

ANNEXURE – I

Scope of Supply:

3 Phase, DIGITAL AC DRIVE -- 7.5 KW, 11 KW & 45KW

The Digital AC Drive of SIEMENS / ABB / YASKAWA / MITSUBISHI / SCHNEIDER ELECTRIC / HITACHI/ALLEN-BRADLEY/FUJI ELECTRIC/BAUMULLER/DELTA make only and its detailed specification as follows:

SPECIFICATION:

- 1) Input supply : 415V AC $\pm 10\%$, 3 phase, 3 wire, 50 Hz $\pm 2\%$.
- 2) Mode of control : Bi-directional fully controlled 3-phase AC.
- 3) Speed regulation : 1 % of base speed through tacho/encoder Current feedback.
- 4) Braking : Dynamic Braking with Chopper unit (EXT/Inbuilt) or Regenerative Braking
- 5) Acceleration time : 0.1 to 1000s or better.
- 6) Deceleration time : 0.1 to 1000s or better.
- 7) Programmable control connections:

7.1 Two analog inputs:

7.1.1 One Voltage signal: 0 to 10 VDC

7.1.2 One Current signal: 4 to 20 mA or One Voltage signal: 0 to 10 VDC.

7.2 Two analog outputs: 0-10 VDC, $\pm 3\%$.

7.3 Six digital inputs: 12 to 24 V DC with internal or external supply.

(External Supply will be in BHEL Scope)

7.4 One relay output: Contact rating of relay is 24V DC, max 250 mA.

7.5 Two Digital Outputs: 24V DC, max 250mA.

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Features of Drive

Features of drive should be as follows:

- a) It must be capable of bidirectional operation with dynamic braking with using inbuilt/External chopper unit or regenerative Braking unit.
- b) It should have automatic torque boost capabilities with starting torque of 150% at 1Hz, V/F ratio should be adjustable to match the torque requirements.
- c) It must have all standard protections like stall protection, instantaneous power failure, single phasing, over voltage, under voltage, over current, inverter overload, thermal overload etc. All faults and operating conditions must be displayed on suitable seven segment /alpha-numeric display.
- d) It must have auto tuning facility. This must enable perfect matching of motor coupled to load with regards to optimum acceleration time, deceleration time, speed amplifier, current amplifier, output torque control etc.
- e) Suitable drive mounted programmer for tuning & programming should be provided on drive.
- f) It must have automatic voltage regulation function to maintain high starting torque even at reduced voltage.
- g) Suitable Drive programming software along with necessary connecting cable and adapter for connection with LAPTOP and drive should be provided to get online with the offered drive (Laptop not in scope). At least one no. cable /adapter to be supplied for connecting the offered drive.

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ANNEXURE – II

Scope of Supply:

3 Phase, DIGITAL AC DRIVE -- 110KW & 160 KW

The Digital AC Drive of SIEMENS / ABB / YASKAWA / MITSUBISHI / SCHNEIDER ELECTRIC / HITACHI/ALLEN-BRADLEY/FUJI ELECTRIC/BAUMULLER/DELTA make only and its detailed specification as follows:

SPECIFICATION:

- 1) Input supply : 415V AC $\pm 10\%$, 3 phase, 3 wire, 50 Hz $\pm 2\%$.
- 2) Mode of control : Bi-directional fully controlled 3-phase AC.
- 3) Speed regulation : 1 % of base speed through tacho/encoder Current feedback.
- 4) Braking : Dynamic Braking with Chopper unit (EXT/Inbuilt) or Regenerative Braking
- 5) Acceleration time : 0.1 to 1000s or better.
- 6) Deceleration time : 0.1 to 1000s or better.
- 7) Programmable control connections:

7.1 Two analog inputs:

7.1.1 One Voltage signal: 0 to 10 VDC

7.1.2 One Current signal: 4 to 20 mA or One Voltage signal: 0 to 10 VDC.

7.2 Two analog outputs: 0-10 VDC, $\pm 3\%$.

7.3 Six digital inputs: 12 to 24 V DC with internal or external supply.

(External Supply will be in BHEL Scope)

7.4 One relay output: Contact rating of relay is 24V DC, max 250 mA.

7.5 Two Digital Outputs: 24V DC, max 250mA.

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Features of Drive

Features of drive should be as follows:

- a) Offered AC Drive should be suitable for Heavy duty operation and Crane operation.
- b) It must be capable of bidirectional operation with dynamic braking with using inbuilt/External chopper unit or regenerative Braking unit.
- c) It should have automatic torque boost capabilities with starting torque of 150% at 1Hz, V/F ratio should be adjustable to match the torque requirements.
- d) It must have all standard protections like stall protection, instantaneous power failure, single phasing, over voltage, under voltage, over current, inverter overload, thermal overload etc. All faults and operating conditions must be displayed on suitable seven segment /alpha-numeric display.
- e) It must have auto tuning facility. This must enable perfect matching of motor coupled to load with regards to optimum acceleration time, deceleration time, speed amplifier, current amplifier, output torque control etc.
- f) Suitable drive mounted programmer for tuning & programming should be provided on drive.
- g) It must have automatic voltage regulation function to maintain high starting torque even at reduced voltage.
- h) Suitable Drive programming software along with necessary connecting cable and adapter for connection with LAPTOP and drive should be provided to get online with the offered drive (Laptop not in scope). At least one no. cable /adapter to be supplied for connecting the offered drive.

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