MEDIUM VOLTAGE CROWBAR

SECOM
Power Electronic Equipment & Components

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About Us

FOUNDED IN 1975, SECOM IS A LEADING COMPANY FOR THE DISTRIBUTION AND PRODUCTION OF COMPONENTS AND DEVICES FOR POWER ELECTRONICS

SECOM continuously carries out new research and technical proposal in conjunction with important clients, providing technical support to meet their specific needs.

Production excellence and efficient organization allow SECOM to commit itself to providing to the market with timely and professional service in numerous sectors of static energy conversion.
Flexibility and short delivery time have become pillars to SECOM's company policy.

WHO WE ARE >>

Over the years the company has become an important designer and manufacturer of power electronic devices for industrial automation manufacturing technologies

WHAT WE DO >>

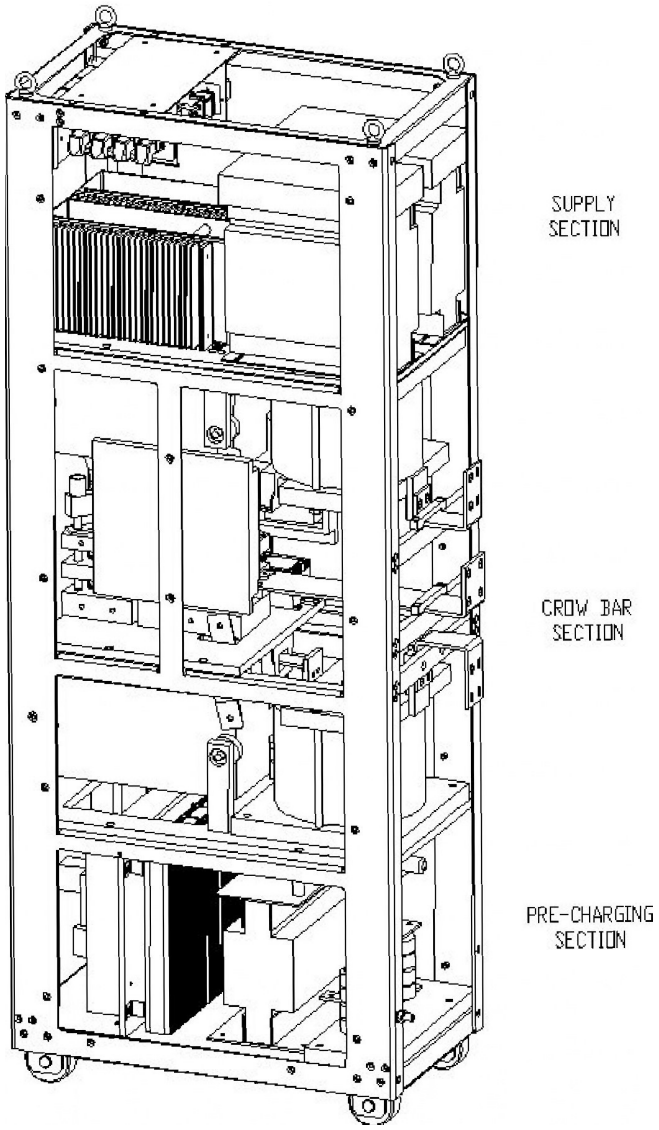
SECOM studies and manufactures customized solutions on behalf of its customers.

CONTENTS

CROWBAR
OVERVIEW

The **Medium Voltage Crowbar module**, named CWB.SD.MT.V33, is an auxiliary removable stack which gather a series of tasks necessary for the operating of the Medium Voltage SD Drives.

The module is divided in the listed sections:
- Crow-bar section/chopper section (depending on the version);
- Power Supply section;
- Capacitor Pre-charge section.



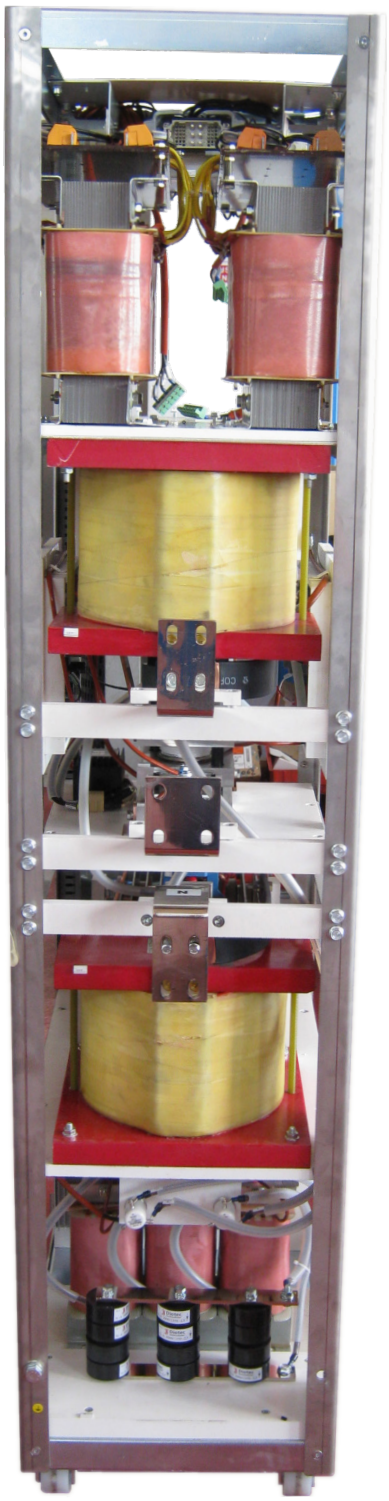
CROWBAR
OVERVIEW

There are different topologies of Crow-bar depending on:
- Precharge type;
- Number of supply units;
- Discharge resistor mounting.

The name coding is described as CWB-SD-MT-V33GCT-AXRY-FP where:
- X is the number of supply units (1-2-3);
- Y is the discharge resistor mounting (1 -> external, 2 -> internal)
- F if present, defines the precharge layout with fuses
- P if present, defines the precharhe layout for enhanced DC-bus capacitance.

e.g. CWB-SD-MT-V33GCT-A231-F defines Crow-bar with two supply units, external discharge resistor and fuses in the pre-charge circuit.

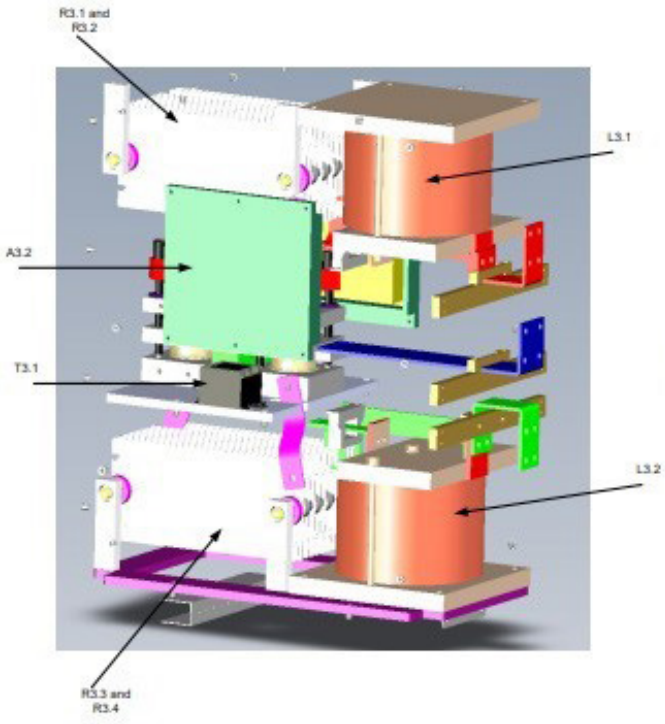
For water cooled version (there is no Crow-bar section but chopper section) the name coding is described as CWB-SD-MT-V33GCT-AXR1-H20-FP where: - X is the number of supply units (1-2-3);
-F if present, defines the precharge layout with fuses;
- P if present, defines the precharge layout for enhanced DC-bus capacitance.

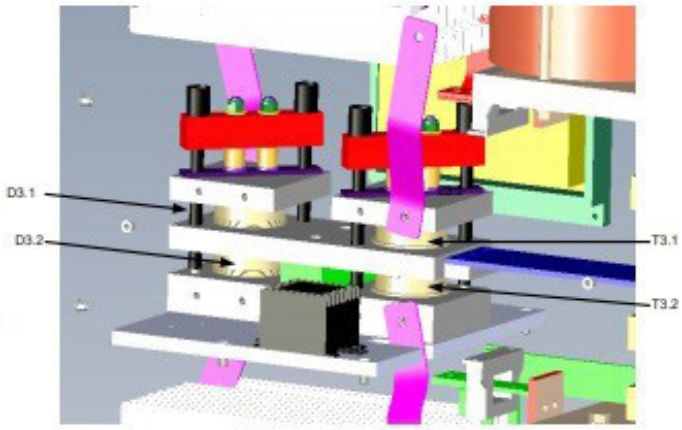


CROWBAR
SECTION

The **Crowbar section** main components are listed below:

- Control card for thyristor firing (UNDEX_MT) A3.1 and A3.2;
- Semiconductor stack, composed by two thyristors (T3.1 and T3.2) and two diodes (D3.1 and D3.2);
- Discharge resistors (R3.1 and R3.3) if present (only for version AXR2);
- Di/dt limiting reactors L3.1 and L3.1;
- Current transducers U3.1 and U3.2;
- Supply transformer T3.1.





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POWER SUPPLY
SECTION

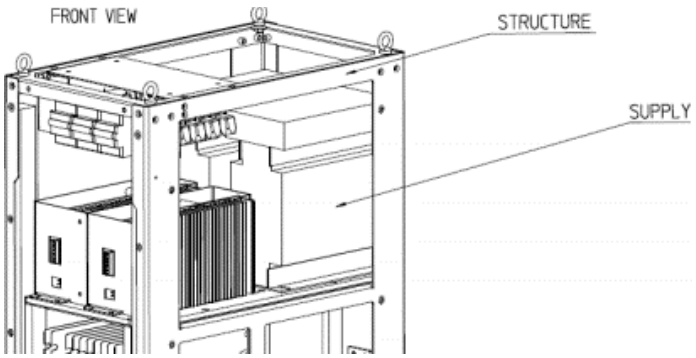
The auxilary supplies for the phase modules IGCT and IGBT are generated in this section; this section has been developed in two different version which differs depending on the drive supplied:

- Drive IGCT; since this drive provides both inverter and AFE units, two or three power supply circuits are installed (CWB.SD.MT.V33.GCT). The number of power supply is defined according the ordering code.
- Drive IGBT; this drive provide the power supply only for the inverter module, for this reason just one supply circuit is installed (CWB.SD.MT.V33.GBT).

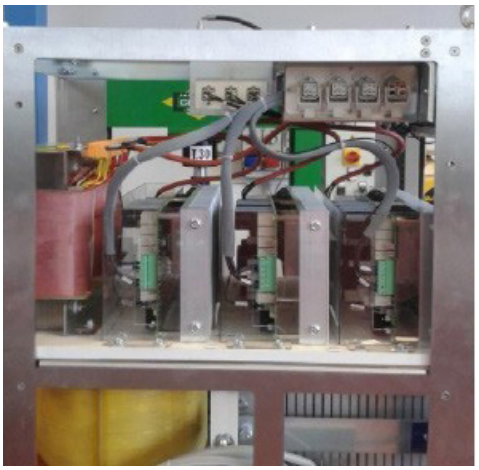
The main components which compose the circuit are listed below:

- Automatic circuit breaker Q1.1. This breaker disconnect all the circuitry from the 400V supply voltage (the
precharge unit and the Crow-bar unit are also feeded from this circuit breaker);
- Automatic circuit breakers Q1.2 and Q1.3. These circuit breakers protect the transformer(s) for ALI-MT supplier.
- Transformers T1.1 and T1.2. These three-phase transformers with 400V primary and 200V secondary winding supply the ALI-MT. In case of A3 configuration,there is only T1.1 transformer with three secondary separated windings;
- ALI-MT supplier A1.1, A1.2 and A1.3 (depending on supply configuration A1, A2 or A3). The output voltage is 200 V_{AC} at 25 kHz for IGCT/IGBT gate drivers. Each ALI-MT can supply at most 3 IGCT phase modules.
The ALI-MT has a fiber optic power good that can be used for diagnostic purpose.

Power supply section (A2 configuration)

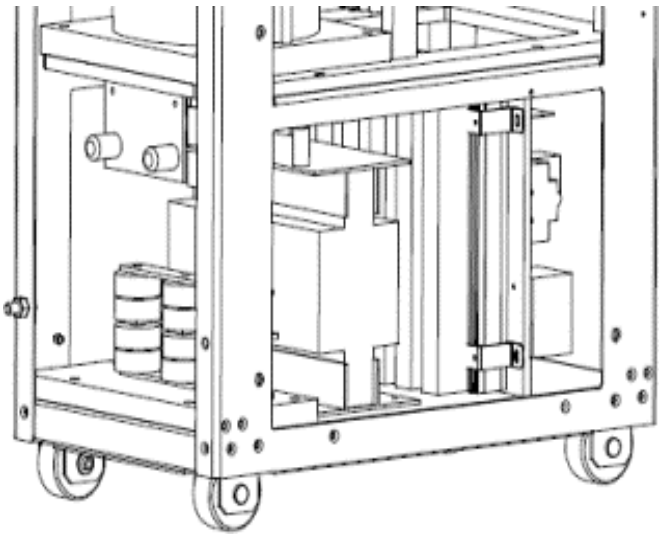


Power supply section (A3 configuration)



DC-BUS PRECHARGE
SECTION

The last section integrated in the CWB.SD.MT.V33 module provide the necessary **supply** to charge the capacitor bank installed on the DC bus.
The circuit is supplied with a 400 V_{AC} three-phase, through the automatic circuit breaker Q2.1; from this line is derived the supply for the single phase transformer T2.2, 400/115-115V 50VA, protected by the automatic circuit breaker Q2.2.



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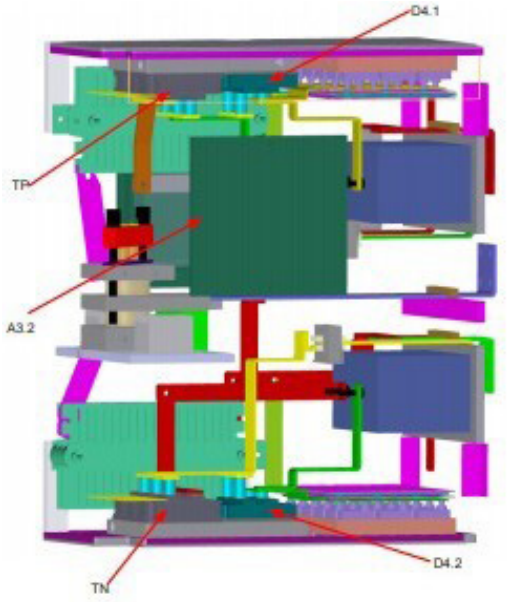
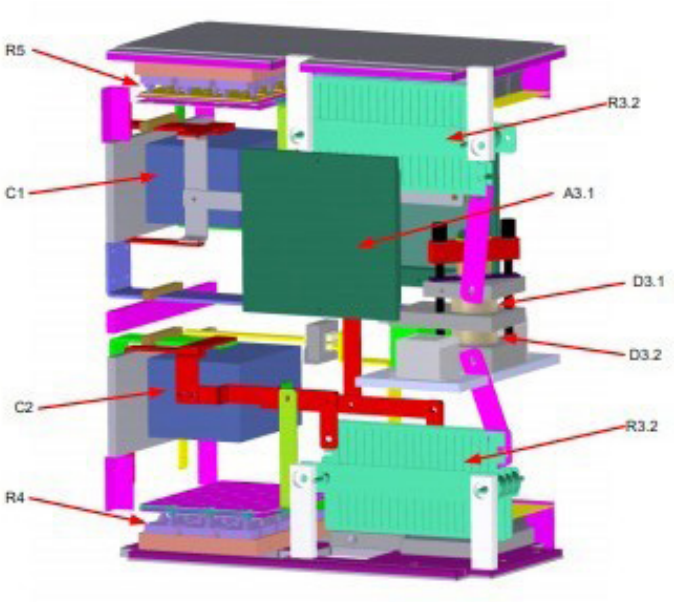
CHOPPER
SECTION

The **chopper section** main components are listed below:

- Control cards for current activation feedback (UNDEX_MT_CHT) A3.1 and A3.2;
- Driver cards for IGBTs control;
- Chopper power circuitry parts composed by IGBT (TP and TN), diodes (D4.1 and D4.2), resistors (R4 and R5) and capacitors (C1 and C2);
- Anti-swing back power circuitry composed by diodes (D3.1 and D3.2) and resistors (R3.2 and R3.4);
- Current trasducers U3.1 and U3.2;
- Supply transformer T3.1 and T3.2.





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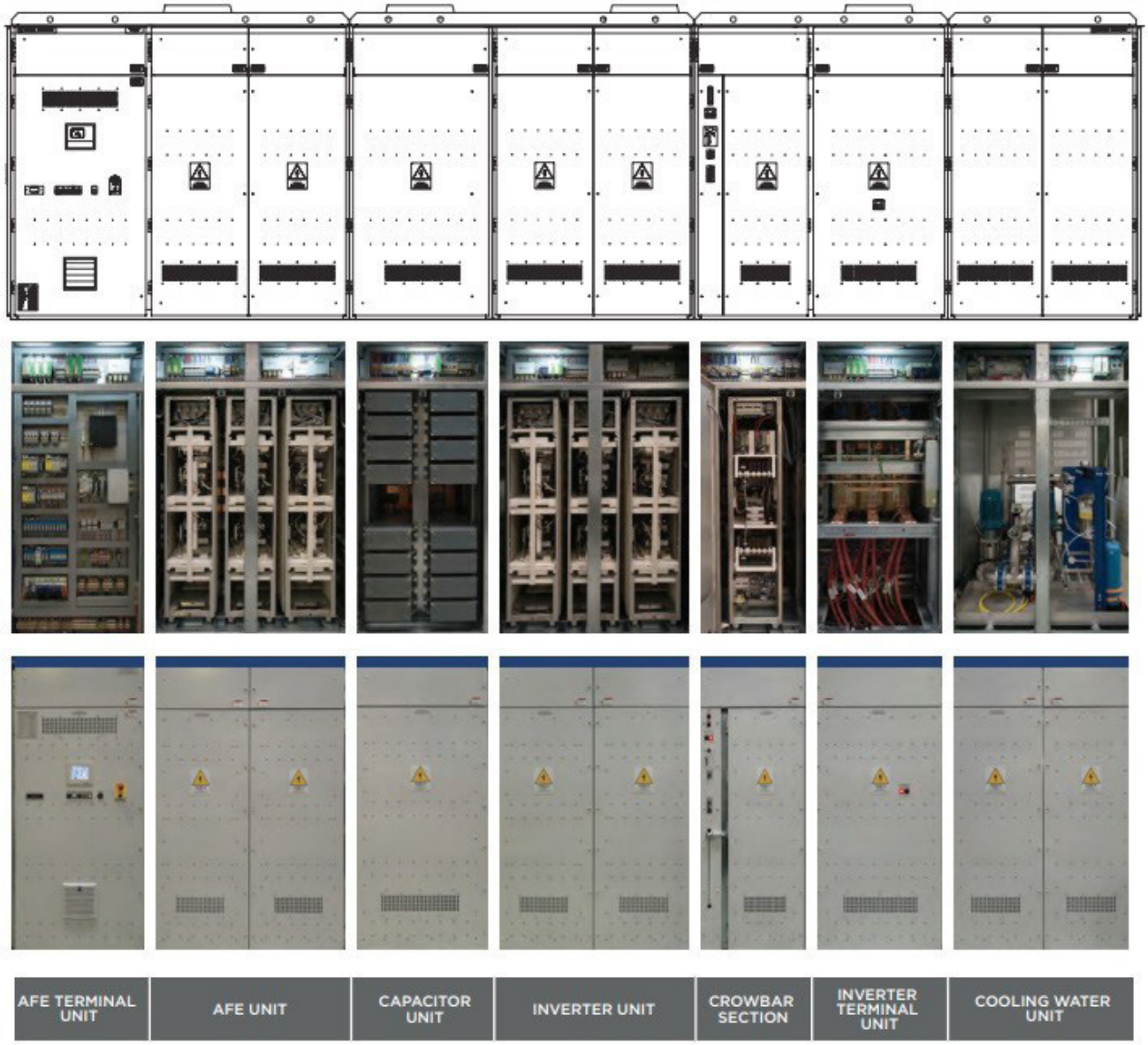
CROWBAR

