

AHP® GT1 Motor Controller Manual and Usage Guide

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GT1 specifications

The GT1 is a stepper motor controller with goto functionality compatible on all types of telescope mounts, being able to set the number of steps per worm and axis revolution. The precision of microstep x64 allows precise goto and impeccable sidereal tracking. Being compatible with the Syntha protocol, you can drive it with a Synscan handset or directly with EQMOD, on Windows and on Linux. It is also compatible with any type of motor and it is capable to supply up to 1A of current for each winding. You can also wire the connected steppers in any way and set a parameter from the configuration application to find the right combination, without having to re-heat the connection wires.

It is equipped with these inputs / outputs:

1. Synscan-compatible handset Input/Output
2. ST4 auto guider input
3. Stepper output for Right Ascension
4. Stepper output for Declination
5. 12v power supply input

The microstepping function

When tracking in sidereal speed, and when moving at fine speed the mounting, the controller enters microstepping mode. You can recognize this mode when you hear an harmonic sound from the stepping motors. Microstepping mode is an operational mode of moving motors capable to enter sub-step resolutions. The total number of steps reached is then much higher this way and a greater resolution is possible.

The ST-4 or GPIO port

The GT1 is equipped with an ST-4 autoguider port, which can be customized for specific functionalities like incremental encoder readings or to drive leds or other peripherals. When updating the firmware, or when configuring the device, you can choose how to use the GPIO port, if you desire the default ST-4 function, or to change its function, or else to not use it at all. See Illustration 1.

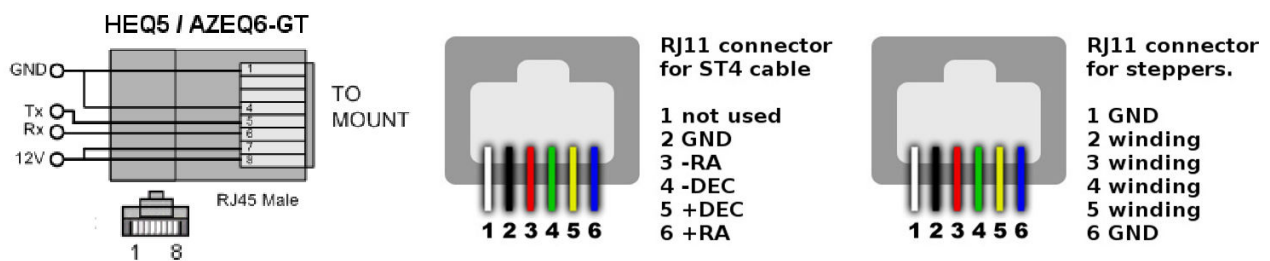


Illustration 1: The pinouts of the GT1 connectors in their default configuration

The connection to motors or actuators

The GT1 is capable to supply 1A on 8 different lanes. Usually these outputs are used for stepping motors as in the default configuration, but we don't exclude future improvements or configurations for different usage/motor or load types. The default configuration permits to connect and drive two stepper motors ranging from 12 to 24 volts supply. The configuration utility permits connecting the windings in any order and a single parameter or setting permits their correct usage and direction.

The communication port

The GT1 communicates with the driving PC application or the SynScan® controller through the Communication port (or HC port). The communication happens using a standard RS232 protocol running at 9600bps, one stop bit, no parity, no flow control.

If the user prefers to not use a SynScan® controller, then there is the chance to simulate its protocol and drive the GT1 from a Personal Computer or an SBC box. The GT1 is compatible with EQAscom and INDI EQMod drivers for ASCOM and INDI platforms respectively. It is not an aim of this document to specify the characteristics of these software neither to explain the features of the SynScan protocol.

The configuration utility

AHP® offers a variety of software dedicated to Astronomy amateurs included into a software suite named ADPA Suite. You can find more information about the ADPA Software Suite at <https://www.adpasuite.com>.

