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FLAMEPROOF CIRCUIT BREAKER SET SN54

The flameproof circuit breaker set SN54 is determined for switching and protection of three-phase mining electrical equipment or for switching and protection of a mining supply network.

The flameproof circuit breaker set SN54 is constructed for use in the isolated supply network up to 11 kV 50/60Hz.

The product complies with the technical requirements for devices designed for use in potentially explosive atmospheres of mines according to Directive 94/9/EC.

The product is designed for use in environment with methane and coal dust explosion hazard category M2, and complies with technical requirements of devices from group I. The product also complies with technical requirements EN 60079-0, EN 60079-1, EN 60079-11 and EN 60 529.

Design

The flameproof circuit breaker set SN54 is executed in a welded flameproof enclosure. The flameproof enclosure composes of these separate areas: input isolator compartment, main apparatus compartment with quick-release door, output isolator compartment, main connecting compartments and auxiliary connecting compartment include intrinsically safe circuits. It is a possible to make electrical and mechanical connection of the several flameproof circuit breaker sets SN54 in to the M.V. distribution board.

The flameproof circuit breaker set SN54 has two type of the design.

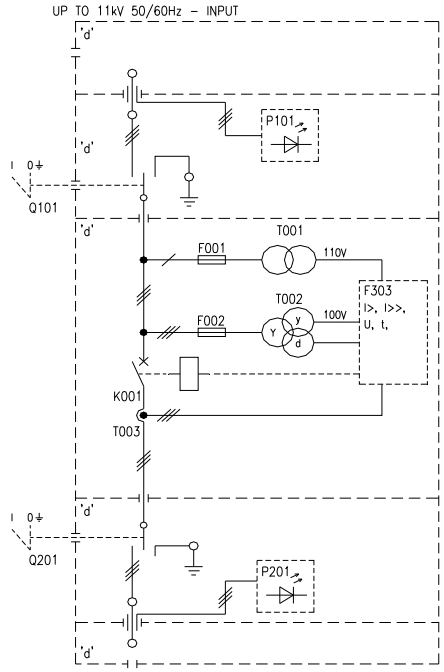
- SN54 – P1 input or coupling circuit breaker
- SN54 – P2 output circuit breaker

Main parts of power electrical circuits are incoming isolator with earth switch, the quick-release door mechanical and electrical interlock, circuit breaker and outgoing isolator with earth switch. The flameproof circuit breaker set SN54 has one auxiliary output 110VAC.

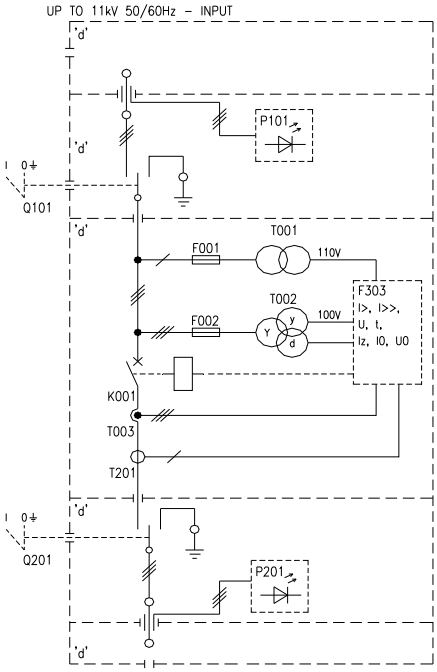
Electric circuits of circuit breaker set insure the following:

- short circuit and overcurrent protection,
- phase failure and phase asymmetry protection,
- earth fault protection *(used in output circuit breaker version only)*,
- directional earth fault protection *(used in output circuit breaker version only)*,
- earth fault lock-out protection *(used in output circuit breaker version only)*,
- pilot circuit protection *(used in output circuit breaker version only)*,
- remote intrinsically safe control,
- M.V. insulation test is operated on an outgoing power cable only before power circuit breaker switch-on. The injection voltage is a nominal 4000VDC *(used in output circuit breaker version only)*,
- indication of all operation and failure conditions and history saving. All items are displayed on 5.3" display.
- remote data transfer.

Input or coupling circuit breaker version



Output circuit breaker version



Technical data

Type	SN54
Nominal voltage	3 AC 10kV 50/60Hz
Total nominal current of circuit breaker	630 Amps.
Symmetric nominal off-switching current of circuit breaker	up to 31,5kA at 12kV
Nominal on-switching current (peak) of circuit breaker	up to 80kA at 12kV
Nominal current of busbar	630 Amps.
Maximum number of power inlets	3
Maximum number of switched/protected power outlets	1
Flameproof equipment marking	Ex M2(M1) Ex db [ia Ma] I Mb
IAC classification	BFLR 25kA/0,1s
Protection degree provided by enclosures	IP54
Total weight	2900kg

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FLAMEPROOF CONTACTOR SET WS-315.*.*

Contactor set WS-315.*.* is used to power the power electric motors built in danger explosion zones of methane and coal dust.

It is flameproof design is characterized by small dimensions and low weight, allows manual transport to the workplace. Built-in isolator switch has the function of changing the direction of rotation of the motor (R).

Contactor set has protected one or two main outlets and one auxiliary outlet (42V or 230V). Auxiliary outlet can be used to power auxiliary equipment or lighting local workplace. Control of the main outlets is realized by local buttons or remote intrinsically safe circuits.

Technical data

➢ Nominal supply voltage	(380,400, 440, 500, 660V) to 690V, (500, 1000, 1100V) to 1140V, 50/60Hz
➢ Max. current	315A
➢ Max. current of outlet	200A
➢ Voltage of auxiliary outlet AC	42V or 230V
➢ Power of auxiliary outlet	200 VA
➢ Ambient temperature	0°C ≤ Ta ≤ +40 °C
➢ Level of protection	IP65
➢ Marking of protection	Ex I M2(M1) Ex db [ia Ma] I Mb Ex I M2(M1) Ex db [ia op is Ma] I Mb
➢ Dimensions	650 x 350 x 650mm

Marking:
Contactor set **WS-315-^{*A}_^{*B}_^{*C*D}**

Option **(^{*A})**:
315 (200, 80) - nominal current of first outlet
R – reversing outlet

Option **(^{*B})**:
200 (80) - nominal current of second outlet
blank space – without second outlet

Option **(^{*C})**:
A – with isolator
B – with circuit breaker

Option **(^{*D})**:
A – for IT
B – for IT+TN
C – for TN

Order example
WS-315-200R-0-AB – Contactor set, nominal supply voltage to 1140V, one reversing outlet with max. current 200A, isolator, TN+IT.

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CONTACTOR SET SN10

Flameproof contactor set SN10 is intended for switching and protection of one three-phase asynchronous electric squirrel cage motors for voltage from 3x400V to 3x1140V in mains with an insulated ground connection or with the grounded junction, type SN10-P3/11 has one more supply circuit 230VAC/500VA for illumination.
It complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU. It is classified as an equipment group I category M2.

Explosion-proof equipment marking - Ex I M2(M1) Ex d e [ia Ma] I Mb

Description of design and equipment

The contactor set contains only one power outlet. It is equipped with a disconnector, one set of fuses and one vacuum contactor.
The outlet is fitted with an integrated motor protective relay RMI3 which watches the insulation state of the motor and its cable before on-switching, the integrity of protective conductor, the motor temperature, overload and short-circuit. The states of all protective circuits are indicated on an LCD display and the information from the LCD display can be transferred by means of an intrinsically safe converter EPPO1 (RS485) up to the aboveground work station.
The set can be controlled locally by means of pushbuttons on the doors of the equipment or remotely by means of intrinsically safe circuits or be controlled up pilot. For illumination there is the output 230VAC/500VA.

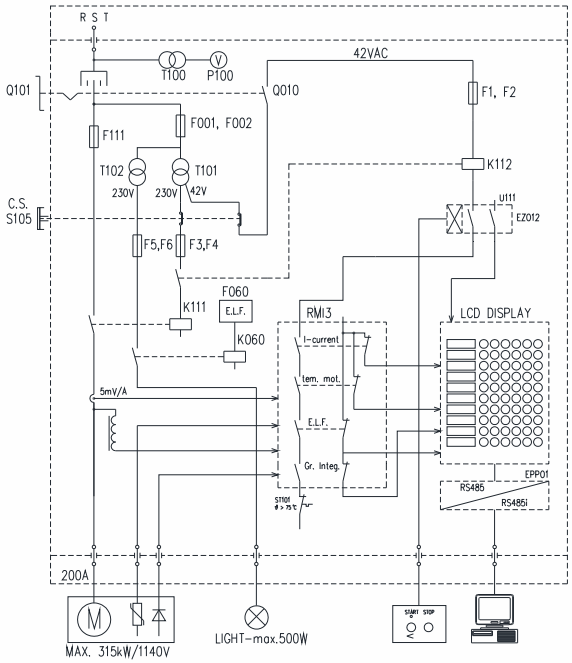
The set consists of three parts.
There is an instrumental compartment in the middle. It is executed as a flameproof welded enclosure with a quick-release door. On the flameproof enclosure there are two glass visors. Through the smaller visor you can see a voltmeter indicating supply voltage and through the other visor, on the door, you can see an LCD display which enables not only the indication of states of all relays, but also archiving of data and transferring of data among the follow-up connected systems. The protective relays are placed on the panel in the inner compartment of the case and are easily accessible.

Terminal compartments

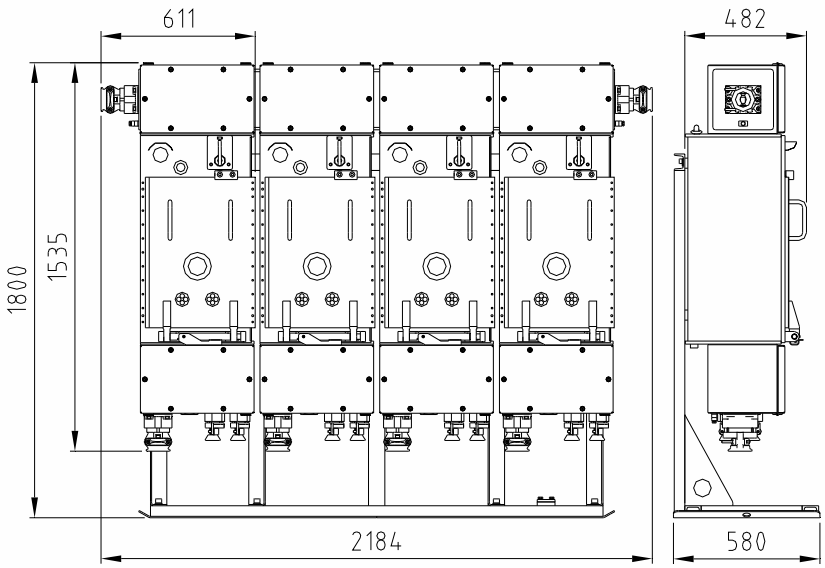
The safe type input terminal compartment is located in the upper part of the case. The set can be used for both, individual connection of the supply cable and connection to a battery (4pcs at maximum). The input terminal compartments are interconnected by means of busbars. It is possible to connect conductors of cross-section up to 120mm^2 to the connecting terminals of each power bushing. The terminal compartment is accessible after dismantling of the front cover.

The safe type output terminal compartment is located in the lower part of the case. Apart from power bushings which are also terminals for the connection of power cables to the motor the compartment is fitted with terminals for the connection of control, monitoring and transmission circuits.

Block diagram



Connection into battery of max. 4pcs



Safety lock

The control of the quick-release door is mechanically interconnected via an inner lock with a control shaft of the power reversing disconnector in such a way that it can be opened only if the disconnector is in the position OFF.

Technical data

➢ Operational parameters of set	
– nominal voltage	3 AC from 400V to 1140V, 50 or 60Hz
– nominal current	200A
➢ Vacuum contactors (EVS2.1/HR-VS160/HR-VS200)	
– nominal operational and isolation voltage	1200V
– nominal current	200A
➢ Current range (determined for installed electronic protection)	
– dependent protection (a-equipment)	2,1 - 200A)
– independent protection (n-equipment)	3 - 12xIn
– max. switched power output of electric motor	100kW/400V, 315kW/1140V (AC 4)
– power output fuses	315A (25kA)
➢ Flame-proof enclosure	
– Max. external dimensions	1535x611x482mm
– volume of instrumental box	128dm^3
– Max. section of the input cable	180mm2
– Max. section of the output cable	120mm2
– weight	265kg

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FLAMEPROOF CONTACTOR SET SN1

The contactor set SN1 is intended for switching and protection of maximum four three-phase asynchronous electric squirrel cage motors with reversing option. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU. It is designed for use in the supply mains 3/PE AC 500/660/1000/1100V 50Hz/IT.

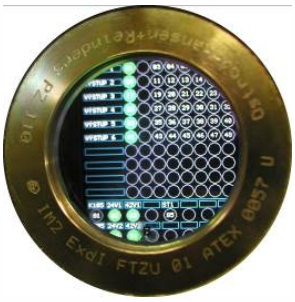
Power and control circuits can be connected as:

- controlled individually
- reversing connection (after internal connection modification)
- connection for switching dual speed electromotor (after internal connection modification)

Each outlet is equipped with an integrated motor relay RMI3, which integrates these protections for the motor:

- earth leakage relay prior to on switching
- pilot circuit monitor
- motor overheat (posistor)
- short circuit, overload, phase failure + timing relay

Description and equipment

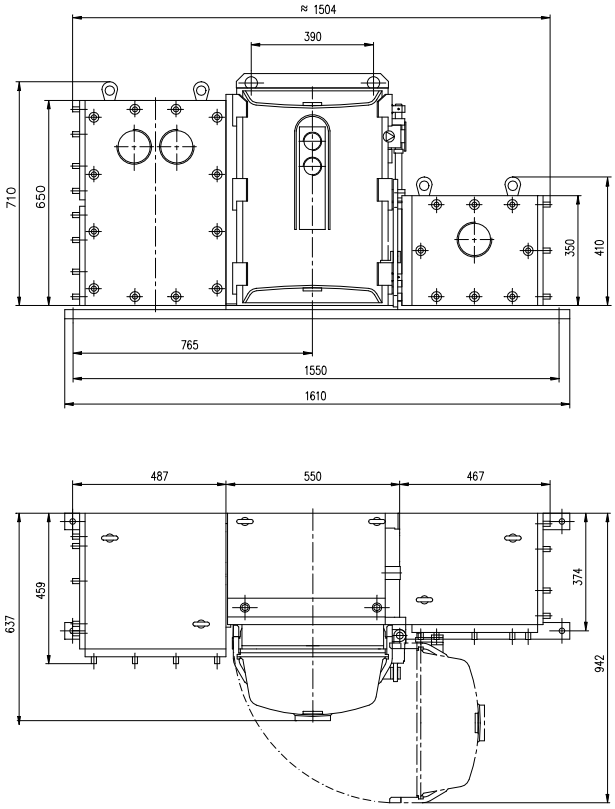


Contactor set SN1 is made as a flameproof enclosure and consists of three welded-design boxes. In the middle there is the main instrument box, which is made as a steel enclosure with door provided with a flap lock. It is furnished with input and output connection boxes for connection to external circuits. These boxes are screwed on the both sides of the main instrument box. Internal area of instrument box is accessible from the front side after opening of a flap lock, there is change-over isolator 1200V/500A in the upper part, vacuum contactors and fuses. In the flap lock door there is a sight glass PZ110 behind which there is a display ID1 for monitoring of contactors operation states, their control circuits, shutoff of protections and switch-on of control converters. Display ID1 further enables data archiving and data transfer among consecutive connected systems.

The set is also equipped with a transformer of output of max. 800VA and with output voltage of 230V for suply of lighting and signalling equipment.

Connecting compartment

The inlet supply cables (max. 4pcs) are connected to the bus-bar box on the right-hand side of the set. To the connecting terminals of e max ach power bushing wires having diameter of up to 120mm^2 can be connected. The bus-bar unit is accessible after dismounting the lid. Through the sight glass of the lid we can see a voltmeter indicating presence of supply voltage before the change-over isolator. The bus-bar box on the left-hand side of the set enables connection of two to four outlet cables of max. cross-section of conductors 95mm^2. A max. number of 6 control cables can be led out of the box. The lids are also modified to enable connection of apparatuses threaded with M48x2.



Safety lock

The control lever of the change-over isolator is mechanically locked by means of a locking mechanism of the quick-release door. This means that the box can be opened only in case the change-over isolator is in the zero position and the locking mechanism is unlocked (in position „0"). When working in an open closure no accidental contact with live parts can occur.

Technical data

- Operation parameters of the set
  - rated supply voltage ..... 3 AC 1100/1000/500V; 50Hz
  - rated current 450A
  - marking ..... Ex I M2(M1) Ex db [ia Ma] I Mb
  - number of power outlets ..... max. 4
  - protection IP54
  - weight 740kgA
- Vacuum contactors (HR-VS80):
  - rated operational an insulation voltage 1200V
  - rated current 80A
- Vacuum contactors (HR-VS160/HR-VS200):
  - rated operational an insulation voltage 1200V
  - rated current 160A/200A
- Vacuum contactors (HR-VS3/HR-VS4):
  - rated operational an insulation voltage 1200V
  - rated current 315A/400A
- Current range (determined by installed electronic protection RMI3 and converters corresponding to it:
  - dependent protection (a-release) ..... 33,3-400A without amplification (3,3 - 40A with amplification)
  - independent protection (n-releae) ..... 3 - 12In

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FLAMEPROOF CONTACTOR SET SN2

The contactor set SN2 is intended for switching and protection of maximum six three-phase asynchronous electric squirrel cage motors with reversing option. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU. It is designed for use in the supply mains 3/PE AC 500/660/1000/1100V 50Hz/IT.
The device is manufactured in different designs, which differ in connection of power part. Control part can be modified as per requirements of the customer.

Contactor connection

The contactor set is divided into two separate branches. Each of these branches is equipped with change-over isolator 1200V/500A and a set of fuses. Under the power fuses there are 4 - 8 pcs of vacuum contactors.

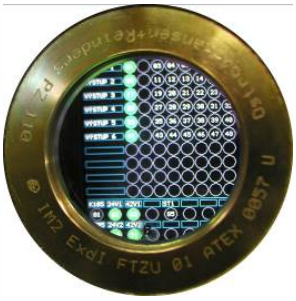
Power and control circuits can be connected as:

- controlled individually
- reversing connection
- connection for switching dual speed electromotor

Each outlet is equipped with an integrated motor relay RMI3, which integrates these protections for the motor:

- earth leakage relay prior to on switching
- pilot circuit monitor
- motor overheat (posistor)
- short circuit, overload, phase failure + timing relay

The instrumental compartment of the contactor set is executed as an flameproof welded steel enclosure equipped with a quick-release door. In the flap lock door in the left position there is a sight glass PZ110 behind which there is **ID1** display for monitoring of contactors operation states, their control circuits, shutoff of protections and switch-on of control converters. Display **ID1** further enables data archiving and data transfer among consecutive connected systems. In the right position there is a brass head with three pushbuttons for display control mounted through a reducer.



The protection relays are located in the control panel on the internal door space and they are easily accessible.
The set is also equipped with a transformer of output of max. 800VA and with output voltage of 230V for supply of lighting and signalling equipment.

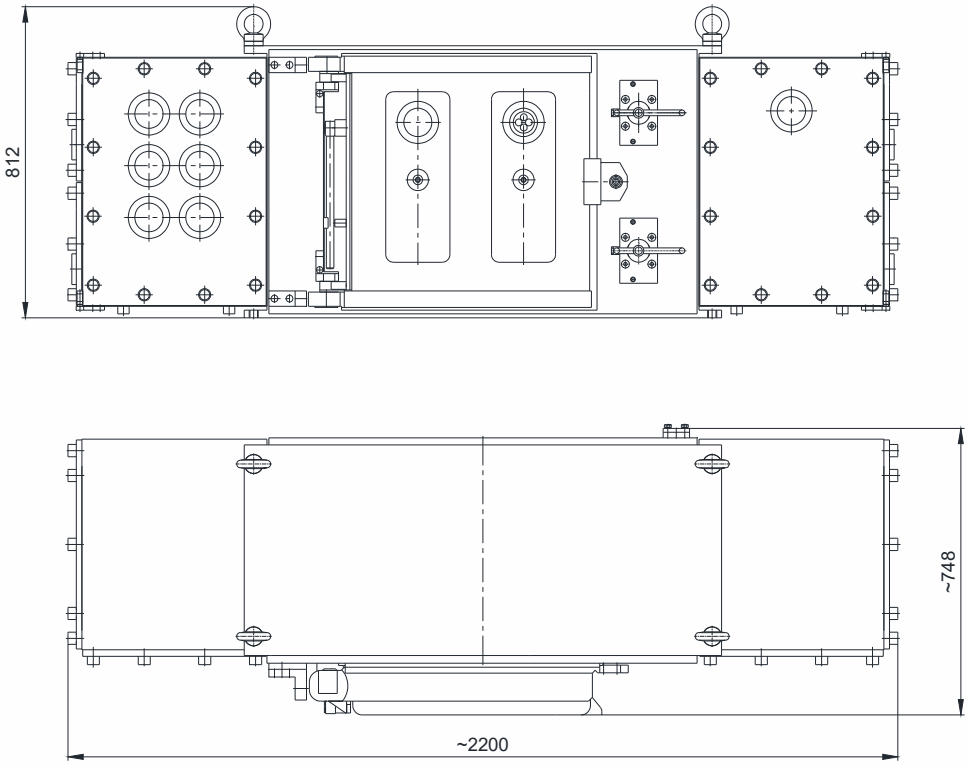
Connecting compartments

The inlet suply cables (max. 4 pcs) are connected to the bus-bar box on the right-hand side of the set. To the connecting terminals of each power bushing wires having diameter of up to 120mm^2 can be connected. The bus-bar unit is accessible after dismounting the lid. Through the inspection hole of the lid we can see an analogous voltmeter indicating presence of the networks supply voltage. The bus-bar box on the left-hand side of the set covers terminals of power bushings for interconnection of two to four output cables of max. cross-section of conductors 120mm^2.

Besides this the box is equipped with terminals for control and watching circuits.

Safety lock

The control of quick-release door is mechanically interconnected by means of internal lock with control shaft of the power changeover isolator in such a way that it can be opened only in case the power changeover isolator is in the off-position.



Technical data

➢ Operation parameters of the set	
– rated supply voltage	3 AC 500V/660V/1000V/1100V, 50Hz
– total rated current	800A
– marking	Ex I M2(M1) Ex db [ia Ma] I Mb
– number of power outlets	max. 6
– protection	IP54
– weight	1450kg
➢ Vacuum contactors (HR-VS80/HR-VS200/HR-VS3/HR-VS4)	
– rated operational and insulation voltage	1200V
– rated current	80A/200A/315A/400A
➢ Current range (determined by installed electronic protection RMI3 and converters corresponding to it):	
– dependent protection (a-equipment)	33,3-400A without amplification (3,3 - 40A with amplification)
– independent protection (n-equipment)	3 - 12xI_n

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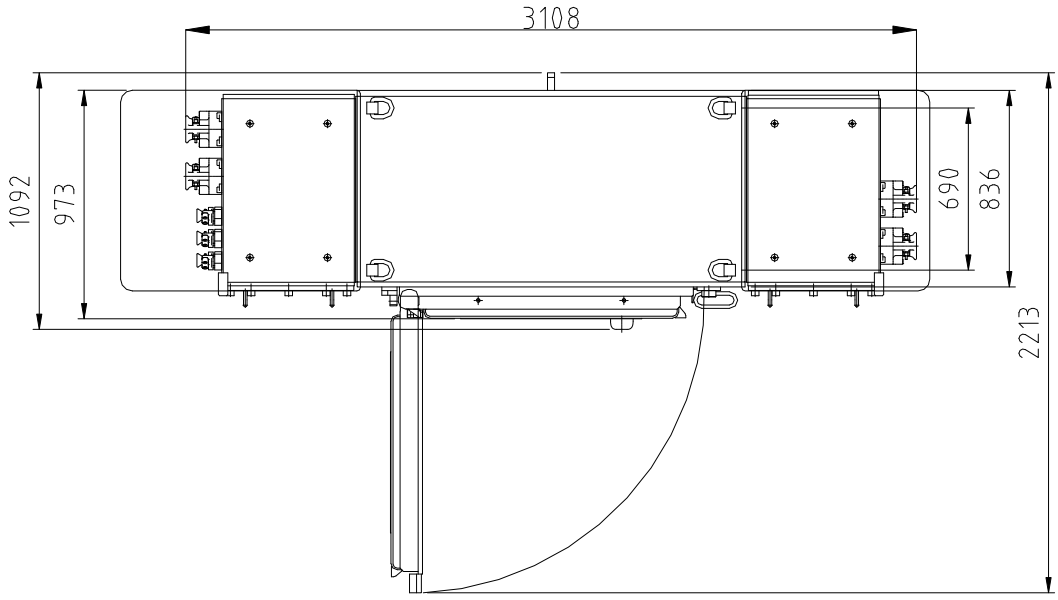
FLAMEPROOF CONTACTOR SET SN23-P2

Flameproof contactor set SN23-P2 serves as remote power switching, controlling and protection of three-phase asynchronous electro motors and supplying of lightning in potentially explosive atmospheres of mines. It is classified as the equipment of group I category M2.

The contactor set has a protection against explosion Ex I M2(M1) Ex d ib [ia Ma] I Mb. This product complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU. It also complies with requirements of EN 60079-0, EN 60079-1 and EN 60079-11.

