

# Pin-Hole-Detect Application Usage Notes

## Introduction

The Pin-Hole-Detect (PHD) application from L&M Instruments provides the user interface for two categories of pin hole detection systems from L&M:

1. RTGOM Infinity System, providing continuous coverage across a width of product
2. RTGOM Singles System, providing a discrete number of points across a width of product

The PHD application auto-detects the type of system attached and adjusts accordingly. The application monitors both layer thickness (in units of Optical Density or Percent Transmission), and pin hole counts of small, medium, or large size.

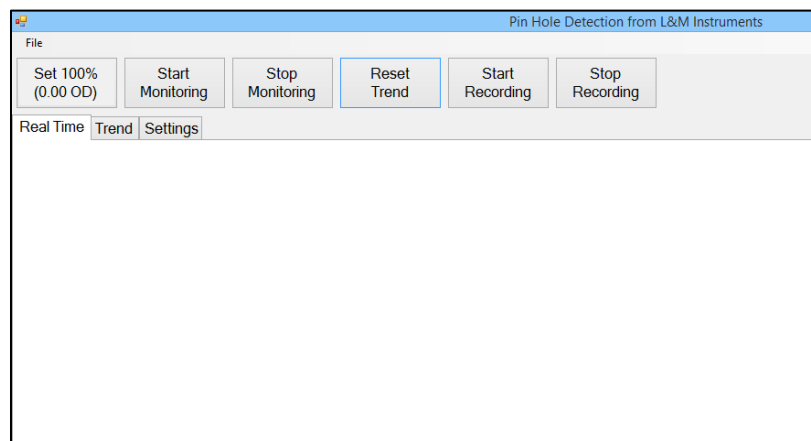
The PHD application software is supported on Windows 8 and 10 systems.

## Theory of Operation

The L&M Pin Hole Detection systems utilize an optical transmission-based method for detecting both pin holes and layer thickness. Pin holes are detected as Small, Medium, or Large depending on the user-configured transmission thresholds. In addition to pin hole counts, layer thickness is also reported in terms of optical density (OD) or %transmission (%T).

## The Main Screen

Upon start-up the PHD application will appear as shown below. The Real Time and Trend graphs (described further below) will be empty until the system is ready to perform monitoring.



## Main Screen Menu

The main screen menu has the following functions:

File->About	This provides the RTG-PHD version as well as the names and versions of all devices attached to the system.
File->Save All Settings	This saves the following items from the Settings tab: <ul style="list-style-type: none"><li>• Settings -&gt; Discovery Method</li><li>• Settings -&gt; Graph Types</li><li>• Settings -&gt; Y-Axis Scaling</li><li>• Settings -&gt; Signal Processing</li></ul> It does NOT save the settings within the "Advanced" box. The threshold settings are saved within the hardware, and the debug settings are temporary.
File->Exit	Exits the application.

## Main Screen Controls

The following are a list of the main screen controls:

Set 100% (0.00 OD)	This control instructs the hardware to capture the existing light level as the 100 %T or 0.00 OD level. All subsequent pin hole detection thresholds and layer thickness readings will be relative to this value.
Start Monitoring	This places the system in active monitoring mode. This mode requires the 100% to have been set using the "Set 100% (0.00 OD)" button. Once selected, this button will turn a shade of green to indicate that monitoring is active. When monitoring is active, the Real Time and Trend charts will start populating on a 2 second interval. Note that many settings, including Set 100%, are not allowed when the system is actively monitoring. When this happens, an error will be displayed. Monitoring will have to be stopped to activate these settings.
Stop Monitoring	This stops all active monitoring. Chart updates will stop, and all settings are available for configuration when monitoring is stopped.

Reset Trend	This control will clear the chart found on the Trend tab.
Start Recording	When monitoring has been started, this control will output every Real Time sample to a file located in Documents\L and M Instruments\Reports. The file will be named in the following format: PHD_DD-MMM-YYYY hhmmss.csv.
Stop Recording	This control will stop any recording that was started with the Start Recording command.

