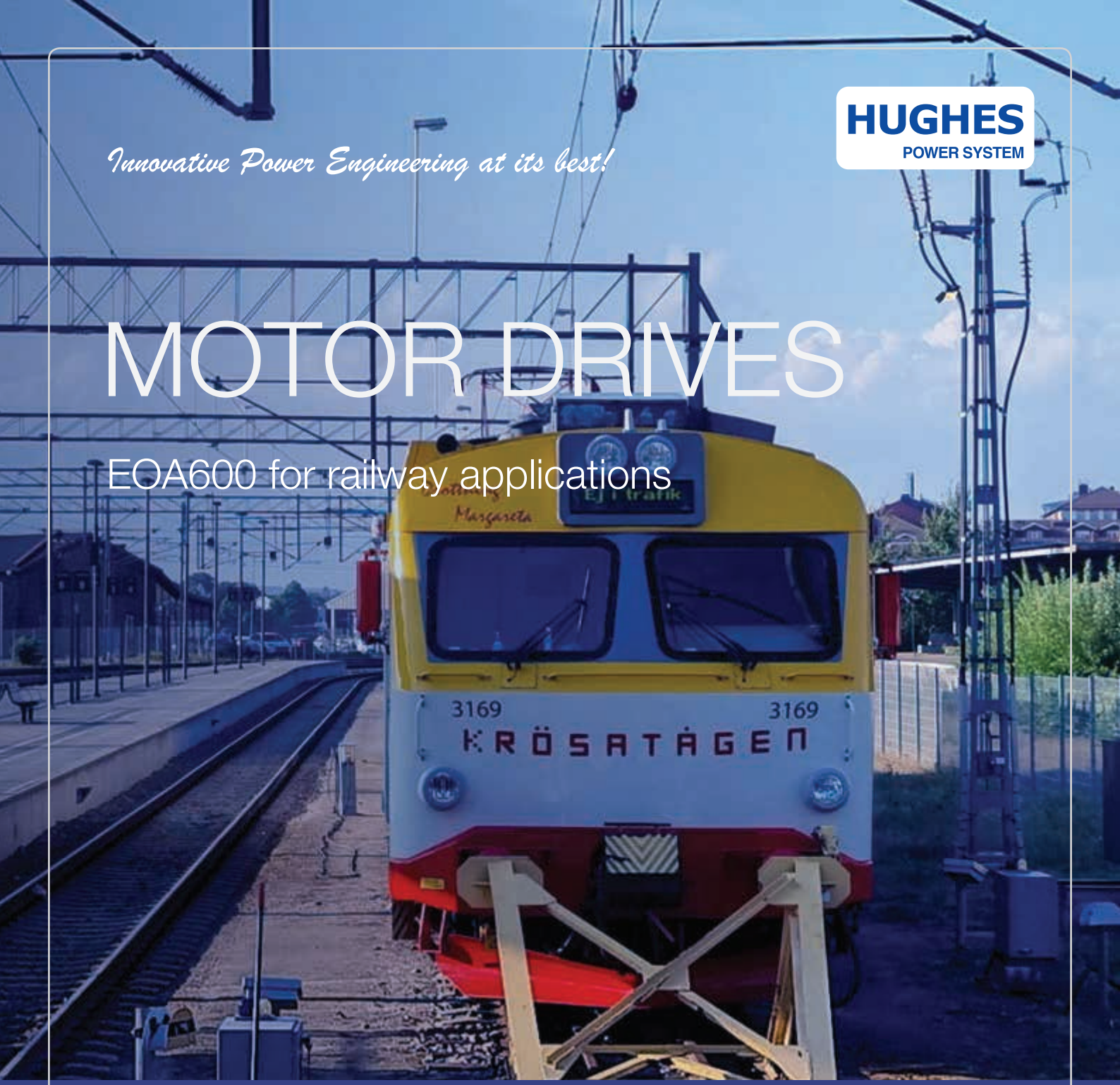


Innovative Power Engineering at its best!

HUGHES POWER SYSTEM

MOTOR DRIVES

EOA600 for railway applications

EOA600 MOTOR DRIVE SERIES FOR RAILWAY APPLICATIONS:

Motor drive:

- 0.5 – 25 kV disconnectors;
- DC, 16.7 – 50 Hz applications;

Remote control:

- Hard wire connected;
- IP and serial interface;
- Remote blocking;

ABOUT HUGHES

Hughes Power System is a Swedish manufacturer of environmentally friendly equipment for electrification and automation of mass transport and electrical distribution systems. Very high quality standards together with innovative approach result in an advanced range of products, aiming to improve network quality by minimizing the number and duration of faults.

Our product portfolio includes:

- High voltage solid insulated vacuum circuit breakers
- Reclosers
- Disconnectors
- Motor drives for disconnectors
- Voltage transformers
- D/C power supplies

With its more than 30 years expertise in research, development, manufacturing, marketing and sales the company operates in many countries though cooperation with local partners. As we move towards our goal of being a world class advanced technological company in electrical utility products, we guarantee our commitment to the well known Swedish standards of reliability, safety and quality.

The majority of Hughes Power System's products are designed and built in Sweden.

HUGHES
POWER SYSTEM

EOA600 MOTOR DRIVE FOR RAILWAYS

GENERAL DESCRIPTION

- The EOA600 railway motor drive, characterized by its innovative design, is a complete solution from a pole to SCADA system.
- The unit is intended for control of disconnectors / earth switches with or without load break heads. The motor drive is easy to install and has built-in all functions for SCADA integration.
- The motor drive can be directly applied on most 0.5 to 25 kV DC/AC single or double, (AT or BT system), gang operated 3-phase disconnectors. The unit has a complete interface to SCADA system with multiple dry contacts. Optional built in 4G-LAN-Fiber RTU is available.
- The EOA600 motor drive is approved by the Swedish national railway administration (Trafikverket) for use in their national railway network.

EQUIPMENT

- Magnetic assisted motor and position switches;
- Screw terminal blocks for SCADA connection;
- Hand crank for local and emergency operation;
- Local switch position indicator;
- Padlock facility to block the motor mechanism in open or closed position;
- Stainless steel mounting bracket for wood and concrete pole or metal structure;
- Cabinet in stainless steel;
- Stainless steel hand crank handle with padlock fittings;
- All internal parts are easily accessible and easy to service;

OPTIONAL EQUIPMENT

- Remote blocking unit for outgoing operation shaft. 1 sec operation time;
- Impulse control of remote blocking and motor mechanism;
- Cell foam cabinet wall insulation;
- Innovative cabinet climate system including ventilation, temperature controlled heating;
- Communication devices: RTU, radio modem, 2G/3G/4G modem, TETRA radio modem;
- Transformer 15 or 25 kV / 110 or 230 V, 1 kVA, 16,7/50/60Hz;
- DC power supply 400- 2100 VDC;

INSTALLATIONS

EOA600 MOTOR DRIVE FOR RAILWAYS

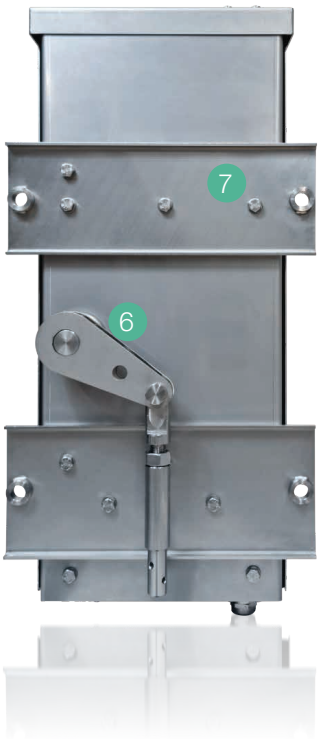
ADVANTAGES

Hughes **EOA600** motor drive for disconnectors for railway applications has the following advantages:

- **Complete solution** from a pole to SCADA system;
- **Super fast operations**: 1.5 seconds - open or close, 1.2 seconds - to remote block or un-block, max 4 seconds - remote un-block – open disconnector – remote block; Multiple choices of AC or DC powering;
- The unit can be used for **1-2-3 pole type of disconnectors** in DC (750 – 1500 – 3000VDC) and AC (15 kV 16.7Hz – 25 kV 50Hz) in AT and BT system architectures;
- **Advanced motor mechanism** is a serial magnetized motor with high start torque that can be operated on AC or DC. The mechanism can be directly controlled by a 3 or 6-wire or an impulse motor controller from SCADA. The motor drives a trapezoidal screw via a gear box. The self-locking trapezoidal screw turns a fork that is connected to the outgoing shaft. This mechanism gives a superior output torque with a low start current. The outgoing shaft starts moving a moment after the high-speed motor starts rotating. The kinetic energy in the rotating mass of 2.5 kg boosts the outgoing operation torque. Safe self-locking motor mechanism;
- **Very compact design**, suitable for the railway infrastructures. Can be installed up to 4 units per one pole;
- **Protection lips** (1) from rain water;

