

PRELIMINARY TECHNICAL INFORMATION

HIGHLIGHTS

- Wide range.
- Reliability.
- Short delivery time
- Modular system.
- Cooling system included.
- Current, voltage and temperature sensors.
- IGBT drivers included.
- Ready to use.

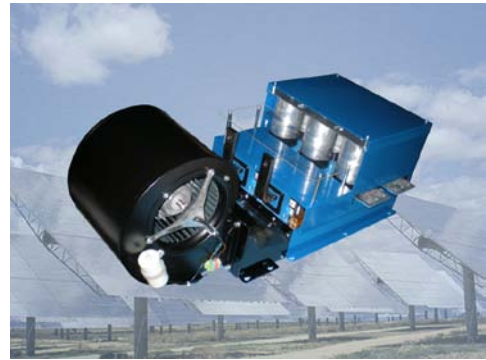


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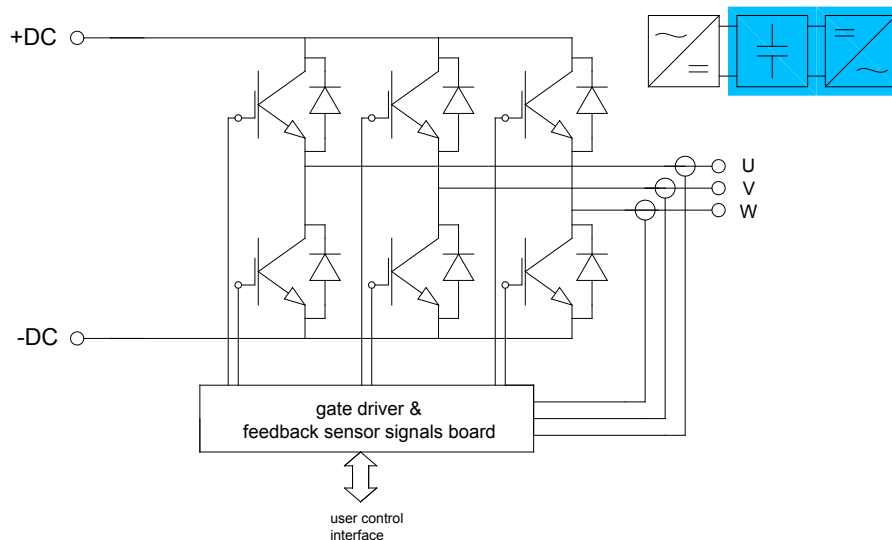
ABOUT MT SERIES

RECTIFICADORES GUASCH S.A. offers the most modifiable way for designing power stages AC-AC or DC-AC by connecting rectifier block, DC-link block and IGBT power stack. This way, the customer (and not the builder) decides which the block that limits the power of the entire system. The customer can obtain in a short delivery time a wide range of power assemblies in a compact size.

Each block is designed for obtaining the maximum efficiency by itself in the minimum dimensions. MT series is suitable to realize converters, choppers, half, full or three phases bridge inverters for motor control, welding, renewable energies, UPS...

BRIEFING

| | | |
|-------------------------------|---|--|
| Topology | B6I + capacitor bank | |
| Market | industrial | |
| Cooling system | centrifugal fan | |
| Driver system | SCiCoreLink67 | |
| Parameters monitored | DC voltage, Output current (each phase) temperature on heatsink, internal module NTC | |
| Max Voltage applied to DClink | 1100 V | |
| Output current per phase | fsw=2kHz, TJ<125°C Tamb=40°C fo=50Hz P.F.=0,85 m=1 VDClink=900V 359 A | |



