

**zam servis**

**MINING SYSTEMS AND  
SOLUTIONS**

ZAM-SERVIS s.r.o., Křišťanova 1116/14, 702 00 Ostrava-Přívoz, Czech Republic

Prepared by : Jiří Ševčík, September 2016

# Where we come from ?

**ZAM – SERVIS, s.r.o.,  
Křišťanova 1116/14, Ostrava, Czech Republic,  
EUROPE**



# Who we are ?

## *Our possibilities*

*ZAM-SERVIS company is a producent electric and electronic equipments for all types of mines. We have a large development, manufacturing and service base to deliver to our customers a complete service from equipment development to meet specific customer requirements to servicing equipments.*

## *Guarantee of quality*

*ZAM-SERVIS company gives a guarantee of quality to our customers in the form of the ISO 9001 certificate 22 years already.*

## *Introduction of the offered equipments*

*The main features of products ZAM-SERVIS are the ability to work safely in an environment where there is a risk of methane explosion, dust, humidity, their robustness and working reliability. All products have a certificate of an authorised testing laboratory and an approval of the Directorate General of the Czech Mining Authority in Prague according to European Directive No. 94/9/EC-ATEX. We deliver except of Czech Republic, to Russia, Poland, Ukraine, Turkey, Slovakia too. For Russia and Ukraine the products are certificated by an authorized testing laboratory according to the GOST Directive, and have the approval of DGMS Russia and Ukraine. Now also testing of our products in the India Testing Laboratory by IS standards and getting approval from the Directorate General of Mines Safety DGMS is being prepared.*

# Range of production

## A) DPS11 transmission system - telemonitoring

- Connection of air sensors
  - e.g. CH<sub>4</sub>, O<sub>2</sub>, CO, CO<sub>2</sub>, H<sub>2</sub>S, air velocity, temperature, humidity, pressure
- Collection of binary and analogue information
- Acoustic and visual signalling
- Connecting the components of system ISI (RFID technology)
- Reporting in SW SCADA
- Connection to LAN network
- ATEX certification
- all equipments „ia“ or flameproof design

# Structure of the DPS11 system – backbone components

- **Surface part**
  - **Switchboard RM1-DPS11 rack**
  - **Operator workplace**
  - **Connection to LAN network**
- **Transmission path**
  - **Metallic cable**
  - **Optical cable**
- **Underground part**
  - **DKD11 data concentrator**
  - **SME-02 source of intrinsically safe voltage**

# Block diagram of the DPS11 + ISI system

Underground mine telemonitoring system DPS11 is a modular system for two-way communication between underground section which consists of mine data concentrators DKD11 with sensing detectors, RFID readers or mine data concentrators DKD11-ABV and surface section which consists of modems and servers for process, archive and visualize data.

**Surface section consists of the following main devices:**  
 RMI-RPKD RACK, PC servers, switch, modems (PKD11-M) and UPS

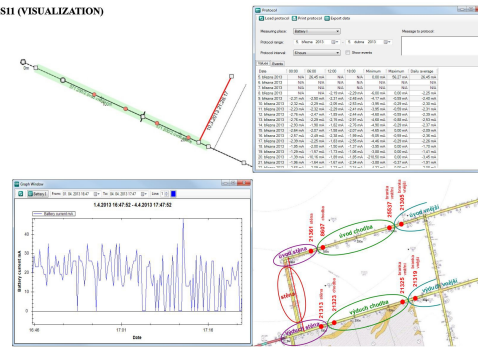
**Underground section consists of the following main devices:**  
 DKD11 mine data concentrator main  
 DKD11-ABV mine data concentrator series  
 SME-02 intrinsically safe power source with backup battery

**Devices designed for measuring of atmosphere in the mine are:**  
 AS-3C stationary anemometer  
 SC-CH4 stationary detector of methane  
 SC-CO2 stationary detector of carbon dioxide  
 SC-TOX stationary detector of toxic gases

**Devices designed for identification of people and material in the mine are:**  
 A71-02 RFID reader to detect people movement in restricted areas  
 EPB-01 RFID reader to detect people movement around conveyor belt  
 RFK-01 RFID reader to detect people movement on conveyor belt communication cable with integrated RFID reader  
 TAG-ZAM-xx RFID identifier, placed in mining lamp or on container  
 TE-01 radiostation  
 TE-02 barcode reader

