


WIRING TOWARDS A BRIGHT WORLD



 **federal
transformers** Co. LLC
(Switchgear Division)

www.federalswitchgear.com



ABOUT US

Federal switchgear was established in the year 2005 to cater to the increasing demand for switchgear products utilizing the potential of the middle east as a manufacturing base. The company is a part of Zubair Corporation, Oman a diversified group with almost 50 wholly-owned companies, subsidiaries and associates in the sultanate of Oman, the rest of the Middle East, India, Far East, and Europe and in the USA.

Federal Switchgear is one of the few fully manufacturers in the Middle East with capabilities from product design, system design up to the routine test and dispatches all under one roof at its factory in Abu Dhabi. With its continued investment in advanced technology, Federal Switchgear is able to provide state-of-the-art manufacturing and testing facilities. This enhances the company's efficiency in generating good quality, safe and reliable products.

VISON & MISSION

To be an active player in the vibrant electric power sector of the MENA region by offering high-quality electrical switchgear, busways and allied products for the power sector.

PRODUCT RANGE

• LOW VOLTAGE PRODUCTS

LV Panel, MDB, SMDB (Standard and Customized),
DB's (Row Type and Way Type), Capacitor Bank,
ATS Panel, MCC Panel (Motor Control Center),
HVAC Panel, LCP Panel

• UTILITY PRODUCTS

Flange Connected, Feeder Pillar, Service Cabinet,
Smart Layer, Control Cabinet

• ENCLOSURE'S (Type Tested and Non-Type Tested)

Customized Sizes, PSS Sub Station.

PAKAGE	- FLUSH TYPE	- DB'S
	SURFACE TYPE	- DB'S
	SMDB'S	- ENCLOSURE
	L V PANEL	- ENCLOSURE
	METER CABINET	- ENCLOSURE

APPROVALS

- ADWEA - Abu Dhabi Electricity & Water Authority
- ADDC - Abu Dhabi Distribution Company
- AADC - Al Ain Distribution Company
- ADM - Abu Dhabi Municipality
- DEWA - Dubai Electricity & Water Authority
- FEWA - Federal Electricity & Water Authority
- KAHRAMAA - Qatar General Electricity & Water Corporation
- PEC - Public Electricity Corporation YEMEN
- EWA - Electricity & Water Authority BAHRAIN
- SWEA - SHARJAH Electricity & Water Authority



هيئة مياه وكهرباء أبوظبي
Abu Dhabi Water & Electricity Authority



شركة أبوظبي للتوزيع
Abu Dhabi Distribution Co.



شركة العين للتوزيع
Al Ain Distribution Company



الهيئة الاتحادية للكهرباء والماء
Federal Electricity & Water Authority



هيئة كهرباء ومياه دبي
Dubai Electricity & Water Authority

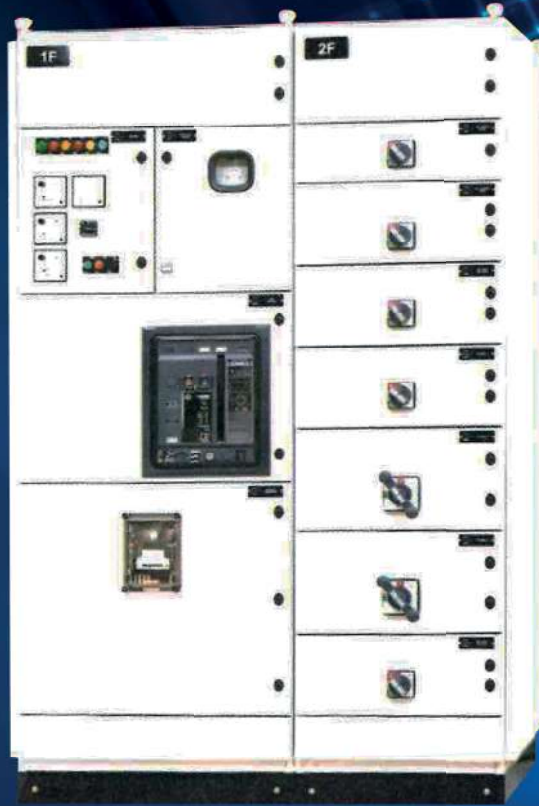


الهيئة العامة للقطر للكهرباء والماء
Qatar General Electricity & Water Corporation



بلدية المنطقة الغربية
WESTERN REGION MUNICIPALITY





Application: Building & Industrial Sector
Operational Conditions: Indoor
Degree of Protection: IP 43 / IP 54
Form of Construction: Form 2 / Form 4
Rating: Up to 2500A

Rated Short Circuit Rating: 50kA for 1 sec.
at ambient Temp.
Incomer: Air Circuit Breaker
Outgoing: Air Circuit Breaker / Moulded Case
Circuit Breakers

MAIN DISTRIBUTION BOARD

Power Distribution is a system, consisting of the Main Distribution Board (MDB), Sub Main Distribution Boards (SMDBs) and Final Distribution Boards, by which the electrical energy is transmitted via branches to reach the exact end user.

An MDB is a panel or enclosure that houses the fuses, circuit breakers and ground leakage protection units where the electrical energy, which is used to distribute electrical power to numerous individual circuits or consumer points, is taken in from the transformer or an upstream panel. An MDB typically has single or multiple incoming power sources and includes main circuit breakers and residual current or earth leakage protection devices. An MDB is comprised of a free-standing enclosure, a bus bar system, MCCB's, metering and support equipment and required current transformers. Panels are assembled in a systematic manner such as incomer section and outgoing section.



LV PANEL

In an electric power system, switchgear is the combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment. Switchgear is used both to de-energize equipment to allow work to be done and to clear faults downstream. This type of equipment is directly linked to the reliability of the electricity supply.

The earliest central power stations used simple open knife switches, mounted on insulating panels. Power levels and voltages rapidly escalated, making opening manually operated switches too dangerous for anything other than isolation of a de-energized circuit. Oil-filled equipment allowed arc energy to be contained and safely controlled. By the early 20th century, a switchgear line-up would be a metal-enclosed structure with electrically operated switching elements, using oil circuit breakers. Today, oil-filled equipment has largely been replaced by air-blast, vacuum, or SF6 equipment, allowing large currents and power levels to be safely controlled by automatic equipment.

Typically, switchgear in substations is located on both the high- and low-voltage sides of large power transformers. The switchgear on the low-voltage side of the transformers may be located in a building, with medium-voltage circuit breakers for distribution circuits, along with metering, control, and protection equipment. For industrial applications, a transformer and switchgear line-up may be combined in one housing, called a unitized substation.

One of the basic functions of switchgear is protection, which is an interruption of shortcircuit and overload fault currents while maintaining service to unaffected circuits. Switchgear also provides isolation of circuits from power supplies. Switchgear is also used to enhance system availability by allowing more than one source to feed a load.



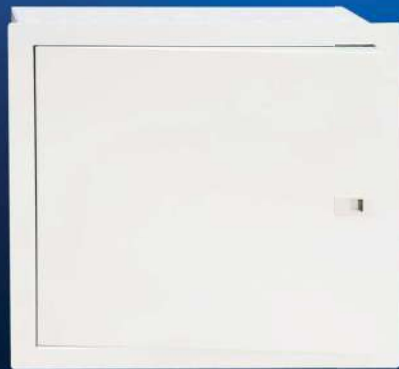
The purpose is to counteract inductive loading from devices like Induction motor, electric motors and transmission lines to make the load appear to be mostly resistive. Individual motor or lamp loads may have capacitors for power factor correction, or larger sets of capacitors (usually with automatic switching devices) may be installed at a load center within a building or in a large utility electrical substation. In high-voltage direct current transmission systems, power factor correction capacitors may have tuning inductors to suppress harmonic currents that would otherwise be injected into the AC power system.

