EXPLOSION-PROOF DEVICES OF THE ELECTRICAL DRIVE CONTROL OF ЭМДВ TYPE

Private Joint Stock Company «DEG»

GENERAL INFORMATION

Explosion-proof devices of the electrical drive control of ЭМДВ type are designed to control the running speed of the trains of the underground rope roads, conveyers and hoist in the coal mines hazardous of gas (methane) and coal dust. The devices control the asynchronous electrical motors with squirrel-cage rotor in the electrical networks of the three-phase AC voltage with the isolated neutral.

The devices have the «flameproof» explosion protection level; their explosion protection types are «flameproof enclosure» and «intrinsically safe electrical circuit»; explosion protection marking is Ex d ia I according to IEC 60079. Environment protection degree is IP54 according to IEC 60529. Climatic version and location category class 3K6 according to IEC 721-3-3-87.

The devices are manufactured for both the inner market and export, they conform with the technical demands of ТУ У 31.2-23189879-012:2007.

IDENTIFICATION CODE STRUCTURE

ЭМДВ-XXX X5

Э — device of the electrical drive control;

МД — modified;

В — explosion-proof;

XXX — rated power of the electrical motor driven in kW;

X5 — climatic version and location category according to GOST 15150.

OPERATION CONDITIONS

- ambient temperature- from 0°C to + 35°C;
- relative humidity is 98±2% at the temperature of + 35°C;
- ambient dustiness up to 1000 mG/m;
- rated values of the external ambient factors for the group of mechanical version M1 according to IEC 721-3-3-87.

FUNCTIONS

The devices support the following:

- wide range speed control of the drive motor;
- soft start of the drive motor with programmable acceleration time until the preset speed;
- electrical braking of the electrical drive motor with the power recuperation into the supply power network while transport movement on the slopes and stoppage;
- hitless reversing of the drive motor;
- emergency stoppage of the electrical drive at the frequency converter failure and when “emergency stop” button is pressed;

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- manual control through the running speed setting unit performed by a train driver;
- control of the transport installation electrical drive braking device;
- blocking of the electrical drive operation through the transport installation control apparatus.
- remote control using analog and digital signals; remote control using intrinsically safe RS485 interface (protocol ModBus RTU).

The control system of the ЭМДВ device proves the following protection types:

- switching off while the value of isolation resistance of the output connections is lower than 30 kOhm;
- protection from the short-circuit inside the frequency converter and in the load;
- protection from the overload and breakdown of drive motor;
- protection from the electrical motor phase loss;
- protection from the over-temperature of the power semi-conductor elements radiator;
- lock power supply to the load with damaged insulation.

CONSTRUCTION

The devices explosion-proof enclosures are welded construction consisting of four sections: the network section, the control circuit section, the apparatus section and the power section.

The network section is designed for the power supply, main drive and auxiliary drives cables input. For this purpose it has two cable glands with the diameter of 63 mm and four cable glands with the diameter of 32 mm. There is an explosion-proof bulkhead between the network section and the control circuit section.

The control circuit section consists of inlet compartment and МУВ module compartment, separated by a bulkhead with holes intended for laying of control circuits. There are communicating plugs mounted in each compartment to support laying of control circuits from apparatus section to control circuits section. There are also terminal blocks mounted in the control circuit section.

The inlet compartment is designed for intrinsically safe circuits only. For cables input/output it has one cable gland with the diameter of 40 mm and one cable gland with the diameter of 32 mm. The inlet compartment is closed with bolted-type removable cover.

The МУВ module compartment is designed for mounting the module of control and visualization and three control buttons. The МУВ module and buttons are placed to the rotary cover, which has a rectangular viewing window covered with a transparent polycarbonate for the МУВ module screen review. The МУВ module compartment cover is mounted on hinges and is fixed to the casing with countersunk screws.

The apparatus section contains the power disconnecting switch, contactor, power sources, control and protection apparatus. It is provided with a rectangular bolt cover with an outer flange mounted on the rotary hinges.

The power section contains the frequency converter, input and output inductors. There is a bulkhead between the power section and the apparatus section with an opening for laying of control and power cables. The power section is provided with a rectangular bolt cover with an outer flange mounted on the rotary hinges.

All ЭМДВ enclosures are equipped with a warning plate “Open after power supply disconnection”.

The device enclosures are equipped with the external and the internal earthing clips.

The ЭМДВ devices of 160 kW and higher are supported with a separate liquid cooling unite (designed to work in the coal mines). This unit includes a pump, radiator, expansion tank and a fan. The liquid cooling device is connected to the ЭМДВ via two hoses.

Device of the electrical drive control of ЭМДВ type functional diagram is given in Figure 1.

Outline drawings of ЭМДВ enclosures are given in Figure 2.

ТЕХНИЧЕСКИЕ ДАННЫЕ

Rated (network) voltage, V	380, 660;
Output voltage, V	0...$U_{ном.}$;
Rated frequency, Hz	50;
Output voltage frequency range, Hz	0...70;
Rated power of the electrical motor driven, kW	55, 75, 90, 110, 132, 160, 200, 250;
Rated voltage of intrinsically safe circuits, V	12

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MANUFACTURER WARRANTY

Warranty period is 12 months from the date of the equipment commissioning but not more than 18 months since the delivery date.

DELIVERY SET

- explosion-proof device of the electrical drive control of ЭМДВ type;
- device can be supplied with the mining transport control apparatus of АУРТ type;
- operation manual;
- certificate of identification.

Designer and Manufacturer:
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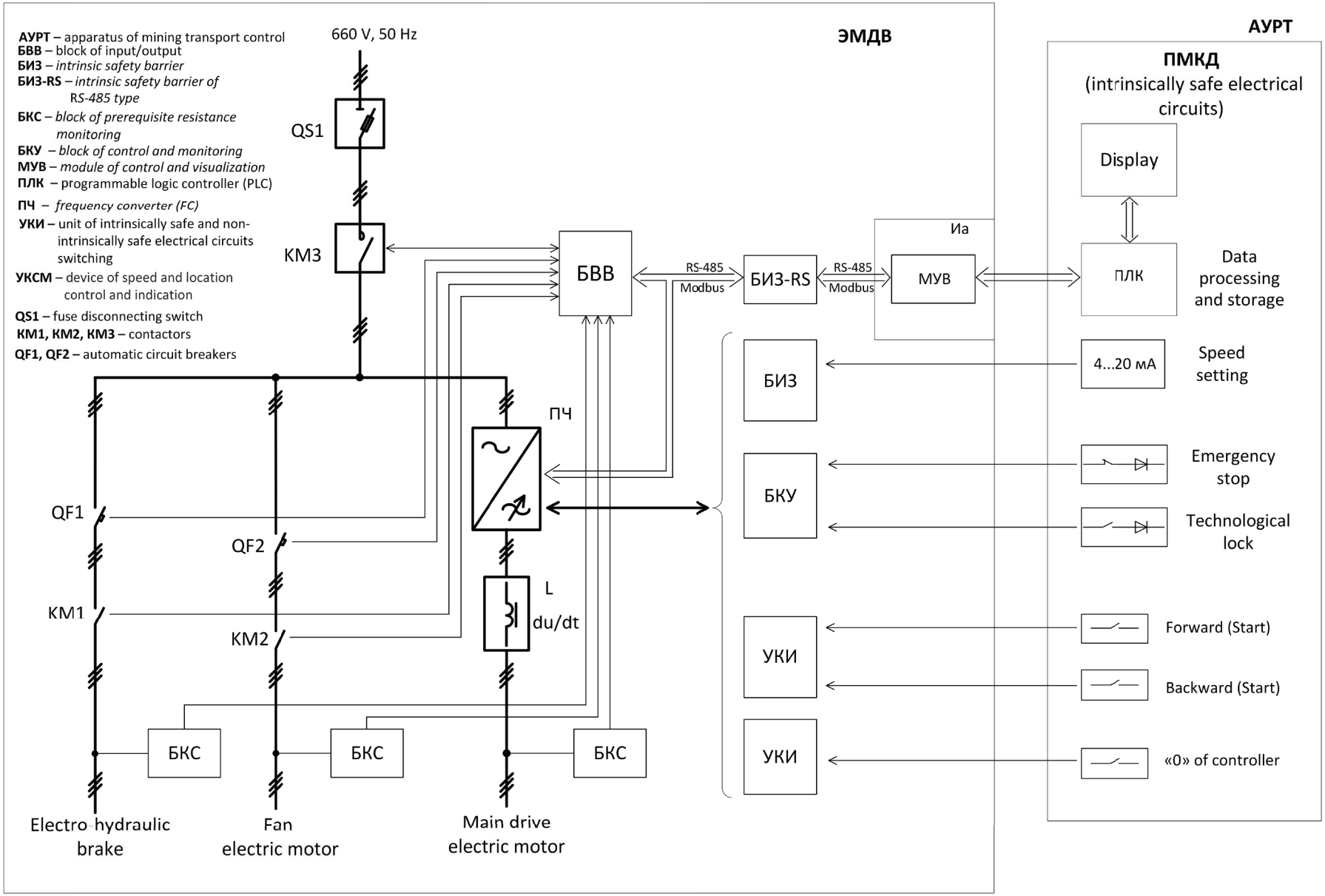

Figure 1. *Device of the electrical drive control of ЭМДВ type functional diagram*

