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microDAQ-Mk2
(including CANdaq5)

Pressure Scanner Acquisition System

INSTALLATION AND OPERATING MANUAL

e-mail:- info@chell.co.uk

Visit the Chell website at:
http://www.chell.co.uk

900193-1.5

Please read this manual carefully before using the instrument.

Use of this equipment in a manner not specified in this manual may impair the user's protection.

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Chell's policy of continuously updating and improving products means that this manual may contain minor differences in specification, components and software design from the actual instrument supplied.

CONTENTS

1 Description

1.1 General

The microDAQ2 is a self-contained acquisition system and combined pressure scanner that acquires and transmits data to a host via Ethernet or a CAN bus. It is the newest version of the popular Chell microDAQ acquisition system, now known as microDAQ1.

The microDAQ comes in several variants to accommodate both conventional HD series scanners and Digital Thermal Compensation (DTC) scanners with 32 and 64 channels. It also comes in a stand-alone version (called the CANdaq5) where the scanner is not contained within the unit but connected by a cable instead.

The microDAQ is supplied with all the software required to configure it and read the data from it. It is configured with an embedded web-server which is simply loaded by entering the i/p address located on the label into a web browser.

The microDAQ addresses the scanner at a defined rate, acquires the output and applies a pressure and thermal calibration to derive the engineering units.

The microDAQ also has a hardware trigger and IEEE 15888 PTPv2 time stamping to enable data synchronisation.

This manual revision covers firmware version 2.0.2.

2 Specification

2.1 Power Supply:

Line voltage:	8-24 VDC
Absolute Max. Line voltage	25VDC
Consumption:	Max 4VA
With a 64-channel scanner:	

2.2 CAN specifications:

CAN type	2.0B
CAN baudrate	Configurable by defining BRP, TEG1, TSEG2 and SJW.
Programmable variables:	
Address 0x?nn	Most significant programmable device ID
Address 0xn?n	Next most significant programmable device ID
BRP	CAN bus timing – see Infineon data sheet
TSEG1	CAN bus timing – see Infineon data sheet
TSEG2	CAN bus timing – see Infineon data sheet
SJW	CAN bus timing – see Infineon data sheet

2.3 Ethernet Specifications:

TCP/IP	10Mb/s & 100Mb/s via Auto Negotiation TCP & UDP protocols supported

2.4 Operating conditions:

Operating temperature range:	+5°C to +90°C
Storage temperature range:	-20°C to +90°C
Maximum Relative humidity:	95% at 50°C (non-condensing)

2.5 Measurement specifications:

System accuracy:	±0.25% FS for conventional scanners ±0.06% FS for DTC scanners ±0.06% FS for I-Daq scanners
Resolution:	16 Bit
Theoretical Maximum Measurement Speed: (actual data output is limited by chosen comms available bandwidth)	See table below:

	Measurements / channel / second	
	32	**64**
@ 50KHz Scanner Acq Frequency	1500	750
@ 20 KHz Scanner Acq Frequency	625	312

3 Installation and Interconnections

3.1 Connector – Mating connector: DEUTSCH ASDD606-09SN-HE

Pin Number	Designation
1	TX+
2	RX+
3	TRIGGER IN (TTL)
4	+8~25V SUPPLY
5	0V
6	CAN_H
7	CAN_L
8	TX-
9	RX-

Hot plugging the power to the microDAQ at the connector can cause permanent damage to the unit. Always switch the power at the power supply source.

3.3 Scanner Connector – Internal micro miniature 'D' type, female.

Pin number	Signal
1	Address line A0
2	Address line A1
3	Address line A2
4	Address line A3
5	Address line A4
6	+12VDC
7	-12VDC
8	+5VDC (Vs)
9	+5VDC RTN
10	Ground
11	Output
12	Address line A5
13	Ov sense
14	Not used
15	Temperature signal

Note: The connection pinouts for the microDAQ-INT interface adapter can be found at the end of this document (Section 7).

4 Operation of the instrument

4.1 Connecting up the microDAQ.

The microDAQ has one connector and cable which supplies the unit with power and also provides CAN and Ethernet comms. Ensure all the connections are made before powering up the microDAQ. **The microDAQ should not be hot plugged with the power connector. Doing so can cause permanent damage to the unit. Always switch the power at the power supply source.**

Upon power up, the blue LED will light constantly while the microDAQ boots up. This boot-up period will vary depending on the type of scanner and the number of channels. The boot up time is also influenced by the Ethernet initialisation process. This process requires a valid network connection to perform auto negotiation and link check status. If there isn't a valid connection the process waits until either a network is found or the timeout occurs. This timeout is configurable via setup and ranges from 0 to 30 secs per check (2 checks).

When the microDAQ has finished booting, the blue LED will flash at a constant rate to show that the system is running (unless auto hardware trigger enable has been set – see later).

4.2 Configuring the microDAQ2.

The MicroDaq2 can be configured over CAN, Ethernet or the webserver. For the command structure for the configuration and data output, please see the Microdaq2 user programming guide (900204-X.X).

The usual method for operating the MicroDaq2 is to configure it with the embedded web server. Here the i/p address, data transmission speed, time stamping etc can all be configured in an intuitive web server. Then, once the MicroDaq has been reset, it will operate as instructed and output data at the appropriate rate (or wait for the hardware trigger if it has been configured to wait for a hardware trigger).

The MicroDaq2 is supplied with software (MicroDaqX) that can display the data output from the MicroDaq2, log it to disk (as a CSV file) and provide some control over the MicroDaq2's configuration. We also supply a version (MicroDaq-M) that will control up to 16 units together.

4.3 Re-zeroing the microDAQ.

Before any measurements are made, the microDAQ2 should normally be re-zeroed. The microDAQ may need further re-zeroing if the unit or scanner should be subject to significant thermal variations. This will depend on the type of scanners used as DTC scanners have some zero thermal compensation.

The microDAQ2 can be re-zeroed by sending the appropriate command over the CAN or Ethernet, via MicroDaqX or by using web server. The system will then average a number of zero readings and perform a re-zero. Naturally, there should be no pressure applied to the ports of the scanner when a re-zero is being performed. The re-zero is normally volatile and therefore lost with a reset or power cycle. It is however possible to save the zeros by using the calibration functions within the embedded web server.

When a re-zero is being performed, the red LED will light momentarily.

4.4 Hardware Trigger

The microDAQ features a hardware trigger to enable the user to synchronise multiple microDAQ's and to calculate the timing of the measurements made. The hardware trigger takes the form of a pulse train. Each time the microDAQ receives a positive edge, it will generate a set of measurements for all the channels configured in the system.

4.4.1 Hardware Trigger Input.

The hardware trigger input is a 5V TTL square wave pulse train. Minimum frequency 2Hz and maximum frequency 1.5KHz (32 channel scanner, real world application – theoretical maximum is determined by the number of channels on the scanner. 64 channel units streaming data via TCP comms will struggle to stream faster than around 600Hz)

4.4.2 Timing Information

The hardware trigger allows the user to calculate the time of each measurement. For example, if the hardware trigger were running at 100Hz then the user would receive 100 measurements per channel per second. The first pulse would generate the first set of measurements and 10ms later the second pulse would generate the second set and so on. When the hardware trigger is activated, the microDAQ will wait for the first pulse. The time that this first pulse is generated can be measured by the user and therefore the time of the first set of data and all subsequent sets can be determined

Data synchronisation can also be achieved by enabling the in-built time stamping. The timing can be synchronised via IEEE 1588 PTPv2 or simply by being set from the PC time. The option exists to transmit a time stamp with each data point of at the beginning of a scan (or 32 or 64 channels).