Harmonic Filter Panels. The basic purpose here is centralized Reactive Power Compensation with Harmonic Mitigation. Automatic control is provided using Automatic Power Factor Control Relays. The switching of individual steps is through contactors or thyristors. Harmonics are unwanted electrical components that are most often spoken about in power quality parameters and cause problems when they exist over the limits set by the standards in the electrical system. In systems where harmonics are present, harmonic filter reactors are connected in series to the capacitors. The main purpose is to prevent the harmonic current flowing in the capacitor and to prevent the resonance of the system.

The harmonic filter (Detuned) reactor is a fixed impedance load in the structure of the coil calculated according to certain calculations. The harmonic filter (Detuned) is to limit the flow of harmonic current from non-linear loads on the reactor to the fixed impedance loads (eg. capacitor). Detuned Reactors prevent harmonic amplification caused due to RESONANCE and avoid the risk of overloading capacitors, thereby significantly reducing voltage and current harmonic distortion in the network.

CAPACITOR BANK

is primarily used to improve the power factor in the network. They also improve voltage stability and reduce network losses. Improving the power factor also means a higher power transmission capability and increased control of the power flow in electric power distribution, capacitors are used for power factor correction. Such capacitors often come as three capacitors connected as a three-phase Electrical load. Usually, the values of these capacitors are given not in farads but rather as a reactive power in volt-amperes reactive (VAr).



Application: Building & Industrial Sector

Operational Conditions: Indoor

Rating: Up to 250A

Mounting: Wall mounted

Form of Construction: Form 2

Rated Short Circuit Rating: 20kA for 0.2 sec.

Type: Row type & VTPN

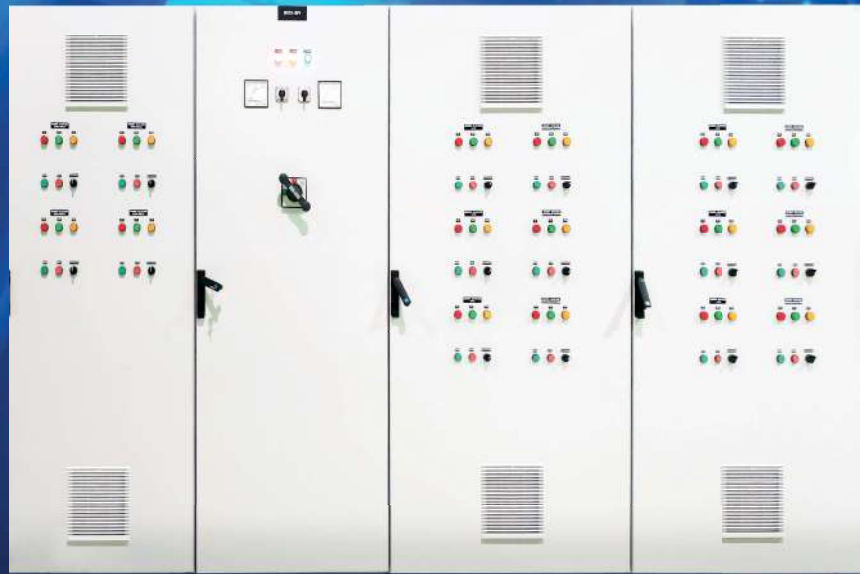
Incomer: Isolator / MCCB

Outgoings: Miniature Circuit Breakers

DISTRIBUTION BOARD

A distribution board (also known as panel board, breaker panel, or electric panel) is a component of an electricity supply system that divides an electrical power feed into subsidiary circuits while providing a protective fuse or circuit breaker for each circuit in a common enclosure. Normally, the main switch, and in recent boards, one or more residual-current devices (RCD) or residual current breakers with over current protection (RCBO), are also incorporated. If distribution board designed for domestic installations is known as a consumer unit. Flush and Surface mounting type Index of

protection: IP 41 & IP 55 as per IEC 60529
Row type distribution, pan assembly Sheet steel enclosure for Three-phase distribution
 - **Split pan assembly** • Designed as per new standard: IEC 61439 • ASTA certified withstand short circuit: 18kA for 0.2sec • Flush and surface mounting design with IP42 protection • Colour: As standard RAL 7035, other colors available upon request incomer options: Isolator / MCB / RCDs • Removable front covers • Complete with earth and neutral bars • Enclosure thickness: 1.2mm • Lock: as a standard metal lock with two keys. Specifications Ordering & Dimensions (mm).



