



TELEDYNE INSTRUMENTS

Monitor Labs

A Teledyne Technologies Company

ULTRAFLOW 150

PC TO MODBUS INTERFACE SOFTWARE USER MANUAL

Teledyne Monitor Labs
Gibsonia Facility
5310 North Pioneer Rd.
Gibsonia, PA 15044
724-444-5000 Phone
724-444-5050 Fax

DOCUMENT NUMBER: 1900-0710-01 REV. C

DECEMBER 2003

Proprietary information. All rights reserved by Teledyne Monitor Labs, Inc. No part of this book may be reproduced or copied in any form or by any means – graphic, electronic, or mechanical, including photocopying, taping or information storage and retrieval systems – without the written permission of the publisher.

Made in United States of America.

END-USER SINGLE-USER LICENSE AGREEMENT

END-USER SINGLE-USER LICENSE AGREEMENT FOR USE OF TELEDYNE MONITOR LABS, INC.

Ultraflow 150 PC to MODBUS Interface SOFTWARE

IMPORTANT-READ CAREFULLY: This Teledyne Monitor Labs, Inc. End-User License Agreement ("EULA") is a legal agreement between you (either an individual or an entity), the end user (recipient and licensee) and Teledyne Monitor Labs, Inc. at 5310 N. Pioneer Rd., Gibsonsia, PA 15044 (supplier and licensor) for the Teledyne Monitor Labs, Inc. software product identified above, which includes computer software and may include associated media, printed materials, or electronic documentation ("SOFTWARE PRODUCT"). By installing, copying, or otherwise using the SOFTWARE PRODUCT, you agree to be bound by the terms of this EULA. If you do not agree to the terms of this EULA, you may not use the SOFTWARE PRODUCT and must return the SOFTWARE PRODUCT to Teledyne Monitor Labs, Inc.

SOFTWARE PRODUCT LICENSE

The SOFTWARE PRODUCT is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties. The SOFTWARE PRODUCT is licensed to the end-user and remains the property of TELEDYNE MONITOR LABS, INC.. It is not sold, and does not become the property of the end-user.

The SOFTWARE PRODUCT is comprised of the software program components distributed on this media and associated installation, operation, configuration, and maintenance materials and/or training, as applicable.

1. **GRANT OF LICENSE.** This EULA grants you the following rights:
Software Product. You may install and use one (1) copy of the SOFTWARE PRODUCT on a single computer which is owned and operated by the licensee mentioned above.

2. **DESCRIPTION OF OTHER OBLIGATIONS, RIGHTS, AND LIMITATIONS.**
SUPPORT SERVICES. Teledyne Monitor Labs, Inc. may provide you with support services related to the SOFTWARE PRODUCT. Use of Support Services is governed by Teledyne Monitor Labs, Inc. policies and programs described in the user manual and/or other Teledyne Monitor Labs, Inc. provided materials. Any supplemental software code provided to you as part of the Support Services shall be considered part of the SOFTWARE PRODUCT and subject to the terms and conditions of this EULA.

Limitations on Reverse Engineering, Decompilation, and Disassembly. You may not reverse engineer, decompile, or disassemble the SOFTWARE PRODUCT, except and only to the extent that such activity is expressly permitted by applicable law notwithstanding this limitation.

Use of SOFTWARE PRODUCT by others. You may not rent, lease or lend the SOFTWARE PRODUCT. It is provided for your exclusive use.

Transferability. This EULA is non-transferable to any other party.

3. **ALL RIGHTS NOT EXPRESSLY GRANTED HEREIN ARE RESERVED BY TELEDYNE MONITOR LABS, INC.**

4. **TERMINATION.** Without prejudice to any other rights, Teledyne Monitor Labs, Inc. may terminate this EULA if you fail to comply with the terms and conditions of this EULA. In such event, you must destroy or return, at Teledyne Monitor Labs, Inc. request, all copies of the SOFTWARE PRODUCT and all of its component parts.

5. **COPYRIGHT.** The SOFTWARE PRODUCT is a copyrighted product of Teledyne Monitor Labs, Inc. except to the extent that it incorporates copyrighted software products owned by others and licensed for our use. In particular, special features including but not limited to any images, photographs, animations, video, audio,

music, text, and "applets" incorporated into the SOFTWARE PRODUCT, the accompanying printed materials, and any copies of the same incorporated into the SOFTWARE PRODUCT are owned by TELEDYNE MONITOR LABS, INC.. The SOFTWARE PRODUCT is protected by copyright laws and international treaty provisions. Therefore, you must treat the SOFTWARE PRODUCT like any other copyrighted material. You may not copy the printed materials accompanying the SOFTWARE PRODUCT without Teledyne Monitor Labs, Inc. express permission.

6. EXPORT RESTRICTIONS. You acknowledge that the SOFTWARE PRODUCT licensed hereunder is subject to the export control laws and regulations of the U.S.A., and any amendments thereof. You confirm that with respect to the SOFTWARE PRODUCT, you will not export or re-export it, directly or indirectly, to any countries that are subject to U.S.A. export restrictions. You further acknowledge that the SOFTWARE PRODUCT may include technical data subject to export and re-export restrictions imposed by U.S.A. law.

LIMITED WARRANTY

1. GENERAL PROVISIONS. Teledyne Monitor Labs, Inc. software is provided in accordance with specific application requirements and is of such complexity that it may exhibit defects under certain unusual combinations or occurrences of events. Therefore, Teledyne Monitor Labs, Inc. does not warrant that such software shall be free from defects under all possible operating conditions. Teledyne Monitor Labs, Inc. will devote its best efforts to ensure that such prohibited conditions will not interfere with normal operation in typical operating conditions.

Teledyne Monitor Labs, Inc. reserves the right to make minor changes to the software and/or hardware system specifications, in order to overcome unforeseen difficulties that may occur in the development or interaction of the specified computer hardware and software, as necessary to meet basic system performance objectives.

2. DEFECT NOTIFICATION AND CORRECTION. Software prepared by Teledyne Monitor Labs, Inc. is warranted to provide general operating characteristics as specified by contract documents. Teledyne Monitor Labs, Inc. must be notified in writing at the address below within 60 days of the software startup date of any observed defects that the customer wishes to have corrected. Upon evaluation of such defects, Teledyne Monitor Labs, Inc. will correct those defects determined to be within the scope of the contract and warranty and resubmit the program to the customer. If further defects are observed, they must be submitted in writing to Teledyne Monitor Labs, Inc. within 30 days of the most recent software shipment date. Teledyne Monitor Labs, Inc. will accept warranty responsibility for defects after the 60-day notification period if such defects could not have been observed within the 60-day notification period, however, the software warranty period will not exceed 120 days past the original software startup date, unless supplied as part of the original order for a complete continuous emission monitoring system (CEMS), in which case the software may be warranted for a period not to exceed the warranty term of the CEMS hardware.

3. EXCLUSIONS AND TERMINATIONS

- Teledyne Monitor Labs, Inc. application software is not warranted to run concurrent with other application programs running within the same operating system environment, unless specifically excepted for special applications authorized by Teledyne Monitor Labs, Inc.. Warranty for such software products may be voided at Teledyne Monitor Labs, Inc.'s option if the PC hardware has been

END-USER SINGLE-USER LICENSE AGREEMENT

modified by the user.

- Teledyne Monitor Labs, Inc. shall not be liable for incidental or consequential damages that may occur as a result of purchasing and using these products. Teledyne Monitor Labs, Inc. liability hereunder is limited to the cost of correcting the defective products subject to this warranty.

- Upon the expiration of the applicable warranty period, Teledyne Monitor Labs, Inc.'s liability shall cease and terminate.

- This limited warranty is provided in lieu of all other warranties, whether statutory, expressed or implied, including implied warranties of merchantability and fitness for a particular purpose.

4. LIMITATION OF LIABILITY. To the maximum extent permitted by applicable law, in no event shall Teledyne Monitor Labs, Inc. or its suppliers be liable for any special, incidental, indirect, or consequential damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or any other pecuniary loss) arising out of the use of or inability to use the SOFTWARE PRODUCT or the provision of or failure to provide Support Services, even if Teledyne Monitor Labs, Inc. has been advised of the possibility of such damages. In any case, Teledyne Monitor Labs, Inc.'s entire liability under any provision of this EULA shall be limited to the amount actually paid by you for the licensed use of the SOFTWARE PRODUCT; provided however, if you have entered into a Teledyne Monitor Labs, Inc. Support Services Agreement, Teledyne Monitor Labs, Inc.'s entire liability regarding Support Services shall be governed by the terms of that agreement. Because some states and jurisdictions do not allow the exclusion or limitation of liability, the above limitation may not apply to you.

Teledyne Monitor Labs, Inc.
Gibsonia Facility
5310 North Pioneer Rd.
Gibsonia, PA 15044

1-724-443-8610 Phone
1-724-443-4025 Fax

<http://www.monitorlabs.com>

(This page intentionally left blank)

TABLE OF CONTENTS

Chapter 1:	Introduction.
Chapter 2:	Ultraflow 150 Main Screen.
Chapter 3:	Service Data Screen.
Chapter 4:	Current Software Versions Screen.
Chapter 5:	System Properties Screen.
Chapter 6:	Numerical Data Screen.
Chapter 7:	Data Sampling Screen.
Chapter 8:	SIXPOINT I/O Screen.
Chapter 9:	Output Cal Test Screen.
Chapter 10:	TIE Diagnostics Screen.

(This page intentionally left blank)

1. Introduction.

The Ultraflow 150 Modbus PC Interface Software is designed to aid configuration of the Ultraflow 150 Transducer Interface Enclosure (TIE) and to perform data sampling. In essence it somewhat mimics the screen layout of the Ultraflow 150 Enhanced Remote Panel (ERP).

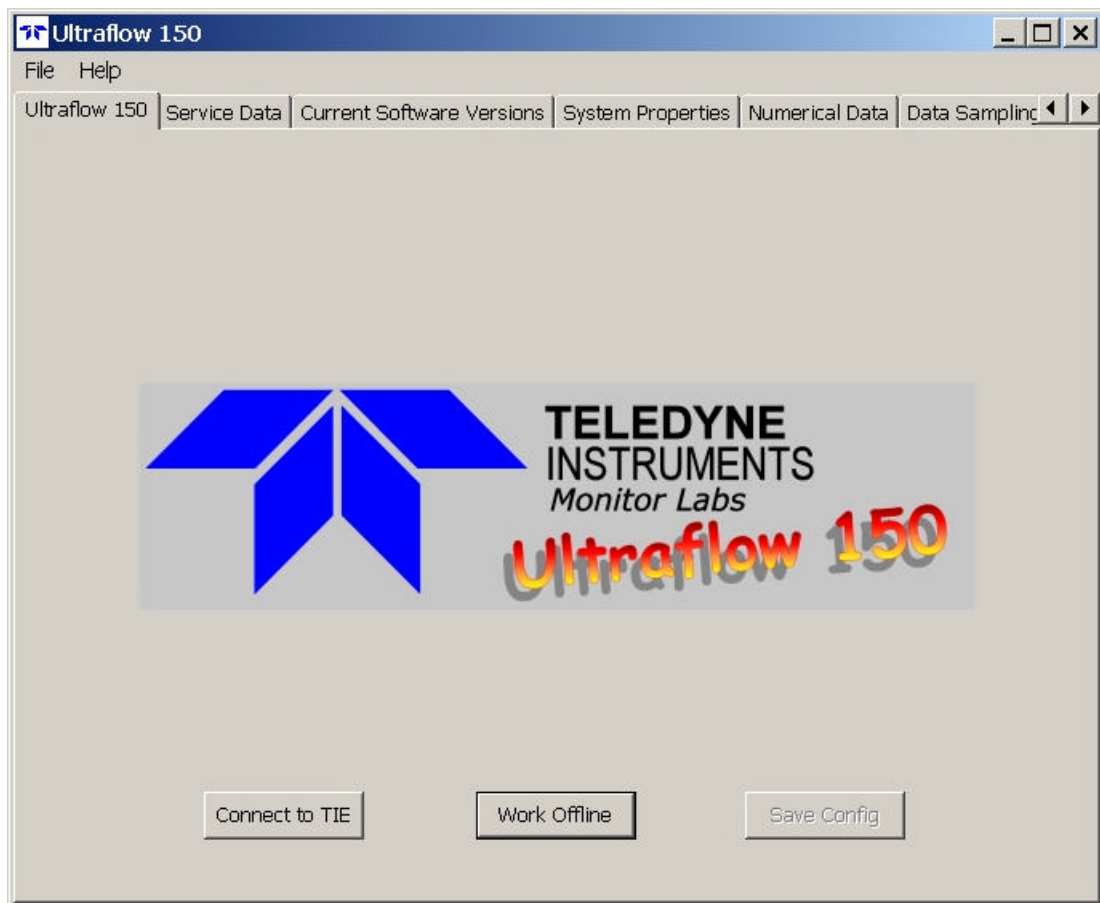
One of the capabilities of the PC Interface software is to retrieve configuration data from the TIE or to upload a stored configuration back to the TIE. The stored configuration can be viewed or edited on a PC without being connected to the TIE.

The TIE configuration data can also be exported into a printable text format directly when connected online to the TIE or when working offline with stored configuration.

In order to facilitate data logging, the PC Interface can be connected to a TIE and can be set to sample data for any amount of time. This data is exported into a formatted, delimited text file, suitable for importing into spreadsheet applications.

The main PC Interface Software window contains main menu and tabbed selection of screens that can display the following:

- Ultraflow 150 Main Screen,
- Service Data Screen,
- Current Software Versions Screen,
- System Properties Screen,
- Numerical Data Screen,
- Data Sampling Screen,
- SIXPOINT I/O Screen,
- Output Cal Test Screen,
- TIE Diagnostics Screen.