4.4.3 Software Control

The hardware trigger mode is activated by the T command over the CAN or Ethernet interfaces. The T command can be used to enable the hardware trigger that will cause the microDAQ to stop free-running and wait for the first pulse. The disable command will return the microDAQ to free-running. The command structure is as follows:

Command	Interface	On / Off
T01	CAN	Off
T11	CAN	On
T02	Ethernet	Off
T12	Ethernet	On

The hardware trigger can also be set to auto enable on power up which means that the microDAQ will not go into free-running mode after initialisation and will instead wait for the first hardware trigger pulse. In this instance the blue LED will not flash at a constant rate after initialisation and will actually turn off. This feature can be enabled/disabled from the embedded webserver configuration.

NOTE : One of the operational options for the Microdaq2 is to configure the MicroDaq2 to power up and wait for a hardware trigger before acquiring any data. If this option is enabled, the blue LED with NOT flash on boot up as the MicroDaq2 isn't acquiring. This is easily confused with a fault condition.

5 microDAQ Configuration Webserver

5.1 Introduction.

The microDAQ web Configuration provides the means of setting up, calibrating and demonstrating the microDAQ unit from a standard PC with an ethernet port and browser. It replaces the old microDAQSetup program provided with the microDAQ-Mk1.

When connecting to the MicroDaq2 web server, it is simply a matter of entering the i/p address on the MicroDaq2 label into a web browser. However, it is necessary that the i/p address range of the PC used to connect to it is similar to that of the MicroDaq2 otherwise it will not connect. For example, if the MicroDaq2 has an i/p address of 192.168.1.190, then the PC must have an i/P address of 192.168.1.XXX where XXX can be any legal i/p address component.

Many network PC's may be configured with a dynamic i/p address (DHCP) so in these circumstances, it may be necessary to configure the PC with a static i/p address of the appropriate range, then connect to web server and change the i/p address of the MicroDaq2 to meet the requirements of the network. Then, the PC can be changed back to DHCP and the MicroDaq2 will still be visible as the first three segments of the i/p address match.

The software is divided by tabs into seven areas of functionality, namely 'Setup', 'Live data', 'Calibration', 'DTC Information', 'Advanced', 'Timestamp' and 'Factory Tools'

'Setup' provides the means to set microDAQ's operating parameters and its identification information. The unit's function may be checked and demonstrated using 'Live Data' to show attached pressure scanner raw readings and microDAQ's calibrated output. 'Calibration' gives access to microDAQ's existing on board, non DTC calibration coefficients, the tools for performing a new calibration, namely calculating and downloading new coefficients, and the means to managing calibration data. Data from the calibration procedure and resulting coefficients may be loaded, stored and exported for filing, reuse and examination in other packages. 'DTC Information' provides a means for interrogating a DTC variant of the microDAQ, the user having access to identification information, the current status of the calibration shuttle valve and both excitation and temperature voltages. 'Advanced' has extra functions that some users might not need but might be necessary for other users. 'TimeStamp' provides a means for the user to control the timestamping settings of the microDAQ2 . 'Factory Tools' provides some functionality to read DTC coefficients and current scanner values and change the MAC address of the Ethernet hardware. This tab is not readily available to everyone and further detail is beyond the scope of this document.

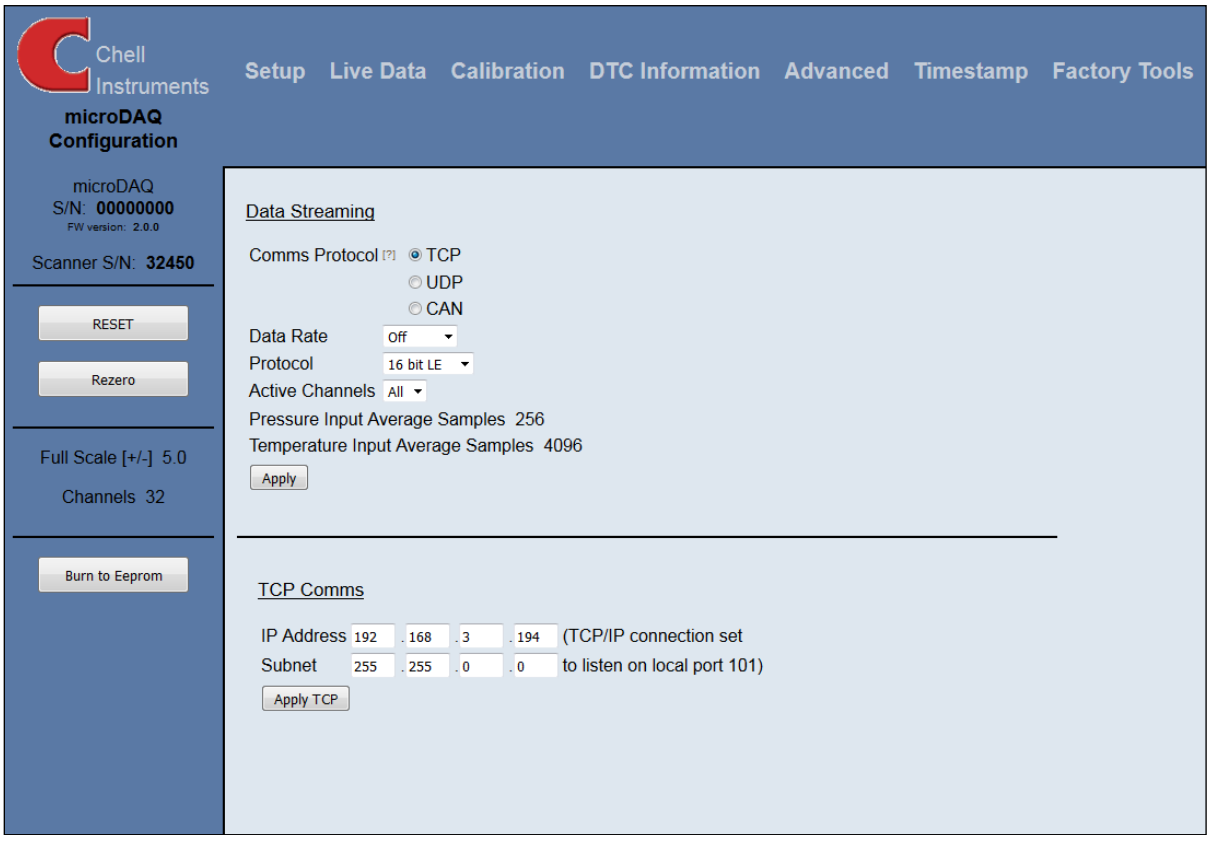


Figure 5.1, Main Setup page

5.2 Common Controls Sidebar

Figure 5.1 above shows the first page viewed when navigating to the webserver. The menu at the top allows the user to choose what is visible in the central window, and the sidebar shows information and has a select few commands that are useful regardless of the central page the user is on. The function of the controls on the sidebar is detailed in the subsequent table (Table 5.1)

Control	Function
'RESET' button	Resets the microDAQ, similar to power cycling the device. Use to activate new settings and/or rebuild calibration tables.
'Rezero' button	Starts a microDAQ rezero operation.
'Full Scale'	Displays the value of the full-scale that the microDAQ2 is set up to use .
'Channels'	Displays the number of channels that the microDAQ2 is set up to use.
'Burn to eeprom" button	Burns all changes made to the local settings into the eeprom

Table 5.1, Common sidebar control functions.

5.3. The 'Setup' Page

5.3.1 Introduction

The 'Setup' page shows all of the microDAQ2's main operating parameters. Setup is divided into different categories by function, and each category is detailed separately in the following.

