

GENERAL NFS

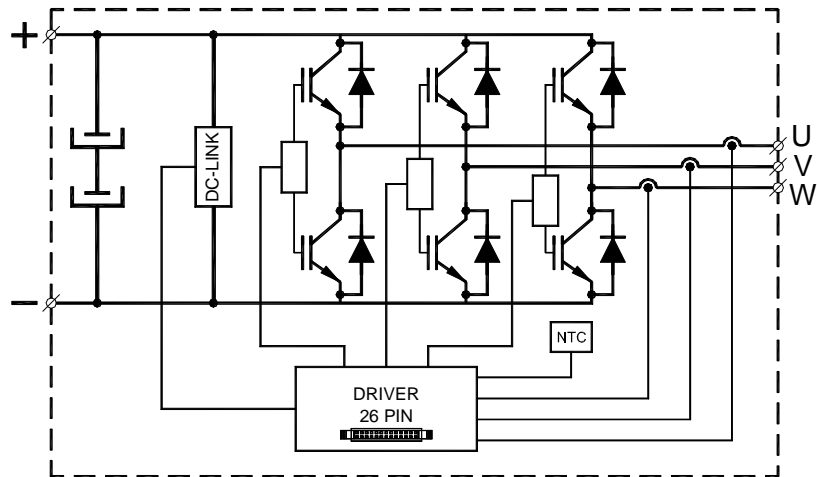
Description

Power equipments for the control of three-phase charges:

- Last generation IGBTs.
- Power protection against overcurrent, V_{ce-sat} , overtemperature, overvoltage and gate voltage drop.
- Analogical protected outputs; such as heat-sink temperature; DC-link voltage measurement and currents.
- Capacitor bank in DC-link with low inductance.
- Power supply and control signals with flat cable of 26 conductors. It is compatible with other brands.

Applications

- Motor controls
- Solar
- Energy storage
- UPS



Common Data

- ✓ Flat cable with 26 conductors (I/O). It is compatible with other brands.
- ✓ Maximum working DC voltage 800 volts.
- ✓ DC Control voltage supply 24 volts. (Range to 20-30V).
- ✓ Protected inputs against electrostatic charges.
- ✓ Trigger inputs, voltage CMOS 15 V (max 20V). Impedance 3K3 ohms.
- ✓ It has one current sensor per branch.
- ✓ 2 NTC sensors per heat-sink for measuring the temperature.
- ✓ DC-link measurement card, with isolated analogical output.
- ✓ 5 protected analogical output against short-circuits.
 - 3 of current.
 - 1 of DC-link
 - 1 of temperature (highest NTC).
- ✓ 4 open collector outputs for alarm indications. It is protected against overcurrent.
 - 1 output per branch.
 - 1 overtemperature.

Protections

- ✓ Logic protection against any anomaly. This protection inhibits the gate and switch-off the module to pass 200ms, during this period avoid triggering the gate. This protection introduces an additional advantage against possible failure of external control.
- ✓ Individual alarm of each three branches.
- ✓ Individual alarm of each one of three branches.
- ✓ Overcurrent alarm (See the analogical output table).
- ✓ Overvoltage alarm in DC-link bus (>800V)
- ✓ Power supply fault alarm (<20V)
- ✓ IGBTs protection by Vce sat. and gate voltage drop.

Measurement Ranges

Within each size, there are several models in order to adjust to the needs of the loads. Certain charges need the current measurement as precise as possible, which is the case of the motors controlled by vector control.

| 560V _{DC} F.SW = 4KHz (except NFS-400-25 2KHz) T _{AMB} = 40°C | | | | | | |
|---|----------------------|--------|------------------------|--------|--------------------------------|---------------------|
| CÓDIGO NFS | I _{RMS} (A) | | I _{CPICO} (A) | | CAPACIDAD TOTAL EQUIPO | |
| | I.RMS1 | I.RMS2 | 8V | 10V | (condensadores electrolíticos) | |
| | | | | ALARMA | | |
| SIZE 1 | | | | | | |
| 50 | -10 | 10 | 13 | 24 | 30 | 4 (1500) = 1500µF |
| | -15 | 20 | 26 | 44 | 56 | |
| | -20 | 29 | 38 | 69 | 86 | |
| | -25 | 39 | 52 | 89 | 111 | |
| SIZE 2 | | | | | | |
| 200 | -10 | 45 | 60 | 133 | 167 | 4 (3300) = 3300µF |
| | -15 | 64 | 85 | 149 | 187 | |
| | -20 | 83 | 110 | 206 | 258 | 6 (3300) = 4950µF |
| | -25 | 94 | 125 | 240 | 300 | |
| SIZE 3 | | | | | | |
| 400 | -10 | 113 | 150 | 267 | 333 | 8 (3300) = 6600µF |
| | -15 | 124 | 165 | 339 | 424 | |
| | -25 | 150 | 200 | 427 | 533 | |
| SIZE 4 | | | | | | |
| 425 | -25 | 165 | 220 | 427 | 533 | 6 (6800) = 10200µF |
| SIZE 5 | | | | | | |
| 905 | -10 | 263 | 350 | 667 | 833 | 12 (6800) = 20400µF |
| | -15 | 326 | 435 | 788 | 985 | |
| 914 | -20 | 413 | 550 | 1000 | 1250 | 12 (6800) = 20400µF |
| SIZE 6 | | | | | | |
| 1400 | -10 | 450 | 600 | 1067 | 1333 | 18 (6800) = 30600µF |
| | -20 | 525 | 700 | 1255 | 1569 | |

Flat Cable

Flat cable with 26 conductors.

The power supply and the control signals are connected through it.

In order to determine the supply consumption of every module to check the pdf file. In equipments with size 4 to 5, if the power supply current exceeds 2 A.;

It is recommendable to supply them with an external connector. In this way, the flat cable is for control signals.

The current relations are according to model. See table below.

| Pin | signal | remark |
|-----|---------------------|--|
| 1 | free | |
| 2 | HB 1 | BOT IN |
| 3 | | ALARM OUT |
| 4 | HB 2 | TOP IN |
| 5 | | BOT IN |
| 6 | HB 3 | ALARM OUT |
| 7 | | TOP IN |
| 8 | HB 3 | BOT IN |
| 9 | | ALARM OUT |
| 10 | | TOP IN |
| 11 | Overtemperature OUT | LOW = NO ERROR; open colector output |
| 12 | free | |
| 13 | V DC. LINK | analog OUT; 9V = 800V |
| 14 | +24V IN | 24V DC (20 - 30V) |
| 15 | +24V IN | 24V DC (20 - 30V) |
| 16 | free | |
| 17 | free | |
| 18 | GND | GND for power supply and digital signals |
| 19 | GND | GND for power supply and digital signals |
| 20 | Temp. Analog OUT | analog OUT; 8V = 75°C |
| 21 | GND aux. | reference for analog output signals |
| 22 | I analog OUT HB 1 | analog OUT; 10V = Max current (100% I _c) see table |
| 23 | GND aux. | reference for analog output signals |
| 24 | I analog OUT HB 2 | analog OUT; 10V = Max current (100% I _c) see table |
| 25 | GND aux. | reference for analog output signals |
| 26 | I analog OUT HB 3 | analog OUT; 10V = Max current (100% I _c) see table |

Digital Inputs

The trigger input HB-1-2-3 TOP and BOT are CMOS inputs, with an input impedance of 3k3 ohm. They have a small filter and protections against electrostatic charges.

The typical high and low levels are:

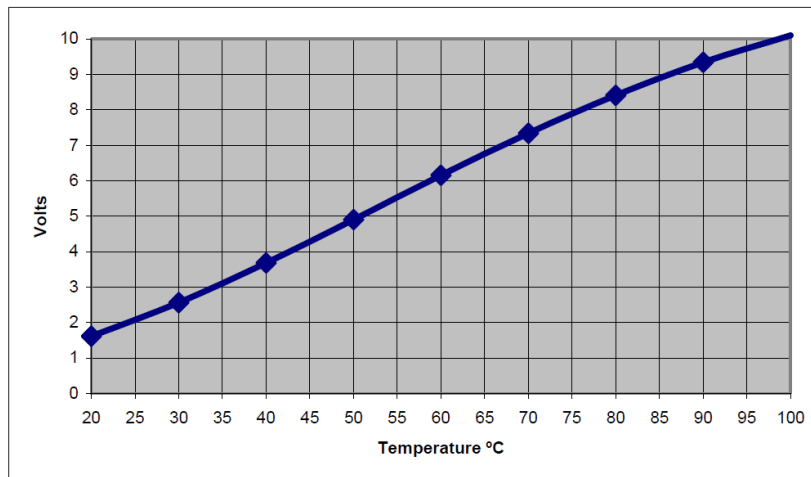
- Low level "0" lower than 7,3 volts.
- High level "1" higher than 9,4 volts

Analogical Outputs

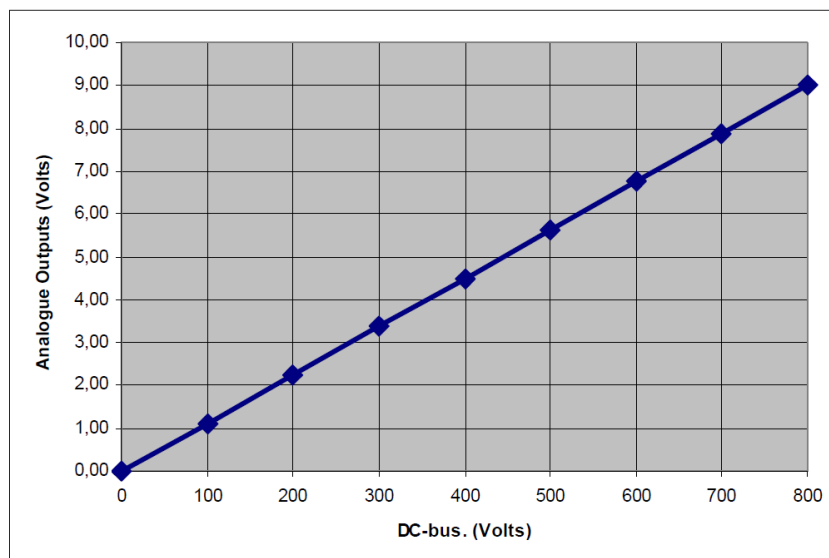
The analogical outputs are protected against overcurrent. Current higher than 30mA. The measurement ranges according to attached table.

| Analogical Outputs | Measurement Range(V) | | Equipment protections | |
|--|----------------------|------|-----------------------|------|
| | Min. | Max. | | |
| Outputs according to the current table | -10 | +10 | +/-10V +/-1% | STOP |
| Temperature output (Size 1) | 0 | +10 | 71°C +/- 2 °C | STOP |
| Temperature output (Size 2 to 6) | 0 | +10 | 78°C +/- 2 °C | STOP |
| Bus DC output | 0 | +10 | 9V(800V) +/-5% | STOP |