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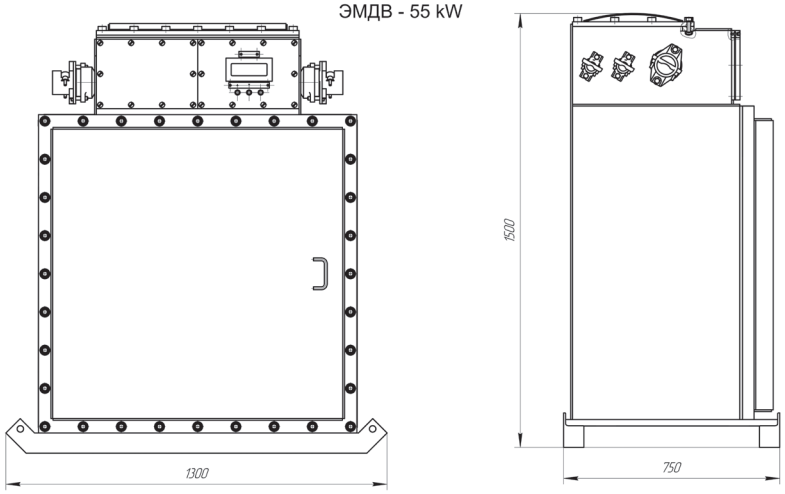
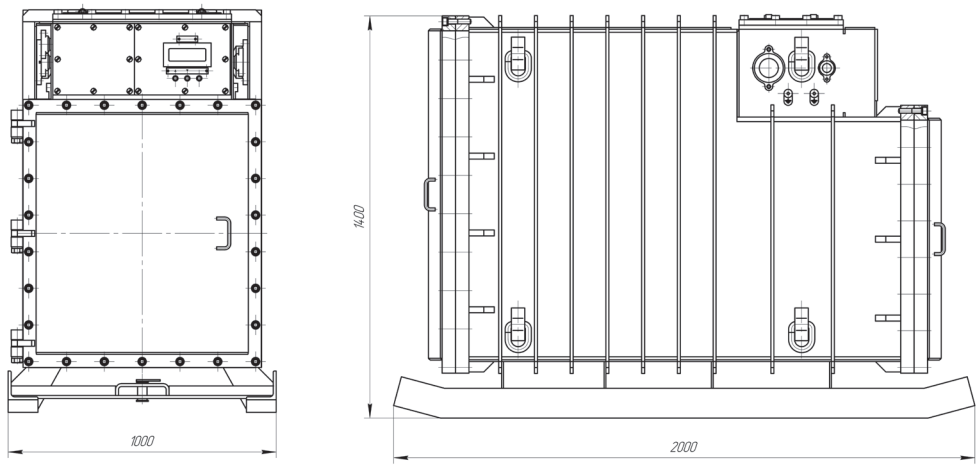
ЭМДВ - 55 kW



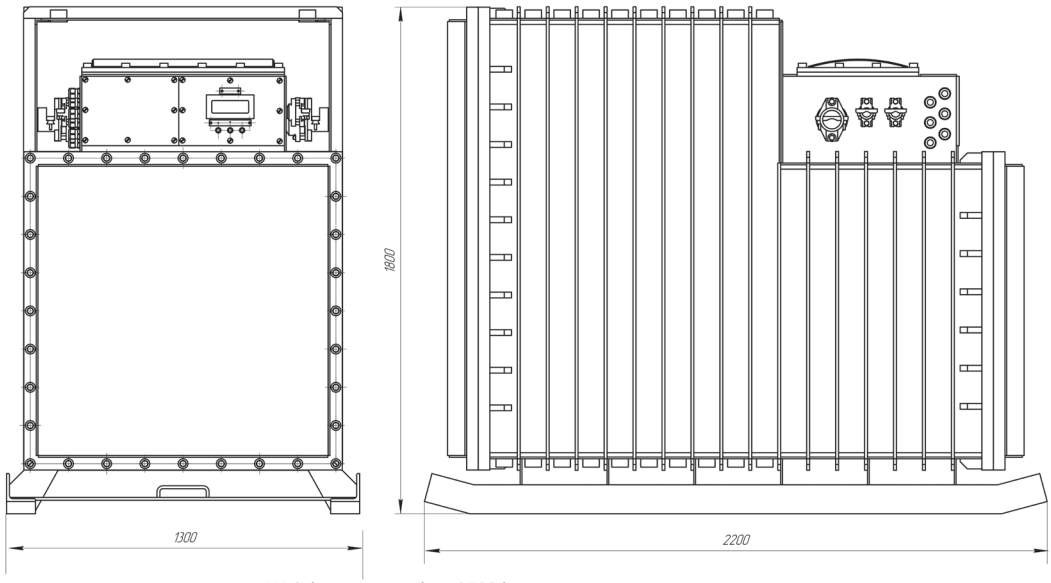
Weight not more than 1000 kg.

ЭМДВ - 75...90 kW



Weight not more than 1200 kg.

ЭМДВ - 110...250 kW



Weight not more then 2500 kg.

Figure 2. *Outline drawings of ЭМДВ enclosures*

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