relation to system mass or when control cable is damaged (broken). Due to acknowledgement output, the signalling device makes it possible to obtain feedback on the optical signal being currently on. If the optical signal - a rectangle is on, then, the feedback signal has a level equal to the level of supply voltage. In an event of optical signal - a circle being on, then, the feedback signal attains the level 0V in relation to system mass.

## Montage

External conduits should be connected into connector

CATEGORY:

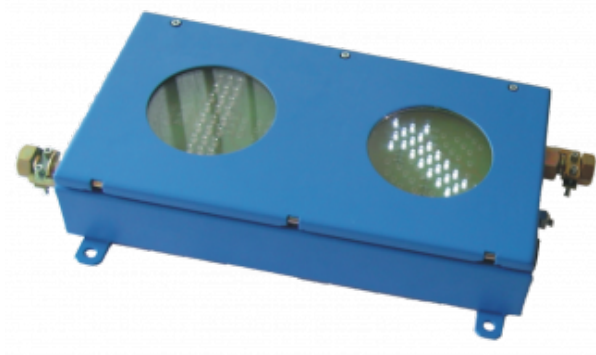
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# GRAPHIC SIGNALLING DEVICE SLOGAN-SG1/08

Signalling device is designed for displaying optical signals (rectangle and arrows) on routes of underground railways. It is an electric device used in methane mines (group 1). Intrinsically-safe embodiment makes it applicable in excavations with methane concentration permissible by relevant provisions.

## Features/Technical specification

Supply voltage (terminals a, b of Z1 connector)	11 - 15,8V
Maximal power consumption	80mA
Control voltage (terminal b of Z1 connector and b of Z2)	11 - 15,8V
Consumption of control current (terminal b of Z1 connector and b of Z2)	20mA
External diameter of connecting cables	10 do 15mm
Cross-section of cables' conductor	1,5mm <sup>2</sup>
Working temperature range	-20°C - +40°C
Relative humidity at 40o temp.	up to 95%
Protection level	IP 54
Power supply	feeder Ex (ZSI-94/1)
Overall dimensions	430 x 265 x 80mm
Weight	~ 8 kg

## Design and operation

The device is ready for operation once it is supplied with power and once command signal, as well as acknowledgement signal are connected. The control of signalling device is enacted via control input. If voltage equal to supply voltage (11-15.8V) is fed to this input, a signal – an arrow will be lit, depending on the elements installed. On the other hand, the rectangle signal will light in a situation when this input is fed with voltage 0V in relation to system mass or when control cable is damaged (broken). Due to acknowledgement output, the signalling device makes it possible to obtain feedback on the optical signal being currently on. If the optical signal – a rectangle is on, then, the feedback signal has a level equal to the level of supply voltage. In an event of optical signal – an arrow being on, then, the feedback signal attains the level 0V in relation to system mass.

## Montage

External conduits should be connected into connector

CATEGORY:

INFORMATION

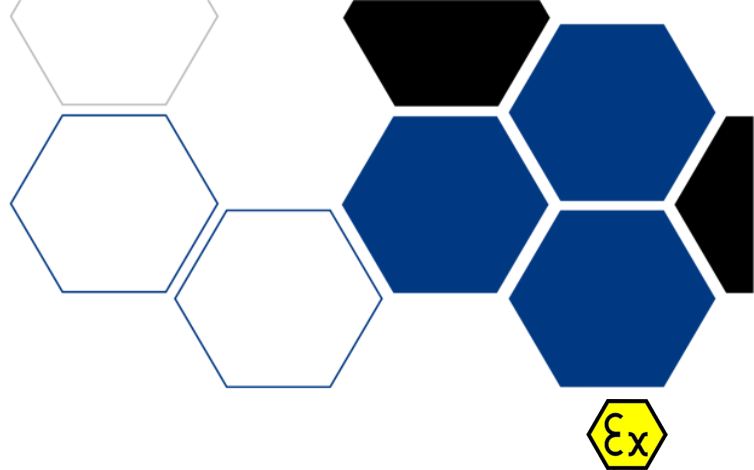
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SGA-09

# GRAPHIC ALPHANUMERIC SIGNALLING DEVICE SLOGAN- SGA/09

It is designed for displaying warning or informative messages programmed in its memory in three available colours: red, green and yellow. It is an electric device used in methane mines (group I). It can be used in underground mining excavations: - with absence of methane explosion hazard classified as "a" class of methane explosion hazard

- with presence of methane explosion hazard classified as "b" or "c" class of methane explosion hazard
- with absence of coal dust explosion hazard
- with and A or B class of coal dust explosion hazard

Intrinsically-safe embodiment makes it applicable in excavations with methane concentration permissible by relevant provisions

## Features/Technical specification

Supply voltage (terminals a, b of Z1 connector)	12 - 15,0V
Maximal power consumption (terminals a, b of Z1 connector)	80mA
Number of displayed messages	64
Number of characters displayed at one time	8
Number of characters of scrolled text	64
External diameter of connecting cables	10 ÷ 15mm
Cross-section of cables' conductor	1,5mm <sup>2</sup>
Working temperature range	-20°C ÷ +40°C
Relative humidity at 40° temp.	do 95%
Protection level	IP 54
Power supply	feeder Ex (ZSI-94/1)
Overall dimensions	600 x 235 x 115mm
Weight	ca 10,5 kg

## Design and operation

Slogan SGA/09 provides projection of pulsating, stable and rewinding inscriptions and simple graphic in three available colours : red, green and yellow. While short messages (up to 8 signs), the message is projected without rewinding text. In case of choosing longer communication (up to 64 signs), signalling device rewinds the text itself.

## Montage

External cables should be connected to the terminal strip. After installing and connecting of the signalling device, switch slides SW4 should be set in such a way so as to select relevant identification number of device.

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SGA-08

# GRAPHIC ALPHANUMERIC SIGNALLING DEVICE SLOGAN- SGA/08

It is designed for displaying warning or informative messages programmed in its memory. It is an electric device used in methane mines (group I). Intrinsically-safe embodiment makes it applicable in excavations with methane concentration permissible by relevant provisions.

## Technical characteristics

Supply voltage (terminals a, b of Z1 connector)	12 - 15,8V
Maximal power consumption (terminals a, b of Z1 connector)	80mA
Number of displayed messages	64
Number of characters displayed at one time	8
Number of characters of scrolled text	64
External diameter of connecting cables	10 ÷ 15mm
Cross-section of cables' conductor	1,5mm <sup>2</sup>
Working temperature range	+5°C - +40°C
Relative humidity at 40° temp.	do 95%
Protection level	IP 54
Power supply	Feeder Ex (ZSI-94/1)
Overall dimensions	600 x 235 x 115mm
Weight	ca 10,5 kg

## Design and operation

Signalling device SGA/08 displays text that may be fixed-in-place, pulsating, scrolled, as well as some simple graphics. With messages being short, of up to 8 characters all together, such message is displayed without the scrolling of text. When a longer message is opted for, up to 64 character-long, the signalling device displays it, and in doing so, it automatically activates text scrolling. Set of 64 messages is subdivided into sixteen even groups. Selection of one of them is controlled with the use of micro switches placed inside of casing. User selects relevant message number from a given subgroup through two intrinsically-safe external contacts. There is a possibility of selecting displayed text through remote control, with the use of serial bus RS485.

## Montage

External cables should be connected to the terminal strip. After installing and connecting of the signalling device, switch slides should be set in such a way so as to select relevant group of displayed messages, and with contacts - one specific displayed text.

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# SGB-13 SIGNALLING DEVICE

## Functions

## Technical characteristics

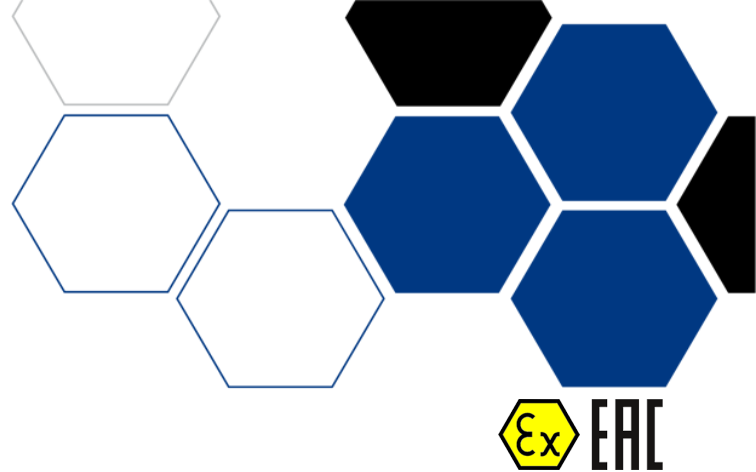
Supply voltage	220...260 V DC
Maximum current load	20 mA
Messages displayed	64
Characters displayed	8
Scrolling text characters	64
Control inputs	4 per display
Confirmation outputs	4 per display
Confirmation output parameters	U <sub>max</sub> = 24 V, I <sub>max</sub> = 1 A
Connection wire O.D.	6 to 12 mm (M20x1.5 cable gland) 9 to 17 mm (M25x1.5 cable gland)
Maximum wire size	2.5 mm <sup>2</sup> for power supply wires 1.5 mm <sup>2</sup> for control wires
Operating temperature range	-20°C to +40°C
Relative humidity at +40°C	95%
Protection rating	IP 54
Overall dimensions	600x235x126.5 mm
Weight	Ca. 13.5 kg

## The most important features

- Controlled over RS-485 bus or contacts
- Message display confirmation contacts
- 64 programmable messages
- Power supply: 250 V DC, directly from electrical contact system



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# ISK-11/M2 TYPE THERMAL IMAGING CAMERA

The ISK-11/M2 type camera ver. 1 and T is designed for remote control of workplaces and production processes as well as temperature measurement in potentially explosive atmospheres. The camera image (mega-pixel and thermal imaging) is transmitted over a fibre optic Ethernet network. The camera has an alarm output (switch contact), the parameters of which are defined in the programme for operating a thermal imaging camera (separate instruction manual).

## Description

The ISK-11/M2 type thermal imaging (1 and T) camera is used for observation of underground equipment and miners' workplaces within the camera range. The camera image is transmitted via a fibre optic cable. The ISK-11/M2 type camera can be used in underground mine excavations:

- in non-hazardous areas with the "a" methane explosion hazard,
- in hazardous areas with the "b" or "c" methane explosion hazard,
- in non-hazardous areas without coal dust explosion hazard,
- of the grade A and B coal dust explosion hazard.

The ISK-11/M2 type camera is a M2 category device and its power supply must be turned off in case of an explosive atmosphere.

## Features/Technical specification

### The ISK-11/M2 type camera ver. 1 and T

Parameter name	Megapixel camera
Image sensor	1/2.8" 2 Mpx
Maximum resolution	1,920 x 1,080
Zoom	Optical: 2.6-8mm, manually controlled Digital
Sensitivity	0.1 Lux (colour) 0.0017 Lux (30 fps, 2 sec) 0.01 Lux (BW)
Day/Night Mode	Colour / BW / Auto (ICR)
Backlight compensation	Off / BLC
Contrast enhancement	Manual / SDR
Noise reduction	Off / SSNR III
Digital image stabilisation	Yes
Intelligent video surveillance	<ul style="list-style-type: none"> <li>• Scene changing</li> <li>• Tripwire</li> <li>• Entrance/exit</li> <li>• Abandoned/missing objects</li> <li>• Face detection</li> </ul>
Additional information	<ul style="list-style-type: none"> <li>• Advanced processor for improved image quality in difficult lighting conditions</li> <li>Simple Focus</li> </ul>
Supported operating systems	<ul style="list-style-type: none"> <li>• Windows XP</li> <li>• Windows Vista</li> <li>• Windows 7 , 8 , 10</li> </ul>
Supported web browsers	<ul style="list-style-type: none"> <li>• Internet Explorer 7.0 or higher</li> <li>• Firefox 9 or higher</li> <li>• Google Chrome 15 or higher</li> </ul>

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Parameter name	Thermal imaging camera
Detector resolution	80x80 pixels
Detector type	FPA, uncooled (34 µm)
Spectral range	7.5 - 13 µm
Measuring range	-20°C...100°C 0°C ... 250°C (20) 150°C ... 900°C
Converter frequency	9Hz
FOV optics	12°
Focusing	Mechanical, digitally controlled
Optical resolution (D:S)	190:1
Digital image stabilisation	Yes
Thermal sensitivity (NETD)	100 mK
Accuracy	±2 °C or ±2 % (whichever is greater)
Repeatability	±1 °C or ±1 %
Supported web browsers	Internet Explorer 7.0 or higher Firefox 9 or higher Google Chrome 15 or higher

## Design and operation

The camera housing is a steel box with sight glasses and fireproof cable gland. Inside the housing, the following components are mounted on the same bracket:

- megapixel camera
- thermal imaging camera
- EFI-BAR-13 fibre optic module
- 230/12V power supply unit
- illuminator unit
- electronics unit
- power strip

The camera is a standalone device and once powered on, images are automatically transmitted from the cameras installed inside. For the device to work properly, however, the camera and/or the Ethernet network to which it is connected has to be properly configured:

- The IP address of the camera has to be within the address range supported by LAN
- If the installed network device has security features such as e.g.: MAC address filtering function, it has to be configured as required
- The software that will allow you to properly log on to the cameras has to be installed.
- When the device is started up for the first time, it is recommended to change the login and password used to access the camera..

The megapixel camera is equipped with a zoom lens with a remote aperture. The camera lens is controlled manually. The camera has an additional Simple Focus feature for adjusting focus remotely. For zoom lenses, it is necessary to manually adjust the focus every time the zoom is changed. This is a cumbersome process, especially in underground conditions. With Simple Focus, the user only needs to pre-focus the image. Precise focus is adjusted using the host system (e.g. via a web browser after logging on to the camera) - either automatically or manually.

The thermal imaging camera has an 80 x 80 pixel sensor for accurate temperature measurements in the -20 ... 900°C range, with a mechanical lens and an electronically adjustable focus.

The camera can automatically detect the temperature in marked areas. This feature makes it possible to activate the alarm output for a specific temperature range. The camera comes with an illuminator that provides additional illumination of the monitored area. The illuminator uses an LED with a lens that emits white light. Unlike IR illuminators, the emitted light is visible to the human eye. The illuminator can be remotely turned on or off using a web browser or managing software. For a description of illuminator operation, see subsection 4 "Operation, handling and use".

The megapixel camera has an internal memory card slot for local image recording according to e.g. the set schedule, after an event (movement in front of the camera). A memory card is included with the camera

## Montage

The device should be installed according to all recommendations provided in this manual and carried out by a fitter or a professional installer with necessary knowledge, tools and qualifications.

The camera should be permanently mounted using the bracket on the top or bottom side of the housing.

If the camera is to be attached to the V-profile of a roof support in a mine, the ISK camera hook mount



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manufactured by Elektrometal can be used. The two types of mounts can be found in the table at the end of the manual. Hook mounts are not included in the camera kit and they have to be ordered separately.

## Execution

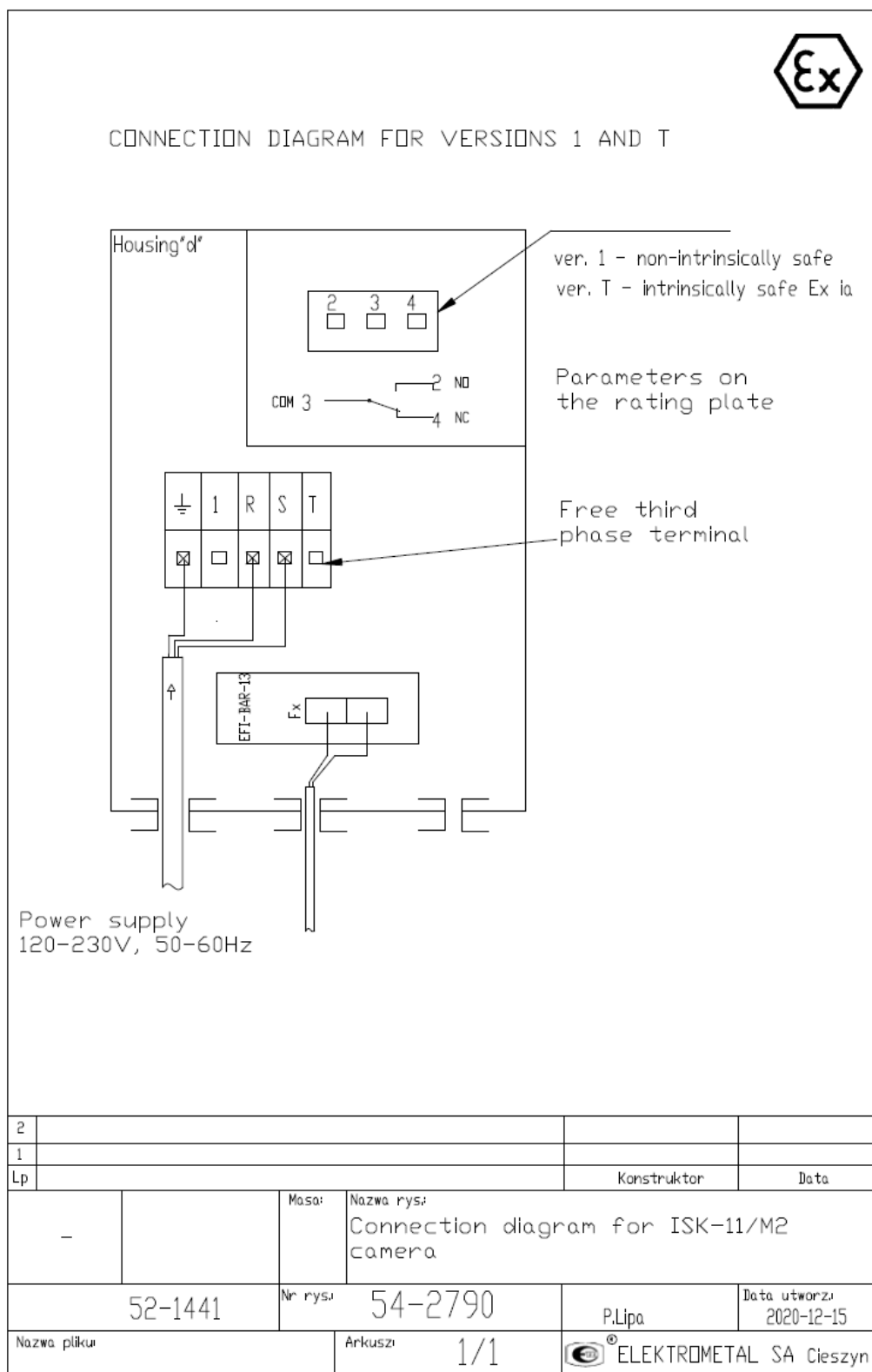
Parameter name	Megapixel camera
Image sensor	1/2,8" 2 Mpx
Maximum resolution	1920 x 1080
Zoom	Optical: 2.6-8mm, manually controlled Digital
Sensitivity	0.1 Lux (colour) 0.0017 Lux (30 fps, 2 sec) 0.01 Lux (BW)
Day/Night Mode	Colour / BW / Auto (ICR)
Backlight compensation	Off / BLC
Contrast enhancement	Manual / SSDR
Noise reduction	Off / SSNR III
Digital image stabilisation	Yes
Intelligent video surveillance	<ul style="list-style-type: none"> <li>• Scene changing</li> <li>• Tripwire</li> <li>• Entrance/exit</li> <li>• Abandoned/missing objects</li> <li>• Face detection</li> </ul>
Additional information	<ul style="list-style-type: none"> <li>• Advanced processor for improved image quality in difficult lighting conditions</li> <li>• Simple Focus</li> </ul>
Supported operating systems	<ul style="list-style-type: none"> <li>• Windows XP</li> <li>• Windows Vista</li> <li>• Windows 7 , 8 , 10</li> </ul>
Supported web browsers	<ul style="list-style-type: none"> <li>• Internet Explorer 7.0 or higher</li> <li>• Firefox 9 or higher</li> <li>• Google Chrome 15 or higher</li> </ul>
Parameter name	Thermal imaging camera
Detector resolution	80x80 pixels
Detector type	FPA, uncooled (34 µm)
Spectral range	7.5 - 13 µm
Measuring range	-20°C...100°C 0°C ... 250°C (20) 150°C ... 900°C
Converter frequency	9Hz
FOV optics	12°
Focusing	Mechanical, digitally controlled
Optical resolution (D:S)	190:1
Digital image stabilisation	Yes
Thermal sensitivity (NETD)	100 mK
Accuracy	±2 °C or ±2 % (whichever is greater)
Repeatability	±1 °C or ±1 %
Supported web browsers	<ul style="list-style-type: none"> <li>• Internet Explorer 7.0 or higher</li> <li>• Firefox 9 or higher</li> <li>• Google Chrome 15 or higher</li> </ul>



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## Types of workmanship



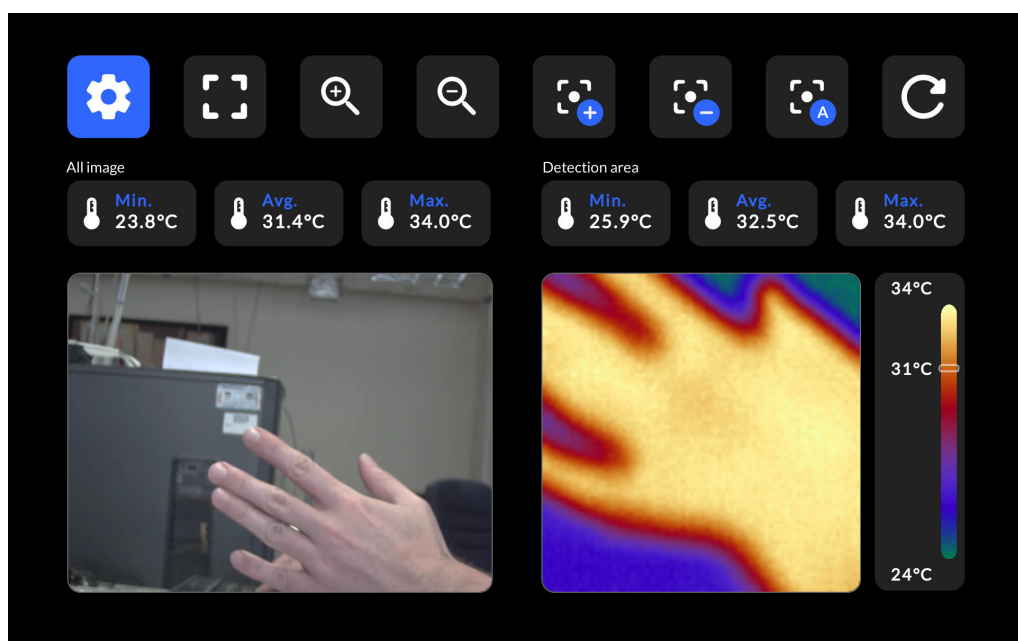
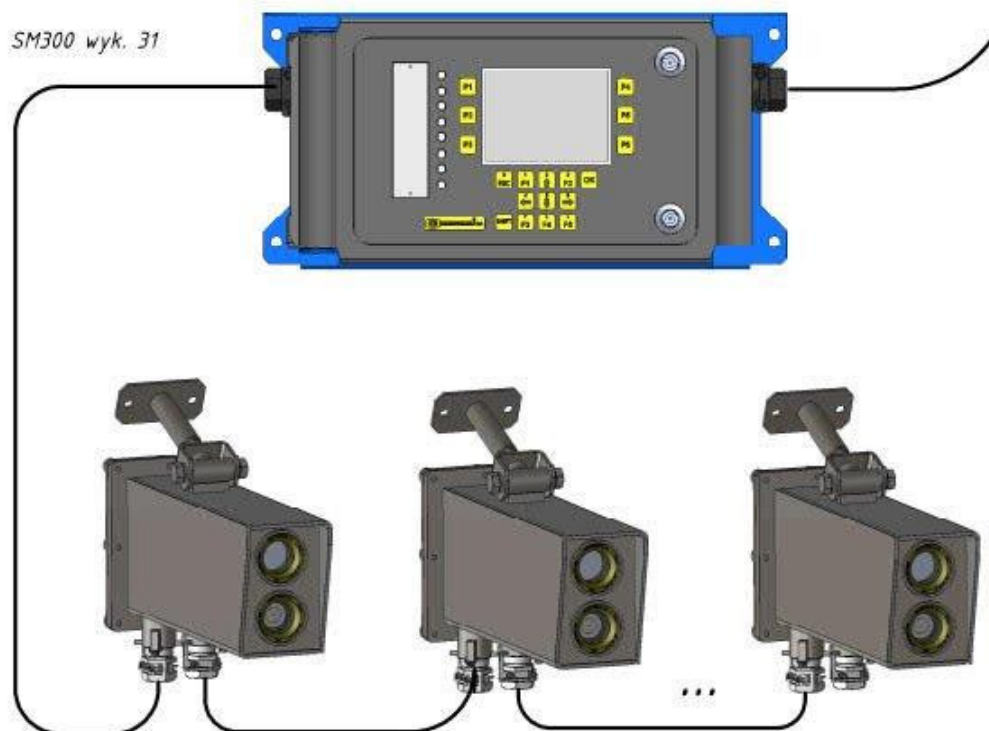
## Options



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## Views form ISK-11/M2/T camera on intrinsically safe display EM471



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ISK-16

## ISK-16 EX-PROOF CAMERA

The **ISK-16** explosion-proof camera has been optimized to work with controllers from the Elsap family equipped with a graphic display.

### Description

The **ISK-16** camera represents the next generation of explosion-proof cameras.

It has been optimized for cooperation with controllers from the **ELSAP** family equipped with a graphic display. The camera is connected directly to the 100BaseTx Ethernet port on the controller or to the fiber optic bus via fiber optic switches, e.g. **EMFOS-18** or **ISE-17**. Transmission of control data and image takes place via a 100BaseTx intrinsically safe copper network over a distance of 100m. For powering the camera and for data transmission, one dedicated DataControl hybrid cable can be used, equipped with a pair of power wires with a diameter of 4mm and a cat 6 double-shielded twisted pair.

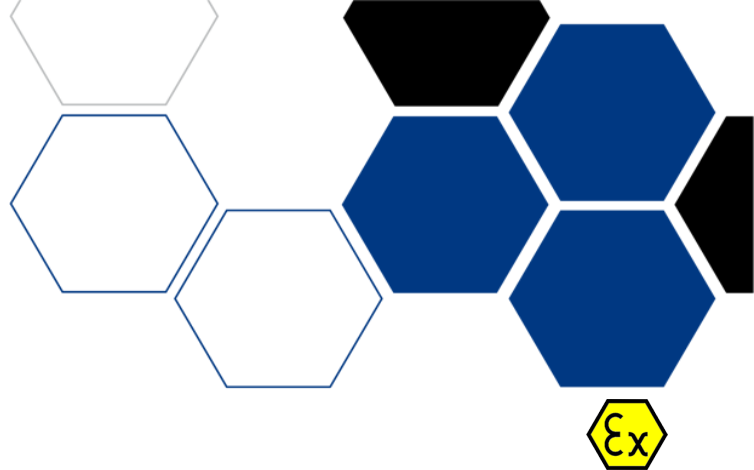
The camera is based on solutions used in **ISK-11/M2** adapted to be powered directly from an intrinsically safe power supply voltage of 12VDC or 15VDC. It is equipped with a memory card enabling local image recording, e.g. according to a set schedule or after motion detection. It has an integrated LED floodlight enabling illumination of the monitored area.

