PENDOTECH
Leading Process Analytics

Downstream Process Analytics

for Biopharmaceutical Applications

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Single-Use Pressure Sensor
Simplify Your Pressure Measurements

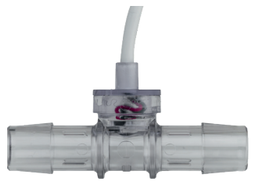
Pendotech has developed a line of Single-Use Pressure Sensors that offer an accurate and cost-effective solution for measuring pressure in biopharmaceutical processes.

Reliable Cost-effective Pressure Measurement
Single-Use Pressure Sensors measure static and dynamic pressure of gases and liquids in your biopharmaceutical processes – accurately and cost effectively.

Simplified Maintenance
Robust enough to be repeatedly cleaned and inexpensive enough to be utilized in single-use applications, our Single-Use Pressure Sensors deliver a dependable alternative to stainless steel pressure transducers.

High Measurement Stability
The sensors feature Pendotech High Accuracy Pressure (MEMS-HAP) Chips and are perfect for filtration and chromatography processes as well as monitoring of single-use bioreactors, filling operations and more. They are available in caustic-resistant polysulfone to withstand sanitization processes.

Versatile
Single-Use Pressure Sensors, which are qualified for use up to 5.17 bar (75 psi), are compatible with PressureMAT™ monitor/transmitter, Process Control Systems or other pre-qualified third-party monitors.



PREPS-N-050V

PREPS-N-1-1-30

Application	Description
Filtration system pressure monitoring	Single-Use Pressure Sensors can be used to monitor the pressure in filtration systems to detect filter plugging and assess filter performance.
Chromatography system pressure monitoring	Single-Use Pressure Sensors can be used to monitor the pressure in chromatography systems, which is important to detect over pressurization and ensure optimal performance of the column.
Filling operations pressure monitoring	Single-Use Pressure Sensors can be used to monitor the pressure in filling operations, which is important for ensuring that the filling process is operating effectively.
Bioreactor pressure monitoring	Single-Use Pressure Sensors are crucial for monitoring pressure in bioreactors. They help detect over-pressurization due to plugged vent filters which can lead to hazardous situations and loss of product.
Other bioprocess applications	Single-Use Pressure Sensors can also be used in other bioprocess applications, such as centrifugation, virus inactivation and diafiltration.

Transmitter selection
Pendotech PressureMAT transmitters are available to work with our Single-Use Pressure Sensors including the PTR Pressure Sensor Transmitter .

Sensor selection:
Hose barb connections
These connections are quick and easy to make, making them a good choice for applications where frequent connections and disconnections are required. They are also recommended for pre-assembled, pre-sterilized, single-use tubing and bag assemblies.

Sanitary flange connections
These connections are more secure than hose-barb connections, and they are less likely to leak. Therefore, they are more suitable for higher pressure applications.
However, they are more expensive and time-consuming to install.

Luer connections
These connections are the smallest and most compact of the three types.
They are often used in applications where space is limited. However, they are not as secure as other types of connection.

Validation
100 % tested for accuracy and leaks during manufacturing. Available in polycarbonate or caustic resistant polysulfone materials. Certificate of Quality included with lot certification; individual NIST Certificates are optional.

Integration flexibility
The Single-Use Pressure Sensors can be integrated with a variety of systems, including: The PressureMAT monitor/transmitter Process Control Systems and third-party monitors.

Single-Use Luer Pressure Sensor

Single-Use Pressure Sensor
Simplify Your Pressure Measurements

The Single-Use Pressure Sensors measure static and dynamic pressure of gases and liquids in your processes accurately and cost effectively. They are perfect for filtration and chromatography processes, monitoring of gases and single-use bioreactors, filling operations and more. They feature the High Accuracy Pressure (MEMS-HAP) chips inside. The sensors connect to monitors via an integral connector. Suitable transmitters include PressureMAT monitor/transmitter, a Process Control System, or other pre-qualified third-party monitors. They can be non-invasively tested in-place with the Pendotech PressureChecker. They are the alternative cost effective solution for use with tubing to the existing stainless steel pressure transducers on the market.

Features Overview

- Available in hose-barb connections, sanitary flange & luer connections
- Can be cleaned and re-used
- Unobstructed flow path provide reduced hold-up volume
- Available in polycarbonate or caustic resistant polysulfone materials
- Certificate of Quality included with lot certification; individual NIST Certificates are optional
- Can be non-invasively tested in-place via test port

Specifications

Accuracy	Positive Range	Specification
	0 to 0.41 bar (0 to 6 psi)	±2 % of reading
	0.41 to 2.07 bar (6 to 30 psi)	±3 % of reading
	2.07 to 4.14 bar (30 to 60 psi)	±5 % of reading
	Vacuum Range	Specification
	0 to – 0.48 bar (0 to –7 psi)	±3 % of reading
	– 0.48 to – 69 bar (–7 to –10 psi)	±5 % of reading
Pressure Range	0.79 to 5.2 bar (– 11.5 to 75 psi)	
Biocompatibility	All materials in contact with product fluid path meet USP Class VI requirements, both pre and post irradiation	
Regulatory and Compliance Testing	• USP Class VI • ISO 10993-5 • ADCF • Particulates • Bacteriostatis and Fungistatis (B&F) • Extractables & Leachables	• USP 661 • Bioburden • REACH Compliant • Endotoxin • RoHs Compliant
Manufacturing Environment	ISO 9001 certified facility, Class 7 clean room	
Gamma Irradiation	Up to 50 kiloGrays	
X-ray Irradiation	Up to 50 kiloGrays	
Operating Temperature	2 °C to 40 °C (5.6 °F to 104 °F) other ranges with process qualification	
Storage Temperature	– 25 °C to 65 °C (– 13 °F to 149 °F)	
Input/Output Impedance	270 Ohms to 400 Ohms	
Excitation Voltage	2.5 to 10 volts DC (for best long term stability, use a lower excitation voltage)	
Sensor Output	0.2584 mV/Volt/psi	
Connector	Rating: IP67 when connected to reusable cable	
Shelf Life	5 years	
Packaging	White Tyvek and clear pouch with easy-open chevron seal; box of 25 sensors in polyethylene bags (except sterile sensors are not in polybags)	

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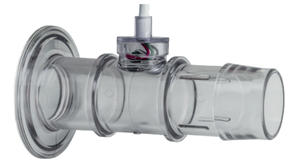
Ordering Information

Luer Sensors	Order Number
Pressure Sensor Luer, polysulfone, Non-sterile	30 961 415
Pressure Sensor Luer,polycarbonate, Non-sterile	30 961 416
Pressure Sensor Luer, polysulfone, 30 psi Cert	30 961 449
Pressure Sensor Luer, polysulfone, 60 psi Cert	30 961 450
Pressure Sensor Luer, polysulfone, 6 psi Cert	30 961 448
Pressure Sensor Luer, polysulfone, IP67	30 961 455
Pressure Sensor Luer, polycarbonate, sterile	30 961 417
Pressure Sensor Luer, polycarbonate, 30 psi Cert sterile	30 961 453
Pressure Sensor Luer, polycarbonate, 60 psi Cert sterile	30 961 454

Hose Barb & Sanitary Flange (non-sterile)	
Polysulfone	
0.318 cm (1/8 in) hose barb	PREPS-N-012
0.64 cm (¼ in) hose barb	PREPS-N-025
0.95 cm (3/8 in) hose barb	PREPS-N-038
1.28 cm (½ in) hose barb	PREPS-N-050
1.91 cm (¾ in) hose barb	PREPS-N-075
2.54 cm (1 in) hose barb	PREPS-N-100
1.28 cm (½ in) sanitary flange	PREPS-N-5-5
2.54 cm (1 in) sanitary flange	PREPS-N-1-1
3.81 cm (1 ½ in) sanitary flange	PREPS-N-15-15
2.54 cm (1 in) sanitary flange to 2.54 cm (1 in) hose barb	PREPS-N-1-100
1.28 cm (½ in) sanitary flange to 0.95 cm (3/8 in) hose barb	PREPS-N-5-038
1.28 cm (½ in) sanitary flange to 1.28 cm (½ in) hose barb	PREPS-N-5-050
Polycarbonate	
0.64 cm (¼ in) hose barb	PRESS-N-025
0.95 cm (3/8 in) hose barb	PRESS-N-038
1.28 cm (½ in) hose barb	PRESS-N-050
1.91 cm (¾ in) hose barb	PRESS-N-075
2.54 cm (1 in) hose barb	PRESS-N-100

Reusable Cable	
Cable Adapter for Single-Use Pressure Sensor – 3.657 m (12 ft)	PDKT-650-298
Cable Adapter for Single-Use Pressure Sensor – 7.31 m (24 ft)	PDKT-650-298-24
Cable Adapter to Minim 2 for Single-Use Pressure Sensor – 0.3 m (1 ft)	PDKT-650-298M2
Cable Adapter with RJ12 phone connector to Midgee Monitor for Single-Use Pressure Sensor – 2 m (6 ft)	PDKT-650-298MG
Cable Adapter with RJ12 phone connector to Pall Minim for Single-Use Pressure Sensor – 2 m (6 ft)	PDKT-650-298MN

Test Cable	
Test cable assembly for PressureMAT accuracy check	PMAT-TCA



Flange to Hose Barb Sensor

Luer Sensor

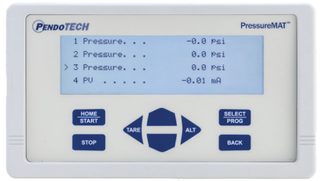
Did You Know

The Pressure Sensors are 100 % tested for critical quality attributes.

- Each sensor is leak tested on the liquid side at 60 psi to confirm integral assembly
- Sensors with a test port are leak tested on the test port side to confirm proper atmospheric reference
- Each sensor is tested electrically to confirm proper electrical performance
- Each sensor is tested to be accurate at 4.14 bar (60 psi) within ±5 % of reading (±0.21bar/-3.0 psi)

PressureMAT Sensor Transmitter

Designed for Single-Use Pressure Sensors



RoHS CE UKCA

Features Overview

– Portable and lightweight
– Interfaces with pumps, valves, and PLCs
– Displays Delta-Pressure or TMP (PMAT3 and PMAT4)
– Measures total flow volume (PressureMAT PLUS)
– Interfaces with other sensors with a 4–20 mA output (PressureMAT PLUS)
– Transmitter function delivers a 4–20 mA output signal
– RS-232 data output for data collection

Other Highlights

– Perfect for use with filtration and chromatography processes, as well as bioreactor pressure monitoring
– Data output capability to a PC or control system
– User configurable min/max set-points with alarm output signal Panel mount option with IP66 NEMA4X Front Panel
– High Resolution (HR) model available for low pressure applications that achieves 10× the accuracy of the standard unit
– IQ/OQ Protocol available

The PressureMAT (PMAT) and the PressureMAT PLUS are both monitor, alarm, and transmitter units designed for use with the Single-Use Pressure Sensors. These lightweight, portable units can easily be moved around a lab or pilot plant to the location where pressure measurement is required. The transmitters use state of the art, solid state electronics, which require no calibration or maintenance. The output options simplify integration to PCs or higher level control systems, and a relay switch enables interfacing with pumps and valves. Options include models with up to four pressure sensor inputs. The PMAT3 and PMAT4 models can optionally display Delta-Pressure of P1-P2 or trans-membrane pressure (TMP) for filtration processes. These calculated values can also have alarm set-points and the values can be transmitted.

The PressureMAT PLUS system is comprised of the monitor with user interface, and connectors on the back panel where input and output components can be interfaced. It has the ability to measure total flow volume in addition to flow rate. The models with an analog input can be used to interface other sensors with a 4–20 mA output, such as temperature, UV, conductivity, pH and turbidity.

