LOW VOLTAGE SWITCHGEAR AND CONTROLGEAR SYSTEMS

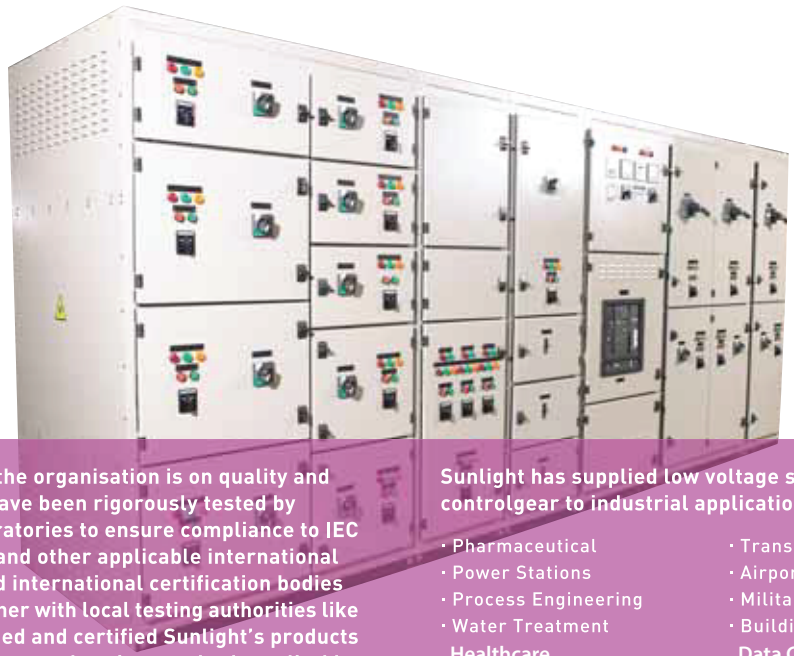
SUNLIGHT

A CHINT COMPANY

Safety & Reliability

Sunlight Electrical is an established organisation engaged in the manufacture and supply of low voltage switchgear and controlgear systems with headquarters in Singapore since 1970.

Sunlight has established a complete range of type-tested switchgear and controlgear systems. These systems cover the whole spectrum of low voltage applications from the main switchboards down to the smallest distribution board and process panels.



The focus throughout the organisation is on quality and safety. Our products have been rigorously tested by independent test laboratories to ensure compliance to IEC 61439-1, IEC 61439-3 and other applicable international standards. Established international certification bodies like ASTA, KEMA together with local testing authorities like PSB have tested, verified and certified Sunlight's products to the fullest and most comprehensive standards applicable.

Sunlight has supplied low voltage switchboards and controlgear to industrial applications like:

- Pharmaceutical
- Power Stations
- Process Engineering
- Water Treatment

Healthcare
Seaport
Residential

- Transportation
- Airport Terminals
- Military
- Building Services

Data Center
Semi Conductor
Commercial Building

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Switchgear & Controlgear System

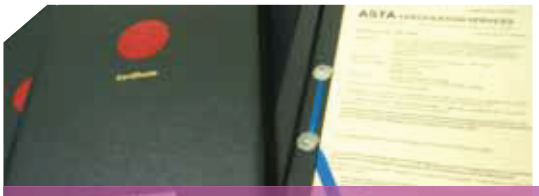
Sunlight provides an extensive low voltage electrical equipment package to cover most applications. Due to the adaptability of Sunlight's modular system, many of the equipment or systems can easily be supplied and integrated into the same enclosures.

- Main Switchboards (MSB)
- Sub Distribution Boards (SB)
- Distribution Boards (DB)
- Control and Process Panels
- Motor Control Panels
- Power Factor Correction Cubicles
- Mechanical (Air-Conditioning) Panels
- Customised Enclosures

Sunlight offers the complete range from packaged sub-stations to main / sub-distribution boards with nominal ratings from 250A to 5000A. Incoming feeder sections and bus-coupler arrangements are available for rated currents up to 5000A.

Full Flexibility of choice is offered in the selection of electrical equipment with regard to brand, make and type of breakers for fixed, withdrawal, etc.

Segregation level up to Form 4 is available.



