

TEHNIČNE SPECIFIKACIJE OPREME

Inštitucija / Organization	Znanstvenoraziskovalni center Slovenske akademije znanosti in umetnosti		
Naziv opreme / Name of equipment	Oprema za zelo širokopasovno potresno opazovalnico Postojnska jama / Equipment for very broadband earthquake monitoring "Postojnska jama"	Količina / Quantity	1 kom / piece

Tehnične specifikacije opreme / Required technical specifications	<p>Equipment for very broadband earthquake monitoring should include:</p> <ol style="list-style-type: none"> 1. SEISMOMETER 2. ACCELEROMETER 3. SEISMOLOGICAL ACQUISITION UNIT, 6 channel, with all elements, that GNSS (GPS) signals can be transmitted from antenna to the acquisition unit over long "optical-cable" distance (optical-single mode). 4. UNINTERRUPTIBLE POWER SUPPLY (UPS) <p>The manufacturer must also provide all the elements that are not specified in the order or specification, but without which the project would not be properly completed (e.g. a special screwdriver, special cable for an independent seismometer test, e.g. if exist independent RS 232 communication with seismometer...).</p> <p>1. SEISMOMETER:</p> <p>seismometer package must include:</p> <ul style="list-style-type: none"> - broadband seismometer (three-component), - seismometer cable (10 m), from acquisition unit (digitizer) to seismometer, with appropriate connectors to meet all requirements without any additional converters between seismometer and acquisition unit (digitizer), - calibration values for each sensor/seismometer, - insulating cover. <p>Seismometer must work 24/7/365 without interruption (in appropriate conditions).</p> <p>Seismometer must be fully compatible with acquisition unit and should include seismic channels outputs, auxiliary input/output signals, mass outputs, mass leveling inputs, calibration signals input, without any additional converters.</p> <p>Other specifications:</p> <p>Response: Flat to ground velocity at least from 2.78mHz (360s) to 50 Hz.</p> <p>Technology: Force feedback (force-balance) velocity sensor.</p> <p>Configuration: Symmetric triaxial design or triaxial orthogonal.</p> <p>Velocity output topology: XYZ</p> <p>Clip level: ≥ 13 mm/s at 1Hz.</p>
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	<p>Generator constant (sensitivity): between 1000 V/(m/s) and 1500V/(m/s).</p> <p>Seismic Channels: 3 x differential output (velocity output).</p> <p>Full scale output (velocity output): ± 20 V Peak-to-Peak Differential (=40Vpp differential).</p> <p>Self- Noise: Below the NLNM from 250 s to 10 Hz. In the offer, the provider must present a plot of seismometer self-noise regards to the NLNM.</p> <p>Operating temperature: at least -20°C to +60°C.</p> <p>Humidity: 0 to 100% relative humidity.</p> <p>Enclosure Rating: IP67 Equivalent or better.</p> <p>Mass position control: Three independent sensor mass position outputs, compatible with acquisition unit inputs.</p> <p>Remote control: Mass centering, calibration, mass lock/unlock (if needed for transportation).</p> <p>Calibration input: Fully compatible with acquisition unit (including max. input range)</p> <p>Supply Voltage: at least 10 to 30 Volts DC isolated input.</p> <p>Power consumption: ≤ 0.9W in average at 12VDC.</p> <p>Locking (for transportation): No mass lock required or remote mass lock/unlock</p> <p>Alignment: bubble level; adjustable feet, north (or east) arrow.</p> <p>Height with feet and handle: <300mm.</p> <p>Connector pinouts: The manufacturer must provide pinouts map.</p> <p>Cable drawing: The manufacturer must provide its own cable drawings.</p> <p>Insulating cover: compatible with seismometer and seismometer cable</p> <p>Calibration results: The manufacturer must provide their own test results for seismometer, evaluated using standard test methodology.</p> <p>2. ACCELEROMETER</p> <p>Accelerometer package must include:</p> <ul style="list-style-type: none"> - accelerometer (three-component), - accelerometer cable (10 m), from acquisition unit (digitizer) to seismometer, with appropriate connectors to meet all requirements without any additional converters between seismometer and acquisition unit (digitizer), - calibration values for each accelerometer sensor, - insulating cover. <p>Accelerometer must work 24/7/365 without interruption (in appropriate conditions).</p>
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	<p>Accelerometer must be fully compatible with acquisition unit and should include seismic channels outputs, auxiliary input/output signals, and calibration signals, without any additional converters.</p> <p>Other specifications:</p> <p>Bandwidth: DC to 100 Hz or better.</p> <p>Technology: Force feedback (force-balance) accelerometer sensor.</p> <p>Configuration: triaxial orthogonal (horizontal-vertical)</p> <p>Output topology: XYZ</p> <p>Full-scale range: $\pm 2g$ at 1Hz ($g = \text{standard gravity} = 9.8m/s^2$).</p> <p>Dynamic Range: $> 155 \text{ dB @ } 1 \text{ Hz}$</p> <p>Full scale output: $\pm 20 \text{ V Peak-to-Peak Differential}$ ($= 40V_{pp}$ differential).</p> <p>Self- Noise: In the offer, the provider must present a plot of accelerometer self- noise regards to the NLNM.</p> <p>Operating temperature: -20°C to $+60^{\circ}\text{C}$ or better.</p> <p>Humidity: 0 to 100% relative humidity.</p> <p>Enclosure Rating: IP67 Equivalent or better.</p> <p>Remote control: calibration.</p> <p>Calibration input: Fully compatible to acquisition unit (including max. input range)</p> <p>Supply Voltage: at least 10 to 30 Volts DC isolated input.</p> <p>Power consumption: $\leq 1.2W$ in average at 12VDC.</p> <p>Alignment: bubble level; adjustable feet, north (or east) arrow.</p> <p>Connector pinouts: The manufacturer must provide pinouts map.</p> <p>Cable drawing: The manufacturer must provide its own cable drawings.</p> <p>Insulating cover compatible with Accelerometer and cable</p> <p>Calibration results: The manufacturer must provide their own test results for accelerometer</p> <p>3. SEISMOLOGICAL ACQUISITION UNIT</p> <p>acquisition unit package must include:</p> <ul style="list-style-type: none"> - 6 channel Acquisition unit, - GNSS (GPS) antenna with cable, - optical fiber converters for GNSS (GPS) signal: all elements, that GNSS (GPS) signals can be transmitted from antenna to the acquisition unit over long "optical-cable" distance (optical-single),
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	<p>- cable from Optical Converter to GNSS (GPS) input at acquisition unit.</p> <p>Acquisition unit must work 24/7/365 without interruption (in appropriate conditions). Other specifications:</p> <p>Channels: 6 (3+3, two groups) differential input. A/D Type: Sigma-delta, 24-bit or better per channel. Resolution: True 24-bits per channel or better. Sampling: Simultaneous. Sample Rates [sps]: at least 200, 100, 20, 1 (independently available for each group of channels (1x3+1x3) Multisampling: Capable of providing multiple sample rates from all groups of channels (example: 200 sps and 20 sps per channel for the first group and 200 sps+1 sps for second group). Dynamic Range: >140 dB @100 sps. Filtering: Linear Phase, Minimum Phase. Clip Level (input voltage range): $\pm 20V$ peak-to-peak differential analog input (input full scale voltage range: 40V peak-to-peak differential).</p> <p>The manufacturer must provide their own test results for acquisition unit.</p> <p>Interfaces: 10/100 Base-T Ethernet, IP Addressing: Static, dynamic (DHCP) Communication: Continuous, real time data communication. SeedLink, other protocol which must enable direct real time communication with Antelope monitoring software (real time Antelope monitoring software compatible protocol) with no additional units (example: Seedlink server must run on the Acquisition Unit). State of health: State of health information (data) in Real Time. Data Format: MiniSEED Local Storage: Automatic data retrieval in a case of communication failure for duration of minimum 2 hours. Internal memory: 64GB or more Additional Archive: Automatic data storage on removable media; 64GB or more, field-swappable with no loss of data.</p> <p>Timing System: Internal (DCXO or TCXO) clock locked (disciplined) to GNSS (GPS). GNSS (GPS): Internal GNSS (GPS) receiver via external antenna (15 m cable) with 3.3V or 5.0V power supply.</p>
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	<p>GNSS (GPS) -over-optical fiber: all elements (optical fiber converters, BNC/TNC cable,...), that GNSS (GPS) signals can be transmitted from antenna to the acquisition unit over long optical-cable distances (optical-single mode is on location).</p> <p>GNSS (GPS) connector at acquisition unit: TNC or BNC type with 3.3V or 5.0V power supply for GPS antenna.</p> <p>GNSS (GPS) antenna: waterproof, weatherproof with 15 m cable.</p> <p>Timing Accuracy: <100 µsec.</p> <p>Duty cycle selectable: always on, power save option</p> <p>SOH: Capable of providing state-of-health (SOH) monitoring via Web interface. SOH parameters include the following as a minimum: mass position (sensor boom position), internal temperature and voltages, external power sources, GNSS (GPS) status, information about local and archive storage.</p> <p>Indicators: Must include interface (web interface or application, working on Windows 10/8.1/8/7/XP) with easily interpreted visual indicators for power status, data acquisition status, communication link activity, local storage, storage archive access and clock status/quality.</p> <p>On site possibility of waveform inspection for all 6 channels (Web interface or application, working on Windows 10/8.1/8/7/XP).</p> <p>Seismometer control: Simple interface (Web interface or application, working on Windows 10/8.1/8/7/XP) for performing remote MASS CENTERING,CALIBRATION and LOCK/UNLOCK functions.</p> <p>Events Triggers: Band passed STA/LTA, Threshold on all 6 channels</p> <p>Configuration: Web based (http) or via application, that runs on all Windows platforms (Windows 10/8.1/8/7/XP).</p> <p>Acquisition unit should work 24/7also without GNSS (GPS) antenna or visible satellites and without Ethernet communication.</p> <p>Acquisition unit should start to record also, when is turned on without GNSS (GPS) antenna or visible satellites and without Ethernet communication.</p> <p>Connector: One connector for one seismometer/accelerometer, it should fully support functionality for seismometer and accelerometer.</p> <p>Calibration signal: Step, sine wave, white noise</p> <p>Calibration output: Needs to be compatible with seismometer/accelerometer.</p> <p>Acquisition unit must support all control functions: mass centering, calibration, sensor power, lock/unlock.</p> <p>Watertight Integrity (resistance) including connectors: IP 67 or better.</p> <p>Humidity: 0-100%</p> <p>Operating Temperature: -20°C to +60°C or better</p> <p>Connectors: IP 67 or better.</p> <p>The function of all external connectors shall be clearly labeled.</p>
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	<p>Power Supply Voltage: At least between 10 V to 16 VDC.</p> <p>Power Consumption: Less than 3W at 12VDC (when all 6 channels are enabled)</p> <p>4. UNINTERRUPTIBLE POWER SUPPLY (UPS)</p> <p>A UPS unit that supplies all equipment at the seismic station site and will power the equipment for at least 24 hours in the case of a 230ADC failure; connector standardized for Slovenia (230VAC, plug schuko), one casing (IP65 or better) for power charger and battery.</p>										
Dodatne zahteve / Additional requirements	<table> <tr> <td data-bbox="531 775 1177 869">- dostava na lokacijo IZRK ZRC SAZU (Titov trg 2, 6230 Postojna) / delivery to location IZRK ZRC SAZU (Titov trg 2, 6230 Postojna)</td><td data-bbox="1177 775 1401 869"><input checked="" type="checkbox"/> da <input type="checkbox"/> ne</td></tr> <tr> <td data-bbox="531 869 1177 931">- montaža opreme / equipment instalation</td><td data-bbox="1177 869 1401 931"><input checked="" type="checkbox"/> da <input type="checkbox"/> ne</td></tr> <tr> <td data-bbox="531 931 1177 994">- izvedba osnovne diagnostike delovanja opreme / initial diagnostics</td><td data-bbox="1177 931 1401 994"><input checked="" type="checkbox"/> da <input type="checkbox"/> ne</td></tr> <tr> <td data-bbox="531 994 1177 1057">- garancija za opremo 3 leta / guaranty period 3 years</td><td data-bbox="1177 994 1401 1057"><input checked="" type="checkbox"/> da <input type="checkbox"/> ne</td></tr> <tr> <td data-bbox="531 1057 1177 1149">- ponudnik opreme mora zagotavljati pooblaščenega uradnega serviserja v Republiki Sloveniji / official service in Slovenia</td><td data-bbox="1177 1057 1401 1149"><input type="checkbox"/> da <input checked="" type="checkbox"/> ne</td></tr> </table>	- dostava na lokacijo IZRK ZRC SAZU (Titov trg 2, 6230 Postojna) / delivery to location IZRK ZRC SAZU (Titov trg 2, 6230 Postojna)	<input checked="" type="checkbox"/> da <input type="checkbox"/> ne	- montaža opreme / equipment instalation	<input checked="" type="checkbox"/> da <input type="checkbox"/> ne	- izvedba osnovne diagnostike delovanja opreme / initial diagnostics	<input checked="" type="checkbox"/> da <input type="checkbox"/> ne	- garancija za opremo 3 leta / guaranty period 3 years	<input checked="" type="checkbox"/> da <input type="checkbox"/> ne	- ponudnik opreme mora zagotavljati pooblaščenega uradnega serviserja v Republiki Sloveniji / official service in Slovenia	<input type="checkbox"/> da <input checked="" type="checkbox"/> ne
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