Meridian Compact Posthole - Release Notes

Firmware Versions	Release Date
4.3.18	2018-04-30
3.4.14	2017-02-27
3.3.3	2016-11-08

Summary for Version 4.3.18

Firmware version 4.3.18 release offers a broad range of new capabilities and improvements for the Meridian Compact PH such as network timing synchronization, free-run timing, and reduced digitizing latency options. Also included is a new highly versatile sensor orientation correction feature unique to Nanometrics which performs full 3D real-time data rotation to correct for sensor Azimuth misalignment and sensor tilt. To complement the existing calibration file playback capability, an onboard waveform synthesizer is now included to generate user-configurable sine and PRB calibration waveforms. Both the playback and synthesized signals are now fully adjustable, including user control of gain, duration, lead-in and lead-out silence intervals. Additional improvements and fixes are also included that improve the usability and reliability of the instrument. See details below.

New features and improvements in this release include:

- Precision network timing and free-run timing
- Minimum-Phase (causal) anti-aliasing filters
- Sensor 3D real-time orientation correction using orthogonal data rotation
- Synthetic Sine and PRB waveform generation for calibration
- Calibration playback files with adjustable gain, duration, lead-in and lead-out
- Calibration command API
- Configuration limits to SeedLink backfill requests
- Improved Resolution of GPS/GNSS Geo-location
- Configurable Earth Location
- DNS server configuration available when using a static IP address
- Added firewall capability
- Configurable filename extensions added to archive filenames
- Earth location included in downloaded instrument response
- Alerts download-in-progress indicator
- Sample rate added to instrument response

Fixes and changes addressed in this release include:

- Fixed problem with time-based SeedLink data retrievals
- Streaming Delay after Power-up or Restart
- Fixed issue where the Meridian Compact PH responded improperly to time-based SeedLink data retrieval requests
- Fixed issue where SeedLink Server cannot backfill requested packets recorded at higher sample rates faster than real-time
- Mobile-specific UI Removed
- Fixed issue where data retrieval could not be performed with duration specified

New Features and Improvements

Precision network timing and free-run timing

In addition to GPS/GNSS timing, Precision Time Protocol (PTPv1) and Network Time Protocol (NTP) are added as selectable time references for Nanometrics digital seismometers. You can also set the time manually and let the instrument free-run. It is also possible to synchronize timing by configuring a Meridian Compact PH to act as a PTPv1 or NTP time server for other instruments when its time server reference is NTP, GNSS, or free-running. For example, a Meridian Compact PH could get its timing from its internal GPS/GNSS receiver and simultaneously serve PTPv1 over a local network to another Meridian Compact PH or other Nanometrics instrument.

There are a wide range of use cases and applications for this very flexible timing system. See the user guide for more application examples and details on usage, setup, network configuration, and performance.

Minimum-Phase (causal) anti-aliasing filters

Low-latency minimum-phase (“causal”) anti-aliasing decimation filters are now available as an alternative to linear phase filters. A minimum-phase filter offers a much lower filter latency while trading off some stop-band performance, and is often used where minimizing overall real-time delay through the digitizer is important. The minimum-phase option is available for all sample rates except for 80 Hz and 2000 Hz. See the user guide for details on latency and filter performance.

Sensor 3D real-time orientation correction using orthogonal data rotation

A new feature has been added to firmware version 4.3.18 to perform real-time 3D seismic data rotation to correct sensor orientation for use cases in which the physical orientation of a Meridian Compact PH is different than what is desired, and where the output X, Y and Z signals do not represent the desired directions of sensitivity (often intended to be East, North and Vertical). Examples of where the sensor orientation correction feature may be

used include borehole sensor azimuth correction and sensor tilt correction. Please refer to the *Meridian Compact PH User Guide* for detailed use case information.

Synthetic Sine and PRB waveform generation for calibration

A new synthetic waveform signal generator for calibration introduces the ability to generate on-demand sine wave and pseudo-random binary (PRB) signals. This feature allows the user to configure the frequency or pulse-width, duration, amplitude, as well as lead-in and lead-out silence intervals for the selected waveform.

This feature complements the existing waveform file playback feature; it does not replace it. The file playback feature allows you to generate any specific signals you wish to define and upload to the Meridian Compact PH.

Calibration playback files with adjustable gain, duration, lead-in and lead-out

Calibration waveform files uploaded to the Meridian Compact PH can now be played back with adjustable gain, duration, lead-in and lead-out silence. Gain is adjustable from 1.0 to 0.001. File playback can be limited to a specific duration instead of playing back the entire file. Lead-in and/or lead-out silence can be set from 0 to 3600 seconds.

Calibration command API

The new HTTP-based Calibration API provides the ability to create external custom scripts or applications to initiate a calibration for a specified sensor. The Calibration API requests allows the user to specify the desired parameters for the required calibration output signal type: file playback or synthesized sine or PRB, voltage waveform, and other waveform parameters.

