



Sincrotrone Trieste

Sincrotrone Trieste is the company that manages Elettra, a Synchrotron Light Laboratory located in the AREA Science Park of Trieste, which produces and uses high-brilliance electromagnetic radiation from the ultraviolet to hard X-ray spectral band. Elettra is specialized in the application of synchrotron light to the study of matter in its various physical states - solid, liquid and gas.

Two sources have been employed and developed by Elettra: the "Storage Ring" (Elettra), which has been operating for over ten years, and the "Free Electron Laser" (FERMI), which is currently under construction and possesses unique characteristics.

Through the experiences accumulated over the years Elettra has created and consolidated an exceptional body of skills and technical expertise that are offered to support industries R&D activities. The tools and technologies available at Elettra allow businesses and laboratories involved in quality control to perform tests and manipulations at the atomic level as a matter of course. Problems that would otherwise resist solution in an industrial environment can thus find an effective and concrete response.

Furthermore, the technologies developed at Elettra provide the ability and the knowledge to design products and prototypes for the international market such as instruments for control of quality and the environment, particulates analysis equipment, sensors and devices for counterfeit detection, and parts for light sources, accelerators, amplifiers and detectors.

PROPRIETARY BEAMTIME

Synchrotron light can reveal otherwise inaccessible details of materials and provide information in multiple fields of study such as biology, environmental sciences, materials engineering, medicine and nanotechnologies. This is possible in the 24 measurement stations (beamlines) each one dedicated to a particular analysis technique and equipped with sophisticated and extremely precise measurement and inspection instruments.

These technologies and skills are also available to business upon request.

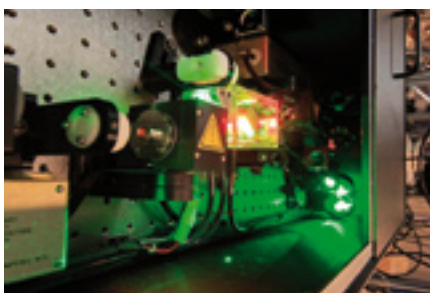
The procedure to use proprietary beamtime is very simple and the results are promptly analysed and communicated to the customer. Moreover, Sincrotrone Trieste guarantees that all work performed at client request will remain confidential, and that the results of such work will not be published in any form nor disclosed and communicated to third parties, but will remain the property of the client.

Besides, over twenty support and analysis laboratories are available. Each one is specialised in at least one field of enquiry, ranging from X-ray optics to biology, surface physics, lithography, microscopy and software development.

Call caen for further details.

Sincrotrone Trieste is a CAEN long-term partner.

The cooperation begun many years ago with the development of the SY900S Multichannel Floating power supply and still continues creating a deep synergy between the two companies.



SY900S Multi-Channel High Insulation System

The SY900S is a powerful and versatile instrumentation system especially suited for applications in experimental physics (i.e. electron spectroscopy). A main general purpose control unit (A900) supplies and supervises all the connected modules assuring the communication with any host computer via ethernet or serial link. The system, a 19"/6U euro-mechanics rack, consists of:

- One controller unit 6U high 15TE wide (A900)
- Up to 8 modules 3U high 15TE wide (i.e. A90Xs)

Various modules are available for different applications and may be combined in different configurations. The most widespread configuration is the A90XS High Voltage Power Supply family. Its modules, generating highly stable floating voltages ranging from 100V to 6kV, are particularly suited to drive complex electrostatic elements. Each module provides high voltage power supplies floating with respect to the ground and stackable with other modules. The SY900S system has no communication bus; the modules are daisy chained by cables both for power supply and for data acquisition.

Other modules are available such as a High Precision and Fast Settling Voltage Generator board (A910S) based on a 16 bits programmable DAC, which supplies 13, 32 or 64V bipolar voltages, or the A1902BS module which is a 4 Channels Linear Bipolar Power Supply delivering +2kV/-2kV @ 0.5mA especially designed to drive piezoelectric motors.

A pre-loaded Linux OS kernel provides the SY900 controller. Under this OS, a proprietary compact and reliable control system handles all the connected



power supply modules as well as the external interfaces. As the instrumentation is designed for experimental set-ups of large scientific facilities, an EPICS integration tool has also been provided to the user. Under EPICS, the field I/O is concentrated on low level local controllers called I/O Controllers (IOC). The SY900 may act as an IOC under EPICS environment.

A1902BS 4 Channels Bipolar Power Supply

The A1902BS module is a 4 Channels Linear Bipolar Power Supply delivering +2kV/-2kV @ 0.5mA especially designed for driving piezoelectric loads. It is completely compatible with the A90XS family mechanical and electrical standard, even though it is not floating being referred to ground. It allows bipolar operations and is provided with 4 channels for a more compact internal design. The A1902BS has a very low ripple of 5mV on the voltages supplied. This feature makes the A1902BS module extremely suitable for applications that require very high stability (i.e. benders for bimorph mirrors).

- -2kV/2kV output voltage
- Referred to ground
- 4 channels per module
- 16 bit Resolution
- No communication bus
- Max current internally limited
- Very low ripple <5mV
- Voltage and current monitor
- Bipolar



A90XS High Voltage Floating Power Supply

The A90XS High Voltage Floating Power Supply family, generating highly stable floating voltages ranging from 100V to 4kV, are particularly suited to drive complex electrostatic elements. Each module provides high voltage power supplies floating with respect to the ground and stackable with other modules. For applications that are more demanding in terms of stability and precision, a High Precision and Fast Settling Voltage Generator module (A910S) is available. The A90Xs module is based on a 16 bits programmable DAC which supplies 13, 32 or 64V bipolar voltages.

The A90XS family provides two independent and floating channels for each module, so that up to 16 channels can be housed in a single 19"/6U crate.

- Up to 6kV output voltage
- 6kV insulation vs. ground
- Up to 16 channels per crate
- 16 bit DAC unit
- Stackable modules
- No communication bus
- 1mA programmable max current
- 16 bit resolution (14 bit accuracy)
- Voltage and current monitor
- Low ripple (<20ppm/FS)



A910 16 bit DAC programmable board

The A910 S module is a 16 bit DAC programmable board designed to generate extreme stable voltage in the range $\pm 12V$, $\pm 32V$, $\pm 64V$. Particularly suitable to be cascaded with A90XS series power supplies, it is insulated with respect to ground up to 6kV.

It operates in all four quadrants and can draw and sink more than 10mA. Capable of generating an arbitrarily composed waveform up to 400kHz (the contents of the whole memory can be outputted at 400kHz max). Can be made to operate as a bipolar power supply directly outputting a particular voltage.

A910S modules provide a 2 pins LEMO connector located on the front panel allowing to step values stored in internal eeprom with respect to an external synchronization signal (opto-insulated input).

The A910S family provides one channel per box.

- +/- 64 V range
- 6 kV insulation vs ground
- 16 bit Resolution
- No communication bus
- 100 mA source/ 7sync capability
- Max current internally limited
- Very low ripple < 5 mV
- Bipolar



A2605BS High Stability Bipolar current power supply

The A2605BS is a low voltage bipolar current source with completely digital controlled feedback loop.

Economic, stable, simple to install and control, these are the most important benefits connected to its use in synchrotron light source research facilities.

Each power supply module is controlled by two independent DSP supervising all processes including the remote control of the power supply over an Ethernet device. A stand-alone software driver has been developed to control the power converter from a PC. This device is also compatible and can be easily controlled via Epics and Tango global control systems.

The system has a modular design hosted in a 19 inch 3U rack. Each power supply has a standard euro-card PCB format and 3U high - 12TE aluminium panel with indicators for troubleshooting, an Ethernet socket and a rear bus connector for power and control. To speed up connection operations a rear backplane has been included.

Four current modules can be housed in a single 3U-rack as part of the space is used for AC/DC converters supplying rails.

The A2605BS implements a completely digital PID control feedback loop that makes it extremely configurable and adaptive to any type of load. Four quadrant capabilities are guaranteed thanks to a H bridge output driver.

Long term stability (> 8 hours) is better than 50 ppm/FS when variation of the ambient temperature is within ± 1 °C.

- Input Voltage Range 5/24V DC
- Max Input Current 7A DC
- Output Current Range configurable up to ± 5 A DC
- Output Voltage Range configurable up to ± 20 V DC
- Output Current Resolution 16 bit
- Accuracy 50 ppm
- Long Term Stability ± 25 ppm
- Max Ripple 30 ppm



AH401/AH401B Picoammeter

The AH401/AH401B picoammeter is a 4-channel, 20-bit resolution, low noise instrument. It is composed by a particular charge-integration input stage for low-current sensing combined with a 20-bit sigma-delta ADC converter integrating a noise reduction digital filter.

This device performs current measurement from 50 pA (with a resolution of 50 aA) up to 1.8 μ A (resolution of 1.8 pA), with integration time ranging from 1ms up to 1s. Moreover, each input channel has two integrator stages so that the current-to-voltage conversion can be performed continuously during the ADC conversion avoiding any dead time in the data output.

The AH401/AH401B is housed in a light and extremely compact box that can be placed close to the signal sources in order to reduce cable lengths and minimize possible noise pick-up. It is particularly suited for applications where multi-channel simultaneous acquisition is required, i.e. 4-quadrant photodiodes for beam displacement measurements.

Low temperature drifts, good linearity and very low noise allow to obtain high-

precision current measurements.

The picoammeter can be easily controlled via communication interface: integration time, range, data format, type of acquisition, baudrate and a lot of other parameters can be instantly set and checked.

The AH401 has a fixed high speed USB interface working only with dedicated LabView™ USB driver under Windows™ OS.

Conversely, the AH401B with its modular communication capability allows the user to choose the type of interface needed leaving the flexibility into controlling the device with different types of programming languages and/or operating systems. Available modules are: RS232, RS422/485, USB and Ethernet (TCP/IP and UDP).

On the AH401B an external TRIGGER/GATE input signal is available to synchronize the acquisition of the picoammeter with external events (i.e. laser triggering). Furthermore, digital samples can be transferred either using ASCII format or RAW binary data format for fast data transmission.

Picoammeter main specifications

Input channels	4
Input connectors type	BNC
Effective current measuring range	From 50 pA to 1.8 mA
Resolution bits	20
Data transfer	Up to 1 ksamples/sec
Integration time	from 1 msec to 1 sec
Polarity	Positive
Communication (AH401)	USB 2.0
Communication modules (AH401B)	USB2.0, RS-232/422/485, Ethernet TCP-IP/UDP
I/O Signal (AH401B)	CONV output - TRIGGER/GATE input
Supply voltage	from 9 V to 15 V
Supply current	from 100 to 350 mA depending on comm. module



AH501 Picoammeter

AH501 is a 4-channel, 24-bit resolution, wide bandwidth and ultra wide input dynamic range picoammeter. It is based on a feedback-type system composed by a particular transimpedance input stage for current sensing combined with signal conditioning and filtering stages with state-of-the-art electronics. This device performs current measurements from $\pm 2.5\text{nA}$ (with a 300aA resolution) up to $\pm 10\text{mA}$ (1.35nA resolution) among three different ranges with sampling frequencies up to 41.7kHz (for 1 channel and a 16-bit resolution) and 8.3kHz (4 channels, 16 bit/sample). AH501 is light, compact and extremely versatile and it is especially suited for applications where multi-channel fast acquisition is a concern, i.e. feedback systems. Low temperature drifts, good linearity and very low noise allow to obtain high-precision current measurements.

Interchangeable proprietary modules were designed to reach data transfer rates up to 1 Mbit/s over USB, RS-232, RS-485 or Ethernet (TCP/IP or UDP).

Picoammeter main specifications

Input channels	4
Input connectors type	SMA or BNC
Effective current measuring range	From $\pm 140\text{ fA}$ to $\pm 10\text{ mA}$ (full BW)
Resolution bits	16 or 24
ENOB (typical)	18.5
Data transfer	Up to 40 ksamples/sec
Analog cut-off	Configurable (tested up to 9 kHz)
Polarity	Bipolar
Communication modules	USB 2.0, RS-232, Ethernet TCP-IP and UDP
Supply voltage	from $\pm 6\text{ V}$ to $\pm 15\text{ V}$
Supply current	from 270 to 410 mA

AH501 is available in different configurations: analog cut-off frequency, communication interface and input connectors are configurable on request.

The availability of trigger input and output signals on a standard RJ11 connector enables the synchronization with external events (i.e. acquisition on a specific time window).

Remote control of the instrument is straightforward: resolution, gain, data format, number of channels, baudrate and many other parameters can be instantly checked and set.

Acquisition of samples from the AH501 can be performed either using continuous or "on demand" transmission mode: in continuous mode data are uninterruptedly sampled and transmitted to user's host device while in the "on demand" mode they are sampled and transmitted only if a specific request is received.



MAS-TER 2kV Bipolar, multi channel, digitally controlled power supply system



MAS-TER is a powerful and versatile power supply system especially suited for applications in experimental physics (i.e. electron spectroscopy, adaptive piezoelectric mirrors, etc). A main general purpose control unit (industrial PC) supervises all connected power supplies modules and runs proprietary software allowing complete control of the system and assuring the communication with any host computer via Ethernet connection.

The rack system (19"-wide, 3U-high Euro-mechanics) has an internal bus where the individual modules are connected through multi-polar connectors for both power supply and data transfer. It can host up to 4 modules; each module is a 4 channels linear bipolar zero crossing power supply delivering $\pm 2\text{kV}/-2\text{kV}$ @ 0.5mA , especially designed to drive piezoelectric bimorph mirrors.

As the instrumentation is designed for experimental set-ups of large scientific facilities, EPICS and TANGO integration tools will also be provided to users. Under EPICS, the field I/O is concentrated on low-level local controllers called I/O Controllers (IOC).

Modular communication also satisfies users' requests: RS232, USB and Ethernet (TCP/IP and UDP) communication are available and are designed to reach data transfer rates up to 1 Mbit/s.

The MAS-TER system makes available proprietary know-how that allows safely control - precisely and with the highest accuracy - repeatability, resolution

- Up to 16 channels (4 channels/module)
- 500 μA effective output current
- $\pm 2000\text{V}$ zero crossing output voltage – referred to ground
- 16 resolution bits
- Up to 1Mbit/s data transfer
- Configurable communication (RS-232, USB, Ethernet TCP/IP and UDP)
- Channel to channel ΔV hardware protection (for piezoelectric bimorph mirrors application)
- < 2 bits 48hours stability
- Tango, Epics, TCP/IP interfaces

and stability of piezoelectric bimorph mirrors based on piezoelectric ceramic actuators. Thus, it is the most reliable, efficient and powerful tool for controlling bimorph mirrors in order to easily and reliably obtain their best performances. The system is composed by a main controller (C2808D) and up to four high voltage power supply modules. Each module accommodates up four bipolar channels each capable of generating up to $\pm 2\text{kV}$. Each channel of the A4205D module is referred to ground. The PS0175 module provides the main power supply to each A4205D module via a dedicated internal power bus.

Each industrial PC controller is released with a preloaded Windows XP OS kernel and with a customized software application which handles the communications with all connected modules.