BeamWatch Readme

Contents

Section 1 - Change log

- v4.3.0 1/30/2026
    - Added support for new BeamWatchAM v3 hardware.
    - Added a temperature mode to the thermal energy gauge in the Device Control Window for BeamWatch AM v3 hardware only.
    - BeamWatch AM hardware will still display the Joule Counter gauge.
    - Fixed an issue with the Clear All feature to properly clear 2D Beam Display data and associated overlays.
    - Fixed an issue where concurrent operations from multiple AM hardware controls would cause a race condition.
    - Consolidated all types from the BeamWatch.Automation.Interfaces namespace into the existing BeamWatch.Automation namespace.
        - All references to BeamWatch.Automation.Interfaces should be updated to BeamWatch.Automation in automation clients.
- v4.2.0 4/18/2025
    - Updated Pleora API and drivers to v6.5.1.6797.
        - Please update all Ophir beam profiling products to ensure capability with Pleora eBus v6.5.1.6797.
    - Added the device serial number to exported CSV files.
    - Added a shaded region to 1D profile to indicate ideal region for peak counts.
    - Added color setting for waist location markers.
    - Fixed an issue where loading data files from earlier versions would not restore the corresponding calibrated power readings.
    - Fixed an issue where the centroid value would appear incorrect through the automation interface when loading an older data file with a single-axis BeamWatch device.

    - Fixed an issue where data files from previous versions didn't persist the FrameID values correctly.

- v4.1.1 4/3/2025

    - Fixed an issue where loading data files from earlier versions would not restore the corresponding calibrated power readings.

- v4.1.0 3/3/2025

    - Added event and property for power meter connection status and expose via automation interface
        - AutomationPowerMeterEvents.OnStatusChange
        - IAPowerMeter.IsConnected
    - Added log events when a power meter connects or disconnects to the data server logs.
    - Changed the previous enumeration AutomationSaveLoadStatus and renamed to ASaveLoadStatus in the Spiricon.Automation namespace. This change brings it in line with the naming convention for other enumerations in the interface. Note: This is a breaking change and requires recompilation of automation clients.
    - Changed EA1 to automatically reconnect to the previously connected EA1 power meter.
    - Changed EA1 discovery broadcast via UDP to not send if currently connected to a power meter.
    - Changed EA1Enumerator automation class to work either as a standalone enumerator or when used by BeamWatch.

- v4.0.0 07/28/2023

    - Added support for BW-NIR-130 and BW-PLUS-45
    - Added support for Windows 11
    - Added D4sigma (Iterative) measurement method as a new Beam Width Basis
    - Added events to the automation interface for wavelength range changes when connected to a BW-PLUS device
    - Added ability to clear out the Frame Buffer
    - Added ability to clear out all data
    - Added option to load only data from a file and not the setup
    - Added ability to change the playback rate when playing through a data file
    - Added tooltips to all controls and revised existing tooltips for clarity

- Added lens type and model designation to the connected device name.
  - BW-NIR-155 BeamWatch Original Low Mag
  - BW-NIR-55 BeamWatch Original High Mag
  - BW-NIR-130 BeamWatch Standard Low Mag
  - BW-NIR-45 BeamWatch Standard High Mag
  - BW-PLUS-45 BeamWatch Plus High Mag
  - BW-NIR-50-AM BeamWatch AM
- Changed frame buffer to present frames in chronological order
- Changed loading data files to automatically play through all frames during load so statistics and charts are populated.
- Changed location of Beam Width Basis selection from the Results Settings Dialog to the Results toolbar
- Changed location of statistics reset from the Results toolbar to the Data ribbon
- Changed the Profile colors in the Measured Caustic Display to match the profile colors in the 1D Profile Display and changed the curve fit to the measured beam widths
- Fixed some filtering algorithms to perform more consistently in a broader range of scenarios. Users may see a <1% change in calculated results with improved accuracy.
- Fixed an issue where the distance results were calculated incorrectly when using units other than millimeters
- Fixed an issue where the Measured Caustic Display only displayed the pre-processed data.
  - Note that widths are taken before the final filter to display more of the complete caustic. This causes the 13.5% of Peak and the D4sigma widths to appear identical.
- Fixed an issue where double clicking on a data file would not load the data.
- Fixed an issue where languages that require double-byte character localizations could not be used in the data file name due to a restriction introduced by a third-party component
- Fixed an issue where the Measured Caustic Display would not always update properly when changing the Beam Width or Distance units
- Fixed an issue where the 1D Profile Display would not update to the selected Beam Width units
- Deprecated IAProgrammableSettings.Wavelength and IAProgrammableSettings.LaserDistance in automation interface, in favor of IAWaveLength and IALaserDistance.

    - Removed the ability to change the wavelength when viewing a loaded data file
    - Removed the ability to change the Frame Buffer size when viewing a loaded data file

- v3.4.2 4/14/2023
    - Fixed an issue where a memory leak could occur when using the Export interface via automation.
    - Improved memory buffer re-use as frames are collected and processed which reducing churn in the memory profile of BeamWatch.
    - Fixed a crash caused by Microsoft .NET Framework Update KB5020623 that affected some dropdown style menus/tooltips such as Source
        - This affected the Source, Power Meter, and Theme dropdown controls.
    - Updated to Spiricon Driver Manager v1.49.0

- v3.4.1 1/31/2022
    - Fixed an issue where the Play/Pause button would intermittently be stuck after pausing data acquisition.
    - Fixed issues where the connection to the BeamWatch Integrated would fail if the EA-1 power meter wavelength was set to NIRS.
    - Fixed an issue where the calibrated offset for the BeamWatch hardware was not applied when loading data or connecting to the hardware in select environments.
    - Added scrolling to the ribbon group visibility dialog to show all ribbon group options.
    - Updated to Spiricon Driver Manager v1.46. Includes the Lumenera v6.90 drivers for the BeamWatch AM.

- v3.4.0 7/30/2021
    - Added a camera selection list for users with multiple cameras. The list displays the serial number and IP address, if applicable.
    - Added the ability in automation to get a list of available cameras by serial number. Automation users can then connect by serial number.
    - Added a power meter selection list for users with multiple power meters.
    - Added the ability in automation to get a list of available power meters by serial number. Automation users can then connect by serial number.
    - Added the ability to configure power sensor wavelength and power scale ranges defined by the specific sensor.
    - Added a source info display to the Source ribbon. This will display the IP

address and serial number of a connected data source, power meter, and power sensor, as applicable.
    - Added the IP addresses to the status bar for all applicable connected devices.
    - Removed centroid average result from the application.
    - Automation documentation update
    - Fixed memory leak associated with logging via automation.

- v3.3.1 4/17/2020
    - Fixed an issue that displayed "No Source Connected" when in fact there was a device connected and collecting frames.
    - Fixed an issue with the EA-1 not connecting to power sensors with discrete wavelength settings.
    - Added ability to configure the EA-1 using UDP via the automation interface.

- v3.3.0 1/22/2020
    - Added a warning in the alert bar if data collection is running and the shutter is closed.
    - Changed the camera overheat warning to appear at a lower temperature.
    - Added the capability to set the IP address of the GigE camera inside the BeamWatch unit via the automation interface.
    - Added support for the EA-1 Ethernet Adapter for power measurement.
    - Added the capability to set the IP address of the EA-1 device via the automation interface.
    - Added a saturation check to the status bar annunciator that will indicate if saturation occurred at the waist.
    - Added an alignment check to the status bar annunciator that will indicate if the beam is out of optimum alignment.
    - Added support for TIFF data in the bwData file output, enable via the options section of the main menu.
        - Data is stored using the Gray32bppFloat pixel format
    - Fixed a bug that could cause loading of data files to fail.

- v3.2.1 9/27/2018
    - Corrected a bug that caused BWAM units to lose license and configuration. This occurred primarily when the BWAM power was removed before closing the software.

    - Changed architecture of joule counter system to write information to disk instead of camera memory. This prevents excessive writing to flash memory.
    - Corrected a bug that prevented the Focal Plane Region overlay from appearing on BeamWatch hardware.
    - Corrected a bug that caused the Focal Plane Region overlay to not draw if the software was not started with the Alignment Crosshair setting already selected.
    - Corrected a bug that occurred when starting the software that caused the system to receive images but fail to produce results.
    - Corrected a bug that applied improper camera gain in BeamWatch hardware.

- v3.2.0 7/20/2018

    - New average results for Waist Width and Location, Focal Shift, Centroid, Cursor to Waist, Center to Waist, Cursor Width, Rayleigh Length, M2, K, BPP and Divergence.
    - Highlighting notification for all results that may be suspect when an M2 measurement less than one (1.0) is calculated.
    - Added ability for determining a suitable exposure setting.
    - Added 13.5% of peak as a selectable beam width basis measurement.
    - Ability to filter frames maintained in the frame buffer based on ISO or SNR/Caustic fit criteria.
    - Connection to devices without external power prohibited to avoid internal memory corruption and loss of licensing. Informative dialogue box added to inform user.
    - Additional Improvements:
        - GPIO communication for enhanced response for fan and shutter control.
        - Depth of focus for various configurations and lenses.
        - Connection speed.
        - Calculations for accuracy of measured results.

- v3.1.2 5/22/2018

    - Maintenance release to enable demo licensing of BeamWatch.
    - Corrected a misleading error message that implied that the camera needed licensing when in fact the true problem was an addressing mismatch between the BeamWatch and the PC’s Network Interface. This update obsoletes Engineering Bulletin 0034.

- v3.1.1 4/23/2018
    - Maintenance release to maintain compatibility with other OSI software. You will need this release if you plan to install BeamWatch on a computer that also has current versions of BeamGage, BeamMic, ModeCheck, or BeamSquared.
- v3.1
    - Added the full BeamWatch Additive Manufacturing (BWAM) feature set.
        - Connection to BWAM hardware for control of shutter and fan.
        - Power meter and energy absorption monitoring.
        - Additional results for BWAM use.
    - Added automation support for access to beam width by location.
    - Added automation support to retrieve 2D image.
    - Added automation support for BWAM specific features.
    - Added improvements to logging.
        - Enable appending when the log file already exists.
        - Add a new header for each data set.
        - Keep logging enabled if in continuous mode.
    - Improved frame buffer management.
        - Prevent mixing of live data with previously loaded file data.
    - Focal reference position is not set until a caustic fit is obtained in both axes and the signal to noise ratio of the image is adequate.
- v3.0
    - Upgraded PGR drivers to 2.11.164
    - Added PDF report.
    - Improved fit and M2 calculations.
    - Beam width measurements now use D4 sigma method.
    - Waist Width, Waist Location, Ellipticity, Rayleigh length, M2, K, BPP, Divergence, and Centroid Calculations are displayed as ISO when possible.
    - Added Beam Tilt X/Y measurement, and the caustic fit is drawn along the beam tilt in the 2D display.
    - 3D display changed to show slices through the beam.
    - Added 2D display zooming.
    - Focal shift markers include tooltips.
    - Reduced file loading and application startup time.
    - Chart data can be exported to CSV.

    - Continuous attempts are made to restore lost connections to BeamWatch units.
    - Automation control to save and load data.

- v2.2.2
    - Added an automatic feature to suspend computer sleep while the program is running. This prevents data loss when taking measurements over long periods of time.

- v2.2.1
    - Enabled a utility for factory calibration, for internal use. It is not accessible to users.

- v2.2.0
    - Full Windows 10 compatibility
    - Image processing improved to increase the SNR in noisy and low intensity environments.
    - Beam Area Height expanded from 60% to 80% for enhanced measurement accuracy.
    - Gain range minimum increased to prevent early saturation of the image.
    - Enhanced application logging for diagnostics
    - Renamed application titles to make them easier to identify in Windows Task Manager
    - Fixed issue where the caustic fit failed to draw after loading a file.

- v2.1.0
    - 3D Beam Display
        - Added ability to view 3D display of beam in dual axis mode only
    - Charts
        - Added ability to individually chart results
    - Dual Axis Offsets
        - X and Y calibration offsets are now used to adjust the x and y images. This corrects the cursor and ellipticity calculations.
    - 1D Profile
        - Beam Width locations were changed to be centered on the raw centroid rather than a fitted centroid.
        - When auto-scale is not selected, the Y axis max will still grow to fit all the data.

- Window positions and sizes now persist globally. They are no longer saved and loaded from the data files.

- v2.0.0
  - Introduced new user interface
    - Supports dual axis BeamWatch units
    - Windows can be moved, resized, undocked, or hidden
    - Individual ribbon tabs can be hidden or shown
  - Results Window
    - Added the following results:
      - Waist to Cursor – Distance between waist location and the cursor
      - Width at Cursor – Beam width at the cursor location
      - Rayleigh Length – The distance from the waist where the beam cross sectional area is 2 times larger than at the waist
      - K – 1/Propagation Ratio (M2)
      - Frame Information results (Frame ID, Timestamp, Exposure, Gain)
    - Added Max, Min, and Sample size statistics
    - New Statistic modes: 1) Number of Frames and 2) Running Window and 3) Time
    - New Option to reset statistics on Start
    - Units can be changed for individual results
    - Results and statistics can be hidden
  - 2D Beam Display
    - Added Option to display the beam horizontally or vertically
    - OSI rainbow palette is the only palette available
    - Removed counts, and micron location description at the bottom of the 2D Beam Display Window
  - 1D Profile Window
    - Profiles now have an auto scale option instead of the normalized option
    - Beam Width markers can be hidden
  - User Setup
    - User entered "Laser Position" was changed to "Laser Distance". Laser Distance is much simpler and is the distance from the laser source to the top of the BeamWatch.
    - Magnification factor no longer needs to be entered into the software. It is read from the BeamWatch unit.
  - Introduction of a frame buffer with user configurable size.

        - The record button was removed because it is not needed with the frame buffer. The data can be saved and played back at any time.
    - Logging
        - New logging options: 1) Number of Frames and 2) Time.
        - Files are overwritten each time logging begins.
        - Only enabled results and statistics are logged.
    - Automation Interface has been changed to a .NET model. This is a breaking change and will require automation clients written for 1.x to be rewritten. A C# example has been added.
    - Data File extension is now .bwData. BeamWatch is backward compatible and can still read .lbd files. When they are opened they are converted to .bwData files.
    - Charts have been removed.
    - Removed measured Beam Width Window
    - Operator interface removed

Section 2 - Errata and Workarounds

We work hard to find and correct any issues in this software product. However, as of this release we still have a few issues for which we have not found complete solutions.

- An issue has been identified for version v3.40 or later versions where localizations that use double-byte character sets cannot be used in the setup or data filenames or it will cause the application to crash. This is due to a limitation with a third-party component and includes languages such as Chinese, Japanese and Korean. This could not be fixed by the release date of this version. If this is a breaking change for a user, we recommend using v3.3.1. This version may be obtained by contacting our Service team at service.ophir.usa@mks.com.

- Due to a technical issue with file handling in BeamWatch v3.40 and later, a bwData data file cannot be opened by double-clicking it. Until this is fixed we recommend opening data files through the File->Open menu item or via drag-and-drop.

- Overwriting an existing log file while playing a data file is not possible. An overwrite window will appear and ask to overwrite, but the file playback will stop.

- Once a View window has been undocked, using the Views menu item to hide

and show the window will typically result in improper drawing of the window. This can be corrected by either right-clicking the title bar of the undocked window and selecting Dock; or by using the Reset Layout option in the Options menu, accessed via the File Menu icon.

Section 3 – BeamWatch Notes

Supported Operating Systems

- Windows 10 (64-bit)

Documentation

- A PDF version of the User Guide is included with the installation. Adobe Acrobat Reader is suggested to view this file.

Installation

- It is recommended that all users are fully updated to the latest Windows Updates. If all updates are not applied to your system this may cause problems with the BeamWatch software.
- You must have Administrator privileges in order to install BeamWatch and the required driver package.
- Because of the continual evolution of our camera supplier's driver interfaces some incompatibilities between BeamWatch and earlier generations of OSI software may be encountered. We recommend that if you have other OSI software on your computer that you update all applications to their current release.

Troubleshooting and Reporting Bugs

If you suspect you have found a bug in our software please help us identify it by sending the following information to service.ophir.usa@mks.com.

1. A description of the actions that reproduce the problem.
2. The .bwSetup or .bwData file you were using at the time.
3. All files (if any) in the directory C:\ProgramData\Spiricon\BeamWatch\Logs.
4. All files (if any) in the directory C:\ProgramData\Spiricon\DataServer\Logs.

The more information you can provide, the more likely we can reproduce it in our lab, and fix it.