5.3.2 Data Streaming

The ‘Data Streaming’ section allows the user to change settings that affect all three communication protocols, and allows the user to choose the protocol that is to be used, along with the data transfer rate and the number of channels.

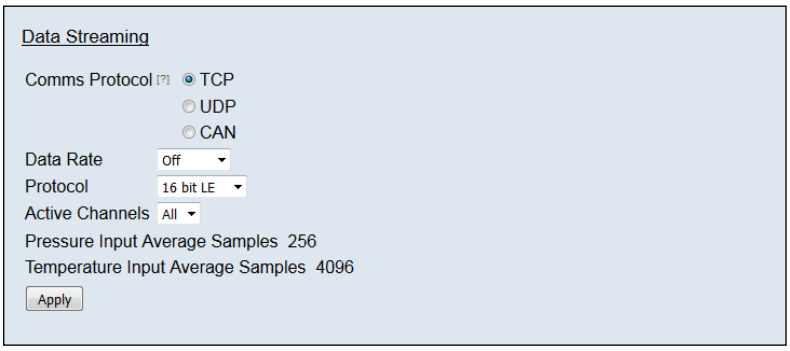


Figure 5.2, Data Streaming group

Control	Function
‘Comms Protocol’ radio button	Chooses the communication protocol that is to be used. When selected this button will change the communications page underneath to the appropriate comms menu.
‘DATA Rate’ option list	Selects the rate at which the microDAQ2 will transmit data, whether this value is for TCP, UDP or CAN will depend on the comms protocol selection.
‘Protocol’ option list	Selects the format that the data will be transmitted as, options are 16 bit LE, 16 bit BE for all protocols and eng. units as an extra option for TCP and UDP Comms.
‘Active channels’	Selects the number of active channels, either 16,32,48 or All
‘Apply’ button	Applies the changes made to the local settings
Pressure input Average Samples	Standard moving averaging filter for the acquired pressure readings.
Temperature input average samples	Standard moving averaging filter for the acquired temperature readings.

Table 5.2, Data Streaming settings.

Note that selecting Engineering Units for a protocol will cause the scanner addressing rate to be reduced; it is better to scale calibrated 16-bit data to engineering units within the client software.

5.3.3 TCP Parameters

The TCP communication protocol parameters are shown in Figure 5.4. Options control the microDAQs's IP address and subnet mask, in addition to any gateway IP address required. Note microDAQ2’s active TCP listening port is fixed at 101.

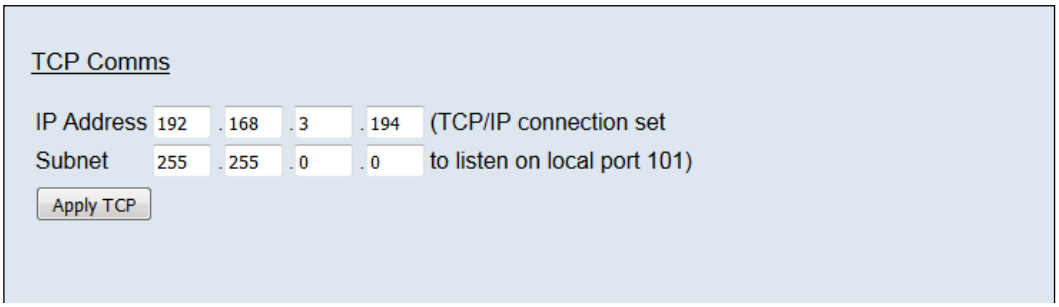


Figure 5.3, TCP Comms group

'IP Address'	IP address allocated to microDAQ on the user's network.
'Subnet'	Subnet mask as set on the user's network.

'Apply'	Applies the settings to the local settings memory

Table 5.3, TCP Comms group settings

5.3.4 UDP Parameters

The UDP section (figure 5.5) holds all the settings specific to UDP. In UDP mode each acquisition cycle (of 'x' number of channels) is packed as a separate UDP packet with a four-byte representation of the microDAQ serial number at the start of the packet. These are attempted to be sent out at the required rate but with no checking for reception or validity of data.
Note that the microDAQ2's local IP address is the same setting as from the TCP Comms group and the microDAQ2's local UDP port is also fixed at 101. Settings available from this section include setting the UDP address and port for a remote connection (for auto streaming via UDP at boot up) and a setting for auto broadcasting a UDP message at bootup to inform the network of the availability of the microDAQ.

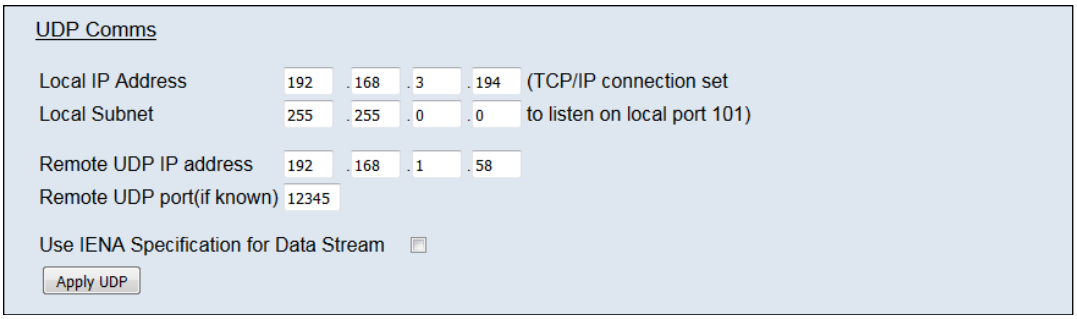


Figure 5.4, UDP Comms group

Local IP Address	This is the IP address of the device. This address is the same as the TCP comms section.
Local Subnet	This is the subnet of the device. This subnet is the same as the TCP comms section.
Remote UDP IP address.	Address of remote connection to microDAQ. If set then the microDAQ can be set to auto stream data to that remote host on boot up (after initialisation)
Remote UDP port.	Port of remote connection to microDAQ. If set then the microDAQ can be set to auto stream data to that remote host on boot up (after initialisation)
'Use IENA Specification for Data Stream'	Turns the Data stream format to IENA specification format. More information on this format can be found in the user programming guide.
'Apply'	Applies the settings to the local settings memory

Table 5.4, UDP Comms group settings

5.3.5 CAN Parameters

The CAN communication settings are shown in Figure 5.6. Options are available to set the base message ID number may be selected, and the offset from this base number for the reception of user commands over CAN, and whether an acknowledgement of these user commands is sent on the next higher message number. Data may be transmitted on either multiple messages, or alternatively on a single message ID, with a selectable delay between messages. Additionally, the CAN bus baudrate and sample point can be modified via the setting of the BRP, TSEG1, TSEG2 & SJW registers.

