

Innovating Energy Technology





Fuji SMBE Switchgear Group

Formerly known as SMB Electric Pte Ltd, the Company is a market leader in the design and manufacture of proprietary low voltage switchgear and controlgear solutions in Singapore. In December 2014, the Company was acquired by Fuji Electric Co., Ltd and renamed as Fuji SMBE Pte Ltd ("Fuji SMBE"). With a long operating history since 1973, Fuji SMBE has gained industry recognition for its expertise in motor and power control systems, switchgear manufacturing, electrical distribution systems to various market applications and OEM solutions.

Not one to rest on its laurels, the Fuji SMBE Switchgear Group has expanded overseas and set up manufacturing locations in countries such as Malaysia, Indonesia and Australia in order to target the growing demand for advanced switchgear solutions in the region. This foray has proved to be very beneficial as the switchgear group was able to achieve greater economies of scale through labour and cost savings. The switchgear group also distributes switchgear solutions to other parts of Asia.



Over the years, the switchgear group has gained invaluable experience and expertise in a comprehensive array of power distribution products and application solutions for the Commercial, Residential, Industrial Process Plants, Infrastructural Developments, Food Processing, Pharmaceutical, and the Marine/Oil & Gas applications as well as for the specialised industries such as Data Centres and other Mission Critical projects such as Hospitals. The group is continuously committed to introduce state-of-the-art equipment and technological upgrades to its product offerings.

The most valuable assets of this division are the people. The group breeds a culture of care, concern and learning for the employees, believing that the staff will be motivated to serve and in turn, create further value for the organisation.

More importantly, the group prides itself on its excellent service to customers. Besides the provision of excellent switchgear products, the sales consultants actively engage clients to understand their requirements in order to provide solutions that best meet their needs.

Features M-Cube

1



Ventilation:

- Excellent design for air passage flow & heat dissipation

2



Withdrawable Modules:

- Easy control by operators
- Safe servicing through Interlock mechanism at withdrawable module

3



Indicators:

- Simple and Clear IN / TEST / OUT withdrawable module indications

4



Corner Joints:

- Strong zinc and aluminium alloy
- Patented base & joint design (SG Copyright: D2003/ 1456/ H)

5



Frame Structure:

- Superior frame structure with high turn frequency
- Great strength and toughness
- Patented design (SG Copyright: D2003/ 1457/ D, D2003/ 1464/ J)

Material:

- 1.5mm ElectroGalvanised Steel
- Option for 1.2mm Stainless Steel for use harsh & corrosive environment

6



Hinges:

- Special 180° stainless-steel hinges
- Ideal in all harsh environments & prevents rust

7



Key-Lock:

- Simple lock design to prevent forced access & unauthorised usage

8



Polyurethane Gasket:

- Machine applied to prevent penetration by moisture or dust
- Continuous foam with no joints to ensure good IP rating

9



Door Locks at Handle:

- Safe interlock mechanism
- Slots for up to 3 padlocks for security & safety
- Isolates operator from hazardous voltages

10



Eye-Bolt Design:

- Direct lifting with use of sling



Customised Engineering Design:

