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Introducing the RBD 9103 USB Autoranging Picoammeter

The 9103 is a general purpose picoammeter designed with vacuum scientists and engineers in mind. The optional built-in +90 volt positive bias increases the accuracy of electron and ion current measurements in vacuum systems. The user interface includes data logging so that you can record and graph the results of your current measurements with respect to time or other variables. The USB hardware interface is plug-and-play and operates under Windows, Mac, or Linux. Additionally, the firmware commands are written in ASCII, making it easy for you to write your own application.

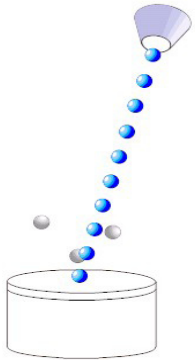
Please see this issue's [Software Corner](#) to learn more about Actuel, the software that works with the 9103 Picoammeter. And, stop by our [booth at AVS](#) to enter a contest to win one!



[9103 Picoammeter; Continued on next page](#)

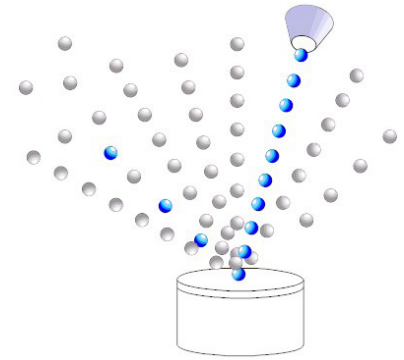
How the +90 Volt DC Bias Improves the Accuracy of Electron and Ion Current Measurements

When the electron or ion beam impacts the target, secondary electrons are ejected. When measuring the target current, these secondary electrons will be subtracted from the total current, resulting in an inaccurate current measurement. This is shown in the graphic on the right.



Adding an ultra-low noise +90 volt DC supply in series with the picoammeter will bias the target and substantially reduce the number of secondary electrons that leave the target. This greatly increases the accuracy of the target electron or ion current measurement. This is shown in the graphic on the left.

For more information, click on this [link](#) or call us at 541-330-0723 x310.



Without Bias

Tech Tip: 32-100 IC Reference Noise Problem Modification

We recently discovered a design flaw in the PHI 32-100 electron multiplier supply that is related to the IC reference in ESCA/XPS systems that use the 20-805 or 20-810 analyzer control. This applies also to PHI ESCA/XPS systems such as the 548, 560, or 570 that use a double-pass CMA (either the 15-255G, the 25-260, or the 25-270).

The problem is that 60 Hz noise is coupled through the CMA multiplier negative bias supply and shows up on the IC multiplier reference. In the Auger mode, the IC reference is grounded, so the problem does not show up there. In the ESCA/XPS mode, the data is averaged and so typically the noise is not noticeable there, either. However, the noise has a noticeable effect on the resolution of the data in the UPS mode.

The solution to this noise problem is simply to disable the negative bias in the 32-100 and replace it with a 45 volt DC battery because the negative multiplier bias is normally set to 50 V on ESCA/XPS systems that use the 20-805 or 20-810 analyzer control. This approach is also a throwback to PHI's early days, back in the 1960s and 1970s, when PHI used photographic batteries to provide the bias in the multiplier supply because batteries are extremely clean sources of power. Back then, it was also less expensive to use batteries instead of adding more electronic components to the design.

When you position the battery to implement this solution, make sure that the battery is not close to the chassis because the negative supply floats on the retard voltage in the ESCA/XPS and UPS modes of operation.

The procedure for making this modification is provided on the next page. Performing this modification on the 32-100 will result in noticeably improved UPS and ESCA/XPS data.

32-100 Modification; Continued on next page

The following procedure provides the steps required to disable the existing CMA NEG bias circuitry in the 32-100 and replace it with a 45 V DC battery.

