

Software Manual

PulseIQ™ Technology

For use together with the HS35iQ encoder with PulseIQ™ Technology to provide quick review of fault conditions, diagnostic data and to program encoder output.

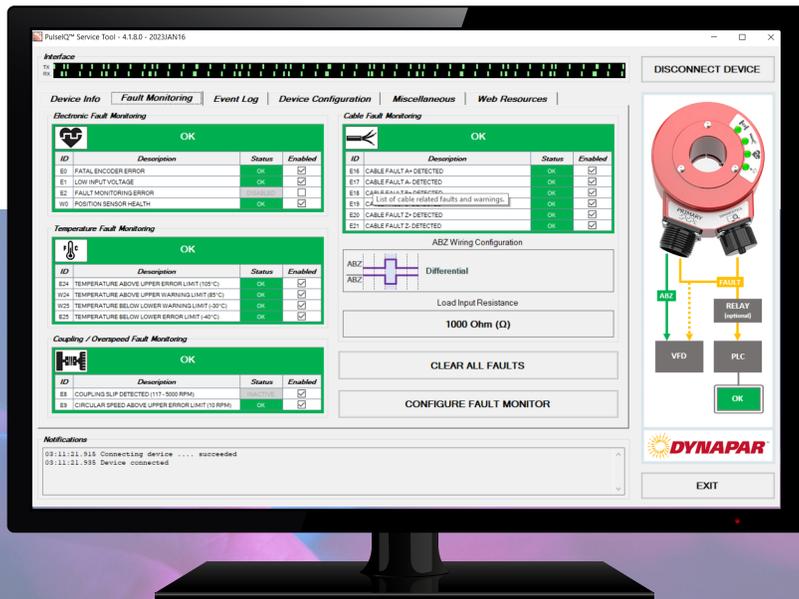


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PulseIQ™ Technology Overview

PulseIQ™ Technology includes downloadable software for monitoring, analyzing, and reporting on historical and real-time data related to fault conditions and diagnostic data received from encoders.

PulseIQ™ Technology provides forewarning and specific fault indication. This solution can specifically indicate common issues with recommended corrective actions to help fix the root cause and avoid unscheduled downtime.

When paired with the HS35iQ encoder, PulseIQ™ Technology allows for a quick review of fault conditions and diagnostic data by when connected to the diagnostics port via USB cable and then opening PulseIQ™ Software on your computer. Once connected, PulseIQ™ also delivers a visual indication of encoder health through fault lights and digital output. Programmable functionality is dependent on decode and includes index position, polarity and gating, channel phasing, quadrature output levels and resolution (PPR).

PulseIQ™ Technology System Requirements

- Windows PC running .NET framework 4.0 or later (included in Windows 8 or later but can be installed on prior versions of Windows)

Disclaimer: Older versions of Windows can be installed with additional steps:

- Install .NET framework <https://dotnet.microsoft.com/en-us/download/dotnet-framework>
- Install FTDI Driver <https://ftdichip.com/drivers/>
- USB port capable of supplying 500mA (if not powering encoder using Primary connector)
- Active internet connection to download FTDI drivers
 - Software minimum resolution 1280 x 800

PulseIQ™ Technology Diagnostic Connection

Connect the 6 pin MS connector end of programming cable to the diagnostic connector. Screw connectors together until hand tight. Plug the other end of the diagnostic cable into the USB port of a compatible PC.

Be advised that some computers do not have enough current to power the encoder from the USB port, so it is recommended to supply power through the primary *programming interface*. With insufficient power, you may get a Low Input Voltage (E1) electronic fault monitoring error.

PulseIQ™ Technology Software Installation

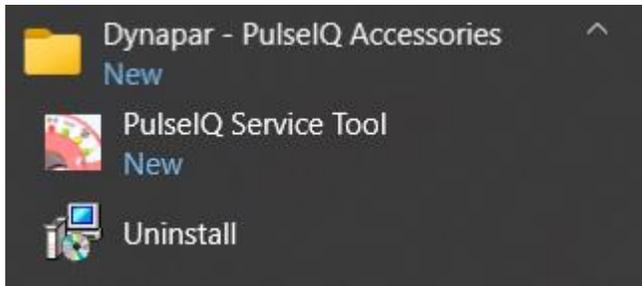
The software installation section lists all the installation tasks that need to be completed for the software to function properly and identifies software dependencies and software license terms.

1. Download PulseIQ™ Software package from:
https://www.dynapar.com/products_and_solutions/hs35iq-hollow-shaft-encoder

2. Launch the downloaded Microsoft Windows Installer file (.msi)



3. Follow the prompts to accept the license agreement and install.
4. Upon completing installation, navigate to “Dynapar – PulseIQ Accessories” folder in the Start menu to launch the “PulseIQ Service Tool”



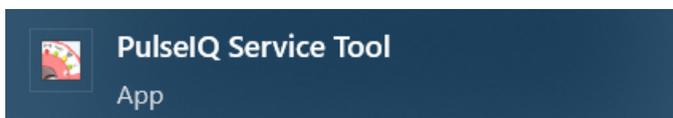
5. Drivers should be automatically installed by Windows after connecting the USB portion of the cable. In the unlikely event they are not installed, drivers may be downloaded from:

<https://www.ftdichip.com/Drivers/CDM/CDM%20v2.12.36.4%20WHQL%20Certified.zip>

*Includes the following version of the Windows operating system: Windows 7, Windows 8/8.1, Windows 10, Windows 11, Windows Server 2008 R2 and Windows server 2012 R2.

Hardware/Software Communication

1. Screw the diagnostic cable into the 6-pin diagnostics port of the HS35iQ encoder and the USB port of your PC.
2. Double click on the “PulseIQ Service Tool” application



Note: First time users will be required to agree to the Terms and Conditions.

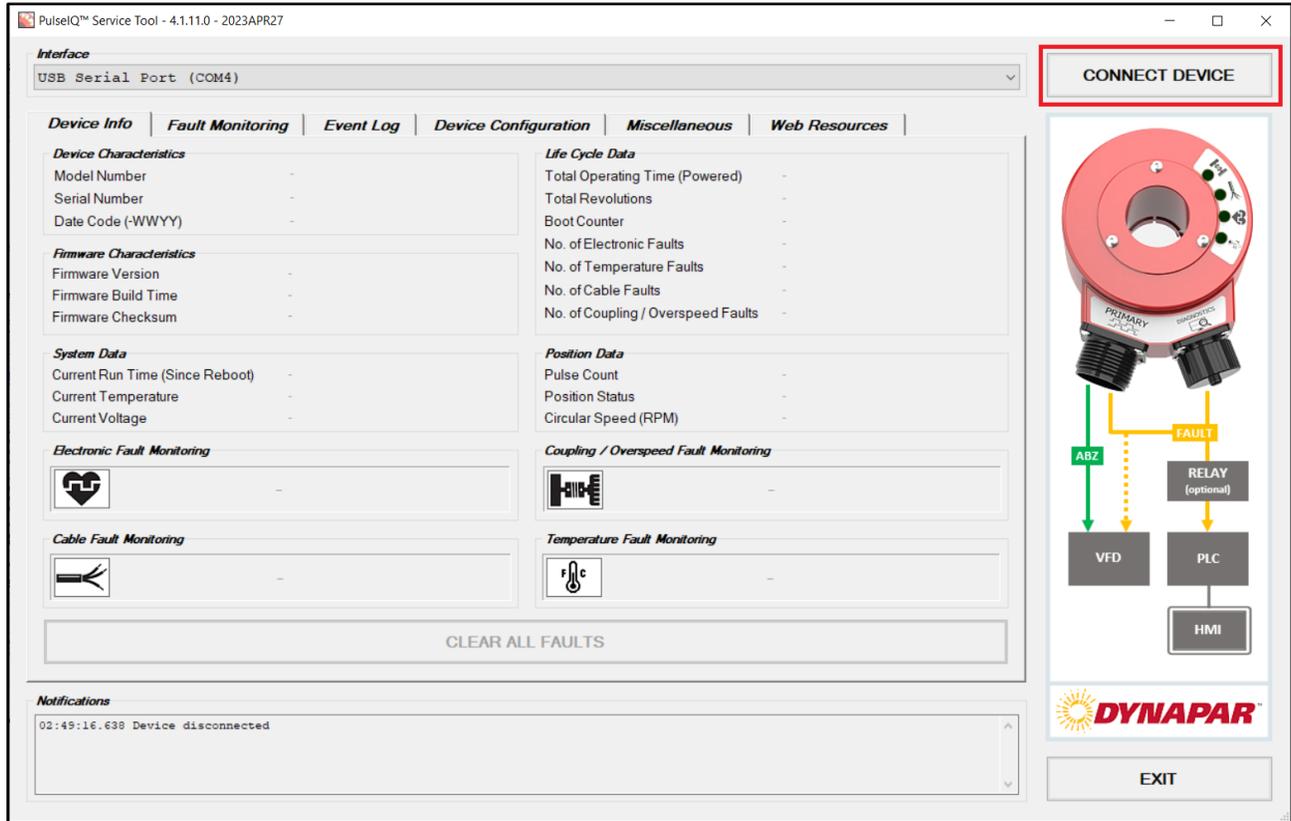
3. Click on the Interface dropdown and regardless of the option, select USB serial port (note: COM port number may vary depending on the PC configuration.)

- In the event that another device using “USB serial port” is present, try each option until a successful connection is established.

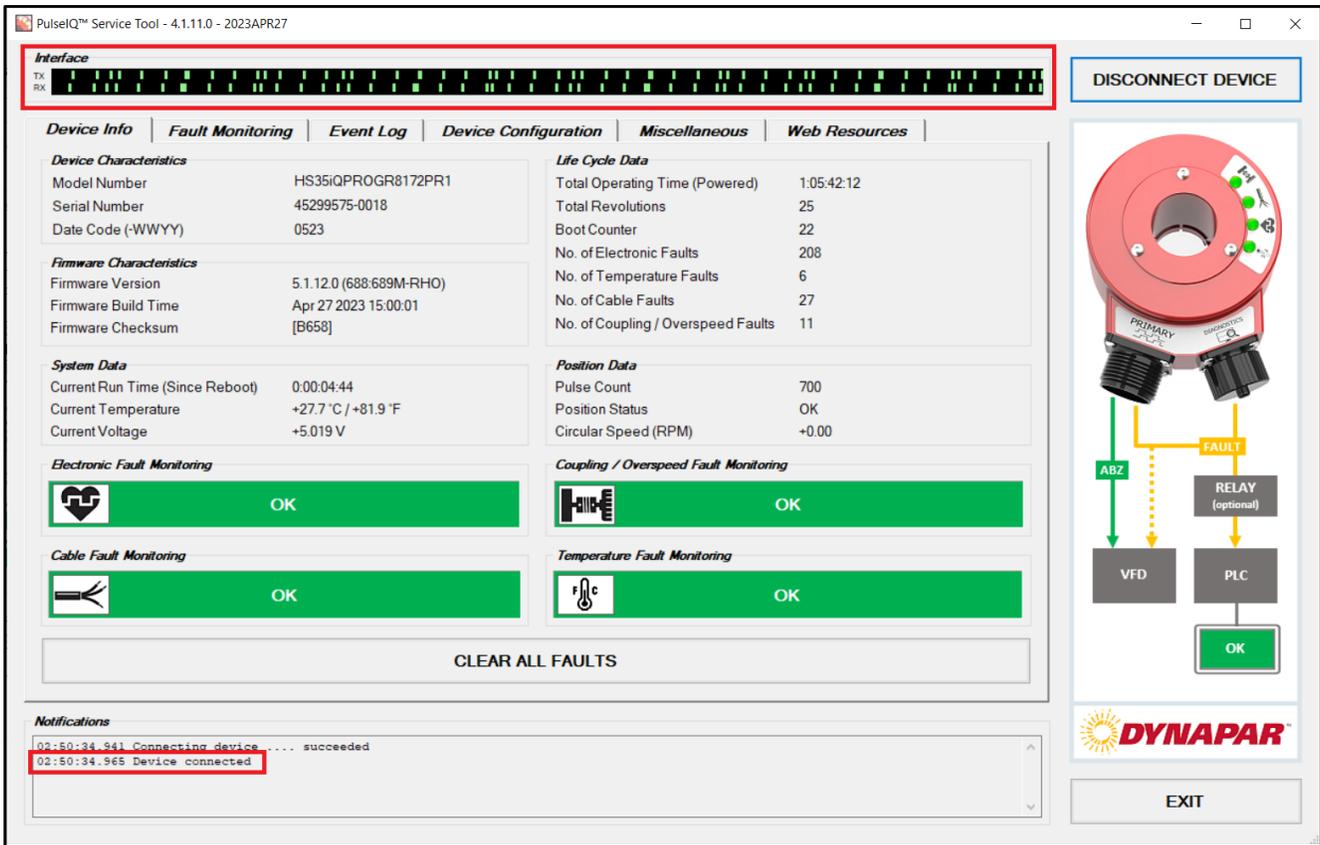
The screenshot displays the PulseIQ Service Tool interface. At the top left, the title bar reads "PulseIQ™ Service Tool - 4.1.11.0 - 2023APR27". The main window is divided into several sections:

- Interface:** A dropdown menu is open, showing four options: "USB Serial Port (COM4)", "Standard Serial over Bluetooth link (COM5)", "Standard Serial over Bluetooth link (COM9)", and "USB Serial Port (COM4)". The first and last options are highlighted in blue.
- Device Characteristics:** A table with fields for Model Number, Serial Number, and Date Code (-WWYY).
- Life Cycle Data:** A table with fields for Total Operating Time (Powered), Total Revolutions, Boot Counter, No. of Electronic Faults, No. of Temperature Faults, No. of Cable Faults, and No. of Coupling / Overspeed Faults.
- Firmware Characteristics:** A table with fields for Firmware Version, Firmware Build Time, and Firmware Checksum.
- System Data:** A table with fields for Current Run Time (Since Reboot), Current Temperature, and Current Voltage.
- Position Data:** A table with fields for Pulse Count, Position Status, and Circular Speed (RPM).
- Electronic Fault Monitoring:** A section with a gear icon and a minus sign.
- Cable Fault Monitoring:** A section with a cable icon and a minus sign.
- Coupling / Overspeed Fault Monitoring:** A section with a gear icon and a minus sign.
- Temperature Fault Monitoring:** A section with a thermometer icon and a minus sign.
- Notifications:** A scrollable area containing the message "02:49:16.638 Device disconnected".
- CONNECT DEVICE:** A button at the top right of the right-hand panel.
- Diagram:** A schematic diagram of the device (a red circular unit) connected to a VFD (Variable Frequency Drive), a PLC (Programmable Logic Controller), and an HMI (Human-Machine Interface). The VFD is connected to the device via a green line labeled "ABZ". The PLC is connected via a yellow line labeled "FAULT" and an optional "RELAY".
- EXIT:** A button at the bottom right of the right-hand panel.
- DYNAPAR:** The company logo is located at the bottom of the right-hand panel.

