

NOVAi; Three-phase, six voltage sensors,  
microprocessor-controlled reclosers (S280-43A)





Automotive



Aerospace



Truck



Hydraulics



Electrical

# Powering business worldwide

Eaton delivers the power inside hundreds of products that are answering the demands of today's fast changing world.

We help our customers worldwide manage the power they need for buildings, aircraft, trucks, cars, machinery and entire businesses. And we do it in a way that consumes fewer resources.

## Next generation transportation

Eaton is driving the development of new technologies – from hybrid drivetrains and emission control systems to advanced engine components – that reduce fuel consumption and emissions in trucks and cars.

## Higher expectations

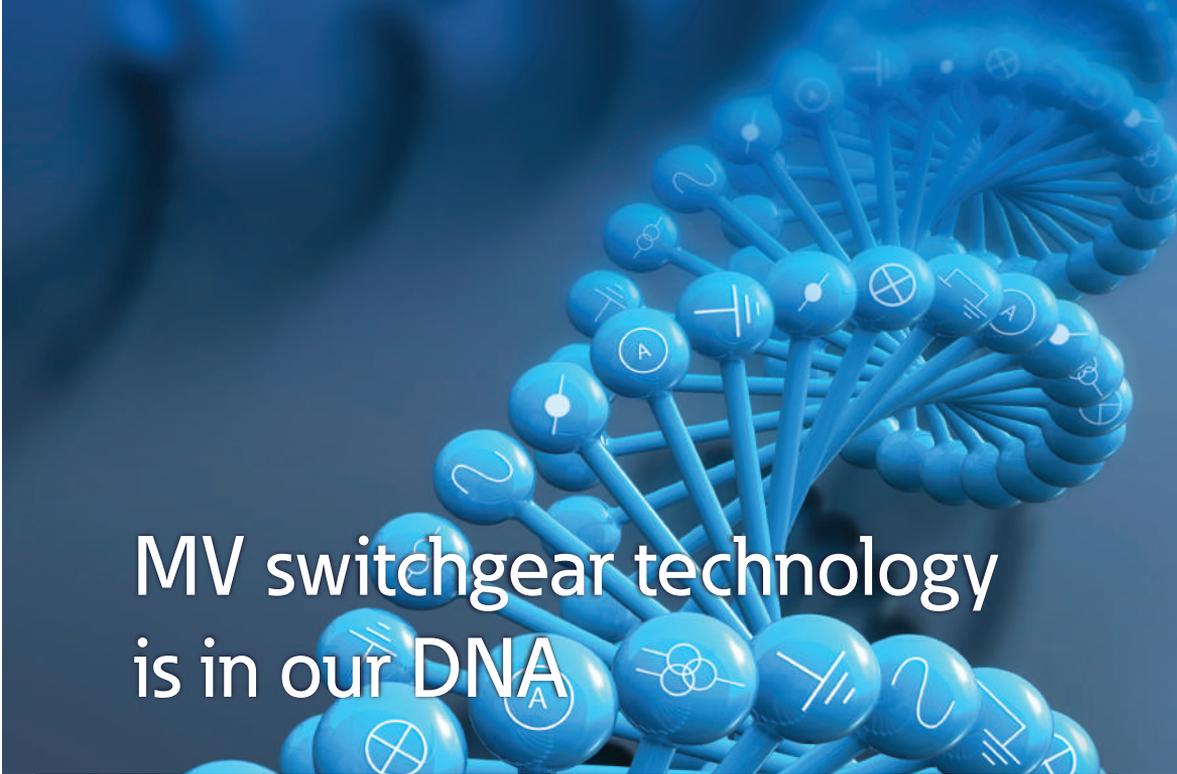
We continue to expand our aerospace solutions and services to meet the needs of new aviation platforms, including the high-flying light jet and very light jet markets.

## Building on our strengths

Our hydraulics business combines localised service and support with an innovative portfolio of fluid power solutions to answer the needs of global infrastructure projects, including locks, canals and dams.

## Powering Greener Buildings and Businesses

Eaton's Electrical Group is a leading provider of power quality, distribution and control solutions that increase energy efficiency and improve power quality, safety and reliability. Our solutions offer a growing portfolio of "green" products and services, such as energy audits and real-time energy consumption monitoring. Eaton's Uninterruptible Power Supplies (UPS), variable-speed drives and lighting controls help conserve energy and increase efficiency.



# MV switchgear technology is in our DNA

Eaton Corporation is a worldwide leader in the design, manufacture, and sale of safe, reliable and high-performance medium voltage power distribution equipment in accordance with IEC, ANSI and GB / DL standards

## **Complete Global Medium Voltage Switchgear Solutions**

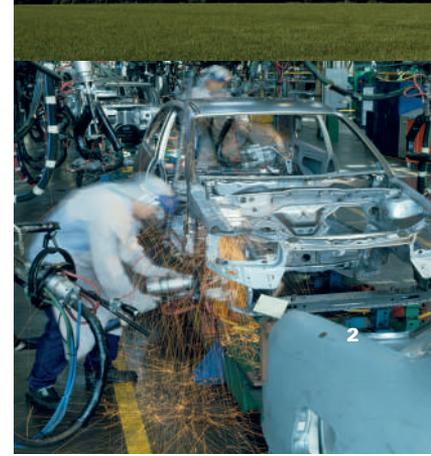
Eaton, a premier leader in designing and manufacturing power distribution and protection equipment in the electrical industry, offers a comprehensive range of medium voltage (MV) solutions to meet the needs of virtually every application. From products that feature cutting-edge design that allow for easy access, maintenance and space savings, to arc-resistant products that enhance safety, Eaton's medium voltage solutions provide a variety of products for every need. Additionally, Eaton's global service network provides maximum customer support in all regions of the world.

As one of the few completely vertically integrated and diversified industrial manufacturers in the world, Eaton designs not only MV assemblies, but also the key components that comprise the MV solutions – from steel housing and circuit breaker compartments to vacuum interrupters, circuit breakers, bus systems and fuses.

Eaton's MV heritage, strengthened by acquisitions such as Westinghouse DCBU, Cutler Hammer, MEM and Holec, has resulted in breakthrough MV technologies and numerous international patents over the years.

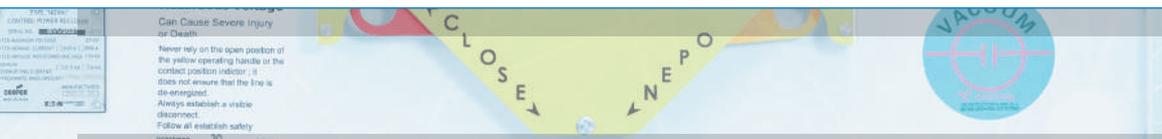
Part of Eaton's complete electrical PowerChain Solutions – which help businesses minimize risks while realizing greater reliability, cost efficiencies, capital utilization and safety – Eaton's medium voltage equipment meets all applicable standards and certifications such as IEC, NEMA / ANSI, GB / DL, UL, IEEE, KEMA and CSA.

When it comes to medium voltage solutions, you can trust the one name with a long history of proven performance: Eaton.



# NOVAi, three-phase, six voltage sensors, microprocessor-controlled reclosers (S280-43A)

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# NOVAi, three-phase, six voltage sensors, microprocessor-controlled reclosers (S280-43A)

General

## 1. General

### General

The NOVAi three-phase, six internal voltage sensors, microprocessor controlled, vacuum-interrupting automatic reclosers provide advanced system protection, metering, and data acquisition with full integration and automation functionality for power distribution systems.

The NOVAi recloser combines solid cycloaliphatic-epoxy polymer-encapsulated vacuum interrupters with a reliable, lightweight operating mechanism that utilizes a magnetic actuator to provide a lifetime of maintenance-free operation. The solid polymer system does not rely on a gaseous, liquid, or foam dielectric. The NOVAi recloser is highly resistant to ozone, oxygen, moisture, contamination, and ultraviolet light.

Designed and tested to be compatible with the Eaton's Cooper Power Systems FXD control, these automatic circuit reclosers offer superior coordination, protection, and application capabilities.

Recloser operations are programmed in an electronic control with accurate characteristics and a host of advanced features. Precise operating tolerances enable close coordination with other protective devices on the system. When system requirements change, program settings are easily altered with no sacrifice of accuracy or consistency.

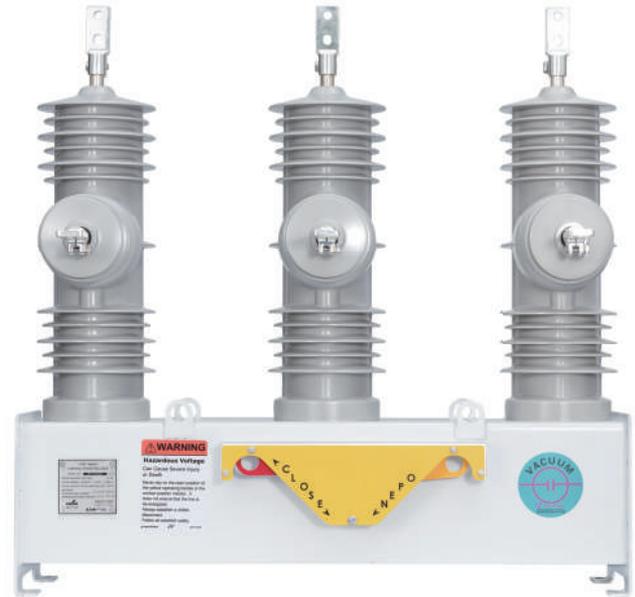
Compact and lightweight, NOVAi reclosers are easily installed on poles or in substations. Mounting equipment is available for both pole and substation applications. Recloser and control accessories enable further tailoring of the protective program to achieve maximum system operating flexibility.

Eaton's Cooper Power Systems is strongly committed to improving the reliability of the electric power industry. Technological advances, including the newest microprocessor-based controls and solid insulation NOVAi distribution switchgear products, represent our investment in the future.

The NOVAi recloser is not only a technological breakthrough, but a valuable component that brings significant operational savings to the utility business unit, lowering the installation, operation, training, and maintenance costs on your power distribution system.

When needed, application expertise, backed by world-wide systems engineering knowledge and experience, is available. Customer focused design capability, based on more than 70 years of recloser experience, has made Eaton's Cooper Power Systems an industry leader.

NOVAi reclosers with six internal voltage sensors are designed and manufactured in accordance with the latest IEC62271-111/ANSI C37.60 2019 standard.



### Standard

- IEC 62271-111/ANSI C37.60 2019 High-voltage switchgear and controlgear – part 111: Automatic circuit reclosers and fault interrupters for alternating current systems up to 38kV
- IEC62271-1 High-voltage switchgear and controlgear - Part 1: Common specifications
- IEC 62271-103 High-voltage switchgear and controlgear - Part 103 Switches for rated voltages above 1 kV up to and including 52 kV
- IEC60060-1 High-voltage Test Techniques - Part 1: General definitions and test requirements
- IEC 60815 Selection and dimensioning of high-voltage insulators intended for use in polluted conditions.
- IEC 60270 High-voltage test techniques – Partial discharge measurements
- IEC60529 Degrees of protection provided by enclosures (IP Code)

# NOVAi, three-phase, six voltage sensors, microprocessor-controlled reclosers (S280-43A)

Feature / Technical

## 2. Features

- Advanced outdoor solid dielectric material
- Vacuum interrupter
- Six internal voltage sensors at both source and load sides
- Embedded current transformer
- Permanent magnetic actuator
- Manual open and close
- Dual CPU based smart control
- 37 Pin control cable

## 3. Technical parameters

### Operation Condition

Ambient air temperature: Max 65°C, Min -40°C

Altitude: ≤ 1000m

Relative humidity: ≤ 100%

Wind speed: ≤ 34m/s

Solar radiation: ≤ 1000W/m<sup>2</sup>

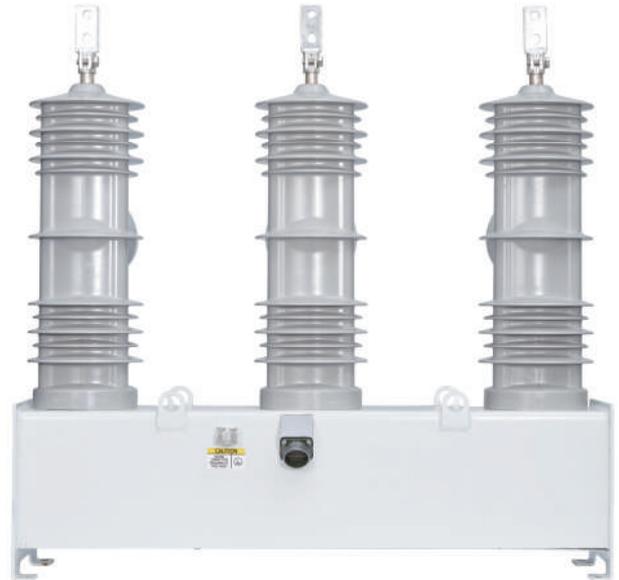
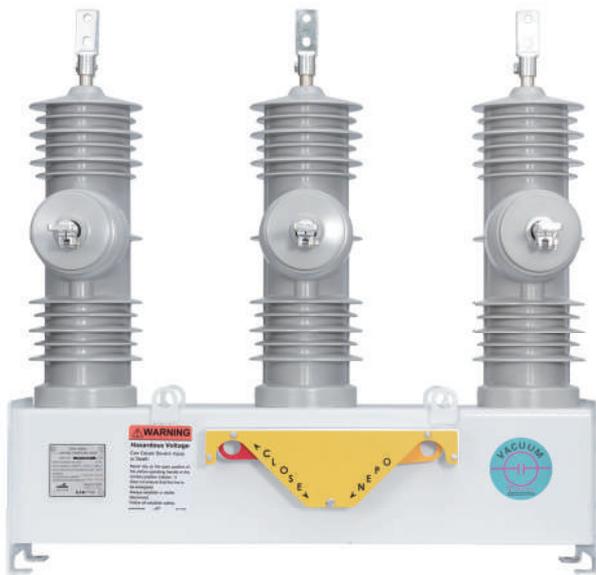
### Parameters

Item		Unit	Parameter
Model			NOVAi27
Current Sensing			3 x Current Transformers
Voltage Sensing			6 x Voltage Sensors
Rated voltage		kV	27
Rated current		A	800
Rated frequency		Hz	50/60
Rated short-circuit breaking current		kA	16
Rated short-circuit making current		kA	41.6
Rated short-time withstand current		kA/s	16 / 3
Power frequency withstand voltage /1min	Dry	kV	60
	Wet	kV	60
Lightning impulse withstand voltage		kV	150
Cable Charging		A	25
Line Charging		A	5
Rated operation sequence			0-0.3s-CO-1.8s-CO-1.8s-CO
Mechanical life		times	10000
Manual Operation	Open & Close		Available
	Making Operation	times	5 times @ 41.6kA
IP			IP54

# NOVAi, three-phase, six voltage sensors, microprocessor-controlled reclosers (S280-43A)

Structure and functions

## 4. Structure and functions



### E-CAP

- Advanced outdoor solid dielectric material
- Solid epoxy polymer encapsulated bushing complied creepage / leakage distance requirement with reliable outdoor performance
- Embedded vacuum interrupter
- Internal CT, 5P20 (Ratio: 1000:1)
- Internal Voltage Sensors for both source and load sides

### Mechanism

- Permanent magnetic actuator could dependably operate 10,000 times with minimal moving parts, and the energizing capacitors located in FXD control.
- Manual open and close mechanism supports manual operations without control and could close fault current to insure safe operation.



# NOVAi, three-phase, six voltage sensors, microprocessor-controlled reclosers (S280-43A)

Control unit

## 5. Control unit



The FXD recloser control offers advanced protection, monitoring and communication function for distribution automation needs. It contains modular components for easy maintenance.

### Local Human Machine Interface

- Large LCD (160mm x 160mm), 10 lines and 20 characters for each line
- User friendly navigation Buttons: Up, Down, Right, Left, Edit and ESC
- 19 LED Status Indicators:
  - Phase/Ground/SEF/Voltage/Frequency fault and Above min trip status;
  - Recloser status of Lockout, Open and Close.
  - System operation healthy status of Alarms, Control Ok, AC or Battery Power Supply
  - 4 programmable indicators
- 2 Operation Buttons: Trip and Close.
- 9 shortcut Buttons:
  - Hot Line Tag
  - Supervisory Off
  - NON-Reclosing
  - Ground Trip Block
  - SEF Blocked
  - Alternate Profile#1;
  - 3 customized buttons
- Front USB engineering port



# NOVAi, three-phase, six voltage sensors, microprocessor-controlled reclosers (S280-43A)

Control unit



## Modular Design

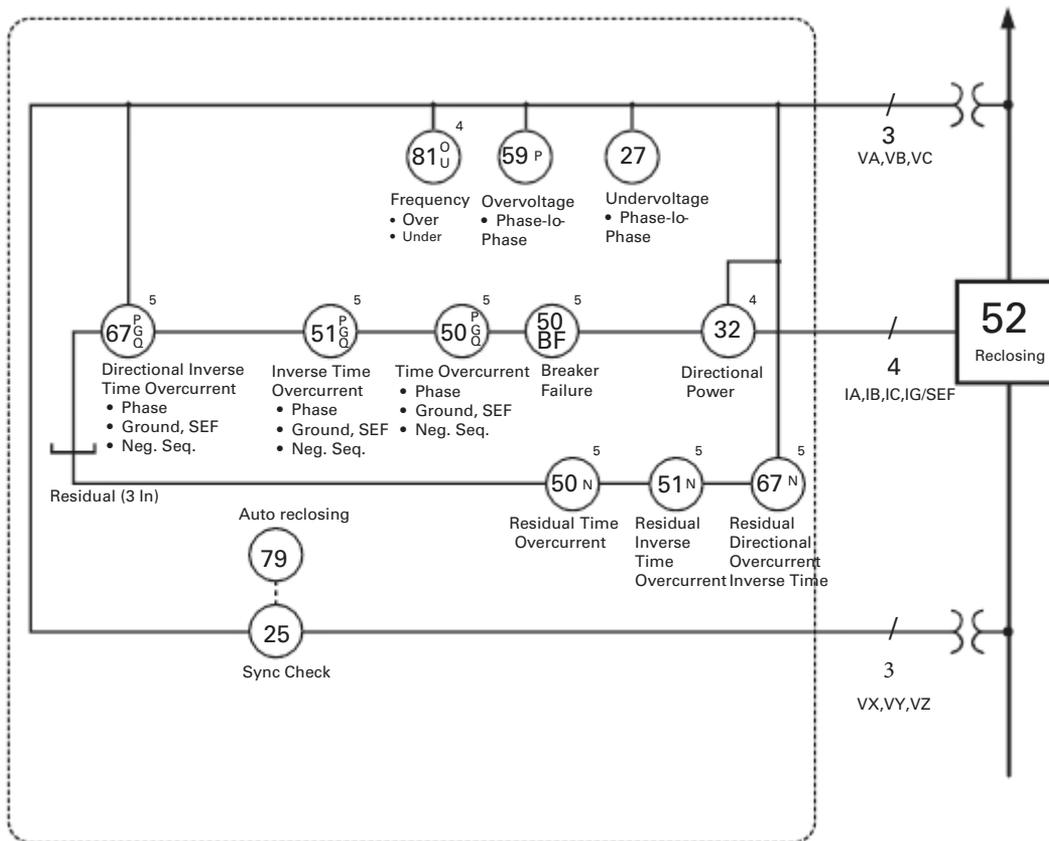
- ARM-based HMI module
- DSP-based Relay for metering, data processing and protection.
- Capacitor housing
- Power supply module
- Battery
- MCB and Surge Protection Device
- Hygrostat-controlled heaters
- 37pin receptacle and wiring

## Protection

- 59P, Overvoltage - Phase or Phase-to-Phase
- 27, Undervoltage - Phase or Phase-to-Phase
- 51P, Inverse Time Overcurrent – Phase
- 51G, Inverse Time Overcurrent – Ground
- 51Q, Inverse Time Overcurrent - Neq. Seq
- 51N, Inverse Time Overcurrent – Residual
- 51Q, Inverse Time Overcurrent - Neq. Seq
- 51N, Inverse Time Overcurrent – Residual
- 50P, Time Overcurrent – Phase
- 50G, Time Overcurrent - Ground, SEF
- 50Q, Time Overcurrent - Neq. Seq
- 50N, Time Overcurrent – Residual
- 67P, Directional Inverse Time Overcurrent – Phase
- 67G, Directional Inverse Time Overcurrent - Ground, SEF
- 67Q, Directional Inverse Time Overcurrent - Neg. seq.
- 67N, Directional Inverse Time Overcurrent - Residual
- 32, Directional Power
- 50BF, Breaker failure
- 81O, Frequency – Over
- 81U, Frequency – Under
- 79, Auto-recloser Sequence (4 shots)
- 25, Sync Check
- 21, Fault Locator

# NOVAi, three-phase, six voltage sensors, microprocessor-controlled reclosers (S280-43A)

Control unit



## Metering / Monitoring functions

- Operational measured values V, A, f
- Energy metering values Wp, Wq
- THD (Current & Voltage); Up to 16th Harmonic
- Duty cycle monitoring
- SOE Recorder
- Data Profiler
- Oscillography fault records

## Communication Ports & IO Ports

- Front USB engineering port
- Isolated RS-232 and RS-485 ports
- Ethernet port, RJ45
- Ethernet port, fiber optical
- Programmable I/O ports \*

\*optional function

## Communication Protocol

- Modbus
- DNP3 Serial
- DNP3 TCP/IP
- IEC 60870-5-101
- IEC 60870-5-104
- IEC 61850 \*
- SNMP \*
- Smart phone app / SMS \*

\* optional function

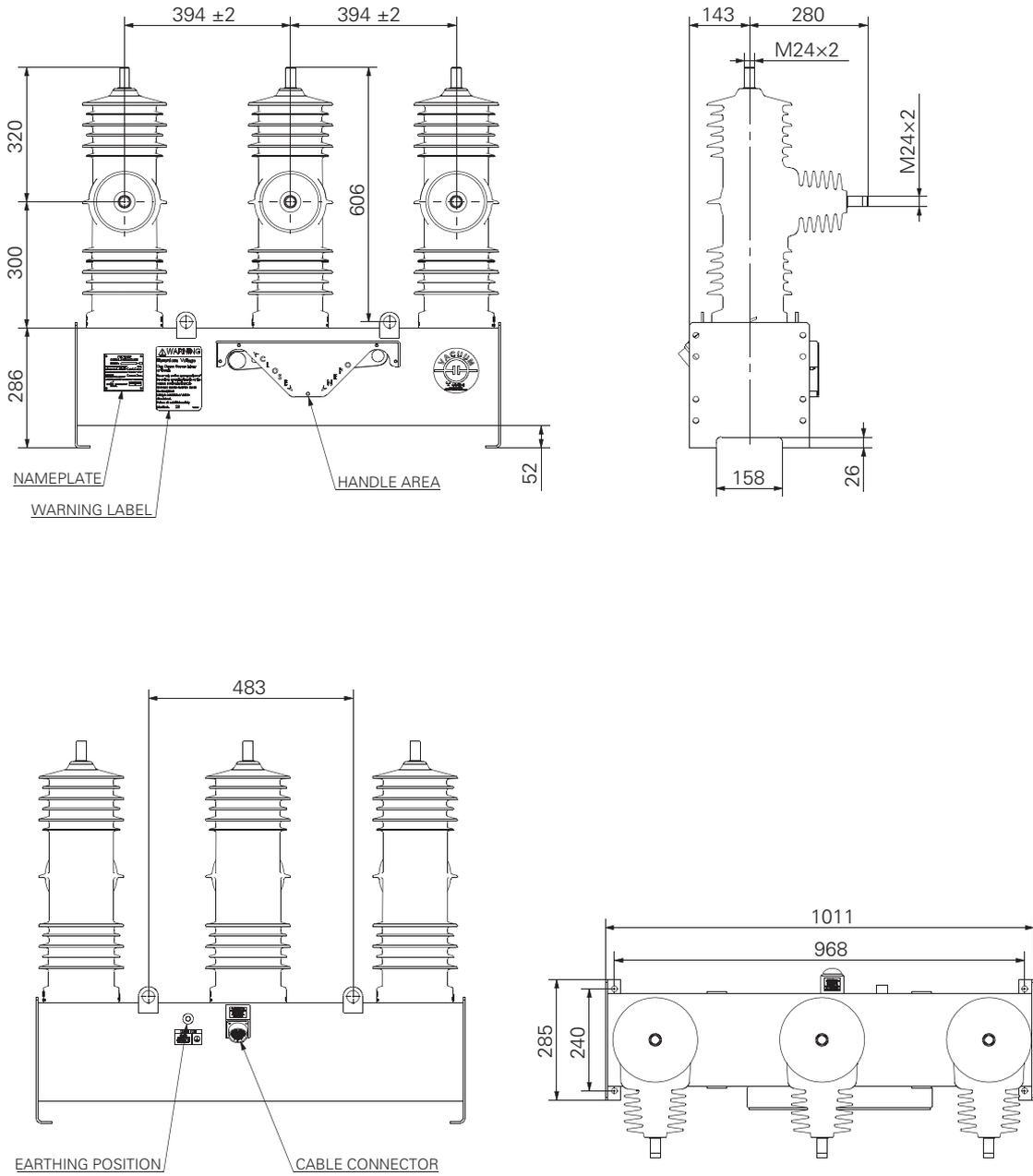
## Software

- Insightview

# NOVAi, three-phase, six voltage sensors, microprocessor-controlled reclosers (S280-43A)

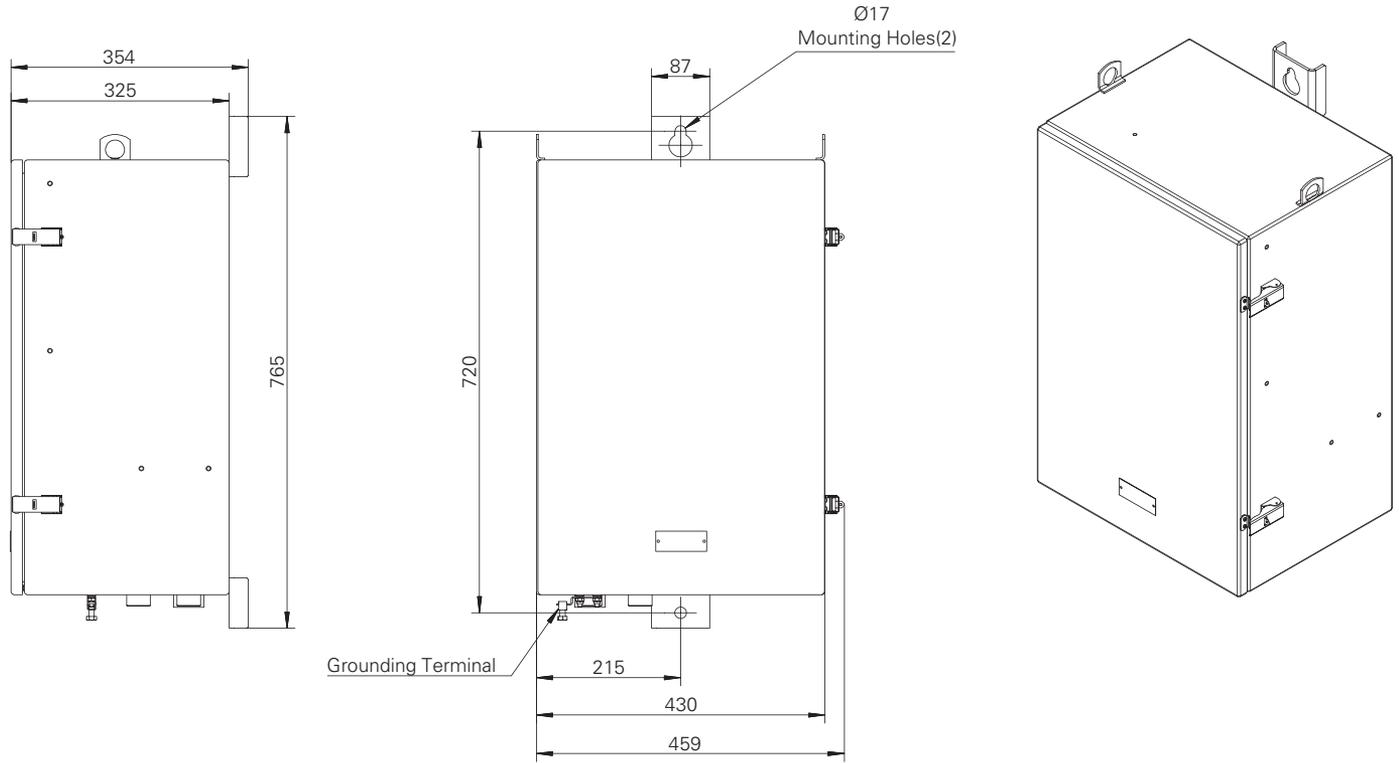
Outline drawing

## 6. Outline drawing



# NOVAi, three-phase, six voltage sensors, microprocessor-controlled reclosers (S280-43A)

Outline drawing

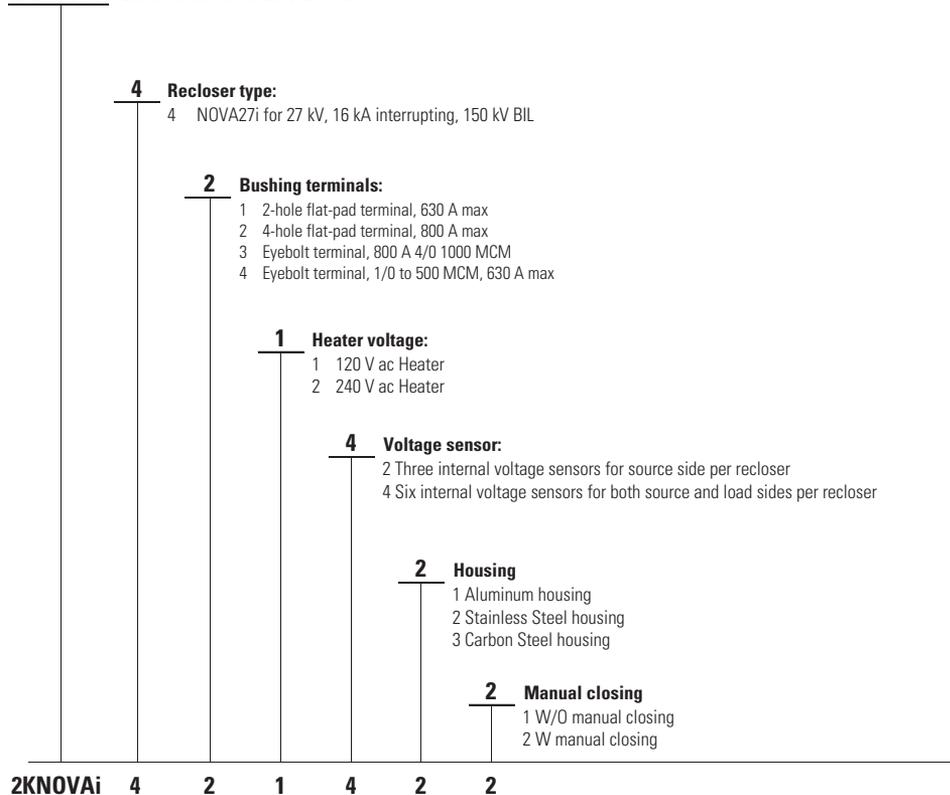


## 7. ORDERING GUIDE FOR FXD CONTROL

### Constructing a catalog number

To order a type NOVAi recloser with 27kV, 16kA interrupting, 800A 4-hole pad terminals, 120V ac heater, six internal voltage sensors, stainless steel housing and with manual closing option, the catalog number would be constructed like this:

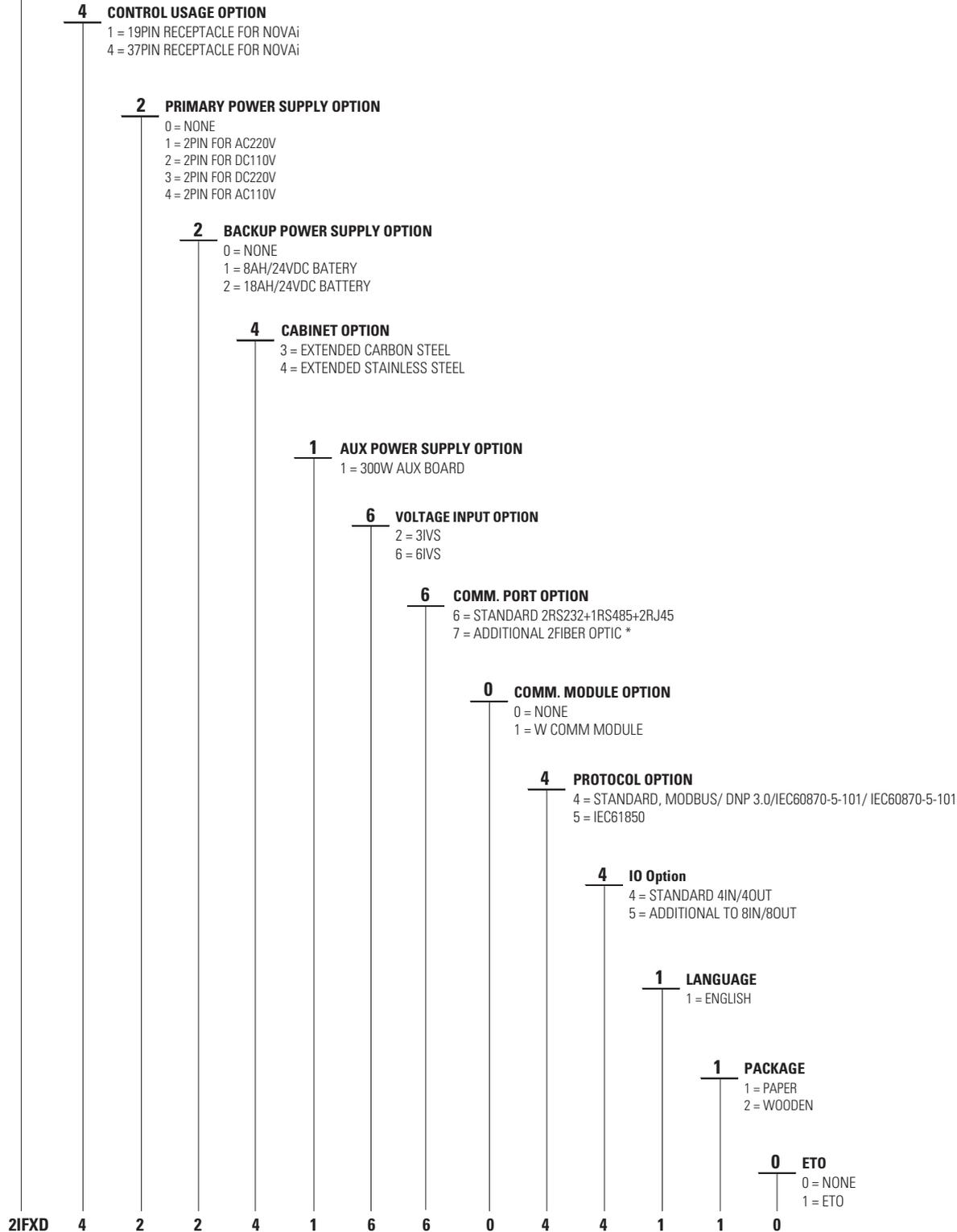
#### 2KNOVAi Basic letters for a NOVAi recloser



# NOVAi, three-phase, six voltage sensors, microprocessor-controlled reclosers (S280-43A)

## Ordering guideline

### 2IFXD Basic letters for FXD, Pole Mount Recloser Control (NOVAi)





Eaton's mission is to improve the quality of life and the environment through the use of power management technologies and services. Eaton provides sustainable solutions that help its customers effectively manage electrical and mechanical power – more safely, more efficiently, and more reliably. Eaton's 2020 revenues were \$17.9 billion, and the company sells products to customers in more than 175 countries. Eaton has approximately 85,000 employees.

Eaton began operation in China more than 20 years ago. Since entering the Chinese market in 1993, Eaton's presence has grown significantly in the country. In 2004, Eaton moved its Asia Pacific headquarters from Hong Kong to Shanghai.

In the Greater China region, Eaton has nearly 8,000 employees, 19 manufacturing bases and 5 R&D centers. Today, we make most products for all of Eaton's distinct business here.

For more information about Eaton China, visit [Eaton.com](https://www.eaton.com).  
Eaton China official social media account: [Eaton\\_China](#)

**Eaton Corporation**

No.3, Lane 280, Linhong Road,  
Changning District,  
Shanghai, China 200335

**Cooper Power Systems**

No. 955 Shengli Road, Zhangjiang  
East High-Tech Zone,  
Shanghai, China 201201

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