

Manufactured by:



AUGUSTE SF6 Insulated Overhead LBS

Manual & Electrical-Horizontal & Vertical Mounting



Horizontal

Vertical

- **A range of heavy-duty and highly efficient switchgear adapted to the most severe environment conditions'**
- **Stainless steel tank sealed for life**
- **Mechanism requires neither maintenance nor lubrication**
- **Installation made easy by the reduced weight of subassemblies, especially the tank and the overall compact design.**
- **Designed for a 30 years operating life without any maintenance in accordance with IEC 60694.**



GENERAL PRESENTATION

Auguste switchgear is an overhead load-break disconnecting switch designed to allow a load interruption up to 630 A for a medium-voltage (up to 36 kV) electrical overhead line. This switchgear is convenient for all types of networks, especially for those requiring frequent operations in severe weather conditions.

Auguste switchgear can be installed on a live line without interrupting the operation. They are easily installed below the line, on a side of the pole. They are extremely reliable, with high-level safety characteristics allowing them to be used in full confidence.

Auguste switchgear design is based on extensive experience, in co-operation with the public and private operators of overhead distribution electrical networks. The equipment meets all their main concerns: assure quality service, install equipment easily, on live or dead lines, safe use, improve network cost-effectiveness by decreasing the sources of output loss. Operational on all continents and subject to the most severe environmental and climatic conditions (saline humidity, rising sand, ice, snow, high altitude, industrial pollution, areas

with high-density bird populations, etc.), these switches are valued by operators for their operational simplicity and high reliability. They are used on all types of overhead distribution networks in rural or suburban areas.

Auguste switchgear exist in manual or electrical control version and are evolutionary. They are designed to be easily inserted in remote SCADA controlled networks.

ADVANTAGES

Quality:

- A range of heavy-duty and highly efficient switchgear adapted to the most severe environmental conditions,
- Products in compliance with international standards (IEC, ANSI, NFC),
- Designed and manufactured according to an ISO 9001-certified quality assurance system.

High reliability due to the NOVEXIA team's technological choices:

- Breaking in SF6 at very low pressure (0.3 bar relative),
- Stainless steel tank sealed for life
- Ability to place a voltage transformer inside the tank in order to power the control box, this enables the load-break switch to be self-powered.
- Internal arc proof
- Exceptional dielectric strength
- mechanism requires neither maintenance nor lubrication,
- Very small number of components,
- Polymer bushings with aluminum connections lugs, or pluggable sockets with leak-proof protection,
- Galvanised steel support fittings and aluminum rod assembly.

Maximum safety:

- Usable as point of isolation or retro feeding point (normally opened switchgear),
- Safe position indicator of the switchgear,
- Visual confirmation of voltage presence,
- Padlocking of the switchgear in different positions,
- Gas vent valve on upper part if an internal fault occurs. No projection of dangerous elements or fire-causing materials.

Possible switchgear adaptation:

Changing a switch with a manual control mechanism to one with a motorised or remote control mechanism without demounting the switch.

STANDARDS

Automation and telecontrol:

- Automation and telecontrol: Load-Break switches designed to meet the adaptation and automation requirements of electrical networks,
- Compatible with subsequent telecontrol selected.

Complete range of options:

- Motorised mechanism,
- Control box,
- Fault detection with phase and/or homopolar sensors,
- Sectionalising function,
- Fastening accessories for strap or clamp mounting or bolt fastening,
- Connection by pluggable sockets or screw terminals
- MV lightning arrestors protection recommended, especially in lightning-prone areas.

Appearance:

- The load-break switch's elongated shape makes it blend in perfectly with its surroundings, thus avoiding any negative visual impacts.

Easy installation:

- Installation below the line on all types of poles,
- Installation made easy by the reduced weight of sub-assemblies, especially the tank, and the overall compact design,
- No need for cross-arm support.

Ergonomically operated:

- Easy identification of the tank source side and the various connection cables between the load-break switch and the control box,
- Clear indication of the direction of manual operations and the control unit.



Economical:

- Designed for a thirty-year operating life without any maintenance in accordance with IEC 60298.
- Helps in reduction of outage time,
- Low purchasing, operating and maintenance costs.

Auguste switchgear is designed and manufactured according to an ISO 9001-certified quality assurance system. The equipment complies with the recommendations in the most recent editions of the following standards and specifications:

IEC 60129 (1984)
IEC 60265-1 (January 1998)
IEC 60298 (December 1990)
IEC 60694 (May 1996)
ANSI C37.63 (1984)
IEEE C37.71 (1984)
BS 5463
EA 41-27
ESI 41-13
NFC 64-130
NFC 64-140
Specification HN 64-S-46 (EDF)
"Remote-controlled overhead loadbreak switches"
(January 1999)
Specification HN 64-S-44 (EDF)
"Remote control interface box for load-break switches"
(December 1998)



TESTS

Type tests

AUGUSTE load-break switches have successfully undergone all type tests specified in international standard IEC 60265-1 and its most recent additional requirements.

The main type tests carried out are:

- dielectric strength tests,
- breaking and making tests,
- short-time over-current withstand tests,
- making capacity on short-circuit current,
- internal arc tests,
- mechanical endurance tests,

The corresponding test reports are available on request.

Routine tests

All Auguste switches undergo individual tests during manufacturing as specified by the standards in force, namely;

- leak-proof tests,
- dielectric tests,
- voltage drop measurement,
- operation tests.

Testing equipment

We have all the equipment required to perform investigation, validation as well as routine tests.

DESCRIPTION

The modular design of the range of Auguste LC Switches enables them to be adapted to the constraints of existing networks and to different modes of operation, as well as to future network evolutions.

Load-break switches with manual control mechanism of horizontal mounted are operable by hot stick while load-break switches with manual control mechanism of vertical mounted are operable by rod assembly.

By adding a control box, the motorised version can be remote-controlled. All the accessories needed for automation and telecontrol, such as the current sensors, voltage sensors, amperemeterical or direction fault detectors, sectionaliser automatic control, modems, etc. are specified to enable changes to be made to already installed equipment.

A wide variety of mounting accessories for clamping, strapping or bolting enable the load-break switch to be very easily installed on any type of pole.

The first aim in developing the range of Auguste LC switches was to achieve a reliable and safe product.

The small number of parts making up the switch and the mechanism, the installation of live parts in SF6 environment inside a tight and permanently sealed enclosure and the use of materials resistant to the most severe environmental conditions, including stainless steel, galvanized steel and epoxy, are all measures of reliability.

In addition, it is completely maintenance-free, requires no lubrication and has low pressure SF6 gas which enables at least a 30-year operating life without gas refilling. Another important factor taken into account in the development is the safety of people and operators:

- A safety valve fitted to the switch's sealed enclosure avoids any risk of explosion. If an internal arc occurs, the gas escapes upwards by the safety valve.
- An indicator mechanically linked to the contact operation shaft clearly gives the load-break switch's position. This indicator is visible from the bottom of the pole.
- The design of the breaking chamber enables the dielectric withstand, across open contacts, even in the air.

Auguste LC load-break switches are designed to be equipped with basic modules and to have options added either at the time of delivery or once installed on the network, enabling the user to take full advantage of this range of products.

The main functions are described below. Contact us for information on all the possible adaptations and options.

Breaking Chamber

The family of Auguste LC load-break switches is built around a three-pole breaking chamber in SF6, installed in a permanently-sealed stainless steel enclosure.



This stainless steel enclosure contains the live parts of the load-break switch (fixed contacts, operation shaft equipped with moving contacts), thus protecting it from all external stresses.

The use of SF6 enables the switch environment to be perfectly controlled, thus reducing isolating distances and therefore the space requirement and weight. Due to its insulating effect, the gas helps extinguish the electric arc generated during a current interruption. Combined with the speed of contact separation, SF6 provides for very short arc duration, which again improves the load-break switch's reliability.

Since the SF6 pressure in the metal enclosure is 0.3 bar relative, a pressure sensor is not necessary according to the recommendations in standard IEC 60298.

The difference between the internal and atmospheric pressure being very small, the amount of leakage through the seals is negligible, thus insuring an expected operating life of more than 30 years.

It is therefore not necessary to conduct pressure tests or checks or to refill the gas. All this eliminates the need for any maintenance operations to be performed by skilled personnel.

For the load-break switch's motorised version, there are two possible power supply solutions: supply by the LV network, or by an external voltage transformer (VT).

The simple product design and selected materials (stainless steel enclosure, self-lubricating materials) provide for superior resistance to harsh weather conditions and vandalism, very stable electrical and mechanical capabilities and, consequently, exceptional reliability.

The Auguste LC switch has remarkable dielectric resistance, enabling the switchgear to be used as point of isolation (isolation switch).

Their electrical and mechanical characteristics put these switches in the highest performance category for live breaking load-break switches according to the classification in the international standards in force (E3/M2 of IEC 60265-1). To ensure the highest level of operational safety, both for people and surrounding property, the switch's enclosure is designed to be able to handle the consequences of a short circuit or break of internal isolation without incident. Specifically, it is equipped with a safety vent valve located in the upper part of the enclosure.

This feature guarantees protection of the operator, who could conceivably be at the bottom of the pole when an incident occurs, as well as the protection of property (proximity to urban or agricultural areas etc.). The internal arc tests, successfully carried out several times in independent specialised laboratories, have shown the repeatability of the switch's performance and its reliability.

Auguste LC load-break switches are compact and light-weight, enabling installation on all types of poles using standard methods. With its ergonomic design and exterior appearance, these switches are able to blend in nicely in urban areas.

A safe position indicator, mechanically linked to the switch, is placed on the lower part of the switchgears so as to be visible from the ground. Work on the line can be performed with every safety.

The standard indicator is defined according to standard IEC 60417. Other versions can be examined on request. The connection to the line is performed by one of the following means:

- Cycloaliphatic epoxy bushing equipped with connection lugs for screw terminals, in compliance with standard NEMA CC1, using bare or sheathed cables. This bushing has a creepage distance to earth greater than 1100 mm.
- Pluggable sockets type PF 400 or PF 630, requiring an insulated cable equipped with a movable socket type PM 400 or PM 630.

External Voltage Transformer

The VT is designed to supply the control box and motor (shown below). It has enough power to supply all the electrical equipment and a charger with battery, which takes over MV disconnection. This transformer should preferably be protected by medium voltage surge arrester.

This VT comes with the motorised control-operated switches. It is not available in the manual version nor if the customer has a low voltage source locally. This VT can be supplied by NOVEXIA or by the user.



Control mechanism

Auguste LC switch control mechanisms are equipped with a tumbler spring system to be operated user-independently: the energy of the operation is stored in the spring before being released to trigger the opening and closing of the load-break switch, thus guaranteeing independent, reproducible operations.

This mechanism of horizontal mounted is coupled to the bottom part of the switch while the mechanism of a vertical mounted is coupled to the bottom part of the switch.

Due to the materials used, this mechanism requires neither lubrication nor maintenance and has very high mechanical endurance of over 5000 C/O operations. A cover protects the mechanism against mechanical and weather stresses. A viewing window allows an operator to clearly see the switch's position indicator from ground level. The motorised control mechanism with gears enables the switch to be electrically operated. The control unit supplies the power in this case.

The proximity of the control mechanism to the switch optimises the motor's efficiency, reduces motor size and power consumption and increases reliability of the switch-mechanism assembly. The motorised control mechanism is equipped with limit switches which ensure replication of the switch position. This status is transmitted to the control centre if the switch is remote-controlled. During a manual emergency operation, the motor is automatically declutched, thus disabling all electrical operation of the switchgear.

Hot stick Operation for Horizontal Mounted

The manual control mechanism is activated by the operator using a hot-stick. The motorised control mechanism is operated from the control box. It is compatible with the above-mentioned manual operations.

The control lever enables the selection of:
the switch operation mode, electrical mode allowing local electrical operation from the control box or remote control electrical operation,
the change of switch position: opening or closing.

Operation for Vertical Mounted

The manual control mechanism is activated by the operator using a control lever and rod assembly. The motorised control mechanism is operated from the control box. It is compatible with the above-mentioned manual operations.

Operation by rod assembly and lever

This control lever is installed at the base of the pole at eye level. It is linked to the switch mechanism by means of telescopic rotary rod assembly enabling adaptation to the pole height. The standard height is 11-13 m. Other rod system lengths can be produced on request.

The control lever enables the selection of:

- the switch operation mode, electrical mode allowing local electrical operation from the control box or remote control electrical operation,
- the change of switch position: opening or closing.

In order to guarantee operator safety:

- The rod assembly is equipped with an isolator, at the top end.
- The control lever can be padlocked in one of the three following positions: open, closed or electrical mode,
- A label placed on the manual control indicates the direction of operation and that the electrical mode and remote control function are selected.

This mechanism has three positions: open, closed, electrical mode. In open or closed position, the switch remote control is deactivated. The operation is carried out by horizontal rotation and requires an effort less than 20 daN.

Control box

The control box controls and operates the switch: locally, remotely (if equipped with remote control and communication equipment).

The box's modular design takes into account user needs in terms of ease of use, configuration, diagnostics and maintenance. The box enclosure is made of stainless steel. It is made up of the following modules:

Power supply

Power can be supplied accordingly:

- by the potential transformer, 230V or 110 V, external,
- by the low voltage network, if available.

The power supply module has the following sub-units:



- a voltage and safety transformer
- a 12-V battery charger for the standard version, or optional 48V
- a 12-V, 24- or 38-Ah battery with minimum 2 x 8 hours autonomy
- protection by fuse or MCB and LV surge arrester.

Electrical control module

This module runs the interface between the CPU and the control mechanism. Other functions can be performed on request (various measurements, alarms, etc).

CPU module

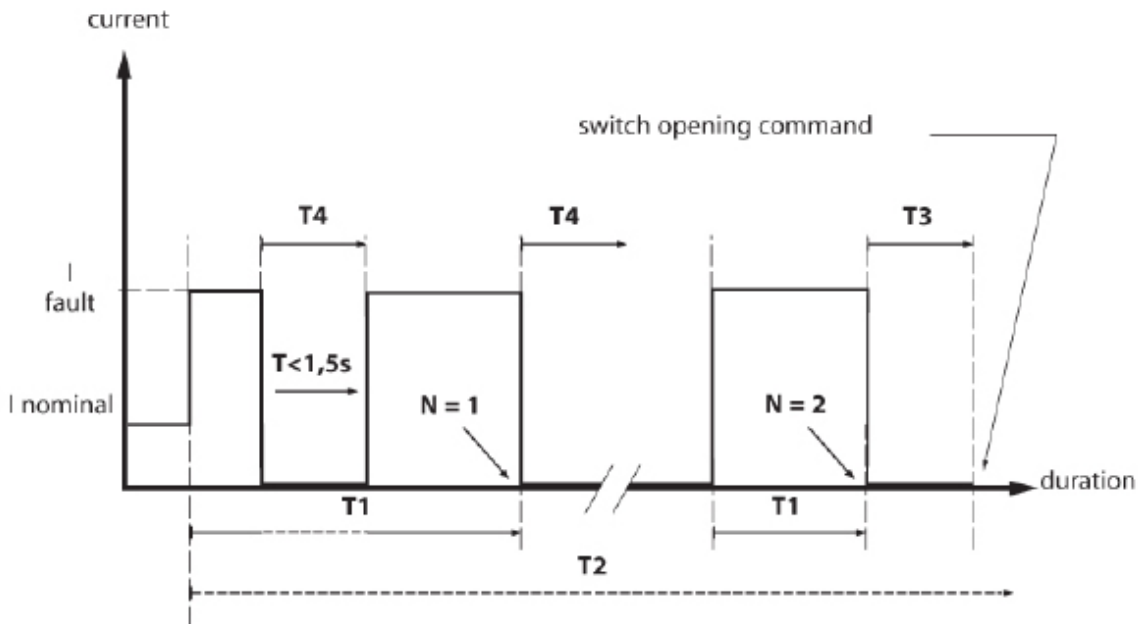
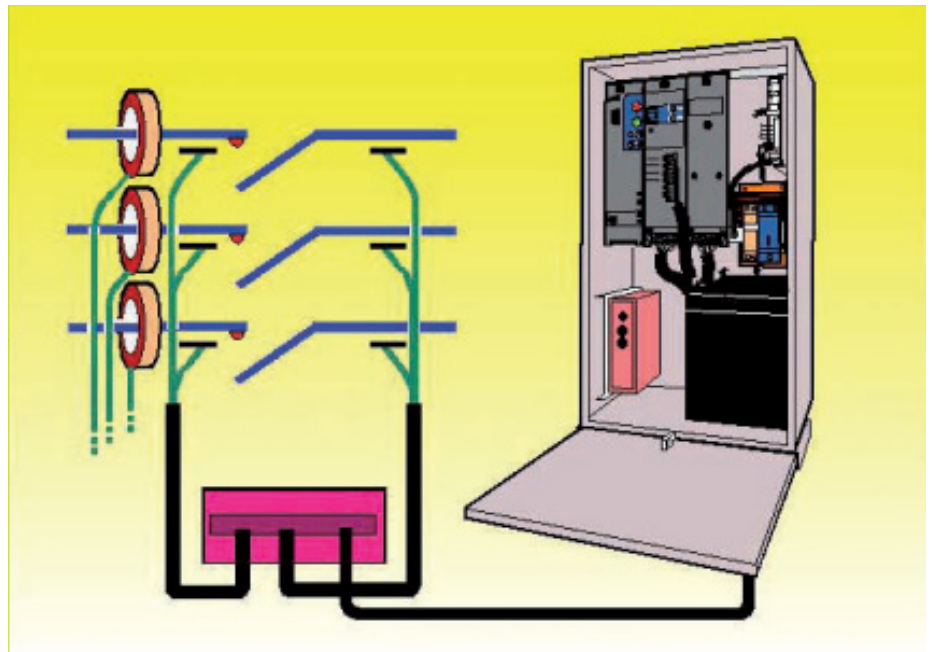
This module ensures the monitoring and management of all modules and sensors and has the following features:

- Human-machine interface,
- Box functions configuration,
- Inter-module communication,
- Battery voltage monitoring.

This module allows the option of linking the switchgear to the SCADA telecontrol system. To ensure this RTU function, a communication protocol (IEC 870-5-101 M/E or M/M, DNP3, RTU Modbus, HNZ) can be loaded in the CPU. A radio or a telephone modem can be installed as well. The control box can also be fitted with external RTUs subject to the dimensions and consumption conditions. For this purpose, an interface module has been designed as an option. It is possible to house a standard radio in the box.

Fault detection module

Fault detection requires the use of current sensors and may need voltage sensors depending on the customer's earthing conditions and the constraints imposed by selectivity and the equipment already installed. This module enables measurement of the electrical variables on one hand, and analysis of these variables on the other hand in order to detect the faults. It can also activate the opening of the switch in off-load conditions in order to reduce the number of customers affected by the fault and to isolate the faulty line sections. This is the "sectionalising" function. The current sensors and the associated fault detector can be adapted to all the network earthing conditions. Fault processing and clearance are carried out in coordination with the upstream protections (feeder circuit breaker) according to the reclosing cycle as shown below.



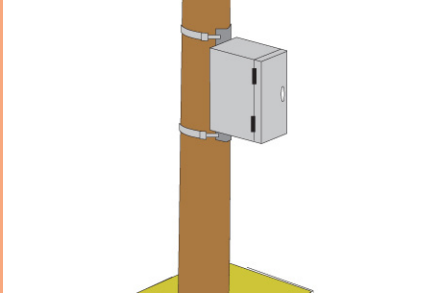
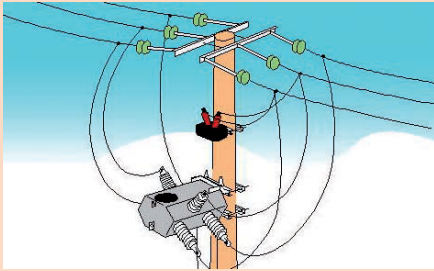
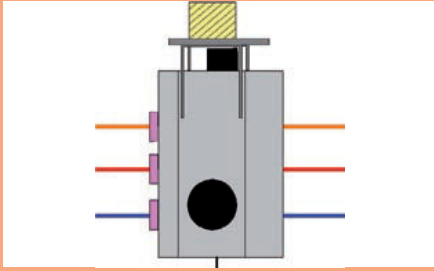
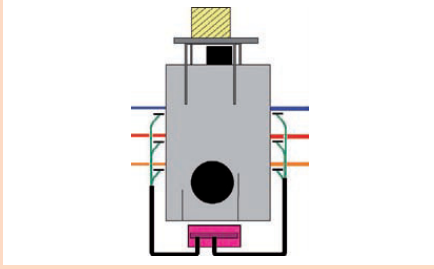
Operation sequence of the opening in the off-peak load
Fault identification:

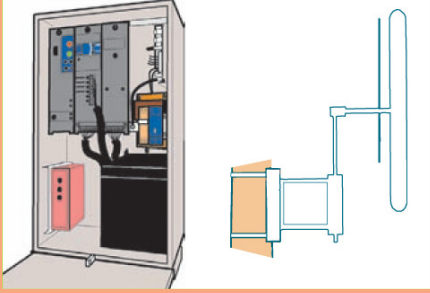

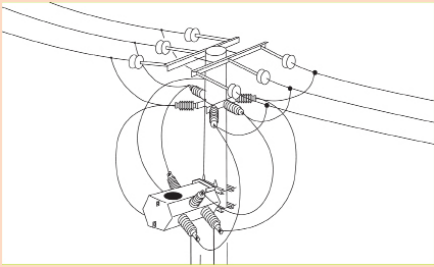
- Two faults separated by less than T_4 are considered as one single fault (example: 1 quick + 1 slow = 1 fault)



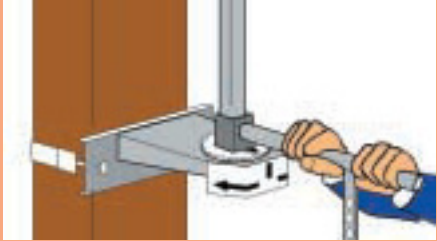
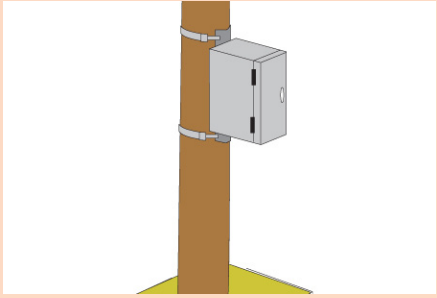
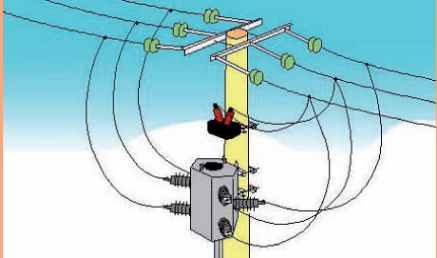
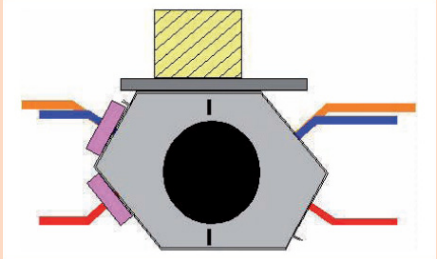
Internal and external configuration of the control box provides for easy installation on the lower or middle part of the pole, as well as simplified implementation and handling. This equipment is configured using dedicated configuration software and a laptop. A family of control boxes is available for many configurations. This equipment is designed to operate in the most varied climates. Easy to configure (laptop), the sectionalising function can be validated by software or push-button or it can be disabled (detection by automatic opening).

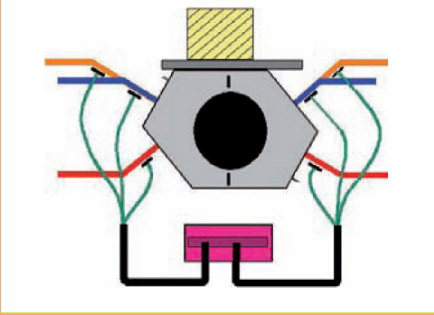
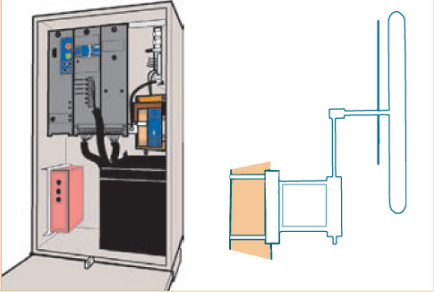

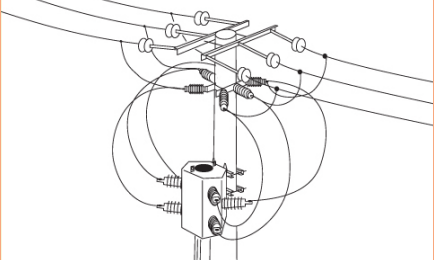
OPTIONS AND ACCESSORIES FOR HORIZONTAL MOUNTED

function	description	diagrams
control box for motorised version	the control box installed at eye level allows the electrical operation of the switch equipped with a motorised operating mechanism.	
Voltage Transformer	In electrical version, the VT can be supplied by Novexia or by the user.	
Fault detection <ul style="list-style-type: none"> • 3CTs+fault current detector 10A 	The current sensors and the fault detectors can be adapted to all earthing conditions.	
Voltage sensors	<ul style="list-style-type: none"> • 6 upstream and downstream voltage sensors allow the indication of voltage presence/absence and/or voltage measurement 	

function	description	diagrams
Communication function	the control box installed at eye level allows the electrical operation of the switch equipped with a motorised operating mechanism.	
LV surge arrester protection		
Options	<ul style="list-style-type: none"> • Switch protection by MV surge arresters 	
	<ul style="list-style-type: none"> • Input/output board to adapt a customer's RTU • Digital counter module (number of operations, number of faults, etc.) 	

OPTIONS AND ACCESSORIES FOR VERTICAL MOUNTED

function	description	diagrams
Manual control with rod assembly	The operation is carried out horizontally using a lever mounted on a rotating rod assembly. Using the control lever, the switches can be locked in "closed" or "open" position or electrical mode.	
control box for motorised version	the control box installed at eye level allows the electrical operation of the switch equipped with a motorised operating mechanism.	
Voltage Transformer	In electrical version, the VT can be supplied by Novexia or by the user.	
Fault detection <ul style="list-style-type: none"> • 3CTs+fault current detector 10A 	The current sensors and the fault detectors can be adapted to all earthing conditions.	

function	description	diagrams
Voltage sensors	<ul style="list-style-type: none"> 6 upstream and downstream voltage sensors allow the indication of voltage presence/absence and/or voltage measurement 	
Communication function	<ul style="list-style-type: none"> CPU board RTU (IEC-870-5-101 M/E or M/M,DNP3,RTU,Modbus,HNZ) modem (radio,RTC,DL) radio antenna 	
LV surge arrester protection		
Options	<p>The current sensors and the fault detectors can be adapted to all earthing conditions.</p> <ul style="list-style-type: none"> Input/output board to adapt a customer's RTU Digital counter module (number of operations, number of faults, etc.) 	

CHARACTERISTICS

Electrical characteristics	UNIT	AGUSTE LC-V 24	AGUSTE LC-V 36
Rated voltage (Ur)	kV	24	36
Rated current (Ir)	A	400 - 630	400 - 630
Frequency (f)	Hz	50 - 60	50 - 60
Rated breaking current (A)			
• Mainly active load	A	400 - 630	400 - 630
• Closed loop	A	400 - 630	400 - 630
• No-load transformer	A	25	25
• Line-charging	A	40	40
• Cable-charging	A	40	40
Rated surge impulse withstand voltage (wae 1.2/50ms kV)			
• common value	kV	125	170
• across the isolating distance	kV	145	195
Rated short- duration power-frequency withstand voltage			
• common value	kV	50	70
• across the isolating distance	kV	60	80
Rated short-time withstand current			
• 3-sec duration	kA	12.5	12.5
• 1-sec duration	kA	20	20
• Peak	kA peak	50	50
Rated short-circuit making current	kA peak	31.5	31.2
Internal fault current in accordance with IEC62271-200	kA	10	10
Electrical endurance	Class	E3	E3
Mechanical endurance	Class	M2	M2

CHARACTERISTICS

Temperature range:	- 25 °C + 55 °C
Operation under ice	20 mm
Humidity:	95 % at 40 °C

CHARACTERISTICS

Mechanical endurance:	opening/closing operations
Protection index	Leak-proof tank: IP 68 Mechanism: IP45 Control box: IP55

Dimensions and weights of main subassemblies

AGUSTE LC-V 24 36 kV	H (mm)	W (mm)	D (mm)	Weight (kg)
Load-break switch assembly without VT, with manual control mechanism	1150	1490	511	95
Load-break switch assembly without VT, with motorised control mechanism	1150	1490	511	100 (*)
Control box	640 (*)	330	370	15
Retractable lever and rod assembly				13

(*): also available in extended version

