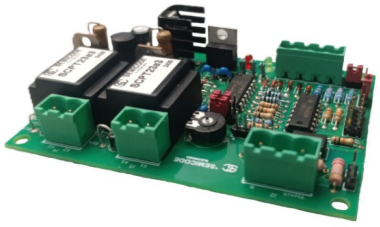
SC2024

Modular thyristor firing board

PRELIMINARY TECHNICAL INFORMATION

HIGHLIGHTS

- Modular system
- Pulse train firing signal
- Wide range of application topologies
- Standard dimensions for 72 mm DIN rail platform
- SC2024HV version for higher voltages (up to 700 V)
- SC2024-60Hz version for 60 Hz mains



non-contractual image

OVERVIEW

SC2024 is a modular thyristor firing board, which its main feature is its versatility, allowing three different regulation options (0-5 V, 0–10 V and 4-20 mA). Designed to fit in standard 72 mm DIN PCB holders.

It can be used by itself in a numerous of single-phase type of converters, or combining multiple boards in order to regulate other multiple-phase converters listed bellow. And can be set to provide a progressive start-up with maximum time of 20 s.

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Notes / Test conditions	Min	Typ	Max	Units
V_{CC}	Supply voltage			24		V
I_{CC}	Supply current	*Full conduction, 20 Ω load*	60	65	75	mA
V_{in}	Mains voltage	*SC2024*	50		480	V_{RMS}
		SC2024HV	100		700	
F_{in} (1)	Mains frequency	*SC2024/SC2024HV*		50		Hz
		SC2024-60HZ/SC2024HV-60Hz		60		
f_{P_GATE}	Gate pulse frequency			13		kHz
V_P	Sustaining gate pulse open circuit voltage			6		V
I_{trig}	Trigger current	@ 2.5 V		400		mA
V_{f_max}	Maximum firing voltage (pulse train)	30 Ω load		4		V
I_{sc}	Sustaining gate drive short circuit current	1 Ω load		570		mA
t_{sc_rise}	Short circuit gate drive current rise time			1.5		A/µs
V_{t_max}	Maximum input voltage to pulse transformers			700		V_{RMS}

Load connections	
Single phase application circuits	W1C, M2CA, M2CK, B2HZ, B2HK, B2HA, B2C
Three phase application circuits	W3.2C, W3C, B6HA, B6HK, B6C
Six phase application circuits	M6CA, M6CK, M3.2CA, M3.2CK
Optional phase application circuits	W1H, M1C, W3H, M3CA, M3CK

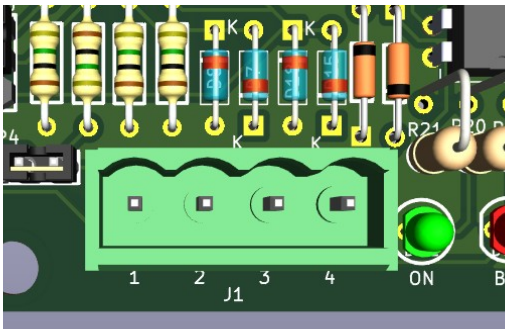
NOTES:
(1) Standard 50 Hz/60 Hz ±5% frequency is shown due to typical application demand, other mains frequency adjusts can be available by order. Please contact us.

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

CONTROL OPTIONS

Symbol	Parameter	Notes / Test conditions	Min	Typ	Max	Units
V_{ref_5}	Reference signal voltage 0 – 5 V	Selectable with configuration jumpers *(see page 3)*	0		5	V
V_{ref_10}	Reference signal voltage 0 – 10 V		0		10	V
I_{ref}	Reference signal current 4 – 20 mA		4		20	mA
BLQ	External blocking	External open contact				

CONTROL & SUPPLY CONNECTORS:

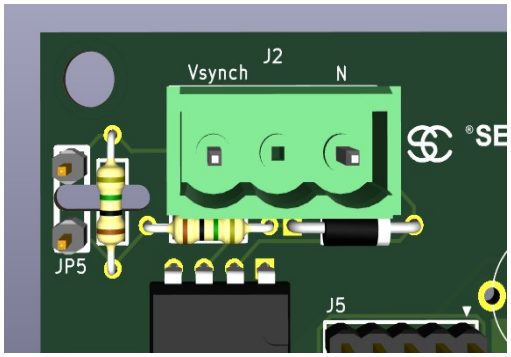


J1 CONNECTOR:

Pin	*Function*
1	External control signal input
2	GND
3	Blocking
4	24 V power supply

(J1:1) - Pin is an external reference input of 0 – 10V, 0 – 5 V or 4 – 20 mA, that can be selected by setting JP3 and JP4 jumpers as shown in page 3.