### Features/Technical specification

Parameter	Value (unit)
Nominal voltage	12-15 V DC
Nominal current	ver. HD: 0,7-0,6 A ver. ZOOM: 0,7-0,6 A
ATEX markings	I M2 (M1) Ex db [ia Ma] I Mb
Intrinsically safe parameters	Power supply: $U_i = 15,8 \text{ V}$ $I_i = 2,5 \text{ A}$ Li, Ci - negligible Analog output and Ethernet: $U_i = 5 \text{ V}$ Li, Ci - negligible $U_o = 2,6 \text{ V}$ $I_o = 80 \text{ mA}$
Maximum distance of transmitted image	Ethernet output: 100m Analog output: 1km
Max. cross section	signal wires: 2,5mm <sup>2</sup>
WE type certification number	TEST 16 ATEX 0031X
Interational Protection Rating	IP 65
Cable inlet	WKE 14-20
Flameproof cap	72.091 or 00-2167
Operating temperature range	-20°C do +50°C
Permissible humidity (at +35°C)	95%
Weight	10 kg
Dimintions (without handle)	315 x 193 x 169 mm

Parameter	ISK-16	
	ver. HD-...	ver. ZOOM-...
Imaging device	1/2,8" 2 MPx or 5MPx	1/2,8" 2 MPx
Resolution	1920 x 1080	1920 x 1080
Zoom	Optical: 2.6-8mm manual Digital	Optical: 32x motozoom Digital
Illumination	0.0017 Lux (30fps, 2sec) 0.002 Lux (B/W)	0.3 Lux (color) 0.001 Lux (B/W)
Night & Day	Color / B/W / Auto (ICR)	Color / B/W / Auto (ICR)

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Backlight compensation	OFF. / BLC	OFF. / BLC / HLC
Contrast enhancement	Manual/ SSDR	Manual/ SSDR
Noise reduction	OFF. / SSNR III	OFF. / SSNR III
Digital Image Stabilization	Yes	Yes
Video analytics	Tampering, Virtual line, Enter/Exit, (Diss)Appear, Face detection	Tampering, Virtual line, Enter/Exit, (Diss)Appear
Additional information	Advanced processor that improves image quality in difficult lighting conditions Simple Focus function	Remote motozoom and focus
Supporting operating systems	Windows XP, Windows Vista, Windows 7, Windows 8	
Supported web browsers	Internet Explorer 8.0 or newer Firefox 9 or newer Google Chrome 15 or newer	



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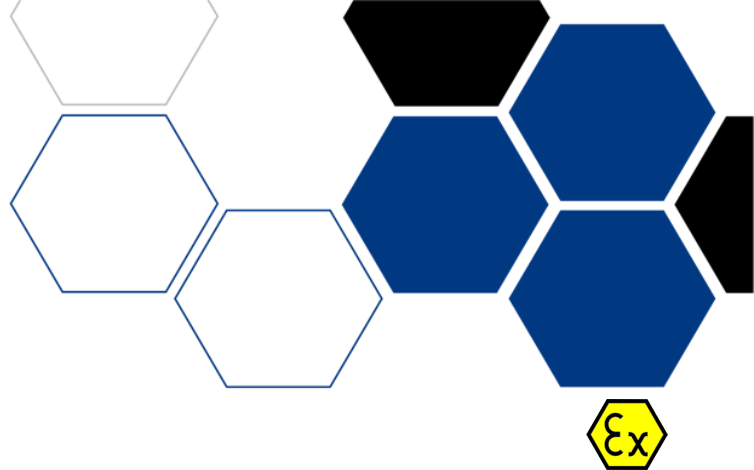
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PZP

## PZP CONTROLLER

PZP controller for multi-device control and cameras image visualization.



CATEGORY:

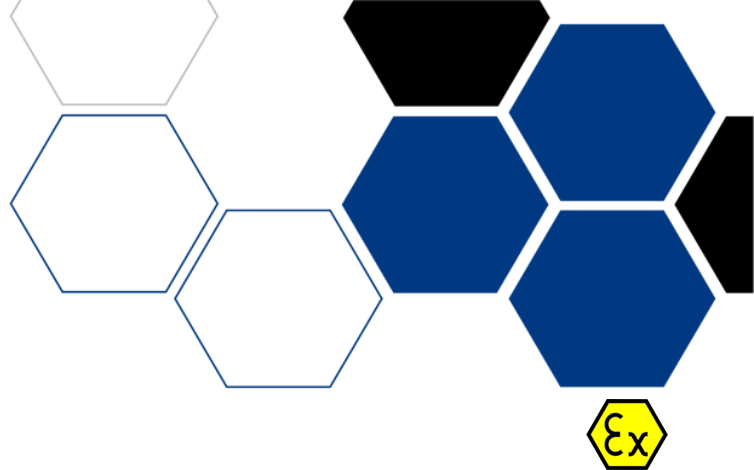
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MIP-15

## IP MONITORING CONTROLLER MIP-15

IP monitoring controller MIP-15 designed for creating an ethernet with local cameras.

CATEGORY:

VISUAL MONITORING-

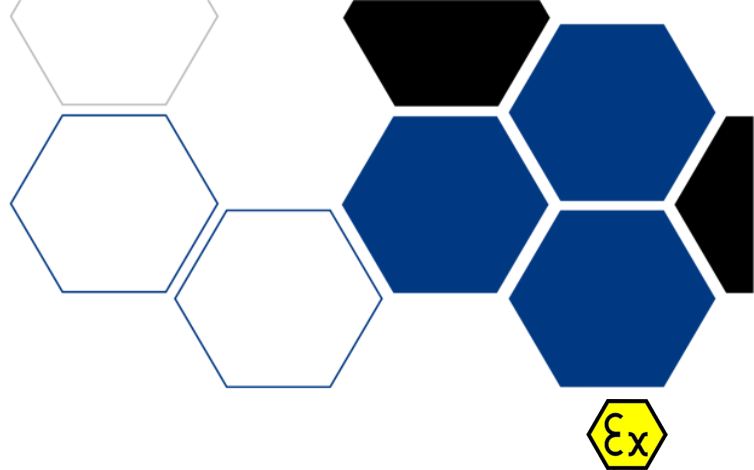
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## RKS-1 OPTIC FIBRE CAMERA

OPTIC FIBRE CAMERA RKS-1 can be used in underground mining plant excavations classified as "a" "b", and "c" class of methane explosion hazard and A or B class of coal dust explosion hazard. Explosion-proof camera is designed for remote control of working zones and production processes in areas with explosion hazard.

### Technical characteristics

Rated supply voltage	42V, 133V, 230V AC
Supply voltage frequency	50-60Hz
Rated Current	250mA/42V 55mA/127V 47mA/230V
Protection level	IP 65
Cable inlet	WKW 17-23, 6-12
Maximal diameter of conductor	4mm <sup>2</sup>
Output	Monomode optic fibre (converter IFS VT4030M), multimode (converter IFS VT4010M) or analogue output (separator BARTEC SSW-1/1)
Junction	ST type (optic fibre output) or terminal strip (analogue output)
Ambience Temperature range	From -10°C to 40°C
Acceptalbe humidity ( temp. +35°C)	Up to 95%
Mass	16kg
External dimensions	280 x 305 x 140 mm

### Design and operation

Construction elements of the camera's housing are made of steel and cast iron. Particular assemblies are welded. Steel elements are protected by anticorrosive zinc coating and varnish coat. The shed is made of stroke-proof polycarbonate.

CATEGORY:

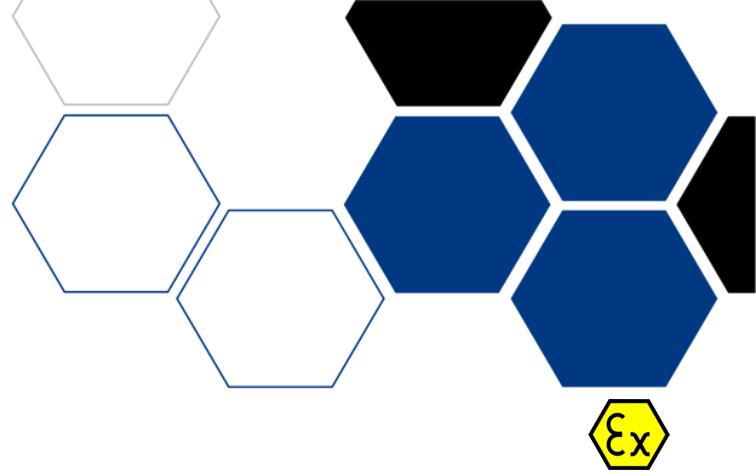
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## ISK-11/M2 FLAME-PROOF CAMERA

The **ISK-11/M2** camera is used to observe underground devices and work places of miners located in the field of observation.

Depending on the version, the camera image is transmitted via fiber optics or a power line.

The **ISK-11/M2** camera can be used in underground mine excavations:

- methane not explosion hazard with the "a" degree of explosion danger,
- methane explosion hazard with explosion hazard grade "b" or "c",
- not subject to coal dust explosion hazard,
- Class A and B coal dust explosion hazard.

The **ISK-11/M2** camera is an M2 category device and its power supply must be turned off in the event of an explosive atmosphere.

### Description

#### Main features

- maximum resolution 1.3Mpix or 2Mpix,
- 20x moto-zoom function for 1.3Mpix camera,
- image and control data sent via fiber optic Ethernet network or via power line
- built-in LED backlight,
- universal power supply module accepting all typical voltages: 42VAC, 133VAC, 230VAC,
- advanced DSP image processor,
- full remote configuration
- the ability to archive the image on an internal memory card.

### Features/Technical specification

	ver. E	ver. HD	ver. ZOOM
Imaging device	1/3" 1.3 MPx	1/2,8" 2 MPx	1/3" 1.3 MPx
Resolution	1280 x 1024	1920 x 1080	1280 x 1024
Zoom	Optical: 5-15mm manual	Optical: 5-15mm manual	Optical: 20x motozoom
	Digital	Digital	Digital
Illumination	0.7 lx (color)	0.0017 lx (color)	0.01 lx (color)
	0.011 lx (B/W )	0.01 lx (B/W )	0.011 lx (B/W )
Day & Night	Color/ B/W / Auto	Color/ B/W / Auto (ICR)	Color/ B/W / Auto (ICR)
Backlight compensation	OFF. / BLC	OFF. / BLC	OFF. / BLC / HLC
Contrast enhancement	Manual	Manual/ SSDR	Manual/ SSDR
Digital noise reduction	OFF. / SSNR	OFF. / SSNR III	OFF. / SSNR III
Digital Image Stabilization	-	Yes	Yes
Video analytics	Tampering	Tampering, Virtual line, Enter/Exit, (Diss)Appear, Face detection	Tampering, Virtual line, Enter/Exit, (Diss)Appear
Nominal voltage	120-230V AC -15% /+8% terminals R i S, 42V AC ±10% terminals X1 i X2		

CATEGORY:

VISUAL MONITORING-

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Frequency	50 / 60 Hz
ATEX markings	Ex I M2(M1) Ex d [op is Ma] I Mb
WE type certification number	FTZU 11ATEX 0128X
Interantional Protection Rating	IP65
Operating temperature range	-5°C do 40°C
Permissible humidity (at 40°C)	up to 95%
Weight	20kg

## Design and operation

The ISK-11/M2 camera is the latest generation of explosion-proof cameras in our range. While it uses the ISK-11 camera fire-proof enclosure, all similarities end there. The analogue camera of the previous product has been replaced with a megapixel-resolution IP camera. The control data and video feed transmission is handled by an IS optical fibre Ethernet 100Base FX network with EFI-13 modules. This allows simultaneous video transmission from multiple cameras over one pair of fibres. The included PSU can handle three typical supply voltages: 42 VAC, 133 VAC and 230 VAC.

## Types of workmanship

The range includes three versions of the camera:

- **ISK-11/M2 ZOOM**  
with a 1.3 MPix image sensor and a 20x power zoom (with remote control), it is perfect for installation wherever precise surveillance of near and far objects matters.
- **ISK-11/M2 HD**  
with a 2 MPix image sensor, a remote focus control function and a high-performance video processor, the camera is intended for operation at limited illumination. The minimum illumination in the colour mode is 0.0017 lx, and the WDR function at 100dB significantly reduces over and underexposure e.g. caused by strong lights aimed at the camera.
- **ISK-11/M2 E**  
with a 1.3 MPix, the device offers the basic IR camera functionalities.

Irrespective of their versions, each camera features a high-power LED illuminator. The zoom and HD cameras have a remote illuminator on-off functionality.

The cameras have memory modules for local image recording e.g. per a preset schedule, triggered by motion, etc.



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SID-16

## SID-16 TRACKING SIGNAL RECEIVING DEVICE



CATEGORY:

PERSONNEL  
TRACKING-

CERTIFICATIONS



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EMTAG-16

## EMTAG-16 SIGNAL TRANSMITTER

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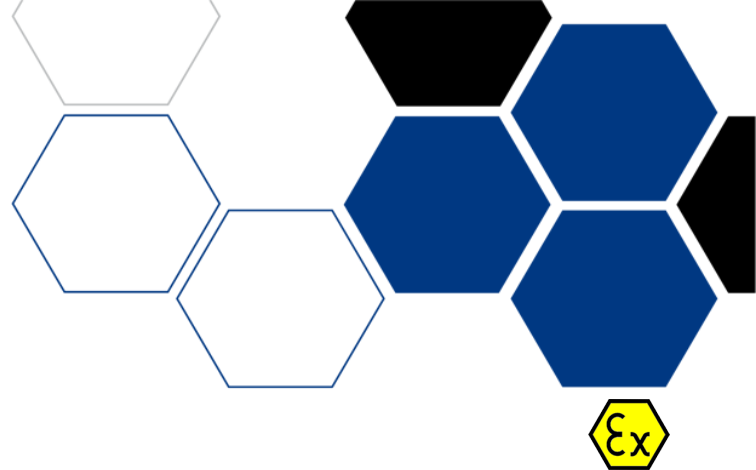
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WAJL-07

## SWITCH WAJL-07

The switch WAJL-07 is designed for detection of the GLON transmitters, for example built in the individual mine cap lamp. The switch can be used to detect miners presence (equipped in lamps with the GLON transmitter) riding on conveyor and to stop in the case of action.

### Functions

- mating with the control system
- two output circuits:
  - freely configurable,
  - contact
- optic signalization of the device's operating state (shining, double colored LED diode)
- choice of the type of output circuit by a switch
- mode of work with the action storage chosen by the switch
- automatic configuration of the device's range

### Technical characteristics

Rated voltage supply	15V
Current consumption	< 50 mA
Type of the universal output circuit	contact, contact with diode, contact with ZRK
Type of inlets	M25x1,5 i M20x1,5
Diameter of the external additive wires	13-18 mm; 6-12mm
Protection level	IP 65
Mass and weight	220x160x90 mm, 1 kg
Working temperature range	From +5°C to 40°C

### Design and operation

In the case of normal operation, LED diode is green and device's output terminals are shorted. The GLON transmitter in the range of operation of the switch WAJL-07 causes that output terminals are opened and running is stopped, LED diode is red. The type of universal output circuit (joint, joint with the diode, joint with the ZRK) can be chosen by the switch, the second circuit contains a joint.

The device can work in the mode with operations storage, which is then maintained unless it is canceled by either a built-in button "KAS" or external joint. This mode is chosen by the switch.

#### CAUTION!

The switch WAJL-07 is an additional element, which improves safety. Using it does not release you from use of primary, required by the safety rules protection, for example wire switches or gates.

CATEGORY:

PERSONNEL  
TRACKING-

CERTIFICATIONS



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## Montage

The switch is assembled by using a grip with holes of diameter 11mm. Electric connections should be made by a wire of cross section  $\geq 1,5 \text{ mm}^2$ . Wires are inserted to the switch by using cable inlets. Insertion and strangulation of the wires should be made carefully, so that required tightness and mechanical strength are provided.

Internal wires should be connected to a terminal strip according to a sign on the data plate, which is inside the device. After connecting the switch it is necessary to choose a proper type of output circuit and an operation mode (with or without the option of operation storage) and to conduct the procedure of automatic range of operation.



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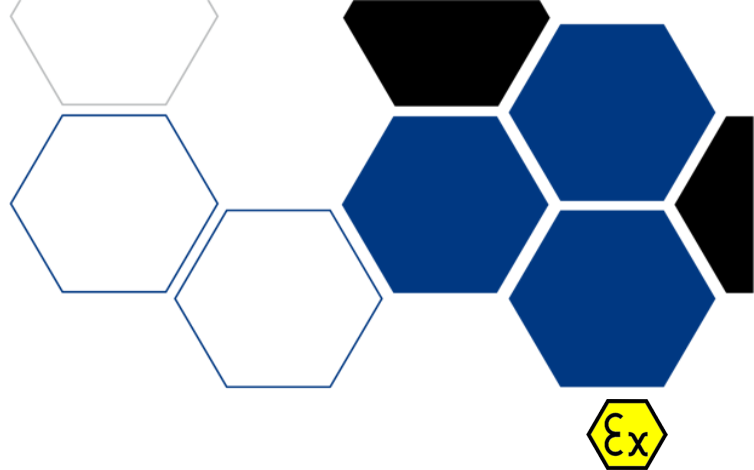
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## MINSEARCH-15

# MINSEARCH-15 POSITION FINDING RECEIVER

The MINSEARCH-08 position finding receiver is used for the searching of miners during rescue operations. A prerequisite for using a receiver is the provision of each miner with cap lamp having a built-in location transmitter emitting location signal 4-6 kHz. Intrinsically safe embodiment of Ia category and IP 54 protection level of casing makes possible the application of receiver in closed areas of mining plants with any given concentration of methane.



CATEGORY:

EMERGENCY RESCUE

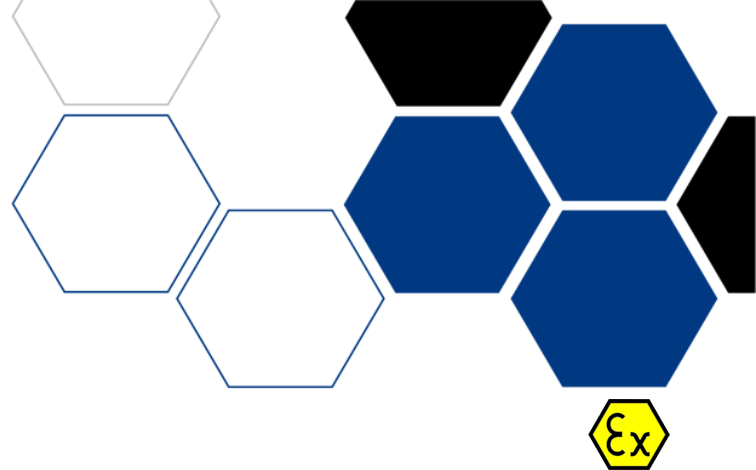
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## Minsearch-08

# MINSEARCH-08

The MINSEARCH-08 position finding receiver is used for the searching of miners during rescue operations. A prerequisite for using a receiver is the provision of each miner with cap lamp having a built-in location transmitter emitting location signal 4-6 kHz. Intrinsically safe embodiment of ia category and IP 54 protection level of casing makes possible the application of receiver in closed areas of mining plants with any given concentration of methane.

## Functions

- Automatic detection of location transmitters within distance range as determined in the technical parameters section
- Sensing of distance by making measurement of the module of amplitude of magnetic intensity
- Sensing of distance by making incremental measurement of magnetic intensity in the direction of its greatest changes
- Accurate location of transmitter with the use of searching antenna
- Graphical or textual presentation of received signals
- In-built functions of scaling (option of receiver re-scaling when particular distance is known) and of self-calibration (verification of processing path with the help of in-built generator)
- Optimal battery management and monitoring of its charging (information about current charging status, counting of charging cycles, prompting replacement)
- Optional function of recording results of sensing in the internal memory of the device and of their subsequent transmission to a PC through the RS232 interface
- Option to develop some more functions on client's special request

## Technical characteristics

Transmitter detection range	0 - 30 m (at low level of environmental interferences) 50 m (at presence of steel objects as pipelines, rails etc.)
Range of the "searching" antenna	0,1 - 2 m
Resolution	0,1 m
Sensing band	4000 - 6000 Hz
Power supply	Lithium-ionic battery
Capacity	10000 mAh
Energy consumption	1 W
Length of time of device operation	40 hrs
Total weight of device and antenna	2.2 kg
Display	Colour LCD TFT 3.5" 240x320
Keyboard	6 functional keys
Methods of measurement	1 - absolute measurement of magnetic intensity 2 - incremental measurement of magnetic intensity 3 - determination of signal source direction
Antenna	1 - omnidirectional antenna x-y-z 2 - uniaxial suppressed - „searching” type antenna
Dimensions of omnidirectional antenna	Ø98 x 90 mm (enclosure), Ø40 x 110 mm (grip)
Length of "searching" antenna	0,5 m

CATEGORY:

EMERGENCY RESCUE

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Dimensions of position finding receiver	128x128x48 mm
Protection level	IP 54

## Design and operation

The system is provided with keyboard and display enabling communication with a user. Communication is made simple, in consideration of the difficult conditions of use prevailing during rescue operations carried out underground in mining plants.

Relevant information is presented on graphical display.

Device casing is resistant to the conditions existing in mines, underground. The device is located inside of plastic casing.

Position finding receiver has got two types of antennas for signal receiving: omnidirectional antenna and searching antenna. Omnidirectional antenna is applied in long-distance sensing, whereas searching antenna is used for direct location of miner during last phase of search operation.

The device amplifies and digitally processes antenna signal. Then, the signal undergoes processing in signal processor with the use of the DSP algorithms. This allows for simultaneous detection of several location transmitters. Each transmitter may be, then, closely examined and located. Results of sensing are displayed in graphical and textual form on LCD.

## Advantages

- operation and sensing are made easy
- legible presentation of results due to the applying of colour graphical display
- all transmitters are detected simultaneously
- automation of sensing

option of recording results of sensing and of their reproduction later on

- option of adapting of the device to suit individual requirements of client thanks to program-following control
- small weight and dimensions
- full information about battery status provided
- energy consumption kept at a low level



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Smart gas finder 13

## METHANE GAS DETECTOR SMART GAS FINDER-13

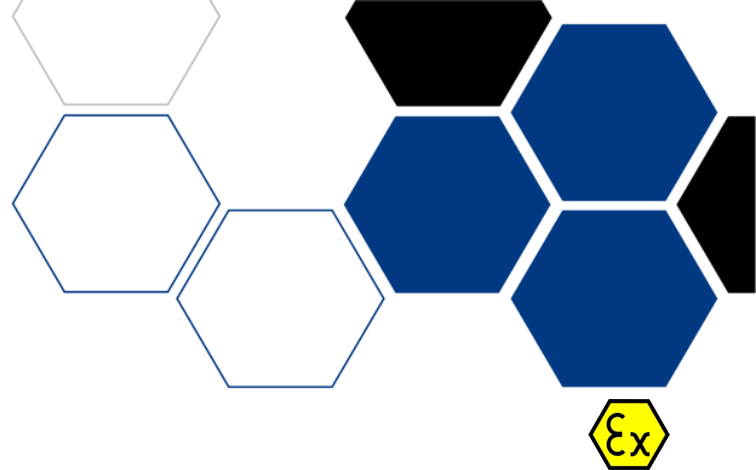
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MEASUREMENTS

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EM-WD-10

## EM-WD-10 UNDERGROUND MINING SCALES

The EM-WD-10 underground mining scales is intended for measuring the output carried over conveyor belts or stored in the batching tank. The solution is intended for use in methane and/or coal dust explosive atmospheres. This is a Cat. M2 device.

### Functions

The EM-WD-10 underground mining scales is a universal tool, which may serve either as a tank scales or a conveyor scales. The device comprises a controller, shown in the figure above, and the weighing bridge. The controller design is universal, and the specific operation type depends on the applied software. This allows reading a maximum of 6 strain gauges installed on the weighing bridge and a motion sensor, which is used in the conveyor scales mode. The device is interfaced with a master automation and visualisation system over 2 on-off IS inputs and 2 on-off IS outputs, complemented by an IS RS-485 serial interface (ModBus ASCII / RTU). The functions of specific on-off inputs/outputs can be adjusted to specific application demands. To facilitate the device operation, the controller has a 3.5" full colour graphic display.

The weighing bridge is adapted to the operation type (which can be the tank scales or the conveyor scales), specific user demands and the interfaced fittings.

In the conveyor scales mode, the most popular designs include 2 or 4 strain gauges with one or several three-pulley units. The 4 strain gauge design with multiple three-pulley units, shown in the figure to the side, boasts the highest measurement accuracy. This version finds use in precision mine output batching systems. The 2 strain gauge design with one three-pulley unit is used in confined space or in systems with lower accuracy demands, e.g. conveyor speed control systems dependent on output volume.

### Technical characteristics

Rated supply voltage	127÷230V AC -15% / +8%
Supply voltage frequency	50Hz
Maximum RMS voltage (Um)	250V AC
Rated current	1A
ATEX mark	I M2 Ex d [ia Ma] I Mb
EC Type Test Certificate no.	OBAC 10 ATEX 628X
Protection rating	IP54
Ambient temperature range	between 0°C and 40°C
Permissible humidity at +40°C	95%
Weight	70 kg
Outer dimensions	730 x 650 x 300 mm
Power supply wire size	0,2÷4mm <sup>2</sup>
IS signal wire size	0,2÷2,5mm <sup>2</sup>

CATEGORY:  
MEASUREMENTS

CERTIFICATIONS

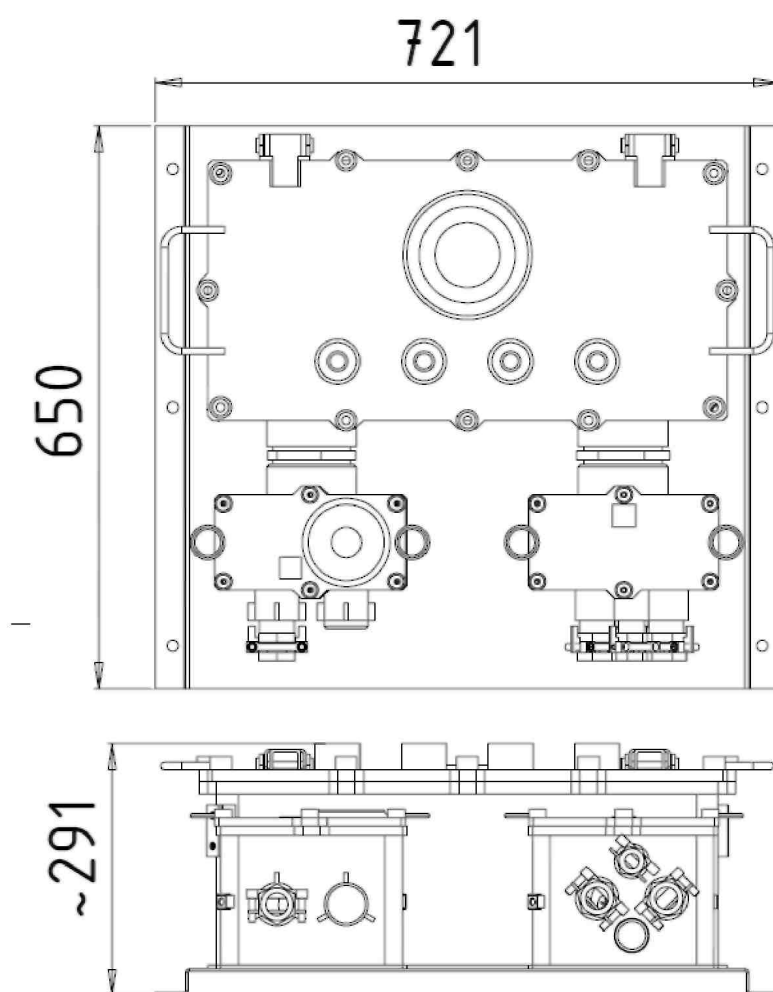


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## Montage



## Advantages

The universal controller design enables operation in the conveyor or tank scales mode

- Connectivity with up to 6 strain gauges
  - IS contact outputs or RS-485 serial connector
  - Integrated graphic display acts as a local visualisation panel
  - Available configuration of the conveyor scales mode weighing bridge:
- 2 strain gauge design: compact equipment design version
  - 4 strain gauge design: extensive equipment design with improved accuracy
- The weighing bridge mechanical design is adapted to the conveyor belt in operation



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## OLU-08

# OLU-08 LAMP

The lamp OLU-08 is designed to illuminate galleries in underground mining plants. It can be installed in areas with potentially methane or coal dust explosion hazard.

