



CATALOGUE OF
PRODUCTS

**methanometry
automation mining
and industrial
electronics**



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About us

HASO was founded in 1990. Its main purpose is the development and production of innovative systems and telemetry equipment in the fields of mining, industrial automation, visualization, monitoring and controlling influence on the growth of machine performance, reduce operating costs and improvement of safety.

As a manufacturer of security systems and cooperating devices, we place great emphasis on continuous development and improvement of existing products and investment in the latest technology. Individual approach to each client allows us to a precise identification of the current needs, and cooperation with world leaders enables access to innovative solutions.



OFFER

Security systems designed for underground mines:

- Integrated Safety Systems CST
- Switch-off interlocking and controlling system SBKW
- Presentation system of industrial processes SP3
- System assisting methanometry dispatchers in underground mines SWμP-3

Industrial Automation:

- Systems of control, visualization and management of production processes
- Measurement & inspection devices
- Measuring systems for monitoring the applications of inert gases

The blasting technique

Services associated with the production of electrical equipment for underground mines:

- Twenty-four-hour service
- Inspection, repair and maintenance of individual components for devices
- Modernization and repair of measuring equipment

SMT/SMD Surface Mount Technology

Training

Technical design

CERTIFICATES

All equipment offered for underground mining operations holds EU Type-Examination Certificates (ATEX), and the safety systems have been approved by the President of the State Mining Authority. Furthermore, to enhance quality, ensure compliance with health and safety regulations, and improve work organization, an Integrated Management System has been implemented; this system meets the requirements of the PN-EN ISO 9001:2015 ("Quality management systems") and PN ISO 45001:2018 ("Occupational health and safety management systems") standards.

The company also holds Quality Assurance Notification No. GIG 21 ATEXQ 052, issued by the Central Mining Institute (GIG).



Quality is a way of thinking that causes apply and is constantly looking for the best solutions.

/E.Deming.

INTEGRATED SAFETY SYSTEM CST



Integrated Safety System CST is built based on telemetric central stations type CST-40, CST-40A, CST-40C, sensors and equipment connected to them, and a master system - SWμP-3

- The system is designed for:
- continuous control and recording of parameters concerning in mines with methane, fire and ventilation hazards
 - switching off the power supply of machines and electric devices in cases where permissible parameters have been exceeded
 - control and recording of work of selected devices having an impact on safety or production process
 - performing complex inspection of work of connected sensors and switching off the power devices
 - transmission of signals about occurring alarms and overflows into the alarm broadcast system.



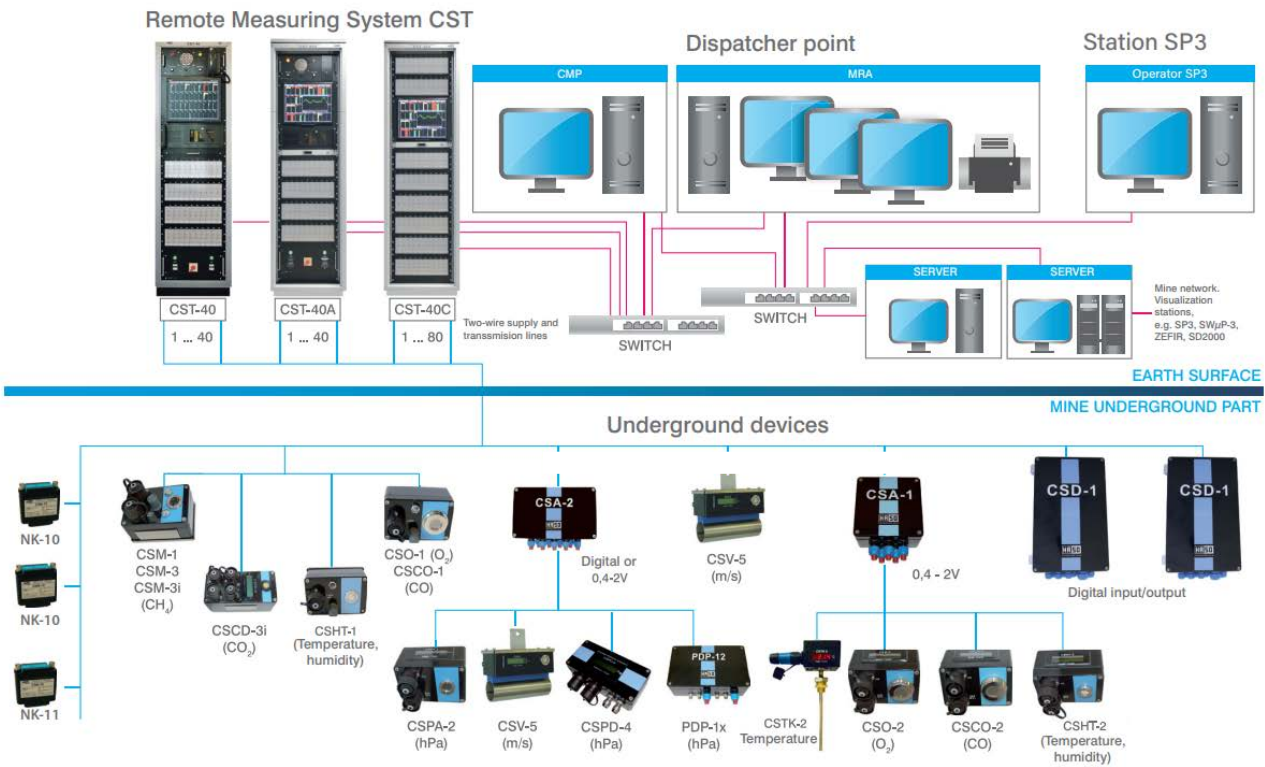
PROFESSIONAL SOLUTIONS IN AUTOMATION AND METHANOMETRY

Basic technical data:

Power supply	230 V (+5 %, -10 %)
Transmission types	digital or based on frequency
Number of measurement channels	40 - one central station CST-40(A) 80- one central station CST-40C
Operation mode	automatic with possibility of manual query
Measurement time of one line	1 ÷ 4 s depending on type of sensor
Time of one measurement cycle	1 ÷ 8 s depending on type of sensor on the line
Power supply shutdown time	< 5 s -- e.g., for CSM-1, CSM-3
Distance between central and sensor	≤ 10 km (CSM-1, CSCO-1, CSM-3, CSHT-1)
Recording of measurement results	computer recorder
Visualization	LCD Monitor
Alarm thresholds	set up in all measurement range
Sending of overflow alarms	from any alarm circuit to any lines in the system of CST-40(A), CST-40C central stations

The system has admittance issued by the President of State Mining Authority, symbol: GX – 64/13.

CST and SBKW Systems configuration

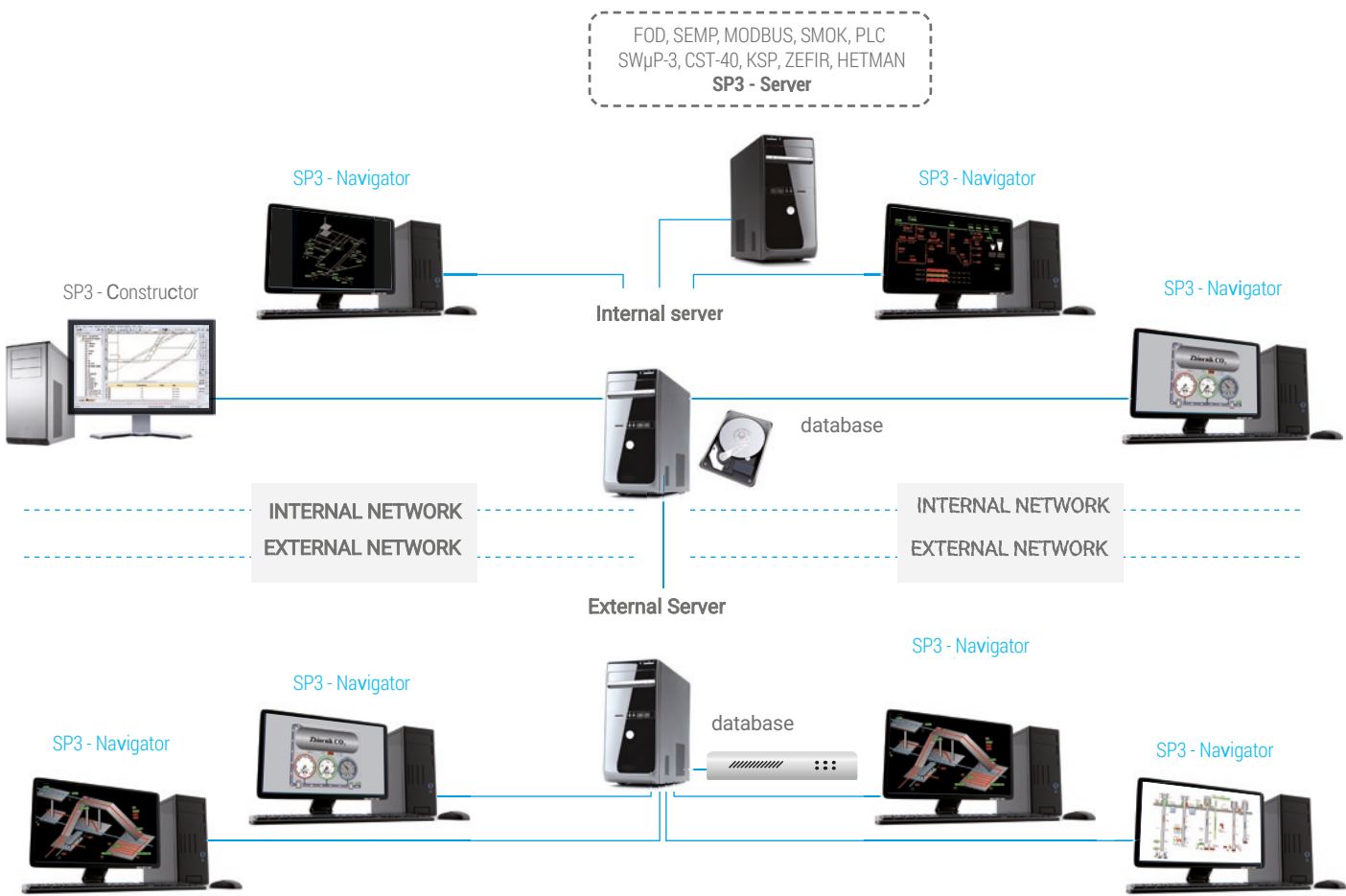


PRESENTATION SYSTEM OF INDUSTRIAL PROCESSES SP3

Presentation system of industrial processes **SP3** provides the possibility of continuous recording, processing, archiving and visualization of measurements on the basis of data collected from sensors of measuring systems, with which SP3 has configured connection. The system is adapted to the requirements of the mine dispatcher service through the implementation of its main functions, namely:

- graphical presentation of current and archived measurements on any size scalable boards, diagrams, maps, etc., in a way adapted to the user's perceptual capabilities taking into account the current technological and ventilation schemes of mine
- alarming in critical situations and warning of the occurring dangers
- alarming in critical situations and warning of the occurring dangers
- displaying of archival measurement data in the form of graphs or alphanumerically
- creation and printing of reports and generating statistics based on archival measurements
- identification of the type, number and source of sensor measuring system
- the possibility of multi-monitor work, settings adjustment and save the created configuration for user convenience
- determining the extent of individual user accounts.

