



IGBT based **Traction Converter**

for new generation Diesel / Electric locomotive,
EMU, DMU and Metro applications

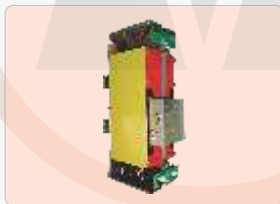
Medha supplies IGBT based traction (propulsion) converters ranging from 1.1 MW upto 4.5 MW and higher power ratings for installation on AC-AC traction vehicles including Locomotives, DMUs, EMUs and Metros.

Medha's traction converters are designed to suit project requirement including building of new traction vehicles and retrofit or modernization or replacement of old (GTO or Thyristor) converters with IGBT traction converters.

- ✔ Proven-in-use modules, packaged to meet space and weight restrictions
- ✔ Mild Steel (MS), Stainless Steel (SS) or Aluminum (Al) enclosures with IP54 or better protections
- ✔ Individual motor or bogie control
- ✔ Under-frame or on-board mounted, light weight solutions
- ✔ Energy efficient solutions
- ✔ In-built redundancy and reliability for improved availability
- ✔ Forced air or liquid cooled
- ✔ Customized for input from Alternator, Transformer winding, or Third Rail supply (600 to 750 Vdc)

Customized traction chain solutions for new vehicles

- Propulsion system designed as an integrated system and integral to vehicle design
- Cost effective solutions to keep overall vehicle cost competitive
- Designed to suit vehicle performance requirements, weight limits and cooling requirements
- Low life cycle cost
- EMI/EMC Homologation
- Latest technology and best in class features



IGBT Module
(water cooled)



IGBT Module
(air cooled, heat pipe technology)



IGBT Module
(air cooled)



Traction Control Computer

Upgrade Thyristor / GTO based traction to IGBT systems

(retrofit solutions for locomotives, DMU and EMU)

- Gives new life (20 years or more) to old vehicles
- Resolves spare parts availability problems
- Overcomes technological obsolescence issues
- Economize by retaining healthy equipment
- Extended warranties and other after sales support schemes
- Customized solutions to suit existing vehicle design, space and weight criteria
- Improved reliability, availability and performance of old vehicles
- Proven-in-use modules & sub-system



3 MW Traction Converter
(forced air cooled) for
4500 HP Diesel Locomotive



5.1 MW Traction
Converter (water
cooled) for 6000 HP AC
Electric Locomotive



1.3 MW Traction
converter for
Electric Multiple Unit
(EMU)



2.88 MW (underslung)
Traction Converter for
Electric Multiple Unit (EMU)



830 kW Traction Converter
(forced air cooled) for
Metro Train



1 MW Traction Converter (forced
air cooled) for 1600 HP Diesel
Multiple Unit (DMU)

Traction Inverter Technology

Traction Inverter drives/brakes one (independent motor control) or multiple (bogie control) Traction Motors. DSP is used for implementing Vector motor control using Space Vector PWM for complete VVVF control of traction motor in both motoring and dynamic/regenerative braking operation. Input power is typically taken from stable DC Link voltage (from diode rectifier or line converter) and torque command is received from locomotive control system.

Independent motor control typically used in locomotives has the advantage of better wheel slip control (better adhesion), better Tractive effort independent of wheel diameter variations and also better availability of locomotive power in cases of inverter or motor failures.

Medha uses IGBT devices in all Traction Inverters for better efficiency and reliability. Gate drive cards control IGBTs and protect them against various short circuit conditions. Optic fiber communication is used between Traction Computers (DSPs) and Gate drive cards for noise immunity. Various current, voltage and temperature sensors are used for monitoring and protection of both inverter and motor.

Line Converter Technology

Front end used in AC input power application (such as EMUs and Electric locos) is a multi-winding transformer feeding into IGBT based DSP controlled Line Converters. Total Harmonic Distortion due to switching of IGBT based Line Converter is controlled within limits to minimize impact of EMI on critical signaling equipment. Line converters work with unity power factor at input irrespective of motoring or regenerative braking modes.