CABINET LAYOUT



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CROWBAR

CABINET LAYOUT

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TECHNICAL
DATA

Ambient conditions	
Altidude	1000 m. a.s.l.
Operating temperature min./max.	0 ... 40°C
Storage temperature	0 ... 40°C
Umidity	10 ... 90%
Dimension and weight	
Height	1740 mm
Width	400 mm
Depth	760 mm
Weight	210 kg
Electrical data	
DC-bus nominal voltage	4800 V_{DC} (2400+2400)
Crow-bar activation treshold	6000 V_{DC} (3000+3000)
Discharge peak current	1000 A
Water cooling system (only for H2O version)	
Flow	> 20 L/min
Pressure drop	2 Bar
Maximum operating temperature	40°C
Minimum operating temperature	20°C
Operating pressure	2.5 Bar
Water type	Distilled
Water maximum conductivity	7 µS/cm
Water pH	7 ÷ 8
Water hardness	3 ÷ 10° dH
Chloride (Cl)	< 300 mg/l
Copper (Cu)	< 0.1 mg/l
Undissolved particles	< 5 mg/l

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TECHNICAL
DATA

The CWB can be used for several applications, depending the number of IGCT phase modules or the DC-bus capacitance.
In this case it's possible to refer to the table below.

Ordering code	Precharge with MV disconnector	Supply units	Internal Disch. Resist.	Fuses	Max DC-bus capacitance (mF)[2]	Drawing n.
110706R1002	CWB-SD-MT-V33GBT-A1R2	1	Yes	No	< 26 mF	220374
110706R1004	CWB-SD-MT-V33GBT-A1R1	1	No	No	< 26 mF	220374
110706R1001	CWB-SD-MT-V33GCT-A2R2	2	Yes	No	< 26 mF	220357
110706R1003	CWB-SD-MT-V33GCT-A2R1	2	No	No	< 26 mF	220357
110706R1005	CWB-SD-MT-V33GCT-A3R2	3	Yes	No	< 26 mF	220400
110706R1006	CWB-SD-MT-V33GCT-A3R1	3	No	No	< 26 mF	220400
110705R1001	CWB-SD-MT-V33GCT (LAES)	2	-	-	< 26 mF	220372
Code	**Precharge with fuses**					
110706R1013	CWB-SD-MT-V33GCT-A1R2.F	1	Yes	Yes	< 26 mF	220503
110706R1014	CWB-SD-MT-V33GCT-A1R1.F	1	No	Yes	< 26 mF	220503
110706R1008	CWB-SD-MT-V33GCT-A2R2.F	2	Yes	Yes	< 26 mF	220481
110706R1009	CWB-SD-MT-V33GCT-A2R1.F	2	No	Yes	< 26 mF	220481
110706R1011	CWB-SD-MT-V33GCT-A3R2.F	3	Yes	Yes	< 26 mF	220504
110706R1012	CWB-SD-MT-V33GCT-A3R1.F	3	No	Yes	< 26 mF	220504
Code	**Precharge with fuses for enhanced capacitor bank**					
110706R1019	CWB-SD-MT-V33GCT-A2R1.FP	2	No	Yes	< 48 mF	220507
110706R1022	CWB-SD-MT-V33GCT-A3R1.FP	3	No	Yes	< 48 mF	220508
	Chopper version (water cooled)					
110706R1025	CWB-SD-MT-V33GCT-H20-A2R1.FP	2	No	Yes	< 48 mF	220520
110706R1027	CWB-SD-MT-V33GCT-H20-A3R1.FP	3	No	Yes	< 48 mF	220521
110706R1030	CWB-SD-MT-V33GCT-H20-A2R1.F	2	No	Yes	< 26 mF	220525
110706R1032	CWB-SD-MT-V33GCT-H20-A3R1.F	3	No	Yes	< 26 mF	220526