ADPA includes a configuration utility for the GT1. With this application you can flash both the bootloader and the firmware for the GT1, you can also configure it to best suite into your mount configuration and you can test your settings in realtime.

Empty board – Bootloader update

The GT1 has the capability to upgrade its firmware using a dedicated bootloader. You can at any time upgrade both the firmware and the bootloader, using the communication port directly. If the firmware is not yet loaded, the bootloader should be loaded and running. Select the serial port on which the GT1 is connected, you can then see on the status bar of the Configuration utility the version of the bootloader (if there is not any firmware loaded), or the version of the firmware. If you wish to upgrade the bootloader, please choose from the “load firmware” button the bootloader firmware upgrade (file starting with “GT1BOOT_XXX”, where XXX is the version). Once loaded, press “flash” to write the bootloader. When the progressbar completes the upload a confirmation message (Success) should appear. Keep much attention during this phase and ensure that the checksum of the firmware is the same as the one reported into the website. After upgrading, confirm by pressing the OK button and wait a minute, then select again the serial port where the GT1 is connected. **CAUTION: PLEASE DO NOT UNPLUG THE CABLE OR POWER DOWN THE DEVICE DURING THIS PROCESS! IF UNSUCCESSFUL FLASHING THE DEVICE MAY NOT WORK ANYMORE!**

Bootloader updated – Firmware loading

If the firmware is loaded, the firmware can be upgraded or installed. The method is the same as the bootloader: open the firmware file using the “Load Firmware” button (the firmware file starts with GT1FW_XXXX, where XXXX is the firmware version). The firmware then can be upgraded/installed by clicking on the “Flash” button. If the firmware is updated with success, then a confirmation dialog will appear. After this step, please re-select the COM port on which the GT1 is connected. The configuration Utility will say that the GT1 is ready to be configured. **CAUTION: PLEASE DO NOT UNPLUG THE CABLE OR POWER DOWN THE DEVICE DURING THE FLASHING PROCESS! IF UNSUCCESSFUL FLASHING THE DEVICE MAY NOT WORK ANYMORE!**

Failsafe mode – reset

If anything went wrong during the flash or upgrade process, there is the possibility to reset the device at any time and start the bootloader. To do this you should open the GT1 box and act on the circuit board. To do this please use much attention, or you may cause irreversible damage to the device. Here the steps to do to start the GT1 in fail-safe mode:

- Unscrew the four screws on the bottom of the box
- power up the GT1 with a 12v power supply
- with a small wire connect the pin 1 and the pin 3, the pin 1 is the leftmost pin when reading the string “ICSP” is on the top (see picture 2)

