electronplus+

SPA100 User Manual

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1 Notices

..1.1 Copyright

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..1.2 Part number

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..1.3 Issue

24.001, March 2024

..1.4 Location

The latest version of this document can be found on the 'manuals' page of our website:
www.electron.plus/pages/manuals

..1.5 Published by

BFRAD Limited (t/a Electron Plus)
Unit 8 Manor Farm Business Centre
Manor Lane
Stutton
Suffolk
IP9 2TD
UK

Hereafter referred to as **Electron Plus**

..1.6 Notes

- We frequently update our manuals and add new features and improvements as they available, please ensure that you check our website for an updated version of this document, especially if updating your **Electron Plus** software.
- We make every effort to ensure the accuracy of this manual's contents. If you find any errors, have suggestions for expanding on a feature, or feel that we can improve it's contents then please contact us at support@electron.plus
- Copying or reproducing this document or any part of this document without written permission of **Electron Plus** is strictly prohibited.

..1.7 Trademark acknowledgement

Electron Plus fully recognises and acknowledges any trademark(s) of the respective trademark holder.

Windows™ is a trademark of Microsoft Corporation

Transzorb™ is a trademark of Vishay General Semiconductor, LLC

..1.8 Purpose of manual

The purpose of this manual is to enable you to safely setup, configure and operate your **Electron Plus** instrument, associated software and/or accessories.

Please pay particular attention to any section with a warning symbol.

..1.9 Safety warnings

Warnings, cautions and notes are colour coded through-out this manual. These are divided into several categories and are described below:

WARNING - Pay special attention to anything written here - this is for your safety and continued protection and is critical information!

CAUTION - Damage may occur to your equipment or any DUT (device under test).

NOTE - General text, with useful information or tips.

2 Getting Started

..2.1 System requirements

We recommend at least Windows 7 operating system (however, we know of Windows XP and 32 bit machines working well with EPIC). EPIC is available in both 32 bit and 64 bit from the **Electron Plus** website.

1x USB 2.0 type A (common) for connection to the instrument, at 0.5A.

Screen resolution of at least 1440(W) x 900(H), it will work with others, but you risk some of the CONTROL RIBBON items not being visible.

EPIC uses the PC sound card for various alerts, although it will operate correctly without sound.

Technical Note
We test EPIC builds mainly on Windows 10/64 bit machines with 1920x1080 monitors.

..2.2 Getting help

Help is available by email: support@electron.plus

If you are experiencing an issue with **SPA**, please email a copy of the following files (see below) found in the **SPA** installation folder along with a description of the problem.

log.txt
bugreport.txt

This will help us understand your problem and provide a quicker fix.

3 Introduction

..3.1 Welcome

Congratulations and thank you for purchasing an **Electron Plus** product.

Please take a few minutes to read the ‘Before You Start’ section of this manual, especially as misusing this product can result in damage to it, your device-under-test or potentially place you in-danger.

..3.2 New in Software

SPA software is specifically for the **Electron Plus** range of picoammeters, this takes over from the earlier EPIC software suite.

Please contact us if you would like copies of previous software versions.

..3.3 Installation sequence

Please install the **SPA** software and the associated USB driver software BEFORE connecting your device to a computer.

You do not need to remove a previous copy of **SPA** (or EPIC), the new copy will overwrite the necessary existing file(s). The "settings.txt" file will only be created if it is not present.

When **SPA** is first started, it will build a number of files (unless they are already there from a previous installation) in the installation directory.

If upgrading from EPIC V21.009 or earlier please be aware that the new program EXE is called either EPIC32.EXE or EPIC64.EXE and that previous shortcuts might not work or will link to previous EPIC.EXE

..3.4 Installing the Software

Electron Plus products require a USB connection to a PC running **SPA** in order to function.

SPA comes in two compiled versions:

SPA64 - for 64 bit Windows installations & PC's (we recommend this).
SPA32 - for 32 bit legacy Windows machines.

You can download the latest copy of **SPA** for free from www.electron.plus/software, EPIC is being constantly revised with new features, updates and bug fixes.

1. Select which variant you wish to use go ahead and download it (typically by double-clicking on the ZIP file named something like: **Install_SPA240001_64.ZIP**)

2. Open the downloaded file (typically Windows will recognise the ZIP format and open the file and display the contents like a folder), double click the EXE file - typically called Install_SPA240001_64.exe)

3. Follow the on screen instructions to complete the installation.

Before starting **SPA**, we recommend installing any USB drivers, see next section for details.

This manual MAY NOT represent the most up-to-date features and screen-shots, if something is unclear, please contact **support@electron.plus** and we will promptly try to assist you.

..3.5 Installing the USB driver

The product covered in this document communicates with the host PC via USB using an WCH CH340 bridge IC.

A copy of the official WCH device driver is available from the SOFTWARE section of our website (www.electron.plus/pages/software), device drivers can also be downloaded directly from WCH's website (www.wch-ic.com/downloads/category/30.html). The driver we use with Windows machines is: CH341SER and is available as .EXE or a .ZIP

..3.6 Earthing for function and safety

For functional and/or safety reasons you may wish to EARTH the casing of your **Electron Plus** instrument. This is not necessary under most normal operating conditions.

In this case, we recommend loosening (and re-tightening) the M3 stainless steel chassis screw (2mm HEX drive) and fitting an earthing wire using either ring terminal or spade terminal.

If in doubt please contact **Electron Plus** for further details.

Caution

USB 0V, rear panel, front panel, casing and any external power supply 0V are all the same potential and connected via low impedances (PCB, metalwork, etc.) - Avoid creating 'ground loops' with your setup!

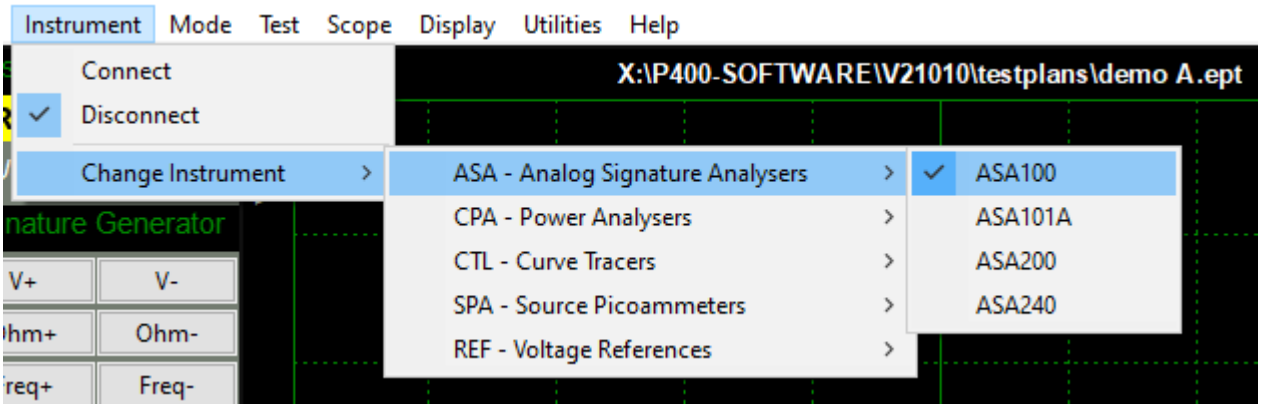
4 Operation

..4.1 Selecting Instrument

When **SPA** is first installed it will initially start in SPA100 mode.

To change this:

INSTRUMENT > CHANGE INSTRUMENT and select the actual instrument you wish to use, you will then have to close and reopen EPIC for this to take effect.

