Bently Nevada

Welcome to System 1

Version 22.1 [June 2022]

Before you Begin

! License Changes !

After upgrading to System 1 22.1, the existing licenses will not be visible in the Licenses tab because of the Publisher Name change to "Baker Hughes". So **before installing System 1 22.1**, you need to return your existing licenses to the Licensing Portal and then, **after upgrade**, register the License Server again using your existing activation code and relicense System 1. For more details, refer System 1 Licensing User Guide.

! Postgres version upgrade !

System 1 22.1 and later will support Postgres 14 as the historian. Databases on Postgres 11 need to be upgraded to Postgres 14.

Users are recommended to create backup before installing System 1 22.1.

After upgrade to PostgreSQL14 on System 1 22.1, rollback installation to previous System 1 versions is not allowed. Rollback is only possible by restoring VSS/Acronis backup.

Users with Postgres 11 database as historian can upgrade to Postgres 14 by launching Database Manager tool and clicking "Upgrade PostgreSQL Database".

! Proficy Obsolescence !

Proficy is no longer supported as historian. Users need to migrate their database from Proficy to Postgres.

Users must migrate Proficy databases to PostgreSQL in order to upgrade to System 1 22.1.

This is applicable for customers having an older System 1 version with Proficy databases. This does not impact customers who already have PostgreSQL databases as historians.

For more details, please refer to System 1 Help.

Welcome

Bently Nevada is pleased to present System 1 version 22.1. This release delivers brand new capabilities to the Orbit 60 Device and OT/IT System Integration use cases.

Turbomachinery Monitoring

- Orbit 60 Enhancements
- Plot Enhancements

OT/IT System Integration

- OPC UA Asynchronous Waveform Import

Users upgrading to version 22.1 will benefit from the many capability enhancements to System 1's **Connectivity**, **Analytics**, and **Visualization** pillars, which are summarized below.

Bently Nevada remains focused on delivering the world's premier plant-wide machinery management software through bi-annual product releases. For a detailed overview of System 1, please visit the website.

Thank you,

Tarannum Sarang – System 1 Product Manager

On behalf of your System 1 Leadership and Development Teams

Table of Contents

1. SYSTEM 1 V22.1 FEATURE OVERVIEW

ALL 22.1 FEATURES ARE ONLY SUPPORTED WITH POSTGRESQL AS THE DATA HISTORIAN.

Table 1: System 1 v22.1 – Connectivity Capabilities

Connectivity		
Bently Devices		
Orbit 60 Demod Waveform Support	Configure Demod Sync and Async waveform for Acceleration and Velocity channels from System 1 and send the configuration to Condition Monitoring Module (CMM) for processing the waveform.	3.1.1.1
Orbit 60 Alarm Data capture Support Enhancement	User can configure Low-res Pre and Post event time span and data resolution for the trended variables, as well as Pre and Post event Low-res and High-res time span and data resolution for spectrums and waveforms.	3.1.1.2
Orbit 60 Firmware upgrade from System 1	Upgrade Firmware of Condition Monitoring Module (CMM) from System 1	3.1.1.3
Orbit 60 Compatibility between CMM & System 1	System 1 22.1 will be backward and forward compatible with the Condition Monitoring Module (CMM), which means that user can add CMM with earlier or later Firmware versions in System 1 22.1 provided that only minor version of the Firmware has changed.	3.1.1.4
SCOUT 200 – Receive Balance Jobs in System 1	Receive balance jobs from SCOUT200 into System 1 through the File mode. Balance tab shows all the Balance jobs performed on the selected machine in the hierarchy.	3.1.2
vbOnline Pro - Support Asynch waveform on Speed channel	System 1 22.1 extends the Async waveform configuration support for speed channel of VbOnline device with Wind license package. The speed channel waveform is already supported with Premium package.	3.1.3
Interfaces		
OPC UA Asynchronous Waveform Import	System 1 22.1 supports import of Asynchronous waveforms from third-party hardware device through OPC UA Protocol and displays that data in System 1 Plots.	3.2.1
Data Management		
Postgres v14 support	System 1 22.1 and later will support Postgres 14 as historian. Databases on Postgres 11 need to be upgraded to Postgres 14.	3.3.1

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Table 2: System 1 v22.1 – Analytics Capabilities

Analytics		
Core Analytics		
Associating speed data from Modbus Tags	System 1 supports associating speed data from a Modbus Tag to Asynchronous Waveform so that spectral band can be calculated for the Waveform. This capability already exists for speed data from an OPC DA Tag.	4.1.1
Decision Support		
Decision Support	Refer to the Decision Support Roadmap for more details.	-

Table 3: System 1 v22.1 - Visualization Capabilities

Visualization		
Plots		
Bently-Defined Plot Set for Wind Turbine Gen Train	System 1 supports Bently-Defined Plot Set for Wind Turbine Generator (WTG) Train along with an ability to synchronize Points across different Plots within a Plot Set, while navigating from one WTG train to another.	5.1.1
Plot Enhancements	Rearrange Plots within a Plot Set to allow custom sorting of Plots based on preference. Enable synchronize cursors based on speed data available on plots.	5.1.2
Reports		
Generate Balance Job Report	Generate Balance Job Report in System 1	5.2.1

2. VERSION SUPPORT & OPERATING SYSTEM COMPATIBILITY

System 1 follows a semi-annual release cadence with targeted releases in May and November of each year. Versions are fully supported for a minimum of two years from the published date of availability (Table 4).

New Versions of System 1 benefit from:

- Compatibility with the latest Microsoft Client & Server Operating Systems
- Client backwards compatibility to previous versions under support (22.1 Client to 20.2 Server DB)
- Database upgrade from previous versions released within last 3 years (19.2→22.1)
- Security patch and update testing for the latest available version
- Bug fixes included in the latest available version
- Standard technical support with escalation to engineering as required

Versions no longer supported:

- Standard support is provided for common FAQ type questions, but users are encouraged to update software to latest version to benefit from new features, OS compatibility, and bug fixes.

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Table 4: System 1 Version Support & OS Compatibility Matrix

System 1 Versions & Support			Windows Server OS						Windows Client OS (64bit)			
Version	Available	End of Support	2022	2019	2016	2012 R2	2012	2008 R2	11**	10**	8.1 U1	7 SP1
22.1	Jun 2022	Jun 2024	✓	✓	✓	✓			✓	✓	✓	
21.2	Nov 2021	Nov 2023		✓	✓	✓				✓	✓	
21.1	May 2021	May 2023		✓	✓	✓				✓	✓	
20.2	Nov 2020	Nov 2022		✓	✓	✓				✓	✓	
20.1	May 2020	May 2022		✓	✓	✓	✓			✓	✓	
19.2	Nov 2019	Nov 2021		✓	✓	✓	✓	✓		✓	✓	✓

**Windows 10 and Windows 11 version compatibility will track Microsoft's published release and support model. System 1 will be tested and supported on all versions of Windows 10 and Windows 11 under support at the time of release.

System 1 v22.1 (Windows 10 v21H2, v21H1, v20H2) (Windows 11 v21H2)

System 1 v21.2 (Windows 10 v21H1, v20H2, 2004)

System 1 v21.1 (Windows 10 v20H2, 2004, 1909)

System 1 v20.2 (Windows 10 v2004, 1909, 1903)

System 1 v20.1 (Windows 10 v1903, 1809, 1803)

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3. CONNECTIVITY

3.1 Bently Devices

3.1.1 Orbit 60 Enhancements

Orbit 60 Enhancements video located in Bently Nevada Tech Support Training Library

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3.1.1.1 Demod Waveform Support

Synchronous and Asynchronous Demod waveform can be configured for Acceleration and Velocity channels from System 1 (Figure 3-1). The configuration is sent to the Condition Monitoring Module (CMM), which processes the waveform and sends it back to System 1 for display and storage. User can configure Software trended variables on Sync and Async waveform in system 1.
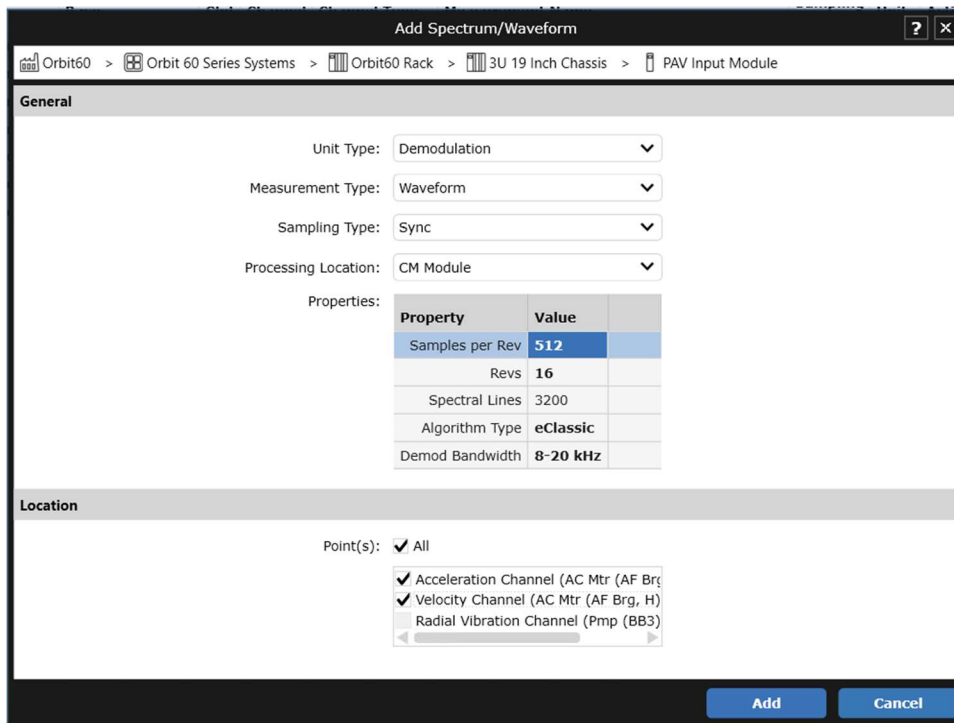

Figure 3-1: Demod Waveform Configuration

3.1.1.2 Alarm Data Capture Enhancement

In previous version of System 1, "Pre-Event and Post-Event Low-Resolution Time Span" and "Data Resolution" properties for Trended Variables were not editable. However, in System 1 22.1 and later, user can control data collection by configuring these properties and sending them to the CMM.

Also, new set of properties are added in alarm data capture for Spectrums and Waveforms (Figure 3-2). User can independently configure and control Pre/Post event and Low-Res/High-Res alarm data captures for spectrums and waveforms.

Figure 3-2: Data Collection properties for Alarm Data capture

3.1.1.3 FW Upgrade from System 1

Condition Monitoring Module (CMM) firmware upgrade was earlier supported only from Orbit Studio. From System 1 22.1 onwards, user can now upgrade the CMM firmware from the System 1 interface. After upgrading the Firmware, System 1 sends the upgraded management configuration to CMM and continues data collection seamlessly.

3.1.1.4 Compatibility Between CMM and System 1

System 1 22.1 is now backward and forward compatible with the Condition Monitoring Module (CMM), which means that user can add a CMM with earlier or later Firmware version in System 1 22.1, provided that only minor version of the Firmware has changed.

For example, System 1 22.1 supports connection to CMM version 1.0.0 (backward compatible), 1.1.0 (exact version support), and 1.2.0 (forward compatible). System 1 enables/disables certain features on CMM depending on its Firmware version.

3.1.2 SCOUT 200 – Receive Balance Jobs in System 1

SCOUT200 Rotor Balancing video located in Bently Nevada Tech Support Training Library

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System 1 22.1 allows you to receive Balance Job data into System 1.

In System 1, open the Receive Data dialog and select File Mode as Source. After selecting Route Folders, click Import. System 1 receives Balance Job data along with vibration data. System 1 Displays Balance Job data in the **Balance Job** tab under the **Case History** tab (Figure 3-3).

Future releases will support Balance Jobs received through other comms methods (Wi-Fi, USB Tethering, Remote Comms). For this release, only File Mode is supported.

