



Government of India
Bhabha Atomic Research Centre
Reactor Design and Development Group (RDDG)
Division of Remote Handling and Robotics (DRHR)

Ref: DRHR /NSD/INQ/2017/202

Date: Nov. 10, 2017

Sub: Minor Fabrication - Invitation of Quotation.

Manufacture, testing and supply of programmable frequency relay for PWM wave based VFD as per enclosed technical specifications. (Total Qty. 16 Nos.)

Dear Sir,

1. Quotations are invited for manufacture, testing and supply of programmable frequency relay for PWM wave based VFD as per tender specification (Qty: 16 Nos.).
2. Taxes and Excise duties if any shall be quoted separately. Form AF/H whichever is applicable shall be provided, if required.
3. Bidder shall quote for above job, with material.
4. The quotation must reach Director RDDG & Head, DRHR, BARC by **27.11.2017** and must be sent in a sealed envelope by speed post or registered post, superscribed with the **reference number & the due date given above.**
5. The address on the envelope should read:
**Director RDDG, and Head, DRHR
DRHR, Building, BARC, Trombay,
Mumbai - 400 085**
6. Director RDDG & Head DRHR, BARC reserves the rights to accept / reject any or all quotations without assigning any reason.
7. Incomplete offer / offer received after the due date shall not be considered.
8. Quotations should be preferably neatly typed and any corrections in the offer are not acceptable.
9. Quotation must also indicate the validity of offer.
10. Quotation received in computer-generated form shall not be acceptable. Quotation must be submitted in printed letterhead, mentioning clearly GST registration No. and PAN No. Submission of Challan and Invoice shall also comply the same, in case work order is placed.

Encl.: Tender specification.

Director RDDG & Head, DRHR

**Annexure
Technical Specification**

Manufacture, testing & supply of programmable frequency relay for PWM wave based (Total Qty. 16 Nos.)

Scope:

The supplier has to make one sample piece as per specifications. This sample piece will undergo all the qualification tests mentioned in the specifications. After qualifying the instrument, the remaining 15 pieces has to be manufactured and routine tested as mentioned below. This sample piece is included in the total quantity. The supplier has to give complete circuit diagram of the instrument before proceeding for actual manufacture. Supplier has to implement the suggested changes in the circuit diagram/design mutually agreed and after that manufacturing should be taken-up.

Specifications:

1. The 3 phase VFD output frequency range is 0-600Hz and output voltage is 0 to 220V/110V line. VFD output voltage will be PWM waves. This is the input signal for frequency relay.
2. In built relay: 1CO, PCB relay contact, output rated for DC 24V 1A, AC 230 V, 5A
3. Frequency display: 4 digit display of frequency with 0.1Hz resolution
4. Local 4 digit thumbwheel switch to set the set-point. Alternately this can be done by few touch buttons using the same display to check the set point.
5. Auxiliary supply: single phase 220V AC 50Hz input for operation
6. DIN Rail mountable enclosure, with built-in screw type wire terminations.
7. Preset hysteresis of 0.5Hz in the alarm set-point.
8. When VFD output voltage frequency reaches above upper limit for time 50mSec & more the inbuilt relay will operate and will give indication of trip. Delay time of 50 mSec is for frequencies above 50 Hz and for below 50 Hz it should be as per frequency.
9. It will have programmable frequency upper limit setting upto one decimal point and password lock.

Qualification test:

Routine Test: (To be performed on each & every instrument)

1. Temperature test at 20 Deg C and 45 Deg C, with VFD.
2. Voltage proof test for isolation among input and output terminals
3. Functional test to verify the relay tripping, within 50ms of input frequency crossing set-point with VFD
4. Heat run test of 168 hours, at ambient temperature with VFD.

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Type test: (To be performed on first sample piece)

1. Dry heat

This test is carried out as per IS 9000 part III, section 5, with the following severities in power ON condition

- a) Temperature: $55\text{ }^{\circ}\text{C} \pm 2^{\circ}\text{C}$
- b) Humidity shall not exceed 50% RH @ 35°C
- c) Rate of change of temperature at the transition: $1 \pm 0.2^{\circ}\text{C}$
- d) Performance check shall be done at nodal point 1 to 6.
- e) Number of cycles: 1
- f) Performance at 55°C
- g) Test duration: 11 Hrs (Cycle details & qualification criteria will be issued after release work order)

2. Damp heat

This test is carried out as per IS 9000 Part V, section 1, with the following severities in power OFF condition

- a) Temperature: $40\text{ }^{\circ}\text{C} \pm 2^{\circ}\text{C}$
- b) Change of temperature at transition: 2 hours \pm 30 min
- c) Performance check shall be done at nodal point 1 to 4.
- d) Number of cycles: 2
- e) Test duration: 48 Hrs (Cycle details & qualification criteria will be issued after work order)

Note:

1. Supplier has to give technical details of instrument offered. If custom built instrument is offered then military grade components should be used.
2. Supplier has to give guarantee/warranty of one year from date of acceptance.
3. The offer should be valid for minimum 3 months time from due date.
4. At the time of testing & qualification purchaser will provide the VFD.

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