

## Engine Polygraph FAQ

2020-12-03

Q1: I get security warnings from my PC when installing EPRReader. Is it really safe to install?

A: The EPRReader application may trigger a security warning prior to installing. Please disregard the warning. You can verify that the file is signed by looking at the properties under the digital signature and see that Predictive Fleet Technologies is the one signing the file with a properly encrypted digital signature from GlobalSign. The software is safe and free of any viruses when signed and will not harm your computer if installed.

With the default security setting in Windows 10 or MS Edge, any file you try to install, signed or not, will give that security warning up front. You may change your setting to "Enable" for downloaded software. However, changing that setting throws up a big warning that your computer is no longer secure.

Q2: My exhaust pressure readings are very low. What might be wrong?

A: A hole in the tailpipe or muffler might be a cause. If so, temporarily plug the hole with wet rags taking care not to actually plug the exhaust stream itself.

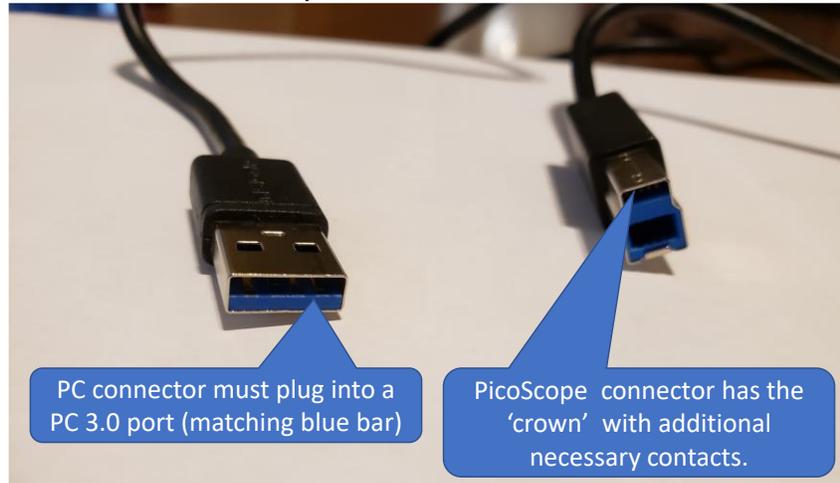
Or put the hose from the sensor into the hole, directed toward the engine.

B: Be sure the spring clamp has not slipped and is not pinching the rubber hose of the exhaust sensor, constricting the flow to the sensor.

Q3: Some of my signatures have plateaus on the peaks and valleys and/or show extreme voltage ( $\pm 50$  V). Sometimes the EPRReader screen disappears during the process of collecting a signature. What causes such erratic behavior?

A: The PicoScope oscilloscope must be connected to your PC/laptop with a 3.0 USB connector (blue bar in the PC side of the connection.). This is needed to provide adequate bandwidth for the high-speed data transfer required and to provide sufficient power to the PicoScope.

## PC-PicoScope 3.0 USB connector



Q4: Will I be charged for an assessment that does not produce a report?

A: No. If the assessment fails for any reason, you should not be charged.

Q5: What is the ideal sample size (time sweep) for the scope to get an accurate Assessment report?

A: If you are using EPReader, the software will control the sweep duration. The time sweep must be long enough to include 5 rotations of the crankshaft (in a 4-stroke engine): 1500 rpm = 500 ms; 500 rpm = 1000 ms (1 second); 250 rpm = 1500 ms; 3000 rpm = 200 ms. The sweep may be longer than the indicated values; a 500 ms sweep should cover a wide variety of engine speeds.

Q6: Is it important to keep the engine speed constant during the signature capture?

A: Yes, very important if you are requesting an Engine Polygraph report. The reports measures differences in the time of the strokes among the cylinders. A variation of engine speed during the signature can alter the report interpretation. This is a reason to keep the time sweep near the lower limits described for the sample size/time sweep. If you use EPReader, that program will accept the input only if the engine is at a steady rpm.

Q7: How accurate does the RPM need to be when I enter it on the Signature record?

A: The RPM is calculated based on the signature data, so the value you record should be similar. The report shows the input estimate and the value determined by the software (in parentheses). Typically, your estimate needs to be within about 15% of the actual RPM. You can change your estimate on the EDIT screen for the signature and re-submit to get a revised report. You will not be charged for a report from an edited signature.

Q8: Sometimes I get more or fewer peaks in the exhaust 'Model' graph in an engine cycle (between the two vertical, solid red lines on the graph = 2 revolutions for a 4-stroke engine) and the scores are worse than I believe is realistic. What's up?

A: (Read the next question, too.) If your engine is firing on all cylinders and your input estimate of RPM is too high, you may get too few peaks (cylinders) displayed and consequently, poor interpretation of the data; if your estimate is too slow, you will get too many peaks, also with poor interpretation. In either case, use the EDIT function of the Signatures screen to increase or decrease your input estimate by about 15% and SAVE the revision. The data file is unaffected by the estimate so you don't need to upload a new file.

Q9: On some newer V-configuration engines, I get about half the number of peaks in an engine cycle as there are cylinders in the engine. What's up with this?

A: Some engines have a form of 'cylinder deactivation' to reduce the number of cylinders burning fuel with light load. Some V8s operate on only 6 or 4 at such times. The engine should fire on all available cylinders when at idle, so you should run a signature at Condition = 'Idle'. Some other modern engines are designed so the exhausts from different banks are combined to minimize turbulence and back-pressure. In either case, you may change the input rpm estimate to ½ the observed value and re-run. The analysis will be normally be quite valid by 'averaging' the two engine cycles of 720° each. The system has data for each engine model and should indicate if you are running a 'CD' engine at other than Idle.

Q10: Help me understand how to get the crankcase sensor data with unusual dipstick tubes.

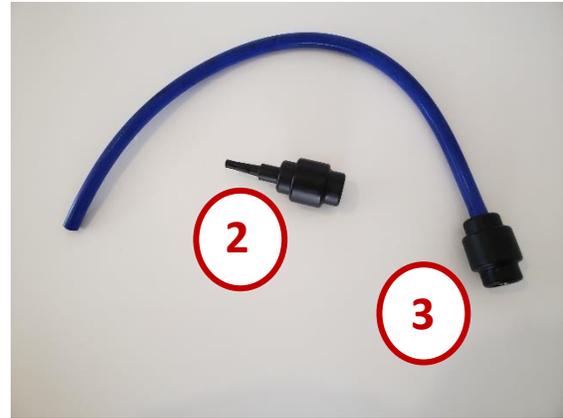
A: We provide a set of attachments to cover many oil dipstick tubes: The tapered nozzles handle many tubes and sometimes the short rubber tube that is provided will do the trick. The three-way adapter handles a number of large vehicles to the Harley-Davidson motorcycles. In addition:

1. Some smaller engines (Yanmar, etc.) have 1.25" ID oil fill/dipstick tubes. We provide a 1.25" OD plastic tube with 1" ID for the 3-way adapter in the kit.



2. To get a sample from a common Cummins dipstick tube with the notched 'cup' at the top, we provide a tapered nozzle with no ribs that fits into the cup to get a good access. Some people have used a pair of clear, narrow plastic tubes, one glued to the interior of the wider tubing. The narrow tube can go down into the dipstick tube and a tapered nozzle can fit into the wider tube.

3. Some horizontal exhausts now have baffles to reduce the danger of starting grass fires from the heat of DPF regens. (E.g., Paccar) To accommodate these, we provide a 27" silicone rubber hose that can be used to 'thread' through the baffles to get a good exhaust pulse from the exhaust. The FirstLook sensor with tapered attachment can be inserted to the external end of the hose.



4. The clamp of the provided exhaust sampler might slide and squeeze the silicone hose. Verify that the clamp is over the metal insert that is designed to prevent distortion of the airflow from the exhaust to the sensor.



Q11: The adapters that came with the diesel kit are not providing a snug fit in the oil filler tube. What should I do?

A: As long as the section of hose attached to the threaded sensor has a 3/8" I.D., the O.D. of the short segment going into the oil filler tube can be of any dimension to fit, provided the opening at the end is not less than 1/4" I.D.

Q12: Is it important if the waveform goes off the screen in places?

A: Yes, the file created by the PC oscilloscope reports a value at a moment only if the voltage is within the range that you have specified for that sensor. If that happens more than rarely, the software will not be able to give a reliable interpolation. (The software will attempt 'curve fitting' to estimate the missing values if there are not too many missing values.) If you see that the waveform exceeds the limits of the display, increase the range for the channel.

Q13: My system does not seem to recognize the PicoScope driver. I've checked connections but it still doesn't work. Be sure you have downloaded a production version of the PicoScope Automotive 6 software. Do **not** download a beta version.

A: Several things could be happening.

1. The Pico device drivers that control data between the PC and PicoScope are installed specifically for the driver that was connected when installed. If you plug into a different port later, the system should install the driver to that port. But if it did not re-install the driver, continue to step 2:
2. The Pico device driver might have been corrupted:
  - a. Look at the Device Manager in the Windows Control Panel.
  - b. 'Right-click' to see if it proposes to Update the driver. Choose 'yes' if the choice is there.
3. The Pico software might have been corrupted:
  - a. Uninstall the Pico software and then re-install if from a new download from the Pico website.
  - b. Reinstall the Pico software (should be at: C:\Programfiles(x86)\Pico Technology)). If not there, download a new copy/version from the Pico website.
  - c. Restart the computer

Q14: Can I combine multiple signatures in one file for upload?

A: No. Each signature should be a single file, normally 200-300kB in size. This is important if your PC oscilloscope preferences specify storing multiple buffers; if so, save only one for upload to Engine Polygraph.

Q15: The \*.psdata file is too large for the Engine Polygraph to upload. What should I do?

A: Chances are that you either are saving a very long duration (much longer than 500 ms) or you are saving multiple buffers of data. Pico allows you to capture up to 32 buffers (separate signatures) for you to browse. (See Preferences.) Pick one that looks stable and save it. Select the option to Save 'Current waveform only' and upload that one into Engine Polygraph. Engine Polygraph will analyze only one waveform in an Assessment request.

Q16: How accurate does the engine temperature need to be when I enter it on the Signature record?

A: The temperature should be within plus or minus ten degrees of the actual engine temperature. This is used to allow you later to compare reports; an engine that has not been warmed up may be going through various air/fuel ratios, spark plug timing advances, etc. that will affect the interpretation. Normally you want the engine near driving operational conditions. Diesel engines typically need the engine parts at operational temperatures so that they are expanded, presenting a 'tighter' engine.

Q17: Can I take a signature with a cold engine?

A: Our experience suggests that the engine coolant temperature is not very significant for gasoline engines. But diesel engines should be warm to at least 160°F (72°C).

Q18: How should I name my signature files?

A: The Pico software proposes a filename with the current date followed by a sequence number. You might add a short description of the vehicle/engine and the rpm from the tachometer. This should make it easier to spot for the upload process. You may want to delete the file from your PC after you upload it.

Q19: The EPReader and/or the PicoScope Automotive software indicates that one of my assigned channels is providing no signal.

A: If the connections are right. If you try a different cable to that sensor and the problem persists, exchange the sensors. If the problem does not shift to the other channel, you may have a PicoScope failure. If so, contact your closest PicoScope dealer. The scope is a sophisticated piece of diagnostic equipment and should be handled with care, even though it is in a ruggedized outer cover, connectors and cables may still be damaged. Check functioning if the scope is dropped or undergoes rough handling.