Tools required:

- Solder tools – soldering iron, solder, pliers, diagonal cutters, wire stripper, and heat shrink
 - 45 V DC battery and clip; available from RBD or electronic suppliers such as Digikey and Newark
1. Unplug the power and all output cables from the 32-100 and place it on a workbench. Check that all of the cables are labeled as you remove them.
 2. Unplug P4 (connects to J4) and tie it back with a tie wrap.
 3. Remove R24, R25, and Q12.
 4. Unsolder the red wire that goes to E5 and connect the end of it to the black (NEG) battery lead. Note: Use heat shrink to insulate these wires.
 5. Solder the red (POS) battery lead to the junction of R30A and C21A.
 6. Apply heat shrink around the outside of the battery to insulate its metal portion. Leave the battery connections exposed.
 7. Use double-sided tape or Velcro tape to secure the battery to the top of C19 and C20.
 8. Attach the battery clip to the battery.

The installation is now complete. **Note:** The battery will need to be replaced about once a year in order to maintain optimum performance.

For more information, please [email our technical support department](#) or call 541-330-0723 x311.

Wanted: Used PHI Monochromator X-ray Source Anodes

As many of you know, RBD provides re-coating of the anodes used in the 04-500 and 04-548 15 kV dual anode X-ray sources. We are conducting a study of the feasibility of providing a rebuild service for the PHI monochromator X-ray source anodes. To pursue this further, we are looking for some used anodes to experiment with. We expect that the rebuild price will be substantially less than the price of a new anode.



If you have some used anodes for the PHI 10-550, 10-560, or 10-610 monochromator X-ray sources, please [email us](#) or call 541-330-0723 x311.



Used Surface Science Reference Books

Are you looking for some general – or even obscure – information about surface science at a rock bottom price? Check out our used reference books listed in the [resource section of our website](#).

04-303 Differential Aperture Improvement

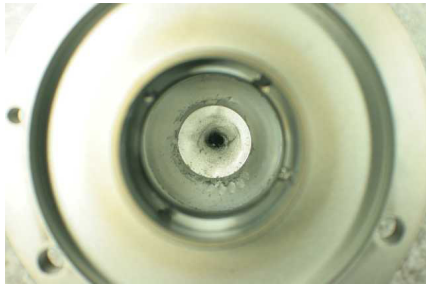
The differential aperture in the PHI 04-303 5 kV ion source (shown in the photograph to the right) is made out of stainless steel. After years of normal use the aperture becomes sputtered away, resulting in a mis-shaped ion beam and higher system pressure.



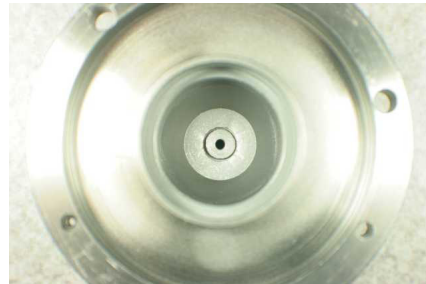
The differential aperture provides two functions:

- It helps to shape the ion beam.
- It restricts the gas in the ionizer, which is at a higher pressure, from entering the vacuum chamber.

RBD has designed an insert aperture made out of tungsten that will last for many years. The picture to the left, below, shows a worn-down aperture. The picture on the right, below, shows our new insert aperture.



Worn-down Aperture



New Insert Aperture

Our 04-303 ion source rebuild service now includes this aperture as part of our rebuilding procedure. So, when your 04-303 needs to be serviced, please contact us for more information about how our rebuild service improves the shape of the ion beam, reduces the pressure in the system for years to come, *and* saves you money.

For more information, please contact our Sales department via phone at 541-330-0723 x310 or via [email](#).

SAVE ON ANY PURCHASE FROM RBD

Save \$50 on any single order over \$500, excluding shipping costs. This credit can be applied to anything you buy from RBD.

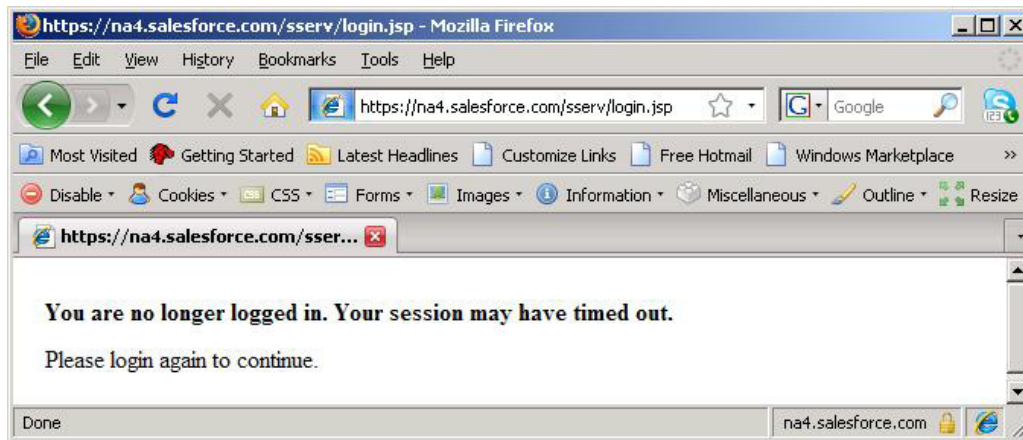
Refer to coupon code #1009Fall when you speak to someone in our sales department (541-330-0723 x310) or when you request a quote via [email](#).

This offer is good for orders delivered by 3/31/10.

One coupon per customer, please.

Using Firefox with the RBD Customer Service Portal

Some of our customers have told us that they cannot log into the Customer Service Portal when they use Firefox as their Internet browser. When they attempt to log in, they see a window similar to the following:



Fortunately, we have found a work-around. Basically, you need to change your cookies settings. To change your cookies settings in Firefox:

1. Select Tools/Options.
2. Click on the Privacy link at the top of the Options window.
3. Click on "Accept Cookies from sites."
4. Click on "Accept third-party cookies."
5. Ideally, select "they expire" from the drop-down list next to "Keep until." If your organization won't allow you to select this choice, select "ask me every time." This latter choice will be a little more inconvenient but should still allow you to access the Portal. If you still cannot access the portal after making this selection, ask your system administrator to allow you to select "they expire" from the drop-down list.
6. Click on OK.

You may also add the Portal's URL to Firefox's Exceptions list. This gives you more control over your cookies on a per-session basis. To add the URL to Firefox's Exceptions list:

1. In Firefox, navigate to RBD's Customer Portal.
2. Highlight and copy (Ctrl+C) the URL that's displayed in the address bar.
3. Select Tools/Options.
4. Click on the Privacy link at the top of the Options window.
5. Click on the Exceptions button.
6. Paste the URL into the text box "Address of web site:".
7. Click on the Allow button to always accept cookies for this site.
Or
Click on the Allow for Session button to accept cookies from the site but to have them deleted when you exit Firefox.
8. Click on Close.
9. Click on OK.

If neither of the above approaches provides you with access to the Customer Portal, you may need to use Internet Explorer.

AVS 56th International Symposium and Exhibition in San Jose, CA

RBD Instruments will be at the AVS-56 International Symposium & Exhibition in San Jose, California. Stop by to learn about our new products (some of which are described elsewhere in this newsletter) and to enter a contest to win a [9103 picoammeter](#). We'll be in booth #622. [Click here](#) for a map of the Exhibition Hall (mouse-over the booths to see which exhibitor is in which booth).

The Symposium dates are from November 8 through November 13, 2009. The exhibit hall is open from Tuesday, November 10th through Thursday, November 12th.

If you would like to register for the symposium [click here](#). Our AVS Exhibitor Evite access code is RBD AVS9. If it isn't already entered for you at the bottom of the form, please enter it manually.

Exhibit Hall Hours:

Tuesday, November 10th - 10 a.m. to 4:30 p.m.

Wednesday, November 11th - 10 a.m. to 4:30 p.m. (Drawing for 9103 Picoammeter at 1:30 PM. Must be present to win.)

Thursday, November 12th - 10:30 a.m. to 2 p.m.

We look forward to seeing you there.



IG2 Introductory Price Ends December 31, 2009



All good things seem to come to an end, and such is the case with our introductory price for our [IG2 2kV sputter ion source package](#). Although we will keep the price of the package as low as possible, our material costs have gone up. Beginning in 2010, we will unfortunately need to increase the price of the IG2 package. However, the year is not over yet so you still have time to place an order for the IG2 at the low introductory price. (You can apply the [coupon](#) that's included in this newsletter to your order before its price increases on December 31st and save even more.)

RBD's 2010 Calendar

RBD Instruments' annual calendar for 2010 will be mailed by the end of November. So, look for it in your mailbox! If you've never seen our calendars before, they're "Earth" calendars, containing photographs of unusual locations here on Earth.



If you've received our calendar in the past and you haven't received 2010's by the middle of December, please contact Sandy at 541-330-0723 x316 (or [send Sandy an email](#)) to confirm your mailing address.

If you haven't ever received our calendar with its beautiful photographs and would like to, please contact Sandy with your contact information using the email link above. She'll add you to the mailing list *and* put one in the mail for you so that you have it as soon as possible for 2010. (Please note that supplies are limited.)

Using Google in New Ways

Many of us use Google every day to find information on the Internet (in some arenas, it's now referred to as "the Cloud", but we digress). However, you may not know about some other ways you can use Google.

For example, did you know that you can search for information within a web site even though the site itself doesn't provide a built-in search engine?

To do this, you'd enter the words you're looking for, followed by "site:nameofsite.com" in the Google search bar.

Let's say that the RBD Instruments web site didn't include a search engine and you wanted to find information about our IG2 Ion Source package. You'd type the following in the Google search bar:

IG2 site:rbdinstruments.com

You could also type

ion source site:rbdinstruments.com

to find all "ion source" references.

For interesting web search-related information, [click here](#).

[Click here](#) for a collection of other tools that might come in handy, like a calculator and a unit converter. You can also track UPS, FedEx, and USPS shipments, as well as check on flight status.

(And, no, we're not getting paid by Google. Really.)

Problems Attaching Documents to an Email?

We've heard that when some of you have tried to send us emails with attachments, the emails get bounced back because our ISP mail server thinks the attachment is a virus. When the attachment is deleted, the email is sent successfully.

We've followed up with our ISP and have learned that the IP address from which the email is sent is being blocked. It can be unblocked.

To get your IP address unblocked, please [email us the bounce-back message](#) that you receive (including full headers) by copying and pasting it into a new email. (The way to retrieve the full header information depends on the email client you're using so we're unable to provide you with specific instructions.) We'll forward this information to our ISP to try to resolve the problem. We'll let you know if our ISP was successfully able to resolve your issue.

Note, however, if the IP address is unblocked, there is no guarantee it will remain unblocked because of the automated spam detection processes that our ISP uses. If the "spam attack" was an isolated case and your ISP is no longer on our ISP's list of potential spammers, then you should be able to send emails to us without incident.

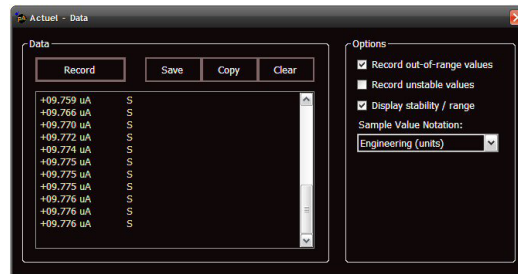
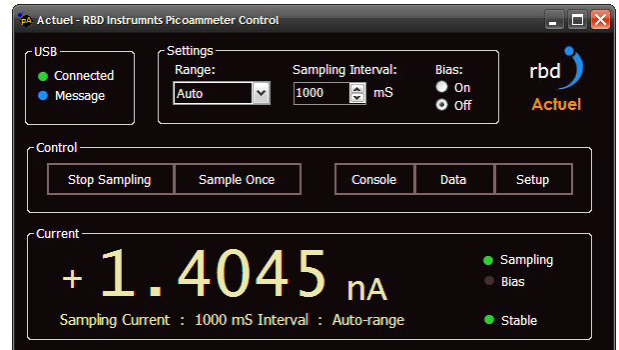
Actuel!

