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ISI - Information system for identification in the underground mine

Information System for Identification (ISI system) is used to identify and locate people, equipment or material in the mine. The ISI system is based on RFID technology (868MHz) and consists of two parts, consisting of several devices. These are data concentrator DKD11 or DKD11-IO, power supply SME-02, communication cables RFK-01, surface switchboard RM1-ISI-P, display TE0-AS and identification device TAG-ZAM-xx (transmitter), located in a mining lamp, on a belt or device etc. The ISI system includes a computer designed for processing, evaluation and visualization of information from RFK-01 communication cables. The CIS SCADA type software created especially for the ISI system is installed in the PC, which can be modified as needed.

The single or multiple communication cables RFK-01 length of 120m or 200m form an area that defines the boundaries of the monitored area and allows to distinguish the direction of movement in the area. The RFK-01 communication cable contains readers which, if the presence of a TAG is detected, send information to the DKD-11 or DKD11-IO and the latter to the PC via a modem. The SW then evaluates the sent data and can also control the relays located in the DKD11-IO.

The TE-01 transmitter serves as a universal communication device for voice communication. The TE-02 terminal serves as a universal communication device and is equipped with a barcode reader for use in logistics.

Communication cables RFK-01 are in the design I M1 Ex ia I Ma, ie they can work in the area with permanent occurrence of methane. The DKD-11 data concentrator is in design I M1 Ex ia I Ma. The DKD11-IO data concentrator is in design I M1 Ex ia I Ma. The SME-02 power supply is I M2 (M1) Ex db eb [ia Ma] I Mb / I M1 Ex ia I Mb.

Technical parametres of SME-ISI-P:

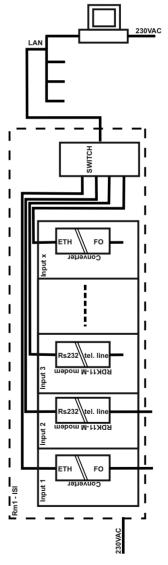| Design	normal spaces	
Input supply voltage	Max. 264VAC/50Hz/TN-S	
Control voltage	Max. 24VDC/SELV	
Variants	1	(2)
Power consumption	800VA	(500VA)
Protection	IP30	(IP54)
Dimensions	1000 x 800 x 2200mm (order)	
Weight	100kg	(30kg)
Temperature range	-20°C to +40°C	
Relative humidity	95% max. non-condensing	
Power supply ZD 130-01		
Output voltage	120VDC/SELV	
Output current	1A	

Description

The ISI system is divided into two parts, the mining part and the surface part, see block diagram of the ISI system.

Surface part:

- RM1-ISI-P device. The RM1-ISI-P switchboard is in a box design (var.1) or a sheet metal switchboard (var.2). The variant is a design containing communication and power supply elements, as well as a server in the rack 19 design. Option 2 contains communication and power supply elements. The desktop server is located outside the rack.

- Client computer PC. It is installed software for processing and visualization of information from mining equipments.

Block diagram of the ISI system - Surface

The catalogue has only those selected important parameters for your final decision. For project designs always ask for the user's guide for this product and any engineering consultation about possible uses.
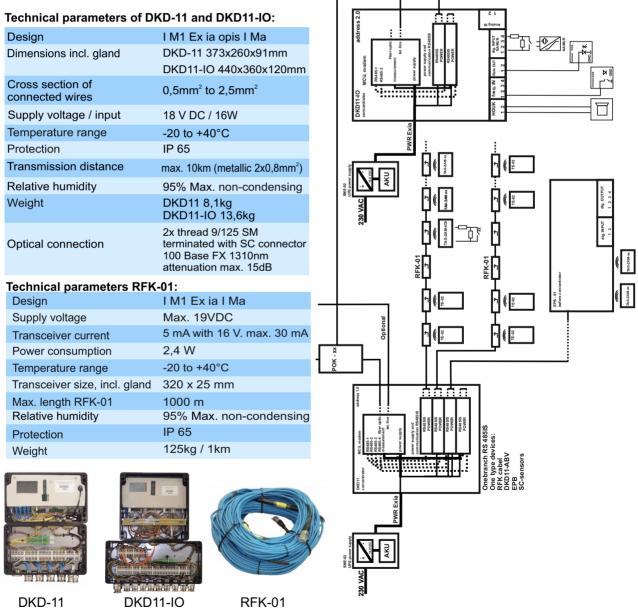
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Underground part:

- Data concentrator DKD11 and DKD11-IO. The device consists of two antistatic enclosures with IP65 protection. In the lower cabinet there are terminal blocks, in the upper cabinet there is a concentrator itself, consisting of three printed circuit boards. The lower cabinet contains glands for connecting cables. It contains a modem providing communication with the surface part of the ISI system via a telephone pair or optical cable, it also provides power supply and communication via the RS485IS serial line for separate branches and other inputs.

- Communication cable RFK-01. The device is equipped with an RFID tag reader and an Ex ia power supply with an Ex ia battery for powering the RFK-01. The maximum distance of the TAG-ZAM-xx devices providing radio connection is 50m under ideal conditions.

Technical parameters of DKD-11 and DKD11-IO:

Design	I M1 Ex ia opis I Ma
Dimensions incl. gland	DKD-11 373x260x91mm
	DKD11-IO 440x360x120mm
Cross section of connected wires	0,5mm² to 2,5mm²
Supply voltage / input	18 V DC / 16W
Temperature range	-20 to +40°C
Protection	IP 65
Transmission distance	max. 10km (metallic 2x0,8mm²)
Relative humidity	95% Max. non-condensing
Weight	DKD11 8,1kg DKD11-IO 13,6kg
Optical connection	2x thread 9/125 SM terminated with SC connector 100 Base FX 1310nm attenuation max. 15dB

Technical parameters RFK-01:

Design	I M1 Ex ia I Ma
Supply voltage	Max. 19VDC
Transceiver current	5 mA with 16 V. max. 30 mA
Power consumption	2,4 W
Temperature range	-20 to +40°C
Transceiver size, incl. gland	320 x 25 mm
Max. length RFK-01	1000 m
Relative humidity	95% Max. non-condensing
Protection	IP 65
Weight	125kg / 1km

DKD-11 DKD11-IO RFK-01

Block diagram of the ISI system - underground

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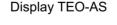
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- Intrinsically safe source SME-02. The device consists of an explosion-proof housing, a firm conclusion in the Ex d design and a terminal part in the Ex e design. The intrinsically safe power supply SME-02 contains a power supply (DKD-Z1 or DKD-Z3) and a battery power supply (DKD-Z2) stored in Ex d. The power supply is used to supply the DKD11 and DKD11-IO mine data concentrator or other devices that meet the connection conditions.
- TE0-AS display. The device is used for optical signaling, such as displaying the number of workers or entry ban, and can only be connected to intrinsically safe circuits.
- TE-01 The transmitter is designed as a universal communication device for the ISI system. Its basic feature is the use of low-power consumption components that provide a significant life of the transmitter on a single charge in standby mode. The communication of the transmitter is realized by means of two independent integrated transceivers operating on the frequency 868MHz, fully compatible with the ISI system.
- TE-02 The terminal is designed as a universal communication device for the ISI system and is equipped with a barcode reader for use in logistics, for example. Its basic feature is the use of low-power consumption components, which provide a considerable life of the terminal on a single charge. Because the terminal is part of the ISI system, it is possible to use communication through this system. If the terminal is online (within range of one of the RFK-01 cables), it is automatically localized using the ISI system and information about the terminal's location is part of every data communication - this can be used for automated determination of the barcod scanning location. It is therefore not possible in principle to distort the data on the movement of the monitored material.

Power supply SME-02   Display TEO-AS

Transmitter TE-01   Terminal TE-02

Technical parameters of SME-02

Design	I M2(M1) Ex db eb [ia Ma] I Mb / I M1 Ex ia I Ma
Temperature range	-10 to+40°C
Dimensions incl. glands	380 x 510 x 210 mm
Weight	25,5 Kg
Relative humidity	95% max non-condensing
Protection	IP 54
Rated supply voltage	2PE 230 V AC 50 Hz IT
Power consumption	35 W
Input voltage	14 to 18,9 V DC
Output current, max.	1,2A

Technical parameters of TEO-AS

Design	I M1 Ex ia I Ma
Number of displayed char.	8
Memory capacity	16 Kbit
Max. message length	up to 110 characters
Temperature range	-20°C to+40°C
Relative humidity	95% max non-condensing
Protection	IP 54
Dimensions	614 x 210 x 60mm
Weight	7,5kg

Technical parameters of TE-01:

Design	I M1 Ex ia I Ma
Power supply	Accu Li-Ion 930 mAh Un = 3,7 VDC
Protection	IP 54
Battery life	Standby time: 9 hours Standard operation: 7 hours
Relative humidity	95% max non-condensing
Display	Grafical LCD 128x32, backlight
Dimensions (without antena)	116 x 57 x 36mm
Communication	ISI - 868MHz, 170kbps
Weight	cca 220g

Technical parameters of TE-02

Design	I M1 Ex ia I Ma
Power supply	Accu NiMH 4500mAh
Battery life	min. 24 hours
Bar code reader	CCD Imager (Code 39 20mil)
Display	Grafical LCD RGB, 3,0" 320x240, backlight
Communication	ISI - 868MHz, 170kbps
Protection	IP 65
Relative humidity	95% max non-condensing
Dimensions	160 x 75 x 35mm
Weight	cca 500g

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These data sheets are not an offer within the meaning of Czech Republic Law No. 89/2012.

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ISI – Information system for identification in the underground mine

- TAG-ZAM-xx, TAG-ZAM-FACE, TAG-ZAM-4DI. These devices are active RFID elements that communicate with RFK-01 at a frequency of about 868MHz. To identify and locate people in the mine, the TAG-ZAM-xx is installed in mining lamps or on a worker's belt. However, it can also be placed in other equipment, on tools, vehicles, containers, etc.
- TAG-ZAM-4DI Tag is used to collect binary information and contactless transfer to the parent system. The information is transmitted by radio on the frequency 868MHz to the reader of the superior Information System for Identification (ISI). The data can be further used in the superior system for switching subsequent circuits or can be visualized as needed, eg in the control room.
- The TAG-ZAM-FER Tag serves as a universal communication device for the ISI system. It is intended for wireless data transfer from the device in which it is installed to the ISI system. In the ISI system, data is stored, evaluated or further processed.

TAG-ZAM-01

TAG-ZAM-02

TAG-ZAM-08

TAG-ZAM-FACE

TAG-ZAM-FER

TAG-ZAM-4DI

Technical parameters of TAG-ZAM-xx:

Design	I M1 Ex ia I
Power voltage	Max. 8VDC
Consumption	Max. 30mA
Power consumption	240mW
Temperature range	-20°C to +60°C
Relative humidity	95% max non-condensing
Protection in the lamp placement	according to IP of lamp
Dimensions	cca 95 x 25 x 10mm
Weight	0,01kg
Communication	ISM 868 MHz

Technical parameters of TAG-ZAM-08:

Design	I M1 Ex ia I Ma
Battery type	Lithium cell 3.6V DC
Battery capacity	2,6 Ah
Battery lifetime	min. 1 year
Temperature range	-20°C to +40°C
Relative humidity	95% max non-condensing
Protection	IP 65
Dimensions	80 x 50 x 20 mm
Weight	cca 115g
Communication	ISM 868 MHz

Technical parameters of TAG-ZAM-FACE:

Design	I M1 Ex ia I Ma
Battery capacity	8,5 Ah
Voltage at the battery poles	3,6 VDC
Output power	10 mW
Temperature range	0°C to +40°C
Relative humidity	95% max non-condensing
Protection	IP 54
Communication	ISM 868 MHz

Technical parameters of TAG-ZAM-FER

Design	I M1 Ex ia I Ma
Dimensions	50x40x13mm
Weight	cca 20g
Temperature range	0 to +40°C
Protection	IP 00
Power voltage	5V DC
Output power	10 mW
Communication	ISM 868 MHz

Technical parameters of TAG-ZAM-4DI:

Design	I M1 Ex ia I Ma
Battery capacity	19 Ah, service life 1 year
Voltage at the battery poles	3,6 VDC
Output power	10 mW
Temperature range	-20°C to +40°C
Relative humidity	95% max non-condensing
Protection	IP 65
Dimensions	190 x 135 x 56mm
Communication	ISM 868 MHz

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