

PENDOTECH® FOUR STATION PHOTOMETER MODULE USER'S MANUAL

PendoTECH
www.pendotech.com

THE FOUR STATION PHOTOMETER MODULE IS INTERNALLY COMPRISED OF FOUR PENDOTECH UV-VIS-NIR PHOTOMETERS. SEE PENDOTECH'S UV-VIS-NIR PHOTOMETER USER'S MANUAL FOR DETAILED PHOTOMETER SPECIFICATIONS, APPLICATION THEORY AND USAGE COMPLIANCE.

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The information in this *User Guide* is believed to be accurate and reliable for use and operation of the monitor, however, PendoTECH assumes no responsibility for the use of this product except for what is covered in the Limited Warranty and Terms and Condition of Sale.

NOTE: "NOTE" is used to notify the user of installation or operation information which is important but not hazard related.

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Contents

1	Safety Guidelines.....	4
1.1	Definition of Equipment and Documentation Symbols and Designations.....	4
1.2	Optical Safety	5
1.3	Correct disposal of unit.....	5
2	Introduction	6
3	Unit Overview	6
4	Installation Instructions	7
4.1	Connecting the Fiber Optic Cables.....	7
	7
4.2	Connecting Analog Outputs	7
4.3	Connecting Power Supply	8
5	PendoTECH NFFSS Analog Input Settings.....	8
6	Appendix	11
6.1	Product Specifications	11
6.2	Product Warranty.....	11

1 Safety Guidelines

1.1 Definition of Equipment and Documentation Symbols and Designations



CAUTION: possible instrument damage or malfunction.



UV Light: Ultraviolet (UV) radiation inside. Exposure may cause eye damage.



WARNING: RISK OF ELECTRICAL SHOCK.



CE Mark: Indicates that product meets EU safety, health and environmental requirements.

	<p>Warning potential shock hazard. Do not submerge this product. Protect the product before cleaning with any liquids by covering openings that expose the internal components.</p>
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Each prospective user must test the measurement unit for its proposed application to determine its suitability for the purpose intended prior to incorporating the sensor to any process or application. The measurement unit is not intended for use as a component in life support. The sensor is not designed for any application in which the failure of the product could result in property damage, personal injury, or death. **Proper safeguards must be put into place for the process in which the unit is used.**

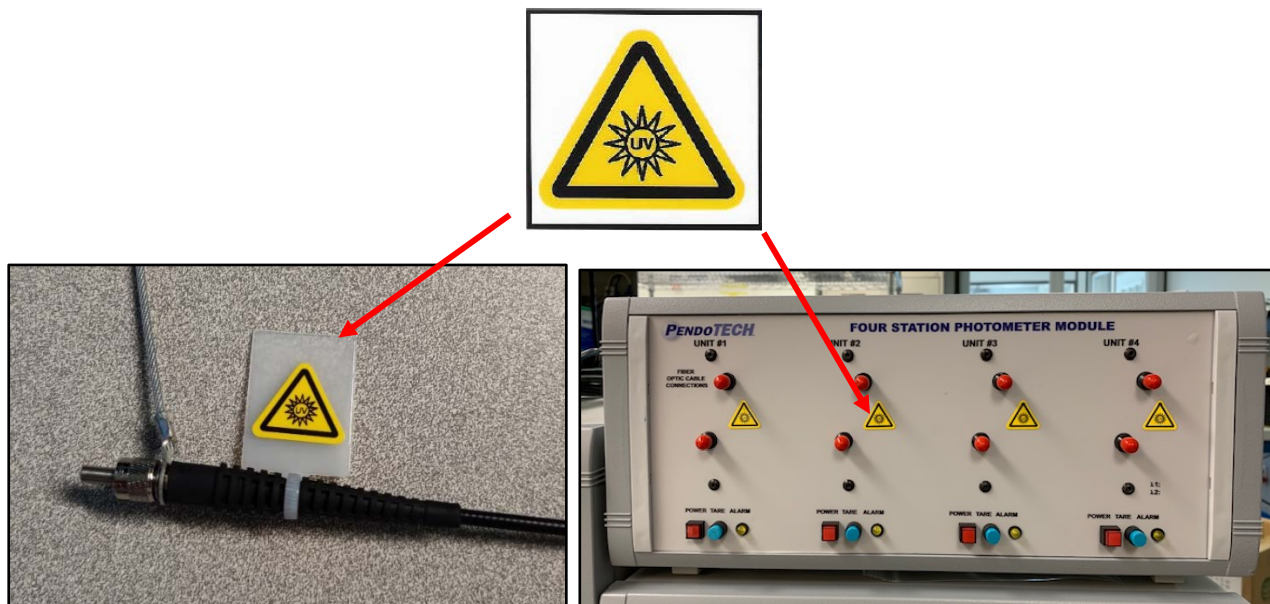
This device has left our facility after careful testing of all the photometer's functions and safety features. The functioning and operational safety of the product can only be ensured if the user observes the usual safety precautions as well as the specific safety guidelines stated in these operating guidelines:

- Before connecting the device to the electrical supply, ensure that the operating voltage stated on the power supply corresponds to the voltage supplied to the unit.
- The functioning and operational safety of the instrument can only be maintained under the conditions specified in the specifications section of this manual.
- If the instrument is moved from warm surroundings, condensate may form and interfere with the functioning of this instrument. In this event, wait until the temperature of the photometer equilibrates to the new temperature before putting it back into operation.
- If there is any reason to assume that the product can no longer be employed without risk, it must be set aside and appropriately marked to prevent further use.
- The safety of the user may be endangered if the instrument:
 - is visibly damaged
 - no longer operates as specified
 - has been damaged in transport
- If you are in doubt, the product should be sent back to the factory.
- The operator of this product must ensure that the following laws and guidelines are observed when using this product around dangerous substances:
 - EEC Directives
 - National Fire Protection Association
 - Safety data sheets of the chemical manufacturer
- Maintenance, and repair work must only be carried out by PendoTECH

1.2 Optical Safety

- ⚠ **WARNING:** The Four Station Photometer Module can emit light from 200 – 1000nm . Hazardous UV and IR radiation are emitted from the unit. Never directly stare into the source/return ports on the module or the fiber optic cables, as this can cause eye damage. The viewer-related risk is dependent on how the users install and use the product.
- ⚠ Ensure that all fiber optic cable connection (module and flow cell connections) are properly secured (firmly hand tight) before powering on the unit.
- ⚠ The Four Station Photometer Module should always be powered off when handling the fiber optic cables. If you must handle the fibers when the unit is powered on, protective eyewear must be worn.
- ⚠ In the event of product failure, do not attempt to open the unit or replace the photometers' LEDs. There are no user-serviceable parts.

This warning label shown below can be found on both the unit and the fiber optic cables ends. Users should take precautions and safety measures for both UV and IR radiation:



1.3 Correct disposal of unit

When the Four Station Photometer Module is finally removed from service, observe all local environmental regulations for proper disposal.

Environmental Protection

Waste electrical products should not be disposed of with household waste. Please recycle where facilities exist. Check with your Local Authority or retailer for recycling advice.



2 Introduction

The PendoTECH Four Station Photometer Module is a measuring system designed to make up to eight separate absorbance or turbidity measurements in bioprocess fluid streams. The Four Station is a continuous-measurement instrument, allowing for instantaneous detection of changes in the processing solution. When used in combination with PendoTECH's UV Flow Cells, the measurements are made in-line, resulting in less disruption to bioprocess operations compared to measurements made off-line.

3 Unit Overview

The PendoTECH Four Station Photometer Module is internally comprised of four PendoTECH UV-VIS-NIR photometers, either single or dual wavelengths units, allowing for up to eight absorbance or turbidity measurements. The Photometer Module allows for easy connection to PendoTECH's UV flow cells through the fiber optic cable connections on the front of the unit.

The Photometer Module does not have a local display, and there are no settings configurations required upon start-up. The unit has 4-8 analog outputs (scaled 0-3AU) for streamlined multi-integration to a PendoTECH Filter Screening System or to a third-party control system or data logger.

The Photometer Module has four local power switches and four tare buttons for operating each photometer inside the system. The module also has four LED lights to provide indication of each photometer's alarm status. See the additional UV-VIS-NIR Photometer user guide for more information on this topic.

For information on environmental conditions and applications, please see PendoTECH's UV-VIS-NIR Photometer User's Manual.

Front Panel:



Fiber optic cable connections

Power switches

Tare buttons

Alarm light indicator

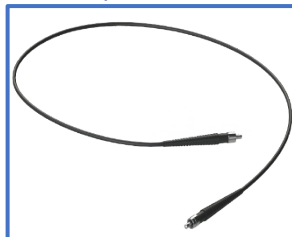
Back Panel:



DB25 Connector
 for Analog Outputs

Power inlet and
 power switch

Fiber Optic Cable:




Stainless Steel Flow Cell:



4 Installation Instructions

4.1 Connecting the Fiber Optic Cables

Remove the protective caps from the SMA-905 connectors on the fiber optic cables and from the Photometer Module front panel. Clean the fiber ends with spectroscopic-grade isopropyl alcohol (IPA, also known as 2-propanol) or methanol using a lint-free cotton swab or non-abrasive task wipe. Spectroscopic grade acetone can also be used, but separation of cotton from the swab might occur as the binding agent dissolves. Connect the stainless-steel flow cell with optical couplers to the Four Station with the fiber optic cables. It does not matter which fiber connects to the source and return.

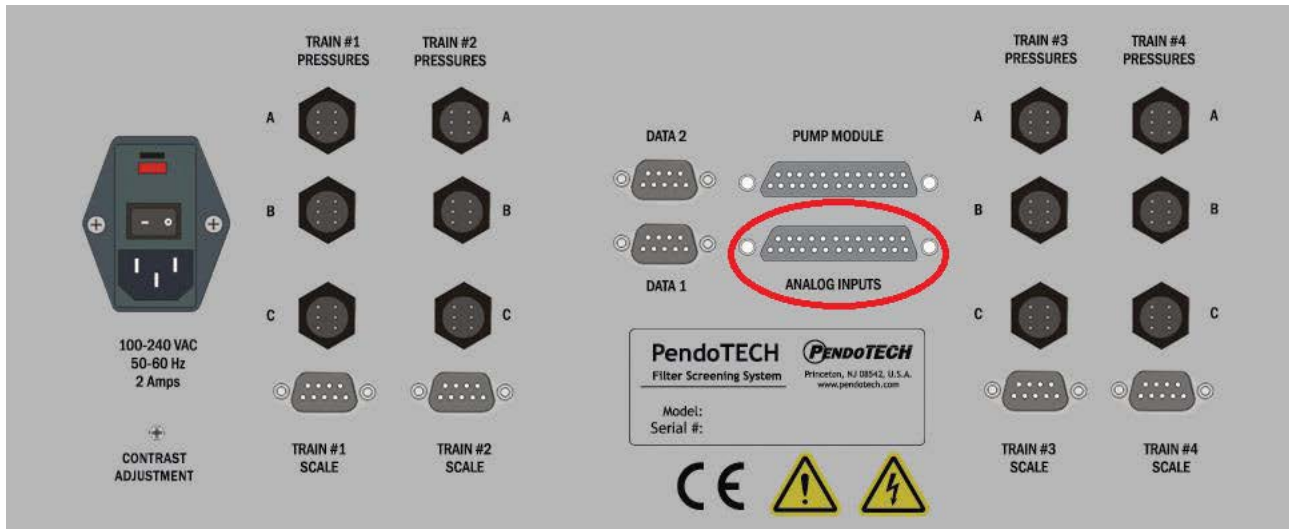


Ensure that both ends of the fiber optic cables (Four Station and flow cell connections) are properly secured (firmly hand tight) before powering on the unit

4.2 Connecting Analog Outputs

If connecting to a PendoTECH Normal Flow Filter Screening System (NFFSS), connect the PDKTP-25PIN cable to the Analog Outputs port on the back of the Photometer Module. Connect the other

end of the cable to the Analog Inputs port on the back of a **powered off** NFFSS. Use the thumb screws on the cable for a secure fit on both the NFFSS and the photometer module.



4.3 Connecting Power Supply

Ensure the power switch is flipped to OFF (“O”). Connect the included power cord to the power inlet on the back of the unit. Plug in the 3-pronged end of the power cord to a wall power supply. The unit is rated for 100-240 VAC.

5 PendoTECH NFFSS Analog Input Settings

Power on the NFFSS. The analog inputs must be ENABLED and configured on the NFFSS. There are 8 available analog inputs. See below for instructions and proper configuration values.

- a. To access the set-up menus on the NFFSS, press the SET UP key on the keypad (must be in STOP mode to access these menus). Use the UP and DOWN arrows on the keypad to navigate between the menu choices and press ENT to access the individual menu choices. Navigate to the Analog Inputs settings menu. See below for further instructions.

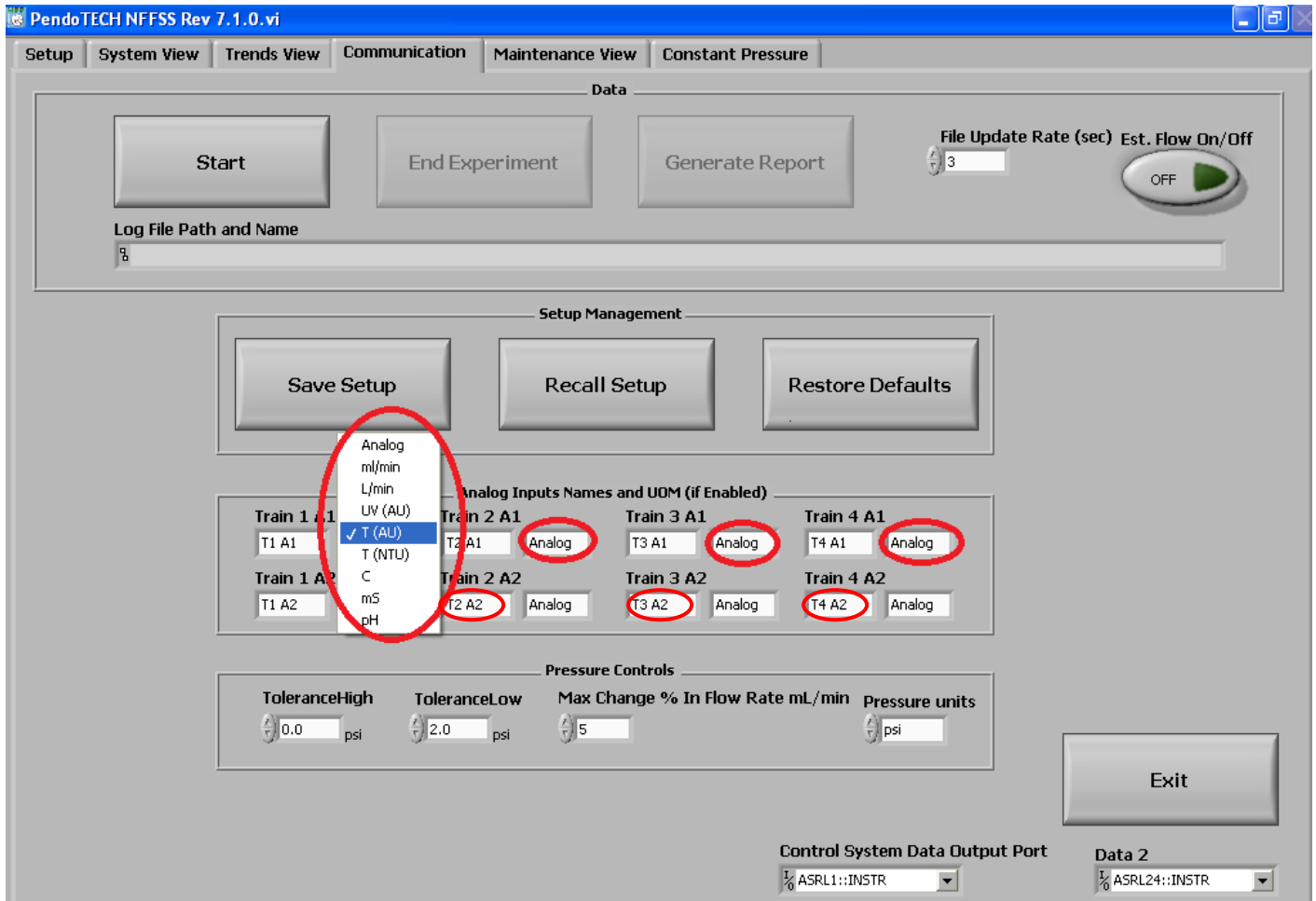
<p>Analog Inputs</p>	<p>Press ENT and the following screen appears. Use the UP and DOWN arrow keys Enable the Analog Input feature. NOTE: When this is selected, the 8 analog values are added to the end of the data collection screen.</p>	<p>Press ENT and the following screen appears. Use the UP and DOWN arrow keys to select the desired the analog input channel to set up. 1-4 are 4-20mA inputs for Trains1-4; 5-8 are 0-10V inputs for Trains1-4</p>
<pre>Setup Mode -> Analog Inputs</pre>	<pre>Setup Mode -> Analog Inputs Analog in: Disabled</pre>	<pre>Setup Mode -> Analog Inputs Analog Input 1 Enter to set range</pre>

<p>Press ENT and if input 1-4 is selected the first screen below appears and if 5-8 is selected, the second screen appears. Enter the respective value. Press the UP arrow button to clear an entry. Press ESC to exit.</p>	<p>Press ENT and one of the following screens appears. Enter the respective value. Press the UP arrow button to clear an entry. Press ESC to exit.</p>	<p>Use the UP and DOWN arrow keys to select zero through six decimal places Press ENT when done.</p>
<div data-bbox="305 596 570 709" style="border: 1px solid black; padding: 2px;"> <p>Setup Mode -> Analog Inputs Analog Input X 4mA Value: X.XX</p> </div> <div data-bbox="305 743 570 856" style="border: 1px solid black; padding: 2px;"> <p>Setup Mode -> Analog Inputs Analog Input X 0V Value: X.XX</p> </div>	<div data-bbox="602 596 899 709" style="border: 1px solid black; padding: 2px;"> <p>Setup Mode -> Analog Inputs Analog Input X 20mA Value: X.XX</p> </div> <div data-bbox="602 743 889 856" style="border: 1px solid black; padding: 2px;"> <p>Setup Mode -> Analog Inputs Analog Input X 10V Value: X.XX</p> </div>	<div data-bbox="959 596 1256 709" style="border: 1px solid black; padding: 2px;"> <p>Setup Mode -> Analog Inputs Analog Input X Decimal plc:2</p> </div>

- b. Channels 1-4 should be set to “4mA value= 0; 20mA value= 3” (these are Absorbance Units AU)
 - i. If dual channel photometers are used (two wavelengths per photometer), then channels 5-8 should be set to “0V value = -0.75; 10V value=3”.

Proper measurement units [T (AU)] must be selected on the NFFSS PC Software (GUI). Single channel photometer modules will only use the “A1” inputs for channels 1-4. If dual channel photometers are used, then “A2” inputs will additionally be used.

- b. On the COMMUNICATION tab of the PendoTECH NFFSS GUI, there is an area for selecting analog input measurement units. Select “T AU” for all analog inputs.



NOTE: For initial setup of turbidity photometer modules (880nm), do not select T(NTU). The native measurement unit of the transmitters in the photometer module is AU. Please see our turbidity datasheet for AU-NTU correlation information. After review of this information, engineering unit scaling may be finalized and expressed in NTU terms.

The photometer module is now ready for use. Power on the photometer module via the power switch at the rear of the device first, then additionally the individual photometer power buttons on the front of the photometer device.

6 Appendix

6.1 Product Specifications

For product specifications, please see the additional “PendoTECH UV-VIS-NIR PHOTOMETER FOR UV ABSORBANCE AND TURBIDITY MEASUREMENTS User Manual”

6.2 Product Warranty

PENDOTECH LIMITED WARRANTY

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Rev. 1