Presentation system of industrial processes SP3 configuration



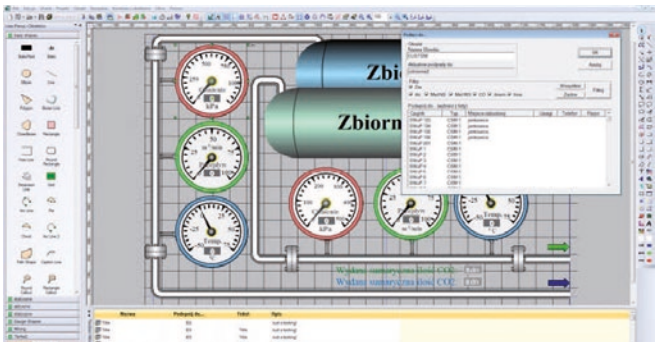
System SP3 is composed of the following, connected to each other with computer network, modules:

- SP3-Constructor
- SP3-Navigator
- SP3-Server

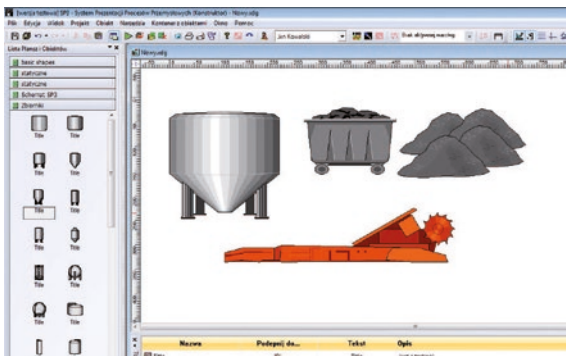
PROFESSIONAL SOLUTIONS IN AUTOMATION AND METHANOMETRY

SP3-CONSTRUCTOR

Allows the creation of any kind of fully scalable charts, maps, diagrams, on which are placed the objects animating display of user-defined sensors available in the system. The extensive set of graphical tools, like the library of readycomponents, allows quick creation of advanced and powerful graphical charts and edit those already existing in the system.



SP3-Constructor window



Library of objects ready to be placed on the board

SP3-SERVER

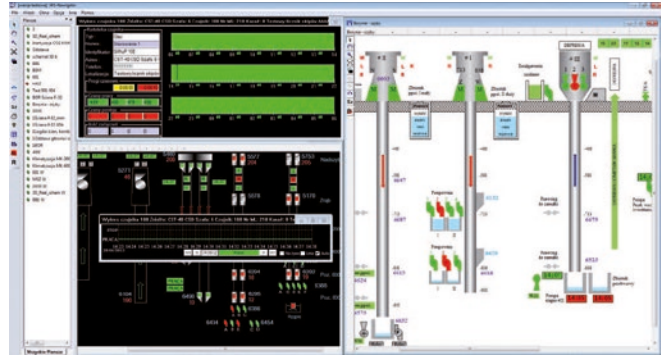
Is used for the collection, archiving and sharing of data for the entire system

SP3-NAVIGATOR

Allows to run previously created charts in separate windows, and provides for continuous monitoring of current measurements (also in the form of graphs). The charts and graphs are displayed in the windows that you can freely distribute on monitors or other display devices.



An example of program operation SP3-Navigator



SP3-Navigator window

The main advantages of the system SP3:

- The possibility of collection data from various systems (SWuP-3, ZEFIR, SMP, SMOK, FOD, PLC, etc.)
- Observation of measurements from various systems in one place
- An extensive palette of graphical tools
- Simple, intuitive operating
- Reporting.

HRP DISTRIBUTED MEASUREMENT SYSTEM

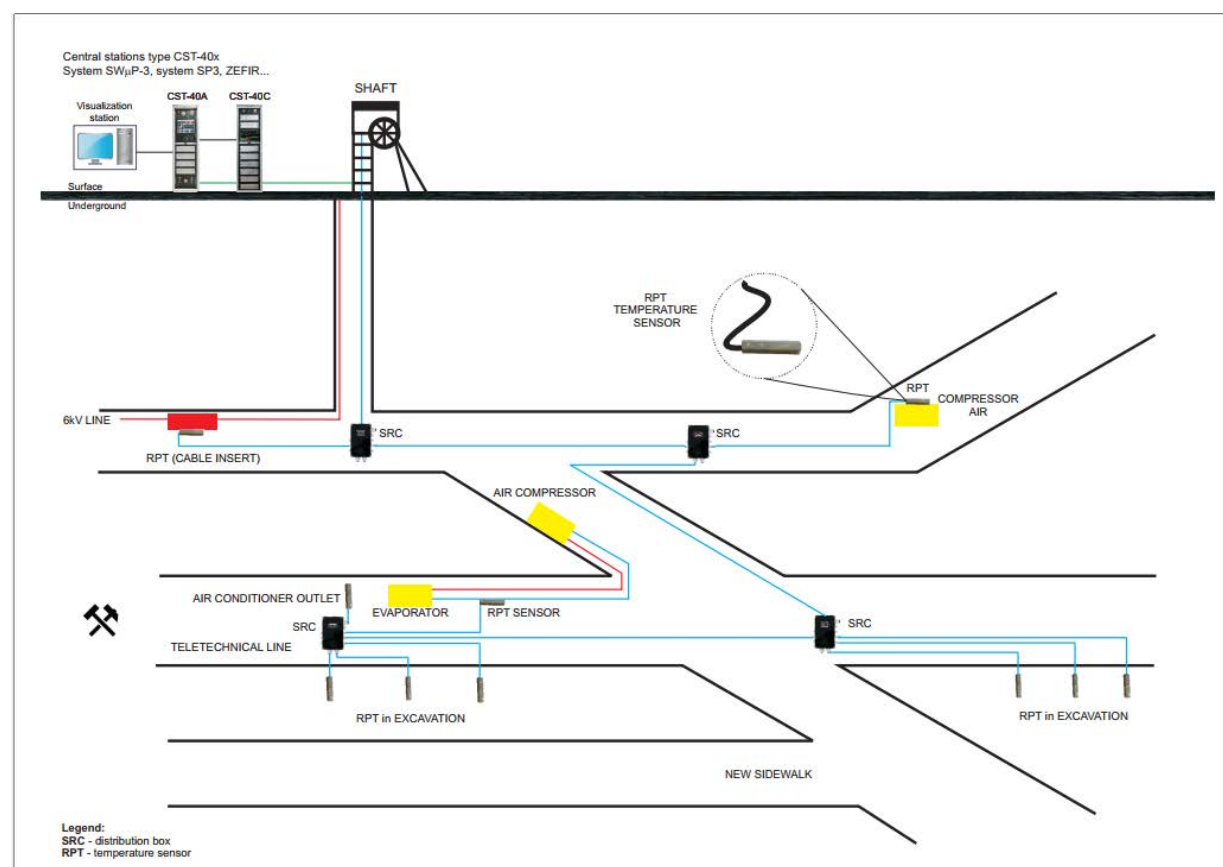
RPT AND RPD SENSORS

The HRP distributed measurement system is designed for the continuous monitoring and recording of temperature (RPT sensor), vibration (RPD sensor), and binary signals (CSN-x transmitter) related to workplace safety. The HRP system operates in conjunction with the CST-40x telemetry system, from which data is transmitted to the SWuP-3 dispatcher support systems and the SP3 industrial process visualization systems. Each HRP system sensor has a unique serial number and an assigned network transmission channel—to which location data and alarm thresholds can be linked—while the user determines the sensor placement.

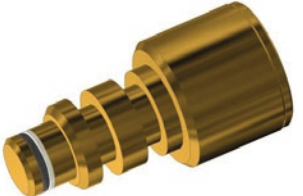
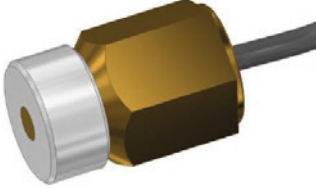
The ability to connect a large number of sensors to a single pair of telecommunication lines—which also serve as the power supply—allows for their precise placement in potentially hazardous areas or locations requiring special monitoring within a controlled excavation, mine section, or production hall. Various types of sensors (RPD, RPT, CSNx) can be connected to a single line, up to a maximum of 32 units.

The compact size and design (including mounting options) of the temperature and vibration sensors allow for their installation directly on the housing of the monitored machine or switchgear, as well as directly within the coal face. The system components hold the necessary certifications and approvals, making them suitable for use in potentially explosive (Ex) atmospheres.

HRP distributed measurement system	
RPT sensor measurement range	-20°C ÷85 °C or -20°C ÷120°C (special version)
RPD sensor measurement range	0,00 ÷8,00 g
CSN-10 transmitter input	one galvanically isolated binary input
CSN-11 transmitter input	one galvanically isolated binary or analog input with an 8V power output
Max. length of measurement and power supply line	15 km
RPT sensor measurement accuracy	± 0,5°C for range -20°C to + 80°C± 1°C for range +80°C to + 120°C
RPD sensor measurement accuracy	0,05 g
RPT sensor resolution	± 0,1°C
RPD sensor resolution	0,01 g



VERSIONS OF TEMPERATURE SENSOR RPT OR VIBRATION RPD

Hole version		RPT/x/O/x or RPD/x/O/x	RPT/S/O/10 – temperature sensor for measurement in the range -20°C do +85°C, hex housing for holes, 10m cable RPD/S/O/10 – vibration sensor for measurement in the range -20°C do +85°C, hex housing for holes, 10m cable
Screwed version		RPT/x/P/x or RPD/x/P/x	RPT/S/P/20 – temperature sensor for measurement in the range -20°C to +85°C, screwed housing M16x1.5 on the length of 15mm, cable 20m Information: On special request, the thread can be made in the range of M10 to M16 and on a different length.
STECKO version		RPT/x/DN10/x	RPT/S/DN10/10 – temperature sensor for measurement in the range -20°C to +85°C, plug-in housing STECKO DN10, cable 10m Information: STECKO versions available in DN10, DN12.
STECKO version		RPT/x/DN20/x	RPT/S/DN20/10 – temperature sensor for measurement in the range -20°C to +85°C plug-in housing STECKO DN20, cable 10m
STECKO version		RPT/x/DN32/x	RPT/S/DN32/10 – temperature sensor in the range -20°C to +85°C, plug-in housing STECKO DN32, cable 10m
Magnetically attached version		RPT/x/M/x or RPD/x/M/x	RPD/S/M/30 – temperature or vibration sensor for measurement in the range -20°C to +85°C, magnetically fastened housing, 30m cable
Pipeline version		RPT/x/RD-N32/x	RPT/S/RDN32/10 – temperature sensor for measurement in the range -20°C to +85°C, casing for STECKO DN32 pipeline, 10m cable

CSN CHANNEL TRANSMITTER

The CSN channel transmitter with components is used to monitor technological processes in places at risk of methane and / or coaldust explosion. The transmitter is made in two versions CSN-10 and CSN-11 and works directly with the central telemetry system CST-40A, CST-40C. The CSN-10 channel transmitter has galvanically separated binary and analog inputs. The CSN-11 version additionally has a + 8V power output, thanks to which it is possible to supply power and cooperate with external sensors, e.g. CP10 or CPE (sensors must work in a two-state mode). The transmitter has several mounting options using the following components:

- junction boxes: CSN-SP3 and CSN-SP8 with IP65 protection rating
- DIN rail connection modules: CSN-MP11, CSN-MP10 designed for installation inside a housing with a minimum protection rating of IP54
- CSN-MP0 connection module in the form of a DB15 connector with leaded wires; the module enables installation of transmitters in a housing having its own set of connection terminals; the casing must have a minimum protection degree of IP54



CSN transmitters

CSN-10, CSN-11 channel transmitter	
Power supply (Interface type CST-40A, CST-40C) transmission max. line length	from the power and transmission line, digital, two-way 15 km
Power consumption	max 1,2mA
Power output capacity + 8V (only CSN-11)	≤ 300 A
Operating temperature range	-20°C to +50°C
Ingress protection	minimum IP54
Type test certificate	TEST 16 ATEX 0021X
Explosion-proof mark	Ex I M1 Ex ia I