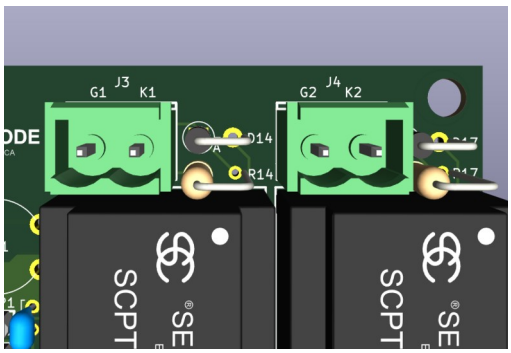
(J1:3) - Connecting the **Blocking** pin to **GND** (J1:2) causes the board to suppress the output firing pulses and the converter output voltage becomes 0 V. After removing the connection to GND the board automatically retakes the switching redoing the startup ramp if enabled.



J2 CONNECTOR:

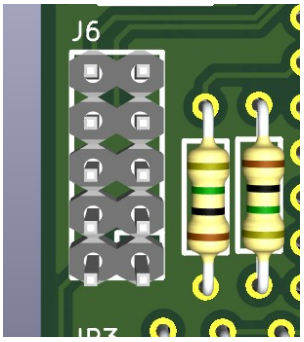
J2 connector, is the synchronism voltage reference. Consider different connection types following the schemes below.

The synchronism voltage reference is obtained normally by the corresponding thyristors cathodes. The connection schemes for each configuration are specified in the following pages.



J3 AND J4 CONNECTORS:

J1 and **J3** connectors are the thyristors gate outputs. It has been used the nomenclature **G1** as gate 1, **K1** as cathode 1, **G2** as gate 2, and **K2** as cathode 2.



J6 CONNECTOR:

This connector is used for interconnect different boards in the case of a multi-phase application. A flat cable, which must be previously requested by the customer, brings the power supply, blocking and control signals.

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INTERNAL ADJUSTMENTS

Power-on-ramp

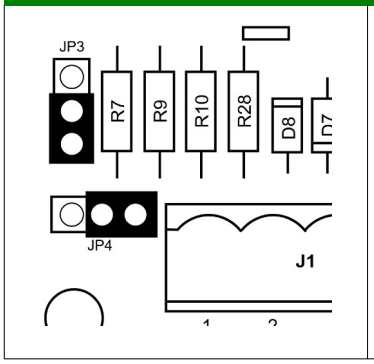
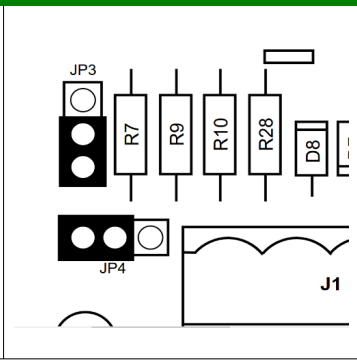
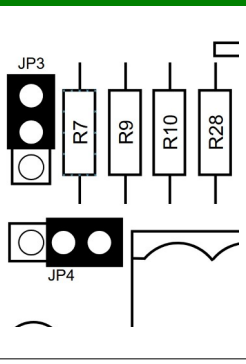
The progressive start-up duration can be adjusted with the potentiometer on board RV1 from 0 to 20 seconds by turning clockwise to increment it and counter-clockwise to decrease it.

Master/Slave setting (JP1 and JP2 jumpers)

JP1 and **JP2** jumpers must be placed between the center and right pins in order for the board to work in single-phase or in master mode in a multi-phase application, and between middle and left pin in order to work as slave in multi-phase applications.

Reference signal type setting (JP3 and JP4 jumpers)

JP3 and **JP4** are meant to set the input signal type to be used. Input configuration must be made in the **master board**, this configuration will not have any effect on boards set as slave.