- **External cabinet** (2) of highest quality stainless steel. The use of stainless steel in accordance with DIN50049 / 3.1B, thanks to its non-magnetic properties, completely eliminates the occurrence of any kind of corrosion, including electrochemical corrosion over the entire life of the cabinet;
- **Multi function hand operation crank** (3) is used for local operation and as locking facility to protect from unauthorized use;
- Optional **bi-stable remote blocking unit** is blocking mechanically and eclectically the motor mechanism operation. To speed up the close-open-close operation, the mechanism is fitted with a regenerative break system. That absorbs the kinetic energy when the mechanism has reached its end position. The safe remote blocking device is controlled by a totally separate system;
- Optional **test set** in a rugged plastic flight case for local control of all functions via push buttons and LED indicators;
- Multiple **gland flanges** (4);
- **Louvers** with polymeric micro fibre filter for cabinet ventilation in high and low positions;

- **Inventive climate system** (5) for long term reliability. The lower louvers have a combination of a polymeric fine filter and a PTC thermoelement, which creates a moving air stream to the upper louvers. This airstream always evens out the day and night effect. The bottom of the cabinet has 5 drainage holes with micro filter preventing water gathering in case of any condensation;
- **Inventive protection system** (6) from water ingress via the outgoing drive shaft;
- Multiple choices of **pole mounting brackets** (7);

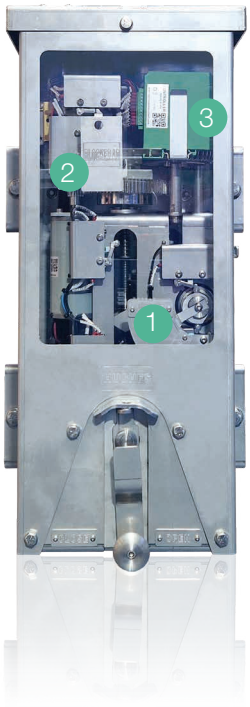


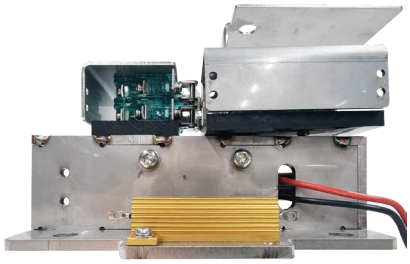
EOA600 MOTOR DRIVE FOR RAILWAYS

COMPONENTS

Hughes EOA600 motor drive for railways has the following components:

- EOA600 motor mechanism (1);
- Terminal blocks for easy installation;
- Internal ventilation system with special filter;





Bi-stable remote blocking unit

Heating system

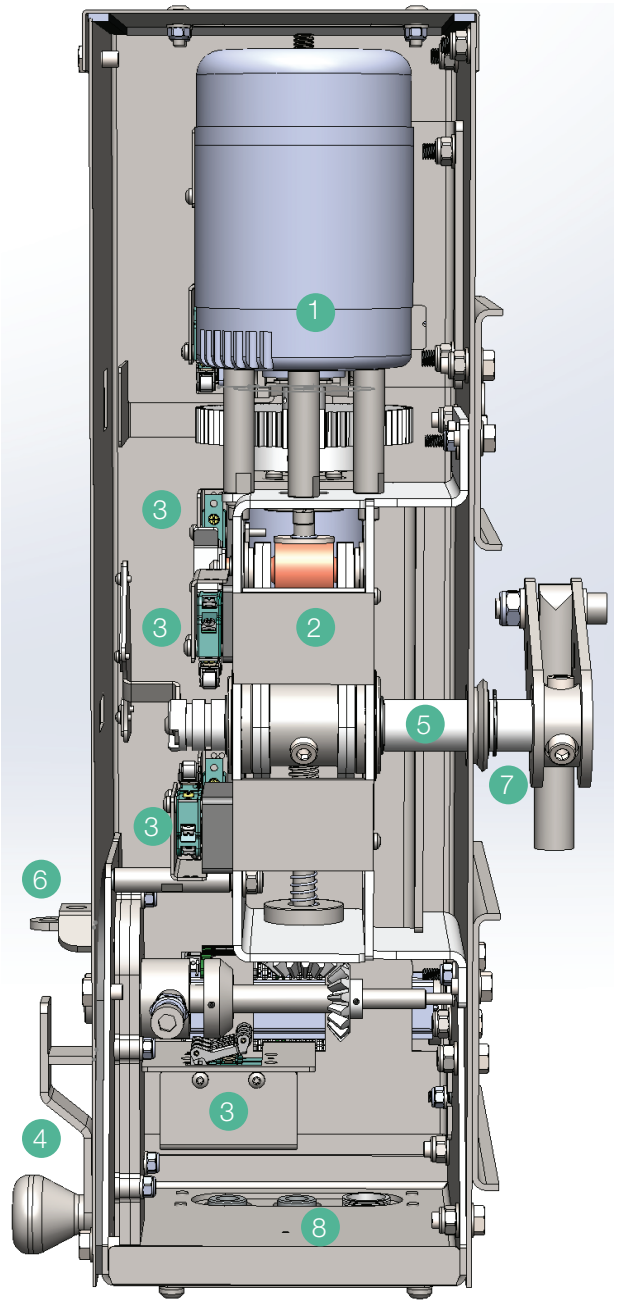
OPTIONAL COMPONENTS

- Bi-stable remote blocking unit (2);
- Impulse controller (3);
- Heating system;
- Input power (24 – 110 VDC, 110 or 230VAC) surge arresters;
- Communication unit option A: GIO-100 GSM/4G/ LAN Router with IEC60870-5-104 signalling protocol and IPSec encryption and IP filtering;
- Communication unit option B: GIO-200 GSM/4G/ LAN Router with IEC60870-5-104 signalling protocol and IPSec and Open VPN encryption and IP filtering;
- Fiber optic to LAN converter;

CONTENTS

Hughes EOA600 motor drive for railways has the following internal parts:

1. Main motor;
2. Trapezoid screw mechanism;
3. Magnetic assisted switches;
4. Hand crank;
5. Out going torque shaft;
6. Pad lock facility;
7. Cabinet wall sealing;
8. Cable glands, 3 pcs;



OPERATING MODES

- Electrical remote control via hard wire connection;
- Local manual operation via the built in hand crank;
- Optional local electrical operation via push buttons in a separate box*;

The motor drive can be controlled by means of SCADA. Remote control can be carried out by a hard wire interface (3 or 6 wire system), local RTU* connected to the SCADA system via:

- Fiber optics;
- GSM/GPRS/4G;
- LAN connection;
- Serial connection;

*installation requires constant power supply.

EOA600 MOTOR DRIVE FOR RAILWAYS

APPLICATIONS

TRADITIONAL RAIL

16kV 16,7Hz 25 kV 50 Hz

TRAM AND LOCAL TRAIN

500 - 3000 VDC

TROLLEY BUSES
500 – 750 VDC

ELECTRIC HIGHWAYS
700 VDC

HUGHES
POWER SYSTEM

EOA600 MOTOR DRIVE FOR RAILWAYS

APPLICATIONS

1-PHASE APPLICATIONS IN
RAILWAY ELECTRIFICATION SYSTEM

DOUBLE DISCONNECTOR SWITCH APPLICATIONS
(2 POLES OR 1+1 POLE SEPARATE OPERATED)

HUGHES
POWER SYSTEM

EOA600 MOTOR DRIVE FOR RAILWAYS

NEW! EXTERNAL ACCESSORIES
CABLE MULTIPLEXER SYSTEM (1)

- is a digital accessory to Hughes motor drives.
- allows to connect modern remote blocking motor drive with 6 or 14 wire system to an old 3-cables SCADA system.
- does not require changes in a cable system between SCADA and a motor drive.
- eliminates the very expensive process of changing the cable along the rail track.
- is an effective solution to expand cable capacity.
- is installed under a Hughes motor drive (see pic).
- consists of electronic units that are connected to the SCADA RTU side and a new motor drive unit. It is not a standard RTU, it communicates with a high current loop to avoid electrical disturbance and utilizes 4 separate microprocessors. The system has a high security form of signalling protocol.