**Devices designed for signaling in the mine are:**  
 HOUK-SC horn with beacon  
 OS-ia-6 signaling lights

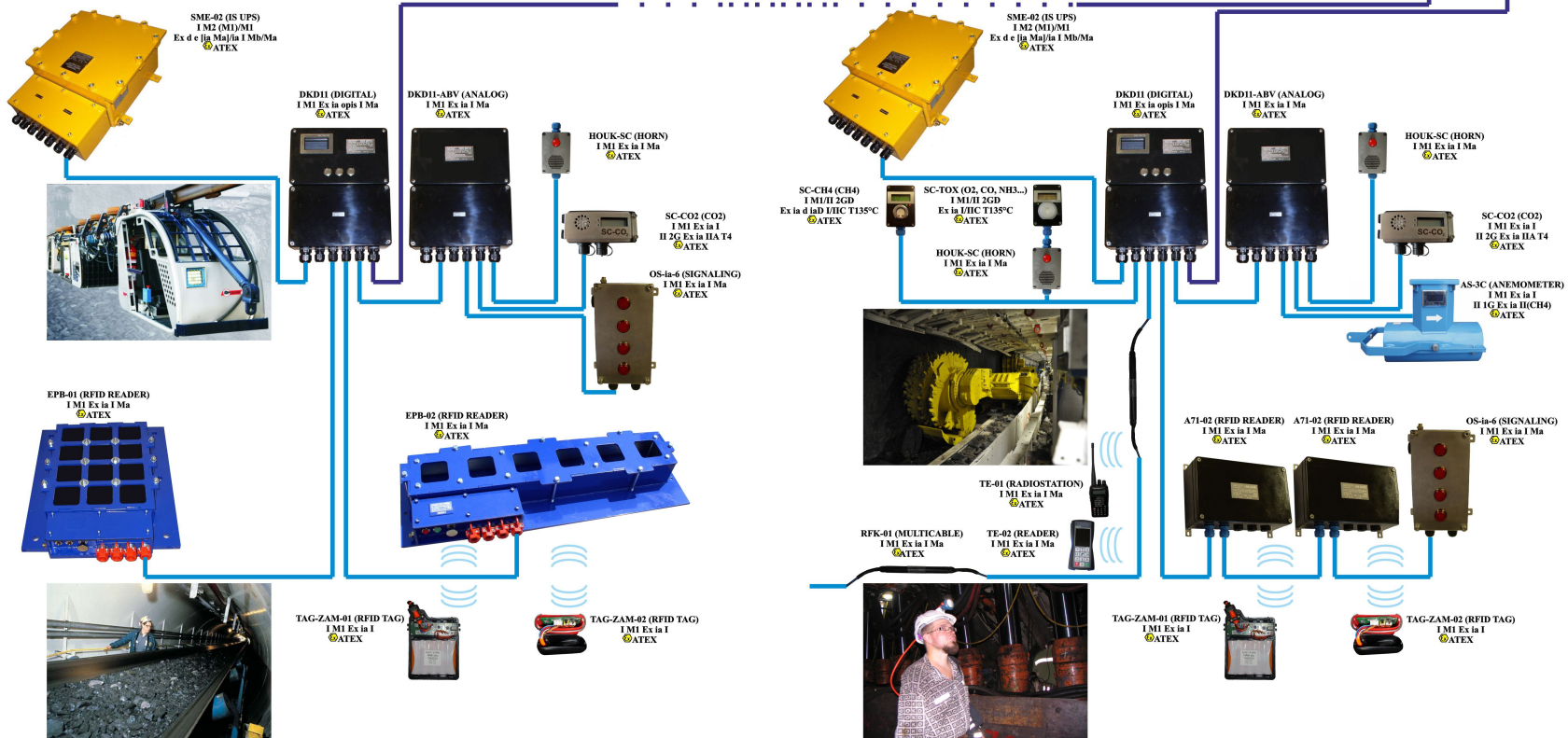
DPS11 (VISUALIZATION)



RMI-RPKD (RACK, SERVERS, SWITCH, MODEMS)