Voltage		*Current*
0-5V	*0-10V*	*4-20 mA*
		

Synchronism input setting:

JP5 jumper must be active when the synchronism voltage is below **230 V_{RMS}** , and disabled when then voltage synchronism is above **230 V_{RMS}** , or **540 V_{RMS}** in the HV version.

Lighting indications:

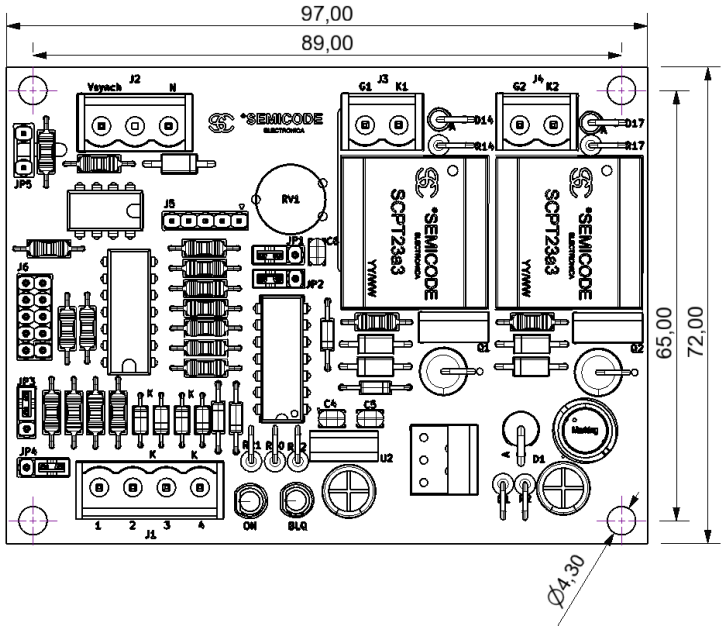
ON LED, indicates that the board power supply is on.

BLQ LED, indicates the blocking condition.

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PCB	97x72x26 mm
Fixations	Drill holes Ø 4.3 mm
Weight	96 g

DIMENSIONS



All dimensions in mm

ENVIRONMENTAL SPECS	
Protection grade	IP-00
Maximum humidity	50% Rh @ 35ºC / 70% Rh @ 20ºC
Maximum working temperature	55ºC
Pollution grade	III
Supply isolation	4000 V_{RMS} @ 1min

ACCESSORIES

The board is supplied with the following accessories:

- Isolators and fixing screws.
- Plugging connectors.
- Configuration jumpers.



SCCAB21



SCCAB22

Optionally can be request the following accessories:

- Interconnection flat cable for three-phase assemblies (SCCAB22 reference).
- Interconnection flat cable for 2 boards assemblies (SCCAB21 reference).

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MOUNTING CONSIDERATIONS

1- Avoid using long cables for the firing system, so that, use twisted or shielded cables. This advice is also for the control potentiometer cables.

2- Protect the control board in front of strong magnetic fields, for example, large power transformers. It's recommended to locate the board over a surface connected to ground.

3- After mounting the system, it's advisable to make some working measures with small loads and reduced voltages. In this way, any possible error in the connections will be detected on time and won't be produced any serious consequences for the application.

