

Engineering Units Technical Note

The MadgeTech Data Logging System allows users to create Engineering Units to receive output signals from a variety of sensors and have this information expressed as other, more meaningful units of analysis.

Application:

Measure brake cylinder pressure on a train

Materials:

- MadgeTech Software
- MadgeTech Process Series Recorder, $\pm 100\text{mADC}$ measurement range Pressure Transducer, 0-300 PSI, 4-20mA output, self-powered

In this setup, the application is to record the output signal of a pressure sensor attached to brake air-lines. As seen above, the pressure transducer used in this setup has a 4-20mA output signal and a 0-300 PSI measurement range. This signal is recorded by the MadgeTech Process Series Recorder, and stored in NVRAM as amperage measurements. Later, when this information is offloaded into the MadgeTech Software for analysis the amperage measurements can be converted into pressure measurements. Here is how it is done:

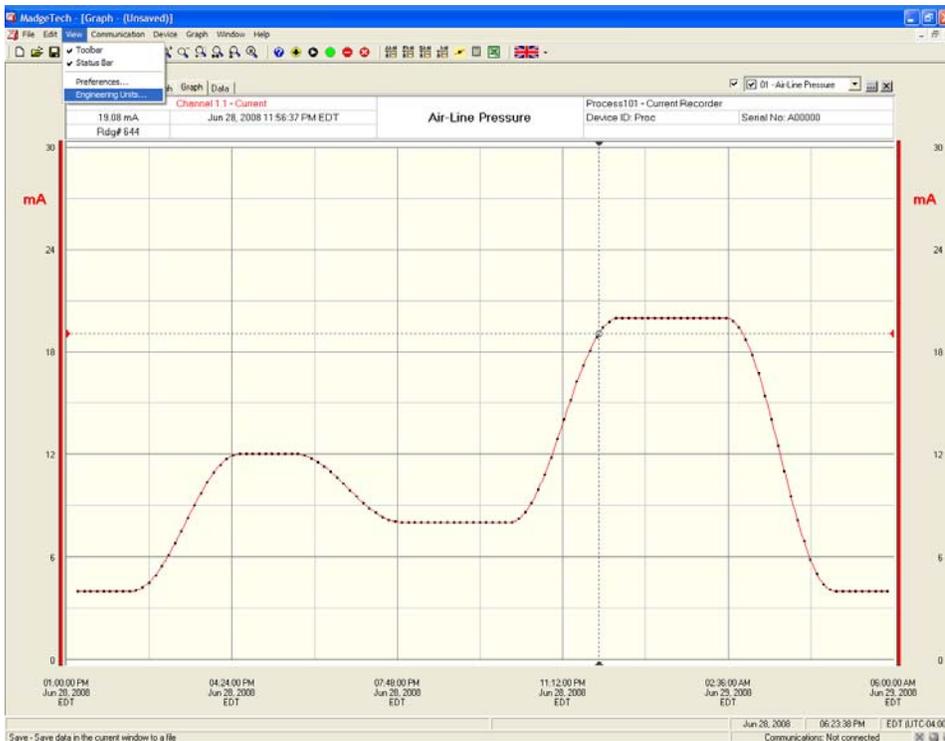
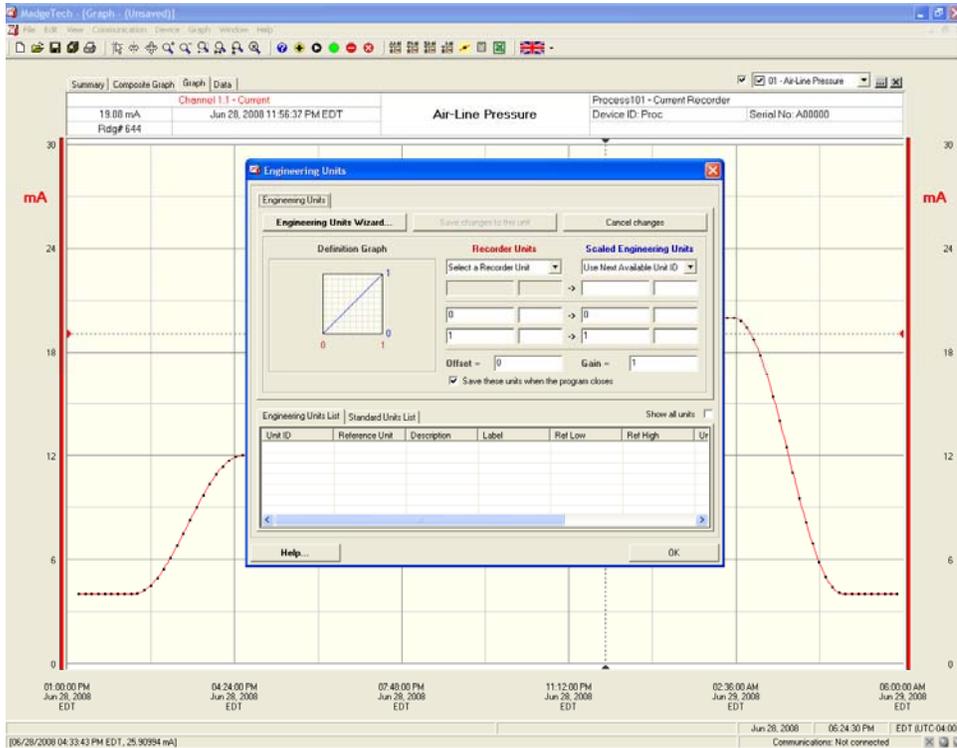


Fig 1. Once the amperage information from the MadgeTech Process Recorder is downloaded into the MadgeTech Software, click "View" then "Engineering Units".

MadgeTech, Inc.
(603) 456-2011 Phone
(603) 456-2012 Fax
www.madgetech.com
support@madgetech.com

PO Box 50
Warner NH 03278



MadgeTech, Inc.
 (603) 456-2011 Phone
 (603) 456-2012 Fax
 www.madgetech.com
 support@madgetech.com

PO Box 50
 Warner NH 03278

Fig 2. Once the Engineering Units window appears, the user can either manually program the “Recorder Units” and “Scaled Engineering Units” sections, or can use the “Engineering Units Wizard”. In this application, then Engineering Units Wizard will be used.

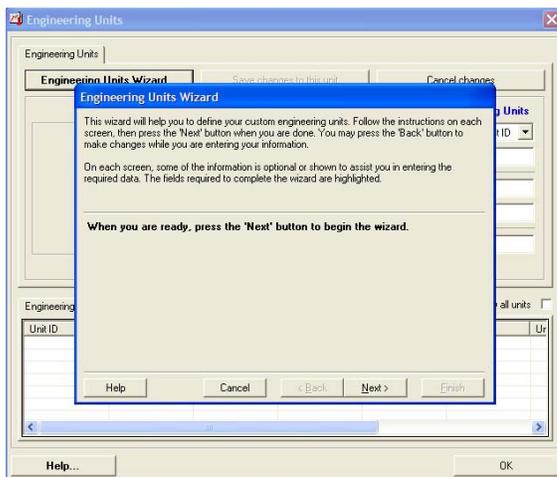


Fig 3. This is the first window of the Engineering Units Window. A description of the Engineering Units Wizard is displayed. Click “Next” to start.

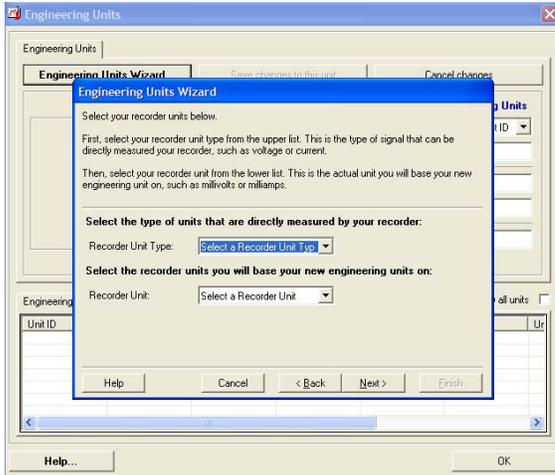


Fig 4. This window asks the user to specify the "Recorder Unit Type" and the "Recorder Unit". This is where information about the Pressure Transducer used in this setup is specified. For reference, the pressure sensor used in this setup has a 0-300 PSI measurement range and a 4-20mA output.

MadgeTech, Inc.
(603) 456-2011 Phone
(603) 456-2012 Fax
www.madgetech.com
support@madgetech.com

PO Box 50
Warner NH 03278

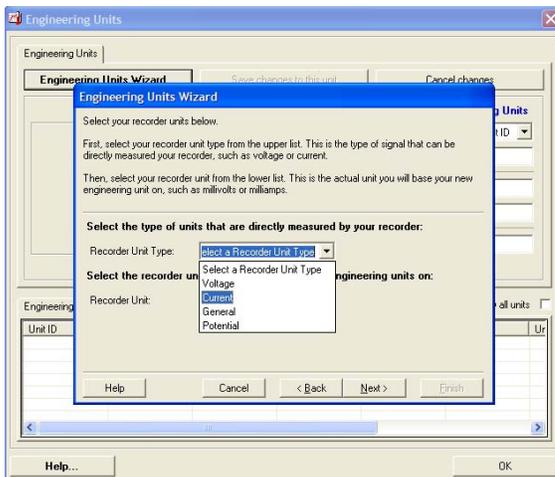


Fig 5. Here the user is specifying "Current" because the output signal of the pressure transducer is in mA (current).

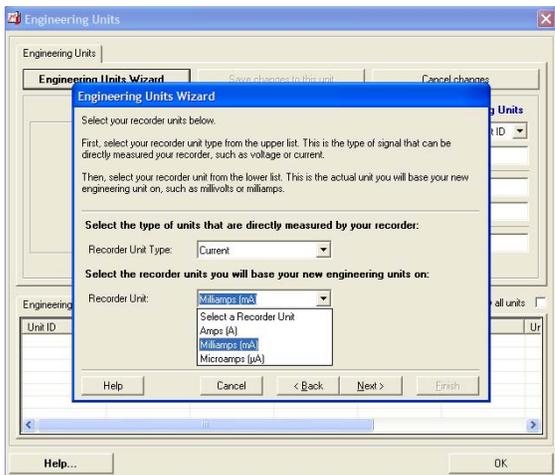


Fig 6. Here the user is specifying "Milliamps (mA)" because the pressure transducer has a 4-20 mA output signal. Once these values are specified click the "Next" button.

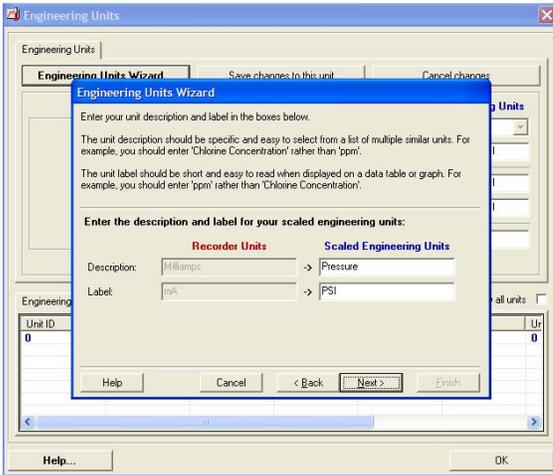


Fig 7. In this window the user programs the “Scaled Engineering Units”, which allow the amperages units shown in Fig 1, to be expressed as “Pressure” with a label of “PSI” indicating that pressure shall be expressed, and the Label is PSI indicating the data is pounds per square inch. Click “Next” to continue.

MadgeTech, Inc.
 (603) 456-2011 Phone
 (603) 456-2012 Fax
 www.madgetech.com
 support@madgetech.com

PO Box 50
 Warner NH 03278

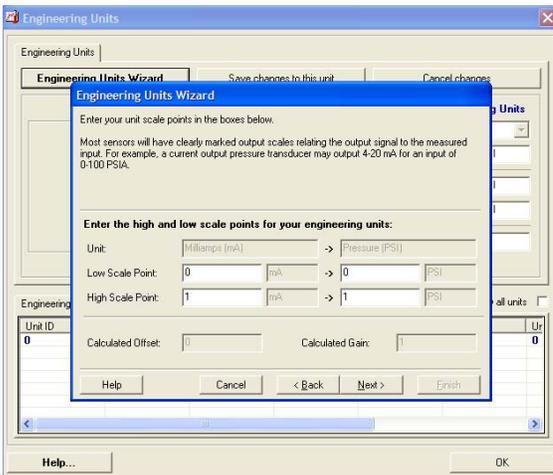


Fig 8. This window is where the user will enter the values of the external transducer including the “Low Scale Point” which is the low range of the pressure transducer output (i.e. 4), and the “High Scale Point” which is the high range of the pressure transducer output (i.e. 20). Once these are entered, the user will specify the range of the external transducer by entering the low range of the pressure transducer (i.e. 0) into the text box adjacent to the “Low Scale Point” under the “Pressure (PSI)” column and then enter the high range of the pressure transducer (i.e. 300) into the text box adjacent to the “High Scale Point” under the “Pressure (PSI)” column.

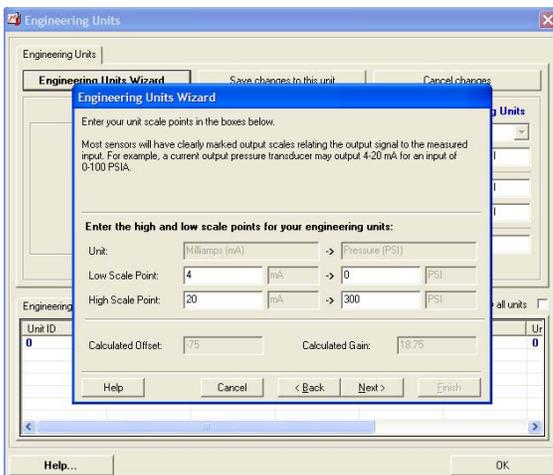


Fig 9. This window shows the entered values from Fig 8, and also displays how the MadgeTech software has automatically created a “Calculated Offset” and “Calculated Gain”. Click “Next” to continue.

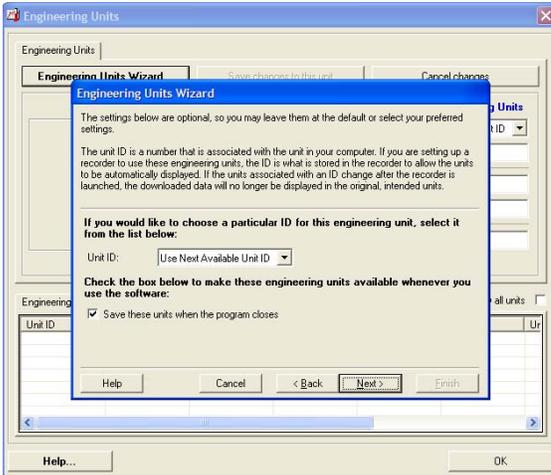


Fig 10. This window allows the user to program a "Unit ID" for the engineering unit that is being created. Click the "Next" button to continue.

MadgeTech, Inc.
 (603) 456-2011 Phone
 (603) 456-2012 Fax
 www.madgetech.com
 support@madgetech.com

PO Box 50
 Warner NH 03278

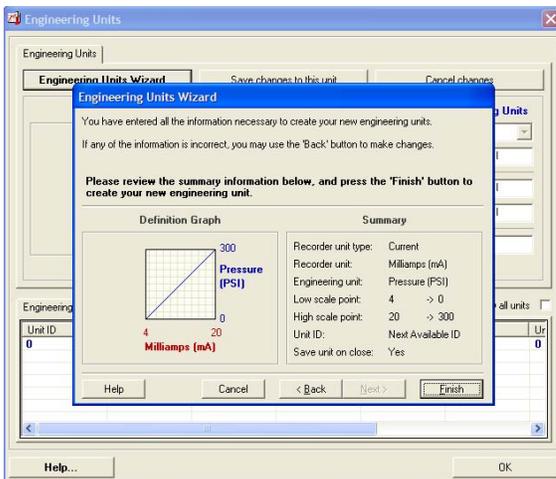


Fig 11. The final step of the "Engineering Units Wizard" summarizes the information that was entered and displays a "Definition Graph", which is how the information will be graphically represented and analyzed. Click the "Finish" button and then "OK" as the final confirmation.

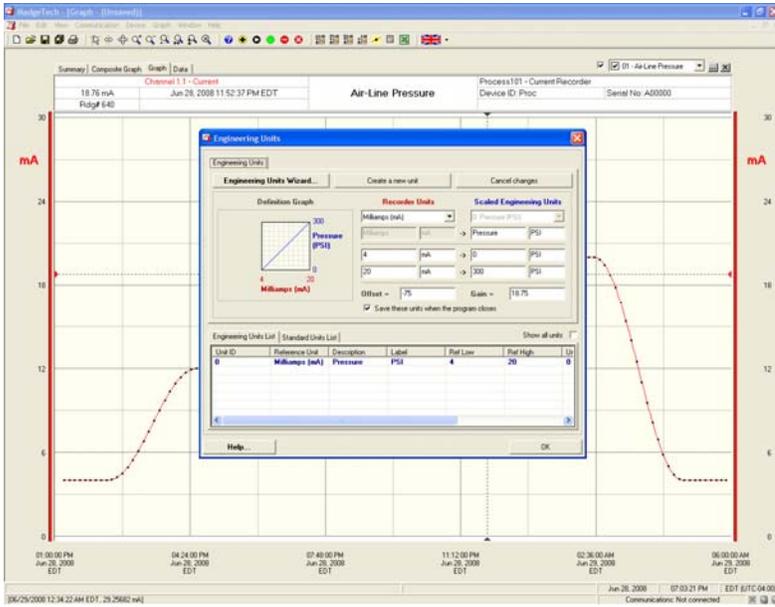


Fig 12. The user is returned to the "Engineering Units" window. Notice how the new engineering unit is now shown under the "Engineering Units List" as Unit ID 0. Click "OK" to close the engineering units window.

MadgeTech, Inc.
 (603) 456-2011 Phone
 (603) 456-2012 Fax
 www.madgetech.com
 support@madgetech.com

PO Box 50
 Warner NH 03278

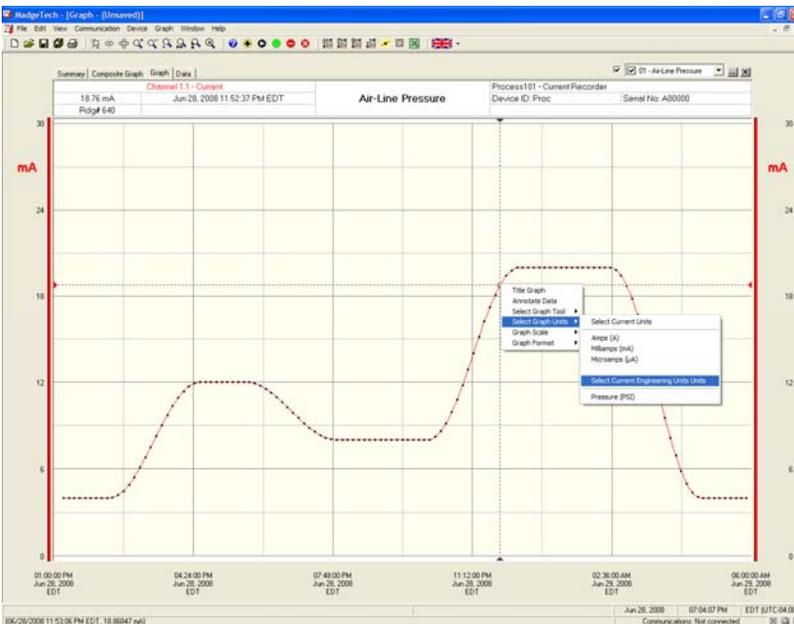
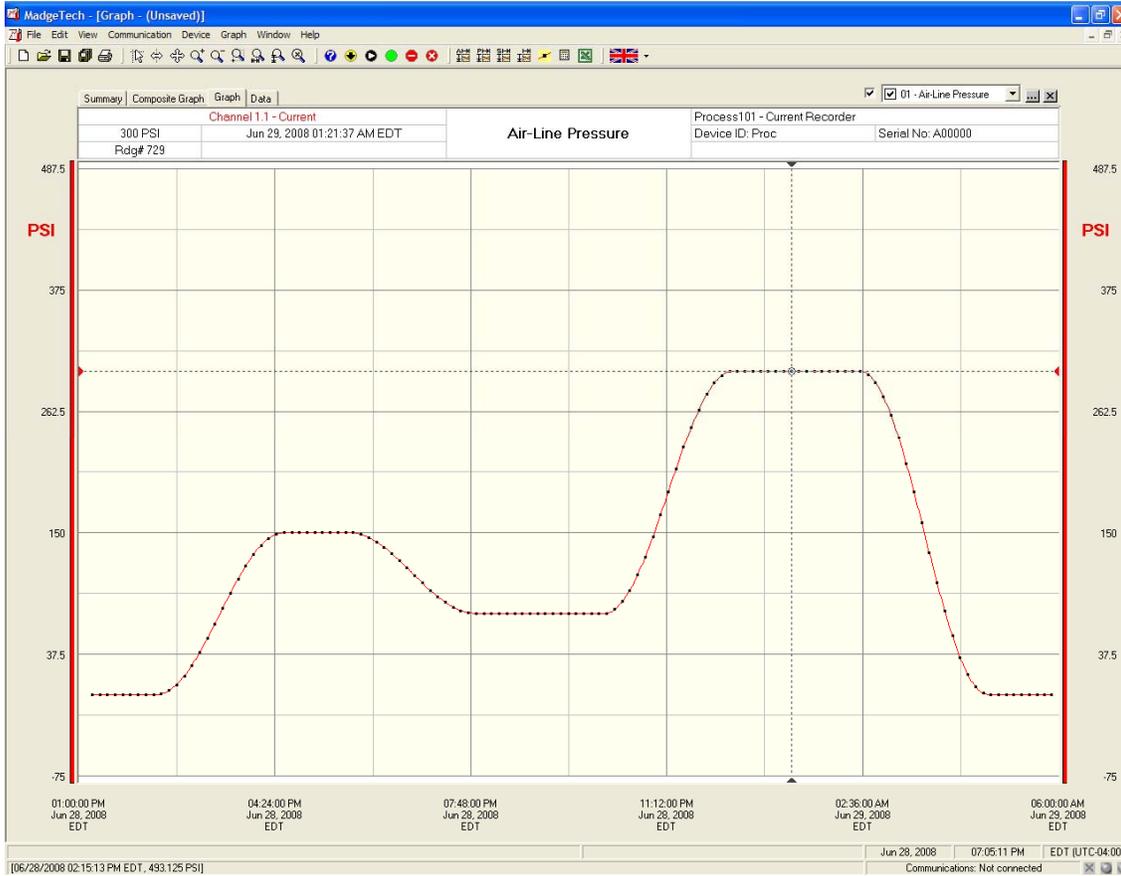


Fig 13. Back in the software, with the amperage data displayed from the Process101 current recorder, select any data point with the left mouse button and right click to bring up the context menu. When the menu appears, click "Select Graph Units" and choose the engineering unit that you would like to use. In this case, the application is measure brake air-line pressure, so a Pressure engineering unit was created. Click "Pressure (PSI)".



MadgeTech, Inc.
 (603) 456-2011 Phone
 (603) 456-2012 Fax
www.madgetech.com
support@madgetech.com

PO Box 50
 Warner NH 03278

Fig 14. The data that has been recorded using the MadgeTech Process Series current recorder connected to an external pressure sensor can now be analyzed and manipulated as units of pressure.

The engineering units function is simple and easy to use. The user only needs to program the units that are being recorded, and then program how they shall be expressed.

This completes the illustrated Engineering Units Technical Note.

For more information:
 MadgeTech, Inc.
www.madgetech.com
 Ph. (603) 456-2011
 Email: info@madgetech.com