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## Smartcloser

MV automated pole-mounted vacuum recloser

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# Smartcloser

The solution to reduce outage duration



The Smartcloser is an automated recloser for overhead distribution networks that reduces the duration of power outages and automatically isolates faulty network sections.

Automated reclosers intended for public electricity distribution networks around the world are essential. They help ensure maximum continuity of electricity supply in a straightforward and economical way. Automated reclosers detect and interrupt fault currents and automatically restore supply after a momentary outage.

The Ensto Smartcloser is mainly an intelligent standalone device capable of detecting overcurrent, interrupting fault currents and re-energizing the line through automated reclosing. If a fault is permanent, the recloser isolates the faulty section from the rest of the network.

### **High reliability**

The Smartcloser has a long service life and does not require any maintenance. It operates under the most extreme environmental and climatic conditions (saline humidity, sand winds, ice, snow, high altitude, industrial pollution, areas with large bird populations, etc ...)

The Smartcloser is extremely reliable and offers high-level security, which means it can be operated with confidence.

### A global solution

Easy to install and operate, the Smartcloser is part of an integrated offer:

- communication equipment with sensors
- control box with protection relay
- upstream and downstream surge arresters
- power transformer
- directional fault detection

### Quality guaranteed by tests

The Smartcloser is designed and manufactured in accordance with a quality assurance system that has ISO 9001 certification. This equipment complies with the recommendations prescribed in the latest versions of international standards and specifications.

### Type tests

The Smartcloser has successfully passed the type tests stipulated in the international standards IEC 62271-1 and IEC 62271-111 (equivalent to IEEE C37.60).

#### Series tests

Each device is individually tested prior to shipment in line with the standards in force:

- dielectric tests
- partial discharge tests
- measuring the voltage drop
- manual and automated operation tests.

## Smartcloser A concept designed to facilitate use



The Smartcloser is composed of a frame with three poles, each fitted with a vacuum interrupter, voltage and current sensors that both detect faults and isolate the faulty network section.

### Advantages

### Intelligence

- Device easily inserted into a distribution network
- Intelligent manual opening device with automated return to starting position
- Easy installation and start-up

### Protection

- Decreased frequency and duration of outages
- Faster localization of faulty sections and immediate identification of the permanent nature of a fault
- Repeated fault closures without material damage

### Reliability

- Long service life with high level of mechanical and electrical endurance
- High reliability of vacuum interrupters and electromagnetic actuators
- Operation under extreme climatic conditions around the world
- No maintenance required

### Durability

- Environmentally-friendly (without SF6)
- Solid insulation with epoxy
- Vacuum breaking technology
- Cost-efficient with decreased losses
- Fits into its environment thanks to a harmonious and timeless design

### Adaptability

- Customisable to meet the expectations of each customer in the different global markets
- Complete range of options (zerosequence toroids, voltage sensors, surge arresters, power supply transformer, ...) that constitute an integrated offer
- Compatible with SCADA remote control systems
- Protection relays that are can be easily configured at the factory or on site and complying with numerous specifications
- Fixing device adaptable to all types of overhead distribution networks
- Easily interchangeable voltage sensors

## Smartcloser

### Description of the automated recloser

<ul> <li>Vacuum interrupter</li> <li>Manufacturer of world class vacuum interrupters</li> <li>Long electrical life and maintenance-free operation</li> <li>Silent opening / closing cycles</li> <li>Environmentally-friendly product</li> </ul>	
<ul> <li>Pole</li> <li>Vacuum interrupter pre-molded with silicone to improve the stability of the epoxy</li> <li>Molded with cycloaliphatic epoxy resin (good resistance to extreme weather conditions)</li> <li>Flexible contact consisting of thin copper sheets</li> <li>Insulated drive rod</li> </ul>	
<ul> <li>Electromagnetic actuator</li> <li>Controls the opening and closing of the vacuum interrupter</li> <li>Snatch gap <ul> <li>ensures continued and good contact pressure of the vacuum interrupter irrespective of the number of operations and the wear of the contacts</li> <li>the vacuum interrupter can be opened with a short movement</li> </ul> </li> <li>Closing and opening process controlled by coil</li> <li>Closed position maintained by a permanent magnet</li> <li>Spring-operated opening: regular and reliable mechanical movement</li> </ul>	ŀ
<ul> <li>Indicator position</li> <li>Directly connected to the electromagnetic actuator</li> <li>Provides information on the position of the VI contacts (green = open / red = closed)</li> </ul>	
<ul> <li>Manual emergency opening</li> <li>Tripping system in direct connection with the actuator</li> <li>Can be used without external power supply</li> </ul>	
<ul> <li>Pole assembly</li> <li>The pole consists of the active parts with the breaking system, the electromagnetic drive, the manual emergency opening, and the position indicator</li> <li>Sub-assembly designed as a fully autonomous system</li> <li>All parts are assembled with unique reference (traceability)</li> </ul>	
<ul> <li>Sensors</li> <li>Molded in epoxy resin and silicone</li> <li>Current and voltage sensors included</li> <li>Plugged on the pole arm <ul> <li>Provides real flexibility and the possibility to adapt the sensors to the needs of the customer</li> <li>ratio: 500/1</li> <li>measurement accuracy: +/- 1% for currents</li> <li>saturation limit at 3,800 A</li> </ul> </li> </ul>	

### Smartcloser Terms of service and installation

### Type of electrical supply network

The devices in the Smartcloser range are designed to be used:

- on all types of overhead distribution networks, in rural or suburban areas, and particularly those requiring frequent operations
- outdoors under severe weather conditions. Normal operation conditions: temperature between - 40° C and + 55° C

They require no maintenance and can reach 5,000 openings / closings with mechanical endurance.

- Type: three-phase overhead network
- Voltage: up to 38 kV
- Current: 630 A

### Pole installation

Smartcloser automated reclosers are designed to be connected under the HVA line:

- they are installed horizontally on the pole
- different fixation devices make it possible to install the Smartcloser regardless of the material used for the pole (wood or concrete, and its shape (round or square, single or double)

The types of fixation are provided as a rule in line with the requested configuration.

- the Smartcloser must be connected to the HVA networkpowered off
- the control box is usually mounted at the bottom of the pole

### Grounding

The Smartcloser is intended to operate in equipotentiality, which means all metallic elements must be connected to the ground. This equipotential connection must be made according to the state of the art.

### Surge protection

Ensto Novexia recommends protecting the Smartcloser automated recloser on both sides with two sets of three HVA surge arresters with mounting brackets.

### Normal conditions of service

These automated reclosers are highly resistant under the following severe operating conditions: saline environment, wind, sand, ice, snow, industrial pollution, areas with a high density of birds, densely populated areas, ...).

- Temperature: as a rule -40° C to +55° C
- Relative humidity: 100% to 25° C // 95% to 40° C
- Altitude:  $\leq$  1,000 m / sea level
- Operation under ice: 20 mm

Technical characterist	ics	UNIT	Smartcloser
Electrical characteristics	Rated voltage	kV	up to 38
	Rated current	А	630
	Rated frequency	Hz	50/60
	Rated short-time withstand current (1s)	kA	12.5
	Rated making current (RMS)	kA	12.5
	Rated symmetrical interrupting current	kA	12.5
	Rated lightning impulse withstand current	kV	170
	Rated power frequency withstand voltage (dry)	kV	70
Switching performance	Mechanical life (operating cycles)	C/O	5,000
	Current sensors	per phase	1
Weather conditions	Ambient temperature	°C	[ -40; +55]
	Humidity	% at °C	100% at 25° C (max)
	Operation under ice	mm	20
	Degree of protection for the poles	IP	65
	Weight (only recloser without options)	kg	138

### Smartcloser Remote control box

### Installation

The box is usually installed at the bottom of the pole, however, it may also be installed at a certain altitude in order to prevent vandalism.

It is attached to the pole via specific included hardware. The latter is installed in advance on the pole and makes it easy to suspend the box.

### **Dimensions and weight**

- Length: 700 mm
- Width: 500 mm
- Depth: 400 mm
- Weight (with battery): 53 kg

### Case

The box is made of stainless steel, it includes all the modules necessary to manage the Smartcloser, both locally and remotely, meaning that it will integrate the communication support (not included).

A double door allows access to the commands.

Its shape and construction ensure:

- a water and dust penetration rating of IP55
- resistance to mechanical impact of 20 joules of index IK10

### Main characteristics

٠	Supply voltage	230 V AC
٠	Battery voltage	24 V (2 batteries 12 V)
٠	Battery capacity	24 A h
٠	Battery control	Yes
٠	Index of protection	IP55-IK10
•	Weight without battery	35 kg

• Weight without battery

### The supply

### The connection

The box is powered with 230 Vac AC voltage from a power transformer mounted on the pole, whose cable enters the box via a stuffing gland at the bottom of the box.

The supply is protected:

- Against surges
  - 4 A fuse for alternative power supply
  - 4 A fuse for radio power supply
  - 4 A fuse for auxiliary power supply and protection relay
  - 15 A fuse for battery protection (internal to the power supply)
  - 20 A fuse for powering the actuator board
- Against overvoltage (low voltage surge arrester)

### The charger

It consists of an uninterruptible power supply from a PRE-MIUM brand: ECS200

The charger has the following characteristics:

- Rated voltage: 24 V
- Rated current: 8.3 A
- Floating voltage (battery charge): 27.2 V
- Charge current: 1 A



The role of the charger is to:

- charge the battery
- continuously supply other equipment in the box

### The batteries

They are type 12 V 24 Ah maintenance-free lead-free batteries 2 batteries in series to obtain the 24 V service voltage Autonomy with no alternative power supply: 48 h Weight of one battery: 9kg

### The protection relay

The role of the protection relay is to control the Smartcloser in order to eliminate HVA faults downstream of the recloser and to resupply the sections that are not faulty

To this end, it mainly performs the following functions:

- Determining the position of the Smartcloser
- Measurement of HVA currents
- Measurement of HVA voltages (upstream, downstream optional)

### **Communication protocols**

- IEC101/104
- DNP3 series/IP
- Modbus RTU/IP .
- IEC61850

### **Communication equipment**

- Ethernet
- RS485
- RS232
- Optic fibre

### Media

- Digital radio
- GSM
- GPRS
- ADSL

### Protection

Functions	Description
50/51	Fault detection between cycles, 4 instances, defined time or inverse time curve
50/51N	Ground fault detection (sensitive), 4 instances, defined time or inverse time curve
67	Directional fault detection between cycles, 4 instances, defined time or inverse time curve
67N	Directional fault detection between cycles, 4 instances, defined time or inverse time curve
67NT	Intermittent ground fault detection
46/46R/46L	Balance fault detection or broken conductor, 4 instances, defined time or inverse time curve
49L	Cable overheating detection
59	Overvoltage detection, 4 instances, defined time or inverse time curve
27	Undervoltage detection, 4 instances, defined time or inverse time curve
81R	Out of range frequency, 4 instances, defined time or inverse time curve

### Control

Functions	Description
25	Synchro-check
79	Recloser
	Cold load pick-up
	8 configuration groups

### Measurement

- Phase current measurement I1, I2, I3 residual current
- Phase voltage measurement V1, V2, V3 residual voltage
- Composite voltage measurement V12, V23, V31
- Active power calculation by phase and total
- Reactive power calculation per phase and total
- Apparent power calculation per phase and total
- Active energy calculation (with sign)
- Reactive energy calculation (with sign)
- Frequency

### Protection and measurement relay ARCTEQ

Product ref.: AQ-F215-PL0-BFA Available languages: FR / EN Website: http://arcteq.fi/ Documents for download: Yes, directly on the manufacturer website http://arcteq.fi/products/ aq-f215-feeder-protection-ied/?fwp\_search=Fl



### Human-machine interface

The relay is equipped with a graphic display and several configurable buttons to best adapt to the needs of the operator. Similarly, various configurable LEDs make it possible to view the state of the product and the operation of the Smartcloser.

### INGETEAM

Product ref.: INGEPAC<sup>™</sup> DA PT Available languages: EN / ESP Website: https://www.ingeteam.com/ Documents for download: Yes, directly on the manufacturer website https://www.ingeteam.com/ es-es/proteccion-y-control-de-redes-electricas/automatizacion-de-la-distribucion/pc32\_17\_291/ingepac-da-pt.aspx



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