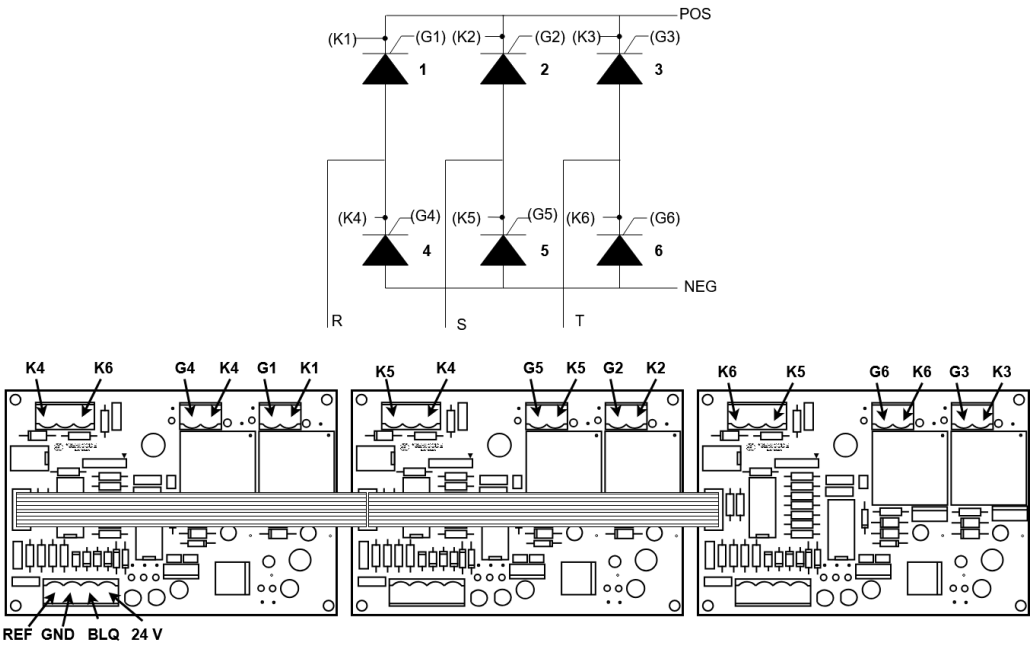
4- In critical applications, with variable loads, parasitic in the network, regulation with minimum currents and voltages, etc… can produce non desirable regulation oscillations. For these cases, **contact our technical department to study an optimal solution**.

5- For specific and exclusive applications, which are not described in this brief, it is possible to make adaptations of the board and connect auxiliary control modules. So please, contact our technical department.

CONNECTION SCHEMES

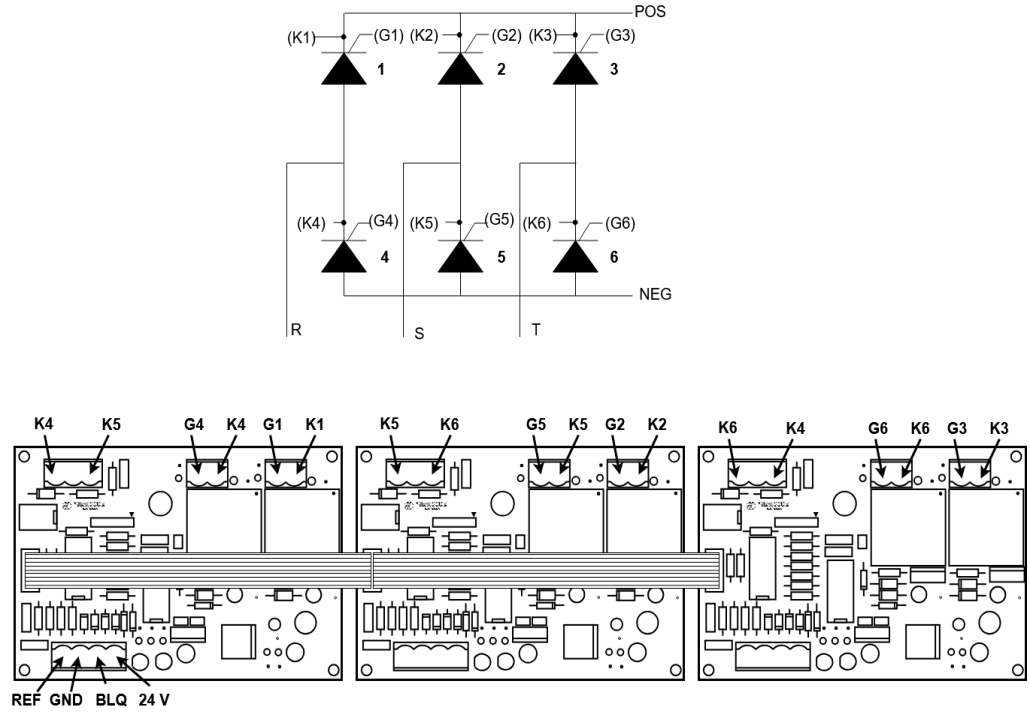
Following you can find the most typical topology scheme connections. Regarding other configurations please contact us.

B6C (THREE PHASE CONTROLLED BRIDGE).



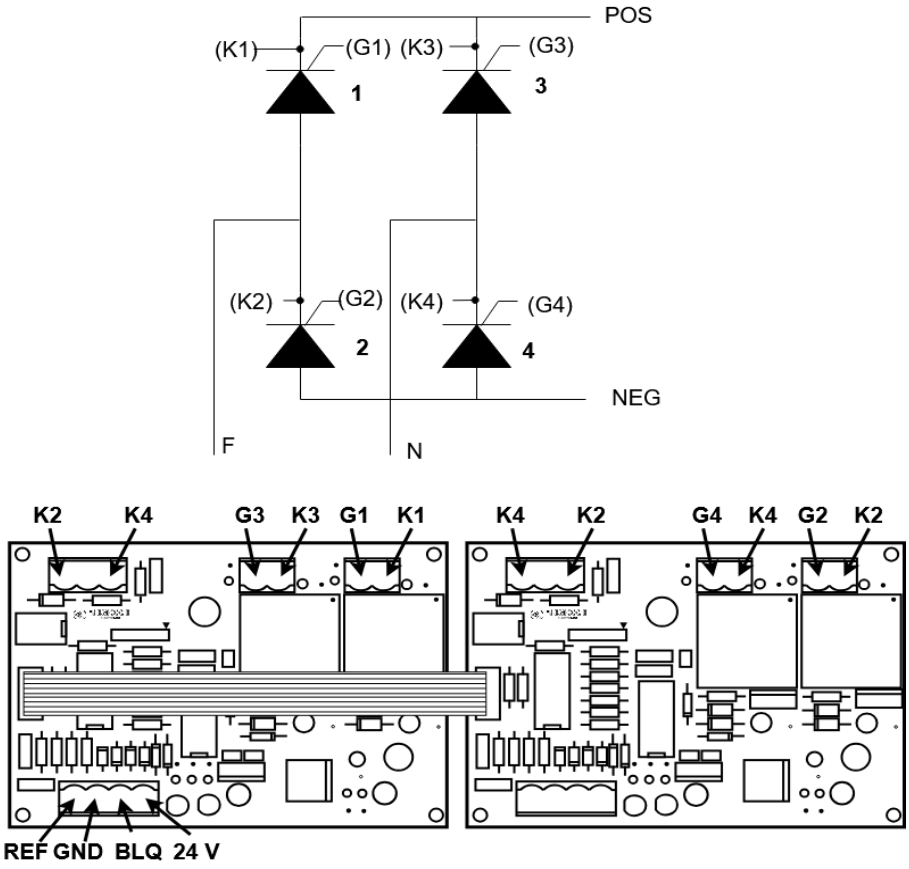
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B6C INVERTED PHASE ROTATION CASE.



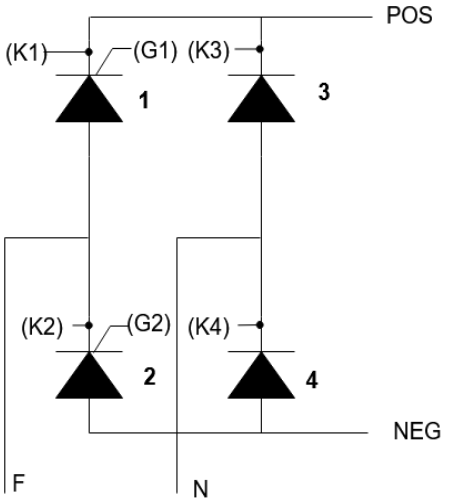
Note: For half controlled full bridges (as B6HK, B6HA...) all depicted connections remain the same but changing SCR for diodes.

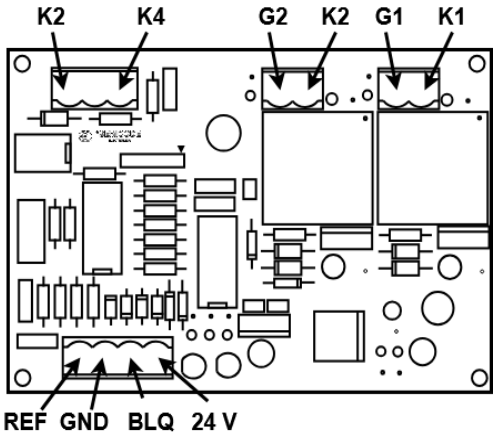
B2C (SINGLE PHASE CONTROLLED BRIDGE).



