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## **Release Notes – v4.2.1**

PBS Vertical Wheel® Bioreactor Control Software

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## Overview

This release adds support for the PBS-15 and PBS-80 systems, maintaining the functionality of version 3.2.0 with an updated user interface. It also includes bug fixes and general feature improvements for all models over version 4.2.0.

## Bug Fixes

### HMI Software

- Fixed an issue where Sample Pump Direction in the menu was not updated to reflect changes made via OPC UA.
- Fixed an issue where the variable list and scrollbar could become misaligned during variable editing for a Wait Until step.

### OPC UA


- Fixed an issue where renaming or duplicating a sequence always returned an error.
- Fixed an issue where a running sequence could be updated, renamed or deleted after an update attempt was rejected.
- Fixed an issue where querying database records for user events used a fixed time range rather than the user-specified time range.
- Fixed an issue where Addition Pump mode or speed could be set to a non-zero value while in Base Pump mode.
- Fixed an issue where a sequence update with an invalid comparison in a Wait Until step was rejected but still returned a success status.

## Miscellaneous

- When comb plate is popped, Interlock applies directly to all control functions and is always indicated in the software. In previous versions, certain functions were interlocked only by cascade effects. For example, the temperature interlock was triggered when agitation stopped rather than directly by the comb plate popped condition.
- Updated Windows operating system to include the latest quality and security updates as of January 2026.

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## Appendix 1 Software Changes

### Dual Sensor

Calibration and Graph now support Dual Sensors on systems equipped with duplicate pH, DO, and temperature sensors.

### Select Sensor

The Actions > Select Sensors menu has been redesigned. The menu now clearly distinguishes input selection from output status and displays the status of both sensors.

- **Sensor Status:**
  - **Good:** Sensor is functioning properly.
  - **Bad:** Sensor is out of range.
  - **Suspect:** The sensor went out of range and returned to normal but hasn't been acknowledged. Applies only in dual mode.
  - **Idle:** Indicates the unselected sensor in single sensor mode.
- **Mode selection:**
  - **Single:** Manual selection, equivalent to "locked" in v3.
  - **Dual:** Automatic failover, equivalent to "unlocked" in v3.
- **User Preferred (Sensor A/B):**
  - **Single Mode:** Selects sensors marked as In Use.
  - **Dual Mode:** Selects the preferred sensor when both sensors have the same status.
- **Reactivate:** Reactivates "Suspect" sensors.

### Integrity Test

The Integrity Test interface has been redesigned. The test now runs as a dedicated routine rather than a sequence and cannot be started while a sequence is running or when the system is in Harvest mode. The new half-screen interface consists of three pages: Test, Settings and History.


- **Test Page**
  - This page displays the currently running test or the most recently completed test when opened.
  - Test state has been moved to the top of the graph, instead of being embedded within it.
  - Enhanced test information is now displayed, including Pass/Fail status.
- **Settings Page**
  - Added configurable test parameters and Pass/Fail criteria.
- **History Page**
  - List of all previous tests.
  - Selecting a test from the list displays the full details.

### Pumps

- Speed Setting ranges from 25 to 600 RPM and is adjustable in 25 RPM increments.

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## Pressure

- **Dashboard and Advanced Menu:** Displays Pressure indicator.
- **Graphs:** Displays Pressure graph with the same timespan options as other graphs.
- **Calibration:** Introduced Pressure Calibration with options for Zero, Span, and Manual.

## Harvest

Harvest alignment has been redesigned and moved to its own half-screen panel, accessible via the Action tab. It includes live agitation trend data, delay setting, and status. Functionality is unchanged from v3.

- Harvest routine can be cancelled during the ramp down and alignment steps.
- During Harvest, sequence cannot be started but can be modified.
- Harvest can't start when a sequence is running.

## Door

Unlock Door button behavior remains the same as v3. The button is disabled and displays “Interlock” when the door is interlocked.

## Network Drives

Added a Refresh button to manually refresh the list of network drive connected in the Network Drives menu.

## Level

For 15L and larger systems, Level Zero Calibration can now be performed while agitation is running.

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## Appendix 2 User Events

### Harvest

#### Starting Harvest

Version	Type	Details
V3.2.0	Harvest Mode started	Begin Harvesting; <delay> second delay
V4.2.1	Harvest Mode Started	Begin Harvesting: <delay> second delay.

#### Stopping Harvest

Version	Type	Details
V3.2.0	End Harvest Mode	Set HarvestMode from <mode> to Off
V4.2.1	Harvest Mode Ended	Harvest Mode Ended.

#### Changing Harvest delay

Version	Type	Details
V3.2.0	Harvest Time changed	Set Harvest Time to <delay> s.
V4.2.1	Harvest Delay Modified	Set Harvest Align Delay from <old> to <new>.

### Select Sensor

#### Consolidated setting Sensor selection events

Type	Details
Sensor Selection	Set <Variable> from <old> to <new>

#### Reactivate Sensor

Version	Type	Details
V3.2.0	Sensor reactivated	Re-activated inactive <sensor name> sensor.
V4.2.1	Sensor Selection	<sensor name> sensors re-activated.

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## Integrity Test

### Added event when Integrity Test configurations are saved

Type	Details
Integrity Test Settings Saved	Ramp Flow Rate: <ramp flowrate> lpm Ramp Pressure: <ramp pressure> psi Ramp Timeout: <ramp timeout> sec Settle Time: <settle time> sec Min Settle Pressure: <min settle pressure> psi Settle Abort Delay: <settle abort delay> sec Test Time: <test time> sec Max Decay Rate: <max decay time> psi/min

### Added event when starting Integrity Test

Type	Details
Integrity Test Started	Ramp Flow Rate: <ramp flowrate> lpm Ramp Pressure: <ramp pressure> psi Ramp Timeout: <ramp timeout> sec Settle Time: <settle time> sec Min Settle Pressure: <min settle pressure> psi Settle Abort Delay: <settle abort delay> sec Test Time: <test time> sec Max Decay Rate: <max decay time> psi/min

### Added event when stopping Integrity Test

Type	Details
Integrity Test Aborted	Stop requested.

### Integrity Test completed

Version	Type	Details
V3.2.0	Integrity Test completed	Integrity Test completed with starting pressure of <start pressure PV> psi, final pressure of <end pressure PV> psi, and calculated decay rate of <decay rate> psi/min.
V4.2.1	Integrity Test Completed	Start Time: <timestamp> Start Pressure: <start pressure PV> psi End Time: <timestamp> End Pressure: <end pressure PV> psi Test Duration: <duration> sec Decay Rate: <decay rate> psi / min Result: <Pass/Fail>

## Door

### Unlocking Door

Version	Type	Details
V3.2.0	Door unlocked	Door unlocked
V4.2.1	Door Unlocked	Door unlocked.

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