Hind Rectifiers Limited

PERFECTLY ENGINEERED POWER CONVERSION SYSTEMS

hirect.com

ABOUT US

Hind Rectifiers Ltd. manufactures a diverse array of Products ranging from Converters, Control Electronics, Transformers, Rectifiers, Inverters and Semi-Conductor Devices. These products are used for a variety of Industrial Applications and also used in Locomotives and Coaches by Indian Railways.

Established in 1958 in Mumbai, India in partnership with Westinghouse, Brake & Signal of UK; Hirect, is a pioneer in the field of Semiconductors and Traction Inverters. The key focus of Hirect, 60 Years later, continues to be on Technology and Innovation.

Inspite of having several Technology Partners around the world, Hirect has built its own R&D team comprising of Electrical, Mechanical, Software and Power Electronics Engineers and is developing high end, technical products completely in-house.

By using Dynamic Tools, Leading Edge Technology and Nonpareil Design complimented with the best industrial and operational practices such as 'Theory Of Constraints', Hirect has come a long way, establishing itself as a Market Leader and the bastion of Quality and Service.

Mumbai

Nashik

Dehradun Unit 1

Dehradun Unit 2

EQUIPMENT DIVISION

- Active Harmonic Filters
- Electro Static Precipitator Transformers with Compact Controllers
  - ESP Controllers ACE4NEXTGEN, HICON3, MAGNUMOPUS
- Constant Current Regulator
- Cathodic Protection Transformer Rectifier
- SMPS Rectifier Unit
- Water Cooled Rectifier
- Thyristor Controlled Rectifier

Active Harmonic Filters

- A harmonic filter is used to eliminate the harmonic distortion caused by appliances. Harmonics are currents and voltages that are continuous multiples of the fundamental frequency of 50 Hz such as 100 Hz (2nd harmonic) and 250 Hz (5th harmonic).

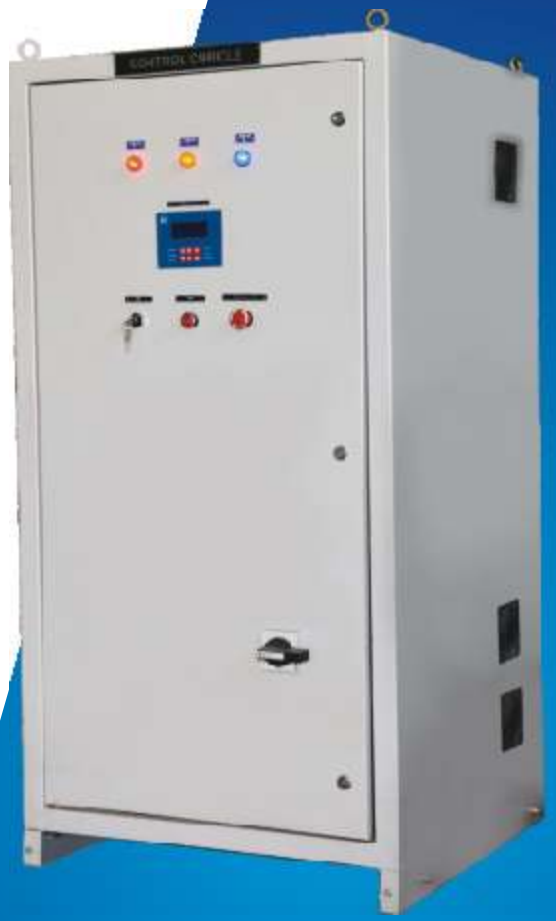
- An increasing number of loads are non-linear, introducing harmonics into the power grid and thus significantly impairing the power quality. An active harmonic filter that effectively reduces the unwanted harmonics

- Active Power Factor Correction also markedly diminishes total harmonics, automatically corrects for AC input voltage, and is capable of a full range of input voltage. Since Active PFC is the more complex method of Power Factor Correction, it is more expensive to produce an Active PFC power supply than PFC. Moreover PFC is improved the Power Factor, but PFC itself generating harmonic.

- Harmonics are caused by non-linear loads, that is loads that draw a non- sinusoidal current from a sinusoidal voltage source. Some examples of harmonic producing loads are electric arc furnaces, static VAR compensators, inverters, DC converters, switch-mode power supplies, and AC or DC motor drives.