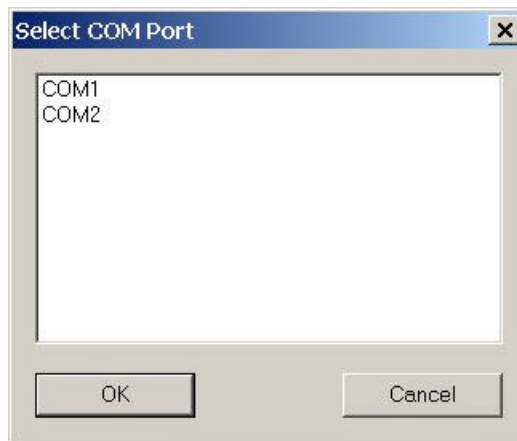


Picture 1: Ultraflow 150 PC Interface Main Screen

2. Ultraflow 150 Main Screen and File Menu.

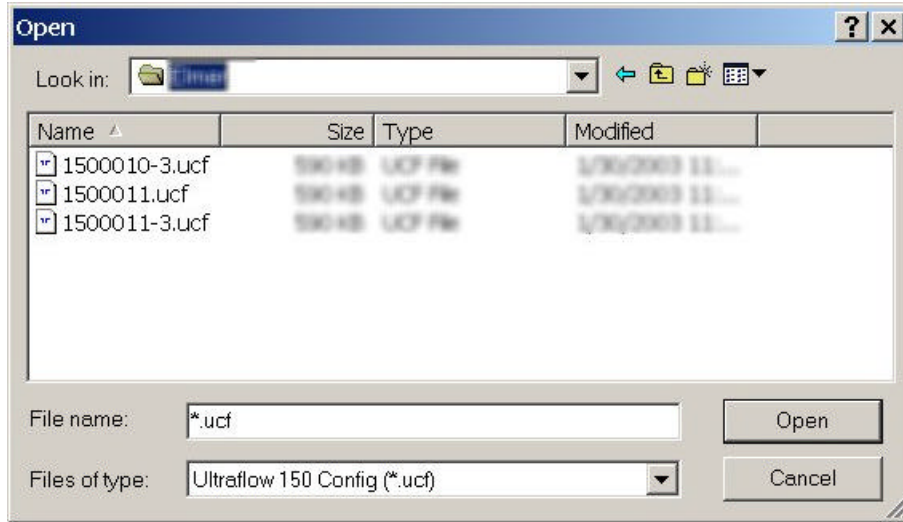
The Ultraflow 150 Main Screen (see Picture 1) has the following buttons displayed:

- **Connect to TIE** – Pressing this button will bring the “Select COM Port” dialog box shown on picture 2 below. This option is used when the TIE is connected to the PC via serial connection. Once successfully connected to TIE the main window’s title will display “Ultraflow 150 - Connected to TIE x” (where x will be 1 or 2 in respect to which TIE the connection applies).



Picture 2: Communication Port Selection

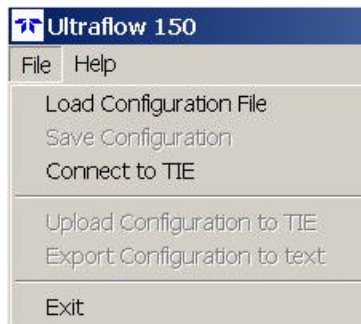
- **Work Offline** – Pressing this button brings a File Open Dialog (Picture 3) from which a stored configuration can be opened for *offline* viewing or editing. Once the configuration file is successfully opened, the main window’s title will display “Ultraflow 150 : FileName.ucf TIE x Configuration” – where FileName.ucf is the name of the file opened and the x will be 1 or 2 in respect to which TIE the configuration applies or was retrieved from.



Picture 3: Open Stored Configuration File Dialog

- **Save Config** – button is enabled once an offline configuration file is opened or the PC is connected to TIE. Pressing this button will bring a File Save Dialog if offline, or if online, it will display a progress bar which will reflect how much data is retrieved from the TIE and stored into a new configuration file.

The File Menu shown on picture 4, has the following options:



Picture 4: File Menu

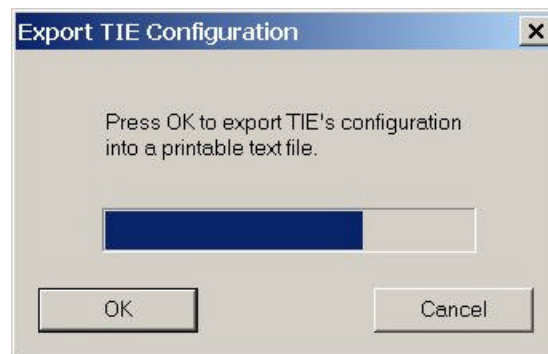
- **Load Configuration File** – Works as same as the **Work Offline** button – it loads a stored configuration.
- **Save Configuration** – same as the **Save Config** button – stores a loaded configuration file, or if online, retrieves configuration from TIE to store in new configuration file.
- **Connect to TIE** – performs same function as the **Connect to TIE** button.
- **Upload Configuration to TIE** – once configuration file is loaded, this option is enabled and uploads the configuration parameters to the TIE. When engaged it first brings a “Select COM Port” window (picture 2) and

after a valid COM port is selected a upload dialog is displayed. Pressing the “Begin Uploading” button starts the upload procedur .During the uploading process, the main window’s title changes into “Uploading... Please wait” and the progress is displayed in the progress bar as shown on Picture 5a.



Picture 5a: Uploading configuration into TIE.

- **Export Configuration** – this option works both with online and offline mode. It exports the configuration file or the TIE’s configuration into a readable text file. The dialog box displayed is shown on picture 5.



Picture 5b: Export configuration into text file.

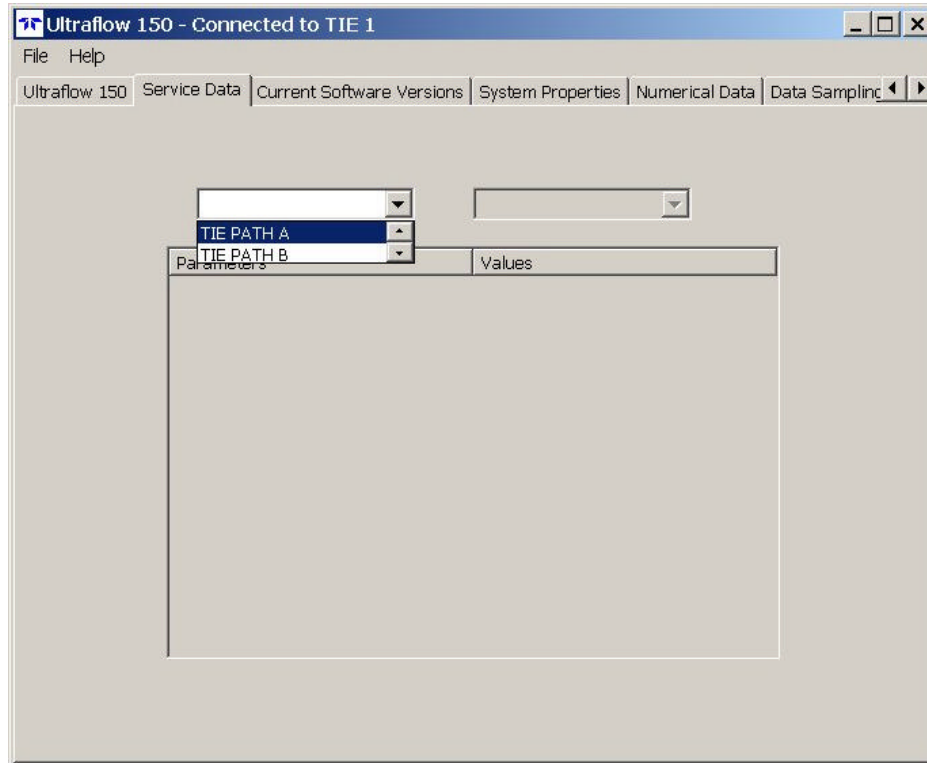
- **Exit** – exits the application.

(This page intentionally left blank)

3. Service Data Screen.

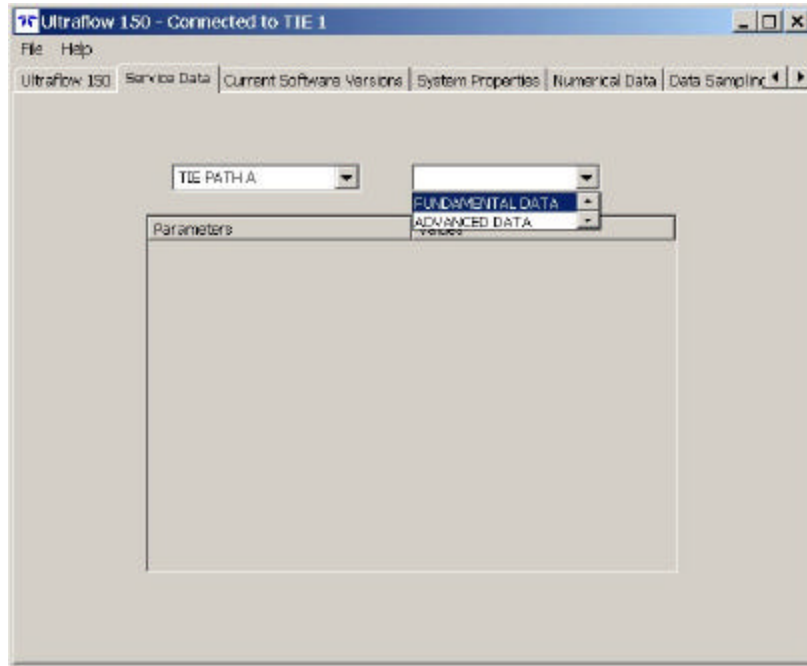
The Ultraflow 150 Service Data Screen mimics the service data screen from the ERP.

In order to display data, first select the Data Path in the left top-most list (Picture 6). Valid choices are **TIE PATH A** and **TIE PATH B**.



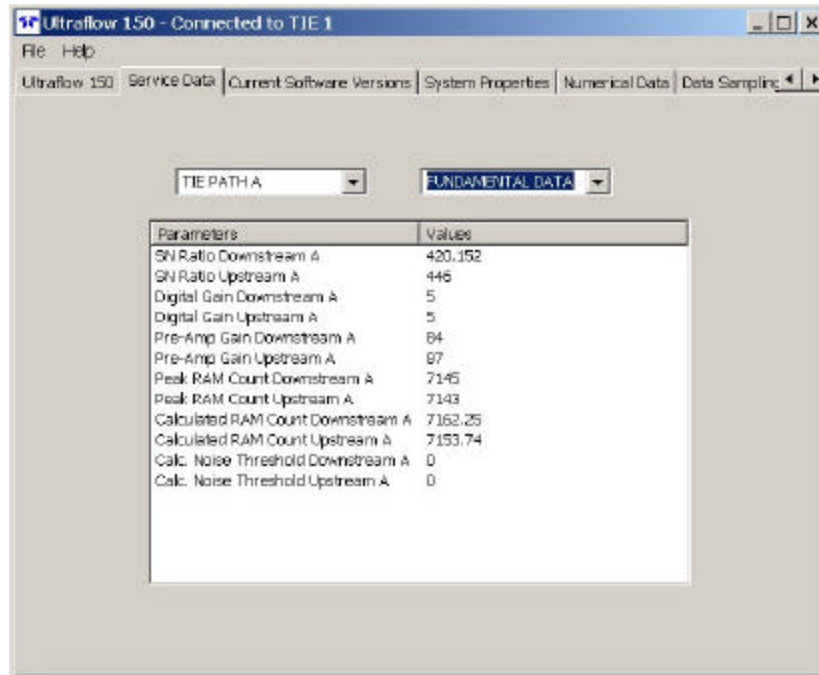
Picture 6: Service Data Path Select.

Second, select which data is to be viewed. Valid selections are **FUNDAMENTAL DATA** and **ADVANCED DATA** shown in picture 7.



Picture 7: Selection of data to be monitored.

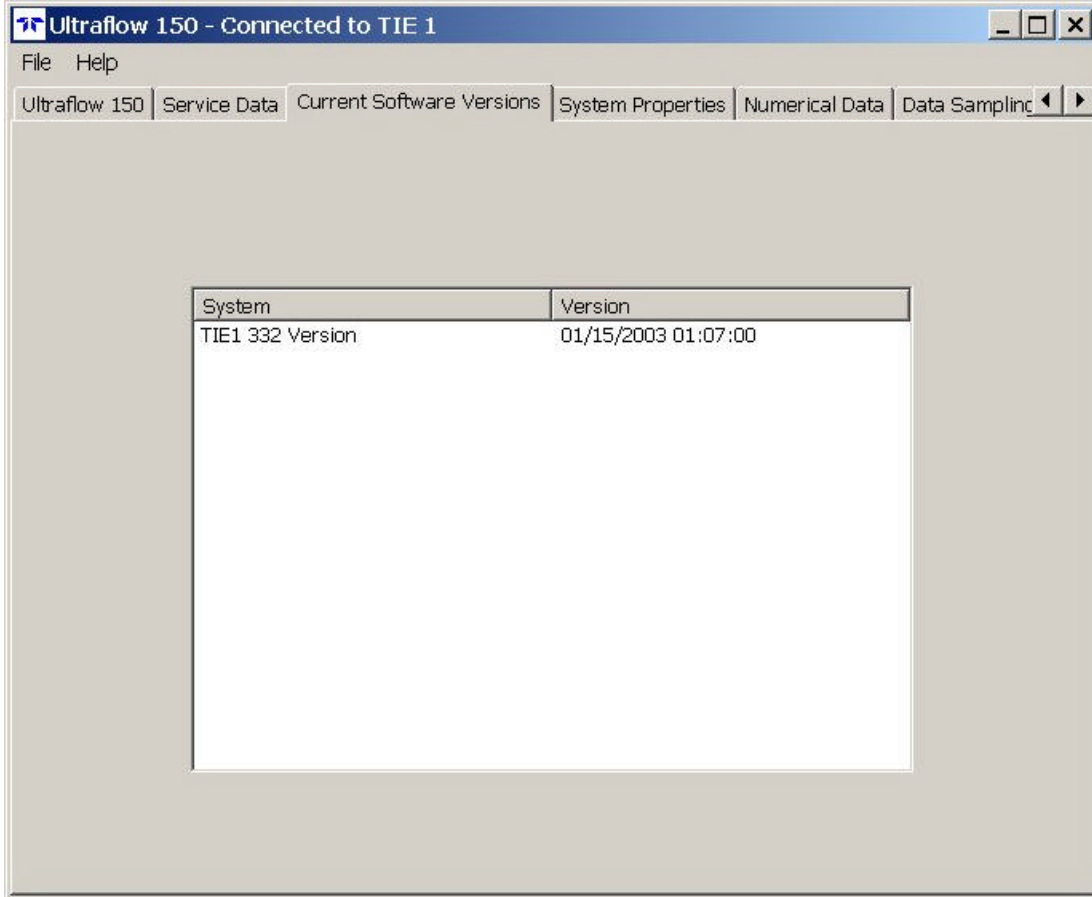
Once the data type is selected, the data should be displayed in the box as shown on picture 8. *This data cannot be edited.*



Picture 8: Fundamental Service Data retrieved form the TIE.

4. Current Software Versions Screen.

The following screen only displays a valid data if the PC is connected to the TIE. In case of offline operation the screen displays zeros.

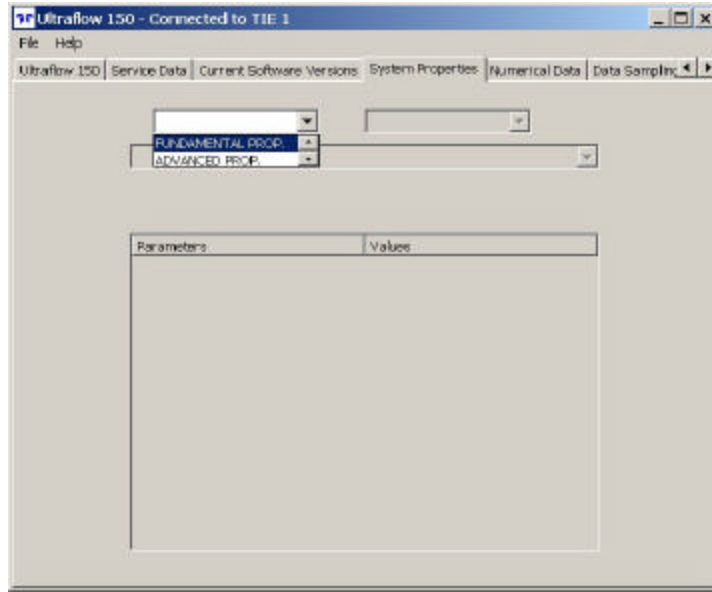


Picture 9: Current Software Versions

(This page intentionally left blank)

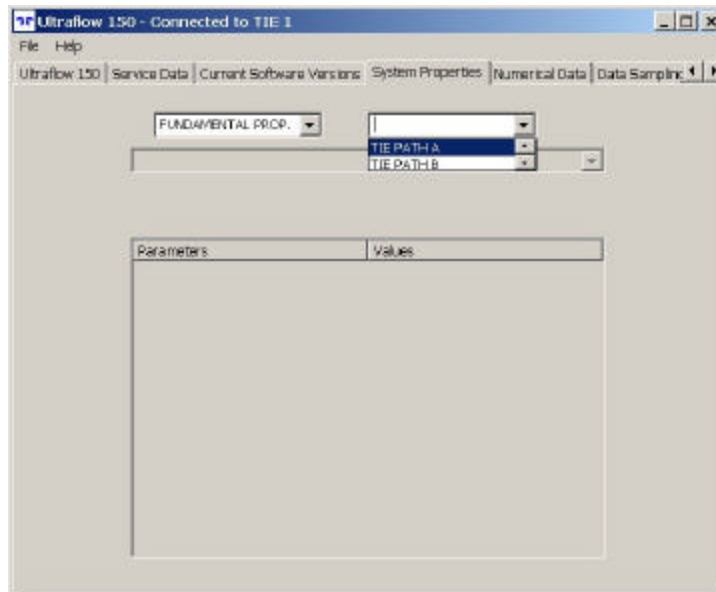
5. System Properties Screen.

The System Properties Screen begins with selection of properties to be viewed or edited. The valid choices are **FUNDAMENTAL PROPERTIES** and **ADVANCED PROPERTIES** as shown on picture 10 below.



Picture 10: Selection of System Properties to edit or view.

The next step is to select the path as shown on Picture 11. The valid selections are **TIE PATH A** and **TIE PATH B**.



Picture 11: Selection of path to view or edit.

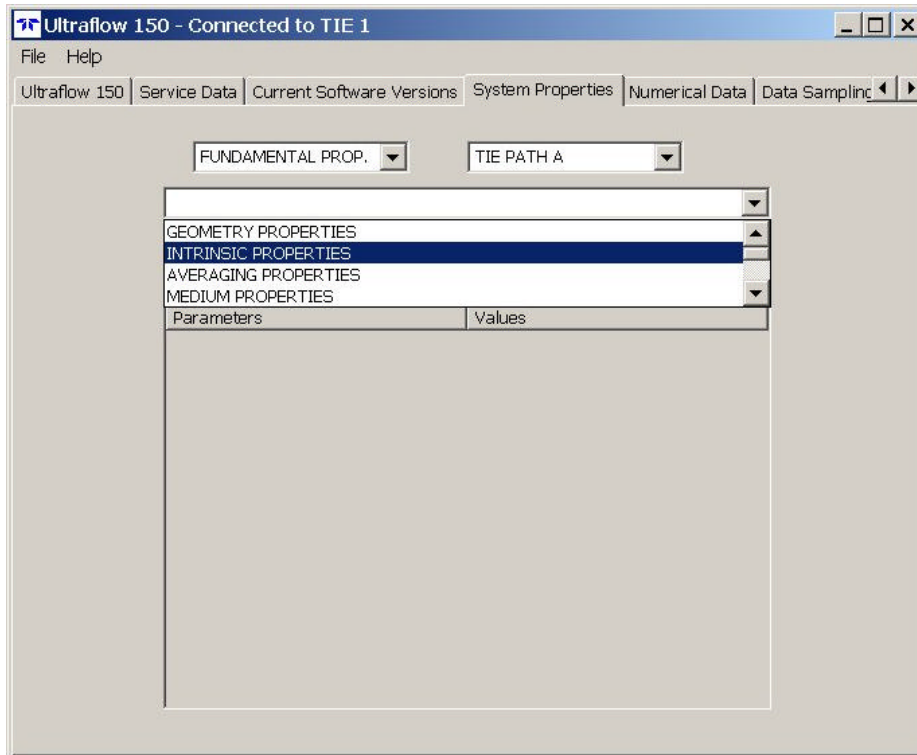
After the path is selected, the middle list box lists the property groups as shown on picture 12. The valid choices are:

For Fundamental Properties:

- **GEOMETRY PROPERTIES,**
- **INTRINSIC PROPERTIES,**
- **AVERAGING PROPERTIES,**
- **MEDIUM PROPERTIES,**
- **CALIBRATION PROPERTIES,**
- **FLOW CORRELATION CURVE PROPERTIES,**
- **TEMP CALIBRATION PROPERTIES,**
- **STANDARD PRESURE PROPERTIES,**
- **STANDARD TEMPERATURE PROPERTIES,**
- **ALARM PROPERTIES.**

For Advanced Properties:

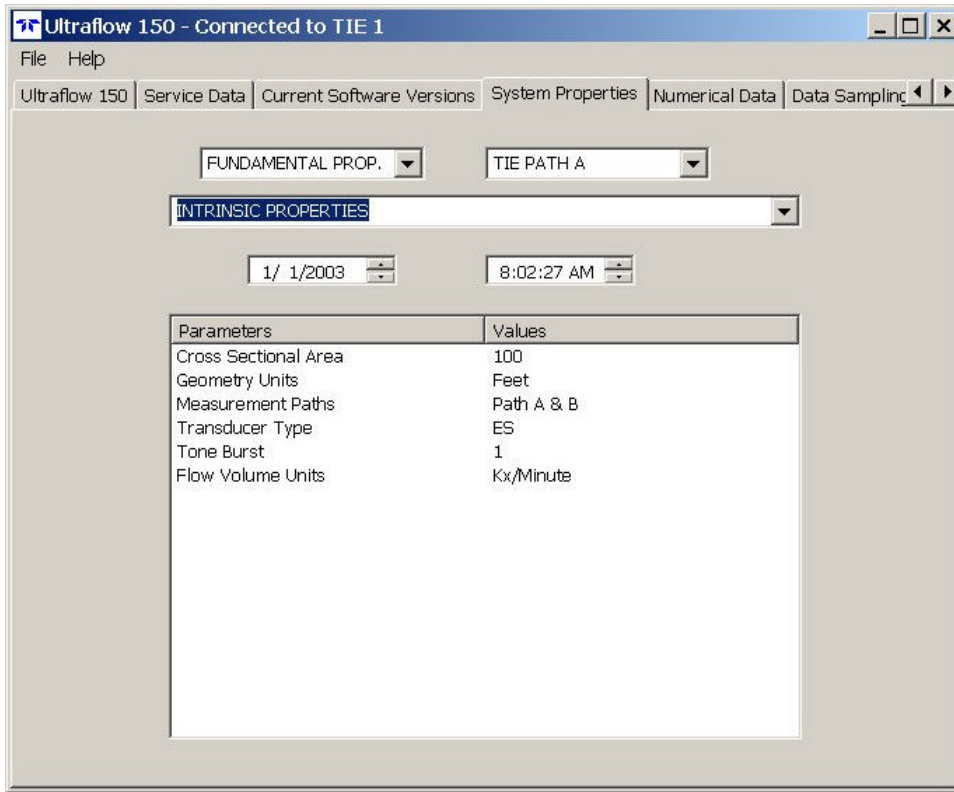
- **RESOLUTION PROPERTIES,**
- **GAIN LIMITS,**
- **GAIN VALUES,**
- **TIME DELAYS,**
- **NOISE THRESHOLD**



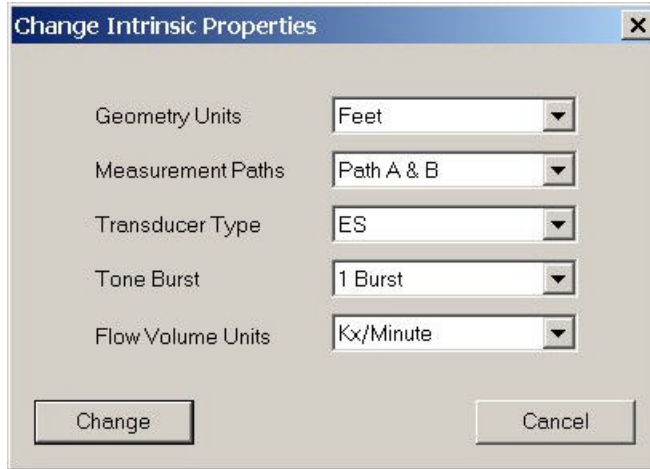
Picture 12: Selection of Fundamental Properties groups.

Once the desired group is selected, the values will be displayed accordingly. Do note that most of the values are editable, so any alteration of a displayed value will change the configuration variable associated with that value.

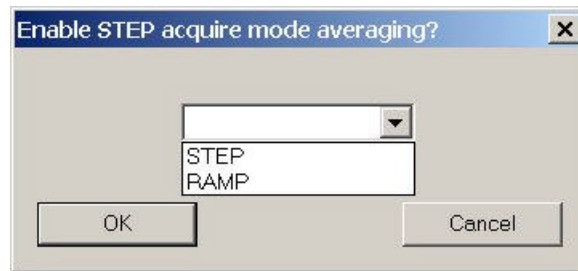
Since some of the variables are displaying the text equivalent of their value (as shown for Geometry Units on picture 13), an attempt to modify these values, brings a new dialog box (shown on pictures 14 and 15).



Picture 13: Intrinsic Properties Display.



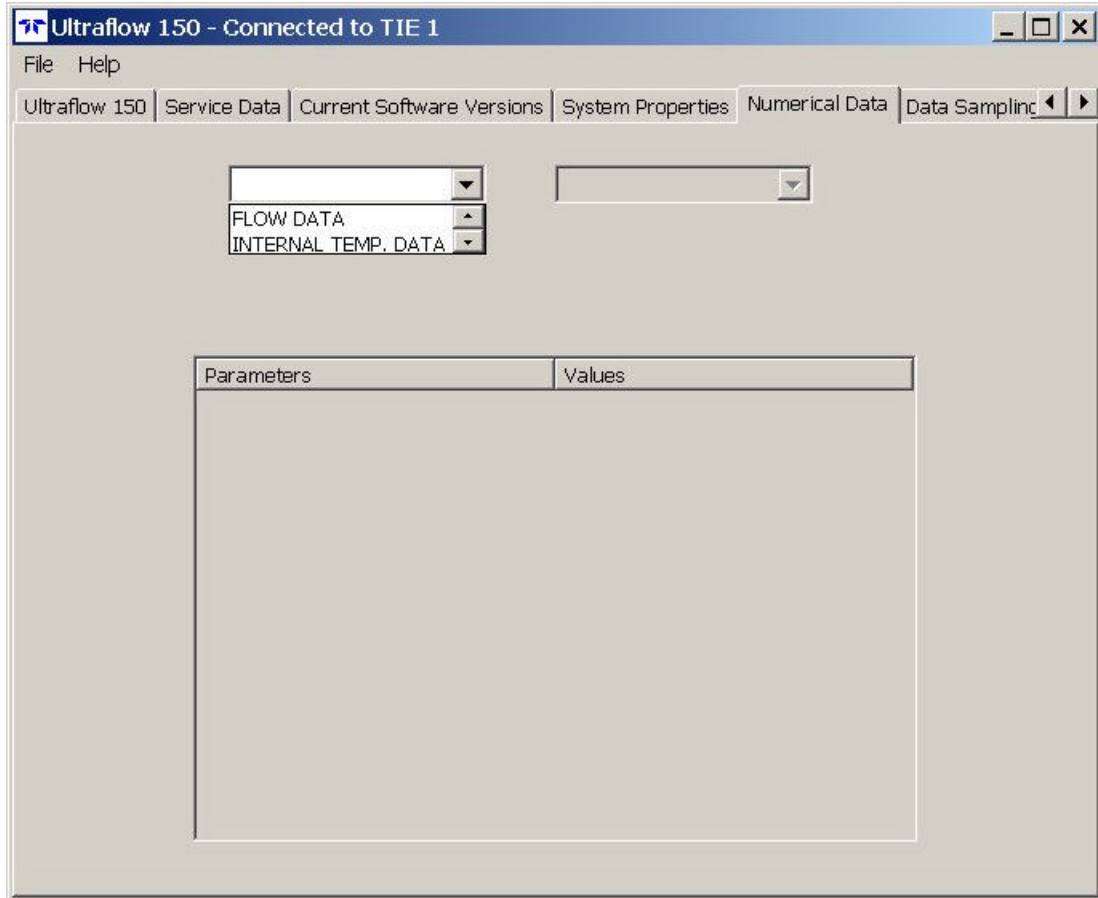
Picture 14: List boxes displaying selections for changing textual Intrinsic Values.



Picture 15: List box used to change textual averaging properties.

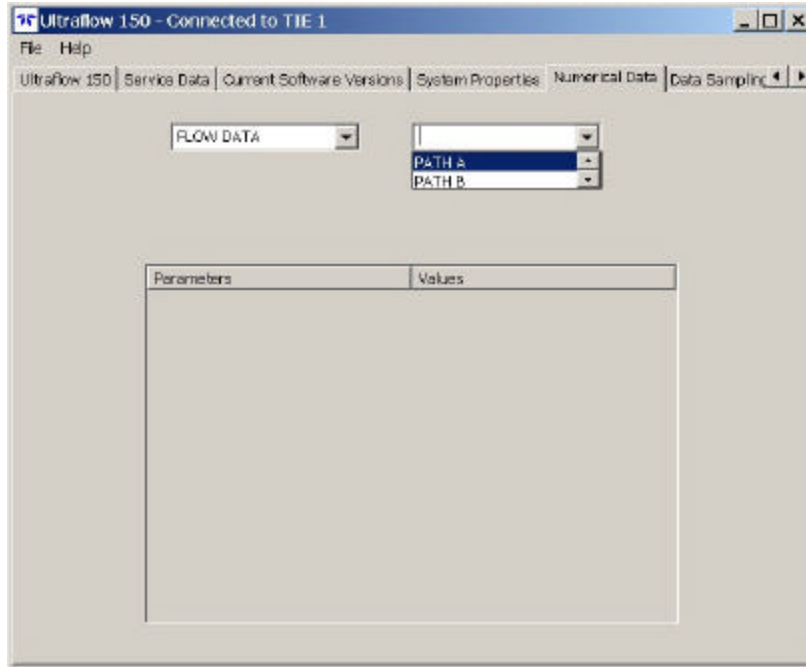
6. Numerical Data Screen.

The Numerical Data Screen provides means for viewing **FLOW DATA**, **INTERNAL TEMPERATURE DATA**, **EXT TEMPERATURE & PRESSURE DATA** and **INDEXED DATA** as shown on picture 16 below.



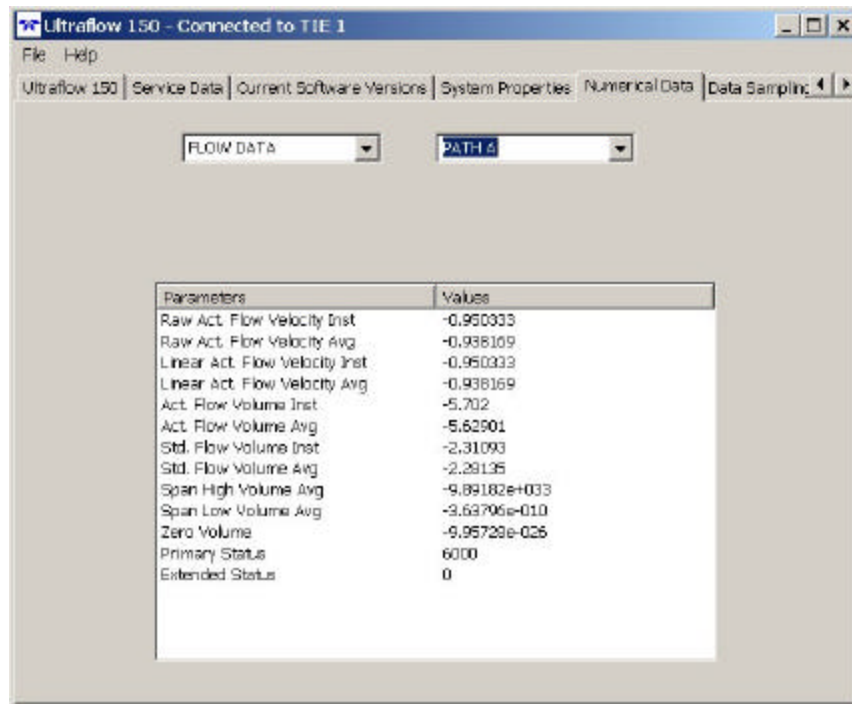
Picture 16: Numerical data selection

After the data set is selected, a valid path (**TIE PATH A** or **TIE PATH B**) must be selected from the list box (Picture 17).



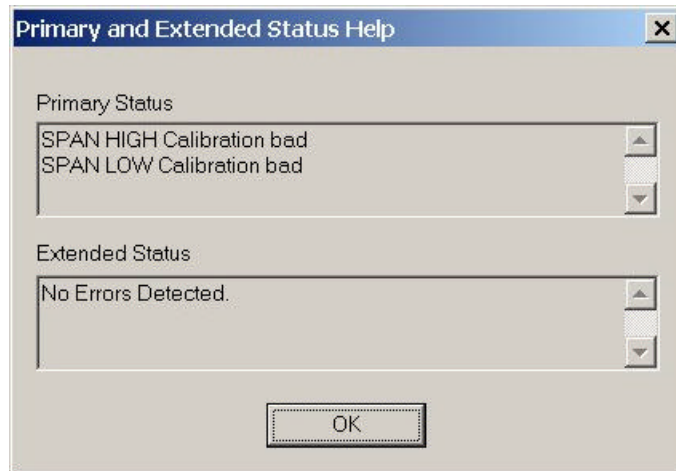
Picture 17: Numerical Data path selection

The Numerical Data screens are for viewing only, and then pull data constantly every 10 seconds. During the pulling cycle, interaction with the PC Interface is disabled, the mouse pointer turns into an hourglass, and the main window title displays “Updating Variables. Please wait...” Sample numerical data screen is shown on picture 18.



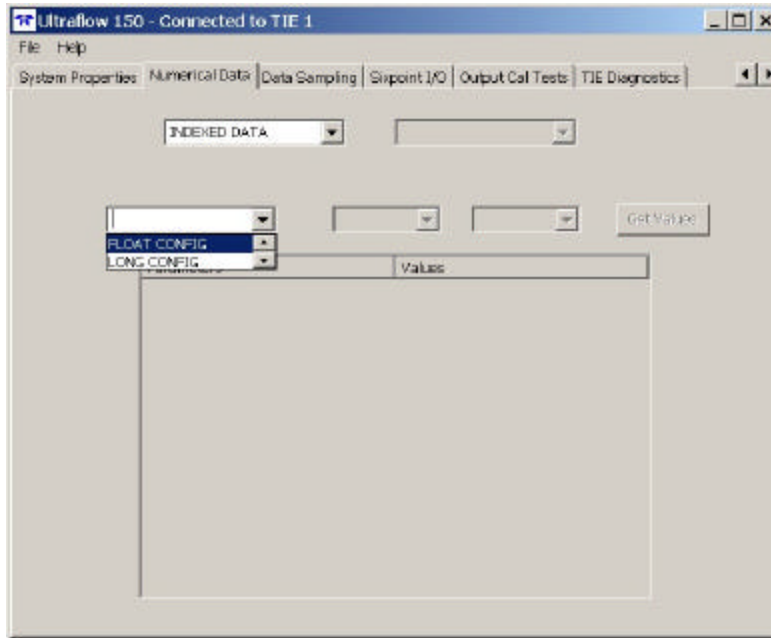
Picture 18: Flow data display.

In order to assist with the Primary and the Extended status interpretation, a dialog box displaying the explanation of the code can be invoked by double clicking on the status fields. This action does not interrupt the operation of the main dialog, which continues to sample data in the background. The help dialog box is static, and needs to be re-opened for new interpretation is needed.

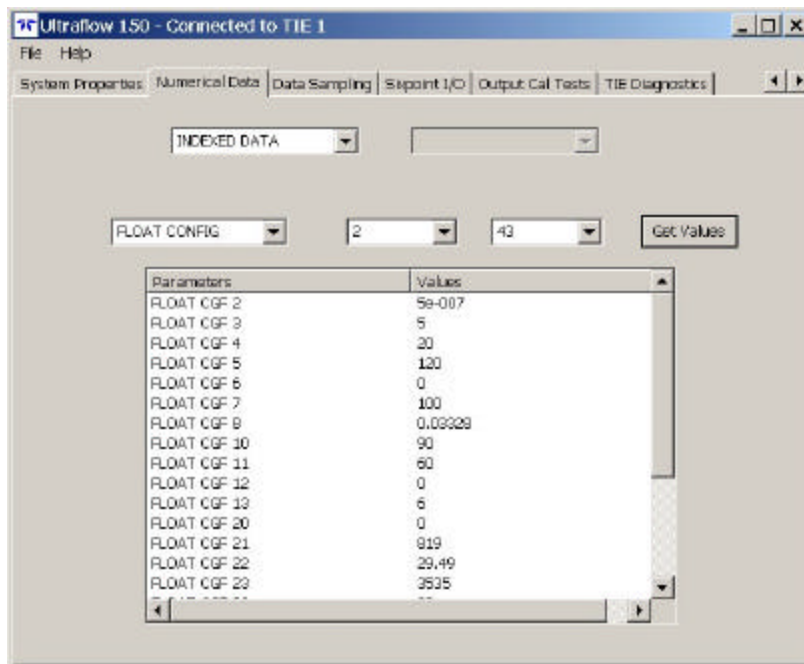


Picture 19: Primary and Extended status help.

The last selection, **INDEXED DATA**, contains indexed variables that represent the configuration and the data values from the TIE. This screen, shown in picture 20, is mainly for advanced diagnostic purposes. It is advised to use this screen only by request and support from the Teledyne Monitor Labs, Inc. Help Desk.



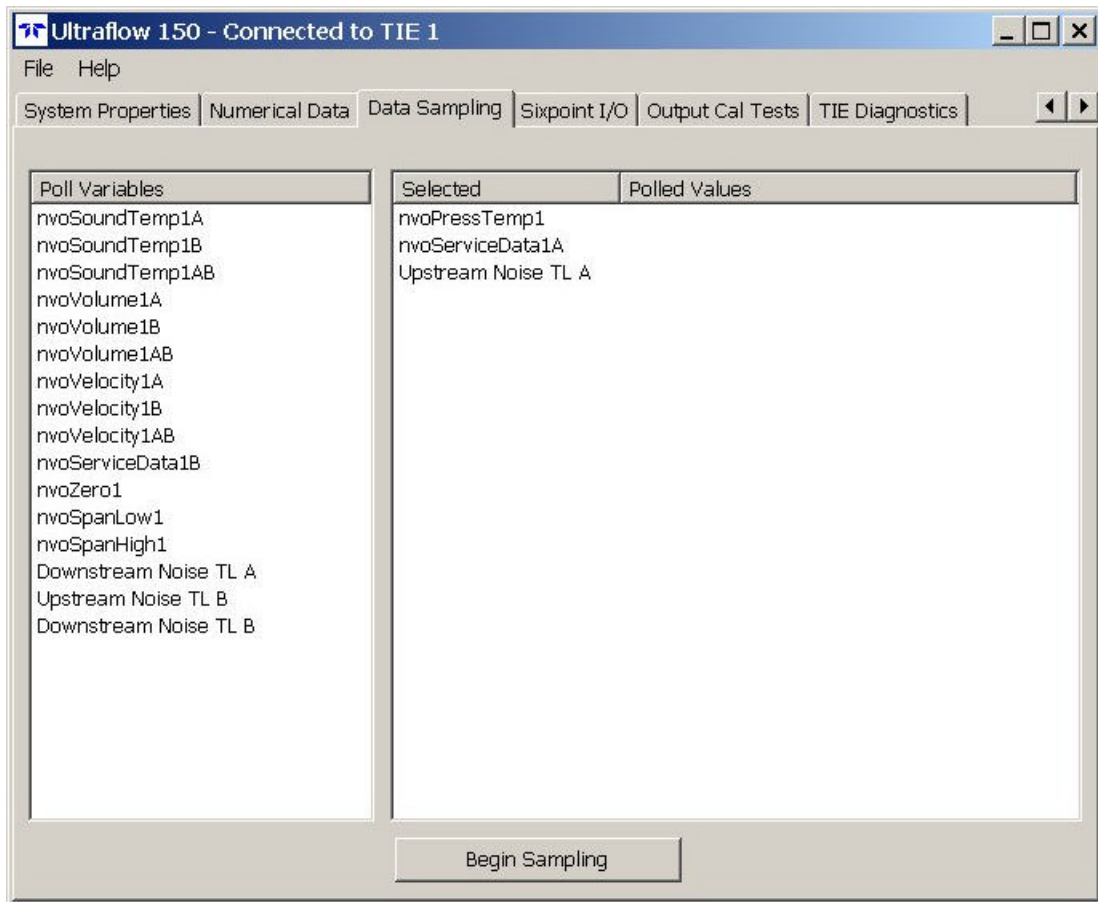
Picture 20: Indexed Data selection.



Picture 21: Indexed data results.

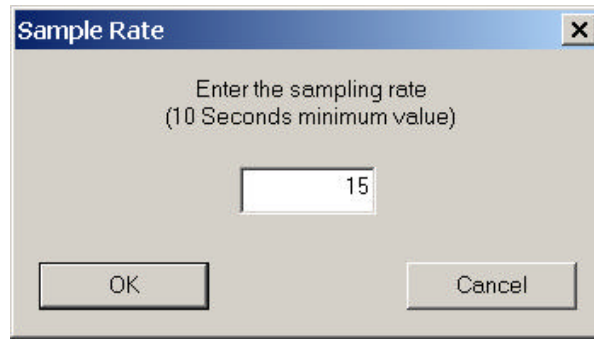
7. Data Sampling Screen.

The Data Sampling screen is only available when the PC Interface is connected to the TIE online. The screen contains two boxes (see picture 22). The left hand one contains the choice of variables valid for the particular TIE (column labeled “Poll Variables”), while the right hand side contains the variables selected to be polled. The contents of these variables are shown in a table at the end of this chapter.

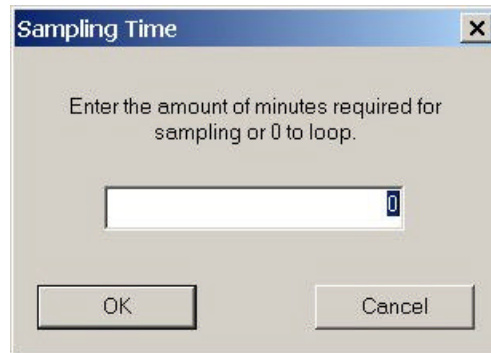


Picture 22: Data Sampling screen.

To select or deselect a variable to be pulled, double-click the variable name or just drag it from one box to the other. Once the desired variables are select, pressing the **Begin Sampling** button brings a dialog box that prompts for the length of the sampling time period (picture 23). Valid values are 0 to 2147483647 minutes. If 0 is entered, the sampling period is infinite.

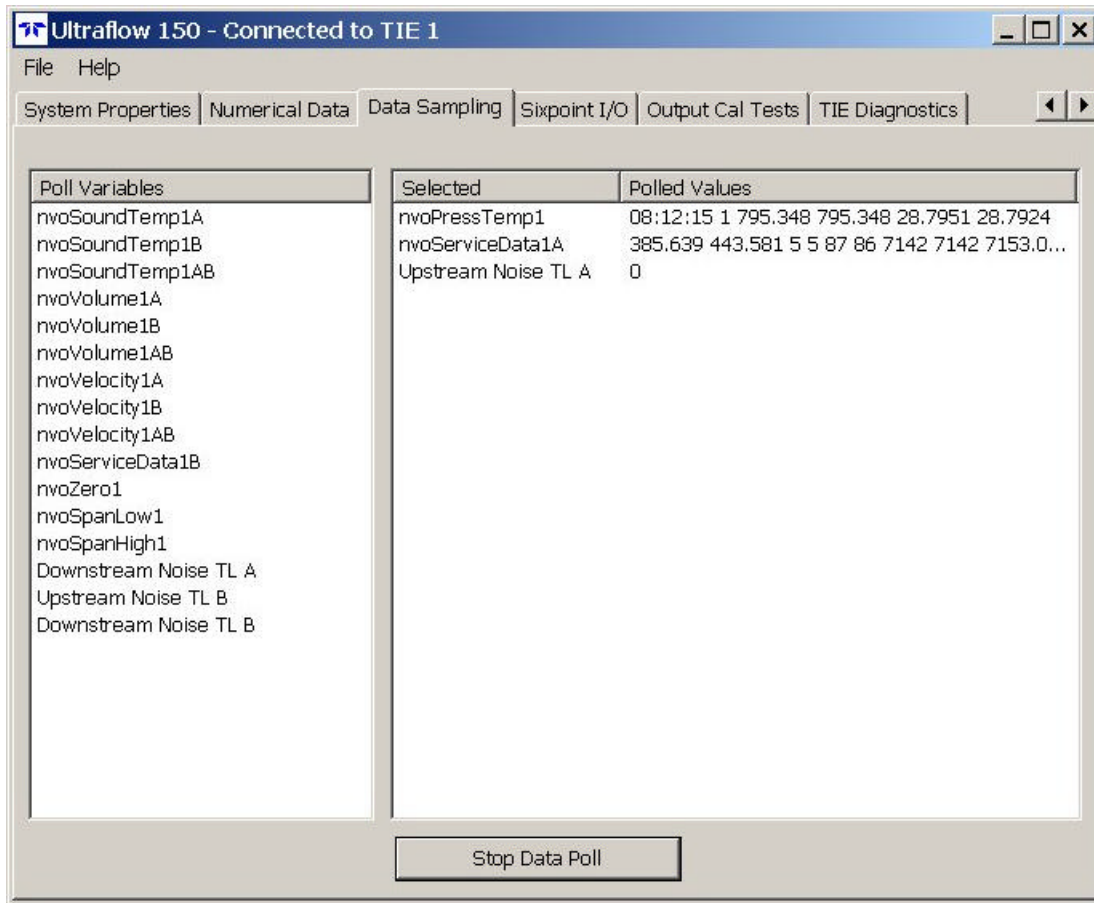


Picture 23-a: Sampling rate selection.



Picture 23-b: Sampling period duration selection.

When the sampling rate and time period are selected, the application will prompt for file name into which the data will be stored. The **Begin Sampling** button changes into **Stop Data Poll** button. Pressing this button will interrupt the data polling.



Picture 24: Data Polling is active.

Appendix B has a sample of puled data file. These files are ASCII text files and are easily imported into a spreadsheet application.

The contents that can be sampled with the corresponding variable are shown in the table bellow.

Parameter	Variable	Variable Member
Instantaneous RTD medium temperature	nvoPressTemp1	inst_float_data1
Average RTD medium temperature	nvoPressTemp1	avg_float_data1
Instantaneous medium absolute pressure	nvoPressTemp1	inst_float_data2
Average medium absolute pressure	nvoPressTemp1	avg_float_data2
Instantaneous medium temperature Path A	nvoSoundTemp1A	inst_float_data1
Average medium temperature Path A	nvoSoundTemp1A	avg_float_data1
Instantaneous speed of sound Path A	nvoSoundTemp1A	inst_float_data2
Average speed of sound Path A	nvoSoundTemp1A	avg_float_data2
Instantaneous medium temperature Path B	nvoSoundTemp1B	inst_float_data1
Average medium temperature Path B	nvoSoundTemp1B	avg_float_data1
Instantaneous speed of sound Path B	nvoSoundTemp1B	inst_float_data2
Average speed of sound Path B	nvoSoundTemp1B	avg_float_data2
Instantaneous medium temperature Path A & B	nvoSoundTemp1AB	inst_float_data1
Average medium temperature Path A & B	nvoSoundTemp1AB	avg_float_data1
Instantaneous speed of sound Path A & B	nvoSoundTemp1AB	inst_float_data2
Average speed of sound Path A & B	nvoSoundTemp1AB	avg_float_data2
Instantaneous linearized actual volume Path A	nvoVolume1A	inst_float_data1
Average linearized actual volume Path A	nvoVolume1A	avg_float_data1
Instantaneous Temp./Press. correlation volume Path A	nvoVolume1A	inst_float_data2
Average Temp./Press. correlation volume Path A	nvoVolume1A	avg_float_data2
Instantaneous linearized actual volume Path B	nvoVolume1B	inst_float_data1
Average linearized actual volume Path B	nvoVolume1B	avg_float_data1
Instantaneous Temp./Press. Correlation volume Path B	nvoVolume1B	inst_float_data2
Average Temp./Press. Correlation volume Path B	nvoVolume1B	avg_float_data2

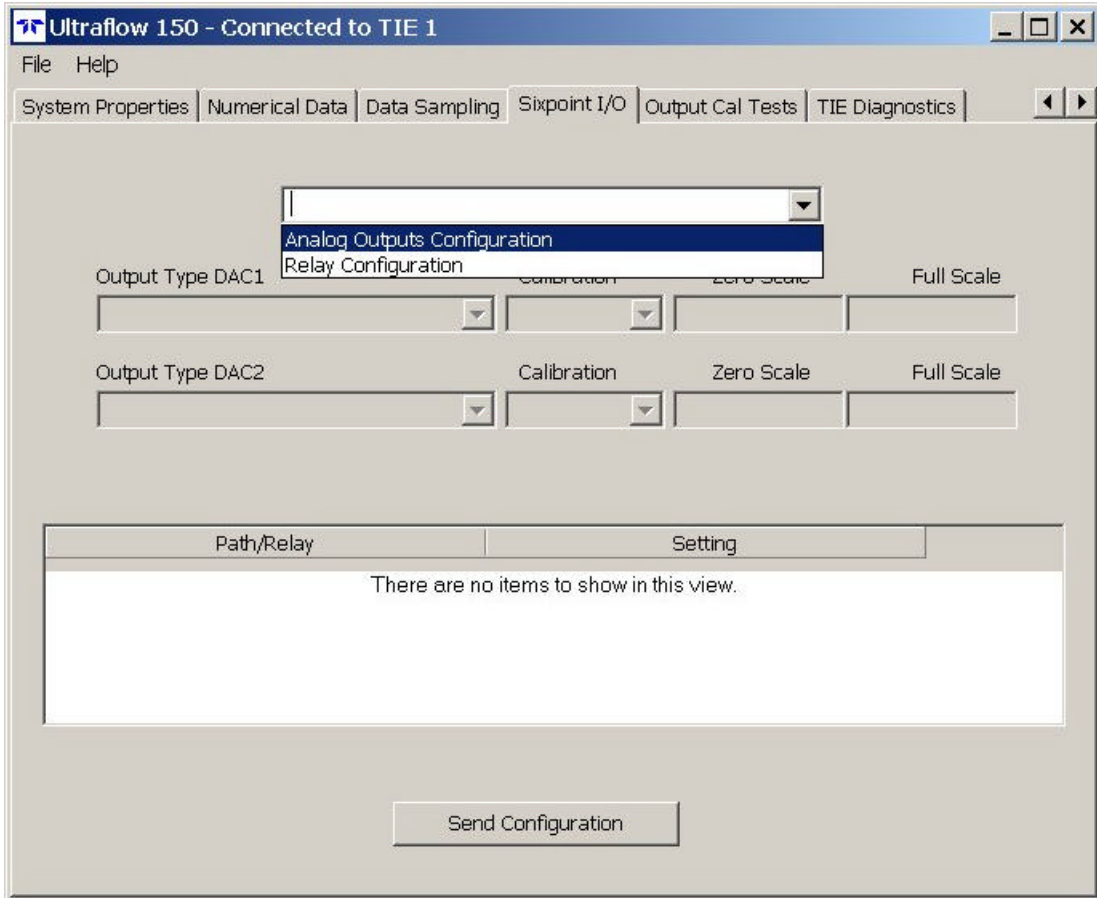
Parameter	Variable	Variable Member
Instantaneous linearized actual volume Path A & B	nvoVolume1AB	inst_float_data1
Average linearized actual volume Path A & B	nvoVolume1AB	avg_float_data1
Instantaneous Temp./Press. correlation volume Path A & B	nvoVolume1AB	inst_float_data2
Average Temp./Press. Correlation volume Path A & B	nvoVolume1AB	avg_float_data2
Instantaneous linearized velocity Path A	nvoVelocity1A	inst_lin_velocity
Average linearized velocity Path A	nvoVelocity1A	avg_lin_velocity
Instantaneous raw velocity Path A	nvoVelocity1A	inst_raw_velocity
Average raw velocity Path A	nvoVelocity1A	avg_raw_velocity
Primary status Path A	nvoVelocity1A	primary_status
Extended status Path A	nvoVelocity1A	extended_status
Instantaneous linearized velocity Path B	nvoVelocity1B	inst_lin_velocity
Average linearized velocity Path B	nvoVelocity1B	avg_lin_velocity
Instantaneous raw velocity Path B	nvoVelocity1B	inst_raw_velocity
Average raw velocity Path B	nvoVelocity1B	avg_raw_velocity
Primary status Path B	nvoVelocity1B	primary_status
Extended status Path B	nvoVelocity1B	extended_status
Instantaneous linearized velocity Path A & B	nvoVelocity1AB	inst_lin_velocity
Average linearized velocity Path A & B	nvoVelocity1AB	avg_lin_velocity
Instantaneous raw velocity Path A & B	nvoVelocity1AB	inst_raw_velocity
Average raw velocity Path A & B	nvoVelocity1AB	avg_raw_velocity
Primary status Path A & B	nvoVelocity1AB	primary_status
Extended status Path A & B	nvoVelocity1AB	extended_status
Upstream S/N ratio Path A	nvoServiceData1A	up_SN_ratio
Downstream S/N ratio Path A	nvoServiceData1A	down_SN_ratio
Upstream digital gain Path A	nvoServiceData1A	up_digital_gain
Downstream digital gain Path A	nvoServiceData1A	down_digital_gain
Upstream preamp gain Path A	nvoServiceData1A	up_preamp_gain
Downstream preamp gain Path A	nvoServiceData1A	down_preamp_gain
Upstream peak RAM counts Path A	nvoServiceData1A	up_peak_RAM_counts
Downstream peak RAM counts Path A	nvoServiceData1A	down_peak_RAM_counts
Upstream calc RAM counts Path A	nvoServiceData1A	up_calc_RAM_counts
Downstream calc RAM counts Path A	nvoServiceData1A	down_calc_RAM_counts
Upstream S/N ratio Path B	nvoServiceData1B	up_SN_ratio
Downstream S/N ratio Path B	nvoServiceData1B	down_SN_ratio
Upstream digital gain Path B	nvoServiceData1B	up_digital_gain
Downstream digital gain Path B	nvoServiceData1B	down_digital_gain

ULTRAFLOW 150 PC TO MODBUS INTERFACE SOFTWARE MANUAL

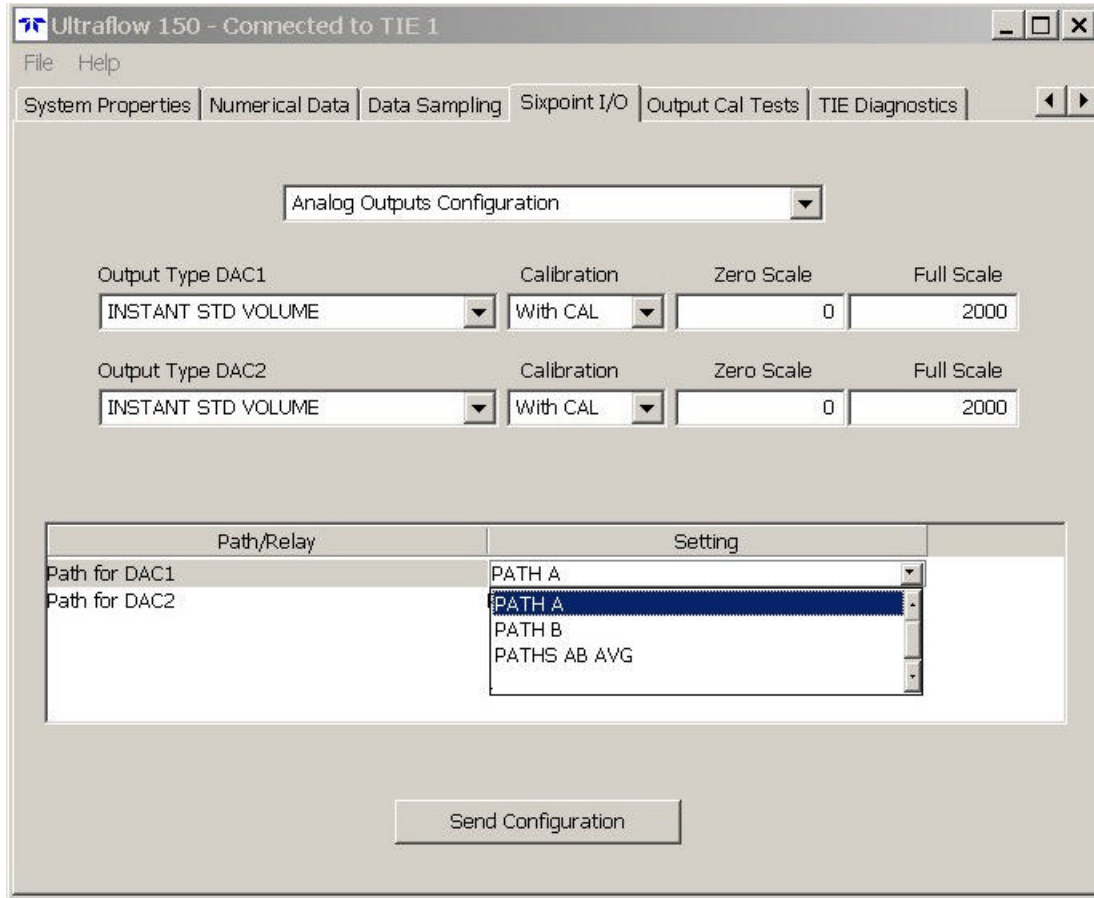
Parameter	Variable	Variable Member
Upstream preamp gain Path B	nvoServiceData1B	up_preamp_gain
Downstream preamp gain Path B	nvoServiceData1B	down_preamp_gain
Upstream peak RAM counts Path B	nvoServiceData1B	up_peak_RAM_counts
Downstream peak RAM counts Path B	nvoServiceData1B	down_peak_RAM_counts
Upstream calc RAM counts Path B	nvoServiceData1B	up_calc_RAM_counts
Downstream calc RAM counts Path B	nvoServiceData1B	down_calc_RAM_counts
Zero Cal last Path-A average	nvoZero1	avg_pathA_data
Zero Cal last Path-B average	nvoZero1	avg_pathB_data
Zero Cal last Path-(A+B)/2 average	nvoZero1	avg_pathAB_data
Span Low Cal last Path-A average	nvoSpanLow1	avg_pathA_data
Span Low Cal last Path-B average	nvoSpanLow1	avg_pathB_data
Span Low Cal last Path-(A+B)/2 average	nvoSpanLow1	avg_pathAB_data
Span High Cal last Path-A average	nvoSpanHigh1	avg_pathA_data
Span High Cal last Path-B average	nvoSpanHigh1	avg_pathB_data
Span High Cal last Path-(A+B)/2 average	nvoSpanHigh1	avg_pathAB_data
Upstream Noise Threshold Level A	(N/A)	(N/A)
Downstream Noise Threshold Level A	(N/A)	(N/A)
Upstream Noise Threshold Level B	(N/A)	(N/A)
Downstream Noise Threshold Level B	(N/A)	(N/A)

8. SIXPOINT I/O Screen.

This screen is used for configuring the SIXPOINT I/O for the TIE units that have one equipped. It can configure both Analog Outputs and the Relay Outputs.



Picture 25: SIXPOINT I/O Configuration Screen.

