

Expression of interest(EOI) on Shore power supply

VISAKHAPATNAM PORT TRUST

BUDGETARY OFFERS ARE INVITED FOR “ SUPPLY, INSTALLATION, TESTING, COMMISSIONING OF ELECTRICAL FACILITIES FOR COLD IRONING (SHORE POWER) TO VESSELS CALLING AT WQ 7 & 8 BERTHS OF VISAKHAPATNAM PORT TRUST.

1. GENERAL:

VISAKHAPATNAM PORT TRUST proposes to Provide Cold Ironing (Providing shore power) to the vessels berthing at WQ 7 & 8 Berth of Visakhapatnam Port Trust.

2. SCOPE OF WORK

Design, manufacture Testing and commissioning of on shore supply for ships berthed in WQ 7 & 8 Berth of Visakhapatnam Port Trust. The work mainly consists of the following

- i. Supply & Erection of Static Frequency Converter
- ii. Supply & Erection of 500KVA Isolation Transformer
- iii. Supply & Erection of Junction Box with Plug & enclosures for feeding power supply to Ships
- iv. Supply and laying of 3X185Sqmm Copper XLPE LTUG cable for interconnecting the above system with suitable termination. Laying of cable in trench from transformer to Junction Box
- v. Civil works such as removal & re-fixing of cable trench slabs, fixing of junction box with plug near to wharf pit

The scope of work broadly described herein and assigned to Contractor, in their area of responsibility is inclusive of all other services required in connection with the completion of work whether specifically mentioned herein or not will not entitle the Contractor to charge any additional fees in as much as the same are included in the overall professional fees payable to them.

A.TECHNCIAL PARAMETERS 500 KVA SFC (STATIC FREQUENCY CONVERTER)

a) GENERAL

1. Rating 500 KVA
2. Make: ABB/SIEMENS
3. Enclosure IP rating IP 42
4. Pollution degree rating 2
5. Operating Temperature 0 °C to 40 °C
6. Cooling Forced Air
7. Temperature De-rating
8. Above 40 °C, derate by 2%
9. load per °C to a maximum of 50 °C
10. Humidity < 95% non-condensing
11. Noise 75-85 dBA typical
12. Electromagnetic Compatibility CISPR 11 class A
13. Enclosure Materials Electro-galvanized Steel
14. Colour RAL 7035
15. Panel Thickness – Sides & Rear Panels (1.5mm, 2mm)

16. Enclosure Access Hinged doors with

key lock

b) INPUT

1. 1 Type IGBT Based
2. 2 Voltage 208-480 V $\pm$ 10%
3. 3 Power System 3-Phase TN
4. 4 Frequency 50 Hz or 60 Hz
5. Frequency Range $\pm$ 5 Hz
6. Max. Continuous Voltage 110%
7. Overload Capacity 150% for 30 seconds
8. Overvoltage Category III
9. Efficiency 95% Typ
10. Current Harmonics <3% THDi (at rated load)
11. Power Factor Unity (adjustable)

c) OUTPUT

1. Capacity Rating 500 KVA
2. Voltage 480 V
3. Frequency 60 Hz
4. Voltage Harmonics < 2.5% THDv (linear load)
5. Overload Capability 120% for 10 min*
6. 150% for 30 s
7. Short Circuit limit 200% for 2 s
8. Voltage Accuracy $\pm$ 1%
9. Frequency Accuracy $\pm$ 0.1%

