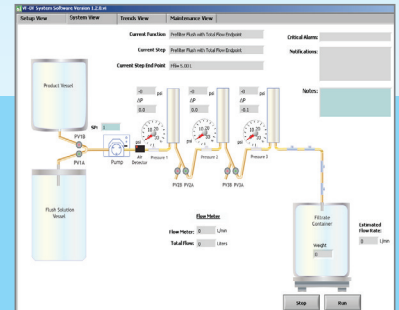


PendoTECH Virus Filtration-Depth Filtration Process Control System & Data Acquisition System



DATA SHEET

- Process automation with pre-programmed functions for different process steps including filter flush and automated process endpoints with ability to link some functions together
- Real-time trending and data collection to a file that can be opened with Excel
- System interaction via a PC-based Graphical User Interface
- Features use of PendoTECH Pressure Sensors that are available from a luer size up to 1 1/2 inch sanitary flange as well as PendoTECH Temperature and Conductivity Sensors
- Flexibility for bench-top setup or Pilot Cart with automated inlet valve selection and filter flush valves
- Integrates with different types of pumps and different brands of scales
- Delta pressure control option that regulates pump automatically to control a setpoint
- Graphical user interface software will operate with TFF Process Control System product hardware or VFDF System product hardware
- Custom selection to reconfigure the valves on the TFF Pilot Cart to optimize operation with the VF-DF software that offers a dual-purpose pilot plant system
- Built-in data server to exchange data with OPC client software such as PI from OSI soft®



- Create an automated benchtop system using built-in functions with end-points
- Alarms with automatic pump shut off
- GUI PC software will operate on TFF Control System to create a dual purpose system

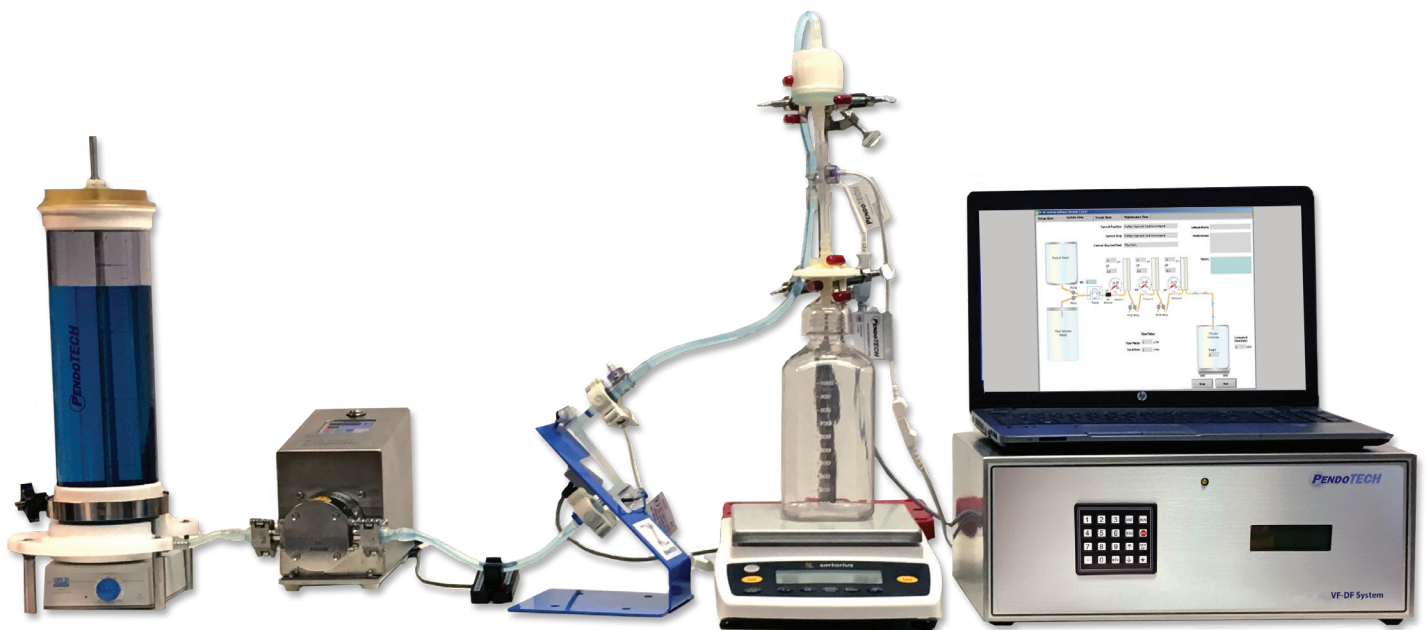
- Pilot cart with automated inlet selection and flush valves
- Streamlined design for use in clean environment

Product Overview

- Completely and efficiently automates your Virus Filtration-Depth (VF-DF) Filtration Process
 - 3 pressure measurements with PendoTECH Pressure Sensors which can be re-used extensively or other pressure sensors
 - Functions that automate all process steps include:
 1. Manual- control valves and pump manually by clicking on the GUI graphic
 2. Run Pump (pump runs but no endpoint with valves in default positions)
 3. Prefilter Flush with Total Flow Endpoint ^
 4. Second Filter (Virus Filter) Timed Flush
 5. Product Filtration with Air Detector Endpoint *
 6. Product Filtration with Filtrate Scale Endpoint
 7. Recovery with Filtrate Scale Endpoint
 - Delta pressure control option that regulates pump automatically
 - Interact with the system via an easy to use graphical user interface (GUI) that includes a trending module with many advanced features
 - Alarms for process parameters that shuts down the pump
 - Alarm features include a delayed detection on the minimum inlet pressure that can stop the system if the inlet pressure drops due to a flow path problem
 - Pre-alarm setpoints for notifications and email alerts
- Automation and alarm features allow the system to be operated with minimal user interaction
 - Integrates PendoTECH Temperature and Conductivity Sensors
 - Process control via integration of industry standard scales and pumps
 - Can be used at different process scales by entering the pump set-up information in the software
 - pH probe input via a BNC connector that can accommodate standard pH probes and the GUI includes an easy to use probe calibration wizard
 - Conductivity sensor input to embedded conductivity transmitter with K entry input into the software to handle the calibration
 - Non-invasive Air detector with delay time programmable, can be used as a product filtration end-point
 - Filtrate flow meter input for optional rotary flow meter, ultrasonic flow meter, or other that includes the ability to totalize flow
 - Two inputs available for other sensors with 4 - 20 milliamp outputs to enable collection of additional process data that can be configured for decimal places and alarms points
 - Graphical user interface software will operate with TFF Process Control System product hardware or VFDF System product hardware
 - Custom selection to reconfigure the valves on the TFF Pilot Cart to optimize operation with the VF-DF software
 - CE tested for EMC and LVD
 - Built-in data server to exchange data with OPC client software such as PI from OSI soft®

^ Includes ability to link to Second Filter Timed Flush

* Ability to link a Filter Flush with Filtrate Scale Endpoint step



Pilot Cart

In the Pilot Cart, additional system functions are controlled by the tubing pinch valves. There are 3 pairs of valves in which one valve is normally closed and the other is normally open. The pair is always actuated in sync so the open valve closes and the closed valve opens which serves to re-direct flow. The available functions are:

1. Manual- control valves and pump manually by clicking on the GUI graphic
2. Run Pump (pump runs but no endpoint with valves in default positions)
3. Prefilter Flush with Total Flow Endpoint (valve pair 2 switches)^
4. Second Filter (Virus Filter) Timed Flush (valve pair 3 switches)
5. Product Filtration with Air Detector Endpoint (inlet valve pair 1 switch)*
6. Product Filtration with Filtrate Scale Endpoint (inlet valve pair 1 switch)
7. Recovery with Filtrate Scale Endpoint (valves in default position)

Delta pressure control option that regulates pump automatically.