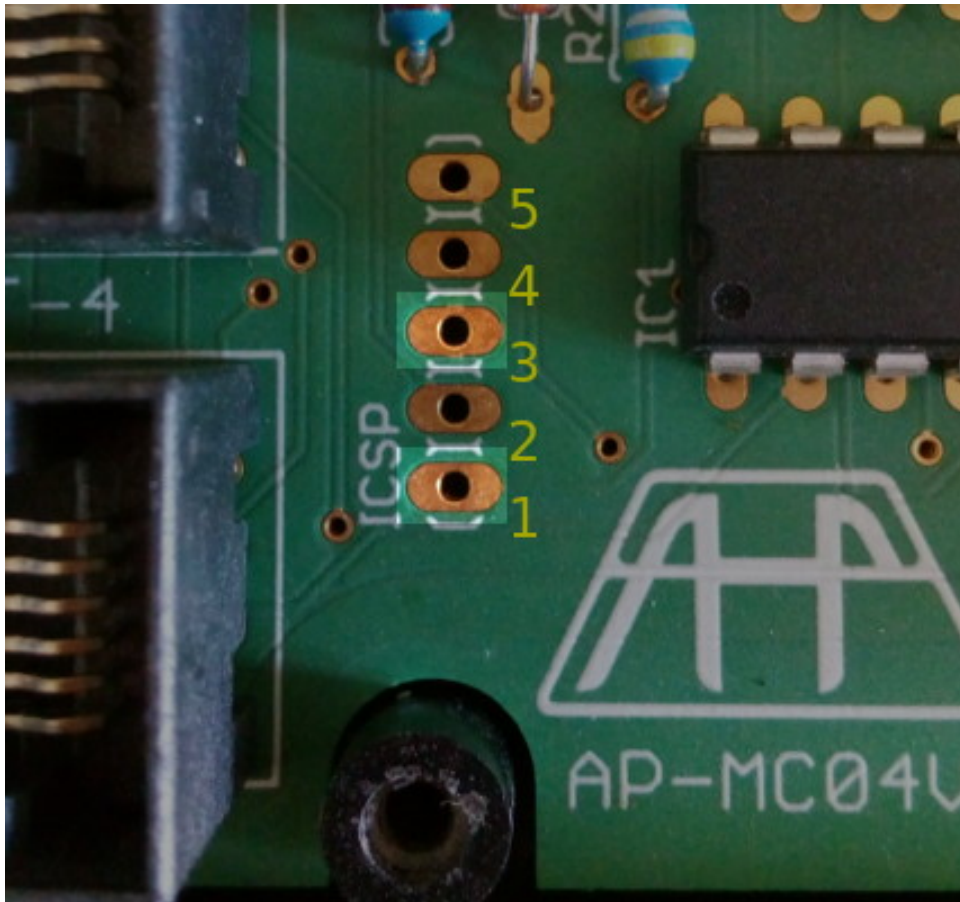
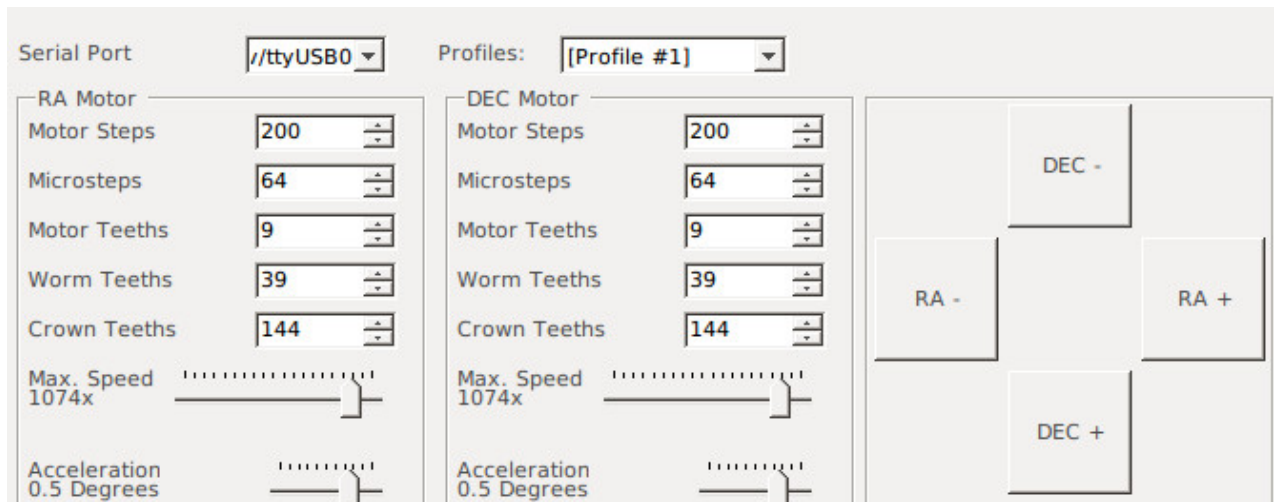


Illustration 2: The pins to short for fail-safe mode

Firmware configuration

The Firmware of the GT1 permits various configurations of gear ratios, maximum speed allowed, acceleration and microstepping maximum speed. These settings can be changed and saved into the internal memory of the GT1 using the configuration software. Illustration 2 shows the graphical layout of the configuration utility.



Calculation of gear ratios

Gear ratios are calculated using as base unit the gear tooth. Generally telescope mounts use a crown/worm gear configuration, most of the times they are equipped with a gear reduction on the motor to the worm. Stepper motors are positional motors, having a number of steps to complete a 360 degrees turn. The useful fields on the configuration utility to setup a correct gear ratio are:

- Motor steps: number of steps of the stepper motors to complete a 360 degrees turn
- Motor teeth: number of teeth of the gear at the motor
- Worm teeth: number of teeth of the gear at the worm gear
- Crown teeth: number of teeth of the crown gear.

The parameter “Motor Teeth”, divided by “Worm Teeth” can be the reduction ratio between the motor and the worm gear. While the “Worm Teeth” divided by “Crown Teeth” can be the reduction ratio between the worm and the crown. These values can be expressed also in belts and pulley configurations. The microsteps are calculated automatically by the configuration utility and cannot be altered.

Mount types

There is a setting called “Mount type”: this settings is useful when one uses the SynScan® handset to drive the mount, in case for example you’re using an EQ mount, the SynScan® handset automatically reads this information and changes its configuration to best fit on your setup. You can use different kinds of mounts, ranging from classical equatorial mounts to AZ-EQ mounts to Alt-Azimuth mountings.

Configuration profiles

Each time you want to update the configuration of your GT1, you must click on the “Write” button, and you can save your current settings into a profile of your choice. You have at your disposal 10 profiles, each one can be selected to restore your custom settings. Those settings remain into the PC running the configuration utility.

Maximum speed vs. gear ratio

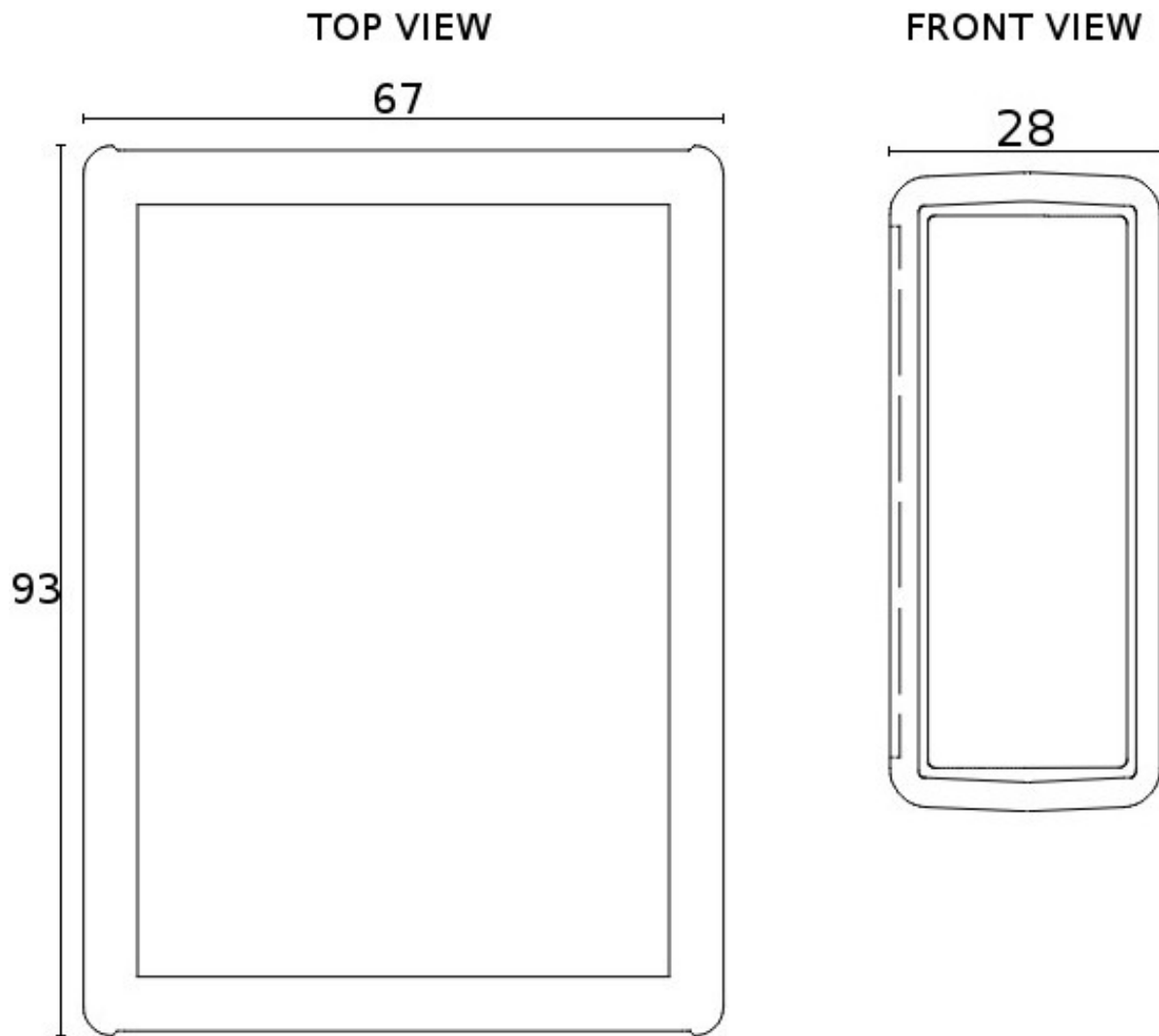
Pay much attention when setting a high maximum speed, especially when the gear ratio is very high. Some stepper motors cannot handle high speeds and can stall when the driving frequency is very high for them. Usually the configuration utility shows a maximum speed and auto-calculate it based on the gear ratios, but a high speed can not be handled well by the motors.

