



Digital Proximity System

Software Installation Manual

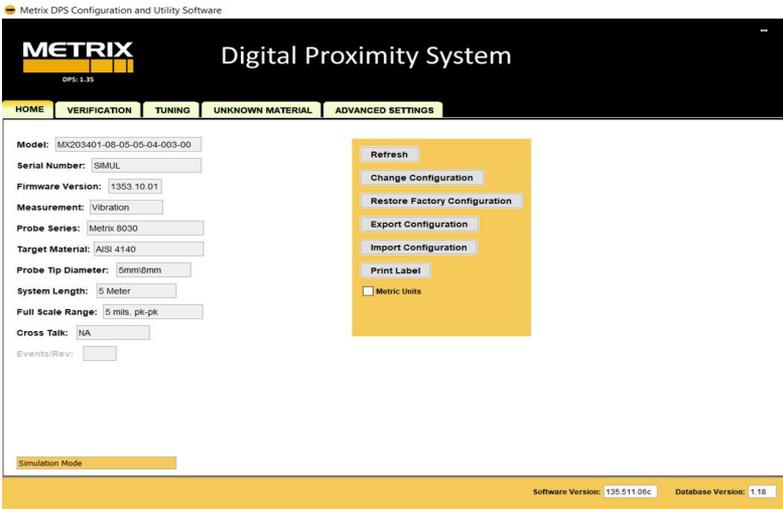


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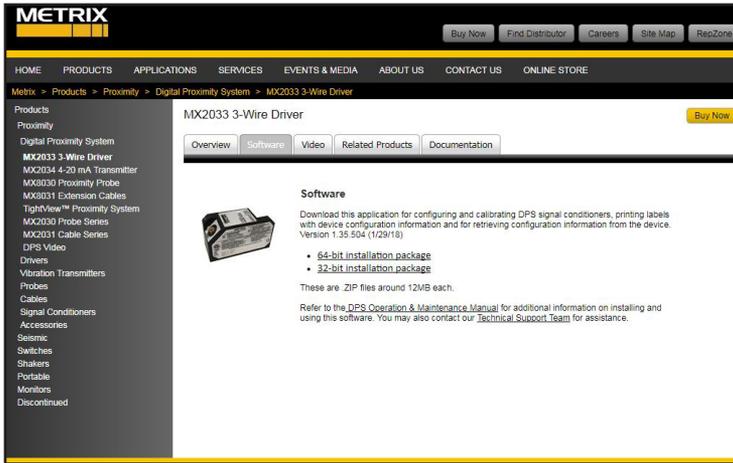
Purpose

The purpose of this manual is to:

1. Inform the user how to download the software from the Internet
2. How to install the DPS 1.35 Software
3. Describe the difference between Simulate and Actual Configuration modes
4. How to use the DPS 1.35 Software to perform:
 - a. Configuration Changes
 - b. Verification Checks
 - c. Custom Calibration
 - d. Generate Verification Reports
 - e. Export and Import Configuration Files
 - f. Print Labels
5. Take advantage of Advanced Settings, including:
 - a. Cross Talk Elimination (applies to both Driver and Transmitter)
 - b. Special Transmitter Settings:
 - i. Invert Buffered Output Signal
 - ii. Vibration Transmitter - Spike Suppression
 - iii. Position Transmitter - Upscale and Downscale
 - iv. Speed Transmitter - Threshold and Hysteresis
6. Helpful Hits while conducting Custom Calibrations for Trimmed Cables
7. How to Handle Unknown Target Materials

How to Download DPS 1.35 Software from the Internet

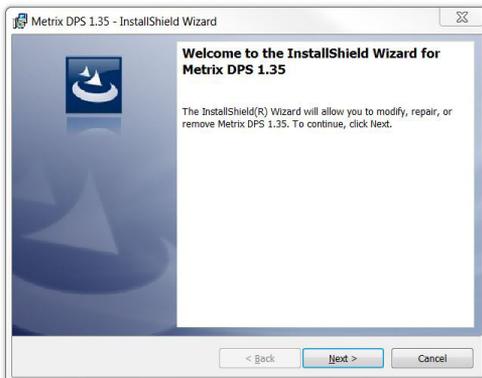
1. Go to the Metrix Website: www.metrixvibration.com
2. Go to the DPS 1.35 Software by following the following path: <http://www.metrixvibration.com/products/proximity/digital-proximity-system/product/655/mx2033-3-wire-driver> or as shown in the picture below:



3. Download and Save the 64-bit or 32-bit versions of the software as appropriate for your computers operating system.
4. After saving the file, click on the below executable (check downloads for location), to install the DPS 1.35 software. The file looks like this:

Name	Type	Compressed size	Password p...	Size
DPS1.35_x64	Application	7,815 KB	No	8,302 KB

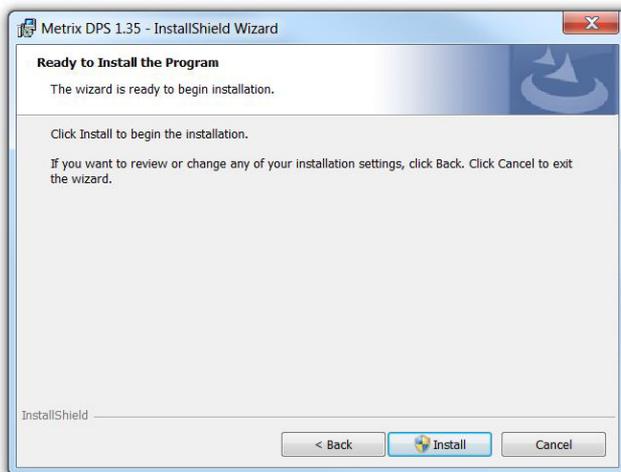
5. Click “Next” on the following screen:



6. After reading the End-User License Agreement, select "I accept . . .", then click Next.



7. Click on Install.



8. The DPS 1.35 software installation is complete, and is ready for use, click OK.



9. You have completed the steps of the DPS 1.35 Software Installation, click Finish.



You should now find the below icon on your desktop:



The software is now ready for use.

