

DEPARTMENT OF ELECTRICAL ENGINEERING  
INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY,  
SHIBPUR, HOWRAH-711 103.

No. 87/2018/EE-3/21(KM)

Dated: 26/12/2018

*From :* The Head of the Department,  
Electrical Engineering,  
IEST, Shibpur, Howrah-711 103

*To :* Enlisted vendors of the institute and other interested parties/ For Website Tender.

Dear Sir(s),

Sealed quotations are invited for supply of the following item(s) within **21 days** from the date of publication of this advertisement in the website. The quotation should include the 5% GST only as per institute rule, delivery charges, entry tax if any, etc. to Department of Electrical Engineering, Indian Institute of Engineering Science and Technology, Shibpur and should mention a firm delivery period. Preferences will be given to the suppliers who can supply ex-stock.

The vendors, who are not enlisted in the Institute register, should submit the copies of their valid Trade License, GST registration, PAN, latest Income Tax / Sales Tax Statement /Return, SSI/MSME certificate, if any etc. and any other commercial credentials. The institute will provide concessional GST rate certificate with the purchase order and will pay 5% GST only.

*Yours faithfully,*



Please put your digital/scanned signature  
Signature of the indenting Officer/  
Concerned Faculty Member



*Prof. & Head of EE Dept.*  
IEST, Shibpur, Howrah – 711 103

Item No.:    Specifications

**PEL#4:    Inverter kit – 1 set**

A three leg MOSFET based H-Bridge inverter kit is required having the following important features:

- 1) The kit will be powered from 230V, 50 Hz., single phase AC mains
- 2) The kit should have a single phase 50 Hz. 230V/45V, 500VA transformer at the input. It will feed a full wave diode bridge rectifier at its input with DC link capacitors, followed by the 3-phase bridge inverter stage. It should have a suitable NTC at the diode rectifier input to limit the inrush current for every starting. Diodes of the bridge rectifier should be at least 12A, 300V capacity and with suitable snubber. DC bus voltage will be around 62V nominal. DC link capacitor bank should be at least 2200 $\mu$ F, 250V (working) with total ripple current rating of at least 12A. Bleeder resistors should be provided. Inverter MOSFETS should be each 20A, 300V. High frequency snubber capacitors to be provided across MOSFETs. Busbar layout should be

optimized to ensure minimum stray inductance. The inverter devices should have short-circuit and under-voltage protection features, LED based indication should be available to the user under such cases and system should be hard-reset in such cases and should be again manually started after fault clearing. Suitable dead-times to be implemented through hardware to have protection against DC bus shoot-through.

- 3) The three phase inverter will be loaded with star-connected R-load (10-20 ohms in star) and R-L load (10-20 ohms, 5A resistor with 5A, 20mH/30mH inductor) – **load is NOT to be provided by vendor but some idea is given here to vendor for arriving at the ratings of the elements of the inverter power stage.**
- 4) Two legs of the same three phase inverter may sometimes be utilized to use it as a single phase H-bridge inverter also.
- 5) The switching frequency should be set at a fixed value in and around 5 kHz. The inverter should have the capability to operate under sinusoidal pulse width modulation strategy (under-modulation/over-modulation) or in square wave mode (180 degree conduction). The amplitude modulation ratio should be settable at some fixed settable values from 0.1 (with a POT/keypad) in under-modulation zone to high values for over-modulation/square wave zone. The fundamental frequency of the inverter should be controllable and settable at some settable fixed values between 30 Hz and 70 Hz with a POT/keypad.
- 6) A 'select' key should be provided so that the user can select the inverter to either be used as a 3-phase inverter or a 1-phase H-bridge inverter. When used as a single phase H-bridge inverter, options should be given to select either a unipolar sine PWM mode of operation or a bipolar sine PWM operation.
- 7) The driver stage should be supplied from an isolated power supply. The driver stage with proper electrical isolation should be properly designed and built/connected inside with overload, short circuit and driver power supply under-voltage protection features. The (isolated) control circuit ground terminal, the 6 switching signals for the MOSFET/IGBT with respect to the control circuit ground and the gate-cathode/emitter terminals of the MOSFET/IGBT should be all brought out through proper terminals in the front panel of the kit for access by the user for viewing waveforms. A separate switch, fuse, indicating LED/light along with plug and wires should be there in the kit which would power up the control and driver circuit. This power should be drawn from single phase 230V, 50 Hz utility available at user's premises.
- 8) The three inverter output terminals, DC bus terminals and the front-end transformer input terminals (10A) with lock nut facilities should be available to the user.
- 9) The whole kit should be housed inside a rugged enclosure with at least one face made up of transparent material so that user can physically see the components inside. The front panel/face of the kit should be made out of a hard material and should have a silk-screen printing based drawing of the power and control circuit of the inverter with terminals, as mentioned earlier.
- 10) There should be 5A glass fuse-based protection at the output and 4A glass fuse based protection at the input of the kit.
- 11) The offer from the vendor should be such that the customer gets a conviction that the vendor has technically performed some system engineering and preliminary design behind framing his/her offer. Upon receipt of the offer from the vendors, before deciding their technical compliance, they might be called by the customer for a presentation followed by a question/answer session to assess the technical capability of the vendor and to understand whether the vendor has understood the customer's requirements properly.

**Warranty requirements: 1 year at least.**