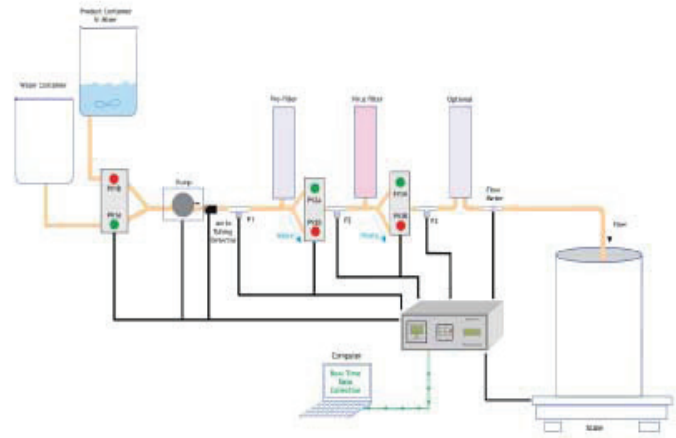
^ Includes ability to link to Second Filter Timed Flush

* Ability to link a Filter Flush with Filtrate Scale Endpoint step

Selectively, the system can be custom-configured in the software to remove Filter 3 or any pair of valves if not required for a specific process. The pH, conductivity and external sensors can also be optionally selected for display on the System View.

- The system uses an optionally interchangeable fluid path that may be project/product dedicated to prevent cross contamination
- Completely sealed front panel for use in clean environments where frequent wipe-down is required.

The process is represented in the following schematic:



Control System accessible behind drop-down door in PC enclosure

Process Overview

Normal Flow Filtration Systems for All Stages of Process Development



Screening

(~1L or less)



Normal Flow Filter Screening System

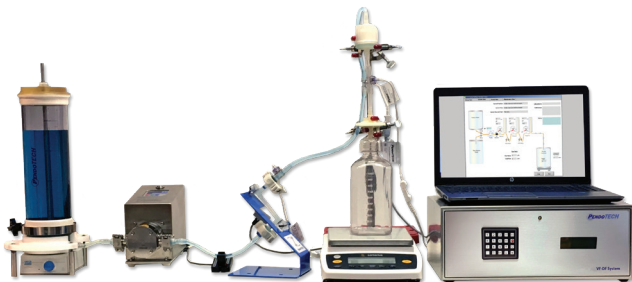
- Studies with constant flow or constant pressure
- Four parallel filtration optimization studies possible with scale-down filter disks

For more information on this Normal Flow Filtration Screening Product
www.pendotech.com/nffss



Process Development / Scale-up*

(~ 1 to 5L)



VF-DF System

- Ability to run constant flow or constant pressure
- Automates a normal flow process with a range of process functions with automated endpoints



Pilot*

(~ >5L)



VF-DF Pilot Cart

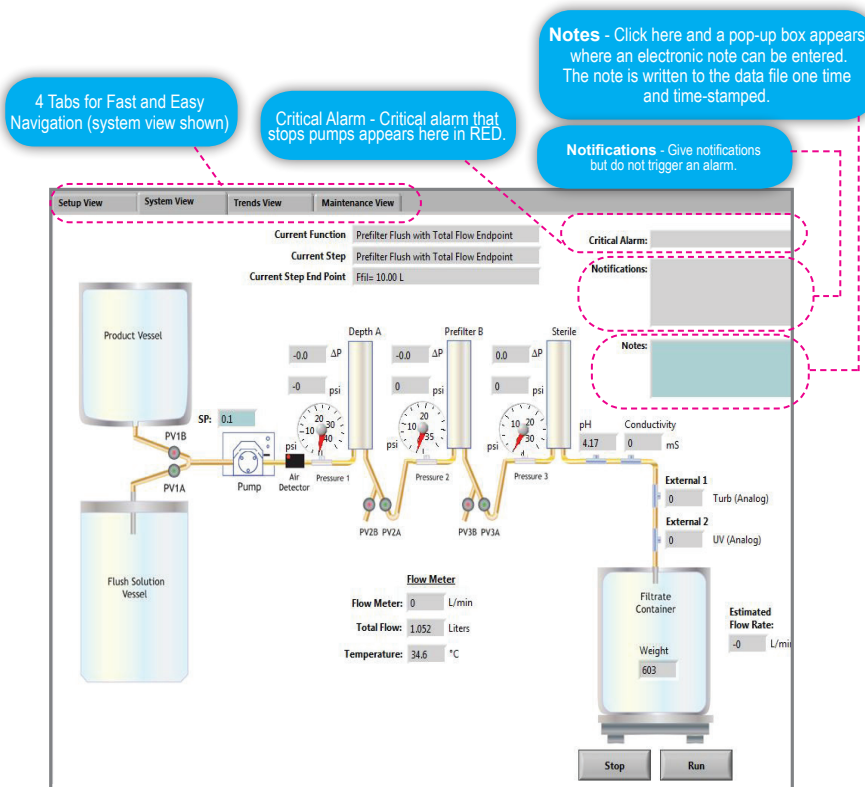
- Automated fluid path selection valves
- A range of process functions with automated endpoints

* The graphical user interface software will also operate with TFF Process Control System control box

Graphical User Interface - Simplifies Control System Interaction

The GUI is designed for use with a mouse or touch-screen operation. Clicking a numeric field is followed by appearance of a pop-up key pad for data entry. Values entered that are out of range are rejected with a message. There are four tabs for easy navigation:

1. Setup View- used to enter experiment information, function selection, set alarms and to create a data file where all process data will be stored
2. System View- used to view current process values and change pump flow rate
3. Trends View- ability to trend process variables that is loaded with features to dynamically view the data of interest, ability to quickly auto-scale or manually scale the axes, and ability to export a trend of interest either as data or a graphics file
4. Maintenance View- used to set up the pump, calibrate pH via easy to use wizard, enter "K" value for conductivity sensor, select units of measure for the scales, configure flow meter and more. The system can be customized to remove Filter 3 or any pair of valves if not required for a specific process. The pH, conductivity and external sensors can also be optionally selected for display on the system view.



4 Tabs for Fast and Easy Navigation (system view shown)

Critical Alarm - Critical alarm that stops pumps appears here in RED.

Notes - Click here and a pop-up box appears where an electronic note can be entered. The note is written to the data file one time and time-stamped.

Notifications - Give notifications but do not trigger an alarm.

