

## Annexure-A

### SCOPE FOR TEST CONTROL UNIT FOR MOTOR SPINDLE REPAIR FACILITY AT NBS

#### Brief About the Motor spindles:

Motor spindles with the following specifications are to be tested with Test control unit:

Power: 19-28 KW, Maximum rpm: 15000, Encoder: 1 Vpp Sin/Cos, Analog sensors for clamping feedback: 0-10 VDC (Starrag) & 4-20 mA (Fischer), Temperature sensors for motor winding: KTY84/130 & Temperature sensors for BEARINGS: PT100.

Sl. No	Description	Quantity	Accepted (Yes/No)	Deviation	Remarks
1.	MATERIAL SUPPLY INCLUDING SCOPE OF WORK				
1.1	AC DRIVE				
	Siemens make Simo-drive 611U AC Drive for control of Asynchronous motor of 27 KW/ 15000 RPM comprising of the following of Siemens make:				
1.1.1	Filter Module 36 KW or above	01 No.			Bidder to provide details & comply
1.1.2	HF Communication Choke 36 KW or above	01 No.			Bidder to provide details & comply
1.1.3	In-feed Regenerative feedback (I/R) module 36/47 KW or above.	01 No.			Bidder to provide details & comply
1.1.4	SIMODRIVE 611 surge arrester/overvoltage limiter suitable for the above I/R module	01 No.			Bidder to provide details & comply
1.1.5	SIMODRIVE 611 shield connection plate suitable for the IR and LT module	01 No.			Bidder to provide details & comply
1.1.6	SIMODRIVE LT MODULE INT. 300A Type No.: 6SN1123-1AA00-0JA1	01 No.			Bidder to provide details & comply
1.1.7	SIMODRIVE 611 Universal Controller card HR 2-axis with all options for the	01 No.			Bidder to provide

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	<p>following:</p> <p>a) Incremental encoder Sin/Cos 1 V pp</p> <p>b) Speed set-point (0 to 10 VDC)</p> <p>c) Current feedback from DAC test point (0 to 10 VDC)</p> <p>d) Speed feedback (0 to 10 VDC)</p> <p>e) Motor winding Temperature feedback (0 to 10 VDC)</p>				<u>details &amp; comply</u>
1.1.8	Pre-assembled Encoder cable 10 meters or above for connecting 1 V pp encoder. Type No.: 6FX8002-2CA31 or equivalent	02 Nos.			<u>Bidder to provide details &amp; comply</u>
1.1.9	Motor Power cable 10 meters or above	02 Nos.			<u>Bidder to provide details &amp; comply</u>
<b>1.2</b>	<b><u>Electrical Cabinet:</u></b>				
<b>1.2.1</b>	<p>Connectors for:</p> <p>a) Encoder connections to the drive at panel side wall to be provided and connected to the drive within the panel. This connector should match with the encoder cable which is mentioned at clause no.1.1.8.</p> <p>b) Single Harting screw type connector 21 pin or above to be provided on the electrical panel side wall. This will carry all the analog feedbacks for Tool clamp/ unclamp, Bearing temperatures etc. for both Starrag and Fischer spindles on different allocated pin nos.</p>	01 Set			<u>Bidder to comply</u>
<b>1.2.2</b>	<p>Cables for :</p> <p>a) Harting connector to Starrag/ Fischer spindle; Connectors at spindle end will be as per requirement on the spindles and connected on a single Harting connector.</p> <p>b) Intermittent cable (2 nos.) for connecting Encoder testing unit (PWM8) in series with motor encoder. These cables will be used in series with Encoder cable at clause no.1.1.8 for testing encoder signals while in operation.</p>	01 Set			<u>Bidder to comply</u>
<b>1.2.3</b>	Digital displays of reputed make & suitable size for viewing from 4 feet by naked eye for display of:	01 Set			<u>Bidder to comply and provide details</u>

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	<ul style="list-style-type: none"> <li>a) 5 digit Motor speed (0 to 10 VDC signal).</li> <li>b) 5 digit Motor current with 2 digits after decimal point (0 to 1.0 VDC signal).</li> <li>c) 5 digit Motor temperature with 2 digits after decimal point (0 to 10 VDC signal).</li> <li>d) 5 digit Tool clamp/ unclamp feedback for Starrag spindle with 3 digits after decimal point (0 to 10 VDC signal).</li> <li>e) 5 digit Tool clamp/ unclamp feedback for Fischer spindle with 3 digits after decimal point (0 to 10 mA signal).</li> <li>f) 5 digit Bearing temperature for Fischer spindle with 2 digits after decimal point (PT 100 feedback).</li> </ul>				
1.2.4	Fluke/ Megger make Digital Insulation tester 1 KV with Back-lit display along with all accessories. The tester is to be mounted on the Cabinet for visual display in Insulation testing mode. Offered model should be equivalent to Megger model MIT320 or higher.	01 Set			<u>Bidder to comply and provide details</u>
1.2.5	<p>Selector switches of Siemens/ Schneider make for :</p> <ul style="list-style-type: none"> <li>a) 2 position selector of Offline/ Online testing for selection of Insulation testing mode and disabling of drive/ Motor operation. This selector should create one contact in series with phase selector for insulation tester.</li> <li>b) 2 position selector for closed loop (with encoder feedback)/ open loop without encoder feedback)</li> <li>c) 3 position selector of Phase for Insulation testing with earth.</li> <li>d) 2 position selector for Make of spindle i.e. Starrag/ Fischer to power the relevant digital display &amp; parameter set change-over.</li> <li>e) 2 position selector for selection of Tool clamp Sensor 1/ Sensor 2 for Fischer spindle.</li> <li>f) 3 position selector for selection of Sensor for Bearing temperature (Bearing 1, 2, 3 + 4).</li> </ul>	01 Set			<u>Bidder to comply</u>
1.2.6	<p>All push-buttons with LED light indicators to be provided for</p> <ul style="list-style-type: none"> <li>a) Motor spindle ON &amp; OFF</li> <li>b) Hydraulic unit ON &amp; OFF</li> </ul>	01 Set			<u>Bidder to comply</u>

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	c) Tool clamp & unclamp. d) Pneumatic ON & OFF. e) Water coolant motor ON & OFF. f) Water coolant Valve ON & OFF.				
1.2.7	Toggle switches to be provided for direction reversal i.e. polarity reversal of reference.	01 Set			<u>Bidder to comply</u>
1.2.8	The electrical cabinet/Panel with suitable side mounted panel fan and should not have rear opening. No elements should be mounted on the back-side of the panel. Operational Push buttons are to be mounted on the front side of the electrical cabinet at a convenient height for the operator of average height (5.5 feet).	01 No.			<u>Bidder to comply</u>
1.2.9	L&T/Siemens/ABB/ Schneider Electric make MCCB of suitable rating with rotary handle kit for switching on the power supply of mounted on the side of the panel.	01 Set			<u>Bidder to comply</u>
1.2.10	Suitable Semiconductor, HRC fuses, fuse bases of GE/ SIEMENS/ BUSSMAN make for overload protection.	01 Set			<u>Bidder to comply</u>
1.2.11	The complete LV switchgear of the electrical cabinet including overloads, relays, contactors, MPCBs etc. is to be supplied & interfaced as per requirement. 30 KW, 3 phase contactor to be provided at drive output for motor disconnection from drive for Insulation testing.	01 Set			<u>Bidder to comply</u>
1.2.12	Electrical Cabinet to be equipped with: a) Door limit switch operated panel tube lights with ON/ OFF switch b) 5 Amp 3-pin service socket and switch c) Feed-rate potentiometer (10 turns- Bourns make) to control manual feed-rate with input 0 to 10 V DC.	01 Set			<u>Bidder to comply</u>
1.2.13	Additional Keys, Push-buttons & Selector switches required on the electrical cabinet for operation of the test control unit to be provided by the vendor	01 Set			<u>Bidder to comply</u>
1.2.14	a) DC Regulated Power Supply 24V DC of minimum 20 Amps capacity of Siemens/Phoenix/M-System for contactors, relay supply, Solenoid valves & all sensors.	01 Set			<u>Bidder to comply</u>

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	b) DC Regulated Power Supply 10V DC of suitable capacity of Siemens/Phoenix/M-System for reference to the drive.	01 Set			
1.2.15	Terminal boxes, screwed terminal blocks, bus bars, transformers etc. as required per the new electrical scheme should be provided of reputed makes viz. Wago, Phoenix contact etc. Connection from drive to side wall mounted connector should be properly routed inside the panel.	01 Set			<u>Bidder to comply</u>
1.3	<b>OTHER FEATURES</b>				
1.3.1	Lapp make hose pipes, DIN rails (5 meters), cable ducts (5 meters), insulated lugs(0.5, 1.0, 1.5 sq. mm 200 nos. each & 2.5, 4.0 sq. mm 100 nos. each), printed ferrules (0-9 of 1.0 & 1.5 sq. mm 200 each and A-Z of 1.0 & 1.5 sq. mm 100 each) and other material required for the wiring of machine and panel.	01 Set			<u>Bidder to comply</u>
1.3.2	Party shall supply all clamps, fixtures and fasteners required to complete the work.	01 Set			<u>Bidder to comply</u>
1.3.3	Any other material not mentioned above but found necessary to complete the work, shall be in party's scope of supply.	01 Set			<u>Bidder to comply</u>
1.3.4	The Vendor shall bring all tools, tackles and testing equipment with them for successful commissioning of supplied system.				<u>Bidder to comply</u>
1.3.5	Before dispatch of material, vendor shall submit to BHEL the Bill of Material (BOM) and proposed electrical drawing/ schematic for scrutiny and acceptance.				<u>Bidder to comply</u>
1.3.6	Party shall impart training to BHEL staff, for operation & maintenance of the system supplied by them during installation & commissioning.				<u>Bidder to comply</u>
2.	<b><u>COMMISSIONING:</u></b>				
2.1.	Party shall undertake commissioning of all the supplied components at HEEP, BHEL, Haridwar. All material required for commissioning of the machines shall be supplied by the party free of cost and obligation. All commissioning materials shall be supplied by party.				<u>Bidder to comply</u>
2.2	Party shall demonstrate working of all the functions of the Test unit as described above and as required by BHEL for one Fischer and one Starrag motor spindle.				<u>Bidder to comply</u>

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<b>3.</b>	<b><u>DOCUMENTATION</u></b>			
	Following documents shall be supplied by the Party:			
<b>3.1</b>	Commissioning and service manuals of the 611U drive	03 Sets		<u>Bidder to comply</u>
<b>3.2</b>	New electrical schematic of the test control unit	03 Sets		<u>Bidder to comply</u>
<b>3.3</b>	All documentation, Spindle drive parameters & back-up on CD	01 Set		<u>Bidder to comply</u>
<b>3.4</b>	Documentation of all bought-out items including display units.	03 Sets		<u>Bidder to comply</u>
<b>4.</b>	<b><u>WARRANTY:</u></b>			
	Party shall stand warranty for a period of 18 months from the date of receipt and acceptance of material at BHEL, Haridwar or 12 months from the date of successful commissioning whichever is earlier.			<u>Bidder to comply</u>
<b>5.</b>	<b><u>PRE-DISPATCH INSPECTION</u></b>			
<b>5.1</b>	Pre-dispatch inspection of all the items covered under Scope of Supply at Para (1) shall be carried out by BHEL personnel at party's works.			<u>Bidder to comply</u>
<b>5.2</b>	Supplier shall invite BHEL for carrying out pre- inspection.			<u>Bidder to comply</u>
<b>5.3</b>	Deputed BHEL persons shall do pre acceptance of material under scope of supply at vendor works and give dispatch clearance.			<u>Bidder to comply</u>
<b>5.4</b>	Expenses of Boarding and lodging of BHEL personnel during PDI shall be borne by BHEL.			<u>Bidder to comply</u>
<b>6</b>	<b><u>GENERAL CONDITIONS:</u></b>			
<b>6.1</b>	A point wise compliance statement shall be submitted by the party with reference to the above scope of supply against each clause/sub-clause with relevant details & comments. Non-compliance to any of the above clauses & quoting inadequate			<u>Information to bidder</u>

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	quantity can lead to disqualification of the offer.				
6.2	The proposed electrical schematic & Bill of material shall be provided by the vendor prior to pre dispatch inspection.				<u>Information to bidder</u>
6.3	Vendor must compulsorily quote the quantity exactly as per the Scope of supply. No reduction in quantity as per the above Scope of supply is permissible.				<u>Information to bidder</u>

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