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TECHNICAL
DATA

The CWB can be used for several applications, depending the number of IGCT phase modules or the DC-bus capacitance.
In this case it's possible to refer to the table below.

Ordering code	Precharge with MV disconnector	Supply	Internal	Fuses	Max DC-bus capacitance (mF)[2]	Drawing n.
110706R1102	CWB-SD-MT-V33GBT-A1R2.UL	1	Yes	No	< 26 mF	220374
110706R1104	CWB-SD-MT-V33GBT-A1R1.UL	1	No	No	< 26 mF	220374
110706R1101	CWB-SD-MT-V33GCT-A2R2.UL	2	Yes	No	< 26 mF	220357
110706R1103	CWB-SD-MT-V33GCT-A2R1.UL	2	No	No	< 26 mF	220357
110706R1105	CWB-SD-MT-V33GCT-A3R2.UL	3	Yes	No	< 26 mF	220400
110706R1106	CWB-SD-MT-V33GCT-A3R1.UL	3	No	No	< 26 mF	220400
Code	**Precharge with fuses**					
110706R1113	CWB-SD-MT-V33GCT-A1R2.F.UL	1	Yes	Yes	< 26 mF	220503
110706R1114	CWB-SD-MT-V33GCT-A1R1.F.UL	1	No	Yes	< 26 mF	220503
110706R1108	CWB-SD-MT-V33GCT-A2R2.F.UL	2	Yes	Yes	< 26 mF	220481
110706R1109	CWB-SD-MT-V33GCT-A2R1.F.UL	2	No	Yes	< 26 mF	220481
110706R1111	CWB-SD-MT-V33GCT-A3R2.F.UL	3	Yes	Yes	< 26 mF	220504
110706R1112	CWB-SD-MT-V33GCT-A3R1.F.UL	3	No	Yes	< 26 mF	220504
Code	**Precharge with fuses for enhanced capacitor bank**					
110706R1119	CWB-SD-MT-V33GCT-A2R1.FP.UL	2	No	Yes	< 48 mF	220507
110706R1122	CWB-SD-MT-V33GCT-A3R1.FP.UL	3	No	Yes	< 48 mF	220508
	Chopper version (water cooled)					
110706R1125	CWB-SD-MT-V33GCT-H20-A2R1.FP.UL	2	No	Yes	< 48 mF	220520
110706R1127	CWB-SD-MT-V33GCT-H20-A3R1.FP.UL	3	No	Yes	< 48 mF	220521
110706R1130	CWB-SD-MT-V33GCT-H20-A2R1.F.UL	2	No	Yes	< 26 mF	220525
110706R1132	CWB-SD-MT-V33GCT-H20-A3R1.F.UL	3	No	Yes	< 26 mF	220526

