



Bently Nevada* ADAPT* 3701

Retrieving Data from an Offline Monitor

Bently Nevada Advanced Distributed Architecture Platform Technology (ADAPT) 3701 monitors provide protection and condition monitoring for various types of machinery assets (gas turbines, hydro turbines, turbo-compressors, etc.) using several standard models:

- Adapt 3701/40 Machinery Dynamics Monitor (designed for compressors, gas turbines, gearboxes, etc.)
- Adapt 3701/44 Aeroderivative Monitor (designed for aeroderivative gas turbines)
- Adapt 3701/46M Hydro Monitor (designed for Hydro-electric turbine generators)

For maximum benefit, we recommend continuous connection of your Adapt 3701 monitors to System 1 Condition Monitoring and Diagnostic Software via your plant network. But these monitors are often used to provide stand-alone machinery protection without being connected to the plant network. For these cases, the system was designed to provide offline data collection or “flight recorder” information in the case of a machine alarm or startup/shutdown event.

Offline Diagnostic Capability

Even if your Adapt 3701 monitors are not connected to a permanent network for continuous online monitoring, they still capture extremely useful trend data and dynamic data during machine startup and shutdown events and whenever alarms occur. This data is stored automatically in digital buffers (sometimes called “trip buffers” or “black box data”) in the Processor Module, where it remains available to be downloaded for diagnostic analysis. Transient data is collected on delta rpm and delta time settings just as it is done in the 3500 Transient Data Interface (TDI) module, the ADRE 408 diagnostic instrument, and in System 1 software.

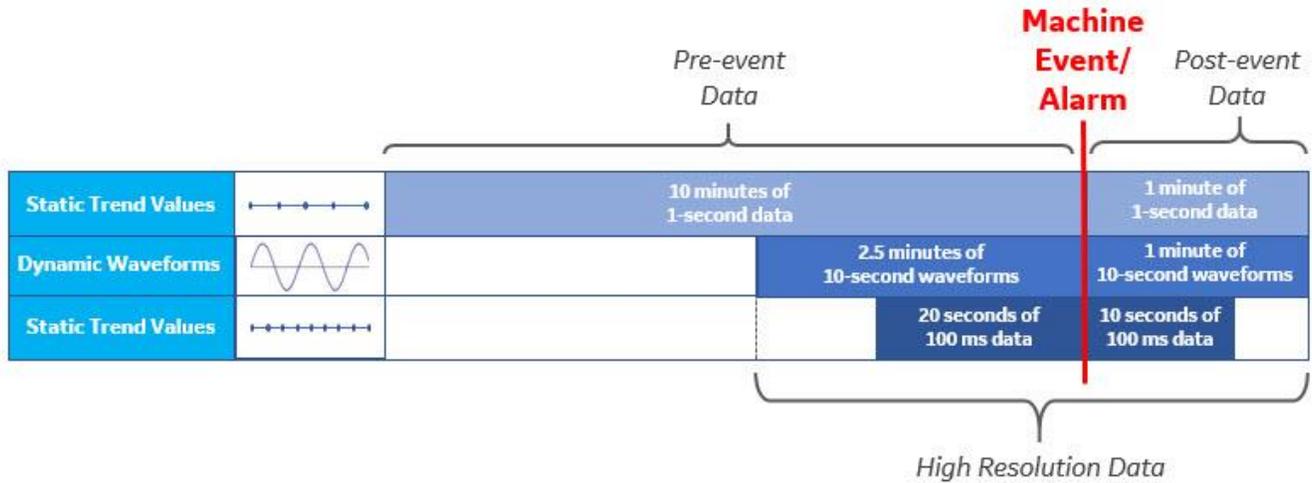
Alarm Data Capture (Reference 1)

Alarm Data Capture settings define the amount of higher resolution data collected before and after an alarm event. This feature supports both high and low-resolution alarm data captures within the monitor that can be viewed and analyzed with System 1 software.

The ADAPT 3701 monitor accepts the Alarm Data Capture configuration parameters when it has been configured via Bently Nevada Monitor Configuration (BNMC) software to provide Machinery Protection. When installed in the field on a running machine, the monitor will then perform the Alarm Data Captures and store the data until the captures are requested by System 1 software. Alarm Data is captured based on the default parameters in Table 1. This table shows graphically (not to scale) the length of time that each type of data is stored before as well as after a machine event or alarm that triggers data capture.

Note: The stored data is kept in the Adapt 3701 Processor Module for 90 days. The monitor will keep as many captures as it can hold before overwriting the data using a First-In, First-Out (FIFO) methodology.

Table 1 – Adapt Offline Data Collection-Factory Default Alarm Event Settings



If the default data collection settings need to be changed for your specific machine, there are two ways to accomplish this task:

1. If you have System 1 software, you can create a new configuration with the new settings in System 1 and load the updated configuration into the monitor.
2. If you do not have System 1 software, you will need to work with the Bently Nevada Engineering team to create modified firmware with the new settings, and overwrite the default firmware in the monitor.

Transient Data Capture (Reference 2)

The monitor firmware auto-generates speed settings if there is a specified speed available in the protection configuration. If machine speed has not been specified in the configuration, transient data collection will not occur. When machine speed does exist in the configuration, it triggers transient data capture during machine startups, shutdowns, and overspeed conditions. You can adjust the running speed settings for your monitored machines in Bently Nevada Monitor Configuration (BNMC) software. The firmware collects transient data for one hour after the system exits a transient condition. When triggered, transient data is collected for all measurement points at the following rates:

- For static and dynamic (waveform) variables, every 10 seconds
- If the RPM increases or decreases by 10 RPM before 10 seconds lapse, a sample is collected. The prevailing speed then becomes the new baseline.

Fixed Speed Machine

If the monitored machine has a fixed running speed, the configured value of running speed will be used to trigger transient data capture. The firmware captures transient data under the following conditions:

- Startup - when machine speed exceeds 2% of the configured running speed
- Shutdown - when machine speed falls below 95% of the configured running speed
- Overspeed - when machine speed exceeds 110% of the configured running speed

EXAMPLE: For a fixed speed machine running at 3600 rpm, transient data will be collected in the following scenarios:

Table 2 - Adapt Offline Data Collection-Factory Default SUSD/Overspeed Event Settings (assuming 3,600 rpm)

Machine Condition	Initial Condition	Transient Data Collection Starts When	Transient Data Collection Stops When
Startup	Speed ≈ 0 rpm	Speed > 72 rpm (2% of configured Running Speed)	3960 rpm > Speed > 3420 rpm
Shutdown	Speed ≈ 3600 rpm	Speed < 3420 rpm (95% of configured Running Speed)	Speed < 72 rpm
Overspeed	Speed ≈ 3600 rpm	Speed > 3960 rpm (110% of configured Running Speed)	Speed < 3960 rpm

Variable Speed Machine

If the monitored machine has a variable running speed, the configured values of lower and upper operating speeds will be used to trigger transient data collection. The firmware captures transient data under the following conditions:

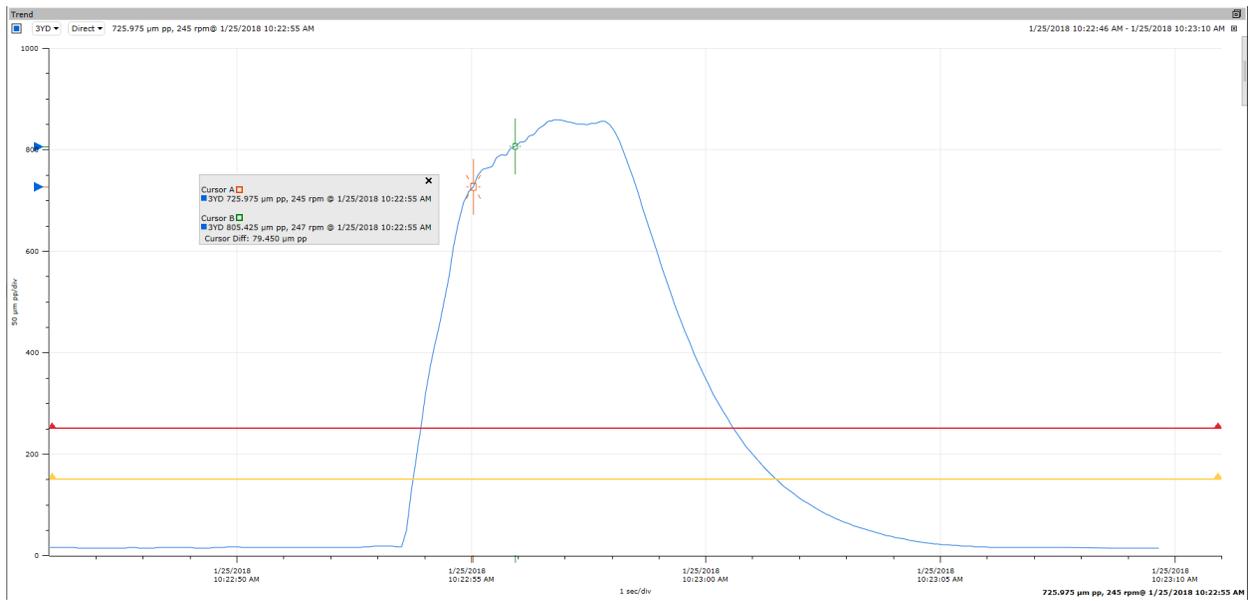
- Startup - when machine speed exceeds 2% of the lower speed value
- Shutdown - when the machine speed falls below 95% of the lower speed value
- Overspeed - when the machine speed exceeds 110% of the upper speed value

EXAMPLE: For a variable speed machine with lower operating range of 4500 rpm and upper operating range of 6000 rpm, transient data will be collected in the following scenarios:

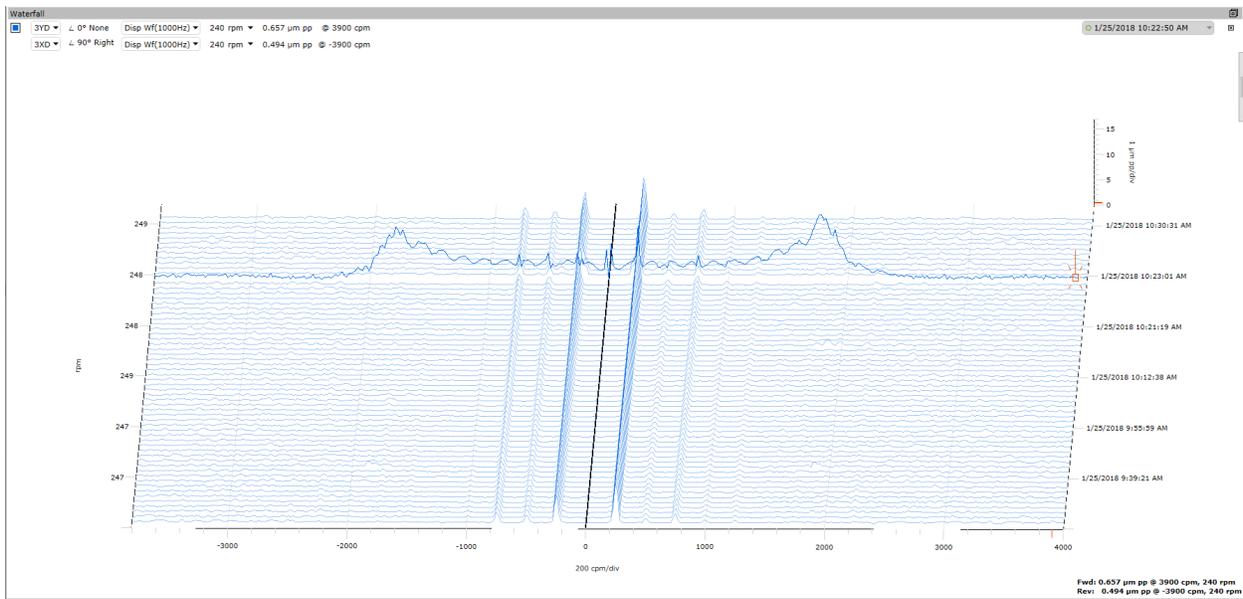
Machine Condition	Initial Condition	Transient Data Collection Starts When	Transient Data Collection Stops When
Startup	Speed ≈ 0 rpm	Speed > 90 rpm (2% of Operating Range Lower)	6600 rpm > Speed > 4275 rpm
Shutdown	Speed ≈ 5000 rpm	Speed < 4275 rpm (95% of Operating Range Lower)	Speed < 90 rpm
Overspeed	Speed ≈ 5000 rpm	Speed > 6600 rpm (110% of Operating Range Upper)	Speed < 6600 rpm

