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## DPS 11 Mine Telemonitoring System



DKD-11

### Use:

The DPS11 Mine Data Transfer System is a modular system for two-way transfer of data, visulization and control the mines technology and air monitoring in the SCADA standart. DPS11 use for the data transfer between the mine section comprising of DKD11 type data concentrators fitted with terminal monitoring sensors or DKD11-ABV concentrators and the surface section comprising of modems and a server to process, store and visualise the data.

The DPS11 provides for communication and power supply to peripheries connected to the system. The system ensures transfer of data with information referring to, for example, the methane concentrations measured, the levels of analogous signals, statuses of binary inputs,binary outputs and voltage outputs.

### Description:

The DPS11 Mine Data Transfer System is a modular system for two-way transfer of data between the mine section comprising of DKD11 type data concentrators fitted with terminal monitoring sensors or DKD11-ABV concentrators and the surface section comprising of modems and a server to process, store and visualise the data.

Mine Section-part air monitoring:

The mine section comprises of the main DKD11 concentrator. The concentrator is poweredusing the spark-safe SME-02 backup power source. The DKD11 concentrator includes a modem to ensure communication with the surface section of DPS11 system. The DKD11 concentrator provides for power supply and communication using the RS485IS series linefor four separate branches. Any branch (output) can be fitted with a DKD11-ABV concentrator and/or a SC-CH4 methane sensor and/or a SC-TOX toxic gas sensor (e.g.CO). The total input power of devices connected to a single branch may not exceed 180mA. I.e. one branch can be connected to the maximum of 3 of SC-CH4 sensors or 2 of SC-CH4 units and 2 of SC-TOX units or 2 of DKD11-ABV units fitted with 1+1 of SCCH4 sensors with analogous output using binary inputs and outputs.

### Technical parameters of DKD11:

| | |
|---|---|
| Design | I M1 Ex ia ma opis I Ma |
| Rated supply voltage | 24VDC |
| Power input | 24W |
| Output supply voltage | 4x21VDC/0.18A max. |
| Optical connection | 2x fibre 9/125 SM fibres terminated with SC connectors 100BaseFX 1310nm |
| Transfer distance | max. 30km, espec. 15dB |
| Connected conductor cross-section | 0.5 to 2.5 mm$^2$ |
| Protection | Ip65 |
| Temperature range | 0°C to +40°C |
| Dimensions, incl. bushings | 196x260x91mm |
| Relative humidity | 95% max. non-condensing |
| Weight of the electrical equipment | 1kg |
| Total weight | 6.5kg |

### Technical parameters DKD11-ABV:

| | |
|---|---|
| Design | I M1 Ex ia ma I Ma |
| Rated supply voltage | 10-22VDC |
| Power input | 4W |
| Connected conductor cross-section | 0.5 to 2.5mm$^2$ |
| Transfer speed at serial port | up to 56bps |
| Transfer distance | max. 1km |
| Shielding | Ip65 |
| Temperature range | 0°C to +40°C |
| Dimensions, incl. bushings | 196x260x91mm |
| Relative humidity | 95% max. non-condensing |
| Weight of the electrical equipment | 1kg |
| Total weight | 5.5kg |

### Technical parameters SME-02:

| | |
|---|---|
| Design | I M2/M1 Ex de/ia ma I Mb/Ma |
| Rated supply voltage | 230VAC 50Hz IT |
| Power input | 35VA |
| Connected conductor cross-section | 0.5 to 2.5mm$^2$ |
| Shielding | Ip65 |
| Temperature range | 0°C to +40°C |
| Dimensions, incl. bushings | 450x310x190mm |
| Relative humidity | 95% max. non-condensing |
| Total weight | 37g |

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## DPS 11 Mine Telemonitoring System

Any branch can be connected with sensors, detectors etc. from other manufacturers provided the spark-safe parameters have been met together with the option for communication using the RS485IS serial line. Sensors, detectors etc. with analogous outputs from other manufacturers can be connected onto the DKD11-ABV concentrator provided the spark-safe parameters have been met.

