

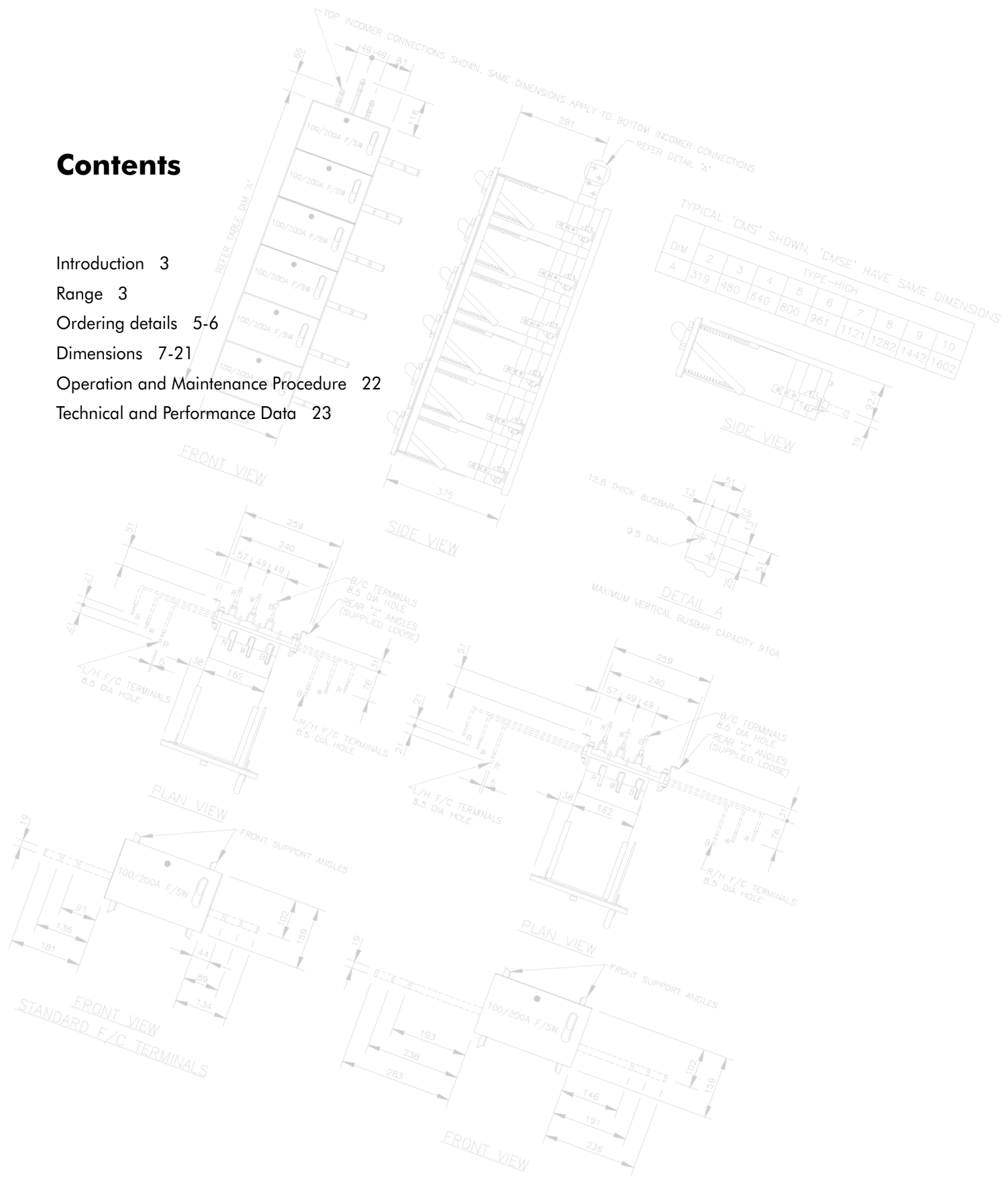
MINISTACK

Fuse Switch Disconnecter Units

ALSTOM

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Ministacks

ALSTOM Industrial Products Division is continually developing the Ministack range of switches to provide for the requirements of consulting engineers, contractors and switchboard builders.

The latest range of Ministacks include:

- Upated busbar (910A) for 100A & 200A stacks, 2 to 10 high.
- New style sandwiched copper cable connectors fitted to the rear moulding of 100A & 200A units.
- 3&4 high 400A & 630A Ministacks.
- NEW comprehensive range of mixed stacks.

The Ministack now offers industry a clear choice in low voltage switchboard design. This design suits Form 1 to Form 4 types of separation. With the addition of optional terminal shrouds plus the necessary barriers provided by the switchboard builder, Form 4 separation is achievable.

Fuse switch disconnecter units are available which have been successfully tested, and meet the requirements of the standard test as indicated by Clause EE3 in Appendix EE of AS3439.1 or special test as specified in Clause EE6 of Appendix EE.

The fuse switch disconnectors are defined as follows:

CMS

Standard types which have been tested with the arc being initiated on the load side terminals.

CMSE

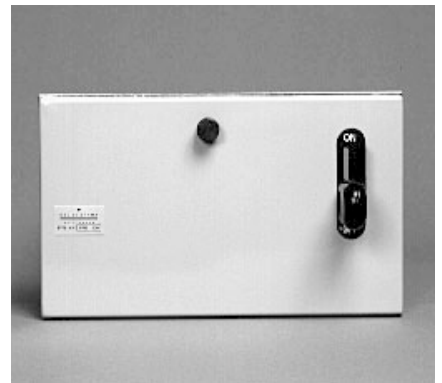
Special types tested where the arc was initiated within the fuse switch disconnectors and substantial 3-phase arcing currents were not interrupted by the fuse links for the full duration of test time nominated.

Service Requirements and Temperature Rise Guidelines (CL.6.1.1) – AS3947.1

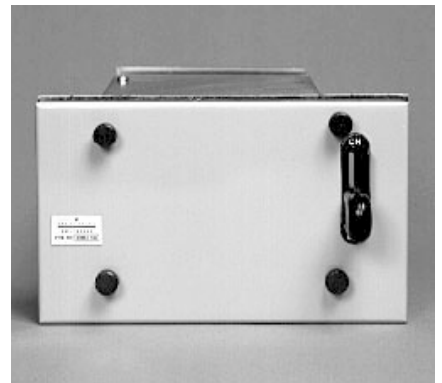
Under normal service conditions as defined in AS3947-1 (i.e. "The ambient air temperature does not exceed +40°C and its average over a period of 24 hrs does not exceed +35°C"), individual switch units in a stack are fully rated. Derating is however necessary when switch ratings exceed the assigned main busbar rating.

Load diversity to be taken into account.

For reliable operation, regular maintenance is required. Refer page 22.



CMS



CMSE

Range:

Switch Rating Amps	Outgoing Terminal Connection Types	Height of Stack	Main Busbar Incomer Direction			Busbar Rating Amps
			Above	Below	Above & Below	
100 & 200	Front Connected – Right Hand – Left Hand Back Connected	2-10H	Above	Below	Above & Below	910
400 & 630	Front Connected – Right Hand – Left Hand Back Connected	2-4H	Above	Below	Above & Below	1000
800	Front Connected – Right Hand – Left Hand Back Connected	1&2H	Above	Below	Above & Below	1000
Mixed Stacks	Front Connected – Right Hand – Left Hand Back Connected	See page 4	Above	Below	Above or Below	1000/910

New Mixed Stacks

Mixed Stacks are now available in standard configurations up to 9 high, by combining 100A up to 800A switch disconnecter CMS/CMSE units. The following table lists the standard configurations available.

Mixed Stack Configuration

Large Switch Disconnecter		Small Switch Disconnecter	
400A, 630A or 800A or Future Space for 400A/630A CMS/CMSE Unit		100A or 200A or Future Space for 100A/200A CMS/CMSE Unit	
Quantity per Stack		Quantity per Stack	
1 x 400A/630A or Future 400A/630A	plus	1 up to 8 of above	
1 x 800A	plus	1 up to 6 of above	
2 x 400A/630A or Future 400A/630A	plus	1 up to 6 of above	
3 x 400A/630A or Future 400A/630A	plus	1 up to 3 of above	
2 x 400A/630A or Future 400A/630A	plus	1 x 800A	
2 x 800A			

Accessories

Key Interlocks: Castell, Lowe & Fletcher
Auxiliary Contacts: Up to 2 C/O contacts per switch
Terminal Shrouds: 2 part terminal shrouds to suit all switches

Notes

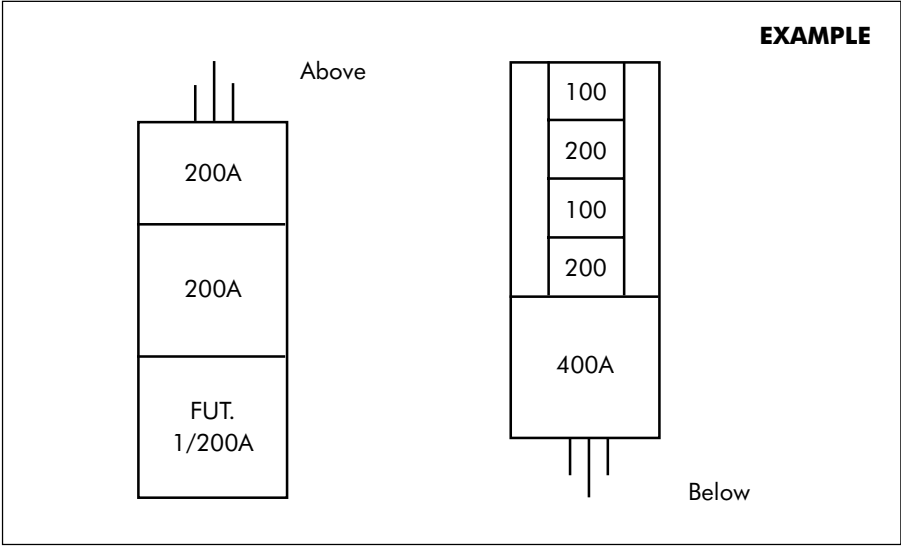
1. CMSE Appendix EE Ministacks supplied less in-fill panels, refer data sheet page 11.
2. Doors supplied loose unpainted c/w accessories and fasteners or switch doors are available fitted and painted.