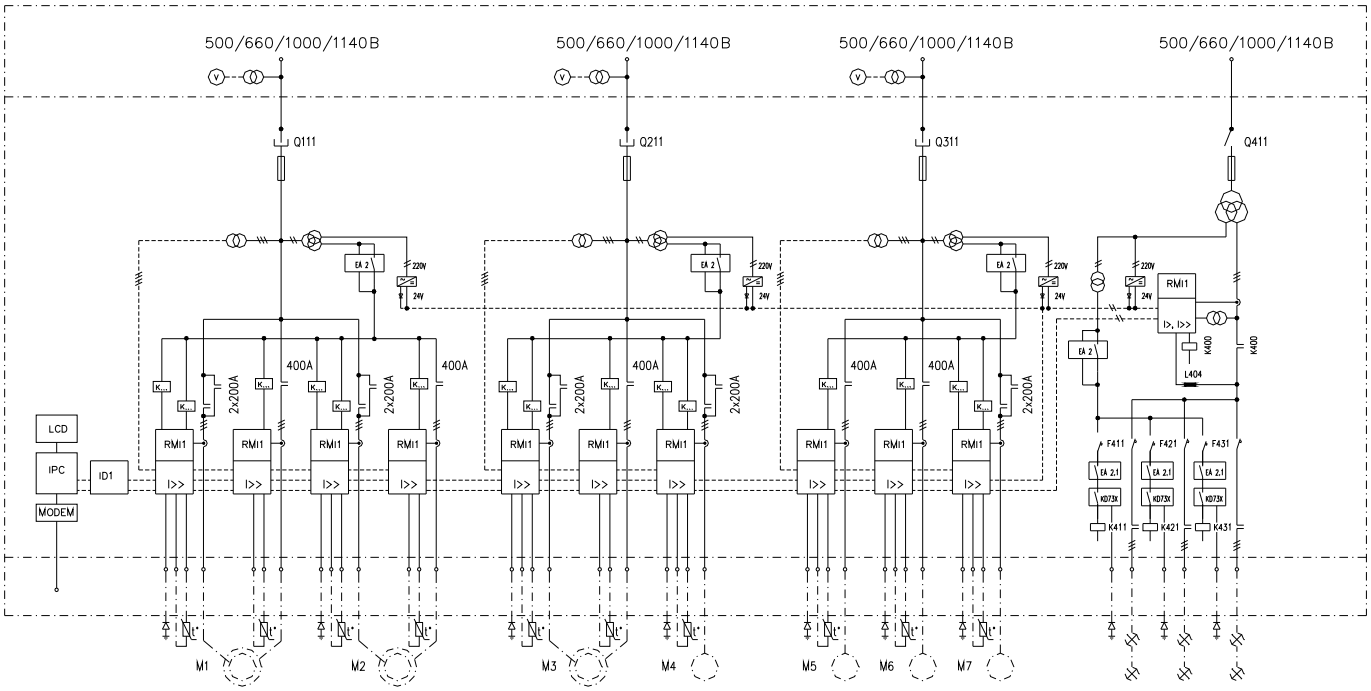


Electrical circuits of a contactor set provide independently for each power outlet of 1000/1100V or 127/230V:

- shutdown during short-circuit and short-circuit indication,
- protection from thermal effects of overloads and overloads indication,

- shutdown at phase failure and phase asymmetry and tripping indication,
- switch off by thermistor relay when the temperature of electromotor increases above allowed limit,
- blocking of switching on while decreasing insulating resistance of power outlets under 100kΩ and tripping indication,
- shutdown of supplying while decreasing insulating resistance of power outlets under 50kΩ and tripping indication,
- blocking the operation at the event of protective conductor increasing over 50 Ohm and tripping indication

The set is equipped with industrial PC which serves for monitoring and parameterization of digital protections of the set, saving parameters of the protections, measuring values, operating and faulty conditions. All the information is possible to transmit by I.S. separators to a remote working place. The industrial PC has a I.S. keyboard, I.S. mouse and 12" screen. It is possible to add optical output and the voice communication (VoIP) via Ethernet.



Technical data:

- Nominal voltage ..... 3 AC 500(660)/1000(1140V), 50Hz
- Nominal continuous current 1000A
- Number of switched/fused power outlets 10
- Type of protection against explosion..... Ex I M2(M1) Ex d ib [ia Ma] I Mb
- Nominal continuous current of power outlets:
- 10 outlets with vacuum contactor..... 200/400A
- 3 outlets 127/230V 20/6/6A
- Total weight..... 3350kg

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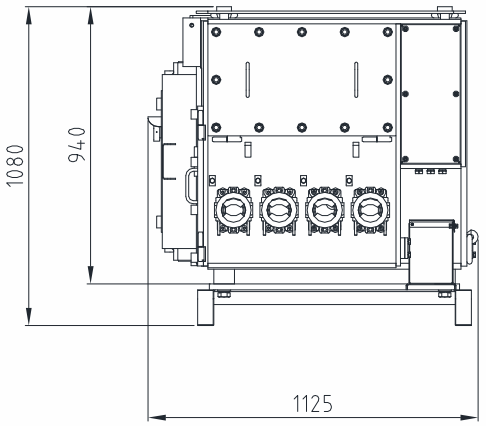
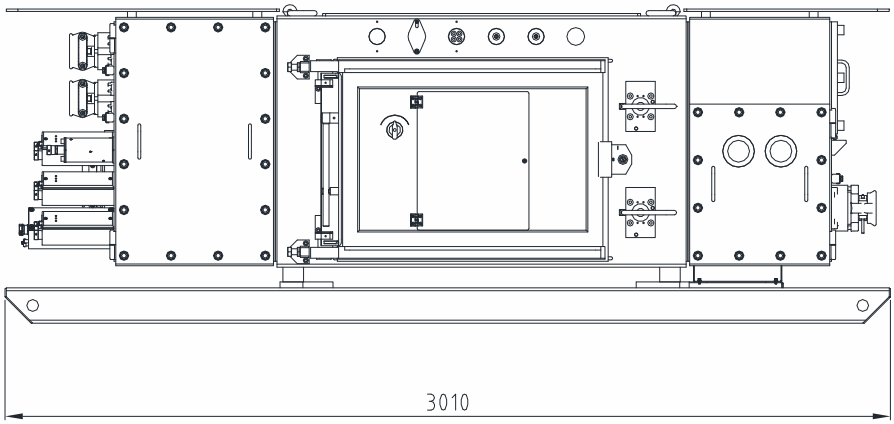
FLAMEPROOF CONTACTOR SET SN43

Flameproof contactor set SN43 serves as remote power switching, controlling and protection of three-phase asynchronous electro motors and supplying of lightning in potentially explosive atmospheres of mines. It is classified as the equipment of group I category M2.

The contactor set has a protection against explosion Ex I M2(M1) Ex db ib [ia Ma] I Mb or Ex I M2(M1) Ex db ib [ia op is Ma] I Mb. This product complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU (NV 116/2016 Coll.). It also complies with requirements of EN 60079-0, EN 60079-1 and EN 60079-11



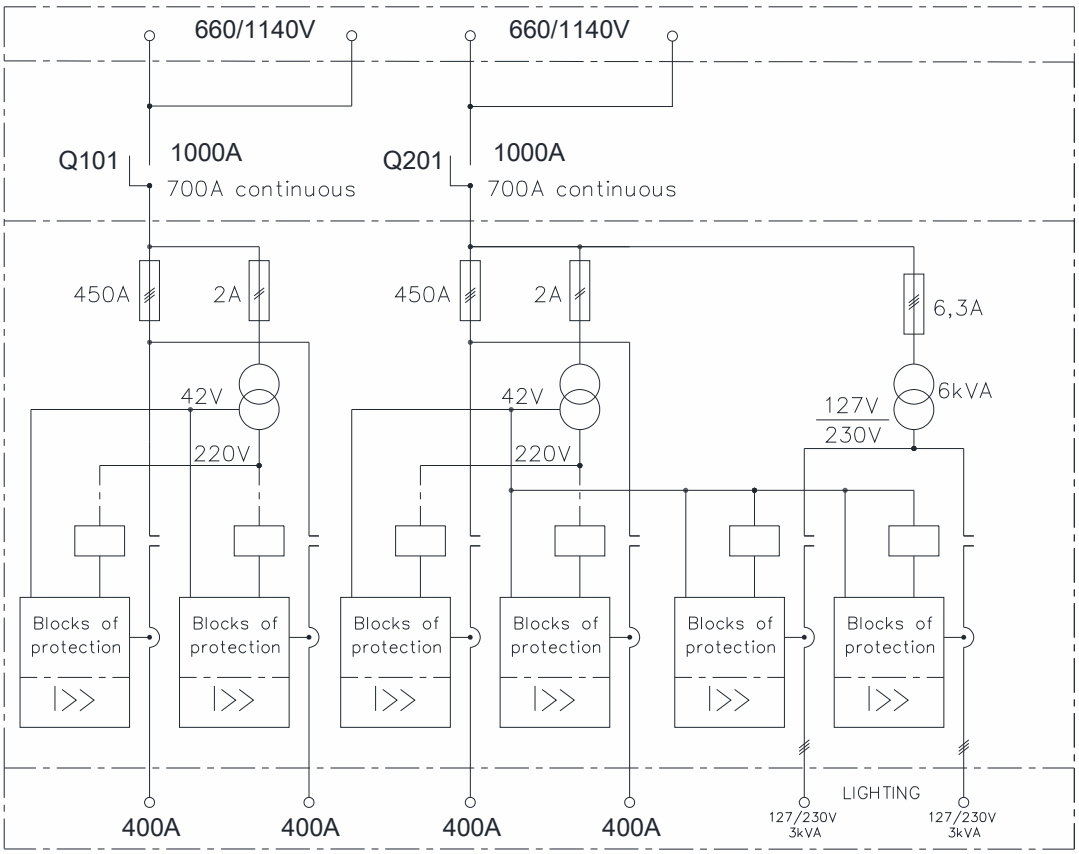


Electrical circuits of a contactor set provide independently for each power outlet of 1000/1140V or 127/230V:

- shutdown during short-circuit and short-circuit indication,
- protection from thermal effects of overloads and overloads indication,

- shutdown at phase failure and phase asymmetry and tripping indication,
- switch off by thermistor relay when the temperature of electromotor increases above allowed limit,
- blocking of switching on while decreasing insulating resistance of power outlets under 100kΩ and tripping indication,
- shutdown of supplying while decreasing insulating resistance of power outlets under 50kΩ and tripping indication,
- blocking the operation at the event of protective conductor increasing over 50 Ohm and tripping indication

The set is equipped with industrial PC which serves for monitoring and parameterization of digital protections of the set, saving parameters of the protections, measuring values, operating and faulty conditions. All the information is possible to transmit by I.S. separators to a remote working place. The industrial PC has a I.S. keyboard, I.S. mouse and 12" screen. It is possible to add optical output and the voice communication (VoIP) via Ethernet.



Technical data:

- Nominal voltage ..... 3 AC 550/1000 or 660/1140V, 50Hz
- Nominal continuous current..... 900A
- Number of switched/fused power outlets.....6 (4x 400A, 2x 12A lighting)
- Type of protection against explosion .....I M2(M1) Ex db ib [ia Ma] I Mb or Ex db ib [ia op is Ma] I Mb
- Nominal continuous current of power outlets:
- 4 outlets with vacuum contactor .....max. 4x 350A/200A
- 2 outlets 127V/230V 2x 3kVA
- Total weight.....3000kg

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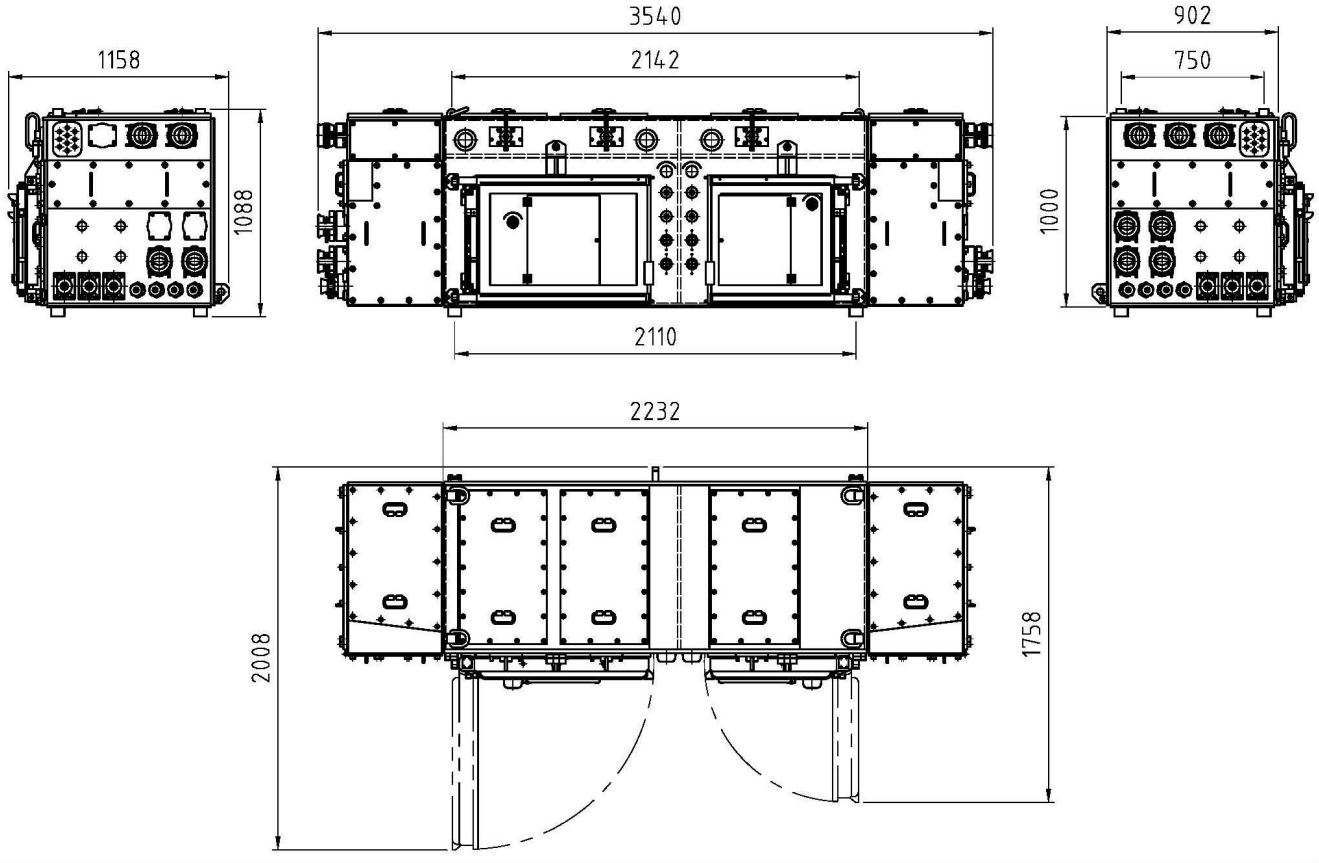
FLAMEPROOF LOAD CENTER SN32

Flameproof load center SN32 serves as remote power switching, controlling and protection of three-phase asynchronous electro motors in potentially explosive atmospheres of mines. It is classified as the equipment of group I category M2.

The contactor set has a protection against explosion Ex I M2(M1) Ex d ib [ia Ma] I Mb. This product complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU. The product also complies with technical requirements EN 60079-0, EN 60079-1 and EN 60079-11.



Electrical circuits of a contactor set provide independently for each power outlet:

- shutdown during short-circuit and short-circuit indication,
- protection from thermal effects of overloads and overloads indication,
- shutdown at phase failure and phase asymmetry and tripping indication,
- switch off by thermistor relay when the temperature of electromotor increases above allowed limit,
- blocking of switching on while decreasing insulating resistance of power outlets under 100kΩ and tripping indication,
- shutdown of supplying while decreasing insulating resistance of power outlets under 50kΩ and tripping indication,
- blocking the operation at the event of protective conductor increasing over 50 Ohm and tripping indication

The set is equipped with industrial PC which serves for monitoring and parameterization of digital protections of the set, saving parameters of the protections, measuring values, operating and faulty conditions. All the information is possible to transmit by I.S. separators to a remote working place. The industrial PC has a I.S. keyboard, I.S. mouse and 12" screen. It is possible to add optical output and the voice communication (VoIP) via Ethernet.

Inside of Flameproof load center is used high technology quick changing module system – type MS6F, MS5 and MS7. One module has inside vacuum contactors, power transformers, fuses, current sensors, auxiliary relays, varistor blocks, and the measuring chokes, two integrated protections RMI3. Time for changing module during work process less than 5 minutes thanks to quick run in contacts technology.

All protections, vacuum contactors and modules, used inside flameproof load center are designed and produced by Hansen Electric's specialists.

Technical data:

- Nominal voltage ..... 3 AC 660/1140V, 50Hz
- Rated continuous current ..... summary 1400A
- Number of switched/fused power outlets 12 (1x 315A, 10x 200A, 1x 80A)
- Type of protection against explosion ..... Ex I M2(M1) Ex d ib [ia Ma] I Mb
- Nominal continuous current of power outlets:
  - 2 outlets with vacuum contactor 450A
  - 10 outlets with vacuum contactor (from this 4 outlets are reversible) 200A
  - 2 outlets 127/230V, 5kVA for lighting .....
- Total weight 4200кг

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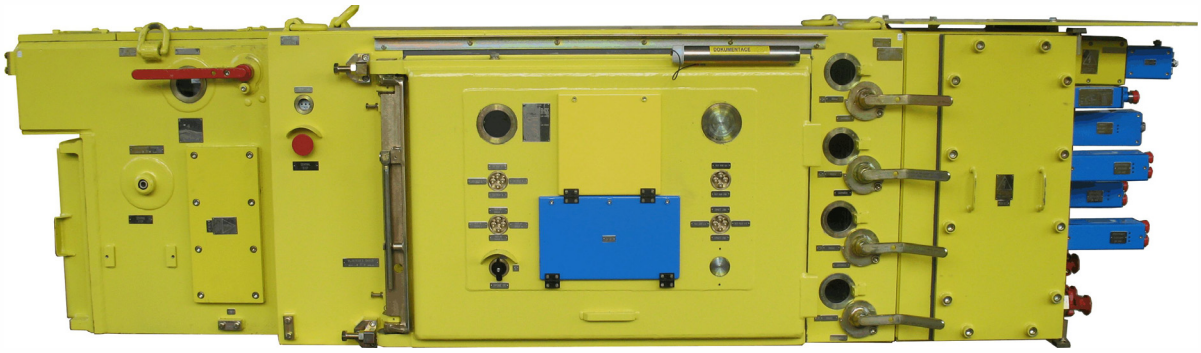
FLAMEPROOF CONTACTOR SET SN20-P02, P02/01, P02/02

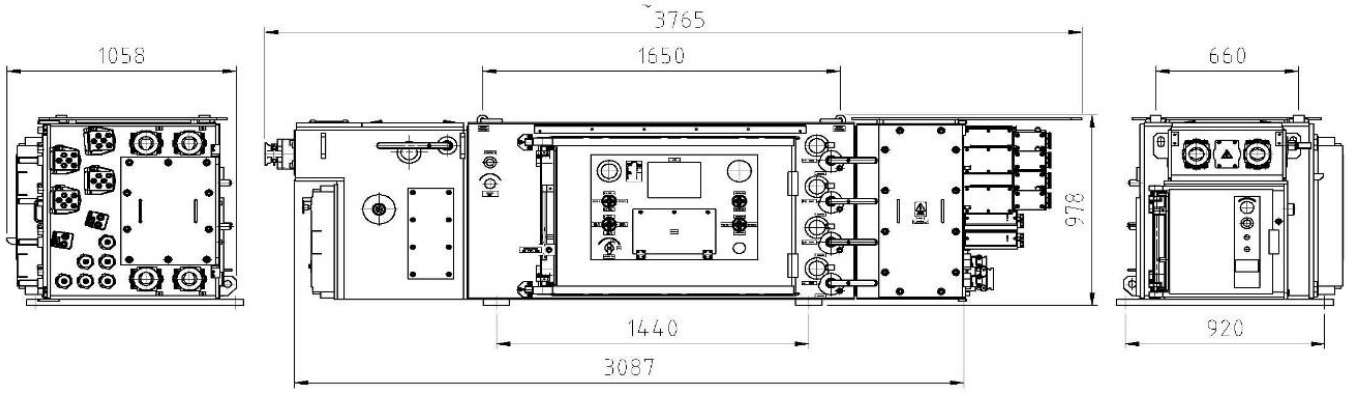
The flameproof contactor set series SN20 is determined for power switching, control and protection of up to four explosion-proof three-phase asynchronal electric motors of mining machinery drives and feeding of lightning. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines. It is classified as being intrinsically safe equipment group I category M2. This device is designed for use in the supply mains 3/PE AC 3300V 50Hz/IT.



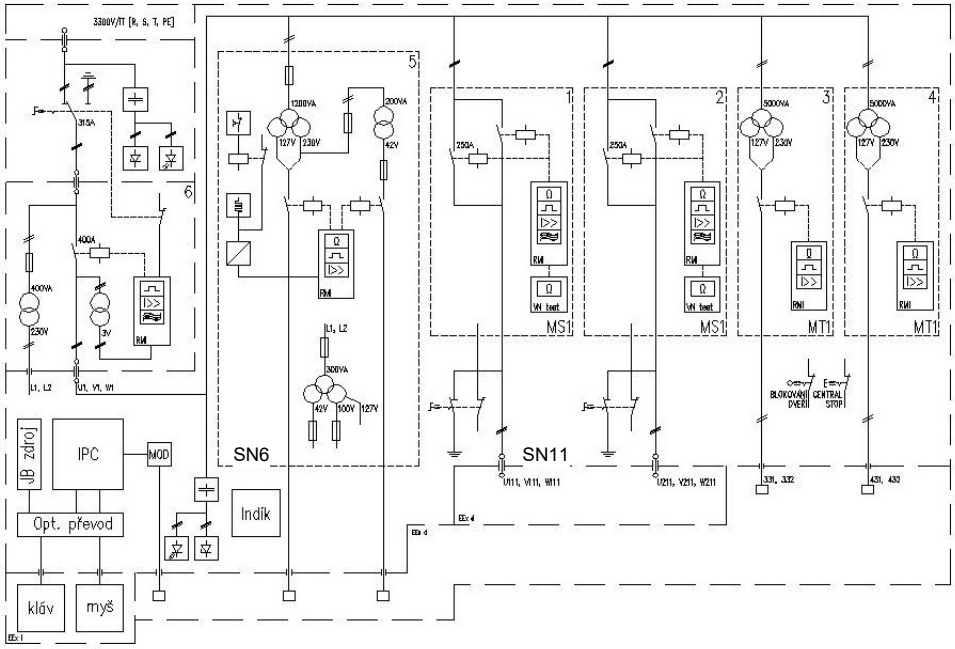
The contactor set has a protection Ex I M2(M1) Ex d ib [ia Ma] I Mb. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU. It also complies with technical requirements according to EN 60079-0, EN 60079-1, EN 60079-11.

Electrical circuits of a low voltage part provide independently for each power outlet of 230V or 3300V:

- shutdown during circuit and signaling circuit,
- protection against thermal effects and signalling overcurrents,
- shutdown at phase failure and phase assymetry and signalling equipment,
- blocking of switching on while decreasing insulating resistance of power outlets and signalling equipment,
- shutdown of feeding while decreasing insulating resistance of power outlets and signalling equipment.



- blocking while interrupting or increasing resistance of grounding circuit more than 50Ohm and signalling equipment,
- supervising condition of the insulation of the cabels while they are switched off by integrated tester of direct voltage 3kV.
- supervising condition of the cables while they are switched on by relay UP6.



The set is equipped with industrial PC which is designated for monitoring and parametrization of digial protection of the set, storing parameters of protection, measured values, operating conditions and faults. All the information is possible to trasmit by I.S. converters to a distant place. The industrial PC has I.S. keyboard, I.S. mouse and 12" screen. It is possible to add optical output and voice comunication (VoIP) via Ethernet.

The set of contactors SN20 is manufactured in three versions:

Version	Number of outputs 3300V (frame MS1)	Number of outputs 230V/127V (frame MT1)
P02.1	4	-
P02.1/01	3	1
P02.1/02	2	2

Technical data:

- Operational parameters
  - Nominal voltage .....3 AC 3300 V, 50÷60 Hz
  - Nominal continuous current.....315 A
  - Number of power outputs 3AC 3300V ..... max. 4
  - Nominal continuous current of power outputs .....250 A
  - Number of outputs 2AC 230V/127VB – 5kVA..... max. 2
  - Nominal continuous current of outputs.....21/39 A
  - Weight..... 3450 kg
- Auxiliary voltage and control voltage
  - 2AC 230V/127V – 1,2kVA.....5,2/9,4 A
  - 2AC 42V.....50 VA

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FLAMEPROOF SET FOR SOFT START OF ELECTRIC DRIVES EZSO1, EZSO2

It is a contactor set fitted with two thyristor regulators which are controlled by means of microprocessors and used to control soft starting, soft run-out and DC braking of asynchronous squirrel-cage electric motors. After the set-up starting time the contactor closes a BYPASS which serves as a bridge over the thyristor unit and puts it out of operation. After that the apparatus performs the role of a contactor set.

Individual working parameters of the drive, e.g. starting time, maximum starting current, DC braking, braking current, maximum short-circuit current and nominal current of the motor are set up by means of a keyboard or using a PC via series circuit wiring. They are stored in the microprocessor memory even after their disconnecting from the supply mains. The control microprocessor also carries out complete diagnostics of operational and emergency states appearing on the display. The emergency states are stored in an energetically independent microprocessor memory.

Main advantages of the set use:

- decrease in mechanical load of drives and removal of mechanical impulses resulting in longer lifetime of the mechanical units,
- when used with belt conveyors no slipping between the belt and driving drum of the conveyor - longer lifetime of belts,
- operation of complex starting conveyor drives operating with single-speed electric motors and without hydraulic clutches – reducing initial costs,
- possibility of DC braking of conveyor drives electric motors – reducing wear of mechanical brakes of conveyors, removing mechanical impulses,
- reduction of excessive voltage oscillating in the supply mains at the start.

Technical description

The device enables feeding of 4 (2) electric motors at maximum whose total power output is 250kW/1000V AC. The device enables reversing of the drive and does not require use of other auxiliary contactors. If necessary, it is possible to run the device only in the BYPASS mode (thyristor unit bridged with a contactor).
The product complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU. It is classified as being intrinsically safe equipment group I category M2.

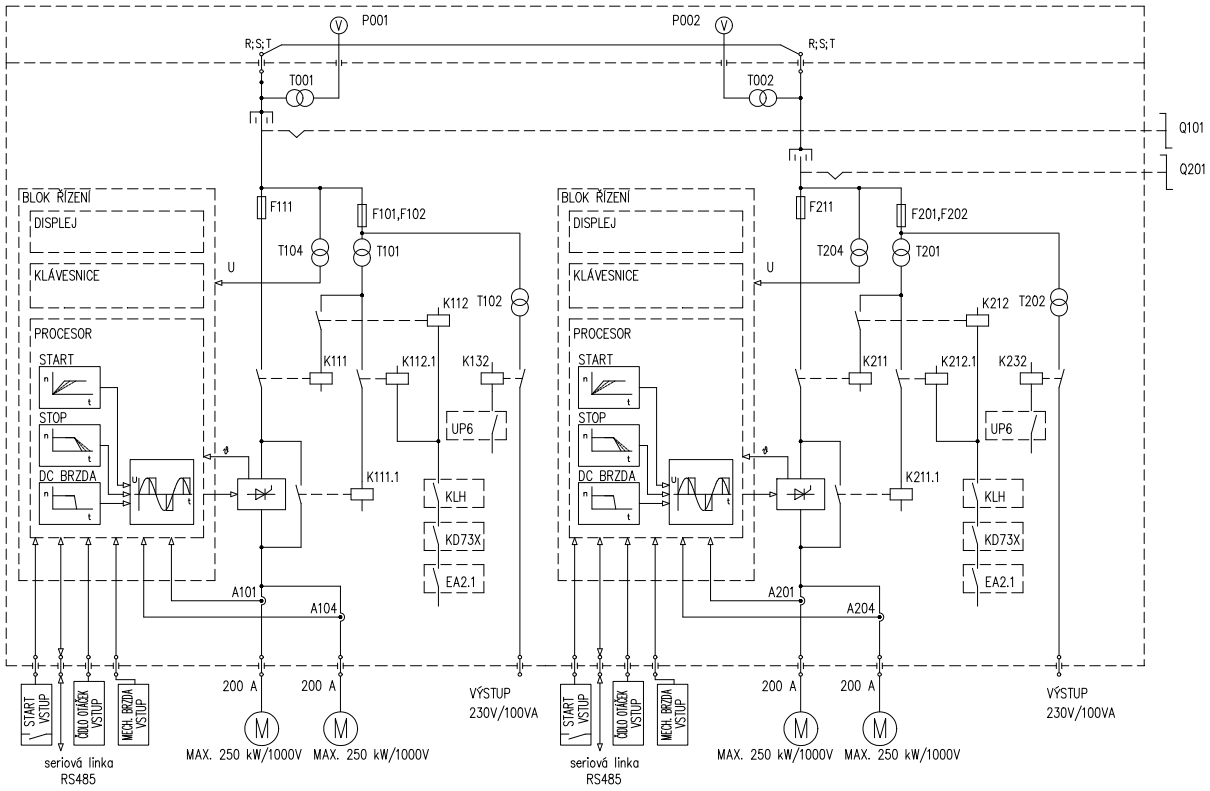
The device contains the following kinds of protection:

- control by means of microprocessor for protection:
  - maximum current protection (short-circuit) and protection against overload,
  - monitoring of supply voltage limit values, current asymmetry and supply voltage phase drop-out,
  - monitoring drive revolutions in its individual operational modes,
- protection for insulation control of all external circuits,
- protection for earthing conductor control,
- protection for control of tolerable temperature of electric motors that are supply.

The device also enables

- limitation of maximum starting and braking current,
- continuous measuring and displaying of output currents, supply voltage, temperature of cooling system with power output units, air temperature inside the contactor set, drive revolutions on the display,
- testing tyristors, testing short circuit, testing overload,
- control of mechanical brake of belt conveyor,
- combination with automatics of conveyor transport APD1, producer Hansen Electric, spol.s r.o., Co.,
- cascade connection arrangement of several starters for realization of soft starting of belt conveyor with several drives,
- communication (visual) with a remote working place (e.g. PC) by means of series circuit wiring.

EZSO1 P04 - Block diagram



KLH	thermistor tipping relay	EA2.1	earth leakage relay (1000/500V)
KD73X	pilot circuit monitor relay	UP6R	earth leakage relay (220V)

Technical data

Type		EZSO1		EZSO2	
Nominal supply voltage		500/1000V AC, 50Hz			
Outputs		Current	Motor 500 or 1000V	Current	Motor 500 or 1000V
	max.	4x200A	4x125 or 250kW	2x200A	2x125 or 250kW
	or max.	2x400A	2x250 or 500kW	1x400A	1x250 or 500kW
Starting	starting time	1 ÷ 25sec			
	Boost (initial current jump)	range 0 ÷ 80%Un, length of current jump time 0,1 ÷ 5sec			
DC braking	- DC braking time	1 ÷ 25sec			
	boost (initial current rise)	range 0 ÷ 99%Un, onset speed 1 ÷ 5sec			
Closing unit		vacuum switch 1200V AC/400A			
Max. current limitation (starting, brak)		4x1500A or 2x3000A		2x1000A or 1x2000A	
Explosion-proof equipment marking		Ex I M2 Ex db [ib] I Mb			
Clearance capacity / Weight		2550x795x760mm/1450kg		1920x884x680mm/830kg	

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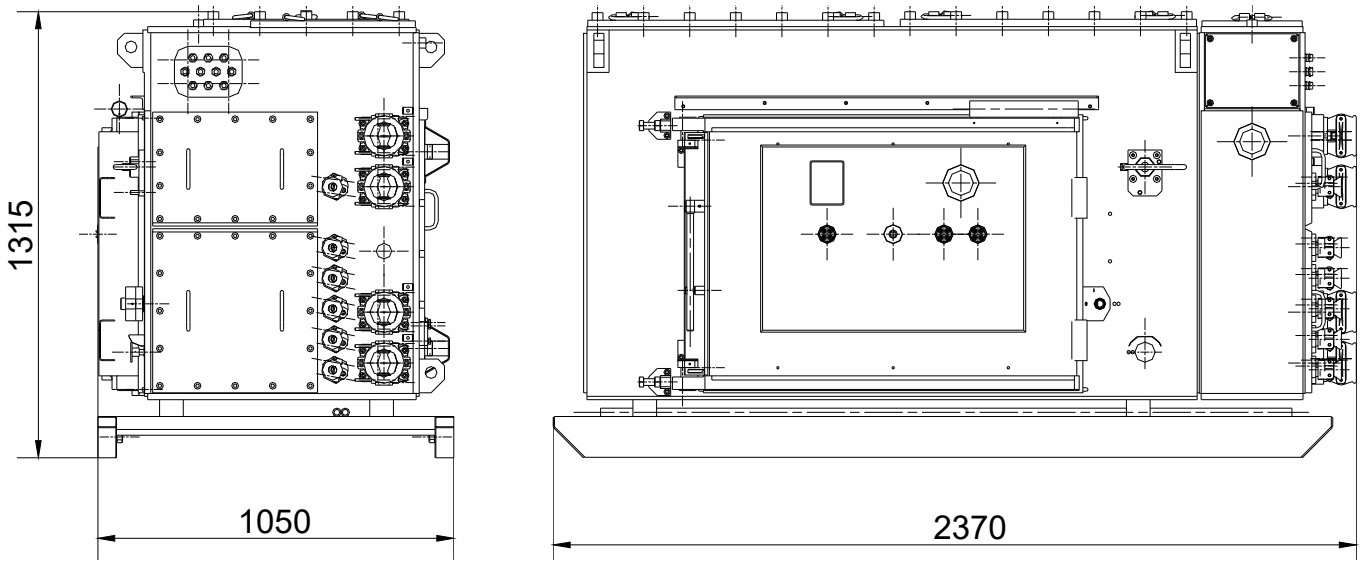
FLAMEPROOF RECOVERY FREQUENCY INVERTER EZMK35-630-1R, EZMK35-315-2R

Water-cooled frequency inverters with a pulse width modulation output voltage, it is produced in the explosion-proof equipment for mines. Inverter is used for fluid control drive or speed control of three-phase asynchronous electric motors with squirrel cage, and it is particularly suitable for drives with frequent starting, braking and changes the direction of rotation. Inverter allows recovery of energy from over synchronous engine speed back to the mains.

The product meets the technical requirements for equipment intended for use in potentially explosive atmospheres in accordance with Directive 2014/34/EU (NV 116/2016 Coll.).

Frequency inverter for Mines EZMK35-…-.R type is based on new technology water cooled power components and it is placed in flameproof enclosure. Equipment has a protection against explosion Ex I M2(M1) Ex d [ia Ma] I Mb. Main box is made as a steel enclosure with door provided with a flap lock. On the right side of the chassis is located busbar box, common to supply inputs, output and control cables. Power of the frequency converter is placed on the construction of the water cooler. Control circuit frequency inverters, protection and application circuits are three separate panels, allowing easy replacement. Control of frequency inverter is solved voltage 42V, 50Hz and intrinsically safe inputs.



Application:

- pump and fan drives and other
- drives conveyor belt speed control¬ with
- drives overhead tracks with endless¬ rope
- rail transport with electric¬ locomotives
- drives¬ winches
- drives travel mining harvesters

Technical data

Nominal supply voltage	3/PE AC 950-1140V 50Hz, -15% to +10%
Nominal output current I_n EZMK35-315-2R	2×215*A*
Nominal output current I_n EZMK35-630-1R	1×430*A*
Frequency of output voltage	4 ÷ 120*Hz*
Type of modulation of output voltage	PWM
Unit Type	voltage
Cooling	water cooling – 2l/min in nominal load 100% In
Overload	150% In for 1 min.
Engine Braking	recovery in the supply network
Marking flameproof electrical equipment	Ex I M2(M1) Ex d [ia Ma] I Mb
Dimensions	2370x1315x1050mm
Weight	3500kg
Type transistor in the inverter bridge	IGBT
Type of the control¬ converters	U/f; OPEN LOOP VECTOR
Setting	programming parameters from the keyboard
Protection against network downtime	All operating parameters are stored in memory, they are reproducible and protected against network downtime
More Protection	against voltage surges and power networks, against current overload and short circuit output

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AUTOMATICS OF CONVEYORS APD1

The automatic control system for conveyors APD1 is a microprocessor control system designed for central control of conveying in underground and open pit mines. The whole system is classified as being intrinsically safe equipment group I category M2/M1. This product complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU.

Main system functions

- program control, regulation and parameterization of conveyor lines or other machines
- emergency stop (blocking) of machinery
- speech communication along lines
- signalling including transmission of warning signals before re-starting
- monitoring and visualization of the whole mucking process
- data archiving
- easy diagnostics of the whole system and localization of failure from control station on surface or in mine
- access from intranet and internet

APD1 system units

- Central station SC1
- Conveyor station SD1,SD2
- Supply sources OZ2, OZ3
- Speech amplifier OPZ1 P3,P4,P5
- Locking key OKB1 P2, P5
- Interlock transmitter OPB1 P1,P3,P4
- Deviation sensor SO1 P1
- Temperature sensor ST1
- Telephone converter TP1 P3
- Speed sensor SR1

Central station SC1

This is a surface workstation equipped with a common personal computer of IBM standard Pentium Celeron 900 and higher. With the help of the supplied software the communication runs along with the conveyor stations. All diagnostic information is accessible on-line for participants of either the Intranet or Internet. All information is stored in files, which can be viewed by other users of the Intranet as well as Internet. SC1 enables setting up configuration and branching of conveyor lines, their control, parameterisation, diagnostics, localization of failure or defect and others. The communication program is sufficient for simultaneous connection of 18 individual conveyor lines at maximum. The maximum connectable number of conveyors is 465. Along with the communication program the visualisation program runs simultaneously. It enables to display the whole mucking process graphically. The visualization program can be started at other stations of the computer network or Internet.

Conveyor station SD1 P2

It enables control and regulation of the conveyor, transfer of information to the Station of central and calling connection. The system can be parameterised, diagnosed and it can easily localise failure thanks to its display and editing push buttons. The station is equipped with an emergency stop button.

Main technical parameters

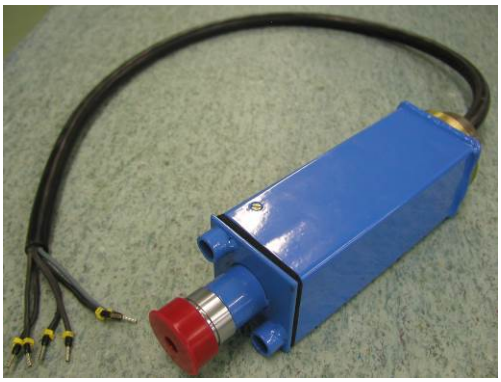
- Nominal supply voltage ..... 9V/200mA - CPU part
  ..... 12V / 1.4A – input/ output circuits
- Marking ..... Ex IM1 Ex ia Ma
- Input circuits (max. 12V/5mA) ..... 18 analogue according to NAMUR standard
  ..... 4 counting
  ..... 2 voltage
- Output circuits ..... 2 for switching contactors by converter with loop current checking
  ..... 5 relays – for switching intrinsically safe valves
- Communication ..... 2 serial interfaces RS 485

Conveyer station SD2 P1

It has the electronics of two SD1 P2 inside. It has more buttons than SD1 P2 and two displays greater than SD1 P2. It can control AFC, stage loader and crusher together.

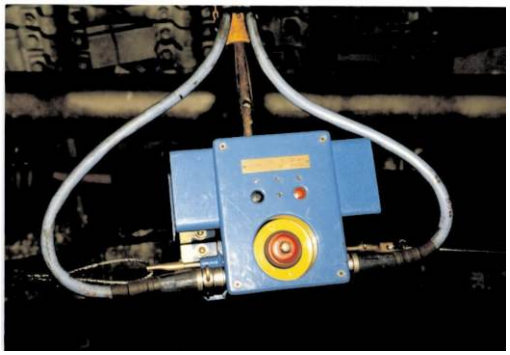
Telephone converter TP1 P3

It serves for transmission of data information and the speech communication signal between 2 intrinsically safe circuits or intrinsically safe circuits and unprotected circuits, and also ensures their galvanic separation. It is designed for installation instead of bushings at the telephone junction box. On cable side is a screw M48x2. Supply voltage for the intrinsically safe side of the circuits is 12V/60mA. Flameproof protection is Ex IM2(M1) Ex d mb [ia Ma] I Mb.



Speech amplifier OPZ1 P5

It enables speech communication along the conveyor line as well as transmission of warning signals and evaluation of the state of two connected sensors (instead 1 sesor could be connecteg 2 outputs). It is equipped with an emergency stop-locking button. With the help of a tie-rod and continuous steel stranded wire it is possible to lock the conveyor from any place along the conveyor. Information about locking place is transmitted to the Conveyor station and Central station where it is displayed. The amplifier is supplied from the conveyor central station (12V/27mA). Flameproof protection is Ex IM2/M1 Ex ib/ia I Mb/Ma.



Locking key OKB1 P2

It is equipped with an emergency stop locking button and tie-rods with steel stranded wires. On pulling the continuous steel stranded wire it is possible to lock the conveyor from any place along its length. The key is supplied from the conveyor station and its flameproof protection is Ex IM1 Ex ia Ma.

Interlock transmitter OPB1 P3

It serves for the switching of 2 contactors on flameproof side. The outputs are controled by data telegrams from the Conveyer station (IS side) and are inside serial coupled on contacts of emergency circuit. The transmitter has 3 inputs for AC voltage 16 – 51 V and 2 inputs for measuring of curent from curent transformer 300A/5A. The transmitter has also serial port RS 485 for kommunikation with device inside of flameproof box. Supply voltage from flameproof side is 42/24V AC, from IS side 12 V DC from the Conveyor station. It is designed for installation by screwing on the flameproof box. On cable side is a screw M48x2.

Deflection sensor SO1

It is an element indicating deflection from the vertical position. When the sensor is deflected from its vertical position as a result of external force influence, its output electric circuit turns over (upsets) as soon as the allowed deflection is exceeded. The external force can be induced for example by material transported on the belt conveyor or by a conveyor's belt deflected from its track. It is possible to use the sensor for reading the presence of rock on the belt, for monitoring conveyor chutes or for preventing the belt from its deflection. The deflection sensor is supplied from the Conveyor station and its flameproof protection is Ex IM1 Ex ia I Ma.

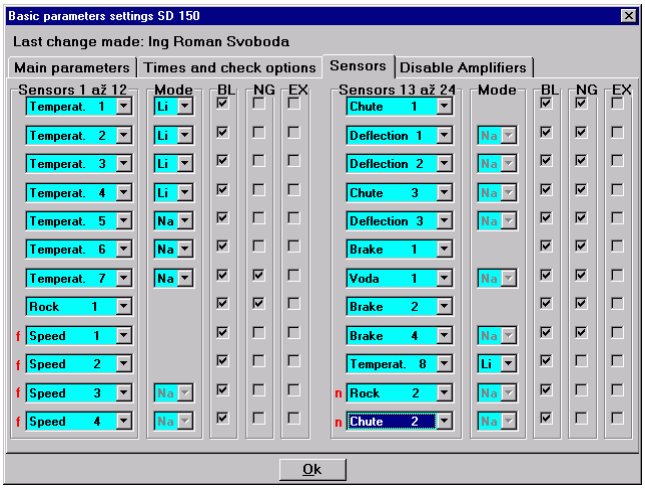
Temperature sensor ST1 P1

It is a part of the fire prevention equipment of the conveyor. It senses the side frame surface temperature. Exceeding the allowed temperature results in immediate conveyor stopping. It is supplied from the conveyor station and its flameproof protection is Ex IM2 Ex ib I Mb.

Speed sensor SR1

It senses the speed of conveyor and transforms it into electric pulses, which are processed by the conveyor station. The speed sensor is an induction transducer without mechanical electric contact. It is supplied from the conveyor station and its flameproof protection is Ex IM1 Ex ia I Ma.

Monitoring conveyor line operation

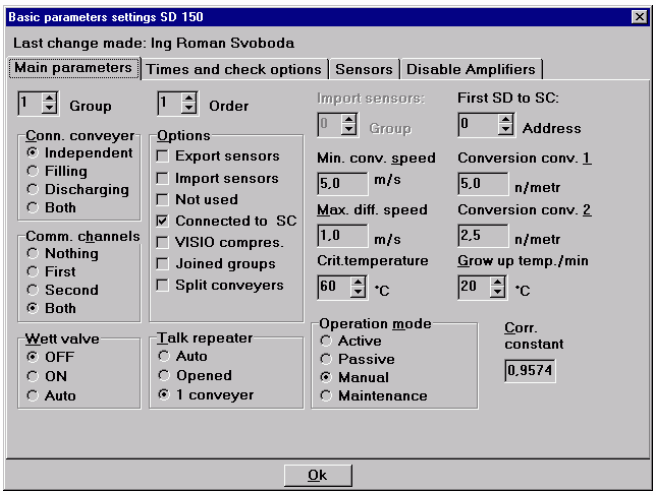


All information about the conveyor's running (state of sensors, state of outputs, information about place of locking and its cause and others) is accessible on every conveyor station SD1. In the diagnostic mode it is possible to display on its two-line alphanumerical LCD display all important information concerning the state of sensor inputs, battery source, emergency circuit wires and others.

In the same way it is possible to obtain information about failures barring the start. Between the central station and the conveyor station there is a continuous transfer of information. This information is accessible also at the control computer of the Central station. If the computer is connected to the company computer network or Internet, the data are accessible to all other users of the net communicating via protocol TCP/IP. All operational changes are kept in a file so they are available for any possible further assessment. The period of file storing is selected by the user.

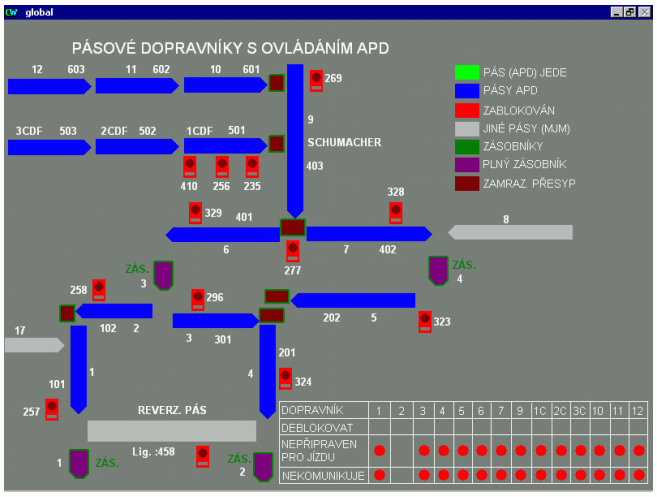
Setting-up configuration and parameters of conveyor line

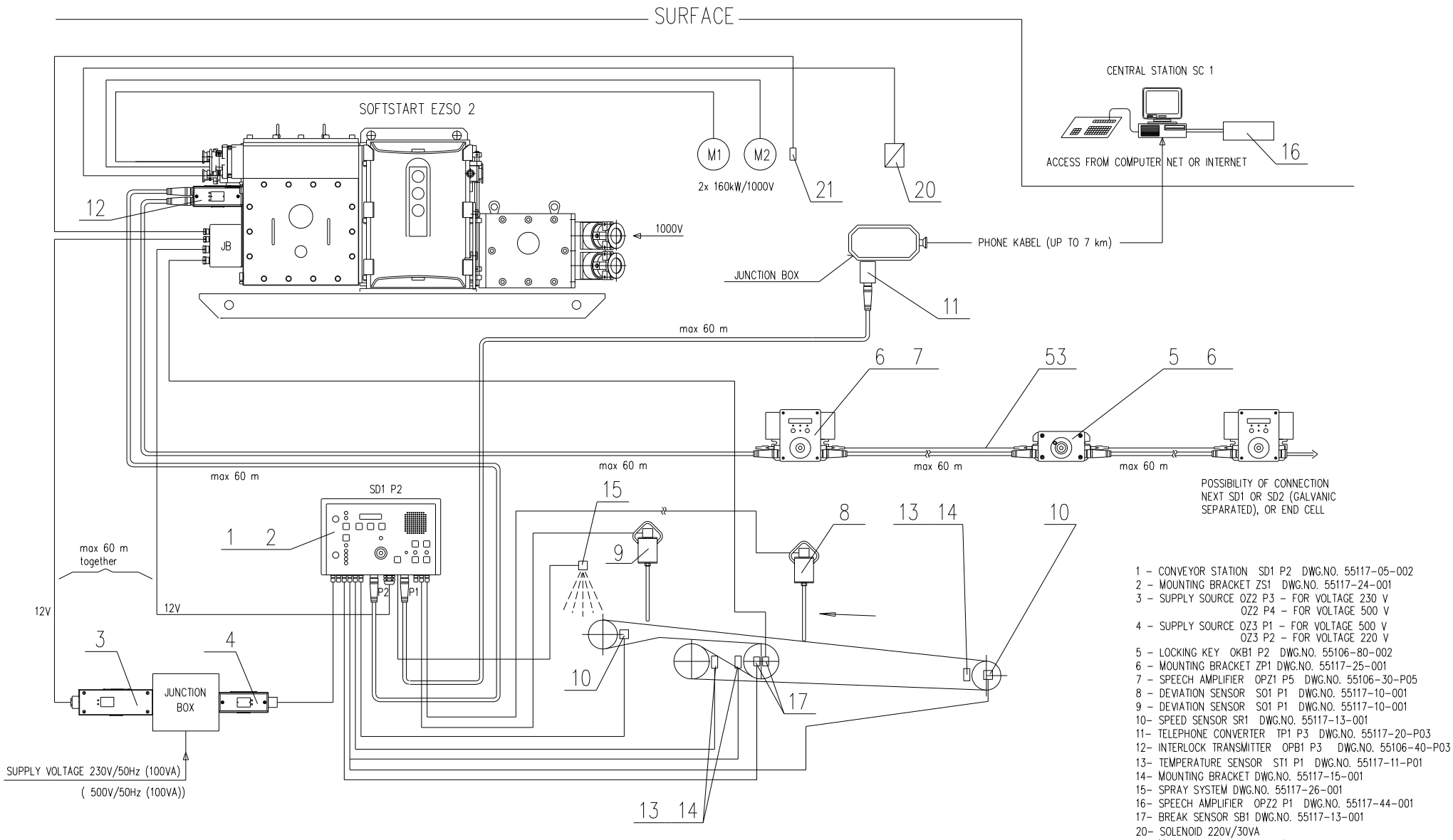
Changes can be made easily, without programming skills by operating staff authorized for this action. The program algorithm of the conveyor control is strictly defined at the system production, however, it is possible to adjust it for the required conditions by means of many parameters, like setting-up the sensor type, its negation: setting up the decisive level, program disconnection of sensors, retarding the response at the event of the sensor actuating and retarding the machine's start. These parameters are protected against unauthorized access by secret passwords. All modifications are kept in the archive file and it is possible to check them at any time. Alterations can be made at the Central station as well as
the Conveyor station.



Visualization of mucking process

The visualization software is supplied along with the system. It facilitates a well-arranged graphic way of displaying the operational states of the drawing line. Staff is informed about mucking process also thrue the speech output. Visualization tasks are accessible to the selected working places of the Intranet, or the Internet if required.





1 – CONVEYOR STATION SD1 P2 DWG.NO. 55117-05-002
2 – MOUNTING BRACKET ZS1 DWG.NO. 55117-24-001
3 – SUPPLY SOURCE OZ2 P3 – FOR VOLTAGE 230 V
OZ2 P4 – FOR VOLTAGE 500 V
4 – SUPPLY SOURCE OZ3 P1 – FOR VOLTAGE 500 V
OZ3 P2 – FOR VOLTAGE 220 V
5 – LOCKING KEY OKB1 P2 DWG.NO. 55106-80-002
6 – MOUNTING BRACKET ZP1 DWG.NO. 55117-25-001
7 – SPEECH AMPLIFIER OPZ1 P5 DWG.NO. 55106-30-P05
8 – DEVIATION SENSOR SO1 P1 DWG.NO. 55117-10-001
9 – DEVIATION SENSOR SO1 P1 DWG.NO. 55117-10-001
10– SPEED SENSOR SR1 DWG.NO. 55117-13-001
11– TELEPHONE CONVERTER TP1 P3 DWG.NO. 55117-20-P03
12– INTERLOCK TRANSMITTER OPB1 P3 DWG.NO. 55106-40-P03
13– TEMPERATURE SENSOR ST1 P1 DWG.NO. 55117-11-P01
14– MOUNTING BRACKET DWG.NO. 55117-15-001
15– SPRAY SYSTEM DWG.NO. 55117-26-001
16– SPEECH AMPLIFIER OPZ2 P1 DWG.NO. 55117-44-001
17– BREAK SENSOR SB1 DWG.NO. 55117-13-001
20– SOLENOID 220V/30VA
21– MOTOR ROTATE SENSOR DWG.NO. 55129-20-P01
53– LOCKING STEEL ROPE I.NO. 3096385

THE EXAMPLE OF CONNECTION APD 1 WITH EZSO 2 FOR 1 CONVEYOR

K55117-00_0968_A

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FLAMEPROOF TRANSFORMER SET TN0

Transformer set TN0 is with its three guarded and protected outlets is intended for supplying of lighting and control circuits with rated supply voltage of 230 VAC or 127 VAC.
The product complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU. It is classified as an equipment group I category M2. It is designed for use in the supply mains 3/PE AC 500//1000/1100V 50Hz/IT.
Explosion-proof equipment marking - Ex I M2 Ex d I Mb.

Design

The transformer set is located in a flameproof enclosure KK0. The flameproof enclosure is divided into input and output connecting compartment and instrumental compartment.

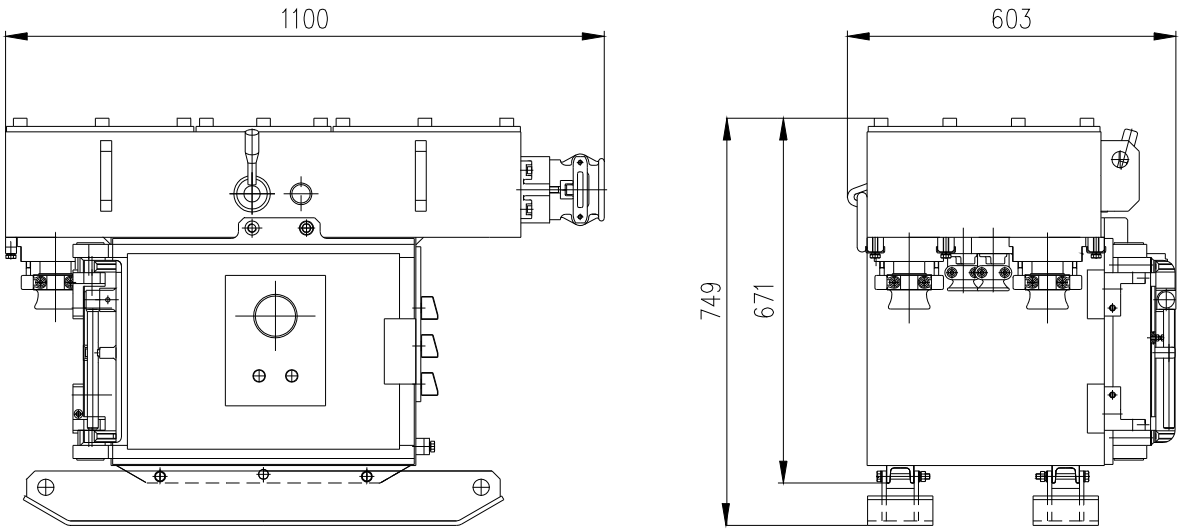
Connecting compartments

Supply power cables enter the connecting part on the right side of the set. Conductors of cross-section up to 120mm^2 can be connected onto the connecting terminals.

