

QHY8 modification – Temperature control

by

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Introduction

The QHY8 One Shot color CCD from QHY is a splendid camera with 6 Mega pixels. The camera offers a good value-for-money and is available in more than 20 countries.

Every serious astrophotographer nows the importance of calibrating dark-frames and also that Dark-frames can be very time consuming to collect. Besides using dark-frames for nice images they are also required for high quality photometric measurements.

Dark-frames must be collected at the same temperature as the light-frames and since collecting light-frames can take several hours the temperature can vary accordingly. If the used imager is not temperature stabilized it will also vary in temperature. Consequently this will ruin the possibility to make well adjusted dark-frame calibration for all frames.



Unfortunately the QHY8 has no temperature stabilization features – fortunately this is something that can be dealt with. This document describes the required modification.

The original QHY8 specs are:

- Total pixel : 3110 x 2030
- Active pixels: 3032 x 2016
- Pixel Size: 7.8um x 7.8um square
- Color method: RGB BAYER film on CCD
- Effective sensor area: 28.4 mm diagonal
- Readout noise: 8 -12 e @600 Kpixel/s
- QE: 60% at Green (Peak) , 50% at Blue and H.a
- Microlensing on chip
- Progressive Scan
- ABG: -110dB
- 16bit ADC with CDS and Preamp
- USB2.0 High Speed interface

The mod

QHY8 has no support for temperature control but QHY did for some other models design a temperature controller – the DC-102.



DC-102 temperature controller

Well, at this point it should be mentioned that the modification can be made rather simple but the drawback is that there will be many cables hanging from your telescope. The simple mod is not described in this document as it only requires you to fit a temperature sensor inside your QHY8.

Using the mod described here you will end up having a QHY with only a USB-cable and an external 12V supply. Two cables – that's all.

Lets begin

What you'll need is this:

- QHY8
- DC-102
- Maxim DS18B20 (temperature sensor)
- 10 inches of 7-lead ribbon cable
- 4 inches of double-sided foam tape
- Philips screw driver
- Soldering iron with small tip

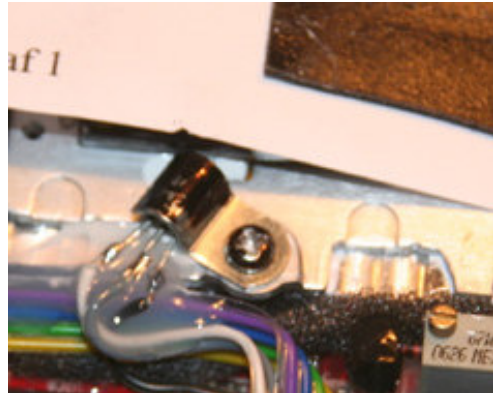
A few words of caution: Before you continue you should know that the warranty is void if you proceed from here on! The author receives responsibility whatsoever for any faults or defects that may arise from your work with your imager. Notice that the CCD sensor is extremely sensitive to static discharge and should not be touched by human hands!

In order to disassemble your QHY8 imager you will need to remove the 4 Philips screws holding the fan. Be careful not to harm the tiny wires. Do not remove the fan! Use a slightly smaller Philips screw driver to remove the screws inside the hole from the screws you just removed. These screws do hold the imager chassis together. You can now re-insert two of the screws to hold the fan. This will secure the fan and thus also the tiny wire.

I will suggest that you tape a small piece of paper over the CCD in order to protect it against flux stains and other damaging things.

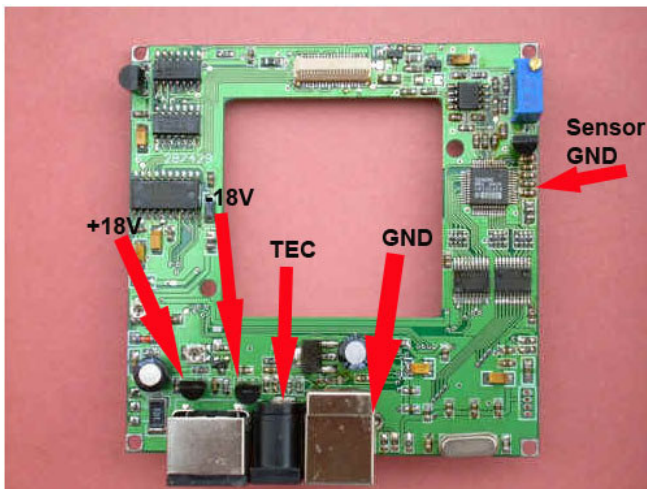
The first part of the internal modification is to mount the temperature sensor, DS18B20:

The CCD cold finger is secured with 3 screws. In the side that has only one screw you can remove that screw and re-insert it so it also holds a clamp that then holds the sensor. Use silicone compound to ensure good thermal conductivity. Be extremely careful not to harm the CCD just a few millimeters away!



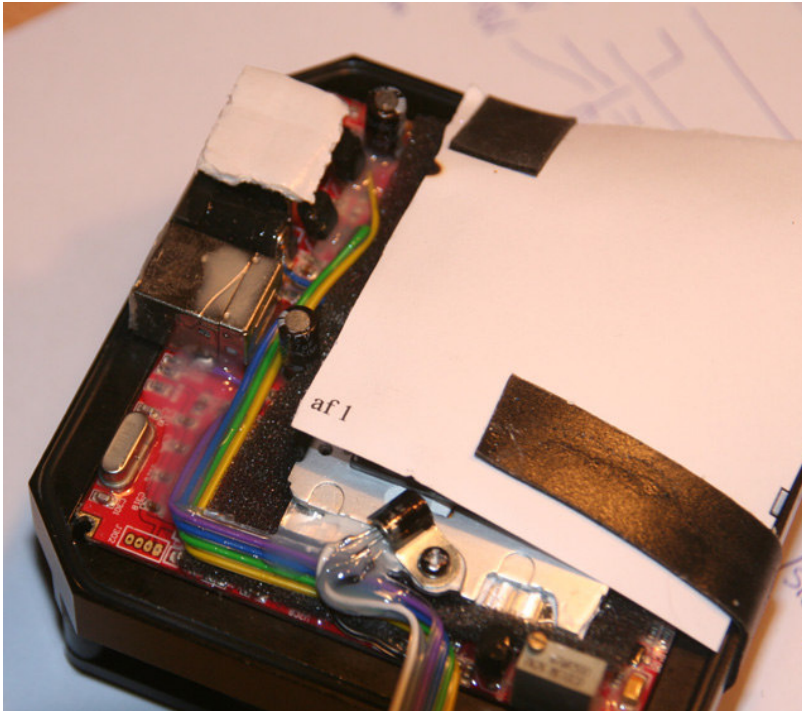
Next you'll need to connect 7 points from the inside of the imager to the outside (DC-102). Remove the rubber plug on the side of the imager chassis. This leaves a hole suitable for your ribbon cable.

There is not much space for anything extra inside the chassis so I suggest you cut your cable so each wire fits to its solder point:



Solder points on the PCB inside the QHY8 imager:

The only difficult part in soldering the wires to the PCB are the +/-18V as you need to dig down to where the two regulators behind the Mini-DIN sockets are:



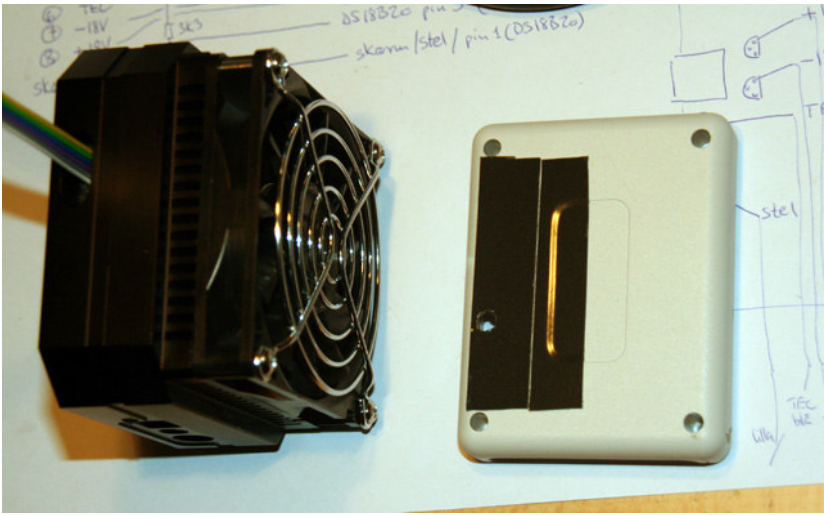
Note that the temperature sensor ground wire (black) is not lead out but is connected directly to the PCB ground. The ribbon cable is cut and bend so it fits nicely without obstructing the CCD view.

To secure the cable some neutral (non acid) silicone has been poured over it. Make sure the silicone is hardened before you close the chassis again!

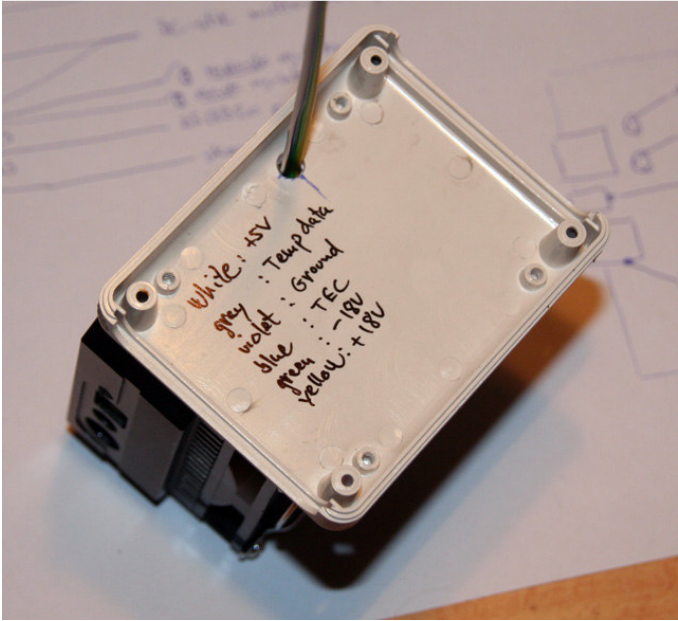
When ready remove the protective paper and assemble the imager chassis again:



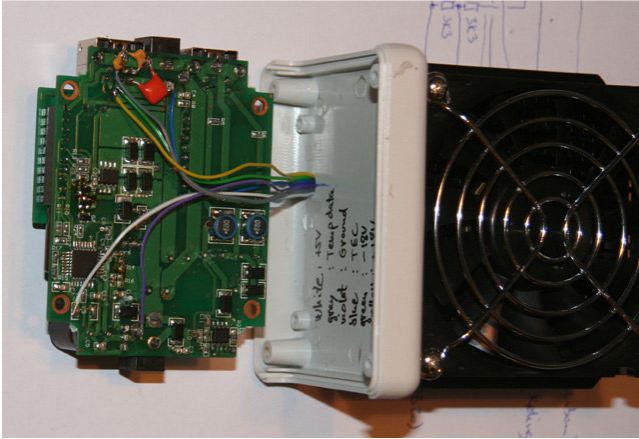
Next step is to fasten the back shell of the DC-102. Drill a hole for the cable and use some double sided foam tape:



Make sure you fix it in the right place so it looks like this:



Cut the ribbon cable so it fits the respective solder joints and solder the ends to the PCB:

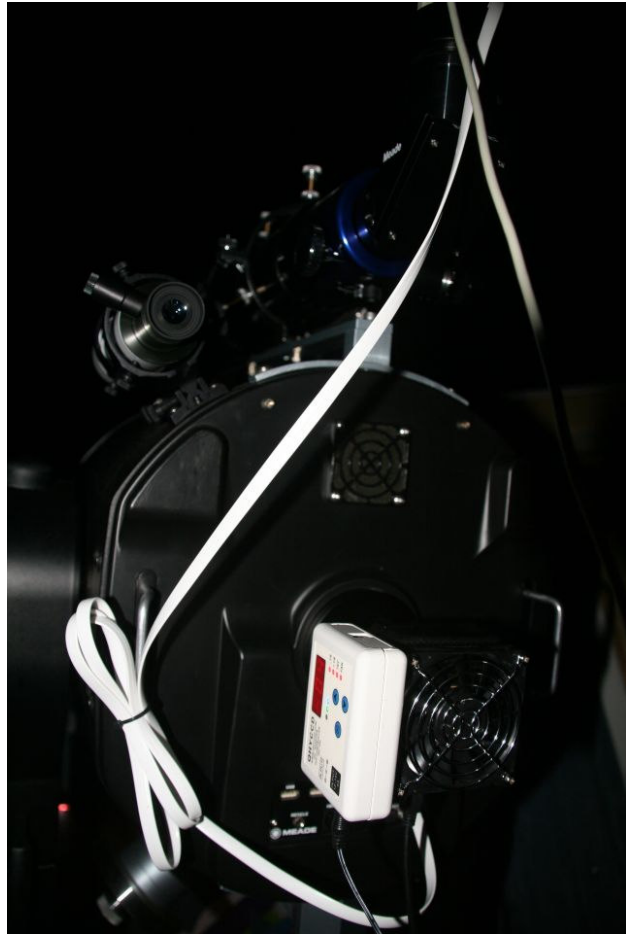


Be careful to use the correct joints and not to create any shorts!

Now, you're ready to assemble the DC-102:



During your work some doughnuts may have found a new home on the front of your CCD. Gently remove them with an optical pen and close the imager again with a (clear) filter. At least that's what I'm doing. Now test you new modified QHY8. If you look carefully you'll see that only 2 cables are going to the imager: USB and 12V.



Using the DC-102 in this modification you can be sure to have a stable temperature within approx 2 degree Celsius. This should be ok for most applications.

Enjoy your work.

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