

## Pico TA009 60A DC Current Clamp

The TA009 current clamp is ideal for use with the ADC-212/3 for measuring currents between 10 mA and 60 A. It enables the ADC-212/3 to display current waveforms for fuel injectors and fuel pumps (see waveforms below).

The current clamp has two calibration settings, set by a slider switch on the handle of the probe.

- 1 mV / 10 mA (100 mV = 1 A): use this for testing currents up to 20 A.
- 1 mV / 100 mA (10 mV = 1 A): use this for testing currents up to 60 A.

There is no need to break into the circuit or disturb the isolation as the jaws simply clamp around the current-carrying conductor. No electrical contact is required.

### Connecting the TA009 current clamp

The current clamp is supplied with 4 mm (banana) plug-type connectors so can not be plugged directly into the ADC-212/3. To connect it to the ADC-212/3 we recommend the use of the TA000 BNC to 4 mm test lead. Alternatively, the MI078 BNC to 4 mm plug adaptor can be used.

Once the current clamp is connected to the ADC-212/3, switch it on (the green LED should light) and then clamp the jaws around the current-carrying conductor (as pictured).



### Using the TA009 current clamp with PicoScope

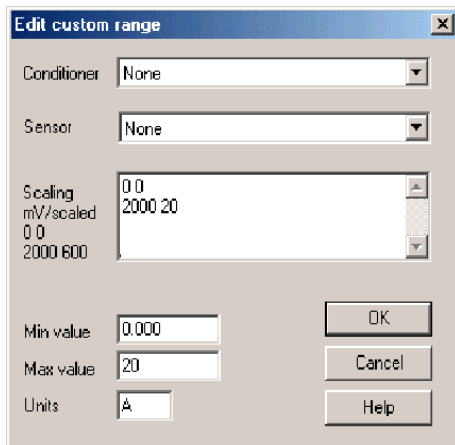
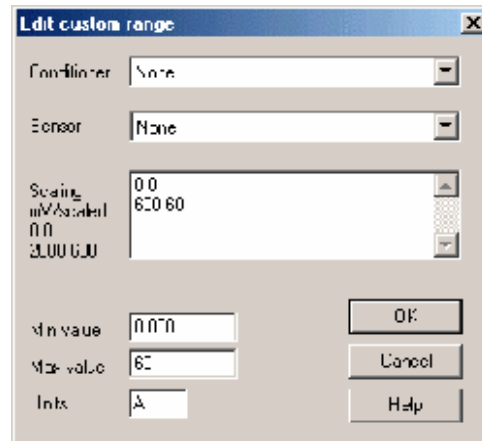
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You can quickly check that the clamp is working by measuring the current drawn when a car's headlamps are switched on. To do this start PicoScope and select the 1 mV / 10 mA range (DC-coupled) on either the scope or the meter. Connect the clamp around one of the wires to the headlamps. With nothing on the car switched on, the reading on PicoScope should be near 0 mV. Now switch the headlamps on, and the reading should jump up a few mV (100 mV per amp of current drawn). If the reading instead jumps down, don't worry - current clamps are directional, so just reverse the clamp on the conductor.

Using PicoScope it is easy to scale the output from the clamp from mV to A. First select **Settings | Custom Ranges** from the drop down menu and click the **Add** button.

Next fill in the scaling information. The custom settings on the right scale the mV output from the current clamp on the 1 mV / 100 mA setting. The output from PicoScope will be in the range 0 to 60 amps.



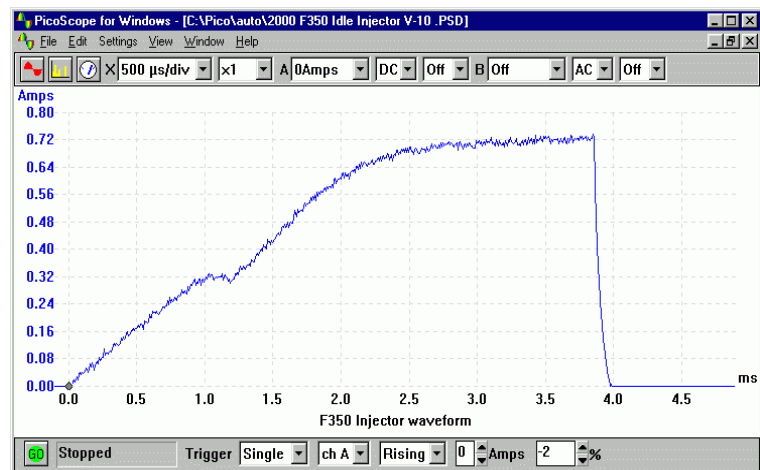
The custom range on the left scales the mV output from the current clamp on the 1 mV / 10 mA setting. PicoScope will show the output from the current clamp in the range 0 to 20 amps.

More information on scaling can be found in PicoScope's online manual.

When you have entered the scaling information press the **OK** button (twice) to return to the main menu. Now select **File | Save Settings** to save your custom range. This custom range now appears in the drop down list of voltage ranges (see examples below).

## Injector current waveform

The waveform on the right shows the current waveform for a fuel injector. The waveform shows two stages. The first stage (0 to 1.2 ms) shows a small amount of current being drawn, where the injector has been switched by the ECU but the solenoid is charging and hasn't been fired. After this small delay an increase in current can be seen. This is the solenoid actually firing and fuel being injected into the engine.



## Fuel pump current waveform

The screenshot on the right shows a captured current waveform from a fuel pump. The waveform shows an AC ripple due to the switching of the commutator in the motor. This can be seen to repeat every 8 cycles. A fault in one of the windings or brushes will be shown by the current drawn for one period of the waveform being reduced significantly.