- Next Click the **Connect Device** button. Note: If connection is not established after 30 seconds, remove power from the encoder before re-establishing power back to the encoder and then click “Connect Device” again.



- When connection is established, you will notice the interface field has changed views. It will now display the outgoing and incoming data packets between your PC and HS35iQ Encoder. Also the notification log will confirm the device is connected. You will also notice the fault icons will come to life with color.

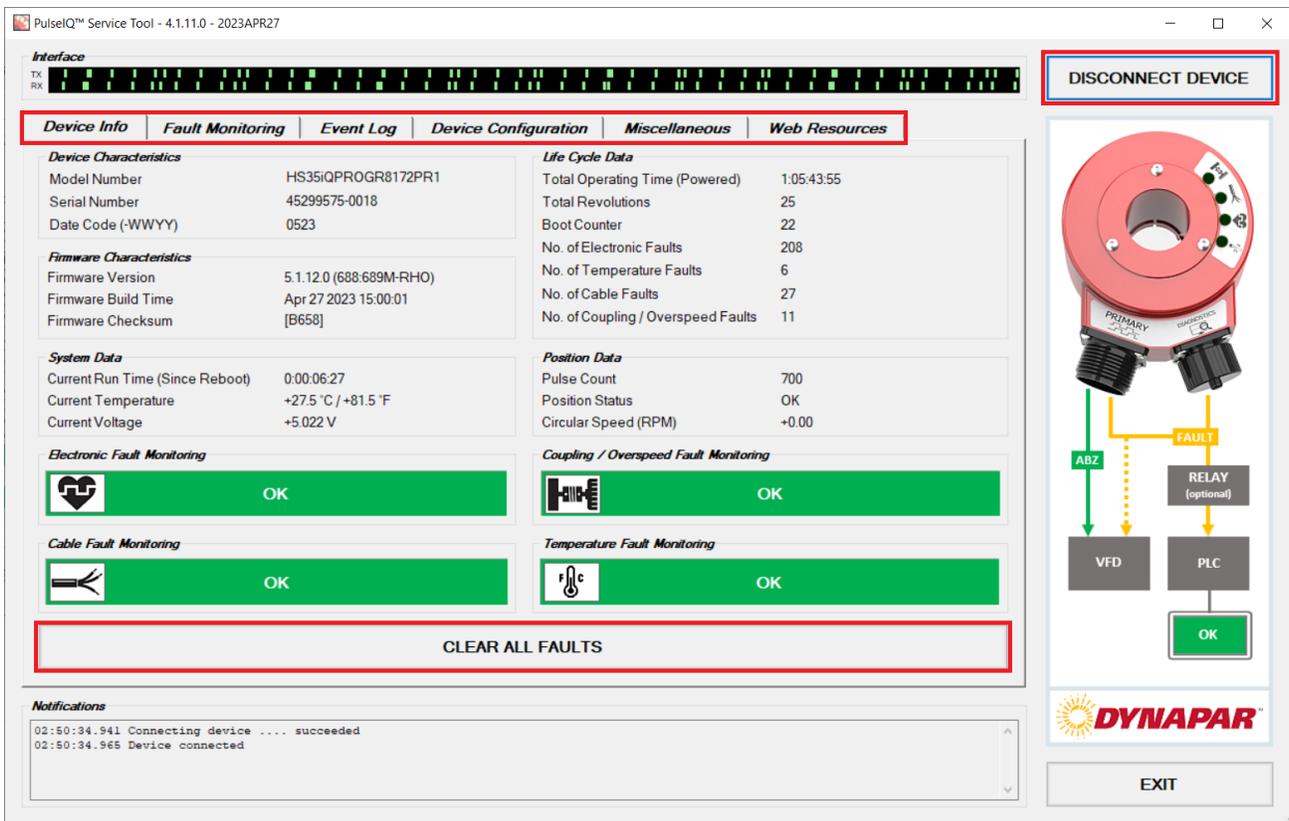


PulseIQ™ Technology Software Screens and Functionality

The PulseIQ™ Technology Service Tool has a total of 6 different screens which can be navigated by clicking on the labeled tabs:

1. Device Info
2. Fault Monitoring
3. Event Log
4. Device Configuration
5. Miscellaneous
6. Web Resources

Regardless of the current tab, the user can disconnect the device and exit the program at any time. As shown in the screen below, on the upper righthand side, there is a static **Disconnect Device** button that will allow the user to disconnect the device at any time. On the bottom center portion of the screen, the **Clear All Faults** button allows users to clear the faults that are currently shown in the Notifications box below. At any time, the user can exit PulseIQ™ Technology Service Tool by clicking on the **Exit** button on the lower right-hand side of the screen.



1. Device Information

Device information screen view provides an overview of characteristics of device, firmware, system data, lifecycle data, position data, and status of fault monitoring (electronic, coupling/overspeed, cable, and temperature).

The screenshot displays the PulseIQ Service Tool interface for a HS35iQ device. The interface includes a top status bar, a navigation menu, and several data panels.

Interface: TX RX

Navigation: Device Info (selected), Fault Monitoring, Event Log, Device Configuration, Miscellaneous, Web Resources

Device Characteristics:

Model Number	HS35iQPROGR8172PR1
Serial Number	45299575-0018
Date Code (-WWYY)	0523

Firmware Characteristics:

Firmware Version	5.1.12.0 (688:689M-RHO)
Firmware Build Time	Apr 27 2023 15:00:01
Firmware Checksum	[B658]

Life Cycle Data:

Total Operating Time (Powered)	1:05:43:55
Total Revolutions	25
Boot Counter	22
No. of Electronic Faults	208
No. of Temperature Faults	6
No. of Cable Faults	27
No. of Coupling / Overspeed Faults	11

System Data:

Current Run Time (Since Reboot)	0:00:06:27
Current Temperature	+27.5 °C / +81.5 °F
Current Voltage	+5.022 V

Position Data:

Pulse Count	700
Position Status	OK
Circular Speed (RPM)	+0.00

Fault Monitoring Status:

- Electronic Fault Monitoring: OK
- Cable Fault Monitoring: OK
- Coupling / Overspeed Fault Monitoring: OK
- Temperature Fault Monitoring: OK

Actions: CLEAR ALL FAULTS

Notifications:

```
02:50:34.941 Connecting device .... succeeded
02:50:34.965 Device connected
```

Wiring Diagram: Shows a red HS35iQ device connected to a VFD and a PLC. The VFD is connected to the device's ABZ terminals. The PLC is connected to the device's FAULT terminal via a RELAY (optional). The PLC status is OK.

Buttons: DISCONNECT DEVICE (top right), EXIT (bottom right)

Logo: DYNAPAR

2. Fault Monitoring

The Fault Monitoring screen allows users to take a closer look at faults and their real time status. This tab allows users to enable or disable fault detection as seen in the screen below by checking the “Enabled” box. When a fault is detected (warning/error), the respective color (orange/red) on the screen will correlate with the appropriate light on the associated HS35iQ device, as well. Additionally, the user will also be able to see the output type which is used for cable fault detection only.

Interface

PulseIQ™ Service Tool - 4.1.11.0 - 2023APR27

DISCONNECT DEVICE

Device Info **Fault Monitoring** Event Log Device Configuration Miscellaneous Web Resources

Electronic Fault Monitoring OK

ID	Description	Status	Enabled
E0	FATAL ENCODER ERROR	OK	<input checked="" type="checkbox"/>
E1	LOW INPUT VOLTAGE	OK	<input checked="" type="checkbox"/>
E2	FAULT MONITORING ERROR	OK	<input checked="" type="checkbox"/>
W0	POSITION SENSOR HEALTH	OK	<input checked="" type="checkbox"/>

Temperature Fault Monitoring OK

ID	Description	Status	Enabled
E24	TEMPERATURE ABOVE UPPER ERROR LIMIT (100°C)	OK	<input checked="" type="checkbox"/>
W24	TEMPERATURE ABOVE UPPER WARNING LIMIT (90°C)	OK	<input checked="" type="checkbox"/>
W25	TEMPERATURE BELOW LOWER WARNING LIMIT (-30°C)	OK	<input checked="" type="checkbox"/>
E25	TEMPERATURE BELOW LOWER ERROR LIMIT (-40°C)	OK	<input checked="" type="checkbox"/>

Coupling / Overspeed Fault Monitoring OK

ID	Description	Status	Enabled
E8	COUPLING SLIP DETECTED (117- 5000 RPM)	INACTIVE	<input checked="" type="checkbox"/>
E9	CIRCULAR SPEED ABOVE UPPER ERROR LIMIT (5000 RPM)	OK	<input checked="" type="checkbox"/>

Cable Fault Monitoring OK

ID	Description	Status	Enabled
E16	CABLE FAULT A+ DETECTED	OK	<input checked="" type="checkbox"/>
E17	CABLE FAULT A- DETECTED	OK	<input checked="" type="checkbox"/>
E18	CABLE FAULT B+ DETECTED	OK	<input checked="" type="checkbox"/>
E19	CABLE FAULT B- DETECTED	OK	<input checked="" type="checkbox"/>
E20	CABLE FAULT Z+ DETECTED	OK	<input checked="" type="checkbox"/>
E21	CABLE FAULT Z- DETECTED	OK	<input checked="" type="checkbox"/>

ABZ Wiring Configuration

Differential

Load Input Resistance

1000 Ohm (Ω)

CLEAR ALL FAULTS

CONFIGURE FAULT MONITOR

Diagram showing VFD and PLC connection with a RELAY (optional) and OK button.

DYNAPAR

EXIT

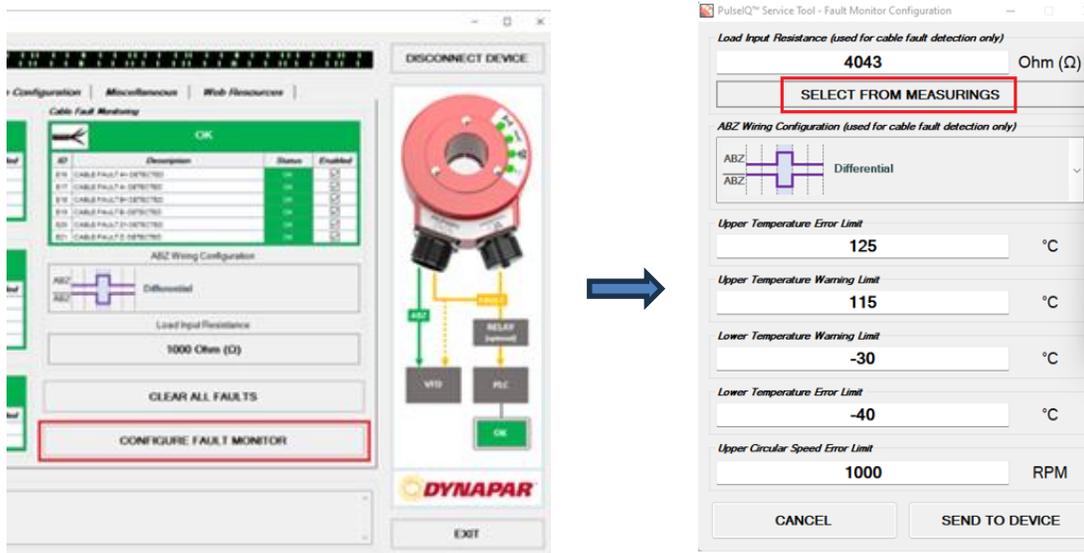
Notifications

```
02:50:34.941 Connecting device .... succeeded
02:50:34.965 Device connected
```

Cable Fault Monitoring – Alternate Commissioning Workflow without Multimeter

The alternate commissioning procedure for cable fault detection is as follows:

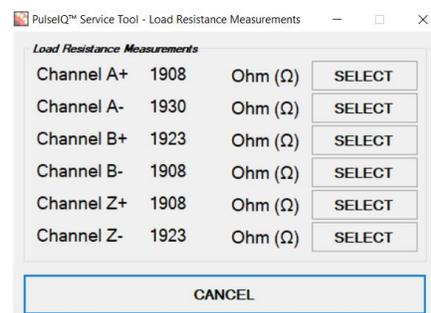
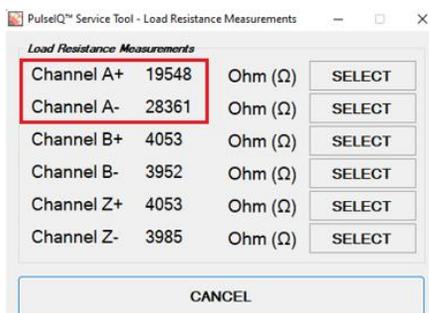
1. Wire-up the 6 differential ABZ signals to the drive
2. Connect the diagnostic cable to the encoder and PC
3. Power-up the encoder and drive
4. On the PC start “PulseIQ Service Tool” program from the Start Menu
5. Go to “Fault Monitoring” tab
6. Click “Configure Fault Monitor” button
7. Click “Select From Measurements” button



8. Compare values displayed for all 6 channels, if:

Values are **inconsistent** (variation is *greater* than +/- 25%). This implies there is a wiring problem (**check the encoder wiring to drive**)

Values are **consistent** (variation is *less* than +/- 25%). This implies the **wiring is correct**. Select one of the values by clicking on the „Select“ button.