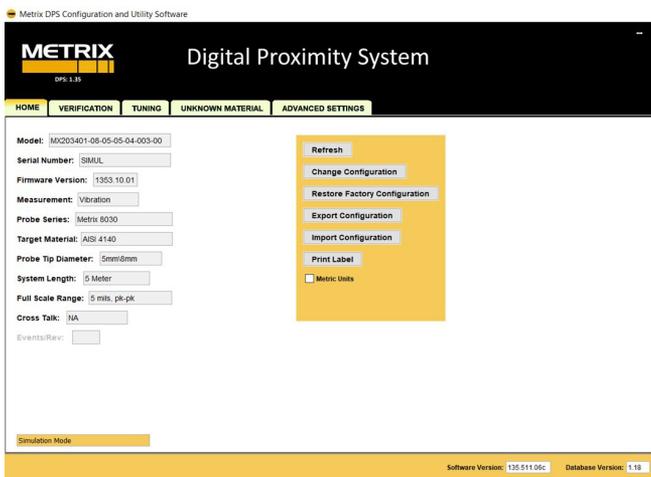
The difference between “Simulate Mode” and “Device is Connected” Modes

If no DPS 1.35 Unit (either the MX2033 Driver or the MX2034 Transmitter) is connected to the computer via a USB cable the DPS 1.35 Software comes up in the “Simulate Mode”. This allows the user to observe the entire breadth of the DPS 1.35 functionality. For a new user, the Simulate Mode is the best place to familiarize oneself on the features of the software.

If the DPS 1.35 Unit (either the MX2033 Driver or the MX2034 Transmitter) is connected to the computer via a USB cable the DPS 1.35 Software comes up in the “Device is Connected” mode. This allows the user to observe the features that are available for the MX2033 Driver or the MX2034 Transmitter as appropriate to the device that is connected.

How to use the DPS 1.35 Software Platform:

The DPS 1.35 Software can best be described by looking at the Home screen, as shown below:



The DPS 1.35 Software has five tabs across the top, titled Home, Verification, Tuning, Unknown Material and Advanced Settings. This manual describes each tab. You will notice that we are using the “Simulate Mode”. The following definitions apply.

Definitions

Home – this page is where the original Factory Configuration will be displayed and any future revisions to the DPS 1.35 Unit made by the user.

Verification - this page is where one can check the linearity of the proximity probe system, if non-linear, perform a Custom Calibration and Generate a Verification Report.

Tuning – use this page if you have changed the configuration from anything supplied from the Metrix factory. Following the steps outlined, this page is where one can check the linearity of the proximity probe system, if non-linear, perform a Custom Calibration and Generate a Verification Report.

Unknown Material - use this page if you want to calibrate the Metrix Digital Proximity System (DPS) unit to an unknown material. Using a shaft calibrator, like the Metrix 9060SCTS, follow the steps outlined, this page is where one can check the linearity of the proximity probe system, if non-linear, perform a Custom Calibration and Generate a Verification Report.

Advanced Settings – this page allows the user to take advantage of some of the special features of the Metrix DPS, like Cross Talk elimination, Signal Inversion, or Speed Pulse Adjustment or, if using the Vibration Transmitter, Spike Suppression, Position Upscale/Downscale, or advanced Speed Settings.

In the yellow highlighted box are the following:

Refresh – this allows a user to connect another DPS 1.35 Unit to the software, via the USB cable, without having to shut down and restart the software. Just clicking refresh will read the configuration of the DPS unit that is currently connected.

Change Configuration – this allows the user to change the configuration of the DPS 1.35 Unit to the system that is required, various probe types, material types, system lengths and scale ranges as appropriate for the device.

Restore Factory Configuration – this button allows the user to restore the DPS 1.35 Unit to the original factory configuration, after possible changes that were made after the unit was shipped from the factory.

Export Configuration – this allows the user to capture a configuration, including any

custom configuration and calibration features, to a file on the users computer. This file can then be used on other like systems, without having to go through the configuration menu options to create the appropriate settings.

Import Configuration – this allows the user to import a configuration, including any custom configuration and calibrations features, from a file on the users computer. This file retrieved from the user computer can then be used to configure the DPS 1.35 Unit, without having to go through the configuration menu options to create the appropriate settings.

Print – this allows the user to print a new label, that contains the changed configuration information, as well as other plant information that the users deems appropriate.

Simulation Mode – this is displayed when a DPS 1.35 Unit is not connected to the software.

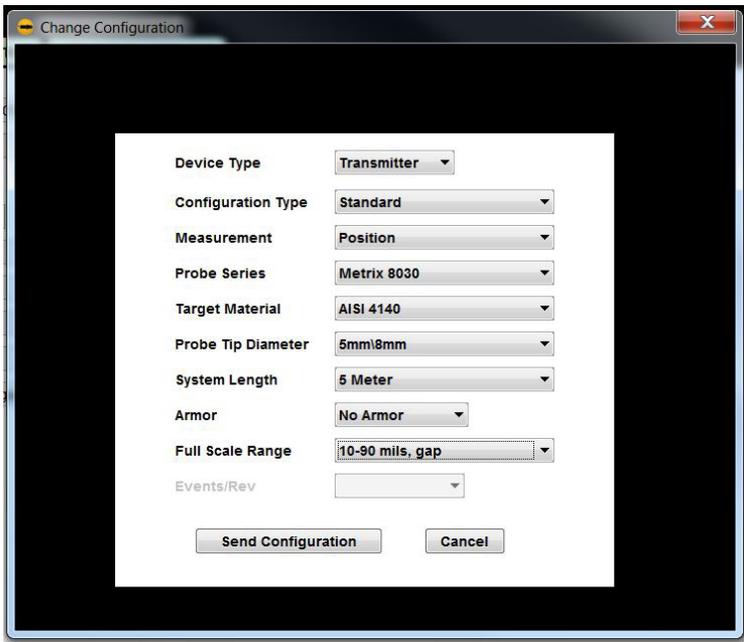
Device is Connected – this is displayed when a DPS 1.35 Driver or Transmitter is properly powered (24VDC) and is connected to the software via a USB connection.