MOTOR CONTROL CENTER PANEL

A motor control center (MCC) is an assembly to control some or all-electric motors in a central location. It consists of multiple enclosed sections having a common power bus and with each section containing a combination starter, which in turn consists of a motor starter, fuses or circuit breaker, and power disconnect. Motor control centers are simply physical groupings of combination starters in one assembly. A combination starter is a single enclosure containing the motor starter, fuses or circuit breaker, and a device for disconnecting power. Other devices associated with the motor, such as pushbuttons and indicator lights may also be included. These usually comprise of incoming Air Circuit Breakers, main horizontal and vertical bus bars, outgoing starter modules with MCCB / Switch Fuse Unit, overload relays, contractors, etc. with adequate space for connection of cable and are easily extendable on either side and have excellent short circuit withstand performance of Bus Bars comprised of bolted/riveted modular construction.

TYPES OF MOTOR STARTER

There are following starters for induction motor:-

- Direct Online Starters
- Star-Delta Starters
- Soft Starters
- VFD Starters

Direct-On-Line (DOL) Starter

This is the simplest method to start the small induction motor up to 5-10 kilowatt. In this method rated supply voltage is directly applied to the motor. But starting current would be very large, up to 5 to 7 times of rated current. The starting torque is likely to be 1.5 to 2.5 times the full load torque.

Star-Delta Starter

This is a starting method that reduces the starting current and starting torque. This method is used for the large size of the induction motor of more than 10 kilowatts. The starter design consists of three contactors, an overload relay and a timer for setting the time in star connection to delta connection. In this method, the motor should be connected in Delta for the normal run. For starting, star connection used for normal run Delta connection used in the motor windings. When the stator winding is Star connected, the voltage over each phase in the motor will be reduced by a factor one by $\sqrt{3}$ of that would be for Delta connected windings. The starting torque will be $1/3$ times that it will be for delta-connected windings.

Soft Starting Method

A soft starter is another form of reduced voltage starter of AC induction motors. The soft starter employees the solid state devices to control the current flow and therefore the

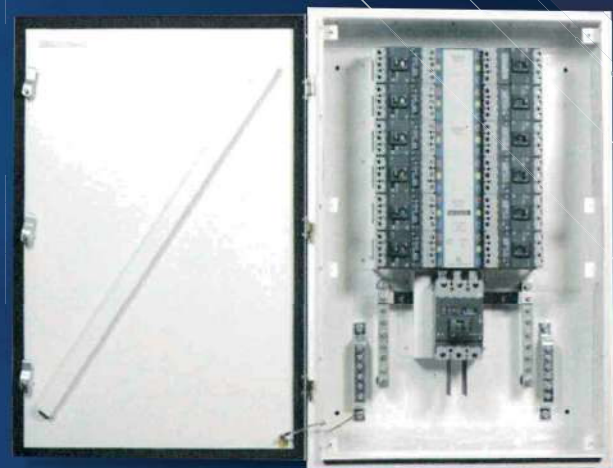
voltage applied to the motor. These solid-state switches are phase controlled in a similar manner to a light dimmer. The average voltage is controlled by varying the conduction angle of the switches. Increase the conduction angle will increase the average output voltage. The power dissipation in the starter during start will be less than 1% of Power dissipated by the primary resistance starter. The solid-state devices used with A.C electric motors to ramp up the voltage and torque on the motor during startup. This ramp-up reduces mechanical stress on the motor and shaft, as well as the electro-dynamic stresses on the attached power cables and electrical distribution network. The soft starters extend the lifespan of your system and reduce maintenance cost.

- Improved efficiency
- Controlled startup
- Controlled acceleration
- Low cost and size

Variable Frequency Drive

This is actually a speed control method for motors but can be used for starting also. In this incoming, electrical supply of fixed frequency and voltage into a variable frequency and variable voltage that is output to the motor with a corresponding change in the motor speed and torque. The motor speed can be varied from zero rpm through to 100- 120% of its full rated Speed. The motor may be operated in either direction. The first step in this process is to convert the AC supply voltage into DC by the use of the rectifier. DC power contains voltage ripples which are smoothed using filter capacitors. This section of the VFD is often referred to as the DC link. This DC voltage is then converted back into AC. This conversion is typically achieved through the use of power electronics such as IGBT the power transistor using a technique called pulse width modulation. The output voltage is turned on and off a high frequency.

- Smooth acceleration
- Low inrush current
- High flexibility in starting characteristics.
- Deceleration and speed control is possible.



Application: Building & Industrial Sector

Operational Conditions: Indoor

Degree of Protection: IP 30 / IP 43

Rating: Up to 800A

Mounting: Wall mounted up to 630A

Form of Construction: Form 2

Rated Short Circuit Rating: 36kA for 1 sec.

No. of Ways: 4, 8, 12

Metering: Available as per requirement

Incomer & Outgoings: Moulded Case
Circuit Breakers

SUB MAIN DISTRIBUTION BOARD

The MDB then feeds SMDBs, which is installed generally at the point where a large distribution cable terminates and several smaller sub circuits start. These are the switchboards that although similar construction, is larger than a final distribution board circuit. The boards are installed midway through the power distribution system, at the point in a large distribution cable ends, and several smaller starting sub-circuits.

Form 2a Separation of the busbars from the functional units, with terminals for external conductors not separated from the busbars.

Form 2b Separation of the busbars from the functional units, with terminals for external conductors, separated from the busbars.



METER CABINET

An electricity meter, electric meter, electrical meter, or energy meter is a device that measures. Possible locations include on a utility pole serving the property, in a street-side cabinet (meter box) or inside the premises adjacent to the meter box supply a range of metal meter boxes We supply internal and external meter boxes.



AUTO TRANSFER SWITCH PANEL

A transfer switch is an electrical switch that switches a load between two sources. Some transfer switches are manual, in that operator effects the transfer by throwing a switch, while others are automatic and trigger when they sense one of the sources has lost or gained power.

An Automatic Transfer Switch (ATS) is often installed where a backup generator is located, so that the generator may provide temporary electrical power if the utility source fails. An automatic transfer switch (ATS) is designed to provide unmatched performance, reliability and versatility for critical standby power applications. The switches can be equipped with the controllers to match your application needs. A bypass isolation transfer switch may be used to provide emergency power to life safety and other critical loads where maintenance of the main transfer switch, without interruption of power to

the load, is either desirable or required. Automatic Transfer Switches include dual automatic switching mechanisms that provide redundancy for critical applications. The ATS distributes electrical power to the load, while the automatic bypass serves as a backup. When the ATS is isolated for the test, power is routed through the automatic bypass switch to ensure that critical loads remain powered without interruption.

Automatic transfer switches (ATS) are designed for mission-critical systems where redundancy is required allowing maintenance, inspection, and testing to be performed while maintaining constant power to the load. Designed for applications where total system coordination is desired, they offer integral over current protection with an electronic trip unit.



STREET LIGHT PANEL

A street light, light pole, lamppost, street lamp, light standard, or lamp standard is a raised source of light on the edge of a road or path. When urban electric power distribution became ubiquitous in developed countries, lights for urban streets followed or sometimes led. Many lamps have light-sensitive photocells that activate automatically when light is or is not needed: dusk, dawn, or the onset of dark weather. This function in older lighting systems could have been performed with the aid of a solar dial. Many street light systems are being connected underground instead of wiring from one utility post to another.



POWER SUB STATION (PSS)

COMPARTMENT. TRANSFORMER COMPARTMENT USS/PSS is used for feeding power from high voltage to low voltage in open cast mines, LV PANEL.

PSS stands for Package Sub Station. It is also known by Combined Sub Station. These panels are known for their high precision engineering standards. Manufactured using high-grade raw material, these panels are known for reliable usage. PSS are consist of RMU, Transformer & LT Panels. A Package Substations is completely self-contained Solution for power.

METAL ENCLOSURE, Type Tested.

Powder coating is the process of applying a dry powdered paint compound made of pigments, specialized resins and fillers that melt and fuse together during the curing process to form a painted finish. The solid powder particles are electrostatically charged when exiting the low-velocity air-powered spray gun.



SUB MAIN DISTRIBUTION BOARD (SMDB)

FSL STANDARD SMDB DIMENSIONS

Sl No.	Code	Width	Height	Depth
1	FSL 080830	800	800	300
2	FSL 081030	800	1000	300
3	FSL 081230	800	1200	300
4	FSL081430	800	1400	300
5	FSL101030	1000	1000	300
6	FSL101230	1000	1200	300
7	FSL101430	1000	1400	300
8	FSL101630	1000	1600	300
9	FSL121230	1200	1200	300
10	FSL121430	1200	1400	300
11	FSL121235	1200	1600	350
12	FSL121240	1200	1800	400

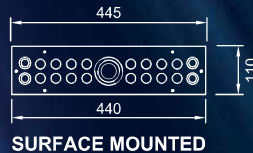
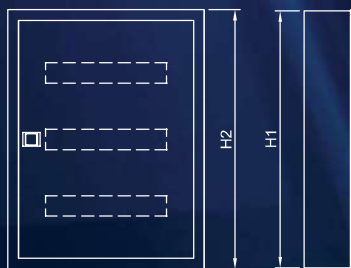
All Dimensions are in mm & Weights are in kg unless otherwise specified
 IP 42 - Our own tested certified regulations, IP 65 - Our own tested certified regulations,
 IP 54 - Our own tested certified regulations



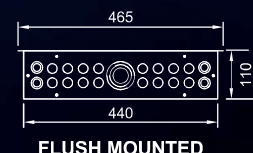
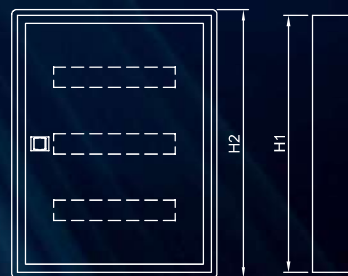
Inside View



Hinges



SURFACE MOUNTED



FLUSH MOUNTED

DISTRIBUTION BOARD (DB)

16 MODULE DB'S

No. of Rows	BACK BOX DIMENSIONS			FLUSH TYPE			SURFACE TYPE		
	Height	Width	Depth	Height	Width	Depth	Height	Width	Depth
1ROW 16M	300	440	115	330	470	115	310	450	115
2ROW 16M	450	440	115	480	470	115	460	450	115
3ROW 16M	600	440	115	630	470	115	610	450	115
4ROW 16M	750	440	115	780	470	115	760	450	115
5ROW 16M	900	440	115	930	470	115	910	450	115
6ROW 16M	1050	440	115	1080	470	115	1060	450	115

24 MODULE DB'S

No. of Rows	BACK BOX DIMENSIONS			FLUSH TYPE			SURFACE TYPE		
	Height	Width	Depth	Height	Width	Depth	Height	Width	Depth
1ROW 24M	300	584	115	330	614	115	310	594	115
2ROW 24M	450	584	115	480	614	115	460	594	115
3ROW 24M	600	584	115	630	614	115	610	594	115
4ROW 24M	750	584	115	780	614	115	760	594	115
5ROW 24M	900	584	115	930	614	115	910	594	115
6ROW 24M	1050	584	115	1080	614	115	1060	594	115

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