Viewing Collected Data

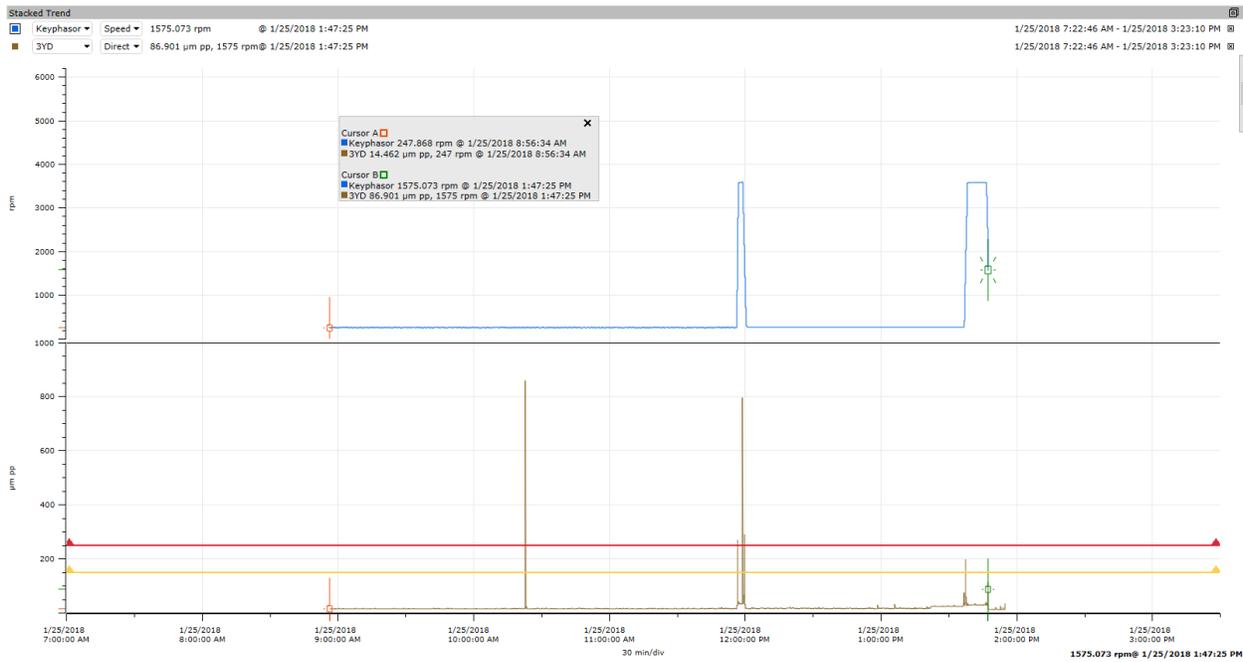
Collected data from an offline ADAPT 3701 monitor can be downloaded to a laptop computer with System 1 software. Once the data has been downloaded, you can review and analyze it using the normal System 1 plots and tools – just as if the data had been collected from an online monitor. The examples shown below were all retrieved from an offline ADAPT 3701 monitor.



