



# SUBSTATION AUTOMATION PANELS



الفيّنار  
alfanar



**PARTNERSHIP**

# **SAFETY**

**DURABILITY**

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# Products Portfolio

“The **alfanar** Relays, Control and custom built Panels are supplied for Generation Plants and Substations Up to 380 Kv”

## 1. Relay Panels

Relay Panels are built with main and auxiliary relays for power system protection at transmission and distribution ends.

### A. Transformer Relay Panel

For protection of distribution transformers of all rating

Main protection includes:

- Differential protection
- REF protection (Residual Earth Fault)
- SEF protection (Sensitive Earth Fault)
- Over current protection
- Over flux protection
- Breaker failure protection





## B. Underground Feeder Relay Panel

For protection of distribution line

Main protection includes:

- Line differential protection
- Distance protection
- Directional over current protection
- Breaker failure protection
- Auto re-close & synchronizing check scheme



# Products Portfolio

## C. Bus Coupler Relay Panel

For protection of coupling two buses

Main protection includes:

- Over current protection
- Breaker failure protection



### D. Bus Section Relay Panel

For protection of two sections of a bus

Main protection includes:

- Over current protection
- Breaker failure protection



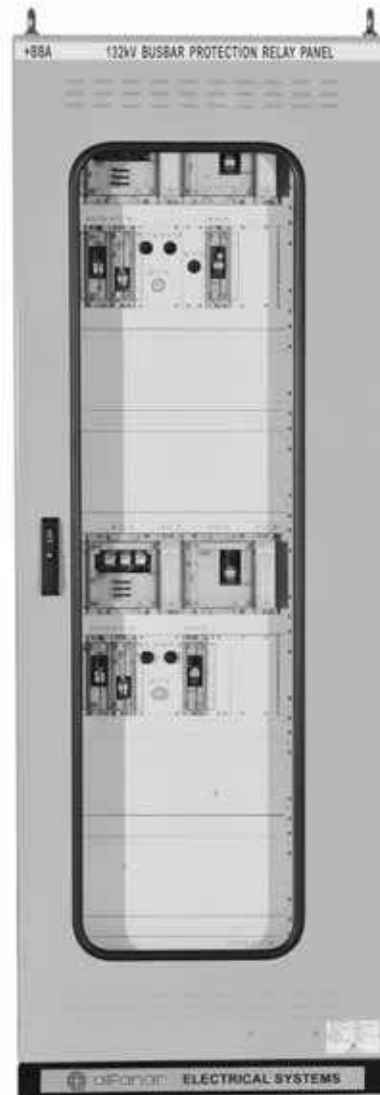
# Products Portfolio

## E. Busbar Protection Relay Panel

For protection of busbar

Main protection includes:

- Busbar differential protection
- Breaker failure protection





## F. Load Shedding Panel

For protection of low voltage feeder/line

Main protection includes:

- Over voltage/under voltage protection
- Over frequency/under frequency protection



# Products Portfolio

## **G. Transformer Auto Changeover Panel**

Automatic Changeover Switching Equipment (ACSE)

Automatic Bus Transfer Scheme (ABTS)

To monitor, control and ensure continuous flow of supply at distribution side.



## 2. Control Panels

Control Panels are built with measuring and control devices to control the switching equipment, to measure the energy and to provide annunciation at the transformer and distribution ends.

### A. Transformer Control Panel

To control switching equipment in transformer bay, measurement of energy and annunciation along with synchronizing relay.



### B. Synchronizing Panel

For manual synchronization of bay/bus.



# Products Portfolio

## **C. Feeder / Line Control Panel**

To control switching equipment in line/feeder bay, measurement of energy and annunciation along with synchronizing relay.

## **D. Bus Coupler Control Panel**

To control switching equipment in coupler bay, measurement of energy and annunciation along with synchronizing relay.

## **E. Bus Section Control Panel**

To control switching equipment in bus section bay, measurement of energy and annunciation along with synchronizing relay.

## **F. Remote Tap Changer Control Panel (RTCC) / Automatic Voltage Control Panel (AVC)**

To control the low voltage side of the transformer and maintain voltage.



# Products Portfolio

## 3. Special Panels

### A. Annunciator & Marshalling Kiosk Panel

To display all characteristics of signals in a substation; it includes continuous signal recording and printing.



### B. Mosaic Control Panel

To control switching equipment and for measurement of energy in all bays

Bay wise control and indication arrangement is built with mosaic tiles in the front side of the panel. Use of tiles helps in easy modification and bay extension for future requirements. All in one compact control panel, due to small size of mosaic control switches, mosaic indication and semaphore indicators - control, measurement, indication and architecture is compacted in a smaller area.

### C. Metering Panels

To measure the energy for tariff

### D. Data Retrieval / Station Evaluation Panel (DTR/SEP)

To communicate relays in all panels through one system

Its major objective is to download and upload data from and to a protection and measurement equipment in a substation located in a remote area from a master station at headquarters.

### E. Custom Built Panels

As per a customer's requirement



# Standard Features

## Product Standards

The panels are manufactured as per national and international standards. The general standards followed are:

- IEC 61439 – 1 (for manufacturing, inspection & testing)
- IEC 60529 (for IP protection)
- SEC Standards (for manufacturing)

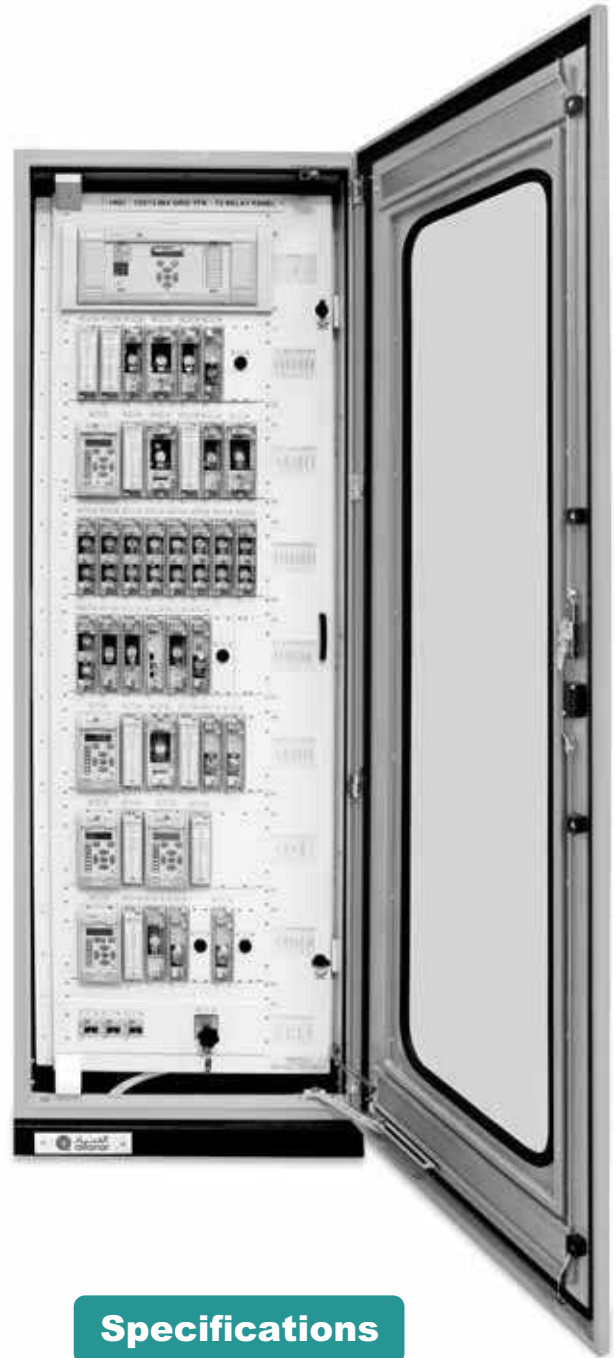
## Standard Dimensions (in mm)

- 2200 X 800 X 800 (H x W x D)
- 800 X 400 X 400 (H x W x D) - only for synchronizing panels.
- 700 X 500 X 400 (H x W x D) - only for synchronizing panels.
- Various alternative arrangements are available to suit customers' requirements.

## Construction

The **alfanar** panels are supplied with all devices duly assembled and wired as per a client's requirement and in line with the system logic.

