



ELSHAFT-15

ELSHAFT-15 SHAFT CONTROL, COMMUNICATION & SIGNALLING SYSTEM



CATEGORY:

AUTOMATION
SYSTEMS

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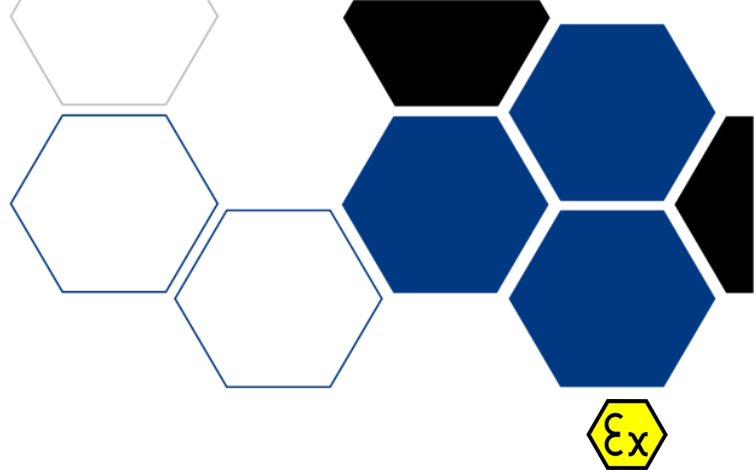
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ELSAP-05

ELSAP-05 AUTOMATION CONTROL SYSTEM



CATEGORY:

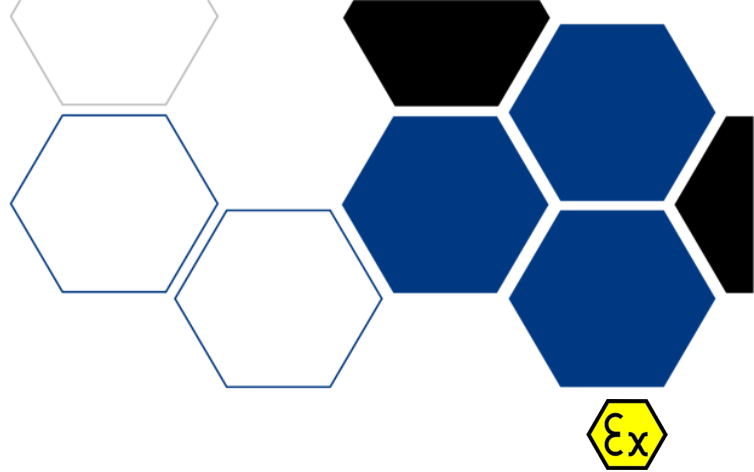
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THE CONVEYOR AUTOMATION SYSTEM

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

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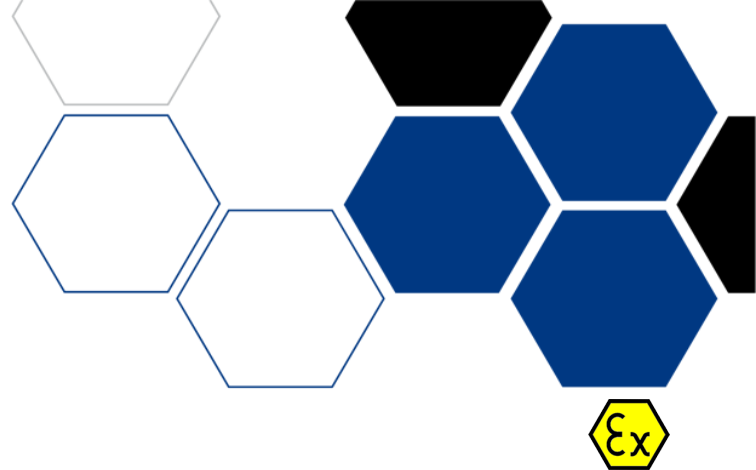


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SKIP LOADING SYSTEM



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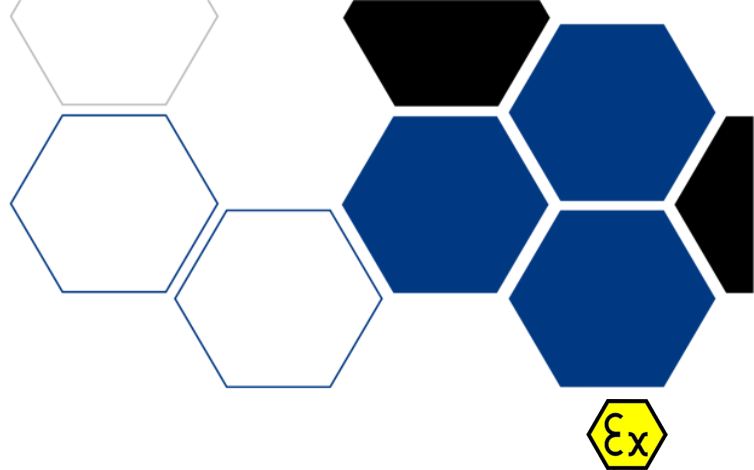
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ELSAP-14 CONTROL SYSTEM

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.

Design and operation

The SLS-15 shaft communication system enables the organization of communication in mine shafts between any levels. It enables conducting telephone conversations in the "duplex" system both in hands-free mode and via a handset.

The system consists of:

- A system cabinet with the necessary equipment (digital telephone exchange, intrinsically safe separation cassette, a set of power supplies and batteries for guaranteed power supply)
- Standard mining devices and/or IKAR telephone signaling devices
- A communication station for the driver (system telephone and/or dedicated driver's desk)

It is also possible to connect analogue devices outside the explosion hazard zone and connect, for example, a doorphone (e.g. at the entrance to the hoisting machine rooms).

The most important features

- Scalable modular expansion
- Independent power supply guaranteeing 4h operation of devices after a power failure.
- Design and solutions guaranteeing simple operation and reliable operation
- Wide configuration possibilities strictly tailored to the customer's needs
- Possibility to connect both analog mining devices and IKAR telephone signaling devices
- Possibility to directly call the driver from any device
- Possibility to set up a conference call
- Possibility to enter "on the 3rd" into the conversation conducted from the driver's device
- Possibility to record conversations from the ECHO system
- It has the ability to record both regular and emergency conversations
- Possibility to connect a doorphone
- Possibility to connect non-intrinsically safe analog devices (outside the explosion hazard zone)

In the case of using IKAR telephone signalling devices, we will additionally expand our functionality by:



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- The ability to listen to the surroundings of the selected device
- The ability to broadcast messages spoken individually by the driver or previously recorded for a single or entire group of devices
- The ability for the driver to create group alarms for selected devices or groups of devices
- It allows to connect up to 4 binary sensors to the IKAR device, the operating status of which is signalled on the driver's panel
- It allows the driver to start (automatically or manually) additional signalling devices (e.g. warning boards) connected to the IKAR device via binary outputs
- The ability to remotely program devices (numbers, software, messages, etc.)
- The ability to display on the device display: current time; own number; number or name of the calling subscriber (CLIP), number of the dialled subscriber, location of the device installation.
- The ability to continuously monitor the status and current operation of the device, including: opening the main chamber; opening the connection chamber; disconnection of the line from the device; failure; low battery



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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

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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

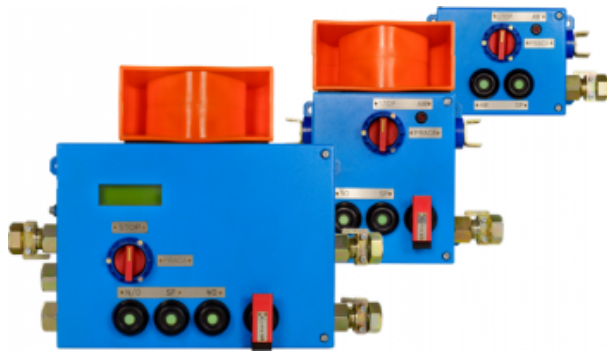
The most important devices included in the system are:

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.