The mine section further includes the DKD11-ABV concentrator. That is connected to the DKD11 concentrator for supply of power and communication with the RS485IS. The DKD11-ABV is provided with 6 binary inputs (voltage-free contact), 2 binary inputs of NAMUR type, 4 binary outputs of transistor of NAMUR type respectively (selectable by means of switches), 2 voltage outputs and 2 analogous inputs of U/I type. SC-CH4 sensors, resp. the SC-TOX units can be linked directly to one of the branches from the DKD11 concentrator or the sensors can be connected onto the analogous input at the DKD11-ABV concentrator. Linkage using the RS485IS line enables communication with the sensor and performance of diagnostics, which is not possible with connection via the analogous output.

Devices linked to the RS485IS serial line must be provided with different IP addresses for communication with the DKD11.

Linkage among devices on the same branch is parallel, using the RD-Y(St)Y 4x2x0,8, cable, where one pair is used for communication, one pair for the positive power supply terminal, one pair for negative power supply pair and the last 4th pair is spare. The maximum distance between the DKD11 concentrator and the furthest located device connected to any branch is equal to 1,000 m.

The maximum distance between the DKD11 concentrator and the surface modem with the metallic line featuring cross-section of 0.8mm2 shall be equal to 10 km. When using communication via an optic fibre, the distance is limited by the attenuation of transfer line, max. 15 dB.

For the surface section see Fig. 2:
The surface section comprises of the distribution board housing the safety elements, the uninterrupted power supply (UPS) modems with connected DKD11 mine concentrators and servers.IN the servers is installation the SW with the name SMOK.

Server parts of the system work under the Windows Server 2008 operation system. Client and configuration components can be operated using computers with the Windows XP or Windows 7 operation system respectively.

Although it is possible to run all the components simultaneously using a single
workstation, it is more convenient to divide the load among multiple workstations to
enable smoother operation. The recommended distribution of elements concerns placing the database server and the main server at the same workstation together, the

technological with the necessary drivers and HW for communication with other computers shall be also integrated in the same. Configuration and user clients can be operated from any computer.

One main server can handle up to 20 clients and 1,000 data points. The actual number of clients served depends on the workload, the number of inputs and the complexity of diagram designs.

Both the technological and main server is connected into a single network, which is
separated from the remaining network operations. The main server is fitted with a second network adaptor for network connection to allow clients log in. The linkage method described here ensures that separate closed networks assure prevention of load onto components due to network communication among other clients and servers from other systems.

Communication and exchange of information among individual components are based on TCP/IP network protocols using XML technologies. That ensures openness of the entire solution for cooperation, exchange of data with other operation systems and technologies.

The data is stored for the period of 180 days until automatic space recovery for
replacement data. The data can be converted into .csv format for further processing or storage. The graphs showing trends can be printed out or saved as images, or the data used for trend visualisation can be exported.

The system is provided with users and access rights administration tools. Those enable to assign user groups with different authorisations to set the option for data acquisition and visualisation of details from the system. The procedure enables for setting of specific workstations for login purposes. Every user login is recorded and the specific users and workstations can be also traced reciprocally.
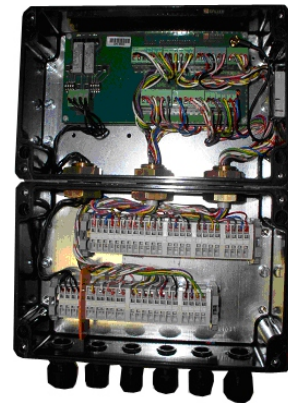


DKD-ABV

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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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## DPS 11 Mine Telemonitoring System

**Surface section consists of the following main devices:**
RM1-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 identification of people and material in the mine are:**
A71-02 — RFID reader to detect personnel moving in restricted areas
EPB-01 — RFID reader to detect personnel moving near a conveyor belt
EPB-02 — RFID reader to detect personnel moving on conveyor belt
RFK-01 — 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

