

ZX Vacuum Auto Recloser
15.5kV, 27kV and 38kV



AUTOMATIC VACUUM RECLOSER

Introduction & Benefits

Pomanique's ZX-Series three-phase, electronically controlled, vacuum-interrupting distribution automation switch provides reliable, economical switching, sectionalizing, advanced metering, and automation systems for distribution circuits rated up to 38 kV.

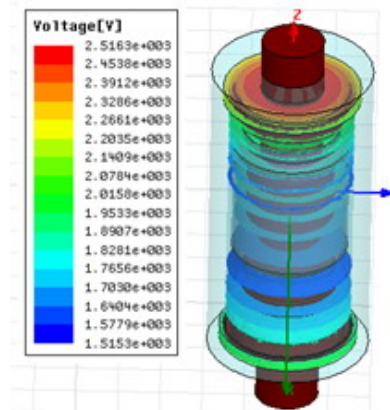
The ZX switch combines solid cycloaliphatic- epoxy vacuum interrupters with a reliable, lightweight operating mechanism that utilizes a magnetic actuator to provide a lifetime of trouble-free operation. The solid polymer system does not rely on a gaseous, liquid, or foam dielectric. The ZX switch is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

Switch operations are programmed in an electronic control with accurate characteristics and a host of advanced features. When system requirements change, program settings are easily altered with no sacrifice of accuracy or consistency.

Pomanique's reclosers meet all the requirements for outdoor use in accordance with the IEEE C37.60 and IEC 62271-111.

Controlled Arc Fault Venting ability

- Adopt vacuum interrupters, the recloser can quench the Arc fault Within very short time.
- The AFV recognizes less-than-critical instantaneous over current, so during the design of Recloser, the arc fault containment and venting has been a mandatory requirement.



- By control of speed of open operation to at least 1.2m/s, the recloser interrupter can vent the arc fault effectively.

High reliability

- Pomanique designed a simple, magnetically actuated operating mechanism that could dependably operate with only one moving part.
- Vacuum interrupter technology make ZX recloser with maximum reliability and minimal maintenance.



15.5kV & 27kV Switch unit



38kV Switch unit



Controller

AUTOMATIC VACUUM RECLOSER

Switch unit description

Recloser principle

Reclosers are used in overhead lines and in substations. Like circuit-breakers they are capable of switching normal and fault currents. They are equipped with sensors and controller being the protection and control device. In case of a temporary line fault, they can trip and reclose up to four times, thus avoiding longer network interruptions.

Recloser cycle

In case of a network fault, the recloser opens and recloses several times. In case of temporary faults, the automatic reclosing significantly reduces the outage times. While the trip settings for each operation can be set individually.

Design of switch unit

Each vacuum interrupter is embedded in a solid-insulated pole made of weather-proof cycloaliphatic epoxy-resin. The vacuum interrupter is vertically mounted inside the pole, providing a long service life. Each pole is equipped with an integrated current transformer and a resistive voltage sensor.

Operating mechanism

The recloser is operated by a magnetic actuator, the actuator is a bi-stable system, locked in the end positions by permanent magnets. If not in operation, the magnet coils do not consume any power. The operating mechanism housing is made of stainless steel for outdoor applications. It also accommodates the position indicator and a mechanical operations counter.

Mechanical lockout

The recloser can be tripped manually. If the handle is pulled, the recloser opens and is simultaneously locked out electrically and mechanically. The handle stays extended, thus indicating the interlocked state. To close the recloser again, the handle must first be pushed back to the operation position in order to release the lockout. Then the recloser can be closed electrically via the controller.



Lockout handle-pushed in (close position)



Lockout handle-pulled (open position)

AUTOMATIC VACUUM RECLOSER

Controller description

Controller: HI !') \$

The Microprocessor Based controller FTU-350 provide protection, control, instrumentation and metering with integrated input and output logic, data logging & fault reports.

Communication access to controller functionality is via electrical RS485 port for remote connection. Additional rear port options including RS232 port is available.

The controller is mounted in the control cubicle. Along with the controller, this cubicle also contains the auxiliary power supply with batteries for uninterruptible power supply, electronic boards and circuit breakers.

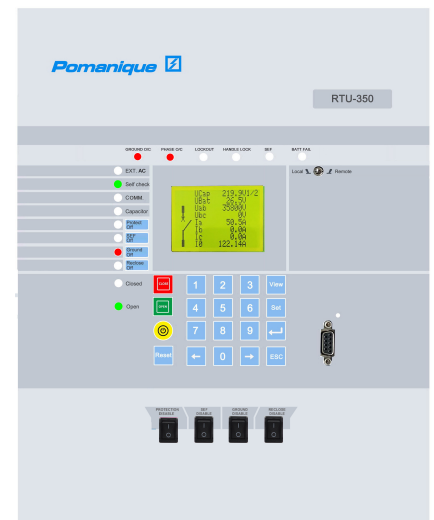
The controller contains a large number of protection functions (elements) which can be selected or deselected through the menu driven display.

Enhanced features

- Analysis of current/voltage normal & negative sequence for power quality monitoring.
- Recording of PQM with fault waveform of 128 sampling and 20 cycles.
- Harmonics analysis of electric data.
- Monitoring of Sag, Swell, Interruption, over & low voltage, unbalance and etc.
- Improvement of fault detection algorithm.
- Automatic isolation of faulted section site and interconnection with other healthy section.
- Improved measuring accuracy
- Multi-Protocol support. (DNP3.0, MODBUS, IEC60870-5-101/104
- User programmable logic(PLC) support.

Cubicle

The cubicle includes the complete electronics, the protection relay and the UPS system of the recloser. Additional components and features can be selected via order.



AUTOMATIC VACUUM RECLOSER

General Protection Features

Operating sequence

Reclose times are selectable. The operating sequence is defined by:

O - 1st rt - CO - 2nd rt - CO - 3rd rt - CO

Reclose times

1st Reclose Time range: 0.1 - 600 sec

2nd Reclose Time range: 1.0 - 600 sec

3rd Reclose Time range: 1.0 - 600 sec

Timing resolution: 0.1 sec

Phase & Ground Fault

Pickup Level : 1~6000A (step:0.1A)

Fast TC Curve : 50 types (ANSI,IECmRecloser)

Fast Multiplier : 0.05~2.00 (step:0.01)

Fast Time Add : 0.00~1.00 (step:0.01sec)

Fast Min Response : 0.00~1.00 (step :0.01sec)

Delay TC Curve : 50 types (ANSI,IECmRecloser)

Delay Multiplier : 0.05~2.00 (step:0.01)

Delay Time Add : 0.00~1.00 (step:0.01sec)

Delay Min Response : 0.00~1.00 (step :0.01sec)

Direction Detection

3V1 threshold : 0~100% (step:1%)

3I1 threshold : 0~100% (step:1%)

3I1 Angle : 0~359° (step:1°)

High Current Trip (HCT)

Phase-HCT Pickup Level : 1~6000A (step:0.1A)

Phase-HCT Adder : 0.01~1 (step:0.01sec)

Ground-HCT Pickup Level : 25~10000A (step:1A)

Ground-HCT Adder : 0.01~1 (step:0.01sec)

Delay Time Current Trip

Phase-HCT Pickup Level : 1~6000A (step:0.1A)

Phase-HCT Adder : 0.01~2 (step:0.01sec)

Ground-HCT Pickup Level : 25~10000A (step:1A)

Ground-HCT Adder : 0.01~2 (step:0.01sec)

Sensitive Earth Fault (SEF)

Pickup I0 : 0.1~900A (step:0.1A)

V0 : 10~80% (step:1%)

Operating Angle : 0~345° (1°step)

Operating Time : 0.1~30 sec (step:0.1sec)

Cold Load Pickup/Inrush Restraint

Cold Load Phase Pickup Multiplier : 1.0~10 (step: 1)

Cold Load Time Duration: 0~180 min (step: 1 min)

Inrush 2nd Harmonic Level: 1~50% (step: 1%)

Phase, Ground, SEF Inrush Block : 1 (yes) / 0(no)

Open Line (Loss of Phase) Detection

Voltage On Level: 50~90% (step: 5%) of rated voltage

Voltage Off Level: 35~75% (step: 5%) of rated voltage

Delay Time: 0.1~30.0 sec (step: 0.1 sec)

Synchronism Check

Sync Fail Phase Difference: 5~60°(step: 1°)

Delay time: 0.1~30.0 sec (step: 0.1 sec)

Under Frequency

Pickup level : 47.00~59.98Hz (step:0.01Hz)

Delay Time : 0.03~10.00sec (step:0.01sec)

Over Frequency

Pickup level : 52.02~63.00Hz (step:0.01Hz)

Delay Time : 0.03~10.00sec (step:0.01sec)

Negative Sequence Overcurrent(Broken conductor)

Pickup I2 / I1 level : 30.0 ~ 100.0 (step: 1%)

I2 / I1 delay time : 0.01 ~ 100.0 (step : 0.01sec)

4 Setting Groups

Each group saves individual setting values for different situations.

Active Setting Group Selection: 1~4

Inter lock

Live Load block

Sync fail block



AUTOMATIC VACUUM RECLOSER

General Protection Features

Recording

Events

Totally more than 32,000 events are stored and listed.
I/O events (1024) / Functional events (30000) / System events(256)

Fault events (256) /PQM event(256) / Demand profile I,P,Q (6144) /Maximum demand profile (1024)

Fault Waveform

Up to 4 faults are stored. (32 samples/cycle, 240 cycles/record)

Graphical Display in Analysis Tool : Ia, Ib, Ic, In, Va, Vb, Vc

Load Profiling

Demand & Daily Maximum Current: Ia, Ib, Ic, In

Demand & Daily Maximum Power: kW, kVAR (A/B/C/3-ph)

Averaging Interval: 5 / 10 / 15 min

Graphical Display in Analysis Tool

Local / Remote : Control Position (only locally changeable)

Open/Close : Switch Body Status Change Command

DO (Direct Operate) and SBO (Select Before Operate) are supported.

Reset : Annunciator Manual Reset Command

Battery Test : Battery & Charger Circuit Check

Protection Function Blocking

User Configurable DO Points (reserved) : 2

Others

RTC (Real Time Clock) : YYYY/MM/DD hh:nn:ss

SOE (Sequence of Event) Time Resolution : 1 msec

Digital Filtering & Dead-band Setting for Analog Inputs

Calibration (Correction Factor) : Factory Setting only

Ia, Ib, Ic, In, Va, Vb, Vr, Vs, Vt

Factor Magnitude: 0.500~1.500

Phase Angle: 0.000~359.9°

Communication Interface

RS 232C #1

On FRTU left-side (inside the inner door)

SCADA or DA System Communication Interface

Through Cable / Wireless / Fiber Optic Modems

Functions

Remote Operation (Control, Status Monitoring, Tele-metering)

Remote Setting (optional)

File Transfer (Event & Fault Data; DNP protocol only)

Protocols

DNP 3.0 (Level 2) or IEC60870-5-101 (optional)

Baud Rate

1200 ~ 19200 bps

Address

Master Address: 0 ~ 65534

Slave Address: 0 ~ 65534

RS 232C Port #2

On FRTU Front Panel

Setting & Configuration, Maintenance, Recorded Data

Analysis Through Setting & Analysis Tool

Functions

Setting and Configuration Change (Batch Job)

Protocol Monitor (Communication Frame Check)

Real-time Display : Measurement and Status Data

Event List and Fault Oscillograph

Demand Load Profiling & Graphical Display

FRTU Firmware Download

Protocols

Modbus

Baud Rate

1200~19200 bps

Connector Type

DB9 Female



| Item | Technical characteristics | Unit | Pomanique Value |
|------|--|-----------------------------------|------------------------------|
| 1 | Maker | | Pomanique Electric Co., Ltd. |
| 2 | Mode | | ZX-16-800-17-H |
| 3 | Manufacturing standard | | IEC |
| 4 | Nominal operating voltage | kV | 13.8 |
| 5 | Nominal maximum voltage | kV | 15.5 |
| 6 | Breaking Capacity | kA | 16 |
| 7 | Continuous rated current capacity | A | 800 |
| 8 | Cable charging current | A | 25 |
| 9 | Line charging current | A | 5 |
| 10 | Short-term nominal allowable current capacity. | kA | 40/3s |
| 11 | Lightning impulse withstand voltage. | kVp | 110 |
| 12 | Power frequency withstand voltage (1 min dry) | kV | 50 |
| 13 | Secuencia de Operación Nominal | | O-0.1s-CO-1s-CO1s-CO |
| 14 | Minimum amount of operation | Times | 30000 |
| 15 | Means of Interruption | | Vacuum |
| 16 | Mechanism Type | | Magnetic Actuator |
| 17 | Ambient temperature range | °C | -40 a 55 |
| 18 | Altitude | m | 3000 |
| 19 | Minimum external creepage distance | mm. | 850 |
| 20 | Weight | kg | 125 |
| 21 | Controller box specifications: | | |
| 22 | Enclosure Material | | Stainless steel |
| 23 | Degree of protection | | IP65 |
| 24 | Relay protection functions | 50/50N/50G/SEF 51/51N/51G, 46, 79 | |
| 25 | Communication protocol | | DNP3.0 |
| 26 | Communication port | | USB,RS232 Ethernet |

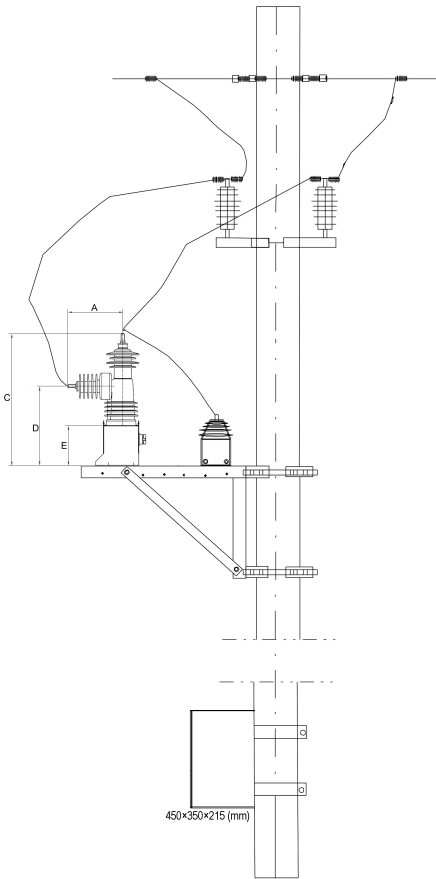
AUTOMATIC VACUUM RECLOSER

| 15.5kV 50/60Hz | Rated continuous current | Rated duration of short-circuit | Rated short-circuit breaking current | Rated short-circuit making current | Rated lightning impulse withstand voltage | Rated short-duration P.F. withstand voltage | Impedance $\mu\Omega$ between connections | Creepage distance, phase-to-earth | Clearance, phase-to-phase | Minimum clearance, phase-to-earth | Weight | Line charging current | Cable charging current | Max. interrupting time / max. closing time |
|-------------------|--------------------------|---------------------------------|--------------------------------------|------------------------------------|---|---|---|-----------------------------------|---------------------------|-----------------------------------|--------|-----------------------|------------------------|--|
| | I_r | T_k | I_{sc} | I_{ma} | U_p | U_d | | | | | | A | A | ms |
| | A | s | kA | kA | kV | kV | $\mu\Omega$ | mm | mm | mm | kg | A | A | ms |
| ZX15-630-12-N | 630 | 3 | 12.5 | 31.5 | 110 | 50 | 50 | 850 | 320 | 270 | 130 | 2 | 10 | 60/60 |
| ZX15-800-12-N | 800 | 3 | 12.5 | 31.5 | 110 | 50 | 50 | 850 | 320 | 270 | 130 | 2 | 10 | 60/60 |
| ZX15-630-16-H | 630 | 3 | 16 | 40 | 110 | 50 | 50 | 850 | 320 | 270 | 130 | 2 | 10 | 60/60 |
| ZX15-800-16-H | 800 | 3 | 16 | 40 | 110 | 50 | 50 | 850 | 320 | 270 | 130 | 2 | 10 | 60/60 |
| ZX15-630-16-H-MR | 630 | 3 | 16 | 40 | 110 | 50 | 50 | 850 | 320 | 270 | 130 | 2 | 10 | 60/60 |
| ZX15-800-16-H-MR | 800 | 3 | 16 | 40 | 110 | 50 | 50 | 850 | 320 | 270 | 130 | 2 | 10 | 60/60 |
| ZX16-800-17-H | 630 | 3 | 16 | 40 | 110 | 50 | 50 | 850 | 320 | 270 | 130 | 2 | 10 | 60/60 |
| 27kV 50/60Hz | I_r | T_k | I_{sc} | I_{ma} | U_p | U_d | | | | | | A | A | ms |
| | A | s | kA | kA | kV | kV | $\mu\Omega$ | mm | mm | mm | kg | A | A | ms |
| | A | s | kA | kA | kV | kV | $\mu\Omega$ | mm | mm | mm | kg | A | A | ms |
| ZX27-630-12-N | 630 | 3 | 12.5 | 31.5 | 125 | 60 | 50 | 850 | 320 | 270 | 140 | 5 | 25 | 60/60 |
| ZX27-800-12-N | 800 | 3 | 12.5 | 31.5 | 125 | 60 | 50 | 850 | 320 | 270 | 140 | 5 | 25 | 60/60 |
| ZX27-630-16-H | 630 | 3 | 16 | 40 | 125 | 60 | 50 | 850 | 320 | 270 | 140 | 5 | 25 | 60/60 |
| ZX27-800-16-H | 800 | 3 | 16 | 40 | 125 | 60 | 50 | 850 | 320 | 270 | 140 | 5 | 25 | 60/60 |
| ZX27-630-16-H-MR | 630 | 3 | 16 | 40 | 150 | 70 | 50 | 1290 | 320 | 350 | 150 | 5 | 25 | 60/60 |
| ZX27-800-16-H-MR | 800 | 3 | 16 | 40 | 150 | 70 | 50 | 1290 | 320 | 350 | 150 | 5 | 25 | 60/60 |
| 38kV 50/60Hz | I_r | T_k | I_{sc} | I_{ma} | U_p | U_d | | | | | | A | A | ms |
| | A | s | kA | kA | kV | kV | $\mu\Omega$ | mm | mm | mm | kg | A | A | ms |
| | A | s | kA | kA | kV | kV | $\mu\Omega$ | mm | mm | mm | kg | A | A | ms |
| ZX38-630-12-N | 630 | 3 | 12.5 | 31.5 | 170 | 70 | 50 | 1290 | 320 | 350 | 150 | 5 | 40 | 60/60 |
| ZX38-800-12-N | 800 | 3 | 12.5 | 31.5 | 170 | 70 | 50 | 1290 | 320 | 350 | 150 | 5 | 40 | 60/60 |
| ZX38-630-16-N | 630 | 3 | 16 | 40 | 170 | 70 | 50 | 1290 | 320 | 350 | 150 | 5 | 40 | 60/60 |
| ZX38-800-16-N | 800 | 3 | 16 | 40 | 170 | 70 | 50 | 1290 | 320 | 350 | 150 | 5 | 40 | 60/60 |
| ZX38-630-16-H-MR | 630 | 3 | 16 | 40 | 170 | 70 | 50 | 1290 | 320 | 350 | 150 | 5 | 40 | 60/60 |
| ZX38-800-16-H-MR | 800 | 3 | 16 | 40 | 170 | 70 | 50 | 1290 | 320 | 350 | 150 | 5 | 40 | 60/60 |

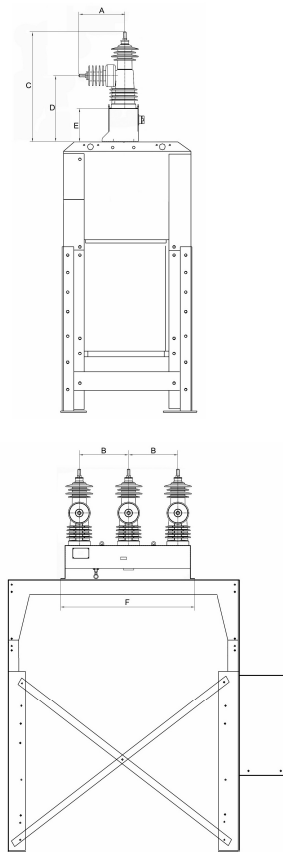
AUTOMATIC VACUUM RECLOSER

Dimension drawings

| | | A | B | C | D | E | F |
|--------|----|-----|-----|-----|-----|-----|-----|
| 15.5kV | mm | 460 | 380 | 850 | 508 | 270 | 970 |
| 27kV | mm | 460 | 380 | 850 | 508 | 270 | 970 |
| 38kV | mm | 512 | 380 | 970 | 590 | 270 | 970 |



Pole mount



Substation mount



Pomanique Electric Co., Ltd.

F.14, Building 3, Headquarter Economic Park, No. 6688 Xuyang Rd.,
Yueqing, Zhejiang, China

Tel:(+86)577-62732638 Fax:(+86)577-62732636

Email:info@pomanique.com

www.pomanique.com