

Innovative Power Engineering at its best!

HUGHES
POWER SYSTEM

MOTOR DRIVES

FOR DISCONNECTORS

EOA MOTOR DRIVE SERIES FOR DIFFERENT APPLICATIONS:

- Electrical distribution networks;
- Railways;
- Tram and light rail.

ABOUT US

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
- Traction DC 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.



MOTOR DRIVES FOR DISCONNECTORS

GENERAL DESCRIPTION



MOTOR DRIVE TYPES

Hughes **EOA motor drive series** introduces a wide range of motor operation mechanisms for disconnectors and earth switches for different applications.

Types:

- **Rocking type** is designed for disconnectors with vertical motion;
- **Rotating or torsional type** can be connected to most existing disconnectors with horizontal motion control rod;
- Motor drive **with auto sectionalizing function** is designed for automatic sectionalising and for manual remote control of disconnectors.

EOA SERIES MODEL RANGE

- **EOA400/401** universal motor drive for disconnectors in electrical distribution networks and railways;
- **EOA500/501** universal high power motor drive for disconnectors in electrical distribution networks;
- **EOA600** motor drive for railway disconnectors;
- **EOA650** motor drive for tram disconnectors;
- **EOA700** motor drive for rotary disconnectors in railway and high voltage applications;
- **EOA501TVS** motor drive with autosectionalizing functions for disconnectors in electrical distribution networks.



INSTALLATIONS



MOTOR DRIVES FOR DISCONNECTORS

EOA400/401 MOTOR DRIVE UNIVERSAL TYPE

ADVANTAGES

Hughes **EOA400/401** motor drive is a rocking type universal drive for disconnectors in electrical distribution networks and railways with the following advantages:

- **Complete solution** from a pole to SCADA system;
- **Easy installation** and compatible with most disconnectors;
- **Compact design**;
- **Advanced motor mechanism** that provides high operation torque with low start current when the disconnector's contacts shall open or close. Its unique design is one of the main features. The Neodymium magnetized DC motor starts rotating with high speed before the operation shaft is moving. It uses extra kinetic energy from the rotating mass as a booster in just that moment when a disconnector needs the most operation energy. The motor operation stops precise at its end position due to a regenerative function. It is a secure self locking mechanism;
- **External cabinet** (1) 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;



Front panel

- **Special double roof** (2) prevents the accumulation of the water / snow on the cabinet and protects from overheating of the internal part of the cabinet in hot climates;
- **Padlock facility handle** (3) protects from unauthorized access;
- **Protection lips** (4) from rain water;
- **Connector** (5) for antenna remote control;
- Rugged pole **mounting brackets** (6) for different pole types;
- **Door alarm switch** (7) activates when the door is opened and sends the signal to the SCADA system. This feature notifies about access to the cabinet;
- **Inventive climate system** (8) 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 air stream 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** (9) from water ingress via the outgoing drive shaft.



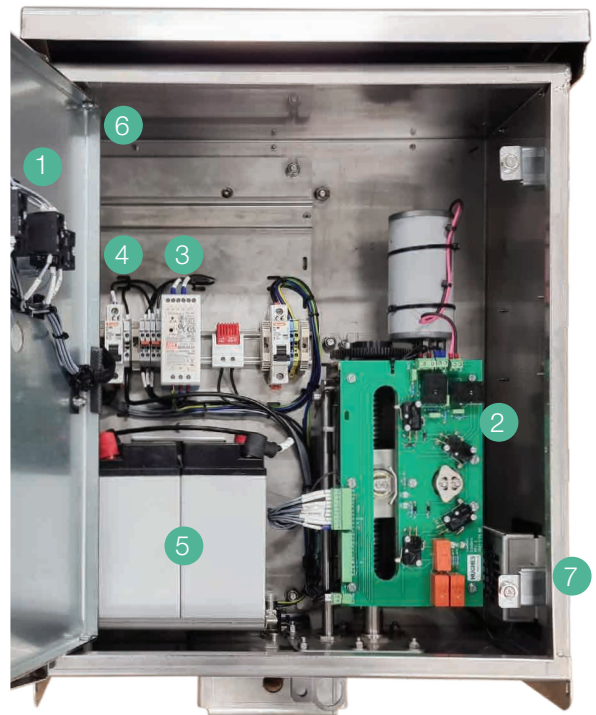
MOTOR DRIVES FOR DISCONNECTORS

EOA400/401 MOTOR DRIVE UNIVERSAL TYPE

COMPONENTS

Hughes EOA400/401 universal motor drive has the following components:

- Standard body cabinet;
- EOA400/401 motor mechanism with local control panel (1);
- Motor control board (2);
- Battery charger 60W (3);
- MCB's for input power and battery (4);
- Batteries AGM type 2 x 12V 20 AH (5);
- Internal ventilation system with special filter (6);
- Heating system (7).



GIO100

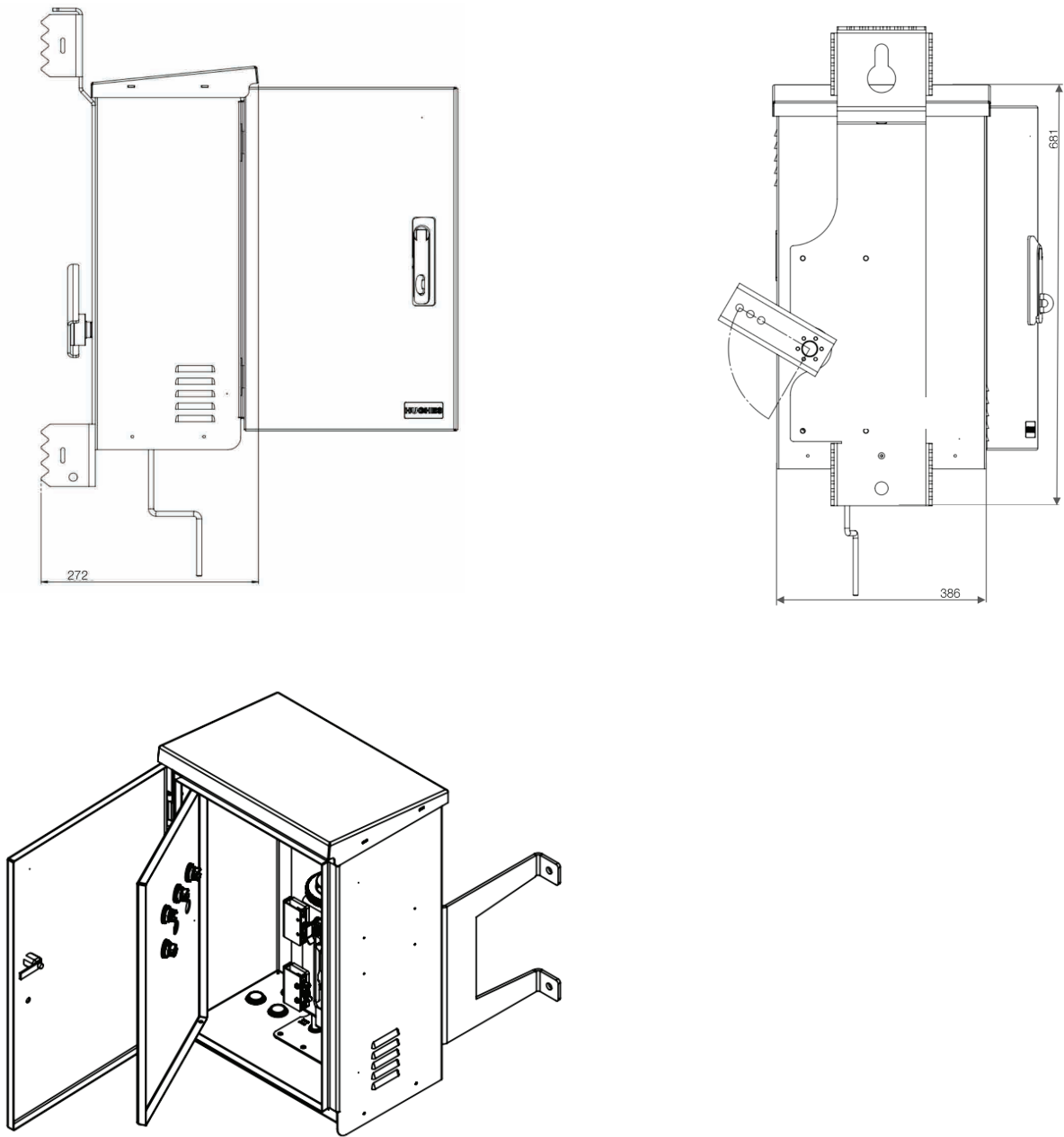


GIO200

OPTIONAL COMPONENTS

- Lightning protection for the antenna connector;
- 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.

DRAWINGS



R01			
DRAWN CagBan 2023-10-02	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: ISO 2768-1 LINEAR: m ANGULAR: K	DEBUR AND BREAK SHARP EDGES	Date: 2023-10-02
			Revision
CHECKED			Title:
APPROVED	A3  SCALE: 1:10	FINISH:	Part No:
APPR. PROD.		MATERIAL:	DWG NO. EOA-401R-0000
DO NOT SCALE DRAWING		WEIGHT:	SHEET 1 OF 1

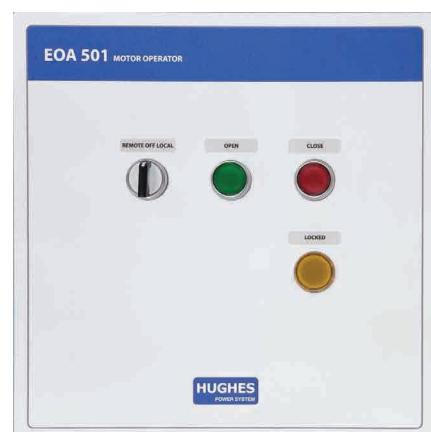
MOTOR DRIVES FOR DISCONNECTORS

EOA500/501 MOTOR DRIVE UNIVERSAL TYPE

ADVANTAGES

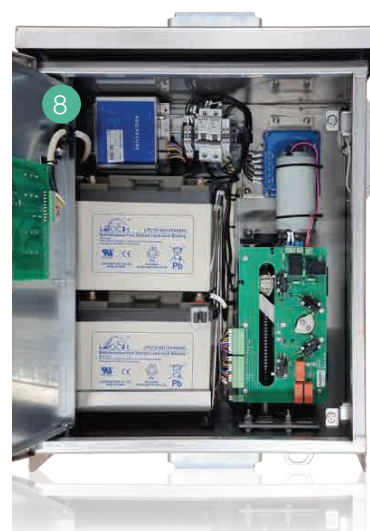
Hughes **EOA500/501** high power motor drive is a rocking type universal drive for disconnectors in electrical distribution networks and railways with the following advantages:

- **Complete solution** from a pole to SCADA system;
- **Easy installation** and compatible with most disconnectors;
- **Wide cabinet body** type with plenty of space for larger batteries, possible for solar power usage;
- **Advanced motor mechanism** that provides high operation torque with low start current when the disconnector's contacts shall open or close. Its unique design is one of the main features. The Neodymium magnetized DC motor starts rotating with high speed before the operation shaft is moving. It uses extra kinetic energy from the rotating mass as a booster in just that moment when a disconnector needs the most operation energy. The motor operation stops precise at its end position due to a regenerative function. It is a secure self locking mechanism;
- **Padlock facility handle** (1) protects from unauthorized access;
- **Protection lips** (2) from rain water;



Front panel

- **External cabinet** (3) 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;
- **Special double roof** (4) prevents the accumulation of the water / snow on the cabinet and protects from overheating of the internal cabinet in hot climates;
- **Connector** (5) for antenna remote control;
- Rugged pole **mounting brackets** (6) for different pole types;
- **Door alarm switch** (7) activates when the door is opened and sends the signal to the SCADA system. This feature notifies about access to the cabinet;
- **Inventive climate system** (8) 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** (9) from water ingress via the outgoing drive shaft.



EOA501 solar power version

MOTOR DRIVES FOR DISCONNECTORS

EOA500 MOTOR DRIVE UNIVERSAL TYPE

COMPONENTS

Hughes EOA500 universal high power motor drive has the following components:

- Slim body cabinet;
- Motor control board mounted on the motor mechanism;
- Temperature compensated battery charger - power supply - UPS
- MCB's for input power and battery;
- Start button for UPS;
- Batteries AGM type 2 x 12V 20 AH
- Ventilation system with special filter;
- Heating system.



GIO100

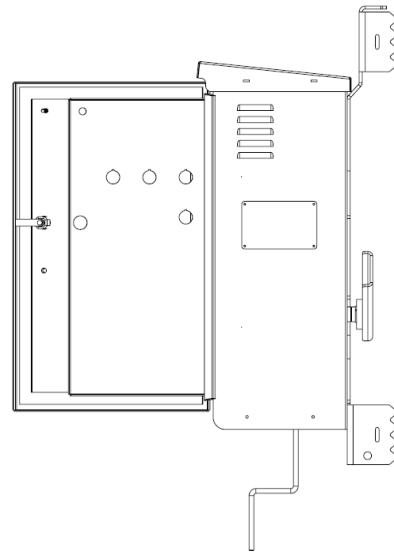
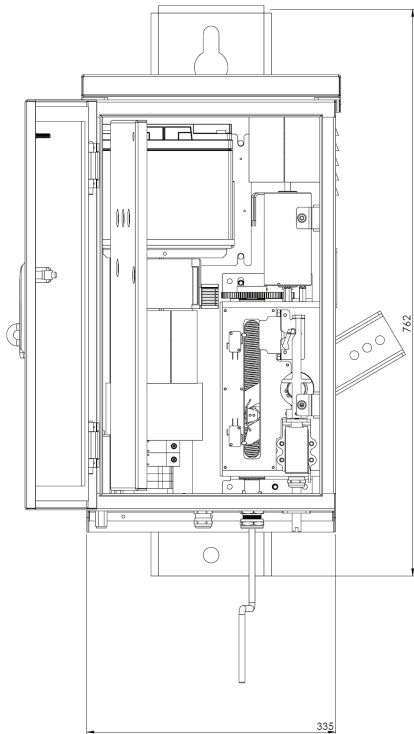


Li-Ion battery

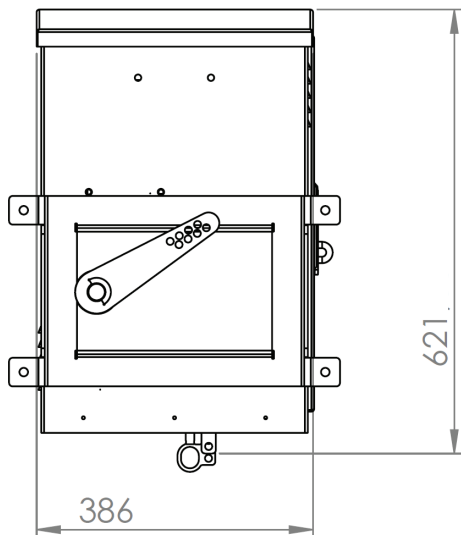
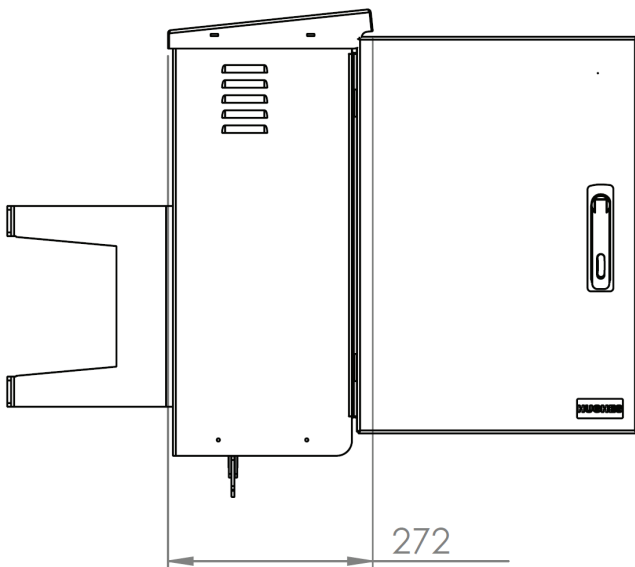
OPTIONAL COMPONENTS

- Lightning protection for the antenna connector;
- Li-Ion batteries for high temperature climate zones, 2 x 12.8 V 20 AH;
- Input power (110 or 230V) 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.

DRAWINGS



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS		DATE: 11/18/2016	HUGHES
SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		Revision: R01	
		Title: Motor Operator	
A0	FINISH:	Part No: EOA_500ED_2000	
	MATERIAL:	DWG NO: D_EOA_500ED_2000	
SCALE:1:3	DO NOT SCALE DRAWING	WEIGHT:	SHEET 1 OF 1



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS		DATE: 2023-10-02	HUGHES
SURFACE FINISH: TOLERANCES: ISO 2768-M LINEAR: .25 ANGULAR: .5		Revision:	
		Title:	
A3	FINISH:	Part No:	
	MATERIAL:	DWG NO: EOA-400R-0000	
SCALE:1:10	DO NOT SCALE DRAWING	WEIGHT:	SHEET 1 OF 1

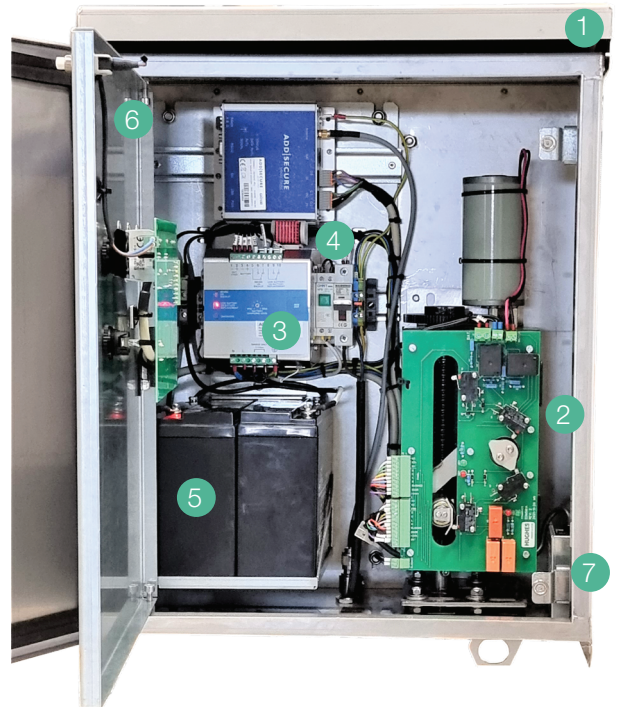
MOTOR DRIVES FOR DISCONNECTORS

EOA501 MOTOR DRIVE UNIVERSAL TYPE

COMPONENTS

Hughes EOA501 universal high power motor drive has the following components:

- Wide body cabinet (1);
- Motor control board mounted on the motor mechanism (2);
- Temperature compensated battery charger - power supply - UPS (3)
- MCB's for input power and battery (4);
- Start button for UPS;
- Batteries AGM type 2 x 12V 20 AH (5)
- Ventilation system with special filter (6);
- Heating system (7).