Ministack Quotation – Ordering Details

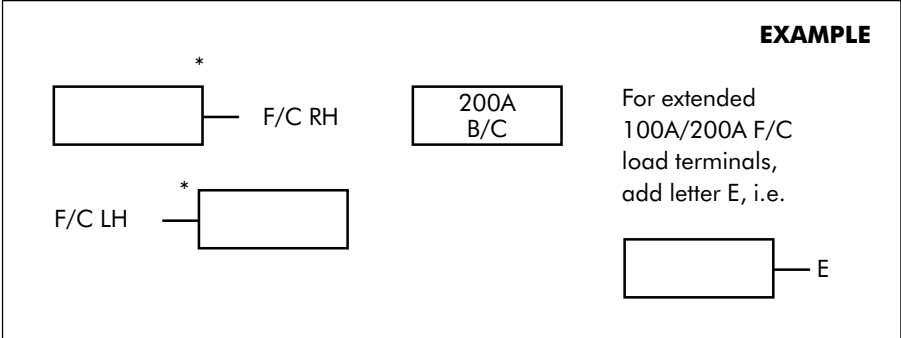


1. Draw switch layout in space provided or attach drawings.

Note:
Space for Future units, write as (FUT.1/200A) or (FUT.4/630A)



2. Show incomer positions of riser busbars, either above, below or above and below.



2a. Show position of outgoing terminals, front connected, left hand, right hand or back connected as indicated:

Ministack Quotation – Ordering Details (cont.)

3. Tick the required riser busbar short time withstand:

100A & 200A Ministacks	63kA for 1 sec	<input type="checkbox"/>
400A/630A/800A Ministacks	50kA for 3 sec	<input type="checkbox"/>
400A/630A/800A Ministacks	63kA for 1 sec	<input type="checkbox"/>
Mixed Stacks 100A to 800A	50kA for 3 sec	<input type="checkbox"/>
Mixed Stacks 100A to 800A	63kA for 1 sec	<input type="checkbox"/>

4. Tick the required switch type:

CMS (Standard)	<input type="checkbox"/>
CMSE (Appendix EE)	<input type="checkbox"/>

5. Tick the required door type:

Loose switch doors supplied unpainted or Switch doors painted and fitted Colour – N42 Storm Grey – AS2700	<input type="checkbox"/>
	<input type="checkbox"/>

6. Accessories:

Add the following codes to switches as detailed:

Dust-proofed CMS units (CMSE IP54 as standard)	DP
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Key Interlocks:

■ Lowe & Fletcher	L&F _ *
■ Castell	C _ * _ _
■ *Add symbol, e.g.	L&FA

Auxiliary Switches:

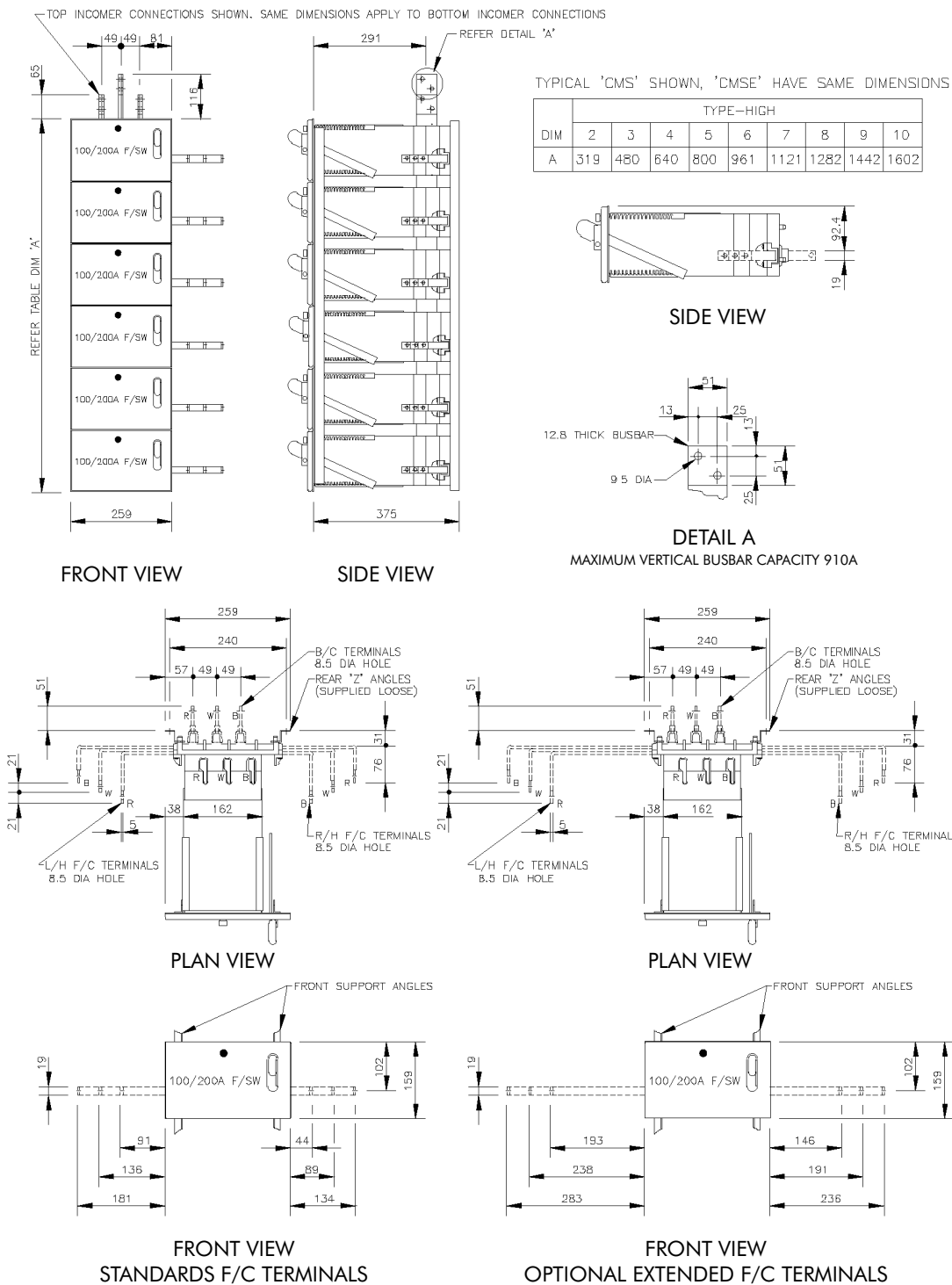
■ Auxiliary contacts for 100A/200A switches Max. No. of contacts = 2	AUX-C/O
■ Auxiliary contacts for 400A/630A/800A Max. No. of contacts = 3	AUX-C/O
■ Add No. of contacts to Code, e.g.	AUX2C/O

Terminal Shrouds (3 Phase Set):

■ 100A - 800A add Code	TS
Typical example: 200A CMS, dust-proofed c/w 2 aux C/O contacts, Code = 200A DP aux 2C/O TS	

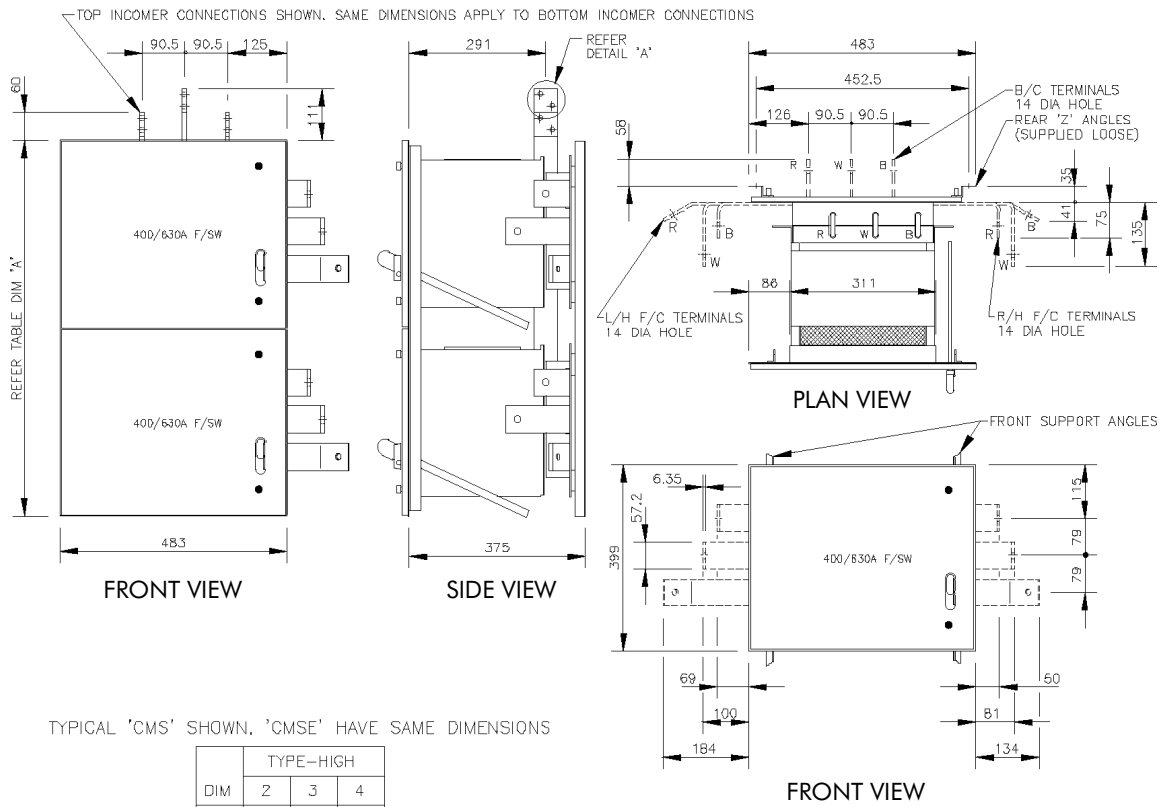
Dimensions

100A/200A CMS Outline



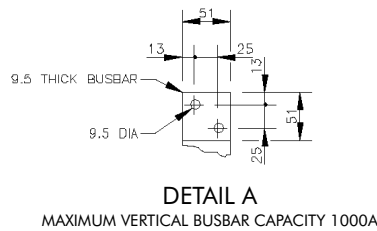
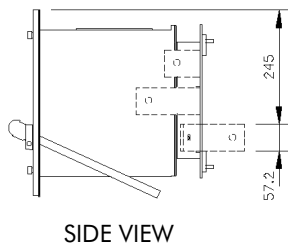
Dimensions