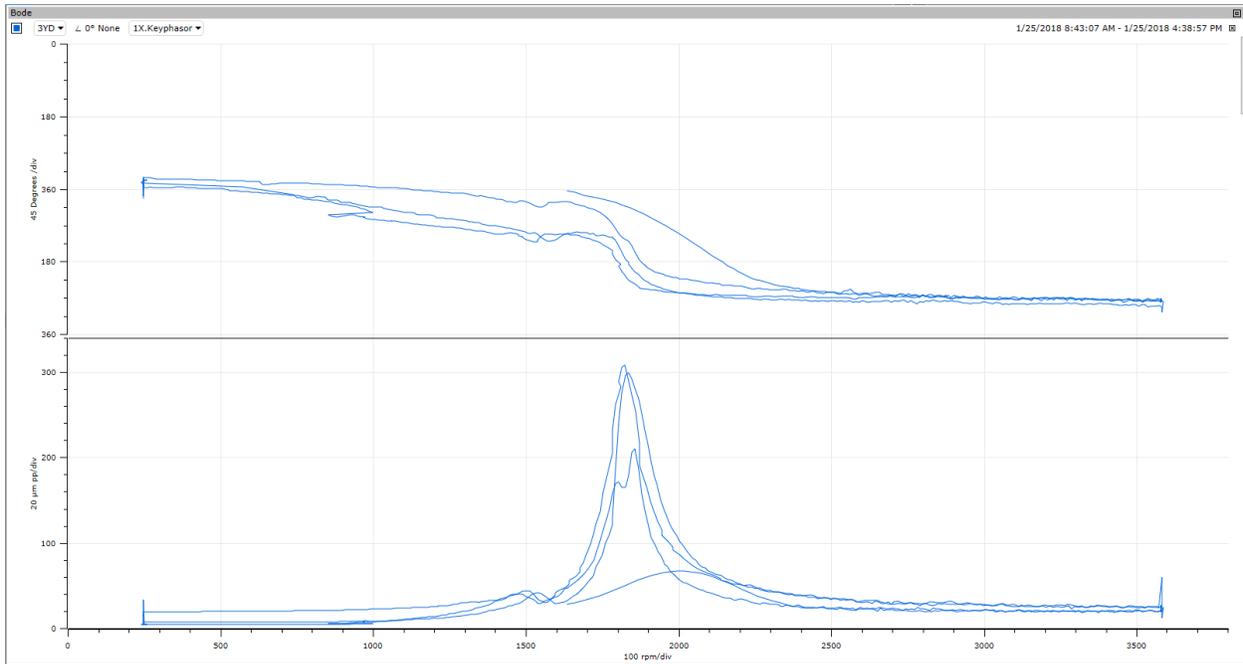
Example: Alarm data zoomed in to see elevated vibration amplitude at time of machine trip



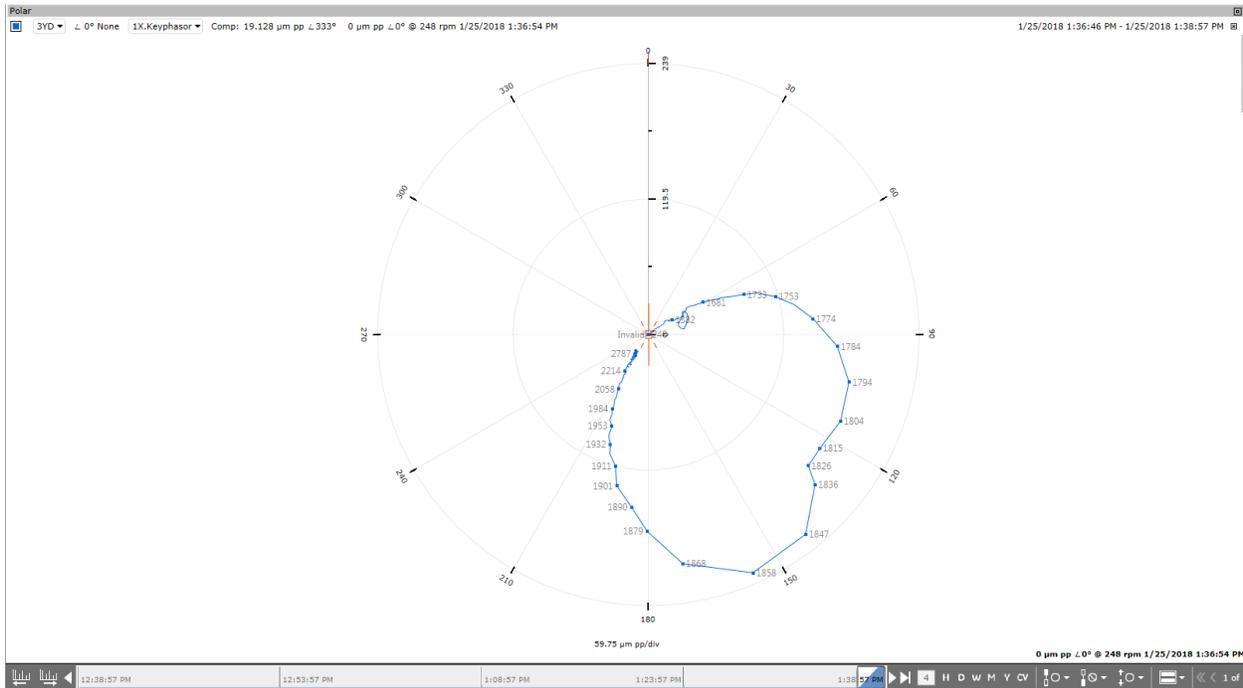
Example: Full Waterfall showing high vibration event