GIO200

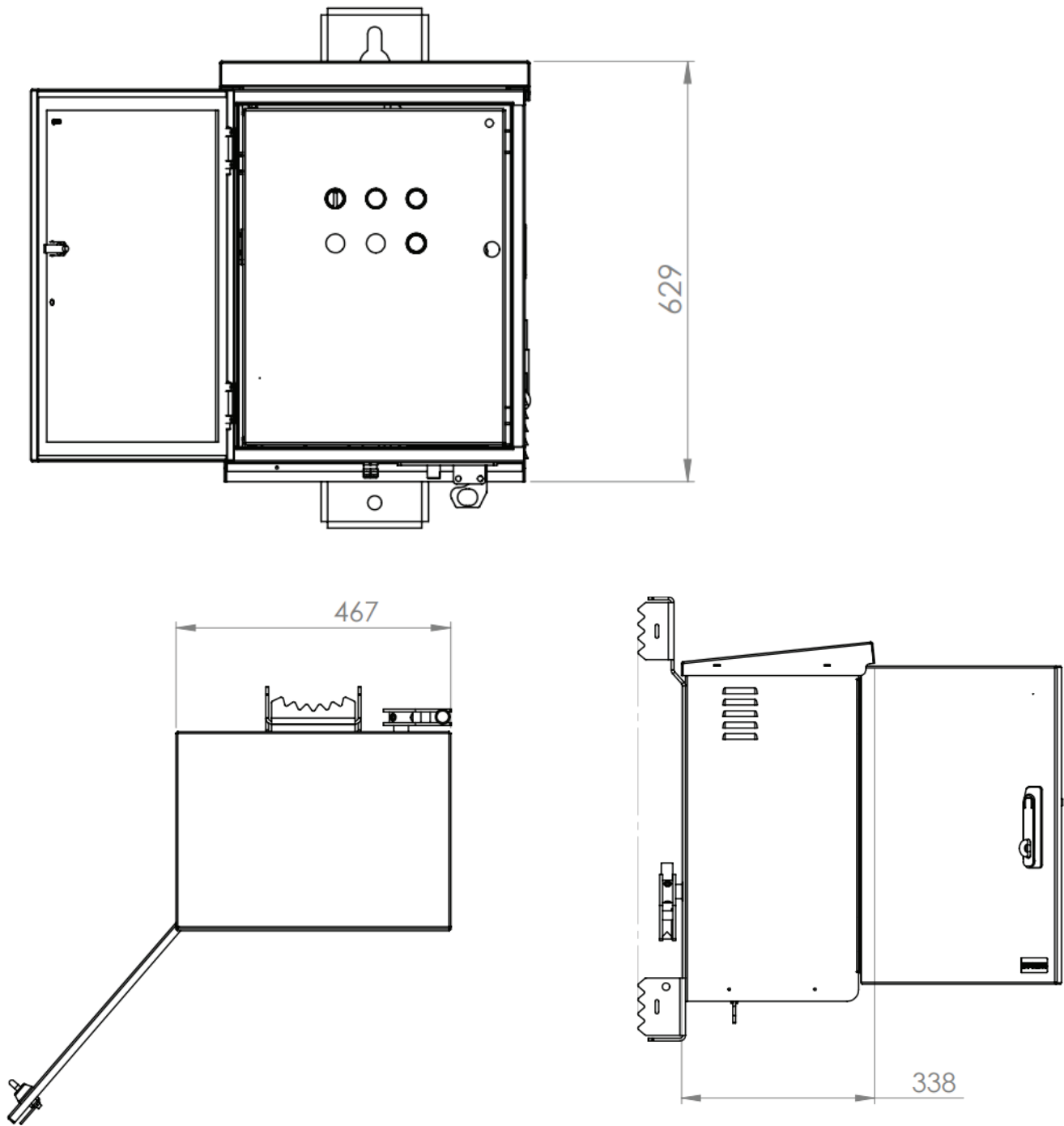


AGM battery

OPTIONAL COMPONENTS

- Lightning protection for the antenna connector;
- Li-Ion batteries for high temperature climate zones, 2 x 12.8 V 20 AH;
- Lead acid AGM batteries 2 x 12 V 45 AH for solar panel operation;
- Input power (110 or 230V) 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.

DRAWINGS



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS		Date:	2019-10-16	HUGHES
		Revision		
SURFACE FINISH:		Title:	EOA 501R - No Inner Door	
TOLERANCES:		Part No:	EOA_501R_2000	
LINEAR:		DWG NO:	D_EOA_501R_NoDoor	
ANGULAR:				
A3	FINISH:			
	MATERIAL:			
SCALE:1:10				
DO NOT SCALE DRAWING	WEIGHT:			SHEET 1 OF 1

MOTOR DRIVES FOR DISCONNECTORS

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 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 electrically 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 air-stream 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).



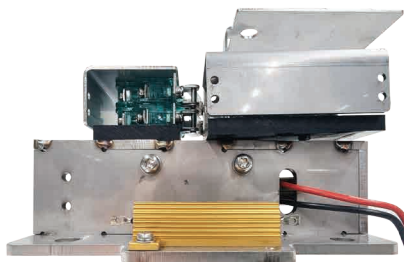
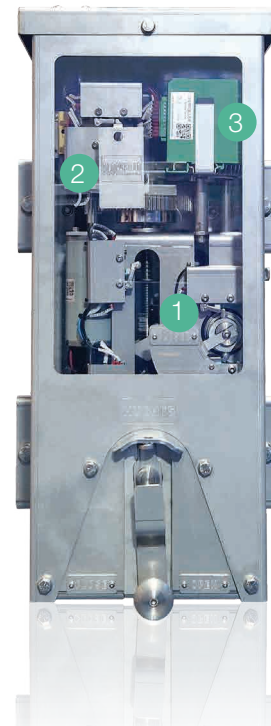
MOTOR DRIVES FOR DISCONNECTORS

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

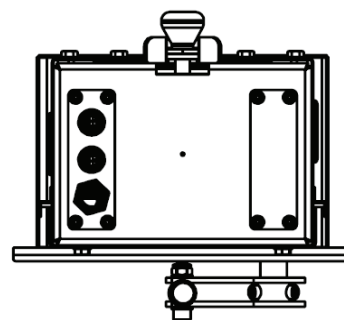
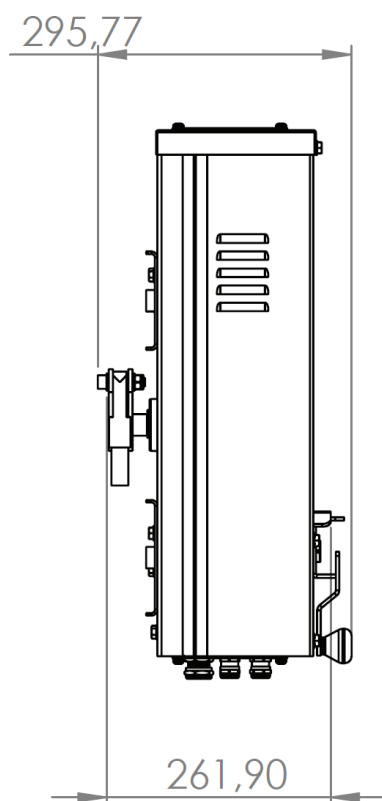
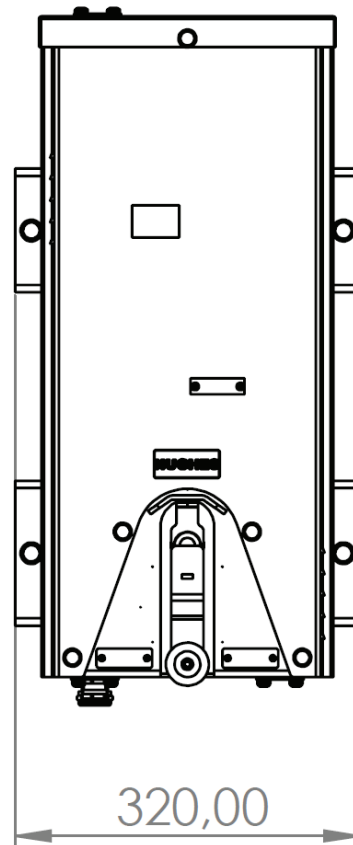
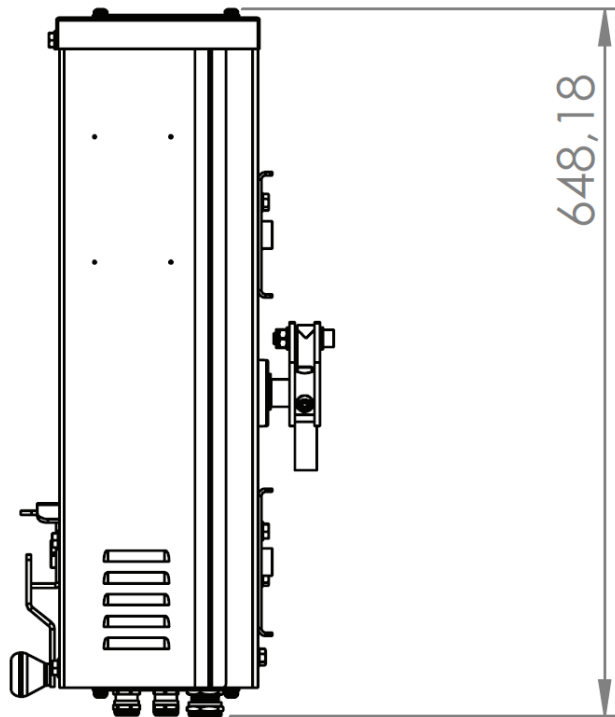


Heating system

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.

DRAWINGS



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		DATE: 2021-07-20	HUGHES
		Revision	
A3		Part No:	9836710
SCALE:1:10		DWG NO.	EOA_600R_0000_4
DO NOT SCALE DRAWING		WEIGHT:	SHEET 1 OF 1

MOTOR DRIVES FOR DISCONNECTORS

EOA650 MOTOR DRIVE FOR TRAMS

ADVANTAGES

Hughes **EOA650** motor drive for remote operation of disconnectors in tram and light rail applications has the following advantages:

- **Complete solution** from a pole to SCADA system;
- **Slim and compact design** suitable for city environments. Fits inside a H-220 steel beam;
- **Vandal proof** 3-way door locking system (1) with cable intake in the top or bottom of the cabinet;
- The unit can be used for **1-2 pole type of disconnectors** in DC 750 – 1500 – 3000VDC system architectures. It includes a rotatable fork (2);
- Multiple choices of **AC or DC powering**;
- **Advanced motor mechanism** provides high operation torque with low start current when the disconnector's contacts shall open or close. That is one of the product's unique features. The Neodymium magnetized DC motor starts rotating with high speed before the operation shaft is moving. It uses extra kinetic energy from the rotating mass as a booster in just that moment, when a disconnector needs the most operational energy. The mechanism utilizes an electrodynamic break function that precisely positions the operational rod. Safe self-locking motor mechanism;
- **Padlock facility handle** (3) protects from unauthorized access;



- **External cabinet** (4) 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;
- **Special double roof** (5) prevents the accumulation of the water / snow on the cabinet and protects from overheating of the internal cabinet in hot climates;
- **Protection lips** (6) from rain water;
- Multiple choices of **pole mounting brackets** (7);
- **Connector** (8) for antenna remote control;
- **Inventive climate system** (9) for long term reliability; A thermostat controlled PTC heater creates a lifting air stream from the bottom louvers to the top louvers;
- **Inventive protection system** from water ingress via the outgoing drive shaft;
- Optional **test set** in a rugged plastic flight case for local control of all functions via push buttons and LED indicators;
- Optional **safety bi-stable remote blocking unit**, that is blocking mechanically and electrically the motor mechanism operations. That part is controlled by a totally separate system.



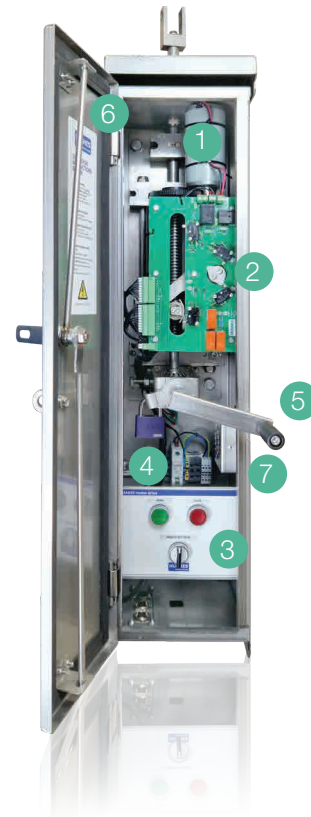
MOTOR DRIVES FOR DISCONNECTORS

EOA650 MOTOR DRIVE FOR TRAMS

COMPONENTS

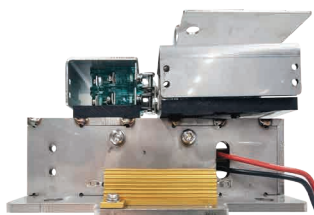
Hughes EOA650 motor drive for trams has the following components:

- EOA650 motor mechanism (1);
- Motor control board (2);
- Local operation panel. Easy to remove during installation (3);
- Terminal blocks for easy installation (4);
- Hand crank and padlock facility (5);
- Internal ventilation system with special filter (6);
- Heating system (7).



OPTIONAL COMPONENTS

- Bi-stable remote blocking unit;
- Impulse controller;
- Temperature compensated battery charger (UPS);
- Li-Ion batteries for high temperature climate zones, 2 x 12.8 V 7.5 AH;
- Standard lead acid AGM type battery 2 x 12 V 7.5 AH;
- Lightning protection for the antenna gland.
- Input power (8) (24 – 110 VDC, 110 or 230VAC) surge arresters;
- Fiber optic to LAN converter;
- 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.