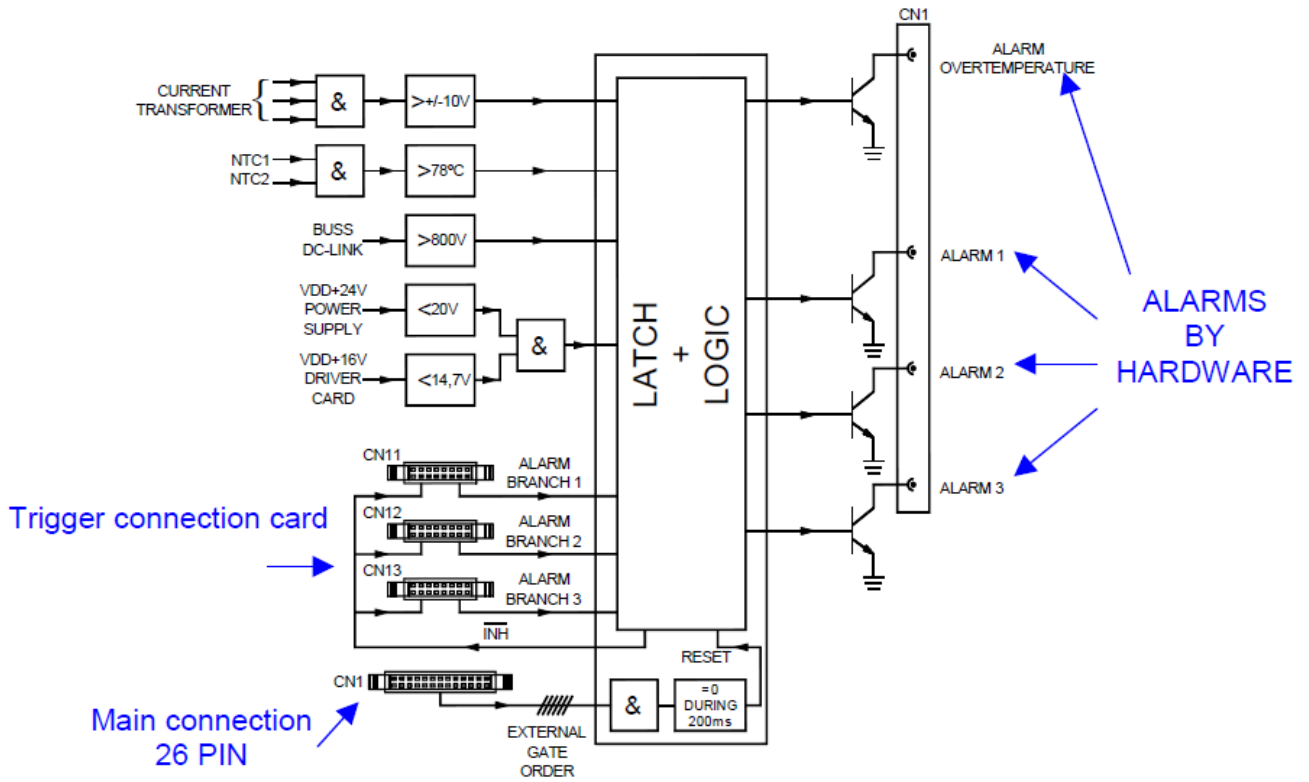
Informative graph of NTC outputs (Tolerance +/- 3°C). Highest temperature between two NTC of the equipment. It can be considered linear scale between (30°C = 2,5V y 80°C = 8,5V). Both NTC are placed in the heat-sink as close as possible to the IGBT,s



Informative Bus graph of DC-link output (MTC-3028) (Tolerance +/- 2%). The total voltage is measured in the Bus through the DC-link. The scale is linear. The maximum voltage on the bus for this series is 800V. (If it exceeds this voltage, it cuts trigger gate).



ALARMS (hardware)



The outputs corresponding to the alarms are in open-collector and are protected against short-circuits (max 30 mA.)

Alarm Codes

| CONDITIONS | TEMP ALARM | ALARM1 | ALARM2 | ALARM3 |
|-------------------------------|------------|--------|--------|--------|
| ALARM BRANCH 1 | 0 | 1 | 0 | 0 |
| ALARM BRANCH 2 | 0 | 0 | 1 | 0 |
| ALARM BRANCH 3 | 0 | 0 | 0 | 1 |
| OVERTEMPERATURE | 1 | 0 | 0 | 0 |
| OVERCURRENT | 0 | 1 | 1 | 1 |
| V _{BUS} HIGH | 0 | 1 | 1 | 1 |
| V _{ALIMENTACIÓN} LOW | 0 | 1 | 1 | 1 |

As can be observed, the alarms of overcurrent, overvoltage and low supply voltage are not differences in hardware.