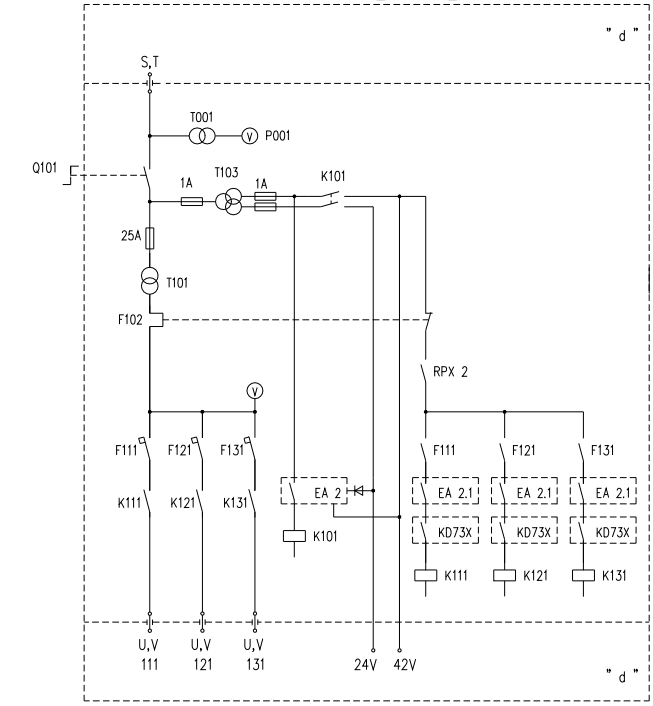
The output connecting compartment is in the left part and enables connection of three cables with cross-section of up to 6mm^2.

Instrumental box

The set is equipped with the main switch, main single-phase 500V - 1000V or 1100V // 200V - 215V - 230V or 120V - 127V - 134V (4,5kVA), auxiliary contactors and auxiliary transformer whose outputs are 24V/42V and they are led out into the output connecting compartment and are guarded by the isolation state watcher. Each output of the set is fitted with a circuit-breaker which provides protection against short-circuits and overloads, with earth leakage relay and pilot circuit monitor relay.
The set can be controlled by means of switches whose shafts are conducted out of the enclosure onto the right side of the instrumental box. In the lid of flameproof enclosure there are test push-buttons of isolation state watchers and an inspection hole of operation and failure states indication modulus. In the enclosure side there is an inspection hole of the analogue voltmeter to check the supply voltage of the mains.



Block wiring diagram



Technical data

- Total output power 4.5kVA
- Nominal supply voltage ..... 3/PE AC 1100/1000/500V 50Hz
- Number of outlets 3
- Outlet protection ..... circuit-breaker 8 A with breaking characteristics C
- Nominal output voltage TN0 P1, P3 ..... 230V with junctions 200V, 215V
- Nominal output voltage TN0 P2 ..... 127V with junctions 120V, 134V
- Nominal output current 6.5A
- Short circuit voltage 2.6%
- Explosion-proof equipment marking ..... Ex I M2 Ex d I Mb
- Dimensions 1100x749x603mm
- Weight 450kg

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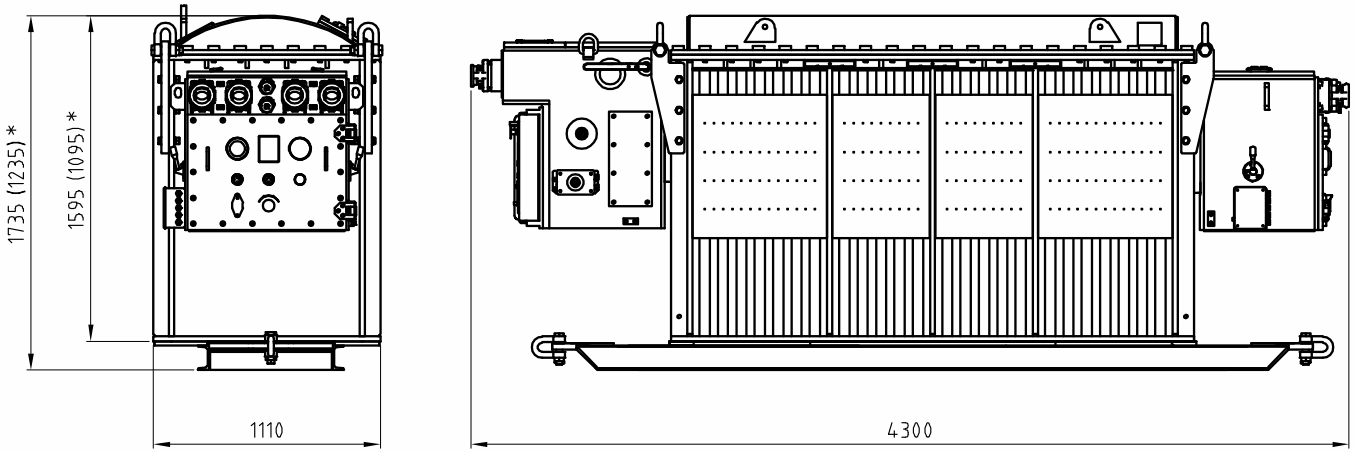
FLAMEPROOF TRANSFORMER SET TN6/….-P30

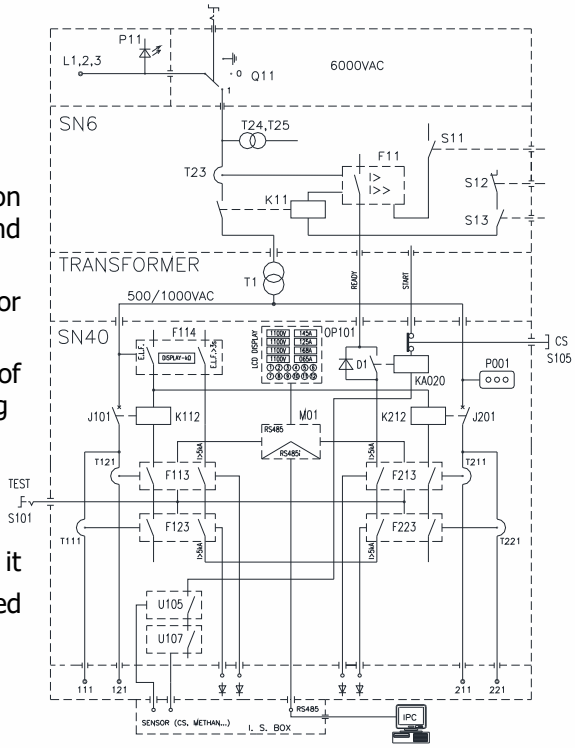
The set TN6/….-P30 is intended to transform high voltage, power supply and protection of three-phase electrical devices or electric power supply and protection of a supply network. The device can operate in potentially explosive atmospheres.

The transformer set has the type of protection against explosion Ex I M2(M1) Ex d [ia Ma] I Mb. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres according to Directive 2014/34/EU (NV 116/2016 Sb.). The product also complies with technical requirements EN 60079-0, EN 60079-1 and EN 60079-11.



Electric circuits provide power outlet independently with:

- off-switching at short-circuit or overloads and their signalling
- On the trip short circuit must be manually reset
- blocking the switching in case the reduction of isolation resistance of power outlet is less than 50(100) kOhm and equipment signalling;
- blocking the switching in case the protective conductor resistance exceeds 80Ω and equipment signalling.
- off-switching in case the reduction of isolation resistance of power outlet is less than 30(60) kOhm and equipment signalling
- On the trip earth fault leakage must be manually reset



LCD display operating and faulty conditions, measured quantities, it also stores data and provides transmission of data between connected systems.

Technical data

- Technical parameters of high voltage part SN6
  - Nominal voltage ..... according to requirements from 3300VAC to 6300VAC, 50Hz or 60 Hz
  - Nominal current ..... according to power output max. 250A
  - Nominal short-circuit power ..... 100MVA at 6kV
  - Nominal off-switching short-circuit current ..... 10kA at 7,2kV
  - Off-switching ability, top value 25kA
  - Short-circuit resistance, effective value 10kA (3s)
  - Time for off-switching ..... 30÷55ms
  - Marking ..... Ex d I Mb (PB Exd I, PB 1B)
  - Total weight 850kg

- Technical parameters of HV transformer
  - Version ..... dry three-phase transformer
  - Power output 630/800/1000/1250/1400/1500kVA
  - Nominal primary voltage ..... according to requirements from 3300VAC to 6300VAC
  - Nominal secondary voltage ..... according to requirements from 400VAC to 1200VAC
  - Junctions of primary winding ..... ±5%
  - Frequency ..... 50Hz or 60Hz
  - Connection ..... Yyn0 or Dyn5 or Dyn11
  - Impedance ek ..... from 4 to 5%
  - Type of cooling ..... using air (ANAN)
  - Class of insulated winding ..... H (200°C)
  - Marking ..... Ex d I Mb (PB Exd I, PB 1B)
  - Total weight (including transformer and enclosure) 4560/5160/5660/6410/6710/7230kg
  - Weight of transport chassis 390kg

- Technical parameters of a low voltage part SN40
  - Nominal voltage ..... according to requirements from 400VAC to 1200VAC, 50Hz or 60Hz
  - Total nominal current ..... according to power max. 800A
  - Maximum number of power outlets 4
  - Maximum current of an outlet 400A
  - Marking ..... Ex d [ia Ma] I Mb (PB Exd ia I, PB 1B Иа)
  - Total weight 620kg

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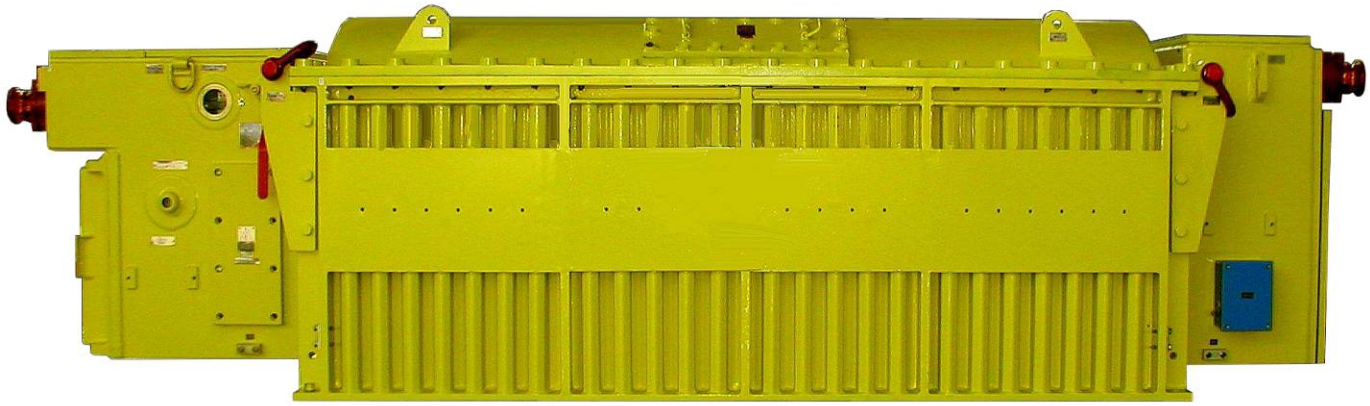
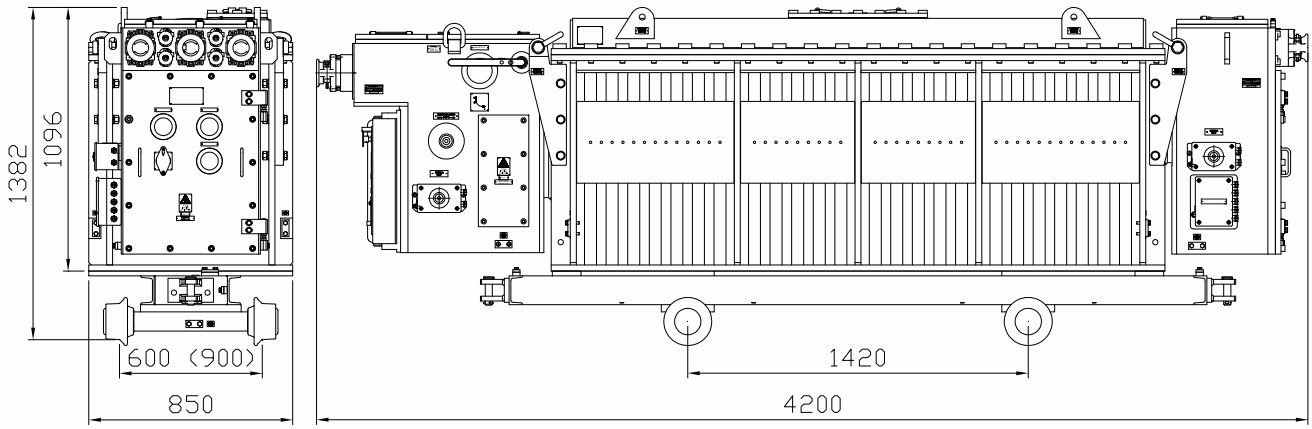
FLAMEPROOF TRANSFORMER SET TN6/….-P14

The set TN6/….-P14 is determined to transform high voltage, power switching, control and protection of three-phase electric devices or eventually for supply and control of power supply mains. It can work in potentially explosive atmospheres.



The transformer set has the type of protection against explosion Ex I M2 Ex d [ia Ma] I Mb. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres according to Directive 2014/34/EU (NV 116/2016 Sb.). The product also complies with technical requirements EN 60079-0, EN 60079-1 and EN 60079-11.

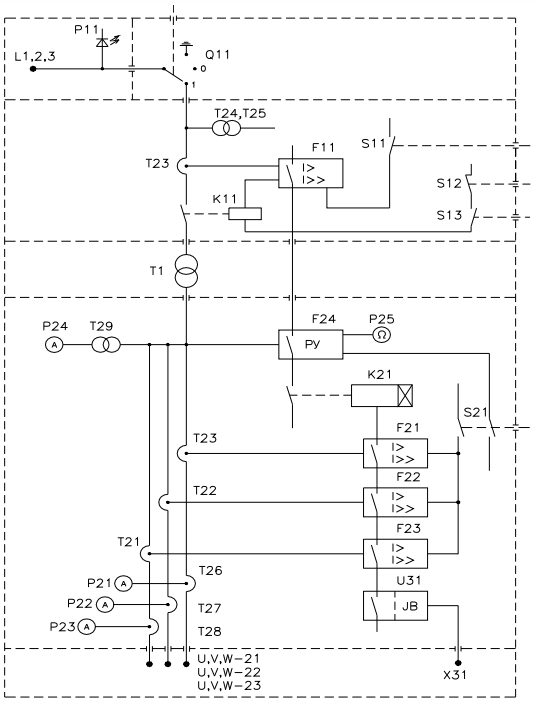
The high voltage part of the transformer set is among others equipped with pole earthing isolator, overload protection and breaking contactor.



Electric circuits provide power outlet independently with:

- off-switching at short-circuit and short-circuit signalling;
- protection from thermal effects of overloads and signalling of overloads;
- off-switching in case the phase fall-out and in case the asymmetry of phases and equipment signalling;
- blocking the switching in case the reduction of isolation resistance of power outlet is less than 50(100)kOhm and equipment signalling;
- off-switching in case the reduction of isolation resistance of power outlet is less than 15kOhm and equipment signalling;
- blocking the switching in case the protective conductor resistance exceeds 50Ω and equipment signalling.

Also in the low voltage part it is possible to replace classical LED indicator by LCD display which shows operating and faulty conditions, measured quantities, it also stores data and provides transmission of data between connected systems.



Technical data

- Technical parameters of high voltage part SN6
  - Nominal voltage ..... according to requirements 6000VAC or 6300VAC, 50Hz or 60 Hz
  - Nominal current ..... according to power output max. 250A
  - Nominal short-circuit power ..... 100MVA at 6kV
  - Nominal off-switching short-circuit current ..... 10kA at 7,2kV
  - Off-switching ability, top value 25kA
  - Short-circuit resistance, effective value 10kA (3s)
  - Time for off-switching ..... 30÷55ms
  - Marking ..... Ex d I Mb
  - Total w 850kg

- Technical parameters of HV transformer
  - Version ..... dry three-phase transformer
  - Power output 500/630kVA
  - Nominal primary voltage ..... according to requirements 6000VAC or 6300VAC
  - Nominal secondary voltage ..... according to requirements from 500VAC to 1200VAC
  - Junctions of primary winding ..... ±5%
  - Frequency ..... 50Hz or 60Hz
  - Connection ..... Yyn0 or Dyn11
  - Impedance ek ..... from 4 to 5%
  - Type of cooling ..... using air (ANAN)
  - Class of insulated winding ..... H (200°C)
  - Marking ..... Ex d I Mb
  - Total weight (including transformer and enclosure) 4060/4590kg
  - Weight of transport chassis 300kg

- Technical parameters of a low voltage part SN5
  - Nominal voltage ..... according to requirements from 500VAC to 1200VAC, 50Hz or 60Hz
  - Total nominal current ..... according to power max. 693A
  - Maximum number of power outlets 3
  - Maximum current of an outlet 345A
  - Auxiliary output 230V 50Hz 300VA
  - Auxiliary output 42V 50Hz 100VA
  - Marking ..... Ex d [ia Ma] I Mb
  - Total weight 530kg

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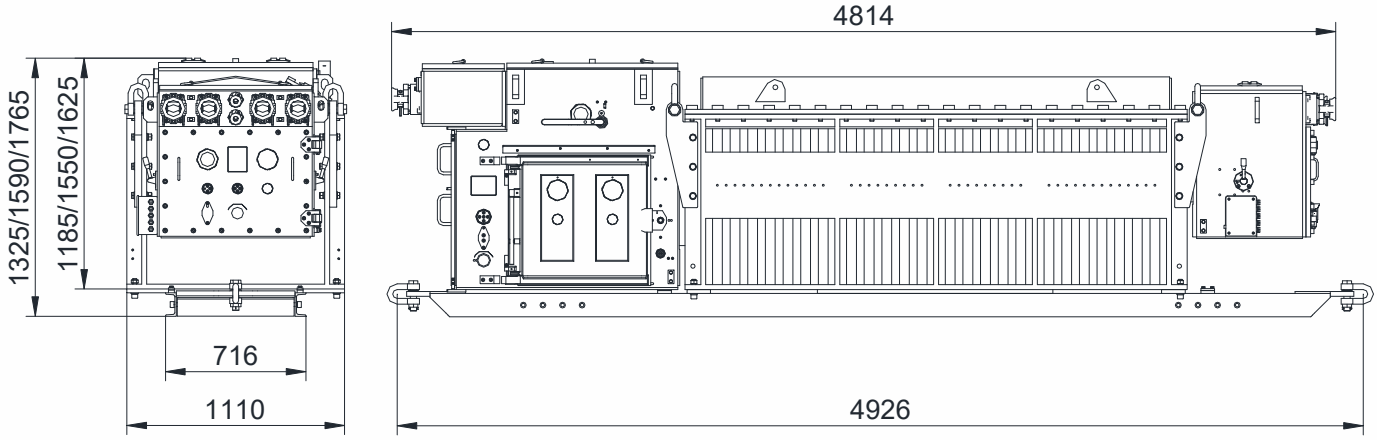
FLAMEPROOF TRANSFORMER SET TN10/….-P27

The Flameproof transformer set TN10/….-P27 is intended to transform high voltage of 10kV to voltage of 1100V 50Hz, power supply and protection of three-phase electrical equipment or electric power supply and protection of a supply network 3/PE AC 1100V 50Hz/IT.

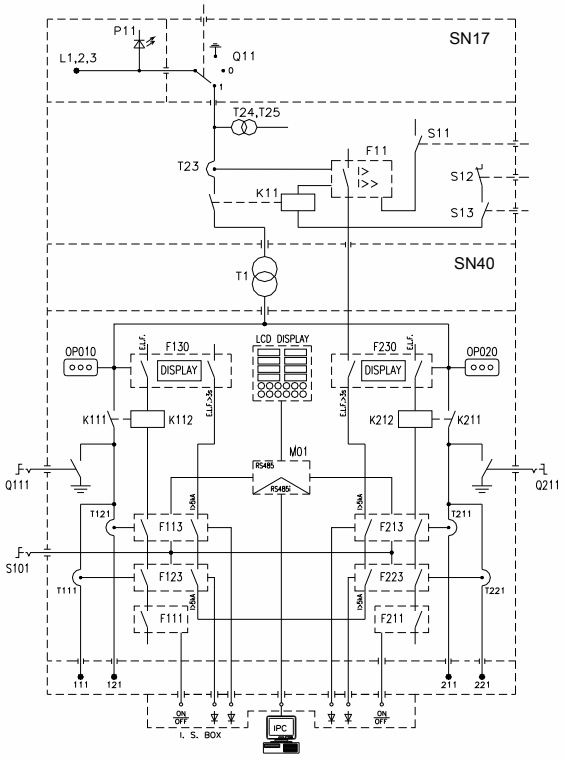
The transformer set has the type of protection against explosion Ex I M2(M1) Ex d [ia Ma] I Mb. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres according to Directive 2014/34/EU. The product also complies with technical requirements EN 60079-0, EN 60079-1 and EN 60079-11.



Electric circuits of the set provide each power output independently with:

- off-switching at short-circuit and short-circuit signalling;
- protection from thermal effects of overcurrents and signalling of overcurrents;
- off-switching in case of phase fall-out and in case of asymmetry of phases and equipment signalling;
- switching blocking in case of reduction of isolation resistance of power outlets of less than 50kOhm and equipment signalling;
- off-switching of supply feeding in case of reduction of isolation resistance of power outlets of less than 15kOhm and equipment signalling;
- blocking the running in case the protective conductor resistance exceeds 50Ohm and equipment signalling.

Also in the low voltage part it is possible to replace classical LED indicator by LCD display which shows operating and faulty conditions, measured quantities, it also stores data and provides transmission of data between connected systems.



Technical data

- Technical parameters of high voltage part SN17
  - Rated voltage 10kVAC, 50Hz
  - Rated current ..... according to power max. 250A
  - Rated off-switching symmetric current (3s) ..... 25kA at 12kVAC
  - Off-switching asymmetrical current ..... 25kA at 12kVAC
  - Rated on-switching current (maximum) ..... 63kA at 12kVAC
  - Short circuit resistance, effective value 10kA (3s)
  - Time for off-switching ..... <50ms
  - Marking ..... Ex d I Mb
  - Total weight 1700kg

- Technical parameters of HV transformer
  - Version ..... dry three-phase transformer
  - Power output 400/800/1000/1250/1400/1500kVA
  - Rated primary voltage 10kVAC
  - Rated secondary voltage 1100VAC
  - Junctions of primary winding ..... ±5%
  - Frequency 50Hz
  - Connection ..... Dyn5 or Dyn11
  - Impedance ek 4%
  - Type of cooling ..... using air (ANAN)
  - Class of insulated winding ..... H (200°C)
  - Marking ..... Ex d I Mb
  - Total weight (including transformer and enclosure) 4620/5280/5660/6410/6710kg
  - Weight of frame 390kg

- Technical parameters of low voltage part SN40
  - Rated voltage 1100VAC, 50Hz
  - Total rated current ..... according to power max. 753A
  - Maximum number of power outputs 4
  - Maximum current of one output 400A
  - Marking ..... Ex d [ia Ma] I Mb
  - Total weight 530kg

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FLAMEPROOF TRANSFORMER SET TN6/….-P6/..

The set is determined to transform high voltage, power switching, control and protection of max. ten three-phase squirrel-cage induction motor of mining machine drives. The mode of on-switching is controlled according to user. Set is also equipped with transformer with three protected and switched outputs for local lighting or as supply for electric maintenance tools. The device can work in potentially explosive atmospheres.

The transformer set has the type of protection against explosion Ex I M2(M1) Ex d ib [ia Ma] I Mb event. Ex I M2(M1) Ex d ib [ia] [op is] I Mb. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres according to Directive 2014/34/EU (NV 116/2016 Sb.). The product also complies with technical requirements EN 60079-0, EN 60079-1, EN 60079-11and event. EN 60079-28.

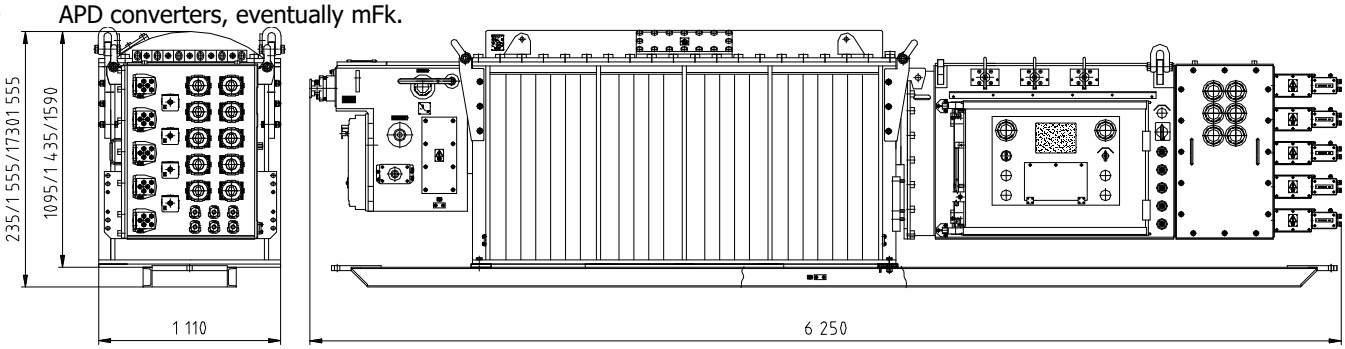
The high voltage part of the transformer set is among others equipped with pole earthing isolator, overload protection and breaking contactor.