Actuel is RBD's newest software application. A play on words (Actuel is French for "current", as in "at the present moment"), Actuel provides the interface to RBD's new 9103 Picoammeter.

Version 1 of Actuel provides a control and display medium for the Picoammeter, as well as an interface that provides data sampling and recording (data logging). In addition, the software provides a console for accessing advanced features of the Picoammeter, including calibration and diagnostics.

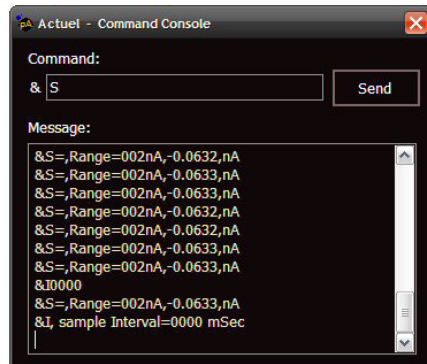
Features include:

- Easy-to-read current display and status information
- Stability and over/under-range status
- Range and sample rate selection
- Null offset control
- Optional Bias control
- Data recording with formatting options for scientific notation, units, etc. (shown in the screen shot below)



9103 Picoammeter Control Using the Actuel Console

The 9103 uses a USB interface that functions as a virtual ASCII serial port. As such, the 9103 can be operated using any ASCII terminal application, such as Hyperterminal. All of the picoammeter commands (and responses, including status and data) are represented using standard ASCII text characters. For example, the command "&S" (as shown in the screen shot below) instructs the picoammeter to acquire a single sample, and the result will be a string representation of the data.



Additionally, the Actuel software provides a convenient built-in terminal console, allowing access to all features of the 9103 Picoammeter. It also provides a convenient way to perform diagnostics. Complete documentation of the picoammeter API (application programming interface) will be provided with the product.

[Actuel: Continued on next page](#)

Controlling the 9103 Picoammeter Without Actuel

As previously stated, the 9103 Picoammeter uses a serial ASCII interface for all its commands and responses. This gives you the ability to write your own software for device control and data acquisition without needing to be concerned about esoteric binary formats and communication protocols. Because the USB interface appears to the operating system as a standard serial COM (communications) connection, most applications that can interface with a COM port can interface with the 9103 Picoammeter.

Actuel 2?

The next version of Actuel is already in the works! Additional features planned for future releases include customizable displays, additional data sampling and recording options, and real-time graphing of data.

Surface Science Resources

Here are a couple of handy surface science resources. (Note: You may be prompted to join or to log in.)

[SAI](#) - Surface Analysis International is a LinkedIn forum started by Vince Christ that is growing rapidly.

The [Surface Science Network](#) is a new forum that hopes to become a viable source of useful information for surface scientists.

Coming in 2010 RBD eStore

To make it possible for you to order many of our products on-line, we will be adding an eStore to our website. You will be able to use Visa, MasterCard, American Express, or PayPal to purchase many of our products without a quotation.

Initially, we will be concentrating on lower-priced consumable items such as filaments and ionizers, and products such as our [9103 USB](#)



[Picoammeter](#). Do you want to see a particular product available in the eStore? [Please let us know!](#)

RBD 20-042 X-Ray Source High Voltage Power Supply

The PHI 14-040 and 22-040 15 kV X-ray source high voltage power supplies are starting to have more frequent malfunctions as they approach 30 years of service. To extend the service life of PHI ESCA/XPS systems, we are developing a drop-in replacement for the PHI 14-040, 22-040, and 20-040 X-ray high voltage power supplies. This supply will work not only as a drop-in replacement for the above mentioned PHI units. It can also serve as a replacement for other manufacturers' X-ray source systems including SPECS, VG, and VSW. The RBD 20-042 X-ray source High Voltage power supply is coming soon.



Please follow [this link to our web site](#) for more information and specifications.