Critical Alarm:

Notifications:

Notes:

Current Function: Prefilter Flush with Total Flow Endpoint
Current Step: Prefilter Flush with Total Flow Endpoint
Current Step End Point: Ffil= 10.00 L

Product Vessel
Flush Solution Vessel

Depth A: -0.0 ΔP, -0.0 psi
Prefilter B: -0.0 ΔP, 0.0 psi
Sterile: 0.0 ΔP, 0.0 psi

SP: 0.1
Pump: Air Detector, Pressure 1, Pressure 2, Pressure 3
Valves: PV1B, PV1A, PV2B, PV2A, PV3B, PV3A

Flow Meter:
Flow Meter: 0 L/min
Total Flow: 1.052 Liters
Temperature: 34.6 °C

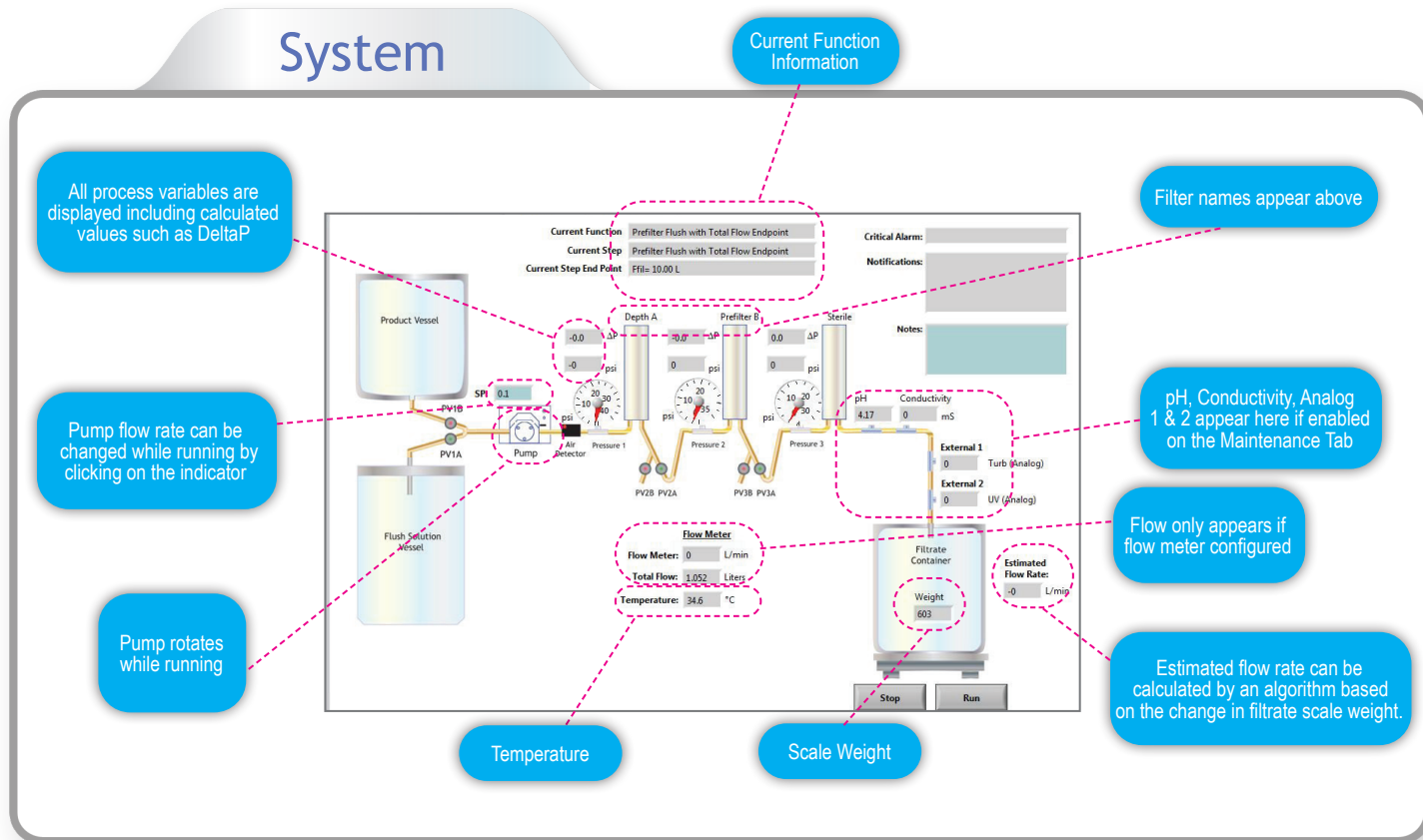
pH: 4.17
Conductivity: 0 mS

External 1: 0 Turb (Analog)
External 2: 0 UV (Analog)

Filtrate Container: Weight 603
Estimated Flow Rate: 0 L/min

Buttons: Stop, Run

System



Current Function Information

All process variables are displayed including calculated values such as DeltaP

Pump flow rate can be changed while running by clicking on the indicator

Pump rotates while running

Temperature

Scale Weight

Filter names appear above

pH, Conductivity, Analog 1 & 2 appear here if enabled on the Maintenance Tab

Flow only appears if flow meter configured

Estimated flow rate can be calculated by an algorithm based on the change in filtrate scale weight.

Current Function: Prefilter Flush with Total Flow Endpoint
Current Step: Prefilter Flush with Total Flow Endpoint
Current Step End Point: Ffil= 10.00 L

Product Vessel
Flush Solution Vessel

Depth A: -0.0 ΔP, -0.0 psi
Prefilter B: -0.0 ΔP, 0.0 psi
Sterile: 0.0 ΔP, 0.0 psi

SP: 0.1
Pump: Air Detector, Pressure 1, Pressure 2, Pressure 3
Valves: PV1B, PV1A, PV2B, PV2A, PV3B, PV3A

Flow Meter:
Flow Meter: 0 L/min
Total Flow: 1.052 Liters
Temperature: 34.6 °C

pH: 4.17
Conductivity: 0 mS

External 1: 0 Turb (Analog)
External 2: 0 UV (Analog)

Filtrate Container: Weight 603
Estimated Flow Rate: 0 L/min

Buttons: Stop, Run

User Interface Details

Setup

Setup View is used to enter experiment information, function selection, set alarms and to create a data file where all process data will be stored. Additionally its used to name the filters (which will appear on the system view), enter the filter areas which are used for flux calculations, and enable Delta-P control and enter the Delta-P setpoint. There is also the ability to save Functions and the function settings for recall in the future. For functions where additional steps can be linked, buttons appear to enable the linked step to run automatically.

Information is written to header of data file when data collection is started; then it becomes uneditable

When Start Process Data Collection is selected, a dialog box appears so a file name and location can be entered. All process data is saved to a CSV file that can be opened later in software such as Excel.

The screenshot shows the 'Setup View' interface with the following sections:

- Experiment Name:** Demonstration
- Other Details:** Test Run
- Flow Meter:** Ultrasonic
- File name and location:** (empty text field)
- Function Selection:** Prefilter Flush with Total Flow Endpoint (selected), Auto 2nd Filter Flush (linked)
- Pump Flow Rates (LPM):** 0.1
- Flow End Point:** 10
- Filter Area (m²):** 1.0000, 0.5000, 0.5000
- Filter Name:** Depth A, Prefilter B, Sterile
- SP ΔP:** 55.0 psi, 55.0 psi
- Critical Alarm Set Points:**

	P1	P2	P3	External 1	External 2
Maximum	40.0	35.0	30.0	100	200
Minimum	-1.0	-2.0	-3.0	-100	-200
- Notification Points:**

	P1	P2	P3	ΔP1	ΔP2	ΔP3	Ext 1	Ext 2
Maximum	35.0	30.0	25.0	15.0	25.0	30.0	110	110
Minimum	-1.0	-2.0	-3.0	-4.0	-5.0	-7.0	-110	-210
- Buttons:** Start Process Data Collection, End Process Data Collection, Save Process Info, Recall Process Info, Configure Email, Stop, Run

7 functions available

Settings for selected function are entered here

Delta-P control by pump speed control

Ability to link 1st & 2nd filter flush (see below info for product filtration link)

Ability to save/recall frequently used functions

Ability to enter filter names and areas

Notification points Show warnings in Notifications box and email alerts (if configured) (create no action)

Alarms setpoints- Will stop pumps

Configure email client for Notification alerts and for function completion

The dialog box is titled 'Flush Filtrate RPM and Flush Weight.vi'. It contains the following text:

Enter the Pump Flow Rate for the Flush Step in the Control below. Then enter the Flush Weight (grams) in the control below. NOTE: The Flush Weight will be added to Filtrate Scale weight when the flush begins. This determines the Filtrate Scale Endpoint. Press "OK" when complete or press "Cancel" to quit and abort.

Inputs: Pump Flow Rate (LPM) = 0.4, Flush Scale Weight = 33

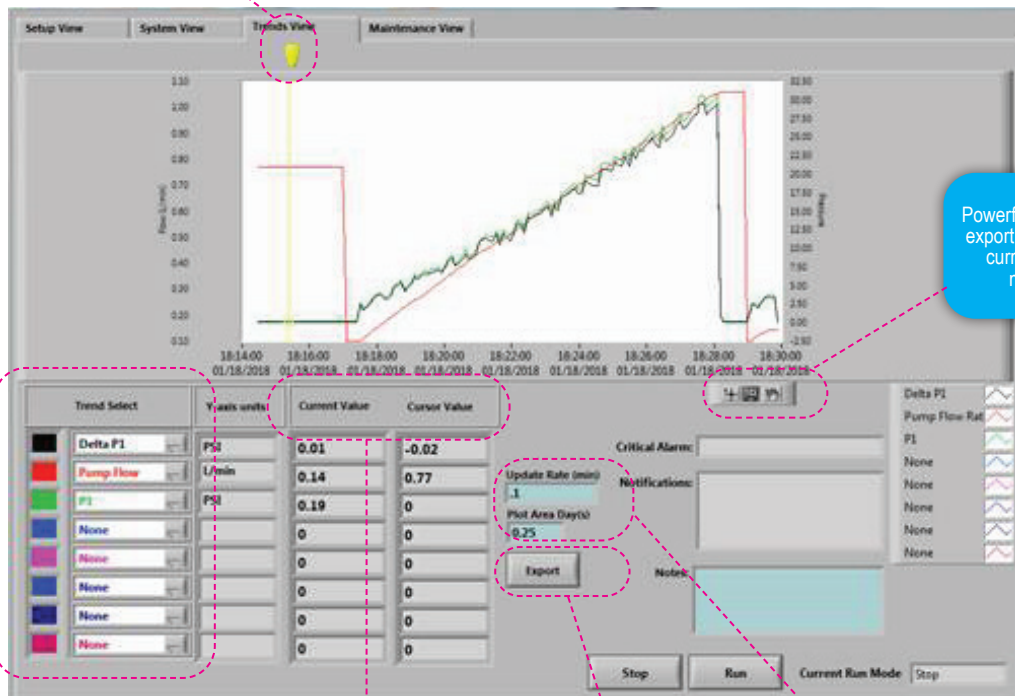
Buttons: OK, Cancel

Product Filtration with Air Detector function can be linked to a flush step with a user entered flow rate and flush weight. The link is activated by clicking the button shown as illuminated

Trends

Used to trend process variables with features to dynamically view the data of interest, ability to quickly auto-scale or manually scale the axes, and ability to export a trend of interest either as data or a graphics file. Using the features on the Trends View, the trends to be plotted can be selected and the yellow cursor tab at the top of the plot area can be dragged across the plot area to display desired cursor values that appear in the table for the respective trend as shown along with the current values.

Slide to change cursor value



Powerful tools to zoom, export an image of the current trend and much more

- √ None
- P1
- P2
- P3
- Delta P1
- Delta P2
- Flow Meter Rate
- Flow Meter Total
- Pump Flow Rate
- Flux Filter 1
- Flux Filter 2
- Flux Filter 3
- Filtrate Weight
- Est. Flow Rate
- pH
- Conductivity
- External 1
- External 2

Options to select Auto-scale or Manual scale on all axes

Quickly compare current values to cursor value

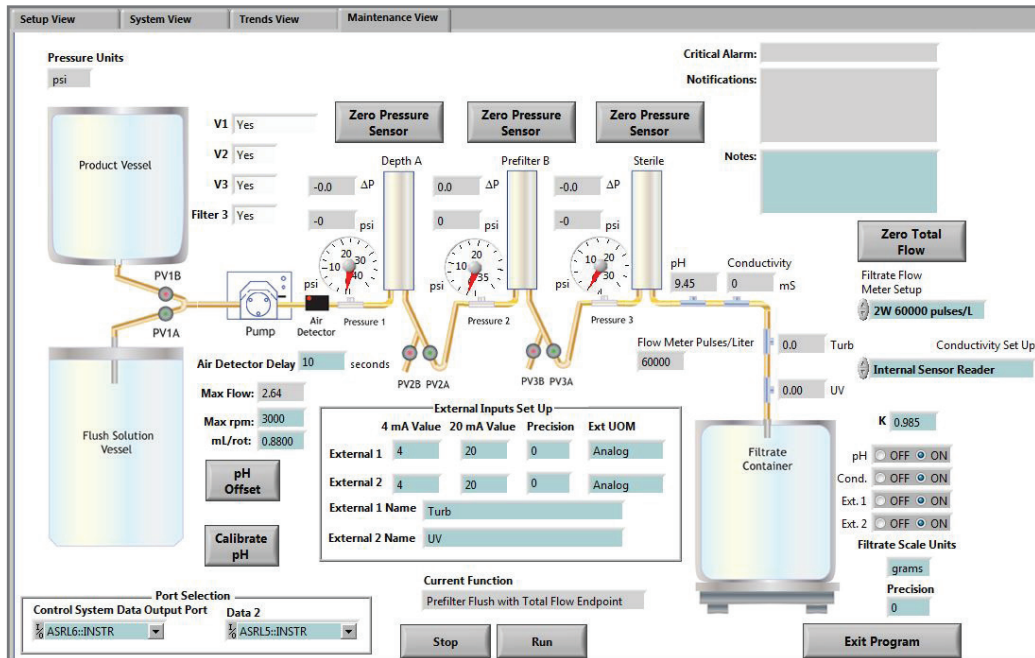
Export the current trend only to open in software such as Excel

Ability to change plot update rate

User Interface Details

The Maintenance View contains a range of capabilities. Its settings are saved in a program configuration file so each time the software is opened it returns to the values and settings from the previous use.

