15-216 Revision B
9330 Operating Manual

Introduction

- 24-bit resolution
- 3750 Hz update rate
- Peak and valley capture
- Log to SD card at 1000Hz
- USB Port with software
- ±5V analog output
- Rechargeable battery
- 20 Hour battery life/300 hour standby
- Stores up to 6 sensor calibrations
- Powers up to 4x 350 ohm sensors
- 7 digit display

Description

Model 9330 is a bipolar display, logging, amplifier that can be used in portable or desktop applications. This instrument has an integrated bridge completion for 120 Ohm, 350 Ohm and 1000 Ohm strain gauges as well active sensors with 0…10V output signal. The measuring rate can be set up to 3750 Hz. Data can be save to an SD Card at a rate of 1000 Hz or directly to the PC and 3750 Hz. This device also stores up to 6 sensor calibrations.

Options

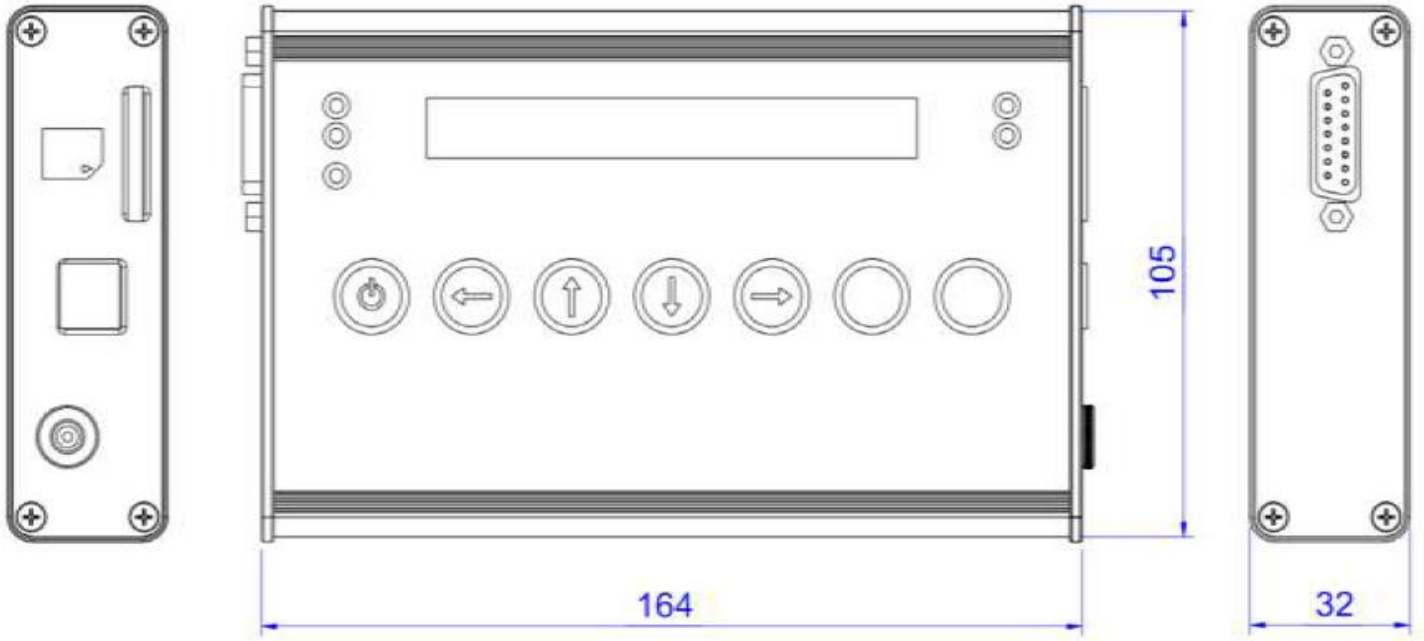
- IP65 Environmental Protection
- SD Card – Class 10

Table of Contents

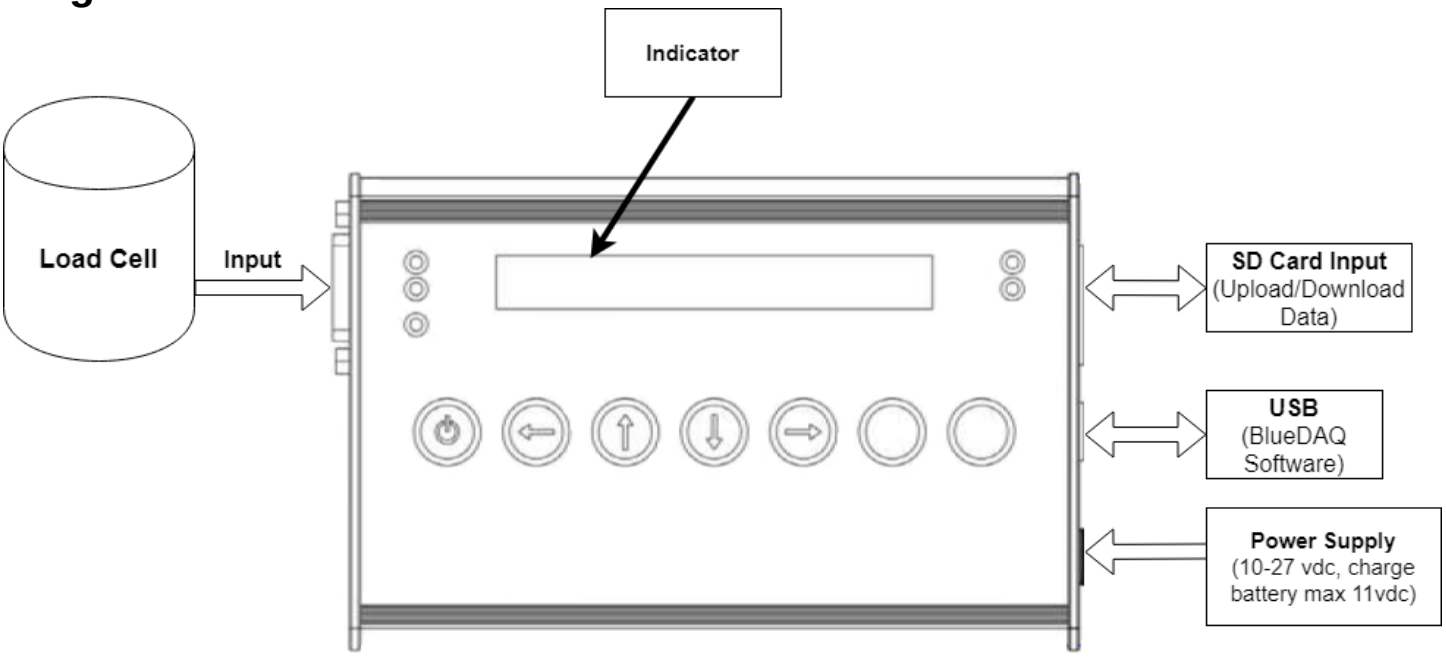
SPECIFICATIONS

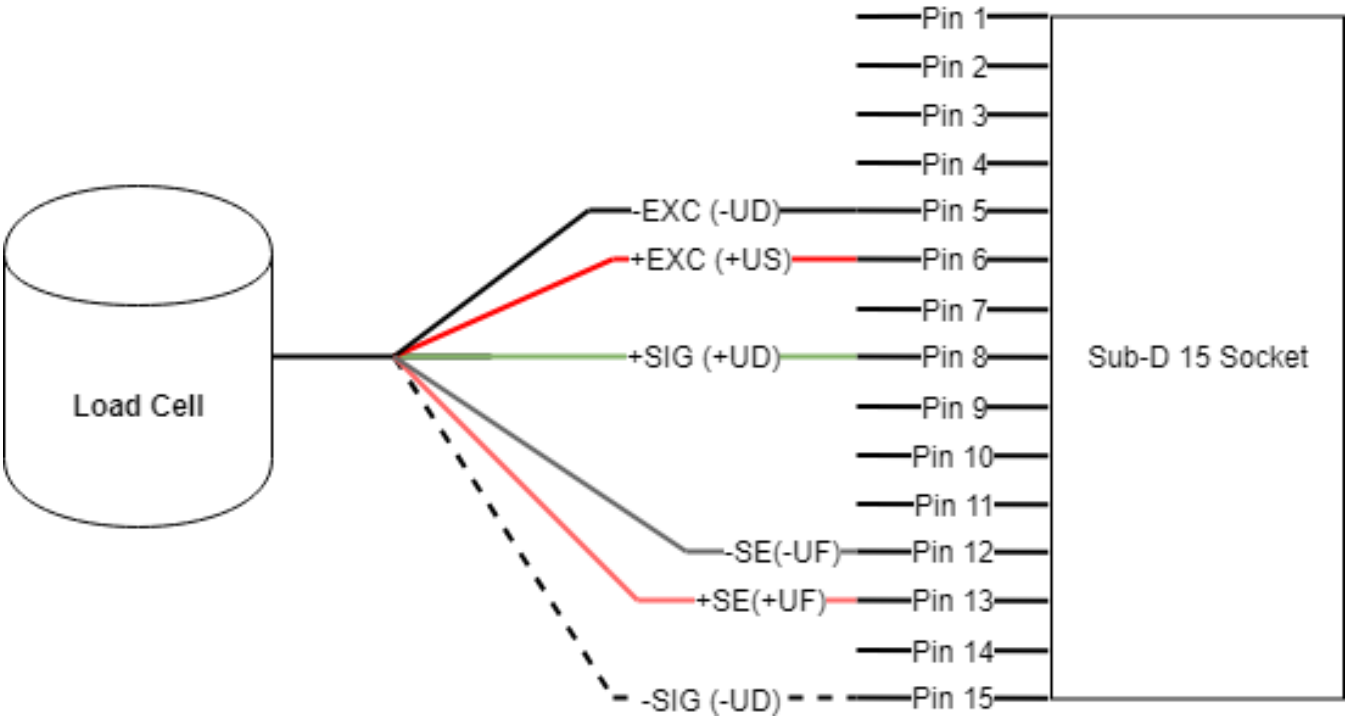
ACCURACY - (MAX ERROR)		
Nonlinearity - %FS		+/- 0.02
TEMPERATURE		
Effect on Zero – %FS/ºC		+/- 0.01
Effect on Output – %/ºC		+/- 0.001
Operating Range	ºC	-0 to +50
	ºF	+32 to 122
Storage Range	ºC	-20 to +70
	ºF	-4 to +158
ELECTRICAL		
Input–mV/V		+/-3.5
Excitation Voltage – VDC		2.5 or 5
Internal Resolution – bit		24
Conversion rate – Hz		3750
Logging rate to SD card – Hz		1000
Filters		Selectable
Electrical Connection		15-pin DSUB
Supply – VDC		7-27
MECHANICAL		
Dimensions - W x H x D	mm	165.1 x 108.0 x 31.8
	in	6.50 x 4.25 x 1.25
Backlit Display	mm	9 HIGH, 16 character
	in	0.35 HIGH, 16 character
Weight	g	610
	lbs	1.34
Protection		IP51 / IP65

Dimensions



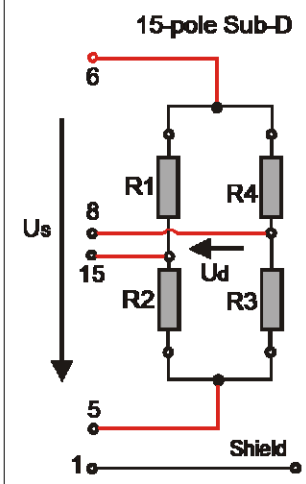
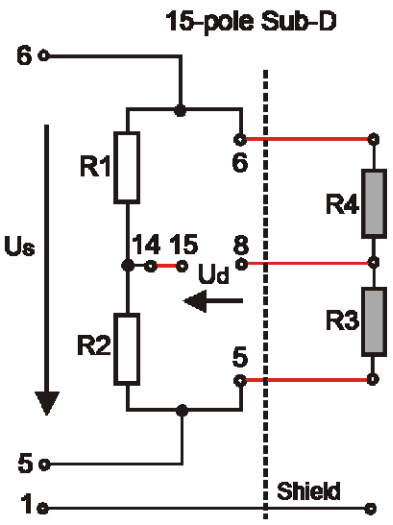
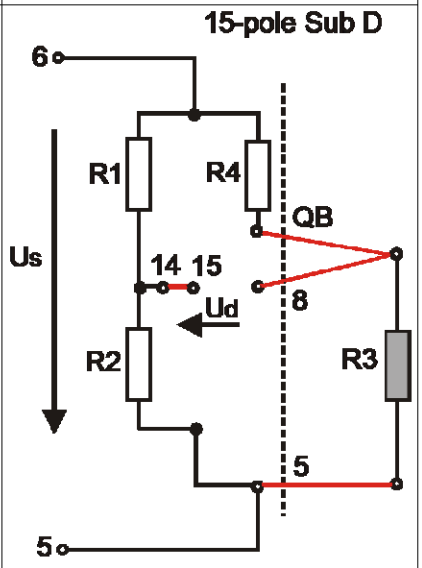
Diagram





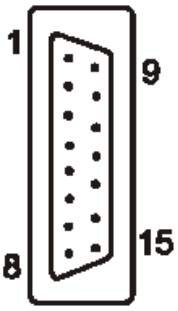
***** Note – Refer to Pin Assignment table *****

Connection of Bridges

Full bridge	Half bridge	Quarter bridge
		
No bridge	Bridge between 14 and 15	Bridge between 14 and 15

Pin Assignment

1	Screen	
2	GND_A	Ground analog input
7	Tare	Zero-setting input / Trigger input
9	U_E	Analog input
10	U_A	Analog output
6	$+U_S$	Positive bridge Excitation
5	$-U_S$	Negative bridge Excitation (GND)
8	$+U_D$	Positive Signal differential input
15	$-U_D$	Negative Signal differential input
13	$+U_F$	Positive Excitation Sense (for four wire sensors the +Sense connections must be jumpered to +EXCITATION)
12	$-U_F$	Negative Excitation Sense (for four wire sensors the -Sense connection must be jumpered to -EXCITATION)
14	HB	Half Bridge selector
11	QB120 Ohm	Bridge Completition Resistor 120 ohm
3	QB350 Ohm	Additional quarter bridge 350 ohm
4	QB1000 Ohm	Additional quarter bridge 1000 ohm



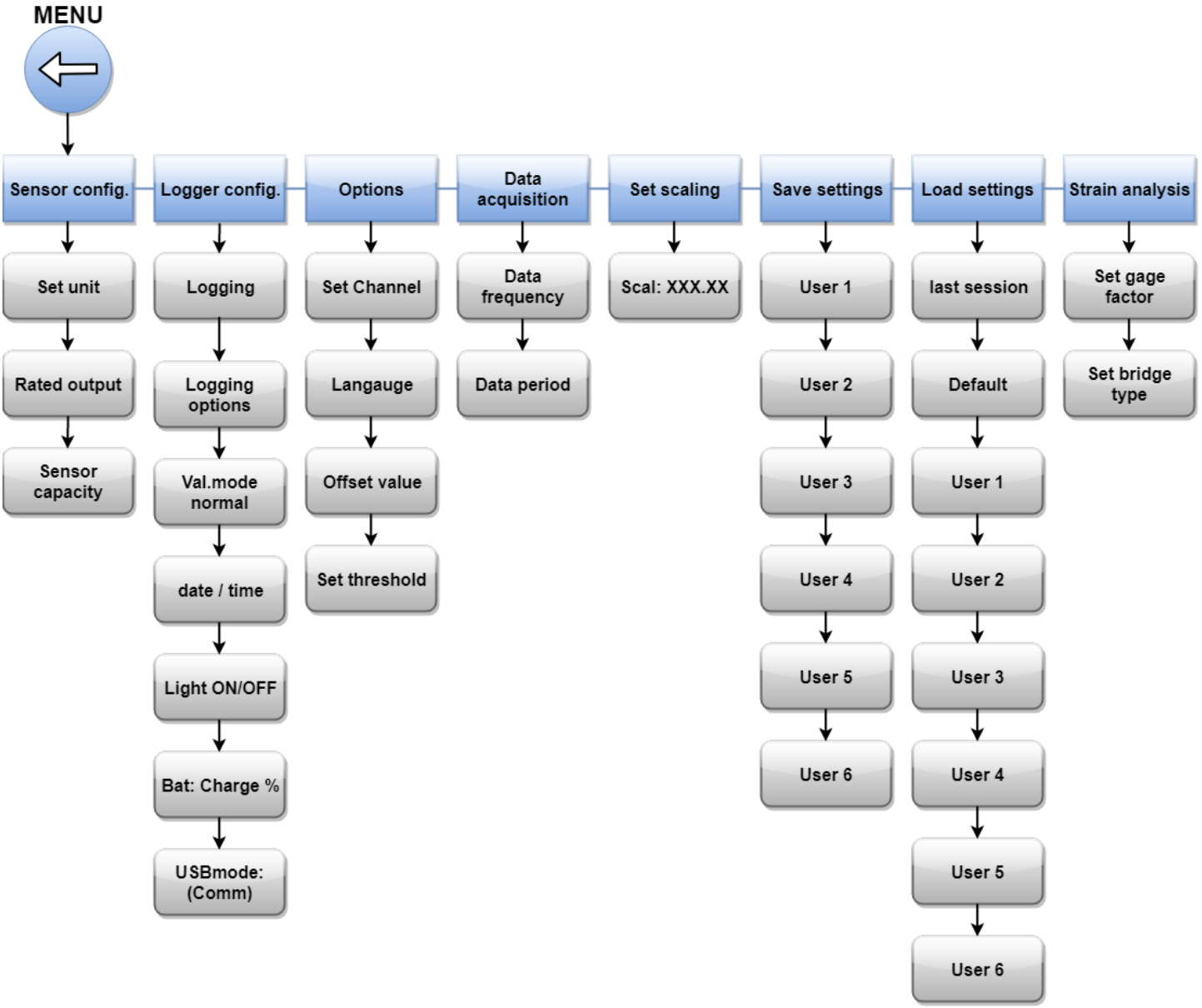
Pin 14 must be bridged with Pin 15 to connect half and quarter bridges.

Quarter bridge are connected in three-wire connection to Pin 5, Pin 8 and QB (3 and/or 11 or 4).

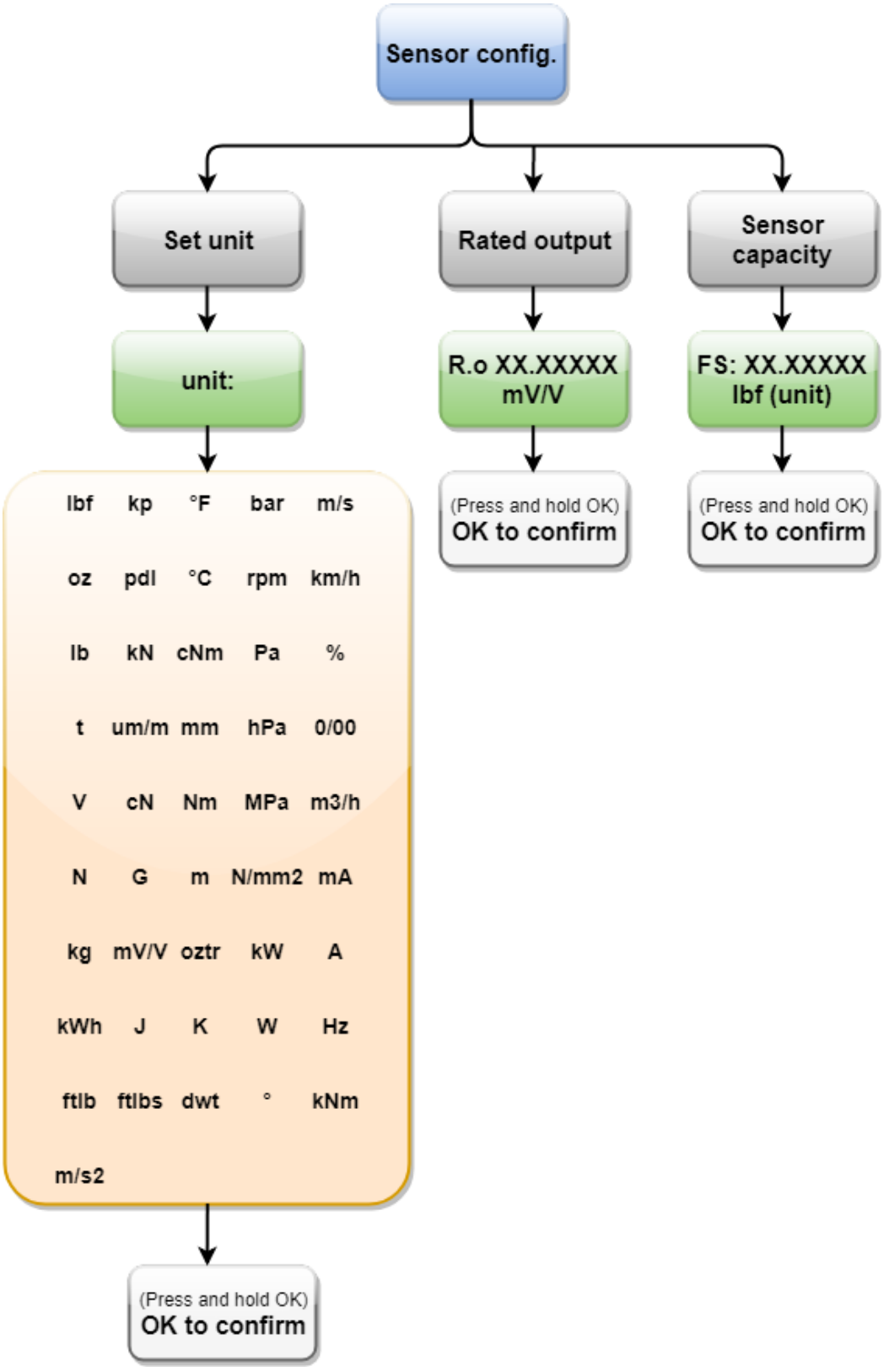
Connection and Commissioning

To switch on, press the MODE button until the display is illuminated.
The device contains a battery that is charged by connecting the power adapter supplied.
The “ON” LED flashes while charging.
To switch off, hold the MODE button (outside the menu) down and confirm the following message “Power off? (OK)“ by pressing the OK button.
Please use SDHC Memory Cards, class 6 or class 10, does not support UHS 2.

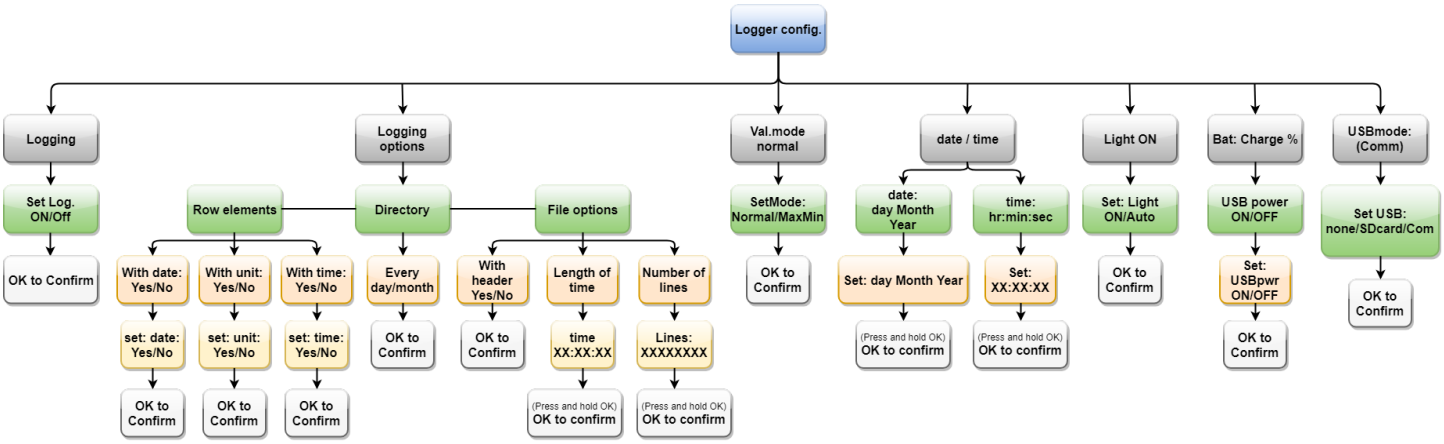
Menu Options



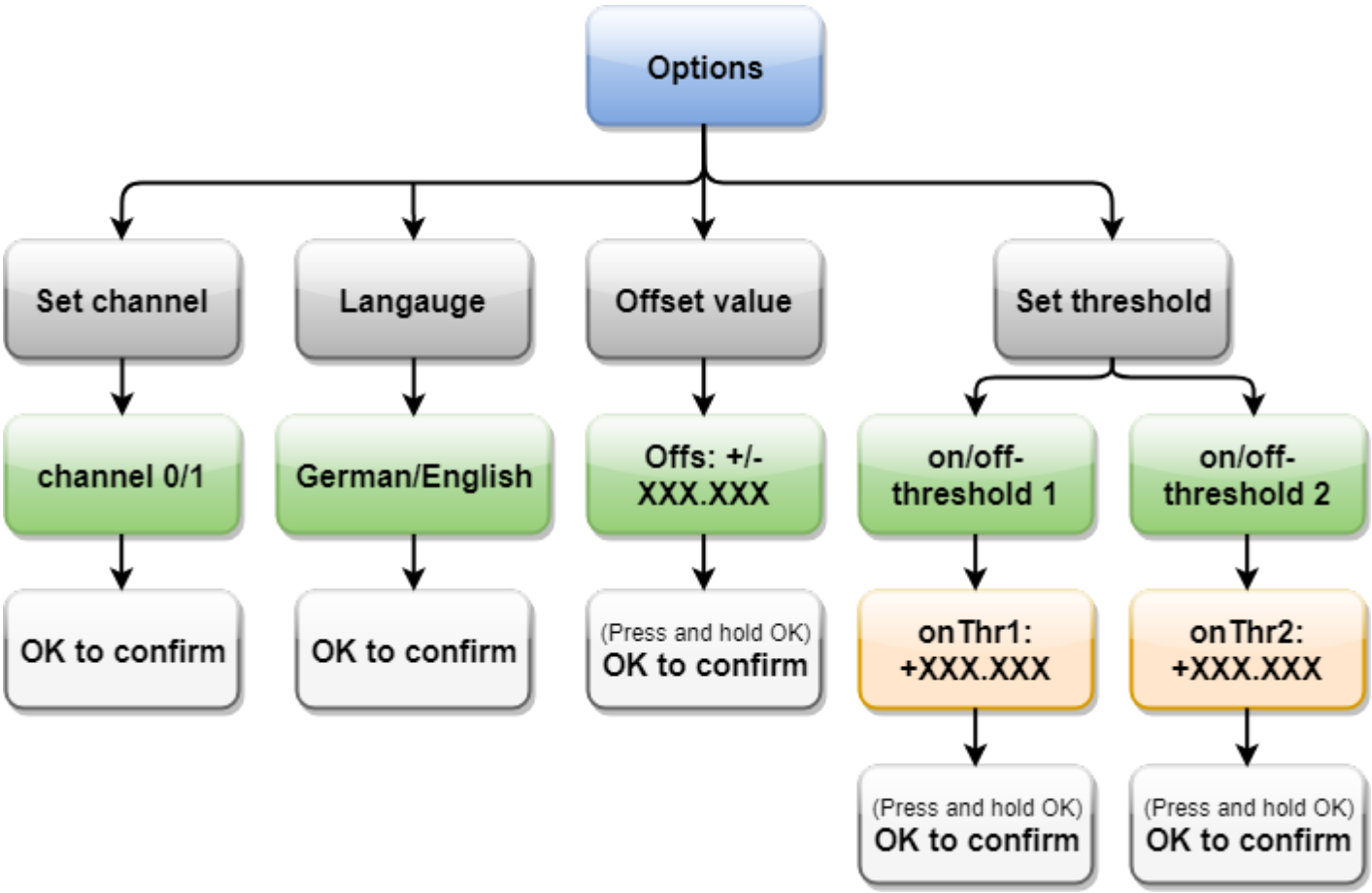
Sensor Config.