- Made of electro galvanized sheet steel with a zinc coating of 20 microns
- Main supports with 3mm, and others with 2mm, EG sheet steel
- The panel exterior and interior is finished with polyester based powder coated paint with paint thickness greater than 90 microns, interior paint shade in RAL 9003
- Terminal block rails, DIN rail channels, cable holding strips and anchor rails are made of steel and zinc plated with yellow passivation or powder coating
- Cable entry from bottom with removable gland plates (in special cases, with top entry also)
- Rating/manufacturer's label are made of Stainless Steel
- Main and subsidiary labels are with black letters on white background
- Accessible from the front and rear depending on the type of a panel
- Vermin proof protection at the top and bottom of the door
- Brand Name **alfanar** and Rating labels are made of Stainless Steel.



## Specifications

- 220/127V AC auxiliary power supply
- 220/125V DC auxiliary power supply
- 1A/5A CT secondary
- Rated insulation voltage up to 1000V
- Degree of Protection IP41 as per IEC 60529
- Simplex/Duplex Type
- Doors with padlock facility

# Manufacturing Facilities

The Substation Automation Factory has an ultramodern and fully equipped manufacturing facility.

The Substation Automation Factory employs highly qualified and skilled technical team which looks after tendering, project management, design, procurement, production, testing, and quality control and assurance.



The factory has sophisticated and reliable kits for testing its panels. Some of the well-know testing equipment used by us are:



- Omicron Relay Test Kit (Omicron)
- Freja Relay Test Kit (Programma)
- Sverker Relay Test Kit (Programma)
- B10E Power Pack (Programma)
- TM 200 Timer (Programma)
- Digital Multimeters (Fluke)

Certified to ISO 9001 standards, our in-house fabrication, painting and wiring methods are checked and inspected to exacting quality assurance standards and we continue a tradition of value and craftsmanship.

# Processes And Activities

## Tendering Process

- Register Requests for Quotation (RFQ)
- Tender/RFQ Review & Evaluation
- Bill of Material (BOM) Preparation and Cost Estimation
- Offer Submission
- Customer Follow-up
- Post Order Review
- Handover to Projects Team



## Projects Management Process

- Allocation of Work Order
- Preparation of Project Execution Plan
- Co-ordination with Customer and Internal Departments
- Project Progress Monitoring and Review
- Handling Customer Complaints and Feedback

## Design Process

The Company offers complete design solutions and services for protection and control systems.

### 1. Engineering Software

- **Microstation V8i**  
Latest version of Microstation in order to meet SEC drawing standards SEEDSII
- **Promise V8i**  
Intelligent & integrated software for electrical control wiring system to provide the most professional and errorless projects execution
- **Pro Engineering**  
Industries' integrated 2D & 3D CAD/CAM/CAE solutions for any size design such as to fulfill all requirements of a customer
- **Autodesk Inventor with AutoCAD**  
The foundation for digital prototyping, producing an accurate 3D model that validates the form, fit and function of a design before it is built



# Processes And Activities

## 2. Core Competencies

- Protective devices function & operation selection
- Engaging protection and metering systems in service as per various philosophies and standards
- AC/DC burden calculations
- Remote end engineering works

## 3. Design Process Activities

- Study of Design Inputs : PTS, SOW & PR
  - PTS : Project Technical Specifications
  - SOW : Scope of Work
  - PR : Project Requirement
- Preparation of Panels, Relays, Meters, AC & DC burden lists
- Base Design submittal
- Preparation of Project Bill of Materials
- Detailed Design submittal
- Panels Manufacturing Work Order Release
- Production Files Release
- Trouble Shooting



## Material Planning & Control Process

- Material planning
- Item code creation
- Preparation of purchase request
- Material procurement
- Material control

## Production Process

The basic production processes followed in the factory are:

- Fabrication & painting of panel parts
- Panel assembly
- Equipment assembly, mounting
- Wiring
- Mimic assembly
- Name plates fixing
- Final assembly





# Quality Control And Assurance

The Substation Automation Factory's approach to Quality is: "To prevent error before it happens". The whole system is directed towards this methodology. The aim is to achieve customer satisfaction by consistently delivering products and services on time, meeting all quality requirements and providing value for money.

The Substation Automation Factory follows the PDCA (Plan-DO-Check-Act) approach towards Quality Management System. The whole Quality Management System is in line with ISO-9001 and certified by ABS Quality Evaluation Inc., USA.

## Quality Control Activities

- Inward Material Inspection & Testing
- In-process Inspection & Testing
- Finished Products Inspection & Testing
- Preparation of Relevant Records and Control

## Quality Assurance Activities

- Quality Management System (QMS) Documentation
- Calibration Control
- Monitoring Quality Trends
- Complaints Analysis
- Quality System Audit
- Customer Satisfaction Survey
- Customer/Third Party Inspection – Coordination



## Final Product – Inspection & Testing

All the finished panels are subjected to 100% routine quality checking as per the customer approved drawings and as per IEC 61439-1. Inspection & Test plan instructions are followed and the results are recorded. The inspection and tests include the following:

- Visual checks
- Mechanical and dimensional checks
- Wiring continuity checks
- Dielectric test
- Insulation resistance test
- Equipment testing
- Functional tests





# SCADA System

**alfanar** 's Substation Automation System provides a complete supervisory control solution for substations (HV, MV, MCC, LC, etc.). It is also a Distributor Control System (DCS). The system uses the industry's latest technology.



## Main Functions of SCADA System

### Supervisory Control

To control the system elements like CBs, Isolators and Voltage Regulators. Remote control is available either manually, by selecting icons, or automatically via event or time schedules. Master Control is delivered with a full sequence language capability that can provide wide area control. Third party applications can also initiate controls via APIs (Applications programming Interface).

### Data scanning

Scan the data changes in filed CB status, Isolators status and Measurements.

### Monitoring

Master Control has user configurable automatic scanning regimes of plant items through the use of an advanced scanning algorithm and prioritizing polls. This function, according to operational importance and polling rates, can be altered in response to a particular event.

### Alarms

The ability to alarm when unsolicited event happened and the ability to manage the alarms, including links to secondary and primary alarms so that a power failure will not swamp the Operations Centre with unnecessary alarms. Alarms are user-prioritized and automatically routed to the relevant users and workstations. These alarms can be routed to radio pagers, sent by SMS message to cellular phones, or e-mailed to relevant users.

## Historic data

Save all data in historical database. The database is very useful for studying the system condition and reporting.

## Reporting

It has the facility to generate various types of reports.

## Trends

Ability to draw data status like data indications and measurements related to another variable like time, as an example.

### Station Level

- Station Computer
- Engineering Workstation
- Station Switch
- GPS Receiver

### Bay Level

- Bay Control Unit (BCU)
- Bay Protection Unit (BPU)
- Bay Monitoring Unit (BMU)
- Bay Switch
- Optical splitter for IRIG-B signal
- Automatic Voltage Regulator (AVR)

### Process Level

- CB
- Metering
- CT, VT

### System Contents

1. BCU (Bay Control Unit ) —→ Manage and control Bays
2. IED (Intelligent Electronic Device ) —→ Protection and Control
3. HMI software —→ Monitoring, Control, Report, Event, Alarm, Historical database
4. Ethernet switches —→ Availability, Conductivity
5. Gateway —→ Protocol converter to connect to DCC and HMI



### SCADA Protocols

1. IEC 61850
2. IEC 60870-5-101, IEC 60870-5-104, IEC 60870-5-103
3. Modbus
4. DNP 3.0
5. OPC

### Project Steps

1. Identification of Solution
2. Design
3. Engineering and Setting
4. Testing/Factory Acceptance Test (FAT)
5. Commissioning & Site Acceptance Test (SAT)

# References

The panels are supplied to various customers across the Kingdom. Some of the major projects are:

Project	Main Contractor	End User
New 33/13.8kV Sakaka Industrial City S/S in Sakaka area	alfanar Co.	SEC-ERB
King Faisal University 69/13.8kV S/S	alfanar Co.	SEC-ERB
115kV Annunciation Panels for Hafer Al-Batin	SAITE-Dammam	SEC-ERB
132/13.8kV S/S # 8914 and 8915	Al-Mashariq Co.	SEC-COA
132/13.8kV S/S # 8828	Al-Toukhi Co.	SEC-COA
115/13.8kV AL-Masoudi S/S	alfanar Co.	SEC-ERB
132/33/13.8kV S/S 8602 at Dawadmi	ZJ Construction Co.	SEC-COA
132/13.8kV S/S #8829	Al-Osais Contracting Co.	SEC-COA
132/13.8kV S/S #8711	Kadi Contracting & Trading Co.	SEC-COA
KAU 110/13.8kV S/S, Thuwal	AREVA-DUBAI	SEC-WOA
115/13.8kV HIE S/S	alfanar Co.	SEC-ERB
220/115kV Jubail - 2 S/S	Al-Harbi Trading & Contracting Co.	SEC-ERB
132/13.8kV S/S #8123 – Al-Morabba	Al-Babtain Contracting Co.	SEC-COA
Construction of New 115/13.8kV Saihat S/S # 2	alfanar Co.	SEC-ERB
Composite Water Plant	BEMCO Contracting Co.	SEC-ERB
4.16kV - Salboukh & Boweb Water Treatment plant	alfanar Co.	SWCC
115/13.8 KV S/S #2,3&4 - Khafji	Al-Mashariq Co.	SEC-ERB
132 KV S/S # 8712 - Kadi	Kadi Contracting & Trading Co.	SEC-WOA
132/13.8kV S/S # 8122	Al-Osais Contracting Co.	SEC-COA
New substation # 8133 - alfanar Industrial Complex	alfanar Co.	SEC-COA
132/13.8 KV S/S # 8826 - MEC	Kadi Contracting & Trading Co.	SEC-COA

# Training

In order to enhance the competency and knowledge of the employees, required training needs are identified and regular trainings are conducted in-house and at training centres.



As a part of customer skill development, technical trainings and seminars are conducted in-house and at Original Equipment Manufacturer's location.

# Approvals And Certificates

TRANS-ASSET PLNG DEPT  
رسالة فاكس  
001

**FAX MESSAGE**

Central Operating Area | منطقة أعمال الوسطى

RECEIVED 04 MAY 2005

FROM: Transmission Stands & Specifications Dept. SEC-Central Head Office-ECC Building	TO: AL-FANAR ELECTRICAL SYSTEMS Riyadh K.S.A
SCECO FAX: 01-405-3965	FAX NO: 01-265-2184
TEL NO : 01-408 6800	REF. NO:
REF. NO: 05-341-03032300	SUBJECT: Prequalification of AL-FANAR ELECTRICAL SYSTEM Riyadh for Relay Control Panel.
DATE: May 04, 2005	
NO. OF PAGES: 1+1	

Attention: **Fawazi Al-Quaid**

With reference to the above mentioned subject, please be informed that based on the satisfactory technical evaluation and plant survey assessment, M/S Al-Fanar Electrical Systems Riyadh is included in the SEC's CTA & DTA List of Technically Acceptable Manufacturers and Manufacturing Plants of Saudi Electricity Company for Relay & Control Panel up to 132KV.

As decided during the factory visit of SEC personnel, Type test for Degree of protection IP41 per IEC 60529 shall be performed at Independent Testing laboratory or at your own facility after developing a turn table as required per clause 14.2.1 figure 3a) of IEC 60529 for second characteristic numeral 1.

The test shall be witnessed by SEC representative/Independent Inspection Agency Inspector for first project.

The manufacturer is technically pre-qualified to participate in any bidding for supplying the above mentioned equipment/product. This letter shall not be interpreted as an approval of any specific equipment/product from this manufacturer. Proposed equipment/product(s) will be evaluated during bidding stage and will only be considered technically acceptable if they meet all the prevailing Saudi Electricity Company Standards / Specifications requirements of each operating area. Factory inspection for first lot of Relay & Control Panel by SEC concerned department personnel is required for the first project handled by each SEC operating area.

If you have any further question, please contact Khalaf M. Al-Shammari - Division Manager, Engineering Support Division at telephone (01)-4086755 or Rahamathullah.H at tel. 01-4086593.

  
Abdullah M. Al-Garni  
Manager, TS&SD

KMS/RH:  
Cc: Prequalification File  
Manufacturer's File  
ESD File

TO: AL-FANAR ELECTRICAL SYSTEM  
Riyadh  
K.S.A

FAX NO: 01-265 5443

REF. NO:

SUBJECT: Prequalification of ALFANAR Electrical System- Riyadh for 380KV Relay & Control Panels

Executive Manager, email: [motazelzein@alf.com.sa](mailto:motazelzein@alf.com.sa)


Final review of the prequalification documents and plant survey visit proceeding to include and upgrade **AL-FANAR ELECTRICAL & Control Panels up to 380KV** in the unified list of "Technically manufacturing plants of Saudi Electricity Company".

ed out type tests for Enclosure in King Saud University as per SEC

confirmed to provide extended Ten (10) years...Guarantee/ AES-380KV-PQA 2009 / 07 dated 10 March 2009, shall be made to SEC directly or through LSTK Contractors.

pre-qualified to participate in any bidding for the supply of the SEC. This should not be interpreted as an approval of any manufacturer. Proposed product(s) from this Manufacturer will be considered technically acceptable if they meet the prevailing standards of respective SEC Operating areas.

please contact - The Division Manager, Engineering Support Division or Rahamathullah.H at Ext. 18539.

  
Abdullah M. Al-Garni  
Department Manager, TS&SD

KMM/RH:  
Cc: Division Manager, TS&SD  
Prequalification File  
ESD File

- Approved by SEC for manufacture of panels up to 132 kV.
- Approved by SEC for manufacture of panels up to 380kV.
- Panels are type tested against IEC 60529 for IP 41 protection.



## Notes

## Notes

## Notes



K.S.A. Toll Free: 800 124 1333  
[www.alfanar.com](http://www.alfanar.com)

As improvement of **alfanar** products is an ongoing process, technical specifications and other details shown in this catalogue may change from time to time

# ABS Quality Evaluations

## CERTIFICATE OF CONFORMANCE

This is to certify that the Quality Management System of:

### Alfanar Electrical Systems

P. O. Box 564  
Riyadh  
Saudi Arabia

(WITH FACILITIES LISTED ON ATTACHED ANNEX)

has been assessed by ABS Quality Evaluations, Inc. and found to be in conformance with the requirements set forth by:

### ISO 9001:2008

The Quality Management System is applicable to:

DESIGN AND MANUFACTURING OF LOW VOLTAGE AND MEDIUM VOLTAGE SWITCHGEAR PRODUCTS,  
ELECTRICAL WIRING ACCESSORIES, CABLES AND DISTRIBUTION TRANSFORMERS

Certificate No: 34039  
Original Certification Date: 06 January 2000  
Effective Date: 19 January 2010  
Expiration Date: 05 January 2012  
Issue Date: 19 January 2010

  
Alex Weisselberg, President



Validity of this certificate is based on periodic audits of the management system defined by the above scope and is contingent upon prompt, written notification to ABS Quality Evaluations, Inc. of significant changes to the management system or components thereof.

ABS Quality Evaluations, Inc. 14855 Northchase Drive, Houston, TX 77060, U.S.A.  
Validity of this certificate may be confirmed at [www.abs-qe.com/cert\\_validation](http://www.abs-qe.com/cert_validation)

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## QUALITY POLICY

The Quality Policy of **alfanar** is to:

- Provide products conforming to governing standards and of consistent quality
- Excel in all our operations to achieve customer's satisfaction for products and services through continual improvement
- Develop and maintain a motivated team of competent employees and vendors
- Redefine and execute new processes and systems that meet the changing market requirements.

## OUR OBJECTIVE

We reach exacting standards in the safety and distribution of power and go well beyond a customer's expectations. This is done by focusing our technology and expertise on the ultimate reward we can get, complete satisfaction of our customers.

## alfanar PRODUCTS

- Oil-Immersed Distribution Transformers
- Switches and Socket Boxes
- Junction Boxes
- Service Enclosures IP65
- Stainless Steel Enclosures NEMA-4X
- Telephone Enclosures
- Circuit Breaker Enclosures – NEMA 1 & NEMA 3R Types with Multiple Outlets
- Modular Enclosures
- Load Centres
  - NEMA Type LA Load Centres
  - IEC Type LD Load Centres
  - Split Busbar Unit Type LAS/LDS Load Centres
- MCCB Distribution Boards
- Pump Control Panels
- Motor Control Centres
- LV Switchboards up to 6300A, Tested for 100KA, 1 Sec Short Circuit Withstand
- Package Substations
- Control and Automation Panels
- Relay and Control Panels
- Medium Voltage Switchgears
- Pole Mounted Metering Structures
- AC/DC Panels up to 5000A, Tested for 85kA, 1 Sec Short Circuit Withstand
- Extendable and Non-Extendable Ring Main Units