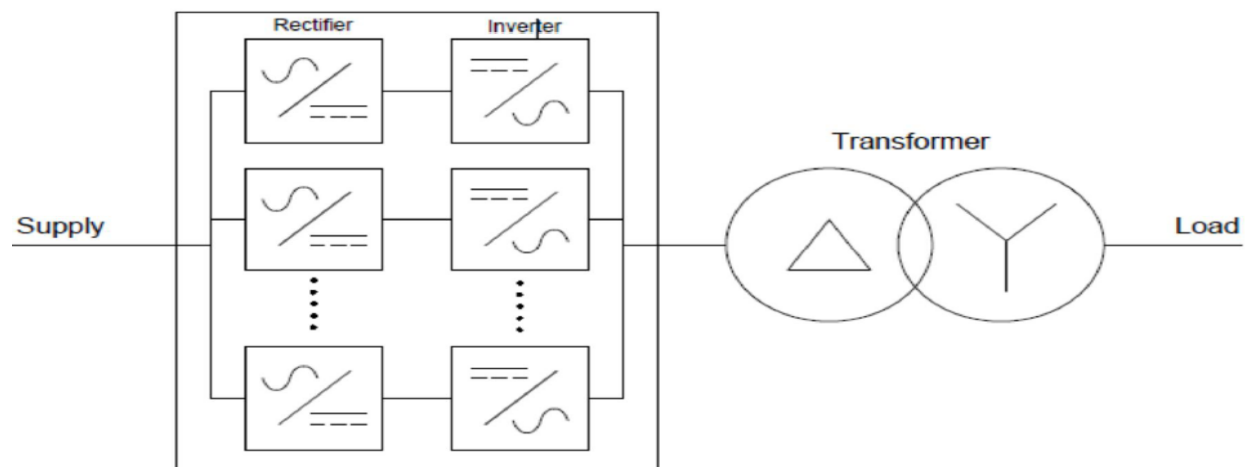
d) STANDARDS

1. ISO 90001 Quality Assurance system
2. IEC62103 / EN 50178
3. CE Mark

1. General Description

The Static Frequency Converter, SFC, allows connection of 60Hz powered equipment To 50 Hz supply network and 50Hz powered equipment to 60Hz supply network. The system functions by converting the input AC power through sine wave rectifier to DC link and then through an AC sine wave inverter to produce clean, full sin wave output at the new frequency and voltage.

SFC Connection Details:



2. Power Electronics:- The SFC system should be constructed using power electronic

modules. These state Of the art modules operate as rectifiers to source sinusoidal current from the supply, and inverters to reproduce the AC wave forms on the output.

3.User Interface:- The primary user interface should be via door mounted touch screen Graphical Display Module(GDM).The display is intuitive and is navigated by touching on the Desired menu buttons.

4.Four Quadrant Operations:- SFC should be capable to operate in four Quadrant, i.e., power flow should be Bi directional.

5.Event Log: SFC should have an event log facility.Maximum of 5000 events should be able to Download through front panel.

6.MODBUS TCP:- MODBUS TCP connection should be provided with SFC converters fitted with the GDM user interface. Connection is via an Ethernet cable to the Ethernet port on the Bottom of the GDM.

7.Remote Synchronizing Feature:- The SFC should connect to live AC bus using its in-built synchronizer. This allows Uninterrupted power to an AC bus while transferring from alternate AC sources such as stand by generators to the SFC.

8. Rectifiers Inverters:- Considering the redundancy SFC should be constructed using pairs of rectifier and Inverter power modules (module pairs). The rectifier modules convert the incoming Three phase AC voltage into regulated DC voltage. The DC voltage is then supplied To the inverter modules to be re-created into AC voltage at different frequency. These modules should behave independently. That is, if one module fails, it will automatically be with drawn from service while the remaining modules continue to run. This provides redundancy (at reduced capacity) and very high availability.

9.Power Module redundancy Feature :- One unique feature critical to the reliability of the converted output supply is the built-in redundancy capability which is an intrinsic feature of the modular system design. In an unlikely event where either single rectifier or inverter module Encounters fault and stop functioning, the master controller that oversees the rectifier/inverter module pairs will reduce the output capacity to the available Remaining working rectifier/inverter module pairs. This reduction of capacity is transparent as typically the converter is not running at full load. The load will not be shed, but it will be transferred seamlessly to the remaining module pairs in the converter. rectifier module failure will result in the controller automatically transferring the load to the remaining pairs of rectifier/inverters. Advanced Redundancy feature required to improve power electronics reliability and availability improvements. Reduces power output in failure only by small fraction of the total system Power Allows flexible planning of converter repair/faulty module replacement.

10.Parallel load sharing:- SFC should be flexible with regard to paralleling with other voltage sources, either other generators or multiple SFC units. Parallel load sharing should be achieved using frequency and voltage droop profiles programmed into the converter. This allows the inverters to share power with other systems without the need for any additional communication signals. In addition SFC converters of different power ratings can be paralleled, with each one delivering the same percentage of its rated power as required by the load

11.Power Flow Control :SFC should have advanced power flow control ability to control the power flow from One AC grid to another AC grid.

12Automatic Output Synchronization: Where two or more SFC units are paralleled together, or the SFC is connected to an AC bus with other generators, starting the SFC into the live bus should be simplified Through automatic output synchronization feature. Using this feature whenever an SFC is commanded to run it will first check its output to see if

there is live bus Connected (for example when changing from generator supply on board

vessel to SFC supply). If the output of the SFC is live, then the SFC controller will first phase Lock to this exact voltage and frequency before enabling the inverter modules. This Enables full seamless transfer from generator supply to SFC supply on the output bus. If the output bus is dead when the SFC is given start command it should ramp up the voltage over second, providing soft energizing of the output.

13.Remote Synchronization:- In addition to the automatic output synchronization feature the SFC should also have Dedicated voltage sensing input to allow the converter to synchronize its output to Any other three phase voltage reference. This feature is particularly useful where Two separate busses must be synchronized before connecting them together i.e. Closing bus tie breaker on vessel switch board.

14.Output Short Circuit Protection:- Should short circuit occur on the SFC output the converter automatically provides Current limiting to 200% of nominal current for seconds. This allows Discrimination with down stream protection. If the fault is still present after seconds the SFC should trip off line to avoid damage.

15.Shore to ship (Converter on harbor side):- When supplying power to berthed vessels, it is necessary for the SFC to have an output transformer. The transformer will not only provide voltage matching and Isolation of the common mode voltages generated by the converter but also very Importantly galvanic isolation for the ship from the shore earth. The isolation is required to eliminate earth currents that cause galvanic corrosion between the ship's hull and other metal objects.

B.TECHNCIAL PARAMETERS TRANSFORMERS

1. KVA : 500 KVA
2. Make: ABB/SIEMENS
3. Type of Cooling Forced Natural Air Cooled
4. Construction CRGO Mitered core joints with four blade system
5. Phases 3 Phase
6. Input Voltage 750 KVA: 480 V, +/- 5 %
7. Input Frequency 60 Hz +/- 3 %
8. Output Voltage 500 KVA: 480 V, +/- 5 %(Isolation Transformer)
9. Output Frequency 60 Hz +/- 3 %
10. Maximum output current 500 KVA: 600 A
11. IR Value >200 M
12. Di-Electric Strength 4 KV per 120 Seconds
13. Leakage Current < 20 Amps
14. Impedance Voltage 4-5 %
15. Regulation 4-5 %
16. Loss per Kg < 1.5 Watts at 1.7 Tesla
17. No Load Losses 500 KVA: <0.8 %
18. Load Losses 500 KVA: <1.2 %
19. Max. Ambient Temp 50 deg C
20. Efficiency 500 KVA: >98 %
21. Linear Harmonics attenuation 100 %
22. Duty Continuous
23. Class of Insulation Class „H“
24. Services Indoor Application
25. Method of Winding Multiple parallel to reduce skin effect
26. Degree of IP IP-20
27. Dimension & Weight Will be submitting at after order confirmation

C.TECHNCIAL PARAMETERS JUNCTION BOX

POWER UNIT AMP

Make: ABB/SIEMENS/CAVOTEC

1) Junction Box (Power Unit) with Plugs:

- Cabinat in 3mm stainless steel 316,813x1216x762mm incl cover holded with 8 bolts.
- Socket at one end. Hole opening at bottom 2pcs 75mm.

2) Terminal block for incoming pilots

- 2 pcs unistrut support as and u-bam cabled between terminal block and pilots with 2,5mm 2 cable connction terminal ground, M10 bolt mounjted on mounting plate
- 1 pc socket type PC5-VX04-K18523-MT1 or equivalent model 3X340A+E+3p/7.2KV. Key way at 12H, Blue, with Kriklock
- 1 pc socket type PC5-VX04-K18523-6MT0 or equivalent model 3X340A+E+3p/7.2KV. Key way at 6H, Red, with Kriklock
- Heating resistance
- Mechanical interlocking through Kriklock one on each PC5 socket or equivalent model
- F0 junction Box 2X4 ch multi-mode
- 2pcs 4ch FO plug with lead, premounted.
- IP 66

3) PC5 plugs for above AMP power unit

- 1pcs PC5 SX04-K18503F0-6MT0 or equivalent model , Plug X5 3x360A+E+3p/7.2 kv,185 mm2 phase cable,95mm2 earth, with crimp terminal, straight bell, push & pull, 4ch FO, Red anodixzed and clearcoated, Keying 6 o'clock
- 1pcs PC5 SX04-K18503F0-MT1 or equivalent model , Plug X5 3x360A+E+3p/7.2 kv,185 mm2 phase cable,95mm2 earth, with crimp terminal, straight bell, push & pull, 4ch FO, blue anodixzed and clearcoated

Sl	Description of work	Qty	Unit	Rate	Amount
1	Supply of 500 kVA Static Frequency Converter of M/s. ABB make: PCS100-03-04E/F-BE 500 kVA or equivalent M/s. Siemens make	1	set		
2	Supply of Output Isolation Transformer 500 kVA, 3Ph 50Hz, Input 480V, Output 440 V. Make: M/s.ABB or M/s. Siemens	1	set		
3	Supply of Cavotec make PC5-AX04-K1858/B Junction Box with Plug or equivalent M/s. Siemens or M/s. ABB make	1	set		
4	Supply and laying of 3X185 sqmm Cu XLPE LT UG cable in cable trench	500	mtrs		
5	Erection and commissioning of the above installations including all Civil works such as removal & re-fixing of cable trench slabs, fixing of junction box with plug near to wharf pit.	1	Job		

Note:

- a) The Tenderer shall furnish budgetary offer for all the items mentioned
- b) The Tenderer shall visit the site and get acquainted with the topography and accordingly furnish their budgetary offer. The Budgetary offer shall be submitted on or before 15.02.2021.
- c) For further details, the Tenderer shall contact the Superintending Engineer (Electrical), Administrative Office Building, Visakhapatnam Port Trust, Visakhapatnam-530035,. Phone No 0891-287-3404/3193, 9948298323, email: cme.pkr.vpt@gov.in, kamaraju_pandiri@yahoo.co.in**
- d) The sealed Budgetary offers will be received by the Chief Mechanical Engineer, Visakhapatnam Port Trust, Visakhapatnam-530035 on or before 07.01.2021. The offers shall also be received through above mail IDs.

Sd

Superintending Engineer (Electrical),
Administrative Office Building,
Visakhapatnam Port Trust,
Visakhapatnam-530035