Electrical Specifications

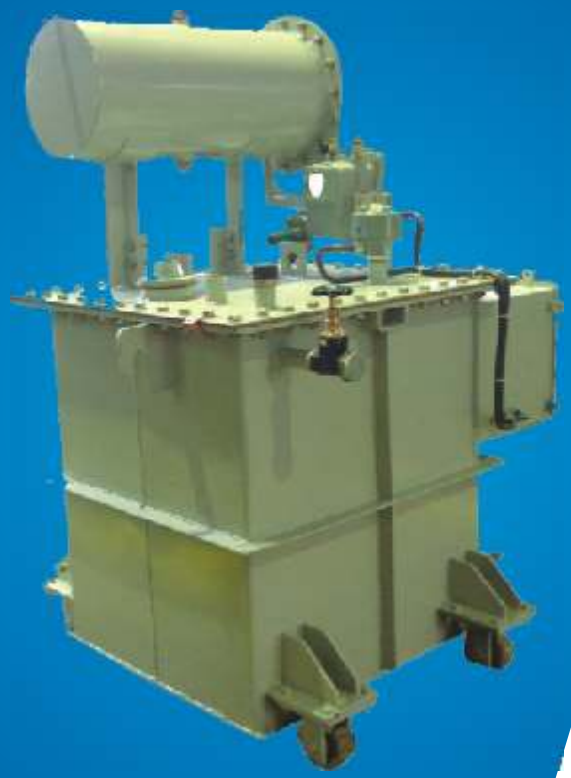
- Connection Method : 3 Phase, 4 Wire, 50 / 60 Hz, ±5%
- Utility Voltage 1 : 400 VAC +10%, -15%
- Filter Current 1 : 75 A to 600 A
- Utility Voltage 2 : 480 VAC +10%, -15%
- Filter Current 2 : 60 A to 500 A
- Utility Voltage 3 : 575 VAC +10%, -15%
- Filter Current 3 : 50 A to 400 A
- Filter Current Neutral : 3 x Line Current
- Parallel Combination : Maximum 4 Units of same power rating in master follower
- Filter Power Loss : Up to 3% of Equipment Rating
- Protection For Filters : MCCB and Fast Acting Semiconductor Fuses
- Cooling : Forced Air Cooling
- Cable Entry : Front-Bottom



Filter Specifications

- Harmonic Range : 2nd to 50th
- Attenuation Ratio : Upto 96% at rated current
- Selection : Any 20 Harmonics can be selected at a time
- Response Time : < 40 ms
- Reactive Current Compensation : Yes
- Priority Selection : Yes (PF and Harmonics)
- Load Balancing : Yes

Electro Static Precipitator Transformers with Compact Controllers



General Specifications

- Input Voltage : 415 Volts AC
- Phase : Single / Three
- Voltage Variation : ±10%
- Frequency : 50 Hz
- Output Voltage : Single / Three Phase
  30 kV - 200 kV DC Peak
  Mid Frequency
  30 kV - 120 kV DC Peak
- Current : 40 mA - 2500 mA DC mean
- Current Regulation : ±5% for load variation full load
- Configuration : Single phase
  Single phase back to back connected
  Silicon Controlled Rectifiers (SCRs)
  Three phase
  Three phase back to back connected
  Silicon Controlled Rectifiers (SCRs)
  Mid Frequency
  3 Phase Diode Bridge Rectifier with
  IGBT "H" Bridge Inverter
- Method of Control : Single / Three Phase
  By means of Silicon Controlled Rectifier (SCRs)
  Mid Frequency
  By means of Insulated Gate Bipolar Transistor (IGBTs)
- Ambient Temp. : Ambient : 50°C maximum
- Installation : Electronic Controller suitable for indoor installation only
  Preferably in Air - Conditioned Room,
  Transformer Rectifier Unit suitable for indoor/outdoor installation.
- Atmosphere : Dusty
- Cooling : Transformer Rectifier Oil cooled,
  Electronic Controller Air cooled
- Scope of Supply : Transformer Rectifier Unit Electronic Controller Panel

Applications

- Thermal Power Plants
- Cement Plants
- Steel Plants
- Paper Plants
- Sponge Iron Industries
- Non Ferrous Metal Industries
- Chemical Plants
- Acid Plants

ESP Controller

Environment

- Ambient Temperature : 0 - 50°C
- Storage Temperature : 0 - 70°C
- Duty : Continuous operation
- Installation : Indoor

Mains Requirements

- Nominal Input Voltage Variations : 120 - 230 VAC, 50 / 60 Hz, 1F (to SMPS)
- Frequency Variation : ±5%
- Current : 0.3 A
- Power : 20 VA

Feedback For Operation

- Output Current Feedback : 1 VDC at rated mA Average
- Output Voltage Feedback : 400μ ADC at rated kV (Peak) (VDC)
- Primary Current Signal : 100 mA AC.
- Primary Voltage Signal : 0 - 10 VAC for system input
- Digital Inputs : 16 optically Isolated contacts
- Digital Outputs : 09 digital outputs
- Serial Interface for Communication : RS-485 / RS-232
  CAN BUS for Display Interface

