

CONTRACT

Contract name**Ref No.****Start Date****End date****Prolongation****Contracting Parties****Buyer****Seller****Address****Address****Contact person****Contact Person****1.1 Contracting parties**

Purchaser (above named Buyer)

Supplier (above named Seller)

1.2 Contacts for contract

Purchaser contact

Supplier contact

1.3 Form of contract

The purchase agreement is completed through a purchase contract, i.e a written contract that is signed by the parties. Other commercial conditions enclosed by the supplier in the tender will not be considered.

1.4 Scope

CERIC-ERIC is seeking proposals for the refurbishment of the control system of a EU5.0 undulator.

The magnetic undulator which is required for the new MOST beamline of Elettra is based on the parameters of an existing undulator EU5.0 developed in 2008 as a prototype for the FERMI radiators.

The undulator must provide variable polarisation (linear horizontal and vertical, elliptical, circular) in the energy range of 200-2000 eV.

The project will investigate the dynamics of free chiral molecules matter, topological insulators (TIs). This innovative research within CERIC-ERIC will exploit different sources of radiation, and develop and consolidate new methodologies. Circular dichroism in photoemission will be applied in both cases.

The project will combine the method of PhotoElectron Circular Dichroism (PECD), used until now only for static studies, with pump-probe spectroscopy. This will extend the range of experimental possibilities available to CERIC users.

In order to plan and implement new, cutting-edge instrumentation for a planned new beamline (Phelix, Solaris) and upgraded on (MOST, Elettra). The framework will carry out the detailed design of the insertion devices, beam transport, monochromators and layouts for the two beamlines, and so provide economies of scale. Also, prototyping of instruments will be carried out, and close contact will ensure knowledge transfer. This prepares the ground for applications for further funding.

1.5 Price

Value in Euro _____, including all ancillary costs (shipment, maintenance operations).

1.6 Terms of delivery

Delivery shall take place DAP TRIESTE – Italy in accordance with Incoterms 2010 (delivered at Place) to the stated delivery address.

Supplier will need to support purchase in application for free duty import if applicable.

The delivery note with the purchaser's reference number () and information on contents, must be clearly visible and affixed on the outside of the packaging transport.

1.7 Date of delivery

30 weeks after receipt of the undulators's pick up.

PICK UP CONDITION:

Incoterms 2010 – EX WORKS – CERIC-ERIC

1.8 Delays to Delivery, Penalties and Revocation

In the case of delays with respect to the agreed dates as in the item on the delivery times which have been not been caused by the purchaser, the purchaser must be entitled to receive a penalty from the supplier.

A penalty must be paid for every seven days time period started during which the delay takes place at 1% of the value of the part of delivery which has not been possible to put into use as a result of delay. However, the entire penalty must not exceed 10% of the paid value.

If the supplier cannot fulfil conditions for approval and handover of the equipment within three (3) months of the agreed dates, the supplier has the option of replacing the equipment in question of the components that have caused the malfunction at no cost to the purchaser.

If the supplier chooses not to replace the equipment in question as above, or if the equipment after replacement still does not fulfil the conditions for approval and handover of equipment, the purchaser has the right to revoke the contract and receive full credit if the fault is substantial or if the delay is of material significance to the purchaser.

If the purchaser revokes the contract in accordance with this item, the purchaser has the right to repayment of the part of the purchase sum paid, including interest corresponding to the current reference interest rate. In the case of any revocation in accordance with this item, no costs for the use of equipment in the form of rent or equivalent shall be paid by the purchaser.

1.9 Delivery address

CERIC-ERIC
S.S.14 Km 163,5 – in AREA Science Park
34149 – Basovizza (Trieste) – Italy

1.10 Terms of Invoicing

The contractual amount will be paid off to the selected supplier as in the following terms:

- 20% of the global amount after receipt of the purchase order;
- 80 % after the final site acceptance test.

Invoicing occurs at delivery. The invoice must include only the portion of the goods delivered and that can be deployed.

1.11 Invoice address

Invoices are to be addressed to:

CERIC-ERIC
S.S.14 Km 163,5 – in AREA Science Park
34149 – Basovizza (Trieste) – Italy
Fiscal code: 90143090323 - VAT Number: IT01278610322

The invoice is to be marked with the due date.

1.12 Terms of payment

Payment will be made in arrears by invoice at thirty (30) days net. Corresponding regulations will be valid for agreed sub-deliveries.

Invoicing and administration charges are not accepted.

Payment of invoice does not mean the purchaser has approved equipment delivered. If there is any reason to query invoices, CERIC-ERIC has the right to withhold all or parts of payment.

1.13 Penalty interest

If the purchaser does not pay the invoice within the correct time, penalty interest shall be paid in accordance with the regulations in the Italian law.

1.14 Bank guarantee

If the purchaser has to make advance payments for which there are no guarantees, the supplier must submit a bank guarantee or other equivalent guarantee for this sum. This will be returned when the ownership of the equipment has been transferred to the purchaser.

All costs for this guarantee will be paid for by the supplier.

1.15 Warranty

There is a warranty period of 24 months for equipment.

The warranty period must be 24 months after an approved final inspection has been carried out by the purchaser with approved results.

If any equipment is unusable for more than one (1) month, or its function is impaired more than slightly as a result of faults or deficiencies in design, materials, manufacture, transport carried out by the supplier or as a result of the equipment not fulfilling the agreed operational properties and performance, the warranty period will be extended by the time during which the equipment was unusable/had substantially reduced function.

1.16 Responsibilities towards third parties and vicarious liability

The supplier is responsible for compensating persons injuries and material damage that may arise to third parties and which are caused by the supplier in conjunction with the execution of the contract.

When the supplier's personnel carry out work on the purchaser's premises, vicarious responsibility lies with the supplier for personnel hired by the supplier.

1.17 Insurance

The supplier is responsible for arranging the requisite insurance cover for his responsibilities and undertakings with respect to property and persons until the warranty period commences, subsequent to deliveries.

On request, the supplier must send copies of the insurance policy or other proof of valid insurance to the purchaser. If the supplier does not fulfil this condition, the purchaser has the right to take out insurance and charge it to the supplier.

1.18 Subcontractors

If the 'supplier uses subcontractors, the supplier will be equally responsible for subcontractors' work as for his own work.

1.19 Accessibility during the warranty period

The supplier warrants that the equipment covered by the contract will have the stated operational accessibility during the warranty period.

1.20 Documentation and drawings

The delivery is only considered as complete when all agreed documentation and drawings have been handed over to the purchaser.

If the supplier carries out any changes to equipment delivered, the supplier will also be responsible for making corresponding changes to the documentation delivered.

The supplier is responsible for the production of and costs for drawing up documentation and systems-related installations and assembly drawings.

1.21 Technical documentation

Complete and appropriate technical documentation must be included for equipment delivered.

The documentation must be in English and in the form of technical information for maintenance and service. The scope of such documentation is stated in the specifications.

1.22 Addition Technical documents

Purpose

The equipment will be connected to the control systems of the Elettra - Sincrotrone Trieste S.C.p.A. accelerators and beamlines (hereinafter Elettra CS).

The equipment supplier undertakes to comply with the requirements listed below

a)Integrating equipment

The Elettra CS are based on the TANGO framework (see <http://www.tango-controls.org>). Any new equipment will be integrated into this system. In order to achieve this, the supplier has the following options, listed in order of preference:

- 1) Provide a manual which documents how the control system communicates with the equipment using one of the standard interfaces (see below for list of standard interfaces).
- 2) Provide a software interface by means of a library of functions allowing the controls staff to develop the TANGO server for the equipment. In this case Linux is the preferred operating system. The library sources and the instructions necessary to successfully compile, install and run it should be made available to the controls staff.
- 3) Provide a TANGO Device Server.

b)Standard hardware interfaces

The preferred way of connecting equipment to Elettra CS is via one of the standard hardware interfaces. The following interfaces are supported as standard:

- 1) Ethernet, RJ-45 connector, up to 10 Gbit/s, full duplex;
- 2) serial line; RS232-C, RS232 on RJ45 (RS-232D), following CCITT V.24/V.28 specification and using only the RX,TX and GND wires (no hardware handshaking); RS422, RS485.

c)Exceptions

Any other cases of interfaces or protocols are considered non-standard and will only be accepted after discussion and approval by the controls experts.

d)Standard Protocols

Equipment connected via the standard hardware interfaces should communicate using one of the following protocols:

Open Modbus/TCP over Ethernet [we support function codes 1,2,3,4,5,6,15,16,23]

ASCII TCP/IP over Ethernet

ASCII over serial line

Binary TCP/IP over Ethernet

SCPI over Ethernet

All equipment should be supplied with a software manual describing the commands and data returned via the standard protocol and all the information necessary to correctly configure and run the protocols

e)Remote control features

The equipment should be remotely controllable from a computer via a standard hardware interface. The software link must be compliant with one of the supported standard protocols. Ethernet devices must support DHCP for IP stack configuration (address, routing, dns, etc.).

An embedded http server is not necessary but would be welcome if it doesn't prevent the other protocol to work at the same time.

Any communication should be initiated by the remote (control system) computer, i.e. the equipment should only answer to requests and not take the initiative to send information on the communication channel. The equipment should reply immediately and at the maximum within 20 ms. Any delay over the maximum will be treated as a timeout and the equipment will be considered as not having answered.

The communication channel must be able to sustain reliably permanent interrogations over long periods (24*7 service) and should be resistant to connection failures and traffic overload; that is the connection should be automatically recovered after the perturbation. Ethernet devices will be connected to LAN switch with several VLANs and should accept high traffic without hanging-up.

The communication channel should be immediately available without local action after being powered up i.e. no need to activate it from the front panel.

The communication protocol should allow the following operations:

e.1 Changing hardware state

any command should be completed in less than 20ms and send an ACK or an ERROR with a clear error message in case of failure. The following is a list of typical operations that all equipment interface should provide:

- Enable/Disable (ON/OFF)
- Remote/Local (in case the equipment can be controlled also from a local operator interface)
- Reset recoverable faults
- Setting of analog values (e.g. current in case of a power-supply)
- Any other tunable signals available on the equipment.

e.2 Reading hardware state

The reading of all the hardware states and measures should be possible in less than 20ms. A complete reporting of any information describing the state of the hardware should be available to allow a comprehensive remote diagnostic. The following is a list of typical readings that all equipment interfaces should provide.

- Enable/disable status reading
- State of Local/Remote switch
- Alarms and interlock states
- Faults status
- Readings of analog values (e.g. current in case of a power-supply)
- Read back of set-points of analog values

In any case the set of operations implemented by the protocol must be sufficient to fully operate and diagnose the equipment remotely

f) Support from controls

Support of controls experts can be requested for the definition of interfaces, review of specifications and other consultancies.

g) Guidelines for hardware selection

For interfacing equipment with "standard" analog (such as 0-10V , +-10V, 4-20 mA, etc.) or digital (0-24 V, 0-5V) input/output signals and with limited needs of speed and bandwidth, we suggest to select industrial modular I/O systems. These systems should be used for remote I/O based on Modbus or other standard protocols (see above). Form factor, price, power consumption, a wide offer of interfaces for several types of signals and subsystems, documentation and commercial support, expected commercial lifetime of the product should be taken into account when selecting these systems. We will select a preferred line of products for standardization of expertise and spare parts. (Beckhoff, Wago, B&R, Siemens, just to name a few candidates).

In case there is the need to provide local processing power or an embedded PC, we endorse Intel based platforms with Linux. A minimum of 2 Gigabit Ethernet ports and fan-less operations are required. However, since these kind of devices are subject to a very fast development and obsolescence cycle, we must be very careful in their selection: the full life-cycle of the plant/subsystem/instrument based on the embedded PC must be planned. We are currently evaluating, for example, the Minnowboard Turbot E3826 and E3845.

h) Interlock system (IS)

The IS will protect all the connected equipments from damage resulting from ionizing radiation, malfunctions or wrong user operations. The IS will be directly controlled by a system of programmable logic controllers (PLCs). The IS will be a standalone system independent from the other control systems. In order to be fully compatible with the equipment already in use the PLC must be Siemens 1500 series.

The allowed interfaces for interfacing to the IS are: Ethernet TCP/IP, Modbus connection. The allowed interfaces for connection to the field are: digital input and output (standard 0-24VDC), analog input and output (4-20 mA, 0-10 VDC, thermo-resistance and thermocouple), ProfiNet, ProfiBus, Modbus, serial RS232, serial RS485.

i) Personnel safety system (PSS)

The (PSS) will prevent injury or damage from ionizing radiation to personnel. The primary objective of PSS is to prevent any unauthorized or accidental entry into radiation areas and avoid inadvertent, but potentially significant exposure to personnel during the operations of the facility. The PSS will be directly controlled by a system of PLCs. The PSS will be a standalone system isolated from the other control systems. In order to be fully compatible with the equipment already in use the PLC must be Siemens 1500 F series. All the devices connected to the PSS plant must be chosen in accordance to European safety standards and according to the results of the in-house risk assessment. The allowed interfaces for interfacing to the PSS are: Ethernet TCP/IP, Modbus connection. The allowed interfaces for connection to the field are: digital input and output (standard 0-24VDC), analog input and output (4-20 mA, 0-10 VDC, thermo-resistance and thermocouple), ProfiNet, ProfiBus, Modbus, serial RS232, serial RS485. If the connection with the field must be Fail Safe, only these are admitted: digital input and output (standard 0-24VDC), analog input and output (4-20 mA only), ProfiSafe (in both Profinet or Profibus versions).

j) Motion control

Motion Controls Systems are required to handle a wide range of motor types (two/three/five phases stepper, brushless, etc), as well as a wide range of motor powers (the required torque may vary from tenth to some units of Nm). Open and close loop control mode must be possible, the latter using digital or analog encoders. Incremental and semi-absolute (for example SENC Acu-Rite series) digital encoders may have quadrature signal (A, B, Index) with differential electrical levels as first choice. Absolute digital encoders and their more complex interface standards may be used when the application do need them. Analog encoders must have a 4-20mA current interface (by its own or by signal conditioning devices). Motion controllers and drivers must be modular and flexible as much as possible, their simplicity and

robustness are key points. Ethernet and/or Ethercat are the preferred communication standards. Controllers and drivers must foresee the capability of interfacing "home" and "end motion" limit switches (normally closed, voltage free contacts, preferably). Concerning stepper motors, manual or software configuration of micro stepping is required, with at least a range from 1:1 to 1:16 step/micro step ratio. Fast coordinated movements among many motors/encoders will be a focal point in new scientific experiments, for example the coordinate movement of an insertion device and monochromator for performing fast measurements on a beamline (fly-scan). The support of the integration and easy programming of the coordinated motion of many axes will be an important factor for the selection of controllers.

1.23 Updating of information in documentation

If development/updating of documentation and/or products takes place, information regarding this must be sent to the purchaser. Service messages and similar information, e.g. from the manufacturer to the supplier's service organisation, must also be sent to the purchaser.

The supplier must guarantee that equipment after updating will fulfil the same functions as new equipment with respect to function and safety.

AII manuals must be updated and current program versions stated in the instructions for use.

Personnel affected must be informed and trained in how the equipment has been influenced by changes made.

1.24 Maintenance during the warranty period

The supplier's undertakings during the warranty period include:

- Remedial maintenance in the case of emergency faults.
- Call out time is one (1) week.
- Telephone support during office hours

All costs for preventive and remedial maintenance, corresponding to a full service contract, will be paid for by the supplier during the warranty period, on condition that the equipment is used in accordance with the supplier's instructions.

1.25 Updates and upgrades

Relevant updates, improvements and changes to the equipment during the time period from ordering to delivery will be carried out by the supplier after the purchaser's approval free of charge to the purchaser.

Updating of software and hardware which contain direct faults or safety risks will be included free of charge during the estimated technical lifespan of the equipment (10 years after handover). In addition, necessary changes to hardware caused by program revision will also be included in this item free of charge. Furthermore, any labour costs must be included.

All updates concerning the equipment's existing functions are included in the supplier's undertakings during the estimated technical life of the equipment (10 years after handover), on condition that the necessary level of service contract has been signed with the supplier.

Updates and upgrades which provide the equipment with new functions are not included in the supplier's undertakings.

1.26 Changes and supplements

Changes and supplements to the current contract may only be made through a written document signed by authorised representatives of the purchaser and the supplier.

1.27 Secrecy

The supplier must be familiar with and shall comply with any rule of secrecy that applies to the purchaser's operations. The supplier undertakes not to reveal or use any information from the purchaser, whatever this may be (information on personnel, finance, commercial aspects or research information etc.) which may become known to the supplier.

"The supplier" includes all natural persons and legal entities which are involved through the supplier in any way in order to fulfil his undertakings towards the purchaser, as well as any other persons who may come into contact with such information in any way.

Secrecy will continue to be applied to such information even after the contract in general has ceased to be valid.

1.28 Order of the documents

The contract documents complement each other.

If it should transpire that the contract documents are contradictory in any way, unless circumstances obviously require another solution, they shall be valid in the following order:

- written changes and supplements to this contract
- this contract, with attachments.
- any necessary clarifications of the tender document
- the procurement document and appendices
- any clarifications of the tender
- the tender and appendices

1.29 Transfer of contract

This contract may not be transferred to another natural person or legal entity without the parties' written approval.

1.30 Infringement of copyright and patents

The supplier is responsible for and will contest the costs for any infringements of copyright, patent rights or other intellectual property rights which may follow from this contract and the obligations the contract covers, and which do not result from the purchaser's negligence.

1.31 Disputes

Disputes that may arise from this contract which cannot be resolved amicably must be finally settled by a court applying law.

Any dispute negotiations must in the first instance take place in Trieste – Italy.

This agreement has been created in two identical copies, one for each party involved. The contract is valid when signed by both parties.

Signatures of authorized parties:

Buyer

Seller

Location/Date

Location/Date

Signature

Signature

Print name

Print name

Role

Role