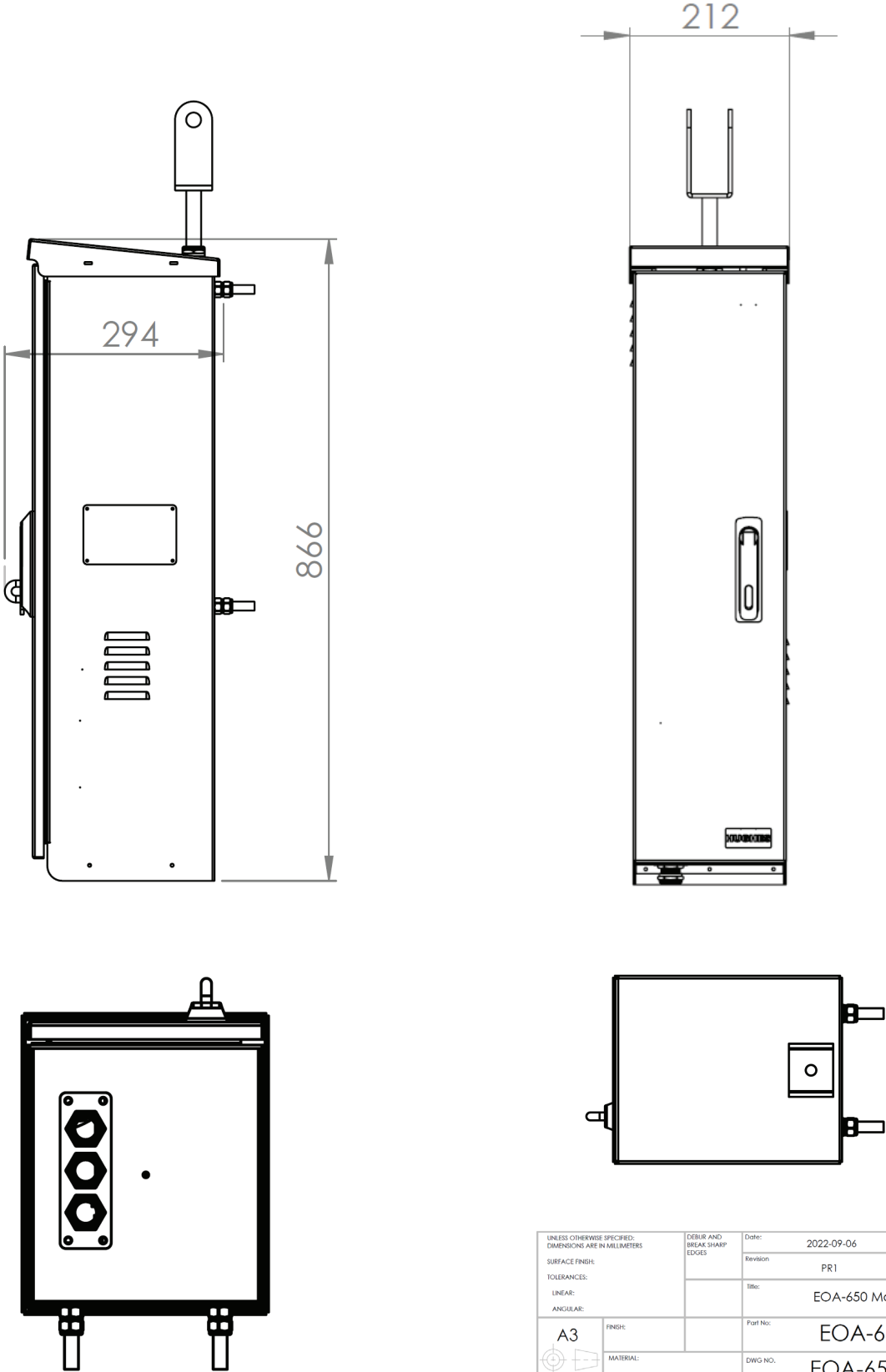


Bi-stable remote blocking unit



Lightning protection for antenna

DRAWINGS



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS		DATE: 2022-09-06	HUGHES
SURFACE FINISH:		Revision PR1	
TOLERANCES:		Title: EOA-650 Motor Operator	
LINEAR:		Part No: EOA-650-0000	
ANGULAR:		DWG NO. EOA-650-0000-1	
A3	FINISH:		
SCALE: 1:10	MATERIAL:		
DO NOT SCALE DRAWING	WEIGHT:		SHEET 1 OF 1

MOTOR DRIVES FOR DISCONNECTORS

EOA700 ROTATING MOTOR DRIVE

ADVANTAGES

Hughes **EOA700** motor drive for disconnectors and earth switches with rotating – torsional operation mode has the following advantages::

- **Complete solution** from a pole to SCADA system;
- The mechanical system is **permanently lubricated** and does not require any maintenance or greasing;
- The main **worm-gear assembly**, which provides operating torque and supports the weight of the mechanism, is bolted to the supporting structure allowing the housing to serve only as a weather proof covering;
- Provides a **true position remote indication** of a disconnector, as well as the necessary operational interlocking functions;
- **Advanced motor mechanism** is driven by a digital step motor. The digital control provides an exact position and speed every time independent of temperature or load. The system uses a closed-loop feedback system to ensure its precise operation. Speed and direction control is 100% solid state operated. No relays. The mechanism is fitted with multiple cam controlled and magnetic assisted switches for parallel control to SCADA and interlocking functions. The motor mechanism can be both electrically and mechanically blocked for extra safety. Safe self-locking motor mechanism;
- **Padlock facility handle** (1) protects from unauthorized access;



Motor mechanism

- **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;
- **Special double roof** (3) prevents the accumulation of the water / snow on the cabinet and protects from overheating of the internal cabinet in hot climates;
- **Protection lips** (4) from rain water;
- **Inventive climate system** (5) for long term reliability. A thermostat controlled PTC heater creates a lifting air stream from the bottom louvers to the top louvers;
- **Inventive protection system** (6) from water ingress via the outgoing drive shaft;
- **Adjustable length** (7) emergency operation hand crank;
- Optional **test set** in a rugged plastic flight case for local control of all functions via push buttons and LED indicators;
- Optional **safety bi-stable remote blocking unit**, that is blocking mechanically and electrically the motor mechanism operations. That part is controlled by a totally separate system;
- **Air louvers**, filters, and internal heater to prevent condensation and ensure trouble-free operation;
- All mechanisms are **factory-wired** to terminal blocks



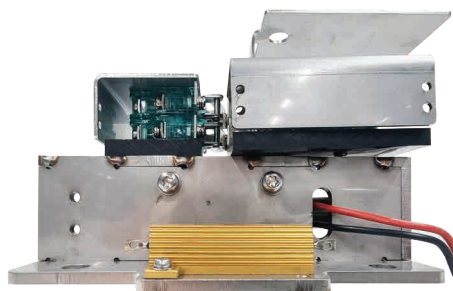
MOTOR DRIVES FOR DISCONNECTORS

EOA700 ROTATING MOTOR DRIVE

COMPONENTS

Hughes EOA700 rotating motor drive has the following components:

- EOA700 motor mechanism (1);
- Main gear box (2);
- Padlock facility for mechanical blocking of operation (3);
- Digital step motor controller (4);
- Local operation panel (5);
- CAM switch (6) with 10 x 2 NC/ 2NO magnetic contacts;
- Terminal blocks (7) for easy installations;
- Internal ventilation system (8) with special filter;
- Heating system (9);
- Door latch (10);
- Adjustable length emergency operation hand crank (11);
- Switch mode UPS power supply (12).



Bi-stable remote blocking unit

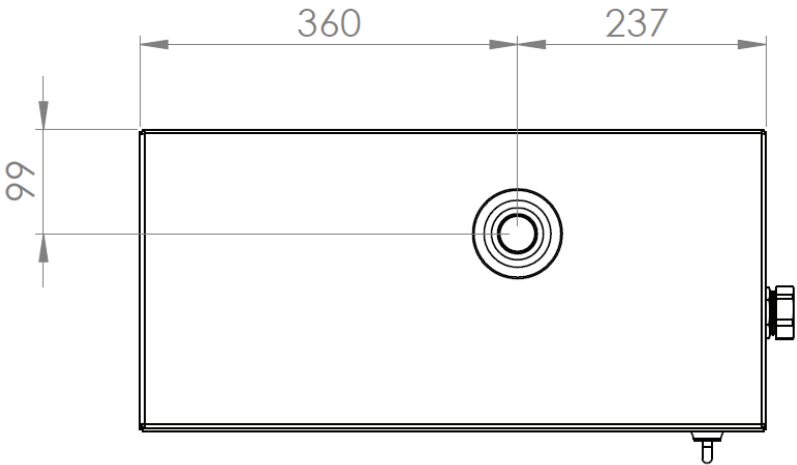
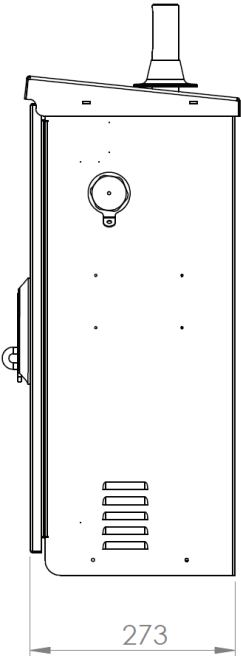
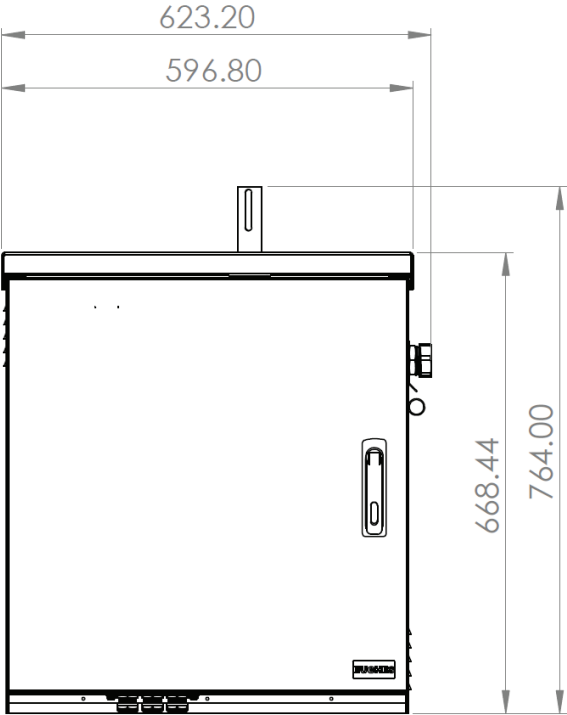


Li-Ion battery

OPTIONAL COMPONENTS

- Bi-stable remote blocking unit;
- Temperature compensated battery charger (UPS);
- Li-Ion batteries for high temperature climate zones, 2 x 12.8 V 20 AH;
- Standard lead acid AGM type battery 2 x 12 V 20 AH;
- 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;

DRAWINGS



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS		DEBUR AND BREAK SHARP EDGES	Date: 09/09/2022	HUGHES
SURFACE FINISH:			Revision	
TOLERANCES:			Title: PART-NMRV075501392811100300NO---DESC	
LINEAR:			Part No:	
ANGULAR:			DWG NO. EOA_700_0000 ver 2	
A3 SCALE:1:10		FINISH:		
DO NOT SCALE DRAWING		MATERIAL:		
		WEIGHT:		SHEET 1 OF 1