Constant Current Regulator

- Rating : 4.0 kW to 70 kW
- Output Current Type I : 6.6 A
- Output Current Type II : 20.0 A
- Input Voltage : For 7.5 kW and below : 240 V ±10%
  For 10.00 kW and above : 415 V ±10%
- No. of Brightness : 5 Step

Environmental Requirements

- Temperature range of -15°C to +55°C at sea level
- Relative Humidity range of 10% to 100%
- Altitude range of 0 to 10000 feet above MSL
- Salt Spray Exposure to salt laden atmosphere

Regulation Resistive Load Requirement

- Brightness Step : 1 to 5
  Type I
- Nominal RMS Output Current : 2.80 A to 6.60 A
  Type II
- Nominal RMS Output Current : 8.50 A to 20.00 A
- Efficiency : 90% to 94%
- Power Factor : not less than 90%
- Temperature Rise : Not exceeding 65°C
- Output Current Stable : ±0.05% of Nominal Current

Special Feature

- 16 Bits DSP Based Controller
- RS-485 Communication Port for External communication
- CAN BUS communication for Display and Keyboard
- NOS Lamp failure indication display

Application

- Airfield Runway Lighting System

Cathodic Protection Transformer Rectifier

Modes of Operation

- Auto Reference Mode
- CVCC Mode
- Manual Mode
- AC inputs Single phase or Three phase,
- 50 Hz / 60 Hz
- Meters 48 x 96 mm, 3½ Digit Digital meters as under
- Input Voltage : 0 to 750 VAC
- Input Current : Ammeter with
- suitable CTS
- Output Voltage : As per output rating
- Output Current : Ammeter with suitable shunt

PSP : 0 to ±19.99 VDC

Additional Features

Following additional features can be provided as per Specifications along with Rectifiers

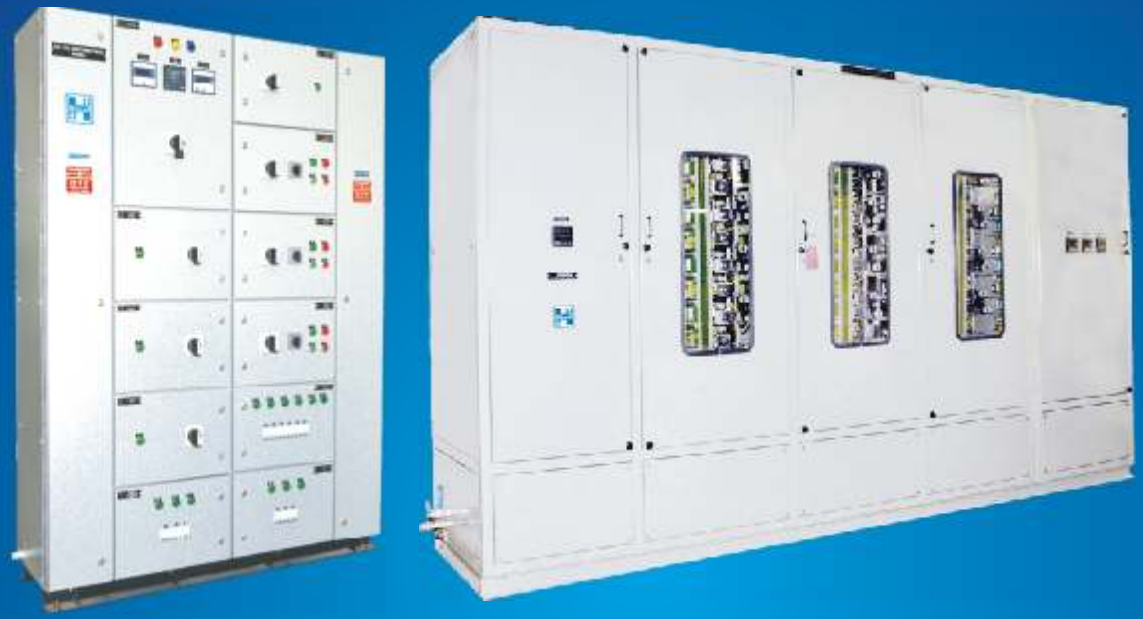
- Interrupter Timer : The Interrupter timer is used for carrying out ON / OFF CP survey using the current interruption technique
- SCADA Monitoring Facility : Isolated 4 - 20 mA are provided for DC output voltage, DC output current and Pipe to Soil Potential (PSP)
- Remote Monitoring through GSM : The parameters values can be remotely monitored using the GSM base remote monitoring systems