Electric circuits of low voltage part provide power outlet independently with:

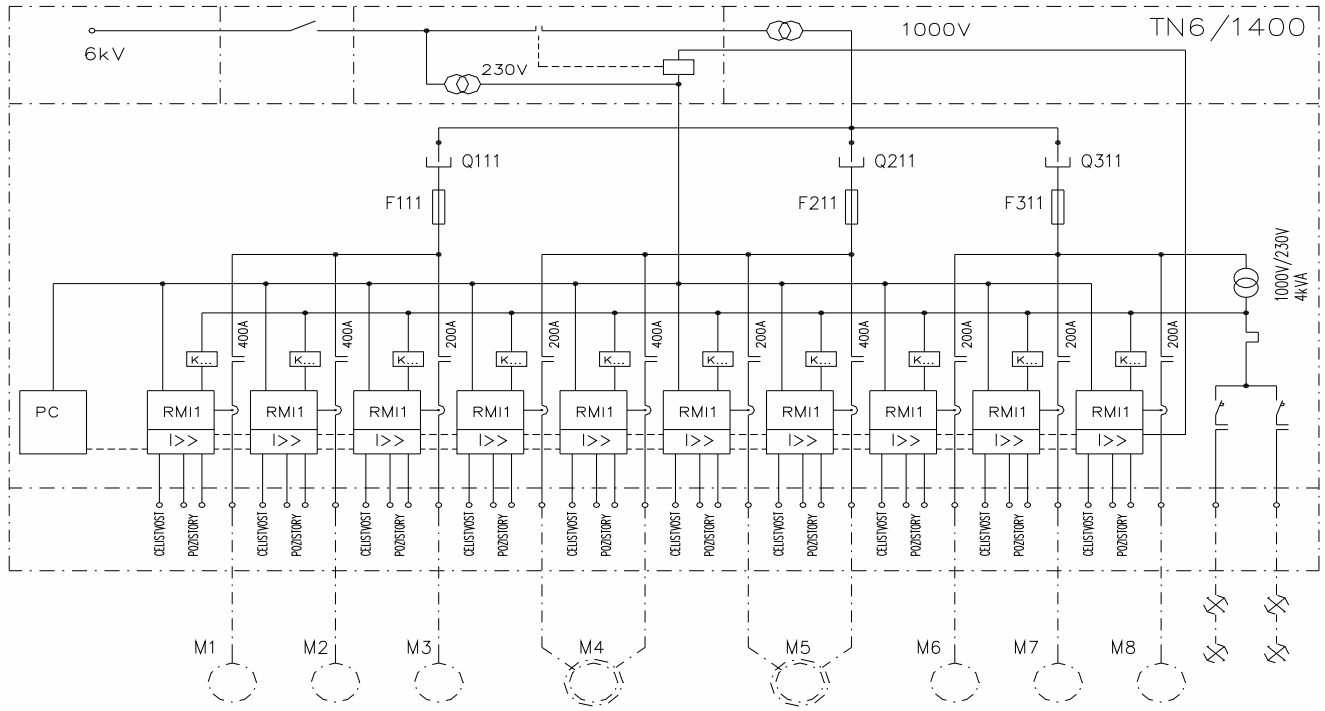
- off-switching at short-circuit and short-circuit signalling,
- protection from thermal effects of overloads and signalling of overloads,
- off-switching in case the phase fall-out and in case the asymmetry of phases and equipment signalling,
- off switching in case non-permissible temperature increase of electric motor,
- blocking the switching in case the reduction of isolation resistance of power outlet is less than 50(100)kΩ and equipment signalling,
- off-switching in case the reduction of isolation resistance of power outlet is less than 15kΩ and equipment signalling,
- blocking the switching in case the protective conductor resistance exceeds 50Ω and equipment signalling.

The control of particular outputs of the transformer is possible via:

- intrinsically safe circuits,
- intrinsically nonflammable circuit in a power cable,
- APD converters, eventually mFk.



The transformer set is equipped by industrial PC, which serves for monitoring and parameterization of digital protections of the set, saving parameters of the protections, measuring values, operating and faulty conditions. All the information is possible transmit via I.S. convertors to a remote working place. The Industrial PC is equipped with I.S. keyboard, I.S. mouse and 12" screen. It is possible to add an optical output to the set which permits voice communication (VoIP) via Ethernet.



Technical data

- Technical parameters of high voltage part SN6
  - Nominal voltage ..... according to requirements from 4160VAC to 6300VAC, 50Hz or 60Hz
  - Nominal current ..... according to power output max. 250A
  - Nominal short-circuit power ..... 100MVA at 6kV
  - Nominal off-switching short-circuit current ..... 10kA at 7,2kV
  - Off-switching ability, top value 25kA
  - Short-circuit resistance, effective value 10kA (3s)
  - Time for off-switching ..... 30÷55ms
  - Type of explosion protection ..... Ex d I Mb
  - Total weight 850kg
- Technical parameters of transformer VN
  - Version ..... dry three-phase transformer
  - Nominal voltage ..... according to requirements from 4160VAC to 6300VAC
  - Power output 1000/1250/1400/1500/1600/1750kVA
  - Nominal primary voltage ..... according to requirements from 4160VAC to 6300VAC
  - Nominal secondary voltage ..... according to requirements from 950VAC to 1200VAC
  - Junctions of primary winding ..... ±5%
  - Frequency ..... 50Hz or 60Hz
  - Connection ..... Yyn0 or Dyn5
  - Impedance ek ..... from 4 to 5%
  - Type of cooling ..... using air (ANAN)
  - Class of insulated winding ..... H (200°C)
  - Type of protection against explosion ..... Ex d I Mb
  - Total weight (including transformer and enclosure) 5660/6410/6710/7230/7160/7560kg
  - Weight of transport frame 390kg
- Technical parameters of low voltage part SN12
  - Nominal voltage ..... according to requirements from 950VAC to 1200VAC, 50Hz or 60Hz
  - Total nominal current ..... according to power output max. 770A
  - Maximum number of switched/control power outputs 10
  - Type of protection against explosion ..... Ex d ib [ia Ma] I Mb event. Ex d ib [ia] [op is] I Mb
  - Nominal continuous current:
    - 4 outlets with vacuum contactor (450A) 270A
    - 6 outlets with vacuum contactor (200A) 100A
    - Outputs 230V/127V 50Hz (6kVA), event. 110V 60Hz (8kVA) 3
  - Total weight 2400kg

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FLAMEPROOF TRANSFORMER SET

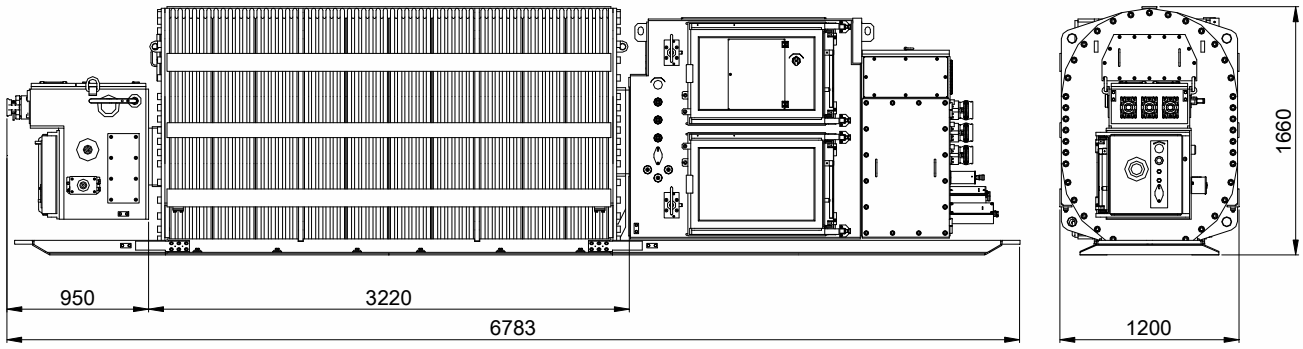
TN6/….-P28/..

The set is determined to transform high voltage, power switching, control and protection of max. twelve three-phase squirrel-cage induction motor of mining machine drives. Set is also equipped with max. two transformers, each with two protected and switched outputs for local lighting or as supply for electric maintenance tools. The transformer set has the type of protection against explosion Ex I M2(M1) Ex d ib [ia Ma] I Mb event. Ex I M2(M1) Ex d ib [ia] [op is] I Mb. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres according to Directive 2014/34/EU (NV 116/2016 Sb.). The product also complies with technical requirements EN 60079-0, EN 60079-1, EN 60079-11and event. EN 60079-28.

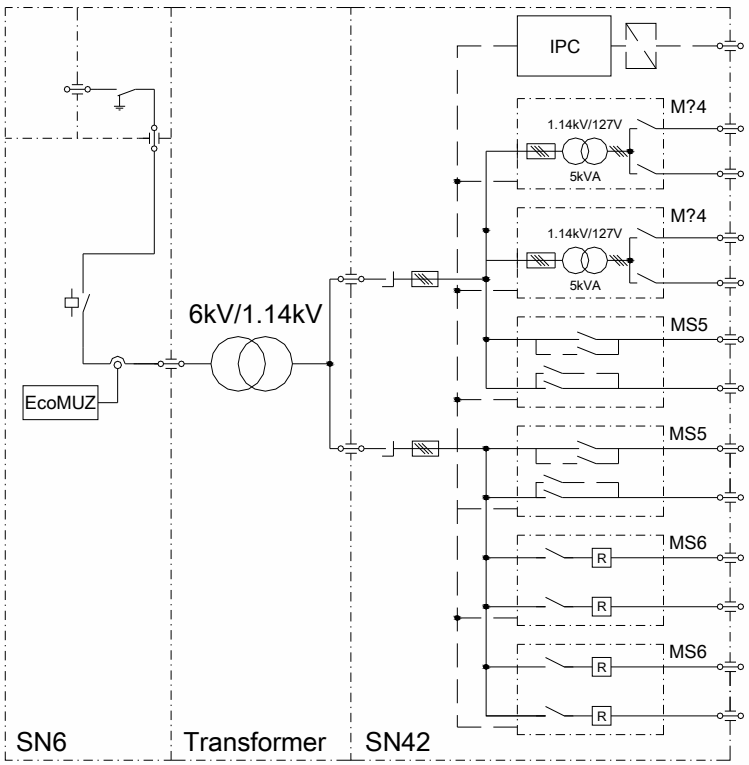
The high voltage part of the transformer set is among others equipped with pole earthing isolator, overload protection and breaking contactor.

Electric circuits of low voltage part provide power outlet independently with:

- off-switching at short-circuit and short-circuit signalling,
- protection from thermal effects of overloads and signalling of overloads,
- off-switching in case the phase fall-out and in case the asymmetry of phases and equipment signalling,
- off switching in case non-permissible temperature increase of electric motor,
- blocking the switching in case the reduction of isolation resistance of power outlet is less than 50(100)kΩ and equipment signalling,
- off-switching in case the reduction of isolation resistance of power outlet is less than 15kΩ and equipment signalling,
- blocking the switching in case the protective conductor resistance exceeds 50Ω and equipment signalling.



The transformer set is equipped by industrial PC, which serves for monitoring and parameterization of digital protections of the set, saving parameters of the protections, measuring values, operating and faulty conditions. All the information is possible transmit via I.S. convertors to a remote working place. The Industrial PC is equipped with I.S. keyboard, I.S. mouse and 12" screen. It is possible to add an optical output to the set which permits voice communication (VoIP) via Ethernet.



Technical data

- Technical parameters of primary part SN6
  - Nominal voltage ..... according to requirements from 6000VAC to 6300VAC, 50Hz
  - Nominal current ..... according to power output max. 250A
  - Nominal short-circuit power ..... 100MVA at 6kV
  - Nominal off-switching short-circuit current ..... 10kA at 7,2kV
  - Off-switching ability, top value 25kA
  - Short-circuit resistance, effective value 10kA (3s)
  - Time for off-switching ..... 30÷55ms
  - Marking ..... Ex d I Mb
- Technical parameters of High-voltage transformer
  - Version ..... dry three-phase transformer
  - Power output 1000/1250/1400/1500/1600/1750/2000/2200kVA
  - Nominal primary voltage ..... according to requirements from 6000VAC to 6300VAC
  - Nominal secondary voltage ..... according to requirements from 950VAC to 1200VAC
  - Junctions of primary winding ..... ±5%
  - Frequency ..... 50Hz or 60Hz
  - Connection ..... Yyn0 или Dyn5
  - Impedance ek ..... from 4 to 5%
  - Type of cooling ..... using air (ANAN)
  - Class of insulated winding ..... H (200°C)
  - Marking ..... Ex db I Mb
  - Total weight (including transformer and enclosure) 6080/6280/6980/7180/7480/8540/9340/10140kg
  - Weight of transport chassis 390kg
- Technical parameters of secondary part SN42
  - Nominal voltage ..... according to requirements from 950VAC to 1200VAC, 50Hz or 60Hz
  - Total nominal current ..... according to power output max.
  - Marking ..... Ex d ib [ia Ma] I Mb
  - Maximum number of power outputs 12
  - Nominal current of power outputs:
    - **MS6** with vacuum contactor (450A) 350A
    - **MS5** with vacuum contactor (200A) 200A
    - **MT4 –** output 230V/127V 50Hz (5kVA) 4
  - Total weight 3500kg

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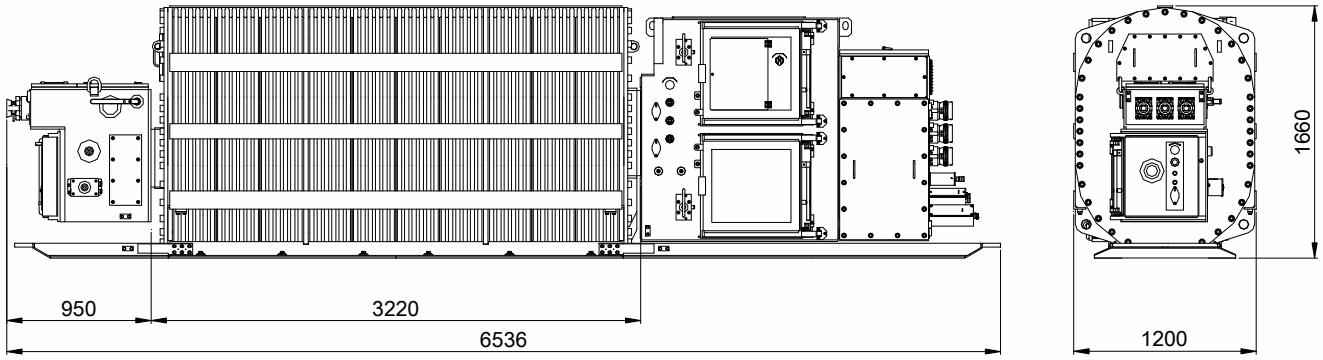
FLAMEPROOF TRANSFORMER SET
TN6/….-P36/..

The set is determined to transform high voltage, power switching, control and protection of max. six three-phase squirrel-cage induction motor of mining machine drives. Set is also equipped with max. two transformers, each with two protected and switched outputs for local lighting or as supply for electric maintenance tools. The transformer set has the type of protection against explosion Ex I M2(M1) Ex d ib [ia Ma] I Mb event. Ex I M2(M1) Ex d ib [ia] [op is] I Mb. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres according to Directive 2014/34/EU (NV 116/2016 Sb.). The product also complies with technical requirements EN 60079-0, EN 60079-1, EN 60079-11and event. EN 60079-28.

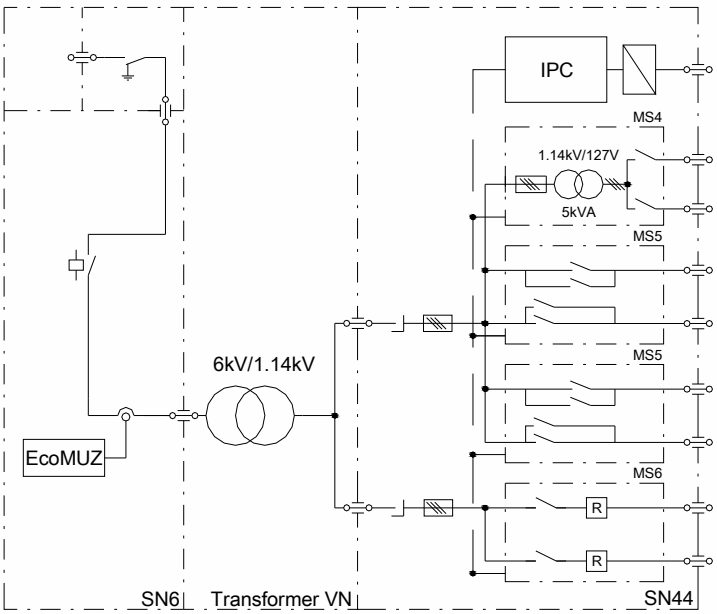
The high voltage part of the transformer set is among others equipped with pole earthing isolator, overload protection and breaking contactor.

Electric circuits of low voltage part provide power outlet independently with:

- off-switching at short-circuit and short-circuit signalling,
- protection from thermal effects of overloads and signalling of overloads,
- off-switching in case the phase fall-out and in case the asymmetry of phases and equipment signalling,
- off switching in case non-permissible temperature increase of electric motor,
- blocking the switching in case the reduction of isolation resistance of power outlet is less than 50(100)kΩ and equipment signalling,
- off-switching in case the reduction of isolation resistance of power outlet is less than 15kΩ and equipment signalling,
- blocking the switching in case the protective conductor resistance exceeds 50Ω and equipment signalling.



The transformer set is equipped by industrial PC, which serves for monitoring and parameterization of digital protections of the set, saving parameters of the protections, measuring values, operating and faulty conditions. All the information is possible transmit via I.S. convertors to a remote working place. The Industrial PC is equipped with I.S. keyboard, I.S. mouse and 12" screen. It is possible to add an optical output to the set which permits voice communication (VoIP) via Ethernet.



Technical data

- Technical parameters of primary part SN6
  - Nominal voltage ..... according to requirements from 6000VAC to 6300VAC, 50Hz
  - Nominal current ..... according to power output max. 250A
  - Nominal short-circuit power ..... 100MVA at 6kV
  - Nominal off-switching short-circuit current ..... 10kA at 7,2kV
  - Off-switching ability, top value 25kA
  - Short-circuit resistance, effective value 10kA (3s)
  - Time for off-switching ..... 30÷55ms
  - Marking ..... Ex d I Mb
- Technical parameters of High-voltage transformer
  - Version ..... dry three-phase transformer
  - Power output 1000/1250/1400/1500/1600/1750/2000/2200kVA
  - Nominal primary voltage ..... according to requirements from 6000VAC to 6300VAC
  - Nominal secondary voltage ..... according to requirements from 950VAC to 1200VAC
  - Junctions of primary winding ..... ±5%
  - Frequency ..... 50Hz or 60Hz
  - Connection ..... Yyn0 или Dyn5
  - Impedance ek ..... from 4 to 5%
  - Type of cooling ..... using air (ANAN)
  - Class of insulated winding ..... H (200°C)
  - Marking ..... Ex db I Mb
  - Total weight (including transformer and enclosure) 6080/6280/6980/7180/7480/8540/9340/10140kg
  - Weight of transport chassis 390kg
- Technical parameters of secondary part SN44
  - Nominal voltage ..... according to requirements from 950VAC to 1200VAC, 50Hz or 60Hz
  - Total nominal current ..... according to power output max.
  - Marking ..... Ex d ib [ia Ma] I Mb
  - Maximum number of power outputs 6
  - Nominal current of power outputs:
    - **MS6** with vacuum contactor (450A) 350A
    - **MS5** with vacuum contactor (200A) 200A
    - **MT4 –** output 230V/127V 50Hz (5kVA) 2
  - Total weight 3000kgкг

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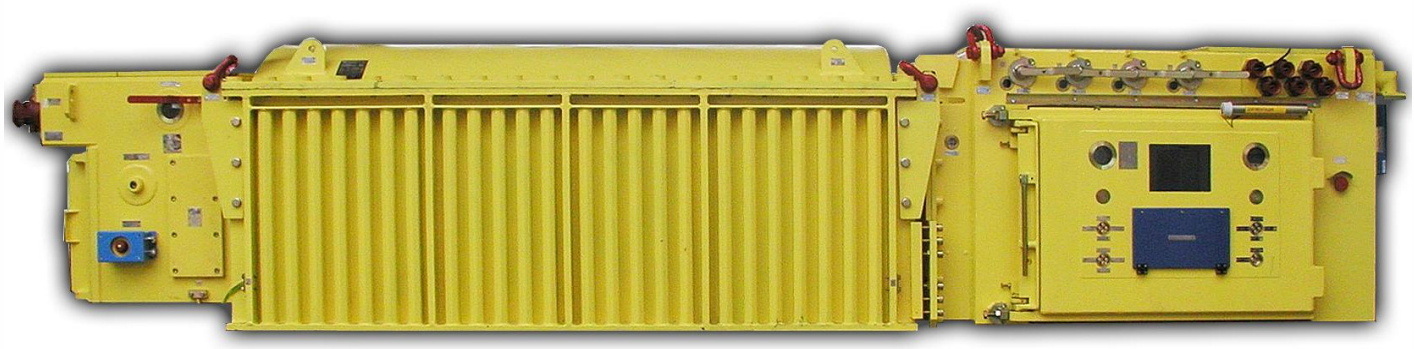
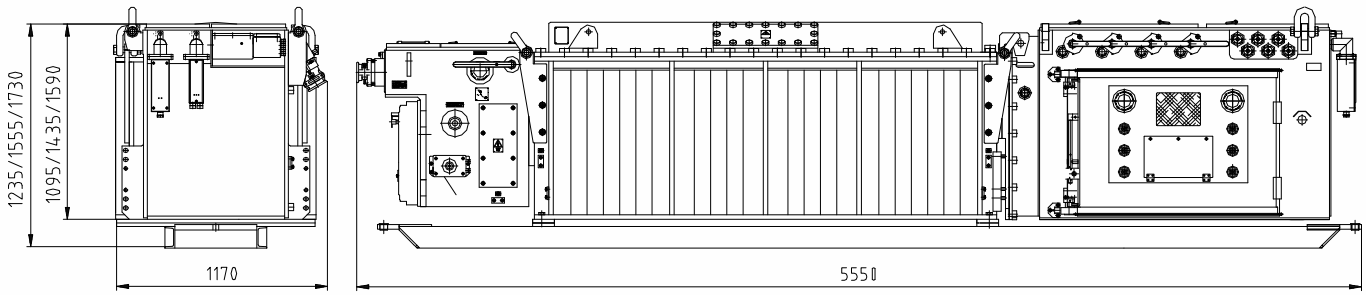
FLAMEPROOF TRANSFORMER SET TN6/….-P5

The transformer set TN6/….-P5 is intended for transformation of high voltage, for power switching, control and protection of three-phase squirrel cage motors of mining machine drives with reversing option or eventually for supply and protection of power supply mains 3/PE AC 3300V 50Hz/IT and for supply of lighting. It can work in potentially explosive atmospheres.



The transformer set has the type of protection against explosion Ex I M2(M1) Ex d ib [ia Ma] I Mb. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres according to Directive 2014/34/EU (NV 116/2016 Sb.). The product also complies with technical requirements EN 60079-0, EN 60079-1 and EN 60079-11.

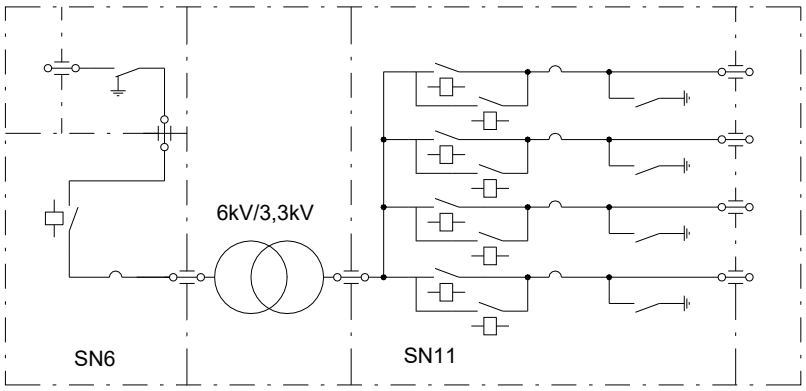
The high voltage part of the transformer set is among others equipped with pole earthing isolator, overload protection and breaking contactor.



Electric circuits of power centre secure the following for each power outlet independently:

- off-switching at short-circuit and short-circuit indication;
- protection from thermal effects of overloads and overloads indication;
- off-switching at the event of phase failure and phase asymmetry, and tripping indication;
- blocking of on-switching at the event of power outlets insulation resistance decreasing under 220kOhm and tripping indication;

- power supply off-switching at the event of power outlets insulation resistance decreasing under 85kOhm and tripping indication;
- blocking the operation at the event of protective conductor increasing over 50 Ohm and tripping indication;
- Control of insulated mode of outlet cable before on-switching using HV tester.



The transformer set is equipped by industrial PC, which serves for monitoring and parameterization of digital protections of the set, saving parameters of the protections, measuring values, operating and faulty conditions. All the information is possible transmit via I.S. convertors to a remote working place. The Industrial PC is equipped with I.S. keyboard, I.S. mouse and 12" screen.

Technical data

- Technical parameters of primary part SN6
  - Nominal voltage ..... according to requirements from 6000VAC to 6300VAC, 50Hz
  - Nominal current ..... according to power output max. 250A
  - Nominal short-circuit power ..... 100MVA at 6kV
  - Nominal off-switching short-circuit current ..... 10kA at 7,2kV
  - Off-switching ability, top value 25kA
  - Short-circuit resistance, effective value 10kA (3s)
  - Time for off-switching ..... 30÷55ms
  - Marking ..... Ex d I Mb
  - Total weight 850kg

- Technical parameters of High-voltage transformer
  - Version ..... dry three-phase transformer
  - Power output 1500/1750/2100kVA
  - Nominal primary voltage ..... according to requirements from 6000VAC to 6300VAC
  - Nominal secondary voltage 3300VAC
  - Junctions of primary winding ..... ±5%
  - Frequency 50Hz
  - Connection ..... Dyn5 or Dyn11
  - Impedance ek ..... from 4 to 5%
  - Type of cooling ..... using air (ANAN)
  - Class of insulated winding ..... H (200°C)
  - Marking ..... Ex d I Mb
  - Total weight (including transformer and enclosure) 7060/8300/8400kg
  - Weight of transport chassis 390kg

- Technical parameters of secondary part SN11
  - Nominal voltage 3300VAC, 50Hz
  - Total nominal current ..... according to power output max. 367,4A
  - Maximum number of power outputs 4
  - Maximum current of power output 250A
  - Output for lightning 5,2/9,4A
  - Marking ..... Ex d ib [ia Ma] I Mb
  - Total weight 2200kg

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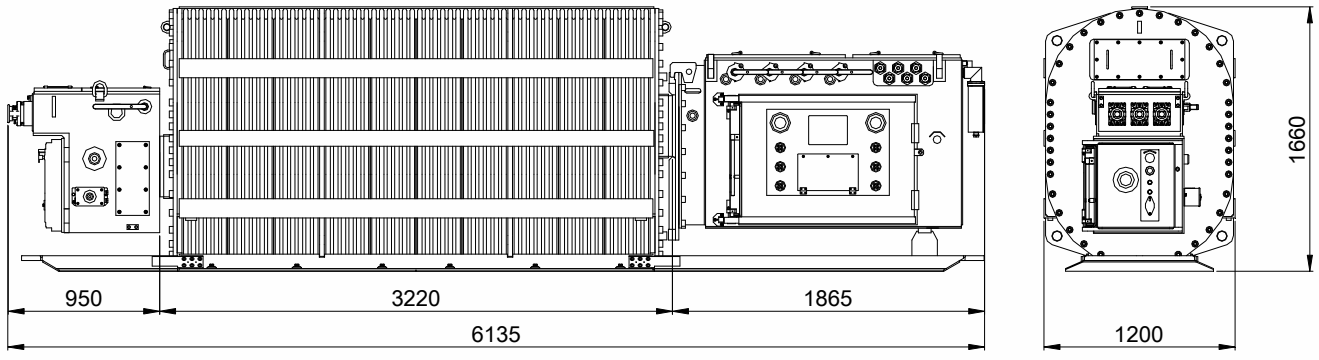
FLAMEPROOF TRANSFORMER SET TN6/….-P5.1.o

The transformer set TN6/….-P5 is intended for transformation of high voltage, for power switching, control and protection of three-phase squirrel cage motors of mining machine drives with reversing option or eventually for supply and protection of power supply mains 3/PE AC 3300V 50Hz/IT and for supply of lighting. It can work in potentially explosive atmospheres.