Configuration limits to SeedLink backfill requests

To ensure that real time streaming resumes quickly, firmware version 4.3.18 introduces a new configuration parameter (Maximum backfill packet) that allows the user to limit the maximum number of 512-byte SeedLink packets that the SeedLink interface will attempt to re-transmit in response to 'DATA' requests. ('TIME' requests will not be limited.)

Improved Resolution of GPS/GNSS Geo-location

Firmware version 4.3.18 improves the resolution of the GPS/GNSS geo-location that is displayed on the Web Interface **Health** page to 6 digits of precision.

Configurable Earth Location

Firmware version 4.3.18 introduces the ability to explicitly configure the earth location for the instrument using latitude, longitude, and elevation to 6 digits of precision. If configured, this location is displayed on the **Health** page and is used instead of the GPS/GNSS derived geo-location in the instrument's downloaded dataless SEED response files. State-of-health data that is generated by the instrument continues to use the GPS/GNSS derived location.

The Web Interface **Health** page now shows both the configured and calculated GNSS earth location.

DNS server configuration available when using a static IP address

Firmware version 4.3.18 introduces the ability to configure up to two DNS server IP addresses when configuring a static IP address configuration on the **Ethernet** page of the Configuration menu. These IP addresses are ignored when a DHCP or Link-Local IP address configuration is specified.

Added firewall capability

Firmware version 4.3.18 introduces the ability to configure a firewall on the instrument using the iptables firewall utility for Linux. Among other capabilities, this utility allows the user to specify sets of IP addresses, IP networks and subnetworks that can communicate with the instrument.

Note that it is possible for users to become locked out of the instrument if the firewall is configured incorrectly. Only users with advanced Linux and networking knowledge should attempt to configure the firewall on Nanometrics instruments.

Configurable filename extensions added to archive filenames

Previously, archive filenames were created with a fixed filename extension (.miniseed or .csv, depending on the archive format). Firmware version 4.3.18 now allows you to configure the filename extension using the filename pattern fields. If the end of the filename pattern contains a dot (.) followed by text, the resulting archive files will use that added text as a filename extension. Conversely, if the end of the filename does not contain a dot (.) followed by text, then the archive files will be created without a filename extension.

Earth location included in downloaded instrument response

In previous firmware releases, download response files did not contain a correct earth location. Firmware version 4.3.18 now includes the geo-location in downloaded dataless SEED files. If the geo-location is manually configured then this value is used; otherwise, if the instrument has a built-in GNSS receiver and is configured to use GNSS as its time source then the actual earth location is used in the downloaded dataless SEED file. Note that the RESP response format does not include any geo-location information. Please consult the user guide for more details.

Alerts download-in-progress indicator

Firmware version 4.3.18 introduces a progress indicator in the Alerts panel on the **Health** page to indicate when alerts are still in the process of being loaded. This is to distinguish it from the condition where there are no alerts.

Sample rate added to instrument response

The currently configured sample rate is now reflected in dataless SEED files generated by the instrument. The sample rate can be found in SEED blockette #52, field #18.

Fixes and Changes

Fixed problem with time-based SeedLink data retrievals

In previous releases there was a race condition in software that resulted in time-based SeedLink data retrieval requests returning no data. Firmware version 4.3.18 fixes this issue.

Streaming Delay after Power-up or Restart

Previously, when the Meridian Compact PH was initially powered on or restarted, streamed data only resumed after approximately 7 minutes. This is resolved in this release.

Fixed issue where the Meridian Compact PH responded improperly to time-based SeedLink data retrieval requests

In previous releases, the Meridian Compact PH responded improperly to time-based SeedLink data retrieval requests, resulting in SeedLink clients such as slinktool and slarchive re-requesting the data indefinitely. Firmware version 4.3.18 fixes this issue.

Fixed issue where SeedLink Server cannot backfill requested packets recorded at higher sample rates faster than real-time

In previous releases, the SeedLink Server was slow to backfill requested data and could gradually get further behind, never catching up to real-time. Firmware version 4.3.18 fixes this Issue.

Note that the data that was recorded to the instrument internal storage prior to the upgrade is still subject to the slow SeedLink backfill problem. You can optionally choose to recreate the store after upgrading to 4.3.18 to delete all prior data to ensure that the instrument does not attempt to backfill data recorded prior to the upgrade.

Mobile-specific UI Removed

Support for a mobile specific Web Interface for Meridian Compact PH has been removed in favor of the default interface.

Fixed issue where data retrieval could not be performed with duration specified

When attempting to download data from the **Maintenance** page using start time and duration fields to specify the time range, the duration value will no longer be rejected.

Upgrade Considerations and Dependencies

Ensure all default instrument passwords are changed to reduce the risk of unauthorized access

Nanometrics highly recommends that all instrument passwords are changed from the default values to improve network security and reduce the risk of unauthorized access. This includes the root password, calibration password, and admin password. Nanometrics technical note *How to Increase the Security of your Internet-connected Instruments (18109)* provides recommendations on how to ensure your instruments are secure, including how to change these passwords to improve instrument security. This technical note can be obtained through our online knowledge base, or by contacting Nanometrics customer support.

Firmware upgrade from 3.1.3 or earlier will cause the Linux root password to revert to the factory default password

If upgrading the firmware from version 3.1.3 or earlier to version 3.2.8 or later, the passwords for logging in to the Linux root or the calibration file upload accounts will revert to factory default passwords. The passwords to log on to the Web Interface are preserved.

> **Workaround**: If you have previously changed the Linux passwords, you must use the factory default password to login and manually update them to the desired passwords. Search for "Calibration Password" in the online help or in the PDF User Guide.

Apollo Server and Apollo Project Version Dependency

If you are using Apollo Server and Apollo Project with the Meridian Compact PH, be sure to use Apollo Server version 2.5.9 or higher and Apollo Project version 2.4.1 or higher. This is to support the default NP streaming format used in Meridian Compact PH firmware version 3.1.x or later. Alternatively, the 'Libra Compatibility Streaming' option available in the Configuration menu can allow the Meridian Compact PH to work with older versions of Apollo Server and Apollo Project.

Configurable Archive Filenames

For the Meridian Compact PH, upgrading to firmware version 4.3.18 from a version prior to 4.0 will apply changes to configurable archive filename settings:

- File format extensions will be appended to all existing archive filename patterns. '.miniseed' will be added to seismic data archive filenames, and either '.miniseed' or '.csv' will be added to existing SOH archive filenames, depending on the configured SOH archive format.

- Seismic event archives will be reconfigured to use MiniSEED format, regardless of the current configuration. This format setting will have to be changed after firmware upgrade if another format is desired.
- Support for SOH archive files in NP format was removed in firmware version 1.5.28. If the Meridian Compact PH is initially using an older firmware version and SOH archive files are configured to use NP format, this setting will be reconfigured to use MiniSEED format.

Other Considerations or Limitations

Some pages of alternate languages unavailable in Firefox

Newer versions of Firefox cannot display all of the Web Interface pages for all languages, and navigating to these unavailable pages returns the user to the **Summary** page.

> **Workaround:** This issue is exclusive to newer versions of Firefox. Using an alternate browser (Chrome, Safari) will avoid this issue.

Context menu “paste” does not work properly in configuration menu

When configuring the instrument using the configuration menu in the Web Interface, the use of context menu paste (i.e. right-clicking the item and selecting “paste” from the subsequent menu) will insert text that visibly looks correct but will not be recognized by the configuration system.

> **Workaround:** Use the keyboard shortcut ‘CTRL-V’ to paste the configuration instead of using the context menu paste.

Ext4 format no longer supported on external SD media, as of version 3.4

As of firmware version 3.4.x, Meridian Compact PH no longer supports Ext4 formatting for the removable SD card. SD cards for archiving must be formatted as FAT32 SDHC. You can format an SD card when it is installed on the Meridian Compact PH, or use a Windows, Linux or Macintosh PC to format an SD card as FAT32 SDHC. Note that Windows cannot format a 64GB SD card as FAT32 SDHC. SD cards preformatted as FAT32 SDXC will need to be reformatted as FAT32 SDHC on the Meridian Compact PH instrument.

HTTP based web service

The Web Interface and the APIs use the HTTP protocol for instrument access. Some browsers may show a security warning when attempting to access the instrument.

Configuration Access Control

Note that configuration changes are only accessible by logging onto the instrument using the administration username and password. To increase the security of your network and

to significantly reduce the risk of unauthorized access to your Meridian Compact PH, we recommend that you change all default passwords after you have logged on for the first time. See the *Meridian Compact PH User Guide* for more details regarding password management.

Column names for Sensor State of Health in Exported CSV Files are no longer configurable

When defining a custom sensor in the instrument configuration it is possible to specify custom names for each of the Sensor SOH channels. Starting with firmware version 4.3, these custom channel names will appear on the **Sensors** page only, and will no longer be downloaded with the CSV-based state of health files.

Continuous Archive may not include all expected channels when recreating the Store

If continuous archiving is enabled, and it later becomes necessary to recreate an instrument Store from the Web Interface **Maintenance** page, some channels may not be included in the archive.

> **Workaround:** Assuming the default internal and external state of health reporting intervals are configured, disable and re-enable continuous archive approximately 70 to 90 minutes after recreating the instrument Store. This issue will be resolved in a future release.

Previous playback calibration file duration persists in GUI

On the Waveform page, when a new calibration playback file is selected from the Configure dialog, the file duration from the previous playback file persists in the **Duration** field. To obtain the actual file duration, the user can delete the displayed duration. The actual duration will be displayed, which can then be customized if desired.

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