

Weber South Pacific Low Voltage Switchgear

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1. Purpose

To provide technical information to assist with the application, installation and operation of Weber South Pacific LV switchgear.

This instruction provides information to assist in the design, application, installation and operation of substations that use Weber South Pacific LV switchgear. The instruction deals only with the standard units approved by Endeavour Energy for use in the network. The instruction does not include the substation mounting and earthing, for which an appropriate document must be referred. There are two (2) main versions of the switchgear, the older units comply with the technical requirements of SDI 306 but the new units comply to ETS 0069.

Instructions from the manufacturer must be consulted for details of individual components, operation, safety and maintenance of the components. Instructions from Weber South Pacific are attached to, and form an integral part of, this document.

2. References

External Regulations		
Electricity Supply Act 1995 (NSW)		
NSW Work Health and Safety Act 2011		
Electricity Supply (General) Regulation 2014 (NSW)		
Work Health and Safety Regulation 2011 (NSW)		
ENA National Electricity Network Safety Code (Doc 01-2019)		
National Electricity (NSW) Law 1997		
National Electricity Rules		

External Standards		
Standard No.	Year	Title
ENA Doc 01	2019	ENA National Electricity Network Safety Code
AS 2067	2016	Substations and high voltage installations exceeding 1kV a.c
AS 3000	2018	Electrical Installations
AS 5577	2013	Electricity network safety management systems
AS 60044.1	2003	Instrument transformers - Current transformers
IEC 60269.1	2024	Low voltage fuses. Part 1: General requirements

IEC 60269.2	2013	Low voltage fuses. Part 2.1: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)-section 1 to V1: Examples of types of standardized fuses
AS 60529	2004	Degrees of protection provided by enclosures (IP Code)
AS/NZS IEC 60947.1	2021	Low-voltage switchgear and controlgear – General rules
AS/NZS IEC 60947.2	2015	Low-voltage switchgear and controlgear – Circuit Breakers
AS/NZS IEC 60947.3	2023	Low-voltage switchgear and controlgear – Low-voltage switchgear and controlgear
AS 61439.1	2016	Low-voltage switchgear and controlgear assemblies – General Rules
AS 61439.2	2016	Low-voltage switchgear and controlgear assemblies – Power switchgear and controlgear assemblies
AS 61439.5	2016	Low-voltage switchgear and controlgear assemblies – Assemblies for power distribution in public networks
AS 6227.1	2019	High-voltage switchgear and control gear – Common specifications for alternating current switchgear and controlgear
AS 62271.201	2019	HV switchgear and controlgear – AC insulation - enclosed switchgear and control gear for rated voltages above 1kV and up to and including 52kV
Weber South Pacific E3		Vertigroup Switchgear – VS2-38 - Installation & Operation
Weber South Pacific PMC-509		MDI Basic Operations – Revision 1
Weber South Pacific PMC-509		MDI Manager Guide - Revision 1
Weber South Pacific PMC-509		Download Guide – Revision 3
Weber South Pacific PMC-592		Multi Circuit Power Monitor User Manual Version 1.0

Company Policies and Procedures

Company Policy (Network) 9.2.2 – Network Protection

Company Policy (Network) 9.2.5 – Network Asset Design
Company Policy (Network) 9.7.1 – Network Asset Construction
Company Policy (Network) 9.8.3 – Network Operations
Company Policy (Network) 9.9.1 – Network Asset Maintenance
Earthing Design Instruction EDI 100 – Distribution Earthing Design, Construct and Test
Equipment Technical Specification ETS 0069 – Distribution indoor and padmount substation low voltage switchgear
Equipment Technical Specification ETS 0072 – Padmount substation plinth and culvert specification
Equipment Technical Specification ETS 0077 – Padmount Substation Cubicle specification
Mains Construction Instruction MCI 0006 – Underground distribution construction standards manual
Substation Design Instruction SDI 101 – Distribution substation general details and minimum requirements
Company Procedure GAM0095 – Mobile generator connection and Operation
Drawing no. 076733 – Padmount substation LV switchgear compartment separate earth

Company Standards	
Earthing Design Instruction EDI 100	Distribution earthing design
Environmental Management Standard EMS 007	Waste Management
Equipment Technical Specification ETS 0067	11kV and 22kV enclosed load break switches
Mains Construction Instruction MCI 0005	Overhead distribution construction standards manual
Mains Design Instruction MDI 0031	Overhead line design
Mains Design Instruction MDI 0026	Location of isolation points on the high voltage distribution network
Standard Asset Data SAD 0001	Project drawing standard
Substation Design Instruction SDI 120	Testing and commissioning for distribution systems
Substation Maintenance Instruction SMI 101	Minimum requirements for maintenance of distribution equipment
Substation Maintenance Instruction SMI 122	Use and handling of sulphur hexafluoride (SF6)
Regional Branch Workplace Instruction WRG 0526	Handling of SF6 (Sulphur Hexafluoride)

3. Definitions and Abbreviations

Term	Definition
ASP	Accredited Service Provider, or “ASP, means a person who has been accredited through a ministerially-recognised accreditation scheme to undertake contestable work.
Common or combined earthing	A common or combined earthing system is one in which the HV distribution and low voltage electrical equipment is earthed to a common terminal bar. This is achieved by connecting the MEN system to the HV and LV earth at the distribution substation or other distribution asset.
CT	Current Transformer
LV	Low voltage – a voltage exceeding 50V AC but less than 1000V AC
MDI	Maximum Demand Indicator
Separate Earthing	A system where the HV and LV earths are electrically separate.

4. Actions

4.1 General

Weber's LV switchgear is frame mounted LV distribution switchgear. Standard components, such as fuse switch strips, isolators, circuit breakers and load break switches, are assembled together to make switchgear configurations specified by Endeavour Energy. Only type tested components in accordance with AS/IEC standards are used in the manufacture of switchgear assemblies.

Temperature rise tests have also been carried out on the fully assembled switchgear in a padmount substation. The switchgear has passed the specified test requirements. The switchgear can be used in a padmount substation as well as in an indoor substation.

4.1.1 Switchgear identification codes

Table 1 shows the range of new manufacturer approved switchgear type codes, only new equipment will be purchased for use on the network.

Table 1: New switchgear identification codes

New Ref no.	Old Ref no.	Configuration	App. no.	Material No.
New smart MDI - to ETS0069				
C-MAPMC50902R		Full MDI-1 meter-2 RTDs-Links etc	530204	1000006291
C-PMC509AA5325AE		Replacement meter 1-6 input	530205	1000006289
C-PMC509AB5325AE		Replacement meter 2-9 input	530206	1000006290
RT001201		RTD - ambient temp-100mm lead		N/A
RT030201		RTD - magnetic temp-3m lead		N/A
RT150201		RTD - magnetic temp-15m lead	530207	N/A
RT030202		RTD - Ins. probe temp-3m lead	530208	1000006292
Category 1 - to ETS0069				
VZSV2		Fuse handle (1 ph) same as Cat 2	530209	1000006293
VSV10		Disconnect handle with lock (1 ph)	530210	N/A
VS1000-E02		Generator switch strip 1000A	530194	N/A
VS1000-E01		Disconnect switch strip 1000A	530193	N/A
MF2240912-ENC1		Fuse, fuse, disconn., gen, fuse, fuse	530192	1000005301
Category 2 - to ETS0069				
VZSV2		Fuse handle (1 ph) same as Cat 1	530209	1000006293
VSV20		Disconnect handle with lock (1 ph)	530211	N/A
VS2000-E02		Generator switch strip 2000A	530212	N/A
VS2000-E01		Disconnect switch strip 2000A	530213	N/A
VS2-E01		Fuse switch strip 400A - no CTs	530214	1000005917
VS2-E02		Fuse switch strip 400A - with CTs	530215	N/A
MF2241612-ENC2B		Fuse, disconnect, gen, fuse	530196	1000005302
MF2241612-ENC2		Fuse, fuse, disconn., gen, fuse, fuse	530195	1000005303
Circuit breakers - to ETS0069				
MF1231600-ENT1		Type 1 – 735A (1590A) LBS+CB	530197	1000005304

MF1231600-ENT2		Type 2 – 1400A (1590A) LBS+CB	530198	1000005305
MF1332500-ENT3		Type 3 – 2100A (2380A) LBS+CB	530199	1000005386
MF1221600-ENT4		Type 4 – 1400A (1590A) CB+CB	530200	1000006288
Load break switch - to ETS0069				
MF1302500-ENLB		2100A (2380A) LBS ONLY	530201	1000005306
Distribution fuse panel (DFP) fuse strips - to ETS0069				
V00-E185	N/A	Fuse switch strip DIN00 – 160A	AL0054A	1000005754
VS2-E01		Fuse switch strip 400A - no CTs	530214	1000005917
Distribution fuse panel (DFP) stainless steel cubicles				
VC500090-S101	N/A	5 way DFP cubicle + busbars	UL0018A	1000005916
VC510090-S120	N/A	5 way DFP cubicle + busbars + bus tie	UL0019A	1000005915
VC700090-S101	N/A	7 way DFP cubicle + busbars	UL0020A	1000005914
VC710090-S120	N/A	7 way DFP cubicle + busbars + bus tie	UL0021A	1000005913
VC900090-S101	N/A	9 way DFP cubicle + busbars	530137	1000006245
VC910090-S120	N/A	9 way DFP cubicle + busbars + bus tie	530138	1000006246
Retrofit frame for Cat 2 fuse strips on old CB frames (refer to clause 5.1.11)				
VB-TYPR1	N/A	To fit a single Cat 2 fuse strip	UL0002A	1000005665
VB-TYPR1	N/A	To fit two (2) Cat 2 fuse strips (2 off)	UL0002A	1000005665
VB-TYPR3	N/A	To fit three (3) Cat 2 fuse strips	UL0003A	1000005664

Table 2 shows the range of previous manufacturer approved switchgear type codes, this equipment details are retained for historical and maintenance purposes only. All items can be replaced by the new equipment listed in Table 1.

Table 2: Older switchgear identification codes

New Ref no.	Old Ref no.	Configuration	Old App. no.
Category 1 - to SDI306			
VER3-L-E	VER3-L-E-CAT1	Generator switch strip	390 007
VER1000-AR	VER1000-ARCAT1	Disconnecter switch strip	390 008
VER-L-E-1C	VER250-CAT1	Fuse switch strip	390 009
VER215093-1CAT1	VER114090-1CAT1	Fuse, fuse, disconn., gen, fuse, fuse	390 000
Category 2 - to SDI306			
VERD3-AU-CAT2	VERD3-AU-CAT2	Generator switch strip	390 010
VER2000-AR	VER2000-AR-CAT2	Disconnecter switch strip	390 011
VER2-L-E-2C	VERD3-AU-CAT2	Fuse switch strip	390 012
VF225163-CAT2B	VF124120-2CAT2	Fuse, disconnecter, gen, fuse	390 001
VF225163-CAT2	VER124120-1CAT2	Fuse, fuse, disconn., gen, fuse, fuse	390 002
Circuit breakers - to SDI306			
VF004163-7TYP1	VF0013163-1TYP1	Type 1 – 735 A	390 003
VF004163-7TYP2	VF0013163-1TYP2	Type 2 – 1400 A	390 004
VF003253-7TYP3	VF0013253-1TYP3	Type 3 – 2100 A	390 006
VF003163-7TYP4	N/A	Type 4 – 1400 A	AL0060A
Load break switch - to SDI306			
VF130253-LBS3	VF130253-LBS3	2100 A	390 005

4.1.2 Technical specifications common to all types

Weber LV switchgear is designed for the following ratings:

Table 3: Common LV weber switchgear specifications

Description	Rating
Applicable standards	AS 3439 .1-2002
Number of phases	Three (3)
Rated Voltage:	
• Operational (Ue)	433V
• PF withstand for one minute	3kV
• PF withstand for 10 sec (new equip. to ETS0069)	12.7kV
Mode of operation	Manual
Type of installation	Stationary
External design	Enclosed
Degree of protection	IP 20
Utilisation category:	
• New equip. to ETS0069	AC22B
• Old equip. to SDI306	AC20
Rated duty	Continuous
Earthing system	Common ¹ and separate
Operation	Manual

¹Note:

The current standard switchboards supplied by Weber are suitable for use on a common or separately earthed system. If a switchboard is to be used on a separate earth system, it is necessary to remove the bridges from the neutral bar to the switchgear HV earth bar on the LV support frame or on older switchgear it is just the bridges to the LV support frame itself. If the neutral bar is connected directly to the support frame (as with some very older designs) then it will be necessary to insulate the neutral bar from the earth (LV switch frame). This will be achieved by removing the neutral bar and mounting it on two (2) post insulators (refer to EDI 100, Drawing no. 076733 and the following drawing). Where it is required, the insulated temperature probe shown in Section 4.1.8.2 must be used.