## Technical characteristics

Version	OLU-08/ 1-27W	OLU-08/ 1-150W	OLU-08/2-3 2W	OLU-08/3-7 0W	OLU-08/3-7 0W
Supply voltage	230V 50-60Hz				
Current consumption A / power coefficient $\lambda$	-/0.5	-/-	for 26W 0,12A / 0,96	for 32W 0,16A / 0,96	0,2A / 0.98 0,35A / 0.95
Lamp cap	E27	E27	GX24q-3	GX24q-4	E27
Electronic stabilizer	-	-	BCQ142 /TCI/ ó SCS42.1Q- 01 /BAG electronics/	BCQ142 /TCI/ ó SCS42.1Q- 01 /BAG electronics/	Powertroni c PTI 70/ 220-240S /Osram/
Cable inlets	WKE 17-23				
Maximal diameter of conductor	4mm <sup>2</sup>				
Connecting terminals	WAGO type 232				
Passing current terminals load	20A				
Protection level	I				
Ambient temperature	-10oC ≤ Ta ≤ +40oC				
Relative humidity at temperature +35oC	up to 95%				
Protection level according to PN-EN 60529	IP 65				
Weight	9,8kg				
Dimensions	332 x 320 x 209mm				

## Execution

OLU-08/1-27W integrated compact fluorescent lamp of maximal power 27W  
 OLU-08/1-150W typical bulb, incandescent-mercurial halide bulb - maximal power is 150W  
 OLU-08/2-32W non-integrated compact lamp for power 26W, 32W  
 OLU-08/2-42W non-integrated compact lamp for power 42W  
 OLU-08/3-70W methahalide lamp, soda lamp for power 70W

## Advantages

- increased mechanical impact resistance
- greater light flux and angle of light distribution
- power saving quality
- easy access to change source light



CATEGORY:

TUNNELS AND  
LONGWALLS  
LIGHTING

CERTIFICATIONS



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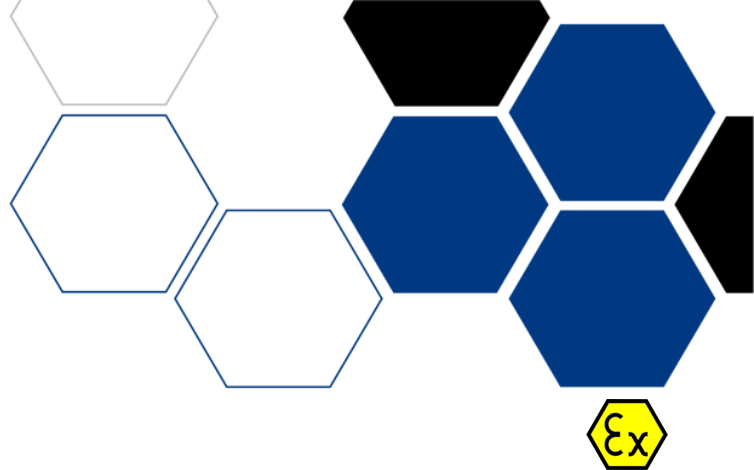
## Types of workmanship

Version	Light source	Luminous flux [lm]
OLU-08/1-27W	MASTER PL-Electronik max. 27W/827 /Philips/	1500
	DULUX EL max.24W /827 /Osram/	1800
OLU-08/1-150W	Bulb standard 150W	2200
	Halogen A4 pro 150W BTT46 CL 1CT /Philips/	2550
	Halogen Halolux BT 64478 BT /Osram/	2550
OLU-08/2-32W	DULUX T/E 26W /840/ IN PLUS /Osram/	1800
	DULUX T/E 32W /840/ IN PLUS /Osram/	2400
	MASTER PL-T TOP 26W /840/ 4p 1CT /Philips/	1800
	MASTER PL-T TOP 32W /840/ 4p 1CT /Philips/	2400
OLU-08/2-42W	DULUX T/E 42W /840/ IN PLUS /Osram/	3200
	MASTER PL-T TOP 42W /840/ 4p 1CT /Philips/	3200
OLU-08/3-70W	Metal-halogen HQI-E 70/WDL/CO /Osram/	4700
	HCI-E/P 70/830/WDL/PB/CO /Philips/	6400
	soda lamp NAV-E 70/E /Osram/	5600
	soda lamp SON 70W/E /Philips/	5600



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OLC-1

## OLC-1 EXPLOSION-PROOF LAMP

I M2 Ex db I Mb

Explosion-proof mining lamp. ATEX certified product of Group I, Category M2.

Lamp designed for mining longwalls, tunnels, underground railway platforms and all areas with explosive environments. For areas with methane and coal dust explosion hazard.

### Features/Technical specification

Parameter	Value	
Version	standard (fluorescent tube)	LED
Voltage	230V +/-10%	100-270V
Frequency	50Hz	
Power consumption	40W	36W
Power factor	0.98	
Light source	DULUX L40W/21 or PL-L 40W/840 or UNIQUE-L 40W/840 Long life	LED Module
Luminous flux	3500 lm	4500 lm
Cap	2G11	-
ATEX marking	I M2 Ex db I Mb	
Ingress protection	IP65	
Cable gland	WKE 17-23	
Ex blanking plug	70.090	
Max. conductor cross-section	1.5 x 4mm <sup>2</sup>	
Current carrying capacity of the terminals	20A	
Protection class	I	
Ambient temperature	-10°C up to +40°C	
Acceptable humidity at +35°C	95%	
Weight	7.8 kg	
External dimensions	155 x 120 x 925 mm	

CATEGORY:

TUNNELS AND  
LONGWALLS  
LIGHTING

CERTIFICATIONS



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complete lamp bowl

assembly slat unit: fluorescent  
compact lamp, electric stabilizer,  
through - cable bunch

two clamping slats

set of fixing rods

two inlet sets

two choices of light source:  
linear fluorescent lamp and  
40W energy-saving LEDs



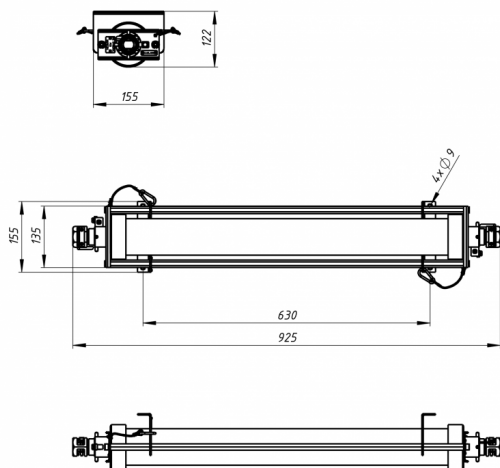
Foto 1. Linear fluorescent lamp.



Foto 2. Lamp with LEDs.

## Design and operation

Dimensions:



- two cable glands or,
- cable gland and blanking plug,
- connection strip set,
- fixing bars' set,
- two terminal strips,
- complete lampshade,
- energy-saving fluorescent tubes or,
  - LED module,
- electronic stabilizer,
- cables set for looping,
- ready for 230V supply,
- allows for looping.

## Advantages

- high resistance against impacts,
- high value of the luminous flux,
- optimal beam angle,
- energy-saving,
- easy light source replacement,
- reduced weight.



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SWIT-14

## SWIT-14 LAMP FOR LONGWALLS

Ex I M2 Ex db I Mb

The ŚWIT-14 lamps have been optimised for use at the powered roof supports of longwalls. The solution is intended for use in methane and/or coal dust explosive atmospheres.

### Features/Technical specification

Parameter	Value		
Product name	ŚWIT-14/		
Version	/230	/42	/24-230
Voltage range	100-270V	35-50V	24-230V
Nominal power	max. 45W		
Frequency range	50-60Hz		
Power factor	min 0.9	min 0.5	min. 0,75
Ingress protection	IP65		
Source of light	12 x LED		
Luminous flux of the light source	up to 5000 lm		
Nominal CCT	4000 K (white neutral)		
Cable gland	WKW 17-23		
Conductor diameter	10 mm <sup>2</sup>		
Terminal strip	Phoenix Contact		
Current carrying capacity of the terminals	25A		
Protection Class	I		
Working temperature range	-10°C do +40°C		
Maksimum humidity (at +35°C)	95%		
Weight	12,0 kg		
External dimensions	284 x 250 x 122 mm		
ATEX Certificate number	FTZU 13 ATEX 0145X		

### Design and operation

The advanced optical system, based on state of the art LEDs and asymmetrical directional lenses, has been designed for uniform illumination of the service space in walking longwall shields. The lamp can be used for effective illumination of other spaces, e.g. train stations, galleries, switching substations, conveyors (especially handling conveyors), etc. The long standing experience in the mining lighting business has allowed us to deliver a device with the luminous flux of light sources at as much as 4000lm, coupled with an eye-friendly neutral light colour (4000 K). The matt white lens version reduces the luminous flux by ca. 20 to 30%, with the benefit of complete elimination of glare.

The lamp enclosure is made of steel and cast iron. The enclosure is galvanized during the manufacturing process for extra anti-corrosion protection. The lens is made of shock-resistant polycarbonate. The lamp has small dimensions, low weight and a small number of shroud fastening bolts. This significantly facilitates handling and installation of the lamp. Aside from the standard mounting holders, the side walls of the lamp feature two threaded holders for M10 bolts.

CATEGORY:

TUNNELS AND  
LONGWALLS  
LIGHTING

CERTIFICATIONS

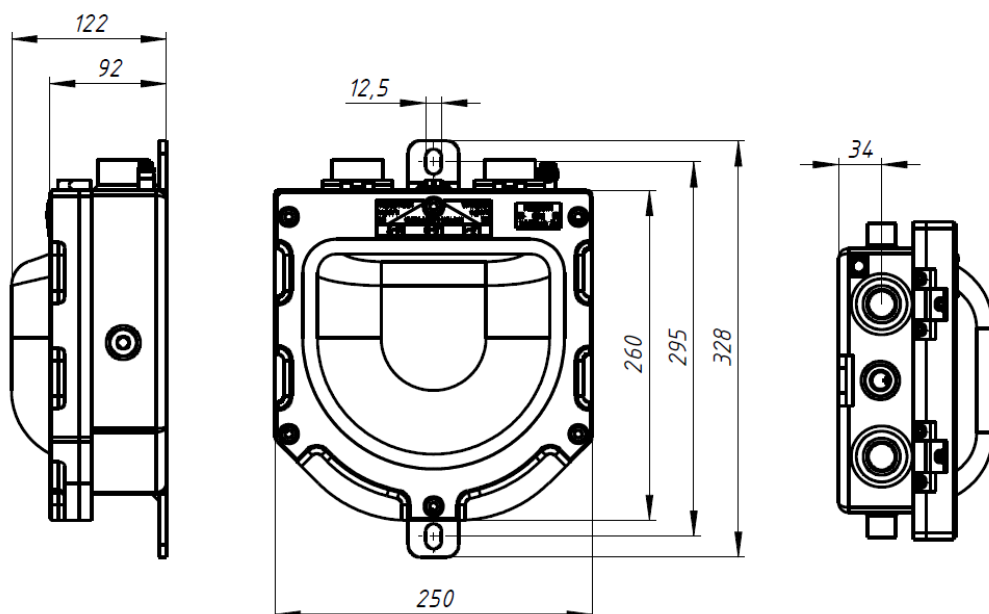


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The wide selection of PSU versions suits the entire range of power supply voltages used in underground mines: 35-50 VAC, 100-270 VAC and 24-230 VAC. The lamps with the 100-270 VAC PSU feature an additional selector for light intensity adjustment from 25% to 100%. Reduced light intensity reduces power consumption, and thus limits the lamp heating. This function is especially useful when installing the lamps in areas of high temperature.

The lamp features a two-function service switch, which disables the inline power supply of the downstream lamps, or isolates the operated lamp while keeping the inline power supply on. A new solution is the phase indicator system, based on three red LEDs in the back of the lens. When on, they indicate that all three power supply phases of the lamp are live. This facilitates pinpointing which wire is damaged or insufficiently tightened on the terminal strip.



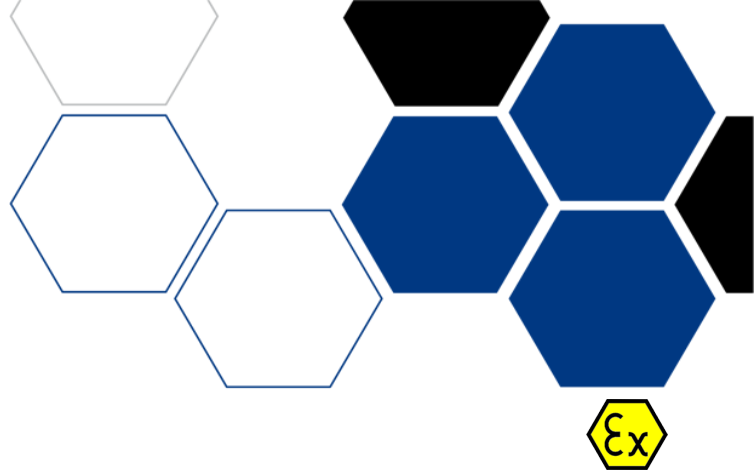
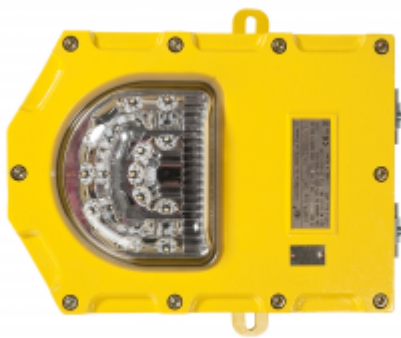
## Advantages

- Multi-functional service switch.
- Live 3-phase power supply indicator system.
- Wide selection of PSUs for the entire range of standard mining voltage systems. The most popular version of the lamp, can cover itself the voltages between 100 and 270V.
- Light-intensity regulator in the /230 version - allows to adjust the power and the required luminous flux intensity according to any specific application of the lamp.
- Light source luminous flux max.: 5000 lm
- Available with matt white or clear lens
- Small dimensions, reduced weight and fewer shroud fastening bolts facilitate handling and installation
- Large terminal strip (max. wire size: 10 mm<sup>2</sup>) facilitates connection of power supply lines
- The lens is made of shock-resistant polycarbonate



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SWIT-09

## SWIT-09 LAMP FOR LONGWALL

The ŚWIT-09 lamp is approved for use in underground mines in the workings categorised as "a", "b" or "c" class of methane explosion hazard as well as "A" or "B" class of coal dust explosion hazard. Due to the light propagation characteristics, the lamp is especially designed for use in the powered roof support are

### Usage

The optical unit consisting of 12 LEDs is designed to provide the best possible lighting conditions in the space around the lamp, not just under it. It is particularly important when working in the longwall workings with powered roof supports – to provide even lighting in the passageways for the scraper conveyor and longwall working personnel. The lamp lens is available in two versions – transparent and matte (reducing the glare effect). The lamp is available in two versions with different power input and the type of LEDs used.

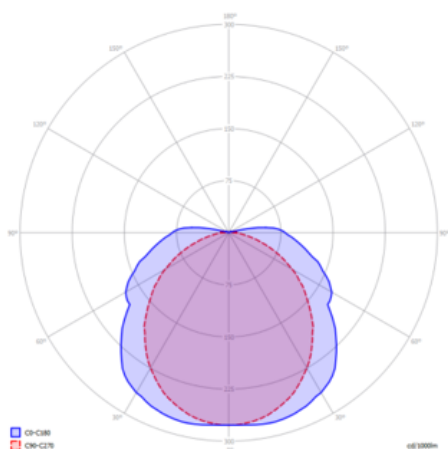
The lamp housing is highly resistant to mechanical impact. The housing is made of steel and cast iron. It is also galvanised during production, as additional corrosion protection means. The lens is made of impact-resistant polycarbonate resin. The use of a rubber seal between the lamp body and cover is important. It guarantees the maintenance of the IP65 protection rating during the entire life of the lamp.

A broad selection of power supply units covers the entire range of supply voltages used in underground mines: 24V, 42V, 127–230V and 24–230V. A large terminal bar (for wires with the max. diameter of 10mm<sup>2</sup>) provides for easier installation of power supply cables.

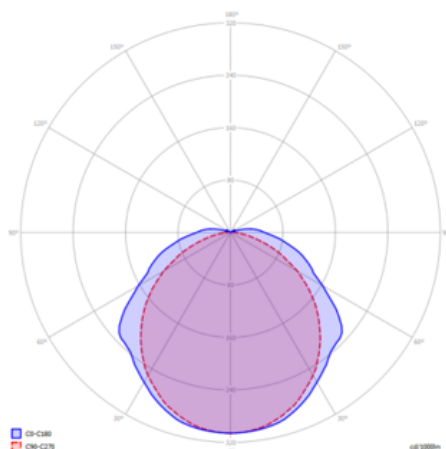
The ŚWIT-09 lamp is equipped with a service switch which enables determining the location of the damage in the cable by disconnecting the pass-through power supply of further lamps and closing the ground continuity circuit with a diode. The operation of the service switch does not require opening the housing.

The cable glands enter from the back. There is an optional version of the lamp with fixing points in the vertical axis (ŚWIT-09/.../TW) – designed for use in the powered roof support niche.

### Technical characteristics



NLS-6 LED 600 20W i NLS-6 LED 1200 37W



NLS-6 LED 600 37W i NLS-6 LED 1200 70W

CATEGORY:

TUNNELS AND  
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## The most important features

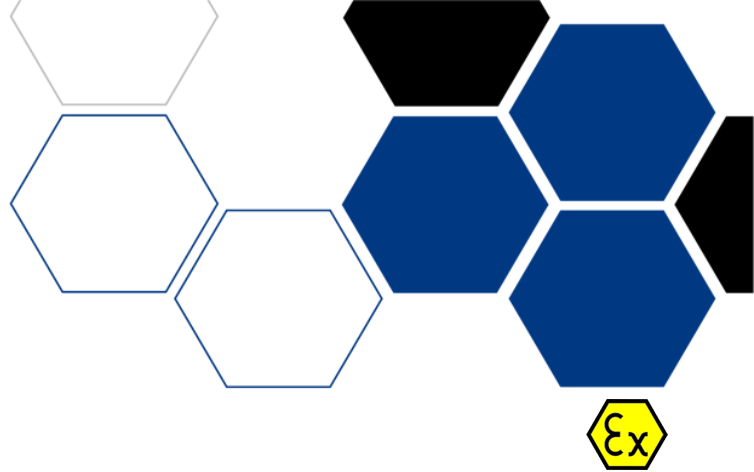
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- high mechanical impact resistance,
- large luminous flux and wide light propagation angles,
- energy efficiency,
- long life light source,
- service switch.



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SWIT-08

## SWIT-08, SWIT-08T MPS LAMPS FOR LONGWALL

The ŚWIT-08 lamps are intended for operation in underground mines with the methane explosion hazard levels a, b and c, and the coal dust explosion hazard class A or B. Their specific light distribution performance makes the product ideal for use in mechanised longwall systems

### Device description

The optical system is based on 12 LEDs and designed for maximum illumination of the volume below and around the lamp. This is especially advantageous during operations within mechanised longwall sections: the lamp provides uniform illumination distribution along personnel passageways, the push-plate conveyor and the longwall head. The lens is available clear or matt for a reduced glare risk. The lamp is available in two versions differing in power demand and LED types.

The lamp enclosure is extremely robust and resistant to mechanical shock. It is made of steel and cast iron. The enclosure is galvanized during the manufacturing process for extra anti-corrosion protection.

The lens is made of shock-resistant polycarbonate. Note the special rubber seal between the housing and the lid. This solution ensures the IP65 rating throughout the service life of the product. A wide selection of PSUs (power supply units) covers the entire range of supply voltages used in underground mines: 24V, 42V, 127-230V and 24-230V. The large terminal strip (max. wire size: 10mm<sup>2</sup>) facilitates connection with the feeders.

The ŚWIT-08 family lamps can feature cable glands on the sides, as in ŚWIT-08, or from the back, as in ŚWIT-08T. There is a lamp version available with vertical fasteners, ŚWIT-08T/.../W, adapted for installation in utility pockets along the mechanised longwall section.

### Technical characteristics

#### NEXT-GENERATION LED ŚWIT-08 LAMP TECHNICAL PARAMETERS

Product name	SWIT-08/		
Version	230/25	42/25	24-230/25
Rated supply voltage	127-230V	35-50V	24-230V
Lamp system output (+/- -20%)	25W	25W	25W
Rated wattage	max. 35W		
Supply voltage frequency	50-60Hz		
Power factor	min 0.9	min 0.5	min 0.75
Protection rating	IP 65		
Light source	12 LEDs		
Standard light source luminous flux	4000 lm		
Light colour temperature	4000K		
Cable gland	WKW 17-23	WKW 17-23	WKW 17-23
Fire-proof plug	72.090	72.090	72.090
Maximum wire size	10 mm <sup>2</sup>		
Terminals	WAGO or Phoenix Contact		
Current terminal capacity	65A		
Appliance class	I	I	I
Ambient temperature range	-10°C to +40°C		
Permissible humidity at +35°C	95%		
Weight	15.5 kg		
Outer dimensions	280 x 305 x 140 mm		

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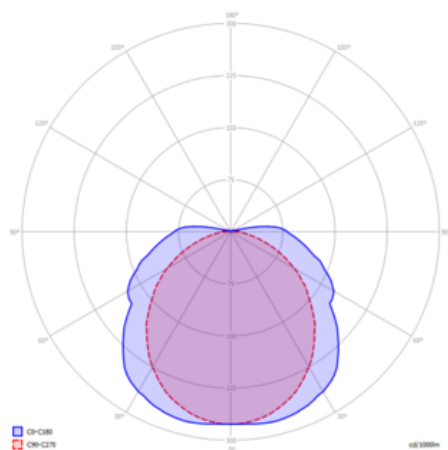
TUNNELS AND  
LONGWALLS  
LIGHTING

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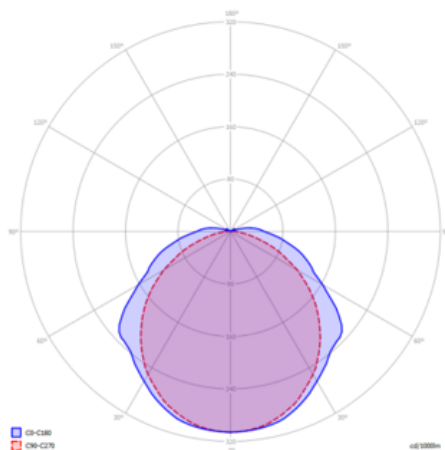


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NLS-6 LED 600 20W i NLS-6 LED 1200 37W



NLS-6 LED 600 37W i NLS-6 LED 1200 70W

## Advantages

- High mechanical shock strength
- High luminous flux output
- Wide light distribution angle
- Energy-efficient
- Long-life light source
- Small weight



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OLR-2D

## OLR-2D DOUBLE APPROVAL LAMP

- I M2 Ex de I Mb
- II 2G Ex de IIB+H<sub>2</sub> T6 Gb
- II 2D Ex tb IIIC T70°C Db; IP65

The OLR-2 is one of the very few mining lamps with the double approval for use in areas where methane and coal dust may be present with hydrogen. That is why it can be used to illuminate traction battery charging stations, or underground fuel and lubricant storage rooms. The light fixture is Cat. M2.

### Features/Technical specification

Parameter	Value
Supply voltage	230V ±10%
Supply voltage frequency	50/60 Hz
Current load	0,14 A
Power factor	0,95
Light source	LED
Light source power	24W
Light source luminous flux	3000 lm
Ingress protection	IP65
ATEX Certificate no.	FTZÚ 13 ATEX 0012X
Cable gland	WKE 17-23
Fire-proof plug	72.090
Wire size	1,5 - 4 mm <sup>2</sup>
Terminals	Type 616M terminal strip
Terminal strip	Phoenix Contact
Current carrying capacity of the terminals	20A
Protection class	I
Ambient temperature range	-10°C up to +40°C
Acceptable humidity at +35°C	95%
Weight	8,7 kg
Dimensions	703 x 285 x 117 mm

### Functions

The OLR-2D is a modified OLR-2 lamp, with the CFL replaced with state of the art SMD LEDs. This has reduced the power demand with an increase in the light source luminous flux. The lamp fixtures are available in two versions: with matt or clear lens. The matt lens version reduces the luminous flux by ca. 20 to 30%, with the benefit of complete elimination of glare.

The lamp enclosure is made of paint coated galvanized steel. The lens is made of a shock-resistant polycarbonate tube. The connection chamber is separated from the light source circuit, which is why the LEDs cannot be soiled when the lamp is being connected to the electrical system. Each lamp features two cable gland sets for inline power supply. The glanded cable size ranges from 17 to 23 mm. The enclosure is rated at IP65.

