

## PeCOD® System Configuration V1.4 January 2017

This application note demonstrates the multiple variations of the PeCOD® technology that MANTECH can provide to accommodate laboratory operations, automated sampling, or continuous process monitoring. Table 1 below provides an overview of what is required for proper setup, operation, and data collection. The following sections describe the system setup and applicable uses.

*Table 1: Summative comparison of PeCOD® configurations*


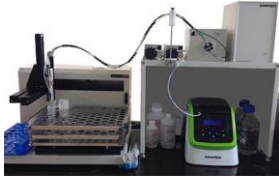



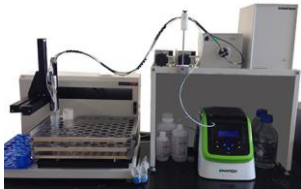


Description	<p>L100 Stand Alone PeCOD®</p> 	<p>Automated L100 PeCOD®</p> 	<p>At-Line L100 PeCOD®</p> 	<p>Online P100 PeCOD®</p> 
Area for Installation	Minimal bench space	Minimal bench space	Can be put on a table, cart or in a cabinet	Can be installed to a wall/stand or mounted to ground with feet
Dimensions (LxWxH)	17" x 13" x 10"	Depends on configuration, roughly 32" x 20" x 37"	Depends on configuration, roughly 24" x 20" x 37"	30" x 13" x 48" and the feet add-on is 24"

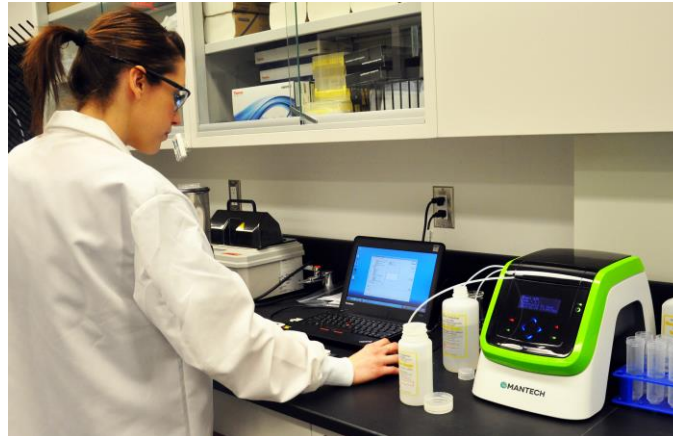
Table 1 Continued: Summative comparison of PeCOD® configurations

Description	<p>L100 Stand Alone PeCOD®</p> 	<p>Automated L100 PeCOD®</p> 	<p>At-Line L100 PeCOD®</p> 	<p>Online P100 PeCOD®</p> 
Electrical	100V to 240V AC, 45 to 65 Hz and 2 A (max)	100V to 240V AC, 45 to 65 Hz and 2 A (max)	100V to 240V AC, 45 to 65 Hz and 2 A (max)	100 to 200V AC, 50 to 60 Hz, 200 W and must be hard wired by electrician
Operating Temperature	5 – 30°C (40- 85°F)	5 – 30°C (40- 85°F)	5 – 30°C (40- 85°F)	5 – 30°C (40- 85°F)
Relative Humidity	Max 90% noncondensing	Max 90% noncondensing	Max 90% noncondensing	Max 90% noncondensing
Operation Method	Manual with option to upgrade to automated	Automated analysis	Automated grab sampling with PC-Titrate software	Automated sampling with PLC
Sample Preparation	Manual	Depends on configuration, manual to automated	Automated	Automated
Sample Flowrate	N/A	N/A	> 10 mL/min	> 35 L/min

*Table 1 Continued: Summative comparison of PeCOD<sup>®</sup> configurations*

Description	L100 Stand Alone PeCOD <sup>®</sup> 	Automated L100 PeCOD <sup>®</sup> 	At-Line L100 PeCOD <sup>®</sup> 	Online P100 PeCOD <sup>®</sup> 
Waste Collection Method	500 mL Beaker	50 L Carboy	50 L Carboy	Municipal Drain
Sample Inlet Line (ID)	N/A	N/A	1/4"	1"
Other Parameters	N/A	Can add a range of other analysis i.e. pH, turbidity etc.	Can add a range of other analysis i.e. pH, turbidity etc.	N/A
Portability	Lithium Ion Battery and Travel Case Options	Rolling Cart Option	Rolling Cart Option	N/A
Ongoing Maintenance	Monthly	Monthly	Weekly Check	Weekly Check
Data Collection	Manual	Manual	Manual	4-20 mA Output, Remote Software and Manual
Computer for Operation	Not required but can use software for automated quality control	Required	Required	N/A

## 1.1 L100 Stand Alone PeCOD®

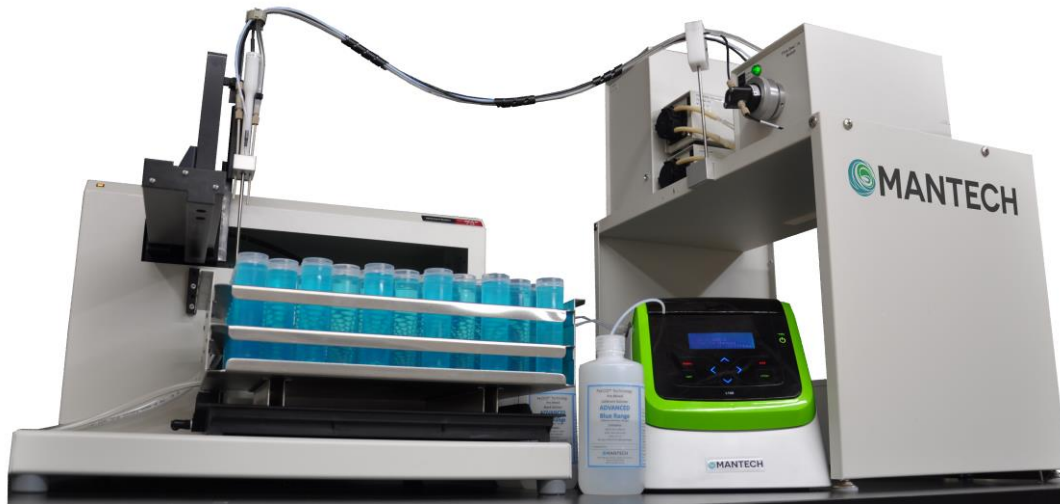


The L100 Stand Alone (SA) PeCOD® is also referred to as the PeCOD® Laboratory Model. It is MANTeCH's base model for use in industrial, municipal or government and academic lab settings. It has a small footprint (17" x 13") and is very simple to operate with "Click and Go" software. Sample prep requires ~ 20 mL of sample, and manually pipetting sample and electrolyte solution in the appropriate ratio. Replicates can easily be run through the software.

Recommendation: This system is ideal in the laboratory to analyze samples as required and to have direct comparison to other sample analysis methods. It can also be incorporated in a carrying case for portability.



## 1.2 Automated L100 PeCOD®



The Automated L100 PeCOD® provides unattended analysis for a large number of samples. The system has the capability to auto pipette, calibrate, dilute, pH adjust, and run quality control checks. The system is extremely versatile, allowing for customization, and add-on's to increase automation. Additions to the systems can include other parameters, in addition to COD, such as ISE analysis, turbidity and colour. The minimum sample volume is ~ 10 mL with the auto sampler utilizing 50 mL tubes or 125 mL cups. There is no automated filtration mechanism with the system, so sample composition would need to be free of large particles before being placed in the auto sampler.

Recommendation: This system is ideal in a lab setting to analyze a large number of samples unattended. The automated PeCOD® can easily incorporate a wide variety of other parameters for water analysis such as pH, alkalinity, turbidity, chloride, and hardness.

### 1.3 At-Line L100 PeCOD®



The At-Line L100 is an automated L100 PeCOD® that allows for continuous sampling at specified time intervals. It can auto calibrate, rinse, run quality control checks and sample analysis. There is the option for pH adjustments if outside the ideal pH range (4-10), and dilution if the sample range and composition is outside of the working limits. It can be placed on a cart for mobility or in a cabinet. The requirements are minimal with sample flow > 10 mL/min and access to deionized water carboys. There is no automated filter mechanism with the system so sample composition would need to be free of large particles. However, with the addition of a time delay for settling to occur this could be utilized with higher particulate loads.

Recommendation: This system is optimal for online applications where there is low sample flow available and when continuous sample data is advantageous.

#### 1.4 Online P100 PeCOD®



The PeCOD® Online P100 provides continuous online monitoring utilizing a 4-20mA output to connect directly to Supervisory Control and Data Acquisition (SCADA) system, so results can be monitored from the control room. Only one sample stream can be analyzed with current setup. The required sample flowrate is >35 L/min to the sample manifold (bottom left of cabinet), tap water at > 2 L/min, and compressed air at >600 kPa. Sample manifold utilizes a 50 um metal mesh filter and performs backflush every half hour. The cabinet can be attached to a wall or to the floor.

Recommendation: This system is ideal for online analysis when data is required on a consistent basis and when there is an industrial sample flow with large particulate load.