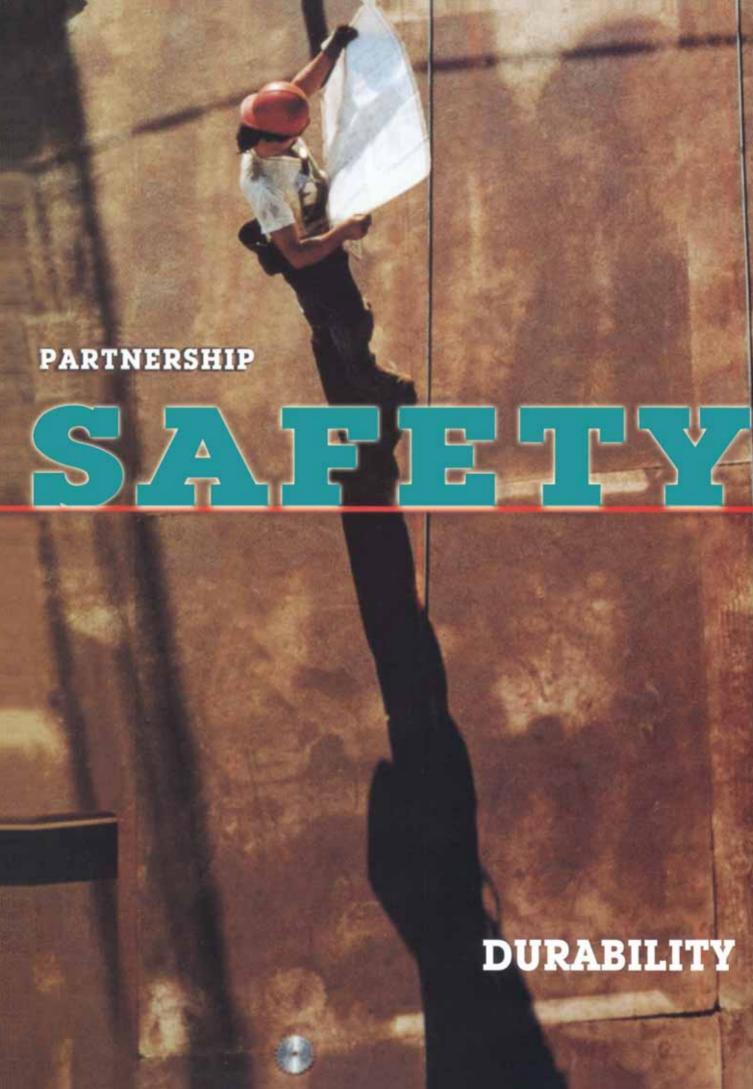


ISO 9001:2008

SUBSTATION AUTOMATION PANELS





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"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

- 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

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





C. Bus Coupler Relay Panel

For protection of coupling two buses

- Over current protection
- Breaker failure protection



D. Bus Section Relay Panel

For protection of two sections of a bus

- Over current protection
- Breaker failure protection





E. Busbar Protection Relay Panel

For protection of busbar

- Busbar differential protection
- Breaker failure protection





F. Load Shedding Panel

For protection of low voltage feeder/line

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





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.





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.



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 X400 (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.



- 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.



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

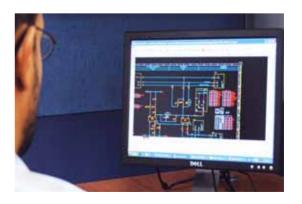
Pro Engineering

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

- BCU (Bay Control Unit) → Manage and control Bays
- 2. IED (Intelligent Electronic Device)
 - ---> Protection and Control
- HMI software

 Monitoring, Control, Report, Event, Alarm, Historical database
- 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



- 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.



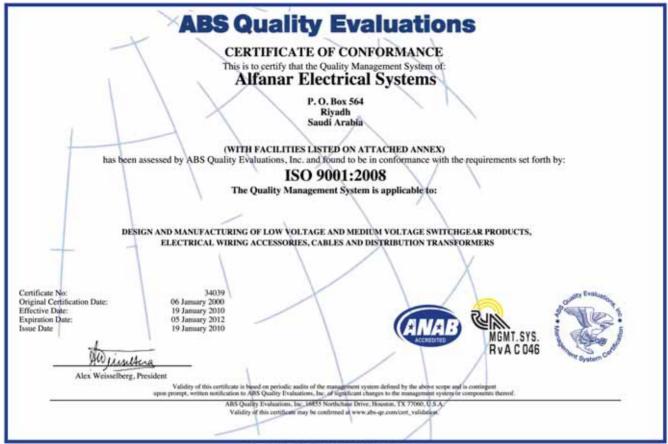
Notes

Notes



Notes





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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