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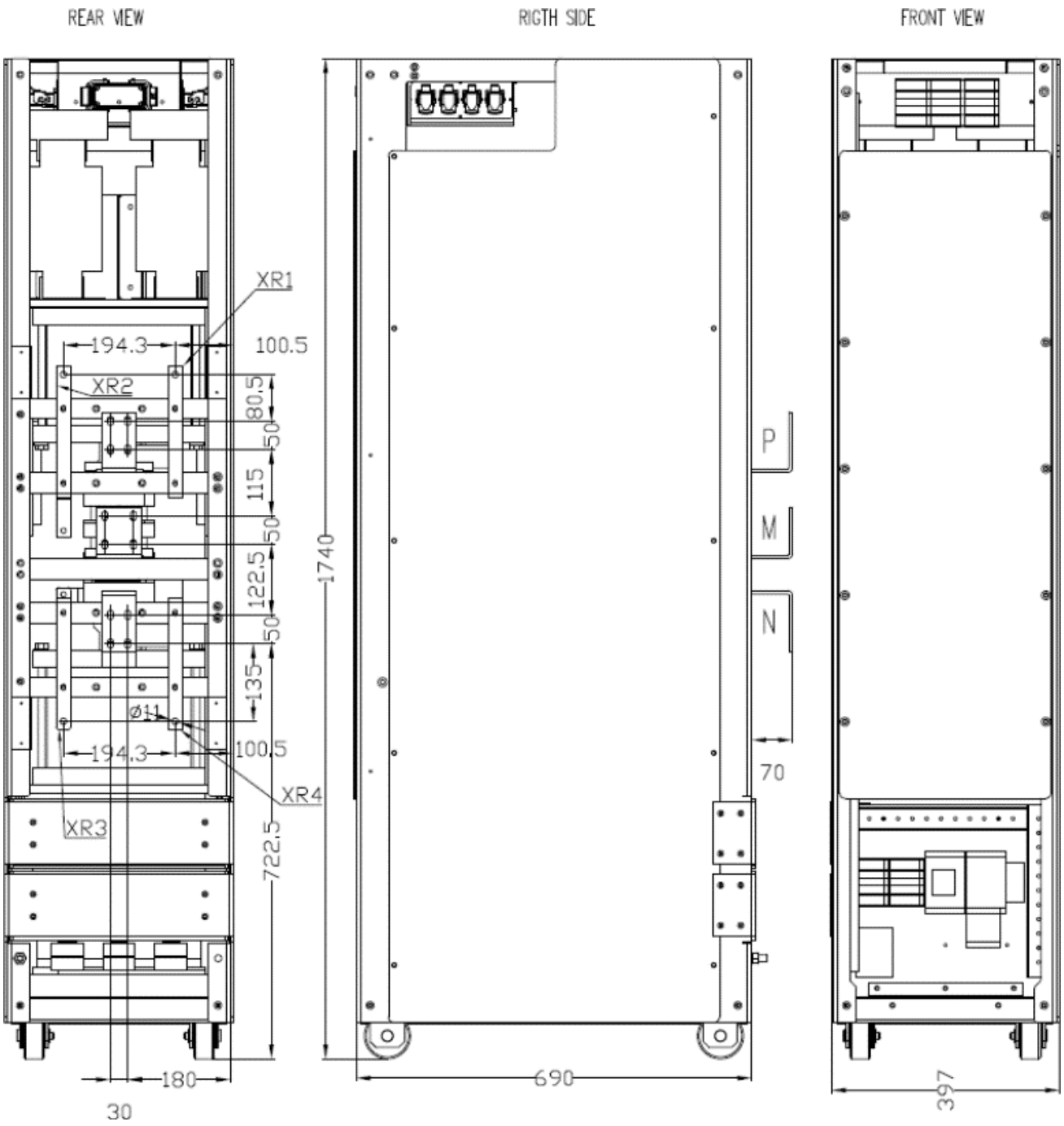
CROWBAR
DIMENSIONS



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