

**Electrical Engineering Department,
Indian Institute of Technology Delhi**

Date:29-04-2013

NIQ for purchase of “ Three-level Voltage Source Converter”

Sealed quotations are invited for purchase of three in number “Three-level Voltage Source Converter” with the following specifications:

DC bus rating	1000 V
DC link capacitance	Nominally around 3000 μ F
AC output voltage	415 V
AC output current	35 A
Output frequency	50 Hz
Switching frequency	20 kHz
Output power	25kVA
Type of cooling	Forced air cooling(1 phase Fan)
Snubbers for switch	Required with proper design for proper function of system
Thermal protection	Required (set according to safe operation of devices)
Gate driver specifications.	<p>Supply +15 V 0 V(nominal) Supply current nominally less then 100mA Input signal voltage levels for on/off typically +15/0 V respectively Input threshold voltage nominally 12.5 V(high),4.5 V(low)</p> <p>Internally isolated grounds 14 A peak current driving capacity Maximum average current of 200mA per leg(4 IGBT) Operating temperature -30 to 80 °C Maximum switching frequency 40kHz collector emitter voltage sense across the IGBT 1600V dV/dt typically 45 KV/μs Output-turn on gate voltage 15 V w.r.t. emitter. Output-turn off gate voltage -7 V w.r.t. emitter. Internal dc-link dead short circuit protection. Device short circuit current protection.(V_{ce} protection) Operating temperature -35 to 80°C Turn on and off propagation delay not more than 2μ seconds MTBF 10⁶ hrs</p>
IGBT module specification	<p>All the switches in one leg (4-IGBTs with inverse diodes and 2 freewheeling diodes) should be in a single module. V_{ces} at T_j 25°C 1200 volts The collector current rating IGBT (I_c) at T_j 175°C (T_s 25°C 200 A T_s</p>

	<p>70°C 165 A with I_{CRM} 500 A) Typical IGBT time parameters $T_{don}=175ns, T_r=50ns, t_{doff}=425ns, T_f=100ns$ $di/dt_{on}=5000A/\mu s$(IGBT typical) $di/dt_{off}=1800A/\mu s$(IGBT typical) V_{GE} range ± 20 V On resistance of switch maximum $7m \Omega$ at T_j 25°C and $8m \Omega$ at T_j 150°C($V_{GE}=15V$) V_{CEO} maximum 1V at T_j 25°C and .9V at T_j 150°C Inverse diode current rating T_j 175°C (T_s 25°C 175 A T_s 70°C 140 A with I_{FRM} 500 A) V_{FO} for inverse diode maximum 1.2V at T_j 150°C and 1.6V at T_j 25°C Clamping diode current rating T_j 175°C (T_s 25°C 175 A T_s 70°C 140 A with I_{FRM} 500 A) V_{FO} for clamping diode maximum 1.2V at T_j 150°C and 1.6V at T_j 25°C $R_{th(j-s)}$ not more than 0.4K/W for both types of diode</p>
Packaging	<p>Enclosed in transparent acrylic sheets with all salient power terminals (Three terminals of DC bus and three-terminals of three-phases)available for connection with standard banana connrctors. Terminals for connecting 1-ph input to cooling fan. Terminals for connecting +15V bias supply for gate drivers. Terminals for connecting all gate inputs with isolated +15V and ground.</p>
DC bus structure	<p>Sandwiched plated DC link structure.</p>

Where T_j is junction temperature and T_s is heat sink temperature

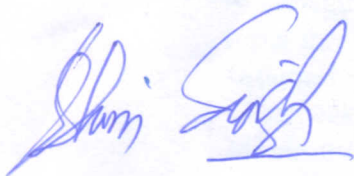
TERMS & CONDITIONS

1. Please submit the TECHNICAL and FINANCIAL bids in separate sealed envelopes. Mark the two envelopes clearly as "Technical Bid" and Financial Bid". Both the sealed envelopes should be sent in a single sealed envelope, with clearly marked as "NIQ for 3 level inverters". The quote should reach the following address on or before **13/05/2013 upto 5:00 PM.**

Name : Prof. Bhim Singh
Address : Professor, Room No. II-118,
Deptt. of Electrical Engineering,
Indian Institute of Technology, Delhi
Hauz Khas, New Delhi-110016 (India)

2. Please quote prices at FOB/ CIF New Delhi, inclusive of installation charges.
3. Quote should be in Indian Rupees or in US Dollars (if imported item) and to valid for at least three months.
4. Attach all the technical literature and a list of similar installations done in India.
5. **A technical compliance chart of the quoted product mentioning technical specification of quoted product verses asked specification is compulsory. Attach the compliance chart with technical bid.**

6. Mention the warranty period. Also mention if there are additional prices for on-site warranty.
7. Mention if you can provide any technical support like training of IIT Delhi personnel at IIT Delhi or in your factory and providing a technical person for operation of the machine for the initial period of 2 years. Kindly mention about this in technical bid.
8. If the quote is being submitted by the representative of the Principals/manufactures themselves, a valid Agency ship/Dealership Certificate authorizing the agent to quote to IIT Delhi on behalf of the Principals should be enclosed.
9. The Institute reserves the rights to accept/reject any/all quotations without assigning any reasons thereof.
10. Complete set of manuals for the operation and servicing of equipment should be given. All circuit diagrams, other mechanical and electrical schematics must be provided to Main unit, sub systems and accessories.
- 11. Delivery as early as possible in weeks on receipt of PO.**
12. Clearly specify the installation requirements – such as space, power, frequency, environment (Temperature and humidity) etc.
13. If the items quoted are proprietary in nature, please enclose proprietary certificate from the principals stating “Certified that ----- is a proprietary item of M/s ----- and no other manufacture make these items”.
14. If the bidder is Indian agent, the agency certificate should be enclosed.
15. Please produce compliance certificate for the specification.
16. Please ensure that the Indian agent has been enlisted with the Department of Expenditure, evidence may please be attached.
17. All bank charges payable in India are to buyer’s account and bank charges in seller’s country to seller’s account.



(Principal Investigator)



(Chairman, Purchase Committee)