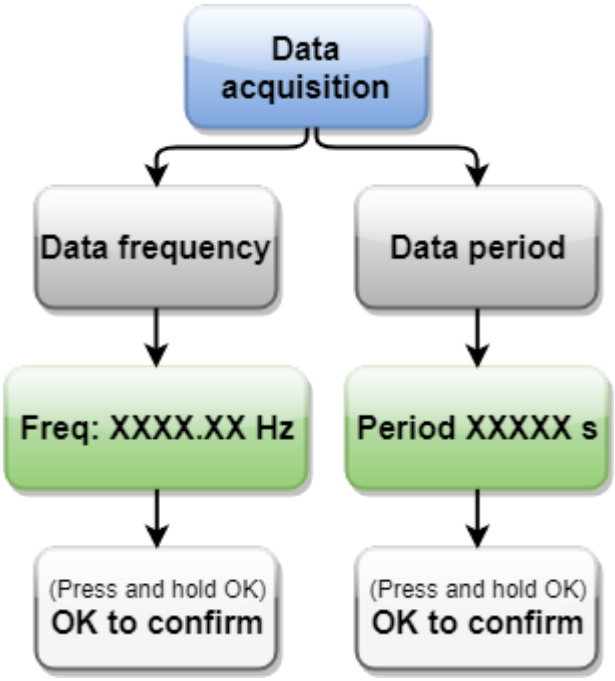
Logger Config.



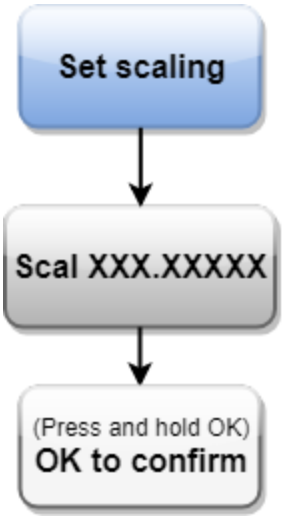
Options



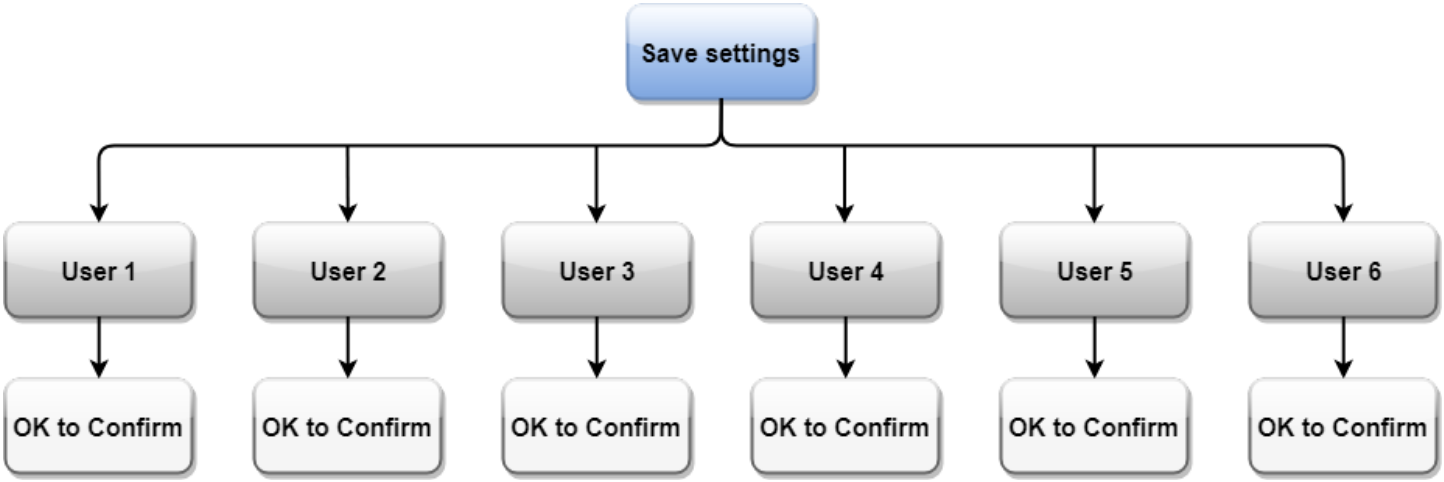
Data Acquisition



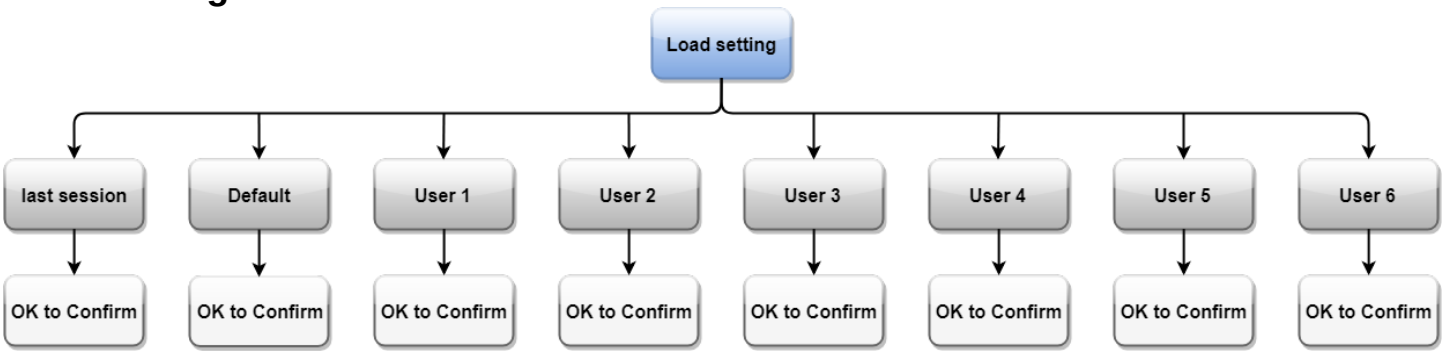
Set Scaling



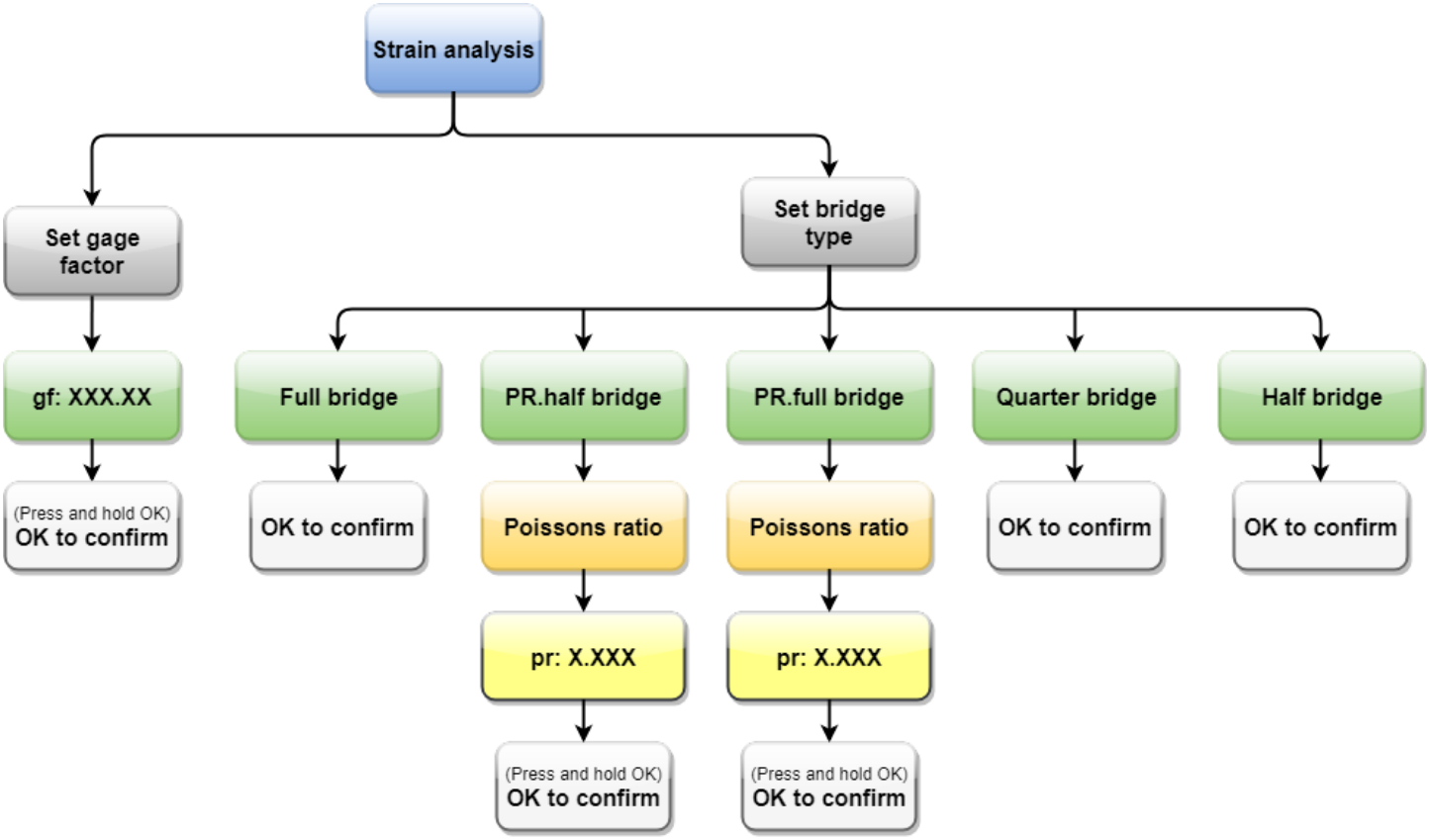
Save Settings



Load Settings



Strain Analysis



Logger Menu

The logger menu has the following functions:

- View and set data recording mode on the SD memory card,
- Select USB connection mode,
- Select display illumination characteristics,
- Display battery life,
- Set date and time,
- Select additional functions e.g. display and recording of maximum, minimum and average
- measured values.

The Logger menu can be reached by pressing the MODE button from the measured value display or via the last entry of the measuring amplifier main menu.

Menu Entry Level 1	Menu Entry Level 2	Menu Entry Level 3
Logging ON, OFF, onOK	➔Set Log: ON – Permanent recording of measured data on the SD card	
	➔Set Log: OFF No Recording	
	Set Log: onOK - Recording of measured data on the SD card as long as the OK button (at measured value displayed) is pressed	
USBmode: Comm, SDcard, none	➔USBmode: SDcard The device is a Mass Storage Device when connected to the USB port, which provides access to the data on the SD card. Simultaneous recording of measured value to file is not possible. If this mode is activated, recording is switched off.	
	➔USBmode: Comm The device is in serial USB mode. Our communication programs (e.g. GSVcontrol, GSVmulti) can then be used. A standard driver is loaded when connected for the first time.	
	➔USBmode: none USB is switched off.	
Bat: level bar or Charge (with Percentage display)	➔USB power: ON, OFF If power supply is via USB port is enabled, the GSV- 2MSD-DI can be supplied by the USB bus if it is connected to a PC and configured as an USB device. If the device is switched off, the battery can be charged.	➔Set: USBpwr ON ➔Set USBpwr OFF Switch power supply via USB on or off

Light ON, Auto	➔Set: Light ON Display is permanently illuminated		
	➔Set: Light Auto Display is illuminated when buttons are pressed and in the menu and goes out after 5 seconds - this preserves the battery.		
date / time	➔Date TT Mon JJJJ		➔Setting the date
	➔Time HH:MM:SS		➔Setting the time ➔(see description of numeric settings below)
Val.mode normal, MaxMin	➔SetMode: normal: Only displays the current measured values		
	➔SetMode: MaxMin:The maximum, minimum or mean value can be displayed in the display and all three are recorded to file.		
Menu Entry Level 1	**Menu Entry Level 2**	**Menu Entry Level 3**	**Menu Entry Level 4**
Logging Options	➔Row elements	➔With date: Yes/No	➔With […] Yes/No i.e. switching to the setting not yet selected
		➔With time: Yes/No	
		➔With unit: Yes/No	
	➔File options	➔Number of lines	➔Setting the max. number of lines in a file
		➔Length of time	➔Setting the max. duration of the file
	➔Directory	➔Every month	
		➔Every day	

Notes
If a setting is in brackets in Level 1, this means that this setting has been selected but is not currently active. This is the case if the conditions for this operating mode
are not met.
Example:
Logging (on): SD card is not inserted or write-protected or full or defective.
USBmode: (SDcard): USB cable is not connected or no SD card is inserted

Measuring Amplifier Menu

The measuring amplifier menu is used to set the parameters of the measuring amplifier, for example:

- Sensor scaling factor
- Unit
- User-definable offset
- Parameter memory

The measuring amplifier main menu can be reached by pressing the MENU button from the measured value display.

Menu Entry Level 1	Menu Entry Level 2	Menu Entry Level 3
Sensor config.	➔unit	Select unit
	➔Sensor capacity	Numeric setting of the physical nominal value of the sensor
	➔Rated output	Numeric setting of the electrical characteristic value of the sensor
Strain analysis	➔Set gage factor	➔Numeric setting of the K-factor between 0.2 and 2583
	➔Set bridge type	➔Full bridge: Full bridge circuit with 4 individual DMS, all in longitudinal direction
		➔Half bridge: Half bridge circuit with 2 individual DMS, both in longitudinal direction
		➔Quarter bridge: Quarter bridge circuit with one DMS
		➔PR.full bridge: Full bridge circuit with 4 individual DMS, 2 in longitudinal direction and 2 in cross direction
		➔PR.half bridge: Half bridge circuit with 2 individual DMS, one in longitudinal direction and one in cross direction
Load settings	➔default: Manufacturer's settings i.e. restoring GSV-2 parameters to default settings	
	➔user 1: Userconfigurable data set no.1 i.e. loading the parameters that were	

	previously filed as user 1 with save settings. ➔...and so on, until ➔user 6: like user 1, but No 6	
Save settings	Saves the current configuration under user 1 to user 6	
Set scaling	Numerical value between 0.1 ...999999	
Data acquisition	➔Data frequency	Numerical value: Num. Of values per second Numerical value: Data period of acquired values Note: the last confirmed with OK value is adopted. Please confirm data period for slow measurements, data rate for fast measurements.
	➔Data period	
Options	➔Set channel (Set channel)	Numerical value 0 or 1
	➔Set threshold (Set threshold)	➔On-threshold Numerical value of the switch-on threshold ➔Off-threshold Numerical value of the switch-off threshold
	➔Offset value	➔Value that is added to each measured value
	➔Language	➔German or English (Menu language setting)
Logger config.	See logger menu.	

Notes

- Changing the unit does not change the measured value scaling!
- Modification of the sensor measurement range or the characteristic value changes the scaling of the measured value.
- Modification of the DMS parameter of the strain analysis changes the scaling of the measured value and the unit.
- Access to the measuring amplifier menu will be blocked if communication is taking place via the serial interface. In this case, the following is displayed: “Menu blocked”

1. Press the Menu button to go back one level.
2. Press the OK button to confirm an entry or to go to the next level.
3. If a setting is selected with the OK button, the following message will appear “OK to confirm“, which you can confirm by pressing OK to approve the setting - or cancel by pressing the MENU button.

Description of the Buttons

Button	Function
MODE	To switch on and off or access the Logger menu
MENU (LEFT)	To access the measuring amplifier menu, to go one menu level higher or to cancel an entry. For numeric settings: to move the cursor left.
UP	To move around the menu within the same level: switching to the next entry. For measured value mode=MaxMin: to switch from one measured value display to the next one up. For numeric settings: to increase number and/or setting above the cursor.
DOWN	To move around the menu within the same level: switching to the previous entry. For measured value mode=MaxMin: To switch from one measured value display to the next one down. For numeric settings: to decrease number and/or setting above the cursor.
OK (RIGHT)	To confirm the entry or move down one level. For measured value display and recording mode “with OK”: to record measured values to file. For numeric settings: to move the cursor right.
SHORT	To connect the +Ud and -Ud inputs (short-circuit of sensor signal)
ZERO	To trigger an automatic zero adjustment.

Number Setting

- To set a numerical value and the date or time, move the cursor right by pressing OK and left by pressing MENU. The digit (and/or the month) above the cursor flashes and can be increased or decreased using the UP / DOWN buttons.
- For the setting to take effect, the OK button must be held down until the whole number flashes.
- Then release the OK button, and the following message will appear “OK to confirm“. Confirm this by pressing OK. To cancel the numeric setting, hold down the MENU button.

Description of LEDs

LED	Meaning
ON	Permanently on: Device on, no charging. Flashing slowly: Device off, battery charging. Flashing faster: Device on, battery charging.
CARD	USB mass storage device active.
COM	USB serial communication mode active.
LOG	Measured data recording to SD card active. **Do not remove card!**
ERR	An error has occurred. Flashes permanently after switching on: the battery was empty, therefore the date and time must be reset. Flashes alternately with ON after switching on for approximately 3 seconds: the battery is empty, please connect power adapter to charge. Flashes alternately with LOG: an error occurred whilst attempting to record measured data e.g. the SD card may be write protected, full, incompatible or defective.

Maximum, Minimum, and Mean Value

The maximum, minimum and mean value mode can be activated in the logger menu under Val. mode. In this operating mode you can switch between these values and the current value in the display using the UP and DOWN buttons. These values are written in every line in the measured value file; in the order:

Current value, maximum, minimum and mean value. If activated, a header is written in the file, the second line of which designates the corresponding column:

Scaling: +3,5000 Data frequency: 10,000 Hz

Date, Time	Value	Max	Min	Mean	Unit
13/05/03,15:38:31.99960	-0.0004	-0.0004	-3.0084	-0.0468	mV/V

The header is only written when *Recording options → File options → Header: Yes* is selected in the menu. In this operating mode, the maximum measured data rate for file recording is 1000 measured values/s.

The following actions reset the determination of the maximum, minimum and mean value, i.e. then re-determined with the subsequent measured values:

- By switching on the device
- By activating max./min./mean value mode
- By zero setting
- By starting permanent file recording
- By ending manual file recording, i.e. by releasing the OK button

Recording Measured Data to File

If data recording is active, the 9330 creates directories on the SD card, which contain the measured data files.

The directory name is created from the current date, depending on the directory mode setting. A new directory is created every month in the initial state, with the name: **G20JJ_MM**, for example in November 2012 this would be "**G2012_11**".

The name of the files within it are then formed based on the day and time, i.e.: **DDHHMMSS.TXT**. For example, if a file is created on 14.11.2012 at 14:41:39, then the directory name is as above and the file name: **14144139.TXT**

The files are written in ASCII text format. Each measured value creates a line that is terminated with <LF> and <CR>. Depending on the line settings, each line begins with the time stamp consisting of date, time and fractions of seconds, then the measured value and the unit. The default setting for lines is as follows (first line of the example above):

- **12/11/14,14:41:39.27669 -0.0011 mV/V**
- **12/11/14,14:41:39.37669 -0.0011 mV/V**

The date format satisfies the big-endian convention, i.e.
JJ/MM/DD

Date and time are separated by comma. The time format is
HH:MM:SS.bbbbb

Whereby the 5-digit fractions of seconds bbbbb, interpreted as a whole number, indicate 10µs steps. In the example above, the data rate of the measuring amplifier is set to 10 measured values/seconds ((37669 - 27669) * 10µs = 100ms = 1/10 s).

Time stamp and measured value are separated with the tab character (‘/t’). Measured value and unit are separated with a space.

The default setting for the maximum number of lines (i.e. displayed measured values) in a file is 32,000. As soon as this number is reached, a new file is opened.

In the “onOK” recording mode, whereby recording are only made by pressing the OK button, the data sets (continuous lines during a recording) are written in the same file. After terminating a data set, i.e. by releasing the OK button, the maximum number of lines is tested. If this is larger than or equal to 32000, a new file is opened. Therefore the number of lines can also be larger than 32000 in this mode.

In this mode at least one line, i.e. one measured value, is written per data set. If you always want exactly one measured value per data set, it is recommended that the data rate of the measuring amplifier is set to a low value e.g. 1 measured value/second using communication software (e.g. 9330 control). By pressing OK, the device waits until a value is measured at records this value.

USB Operation

The USB operating mode can be selected in the logger menu at any time (see above), regardless of whether the condition(s) for this operating mode are currently met or not - see note above. In the latter case, the setting will be displayed in brackets in menu Level 1, and with an unchecked box instead of a checked box in menu Level 2.

If a USB operating mode is currently active (i.e. the USB cable is connected to a PC) and the other is selected, the current operating mode is switched off and the new mode is activated after 5 seconds. If the host PC is equipped with speakers, you will hear the corresponding acoustic signal.

If the USB operating mode “SDcard” is selected and one of the recording modes is selected at the same time, the recording will be switched off. In this Mass Storage mode, files on the SD card can be read, written, deleted or formatted.

Power Supply per USB Connection

If the USB power supply “USB Power” is activated in the logger menu, the device can also be powered via the USB port if it is connected to a host PC and fully configured. The battery is emptied barely or not at all when switched on. When the device is switched off, the battery can be charged by the host PC. In this state, the device is then an SD card reader, irrespective of the set USB mode.1 A USB charging device cannot be used at this time.

USB Driver

The USB Mass Storage mode does not need a driver for Windows systems from Windows XP - once the USB cable is connected a window will appear (depending on operating system settings), where you can access the files; or you can reach the 9330 drive via “My computer” or with the Windows explorer.

BlueDAQ Software Installation

1. **Please follow these instructions carefully. DO NOT** connect the amplifier to the PC until instructed to do so. The BlueDAQ PC software is included on a USB Flash Drive with the amplifier or can be downloaded from www.interfaceforce.com

2. Install the software by double-clicking the “setup.exe” file located in the BlueDAQ folder. You may need to “Extract” the contents of the folder first if you downloaded it from the website. Follow the instructions for installation. Once the software completes installation you **MUST** restart your computer.

3. Attach the amplifier to the PC using the supplied USB A-B cable. BSC4, BSC8 and BX8 drivers were installed with the BlueDAQ software and Windows will automatically load them. BSC8D/BX8 must be powered ON using supplied power cable and power switch. 9330 drivers must be installed as described below.

4. When the device is connected in **Communication mode** for the first time, Windows will ask for a driver directory. The installation process is described below. The driver is located on the USB Flash drive supplied with the 9330. The Flash drive **MUST** be connected to the PC or the files copied to the PC before connecting the 9330 to the PC.

5. Enable USB Communication mode. To do this, click the MODE button of the measuring amplifier and select USBmode: Comm in the logger menu.

6. Now you can connect your 9330 to the PC via USB cable. Once connected the driver installation window appears. Select “Install software from a list or specific source (advanced users)” and Click “Next >”.

FIGURE 1 - FOUND NEW HARDWARE WIZARD

7. Click “Search for the best driver in these locations”

8. Check the option “Include this location in the search:” and then click “Browse”. Select the folder: 9330_Com_Driver from the supplied USB drive and Click “Continue >”.