400A/630A CMS Outline

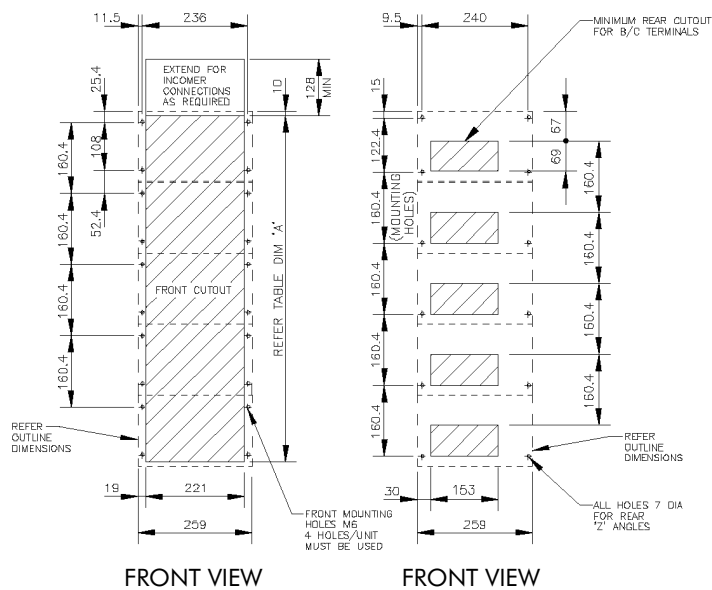


TYPICAL 'CMS' SHOWN, 'CMSE' HAVE SAME DIMENSIONS

DIM	TYPE-HIGH		
	2	3	4
A	800	1201	1602



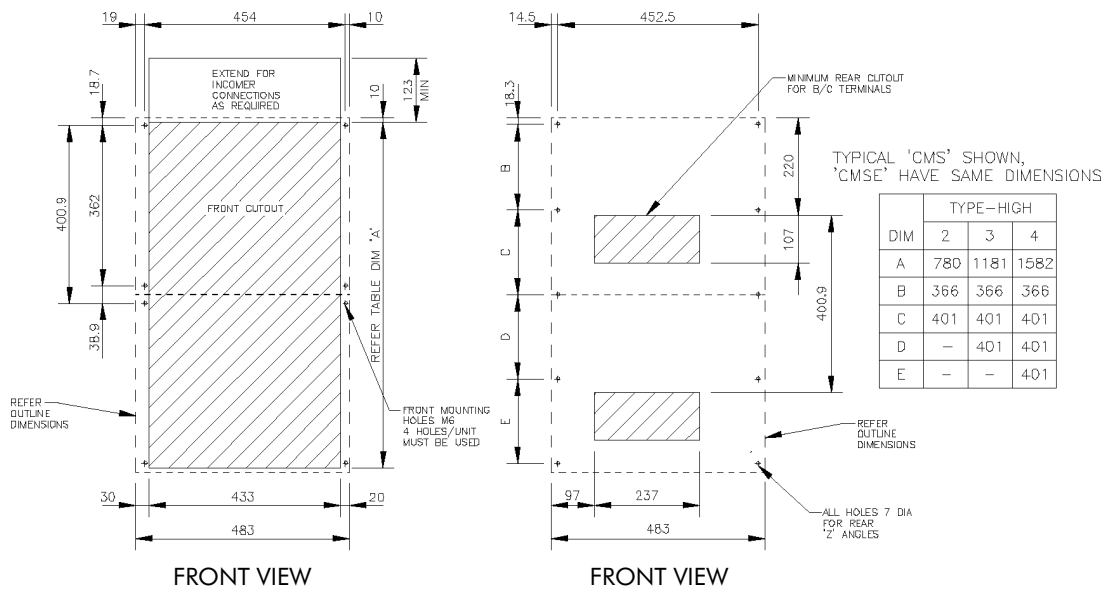
Dimensions 100A/200A CMS Cutout & Mounting



TYPICAL 'CMS' SHOWN, 'CMSE' HAVE SAME DIMENSIONS

DIM	TYPE-HIGH									
	2	3	4	5	6	7	8	9	10	
A	299	460	620	780	941	1101	1262	1422	1582	

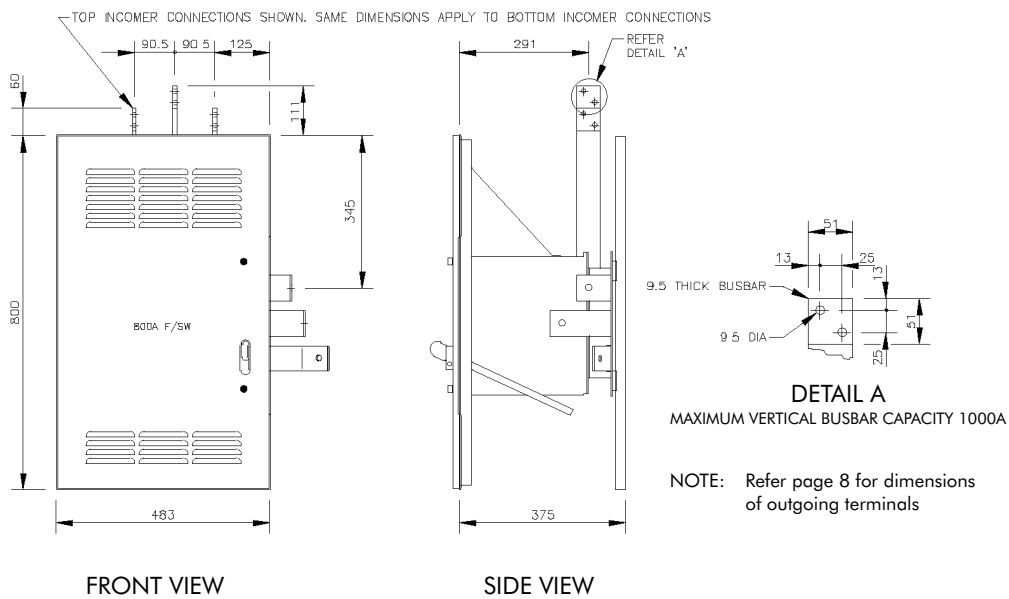
Dimensions 400A/630A CMS Cutout & Mounting



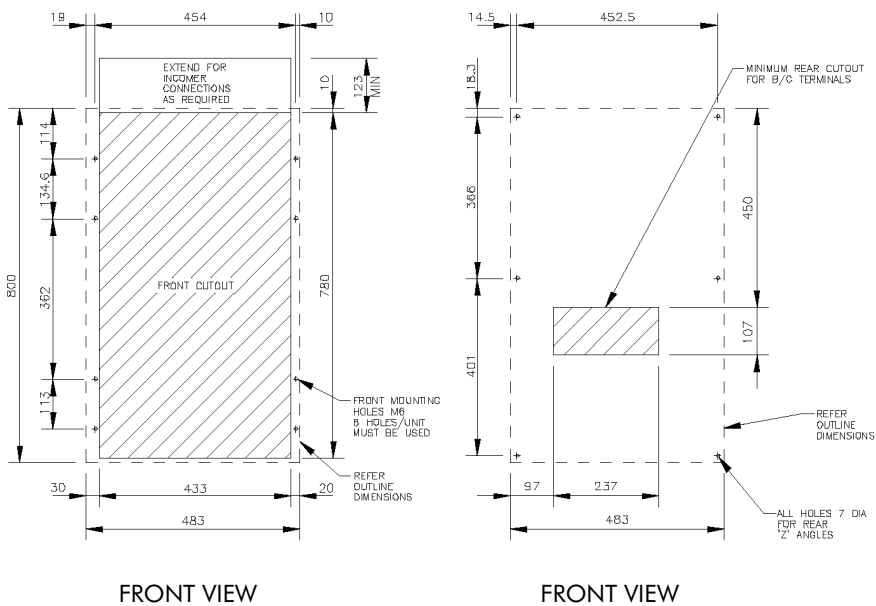
TYPICAL 'CMS' SHOWN, 'CMSE' HAVE SAME DIMENSIONS