Configuration Changes

The Change Configuration Menu is displayed by clicking on the “Change Configuration” button. Depending upon what device is connected will determine what menu features are active, below is the Change Configuration Menu for a MX2033 Driver:



The Change Configuration Menu for the MX2034 Transmitter is similar, but has added fields due to its increased functionality:

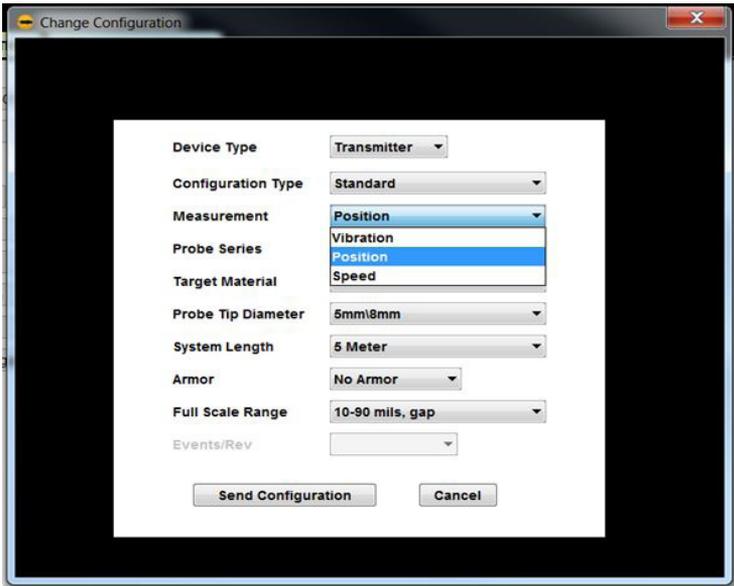


Each of the features of the Change Configuration Menu will be described below. **Please note – upon making any changes to the DPS Unit be sure to conduct a verification check to ensure the proximity probe system (probe, cable and DPS Unit) is within required tolerances.** The Metrix 9060 Series of Static Calibrators can be used for these system checks.

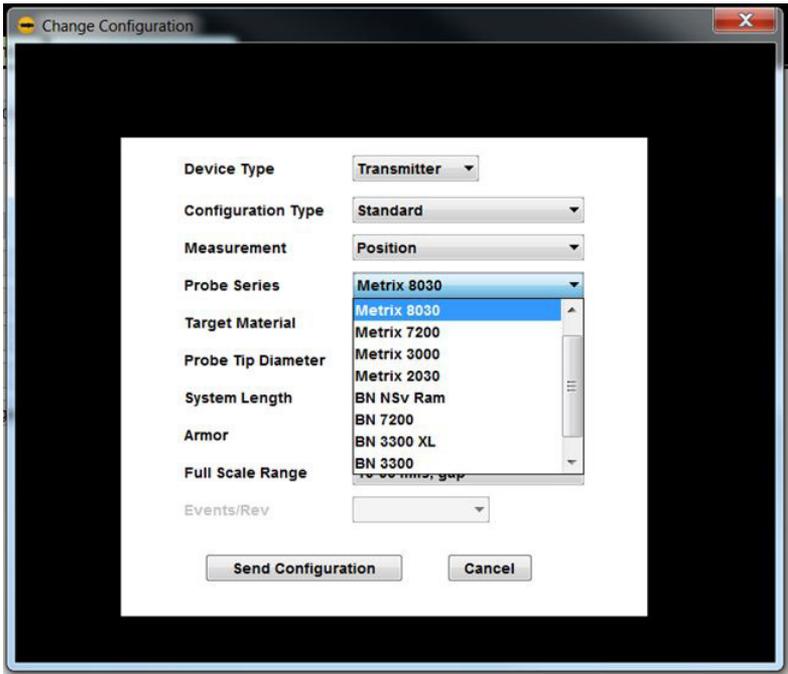
Device Type - will either be the MX2033 Driver or MX2034 Transmitter as appropriate to the Connected Device or the Simulated Mode.

Configuration Type – will use a Standard characteristic (linear curve) or a Custom characteristic from a Custom Calibration defined linear curve. If “Custom” is chosen the “Send Configuration” button is changed to a “Next” button, that will take the user to a Verification Screen to generate the Custom Characteristic (linear curve).

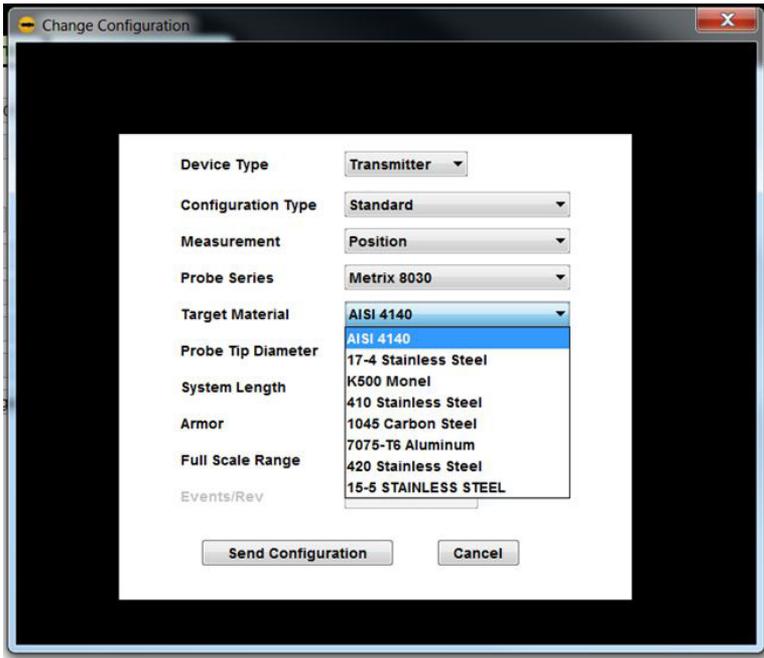
Measurement – is used for a MX2034 Transmitter. For a MX2033 Driver this feature is not necessary because the measurement is made in the Monitoring System. For the Transmitter it can be configured for position, vibration or for speed.



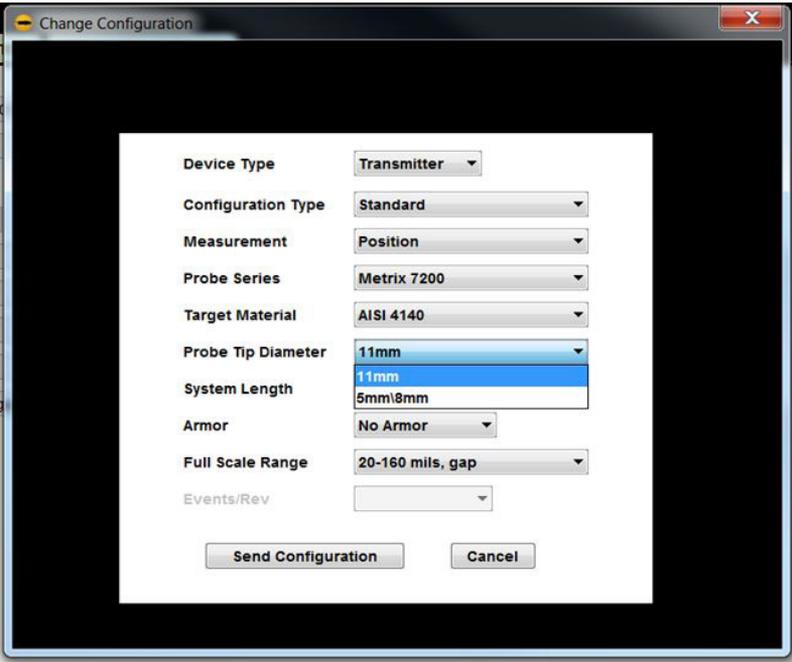
Probe Series – This allows the software to choose the appropriate linear characteristic based on the probe type, in combination with the target material, probe tip diameter, and system length. The most flexibility in the system is using probe series MX8030 and MX2030, the other probe series are limited to AISI 4140 Steel, and typical system lengths of 5, 7 and 9 meters. There are some unusuals like the BN and Metrix 3000 Series which only had lengths of 15 and 20 feet. This is also where you find the MX8030 TightView selection.



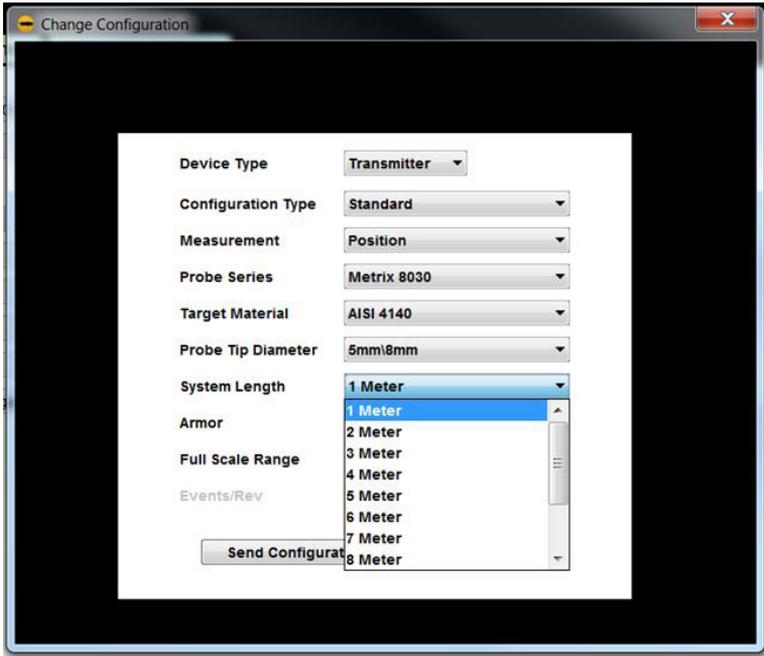
Target Material – This menu allows one to change the target material from AISI 4140 Carbon Steel to another shaft material. Only Metrix Probe Series MX8030 and MX2030 allows the user to change to the available materials listed. The materials listed represented 95% of the material types ever ordered from Metrix. If you do not see a material that you need, Metrix can add the material to the software upon request along with a small engineering fee. If you have a BN 3300XL Series Probe and you need a different material type other than 4140 you can configure the DPS Unit with the MX8030, select the proper material type, and you will achieve satisfactory results.



Probe Tip Diameter – Probe Tip Diameter selection depends upon the Probe Series. Most probes are 5mm/8mm, some probes like the Metrix 7200 and BN 3300XL also have 11mm probe tips. The 3000 Series probes have 0.19 inch and 0.30 inch diameter tips.



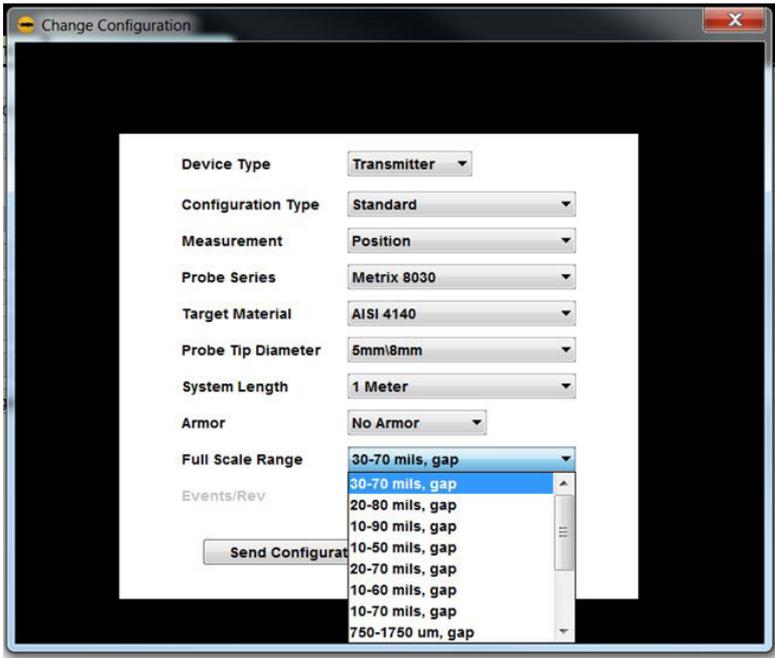
System Length – this feature allows the user to switch between standard system lengths for the Probe Series selected. For example, the Metrix 7200 and BN 3300XL has 5 and 9 meter System Lengths listed. The Metrix MX8030 and MX2030 Probe Series allow the DPS to take advantage of extended Systems Lengths from 1 to 12 meters for Vibration, and to 20 meters for Speed and Thrust measurements. If a user wants to use a length other than listed, like 7.6 meters, the user would use a 7 meter or an 8 meter System Length and perform a verification check to determine which length provided the best results. If the verification is not within limits a Custom Calibration can be conducted using the Verification Voltage values. Users can use the Metrix MX8020-001 Cable Trimming and Connector Kit to alter the length of a MX8030 probe or MX8031 extension cable. Users no longer have to keep coils of extension cable in their junction boxes.



Armor – This is used to slightly adjust the Proximity Probe System characteristics due to armored cable (stainless steel armor). If the Proximity Probe System Length is 50% of less, then the “No Armor” should be selected. If the Proximity Probe System Length is >50%, then “Armor” should be selected.

Full Scale Range – this feature is dependent upon what is selected for the MX2034 Transmitter measurement. The MX2033 Driver output goes to a monitoring system, so the Full Scale Range is not used. If the Transmitter Measurement was Position then the 4 to 20 milliamp scale can be selected for the appropriate displacement output, either in mils or microns (μm). If the Transmitter Measurement was Vibration then the 4 to 20 milliamp scale can be selected for the appropriate vibration output, either in mils pk-pk (peak to peak) or microns pk-pk. If the Transmitter Measurement was Speed then the 4 to 20 milliamp scale can be selected for the appropriate speed output in rpm (revolutions per minute).

Extended Range – This feature is used to extend an MX8030/MX2030 probe from a 10 to 90 mil (250 to 2250 μm) linear range to a 20 to 180 mil (500 to 4500 μm) linear range, simply by changing the Scale Factor Range. When using the Extended Range feature the Incremental Scale Factor (ISF) is changed from 200 mV/mil (7.87 mV/ μm) to 100 mV/mil (3.93 mV/ μm). Note: If one changes the configuration from factory, one must perform the Tuning and Calibration Steps.



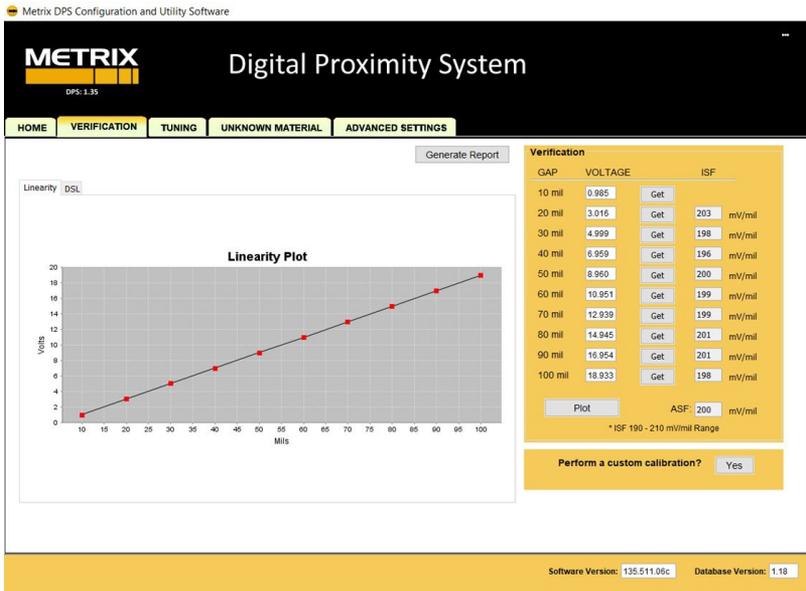
Events/Rev – stands for Events per Revolution. This applies when the MX2034 Transmitter is used as a Speed Transmitter. This is the number of pulses the phase trigger (speed) sensor is going to see for each revolution of the shaft. The number of pulses allowed depends upon the speed of the machine. The higher the speed the less pulses are allowed.

Tuning and Verification Checks

Verification Tab - The Metrix 1.35 DPS Software allows easy System Verification and Custom Calibration if necessary. After a verification is complete a Report specific to the DPS unit can be generated. This is used for out of the box, factory configurations. Note: If one changes the configuration from factory, one must perform the Tuning and Calibration Steps.

The Verification is completed using a Proximity Probe static calibrator (dial micrometer). When the proper gap is set between the probe and appropriate target material, use the “Get” button for the DPS to gather the voltage information. Please note that this process takes between 5 and 10 seconds, and cannot be filled in. It must be the voltage measured by the Metrix Digital Proximity System.

As the gaps are changed and voltages recorded the system draws the line between points, calculates the Incremental Scale Factor (IFS – slope between points), the Average Scale Factor (ASF) and the Deviation from Straight Line (DSL – 1 mil or 25 μm). Acceptable IFS for a 200 mV/mil Proximity Probe is from 190 to 210 mV/mil or 7.48 to 8.26 mV/ μm (200mV/mil + 5% or 7.87mV/ μm + 5%, per API 670).



Tuning Tab - If the probe and cable match the Factory Configuration on the DPS 1.35 Unit then the Tuning Steps are not necessary. Go directly to the Verification section. If the user has made a change to the proximity probe system, the user should go through the Tuning Steps to help with the System Verification.