CATEGORY:

TUNNELS AND  
LONGWALLS  
LIGHTING

CERTIFICATIONS



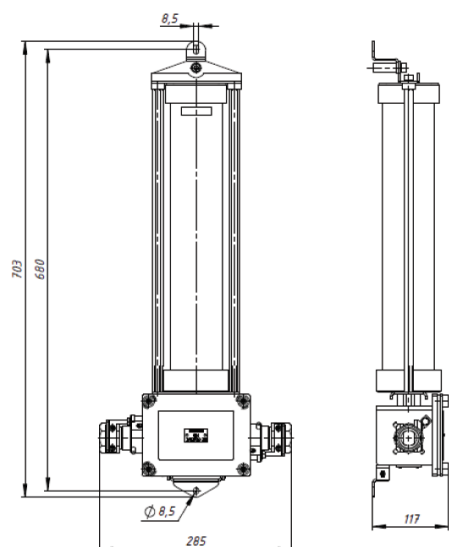
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The lamp is powered with 230 VAC. The installed PSU features active PFC, which minimises the reactive power consumption. This enables an optimum usage of the transformer unit

## Design and operation



## The most important features

- LED-based light source
- Light source luminous flux max.: 3000 lm
- White neutral light
- Available with matt or clear lens
- Designed for use in methane, coal dust and/or hydrogen explosive atmospheres
- The lens is made of a shock-resistant polycarbonate tube
- Protection rating: IP65
- Active PFC PSU



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## OLR-2

# OLR-2 LAMP

The OLR-2 luminaire is designed for use in areas and rooms in mining plants which are in danger of explosion, according to the characteristic described in the explosion-proof mark. The luminaire is especially designed to illuminate the charging rooms of traction batteries and mining stocks of fuels and greases.

## Technical characteristics

Supply voltage	230 V 50 - 60 Hz
Current input	0,16A
Power coefficient $\lambda$	0,98
Light source	DULUX L36/21 or PL-L 36W/840
Luminous flux	2300 lm
Cable inlets	WKE 17-23
Max wire intersection	4mm <sup>2</sup>
Connection clamps	Terminal strip type 616M
Current-carrying capacity of through wiring clamps	20 A
Protection class	I
Temperature range of work	from -100C to +400C
Relative humidity at 35°	Up to 95 %
Ingress protection acc. to PN-EN 60529	IP 65
Weight	8,7 kg
Overall dimensions	700 x 285 x 115

## Design and operation

- flame-proof construction of the chamber of light source,
- reinforced construction of the terminal chamber,
- lamp bowl made of polycarbonate
- construction elements made of steel which are protected by zinc and lacquer coat,
- luminaire equipped with energy saving compact fluorescent lamp,
- equipped in energy-saving compact fluorescent lamp 36W,
- adapted for supply voltage 230V.



CATEGORY:

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LONGWALLS  
LIGHTING**

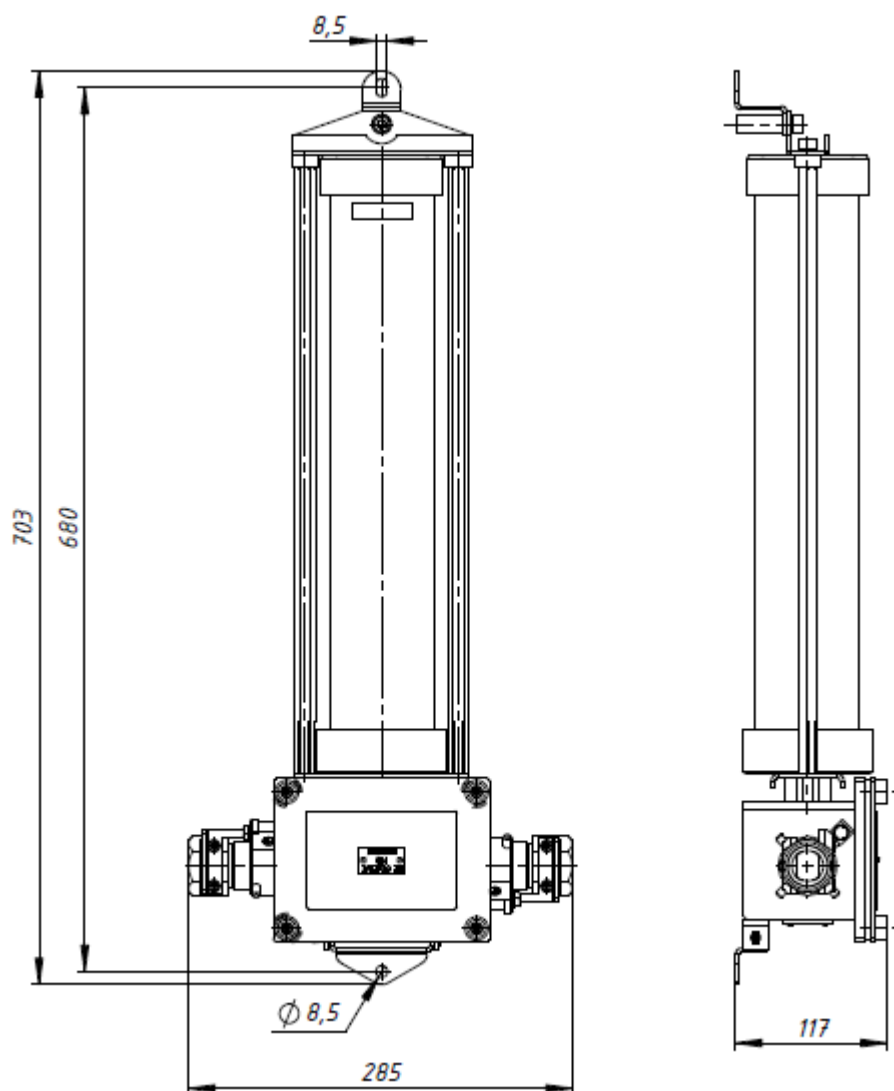
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## Execution



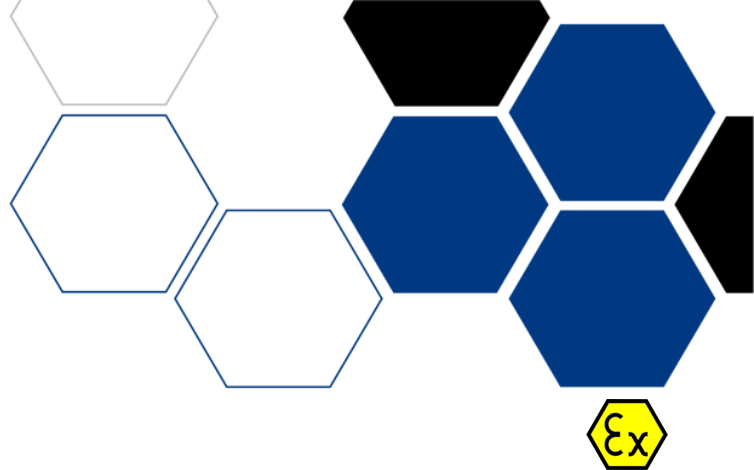
## Advantages

- big luminous flux and light distribution angle,
- highly resistant to mechanical damage,
- easily replaceable light source,
- energy save,
- small weight




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OLR-1

## OLR-1 EXPLOSION-PROOF LAMP

 I M2 Ex db I Mb

Explosion-proof mining lamp. ATEX certified product of Group I, Category M2.

Lamp designed for mining longwalls, tunnels, underground railway platforms and all areas with explosive environments. For areas with methane and coal dust explosion hazard.

### Description

Explosion-proof lamp OLR-1 is available with

LED's as a source of light:

- OLR-1-18 - LED's of 12W power and voltage between 100-250V or 22-50V,
- OLR-1-36 - LED's of 24W power and voltage between 100-250V or 22-50V,

or with fluorescent tubes:

- OLR-1-18 - fluorescent tube of 18W and voltage between 100-250V or 22-50V,
- OLR-1-36 - fluorescent tube of 36W and voltage between 100-250V or 22-50V.

Lamp available with or without a light matting element a to reduce the glare effect. It allows to reduce the uncomfortable visual sensation, however it also may cause a light intensity drop for about 20-30%.

Explosion and flame-proof construction

Enclosure made of shock-resist plastics

Equipped in energy saving compact fluorescent lamp

Adapted to rated supply 42 or 127V or 220V



Fluorescent luminaire 36W

OLR-1-18 with fluorescent or LED lamp 18 W

OLR-1-36 with fluorescent or LED lamp 36 W



LED luminaire 18W

CATEGORY:

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## Features/Technical specification

### Source of light: LED

Product	OLR-1-18	OLR-1-36
Version	230V ver. LED 42V ver. LED	230V ver. LED 42V ver. LED
Voltage	100-250 VAC, 140-340VDC, 22-50 VAC/DC	100-270 VAC, 140-380VDC, 22-50 VAC/DC
Frequency	50-60 Hz (AC) or direct voltage (DC)	
Power	12W	24W
Maximum current consumption	0.6A for 24 VDC 0.6A for 42 VAC 200 mA for 133 VAC 130 mA for 230 VAC	1.7A for 24 VDC 1.1A for 42 VAC 220 mA for 133 VAC 130 mA for 230 VAC
Luminous flux of the light source	1500 lm	3000 lm
ATEX marking	Ex I M2 Ex db I Mb	
Ingress protection	IP54	
Cable gland	WKE 17-23	
Ex blanking plug	72.090	
Max. conductor cross-section	4mm <sup>2</sup>	
Terminals	Terminal strip type 616M	
Current carrying capacity of the terminals	25A	
Protection class	I	
Ambient temperature	-10°C up to +40°C	
Acceptable humidity at +35°C	95%	
Weight	8.7 kg	9.8 kg
External dimensions	510 x 285 x 115mm	700 x 285 x 115mm

### Source of light: fluorescent tube:

Product	OLR-1-18	OLR-1-36
Voltage	230V, 127V or 42V	
Frequency	50-60 Hz	
Power consumption	18W	36W
Light source	DULUX L18 W/21 or PL-L 18 W/840	DULUX L36 W/21 OR PL- L 36 W/840
ATEX marking	Ex I M2 Ex d I Mb	
Luminous flux of the light source	1200 lm	2900 lm
Supply cable	5 x 4 mm <sup>2</sup>	
Cable glands	WKE 17-23	
Current carrying capacity of the terminals	20A	
Terminals	Terminal strip type 616M	
Ingress protection	IP54	
Protection class	I	
Ambient temperature	-10°C ≤ Ta ≤ +40°C	
Acceptable humidity at +35°C	up to 95%	
External dimensions	510 x 285 x 115 mm	700 x 285 x 115 mm
Mounting holes distance	487 mm	677 mm
Weight	8.7 kg	9.8 kg



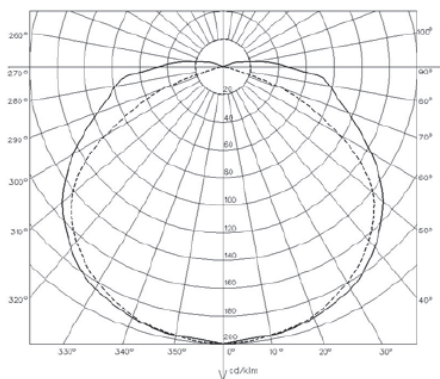
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## Beam angle curve

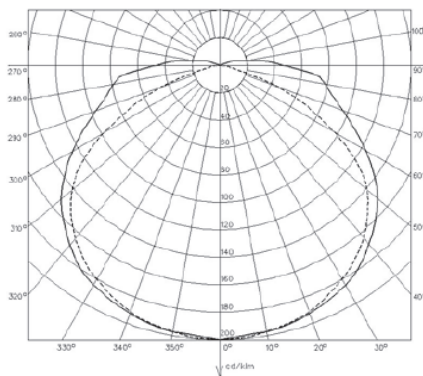
Curve of intensity distribution for luminaire type OLR-1-18 for rated voltage 220 V, counted over flux 1 klm

— in vertical plane of symmetry  
- - - in horizontal plane of symmetry



Curve of intensity distribution for luminaire type OLR-1-18 for rated voltage 220 V, counted over flux 1 klm

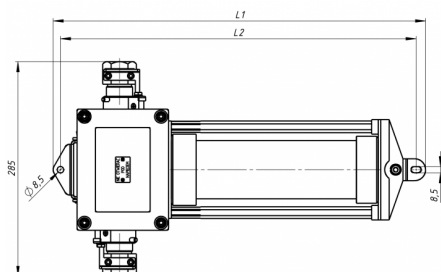
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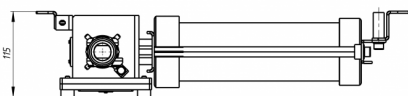
## Design and operation

- explosion-proof, flame-proof,
- cover made of highly impact resistant polycarbonate,
- energy saving fluorescent tubes,
- ready to be supplied with 42V, 127V or 230V

### Dimensions



OLR-1-36	700	677
OLR-1-18	510	487
Type	L1	L2



## Montage

Fixing - by 2 holes for M8 screws. Lamp allows for looping. The supply cable enters by 2 cable glands. In case of the final lamp, the unused cable gland is being replaced by an appropriate blanking plug.

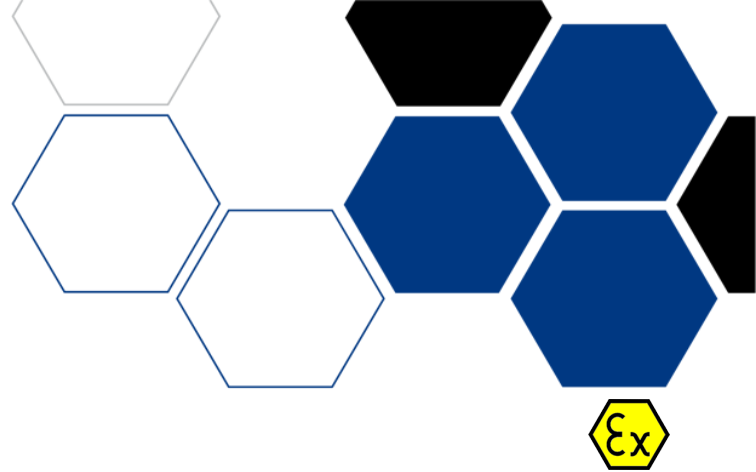
## Advantages

- high resistance against impacts,
- high value of the luminous flux,
- optimal beam angle,
- energy-saving,
- easy light source replacement,
- reduced weight.



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# LPI -14 FLAME-PROOF LONGWALL LAMP

Lamps type LPI-14 are designed and optimized in order to application in the low longwall support.

## Description

### Advantages

- The reduced size, especially height is less than 4 cm, that eliminates the need for making the niche in section bar.
- Simple and easy installation process thanks to the quick coupling electrical conductors and low weight.
- Perfect illumination of the workplace by applying the optical system with diodes LED and directional lenses
- Antistatic plastic casing with high resistance
- Polycarbonate lampshade with high impact resistance
- Optionally, the lamp base can be of stainless steel resistant to acids

## Features/Technical specification

Lamps are available in four versions with different power and additional features. The LPI-14 / ... /SMART version is equipped with optical signaling of pressure status in the mechanized section block. Control of cylinder pressure of support of mechanized section allows detection of potentially dangerous conditions of section. Too low pressure can mean that the session has not been placed correctly, however the increased pressure more than nominal value means excessive oppression of the massif. These statements are incorrect and the appropriate personnel should be informed about it. If the pressure value of one of the cylinders is outside the stated range, white LED, which illuminates the manway, is off and light color are activated.

The illumination color clearly indicates the status of the support cylinder pressure. The construction of the optical system allows signaling pressure states separately for both cylinders. The main diode illuminates the section all the time, independently of the value of the pressure.

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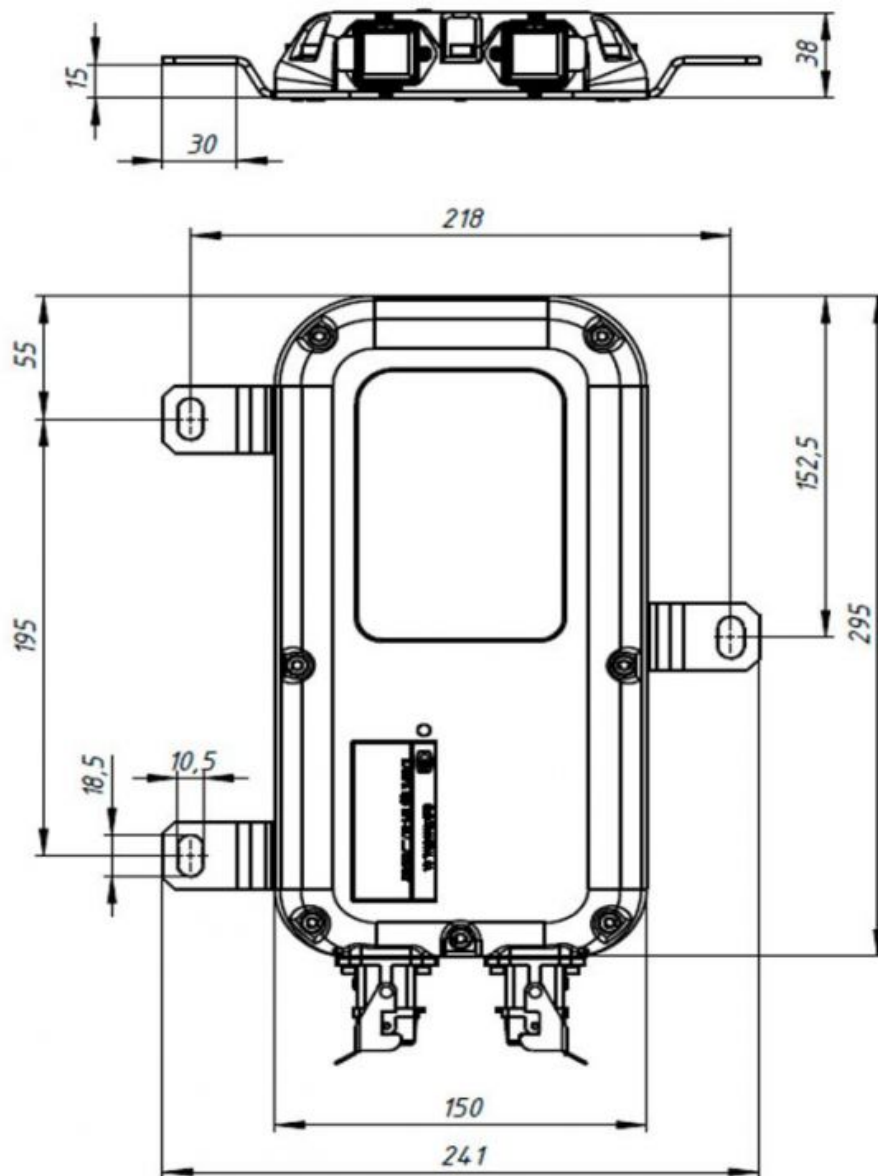
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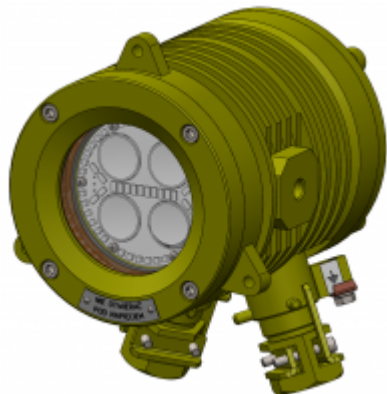
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ROZ-5D

## ROZ-5D LUMINAIRE

The ROZ-5D lamp may be used in underground excavations of mines:

- with no methane explosion hazard classified under the "a" class,
- with methane explosion hazard classified under the "b" or "c" class,
- with no coal dust explosion hazard,
- with coal dust explosion hazard of the "A" and "B" class.

The ROZ-5D lamp is classified in the M2 category and its energy supply must be switched off in the event of the formation of an explosive atmosphere.

The ROZ-5D lamp is intended for installation on underground mining locomotives as a main-beam or dipped-beam lamp to illuminate the route or as a red or white position lamp.

### Features/Technical specification

Technical parameters	
Parameter	Value (unit)
Supply voltage	12-24V DC, 42V AC
Frequency of supply voltage	0Hz, 50-60Hz
Rated power	24W - main beam 12W - dipped beam
ATEX marking	Ex I M2 Ex db I Mb
EC type examination certificate no.	FTZÜ 15 ATEX 0140X
Ingress protection	IP65
Source of light	LEDs
Luminous flux of the source of light	3000 lm
Cable gland	WKE 14-20
Flameproof cap	72.091
Maximum conductor cross-section	4 mm <sup>2</sup>
Connecting terminals	KDS 4 (Phoenix Contact)
Current-carrying capacity of current terminals	20A
Protection class	I
Ambient temperature	-10°C to +40°C
Acceptable humidity (at a temperature +35°C)	95%
Weight	11 kg
external dimensions (W x H x L)	155 x 220 x 180 mm - glands from the bottom 155 x 160 x 240 mm - glands from the back

### Design and operation

The lamp consists of the following main parts: the body (1), front head (2), back cover (3), heat sink unit (4), and power supply unit (5). The body is made of steel tube, in which there is a partition that divides the lamp into two parts: the source-of-light part and the terminal part.

The source-of-light part includes a heat sink unit (4) with LEDs. The front head (2), which closes the source-of-light part, includes a transparent cover (9) made of tempered glass. The head is screwed to the body with 4 M6x25 hexagon-socket cap screws (10).

The terminal part includes a power supply unit (5) with a terminal block (6) consisting of current through-put terminals, a PE terminal, and an earthing continuity terminal. Depending on the version, WKE 14-20 cable glands (7) are screwed into the body or the back cover. The terminal part is protected by the back cover (3), which is screwed into the body with 4 M6x25 hexagon-socket cap screws (8).

The ingress protection (IP) of the lamp is provided by:

- front head seal (11),
- back cover seal (12),
- cable gland seal.

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The lamp includes the following flameproof gaps (connectors):

- between the head and the body,
- between the back cover and the body.

Main-beam or dipped-beam lights should be used when a locomotive is operated. It is forbidden to turn on these two types of lights simultaneously. Locomotives should be equipped with a light switch in order to prevent main-beam and dipped-beam lights from being turned on at the same time. The white or red position lights may be turned on only when the main lighting power is turned off.

The lamp includes through-put terminals: a common "+" terminal and 4 "-" terminals (Fig. 2). Voltage may be supplied to one "-" terminal only, which causes appropriate lights to be turned on:

- main-beam lights - 24 W,
- dipped-beam lights - 12 W,
- position lights,
- red lights

The lamp has a terminal that allows you to set the required operation mode: 100% or 50% power. The default setting is 100% power. If it is necessary to reduce the power supplied to the lamp by a half, you need to set the 50% mode by applying jumpers in terminals labelled as "Light intensity" in the terminal block.

The ROZ-5D lamp may be used in a system with protective conductor continuity control.

## Montage

The lamp features three handles (on the body near the front head) for mounting it in the locomotive. Fig. 3 shows an example of how the lamp may be mounted. The angle of incidence may be adjusted by changing the thickness of rubber pads mounted under the handles.

Alternatively, the handle (13), which is shown in Fig. 4, may be used to mount to the lamp. The handle is mounted to the base using two M12 screws with a pattern of 170 mm. The handle allows you to adjust the light emitted by the lamp in the selected direction. The lamp may be adjusted by 30° in the plane parallel to the installation plane and 20° in the plane perpendicular to the installation plane (in accordance with Fig. 4).

You should disassemble the back cover before connecting the power supply cable. The power supply cable should be led to the terminal part by a cable gland that enables proper glanding and protection against tearing of a cable 14-20 mm in diameter. The isolated cable wires should be connected to corresponding terminals according to the terminal block plate. The torque of at least 20 Nm should be used to mount the gland. If one of the cable glands is not used (e.g. in the ending lamp), it should be closed using the 72.091 cap.

The lamp is adapted to be powered by the YnHKGSly 6x2.5+2.5 cable from the flameproof transformer unit in mines or from a system that powers mining machines. Alternatively, a different conductor/cable may be used. It should be authorised for use in underground mines and in rooms with methane and/or coal dust explosion hazard. The maximum cross-section of wires is 4 mm<sup>2</sup> (4 mm<sup>2</sup> terminal block), while the maximum cross-section of the entire conductor/cable is 20 mm (WKE 14-20 cable gland). The maximum cross-section for the enclosure grounding terminal is 4 mm<sup>2</sup>. The terminal labelled as "1" is used to connect the earthing continuity control circuit. A lamp connection diagram and a functional lamp wiring diagram are included at the end of this manual.

A BYP 401-100 diode or its equivalent should be connected between the "PE" and "1" terminals in the ending lamp.

## Options

The flameproof ROZ-5D lamp is manufactured in the following versions depending on the quantity and the location of cable glands:

ROZ-5D ver. 1 - two glands from the bottom (through-put supply)

ROZ-5D ver. 2 - one gland from the bottom

ROZ-5D ver. 3 - two glands from the back (through-put supply)

ROZ-5D ver. 4 - one gland from the back



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LS-12

## LS-12 PORTABLE LAMP

Ex I M1 Ex ia I Ma

The LS-12 station lamp can be used for temporary auxiliary lighting of work places. The integrated battery eliminates the need for any external PSUs. The solution is intended for use in methane and/or coal dust explosive atmospheres. The Cat. M1 enclosure makes the product usable in explosive atmospheres.

### Features/Technical specification

The LS-12 station lamp is a small, lightweight device for temporary auxiliary illumination of work places. Its enclosure and other solutions come from the SMARTLIGHT-05 lamps. The lamp is charged with the same chargers as helmet lamps, which are available at virtually every mine in Poland.