CSN-SP3



CSN-SP8



CSN-MP 11

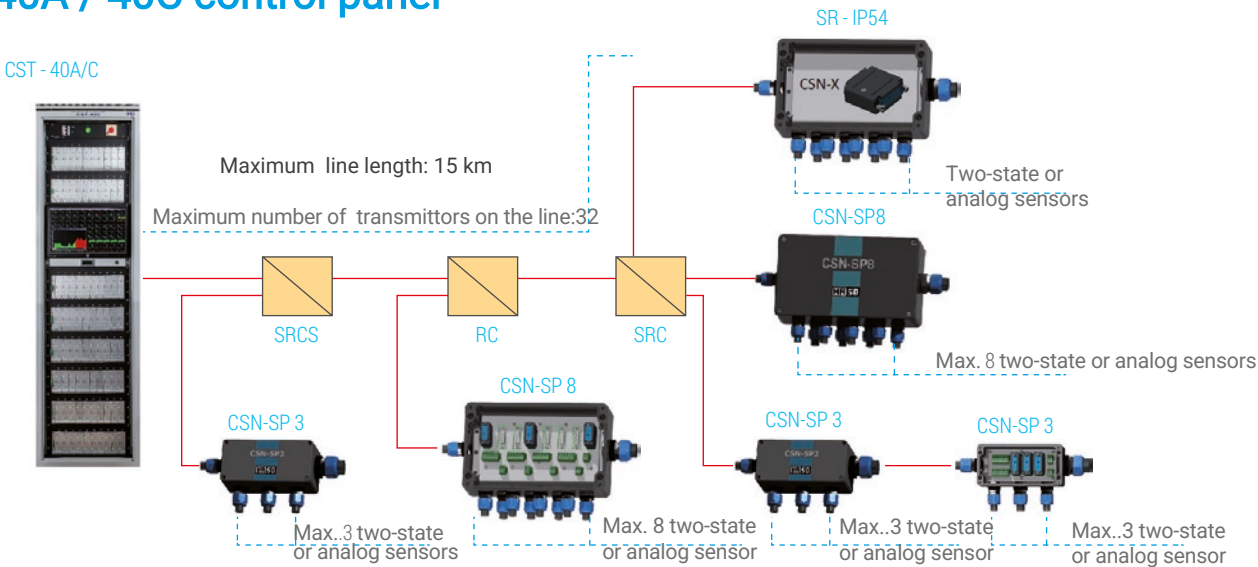


CSN-MP10



CSN-MP0

An example of connecting the CSN-10, CSN-11 transmitters to the CST-40A / 40C control panel



CONTROL UNITS AND DETECTORS

METHANE DETECTORS CSM-1, CSM-1R, CSM-3, CSM-3i, CSM-3M

Methane Detectors CSM-1, CSM-1 version R, CSM-3, CSM-3i, CSM-3m are stationary devices for measuring methane content in explosion hazard areas in underground coal mines. They mainly cooperate with telemetric central stations type CST-40, CST-40A, CST-40C in area of data transmission. They can also cooperate with other telemetric stations, provided that the parameters of the feeder-measurement line are compatible. Methane Detectors have one or two outputs (UW) used to control equipment switching off power supply when the preset alarm thresholds have been exceeded. Optionally, they may also be equipped with ambient temperature sensor. Its autonomous supply system (battery) supplies the methane detector when the feeder line is switched off. The communication with the methane detector is carried out by means of digital transmission through the feeder-measurement line of the central station and through the type KR-2 calibrator. The calibrator communicates with the methane detector through a radio link. Methane Detectors are devices in category M1, therefore, they may be used in all underground mines with methane or coal dust explosion hazard..



CSM-1	
Measurement range:	0-5% CH ₄ (catalytic) 5-100% CH ₄ (conductometric)
Measurement method	continuous
Response time	≤ 5s
Ingress protection	IP54
Type test certificate	KDB 06 ATEX 428
Explosion-proof mark	Ex I M1 Ex ia I



CSM-1 version R	
Measurement range	0-100% CH ₄ (conductometric)
Measurement method	continuous
Response time	≤ 15s
Ingress protection	IP54
Type test certificate	KDB 06 ATEX 428
Explosion-proof mark	Ex I M1 Ex ia I



CSM-3, CSM-3i, CSM-3m	
Measurement range	CSM-3: 0-5% CH ₄ (catalytic) 5-100% CH ₄ (conductometric) CSM-3i, CSM-3m: 0-100% CH ₄ (IR)
Measurement method	CSM-3: continuous CSM-3i, CSM-3m: IR, continuous
Response time	CSM-3: ≤ 5s CSM-3i: ≤ 25s CSM-3m: ≤ 7s
Display	LCD
Ingress protection	IP54
Type test certificate	KDB 09 ATEX 094
Explosion-proof mark	Ex I M1 Ex ia I

SENSOR CONNECTED DIRECTLY TO THE CONROL PANEL

Sensors from this group are stationary devices designed to measure atmospheric parameters in potentially explosive areas in hard coal mines. They work mainly with the CST40, CST-40A and CST-40C telemetry control panel in the scope of data transmission andtransmission (they are connected directly to the control panel). They can also cooperate with other control panels, provided that the condition of the power supply and measurement line is compatible.



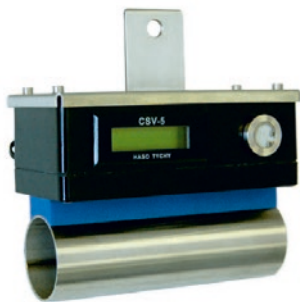
Carbon monoxide concentration sensor CSCO-1	
Measurement range	0-1000 ppm for digital transmission 0-200 ppm lub 0-1000 ppm for transmission frequency
Response time	≤ 40s
Oxygen concentration sensor CSO-1	
Measurement range	0-25 % O ₂
Response time	≤ 20s
Czujnik wilgotności i temperatury CSHT-1	
Measurement range	Humidity 0÷100%RH Temperature -20÷50°C
Response time	for humidity measurement ≤ 4s, for temperature measurement ≤ 30s

Hydrogen sulphide concentration sensor CSHS-1	
Measurement range	0-200 ppm H ₂ S
Response time	≤ 40s
Sulfur dioxide concentration sensor CSSD-1	
Measurement range	0-100 ppm SO ₂
Response time	≤ 40s
Nitrogen oxide concentration sensor CSNO-1	
Measurement range	0-250 ppm NO
Response time	≤ 40s
Nitrogen dioxide concentration sensor CSND-1	
Measurement range	0-20 ppm NO ₂
Response time	≤ 40s

COMMON DATA	
Measurement method	continuous
Ingress protection	IP54
Type test certificate	KDB 08 ATEX 131
Explosion-proof mark	Ex I M1 Ex ia I

Carbon dioxide concentration sensor CSCD-3i	
Measurement range	0-5 % CO ₂
Measurement method	IR, continuous
Response time	≤ 25s
Ingress protection	IP54
Type test certificate	KDB 09 ATEX 094
Explosion-proof mark	Ex I M1 Ex ia I Ex II 2G Ex ia IIB T4

Anemometer CSV-5A	
Measurement range	± (0,1 ÷ 10) m/s
Measurement method	continuous
Response time	≤ 2s
Ingress protection	IP54
Type test certificate	JSHP 19 ATEX 0040
Explosion-proof mark	Ex I M1 Ex ia I Ex II 2G Ex ia IIB T4 Gb



Control units are generally intended for use with the safety system CST. They can also operate with other systems, on condition that they comply with the supply & measurement line parameters

ANALOGUE SIGNAL CONTROL UNIT CSA-1, CSA-2

The main purpose of using the CSA-1 unit is the possibility of connecting sensors with voltage analogue outputs of 0,4 – 2V to the CSTsystem, and additionally 2-stage inputs and 2-stage outputs for Control Unit CSA-2. The unit not only does the measurements andtransfers them, but also supplies the connected sensors with power. Application of the control unit highly extends the measurementcapability of the CST-40, CST-40A, CST-40C units and allows to connect 4 sensors to a single line.



CSA-1	
Transmission mode	digital
Max. length of a supply-transmission line	8 km
Max. length of a sensor line	1500 m
Number of analogue inputs	4
Ingress protection	IP 65
Type test certificate	KDB 05 ATEX 039X
Explosion-proof mark	Ex I M1 Ex ia I

CSA-2	
Transmission mode	digital
Max. length of a supply-transmission line	8 km
Max. length of a sensor line	1500 m
Ingress protection	IP 65
Type test certificate	JSHP 20 ATEX 0003
Explosion-proof mark	Ex I M1 Ex ia I
Number of analogue inputs	4
Number of digital inputs	4
Number of 2-state outputs	2

TWO-STATE SIGNAL CONTROL UNIT CSD-1

CSD-1 highly extends the measurement capability of the system central CST-40(A), CST-40C and enables a variety of 2-state sensors to be connected to it. To each CST supply-transmission line a single CSD-1 control unit can be connected. The unit has sixteen2 -state voltage free inputs and eight voltage free 2-state outputs. Input signals are checked for shortcuts in connected lines. Furthermore unit can be programmed from the CST central system and can function as a protection for power shut-offs, enable signal linesor control other electrical equipments.



CSD-1	
Transmission mode	digital
Run time on own power supply	>12h
Number of 2-state inputs	16
Max. resistance of input circuit	400Ω
Line check mode	diode at checked contact in series
Number of 2-state outputs	8
Ingress protection	IP 65
Type test certificate	KDB 05 ATEX 010X
Explosion-proof mark	Ex I M1 Ex ia I

SENSORS CONNECTED BY THE CONTROL UNITS

The **sensors** in this group are stationary devices, designed to measure atmospheric parameters in explosive atmospheres in underground coal mines. They cooperate with telemetric central station type CST-40, CST-40A and CST-40C through analogue station CSA-1and CSA-2. They may also cooperate with other devices provided that the terminal of the feeder-measurement line is compatible.



Carbon monoxide sensor CSCO-2	
Measurement range	0-1000 ppm CO
Hydrogen sulfide concentration sensor CSHS-2	
Measurement range	0-200 ppm H ₂ S
Sulfur dioxide concentration sensor CSSD-2	
Measurement range	0-100 ppm SO ₂
Nitrogen oxide concentration sensor CSNO-2	
Measurement range	0-250 ppm NO
Nitrogen dioxide concentration sensor CSND-2	
Measurement range	0-20 ppm NO ₂

COMMON DATA	
Response time	≤ 40s
Measurement method	continuous
Ingress protection	IP54
Type test certificate	KDB 07 ATEX 257
Explosion-proof mark	Ex I M1 Ex ia I



Oxygen concentration sensor CSO-2	
Measuring range	0-25 % O ₂
Measurement method	continuous through diffusion
Response time	≤ 20s
Ingress protection	IP54
Type test certificate	KDB 07 ATEX 260
Explosion-proof mark	Ex I M1 Ex ia I



Humidity, temperature and atmospheric pressure sensor CSPA-2	
Measuring range	atmospheric pressure,standard from 800 hPa to 1300 hPa atmospheric pressure, extended from 800 hPa to 1600 hPa relative humidity from 0% RH to 100% RH ttemperature from -20°C to +50°C
Measurement method	continuous
Response time	≤ 2s for atmospheric pressure measurement ≤ 30s for temperature measurement ≤ 4s for relative humidity measurement
Ingress protection	IP54
Type test certificate	KDB 09 ATEX 095
Explosion-proof mark	Ex I M1 Ex ia I

SENSORS CONNECTED BY THE CONTROL UNITS

The **sensors** in this group are stationary devices, designed to measure atmospheric parameters in explosive atmospheres in underground coal mines. They cooperate with telemetric central station type CST-40, CST-40A and CST-40C through analogue station CSA-1and CSA-2. They may also cooperate with other devices provided that the terminal of the feeder-measurement line is compatible.



Differential pressure sensor CSPD-4	
Measuring range	± 250 Pa (Typ: 0250)± 1250 Pa (Typ: 1250)± 2500 Pa (Typ: 2500)± 5000 Pa (Typ: 5000) 4 ± 7500 Pa (Typ: 7500)
Measurement method	continuous
Response time	≤ 2s
Ingress protection	IP54
Type test certificate	JSHP 20 ATEX 0034
Explosion-proof mark	Ex I M1 Ex ia I



Humidity and temperature sensor CSHT-2	
Measuring range	Humidity 0÷100% Temperature -20÷50°C
Measurement method	continuous through diffusion
Response time	≤ 4s or measurement of humidity ≤ 30s for temperature measurement
Ingress protection	IP54
Type test certificate	KDB 08 ATEX 132
Explosion-proof mark	Ex I M1 Ex ia I



Probe thermometer CSTK-2	
Measuring range	-20°C to +50°C
Measurement method	continuous
Response time	≤ 2min (air velocity v=2 m/s)
Ingress protection	IP54
Type test certificate	TEST 13 ATEX 0023X
Explosion-proof mark	Ex I M1 Ex ia I Ex II 2G Ex ia IIC T4



Hydrogen concentration sensor CSH-2	
Measuring range	0,1% H ₂ with a measuring range of 0 to 0,100% H ₂ (0 ÷ 1000 ppm H ₂) 1% H ₂ with a measuring range of 0 to 1,000% H ₂ (0 ÷ 10000 ppm H ₂) 4% H ₂ with a measuring range of 0 to 4,000% H ₂ = 100% DGW (0 ÷ 40000 ppm H ₂)
Measurement method	continuous
Response time	≤ 40s - 110s (depending on version)
Ingress protection	IP54
Type test certificate	KDB 13 ATEX 0052
Explosion-proof mark	Ex I M1 Ex ia I Ex II 2G Ex ia IIC T4

SENSOR RS1X

Sensor **RS1x** is a stationary device intended to measure gas concentrations and signaling exceeded preset limits. Sensor can be acomponent of a Distributed Telemetry System (RST) and is available as follows:

- RS10** without signal
 - RS11** with optical signal
 - RS12** with optical-acoustic signal.
- The gas probe S1-X is mounted in the sensor. Probes can measure gas concentrations like methane (infrared or pellistor), oxygen, oxide and carbon dioxide, hydrogen sulphide, sulfur dioxide, nitric oxide and nitrogen dioxide (electrochemical method). The sensor can be equipped with the following peripheral modules:
- communications interface RS-485 (Modbus RTU)
 - output of the swithing-off circuit UW1, UW2
 - digital input
 - analog output (4-20mA, 04-2V or 0-10V)

The **RS10** sensor is also available in a pipeline version, the RS10 v.R. This version is designed to measure gas concentrations and signal when preset thresholds are exceeded. The sampling tube that delivers the gas to the probe is mounted on the pipeline using a pipeline gland.



Power supply	12 VDC (8-16V)
Measurement range	RS1x-M0: 0÷5% CH ₄ (catalic), 5÷100% CH ₄ (conductivity) RS1x-M1: 0÷100 CH ₄ RS1x-CD: 0÷5% CO ₂ RS1x-CO: 0÷2000ppm CO RS1x-NO: 0÷250ppm NO RS1x-ND: 0÷20ppm NO ₂ RS1x-SD: 0÷50ppm SO ₂ RS1x- HS: 0÷50ppm H ₂ S RS1x- O: 0÷25% O ₂
Measurement methode	Continuous , gas diffusion, method dependent on the type of gas being measured
Display	OLED
Light signaler (RS11x, RS12x)	high brightness LED, red
Acoustic signaler (RS12x)	95dB at 1m distance
Ingress pttection	IP65
Type test certificate	TEST 17 ATEX 0005X
Explosion-proof mark	Ex I M1 Ex ia I Ma Ex II 2G Ex ia IIB T4 Gb

CALIBRATORS

Calibrators are devices designed for carrying out tests and measurements of devices operating in explosion hazard areas in underground coal mines.

Calibrator KR-2 is a portable microprocessor device, It is mainly used to cooperate with gas detection devices, e.g., CSM-1, CSHT-1, CSCO-1, CSCO-2, CSO-2, CSPA-2, CSM-3, CSM-3i and CSCD-3i. The calibrator communicates with such devices via radio waves or by cable.

Calibrator KK-1 works mainly with a portable signaling methane detector MPS-1 and MPS-1i. Calibrator allows to connect methane detector to a computer to manage accounts, set alarm thresholds, archive data, etc.



Calibrator KR-2	
Power supply	3,6 V batteries
Transmission method	digital, by radio or with cable
Weight	0,35 kg
Ingress protection	IP 54
Type test certificate	KDB 07 ATEX 256X
Explosion-proof mark	⚡ I M1 Ex ia I

METHANE DETECTORS

Methane detectors **MPS-1, MPS-1i** are portable devices for measuring atmospheric parameters and signaling exceeding methane content in explosion hazard areas in underground coal mines. Thanks to the innovative technology methane detectors MPS-1, MPS-1i can be used:

- as a personal methane detector,
- as a portable methane detector, hung in a mining work place (also blasting work) or in underground vehicles e.g. railway locomotive,
- as a methane detector it cooperates with exploder of electrical and electronical fuse. Methane detector will be used to block the exploder when the methane content have been exceeded,
- as a stationary methane detector with use of switching-off outputs UW1, UW2.

The methane detector is also available in the MPS-1R variant, designed for use with a remote R-x measuring probe. In this configuration, the devices form a stationary system used to monitor atmospheric parameters and signal when gas concentrations exceed specified limits. One possible application is measuring methane concentration in the operating area of a mining shearer.

The connection box type **MPS-1SP** is an additional component for the portable device MPS-X. It is used to separate and double the quantity of two-state outputs (UW1 and UW2).



Measurement range	MPS-1: 0-5% CH ₄ (catalytic) 5-100% CH ₄ (conductometric) MPS-1i: 0-100% CH ₄
Measurement method	continuous, pellistor (MPS-1), IR (MPS-1i)
Response time	MPS-1: ≤ 5s, MPS-1i: ≤ 25s
Ingress protection	IP54
Type test certificate	JSHP 20 ATEX 0074
Explosion-proof mark	⚡ I M1 Ex ia I Ma



THE HZK-100x CAPACITIVE BLASTING MACHINE

The **HZK-100x** Capacitive blasting machine is a portable device designed to initiate electric detonators in series connection (class:0.2A; 0.45A). The device has an internal Li-Ion battery providing an autonomous power supply system, and charging takes place outside the hazardous area using a dedicated power supply. The lighter is available in the version with the **HZK-100M**, methane detector block, which works with the MPS-1 portable methane meter. The lighter has a built-in ohmmeter for measuring the resistance of the blasting circuit. The device is protected against accidental ignition of fuses with an external key and by requiring the appropriate sequence of use of the two buttons on the housing. Measurement of line resistance and firing of fuses is done through the same pair of terminals. HZKT-100 tester is used to check the machine.



HZK-100M HZK-100



HZKT-100

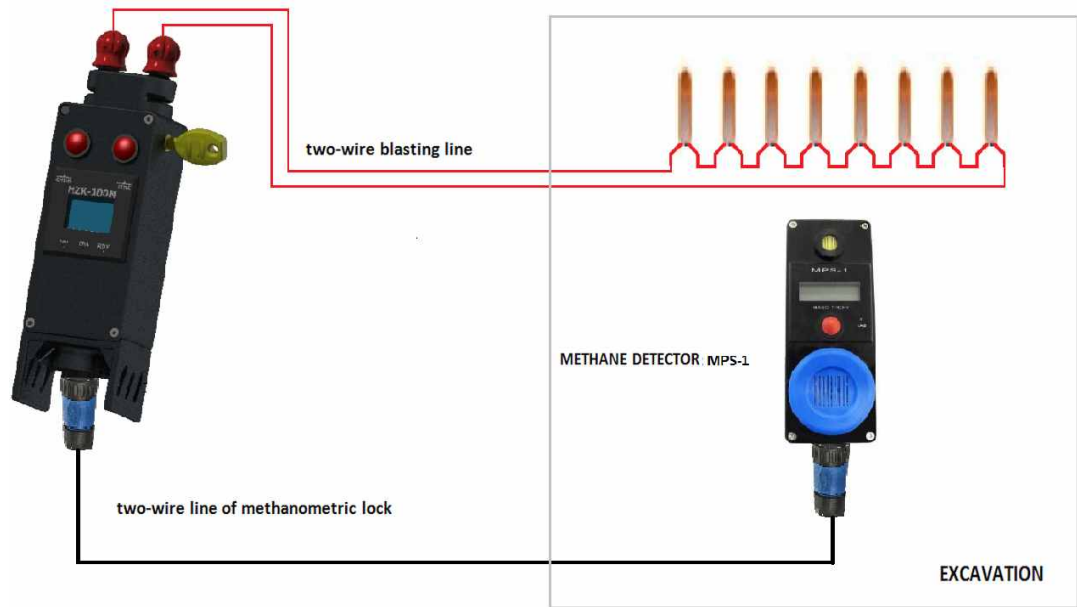


FIVE- POSITION CHARGER MCS-5



ONE- POSITION CHARGER SCS-1

Power	Internal lithium-ion battery
Clamps max voltage	00V ±10V
Ohmmeter measuring range	0 – 999,0Ω
Ohmmeter measuring resolution	0,1Ω
Ohmmeter measuring accuracy	0,2Ω range from 0Ω to 4Ω 5% range from 4,1Ω to 20Ω 1,5Ω range from 20,1Ω to 999Ω
Auxiliary device (tester)	Capacitive blasting machine tester HZKT-100 (Explosion-proof mark: I-/M2 Ex ib I Mb)
Blasting efficiency for configuration 0.2A	220 detonators of 0,2A class (max. line esistance: 685Ω)
Blasting efficiency for configuration 0.45A	180 detonators of 0,45A class (max. line resistance 260Ω)
Pulse time / Maximum pulse energy	(max. line resistance 260Ω) t ≤ 4ms / 20J
Charging time of the capacitor	< 10s
Time to press the FIRE button	15 s
Ingress protection	IP65
Type test certificate	TEST 17 ATEX 0030X
Explosion-proof mark	Ex I-/M2(M1) Ex eb mb [ia Ma] I Mb



Blasting ohmmeter type OSH-1 is designed for precise measurement of the resistanceof blasting lines, blasting circuits and single electric detonators. Measurements may also be carried out in mine faces, close to loaded explosion material in blast holes.The device has two measurement ranges, 00.00÷99.99Ω and 100.0÷1999.9 and may be used in all underground and strip mines. Themeasurement current is checked bymeans of OSH-1T. tester.

Stray currents recorder RPB-1 is designed for measurement of direct and alternatingstray currents intensity in rock shooting sites and blasting agents storage places. It is a category M2 device and may thus be used in all underground mines with methane orcoal dust explosion hazard.

