



सीएसआईआर- भारतीय रासायनिक प्रौद्योगिकी संस्थान  
**CSIR-Indian Institute of Chemical Technology**  
आई. एस. ओ. 9001 संगठन (विश्लेषणात्मक परित्सेवा हेतु) / ISO 9001 Organization (for Analytical Services)  
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद) / (Council of Scientific and Industrial Research)  
तारनाका, उप्पल रोड, हैदराबाद. तेलंगाना राज्य, भारत. 500 007.  
Tarnaka, Uppal Road, Hyderabad. Telangana State, India. 500 007



## PURCHASE ORDER

No: PUR/IICT/0396/24-25/EQPT/2178

Date: 05-12-2024

To

M/s. TECHSOL Instruments Pvt. Ltd.  
No.36 Sri Krishna Complex  
Opp. Mother Teresa School  
MES Ring Road, Bangalore-560 054  
Mobile: 080 28389955 /9738015908  
Email:sales@technosolstruments.in

**Sub:- Supply Installation and Commissioning of "Mass Flow Controllers For Existing Fluorinations Tubular Reactor System And Pyrolyser Reactor System" - reg.**

**Ref:** - 1. Our Tender Enquiry No. PUR/IICT/0396/24-25/EQPT DT.05.08.2024 and CPPP tender enquiry No.2024\_CSIR\_203836\_1 Dt.05.08.2024.

2. Your bid reference No: nil DT.23.08.2024 and revised offer received through email dt.20.11.2024.

Dear Sirs,

Kindly supply the following item(s) strictly as per the terms and conditions.

Sl. No	DESCRIPTION OF MATERIAL	Quantity	Price in (₹)	Total Amount in (₹)
1.	Supply Installation and Commissioning of "Mass Flow Controllers For Existing Fluorinations Tubular Reactor System And Pyrolyser Reactor System"  Detailed specifications as per the Annexure attached)	8Nos.	16,40,000.00	16,40,000.00
			Add GST @18%	Inclusive
			FOR CSIR-IICT, Hyderabad	16,40,000.00

**Note : The Supplied Equipment along with accessories should completely comply with all the technical specifications and related requirements indicated in Chapter 4 of Tender Documents on the subject and subsequent "corrigendum" issued in pursuance of the same.**

*Handwritten signature and date: 5.12.24*

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ईमेल/ Email: cosp@iict.res.in; csiriict@csiriict.in वेबसाईट/website:www.iictindia.org



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### TERMS & CONDITIONS:

- Prices:** FOR CSIR-IICT Inclusive of all taxes, duties etc., Hyderabad. Unloading the consignment at our site is your cost.
- Order Acknowledgement:** Kindly send order acknowledgement within 15 days through Email: [cosp@iict.res.in](mailto:cosp@iict.res.in) and [csiriicthyd@csiriict.in](mailto:csiriicthyd@csiriict.in) mention PO No. in the subject line. If you notice any discrepancy/typographical error etc. in this order, you must immediately request for its amendment/correction. Further along with duly signed and stamped copy of this P.O. as token of acceptance of terms and conditions of this P.O. You are also required to sign a contract agreement in pursuance of this Purchase Order in the prescribed format on a Non-Judicial Stamp paper of Rs 200/-**(contract form attached)**
- Taxes and Levies:** Price includes GST@18% also
- Delivery Period :** The ordered material should be supplied within the delivery period of 10 weeks from the date of receipt of the Purchase Order. (Ten)
- PAYMENT TERMS:** PAYMENT TERMS: 1) 100% through RTGS /NEFT or online mode against supply in complete quantity of ordered items in good condition as per ordered specifications and terms, subject to its joint inspection in the presence of suppliers service engineers/ representative and its confirmations and final acceptance by CSIR ICT user, payment through our Bankers State Bank of India, IICT Branch, Hyderabad, successful Installation, subject to submission of prescribed PBG.
- Warranty:** Warranty should be furnished for 24 months from the date of successful installation and commissioning of the equipment and subject to final acceptance of the same by the CSIR-IICT user. If CSIR IICT wants to enter into CAMC/AMC in future after warranty period the amount for AMC charges shall not exceed CAMC/AMC Charges indicated in quotation (if any) and the same will not be paid in advance and the same shall be paid on bill basis only.
- Performance Bank Guarantee:** 5% PBG valid till 60 days beyond the date of final installation and commissioning to be submitted within 21 days from the date of the Purchase Order, failing which order may be cancelled at the discretion of CSIR IICT.