Both systems have an alarm function where minimum and maximum values are entered on the key pad and if the process value goes below the minimum setting or above the maximum setting, the system will go into an alarm state. The alarm state may be tied to the relay output to help safeguard the integrity of a process. The transmitter function delivers a 4–20 milliamp output signal corresponding to the process values on the display. The RS-232 data output to a PC is available for data collection to the PMAT Data Acquisition Software.

There are numerous applications in biopharmaceutical production processes where these units can be used to monitor pressure, including filtration, chromatography, bioreactor monitoring, perfusion, and fill finish operations.

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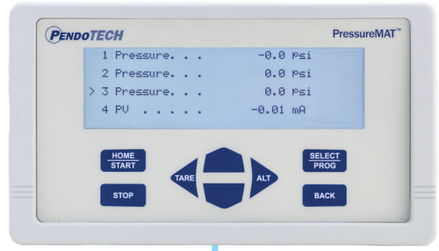

PressureMAT

Connect up to 4 Pressure Sensors

4–20 mA — **Control System**

RS-232 — **PC**

Relay — **Pump, valve or alarm**

PressureMAT PLUS

Up to 4 Pressure Sensors
Temperature Sensor
UV Absorbance Sensor
Flow Meter
Turbidity Sensor

4–20 mA — **Control System**

4–20 mA Inputs

Relay — **Pump, valve or alarm**

RS-232 — **PC**

Did You Know
The PressureMAT-S is a portable monitor, alarm, and transmitter ideal for applications which are space limited and require only 1 sensor. The PressureMAT-S also provides the option for remote tare.

Did You Know
PressureMAT Sensor Transmitter, with a DIN rail mounting design, connects to the Single-Use Pressure Sensor and produces a 4–20mA signal linear with pressure, offering five options for optimal performance based on pressure range.

PressureMAT

The Smart Way to Monitor Pressure.

PressureMAT Transmitter

Specifications

Enclosure (PMAT)	WXDXH 19.96 × 11.35 × 5.72 cm (7.86 × 4.47 × 2.25 in) Approx Weight: 0.65 kg (1.3 lbs) Material: ABS Plastic IP66/NEMA 4X front panel; panel and wall mount optional	
Enclosure (PMAT-S)	11.94 × 11.94 × 5.72 cm (4.70 × 4.70 × 2.25 in) Approx Weight: 0.39 kg (0.86 lbs)	
Keypad	8 button keypad with LEXAN® overlay	
Display	8 line LCD backlit blue, pressure displayed as X.XX bar/X.X psi; PMAT4HR, PMAT2HR & PMAT-SHR X.XXX bar/X.XXX psi	
Power Inlet	2.5 mm (0.04 in) Circular Power Jack (center post positive) or D9 12–24 VDC, 4 watts (powered by wall supply)	
Pressure Sensors Input (s) Models offered with 1-4 inputs	Range of –0.793 bar to 5.171 bar (–11.5 to 75.0 psi) PMAT4HR, PMAT2HR & PMAT-SHR -0.0483 bar to 0.510 bar (–0.7 to 7.5 psi) Configured for Single-Use Pressure Sensors, Connector: DA15 (includes 3.657 m (12 ft) reusable cables)	
Relay Outputs(s) [Up to 4 outputs available as a combination of Relay and Analog outputs]	Specifications for relay used for the alarm output: • Normally CLOSED or OPEN via wiring • 1 amp closure, 2 amps maximum current Configured for Single-Use Pressure Sensors, Connector: DA15 (includes 3.657 m (12 ft) reusable cables)	• 28 Volt AC/DC Maximum • 20 millisec max turn on/off time
Analog Output(s) [4 – 20 mA] [Up to 4 outputs available as a combination of Relay and Analog outputs]	Screw terminal connector 4–20 mA Range: –0.689 bar to 5.171 bar (–10 to 75 psi) PMAT4HR, PMAT2HR & PMAT-SHR –0.069 bar to 0.207 bar (–1 to 3 psi) Accuracy: 0.1 % of full scale Sourcing with Maximum Load: 400 ohms Load Impedance: Zero Ohm minimum resistance, 22 mA maximum output	
RS232 Output	Data output to a PC at frequency up to approx every 2 seconds Optional Internal Data Logger: Part# PDKTP-DLOG (logger not available with PMAT-S)	
Regulatory Compliances	CE Mark EN61326-1:2021; EN61010-1:2010/A1:2016/C2019; EN/ISO13849-1:2015; EN60204:2018 FCC Part 15 Class B verified RoHS and REACH Compliant	FCC Part 68 5TUUSA-23969-DT-E UL Listed

Ordering Information

PressureMAT

Number of Inputs	Number of Outputs	Order Number
1 Pressure Sensor (bar)	2 (1 Relay/1 Analog)	30942891
1 Pressure Sensor (psi)	2 (1 Relay/1 Analog)	30950801
1 Pressure Sensor (bar)	2 (1 Relay/1 Analog)	30942892
1 Pressure Sensor (psi)	2 (1 Relay/1 Analog)	30950803
2 Pressure Sensor (bar)	4 (2 Relays/2 Analogs or 4 Relays)	30942880
2 Pressure Sensor (psi)	4 (2 Relays/2 Analogs or 4 Relays)	30950755
2 Pressure Sensor (bar)	4 (2 Relays/2 Analogs or 4 Relays)	30942883
2 Pressure Sensor (psi)	4 (2 Relays/2 Analogs or 4 Relays)	30950758
2 Pressure Sensor/1 Flow Meter/1 4–20 mA (bar)	4 (4 Analogs)	30942884
2 Pressure Sensor/1 Flow Meter/1 4–20 mA (psi)	4 (4 Analogs)	30950759
2 Pressure Sensor/2 4–20 mA (bar)	4 (4 Analogs)	30942881
2 Pressure Sensor/2 4–20 mA (psi)	4 (4 Analogs)	30950756
2 Pressure Sensor/2 Flow Meters (bar)	4 (4 Analogs)	30942882
2 Pressure Sensor/2 Flow Meters (psi)	4 (4 Analogs)	30950757

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Ordering Information

PressureMAT

Number of Inputs	Number of Outputs	Order Number
3 Pressure Sensor (bar)	4 (3 Analogs/1 Relay – for all sensors)	30942885
3 Pressure Sensor (psi)	4 (3 Analogs/1 Relay – for all sensors)	30950760
3 Pressure Sensor/1 Flow Meter (bar)	4 (4 Analogs)	30942887
3 Pressure Sensor/1 Flow Meter (psi)	4 (4 Analogs)	30950762
3 Pressure Sensor/1 4–20 mA4 (bar)	(4 Analogs)	30942886
3 Pressure Sensor/1 4–20 mA4 (psi)	(4 Analogs)	30950761
4 Pressure Sensor (bar)	4 (4 Analogs)	30942888
4 Pressure Sensor (psi)	4 (4 Analogs)	30950763
4 Pressure Sensor (bar)	4 (4 Relays)	30942890
4 Pressure Sensor (psi)	4 (4 Relays)	30950764
4 Inputs (bar)	4 (4 Analogs) Outputs	30942889
4 Inputs (psi)	4 (4 Analogs) Outputs	30942624

Ordering Information

Software	Order Number
Data Acquisition and Trending Software for PressureMAT and CMONT with 2 USB/serial cables to connect to a PC	PMATP-GUI

Stands/Cart

PressureMAT Benchtop Stand for all models	PMAT-STND
PressureMAT water-tight box (PMAT NOT included) with water-tight cable connections and cart with power strip & filter holder with optional touch-screen PC with Data Acq Software	PMAT-CART4

Water Tight Enclosures

PressureMAT water-tight wall mount box with water-tight cable connections	PMAT-WALL
PressureMAT water-tight bench top stainless steel box with water-tight cable connections for PMAT on left side	PMAT-BNCH-IP-L
PressureMAT water-tight wall mount box with water-tight cable connections – holds 2 PressureMATs	PMAT-WALL2
PressureMAT-S single channel water-tight wall mount box with water-tight cable connections for PMAT	PMAT-WALL-S

Cables

RS232 Cable for PressureMAT data output (2 m/6 ft) for USB input to PC	PDKTP-RS232U
Cable adapter with D15 for Single-Use Pressure Sensor for PMAT (4 m/12 ft)	PMAT-650-298
Cable adapter with D15 for Single-Use Pressure Sensor for PressureMAT (7 m/24 ft)	PMAT-650-298-24F
Pressure Sensor Extension Cable (4 m/12 ft)	PMAT-EXT-12F
RS232 Serial to USB adapter, for PMAT Wall/ Benchtop box (2.13 m/7 ft)	PMAT-WALL-RS232USB
PMAT Enclosure Box replacement power supply, 12VDC w/ global plug blades	PMAT-PWR-WALL-12VDC

Accessories

Test cable assembly for PressureMAT accuracy check	PMAT-TCA
Pressure sensor cable dust cover/zero simulator for PressureMAT	PDKT-650-298CVR
DIN rail mounting kit for PMAT-S	PMAT-S-DIN
Installation qualification/operation qualification protocol documentation	PMAT-IQ/OQ
PMAT Panel mount kit – 2 gaskets, 4 mounting brackets, 2 sensor cables, and input connectors for sensors and power	PMAT-PANEL-2-C
PMAT Panel mount kit – 2 gaskets, 4 mounting brackets, 3 sensor cables, and input connectors for sensors and power	PMAT-PANEL-3-C
PMAT Panel mount kit – 2 gaskets, 4 mounting brackets, 4 sensor cables, and input connectors for sensors and power	PMAT-PANEL-4-C
PMAT Panel mount kit – 2 gaskets, 4 mounting brackets, 1 sensor cable, and input connectors for sensor and power	PMAT-PANEL-S-C
PressureMAT Power supply with circular barrel connector, 12VDC, 1amp with plugs blades for destination	PMAT-PWR
Pinch Valve Pair – 24 VDC supply & relay input for each normally closed valve – Small for 0.318 cm (1/8 in) ID	PDKT-PVE2-PMAT-S
Pinch Valve Pair – 24 VDC supply & relay input for each normally closed valve – Medium for 0.64 cm (¼ in) ID	PDKT-PVE2-PMAT-M
Pinch Valve- 24 VDC supply & relay input for normally closed valve- Small for 0.318 cm (1/8 in) ID	PDKT-PVE-PMAT-S
Pinch Valve- 24 VDC supply & relay input for normally closed valve- Medium for 0.64 cm (¼ in) ID	PDKT-PVE-PMAT-M

PTR Transmitter
Designed for Single-Use Pressure Sensors

The PTR Transmitter offers advanced pressure monitoring by connecting seamlessly with Mettler-Toledo Pendotech's Single-Use Pressure Sensors to deliver a 4–20 mA signal that is linear with pressure readings. It enhances safety with an integrated alarm output featuring a dry contact relay, based on user set high or low pressure alarms. The PTR also supports Modbus-TCP programming for enhanced system integration and settings customization. Its DIN rail mounting design ensures straightforward and flexible installation across various setups. Available in two models—PTR 7.5 psi for low pressure ranges (-11.5 to 7.5 psi) and PTR 75 psi for higher pressures (-11.5 to 75 psi)—it ensures improved accuracy tailored to application needs. Additionally, it comes with a 12-foot reusable sensor cable, with a recommended maximum extension of 24 feet to maintain measurement precision.

Specifications

Performance Accuracy	Input accuracy + output accuracy
Input Accuracy	PTR 7.5 psi (0.517 bar): 0-2 psi (0-0.14 bar): ±0.012 psi (0.0008 bar); others: ±[0.01 + 0.1% of reading] psi PTR 75 psi (5.17 bar): ±0.15 psi (0.01 bar)
Output Accuracy	±[0.021 + 0.15% of reading] mA
Temperature Coefficient	±0.015%/°C (±0.008%/°F) of max. range at -5 to +55°C [23 to 131°F]; ±0.03%/°C (±0.02%/°F) at <-5°C, >+55°C
Response Time	≤100 milliseconds (0 – 90%)
Line Voltage Effect	±0.1% over voltage range
Insulation Resistance	≥100 MΩ with 50 0VDC
Relay Output	• Normally OPEN or CLOSED via wiring • 28 volt AC/DC maximum • 1 amp closure, 2 amps maximum current • 20 mS max turn on/off time
Modbus TCP Programming	Please refer to the user manual
Dielectric Strength	1500 VAC @ 1-minute (input to output or power to ground) 500 VAC @ 1 minute (output to power)
Regulatory Compliances	CE & UKCA Mark EN IEC 61326-1:2021; EN 61010-1:2010, EN 61010-1:2010/A1:2019; EN ISO 13849-1:2023 UL and cUL Recognized RoHS and REACH compliant
Power Supply	Operational voltage range 9 – 36 VDC; approx. 5 W; ripple 10% p-p max
Operating Temperature	-25 to +65°C (-13 to +149°F) Max. 55°C (131°F)
Operating Humidity	0 to 95% RH (non-condensing)

Features Overview

- DIN rail mounting design
- Linear 4–20 mA signal output
- Alarm output function with dry contact relay
- Supports Modbus TCP digital communication
- Available in two models: PTR 7.5 psi and PTR 75 psi

Other Highlights

- Reusable sensor cable optimizes long-term usage and measurement consistency
- Enables seamless integration into various industrial systems.
- Suitable for a range of pressure applications due to model variety.

Ordering Information

	Order Number
Transmitter PTR 7.5 psi 4–20 mA Din	30827316
Transmitter PTR 75 psi 4–20 mA Din	30827317
Cable Adapter for Pendotech Single-Use Pressure Sensor (12 feet)	PDKT-650-298
Cable Adapter for Pendotech Single-Use Pressure Sensor (24 feet)	PDKT-650-298-24F

PressureMAT - DPG
Designed for Single-Use Pressure Sensors

The PressureMAT DPG is a portable handheld device designed for easy pressure monitoring on the move. The PMAT-DPG is compatible with Mettler-Toledo Pendotech's Single-Use Pressure Sensors, featuring a single channel input and equipped with a 12-foot reusable cable for versatility in various applications, such as lab or benchtop environments. It requires no calibration since it directly reads standardized sensor output signals and features a high-resolution display, making pressure monitoring easy and intuitive. Additional features include an auto shut-off after 10 minutes of inactivity to save battery life, as well as minimum and maximum pressure display buttons for improved monitoring.

Specifications

Performance Accuracy	0-6 psi: ±2% accuracy of reading 6-30 psi: ±3% accuracy of reading
Resolution	X.XX psi
Update Rate	2 readings / sec
Power Supply	9V battery
Battery Life	14 hours of operation
Input Channels	1x Single-Use Pressure Sensor

Ordering Information	**Order Number**
Handheld monitor for one Pendotech Pressure Sensor	30950785

Features Overview

- Portable handheld design
- No calibration required
- High-resolution display
- Updates pressure readings twice per second
- One-touch button for quick taring to atmospheric pressure
- Long battery life complemented by power-saving auto shut-off

Recommended Pressure Transmitter Services

Description	**Order Number**
PTR - Extended Care Maximize uptime with full coverage over the first 24 months of your transmitter's life. Services include: two annual planned preventive maintenances, visual inspection, priority intervention on-site, and free access to technical hotline.	PTR-EXTENDED-CARE
PTR - Comprehensive Care Continue maximized uptime beyond your transmitter's first 24 months. Services include: planned preventive maintenance, visual inspection, priority intervention on-site, and free access to technical hotline.	PTR-COMPREHENSIVE-CARE
PTR - Repair Coverage Full For permanent installations, enjoy peace of mind with full coverage of the PTR transmitter firmware, hardware, and software.	PTR-COVER-FULL
PMAT-DPG - Depot Preventive Maintenance Service for the PMAT-DPG satisfies regulatory compliance and ensures readings are within tolerance. Recommended at least annually.	PMAT-DPG-RECERT

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CMONT Conductivity Transmitter

Designed for Single-Use Conductivity Sensors

Mettler-Toledo Pendotech's CMONT conductivity transmitter can be used for highly accurate conductivity and temperature measurement monitoring. The CMONT features two channel inputs that are compatible with Mettler-Toledo Pendotech's Single-Use Conductivity Sensors. Each channel reads both the measured conductivity value as well as the temperature reading. The CMONT is comprised of a local display with user interface and connectors on the back panel where the input and outputs are connected. The local display and easy to install connectors make this device friendly for benchtop or lab applications. The CMONT can also optionally be panel mounted for use in process skids or control cabinets.

The CMONT features 4x 4–20 mA outputs for both conductivity and temperature readings to enable integration to a control system. The CMONT also features an RS-232 output for data collection to a PC or to Pendotech's PMATP-GUI software for live data logging and trending.

Features Overview

- Reads two conductivity sensors, including ability to read temperature only
- RS-232 output for data collection to PC
- Performs temperature normalization to 25°C
- Can be panel mounted or used on a benchtop

Other Highlights

- Features seamless integration to higher level control systems such as a PLC or DeltaV through the 4–20 mA outputs
- User adjustable mS/°C factor makes this device customizable for unique applications

Specifications

Performance Accuracy	From 0.1 to 2 mS/cm ±0.1 mS/cm; 2 to 50 mS/cm ±5% of reading; 50 to 100 mS/cm typically ±5% of reading
Power Inlet	D9 15-24 volts DC, 4 watts (powered by wall supply) Pin 1- ground; Pin 4- +24V
Sensor Input	D15 female; Temperature Pin 7 (-), Pin 2 (+); Conductivity Pin 9 (high), Pin 12 (low)
Analog Output	D15 male Conductivity 4–20 mA Range: 0-100 mS Temperature 4–20 mA Range: 0-70°C Accuracy: 0.1% of full scale Sourcing with Maximum Load: 400 ohms
RS-232 Output	Data output to a PC at frequency up to 1/sec.
Display	4 line backlit LCD
Operating Temperature	0–55° C (32–132° F)
Relative Humidity	0–95% non-condensing
Regulatory Compliance	RoHS and REACH Compliant CE Mark EN613261:2013; EN61010-1:2010

Ordering Information

	Order Number
Pendotech monitor and transmitter for 2 conductivity sensors (4 analog outputs, 2 temp, 2 conductivity)	CMONT
Pendotech Conductivity Monitor test kit for conductance and temperature verification	CMONT-TKS
Stand for PressureMAT & Conductivity monitors	PMAT-STAND
Data Acquisition and Trending Software for PressureMAT and CMONT with 2 USB/serial cables to connect to a PC	PMATP-GUI
CMONT Panel Mount Upgrade Kit-2 gaskets (one and a spare), 4 mounting brackets, 2 sensor cables (CN-650-298), 2 sensor connectors (one for each input), and power input connector	CMONT-PANEL
DIN rail mounting kit for CMONT	CMONT-DIN
Cable adaptor with D15 male for Single-Use Conductivity Sensor for CMONT (10 ft/3.04 M)	CMONT-650-298

Recommended CMONT Services

Description	Order Number
Standard Qualification (IPac) Commissioning service bundle includes Setup, Installation Qualification (IQ), Operational Qualification (OQ), and wet (water only) demonstration training with documentation.	CMONT-IPAC-EA
Extended Care Maximize uptime with this full coverage of parts and labor over the first 24 months of your equipment's life. Services include: two planned preventive maintenances, visual inspection, priority intervention on-site, and free access to technical hotline.	CMONT-EXTENDED-CARE
Comprehensive Care Continue maximized uptime beyond your system's first 24 months. Services include: planned preventive maintenance, visual inspection, priority intervention on-site, and free access to technical hotline.	CMONT-COMPREHENSIVE-CARE

Did You Know

The CMONT Conductivity Monitor can be connected to the PMATP-GUI software in conjunction with a PMAT Pressure Monitor to log and trend both conductivity and pressure readings simultaneously.

www.pendotech.com/conductivity

CT-2 Conductivity Sensor Transmitter

Designed for Single-Use Conductivity Sensors

The CT-2 Conductivity Sensor Transmitter offers a wide measurement range, measuring conductivity from 0.1 to 100 mS and temperature from 2 to 50°C, making it suitable for various downstream bioprocessing applications. It calculates a normalized conductivity value at 25°C in real time and outputs this via a linear 4–20 mA signal. Designed for user-friendly installation, it features a DIN rail mounting design compatible with 35 mm EN50022 DIN rails. Easily integrating with Mettler-Toledo Pendotech's Single-Use Conductivity Sensors and operating on a standard 24 VDC power supply, it is an ideal solution for reliable and precise process monitoring.

Specifications

Conductivity Input Signal	0.1 mS/cm to 150 mS/cm
Cell Constant	0.5 to 3 (see sensor label)
Temperature Input	Thermistor with resistance @ 25°C of 2252 ohm (NTC 2.252K)
Temperature Compensation	2.1%/°C (3.78% / °F)
Output Signal	4 to 20 mA range of 0 mS to 150 mS
Admissible Current Load	Max. 500 Ω at 20 mA
Admissible Voltage Load	Max. 2 kΩ at 10 V
Power Supply	24 VDC ± 20%, max. 100 mA
Input Isolation	1500 VAC for 1 min
Conductivity Measurement Accuracy (with sensor connected)	0.1 to 2 mS/cm: ±0.1 mS/cm; 2 to 50 mS/cm: ± 5% of reading; 50 to 100 mS/cm: typically, ± 5% of reading
Temperature Measurement Accuracy (with sensor connected)	2 to 50°C: ± 0.2°C (35.24°F to 122.36°F: ±0.36°F)
Ambient Temperature / Humidity	-20 to 85°C (-4°F to 185°F) / 0 to 85% RH, non-condensing
IP Rating	IP20
Mounting Specification	DIN rail

Features Overview

- Measures conductivity from 0.1 to 100 mS and temperature from 2 to 50°C
- Features a DIN rail mounting design, compatible with any 35 mm rail
- Utilizes actual temperature readings from the sensor and calculates conductivity with a compensation coefficient of 2.1% per °C

Ordering Information

	Order Number
Pendotech Conductivity Sensor Transmitter with 4–20 mA output, 0-100 mS operating range, 24 VDC, with quality certificate and 10 ft sensor cable	CT-2
RS232 to USB serial communications cable for DIN rail conductivity transmitter CT-2	CT-2-RS232

www.pendotech.com/conductivity

Temp340 Handheld Monitor

Designed for Single-Use Temperature Sensors

The TEMP340 is a handheld temperature monitor that interfaces with Mettler-Toledo Pendotech's Single-Use Temperature Sensors. The portable, battery operated design makes it the perfect device for on-the-go temperature monitoring in your lab. The device features 1x sensor input, a rugged design with a large backlit display, built-in stand and Min/Max hold functions, as well as °C/°F readings and a low battery alert. User customizable high and low temperature alarms can also be set to alert the user when specified temperature conditions are reached. The TEMP340 can also manually store or automatically log up to 2000 time-stamped readings, with data easily downloadable to a PC via USB.

Specifications

Sensor Input	1x Single-Use Temperature Sensor
Temperature Input Signal	0-70°C (32°F to 158°F)
Accuracy	± 0.2C
Resolution	0.01°C
Update Rate	600 mS per update
Power Supply	1.5V battery
Battery Life	400 hours of operation
IP Rating	IP54
Display Type	1.5" display, 4-digit LCD
Output	USB
Storage Temperature	-40°C to 65°C (40°F to 149)
Humidity	10% to 90% RH (noncondensing)

Features Overview

- Portable handheld design
- Battery operated
- High-resolution display
- Custom temperature alarm setpoints
- Data logging and storage of up to 2000 readings

Ordering Information

	Order Number
Pendotech Temperature sensor monitor for 1 sensor with built-in data logger and RS-232 data output	TM-TEMP-340

www.pendotech.com/temperature

TT1 Temperature Sensor Transmitter
Designed for Single-Use Temperature Sensors

Features Overview

- Measures temperature from 0 to 70°C
- DIN rail compatible
- Loop-powered
- Convenient screw terminals for easy installation
- 4–20 mA output for integration to higher level control systems

The TT1 Temperature Sensor Transmitter is a DIN rail compatible transmitter that interfaces with Mettler-Toledo Pendotech's Single-Use Temperature Sensors. The transmitter includes one sensor input and outputs a 4–20 mA signal linear with the temperature reading (0-70°C). The transmitter uses a "loop powered" system with screw terminals for easy installation and a central hole for wire threading. The transmitter protects against reverse polarity, stopping current flow if output wires are incorrectly connected. The TT1 can be used with the optional DIN rail kit for installation into skids or electrical cabinets.