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POWER STACK GENERAL CHARACTERISTICS

| Description | symbol | notes/test conditions | Min | Typ | Max | Units |
|---------------------------------------|--------------|---|-----|-----|------|------------|
| Voltage applied to DClink | V_{DClink} | note 1 | | 900 | 1200 | V_{DC} |
| Output current per phase | $I_{U,V,W}$ | fsw=2kHz, $T_J < 125^\circ C$, $T_{amb} = 40^\circ C$ fo=50Hz P.F.=0,85 m=1 $V_{DClink} = 900V$ | | | 359 | A_{RMS} |
| IGBT maximum junction temperature | T_{Jmax} | | | | 150 | $^\circ C$ |
| IGBT temp. under switching conditions | $T_{J(sw)}$ | | -40 | | 125 | $^\circ C$ |
| Storage temperature | T_{stg} | | -40 | | 85 | $^\circ C$ |
| Operating temperature | T_{op} | | -25 | | 85 | $^\circ C$ |
| Power-to-control isolation voltage | V_{ISOp-c} | 50 Hz @1min/ note 2 | 3 | | | kV_{AC} |
| Module isolation voltage | V_{ISOmod} | 50 HZ @1min/ note 3 | 4 | | | kV |
| Mounting Torque DC terminals | | M8 | 8 | | 10 | N·m |
| Weight (aprox) | | | | | 38.5 | kg |

COOLING SYSTEM CHARACTERISTICS

| Description | symbol | notes/test conditions | Typical | Units |
|---------------------------|-----------|-----------------------|-----------|-----------|
| Type | | centrifugal fan | | |
| Fan system supply voltage | V_{FAN} | | 230 | V_{RMS} |
| Fan system consumption | I_{FAN} | 50Hz/60Hz | 1,11/1,36 | A |

IGBT MODULE ELECTRICAL CHARACTERISTICS

| Description | symbol | notes/test conditions | Min | Typ | Max | Units |
|--------------------------------------|-------------|--|-----|------|------|-------|
| Collector-Emitter Voltage | V_{CES} | $T_J = 25^\circ C$ | | | 1700 | V |
| DC Collector current | I_{Cnom} | $T_C = 80^\circ C$, $T_J = 150^\circ C$ | | | 450 | A |
| Repetitive peak collector current | I_{CRM} | $t_p = 1ms$ | | | 900 | A |
| Power dissipation (per module) | P_{DISS} | $T_C = 25^\circ C$, $T_J = 150^\circ C$ | | | 2800 | W |
| Collector-emitter saturation voltage | V_{CEsat} | $I_c = 450 A$, $T_J = 125^\circ C$ | | 2,35 | | V |

note 1: This voltage is limited by IGBT module. Restriction by DC Link capacitors voltage must be considered.

note 2: This isolation voltage is referred to the minimum isolation voltage between any control/feedback signal (PWM, reset fault, feedback sensor signals and supply of boards) and any power voltage (DC input, AC output).

note 3: This is an inner property of the IGBT module. It refers to the isolation between the internal chip and the external case.

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CAPACITOR BANK CHARACTERISTICS

| Description | symbol | Typical | Units |
|-------------------------------|--------------|-------------------------------|-----------------|
| Single capacitor | C | MKP type 420uF -15%..0% 1100V | |
| Total equivalent capacitance | C_{equiv} | 3780 | μ F |
| max capacitor bank DC voltage | V_{DClink} | 1100 | note 4 V |

ENVIRONMENTAL SPECIFICATIONS

| Description | |
|--|-------------------------------|
| Protection grade (EN-60529 / CEI529 / UNE-20324) | IP-00 |
| Humidity max. | 50% RH @ 35°C / 90% RH @ 20°C |
| Pollution degree | III |

