

# **BRKC-180**

Braking circuit

## **User's Manual and Installation Guide**

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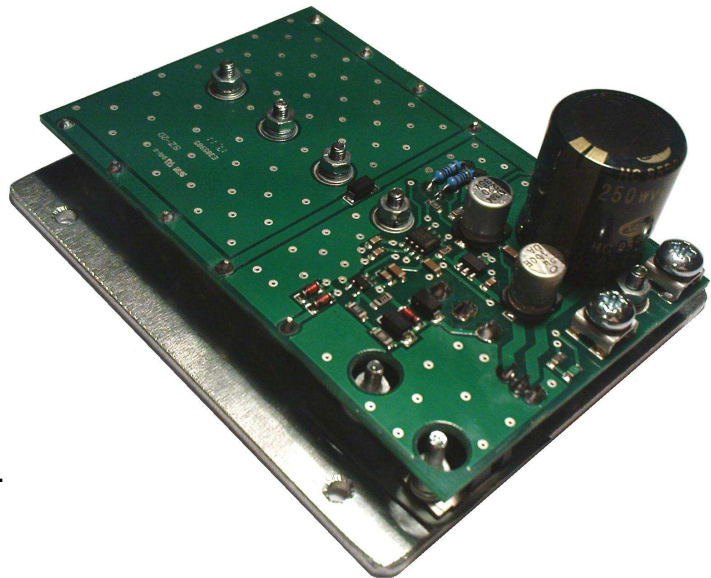
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## **1.1. Safety Notes**

Please read through this documentation before operating the device. The devices can operate on high Voltages upto 160 Volts and therefor it's metal case must be connected to safety ground for safety purpose and the device must be mounted into a closed and grounded enclosure for touch safety reasons.

The device should not be used where it can cause personal injury, death or high financial loss. Never touch the inner circuitry even if the device is unpowered, because the capacitors on the board may buffer high Voltage potenciales. Take care of the correct polarity connection, wrong polarity connection of the power supply will cause permanent damage to the device and may cause blowup of parts in the circuit.

Please take care to protect the device from taint damage.

## **1.2. Policy**

CNCdrive cannot take responsibility for any personal injury and/or financial loss caused by their drives' failure or caused by following an error in this documentation.

## **1.3. Warranty**

We give 12 months of standard warranty period with our BRKC-180 braking circuits. Customers may send back the devices within 15 days from reception date if they are not satisfied with the performance. Using the drive outside of the specified electrical ranges may cause permanent damage to the device and void warranty. Making any modification in the device voids warranty.

## 2. Electric specifications and limitations.

### 2.1.Operation ranges.

Property	Min	Typ	Max	Unit	Notes
Power supply Voltage	24	-	160	VDC	
Braking resistance	23.75	25	26.25	Ohms	The +-5% tolerance of the 25 Ohms resistance is shown here.
Braking current	6.85	7.20	7.58	Amps	Calculated with the +-5% resistors tolerances.
Voltage trigger level	178	180	182	Volts	
Maximum on duty cycle	0	-	3	%	
Continous power rating	-	40	-	Watts	
Peak power rating		1300		Watts	For short times only with low duty cylce, thermal dissipation must be checked by the user in the application
Operating temperature	0	-	70	°C	Thermal dissipation must be checked by the user in the application

### 3. Connections and installation.

#### 3.1. Making connections.

There are 2 pieces of heavy duty high current bare screw connectors with M4 diameter on the device panel. The power supply should be connected to these connectors. Connector at the edge of the board is the positive terminal and the inner connector is the negative terminal. Be careful to make these connections with the right polarity, wrong polarity connection may damage the device permanently.

Use as high diameter and as short cables as possible for these connections to minimise inductance and resistance between the power supply and the braking circuit.