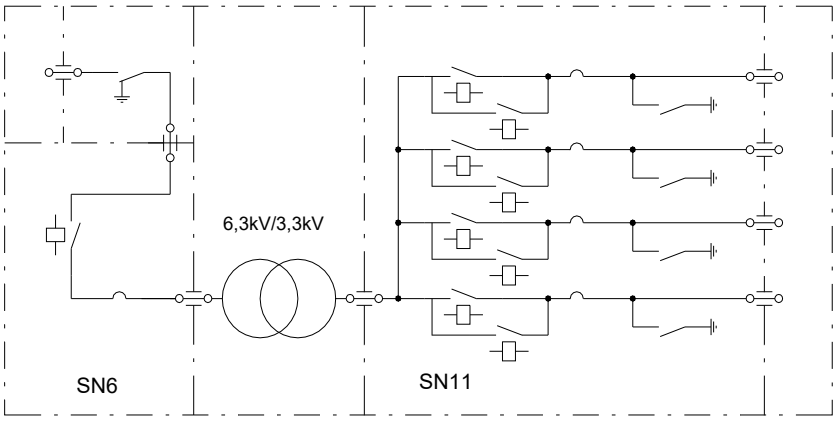
The transformer set has the type of protection against explosion Ex I M2(M1) Ex d ib [ia Ma] I Mb. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres according to Directive 2014/34/EU (NV 116/2016 Coll.). The product also complies with technical requirements EN 60079-0, EN 60079-1 and EN 60079-11.
The high voltage part of the transformer set is among others equipped with pole earthing isolator, overload protection and breaking contactor.



Electric circuits of power centre secure the following for each power outlet independently:

- off-switching at short-circuit and short-circuit indication;
- protection from thermal effects of overloads and overloads indication;
- off-switching at the event of phase failure and phase asymmetry, and tripping indication;
- blocking of on-switching at the event of power outlets insulation resistance decreasing under 220kOhm and tripping indication;

- power supply off-switching at the event of power outlets insulation resistance decreasing under 85kOhm and tripping indication;
- blocking the operation at the event of protective conductor increasing over 50 Ohm and tripping indication;
- Control of insulated mode of outlet cable before on-switching using HV tester.



The transformer set is equipped by industrial PC, which serves for monitoring and parameterization of digital protections of the set, saving parameters of the protections, measuring values, operating and faulty conditions. All the information is possible transmit via I.S. convertors to a remote working place. The Industrial PC is equipped with I.S. keyboard, I.S. mouse and 12" screen.

Technical data

- Technical parameters of primary part SN6
  - Nominal voltage ..... according to requirements from 6000VAC to 6300VAC, 50Hz
  - Nominal current ..... according to power output max. 250A
  - Nominal short-circuit power ..... 100MVA at 6kV
  - Nominal off-switching short-circuit current ..... 10kA at 7,2kV
  - Off-switching ability, top value 25kA
  - Short-circuit resistance, effective value 10kA (3s)
  - Time for off-switching ..... 30÷55ms
  - Marking ..... Ex d I Mb
  - Total weight 850kg

- Technical parameters of High-voltage transformer
  - Version ..... dry three-phase transformer
  - Power output 2500/2800/3000kVA
  - Nominal primary voltage ..... according to requirements from 6000VAC to 6300VAC
  - Nominal secondary voltage 3300VAC
  - Junctions of primary winding ..... ±5%
  - Frequency 50Hz
  - Connection ..... Dyn5 or Dyn11
  - Impedance ek ..... from 4 to 5%
  - Type of cooling ..... using air (ANAN)
  - Class of insulated winding ..... H (200°C)
  - Marking ..... Ex d I Mb
  - Total weight (including transformer and enclosure) 11350/12060/12590kg
  - Weight of transport chassis 390kg

- Technical parameters of secondary part SN11
  - Nominal voltage 3300VAC, 50Hz
  - Total nominal current ..... according to power output max. 525A
  - Maximum number of power outputs 4
  - Maximum current of power output 250A
  - Output for lightning 5,2/9,4A
  - Marking ..... Ex d ib [ia Ma] I Mb
  - Total weight 2200kg

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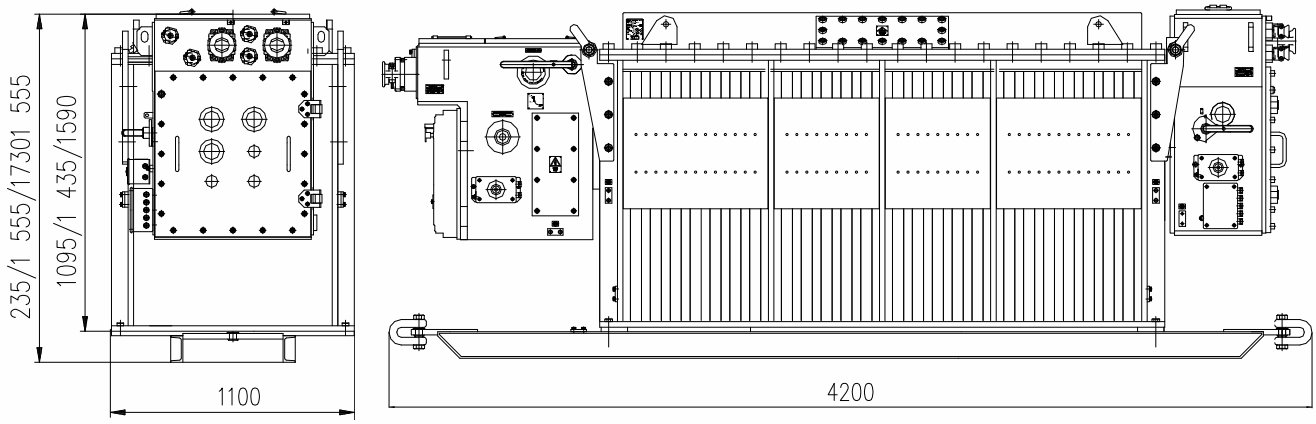
FLAMEPROOF TRANSFORMER SET TN6/….-P11

The set TN6/….-P11 is determined to transform high voltage, power switching, control and protection of three-phase electric devices or eventually protection of power supply mains 3/PE AC 3300V 50Hz/IT. It can work in potentially explosive atmospheres.

The transformer set has the type of protection against explosion Ex I M2(M1) Ex d [ia Ma] I Mb.

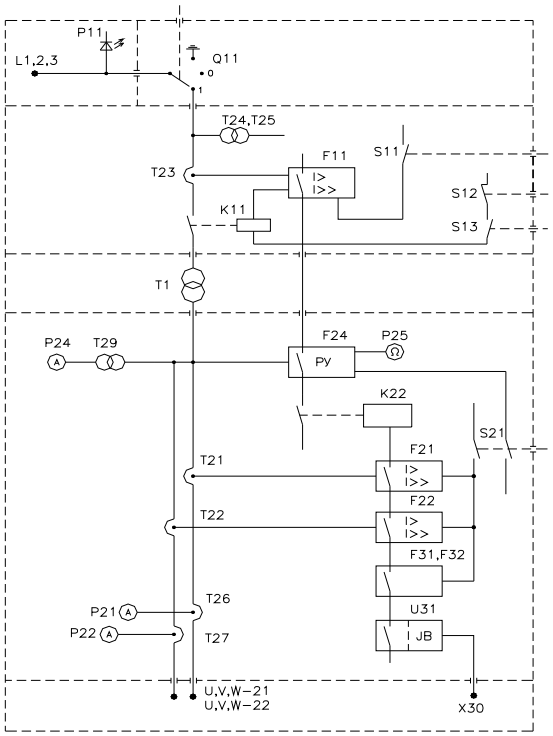
The product complies with technical requirements for devices determined for use in potentially explosive atmospheres according to Directive 2014/34EU (NV 116/2016 Sb.). The product also complies with technical requirements EN 60079-0, EN 60079-1 and EN 60079-11.

The high voltage part of the transformer set is among others equipped with pole earthing isolator, overload protection and breaking contactor.



Electric circuits provide power outlet independently with:

- off-switching at short-circuit and short-circuit signalling;
- protection from thermal effects of overloads and signalling of overloads;
- off-switching in case the phase fall-out and in case the asymmetry of phases and equipment signalling;
- blocking the switching in case the reduction of isolation resistance of power outlet is less than 220kΩ and equipment signalling;
- off-switching in case the reduction of isolation resistance of power outlet is less than 85kΩ and equipment signalling;
- blocking the switching in case the protective conductor resistance exceeds 50Ω and equipment signalling;
- control of the insulating state of circuit cable before on-switching using tester.



Technical data

- Technical parameters of primary part SN6
  - Nominal voltage ..... according to requirements from 6000VAC to 6300VAC, 50Hz
  - Nominal current ..... according to power output max. 250A
  - Nominal short-circuit power ..... 100MVA at 6kV
  - Nominal off-switching short-circuit current ..... 10kA při 7,2kV
  - Off-switching ability, top value 25kA
  - Short-circuit resistance, effective value 10kA (3s)
  - Time for off-switching ..... 30÷55ms
  - Marking ..... Ex d I Mb
  - Total weight 850kg

- Technical parameters of transformer VN
  - Version ..... dry three-phase transformer
  - Power output 1500/1750/2100kVA
  - Nominal primary voltage ..... according to requirements from 6000VAC to 6300VAC
  - Nominal secondary voltage 3300VAC
  - Junctions of primary winding ..... ±5%
  - Frequency 50Hz
  - Connection ..... Dyn5 or Dyn11
  - Impedance ek ..... from 4 to 5%
  - Type of cooling ..... using air (ANAN)
  - Class of insulated winding ..... H (200°C)
  - Marking ..... Ex d I Mb
  - Total weight (including transformer and enclosure) 7060/8300/8400kg
  - Weight of transport chassis 390kg

- Technical parameters of secondary part SN18
  - Nominal voltage 3300VAC, 50Hz
  - Total nominal current ..... according to power max. 367,4A
  - Maximum number of power outlets 2
  - Maximum current of an outlet 300A
  - Marking ..... Ex d [ia] I Mb
  - Total weight 630kg

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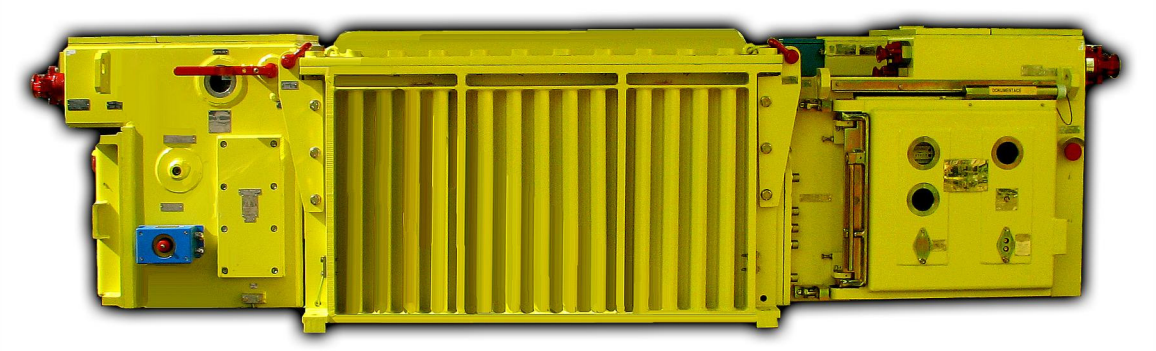
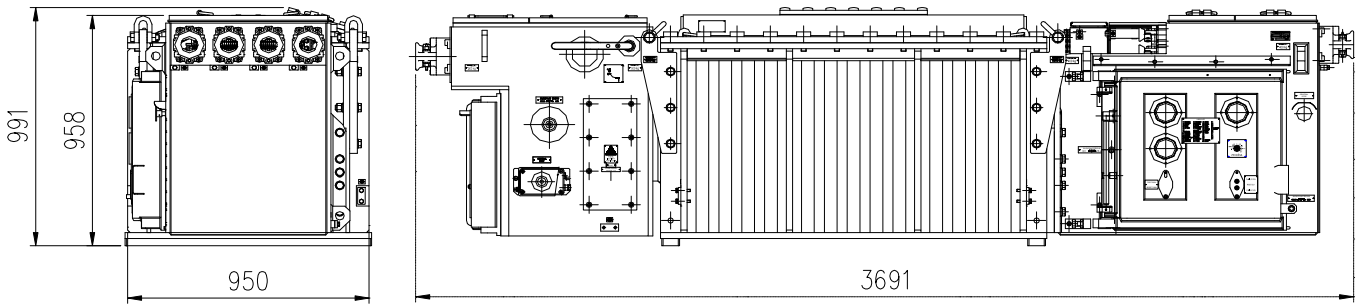
FLAMEPROOF TRANSFORMER SET TN3/160-P15

The explosion-proof transformer set is determined to transform high voltage 3,3kV to low voltage 500V (660V), for power switching and control of three-phase electro devices of mining machines. It can work in potentially explosive atmosphere.

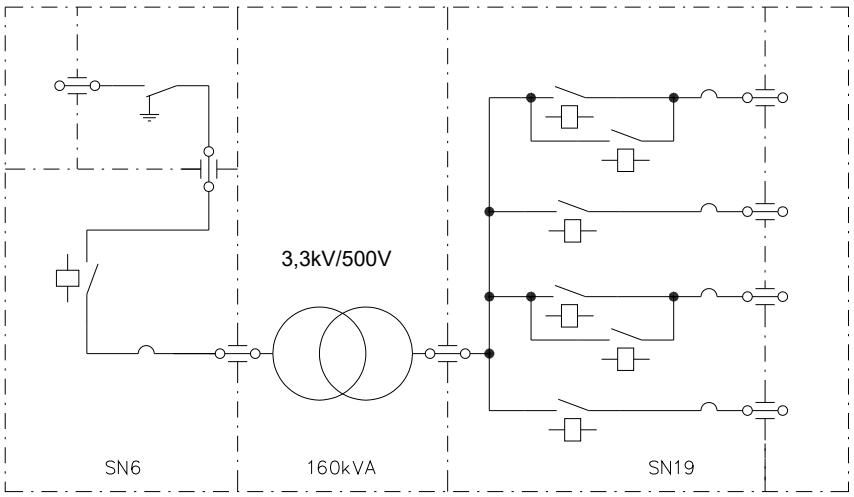


The transformer set has the type of protection against explosion Ex I M2(M1) Ex d [ia Ma] I Mb. The product complies with technical requirements for devices determined for use in potentially explosive atmospheres according to Directive 2014/34/EU (NV 116/2016 Coll.). The product also complies with technical requirements EN 60079-0, EN 60079-1 and EN 60079-11.



Electric circuits provide power outlet independently with:

- off-switching at short-circuit and short-circuit signalling;
- protection from thermal effects of overloads and signalling of overloads;
- off-switching in case the phase fall-out and in case the asymmetry of phases and equipment signalling;
- blocking the switching in case the reduction of isolation resistance of power outlet is less than 50(100)kOhm and equipment signalling;
- off-switching in case the reduction of isolation resistance of power outlet is less than 15kOhm and equipment signalling;
- blocking the switching in case the protective conductor resistance exceeds 50Ω and equipment signalling.



Technical data

- Technical parameters of high voltage part
  - Nominal voltage 3300VAC, 50Hz
  - Nominal current ..... according to requirements max. 250A
  - Nominal circuit power ..... 100MVA at 6kV
  - Nominal off-switching short-circuit current ..... 10kA at 7,2kV
  - Off-switching ability, top value 25kA
  - Short-circuit resistance, effective value 10kA (3s)
  - Time for off-switching ..... 30÷55ms
  - Marking ..... Ex d I Mb
  - Total weight 850kg

- Technical parameters of HV transformer
  - Version ..... dry three-phase transformer
  - Power output 160kVA
  - Nominal primary voltage 3300VAC
  - Nominal secondary voltage ..... according to requirements from 500VAC to 660VAC
  - Junctions of primary winding ..... ±5%
  - Frequency 50Hz
  - Connection Dyn5
  - Impedance ek 2,5%
  - Type of cooling ..... using air (ANAN)
  - Class of insulated winding ..... H (200°C)
  - Marking ..... Ex d I Mb
  - Total weight (including transformer and enclosure) 2330kg
  - Weight of transport chassis 300kg

- Technical parameters of low voltage part SN19
  - Nominal voltage 500/660VAC, 50Hz
  - Total nominal current ..... max. 176A
  - Maximum number of power outputs 4
  - Maximum current of an output 120A
  - Auxiliary output 230V 50Hz 300VA
  - Auxiliary output 42V 50Hz 100VA
  - Auxiliary output 24V 50Hz 100VA
  - Marking ..... Ex d [ia Ma] I Mb
  - Total weight 1000kg

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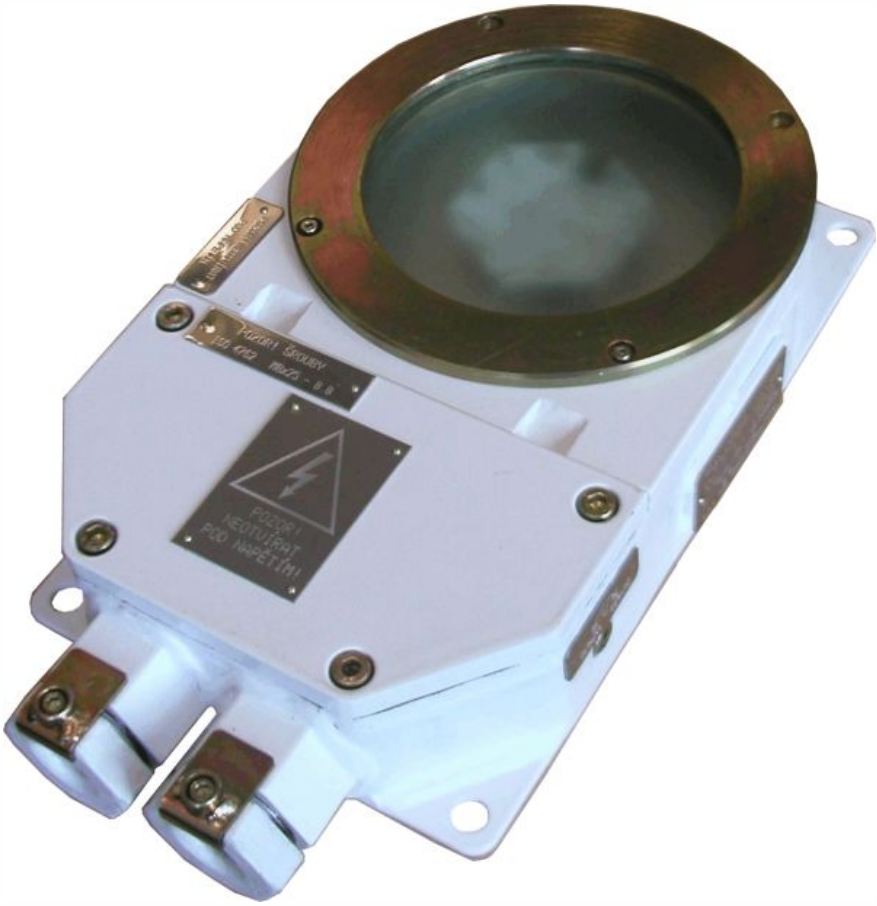
MINE WORKING LIGHTING EZSVP 12

The mine working lighting fitting EZSVP 12 is determined to illuminate the working face of underground mines. The lighting fitting can be used in all mine premises with danger of explosion of methane.
The product is designed for use in supply mains of 2/PE~ 90 to 264V, 47 to 63Hz, the source of light is provided by output power LED diodes. The lighting complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU (NV 116/2016 Sb.).



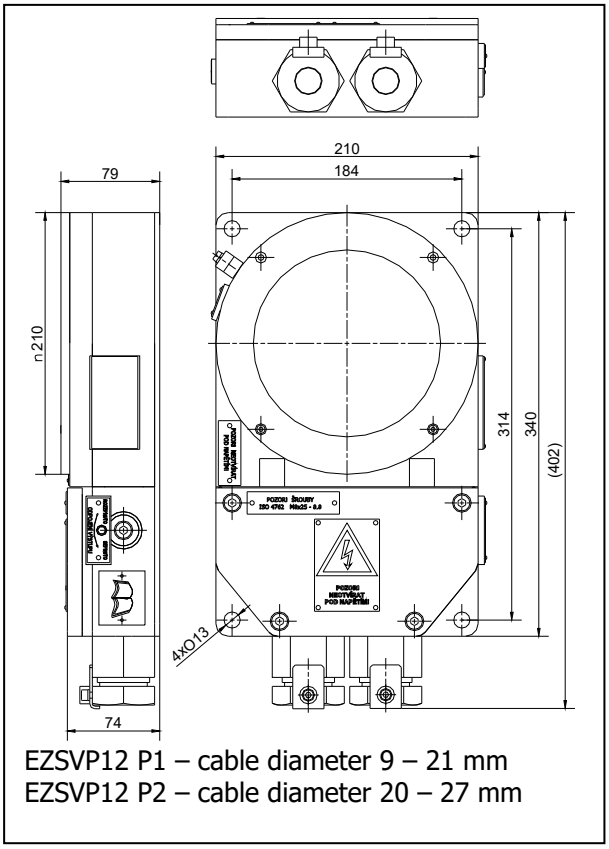
Advantages of EZSVP 12:

- High resistance against shocks, vibrations, impacts and temperature
- Energy saving, low power consumption, high illuminating power of up to 1500 lm at consumption of 35W
- Long life of light source
- Compared to fluorescent lamps possibility of frequent switching
- Almost zero fault rate
- Low weight and small dimensions
- Good mechanical wear resistance, no protrudent shapes

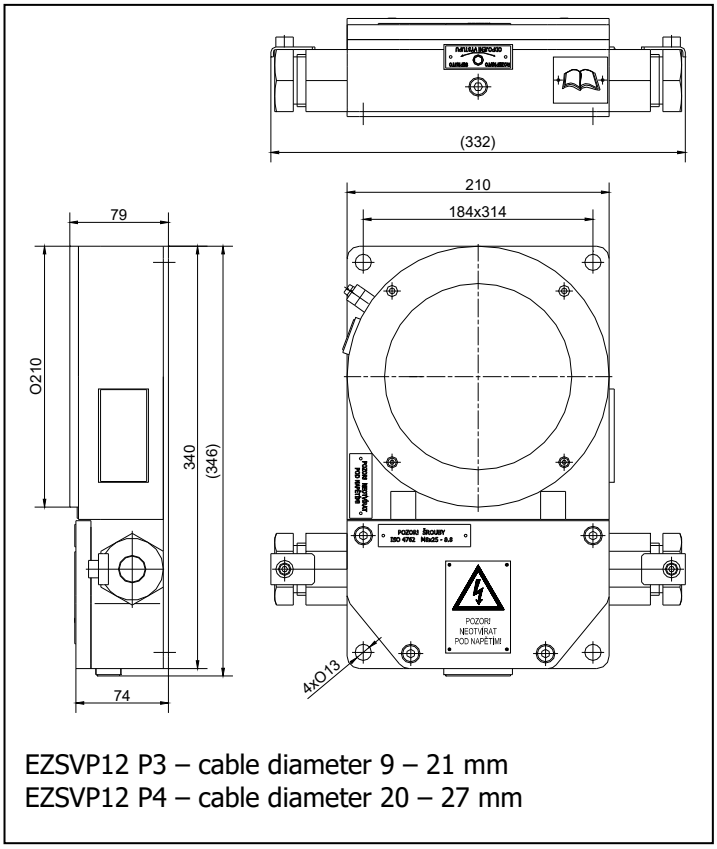
Technical description

The lighting fitting is designed as a flameproof enclosure welded of steel sheets. It contains two compartments separated by a partition fitted with an explosion-proof two-wire bushing. The connecting compartment is closed with a lid, the instrumental compartment is closed with a glass inspection window. In the connecting compartment there is a switch, supply terminal board and also a protective terminal and two fixing clips preventing the cable from snatching. The switch is determined for disconnection of continuous supply voltage in case of looking for earth leakage fault of the cable. In the lower part or side of the connecting compartment there are hexagonal threaded flameproof cable gland.

In the instrumental compartment there is a supply feeding source, lighting body with LED diodes and two fuses. After being screwed in the glass window is secured against loosening with safety bolts. On the outer side of the case there is a protective terminal. The lighting is tightened with four suiting bolts through holes of diameter of 13mm placed on the rear board of the lighting. It can be mounted in any position.



EZSVP12 P1 – cable diameter 9 – 21 mm
EZSVP12 P2 – cable diameter 20 – 27 mm



EZSVP12 P3 – cable diameter 9 – 21 mm
EZSVP12 P4 – cable diameter 20 – 27 mm

Technical data

	EZSVP12
➢ Nominal supply voltage	90 to 264V / 47 - 63Hz
➢ Nominal input power	max. 35W
➢ Light source	9 pcs of LED diode 3W
➢ Flux	1500 lm
➢ Colour of light	cold white
➢ Coverage range	IP54
➢ Marking of explosion-proof equipment	Ex I M2 Ex d I Mb
➢ Lighting weight	13.7kg

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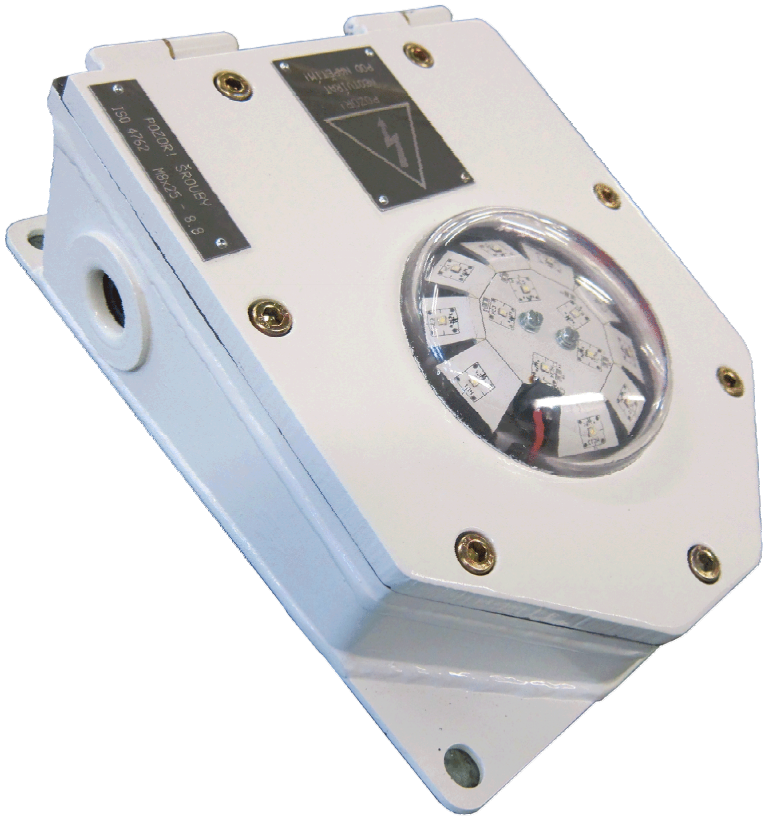
MINE WORKING LIGHTING EZSVP 13

The mine working lighting fitting EZSVP 13 is determined to illuminate the working face of underground mines. The lighting fitting can be used in all mine premises with danger of explosion of methane.
The product is designed for use in supply mains of 2/PE~ 90 to 264V, 47 to 63Hz, the source of light is provided by output power LED diodes. The lighting complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 94/9/EC (NV 23/2000 Sb.).

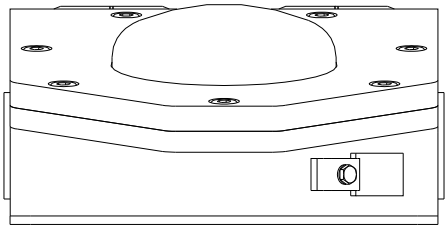


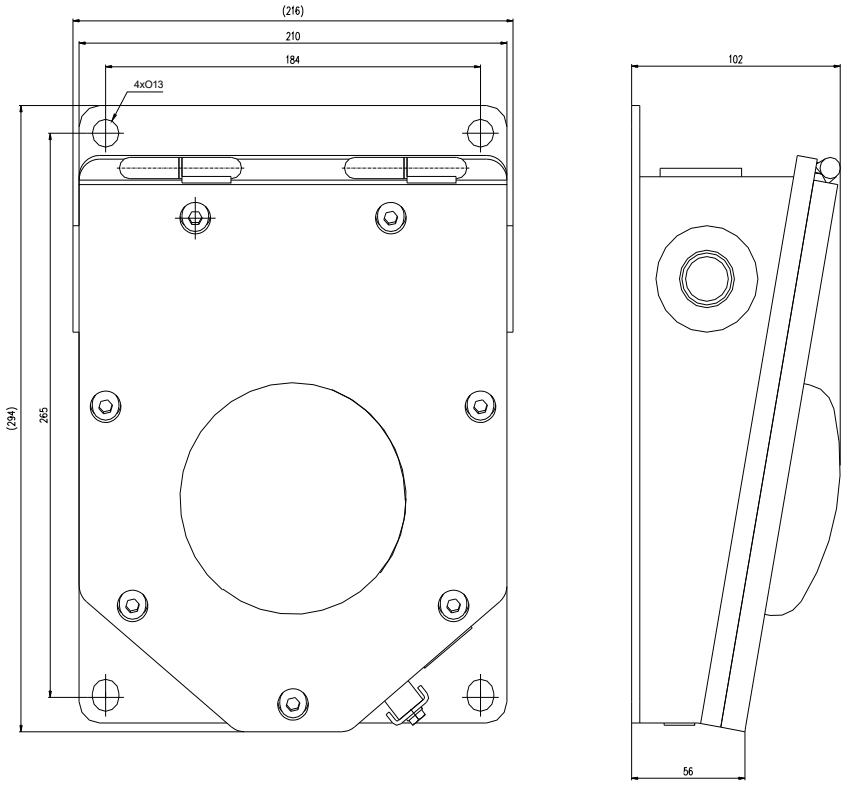
Advantages of EZSVP 13:

- High resistance against shocks, vibrations, impacts and temperature
- Energy saving, low power consumption, high illuminating power of min. 3900 lm at consumption of 35W
- Long life of light source
- Compared to fluorescent lamps possibility of frequent switching
- Almost zero fault rate
- Low weight and small dimensions
- Good mechanical wear resistance, no protrudent shapes

Technical description

The lighting is made as a flameproof enclosure welded of steel plates. On the lighting body there is a lid attached by means of hinges. There is a convex plastic inspection window in the lid. The lid is attached to the lighting body by means of seven bolts. There are supply terminals, a fuse, protective terminal, power supply, light unit with LED diodes and two cable bushings. The inner bushings used provide for the minimized lighting dimensions. There is a protective terminal on the side of the box from the outside. The lighting is attached with four suitable bolts via inlets of diameter of 13mm which are on the rear board of the lighting. The unit can be mounted in any position.





Technical data

	EZSVP13
➢ Nominal supply voltage	90 to 264V / 47 - 63Hz
➢ Nominal input power	max. 35W
➢ Light source	14 pcs of LED diode 3W
➢ Flux	min. 3900 lm
➢ Colour of light	cold white
➢ Coverage range	IP54
➢ Marking of explosion-proof equipment	Ex I M2 Ex db op is I Mb
➢ Certificate	FTZU 17 ATEX 0048X
➢ Lighting weight	13kg

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FLAMEPROOF LAMP TYPE SVN8

The flameproof lamp SVN8 is determined to illuminate the working face of underground mines. The lamp can be used in premises with danger of explosion of methane
The product complies with technical requirements for devices determined for use in potentially explosive atmospheres of mines according to Directive 2014/34/EU. The product also complies with technical requirements EN 60079-0 and EN 60079-1.

Technical data

Voltage supply	200-240V AC
Frequency	50 ÷ 60Hz
Light source	24W
Luminous efficacy	≥ 160 lm/W
Luminous flux of light source	3800 lm
Viewing angle	122º
Correlated color temperature	4000K, 6000K
Cable glands	2x M36x1,5
Connection clamb	10mm^2
Clamb loading	28A
Ambient temperature	-10ºC ≤ Ta ≤ +40ºC
Marking of devices	Ex I M2 Ex d I Mb
Coverage range	IP65
Dimensions	146 x 158 x 721 cm
Weight	8kg

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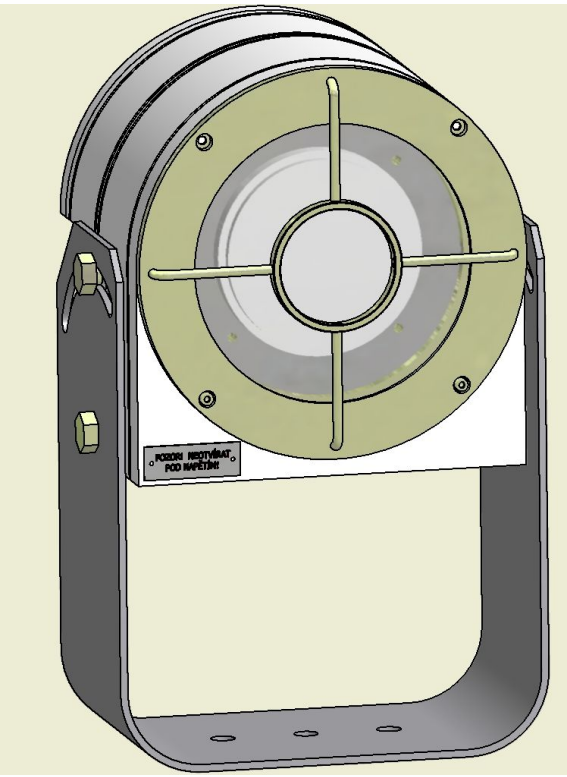
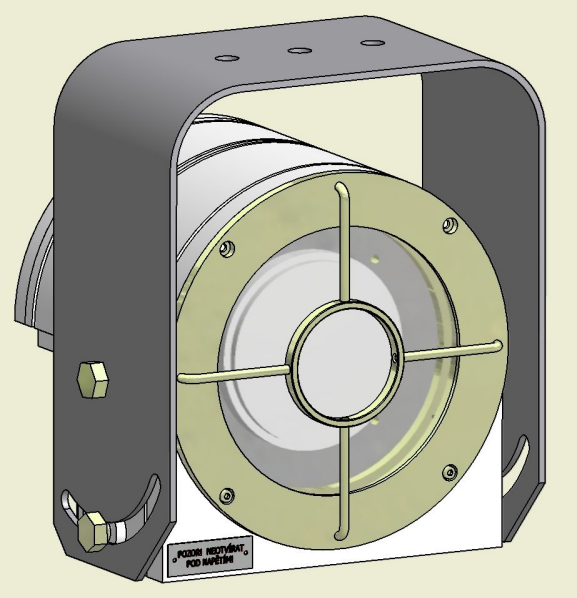
Electrical equipment spotlight EZSVR1 P1 and P2

The product is intended for lifting in underground mines, for example it is used on cutter loaders.
EZSVR1 P1 and P2 spotlight is designed as equipment of group I, category M2.
The spotlight EZSVR1 P1 is intended for use in supply network 2/PE~ AC110V ... 230V ±10%, 47 up to 63Hz and EZSVR1 P2 is intended for use in supply network 2/PE~ AC24V ±30%, 47 až 63Hz.
The product complies with technical requirements for appliances determined for use in premises where there is danger of explosion according to Directive 2014/34/EU (NV 116/2016 of Coll.).





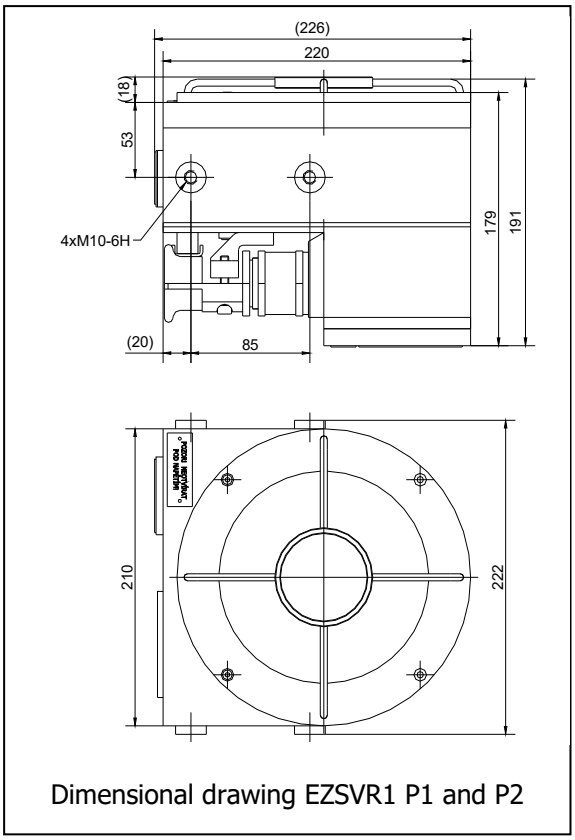
Advantages of EZSVR 1

- High resistance against shocks, vibrations, impacts and temperature
- Energy saving, low power consumption, high illuminating power of up to 1500 lm at consumption of 35W
- Long life of light source
- Compared to fluorescent lamps possibility of frequent switching
- Almost zero fault rate
- Low weight and small dimensions
- Good mechanical wear resistance, no protrudent shapes

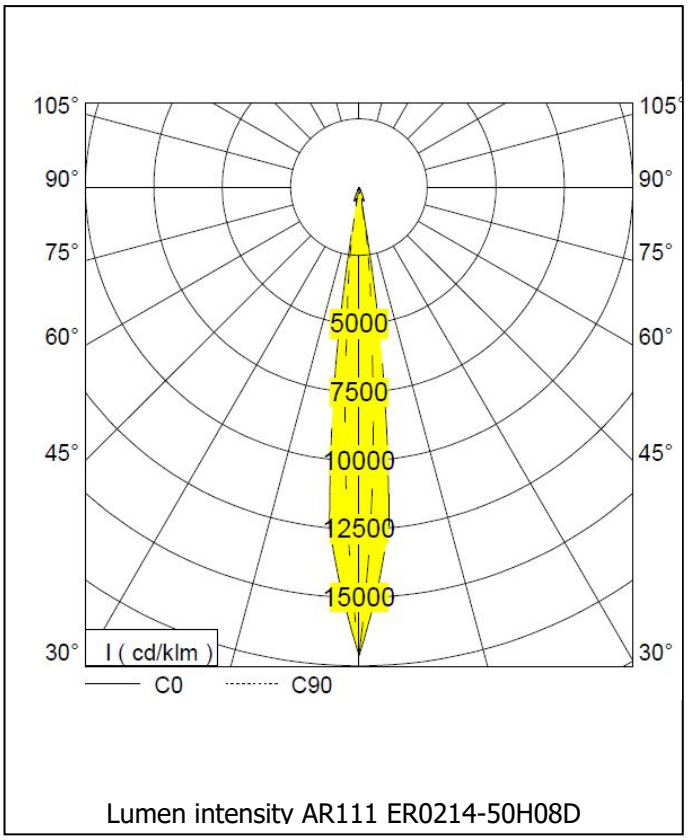
Technical description

The spotlight is manufactured as welded steel flameproof enclosure with a glass peephole and explosion-proof cable glands. The enclosure is divided into two areas separated from each other by a barrier with explosion-proof double-tubes cable gland. A cover with plane joint is used for closing of connecting area. Instrument area is closed with a peephole which creates with the flameproof enclosure a threaded joint.

There is a terminal board and protective terminal in the connecting area. The spotlight has two explosion-proof cable glands of Goethe&Co GmbH typ 54232.26-M36 type on the bottom part or one cable gland and one blind cover of Goethe&Co GmbH type 54285.M36. The cable glands are intended for supply cables of diameter 22 up to 26 mm. In the instrument area there is a power supply, LED spotlight and two fuses.
The cabinet has internal and external protective terminal, it is possible to connect a conductor with cross-section up to 10mm2
The spotlight is fixed by means of special holders with one, two or three M12 bolts. Spacing of holes for bolts in the holder is 45 mm (see pict. 2). The light can also hang (it is bolted to the "ceiling") or stand (it is bolted to the "floor"). Side bolts of the spotlight enable its tilting.



Dimensional drawing EZSVR1 P1 and P2



Lumen intensity AR111 ER0214-50H08D

Technical data

➢ Rated supply voltage EZSVR1 P1	90 až 264VAC / 47 - 63Hz
➢ Current EZSVR1 P1	0,3 ... 0,12 A
➢ Rated supply voltage EZSVR1 P2	24VAC ± 30%, / 47 - 63Hz
➢ Current EZSVR1 P2	1,25 ... 0,68 A
➢ Rated power	max. 21W
➢ Light source LED spotlight	AR111 ER0214-50H08D
➢ Luminance	16000 cd
➢ Colour temperature	Coolwhite
➢ IP code	IP54
➢ Type of protection against explosion	Ex I M2 Ex d I Mb
➢ Weight (with holder)	16,2kg (19,2kg)

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VACUUM CONTACTOR HR-VS4

The vacuum contactor HR-VS4 is an electromechanically operated device determined for frequent switching of exclusively alternating current circuits with low voltage up to 1000V and high voltage of up to 1200V according to EN 60947-1 and EN 60947-4-1 with currents of up to 400A in the range of closing and breaking currents corresponding to AC4 category. This contactor is used particularly for switching of squirrel-cage and slip-ring motors. It is suitable for switching of resistance and mixed loads. The contactor was certified by Testing Institute for Electrical Engineering at Prague (Certifying body NO. 3018).

Technical merits

- high reliability
- long lifetime
- minimum maintenance demanded during its whole lifetime
- high frequency of repeated switches
- small size and low weight
- high climatic resistance

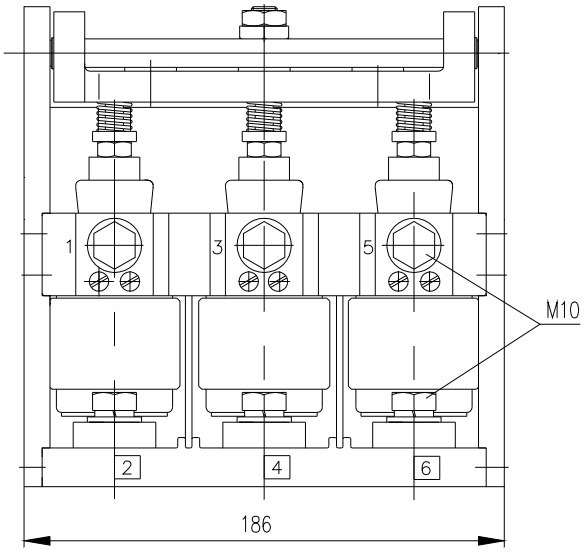
Material and design

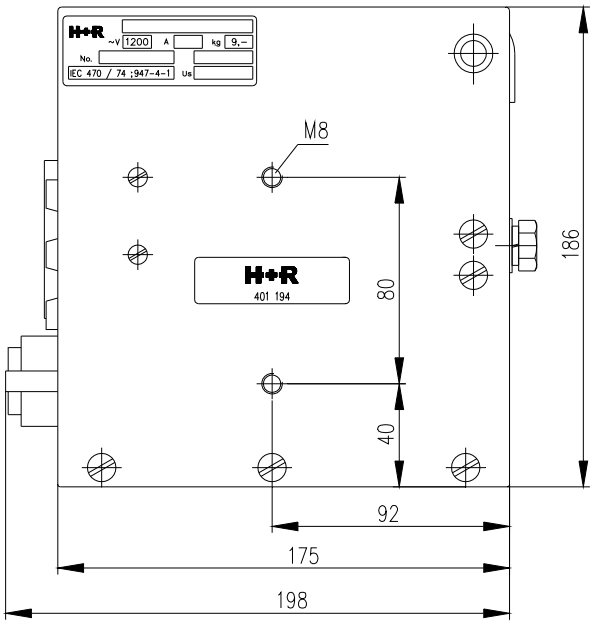
All structural parts of the contactor housing are moulded of polyester resin filled with glass fibre (DUROFORM).
The relay magnet coil former is made of Silamid.

Working environment

The vacuum contactor is designed for operation in a conventional indoor environment and the following values:

- ambient temperature ..... from -20°C to +70°C
- relative humidity at 20°C ..... max. 80%
- altitude ..... max. 1000m
- working position ..... vertical
- deflection in any direction ..... max. 10°





Technical data

➢ Nominal operational and insulation voltage	1200V
➢ Nominal operational and thermal current	450A
➢ Utilisation category	AC1 - AC4
➢ Frequency	50Hz
➢ Number of poles	3
➢ Nominal switching capacities making current	4800A
➢ Nominal switching capacities breaking current	4000A
➢ Nominal short-time current 1.0s	4.8kA
➢ Nominal dynamic current	18kA
➢ Max. breaking capacity (cosφ=0,35)	6kA
➢ Class of interrupted operations 1200	1200 cycles/hour
➢ Mechanical lifetime	$1x10^6$ cycles
➢ Electrical lifetime for AC3	$3x10^5$ cycles
for AC4	$1x10^5$ cycles
➢ Protection	protected by fuse of up to 400A with aM characteristic
➢ Nominal control voltage	230V/50Hz, +15%, -25%
	120V/50Hz, +15%, -25%
➢ Continuous consumption	5.3VA
➢ Closing time	≤ 65ms
➢ Breaking time	≤ 35ms
➢ Auxiliary contacts (AC11: 500V / 3A)	a-3, b-2 OR a-2, b-3
➢ Weight	9kg
➢ Volume	$6.1dm^3$

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VACUUM CONTACTOR HR-VS3

The vacuum contactor HR-VS3 is an electromechanically operated device determined for frequent switching of exclusively alternating current circuits with low voltage up to 1000V and high voltage of up to 1200V according to EN 60947-4-1 and EN 60947-4-1 with currents of up to 315A in the range of closing and breaking currents corresponding to AC4 category. This contactor is used particularly for switching of squirrel-cage and slip-ring motors. It is suitable for switching of resistance and mixed loads. The contactor was certified by Testing Institute for Electrical Engineering at Prague (Certifying body No. 3018).

Technical merits

- high reliability
- long lifetime
- minimum maintenance demanded during its whole lifetime
- high frequency of repeated switches
- small size and low weight
- high climatic resistance

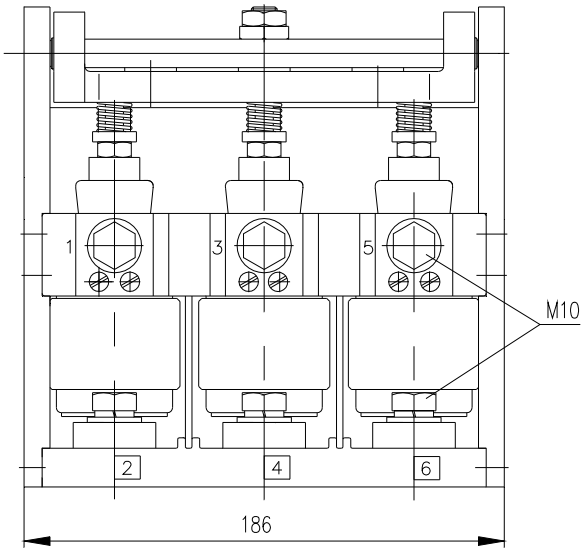
Material and design

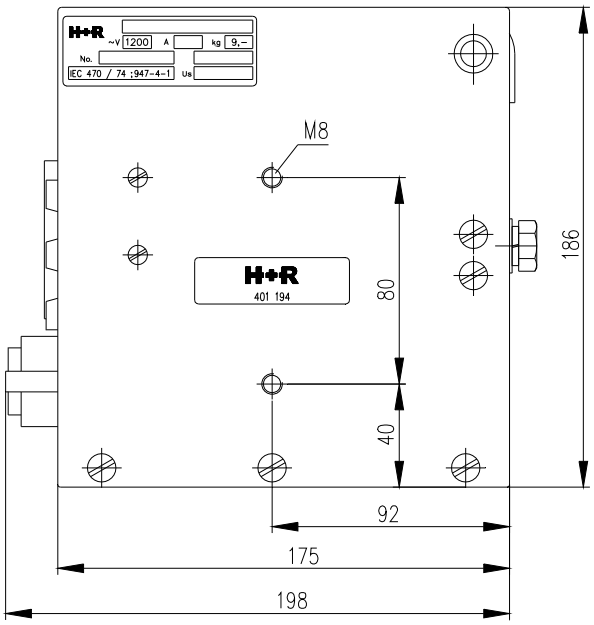
All structural parts of the contactor housing are moulded of polyester resin filled with glass fibre (DUROFORM).
The relay magnet coil former is made of Silamid.

Working environment

The vacuum contactor is designed for operation in a conventional indoor environment and the following values:

- ambient temperature ..... from -20°C to +70°C
- relative humidity at 20°C ..... max. 80%
- altitude ..... max. 1000m
- working position ..... vertical
- deflection in any direction ..... max. 10°





Technical data

➢ Nominal operational and insulation voltage	1200V
➢ Nominal operational and thermal current	315A
➢ Utilisation category	AC1 - AC4
➢ Frequency	50Hz
➢ Number of poles	3
➢ Nominal switching capacities making current	3800A
➢ Nominal switching capacities breaking current	3150A
➢ Nominal short-time current 1.0s	5kA
➢ Nominal dynamic current	12,5kA
➢ Max. breaking capacity (cosφ=0,35)	5kA
➢ Class of interrupted operations 1200	1200 cycles/hour
➢ Mechanical lifetime	$1x10^6$ cycles
➢ Electrical lifetime for AC3	$3x10^5$ cycles
for AC4	$1x10^5$ cycles
➢ Protection	protected by fuse of up to 315A with aM characteristic
➢ Nominal control voltage	230V/50Hz, +15%, -25%
	120V/50Hz, +15%, -25%
➢ Continuous consumption	5.3VA
➢ Closing time	≤ 60ms
➢ Breaking time	≤ 35ms
➢ Auxiliary contacts (AC11: 500V / 3A)	a-3, b-2 or a-2, b-3
➢ Weight	9kg
➢ Volume	$6.1dm^3$

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VACUUM CONTACTOR HR-VS200

The vacuum contactor HR-VS200 is an electromechanically operated device determined for frequent switching of exclusively alternating current circuits with low voltage up to 1000V and high voltage of up to 1200V according to EN 60947-1 and EN 60947-4-1 with currents of up to 200A in the range of closing and breaking currents corresponding to AC4 category. This contactor is used particularly for switching of squirrel-cage and slip-ring motors. It is suitable for switching of resistance and mixed loads. The contactor was certified by Testing Institute for Electrical Engineering at Prague (Certifying body No. 3018).

Technical merits

- high reliability
- long lifetime
- minimum maintenance demanded during its whole lifetime
- high frequency of repeated switches
- small size and low weight

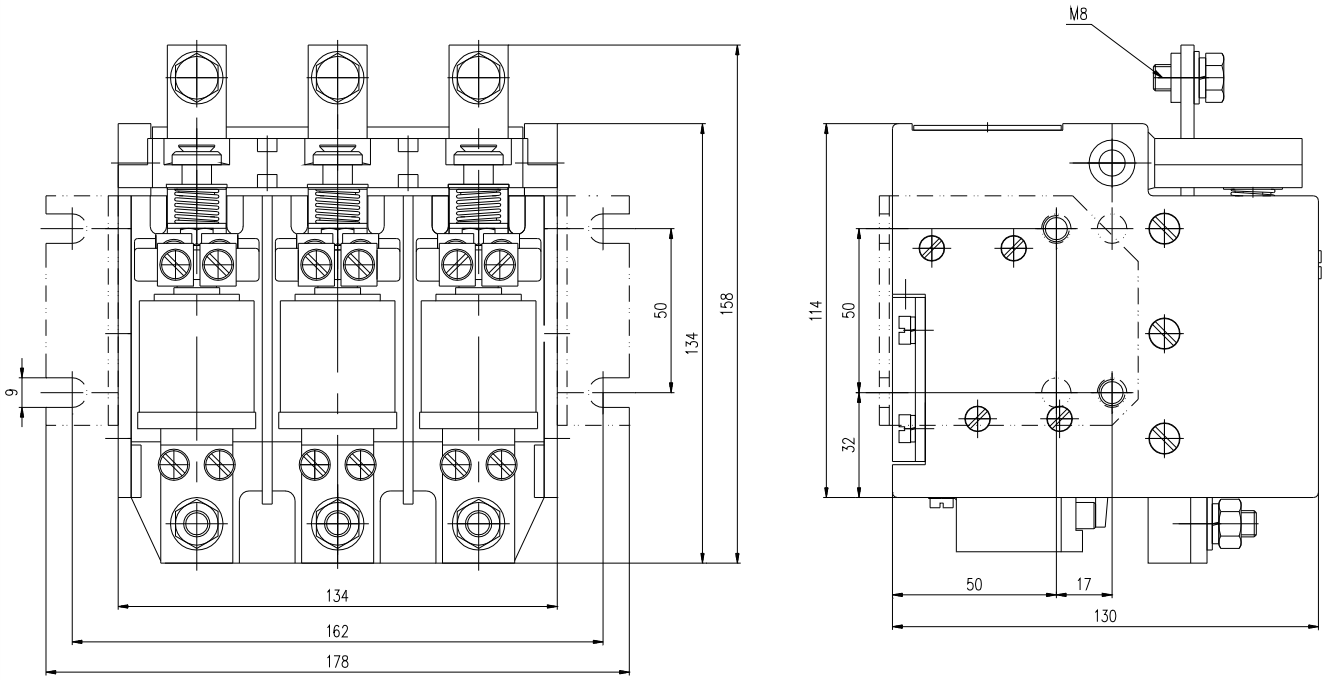
Material and design

All structural parts of the contactor housing are moulded of polyester resin filled with glass fibre (DUROFORM).
The coil former is made of Silamid.
Contactor coverage degree is - IP00.

Working environment

The vacuum contactor is designed for operation in a conventional indoor environment and the following values:

- ambient temperature ..... from -20°C to +60°C
- relative humidity at 20°C .....max. 80%
- altitude .....max. 1000m
- working position .....vertical
- deflection in any direction ..... max. 10°



Technical data

- Nominal operational and insulation voltage 1200V
- Nominal operational and thermal current 200A
- Utilisation category ..... AC1 - AC4
- Frequency 50Hz
- Number of poles 3
- Nominal switching capacities - making current 2400A
- Nominal switching capacities - breaking current 2000A
- Nominal short-time current 1.0s 3,2kA
- Nominal dynamic current 16kA
- Maximum switching capacity ..... 4000A, cos f = 0,4
- Class of interrupted operations 1200 ..... 1200 cycles/hour
- Mechanical lifetime ..... $1x10^6$ cycles
- Electrical lifetimet for AC3 ..... $3x10^5$ cycles
  for AC4 ..... $1x10^5$ cycles
- Protection ..... by fuse of up to 200A with aM characteristic
- Nominal control voltage ..... 230V/50Hz, +15%, -25%
  120V/50Hz, +15%, -25%
- Continuous consumption 3,2VA
- Closing time ..... ≤ 45ms
- Breaking time ..... ≤ 30ms
- Auxiliary contacts (U_i=500V, AC15: 230V/400V 6A/4A) a-3, b-2
- Weight 4,7kg

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VACUUM CONTACTOR HR-VS80

Vacuum contactor HR-VS80 is an electromechanically controlled device determined for frequent switching of exclusively AC electrical circuits of low voltage up to 1000V and high voltage up to 1200V as specified in EN 60947-1 and EN 60947-4-1 with currents up to 80A in the range of on-switching and off-switching category AC4. It is designed for switching of squirrel-cage and slip-ring armature motors. It is suitable for switching of resistance as well as mixed loads.