4.1.3 HV and LV frame earthing – 2012 onward

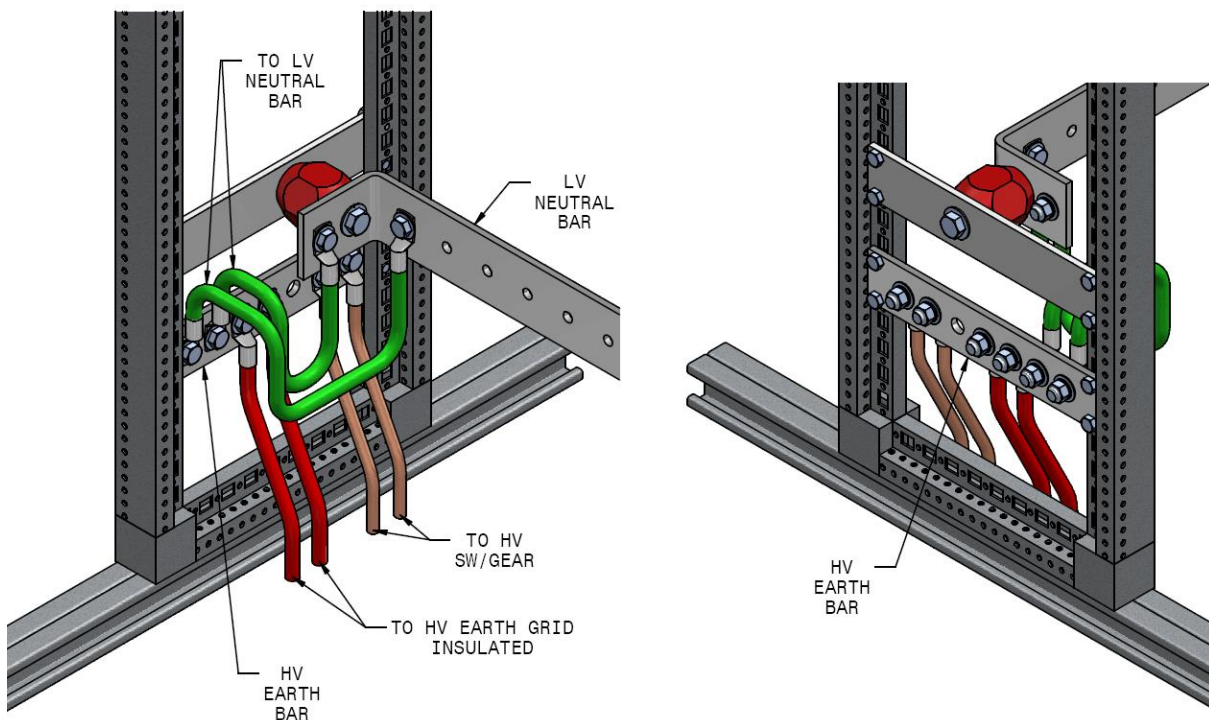


Figure 1: LV frame neutral bar and HV earth bar connection detail - new from 2012

4.1.4 Switch operating handles – 2013 onwards

2013 fuse strips are fitted with operating handles that hold the fuse and protect the operator from arcing. The handle allows the fuse to be switched with a horizontal double break action. These handles can be reversed and stored with the fuse in the fuse strip when not in use.

Fuses clip in to the holder and are released by pressing the green button on the front of the holder and lifting the fuse.

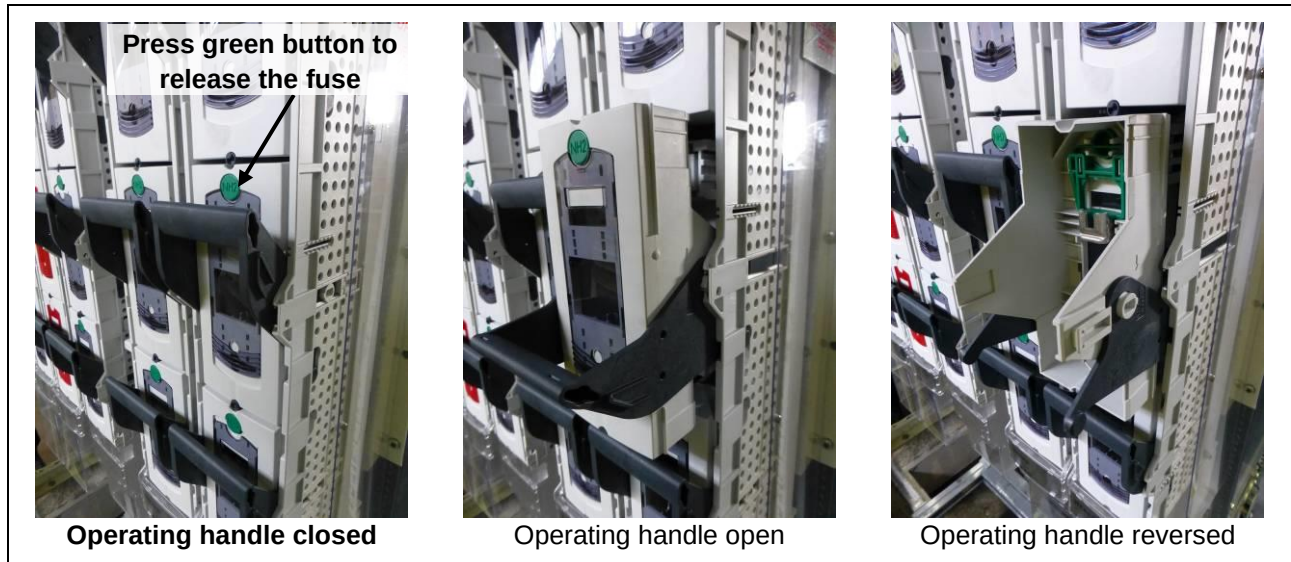


Figure 2: Switch operating handles - 2013 onwards

On the 2013 models the incoming isolators can be locked to prevent inadvertent operation and to increase the through fault ratings. Locking and unlocking is carried out using a supplied allen key. The black handle must be pushed in before trying to turn the red lock so that there is no jamming of the lock.

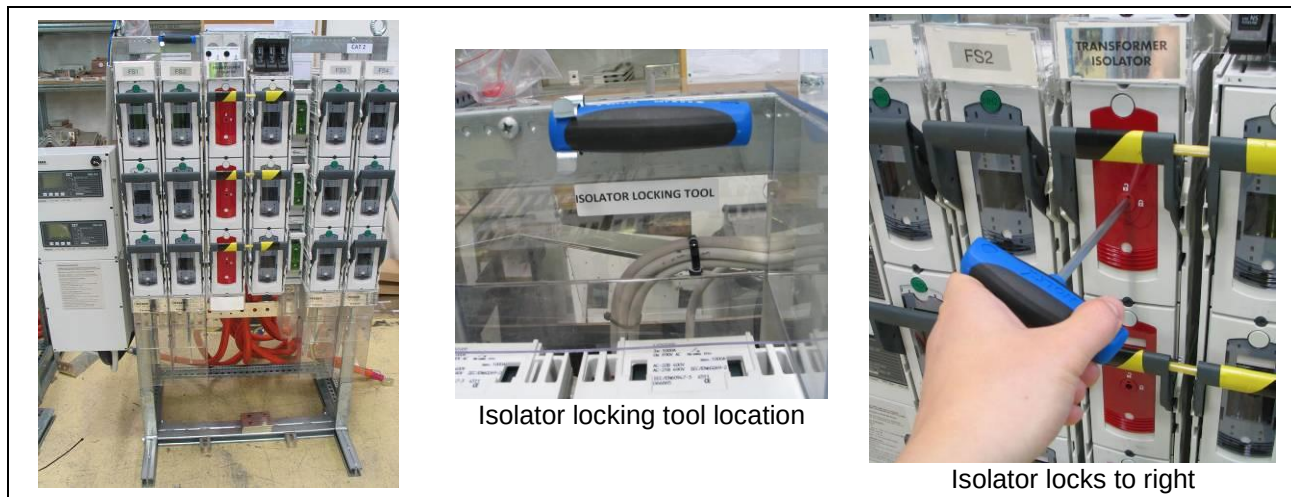


Figure 3: Isolator locking

4.1.5 Adjustable frame – 2013-2018

To aid in the fitting of the LV switchgear to previous versions of substations and cabling the frame has now been made adjustable. The height can be varied by about 100mm; the body of the switchgear can be moved forward or backward along the full length of the feet. The cable support rail can be moved forward or backward and the hold down feet can also be moved forward or backward along the unistrut frame.



Figure 4: Adjustable mounting frames - 2013 onwards

4.1.6 Feeder cable connection plate

Feeder cables must be connected using two (2) hole lugs and the supplied connection plate for all new LV switchgear terminations. This plate is suitable for up to 2 x 240mm cable feeder lugs, they provide a solid surface and allows connections to be tightened without the need to hold the bolt head from turning. The Feeder cable connection plate is made up of 2 x M10 x 50mm bolts welded to a 6mm plate. One (1) hole lugs are only to be used on existing switchgear that has the restriction of only one (1) hole in the terminal palm, a 10mm or 12mm bolt may be used.



Figure 5: Feeder cable connection plate

4.1.7 Equipment rating labels

Labels will be fitted to the front of each fuse strip, isolator or circuit breaker which states the maximum rating of the piece of equipment in line with the individual equipment category.

4.1.8 Maximum demand indicators

4.1.8.1 Analogue MDI 2006 – 2013, 2017 onwards

An analogue MDI provides visual indication of the maximum demand that has been recorded for each phase of the transformer. The MDI has a manual reset button.



Figure 6: Analogue MDI

4.1.8.2 Smart MDI - 2013 to 2017

The smart MDI can store a year of data with each value being time stamped at 10 minute intervals. The data is captured and displayed to 3 decimal places.

The MDI will record the LV busbar 3 phase voltages, average current over a 10 minute period and the maximum demand current from each fuse on each feeder and the transformer CTs totalling 15 CT inputs, the cubicle and transformer temperatures are also captured.

The transformer temperature is collected using a magnetic temperature device, a 15m lead is also available, (an insulated probe is also available for separately earthed subs with a temp. pocket in the transformer) attached adjacent to the oil site glass.

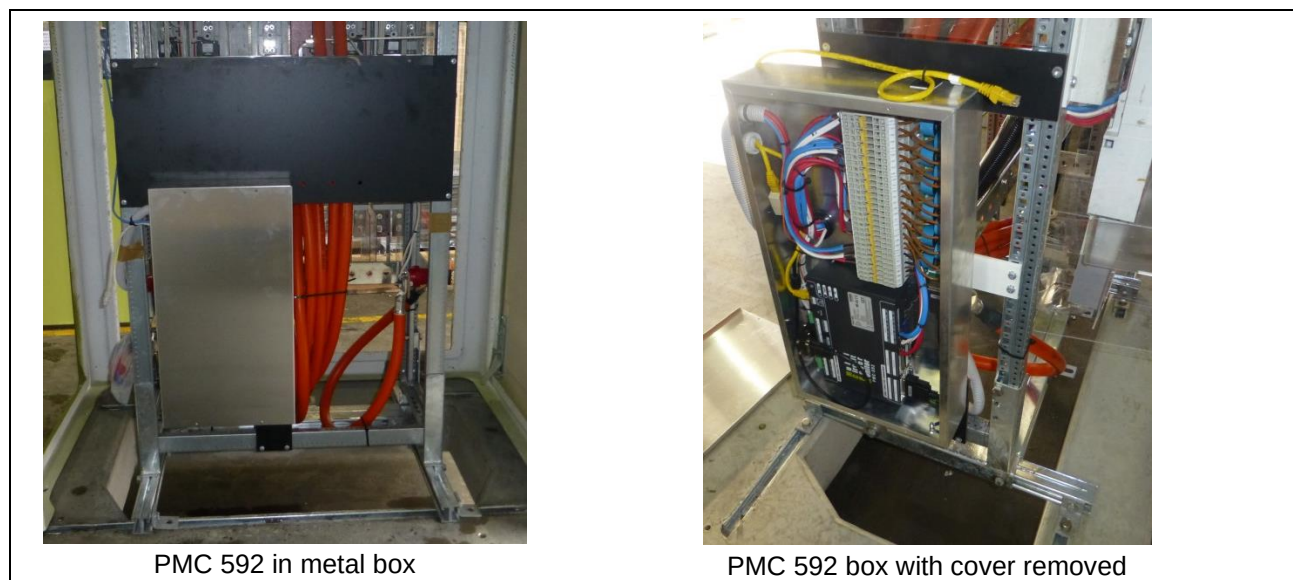
The initial supply of smart MDIs were with PMC 509 meter (a total of 714 LV switchgears – refer to the attached list with the serial numbers) which has a serial connection and this would require leaving a laptop in the substation for at least 6 hours to complete the download.