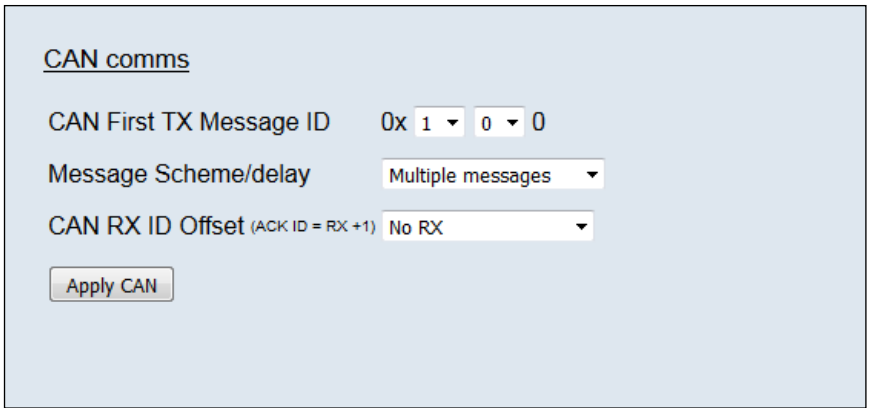


Figure 5.5, CAN Comms group

'CAN First TX Message ID'	microDAQ uses standard CAN message arbitration id's, and the unit is assigned the most significant 2 digits of the Hex base address. For the digits 0x1A for example, data for the first 4 channels will be sent on 0x1A0, the next 4 on 0x1A1, etc.
Message scheme/delay	Select 'Multiple Messages' for the 4 channels per message, multiple message scheme. Alternatively, data may be packed 3 channels per message + identifier byte, with a selectable delay between messages.
'CAN RX ID Offset'	Selects the hex offset from the base message ID where microDAQ will receive incoming user commands (see user command document). If 'Ack. Enabled' is selected, the unit will acknowledge the reception of a correctly formatted command on the message ID calculated as Base ID + RX Offset + 1
'Apply'	Applies the settings to the local settings memory

Table 5.5, CAN Comms group settings.

5.4. 'Live Data' Page

Figure 5.8 shows the 'Live Data' page of the webserver, selected for a 64-channel pressure scanner.

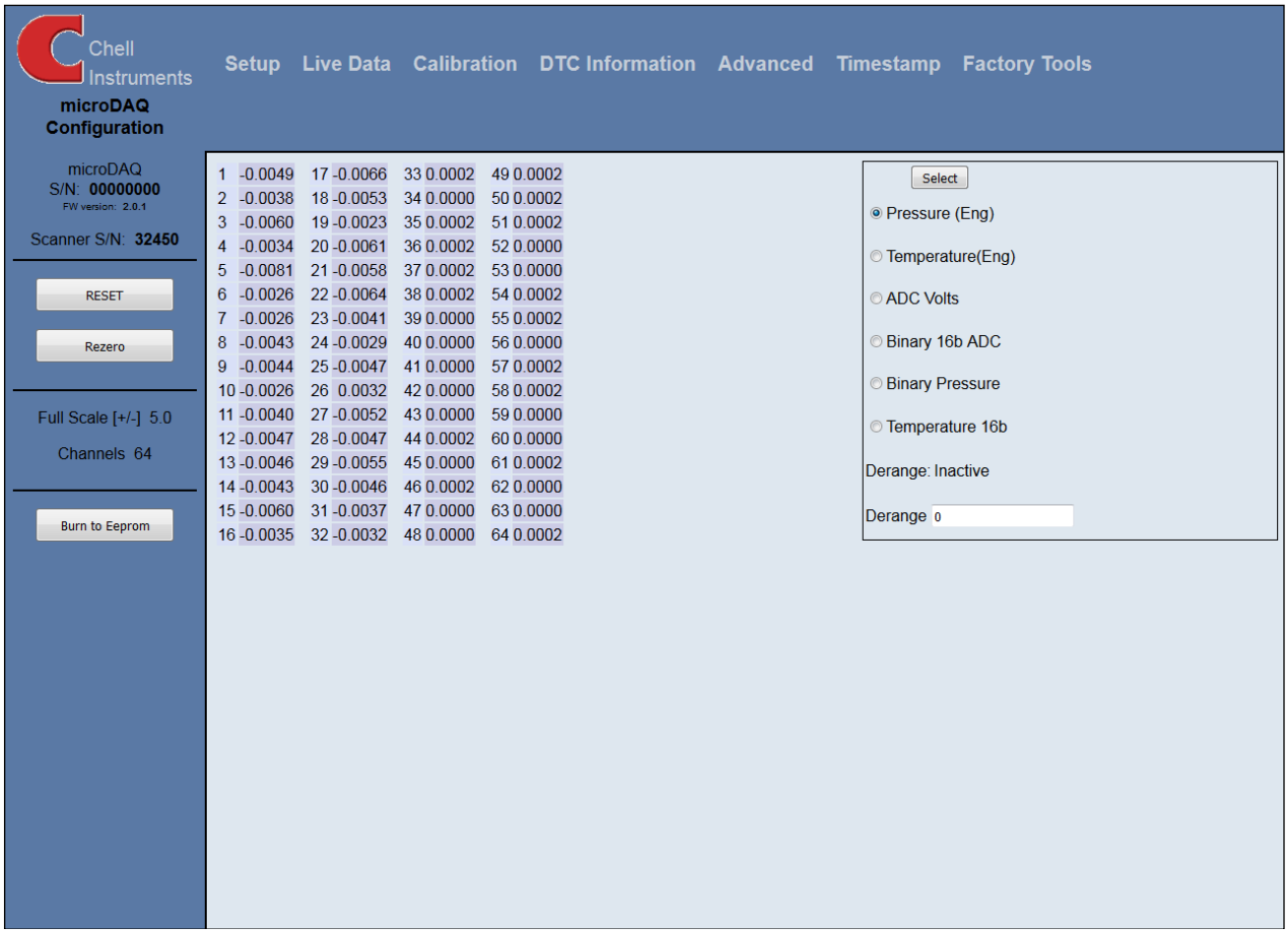


Figure 5.6, Live Data Page

The live data page is a means to demonstrating the correct operation of microDAQ and testing the unit's calibration. By selecting the correct number of channels for the attached scanner, the software shows a data label dedicated to each. The type of value shown in the label may be selected by means of the option buttons to the right of the frame, the user selecting between raw (decimal 16 bit unsigned), calibrated (decimal 16 bit unsigned) and engineering units or voltage scaled to the known full scales. Also, for DTC scanners, the temperature values as raw unsigned 16 bit and calibrated engineering units may be displayed. Values are updated automatically, once a second, with the default view being Pressure (Eng). Use the Select button to start showing values from one of the other selectable options.

The 'Derange' shows whether the derange is active or inactive, this is changed by changing the DTC Gain value in the advanced page, a DTC Gain of 1 means derange will be inactive and a DTC Gain of 3 means derange will be active. The derange value will be displayed on if derange is active, if not then the displayed value will be 0.

5.5. 'Calibration' Page

The 'Calibration' page allows access to microDAQ's existing non-DTC calibration coefficients and provides a means to acquiring live calibration data and calculating new coefficients. The loading and saving of tests is also possible from this tab.

Calibrations may either be 3 temperature based for a temperature calibration, or by unchecking the 'Temperature Cal.' checkbox, a non-temperature calibration may be performed at a single temperature. Figure 5.9 shows the 'Calibration' tab controls which are further explained in table 5.8.

The Live values section is an indicator of the currently read pressure and temperature of the selected View channel. This is just to show if valid values are being read by the unit. They can be toggled off and on using the check box and Accept button.

Other controls include the 'Burn Coeffs' button which writes the current local coefficients to microDAQ EEPROM. The 'Clear' button sets all local coefficients to zero.

