

quTAG MC

Time-to-Digital Converter

Manual V1.0



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1. Safety and Maintenance

1.1 Legend



Caution

General risk of danger.



Warning

An instruction which draws attention to the risk of injury or death.



Warning

Risk of electric shock. High voltages present.

1.2 General Instructions



The equipment, as described herein, is designed for use by personnel properly trained in the use and handling of mains powered electrical equipment. Only personnel trained in the servicing and maintenance of this equipment should remove its covers or attempt any repairs or adjustments. If malfunction is suspected, immediately return the part to the vendor for repair or replacement. There are no user-serviceable parts inside the electronics. Modified or opened electronics cannot be covered by the warranty anymore. Take special care if connecting products from other manufacturers. Follow the General Accident Prevention Rules.



If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Do not operate the instrument outside its rated supply voltages or environmental range. In particular, excessive moisture may impair safety.



For laboratory use only. This unit is intended for operation from a normal, single phase supply, in the temperature range 5° to 40°C, 20% to 80% RH.

1.3 Environmental Conditions



Warning. Operation outside the following environmental limits may adversely affect operator safety:

- Indoor use only
- Maximum altitude 2000 m
- Temperature range 5°C to 40°C
- Maximum humidity less than 80% RH (non-condensing) at 31°C
- To ensure reliable operation the unit should not be exposed to corrosive agents or excessive moisture, heat or dust. If the unit has been stored at a low temperature or in an environment of high humidity, it must be allowed to reach ambient conditions before being powered up.

1.4 Electrical Installation



The unit must be connected only to an earthed fused supply of 100 to 240V (Japan, USA and Europe).

Use only power supply cables supplied by the manufacturer, other cables may not be rated to the same current. The unit is shipped with appropriate power cables for use in Europe. When shipped to other territories the appropriate power plug must be fitted by the user.



Never connect any cabling to the electronics when contacts are exposed!
Avoid short-cuts.



Prevent electrical shock from electronic. To prevent electrical shock do not remove the cover of the control unit. Unplug power cord and all other electrical connections and consult qualified service personnel when servicing or cleaning. Operate only under dry conditions and at room temperature conditions.

1.5 Preventive Maintenance



The equipment contains no user serviceable parts. There is a risk of severe electrical shock if the equipment is operated with the covers removed. Only personnel authorized by the vendor and trained in the maintenance of this equipment should remove its covers or attempt any repairs or adjustments. Maintenance is limited to safety testing and cleaning as described in the following sections.

1.6 Safety Testing



Safety testing in accordance with local regulations, should be performed on a regular basis, (typically once per year for an instrument in daily use). Caution. The instrument contains a power supply filter. Insulation testing of the power supply connector should be performed using a DC voltage.

1.7 Cleaning



Disconnect the power supply before cleaning the unit. Never attempt to clean the quTAG by immersion into any liquid. Never allow water to get inside the case. The quTAG parts are sensitive to any kind of liquid. Do not use any type of abrasive pad, scouring powder, or solvent, e.g. alcohol or benzene. Please note that all parts of quTAG are cleaned in our production facility.

2 Getting Started

Please install the USB driver from the included USB stick or download the latest software package from the qutools website:

<https://www.qutools.com/qutag-hr-mc/>

In the tab "**Downloads**" you will find the software for the **quTAG MC** containing the Daisy Software as a GUI and libraries for your own application together with some programming examples.

2.1 Windows

Copy the software to a directory of choice (zip archive).

Run the USB driver (32- or 64-bit version depending on your operating system) from the subfolder *usbdriver*.

Start the Daisy.exe or your code via the DLL, see the software manual and Python examples.

2.2 Linux

Installation of Daisy and its libraries under Linux.