SMPS Rectifier Unit

General Specifications

- Input Voltage : 3 Phase, 4 Wire, 415 V ±10%
- Frequency : 50 - 60 Hz
- Output Voltage : 0 - 12 V (CV Mode)
- Output Current : 0 - 500 A (CC Mode)
- T ambient : 50°C Max.
- Cooling : Force Air
- Duty Class : Class I (100% Continuous Operation)
- Efficiency : Typically >0.85 @ rated Load
- Line Regulation : Better than 1%
- Load Regulation : Better than 1%

Water Cooled Rectifier



General Specifications

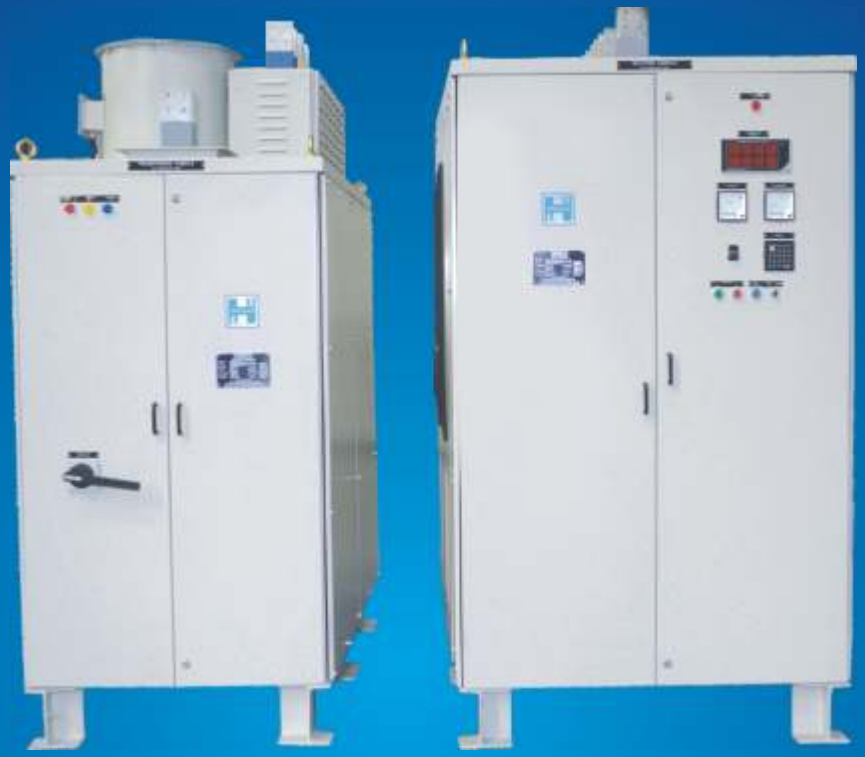
- Operating AC Voltage : 11 kV, 22 kV & 33 kV, ±10%, 3 Phase, 50 / 60 Hz
- DC Output Voltage : 50 V to 1000 V
- DC Current : 10 kA to 60 kA
- No. of Pulse : 6 or 12
- Type of Control : Thyristor with OCTC and/or OLTC
- Current / Voltage Stability : Better than ±1%
- Transformer Connection : Ddoy11 / Dy11 / Dy11y5 / Yy0y6
- Transformer Cooling : ONAN / ONAF / OFWF
- Rectifier Cooling : Forced DM / Cooling water
- Rectifier Connection : Single way / Double way
- Standards : IS / IEC
- Efficiency @Rated Output : 94 - 98% depending on DC Rating

Applications

- Anodising
- Aluminium Smelting
- Ballast Water
- Battery Formation
- Battery Charger
- Caustic Soda
- Copper Refinery
- Cathodic Protection
- Caustic Chlorine
- Clo2 Production
- Coloring Application
- Desaltation
- Demagnetisation
- DC Motor Testing
- Defence and Aviation
- Electro Plating
- Electro Chlorination
- Electro Cleaning
- Electro Co-agulation
- Electro Oxidation
- Electro Smelting
- ED Coating
- Electro winning
- ESP

- Engine Cranking
- Electro tinning
- Traction Rectifiers
- Polarity Reversal Rectifiers
- Plasma Torch
- DC Arc Furnace
- Polarization Rectifier
- Graphite Electrodes
- Hydrogen Generation
- Hard Anodising
- Heating / Dehydration
- Magnetisation
- Magnesium Smelters
- Nickel Purification
- Oxygen Generation
- Polarisation
- Pulse Rectifier
- PCB Manufacturing
- Static Excitor
- Soda Recovery
- Telecomunication
- UV Curing
- Welding
- Zinc Smelting