MOUNTING CONSIDERATIONS

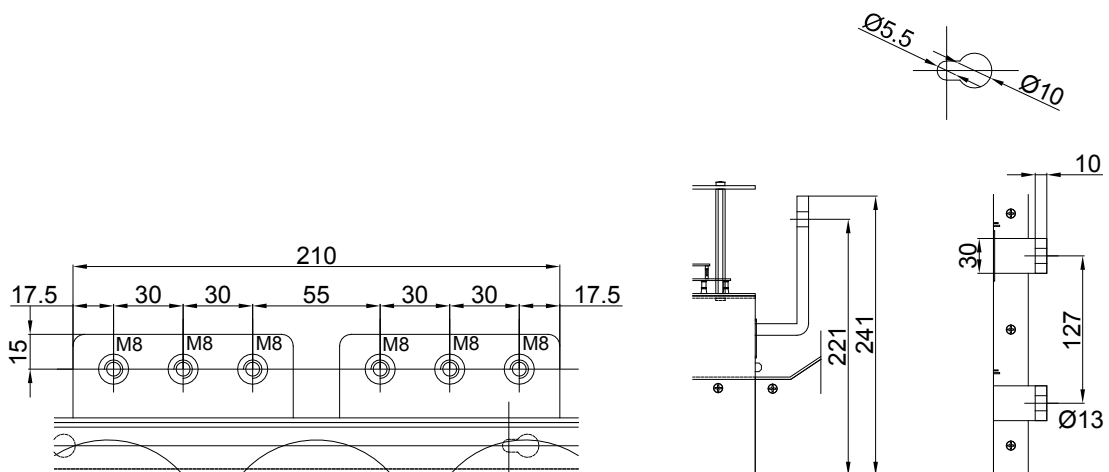
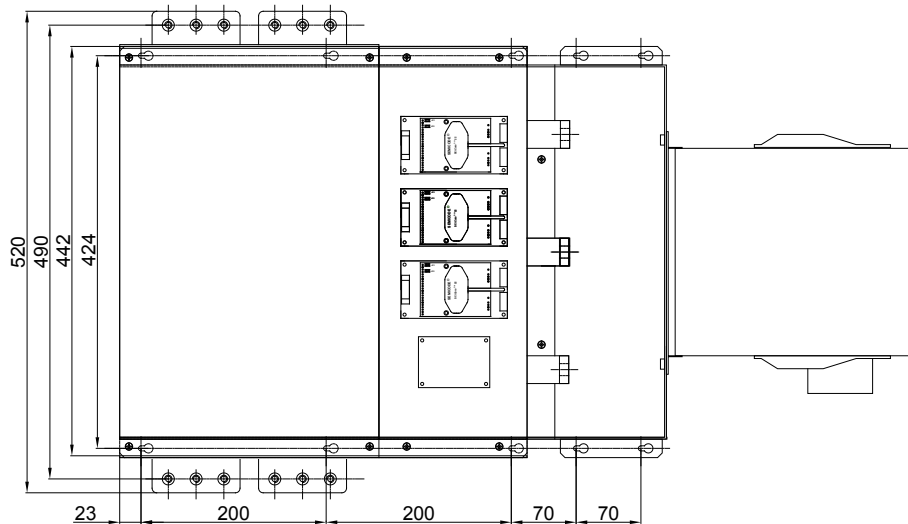
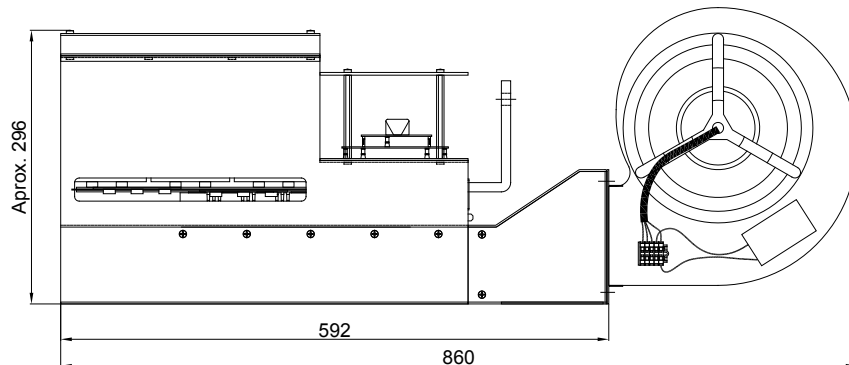
It's necessary a minimum distance of 100 mm with regard to the envelope. The free air circulation should be guaranteed. Avoiding the heat sources of nearby to assembly.

In the 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...), margins of the 30% to 50% are used.

note 4: This voltage is limited by DC Link capacitors. Restriction by IGBT maximum voltage must be considered.

