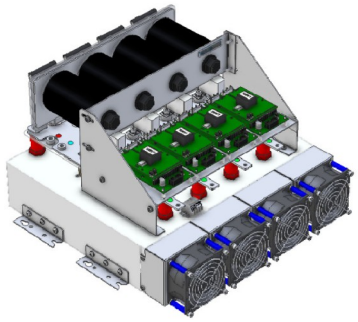
MTM-B8I0200F12FULH

MT Series

PRELIMINARY TECHNICAL INFORMATION

POWER STACK GENERAL CHARACTERISTICS



Features

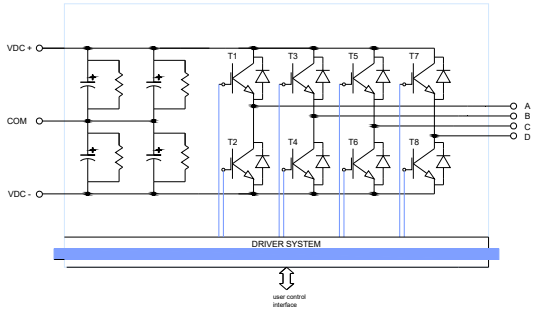
- 1200V, 200A IGBT
- Capacitor bank included
- Drivers included
- Forced air heatsink
- Ultra compact design

Typical applications

- Renewable energies
- AC inverter drives
- Traction
- Elevators
- Industrial drives
- UPS

ABSOLUTE MAXIMUM RATINGS

Symbol	Conditions	Min	Typ	Max	Units
System					
V_{DClink}	Operating DC link voltage			800	V_{DC}
$I_{U,V,W}$	f_{SW}=10 kHz, T_J<125ºC, T_{HK}<90ºC, T_A=40ºC, fo=50 Hz, PF= 0.85, m=1, V_{DCLink}=600V			93	A_{RMS}
T_{stg}		-40		50	ºC
T_{op}		-10		50	ºC
V_{ISOmod}	50 Hz @1min		4000		V_{AC}
IGBT Module					**2MBI200XBE120-50**
IGBT					
V_{CES}	T_J=25ºC			1200	V
I_C	T_C=25ºC, 1 ms			400	A
	T_C=100ºC			200	A
T_J	junction temperature	-40		175	ºC
Diode					
V_{RRM}	T_J=25ºC			1200	V
I_F	T_C=25ºC, T_J=125ºC			–	A
	T_C=80ºC, T_J=125ºC			–	A
T_J	junction temperature	-40		175	ºC
Driver					**SCiCoreDrive22 + SCiCoreLink62**
V_S	Power supply	13	15	17	V
V_{iH}	Input signal voltage (high)			5/15	V
V_{isoIPS}	Isolation between secondaries			1000	V
V_{isoISS}	Isolation primary to secondary			3000	V
f_{sw}	Switching frequency		5	100	kHz
Capacitor bank					
C_N	Nominal capacity		2200		µF
C_{N_TOL}	Capacity tolerance		20		%
$V_{DC\ max}$	Maximum voltage		900		V_{DC}
Heatsink					**SV-AA8382HB-AT-RG42080L57/300FR**
V_S	Fan rack supply voltage		230		V
R_{thHA}	Thermal resistance to ambient		0.06		K/W
T_{TH}	Thermal switch (NC) temperature		90		ºC



240314 Rev.:1

Reserves the right to change limits, test conditions and dimensions given in this data sheet at any time without previous notice.

COOLING SYSTEM CHARACTERISTICS

The cooling system SV-AA8382HB-AT-RG42080L57/300FR is formed by a high efficiency heatsink assembled with 4x standard high air flow rate radial fans.