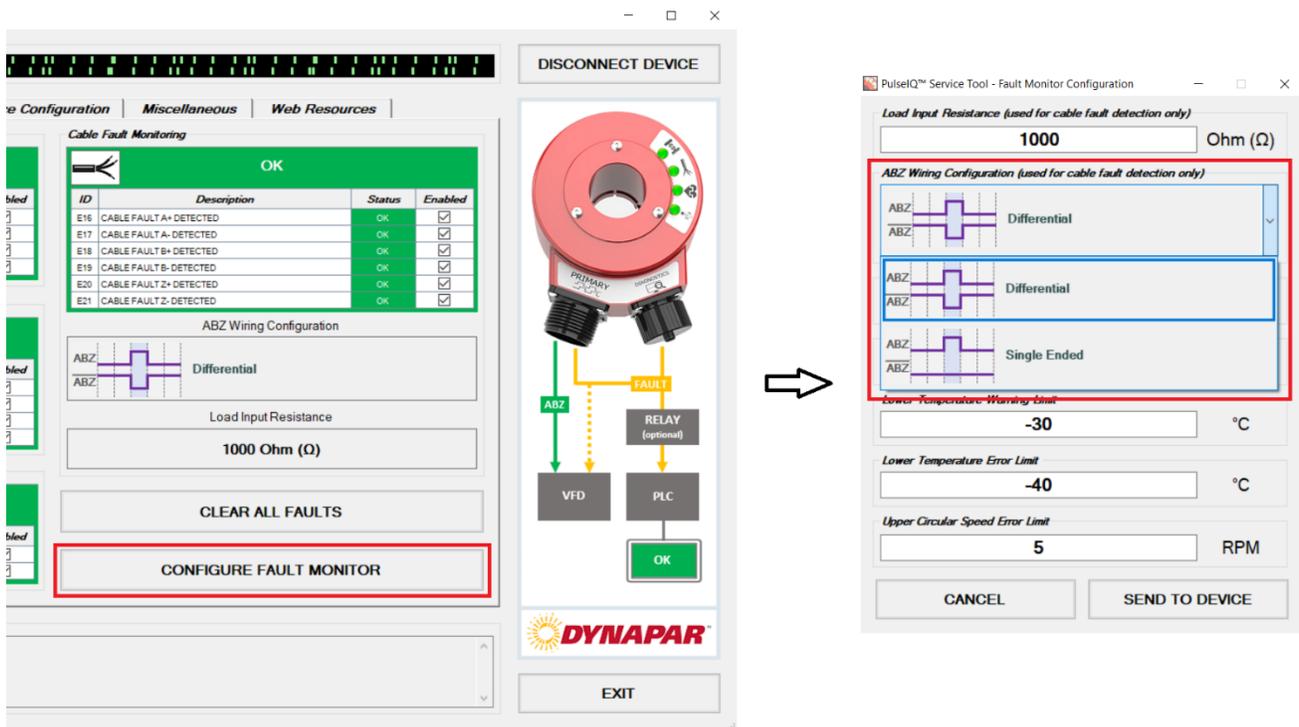


Be advised:

- Cable Fault Monitoring availability dependent on product decode; please refer to HS35iQ datasheet.
- The Load Input Resistance value must be set as close as possible to the actual connected load resistance for the Cable Fault Monitoring to work correctly. An incorrectly set Load Input Resistance value can lead to *erroneous* Cable Fault Monitoring errors.
- The **Alternate Commissioning Workflow without Multimeter** (i.e., “Select From Measurements”) is the recommended procedure for setting the Load Input Resistance value.
 - Please note that the load resistance measured via the PulseIQ™ Service Tool (without multimeter) may differ from the actual resistance measured on the drive (with multimeter). To minimize the measurement error, you should use a supply voltage of at least 12V.

Selecting Differential vs Single Ended - ABZ Wiring Configuration

Selecting differential or single ended will inform the algorithm on how to report cable faults accurately. It is important to select the wiring that the system is using. For example, if only A, B, and Z are wired without complements, the “Single Ended” option should be selected. Otherwise, cable faults errors will display for inactive wires.



Note: Upon selecting "Single Ended" ABZ Wiring Configuration, the Cable Fault Monitoring functionality for all channels will be set to inactive. Please refer to the datasheet for more information.

The screenshot displays the PulseIQ Service Tool interface with the following sections:

- Interface:** TX and RX status indicators.
- Navigation:** Device Info, Fault Monitoring, Event Log, Device Configuration, Miscellaneous, Web Resources.
- Electronic Fault Monitoring:** Status: OK. Table:

ID	Description	Status	Enabled
E0	FATAL ENCODER ERROR	OK	<input checked="" type="checkbox"/>
E1	LOW INPUT VOLTAGE	OK	<input checked="" type="checkbox"/>
E2	FAULT MONITORING ERROR	OK	<input checked="" type="checkbox"/>
W0	POSITION SENSOR HEALTH	OK	<input checked="" type="checkbox"/>
- Temperature Fault Monitoring:** Status: OK. Table:

ID	Description	Status	Enabled
E24	TEMPERATURE ABOVE UPPER ERROR LIMIT (100°C)	OK	<input checked="" type="checkbox"/>
W24	TEMPERATURE ABOVE UPPER WARNING LIMIT (85°C)	OK	<input checked="" type="checkbox"/>
W25	TEMPERATURE BELOW LOWER WARNING LIMIT (-30°C)	OK	<input checked="" type="checkbox"/>
E25	TEMPERATURE BELOW LOWER ERROR LIMIT (-40°C)	OK	<input checked="" type="checkbox"/>
- Coupling / Overspeed Fault Monitoring:** Status: OK. Table:

ID	Description	Status	Enabled
E8	COUPLING SLIP DETECTED (58 - 5000 RPM)	INACTIVE	<input checked="" type="checkbox"/>
E9	CIRCULAR SPEED ABOVE UPPER ERROR LIMIT (5 RPM)	OK	<input checked="" type="checkbox"/>
- Cable Fault Monitoring:** Status: INACTIVE. Table:

ID	Description	Status	Enabled
E16	CABLE FAULT A+ DETECTED	INACTIVE	<input checked="" type="checkbox"/>
E17	CABLE FAULT A- DETECTED	INACTIVE	<input checked="" type="checkbox"/>
E18	CABLE FAULT B+ DETECTED	INACTIVE	<input checked="" type="checkbox"/>
E19	CABLE FAULT B- DETECTED	INACTIVE	<input checked="" type="checkbox"/>
E20	CABLE FAULT Z+ DETECTED	INACTIVE	<input checked="" type="checkbox"/>
E21	CABLE FAULT Z- DETECTED	INACTIVE	<input checked="" type="checkbox"/>
- ABZ Wiring Configuration:** Single Ended. Load Input Resistance: 1000 Ohm (Ω).
- Buttons:** DISCONNECT DEVICE, CLEAR ALL FAULTS, CONFIGURE FAULT MONITOR, EXIT.
- Diagram:** Shows a red cable fault monitor connected to a VFD and a PLC via a relay. Labels include ABZ, FAULT, RELAY (optional), VFD, PLC, and OK.
- Notifications:**

```

11:18:51.685 Connecting device .... succeeded
11:18:51.705 Device connected
            
```
- Logo:** DYNAPAR

Individually Deactivating Channels

If a certain channel is not used and left open, the algorithm will detect an open and will display an error. To prevent erroneous fault output alarms, individual cable faults may be deactivated. In this instance A+ was inactivated.

PulseIQ™ Service Tool - 4.1.15.0 - 2023JUN01

Interface
TX RX

Device Info | Fault Monitoring | Event Log | Device Configuration | Miscellaneous | Web Resources

Electronic Fault Monitoring
OK

ID	Description	Status	Enabled
E0	FATAL ENCODER ERROR	OK	<input checked="" type="checkbox"/>
E1	LOW INPUT VOLTAGE	OK	<input checked="" type="checkbox"/>
E2	FAULT MONITORING ERROR	OK	<input checked="" type="checkbox"/>
W0	POSITION SENSOR HEALTH	OK	<input checked="" type="checkbox"/>

Temperature Fault Monitoring
OK

ID	Description	Status	Enabled
E24	TEMPERATURE ABOVE UPPER ERROR LIMIT (100°C)	OK	<input checked="" type="checkbox"/>
W24	TEMPERATURE ABOVE UPPER WARNING LIMIT (85°C)	OK	<input checked="" type="checkbox"/>
W25	TEMPERATURE BELOW LOWER WARNING LIMIT (-30°C)	OK	<input checked="" type="checkbox"/>
E25	TEMPERATURE BELOW LOWER ERROR LIMIT (-40°C)	OK	<input checked="" type="checkbox"/>

Coupling / Overspeed Fault Monitoring
OK

ID	Description	Status	Enabled
E8	COUPLING SLIP DETECTED (58 - 5000 RPM)	INACTIVE	<input checked="" type="checkbox"/>
E9	CIRCULAR SPEED ABOVE UPPER ERROR LIMIT (5 RPM)	OK	<input checked="" type="checkbox"/>

Cable Fault Monitoring
OK

ID	Description	Status	Enabled
E16	CABLE FAULT A+ DETECTED	DISABLED	<input type="checkbox"/>
E17	CABLE FAULT A- DETECTED	OK	<input checked="" type="checkbox"/>
E18	CABLE FAULT B+ DETECTED	OK	<input checked="" type="checkbox"/>
E19	CABLE FAULT B- DETECTED	OK	<input checked="" type="checkbox"/>
E20	CABLE FAULT Z+ DETECTED	OK	<input checked="" type="checkbox"/>
E21	CABLE FAULT Z- DETECTED	OK	<input checked="" type="checkbox"/>

ABZ Wiring Configuration

ABZ Differential

Load Input Resistance
1000 Ohm (Ω)

CLEAR ALL FAULTS

CONFIGURE FAULT MONITOR

Notifications

```

11:22:25.716 Connecting device ... succeeded
11:22:25.735 Device connected
11:22:30.542 Setting Device Attributes (abzWiring=Differential) ... succeeded
11:22:32.362 Altering error disabled mask (errorMask=[00010000], mode=DISABLE) ... succeeded
    
```

DISCONNECT DEVICE

DYNAPAR

EXIT

3. Event Log

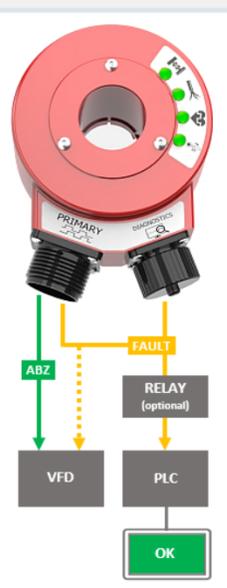
The Event Log screen allows users to take a deeper look at faults and their real time status. Corrective Actions for respective errors are listed in the furthest right-hand column. The log is capable of storing the last 128 events and therefore will overwrite the oldest event when full. The time stamp indicated in the log refers to the elapsed time since last powerup.

PulseIQ™ Service Tool - 4.1.11.0 - 2023APR27
— □ ×

Interface

TX
RX

DISCONNECT DEVICE



Device Info
Fault Monitoring
Event Log
Device Configuration
Miscellaneous
Web Resources

Event Log

Counter	Time Stamp	Identifier	Level	Description	Corrective Action
40	00:00:27:43	11	NOTICE	FAULTS CLEARED => [00010000]	-
39	00:00:24:42	11	NOTICE	FAULTS CLEARED => [00010000]	-
38	00:00:10:50	11	NOTICE	FAULTS CLEARED => [FFFFFFF]	-
37	00:00:09:14	61	ERROR	CABLE FAULT A+ => +0.00 kHz, -1.00 mA, OPEN	Check cable connections, load and continuity.
36	00:00:00:04	62	ERROR	CABLE FAULT A+ => +0.00 kHz, +0.26 mA, OPEN	Check cable connections, load and continuity.
35	00:00:00:04	61	ERROR	CABLE FAULT A+ => +0.00 kHz, +0.16 mA, OPEN	Check cable connections, load and continuity.
34	00:00:00:00	1	NOTICE	SYSTEM STARTUP => 01:04:13:14	-
33	00:00:06:35	63	ERROR	CABLE FAULT B+ => +0.00 kHz, +42.57 mA, SHORT	Check cable connections, load and continuity.
32	00:00:06:33	62	ERROR	CABLE FAULT A+ => +0.00 kHz, +0.06 mA, OPEN	Check cable connections, load and continuity.
31	00:00:06:33	61	ERROR	CABLE FAULT A+ => +0.00 kHz, -6.57 mA, SHORT	Check cable connections, load and continuity.
30	00:00:02:19	11	NOTICE	FAULTS CLEARED => [FFFFFFF]	-
29	00:00:02:10	63	ERROR	CABLE FAULT B+ => +0.00 kHz, +42.37 mA, SHORT	Check cable connections, load and continuity.
28	00:00:02:10	61	ERROR	CABLE FAULT A+ => +0.00 kHz, -41.27 mA, SHORT	Check cable connections, load and continuity.
27	00:00:02:08	11	NOTICE	FAULTS CLEARED => [FFFFFFF]	-
26	00:00:02:04	63	ERROR	CABLE FAULT B+ => +0.00 kHz, +42.29 mA, SHORT	Check cable connections, load and continuity.
25	00:00:02:04	61	ERROR	CABLE FAULT A+ => +0.00 kHz, -41.21 mA, SHORT	Check cable connections, load and continuity.
24	00:00:02:02	11	NOTICE	FAULTS CLEARED => [FFFFFFF]	-
23	00:00:01:56	62	ERROR	CABLE FAULT A+ => +0.00 kHz, +0.06 mA, OPEN	Check cable connections, load and continuity.
22	00:00:01:56	61	ERROR	CABLE FAULT A+ => +0.00 kHz, +0.00 mA, OPEN	Check cable connections, load and continuity.
21	00:00:01:54	11	NOTICE	FAULTS CLEARED => [FFFFFFF]	-
20	00:00:01:23	66	ERROR	CABLE FAULT Z+ => +0.00 kHz, +0.00 mA, OPEN	Check cable connections, load and continuity.
19	00:00:01:23	65	ERROR	CABLE FAULT Z+ => +0.00 kHz, +0.06 mA, OPEN	Check cable connections, load and continuity.
18	00:00:01:22	64	ERROR	CABLE FAULT B+ => +0.00 kHz, +0.00 mA, OPEN	Check cable connections, load and continuity.
17	00:00:01:22	11	NOTICE	FAULTS CLEARED => [00200000]	-

CLEAR EVENT LOG

Notifications

```

01:17:43.370 Connecting device ... succeeded
01:17:43.392 Device connected
01:27:04.379 Setting Device Attributes (absWiring=SingleEnded) ... succeeded
01:30:04.771 Altering error disabled mask (errorMask=[00010000], mode=DISABLE) ... succeeded
01:33:06.283 Altering error disabled mask (errorMask=[00010000], mode=ENABLE) ... succeeded
                    
```

 **EXIT**

4. Device Configuration

Disclaimer changing the device configuration is only available for encoders with part numbers that conform to the following decode:

Code 1: Model	Code 2: PPR
HS35iQ	PROGR

You can check this by looking at “Device Info -> Device Characteristics -> Model Number”.

The screenshot shows the PulseIQ Service Tool interface with the following sections:

- Interface:** TX/RX status bar.
- Navigation:** Device Info, Fault Monitoring, Event Log, Device Configuration, Miscellaneous, Web Resources.
- Device Info:**
 - Device Characteristics:** Model Number: **HS35iQPROGR8172PR1** (highlighted), Serial Number: 45299575-0018, Date Code (-WWYY): 0523.
 - Firmware Characteristics:** Firmware Version: 5.1.12.0 (688:689M-RHO), Firmware Build Time: Apr 27 2023 15:00:01, Firmware Checksum: [B658].
 - System Data:** Current Run Time (Since Reboot): 0:00:34:39, Current Temperature: +26.5 °C / +79.7 °F, Current Voltage: +5.017 V.
 - Life Cycle Data:** Total Operating Time (Powered): 1:04:47:53, Total Revolutions: 25, Boot Counter: 20, No. of Electronic Faults: 208, No. of Temperature Faults: 6, No. of Cable Faults: 27, No. of Coupling / Overspeed Faults: 11.
 - Position Data:** Pulse Count: 700, Position Status: OK, Circular Speed (RPM): +0.00.
- Fault Monitoring:**
 - Electronic Fault Monitoring:** OK
 - Cable Fault Monitoring:** OK
 - Coupling / Overspeed Fault Monitoring:** OK
 - Temperature Fault Monitoring:** OK
- Actions:** CLEAR ALL FAULTS button.
- Notifications:** Log of connection and configuration events.
- Hardware Diagram:** Shows the encoder connected to a VFD and PLC via ABZ and FAULT lines, with an optional relay.
- Buttons:** DISCONNECT DEVICE and EXIT.

Note: The Configure Device button will be grayed out if you have a non-programmable encoder. To replace your non-programmable encoder, please contact Dynapar Customer Service.

The Device Configuration screen allows users to view current settings for:

- Pulses Per Revolution (PPR)
- Phasing (from clamp or shaft end)
- Z Polarity
- Z Index Length
- Z Gating
- ABZ Signal Voltage
- Fault Signal Voltage

The screenshot displays the PulseIQ Service Tool interface. The 'Device Configuration' tab is active, showing various settings:

- Pulses Per Revolution (PPR):** 1024
- Z Polarity:** Inverted Low
- Z Index Length:** 90 Electrical Degrees
- Z Gating:** Z at AB is Low/Low
- Phasing (from clamp or shaft end):** Shows waveforms for A, B, and Z signals. The 'B leading A' configuration is selected.
- ABZ Signal Voltage:** HTL
- Fault Signal Voltage (REV-D):** HTL

At the bottom left, the 'Notifications' window shows the following log entries:

```

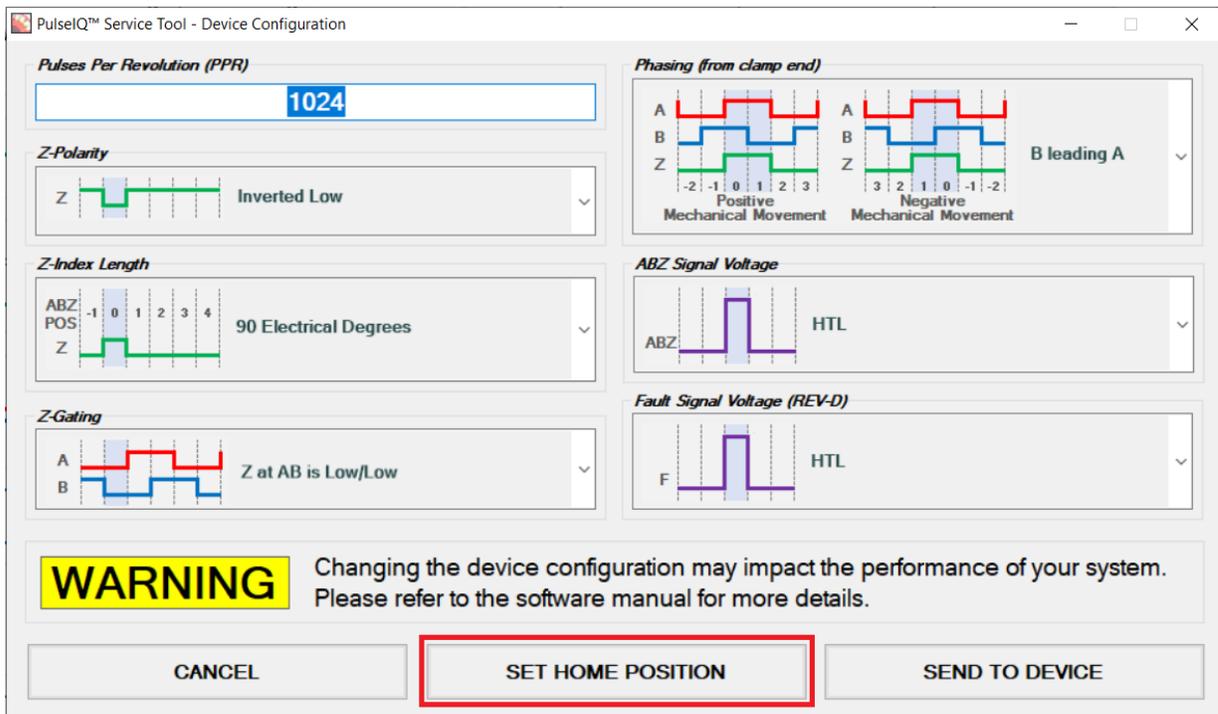
01:17:43.370 Connecting device .... succeeded
01:17:43.352 Device connected
01:27:04.379 Setting Device Attributes (absWiring=SingleEnded) ... succeeded
01:30:04.771 Altering error disabled mask (errorMask=[00010000], mode=DISABLE) ... succeeded
01:33:06.283 Altering error disabled mask (errorMask=[00010000], mode=ENABLE) ... succeeded
    
```

On the right side, a diagram of the DYNAPAR motor is shown with connections for ABZ (green), FAULT (yellow), VFD, and PLC. An 'OK' button is present below the diagram. The 'DISCONNECT DEVICE' button is at the top right, and the 'EXIT' button is at the bottom right.

In addition to viewing existing settings, users with a Programmable HS35iQ can configure the device by clicking the **Configure Device** button.

“Please note, changing the device configuration may impact the performance of your system.”

Set Home Position: When clicked, the current mechanical position of the encoder will become the new home position (Z index position)



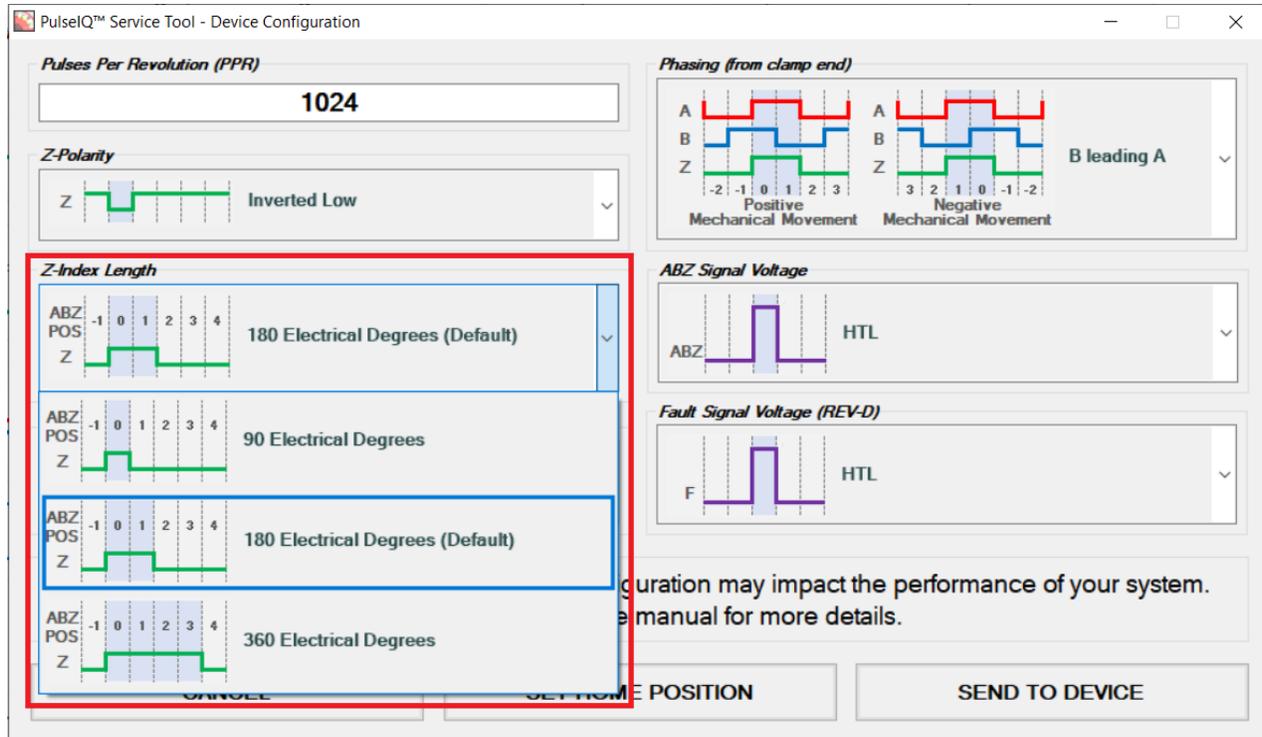
Z-Polarity: The Z (index) polarity can be set Standard High (default) or Inverted Low.

The screenshot shows the 'PulseIQ™ Service Tool - Device Configuration' window. The 'Pulses Per Revolution (PPR)' is set to 1024. The 'Z-Polarity' section is highlighted with a red border and contains three options: 'Inverted Low', 'Standard High (Default)', and 'Inverted Low'. The 'Z-Gating' section shows a timing diagram for A and B signals with the note 'Z at AB is Low/Low'. The 'Phasing (from clamp end)' section shows timing diagrams for A, B, and Z signals for 'Positive Mechanical Movement' and 'Negative Mechanical Movement', with the note 'B leading A'. The 'ABZ Signal Voltage' is set to HTL, and the 'Fault Signal Voltage (REV-D)' is also set to HTL. A yellow 'WARNING' box states: 'Changing the device configuration may impact the performance of your system. Please refer to the software manual for more details.' At the bottom, there are three buttons: 'CANCEL', 'SET HOME POSITION', and 'SEND TO DEVICE'.

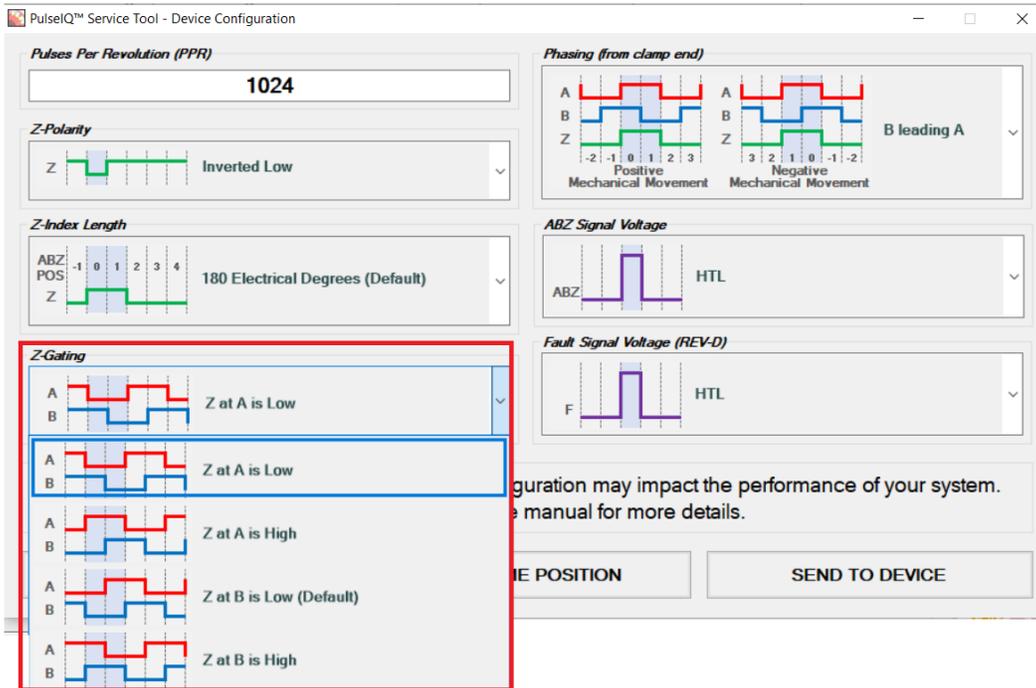
Phasing (from clamp or shaft end): By changing the phasing, the direction of the incremental signals can be changed.