DIM	TYPE-HIGH		
	2	3	4
A	780	1181	1582
B	366	366	366
C	401	401	401
D	-	401	401
E	-	-	401

Dimensions 800A CMS Outline

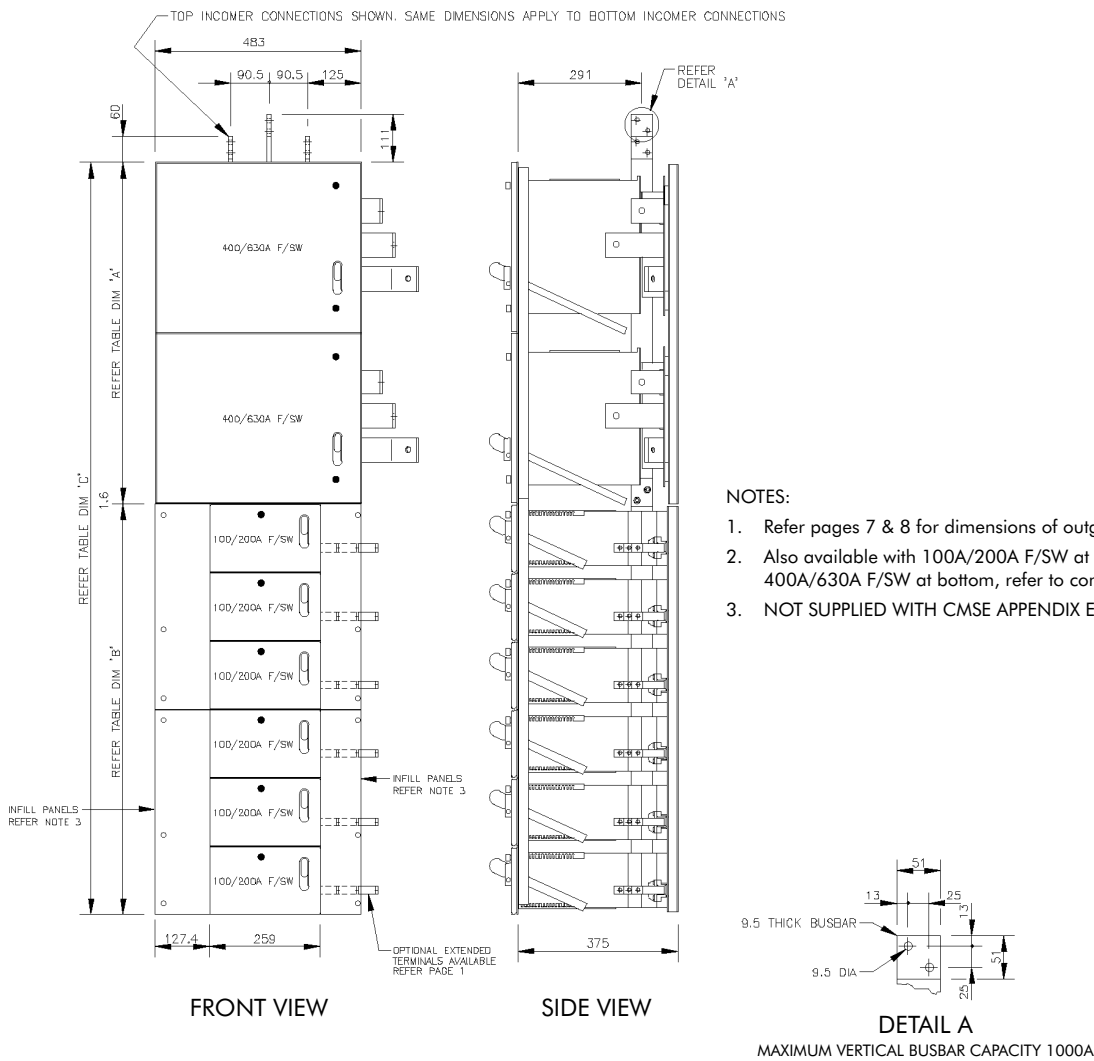


Dimensions 800A CMS Cutout Details



Dimensions

Mixed 100A/200A/400A/630A CMS Outline

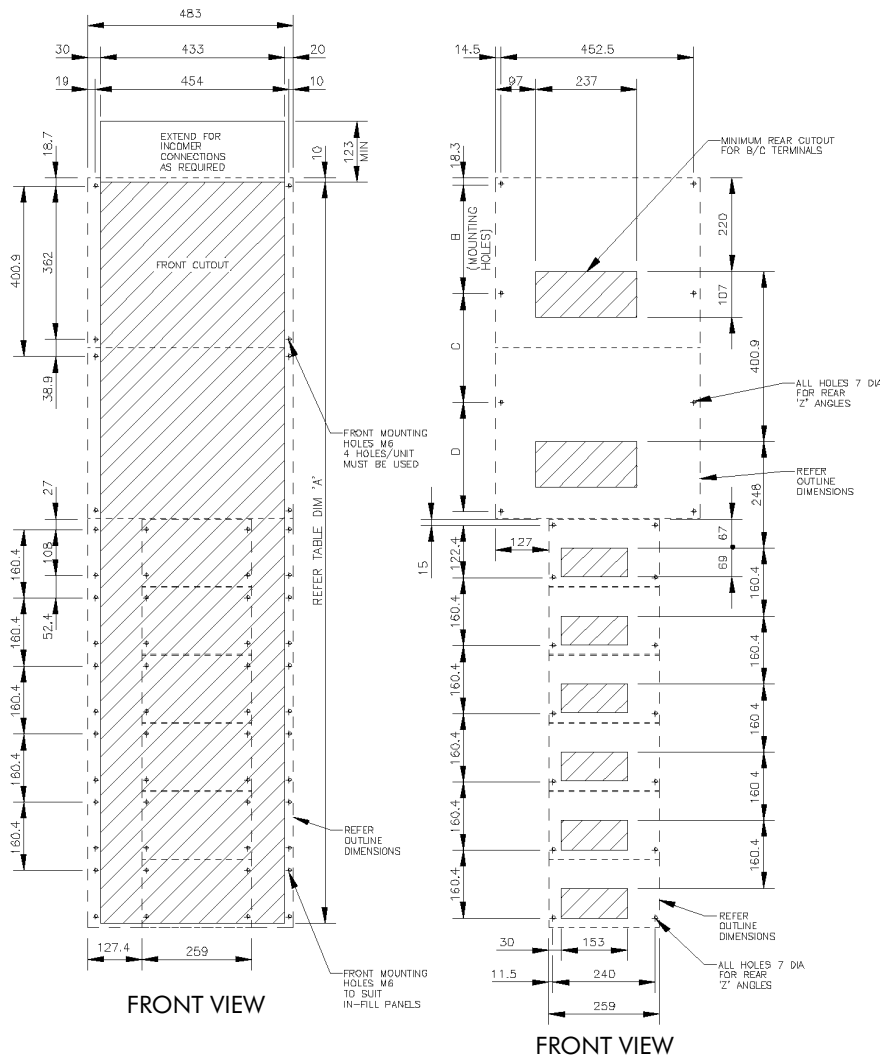


TYPICAL 'CMS' SHOWN, 'CMSE' HAVE SAME DIMENSIONS

		MIXED STACK COMBINATION																																	
DIM		1X4/630A+1X1/200A	1X1/200A+1X4/630A	1X4/630A+2X1/200A	1X4/630A+1X4/630A	3X1/200A+1X4/630A	1X4/630A+4X1/200A	4X1/200A+1X4/630A	1X4/630A+5X1/200A	5X1/200A+1X4/630A	1X4/630A+6X1/200A	6X1/200A+1X4/630A	1X4/630A+7X1/200A	1X4/630A+8X1/200A	8X1/200A+1X4/630A	2X4/630A+1X1/200A	1X1/200A+2X4/630A	2X4/630A+2X1/200A	2X1/200A+2X4/630A	2X4/630A+3X1/200A	3X1/200A+2X4/630A	2X4/630A+4X1/200A	4X1/200A+2X4/630A	2X4/630A+5X1/200A	5X1/200A+2X4/630A	2X4/630A+6X1/200A	6X1/200A+2X4/630A	3X4/630A+1X1/200A	1X1/200A+3X4/630A	3X4/630A+2X1/200A	2X1/200A+3X4/630A	3X4/630A+3X1/200A	3X1/200A+3X4/630A		
A		399	399	399	399	399	399	399	399	399	399	399	399	399	800	800	800	800	800	800	800	800	800	800	800	800	800	1201	1201	1201					
B		159	319	480	640	800	961	1121	1282	159	319	480	640	800	961	159	319	480	640	800	961	159	319	480											
C		560	720	881	1041	1201	1362	1522	1683	961	1121	1282	1442	1602	1763	1362	1522	1683																	

Dimensions

Mixed 100A/200A/400A/630A CMS Cutout Details

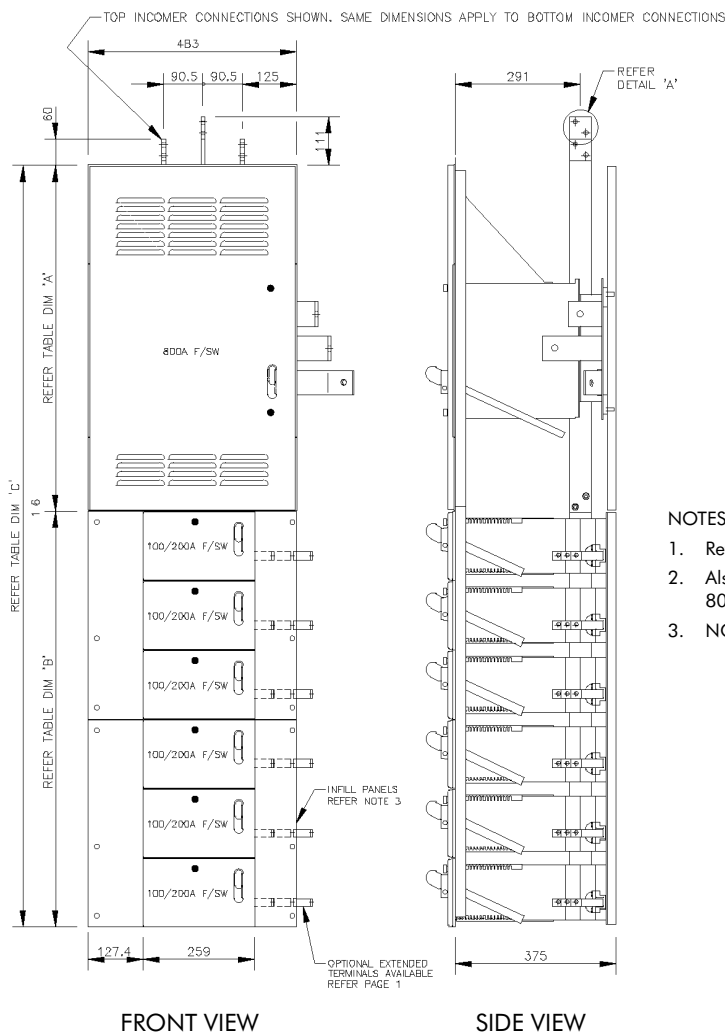


TYPICAL 'CMS' SHOWN, 'CMSE' HAVE SAME DIMENSIONS

DIM	MIXED STACK COMBINATION																																				
	1X4/630A+1X1/200A	1X1/200A+1X4/630A	1X4/630A+2X1/200A	2X1/200A+1X4/630A	1X4/630A+3X1/200A	3X1/200A+1X4/630A	1X4/630A+4X1/200A	4X1/200A+1X4/630A	1X4/630A+5X1/200A	5X1/200A+1X4/630A	1X4/630A+6X1/200A	6X1/200A+1X4/630A	1X4/630A+7X1/200A	7X1/200A+1X4/630A	1X4/630A+8X1/200A	8X1/200A+1X4/630A	2X4/630A+1X1/200A	1X1/200A+2X4/630A	2X4/630A+2X1/200A	2X1/200A+2X4/630A	3X1/200A+2X4/630A	2X4/630A+3X1/200A	2X4/630A+4X1/200A	4X1/200A+2X4/630A	2X4/630A+5X1/200A	5X1/200A+2X4/630A	2X4/630A+6X1/200A	6X1/200A+2X4/630A	3X4/630A+1X1/200A	1X1/200A+3X4/630A	3X4/630A+2X1/200A	2X1/200A+3X4/630A	3X4/630A+3X1/200A	3X1/200A+3X4/630A			
A	540	700	861	1021	1181	1342	1502	1662	941	1101	1261	1422	1582	1743	1341	1502	1662																				
B	366	366	366	366	366	366	366	366	366	366	366	366	366	366	366	366	366																				
C	-	-	-	-	-	-	-	-	401	401	401	401	401	401	401	401	401																				
D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																				