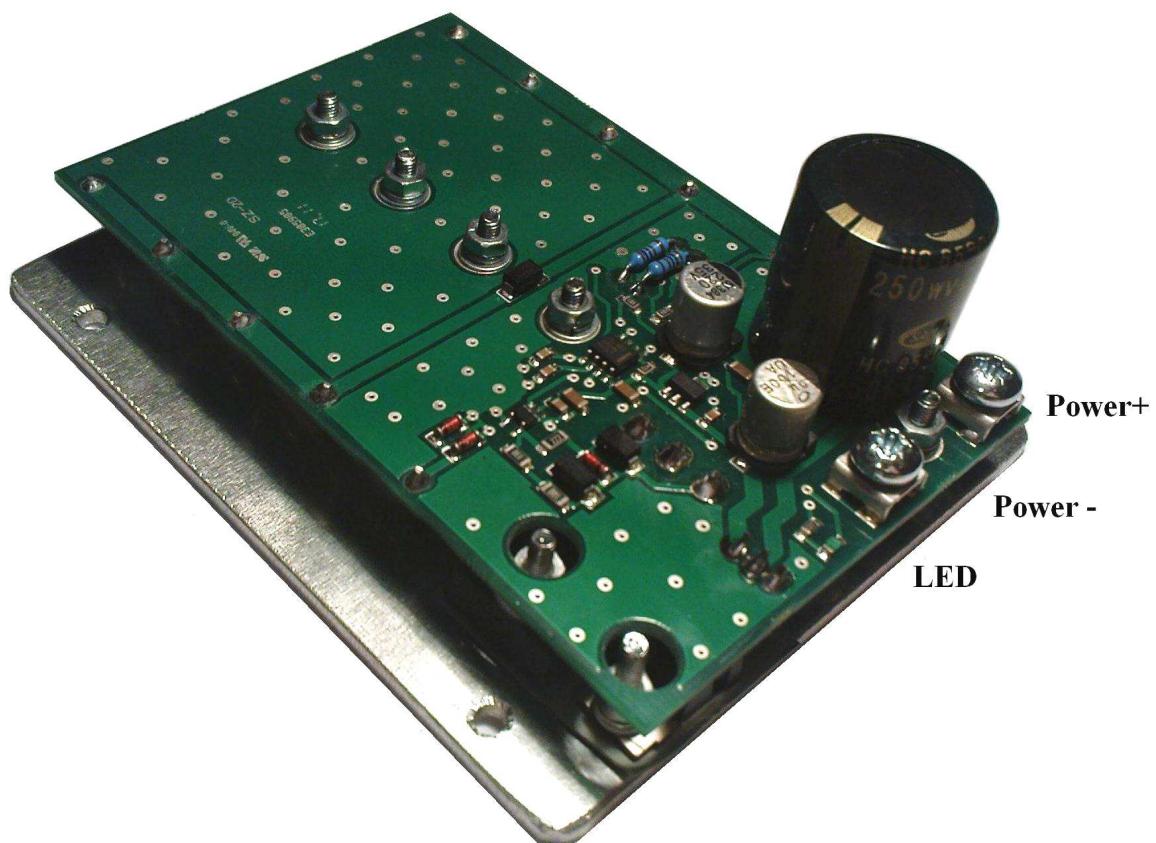


Figure 1. Connections

Be very careful to get the Power polarity correct!

Always put the device into a closed box!

