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**DYNAMIC BRAKE CHOPPER**

*Figure 1:* ***Brake Chopper Overview***

## 1. Overview

The Dynamic Brake Chopper, specifically the Brake Chopper is a shunt or regen board designed to manage excess energy in the DC bus during motor deceleration or braking. It is compatible with drivers that have suitable inputs and operates by converting the excess energy into heat and dissipating it through resistors.
This device is crucial for maintaining the safety and efficiency of electric motor control systems, as it prevents overvoltage and overcurrent conditions that could damage the motor or other system components. Commonly used in industrial and commercial applications such as conveyors, elevators, and cranes, the Brake Chopper offers a reliable and efficient solution for managing excess energy in electric motor control systems.

**The Brake Chopper can be configured as fixed voltage or adjustable voltage according to the power and voltage values requested.**

When the motor is used to actively slow a load, electrical power will be regenerated. If the drives are supplied with a standard power supply (without recovery function), such regenerative duty points will cause an overvoltage in the DC circuit and therefore the drive or power supply will be turned off.
To prevent this from happening, a shunt circuit is required to burn this recovered energy.

## 2. Technicial Specifications

*Table 1: Brake Chopper Features*

| **General features** | |
|---|---|
| Standard Bus Voltage | 48 VDC (Configurable 24V) |
| Activation threshold voltage V_th* | It can be adjusted between 50-57 V by the user. |
| Maximum Voltaj | 57V |
| Rated continuous power | 200 W, depending on cooling condition and duty cycle (Configurable up to 1kW) |
| Max. Power | 200 Watt (up to 1kW) |
| Peak power application period *** | 500 µs |
| Ambient temperature for power ratings | Room temperature (20 °C) |
| Maximum system temperature *** | < 75 °C |

***This voltage defines the voltage at which the first shunt starts to become active.**

*****The Brake Chopper can emit up to 200 W for periods of 500 µs. Please ensure that the Brake chopper is mounted on a suitable surface with a large enough volume to dissipate the heat generated.**

If the voltage level is above the Threshold Voltage, the shunts of the board will be activated.

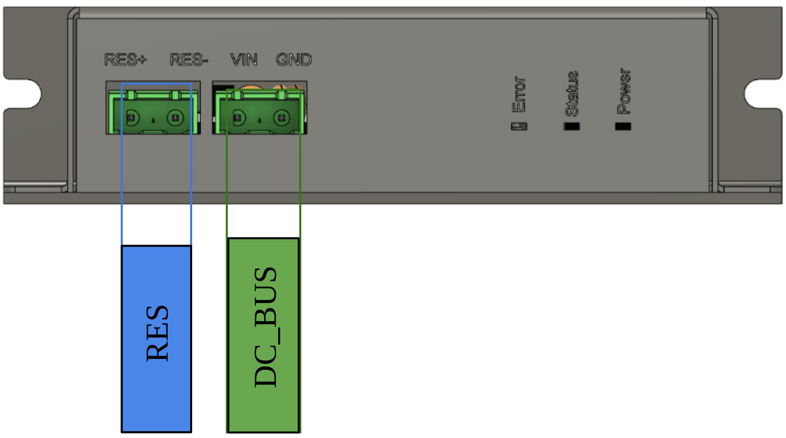


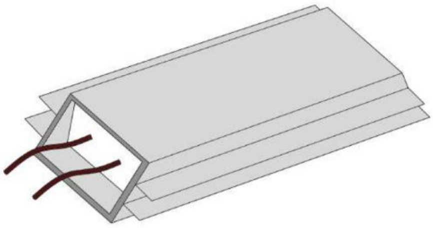

*Figure 2: **Brake Chopper Connection Inputs***

## 3. Installing the module and setting the threshold voltage

Install the resistor board connected to the brake chopper circuit in a suitable location with good cooling. Make sure the bottom is connected to a thermally conductive metal structure.

**!!! A suitable thermal conductivity is essential to ensure optimum performance. It is recommended to use silicone paste or thermal pad.**

Connect the brake chopper cables to the DC bus. The circuit must be connected in parallel with the driver boards. You can use the voltage adjustment pot on the top of the board to adjust the threshold voltage: 50- 57 VDC



The threshold voltage is adjusted by rotating the potentiometer, following the V_Th displayed on the OLED display on the case.