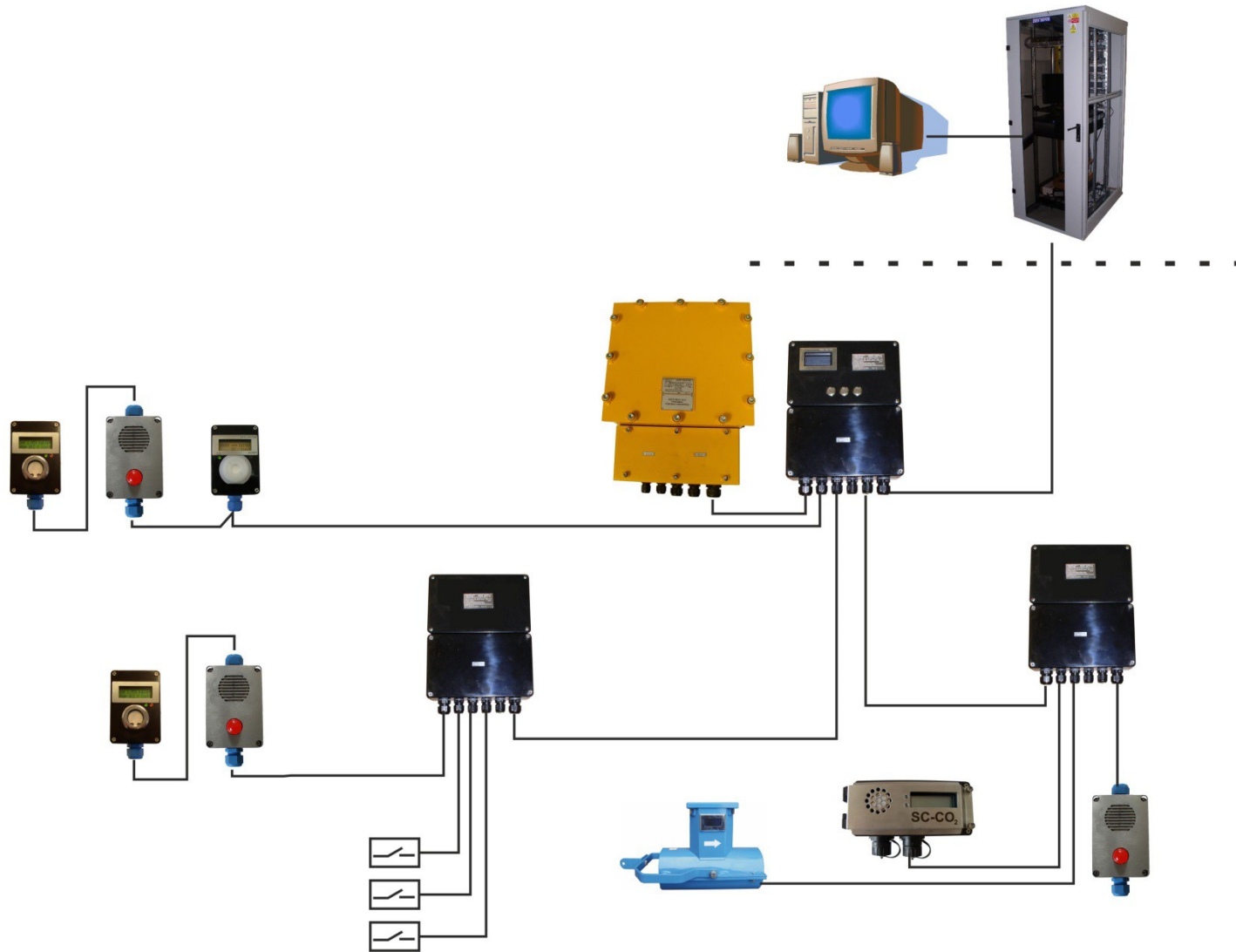


PKD11-M (MODEM) I M1 Ex ia I ATEX



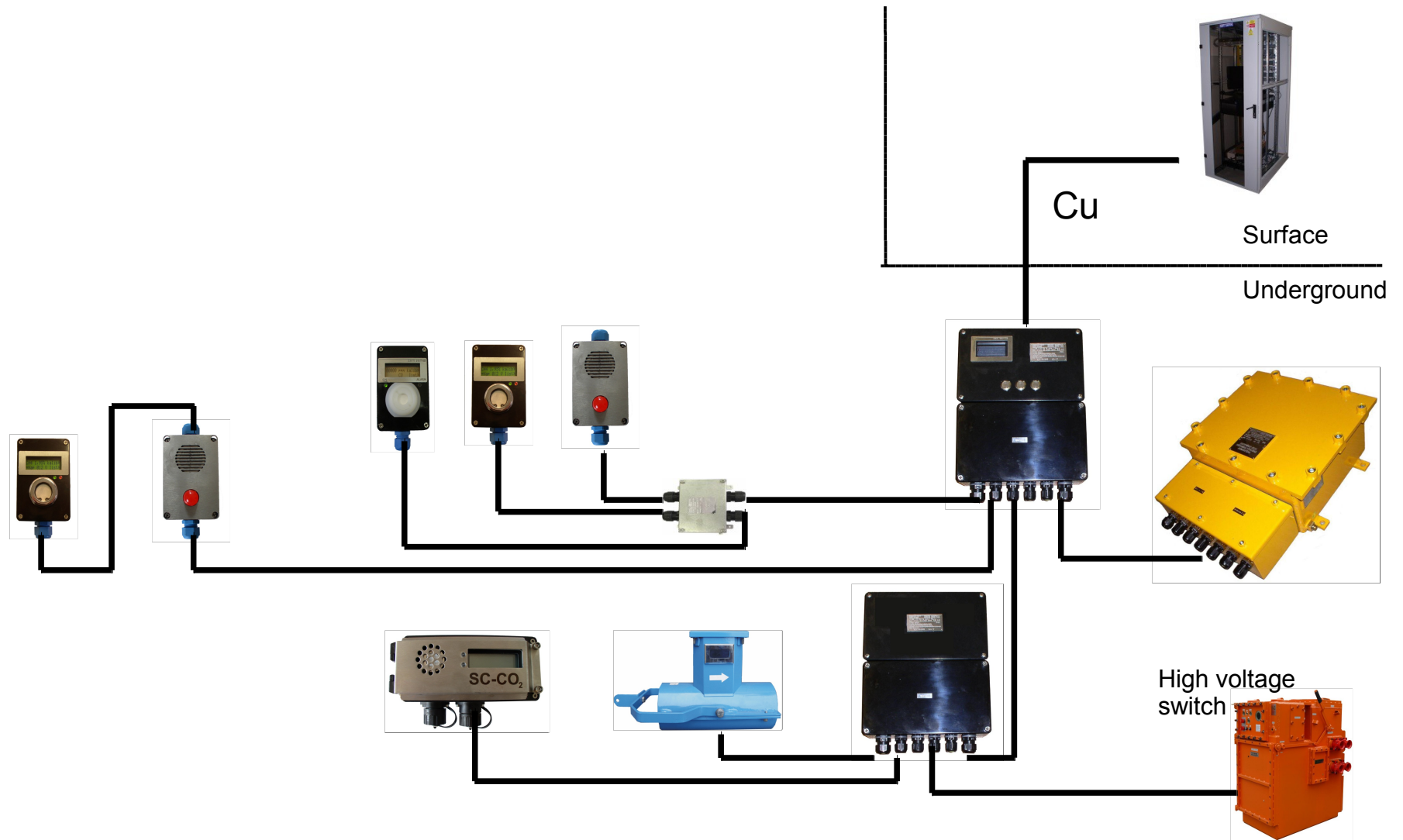
Mining systems and solutions

# DPS11 connection of the air sensors, collection of binary and analogue information, acoustic and optical signalling



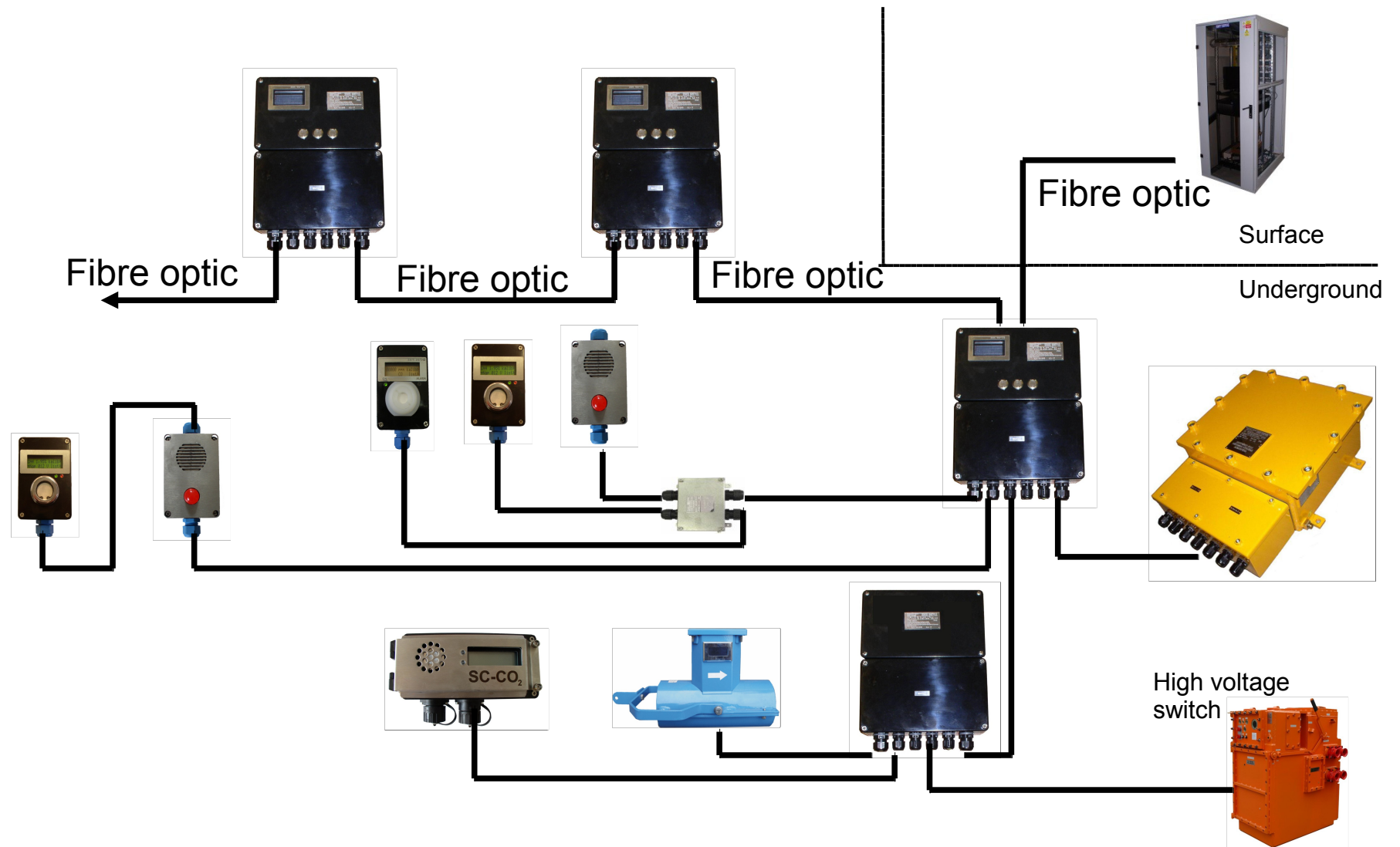
Mining systems and solutions

# DPS11 system use - GAS MONITORING





# DPS11 system use - GAS MONITORING



# DPS11 system components

RM1-RPKD  
(ROZVADĚČ,  
SERVERY,  
SWITCHE,  
MODEMY)



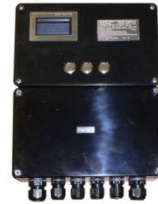
PKD11-M (MODEM)  
I (M1) [Ex ia] I  
ATEX



SME-02 (JB ZDROJ)  
I M2 (M1)/M1  
Ex d e [ia Ma]/ia I Mb/Ma  
ATEX



DKD11  
I M1 Ex ia opis I Ma  
ATEX



DKD11-ABV  
I M1 Ex ia I Ma  
ATEX



Povrchová část se skládá z těchto zařízení:

RM1-RPKD rozvaděč, PC servery, switche, modemy (PKD11-M) a UPS

Důlní část se skládá z těchto hlavních zařízení:

DKD11 důlní koncentrátor dat hlavní  
DKD11-ABV důlní koncentrátor dat předřadný  
SME-02 jiskrově bezpečný zdroj s baterií

Pro měření složení atmosféry v dole slouží tato zařízení:

AS-3C stacionární anemometr  
SC-CH4 stacionární detektor metanu  
SC-CO2 stacionární detektor oxidu uhličitého  
SC-TOX stacionární detektor toxických plynů

Pro signalizaci v dole slouží tato zařízení:

HOUK-SC houkačka s majákem  
OS-ia-6 světelná signalizace

SC-CH4 (CH4)  
I M1/II 2GD  
Ex ia d iaD I/IIC T135°C  
ATEX



SC-TOX (O2, CO, NH3...)  
I M1/II 2GD  
Ex ia I/IIC T135°C  
ATEX



HOUK-SC (HOUKAČKA)  
I M1 Ex ia I Ma  
ATEX



SC-CO2 (CO2)  
I M1 Ex ia I  
II 2G Ex ia IIA T4  
ATEX



OS-ia-6 (SIGNÁLY)  
I M1 Ex ia I Ma  
ATEX



AS-3C (ANEMOMETR)  
I M1 Ex ia I  
II 1G Ex ia II(CH4)  
ATEX



# Range of production

## B) Identification ISI system

- Identification and localization of materials
- Identification and localization of persons
- Monitoring of the number of persons in a specific area
- Control of access of authorized persons to a specific area
- Identification and localization of persons and/or materials on a conveyor belt
- Identification and localization of persons in a cave-in after an accident
- Identification and localization of mining machinery, e.g. locomotives
- Determination of the position of the mining excavator (combined cutter loaders)
- Voice communication
- SMS messaging

# Block diagram of ISI + DPS11

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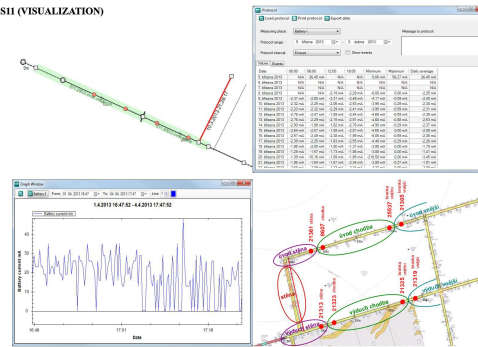
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 TE-01 radiostation  
 TE-02 barcode reader