Thyristor Controlled Rectifier



General Specifications

- DC Current : Upto 60 kA
- DC Voltage : Upto 1000 VDC
- 6 / 12 / 24 Pulse Configuration
- Current / Voltage stability : < ±1%
- Standards : IS / IEC
- Transformer Cooling : Air Cooled / ONAN / OFWF
- Rectifier Cooling : Air Cooled / Forced Air Cooled / Water Cooled
- Efficiency : Upto 98%
- Robust Design
- Built as per International Standard

TRACTION DIVISION

- Propulsion System
  - Vehicle Control Unit
  - IGBT Based Traction Converter
  - 3 x 130 kVA Auxiliary Converter
- 2 x 500 kVA IGBT based Hotel Load Converter
- Roof Mounted AC Package Unit
- Transformers for 3 Phase Locomotive
- Transformers for EMU
- Microprocessor based Electronic Speed cum Energy Monitoring System
- Driver Display Unit
- Regulated Battery Charger
- Inverters for AC Coaches

Vehicle Control Unit

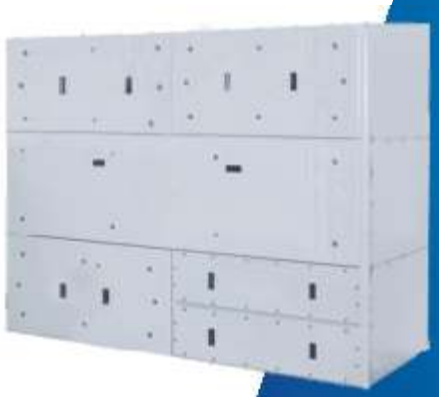
- Based on the IEC-61375 TCN open Standard which allows compatibility with 3rd party systems running same standard
- Input Operating Voltage Range : 65 to 165 VDC
- Four Digital I/O Cards per unit with each Card having 16 Digital Inputs and 16 Digital Contact free outputs
- All Input channels are redundant internally for better reliability of the system
- One Analog I/O card with 8 Analog Input Channels and 8 Analog Output channels (User Configurable)
- Multiple Processor architecture for faster real time response.
- Communications: MVB, ETH, WTB and CAN
- Form Factor : 6U Rack

IGBT Based Traction Converter

General Specifications

Input Data
- Nominal Voltage : 2 x 1269 VAC
- Input Current : 2 x 1142 Arms
- Input Frequency : 50 Hz

Output Data
- Power : 3 x 850 kW or 2 x 1150 kW
- Nominal Voltage : 3 x 2180 VAC
- Nominal Current : 3 x 270 Arms or 2 x 370 Arms
- Fundamental Frequency : 0 to 160 Hz



Control System
- Communication Bus : CAN / MVB

Thermal And Mechanical Data
- Weight : 3000 Kg
- Size (L x W x H) : 3000 mm x 1100 mm x 2100 mm
- Mounting Place : Machine Room
- Cooling : Liquid Cooling

3 x 130 kVA Auxiliary Converter

General Specifications

Input Data
- Nominal Voltage : 1000 VAC
- Frequency : 50 Hz

Output Data
- Power : 3 x 130 kVA at Power Factor $\geq$ 0.8
- Nominal AC Voltage : 3 x 415 VAC, Sine Wave, VVVF
- Frequency : 50 Hz
- DC Output : 12 kW, 110 VDC, 110 ADC

Control System
- Communication Bus : MVB / CAN
- Service Signal Connector : RS-232

Thermal And Mechanical Data
- Weight : Cubicle 1 - 540 Kg & Cubicle 2 - 937 Kg
- Size (L x D x H) : Cubicle 1 - 1160 x 1020 x 1810 (mm) Cubicle 2 : 1520 x 1020 x 1810 (mm)
- Mounting Place : Machine Room
- Cooling : Forced Air Cooling (External from Machine Room)

2 x 500 kVA IGBT based Hotel Load Converter

General Specifications

Input Data
- Nominal Voltage : 960 VAC
- Frequency : 50 Hz
- Input Power Factor : Close to Unity at Full Load

Output Data
- Power : 500 kVA at Power Factor ≥0.8
- Nominal Voltage : 3 x 750 VAC, Sine Wave
- Nominal Current : 3 x 385 Arms
- Frequency : 50 Hz

