

Government of India
Bhabha Atomic Research Centre
Electromagnetic Applications & Instrumentation Division

Ref: EmA&ID/EMAS/21/12197

Date: 01/11/21

Sub: Development, testing & supply of 8 channel scanners for low temperature measurement system for low temperature measurement systems conforming to the technical specification No: EmA&ID/21/02 dated 01/10/2021

Dear Sir/Madam,

1. Quotations are invited for development, testing & supply of 8 channel scanners for low temperature measurement system as per the technical specification document No: EmA&ID/2/021 dated 01/10/2021.
 2. Bidder shall quote for development, testing and supply of 8 channel scanners for low temperature measurement system. There is no FIM.
 3. Taxes and Excise Duties shall be quoted separately. Form AF / H whichever is applicable shall be provided, if required.
 4. **The quotation must reach The Head, Electromagnetic Applications Section by 11th Nov, 2021 and must be sent in a sealed envelope super scribed with the reference number & the due date given above.**
 5. **The quotations shall be sent only through registered post/speed post through Indian postal services.**
 6. The address on the envelop should read:
**The Head,
Electromagnetic Applications & Instrumentation Division,
BARC, Trombay,
Mumbai - 400 085.
(Kind Attn: Shri. Udai Giri Pratap Singh Sachan, SO/D)**
 7. The system shall be checked by our engineer. The material shall not be dispatched prior to approval by our engineer at bidder's premises. Necessary inspection facilities shall be provided to our engineer during fabrication at bidder's premises.
 8. The bidder shall deliver the finished components after approval by our engineer within 4 weeks from the date of firm work order issued to the bidder. The finished components shall be delivered by the bidder at **Electromagnetic Applications & Instrumentation Division, BARC, Trombay, Mumbai - 400 085.**
 9. Head, Electromagnetic Applications & Instrumentation division reserves the rights to accept / reject any or all quotations without assigning any reason.
 10. Delivery charges if any must be clearly mentioned in the offer. Quotation must also indicate the validity of offer. Quotation must also indicate the GST no and PAN no of the party.
 11. The quotation has to be signed by authorized person with company seal.
 12. Job should be guaranteed against material and manufacturing defects for 1year from the date of supply.
- Encl.: Technical Specification Sheet no:- EmA&ID/21/02 dated 01/10/2021

Udai Giri
(Udai Giri Pratap Singh Sachan)
SO/D, EMAS, EmA&ID

वैज्ञानिक अधिकारी / Scientific Officer
ई एम ए आय डी / EmA&ID
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Bhabha Atomic Research Center
मॉडे, मुंबई / Trombay, Mumbai - 400085

Specification for Minor fabrication Work order

Specification no.	Revision no.	Date of Issue	No of pages
EmA&ID/21/01	0	01/10/2021	05

Development, testing & supply of 8 channel scanners for low temperature measurement system

This specification specifies the requirements for development, testing and supply of 8 channel scanners for low temperature measurement system. Fabrication shall be carried out strictly as per specifications as detailed in this document.

Supplier shall arrange required raw material/ facilities for manufacturing and testing. Supplier shall be qualified on the basis of technical evaluation. (Refer Para 9.0). The brief description of contents of this tender specification document is as described below.

Para 2.0 gives intended application and operating service conditions.

Para 3.0 gives the details of deliverables.

Para 4.0 gives the general description details.

Para 5.0 gives engineering requirements.

Para 6.0 gives the requirement of raw material procurement.

Para 7.0 gives the inspection and testing.

Para 8.0 gives the requirements of packaging and safe delivery.

Para 9.0 gives the requirements of supplier qualifications.

Para 10.0 gives the requirements of price and delivery schedule.

2.0 INTENDED APPLICATION AND OPERATING SERVICE CONDITIONS

Sub kelvin system is required to carry out physics studies at temperature less than 1K. The system consists of multi stage cooling plates and a 1.5 Watts GM cryocooler. Due to Joule Thompson expansion, very low temperatures can be achieved. It is planned to develop a system which can measure these low temperatures. As per current system configuration we have AC resistance bridge 372. The output port capacity is very limited in the AC resistance bridge. Therefore we intend to put 8 channel multiplexer scanners to expand the capability of the device.

3.0 GENERAL DESCRIPTION

- a) The current system has the provision of low temperature measurement as well as it shall also serve as the temperature controller.

The current system specifications are shown below in Table-1.0:

Sr. No:	Parameters	Values
1	Input type	AC, 4-lead differential, resistance
2	Number of inputs	1
3	Maximum channels	16 (with optional scanner)
4	Resistance ranges	22 ranges from 2 mΩ to 63.2 MΩ (excitation dependent)

5	Maximum update rate	10 rdg/s (single range and input)
6	Range change settling	3 s + filter settling
7	Channel change (scan) settling	3 s + filter settling
8	Resolution	Sensor and range dependent, refer to Measurement Input Specifications table
9	Accuracy	Sensor and range dependent, refer to Measurement Input Specifications table
10	Temperature coefficient	$\pm 0.0015\%/^{\circ}\text{C}$ of rdg
11	Maximum lead resistance	100 Ω + 10% of resistance range per lead for current ≤ 3.16 mA; 10 Ω + 10% of resistance range per lead for current ≥ 10 mA
12	Isolation	Isolated from chassis and heater grounds
13	Lead connections	V+, V-, I+, I-, V shield, I shield, individual guards
14	Scanner lead connections	V+, V-, I+, I-, for each sensor, shield common to all
15	Common mode rejection	Matched impedance voltage input and current output, active CMR
16	Excitation	Sinusoidal AC current source
17	Excitation frequency	9.8 Hz, 11.6 Hz, 13.7 Hz (default), 16.2 Hz, or 18.2 Hz
18	Excitation currents	22 ranges from 1 pA to 31.6 mA RMS
19	Excitation accuracy	$\pm 2\%$ of nominal
20	Minimum excitation power	10-18 W into 100 k Ω (see Measurement Input Specifications table for other ranges)
21	Typical DC bias current	2 pA +1% of excitation current (4.0×10^{-19} W into 100 k Ω)
22	Maximum DC bias current	4 pA +1% of excitation current (1.6×10^{-18} W into 100 k Ω)
23	Power up current protection	Current output shunted on power up
24	Voltage input ranges	12 ranges from 2 μV to 632 mV RMS

		refer to Control Input Specifications table
36	Accuracy	Sensor and range dependent, refer to Control Input Specifications table

1. Scanner shall have minimum 8 input ports and 1 output port. The developed scanner shall be compatible with the above controller.
2. The details of the controller shall be shared at the time of placement of work order.
3. The noise levels of the scanner shall be less than $2nV_{RMS}/\sqrt{Hz}$ and D.C Bias Current 55 pA

DELIVERABLES:

S No:	Item Description	Quantity
1	8 channel scanners along with cables for low temperature measurement system	01 Set

ENGINEERING REQUIREMENTS APPROACH

3.1.1 System shall be designed as per the specifications given by the user. The engineering drawings along with their materials shall be approved by our engineering-in-charge.

4.0 MATERIAL PROCUREMENT

5.0 INSPECTION AND TESTING

5.1 Test reports generated from CMM inspection shall be used for changes in the 3D model.

6.0 REQUIREMENT OF PACKAGING AND SAFE DELIVERY

6.1 The finished/rectified components boards shall be packed carefully before dispatch. Utmost care shall be taken during card installation.

6.2 **Protective covers:** Supplier shall make necessary arrangements for all components using a suitable PVC cover or moulded thermocol. Connectors shall be provided extra cushioning during transportation.

7.0 REQUIREMENTS OF SUPPLIER QUALIFICATIONS

7.1 **Past experience:** The supplier must give their past three-year turnover and job executed by them with reference, volume of work and completion schedule, present commitments and anticipated commitments inside and outside India.

8.0 REQUIREMENTS OF PRICE AND DELIVERY SCHEDULE

10.1 The supplier shall provide overall cost with delivery schedule.