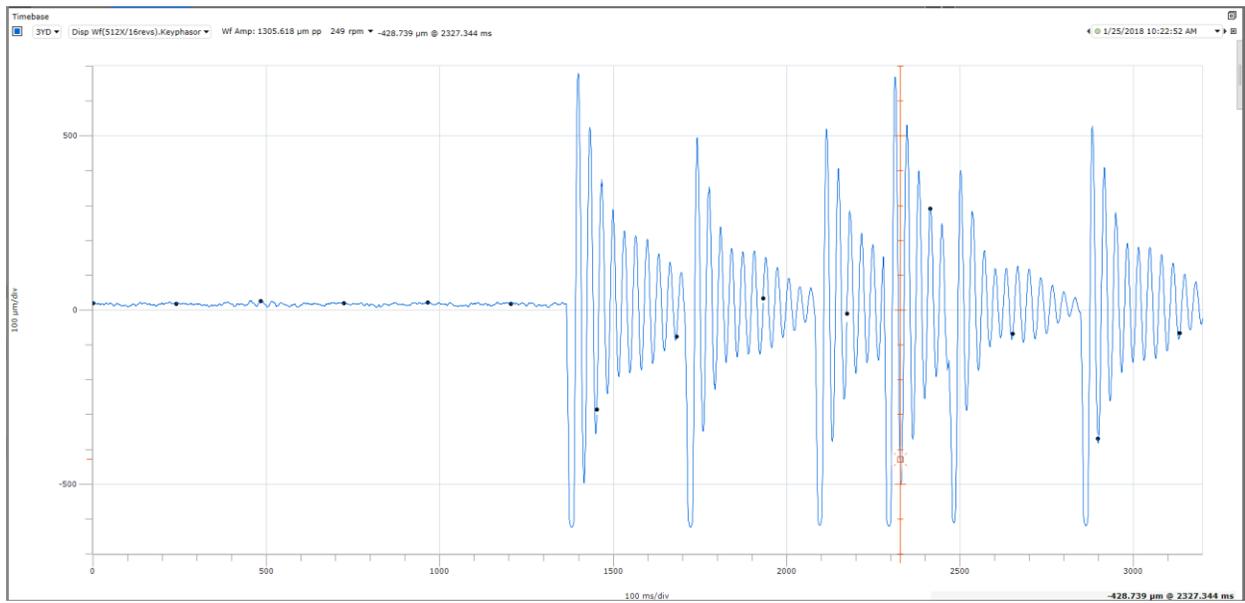
Example: Stacked trend plot shown high vibration events



Example: Bode plot showing two machine startup and shutdown events.



Example: Compensated polar plot showing a startup event



Example: Timebase plot showing sequence of impulse events at time of machine trip

References

1. BNMC Help System. ADAPT Series > Event List > Alarm Data Capture
2. BNMC Help System. ADAPT Series > Properties > Transient Data Capture

If you are interested in learning more about using System 1 software with your Adapt 3701 monitors, contact your local Bently Nevada representative to ask about training.

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