ZX Vacuum Auto Recloser

15.5kV

ZX-16-800-17-H-MI

Pomanique

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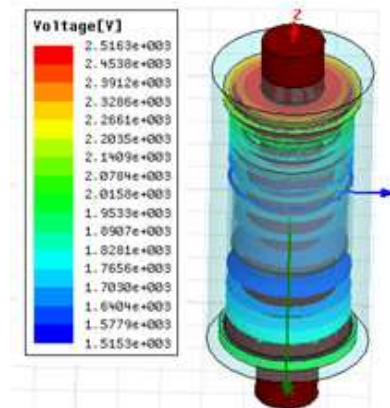
- By control of speed of open operation to at least 1.2m/s,the recloser interrupter can vent the arc fault effectively.

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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

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-push in (close position)

Lockout handle-pulled (open position)

Controller description

ControllerFTU-R200

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.

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 Responese : 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 Responese : 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 Leve : 1~6000A (step:0.1A)

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

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

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

Delay Time Current Trip
Phase-HCT Pickup Leve : 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)
Opearting 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

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°

Commmunication 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-MI
3	Manufacturing standard		IEC
4	Nominal operating voltage	kV	13.8
5	Nominal maximum voltage	kV	15.5kV (2-24kV Configurabale)
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	Current Transformer Ratio		Multi-Ratio 100/300/600:1A
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	Protection Current Range		1-1600A
26	Communication port		USB,RS232 Ethernet

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
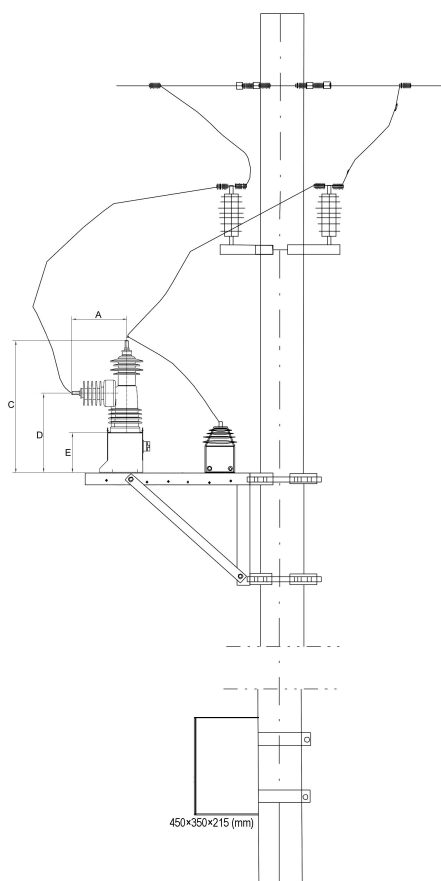
Pole mount
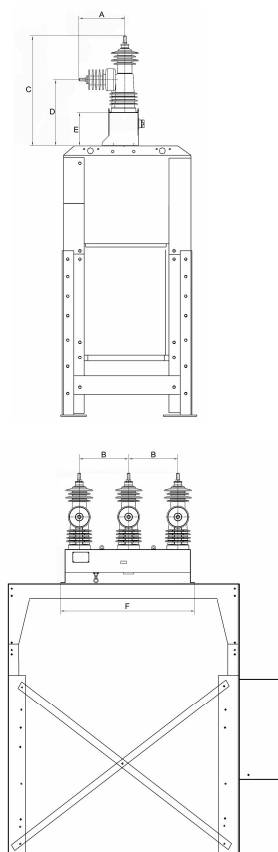
Substation mount

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