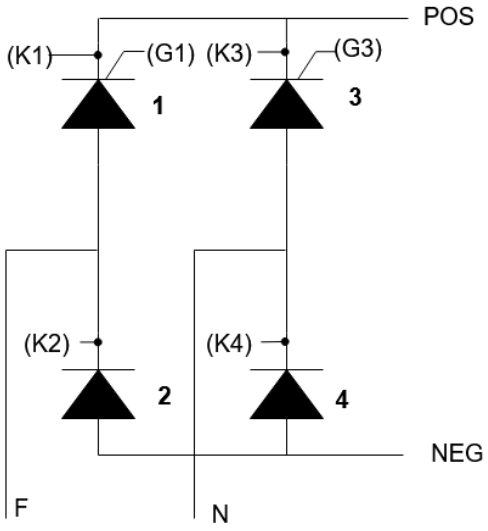
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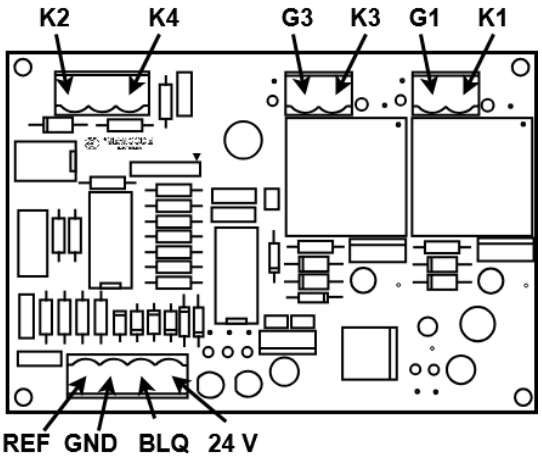
B2HZ (SINGLE PHASE SEMICONTROLLED BRIDGE).





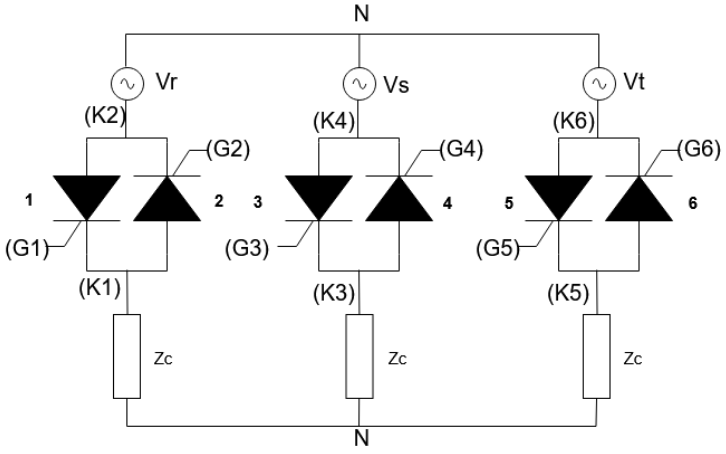
B2HK (SINGLE PHASE SEMICONTROLLED BRIDGE)

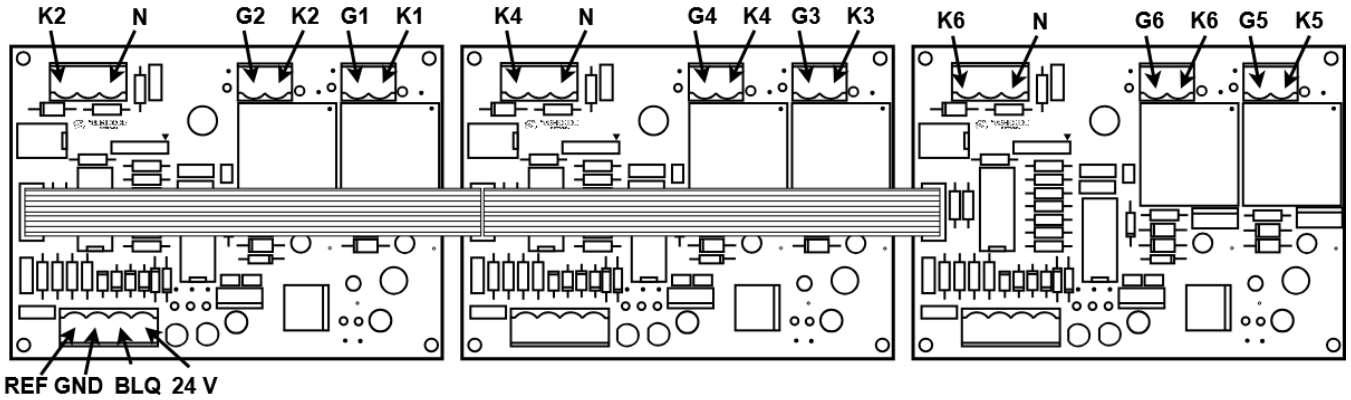




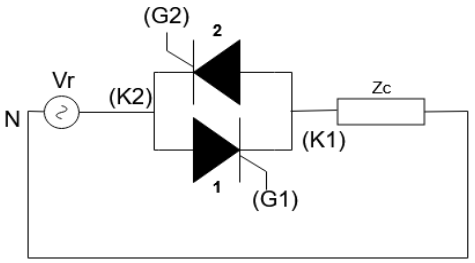
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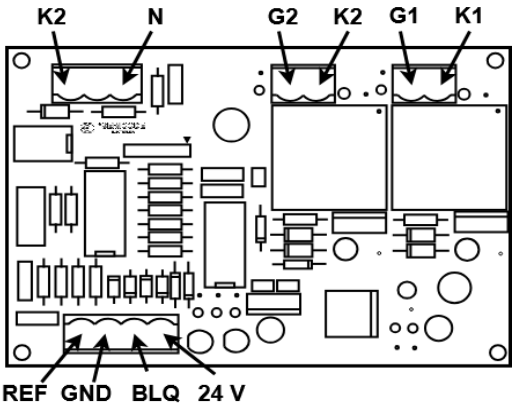
W3C (THREE PHASE WYE AC/AC CONVERTER).