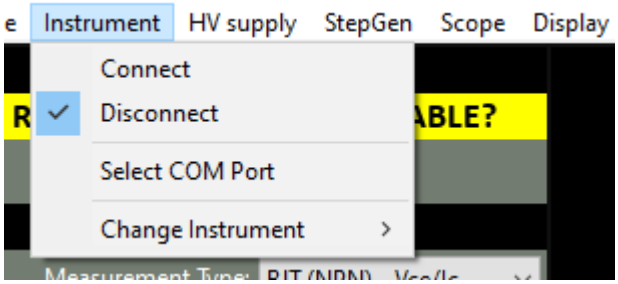


Technical Note
Variable used in settings.txt: ActiveInstrument=SPA100

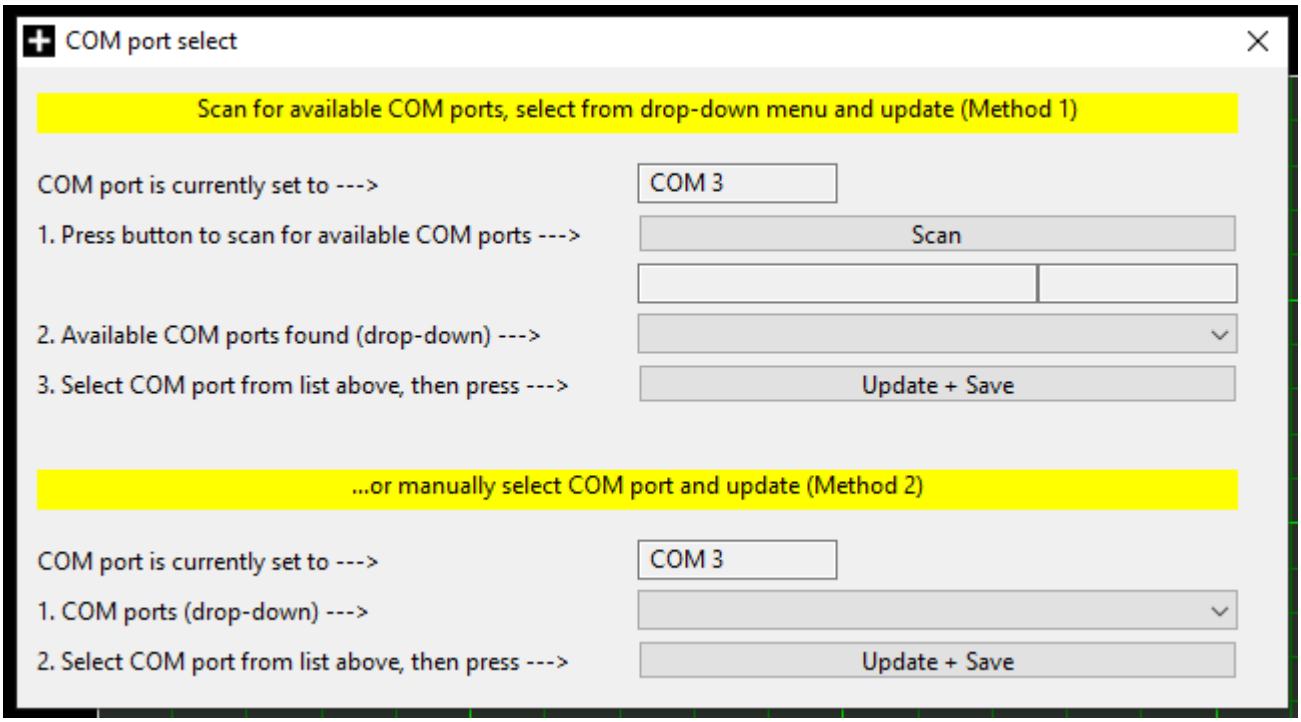
..4.2 Selecting Serial COM Port

To connect to the instrument you will need to select a COM port:

INSTRUMENT > SELECT COM PORT



then this pop-up window will appear:



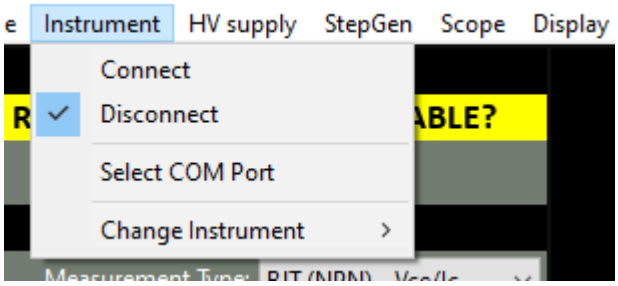
Follow the on-screen prompts in sequence (for either 'Method 1' or 'Method 2') to find and select the appropriate COM port and save your selection. When you have finished, either close the pop-up window or click the main window (the pop-up will close automatically).

Technical Note
Each Electron Plus instrument type that uses a COM serial port has it's own entry in "settings.txt", e.g. CTL_ComPort=3

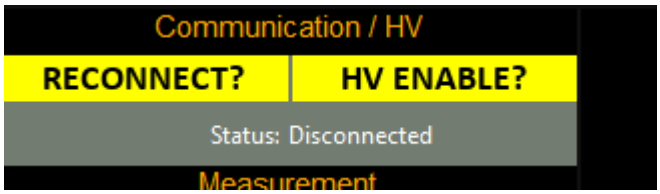
..4.3 Connecting Instrument

To connect to the instrument you can use the options in the MENU or the button on the CONTROL RIBBON.

INSTRUMENT > CONNECT to connect, or **DISCONNECT** to disconnect.



or



An error message will be displayed if **SPA** cannot open a serial port to the instrument - this can be caused by the following:
1. Not having the serial port driver installed or
2. Wrong (or no) serial port COM number being selected or
3. No instrument attached or powered on.

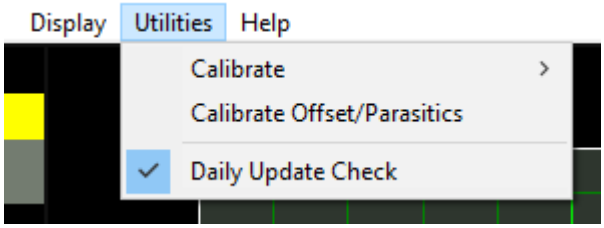
Ensure the correct driver is installed, the correct COM port is selected (Selecting Serial COM Port section).

..4.4 Check for updates

Once per day **SPA** will check if there is a newer version available. This feature maybe disabled or re-enabled here:

UTILITIES > DAILY UPDATE CHECK

Tick will enable EPIC to perform the daily update check, unticking will prevent EPIC from performing the daily update check.

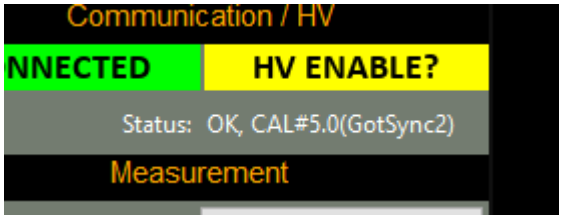


Technical Note
In "settings.txt": CheckWebsiteForUpdate=1 or 0 determines if this function is enabled/disabled. DateOfLastUpdateCheck=04/11/2021 is self-explanatory.
If function is enabled and date <> today a small file called "version.txt" is downloaded from "http://www.electron.plus/wp-content/". This contains the current revision of EPIC also the current revision for each product where a change/update has been made.

..4.5 Calibration loading

When the SPA100 is first connected during an **SPA** session it will automatically download all the necessary calibration coefficients. This happens in the 'background' and the user need not think about it.

The status of the background download from the SPA100 is displayed in the Status window (seen below).

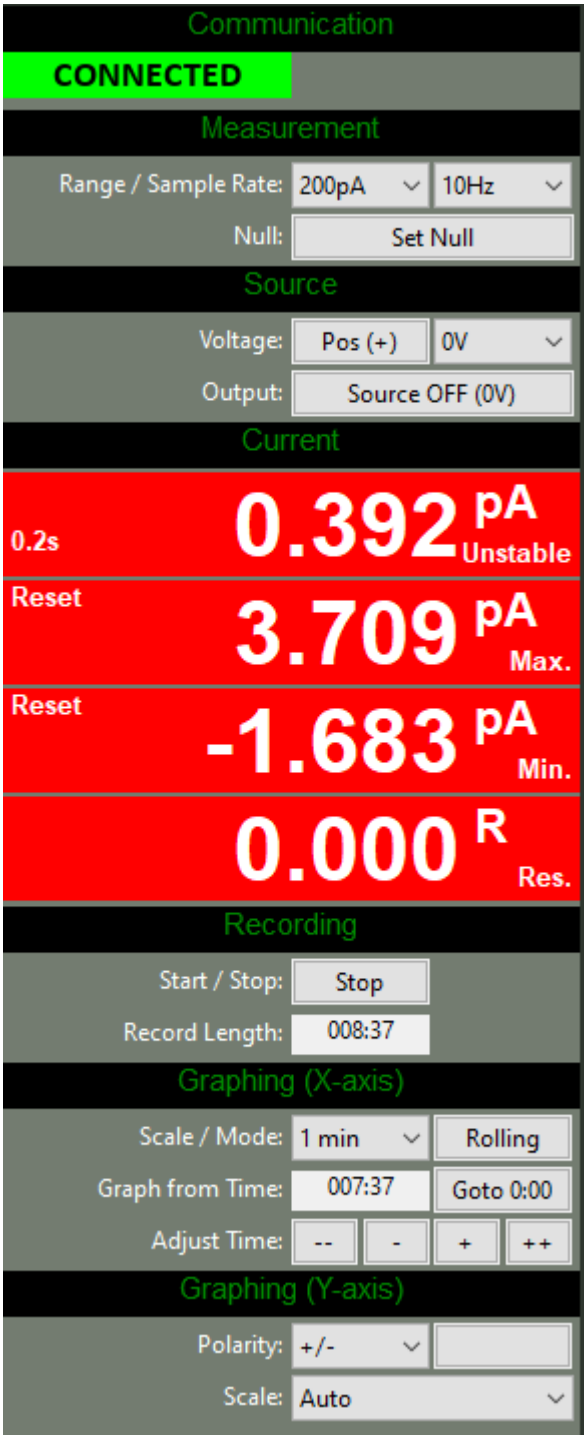


If a particular SPA100 has not been used with a particular installation of **SPA**, then the calibration download must complete before accurate results can be obtained.

Calibration data will load will load faster when sample rate is set to 10Hz, if the calibration data has changed (i.e. a different SPA100 is connected or the unit has been recalibrated, then the calibration loading will be automatically repeated).

Technical Note
SPA will wait for two copies of the calibration file to download before comparing them with each other and the existing copy of "SPA_cal.txt" in the SPA folder, if both downloaded copies are identical and there is a discrepancy with "SPA_cal.txt" SPA will overwrite "SPA_cal.txt" with the new data and then check it again.

..4.6 Control Ribbon



The following sections are descriptions of Instrument Status, Signature Generator, Test Controls and Edit Controls and their functions.

..4.7 Menu Bar

.4.7.1 File

.4.7.2 New topic

..4.8 Measuring Resistance

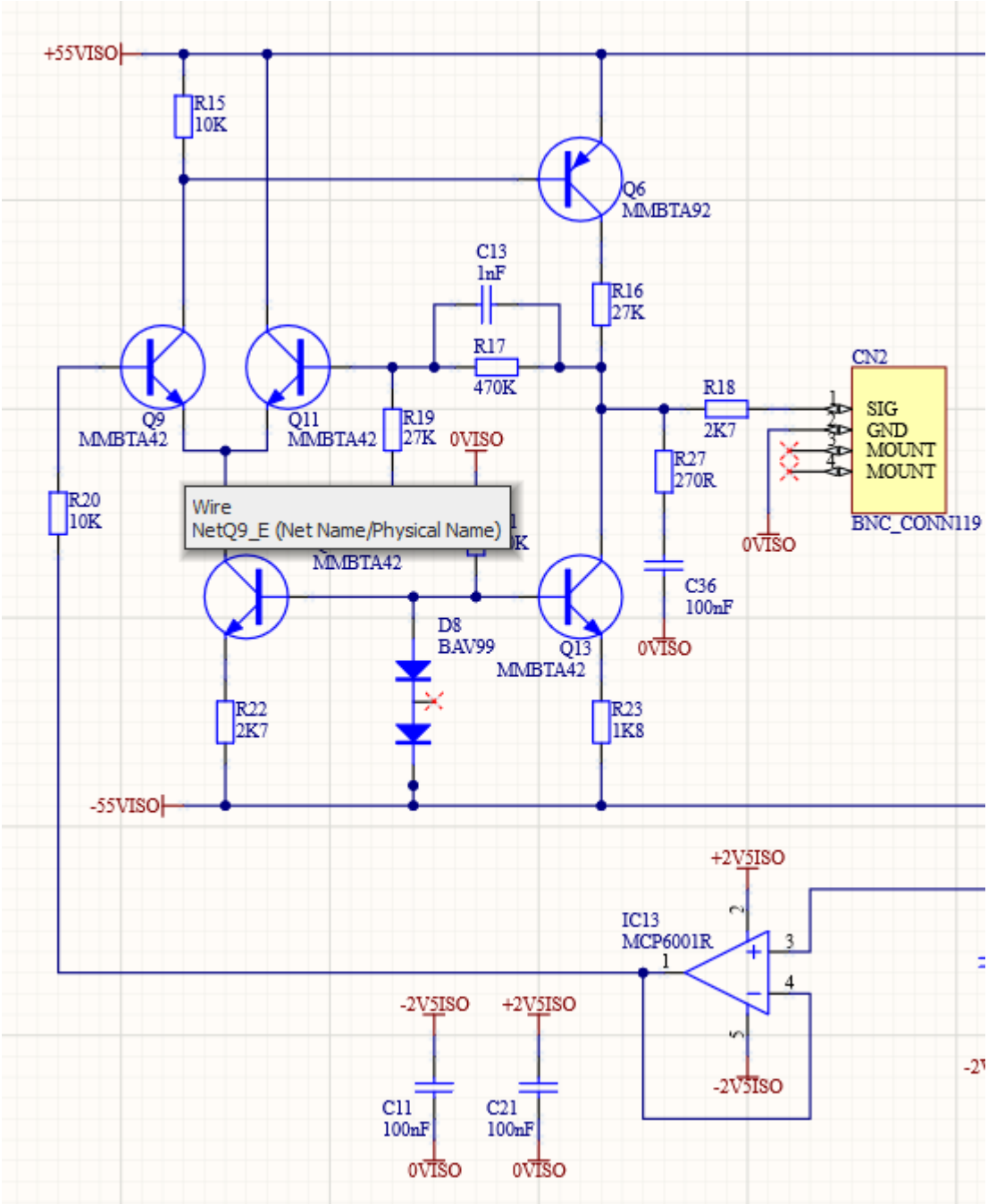
Resistance is measured by connecting the resistor (or material substrate) between the centre pin of the Source BNC and the centre pin of the Input BNC.

Resistance is measured by selecting a known voltage (from the Source).

5 Technical

..5.1 SPA100 Bias Generator

The bias generator output of the SPA100 is a low power class A amplifier. It is primarily design to provide a bias voltage for photodiodes in low-current measurement situations.

The output impedance is 2.7Kohms, this is after the feedback network, so some drop should be expected depending on load impedance.

Schematic of the bias generator output: