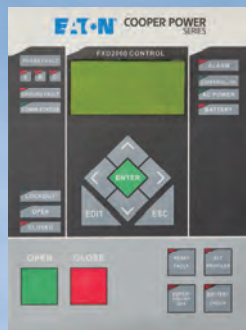
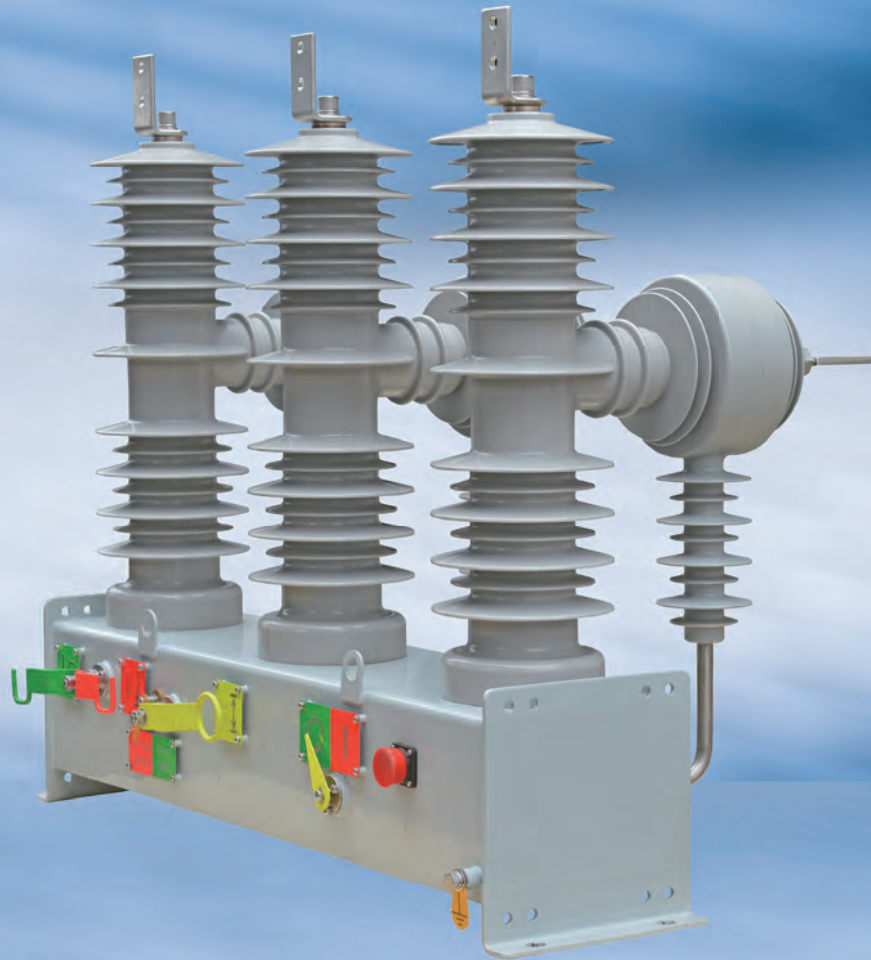


**NOVAs Outdoor Pole Mounted**  
Vacuum Circuit Breaker

**COOPER POWER**  
SERIES





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.







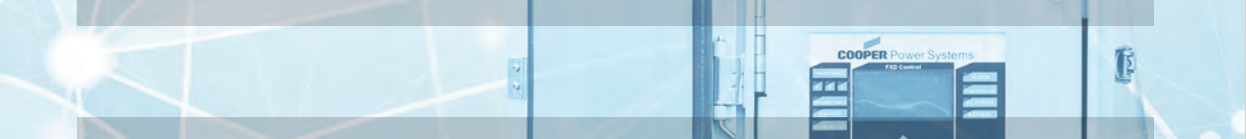
Part of Eaton's complete electrical PowerChain Solutions – which help businesses minimize risks while realizing greater reliability, cost efficiencies, capital utilization and safety – Eaton's medium voltage equipment meets all applicable standards and certifications such as IEC, NEMA / ANSI, GB / DL,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



# NOVAs Outdoor Pole Mounted Vacuum Circuit Breaker

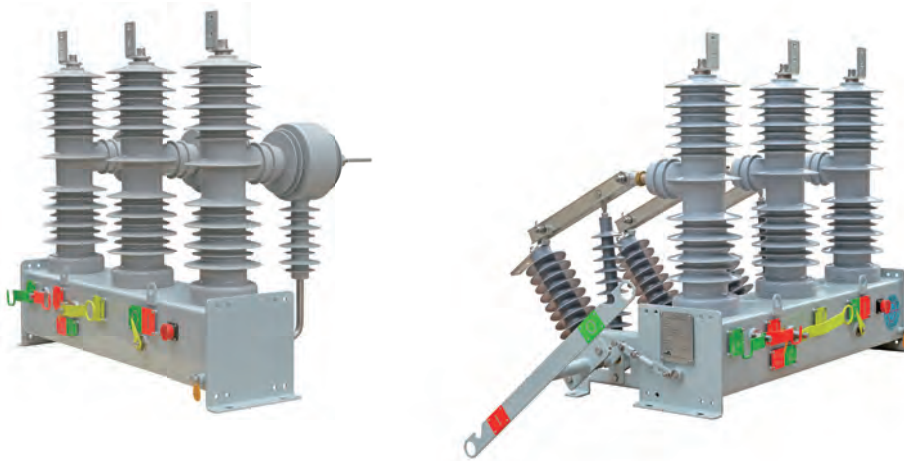
## Contents

	<b>1</b>
<b>1. GENERAL</b>	<b>4</b>
	<b>2</b>
<b>2. FEATURE</b>	<b>4</b>
	<b>3</b>
<b>3. TECHNICAL PARAMETERS</b>	<b>5</b>
	<b>4</b>
<b>4. STRUCTURE AND FUNCTIONS</b>	<b>6</b>
	<b>5</b>
<b>5. CONTROL UNIT</b>	<b>9</b>
	<b>6</b>
<b>6. OUTLINE DRAWING</b>	<b>11</b>
	<b>7</b>
<b>7. ORDERING GUIDELINE</b>	<b>13</b>

## 1. General

### General

NOVAs outdoor circuit breaker is a three-phase vacuum circuit breaker suitable for pole or substation mounting. It can meet various metering and protection requirements equipped with automation control. NOVAs provides flexible choice to customer with optional supply of current transformer and disconnect.



### Standard

GB/T 11022	Common specifications for high-voltage switchgear and controlgear standards
IEC 62271-1	High-voltage switchgear and controlgear- Part1: Common specifications
GB/T 1984	High-voltage alternating-current circuit-breakers
IEC 62271-100	High-voltage switchgear and controlgear- Part100: Alternating-current circuit-breakers.

## 2. Feature

- Solid-encapsulated pole with high-hydrophobicity outdoor epoxy, no oil, no SF6
- Embedded vacuum interrupt
- Internal voltage sensor (optional)
- Spring mechanism with high reliability, up to 10000 times maintenance-free operation
- Manual open & close operation
- Manual or Motor charging (<12s)
- External protective current transformer (Optional)
- Multiple CT ratio of 600/400/200:5
- Integrated disconnect (Optional)
- Switch status indicator: Open/Close status, Charging status.
- Stainless steel or carbon steel tank (IP54)
- Surge protector option when only manual type
- Distribution automation with intelligent FXD control configured

# NOVAs Outdoor Pole Mounted Vacuum Circuit Breaker

Technical

## 3. Technical parameters

### Environment

Temperature: Max 50°C, Min -40°C

Altitude: 2000m

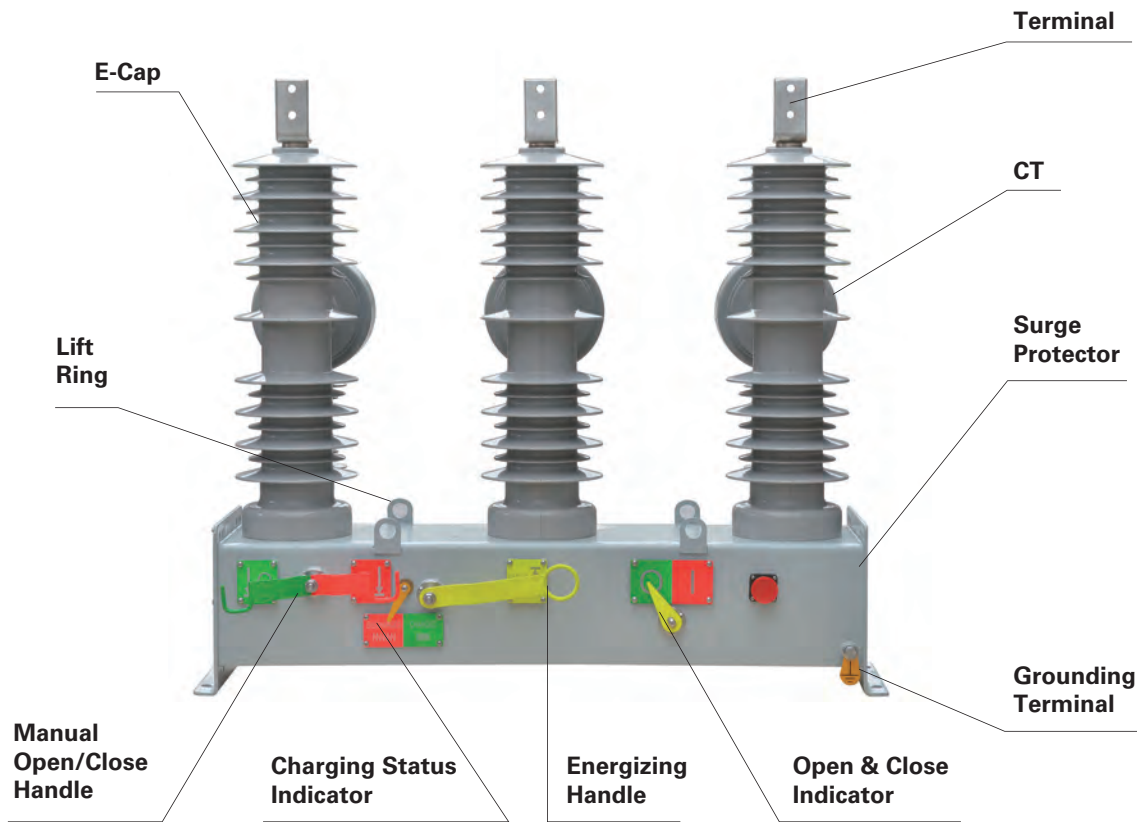
Humidity: 95%

Ingress Protection: IP54

### Parameters

		Unit	Value
Rated Voltage		kV	24
Rated Current		A	630
Frequency		Hz	50/60
Rated Current		A	630
Power frequency withstand voltage	Phrase to Phrase	kV/1min	50
	Gap		60
BIL	Phrase to Phrase	kV	125
	Gap		145
Operation Sequence			0-(0.3s)-CO-(15s)-CO
Short time withstand current		kA/s	20/4
Rated short circuit making current		kA	50
Rated short circuit breaking current		kA	20
Line Charging Breaking Current		A	10
Cable Charging Breaking Current		A	31.5
Circuit Breaker Level			C2-E2-M2
Mechanism Type			Spring Mechanism
Energizing Motor Voltage		V	DC24, AC220/DC220 (Optional)
Energizing Motor Power		W	80
Charging time		s	<12
Opening Release Voltage	Rated	V	DC24, AC220/DC220 (Optional)
	Range	V	80%~120% of DC24
Closing Release Voltage	Rated	V	DC24, AC220/DC220 (Optional)
	Range	V	70%~120% of DC24
Closing time		ms	40~70
Opening time		ms	20~70
Mechanical Lifetime		Times	10000

## 4. Structure and functions



### E-CAP

- Solid-encapsulated pole
- Vacuum Interrupt embedded (up to 20kA Breaker)
- Over design for creepage distance
- HCEP Insulation Material
  - Low leakage current
  - Low discharge activity
  - Low flash over probability
  - Environment Friendly (no SF6, no Oil)
- 2000m altitude application

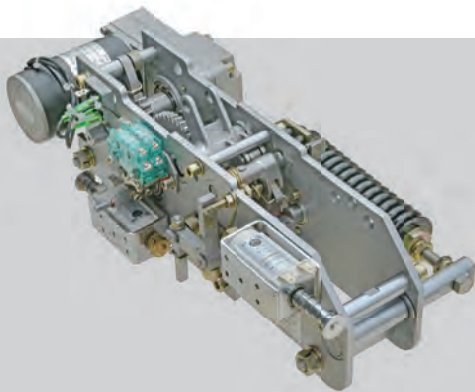
# NOVAs Outdoor Pole Mounted Vacuum Circuit Breaker

Structure and functions



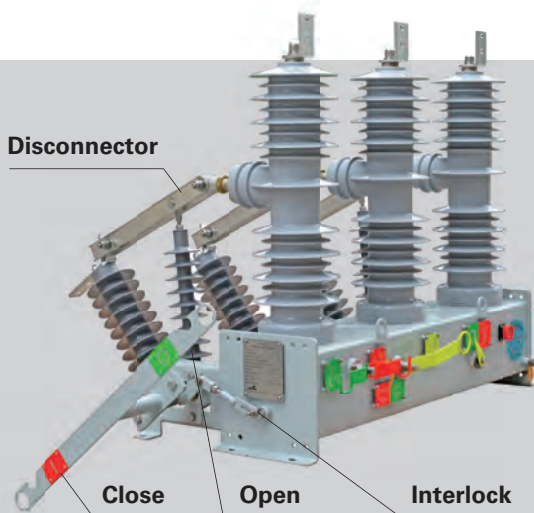
## CT

- HCEP insulation material
- Ratio: 600/400/200/5
- Class: 10P10



## Mechanism

- Spring charged, stored energy mechanism
- Up to 10000 times long mechanical life
- Optimized mechanical design
- Easy installation
- Motor / Manual operation
- Low energy
- Light weight



## NOVAs-24 can configure a disconnect with integrated design

- Three phase design, moving simultaneously
- Manual Open/Close
- Interlock design to keep the disconnect manipulation safety
- Operation sequence:
  - Open: SWG -> Disconnect
  - Close: Disconnect -> SWG



## Disconnecter parameter

Item	Unit	Data
Rated Voltage	kV	24
BIL	kV	145
PF withstand / 1min	kV	50/60
Rated current	A	630
Rated making current	kA	40
Short time withstand current	kA/3s	16
Mechanical life	Times	2000
Main Resistance (Incl SWG)	$\mu\Omega$	150
Clearance distance	mm	300

# NOVAs Outdoor Pole Mounted Vacuum Circuit Breaker

Control unit

## 5. Control unit



### General

The FXD circuit breaker control belongs to FXD family. It shared the same platform as FXD recloser control. It is developed by Eaton-Cooper Power System for the distributor automation system. and can meet customer various requirements including relay, metering, monitor, remote control & smart solution.

### Standard

- IEC 60255 Measuring relays and protection equipment
- IEEE C37.90 Relays and Relay Systems Associated
- ANSI/IEEE C37.60™ Automation Circuit-Reclosers and Fault Interrupters for Alternating Current Systems.
- IEC 255-21-3 Vibration, Shock, Bump, and Seismic Tests in Measuring Relays and Protective Equipment; Seismic tests, Class 1 minimum, class 2 preferred.
- EN 61000-4 Electromagnetic Compatibility
- EN 61000-4-12 Oscillatory waves immunity test
- IEC-605-29 IP Rating.



### HMI

- LCD display
- Operation Buttons
- LED Indicator

#### LCD Display

- 4 line 16-character wide display
- Enter: Saving modification/entering submenu
- Edit: Modify setting, configurations and values
- Esc: Leave current page to previous page
- Up/Down/Left/Right: Direction

#### Operation Buttons

- Trip/Close
- Hot Line: Prevent all closing operation and shift to one-trip-lockout
- Block Ground trip fault detection
- Block sensitive fault detection



## LED Indicator

Trip signal was issued, one of them was lighted up

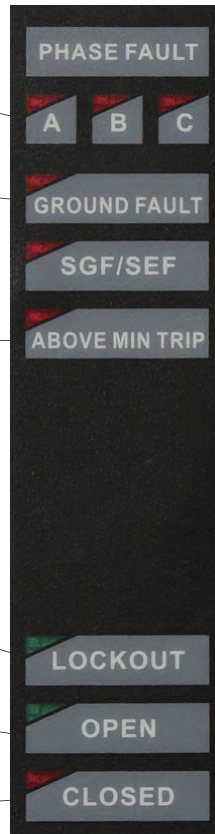
Indicates that a Ground or Sensitive Fault emerged

Tripped current is higher than the pre-programmed min trip

Indicates the control is in a locked out state

Indicates FXD is in the open position

Indicates FXD is in the closed position



The red light will be lighted when these six situations occurred: CLPU Failure, No AC Present, Battery Alarm, Trip Malfunction, Close Malfunction and Interrupter Malfunction



Indicates the control is operating normally

Indicates the presence of AC Power

Indicates the presence of BATTERY Power

## FXD - Protection

- Phase/Ground/Negative Time Overcurrent
- Phase/Ground/Negative Instantaneous Overcurrent Protection
- Phase/Ground/Negative Sequence High Current Lockout Protection
- Sensitive Earth Definite Time Overcurrent Protection
- Cold Load Pickup Blocking
- Phase Directional Control
- Ground/Sensitive Earth Directional Control
- Negative Directional Control
- Under/Over voltage Protection
- Under/Over Frequency
- Protection TCC:
  - ANSI: Moderate/Very/Extremely
  - IEC: Inverse/Very/Extremely
  - Kyle: 101/102/103/104/105/106/107; 111/112/113/114/115/116/117/118/119/120/121/122; 131/132/133/134/135/136/137/138/139/140/141/142; 151/152; 161/162/163/164/165; 200/201/202

## FXD - Metering

- Current: IA, IB, IC, IO
- Voltage: UA, UB, UC, U0, Uab, Ubc, Uca
- Real Power
- Reactive Power
- Apparent Power
- THD%

## Communication

### Communication Board:

- 1\*RS232 + 1\*RJ45
- 2\*RS232
- 2\*RJ45

### Communication Module:

- GPRS
- SMS
- Optical Fiber Box

### Communication Protocol:

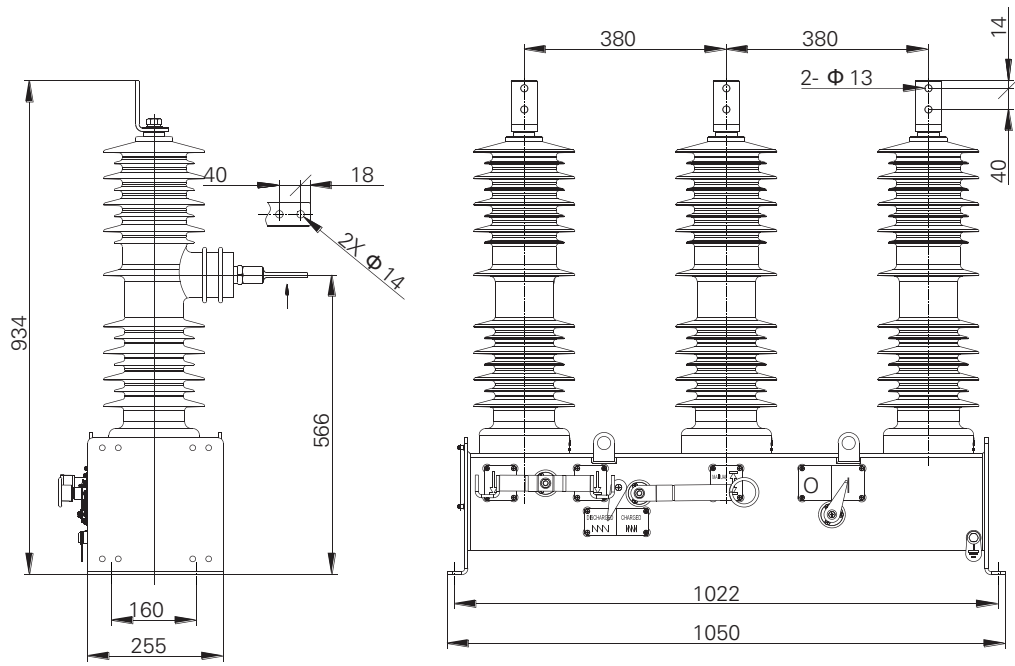
- DNP3.0
- Modbus
- IEC 101
- IEC 104
- IEC 61850

# NOVAs Outdoor Pole Mounted Vacuum Circuit Breaker

Outline drawing

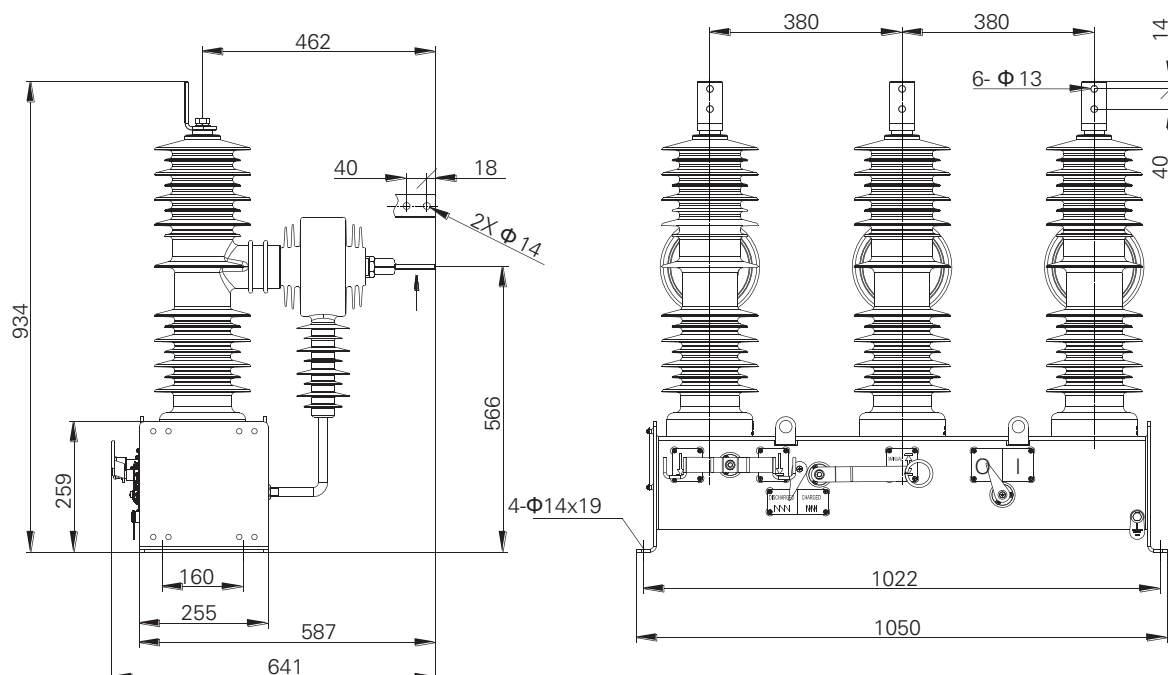
## 6. Outline drawing

- Without Current Transformer



Weight: 85kg

- With Current Transformer

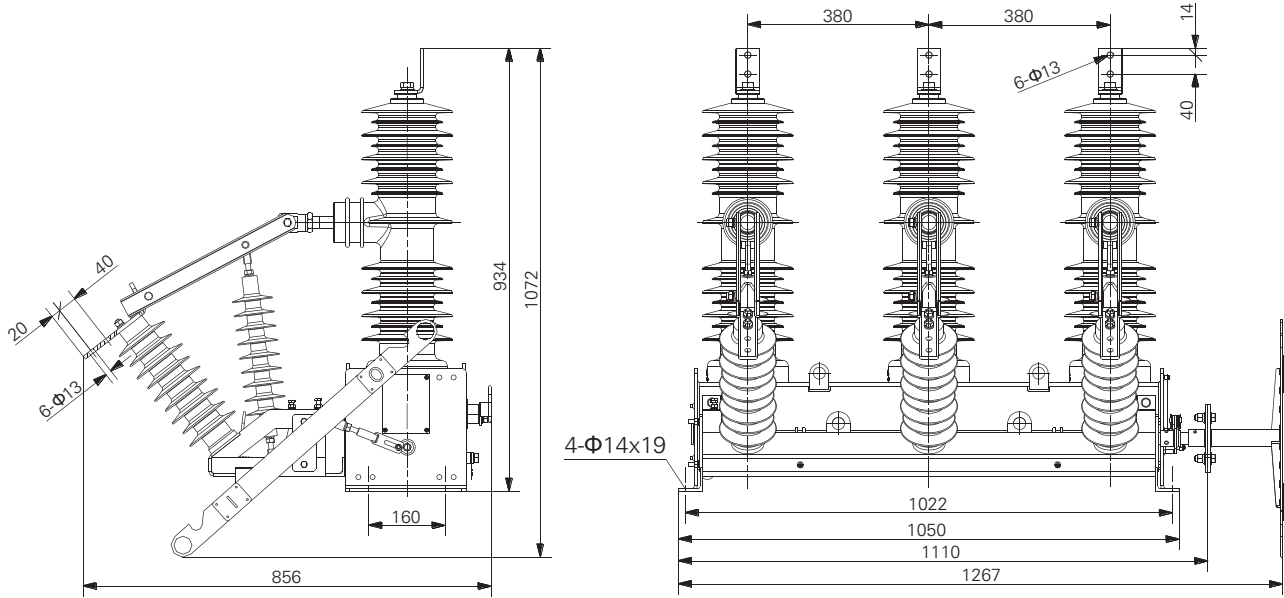


Weight: 105kg

# NOVAs Outdoor Pole Mounted Vacuum Circuit Breaker

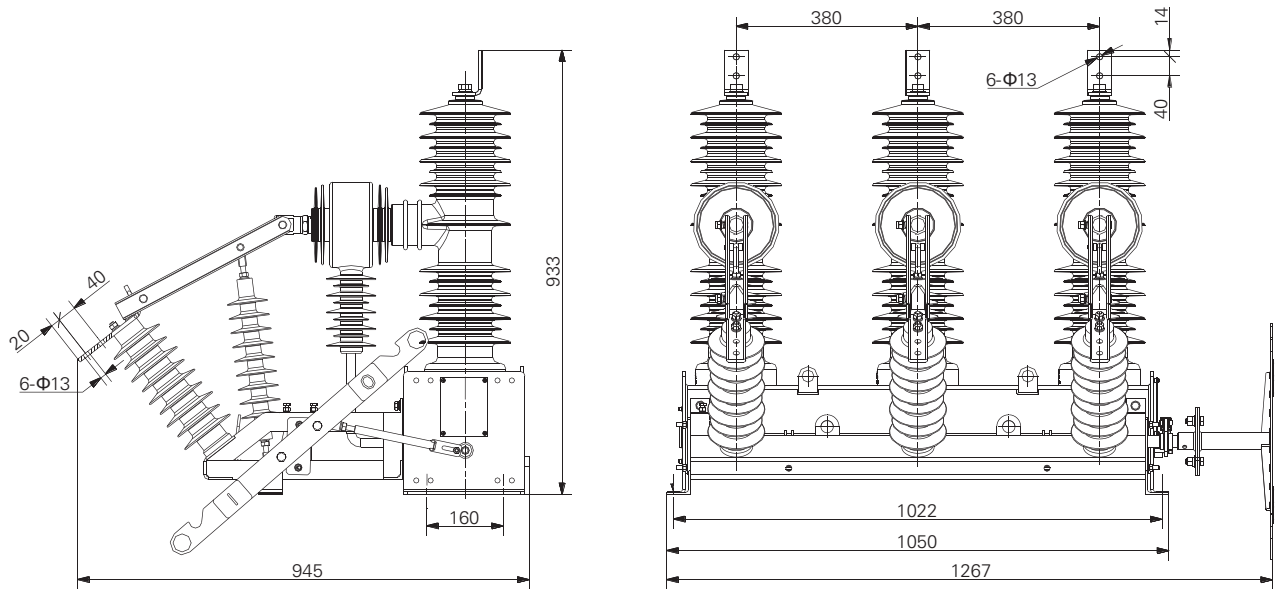
Outline drawing

- With Disconnect



Weight: 115kg

- With Current Transformer and Disconnect

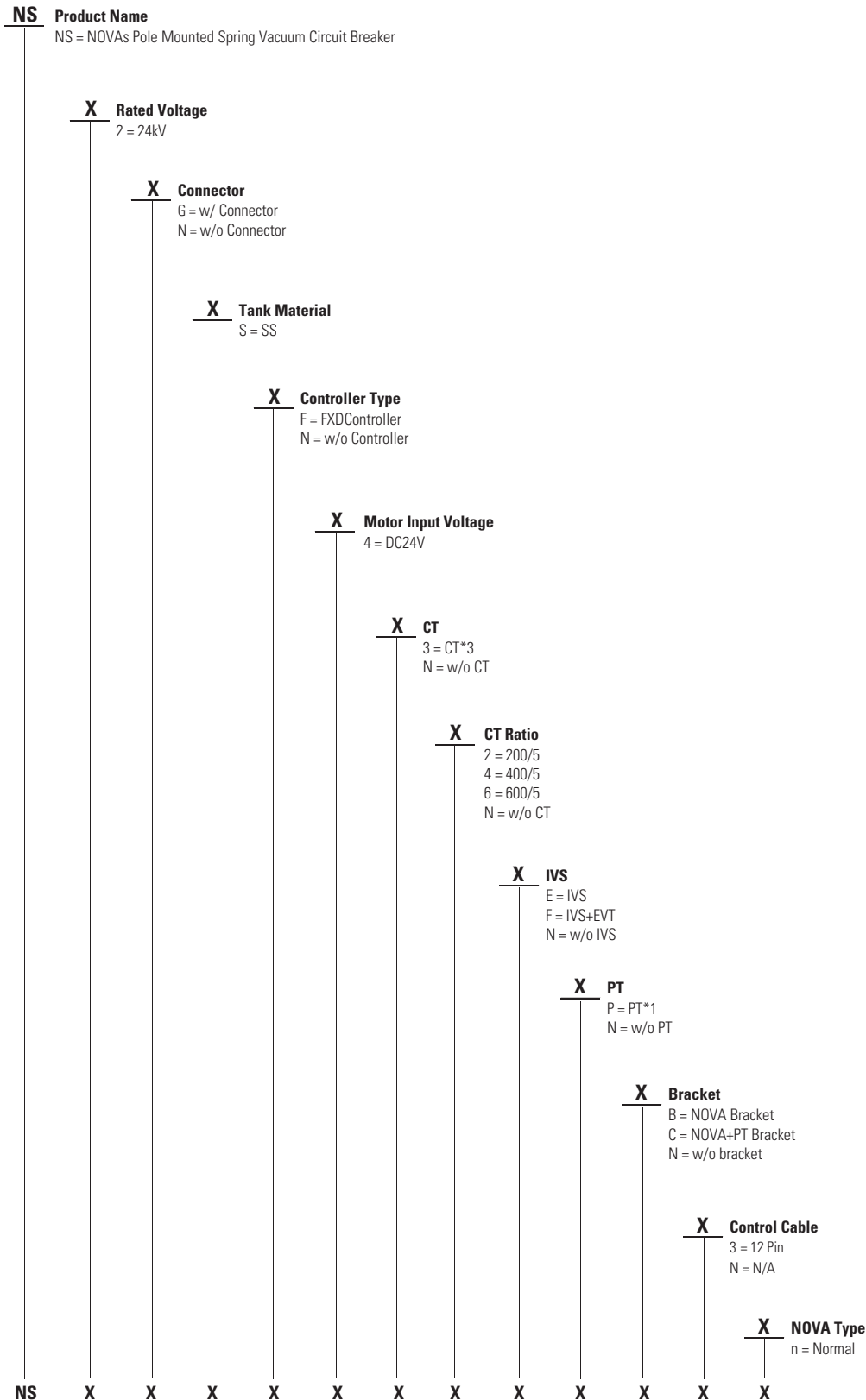


Weight: 135kg

# NOVAs Outdoor Pole Mounted Vacuum Circuit Breaker

## Ordering guideline

### 7. Ordering guideline



Eaton is a power management company with 2016 sales of \$19.7 billion. We provide energy-efficient solutions that help our customers effectively manage electrical, hydraulic and mechanical power more efficiently, safely and sustainably. Eaton is dedicated to improving the quality of life and the environment through the use of power management technologies and services. Eaton has approximately 95,000 employees and sells products to customers in more than 175 countries. For more information, **visit [www.eaton.com](http://www.eaton.com)**.

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