Proven Solutions

	2200 HP Diesel Loco Retrofit/Upgrade Freight/ Passenger	4500 HP Diesel Loco Retrofit/Upgrade Freight/ Passenger	5500 HP Diesel Loco Retrofit/Upgrade Freight/ Passenger	1600 HP DMU Diesel Multiple Unit	6000 HP Electric Loco Freight/ Passenger	1.3 MW EMU Electric Multiple Unit	2.88 MW EMU Electric Multiple Unit	Metro Train
Configuration	1 Cabinet 6 Independent Traction Inverters	1 Cabinet 6 Independent Traction Inverters	1 Cabinet 6 Independent Traction Inverters	2 Cabinets 1 Traction Inverter each	2 Cabinets 2 Line Converters 3 Traction Inverters each	1 Cabinet 2 Line Converters 2 Traction Inverters each	4 Cabinets 1 Line Converters 1 Traction Inverters each	2 Cabinets 1 Traction Inverter each
Power	1650 kW 275 kW X 6 Inverters	3100 kW 520 kW X 6 Inverters	3900 kW 650 kW X 6 Inverters	1100 kW 550 kW X 2 Inverters	5100 kW 1275 kW X 4 LCs 850 kW X 6 Inverters	1152 kW 576 kW X 2 Inverters	2160 kW 540 kW X 4 Inverters	1100 kW 550 kW X 2 Inverters
Input	600 - 1800 Vdc Link From Traction Alternator Engine Driven	600 - 2600 Vdc Link From Traction Alternator Engine Driven	600 - 2700 Vdc Link From Traction Alternator Engine Driven	600 - 1800 Vdc Link From Traction Alternator Engine Driven	838 - 1547 Vac (1F) From Traction Transformer 4 Secondaries	630 - 1142 Vac (1F) From Traction Transformer 2 Secondaries	630 - 1142 Vac (1F) From Traction Transformer 4 Secondaries	500 - 900 Vdc From 3rd Rail Supply
Output	Up to 1375 Vac (3F), 275 kW	Up to 2030 Vac (3F), 520 kW	Up to 2090 Vac (3F), 650 kW	Up to 1375 Vac (3F), 550 kW for 2 motors	Up to 2185 Vac (3F), 850 kW	Up to 1375 Vac (3F), 576 kW for 2 motors	Up to 1375 Vac (3F), 540 kW for 2 motors	Up to 615 Vac (3F), 415 kW
Starting TE	387 kN	540 kN ^{Freight} 462 kN ^{Passenger}	560 kN ^{Freight} 462 kN ^{Passenger}	160 kN	520 kN ^{Freight} 320 kN ^{Passenger}	135 kN	200 kN 100 kN per motor coach	140 kN
IGBT	3.3 kV, 1200 A	6.5 kV, 600 A	4.5 kV, 900 A	3.3 kV, 1200 A	4.5 kV, 1200 A	3.3 kV, 1200 A	3.3 kV, 1000 A	1.7 kV, 1800 A
Cooling	Water Cooled	Independent Forced Air Cooling for each inverter heat pipe heat sink	Forced Air Cooling	Independent Forced Air Cooling for each inverter	Water Cooled	Forced Air Cooling	Forced Air Cooling	Independent Forced Air Cooling for each inverter
Type of Control	Independent Motor Control	Independent Motor Control	Independent Motor Control	Bogie Control one inverter for two traction motors	Independent Motor Control	Bogie Control one inverter for two traction motors	Bogie Control one inverter for two traction motors	Bogie Control one inverter for two traction motors
Enclosure, Mounting	Mild Steel On-board	Mild Steel On-board	Mild Steel On-board	Mild Steel Underslung	Stainless Steel On-board	Aluminium On-board	Stainless Steel Underslung	Stainless Steel Underslung

www.medha.com

MEDHA SERVO DRIVES PVT. LTD.



Design ▶ Manufacturing ▶ Maintenance



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