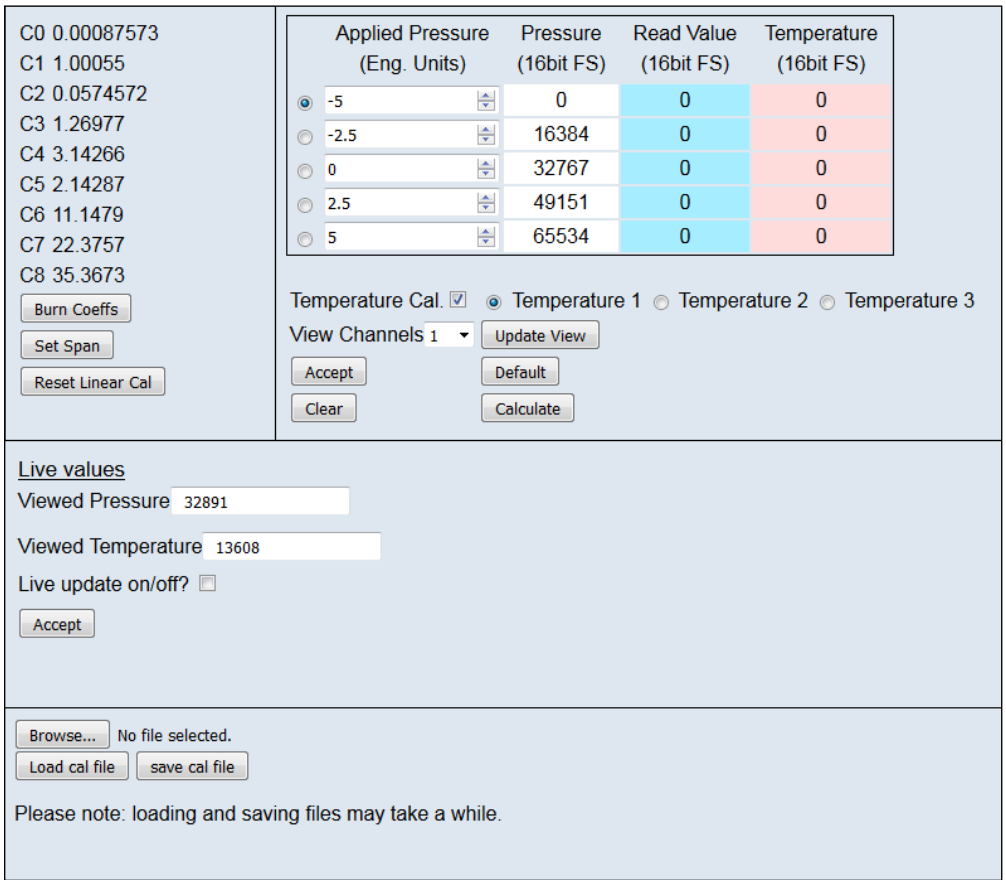


Figure 5.7, Calibration Page

Control	Function
Temperature tickbox and radio buttons	Select at which temperature point the unit is currently been calibrated
Applied Pressure	The engineering units pressure setpoints - user entered, or set to standard values (+/- FS, +/-0.5FS, 0) by clicking 'Defaults'
Pressure (16 bit FS)	The 16 bit unsigned representation of the pressure setpoints, calculated by the software
Read value (16 bit FS)	The raw value read by microDAQ from the pressure scanner for the pressure setpoint
Temperature (16 bit FS)	The temperature value read by microDAQ from the pressure scanner at that pressure setpoint
'Accept' button	Clicking 'Accept' stores the current read value as the calibration point, and moves on to the following setpoint
'Defaults' button	Sets the default calibration points as +/- full scale, +/- 0.5 full scale and zero
Calculate	Takes the acquired data and calculates the derived calibration coefficients - will not proceed unless there is no more than one zero in the applied pressure text boxes
Clear	Clear the current calibration test data to zeroes, also clears the calibration controls
Temperature Cal.	When checked enables temperature options 2 and 3 for a 3-temperature calibration. Unchecked only temperature point 1 is available to the user and the system will calculate coefficients for a non-temperature calibration
Live Values	The live values of the current channel are displayed here
Live update on/off	Selects whether the live values will update at a 1 second interval or not.
View channel	Select the channel that supplies the values displayed in the calibration controls
C0 – C8	Calibration coefficients read/calculated for the selected channel
Burn Coeffs	Tell the microDAQ to store the current coefficients to non-volatile storage (EEPROM)
Linear Cal Functions	
'Set Span'	Set the span of a linear calibration – confirms the value of pressure that has been set up as the span value is being applied to the sensor.
'Reset Linear Cal.'	Resets the linear calibration to (+ 0) x1 i.e. no offset, unity gain. Applies ONLY to the current linear calibration, ie the DTC calibration if using a DTC scanner.
Calibration Load/Save	
Browse	Allows the user to search through the file directory system and select a calibration file
Save File	Save the current local calibration coefficients to a file - defaults to the calibration file directory
Read File	Reads the calibration file selected by the browse function into the microDAQ (note: Reading a non-calibration file will cause the system to crash)

Table 5.6, Calibration Page controls

5.6. 'DTC Information' Page

The 'DTC Functions' page gives the user access to some information regarding the attached DTC scanner. The scanner voltages for temperature and excitation may be read and the position of the calibration shuttle valve determined as either being in 'RUN' or 'CAL.' mode. Also, the information contained in the scanner header may be displayed. Note that the value of the parameter read from the scanner (ie temperature, excitation voltage and particularly valve position) is valid only for the time that it is read.

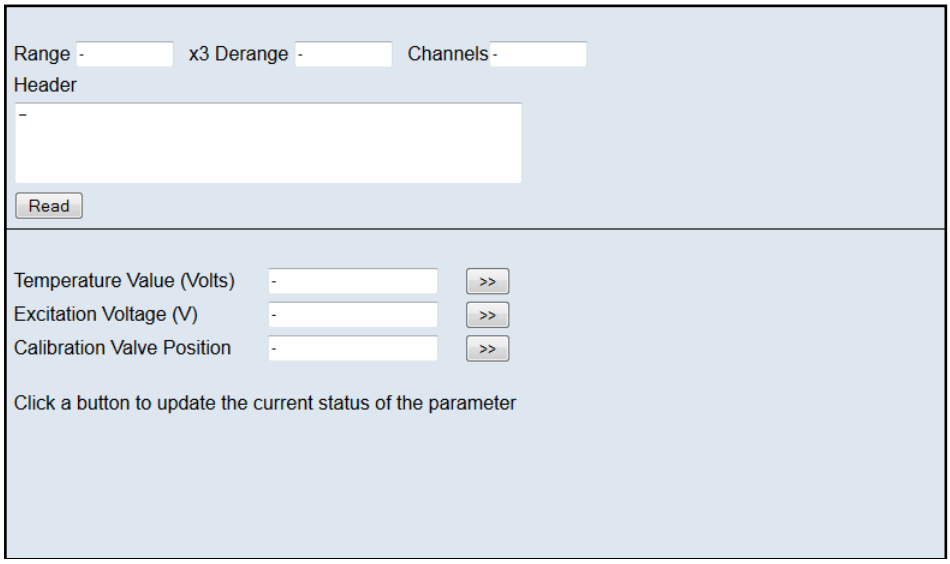


Figure 5.8, 'DTC Information' Page

Control	Function
'Range'	Shows the floating-point value for the range contained within the scanner.
'x3 derange'	Shows the floating-point value for the sensitivity derange constant contained within the scanner.
'Channels'	Shows the floating-point value for number of scanner channels.
'Read'	Displays the data header from the DTC scanner, splits out the information and displays scanner full scale, the number of channels and the deranging factor. Also shown are the scanner model, serial number and date of manufacture.
'Temperature (V)'	Click '>>' to read the current temperature voltage from the scanner.
'Excitation (V)'	Click '>>' to read the current excitation voltage from the scanner.
Calibration Valve Position	Click '>>' to read the valve position as 'RUN' or 'CAL'.

Table 5.7, 'DTC Information' Page controls

5.7 'Advanced' Page

The advanced page contains functions that will change the how the microDAQ2 acts and how it applies various calculations to its data, this page should only be used by users who fully understand what they are changing.

5.7.1 Filtering

The microDAQ2 has settings to allow the user flexible control over the data throughput of the device. Averaging options allow the preference of noise reduction over time domain response, the frequency of calibration temperature compensation renewal may be chosen as may be the size of the average (and hence time taken) for the re-zero routine. Table 5.2 details the function of the signal parameter option controls.

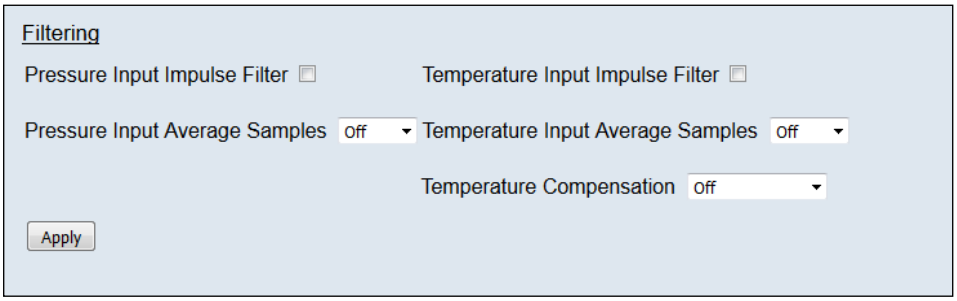


Figure 5.9, Filtering group

Control	Function
'Pressure Input Impulse Filter'	Check box to apply impulse filter to pre-calibration data - will remove single impulse noise events in the pressure data.
'Temperature Input Impulse Filter'	As above but with temperature data.
'Pressure input average samples'	Selects the number of samples for a moving average of pre-calibration pressure data.
'Temperature input average samples'	As above but with temperature data.
'Temperature Compensation'	Selects the temperature compensation scheme for the calibration. 'Continuous' repeatedly rebuilds the calibration data on a channel by channel basis without interrupting the flow of data. 'With zero only' rebuilds the table when a user re-zero is issued, after the re-zero has been actioned.
'Apply'	Applies the settings to the local settings memory

Table 5.8, Filtering group settings

5.7.2 Advanced communication settings

The microDAQ2 has several more advanced communication options available, but these features are unlikely to be used by an everyday user and as such should generally be left as default settings.

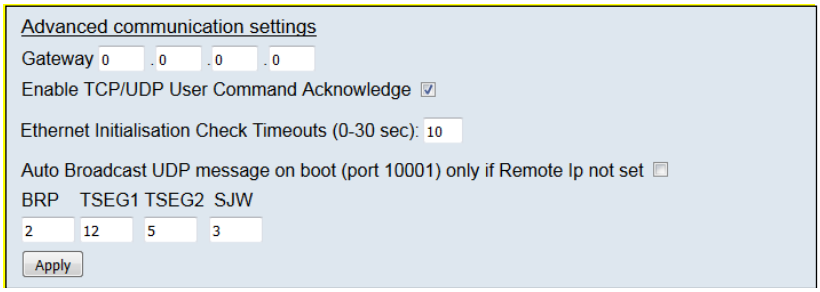


Figure 5.10, Advanced communication settings

'Gateway'	Allows the user to change the Gateway address interface for the local connection.
'Enable TCP/UDP User Command Acknowledge'	If enabled, replies with a two byte acknowledge if a user command is sent to the microDAQ2 over TCP or UDP.
Ethernet Initialisation Check Timeouts(0-30 sec)	At bootup the Ethernet module performs two checks for auto negotiation and link check status. This timeout can be controlled via this text box. If Ethernet comms are not going to be used then this value can be set at 0 to speed up startup time.
Auto Broadcast UDP message on boot (port 10001)	If checked, auto broadcasts a UDP message on port 10001 on startup which details the microDAQ2's serial number, IP address, etc. in an ASCII, comma separated list. (should not be used if remote UDP address/port has been configured and auto streaming has been set – via TCP rate on Standard tab)
BRP, TSEG1, TSEG2, SJW	Register values for the CAN module within microDAQ2's microcontroller. Suggest value for 1M baudrate : BRP: 4, TSEG1 : 11, TSEG2 : 4 and SJW : 3 Suggest value for 500k baudrate : BRP: 9, TSEG1 : 11, TSEG2 : 4 and SJW : 3 Suggest value for 250k baudrate : BRP: 19, TSEG1 : 11, TSEG2 : 4 and SJW : 3 Suggest value for 125k baudrate : BRP: 39, TSEG1 : 11, TSEG2 : 4 and SJW : 3 Suggest value for 100k baudrate : BRP: 49, TSEG1 : 11, TSEG2 : 4 and SJW : 3 Suggest value for 50k baudrate : BRP: 99, TSEG1 : 11, TSEG2 : 4 and SJW : 3

Table 5.9, Advanced communication settings

5.7.3 Miscellaneous

The remaining parameters are edited via the Miscellaneous group shown in Figure 5.7. The scanner type should always be set to the type of scanner installed in the microDAQ2 to ensure proper operation of the system. If the microDAQ2 is a DTC variant and DTC mode is to be used, the 'Use DTC' checkbox should be checked. If the microDAQ2 is an I-daq variant then the 'use raw calibration' checkbox can be ticked to apply a linear calibration function on boot up. The DTC scanner's options of sensistor and gain configuration may also be selected from this tab. 'All DTC Channels Active', defaults the number of active channels to all on a DTC scanner, overriding the number in the setup. The scanner acquisition frequency can be toggled between 20KHz & 50KHz. The latter should be used in most cases to allow for faster data streaming, however 20KHz is provided for older scanners that only have Gen1 headers.

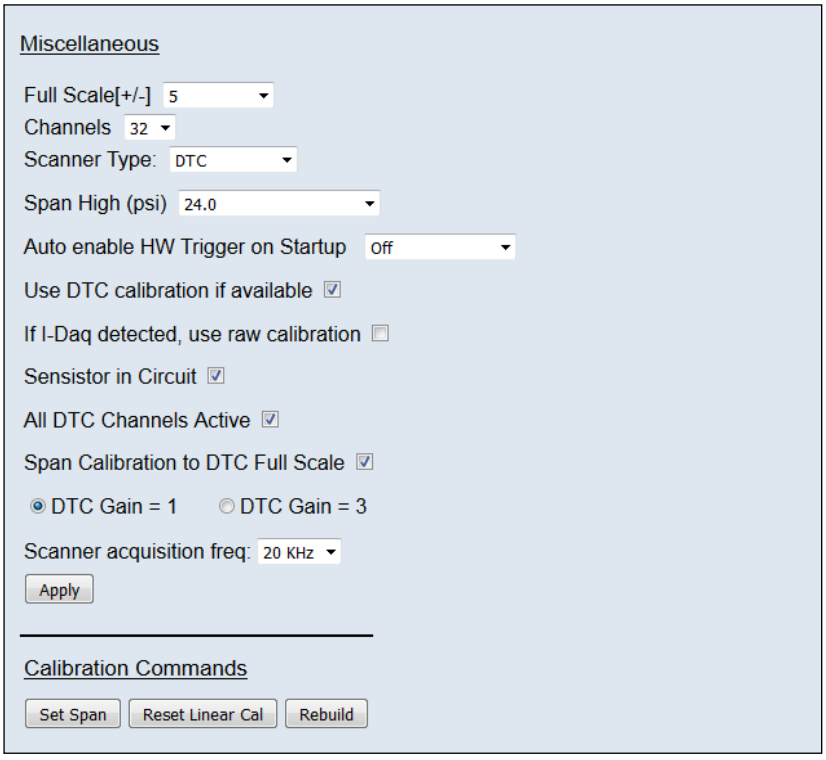


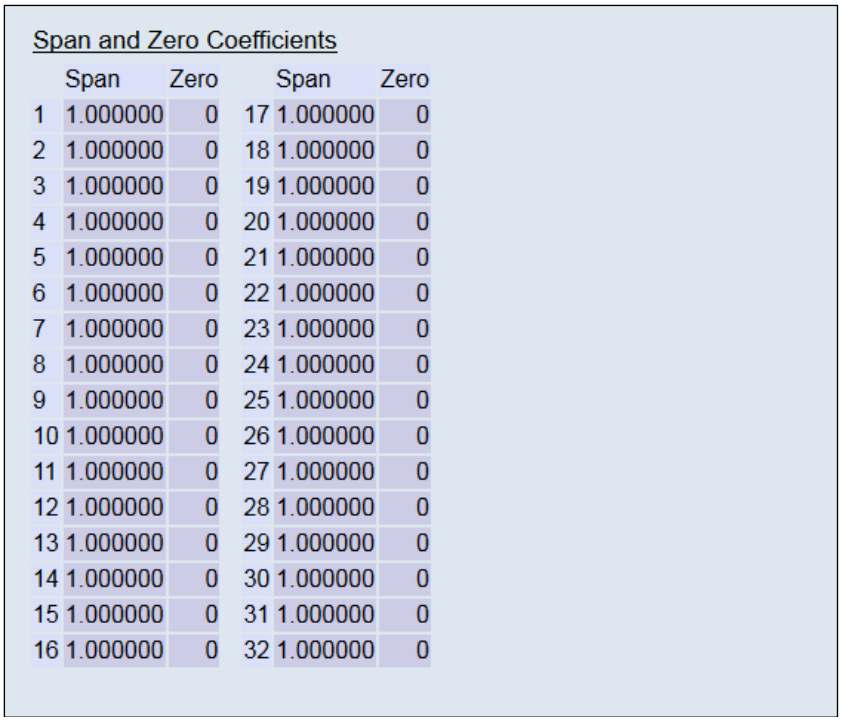
Figure 5.11, Miscellaneous group.

'Channels' dropdown	The number of channels on the attached scanner should be chosen from the 'Channels' drop down. It is important that this number is correct when performing any calibration or reading data from microDAQ2.
'Full Scale' dropdown	This dropdown is the only means of selection of the scanner's full-scale operating pressure. The value affects the display of live engineering values and the generation of calibration coefficients.
Scanner Type	Sets the type of scanner installed into the microDAQ2 (Conv, DTC, I-Daq, T-DAQ)
'Span High'	Sets the value of pressure for the 'high' point in the linear span and zero calibration. Valid values range from 0.144PSI (3"WC) to 90PSI. Typically, this value should be set to 90% of the scanners full scale value, if possible.
'Auto enable HW trigger on startup' dropdown	If set to anything other than Off, the microDAQ2 will immediately switch to hardware trigger mode, waiting for the first trigger pulse, after initialisation. The dropdown indicates the comms protocol used to send acquired data during triggering.
'Use DTC calibration if available'	On powerup, uses the DTC scanners internal calibration coefficients to build the microDAQ2's internal calibration data table.
If I-daq detected, use raw calibration	If checked, this replaces the normal polynomial calibration function with a 'raw' linear function whenever an I-daq is present in the microDAQ2.
'Sensistor in circuit'	If checked, keeps the sensistor in circuit for a DTC scanner. In normal operation this control should be left unchecked.
'All DTC Channels Active'	If checked, defaults microDAQ2 to setting the number of active channels to the number read from the DTC scanner header
'Span Calibration to DTC Full Scale'	If checked, defaults the span of the calibrated output to the full scale read from the DTC scanner header.
'DTC gain = 1/3'	Selects the deranging function of the DTC scanner if the '3' option is selected, otherwise defaults to the standard range of the scanner.
'Scanner acquisition freq'	Selects the acquisition frequency of the scanner, either 20KHz or 50 KHz
'Apply'	Applies the settings to the local settings memory
Calibration commands	
Set span	Set the span of the linear calibration – confirms the value of pressure that has been set up as the span value is being applied to the sensor.
Reset Linear cal	Resets the linear calibration to (+ 0) x1 i.e. no offset, unity gain. Applies ONLY to the current linear calibration, i.e. the DTC calibration if using a DTC scanner.
Rebuld	Force a calibration table rebuild.

Table 5.10, Miscellaneous group settings

5.7.4 Span and Zero Coefficients

This section displays the Span and Zero coefficients currently stored within the microDAQ2 as a result of a linear calibration.



Span and Zero Coefficients

	Span	Zero		Span	Zero
1	1.000000	0	17	1.000000	0
2	1.000000	0	18	1.000000	0
3	1.000000	0	19	1.000000	0
4	1.000000	0	20	1.000000	0
5	1.000000	0	21	1.000000	0
6	1.000000	0	22	1.000000	0
7	1.000000	0	23	1.000000	0
8	1.000000	0	24	1.000000	0
9	1.000000	0	25	1.000000	0
10	1.000000	0	26	1.000000	0
11	1.000000	0	27	1.000000	0
12	1.000000	0	28	1.000000	0
13	1.000000	0	29	1.000000	0
14	1.000000	0	30	1.000000	0
15	1.000000	0	31	1.000000	0
16	1.000000	0	32	1.000000	0

Figure 5.12, Span and zero coefficients

5.9 'Timestamp' page

This page allows the user to edit the timestamp settings of the microDAQ2. This timestamp will allow the user to get millisecond level accuracy timestamps on the data packets. If the timestamp is enabled it will have an effect on the maximum transmission rate.

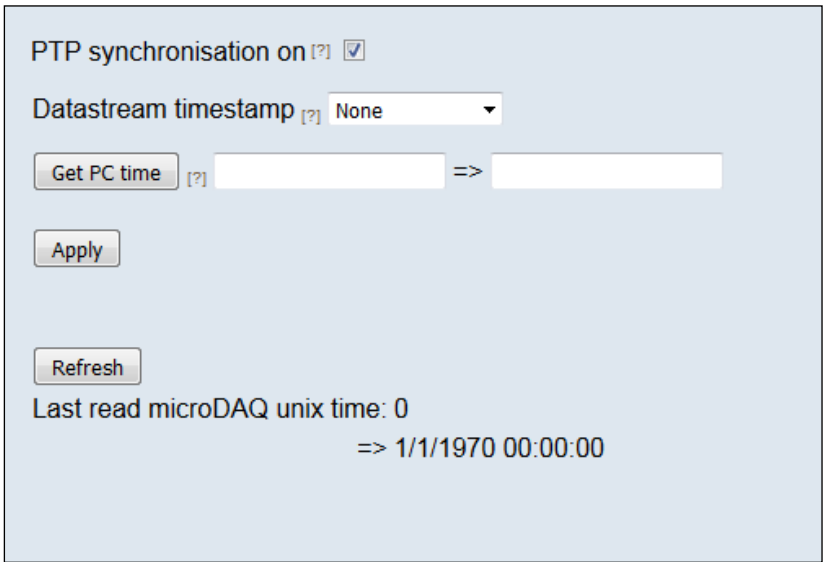


Figure 5.13, Timestamp

‘PTP synchronisation on’ checkbox	This allows the user to select whether any timestamps that may be added to the datastream are PTP synchronised or not. Please note this will only work if there is a PTP grandmaster on the same network as the microDAQ2
‘Datastream timestamp’ dropbox	The user can use this to select where the timestamp is positioned in the datastream, either none which will turn the timestamp off, start of cycle which will place a timestamp at the beginning of all the channels and every channel which will read the timestamp for every channel. It should be noted that the latter 2 options will reduce the maximum transmission speed datastream.
‘get PC time’	This button allows the user to get the timestamp from the PC time of the PC they are using. This can be used as a base time for the timestamps if the user is not using PTP. In the first box it will show the timestamp and in the second box it displays the timestamp converted date/time to make it easier to understand.
‘Apply’	This button will apply the settings chosen on this page.
‘Refresh’	This allows the user to refresh the displayed value of the last read timestamp from the microDAQ2.
‘last read microDAQ unix time’	The top line shows the current time in the microDAQ2 in

Table 5.11, Timestamp

6. Service and Calibration

6.1 Service

There are no user serviceable parts inside the instruments. Should any difficulties be encountered in the use of the microDAQ, it is recommended that you contact Chell Instruments Ltd for advice and instructions.

6.2 Calibration

Calibration is recommended on an annual basis and Chell Instruments Ltd. Provides a fully traceable facility for this purpose.

6.3 Adjustment

There are no user adjustments in the instrument. The user is strictly forbidden from removing the covers without invalidating Chell's obligations under both Warranty and COSSH.

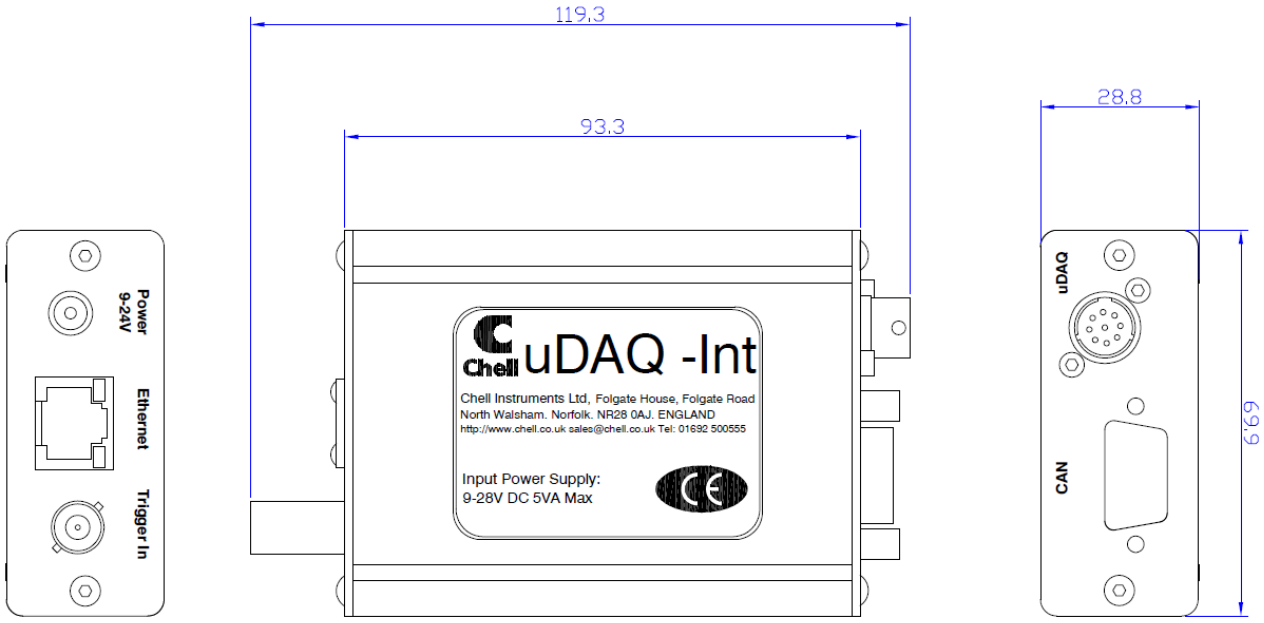
6.4 Cleaning

A dirty instrument may be wiped clean with a soft cloth that has been sprayed with a proprietary 'foaming cleaner', then wiped dry immediately.

Under no circumstances should the instrument be wetted directly or left damp.

7. MicroDAQ-INT Connector interface adaptor

7.1 Case Assembly



7.2 Power Connector - Mating connector 2.1mm DC power jack

Pin Number	Designation
Center	+8 to 25Vdc
Outer	Gnd

7.3 CAN Connector – Mating connector 9 way 'D' type male

Pin Number	Designation
2	CAN_L
5	Gnd
7	CAN_H
4	N/C
5	0V

7.4 Trigger Connector - Mating connector 50 Ohm BNC

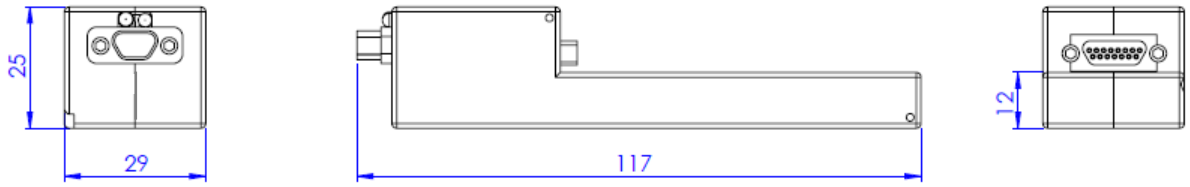
Pin Number	Designation
Center	TTL level input
Outer	Gnd

7.5 MicroDaq2 – Mating connector: DEUTSCH ASDD606-09SN-HE

Pin Number	Designation
1	TX+
2	RX+
3	TRIGGER IN (TTL)
4	+8~25V SUPPLY
5	0V
6	CAN_H
7	CAN_L
8	TX-
9	RX-

8. CANdaq 5

8.1 Case Assembly



Weight: 100g

8.2 Description

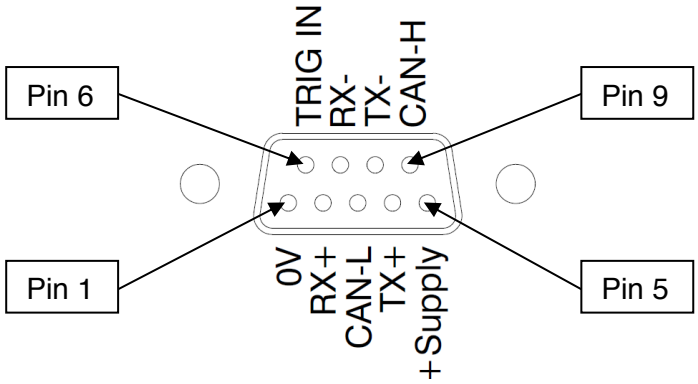
The CANdaq5 is a self-contained acquisition system which is based on the Microdaq2. Its operation is identical to the MicroDaq2 except that the scanner is not mounted within it but instead connected ty it with a standard SDCB cable via a 15-way micro ’D’ connector. Due to its size, the host connector (for power, Ethernet, CAN and trigger) is via a 9-way micro ’D’ in place of the Deutsch connector used in the MicroDaq2.

8.3 Scanner Connector – DCDM-15PCBRP

Pin number	Signal
1	Address line A0
2	Address line A1
3	Address line A2
4	Address line A3
5	Address line A4
6	+12VDC
7	-12VDC
8	+5VDC (Vs)
9	+5VDC RTN
10	Ground
11	Output
12	Address line A5
13	Ov sense
14	Not used
15	Temperature signal

8.5 Host CANdaq mating connector: Cinch DCDM-9P

Pin Number	Designation
1	0v
2	RX+
3	CAN L
4	TX+
5	+8~25v Supply
6	Trigger IN (TTL)
7	RX-
8	TX-
9	CAN H



(View of CANdaq5 connector)

Hot plugging the power to the CANdaq5 at the connector can cause permanent damage to the unit. Always switch the power at the power supply source.