The screenshot shows the 'PulseIQ™ Service Tool - Device Configuration' window. On the left, there are configuration fields: 'Pulses Per Revolution (PPR)' set to 1024, 'Z-Polarity' set to 'Inverted Low', 'Z-Index Length' set to '90 Electrical Degrees', and 'Z-Gating' set to 'Z at AB is Low/Low'. On the right, a 'Phasing (from clamp end)' section is highlighted with a red border. It contains three rows of timing diagrams for A, B, and Z signals. The first row is labeled 'B leading A', the second 'A leading B (Default)', and the third 'B leading A'. Each row shows two diagrams: 'Positive Mechanical Movement' and 'Negative Mechanical Movement'. Below the phasing section is a yellow 'WARNING' box with the text: 'Changing the device configuration may impact the performance of your system. Please refer to the software manual for more details.' At the bottom are three buttons: 'CANCEL', 'SET HOME POSITION', and 'SEND TO DEVICE'.

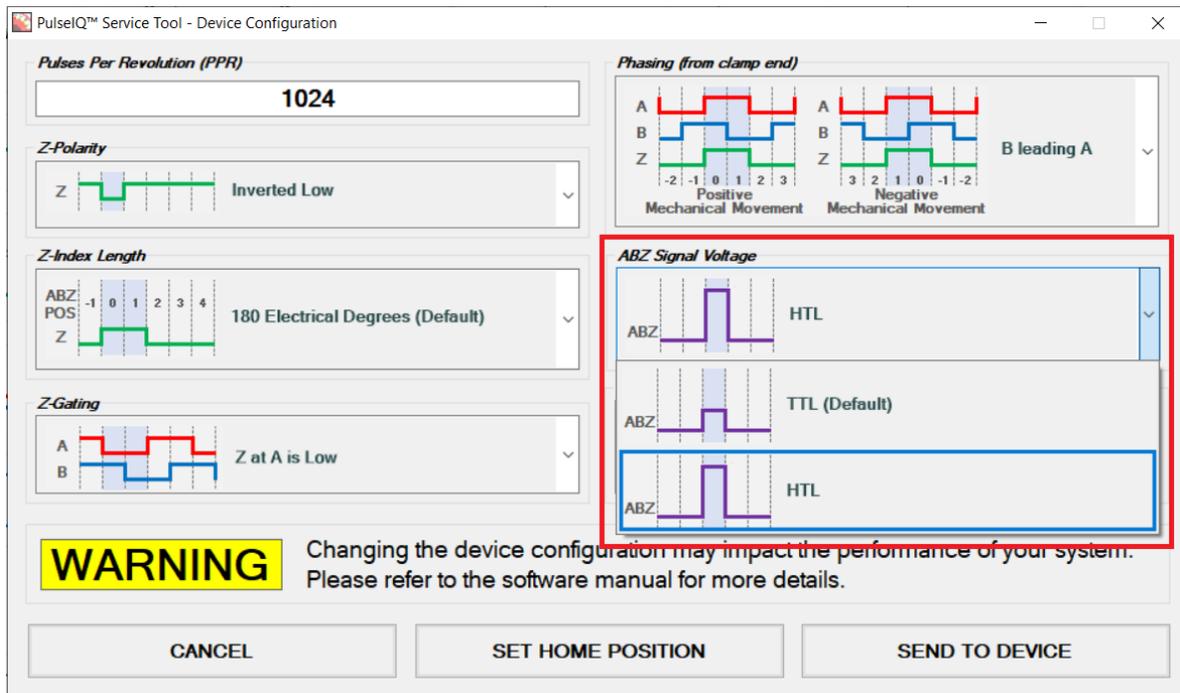
Z-Index Length: The Z-Index length can be changed to a preferred setting. Three options are available 90, 180, and 360 Electrical Degrees. At 180 electrical degrees, the Z-Index will be the length of a single A or B high pulse (1/2 period depending on the gating). 360 electrical degrees will be the length of a full period (i.e., a high and a low) A or B pulse.



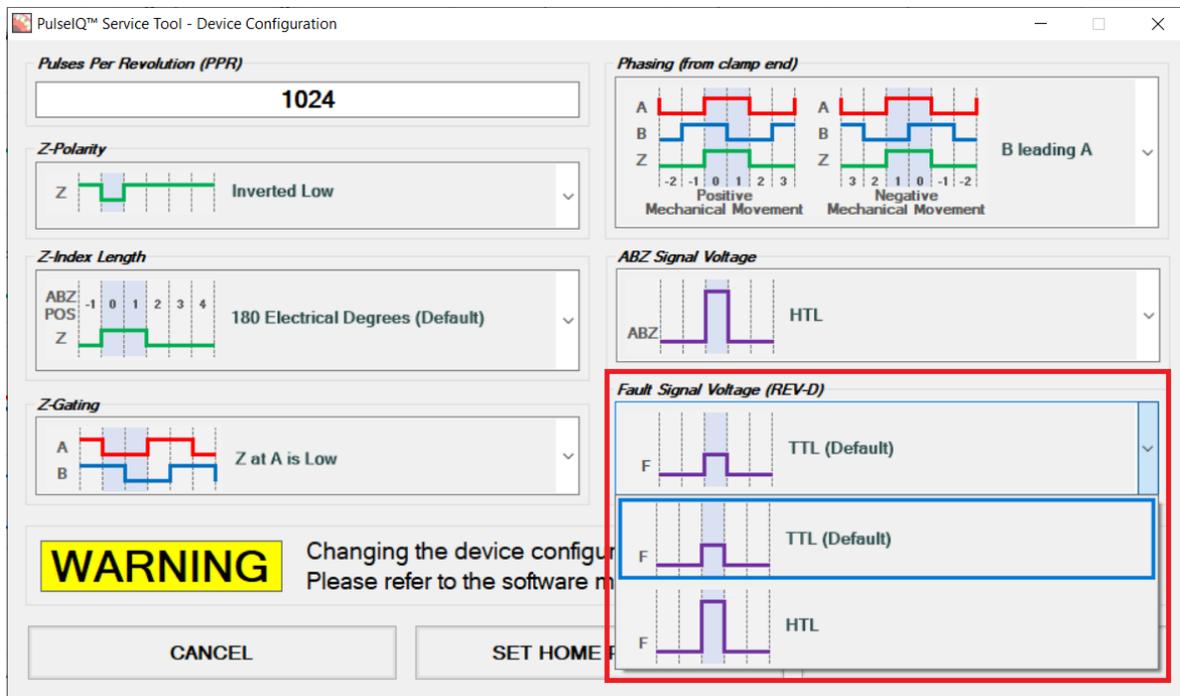
Z-Gating: There are ten different possibilities to gate Z. The settings that are available are dependent on the Z-Index Width so that setting must be configured first before selecting the Z-Gating options.



ABZ Signal Voltage: The ABZ output signal amplitude can also be configured by setting the ABZ Signal Voltage. TTL is set to 5V-out and HTL will match the input voltage to the encoder.



Fault Signal Voltage: The Fault output signal amplitude can also be configured by setting the Fault Signal Voltage. TTL is set to 5V-out and HTL will match the input voltage to the encoder. Be advised that the fault output signal is internally current limited. The TTL option is limited by a 560 Ω resistor and the HTL option is limited by 2.2kΩ resistor.



5. Miscellaneous

The Miscellaneous screen allows users to:

1. Receive Configuration (file) from Device
2. Send Configuration (file) to Device
3. Reboot Device
4. Create Report
5. Reset to Factory Settings
6. Update Firmware

The screenshot displays the PulseIQ Service Tool interface. At the top, there is a status bar with 'Interface' and TX/RX indicators. Below this is a navigation menu with tabs for 'Device Info', 'Fault Monitoring', 'Event Log', 'Device Configuration', 'Miscellaneous' (highlighted with a red box), and 'Web Resources'. The main area contains six buttons: 'RECEIVE CONFIGURATION FROM DEVICE', 'SEND CONFIGURATION TO DEVICE', 'REBOOT DEVICE', 'CREATE REPORT', 'RESET TO FACTORY SETTINGS', and 'UPDATE FIRMWARE'. On the right side, there is a diagram of a red Dynapar encoder with a wiring schematic showing connections to a VFD and a PLC. The diagram includes labels for 'ABZ', 'FAULT', 'RELAY (optional)', and 'OK'. Below the diagram is the 'DYNAPAR' logo and an 'EXIT' button. At the bottom left, there is a 'Notifications' section with a log of system events.

Notifications

```
01:17:43.370 Connecting device .... succeeded
01:17:43.392 Device connected
01:27:04.379 Setting Device Attributes (abzWiring=SingleEnded) ... succeeded
01:30:04.771 Altering error disabled mask (errorMask=[00010000], mode=DISABLE) ... succeeded
01:33:06.283 Altering error disabled mask (errorMask=[00010000], mode=ENABLE) ... succeeded
```

6. Web Resources

The Web Resources screen allows users to quickly access the HS35iQ Encoder with PulseIQ™ Technology Resource Library through a built-in browser. Here you will find HS35iQ tutorial videos in addition to other resources; such as white papers, datasheets and manuals.

The screenshot displays the PulseIQ Service Tool interface. At the top, there is a status bar with 'Interface' and TX/RX indicators. Below this is a navigation menu with tabs for 'Device Info', 'Fault Monitoring', 'Event Log', 'Device Configuration', 'Miscellaneous', and 'Web Resources' (which is highlighted). The main content area features the DYNAPAR logo and the title 'HS35iQ Encoder with PulseIQ™ Technology Resource Library'. A video tutorial titled 'How to Select A HS35iQ Encoder Part Number' is shown, with a 'Watch Now' button. To the right of the video is a wiring diagram of the HS35iQ encoder, showing connections for ABZ, FAULT, RELAY (optional), VFD, and PLC. The bottom of the interface includes a 'Notifications' section with a log of system events and an 'EXIT' button.

PulseIQ™ Technology Software Uploading and Downloading Configurations

WARNING:

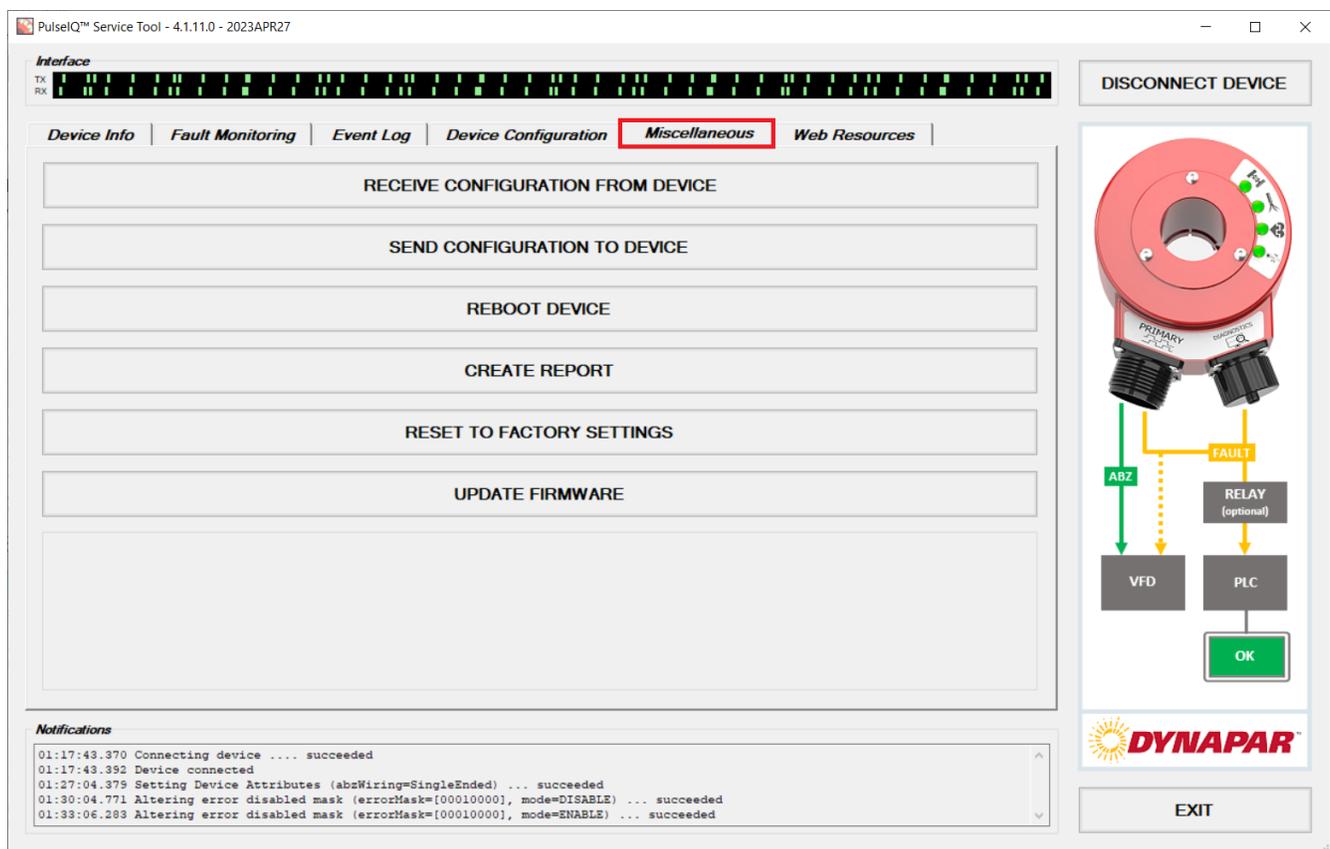
HS35iQ is a programmable encoder. Please ensure encoder settings are properly configured before installing.