- Flexibility in design to match customer preferences



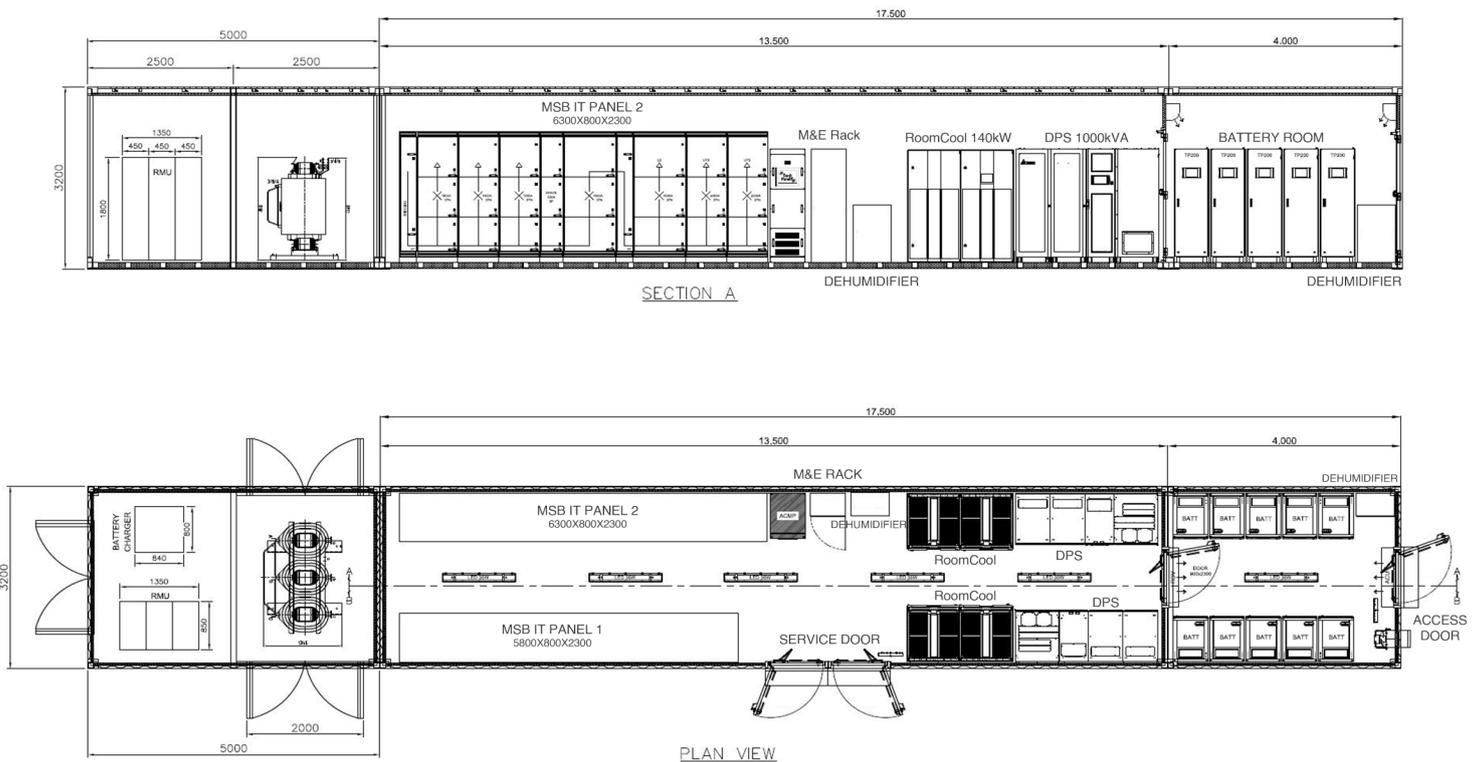
Vertical Copper Busbars:

- High conductivity copper busbars designed to withstand effects of short circuit currents
- Specially designed Jaws to clamp withdrawable modules to busbars

Fuji SMBE's Customisable Prefabricated PTU Solution

Fuji SMBE's customisable Prefab PTU solution helps you manage your data centre power and fit-for-purpose thermal management system as strategic assets that drive real business benefits.

Our scalable infrastructure delivers your Prefabricated PTU solution at the optimum efficiency and lowest cost throughout the complete life cycle of your data centre.



Benefits of Modular Data Centre

Increased Speed to Market	Reduced Footprint	Lower Operating Costs	Full Factory Tested & Commissioned	Infrastructure/IT All-in-one Design
Increased Speed of Repair & Reduced Downtime	Better Cost Control & Quality	Reduced On-site Construction Time	Reduced On-site Installation Complexity	Repeatability

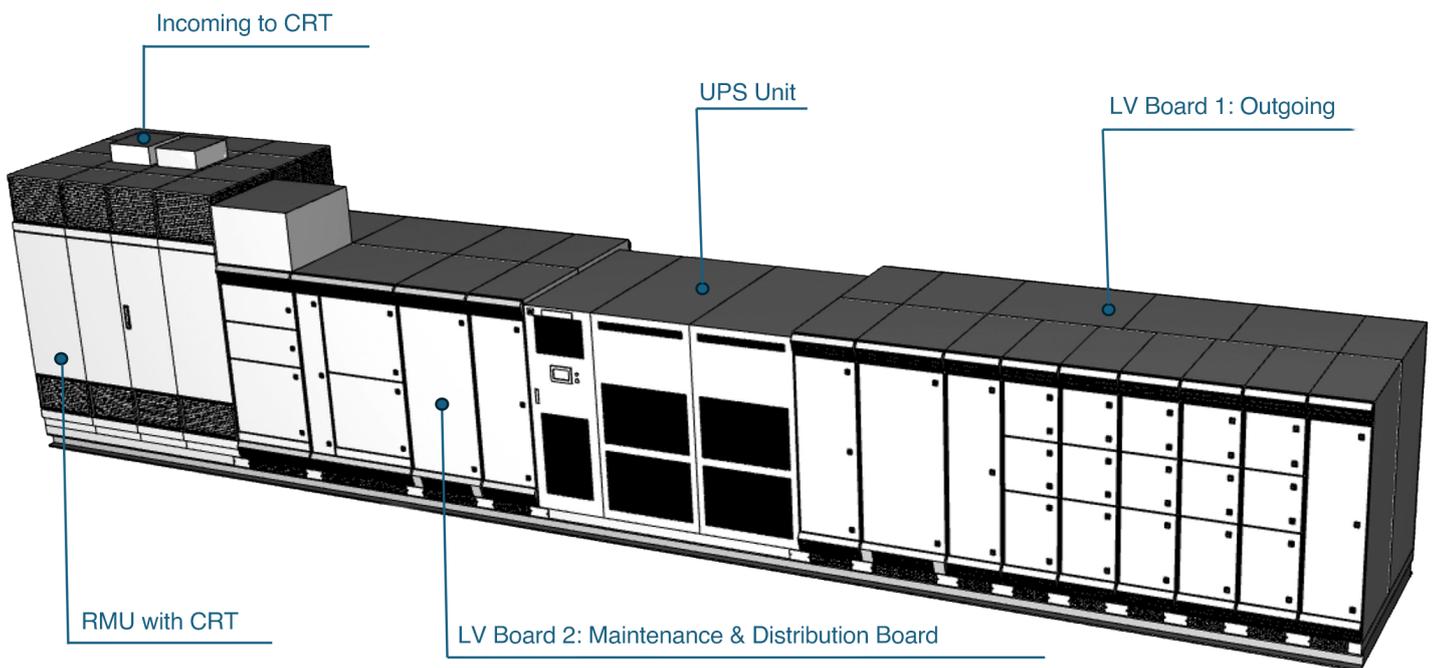
Fuji SMBE's Modular data centres offer faster deployment, cost efficiency, improved quality, compact design, simplified installation, reduced downtime, and lower operating costs.

Fuji SMBE adopts brand neutrality and product flexibility and customisation to our customers. With multiple manufacturing zones in ASIA-PACIFIC, Fuji SMBE delivers exceptional product solutions that exceed customer expectations.

Skid UPS System (2,400kVA)

Fuji SMBE's customisable Prefab Modular & Power Skid System is designed for efficiency, offering significant time savings, adaptability, and easy relocation.

Our Energy Storage System provides advanced solutions, including Demand Charge Reduction, Load Leveling, and VAR Voltage Optimisation, ensuring smarter and more reliable energy management.



Components: LV-UPS Portion

LV Switchgear	415V, 4000/2500A, Low Voltage Switchgear
Uninterruptible Power Supply (UPS)	Three phase double conversion UPS for critical environments provides continuous flow of power. (2x 700kW & 1 x200kW)

Components: Unit-Sub Portion

Ring Main Unit (RMU)	A type of Gas Insulated Switchgear up to 40.5kV with unique flexibility for switching devices, and protection against faults.
Dry Type Transformer (TX)	25kV/415V, 2500KVA Epoxy Resin Dry Type Transformer with surge arrester.

