Ref: CnID/FA/INQ/2022/   Date: May,   2022

Sub :   Minor Fabrication - Invitation of Quotation.

Supply of items as per enclosed list in the technical specification, installation, programming, testing and qualification of test console.

Dear Sir,

1. Quotations are invited for supply of items as per enclosed list in the technical specification, installation, programming, testing and qualification of test console.

2. Bidder shall quote for Supply, installation, programming, testing and qualification of the test console in situ.

3. Taxes and Excise Duties, if any, shall be quoted separately. Form AF / H whichever is applicable shall be provided, if required.

4. The quotation must reach The Head, Division of Control Instrumentation Division, by **10.06.2022** and must be sent in a sealed envelope by **speed post** superscribed with the **reference** **number & the due date given above.**

5. The address on the envelope should read :

   Head, CnID, RCnD Building
   BARC, Trombay, Mumbai - 400 085

6. The Supply material shall be subjected to inspection by our engineer. The components shall not be dispatched prior to approval by our engineer at bidder's premises. Necessary inspection facilities should be provided to our engineer during procurement at bidder's premises.

7. After placing the work order, as given in the tender specification, final testing of test console should be done within **Nine months.**

8. Head, Control Instrumentation Division BARC reserves the rights to accept / reject any or all quotations without assigning any reason.

9. Incomplete offer / offer received after the due date shall not be considered.

10. Quotations should be preferably neatly typed and any corrections in the offer are not acceptable.

11. Quotation received in computer generated form shall not be acceptable. Quotation must be submitted in print letterhead, mentioning clearly GST registration No., PAN No. & service tax registration no., submission of challan and invoice shall also comply the same, in case work order is placed.

12. Kindly contact on phone number **022-25591874** for any query.

Encl.: Technical specification

Head, CnID
BARC, Trombay.

Tender Specification

Supply of items as per enclosed list in the technical specification, installation, programming, testing and qualification of test console.

Introduction:

This console is required to carry out performance and routine testing of the drive mechanisms. This drive mechanism consists of three phase induction motor, worm and worm wheel, electromagnetic clutch, set of spur gears, rack and pinion arrangement, potentiometer for continuous position and direct/indirect micro-switches for end limits and 90% position monitoring switches. Rope and sheave arrangement are used for converting rotary motion to linear motion. One end of rack is attached to the to the Load using extension rod. The drive motor is used to move the load as required (up/down). The electromagnetic clutch is energised before lifting the load and act as a coupling device between pinion and worm gear. During load dropping, clutch is de-energised and rod falls down due to gravity. Clutch is fed from 110V DC & the motor is fed from 220V, 3ph, 50Hz, AC supply.

Scope of work:

The supplier has to arrange all the items as per enclosed material list required for test console, changes in the panel for console for extra push button and HMI fitting, assemble these items and wiring, write the code for PLC and HMI console for all functions (display, control, safety interlock, alarm, rod drop data recording and others), testing the console functionality with dummy sensors and mechanism. After suppling of material all the work has to perform in RCnD, BARC, Mumbai.

Functional requirements:

A] Parameter Display: The test console should have following parameter display on the monitor:

Sr. No.	Parameter to be displayed	Display	No of parameters	Remark
1.	Auxiliary Voltage (DC)	Digital Value	one	Signal from console
2.	Motor Supply Voltage (line)	Digital Value	3	Signal from console
3.	Motor Current (Line)	Digital Value	3	Signal from console
4.	Motor Supply Frequency	Digital Value	One	Signal from console
5.	Clutch Voltage	Digital Value	One	Signal from console

SN	Description	Type	Quantity	Remark
6.	Clutch Current	Digital Value	One	Signal from console
7.	Rod continuous position	Digital Value	Two	Signal from mechanism
8.	Hydraulic Dashpot position	Digital Value	One	Signal from mechanism
9.	Top limit indication	ON/OFF	3	Signal from mechanism
10.	90% 'Down' indication	ON/OFF	2	Signal from mechanism
11.	Bottom limit Indication	ON/OFF	3	Signal from mechanism
12.	Dashpot Limit Indication	ON/OFF	1	Signal from mechanism
13.	Headgear enable Indication	ON/OFF	One	Signal from mechanism
14.	Temperature Indication (0-99°C)	Digital Value	One	Through RTD PT 100
15.	Continuous Velocity	Analogue	One	Signal from mechanism
16.	Continuous Pressure	Analogue	One	Signal from mechanism

B] Timing Display:

During rod motorized movement (UP/Down), the time required from start to reach end limit is measured and continuously displayed. The drop time is measured. The details are as follows:

SN	Display	Type	Remark
1.	Load Top reach time (sec) Typical value 425 sec	3 Digit Display	Time elapse between up button press to motor cutoff by top limit switch during UP movement
2.	Load Bottom reach time (sec) Typical value 425 sec	3 Digit Display	Time elapse between down button press to motor cut off by bottom limit switch during down movement
3.	Delay time (msec) Typical value 200 msec	3 Digit Display	Time elapse between scram switch press to direct up micro switch actuation during load drop
4.	90% drop time (msec) Typical value 500 msec	3 Digit Display	Time elapse between scram switch press to 90% limit switch actuation during Load drop
5.	100% drop time (sec) Typical value 2.50 sec	3 Digit Display	Time elapse between scram switch press to 100% limit switch actuation during load drop

C] Control Button:

The software control buttons shall give command for following operations:

SN	Control Button	Type	Remark
1.	Raise Green Color	Push Button Illuminating	
2.	Hold Blue color	--do--	
3.	Lower Red color	--do--	
4.	Scram/drop Red color	--do--	Always active
5.	Clutch 'ON/OFF' Red color	Push Button Illuminating	

D) Safety Interlock:

These interlocks should be always active and built in hardware of console (electronics card). These interlocks should not get affected by mal operation of monitoring system.

SN	Interlock	Action	Generated By Logic
1.	Rod reaches top limit during Up movement	Motor cutoff & up operation will become ineffective	Generated by input signal received from mechanism
2.	Rod fully down during rod down movement	Motor cutoff & down operation will become ineffective	Generated by input signal received from mechanism
3.	Dash pot not reset in 20% of rod up movement	Motor cutoff & up operation will become ineffective	Generated by inputs received from mechanism & comparator

E) Alarm:

All alarms should be provided with indication. Alarm reset will be provided. Alarm signal generated should be displayed in monitor of system.

SN	Alarm	Generation Logic	Remark
1.	Motor raise or lower without clutch active	Through software button operation	
2.	Head gear enable	Through series wire of connector from mechanism	
3.	Load raising/lowering time increased by specified seconds	Comparing with reference time set	During Cyclic operation only
4.	Load 90% drop time increased by specified time	--do--	During Cyclic operation only
5.	Load 100% drop time increased by specified time	--do--	--do--

F) Other:

1) Cycle testing control: In this mode of control, the sequence of the control button operation will be set in defined format. Two types of cycle testing will be performed a) Motorised Up/drop testing During this testing clutch is de-energised for rod drop b) Motorised UP/Down testing. During this testing the mechanism parameters and load parameters are continuously recorded.

2) Mechanism Calibration: The signals obtained from the mechanism will be used to calibrate the load physical parameter (e.g. load position pot output is converted into load position display, output of voltage signal isolator is converted to motor voltage display).

3) Data storage and report generation: During cyclic operation all the motor, clutch, load timings, date, time, mechanism type, mechanism number, operator, ambient temperature, type of test

and min & max load timings should be stored & its data should transferable and displayed in excel format (offline as & when operator commands).

4] Input signal identifier: The software shall have facility to set the various input signals. Along with their type, range and definition and manipulation before display. The prepared setting can be saved by defining it. This setting will be loaded after initiating the software.

5] Mechanism Selection: There are two type of mechanism will be tested with this test console. All theses mechanisms have more or less similar components only functionally different. The software should have facility select these mechanisms for testing.

6] Administrative Function: The software will have administrative controls like level of access to the operator/supervisor/designer with password access and data access protection.

G) Testing the console functionality with dummy sensors:

The complete console test procedure will be provided after placing purchase order. The console functionality testing includes the qualification of console with respect to functionality, console software and electronics card stability against the noise generated due to operation of Electromagnetic devices like EM clutch, relay and 3ph Induction motor.

H] Additional/ general specifications:

1) The supplier will require to give complete bill of material before supply for approval from our engineer, flow charts, any tool, language used, hardware details and all other related things for approval before proceeding the work.

2) The supplier has to give all the source codes along with detailed explanation in written as well as soft copy in CD, at the time of delivery.

3) License copy of PLC and HMI software should be provided along with compatible Laptop.

4) If any specific tools like lab windows etc are used then the supplier will require to give soft copy and detailed manual. The supplier has to give the drivers & software in CD and detail manuals in hard copy of the cards he used for developing the console.

5) The SBC should have authorized Win 7 operating system or higher.

6) Console panel/rack have proper grounding, cooling & ventilation arrangement. Supplier should maintain all these after installation.

7) Supplier has to give general scheme showing clearly how the hardware devices and monitor will be interfaced, data acquisition, analogue and digital signal and time counting in the quotation.

8) Offer should have 3 months validity from the due date.

9) All the material used for the installation should be stated separately with Name, Make, Model No, Rating and other required technical details of each and every item for approval before starting the work.

10) The supplier has to give support as well as guarantee/warrantee at least for one year for each and every item and functionality of the test console (at least 10,000 times console operation).

11) The supplier has to be associated with our representative throughout this work and required to make familiar with all the software developmental work. Also, supplier has to train him to carry out small changes and general day to day maintenance.

12) The material should be qualified by our representative before final dispatch at supplier's place. The supplier has to make all the required testing arrangements of his own for this.

13) The safe delivery of material should be done by the supplier at his own cost at the RCnD building, BARC, Trombay, Mumbai.

14) The supplier has to take the approval before sub-contracting the work.

I) Available Power Console have following circuitry and in-built power supply:

SN.	Parameter	Value	
1.	Input power supply	400V_{L-L} A/C, 5 wires, through 5 pin circular connector.	
2.	Panel Size in mm	Approx. 600 x 600 x 1200 including caster wheel.	
3.	In build power supply i) Variable Frequency Drive ii) DC 24V, 100W regulated linear power supply (for Pot & LS) iii) ±15V, 1A, 30W DC regulated power supply with fuse and indicator. iv) 0-110V, 2A, DC unregulated power supply with variable knob, fuse and indicator. v) Power supply for electronic cards		Qty. 1No. 1No. 1No. 1No. 1No.
4.	Signal processing isolator	Required for motor, clutch & temperature measurements	2 sets
5.	Console panel have following Inbuilt circuits. i) Power supply circuit. ii) Motor and clutch control circuit. iii) Digital input & output circuit (PLC card). iv) Analog input/ Output circuit (PLC card). v) Circular connector circuit. Note- These materials are already available in our power console. If Supplier want to change any of the item, they have to provide supporting power and software accordingly.		

J) Bill of material

Following is the list of hardware items required for the console. However, supplier may suggest the different scheme with his expertise meeting all requirements of console. Note that this list is only guide line for cost estimation including spares, however supplier should be capable of making some changes at any stage if required. The console control circuit diagram showing the interconnection of following items may be provided after placing the purchase order.

Table 1: Showing the list of the hardware and software items to be arranged by the supplier.

Electronics card/PLC: Supplier may use exiting PLC or provide Electronics card contains ADC card (16 channel, 16 bit, single ended), DI (24 channel), DO (8 channel) & AO (2 channel for VFD) card, micro controller card, data storage, USB connectivity and interfacing circuit for display system interface. Supplier has to develop or use standard card meeting the technical requirements of electronics card. And also provide 15" HMI compatible with data card/PLC. (Already Modicon M340 and its attachments of D/I/O and A/I/O are in use and Schneider- HMIPSOC752D1W01 is used as HMI in present console.)

Programming: a) SBC software programming b) Electronics card programming. Supplier has to use licensed software for these programs, also provide this license software in supporting laptop and he has also give the source code to the purchaser during installation and commissioning. He has to provide software service for at least two year from date of installation for any modification in the programs. A brief training of software to the purchases to handle small changes in PLC/HMI.

User Windows: The user interface windows are approximately 17. Theses windows are related with functional testing of mechanisms as mentioned above.

List of Items to be supplied

SN	Item	Qty.
1.	**Touch Screen Monitor**: 15", LED/TFT, Resolution 1024 x 768, two front USB port, Projective capacitive touch screen, IP65 (Description: E3845 processor with 4 core 1.91 MHz, 2xDDR3L SO-DIMM supporting up to 8Gb memory, 2 PCI + 1PClex4 slots,9-32 DC input, 4GB DDR3L 1333MHz Memory, Compact flash 32GB SSD, 500 GB HDD, 100W AC-DC adapter) or equivalent. (Schneider- HMIPSOC752D1W01 will be preferred because it is already in use.) **Software compatibility**: Windows 10/Windows 11	Two Set.
2.	Electronics cards /PLC	As mentioned above
3.	Digital input/output card	16+16 channel
4.	Analog input/output card	8 (16Bit) + 2 channel
5.	Terminal boards for signal wiring connections with electronic card.	As per electronics card interface requirements
6.	Licensed software for HMI and PLC with compatible laptop	One set.
7.	Power supply for electronic card (if required)	One Set.
8.	Push Button	Ten Nos.
9.	Panel internal wiring/ferrule etc. (Wiring by Teflon coated 1mmSQ wire) & others	Lump sum