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 HOUK-SC horn with beacon  
 OS-ia-6 signaling lights

DPS11 (VISUALIZATION)



RMI-RPKD  
 (RACK,  
 SERVERS,  
 SWITCH,  
 MODEMS)



PKD11-M (MODEM)  
 I M1 Ex ia I  
 ⓐATEX



SME-02 (IS UPS)  
 I M2 (M1) M1  
 Ex d e l ia Ma I Mb/Ma  
 ⓐATEX



DKD11 (DIGITAL)  
 I M1 Ex ia opis I Ma  
 ⓐATEX

DKD11-ABV (ANALOG)  
 I M1 Ex ia I Ma  
 ⓐATEX

HOUK-SC (HORN)  
 I M1 Ex ia I Ma  
 ⓐATEX

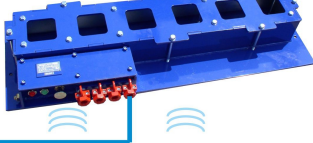
SC-CO2 (CO2)  
 I M1 Ex ia I  
 II 2G Ex ia IIA T4  
 ⓐATEX

OS-ia-6 (SIGNALLING)  
 I M1 Ex ia I Ma  
 ⓐATEX

EPB-01 (RFID READER)  
 I M1 Ex ia I Ma  
 ⓐATEX



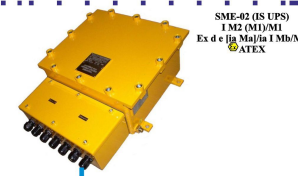
EPB-02 (RFID READER)  
 I M1 Ex ia I Ma  
 ⓐATEX



TAG-ZAM-01 (RFID TAG)  
 I M1 Ex ia I  
 ⓐATEX



TAG-ZAM-02 (RFID TAG)  
 I M1 Ex ia I  
 ⓐATEX



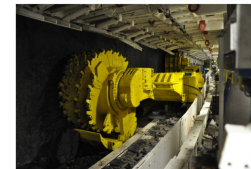
SME-02 (IS UPS)  
 I M2 (M1) M1  
 Ex d e l ia Ma I Mb/Ma  
 ⓐATEX



SC-CH4 (CH4)  
 I M1/II 2GD  
 Ex ia d iaB IHC T135°C  
 ⓐATEX

SC-TOX (O2, CO, NH3...)  
 I M1/II 2GD  
 Ex ia IHC T135°C  
 ⓐATEX

HOUK-SC (HORN)  
 I M1 Ex ia I Ma  
 ⓐATEX



TE-01 (RADIOSTATION)  
 I M1 Ex ia I Ma  
 ⓐATEX

RFK-01 (MULTICABLE)  
 I M1 Ex ia I Ma  
 ⓐATEX



DKD11 (DIGITAL)  
 I M1 Ex ia opis I Ma  
 ⓐATEX

DKD11-ABV (ANALOG)  
 I M1 Ex ia I Ma  
 ⓐATEX

HOUK-SC (HORN)  
 I M1 Ex ia I Ma  
 ⓐATEX

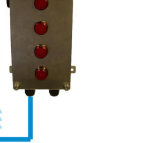
SC-CO2 (CO2)  
 I M1 Ex ia I  
 II 2G Ex ia IIA T4  
 ⓐATEX

AS-3C (ANEMOMETER)  
 I M1 Ex ia I  
 II HG Ex ia IIC (CH4)  
 ⓐATEX

A71-02 (RFID READER)  
 I M1 Ex ia I Ma  
 ⓐATEX

A71-02 (RFID READER)  
 I M1 Ex ia I Ma  
 ⓐATEX

OS-ia-6 (SIGNALLING)  
 I M1 Ex ia I Ma  
 ⓐATEX



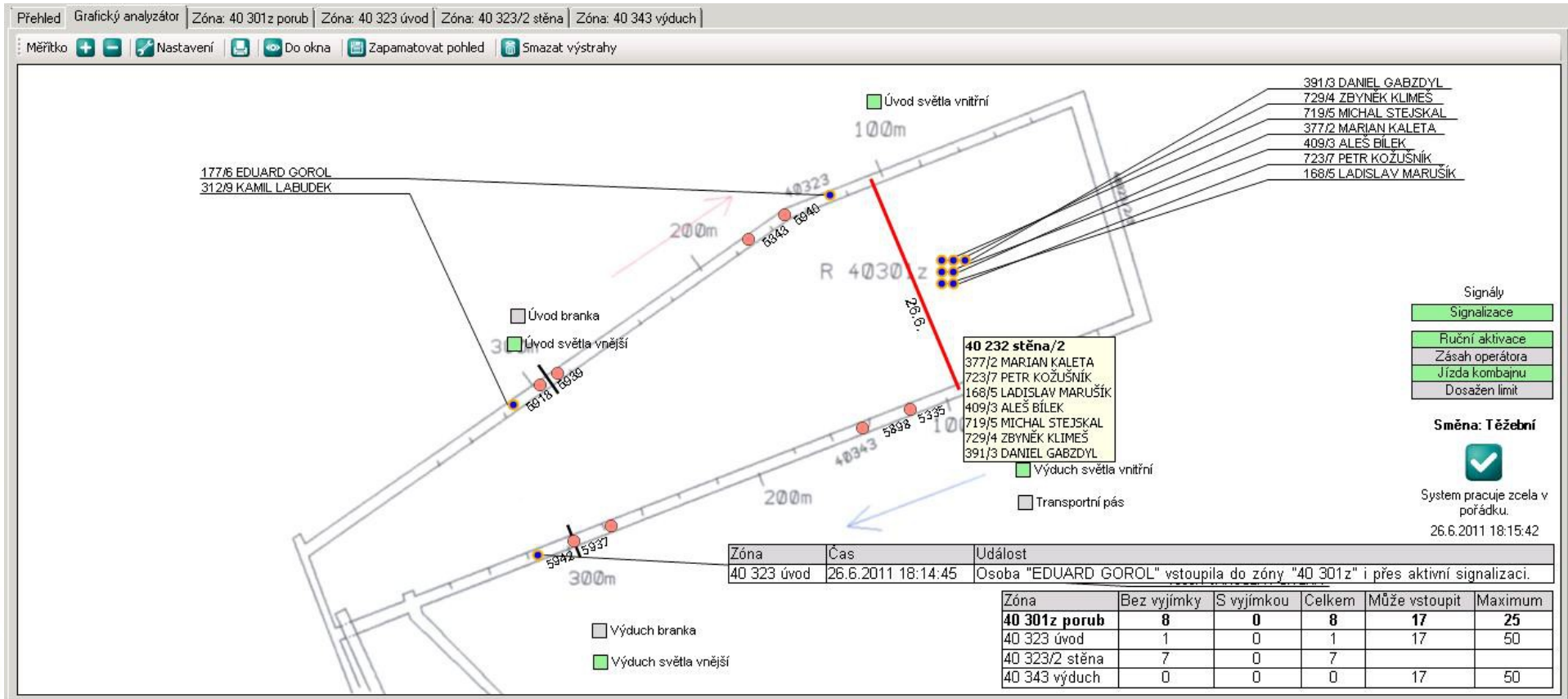
TAG-ZAM-01 (RFID TAG)  
 I M1 Ex ia I  
 ⓐATEX