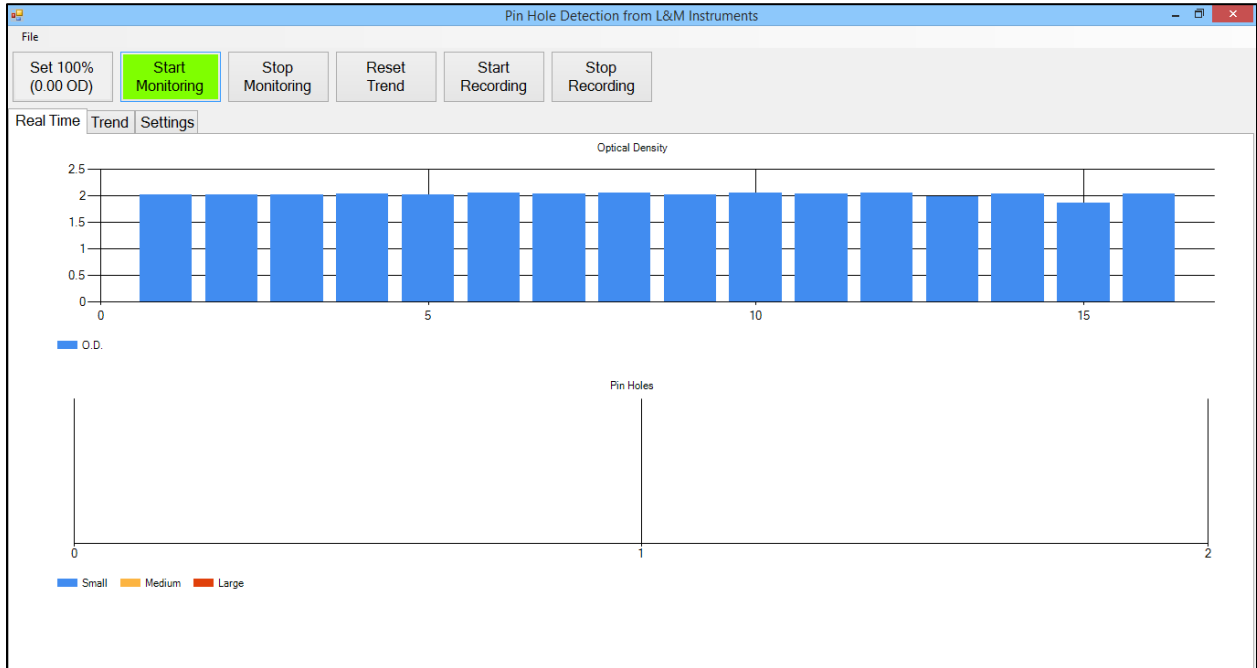
### Main Screen Tabs

The main screen presents three tabs as described below.

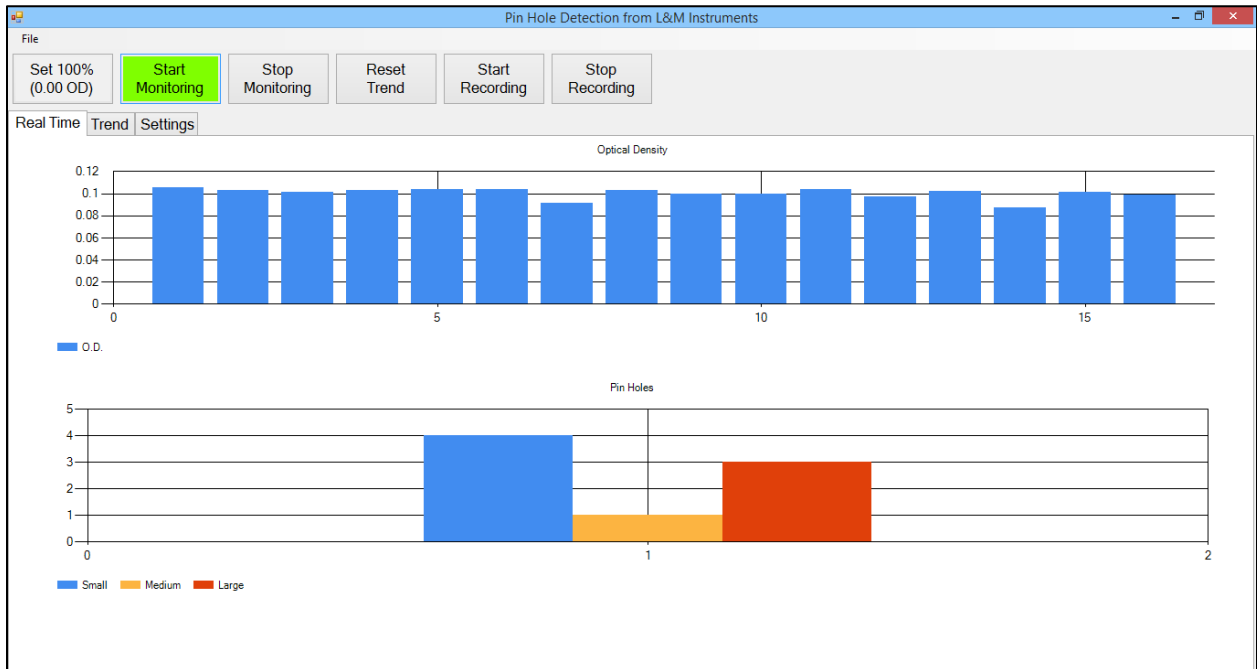
#### **The Real Time Tab**

This tab displays both the layer thickness (in OD units by default) as well as a count of pin holes. For an RTG-Singles system, the number of columns on the layer thickness (upper) chart corresponds to the number of RTG-Single devices in the system. For an RTG-Infinity system, the number of columns is programmable in the Settings tab, and can range from one to a hundreds, depending on how much cross-width resolution is desired. The lower chart is a count of the pin holes, by size, for the last real-time (2 second) sample. There is one data set per RTG-Single or RTG-Infinity segment.

Below is an example Real Time chart. The green color of the Start Monitoring button indicates that monitoring is active. The empty Pin Holes chart indicates that no pin holes were detected for the last sample.

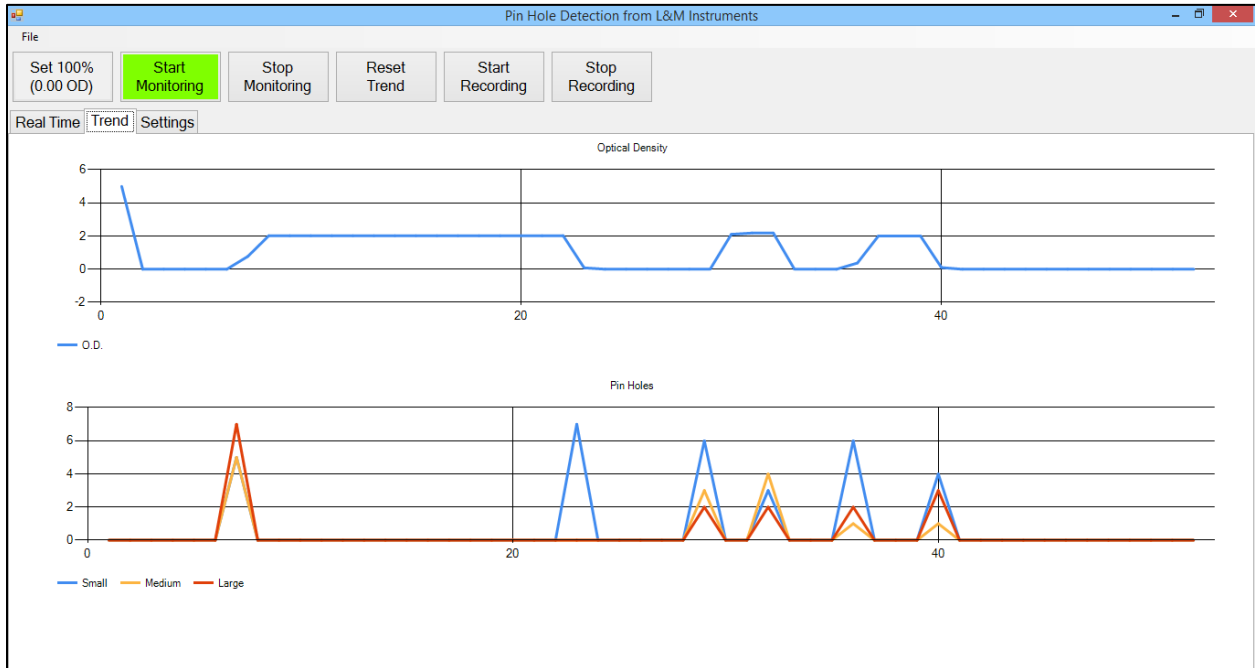


In the Real Time chart sample below the Pin Holes chart indicates that there were 4 small pin holes, 1 medium, and 3 large pin holes detected.



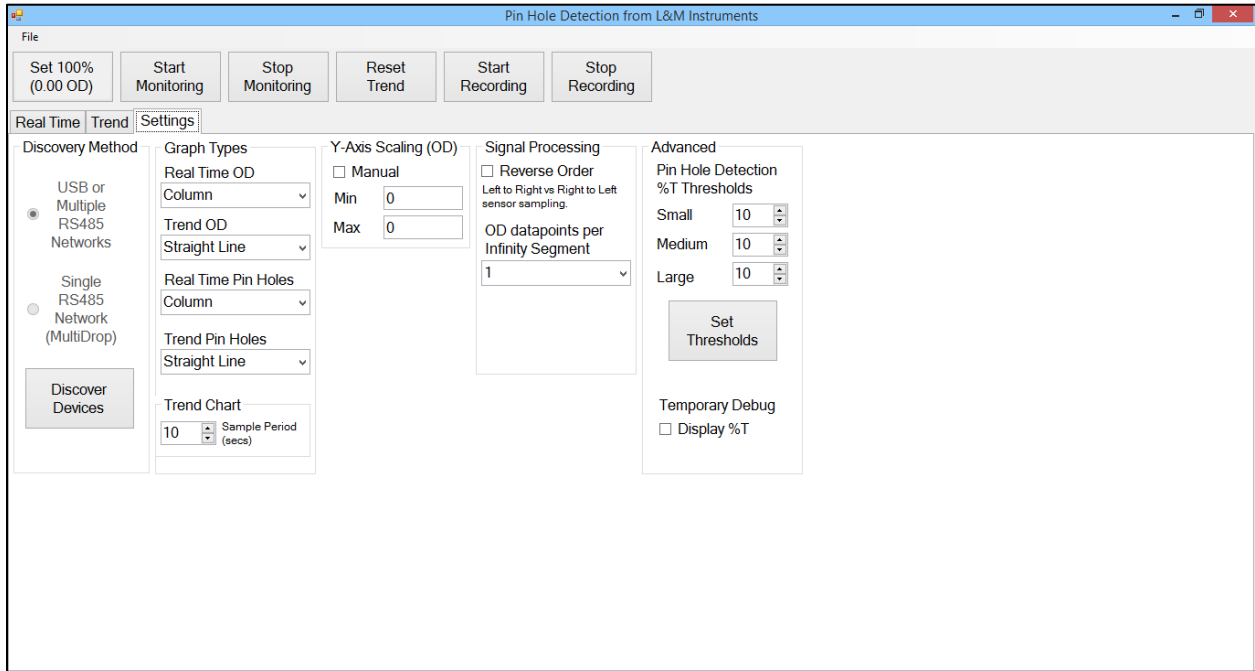
## The Trend Tab

The Trend tab shows a history of the layer thickness (OD) and pin hole counts. The chart will display all historical values until reset with "Reset Trend".



## The Settings Tab

The Settings tab allows a number of settings as illustrated and described below.



### Discovery Method Settings

<p>USB or Multiple RS485 Networks</p>	<p>This indicates that the PHD application will look for all devices (RTG-Singles or RTG-Infinity) on per-device USB or RS485 networks. NOTE: This is the only mode currently supported by the PHD prototype units.</p>
<p>Single RS485 Network (MultiDrop)</p>	<p>This indicates that the PHD application will look for all devices on a single RS485 “MultiDrop” network. This type of wiring configuration facilitates wiring, but slows access as each device must be accessed in sequence as opposed to in parallel. NOTE: This mode is not supported with the prototype units.</p>
<p>Discover Devices</p>	<p>This button causes the software to re-discover RTG-Single or RTG-Infinity devices. While the software automatically discovers devices when first run, there may be occasions when the devices will need to be rediscovered.</p>

## Graph Types Settings

Real Time OD, Trend OD, Real Time Pin Holes, Trend Pin Holes	These settings allow each particular chart to be configured as any of the three following chart types: <ul style="list-style-type: none"><li>• Column</li><li>• Straight Line</li><li>• Curved (Spline) Line</li></ul>
Trend Chart Sample Interval (secs)	This is the amount of time, in seconds, that each Trend chart data point represents.

## Y-Axis Scaling (OD) Settings

Manual Checkbox	When this is checked, the Min and Max values are used as the minimum and maximum Y-Axis values for both the Real Time and Trend OD charts.
Min	The minimum Y-Axis value for the Real Time and Trend OD charts when using the Manual mode.
Max	The maximum Y-Axis value for the Real Time and Trend OD charts when using the Manual mode.

## Signal Processing

Reverse Order	This allows the system to be setup to read sensors left to right, or right to left.
OD Datapoints per Infinity Segment	Each RTG-Infinity segment can have 16 or 48 sensors, and a pin hole detection system can have several segments. This setting allows data reduction in the amount of layer thickness data that is returned and charted. For instance a 48 sensor Infinity segment can be programmed to return 12 OD values, meaning it will average every 4 sensors to produce a reading.

## Advanced Settings

Pin Hole Detection %T Thresholds	Each pin hole category (Small, Medium, Large) is defined by a %T value. Note that these values are obtained from, and stored, in the actual hardware devices as they need to access this information in real time. This setting also persists power cycles of the devices.
Temporary Debug -. Display %T	When checked, the layer thickness charts within the Real Time and Trend tabs will present %Transmission as opposed to OD. This is helpful in setting the %T thresholds. This setting is for debug only and is reset every time the PHD program is run.



## **Licensing Information**

### ***L & M Instruments Pin-Hole-Detect Application Software***

Copyright (c) 2017 L and M Instruments LLC

All rights reserved.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Application software is shipped with the following End-User License Agreement:

<http://landminstruments.com/license/>

Other licensing terms can be made available for the FREE application software. Please contact L and M Instruments for details and pricing (if applicable).

### ***L & M Instruments Device Firmware***

Copyright (c) 2017 L and M Instruments LLC

All rights reserved.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.