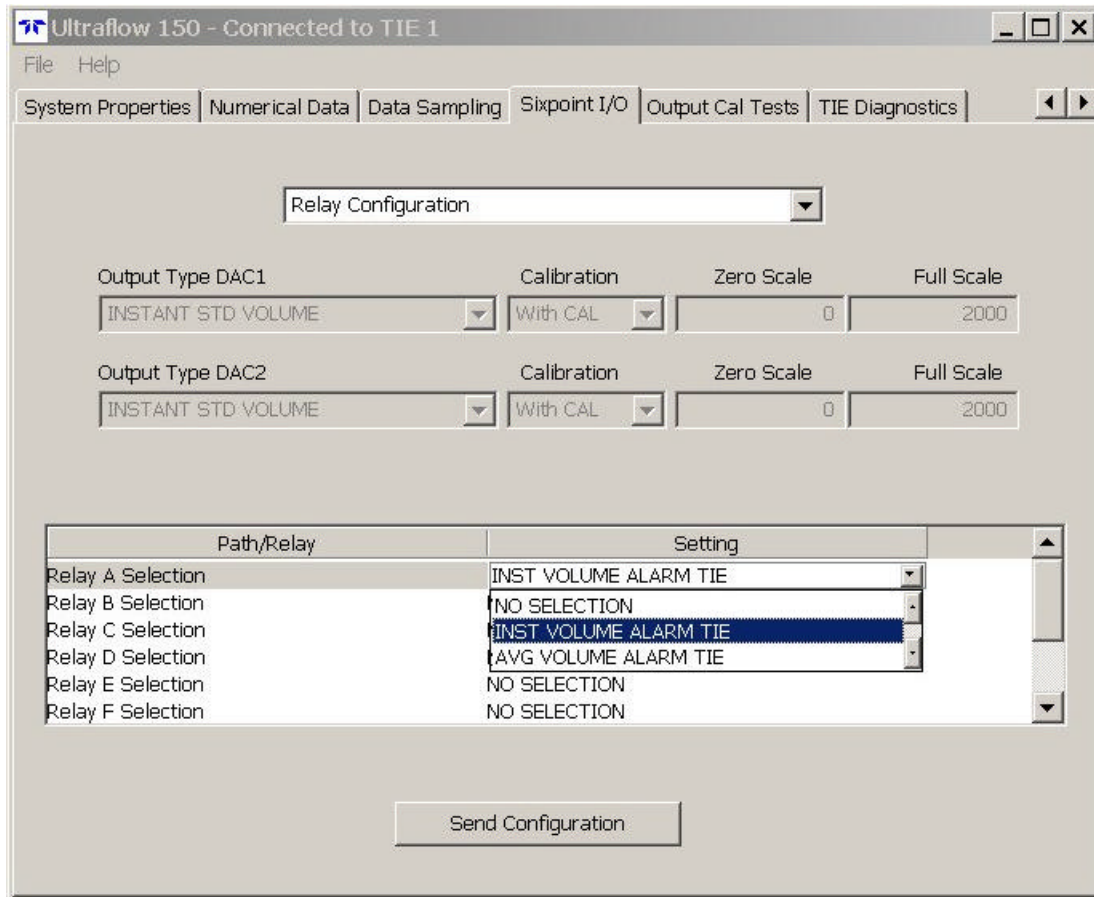


Picture 26: Analog outputs configuration example.

The two Analog Outputs (DAC1 and DAC2) can be configured through the appropriate boxes that define the following:

- Output Type – Defines which variable value maps to DAC.
- Calibration – Defines whether the DAC will contain calibration data and if so, whether or not the data will contain an expanded zero. Three calibration options are available: (1) “WITH” , which means the analog output will contain calibration data; (2) “WITHOUT”, which means no calibration data is present on the analog outputs; and (3) “Expanded” is Expanded Calibration Scaling. The latter means that ZERO mode calibration data analog output scaling will have different values for 4mA (if SIXPOINT I/O 0/4 jumper = 4) or 0mA (if SIXPOINT I/O 0/4 jumper = 0) and 20mA so as to provide expanded resolution (+/- 10% of the Full scale value, during ZERO calibration cycle).
- Zero scale – Defines the value for the that will create an analog output current on DAC1 of 4mA (if SIXPOINT I/O 0/4 jumper = 4) or 0mA (if SIXPOINT I/O 0/4 jumper = 0).

- Full scale – Defines the value that will create an analog output current on DAC of 20mA.
- Path/Relay – Defines which measurement path (A or B or A and B averaged together) apply to the selection for analog output (DAC).



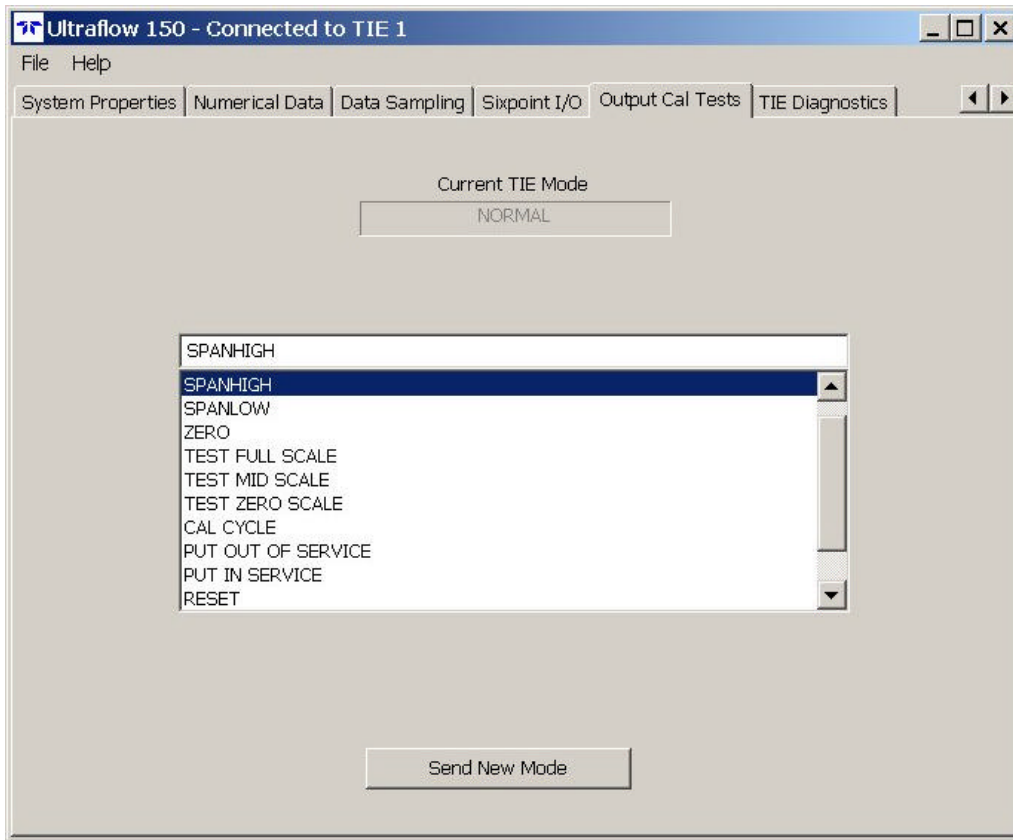
Picture 27: Relay Configuration Example

Each of the eight Relay Outputs can be configured to any of the following:

- NO SELECTION
- INST VOLUME ALARM TIE
- AVG VOLUME ALARM TIE
- INST MEDIUM TEMP ALARM TIE
- AVG MEDIUM TEMP ALARM TIE
- SPAN HIGH ON AO TIE
- SPAN LOW ON AO TIE
- ZERO ON AO TIE
- NORMAL ON AO TIE
- CAL ON AO TIE
- FATAL FAULT TIE A
- NONFATAL FAULT TIE A
- DATA VALID TIE A
- INTERFERENCE TEST TIE A
- PURGE FAILURE TIE A
- CAL FAILURE TIE A
- SN RATIO UPSTREAM ALARM TIE A
- SN RATIO DOWNSTREAM ALARM TIE A
- SN RATIO BOTH ALARM TIE A
- FATAL FAULT TIE B
- NONFATAL FAULT TIE B
- DATA VALID TIE B
- INTERFERENCE TEST TIE B
- PURGE FAILURE TIE B
- CAL FAILURE TIE B
- SN RATIO UPSTREAM ALARM TIE B
- SN RATIO DOWNSTREAM ALARM TIE B
- SN RATIO BOTH ALARM TIE B
- FATAL FAULT TIE A OR B
- NONFATAL FAULT TIE A OR B
- DATA VALID TIE A OR B
- INTERFERENCE TEST TIE A OR B
- PURGE FAILURE TIE A OR B
- CAL FAILURE TIE A OR B
- SN RATIO UPSTREAM ALARM TIE A OR B
- SN RATIO DOWNSTREAM ALARM TIE A OR B
- SN RATIO BOTH ALARM TIE A OR B
- SPAN HIGH OR ACQ ON AO TIE
- SPAN LOW OR ACQ ON AO TIE
- ZERO OR ACQ ON AO TIE
- NORMAL OR ACQ ON AO TIE
- CAL OR ACQ ON AO TIE

9. Output Calibration Test Screen.

The following screen is used only when there is a serial communication connection established with the TIE (i.e. working online). It displays the current mode of the TIE, along with a list of all possible modes that can be commanded upon the TIE by selecting the appropriate mode and pressing the Send New Mode button.



Picture 28: Output Calibration Test Screen.

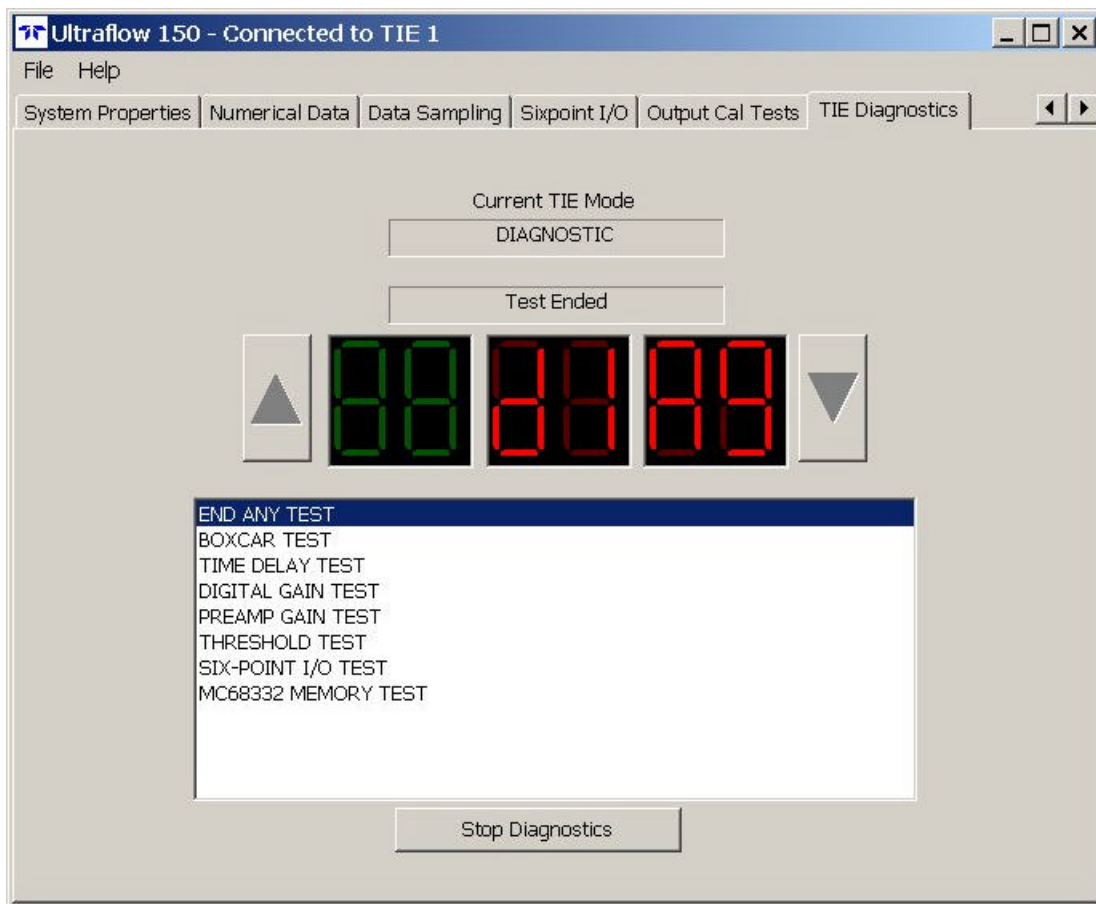
(This section intentionally left blank)

10. Ultraflow 150 TIE Diagnostics Tests Screen.

NOTE: The TIE diagnostics screen is available only while the TIE is connected, online and the TIE system software *version is 1.08 or later*. Please see chapter 4 about viewing the TIE system software version.

These diagnostics tests are created to test several sections of the TIE motherboard independently, and some tests may not be performed on an installed monitor. This is an advanced feature and should be performed only by trained personal or if requested and supervised by Teledyne Monitor Labs Help Desk personal.

The TIE diagnostics screen somewhat mimics the keypad and the LED display. It displays the current mode, the current diagnostics test (if the TIE is in diagnostics mode), the LED's and a list on available diagnostic tests, as shown in picture 29.



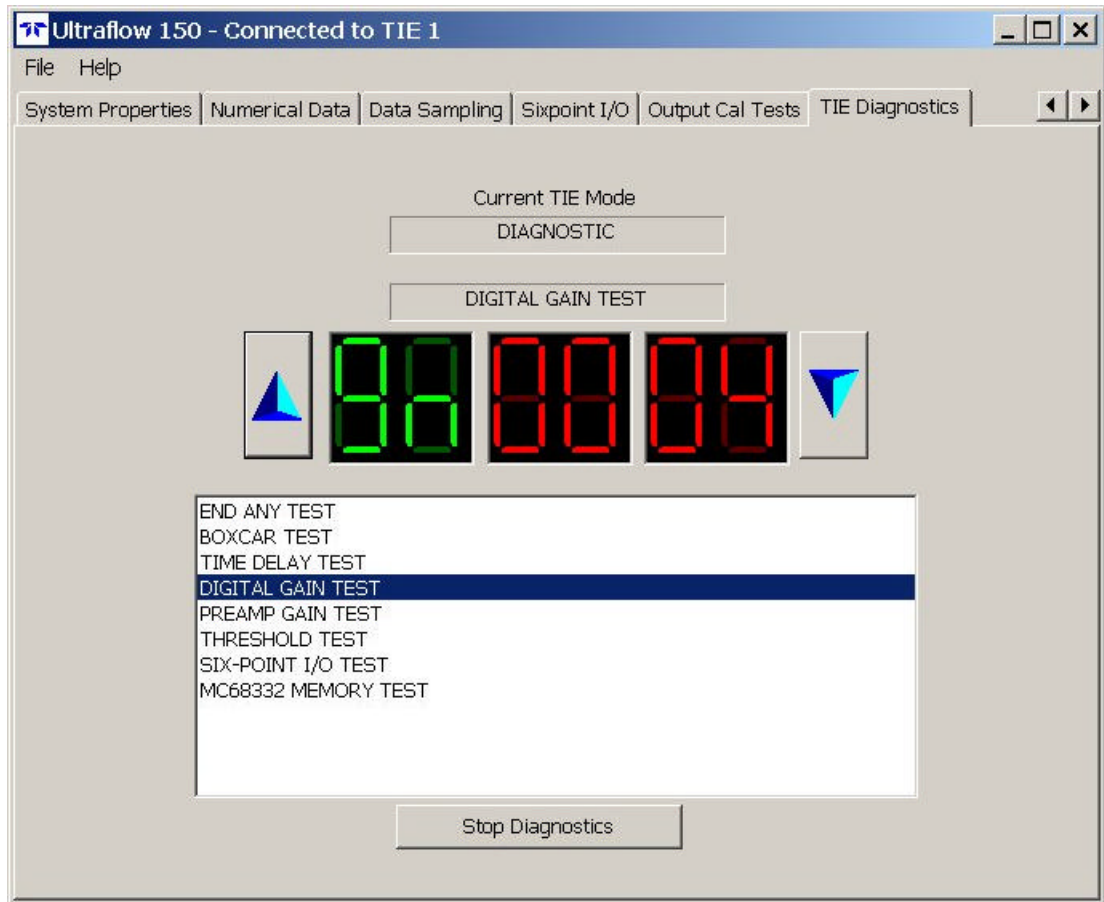
Picture 29: Diagnostic Screen when no test are started.