1. The software is built for x86 systems; builds for 32- and 64-bit (AMD architecture) systems are available. It is linked against libc 2.19; binary compatibility has been verified with different distributions / distribution families. There should be good chances to run the programs on distributions released not before 2015.
2. Besides the standard installation, the following software is required:
 - a. Add the repository from where to download Qt4 packages, e.g.:
add-apt-repository ppa:rock-core/qt4
 - b. Qt4 Core, GUI, and OpenGL libraries
(Ubuntu: packets libqtcore4, libqtgui4 libqt4-opengl)
 - c. libusb 1.0 (don't confuse with libusb 0.1) (Ubuntu: libusb-1.0-0)
3. Extract the directory tree to a place of your choice. E.g. /home/me/daisy .
4. Add nhands.rules from /home/me/daisy/install to the udev rules.
(Ubuntu: copy to /etc/udev/rules.d, requires root privileges).The file installs a rule that grants access to nhands USB devices to every user.
5. Daisy et al. require a couple of shared libraries that reside in the program folder. The program loader must be enabled to find those libs. Using the start scripts "rundaisy" and "runflasher" instead of "daisy" and "nhflash" will do the job.

To call the programs (or userlib applications) directly, the library path has to be published. This may be achieved:

- a. temporarily: add the extra search path to your shell:
export LD_LIBRARY_PATH=\$LD_LIBRARY_PATH:/home/me/daisy
Daisy only can be started by command from that shell window:
/home/me/daisy/daisy &
- b. permanently: add the extra search path to the loader config.
Ubuntu: create a file "daisy.conf" that contains just one line /home/me/daisy .

Copy that file to `/etc/ld.so.conf.d` and call `ldconfig` for cache generation. Root privileges required.

Daisy now can be started by command or file manager click.

Note that daisy versions can't be installed in parallel this way because daisy's shared libs don't have real version management.

6. What has been said for Daisy also holds for programs developed on top of the libraries. Examples for such programs can be found under `userlib/src` or `daisybase` in the installation directory.
7. On some systems, Daisy is using a very large font leading to inappropriate screen space consumption. The program "qtconfig" (Ubuntu: packet `qt4-qtconfig`) can be used to customize the font size and other look-and-feel parameters.

3 Connecting the quTAG MC

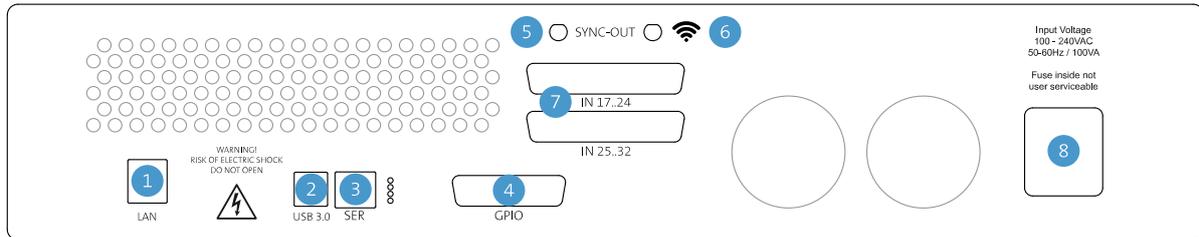


Figure 1: Rear side of the quTAG

- 1 LAN port
- 2 **USB3.0 connection**
- 3 Service port
- 4 GPIO port: marker inputs, channel outputs and general purpose IOs
- 5 Synchronization output
- 6 WIFI antenna
- 7 Stop input channels 17-32, device dependent
- 8 **AC power input and power switch**

Always connect the quTAG with the PC using the USB3.0 connection (2). You can use an USB2.0 cable as well, although not recommended. The full transfer rate of 100million events per second is reached only with an USB3.0 connection.

The GPIO connector (4) is used for the marker inputs (additional feature). See the manual for the pin diagram.

Connect the quTAG unit with a IEC power supply cord (8).

Switch on the device. Windows will install the device driver automatically.

Start the Daisy Software (daisy.exe) and use the device.



Make sure the cooling fans are not obstructed. Otherwise the quTAG may be damaged due to overheating.