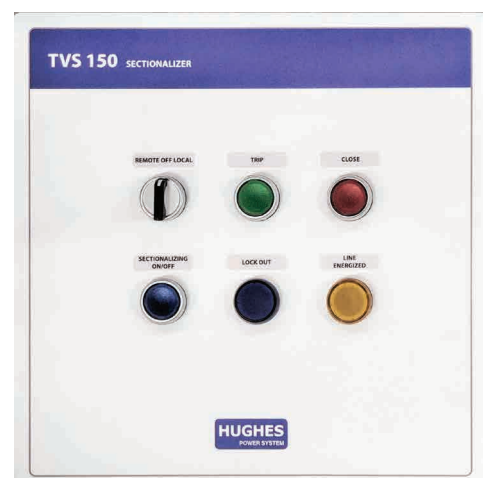
MOTOR DRIVES FOR DISCONNECTORS

EOA501TVS MOTOR DRIVE WITH SECTIONALIZING

ADVANTAGES

Hughes **EOA501TVS** motor drive with auto sectionalizing has the following advantages:

- **Complete solution** from a pole to SCADA system;
- **Easy installation** and compatible with most disconnectors;
- **Compact design**;
- **Advanced motor mechanism** that provides high operation torque with low start current when the disconnector's contacts shall open or close. Its unique design is one of the main features. The Neodymium magnetized DC motor starts rotating with high speed before the operation shaft is moving. It uses extra kinetic energy from the rotating mass as a booster in just that moment when a disconnector needs the most operation energy. The motor operation stops precise at its end position due to a regenerative function. It is a secure self locking mechanism;
- **External cabinet** (1) 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 recloser cabinet.
- **Special double roof** (2) prevents the accumulation of the water / snow on the cabinet and protects from overheating of the internal cabinet in hot climates.



Front panel

- **Automatic sectionalizing logic.** The EOA501TVS uses a Time Voltage Sectionalizing algorithm. When a fault is registered by the distribution station, its breaker trips. At the same moment, the EOA501TVS devices sense that the line voltage disappears. The first timer starts. After a preprogrammed time, all EOA501TVS open when the line is de-energized. The network is now divided into several sections. Some time later, the distribution station's circuit breaker reconnects the outgoing line. The first EOA501TVS senses that line voltage has returned. The second timer starts. After a pre-programmed time, the EOA501TVS closes the disconnect. If the line voltage disappears in a pre-programmed time window after the EOA501 has closed its disconnect, it recognizes that it has closed against the fault. The switch of the distribution station releases. The switch of the distribution station resets. At the same moment, the EOA501TVS sense that the line voltage has returned, but they do not close. The section allocation sequence is now complete;
- **Padlock facility** (3) handle protects from unauthorized access.
- **Protection lips** (4) from rain water;
- **Connector** (5) for antenna remote control;
- Rugged pole **mounting brackets** (6) for different pole types
- **Door alarm switch** (7) activates when the door is opened and sends the signal to the SCADA system. This feature notifies about access to the cabinet.
- **Inventive climate system** (8) 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 air stream 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** (9) from water ingress via the outgoing drive shaft;



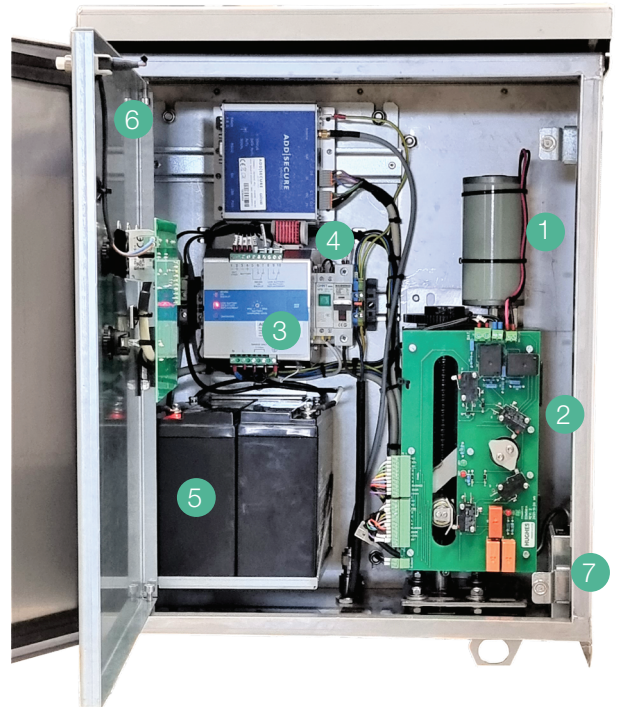
MOTOR DRIVES FOR DISCONNECTORS

EOA501TVS MOTOR DRIVE WITH SECTIONALIZING

COMPONENTS

Hughes EOA501TVS motor drive with auto sectionalizing has the following components:

- Wide body cabinet;
- EOA501 motor mechanism (1);
- Motor control board mounted on the motor mechanism (2);
- Temperature compensated battery charger - Power supply - UPS (3)
- MCB's for input power and battery (4);
- Start button for UPS;
- Batteries AGM type 2 x 12V 20 AH (5);
- Ventilation system with special filter (6);
- Heating system (7).



GIO200

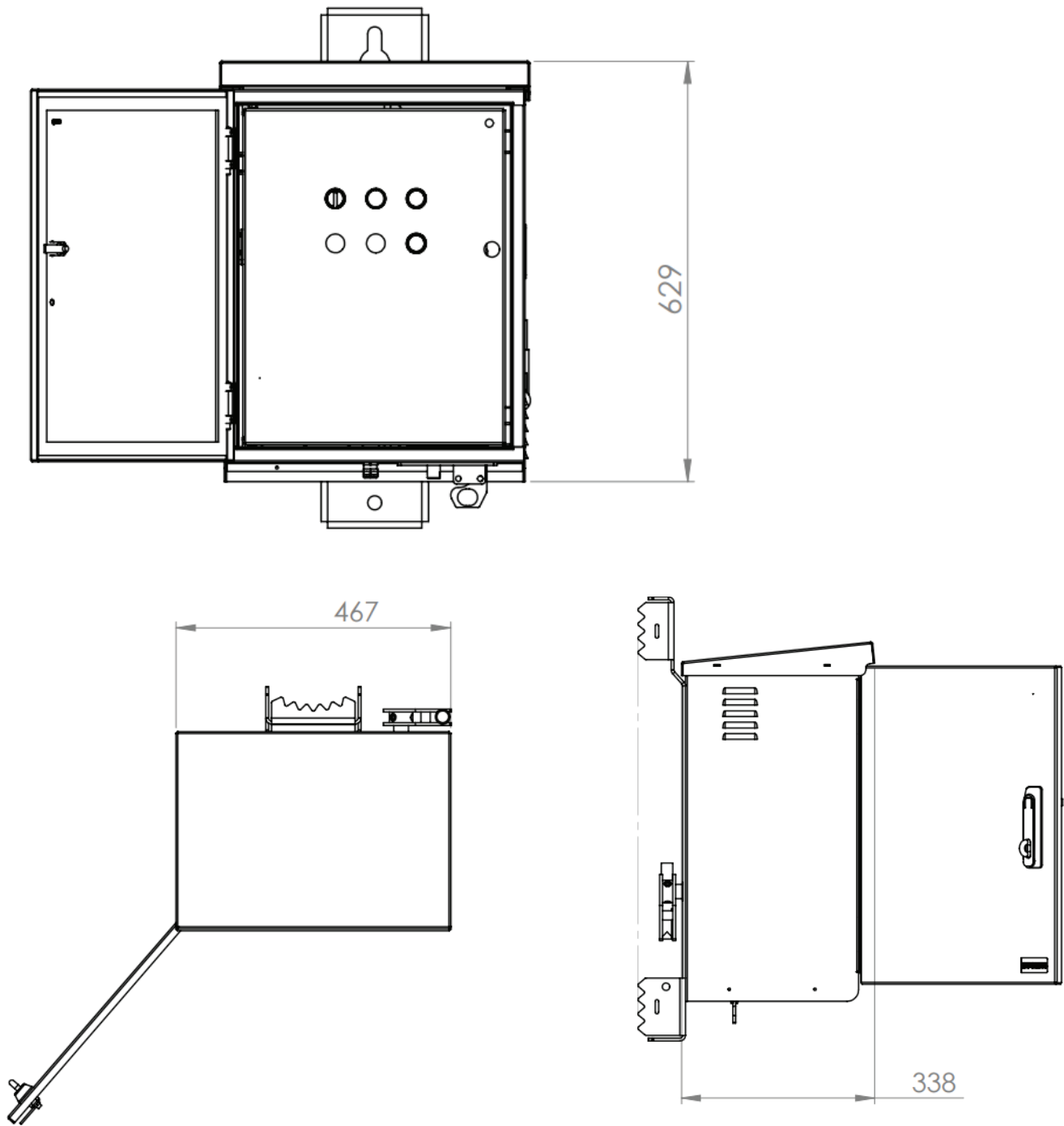


LI-ion battery battery

OPTIONAL COMPONENTS

- Lightning protection for the antenna connector;
- Li-Ion batteries for high temperature climate zones, 2 x 12.8 V 20 AH;
- Input power (110 or 230V) 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;

DRAWINGS



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS		DESUR AND BREAK SHARP EDGES	Date: 2019-10-16	HUGHES
SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:			Revision	
A3		FINISH:	Title: EOA 501R - No Inner Door	Part No: EOA_501R_2000
		MATERIAL:	DWG NO: D_EOA_501R_NoDoor	
SCALE:1:10				
DO NOT SCALE DRAWING		WEIGHT:	SHEET 1 OF 1	

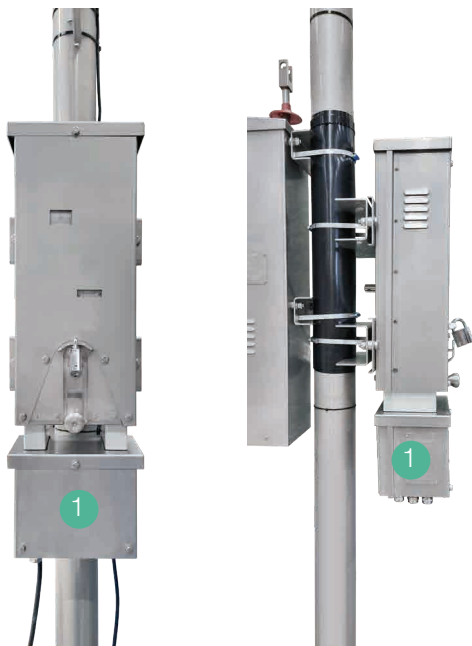
MOTOR DRIVES FOR DISCONNECTORS

EXTERNAL ACCESSORIES

NEW! FOR ALL MODELS

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

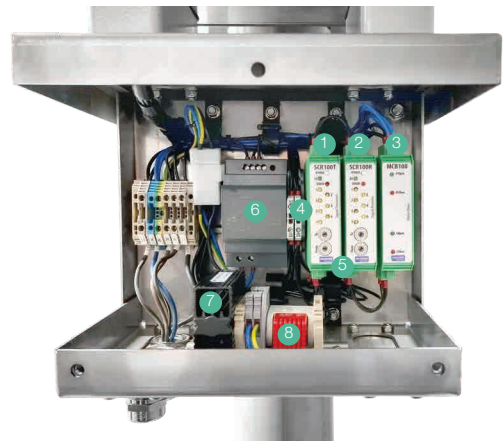
- Receiver unit (1)
- Transmitter unit (2)
- Communication current load (3)
- LED function indicators (4)
- 2 x hex coded address switches (5)
- Power supply (6)
- RTU parallel interface (7)



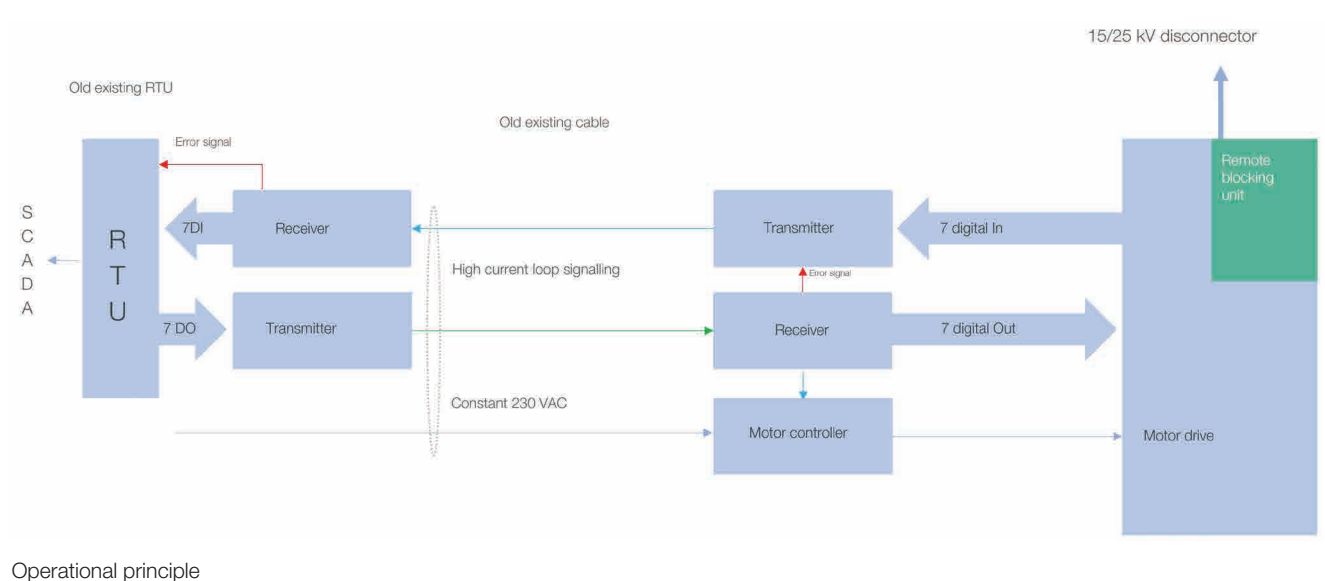
Master unit at the SCADA side

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



MOTOR DRIVES FOR DISCONNECTORS

EXTERNAL ACCESSORIES

NEW! FOR ALL MODELS 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.

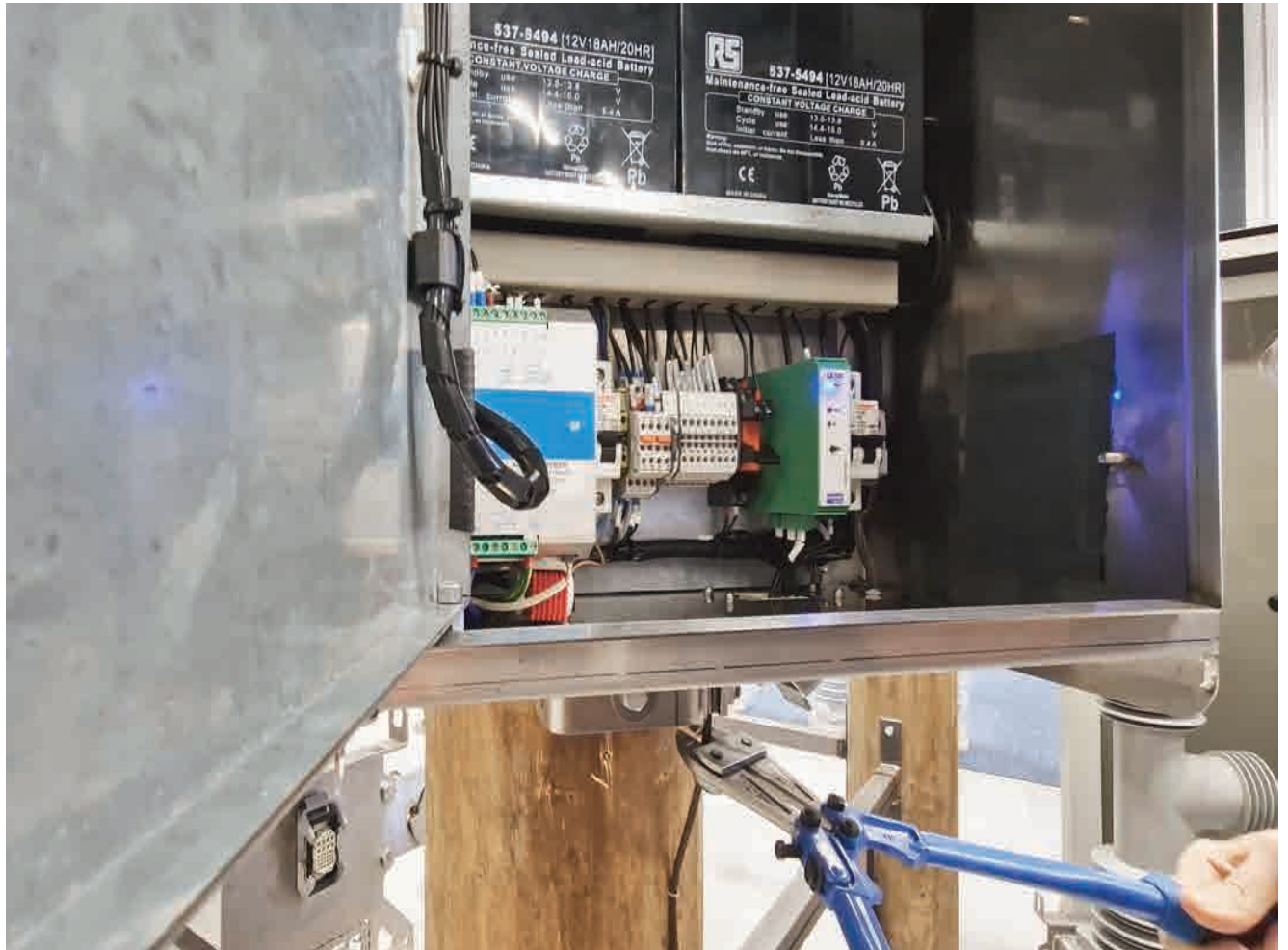


Installation in the motor drive cabinet

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.

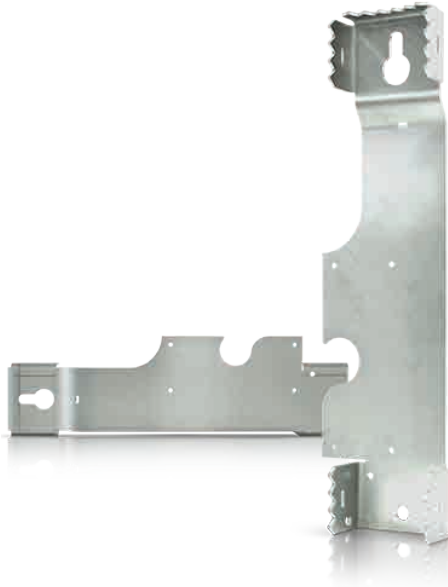
The theft alarm purposes are:

- 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.

MOTOR DRIVES FOR DISCONNECTORS

EXTERNAL ACCESSORIES

FOR EOA400/401/500/501/501TVS/EOA700



EOA500, 501, 700 mounting bracket



Antenna for GSM/4G



Pole mounted bracket for antenna



Surge arresters for antenna
N-N connectors



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



Phase to phase connected, epoxy
insulated voltage transformer 6/0.11kV



Phase to phase connected, epoxy
insulated voltage transformer 10/0.11kV



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



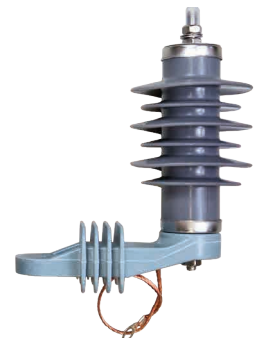
Phase to ground connected, epoxy
insulated voltage transformer 30/0.11kV



Drop out fuses, silicone
insulated, 15kV 3A



Drop out fuses, silicone
insulated, 38kV 3A



Surge arresters silicone
insulated, 22kV



Surge arresters silicone
insulated, 33kV

FOR EAO600, EOA650



EOA600, 650 mounting bracket



Flexible wire operation rod



Antenna for GSM/4G



Surge arresters for antenna
N-N connectors



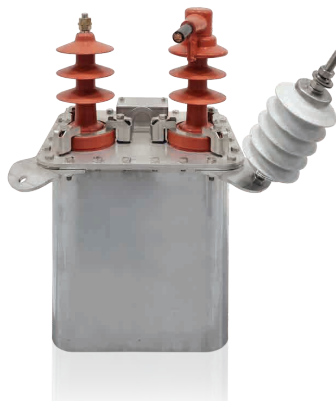
Antenna cable (3) 8M RG-213 N-N
professional connectors;



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



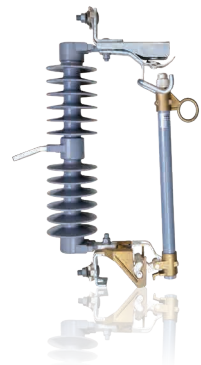
Test set for all functions



DC/DC converter, 750 or 1500 VDC



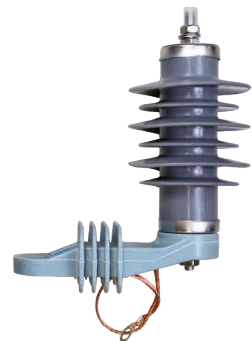
Operational rod support



Drop out fuses, silicone
insulated, 15kV 3A



Drop out fuses, silicone
insulated, 38kV 3A



Surge arresters silicone
insulated, 22kV



Surge arresters silicone
insulated, 33kV

MOTOR DRIVES FOR DISCONNECTORS

TECHNICAL DATA

CHARACTERISTICS	EOA400/401	EOA500/501	EOA501TVS
Dimensions (mm)	590 x 240 x 335 / 590 x 265 x 450 (HxWxD)	500 x 400 x 220 / 630 x 465 x 336 (HxWxD), multiple formats, custom fit	630 x 465 x 336 (HxWxD), multiple formats, custom fit
Weight (kg)	40 (including batteries)	45 (including batteries)	46 (including batteries)
Operating temperature (°C)	-50 ... +60	-50 ... +60 Optional -10...+80	-50 ... +60 Optional -10...+80
Enclosure	IP65, non-magnetic stainless steel, optional painted in RAL or ANSI colour	IP55-65, non-magnetic stainless steel, optional painted in RAL or ANSI colour	IP55-65, non-magnetic stainless steel, optional painted in RAL or ANSI colour
Climate system	35 W PTC element	35 W PTC element	35 W PTC element
Thermostat (°C)	on at 5°C off at 15°C	on at 5°C off at 15°C	on at 5°C off at 15°C
Linear speed	160mm in max 2.5 seconds	160mm in max 2.5 seconds	160mm in max 2.5 seconds
Linear force	2.5kN	4kN	4kN
Stroke	160, 180, 200, 220 and 240mm	160, 180, 200, 220 and 240mm	160, 180, 200, 220 and 240mm
Motor	24/110/ 220 Vdc 150 W	24Vdc 250W	24Vdc 250W
Motor type	Neodymium magnetized DC/serial	Neodymium magnetized DC	Neodymium magnetized DC
Power supply remote blocking	N/A	N/A	N/A
Optional remote blocking operation speed	N/A	N/A	N/A
Operation voltage*	82– 264 VAC 120 – 370 VDC	90–135 180–305 VAC	90–135 180–305 VAC
Charging power*	60W	250W	250W
Batteries*	2 x 12 V 20 Ah AGM Lead cell	2 x 12 V 20 Ah AGM Lead cell	2 x 12 V 20 Ah AGM Lead cell
Batteries solar version	N/A	2 x12 V 45 AH	N/A
Battery optional	N/A	2 x 12.8 V, 20 AH Li-Ion	2 x 12.8 V, 20 AH Li-Ion
Control interface	Parallel	Parallel	Parallel - Modbus
Signalling protocols, optional	IEC60870-5-104, DNP3, Modbus	IEC60870-5-104, DNP3, Modbus	IEC60870-5-104, DNP3, Modbus
Communication interface, optional	RS-232/485, 10/100Mbit TP(Ethernet), GSM/4G	RS-232/485, 10/100Mbit TP(Ethernet), GSM/4G	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 60265	- 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 60265	- 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 60265

* not applicable for EOA401

CHARACTERISTICS	EOA600	EOA650	EOA700
Dimensions (mm)	615 x 275 x 185 (HxWxD);	866 x 212 x 295 (HxWxD);	764 x 623 x 273 (HxWxD);
Weight (kg)	32	32	60
Operating temperature (°C)	-50 ... +60	-50 ... +60	-50 ... +60
Enclosure	IP54, non-magnetic stainless steel, optional GRP, optional painted in RAL or ANSI colour	IP54, non-magnetic stainless steel, optional GRP, optional painted in RAL or ANSI colour	IP54, non-magnetic stainless steel, optional GRP, optional painted in RAL or ANSI colour
Climate system	Optional 35 W PTC element	35 W PTC element	35 W PTC element
Thermostat (°C)	on at 5°C off at 15°C	on at 5°C off at 15°C	on at 5°C off at 15°C
Linear speed	100 mm in max 1.5 seconds	200 mm in 3 seconds	N/A
Linear force	2.5 – 4 kN	2.5 – 4 kN	N/A
Stroke	50 - 240mm depending on type of lever arm;	50-200mm	N/A
Motor	24 / 110 / 230 VAC/DC 250 W	24 / 48 / 60 / 110 / 230 VAC/DC 250 W	24 / 110 / 230 VAC/DC
Motor type	Serial high-speed AC/DC	Neodymium magnetized DC	Digital step motor
Power supply remote blocking	24VDC 10W	24VDC 10W	N/A
Optional remote blocking operation speed	1.2 second	1.2 second	N/A
Cam switches	N/A	N/A	10 pcs magnet assisted with 2 NO and 2 NC per switch
Rotation	N/A	N/A	programmable 0-360 degrees
Rotation speed	N/A	N/A	programmable 10-60 sec per 360 degrees
Installation mode	N/A	N/A	60 – 360 sec for 360 degrees rotation
Operation voltage	110/230 VAC/VDC – 24 VDC	90– 250VAC 240 W, temperature compensation	90– 250VAC 240 W, temperature compensation
Batteries	N/A	2 x 12 V 7.5 Ah AGM Lead cell	N/A
Batteries solar version	N/A	N/A	N/A
Batteries optional		2 x 12.8 V, 7.5 AH Li-Ion	N/A
Control interface	3 and 6 wire rail interfaces	Parallel	Parallel
Signalling protocols, optional	IEC60870-5-104, DNP3, Modbus	IEC60870-5-104, DNP3, Modbus	IEC60870-5-104, DNP3, Modbus
Communication interface, optional	RS-232/485, 10/100Mbit TP(Ethernet), GSM/4G	RS-232/485, 10/100Mbit TP(Ethernet), GSM/4G	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	• 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 60265	• 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 60265



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.

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

www.hughespowersystem.com