Description	Symbol	Notes / Test conditions	Min	Typ	Max	Units
Heatsink thermal resistance	$R_{th\ HA}$	**Note 1**		0.06		K/W
Input supply voltage	$V_{IN\ AC}$	50/60 Hz		230		V_{AC}
Input supply current	$I_{IN\ DC}$	50 Hz		280	400	mA
Power consumption	P_N	50 Hz		54.4		W
Fan rated speed		±10%		2300		rpm
Noise Level		per fan, 50 Hz		25.3		dBA
Failure Rate		50ºC / 65% RH		30000		h
Thermal switch temperature		NC (normally closed)	85.5	90	94.5	ºC
Thermal switch nominal voltage	$V_{N\ TH}$	50/60 Hz		250		V_{AC}
Thermal switch nominal current	$I_{N\ TH}$			10		A
Thermal switch threshold histeresis				30ºC ±10ºC		

Data at T_a = 25 °C, V_{IN} = 230 V_{AC} and rated values, unless otherwise indicated

Table 1: Cooling system technical specifications.

CAPACITOR BANK CHARACTERISTICS

Description	Symbol	Notes / Test conditions	Min	Typ	Max	Units
Total bank nominal capacitance	C_{TOT}	±20%		2200		µF
Maximum voltage	V_{DC_MAX}				900	V
Surge voltage	V_S	per capacitor			495	V
Rated working voltage	V_{DC}			700		V
Equivalent series resistance	ESR	per capacitor, 100 Hz			102.8	mΩ
Impedance	Z_C	per capacitor, 100 Hz				mΩ
Ripple current	I_R	per capacitor, 100 Hz, T_A=85ºC		13.4	40	A
Leakage current	I_{LEAK}	per capacitor			2.97	mA
Mounting position		upright or horizontal				
C_N tolerance					20	%
Operating Temperature	T_{op}		-40		85	ºC
Useful life		T_A=85ºC, at rated I_R		20000		h

Data at T_a = 25 °C and rated values, unless otherwise indicated

Table 2: Capacitor bank technical specifications.

Note 1:

The thermal resistance values showed are only standard values measured under the following conditions: using 3 modules of 45x92 mm layout footprint with a constant dissipated power equally distributed between modules. The test was perfomed on a power stack mounted on upright position with fan rack supplied at its nominal supply voltage.

This given data should be taken only as a reference and at any case should replace measurements under real field and on end application conditions.

Reserves the right to change limits, test conditions and dimensions
given in this data sheet at any time without previous notice.

Capacitor bank circuit diagram

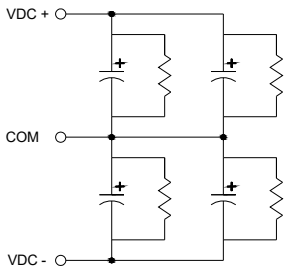


Figure 1: Capacitor bank circuit diagram.

Warning note:
When charged at nominal voltage and then disconnected from DC power source the capacitor bank will be naturally discharged after aproximately 10 min ($V_{C@10min}$ < 2% x V_{RATED}). If a shorter discharge time is needed an external discharge resistor must be used.

Ripple current

Capacitors withstand rms ripple current at 100 Hz at 105ºC. When capacitors operate at temperatures other than 105ºC, the permissible rms ripple current at 105ºC should be multiplied by the factors given below:

T_C	45ºC	55ºC	65ºC	75ºC
Multiplying Factor	2.6	2.4	2.2	2.0

Table 3: Ripple current multiplying factor vs. hotspot temperature.

Where capacitors are required to operate at frequencies other than 100 Hz, the multiplying factors given below may be used to determine the ripple current capacity at that frequency.

Frequency [Hz]	100	250	1k to 10k	>10k
Multiplying Factor	1.0	1.05	1.32	1.35

Table 4: Ripple current multiplying factor vs. frequency.

e.g.: For an application where the capacitor bank is operating at a 55ºC hotspot and ripple current frequency is about 5 kHz the total multiplying factor should be aproximately of 2.4 x 1.32 ≈ 3.16. In that case the total ripple current withstand on DC-Link for the capacitor bank will be of 2 x 13.4 A x 3.16 ≈ 84.7 A.

Reserves the right to change limits, test conditions and dimensions
given in this data sheet at any time without previous notice.

DRIVERS SPECIFICATIONS AND CHARACTERISTICS

MTM-B8I power stacks uses as a driving circuitry the SCiCoreDrive22 2-channel IGBT driver from Semicode. This is a general purpose 2-channel driver designed to interface IGBTs up to 1200 V. It includes a V_{CE} monitoring for each IGBT which it protects the devices in case of failure by soft turning OFF the IGBT and providing to the user a galvanically isolated fault signal.