TAG-ZAM-02 (RFID TAG)  
 I M1 Ex ia I  
 ⓐATEX



# Monitoring of the number of persons in a specific area, access control of authorized persons to a specific area



# Range of production

## C) Video and Communication equipments in underground gas-explosive mines

### KS-03 Camera System



### PST Telephones

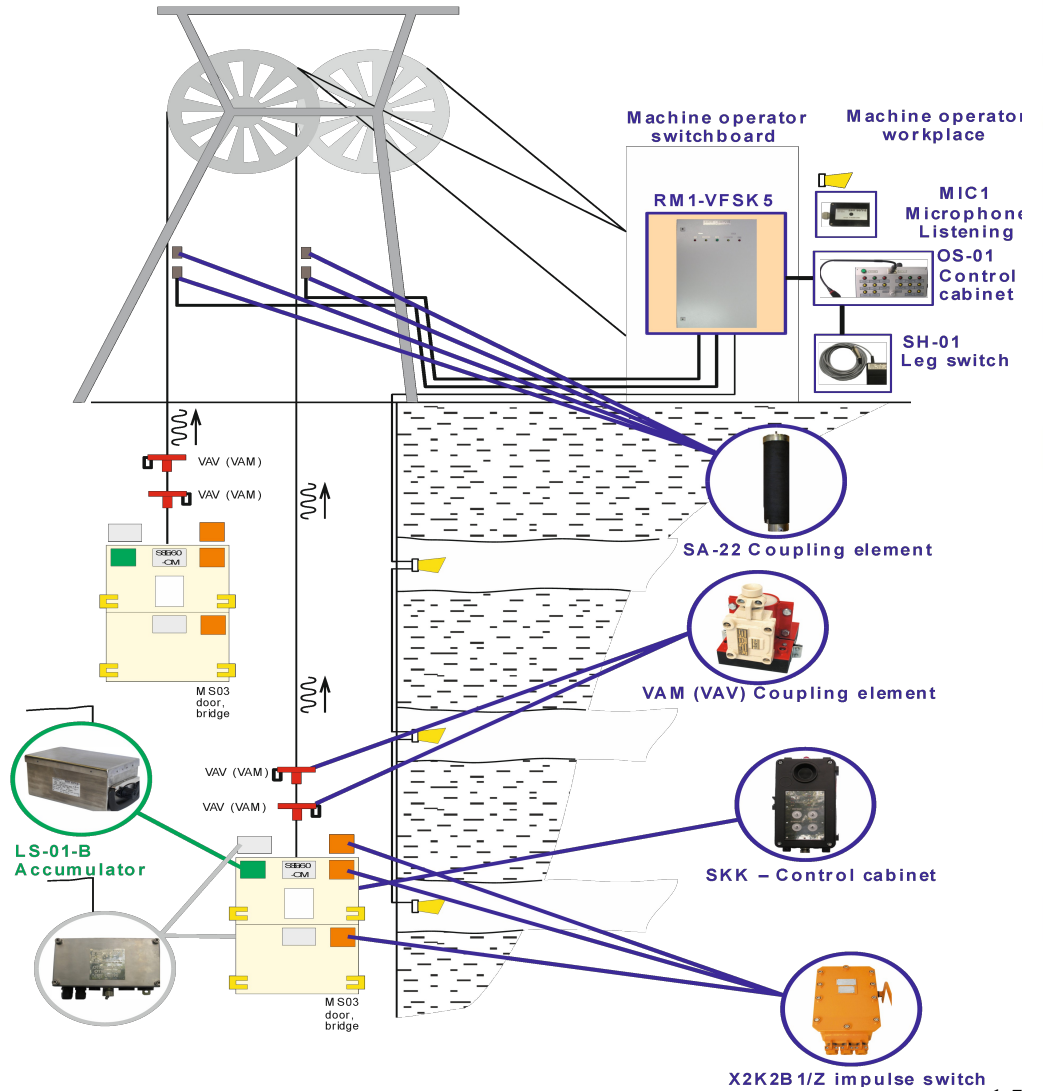


### SEFAR AB1 – System of Wireless Communication



# Range of production

## VFSK 5 Signaling and Communication Device



# Range of production

## D) Optical net equipments in underground gas-explosive mines

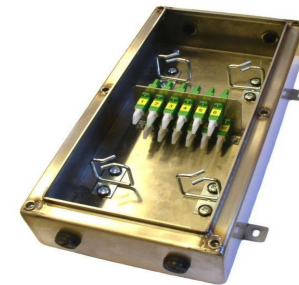
**DOR-01 Data Optical Cabinet**



**DOR-02-X Data Optical Converter**



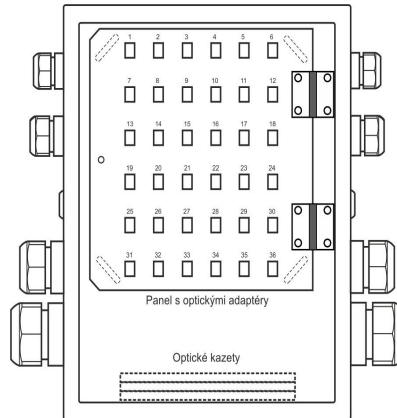
**POK-01 K Pre-connected Optical Cable**    **POK-01 S Pre-connected Optical Cable Connecting Cabinet**





# Range of production

## POK-36xx Fiber Optic Cabinet



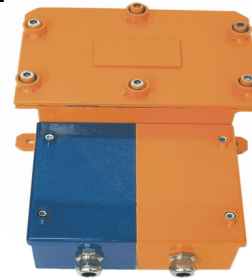
## POK-72xx Fiber Optic Cabinet



# Range of production

## E) Measurement in underground gas-explosive mines

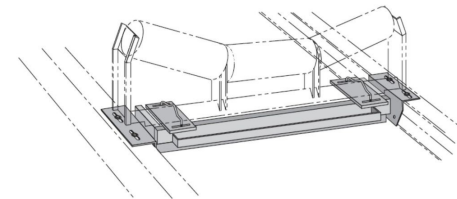