SYGNALING DEVICE RS20, ISO-1, OSA-2

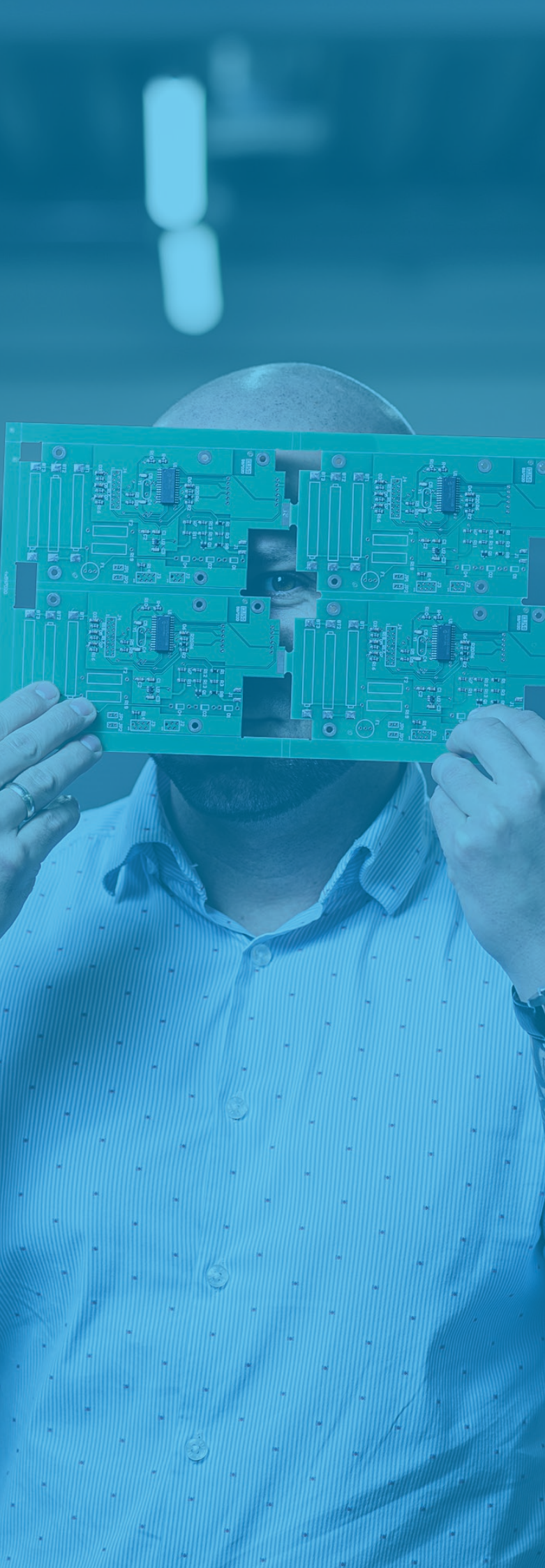
Optical-acoustic signaling device **RS20** is a stationary device intended to generate acoustic and optical alarm signals. Device is powered by an external intrinsically safe power supply 12VDC. It can work in RS-485 communication network. The signaling alarm canbe switched on via the transmission line or via signals to intrinsically safe digital inputs.



Power supply	12 VDC (8-16V)
Light signaler	high brightness LED, red
Acoustic signaler	95dB at 1m distance
Ingress protection	IP65
Type test certificate	TEST 17 ATEX 0006X
Explosion-proof mark	Ex M1 Ex ia I Ma Ex II 2G Ex ia IIB T4 Gb

Intrinsically safe signal light ISO-1 is a device dedicated for wheel transport in explosion hazard areas (It is used in underground mines – M1 category). It is a portable battery supplied device which emits pulsating light. The source of light are LED diodes.

Optical-acoustic siren OSA-2 is a stationary device designed for optical and acoustic signals. It is equipped with a digital input, working in „diode-in-series” mode. Inputstate enforces specific optical-acoustic signaling. OSA-2 is a device of M1 category.



CAMERAS ACCESS POINTS, SWITCHES, POWER SUPPLIES

CAMERAS, ACCESS POINTS, SWITCHES, POWER SUPPLIES

INTRINSICALLY SAFE MINING SWITC ISG-1

Intrinsically safe mining switch **ISG-1** is a stationary device designed to connect devices in Ethernet standard. It has from two to eight communication ports. The ports can be configured to work in the appropriate communication standard (electric 10/100BASE-T/TX or fiber optic 100BASE-FX), according to the order. It is possible to make a switch in a version with battery backup (min. 4 hours) and with an SC / APC optical fiber distribution box.



Power supply	Un = 12÷24V DC, In = max. 0,8A
Working temperature	from -20°C to +60°C
Relative humidity range	from 0% to 99% without condensation
External dimensions	160 x 260 x 90 mm to 380 x 600 x 350 mm
Ingress protection	IP65
Transmission speed	LAN (Ethernet): 10/100 Mbps (10/100BASE-T/ TX) LAN (optyczny): 100 Mbps (100BASE-FX)
Explosion-proof mark	Ⓔ I M1 Ex ia op is I Ma
Type test certificate	TEST 16 ATEX 0011X



MINING MONITOR MG-1

Mining monitor **MG-1** is a stationary device for displaying images from the cameras monitoring the mining excavations. The video is transmitted via optical fiber standard 100BASE-FX via cable or standard 100BASE-TX . In addition, the is ability to connect an external analog input PAL (composite video 1Vpp). The monitor can be equipped with the function keys in the amount of 6 or 12 pieces. Button functions can be defined by the customer (eg. change the configuration parameters of devices, switching the image on the visual system of industrial processes, etc.)



Power supply	Uz = 9÷30V DC, type. 12V DC max. 16W
Temperature range	from -10°C to +40°C
Relative humidity range	from 0% to 95% without condensation
External dimensions	400 x 300 x 130 mm
Weight	up to 8 kg
Ingress prtction	IP65
Type test certificate	TEST 16 ATEX 0009X
Explosion-proof mark	Ⓔ I M1 Ex ia I Ma Ⓔ I M1 Ex ia op is I Ma

MINING CAMERA KG-X

Mining camera in versions **KG-1**, **KG-1z** and **KG-1(z)** with floodlight is a stationary device. In the KG-1 or KG-1z variant, the video image is compressed using the H.264 standard and transmitted via the TCP/IP protocol using either the 100BASE-FX (single-mode fiber optic) or 100BASE-TX (twisted-pair Ethernet) standard. In the KG-2 variant, the video output is provided as a balanced (100 Ω) or unbalanced (75 Ω) analog video signal in the PAL standard (so-called "composite video 1 Vpp").

All camera types are available in the following configurations:

- analog or digital HD 1080p
- with or without factory-set zoom
- with a fiber-optic or cable interface (RJ45)
- with or without floodlight..



KG-1z



KG-2

Power supply	Un = 12÷15V DC In ≤ 0,8A (KG-1, KG-1z) Un = 12÷24V DC In ≤ 0,2A (KG-2n, KG-2s)
Ambient temperature	from -10°C to +40°C (KG-1, KG-1z) from -10°C to +50°C (KG-2n, KG-2s)
External dimensions	230 x 75 x 75 mm without sling (KG-1, KG-1z) 85 x 90 x 75 mm without sling (KG-2n, KG-2s)
Weight	ok. 2 kg (KG-1, KG-1z); ok. 0,8 kg (KG-2n, KG-2s)
Ingress protection	IP54 (KG-1, KG-1z); IP65 (KG-2n, KG-2s)
LAN transmission parameters (fiber or cable, only KG-1 i KG-1z)	100 Mbps (100BASE-FX or 100BASE-TX); TCP/IP, UDP, RTP, RTSP, RTCP, HTTP, DNS, DDNS, DHCP, FTP, NTP, PPPoE, SMTP, UPNP, ONVIF
Sensitivity	0,001 lux/F1 (KG-1, KG-1z); 0,01 lux F/1 (KG-2n, KG-2s)
TVL resolution (KG-2n, KG-2s)	128Kbps – 8192Kbps, H.264, H.265
Type test certificate	TEST 14 ATEX 0080X
Explosion-proof mark (KG-1, KG-1z)	Ⓔ I M1 Ex ia op is I Ma Ⓔ II 2G Ex ia op is IIB T4 Gb
Explosion-proof mark (KG-2n i KG-2s)	Ⓔ I M1 Ex ia I Ma Ⓔ II 2G Ex ia IIB T4 Gb
Dusk sensor	yes (floodlight version)
Lighting	Light color: white or IR – sermanently or automatically



KG-1z with floodlight



KG-1 with floodlight in cover

The user can change the illuminator light color (white or IR) and the operating mode using a magnet.

MINING CAMERA KG-3

Mining camera **KG-3** is an extended version of the KG-1 digital camera. The camera has an integrated power supply, which enables power supply from 42VAC or 230VAC. The supply voltage is switched with dedicated fuses in the connection chamber of the power cable. The KG-3z version can also be powered from an intrinsically safe 12-15V DC power supply.

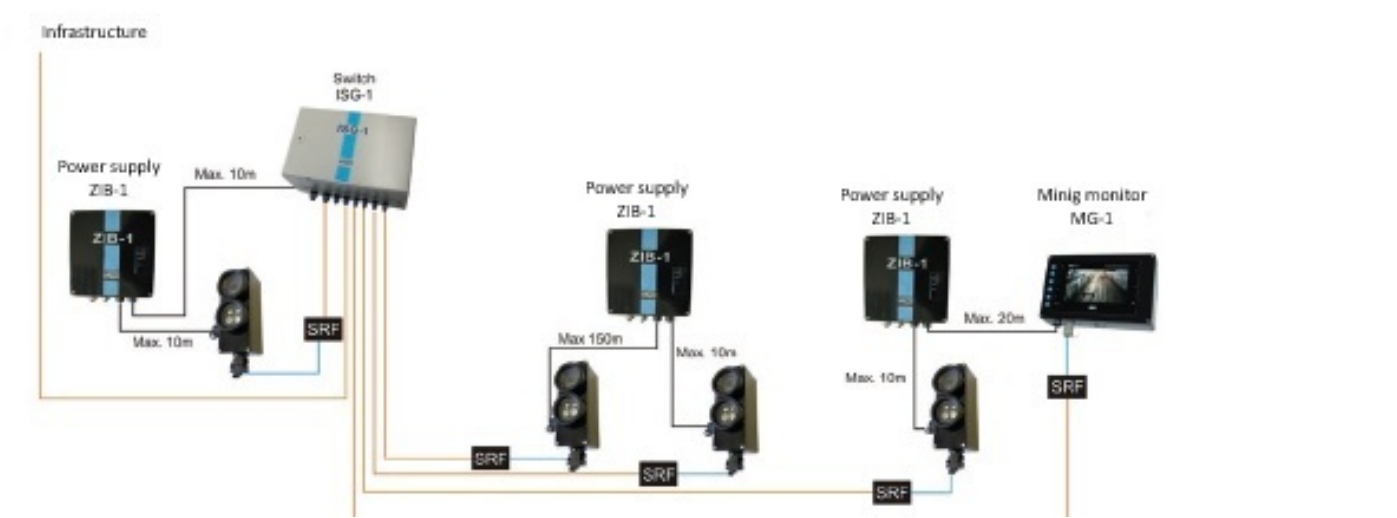


Power supply	Un = 42VAC lub 230VAC -15% +10% 12 ÷ 15 VDC (option)
External dimensions	240 x 190 x 143 mm
Weigh	about. 3,5 kg
Ingress protection	IP65
Sensitivity	0,001 lux
Explosion - proff markmark	
F version	Ⓔ I M2(M1) Ex eb mb [ia op is] I Mb Ⓔ II 2(1)G Ex eb mb [ia op is] IIB T4
E version	Ⓔ I M2(M1) Ex eb mb [ia] I Mb Ⓔ II 2(1)G Ex eb mb [ia] IIB T4
Type test certificate	JSHP 19 ATEX 0041



View from a camera at the bottom of the mine

Monitoring system scheme



MINING ACCESS POINT HAP-*

The **HAP-*** mining access point is a stationary device that has the access point functionality of an WiFi IEEE 802.11 a / b / g / n wireless network.

The device is made in the following versions:

HAP-1 Mining access point, 1-port

HAP-4 Mining access point, 4-port

HAP-1/RP Repeater WiFi

The **HAP-1** version has 1 port operating in the Fast Ethernet 100Mbps standard. Depending on the version, this port can operate in the fiber optic (100BASE-FX) or electrical (10 / 100BASE-T / TX) standard. The **HAP-4** version has 4 ports in the Fast Ethernet standard. Three ports operate in the 100BASE-FX fiber optic standard, while the fourth one can operate in the fiber or electric standard depending on the version.

In addition, selected versions may be provided with battery backup (min. 4 hours).



Power supply	Un = 12÷24V DC, max 0,5A
Communication standards	10/100Base-T/TX, 100Base-FX, WiFi IEEE 802.11 a/b/g/n 2,4GHz, 5GHz, RS485, digital outputs / inputs
Communication ports	Max 4 x Ethernet 2 x antenna
Ingress protection	IP65
Type test certificate	JSHP 19 ATEX 0016
Explosion-proof mark	Ⓔ I M1 Ex ia op is I Ma Ex Ⓔ M1 Ex ia I Ma

Example of HAP-4 i HAP-1/RP use



HAP-4/*/R VERSION WITH CONNECTION COMPARTMENT



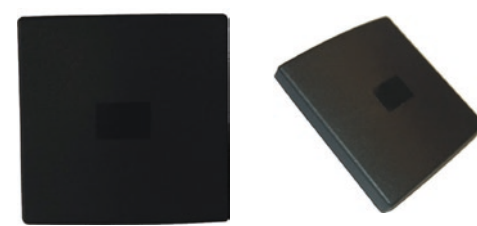
The mining access point is also available in a version featuring an HAP-4/*/R connection compartment. This compartment allows for cable connection and termination inside the unit without the need for dedicated HARTING connectors for data transmission or AMPHENOL connectors for power supply.

ANTENNAS WIFI – EX INT-X

The WiFi-Ex INT-X antennas are Ex-rated components designed for use with equipment such as radio access points (e.g., the NS40). Classified as Category M1 devices, they are suitable for use in all underground mining operations where there is a potential risk of methane and/or coal dust explosions. They also hold a Category 2G rating, making them suitable for industrial applications.

The antennas will be manufactured in the following variants:

- INT-HOR-07/24-V – omnidirectional base station antenna with a gain of 7dBi
- INT-HOR-09/24-V – omnidirectional base station antenna with a gain of 9dBi
- INT-PAN-04/24-HV-EX – directional panel antenna with a gain of 4dBi
- INT-PAN-10/24-HV-EX – directional panel antenna with a gain of 10dBi



Input power	Pi= 0,5W
Input voltage	Ui = 4,97V
Input current	Ii = 10A
Internal capacity	Ci = 781pF
Internal inductance	Li = 5,54µH
Operating temperature range	from -20°C to + 40°C
Relative humidity range	from 0% do 90% without condensation
Ingress protection	IP65
Type test certificate	KDB 13 ATEX 0013U
Explosion-proof mark	Ⓔ I M1 Ex ia I Ⓔ II 2G Ex ia IIB T4

ZIB-X POWER SUPPLY

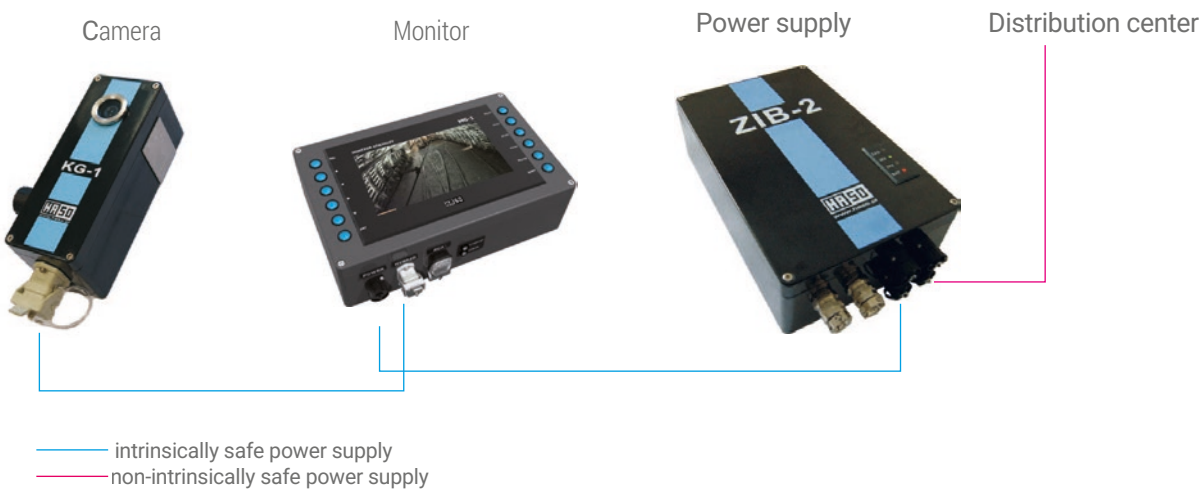
The intrinsically safe power supply **ZIB-x** is a stationary device mainly used to supply intrinsically safe circuits. The power supply is made in variants that differ in input and output parameters. Available in two versions: without battery backup (ZIB-1) and with battery backup (ZIB-2x).

ZIB-x is powered from non-intrinsically safe voltage 24VAC, 42VAC, 230VAC or 250VDC. The output voltage of the PSU is connected to the DC1 and DC2 connectors (or DC1 and OPTO in the ZIB2F version) connected in parallel. In the ZIB-2x version, in the absence of a mains power supply, the device switches to battery operation mode. Each version of the power supply has two communication interfaces: ZIB-1 and ZIB-2 versions have an RS-485 interface and an RS-232 interface, the ZIB-2F version has an RS-485 interface and a 100base-FX fiber optic Ethernet connector. Signaling diodes (3 for ZIB-1 and 4 for ZIB-2x) and binary outputs are used for signaling and monitoring the current status of the PSU. Operating parameters and data on the status of the PSU can also be obtained through the above-mentioned communication interfaces. The power supply unit is available in the ZIB-xA/x/12/10/x version and is compatible with "MULTICOM" and "FLEXCOM" systems. Custom versions tailored to specific customer requirements can also be manufactured upon special order.



Supply voltage (nominal)	24VAC, 42VAC, 230VAC lub 250VDC
Nominal output voltage	12V or 15V
Rated output current	0,5A or 1A or 1,5A
Guaranteed backup time	from 2,5 h to 16 h
Ingress protection	IP54
Working temperatures	from -5°C to +40°C
Working humidity range	from 15% to 95% without condensation
Dimensions (with glands and connectors)	ZIB-1: 295 x 250 x 12 mm ZIB-2x: 440 x 250 x 125 mm
Weight	ZIB-1: 10 kg ZIB-2x: 15 kg
Type test certificate	TEST 13 ATEX 0009X
Explosion-proof mark	ZIB-1: I M2 Ex eb mb [ia] I, II 2G Ex eb mb [ia] IIB T4 ZIB-2: I M2/M1 Ex eb ma mb [ia] I, II 2(1)G Ex eb ma mb [ia] IIB T4 ZIB-2F: I M2/M1 Ex eb ma mb [ia op is] I, II 2(1)G Ex eb ma mb [ia op is] IIB T4

An exemplary diagram of the ZIB-2 power supply use



OTHER
PRODUCTS

OTHER PRODUCTS

MOBILE GAS METER GM-1

Mobile gas meter **GM-1** is designed to work in all types of mine railways (floor-mounted rail, monorail, diesel-locomotive, battery-powered), longwall shearers, roadheaders and all the other moving machines used in mines. It is designed for continuous operation. GM-1 has four relay outputs. These outputs can be used for driving power switch to machines e.g. in case of exceeding the concentration of methane. Gas meter beside relay (opto-mos) outputs has RS422 interface and analog output (depending on version it can be voltage output 0-10V, 0-5V or current output 4-20mA). The Mobile Gas Meter system consist of three cooperating types of devices:

- Main controller GM-1JB/x
- The remote probe R-X
- User terminal GM-1TB.

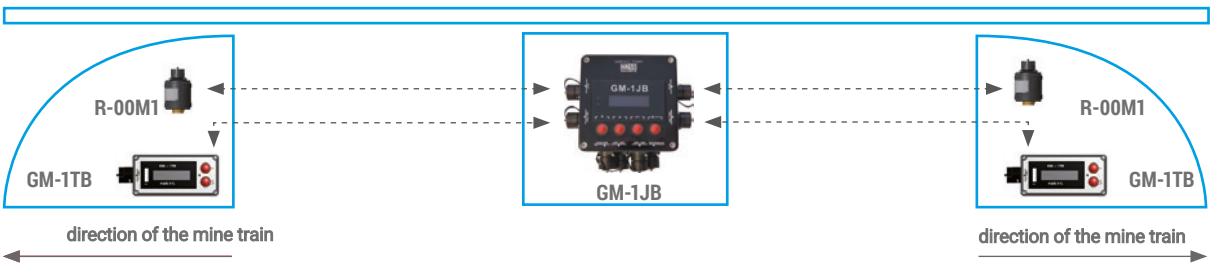
The device is equipped with rechargeable battery. In case of power failure the device can operate autonomously for about 10 hours. Mobile Gas Meter GM-1 is M1 category device.



Power supply	$U_n = 10V \pm 16V, I_n = 500mA$ (for $U_n = 12V$)
Power supply autonomy	min. 8 h
Measurement method	using attached probe, type R-x
Digital interface	RS422
Analog interface	0-10V/0-5V or 4-20mA
Working temperature range	from -10°C to +40°C
Relative humidity range	to 95% without condensation
External dimensions	GM-1JB/x : 160 x 160 x 90mm; GM-1TB: 75 x 160 x 56mm
Ingress Protection	IP54
Safety Integrity Level (SIL)	SIL 1 (for configuration I - see manual) or SIL 2 (for configuration II - see manua)
Explosion-proof mark	Ex ia I Ma
Type test certificate	GM-1JB/x: TEST 14 ATEX 0063X; GM-1TB: TEST 14 ATEX 0062X

Example of gas meter configuration

MONORAIL GAS METER GM-1



- System consists of:
- GM-1JB/x: Gas Meter Main Controller (1 pc)
 - GM-1TB: Gas Meter User Terminal (1 or 2 pcs)
 - R-00M1: The Remote Probe R-X (infrared methane gas sensor) (1 or 2 pcs)

COMBINE METHANE DETECTOR SET MKO-1X

Combine methane detector **MKO-1x** is a stationary device designed to measure and signal the concentration of methane in the area of combine mining work. In case of increasing the methane concentrations and exceeding the set threshold, the alarm signal is activated and the power of combine is shutdown by opening the control circuit UW1 / UW

MKO-1 consists of:

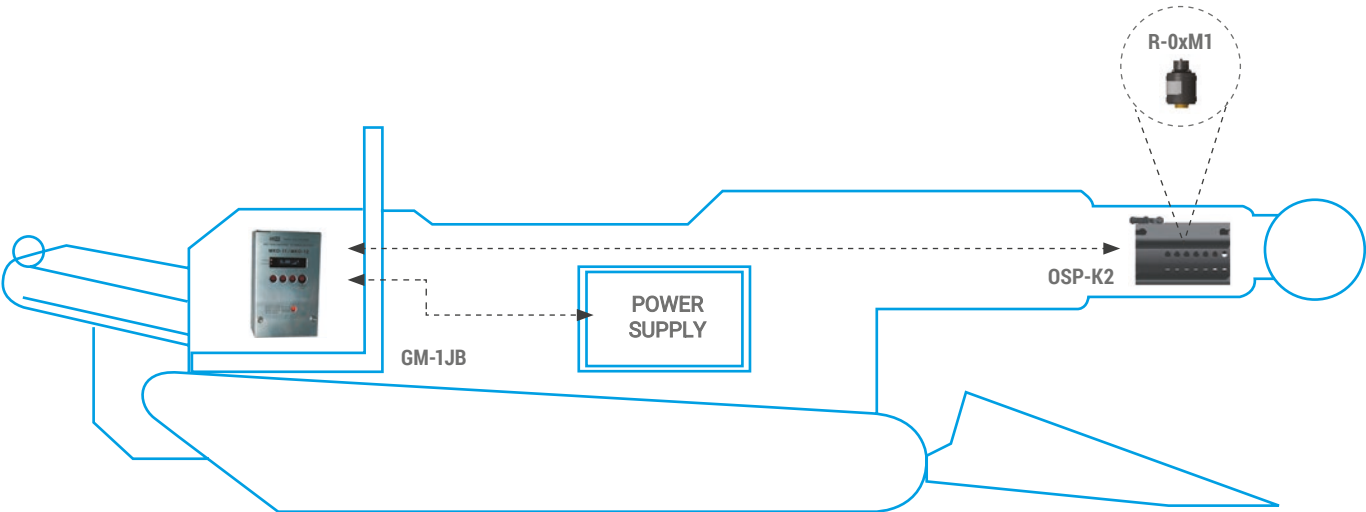
- The main controller GM-1JB/xS-1JB/xS
- The user terminal GM-1TB
- Remote probe R-xM1 in combines cover OSP-Kx