The input signaling are Schmidt-trigger, and admits logic levels of 0-5 V or 0-15 V, the reference is configured by default with a 0-5 V input logic but the user can select the best suited configuration. Please see Table 7 and Figure 2 to change logic levels configuration.
The input signaling also includes a short pulse supressor to avoid undesired triggering glitches and parasites.

For more details and up-to-date information about the drivers please download the last released SCiCoreDrive22 datasheet here and its adaptation board SCiCoreLink62 here.

TECHNICAL DRIVER SYSTEM SPECIFICATIONS

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{CC}	Supply voltage		13	15	17	V
I_{CC}	Current consumption (full load)	Q_G=0.80 µC, f_{sw}=100 kHz (2 chan.)			480	mA
I_{STBY}	Stand by consumption (no load)			140		mA

Table 5: IGBT drivers power supply technical specifications.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{IN_H}	IN signal high level	See LOGIC LEVELS			15	V
I_{CC}	IN signal low level		0			V
I_{STBY}	FAULT output current				8	mA

Table 6: IGBT drivers logic inputs and outputs characteristics.

APPLICATION NOTES REGARDING THE DRIVING SYSTEM

LOGIC LEVELS

The inputs of SCiCoreDrive22 (PWM_{TOP}_x, PWM_{BOT}_x and RESET_x) are TTL compatible see its pinout on 8. The FAULT_x outputs are open collector outputs, and require an external pull-up resistor.

LOGIC INPUTS/OUTPUTS

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{IN_H_RS}$	RST Input signal high level voltage	*RESET signal (active when in low-state)*	2		5	V
$V_{IN_L_RS}$	RST Input signal low level voltage		0		0.8	V
$V_{IN5_H_IN}$	IN Input signal high level voltage	*IN_x signal (JP1 & JP2 plugged)*	3.7		5	V
$V_{IN5_L_IN}$	IN Input signal low level voltage		0		1.3	V
$V_{IN15_H_IN}$	IN Input signal high level voltage	*IN_x signal (JP1 & JP2 unplugged)*	11		15	V
$V_{IN15_L_IN}$	IN Input signal low level voltage		0		3.9	V

Table 7: IGBT drivers logic inputs/outputs configurations.

In addition, the inputs IN_x are schmitt-trigger and admits 2 different voltage levels depending on whether the JP1 & JP2 are plugged or not.

Reserves the right to change limits, test conditions and dimensions
given in this data sheet at any time without previous notice.

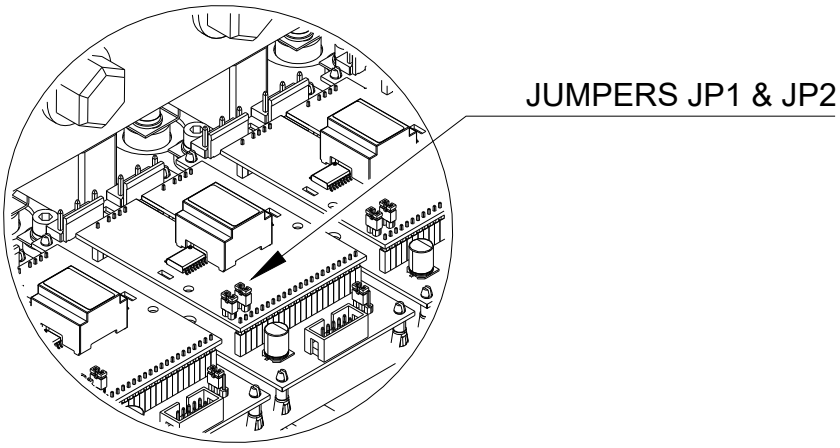


Figure 2: Position detail of voltage level input voltage on SCiCoreDrive22.

Warning note:
It is recommend to use the 0-15V levels for a better noise immunity on harsh environments. It is not permitted to use different level configuration on each channel. Both channels must work as 0-15 V or 0-5 V. Using 0-15 V input signal when jumpers JP1 & JP2 are plugged can damage the driver. Using 0-5 V or 0-15 V on input signals when drivers are unpowered can also damage the equipment.