**JBP-BOS, BOS-21 Point resistance level meter**



**RSH-02 The kit of the level radar detector**



**KPV – 02 Conveyor scale**



# Range of production

## F) Switching equipments in underground gas-explosive mines

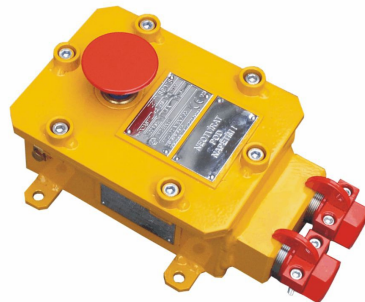
**NRS 5 Non-explosive Contactor System**



**Rotary Switches X1AV11/Z –  
Double Pole, X1AV31/Z Triple Pole**



**X2AST/Z Emergency Stop Pushbutton**

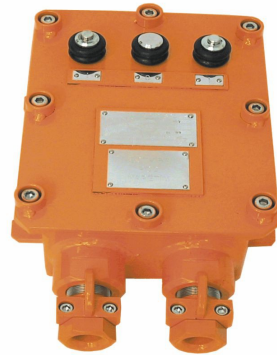


**X2A02/Z Non-explosive Double  
Pushbutton Control Cabinet  
with Signalisation**



# Range of production

**X2A04/Z Non-explosive Triple Pushbutton Control Cabinet**



**OS-ia-2, OS-ia-3 Pushbutton Case with the maximum of 8 Pushbuttons and Rotary Controls**



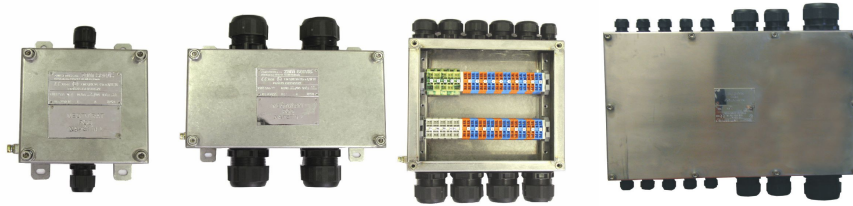
**X2K2B1/Z End Lever Switch**



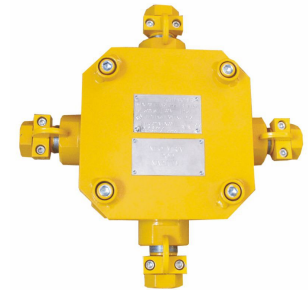
# Range of production

## G) Connection Boxes in underground gas-explosive mines

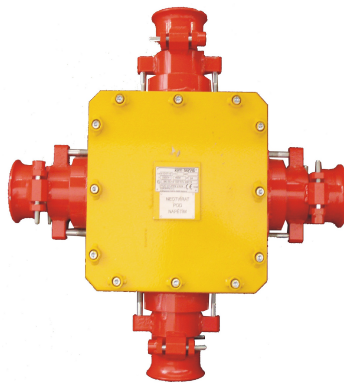
- ✓ **SSEi 10, 30, 60, 280 – Secured Terminal Block Cabinets**



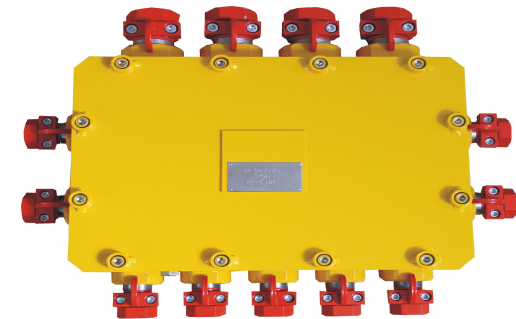
- ✓ **X1D3F1/Z2 – Terminal Block Cabinets**



- ✓ **X1D3T1/Z – Terminal Block Cabinet**



- ✓ **XD 60 – Terminal Block Cabinet with the Maximum of 60 Terminals 500 V / 25 A / AC**



# Range of production

**XD 200 – Terminal Block Cabinet with 220  
WAGO Terminals – Maximum of 250 V/AC,  
V/DC / 150 W**



**STN – Telecommunication Cabinet for 420  
Terminals – 275 V/ 120mA / AC/ DC**



# Range of production

## H) Signaling equipments in underground gas-explosive mines

**HOUK Intrinsically Safe Horn**



**HOUK – SC Horn for Potentially Explosive Atmospheres**



**NHD-02 Mine Horn**



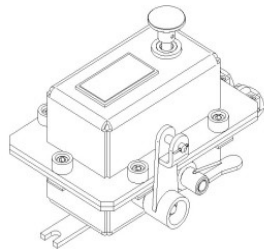
**FL-01 Intrinsically Safe Beacon (flash)**



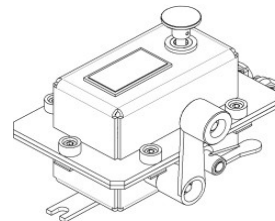
# Range of production

## CH) Emergency switches of conveyor in underground gas-explosive mines, surface mines and power plants

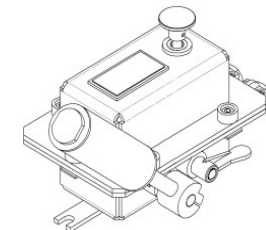
### NS-01 non-explosive switch



Cable switch NS-01-L



Lever end switch NS-01-K

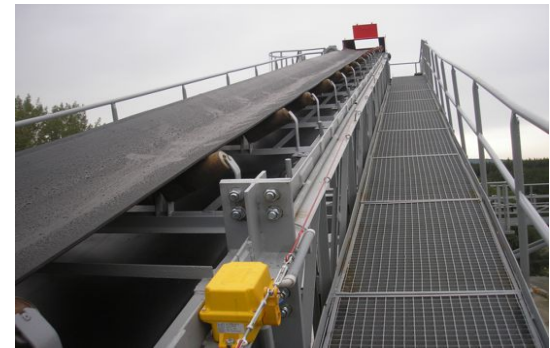
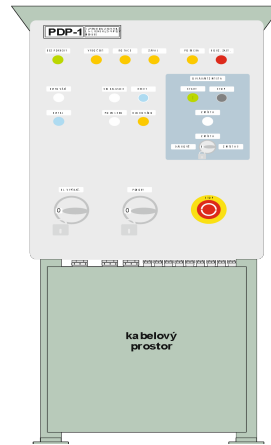
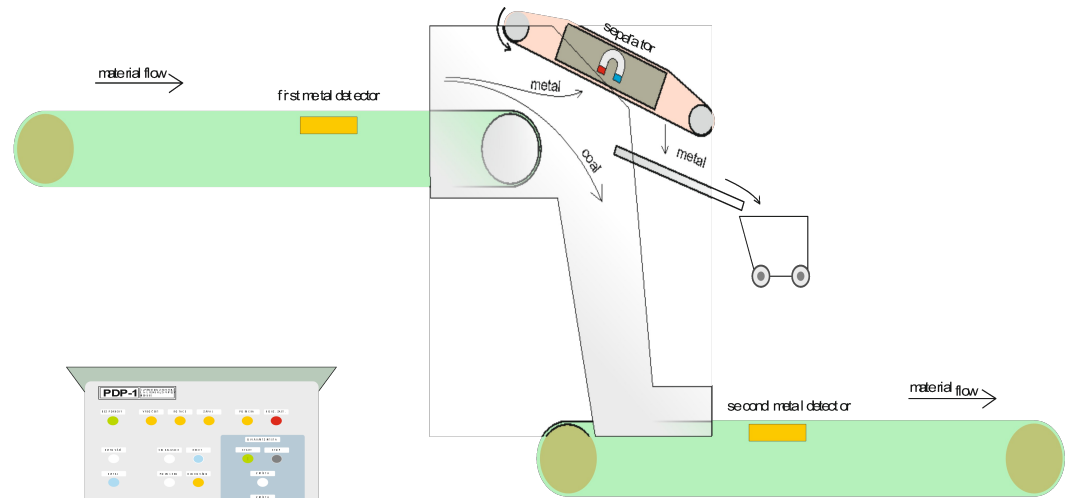
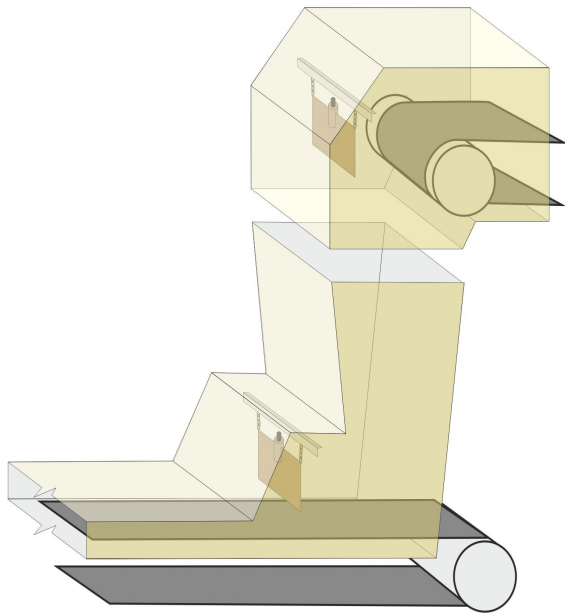


Swing-away switch NS-01-V



# Range of production

## I) Automation, safety devices, metal detector and separator of conveyor in surface mines and power plants



# **zam servis**

**Than you very much for your  
attention !!!**

ZAM-SERVIS s.r.o., Křišťanova 1116/14, 702 00 Ostrava-Přívoz, Czech Republic

For others, please see our web sites: [www.zam.cz](http://www.zam.cz) or call us: +420/ 556 685 111 or send e-mail:  
[zam@zam.cz](mailto:zam@zam.cz)