Verification Tests



Verified by testing in accordance to IEC Standards

- LV Switchgear & Controlgear IEC 61439
- Degree of Protection IEC 529
- Internal Arc Fault Containment IEC 61641
- Resistance to Salt mist IEC 60068-2-11
- Resistance to Damp heat IEC 60068-2-30

* These tests apply to the full range of Fuji SMBE LV Switchgear up to 10000A (600A, 800A, 1000A, 1600A, 3200A, 4000A, 5000A, 6300A, 10000A), with a short circuit rating up to 125kA, 1 sec, Peak 275A, 50 Hz/60 Hz
 * Withdrawable column vertical busbar with rating of 1000A is tested to 85kA, 50 Hz/60Hz
 * Arc Fault Containment test:
 Fixed and Withdrawable columns are verified to a rating of 75kA rms 0.3 sec for both fixed and withdrawable switchgear systems

List of Verification Tests Performed on M-Cube

Strength of material and parts (clause 10.2)

Additional tests which were not included in the previous IEC 60439 type testing. They include corrosion resistance, properties of insulating materials, heat resistance, resistance to UV radiation, lifting, mechanical impact and marking. Fuji SMBE switchboards are verified by tests in accordance with IEC 61439 clause 10.2 and this qualifies the M-Cube switchboards for operating in all conditions and environments.

Degree of protection (clause 10.3)

Tests carried out to prove that the assembly achieves its specified degree of protection. Fuji SMBE switchboards have achieved an external rating up to IP44 and Form 4b internal separation. In spite of the high degree of protection, the M-Cube switchboards do not lead to de-rating and increased cost.

Clearance and creepage distances (clause 10.4)

Fuji SMBE switchboards provide greater clearance and creepage distances than the distances laid down by the standard and they are verified in accordance with IEC 61439 clause 10.4.

- High degree of protection for foreign particles and water : IP44
- Forms of Internal Separation : Form 4b



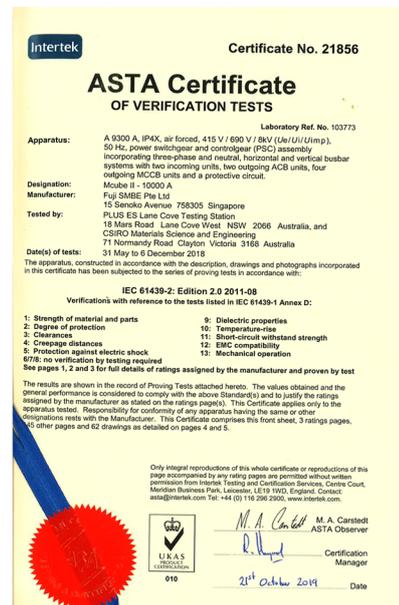
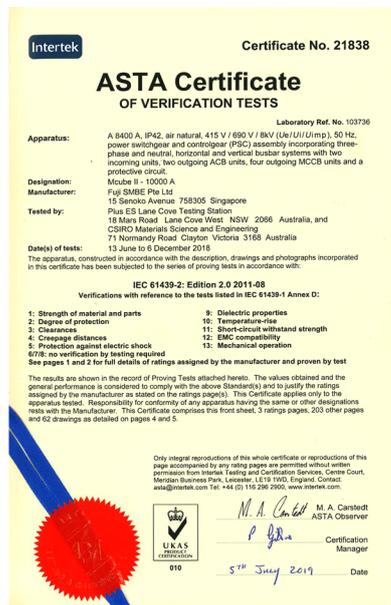
Protection against electric shock and integrity of protective circuits (clause 10.5)

Protective circuits play a major role in providing protection against indirect contact, as such verifying their effectiveness in the assemblies is vital.

The exposed conductive parts of M-Cube switchboards were inspected for the effectiveness of the connection to the protective circuit. The framework and all the panels and doors are effectively connected to the frame. A continuous protective copper bar conductor is bolted to the frame at the bottom of the assembly. The effectiveness of the protective circuit for external faults and its short circuit withstand current are tested and verified in accordance with IEC 61439 clause 10.5.

Dielectric properties (clause 10.9)

The test may be performed either with an impulse withstand voltage, or with a power frequency withstand voltage. Both forms of test had been carried out on Fuji SMBE switchboards in accordance with IEC 61439 clauses 10.9.2 and 10.9.3, with conformance without sign of puncture flashover.



Temperature-rise Limits (clause 10.10)

Fuji SMBE switchboards are verified in accordance with IEC 61439 to prove that the temperature rise inside the switchboards did not exceed the values specified in the standard.

Short-circuit withstand strength (clause 10.11)

The performance of an assembly under short-circuit conditions is one of the most important factors affecting its safety. Short-circuit withstand tests check two distinct aspects of the assembly's design and construction, namely mechanical strength and thermal capability.

Factors which testing verifies, and which further complicate attempts at extrapolation, include:

1. Conductor positioning and enclosure strength;
2. Correct mounting for devices and cables; and
3. The effect of arc emissions of circuit breakers.

Fuji SMBE switchboards are tested to withstand for both 1 second and 3 seconds duration with the following criteria:

- The conductors and busbars did not show any undue deformation;
- The insulation of the conductors and the supporting insulation parts did not show any significant signs of deterioration and had proven that the mechanical and dielectric properties

satisfy the requirement of IEC 61439 clause 10.11;

- No loosening of parts used for connection of conductors and conductors did not separate from the outgoing terminals;
- Enclosure did not show undue deformation and had proven that the degree of protection is not impaired.

Electromagnetic compatibility (clause 10.12)

It is important to know if the switchboards causes radio interference in which case the user may be required to take adequate measures especially in a radioactive environment. Fuji SMBE switchboards are verified in accordance with IEC 61439 clause 10.12 to be free from EMC emission and immune to EMC disturbance.

Mechanical operation (clause 10.13)

Each circuit breaker was operated 200 times. And each withdrawable air circuit breaker withstood 200 cycles of mechanical operation from connected to disconnected position and back to the connected position. The breakers used in the switchboards are verified by the above tests and had not impaired and had practically the same effort for operation as before the test.

The M-cube switchboards which have a current rating up to 10000A, have successfully undergone the above tests in full compliance with IEC 61439, Fuji SMBE switchboards undoubtedly offer a full designed, engineered and proven solution which minimise risk, and maximise reliability.

Designation	Current Rating (A)	Short Time Withstand Current (Main Power Distribution System)		Ingress Protection (IP)	Form of Separation
M-Cube 06	600A	-	36kA rms 3sec	IP44	Form 4b
M-Cube 08	800A	-	36kA rms 3sec	IP44	Form 4b
M-Cube 10	1000A	65kA rms 1sec	43kA rms 3sec	IP44	Form 4b
M-Cube 16	1600A	65kA rms 1sec	50kA rms 3sec	IP44	Form 4b
M-Cube 25	2500A	100kA rms 1sec	65kA rms 3sec	IP44	Form 4b
M-Cube 32	3200A	100kA rms 1sec	65kA rms 3sec	IP44	Form 4b
*M-Cube 40 Compact	3700A	100kA rms 1 sec	65kA rms 3sec	IP43	Form 4b
M-Cube 40	4000A	100kA rms 1sec	85kA rms 3sec	IP44	Form 4b
M-Cube 50	5000A	100kA rms 1sec	100kA rms 3sec	IP44	Form 4b
M-Cube 63	6300A	125kA rms 1sec	100kA rms 3sec	IP43	Form 4b
M-Cube	10000A	115kA rms 1sec	100kA rms 3sec	IP42	Form 4b

* Compact: Compact Switchgear Design

* WD: Withdrawable System

* Verified with Arc Fault Containment to IEC 61641

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