# How to Use EtherCAT Mini-DAQ

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## 1 Introduction

This document serves as a simple start-up guide for the EtherCAT Mini-DAQ. This DAQ system sits on a test model and allows all data to be transferred out of the test area via a single ethernet cable. GitHub link :`https://github.com/shaun11740/EtherCAT-Mini-DAQ`.

## 2 What you will need

1. EtherCAT Mini-DAQ Main Hub
2. CompactRIO Real Time Target Machine (With EtherCAT drivers installed)
3. LabVIEW PC
4. Ethernet cable x2
5. Sensors (up to 8 analogue voltage)
6. Voltage division sensors (if sensors are greater than +5V output signal)
7. All C++ files for Arduino and labVIEW files available on GitHub

## 3 Setting up Mini-DAQ

Firstly, ensure that the CompactRIO in use has NI Industrial Communications for EtherCAT installed, and that Port 2 of this machine is set to EtherCAT mode. This can be viewed in the NI Measurement and Automation Explorer under network settings for the connected CompactRIO (see figure 1). Once the CompactRIO has port 2 configured to EtherCAT mode we can go ahead and connect the Mini-DAQ. CRIO Port 2 should connect to Mini-DAQ OUT and Mini-DAQ USB should connect to the PC for power and reprogramming (see figure 2). The Arduino should be pre-programmed but if it is not it can be programmed with the MiniDAQ.ino file available on the github repository.

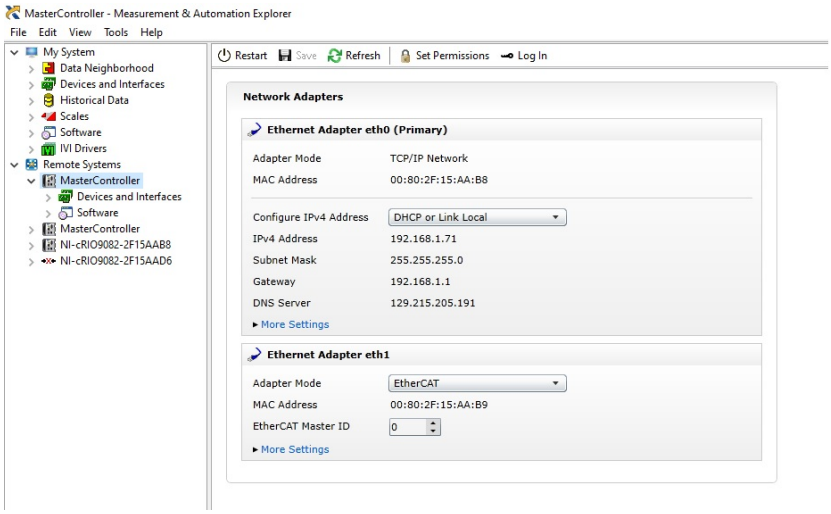


Figure 1: NI MAX

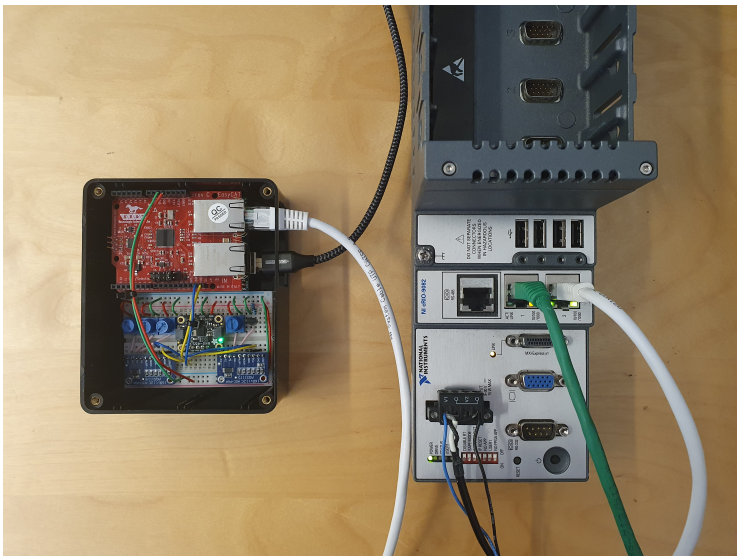

Figure 2: Mini-DAQ Network Setup

Now that the Mini-DAQ network has been set up you can wire sensors into the main enclosure. The default setup has 8 analogue channels aswell as a digital accelerometer. The analogue channels can be wired in where the 5V markers are placed with +5V, Signal and Ground pins respectively from left to right.