Control System
- Communication Bus : CAN
- Service Signal Connector : RS-232

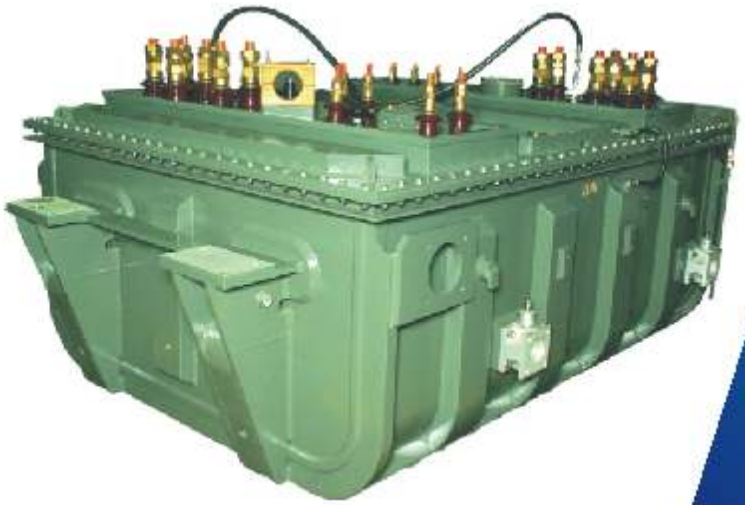
Thermal And Mechanical Data
- Weight : 1800 Kg
- Size (W x D x H) : 1400 mm x 1040 mm x 1750 mm
- Mounting Place : Machine Room
- Cooling : Forced Air Cooling

Roof Mounted AC Package Unit

General Specifications
- I/P Voltage : 415 VAC, 3 Phase, 50 Hz
- I/P Power : 13.5 kW
- Cooling Capacity : 7 Tonne
- Refrigerant Used : R 407 c
- Stainless steel structure for long durability
- Micro Controller monitoring software to operate RMPU with LCD unit
- USB data downloading facility directly on pen drive

Transformers for 3 Phase Locomotive

- 6531 kVA without Hotel load winding WAG9 Locomotive & designated as LOT 6500
- 7775 kVA with Hotel load winding for WAP5 & WAP7 Locomotive & designated as LOT 7775
- Loco Transformer is a front end component with steps down 25 kV AC line cantenary voltage to 1269 V for feeding to 3 phase regenerative drive which ultimately drives 3 phase asynchronous traction motors
- The Transformer is Forced Oil Cooled with 2 Circuits
- The Transformer also has Auxiliary winding of 1000 V for feeding to Auxiliary convertor & filter winding of 1154 V for Harmonic reduction filter
- Having Permawood Clamping parts to minimize the Stray & eddy losses in the Clamping parts

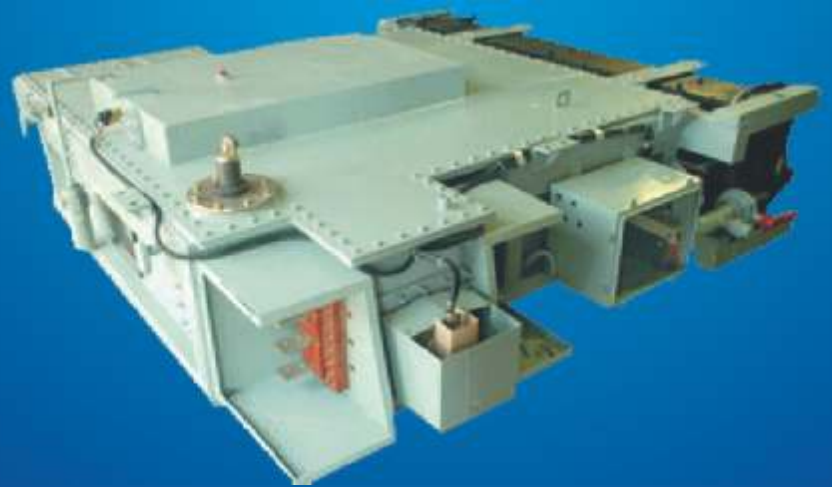


Transformers for EMU

General Specifications

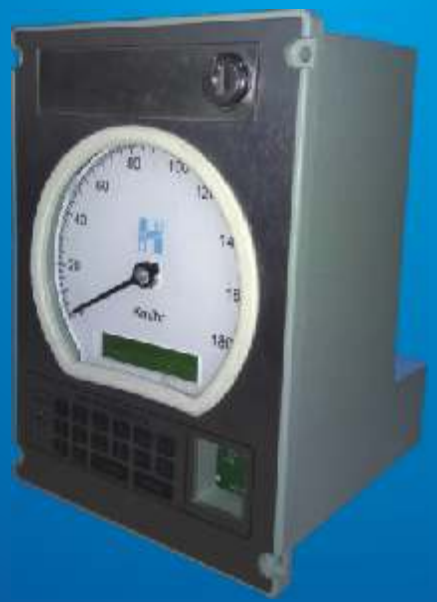
- Capacity : 1250 kVA
- Voltage : 25 / 1.85 / 0.266 / 0.141 kV
- Frequency : 50 Hz
- Cooling : OFAF
- Weight : 4200 Kg
- Feature : 1250 kVA transformer unit along with reactor units both in a common tank.