MECHANICAL DIMENSIONS



All dimensions in millimeters

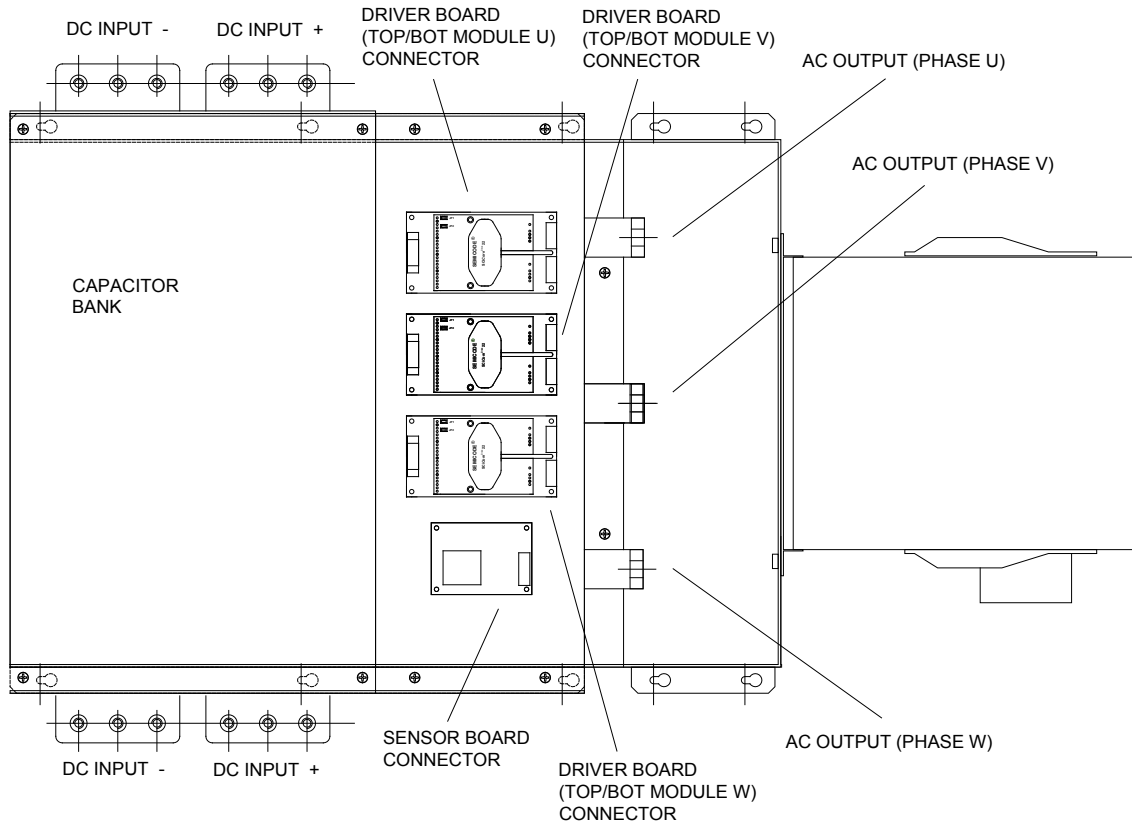
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POWER AND CONTROL CONNECTION