Specifications

Temperature Input Signal	0-70°C (32°F to 158°F)
Sample Rate	500 mS per reading
Accuracy	±0.14°C (±0.252 °F)
Thermal Drift	Zero ±0.01°C/°C (±0.018 °F/°F); span 50 ppm
Output	4 to 20 mA, (spans to temperature range of 0°C (32°F) to 70°C (158°F))
Maximum Output Range	3.8 to 22 mA
Operating Voltage	8 to 30 VDC
Thermal Drift	±2 µA/°C
Response Time^	500 mS to reach 70% of the final value
Loop Resistance	800R @ 24 VDC
Loop Sensitivity	0.4 µA/volt
Loop Noise	±0.001 µA
Input/Output Isolation	Not isolated
Regulatory Compliance	Emissions: BS EN61326 Susceptibility: BS EN61326
Ambient Temp. Range	-20°C to 80°C (-4°F to 176°F)
Ambient Storage	-40°C to 80°C (-40°F to 176°F)
Ambient Humidity	0 to 95% (noncondensing)

Ordering Information

	Order Number
Pendotech Temperature Sensor Transmitter	TT1
Pendotech Temperature Sensor Transmitter DIN rail mounting kit	TT1-DR
3.0 m reusable temperature sensor cable with 1/4 phone jack for barb sensors	PDKT-650-TEMPB
7 foot reusable temperature sensor cable with 1/4 phone jack term. for luer sensors	PDKT-650-TEMPL
Pendotech 12 inch reusable temperature sensor cable with M8 termination for hose barb sensors	PDKT-TEMPB-PNL

www.pendotech.com/temperature

Benchtop Temperature Transmitter
Designed for Single-Use Temperature Sensors

Features Overview

- Compatible with 1, 2, or 4 Mettler-Toledo Pendotech Single-Use Temperature Sensors
- The durable plastic housing, 24 VDC power supply and field wireable connectors make this transmitter convenient for benchtop experiments
- LED power indicator on front panel signals device power status

Did You Know

The benchtop transmitters can be interfaced directly with select PMAT PLUS models via the 4–20 mA output to display the temperature readings on a local LCD. Once integrated with the PMAT, the temperature readings can be transmitted to the PMAT-GUI software via the PMAT RS-232 output, allowing for simultaneous data logging of pressure and temperature readings.

The Mettler-Toledo Pendotech Temperature Sensor Benchtop Transmitter, designed to connect with Pendotech Single-Use Temperature Sensors, features a durable ABS plastic casing with rubber feet for stability. It is offered in models supporting 1, 2, or 4 channels, with all electrical connections conveniently positioned on the back panel. It uses a 24 VDC wall supply that supports a universal voltage input of 100-250 VAC. The 4–20 mA output can be used to transmit the temperature readings to a higher control system or other Pendotech devices such as select Pendotech PMAT Plus models.

Specifications

Temperature Input Signal	0-70°C (32°F to 158°F)
Sample Rate	500 mS per reading
Accuracy	± 0.14°C (±0.252 °F)
Thermal Drift	Zero ±0.01°C/°C (±0.018 °F/°F); span 50 ppm
Maximum Output Range	4 to 20 mA, (spans to temperature range of 0-70°C (32°F to 158°F))
Operating Voltage	24 VDC
Thermal Drift	Zero ±0.01°C/°C (±0.018°F/°F); Span 50 ppm
Response Time^	500 mS to reach 70% of the final value
Loop Resistance	800 ohms
Regulatory Compliance	Emissions: BS EN61326 Susceptibility: BS EN61326
Ambient Temp. Range	-20 °C to 80°C (-4°F to 176°F)
Ambient Storage	-40 °C to 80°C (-40°F to 176°F)
Ambient Humidity	0 to 95% (noncondensing)

Ordering Information

	Order Number
Pendotech Temperature Sensor Benchtop Transmitter with 4–20 mA output in ABS plastic box with 24 VDC wall supply	PDKT-TT1
Pendotech Temperature Sensor Benchtop Transmitter with 4–20 mA output in ABS plastic box with 24 VDC wall supply (for 2 sensors)	PDKT-TT2
Pendotech Temperature Sensor Benchtop Transmitter with 4–20 mA output in ABS plastic box with 24 VDC wall supply (for 4 sensors)	PDKT-TT4

Single-Use Conductivity Sensor
Simple, Accurate, Reliable

CE

Features Overview
- Pre-determined cell constant
- Optional one-point calibration
- Range: 0.1 to 100 mS/cm
- Accuracy: ±0.1 mS/cm from 0.1 to 2 mS/cm; ± 5% of reading from 2 to 50 mS/cm and 50 to 100 mS/cm
- Built-in temperature compensation
- Easy to use and maintain
- Affordable and cost-effective

Efficient and Affordable Conductivity Measurement
Single-Use Conductivity Sensors provide precise and cost effective measurement of the conductivity of liquids in your biopharmaceutical processes.

Ease of Maintenance
Our Single-Use Conductivity Sensors are sturdy enough to withstand repeated cleaning, yet affordable enough to be used in single-use applications. They offer a reliable alternative to stainless steel conductivity sensors, simplifying maintenance and reducing costs.

Calibration-Free Conductivity Measurement
No calibration required because of predetermined cell constant and also optional one-point calibration by user

Compatibility and Resistance
Measure conductivity and temperature.
Fluid path materials
- Gamma & X-ray irradiation compatible
- NaOH resistant
- USP Class VI

Calibration-Free Conductivity
The Single-Use Conductivity Sensor is a reliable and accurate tool for measuring conductivity in a variety of applications. It is designed for single-use, which eliminates the need for calibration and maintenance. This makes it a cost-effective and convenient solution for biopharmaceutical manufacturing and chemical processing.

The sensor has a pre-determined cell constant, which means that it is ready to use immediately. It also has an optional one-point calibration feature, which allows users to calibrate the sensor for specific applications. The sensor has a range of 0.1 to 100 mS/cm and an accuracy of ±0.1 mS/cm from 0.1 to 2 mS/cm; ±5% of reading from 2 to 50 mS/cm and 50 to 100 mS/cm. It also has built-in temperature compensation to ensure accurate readings over a wide range of temperatures.

The sensor is easy to install and use, even in harsh or corrosive environments. It is also durable and sterile, making it ideal for use in biopharmaceutical and other sterile applications. The sensor is also affordable, making it a cost-effective solution for a variety of applications.

Application	Description
Buffer Preparation	Monitor the conductivity to ensure that the final buffer solution meets specification.
Chromatography	Monitoring buffer conductivity prior to the chromatography column to protect the product by diverting out of specification product.
UF/DF	Monitor the diafiltration process to ensure buffer exchange endpoints are met.

Sensor Specifications	
Accuracy	From 0.1 to 2mS/cm ±0.1mS/cm; 2 to 50mS/cm ±5% of reading; 50 to 100mS/cm typically ±5% of reading
Pressure Range	75 psi max
Biocompatibility	All materials in contact with product fluid path meet USP Class VI requirements, both pre and post gamma exposure
Manufacturing Environment	ISO 9001 certified facility; Class 5
Operating Temperature	2 °C to 50 °C (35.6 °F to 122 °F) - other ranges with process qualification because thermistor reads to 70 °C (158°F)
Temperature Accuracy	Better than 0.2 °C (0.36 °F) – typical better than 0.1 °C (0.18 °F)
Temperature Element	Thermistor with resistance @ 25 °C (77 °F) of 2252 ohm
Gamma Irradiation	Up to 50 kiloGrays
X-ray Irradiation	Up to 50 kiloGrays
ADCF Status	All fluid path materials are animal derived component free
Connector	Custom molded water-tight 4 pin connector
Rating:	IP67 when connected to reusable cable and dust cover
Shelf life	3 years
Packaging	Sealed in vapor barrier bag inside polybag
Storage Temperature	–25 °C to 65 °C (–13 °F to 149 °F)

Ordering Information	Order Number
Single-Use Conductivity Sensor, non-sterile, polysulfone 0.318 cm (1/8 in) hose barb	CONDS-N-012
Single-Use Conductivity Sensor, non-sterile, polysulfone 0.64 cm (¼ in) hose barb	CONDS-N-025
Single-Use Conductivity Sensor, non-sterile, polysulfone 1.28 cm (½ in) hose barb	CONDS-N-050
Conductivity Monitor test kit for conductance and temperature verification	CMONT-TKS
Individual Certificate of Analysis for Single-Use conductivity sensor (ea.)	CONDS2-COA
Benchtop Stand	PMAT-STAND
Data Acquisition and Trending Software for PressureMAT and CMONT with 2 USB/serial cables to connect to a PC	PMATP-GUI
CMONT Installation Qualification/Operation Qualification (Protocol documentation includes Breakout Board, CMONT-TKS Test kit)	CMONT-IQ/OQ
CMONT Panel Mount Upgrade Kit-2 gaskets (one and a spare), 4 mounting brackets, 2 sensor cables (CN-650-298), 2 sensor connectors (one for each input), and power input connector	CMONT-PANEL
DIN rail mounting kit for CMONT	CMONT-DIN
Cable adaptor with D15 male for Single Use Conductivity Sensor for CMONT (10ft/3.04m)	CMONT-650-298

▶ **www.pendotech.com/conductivity**

Single-Use In-line pH Sensor
Hassle-free pH measurement

1/4 inch Hose Barb

¾ inch Sanitary Flange

Features Overview

Single-use pH sensor combining Mettler-Toledo InSUS 307 pH probe technology with single-use flow cell designed by Pendotech
- Designed for applications where in-line sensing is necessary
- Compatible with gamma irradiation
- No process calibration required
- Designed for use with existing Mettler-Toledo transmitters

In downstream bioprocessing operations, monitoring and controlling the pH of a solution is critical to maintaining the stability and efficacy of large biomolecules. A pH sensor is a valuable tool used to determine the acidity or alkalinity of a solution. The electrochemical pH probe is a widely used method for measuring pH in these types of operations.

The Pendotech Single-Use In-line pH Sensor is a cutting-edge device that is designed for both Good Manufacturing Practice (GMP) operations and process development applications. This sensor comes pre-calibrated with values for slope offset and zero point constant, eliminating the need for process calibration. It is designed for applications where in-line sensing is necessary and is compatible with gamma irradiation. The sensor also has full traceability on materials and qualification of biocompatibility. It combines Mettler-Toledo InSUS 307 pH probe technology with a single-use flow cell designed by Pendotech.

Available in two sizes as a pre-assembled product, it is an ideal choice for downstream processing applications where real-time, in-line measurements are necessary.