SHORT PULSE SUPPRESION (SPS)

Each Input signal (IN_x) of SCiCoreDrive22 includes a SPS to protect the driver and the IGBT from undesired short duration glitches. A pulse shorter than 1.4 µs will be eliminated with 100% probability. A pulse longer than 1.8 µs will pass the SPS without suffer any change. A pulse with a duration between 1.4 µs and 1.8 µs may pass or not.

FAILURE MANAGEMENT

The power stage of a typical three phase inverter or full bridge is susceptible to several types of failures, most of which are potentially destructive to the power IGBT. Under any of these fault conditions, the current through the IGBT can increase rapidly, causing excessive power dissipation and heating. The IGBT become damaged when the current load approaches the saturation current of the device, and the collector to emitter voltage rises above the saturation voltage level. The drastically increased power dissipation overheats very quickly the power device and destroys it. To prevent damage to the drive, fault protection must be implemented to reduce or turn-off the over-currents during a fault condition. SCiCoreDrive22 provides fast local fault detection and shutdown.

The fault detection method is to monitor the saturation (collector) voltage of the IGBT and to trigger a local fault shutdown sequence if the collector voltage exceeds a predetermined threshold. A small gate discharge device slowly reduces the high short circuit IGBT current to prevent damaging voltage spikes. Before the dissipated energy can reach destructive levels, the IGBT is shut off. During the off state of the IGBT, the fault detect circuitry is simply disabled to prevent false 'fault' signals.

During normal operation, voltage at RON_x and ROFF_x is controlled by the signal IN_x, with the IGBT collector to emitter voltage being monitored through VDESAT. The FAULT output is high and the RESET input must be held high.

HALF BRIDGE MODE OF OPERATION

As each driver is interfacing a 2 IGBT forming a half bridge, the half bridge operation mode on SCiCoreDrive is set and is recommended not to change it.

Reserves the right to change limits, test conditions and dimensions
given in this data sheet at any time without previous notice.

In this mode the if both signals, IN1 and IN2, are high at the same time, the intern dead time generator of the driver resolves this conflictual situation by separating the signals in time and generating automatically a dead time. This way we can assure that the signals at the output of the driver don't provoke that both IGBTs are ON at the same time. See the chronogram of Figure 3. The dead time generated by SCiCoreDrive22 drivers on the power stack is, by default, of 4 µs.

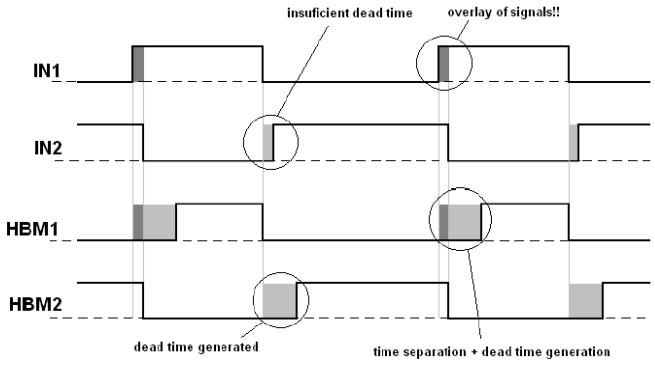


Figure 3: SCiCoreDrive22 signal operation chronogram.

POWER CONNECTIONS AND SIGNAL INTERFACES

DRIVERS I/O INTERFACE AND SUPPLY

Signal connections:

J1 to J4 CONTROL CONNECTORS are the main connectors for each half-bridge driver providing the control switching signals for each IGBT, reset signal, and output fault signals. It is also used to supply the drivers +15 V_{DC}. The position of this connectors on the power stack are depicted on Figure 4.

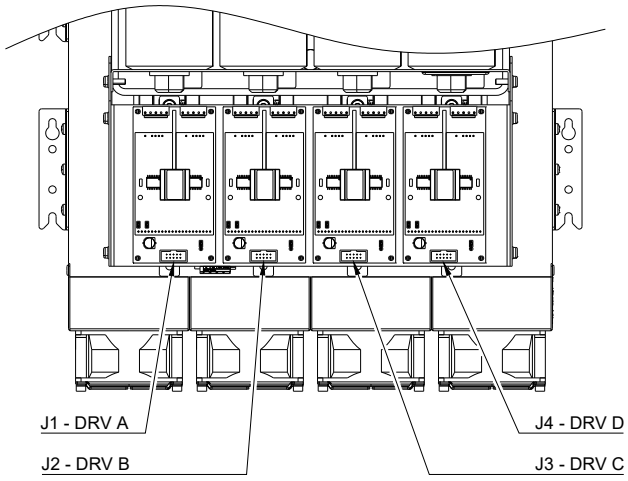


Figure 4: Position detail of signal & control connectors.

CONNECTORS PINOUT

J1...J4: DRIVERS - SCiCoreLink62

Pin	Designator	Description
1	PWM_{TOP}	Input logic signal for switching TOP IGBT
2	GND	Ground terminal for supply and logic signals
3	GND	Ground terminal for supply and logic signals
4	RESET	Reset input signal (low state)
5	GND	Ground terminal for supply and logic signals
6	VCC	+15 V_{DC} supply voltage
7	FAULT	Fault output signal
8	VCC	+15 V_{DC} supply voltage
9	VCC	+15 V_{DC} supply voltage
10	PWM_{BOT}	Input logic signal for switching BOT IGBT

Table 8: IGBT drivers pinout.

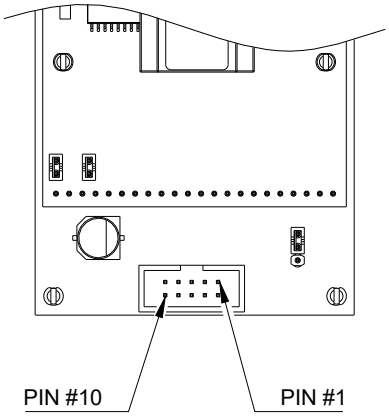


Figure 5: Connector numeration detail.

Connector type:
AMP-LATCH series, 5103308-1, TE Connectivity or equivalent alternative.

Recommended matched connector socket for PCB to flat cable connection:
AMP-LATCH series, 1658621-1, TE Connectivity.

Reserves the right to change limits, test conditions and dimensions
given in this data sheet at any time without previous notice.

POWER TERMINALS AND CONNECTIONS

AC POWER TERMINALS are the main power output terminals for the stack. Below on Figure 6 you can find the position of this terminals on the power stack.

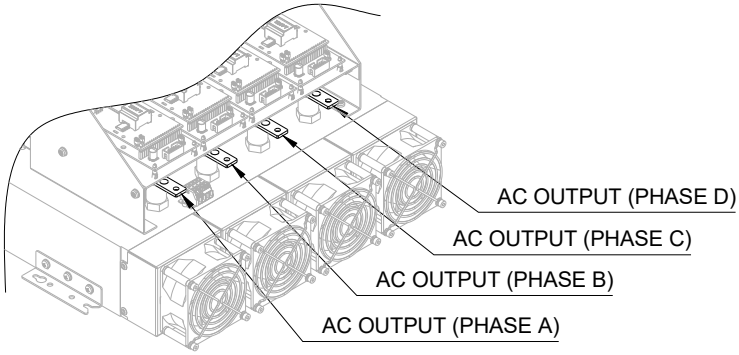


Figure 6: Output AC terminals position detail.

AC Output terminals mounting hole: Ø 5.5 mm, for M5 terminal thightening.

DC-LINK POWER TERMINALS are the electrical power connections for DC-Link. In the image below (Figure 7) is depicted the position and polarity for this terminals.

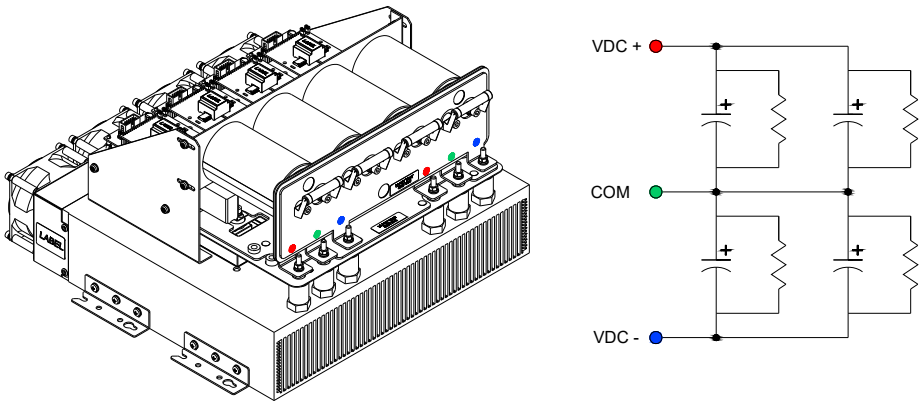


Figure 7: DC Input terminals position detail.

DC Input terminals threaded stud: M5x16 mm.

Reserves the right to change limits, test conditions and dimensions
given in this data sheet at any time without previous notice.

FAN ARRAY SUPPLY AND THERMAL SWITCH SNAP-IN TERMINAL BLOCK

Designator	Description
V1	L1 230 V_{AC}
V2	L2 230 V_{AC}
T1	Thermal switch 1
T2	Thermal switch 2

Table 9: Snap-in terminal block pinout.

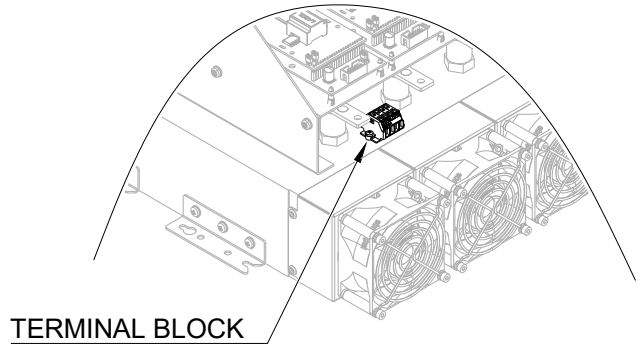


Figure 8: Snap-in terminal block position detail.

In order to work with the stack user must supply 230 V_{AC} on the snap-in terminal block to power on the fan array. The equipment should be operated with its fan rack powered on and user must ensure the correct supply of the fan array.

Please check the power requirements of the fan array and find all thermal switch characteristics on Table 1.

Note: *Thermal and power performance specifications in this datasheet are given under forced air operation, Rectificadores Guasch do not recommend to use it without power on the fan array or without it. In this case user must apply a current derating based on custom own power and thermal measurements.*

Reserves the right to change limits, test conditions and dimensions
given in this data sheet at any time without previous notice.

STACK MOUNTING CONSIDERATIONS

It is necessary a minimum distance of 100 mm with regard to the envelope. The free air circulation should be guaranteed avoiding external nearby heat sources from the assembly.

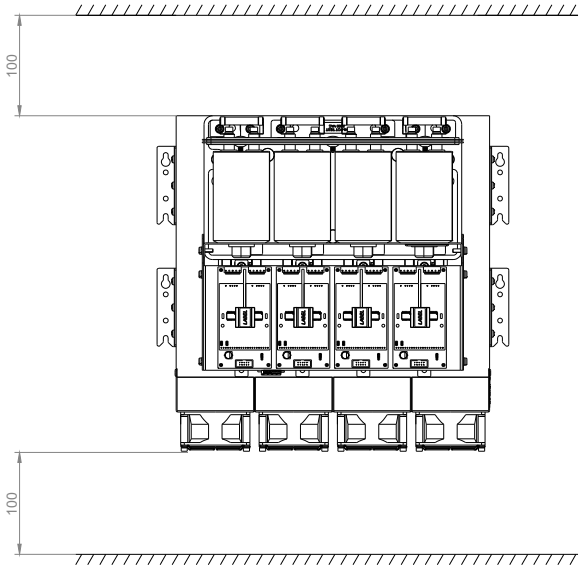


Figure 9: Spacing example with regards the envelope.

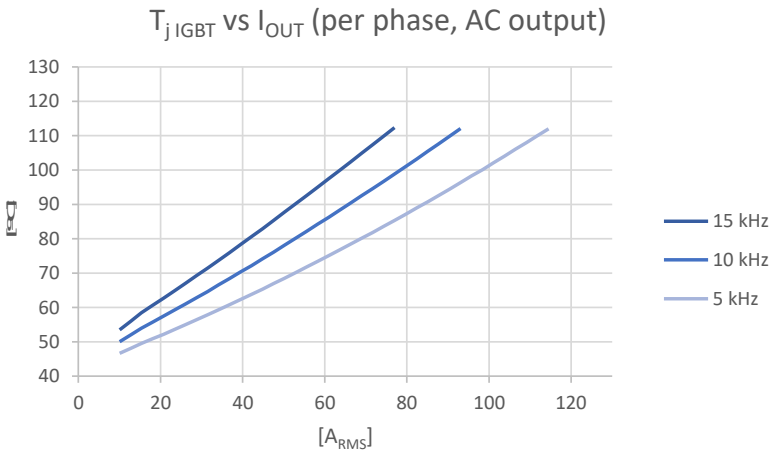
The power stack must be mounted in upright or horizontal position and tightened to a plane surface using its mounting fasteners providing a correct heatsink fin air canalization and heatsink thermal performance in order to accomplish with rated values specified on this datashet, other mounting positions must be avoided.

For real applications it is important to consider a safety margin with regarding the working current, we recommend a margin of the 20%.
For critical cases (24 hours work, repetitive overloads, high ambient temperature...), margins of the 30% to 50% are used.

Reserves the right to change limits, test conditions and dimensions
given in this data sheet at any time without previous notice.

PERFORMANCE CURVES

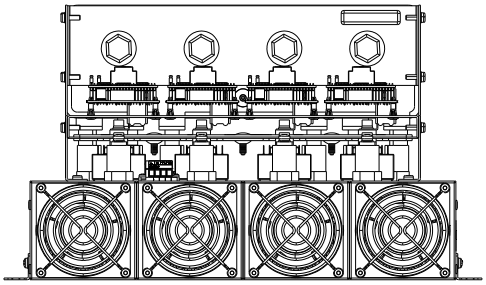
Stack working as a three-phase inverter, each phase with the same current output as parameter.

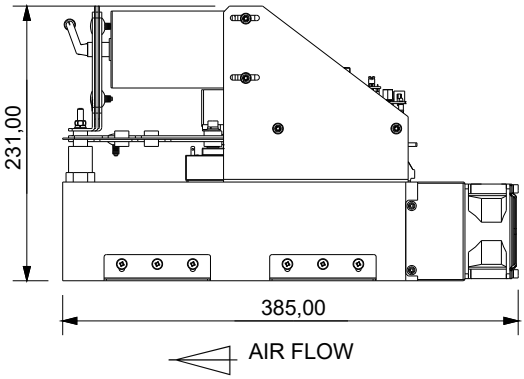


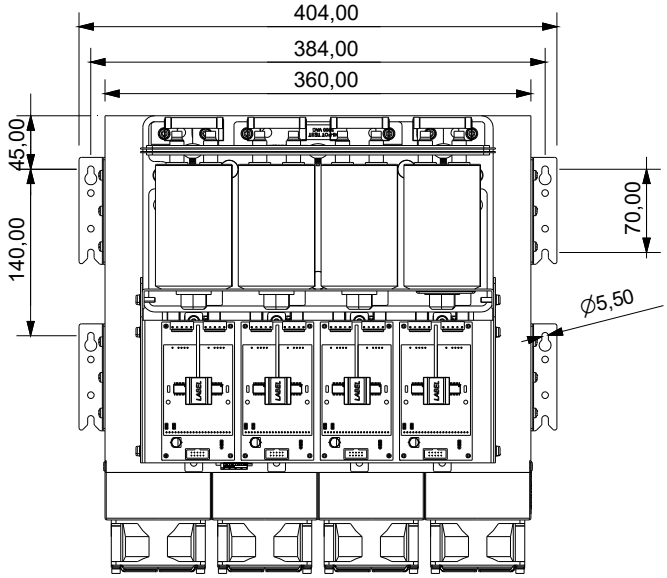
Condition	Symbol	Value	Units
Ambient temperature	T_A	40	°C
DC-Link voltage	V_{DCLINK}	600	V
Modulation index	m	0.94	
Load power factor	PF	0.85	
Output frequency	f_{OUT}	50	Hz

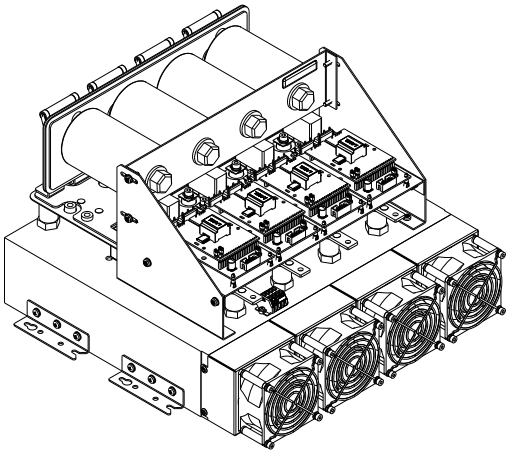
Reserves the right to change limits, test conditions and dimensions
given in this data sheet at any time without previous notice.

POWER STACK MECHANICAL DIMENSIONS









All dimensions in mm

Dimension	Typ	Units
Width	404	mm
Lenght	385	mm
Height	231	mm
Weight	21	kg

Reserves the right to change limits, test conditions and dimensions
given in this data sheet at any time without previous notice.

ANOTACIONES EN LA HOJA DE ESPECIFICACIONES:

RECTIFICADORES GUASCH, S.A.U. utiliza la siguiente anotación para identificar el estado del producto, en el lado izquierdo de la primera página:

PRELIMINARY TECHNICAL INFORMATION: El producto se encuentra en proceso de diseño y desarrollo. La información presenta los datos del producto pero algunas características pueden cambiar.
ADVANCED TECHNICAL INFORMATION: El producto se encuentra totalmente diseñado y las características se refieren a la fabricación en serie.
Sin anotación: Los parámetros del producto están fijados y se suministra de acuerdo con las especificaciones publicadas.

Los datos indicados en esta publicación corresponden a especificaciones de producto, queda exlcuida cualquier garantía expresa o implícita sobre sus propiedades o su aplicación, así como cualquier responsabilidad sobre daños directos o indirectos producidos por los materiales o resultantes de su aplicación. La empresa se reserva el derecho de realizar cambios en las especificaciones de los productos sin previo aviso. La información respecto a métodos de uso y aplicaciones se indica sólo como guía y no constituye garantía alguna de funcionamiento satisfactorio en un determinado equipo o aplicación. Es responsabilidad del usuario determinar la idoneidad del producto para su aplicación utilizando la información disponible y asegurarse de que la misma esta actualizada.
Cualquier nombre de producto o marca usada en esta publicación corresponde a marcas depositadas, marcas registradas o nombres protegidos por sus respectivos propietarios.

DATASHEET ANNOTATIONS:

RECTIFICADORES GUASCH, S.A.U. annotate datasheets in the left corner of the front page, to indicate product status:

PRELIMINARY TECHNICAL INFORMATION: The product is in design and development. The datasheet represents the product as it is understood but details may change.
ADVANCED TECHNICAL INFORMATION: The product design is complete and final characterisation for volume production is well in hand.
No Annotation: The product parameters are fixed and the product is available to datasheet specification.

The technical data are to specify components, not to guarantee their properties. No warranty or guarantee expressed or implied is made regarding delivery or performance. The Company reserves the right to alter without prior notice the specification of any product. Information concerning possible methods of use is provided as a guide only and does not constitute any guarantee that such methods of use will be satisfactory in a specific piece of equipment. It is the user's responsibility to fully determine the performance and suitability of any equipment using such information and to ensure that any publication or data used is up to date.
All brand names and product names used in this publication are trademarks, registered trademarks or trade names of their respective owners.

© RECTIFICADORES GUASCH, S.A.U.
DOCUMENTACION TECNICA, TECHNICAL DOCUMENTATION
PRODUCIDO EN ESPAÑA, PRODUCED IN SPAIN
PROHIBIDA SU VENTA, NOT FOR SALE

Your Needs, Our Solutions