Neutron and X-ray Physics Section
Technical Physics Division
PURNIMA Laboratories

Ref: TPD/NXPS/MF/140 Date: 17-05-2018

Due Date: 25-05-2018

Sub: Minor Fabrication - invitation of quotations.

1. Quotations are invited for the minor fabrication job, as per the enclosed specifications.
2. Bidder shall quote for fabrication of these components with material.
3. Taxes and excise duties shall be quoted separately.
4. The quotations must reach to the Head, Neutron and X-ray Physics Section, Technical Physics Division, Purnima Labs, BARC within 9 days of the date of this letter and must be sent by ***Indian Speed post / Indian Post*** only in a sealed envelope superscripted with the above reference number and due date given above.
5. The address on the envelope should read:

Head
Neutron and X-ray Physics Section
Technical Physics Division
Bhabha Atomic Research Centre
PURNIMA Labs., Trombay, Mumbai 400085.

6. The bidder shall have to take an insurance policy against any material issued to him by the purchaser
7. The fabrication work shall be subject to inspection by our representative. The finished components shall not be dispatched prior to approval by our representative at the bidder's works. Necessary inspection facilities should be provided to our engineers during fabrication at bidder's premises.
8. The bidder shall deliver the finished components and install it after approval by our representative, within 60days from the date the firm purchase order issued to the bidder. The finished components and the scrap from the free issue material shall be delivered by the bidder at PURNIMA Laboratory, Neutron and X-ray Physics Section, Technical Physics Division (Near Plutonium Plant), Bhabha Atomic Research Centre, Trombay, Mumbai 400085.
9. Head, Neutron and X-ray Physics Section, Technical Physics Division, BARC, reserves the right to accept/reject any or all quotations without assigning any reason.
10. The bidder should furnish the VAT, PAN and TIN numbers in their quotations without which the quotations will be rejected.
11. Quote for each part separately.
12. Detailed drawing will be made available after issue of order.
13. Clarifications for executing the order can be sought after issue of order.

Head,
NXPS/TPD

Description and specification of different items of
Work order ref: TPD/NXPS/MF/140
Fabrication and supply of control system and accessories for neutron imaging beamline

Specifications:
Item #1 Control system
Quantity – 1 No.

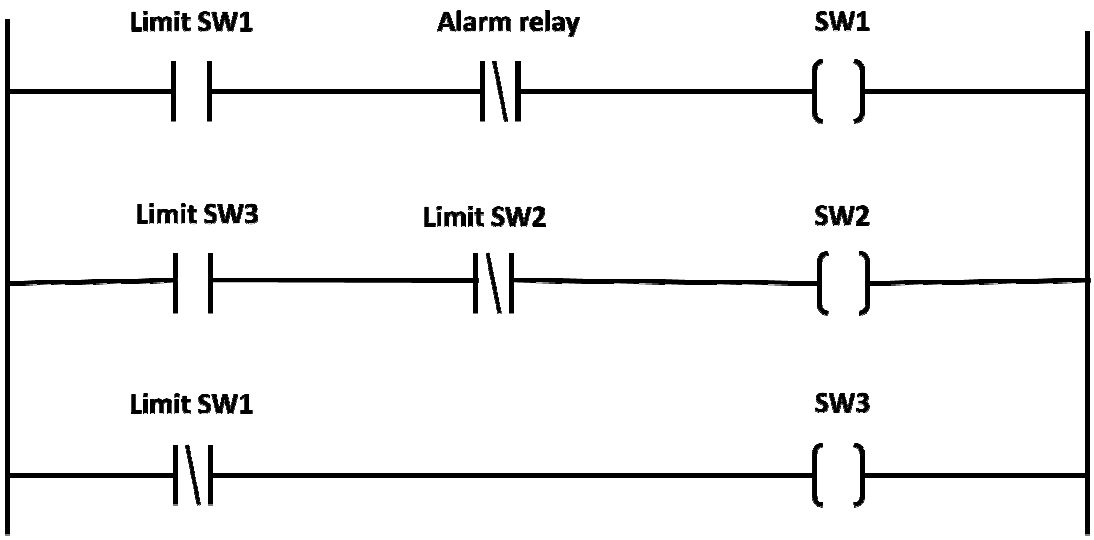
Control system consists of suitable controller which should provide following functions

A. Should be able control five numbers of suitable stepper motor drives to drive two phase stepper motors of holding torque 2.2 Nm / step angle 1.8°.
   It consists of five number of stepper motor drives with following specifications
   i. Input Power: 24~50V DC
   ii. Input Signal: PLS (CW),DIR(CCW), FREE signal,
   Input voltage:5~24V DC,
   Input current:8mA@5V DC,12mA@24VDC
   iii. 15 subdivision levels and 8 current levels are selectable by DIP switches
   iv. Pulse type is selectable by DIP switches: PLS+DIR&CW/CCW
   v. 15 subdivision levels and 8 current levels are selectable by DIP switches
   vi. Over voltage protection and over current protection circuit provided

B. Controller should be able control and should consist of two numbers of the variable frequency drives (VFD). Each VFD should couple with two AC contactors. VFD should have following specification.
   VFD Specifications–Quantity: 2No.
   i. Input Voltage: 1Phase, 6.5A, 200~240VAC,50/60Hz
   ii. Power Rating: 0.4KW
   iii. Motor Rating: 0.5HP
   iv. Output Phase: Three , 240V, 2.5A
   v. Output frequency: 1~400Hz
   vi. Type of product: AC Drive
   AC contactors Specifications – Quantity: 4Nos.
   i. Volts: 220-230 VAC
   ii. Rated current 9A
   iii. Phase 3

C. Controller should consist of two programmable logic controllers (with at least 10 digital inputs, 10 digital outputs and 2 analog inputs). It should also have serial communication (RS485) port for remote control from computer.

D. The interlock logics given below should be implemented in the controller.



	Condition	Logic
1.	**Limit SW1 is activated <u>OR</u> Alarm relay is not activated**	**SW1 Closes**
2.	**Limit SW3 is activated OR Limit SW2 is not activated**	**SW2 Closes**
3	**Limit SW1 is not activated**	**SW3 Closes**

Note: SW1, SW2, SW3 are relay outputs

E. The controller, VFD drive, five number of stepper motor drives should be placed within suitable 3U to 6U, 19" rack.

F. There should be ON/OFF input power button, VFD ON/OFF button, forward/stop and reverse/stop for VFD, forward & reverse buttons for all five stepper motor drives on the front panel of the controller assembly.

G. One set of joy stick should be provided with a provision for VFD ON/OFF forward/stop and reverse/stop for VFD, forward & reverse buttons for all five stepper motor drives along with 5 meters of cable from controller to the joy stick.

H. The software should be provided for configuration of the controller and also a separate graphical user interface for controlling stepper motors and three phase motor through PC.

I. Control system configuration, installation, commissioning to be provided.

Accessories

Item #2

A. Two phase stepper Motors — Quantity: 2 Nos.

i. Holding torque : 2.2 Nm (22.4Kgcm)

ii. Step angle: 1.8°

iii. Series Phase current: 2.8A
iv. Parallel Phase current: 5.6A
v. Number of lead wires: 8
vi. Max. axial load: 15N
vii. Max. radial load: 75N

B. Coreless encoder motor & PID DC Servo drive Quantity: 1 No.

Motor specifications

i. 12V DC coreless motor
ii. 120 RPM
iii. Power:17W
iv. Load current:1400mA
v. No load current:75mA

Servo Drive specifications

vi. Can drive up to 500mA
vii. Uses PID method for position control
viii. Accept serial commands
ix. Interface to computer USB or Serial port via TTL/level converter
x. Absolute position mode
xi. Speed setting mode
xii. Virtually infinite absolute positions

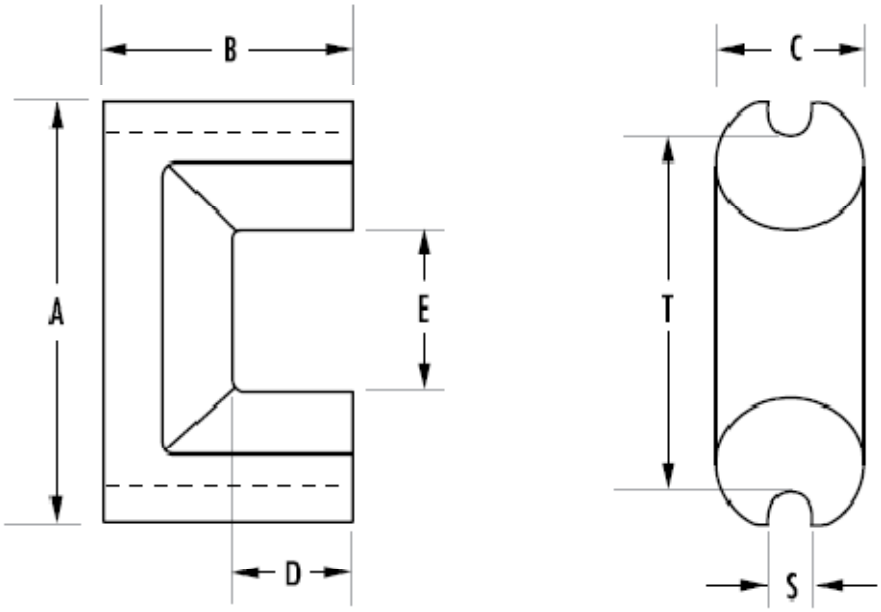
C. Joy stick Quantity: 1 No.
D. 3U – 19” Rack Quantity: 3 Nos.

E. High Voltage Transformers Quantity: 8 Nos.
(Specifications shown in the table below)

Transformer specifications

Sr. No.	Core Type Core type: Ferrite HP 3C/HP 4 or equivalent	No. of secondary turns	No. of primary turns	Secondary Voltage	Inter layer Insulation	Quantity
1	Torroidal core:- (ID=41mm, OD= 60mm, Thickness= 19mm)	1000 turns Wire guage: AWG-32	5 turns Wire guage: bundle of 6 wires of AWG-20	2kV	700V	1 No.
2	Torroidal core:- (ID=41mm, OD= 60mm, Thickness= 19mm)	1500 turns Wire guage: AWG-32	5 turns Wire guage: bundle of 6 wires of AWG-20	4kV	1kV	1 No.
3	Torroidal core:- (ID=41mm, OD= 60mm, Thickness= 19mm)	2500 turns Wire guage: AWG-32	5 turns Wire guage: bundle of 6 wires of AWG-20	15kV	3kV	1 No.
4	Torroidal core:- (ID=41mm, OD= 60mm, Thickness= 19mm)	3500 turns Wire guage: AWG-32	5 turns Wire guage: bundle of 6 wires of AWG-20	25kV	4kV	1 No.
5	UR-59	1000 turns Wire guage: AWG-32	5 turns Wire guage: bundle of 6 wires of AWG-20	2kV	700V	1 No.
6	UR-59	1500 turns Wire guage: AWG-32	5 turns Wire guage: bundle of 6 wires of AWG-20	4kV	1kV	1 No.
7	UR-59	2500 turns Wire guage: AWG-32	5 turns Wire guage: bundle of 6 wires of AWG-20	15kV	3kV	1 No.
8	UR-59	3500 turns Wire guage: AWG-32	5 turns Wire guage: bundle of 6 wires of AWG-20	25kV	4kV	1 No.

UR core snapshot.



UR-59 dimensions:

A= 60mm
B= 36mm
C= 17mm
D= 21.5mm
E= 26.5mm
S= 4.5mm
T= 50.5mm

Note: These are the minimum size required. So a higher size that is available will also work. The transformers are to be vacuum potted. For UR-59 use bobbin of proper size.

Note: **All items should be quoted simultaneously. Control system should be installed and commissioned and should be supplied with operating manuals, connecting cables, power cords etc. Material will be accepted only after successful testing as per specifications at user site.**