1. The "Offset" is the first step and it is done with the Proximity Probe in open air, this sets the top end of the Proximity System characteristic configured from the Home page. Follow the steps as instructed.
2. The second step is done with the Proximity Probe gapped at 10 mils (250 μm). Select "1 Volt". This sets the bottom of the Proximity Probe range and ensures the System is oscillating properly. This "1 Volt" feature is also very useful in thrust applications to ensure the physical gap actually matches the electrical gap. With the Tuning Steps complete, if required, go to the Verification steps.

METRIX Digital Proximity System
DPS: 1.35

HOME VERIFICATION TUNING UNKNOWN MATERIAL ADVANCED SETTINGS

Tuning Steps

1. Move the probe away from the target (open position) and select 'Offset'.
2. Move the probe to 10 mil gap and select '10mil'.
3. Collect voltage readings at each gap setting.
4. If necessary, select 'Yes' to perform a custom calibration.

Linearity

Verification

GAP	VOLTAGE	ISF
10 mil	<input type="text"/>	<input type="button" value="Get"/> <input type="text"/>
20 mil	<input type="text"/>	<input type="button" value="Get"/> <input type="text"/> mv/mil
30 mil	<input type="text"/>	<input type="button" value="Get"/> <input type="text"/> mv/mil
40 mil	<input type="text"/>	<input type="button" value="Get"/> <input type="text"/> mv/mil
50 mil	<input type="text"/>	<input type="button" value="Get"/> <input type="text"/> mv/mil
60 mil	<input type="text"/>	<input type="button" value="Get"/> <input type="text"/> mv/mil
70 mil	<input type="text"/>	<input type="button" value="Get"/> <input type="text"/> mv/mil
80 mil	<input type="text"/>	<input type="button" value="Get"/> <input type="text"/> mv/mil
90 mil	<input type="text"/>	<input type="button" value="Get"/> <input type="text"/> mv/mil
100 mil	<input type="text"/>	<input type="button" value="Get"/> <input type="text"/> mv/mil

ASF:

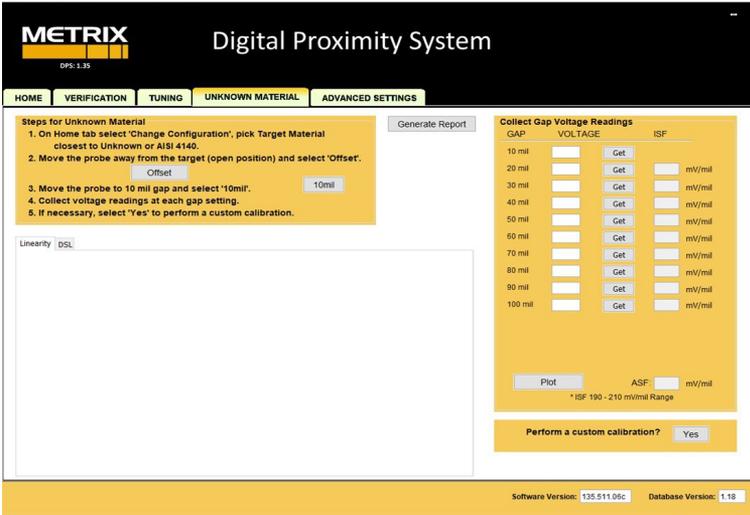
* ISF 190 - 210 mv/mil Range

Perform a custom calibration?

Software Version: 135.511.06c Database Version: 1.18

Unknown Material Tab - Use this page if you want to calibrate the Metrix Digital Proximity System (DPS) unit to an unknown material. Using a shaft calibrator, like the Metrix 9060SCTS, follow the steps outlined, this page is where one can check the linearity of the proximity probe system, if non-linear, perform a Custom Calibration and Generate a Verification Report. If the user has made a change to the proximity probe system, the user should use the Steps to help with the System Verification and Calibration.

1. The "Offset" is the first step and it is done with the Proximity Probe in open air, this sets the top end of the Proximity System characteristic configured from the Home page. Follow the steps as instructed.
2. The second step is done with the Proximity Probe gapped at 10 mils (250 μm). Select "1 Volt". This sets the bottom of the Proximity Probe range and ensures the System is oscillating properly. This "1 Volt" feature is also very useful in thrust applications to ensure the physical gap actually matches the electrical gap.
3. If the system is linear then a Custom Calibration is not needed. Generate a Verification Report. If you want to use the generated material curve on other like materials then use the Export function on the Home page.



Probes buried in a machine (inaccessible for Verification)

If the systems you are verifying have probes buried within a machine, use an identical probe connected to the extension cable to check out the proximity probe system. Using the appropriate shaft target material in the static calibrator, with the identical probe to complete the system, should provide accurate results.

Custom Calibration

If the Verification is satisfactory, then one can generate a report. If the Verification is unsatisfactory then the user can select “Perform a Custom Calibration – Yes”. This will use the voltages measured in the Verification Step to create a Custom Calibration for the DPS unit connected. To ensure the Custom Calibration was effective perform the Verification step again. If the Verification after the Custom Calibration is not satisfactory, do not do another Custom Calibration. It is recommended to change parameters like System Length, or Material Type as appropriate. It could also be a problem with the system set up, please refer to helpful hints at the back of this manual. Please note – that last point (100 mils or 2500 μm) is not required, Metrix put this in because we normally can meet this distance. The requirement is 80 mils (2250 μm) of linearity.

Generate Verification Reports

After the System Verification is complete a Report can be generated by selecting “Generate Report”. The system will prompt the user to input appropriate information for the test. None of the fields are required, but are usually necessary for proper documentation. The data from the DPS Configuration is automatically uploaded into the report. After the report fields are filled in, or not, the user selects “OK” and then the user is prompted to input a file name and file location. The file generated is a Microsoft Excel file. Upon opening the Excel file the header and footer can be changed, and the file can be supplemented with other verifications. Other verifications can be added, using the Excel copy and paste feature, to create a complete report.

Advanced Settings

Most of the Advanced Settings apply to the MX2034 Transmitter with the exception of Cross Talk Elimination.