CHARACTERISTICS

- Retrofit solutions for 3-wire systems
- Safe communication for rail application
- Replace a multi core cable
- 3-wire signalling >> 14 logical channels
- Long communication range of 2000 m
- Full duplex high current signalling, 100-500 mA
- Safety signalling protocol + external error alarm
- Opt insulated for minimizing risk of disturbance
- External addition to the EOA600 motor drive
- Internal addition to the EOA500 motor drive series
- Easy installation
- Address selection with 4 x hexadecimal coded rotary switches.

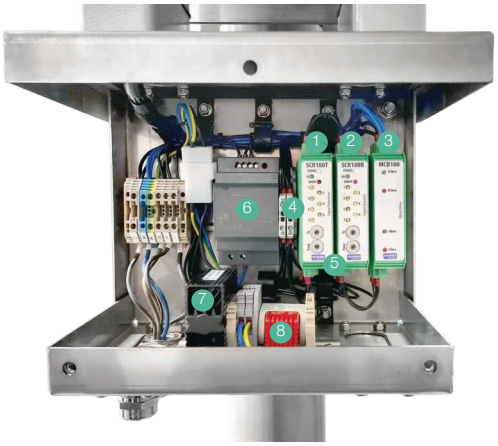
MASTER UNIT INSTALLED AT THE SCADA SIDE

- Receiver unit (1)
- Transmitter unit (2)
- Communication current load (3)
- LED function indicators (4)
- 2 x hex coded address switches (5)
- Power supply (6)
- RTU parallel interface (7)

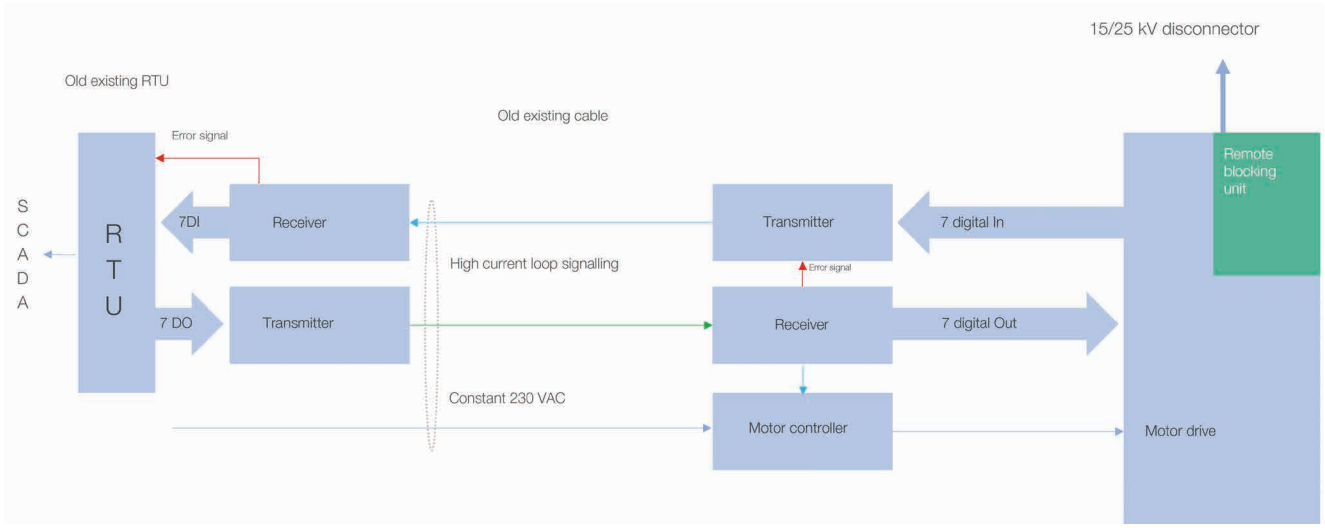
Master unit at the SCADA side

SLAVE UNIT INSTALLED AT THE MOTOR DRIVE SIDE

- Receiver unit (1)
- Transmitter unit (2)
- Motor controller (3)
- LED function indicators (4)
- 2 x hex coded address switches (5)
- Power supply (6)
- PTC heater (7)
- Thermostat (8)



Slave unit at the motor drive side



Operational principle

EOA600 MOTOR DRIVE FOR RAILWAYS

NEW! EXTERNAL ACCESSORIES
GROUNDING SYSTEM CABLE THEFT ALARM

Grounding system cable theft alarm is an optional accessory that notifies SCADA system if the grounding system is missing or damaged.

It is installed inside a control cabinet and is suitable for all Hughes pole mounted products, such as:

- motor drives;
- overhead line and kiosk reclosers' protection relay cabinets;
- control cabinets for sectionalizers;
- control cabinets for vacuum circuit breakers or load break switches.

Installation in the motor drive cabinet

INDICATORS AND BUTTONS

When a ground wire of a control cabinet is cut, the red LED button is activated, and an immediate notification is sent to a SCADA system.

- The accessory has 3 indicators and one test button:
- POWER - on with a constant blue LED indicator;
- OK - with green LED displaying that ground system is normal;
- ALARM - with red LED displaying that the ground wire is cut;
- Test button - for testing the operation of the device;

PURPOSES

The alarm is in high demand in regions with a big number of copper cable thefts.

The theft alarm purposes are:

- to receive immediate notification that the grounding system is missing;
- to help to prevent big electrical hazardous risks for the operator or public;
- to avoid receiving false measuring information from the remote device;
- to make it possible to repair the grounding system in the shortest time;

EOA600 MOTOR DRIVE FOR RAILWAYS

STANDARD EXTERNAL ACCESSORIES

EOA600, 650 mounting bracket

Flexible wire operation rod

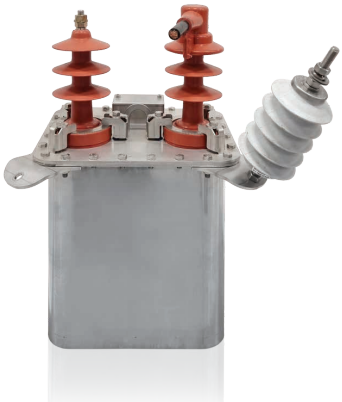
Antenna for GSM/4G

Surge arresters for antenna N-N connectors

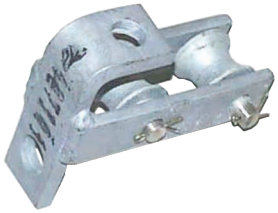
Antenna cable (3) 8M RG-213 N-N professional connectors;

Phase to ground connected, epoxy insulated voltage transformer 30/0.11kV

Test set for all functions



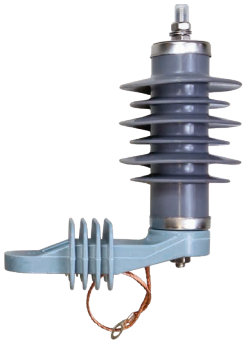
DC/DC converter, 750 or 1500 VDC



Operational rod support

Drop out fuses, silicone insulated, 15kV 3A

Drop out fuses, silicone insulated, 38kV 3A



Surge arresters silicone insulated, 22kV

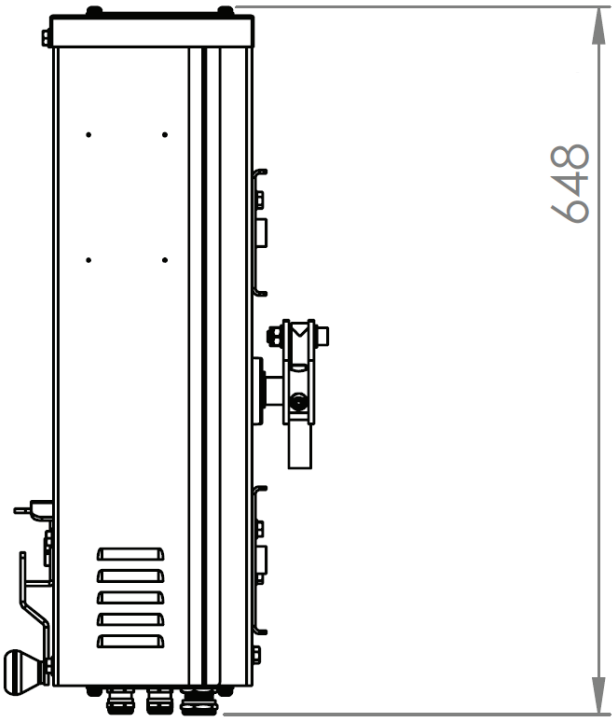
Surge arresters silicone insulated, 33kV

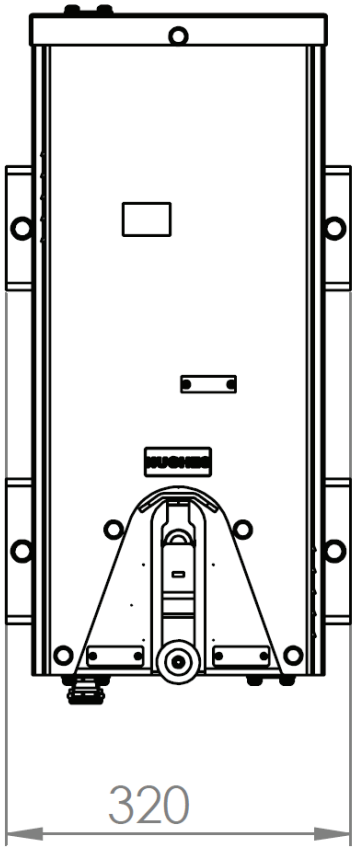
TECHNICAL DATA

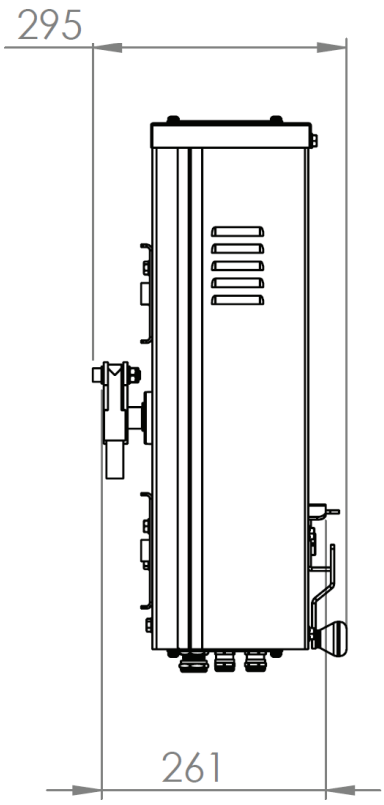
CHARACTERISTICS	EOA600
Dimensions (mm)	615 x 275 x 185 (HxWxD)
Weight (kg)	32
Operating temperature (°C)	-50 ... +60
Enclosure	IP54, non-magnetic stainless steel, optional GRP, optional painted in RAL or ANSI colour
Climate system	Optional 35 W PTC element
Thermostat (°C)	on at 5°C off at 15°C
LInear speed	100 mm in max 1.5 seconds
LInear force	2.5 – 4 kN
Stroke	50 - 240mm depending on type of lever arm;
Motor	24 / 110 / 230 VAC/DC 250 W
Motor type	Serial high-speed AC/DC
Control interface	3 and 6 wire rail interfaces
Remote blocking speed, optional	1.2 second
Power supply remote blocking	24VDC 10W
Signalling protocols, optional	IEC60870-5-104, DNP3, Modbus
Communication interface, optional	RS-232/485, 10/100Mbit TP(Ethernet), GSM/4G
Tests	• EN 60068-2-1 • EN 60068-2-2 • EN 60068-2-30 • EN 60068-2-52 • EN 60068-2-78 • EN 62271-102 6.103 • EN 62271-102 6.104 • EN 62271-102 6.105 • EN 50124 • EN 50152 • EN 60265

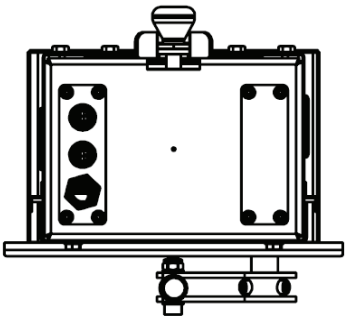
EOA600 MOTOR DRIVE FOR RAILWAYS

DRAWINGS









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