

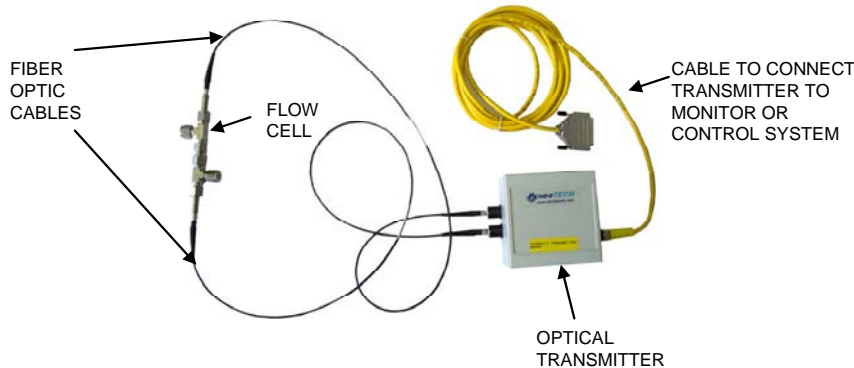
PendoTECH Turbidity Flow Cell

Background

In bioprocess operations, the turbidity of the liquid after a filter can be measured as an indication of filter performance. The measurement may indicate that undesired components are “breaking through” the filter meaning the filter is losing its capacity. The turbidity measurement at 880nm can be used in conjunction with pressure measurements in constant flow filtration processes to give an overall measurement of filter performance. To make a turbidity measurement a sample may be drawn and measured off-line or an on-line measurement may be made with a device such as the PendoTECH Turbidity Flow Cell.

PendoTECH Turbidity Flow Cell Technical Details

The flow cell consists of the items in the following picture.

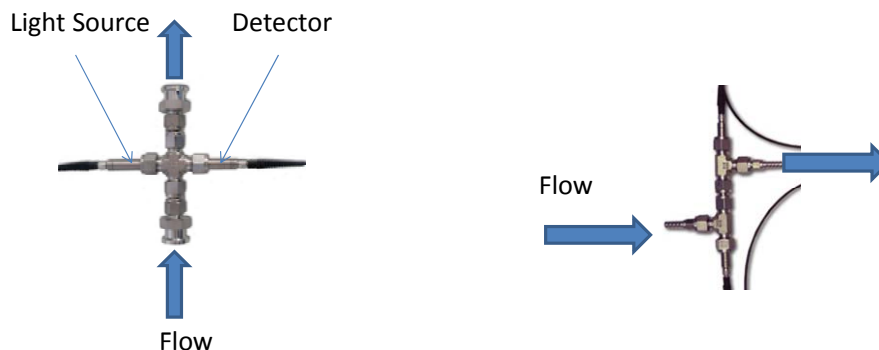


There is no display or readout on the unit because the optical transmitter is designed to be integrated to a monitor with data acquisition capability or a control system. The raw output of the transmitter is a voltage signal that is scales 1 to 1 with absorptions units (0-2 AUs). Conversion to units such as NTUs can be made by the monitor or control system. For filter evaluation studies and filter screening with the PendoTECH Filter Screening System, one to four transmitters may be plugged directly into the system and the turbidity data can be collected with all of the other process data.

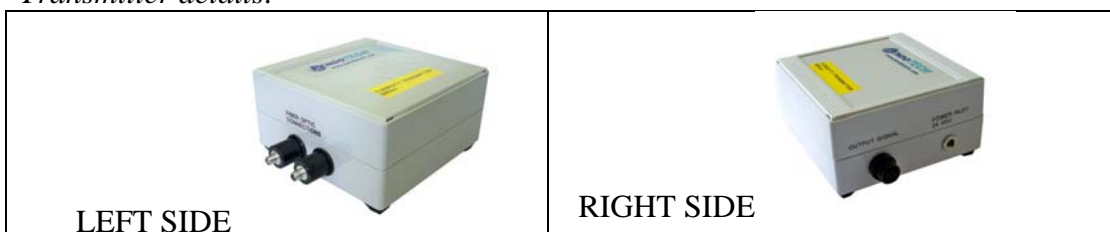
There are 2 different path length options of 1cm or 6.5cm. The larger path length is suitable for measuring approximately 0-200NTUs and the smaller from 0-1200NTUs (both in increments of 1/100th of the full scale). The following picture shows 2 possible set-ups:

1 cm path length with TC fitting

6.5 cm path length with barb fitting



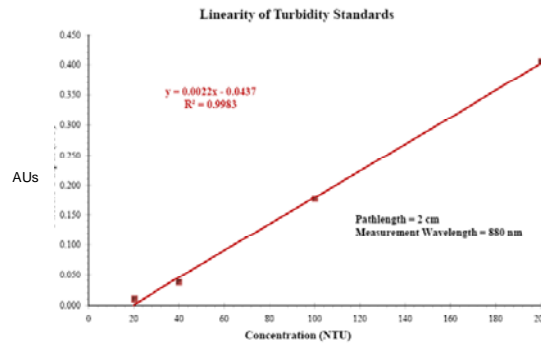
Transmitter details:



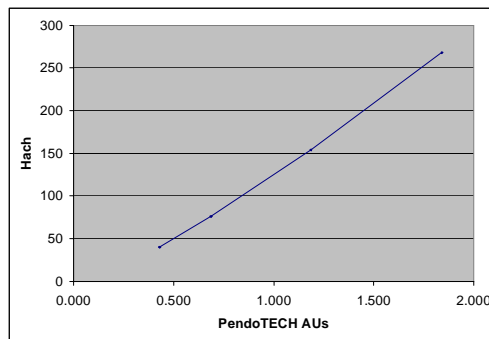
Product Information

Correlation of AUs to NTUs

The raw reading of the instrument is absorption units. This is directly correlated to NTUs that is typically the units of measure of interest. However, the correlation may vary between samples from different processes. The correlation of the HACH turbidity standard yields the following results:



From a fermentation process, after a centrifuge, the following results were determined comparing process data from the flow cell to samples taken and measured off-line:



A comparison of the 2 indicates a different correlation of AUs measured by the flow cell to NTUs measured by an off-line instrument.

	Fermentation Process	Turbidity Standards
	Hach vs Pendotech AU	Default values for Pendotech NTU*
Slope	162.17	156
y-int	-33.39	-47
Correl.	0.9992	

* based on Hach Standards

Flow Cell Material	Stainless Steel with 3/8 inch ID (larger available upon request); removable optical interface with glass lens (for cleaning); Flow connection: 3/4inch TC or 1/4 or 3/8 inch barb
Flow Cell Properties	Path length: 6.5 cm or 1cm. Wavelength: 880 nm with LED light source
Transmitter Box	ABS plastic: 5 inch x 5 inch x 2.5 inch 4 channel unit: Anodized aluminum: 10 inch x 14 inch x 4.2 inch
Power requirement	24 Volts DC (100-250VAC to 24VDC supply included)
Output signal	0-2V scaled to 0-2 AU with readability of 0.02 AU (4-20mA optional)
NTU Standard Measurement	With turbidity standards correlation, 6.5 cm path length, NTU range = 265
Output signal connector	Either field wireable connector or cable with leads for integration

- Four Channel Unit:**
- Front Panel: Power indicator
 - Back Panel: fiber optic connectors; output signals on D25 connector
 - Power inlet and power switch