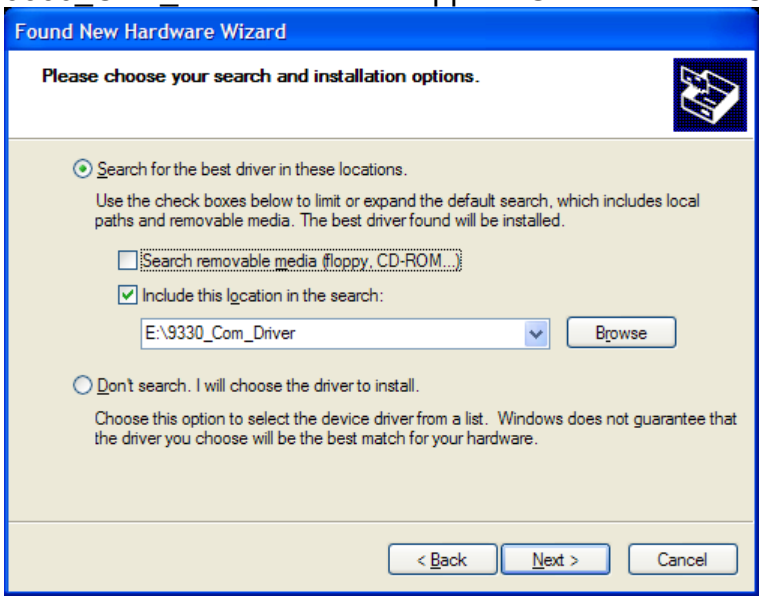


FIGURE 2 - NEW HARDWARE WIZARD

9. In the dialogue window “Hardware installation” click “Continue installation”.

FIGURE 3 - HARDWARE INSTALLATION

10. The driver was installed successfully. Click “Finish”.

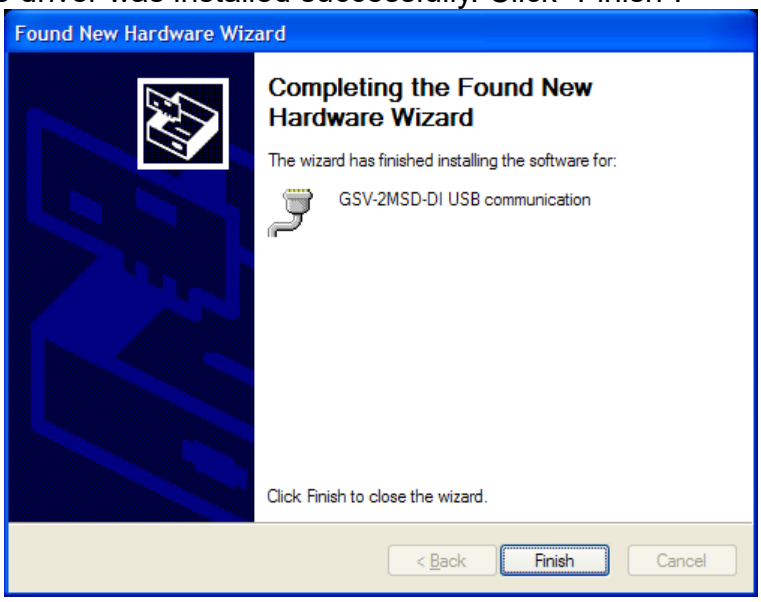


FIGURE 4 - HARDWARE INSTALL FINISH

COM Ports

Once windows is finished installing the device navigate to Device Manager and check for a new USB Serial Port (COMX) where X is the assigned port number. Remember this number. In the examples below it is COM28

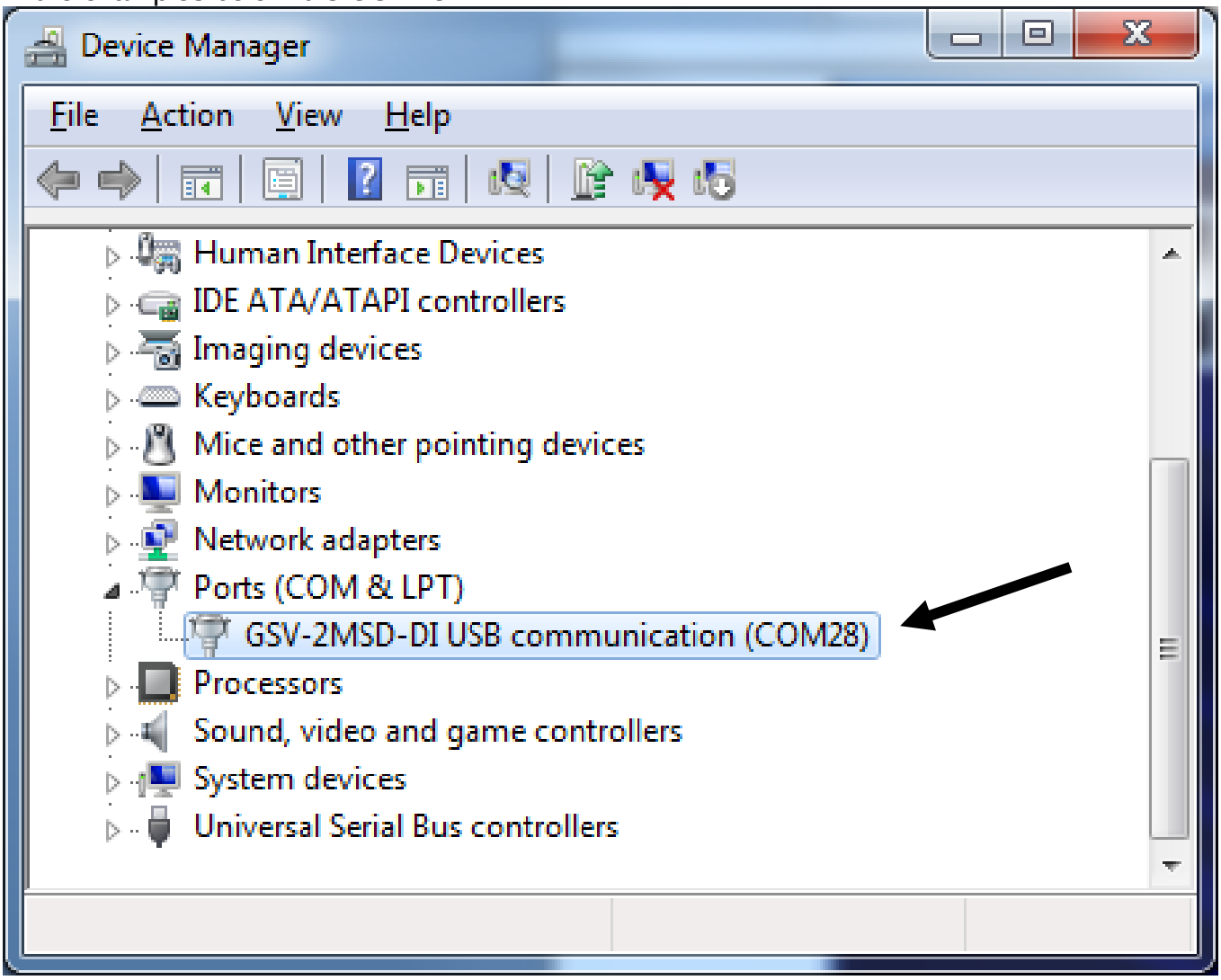


FIGURE 5 - EXAMPLE OF 9330 COMPORT

Adding a Channel

Run BlueDAQ from the start menu. After the program launches click “ADD CHANNEL”

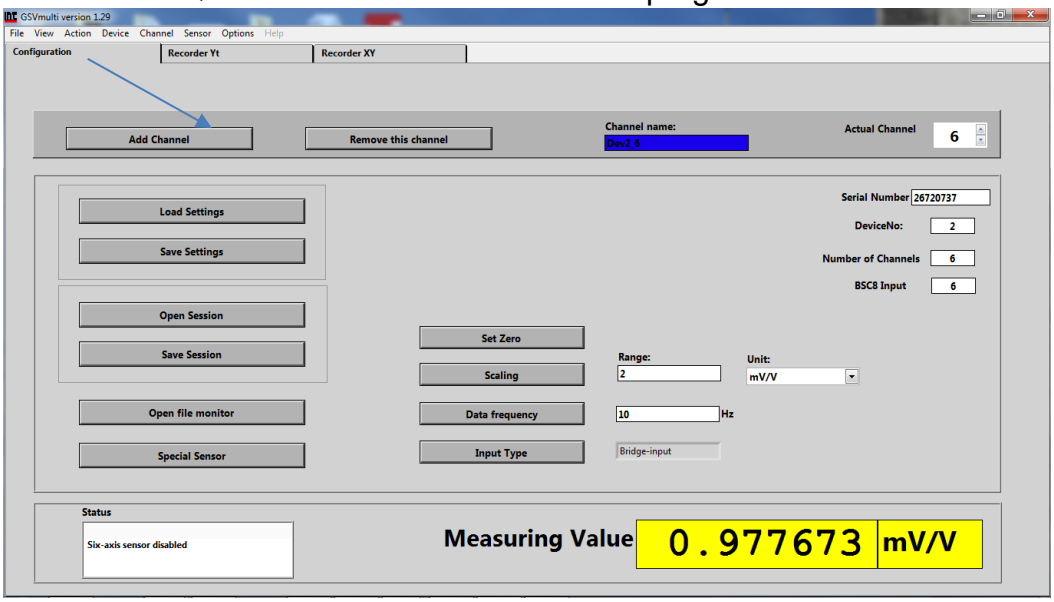


FIGURE 6 - ADD CHANNEL

1. In the Add Channel dialog box
   1.1. Click Devicetype drop-down and select BSC4, BSC8, BX8, or BSC2 (9330)

   1.2. Click the Device dropdown box and select the device, select the COM Port (See Device Manager if unknown) and open the correct amount of input channels (First = 1 and Last = total # of channels for device). For Model 9330, you will not be allowed to change the number of channels.
   1.3. Click Connect

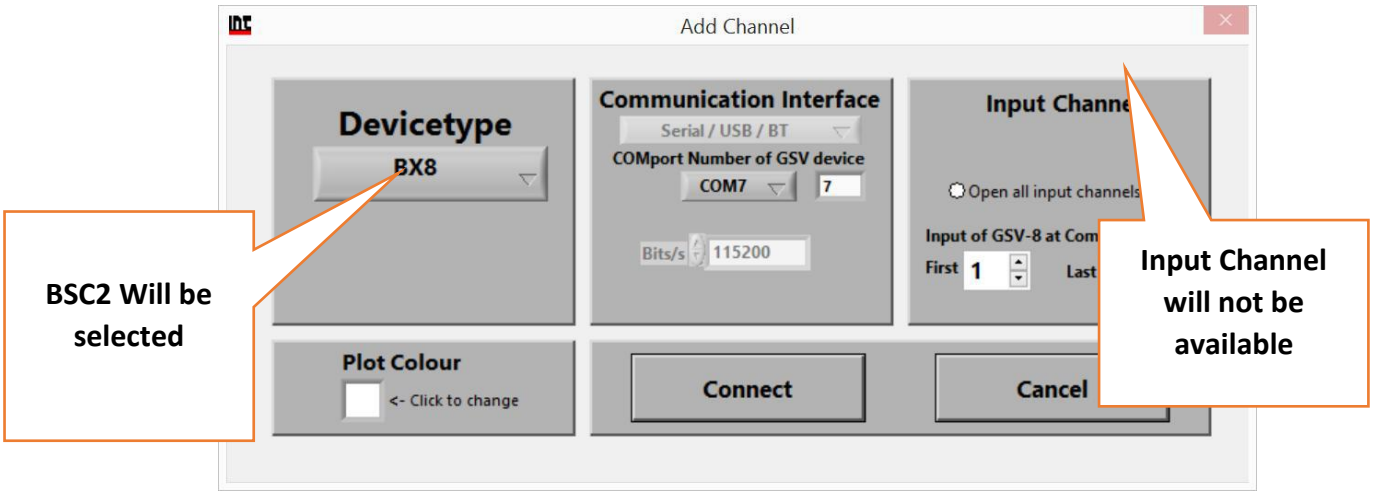


FIGURE 7 - ADD CHANNEL MENU

2. BSC8 has a slightly different add channel box. Select Dev1 instead of Com port. Please remember to open the needed amount of input channels.

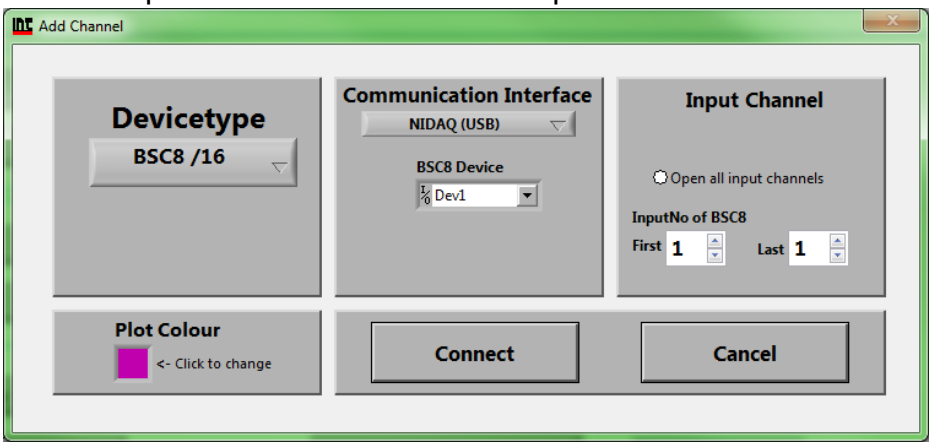


FIGURE 8 - EXAMPLE BSC8 DEVICE

3. Each channel must now be scaled using the “SCALING” dialog box. Each channel must be scaled independently. If the BSC8 was purchased with Interface load cells and a System Setup and Scaling then the scaling values will be taken from the “Load Cell / BSC8 Digital Bridge Amplifier Calibration Certificate”

4.

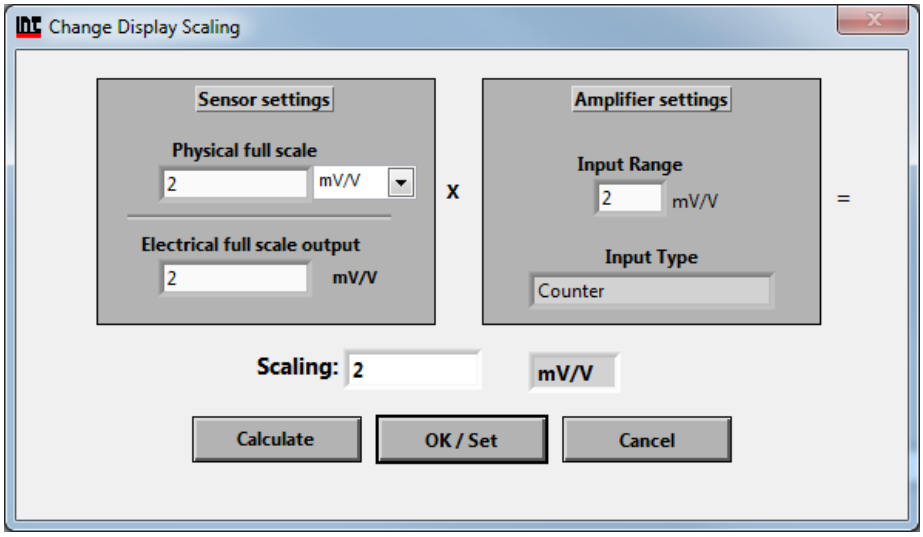


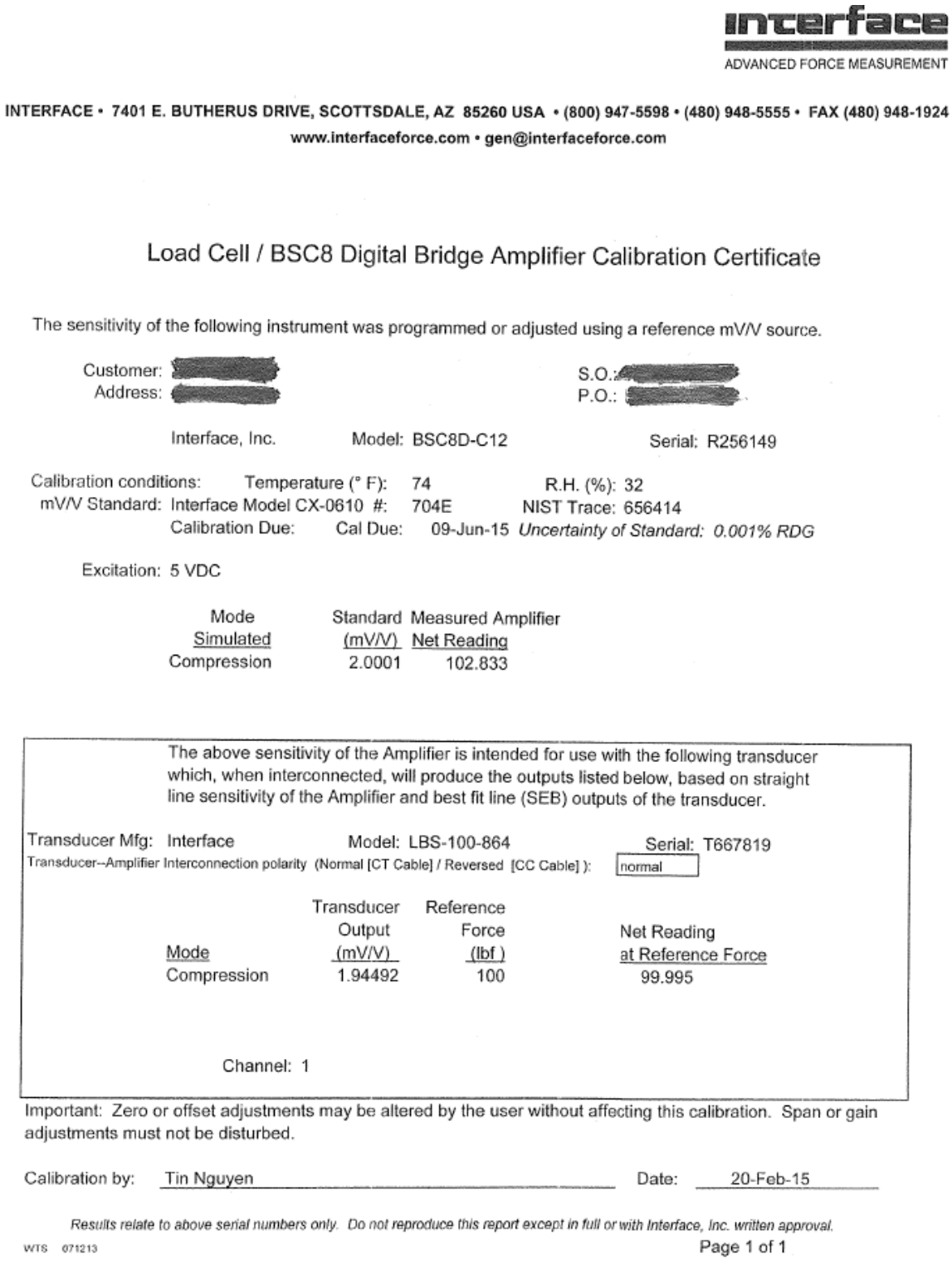
FIGURE 9 - EXAMPLE OF SCALING

4.1. Physical full scale is typically the capacity of the sensor.

4.2. Electrical full scale output is the output of the sensor at the Physical full scale.

4.3. Input Range is always 2 mV/V and should not be changed.

5. Example scaling using Load Cell / BSC8 Digital Bridge Amplifier Calibration Certificate"



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www.interfaceforce.com • gen@interfaceforce.com

Load Cell / BSC8 Digital Bridge Amplifier Calibration Certificate

The sensitivity of the following instrument was programmed or adjusted using a reference mV/V source.

Customer: [redacted] S.O.: [redacted]
Address: [redacted] P.O.: [redacted]

Interface, Inc. Model: BSC8D-C12 Serial: R256149

Calibration conditions: Temperature (° F): 74 R.H. (%): 32
mV/V Standard: Interface Model CX-0610 #: 704E NIST Trace: 656414
Calibration Due: Cal Due: 09-Jun-15 *Uncertainty of Standard: 0.001% RDG*

Excitation: 5 VDC

Mode Simulated	Standard (mV/V)	Measured Amplifier Net Reading
Compression	2.0001	102.833

The above sensitivity of the Amplifier is intended for use with the following transducer which, when interconnected, will produce the outputs listed below, based on straight line sensitivity of the Amplifier and best fit line (SEB) outputs of the transducer.

Transducer Mfg: Interface Model: LBS-100-864 Serial: T667819
Transducer–Amplifier Interconnection polarity (Normal [CT Cable] / Reversed [CC Cable]): normal

Mode	Transducer Output (mV/V)	Reference Force (lbf)	Net Reading at Reference Force
Compression	1.94492	100	99.995

Channel: 1

Important: Zero or offset adjustments may be altered by the user without affecting this calibration. Span or gain adjustments must not be disturbed.

Calibration by: Tin Nguyen Date: 20-Feb-15

Results relate to above serial numbers only. Do not reproduce this report except in full or with Interface, Inc. written approval.

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FIGURE 10 - CALIBRATION DATA SHEET – AMPLIFIER CALIBRATION CERTIFICATE

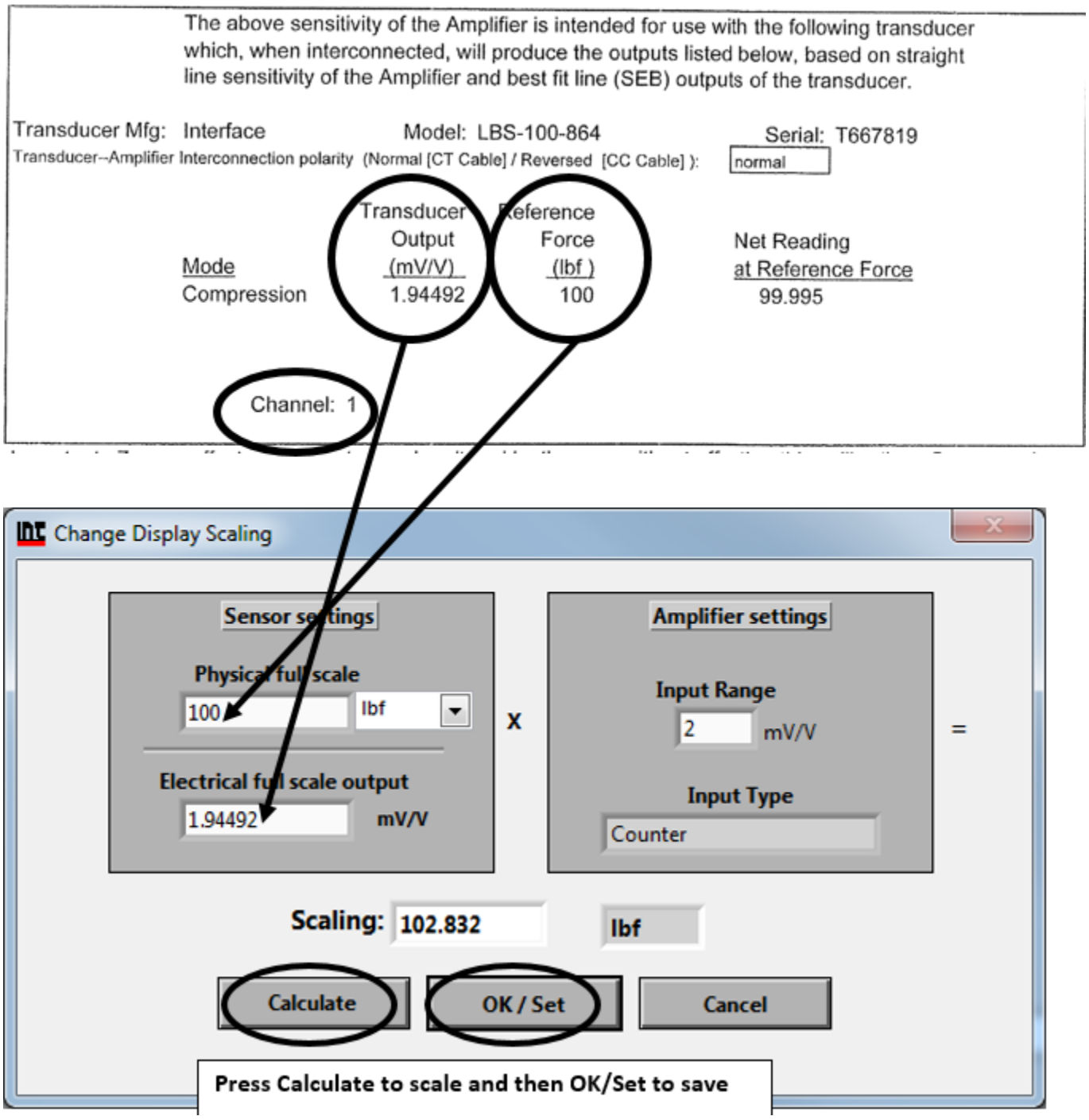


FIGURE 11 - SCALING USING CALIBRATION CERTIFICATE

6 Example scaling a channel using model WMC-100 load cell with 100 lbf capacity and 1.9587 mV/V output. After entering the values into the dialog box you must click “Calculate” and then “OK/Set”.

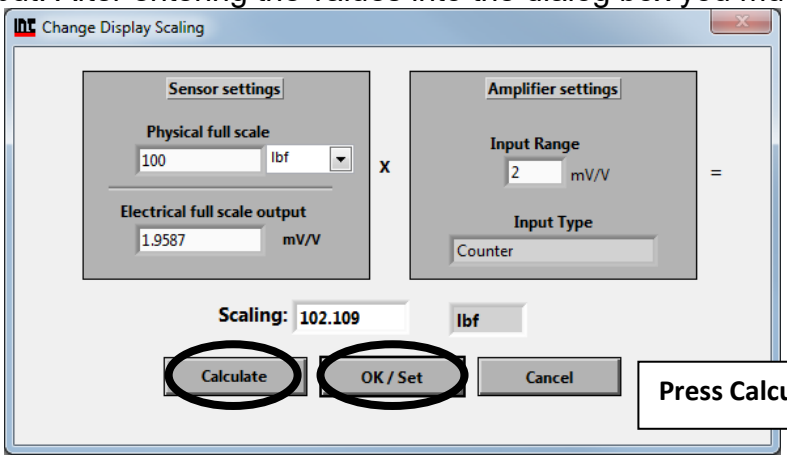
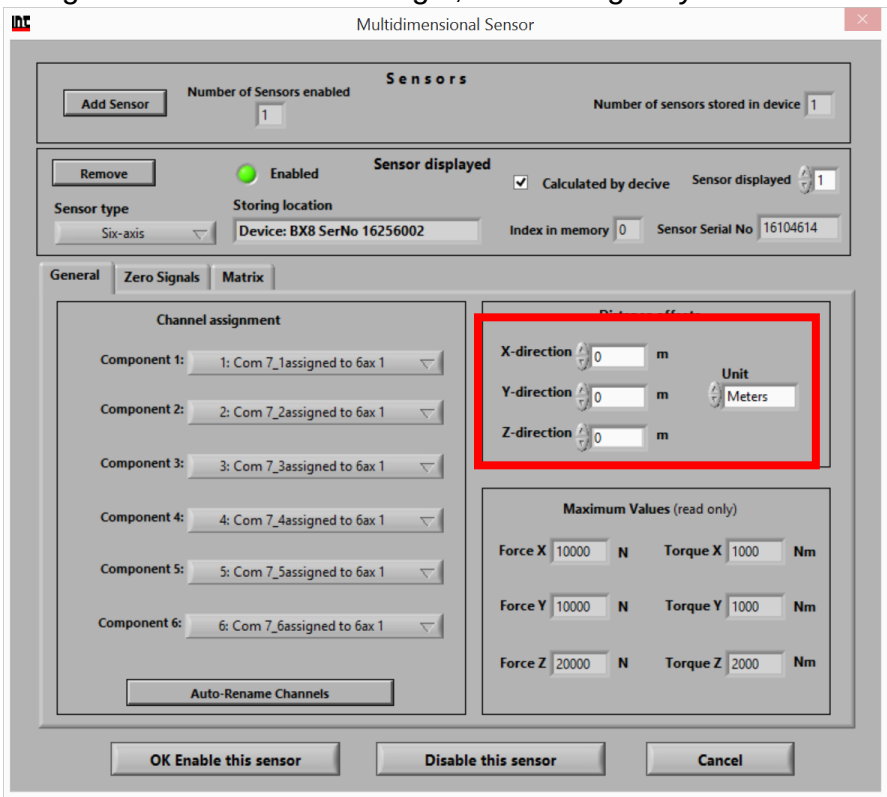