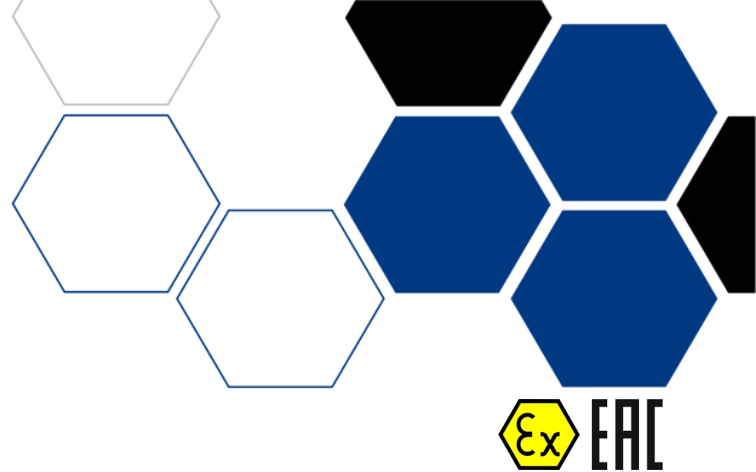
The lamp features two LED light sources: the scattered LED light on the side panel and the focused beam LED, placed in the shroud. The nominal luminous flux of both light sources is ca. 100 lm. This gives the light intensity at 1 m of distance of ca. 1800 lx for the focused beam and 22 lx for the scattered LED. The lamp can shine in one of the three available modes, which are selected with the button on the shroud:

- Scattered light
- Focused beam light
- Focused beam light (at 20% of rated output)

Maintenance-free dry battery	Li-Ion 9Ah
Battery charging cycles	min. 500 cycles
Light source: (scattered)	21 diodes LED
Light source: (focused beam)	2 diodes LED
Light source life	50 000 h
Minimum light time (with operative and fully charged battery)	24 h
Maximum charging time	10 h
Ingress protection	IP 65
Ambient temperature range	between -5°C and +40°C
Acceptable humidity at +40°C	up to 95%
Weight	0,9 kg
Outer dimensions	142 x 130 x 72 mm

### Advantages

- LED light sources
- Focused beam and scattered light
- Operation time min. 24 h in each light mode
- Recharged with standard type ŁK chargers
- Small and lightweight enclosure



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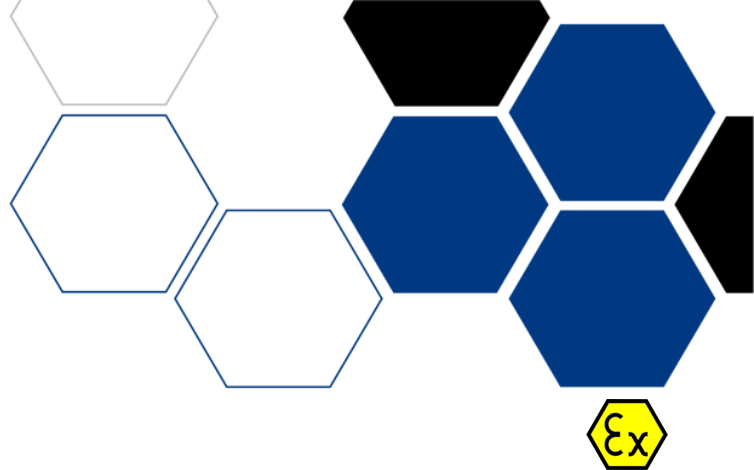
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POH-7

## POH-7 HEADLAMP

Owing to its intrinsically safe design, the POH-7 light projector can be used in methane and non-methane fields of underground mining facilities, in workings of any methane concentration. It is a category M1 device, therefore its power supply does not need to be switched off whenever explosive atmosphere occurs. The POH-7 light projector has been designed for installation on mining machines and it is intended for lighting of the chosen observation point

### Device description

The POH-7 light projector's structure is intrinsically safe. It is also far more compact compared to other POH type light projectors. The enclosure is made of steel whereas the optical system is shielded by a toughened glass panel. The light project features an external M70x6 thread. It is mounted by screwing into a mining machine's threaded socket. It is manufactured in versions adapted to power supply with voltage of 12 VDC, 6 VDC as well as 4-12 VDC from a power pack with 1.4 A current limit. The light projectors powered with the 6 VDC current are intended for being connected in series, i.e. two light projectors are fed by a single 12 VDC power pack. They are available in versions with a 3 m long cable (ver. 4, 5, 6) or without cable (ver. 1, 2, 3). The cable to be used with them should feature 2 x 1 mm<sup>2</sup> wires and its external diameters should range between 7 and 11.5 mm. The light source is a single LED.

A standard light projector is equipped with an optical lens of the "medium" type filter. Upon the customer's request, it may feature one of the following filters:

- "narrow" type - lighting angle of 15°,
- "medium" type - lighting angle of 20°,
- "wide" type - lighting angle of 30°,
- "fog" type - lighting angle of 25°, with blurred lighting point.

### Technical characteristics

Version	ver. no. 1, 4	ver. no. 2, 5	ver. no. 3, 6
Rated supply voltage	6V DC	12V DC	4÷12V DC
Rated current		1,4 A	
Protection rating		IP 65	
ATEX marking	I M1 Ex ia I Ma		
EC-Type Examination Certificate no.		FTZÚ 13 ATEX 0129	
Input circuit parameters	Ui=6,4V Ii=1,48A Ci=0 Li=0	Ui=12,8V Ii=1,48A Ci=0 Li=0	Umax=12,8V Ii=1,48A Ci=0 Li=0
Ambient temperature range		from -20°C to +40°C	
Permissible humidity (at +35°C)		95 %	
Weight		1,7 kg	
External dimensions		108 x 70 x 73 mm	

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## Advantages

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- reduced dimensions,
- easy to mount on a machine in any chosen orientation,
- energy efficiency,
- very long service life of the light source.



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POH-6

## POH-6 HEADLAMP

Intrinsically safe projector POH-6 can be used in underground plants in methane-free and methane areas in excavations with any concentration of methane. The projector POH-6 is designed to be mounted on mining machines and to illuminate a selected place of observation.

### Technical characteristics

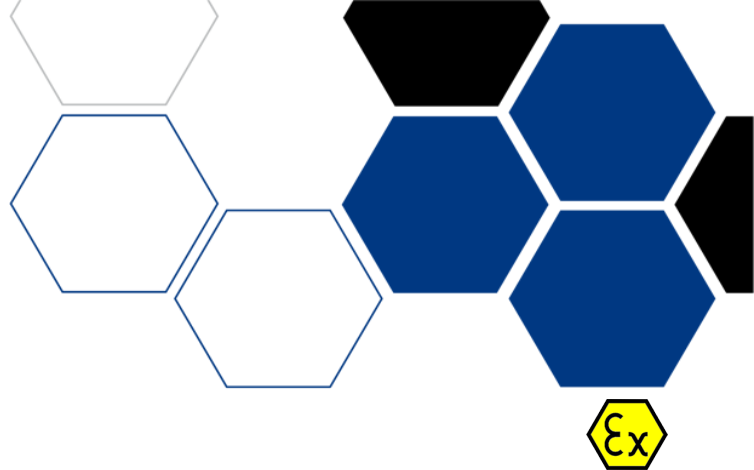
Rated supply voltage	15 V DC
Frequency of the supply voltage	50-Hz
Rated current	1,5 A
Ingress protection grade	IP65
Cable gland	WKE 14-20
Ambient temperature range	-20 0C ÷ + 40 0C
Admissible humidity at +350C	95%
Weight	4,35 kg
External dimensions	160 x 120 x 140 mm

### Design and operation

- explosion-proof,
- steel body,
- mounted on a special grip.

### Advantages

- high mechanical impact resistance,
- projector can be fastened in any plane,
- big luminous flux,
- energy saving,
- long life light source.



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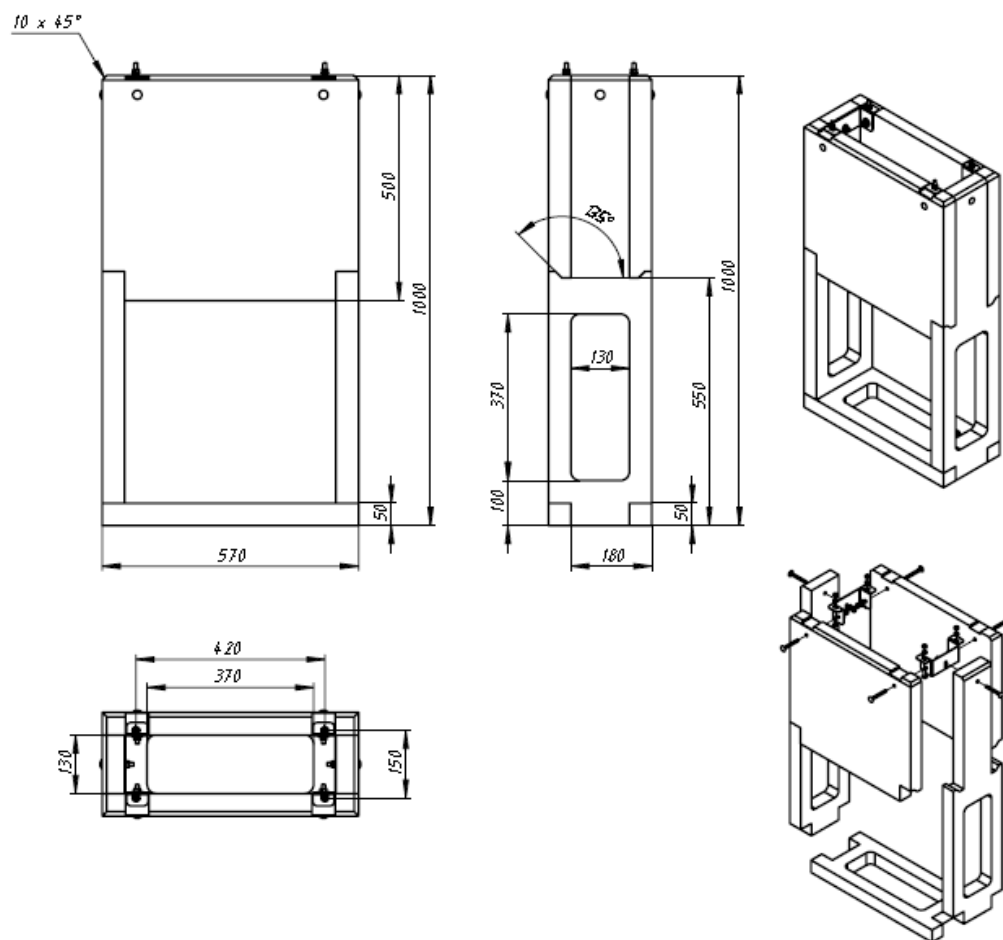
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## Options



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POH-5

## POH-5 HEADLAMP

The projector POH-5 is to be installed on mining machines to illuminate selected working areas with potential risk of methane or coal dust explosion.

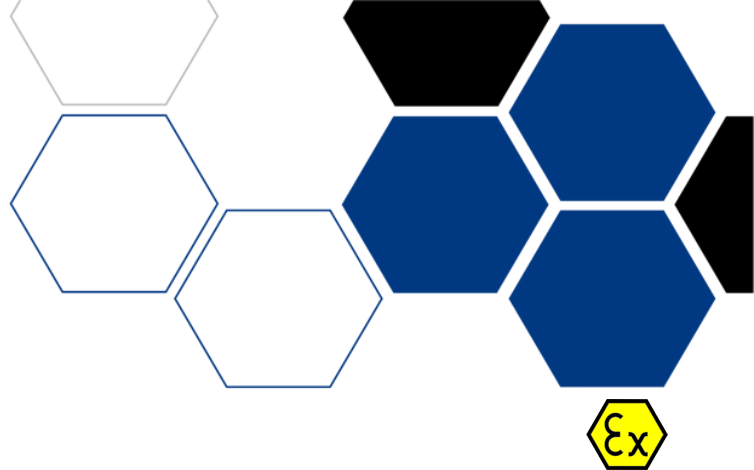
The projector fixed in a special holder enables pointing the flux of light at a chosen direction

### Technical characteristics

Version	24V	42V	230V
Rated supply voltage	24V AC	42V AC	127-230V AC
Frequency of the supply voltage	50-60 Hz		
Rated current	2,1A	1,3A	0,29-0,13A
Ingress protection grade	IP65		
Light source type	3 diodes LED (3x10W)		
Luminous flux	2400 lm		
Cable gland	WKE 14-20		
Ambient temperature range	-10°C ÷ + 40°C		
Admissible humidity at +35°C	95%		
Weight	11,7 kg		
External dimensions	245 x 210 x 165 mm		

### Advantages

- high mechanical impact resistance,
- projector can be fastened in any position,
- greater luminous flux
- power energy saving,
- long life light source.



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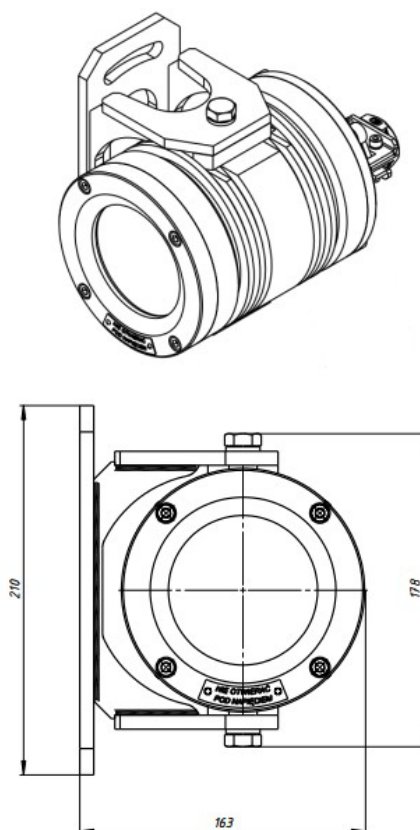
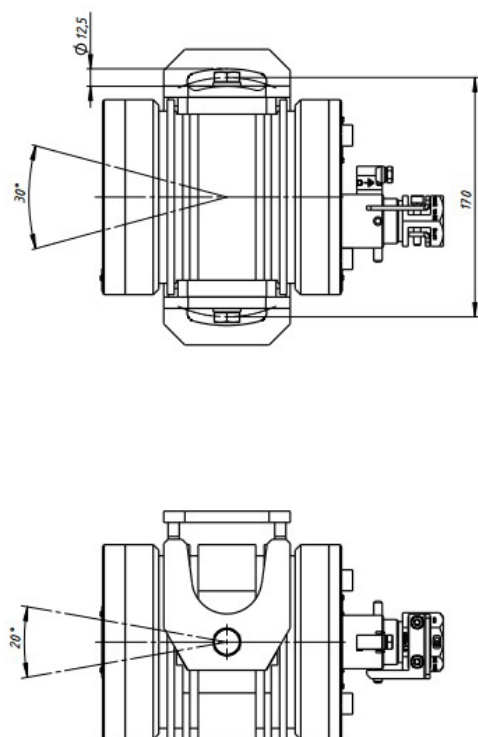


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## POH-4

# POH-4 HEADLAMP / REARLIGHT

The projector POH-4 is designed to be installed on mining machines to illuminate selected working places. The Projector is equipped in an additional red colour light source. Thanks to its intrinsically safe design, ia class and ingress protection IP65, the Projector is allowed to use in rooms of any methane concentration.

## Technical characteristics

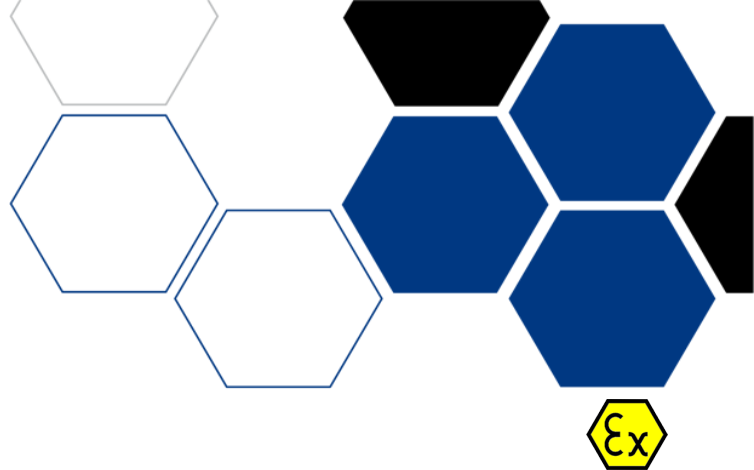
Max. supply voltage	12 V DC
Light source power (white/red)	12 W / 3 W
Light source type	3W LEDs
Supplying cable	GLgG-K750 (3 x 1,5 mm2)
Cable inlet	M20 x 1,5
Protection level	IP 65
Shock hazard protection level	III
Luminous flux	1500 lm
Ambient temperature	0°C ≤ Ta ≤ +40°C
Relative humidity at +35°C	up to 95 %
Overall dimensions with a holder	120 x 160 x 140 mm
Weight with a holder	4,6 kg

## Execution

- explosion-proof, intrinsically-safe,
- steel body,
- mounted in a special grip,
- light source: white - 4 LEDs 3W, red - 1 LED 3W,
- flat transparent shield for bulb made of chilled glass,
- replaceable lens (4 types) - depending on requests any formation of luminous flux is possible.

## Advantages

- high resistance for mechanical damages,
- projector can be fastened in any plane,
- big luminous flux,
- energy saving,
- long life light source.



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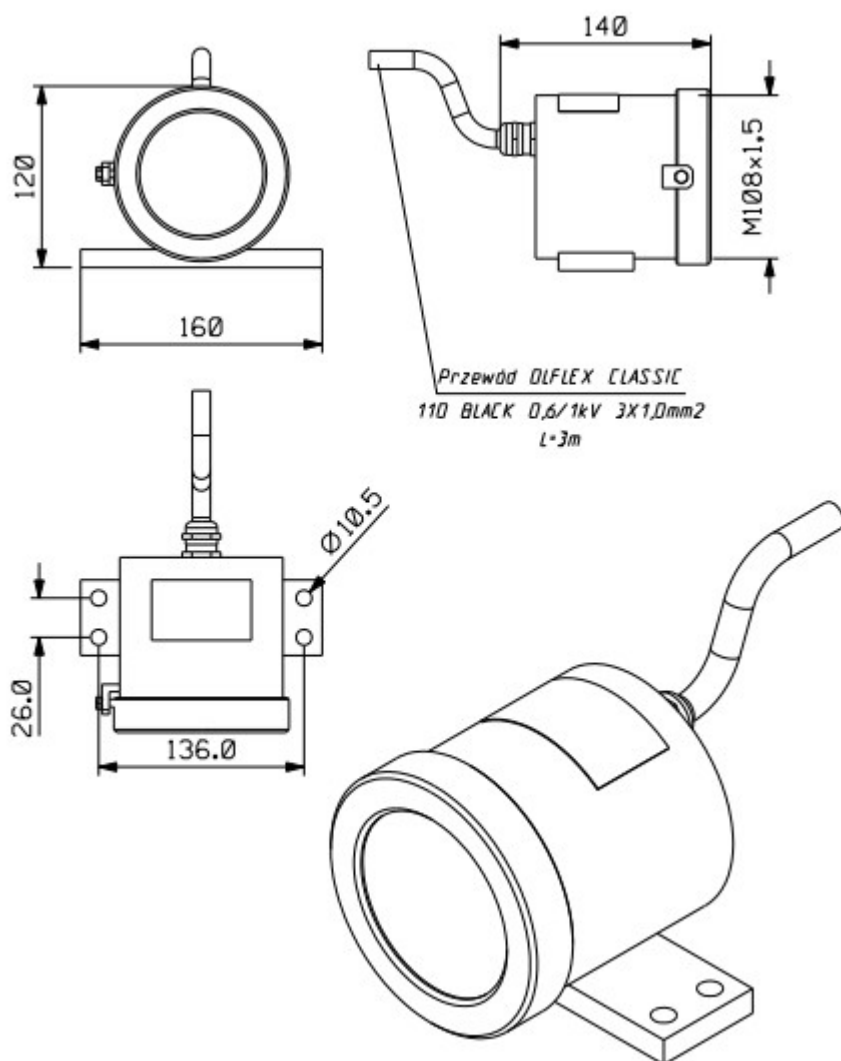


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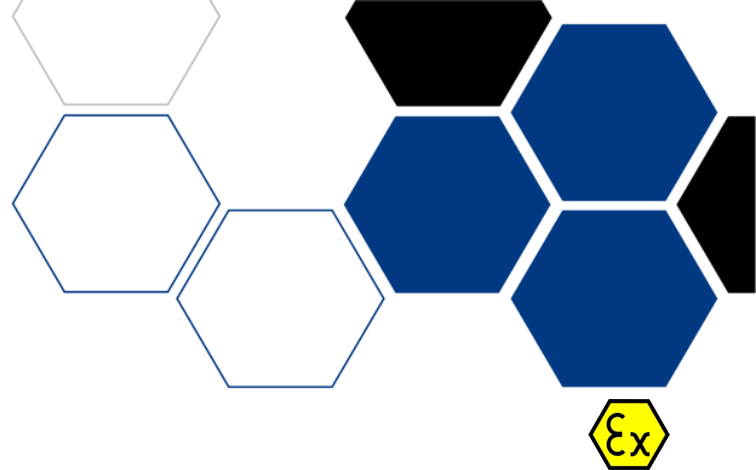
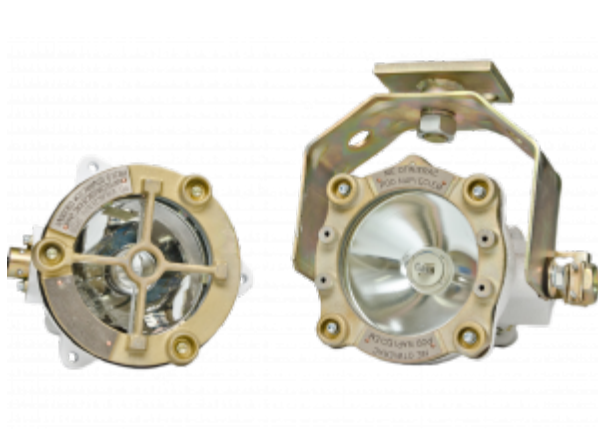
## Options

POH-4 projector is delivered with cable.



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POH-3

## POH-3 HEADLAMP

The projector POH-3 is designed to be mounted on mining machines or in headings and to illuminate a selected place of observation. The projector fixed in a special holder enables pointing the flux of light at a chosen direction.

The projector can be used in underground mining plants in methane-free and methane areas in the headings qualified as "a", "b" or "c" methane explosion risk level and class A or B of coal dust explosion risk.

### Technical characteristics

Max supply voltage	42V 50Hz	127V 50Hz	230V 50Hz
Current consumption	1.7A	0.56A	0.3A
Type of light source	LH 58, 24V, 65W halogen lamp (H3, 24V, 70W halogen lamps are acceptable)		
Type of lamp cap		PK22s	
Protection class		I	
Protection level		IP 65	
Usable flux of light		800 lm	
Cable inlet		WKE 14 - 20	
Connection terminals		max 4mm <sup>2</sup>	
Ambient temperature		-200C ≤ Ta ≤ +400C	
Relative humidity @ +35°C		up to 95 %	
Supply cable	Of acceptable type with external diameter $\varnothing$ 14-20 mm		
External diameters including holder		280 x 275 x 220 mm	
Weight including holder		17,2 kg	

### Design and operation

- explosion-proof, flame-proof,
- double-cell cast iron housing,
- fixed in a special holder,
- longer-life halogen lamp,
- flat transparent shield made of toughened glass.

### Advantages

- high resistance to mechanical shocks,
- can be mounted on a machine at any angle,
- large flux of light,
- energy-saving,
- flux of light can be pointed at any direction.

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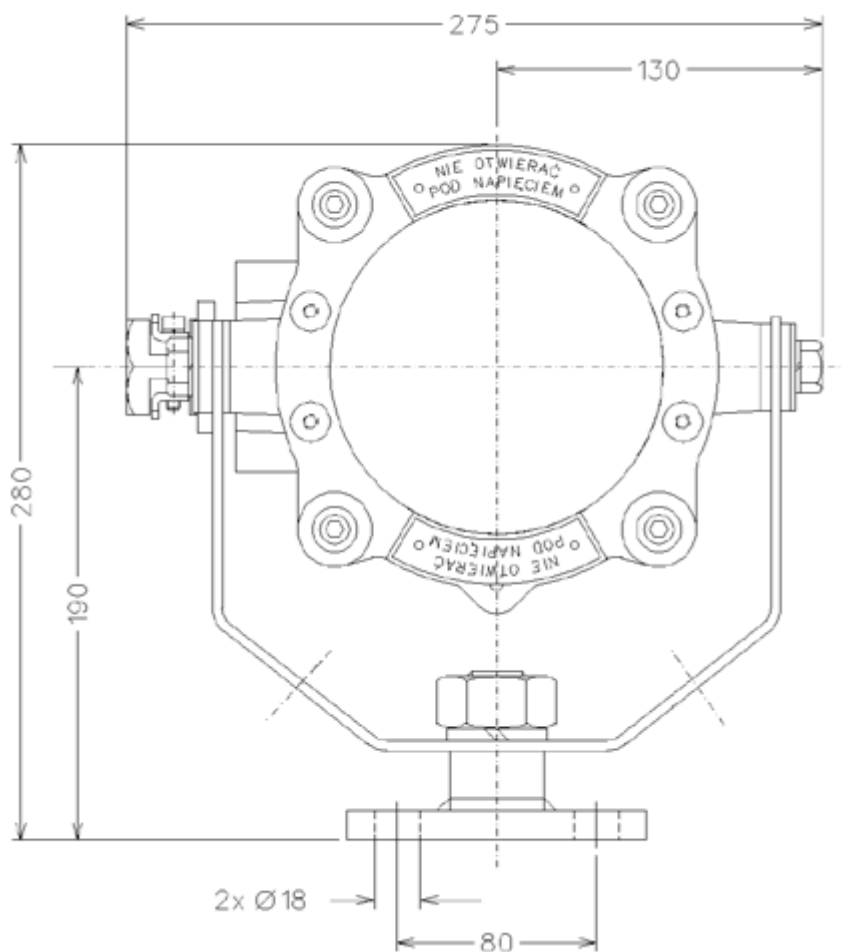
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## Options

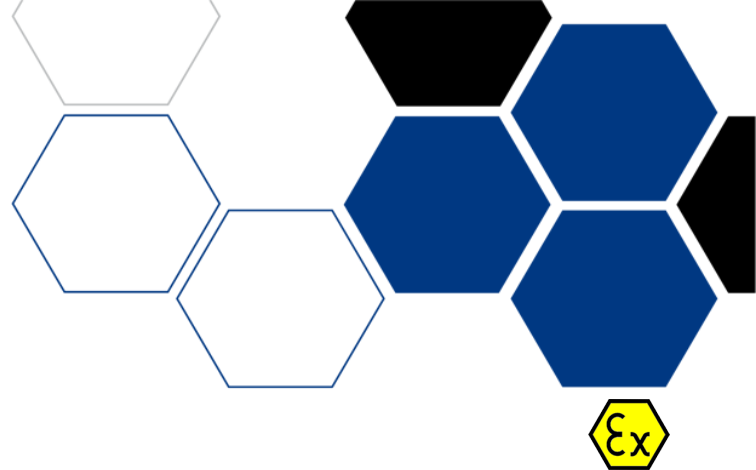
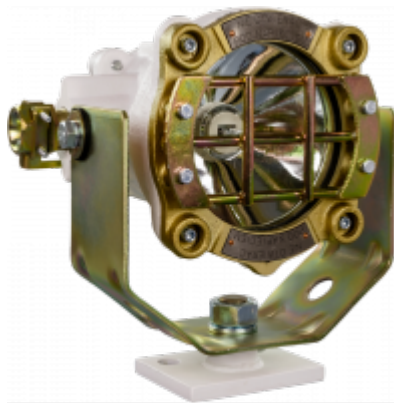
A holder with a shock absorbing insert is used to mount the projector on a machine.

A supply cable is connected to the projector through a cable inlet that enables clamping of the cable and protecting it against pulling out.



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POH-2

## POH-2 HEADLAMP

The flame-proof halogen projector POH-2 is to be installed on mining machines to illuminate selected working places. The projector is allowed to use in rooms classified as "a", "b", "c" class of methane explosion hazard and "A" or "B" class of coal dust explosion hazard

### Technical characteristics

Max. supply voltage	24 V
Max power of source of light	70 W
Type of source of light	halogen bulb type LH 58, 24 V, 65 W (it is allowed to use the bulbs type: H3, 24 V, 70W or H3, 12 V, 55 W )
Supplying cable	certified type with outer diameter Ø14-20 mm
Cable inlet	WKE 14 - 20
Connecting terminals	max 6 mm <sup>2</sup>
Cap	PK 22 s
Ingress protection	IP 65
Shock hazard protection level	III
Luminous flux	800 lm
Ambient temperature	-20°C ≤ Ta ≤ +40°C
Relative humidity at +35°C	Up to 95 %
Overall dimensions with a holder	280 x 275 x 220 mm
Weight with a holder	15,8 kg

### Design and operation

- explosion-proof, flame-proof,
- double - chamber cast iron body,
- mounted in special grip,
- equipped in halogen bulb type of higher quality,
- flat transparent shield for bulb made of chilled glass.

### Advantages

- high resistance for mechanical damage,
- projector can be fastened in any plane,
- big luminous flux,
- energy saving,
- luminous flux can be directed in any direction.

### Options

To mount the projector on a machine there are used special handle with a shock absorber pad. The supplying cable is inserted to the projector through a cable inlet enabling its choking and protection against pulling out.

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LN-1a

## LN-1A INDIVIDUAL CHARGER FOR MINING CAP LAMP

LN-1a individual charger is designed for battery charging of the mining cap lamps series Smartlight-12, Smartlight-05, ELM-01 produced by Elektrometal SA. Charger is supplied with 12V DC feeder from the supply network through a regular socket.

Charger enables control over the charging process and provides information about it through a seven-segment digit display.

### Features/Technical specification

Parameter	Value
Charging positions number	1
Supply voltage	10-12V
Current consumption	1A
Ingress protection	IP20
Operating temperature range	-5°C up to 55°C
Acceptable humidity	95%
Dimensions	141 x 60 x 41
Weight	0,31 kg

### Functions

- test of seven-digit display after turning-on the charger
- information about the installed software version,
- possible addressing of the charger,
- battery charging with auto-switch into the final charging mode after the charging process is finished,
- battery capacity test (discharging process initiated from the lamp)
- charging or discharging process information,
- information about completing the charging process (final charging mode),
- information about the remaining battery charge level,
- information about starting the capacity test,
- information about the GLON or LOK transmitters failure (transmitters optionally embodied into the lamp to communicate with the emergency rescue systems),
- information about low battery level.

CATEGORY:

CAP LAMPS

CERTIFICATIONS


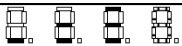



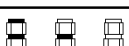






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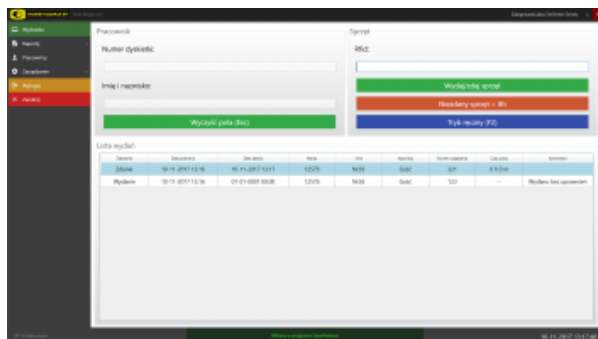
Symbols displayed on the charger and information which they provide. Additionally the visualized digits from 0 to 9 will inform about the current battery charge level.

stand-by mode, no battery in the position, module is operative	
battery in the charging position in the charging mode	
battery in the charging position in the charging mode, after being found completely discharged	
battery in the final charging mode, battery is completely is full, no capacity test have been made, the transmitter is operative	
battery in a discharging mode	
battery in a discharging mode, being found not discharged or undercharged.	
battery in a final charging mode, capacity test carried out successfully, position transmitter is operative	
Damage: position transmitter failure.	
Damage: battery in the final charging mode, capacity test carried out unsuccessfully, position transmitter is operative	
dot - initiating the capacity control mode.	



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## SMART RELEASE

# SMART RELEASE

Mining equipment distribution - an application that enables easy adaptation of any element of miner's equipment. It works as a TCP/IP client with the SmartView server.

## Description

Mining equipment distribution - it enables easy adaptation of any element of miner's equipment. It works as a TCP/IP client with the SmartView server.

Key functionalities:

- Simultaneous operation on multiple workstations.
- Individual user accounts with custom permissions.
- Report distribution:
  - For a department,
  - For an employee,
  - Distribution statistics
  - For a device.
- Equipment record along with periodic inspection reporting.
- Management of training and equipment distribution rights.
- Supporting many types of card readers: Contactless, SmartCard, Rfid, etc.

CATEGORY:

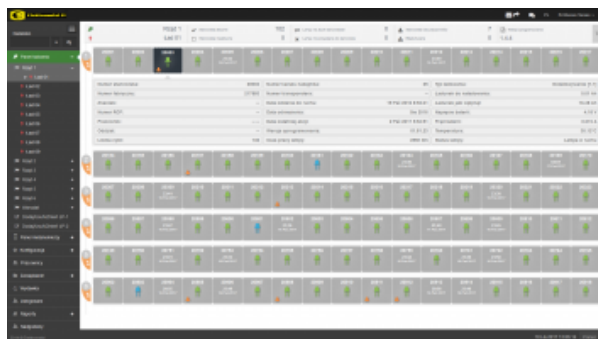
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## SMARTVIEW

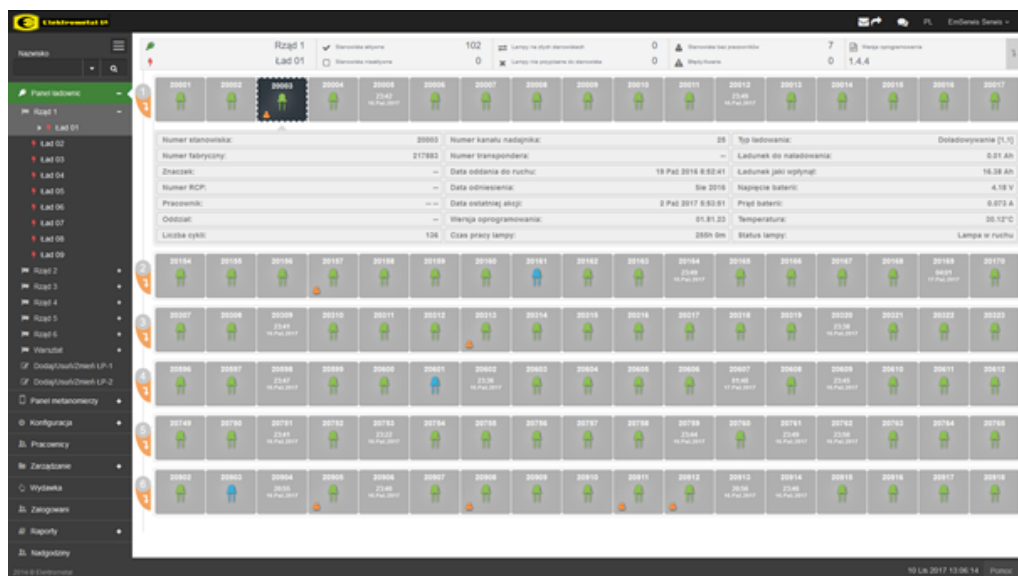
# SOFTWARE FOR THE CAP LAMPS CHARGING PROCESS - SMARTVIEW

SmartView is a modular application that enables you to track the state and location of individual mining equipment.

## Description

Integrated visualisation system for individual mining equipment.

SmartView is a modular application that makes it possible to track the state and location of individual mining equipment. The functionality of the application was divided into separate parts, allowing an easy expansion and configuration for customer needs. The system is designed to support multiple users simultaneously while providing real-time mutual data exchange. In addition, the application has the ability to exchange data with the already existing systems. The **SmartView Server** lies at the heart of the whole system; it is responsible for communication with dedicated devices and for management and synchronisation of data.



CATEGORY:

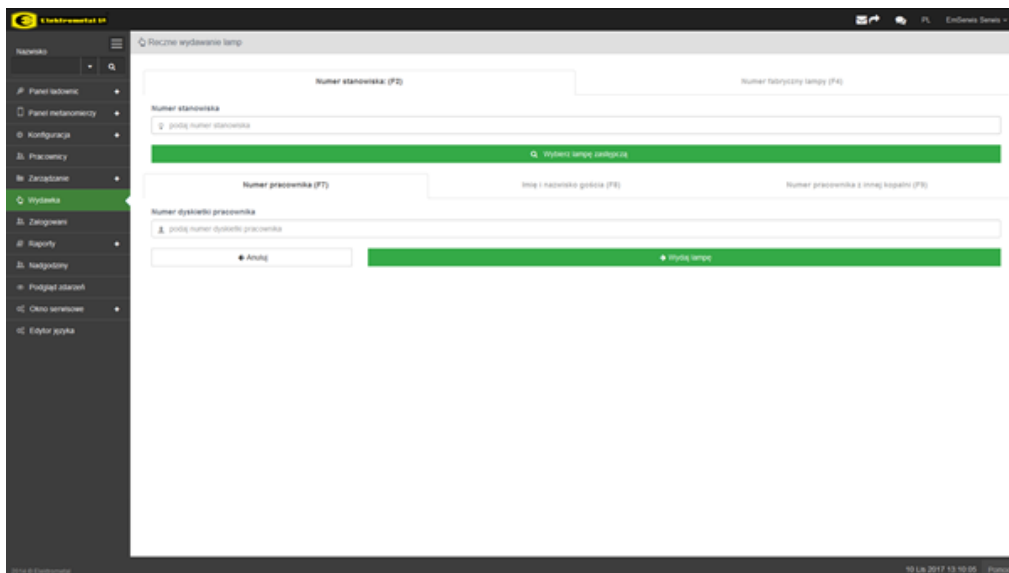
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### SmartDump module

It enables you to perform a compressed backup at the location indicated by the user. In addition, it allows you to send a .zip file to a specified email address in the internal network.

### SmartWorkerMonitor module

It enables you to monitor working time. It sends automatic notifications of exceeded working time in the form of an e-mail, text message, or to a dedicated application at the client station. Possible integration with the EMLOK-16 system.

### SmartImport module

Synchronisation of mine employees. The data from an external system are sent to the server, where an employee is automatically hired / released and a lamp is assigned.

## Features/Technical specification

### Key functionalities:

- Adding, editing and removing new chargers without interrupting the operation of the programme.
- Automatic addition of lamps to the system.
- Remote control of cap lamps.
- Assigning employees to lamps. -> Possibility to add, edit and delete as well as synchronise with the external server.
- Assigning lamps to chargers. (Monitoring damaged lamps and breakdowns, wrongly located lamps, lamps not assigned to employees, spare lamps, duplicates, damaged posts and lamps with no serial number assigned).
- Manual distribution of lamps for guests and replacement lamps.
- Reports of lamps that have not been returned for more than 12 hours.
- Reports of damaged lamps/chargers.
- Reports of device operating times.
- All reports can be filtered, personalised and saved as PDF files.
- Adding transponders to lamps and editing them.
- Integration with tracking systems.
- Time and Attendance Systems support.
- Configuration.
- Individual user accounts with custom permissions.
- Automatic database backup with the possibility to send it via email in the internal network.
- Employee synchronisation with the use of xml, csv and xls files.
- Possibility to restrict access to data for individual users.
- Monitoring hard drive space.
- Sending service messages to all logged-in users.
- Export of data concerning the collected and returned lamps as well as the current state of lamps to external servers.
- Possibility of simultaneous multi-station operation.
- Configuration of connection parameters and selected modules. All parameters have optimal default values.
- Archived log viewer.
- Tracking of important user actions that affect the operation of the entire system.
- Possibility to use one of many databases:
  - Microsoft SQL Server 2005/2000
  - Oracle
  - Microsoft Access
  - Firebird



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- PostgreSQL
- DB2 UDB
- MySQL
- MariaDB
- SQLite.
- Responsive browser application that adjusts itself to screen resolution.



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## SMARTLIGHT-05

# SMARTLIGHT-05 CAP LAMP

Mining lamp SMARTLIGHT-05/M1 is designed for individual lighting of the workplace.

## Description

The **SMARTLIGHT-05/M1** lamp incorporates significant innovations, as as a light source high-intensity diode system was designed, and as a power source - a small-size, maintenance-free battery. These two elements led to a significant reduction in the size and weight of the lamp, resulting in easier use and operational maintenance.

The lamp is equipped with a mining personal locator beacon and with a system that guarantees automatic disconnection of the light source in the event of a reduction in power supply voltage to guarantee long-term operation of the locator beacon.

The head of the lamp is movable, which makes it possible to individually adjust the angle of the light beam depending on the type of helmet used and the type of work performed (user preference).

The housing of the locating transmitter is equipped with a third LED, which in normal operation informs about the correct operation of the transmitter, and in case of failure (damage to the head, cable) can shine a continuous light, thus providing illumination of the return path to the user.

## Features/Technical specification

Rated voltage of the battery	3,6 V
Battery	Ni-MH min 9 Ah
Number of battery cycles	800 cycles
Light source:	main GLED additional DLED emergency ALED
Durability of light sources	100 000 h
Minimum lighting time: (for a charged battery)	DLED 90h GLED 10h GLED (reduced brightness) 48h ALED 70h
Minimum operating time of the GLON transmitter	170 h
Maximum charging time	10 h
Maximum illumination from a distance of 1m	4500 lux
Angle of light distribution limitation	1200
Degree of protection	IP 65
Feature of construction	I M1 Ex ia I
Working temperature	-5°C...+ 40° C
Dimensions of the battery assembly	140 x 130 x 48 mm
Head diameter	72 mm
Cable length	1500 mm
Weight	1,2 kg

## Usage

Intrinsically safe execution of category ia and the IP65 degree of protection of the housing allows the lamp to be used in mining plants in rooms with any concentration of methane.



CATEGORY:  
CAP LAMPS

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LDI-1

## LDI-1 MINING CAP LAMP

I M1 Ex ia I Ma

The LDI-1 cap lamp is designed for individual illumination of workplace. Intrinsically safe quality of work - ia category and IP65 ingress protection of the. Cap lamps are fed with the Li-Ion service-less battery ensuring excellent illumination in different working situations maintaining at the same time low weight of the lamp.

Lamp charged through the headpiece.

### Features/Technical specification

Feature	Value
Voltage	3,6 V
Battery type and capacity	Li-Ion 6,7 Ah
Minimum charging cycles number	800
Light sources:	Long beam LED
	Short beam LED
Light source durability	100.000 hours
Minimum operating time (For fully charged battery)	Long beam - 18 hours
	Short beam - 60 hours
Maximum charging time	8 hours
Charging type	Thorough headpiece
Light intensity at distance of 1m (lx)	>14000 lux (main LED)
Ingress protection as per EN 60529: 2003	IP65
Working temperature range	-10°C up to +40°C
Environment temperature durin charging	0°C up to +40°C
Cable length	1500 mm
Weight	0,6kg



CATEGORY:  
CAP LAMPS

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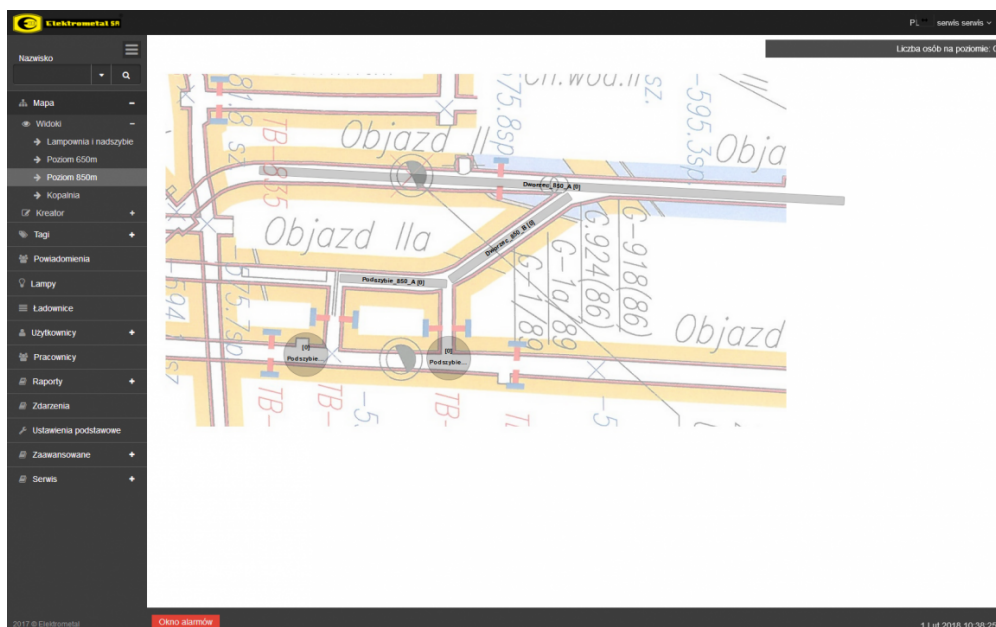
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## Functions

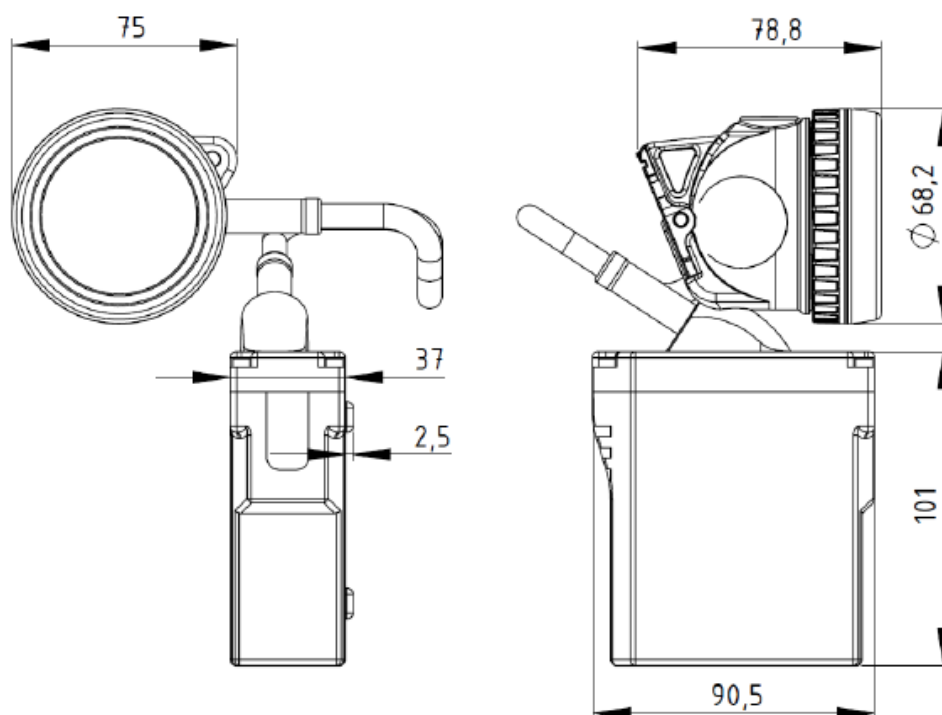
LDI-1 lamp operates has 2 operating modes:

- main LED,
- auxiliary LED (in this mode the main LED still operates but with reduced power.
- Possibility of implementing with a tracking system which allows to visualize the current position of the miner from the dispatcher's office (optional feature on request). Compatible with EMLOK-16 tracking system based on TDOA - Time Difference of Arrival. For this purpose, the lamp is equipped with EMTAG-16/W transmitter.



sample screen of EMLOK-16 system

## Design and operation



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LK-xx/xxx

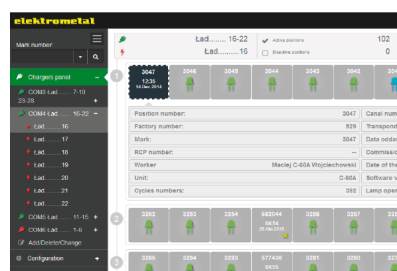
## CHARGING RACKS LK-1/XX, LK-5, LK-17

The charging rack type LK-1/XX, LK-5 y LK-17 is designed for a self-service charging of batteries of cap lamps type: SMARTLIGHT-05/x/x and SMARTLIGHT-12, produced by ELEKTROMETAL SA.

Charging is realized directly to battery and not through head. The charging rack type LK-1/XX with 102 charging modules enables to charge between 32 and 102 batteries of mining cap lamps. Versions LK-5 and LK-17 allow charging respectively 5 and 17 mining cap lamps

### Functions

- Inspection of operating parameters of charging lamps.
- If the lamp room is equipped with a control center of technical process of lamp charging, charging module can transfer data between the lamp and the visualization system and charging control in a PC. The computer may also be equipped with a function to record the data and generate reports (optional feature)
- Having finished the charging process battery is kept in maintenance mode.
- Testing the battery capacity with automatic change to the final charging mode (process of discharging initiated by the cap lamp or by means of the visualising software).
  - Signalling of start-up of the capacity test,
  - Signalling a too low battery capacity (after the capacity test has been carried out),
  - Protect the state of charge of a lamp in case of a supply voltage decay at the chargers, or taking out the lamp from the charging stand for a short duration,
    - The chargers are protected against mechanical damages with a casing
    - The data of charging and discharging process, including the states of „wait-ready”, „breakdown”, „not charging”, „F” - fully charged battery are presented in a LED display, at each single charging position.



The entire process of charging and discharging takes place in the lamp. The charger only is to limit the value of the load current (ie, controls the source of the stream) and indicates the starting of process, its progress, states of emergency and data relay.

CATEGORY:

CAP LAMPS

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## Design and operation

	LK-1/xx	LK-17	LK-5
Number of charging positions (stands)	34 up to 102	17	5
Supply voltage of the charging rack LK-1/xx	90-264 V AC 47-63 Hz	100-240V 50/60Hz Ac	100-240V 50/60Hz AC
Supply voltage of the module ŁP-1 (single position charging element)	10-12V DC		
Maximum current consumption of the module ŁP-1	1A		
Visualization interface	1Wire - Smartview		
Ambient temperature	-20°C up to +55°C		
Ingress protection	IP2-		
Acceptable humidity	96%		
Dimensions	2000 x 1800 x 450 mm	1890 x 400 x 350 mm	565 x 400 x 350 mm

Symbols displayed on the charger and information which they provide. Additionally the visualized digits from 0 to 9 will inform about the current battery charge level.

stand-by mode, no battery in the position, module is operative	
battery in the charging position in the charging mode	
battery in the charging position in the charging mode, after being found completely discharged	
battery in the final charging mode, battery is completely is full, no capacity test have been made, the transmitter is operative	
battery in a discharging mode	
battery in a discharging mode, being found not discharged or undercharged.	
battery in a final charging mode, capacity test carried out successfully, position transmitter is operative	
Damage: position transmitter failure.	
Damage: battery in the final charging mode, capacity test carried out unsuccessfully, position transmitter is operative	
dot - initiating the capacity control mode.	



Example of charging rack LC-1/51 - equipped with three load banks; enables simultaneous loading of 51 lamps. Charging for 68, 85 or 102 lamps have 4, 5 or 6 load banks respectively.



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## SMARTLIGHT-12

# SMARTLIGHT-12 MINING CAP LAMP

Ex I M1 Ex ia op is I Ma

Mining cap lamp type SMARTLIGHT-12 is designed for individual illumination of workplace. Intrinsically safe quality of work - ia category and IP65 ingress protection of the enclosure enables use of cap lamps in mines or areas with any concentration of methane. Cap lamps are fed with the Li-Ion service-less battery ensuring excellent illumination in different working situations maintaining at the same time low weight of the lamp.

Lamp charged directly into the battery pack and not through the headpiece. This allows an increased efficiency and better control over the charging process. Charging with and individual charger LN-1 or with the multi-position racks LK-series with 5, 17, 34, 51, 68, 85 or 102 simultaneous charging positions.

## Features/Technical specification

Alternatie	1	2
GLON type transmitter (for rescue system)	no	yes
Battery	Li-Ion, capacity: min. 6,75Ah	
No. of battery charge-discharge cycles	from 800 up to 1200 cycles	
Light source life	100 000 h	
Operating time - main LED /100%/	min. 24 h	min. 10 h
Operating time - main LED /50%/	min. 120 h	min. 24 h
Operating time - additional LED	min. 180 h	min. 70 h
Operating time - emergency LED at battery pack	min 270 h	min. 70 h
Light intensity at distance of 1 m (lx)	aprox. 4500	aprox. 4500
Short circuit protection	Electronically protected	
Charging time	6 h	
Angle limit of light distribution	120°	
Element responsible for focusing the light	Collimator	
Ingress protection level	IP 65	
Working temperature range	-5°C ÷ + 40°C	
Cable	Two core cable reinforced with string	
Cable length (visible)	1400 mm (optionally from 1100 up to 1600 mm)	
Dimensions of the battery pack	117 x 106 x 57 mm	
Weight	aprox. 0,95 kg	



CATEGORY:  
CAP LAMPS

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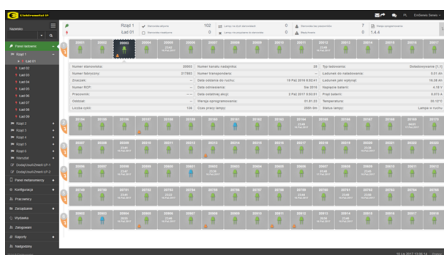


## Functions

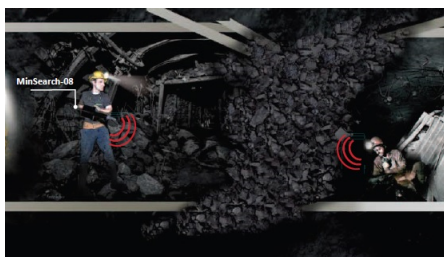
- Adjustable angle position of the headpiece.
- Excellent adjustment of the headpiece fixture to the existing types of mining helmets.
- Center of gravity fitted to minimize the possible moment of instability of the mining helmet.
- Belt holder is an integral part of the battery pack, made of the same material.
- Low weight.
- High resistance confirmed by impact & drop tests carried out and certified by an accredited certifying body acc. to EN 60079-0:2012.
- Lighting options: headpiece – 2 LEDs: one main LED operating in two stages (low and high) and one additional LED; battery pack – 1 emergency LED.
- The intensity of light is maintained at the same level during all the given lighting time, regardless if it is 24, 17 or 10 h. When the capacity of lamp not enough to comply with the guaranteed intensity, it switches itself into the additional LED which required less charge.
- Light intensity value guaranteed through the whole warranty period and not just at the initial period of use.
- Actual charging level visualized at each charging position on of the rack.
- Warranty covering 800 cycles of charge-discharge or 3 years.



- Additional, emergency LED at the battery pack in case of possible cable damage, which ensures the minimum illumination in a critical situation.
- Resting battery charge level indicator located at the battery pack. The battery level is indicated by the color and number of illuminating diodes.
- Optionally it is possible to replace the LED charge level indicator with a OLED screen for the purpose of text messages visualization.



- Possibility of controlling the charging process with a visualization system.



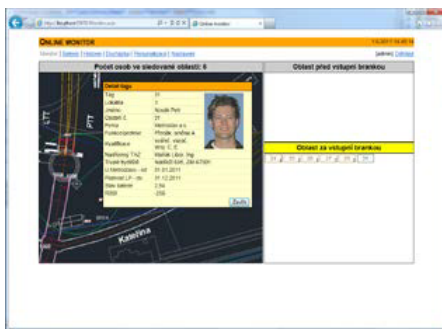
- Possibility of implementing with the lamp a emergency rescue system based on MinSearch-15 and Minsearch-08 receivers (optional - on special request). In this case a GLON transmitter is embodied.