Dynapar is not responsible for storing configuration files or changes to the programming of the encoder. For the original configuration file, please contact your original equipment manufacturers or system builder.

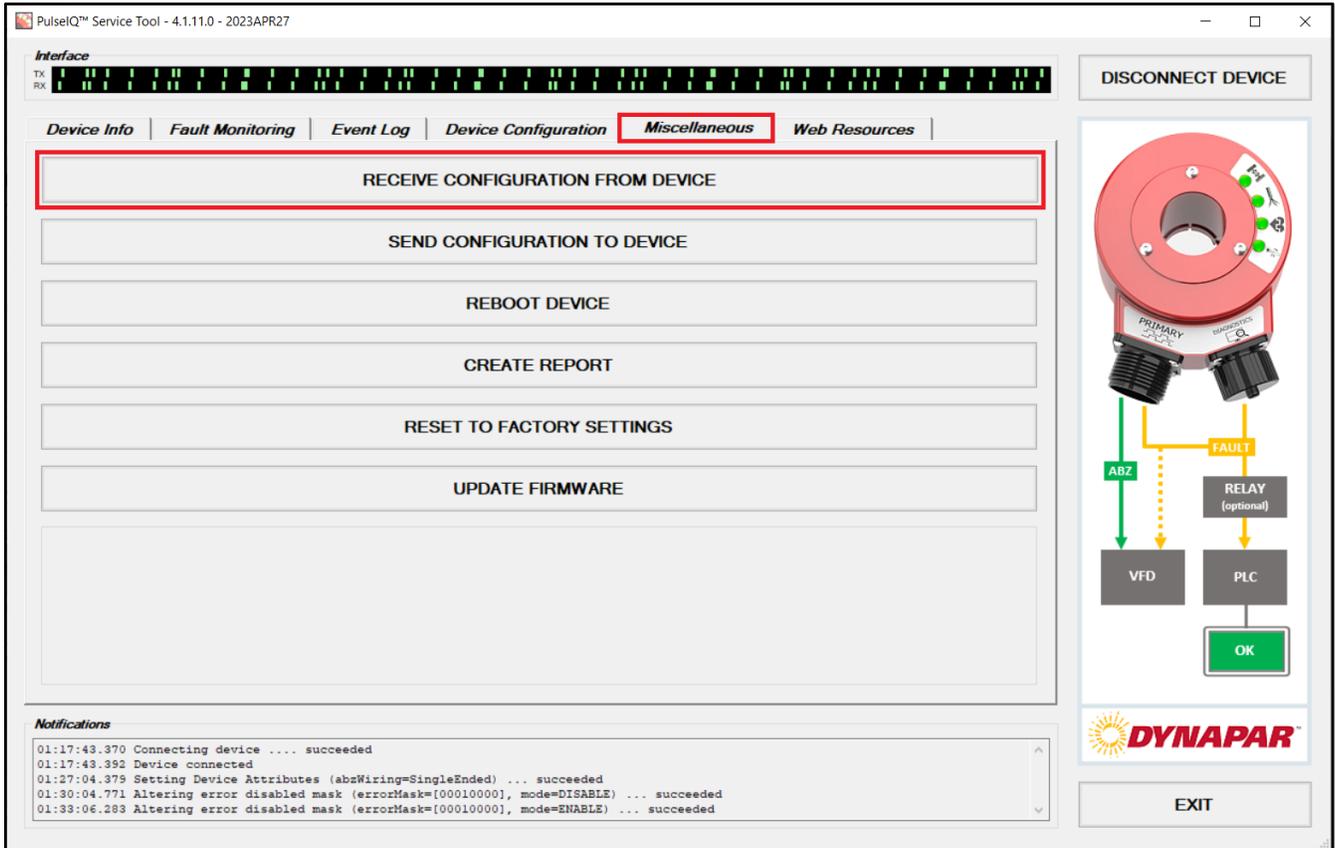
If you have questions, please contact OEM, distributor, or Dynapar customer service if you are unsure of the proper settings. (**for further information refer to troubleshooting FAQs in the later portion of the software manual)

Receive Configuration File

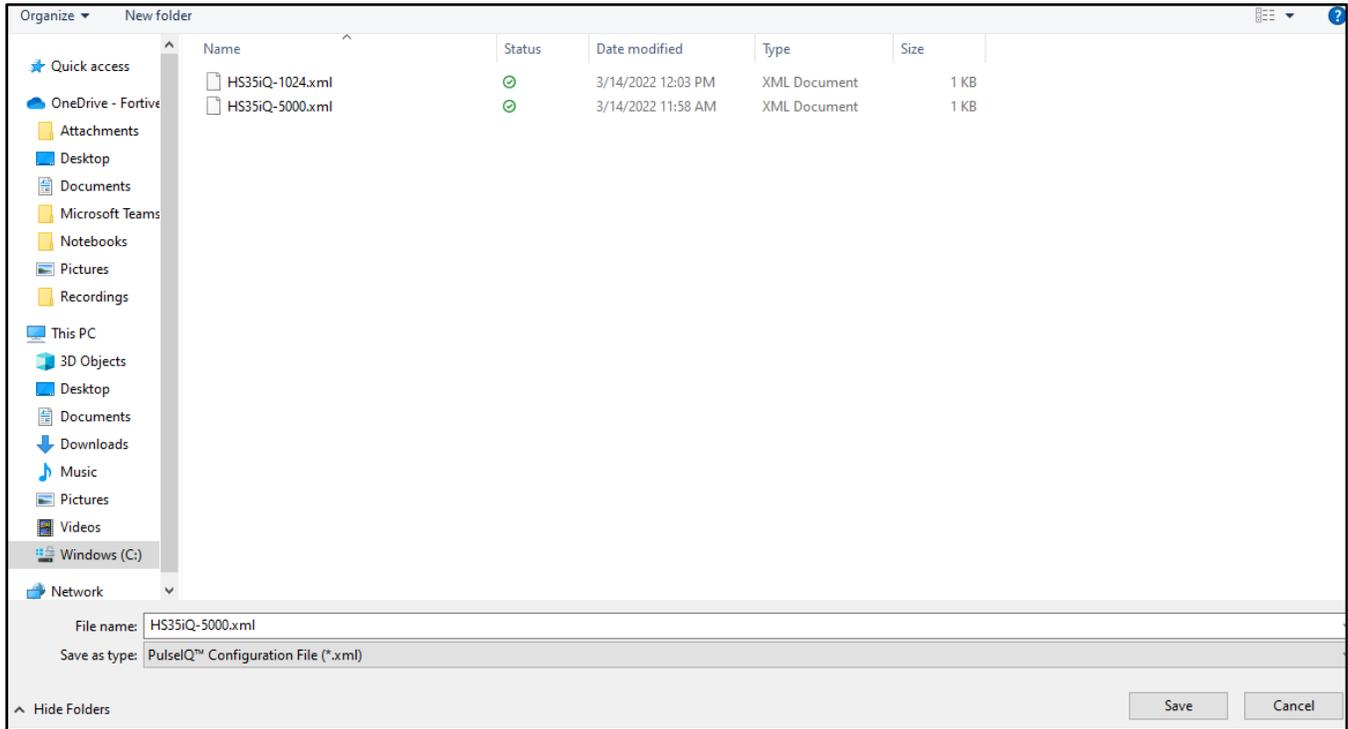
1. With the encoder connected, select the “Miscellaneous” tab.



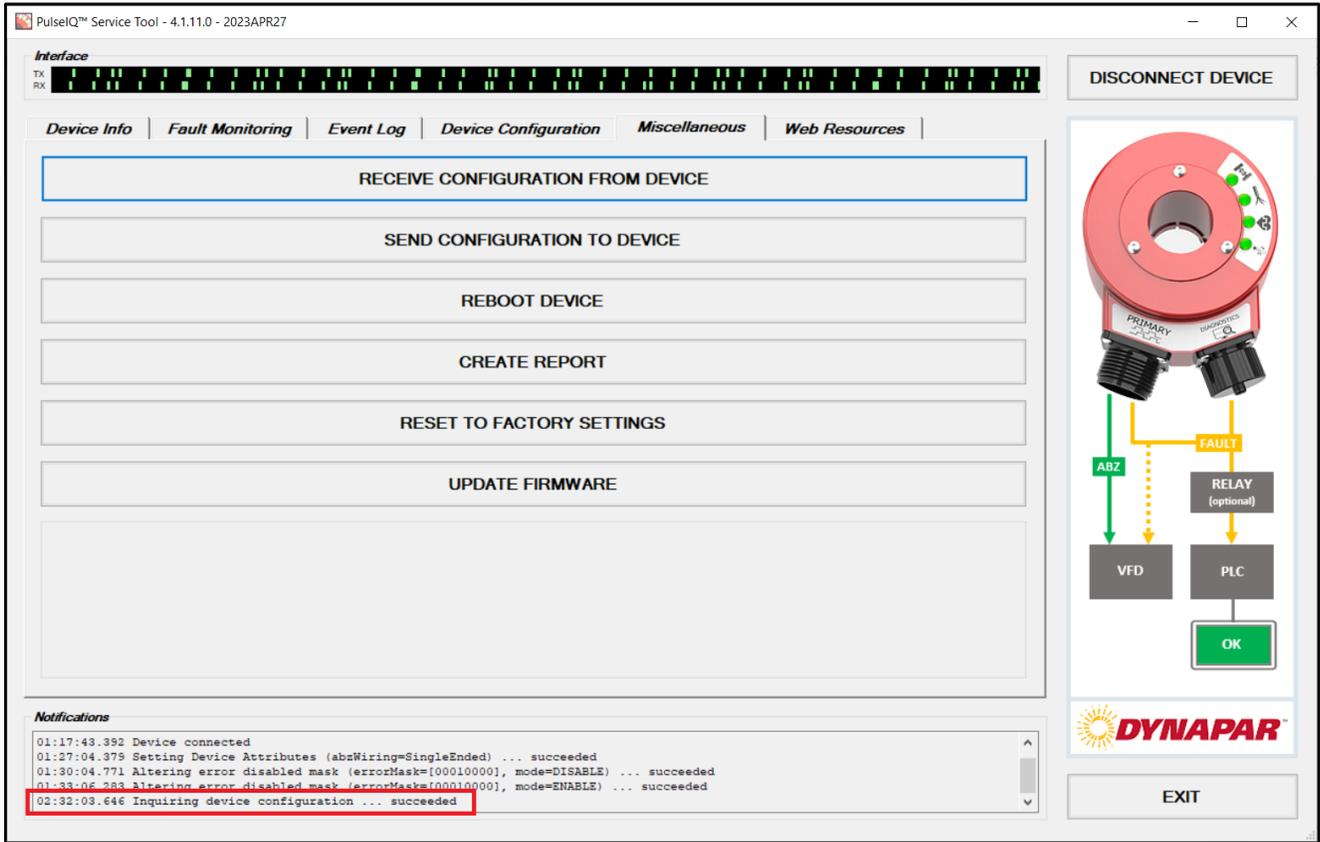
- Click on the **Receive Configuration from Device** button.



3. A window explorer screen will pop up. Navigate to the preferred folder, create a file name, and click “Save” to create a copy of your existing encoder configuration:

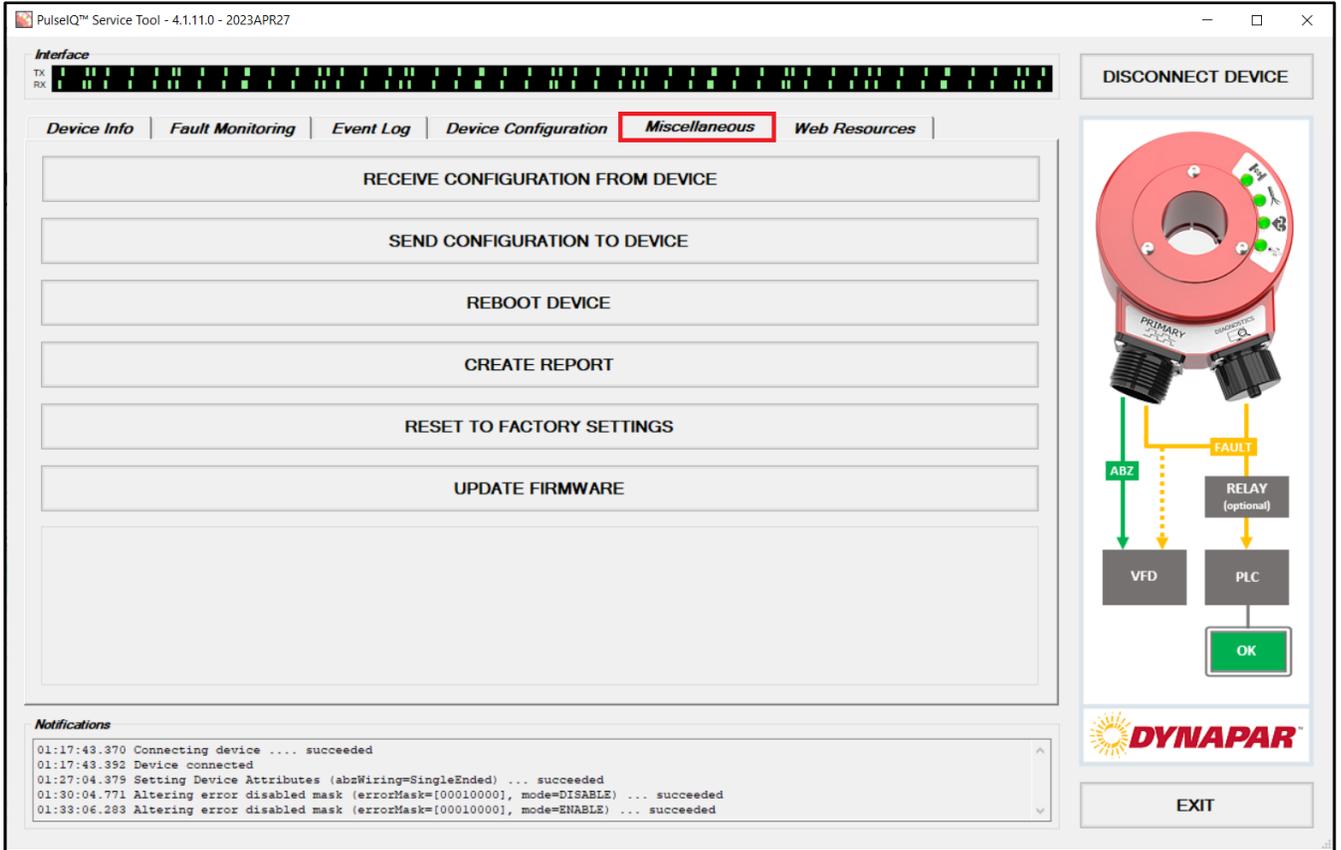


- 4. You have now created a configuration. A notification will appear confirming a successful configuration file has been created.