FIGURE 12 - EXAMPLE OF CALIBRATION FOR A WMC-100 LOAD CELL

Distance Offset

1. To change the distance of the origin, this setting may be access in the sensor option



2. Select the corresponding direction and the distance.
3. Can be set in meters or millimeters.

Measurement and Recording

1. Click Set All Zero before measuring

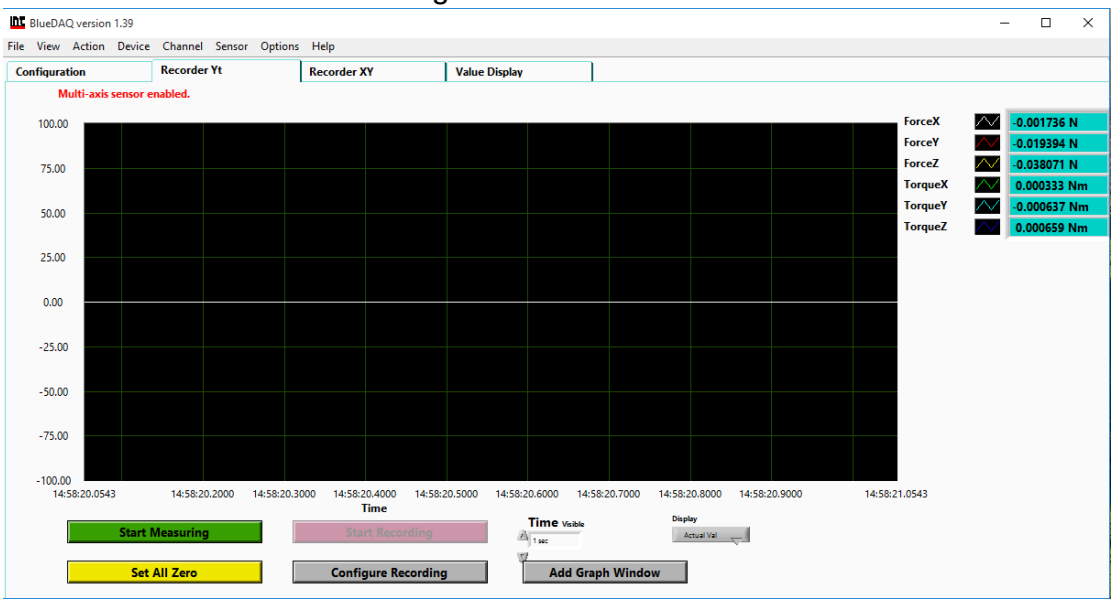


FIGURE 13 - ZERO VALUES

2. Click YES

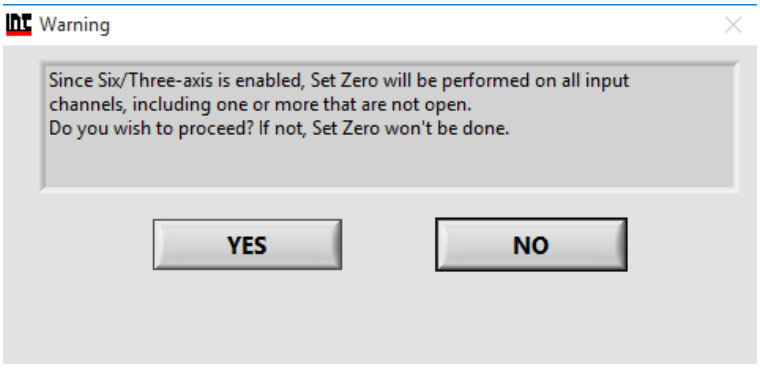


FIGURE 14 – PROCEED WITH ZERO RESET

3. Click OK to Start Measuring

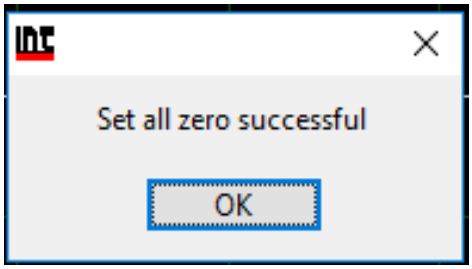


FIGURE 15 - SUCCESSFUL ZERO

4. Click Start Measuring

FIGURE 16 - MEASUREMENT

5. Recording Options are available.

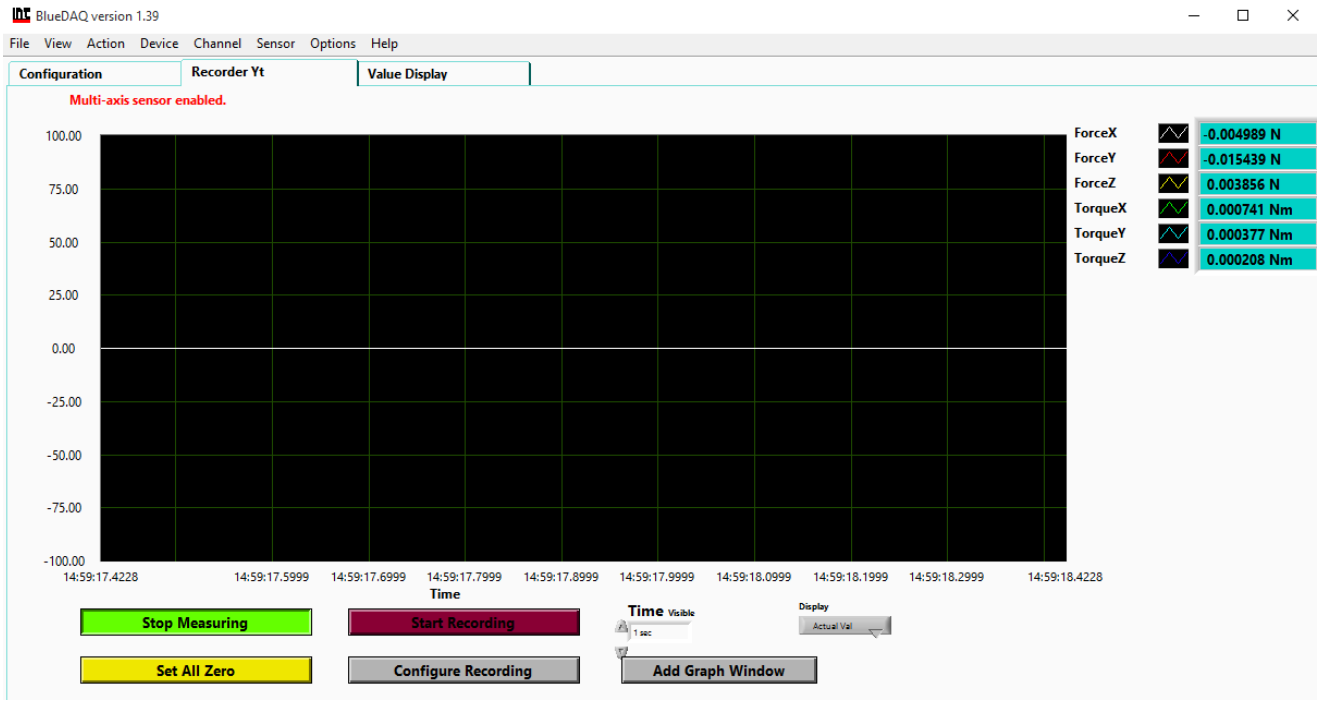


FIGURE 17 - MEASUREMENT INITIATED

6. Recorder Tab, measurements of all Axis.

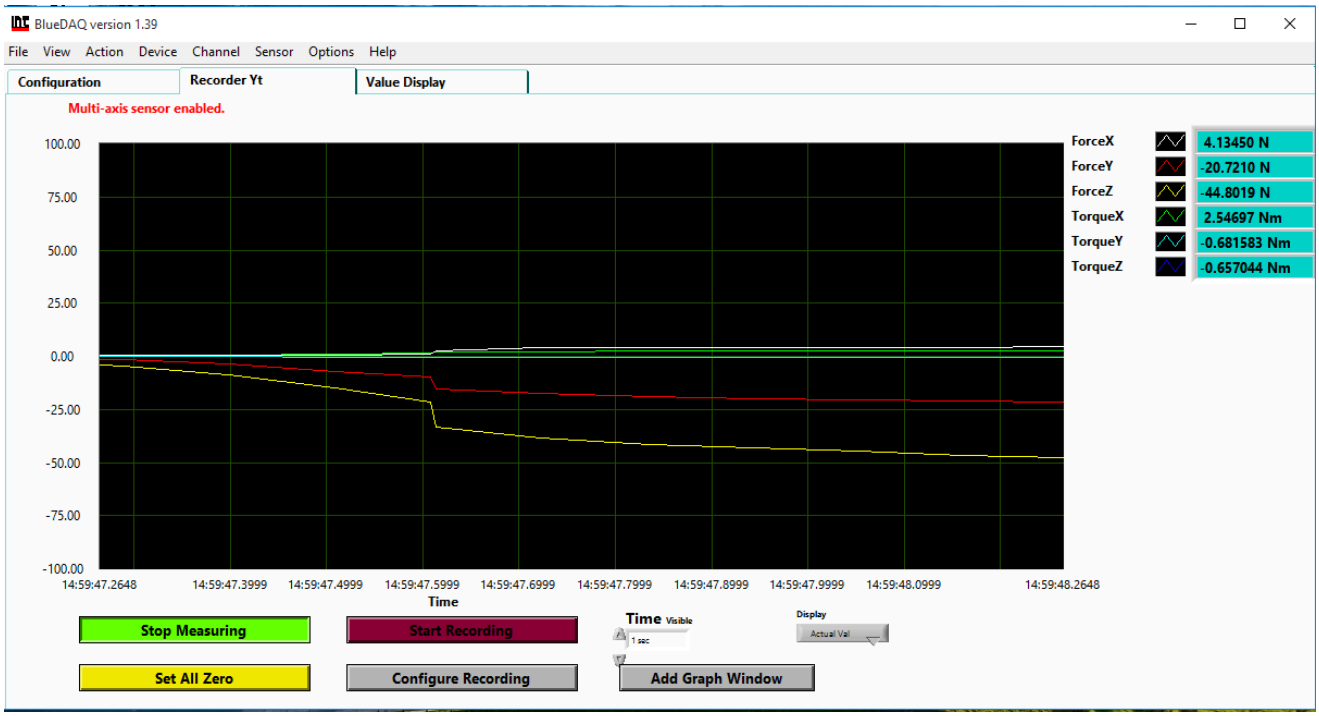


FIGURE 18 - VALUES MEASURED

7. Value Display shows values in each Axis.

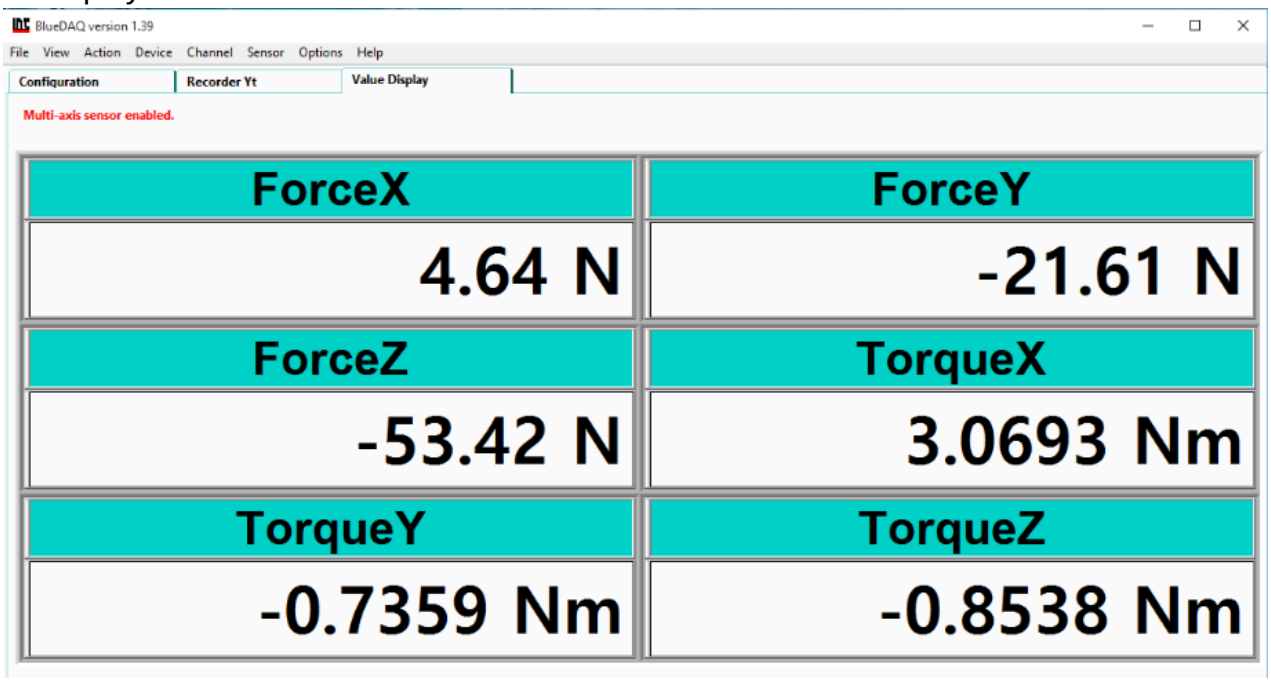


FIGURE 19 - VALUE DISPLAY SCREEN, EXAMPLE SHOWN FOR A 6-AXIS LOAD CELL

BlueDAQ Menus

File

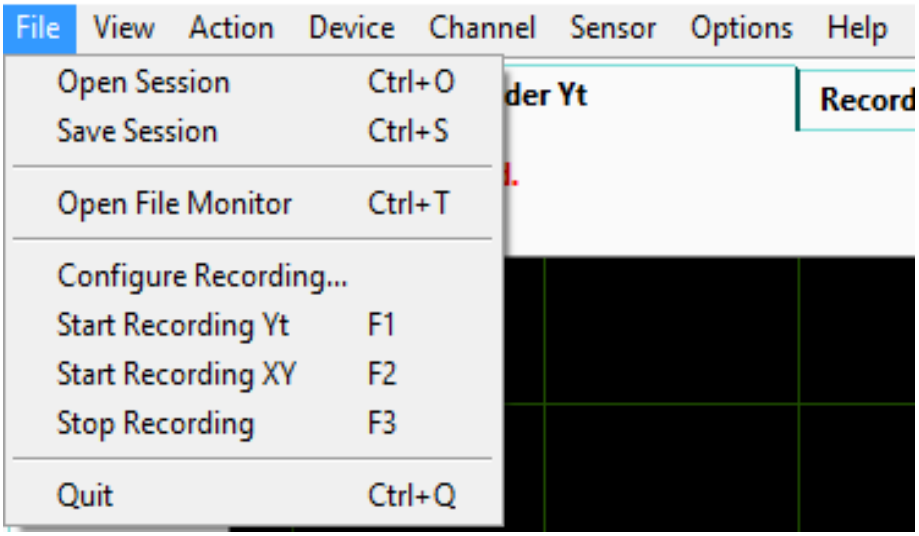


FIGURE 20 - FILE

1. Open Session allows you to open a previous session and start where you left off.

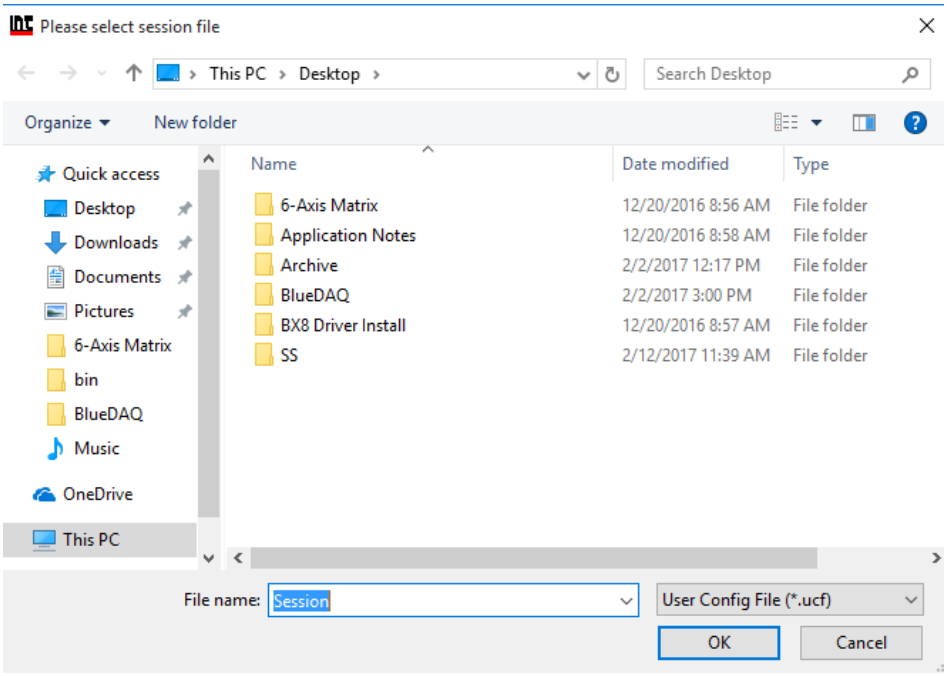


FIGURE 21 - OPEN SESSION

2. Save Session allows you to save your session

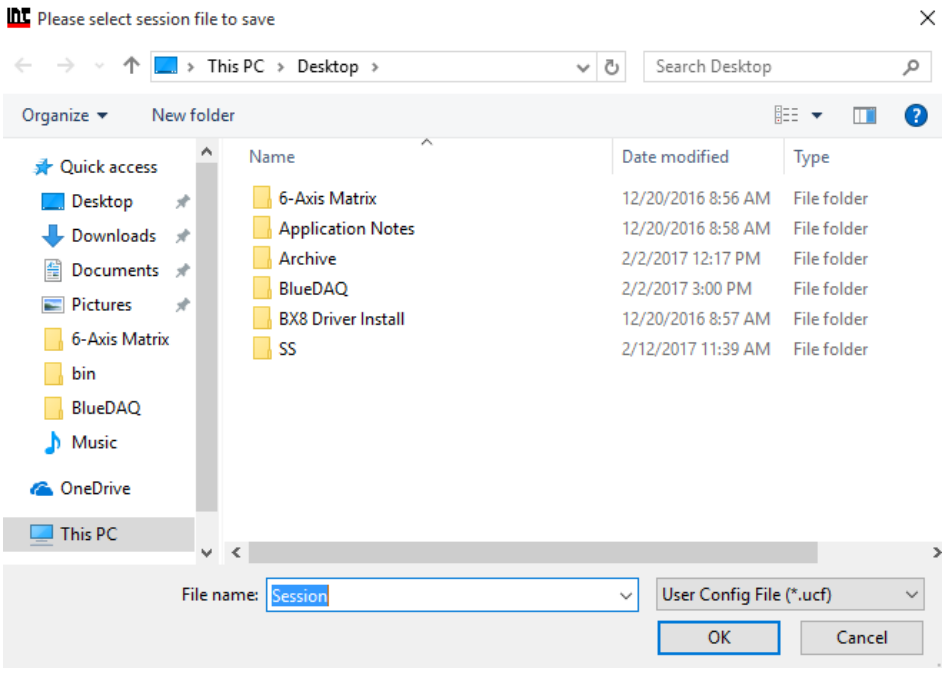


FIGURE 22 - SAVE SESSION

3. Open File Monitor allows you to open previous monitor file.

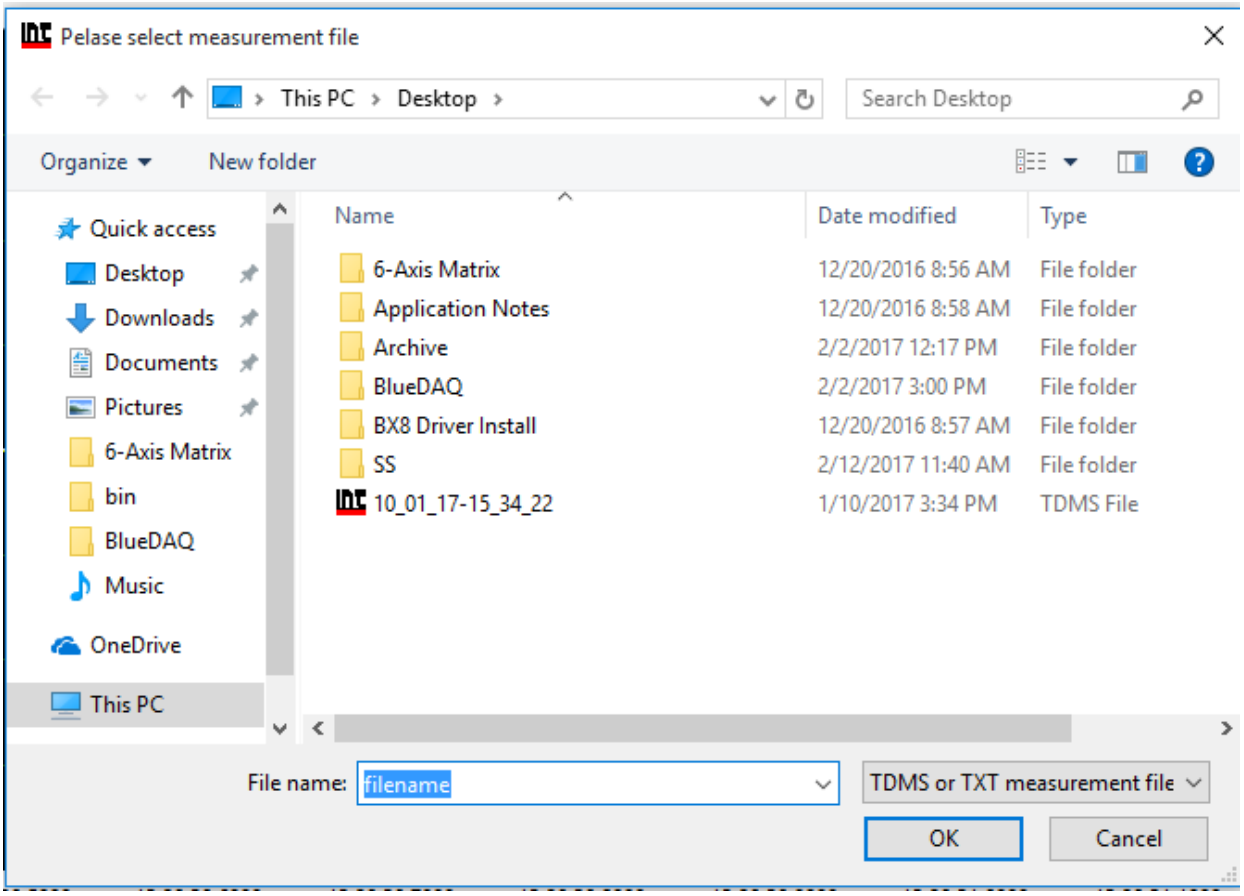


FIGURE 23 - OPEN FILE MONITOR

4. Configure Recording
    4.1. Save Memory Data, allows you to save data of the recorded value.
        A. All available values
        B. Number of values
        C. Available Last Time
        D. Data Available

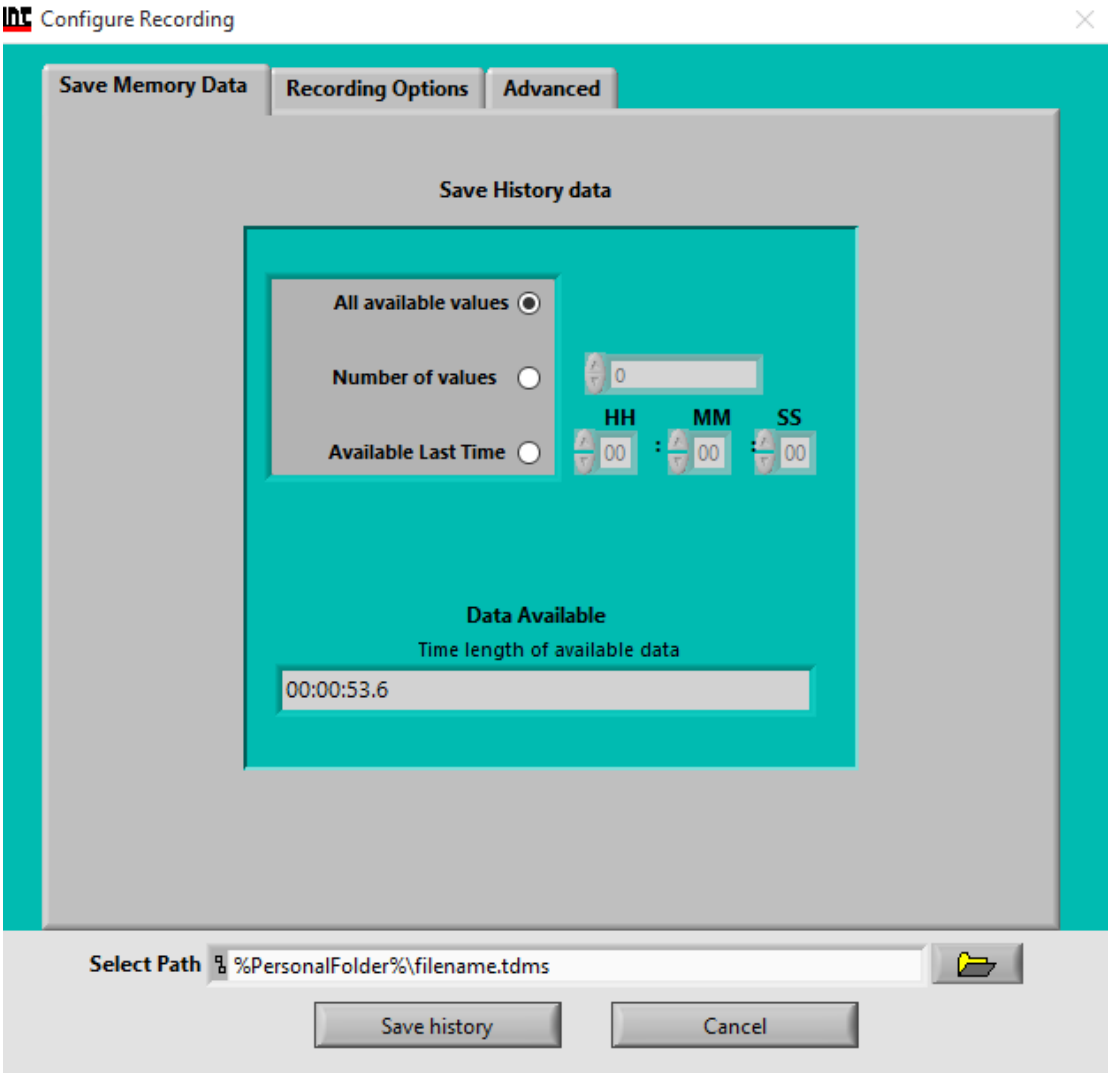


FIGURE 55 - SAVE MEMORY DATA

4.2. Recording Options

A. Manually allows you to choose the run and stop time of recording.

B. Automatically will choose the run and stop time.

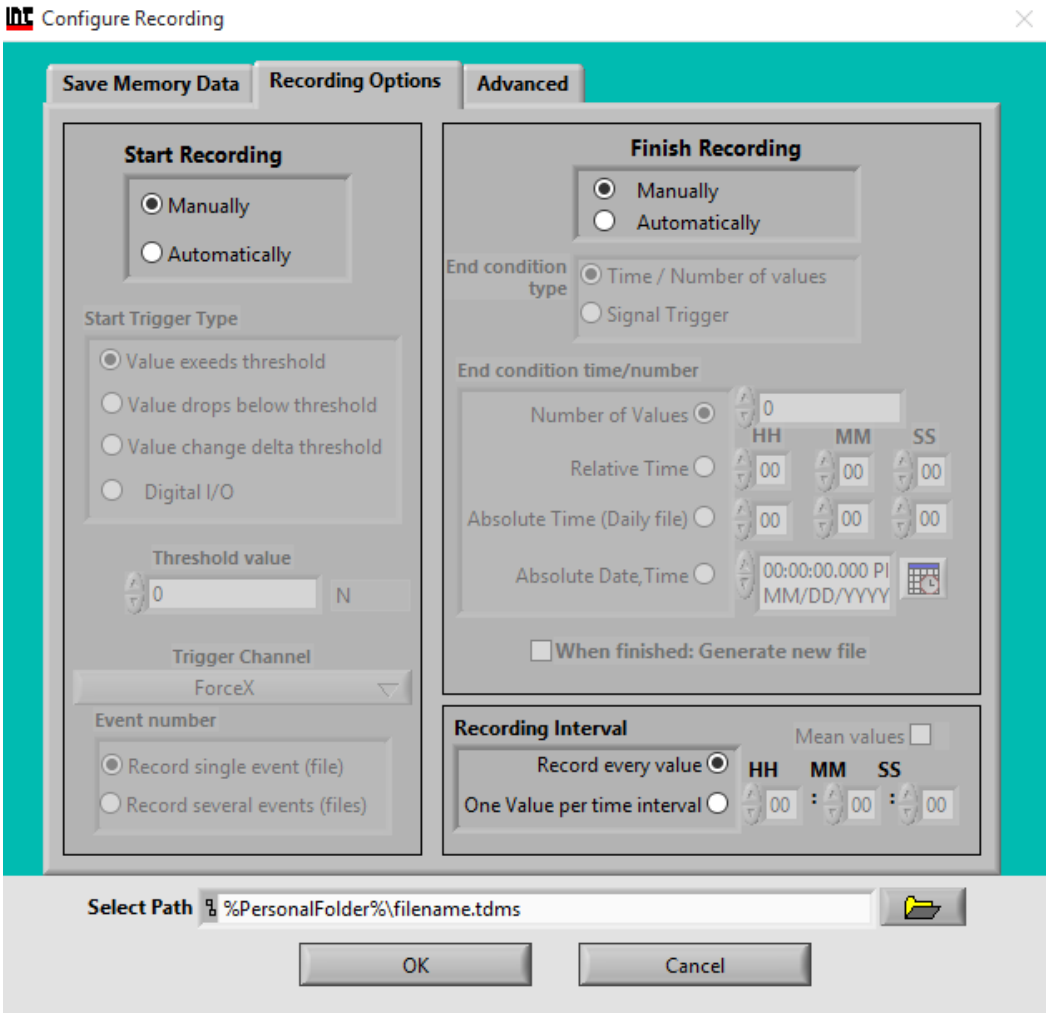


FIGURE 24 - RECORDING OPTIONS

4.3. Advanced

A. Allows you to choose the timestamp, record hidden channels and create a second file with filters.

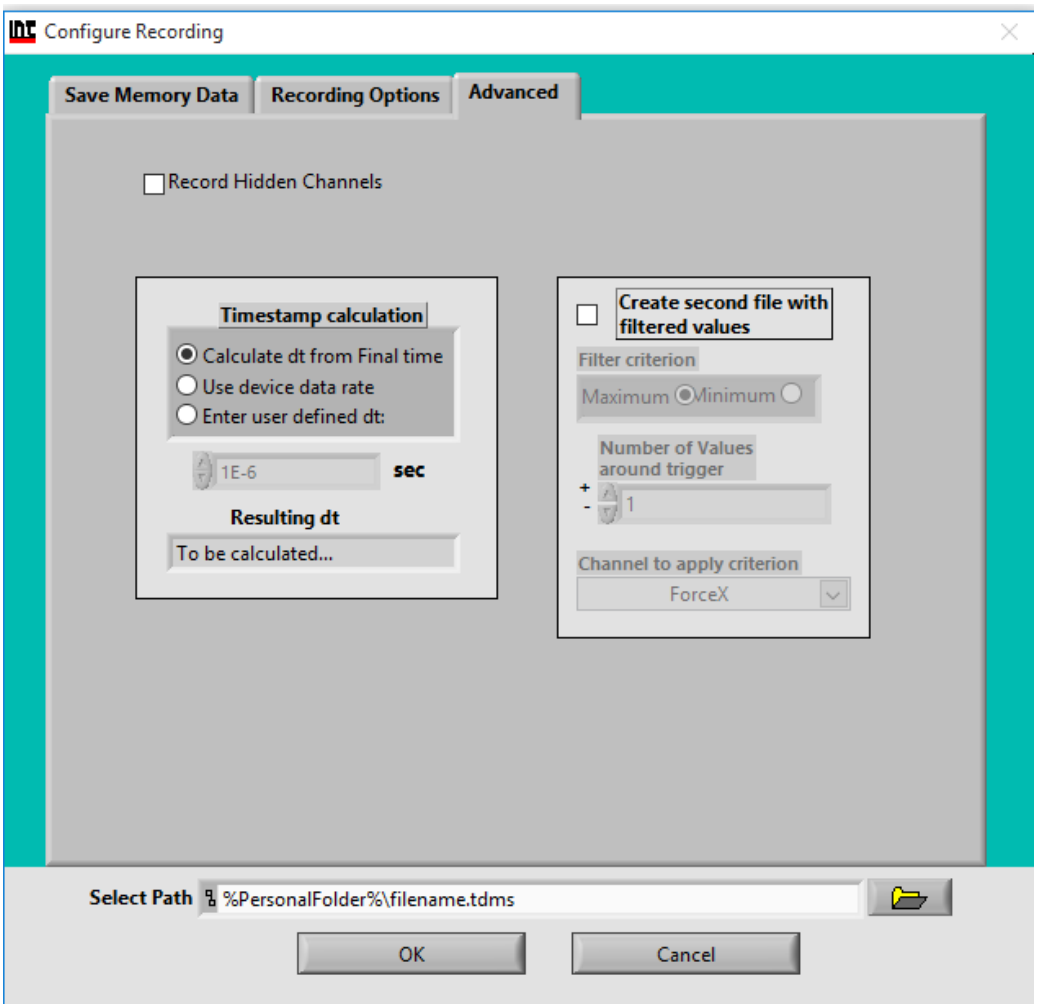


FIGURE 25 - ADVANCED

View

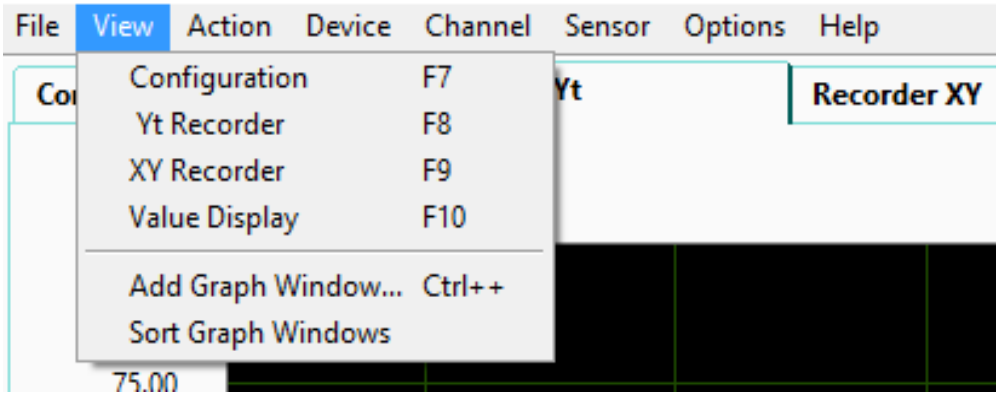


FIGURE 26 – VIEW

1. Configuration
    1.1.1. Allows configurations of Axis to be viewed.

2. Yt Recorder
    2.1. Shows only the Yt Axis

3. XY Recorder
    3.1. Shows only the XY Axis

4. Value Display
    4.1. Shows all Axis and values

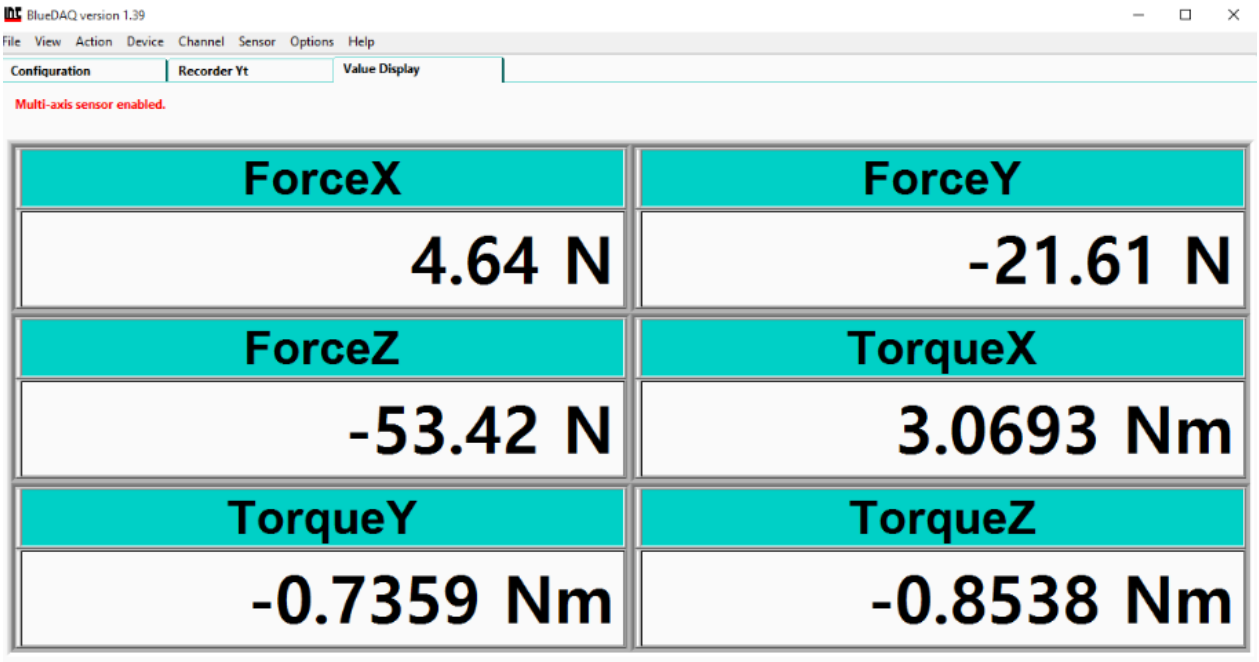


FIGURE 27 - VALUE DISPLAY, EXAMPLE OF 6-AXIS LOAD CELL DISPLAY

5. Add Graph Window

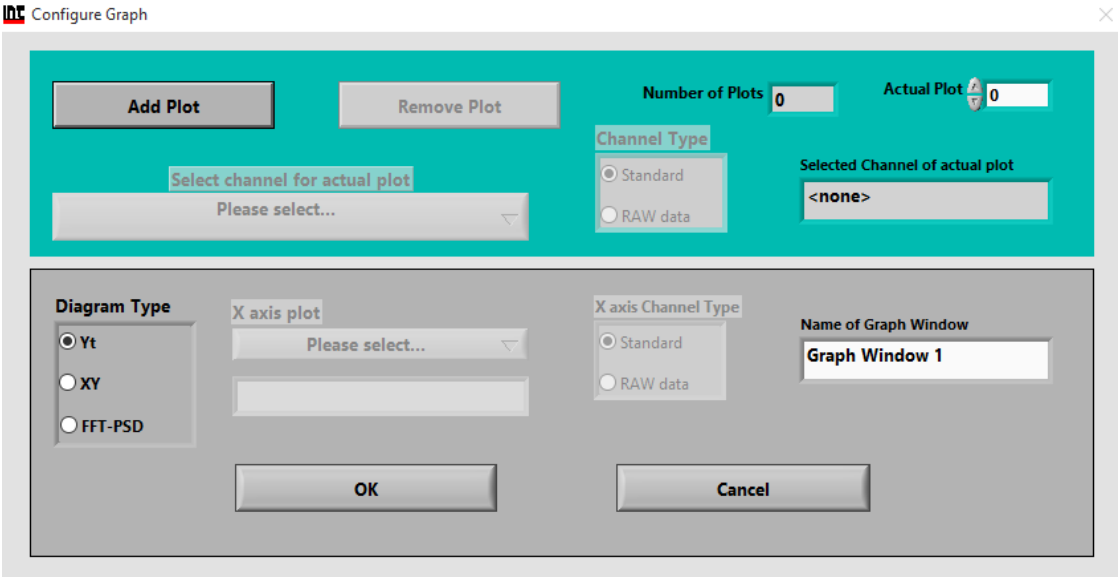


FIGURE 28 - ADD GRAPH WINDOW

5.1. Add Plot

A. Allows you to add an Axis to the graph.

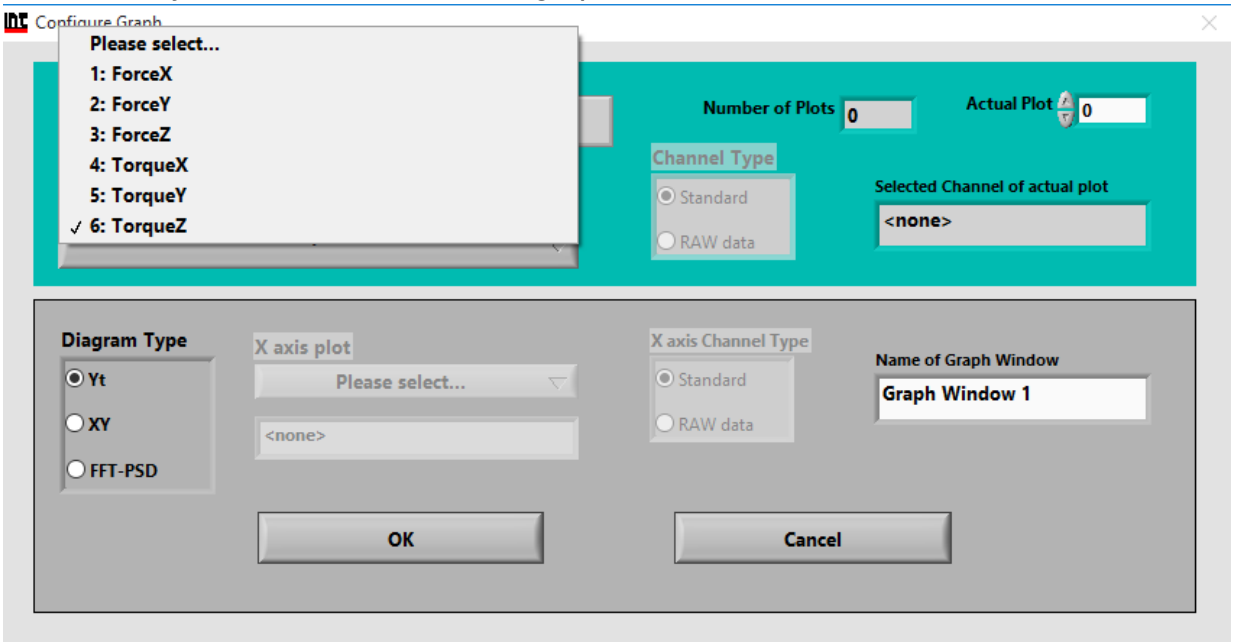


FIGURE 29 - ADD PLOT

6. Sort Graph windows

6.1. Sort between graphs

Action

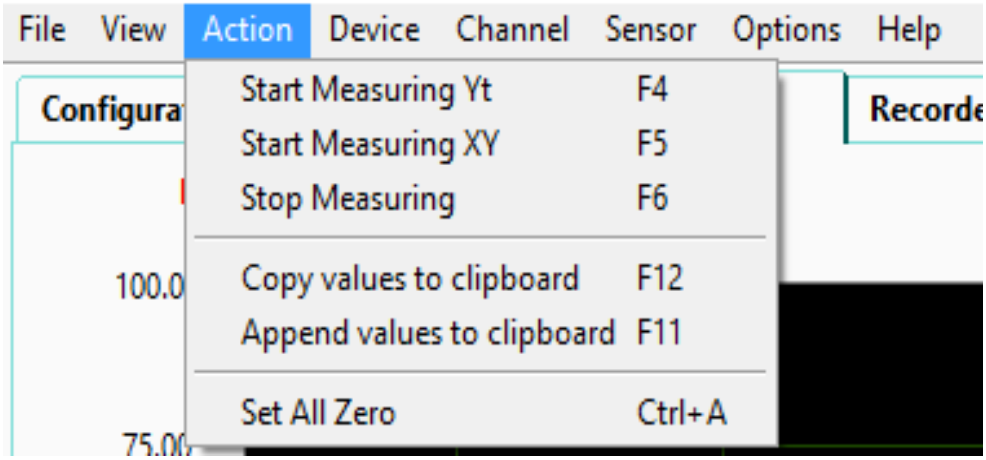


FIGURE 30 - ACTION

1. Start Measuring Yt - Measures only the Yt axis.
2. Start Measuring XY - Measures only the XY Axis.
3. Stop Measuring - Stops measurement.
4. Copy Values to clipboard - Copies the last data measured.
5. Append values to clipboard - Add values to be copied.
6. Set All Zero - Sets all Values to Zero.

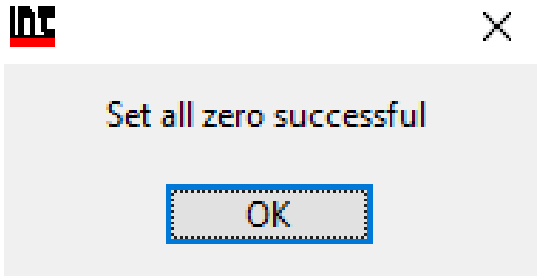


FIGURE 31 - SET ALL ZERO

Device

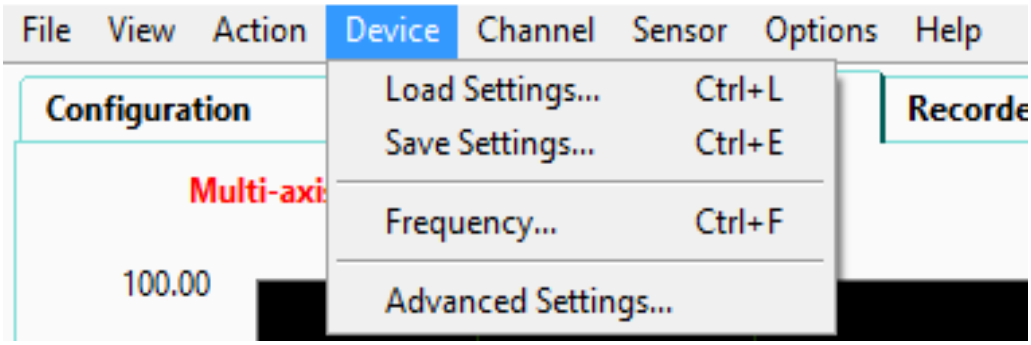


FIGURE 32 – DEVICE

1. Load Settings

1.1. Load Settings from a Custom or Previous Setting

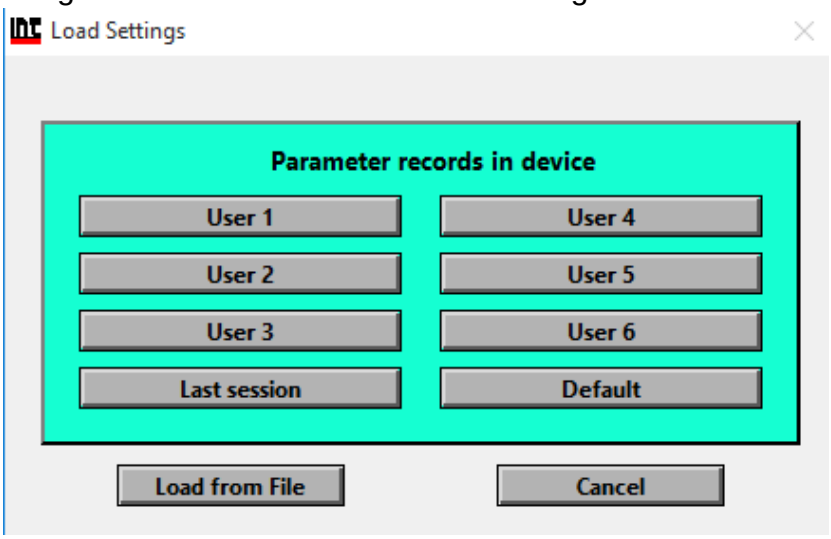


FIGURE 33 - LOAD SETTINGS

1.2. Load from File

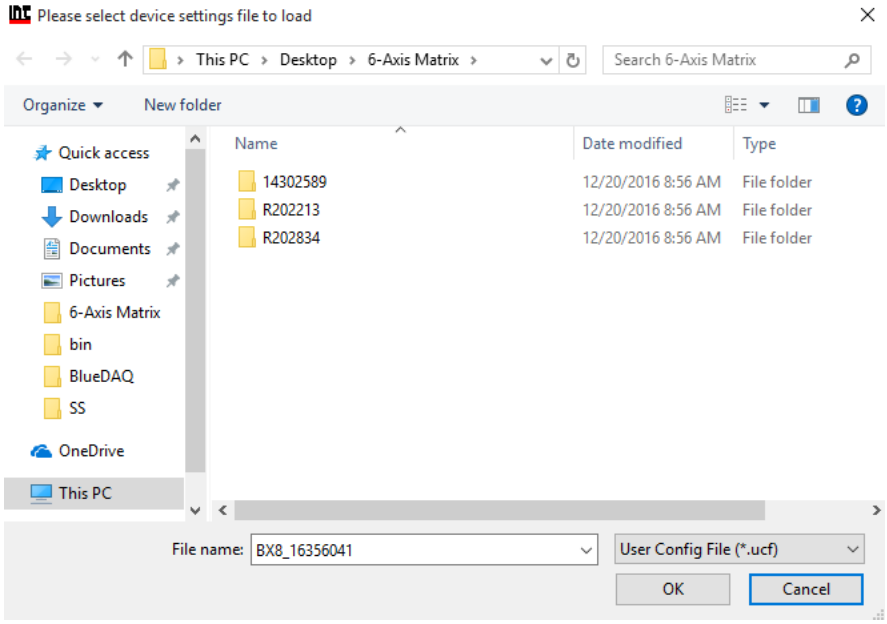


FIGURE 34 - LOAD FROM FILE

2. Save Settings - Save current settings.

3. Frequency - Frequency rate of each record value per second.

3.1. Using low settings such as 1Hz or 0.1Hz may provide a stable reading, but slower refresh rate.

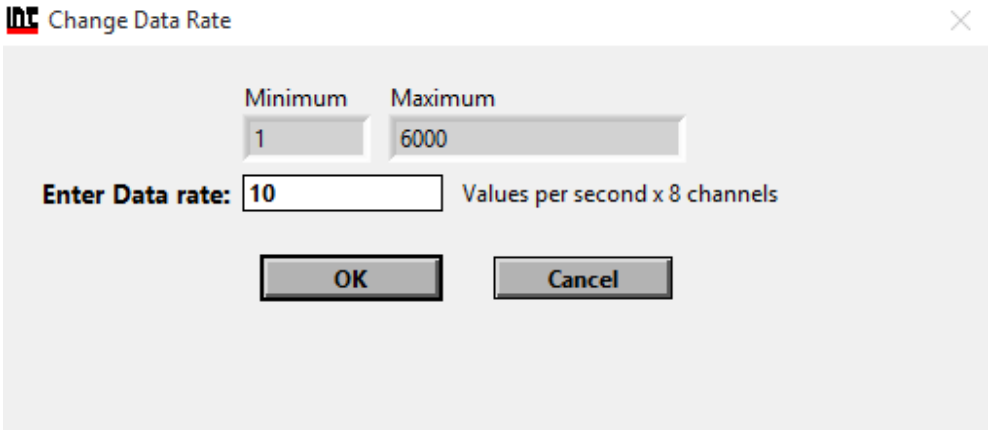


FIGURE 35 - FREQUENCY

4. Advanced Settings

4.1. Filter

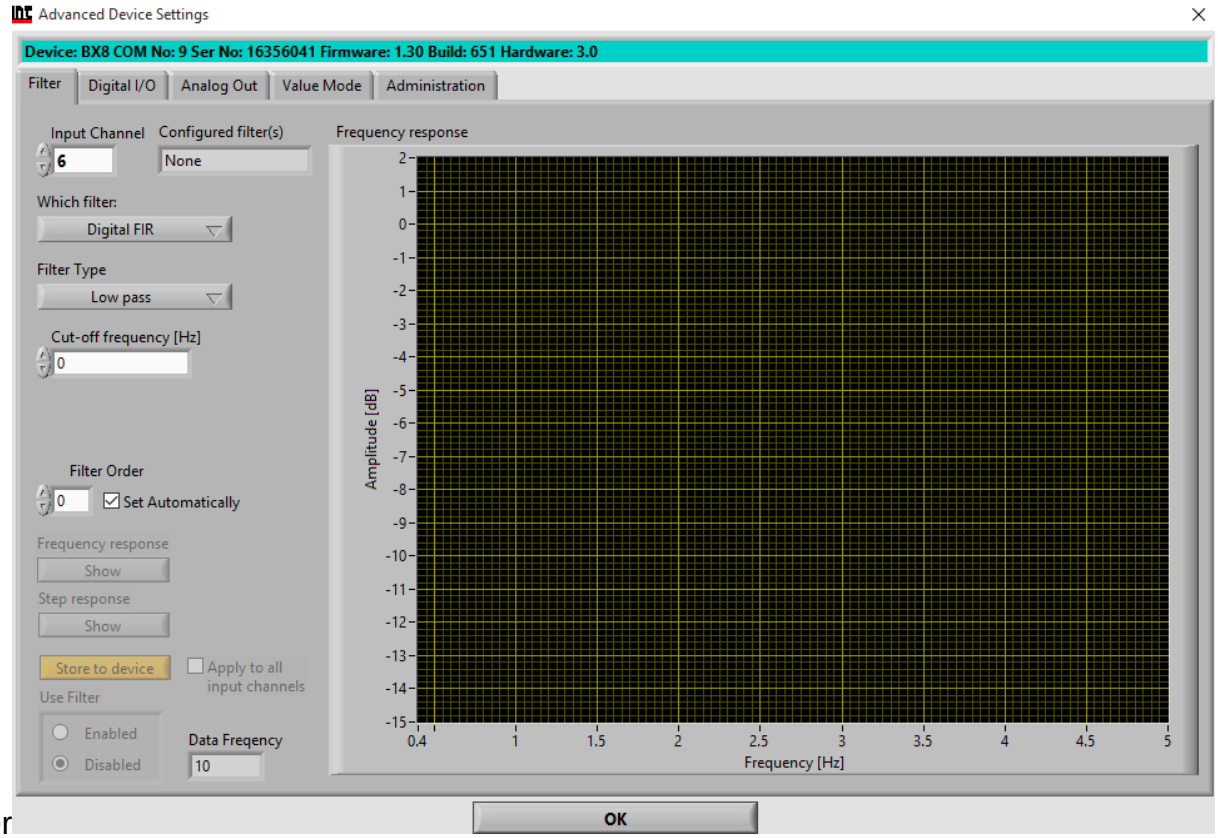


FIGURE 36 - FILTER

4.1.1. Input Channel – Digital Filters are individually configurable for each of the 8 analog input channels. Select input channel here. Do this first, if the filter is not yet configured.

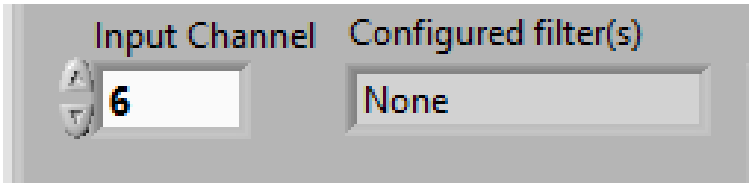


FIGURE 37 - INPUT CHANNEL

4.1.2. Which Filter

FIGURE 38 - WHICH FILTER

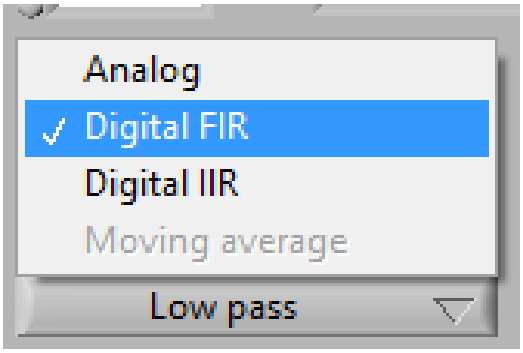


FIGURE 39 - FILTERS

A. Analog is the frontend low-pass filter

B. FIR is a Finite-Impulse-Response digital Low pass filter

C. IIR is an Infinite-Impulse-Response digital filter with selectable type.

4.1.3. Filter Type – Can only set if “Which filter” is set to IIR.

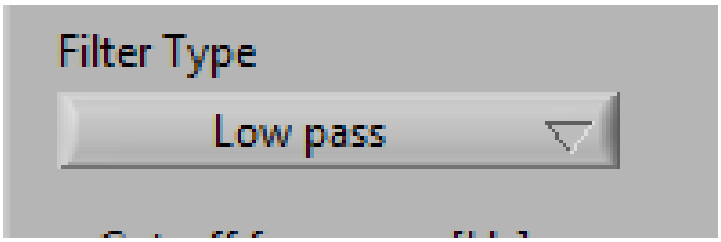


FIGURE 40 - FILTER TYPE

A. Low Pass frequencies above Cut-off are damped.

B. High Pass, frequencies below Cut-off are damped.

C. Band Pass, frequencies below Lower Cut-off and above Upper Cut-off are damped.

D. Band Stop, frequencies between Lower and Upper Cut-off are damped.

4.1.4. Cut-off frequency (Hz)

A. Cut-off frequency in Hz, where the signal is damped by -3dB. Lower Cut-off with Band pass and Band stop type.

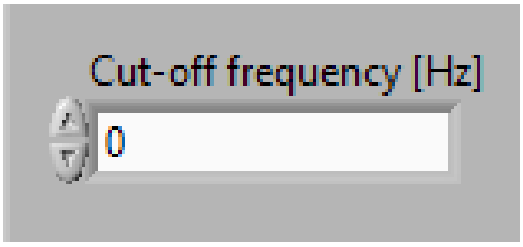


FIGURE 41 - CUT OFF FREQUENCY

4.1.5. Filter Order

A. Settable for FIR Filter only

B. Higher order leads to steeper damping characteristics, but slower step response.

C. Lower cut-off frequency is possible with higher order, higher cut-off with lower order.

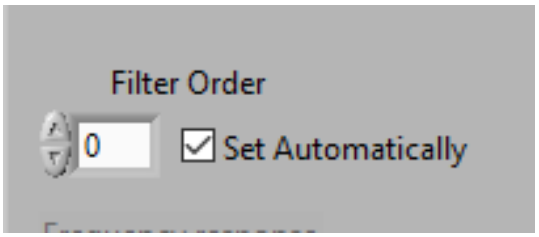


FIGURE 42 - FILTER ORDER

4.1.6. Frequency response

A. Calculate filter and show results in frequency domain of sine waves at the input of different frequencies if successful.

B. Especially with IIR High pass. Band pass and Band stop, observe the graph carefully for instability: A stable freq. response of an IIR filter is generally continuous and should never exceed 0dB.

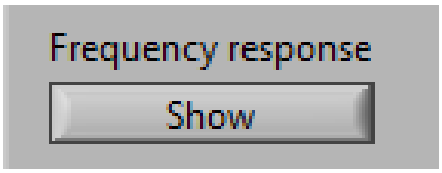


FIGURE 43 - FREQUENCY RESPONSE

4.1.7. Step response

A. Show filter output signal in time domain of standard step from 0 to nominal value at the input at time=0.

B. Useful for determining settling time, e.g. for high-order FIR filter.

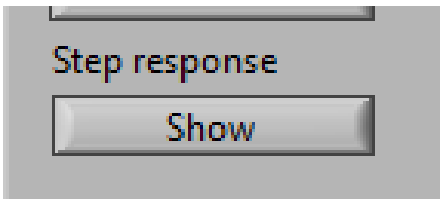


FIGURE 44 - STEP RESPONSE

4.1.8. Store to device

A. Calculate filter and store all necessary information in the device if the calculation is successful. The same settings will be stored for all 8 inputs if “Apply to all input channels” is checked.

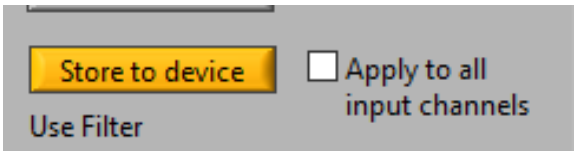


FIGURE 45 – STORE TO DEVICE

4.1.9. Use Filter

A. Enable or disable this filter. Even if disabled, all other filter settings will remain stored in device (if no error occurred), if they are already stored.

B. This filter will be enabled/disabled for all 8 inputs channels if “Apply to all channels” is checked.

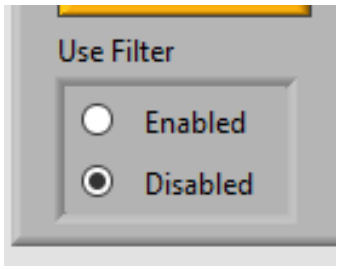


FIGURE 46 - USE FILTER

4.2. Digital I/O

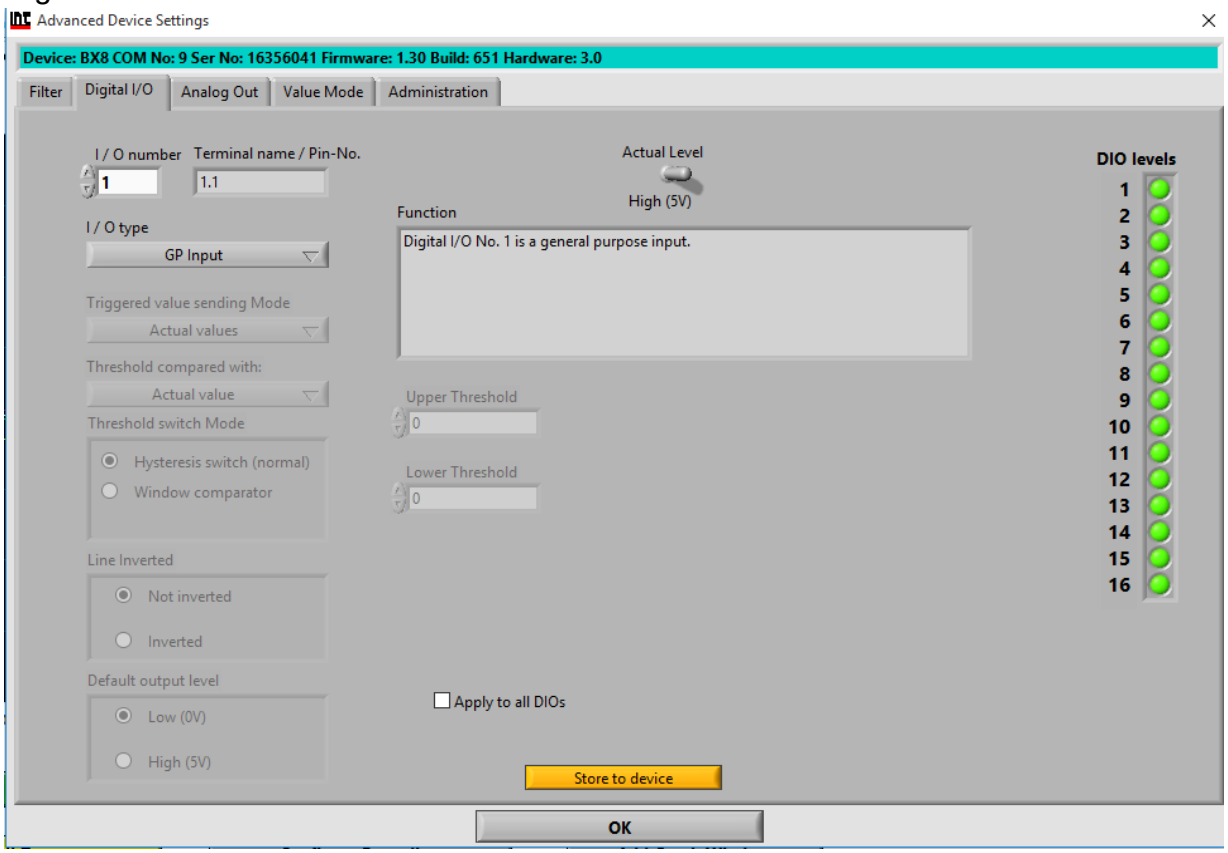


FIGURE 47 - DIGITAL I/O

4.3. I/O number

4.3.1. Devices can have up to 16 digital I/O lines. Enter number of digital I/O here.

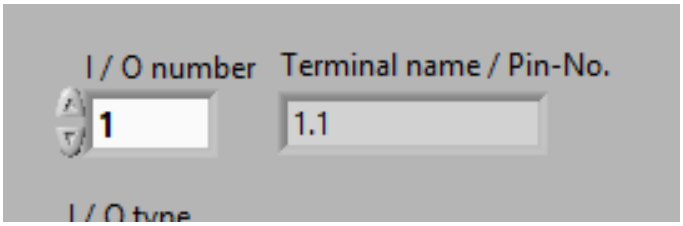


FIGURE 48 - I/O NUMBER

4.3.2. I/O type

A. GP Input – “General Purpose” Input

B. Tare Single – Zero out.

C. Tare All – Zero all.

D. Reset Max/Min

E. Trigger Send value
   i. Actual Values
   ii. Maximum Values
   iii. Minimum Values
   iv. Mean Values

F. GP Output – “General Purpose” Output

G. Threshold Switch

4.3.3. Threshold switch Mode – Only Activated if Threshold Switch is selected in I/O type.
   A. Hysteresis switch (normal) – Digital output becomes active if measuring value of corresponding channel is above ON-threshold. It becomes inactive if measuring value of corresponding channel is blow OFF-threshold.
   B. Window comparator – Digital output becomes active if measuring value of corresponding channel is between upper and lower threshold, otherwise inactive.

4.3.4. Line Inverted
   A. Not inverted – Active level is logical high = 5V. Inactive logical low is 0V.
   B. Inverted – Active level is logical low – 0V. Inactive logical high is 5V.

4.3.5. Default output level – Level which digital I/O will output by default. That applies to all DIO output types after power-on, before a set output condition occurs.
   A. E.g. set output level command if GP output type.

4.4. Analog Out

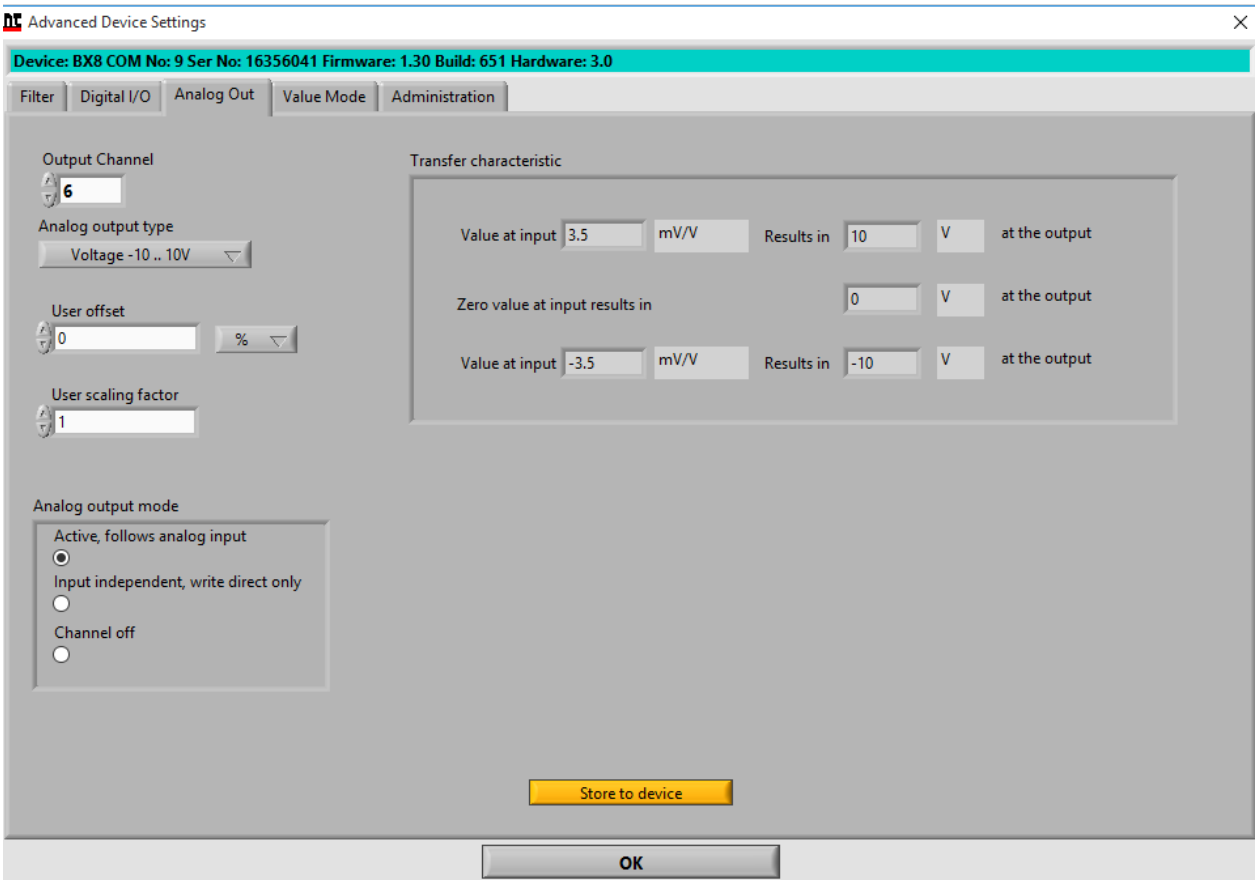


FIGURE 49 - ANALOG OUT

4.4.1. Output Channel – Analog output type, voltage or current.

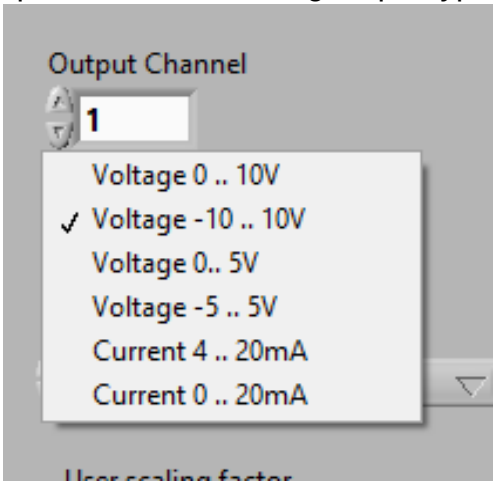


FIGURE 50 - OUTPUT CHANNEL

4.4.2. User offset – Additional offset in percent, which defines output value at zero analog input value.

A. E.g. if set to 50%, analog out value will be half of the positive range.

B. 2.5V at 0-5V or ±5V.

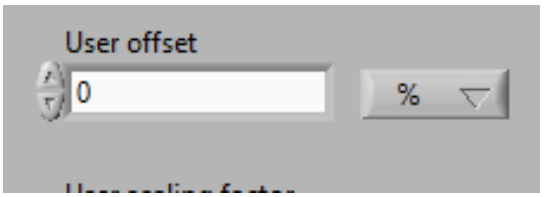


FIGURE 51 - USER OFFSET

4.4.3. User scaling factor – Scaling factor to adapt analog input physical values to analog output.

A. If using User offset, set User offset first, then User scaling.

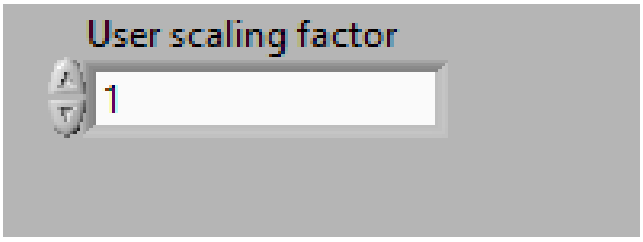


FIGURE 52 - USER SCALING FACTOR

4.4.4. Analog output mode

A. Active, follows analog input – Output value depends on setting and analog input value of the same input channel number.

B. Input independent, write direct only – Use analog output DAC directly.

C. Channel off – Channel switch is off.

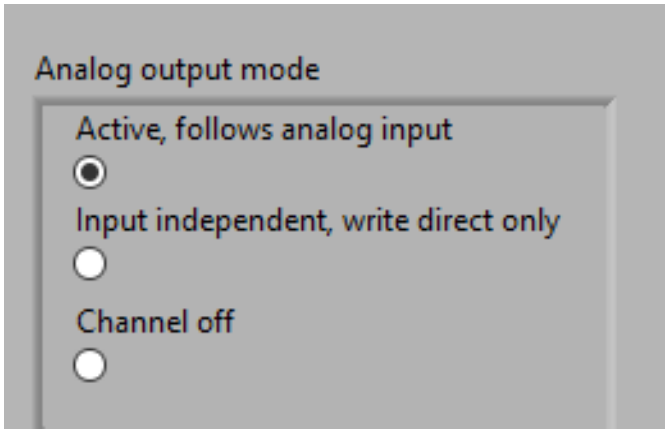


FIGURE 53 - ANALOG OUTPUT MODE

4.5. Value Mode

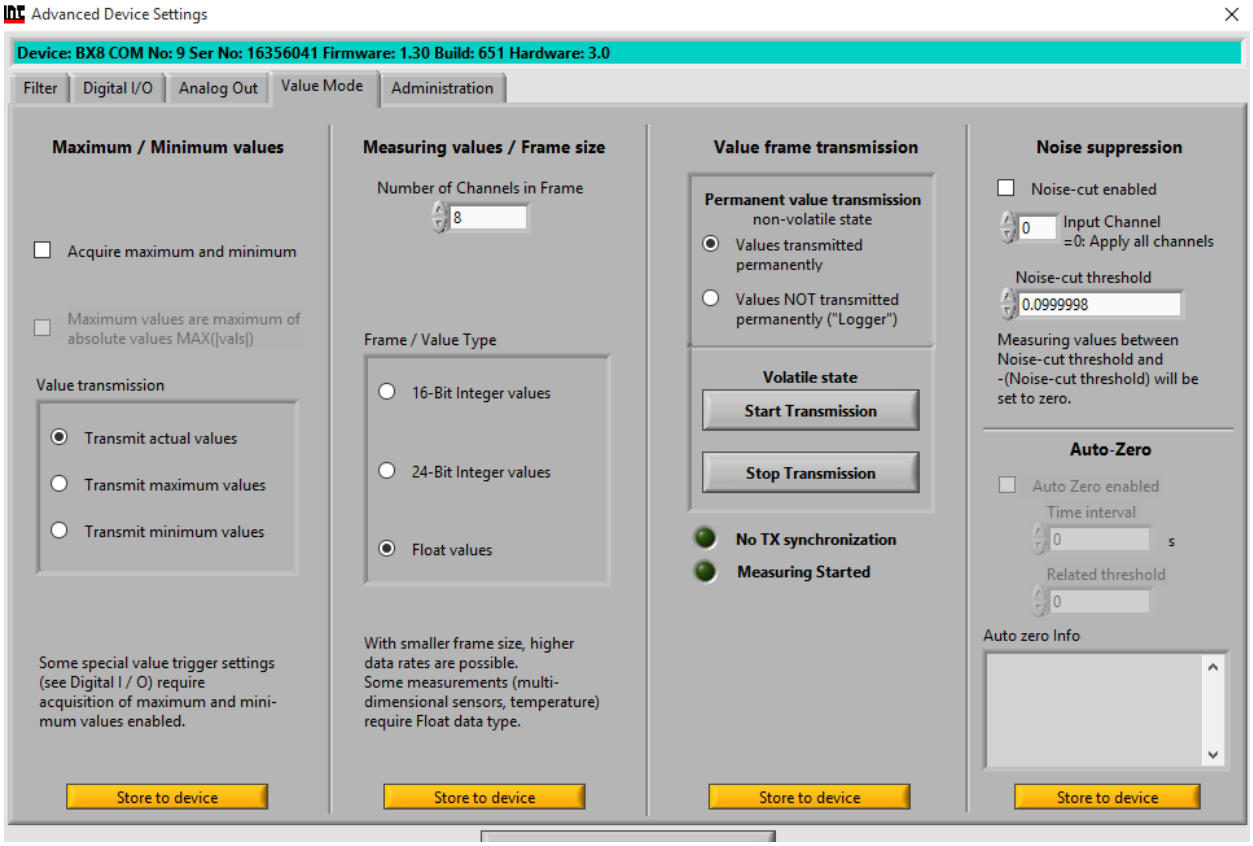


FIGURE 54 - VALUE MODE

4.5.1. Acquire maximum and minimum – Max/Min value determination enabled. This is a precondition for other max/min settings, also for some threshold and value-trigger modes.

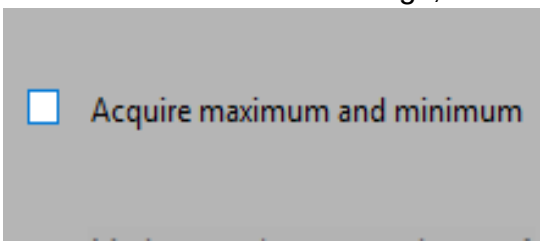


FIGURE 55 - ACQUIRE MAX AND MIN

4.5.2. Maximum values are maximum of absolute values MAX(|vals|) – Only active if “Acquire maximum and minimum” is checked. Replaces the maximum value register with that

maximum of the absolute values, so that both positive maximum and negative maximum values are determined.

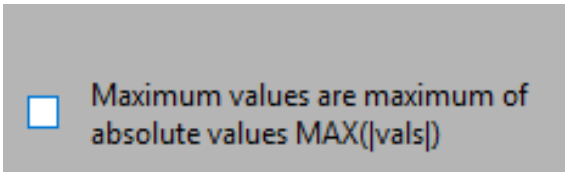


FIGURE 56 - MAX VALUES ARE MAXIMUM OF ABSOLUTE VALUES

4.5.3. Value transmission – Which values are in the value frame: All channels are either actual values, maximum values or minimum values.

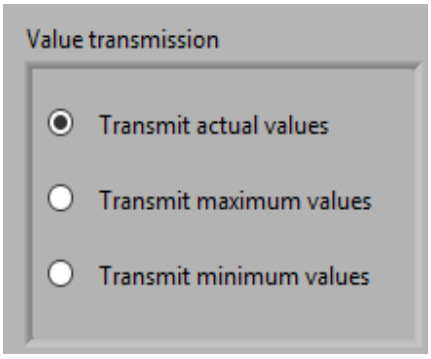


FIGURE 57 - VALUE TRANSMISSION

4.5.4. Number of Channels in Frame – Number of input channel values in the measuring data frame. With smaller numbers, higher data frequencies are possible.

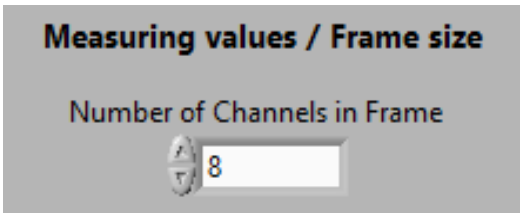


FIGURE 58 - MEASURING VALUES / FRAME SIZE

4.5.5. Frame / Value Type – Data type of measuring values in the value-frame that device transmits.

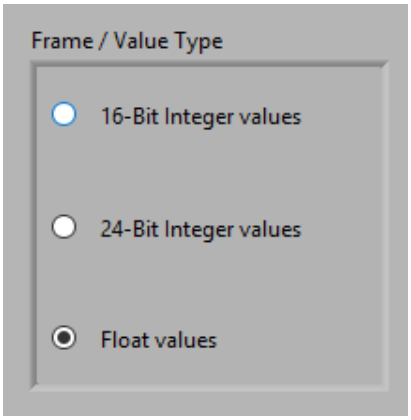


FIGURE 59 - FRAME / VALUE TYPE

4.5.6. Value frame transmission

A. Values transmitted permanently – After power-on, the device transmits measuring values continuously.

B. Values NOT transmitted permanently – After power-on, the device transmits measuring values on request.

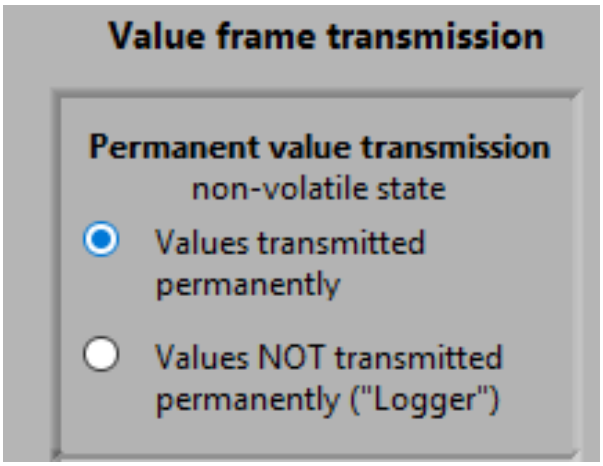


FIGURE 60 - VALUE FRAME TRANSMISSION

4.5.7. Volatile state

A. Start transmission of measuring values, if permanent value transmission is off. State not stored in non-volatile memory.

B. Stop Transmission of measuring values, if permanent value transmission is on. State not stored in non-volatile memory.

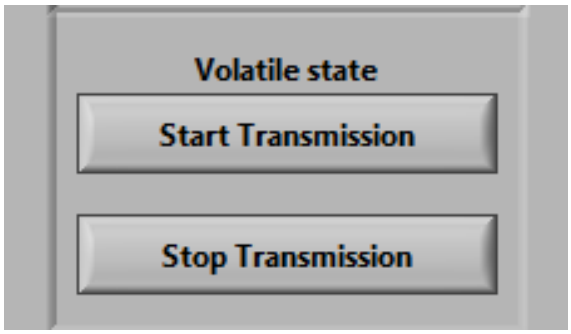


FIGURE 61 - VOLATILE STATE

4.5.8. Noise suppression

A. Noise-cut enabled – If measuring values are between Noise-cut threshold and (Noise-cut threshold), they will be set to 0.000000000, so that the noise around zero will be suppressed. Set checkbox to enable this feature.

B. Input Channel = 0: Apply all channels – Input channel to be used with Noise-cut. Set to 0: Use the same threshold for all inputs.

C. Noise-cut threshold – If measuring values are between Noise-cut threshold and (Noise-cut threshold), they will be set to 0.000000000, so that the noise around zero will be suppressed.

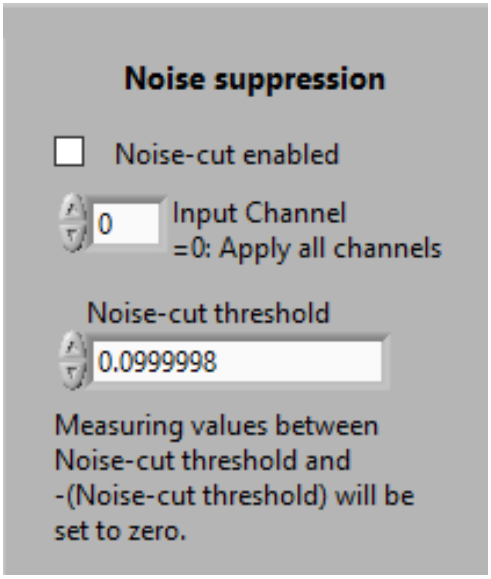


FIGURE 62 - NOISE SUPPRESSION

4.5.9. Auto-Zero enabled – Every (Time interval) seconds, an automatic set-zero routine will be performed.

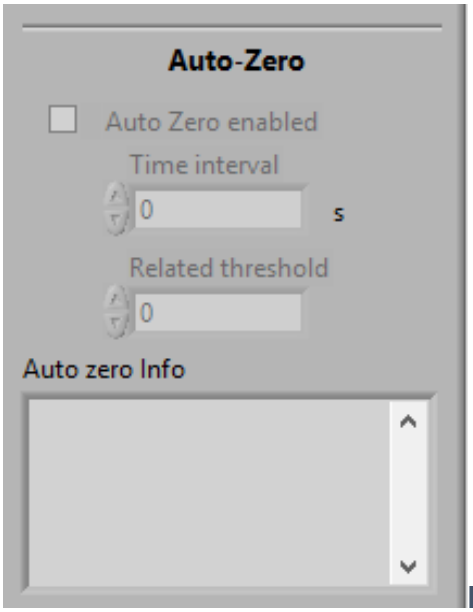


FIGURE 63 - AUTO-ZERO

4.6. Administration

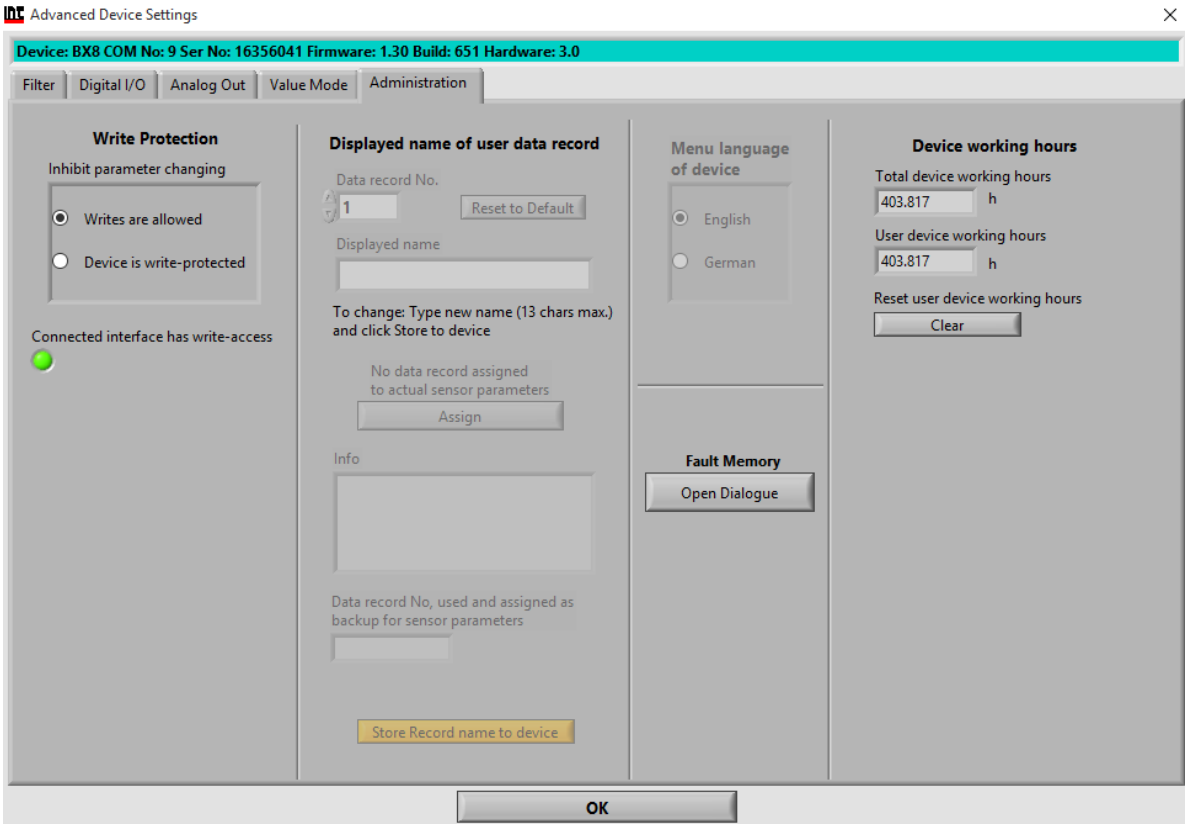


FIGURE 64 - ADMINISTRATION

4.6.1. Write Protection

A. Inhibit parameter changing – If the device is write-protected, the device parameters are secured from unintentional changing. To disable write-protection, a device-depended password must be entered.

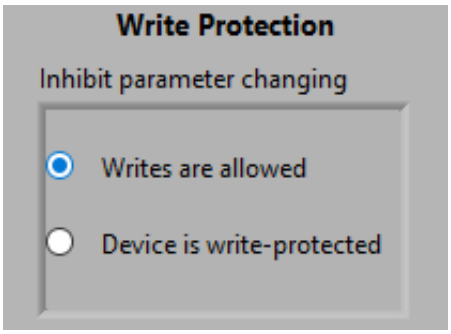


FIGURE 65 - WRITE PROTECTION

4.7. Displayed name of user data record

4.7.1. Data record No. – Six different parameter records can be saved and restored; in the main window with “Save Settings” and “Load Settings”. User-defined names for each data

record can be viewed and changed here. Parameter record number (1 to 6) can be set by this, to view and change its name.

A. Displayed name – Name of the parameter record.

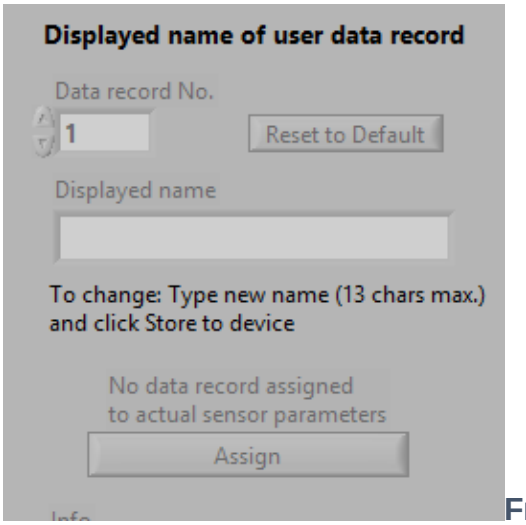


FIGURE 66 - DISPLAYED NAME OF USER DATA RECORD

4.7.2. Menu language of device

A. English
B. German

FIGURE 67 - MENU LANGUAGE OF DEVICE

4.7.3. Fault memory – Some devices are capable of storing faults that are related to external connections. E.g. broken sensor cable or value saturated.

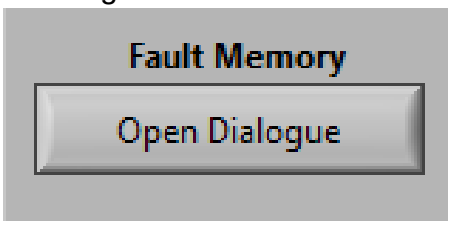


FIGURE 68 - FAULT MEMORY

4.7.4. Device working hours – Some devices count their working hours. This displays the absolute working hours, which can't be reset.

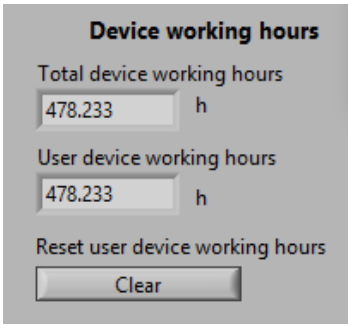


FIGURE 69 - DEVICE WORKING HOURS

Channel

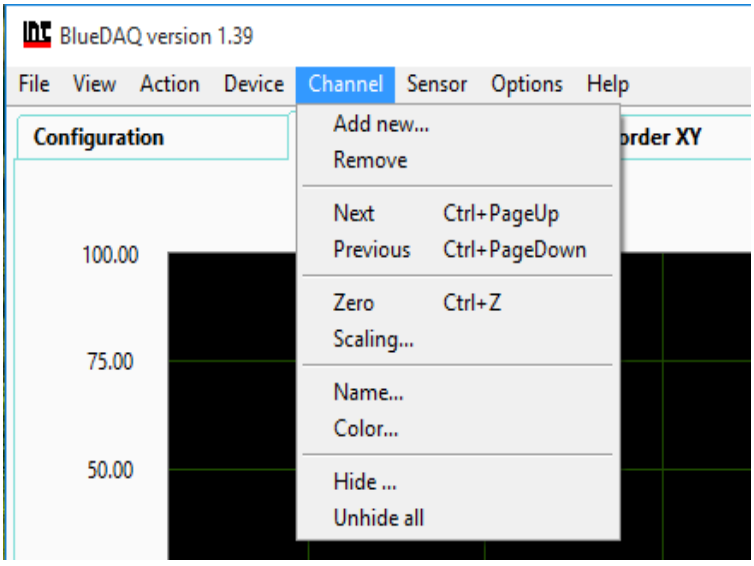


FIGURE 70 - CHANNEL

1. Add new

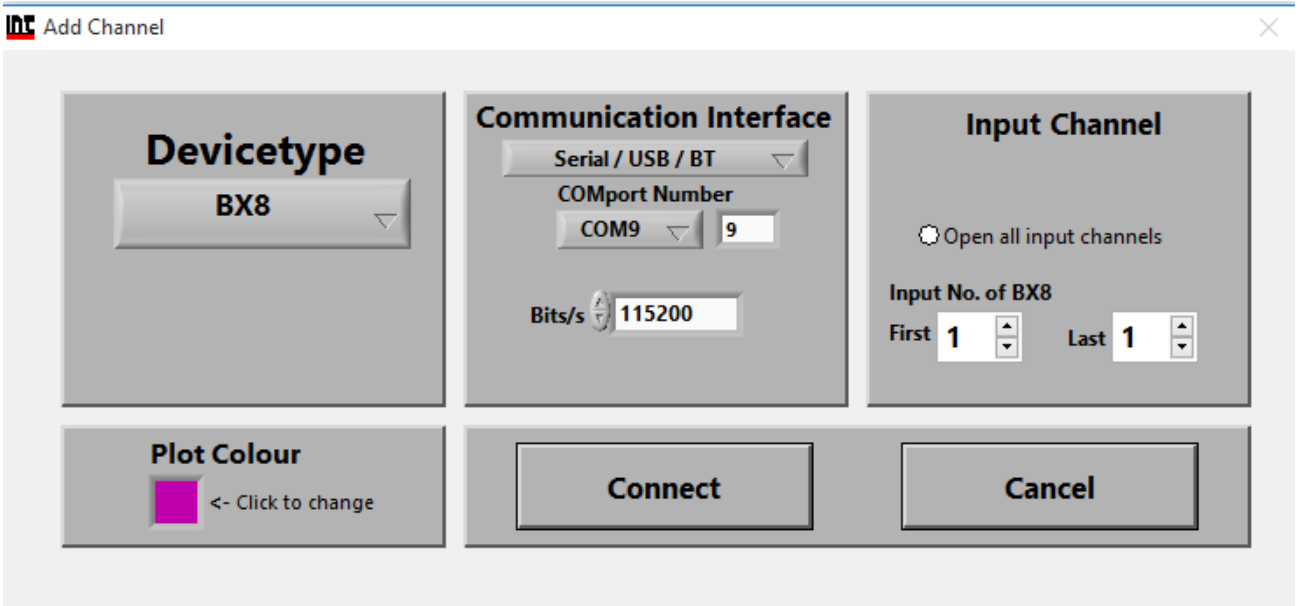


FIGURE 71 - ADD NEW

1.1. Devicetype

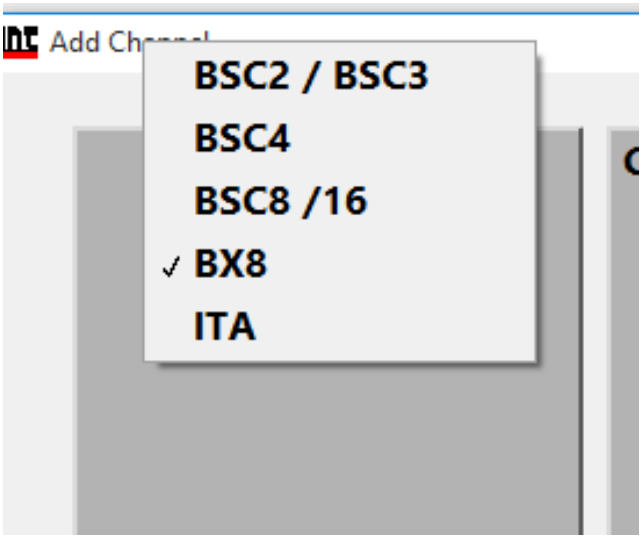


FIGURE 72 – DEVICETYPE

1.2. Communication Interface

1.2.1. Bits/s – Communication Bitrate. If you aren't sure which Bitrate is appropriate to your device, leave this at 115200.

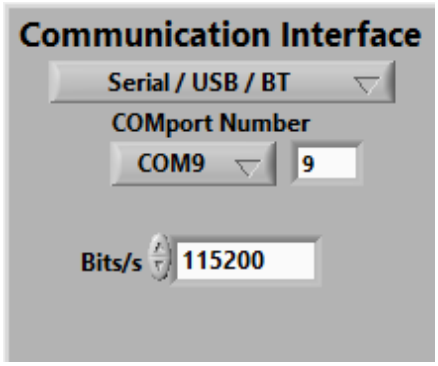


FIGURE 73 - COMMUNICATION INTERFACE

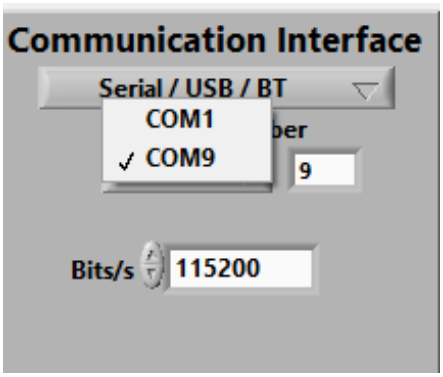


FIGURE 74 - COMMUNICATION INTERFACE COM

1.3. Connect and Cancel

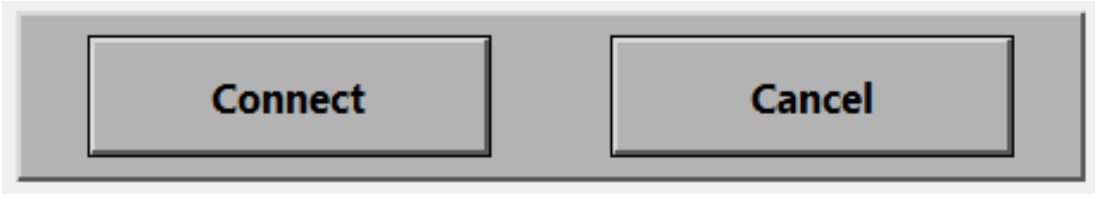


FIGURE 75 - CONNECT AND CANCEL

2. Channel Scaling

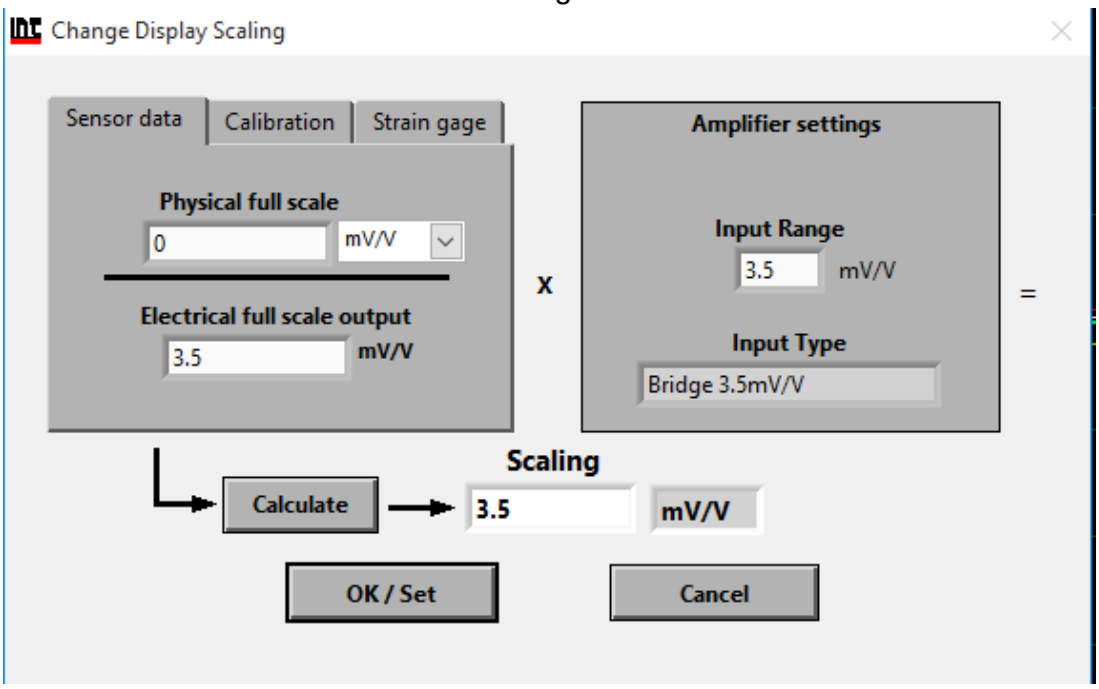


FIGURE 76 - CHANNEL SCALING

Sensor

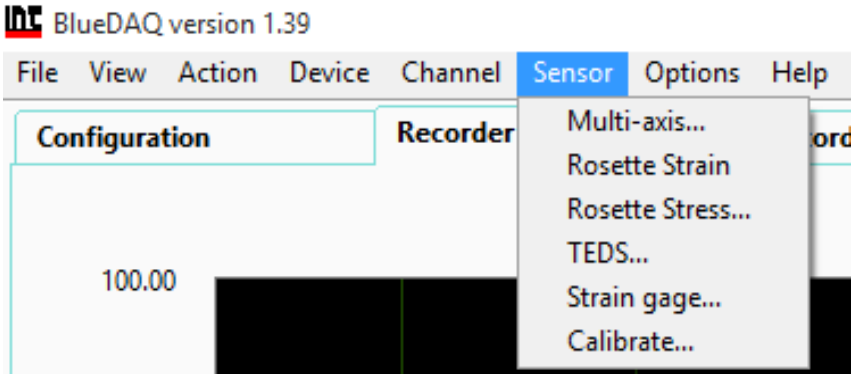


FIGURE 77 – SENSOR MENU

1. Multi-axis – Refer to **step 5.**
2. Rosette Strain – Arrangement of two or more strain gauges.
3. Rosette Stress

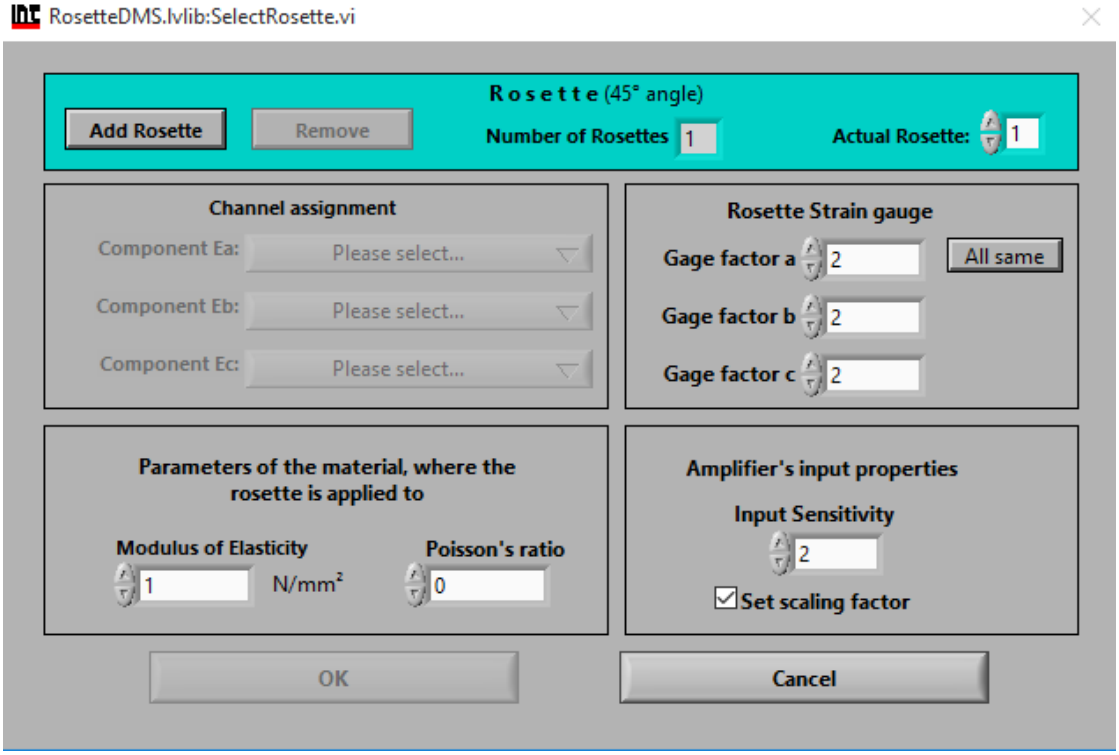


FIGURE 78 - ROSETTE STRESS

4. Add Rosette / Remove

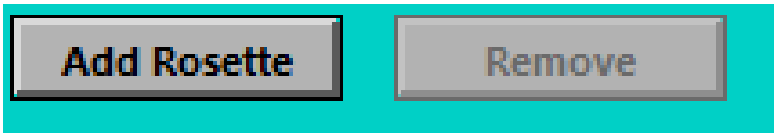


FIGURE 79 - ADD ROSETTE

5. Number of Rosettes – Number of included rosette strain gauges which are configured already.

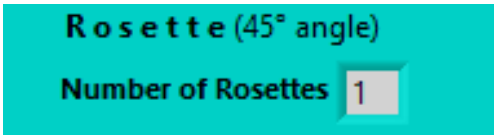


FIGURE 80 - NUMBER OF ROSETTES

6. Actual Rosette – If you have configured more than one rosette strain gauge, here you can switch between the different rosette stain gauge settings.

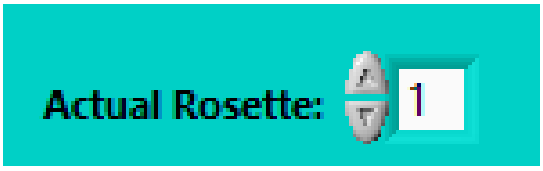


FIGURE 81 - ACTUAL ROSETTE

7. Component Ea: - The Rosette-Strain gauge consists of three single strain gauges which are arranged at an angle of 45° to each other. Choose here for the physical channel of your measuring amplifier where the single strain gauge Epsilon A is connected to. The resulting angle value of Phi refers to the longitudinal axis of this single strain gauge.

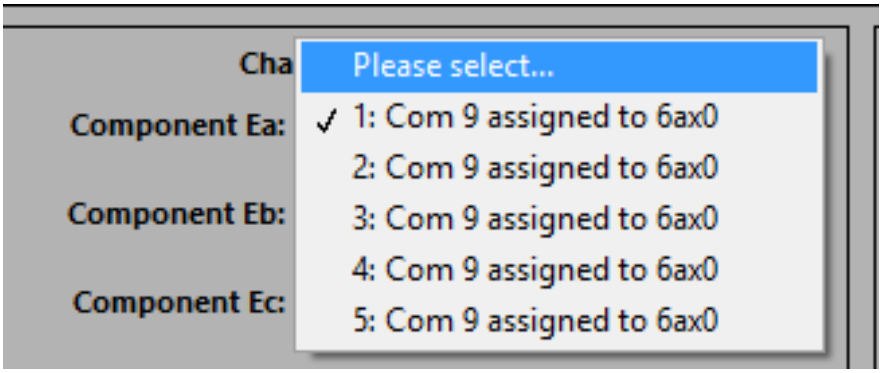


FIGURE 82 - COMPONENT EA

8. Parameters of the material, where the rosette is applied to

8.1. Modulus of Elasticity – Enter the elastic modulus of the material, whose stress shall be determined in Newtown per square millimeters. The elastic modulus of an object is defined as the slope of its stress-strain curve in the elastic deformation region of the material to be measured. Since this parameter is very significant for the stress calculation, it should be entered as exact as possible. Please multiply the values in lb/in^2 with 0.0068971125763 to get the modulus in N/mm^2.

8.2. Poisson's ratio – Enter the Poisson's ratio of the material whose stress shall be determined. The Poisson's ratio is the ratio when a sample object is stretched of the contraction or transverse strain (perpendicular to the applied load), to the extension or axial strain. Since this parameter is a little less significant for the stress calculation, an approximate value may be entered.

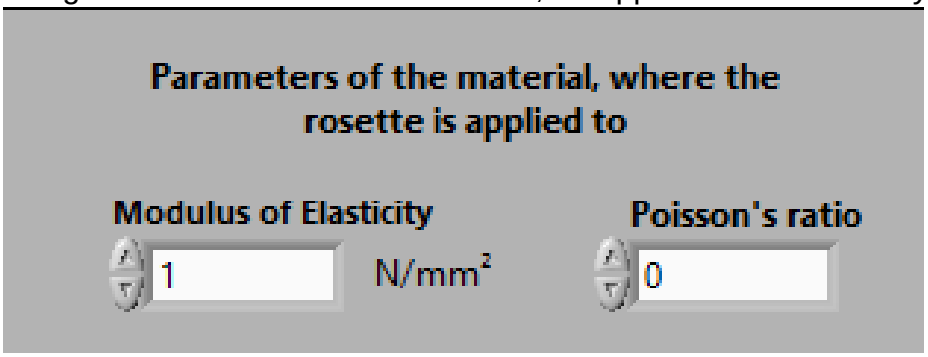


FIGURE 83 - PARAMETERS OF THE MATERIAL

8.3. Gage factor – Enter the gage factor for the single strain gauge. The gauge factor is the ratio of relative change in an electrical resistance to the mechanical strain epsilon. If all three gauge factors are equal, enter the value and then press "All Same".

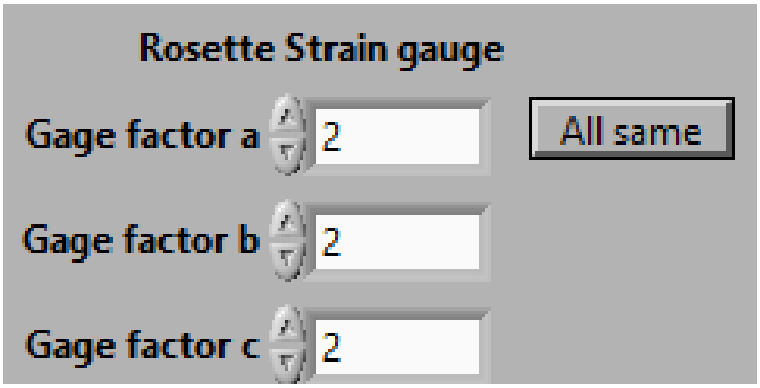


FIGURE 84 - ROSETTE STRAIN GAUGE

8.4. Amplifier's input properties

8.4.1. Input Sensitivity – Change this value if it doesn't match the input sensitivity of the measuring amplifier where the strain ages are connected to. Normally the value shown is the correct value, some GSV-2 or GSV-4 measuring amplifiers do communicate the correct value to the program. Together with the gauge factor, this value will be used to calculate the correct scaling factor automatically after the OK button is pressed. NOTE: The strain gauges must be wired in a quarter bridge configuration in order to calculate the scaling factor correctly.

8.4.2. Set Scaling factor – Uncheck this checkbox if you are sure that the scaling factors of the channels where the three strain gauges are connected to are already correct. If checked, the new scaling factor will be calculated automatically according to the gauge factors and the input sensitivity settings. NOTE: the strain gauges must be wired in a quarter bridge configuration in order to calculate the new scaling.

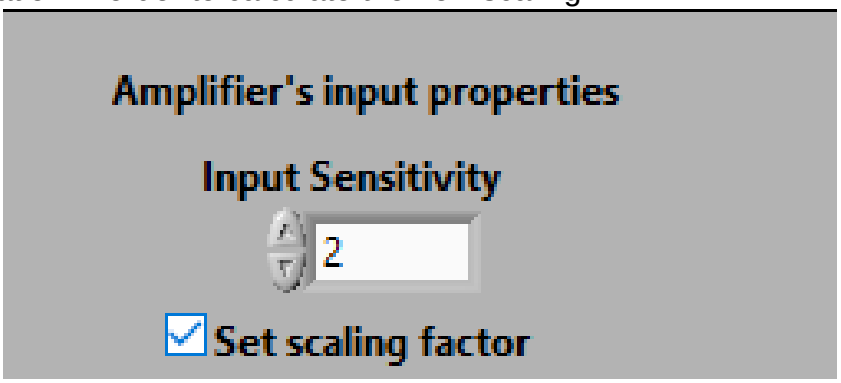


FIGURE 85 - AMPLIFIER'S INPUT PROPERTIES

9. TEDS – Transducer Electronic Data Sheet

10. Strain gage

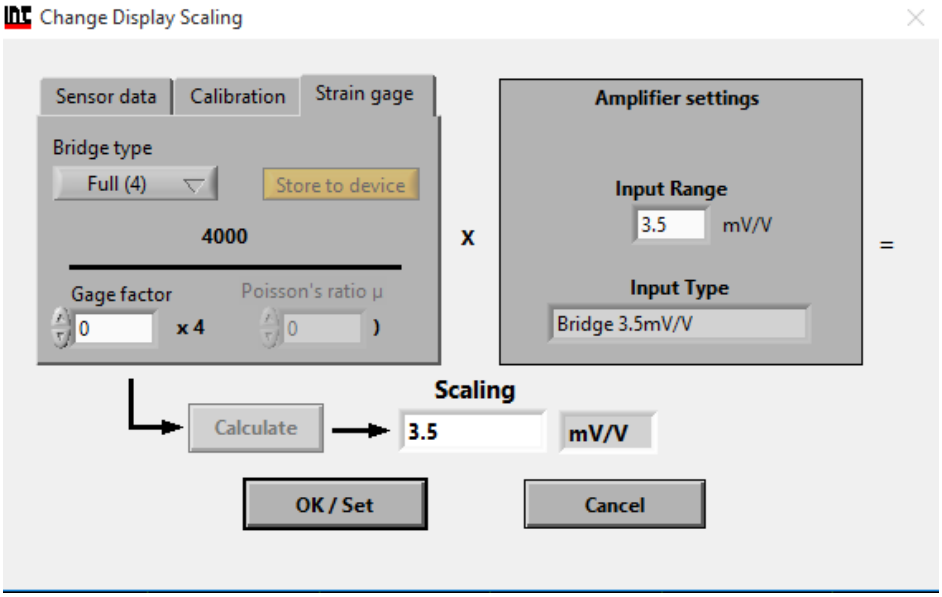


FIGURE 86 - STRAIN GAGE

11. Calibrate

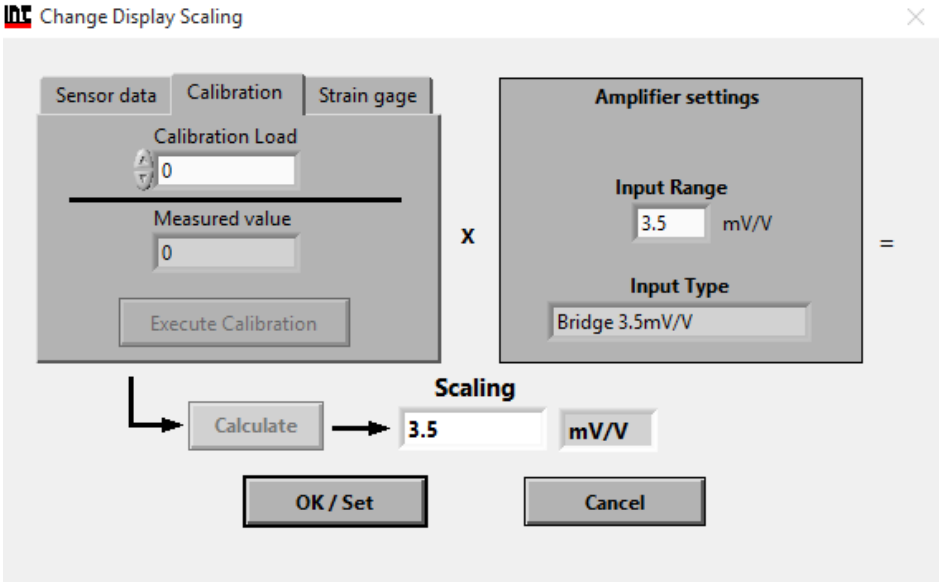


FIGURE 87 - CALIBRATE

Options

1. Hardware

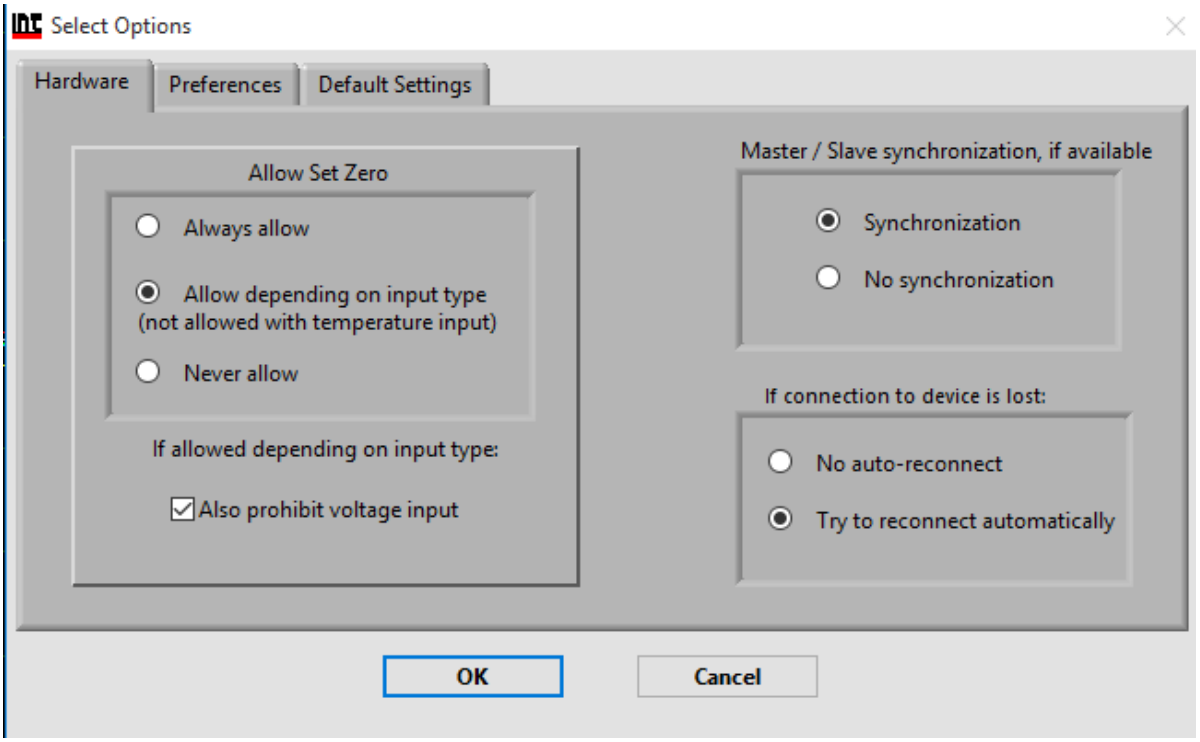


FIGURE 88 - HARDWARE

2. Preferences

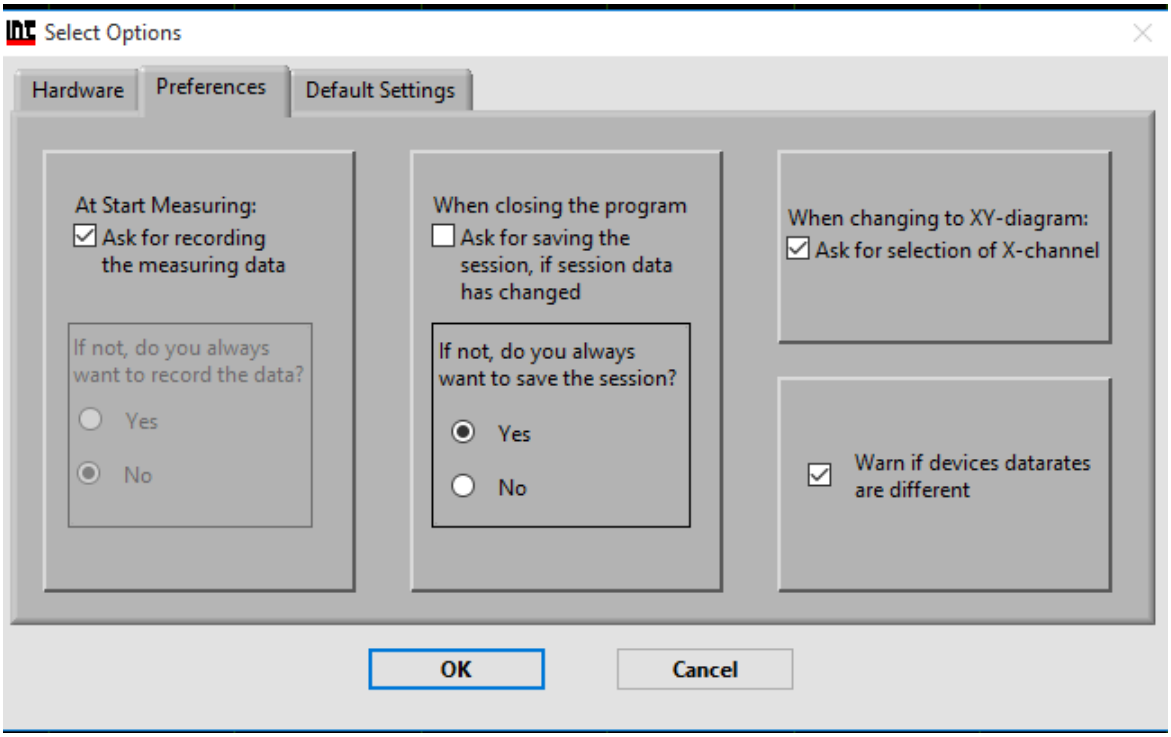


FIGURE 89 - PREFERENCES

3. Default Settings

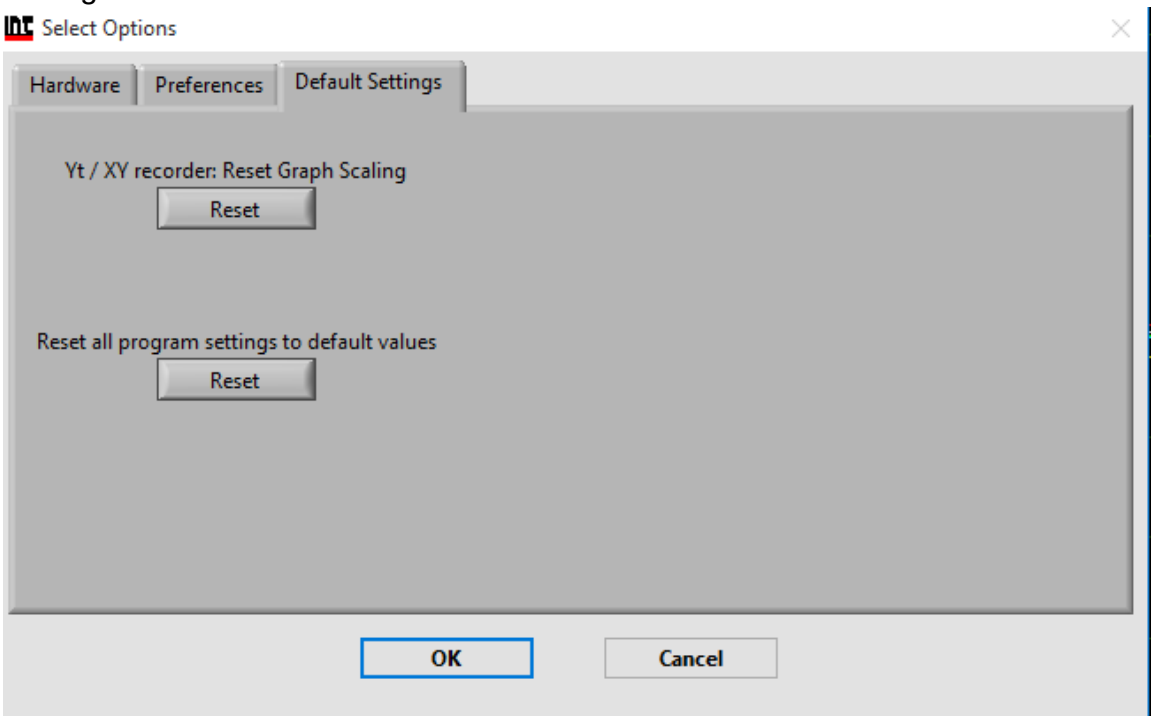


FIGURE 90 - DEFAULT SETTINGS

Help

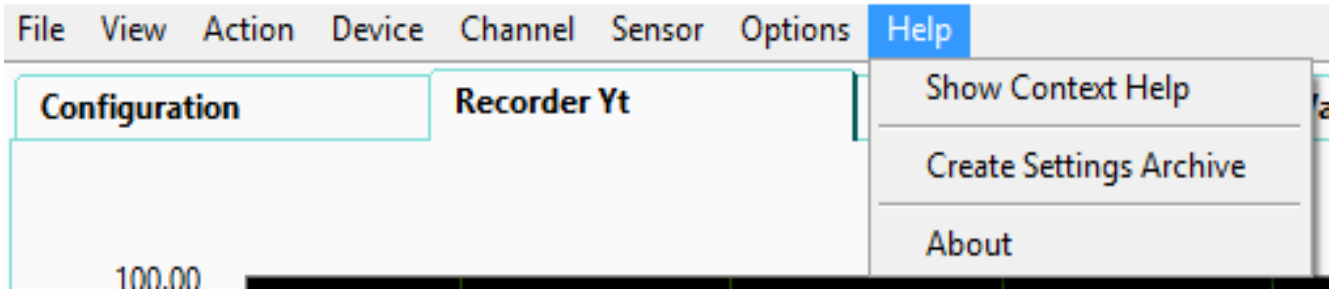


FIGURE 91 - HELP

1. Show Context Help

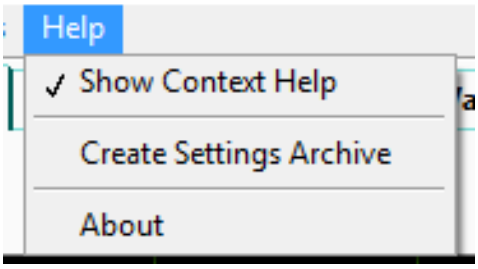


FIGURE 92 - SHOW CONTEXT HELP

2. A box will appear on the corner with a definition of each function.

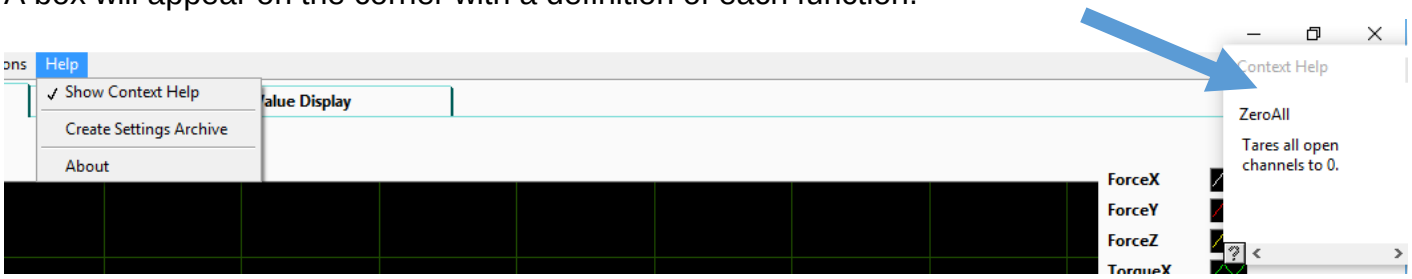


FIGURE 93 - CONTEXT HELP POPUP

3. Create Settings Archive

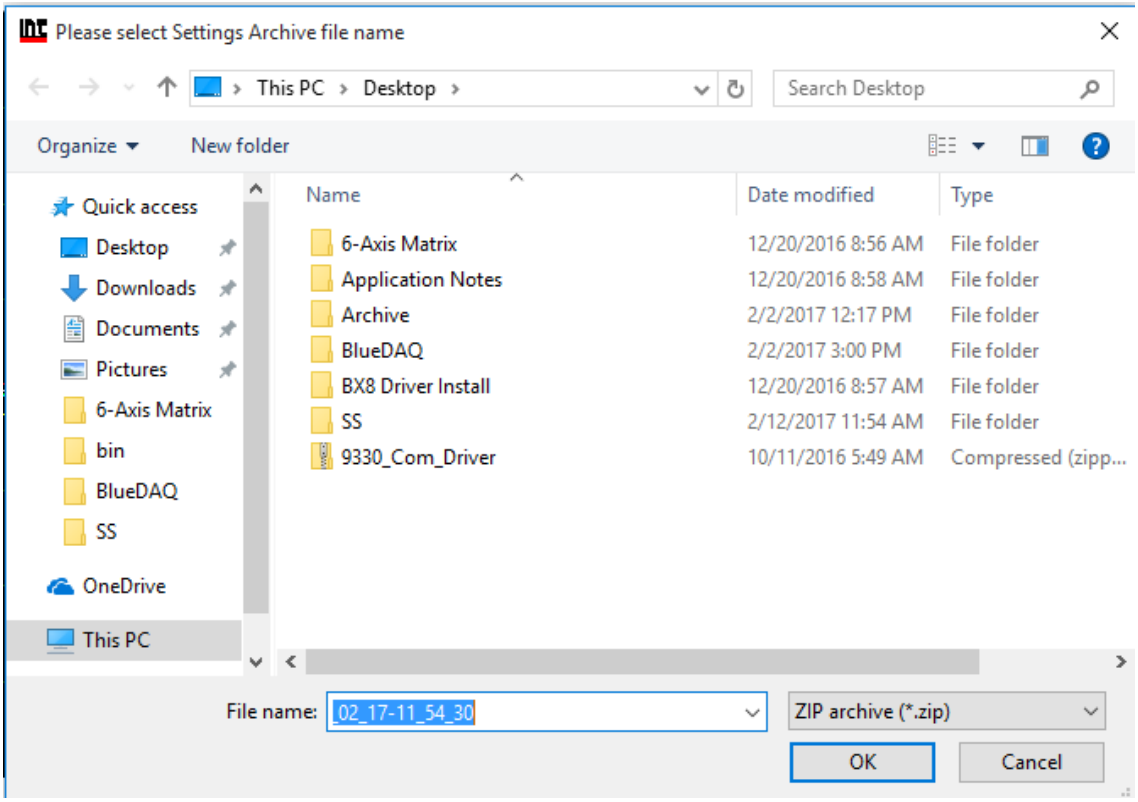


FIGURE 94 - CREATE SETTINGS ARCHIVE

4. About lets you know the BlueDAQ version number.

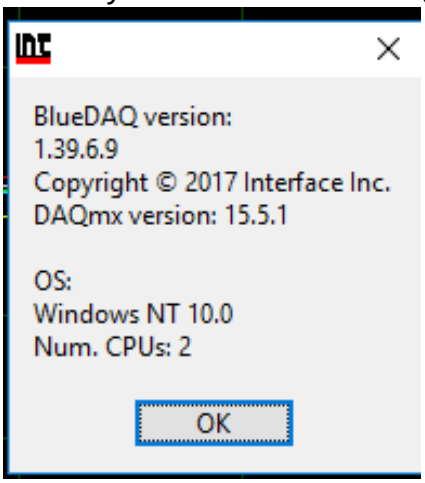


FIGURE 95 – ABOUT

Technical Data

Accuracy Class	
Analog	0.1%
Digital	0.05%
Inputs	
Measurement Range	±1mV/V (JP1 on 1 with 5V sensor supply)
	±2mV/V or ±3.5 per software) ±3.5mv/V per software) (JP1 on 2 with 2.5V sensor supply)
Connectible full bridge	4 x 350 Ohm
Bridge supply voltage	2.5V/5V
Input Impedance	>20MOhm (300pF)
Common mode rejection	
DC	>120 dB
100Hz	>100 dB
Analog Input 1	
Input voltage range	0 - 10V
Input resistance	56 kOhm
Accuracy	
Linearity deviation	<0.02% of unit
Influence of temperature on the zero point per 10K	Measurement range 1mV/V: <0.4 type 0.2% of unit Measurement range 2mV/V: <0.2 type 0.1% of unit
Influence of temperature on the measurement sensitivity per 10K referring to the measured value	
Analog output	<0.1; type 0.05%
Display / digital	<0.1; type 0.005%
Resolution	
Peak Value	>30000 parts
RMS	>150000 parts
Output	
Analog Output Filter	
-3dB cut-off frequency, Bessel, 2. order	3.5; 260; 1700 Hz (can be switched using software)
Digital Output Filter	
3dB cut-off frequency	0.06-1700 Hz
Digital output measuring rate	0-3750 Hz
Analog Output	±5V
Source resistance	47 Ohm

Control cables	High level: 3.4V (active high)
Automatic zero-point adjustment	Low Level: <1.4V
Control cables	High level: 3.4V (active high)
Automatic zero-point adjustment	Low Level: <1.4V
Supply	
Supply voltage	
Nominal range	7 - 27VDC
Operating range	6 - 30VDC
Power Input	2 (charge battery: max. 11VA)
Battery	31.2 Wh
Operating time with battery	
Normal operation	Max. 20 Hours
Standby	Max 300 Days
Duration of battery charging	
Supply voltage 10-27V	Max. 6 Hours
Supply with USB (standby operation)	Max. 27 Hours
Interface	
USB Version	2.0 Fullspeed
Device classes	Mass Storage Device, Communication Device Class
Memory card	SD (1.x), SDHC, class6 or 10, (not UHS-1 and not UHS-2)
File system	FAT16, FAT32
Functions, user menu (selection)	
Parameter memory	Last setting (automatic) Manufacturer's settings 6 parameter sets
Other functions	- programmable amplification - programmable adjustment of the digital final value - activation of the zero-point adjustment
Temperature range	
Nominal temeperature range	0 to 50 C
Storage temperature range	-20 to 70 C
Dimensions	
L x H x T	164 x 105 x 32
Weight	610g
Protection class	IP51 / IP65

Absolute limit values
(all voltages based on supply chassis)
Differential input:: -12 to +12V
Sense inputs: -12 to +12V
Control cables: -30 to +30V

Warranty

All Telemetry products from Interface Inc., ('Interface') are warranted against defective material and workmanship for a period of (1) one year from the date of dispatch. If the 'Interface' product you purchase appears to have a defect in material or workmanship or fails during normal use within the period, please contact your Distributor, who will assist you in resolving the problem. If it is necessary to return the product to 'Interface' please include a note stating name, company, address, phone number and a detailed description of the problem. Also, please indicate if it is a warranty repair. The sender is responsible for shipping charges, freight insurance and proper packaging to prevent breakage in transit. 'Interface' warranty does not apply to defects resulting from action of the buyer such as mishandling, improper interfacing, operation outside of design limits, improper repair or unauthorized modification. No other warranties are expressed or implied. 'Interface' specifically disclaims any implied warranties of merchantability or fitness for a specific purpose. The remedies outlined above are the buyer's only remedies. 'Interface' will not be liable for direct, indirect, special, incidental or consequential damages whether based on the contract, tort or other legal theory. Any corrective maintenance required after the warranty period should be performed by 'Interface' approved personnel only.

Revision History		
Author	**Revision**	**Release Date**
KB	A	-
PB	B	09/12/2018