- Capacity : 1050 kVA
- Voltage : 25 / 1.85 / 0.266 / 0.141 kV
- Frequency : 50 Hz
- Cooling : OFAF
- Weight : 3900 Kg
- Feature : 1050 kVA transformer unit along with 3 reactors units both in separate tanks.

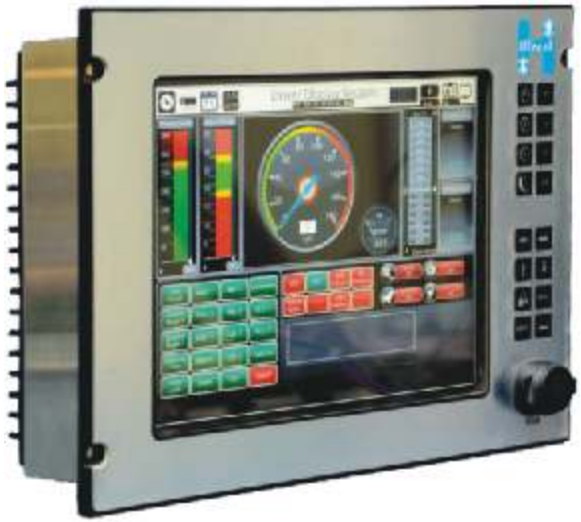


Microprocessor based Electronic Speed cum Energy Monitoring System

- Modular Design with sturdy vibration resistant structure
- Angular Pointer with point source LED indication at specific speed points
- Microprocessor based Central Processing Unit with real time data logging capability processing unit with real time data logging capability
- Real time parameter monitoring such as OHE Voltage, load Current, Speed etc.
- 16x2 Character LCD provided to display various information according to user input
- Max Display Speed of 180 Km/hr
- Operating Voltage : 65 V to 165 VDC
- Speed Resolution : 0.5 Km/hr
- Audio Visual Indication helps alert the running crew during over speed condition
- Driver Wise, Trip Wise and other user defined reports can be generated and downloaded via USB



Driver Display Unit



- Wide Input Voltage Operating Range from 65 V to 165 VDC
- High Resolution 10.4" 1024x768 High Resolution Display with 16.7M color for best clarity
- User adjustable LED backlight brightness and contrast settings with dedicated function keys
- Spare keys provided for customer definable functions
- Modular keyboard design for easy and intuitive navigation of various display screens
- Communication protocols like RS-232 serial, RS-422 / RS-485, USB and MVB (optical) are provided for real time data communication with VCU / TCMS unit
- Optional Communication protocols such as CAN, Ethernet can be provided as per customer requirement
- Splash and dust proof front panel and optional full body IP-65 Design
- Natural Convection cooling with an operating temperature range of -25°C to +70°C

Regulated Battery Charger

General Specifications

Input

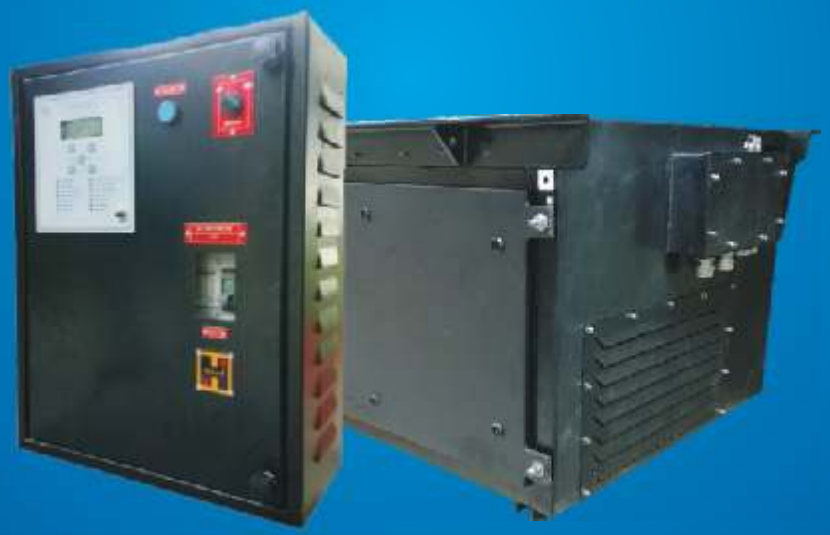
- Nominal Voltage : 415 VAC 3 Phase, 3 Wire System
- Operating Voltage Range : 415 V ±15%, 3 Phase AC, 50 Hz ±3%

Output

- DC Output Voltage : 110 V to 135 V (settable with keypad)
- Output Current DC : 35 A (maximum)
  (a) Battery Charging Current : 10 A to 20 A (settable with keypad)
  (b) Output Current DC : 15 A
- Operating Modes : Constant Voltage

25 kVA Inverters for AC Coaches

- Input Voltage : 90 VDC to 170 VDC
- Output Current : 35 AAC
- Output Voltage : 415 VAC, 3 Phase, 50 Hz
- Power : 25 kVA at 0.8 pf
- Cooling : Natural Cooled
- Mounting : Underslung
- Protection : IP 65

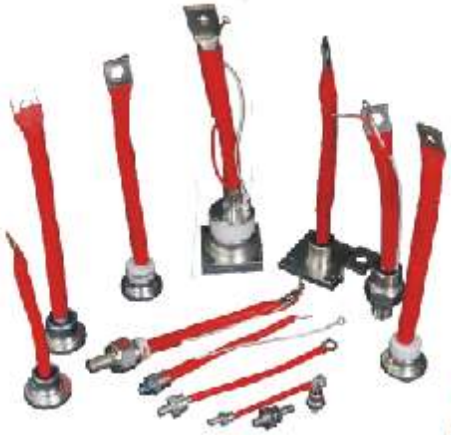


SEMICONDUCTOR DIVISION

- Stud / Flat Base / Capsule Devices
- Power Stack / Assemblies
- Rotating Assemblies

Stud / Flat Base / Capsule Devices

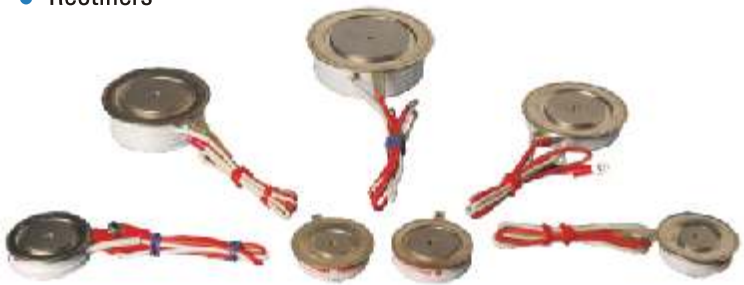
Stud / Flat Base



- Diodes : 6 Amps. to 860 Amps. with a voltage range upto 5800 V
- Thyristors : 16 Amps. to 650 Amps. with voltage range upto 2600 V

Applications

- Battery Chargers
- Free Wheeling Diodes
- Welding
- Traction Applications
- DC Drives & SPRS
- Rectifiers



Capsule Devices

- Diodes : 450 Amps. to 6400 Amps. with a voltage range upto 6000 V
- Thyristors : 400 Amps. to 5000 Amps. With voltage range upto 4400 V

Applications

- Battery Chargers
- Free Wheeling Diodes
- Welding
- Traction Applications
- DC Drives & SPRS
- Rectifiers

Power Stack / Assemblies

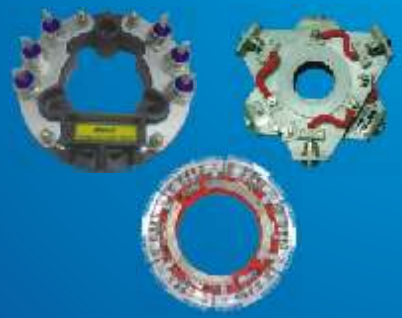
Circuit Configurations

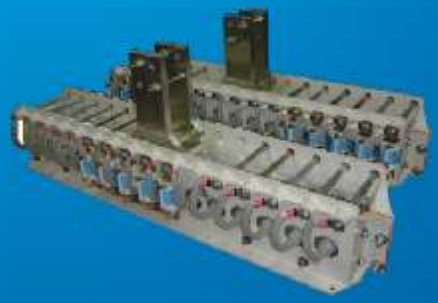
- Single
- Single Phase Bridge
- Three Phase Bridge
- Half Bridge
- AC Switch

Applications

- Battery Charger
- Motor Control
- Transportation
- UPS
- Power Supplies
- Welding
- Slip Power Recovery System

Rotating Assemblies





- Brushless Excitation Systems of High Power Electrical Machine
- Automatic Voltage Regulation (AVR) System Hydrogeneration Plant
- Brushless Alternator
- Custom built disk for rotating applications

Hind Rectifiers Limited

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