3kV-380 220V HIGHT INPUT VOLTAGE INVERTER

Solid state converter for testing passenger coaches.

The purpose of the converter is to provide an alternating sinusoidal stabilized voltage with a low harmonic distortion, at 400Vac 50Hz.
The converter is composed by a three phase IGBT inverter fed directly by the 3kVdc voltage.

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1. DESCRIPTION

Main components:
1) Input filter. It has the following functions:
- Reducing the input surge at the converter;
- Reducing the input voltage harmonic distortion in order not to disturb the signalling circuits;

The input contactor, with the relative ground equipment, has to be installed outside.

2) 24Vdc auxiliary battery voltage power supply;
It provides two stabilized voltage to +12 –12Vdc to supply the control logic and a alternating voltage 70V-40kHz to supply inverter driver cards.

3) Control logic:
It provides the control signals to the inverter driver cards, in order to supply a three phase alternating sinusoidal and stabilized voltage in all conditions, with load variations and with voltage sags. The control logic assures all operations regarding the start up and shutdown procedures and protection of the apparatus against input overvoltage and output overload.

4) Inverter bridge:
It is composed by a IGBT Greatz bridge type with PWM three-phase regulation with a frequency modulation of 600Hz: this value optimise the invert losses and meanwhile it gets a good output waveform. The insulation between the control logic and the drivers is obtained with optical cables.

5) Transformer and filter capacitor:
The output voltage of the bridge is an PWM alternating voltage at three steps. The transformer fits the value of the bridge output voltage at the value of the converter output voltage creates the input/output insulation and realizes the inductive part of the output filter. The output filter reduces the harmonic content of the output and limits voltage deviations under step load conditions.

6) Output converter unit:
The converter is configured for both three phase and single phase outputs. To protect the users, two output circuit breakers are configured. The converter is provided by a by-pass switch which allows to feed the output from an external mains at 400Vac 50Hz (service point) when the coach is in maintenance.

2. TECHNICAL DATA

2.1 – INPUT PARAMETERS (DC VOLTAGE)

- Input voltage [Un]: 3000Vdc
- Minimum continuous voltage [Umin1] : 2000Vdc
- Minimum voltage for 10 minutes [Umin2] : 1800Vdc
- Maximum continuous voltage [Umax1]: 3600Vdc
- Maximum voltage for 5 minutes [Umax2] : 3900Vdc
- Maximum inrush voltage : 4050Vdc
- Input overvoltage :

  14kV for 1 msec. [Umax4]
  5075V for 20msec. [Umax3]
  4050V for 2 seconds [Umax2A]
- Test atmospheric pulse voltage (EN 50124-1): 18kV

2.2 - OUTPUT PARAMETERS

- Output voltage : 400Vac 3Ph+N
- Continuous output current: 60 A
- Overload: 125% for 10 minutes
  200% for 1 minute
- Static stability: ± 5%
- Output frequency: 50Hz ± 1%
- Phase voltage symmetry: 120° ± 1°
- Voltage harmonic distortion (THD) at linear load: 5%
- Maximum dynamic stability: ± 10%
- Recovery time: 40 msec.
- Insulation resistance at 1000Vdc: > 10Mohm
- Dc input and output dielectric strength: 12.000V 50Hz for 60 sec.
- Efficiency: > 86%
- Noise level: < 70dBA
- Maximum insertion time: 15 sec. (programmable)

2.3. – PROTECTIONS

- Overvoltage
- Internal hight temperature
- Overload
- Short circuit
- Soft start

2.4 - ENVIRONMENT CHARACTERISTCS

- Operating temperature: -25 / + 50°C
- Maximum relative humidity: 100% (no condensing)
- Maximum Altitude: 1400 meters
- Dust granulemeters (variable composition with the presence of metallic granules):
  From 80 to 200um: 10% in weight
  From 0 to 80um: 90% in weight
- Pushes or vibrations: according to IEC 61373
- Protection class: IP 22

2.5 - SYSTEM PARAMETERS

- Mechanical assembly: 180157
- Dimensions: Width : 900mm
  Depth/length 750mm
  Height: 1805mm
- Weight: 450kgs
- Bottom and top fastening
- Access for maintenance and repairs: front
- Cabinet in sheet-iron with synthetic furnace painting
- Colour: grey RAL 7001
- Cooling: Natural

2.6 - EMC - Electromagnetic Compatibility

- D.L. 615/96 (conform to the following directives: 89/336/EEC, 92/31/EEC, 93/68/EEC and 93/97/EEC

2.7 – ELECTRICAL CONNECTIONS

- Input line 3000Vdc: M8 screw
- Battery: connector
- 380V output: connector
- 220V output: connector
- Input service tap: connector

2.8 – LOCAL CONTROLS

switch at three positions 1-0-2

- pos. 1: CONNECTED
- pos. 0: OFF
- pos. 2: PREDISPOSITION TO REMOTE CONNECTION

2.9 – SIGNALLING

- BATTERY INPUT : ok
- 3000Vdc INPUT: 0k
- 380V OUTPUT: 0k
- 220V OUTPUT: ok
- FAULT