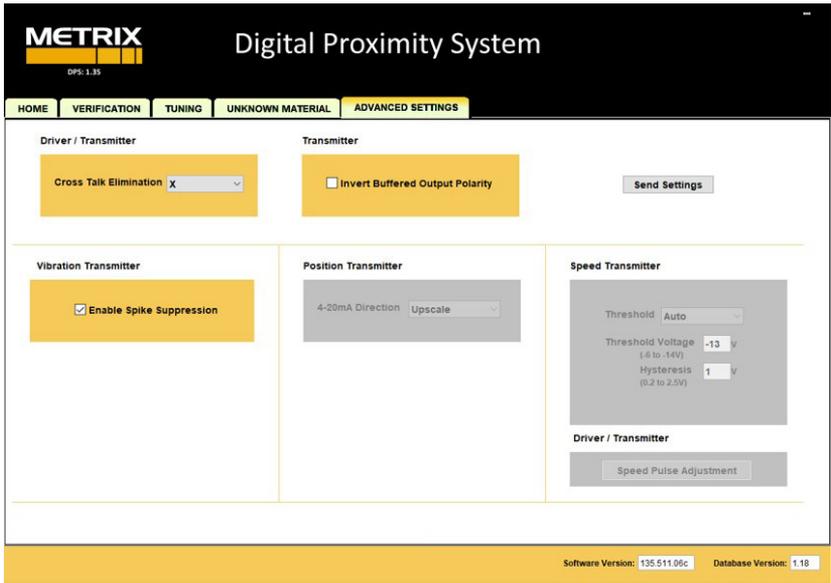
Cross Talk

Cross Talk Elimination is used when proximity probes are close together, typically less than 25mm. This feature is used on one of the probes that could interfere electrically with another probe close by. This feature shifts the oscillation frequency of the DPS unit so it is different from the adjacent probe, thereby, preventing Cross Talk interference. Do not use this feature on both probes that are close by. Only on one of the probes of the set.

The other Advanced Settings are used by the MX2034 transmitter. The MX2033 Driver takes advantage of the advanced settings within the Monitoring System.

Invert Buffered Output Polarity

Normal polarity is negative for output at the BNC of the MX2034 Transmitter, this feature allows the user to change the output polarity to positive.



Vibration Transmitter

Enable Spike Suppression: This feature is used to inhibit high amplitude electrical noise from outside the vibration monitoring system from impacting the performance of the vibration transmitter system. This feature temporarily suppresses high amplitude, short duration, typically less than 50 millisecond, vibration spikes. If this feature is selected, any vibration spike greater than the full-scale range will be suppressed for a duration of 50 milliseconds. During a Spike Suppression event, the output of the vibration transmitter will go to 2.6 milliamps for approximately 0.25 seconds to inform the Control System that a Spike Suppression event has occurred. Vibration amplitudes greater than the Spike Suppression setting, that last longer than the Spike duration setting, will be reported normally via the 4-20 mamp output. The dynamic output via the BNC, on the transmitter, is not impacted by selecting Spike Suppression.

Position Transmitter

Thrust Direction: The “Upscale” selection will correlate the low value of the full-scale range with the 4-milliamp output of the transmitter, and the 20-milliamp output at the high value of the full-scale range. The “Downscale” selection will correlate the high value of the full-scale range with the 4-milliamp output of the transmitter, and the 20-milliamp output at the low value of the full-scale range.

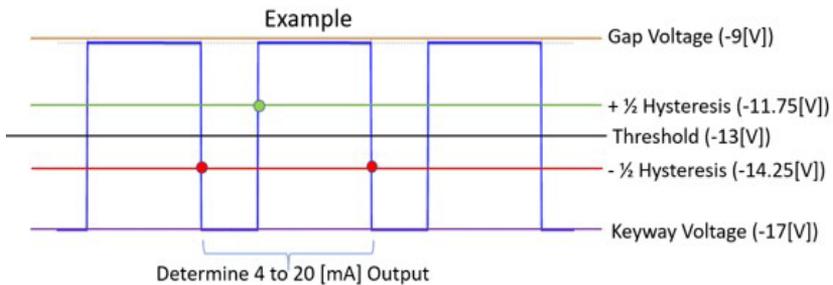
Speed Transmitter

These steps are used when installing, operating or troubleshooting a Metrix Speed Measurement System. **From the factory Metrix has done several things to help ensure the speed system is easy to install and provides excellent data:**

1. If necessary, use Cross Talk Elimination, so the systems don't electrically talk to each other. The ability to change the frequency of the Oscillator Demodulator is enabled in the DPS Software. This allows one to purchase a new DPS Unit and adjust the frequency as required in the field for X and Y frequencies for the 5-meter and 9-meter system lengths.

2. Increased the Auto Speed setting hysteresis to 2.5 volts to prevent low level noise from being counted as speed (July 2020). The Auto Threshold is set at half the peak to peak value of the voltage sensed. At zero speed, or even at high speed, if there is low level noise it is possible for the counter to detect the changes in voltage, and due to the noise give erroneous speed readings, even when the unit is not rotating. To prevent this the Auto Threshold has to see a pulse greater than 2.5 volts to be counted, so low level noise must be greater than 2.5 volts peak to peak to be counted.

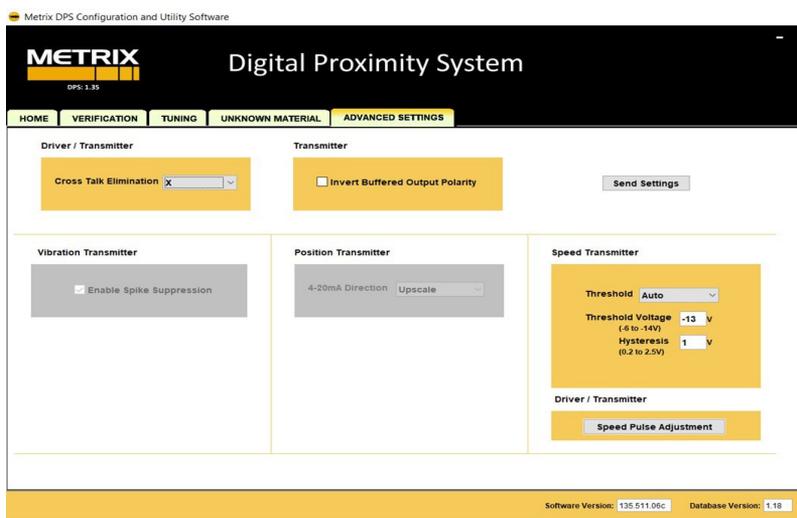
3. The diagram below shows the voltage of a keyway and how the Threshold and Hysteresis values work. Note: half the peak to peak voltage is -13 Vdc ($(-9 \text{ Vdc} + -17 \text{ Vdc}) / 2 = -13 \text{ Vdc}$).