Technical advantages

- high reliability
- long life
- minimum requirements for maintenance during its whole lifetime
- high frequency of repeated switches
- small dimensions and low weight

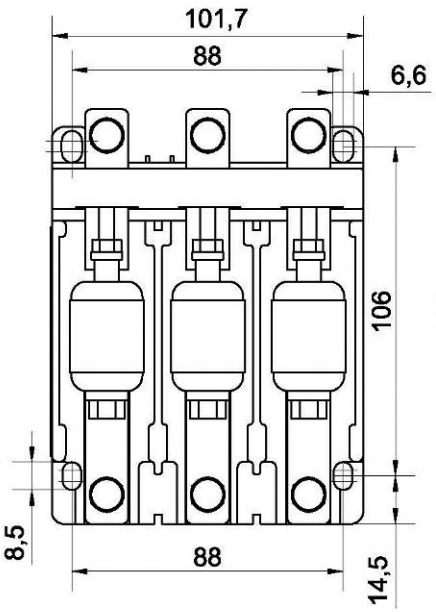
Material and design features

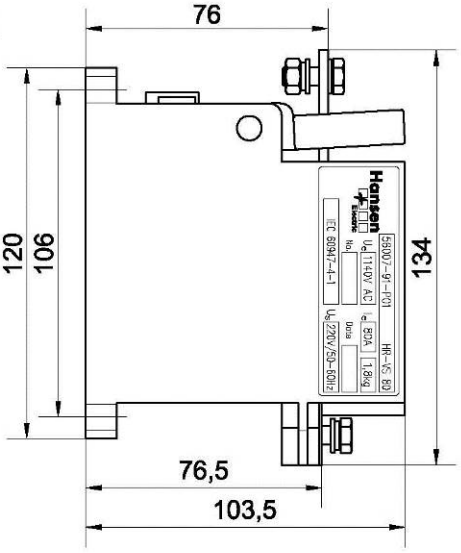
All structural parts of the contactor housing are moulded of polyester resin filled with glass fibre.
The electromagnet coil casing is made of Silamid.
Contactor coverage degree - IP00.

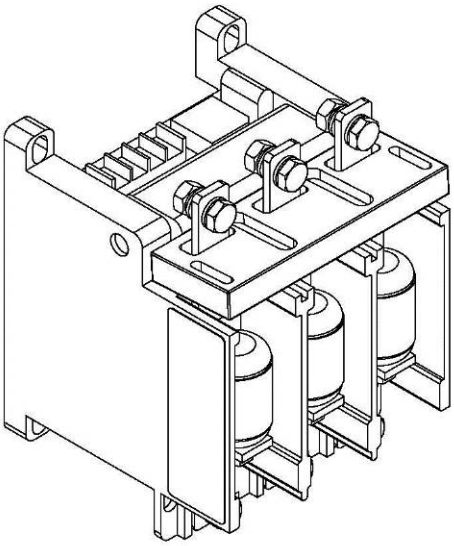
Working ambient

The vacuum contactor is designed for the operation in common indoor premises with the following values:

- ambient temperature ..... -20°C to +70°C
- relative humidity at 20°C ..... max. 80%
- altitude ..... max. 1000m
- operation position ..... vacuum interrupters vertical
- deflection in any direction ..... max. 10°







Technical data

- Nominal operational and insulation voltage 1200V
- Nominal operational and thermal current 80A
- Category of use ..... AC1 - AC4
- Frequency 50-60Hz
- Number of poles 3
- Nominal switching capacity - Izap 960A
- Nominal off-switching capacity - Ivyp 800A
- Nominal short-term current 1.0 s 1340A
- Nominal dynamic current 2360A
- Class of interrupted operation 1200 ..... 1200 cycles/hour
- Mechanical life ..... $1x10^6$ cycles
- Electrical life for AC3 ..... $3x10^5$ cycles
  for AC4 ..... $1x10^5$ cycles
- Protection ..... up to 80A with aM characteristics
- Nominal control voltage ..... 220V/50-60Hz, +15%, -25%
  230V/50-60Hz, +15%, -25%
  120V/50-60Hz, +15%, -25%
- Permanent consumption when ON 9VA
- On-switching time ..... ≤ 30ms
- Off-switching time ..... ≤ 40ms
- Auxiliary contacts LX19K (AC380V DC220V 5A) 2xNO,1xNC
- Weight 1.8kg

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THREE-PHASE EXPLOSION-PROOF ASYNCHRONOUS ELECTRIC MOTOR WITH SQUIRREL CAGE

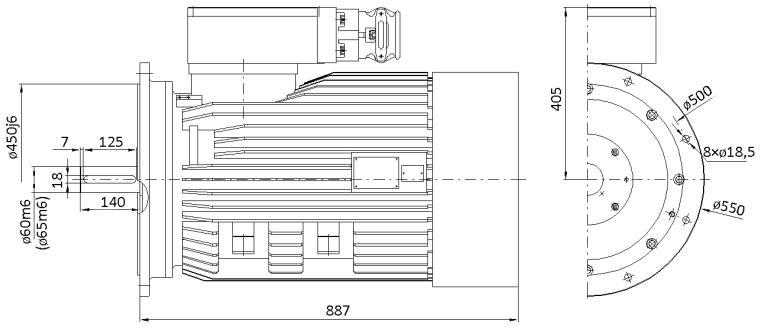
2HVM 250M - 4 - … 55kW Ex IM2 Ex d I Mb CE 1026

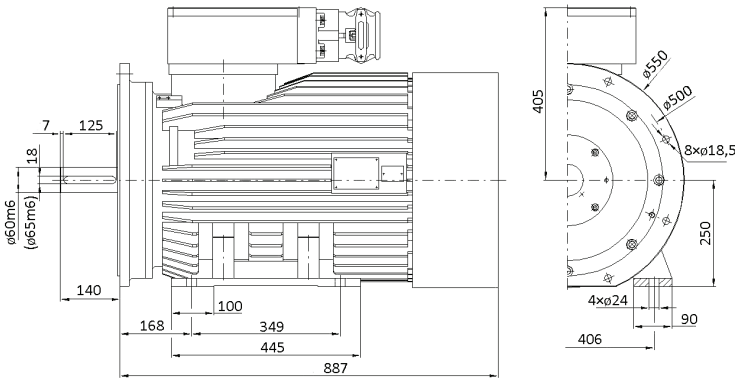
Motor 2HVM 250M-4-xxx is designed to power of mining equipment. Motor can be used in underground parts of mines and in surface installations of such mines endangered by an explosion of methane and/or coal dust. Electric motor is included in group I. category M2 according to ATEX directive (94/9/EC).

Design:

The electric motor is explosion-proof. Type of protection is flameproof enclosure „d", meeting the requirements and provisions of the standards EN 60079-0, EN 60079-1 and of the series of standards EN 60034. Motor is designed with flange (IM B5) or with flange and feet (IM B35), degree of protection IP 65, insulation class H. For the control of bearings and winding heating is motor equipped with two independent thermal sensor circuits (PTC thermistors or NC bimetal sensors).

Basic installation dimensions:





Technical data:

Supply voltage U_N	[V]	400	500	660	690	1000	1100	1140
Rated power P_N	[kW]	55						
Frequency f_N	[Hz]	50						
Mode of operation		S1						
Rated current I_N	[A]	100,0	80,0	60,6	58,0	40,0	36,4	35,1
Rated speed n_N	[min^{-1}]	1466						
Power factor cosϕ	[-]	0,86						
Minimum cross-section of the power cable	[mm^2]	35	25	25	25	16	16	16
Rated torque M_N	[Nm]	358						
Starting current I_K/I_N	[-]	5,8						
Starting torque M_K/M_N	[-]	2,2						
Torque of reversal M_B/M_N	[-]	2,3						
Efficiency η	[%]	92,7						
Moment of inertia of rotor J_M	[kgm^2]	1,05						
Mass m (IMB3/IMB35)	[kg]	655/687						

Conditions of operation and application:

Ambient temperature	-20 ÷ +40 °C	Operating voltage	(0,90÷1,10)U_N
Relative humidity at 35°C	≤ 100%	Slope of the axis of shaft	≤ 30°
Dusty of environment	<1000mg/m^3	Outer diameter of the cable	∅ 30-54mm

Meaning of the characters in the motor labelling:

1. - 4.	5. - 8.		9.		10.	11.	12.
2HVM	**250M**	**-**	**4**	**-**	**0**	**0**	**A**

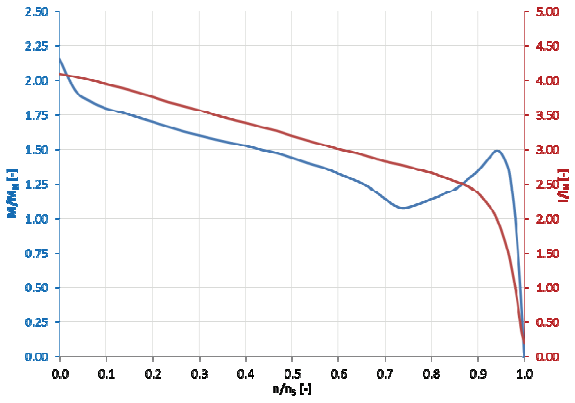
1. – 4. Type labelling
5. – 8. Axis height (250mm) and length (middle)
9. Number of poles (4 poles ~ 1500 rpm at 50Hz)

10. char. – Supply voltage	
0 – 400V, 50Hz, Δ, one voltage	4 – 1000V, 50Hz, Y, one voltage
1 – 500V, 50Hz, Y, one voltage	5 – 1100V, 50Hz, Y one voltage
2 – 660V, 50Hz, Δ, one voltage	6 – 1140V, 50Hz, Y, one voltage
3 – 690V, 50Hz, Y, one voltage	

11. char. – Thermal sensors
0 – bimetal NC
1 – thermistor PTC

12. char. - Design	
A – flange IM B3, shaft Ø60×140	C – flange and feet IM B35, shaft Ø60×140
B – flange IM B3, shaft Ø65×140	D – flange and feet IM B35, shaft Ø65×140

Torque characteristic:



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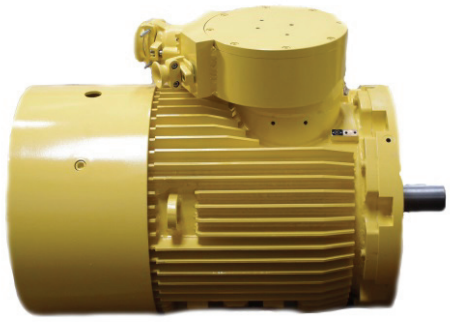
THREE-PHASE EXPLOSION-PROOF ASYNCHRONOUS ELECTRIC MOTOR WITH SQUIRREL CAGE

2HVM 280S - 4 - … 75kW IM2 Ex d I Mb CE1026

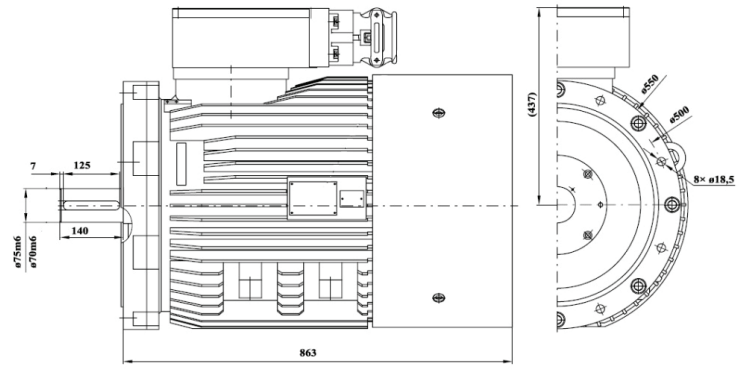


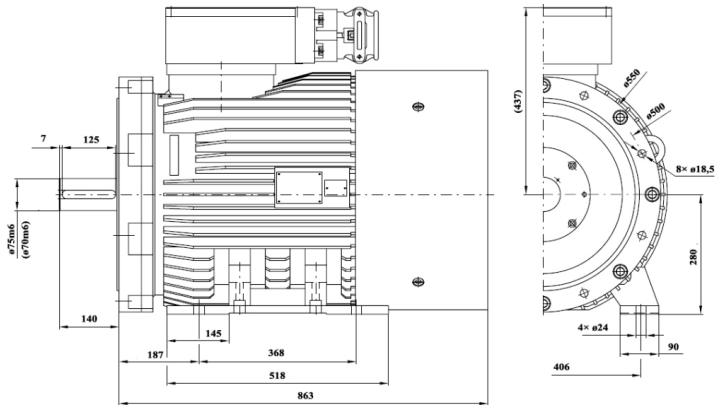
Motor 2HVM 280S-4-xxx is designed to power of mining equipment. Motor can be used in underground parts of mines and in surface installations of such mines endangered by an explosion of methane and/or coal dust. Electric motor is included in group I. category M2 according to ATEX directive (94/9/EC).

Design:

The electric motor is explosion-proof. Type of protection is flameproof enclosure „d", meeting the requirements and provisions of the standards EN 60079-0, EN 60079-1 and of the series of standards EN 60034. Motor is designed with flange (IM B5) or with flange and feet (IM B35), degree of protection IP 65, insulation class H. For the control of bearings and winding heating is motor equipped with two independent thermal sensor circuits (PTC thermistors or NC bimetal sensors).

Basic installation dimensions:





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Technical data:

Supply voltage U_N	[V]	400	500	660	690	1000	1100	1140
Rated power P_N	[kW]	75						
Frequency f_N	[Hz]	50						
Mode of operation		S1						
Rated current I_N	[A]	131,3	105,0	79,5	76,1	52,5	47,7	46,1
Rated speed n_N	[min^{-1}]	1475						
Power factor cosϕ	[-]	0,88						
Minimum cross-section of the power cable	[mm^2]	50	35	35	35	25	25	25
Rated torque M_N	[Nm]	486						
Starting current I_K/I_N	[-]	6,3						
Starting torque M_K/M_N	[-]	2,6						
Torque of reversal M_B/M_N	[-]	2,8						
Efficiency η	[%]	93,0						
Moment of inertia of rotor J_M	[kgm^2]	1,43						
Mass m (IMB3/IMB35)	[kg]	765/780						

Conditions of operation and application:

Ambient temperature	-20 ÷ +40 °C	Operating voltage	(0,90÷1,10)U_N
Relative humidity at 35°C	≤ 100%	Slope of the axis of shaft	≤ 30°
Dusty of environment	<1000mg/m^3	Outer diameter of the cable	∅ 30-66mm

Meaning of the characters in the motor labelling:

1. - 4.	5. - 8.		9.		10.	11.	12.
2HVM	**280S**	**-**	**4**	**-**	**0**	**0**	**A**

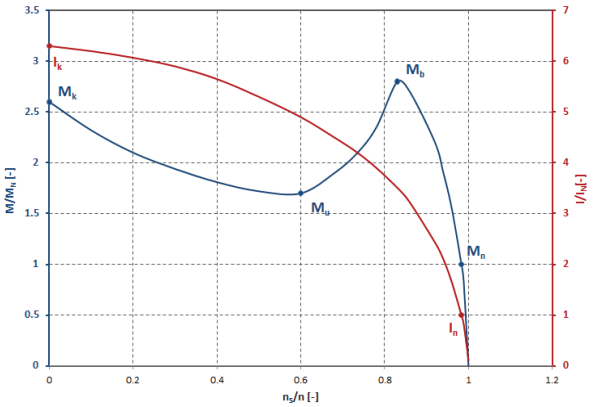
1. – 4. Type labelling
5. – 8. Axis height (250mm) and length (middle)
9. Number of poles (4 poles ~ 1500 rpm at 50Hz)

10. char. – Supply voltage	
0 – 400V, 50Hz, Δ, one voltage	4 – 1000V, 50Hz, Y, one voltage
1 – 500V, 50Hz, Y, one voltage	5 – 1100V, 50Hz, Y one voltage
2 – 660V, 50Hz, Δ, one voltage	6 – 1140V, 50Hz, Y, one voltage
3 – 690V, 50Hz, Y, one voltage	

11. char. – Thermal sensors
0 – bimetal NC
1 – thermistor PTC

12. char. - Design	
A – flange IM B3, shaft Ø70×140	C – flange and feet IM B35, shaft Ø70×140
B – flange IM B3, shaft Ø75×140	D – flange and feet IM B35, shaft Ø75×140

Torque characteristic:



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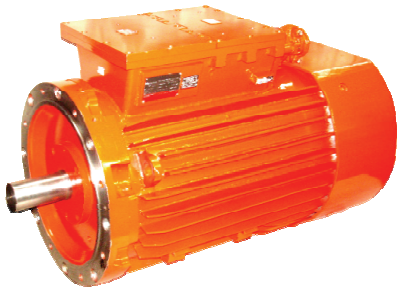
THREE-PHASE EXPLOSION PROOF ASYNCHRONOUS ELECTRIC MOTOR WITH SQUIRREL CAGE HVM 280M-4, HKM 280M-4, 100kW

Three-phase asynchronous electric motor HVM 250M-4 (flanged) and HKM 250M-4 (foot-flanged) is designed to power mining equipments. The motor can be used in underground parts of mines and in surface installations of such mines endangered by an explosion of methane or coal dust. The electric motor is included in group I., category M2 according to ATEX directive (94/9/EC).



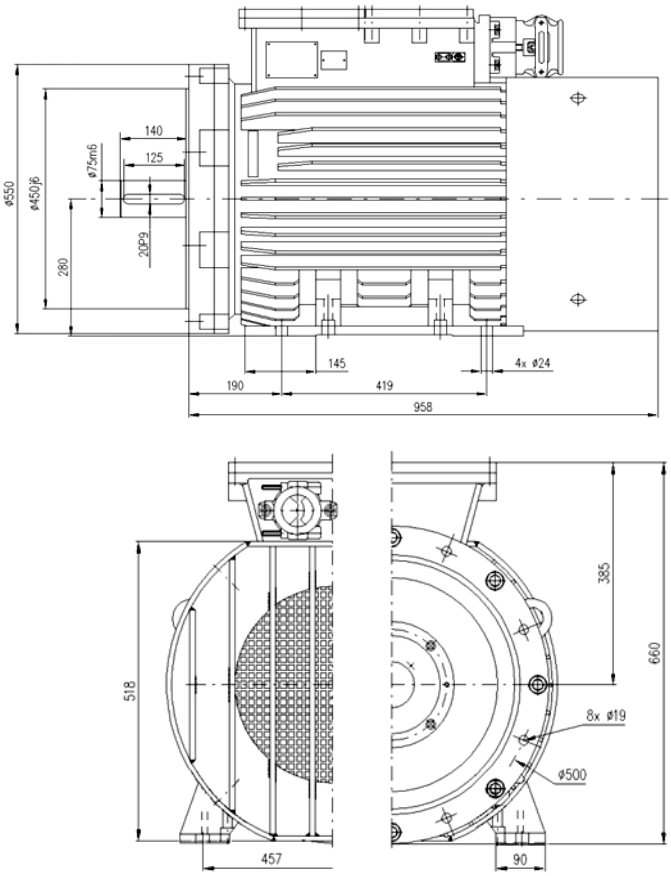
Design:

The electric motor is produced explosion-proof. Type of protection is flameproof enclosure ,,d", meeting the requirements and provisions of the standards EN 60079-0, EN 60079-1 and general standard EN 60034. The electric motor is marked

Ex IM2 Ex d I

Electric motor was tasted by a notified company with type certificate nr. FTZÚ 11 ATEX 0106X.The electric motor is designed as a flange or foot-flange, shape IM 3001 or IM 2001. Degree of protection is IP 65.Class of insulation is H. To the electric motor is included one circuit of resistance heat sensors PTC (with positive temperature coefficient) and one circuit of NC heat sensors (bimetal).

Overall and assembly dimensions:



Technical data:

HVM (HKM) 280M-4				
Supply voltage U_N	[V]	440	500	1000
Rated power P_N	[kW]	100	100	100
Frequency f_N	[Hz]	60	50	50
Rated current I_N	[A]	174	142	71
Rotation speed n_N	[min^{-1}]	1785	1480	1480
Rated torque M_N	[Nm]	535	645	645
Power factor cosϕ	[-]	0,82	0,89	0,89
Mode of operation		S1	S1	S1
Starting current I_K/I_N	[-]	6,3	6,0	6,0
Starting torque M_K/M_N	[-]	2,2	2,4	2,4
Torque of reversal M_{MAX}/M_N	[-]	2,5	2,4	2,4
Efficiency η	[%]	92,3	92,0	92,0
Moment of inertia of rotor J_M	[kgm^2]	2,08	2,08	2,08
Mass of motor m	[kg]	892(920)	892(920)	892(920)

Conditions of operation and application:

HVM (HKM) 280M-4			
Supply voltage U_N	400V	500V	1000V
Ambient temperature	-20 ÷ +40 °C		
Relative humidity at 35°C	≤ 100%		
Dusty environment	<1000mg/m^3		
Working voltage	(0,95÷1,05)U_N		
Slope of the shaft axis	≤ 30°		
Voltage of the lead	≥0,6kV	≥0,6kV	≥1,0kV
Cross-section of the lead	95mm^2	70mm^2	50mm^2
Outer diameter of the lead	Ø 30 ÷ 54mm (VP50) Ø 50 ÷ 66mm (VP67) acc. to diameter of the sealing ring		

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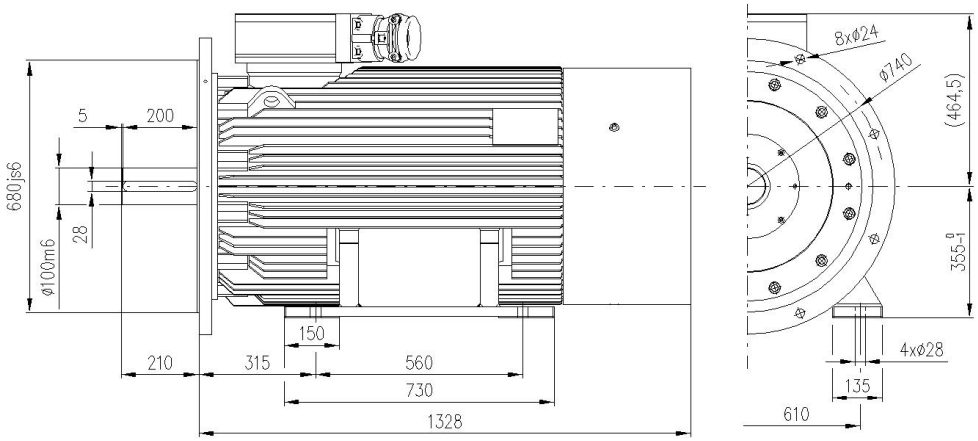
THREE-PHASE EXPLOSION-PROOF ASYNCHRONOUS ELECTRIC MOTOR 2HVM 355L – 4 – … 250KW

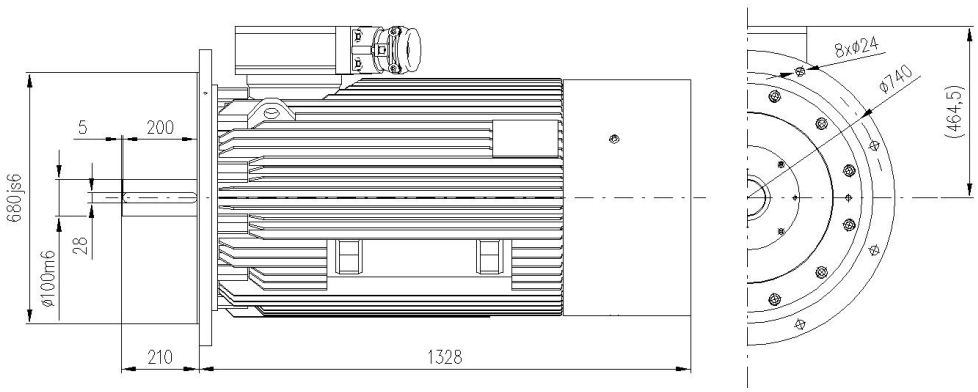
Motor 2HVM 280S-4-xxx is designed to power of mining equipment. Motor can be used in underground parts of mines and in surface installations of such mines endangered by an explosion of methane and/or coal dust. Electric motor is included in group I. category M2 according to ATEX directive (2014/34/EU).

Design:

The electric motor is explosion-proof. Type of protection is flameproof enclosure „d", meeting the requirements and provisions of the standards EN 60079-0, EN 60079-1 and of the series of standards EN 60034. Motor is designed with flange (IM B5) or with flange and feet (IM B35), degree of protection IP 65, insulation class F. For the control of bearings and winding heating is motor equipped with two independent thermal sensor circuits (PTC thermistors or NC bimetal sensors).

Basic installation dimensions:





Technical data:

Supply voltage U_N	[V]	1000	1100	1140
Rated power P_N	[kW]	250		
Frequency f_N	[Hz]	50		
Mode of operation		S1		
Rated current I_N	[A]	170	154,5	149,1
Rated speed n_N	[min^{-1}]	1487		
Power factor cosϕ	[-]	0,90		
Minimum cross-section of the power cable	[mm^2]	70	70	70
Rated torque M_N	[Nm]	1608		
Starting current I_K/I_N	[-]	5.7		
Starting torque M_K/M_N	[-]	0.9		
Torque of reversal M_B/M_N	[-]	2,1		
Efficiency η	[%]	94,3		
Mass m (IMB3/IMB35)	[kg]	1860/1890		

Conditions of operation and application:

Ambient temperature	0 ÷ +40 °C	Operating voltage	(0,90÷1,10)U_N
Relative humidity at 35°C	≤ 100%	Slope of the axis of shaft	≤ 30°
Dusty of environment	<1000mg/m^3	Outer diameter of the cable	∅ 42-66mm

Meaning of the characters in the motor labelling:

1. - 4.	5. - 8.		9.		10.	11.	12.
2HVM	**315L**	**-**	**4**	**-**	**4**	**0**	**A**

1. – 4. Type labelling
5. – 8. Axis height (315mm) and length (long)
9. Number of poles (4 poles ~ 1500 rpm at 50Hz)

10. char. – Supply voltage	
4 – 1000V, 50Hz, Y 5 – 1100V, 50Hz, Y 6 – 1140V, 50Hz, Y	

11. char. – Thermal sensors
0 – 2× bimetal NC 1 – 2× thermistor PTC 2 – 1× bimetal NC + 1× thermistor PTC

12. char. - Design	
A – flange IM B3, shaft ∅100×210	C – flange and feet IM B35, shaft ∅100×210

Torque and current characteristic: