

NOJA POWER®

GMK

GROUND MOUNT KIOSK PRODUCT GUIDE

OSM AUTOMATIC
CIRCUIT RECLOSER
15KV 27KV & 38KV MODELS



INTRODUCTION

The GMK Ground Mount Kiosk is designed for the connection and protection of underground cables for voltage classes up to 38kV.

The kiosk houses an OSM automatic circuit recloser, an RC controller, an interlocked isolation and earthing mechanism and cable connection compartment.

The OSM automatic circuit recloser has been extensively type tested by independent laboratories to ensure long life and reliability under the harshest environmental conditions. It is the only solid dielectric insulated recloser to provide controlled arc fault venting and independent testing provides verification of this important safety feature.

The RC controller provides all the protection, data logging and communications functions. An operator panel is used to operate the device locally.

A two phase VT located in the main compartment provides low voltage AC auxiliary supply to the RC controller.

A manual trip mechanism is located above the RC controller, and is used to manually open and isolate the OSM. The mechanism is then rotated using a lever to connect earth switches to the Load side of the OSM.

Underground cables enter the kiosk through a metal plate provided in the base of the cable

connection compartment. Six DIN 400 or ANSI Taper aromatic epoxy bushings are provided to terminate the cables onto the Load and Source side of the OSM automatic circuit recloser. An earth bar is also located in this compartment for earth bond connections.



Cable Entry, Main Earth Bar & High Voltage Terminations

1. Earth Switch Viewing Window
2. Cable Termination
3. Main Earth Bar
4. Gland Plate



GMK Ground Mount Kiosk

OVERVIEW

The OSM automatic circuit reclosers incorporate vacuum interrupters inside a solid dielectric polymer housing enclosed inside an arc vented stainless steel tank. This ensures the maximum in life and reliability with a fully insulated arrangement inside the long life housing.

Voltage is measured on all six (6) bushings using capacitively coupled screens. Current is measured on all three (3) phases using current transformers.

The recloser mechanism is operated by three (3) separate magnetic actuators, one per phase. These magnetic actuators are mechanically interlocked to guarantee correct three (3) phase operation. The device is latched in the closed position by magnetic latching. Each magnetic actuator uses a single coil.

The open and closed position of the device is indicated by a green 'O' to indicate the device is open and a red 'I' to indicate the device is closed, this can be viewed through the window next to the control cubicle.

The status of the recloser is also reflected by a microswitch connected to the control electronics. The electronic circuit board where the microswitch is fitted has no active elements which dramatically improves impulse immunity.

The main circuit bushings are manufactured from UV stable polymer and have a silicone rubber

bushing boot to provide the required creepage distance.

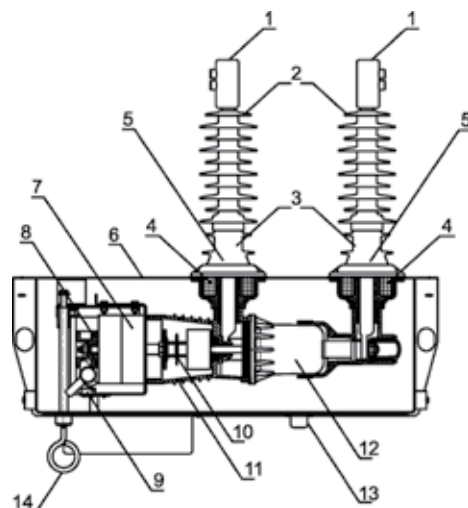
The magnetic actuators are operated from stored energy charged capacitors located in the RC control cubicle. There is a rating plate located in the base of the tank that provides tank rating details in accordance with the requirements of ANSI C37.60.

The cross sectional diagram below details the OSM tank configuration and main components.



OSM Automatic Circuit Recloser

1. Bushing Connector
2. Silicone Rubber Bushing Boot
3. Polymer Bushing
4. Current Transformers
5. Capacitively Coupled Voltage Sensor
6. Stainless Steel Tank
7. Magnetic Actuator
8. Opening Spring
9. Auxiliary Switches
10. Insulated Drive Rod
11. Polycarbonate Housing
12. Vacuum Interrupter
13. Ceramic Breather
14. Mechanical trip Ring



RC10 CONTROL & COMMUNICATIONS CUBICLE

The RC10 control and communications cubicle is a microprocessor based controller that provides a directional overcurrent, earth fault and sensitive earth fault relay, auto reclosing relay, instantaneous metering, event log, demand logger and remote terminal unit (RTU) for remote control in a single package.

The operator control panel is provided with a large backlit LCD display and keypad to provide local control functions.

The control cubicle has three (3) main modules:

- The operator panel module which provides the man machine interface.
- The Switchgear Interface Module (SIM) which provides the power supply battery charger and incorporates the capacitors that provide the tripping and closing energy to the OSM tank.
- The Relay module which provides the main microprocessor and DSP functionality.

Temperature compensated float charging is provided to the sealed lead acid batteries located in the RC10 control cubicle.

There is space provided inside the control cubicle to install any communications equipment to be connected to the inbuilt RTU or I/O module.

The equipment has been designed for the RC10 control cubicle to operate over a temperature range of -40 to +55°C inside the IP65 sealed enclosure.

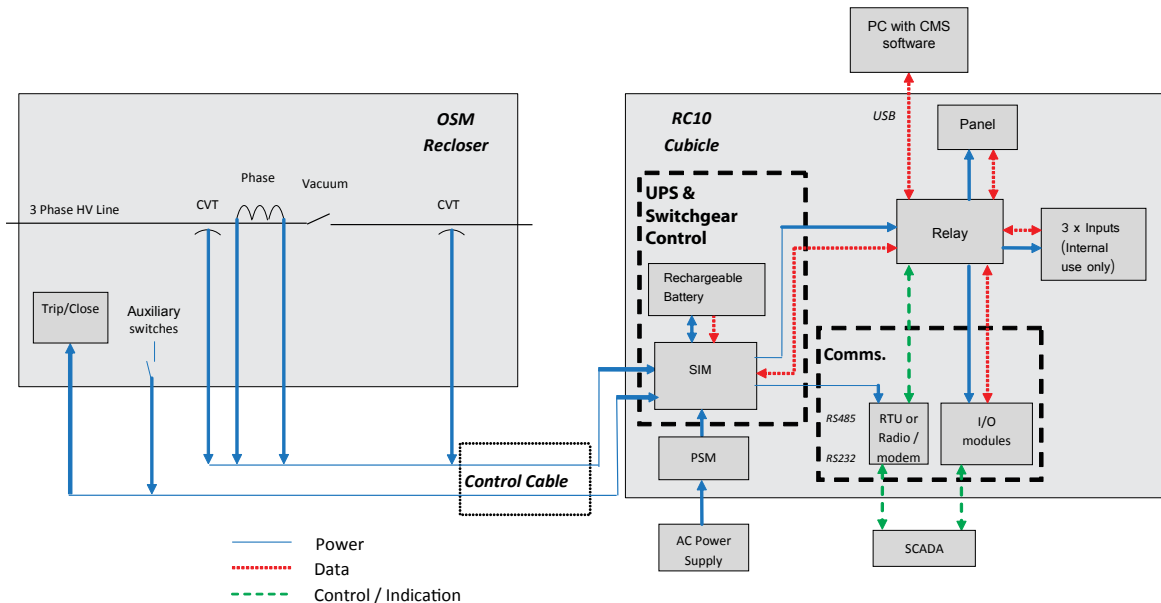
The cubicle is constructed out of powder coated stainless steel for a long, maintenance free lifetime. The roof features a ceramic based insulating



Control and Communications Cubicle

coating that provides a 16°C reduction in internal temperature when the cubicle is exposed to 1.1kW of solar radiation.

The entry point for the control cable is housed within a vandal-proof enclosure and the cubicle door has a three point handle locking mechanism making it extremely difficult to break into.



PROTECTION

- 4 Independent Protection Groups
- Directional over current and earth fault protection
 - Current Setting Range 10-1280A
 - Setting Resolution 1A
- Inverse Time Protection
 - Independent Curve Selection for Forward & Reverse Direction
 - 4 x IEC255 Curves
 - 8 x ANSI Curves
 - User Defined Curves
 - 42 x Custom Curves
- Definite Time Protection
 - 0-120 seconds
 - Time Resolution 0.01 seconds
- High set Instantaneous element
- Directional Sensitive Earth Fault Protection
 - Current Setting Range 4-80A
 - 1-80A option available
 - Setting Resolution 1A
 - Definite Time 0-120 seconds
 - Time Resolution 0.01 seconds
- Voltage Protection Element
 - Phase undervoltage balanced element (UV1)
 - 3 phase load shedding
 - Multiplier setting range: 0.6-1 of system voltage
 - Multiplier setting resolution: 0.01
 - Trip time range: 0-180 sec
 - Trip time setting resolution: 0.01 sec
 - Phase-to-Phase Undervoltage Element (UV2)
 - Multiplier setting range: 0.6-1 of system voltage
 - Multiplier setting resolution: 0.01
 - Trip time range: 0-180 sec
 - Trip time setting resolution: 0.01 sec
 - Loss of Supply (UV3)
 - Trip time range: 0-180 sec
 - Trip time setting resolution: 0.01 sec
 - Reclose time: 0-180 sec
 - Reclose time resolution: 0.01 sec
 - Phase (OV1) & Line-to-Line (OV2) Over Voltage
 - Trip time range: 0-180 sec
 - Multiplier Setting Range: 1.00 -1.20
- Frequency Protection Element
 - Under Frequency (UF) Pickup Range: 46-50Hz (50Hz system), 55-60Hz (60Hz system)
 - Over Frequency (OF) Pickup Range: 50-55Hz (50Hz system), 60-65Hz (60Hz system)
 - Frequency settings resolution: 0.01Hz
 - Trip time range: 0-120 sec
 - Trip time setting resolution: 0.01 sec
- Voltage reclose control with automatic back feed restoration provides loop automation functionality.



Local Control Panel

- Zone Sequence Co-ordination
- Cold Load Pickup
 - Cold load time ramp up: 1-400 min
 - Cold load time ramp down: 0-60 min
 - Cold load time resolution: 1 min
 - Cold load multiplier: 1-5 times pickup current
 - Cold load multiplier resolution: 0.1
- Inrush Restraint
- Inrush time: 0.01-10 sec
 - Inrush time resolution: 0.01 sec
 - Inrush multiplier: 1-20
 - Inrush multiplier resolution: 0.1
- Temporary Time Addition
 - Provides a stepped time delay to automatically isolate faulted sections in a feeder or correct grading of devices in series.
- Duty Cycle
 - 0-0.1sec-CO-1sec-CO-1sec-CO-60sec recovery time
- Reclosing Times
 - 1st reclosing time range 0.1 - 180 seconds
 - 2nd reclosing time range 1 - 180 seconds
 - 3rd reclosing time range 1 - 180 seconds
 - Setting resolution 0.01 seconds
- Auto Reclose
 - User configurable 1-4 trips to lockout, independently settable for overcurrent earth fault, sensitive earth fault and voltage protection.
- Live Line Function & Hot Line Tag Function

MEASUREMENT

Voltage is measured on all six (6) bushings and current is measured on all three (3) phases of the OSM recloser using capacitively coupled voltage sensors and current transformers.

Phase to Earth Voltage:
Range 0.3 – 22.0kV, Accuracy $\pm 1\%$ or $\pm 0.1kV$

Phase to Phase Voltage:
Range 0.5 – 38.0kV, Accuracy $\pm 2\%$ or $\pm 0.1kV$

Phase Current:
Range 0 – 630A, Accuracy $\pm 1\%$ or $\pm 4A$

Residual Current:
Range 0 – 100A, Accuracy $\pm 5\%$ or $\pm 0.5A$

Active, Reactive and Total Power:
Range 40 – 630A, 4.5 – 38kV, Accuracy $\pm 2\%$

Single and Three Phase Active, Reactive and Total Power:
Range 0 – 30,000 KW/KVAR/KVA, Accuracy $\pm 2\%$

Frequency:
Range 46–55Hz, 55–65Hz
Accuracy at $dF/dT < 0.2Hz/s$: $\pm 0.025Hz$

Range 46–55Hz, 55–65Hz
Accuracy at $dF/dT < 0.5Hz/s$: $\pm 0.05Hz$

Power Factor:
Range 0–1, Accuracy ± 0.02

EVENT LOG

The RC10 control provides two method to access the event logs time and date stamped to a 0.01 sec resolution.

The first is method is from the RC LCD display, it provides critical operations data for the linesman and includes close/open operations, fault types, phase and peak level of fault current.

The second is method is by PC upload using CMS. It provides a full log of all operational history including setting changes, operations and fault history.

The fault history logs include 50 cycles of pre-trip history to allow analysis of the fault propagation.

LOAD PROFILE LOG

The Load Profile is logged with a user configured integration period of either 1, 5, 10, 15, 30, 60 and 120 minutes.

The following parameters are logged separately for both positive and negative power flow.

Up to 10000 events can be stored in the memory which corresponds to a 417 day, 60 minute, integration period.

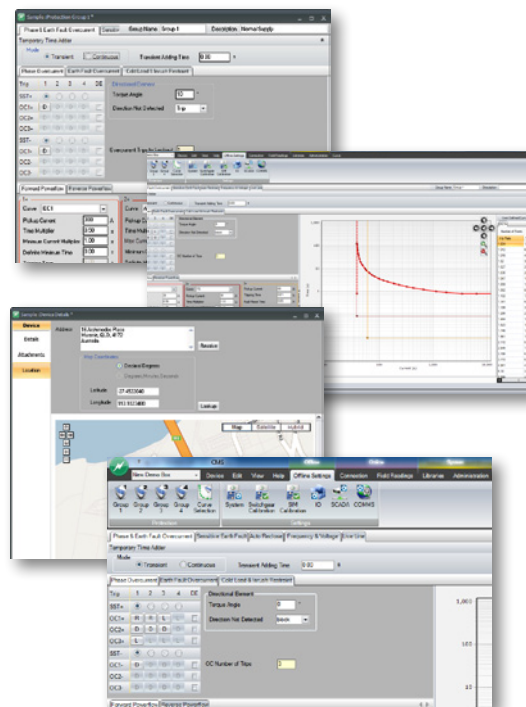
CMS can be used to upload and plot the data.

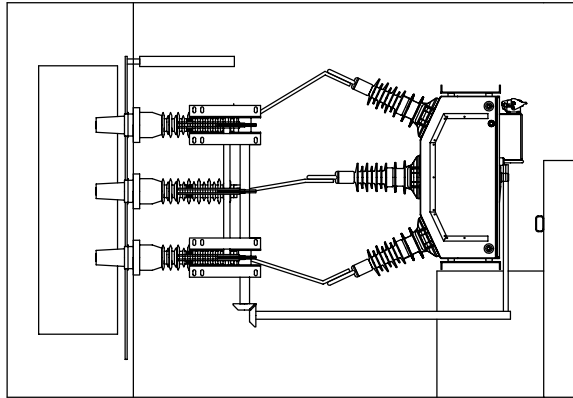
REMOTE CONTROL

A USB front panel interface is provided to connect to a PC running CMS. This provides full settings and data management facilities. An RS232 RTU interface offering 300–19.2k & 3xUSB port baud, full and half duplex modes, is provided to connect to remote control systems. DNP3 communications protocol is provided in the standard product combined with our ability to engineer new protocols to meet specified customer requests.

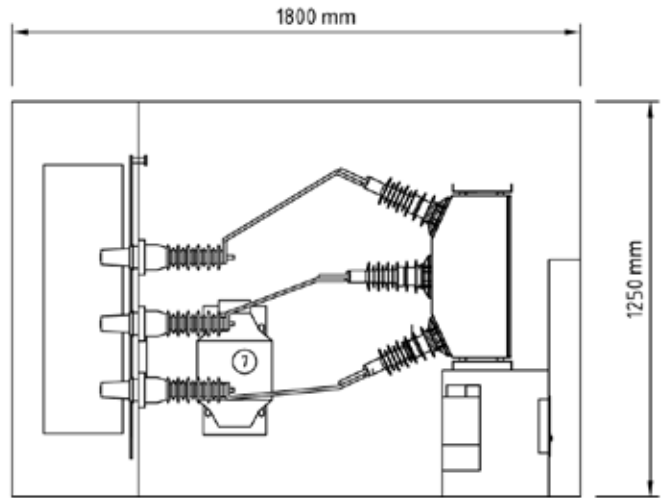
The control cubicle has space to mount a radio or modem. The onboard radio power supply is rated at 12V 20W continuous duty, 30 watts 50% duty cycle.

I/O modules with eight (8) user configurable inputs and eight (8) user configurable outputs can be ordered as options in the RC10 control. Up to two I/O modules can be fitted extending this to sixteen inputs and sixteen outputs. Three (3) user configurable sanitized inputs are included as standard.

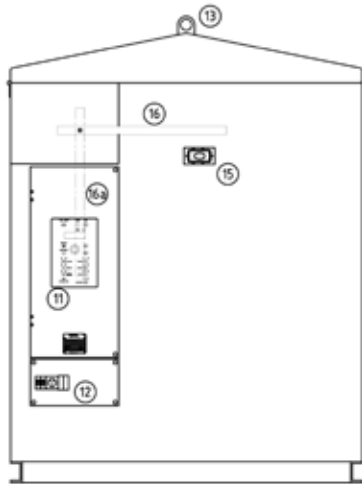




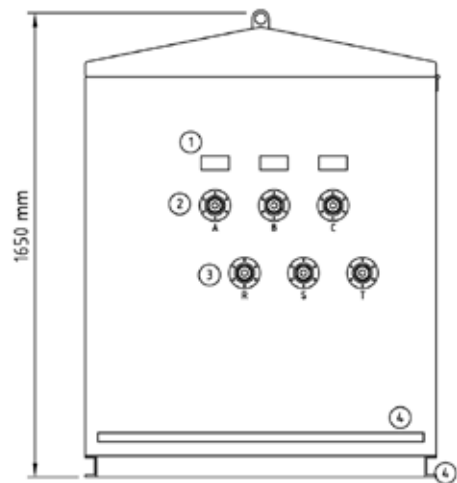
Top View A



Top View B



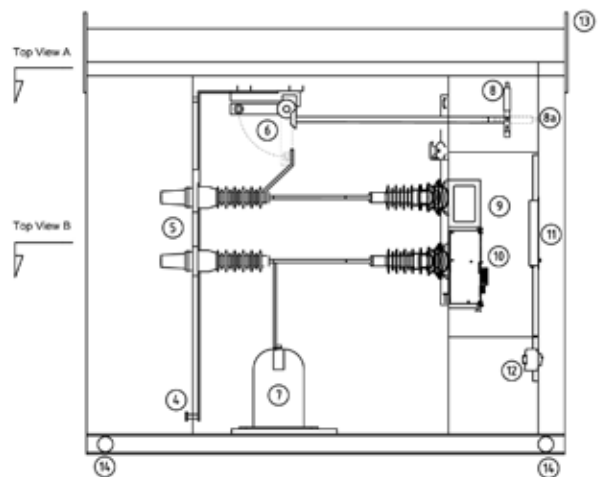
Front View



Back View

COMPONENTS

1. Earth Connection Viewing Window
2. Load Side Bushings
3. Source Side Bushings
4. Earth Bar
5. DIN 47636 series 400 630A Interface Bushing
6. Earth Switch
7. Phase To Phase VT
8. Interlock Operator Shown In Normal Position
- 8A. Interlock Operator Shown In Isolated Position
9. Sealed Lead Acid Battery
10. Power Supply and Driver Modules
11. Main Processor Module
12. LV Molded Case Breakers and General Purpose Outlet
13. Lifting Lugs
14. Sling Guides
15. Recloser Status Viewing Window
16. Removable Operating Arm Shown In Isolated But Not Earthed Position.
- 16A. Removable Operating Arm Shown In Isolated and Earthed Position



Side View

NOJA POWER®

Part Number	OSM15-16-630	OSM27-12-630	OSM38-12-630
Current Sensing	3 x Current Transformers	3 x Current Transformers	3 x Current Transformers
Voltage Sensing	6 x Voltage Screens	6 x Voltage Screens	6 x Voltage Screens
Control Type	RC 10	RC 10	RC 10
Rated Maximum Voltage	15.5kV	27kV	38kV
Rated Continuous Current	630A	630A	630A
Fault Make Capacity RMS	16kA	12.5kA	12.5kA
Fault Make Capacity Peak	40kA	31.5kA	31.5kA
Fault Break Capacity	16kA	12.5kA	12.5kA
Mechanical Operations	30,000	30,000	30,000
Full Load Operations	30,000	30,000	30,000
Fault Break Capacity Operations	200	200	200
Short Time Current Withstand	16kA/4 secs	12.5kA/4 secs	12.5kA/3 secs
Mainly Active Breaking Capacity	630A	630A	630A
Cable Charging Current	25A	25A	40A
Line Charging Current	10A	5A	5A
Impulse Withstand Phase to Earth & Phase to Phase	110kV	125kV (150kV option)	195kV
Impulse Across the Interrupter	110kV	125kV (150kV option)	170kV
Power Frequency Withstand Phase to Earth (Dry) Across the Interrupter	50kV 50kV	60kV 60kV	70kV 70kV
Ambient Temperature	-40°C to +55°C	-40°C to +55°C	-40°C to +55°C
Humidity	0-100%	0-100%	0-100%
Altitude	3000M	3000M	3000M
Weight of the Tank	720kg	720kg	775kg

Altitudes above 1000m should be derated in accordance with ANSI C37.60-2003

NOJA Power Switchgear Pty Ltd

16 Archimedes Place, Murarrie,
Qld 4172, Australia

Phone: +61 7 3907 8777
 Fax: +61 7 3399 6777
 Email: sales@nojapower.com.au
 Website: www.nojapower.com.au

Distributor