The Hysteresis feature is used to improve the performance of the speed measuring system. Threshold is used with a 'Speed' selected transmitter, this feature allows one to use an Auto Threshold setting (Auto is set at the Factory), which will trigger the DPS when the voltage passes through half (1/2) the peak to peak amplitude with a dead band of 2.5 volts, or Manual Threshold setting where the user can select the Threshold Value (usually -13 Vdc) and a hysteresis band of up to 2.5 Vdc for a negative going pulse. One must ensure the negative going pulse will produce a more negative voltage than the Hysteresis dead band. Hysteresis creates a dead band around the Threshold Value.

For example, if the Threshold was set at -13Vdc, and the Hysteresis was set at 2.5 Vdc, the negative going pulse would have to pass -14.25Vdc ($-14.25\text{Vdc} = -13\text{Vdc} - 1.25\text{Vdc}$) to have the counter within the transmitter see the pulse, and then the counter would not reset until it saw the voltage pass through -11.75Vdc ($11.75\text{Vdc} = -13\text{Vdc} + 1.25\text{Vdc}$) on its way back to the original gap voltage. Using Threshold and Hysteresis are ways to help reduce noise and increase accuracy in a speed measurement system. The same or similar adjustment can be made in a Monitoring System.

4. If the pulse height from the MX2033 Driver is not large enough for the Monitoring System to provide a reliable speed indication, or the MX2034 Transmitter is not providing a large enough pulse to have a reliable 4-20 mA speed output, then take advantage of the “Speed Pulse Adjustment” in the DPS Software “Advanced Features” tab:

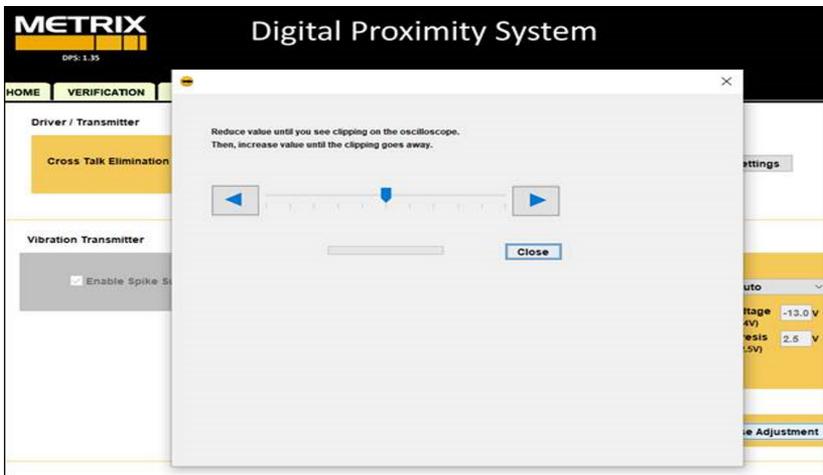


Caution: This process is done with the machine running. Take necessary precautions to ensure safe work and prevent an unnecessary shutdown.

With the machine running, connect an oscilloscope to the BNC of the monitor or transmitter to observe the speed pulse AC waveform. Connect the DPS Unit to the computer with the DPS Software.

Export the current configuration of the DPS Unit to the computer. This is done in order to restore the configuration to the DPS Unit if necessary.

Go to the “Advanced Settings” tab. Select the button “Speed Pulse Adjustment”, you will see the following screen:



While observing the pulse height of the speed output on the oscilloscope, move the slider bar several divisions in the left direction and observe the impact on speed pulse height. If the move is favorable, continue to move in that same direction until the pulse height is greater than 5 V pp. If the move is unfavorable, move in the opposite direction until the pulse height is greater than 5 V pp. This control changes the scale factor of the DPS Unit to optimize the speed pulse, to provide an adequate pulse for a reliable speed reading. It is used only as necessary.

Helpful Hints while conducting Custom Calibrations for Trimmed Cables

A couple of Cable Trimming Rules:

1. If you are running hot (> 200 mV/mil or 7.87 mV/ μ m IFS) choose a shorter system length.
2. If you are trimming a cable it is better to run cold (< 200 mV/mil or 7.87 mV/ μ m) then hot, running hot will often put you over 19 volts which will limit your range on a Custom Calibration.

Competitive Probes

1. If you are using BN 3300XL probes and cables, and you need more options than what Metrix provides in our DPS 1.35 Software, then use the Metrix MX8030 Series to configure the BN 3300XL.

How to Handle Unknown Target Materials

Take advantage of the Metrix 9060-SCDM (Shaft Calibrator Dial Micrometer – for 5mm/8mm probes, with 4 inch (100mm) probe bodies or less) or the 9060-SCTS (Shaft Calibrator Touch Select – for 5mm/8mm/11mm probes including probe holders, with 2.5 inch (75mm) probe bodies or greater) to calibrate the Metrix DPS with the unknown shaft material. These systems allow one to take data directly on the shaft target material.

Unknown Target Materials result in a trial and error process. For the first iteration, use AISI 4140 Carbon Steel material type. If the verification check is running cold (< 200 mV/mil or 7.87 mV/μm for IFS) then a custom calibration should be effective. If the verification is running hot, and exceeds 19Vdc, try a less dense material like one of the stainless steels.

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info@metrixvibration.com
www.metrixvibration.com
8824 Fallbrook Dr. Houston, TX 77064, USA
Tel: 1.281.940.1802 • Fax: 1.713.559.9421
After Hours (CST) Technical Assistance: 1.713.452.9703