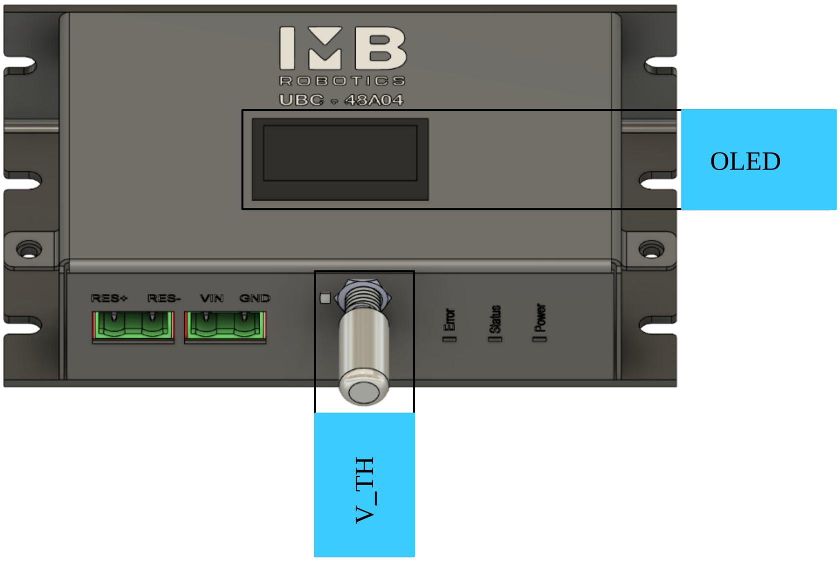



*Figure 3:* ***Brake Chopper Threshold Voltage Adjustment***

# 4. Connecting the Brake Chopper Board to DC-BUS

## 4.1. Suitable Cables

- V_IN,  Red Core Cable , 14AWG
- GND, Black Core Cable, 14AWG

**!! Use suitable cable lugs for secure connection.**

## 4.2. Cable Assembly

Before connecting the wires, please pay attention to the correct polarity indicated by +/-

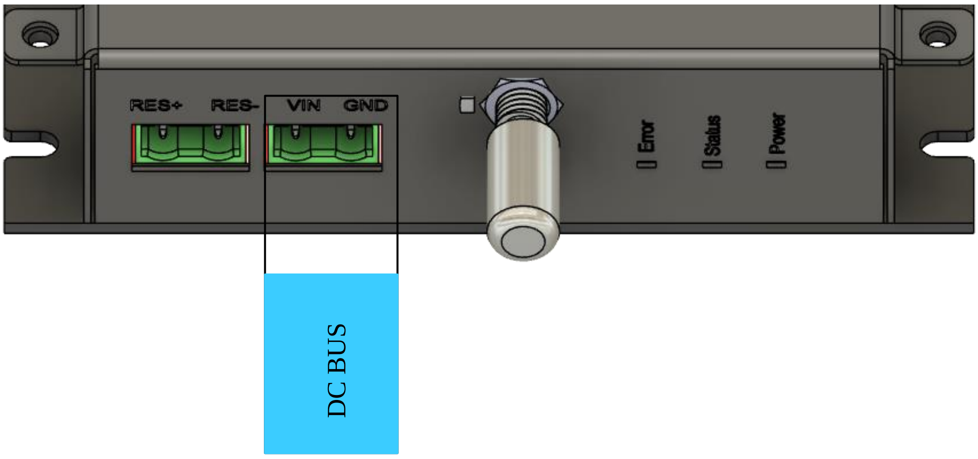



*Figure 4: Brake Chopper DC Bus Connection Inputs*

## 5. Multi Card Option

Total shunt power required in a robotic system, robot inertia, payload, number of axes, size and type of motors, trajectory, controller settings, braking and fast stop strategies etc. It depends on many factors, including There is no universal rule to indicate how many IMB Brake boards are required for a given number of motors. Developers should calculate the regenerative forces and energies in the respective load cycle of their robot or measure these values in experiments.

Some practical tips for getting started:

If decelerations and loads are moderate, one brake chopper card can handle the renewed energy of several Drives. In many real world applications this is already sufficient, so one IMB Brake card per robot is usually sufficient.

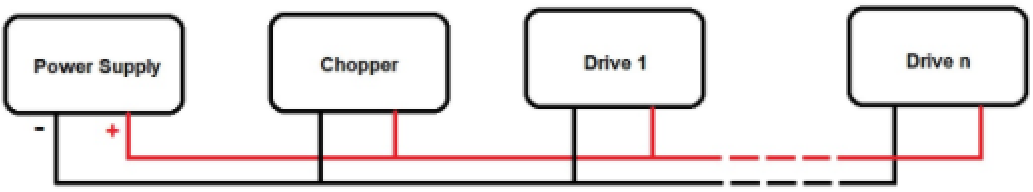



*Figure 5: Multi-Drive Wiring Diagram*

**Attention!!**

**A small size chopper system can also lead to dangerous situations when the robot cannot slow down properly.**

## 6. Failsafe Behavior

If the power on the DC bus exceeds Peak Power or the shunts reach their temperature limits, the shunt is disabled to prevent burnout of the resistors. In this case, the DC bus will act as if no shunt is installed. Thus the DC bus voltage will continue to increase until the overvoltage protection of the Drive is triggered.

## 7. Led Indicators

There are three led indicators on the case. The function of these indicators is as follows:

**Error:** In case of error, the error indicator led flashes. You can see the error information from the error code on the OLED screen.
**Status:** When the shunt resistors are activated, the status indicator LED is on.
**Power:** Indicator led showing whether there is system power supply.

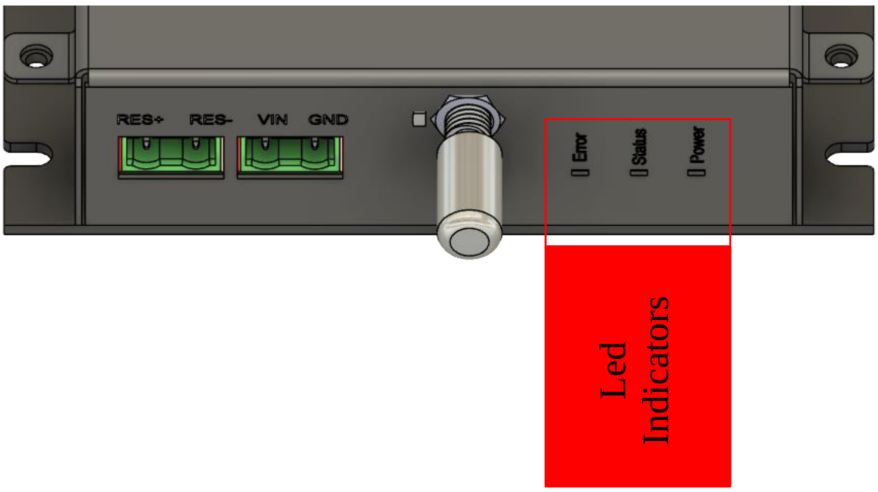



*Figure 6: Brake chopper Indicator LED*

# 8. Dimensions

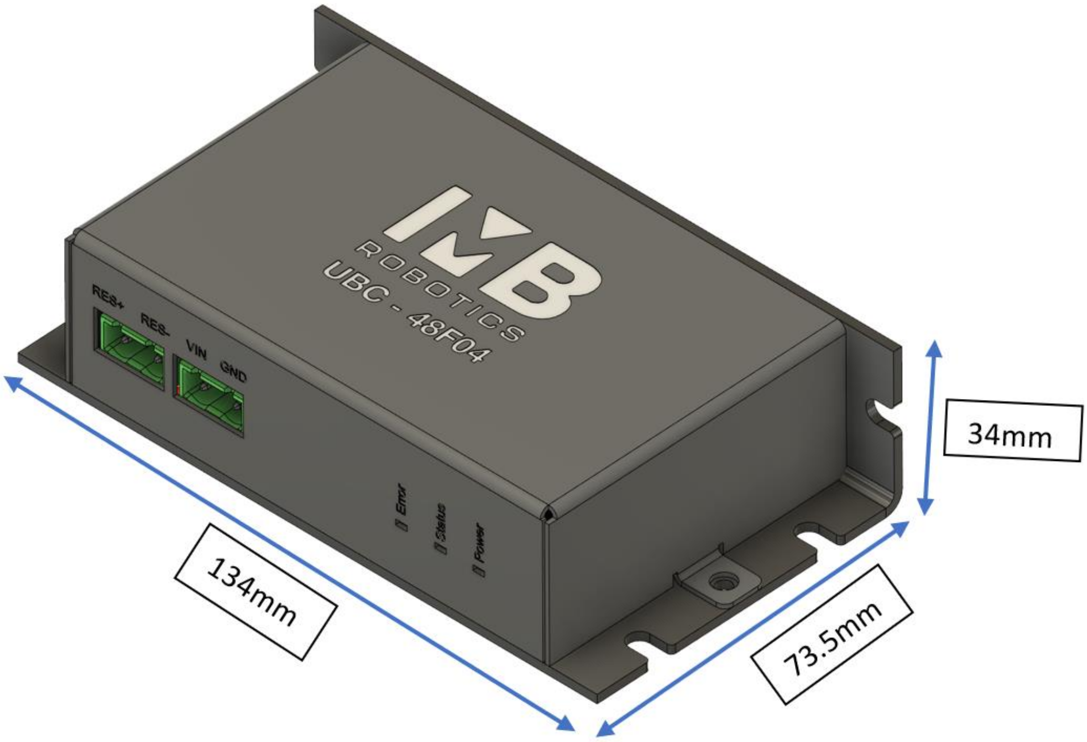



*Figure 7: Dimensions of Brake Chopper*