Installation & Initial use

1. Don't plug SPA100 into PC until you have completed installation of the software and drivers.
2. Download Install EPIC21.009 from www.electron.plus
3. Install CH341SER serial driver (found on our website AND included with EPIC21.009 download).
4. Once both EPIC and the serial driver installed, you may plug in the SPA100.
5. *When you start EPIC for the first time it will assume the instrument connected is an ASA100, this is deliberate! (EPIC will automatically create several files it uses as well, including "settings.txt")*
6. Select "Instrument/Change Instrument/SPA-Picoammeters/SPA100" in the top menu.
7. Restart EPIC – it will now be in the SPA100 instrument mode. *(You cannot connect to the SPA100 yet, it needs to know what serial COM port it is attached to).*
8. Goto "Instrument/Select COM Port" to bring up the serial port window.
9. Follow the instructions in the window to select/update the serial COM port *(this value is saved as SPA_ComPort=n in settings.txt).* Close the window when done.
10. Press RECONNECT? Button on the main control ribbon, this should change to CONNECTED.
11. The SPA100 will now download the calibration values, this will take around 5 minutes the first time the unit is connected. *(It will also create a file called SPA_cal.txt with these values in it, and automatically load these next time EPIC is started for immediate use).*

Electrical Connections

Input (for current): Left (nearest the LED) 50ohm BNC.

Output (-40V to +40V): Right 50 ohm BNC. This has a 2700 resistor in series with the internal voltage source.

USB: USB connection to Windows PC. Current consumption is typically <0.25A at 5V. CH340C USB<>Serial converter IC is used internally. Driver available on Electron Plus website as well as in the installation package.

Earth point: M3 hex machine screw (use 2mm AF hex wrench) - loosen (and then retighten) to make chassis earth connection.

Control Ribbon (EPIC)

Communication

Connect/Reconnect: This connects/disconnects to the SPA100.
Message Box: This is to the right of the CONNECT/RECONNECT button and shows general status, such as "USB disconnected" or messages beginning with CAL (internal status of the calibration download). Ignore in normal use.

Measurement

Range: This selects the maximum current range, in 8 steps from +/-2mA to +/-200pA.
Null: This will take the current value and create an offset so the display shows 0.000, this can be set/cleared by pressing the button "Set Null" or the text "Null" in the top left corner of the current reading.

Source

Voltage: Sets polarity and target output voltage.
Output: Switches output ON or OFF. When OFF, the output is forced to 0V (no high impedance!)

Current

1st box: Current reading (after rolling average). Null is shown in top-left of this box if engaged. The rolling average period is shown in the bottom-left of this box. Stability indication is shown in the bottom-right of this box. The behaviour of the stability indicator can be altered (see further below).
2nd box: Maximum current reading. Reset is shown in top-left, if pressed it will typically reset both the maximum (this box) and minimum (3rd box) values. This behaviour can be altered (see further below).
3rd box: Minimum current reading. Reset is shown in top-left, if pressed it will typically reset both the maximum (2nd box) and minimum (this box) values. This behaviour can be altered (see further below).
4th box: Calculated resistance. This is derived using the equation: (Source Voltage/Current)-2700
It will NOT be calculated when the current reading is marked as Unstable.

Recording

Start/Stop: Starts and stops the recording, when the recording is stopped it can be reset.
Record Length: Number of minutes:seconds that the recording has been active for.

Graphing (X-axis)

Scale: Length of recording to be shown on the graph.
Mode: When set to Rolling the display will automatically scroll along to show the last X seconds/minutes of the recording (as selected by scale). When set to Manual the display will not automatically scroll.
Graph from Time: Shows the left hand X-axis time.
Goto 0:00 – press this to Graph from Time to 0:00.
Adjust Time: ++/-- increments or decrements the Graph from Time in whole scale increments (e.g. 1 minute). +/- increments or decrements Graph from Time in major grid increments (e.g. 10 seconds).

Graphing (Y-axis)

Polarity: When set to +/- will set the centre of the Y-axis to 0, and will show scale symmetrically around 0. When set to + will show only positive currents. When set to – will show only negative currents (useful for electron beam measurements).
Scale: Presently only auto-scale of the graph Y-axis is possible.

Menu Ribbon (EPIC)

File/Save: Save all readings to file (name must be preselected or it will ask you for the filename).
File/Save As: Asks for name of file to save data to, then will save data as above.

Instrument/Connect: Connects to SPA100 using the serial port preselected.
Instrument/Disconnect: Disconnects from SPA100.
Instrument/Select COM Port: Brings up COM port selection window.
Instrument/Change Instrument: Changes instrument selection.

Sampling/Sample Rate Resolution: Selects between 2Hz (18bit resolution) and 10Hz (16 bit resolution). This affects the operational mode of the analog-digital converter in the SPA100.
Sampling/Rolling Averager: Adjusts the number of samples in the rolling average filter, selectable between 1x (no filter) and 64x.
Short Input (10MR): Applies a 10Mohm resistor across the input. This is automatically engaged if the SPA100 is powered and NOT connected. If this is engaged, this can be used to calculate the input offset voltage of the SPA100.

Scope/Graticule: Not used presently.

Display/Stable Current Marker: Selects the number of least significant digits used by the stability marker system, or can turn off stability marker.
Display/Display Decimal Places: Selects number of decimal places to be shown.
Display/Link Min-Max Resets: When active, both Min and Max resets are linked together.
Display/Show Min-Max Display: When active both Min and Max displays are shown.
Display/Show Resistance Display: When active will show the resistance display.
Display/Display Colours: Used to change the colours of the display, this is a work-in-progress.

Utilities/Correct Zero: Used to create (or cancel) a zero offset. Ensure no current is present when using this function. This function creates a separate zero offset for each range selected (i.e. if you want to zero each range you must do this once per range). *Values are stored in "settings.txt".*

Utilities/Calibrate: Used in the factory to calibrate the SPA100. Maybe used to recalibrate the SPA100 if you have access to an accurate DVM and several known resistors (10-20K, 1M and 1G). We calibrate using 15K, 1M and 1G along with a precision voltage source). Follow the numbered sequence!
Utilities/Status LED: Can be used to switch off the green LED on the SPA100 – useful in photonics experiments.
Utilities/Daily Update Checks: When active, EPIC will look (once per day) to the www.electron.plus website for a small text file that shows the current stable release number for each instrument type.
Utilities/Development Only: Functions used by Electron Plus during development and for debugging.

Help/About: Presently shows Copyright notice.
Help/Support: Present shows email address for support and Electron Plus website.

Notes:

1. CSV file format uses commas to separate values, current and range values are stored with 18 decimal places, not in scientific (e.g. 1.0000e-15) format.
2. Known bugs: include blinking display (when using OBS Studio screen recording) and when used on slow PC's. Unknown USB status if removing USB without first disconnecting from EPIC.
3. If reporting a bug or you have trouble, please include a copy of bugreport.txt and log.txt, this will help us quickly sort your problem out.