Status	Events	Plots	Case History			
Reviews	Plot Records	Notes	Balance Job			
Path	Asset Name	Tag Name	Balance Speed	Device	Created Date	
CC Power Plant > Unit 1-2 >...	U1-2 WSAC Spray Wat...	GenericMotorPumpS...	1800 rpm	SCOUT200	4/22/2022 5:10:08 PM	
CC Power Plant > Unit 1-2 >...	U1-2 WSAC Spray Wat...	GenericMotorPumpS...	1800 rpm	SCOUT200	4/19/2022 5:57:13 PM	
CC Power Plant > Unit 1-2 >...	U1-2 WSAC Spray Wat...	GenericMotorPumpS...	1800 rpm	SCOUT200	4/22/2022 5:10:47 PM	
CC Power Plant > Unit 1-2 >...	U1-2 WSAC Spray Wat...	GenericMotorPumpS...	1800 rpm	SCOUT200	4/22/2022 5:11:09 PM	
CC Power Plant > Unit 3 Air...	ACC Cooling Fan/Mtr 1A	MtrGbx2StgParCTF	1800 rpm	SCOUT200	4/19/2022 7:31:18 PM	
CC Power Plant > Unit 3 Air...	ACC Cooling Fan/Mtr 1A	MtrGbx2StgParCTF	1800 rpm	SCOUT200	4/19/2022 4:25:15 PM	
CC Power Plant > Unit 3 Air...	ACC Cooling Fan/Mtr 1A	MtrGbx2StgParCTF	1800 rpm	SCOUT200	4/19/2022 5:02:29 PM	
CC Power Plant > Unit 3 Air...	ACC Cooling Fan/Mtr 1A	MtrGbx2StgParCTF	1800 rpm	SCOUT200	4/22/2022 5:14:57 PM	
CC Power Plant > Unit 3 Air...	ACC Cooling Fan/Mtr 1B	MtrGbx2StgParCTF	1800 rpm	SCOUT200	4/19/2022 7:28:31 PM	
CC Power Plant > Unit 3 Air...	ACC Cooling Fan/Mtr 1C	MtrGbx2StgParCTF	1800 rpm	SCOUT200	4/19/2022 5:05:31 PM	
CC Power Plant > Test > Rot...	Dual Plane Machine	Machine	3000 rpm	SCOUT200	4/21/2022 4:59:40 PM	

Figure 3-3: Balance Job Data in System 1

3.1.3 vbOnline Pro – Support Asynch Waveform on Speed channel

Wind Enhancements video located in Bently Nevada Tech Support Training Library

<u>Valid M&S Agreement Required</u>

In System 1 22.1 with Wind License Package, user can configure Asynchronous Waveform under speed channels and send the configuration to the device. This Asynchronous Waveform is helpful during sensor commissioning and troubleshooting. This capability already exists in System 1 Premium license package.
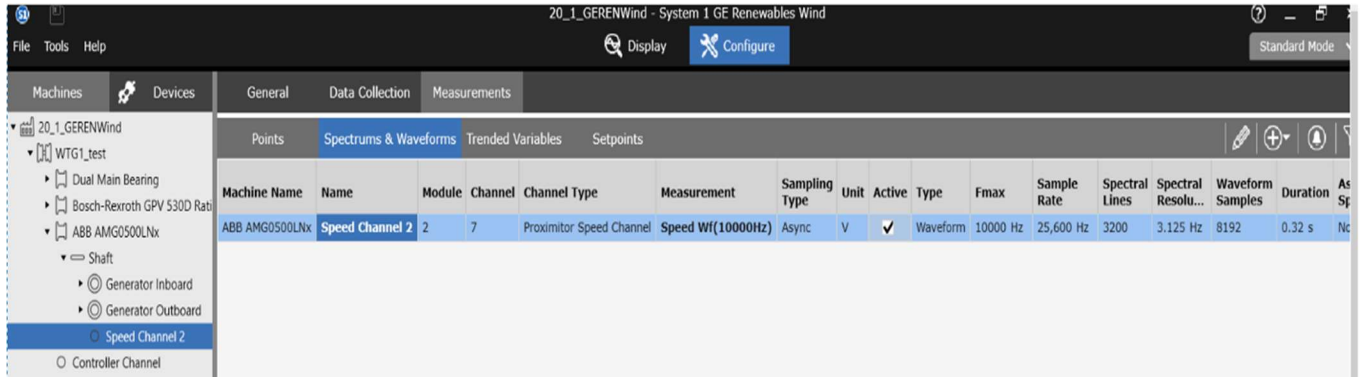

Figure 3-4: Speed Channel's Waveform Configuration

3.2 Interfaces

3.2.1   Import Asynchronous Waveform using OPC UA

OPC UA Waveform Import video located in Bently Nevada Tech Support Training Library

Valid M&S Agreement Required

System 1 21.2 supported import of static tags from third-party systems using the OPC UA Protocol. System 1 22.1 now extends this capability to enable import of Asynchronous Waveforms along with static tags from third-party systems.

To import Asynchronous Waveforms in System 1, users need to map Data Fields and Properties from third party OPC UA server to System 1's Asynchronous Waveform structure. This enables System 1 to read data from third party systems and store it in System 1 readable format. This is a mandatory step to import Asynch Waveforms in System 1. Data Field mapping is performed by importing the "OPC UA Field Mapping" CSV template (Figure 3-5 and Figure 3-6).
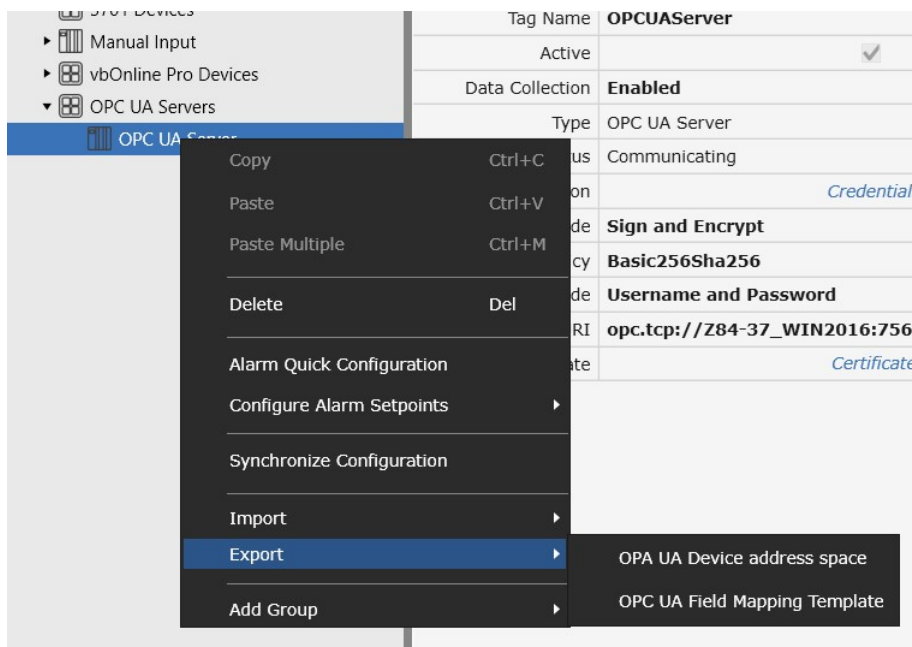