Sensor Performance Specifications

pH Range	pH 3 to pH 10
Slope (pH 7 to pH 4 buffer)	Min – 57.8 mV/pH (98 %)
Zero-point (In pH 7 buffer)	7.20 ± 0.25pH
Accuracy under defined laboratory conditions	± 0.10 pH for ± 1.50 pH units around the calibration point after 1-point process calibration (adjustment of inline reading to an offline pH measurement of a grab sample)
Response Time	t90 % < 20s between pH 4 to 7
Operating Temperature Range	5 to 60 °C (41 to 140°F)
Operating Pressure Range	4 Barg at 25 °C (77 °F)* 2 Barg at 40 °C (104 °F)** 1 Barg at 60 °C (140 °F)**
Membrane Glass Resistance	300 … 900 MOhm
Glass Type	pH-Sensitive glass membrane
Temperature Compensation (T.C.)	Via built-in Pt 1000
Shelf life	12 months PT-PH-S-5-5, PT-PH-S-025 24 months with available coating on the reference system PT-PH-L-5-5, PT-PH-L-025

* This specification was determined and validated by Pendotech. Testing and validation data regarding this claim are on file.
**This specification is provided by the original manufacturer (PT-PH1 pH Sensor).

www.pendotech.com/ph

Benefits
- Provides accurate and reliable pH measurement in downstream bioprocessing operations
- Real-time measurement of pH helps to maintain stability of large biomolecules in a specific pH range
- Rapid response time helps to capture rapid shifts in pH due to process changes
- Calibration values printed on probe for easy entry into pH monitor, eliminating need for calibration with buffers
- Closed system operation is not impacted, as there is no need to expose pH sensor to buffer standards
- It may be re-used, however, in applications where cross contamination is to be avoided.

The sensor/flow cell combination is designed specifically and optimized for in-line measurements:
- It is ideal for processes where cleaning the probe is not practical post use
- Has a rapid response to change in pH conditions

Application	Description
Upstream processing	Monitoring and control of pH in fermentation and cell culture processes, viral inactivation, and media/buffer preparation.
Downstream processing	Monitoring and control of pH in purification and product recovery processes, viral inactivation, buffer preparation, and protein refolding.
Quality control	Testing of the final product to ensure that it meets pH specifications.
Research and development	Development of new biopharmaceutical products and processes.

Ordering Information

Monitors	**Order Number**
Dual pH Bench-Top monitor/transmitter for the interface of 2 Single-Use pH sensors.	30280773
Cable from single wavelength photometer to TFF/DAQ, 2 m (6 ft)	PDKT-UV-PCS
Cable from single wavelength photometer to PMAT analog input, 2 m (6 ft)	PDKT-UV-PMAT
M8 3 pin male cordset, 2 m (6 ft), flying leads	1406281
M300 Transmitter Stand Kit ½ DIN	58083319
Probes/Flow Cells	
Single-Use pH In-Line pH Sensor - 1.91 cm (¾ in) sanitary flange, polysulfone. 1-year Shelf-Life	PT-PH-S-5-5
Single-Use In-Line pH Sensor - 0.64 cm (¼ in) hose barb, polysulfone, 1-year Shelf-Life	PT-PH-S-025
Single-Use pH In-Line pH Sensor - 1.91 cm (¾ in) sanitary flange, polysulfone, 2-years Shelf-Life	PT-PH-L-5-5
Single-Use In-Line pH Sensor - 0.64 cm (¼ in) hose barb, polysulfone, 2-years Shelf-Life	PT-PH-L-025
Cables	
Cable VP6 ST/1m, for Mettler-Toledo InSUS 307 Probe	52300107
Cable VP6 ST/3m, for Mettler-Toledo InSUS 307 Probe	52300108
Cable VP6 ST/1m/BNC	52300210
Cable VP6 ST/3m/BNC	52300211

Single-Use UV Flow Cells & PM2 Photometer

Ensuring Accuracy, One Measurement at a Time

The PM2 Photometer is a versatile tool for both lab and process applications, available in benchtop and panel mount versions for easy integration into various systems. It comes with seven factory-configurable wavelength combinations, including 260nm, 280nm, 300nm, 880nm, 260–280nm, 280–300nm, and 280–880nm.

Designed to work with a monitor possessing data acquisition capabilities, the PM2 Photometer can be used with Pendotech solutions like PressureMAT PLUS models for data logging via a PC, or Process Control Systems.

The photometer provides two 4–20mA signals spanning 0 to 3AUs as output, allowing for continuous monitoring. It also features a local display for direct reading. The output signals can be connected to other data acquisition devices or higher-level control systems like PLCs and HMIs for data collection and integration into larger control systems.

The PM2 Photometer supports digital communication protocols such as Modbus over RS485 and Modbus-TCP over Ethernet for device monitoring, control, and network communication. This makes the PM2 Photometer a flexible solution for bioprocess monitoring due to its adaptability and compatibility with various systems.

Features Overview

- Dual functionality for lab and panel mount
- Versatile instrument for lab and process applications
- Factory configured with seven different wavelength combinations
- Designed to be integrated into a monitor with data acquisition capability
- Two 4–20mA output signals spanning 0 to 3AUs
- Local display for viewing readings directly from the instrument
- Compatible with a variety of data acquisition devices and control systems
- Supports digital communication protocols

Photometer Specifications

Optical Configuration	LED light source
Optical Connectivity	SMA-905
Mechanical	10.2 cm (4 in) W × 10.2 cm (4 in) L× 6.4cm (2.5 in) H Weight: ~0.68kg (~1.5 lbs)
Max. supply voltage fluctuations	±10 % of DC supply voltage
Overvoltage Category	Category I
Power Requirement	24 VDC nominal, 2.7W max power
Output	4–20 mA (Active/sourcing) spanned 0-3AU
Analog Loop Resistance	500ohms at 24 VDC
Alarm Relay	Max. 48VDC, Max. 1A
Operating Temperature	5 to 50 °C (41 to 122 °F)
Storage Temperature	–20 to 50 °C (–4 to 122 °F)
Operating Altitude	Max. 5000m above sea level
Humidity	20–80 % relative humidity, non-condensing
Measurement Range	0.000–3.00AU
Response Time	1 second
Maximum Zero Shift	±0.1 % full scale (±0.002AU)
Accuracy*	0-2AU ±1 %FS (±0.03AU) ; 2–3AU ±2 %FS (±0.06AU)
Long Term Output Drift	±0.1 % full scale (±0.002AU)
Precision/Repeatability	±0.5 % full scale (±0.015AU)
LED Lifetime	> 5 years
Emission Range	240–1000 nm
Regulatory	RoHS3, REACH, CE, UKCA

* Accuracy is dependent on system arrangement and proper tare

www.pendotech.com/uv

Flow Cell Shown ½ inch hosebarb with 1 cm path length

Flow Cell Installed with Tubing

Optical Couplers Installed to Flow Cell

6.5 cm Single-Use Turbidity Flow Cell

Other Highlights

- Non-invasive measurement
- Real-time monitoring
- Cost-effective
- Durable
- Versatile
- Easy to use

Pendotech's Single-Use Flow Cells allow non-invasive measurements using a unique silica glass lens. The fluid to be measured flows between the lenses via tubing attached to the flow cell ports. They come in various sizes and path lengths, with the largest recommended for turbidity applications. The 6.5 cm flow cell is ideal for turbidity measurements below 400 NTU, while the 1cm flow cell is suitable for applications above 400 NTU. These low-cost flow cells are perfect for single-use applications but can be cleaned and reused. They meet USP Class VI standards and can be gamma and x-ray irradiated up to 50KGy and autoclaved up to 121 °C (249°F).

UV Absorbance

In bioprocess operations, UV absorbance is used to detect specific molecules, typically at 280 nm, using a spectrophotometer or photometer. The Single-Use UV Flow Cell and UV PM2 Photometer offer a non-invasive method for this. The flow cell, connected to the PM2 system with fiber optic cables, uses special silica glass lenses to pass light through the sample. The sample flows between the lenses via tubing attached to the flow cell. This low-cost flow cell is ideal for single-use applications but can also be cleaned and reused.

Turbidity

Turbidity, the relative clarity of a liquid, is caused by suspended solids scattering light. It is measured by the difference in light emitted from a source and received by a detector, typically using near-infrared light at 880 nm. The standard unit is the Nephelometric Turbidity Unit (NTU). In bioprocess operations, turbidity post-filtration indicates filter performance on unclarified material from a bioreactor. The Turbidity System, which includes a photometer, flow cells, and cables, can measure turbidity online. The Single-Use Flow Cell eliminates the need for cleaning.

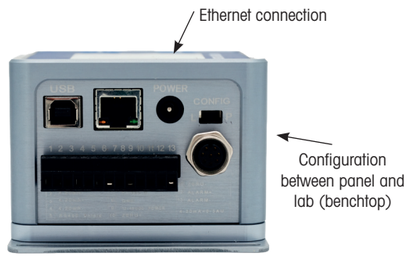
Single-Use Flow Cell Specifications

Material	Polysulfone and fused silica with silicone O-ring
Pressure range	Rated for pressure up to 5 bar (75 psi)
Biocompatibility	All materials in contact with product fluid path meet USP Class VI requirements
Manufacturing Environment	ISO 7 clean room
Gamma Irradiation	Up to 50 kiloGrays
X-ray Irradiation	Up to 50 kiloGrays
Operating temperature	2 °C to 50 °C (35.6 °F to 122 °F) (other ranges with process qualification)
Storage temperature	-25 °C to 65 °C (–13 °F to 149 °F)
Shelf Life	>5 years

PM2 Photometer and Single-Use UV/Turbidity

UV Absorbance Measurements, Simply and Quickly

Photometer / Transmitter Details



Flow Cell Stands

Flow cell stand for 6.5 cm turbidity flow cell

Flow cell stand for single-use UV flow cell

Did You Know

PM2 Calibration Kit Photometer Test Rig and Standards is designed for quick and easy accuracy verification of PM2 Photometers. The test kit includes one blank and 5 NIST-traceable filters, a test rig for holding the filters and for connecting the photometer, and a convenient holder.

Ordering Information

Photometers	Order Number
Photometer PM2 260 nm	30 849 447
Photometer PM2 280 nm	30 849 498
Photometer PM2 300 nm	30 849 499
Photometer PM2 880 nm	30 849 500
Photometer PM2 260–280 nm	30 849 501
Photometer PM2 280–300 nm	30 849 502
Photometer PM2 280–880 nm	30 849 503

Single-Use Flow Cells	
Single-use UV flow cell, 2 mm (0.08 in) path length, non-sterile, polysulfone, 0.318 cm (1/8 in) hose barb	SPECPS-N-012
Single-Use UV Flow Cell, 0.5 cm (0.2 in) path length, non-sterile, polysulfone, 0.64 cm (¼ in) hose barb	SPECPS-N-025
Single-Use UV Flow Cell, 1 cm (0.4 in) path length, non-sterile, polysulfone, 1.28 cm (½ in) hose barb	SPECPS-N-050
Single-Use Flow Cell, 6.5 cm (2.5 in) path length, non-sterile, polysulfone, 1.90 cm (¾ in) Sanitary Flange Inlet/Outlet	SPECPS-880-6CM

Couplers, Cables & Power Cords	
Optical Coupler Single-Use Flow Cell	30 849 506
Optical Fiber Photometer 0.5 m (1.64 ft)	30 830 317
Optical Fiber Photometer 0.7 m (2.30 ft)	30 919 657
Optical Fiber Photometer 1 m (3.28 ft)	30 830 318
Optical Fiber Photometer 2 m (6.56 ft)	30 830 319
Optical Fiber Photometer 3 m (9.84 ft)	30 830 320
Panel mount SMA-905 connector (for pass through)	SPEC-OC-PANEL
Power Cord CN 3 Prong	30 305 179
Power Cord EU 3 Prong	30 305 178
Power Cord UK 3 Prong	30 305 174
Power Cord US 3 Prong	30 305 173
Mains Cable CH, 3P – For PM2 Photometer (Swiss Power Cord)	87920

Accessories	
Calibration Kit with Standards 3AU	30 849 507
Replacement Standards for Calibration Kit	30 849 508
SU Flow Cell Stand 6.5 cm (2.5 in) path length	30 849 504
SU Flow Cells Stand 1 cm (0.4 in) path length	30 849 505
Analog display with 4 inputs with alarm inputs and serial port for data collection	PMAT-DAQ
Analog display with 4 inputs, 4 analog outputs, alarms, and serial port for data collection	30950784
PM2 Photometer DIN Rail mounting kit, includes mounting plate and mounting hardware	PHOTO-DR
PM2 Photometer Panel Mount Support Bracket, with 2 × 1.28 cm (¼ in) - 20 × 1.28 cm (½ in) bolts	PHOTO-PNL

Interface Cables	
Cable from single channel PM2 photometer to PressureMAT analog input, 2 m (6 ft)	PDKT-PM2-1-PMAT
Cable from dual channel PM2 photometer to PressureMAT analog input, 2 m (6 ft)	PDKT-PM2-2-PMAT
Cable from single channel PM2 photometer to PCS Control System (DAQ/TFF), mA, 2 m (6 ft)	PDKT-PM2-1-PCS
Cable from dual channel PM2 photometer to Gen 2 TFF Control System, mA, 2 m (6 ft)	PDKT-PM2-2-PCS
Cable from single channel PM2 photometer to PDKT-BOX-NFFSS breakout box, M8 male, mA signal, 2 m (6 ft)	PDKT-PM2-1-NFFSSB
Cable from dual channel PM2 photometer to PDKT-BOX-NFFSS breakout box, 2 m (6 ft)	PDKT-PM2-2-NFFSSB
Cable from dual channel/turbidity photometer to flying leads, 2 m (6 ft)	PDKT-PM2-FL

Single-Use Temperature Sensors
Accurate Temperature Measurement

Pendotech Single-Use Temperature Sensors measure temperature in your processes accurately and cost effectively. They are low cost for single-use applications where elimination of cross-contamination is required yet robust enough to be repeatedly cleaned and re-used. They are designed for in-line use and perfect for filtration and chromatography processes, filling operations, and general process monitoring. These sensors connect to monitors via a re-usable cable. Suitable monitors include the handheld unit TEMP-340, a Process Control System, or other pre-qualified third-party monitors. Also, a stand-alone transmitter is available with a 4 to 20mA analog output. They are the alternative solution for use with tubing to the existing temperature measurements devices on the market.

CE

Features Overview
- Adaptable fittings
- No obstruction
- Hose-barb, a 1-inch sanitary flange and Luer fitting
- Temperature sensing element
- No calibration required

Specifications

Accuracy	Hose-barb and flange sensors: Better than ±0.2 °C (0.36 °F) (typical better than 0.1 °C (0.18 °F) Luer: Better than ±0.4 °C (0.72 °F) (typical better than 0.2 °C (0.36 °F)
Temperature range	0 to 70 °C (0 to 158 °F)
Biocompatibility	Hose-barb and flange sensors: all polymeric materials in contact with product fluid path meet USP Class VI requirements
Manufacturing environment	ISO 9001 certified facility; Class 5
Gamma irradiation	Up to 50 kiloGrays^
X-ray irradiation	Up to 50 kiloGrays^
Resistance @ 25 °C	2252ohm
Connector	Custom molded 2 contact connector (different versions for luer and hose-barb versions)
Pressure range	Up to 5.2 bar (75 psi)
Shelf life	5 years
Monitor Cable	Hose-barb: 3 m (10 ft) with 0.64 cm (¼ in) headphone plug to connect to monitor receptacle Luer: 2.1 m (7 ft) with 0.64 cm (1/4 in) headphone plug to connect to the monitor receptacle
Storage Temp	–25 °C to 65 °C (–13 °C to 149 °F)
Packaging	Heat sealed, individually packaged in polybag

^ At this gamma dose there is a shift in the accuracy in the range of 0 to 2 °C to ±0.5 °C and in the range of 50 to 70 °C to ±0.5 °C.

Sensor Features
To optimally adapt to tubing, the sensors are available with either a hose-barb fitting , a 1 inch sanitary flange, or a luer fitting. The hose-barb and flange sensor designs imparts no obstruction on the fluid path that can cause a pressure drop. There is no dead-leg at the point where the temperature is measured. The luer fitting can be connected to a variety of fittings that can securely adapt to tubing or other devices. The temperature sensing element is a thermistor. No calibration is required because the temperature versus resistance for the thermistor element is well-defined within the specified accuracy range. Within the electrical instrument, the measured resistance is converted to the temperature. A disposable dip probe is also available to measure temperature within a vessel.

Connection to Monitors
The hose-barb flange sensors and dip probe connect to the monitor via a 3 m (10 ft) long re-usable cable. One end has a molded connector to connect to the sensor connector and the other end has a ¼ inch headphone plug commonly used by many commercially available monitors. The luer sensor has a custom molded connector on the 2.1 m (7 ft) long re-usable monitor cable that is quickly secured to the temperature sensor. There is an alignment guide on the sensor that prevents it from being connected improperly. Disconnection of the cable connector from the sensors is quick and easy and the monitor indicates the sensor has been disconnected.

Ordering Information

Sensor	Order Number
Single-use temperature sensor, non-sterile, polysulfone, stainless steel sensor, 0.318 cm (1/8 in) hose barb	TEMPS-N-012
Single-use temperature sensor, non-sterile, polysulfone, stainless steel sensor, 0.64 cm (¼ in) hose barb	TEMPS-N-025
Single-use temperature sensor, non-sterile, polysulfone, stainless steel sensor, 0.95 cm (3/8 in) hose barb	TEMPS-N-038
Single-use temperature sensor, non-sterile, polysulfone, stainless steel sensor, 1.28 cm (½ in) hose barb	TEMPS-N-050
Single-use temperature sensor, non-sterile, polysulfone, stainless steel sensor, 1.90 cm (¾ in) hose barb	TEMPS-N-075
Single-use temperature sensor, non-sterile, polysulfone, 2.54 cm (1 in) sanitary flange	TEMPS-N-1-1
Single-use temperature sensor with luer fitting	TEMPC-N-999
Accessories for Sensors	
3 m (10 ft) re-usable temperature sensor cable with ¼ phone jack term. for hose barb sensors	PDKT-650-TEMPB
2.1 m (7 ft) re-usable temperature sensor cable with ¼ phone jack term. for luer sensors	PDKT-650-TEMPL
30.48 cm (12 in) re-usable temperature sensor cable with M8 termination for hose barb sensors	PDKT-TEMPB-PNL
Temperature sensor monitor for 1 sensor with built-in data logger and RS-232 data output	TM-TEMP-340
Temperature Sensor Transmitter	TT1
Temperature Sensor Transmitter DIN Rail Mounting Kit	TT1-DR
Cable from PDKT-TT1 temperature transmitter to PressureMAT analog input, 2 m (6 ft)	PDKT-TT1-PMAT
Cable from PDKT-TT2 temperature transmitter to PressureMAT analog input (2×), 2 m (6 ft)	PDKT-TT2-PMAT
Analog display with 4 inputs with alarm inputs and serial port for data collection	PMAT-DAQ
Analog display with 4 inputs, 4 analog outputs, alarms, and serial port for data collection	30950784
Cable from PDKT-TT4 to PMAT-DAQ, 4 analog signals, 1.2 m (4 ft)	PDKT-TT4-PDAQ
0.64 x 0.64 cm (¼ in × ¼ in) polycarbonate straight connector with luer port	PDKT-103-03
0.95 x 0.95 cm (3/8 in × 3/8 in) polycarbonate straight connector with luer port	PDKT-104-03
1.27 x 1.27 cm (½ in × ½ in) polycarbonate straight connector with luer port	PDKT-105-03
Male x female x female luer tee, polycarbonate	PDKT-000-03
Male x female x female luer tee, polypropylene	PDKT-000-04

www.pendotech.com/temperature

Single-Use Rotary Flow Meters
Simplify Your Bioprocess Flow Measurements

Pendotech's Single-Use Rotary Flow Meters accurately measure static and dynamic flow of liquids in your biopharmaceutical processes. These sensors are crucial for monitoring and controlling flow rates and totalized volume in critical applications, from filtration and chromatography to buffer transfer, ensuring process efficiency and consistency.

Key Advantages

Reliable & Cost-Effective Flow Measurement

- Pendotech Single-Use Rotary Flow Meters accurately measure static and dynamic flow of liquids in your biopharmaceutical processes, providing a dependable and economical solution as an alternative to traditional reusable flow meters.

High Accuracy & Wide Operational Range

- Precision: Delivers flow rate readings with an accuracy of ±5%.
- Scalable Flow Ranges: Available in two sizes to cover flow rates from 0.1 L/min to 20 L/min (100 mL/min to 20 L/min).
- Totalized Flow: Can be used to measure total flow volume in addition to instantaneous flow rate, useful for applications like filtration capacity monitoring or precise dispensing.

Designed for Bioprocessing Demands

- Biocompatible Materials: Fluid path materials (PVDF body, ruby glass bearing) meet USP Class VI and Animal Derived Component Free (ADCF) standards.
- Sterilization Compatibility: Compatible with gamma irradiation and can be autoclaved up to 140°C, ensuring suitability for sterile processes.
- Robust Operation: Designed for a wide operating temperature range of –20°C to 80°C.

Versatile Integration & Monitoring

- Flexible Connectivity: The reusable electronic sensor assembly connects easily to a range of monitors via a standard cable.
- Dedicated Monitor: The Pendotech Flow Monitor (FMT-S) provides a user-friendly interface with LCD, data logging capabilities, and alarm functions.
- System Compatibility: The FMT-S monitor offers RS-232 serial output for PC data logging and a 4-20 mA analog output for seamless integration with process control systems (e.g., PLC, DeltaV). Also compatible with Pendotech PressureMAT-PLUS, TFF Process Control Systems, or other qualified 3rd party monitors.

www.pendotech.com/flow

Applications

Single-use Rotary Flow Meters are essential for precise liquid handling and monitoring across various bioprocessing stages. They ensure operational parameters are met, contributing to product quality and process reproducibility.

Application	Description
Tangential Flow Filtration (TFF)	Monitor and control permeate and retentate flow rates for efficient concentration and diafiltration. Can also track total processed volume.
Depth Filtration / Clarification	Measure flow rate to optimize filter performance and monitor total throughput to predict filter saturation.
Chromatography Systems	Ensure accurate and stable flow rates for buffer delivery and fraction collection, critical for consistent separation and purification.
Buffer & Media Preparation/ Transfer	Precisely measure volumes during buffer or media transfer operations, ensuring accurate formulations and batch consistency.
Bioreactor Feeds & Perfusions	Monitor and control the flow rate of nutrient feeds or harvest streams in bioreactor operations, including perfusion systems.
General Fluid Transfer & Dosing	Accurately measure and control the flow of various process liquids where precise volume or flow rate is necessary.

Product Selection & Integration

Flow Meter Sensor Body (Single-Use Rotor Component): Pendotech Single-Use Rotary Flow Meters are available in two main sizes, each designed with simple hose barb connections for easy integration into flexible tubing setups.

FM-23WV (1/4 inch Hose Barb)

- **Flow Range:** 0.1 to 2 L/min.
- **Typical Use:** Ideal for lower flow rate applications, such as lab-scale filtration, small-scale chromatography, or precise additions in bioreactors.
- **Connection:** 1/4 inch (7 mm) hose barb for quick and easy tubing attachment.

FM-22WV (1/2 inch Hose Barb)

- **Flow Range:** 1.0 to 20 L/min.
- **Typical Use:** Suited for higher flow rate applications, including pilot scale filtration, larger chromatography skids, and bulk fluid transfers.
- **Connection:** 1/2 inch (12 mm) hose barb for secure tubing connection at higher flows. Pendotech Process Control Systems and Third-party monitors.

Electronic Assembly (Reusable Sensor Reader)

- A separate, reusable electronic assembly (e.g., FM-22WV-E, FM-23WV-E) clips onto the single-use rotor body. This component houses the infrared sensor that detects rotor movement and connects to the monitor. Each assembly includes one rotor.

Considerations for Hose Barb Connections: These provide rapid setup and are cost-effective. Ensure appropriate tubing size and secure with cable ties or other clamps for optimal performance and leak prevention.

Flow Monitor FMT-S
Designed for Flow Meters

The Pendotech Flow Monitor (FMT-S) is a dedicated microcomputer-based instrument for use with the rotary flow meters.

Flow Monitor Specifications

Enclosure	Size - 4.70 inch x 4.70 inch x 2.25 inch (11.94 x 11.94 x 5.72 cm) Approx weight: 0.86 lbs (0.39 kg) ABS Enclosure NEMA 4X front panel/surface mount
Power Inlet	2.1 mm center pos 12-24 VDC
Sensor Input	Flow meter input to measure 5 V square wave via M8 connector (includes 6 ft (2 meters) extension cable with 1/4 inch earphone receptacle)
Analog Output (4-20 mA)	4-20 mA accuracy = +/- 0.016 mA
RS232 Serial Output	Data output to a PC at frequency up to approx every 2 seconds
Environment –20°	0–55°C, 0–95% RH non-condense, ship-store to +85°C
Regulatory Compliances	CE Mark EN61326-1:2013; EN61010-1:2010; EN/ISO13489-1:2009; EN60204-1:2009 FCC Part 15 Class B verified FCC Part 68 5TUUSA-23969-DT-E RoHS and REACH Compliant UL Listed

Features Overview

- Displays instantaneous flow rate and totalized volume, menu-driven interface via keypad and LCD, on-board audio alarms. DIN rail compatible
- Outputs: RS-232 for data collection to PC, 4-20 mA for integration with control systems.
- Calibration Data: Stores pre-calibrated pulse constants for each rotor size. Pulse constants can be user-adjusted for fluids with viscosities significantly different from water by measuring a known volume and counting pulses.

Integration Flexibility

- The flow meter sensors and FMT-S monitor are designed for straight forward integration into new or existing bioprocess setups.
- Extension cables are available for the sensor electronics.
- Mounting options for the FMT-S include panel-mount and DIN rail kits.

Quality & Calibration

- Fluid path materials (PVDF, ruby glass bearing) meet USP Class VI & ADCF.
- Sensors are compatible with gamma irradiation and autoclave.
- Flow meters (FM-22WV, FM-23WV) are supplied with individual calibration data. The nominal pulse constant is provided, and users can perform a simple calibration for specific process fluids to optimize accuracy.

Flow Meter Specifications

Specifications (based on water at 68°F)	**FM-22WV**	**FM-23WV**
Connection	1/4 inch / 7 mm hose barb	1/2 inch / 12 mm hose barb
Fluids	Liquids	Liquids
Flow Range	0.1 to 2 L/min	1.0 to 20 L/min
Fluid Path Materials	PVDF, ruby glass bearing	PVDF, ruby glass bearing
Accuracy (linearity deviation) of Reading	+/-5%	+/-5%
Repeatability	<1%	<1%
Normal Pulse Constant	100,000 pulses/L	4,500 pulses/L
Operating Temperature	-20°C to 80°C (-4°F to 176°F)	-20°C to 80°C (-4°F to 176°F)
Viscosity Range	0.8 to 10 cP	0.8 to 10 cP
Max. Operating Pressure @ 20°C	25 Bar	15 Bar
Length	2 inches (53 mm)	2.5 inches (63 mm)
Electronic Assembly	3 ft (1 meter) with integral 1/4 inch earphone plug (3) wires: +5VDC Power (Red), Common Ground (Black or Silver), Output (White), 34 mA Power	

Ordering Information

	Order Number
Pendotech Premium Flow Meter Monitor with LCD and white backlit display, 4-20 mA output, serial port, 12-24 VDC power input range	FMT-S
Single-Use Rotary Flow Meter, non-sterile, PVDF, 1/4 inch hose barb, 0.1-2 lpm, clip mount. With individual calibration.	FM-22WV
Electronic assembly for one PVDF rotor with 1/4 inch hose barb (includes one rotor)	FM-22WV-E
Single-Use Rotary Flow Meter, non-sterile, PVDF, 1/2 inch hose barb,1.0 - 20.0 lpm, clip mount. With individual calibration.	FM-23WV
Electronic assembly for one PVDF rotor with 1/2 inch hose barb (includes one rotor)	FM-23WV-E
Rotary flow meter adapter cable for FMT-S (3 ft)	PDKT-FM-FMT
Data Acquisition and Trending Software for PressureMAT and CMONT with 2 USB/serial cables to connect to a PC	PMATP-GUI
PressureMAT Benchtop Stand	PMAT-STND
DIN rail mounting kit	PMAT-S-DIN
PMAT-S Panel mount kit UPGRADE - 2 gaskets, 4 mounting brackets, sensor cable (in replacement of standard cable), input connectors for sensor and power	PMAT-PANEL-S-U
PMAT Panel mount kit - 2 gaskets, 4 mounting brackets, 1 sensor cable, and input connectors for sensor and power	PMAT-PANEL-S-C

www.pendotech.com/flow

LEVIFLOW Single-Use Flow Meters
Accurate Flow Measurement

Experience exceptional process control with LEVIFLOW single-use flow meters, delivering high-precision ultrasonic measurement for critical biopharmaceutical applications like tangential flow filtration (TFF), chromatography, and sterile filtration. By measuring the transit time of ultrasonic waves, this system provides real-time flow data with an accuracy of ±1%, which is essential for accurate gradient control or flux management. The gamma-sterilizable, USP Class VI polypropylene fluid path eliminates cross-contamination risk, while the accompanying LEVIFLOW Sensor Monitor provides seamless integration for robust and reliable performance.

Key Features & Benefits
- **High Precision:** Achieve 1% accuracy of reading.
- **No Moving Parts:** The absence of moving components eliminates particle generation.
- **Robust Performance:** Enhanced bubble robustness is achieved through advanced DSP technology.
- **Biocompatible Materials:** Wetted surfaces are fabricated from gamma sterilizable polypropylene (PP) that is FDA, USP-VI, BSE/TSE, and ACDF.
- **Easy Integration:** Designed for quick integration into OEM equipment.

Common Applications
- Tangential Flow Filtration (TFF) filtrate flow
- Normal flow/depth filtration (NFFSS)
- Chromatography

Sensor Specifications

Sensor Type/ Characteristics	FM-LFS-03SU	FM-LFS-06SU	FM-LFS-10SU	FM-LFS-15SU	FM-LFS-20SU
Flow Range [lpm] Triclamp Fitting Size Measurement Path ID in [mm]	0 – 0.8 3/8inch (ID = 6.4mm) 2.5	0 – 8 3/8inch (ID = 6.4mm) 6	0 – 20 1/2inch (ID = 9.4mm) 10	0 – 50 1inch (ID = 22.2mm)	0 – 80 1inch (ID = 22.2mm) 20
Accuracy of Reading Repeatability < Accuracy/2	> 6ml/min: ±1% < 6ml/min: ±0.06ml/min	> 1.7l/min: ±1% < 1.7l/min: ±17ml/min	> 4.7l/min: ±1% < 4.7l/min: ±47ml/min	> 10.6l/min: ±1% < 10.6l/min: ±106ml/min	>18.8l/min: ±1 % <18.8l/min: ±188ml/min
Wetted Surface Area [cm²] Wetted Surface Area [ml] Weight [g]	29.5 4 42	32.2 4.8 43	53.2 12.3 61	141.2 61.7 96	173.5 95.8 125
Pressure Drop Coefficient C at 20°C ΔP = C x Q2; Q = Flow [lpm], ΔP = Press. Drop [kPa]	16.8	0.88	0.07 5	0.0101	0.0035
Fluid Temperature Ambient Temperature Maximum Fluid Pressure Kinematic Viscosity Sound Speed Wet Materials Sensor Enclosure Classification Cable Jacket Material Cable Length (re-usable cable) Electrical Connectors	Normal range: 10 – 60°C (50 – 140°F) 0 – 40°C (32 – 104°F) 0 – 0.5MPa (0 – 5 bar, 0 – 72.5 psi) 0.8 – 40 mm2/s (0.8 – 40 cSt) 1000 – 2200 m/s Polypropylene (FDA, USP VI, ADI free), Gamma robust for up to 40kGy IP-65 (for connected sensor) PVC 9 ft / 3 meter Circular type (IP-67), lock-release mounting				

Flow Meter Models

Part Number	Max Flow	Fitting Size	Measurement Path ID
FM-LFS-03SU	0.8 LPM	3/8 inch	2.5 mm
FM-LFS-06SU	8 LPM	3/8 inch	6 mm
FM-LFS-10SU	20 LPM	1/2 inch	10 mm
FM-LFS-15SU	50 LPM	1 inch	20 mm
FM-LFS-20SU	80 LPM	1 inch	20 mm

LEVIFLOW Sensor Monitor
Accurate Flow Measurement

The LEVIFLOW Sensor Monitor is a dedicated unit for processing signals from the LEVIFLOW sensors. It features a digital signal processor (DSP), a digital LED display for real-time flow readings, and multiple outputs for system integration.

Key Features
- **Digital Display:** Provides a clear, immediate flow reading.
- **Versatile Outputs:** Includes a 4–20 mA analog output and a digital frequency output for process control and data acquisition.
- **Complete System:** The monitor is part of a standard configuration that includes the flow sensor and the monitor itself.

Monitor Specifications

Power Supply	24 VDC +/- 10%
Current	150 mA (Peak of 3.8 A within 210 µs)
Ambient Temperature	0 - 40°C (32 - 104°F)
Humidity Range	30 - 85% R.H. (no condensation)
Weight	485 g
Dimensions (W x L x H)	13.65 x 19.05 x 4.45 cm

Ordering Information

	Order Number
Leviflow Sensor Monitor with display (includes power supply, interconnect cable, and stand)	FMT-LFS
Leviflow Sensor Interconnect Cable, 3 m, PVC	FM-LFI-C-1-30
Leviflow Sensor Interconnect Cable, 6 m, PVC	FM-LFI-C-1-60
Single-Use and Low Flow Ultrasonic flow meter to PressureMAT analog input, 6 ft	PDKT-US-PMATA
Micro connector with integral cable with flying leads	MC-6897K35
Levitronix single channel DIN rail transmitter	FM-LF-CONVERT
Leviflow Wall Mount Extension Cable, 1 M	FM-LF-EXT-1M
Leviflow Wall Mount Extension Cable, 3 M	FM-LF-EXT-3M
Leviflow Wall Mount Extension Cable, 6 M	FM-LF-EXT-6M
Flow Sensor Stand (included with monitor)	LEVI-STAND

www.pendotech.com/flow

Automated Filtration and Data Acquisition Systems

Your Gateway to Automated Bioprocess Control

Automation
A control system in biopharma is an automated setup designed to monitor and manage filtration processes used in the production of biopharmaceutical products. Mettler-Toledo Pendotech offers a comprehensive range of filtration and data acquisition systems that provide automated, end-to-end solutions for bioprocess control and monitoring across a variety of applications. Safety is prioritized by incorporating automated alarms and pump shutdowns that protect equipment and processes from parameter deviations.

Multi-parameter Control
These systems accommodate a wide range of sensor inputs and equipment from multiple manufacturers, such as those measuring pressure, flow, temperature, pH, conductivity, and turbidity, allowing for comprehensive process monitoring and control. This adaptability guarantees that customers can seamlessly integrate our control solutions into their existing operation.

Ease of Use
Each system features user-friendly PC-based graphical interfaces that facilitate real-time data collection, process visualization, and simplified operation while supporting seamless integration with pumps, scales, sensors, and other parameters. Data management is enhanced with real-time trend analysis, customizable display options, and the ability to export data in Excel-compatible formats.

Diverse Configurations
Designed to deliver flexibility and efficiency, these systems accommodate both benchtop and pilot-scale setups, providing capabilities such as automated pump and valve management, filter flushing, concurrent operation of multiple filters, and parallel processing of experiments.

By adhering to EMC and LVD standards, these durable and scalable solutions ensure reliability and safety, effectively optimizing filtration and bioprocess development workflows. Ultimately, these control systems enable customers to enhance productivity, achieve superior process control, and gain deeper data insights, all while upholding the highest levels of safety and compliance.

Data Acquisition System

Real-Time Sensor Data: Integrated, Analyzed, Secured

Features Overview
- The system supports up to 14 sensors/devices, including air-in-tube detectors, pressure sensors, scales, flow meters, pH probes, conductivity sensors, and configurable analog inputs.
- It provides real-time data analysis with an advanced trending module.
- Automated safety features include alarm outputs that can shut down connected pumps.
- It has a built-in data server that supports communication with OPC client such as PI from OSIsoft.

Other Highlights
- Data visualization tools are customizable, including features like auto-scaling, manual limits, and cursor comparison.
- The system provides robust maintenance support for both one-time and ongoing sensor configuration.
- The real time data collection in the .csv file format and is set to automatically open with Excel.

Did You Know
A standout feature of the DAQ System is its ability to integrate and monitor up to 14 different sensors simultaneously.

The DAQ System offers diverse sensor integration by supporting up to 14 sensors/devices, including four Pendotech pressure sensors, two scales, two flow meters, one pH probe, one conductivity sensor, one air-in-tube detector, and three configurable analog inputs for UV, temperature, and turbidity sensors. The system incorporates automated safety features like alarm outputs that can automatically shut down connected pumps during alarms, enhancing operational safety. Its user-friendly interface includes a dedicated System View for sensor configuration and data entry, a Trends View for customizable data visualization and comparison, and a Maintenance View for sensor setup and adjustments. Connects to a PC via USB and includes reusable sensor cables, ensuring comprehensive readings and alarm monitoring within the system itself, making it a robust and versatile solution for complex monitoring needs.

Specifications

Dimensions (HxWxD)	6.125 inch x 16 inch x 11.5 inch (15.5575 cm x 40.64 cm x 29.21cm)
Weight	20 lb (9.1 kg)
Enclosure Material	304 stainless steel
Power Requirements	100 – 240 volts, 50 – 60 hertz, 2-amp max
Pressure Sensor Inputs	Pendotech pressure sensors default configuration - other full-bridge type sensors optional
Alarm Output	Dry contact relay 3 – 48 VDC, up to 3 A continuous
Air Detector Input	Digital input with 24 VDC supply
Flow Meter Input	5 V digital pulse input with 5 VDC or 24 VDC supply
External Inputs	External 1 and 2: Analog Signal: 4-20 mA External 3: 0-10 V (External 3 can be a generic 0-10 V input, or when a system is ordered, configured to accept a direct plug-in of Pendotech Single-Use Temperature Sensors without the requirement of an external transmitter) NOT LOOP POWERED, DO NOT APPLY 24 VDC
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	Settings: 1200 Baud, 7 data bits, odd parity, 1 stop bit, manual print
PC Requirements	Windows 7 or 10, 2 GHz or faster, 4 GB of RAM or more

Ordering Information	Order Number
Pendotech Sensor Data Acquisition System with alarm functions for 14 sensors/devices & PC Software	PDKT-PCS-DAQ
Pendotech Sensor Data Acquisition System with alarm functions for 14 sensors/devices & PC Software with external 3 configured for Pendotech Single-Use Temperature Sensor input	PDKT-PCS-DAQ-T

Normal Flow Filtration Screening System

Efficient Optimization for Bioprocess Development

Features Overview

– Supports four independent filter trains, each handling up to three filters simultaneously.
– Enables simultaneous volume throughput studies, enhancing productivity.
– Includes alarms for high pressure and high delta pressure per filter to ensure safety.
– Measures total flow via scales with density input (weight-to-volume conversion) or pump accumulation.
– Monitors pressure, weight, turbidity, and temperature for comprehensive filtration analysis.

Other Highlights

– Designed for comprehensive bioprocess development filtration optimization.
– Offers real-time trend viewing with instant export capability.
– Acquires data in .csv format compatible with Excel.
– Supports four parallel constant-pressure experiments using scale input.

Filter selection and screening in bioprocess development are significantly enhanced by a filtration optimization system designed for comprehensive and efficient operation. This system supports four independent filter trains, each capable of handling up to three filters, allowing simultaneous volume throughput studies and thereby increasing productivity. Safety is prioritized with alarms that detect high pressure and high delta pressure per filter, automatically shutting off the pumps to prevent damage. The system measures total flow either through scales with density input for weight-to-volume conversion or via pump accumulation, and it tracks pressure, weight, turbidity, and temperature to provide real-time calculations such as flux and permeability for optimal filtration.

The software is user-friendly, with seven tabs—Setup View, System View, Trends View, Analog Trends, Communication View, Maintenance View, and Constant Pressure View—that streamline navigation and control. Additional features include real-time trend viewing with instant export, data acquisition in .csv format compatible with Excel, and the ability to conduct four parallel constant-pressure experiments using scale input.

The system's versatility is enhanced by compatibility with Pendotech pressure sensors and various sensor fittings, which enable direct connections to filter test devices.

Specifications

Dimensions (HxWxD)	4.8 x 13.8 x 10.3 inch (12.2 x 35.1 x 26.3 cm)
Enclosure Weight	9 lb (4.1 kg)
Enclosure Material	Aluminum
Power Requirements	100 – 240 volts, 50 – 60 hertz, 2-amp max
Pressure Sensor Inputs	Pendotech pressure sensors default configuration - other full-bridge type sensors optional
Pump Control (1 for each pump)	Speed Control: 4 – 20 mA or 0 – 10 V output
Spare Inputs (standard)	Four of 4 – 20 mA and four of 0 – 10 V inputs

Ordering Information	**Order Number**
Pendotech Normal Flow Filtration Screening System w/ PC software	PDKT-PCS-NFFSS

Did You Know

The system is interfaced with up to four pumps, enabling independent control of each. Automation facilitates unattended operation by automatically shutting off individual pumps when a volume target is achieved, or an alarm is triggered.

Tangential Flow Filtration System

Precision, Safety, and Insight in Bioprocess Control

Features Overview

– Real-time monitoring via a user-friendly graphical interface with trending and data export capabilities.
– Comprehensive safety features, including alarms for all critical parameters and immediate pump shutdown on flow issues.
– Built-in sensors for conductivity, pH, and temperature with Condition Excursion function for advanced process optimization.
– Multiple sensor inputs for additional measurements and customizable alarm notifications.
– The retentate flow can be easily regulated by using a retentate flow meter to set the flow rate for the application.

The TFF system efficiently manages diafiltration process with multiple endpoints such as air detector, filtrate weight, conductivity, and pH, It uses Pendotech pressure sensors for accurate pressure and TMP measurement and includes conductivity, pH, and temperature sensors for process integrity. The user-friendly GUI, accessible via mouse or touchscreen, includes a pop-up keypad and error alerts to prevent invalid inputs. It offers eight tabs:

- **Setup View:** experiment setup and data management
- **System View:** parameter monitoring and pump control
- **Trends View:** process trend visualization and export
- **Maintenance View:** pump configuration and sensor calibration
- **Condition Excursion:** process optimization
- **Condition Excursion Plots:** flux vs TMP and concentration graphs
- **Queued Recipes:** recipe scheduling
- **Concentration Plot:** concentration estimation

Further enhancing usability, the system supports remote monitoring through software such as Remote Desktop. Key features include circulation pump control, email and text notifications, and external sensor inputs for expanded monitoring capabilities.

Additionally, two external input channels enable integration of additional process parameters, such as Pendotech UV, turbidity, or third-party monitors via 4-20 mA inputs, while configurable alarms facilitate prompt email and text alerts, ensuring responsive process management.

Overall, it delivers streamlined, automated control and monitoring of tangential flow filtration, enhancing efficiency, safety, and data management.

Highlights

– Fully automated Tangential Flow Filtration (TFF) or Crossflow Filtration with recipe-based control for concentration and diafiltration.
– Flexible integration with industry-standard pumps and scales, supports a range of process scales.
– Automated diafiltration endpoints including filtrate weight, conductivity, pH, and air detection.
– CE tested for EMC and LVD compliance, ensuring safety and compliance.
– Email and text message notifications for pre-alarm and alarm conditions enhancing process awareness.

Specifications

Dimensions (HxWxD)	6.125 inch x 16 inch x 11.5 inch (15.5575 cm x 40.64 cm x 29.21 cm)
Weight	20 lb (9.1 kg)
Enclosure Material	304 Stainless Steel
Power Requirements	100 – 240 volts, 50 – 60 hertz, 2-amp max
Pressure Sensor Inputs	Pendotech pressure sensors default configuration - other full-bridge type sensors optional
Pump Control	Speed Control: 4 - 20 mA; Circ Pump Alternate: Scalable voltage signal within 0-10 volts Start/Stop: Relay 3 - 48 VDC, up to 3A continuous
Air Detector Input	Digital input with 24 VDC supply
Flow Meter Input	5 V Digital pulse input with 5 VDC or 24 VDC supply
External Inputs	Analog Signal - both 4-20 mA
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 Inputs	2-wire 2252 ohm 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, 4 GB of RAM

Ordering Information	Order Number
TFF Process Control System with Graphical User Interface Software and interface cables	PDKT-PCS-TFF

Did You Know
The Condition Excursion feature can handle up to 40 simultaneous flow and TMP settings, to conduct DOE setups to get better insight of optimal process parameters.

www.pendotech.com/tff

Virus Depth Filtration System

Automated Precision for Enhanced Viral Clearance

Features Overview

– The automated filtration process control system significantly reduces manual work by automating key steps.
– Enables real-time data collection and logs information in Excel-compatible files for convenient analysis.
– Provides a user-friendly PC-based graphical interface that simplifies operation and monitoring.
– Features safety alarms that automatically shut down pumps upon detecting parameter deviations.

Other Highlights

– The system integrates seamlessly with pumps, scales, and sensors, supporting both benchtop and Pilot Cart configurations.
– It offers both manual and automated control of pumps and valves, including prefilter and virus filter flushing functions.
– The system supports additional sensors to provide enhanced monitoring capabilities.
– It is versatile across different process scales and includes easy-to-use calibration and configuration tools for flexible operation.

Did You Know
The system provides manual and automated control for valves and pumps via GUI, filter flushing, product filtration with air and scale monitoring, recovery, and optional precise pump regulation via delta pressure control.

The Virus Depth Filtration System is an automated filtration process control system designed for laboratory and pilot-scale applications. The system features a user-friendly PC-based graphical user interface (GUI) that enables users to control processes, visualize operations, manage alarms, and perform manual controls efficiently.

It integrates seamlessly with various pumps, scales, and sensors, supporting both benchtop and Pilot Cart setups, and includes optional automated valve selection. Key functionalities include manual and automated pump and valve control, prefilter flushing with flow endpoints, virus filter timed flush, product filtration with air detector and filtrate scale endpoints, and recovery based on filtrate scale endpoints. An optional delta pressure control ensures precise pump regulation.

The system also incorporates a built-in data server for OPC client data exchange, safety alarms that shut down pumps on parameter deviations, and compatibility with additional sensors for enhanced monitoring. Furthermore, the system is CE tested for EMC and LVD compliance, ensuring reliability and safety in operation.

Specifications

Dimensions (H×W×D)	6.125 inch × 16 inch × 11.5 inch (15.5575 cm × 40.64 cm × 29.21 cm)
Weight	20 lb (9.1 kg)
Enclosure Material	304 Stainless Steel
Power Requirements	100 – 240 volts, 50 – 60 hertz, 2-amp max
Pressure Sensor Inputs	Pendotech pressure sensors default configuration – other full-bridge type sensors optional
Pump Control	Speed Control: 4 – 20 mA; Circ Pump Alternate: Scalable voltage signal within 0–10 volts Start/Stop: Relay 3 – 48 VDC, up to 3A continuous
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Scale Inputs	RS232 Communication
Temperature Inputs	2-wire 2252 ohm 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, 4 GB of RAM

Ordering Information	Order Number
Pendotech Virus Filtration-Depth Filtration Process Control and Monitoring System with pressure sensor and pump cables	PDKT-PCS-VFDF

Trademark Information

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Mettler-Toledo Pendotech
Process Analytics

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