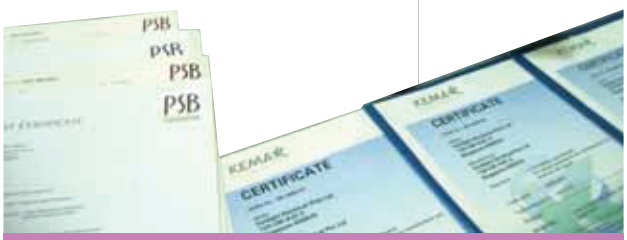
Sunlight System is thoroughly type-tested according to specifications and requirements in **IEC 61439-2, BS EN 61439-2** for Type Tested Switchgear Assemblies (TTA). It conforms to major markets in the world.

The following tests have been successfully carried out at independent test laboratories by ASTA and KEMA. Further specific tests are also performed and verified by local testing bodies like PSB (Productivity and Standards Board of Singapore) for some local installations.

- Verification of temperature-rise limits (8.2.1)
- Verification of dielectric properties (8.2.2)
- Verification of short-circuit withstand strength (8.2.3)
- Verification of the effectiveness of protective circuit (8.2.4)
- Verification of the clearances and creepage distances (8.2.5)
- Verification of mechanical operation (8.2.6)
- Verification of the degree of protection (8.2.7)
- **Verification of electromagnetic compatibility (8.2.8)**
- **Verification of the resistance of insulating material to abnormal heat and fire (8.2.9)**

The distinguishing mark from the competition is our carefully designed busbar system which is certified up to **125kA 1 second** and **100kA 3 seconds** short-circuit fault level. The busbar system and its operating temperature is designed and tested for **below 80 degree rise i.e. 80K** for both vertical and horizontal placements of breakers in both direct and reverse feeding for Ingress Protection up to IP 43 all in a complete system deemed certified for Electromagnetic Compatibility by ASTA Certification Services.

Rating Table - Type-Tested Range of Assemblies (TTA) *



Rated Current	Short time Withstand (Icw)	Configuration
250A	40/conditional	PAN Assembly
400A	65/conditional	PAN Assembly
400A	50/1 sec	PAN Assembly
630A	50/1 sec	PAN Assembly
	30/3 secs	PAN Assembly
800A	36/1 sec	Single support
1000A	36/3 secs	Single support
1600A	50/3 secs	Single support
2500A	65/3 secs	Single support
3200A	65/3 secs	Single support
4000A	65/3 secs	Single support
5000A	100/3 secs,	Double tier support
	125/1 sec	Single support

*Updated at the time of publication. Please contact us for an updated list.

Frame & Enclosure Construction

Frames & Door Covers

The frame consists of rigid sheet steel sections that are inter-connected to another. Sunlight sturdy frame is available in bolted versions.

All round perforation rows with a 25mm hole grid for individual installation.

Flexible door system for all requirements.

Heavy-Duty Hinges and Spring-loaded locks reliably prevent doors from opening unintentionally.

Frame is galvanised steel or powder coated as an option.

Door covers are powder coated.

The type-tested joints are suited for heavy duty equipment, large busbar systems and demanding operating conditions.

Material

Frames are made from sheet steel galvanised (G.I.) or electro-galvanised (E.G.) 2.0mm

Door Covers are made from E.G. 2.0mm/Partitions and brackets are made from sheet steel GI or EG steel 1.5mm

Degree of Protection

IP40, IP 43 naturally ventilated
IP 54, IP 65 unventilated

Busbar

Tinned Copper with 100% full-sized Neutral (No matt-black copper is used within board)

Finishing

Powder coated texture finishing to RAL 7044 (light beige). A wide choice of colours is available upon request.

Modular Dimensions (Dimension is excluding the door cover)

Depth – 750, 1050, 1200, 1300, 1500mm
Height – 2005, 2205, 2605mm
Width – 750, 1050 and 1200mm
Its versatile enclosure system allows future extension of busbar and modular cubicles. Customisation of cubicle sizes is possible for varied conditions.

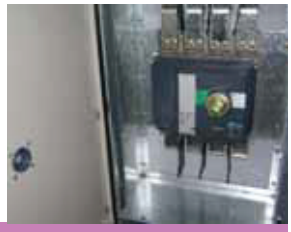
Forms of Separation

Form 2, 3 & 4 Constructions

Entry

Top and bottom cable and busduct entry with removable cable entry gland plates or insulated boards.

Cubicle & Compartment Selection (for Form 3 and above)



Cubicle Dimensions

Main Incoming Functional Unit (Amps) TPN or 4 Pole	Cubicle Dimension W x H x D (mm)
400 MCCB	550 x 2005 x 750
630 MCCB	550 x 2005 x 750
800 MCCB	550 x 2005 x 750
800 ACB	750 x 2005 x 1050
1000 ACB	750 x 2005 x 1050
1600 ACB	750 x 2005 x 1050
2000 ACB	750 x 2005 x 1050
2500 ACB	750 x 2005 x 1200
3200 ACB	750 x 2005 x 1200
4000 ACB	750 x 2205 x 1300
	1050 x 2205 x 1300
5000 ACB	1200 x 2605 x 1500

*Compartment Dimensions for Air Circuit Breaker (ACB) Functional Units

Module (Amps)	Width (W) (mm)	Height (H) (mm)	Depth (D) (mm)
800A	750	750	1050
1000A	750	750	1050
1600A	750	750	1050
2000A	750	750	1050
2500A	750	750	1050
3200A	750	750	1300
4000A	750-1050	750	1300
5000A	1200	750	1500

*Compartment Dimensions for Moulded Case Circuit Breaker (MCCB) Functional Units

Functional Unit (Amps) TPN or 4 Pole	Compartment Height Dimension (mm)
100 - 250 MCCB	300 (cable), 450 (Bar)
300 - 400 MCCB	600
630 MCCB	600
800 MCCB	750
800 – 5000 ACB	750

* Final designs vary with equipment and accessories' dimensional and technical requirements

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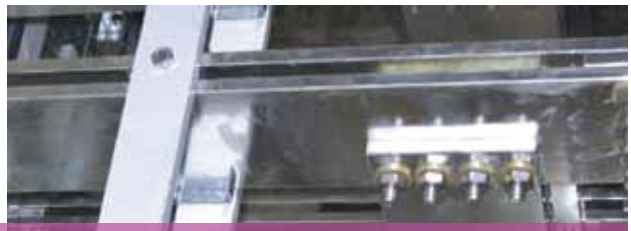
Busbar Configuration

The system consists of modular components which allows unlimited variations. Three (3), four (4) and five (5) wire systems can be created with ease.

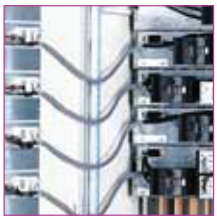
The busbar support insulators are manufactured from a high grade reinforced glass polyester which can withstand high mechanical and thermal stress.

The high short circuit level of the busbar system and the mechanical robustness of the enclosures guarantee a reliable, safe and long lasting system suitable for even the most demanding environment.



Features

- Busbar position at top
- Busbar system tested up to 5000A
- Short-circuit withstand of up to 125kA 1sec and 100kA 3 secs
- Separation of the busbar from device compartment
- Transport unit joints easily accessible from the front and top
- Main Busbar and connecting busbar are made from 99.99% tinned copper purity with a maximum of 80K temperature rise with an ambient of 50 degree C
- A tinned copper earth bar of dimensions not less than 40 x 10mm is provided along the whole length of the switchboard bonding the framework of all modular sections.



Functional Units

Functional units are classified by their level of compartmentalisation and type of electrical connection. An extensive range of standard parts offers complete freedom in design:

. Internal form of separation from Form 1 to Form 4

. Fixed Functional Units

. Removable Functional Units

. Withdrawal Functional Units

Different types of functional units can be designed within the same assembly or sections. Electrical equipment from all manufacturers may be fitted in accordance with customers' preferences.

Cable Sections

In designing Sunlight type-tested assembly, various widths of cableways may be incorporated depending on the number of cables and their sizes. Standard widths are 300mm and 450mm. This is especially important where large cables have to be installed or a cableway is shared by two functional unit sections.

A cableway can run horizontally throughout the whole length of the board, at the top or bottom as well as vertically beside each functional unit section. This provides a complete wiring around each functional unit and allows inter-wiring between various units and back, e.g. PLC sections, with ease.

Where wiring is carried across door hinges, it is enclosed by a flexible PVC tubing and looped to permit the opening of doors and removal of components for inspection without disconnecting and over-flexing of the cables. Wiring is neatly bunched by cable ties, run on supporting PVC trunking.

Motor Controlgear (Fixed and Withdrawal)

The complete modular system allows maximum freedom when designing Motor Control Centre (MCC). The physical dimensions of each compartment can be varied in width, height and depth to accommodate the various space requirements for different starter types:

- Direct on Line
- Star Delta
- Soft Starter
- Auto Transformer Starters
- Variable Speed Drives

In order to meet the high demand for uninterrupted power supply technologies or critical services, motor control centres can be made in fixed, removable or any combination thereof.