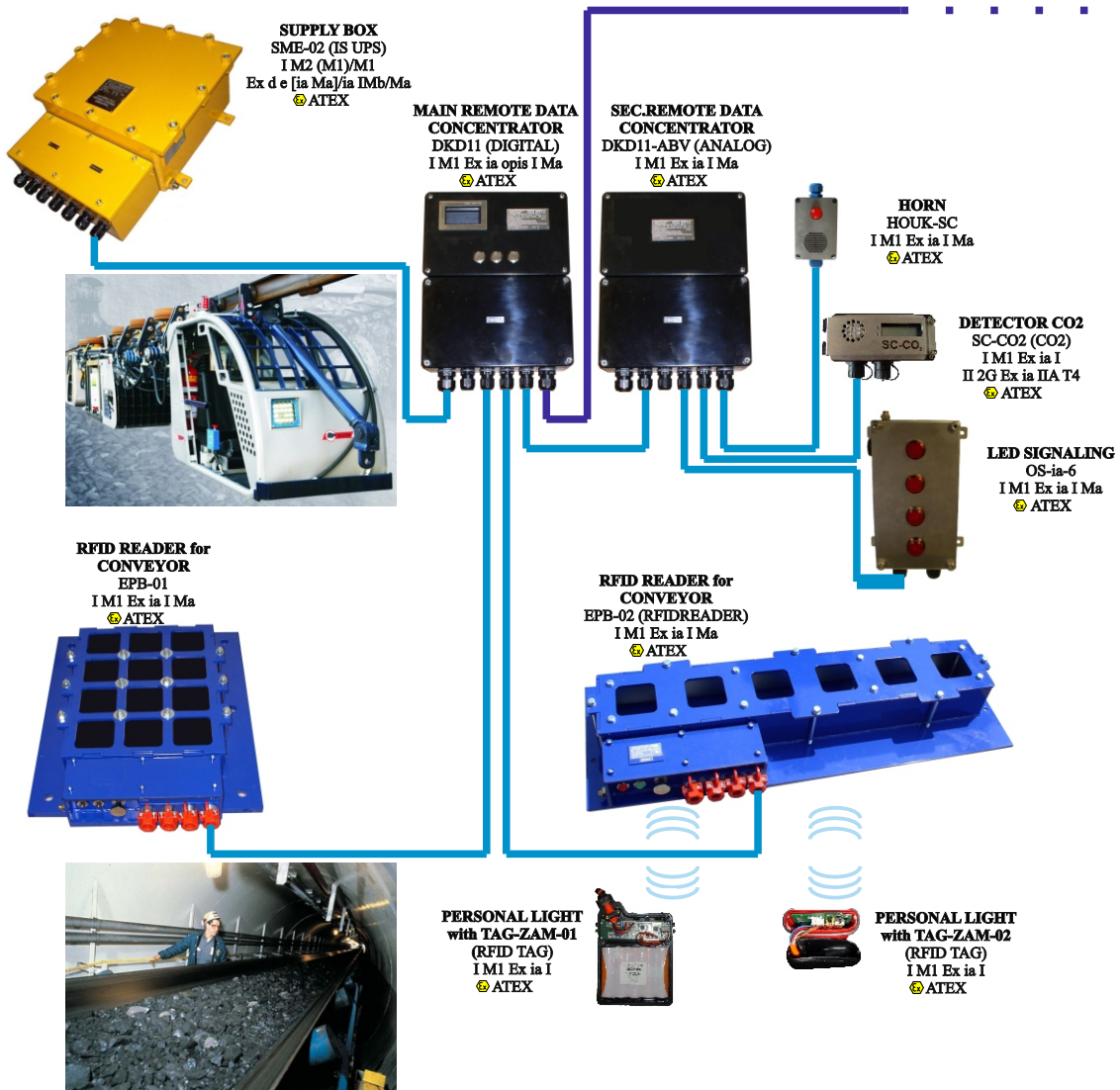**Devices designed for measuring of atmosphere in the mine are:**
AS-3C — stationary anemometer
SC-CH4 — stationary detector of methane
SC-CO2 — stationary detector of carbon dioxide
SC-TOX — stationary detector of toxic gases

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

**Application:**
- Transfer of digital and analog data
- Wireless voice communication
- Remote control and monitoring of mine technology
- Monitoring of air condition mine atmosphere
- Identification of personnel in the mine
- Management of transporting technology parts and materials in and out of the mine
- Detecting personnel in the dangerous places around mine machines (conveyors, drilling machines etc.)

SUPPLY BOX
SME-02 (IS UPS)
I M2 (M1)/M1
Ex d e [ia Ma]/ia IMb/Ma
ATEX

MAIN REMOTE DATA CONCENTRATOR
DKD11 (DIGITAL)
I M1 Ex ia opis I Ma
ATEX

SEC.REMOTE DATA CONCENTRATOR
DKD11-ABV (ANALOG)
I M1 Ex ia I Ma
ATEX

HORN
HOUK-SC
I M1 Ex ia I Ma
ATEX

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

LED SIGNALING
OS-ia-6
I M1 Ex ia I Ma
ATEX

RFID READER for CONVEYOR
EPB-01
I M1 Ex ia I Ma
ATEX

RFID READER for CONVEYOR
EPB-02 (RFIDREADER)
I M1 Ex ia I Ma
ATEX

PERSONAL LIGHT with TAG-ZAM-01
(RFID TAG)
I M1 Ex ia I
ATEX

PERSONAL LIGHT with TAG-ZAM-02
(RFID TAG)
I M1 Ex ia I
ATEX

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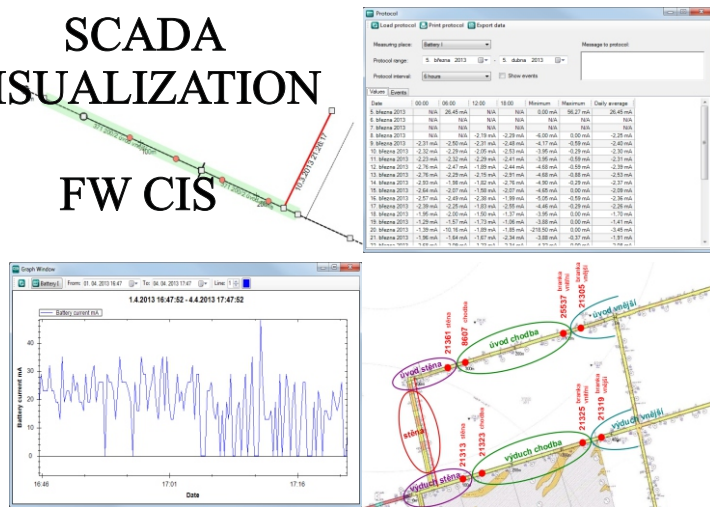
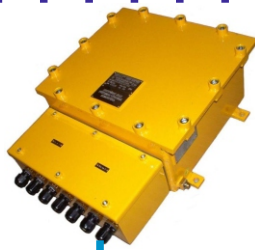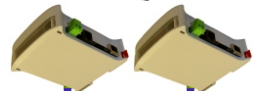# zam servis

## DPS 11 Mine Telemonitoring System

SCADA
VISUALIZATION

FW CIS

**DISTRIBUTION BOX**
RM1-RPKD
(UPS, RACK,
SERVERS,
SWITCH,
MODEMS)

**INPUT MODEMS**
PKD11-M (MODEM)
I (M1) [Ex ia] I
⚠ ATEX

**SUPPLY BOX**
SME-02 (IS UPS 5 hours)
I M2 (M1)/M1
Ex d e [ia Ma]/ia I Mb/Ma
⚠ ATEX

**PRIMARY
REMOTE CONCENTRATOR**
DKD11 (DIGITAL)
I M1 Ex ia opis I Ma
⚠ ATEX

**SECONDARY
REMOTE CONCENTRATOR**
DKD11-ABV (ANALOG)
I M1 Ex ia I Ma
⚠ ATEX

**HORN**
HOUK-SC
I M1 Ex ia I Ma
⚠ATEX

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

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

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

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

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

**WIRELESS DATE+ VOICE
COMMUNICATION CABLE**
RFK-01
I M1 Ex ia I Ma
⚠ ATEX

**HAND RADIOSTATION**
TE-01
I M1 Ex ia I Ma
⚠ATEX

**BAR CODE READER**
TE-02
I M1 Ex ia I Ma
⚠ ATEX

**LED SIGNALING**
OS-ia-6
I M1 Ex ia I Ma
⚠ ATEX

**PERSONAL LIGHT with
TAG-ZAM-01 (RFID TAG)**
I M1 Ex ia I
⚠ATEX

**PERSONAL LIGHT with
TAG-ZAM-02
(RFID TAG)**
I M1 Ex ia I
⚠ ATEX

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