Figure 3-5: Field Mapping Template in the Export Menu

	A	B	C	D	E
1	Action Type	System 1 Waveform/Spectrum Data Type	System 1 Data Type Properties	Waveform/Spectrum Data Type	Data Type Properties
2		AsyncWaveform	Speed		
3		AsyncWaveform	Spectral Lines [M]		
4		AsyncWaveform	Fmax [M]		
5		AsyncWaveform	Waveform Samples [M]		
6		AsyncWaveform	DC Offset		
7		AsyncWaveform	Timestamp		
8		AsyncWaveform	Sample Rate		
9		AsyncWaveform	Number Of Samples [M]		
10					

Figure 3-6: Fields in the OPC UA Field Mapping Template

After the Field Mapping template is filled with appropriate details, to import the template, user needs to right-click the OPC UA Server node and choose Import > OPC UA Field Mapping (Figure 3-7).
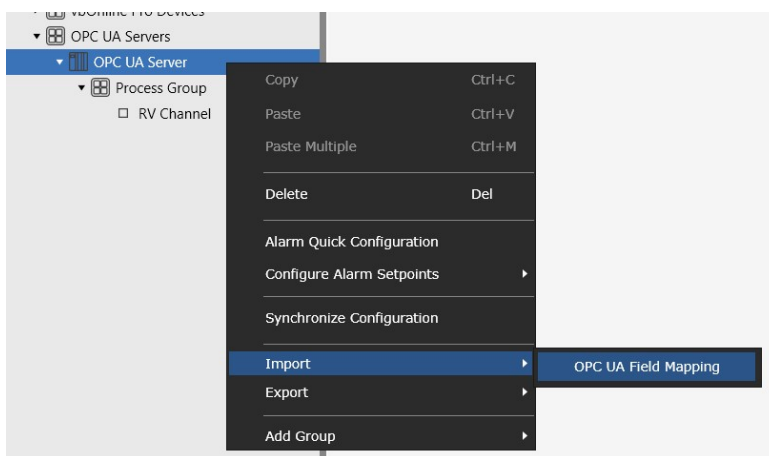

Figure 3-7: Import OPC UA Field Mapping CSV

Users can then add the Process Measurement Group to import the Asynchronous Waveforms along with the Static Tags. To download OPC UA Items Template, right-click the Process Group node and choose Export > OPC UA Items Template. The new "OPC UA Items Template" includes configuration details of the waveform being imported.

User can add both Static Tags as well as Asynchronous Waveforms in the same Item Template. In the OPC UA Items Template, fields for Asynchronous Waveform include Data Type (always defined as "AsyncWaveform" for Async Waveform type), Fmax (Hz), Spectral lines, and Waveform Samples. To import the OPC UA Items template, user needs to right-click Process Group Node and choose Import > OPC UA Items Template.

After the user imports the OPC UA Items, the Waveforms are displayed in the "Spectrums & Waveforms" Tab under the Point Node. The Static Tags are displayed under the "Trended Variables" Tab under the same Point Node (Figure 3-8).

Figure 3-8: Point configured with Asynchronous Waveform

Asynchronous Waveform data is updated in System 1 Plots based on the subscription rate configured for the OPC UA Process Group, and the historical data is available at the rate configured for historization of OPC UA Waveforms (Figure 3-9).
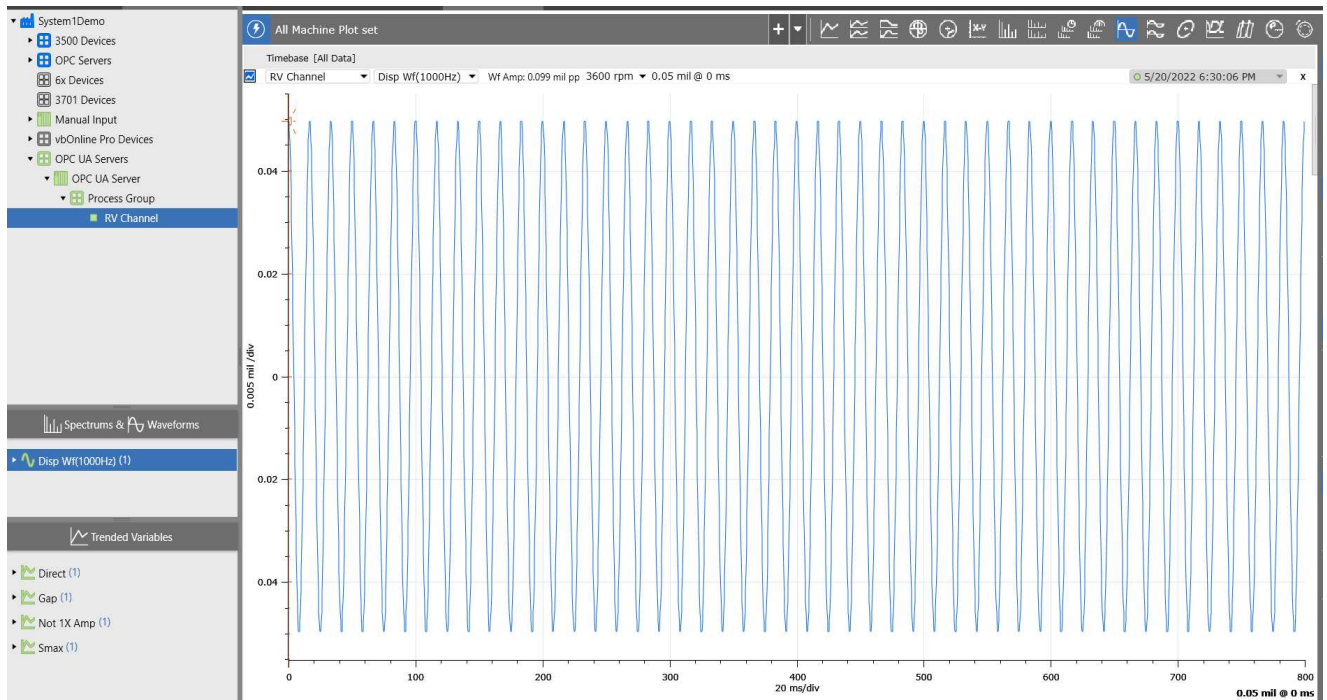

Figure 3-9: OPC UA Asynch Waveform data in System 1 Timebase Plot

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3.3 Database Management

3.3.1 Postgres v14 support

Postgres v14 upgrade video located in Bently Nevada Tech Support Training Library

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PostgreSQL 11 is going end of life on November 9, 2023, and is no longer supported. Bently Nevada recommends customers to upgrade PostgreSQL 11 databases to PostgreSQL 14 before the planned end of life for PostgreSQL 11.

Users with older System 1 versions using PostgreSQL 11 as historian, will have to manually upgrade to PostgreSQL 14 through System 1 Database Manager after upgrading to System 1 22.1.

Customers installing System 1 22.1 for the first time on a new machine will get PostgreSQL 14 installed with System 1 22.1.

Users are recommended to create backup before installing System 1 22.1.

After upgrade to PostgreSQL14 on System 1 22.1, rollback installation to previous System 1 versions is not allowed. Rollback is only possible by restoring VSS/Acronis backup.

Users with Postgres 11 database as historian can upgrade to Postgres 14 by launching Database Manager tool and clicking "Upgrade PostgreSQL Database". (Figure 3-10).
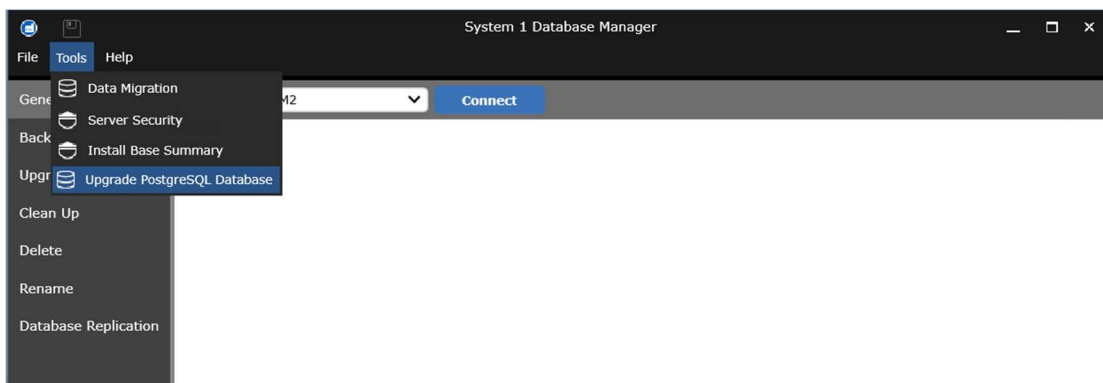

Figure 3-10: PostgreSQL upgrade menu in System 1 Database Manager

4. ANALYTICS

4.1 Core Analytics

4.1.1   Associating Speed Data from Modbus tags for Spectral Band Calculations

General Enhancements video located in Bently Nevada Tech Support Training Library

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System 1 22.1 provides an ability to associate speed data from a Modbus Speed Tag with Asynchronous Waveform data to perform spectral band calculations on that Asynch Waveform. This is applicable to devices that do not have a Keyphasor input. Prior to System 1 22.1, this capability was supported for speed data received from OPC Tags.

The Modbus Speed Tag from System 1 needs to be mapped to the Speed Point Type of that machine in the mapping mode (Figure 4-1). All Asynchronous Waveforms from the Points mapped to that machine then use the Modbus Speed Tag's data to display information in the Plots Workspace and in Spectral band calculations.
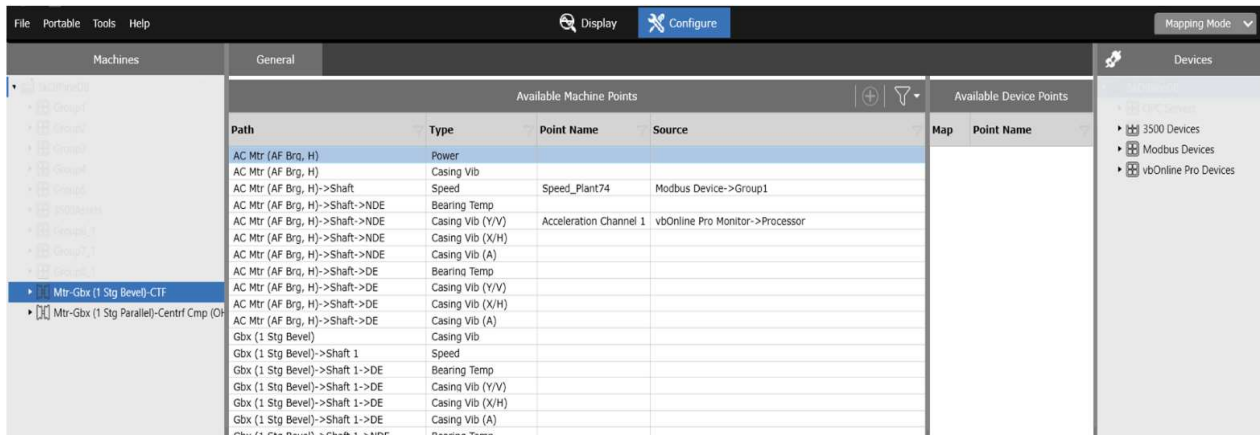

Figure 4-1: Modbus Speed Mapping

5. VISUALIZATION

5.1 Plots

Plot Enhancements video located in Bently Nevada Tech Support Training Library

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5.1.1 Rearrange Plots within a Plot Set

System 1 22.1 supports rearranging plots in a Plot Set using the "Sort by Custom" option available under the Plot Sorting Tool in the Plot Footer.

Users can select the "Edit Custom Sort" (Figure 5-1) option to rearrange the plots based on their preference.
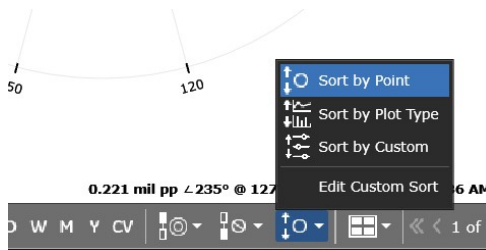

Figure 5-1: Edit Custom Sort

Users need to click the "Edit Custom Sort" option, which opens a dialog that displays the current sort order of plots in that Plot Set, indicating the Plot Position and Page Number. User can hover over each plot icon for more details (Figure 5-2).
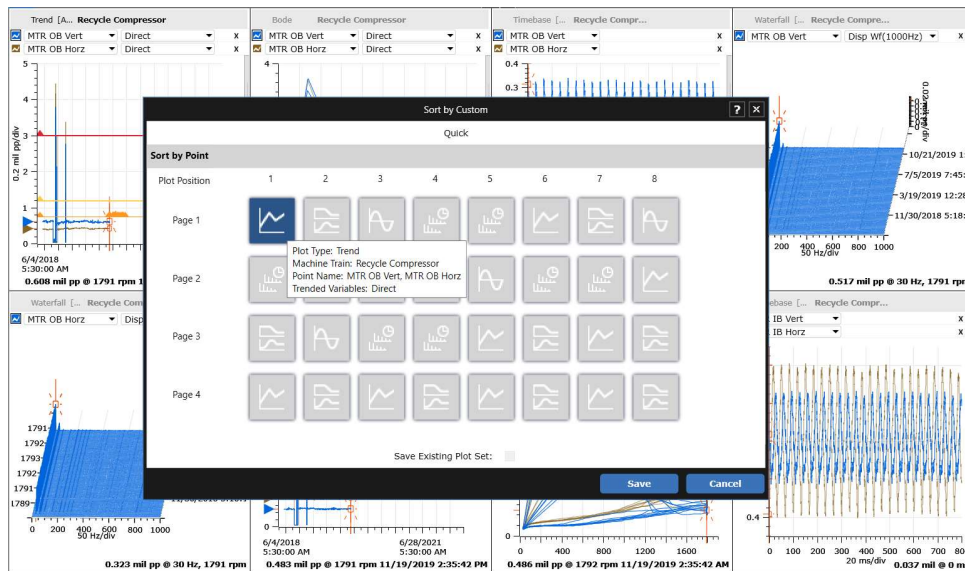

Figure 5-2: Sort by Custom Dialog

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To rearrange the Plots, users can drag and drop the Plot icon to the desired location. If users want to save the changes to the Plot Set, they need to select the save existing Plot Set checkbox.

To apply the Sorting order, user needs to click Save.

5.1.2 Synchronize Cursors Based on Speed

In previous releases, System 1 provided an option in the Plot Toolbar to *Synchronize cursors on all plots with the same axes (Figure 5-3)*.

In System 1 22.1, the Synchronize cursor functionality is extended to support speed-based synchronization on all plots *(Figure 5-3)*.

By default, Plot Sets are set to synchronize cursors with same axes. Users can now choose the Speed option from the Plot Toolbar to enable cursors to synchronize based on speed.
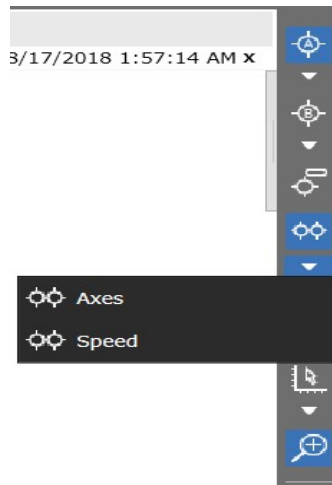

Figure 5-3: Synchronize Cursors in Plot Toolbar

When selected, cursors are synchronized across Trend, Bode, Polar, SCL and XvsY Plots, based on the speed values of the active Plot's selected cursor.

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5.1.3 Bently-Defined Plot Sets for Wind Turbine Generator Train

Wind Enhancements video located in Bently Nevada Tech Support Training Library

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Bently-Defined Plot Set is now supported for Wind Turbine Generator (WTG) Trains in System 1 22.1 with the Wind License package. The Bently-Defined Plot Set Tab displays a default name "Overview – Wind" (Figure 5-4).