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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

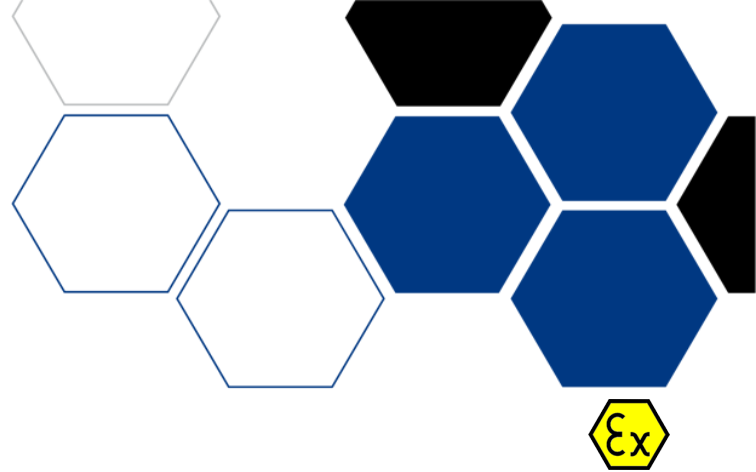
Technical characteristics

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

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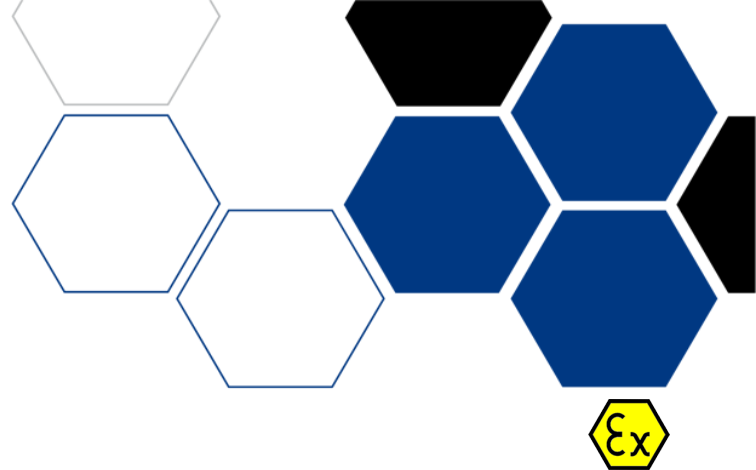
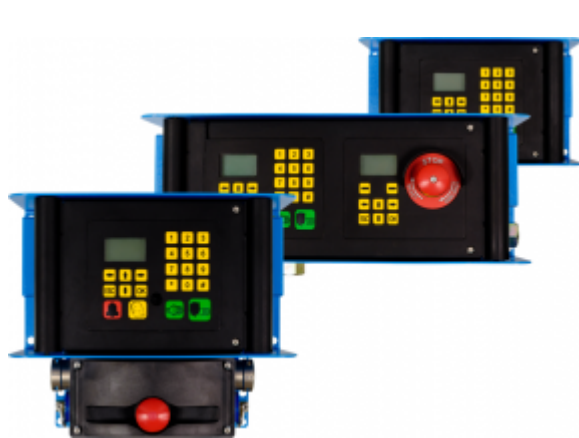
LOUDSPEAKING
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UGS-10 - INTRINSICALLY SAFE SYSTEM FOR LOUD SPEAKING COMMUNICATION, SIGNALLING AND BLOCKING

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 SYSTEMS

CERTIFICATIONS



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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:

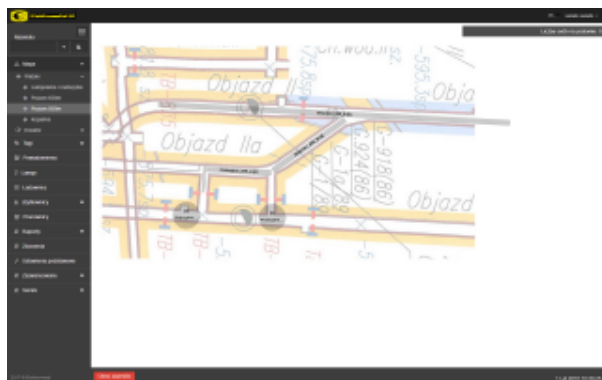
- Dialling PBX subscribers from any UGS-10 signalling device over DTMF.
- Dialling a UGS-10 signalling device or groups thereof by any PBX subscriber (over DTMF).
- semi-duplex calls between PBX subscribers and UGS-10 signalling device users.

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



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EMLOK-16

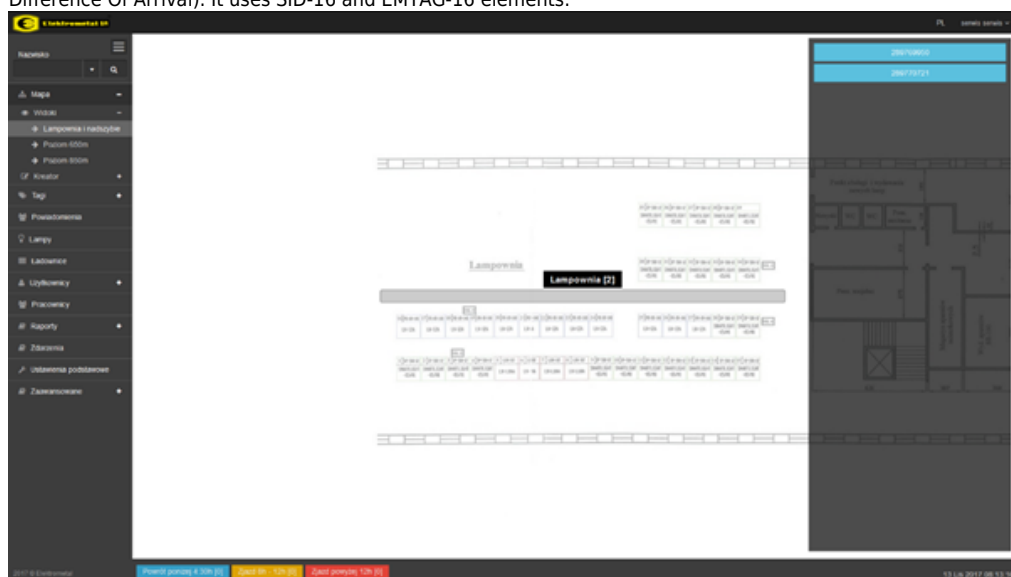
MONITORING AND TRACKING SYSTEM EMLOK-16

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



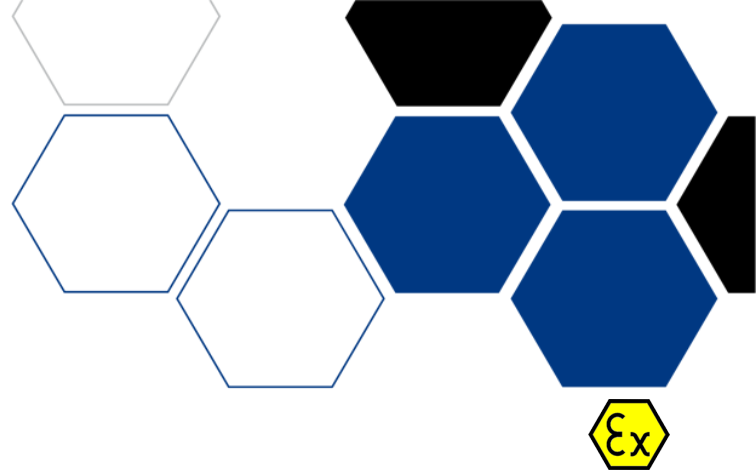
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Key functions:

- 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:

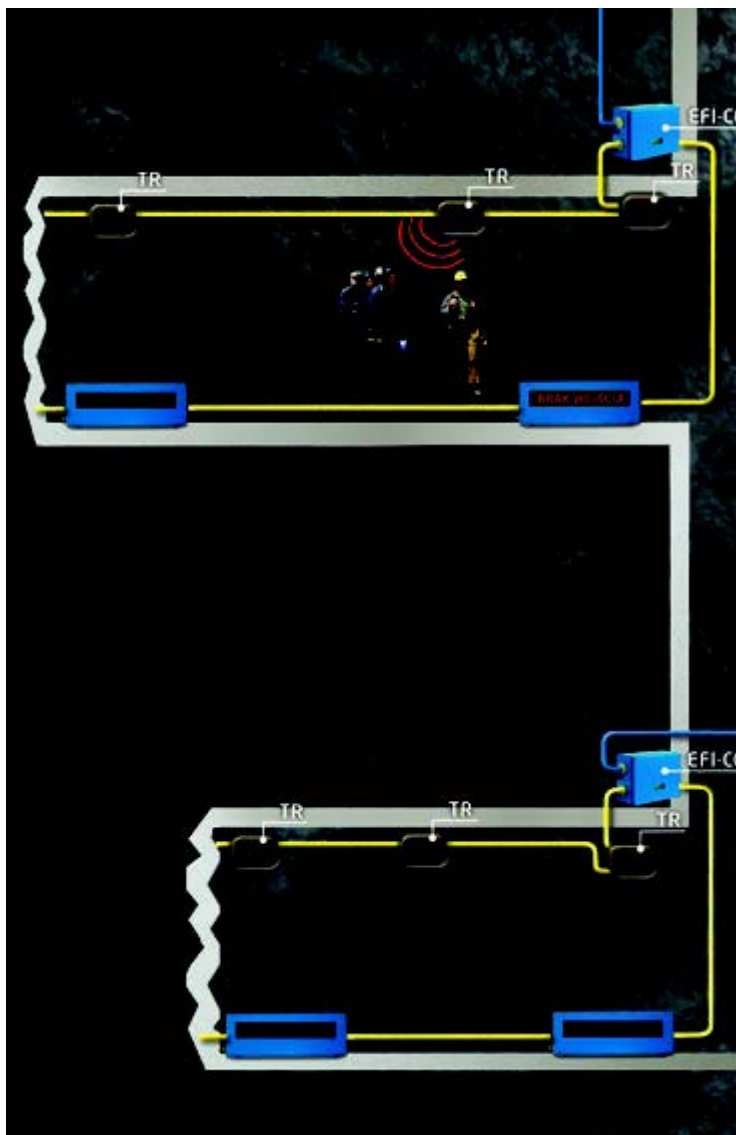
MONITORING AND TRACKING

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



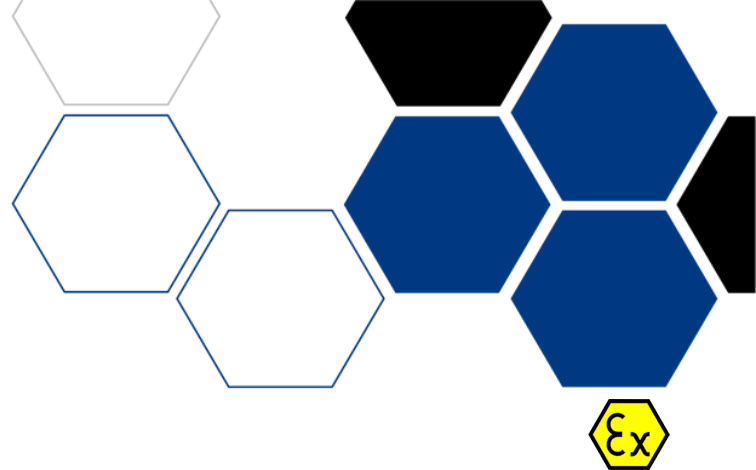
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Minsearch 08

EMERGENCY POSITION FINDING SYSTEM MINSEARCH-08



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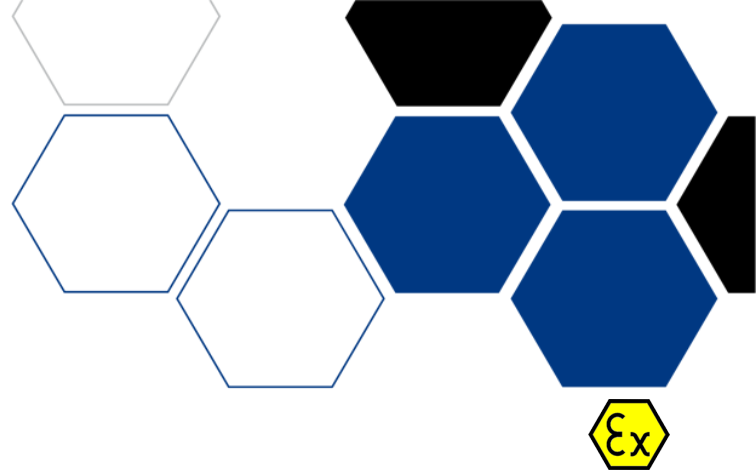
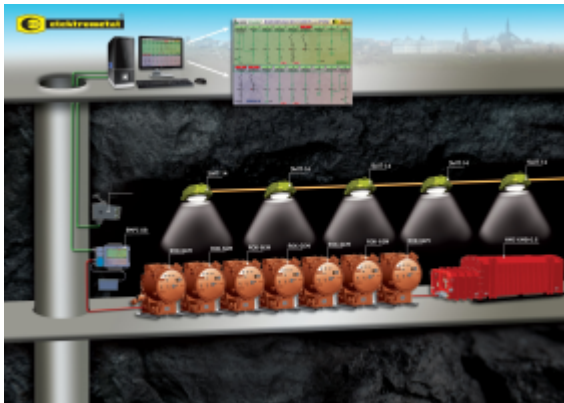
EMERGENCY
POSITION FINDING

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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:

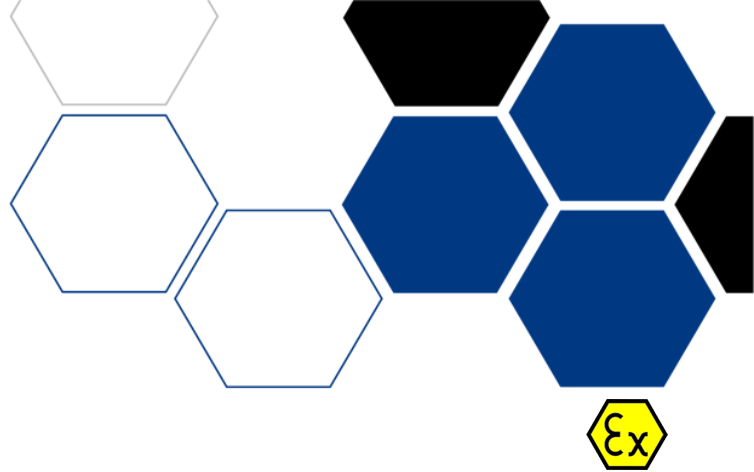
FIBER OPTIC SYSTEMS

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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:

CONTROL DEVICES

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	

21712



CATEGORY:

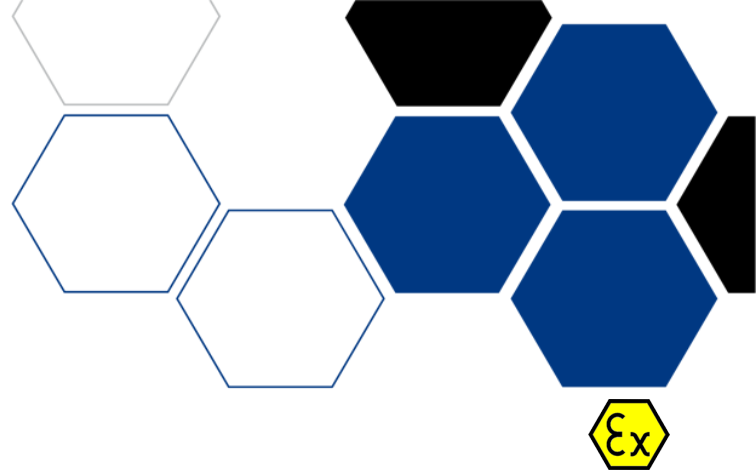
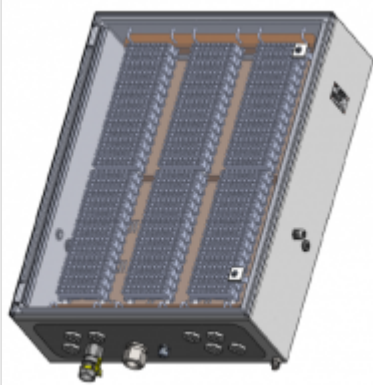
COMPUTER /
ACCESSORIES

CERTIFICATIONS



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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:

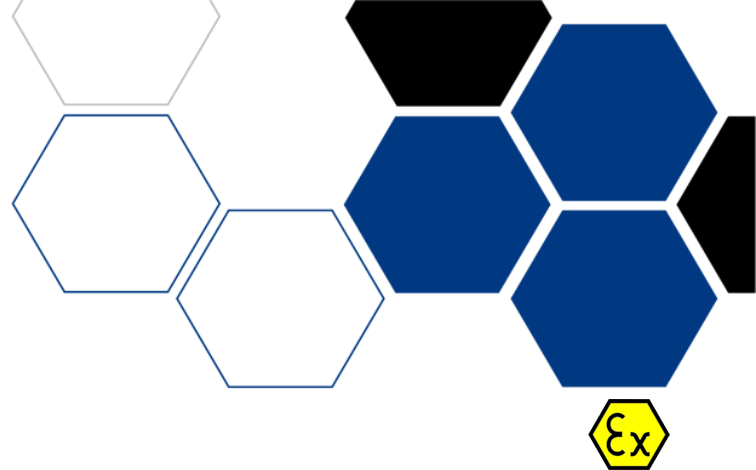
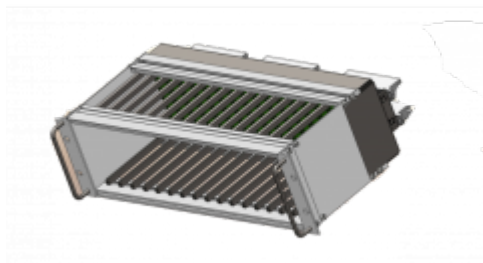
TELEPHONE
COMMUNICATION

CERTIFICATIONS



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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

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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%

30712



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

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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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:

TELEPHONE
COMMUNICATION

CERTIFICATIONS



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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

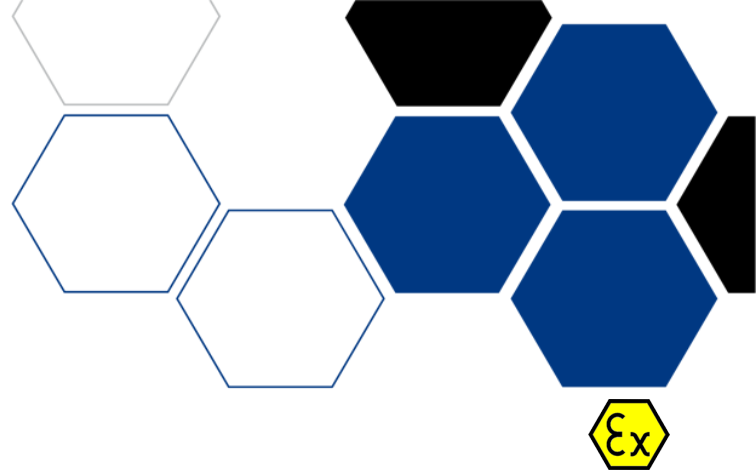
Temperature range - -20 °C to + 40 °C

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 ²
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

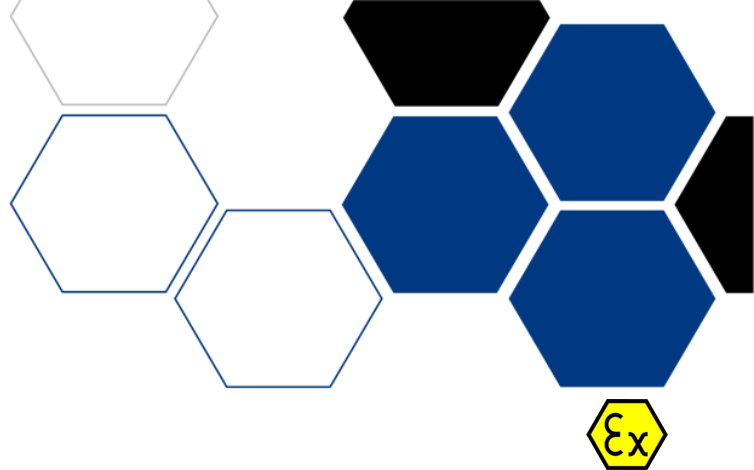
The module is available in both intrinsically safe and ordinary construction. Regardless of the version, it plays the role of a 5-port switch. It is equipped with three RJ-45 connectors and two SC fiber connectors. It enables loop-through connection to an fiber-optic Ethernet network and connection of 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 ²
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 ²
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.

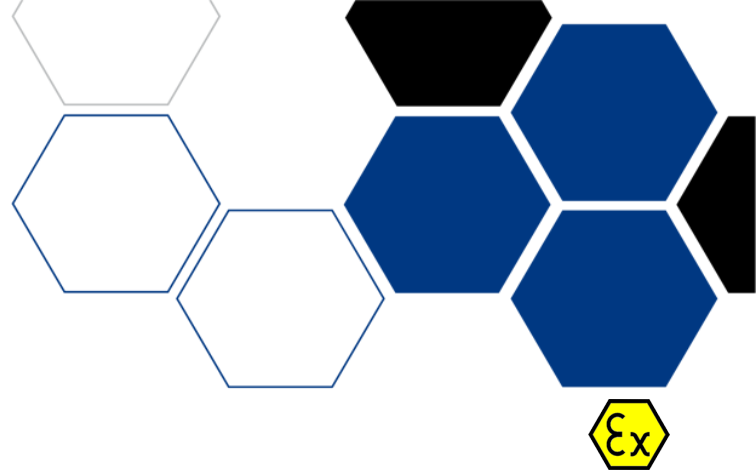
Design 2

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 ²
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 ²
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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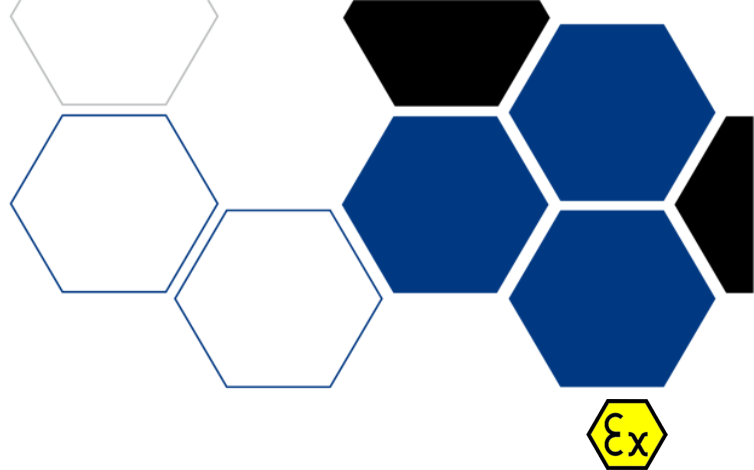
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explosive area and a non-explosive area. The module can be mounted in potentially explosive areas only if it is protected by another type of flameproof construction.



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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.

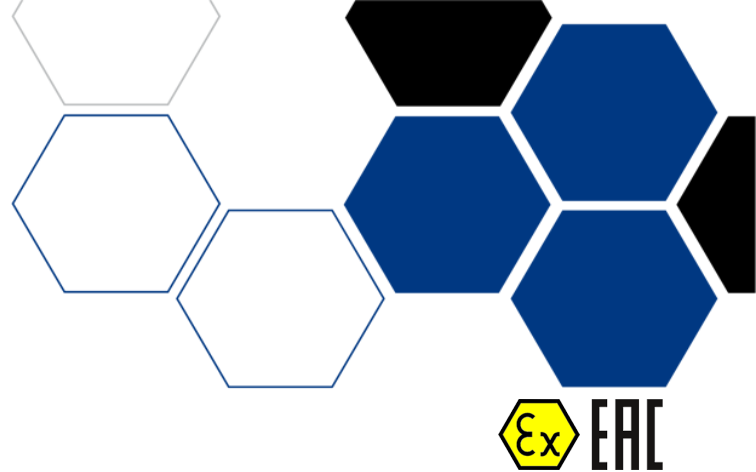
Montage

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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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"> • Scene changing • Tripwire • Entrance/exit • Abandoned/missing objects • Face detection
Additional information	<ul style="list-style-type: none"> • Advanced processor for improved image quality in difficult lighting conditions Simple Focus
Supported operating systems	<ul style="list-style-type: none"> • Windows XP • Windows Vista • Windows 7 , 8 , 10
Supported web browsers	<ul style="list-style-type: none"> • Internet Explorer 7.0 or higher • Firefox 9 or higher • Google Chrome 15 or higher

CATEGORY:
VISUAL MONITORING-

CERTIFICATIONS



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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

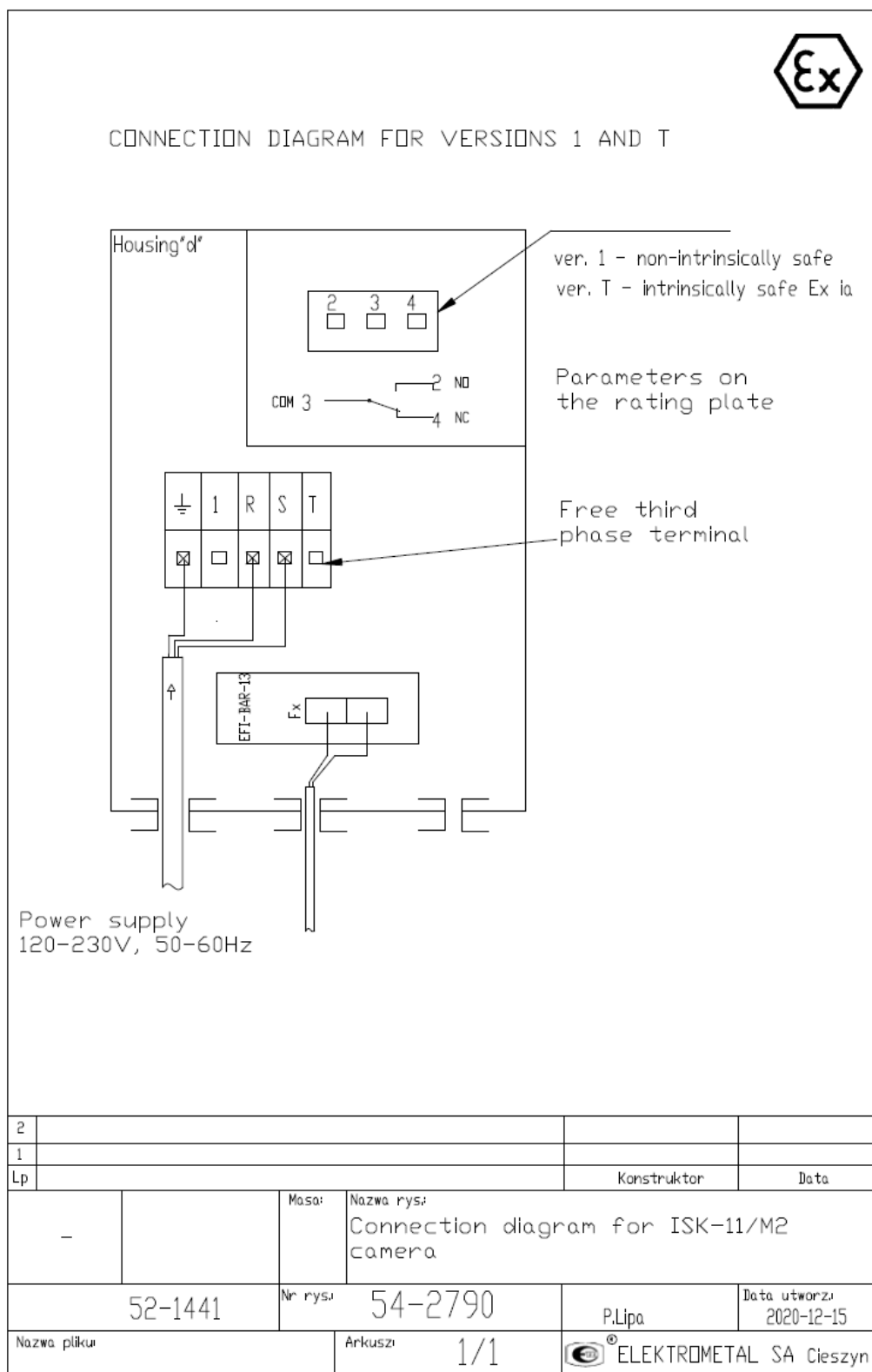
Parameter name	Megapixel camera
Image sensor	1/2,8" 2 Mpx
Maximum resolution	1920 x 1080
Zoom	Optical: 2.6-8mm, manually controlled Digital
Sensitivity	0.1 Lux (colour) 0.0017 Lux (30 fps, 2 sec) 0.01 Lux (BW)
Day/Night Mode	Colour / BW / Auto (ICR)
Backlight compensation	Off / BLC
Contrast enhancement	Manual / SSDR
Noise reduction	Off / SSNR III
Digital image stabilisation	Yes
Intelligent video surveillance	<ul style="list-style-type: none"> • Scene changing • Tripwire • Entrance/exit • Abandoned/missing objects • Face detection
Additional information	<ul style="list-style-type: none"> • Advanced processor for improved image quality in difficult lighting conditions • Simple Focus
Supported operating systems	<ul style="list-style-type: none"> • Windows XP • Windows Vista • Windows 7 , 8 , 10
Supported web browsers	<ul style="list-style-type: none"> • Internet Explorer 7.0 or higher • Firefox 9 or higher • Google Chrome 15 or higher
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"> • Internet Explorer 7.0 or higher • Firefox 9 or higher • Google Chrome 15 or higher



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Types of workmanship



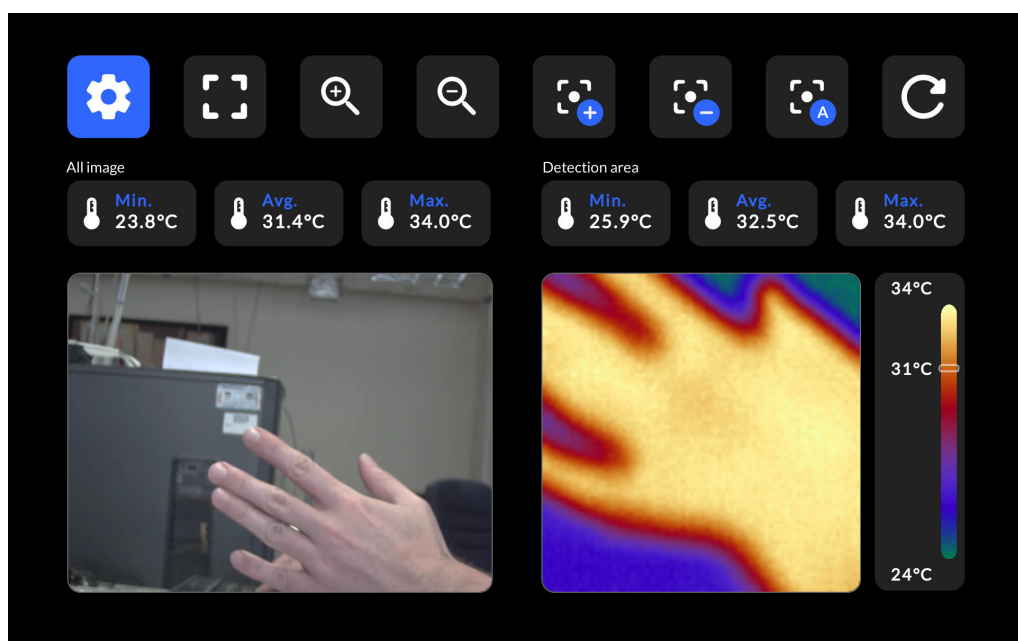
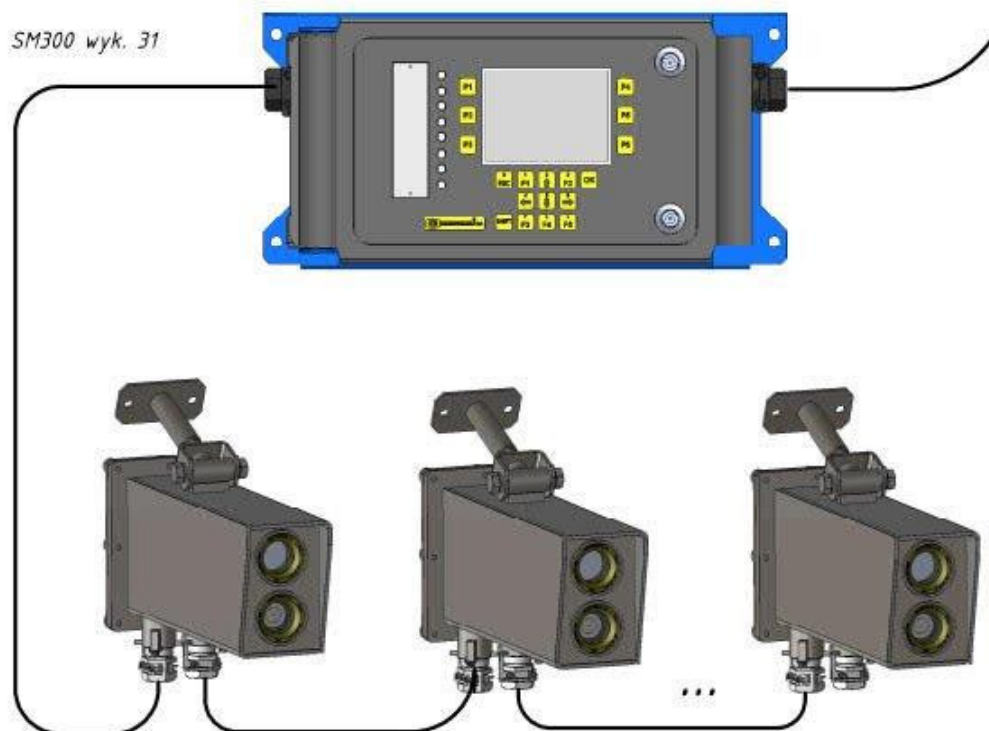
Options



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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.

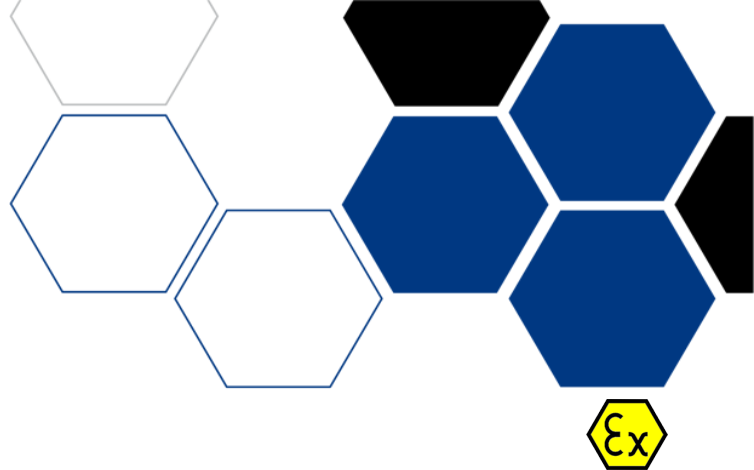
It has been optimized for cooperation with controllers from the **ELSAP** family equipped with a graphic display. The camera is connected directly to the 100BaseTx Ethernet port on the controller or to the fiber optic bus via fiber optic switches, e.g. **EMFOS-18** or **ISE-17**. Transmission of control 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 ²
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)



CATEGORY:

VISUAL MONITORING-

CERTIFICATIONS



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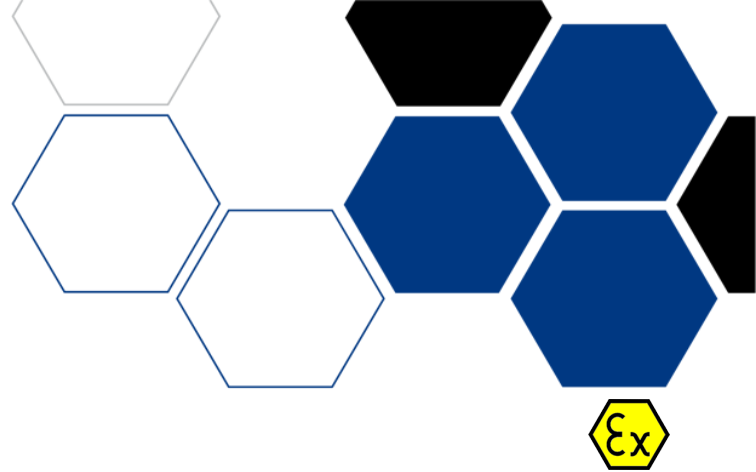
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Backlight compensation	OFF. / BLC	OFF. / BLC / HLC
Contrast enhancement	Manual/ SSDR	Manual/ SSDR
Noise reduction	OFF. / SSNR III	OFF. / SSNR III
Digital Image Stabilization	Yes	Yes
Video analytics	Tampering, Virtual line, Enter/Exit, (Diss)Appear, 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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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-

CERTIFICATIONS



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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.

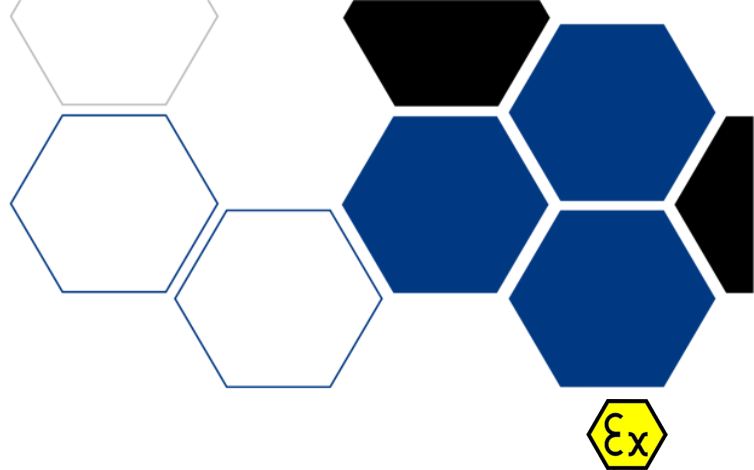
Irrespective of their versions, each camera features a high-power LED illuminator. The zoom and HD cameras have a remote illuminator on-off functionality.

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



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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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OLR-2D

OLR-2D DOUBLE APPROVAL LAMP

- I M2 Ex de I Mb
- II 2G Ex de IIB+H₂ 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 ²
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

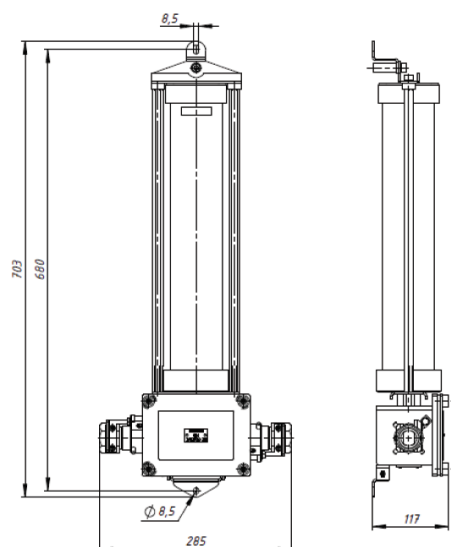


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The lamp is powered with 230 VAC. The installed PSU features active PFC, which minimises the reactive power consumption. This enables an optimum usage of the transformer unit

Design and operation



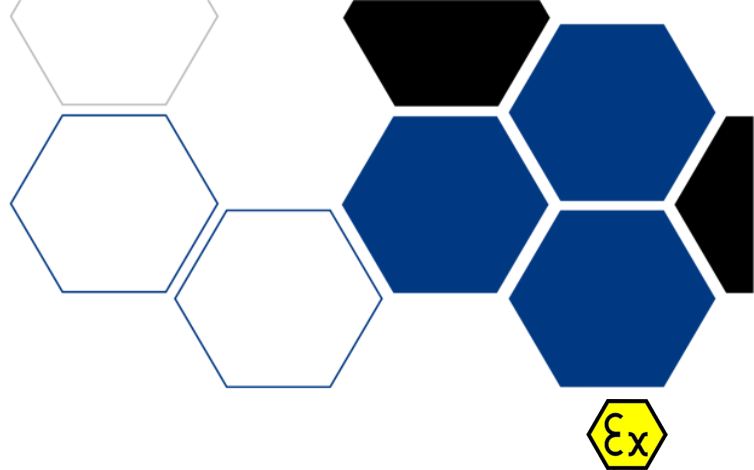
The most important features

- 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-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:

TUNNELS AND
LONGWALLS
LIGHTING

CERTIFICATIONS



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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 ²	
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 ²	
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



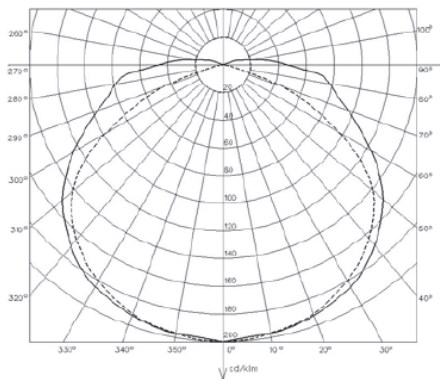
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Beam angle curve

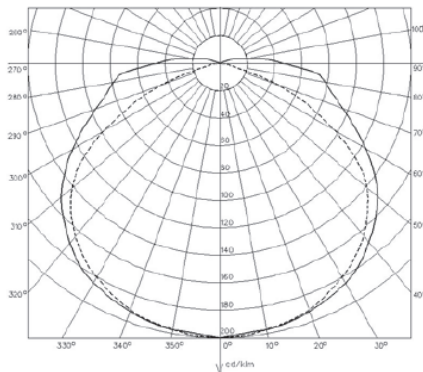
Curve of intensity distribution for luminaire type OLR-1-18 for rated voltage 220 V, counted over flux 1 klm

— 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

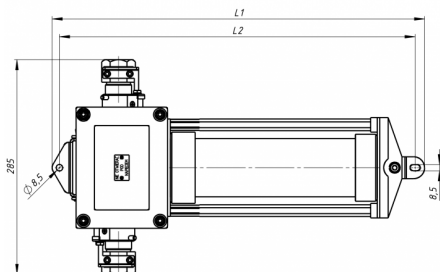
— in vertical plane of symmetry
- - - in horizontal plane of symmetry



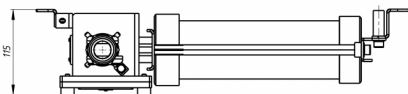
Design and operation

- 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.

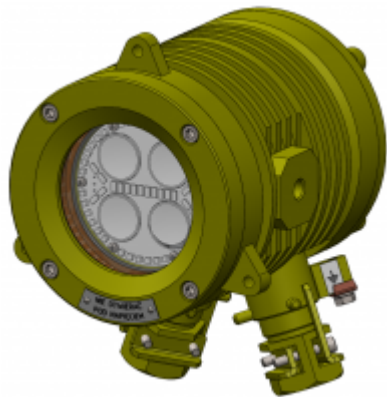
Advantages

- 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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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 ²
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.

CATEGORY:

VEHICLES AND
MACHINES LIGHTING

CERTIFICATIONS



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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 mm² (4 mm² 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 mm². 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

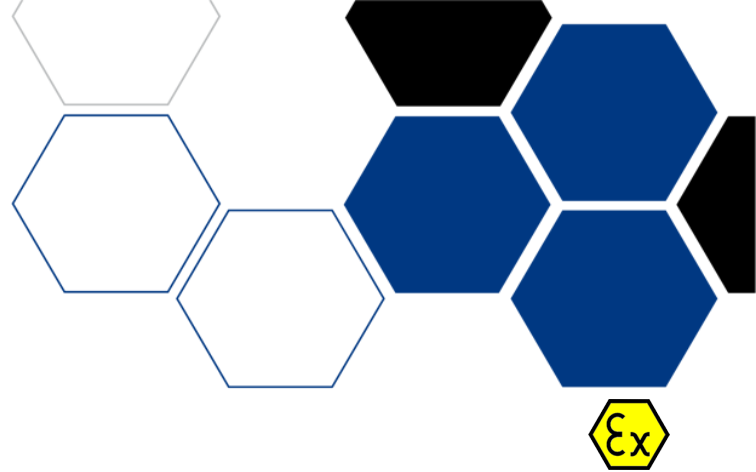
ROZ-5D ver. 3 - two glands from the back (through-put supply)

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



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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 mm² 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	

CATEGORY:

VEHICLES AND
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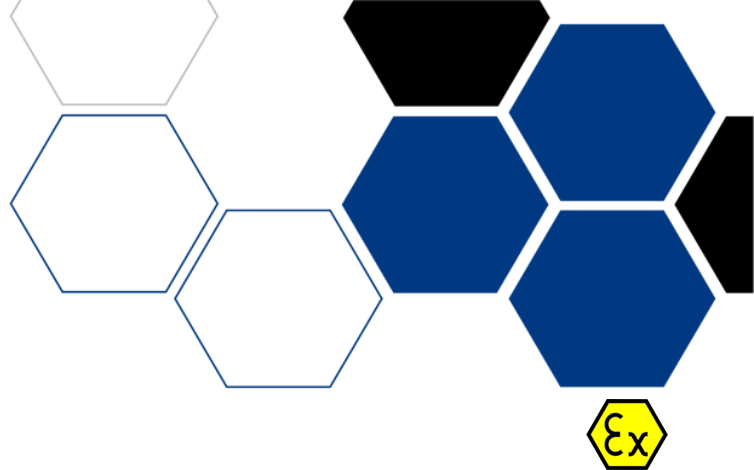
Advantages

- 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-5

POH-5 HEADLAMP

The **POH-5** projector 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

Description

The **POH-5** projector is an explosion-proof and flameproof structure. It is characterized by very high resistance to mechanical impacts. The housing is made of steel and the optical system is covered with tempered glass. The projector is mounted using a dedicated, special holder that allows you to direct the light in the selected direction. The adjustment range is: 30° in the direction parallel to the mounting plane and 20° in the perpendicular direction.

The light source is 3 10W LEDs. Each of the three diodes is equipped with focusing lenses. As standard, a combination of "DIFFUSER", "MEDIUM", "WIDE" lenses is installed. At the customer's request, other types of lenses can be used according to the list below:

- three "DIFFUSER" lenses light distribution angle (FWHM) $\sim 17^\circ$ "DDD" marking
- three "MEDIUM" lenses light distribution angle (FWHM) $\sim 24^\circ$ "MMM" marking
- three "WIDE" lenses light distribution angle (FWHM) $\sim 38^\circ$ "WWW" marking
- three "VERY WIDE" lenses light distribution angle (FWHM) $\sim 63^\circ$ "VVV" marking

For applications requiring complex lighting characteristics, it is possible to use a combination of three different lenses, e.g.:

- lens combination: "DIFFUSER", "MEDIUM", "WIDE" marking "DMW"
- combination of a "DIFFUSER" lens and two "WIDE" lenses, "DWW" marking
- combination of a "MEDIUM" lens and two "VERY WIDE" lenses, "MVV" marking
- others created by combining three lenses from the list above

Features/Technical specification

Technical parameters			
Parameter name	Value (unit)		
Version	POH-5 /24V	POH-5 /42V	POH-5 /230V
Supply voltage	24V ±10%	42V ±10%	127-230V ±10%
Frequency of the supply voltage	50-60/0Hz	50-60Hz	
Rated current	1,5/1,2 A	0,9 A	0,22-0,13 A
ATEX marking	☸ I M2 Ex db op is I Mb		
EU type examination certificate number	FTZÚ 10 ATEX 0163X		
Ingress protection	IP65		
Source of light	3 LED's		
Cable inlet	WKE 14-20		
Ambient temperature range	-10°C do +40°C		
Humidity (at +35°C)	95%		
Weight	11,7 kg		
Dimensions	243 x 210 x 168 mm		

Usage

The **POH-5** projector can be used in underground mine workings:

- not at risk of methane explosion with "a" degree of explosion hazard,

CATEGORY:

VEHICLES AND MACHINES LIGHTING

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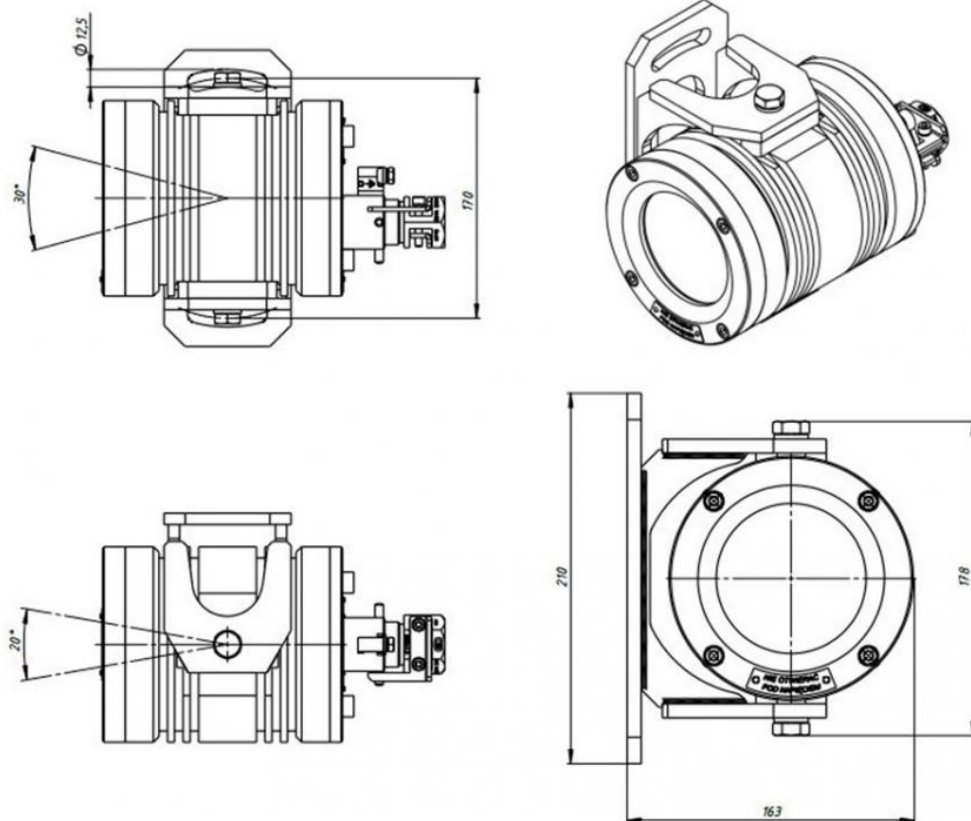
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- at risk of methane explosion with "b" or "c" degree of explosion hazard,
- not at risk of coal dust explosion,
- class A and B coal dust explosion hazard.

The **POH-5** projector is designed to be installed on mining machines and illuminate selected observation sites.

Montage

A dedicated holder is used to mount the projector on the machine. The basic dimensions and adjustment range of the handle are marked below.



Advantages

- high mechanical impact resistance,
- projector can be fastened in any position,
- greater luminous flux
- power energy saving,
- long life light source
- possibility of power supply directly from the transformer set.



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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).

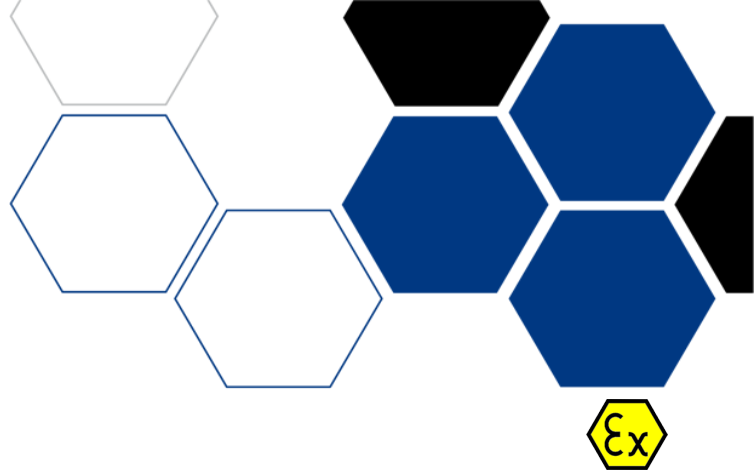
The housing of the locating transmitter is equipped with a third LED, which in normal operation informs about the correct operation of the transmitter, and in case of failure (damage to the head, cable) can shine a continuous light, thus providing illumination of the return path to the user.

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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LK-xx/xxx

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

The charging rack type ŁK-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 ŁK-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

Description

- Monitoring the operating parameters of the lamps being charged.
- If the lamp room is equipped with a lamp charging control centre, the charging module enables data exchange between the lamp and the computerised charging monitoring and control system. The computer can also be used to archive data and generate reports.
- The computer can also be used to archive data and generate reports.
- After charging is completed, the battery remains in service mode.
- Testing of the battery capacity by automatic charging to the final charging mode (the discharging process is initiated from the headlamp or via the monitoring system).
- Signaling the start of the capacity test,
- Signaling low battery charge (after the capacity test is completed),
- Maintaining the lamp's state of charge in the event of a voltage drop on the chargers or when the lamp is removed from the charging station for a short time,
- The chargers are protected from mechanical damage by a housing



Information about the charging and discharging processes, including the statuses 'ready for operation', 'failure', 'no charge', 'F - battery fully charged' are displayed on the LED display.

The charging and discharging processes take place inside the lamp. The only task of the charger is to limit the current value (it controls the current source), signalling the start of the process, its progress, emergency situations and the status of data transfer.

Functions

CATEGORY:

CAP LAMPS

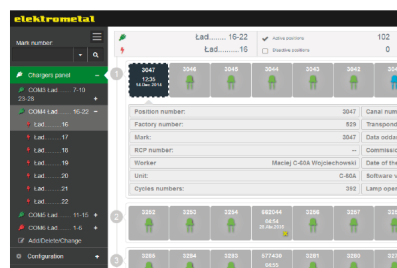
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- Inspection of operating parameters of charging lamps.
 - If the lamp room is equipped with a control center of technical process of lamp charging, charging module can transfer data between the lamp and the visualization system and charging control 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.



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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 ŁK-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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KMB-0.6

KMB-0.6 REACTIVE POWER COMPENSATOR

CATEGORY:

REACTIVE POWER
COMPENSATION

CERTIFICATIONS



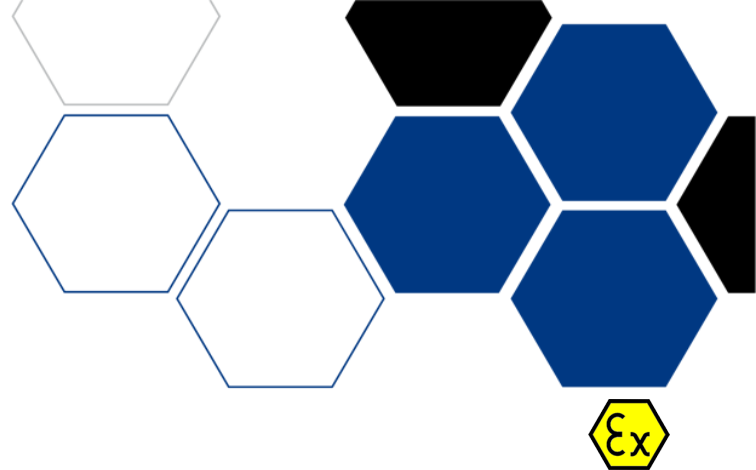
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KMB-0.3

KMB-0.3 REACTIVE POWER COMPENSATOR



CATEGORY:

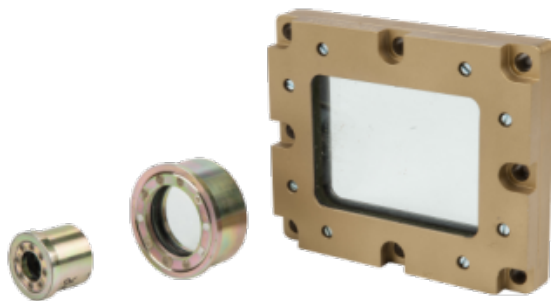
REACTIVE POWER
COMPENSATION

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OwO-01, OwO-02, OwO-03

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

CATEGORY:

EXPLOSIONPROOF
COMPONENTS

CERTIFICATIONS



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