Weber then supplied with PMC 592 which has an Ethernet connection and the data was downloadable in less than 2 minutes using a laptop.

Smart MDI's in Weber LV switchgear was discontinued from June 2017 onwards. The analogue MDI's replacement was discontinued from 2018.



Figure 7: PMC 509 Smart MDI and components



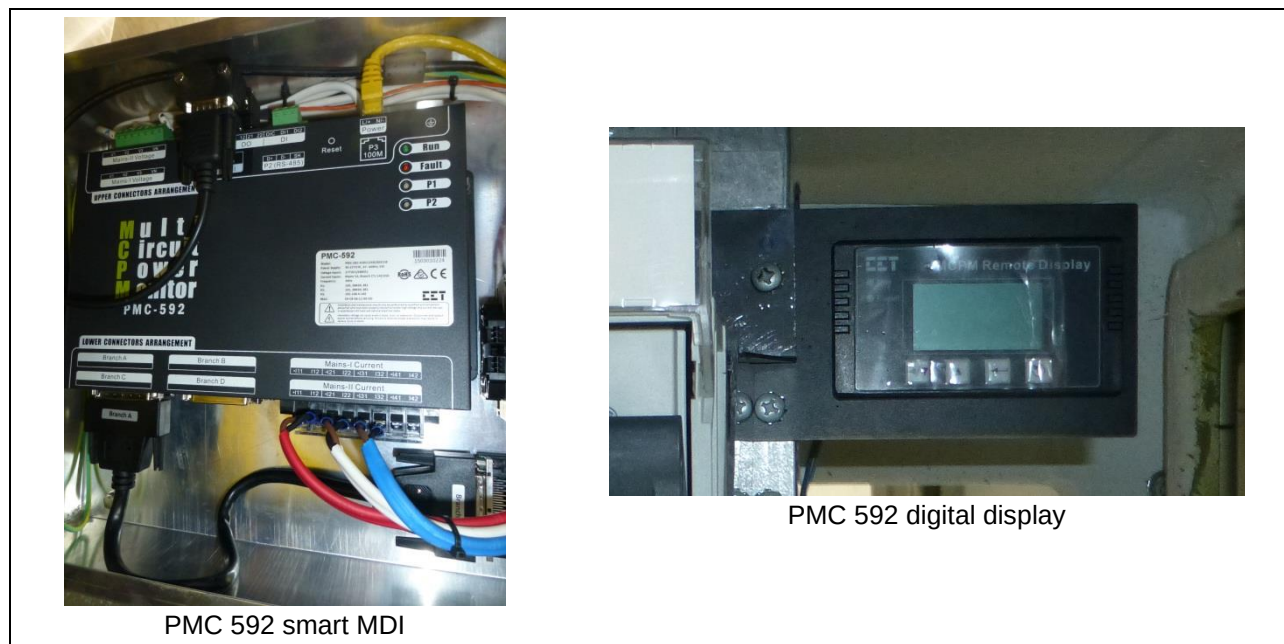


Figure 8: PMC 592 Smart MDI

4.1.8.3 Smart Meter Download Tool

To download data from smart MDI's the smart meter download tool is used. The device is suitable for use with both serial and Ethernet meters. The data is recorded in comma separated (CSV) format, which can be transferred to a computer and opened in Microsoft Excel. The filename of the log will contain the date and time of the download as well as the serial number of the meters so it is important to record the serial numbers in order to correlate the data with the substations accessed.

These tools are kept by the respective Regional Services Managers.

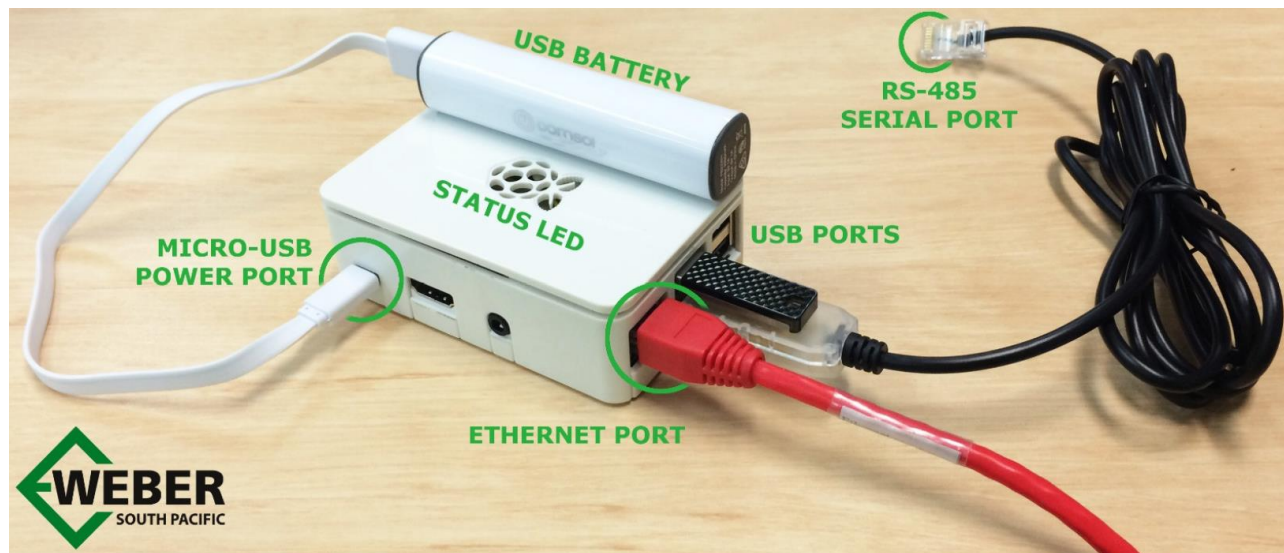


Figure 9: Smart MDI download tool

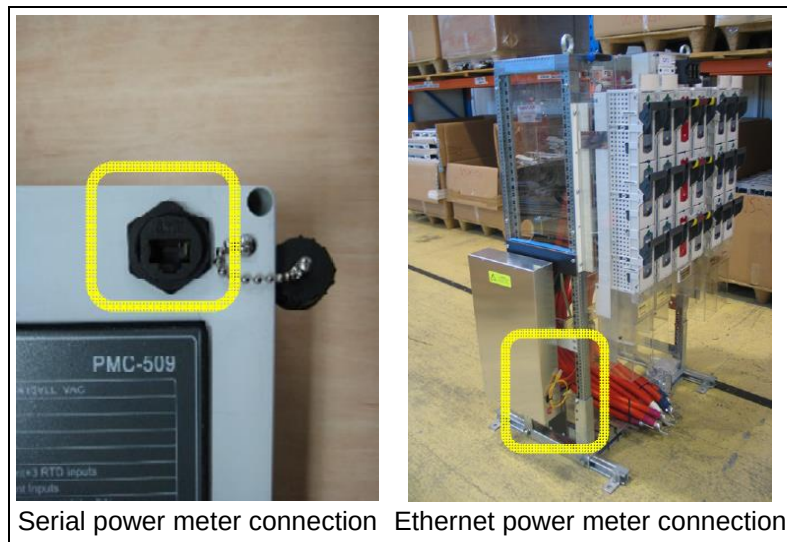


Figure 10: Smart MDI connection types

Table 4: Smart MDI indicative data download times

Meter	Download Time (guide only)
Serial – single meter	1.5 hours
Serial – dual meter	3 hours
Ethernet	2 minutes

4.1.8.4 Typical MDI wiring diagram - 2013 onwards

On some MDIs a second meter will need to be installed to collect all the CT inputs. No longer applicable to LV switchgear after 2018.

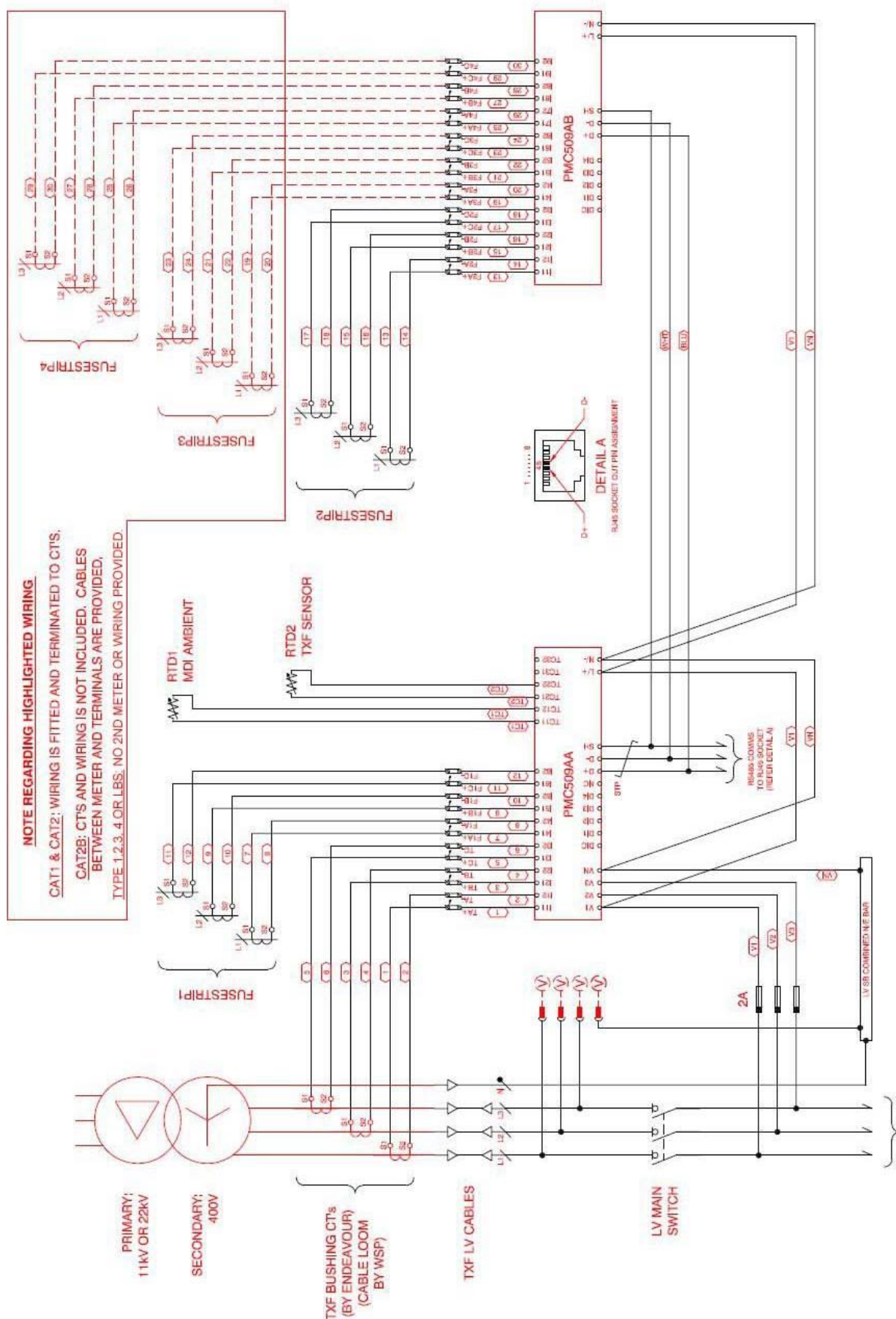


Figure 11: Typical MDI wiring diagram - 2013 onwards

4.1.9 Typical LV switchboard frame sizes – 2013 onwards

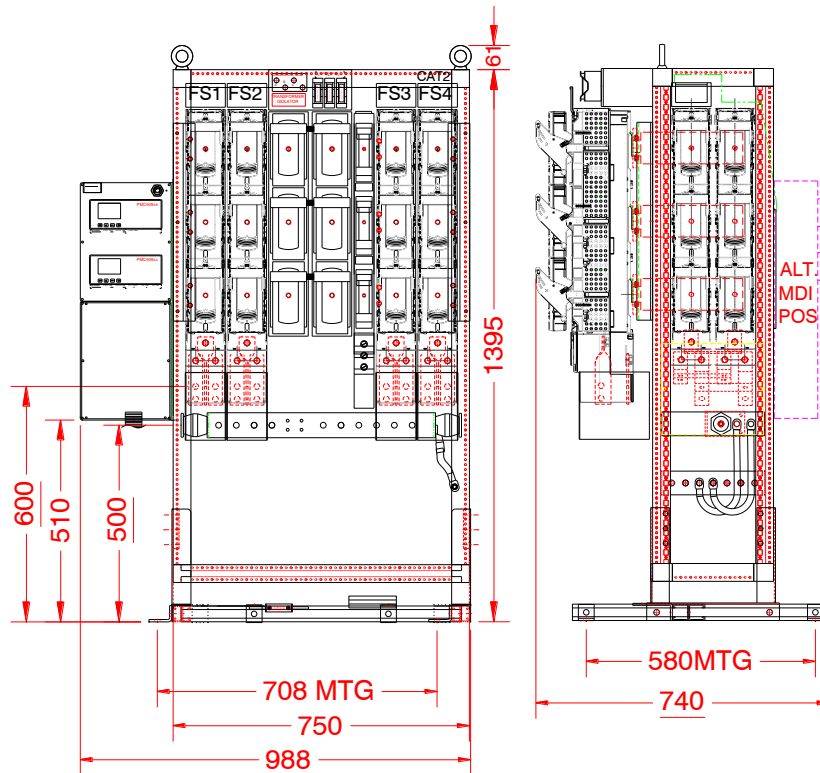


Figure 12: Cat 1 & Cat 2 LV switchboard frame sizes

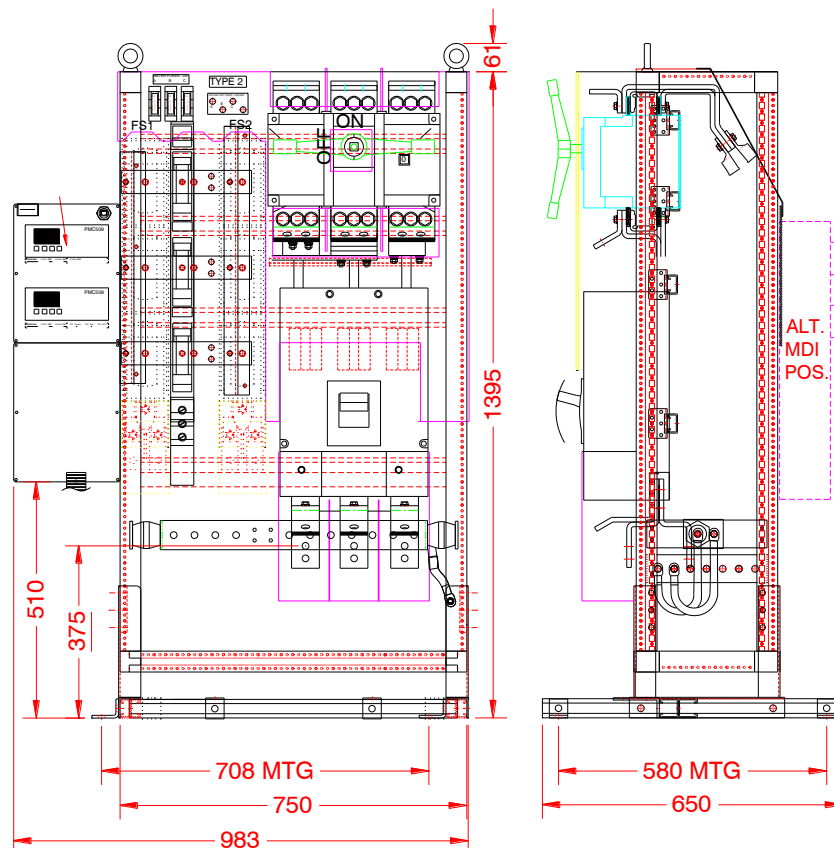


Figure 13: Type 1, 2, 3, 4 and LBS frame sizes

4.1.10 Safety barrier installation on 2003 to 2006 model Cat 1 and Cat 2 boards

In 2003 Endeavour Energy introduced Weber LV switchgear to distribution substations. During implementation of the switchgear a couple of items were identified as a possible safety issue that needed modification. These items were fixed in later versions from approx. April 2004 but for units already installed the following modifications will be required when work is being carried out on the switchgear.

Note: When working in or around any HV or LV switchgear care must be taken not to touch or insert any object into an area which may be alive. Temporary insulation or earthed barriers may be required to be installed by the worker to achieve a safe working environment.



Figure 14: “C” phase transformer connection barrier

Barrier 1

To prevent inadvertent contact with the “C” phase transformer connection on the bottom of the switchgear a permanent clear barrier is to be fitted to the bottom of the transformer isolation link strip.

Two (2) screws must be used to attach the barrier to the strip.

Note: These barriers can be obtained from the transformer workshop at Hoxton Park.

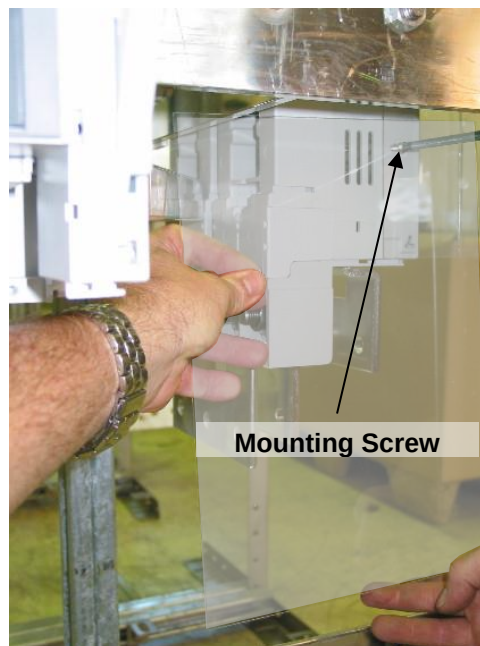


Figure 15: Cat 2 Generator to Fuse strip barrier

Barrier 2

This permanent clear barrier is required on Cat 2 switchgear so that no contact will occur when connecting and disconnecting generator incoming leads to the generator isolation strip.

One (1) screw is used to attach the barrier to the side of the generator strip.

Note: These barriers can be obtained from the transformer workshop at Hoxton Park.

Cable Terminations

The first stocks of Weber switchgear issued had cable terminations which were too close together, especially when double cabling was necessary. This has been addressed and future switchgear will be modified prior to delivery.

Two (2) methods to rectify the problem with existing stocks have been identified.

Method 1 – Re-orientate the connection flags as shown below:

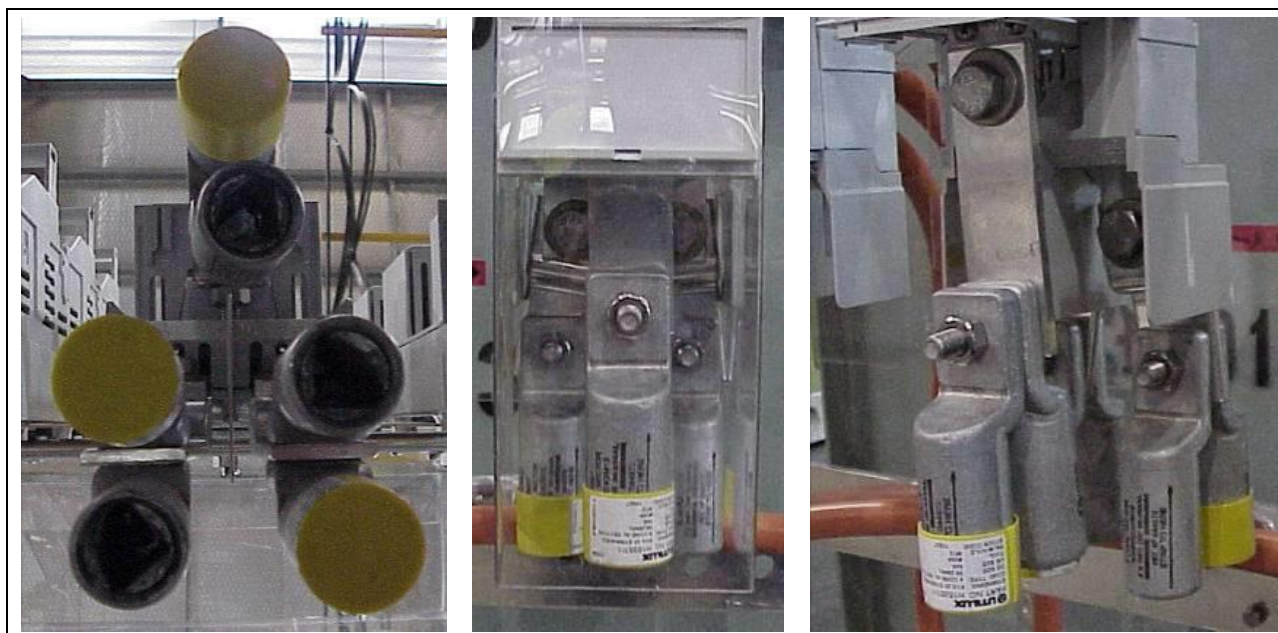


Figure 16: Cable termination orientation

By aligning the back two (2) connection flags to the same orientation it gives more room for the front connections.

The two (2) rear flags can also be either angled out slightly or have their top hole elongated which will allow the lugs to be located further apart.

Method 2 - Install an extra piece of LV heat shrink over the lug and bolted connection up to a point where a gap between phases of approximately 12mm is obtained.

Reorientation of the back two (2) connection flags is also a good idea but not absolutely necessary.

4.1.11 Retrofit of new fuse strips to old CB frames

Where older LV CB frames require additional Cat 2 fuse strips to be added the following kits manufactured by Weber South Pacific must be used. All kits include a busbar to mount standard Weber Cat 2 fuse strips, busbar to unistrut mounting frame, insulated supply leads and insulated busbar covers.

Table 5: Retrofit Cat 2 fuse strips

Description	Qty	Manuf. Code	Approval No.	Stock code
Single Cat 2 fuse strip	1	VB-TYPR1	UL0002A	1554328
Two (2) Cat 2 fuse strips	2	VB-TYPR1	UL0002A	1554328
Three (3) Cat 2 fuse strips	1	VB-TYPR3	UL0003A	1554310

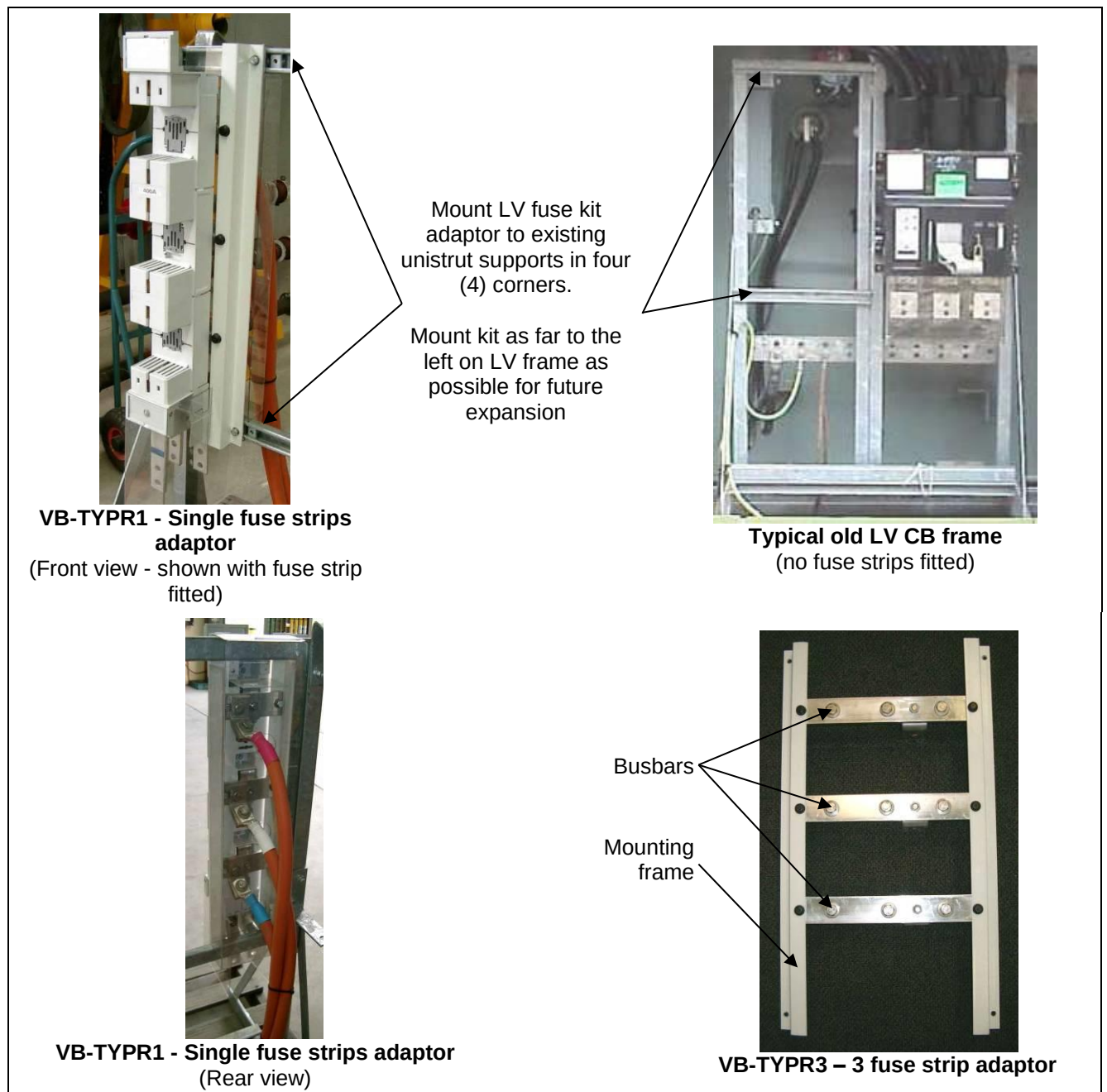


Figure 17: Retrofit of fuse strip

4.2 Category 1 – 750a fused switchboard

NOTE: Category 1 – 750A fuse switchboards are designed for use on transformer sizes up to and including 500kVA.

The Weber South Pacific Category 1 switchgear is of a modular construction. The switchgear is supplied fully assembled and wired by the manufacturer as a four (4) fused feeder distribution board. However, individual switch strips can be purchased from Weber South Pacific. Facilities have been made for the connection of an emergency generator set without disconnection of the power supply to customers.

The following standard items are mounted on a Category 1 switchboard.

Table 6: Cat 1 LV switchgear standard items

Item	Qty
3Ø isolator switch strip to serve as incomer from transformer	1
3Ø isolator switch strip to serve as incomer from stand-by generator	1
3Ø fuse switch strip to serve as distribution feeders	4
1Ø auxiliary fuse for street lighting - approx. 2003	1
3Ø auxiliary fuse strip for street lighting - after 2006	1
Provision to mount additional 63A 1Ø auxiliary fuse for street lighting- up to 2006	2
Provision to mount street light control panel	1
800/5A current transformers for maximum demand indicator- up to 2009	3
15 minutes delay maximum demand indicator wired to the CTs- up to 2009	3
2 x 185 mm ² /phase copper super stranded cable complete with lugs (phase)	3
1 x 185 mm ² copper super stranded cable complete with lugs (neutral)	1
Copper bar with perforation for external/internal neutral and earth connections	1
Tags to facilitate connection/synchronisation of stand-by generator	1
Space for street light control (mounted and wired by Endeavour Energy, if req.)	1
Busbars, covers, shrouds to complete	1
Stainless steel or galvanised box section frame	1

The following **additional/modified** items are supplied on frames from 2013 under ETS0069.

Table 7: Cat 1 LV switchgear additional items

Item	Qty
400/5A CTs for load readings on each phase of each fuse strip	12
Smart MDI-time stamped 10 minute storage of data incl. Temp of trans (2 meters)	1
Magnetic temp. probe for transf. temp measurements	1
Adjustable frame up/down, backward and forward	1
2 x 240 mm ² /phase copper super stranded cable complete with lugs (phase)	3
1 x 240 mm ² copper super stranded cable complete with lugs (neutral)	1

4.2.1 Reference drawings/catalogues

Table 8: Cat 1 LV switchgear reference drawings

Description	2013 ref no.	Rating	2006 ref no.	2003 ref no.	Rating
Gen. switch strip	VS1000-E02	940A	VER3-L-E	VER3-L-CAT1	750A
Disc. switch strip	VS1000-E01	940A	VER1000-AR	VER 1000-ARCAT1	750A
Fuse switch strip	VS2-E02	400A	VER-L-E-1C	VER250-CAT1	250A
Full sw/bd (4 fdrs)	MF2240912-ENC1	-	VER215093-1CAT1	VF114090-1CAT1	-
MDI	C-MAPMC50902R	-	-	CAMSCO	-
Tx to sw/bd cables	2x240mm	110°	2x185mm	2x185mm	110°

Equipment ratings shown above prior to 2013 are based on a 500kVA transformer rating of 100%. Equipment from 2013 has been designed and tested to operate at overloads of up to 130% based on 400V.

Equipment has been rated to account for higher temperatures inside a padmount cubicle that can be encountered on a hot day and with a fully loaded transformer. Therefore, it is possible that the rating plate on the individual item may show a higher value. However, the switchgear must not be loaded beyond the maximum current rating given above.

4.2.2 Operations/features

The fuse switch and disconnecting switches are suitable for single-phase operation only.

The fuses switch strips are suitable for 250A DIN Size 2 fuses. **Do not use a higher rating fuse unless approval is given by the Engineering Delivery Manager.** Feeder load must be monitored so that the total current does not exceed the continuous maximum current as above. Weber does not supply fuses as a part of the switchboard.

Tags are provided for synchronisation of an emergency generator without loss of supply to the customers (refer to **GAM 0095** for instruction on generator synchronization).

The switches are provided with their own handles. Separate handles are not needed.

2013 models come with a dual break fuse holder rated at AC22B to switch full load.

4.2.3 External cabling

The switchgear is designed for termination of external cables with sizes up to 2 x 240mm² for each phase on the fuse switch strips. Please refer to Section 4.1.6 for cable connection detail.



Cat 1 – (2013-Present)
(No gap between fuse strips + aux fuse)



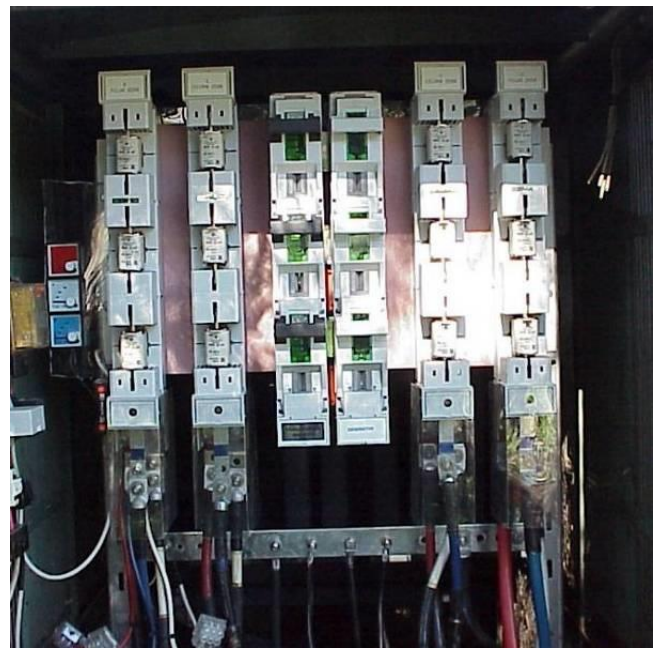
2013 Cat 1 LV board in a size 14 cubicle with MDI facing the end of the cubicle



2013 Cat 1 LV board in an old narrow size 5 cubicle with switches & MDI facing the side doors



Cat 1 – (2006-2013)
(No gap between fuse strips + new aux fuse)



Cat 1 – (2003 – 2006)
(Gap between fuse strips)

Figure 18: Cat 1 LV switchgear

4.3 Category 2 – 1400A fused switchboard

NOTE: Category 2 – 1400A fuse switchboards are designed for use on transformer sizes up to and including 1000kVA.

The Weber South Pacific Category 2 switchgear is of a modular construction. The switchgear is supplied fully assembled and wired by the manufacturer as a four (4) or a two (2) fused feeder distribution board. However, individual switch strips can be purchased from Weber South Pacific. Facilities have been made for the connection of an emergency generator set without disconnection of the power supply to customers.

The following standard items are mounted on a Category 2 switchboard.

Table 9: Cat 2 LV switchgear standard items

Item	Qty
3Ø isolator switch strip to serve as incomer from transformer (2 x parallel)	1
3Ø isolator switch strip to serve as incomer from stand-by generator (2 x parallel)	1
3Ø fuse switch strip to serve as distribution feeders	4
1Ø auxiliary fuse for street lighting - approx. 2003	1
3Ø auxiliary fuse strip for street lighting - after 2006	1
Provision to mount additional 63 A 1Ø auxiliary fuse for street lighting- up to 2006	2
Provision to mount street light control panel	1
1500/5A Current transformers for maximum demand indicator - up to 2009	3
15 minutes delay maximum demand indicator wired to the CTs - up to 2009	3
4 x 185 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 185 mm ² copper super stranded cable complete with lugs (neutral)	1
Copper bar with perforation for external/internal neutral and earth connections	1
Tags to facilitate connection/synchronisation of stand-by generator	1
Space for street light control (mounted and wired by Endeavour Energy, if req.)	1
Busbars, covers, shrouds to complete	1
Stainless steel or galvanised box section frame	1

The following **additional/modified** items are supplied on frames from 2013 under ETS0069.

Table 10: Cat 2 LV switchgear additional items

Item	Qty
400/5A CTs for load readings on each phase of each fuse strip	12
Smart MDI-time stamped 10 minute storage of data incl. Temp of trans (2 meters)	1
Magnetic temp. probe for transf. temp measurements	1
Adjustable frame up/down, backward and forward	1
4 x 240 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 240 mm ² copper super stranded cable complete with lugs (neutral)	1

4.3.1 Reference drawings/catalogues

Table 11: Cat 2 LV switchgear reference drawings

Description	2013 ref no.	Rating	2006 ref no.	2003 ref no.	Rating
Gen. switch strip	VS2000-E02	1590A	VERD3-AU-CAT2	VERD3-AU-CAT2	1400A
Disc. switch strip	VS2000-E01	1590A	VER2000-AR	VER 2000-AR-CAT2	1400A
Fuse switch strip	VS2-E02	400A	VER2-L-E-2C	VER400-CAT2	400A
Full sw/bd (2 fdrs)	MF2241612-ENC2B	-	VF225163-CAT2B	VF124120-2CAT2	-
Full sw/bd (4 fdrs)	MF2241612-ENC2	-	VF225163-CAT2	VF124120-1CAT2	-
MDI	C-MAPMC50902R	-	-	CAMSCO	-
Tx to sw/bd cables	4x240mm	110°	2x185mm	2x185mm	110°

Equipment ratings shown above prior to 2013 are based on a 1000kVA transformer rating of 100%.

Equipment from 2013 has been designed and tested to operate at overloads of up to 110% based on 400V.

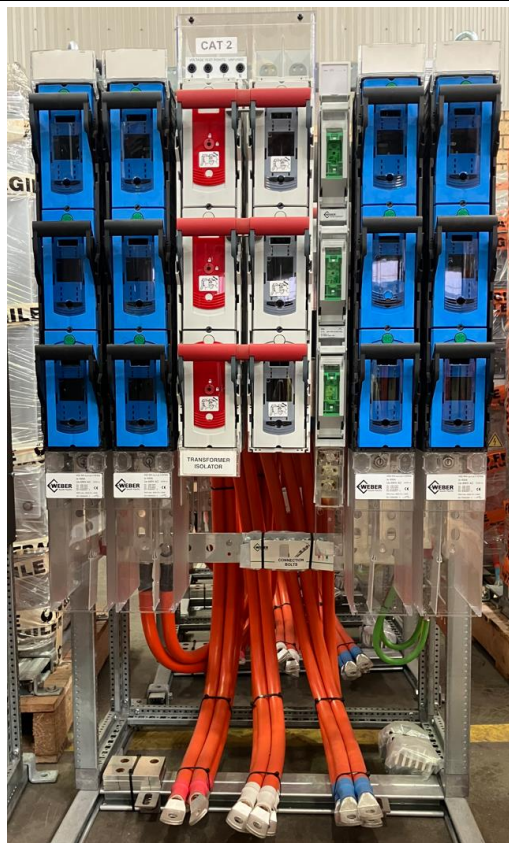
Equipment has been rated to account for higher temperatures inside a padmount cubicle that can be encountered on a hot day and with a fully loaded transformer. Therefore, it is possible that the rating plate on the individual item may show a higher value. However, the switchgear must not be loaded beyond the maximum current rating given above.

4.3.2 Operations/features

- The fuse switch and disconnecting switches are suitable for single-phase operation only.
- The fuse switch strips are suitable for 400A DIN Size 2 fuses. **Do not use a higher rating fuse.** Feeder load must be monitored so that the total current does not exceed the continuous maximum current as above. Weber does not supply fuses as a part of the switchboard.
- Busbar tags are provided for synchronisation of emergency generator without loss of supply to the customers (refer to GAM 0095 for instruction on generator synchronization).
- The switches are provided with their own handles. Separate handles are not needed.

4.3.3 External cabling

The switchgear is designed for termination of external cables with sizes up to 2 x 240mm² for each phase on the fuse switch strips. Please refer to Section 4.1.6 for cable connection detail.



Cat 2 – (2013 - Present)
(Front view)



**Cat 2 – (2013)
(Front view with MDI)**



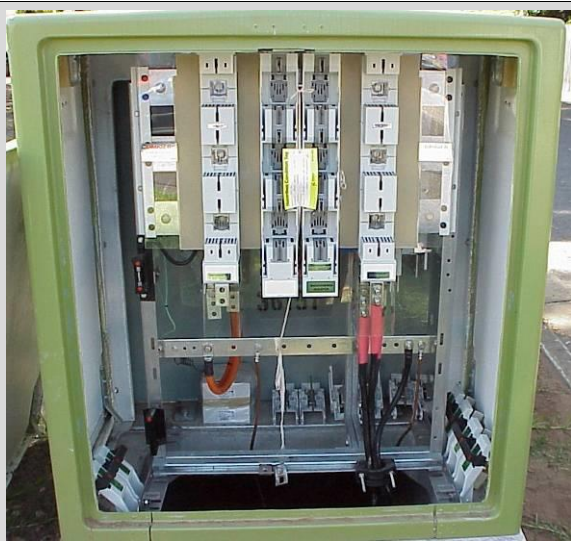
**Side View– (2013)
(Generator connections)**



**Cat 2 – (2006-2013)
(With no gap between fuse strips)**



**Side View – (2006-2013)
(Generator connections)**



Cat 2 – (2003-2006)
(With gap between fuse strips)



Side View– (2003-2006)
(Generator connections)

Figure 19: Cat 2 LV switchgear

4.4 Type 1 – 735A / 1400A circuit breaker switchboard

NOTE: Type 1 – 735A / 1400A Circuit breaker switchboard can be used on transformer sizes up to and including 1000kVA.

The Weber South Pacific Type 1 - 735A circuit breaker switchboard is of a modular construction. The switchgear is supplied fully assembled and wired by the manufacturer as a circuit breaker only switchboard. This switchboard is usually to be used when demand of a single customer exceeds 400A but is less than 735A. 1400A may be supplied through the unit if an additional 2 x 400A Cat 2 fuse strips are added.

However, provision exists to mount two (2) additional Cat 2 400A fuse switch strips at a later date. Three fuse strips can be installed if the Aux supply fuse is removed. The load supplied through the switchboard must not exceed 1400A or 1000kVA. Individual switch strips can be purchased from Weber South Pacific. Facilities are made for the connection of an emergency generator set without disconnection of power supply to customers.

The following standard items are mounted on a Type 1 – 735A circuit breaker switchboard.

Table 12: Type 1 LV CB switchgear standard items

Item	Qty
3Ø Terrasaki MCCB XS1250NE with electronic trip unit-up to 2013	1
3Ø auxiliary fuse strip for street lighting - after 2006	1
Provision only to add 2 x 400 A fuse switch strip at a later date, 3 if Aux removed	2
1600/5A current transformers for maximum demand indicator-up to 2011	3
15 minutes delay maximum demand indicator fully wired to the CTs-up to 2013	3
4 x 185 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 185 mm ² copper super stranded cable complete with lugs (neutral)	1
Copper bar with perforation for external/internal neutral and earth connections	1
Tags to facilitate connection/synchronisation of emergency generator	1
Space for street light control (mounted and wired by Endeavour Energy, if req.)	1
Busbars, covers, shrouds to complete	1
Stainless steel or galvanised box section frame	1

The following **additional/modified** items are supplied on frames from 2013 under ETS0069.

Table 13: Type 1 LV CB switchgear additional items

Item	Qty
3Ø Socomec Isolator W2000-SOC 2000A (Transformer isolator)	1
3Ø Schneider NS1250 with ML5.0 Electronic trip unit	1
Smart MDI-time stamped 10 minute storage of data incl. Temp of trans (1 meter)	1
Magnetic temp. probe for transf. temp measurements	1
Adjustable frame up/down, backward and forward	1
4 x 240 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 240 mm ² copper super stranded cable complete with lugs (neutral)	1

4.4.1 Reference drawings/catalogues

Table 14: Type 1 LV CB switchgear reference drawings

Description	2013 ref no.	Rating	2006 ref no.	2003 ref no.	Rating
ABB MCCB	T7	795A	-	-	-
Terasaki MCCB	-	-	XS 1250NE	XS 1250NE	735A
Schneider MCCB	NS1250	795A	-	-	-
Socomec Isolator	W2000-SOC	1590A	-	-	-
Fuse switch strip	VS2-E02	400A	VERD3-AU-CAT2	VER250-CAT1	400A
Sw/bd (No fuses)	MF1231600-ENT1	795A	VF004163-7TYP1	VF0013163-1TYP1	-
Sw/bd (With fuses)	MF1231600-ENT1	1590A	VF004163-7TYP1	VF0013163-1TYP1	-
MDI	C-MAPMC50902R	-	CAMSCO	CAMSCO	-
Tx to sw/bd cables	4x240mm	110°	2x185mm	2x185mm	110°

Equipment ratings shown above prior to 2013 are based on a 1000kVA transformer rating of 100%. Equipment from 2013 has been designed and tested to operate at overloads of up to 110% based on 400V.

Equipment has been rated to account for higher temperatures inside a padmount cubicle that can be encountered on a hot day and with a fully loaded transformer. Therefore, it is possible that the rating plate on the individual item may show a higher value. However, the switchgear must not be loaded beyond the maximum current rating given above.

4.4.2 Operations/features

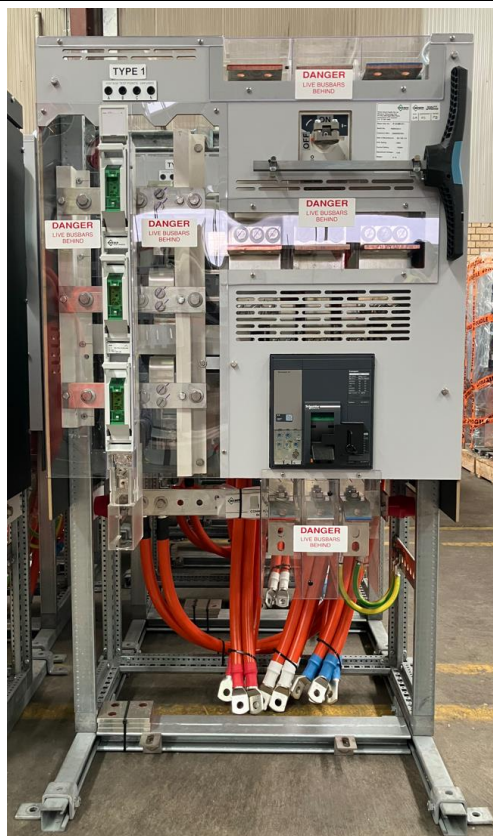
- From 2013 the CB frame has been fitted with a switch on the incoming supply. This allows the isolation of the load from the transformer and provides a generator connection directly after the switch to feed all loads.
- The MDI comes with only 1 MDI meter which can monitor all data plus one extra Cat 2 fuse strip. If a second Cat 2 fuse strip is required, and needs to be monitored, then the second MDI meter will be required to be added.
- Moulded case circuit breakers (MCCB) XS1250NE of Terasaki, T7 of ABB (from 2013) and NS1250 of Schneider make are used in the switchgear. The MCCBs are provided with an integrated electronic protection trip unit. The circuit breakers are positive action type, that is, the breaker can be either in *open* or *closed* position. The circuit breaker is a three-phase operation device, that is, all three (3) phases are operated simultaneously. This is clearly indicated on the circuit breaker front panel. The circuit breaker can be operated simply by pushing the operating handle up or down. Further details on application, setting procedures, operation and maintenance are provided in the manufacturer's instructions.
- The fuse switch strips, if provided, are suitable for single-phase operation only.
- Only Cat 2 400A fuse switch strips with 400A DIN size 2 fuses are to be used. **Do not use a higher rating fuse.** Feeder load must be monitored so that the total current does not exceed the continuous maximum current as above. Weber does not supply fuses as a part of switchboard.
- Tags are provided for synchronisation of an emergency generator to the circuit breaker load only without loss of supply to the customers (refer to **GAM 0095** for instruction on generator synchronization).
- The switches and circuit breakers are provided with their own handles. Separate handles are not needed.

4.4.3 External cabling

The switchgear is designed for termination of external cables as follows:

- Up to 4 x 630 mm² Cu or Al for each phase on the circuit breakers.
- Up to 2 x 240 mm² Cu or Al for each phase on the fuse switch strips (if provided).

Please refer to Section 4.1.6 for cable connection detail.



**Type 1 – (Present)
(Switch on incomer)**



**Type 1 – (2013)
(Switch on incomer)**



**Type 1 – (2003-2006)
(No switch on incomer)**

Figure 20: Type 1 LV CB switchgear

4.5 Type 2 - 1400a circuit breaker switchboard

NOTE: Type 2 – 1400A Circuit breaker switchboard can be used on transformer sizes up to and including 1000kVA.

The Weber South Pacific Type 2 - 1400A circuit breaker switchboard is of a modular construction. The switchgear is supplied fully assembled and wired by the manufacturer as a circuit breaker only switchboard. This switchboard is usually to be used when demand of a single customer exceeds 735A but is less than 1400A. However, a provision exists to mount up to two (2) additional Cat 2 400A fuse switch strips at a later date. The load supplied through the switchboard must not exceed 1400A or 1000kVA. Individual switch strips can be purchased from Weber South Pacific. Facilities are made for the connection of an emergency generator set to circuit breaker load only, without disconnection of power supply to customers.

The following standard items are mounted on Type 2 – 1400A circuit breaker switchboard.

Table 15: Type 2 LV CB switchgear standard items

Item	Qty
3Ø Terrasaki MCCB XS2500NE with electronic trip unit	1
3Ø auxiliary fuse strip for street lighting - after 2006	1
Provision only to add 2 x 400 A fuse switch strip at a later date	2
1600/5A current transformers for maximum demand indicator	3
15 minutes delay maximum demand indicator fully wired to the CTs	3
4 x 185 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 185 mm ² copper super stranded cable complete with lugs (neutral)	1
Copper bar with perforation for external/internal neutral and earth connections	1
Tags to facilitate connection/synchronisation of emergency generator	1
Space for street light control (to be mounted and wired by Endeavour Energy, if required)	1
Busbars, covers, shrouds to complete	1
Stainless steel or galvanised box section frame	1

The following **additional/modified** items are supplied on frames from 2013 under ETS0069.

Table 16: Type 2 LV CB switchgear additional items

Item	Qty
3Ø Socomec Isolator W2000-SOC 2000A (Transformer isolator)	1
Smart MDI-time stamped 10 minute storage of data incl. Temp of trans (1 meter)	1
Magnetic temp. probe for transf. temp measurements	1
Adjustable frame up/down, backward and forward	1
4 x 240 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 240 mm ² copper super stranded cable complete with lugs (neutral)	1

4.5.1 Reference drawings/catalogues

Table 17: Type 2 LV CB switchgear reference drawings

Description	2013 ref no.	Rating	2006 ref no.	2003 ref no.	Rating
Terasaki MCCB	XS 2500NE	1590A	XS 2500NE	XS 2500NE	1400A
Socomec Isolator	W2000-SOC	1590A	-	-	-
Fuse switch strip	VS2-E02	400A	VERD3-AU-CAT2	VER400-CAT2	400A
Sw/bd (with fuses)	MF1231600-ENT2	1590A	VF004163-7TYP2	VF0013163-1TYP2	-
MDI	C-MAPMC50902R	-	CAMSCO	CAMSCO	-
Tx to sw/bd cables	4x240mm	110°	2x185mm	2x185mm	110°

Equipment ratings shown above prior to 2013 are based on a 1000kVA transformer rating of 100%. Equipment from 2013 has been designed and tested to operate at overloads of up to 110% based on 400V.

Equipment has been rated to account for higher temperatures inside a padmount cubicle that can be encountered on a hot day and with a fully loaded transformer. Therefore, it is possible that the rating plate

on the individual item may show a higher value. However, the switchgear must not be loaded beyond the maximum current rating given above.

4.5.2 Operations/features

- From 2013 the CB frame has been fitted with a switch on the incoming supply. This allows the isolation of the load from the transformer and provides a generator connection directly after the switch to feed all loads.
- The MDI comes with only (one) 1 MDI meter which can monitor all data plus one extra Cat 2 fuse strip. If a second Cat 2 fuse strip is required, and needs to be monitored, then the second MDI meter will be required to be added.
- Moulded case circuit breakers (MCCB) XS2500NE of Terasaki make are used in the switchgear. The MCCBs are provided with an integrated electronic type protection trip unit. The circuit breakers are positive action type, that is, the breaker can be either in *open* or *closed* position. The circuit breaker is a three-phase operating device, that is, all three phases are operated simultaneously. This is clearly indicated on the circuit breaker front panel. The circuit breaker can be operated simply by pushing the operating handle up or down. Further details on application, setting procedures, operation and maintenance are provided in the manufacturer's instructions.
- The fuse switch strips, if provided, are suitable for single-phase operation only.
- Only Cat 2 400A fuse switch strips with 400A DIN size 2 fuses are to be used. **Do not use a higher rating fuse.** Feeder load must be monitored so that the total current does not exceed the continuous maximum current as above. Weber does not supply fuses as a part of the switchboard.
- Tags are provided for synchronisation of emergency generator, to the circuit breaker loads only, without loss of supply to the customers (refer to **GAM 0095** for instruction on generator synchronisation).
- The switches and circuit breakers are provided with their own handles. Separate handles are not needed.

4.5.3 External cabling

The switchgear is designed for termination of external cables as follows;

- Up to 4 x 630 mm² Cu or Al for each phase on the circuit breakers.
- Up to 2 x 240 mm² Cu or Al for each phase on the 400A fuse switch strips (if provided).

These cables are to be fitted with the standard lugs. Lugs are to be secured using M12 high tensile bolts tensioned to 45Nm.



**Type 2 – (Present)
(Switch on incomer)**



**Type 2 – (Pre 2013)
(Switch on incomer)**



**Type 2 – (Post 2013)
(No switch on incomer)**

Figure 21: Type 2 LV CB switchgear

4.6 Type 3 - 2100a circuit breaker switchboard

NOTE: Type 3 – 2100A circuit breaker switchboard can be used on transformer sizes up to and including 1500kVA.

The Weber South Pacific Type 3 - 2100A circuit breaker switchboard is of a modular construction. The switchgear is supplied fully assembled and wired by the manufacturer as a circuit breaker only switchboard. This switchboard is usually to be used when demand of a single customer exceeds 1400A but is less than 2100A. A provision exists to mount up to two (2) additional Cat 2 400A fuse switch strips at a later date. The load supplied through the switchboard must not exceed 2100A or 1500kVA. Individual switch strips can be purchased from Weber South Pacific. Facilities are made for the connection of an emergency generator set without disconnection of power supply to customers.

The following standard items are mounted on Type 3 – 2100A circuit breaker switchboard.

Table 18: Type 3 LV CB switchgear standard items

Item	Qty
3Ø ABB S8 MCCB with electronic trip unit type PR212-LS1-up to 2013	1
3Ø auxiliary fuse strip for street lighting - after 2006	1
Provision only to add 2 x 400 A fuse switch strip at a later date	2
2500/5A current transformers for maximum demand indicator	3
15 minutes delay maximum demand indicator fully wired to the CTs	3
4 x 240 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 240 mm ² copper super stranded cable complete with lugs (neutral)	1
Copper bar with perforation for external/internal neutral and earth connections	1
Tags to facilitate connection/synchronisation of emergency generator	1
Space for street light control (to be mounted and wired by Endeavour Energy, if required)	1
Busbars, covers, shrouds to complete	1
Stainless steel or galvanised box section frame	1

The following **additional/modified** items are supplied on frames from 2013 under ETS0069.

Table 19: Type 3 LV CB switchgear additional items

Item	Qty
3Ø Socomec Isolator W3000-SOC1 3200A (Transformer isolator)	1
3Ø Terasaki MCCB XS3200 with electronic trip unit - 2013	1
Smart MDI-time stamped 10 minute storage of data incl. Temp of trans (1 meter)	1
Magnetic temp. probe for transf. temp measurements	1
Adjustable frame up/down, backward and forward	1
4 x 300 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 300 mm ² copper super stranded cable complete with lugs (neutral)	1

4.6.1 Reference drawings/catalogues

Table 20: Type 3 LV CB switchgear reference drawings

Description	2013 ref no.	Rating	2006 ref no.	2003 ref no.	Rating
Terasaki MCCB	XS 3200	2380A	S8 + PR212LSI	S8 + PR212LSI	2100A
Socomec Isolator	W3000-SOC1	2380A	-	-	-
Fuse switch strip	VS2-E02	400A	VERD3-AU-CAT2	VER400-CAT2	400A
Sw/bd (with fuses)	MF1332500-ENT3	2380A	VF003253-7TYP3	VF0013163-1TYP3	-
MDI	C-MAPMC50902R	-	CAMSCO	CAMSCO	-
Tx to sw/bd cables	4x300mm	110°	2x240mm	2x240mm	110°

Equipment ratings shown above prior to 2013 are based on a 1000kVA transformer rating of 100%.

Equipment from 2013 has been designed and tested to operate at overloads of up to 110% based on 400V.

Equipment has been rated to account for higher temperatures inside a padmount cubicle that can be encountered on a hot day and with a fully loaded transformer. Therefore, it is possible that the rating plate on the individual item may show a higher value. However, the switchgear must not be loaded beyond the maximum current rating given above.

4.6.2 Operations/features

- From 2013 the CB frame has been fitted with a switch on the incoming supply. This allows the isolation of the load from the transformer and provides a generator connection directly after the switch to feed all loads.
- The MDI comes with only (one) 1 MDI meter which can monitor all data plus one extra Cat 2 fuse strip. If a second Cat 2 fuse strip is required, and needs to be monitored, then the second MDI meter will be required to be added.
- Moulded case circuit breakers (MCCB) S8 of ABB make are used in the switchgear. The MCCBs are provided with an integrated electronic protection trip unit PR 212P-LSI. The circuit breakers are positive action, that is, the breaker can be either in *open* or *closed* position. The circuit breaker is a three-phase operating device, that is, all three (3) phases are operated simultaneously. This is clearly indicated on the circuit breaker front panel. The circuit breaker can be operated simply by pushing the operating handle up or down. Further details on application, setting procedures, operation and maintenance are provided in the manufacturer's instructions.
- The fuse switch strips, if provided, are suitable for single-phase operation only.
- Only Cat 2 400A fuse switch strips with 400A DIN type Size 2 fuses are to be used. **Do not use a higher rating fuse.** Feeder load must be monitored so that the total current does not exceed the continuous maximum current as above. Weber does not supply fuses as a part of switchboard.
- Busbar tags are provided for synchronisation of emergency generator without loss of supply to the customers (refer to [GAM 0095](#) for instruction on generator synchronization).
- The switches and circuit breakers are provided with their own handles. Separate handles are not needed.

4.6.3 External cabling

The switchgear is designed for termination of external cables as follows:

- Up to 4 x 630 mm² Cu or Al for each phase on the circuit breakers.
- Up to 2 x 240 mm² Cu or Al for each phase on the 400A fuse switch strips (if provided).

Please refer to Section 4.1.6 for cable connection detail.



**Type 3 – (Present)
(Switch on incomer)**



**Type 3 – (Pre 2013)
(Switch on incomer)**



**Type 3 – (Post 2013)
(No switch on incomer)**

Figure 22: Type 3 LV CB switchgear

4.7 Type 5 – 2100A load break switch switchboard

NOTE: Type 5 – 2100A load break switch switchboard must only be used on 1500kVA transformer.

The Weber South Pacific Type 5 – 2100A load break switch switchgear is supplied fully assembled and wired by the manufacturer as a load break switch only switchboard. The use of load break switch is to be restricted to single customer substations where the demand of the customer exceeds 1400A and necessary protection is provided at the customer's LV switchboard (refer to ETS0069 for details on use of load break switch). Use of the load break switch will be subject to Endeavour Energy's approval for each and every installation. No provision exists to mount additional fuse switch strips distributors at a later date. Facilities are made for the connection of an emergency generator set without disconnection of power supply to customers.

The following standard items are mounted on Type 5 – 2100A load break switch switchboard.

Table 21: Type 5 LV LBS switchgear standard items

Item	Qty
3Ø OETL3150 of Control and Switchgear-up to 2013	1
2500/5A current transformers for maximum demand indicator-up to 2013	3
15 minutes delay maximum demand indicator fully wired to the CTs	3
4 x 240 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 240 mm ² copper super stranded cable complete with lugs (neutral)	1
Copper bar with perforation for external/internal neutral and earth connections	1
Tags to facilitate connection/synchronisation of emergency generator	1
Space for street light control (to be mounted and wired by Endeavour Energy, if required)	1
Busbars, covers, shrouds to complete	1
Stainless steel or galvanised box section frame	

The following **additional/modified** items are supplied on frames from 2013 under ETS0069.

Table 22: Type 5 LV LBS switchgear additional items

Item	Qty
3Ø Socomec Isolator W3000-SOC1 3200A (Transformer isolator)	1
Smart MDI-time stamped 10 minute storage of data incl. Temp of trans (1 meter)	1
Magnetic temp. probe for transf. temp measurements	1
Adjustable frame up/down, backward and forward	1
4 x 300 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 300 mm ² copper super stranded cable complete with lugs (neutral)	1

4.7.1 Reference drawings/catalogues

Table 23: Type 5 LV LBS switchgear reference drawings

Description	2013 ref no.	Rating	2006 ref no.	2003 ref no.	Rating
Socomec Isolator	W3000-SOC1	2380A	2100A OETL 3150	2100A OETL 3150	2100A
Sw/bd	MF1302500-ENLB	2380A	VF130253-LBS3	VF130253-LBS3	2100A
MDI	C-MAPMC50902R	-	CAMSCO	CAMSCO	-
Tx to sw/bd cables	4x300mm	110°	2x240mm	2x240mm	110°

Equipment ratings shown above prior to 2013 are based on a 1000kVA transformer rating of 100%. Equipment from 2013 has been designed and tested to operate at overloads of up to 110% based on 400V.

Equipment has been rated to account for higher temperatures inside a padmount cubicle that can be encountered on a hot day and with a fully loaded transformer. Therefore, it is possible that the rating plate on the individual item may show a higher value. However, the switchgear must not be loaded beyond the maximum current rating given above.

4.7.2 Operations/features

- The MDI comes with only (one) 1 MDI meter which can monitor all data.
- Load break switch OETL of Control and Switchgear make, up to 2013 and Socomec from 2013 onwards is used in the switchboard. The switch is positive action type, that is, the switch can be either in *open* or *closed* position. The switch is a three-phase device, that is, all three (3) phases are operated simultaneously. This is clearly indicated on the switch front panel. The switch can be operated simply by pushing the operating handle up or down. Further details on application, setting procedures, operation and maintenance are provided in the manufacturer's instructions.
- Busbar tags are provided for synchronisation of emergency generator without loss of supply to the customers (refer to GAM 0095 or instruction on generator synchronization).
- The switch is provided with its own handle. Separate handles are not needed.

4.7.3 External cabling

The switchgear is designed for termination of external cables as follows:

- Up to 4 x 630 mm² Cu or Al for each phase on the circuit breakers.

Please refer to Section 4.1.6 for cable connection detail.



Type 3 LV LBS frame front
(2100A LBS - No fuse strips)



Type 3 LV LBS frame rear
(2100A LBS - No fuse strips)

Figure 23: Type 3 LV LBS switchgear

4.8 Type 4 – 1400a circuit breaker switchboard

NOTE: Type 4 – 1400A Circuit breaker switchboard can be used on transformer sizes up to and including 1000kVA.

The Weber South Pacific Type 4 - 1400A circuit breaker switchboard is of a modular construction. The switchgear is supplied fully assembled and wired by the manufacturer as a circuit breaker only switchboard. This switchboard is usually to be used when demand of two (2) single customers exceeds 400A but is less than 735A. There is no provision to mount additional 400A fuse switch strips. The load supplied through the switchboard must not exceed 1400A or 1000kVA. Facilities are made for the connection of an emergency generator set without disconnection of power supply to customers.

The following standard items are mounted on a Type 4 – 1400A circuit breaker switchboard.

Table 24: Type 4 LV CB switchgear standard items

Item	Qty
3Ø Terrasaki MCCB XS1250NE with electronic trip unit-up to 2013	2
1600/5A current transformers for maximum demand indicator-up to 2013	3
15 minutes delay maximum demand indicator fully wired to the CTs	3
4 x 185 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 185 mm ² copper super stranded cable complete with lugs (neutral)	1
Copper bar with perforation for external/internal neutral and earth connections	1
Tags to facilitate connection/synchronisation of emergency generator	1
Space for street light control (to be mounted and wired by Endeavour Energy, if required)	1
Busbars, covers, shrouds to complete	1
Stainless steel or galvanised box section frame	1

The following additional/modified items are supplied on frames from 2013 under ETS0069.

Table 25: Type 4 LV CB switchgear additional items

Item	Qty
3Ø Socomec Isolator W2000-SOC 2000A (Transformer isolator)	1
3Ø ABB MCCB T7 with electronic trip unit-2013	2
Smart MDI-time stamped 10 minute storage of data incl. Temp of trans (1 meter)	1
Magnetic temp. probe for transf. temp measurements	1
Adjustable frame up/down, backward and forward	1
4 x 240 mm ² /phase copper super stranded cable complete with lugs (phase)	3
2 x 240 mm ² copper super stranded cable complete with lugs (neutral)	1

4.8.1 Reference drawings/catalogues

Table 26: Type 4 LV CB switchgear reference drawings

Description	2013 ref no.	Rating	2006 ref no.	2003 ref no.	Rating
ABB MCCB	T7	795A	-	-	-
Terasaki MCCB	-	-	XS 1250NE	XS 1250NE	735A
Socomec Isolator	W2000-SOC	1590A	-	-	-
Sw/bd	MF1221600-ENT4	1590A	VF003163-7TYP4	VF003163-7TYP4	-
MDI	C-MAPMC50902R	-	CAMSCO	CAMSCO	-
Tx to sw/bd cables	4x240mm	110°	2x185mm	2x185mm	110°

Equipment ratings shown above prior to 2013 are based on a 1000kVA transformer rating of 100%. Equipment from 2013 has been designed and tested to operate at overloads of up to 110% based on 400V.

Equipment has been rated to account for higher temperatures inside a padmount cubicle that can be encountered on a hot day and with a fully loaded transformer. Therefore, it is possible that the rating plate on the individual item may show a higher value. However, the switchgear must not be loaded beyond the maximum current rating given above.

4.8.2 Operations/features

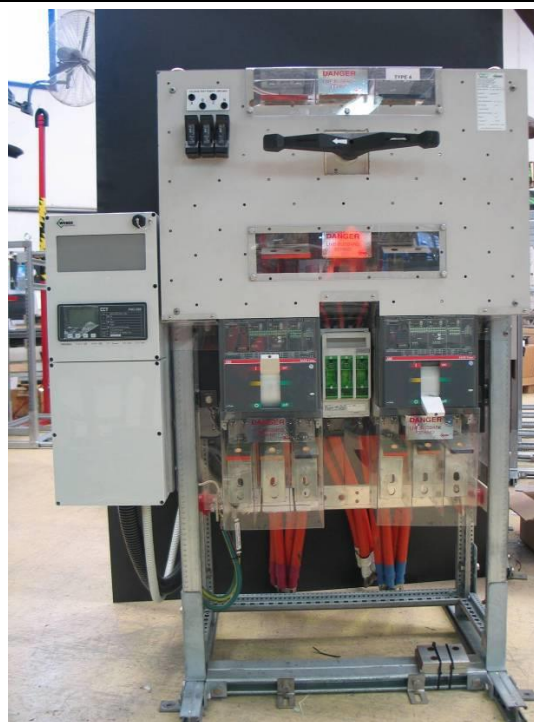
- From 2013 the CB frame has been fitted with a switch on the incoming supply. This allows the isolation of the load from the transformer and provides a generator connection directly after the switch to feed all loads.
- The MDI comes with only (one) 1 MDI meter which can monitor all data.
- Moulded case circuit breakers (MCCB) XS1250NE of Terasaki make and T7 of ABB (from 2013) are used in the switchgear. The MCCBs are provided with an integrated electronic protection trip unit. The circuit breakers are positive action type, that is, the breaker can be either in *open* or *closed* position. The circuit breaker is a three-phase operation device, that is, all three (3) phases are operated simultaneously. This is clearly indicated on the circuit breaker front panel. The circuit breaker can be operated simply by pushing the operating handle up or down. Further details on application, setting procedures, operation and maintenance are provided in the manufacturer's instructions.
- Tags are provided for synchronisation of an emergency generator to the circuit breaker load only without loss of supply to the customers (refer to GAM 0095 for instruction on generator synchronization).
- The switches and circuit breakers are provided with their own handles. Separate handles are not needed.

4.8.3 External cabling

The switchgear is designed for termination of external cables as follows:

- Up to 4 x 630 mm² Cu or Al for each phase on the circuit breakers.
- Up to 2 x 240 mm² Cu or Al for each phase on the fuse switch strips (if provided).

Please refer to Section 4.1.6 for cable connection detail.



Type 4 – (2013)
(New LBS, CBs, Smart MDI + 3 ph Aux)



Type 4 – (2006-2013)
(Fully shrouded + MDI)



Type 4 – (before 2006)

Figure 24: Type 4 LV CB switchgear

4.9 Distribution fuse panel (DFP)

4.9.1 Fuse strips 160A and 400A

The fuse strips used in DFPs up to 2013 were similar to that used on older Category 2 switchgear but with operating handles fitted. From 2013 onwards the exact same fuse strips are used in DFPs as is used for CAT 2 LV frames.

The 160A strips are 50mm wide and accept a DIN 00 fuse. They are typically used to supply auxiliary or street lighting requirements but can be used for small customer loads.

The 400A strips are 100mm wide and accept a DIN 02 fuse. They are typically used to supply individual customer loads of 250-350A.

As indicated above the fuse strips in DFPs were different from that of older padmount Cat 2 fuse strips. The older switching handles did restrict air flow to the fuses but this was not as big an issue in DFPs as the total loading and temperatures in these panels did not de-rate adjacent fuses to the same extent as in a padmount situation. The newer fuse strips and handles have more venting and are even less affected by temperature.

4.9.2 Cubicles, busbars and bus-tie

The Weber South Pacific DFP is of a modular construction. The unit is normally wall mounted but can be free standing (when used in conjunction with additional mounting frame) and is supplied fully assembled by the manufacturer as a cubicle with insulated phase, neutral and earth busbars.

Table 27: Equipment dimensions

Description	Width	Height	Depth
5 Way	700	1310	375
7 Way	920	1310	375
9 Way	1140	1310	375

This switchboard is typically used in commercial areas to provide an individually fused supply to multiple customers in excess as to what can be provided from a normal substation. There is provision to mount a mixture of 160A or 400A fuse switch strips.

The 5 way board is so named to accept 5 x 100mm fuse strips but can accept 10 x 50mm fuse strips or a mixture of both. The 7 way board is so named to accept 7 x 100mm fuse strips but can accept 14 x 50mm fuse strips or a mixture of both. The 9 way board is so named to accept 9 x 100mm fuse strips but can accept 18 x 50mm fuse strips or a mixture of both.

A unit with a bus-tie is also available for the 5, 7 and 9 way units to provide an isolation/open point in the cubicle. To keep the physical sizes of the enclosures consistent the inclusion of a bus-tie results in the reduction of the number of available fuse strips by (1) one.

The load supplied through the switchboard must not exceed 900A. Facilities are made for the connection of an emergency generator set (not in the bus-tie units) without disconnection of power supply to customers.

A mounting frame is available to support the cubicle when it is free standing. The frame does not need to be cemented in (but can be) and is normally buried in the ground with the cables entering the base through the legs of the frame.



Figure 25: Stainless steel mounting frame

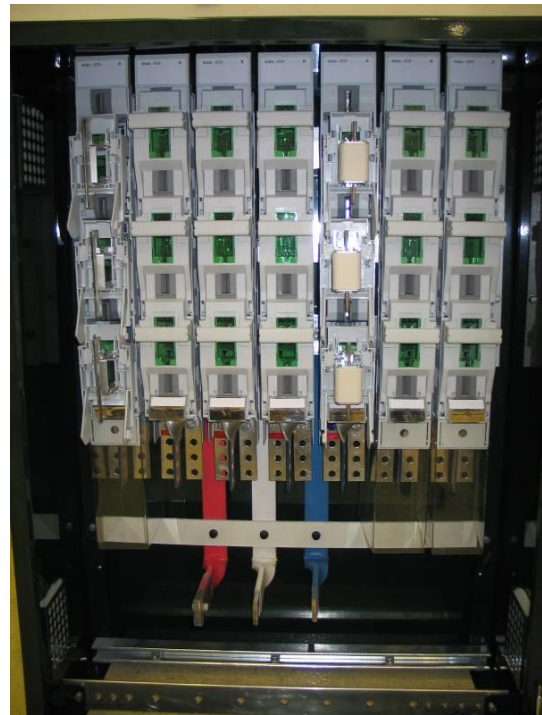


Figure 26: Example - 7 way cubicle (with new fuse strips)



Figure 27: Example 5 - way cubicle (with older fuse strips)



Figure 28: Example - 9 way cubicle with bus tie

5. AUTHORITIES AND RESPONSIBILITIES

General Manager Future Grid & Asset Management has the authority and responsibility for:

- Making all decisions concerning compliance in respect of this Standard.
- Delegating any of these authorities and responsibilities to the **Head Of Asset Planning & Performance**.

Head Of Asset Planning & Performance has the authority and responsibility for:

- Approving this Standard, including any variations
- Reviewing this Standard and making recommendations to the **General Manager Future Grid & Asset Management**.
- Making recommendations concerning compliance in respect of this Standard.

Engineering Delivery Manager has the responsibility for:

- Clarifying all the technical aspects of this Standard with stakeholders.
- Updating the relevant actions required and outlined in this Standard.

Head of Design have the responsibility for confirming that all designs carried out by employees conform to the requirements of this instruction.

Head of Customer Network Solutions have the responsibility for confirming that all designs carried out by Level 3 ASPs conform to the requirements of this instruction.

Accredited Service Providers have the responsibility that the latest issue of any instruction or drawing relevant to or listed in this manual are made available and used during the design of any project.