This Plot Set includes Trend Plot, Timebase Plot (Accel Asynchronous Waveform), and Spectrum Plots (Accel Synchronous Waveform and Demod Synchronous Waveform) defaulted to the Main Bearing Sensor as a starting point, user can add more plot types and measurements to assist with diagnostics.
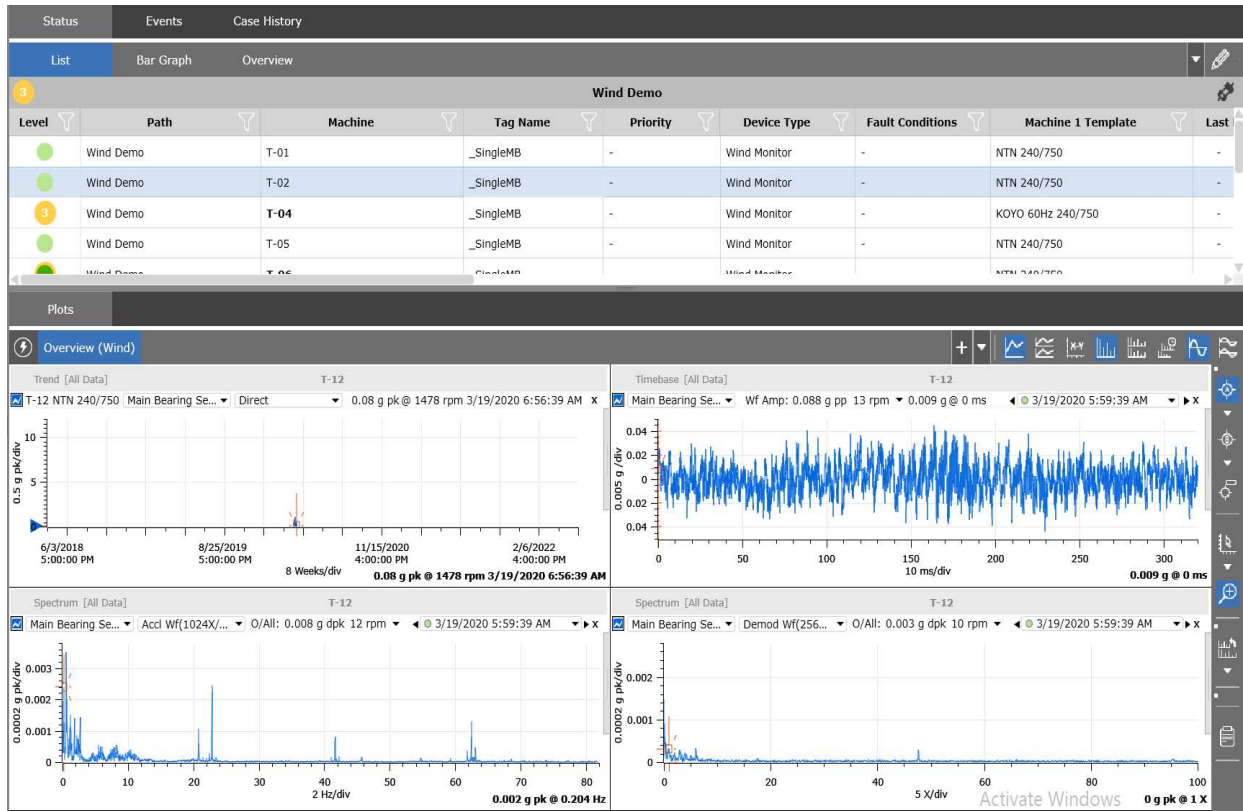
Figure 5-4: Bently Defined Plot Set – Overview (Wind)

Users can now quickly scan through different sensors mapped to a WTG from the sensor drop-down within each plot. The sensor drop-downs are synchronized across all plots within the Plot Set by selecting the "Point Synchronization" checkbox (Figure 5-5) in Plot Preferences (available only for Wind License Package). By default, the "Point Synchronization" checkbox is always selected.
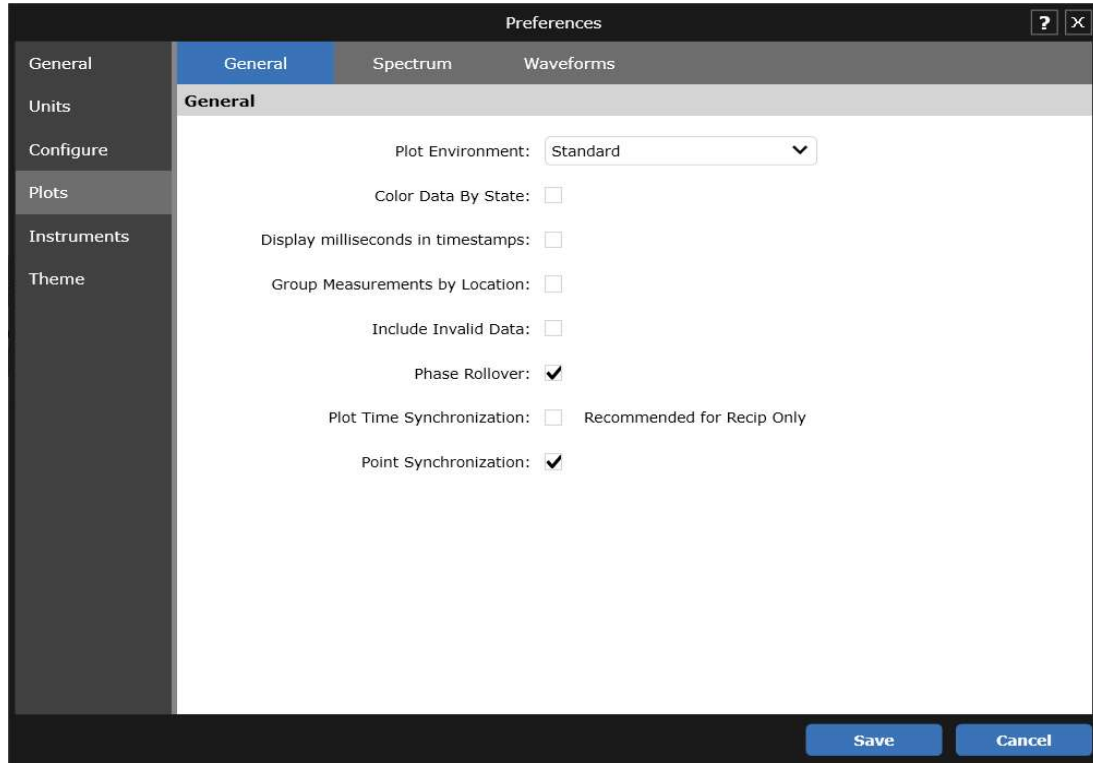
Figure 5-5: Point Synchronization

Users can modify the Bently defined Plot Set by creating a copy of the Plot Set or by using "Define as New Plot Set" option (Figure 5-6).