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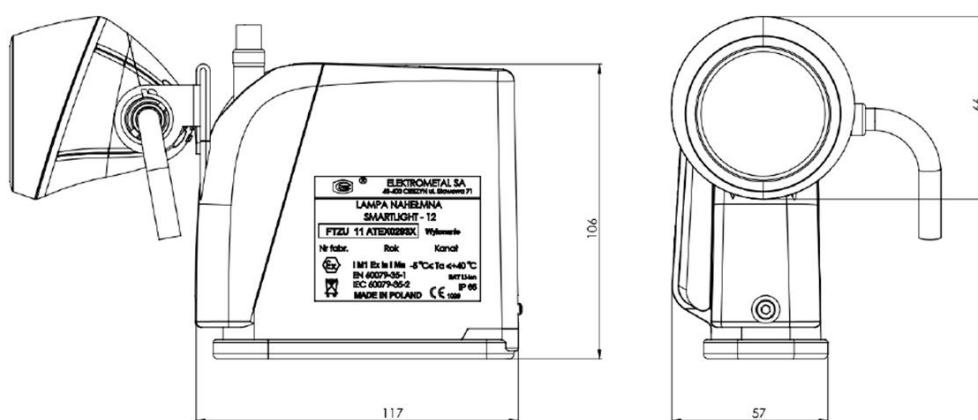
- Possibility of implementing with a tracking system which allows visualization of the current miner's positions from the dispatcher's office (optional - on special request). Lamp compatible with 2 tracking systems by Elektrometal SA and possibly with chosen other tracking systems. The Elektrometal tracking systems are EM-VLIT system based on RFID and the EMLOK-16 system based on TDOA - Time Difference of Arrival

## Design and operation

The Smartlight-12 has significant innovations which guarantee improved efficiency, high quality and excellent operating parameters. As a light source has been implemented an ultra-efficient LED, and as the power source - Li-Ion battery. Those two elements allowed to significantly reduce the dimensions and the weight of the lamp, which, in consequence, provides very user-friendly and easy maintenance product.

The mining cap is highly resistant against various environmental agents like oils, mine waters, dust, high humidity.

The lamp is available in two color versions (elements made of ABS, Polyamid) - black and yellow. Different lamp color may be applied to differentiate the miners - for example the members of the rescue teams or the shotfirers.



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## ZISD-13

# ZISD-13 ITRINSICALLY SAFE PSU

The ZISD-13 two-power supply PSU (power supply unit) is intended for simultaneous power feeding of IS equipment from two independent output feeders. The solution is intended for use in methane and/or coal dust explosive atmospheres. This is a Cat. M2 device with an IS output rated at „ib”.

## Features/Technical specification

Rated supply voltage	42V ÷ 250VAC + 0% -5%,
Supply voltage frequency	50-60Hz
Maximum power output	<75W
ATEX mark	I M2 Ex d [ib] I Mb
EC Type Test Certificate no.	TEST 14 ATEX 0002X
Typical PSU startup time	<2s.
Ambient temperature range	between -20oC and 40oC
Permissible humidity at +40°C	95%
Protection rating	IP54
Weight	24kg
Outer dimensions	550 x 320 x 140mm

## Functions

The design of the ZISD-13 PSU is based on the trusted solutions applied in the well known and reliable ZIS-12/10/... and ZIS-15/10.... PSU families. Unlike the predecessors, the ZISD-13 enclosure houses two independent power supply modules. This allows feeding power to IS devices at two completely separate voltage values. Each outgoing feeder can feature one of the following power supply modules:

- IS voltage: 12 V, current output: 1.45 A, max. cable length: 450m\*
- IS voltage: 12 V, current output: 0.85 A, unlimited cable length\*
- IS voltage: 15 V, current output: 1.45 A, max. cable length: 450m\*
- IS voltage: 15 V, current output: 0.85 A, unlimited cable length\*

\* - for 2 x 4mm2 wires.

The solution unlocks a great configurability and adaptation of the device to specific applications. An example application is the power supply for automation and signalling devices and the UGS loudspeaking devices along a haulage way. Automation systems are powered from the 12 V 1.45 A feeder, since the highest possible current output is desired. The UGS loudspeaking communication system is powered from the 15 V 0.85 A, since the greatest length of power supply cables is desired.

The design process of this solution focused first on maximising the resistance to mechanical damage and electrical damage from the power supply system. The PSU works properly at 42-250 VAC. Moreover, it resists instantaneous voltage peaks, which may occur e.g. when main lines are turned off. Each power supply module features overtemperature and short-circuit protection.

The PSUs are available in two versions: with a communication module (shown in the left figure) and without the communication module. The communication module version features:

- Relay outputs to confirm proper operation of each outgoing feeder;
- An RS-485 serial communication port for visualisation data output;
- An LCD display for the indication of voltage and current of each outgoing feeder, the mains side voltage
- and current time;
- Two bi-colour LEDs located on the front panel to indicate the operating status of each outgoing feeder(green: operation OK, red: overload/failure).



CATEGORY:

FEEDERS

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The version without the communication module features two bi-colour LEDs on the side walls of the IS connection chamber.

For the maximum simplicity of each version identification, the PSU name reads the outgoing feeder data:

	FEEDER 1	FEEDER 2	COMM MODULE
ZISD-13	voltage-current	voltage-current	T

## The most important features

- Two completely separate outgoing feeders
- Wide output voltage and current configurability
- PSU Cat. „ib”
- Supply voltage: 42 VAC to 250 VAC
- High resistance to mechanical damage, instantaneous voltage peaks, output shorting and overheating
- LCD display, reads current PSU operating parameters
- Output relays for feeder online confirmation and RS-485 comm connector

## Execution



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ZIS-X/10/X/X

## ZIS-X/10/X/X POWER SUPPLY

Feeders are used as power sources for intrinsically safe devices in underground mining plants. The feeder can be used in excavations of underground mining plants:

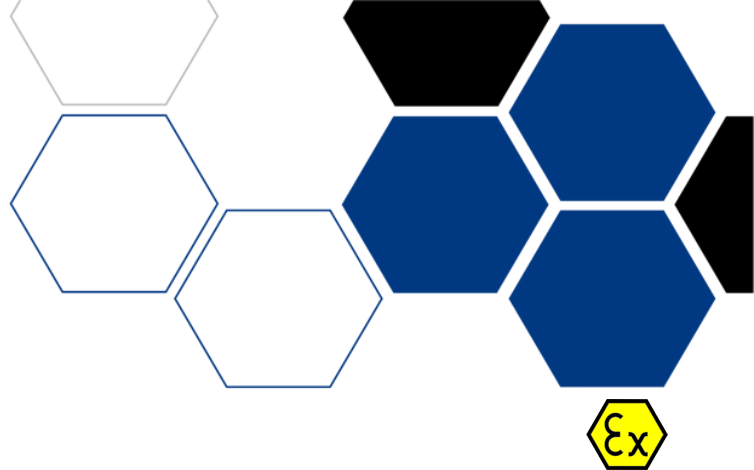
- with no methane explosion hazard with „a” grade of explosion hazard
- with methane explosion hazard with „b” or „c” grades of explosion hazard
- with no coal dust explosion hazard
- with A and B classes of coal dust explosion hazard

### Functions

Feeding intrinsically safe devices used mainly in undergrounds in the mines.

### Technical characteristics

Type of feeder	ZIS-15/10/1,45	ZIS-15/10/0,8 4	ZIS-12/10/1,45 ZIS-12/10/0,85
Supply voltage			42V up to 230V
Supply voltage frequency			50 Hz or 60 Hz
Output voltage	15V +/-0,4V +/-0,4V	15V	12V +/-0,4V 12V +/-0,4V
Rated unload current	1,45 A 0	,85 A	1,45 A 0,85 A
Max. output voltage ripples		100mVpp /dla Uzas=38Vac/	
Power consumption			40 VA
Protection level			IP54
Weight			14kg
External dimensions	425 x 315 x 122mm		425 x 315 x 122mm



CATEGORY:

FEEDERS

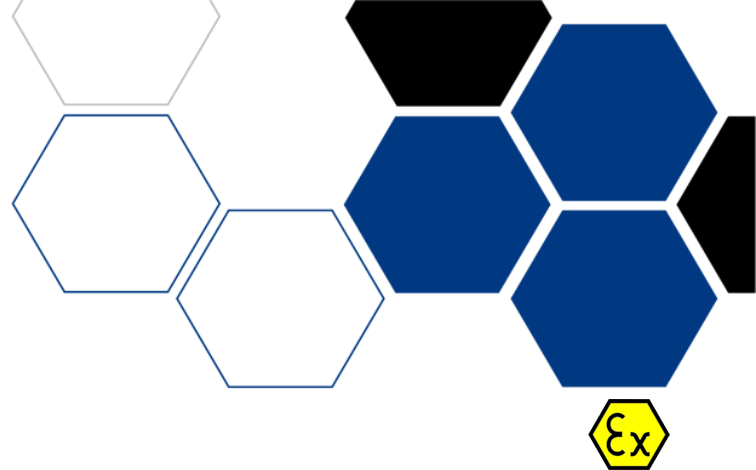
CERTIFICATIONS



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## ZIS-X/04/X/X POWER SUPPLY

Power supply unit ZIS-x/04/x/x is used as an explosion-proof source of power of intrinsically safe devices in underground mining excavations in methane fields.

### Features/Technical specification

x/04/x/Z	ZIS-x/04/x/W	ZIS-x/04/x/K	
Connecting element	Quick connect/disconnect coupling	Cable inlet	Cable
Supply voltage	between 42 V -15% and 230 V +10%		
Supply voltage frequency	50 Hz or 60 Hz		
Power consumption	≤40 VA		
Protection level	IP 54		
Working temperature range	between +5°C and 40°C		
Relative humidity at working temperature 40°C	up to 95 %		
External dimensions	280 x 300 x 122 mm	425 x 315 x 122 mm	280 x 300 x 122 mm
Weight	12kg	14 kg	9kg

#### ZIS-5/04/3/x

Output voltage	5V ±0,2V
Rated unload current	2,2A
Max output voltage ripples	50mVpp (for Uzas=35,7Vac)
Output circuit parameters	Uo=5,4V, Io=3A, Lo=10μH, Co=3μF

#### ZIS-5/04/3/x

Output voltage	5V ±0,2V
Rated unload current	2,2A
Max output voltage ripples	50mVpp (for Uzas=35,7Vac)
Output circuit parameters	Uo=5,4V, Io=3A, Lo=10μH, Co=3μF

#### ZIS-12/04/2/x

Output voltage	12V ±0,5V
Rated unload current	1,5A
Max output voltage ripples	100mVpp (for Uzas=35,7Vac)
Output circuit parameters	Uo=12,6V, Io=2A, Lo=16μH, Co=1,5μF

#### ZIS-15/04/1,5/x

Output voltage	15V ±0,5V
Rated unload current	1,1A
Max output voltage ripples	100mVpp (for Uzas=35,7Vac)
Output circuit parameters	Uo=15,8V, Io=1,5A, Lo=20μH, Co=1,2μF

CATEGORY:

FEEDERS

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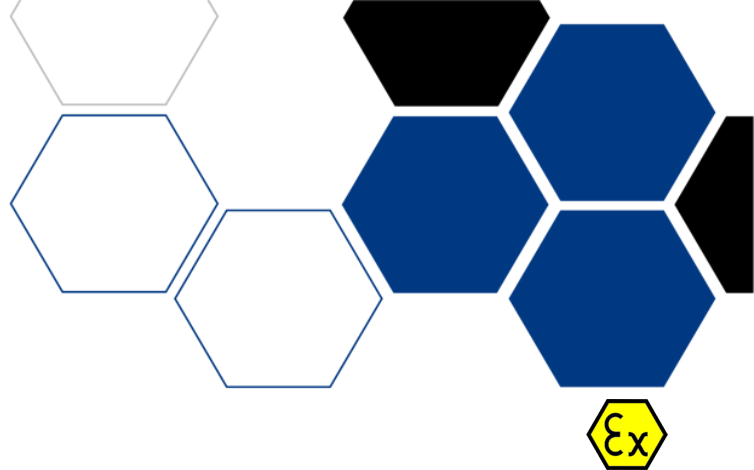
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ZIS-24/04/1/x	
Output voltage	24V $\pm$ 1V
Rated unload current	0,75A
Max output voltage ripples	100mVpp (for $U_{zas}=35,7V_{ac}$ )
Output circuit parameters	$U_o=25,2V$ , $I_o=1A$ , $L_o=25\mu H$ , $C_o=0,8\mu F$



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## ZIG-X/06/X POWER SUPPLY

Power Supply ZIG-x/06/x is used as an explosion-proof source of power of intrinsically safe devices in underground mining excavations in methane and non-methane fields.

The power supply should be used as:

- M2 category for main power
- M1 category for battery power (once main power is off)

### Features/Technical specification

Parameter	Unit
Supply voltage depending on a given voltage version	127V -15% to 230V +10%
Frequency of supply voltage	50Hz or 60Hz
Power consumption	≤135W
Protection level	IP54
Working temperature range	+5°C a +40°C
Relative humidity @ 40°C work temp.	up to 95%
External dimensions	
- without inlets	380x200x480mm
- with inlets	380x200x550mm
Battery loading time (full)	min. 6 hours
Operating time after disconnection of supply voltage	min. 4 hours
Power supply unit operation time without buffering and main power	max 2 months

Parameter	ZIG-5/06/2,2	ZIG-12/06/1,5	ZIG-15/06/1,1	ZIG-24/06/0,75
Output voltage	5V ±0,2V	12V ±0,5V	15V ±0,5V	24V ±1V
Rated load current	2,2A	1,5A	1,1A	0,75A
Maximal ripples of output voltage	50mVpp (for Uzas=35,7Vac)	100mVpp (for Uzas=35,7Vac)	100mVpp (for Uzas=35,7Vac)	100mVpp (for Uzas=35,7Vac)
Uo	5,4V	12,6V	15,8V	25,2V
Io	3A	2A	1,5A	1A
Po	16,2 W	25,2 W	23,7 W	25,2 W
Lo	10μH	16μH	20μH	25μH
Co	3μF	1,5μF	1,2μF	0,8μF

CATEGORY:

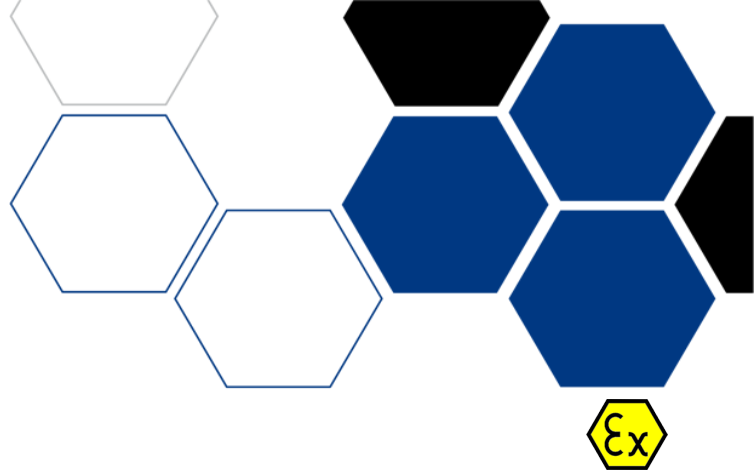
FEEDERS

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## ZSI-94/1 POWER SUPPLY

The intrinsically safe ZSI-94/1 power supply can be used as a source of power of intrinsically safe devices in excavations at any concentration of methane.

### Features/Technical specification

Parameter	Unit
Supply voltage depending on the voltage version	42 V, 127 V, 230 V+ 10, - 15 %
Supply voltage frequency	50Hz or 60Hz
Output voltage	15 V +/-0,5 V
Rated unload current	0,7 A
Output current ripples	≤10 mVpp
Output circuit parameters	U <sub>o</sub> = 15,5V, I <sub>o</sub> = 0,7 A, L <sub>o</sub> = 130 μH, C <sub>o</sub> = 10μF or cable of arbitrary length and maximal conductor wire cross section of 4 mm <sup>2</sup>
Power consumption	≤40 VA
Protection level	IP 54
Working temperature range	from 0°C to 40°C
Relative humidity in temperature +40°C	up to 95%
Dimensions	425 x 315 x 122 mm
Weight	aprox. 14 kg

CATEGORY:

FEEDERS

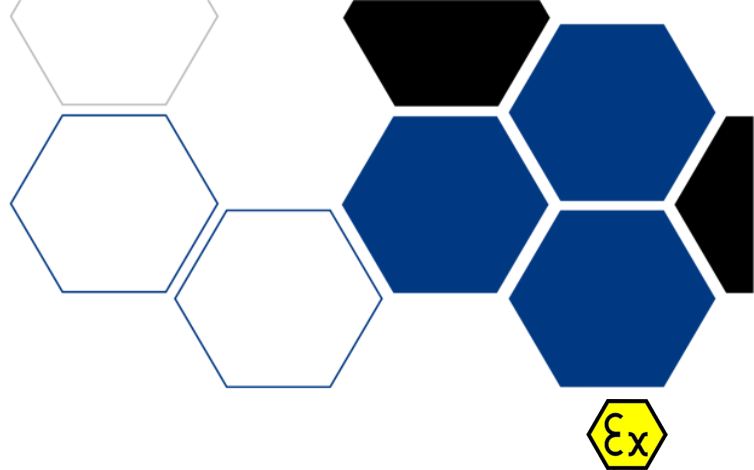
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HMC-OST1

## HMC-OST1 TRANSFORMER STATION

CATEGORY:

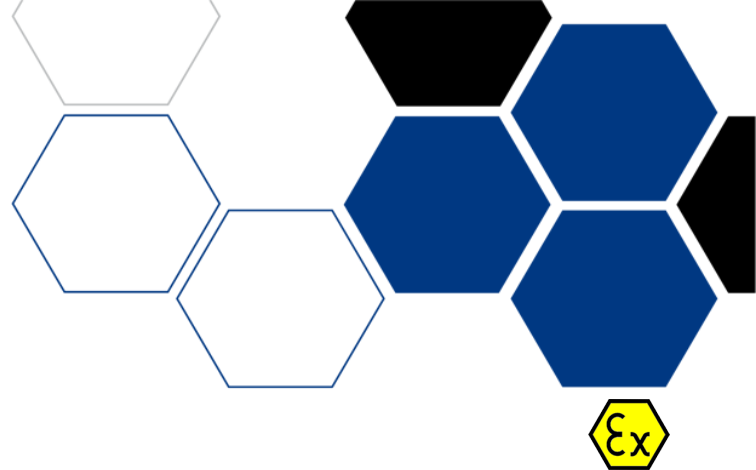
TRANSFORMER  
STATIONS AND UNITS

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HMC-ZT.1

## HMC-ZT.1 TRANSFORMER STATION

Flameproof transformer unit HMC-ZT.1 type is designed to supply power and direct starting up control of low power electric motors and to supply power to lighting circuits or other auxiliary small power devices such as hand drills, power supply units, etc. The powered devices are protected against the results of short circuits, overloads, power supply asymmetry and supplying power to outflow with damaged insulation.

The unit is also provided with projecting outside auxiliary voltage circuits 42 V/250 VA with leak control. Supplying power to the transformer unit will be realized from the three phase alternating power mains 3 x 500 V or 3 x 1000 with insulated neutral point of the transformer. The transformer unit can be installed in any part of the electric power grid, (as a through flow device).

Each of the outflows of the three phase transformer unit is provided with protections against:

- excessive current;
- central leakage;
- leakage interlocking;
- powered motor windings temperature control.

Additionally, the transformer unit is equipped with control and earthing continuity control and isolation relays of intrinsically safe and not intrinsically safe circuits.

CATEGORY:

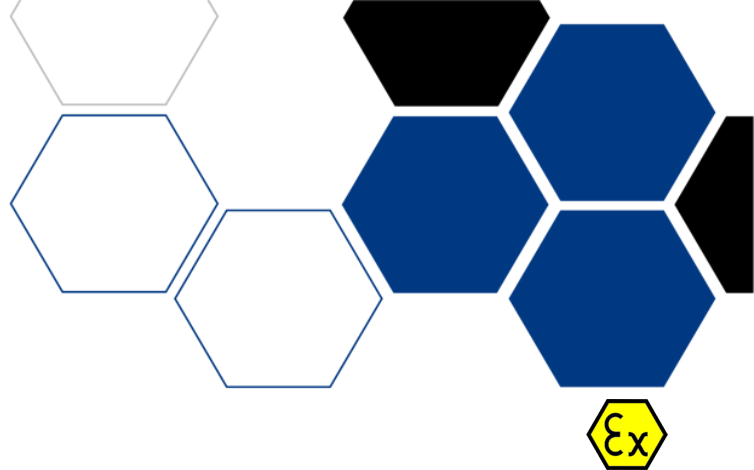
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STATIONS AND UNITS

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HMC-ORKW-1

## HMC-ORKW-1 COMPACT STATION

CATEGORY:

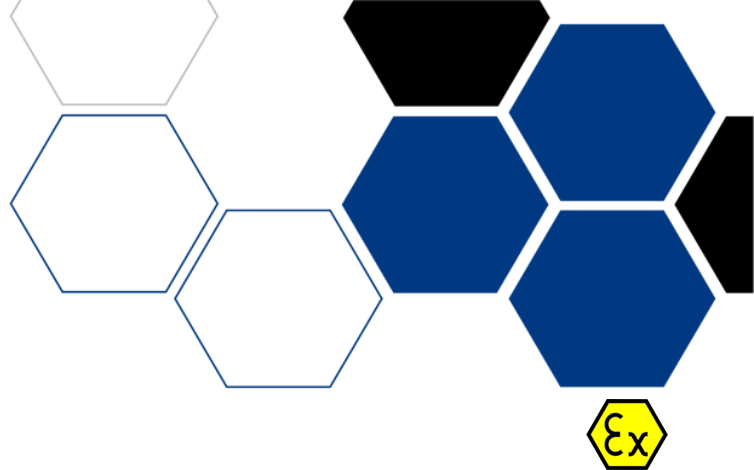
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HMC-ORK/P

## HMC-ORK/P COMPACT STATION

CATEGORY:

COMPACT STATIONS

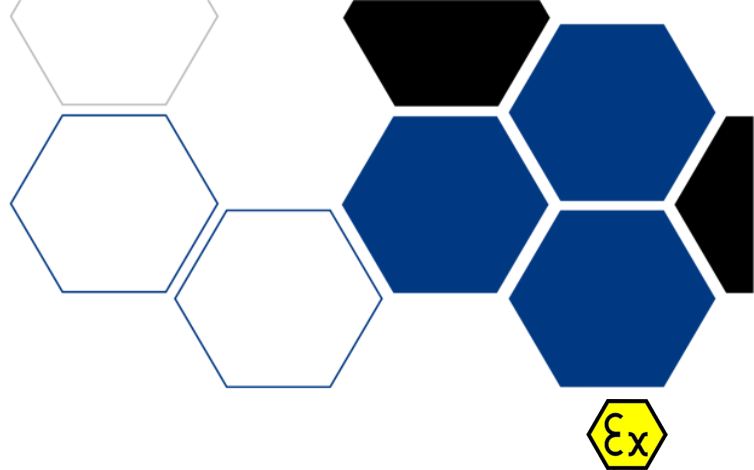
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HMC-ORKS

## HMC-ORKS COMPACT STATION

CATEGORY:

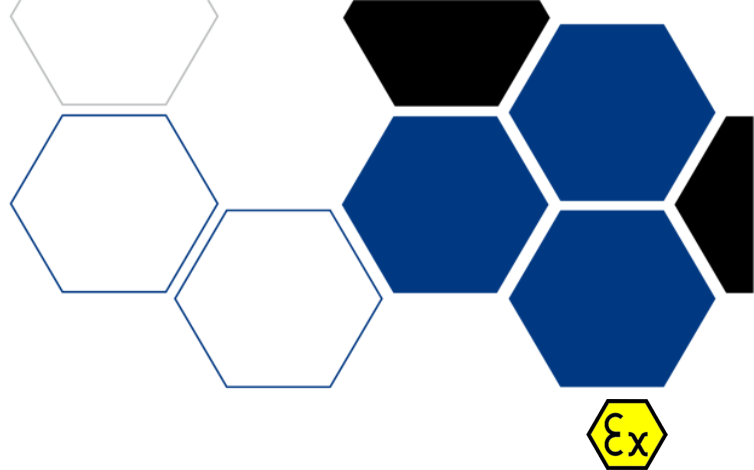
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HMC-ORKW

## HMC-ORKW COMPACT STATION

CATEGORY:

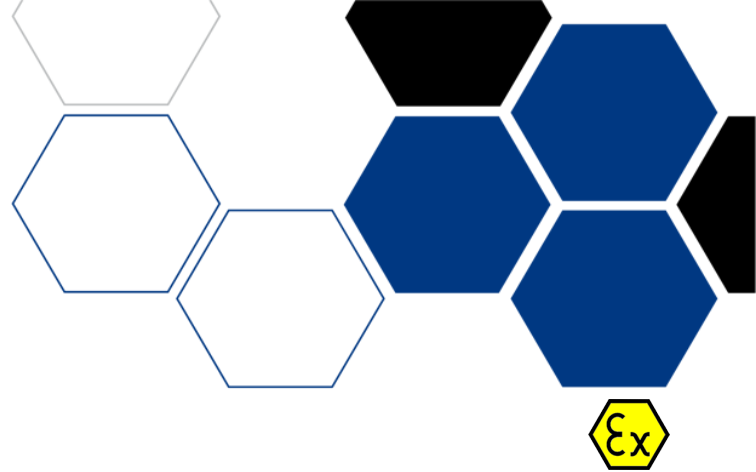
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# HMC-ORKW 800 MULTI-FEEDER FLAMEPROOF MINE SARTER

Multi-feeder flameproof mine starter HMC-ORKW 800... is intended for supplying and controlling mining machines drives from the three phase alternating current network 3x1000V (3x500V, 3x660V, 3x1140V as an option) with insulated star point of the transformer. The starter control system enables local and remote control of motors and in cooperation with signalling units or hands-free voice communication system - sending warning signals prior to machines or devices start up.

## Device description

The starters are equipped as a standard with:

- changeover and load switches enabling selection of revolutions direction of powered motors,
- t digital protections protecting powered equipment against the effects of short circuits, overloads, asymmetry and applying the power to the feeder with damaged insulation (integrated multifunction relay as an option),
- additional voltage circuits 230 V, 24 V, 42 V, 133V and 500V with leakage control that are led outwards,
- pass through circuit able to transfer the power of up to 200 kW,
- cable glands (max. 8 D + 9 O pcs.) for power cables with diameter of 13÷68 mm,
- cable glands (max. 8 D + 8 O pcs.) for power cables with diameter of 8÷30 mm.

Maximal permissible cross-section of working conductors of power cables is 120 mm<sup>2</sup> (240 mm<sup>2</sup> as an option). Optionally, the starters are equipped with a phase sequence control relay.

## Execution

Marking:

Multi-feeder flameproof mine starter HMC-ORKW a.../b.../c.../d.../e...

a ...	b ...	c ...	d ...	e ...T
Rated current [A]	Number of breaker circuits	Number of contactors of main feeders	Number of main feeders	Number of additional feeders
50 - 800	1 or 2	1 to 20	1 -14	1 - 6

HMC-ORKW 650/2/6/6/2T - multi-feeder flameproof mine starter with the rated current 650 A, with two disconnecting circuits, six main contactors and six main feeders, equipped with a set of protections and two additional protected feeders.

HMC-ORKW 500/2/3/3/2T - multi-feeder flameproof mine starter with the rated current 500 A, with two disconnecting circuits, three main contactors and three main feeders, equipped with a set of protections and two additional protected feeders.

CATEGORY:

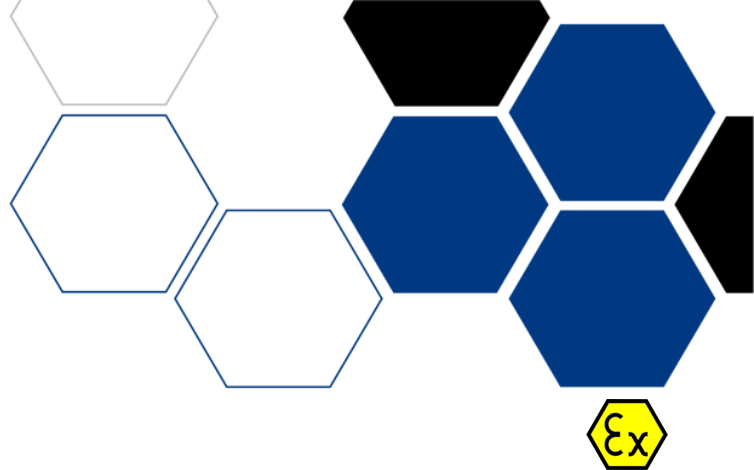
COMPACT STATIONS

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# HMC-ORK.1 400 TYPE FLAMEPROOF MINE STARTER OF

Flameproof mine starter type HMC-ORK.1 400... is designed for connecting and control of mining machine drives from the three phase alternating current mains 3x500V or 3x1000V with insulated star point of the transformer. The starter control system enables local and remote control of motors and in cooperation with signalling units or hands free voice communication system - sending warning sound signals prior to machine or device starting up.

## Technical characteristics

Rated connected voltage Ue	500 [V] or 1000 [V] / 660 V or 1140 V	
Rated insulation voltage Ui	1000 [V]	
Frequency	50 [Hz]	
Continuous rated current In *)	10 - 400 [A]	
Category of use	AC3	
Connection power in category AC3 *)	to 250 [kW] or 2x132 [kW] for Ue =500 V to 500 [kW] or 2x250 [kW] for Ue =1000 V	
Rated breaking current	25 [kA]	
Auxiliary circuit voltage	24 [V] and 42 [V]	
Control voltage	ab. 16.0 [V] cat. "Ia"	
Overcurrent protection type	HMC-ZPZ-310	HMC-PW-2
- rated current settings In	0,4 ÷ 180 [A]	0,4 ÷ 800 [A]
- setting of short circuit protection Ia	1,0 ÷ 12 In	1,5 ÷ 12 In
Protection level	IP54	
Dimensions W*H*D	778 x 655 x 424 [mm]	
Weight	approx. 280 [kg]	

\*) – depending on applied subassemblies

## Execution

Standard equipment of the starters comprises:

- isolating-switch enabling selection of revolution direction of powered motor (motors),
- digital protections protecting powered equipment against the results of short circuits, overloads, asymmetry and supplying,
- power to the outflow with damaged insulation,
- projecting outside additional voltage circuits 24 V and 42 V with leak control,
- through put line, which is able to transfer power to 110 kW,
- cable glands (max. 2 D + 2 O pcs) for power cables with diameter of 13+68 mm,
- cable glands (max. 2 D + 4 O pcs) for power cables with diameter of 8+30 mm.

Maximal permissible section of power conductors of power cables is 120 mm<sup>2</sup> (240 mm<sup>2</sup> as an option). Optionally starters are provided with a phase sequence control relay.

CATEGORY:

COMPACT STATIONS

CERTIFICATIONS



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## Types of workmanship

Way of marking:

Flameproof mine starter type HMC-ORK.1 a.../b.../c.../d.../e.../f...T g...

a...	/b...	/c...	/d...	/e...	/f...	T g...
Current rated [A]	Voltage rated [V]	Quantity of contactors of main outflows	Quantity of special outflows	Quantity of main outflows	Quantity additional outflows	Voltage rated additional outflows
10 ÷ 400	1-500 or 2-500/100 0 3-660 or 4-660/1140	1 or 2 or 3 or 4 or 5 or 6	1S - one with soft system start, 1 R - one with reverse, 2R - two with reverse, when none in marking - without outflow	1- one or 2- two or 3 - three or 4 - four or 5 - five or 6 - six when none in marking - without outflow	1- one or 2- two or 3 - three or 4 - four or 5 - five or 6 - six when none in marking - without outflow	1 - 24 V or 2 - 42 V or 3- 133V or 4 - 230 V when none in marking - without outflow

## Options

An order should indicate:

- rated voltage,
- frequency,
- number of main and auxiliary outflows,
- kinds of main outflows (direct or with reverse),
- foreseen load of main and additional outflows,
- foreseen purpose,
- foreseen load of 24V circuit,
- foreseen load of 42V circuit,
- number and size of cable glands.



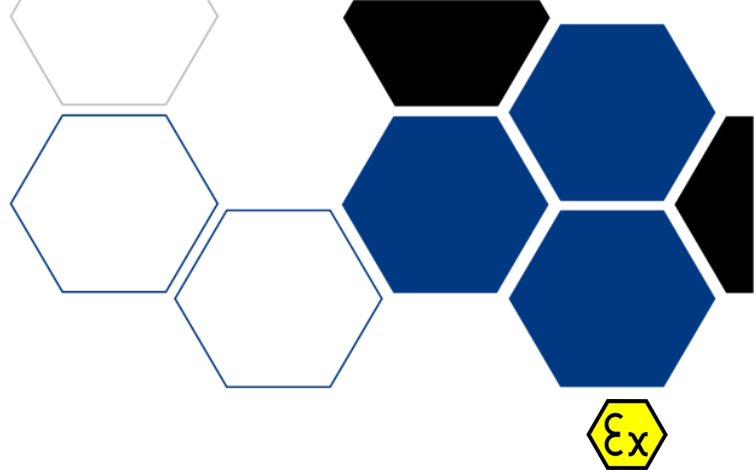
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ROK-6EM

## ROK-6EM SWITCHGEAR



CATEGORY:

MEDIUM VOLTAGE  
SWITCHGEAR

CERTIFICATIONS



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KMB-0.6

## KMB-0.6 REACTIVE POWER COMPENSATOR

CATEGORY:

REACTIVE POWER  
COMPENSATION

CERTIFICATIONS



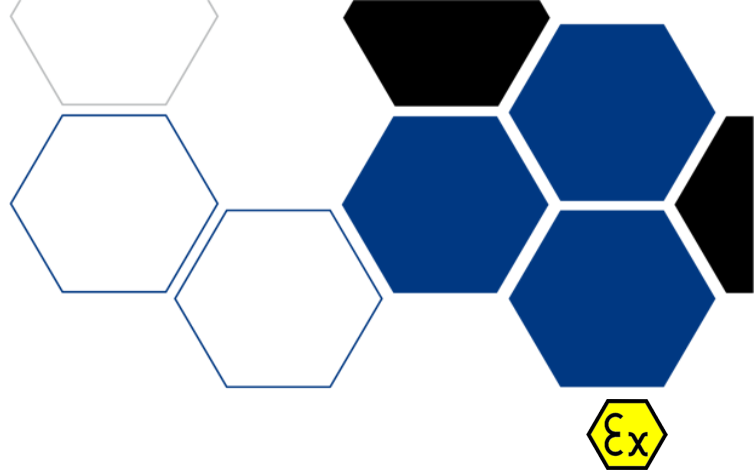
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KMB-0.3

## KMB-0.3 REACTIVE POWER COMPENSATOR



CATEGORY:

REACTIVE POWER  
COMPENSATION

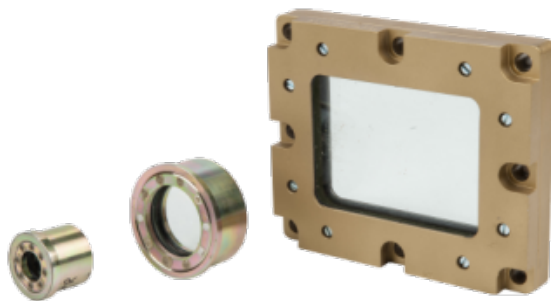
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OwO-01, OwO-02, OwO-03

## OWO-1, OWO-2, OWO-3 SIGHT GLASS

CATEGORY:

EXPLOSIONPROOF  
COMPONENTS

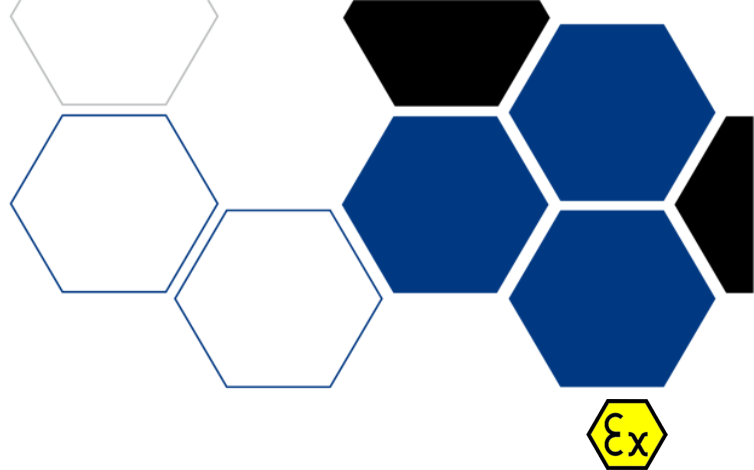
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## EM-CS-13 PILLING UP SENSOR

The EM-CS-13 analog temperature sensor is fit for use in underground mine workings:

- in non-explosive atmospheres, with level „a” of explosion hazard,
- in potentially explosive atmospheres, with „b” or „c” level of methane explosion hazard,
- without coal dust explosion hazard,
- with A or B coal dust explosion hazard class.

### Functions

Detection of too high level of coal causes immediate stop of belt conveyor.

Transmitting the information regarding the level of coal to the superordinate unit is provided via a RS485 (MOD- BUS ASCII) serial connection or, optionally, via a binary relay output. The configuration of the threshold level for the relay output is possible via the RS485 or the LEVEL1 rotary switch located on the board.

### Technical characteristics

Rated power supply voltage		12 – 15VDC
Maximum power consumption		100mA
Measurement range		0,5m– 2m
Measurement accuracy		±2cm
Hysteresis		15 cm (±7,5)
Measurement resolution		1cm
Protection rating		IP65
Ambient temperature range		-20 °C to 40 °C
Allowable humidity (at 40°C)		95%
Weight		1kg
External dimensions		135 x 75 x 55
		mm
EC-Type Examination Certificate Number:		FTZÚ 10 ATEX 0263
Explosion protection rating		I M1 Ex ia I Ma

CATEGORY:

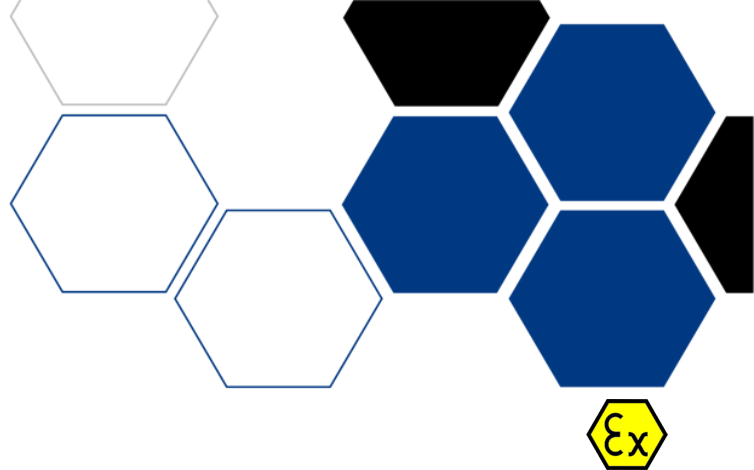
**SENSORS**

CERTIFICATIONS



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# EM-ACT-10 ANALOG TEMPERATURE SENSOR

The EM-ACT-10 analog temperature sensor is fit for use in underground mine workings:

- in non-explosive atmospheres, with level „a” of explosion hazard,
- without coal dust explosion hazard,
- with A or B coal dust explosion hazard class.

## Functions

Analog temperature sensor intended for measuring the temperature of machine parts. Transmitting the information regarding the temperature to the superordinate unit is provided via a RS485 (MOD-BUS ASCII) serial connection or, optionally, via a binary relay output. The configuration of the threshold level for the relay output is possible via the RS485 or the LEVEL1 rotary switch located on the board.

## Technical characteristics

Rated power supply voltage		10 - 15.8V
Rated current		40mA
Measurement range		-55 °C - 125 °C
Measurement accuracy		±0.5 °C in the range of -10 °C - 85 °C
Temperature hysteresis		15 °C
Protection rating		IP54
Ambient temperature range		-20 °C to 40 °C
Allowable humidity (at 40°C)		95%
Weight		575g
External dimensions		132.6 x 82.6 x 56 mm
RS485 interface		MODBUS ASCII / 19200bps / 7 data bits / no parity / 2 stop bits
EC-Type Examination Certificate Number:		FTZÚ 10 ATEX 0263
Explosion protection rating		I M1 Ex ia I Ma

CATEGORY:

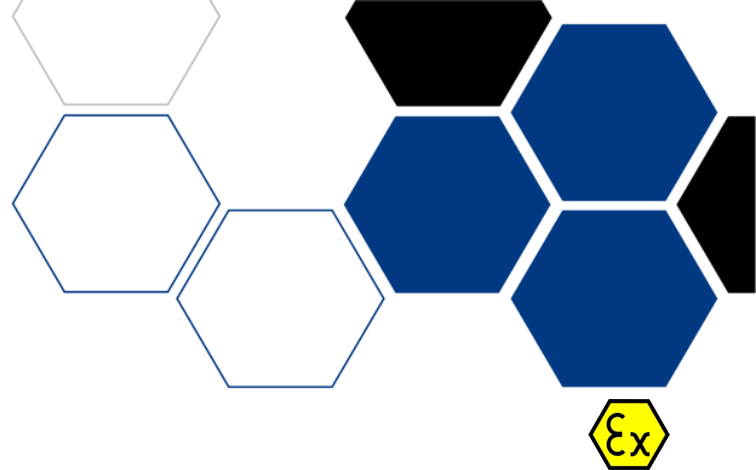
SENSORS

CERTIFICATIONS



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# EM-DCT-10 BINARY TEMPERATURE SENSOR

The EM-DCT-10 binary temperature sensor is fit for use in underground mine workings: - in non-explosive atmospheres, with level „a” of explosion hazard, - in potentially explosive atmospheres, with „b” or „c” level of methane explosion hazard, - without coal dust explosion hazard, - with A or B coal dust explosion hazard class

## Features/Technical specification

Confirmation output limit values - maximum Ui voltage (CON2 port outs 3, 4)	60V
Confirmation output limit values - maximum Ii current (CON2 port outs 3, 4)	0.5V
Factory set actuation threshold	65 °C - 150 °C
Temperature hysteresis	15 °C
Protection rating	IP54
Ambient temperature range	-20 °C to 40 °C
Allowable humidity (at 40°C)	95%
Weight	450g
External dimensions	132.6 x 82.6 x 56 mm
EC-Type Examination Certificate Number:	FTZU 10 ATEX 0264
Explosion protection rating	I M1 Ex ia I Ma

## Functions

The binary temperature sensor is intended for measuring the temperature of machine parts. Transmitting the information regarding the temperature to the superordinate unit is provided via a binary output of the device (closed - correct operation, open - temperature threshold exceeded). The threshold level is configured during production. After actuation, normal operation is returned after decreasing the temperature by 15°C (temperature hysteresis). The threshold level is configured during production.

## Montage

Depending on the cable access possibilities, the enclosure of the sensor enables screwing in the DP 10-15 cable gland on the top or bottom wall. The unused opening is closed with the WP gland plug. The sensor is screwed to the conveyor housing through 4 10.5 mm openings in the body.

CATEGORY:

SENSORS

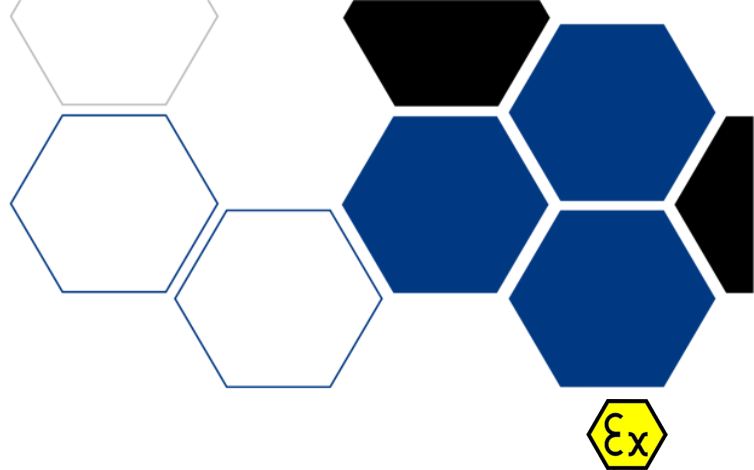
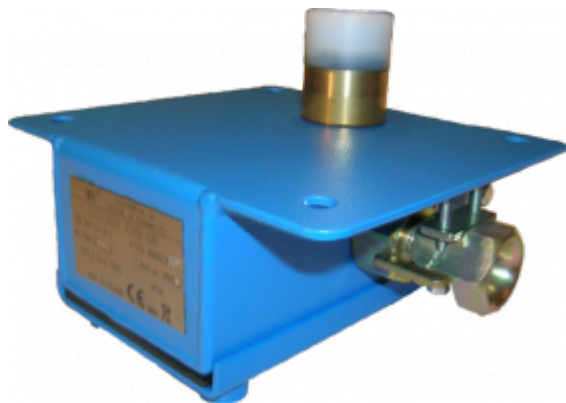
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## CRB-08 DETECTOR OF DRUM MOVEMENT

Intrinsically safe movement detector CRB-08 is intended for use in mining plants, in excavations classified as "a", "b", and "c" category of methane explosion hazard, and A, B class of coal dust explosion hazard

### Features/Technical specification

Maximal voltage in a sensor circuit	15 V DC
Type of an inductive sensor	PCIN-15 SELS
Operation zone	15 mm $\pm$ 10%
Type of cable inlet	DP 10-15
External diameter of cables	10-15 mm
Working temperature range	from +5°C to +40°C
Protection level	IP 54
Dimensions	175 x 210 135 mm
Weight	3,0 kg

### Functions

- conversion of the rotary motion of the drum of belt conveyor or other machine into a pulse train enabling the determination of rotational speed.

### Montage

Depending on the possibility of cable leading-in, the detector enclosure enables the screwing of cable inlet, type DP 10-15, to either bottom or top wall of the enclosure. The hole left unused is protected with the DP inlet stopper. 4 holes of dia. 10.5 mm in the body are used for the screwing of detector to the conveyor housing.

CATEGORY:

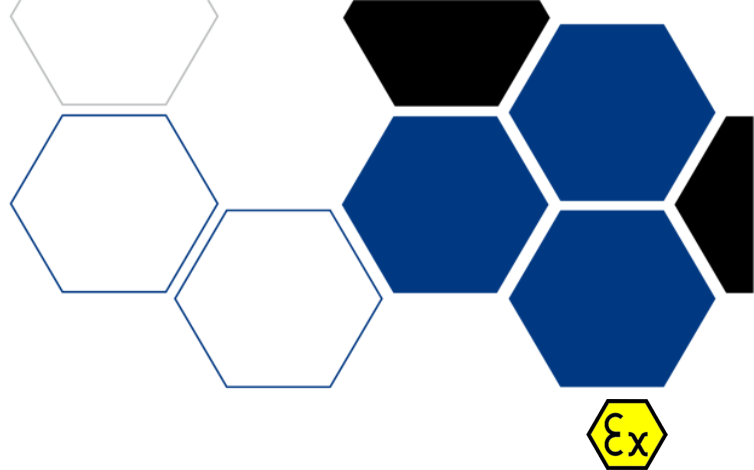
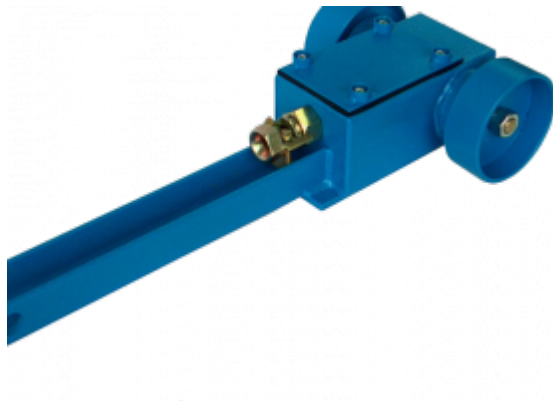
SENSORS

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# CRI-97/1 ITRINSICALLY SAFE MOVEMENT SENSOR

The CRI-97/1 intrinsically safe movement sensor is designed to be used in mining plants, in excavations at any concentration of methane.

## Features/Technical specification

Maximal voltage in a sensor circuit	15 V
Number of pulses for one rotation of a roller	4
External diameter of a roller	ø108 mm
Type of an inductive sensor	Ni10-P18-Y1X/S97 TURCK, PCIN-8Ex
SELS	
Type of cable inlet	DP 10-15
External diameter of cables	10-15 mm
Working temperature range	-20°C to +40°C
Protection level	IP 54
Dimensions	242 x 110 x 530 mm
Weight	8,8 kg

## Functions

- monitoring of a conveyor belt movement in cooperation with the UML local microprocessor device.

The basic element of the device is an inductive sensor of the type Ni10-P18-Y1X/S97 or PCIN-8 Ex which reacts to inserting a metal in sensitivity zone of a sensor. By movement of a roller with hollow holes there is a change of output resistance of a sensor. The difference in resistance is used in cooperation of a sensor and amplifier of direct current whose input circuit supply a sensor.

CATEGORY:

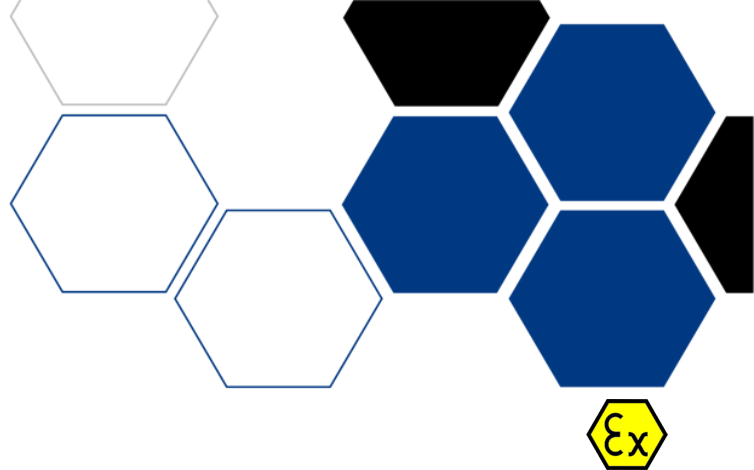
SENSORS

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# GLM-01 MINING MAGNETIC CONNECTOR

The mining magnetic connector is intended for use in machinery automation systems, e.g. in winding engines in mine shafts.

It is designed to be used in underground mine workings in methane and non-methane areas classified as "a", "b" and "c" level of methane explosion hazard and "A" and "B" class of coal dust explosion hazard.

## Device description

The design of the mining magnetic connector ensures safe operation in case of electrical, mechanical and thermal hazards.

## Technical characteristics

Switching voltage	depends on the used reed switch 100-200 V DC
Switching current	depends on the used reed switch 0.5 , 1 or 3.0 A
Inlet thread	M30x1.5, M40x1.5
Protection level	IP 54
Weight	about 4.3 kg

CATEGORY:

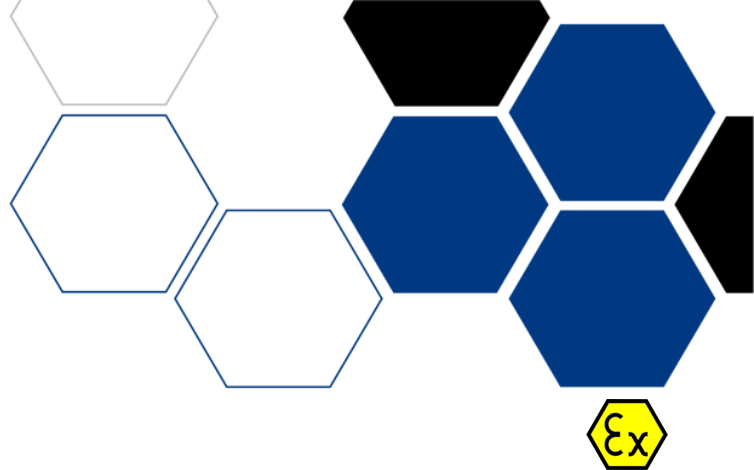
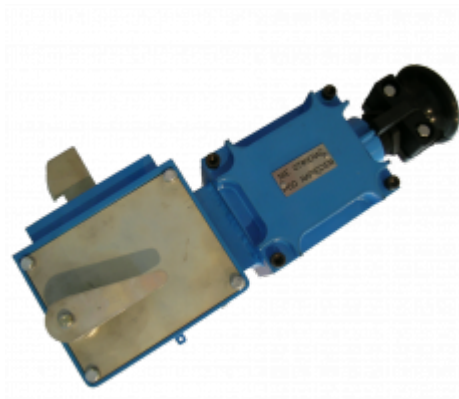
LOCOMOTIVE  
MAINTENANCE AND  
SERVICE

CERTIFICATIONS



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## RWS-02

Shaft door lock RWS-02/.../.../... is designed for using with winding plants in mines. It mechanically locks the possibility of opening shaft door using a detent. Shaft doors can be open then only under some circumstances i.e. authorization and presence of man cage.

Shaft door lock is designed for working in mining plants and underground excavation classified as "a", "b", and "c" category of methane explosion hazard, and A, B class of coal dust explosion hazard.

### Device description

Supplying a voltage causes absorption of a keeper to the housing of the solenoid coil and activation of locking arm. If locking arm is active, there is a possibility of opening the door using manual locking arm. If there is lack of voltage on solenoid terminals opening the lock is impossible

### Technical characteristics

Rated supply voltage	UN = 127 V AC or 230 V AC
Rated current	IN = ...A lub ... A
Rated frequency	F = 50 Hz
Ingress protection	IP 54
Available deviation	20°
Temperature	-5°C do +40°C
Relative air humidity	Max 95% at temperature up to 40°C
Weight	8,3 kg

### Composition of sets

Depending on execution:

- rated voltage
- left/right construction
- type of cable inlet

is denoted RWS-02/.../.../... according to table:

RWS-02	/.../	/.../	/...
	Rated voltage	Construction execution	Type of cable inlet
	127 - 127 V AC or 230 - 230V AC	L - left P - right	30 - thread 30x1,5 40 - thread 40x1,5

CATEGORY:

LOCOMOTIVE  
MAINTENANCE AND  
SERVICE

CERTIFICATIONS



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