- INSTALLATION, COMMISSIONING AND DEMONSTRATION:** A qualified and factory-trained service engineer should commission the supplied equipment free of cost within one month from the date of receipt of the ordered goods and onsite application training to be provided for 2 persons 3 working days at CSIR IICT., Telangana, India.

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9. **LD clause:** Timely supply is the essence of stipulation in the delivery period of our purchase order, for our requirements have got a direct bearing with time targeted research work. By any measure, if there is any delay in delivery of the ordered material(s), a sum equivalent to **0.5 (point five)** per cent of contract value for each week of delay or part thereof until actual delivery will be deducted from the contract value as liquidated damages, subject to the maximum deduction of **10 (ten) per cent** of P.O. Value. CSIR IICT is also at liberty to consider the termination of the contract of the items is not delivered within the delivery period without assigning any reason thereof.
10. **CSIR-IICT-GST No: 36AAATC2716R2ZF**  
**PAN No. AAATC2716R** **TAN No. HYDI00674C**
11. **Availability of spares and service engineer support shall be conformed for a period of 10 years as part of after sales and service support on applicable charges after warranty period.**
12. The dispute settlement mechanism/arbitration proceedings shall be Concluded as under:
- a) If any dispute or difference arises between the parties hereto as to the construction, interpretation, effect and implication of any provision of this agreement including the rights or liabilities or any claim or demand of any party against other or in regard to any other matter under these presents but excluding any matters, decisions or determination of which is expressly provided for in this Agreement, such disputes or differences shall be referred to **Delhi International Arbitration Centre (DIAC), New Delhi**. A reference to the Arbitration under this Clause shall be deemed to be submission within the meaning of the Arbitration and Conciliation Act, 1996 and the rules framed thereunder for the time being in force. Each party shall bear and pay its own cost of the arbitration proceedings unless the Arbitrators otherwise decides in the Award.
- b) In the case of a dispute between the purchaser and a Foreign Supplier, the dispute shall be settled by arbitration in accordance with provision of sub-clause (a) above. But if this is not acceptable to the supplier then the dispute shall be settled in accordance with provisions of UNCITRAL (United Nations Commission on International Trade Law) Arbitration Rules.

The venue of the arbitration shall be the place from where the

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purchase order or contract is issued. (for further information please refer to our Tender Document)

13. **Jurisdiction** - All disputes related to this tender shall be subject to the local court of competent jurisdiction at **HYDERABAD, Telangana, India** only.
14. The terms and conditions and tender specifications and clarification there off as contained in the tender document shall form part of this purchase order .However, Incase of any discrepancy between this P.O. and Tender terms this purchase order (P.O.) shall prevail.  
Bill of entry to be submitted at the time of delivery of goods in case of foreign Origin.

Yours faithfully,  
For & on behalf of CSIR,

(Dharmendra Kumar)  
**Controller of Stores & Purchase**

Note: Kindly, mention our purchase order reference number for all your future correspondence so as to enable us to avoid any delay while tracking/clearing the material(s).

**Budget Head: FCP512403 (Rs.16,40,000/- (Rupees Sixteen Lakhs Forty Thousand only)**

1. Indentor's copy: **B.Vijaya Thomas (FAC)** 2. Accounts copy; 3. Office copy; 4. Guard File copy 5. Spare copy.



PUR/IICT/0396/24-25/EQPT/2178

Annexure  
Dt.05.12.2024

a. Specification for Digital Mass Flow Controller

Sl. No	Gas	Flow rate	Seal Type	Quantity (No.)	We Offer
1	Ammonia (NH <sub>3</sub> )	500 SCCM	316LSS, FFKM	1	1
2	Nitrogen Trifluoride (NF <sub>3</sub> )	240 SCCM	316LSS, FFKM	1	1
3	Propylene (C <sub>3</sub> H <sub>6</sub> )	500 SCCM	316LSS, FFKM	1	1
4	Iso-Butene (iButene)	500 SCCM	316LSS, FFKM	1	1
5	Hydrogen Sulfide (H <sub>2</sub> S)	240 SCCM	316LSS, FFKM	1	1
6	Sulfur Hexafluoride (SF <sub>6</sub> )	240 SCCM	316LSS, FFKM	1	1
7	Difluoroethane (R-152a)	500 SCCM	316LSS, FFKM	1	1
8	Chlorine (Cl <sub>2</sub> )	240 SCCM	316LSS, FFKM	1	1

b. Detailed specification of all above MFC:

Sl. No		
1	The Corrosive Mass flow controllers should be preferable calibrated gases include for NH <sub>3</sub> , NO <sub>2</sub> , H <sub>2</sub> S, NO, Air, N <sub>2</sub> , He, CH <sub>4</sub> , H <sub>2</sub> , CO, CO <sub>2</sub> , Ar, LPG, 70% C <sub>4</sub> H <sub>10</sub> + 30% C <sub>3</sub> H <sub>8</sub> , 2% CO <sub>2</sub> + 98% Ar, 10% CH <sub>4</sub> + 90% Ar, 3.7% O <sub>2</sub> + 15% CO <sub>2</sub> + 80.3% N <sub>2</sub> + 1% Ar etc	The Corrosive Mass flow controllers is calibrated for gases including NH <sub>3</sub> , NO <sub>2</sub> , H <sub>2</sub> S, NO, Air, N <sub>2</sub> , He, CH <sub>4</sub> , H <sub>2</sub> , CO, CO <sub>2</sub> , Ar, LPG, 70% C <sub>4</sub> H <sub>10</sub> + 30% C <sub>3</sub> H <sub>8</sub> , 2% CO <sub>2</sub> + 98% Ar, 10% CH <sub>4</sub> + 90% Ar, 3.7% O <sub>2</sub> + 15% CO <sub>2</sub> + 80.3% N <sub>2</sub> + 1% Ar etc
2	LCD display with integrated touchpad should display Mass Flow, Volumetric Flow, Pressure, Temperature and Set point and Percentage of Valve Opening simultaneously with Gas totalizer option on the Front panel Display.	LCD display with integrated touchpad will display Mass Flow, Volumetric Flow, Pressure, Temperature and Set point and Percentage of Valve Opening simultaneously with Gas totalizer option on the Front panel Display.
3	The resolution of the device should have two to three decimal for fine tune to operate the input set point and can be possible to increase or decrease the decimal option through Front Panel Display.	The resolution of the device will have two to three decimal for fine tune to operate the input set point and can be possible to increase or decrease the decimal option through Front Panel Display.
4	Controllers should have individual inbuilt LED /LCD / digital display with flow control switch and stand-alone power supply adopter to plug into power socket and use.	Controllers should have individual inbuilt LCD digital display with flow control switch and stand-alone power supply adopter to plug into power socket and use.
5	MFC should have the option for Personalized gas mixing compositions for accurate mixed gas measurement and switch between selected gases on the fly without any need for recalibration of the mass flow controller	MFC has the option for Personalized gas mixing compositions for accurate mixed gas measurement and switch between selected gases on the fly without any need for recalibration of the mass flow controller
6	Software: A PC based software program that should interface with the RS-232 and RS 485 communication. The graphical user interface (GUI) should provide automatic configuration, session saving for easy	Software: A PC based software program that should interface with the RS-232 communication. The graphical user interface (GUI) will provide automatic configuration, session saving for easy Configuration and



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	Configuration and experiment setup reloads, data capturing and logging (including a graphing tool), simple and advanced script building for automating meter sequences, software alarms and support for multiple devices	experiment setup reloads, data capturing and logging (including a graphing tool), simple and advanced script building for automating meter sequences, software alarms and support for multiple devices
7	Operating Pressure: Max 160 psi	Operating Pressure: Max 160 psi
8	Downstream pressure: 0.25 kg/cm <sup>2</sup> (G) and vacuum	Downstream pressure: 0.25 kg/cm <sup>2</sup> (G) and vacuum
9	Temperature range of operation: -10 oC to 60 Oc	Temperature range of operation: -10 oC to 60 Oc
10	Wetted and Seal Material: Recommended Body material and seals suitable for the gas preferably SS316 and Viton (FFKM) for corrosive gases	Wetted and Seal Material: Body material and seals suitable for the gas preferably SS316 and Viton (FFKM) for corrosive gases
11	Accuracy: $\pm 0.7\%$ or (0.6% of Reading $\pm 0.1\%$ of Full Scale)	Accuracy: $\pm 0.7\%$ or (0.6% of Reading $\pm 0.1\%$ of Full Scale)
12	Repeatability: $\pm (0.1\%$ of Reading + 0.02% of Full Scale)	Repeatability: $\pm (0.1\%$ of Reading + 0.02% of Full Scale)
13	The Analog Input/Output of the controller should be RS-232 or RS-485	The Analog Input/Output of the controller will be RS-232
14	The controller should have the connection of 1/4 inch Swagelok compression gas fittings	The controller will have the connection of 1/4 inch Swagelok compression gas fittings
15	Setting Flow Ramp up programming cycle should be possible by interfacing through the in build LCD display and keypad on the MFC	Setting Flow Ramp up programming cycle is possible by interfacing through the in build LCD display and keypad on the MFC
16	Manufacturer should have their own Re-Calibration and Service Centre in India.	Manufacturer has their own Re-Calibration and Service Centre in Mumbai - India.
17	Warm-up Time: < 1 Second	Warm-up Time: < 1 Second
18	Typical Response Time	Typical Response Time
19	Operating Range: 1% to 100% Full Scale	Operating Range: 1% to 100% Full Scale
20	Electrical Connection Options: DB9 Pin	Electrical Connection Options: DB9 Pin
21	All connecting cables/chords/interfaces ports and necessary power supply (110V to 230V converter) should be supplied along with the instrument	All connecting cables/chords/interfaces ports and necessary power supply (110V to 230V converter) will be supplied along with the instrument
22	Detailed service manual and operating manual with circuit diagram should be provided along with the instrument	Detailed service manual and operating manual with circuit diagram will be provided along with the instrument
23	Necessary accessories such as Power Supply, Communication cable, 1/4" SS tube Connector Fittings with computer Controller software should be provided for trouble free operation of the instrument.	Necessary accessories such as Power Supply, Communication cable, 1/4" SS tube Connector Fittings with computer Controller software will be provided for trouble free operation of the instrument.