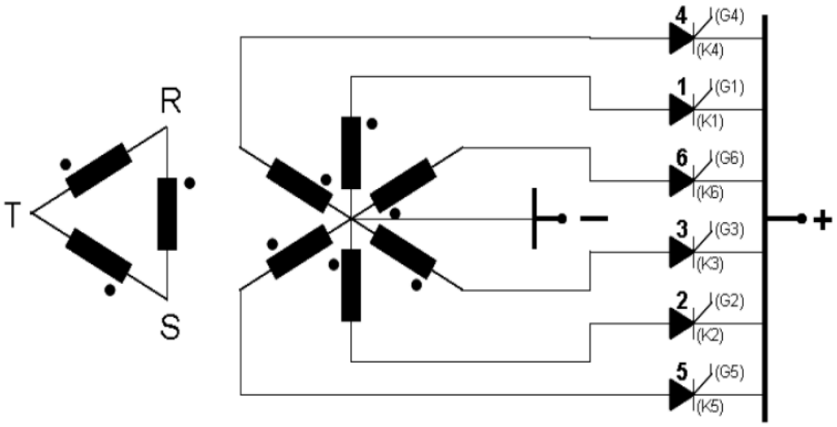
W1C (SINGLE PHASE AC/AC CONVERTER

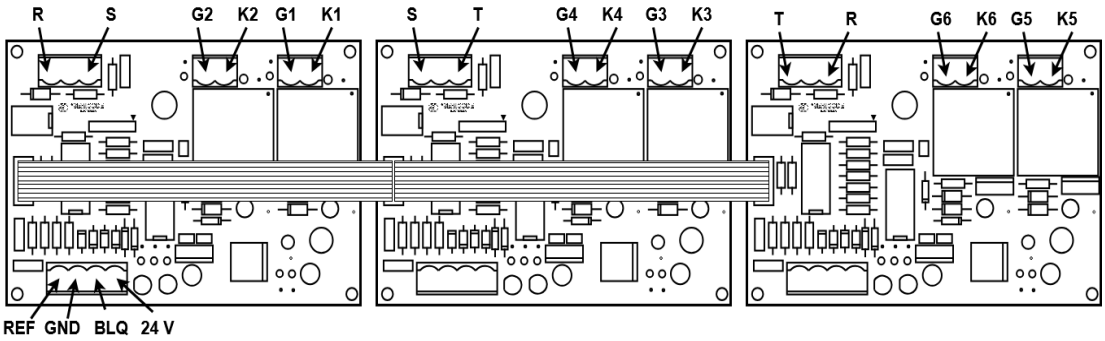




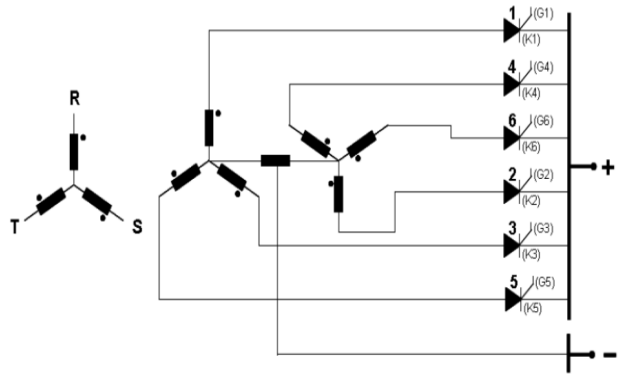
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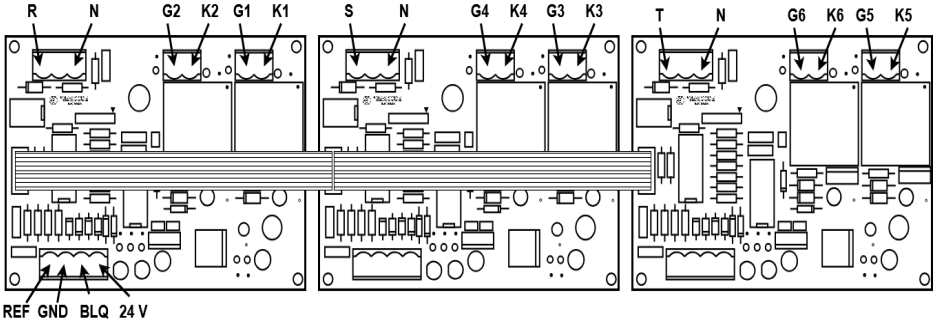
M6CK (SIX PHASE AC/DC CONVERTER).





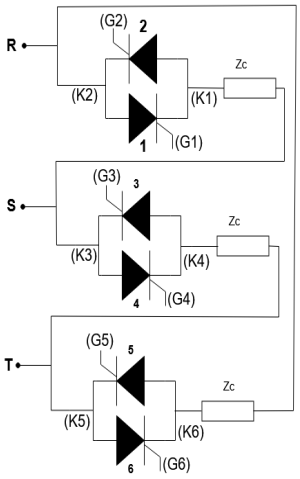
M3.2CK (SIX PHASE STAR AC/DC CONVERTER).

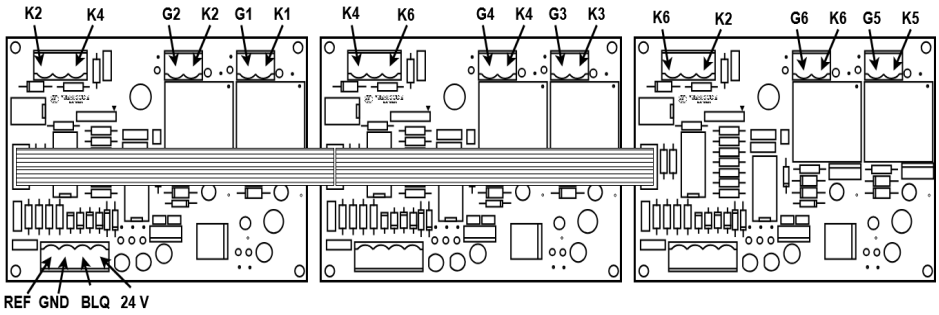




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W3C (THREE PHASE DELTA AC/AC CONVERTER).





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