Methane detector in MKO-11 version is powered by an external intrinsically safe power supply 12V DC, and MKO-12 is powered from the alternating voltage source with a value determined by power supply ZIB-1/x. Main controller GM-1JB has a built-in battery whichallows activation of methane detector before powering combine, measure the initial concentration of methane and then switching power supply control circuit of combine



Power supply (MKO-11 version)	10÷16V DC
Power supply (MKO-12 version)	24 V or 42V or 230V AC
Power supply autonomy	min. 8h when the battery is fully charged
Working temperature range	from -5°C to +40°C
Relative humidity range	from 10% to 95% without condensationi
Measurement method	Continuous, infrared, gas penetration through diffusion
Measurement range	0 - 100% CH4
Response time	T90 <30s
External dimensions / weight:	160 x 160 x 90 mm / 2,5 kg
- main controller GM-1JB/xS	75 x 160 x 56 mm / 1 kg
- user terminal GM-1TB	220 x Ø135 mm / 5,8 kg
- probe R-xM1 in combine cover	295 x 250 x 125 mm / 10 kg
- power supply ZIB-1/x	
Ingress protection	IP55
Explosion-proof mark	Ex I M2(M1)/M1
Type test certificate	TEST 15 ATEX 0042X

Example operating configuration of the MKO-1 methanometer



MKO-1x Shearer-Mounted Methanometer

ELECTROMAGNETIC FLOWMETER MTFEx-10

Electromagnetic flowmeter **MTFEx-10** is design to measure the liquids flow in closed piping installations. Device measures the flow of clean and contaminated conductive liquids, aggressive and chemically inert liquids as well as conductive mixtures and pulps, e.g.

- drinking water, sewage and sewage sludge, water in fire protection installations
- acids, alkalies
- food liquids (milk, juice, beer, wine).

The MTFEx-10 measures liquid flow—with a specified accuracy class—at linear velocities ranging from 0.1 m/s to 10 m/s (standard version). Measurement is performed in both directions. The flowmeter is available in versions differing by connection type: flanged, wafer (flangeless), threaded process connection (R DIN), and clamped process connection (DIN).

The flowmeter is available in a compact version (transmitter mounted directly on the sensor) and a remote version (transmitter connected to the sensor via cables).

Additionally, the flowmeter can be equipped with an intrinsically safe pressure transmitter—such as the PC-28.Modbus16 —designed to measure gauge pressure, vacuum, and absolute pressure of gases and liquids in installations located in underground mine workings, in areas where there is a risk of methane and/or coal dust explosion.

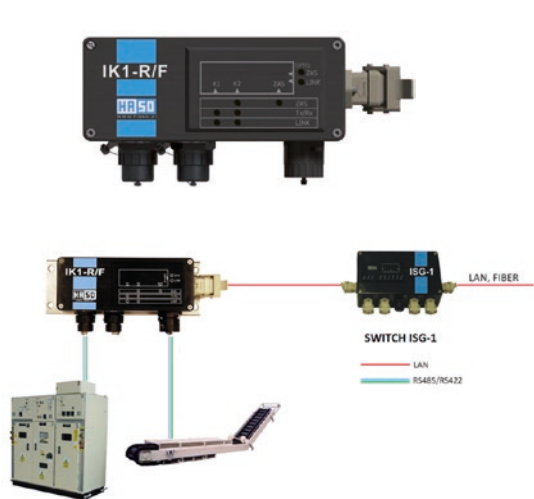


Przepływomierz elektromagnetyczny MTFEx-10 z przetwornikiem ciśnienia		
	MTFEx	PC-28.Modbus16
Power supply	Un = 10-16V	10,5...15,8 V DC (max..2A)
Power consumption (max.)	In = 450mA	<23mA
UW shutdown output	Opto-MOS with a series diode	-
Serial interface	RS485 (two-wire)	RS485 transmission with MODBUS RTU protocol
Analog output (active)*	4-20mA	-
Frequency output*	0÷1/5/10 kHz oraz 5÷15 Hz	-
Ambient temperature range	-20°C to +60°C	-40°C to +80°C
Maximum medium temperature range	-20°C to +80°C (kompakt version) -20°C do +100°C (separate version)	-40°C to +80°C
Humidity range	from 0% to 95% without condensation	
Ingress protection	IP67	IP66
Available materials	Electrodes: stainless steel (standard) C-386 (HASTELLOY), tantalum, titanium, Monel (optional)	Case: Steel 316L Steel 304
Available measuring tube diameters (DN)	50-500 mm	-
Measurement ranges	-	0-2,5MPa or another from the data sheet
Type test certificate	JSHP 19 ATEX 0005	FTZU 18 ATEX 0077X
Explosion-proof mark	I M1 Ex ia I Ma II 2G Ex ia IIB T4 Gb	I M1 Ex ia I Ma

INTRINSICALLY SAFE CONVERTER IK1-X/X

Intrinsically safe converter **IK1-x/x** is a device used to convert digital signals in following standard: Serial RS232/422/485, Ethernet 100Base-TX, 100Base-FX optical, radio WiFi IEEE 802.11b/g, Modbus/RTU RS-xxx and Modbus/TCP.

The converter version is individually agreed with the client according to their needs during the quotation stage. The converter can be powered redundantly via a power connector, a hybrid connector (power supplied via the fiber optic cable), or via a second serial transmission channel connector (compatible with the ZIB-x power supply).



Power supply	12÷15V DC
Serial Interface	RS-232/422/485
Network interface	electrical: 100BASE-TX
	radio: WiFi 802.11b/g
Working temperature	from -10°C to +40°C
External dimensions	190x75x75mm
Ingress protection	IP54
Type test certificate	TEST 13 ATEX 0057X, IECEx FTZU 15.0008
Explosion-proof mark	Ex ia I Ma, Ex ia o pis I Ma

CONVERTER CSKA-420and CSKC-485

Converter **CSKA-420** is a device used to convert the current signal from 4-20mA and 0-20mA standards into digital form, whereas **CSKC-485** converter is a device used to convert digital signals from RS422/RS485 standard into telemetric central station type CST-40, CST-40A and CST-40C. RS485/RS422 interface connector is a separate intrinsically safe circuit and is galvanically isolated from the rest of the system. Both converters work directly via the supply and transmission line of telemetric central station CST-40, CST-40 or CST-40C. Converters CSKC-420 and CSKC-485 are devices of M1 and 2G category. Field of use shall include all establishments of underground mining with possible methane or coal dust explosion hazard. The device can also work in threatened areas beyond the mining industry.



Measuring range	0-25 mA
Measurement method	continuous
The input impedance	100Ω
Working temperature	from -10°C to +40°C
External dimensions	110 x 75 x 56 mm
Ingress protection	IP54
Type test certificate	TEST 13 ATEX 0055X
Explosion-proof mark	Ex ia I Ma Ex ia IIB T4 Gb
Serial Interface	RS422/485
Working temperature	from -10°C to +40°C
External dimensions	110 x 75 x 56
Ingress protection	IP54
Type test certificate	TEST 13 ATEX 0056X
Explosion-proof mark	Ex ia I Ma Ex ia IIB T4 Gb

OTHER PRODUCTS

MEDIA CONVERTER CFC-*

Media converter type CFC-* is a device used to convert signals in the Ethernet, Fast Ethernet and Gigabit Ethernet standard between the electrical and fiber optic interface.

The converter is available in the following versions:

CFC-M/S Media converter 10/100BASE-TX na 100BASE-FX (standard) version

CFC-M/I Media converter 10/100BASE-TX na 100BASE-FX (version for DIN rail))

CFC-G/S Media converter 10/100/1000BASE-T na 1000BASE-LX (standard version)

CFC-G/I Media converter 10/100/1000BASE-T na 1000BASE-LX (version for DIN rail)

Each device is equipped with the appropriate SFP module.



Power supply	Un = 12÷48V DC for CFC-x/I version Un = 5V DC for CFC-x/S version
Parameters of the optical output	P _{OPTO} ≤ 40 mW
Type test certificate	JSHP 18 ATEX 0017X
Explosion-proof mark	Ⓔ I (M1) [Ex op is I Ma] Ⓔ II (1G) [Ex op is IIB T3 Ga]

LINEAR DISPLAY CSWL-1x

Linear display CSWL-1x is a device used to present the measurements results of the sensor connected to the telemetric center line of CST-40x system. It can work with module line type ML-1 and ML-2. The display is useful when the sensor/ device that we want to check does not have a display or access to it is difficult. The device can display measurements from the sensor, alarm thresholds, serial number, etc.

There are two versions of the display. These versions differ in the way they are connected to the line. The CSWL-1 has cable glands, while the CSWL-1A has connectors.



Power (Interface type CST-40(A), CST-40C)	from the power supply and transmission line
Transmission	digital, unidirectional
Max. line length	to 10 km (depending on the sensor)
Connection method	parallel to the line
Range of throttled cable diameters	stuffing boxes M16x1,5: 4 ÷ 8mm
Ingress protection	IP65
Type test certificate	JSHP 18 ATEX 0016
Explosion-proof mark	Ⓔ I M1 Ex ia I Ma

DIFFERENTIAL PRESSURE TRANSDUCER PDP-1X

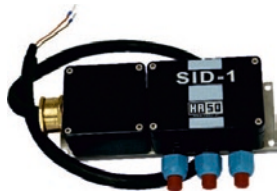
Differential pressure transducer PDP-1x j is a stationary, contact device used to control the pressure difference. It is intended for use primarily in mines in order to control the opening, closing and sealing ventilation dam, airflow in separately ventilated wall and for signaling the level of the water in sump. The pressure is indicated as a digital signal, and the threshold value is set individuall.



Measuring range	20 ÷ 4500 Pa (0,2-45 mbar)
Pressure entry	2 or 4 connectors
Cable entry	1 or 2 cable glandse
Ingress protection	IP54
Type test certificate	TEST 13 ATEX 0042X
Explosion-proof mark	Ⓔ I M1 Ex ia I, Ⓔ II 2G Ex ia IIC T6

SEPARATORS SID-1, SID-2, SID-3

Intrinsically safe Two-Stage Separator type SID-1, SID-2 and SID-3 is a stationary device designed for transmitting two-stage information between intrinsically safe circuits. It is used for separation of intrinsically safe circuits in class “ia” or “ib” in any combination.