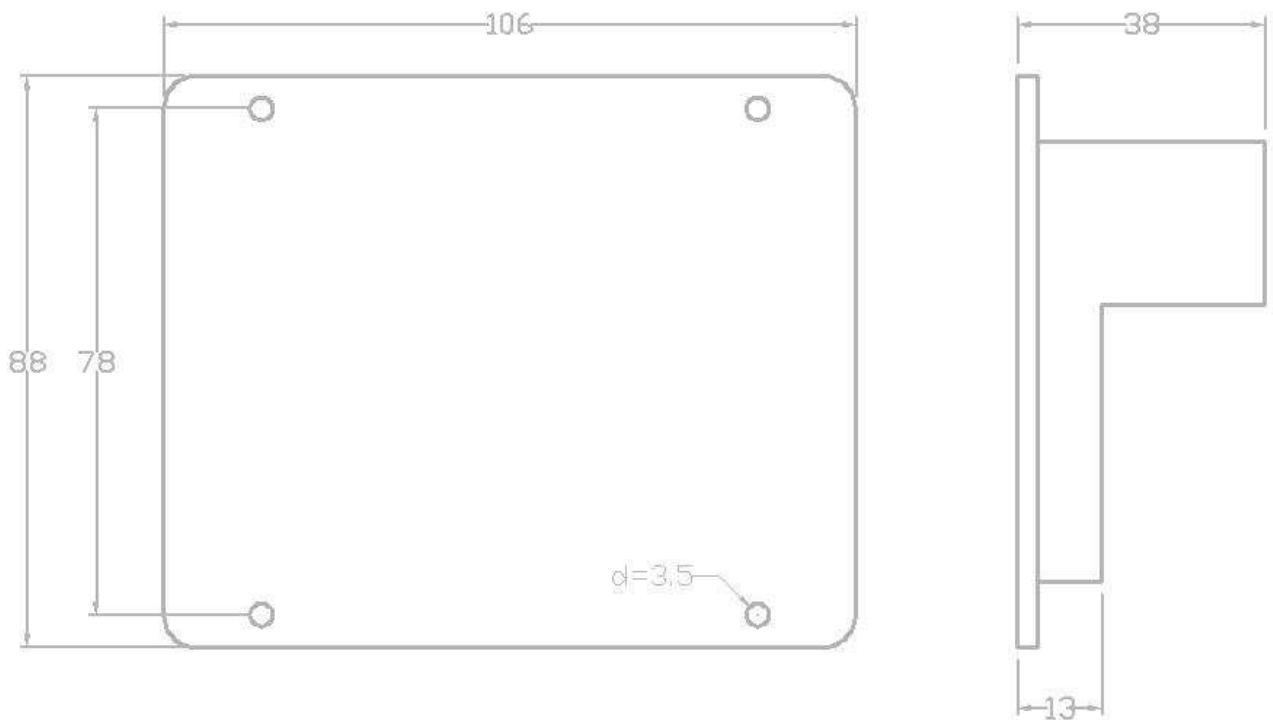
Never touch the terminals!

### **3.2. Installation of device frame.**

The device has 4pcs of 3.5mm diameter mounting screw holes on the 3mm thick aluminium backplate. Install the device to an external cooling rib or onto an external cooling plate with thermal paste for the best thermal performance.

The device's metal plate should be grounded to the system's safety groundings for touch safety reasons.

The device should be mounted into a shielded enclosure for touch safety reasons.



All dimensions in mm.

Figure 2. Braking circuit dimensions.

## **4. Theory of operation**

### **4.1. Operation detailed**

All type of motors works with electricity, but they may be used in reverse operation mode, when the motor shaft is rotated with an external force the motor acts as a generator and generating energy and Voltage.

With using electric motor drives and when the motor is braking the same thing happens and extra Voltage is generated by the motor. This extra energy seen as a Voltage and is charging back to the power supply. Beyond a power level the power supply and it's buffer capacitors may be unable to handle and buffer this extra Voltage and the Voltage in the power supply may start to rise. The rising of the Voltage could be infinite in theory and too much Voltage rising may damage both the power supply and the motor drive when Voltage rises above the Voltage rating of the components inside these devices.

The braking resistor is to discharge and dissipate this extra Voltage and energy and to protect the motor controllers and the power supply.

The working of the braking circuit is simple, it measures the Voltage of the power supply and if it rises above a set point the circuit triggers a Mosfet transistor with a power resistor connected. The resistor shunts the power supply rails and dissipates the extra Voltage.

When the Voltage drops below the set point the Mosfet and of the braking circuit closes removing the power resistor from the power supply rails.

## **4.2. Electric installation step by step.**

- a.) Connect the power supply to the device. (Take care of the correct polarity)
- b.) Connect the load (e.g. motor drive) to the power supply or to the braking circuit.
- c.) Power up the system and check the LED on the braking circuit.

The LED is located close next on the left to the screw terminals on the board and has green color.

If the LED lights without a running motor or a braking motor means that the power supply Voltage is too high and in this case the braking circuit should not be used because it will always be powered up and may damage from the 100% on duty cycle.

Power off the device quickly if this happens!

Continue using the braking circuit only if it's LED is off after power up, when the motor is not running.

- d.) Make testruns with the motor, it may be noticed that at rapid braking the braking circuit triggers with LED lights indication.

- e.) Make thermal measurements on the braking circuit's backplate after some testrun.

If the backplate of the device is above 65°C means the device is overloaded and in this case a second device should be installed in parallel, or if possible the external cooling performance should be increased.

Important note: The device does not have a thermal protection, running the backplate temperature above 70°C may cause permanent damage to the device . The user should always check the heating of the circuit in the application.

For more information visit:

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