***"Establishment of a national laboratory "CMS RPC ALBANIA LAB" for gas detector in support of the cooperation of Albanian HEIs with the European Compact Muon Solenoid (CMS) project at CERN, in particular for the muonic sub-system RPC (Resistive Plate Chambers)"***

**Preventive.**

| Description | | Unit | Quantity | Price | Value |
|---|---|---|---|---|---|
| 1 | Supply and installation Network Fiber(Router) | Piece | 1 | | |
| 2 | Supply and installation UPS 16 Kva | Piece | 1 | | |
| 3 | Supply and installation 4 Channel Low Voltage Feeder | Piece | 2 | | |
| 4 | Supply and installation High Voltage Multichannel Feeder | Piece | 1 | | |
| 5 | Supply and installation Digital DAQ System with Silicone/Plastic Pulverizer and Photomultipliers | Set | 2 | | |
| 6 | Supply and installation Analog Oscilloscope | Piece | 2 | | |
| 7 | Supply and installation Digital Oschyloscope 10 | Piece | 1 | | |
| 8 | Supply and installation 6 Mixture Gas Management System | Set | 1 | | |
| 9 | Supply and installation Desktop Workstation with Display and Corresponding Work Elements | Piece | 4 | | |
| 10 | Supply and installation Rack | Piece | 1 | | |
| 11 | Supply and installation Server | Piece | 1 | | |
| 12 | Supply and installation Switch | Piece | 1 | | |
| 13 | Laptopa Workstation | Piece | 6 | | |
| | **Total excluding VAT** | | | | |
| | **VAT** | | | | |
| | **Total including VAT** | | | | |

**Technical Specifications.**

**1.F.V Network Fiber(Router)**

| MINIMUM TECHNICAL CHARACTERISTICS | |
|---|---|
| **Type, "Type":** | Router Wireless Wi-Fi Gigabit |
| **Operation Mode:** | Wireless router mode<br>Access point mode<br>Media bridge mode |
| **"Class":** | Min. AX 3200 |
| **WiFi Standards:** | IEEE 802.11a/b/g/n/ac/ax |
| **Network Standards, "Network Standard":** | IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11ac, IEEE 802.11ax, IPv4, IPv6 |
| **Ports, "Ports":** | (1) Gigabit WAN Port<br>(4) Gigabit LAN Ports |
| **WAN Connection Type:** | Automatic IP, Static IP, PPPoE (MPPE supported), PPTP, L2TP |
| **Transfer rate:** | Min. 570 Mbps |
| **Routing Protocols:** | IPSec, L2TP or PPTP |

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|---|---|
| **Operation Gang, "Band":** | Dual Band: 2.4 GHz & 5 GHz |
| **Antenat, "Antennas":** | Build-In or External |
| **Security, "Security Features":** | WEP 64/128-bit<br>WPA2-Human & Enterprise<br>(AES/TKIP) WPS |
| **LED lights, "LED indicators":** | Yes |
| **Buttons, "Buttons":** | WPS Button<br>Reset Button |
| **Food, "Power Supply":** | AC Input: 110 - 240 V AC (50/60 Hz) |
| **Accessories:** | Quick Start Guide<br>CD-ROM with Documentation External Antennas (Opsional)<br>Ethernet Cable<br>Power Adapter<br>Power Cord |
| **Warranty Coverage Period** | **":** 1 year |

**2. F.V UPS 16 Kva**

| **MINIMUM TECHNICAL CHARACTERISTICS** | |
|---|---|
| **UPS Online** | Convertible rack/tower, rail kit included |
| **Power output** | >=16KVA/16KW; |
| **Power factor** | >= 1; |
| **Dimensions, width, depth, height** | Rack mountable provided in the server room. |
| **Nominal Inlet and Output Voltage** | 1 phase and or 3 phase input and 1 phase output 220/230VAC +/- 1%; |
| **Total Harmonic Disturbance (THD)** | for the output voltage <=2% for 100% linear load and <=5% for 100% non-linear load; |
| **Permissible overload** | > 150% minimum 200 ms |
| **Efficiency** | online >=94%; |
| **Output frequency (synchronized with input)** | 50Hz /60Hz with range >= +/- 3 Hz when synchronized with the network ... and <= +/-0.1Hz when working on batteries; |
| **Online with double conversion** | Yes; |
| **Operation in Eco Mode** | Yes; |
| **Operation in Frequency converter mode** | Yes, so the UPS can be used as a voltage regulator/stabilizer without the need for batteries; |
| **Output Signal** | Pure sinusoidal; |
| **Entry/Exits** | with wire connections. |
| **Static Bypass automatic and manual** | Yes; The UPS must enable the physical separation/disconnection of its electronic part, from the part of the load cables, the input cables and the manual bypass... In order that in case of maintenance and in case of service, the part of the load supply which during this time, will be supplied by the manual bypass, will not be affected.<br>Equivalent solutions are also accepted<br>Schematically, an "*illustrative*" figure is as follows: |