SID-1	
Power supply	42 VAC
Line check mode	diode in series
Weight	3,0 kg
Ingress protection	IP54
Type test certificate	KDB 09 ATEX 107
Explosion-proof mark	Ⓔ I M1/M2 Ex ia I

SID-2	
Power supply	42 or 230 VAC
Line check mode	diode in series
Weight	2,3 kg
Ingress protection	IP54
Type test certificate	KDB 12 ATEX 0094
Explosion-proof mark	Ⓔ I M1/M2 Ex ia I Ma Ⓔ I M2 Ex e mb [ia Ma] T Mb

SID-3	
Power supply	42 VAC
Line check mode	ldiode in series
Weight	2,2 kg
Ingress protection	IP54
Type test certificate	FTZU 12 ATEX 0090
Explosion-proof mark	Ⓔ I M1/M2 Ex ia mb I

DISTRIBUTION BOX SRx

The SRx distribution box is designed for making electrical and / or optical fiber connections in cables with different or the same number of pairs and fibers. The SRx box is used in teletechnical, signaling, methanometric systems and in automation control circuits in intrinsically safe installations. The box is produced in the following varieties:

SRC-X Cable distribution box

SRF-X Fiber optic distribution box

SRCF-X Cable and fiber distribution box



Connectors type	SRC-X box board KVA-1/a board LZ B-4 board LZ B-10 board TOPJOB board ZT-20	SRF-X box welds only SC/APC SC/PC E2000/APC E20 00/PC ST
	glands M16x1,5: 4 ÷ 8mm glands M20x1,5: 6 ÷ 13mm glands M25x1,5: 7 ÷ 17mm glands M32x1,5: 13 ÷ 21mm glands M40x1,5: 22 ÷ 32mm	
Cable diameter range	Depending on the type of terminal blocks.	
Number of terminals	IP65	
Ingress protection	TEST 15 ATEX 0052X	
Type test certificate	I M1 Ex ia I Ma II 2G Ex ia IIB T4 Gb	
Explosion-proof mark		

INDUSTRIAL COMPUTER HPC-1

The **HPC-1** industrial computer is a stationary device designed for displaying images from video monitoring systems and technological process monitoring systems. Thanks to the converters and barriers used, it enables the conversion of digital electrical signals (RS, LAN, Modbus, etc.) into optical signal.

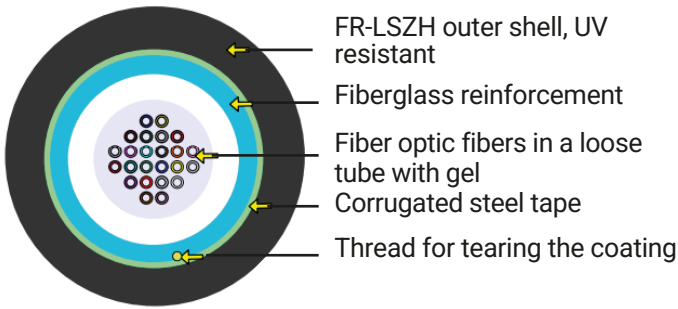
Various versions of the **HPC-1** computer enable the development of RS422 / RS485 ports, fiber optic or copper ETHERNET, WiFi connection, USB ports. The computer can be operated by a pad keyboard placed on a bracket attached to the housing. obudowy.
The HPC-1 computer is available in many versions that are configured according to the user's needs.



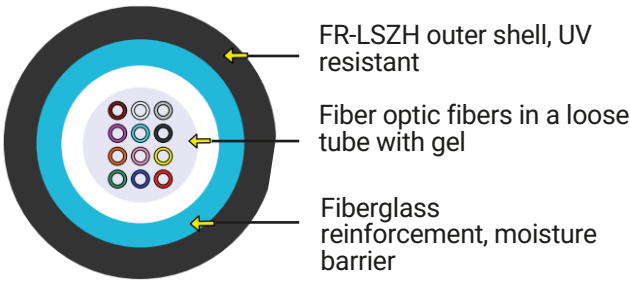
Processor type	Celeron, i3, i5
Memory size	1GB, 2GB, 4GB, 8 GB
Hard drive	1 lor 2; SSD/HDD; from 120GB to 5TB
Number of RS422/485 ports	from 0 to 4
Number of ETHERNET 100base-FX ports	from 0 to 7
INumber of ETHERNET 10/100base-T/TX ports	from 0 to 7
WiFi card	0 or 1 port
Number of USB ports	from 0 to 2
Monitor size	from 17'' to 28''
Power supply	110÷230V AC, 50Hz, 140W
Working temperature	from -20°C to + 40°C
Relative humidity range	from 0% to 95% without condensation
External dimensions (without glands)	600 x 600 x 250 mm lub 800 x 800 x 300 mm
Weight (depending on version)	up to 40 kg
Ingress protection	IP54
Type test certificate	JSHP 20 ATEX 0022
Explosion-proof mark	I (M1) [Ex ia op is Ma] I II (1) [Ex ia op is Ga] IIB

FIBER OPTIC CABLES

The cables are designed for transmitting digital and analog signals across the entire optical spectrum used in all transmission systems: data, video, and audio. The cables are constructed from a tube filled with a thixotropic gel and contain up to 24 colored fibers with a 250µm primary coating. The cables are fully dielectric, and their sheath is made of flame-retardant, halogen-free, UV-, abrasion-, and corrosion-resistant materials.



Armored cable - SLA-X-01xxx-ZRH-D



Reinforced cable - SLA-X-01xxx-JH-D

	1-12 włókien AR02 (JH-D)	16-24 włókna BR02 (JH-D)	2-24 włókna Z297 (ZRH-D)
Outer diameter [mm]	6,5	7,7	8,9
Weight [kg/km]	52	68	109
Max. dynamic pulling force[N]	2000	2500	1500
Min. bending radius during operation [mm]	15 x cable diameter	15 x cable diameter	15 x cable diameter
Crush resistance	2000N/10cm	2000N/10cm	10000N/10cm 24
Operating temperature [°C]	- 30 to +70	- 30 to +70	- 30 to +70
Technical Opinion No.	5088/2018		
Certificate	5243/5088/A1/2018 5243/5088/A2/2018		

UTP-H CABLE FOR USE IN UNDERGROUND MINING PLANTS

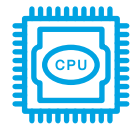
UTP-H cat. 5e 4x2x05mm cable s designed for use in multimedia computer networks (transmission of data, voice, and high-definition television images – HDTV), in industrial networks, and in computer networks with increased binary data rates while simultaneously transmitting bidirectionally across all symmetrical paths of a 4-pair cable (full duplex, Gigabit Ethernet).

Thanks to its halogen-free plastic sheath, the cables are suitable for use in infrastructures with increased fire safety requirements, where greater safety for people and property is required. They are flame-retardant, have low smoke emissions, and the emitted gases are non-corrosive.



UTP-H kat.5e 4x2x05mm cable	
Working temperature range	from - 20°C to + 70°C
Min. bend radius	4 x cable diameter
External dimensions	6,4mm
Technical Opinion No.	6209/2020
Certificate	6209/A1/2020





ELECTRONICS ASSEMBLY

Our mission is to continually develop and improve existing products, which is why we have expanded our services to include contract assembly of electronic components. Our modern and fully equipped assembly facility, centered on an innovative SMT line for surface-mount (SMD) electronic components, allows us to fulfill these requirements.



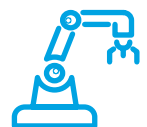
ASSEMBLY LINE

On the assembly line, under the supervision of our employees, components are created for various projects, starting from small prototype series to large production batches.



QUALITY

We use equipment from top-quality manufacturers. Our professional team ensures strict quality standards are maintained through meticulous inspection of the finished product using an inspection microscope.



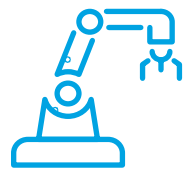
TECHNOLOGY

Leaded and lead-free technology for the assembly of SMD and THT components for manufactured devices, contract assembly in a modern and precise assembly line.



OUR ASSEMBLY LINE GUARANTEES THE HIGHEST QUALITY:

- product service from idea, through design and warranty
- assembly of prototypes and production series
- automatic, single-sided and double-sided SMD assembly
- optical control of the paste position using 3D SPI technology
- mixed assembly (THT and SMD)
- optical inspection of wafers (AOI)



OUR COMPANY'S OFFER

The offer includes a wide range of control and visualization systems always tailored to the individual needs of the customer, e.g.:

- standalone devices built on the basis of proprietary electronic designs, which may include a microcontroller
- small control systems built based on PLC controller and possibly operator panel
- control and visualization systems containing, among others control cabinets, control station equipped with PCs, remote communication systems, etc

The proposed solution can provide modernization or expansion of existing control systems, partial or total replacement of the old type of control on modern.

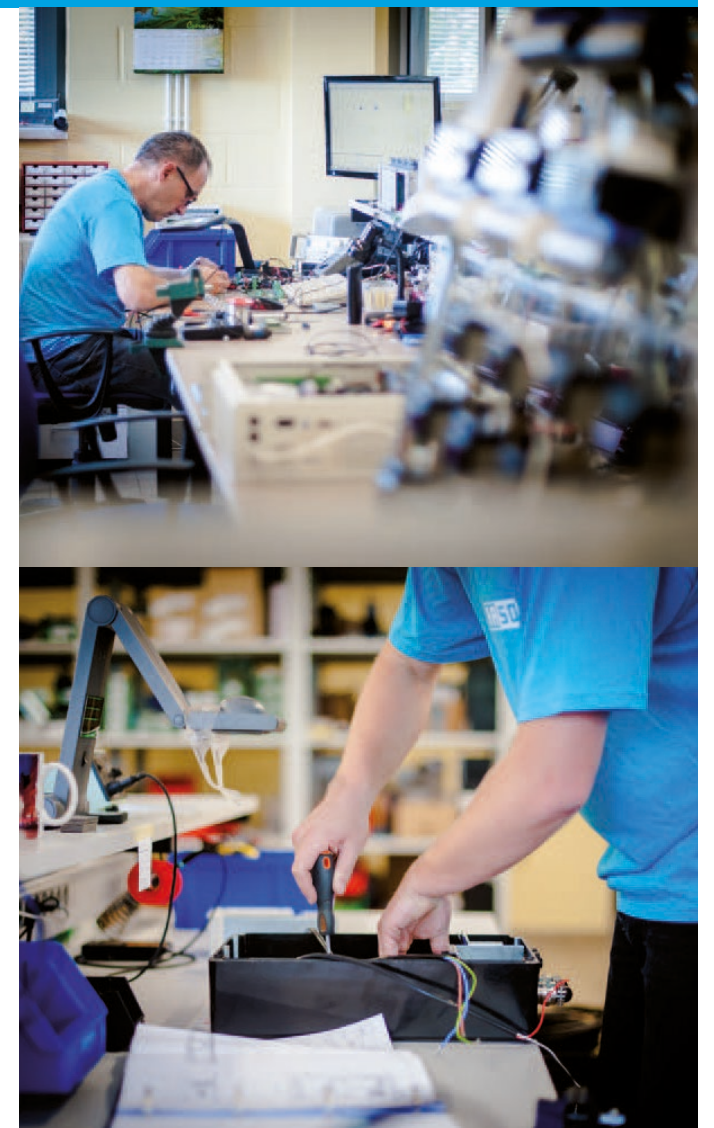
In performing control systems HASO offers:

- development of functional requirements in consultation with the user
- realization of the system design and electrical / electronic design
- completion of delivery devices and components
- realization of cabinets, control boxes
- installation of actuating devices, sensors and object connection
- software of PLC controllers
- SCADA systems visualization
- development of a complete built documentation
- launch of the system and training of operators
- warranty and post warranty service



OFFER OF HASO INCLUDES COMPREHENSIVE SERVICES

- conducting periodic inspections and repairs of systems and methanometry equipment, during the warranty and post warranty periods
- replacing parts and components of devices which are not suitable for further use
- technical consulting
- installation and commissioning of installed safety systems and devices
- egalization and controlling of blasting equipment
- break down of telemetry system CST removing
- twenty-four-hour service readiness, seven days a week





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