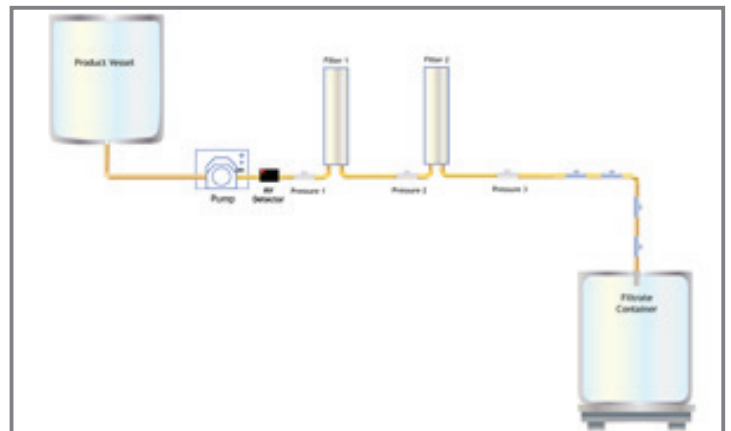
Maintenance



Customized System View

Maintenance View includes the ability to:

- Zero pressure sensors
- Select conductivity range
- Calibrate pH
- Set units of measure
- Set-up pump
- Customize system view for specific processes
- Configure the flow meter
- Zero flow meter total
- Set range of external signals & name them
- Exit program

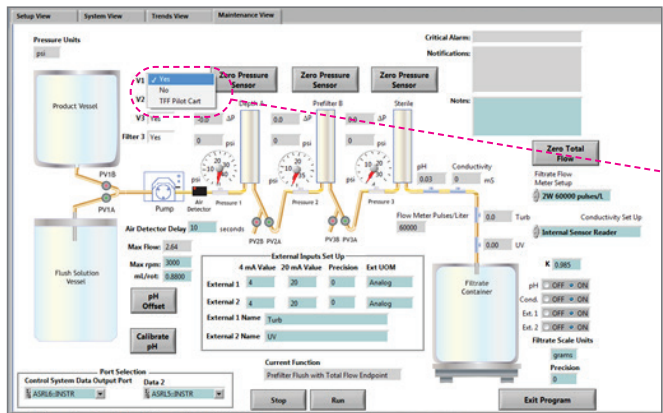


Shown with valves and filter 3 removed

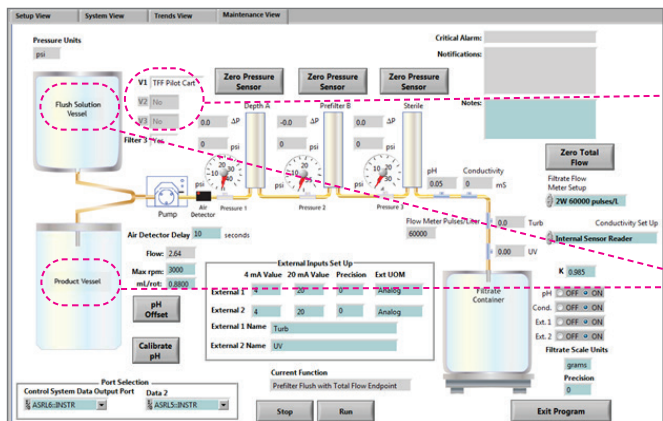
Special Function for Use with TFF Pilot Cart

Special Configuration for Using the VFDF Software with the TFF Pilot Cart

There is a selection under V1 named TFF Pilot Cart. This is designed to optimize use of the VFDF software with the TFF Pilot Cart. This creates a convenient, flexible solution to use the TFF Pilot Cart as designed for TFF unit operations and additionally for VFDF unit operations. When the TFF Pilot Cart is selected as the V1 option, the pump inlet selection valve on the TFF Pilot Cart become assigned as the VFDF pump inlet selection valves. This includes swapping the positions of the containers to line up with the top valve on the TFF pump inlet valves to be normally open to the Flush Solution Vessel. Additionally, the other valves are removed because the flush valves are not available on the TFF Pilot Cart.

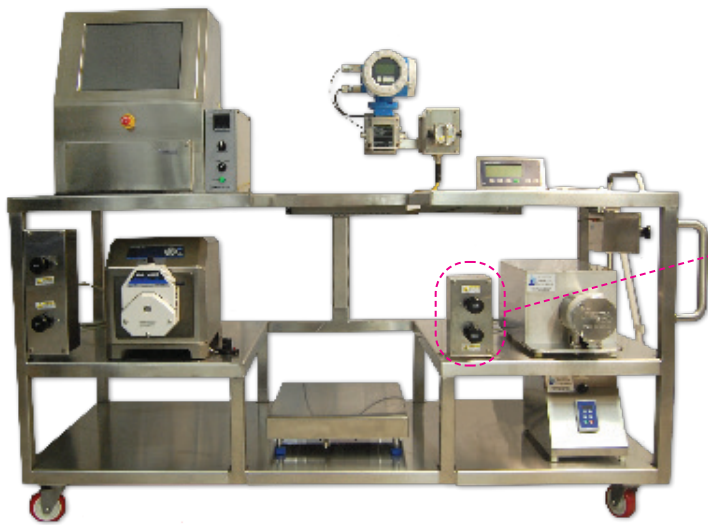


Selection option for TFF Pilot Cart

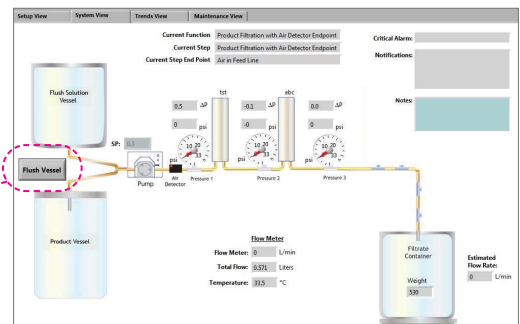


When the selection is made to TFF Pilot Cart, valves V1 & V2 are automatically disabled and removed from the graphics

The Flush Solution Vessel & Product Vessel positions are swapped to allow the flush solution vessel to be aligned with the top valve on the TFF Pilot Cart which is "normally open"



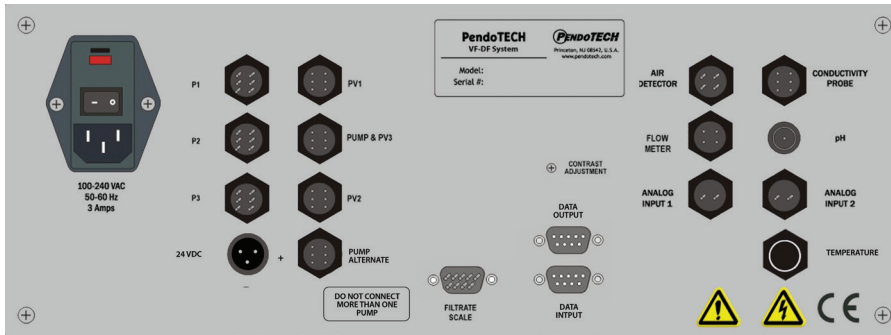
TFF Pilot Cart



When a Product Filtration function is selected, a button appears where the "TFF Recovery Valve" at the pump inlet can be switched by the user

Integration Options

Control System Back Panel Input/Output Connections



The system comes with the required cables to enable the system to be quickly up and running. All connections are keyed to prevent connection of a cable to the wrong connector. Pumps and scales may be delivered with the system or existing equipment or self-procured equipment may be used.

Pressure Sensors

Pressure sensor cables provided with the system accept the PendoTECH Pressure Sensors (below). Even though these are called single use, they are robust enough to be re-used for process development where cross-contamination is not a concern. Sizes available luer, 1/8inch, 1/4inch, 1/2inch, 3/8inch, 1/2inch, 3/4inch and 1inch hose barb, also in sanitary flange. Ultra secure tubing retainers are available for higher pressure operations.



Other sensors such as Stainless Steel transducers with full bridge - 4 wire output may be used.

Conductivity Sensors



The system measures conductivity via the PendoTECH Single Use Conductivity Sensor which is also robust enough for cleaning and extensive reuse. The sensors are available in a range of sizes. All sensors have a pre-determined cell constant that is printed on their tag which is entered into the software. Temperature compensation performs normalization to 25°C and have a measurement range of 0 to 100mS.

pH



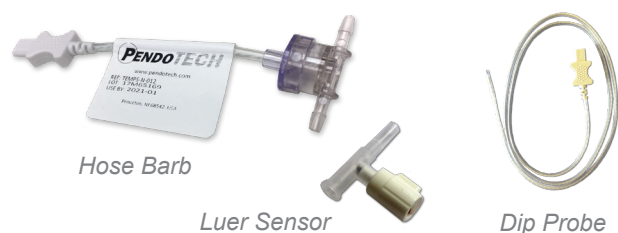
Single Use Probe inserted into the 2 flow cells

pH measurement is integrated to the system. The probe can be removed from the cell for calibration with buffers using the software's pH calibration wizard. The PendoTECH Single Use pH Probe may be re-used, however, in applications where cross contamination is desired to be avoided, it can be easily replaced with a new one. The probe must be calibrated before use, then inserted into the flow cell and hand tightened. The flow cell is available in two sizes: 1/4inch hose barb and 3/4inch sanitary flange. Other electrochemical pH probes can be used.

WARNING: Maximum pressure of 15psi/1 bar

Temperature

Temperature is displayed in the software system view and recorded in the data file. There are several options to measure temperature - either a luer fitting for small scale, an in-line hose barb sensor, or a dip probe.



Hose Barb

Luer Sensor

Dip Probe

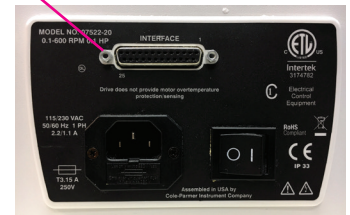
Pump Options

- Any pump with a remote speed control input can be used- no process scale limitations!
- Peristaltic, rotary lobe, diaphragm pump, and other
- Pump Setup function used to quickly enter the pump parameters
- Masterflex pump selection guide available from PendoTECH
- The pump cables are supplied to interface to the remote control connector on the user selected pumps as shown in the example to the right.



Pump Cable
(Masterflex Pump
Cable Shown)

Interface Connector



Example of Pump Back Panel
with remote interface connector

Peristaltic Pump Features

A peristaltic pump allows for quick changeout of the tubing to prevent cross-contamination and tubing is available in a wide range of materials for different applications. Peristaltic pumps are self-priming and can run dry to drain the tubing. They are positive displacement pumps so based on the different options of tubing inner diameter, one pump model can cover a wide range of flow rates. For many applications they can generate adequate pressure based on the pump design and tubing used.



Quattroflow™ Diaphragm Pump Features

The method of operation of Quattroflow pumps allows them to gently, safely and securely convey aqueous solutions and biological products that are sensitive to shear force. The design does not feature a mechanical shaft seal or wetted rotating parts, ensuring total product containment without abrasion. Additionally, the pumping principle enables risk-free dry-running, low pulsation, self priming, and minimal particle generation.

The Quattroflow pump offers the following features:

- A wide range of flow and pressure up to 4bar (58psi) which is generally not achievable with peristaltic technology
- The pressure capability enables concentration to high concentration factors as the product becomes viscous
- The pump design is for low shear operation that can reduce pump damage to fragile biomolecules and shear-sensitive viruses
- A pump chamber that can be reused extensively or can be swapped quickly without the use of tools in situations where cross-contamination wants to be avoided



Scale Options

- Most scales with RS232 communication can be used
- Control system has customized software interface for optimal integration of scales to enhance performance

- A scale selection menu on the process control system is used to quickly configure the RS232 parameters for the different scale brands.



Integration Options

Air Detector Option

The non-invasive ultrasonic air detector detects air in a tube placed into the detector. There is an integral LED that indicates liquid presence. The tube can be opaque because the sensing mechanism is sound waves. The software has a user entered detection delay to prevent false endpoints.



The Air Detector which detects the difference between air and liquid in a tube, is integrated into the software as a Function Endpoint.

Inlet Selection Valves for Benchtop Configuration



Pneumatic valves for 3/8inch ID tubing



Electric valves for 1/8inch & 1/4inch ID tubing

Tubing pinch valves are available for the benchtop system as the inlet selection valves for either Flush Solution Vessel or Product Vessel to feed the pump.

Filtrate Flow Meter Options

For filtrate flow measurement, flux calculation, and total flow measurement, there is a Filtrate Flow Meter input on the back panel. This reads a digital pulse/frequency input signal that is an available output on many flow meters. Basic flow meter measurement technology can be used to measure clean, filtered material with relatively consistent viscosity. Ultrasonic flow measurement is available with the Leviflow Sensor with five models available covering the range from 10mL/min to 80L/min. These can be used on a single use mode or re-used and have high accuracy of +/- 1%. There is also a Low Flow Ultrasonic Flow Meter capable of measuring flows in a range of 5 to 100mL/minute. This model has a low hold-up volume and a 1/16inch ID x 1/8inch OD and a luer fitting inlet fitting for easy connection. The rotary flow meters have a 1/4inch hose barb and can measure flows from about 0.1 to 2L/min or a 1/2inch barb that can measure flows from 1.0 to 20L/min. These rotary flow meters can be used in a single use mode or re-used.



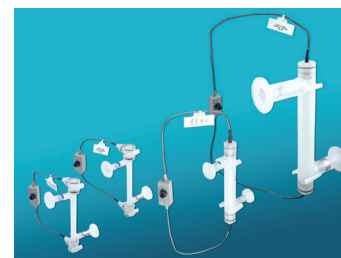
Leviflow Sensor Monitor with Sensor Stand
[Click here for data sheet](#)



Rotary Flow Meter



Low Flow Ultrasonic



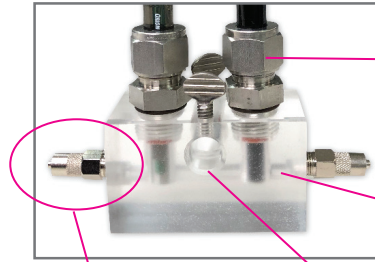
A selection of sensors to cover a wide range of flow rates

Lab Scale Flow Cell for a Variety of 12mm OD Probes

PendoTECH has available lab scale flow cells made of acrylic material. They be used to make measurements from 12mm OD probes and features a low hold-up volume. It can be used with a pH probe that connects directly to the pH input on the rear panel of the system. And additionally it can be used for probes connected to 3rd party transmitters that are connected to one of the analog inputs. For example, this could be used to measure a second conductivity, dissolved oxygen or other. If only one probe is to be used there is a blank available to seal the second probe port. The probe port blank can also be used to seal the port during cleaning if the probe is removed.



Acrylic Flow Cell shown with 12mm OD epoxy conductivity probe & 12mm OD polysulfone pH probe.



Compression fitting to secure probe

Low hold-up volume fluid path

Available with different fitting options

1/2inch hole for mounting

WARNING: Maximum pressure of 15psi/1bar

UV Absorbance & Turbidity

PendoTECH's Single-Use UV Absorbance and Turbidity measurement units can measure from the bioprocess fluid streams while it is processing, resulting in less disruption to bioprocessing operations compared to off-line measurements. PendoTECH's Single Use UV Flow Cells, coupled with a unit's compact photometer with fiber optic cables, can measure the UV absorbance at 280nm without product contact. Additionally, the single wavelength LED light source in the unit is available in other popular wavelengths of 300nm and 260nm and most other wavelengths in the UV-VIS-NIR range. Our Turbidity Flow Cells and 880nm photometer can measure the turbidity of a liquid as it flows through a tube in a process. The single use cells are cost-effective for disposable applications, but also may be repeatedly cleaned and reused. The photometer has no display so via their transmitter feature they integrate to the analog input on the TFF System to display the measured value. On the Maintenance View of the software the range of measurements and units of measure are configured. The UV flow cell can be placed on the filtrate/permeate tubing to detect breakthrough of product through the filter membrane. An alarm can be set so when breakthrough is detected the process will stop. Concentration measurement may or may not be possible because saturation may occur quickly during the concentration process because the flow cell has a fixed path length.



UV Flow Cells



Photometer



Turbidity Flow Cell



UV Flow Cell Stand

Vessel Options

Lab Scale Process Vessels

Three different size vessels with Low Holdup Volume - the key to minimizing overall system holdup. All have a conical bottom with mixing and a low point drain.

Small Scale Vessels

- Design with conical base with low-point drain minimizes liquid hold-up
- Luer outlet at base that facilitates easy integration to any process flow path
- Lid with 3 holes easily inserts into vessel - 2 holes for placement of dip tubes and one for venting
- Locator at bottom for stir bar for process mixing
- Transparent with graduation marks for accurate process volume measurement
- Made of polysulfone which is compatible with many chemicals including sodium hydroxide
- Available in 2 different sizes of 600mL and 140mL

Contact Materials
Vessel: Polysulfone
Dip Tubes: Nylon

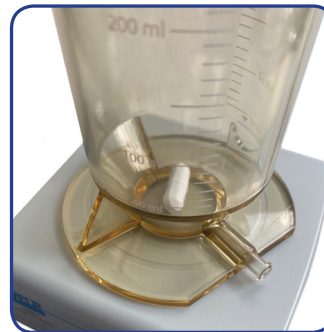
*Stir plate not included



Luer Outlet

600mL with 40mL
in conical section

140mL with 12mL
in conical section

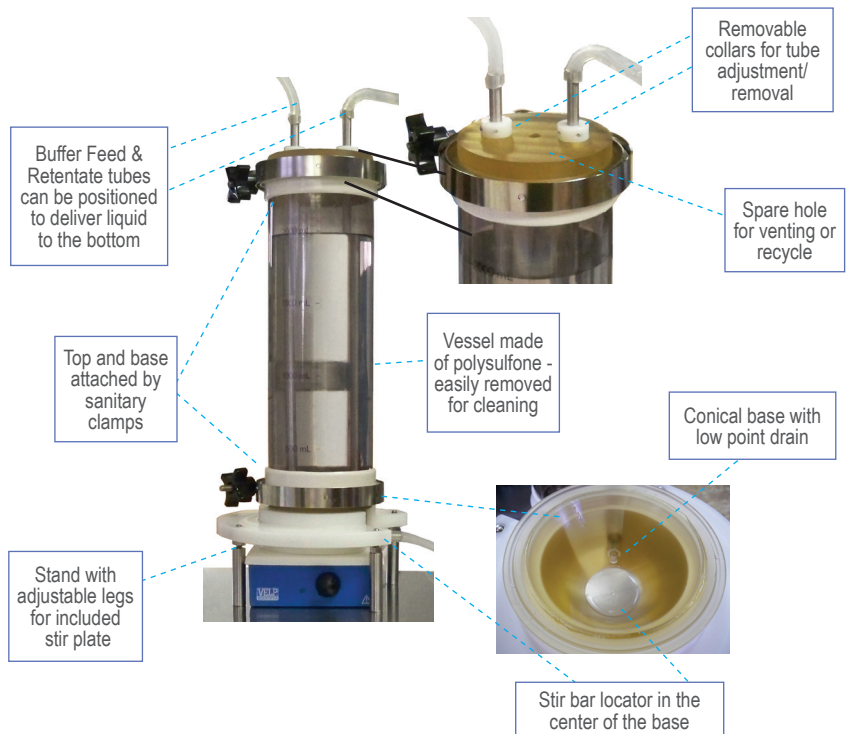


Pocket for the included
magnetic stir bar*

2 Liter Vessel



Vessel Detail - 2 Liter Vessel shown



Advanced Features

Remote Access

- Easy ability to operate system remotely from another PC using software such as Real VNC, Remote Desktop, Timbuktu, GoToMyPC, LogMeIn and others or smart devices such as the iPhone/iPad

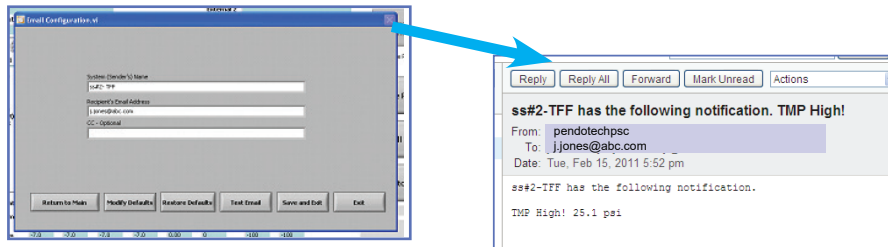


OPC Server Capability

- Serve data to OPC - clients such as facility historian like OPC client software such as PI from OSI soft®
- Enable the data generated by the system to be stored in a central repository with other process data

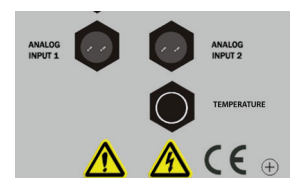
Email & Text Message Notification

The pre-alarm notification points can be used to send email alerts and text messages. The system is given a name and the email addresses to send the alerts are entered. There is a built-in mail program to send these notifications with a default mailbox which may be replaced by a user configured mailbox.



External Inputs

The two analog inputs can be used to collect data from a wide variety of sensors not built into the system. The input signals are configured in the software and alarm points on these values may be entered also. These inputs give the ability to instantly integrate the PendoTECH Turbidity and UV Sensors.



Detail	Specifications
Dimensions (HxWxD)	6.125inch x 16inch x 11.5inch (15.5575cm x 40.64cm x 29.21cm)
Weight	20lbs. (9.1kgs.)
Enclosure Material	304 Stainless Steel
Power Requirements	100 - 240 Volts, 50 - 60 Hertz, 2amp max
Pressure Sensor Inputs	PendoTECH Pressure Sensors default configuration- other full-bridge type sensors optional
Pump Control	Speed Control: 4 - 20mA; Circ Pump Alternate: Scalable voltage signal within 0-10 volts Start/Stop: Relay 3 - 48VDC, up to 3A continuous
Alr Detector Input	Digital input with 24VDC supply
Flow Meter Input	5V Digital pulse input with 5VDC or 24VDC supply
External Inputs	Analog Signal - both 4-20mA
pH Input	Standard probe input via BNC connector
Conductivity Input	Specifically designed to read the PendoTECH Single Use Conductivity Sensor with the K input via the software
Scale Inputs	RS232 Communication
Temperature Input	2-wire 2252ohm thermistor input designed for use the PendoTECH temperature sensors available in a luer design, in-line with a hose barb and a dip probe.
PC Requirements	Windows 7 or 10, 2 GHz or faster, 4GB of RAM, at least 2 USB ports



Ordering Information

SYSTEM	
PDKT-PCS-VDF	PendoTECH Virus Filtration-Depth Filtration Process Control and Monitoring System w/ pressure sensor and pump cables

PUMPS (Others Available)	
PUMP-MF-LS-TW	Masterflex General Purpose Digital, with RPM display only, 600RPM with EasyLoad II pump head for thin wall L/S tubings
PUMP-MF-LS-TKW	Masterflex General Purpose Digital, with RPM display only, 600RPM with EasyLoad II pump head for thick wall L/S tubings
PUMP-MFD-LS-TKW	Masterflex Peristaltic Digital Pump w/DB25 remote control port for control from system. 600RPM drive w/ EasyLoad II for precision thick wall L/S tubing
PUMP-MFD-LS-TW	Masterflex Peristaltic Digital Pump w/DB25 remote control port for control from system. 600RPM drive w/ EasyLoad II for precision thin wall L/S tubing
PUMP-WM-120-TW	Watson-Marlow 120U/DV 200RPM Pump Fitted with 114DV flip-top four roller pumphead for thin tubing
PUMP-WM-620	Watson Marlow Model 620U/R 265 RPM Pump with Flow to 12.7 l/min
PUMP-QF30D-SU	Quattro Pump QF30 pump with one SU chamber (up to 500mL/min)
PUMP-Q150SU	Quattro Pump Q150 Single Use chamber (up to 3L/min) and includes 3 disposable chambers (QTY 3 of part # QF15IES)
PUMP-Q150SS	Quattro Pump Q150 Stainless steel chamber (up to 3L/min)
PUMP-Q1200HSU	Quattroflow 1200 (up to 20 LPM) Compact Version with 3 disposable pump chambers (QTY 3 of part # QUA-PQ12DISPP) and a stainless steel pressure plate, 4-20mA analog input for speed control, 120VAC
PUMP-Q1200HSS	Quattroflow 1200 (up to 20 LPM) Compact Version with Stainless Steel Pump Head, 4-20mA analog input for speed control, 120VAC
PUMP-Q4400HSS	Quattroflow 4400 (up to 83.3 LPM) Compact Version with Stainless Steel Pump Head, 4-20mA analog input for speed control, 200-240VAC
PUMP-Q4400HSU	Quattroflow 4400 (up to 83.3 LPM) Compact Version for use with single use chamber (incl. QTY 1: QF44D) and pressure plate, 4-20mA analog input for speed control, 200-240VAC

SCALES	
Contact PendoTECH for Scale Selection Guide	

VESSELS	
PDKT-TNK	Complete 2L tank setup with stir plate, 2 dip tubes, and stand
TNK-2L-STRPLATE	Stirrer plate for 2 liter vessel
PDKT-TNK500M	500mL - 2.5inch diameter (base with outlet, vessel, lid with 2 tube holders and dip tubes)- (DOES NOT INCLUDE STIR PLATE)
PDKT-TNK125M	125mL - 1.5inch diameter (base with outlet, vessel, lid with 2 tube holders and dip tubes)- (DOES NOT INCLUDE STIR PLATE)

FOR PENDOTECH PRESSURE SENSORS	See www.pendotech.com/pressure
FOR PENDOTECH TEMPERATURE SENSORS	See www.pendotech.com/temperature

Ordering Information



FLOW METERS	
FM-22WV	Rotor for Disposable PVDF Turbine Flowmeter 1/4inch, 0.1-1.0LPM, clip mount. With individual calibrations.
FM-22WV-E	Electronic Assembly for one PVDF rotor with 1/4inch hose barb (includes one rotor), 0.1-1.0LPM clip mount. With individual calibrations.
FM-23WV	Single Use Rotary Flowmeter, non-sterile, PVDF, 1/2inch hose barb, 0.3-20.0LPM, clip mount. With individual calibrations.
FM-23WV-E	Electronic Assembly for one PVDF rotor with 1/2inch hose barb (includes one rotor), 0.3-20.0LPM, clip mount. With individual calibrations.
FM-US-LF-I	Low Flow Ultrasonic Flow Meter (1/16inch ID), flow range 2-400mL/min, console unit with 24VDC power supply and Freq and mA output
FMT-LFS	PendoTECH Leviflow Sensor Monitor
FM-LFS-03SU	Leviflow single use flow sensor to 0.8LPM
FM-LFS-06SU	Leviflow single use flow sensor to 8LPM
FM-LFS-10SU	Leviflow single use flow sensor to 20LPM
FM-LFS-15SU	Leviflow single use flow sensor to 50LPM
FM-LFS-20SU	Leviflow single use flow sensor to 80LPM

CONDUCTIVITY	
COND2-TFF	Conductivity Probe K=1 with 100ohm Pt RTD for temperature measurement for TFF Process Control System, epoxy
CONDS-N-025	Single Use Conductivity Sensor, non-sterile, polysulfone 1/4inch hose barb
CONDS-N-050	Single Use Conductivity Sensor, non-sterile, polysulfone 1/2inch hose barb

AIR DETECTOR			
Part Number	AD-16-P	AD-17-P	AD-73-P
Tubing OD	1/4inch	3/8inch	5/8inch

DIAFILTRATION VALVE	
PDKT-PVE2-TFF-S	TFF Control System Electric Diafiltration Pinch Valve Pair - Small for 1/8inch ID
PDKT-PVE2-TFF-M	TFF Control System Electric Diafiltration Pinch Valve Pair - Medium for 1/4inch ID
PDKT-PV2-TFF-L	TFF Control System Pneumatic Diafiltration Pinch Valve Pair - Large for 3/8inch ID, size 36 tubing
PDKT-PV2-TFF-LT	TFF Control System Pneumatic Diafiltration Pinch Valve Pair - Large for 3/8inch ID, size 73 tubing

pH	
PT-PH1	PendoTECH Single Use pH probe with BNC connector for Single Use Cell
PT-PH1-CELL	Flow Cell for PendoTECH Single Use pH Probe, 3/4inch SF inlet/outlet, PA12 Nylon
PT-PH1-CELL-025	Flow Cell for PendoTECH Single Use pH Probe, 1/4 inch hosebarb inlet/outlet, PA12 Nylon
PT-PH1-M	PendoTECH Single Use pH probe with Single Use Cell- sanitary flange
PH-PILOT-C	pH pilot scale flow cell with 3/4inch sanitary flange inlet/outlets for 12mm OD probe
PH-PILOT-CP	12mm OD pH probe for flow cell
PH-PILOT-CC	pH pilot scale flow cell with 3/4inch sanitary flange inlet/outlets with 12mm OD pH probe
PH-PILOT-C-1	pH pilot scale flow cell, polysulphone with 1inch sanitary flange inlet/outlets for 12mm OD probe
PH-PILOT-6MM-SS	316L Stainless steel pilot scale flow cell with 3/4inch sanitary flange inlet/outlets for 6mm OD probe

Warranty/Disclaimer

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