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<b>SENSOR AND CONTROL PERFORMANCE</b>	
Mass flow accuracy <sup>1</sup>	Standard accuracy: $\pm 0.6\%$ of reading or $\pm 0.1\%$ of full scale, whichever is greater High accuracy: $\pm 0.5\%$ of reading or $\pm 0.1\%$ of full scale, whichever is greater
Flow repeatability (2 $\sigma$ )	$\pm (0.1\%$ of reading + $0.02\%$ of full scale)
Pressure accuracy <sup>1</sup>	Above 1 atm: $\pm 0.5\%$ of reading Below 1 atm: $\pm 0.07$ PSIA
Steady state control range	0.01 – 100% of full scale (10,000:1 turndown ratio)
Operating pressure full scale	11.5–160 PSIA
Pressure sensitivity	Mass flow zero shift: $\pm 0.01\%$ of full scale per atm from tare pressure Mass flow span shift: $\pm 0.1\%$ of reading per atm from calibration conditions
Temperature sensitivity	Mass flow zero shift: $\pm 0.01\%$ of full scale per °C from tare temperature Mass flow span shift: $\pm 0.01\%$ of reading per °C from 25°C
Temperature accuracy	$\pm 0.75^\circ\text{C}$
Operating temperature range	-10–60°C (ambient and gas)
Valve function	Normally closed
Totalizer volume uncertainty	$\pm 0.1\%$ of reading in additional uncertainty
Sensor response time	< 1 ms
Typical control response time	As fast as 30 ms (T63), flow rate dependent, user-adjustable
Typical indication response time	< 10 ms, flow rate dependent
Typical warm-up time	< 1 s
<b>MECHANICAL</b>	
Wetted materials	302, 303, 304, 316L, and 430FR stainless steel; FKM, alumina ceramic, brass, glass, gold, heat-cured epoxy, heat-cured silicone rubber, polyamide, silicon
Maximum pressure	Damage possible above 200 PSIA common mode pressure. Damage possible by rapid pressure change above 75 PSI differential pressure.
Relative humidity range	0 – 95%, non-condensing
Ingress protection	IP40 (consult Alicat for weatherproofing options)
Mounting orientation sensitivity	None
Mounting holes	10–50 SCCM: 2× 8-32 UNC threaded $\mp 0.175"$ [4.45 mm] 100 SCCM–20 SLP: 2× 8-32 UNC threaded $\mp 0.350"$ [8.89 mm]
Process connections <sup>2</sup>	10–50 SCCM: M5 female (10-32 compatible), shipped with Buna-N O-ring face seal 100 SCCM–20 SLP: $\frac{1}{8}"$ NPT female
<b>POWER AND COMMUNICATIONS</b>	
Digital input and output options	RS-232 Serial and Modbus RTU (default) RS-485 Serial and Modbus RTU, Modbus TCP/IP, DeviceNet, EtherCAT, Ethernet/IP, PROFINET, PROFIBUS
Digital data update rate <sup>3</sup>	40 Hz at 19200 baud
Analog input and output options	4–20 mA, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc
Analog data update rate <sup>3</sup>	1 kHz
Analog signal accuracy	$\pm 0.1\%$ of full scale additional uncertainty
Interactive display	Monochrome LCD or color TFT display with integrated touchpad; simultaneously displays mass flow, volumetric flow, temperature, setpoint, and pressure
Display update rate	10 Hz
Electrical connection options	6-pin locking, 8-pin mini-DIN, 8-pin M12, DB-9, DB-15
Power requirements <sup>3</sup>	12–24 Vdc, 250 mA (290 mA if equipped with 4–20 mA output)



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FEATURES	
STP reference conditions	25°C and 1 atm (default), user-configurable
NTP reference conditions	0°C and 1 atm (default), user-configurable
Gas Select™	98 user-selectable gases stored internally. Each gas optimized to match NIST's REFPROP 10 gas property calculations across the operating temperature and pressure ranges for highest accuracy.
COMPOSER™	20 user-definable gas mixes. Each mix may have up to 5 gases with 0.01% composition resolution.

RANGE-SPECIFIC TECHNICAL DATA	
Full scale flow	Pressure drop at full scale when venting air to atmosphere <sup>a</sup>
10 SCCM	2.8 PSID
20-500 SCCM	1.0 PSID
1 SLPM	1.5 PSID
2 SLPM	3.0 PSID
5 SLPM	2.0 PSID
10 SLPM	5.5 PSID
20 SLPM	12.0 PSID

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