Specifications of MCC

- Motor and cable feeder up to 630 A (fused and non-fused)
- Space-saving sizes of withdrawable units from 100 mm
- Module height (up to 17 feeders per cubicle)
- Clearly visible withdrawable unit positions
- Standard operator interface for all withdrawable units
- Isolating gaps on the supply and feeder sides
- Cable connection compartment at front or rear
- Alteration of compartment size possible without having to shut down the switchboard

Interface with Intelligence

The system will also allow the design of intelligent motor control centres which integrate electronic and programmable devices connected to a network such as ProfiBus with electro-mechanical equipment.

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Technical Specifications and Standards

Standards	- IEC 61439-1 Clauses 8.2.1 to 8.2.9	
	- BS EN 61439-1 Clauses 8.2.1 to 8.2.9	
	- IEC 61439-3	
	- BS EN 61439-3	
	- IEC 60529	
Tests	- Testing & Certification Australia (ASTA certification)	
	- British Short Circuit Station (ASTA Certification)	
	- Falcon (ASTA Certification)	
	- SABS – NETFA, South Africa (KEMA Certification)	
	- Productivity and Standards Board of Singapore (PSB)	
	- ASTA (Rugby, England)	
	- KEMA (Arnhem, Holland)	
Electrical Characteristics	- Electrical System	: 3 phase, 3, 4 & 5 wires
	- Rated Voltage (Ue)	: 415 V. AC
	- Rated Insulation Voltage (Ui)	: 690 V
	- Dielectric test Voltage	: 2.5 kV
	- Rated Impulse withstand Voltage (Uimp)	: Up to 8 kV
	- Rated Frequency	: AC 50Hz
	- Rated Current (In)	: 250A to 5000A
	- Rated short-time withstand Current (Icw)	: Up to 125kA 1 sec Up to 100kA 3 secs
	- Earthing System	: Suitable for TT, TN-S and TN-C
	- Busbar Density	: Temperature Rise of buswork not more than 80K rise with an ambient of 40C
Mechanical Characteristics	- Degree of Protection, IEC 60529	: IP40, IP42, IP43, IP54, IP65
	- Framework Steel (Galvanised or painted)	: 2.0mm
	- Doors and entry plates (Painted)	: 2.0mm
	- Side Plates (painted)	: 1.5mm
	- Mounting plates, internal partitions steel (Galvanised or painted)	: 1.5mm
	- Internal separation	: Form 1 to 4
	- Powder Coating	: Modified Polyester powder with a minimum coating of 50 microns
	- Busbar	: 99.99% tinned copper purity
	- Busbar Supports	: Fire retardant materials up to 960 degree C
	- Installation	: Floor standing or wall mount

Specialised Technical Support Services

- Sizing of switchboards for switch-room designs
- Advice and assistance on technical specifications in writing and evaluation
- Detailed design and drafting engineering
- Temperature rise and short-circuit calculations / extrapolations on each cubicle
- Advice on protection, controls and system applications
- Project management
- In-house testing
- Deliveries and switchboard positioning and commissioning
- Trouble-shooting & routine shutdown and servicing
- Co-ordination activities of replacing old switchboards with new systems
- Pricing advice to your satisfaction

SUNLIGHT
A CHNT COMPANY

Singapore

Sunlight Electrical Pte Ltd
1 Third Chin Bee Road
Singapore 618679
Tel : +65 6741 9055
Fax : +65 6265 4586
www.sunlightgroup.com
info@sunlightgroup.com

Malaysia

Sunlight Switchgear Sdn Bhd
PTD 37437 & PTD 37441
Off Jalan Perindustrian Senai FASA 3
Kawasan Perindustrian Senai FASA 2
81400 Senai, Johor, Malaysia
Tel : +60 (7) 599 9600
Fax : +60 (7) 599 9601
info-my@sunlightgroup.com

Vietnam

Sunlight Electrical (VN) Co Ltd
20 Doc Lap Ave, Vietnam-Singapore
Industrial Park, Thuan An Town,
Binh Duong Province, Viet Nam
Tel: 0274-3743505
Fax: 0274-3743508
Ref Office:
CJ Building, Unit 703, 6 Le Thanh Ton,
Ben Nghe ward, Dist 1, HCMC, Vietnam
Tel: 028 38270015
Sales.sev@sunlightgroup-vn.com.vn

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