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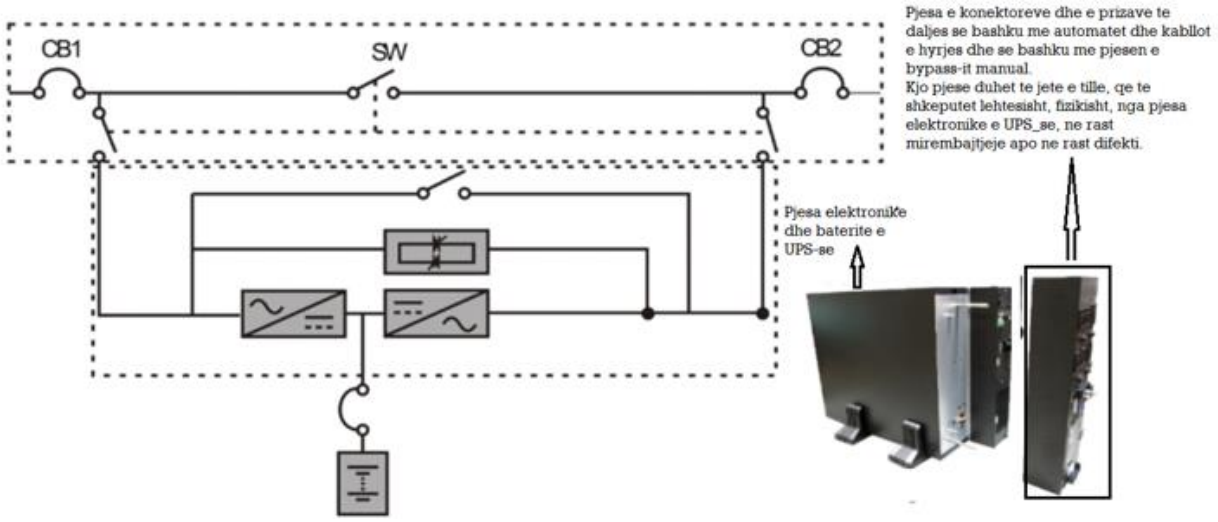
|---|---|
| **Input voltage** | 1 Phase 220/230VAC (1L+N+G) with range (for online operation) not narrower than 175 – 275VAC; |
| **Input Frequency** | 40 – 70Hz (50Hz/60Hz nominal); |
| **Batteries** | Indoor and with additional options with extra batteries also in the rack or tower. |
| **Automatic Battery Test** | Yes (configurable) |
| **Communication gates** | Ethernet (SNPM included) RJ45; USB; |
| **Management Software** | Yes; |
| | Have color display and graphical representation for reading and configuring parameters or equivalent interface. |
| **EPO** | Emergency power off ... Yes, or equivalent solutions; |
| **Standards/surge protection** | IEC / EN EN61000-4-5, Level 4, Criteria A; ANSI C62 41 Category B or equivalent. |
| **Warranty Coverage Period:** | Minimum 2 years |

Schematically an "*illustrative*" figure is as follows:




***Clarification on the works to be carried out:***
*The Economic Operator undertakes all the necessary work processes related to the supply and commissioning of the UPS for the energy supply of the Laboratory. The Economic Operator also takes care of all the necessary connections or accessories.*

**3. F.V Low Voltage Feeder 4 Channels**

| **MINIMUM TECHNICAL CHARACTERISTICS** | |
|---|---|
| **Description:** | Low-voltage feeding device with 4 independent channels, suitable for laboratory and industrial applications. It offers adjustable voltage up to 32 V and current up to 10 A per channel, with full electronic protection (OVP, OCP, OTP). The device supports advanced functions such as inter-channel connection, arbitrary simulation, and distance sensors. It communicates via |

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| | USB/LAN and is compliant with international security and EMC standards. |
| **Number of independent channels:** | 4 |
| **Output voltage per channel:** | 0 – 32 V DC |
| **Maximum current per channel:** | 0 – 10 A |
| **Maximum power per channel:** | Up to 160 W |
| **Total power of the device:** | Up to 384 W |
| **Protections:** | Protection against overload, overvoltage, overheating |
| **Protection Type:** | Thermal and magnetic for each channel |
| **Load Adjustment:** | Voltage: ±(0.01 % + 2 mV), Current: ±(0.01 % + 250 µA) |
| **Noise and noise (20 Hz – 20 MHz):** | < 1.5 mV RMS, < 1 mA RMS |
| **Programming Resolution:** | Voltage: 1 mV; Current: up to 1 mA |
| **Read-back measurement:** | With the same resolution as programming |
| **Advanced Functions:** | Connection between channels (tracking), arbitrary function (EasyArb), distance sensor (remote sensing) |
| **Communication interface:** | USB, LAN; with the possibility of RS-232, |
| **Display:** | Graphic LCD with 240×128 resolution |
| **Protection with electronic fuse:** | Yes |
| **Dimensions:** | Minimum 285 × 405 × 136 mm |
| **Weight:** | <= 15 kg |
| **AC Supply Voltage:** | 115/230 V AC ±10 %, 50/60 Hz |
| **Electromagnetic and Electrical Compatibility:** | In accordance with international standards for EMC, electrical safety and compliance directives |
| **Warranty Coverage Period:** | Min. 3 Years (36 Months) |

**4. High Voltage Multichannel F.V Feeder**

| **MINIMUM TECHNICAL CHARACTERISTICS** | |
|---|---|
| **Description :** | Multi-channel feeder system with 19" – 8U modular rack structure, designed for research and technology applications. It offers up to 16 channels with a total power of up to 5 500 W and supports hot swapping during work. The device includes a touchscreen display, LAN/USB/Wi-Fi interface, and software for control, alarm, and logging. Suitable for use in laboratory and industrial environments with high safety and flexibility requirements. |
| **Physical Structure:** | 19" – 8U rack case, modular with 10 to 16 slots |
| **Total Power Supply:** | From 600 W to 4 × 1200 W (5 500 W max) |
| **Standard Supplier Included:** | Minimums: 1 × 600W PSU |
| **PSU Expansion:** | Up to 3 additional units (600 – 1200 W each) |
| **Hot Swap:** | Supported for PSUs and modular boards |
| **Number of Replaceable Boards:** | 8 to 16 |
| **Control module:** | CPU with support for I/O signals, beam-handshake, advanced fan control |
| **Control screen:** | LCD Touchscreen <= 10.5" – graphic and functional |
| **Communication interface:** | LAN, USB, Wi-Fi; Support for OPC, EPICS, SNMP |
| **I/O functionalities:** | Enable, Reset, Interlock, Kill, Check Pass |
| **Operational Signals:** | CH-ON, GEN, VSEL, ISEL – configured for external process signaling |
| **Ventilation Control:** | Fans with automatic control and condition reporting (diagnostics) |

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| **Operating Temperature:** | 5 °C to 40 °C (operational) |
| **Software Support:** | GUI software with log, alarm, scripting, configurable profiles |
| **Additional equipment:** | External Wi-Fi adapter for wireless connection |
| **Electrical Safety:** | Protection for AC input, physical and logic interlock, protection for emergency cases |
| **Compatibility:** | Compliant with EMC directives, electrical safety standards and RoHS requirements |
| **WARRANTY** | |
| **Warranty Coverage Period:** | Min 3 Years 36 Months |

**5. F.V Digital DAQ System with Silicone/Plastic Sharpener and Photomultipliers**

| **MINIMUM TECHNICAL CHARACTERISTICS** | |
|---|---|
| **Description :** | The system consists of a plastic or silicone scinthinist, which when hit by charged particles or ionizing radiation (beta, gamma, muon), emits light in the visible spectrum. This light is transmitted through an optical pipeline (optical fiber or reflective tube) to the photomultiplier, which converts the optical signal into an electrical impulse. The obtained signal is further sent to the measurement system (DAQ) for analysis. The polisher is placed in the sensitive area and isolated from ambient light, while the optical connection must be clean and protected. The photomultiplier works at controlled voltage and provides high sensitivity and very fast response time. The system is used in experimental physics laboratories for the efficient detection of particles and radiation. |
| **Components that make up the set:** | • Photomultiplier<br>• Light guide for the System<br>• Silicone/Plastic Polisher |
| **Plastic Crystal** | |
| **Materials:** | NaI(Tl) Detector |
| **Shining Crystal Size:** | 20 x 40 cm NaI(Tl) |
| **PMT Diameter:** | Ø 130 mm |
| **Protective Room:** | Aluminum Wrap (Min. 1 mm Thickness) with Magnetic Protection |
| **Connectors:** | Week 14 pin JEDEC (pin-mapping specified for dynode, anode, cathode) |
| **High voltage:** | 400 V to 1100 V |
| **Energy resistance:** | Resolution ≤ 8.5% @ Cs-137 |
| **Functional Temperature:** | -20 °C to +65 °C |
| **Maximum dimensions:** | Outer shaft Min. Ø 160 mm;<br>Shining diameter Min Ø 150 mm,<br>PMT Min. Ø 130 mm |
| **Warranty Coverage Period:** | Min. 1 Year (12 Months) |
| **Light guide for the System** | |
| **Materials:** | Polymethyl methacrylate (PMMA) or equivalent, optically clear, with minimal loss and transparency > 90% in the visual spectrum. |
| **Form & Dimensions:** | Fish tail shape customized on request. |
| **Surface:** | Poly-finished: optical polishing to minimize loss-reflection and maximize light transfer. |
| **Main Objective:** | It aims at optical connection between the detector and the |

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| | detector (SiPM, PMT, camera), improving the efficiency of light collection. |
| **Integration:** | Easy to connect to solder, using optical couplings. |
| **Adaptability:** | It can be customized to fit the required dimensions and shapes – flexible for complex designs. |
| **Main advantages:** | - Efficient light transfer<br>- Chemical and dimensional resistance<br>- Suitable for laboratory/inclusive applications. |
| **Warranty Coverage Period:** | Min. 1 Year (12 Months) |
| **Silicone/Plastic Polisher** | |
| **Materials:** | Cesium iodide doped with sodium (CsI(Na)) |
| **Shape:** | Smooth crystals, with excellent polymerization; can be unencapsulated or encapsulated on demand |
| **Extinction Rate:** | approximately 0.63 μs (relatively fast speed) |
| **Show Point:** | <= 420 nm (good for PMT &SiPM significantly in this band) |
| **Density:** | Approximately 4.51 g/cm³ (fairly compact material for efficient radiation banning) |
| **Thermal resistance:** | Melting point: about 894 K |
| **Energy loss:** | Radial Stop Length: Approximately 1.86cm |
| **Light Efficiency:** | Approximately 85% compared to NaI(Tl) |
| **Refractive Index:** | Approximately 1.84 suitable for optical cooperation with equipment |
| **Hardness (Mohs):** | About 2 (mild – gentle treatment) |
| **Mechanical Characteristics:** | Durable material, suitable for various detection–physical or industrial applications |
| **Common Applications:** | Nuclear physics, environmental monitoring, industrial applications (density, thickness measurement) |
| **WARRANTY** | |
| **Warranty Coverage Period:** | Min. 1 Year (12 Months) |

**6. F.V Analog Oscilloscope**

| **MINIMUM TECHNICAL CHARACTERISTICS** | |
|---|---|
| **Description :** | Analog oscilloscope with digital functions, suitable for measuring and analyzing electrical signals in laboratory and educational applications. The device offers mid-bandwidth, several input channels, and automatic metering functions, combining classic use with modern features such as advanced display, precision triage, and USB/LAN connectivity for data storage and analysis. |
| **Bandwidth:** | 70 MHz to 500 MHz |
| **Number of channels:** | Min. 4 analog channels |
| **Sampling Scale:** | 1.25 GS/s to 2.5 GS/s |
| **Memory depth:** | 10 Sample to 160 Sample |
| **Vertical resolution:** | 8 to 16 bit |
| **Digital capacity:** | Up to 16 Digital Channels |
| **Surge Capture Speed:** | ≥ 4 000 000 vale/s |
| **Functions on Wave Analysis:** | Minimum 35 automatic measurements, Fast Furier transform, and equation editing |

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|---|---|
| **Display:** | ≥ 10" touch with Min resolution 1280 x 800 |
| **Interfaces:** | Min. 3 USB 2.0 port<br>1x LAN 10/100 Mb/s,<br>1x Virtual network computing for remote control |
| **Segmented Memory:** | Up to 13,107 segments |
| **Decoding Protocols Supported:** | I²C, SPI, UART/RS-232/422/485, CAN, CAN FD, CAN XL, LIN, SENT, Automotive Ethernet 10BASE-T1S |
| **Operating System (O.S):** | Built-in Linux |
| **Weight:** | ≤ 2.5 kg |
| **Selected items:** | Passive Testing for Each Channel<br>Power Supply Cable<br>User Manual |
| **WARRANTY** | |
| **Warranty Coverage Period:** | Min. 3 Years (36 Months) |

**7. F.V Digital Oscilloscope**

| **MINIMUM TECHNICAL CHARACTERISTICS** | |
|---|---|
| **Description:** | This instrument is a high-performance digital oscilloscope, used to measure, visualize, and analyze electrical signals in real-time. It is suitable for research laboratories, electronic development, and industrial testing. With multi-channel, high resolution, and advanced analysis functions, the device helps diagnose and develop electronic circuits and systems.<br>This tool is essential for electronic engineers, measurement technicians, and researchers who require an accurate and detailed analysis of electrical signals in various applications from microcontrollers and sensors, to high-speed communication systems. |
| **Number of channels:** | Min. 4 analog channels (optional: 16 digital channels) |
| **Bandwidth:** | Up to 1 GHz |
| **Sampling Scale:** | 2.5 – 5 GS/s Depending on the number of active channels |
| **Memory depth:** | 400 – 800 Mpts per channel expandable according to configuration |
| **Take-off time:** | ≤ 350 hp |
| **Vertical resolution:** | 12 – 18 bit |
| **Vertical Scale:** | 0.5 mV/div – 1 V/div |
| **Horizontal Scale:** | 200 hp/div – 10,000 s/div |
| **Input Sensitivity:** | 500 µV/div up to 10 V/div |
| **Input Offset:** | ±5 V with a sensitivity of 500 µV/div |
| **Input Impedance:** | 1 MΩ / 12 pF |
| **Maximum Input Capacity:** | up to 300 V RMS |
| **Screen Type:** | ≥ 13" TFT LCD with touch (1920x1080) |
| **Waveform Capture Rate:** | Up to 4.5 million waveforms/second |
| **Types of triage:** | Glitch, pulse width, interval, pattern, pattern width, runt, rate of change, timeout, window |
| **Interfaces:** | Min. 2x USB-A, 1x USB-B, LAN, HDMI |
| **Weight:** | ≤ 6 kg |
| **Dimensions:** | ≤ 414 × 279 × 162 mm |
| **Standard equipment:** | Min. 4x 700 MHz passive probes, accessory bag, quick guide, supply cable |
| **WARRANTY** | |
| **Warranty Coverage Period:** | Min. 3 Years (36 Months) |

**8. F.V 6 Mixture Gas Management System**

| MINIMUM TECHNICAL CHARACTERISTICS | |
|---|---|
| **Description:** | Gas control and manipulation distribution system.<br>These detectors, in order to become operational, need a mixture of different gases, a total of three are 95.2% freon (C2, H2, F4), 4.5% isobutane (i −C4 H10) and 0.3% sulphur hexafluoride (SF 6). This mixture is very efficient with relatively good results for detecting muons and other particles, and also the peak of work is relatively low, requiring only potential differentials of up to 6.8KV. This entire system must meet either the classic studies (i.e. with the mixture cited above) or with innovative gas mixtures, which are defined as ECO-GASES (environmentally acceptable). The characteristic of these compounds is that they do not catch fire, and do not pollute the surrounding environment and also the natural environment. These types of studies are also a European priority for the protection and maintenance of the natural environment and public health in the workplace.<br>These additional mixtures consist of HFO and CO2, which can even replace the classic mixture compounds for RPC detectors. |
| **The gas distribution and monitoring system consists of:** | • Six total gas distribution lines connected to their respective cylinders (14 liters -20 liters) which will be mounted outside the main facility with the relevant lines which will go up to the Laboratory. The lines should be with strong metal material and not oxidizing from the inside. Preferably stainless steel or equivalent.<br>1.1 CO2<br>1.2 HFO<br>1.3 Freon (C2H2F4)<br>1.4 Isobutane C4H10<br>1.5 SF6<br>1.6 Argon<br>• Flow Controller<br>• Mixer<br>• Air humidifier<br>• Digital Reading and Flow Control Unit<br>• Portable Gas Leakage Meters<br>• Dedicated Desktop Computer |
| **Line Connection Mode:** | 1.1 These lines must have a control panel with valves and barometers and anti-CO2 sensors, respectively indicating the pressure. These lines will be placed on the wall in a patch-panel.<br>1.2 These lines will be merged into a rack in the Laboratory, where each of them will have a flow controller. |
| **Flow Controller** | |
| **Type :** | Gases |
| **Flow Range:** | min. 0.12 to 6 mln/min<br>max. 1 to 50 ln/min |
| **Accuracy:** | ±0.5% Rd plus ±0.1%FS |
| **Repeatability:** | <±0.2% Rd (or <±0.04% FS whichever is greater) |
| **Decrease ratio:** | 1:150 (1:50 in analog mode) |
| **Multi-fluid capability:** | Maintaining the maximum of 8 calibration curves |

| | |
|---|---|
| **Deployment time (in control, typical):** | 1 typical second above 5% FS; Option: Up to 600ms |
| **Control stability:** | ≤ ± 0.1 % FS (typical for 1 ln/min N2) |
| **Operating Temperature:** | -10...+70°C |
| **Temperature sensitivity:** | zero: < 0.05% FS/°C; span: < 0.05% Rd/°C |
| **Leak integrity, out:** | tested < 2 x 10-9 mbar l/s He |
| **Pressure Sensitivity:** | 0.1% Rd/typical N2 bar; 0.01% Rd/bar typical H2 |
| **Pressure Range Sensor:** | 0 to 64 bar |
| **Leakage through closed valve:** | < 10-5 Pa.m3/s Ai |
| **Assembly:** | maximum error at 90° outside the horizontal 0.2% at 1 bar, Typical N2 |
| **Heating Time:** | ≤ 30 minutes |
| **Storage/Shipping Conditions:** | 0...+50°C, max. 95% RH (non-condensing) |
| **Mechanical Specifications Flow Controller** | |
| **Pressure Rating (PN):** | 64 or better |
| **Ingress Protection:** | IP40 |
| **Wet parts from material:** | stainless steel 316L or similar |
| **Sealing Material:** | External seals: metal-to-metal (without rings); Inner seal/ valve place: FFKM/Kalrez |
| **Piston Material:** | FFKM/Kalrez®; option FKM/Viton® |
| **Process Links:** | 1/4" Male Face Sealer |
| **Weight:** | ≤ 0.7 kg |
| **Electrical Properties Flow Controller** | |
| **Power Supply:** | +15… 24 Vdc |
| **Power Consumption:** | 3.5 W typical at 24 V<br>for fieldbus: add +0.9 W |
| **Analog output:** | 0… 5 (10) Vdc or 0 (4)... 20 mA (source) |
| **Designated Analog Point:** | 0… 5 (10) Vdc or 0 (4)... 20 mA (decreasing) |
| **Digital Communication:** | Standard: RS232; Option: PROFIBUS DP, CANopen®, DeviceNet™, PROFINET, EtherCAT,® Modbus RTU, ASCII or TCP/IP, EtherNet/IP, POWERLINK, FLOW BUS |
| **Electrical Interfaces Flow Controller** | |
| **Power (main connector):** | D-sub with 9 pins (male) |
| **Function (main connector):** | Analog, RS232, RS485 |
| **PROFIBUS DP:** | D-sub with 9 pins (female) |
| **CANopen/DeviceNet:** | M12A with 5 pins (male): |
| **Modbus RTU/ASCII/FLOW-BUS:** | RJ45 |
| **Modbus TCP / EtherNet/IP / EtherCAT/® PROFINET / POWERLINK:** | 2x RJ45 |
| **Note:** | CE product, Total 6 of them needed. |
| **Warranty Coverage Period:** | Min. 2 years (24 months) |
| **Mixer** | |
| **Description:** | All the massive flow controllers will be merged into a corresponding mixer which plays the role of the lungs. |
| **Type :** | Gases |
| **Flow Range:** | min. 0.8 to 40 ln/min<br>max. 5 to 250 ln/min |
| **Accuracy:** | ±0.5% Rd plus ±0.1%FS |
| **Repeatability:** | <±0.2% Rd (or <±0.04% FS whichever is greater) |
| **Decrease ratio:** | up to 1:187.5 (1:50 in analog mode) |
| **Multi-fluid capability:** | Maintaining the maximum of 8 calibration curves |
| **Deployment time (in control, typical):** | 2 to 4 seconds |
| **Control stability:** | ≤ ± 0.1 % FS (typical for 1 ln/min N2) |
| **Operating Temperature:** | -10 to +70°C |
| **Temperature sensitivity:** | zero: < 0.05% FS/°C; Space: < 0.05% Rd/°C |

| | |
|---|---|
| **Leak integrity, out:** | tested < 2 x 10-9 mbar l/s He |
| **Pressure Sensitivity:** | 0.1% Rd/typical N2 bar; 0.01% Rd/bar typical H2 |
| **Maximum Kv Value:** | 0.04 to 0.4 |
| **Assembly:** | maximum error at 90° outside the horizontal 0.2% at 1 bar, Typical N2 |
| **Heating Time:** | ≤ 30 minutes |
| **Storage/Shipping Conditions:** | 0...+50°C, max. 95% RH (non-condensing) |
| **Mechanical Specifications Mixer** | |
| **Pressure Rating (PN):** | 64 |
| **Ingress Protection:** | IP40 |
| **Wet parts from material:** | stainless steel 316L or similar |
| **Sealing Material:** | Standard: FKM/Viton®; Option: EPDM, FFKM/Kalrez®, FDA and USP Class VI approved |
| **Piston Material:** | standard: FFKM with PI foil; Options: EPDM with PI foil, FDA approved and USP Class VI, EPDM, FDA approved and USP Class VI, FFKM/Kalrez® |
| **Process Links:** | compression type or face seal (VCR/VCO) Mergers |
| **Min. DP:** | 2 bar(d) |
| **Max. ΔP:** | 20 bar(d) |
| **Weight:** | Max. 2.1 kg |
| **Electrical Properties Mixer** | |
| **Power Supply:** | +15 to 24 Vdc |
| **Power Consumption:** | 3.5 W typical at 24 V for fieldbus: add +0.9 W |
| **Analog output:** | 0… 5 (10) Vdc or 0 (4)... 20 mA (source) |
| **Designated Analog Point:** | 0… 5 (10) Vdc or 0 (4)... 20 mA (decreasing) |
| **Digital Communication:** | Standard: RS232; Option: PROFIBUS DP, CANopen®, DeviceNet™, PROFINET, EtherCAT,® Modbus RTU, ASCII or TCP/IP, EtherNet/IP, POWERLINK, FLOW BUS |
| **Electrical Interfaces Mixer** | |
| **Power (main connector):** | D-sub with 9 pins (male) |
| **Function (main connector):** | Analog, RS232, RS485 |
| **PROFIBUS DP:** | D-sub with 9 pins (female) |
| **CANopen/DeviceNet:** | M12A 5-pin (male) |
| **Modbus RTU/ASCII/FLOW-BUS:** | RJ45 |
| **Modbus TCP / EtherNet/IP / EtherCAT/® PROFINET / POWERLINK:** | 2x RJ45 |
| **Note:** | CE product, Total 2 of them needed. |
| **Warranty Coverage Period:** | Min. 2 years (24 months) |
| **Air humidifier** | |
| **Media Type:** | liquids at sound speed 1000...2000 m/s |
| **Flow Range:** | Liquid: 0 to 1500 mL/min (Nominal flow rate: 600 mL/min or 36 l/h) full-scale value (FS) is user-configurable |
| **Accuracy:** | ±0.8% Rd |
| **Repeatability:** | ±0.1% Rd ±hp |
| **Decrease ratio:** | up to 1:750 |
| **Deployment time (in control, typical):** | 1 sec. (typical) |
| **Zero Point Stability (ZS):** | < ±0.4 ml/min (MkII) |
| **Response time (sensor):** | < 50 ms (meter, T98%) |
| **Operating Temperature:** | 0 to 60 °C |
| **Liquid temperature:** | -10 to 90 °C |
| **Temperature sensitivity:** | < 0.1% Rd/°C |

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|---|---|
| **Leak integrity, out:** | < 2 x 10-9 mbar l/s He |
| **Assembly:** | any position |
| **Heating Time:** | ≤ 30 minutes |
| **Storage/Shipping Conditions:** | 0 to 50 °C, max. 95% RH (non-condensing) |
| **Mechanical Specifications Air Humidifier** | |
| **Pressure Rating (PN):** | 10 |
| **Ingress Protection:** | IP66/67 |
| **Surface roughness of wet parts:** | 0.8 µm (Ra max) |
| **Wet parts from material:** | stainless steel 316L |
| **Housing Material:** | stainless steel 316L |
| **Sealing Material:** | none, only welds (in the way of liquid) |
| **Inner diameter of the sensor:** | straight tube, 1.3 mm |
| **Process Links:** | Triple clamp 1/4" according to DIN32676-C (welded) |
| **Weight:** | Max. 1.3 kg |
| **Electrical Properties Air Humidifier** | |
| **Power Supply:** | 15 to 24 Vdc ±10% |
| **Power Consumption:** | Meter: 2.5 W typical at 24 V<br>Controller: 7 W typical at 24 V<br>for fieldbus: add 0.9 W |
| **Analog output:** | 0… 5 (10) Vdc or 0 (4)... 20 mA (source) |
| **Designated Analog Point:** | 0… 5 (10) Vdc or 0 (4)... 20 mA (decreasing) |
| **Digital Communication:** | Standard: RS232; Option: DeviceNet™, CANopen®, PROFIBUS DP, Modbus RTU/ASCII, FLOW-BUS, EtherCAT,® PROFINET, Modbus/TCP, EtherNet/IP, POWERLINK |
| **Frequency/Pulse Output:** | max 50 kHz |
| **Electrical Interfaces Air Humidifier** | |
| **Actuator's output:** | 4-pin M8 (female) |
| **Power (main connector):** | M12A with 8 pins (male) |
| **Function (main connector):** | Analog, RS232, RS485 |
| **PROFIBUS DP:** | M12B 8-pin (female) |
| **CANopen/DeviceNet:** | M12A 5-pin (male) |
| **Modbus RTU/ASCII/FLOW-BUS:** | M12A 5-pin (male) |
| **Modbus TCP / EtherNet/IP / EtherCAT/® PROFINET / POWERLINK:** | 2x 4 pins M12D (female) |
| **Note:** | CE product, Total 2 of them needed. |
| **Warranty Coverage Period:** | Min. 2 years (24 months) |
| **Digital Reading and Flow Control Unit** | |
| **Description:** | Modular Flow Reading and Control System |
| **Number of channels:** | 6 flow channels (3 segments of 2 channels each) |
| **Front Screen:** | TFT Min 1.8" with 4 control buttons for each channel |
| **Dimensions:** | 1/2 19" Rack Mount / Tabletop (1 Module) |
| **Power Supply:** | 100–240 Vac, 50/60 Hz, +24 Vdc / 30 W output for 6 instruments |
| **Communication with hosts:** | FLOW-BUS (based on RS-485), RJ45 connectors |
| **Instrument Connection Type:** | FLOW-BUS with 3 separate ports for 3 segments (6 instruments total) |
| **Local control:** | Menu for fluid selection, set-point change, totalizer, alarms, various configurations |
| **User Safety:** | Limited password functions (setpoint change, alarm reset, configurations, etc.) |
| **Typical Use:** | Control and monitoring of instruments for gases and liquids |
| **Electrical Protection:** | 24 Vdc galvanically isolated for each instrument; internal fuses for each channel |
| **Use in industrial environment:** | Yes, suitable for laboratories, industrial processes and |

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| | control facilities |
| **Modularity:** | Configurations 2, 4, 6 of instruments with modules |
| **Working Temperature:** | 5 °C to 40 °C |
| **Additional equipment:** | Converter for Ethernet, USB, DeviceNet, EtherCAT |
| **Warranty Coverage Period:** | Min. 2 years (24 months) |
| **Portable Gas Leakage Meters** | |
| **Description:** | Portable Multi-Gas Detector with Integrated Pump |
| **Detection Type:** | 4 gases simultaneously: $O_2$, LEL, CO, $H_2S$ |
| **Gases detected:** | - Oxygen ($O_2$)<br>- All Combustible Gases (LEL, Even Isobutane in this case)<br>- Carbon monoxide (CO)<br>- Hydrogen sulfide ($H_2S$) |
| **Detection method:** | Electro-chemicals for CO, $H_2S$ and $O_2$; catalytic for LEL |
| **Built-in Pump:** | Yes – electric pump for sampling up to 20 meters (flexible tube) |
| **Response Time:** | - $O_2$: ≤15 seconds<br>- LEL: ≤15 seconds<br>- CO/$H_2S$: ≤20 seconds |
| **Measurement range:** | - $O_2$: 0–30%<br>- LEL: 0–100% LEL<br>- CO: 0–1000 ppm<br>- $H_2S$: 0-200 ppm |
| **Alarms:** | - Visual<br>- Acoustic<br>- Vibration |
| **Display:** | LCD with automatic illumination; shows gas concentrations, pump and battery status |
| **Memory & Login:** | Stores the history of alarms and events |
| **Powering the pump:** | Automatic and blocked suction protected (displays blockage alarm) |
| **Power Supply:** | Rechargeable lithium-ion battery |
| **Battery life:** | Up to 13 hours of continuous operation with active pump |
| **Charging Time:** | Approximately 5 hours |
| **Weight:** | No more than 350 Grams with the built-in Pump |
| **Working Conditions:** | Temperature: -20 °C to +50 °C<br>Humidity: 10 – 95% RH |
| **Certifications:** | ATEX, IECEx, UL, CSA – for use in hazardous environments |
| **Note:** | CE product, Total 2 of them needed. |
| **Warranty Coverage Period:** | Min. 2 years (24 months) |
| **Dedicated Desktop Computer** | |
| **Min. Points for Processor As: cpubenchmark.net Min Proc. Rating According to: cpubenchmark.net:** | Min. 49000 Dots with Min 20 Core |
| **"RAM":** | Min. 32 GB, min. DDR5 5600 ECC |
| **Hard Disk Size "HDD Size":** | Min. (1) x 1T SSD M.2 |
| **Raid:** | Raid 0, 1 Support |
| **Graphics card:** | Integrated graphic Card. |
| **"Media Device":** | DVD+/-RW RW (External DVD+/-RW can also be used, not necessarily of the same brand as the computer) |
| **"Slots":** | Min (3) M.2 PCIe, Min(4) PCIe where (1) be x16 slot.<br>Min(3) SATA 3.5 inch |
| **Communication & Management** | |
| | Min(9) USB, where Min (7) is USB 3.2.<br>Min (4) USB to be Money. |

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| **Communication Ports "Ports":** | (1) RJ-45, Min (2) Display Port.<br>Min (1) Headset jack<br>Min (1) Thunderbolt Port |
| **"Networking" Network:** | 1 RJ45 (1GbE) Ethernet port<br>Wi-Fi 7 802.11be, Bluetooth Min5.4 |
| **"Sound":** | Integrated Sound Card |
| **"Speakers":** | Internal speakers or Built-in Monitor |
| **Security Management:** | Embedded Security TPM 2.0 |
| **"Preinstalled Licensed O. S." Operating System:** | Ubuntu 24.04 LTS |
| **Keyboard:** | Standard Keyboard QWERTY |
| **"Mouse":** | Minimum 3 Button scroll Optical |
| **"Power Supply" Food:** | 220 V AC , 50 Hz |
| **Energy Efficiency:** | Energy Star |
| **Accessories** | |
| **Power Cord Cable:** | Yes, European |
| **"Recover":** | Recover Partition |
| **MONITORS** | |
| **"Type" types:** | LCD or LED of the same brand as the Computer |
| **Size:** | ≥ 23" |
| **Rezolucioni "Native Resolution":** | 1920 x 1080 @ 60 Hz |
| **Contrast Report "Constrast Ratio Static":** | 3000:1 |
| **Response Time:** | ≤ 6 ms |
| **"Display Port":** | (1) VGA or DVI and (1) from DP/DVI/HDMI Ports |
| **Energy Efficiency:** | Energy Star |
| **"Power Supply" Food:** | 220 V AC , 50 Hz |
| **Warranty** | |
| **Warranty Coverage Period:** | Min. 3 Years (36 Months) |

- **Clarification on Gas Management System Installation Structure**

| **Gas Management System Installation Structure** | |
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| **Description:** | The cage must be constructed of stainless steel or 50×50 mm galvanized steel profiles, with galvanized metal mesh panels (30×30 mm mesh) for full ventilation. The roof should be sloping, covered with coated steel/aluminum foil for weather protection.<br><br>The base should be made of metal beams reinforced with metal gratings (grating) for resistance and ventilation from below. The door must have stainless steel hinges and a safety lock. Inside there should be holders for fixing the cylinders.<br><br>The minimum capacity should be 6 canisters (14–20 l), diameter ≤ 230 mm, height ≤ 1700 mm, located vertically. The structure must be modular for future expansion and meet European safety standards for the storage of technical gases.<br><br>Six individual lines of metal piping (stainless steel or equivalent material, corrosion-resistant, and non-oxidizing from the inside) must emerge from the cage, each connected to the corresponding cylinder. The cage will be positioned outdoors, in front of the laboratory, with direct access to it. Because of this proximity, the lines will be immediately inserted from the cage into the |

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| | laboratory, without the need for long horizontal stretching. Entry into the indoor environment must be carried out through a dedicated panel with hermetic passages, guaranteeing maximum safety and isolation from external factors.<br><br>In the interior of the laboratory, in front of the cylinder cage, a dedicated metal rack unit will be mounted, which will contain all the main components of the gas management system. These include the gas mixer, humidifier, control panels and pressure gauges, as well as other auxiliary equipment necessary for the accurate mixing, measurement and distribution of gases to the detectors. The rack should be of industry standard (19"), with sufficient ventilation and easy access for maintenance. The connection of the equipment to the gas inlet lines from the cage must be carried out with pipes and hermetic connections certified for use with technical gases, guaranteeing maximum safety and stable operation of the system. |
| **Frame Material:** | Stainless steel or galvanized steel, 50×50 mm profiles |
| **Side Panels:** | Galvanized metal mesh (mesh), opening 30×30 mm |
| **Roof:** | Sloping, with coated steel/aluminum foil for weather protection |
| **Base:** | Metal beams reinforced with metal grating (grating) for ventilation and resistance |
| **Dera:** | Reinforced with stainless steel hinges and key safety lock |
| **Capacity of the cylinders:** | Up to 6 vertical canisters, 14–20 liters, minimum diameter ≤ 230 mm, height ≤ 1700 mm |
| **Modularity:** | Structure designed for future expansion with additional modules |
| **Gas Line Outlets:** | 6 stainless steel or equivalent metal piping lines, corrosion resistant and non-oxidizing |
| **Line connections in the laboratory:** | Direct entry into the laboratory via panel with hermetic passages, no long distance |
| **Cage position:** | Outdoors, in front of the laboratory |
| **Ventilation:** | Natural ventilation through side meshes and grilled bases |
| **Security:** | Limited lock access, cylinder drop protection, warning inscriptions |
| **Structure dimensions:** | Minimum 1200 mm x 1000 mm x 2300 mm (Width/ Depth/ Height) |
| **Clarification on the works to be carried out:** | The Economic Operator undertakes the supply of the gas management system along with all relevant components and accessories. Also, it must provide as part of the offered solution all the necessary technical installations to ensure the full and optimal operation of the system, in accordance with the defined technical specifications.<br><br>In addition to the supply and installation of the main system, the Economic Operator is responsible for the realization of all works for the extension and connection of six gas pipeline lines that connect the gas cylinders in the metal cage with the gas management equipment inside the laboratory. These works must be carried out |

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| | with certified, corrosion-resistant materials and suitable for use with technical gases, guaranteeing insulation, safety and stable operation of the system.<br><br>Also, the hermetic connection and installation of pipeline passage panels on the laboratory wall must be ensured, respecting technical requirements and international standards for safety and environmental protection. All works should include functional testing and quality control before the final acceptance of the system. |