Dimensions

Mixed 100A/200A/800A CMS Outline

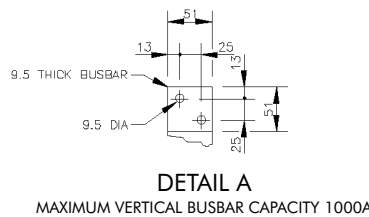


NOTES:

1. Refer pages 7 & 8 for dimensions of outgoing terminals
2. Also available with 100A/200A F/SW at the top and 400A/630A/800A F/SW at the bottom, refer to combination table below.
3. NOT SUPPLIED WITH CMSE APPENDIX EE STACKS

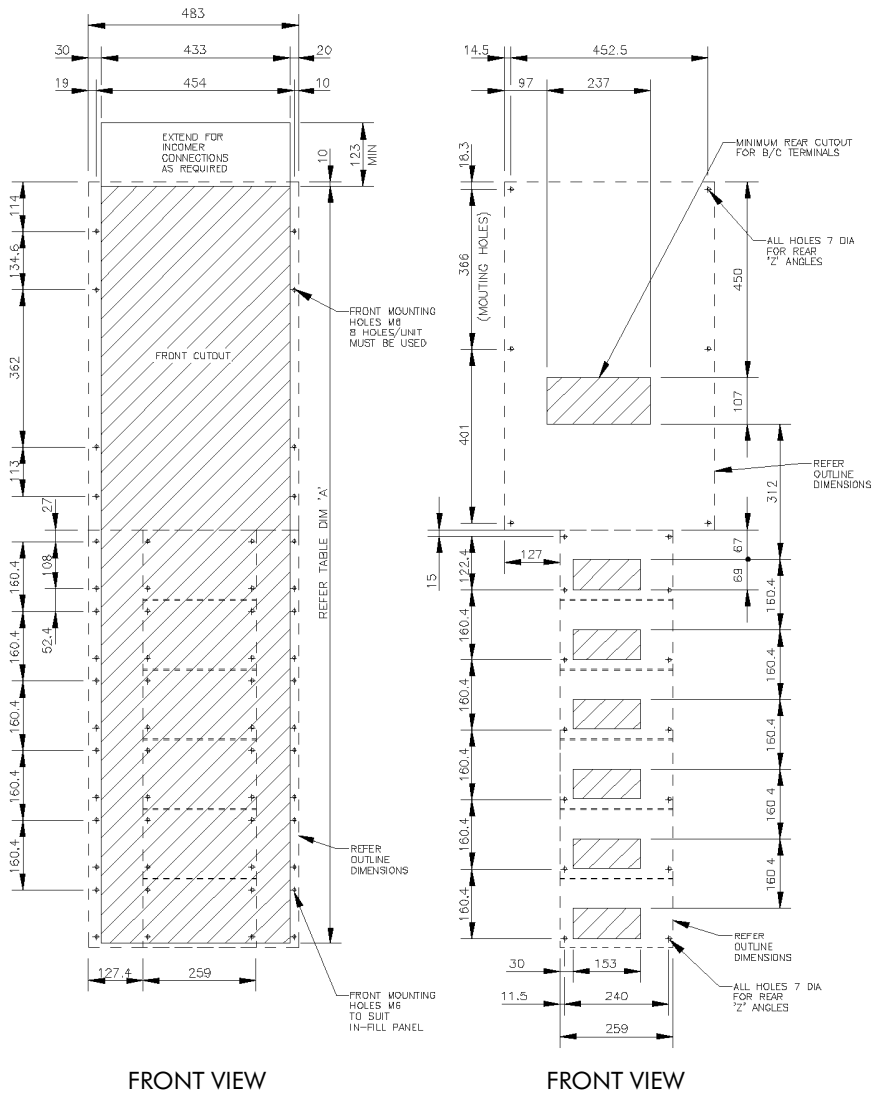
TYPICAL 'CMS' SHOWN, 'CMSE' HAVE SAME DIMENSIONS

		MIXED STACK COMBINATION					
DIM	1X800A+1X1/200A	1X1/200A+1X800A	1X800A+2X1/200A	2X1/200A+1X800A	1X800A+3X1/200A	1X800A+4X1/200A	1X800A+5X1/200A
A	800	800	800	800	800	800	800
B	159	319	480	640	800	961	
C	961	1121	1282	1442	1602	1763	



Dimensions

Mixed 100A/200A/800A CMS Cutout Details

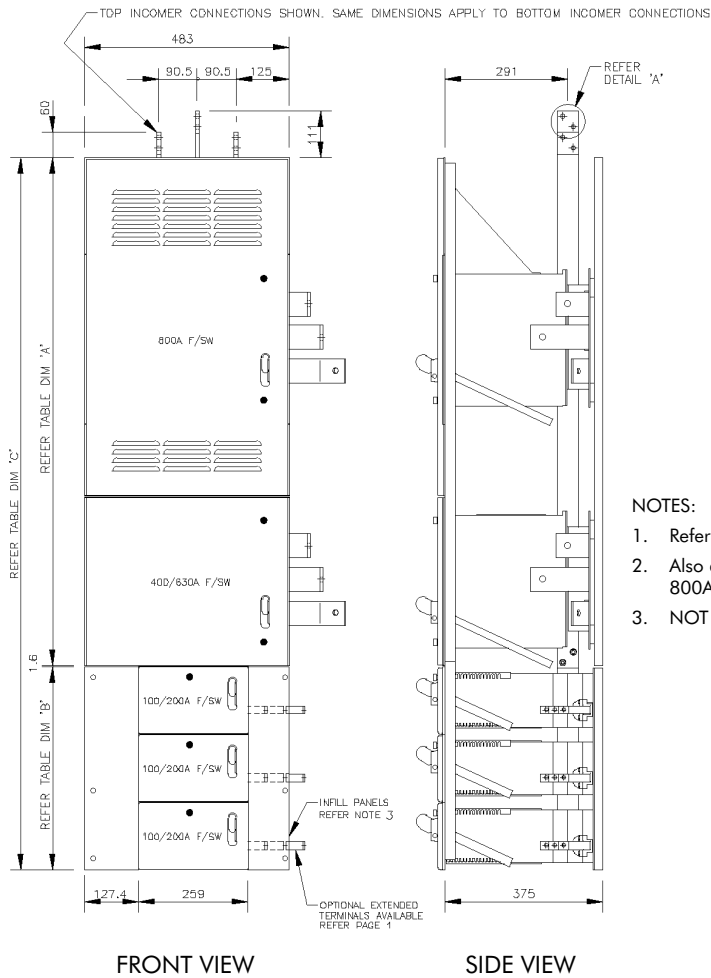


TYPICAL 'CMS' SHOWN, 'CMSE' HAVE SAME DIMENSIONS

DIM	MIXED STACK COMBINATION					
	A	1X800A+1X1/200A 1X1/200A+1X800A	1X800A+2X1/200A 2X1/200A+1X800A	1X800A+3X1/200A 3X1/200A+1X800A	1X800A+4X1/200A 4X1/200A+1X800A	1X800A+5X1/200A 5X1/200A+1X800A
	941	1101	1261	1422	1582	1742

Dimensions

Mixed 100A/200A/400A/630A/800A CMS Outline

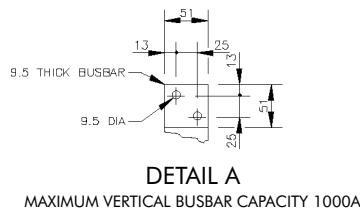


NOTES:

1. Refer pages 7 & 8 for dimensions of outgoing terminals
2. Also available with 100A/200A F/SW at the top and 400A/630A/800A F/SW at the bottom, refer to combination table below.
3. NOT SUPPLIED WITH CMSE APPENDIX EE STACKS

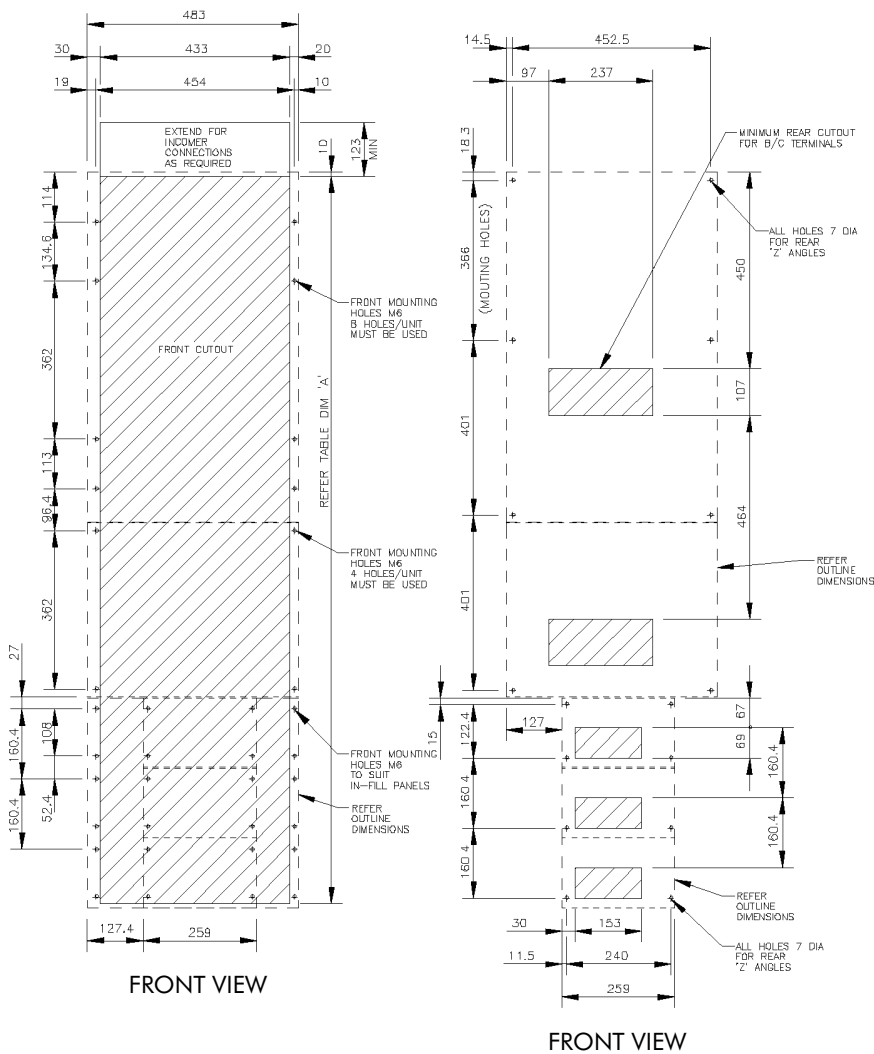
TYPICAL 'CMS' SHOWN, 'CMSE' HAVE SAME DIMENSIONS

MIXED STACK COMBINATIONS				
DIM	1X800+1X4/630A+1X1/200A			
	1X1/200A+1X4/630A+1X800A			
	1X800+1X4/630A+1X1/200A			
	2X1/200A+1X4/630A+1X800A			
	1X800+1X4/630A+3X1/200A			
	3X1/200A+1X4/630A+1X800A			
A	1201	1201	1201	
B	159	319	480	
C	1362	1522	1683	



Dimensions

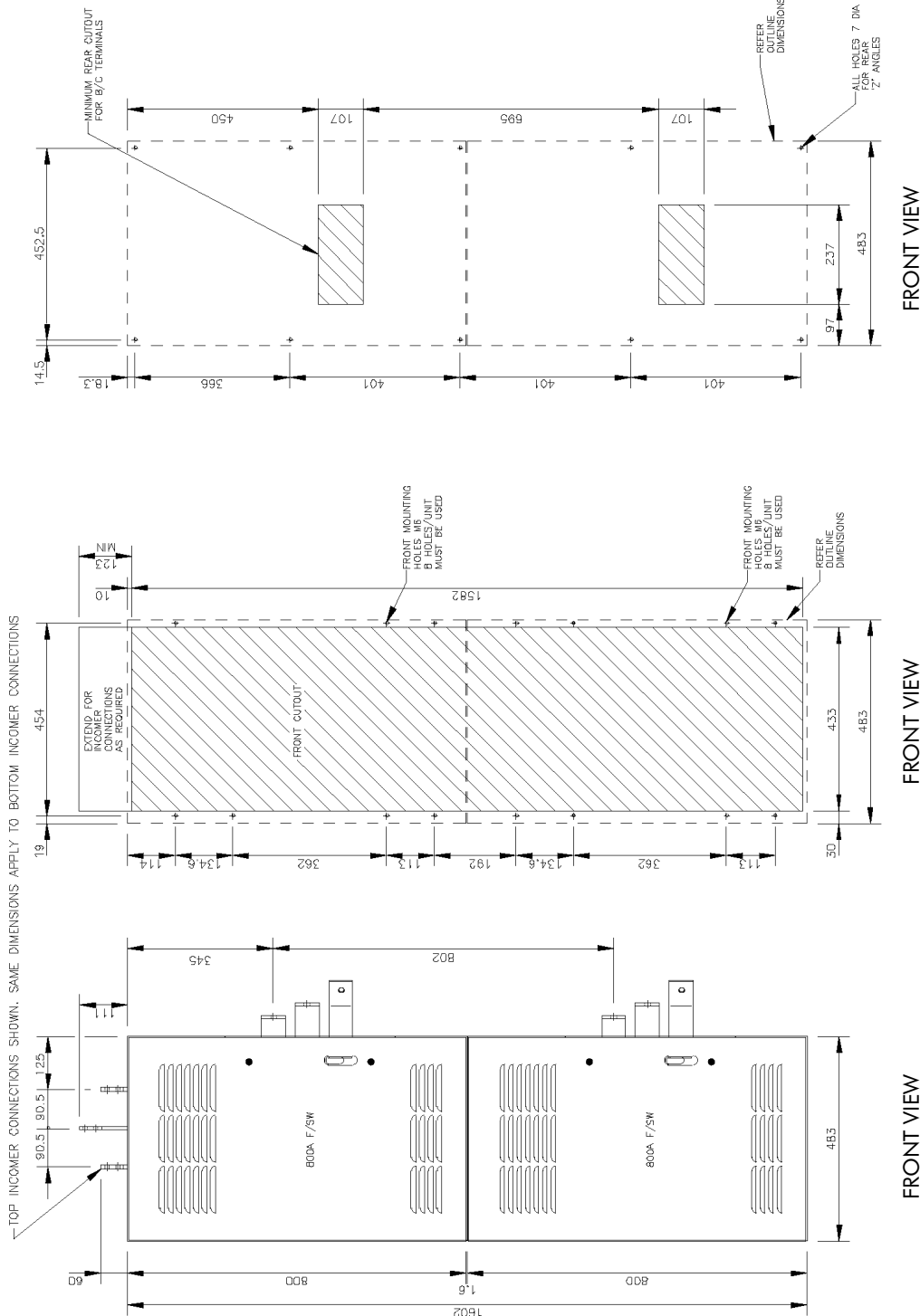
Mixed 100A/200A/400A/630A/800A CMS Cutout Details



MIXED STACK COMBINATIONS	
DIM	1X4/630+1X800A+1X1/200A
A	1342
	1X1/200A+1X4/630A+1X800A
	1X4/630+1X800A+2X1/200A
	2X1/200A+1X4/630A+1X800A
	1X4/630+1X800A+3X1/200A
	3X1/200A+1X4/630A+1X800A

Dimensions

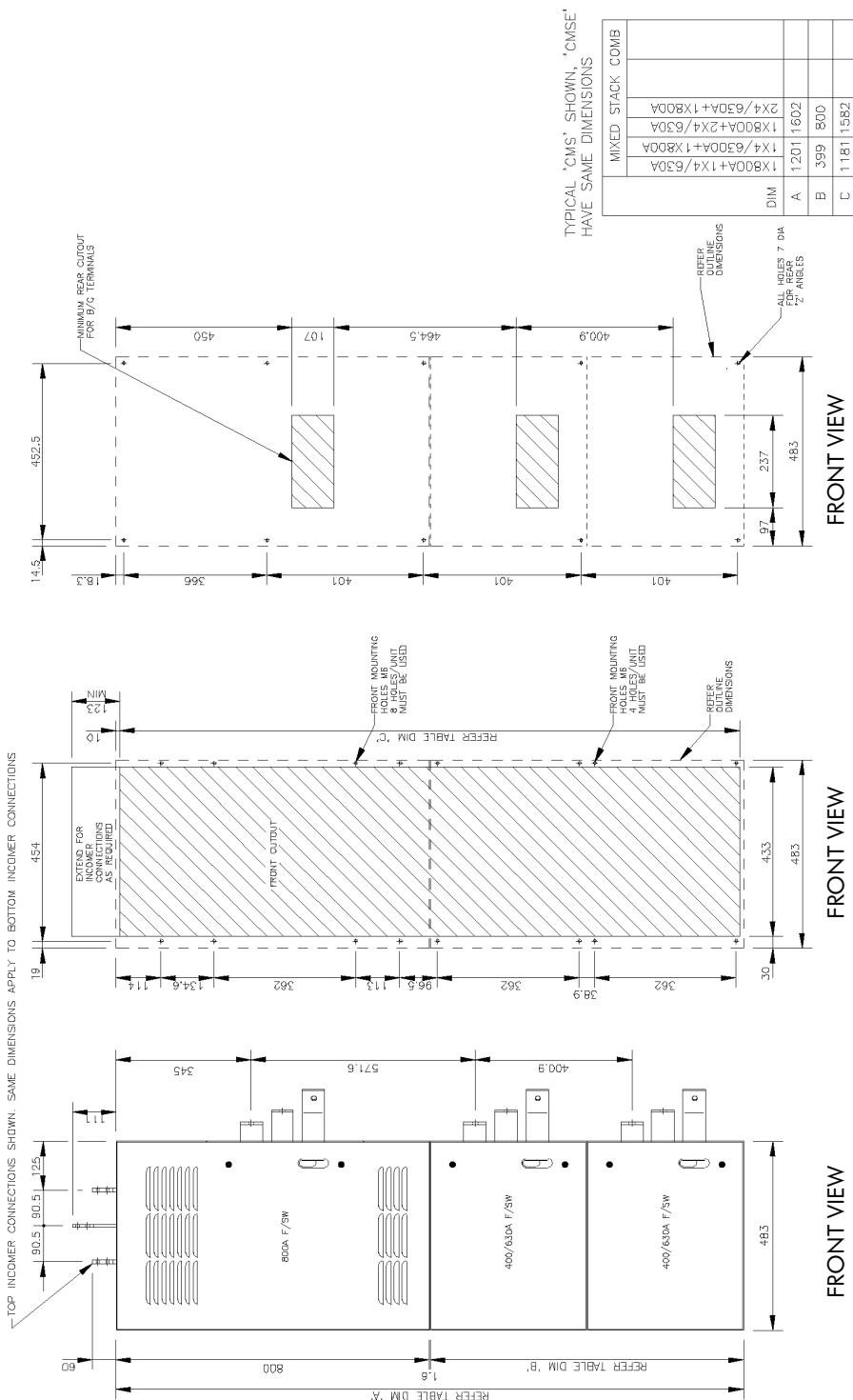
2H 800A CMS Outline & Cutout Details



- NOTES:
1. Refer page 8 for dimensions of outgoing terminals
 2. Refer page 10 for side view details
 3. Refer page 13 for dimensions of incoming terminals

Dimensions

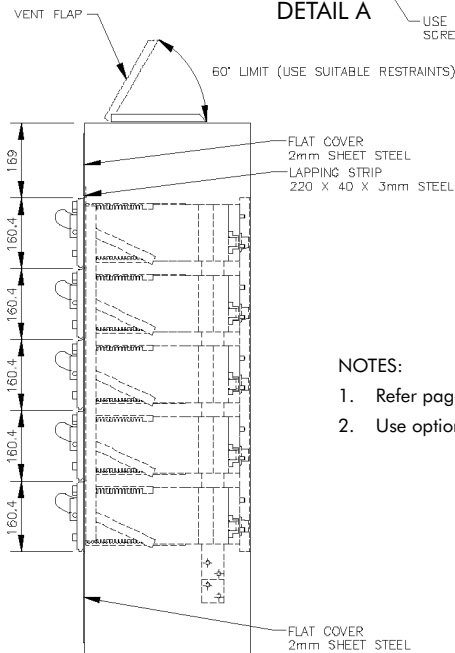
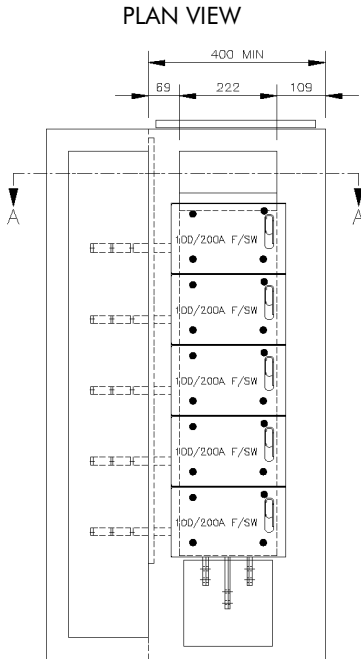
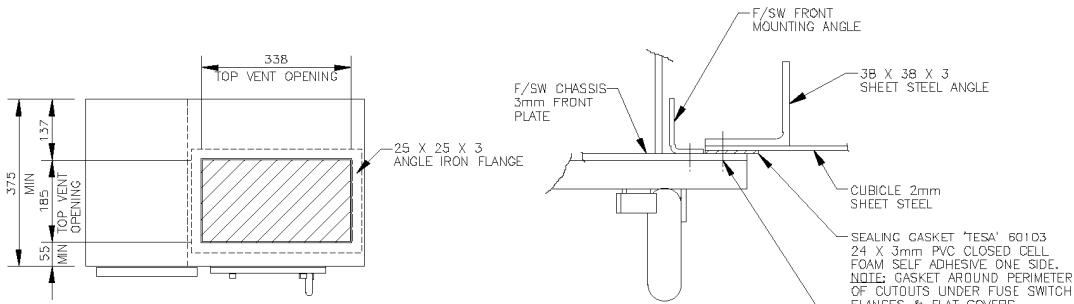
Mixed 400A/630A/800A CMS Outline & Cutout Details



NOTES:

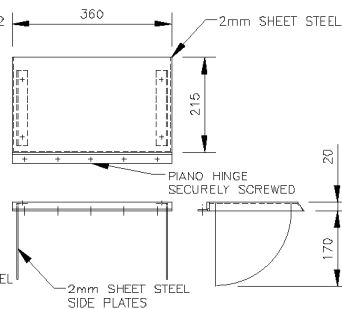
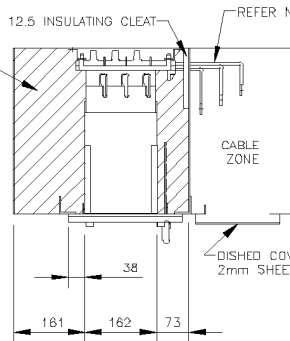
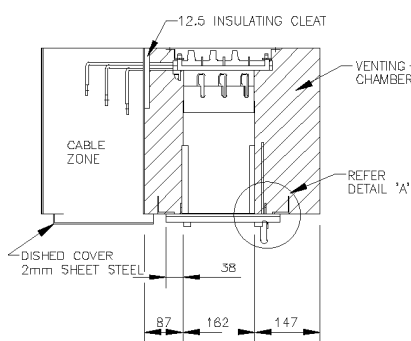
1. Refer page 8 for dimensions of outgoing terminals
2. Refer page 10 for side view details
3. Refer page 13 for dimensions of incoming terminals

Arcing Fault Containment Cubicle Construction Guide for 100A/200A CMSE



NOTES:

1. Refer page 7 for outline dimensions of fuseswitches
2. Use optional F/C extended terminals as required (L/H or R/H sides)

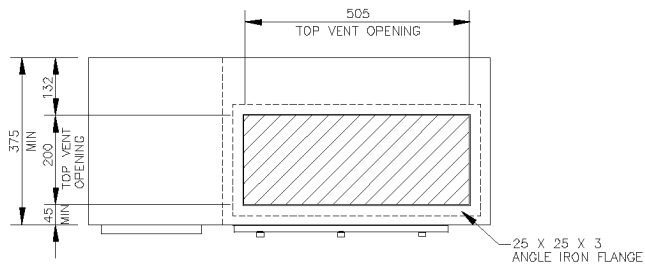


SECTION VIEW 'A-A'
(LEFTHAND CABLE ZONE)

SECTION VIEW
(RIGHTHAND CABLE ZONE)

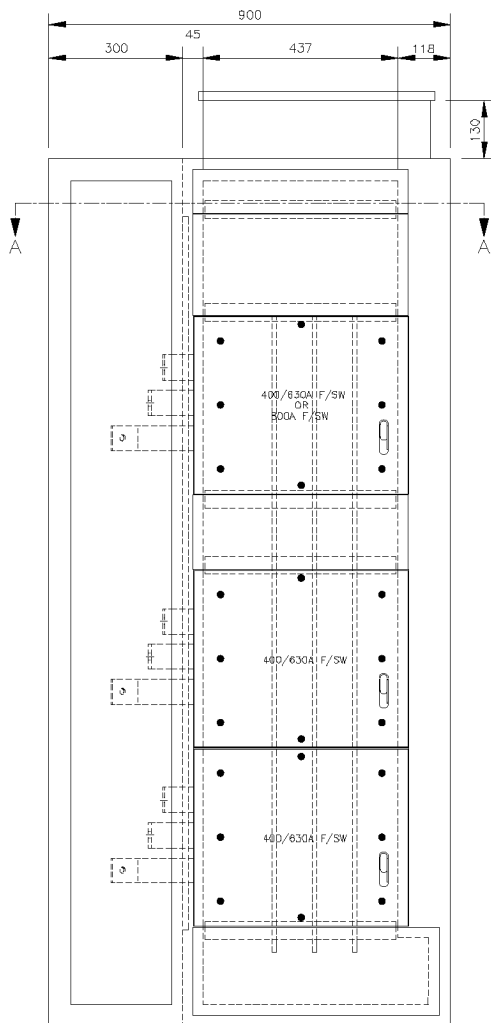
VENT FLAP DETAIL

Arcing Fault Containment Cubicle Construction Guide for 400A/630A/800A CMSE

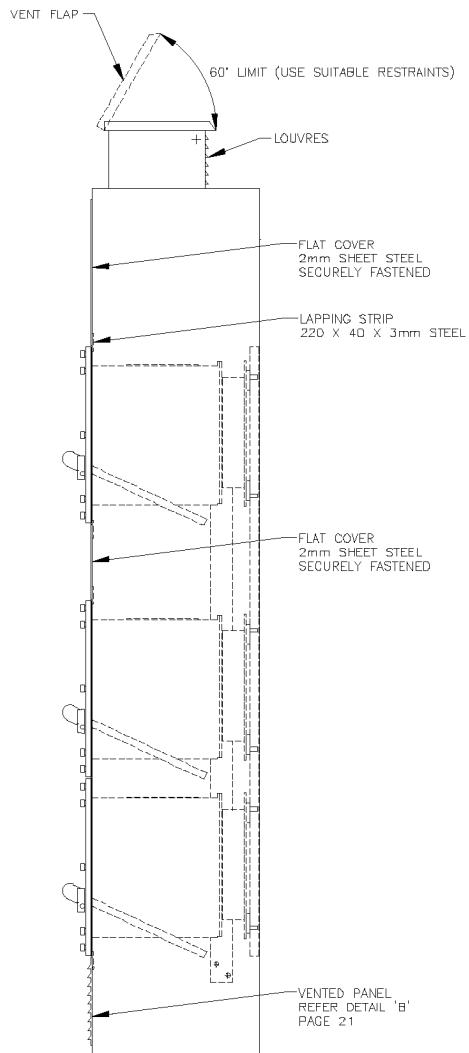


PLAN VIEW

NOTE: Refer pages 8 & 10 for outline dimensions of fuseswitches

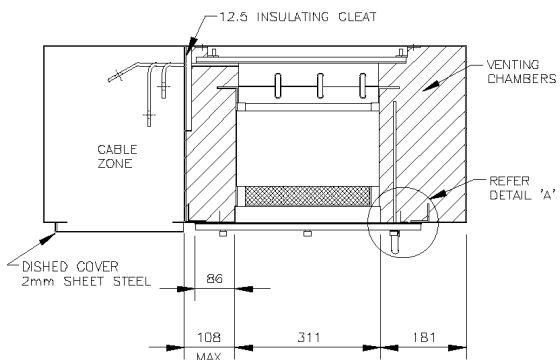


FRONT VIEW
(COVERS REMOVED FOR CLARITY)

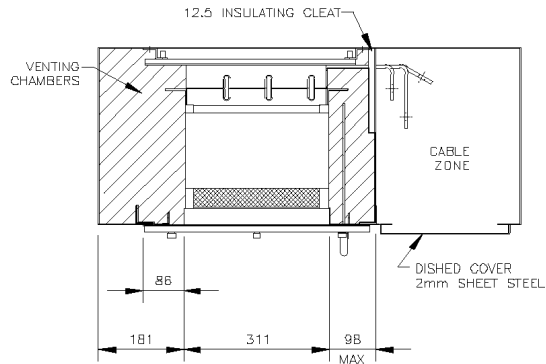


SIDE VIEW

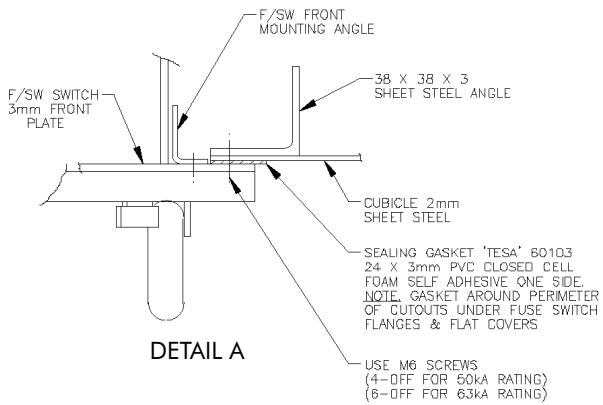
Arcing Fault Containment Cubicle Construction Guide for 400A/630A/800A CMSE



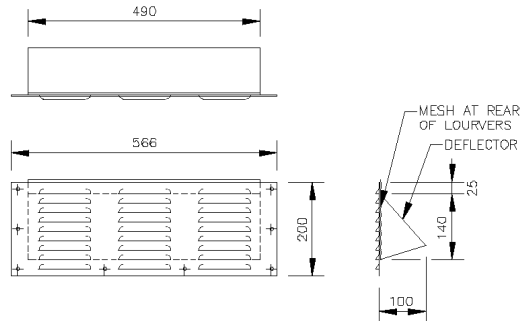
SECTION VIEW 'A-A'
(LEFTHAND CABLE ZONE)



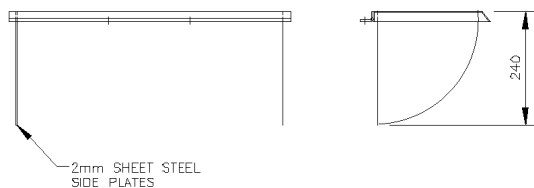
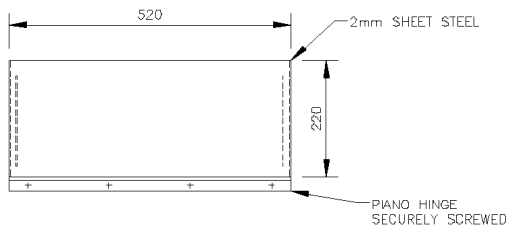
SECTION VIEW 'A-A'
(RIGHTHAND CABLE ZONE)



DETAIL A



DETAIL 'B'



VENT FLAP DETAIL

Operating & Maintenance

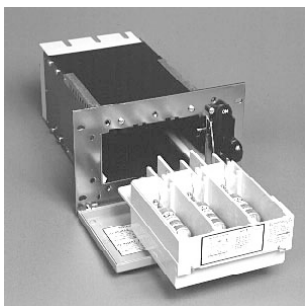
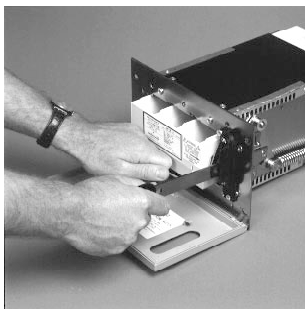
Operation

The following information details the correct operating procedure for the standard equipment supplied on a Ministack assembly.

Fuse Switches

- (a) Withdraw the sliding operating handle.
- (b) Move the handle upwards to the 'ON' position or downwards to the 'OFF' position. Operate the switch handle firmly to its full limit.

Carrier Removal/Fuse Replacement



To remove the fuse carrier, open the front door, withdraw operating handle and apply sufficient upward pressure to the operating handle to release the interlock while at the same time pulling the fuse carrier outwards in a horizontal direction. **DO NOT** depress the door safety interlock during this operation.

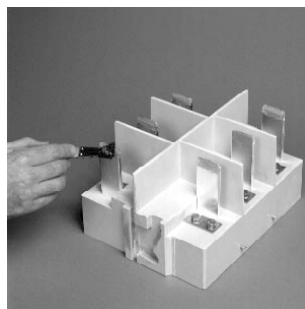
Maintenance

It is recommended that a six monthly inspection and test be made using the following procedures:

Note: If the equipment is operating in a dusty or corrosive atmosphere, this inspection should be made more frequently and appropriate remedial action taken.

Fuse Switches

- (a) Turn switch off.
- (b) Remove moving carrier from switch.
- (c) Visually check carrier contact blades for discolouration and arcing damage, replace if excessive.
- (d) Clean switch blades if necessary and regrease.
- (e) Ensure all fuse connections are tight to following torque values :
 - 1/200A – 8-11 Nm
 - 4/630/800A – 12-15 Nm



Note: The application of grease should only be made on the lead-in chamfer of the blades. The amount used should not be excessive. Shell LGP1 or Darina R2 grease must be used. **DO NOT** use vaseline or petroleum jelly.

Transport

Switch must be transported in 'ON' position.

Suggested Specification

- All fuse switch stacks are to be rated at either 50kA or 63kA and conform to the requirements of AS3439.1. Fuse switch disconnecter units shall be rated at 660V AC and 250V DC.
- All fuse switch stacks shall be provided with an integral fully shrouded riser busbar system, encapsulated within the DMC moulding of the fuse switch disconnecter units. The line side connection from the switch to the riser busbar system, shall be of a plug in type.
- All combination fuse switch units shall be fitted with ASTA20 certified LV HRC fuse links.
- Fuse switch stacks are to be ALSTOM Ministacks or equivalents. The fitted fuse links are to be GEC, EE or GE Red Spot or equivalents.
- All future fuse switch disconnecter spaces shall be supplied to allow fitting of future switch units at a later date without supply interruptions.

Technical & Performance Data

Description	CMS100	CMSE100	CMS200	CMSE200	CMS400	CMSE400	CMS630	CMSE630	CMS800	CMSE800
Rated enclosed thermal current Ith (fuse links fitted)	100A	100A	200A	200A	400A	400A	630A	630A	800A	800A
Degree of protection, front door & fascia (AS1939)										
Standard	IP42	IP54	IP42	IP54	IP42	IP54	IP42	IP54	IP31	IP52
Dustproofed	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54	-	-
Insulation voltage Ui	415V	415V	415V	415V	415V	415V	415V	415V	415V	415V
AC22 Ie @415v	100A	100A	200A	200A	400A	400A	630A	630A	800A	800A
AC23 Ie @415v	100A	100A	200A	200A	400A	400A	630A	630A	800A	800A
Actual test currents on AC23 @457V 0.35p.f.										
Make current	800A	800A	1200A	1200A	3200A	3200A	3800A	3800A	4800A	4800A
Break current	800A	800A	1200A	1200A	3200A	3200A	3800A	3800A	4800A	4800A
Maximum fuse switch capacity										
L.V fuse link fitted	TCP100M200L	TCP100M200L	TF200M315L	TF200M315L	TM400M450L	TM400M450L	TTM630L	TTM630L	TLM800L	TLM800L
Motor size – HP @ 415V	75	75	150	150	270	270	450	450	570	570
– kW @ 415V	55	55	110	110	200	200	335	335	425	425
Fused short circuit at 440V	80kA	80kA	80kA	80kA	80kA	80kA	80kA	80kA	80kA	80kA
Max. peak through peak currents (fuse cut-off)	22kA	22kA	38kA	38kA	42kA	42kA	73kA	73kA	73kA	73kA
Standard fused short circuit current at 415V A.C.	80kA	80kA	80kA	80kA	80kA	80kA	80kA	80kA	80kA	80kA
DC performance DC23 275V T/C 15 milliseconds	100A	100A	200A	200A	400A	400A	630A	630A	800A	800A
Busbar riser rating (enclosed)	910A	910A	910A	910A	1000A	1000A	1000A	1000A	1000A	1000A
Busbar riser system rated short time withstand current	63kA rms for 1 second, 139 kA peak TCA Test Report No 68409C or 85kA rms for 1 second, 187kA peak TCA Test Report No 68551C					50kA rms for 3 second, 105 kA peak TCA Test Report No 59340C				
						63kA rms for 1 second, 139 kA peak TCA Test Report No 64178C			63 kA rms for 1 second, 139kA peak TCA Test Report No 64177C	
Internal arcing fault containment to AS1136-1-1988 Note: Tests performed relate to CMSE switched only	50kA rms for 0.2 second, TCA Test Report 68003 63kA rms for 0.1 second, TCA Test Report 68004					50kA rms for 0.2 second, TCA Test Report 68009 63kA rms for 0.1 second, TCA Test Report 68010				

Fuse Link Selection Fuse switch disconnecter type CMS & CMSE

Rating A	TIA2-32#	TIS35-63#	TB2-63	TBC2-63	TC80&100L	TCP80&100L	TF125,16&200#	TKF250&315#	TKM250&315L	TM355&400#	TTM450-630L	TLM670-800L
100	C	C										
200	C	C										
400				B	B		B	B				
630				B	B		B	B				
800				B	B		B	B				

Motor rated fuse links also available

TIA32M35-63L	TIS63M80&100L				TCF100,160&200L	TF200M2&315L	TKF315M355L			TM400M450L		
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 Fuse link fits direct

B designates type B adaptor

C designates type C adaptor



INDUSTRIAL PRODUCTS

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