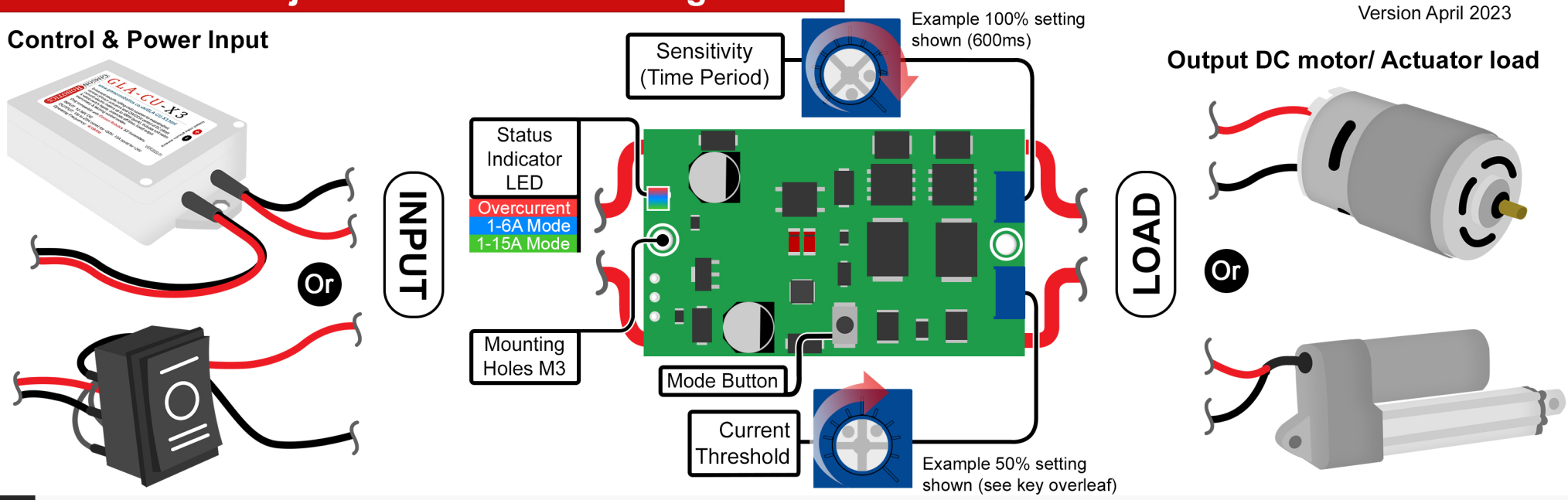
GR-SENS V2023 Adjustable Current-Limiting Switch

GIMSON ROBOTICS
Version April 2023

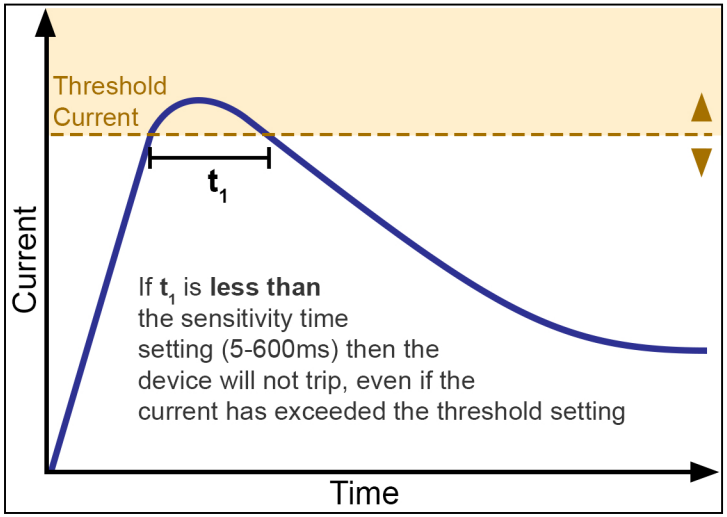
More details overleaf

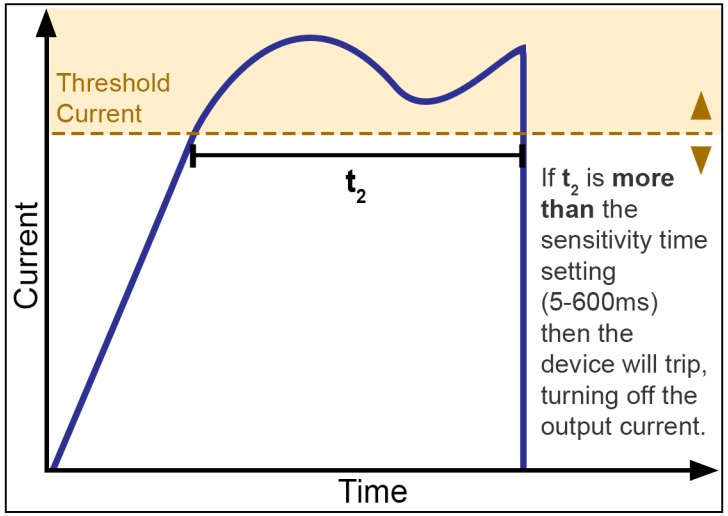


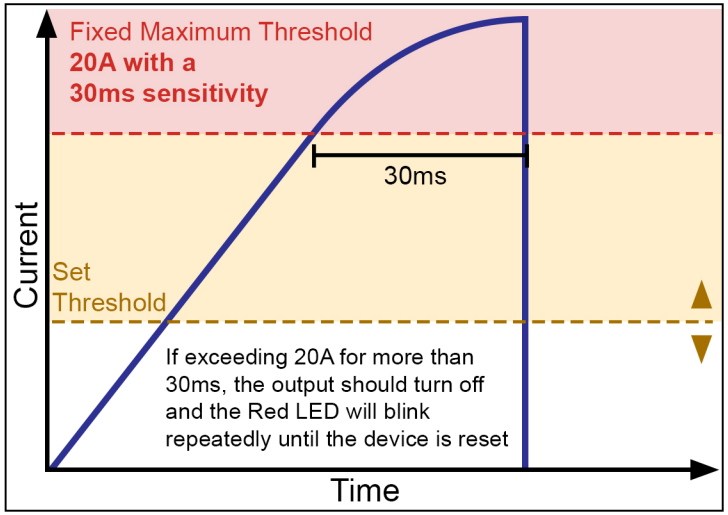
The GR-SENS is a compact, adjustable, and fast-response overcurrent protection device, designed for use with DC electric motors and actuators

It is designed to measure the current drawn by a motor or actuator, and if it exceeds a ***Current Threshold*** (adjustable between either 1-6A when set in **BLUE** mode, or 1-15A in **GREEN** mode) for longer than the adjusted ***Sensitivity (Time Period)*** then the output is turned off and a **RED** LED turns on to indicate that the device has 'tripped'. Resetting the output after a trip event is as simple as either inverting the input polarity (reversing travel direction, in the case of an actuator), or turning the input supply off and on again, meaning that the protection the device can provide is far more consistent and rapid than that which a fuse or circuit breaker could provide.

The **GREEN** (1-15A) operating mode is the default mode set, following our QA tests on each unit. Please see the instructions on the next page to change the current sensitivity mode. The input voltage can be anywhere **from 8 to 28V DC**, and the device supports a **maximum DC current of 5A continuously**, or **15A with a maximum 20% duty** (max. 2 mins continuously). The operating current draw is less than 35mA (with LED on). Beware that the output **must be de-rated if using a PWM input** to avoid overheating, to no more than 15% duty, 60 seconds maximum continuous, with a maximum 10A load. Beware that some adjustable-speed motor controllers may use PWM control without explicitly mentioning this in their documentation. Please feel free to contact us if you're unsure about suitability for your application, at support@gimsonrobotics.com







Calibrating Your Device

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Useful things to know

When a DC (direct current) motor starts moving it demands a short spike (start-up surge) in current before stabilising, so for the GR-SENS your ***Sensitivity Time*** setting ought to be just-longer than this initial surge period so that you clear the start-up hurdle whilst having a ***Current Theshold*** setting *lower* than the start-up current, for maximum responsiveness to overloads.
Electric motors can be damaged if mechanically stalled with power still reaching them, the damage can be permanent if they're left for too long in this condition.The GR-SENS is designed to help protect motors (and the driven assembly) in these situations but it is important that it is adjusted to appropriate values for your motor and load, in order to provide effective protection.

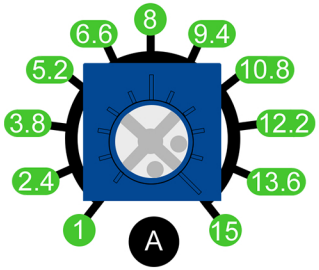
The process of calibrating your current limiter usually requires some trial and error, iterating towards the appropriate settings.
We've described some example steps that you could take at the bottom of this page.

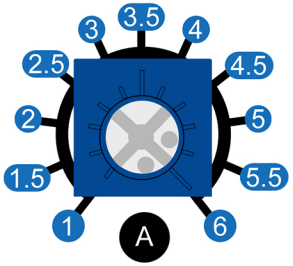
The area shown highlighted in red to the left, with two indented dots straddling a line, is the 'arrow' of each adjustment dial, indicating the position it is set to.

1-15A Threshold Mode | 1-6A Threshold Mode

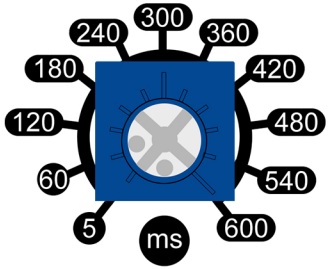
Overcurrent Sensitivity Adjustments

Current Threshold (Amps)

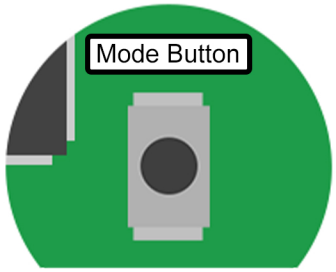




Sensitivity Time (milliseconds)



Be careful when adjusting the dials, use an appropriately sized flat-head or cross-head screwdriver and **don't apply too much turning force** at the ends of travel as this can damage the plastic head of the dial.

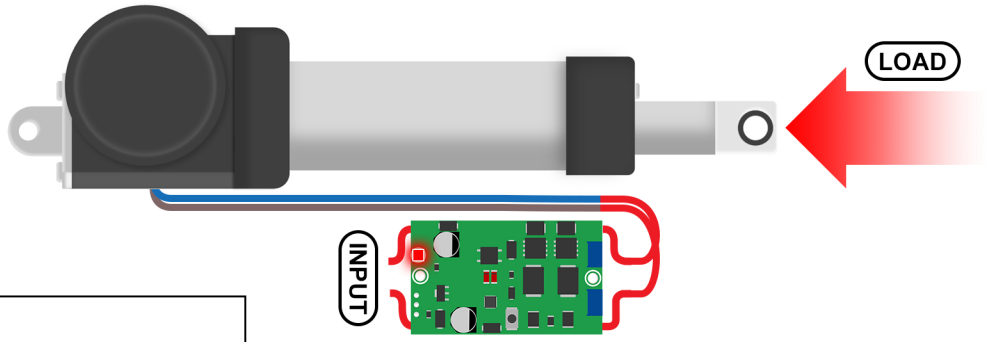


Default Setting, Green: 1-15A

Hold **Mode Button** for 3 seconds and then double-press within 4 seconds to toggle between current limiting modes

1-6A
1-15A

Once the button has been held down for 3 seconds the LED will flash the colour of the active mode (Green or Blue), a fast double-press while it is flashing will invert the mode and change the LED colour. 4 seconds after the change-mode process has begun, it will lock into the new mode and also save it for the next time it turns on.



For DC electric actuators, the **current** that the actuator demands is proportional to the **force** it is generating. You may have enough information in the documentation for your actuator to be able to make an educated estimate of the appropriate *Current Threshold* setting for the GR-SENS, for example if the documentation says that the no-load current is 1A, the maximum load current is 5A, and you know that you'll only need to use up-to half of the max. load of the actuator, then in this case a *Threshold* setting of around 3A should be appropriate.
Similarly, for DC electric motors, the **current** is proportional to the **torque**, or turning force, of the motor.

Includes 20A 'micro' blade fuse

The ***GR-SENS V2023*** features an in-line fuse as a failsafe. It is a 'micro' automotive size, also called type APS or ATT.

If the device is operating normally, the 20A fuse should very rarely blow, as the **Fixed Maximum Threshold** of **20A for >30ms**, will usually automatically turn the output off before the fuse has a chance to blow. The possible exception to this is scenarios where the output shorts out completely, or has such a low resistance that the surge current is beyond 50A for <30ms.

UK CA

Gimson Robotics Ltd (UK company number 08708521) of Unit 31 Filwood Green Business Pk, Bristol, BS4 1ET, United Kingdom, declare under our sole responsibility that this device complies with the following directives:

EMC
BS EN IEC 61000-6-3:2021
BS EN IEC 61000-6-1:2019

RoHS
RoHS Directive 2015/863 (RoHS 3)

STEP 1

Set the Current Threshold value to a reasonable estimation of the limit required for the size of motor that you are using and the load it is under.
For example, if you have an actuator that is rated to demand 6A when under a 100kg load, but it is only pushing a 50kg load, then try starting with a current threshold setting of around 3A. It is better to under-estimate the current value to start with.

STEP 2

Set the sensitivity dial fully (or close to fully) anti-clockwise for high sensitivity.

STEP 3

Test under the highest 'normal' expected load condition, if the device trips then adjust sensitivity gradually clockwise by small amounts at a time. If you're still getting interrupted operation then gradually adjust current limit clockwise (upwards) too, testing after each increment.

STEP 4

Having found a combination of settings that works OK for your 'normal' load, try increasing the load beyond this, intentionally, to verify that the device trips as intended. If it is not sensitive enough, try adjusting the values down a little and testing again.