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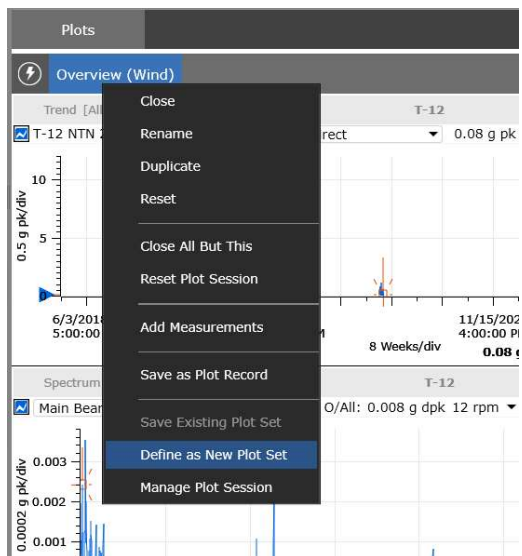
Figure 5-6: Create New Plot Set

When using "Define as New Plot Set" option or saving the changes to the existing Plot Set, ensure that the changes are always saved and the "Apply to" option is set to "All Machines" (Figure 5-7).
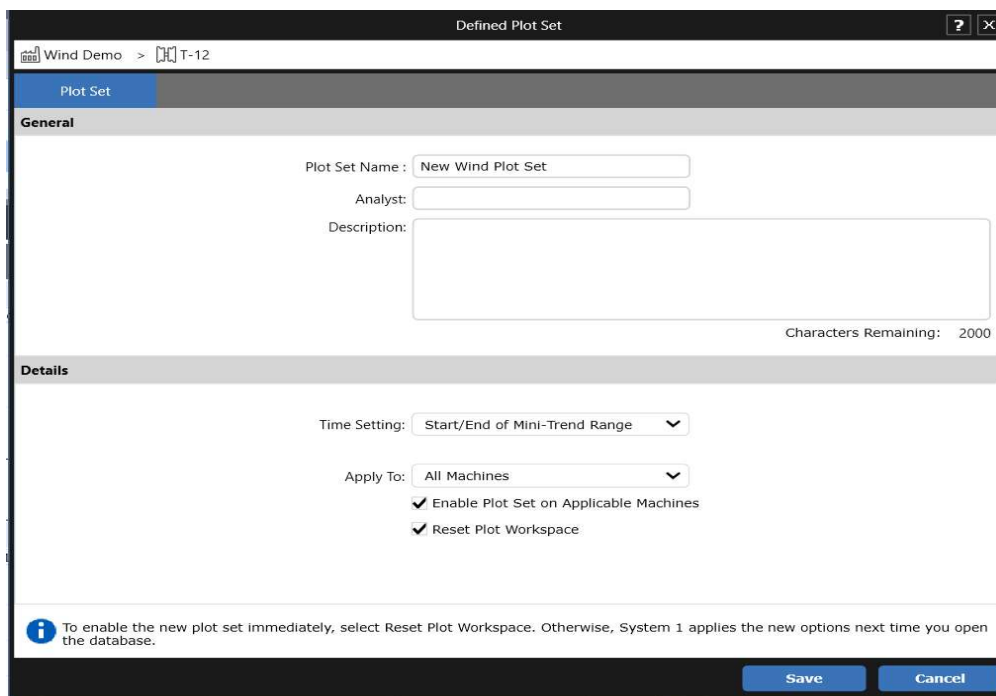
Figure 5-7: Save existing Plot Set with Apply to as "All Machines"

Users can seamlessly navigate from one WTG to another and while doing so, scan through each sensor data as the Plot Set now retains the sensor selection during navigation.

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5.2 Reports

5.2.1 Generate Balance Report

SCOUT200 Rotor Balancing video located in Bently Nevada Tech Support Training Library

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System 1 22.1 allows you to view and print Balance Reports. In the Case History tab > Balance Jobs tab, select a Balance Job and click the Generate Balance Report icon (at top right of screen).

Balance Report
Database: CC Power Plant
Balance Job Creation Time: 22-Apr-2022 05:10:08 PM

Machine Information
Folder: CC Power Plant
Machine Name: U1-2 WSAC Spray Water Pump/Mtr B
Rotor Weight: 16 kg
Bearing Convention: NDE/DE
Rotation Direction: CounterClockwise

Sensors & Tach
CH1 Sensor: Accl 100mV/g
CH2 Sensor: ACCL0547
Channel 1 Location: DE
Channel 1 Orientation: 90°
Channel 2 Location: NDE
Channel 2 Orientation: 90°
Tachometer Orientation: 0°

Weight Planes
Plane A
Weight Plane Radius: 60 mm
Weight Position: Degrees
Weight Reference Mark: 0°
View Direction: Driver-to-Driven

Plane B
Weight Plane Radius: 60 mm
Weight Position: Degrees
Weight Reference Mark: 0°
View Direction: Driver-to-Driven

Figure 5-8: Balance Report Page 1

Balance Report
Database: CC Power Plant
Balance Job Creation Time: 22-Apr-2022 05:10:08 PM

Machine Speed: 1800 rpm/30 Hz

	Weight Plane A (g)	Weight Plane B (g)	Ch1 (m/s² pk)	Ch2 (m/s² pk)
Initial Reading	-	-	1.565@184°	1.553@115°
Trial A	7.36@139°	-	1.171@154°	1.161@84°
Trial B	-	7.36@70°	0.78@124°	0.774@52°
Balance	44.85@141.07°	32.56@275.7°	0.312@94°	0.386@20°

Figure 5-9: Balance Report Page 2

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ONLY APPLICABLE WHEN UPGRADING FROM VERSIONS PRIOR TO 20.2

Installation

Before installing System 1 20.2 and later, users must <u>uninstall</u> any System 1 versions below 20.2.

! Change to Program ID impacting OPC Data Collection

As part of the Baker Hughes separation from General Electric (GE), OPC DA import settings have been renamed. To <u>maintain data collection from OPC connections</u> , please take the following actions:

Property	Prior Versions	Versions 20.2 & later	Required Action
Program ID	GE.BentlyNevada.Sys1OPCServer.2	System1OPCServer.1	Change Program ID in client to "System1OPCserver.1"
DCOM Config Name	System 1 OPC Server	System 1 OPC DA Service	**Before uninstalling System 1:** Take a screenshot of DCOM setting for "System 1 OPC Server" for the following tabs: — General — Security (Launch and Activation / Access / Config Permissions) — Identity **After installing System 1 v20.2 and above:** Reapply the DCOM settings to "System 1 OPC DA Service"

For Bently Performance (BP) installations, open the BP template key and change the Program ID from "Input OPC Server" to "System1OPCServer.1" (as shown in below image).

Bently Performance	Performance 0.6.0
Input OPC Server	System1OPCServer.1
Auto Start	TRUE
Cycle Time	30000
Status	Ok
Input Cell Range	A10:A200
Output Cell Range	V11:V200

For more details, please refer to System 1 Help.

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