

**GOVERNMENT OF INDIA  
DEPARTMENT OF SPACE  
VIKRAM SARABHAI SPACE CENTRE (VSSC)  
THIRUVANANTHAPURAM**

**Tender for Data Acquisition and Control Electronics Systems for  
Atmospheric Lidar**

**Bids to be submitted online**

**Tender No.: VSSC/PURCHASE UNIT II (AVN)/VS202400411101 dated 24-09-2024**

## A. Tender Details

Tender No : **VSSC/PURCHASE UNIT II (AVN)/VS202400411101**

Tender Date : **24-09-2024**

Tender Classification: **GOODS**

Purchase Entity : **PURCHASE UNIT II (AVN)**

Centre : **VIKRAM SARABHAI SPACE CENTRE (VSSC)**

## Data Acquisition and Control Electronics Systems for Atmospheric Lidar

Data Acquisition and Control Electronics Systems for Atmospheric Lidar

### A.1 Tender Schedule

Bid Submission Start Date : **26-09-2024 11:00**

Bid Clarification Due Date : **11-10-2024 17:00**

Bid Submission Due Date : **30-10-2024 14:00**

Bid Opening Date : **30-10-2024 15:00**

Price Bid Opening Date : **07-11-2024 15:00**

## **B. Tender Attachments**

### **Technical Write-up/Drawings**

**Document : Specifications and T&C**

### **Instructions To Vendors**

## C. Bid Templates

### C.1 Technical Bid - Data Acquisition and Control Electronics Systems for Atmospheric Lidar

#### 1. 16 bit Data Acquisition System: Transient Recorder (TR) Modules with Accessories

##### Item specifications for 16 bit Data Acquisition System

Sl No	Specification	Value	Compliance	Offered Specification	Remark
1	Application	Transient Recorder (TR) Modules and accessories for Atmospheric Lidar application:	Yes / No / Explain		
2	Item Description	(i) Transient Recorder (TR) Modules for Atmospheric Lidar application (4 Nos.); (ii) Ethernet-based TR Controller for remote control of the TRs (1 No.); (iii) Rack and Power Supply for mounting TRs and TR Controller (1 No.);	Yes / No / Explain		
3	Acquisition modes	Analog Mode and Photon Counting Mode, with built-in pre-amplifiers and discriminators	Yes / No / Explain		
4	Signal Input Range	Compatible with output of PMT Modules specified in this indent	Yes / No / Explain		
5	Analog Mode Acquisition	A/D Resolution: 16-Bit or more; Sampling rate: 40 MHz or more; Bandwidth: 20 MHz or better	Yes / No / Explain		
6	Photon Counting Acquisition	Maximum photon count rate: 800 MHz or higher; Discriminator: multiple software-controlled levels (at least 32 levels)	Yes / No / Explain		

7	Standard deviation retrieval	Acquisition of the single shot standard deviation for analog and photon counting rate should have a minimum of 4000 range bins	Yes / No / Explain		
8	Spatial Resolution	5 m or better	Yes / No / Explain		
9	No. of Acquisitions	Up to 64k shots or more	Yes / No / Explain		
10	Memory depth	32k bins or more	Yes / No / Explain		
11	External Trigger Input	Should have provision for external trigger input	Yes / No / Explain		
12	Interface	Ethernet	Yes / No / Explain		
13	Computing System for TR Control and Data Acquisition	Adequate computing system for TR control and data acquisition, with adequate storage and display unit for data visualization, & provision for hard copy generation of data profiles. The system should have pre-installed control software, suitable for Windows OS (version 10 or later), with remote module / ethernet / RS232 / USB interface	Yes / No / Explain		
14	Software	All necessary software for TR should be provided, suitable for Windows platform (version 10 or later)	Yes / No / Explain		

15	TR Controller	<p>Functions: Remote control and readout of multiple Transient Recorders, including selection of acquisition mode, binning, pre-amplification level, discriminator level, sampling rate, no. of acquisitions, etc.;</p> <p>No. of Transient Recorders to control: Up to 6 or more;</p> <p>Compatibility: The TR Controller should be compatible with the Transient Recorders specified above;</p> <p>Interface: Ethernet;</p> <p>Software: All necessary software should be provided, suitable for Windows platform (version 10 or later)</p>	Yes / No / Explain		
16	Rack with Power Supply for TRs	<p>Compatible Rack with Power Supply (suitable for 230V, 50 Hz input supply) for TRs should be provided, with capacity to mount and control up to 6 or more TRs, and Global Rack Trigger provision for simultaneous control of all mounted TRs. The 4 TRs and TR Controller being supplied should be mounted in the rack.</p>	Yes / No / Explain		
17	Cables and Connectors	<p>(i) All necessary cables and connectors required for the Transient Recorders, TR Controller, Rack and power supply should be provided, with minimum 5 m cable lengths;</p> <p>(ii) 1 set of additional cables should be provided as spares.</p>	Yes / No / Explain		

18	Compatibility	Offered TRs and accessories should be inter-compatible with each other, and should be compatible with the PMT Modules and accessories specified in this indent.	Yes / No / Explain		
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## Document : Specifications

### 2. Photon counting module: Mini PMT Modules with Accessories

#### Item specifications for Photon counting module

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Application	Mini Photomultiplier Tube (PMT) Modules and accessories for Atmospheric Lidar application	Yes / No / Explain		
2	Item Description	(i) Ungated uncooled Mini PMT modules with HV Power Supplies for Atmospheric Lidar application (3 Nos.); (ii) Ethernet-based PMT Controller for remote control of the PMTs (1 No.); (iii) Rack and Power Supply for mounting the PMT HV Power Supplies and PMT Controller (1 No.)	Yes / No / Explain		
3	PMT Type	Ungated and Uncooled	Yes / No / Explain		
4	Cathode	Super Bialkali (SBA)	Yes / No / Explain		
5	Window	UV Glass	Yes / No / Explain		
6	Wavelength Range	300-600 nm or wider	Yes / No / Explain		
7	Peak Wavelength	Around 400-500 nm	Yes / No / Explain		
8	Gain	~10 <sup>6</sup> or better	Yes / No / Explain		

9	Average anode output current	25 $\mu$ A to 400 $\mu$ A (typical $\sim$ 100 $\mu$ A)	Yes / No / Explain		
10	Dark current	Max. 1 nA; Dark Counts: Max. 500 cps	Yes / No / Explain		
11	Quantum Efficiency at 532 nm	>10%	Yes / No / Explain		
12	Operating temperature	15 deg C to 30 deg C	Yes / No / Explain		
13	High Voltage Power Supply	Compatible HV power supplies for the offered PMT Modules specified above, with necessary accessories such as cables	Yes / No / Explain		
14	PMT Controller	Functions: Remote control of multiple PMT modules, including remote high voltage setting and high voltage monitoring; No. of PMT Modules to control: Up to 6 or more; High voltage set/read accuracy: +/-1 V or better; Compatibility: The PMT Controller should be compatible with the PMT Modules specified above; Interface: Ethernet; Software: All necessary software should be provided, suitable for Windows platform (version 10 or later)	Yes / No / Explain		



15	Rack for HV Power Supply of PMTs	Compatible Rack with Power Supply (suitable for 230V, 50 Hz input supply) should be provided for mounting the HV Power Supplies of the ungated uncooled PMTs, with the capacity to mount up to 6 or more units. The HV Power Supplies of the 3 ungated uncooled PMTs and the PMT Controller being supplied should be mounted in the rack.	Yes / No / Explain		
16	Cables and Connectors	(i) All necessary cables and connectors required for the PMT Modules, HV power supplies, PMT Controller, and Rack should be provided, with minimum 5 m cable lengths. (ii) 1 set of additional cables should be provided as spares.	Yes / No / Explain		
17	Compatibility	Offered PMTs and accessories should be inter-compatible with each other, and should be compatible with the TR Modules and accessories specified in this indent.	Yes / No / Explain		

## Document : Specifications

### 3. Photon counting module: Gated TE-Cooled Mini PMT Modules with Accessories

#### Item specifications for Photon counting module

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	Description	Gated TE-Cooled Mini PMT Modules and accessories for Atmospheric Lidar application	Yes / No / Explain		

2	Item Description	(i) Gated TE-Cooled Mini PMT modules with HV & TEC Power Supplies for Atmospheric Lidar application (3 Nos.); (ii) Ethernet-based PMT Controller for remote control of the PMTs (1 No.); (iii) Trigger Module for Gating Control of 2 PMTs (1 No.); (iv) Rack and Power Supply for mounting the PMT HV & TEC Power Supplies, PMT Controller and Trigger Module (1 No.)	Yes / No / Explain		
3	PMT Type	Gated and TE-Cooled	Yes / No / Explain		
4	Cathode	Multialkali (MA)	Yes / No / Explain		
5	Window	UV Glass	Yes / No / Explain		
6	Wavelength Range	300-600 nm or wider	Yes / No / Explain		
7	Peak Wavelength	Around 400-500 nm	Yes / No / Explain		
8	Gain	~10 <sup>6</sup> or better	Yes / No / Explain		
9	Average anode output current	25 µA to 400 µA (typical ~100 µA)	Yes / No / Explain		
10	Dark current	Max. 2 nA; Dark Counts: Max. 2000 cps at Room Temperature (to be reduced by a factor of 10-20x by TE-cooling)	Yes / No / Explain		
11	Quantum Efficiency at 532 nm	12% or better	Yes / No / Explain		
12	Operating temperature	15 deg C to 30 deg C	Yes / No / Explain		
13	High Voltage Power Supply	Compatible HV power supplies for the offered PMT Modules specified above, with necessary accessories such as cables	Yes / No / Explain		

14	PMT-TEC Power Supply	Additional compatible 12V TEC power supplies for the PMT modules specified above, with necessary accessories such as cables	Yes / No / Explain		
15	PMT Controller	Functions: Remote control of multiple PMT modules, including remote high voltage setting and high voltage monitoring; No. of PMT Modules to control: Up to 6 or more; High voltage set/read accuracy: +/-1 V or better; Compatibility: The PMT Controller should be compatible with the PMT Modules specified above; Interface: Ethernet; Software: All necessary software should be provided, suitable for Windows platform (version 10 or later)	Yes / No / Explain		
16	Trigger Module for Gating	Suitable Trigger Module (Dual Trigger Generator) for simultaneous Gating Control of 2 gated PMTs, with Gate out delay selectable in the range 10-500 $\mu$ s (or wider)	Yes / No / Explain		

17	Rack for HV Power Supply of PMTs	Compatible Rack with Power Supply (suitable for 230V, 50 Hz input supply) should be provided for mounting the HV & TEC Power Supplies of the Gated TE-cooled PMTs, with the capacity to mount up to 3 or more units. The HV & TEC Power Supplies of the 3 Gated TE-cooled PMTs, the PMT Controller, and the Trigger Module being supplied should be mounted in the rack.	Yes / No / Explain		
18	Cables and Connectors	(i) All necessary cables and connectors required for the PMT Modules, HV power supplies, PMT Controller, Trigger Generator, and Rack should be provided, with minimum 5 m cable lengths. (ii) Additional cables should be provided as spares.	Yes / No / Explain		
19	Compatibility	Offered PMTs and accessories should be inter-compatible with each other, and should be compatible with the TR Modules and accessories specified in this indent.	Yes / No / Explain		

## Document : Specifications

### Common Specifications (Applicable for all items)

SI No	Specification	Value	Compliance	Offered Specification	Remark
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1	<p>Transient Recorders (TR) Modules and accessories for Atmospheric Lidar application: (i) Transient Recorder (TR) Modules (4 Nos.); (ii) Ethernet-based TR Controller for remote control of the TRs (1 No.); (iii) Rack and Power Supply for mounting TRs and TR Controller (1No.);</p>	<p>These items/modules are for atmospheric lidar application. Inter-module compatibility should be ensured for all items and accessories. All necessary cables and connectors required for the items and accessories should be supplied. The party has to comply with all the item-wise specifications provided in the indent.</p>	<p>Yes / No / Explain</p>		
2	<p>Mini PMT Modules and accessories for Atmospheric Lidar application: (i) Ungated Uncooled Mini PMT modules with HV Power Supplies (3 Nos.); (ii) Ethernet-based PMT Controller for remote control of the PMTs (1 No.); (iii) Rack and Power Supply for mounting the PMT HV Power Supplies and PMT Controller (1 No.)</p>	<p>These items/modules are for atmospheric lidar application. Inter-module compatibility should be ensured for all items and accessories. All necessary cables and connectors required for the items and accessories should be supplied. The party has to comply with all the item-wise specifications provided in the indent.</p>	<p>Yes / No / Explain</p>		

3	Gated TE-Cooled Mini PMT Modules and accessories for Atmospheric Lidar application: (i) Gated TE-Cooled Mini PMT modules with HV and TEC Power Supplies (3 Nos.); (ii) Ethernet-based PMT Controller for remote control of the PMTs (1 No.); (iii) Trigger Module for Gating Control of 2 PMTs (1 No.); (iv) Rack and Power Supply for mounting the PMT HV & TEC Power Supplies and PMT Controller (1 No.)	These items/modules are for atmospheric lidar application. Inter-module compatibility should be ensured for all items and accessories. All necessary cables and connectors required for the items and accessories should be supplied. The party has to comply with all the item-wise specifications provided in the indent.	Yes / No / Explain		
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**Supporting Documents required from Vendor**

- 1. Price-bid related documents, if any (Price Bid Related)**
- 2. Warranty period should be mentioned in the quote. A minimum warranty period of 12 months should be provided.**
- 3. Make/Model of the item should be included in the technical document**
- 4. Detailed specification of the items shall be included in the quote.**

5 additional documents can be uploaded by the vendor

## C.2 Commercial Terms / Bid

Sl. No.	Description	Compliance	Vendor Terms
1	Any necessary tools required for operating/handling the supplied modules needs to be provided by the party.	Yes / No / Explain	
2	Party shall demonstrate the functioning of the PMT and TR units in real-time environment at VSSC.	Yes / No / Explain	
3	Party shall perform complete installation and interconnection of the supplied modules after delivery at VSSC.	Yes / No / Explain	
4	All necessary cables and connectors required for the indented PMTs, TRs and accessories should be provided, with minimum 5 m cable length each, and additional 1 set of cables as spares.	Yes / No / Explain	
5	Detailed specification of the items shall be included in the techno-commercial bid, including datasheets.	Yes / No / Explain	
6	Make and Model of the items should be explicitly specified in the techno-commercial bid.	Yes / No / Explain	
7	Being 2 Part PT, the price should NOT be revealed in Techno-Commercial bid/offer.	Yes / No / Explain	
8	Supplier has to quote for all items, including all accessories, and partial offers will not be considered.	Yes / No / Explain	
9	Inter-module compatibility should be ensured for all items and accessories.	Yes / No / Explain	
10	The offered items/modules should be suitable for atmospheric lidar application.	Yes / No / Explain	
11	All items should have warranty for a minimum period of 1 year from the date of delivery and acceptance.	Yes / No / Explain	
12	Dark Current, Spectral Response, Quantum Efficiency graphs, etc. for PMTs shall be provided by the party.	Yes / No / Explain	

## C.3 Price Bid

Sl. No.	Item	Quantity	Unit Price	Currency	Total Price	Remark
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1	16 bit Data Acquisition System: Transient Recorder (TR) Modules with Accessories	1.00 Sets		-		
2	Photon counting module: Mini PMT Modules with Accessories	1.00 Sets		-		
3	Photon counting module: Gated TE-Cooled Mini PMT Modules with Accessories	1.00 Sets		-		

**Common charges (Applicable for all items)**

<b>Customs Duty</b>	
<b>IGST</b>	