# 4 Collecting Data with Mini-DAQ

To begin collecting we must first open the LabVIEW project EtherCAT-Mini-DAQ.lvproj, within which we find the CompactRIO target, EtherCAT master device I/O and the Mini-DAQ virtual instrument (see figure 3). The next step

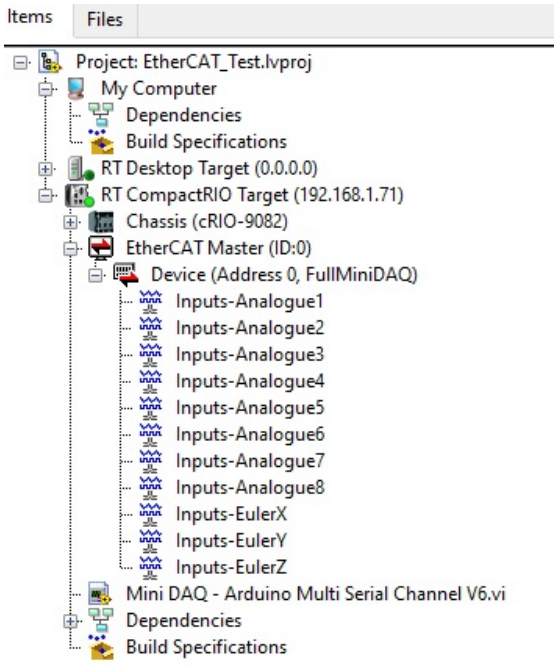


Figure 3: Mini-DAQ LabVIEW project

is to open the VI titled, EtherCAT Mini DAQ which takes you to the front panel of the DAQ (see figure 4). Now just set sample rate and test time from the front panel and hit run. A dialogue box may appear asking to resolve an issue, just press apply to continue. You should then see all waveform charts progressing, a good way to know collection is working is to move the DAQ box and see if the Accelerometer charts respond. **If at any point the Arduino loses power supply you must close LabVIEW, power off CRIO and re-power otherwise all channels will read zero as EtherCAT connection is lost.**

# 5 Accessing Collected Data

All data is saved onto the CompactRIO, default type is .tdms but .LVM is also available. This can be changed by opening the back panel of the VI in LabVIEW, right clicking Write to Measurement express VI and clicking properties.

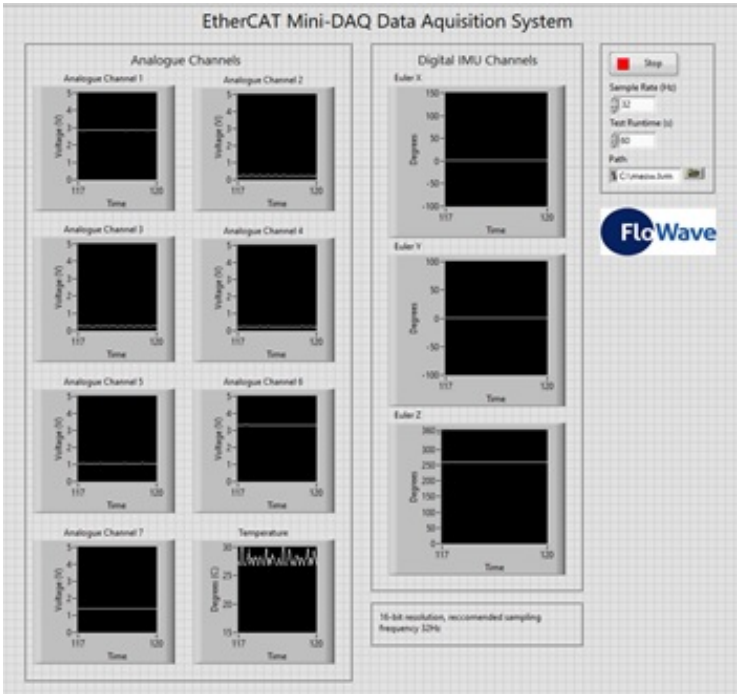


Figure 4: Mini-DAQ VI Front Panel

Remember to change the file name after each run as otherwise it will overwrite previous data.

# 6 Design and Configuration

If you wish to understand the the full technical specification of the min-DAQ: see the Overview document. If you wish to reconfigure the mini-DAQ for additional channels or sensor scaling: see the Configuration document. If you have any questions about the design feel free to contact the author on s1930619@ed.ac.uk.