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GATE DRIVER BOARD ELECTRICAL CHARACTERISTICS

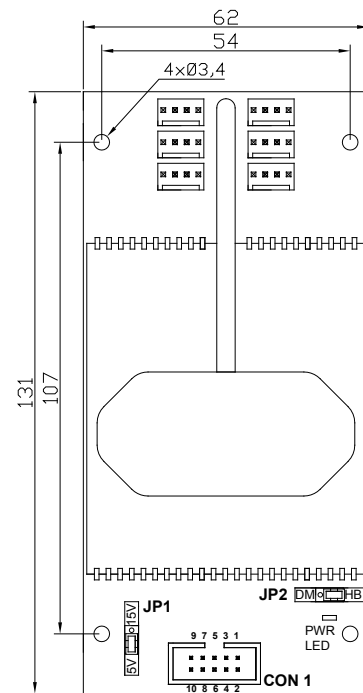
| Description | symbol | notes/test conditions | Min | Typ | Max | Units |
|---|----------------|---|-----|-----|-----|-------|
| Supply voltage | V_{CC} | | | 15 | | V |
| Current consumption | I_{CC} | $f_{sw} = 10\text{kHz}; Q_{G/pulse} = 6\mu\text{C}$ | | 370 | | mA |
| PWM & reset High state Input voltage | V_{IN_H} | JP1 to 5V connected | 3,5 | | 5 | V |
| PWM & reset Low state Input voltage | V_{IN_L} | | 0 | | 1,5 | V |
| PWM & reset High state Input voltage | V_{IN_H} | JP1 to 15V connected | 11 | | 15 | V |
| PWM & reset Low state Input voltage | V_{IN_L} | | 0 | | 4 | V |
| Fault High state Output Voltage | V_{FAULT_H} | working in logic lev; JP1 to 15V | | | 15 | V |
| Fault High state Output Voltage | V_{FAULT_H} | working in logic lev; JP1 to 5V | | | 5 | V |
| Fault (working as open collector) current | I_{FAULT} | working as open collector | | | 20 | mA |

GATE DRIVER BOARD PINOUT

| CON 1 | designation | function |
|-------|--------------------|--|
| 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 | +15VDC for supply voltage |
| 7 | FAULT | fault output signal |
| 8 | VCC | +15VDC for supply voltage |
| 9 | VCC | +15VDC for supply voltage |
| 10 | PWM _{BOT} | Input logic signal for switching BOT IGBT |

JUMPERS

| | |
|-----|--|
| JP1 | right connected: 15V logic level left connected: 5V logic level |
| JP2 | right connected: half bridge mode left connected: direct mode |



All dimensions in mm.

DEFAULT VALUES

- half bridge mode (direct mode optional)
- 4µs dead time between channels generated
- Gate resistor depending of the IGBT module used
- 0-5V input PWM and reset logic levels (0-15V optional)
- 0-5V logic fault output (0-15V or low level-open collector fault output optional)

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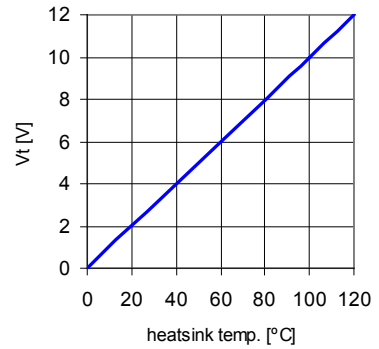
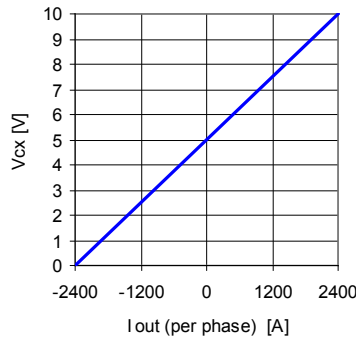
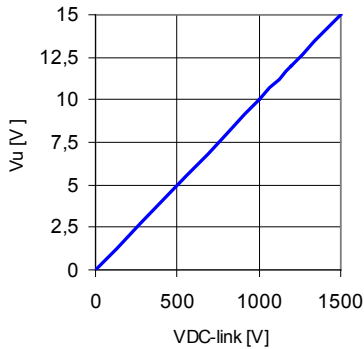
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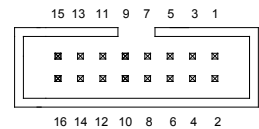
SENSOR BOARD ELECTRICAL CHARACTERISTICS

| Description | symbol | notes/test conditions | Min | Typ | Max | Units |
|-------------------------------------|--------------|-----------------------------|-------|----------|------|----------|
| Supply voltage | V_{CC} | | | ± 15 | | V |
| Feedback signal of heatsink temp. | V_T | relative error <2,5% | 0 | | 12 | V |
| Heatsink temp. measurable range | | | 0 | | 120 | °C |
| Feedback signal of output current | V_{CX} | relative error <3% | 0 | | 10 | V |
| Current measurable range | | | -2400 | | 2400 | A |
| Feedback signal of VDC-link voltage | V_U | relative error <2,8% | 0 | | 15 | V |
| DC-link measurable voltage range | | | 0 | | 1500 | V_{DC} |
| Thermostat | | Normally connected | | 90 | | °C |
| NTC rated resistance | $R_{NTC 25}$ | internal module NTC TC=25°C | | 5 | | kΩ |
| NTC B value | $B_{25/50}$ | note 1 | | 3375 | | K |