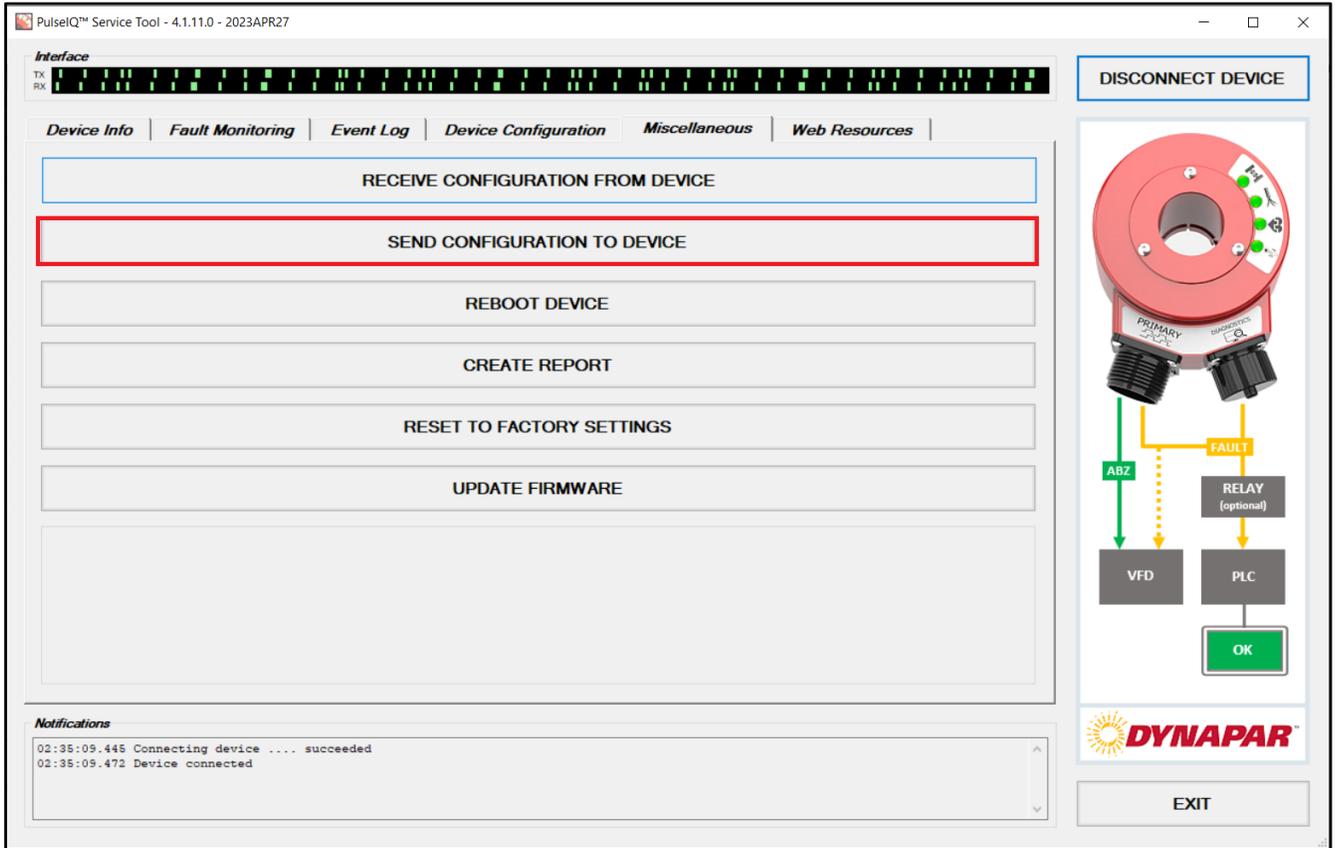


Send Configuration File

1. With the encoder connected, select the “Miscellaneous” tab:



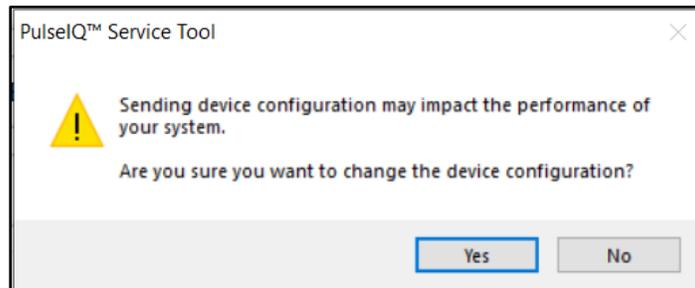
2. To upload predetermined configurations, select the **Send Configuration to Device** button:



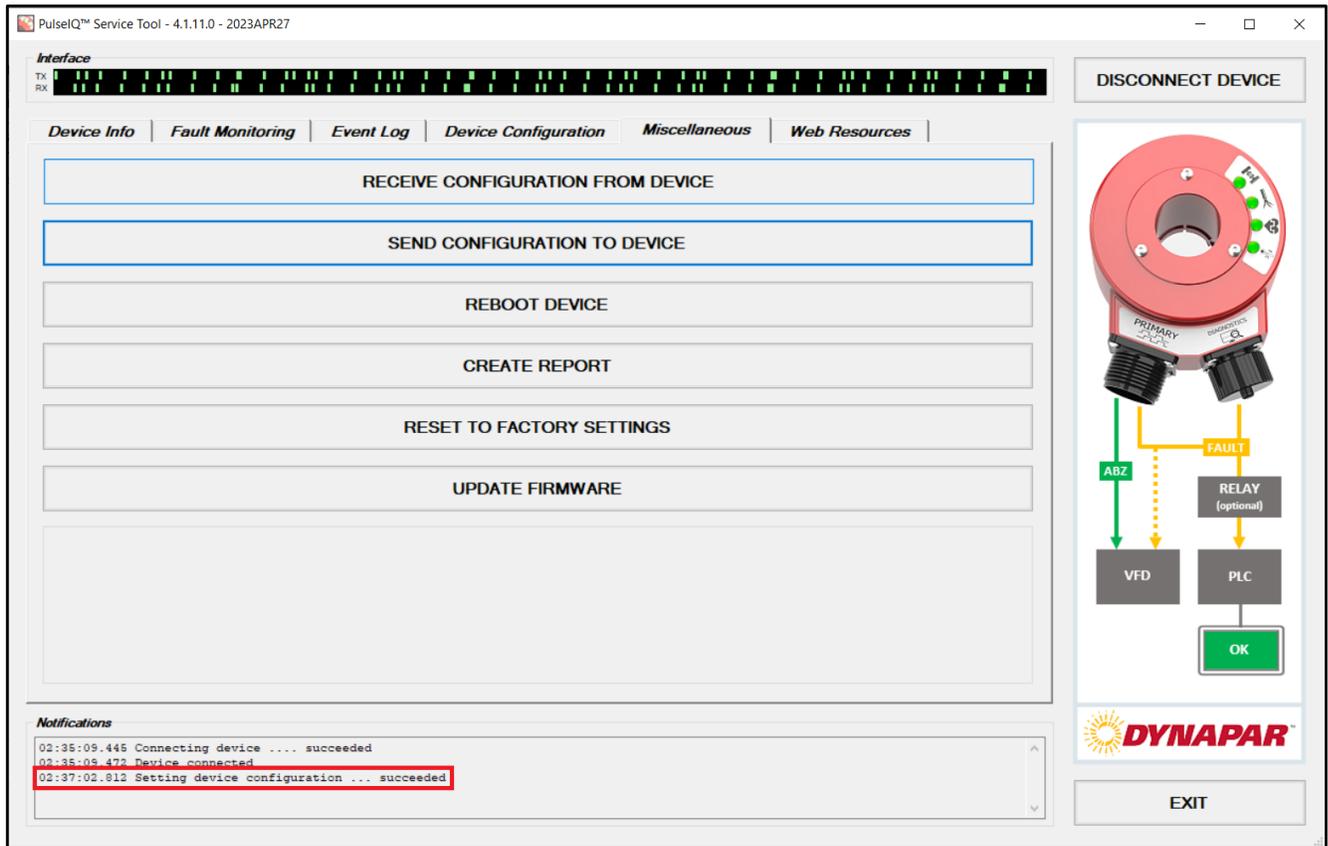
3. A window explorer will pop up. Find the folder which holds the configuration file and select “Open” (the configuration file must have the .xml extension).

Name	Status	Date modified	Type	Size
HS35iQ-5000.xml	✔	3/14/2022 11:58 AM	XML Document	1 KB

4. Upon selecting open on the configuration file, a pop-up message will display. Select “Yes” and the configuration will be uploaded.



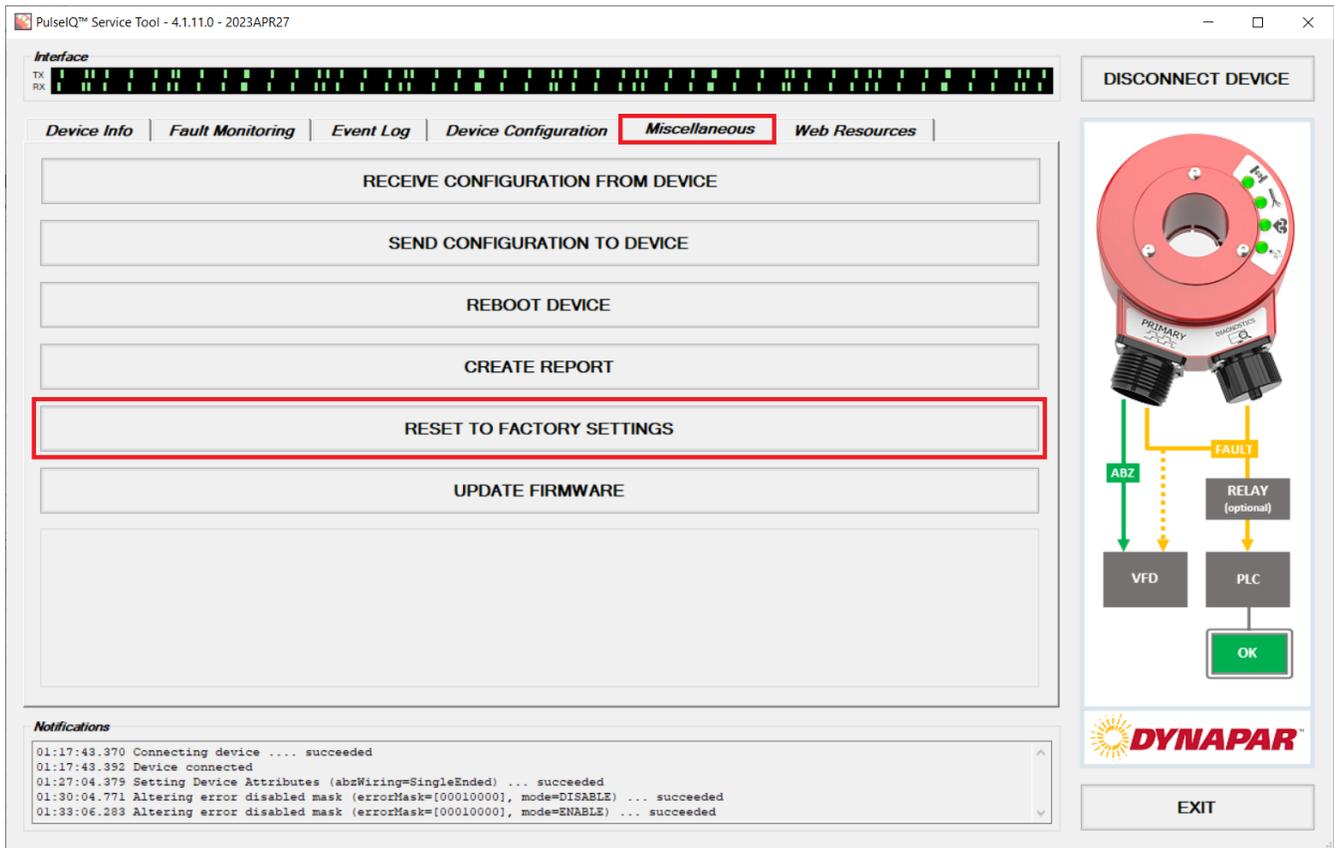
- 5. You will receive a message in the Notifications section which will verify if the upload was successful:



Reset to Factory Defaults.

Dynapar is not responsible for storing configuration files or changes to the programming of the encoder. For the original configuration file, please contact your original equipment manufacturers or system builder.

The software provides an option to **Reset to Factory Settings**. Note: This may vary from original equipment manufacturer configuration. You will be prompted to confirm the reset after clicking the button.



The Factory Default Settings, which can be found in the HS35iQ datasheet, are:

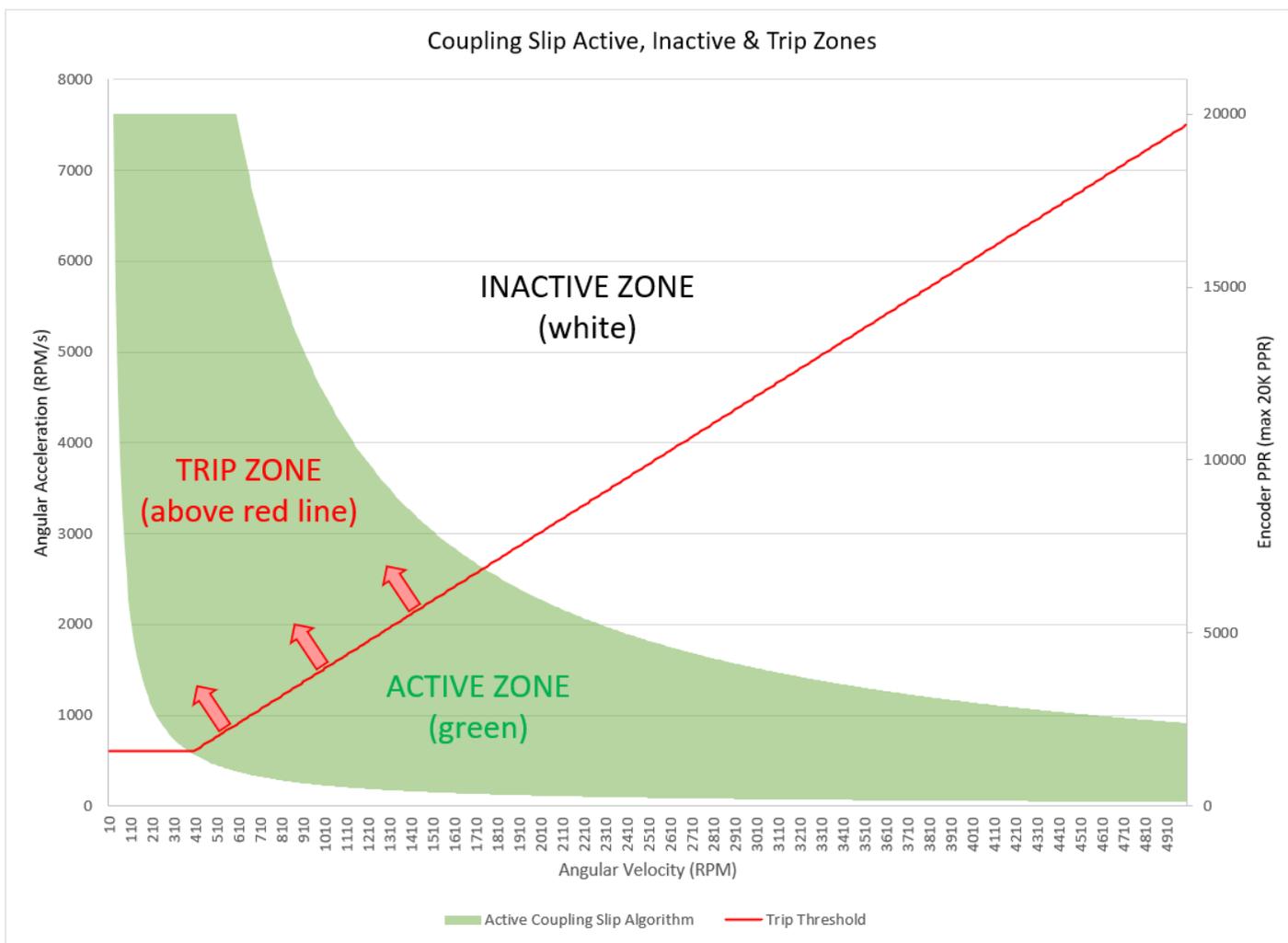
Specification	Factory Default Setting	Programmable Options
Pulses Per Revolution	1,024 PPR	1 to 20,000 PPR in 1 PPR increments
Phasing	A leads B, CW from clamp end	A leads B, CW from clamp end A leads B, CCW from clamp end
ABZ Signal Voltage	TTL (5VDC)	TTL (5VDC), HTL ($V_{out}=V_{in}$)
Z Index Pulse Polarity	Standard High	Standard High, Inverted Low
Z Index Pulse Position and Gating	180° electrical gated to B low	90°, 180° or 360° electrical, many gating options to A/B
Fault Signal Voltage	TTL (5VDC)	TTL (5VDC), HTL ($V_{out}=V_{in}$)

The factory default settings for non-programmable encoders may vary from the chart listed above.

Coupling Slip Configuration.

Detection of mechanical coupling slippage in HS35iQ PulseIQ™ Technology is derived from an analysis of rapid changes in an encoder shaft’s angular position. Slippage occurrence of the mechanical coupling is detected when an interval between a negative peak acceleration and a positive peak acceleration is less than what would be seen in standard control applications. The HS35iQ encoders are pre-configured with coupling slip settings to work with most applications’ speed profiles. However, if your acceleration profiles, relative to steady-state speed, exceeds the coupling slip trip threshold line shown in the figure below, an unwanted coupling slip event may occur. Upon request, Dynapar can modify the pre-configured coupling slip settings to account for applications with higher-than-expected acceleration ramp profiles.

The figure below shows where the coupling slip algorithm is active (green) vs inactive (white). Users should check that their application’s velocity and acceleration speed profiles stay within the active zone. For example, if the asset is running at a speed of 1000 RPM steady-state and accelerates/de-accelerates at 3500 RPM/s (above the trip threshold line), multiple times over a short interval, a coupling slip event may occur. For additional information on the coupling slip feature’s functionality, please refer to our “Detection of Coupling Slippage in Encoder Systems” whitepaper.



PulseIQ™ Technology Software Troubleshooting

Problem Observed	Possible Reason	Solution
Cannot connect to software	Drivers not properly installed, or connections might be loose	Go to https://ftdichip.com/drivers/vcp-drivers/ and download and install the proper drivers for your OS. Check your connections and make sure everything is plugged in correctly.
	Incorrect COM port selected	Verify the Interface is set to USB Serial Port option. If that still does not work, then try power cycling the encoder.
The LEDs stop pulsing	Internal micro has stopped operating	Power cycle the unit, if the problem remains then please contact Dynapar Customer Service
The coupling slip LED trips on direction change	Tether clamp or collar not properly secured or bore size not matched to shaft.	Make sure the tether is properly secured with little to no movement. Refer to the installation manual for further details. Make sure you have the right sized bore, clamp/collar is secure.
The coupling slip LED trips during rapid speed changes	The acceleration seen by the encoder is outside the normal range	Reduce the acceleration / deceleration of the motor or contact Dynapar technical support for a custom configuration file.
The coupling slip LED trips but I am sure the clamp collar is tight.	The overspeed detection error is being tripped.	Check the overspeed RPM value in the software and make sure it is set to a value above your max operating speed.
The cable fault LED light has turned red, but the connection has been verified to be correct	The load resistance value of the encoder is too high or too low and has caused a false trip.	Verify the load resistance value in the software is set correctly to match the resistance of your system.
The cable fault LED stays red	Some encoder signal connections might not be connected	Make sure all signal outputs are connected to a load. If you are using single ended mode, then make sure the Output Type is set correctly on the Fault Monitoring tab
Temperature LED has turned red	The temperature of the device has exceeded the warning temp or maximum operating temperature	Stop the motor/encoder. Check the area for excessive heat and bring the ambient temperature down.
If using a programmable unit, it is unclear what PPR should be set to.	My control device will accept different PPR outputs.	Recommend higher PPR for slower moving applications, lower PPR for fast moving applications due to limits of frequency response rate. Use this article to calculate your minimum PPR needed and maximum PPR control device will accept. https://www.dynapar.com/knowledge/how-to-calculate-encoder-resolution
Drive is counting in the wrong direction	Phase direction is set in reverse direction of motion	Change the phasing on the Device Configuration tab.
The feedback control loop is not operating correctly	Incorrect configuration	Contact the original equipment manufacturer and ask for the original configuration file.
There are missing events in the Event Log	The event log only holds 128 Events	If frequent events are happening, then check the event log regularly and record the data.
The Configure Device button is greyed out.	The encoder is rotating.	The ability to configure a device is not allowed while the encoder is rotating. This is a safety precaution to prevent damage in the event incorrect settings are sent to the device.
	The encoder model is not programmable.	Only part numbers starting with HS35IQPROGR can have their device configurations changed.
The encoder configuration settings are not correct.	The settings were changed inadvertently.	Click the Reset to Factory Settings button on the Miscellaneous tab to revert all settings back to the values that were configured at the factory.

PulseIQ™ Technology Software Customer Service and Technical Support

Call: 1-800-873-8731 option 3

Email: support@dynapar.com

PulseIQ™ Technology Software Agreement

Please refer to Dynapar's Terms and Conditions - https://www.dynapar.com/terms_and_conditions/

Appendix – Glossary of Terms	
ABZ Signal Voltage	Sets the output voltage for all encoder signals. Can be set to a static 5V (TTL) or be set to match the input voltage of the encoder (HTL)
ABZ Wiring Configuration	Used as an input to the cable fault algorithm. This setting shall match the physical connections to the encoder (single vs differential)
Boot Counter	Total number of times the encoder has been powered on
Cable Fault X Detected	Indicates an output wire has been shorted to another wire or lost connection
Circular Speed	Current rotational velocity of the encoder in RPM (Revolutions Per Minute)
Counter	An incremental count of every event that has been recorded. This will go back to 0 if the Event log is cleared.
Coupling Slip Detected	Indicates the shaft of the encoder has lost a reliable connection to the motor shaft or a coupling downstream of the encoder is loose
Create Report	Used to create a diagnostic report to send to Dynapar engineering for evaluation
Current Run Time	Elapsed operating time since the encoder was last powered on
Current Temperature	Current internal temperature of the encoder
Current Voltage	The voltage measured at the input of the encoder
Date Code	Date the encoder was manufactured in WWYY format
Event Log	Listing of the most recent events captured by the encoder
Fatal Encoder Error	Indicates the internal circuitry has failed and the encoder may not operate correctly
Fault Monitoring Error	Indicates the unit has lost some or all of its ability to detect errors. This does not mean the encoder has lost its ability to properly generate ABZ signals.
Fault Signal Voltage	Sets the output voltage of the fault output signals. Can be set to a static 5V (TTL) or be set to match the input voltage of the encoder (HTL)
Firmware Build Time	Date the firmware was released
Firmware Checksum	Value used to determine if the code was programmed correctly
Firmware Version	Current revision level of the code programmed in the internal microcontroller
Identifier	Unique internal number for each possible event type.
Interface	Name of the hardware connected via the USB port
Level	Severity level of the event posted in the log.
Load Input Resistance	Used as an input to the cable fault algorithm. The value placed in this box shall match the physical load impedance connected to each of the encoder outputs
Low Input Voltage	Indicates the voltage supplied to the encoder is below the recommended range. Can occur when powered by inadequate USB power supply.
Model Attributes	Reserved for internal use
Model Number	Part number of the device connected to the software
Number of Cable Faults	Total number of cable faults it has experienced over its life
Number of Coupling/Overspeed Faults	Total number of coupling/overspeed faults it has experienced over its life
Number of Electronic Faults	Total number of electronic faults it has experienced over its life

Number of Temperature Faults	Total number of temperature faults it has experienced over its life
Phasing	Setting to determine if A or B goes high first when rotating in a CW direction. This will be flipped when the motor direction is reversed.
Position Sensor Health	Early warning indicator the internal LED is close to end of life
Position Status	Indicates whether a valid position has been detected
Pulse Count	Current rotational position of the encoder expressed in pulses
Pulses Per Revolution	Number of pulses generated by each channel (A,/A,B,/B) per one revolution of the shaft
Reboot Device	Used to reboot the microcontroller inside the encoder. This will not affect the encoder signals.
Receive Configuration from Device	Used to save the current settings of the encoder to a file
Reset To Factory Settings	Used to revert all settings of the encoder as they were shipped from the factory
Send Configuration to Device	Used to change the settings of the encoder with a saved configuration
Serial Number	Unique identifying number for the encoder.
Set Home Position	Used to force the Z-Index to trigger at the current physical rotational location of the encoder
Temperature Error Limit	Indicates the internal temperature of the encoder is above or below the safe operating limits
Temperature Warning Limit	Indicates the internal temperature of the encoder is within the pre-configured value of the safe operating limits
Time Stamp	The elapsed time since last power up at which an event occurred,
Total Revolutions	Total number of revolutions the encoder has experienced over its life
Total Operating Time	Elapsed operating time since the encoder was initially powered on at the factory
Update Firmware	Used to program the encoder with a different version of firmware
Upper Circular Speed Error Limit	The value in RPM which will trip the speed alarm.
Z Gating	Determines at which rising and falling edges of A and/or B the Z-index will follow
Z Index Length	The length of the index pulse in electrical degrees. One complete A or B cycle = 360 electrical degrees
Z Polarity	Setting to determine if the Z-index voltage will be normally high or normally low