Once Diagnostic Mode is started, the PC to MODBUS software will begin rapidly communicating with the TIE so it displays the test status as accurately as possible.

Double-clicking the desired test name from the selection box will start any of the diagnostic tests.

NOTE: The rapid communication may impede a bit with the control interactions, but there should be no need for repeated key or button presses. For instance, if *DIGITAL GAIN TEST* is selected (as shown in Picture 30) and the user wants to increase the gain by pressing the up-arrow button on the left hand side, the display may not immediately reflect the gain change until the gain value message is due to be shown.

After completion of the diagnostic tests, please select the *END ANY TEST* option and press the “Stop Diagnostics” button on the bottom of the screen. This will cause the TIE to completely reset and restore any data that may have been altered during the diagnostics.



Picture 30: Digital Gain (gn0004) set to 4 during diagnostics test.

Appendix A: Exported Configuration Values list.

The following text is an example of an exported configuration list text file.

TIE1 Configuration

Index	Description	Value
F 62	Downstream nozzle length, Path-A.....	:0.707
F 63	Upstream nozzle length, Path-A.....	:0.707
F 60	Transducer-to-Transducer Distance, Path-A.....	:4.95
F 61	Offset, Path-A.....	:3.65
F 53	Cross Sectional Area.....	:100
U 27	Geometry Units.....	:Feet
U 2	Measurement Paths.....	:A AND B
U 3	Transducer Type.....	:ES
U 4	Tone Bursts Per Transit.....	:1 Burst
U 1	Flow Volume Units.....	:Kx/Minute
F 3	Integration Period.....	:5
U 6	Integration Periods in Average.....	:4
F 4	Minimum Medium Temperature.....	:20
F 5	Maximum Medium Temperature.....	:120
F 6	Minimum Flow Velocity.....	:0
F 7	Maximum Flow Velocity.....	:100
F 10	SpanHigh Volume Setpoint.....	:90
F 11	SpanLow Volume Setpoint.....	:60
F 12	Zero Volume Setpoint.....	:0
F 13	Calibration Tolerance.....	:6
U 17	Hour of Calibration.....	:25
U 18	Minute of Calibration.....	:0
U 19	Interval Hours Between Calibrations.....	:25
U 14	Integration Periods of Span High.....	:8
U 15	Integration Periods of Span Low.....	:8
U 16	Integration Periods of Zero.....	:8
U 40	Flow Correlation Curve Source.....	:LUT
F 80	Flow X1 Path-A.....	:1
F 81	Flow Y1 Path-A.....	:1
F 82	Flow X2 Path-A.....	:2
F 83	Flow Y2 Path-A.....	:2
F 84	Flow X3 Path-A.....	:3
F 85	Flow Y3 Path-A.....	:3
F 90	Flow A0 Path-A.....	:0
F 91	Flow A1 Path-A.....	:1
F 92	Flow A2 Path-A.....	:0
F 93	Flow A3 Path-A.....	:0
F 94	Flow A4 Path-A.....	:0
F 95	Flow A5 Path-A.....	:0
F 100	Temperature R1 Path-A.....	:0.000231
F 101	Temperature CS1 Path-A.....	:1000
F 102	Temperature R2 Path-A.....	:0.000231
F 103	Temperature CS2 Path-A.....	:1100
F 104	Temperature R3 Path-A.....	:0.000231
F 105	Temperature CS3 Path-A.....	:1200
U 7	Standard Pressure Correction Enable.....	:Enable
F 20	Pressure Scaling, Pressure at Point 1.....	:0
F 21	Pressure Scaling, A/D Counts at Point 1.....	:819
F 22	Pressure Scaling, Pressure at Point 2.....	:29.41
F 23	Pressure Scaling, A/D Counts at Point 2.....	:3476
F 51	Reference Pressure.....	:29.92
U 8	Temperature Source.....	:External
U 9	Standard Temperature Correction Enable.....	:Enable
F 30	Temperature Scaling, Temperature at Point 1.....	:32
F 31	Temperature Scaling, A/D counts at Point 1.....	:2336
F 32	Temperature Scaling, Temperature at Point 2.....	:500
F 33	Temperature Scaling, A/D counts at Point 2.....	:3391
F 50	Reference Temperature.....	:68
U 10	Flow Alarm Selection.....	:Lin. Act. Volume B

ULTRAFLOW 150 PC TO MODBUS INTERFACE SOFTWARE MANUAL

U 11 Flow Alarm Actuation Mode.....:On Less Than
F 40 Instantaneous Flow Alarm Threshold.....:-50
F 41 Average Flow Alarm Threshold.....:-50
U 12 Temperature Alarm Selection.....:Medium Internal Temp. B
U 13 Temperature Alarm Actuation Mode.....:On Greater Than
F 42 Instantaneous Temperature Alarm Threshold.....:201
F 43 Average Temperature Alarm Threshold.....:200
U 5 Time Between Transmits, seconds/count.....:64
U 26 Seconds per RAM Count.....:5.0E-7 seconds
U 30 Seconds per TD.....:5.0E-7 seconds
U 22 Minimum Preamp Gain.....:33
U 23 Maximum Preamp Gain.....:4095
U 20 Minimum Digital Gain.....:3
U 21 Maximum Digital Gain.....:255
U 24 Automatic Gain Control.....:Enable
U 53 Downstream Preamp Gain Level - Path-A.....:5
U 52 Upstream Preamp Gain Level - Path-A.....:1000
U 51 Downstream Digital Gain Level - Path-A.....:1
U 50 Upstream Digital Gain Level - Path-A.....:1
U 31 TD_DownstreamA.....:1000
U 32 TD_UpstreamA.....:1000
U 33 Acquire Mode Averaging.....:STEP
F 66 IntrinsicDelayA.....:0.000215
F 64 NozzleDelayDownstreamA.....:0.0006264
F 65 NozzleDelayUpstreamA.....:0.0006264
U 25 Automatic Noise Threshold.....:Enable
U 61 Downstream Noise Threshold Level - Path-A.....:5
U 60 Upstream Noise Threshold Level - Path-A.....:6
F 70 SN Ratio Alarm Threshold, Downstream, Path-A.....:5

APPENDIX A: EXPORTED CONFIGURATION VALUES LIST

```

F 71      SN Ratio Alarm Threshold, Upstream, Path-A.....:5
F 1062   Downstream nozzle length, Path-B.....:0.707
F 1063   Upstream nozzle length, Path-B.....:0.707
F 1060   Transducer-to-Transducer Distance, Path-B.....:4.87
F 1061   Offset, Path-B.....:3.65
U 1040   Flow Correlation Curve Source.....:Polynomial
F 1080   Flow X1 Path-B.....:1
F 1081   Flow Y1 Path-B.....:1
F 1082   Flow X2 Path-B.....:2
F 1083   Flow Y2 Path-B.....:2
F 1084   Flow X3 Path-B.....:3
F 1085   Flow Y3 Path-B.....:3
F 1090   Flow A0 Path-B.....:0
F 1091   Flow A1 Path-B.....:1
F 1092   Flow A2 Path-B.....:0
F 1093   Flow A3 Path-B.....:0
F 1094   Flow A4 Path-B.....:0
F 1095   Flow A5 Path-B.....:0
F 1100   Temperature R1 Path-B.....:0.000231
F 1101   Temperature CS1 Path-B.....:1000
F 1102   Temperature R2 Path-B.....:0.000231
F 1103   Temperature CS2 Path-B.....:1100
F 1104   Temperature R3 Path-B.....:0.000231
F 1105   Temperature CS3 Path-B.....:1200
U 1053   Downstream Preamp Gain Level - Path-B.....:5
U 1052   Upstream Preamp Gain Level - Path-B.....:1000
U 1051   Downstream Digital Gain Level - Path-B.....:1
U 1050   Upstream Digital Gain Level - Path-B.....:1
U 1031   TD_DownstreamB.....:1000
U 1032   TD_UpstreamB.....:1000
F 1066   IntrinsicDelayB.....:0.000215
F 1064   NozzleDelayDownstreamB.....:0.0006264
F 1065   NozzleDelayUpstreamB.....:0.0006264
U 1061   Downstream Noise Threshold Level - Path-B.....:5
U 1060   Upstream Noise Threshold Level - Path-B.....:6
F 1070   SN Ratio Alarm Threshold, Downstream, Path-B.....:5
F 1071   SN Ratio Alarm Threshold, Upstream, Path-B.....:5

```

ULTRAFLOW 150 PC TO MODBUS INTERFACE SOFTWARE MANUAL

SIXPOINT I/O Configuration:

----- Analog Output Side A

Configured for: INSTANT STD VOLUME
Calibration type: With CAL
Path: PATH A
Zero Scale: 0
Full Scale: 2000

----- Analog Output Side B

Configured for: INSTANT STD VOLUME
Calibration type: With CAL
Path: PATH A
Zero Scale: 0
Full Scale: 2000

Relay Configuration:

Relay A: NO_SELECTION
Relay B: NO_SELECTION
Relay C: NO_SELECTION
Relay D: NO_SELECTION
Relay E: NO_SELECTION
Relay F: NO_SELECTION
Relay G: NO_SELECTION
Relay H: NO_SELECTION

Appendix B: Sampled Data example file.

The following text is an example of a time-sampled data text file:

Variable: nvoPressTemp1

Tuesday, August 13, 2002

Time	Mode	InstRTDMedTemp	AveRTDMedTemp	InstMedAbsPress	AveMedAbsPress
08:41:41	1	73.6292	73.7388	29.2801	29.299
08:41:51	1	73.6292	73.7388	29.3017	29.3071
08:42:01	1	74.0674	73.7388	29.2909	29.3071
08:42:11	1	73.6292	73.7388	29.3234	29.3017
08:42:21	1	73.6292	73.7388	29.2801	29.2963
08:42:31	1	74.5057	73.8483	29.3017	29.2909
08:42:41	1	73.191	73.7388	29.2909	29.2909
08:42:51	1	74.0674	73.8483	29.3342	29.3044
08:43:01	1	73.6292	73.8483	29.3342	29.3125
08:43:11	1	73.6292	73.8483	29.2909	29.3125

Variable: nvoVolumelA

Tuesday, August 13, 2002

Time	Mode	InstLinActVol	AveLinActVol	InstTempPressCorVol	AveTempPressCorVol
08:41:41	1	-1.05068	-0.907844	-1.0178	-0.879438
08:41:51	1	-0.594533	-0.881366	-0.57609	-0.854025
08:42:01	1	-0.775574	-0.663613	-0.751515	-0.643026
08:42:11	1	-0.686698	-0.62371	-0.665273	-0.60425
08:42:21	1	-0.260456	-0.533613	-0.252283	-0.516869
08:42:31	1	0.340525	-0.0885527	0.329711	-0.0857405
08:42:41	1	0.203035	0.0651373	0.196627	0.0630816
08:42:51	1	0.102603	0.215939	0.099391	0.209178
08:43:01	1	0.0509391	0.106975	0.0493578	0.103654
08:43:11	1	-0.452546	-0.0605592	-0.438498	-0.0586794

Variable: nvoVelocity1A

Tuesday, August 13, 2002

Time	Mode	InstLinVelocity	AvgLinVelocity	InstRawVelocity	AvgRawVelocity	PrimaryStatus	ExtendedStatus
08:41:41	1	-0.141052	-0.152924	-0.141052	-0.152924	1024	0
08:41:51	1	-0.0990888	-0.146894	-0.0990888	-0.146894	1024	0
08:42:01	1	-0.129262	-0.110602	-0.129262	-0.110602	1024	0
08:42:11	1	-0.11445	-0.103952	-0.11445	-0.103952	1024	0
08:42:21	1	-0.0434094	-0.0889356	-0.0434094	-0.0889356	1024	0
08:42:31	1	0.0567541	-0.0147588	0.0567541	-0.0147588	1024	0
08:42:41	1	0.0338391	0.0108562	0.0338391	0.0108562	1024	0
08:42:51	1	0.0171006	0.0359898	0.0171006	0.0359898	1024	0
08:43:01	1	0.00848984	0.0178292	0.00848984	0.0178292	1024	0
08:43:11	1	-0.0754243	-0.0100932	-0.0754243	-0.0100932	1024	0

(This page intentionally left blank)

Appendix C: Installation

Note: Please quit all running applications. It is also desirable to disable any anti-virus software until the installation is finished. If there are previous versions of the Ultraflow 150 PC to MODBUS Software found installed on the system, the installer will prompt you to remove them and restart the installation.

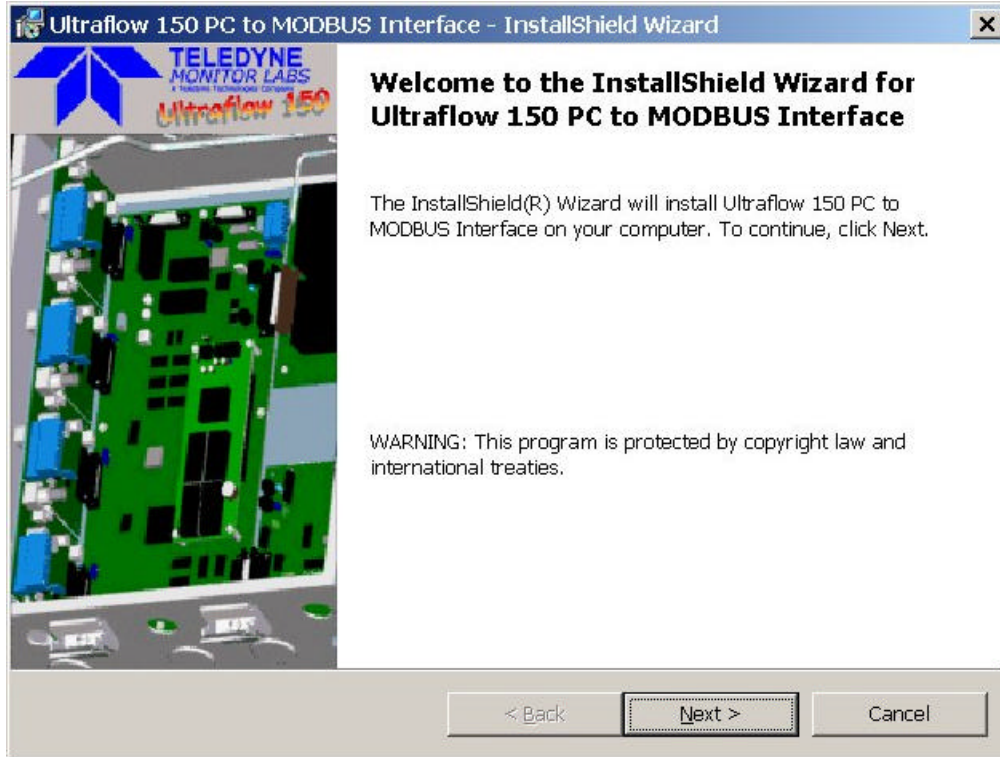
The program installation is a very straight through process. After the CD is inserted an automated installation sequence begins. If the installation does not start automatically, please run the **setup.exe** file from the CD.

The Ultraflow 150 PC to MODBUS Interface Software needs to update several components during installation in order to work correctly. This may require you to restart the computer after some components are installed. After rebooting, the installation continues automatically. Please wait until the screen to tell you that the application setup is complete and do not interrupt the installation unless necessary.

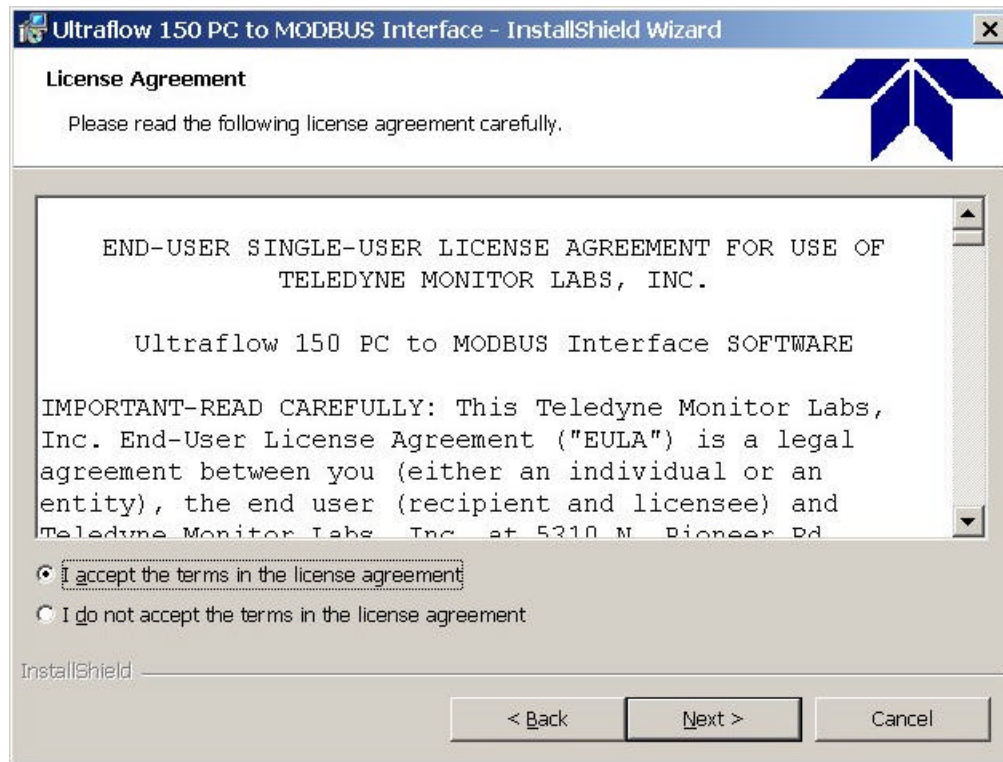
In case you decide to remove the Ultraflow 150 PC to MODBUS Interface Software from your system, please use the uninstall feature from the Control Panel – Add/Remove Software, or by clicking the Uninstall Icon from the program directory.

The installation procedure is the following:

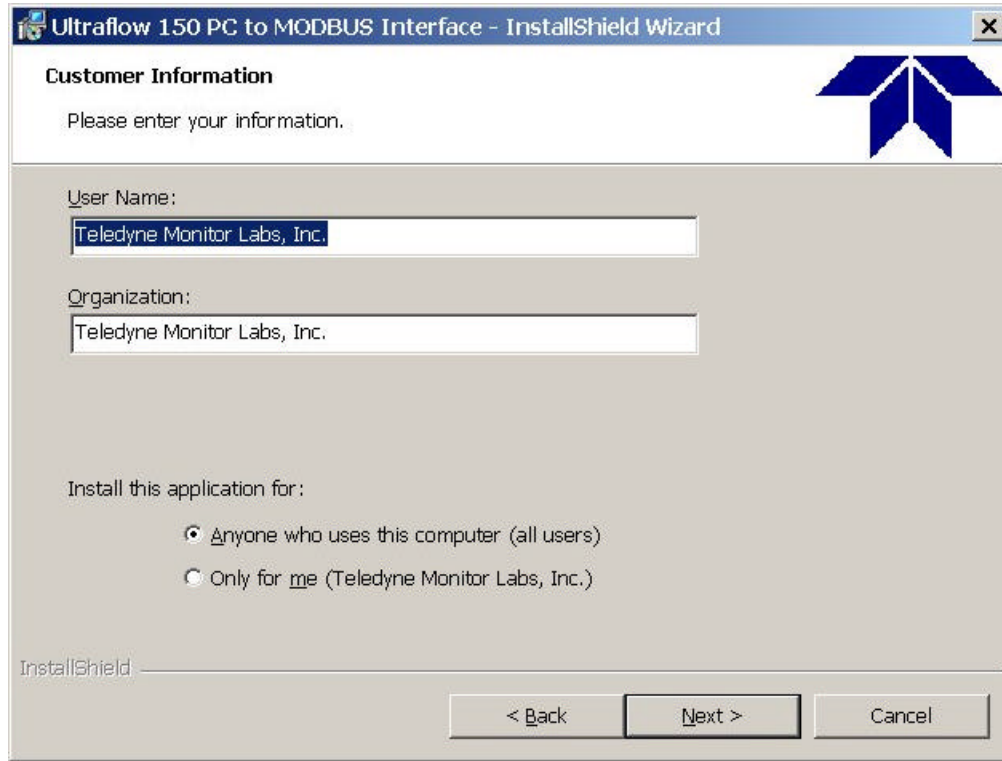
1. The Ultraflow 150 PC to MODBUS Interface – InstallShield Wizard begins the installation by detecting the installed components. If additional components need to be installed, it will be done automatically before the screen from below is displayed. Some components may require the system to be restarted before the installation continues.



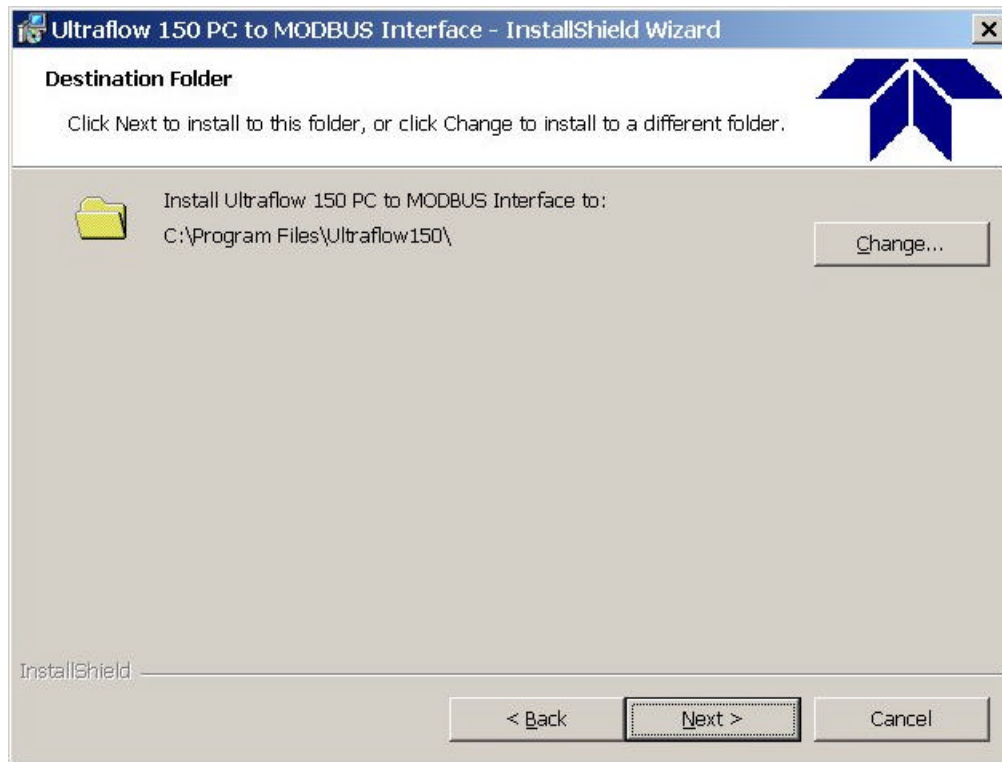
2. In the next step, the End-User Single-User License Agreement is displayed. Please read it carefully. The installation will not continue if you do not agree with the EULA.



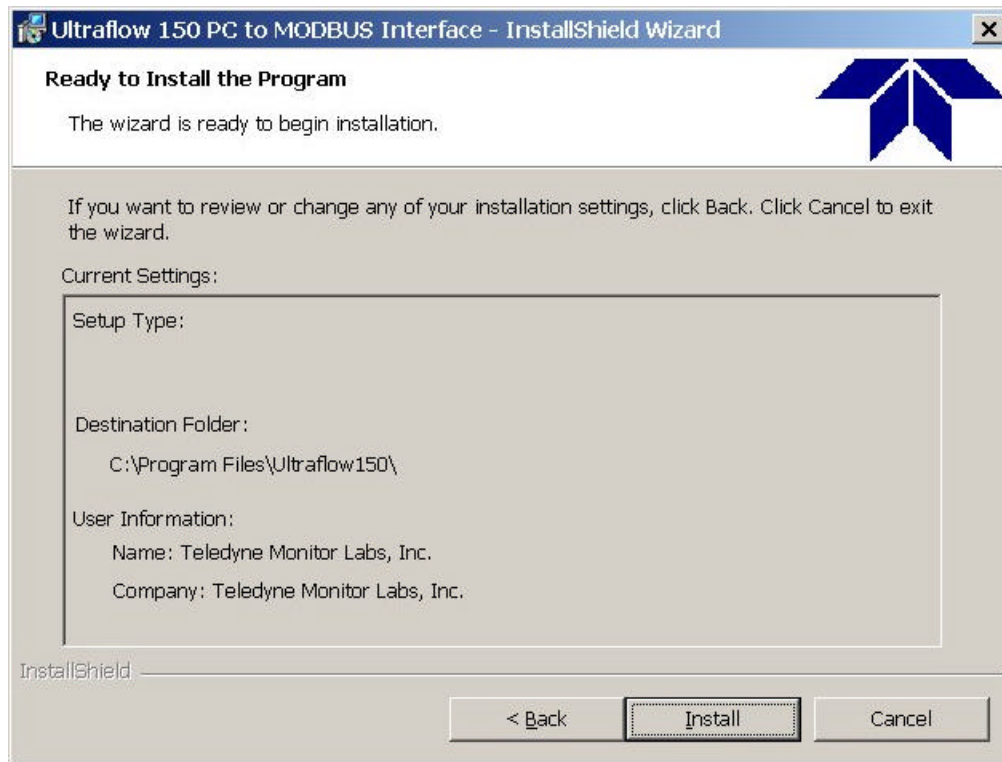
3. The Ultraflow 150 PC to MODBUS Interface can be installed for use by a particular user or for anybody that uses the particular computer as per the EULA. Please select the desired option in the screen shown below.



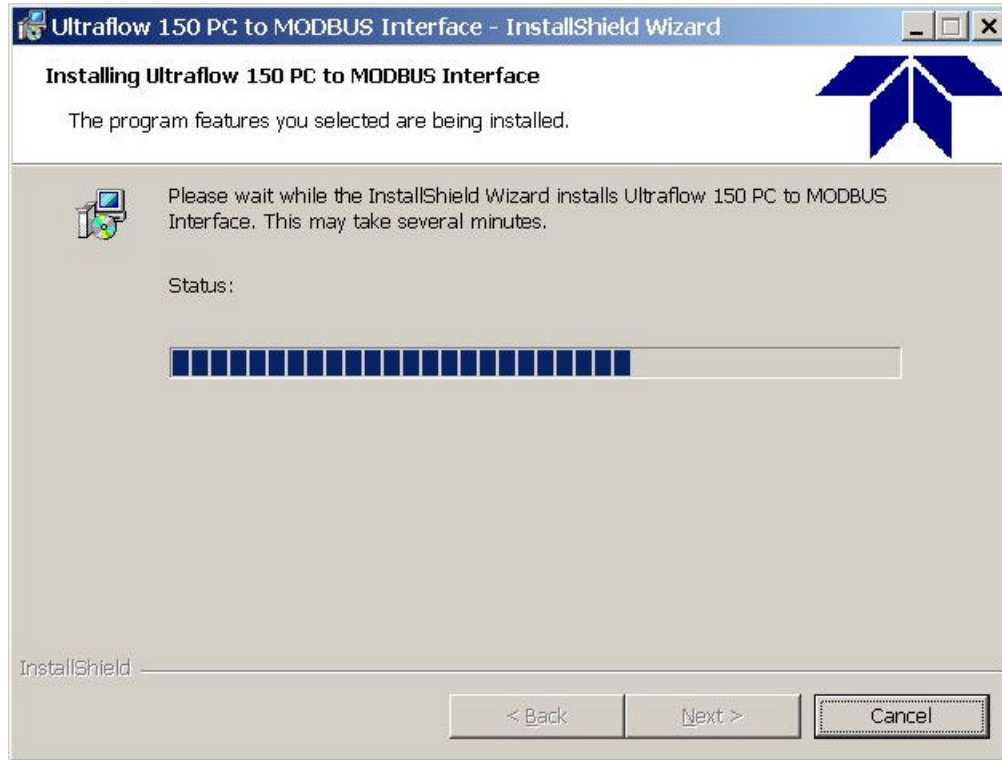
4. Choose the installation path where you want the Ultraflow 150 PC to MODBUS Interface software to be installed. You may leave this option to default.



5. When all options are selected, the installation summarizes them for a review. If the installation options match the desired, press the “Install” button to continue.



6. The Ultraflow 150 PC to MODBUS Interface – InstallShield Wizard will display the status of the installation as shown below.



7. When all modules are installed, the Ultraflow 150 PC to MODBUS Interface – InstallShield Wizard will delete the temporary files created during the installation process and display the message shown below. The Ultraflow 150 PC to MODBUS Interface Software is now ready for use.