**9.** F.V Desktop Workstation with Display and Corresponding Work Elements

| **MINIMUM TECHNICAL CHARACTERISTICS** | |
|---|---|
| **Min. Points for Processor As: cpubenchmark.net<br>Min Proc. Rating According to:<br>cpubenchmark.net:** | Min. 49000 Dots with Min. 20 Core |
| **"RAM":** | Min. 32 GB, min. DDR5 5600 ECC |
| **Hard Disk Size "HDD Size":** | Min. (1) x 1TB SSD M.2 |
| **Raid:** | Raid 0, 1 Support |
| **Graphics card:** | Integrated graphic Card. |
| **"Media Device":** | DVD+/-RW RW (External DVD+/-RW can also be used, not necessarily of the same brand as the computer) |
| **"Slots":** | Min (3) M.2 PCIe, Min(4) PCIe where (1) be x16 slot.<br>Min(3) SATA 3.5 inch |
| **COMMUNICATION<br>& MANAGEMENT** | |
| **Communication Ports "Ports":** | Min(9) USB, where Min (7) is USB 3.2.<br>Min (4) USB to be Money.<br>(1) RJ-45, Min (2) Display Port.<br>Min (1) Headset jack<br>Min (1) Thunderbolt Port |
| **"Networking" Network:** | 1 RJ45 (1GbE) Ethernet port<br>Wi-Fi 7 802.11be, Bluetooth Min 5.4 |
| **"Sound":** | Integrated Sound Card |
| **"Speakers":** | Internal speakers or Built-in Monitor |
| **Security Management:** | Embedded Security TPM 2.0 |
| **"Preinstalled Licensed O. S." Operating System:** | Ubuntu 24.04 LTS |
| **Keyboard:** | Standard Keyboard QWERTY |
| **"Mouse":** | Minimum 3 Button scroll Optical |
| **"Power Supply" Food:** | 220 V AC , 50 Hz |
| **Energy Efficiency:** | Energy Star |
| **ACCESSORIES** | |
| **Power Cord Cable:** | Yes, European |
| **"Recover":** | Recover Partition |
| **MONITORS** | |
| **"Type" types:** | LCD or LED of the same brand as the Computer |
| **Size:** | ≥ 23" |
| **Rezolucioni "Native Resolution":** | 1920 x 1080 @ 60 Hz |

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| **Contrast Report "Constrast Ratio Static":** | 3000:1 |
| **Response Time:** | ≤ 6 ms |
| **"Display Port":** | (1) VGA or DVI and (1) from DP/DVI/HDMI Ports |
| **Energy Efficiency:** | Energy Star |
| **"Power Supply" Food:** | 220 V AC , 50 Hz |
| **WARRANTY** | |
| **Warranty Coverage Period:** | Min. 3 Years (36 Months) |

**10. F.V Rack**

| **MINIMUM TECHNICAL CHARACTERISTICS** | |
|---|---|
| **Physical description:** | Cabinet 26U, dimensions 600 x min 1200 mm, Metallic material. The cabinet should be suitable for assembling all equipment of Rack mount offered. |
| **Features :** | Detachable and fitted side panels with a key. The cabinet should be suitable for it assembled all the equipment provided. |
| **Power supply "PDU" devices:** | The cabinet must be equipped with two units for power distribution (PDU). Each unit must provide at least 12 x C13 outputs for each PDU. |
| **Doors :** | Front and rear doors open (with holes), dismountable and equipped with a key. |
| **Stabilizer and accessories of grounding "Stabilizer and Grounding Kit":** | Be included "Included" |
| **Maximum Capacity:** | ≥ 300 kg |
| **Color:** | Preferred Black RAL9005 |
| **Contents :** | 26U Open Frame Shelf Cabinet with Flat Package with 2 Supports:<br>Leveling feet x4<br>Wheels x4<br>Cable gill x8<br>Mounting bolts, washers and screws<br>Assembly Instructions |

**11. F.V Server**

| **MINIMUM TECHNICAL CHARACTERISTICS** | |
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**12. F.V Switch**

| MINIMUM TECHNICAL CHARACTERISTICS | |
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**13. Laptop Workstation**

| MINIMUM TECHNICAL CHARACTERISTICS | |
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| **Min. points for the processor according to: cpubenchmark.net Min Proc. Rating according to: cpubenchmark.net: Processor:** | Intel core ultra 7 or equivalent,Min 16 core, Min: 24900 pips |
| **"Chipset":** | Intel, AMD, or Equivalent |
| **"RAM":** | Min.16GB DDR5 5600MT/s |
| **Solid-state Drive Size "SSD Size":** | Min.512 GB NVMe SSD |
| **"Graphics":** | Integrated graphic Card Min 4GB DDR6 |
| **"Slots":** | Min(4) M.2 slots, min(2) be for SSD. |
| **Display:** | 15.6 FHD 1920 x 1080, 400 nits |
| **Battery:** | Min. 4 cell, Min.64WHr |
| **COMMUNICATION & MANAGEMENT** | |
| **Communication Ports "Ports":** | Min. (4) USB of which:<br>Min. (2) USB 3.2<br>(1) RJ-45, (1) Universal audio, (1) HDMI port |
| **"Networking" Network:** | 1 RJ45 ethernet port,<br>Wireless Min 2.4/5/6 Ghz, WI-FI 6/6E,<br>Bluetooth Min. 5.3 |
| **"Sound":** | Integrated Sound Card, Internal speakers or Built-in Monitor |
| **Preinstalled Licensed O.S. Operating System:** | Ubuntu Linux 22.04 |
| **Keyboard:** | Standard Keyboard QWERTY |
| **"Pointing Device":** | Touch Pad |
| **Security:** | Embedded Security TPM 2.0 |
| **ACCESSORIES** | |
| **Power Cord Cable:** | Yes, European |
| **"Recharger" feeder:** | Yes |

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| **"Mouse"** | Yes, of the same brand as the Laptop |
| **Çanta "Carrying Bag":** | Yes, by the Manufacturer. Suitable for Laptop and Other accessories. |
| **"Recover":** | Recover Partition |
| **WARRANTY** | |
| **Warranty Coverage Period:** | Min. 3 Years (36 Months) |