SENSOR BOARD PINOUT

| CON 2 | designation | function |
|-------|-----------------|---|
| 1 | +15Vcc | +15VDC for supply voltage |
| 2 | NTCA1 | NTC terminal 1 of IGBT module A |
| 3 | NTCB2 | NTC terminal 2 of IGBT module B |
| 4 | NTCB1 | NTC terminal 1 of IGBT module B |
| 5 | NTCC1 | NTC terminal 1 of IGBT module C |
| 6 | NTCA2 | NTC terminal 2 of IGBT module A |
| 7 | NTCC2 | NTC terminal 2 of IGBT module C |
| 8 | TH ₂ | Thermostat terminal 2 |
| 9 | V_T | Output voltage representation of heatsink temperature |
| 10 | TH ₁ | Thermostat terminal 1 |
| 11 | $V_{C,V}$ | Output voltage representation of phase V output current |
| 12 | V_U | Output voltage representation of VDC-link voltage |
| 13 | $V_{C,W}$ | Output voltage representation of phase W output current |
| 14 | $V_{C,U}$ | Output voltage representation of phase U output current |
| 15 | -15Vcc | -15VDC for supply voltage |



note 1:

$$R_T = R_{25} \cdot e^{B \left(\frac{1}{T[K]} - \frac{1}{298,15K} \right)}$$

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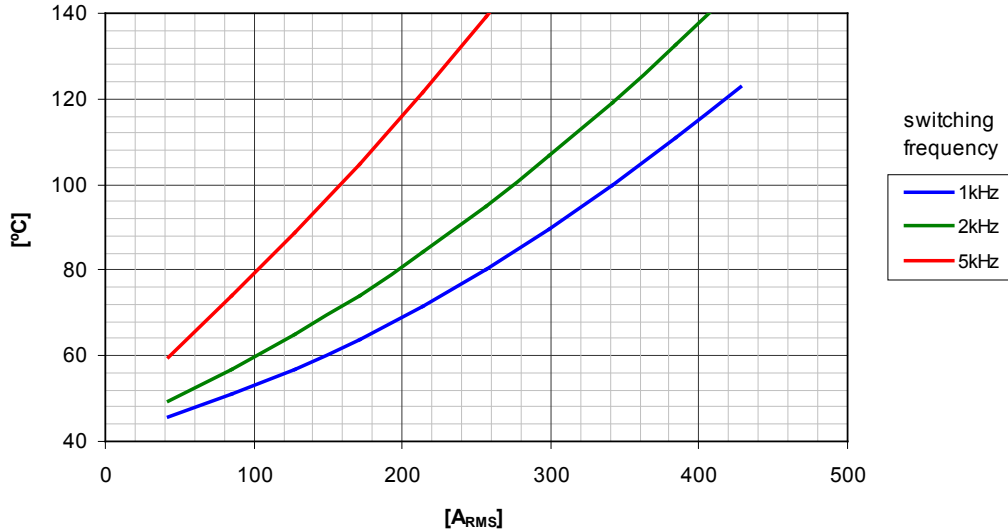
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PERFORMANCE CURVES

Stack working as an inverter

T_{J_IGBT} vs I_{OUT} (per phase, AC output)



| Condition | Symbol | Value | Units |
|---------------------|---------------------|-------|-------|
| Ambient temperature | T _A | 40 | °C |
| DCLink Voltage | V _{DCLink} | 900 | V |
| Load Power Factor | PF | 0,85 | |
| Modulation index | m | 1 | |
| Output frequency | f _{OUT} | 50 | Hz |

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