Damage & security prescriptions

During tests of your configurations please keep much attention to the safety of objects, persons and animals, don't let the devices in places accessible by children and electrical parts must be away from too wet ambients. If you use big or heavy instrumentation, please test at the lower speed possible, and let all testing area free from objects that can block or damage or be damaged to/by the instrument driven by the GT1. AHP® team declares itself and its employers not responsible by usage of its peripherals and devices without the right care.

Dimensions

All dimensions are in mm.



For more informations, please visit:

<https://www.adpasuite.com>

GT1 official page:

<https://www.adpasuite.com/gt1>

EQMod home page:

<http://eq-mod.sourceforge.net>

INDI Library home page:

<http://indilib.org>

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AHP® GT1 Motor Controller - Manual and Usage Guide

AHP® LISTINO PRODOTTI ESTATE-AUTUNNO 2018

SKU	UPC/EAN	NOME	DESCRIZIONE	PREZZO (IVA ESCL.)
GT1	635292392962	GT1	GT1 MOTOR CONTROLLER WITH GOTO	€ 160,00
PM5	635292392979	PM5	PM5 POWER MODULE	€ 104,00
GT1KITSTEP	635292393013	GT1 KIT STEPPER	GT1 STEPPER MOTOR KIT WITH GOTO	€ 350,00
GT1KITSERVO	635292392924	GT1 KIT SERVO	GT1 SERVO MOTOR KIT WITH GOTO	€ 250,00
CABST4	635292392986	ST4 CABLE	ST4 CABLE	€ 15,00
CABFS2	635292392993	FS2 CABLE	FS2 MOTOR CONNECTION CABLE	€ 15,00
CABGEM	635292393006	GEMINI CABLE	GT1 ADAPTOR CABLE FOR GEMINI MOUNTS	€ 35,00