



# POWER SOLUTIONS FOR EMERGING TECHNOLOGIES



[www.electronicssystemsendia.com](http://www.electronicssystemsendia.com)



**ELECTRONIC SYSTEMS**  
DC System ★ Automation ★ Power Panels ★ Instruments

**Associate Companies :**  
**DHAWAMI POWER SYSTEMS PVT. LTD.**  
**HEM AUTOMATION SYSTEMS**



**ELECTRONIC SYSTEMS**

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## Power

Torrent Power Ltd., Essar Power Ltd., Nuclear Power Corporation Ltd., GESCL, GETCO, KEB, BHEL, NTPC, GIPCL, J&K Electricity, Karnataka Power Corporation Ltd., NHPC, GMDC....& more



## Gas, Refinery, Petrochemical & Fertilizer

Reliance, IPCL, ONGC, IOCL, GAIL, Narmada Chematur Petrochemicals Ltd., Gujarat States Fertilizers & Chemicals Ltd., Gujarat Narmada Valley Fertilizers Co., Indo Gulf Fertilizers & Chemicals Corporation Ltd., GACL, GSPL ....& more



## Hydro Power Plants

Sardar Sarovar Narmada Nigam, Pilangadh HEP, Bhikuriagadh HEP, Lower Ghagari HEP, Sadani HEP, Maniamsha HEP, Shimsha HEP, Amogha HEP, Lingti HEP, Kothi HEP, Pussimbing HEP, Shanoor HEP, Mungpoo Project, Dolwahal HEP, Kabang HEP, Sippy HEP ....& more



## Cement & Steel

Ultratech Cement, Gujarata Ambuja Cement, Gujarat Sidhee Cement, Digvijay Cement, SAIL, Essar Steel, Rourkela Steel, Panchmahal Steel ....& more



## Projects & Industries

Larsen & Toubro, ABB, Crompton Greaves, Jyoti Ltd., Kirloskar Electric Co., Apollo Tyres, Welspun, Indian Rayon and Industries, GHCL, Elecon Engineering, General Motor, Zydus Cadila, Arvind Mills, Tata International, FAG Bearing, Novino Batteries, BSES, Birla Cellulosic, Bombardier Transportation ....& more



## Pharmaceutical, Chemical & Glass Industries

Alembic, Zydex Industries, Zydus Cadila, Nirma Ltd., Godrej Soaps Ltd., Torrent Pharmaceuticals Ltd., Aventis Pharma, UPL, Wockhardt, BASF, Gujarat Glass Ltd., Gujarat Guardian, Videocon Narmada Glass, Philips India Ltd. ....& more



## Major Consultants

Tata Consulting Engineers, MECON, Harmony Associates, DESEIN, Gerzi Eastern, Chemtex, Jacob H & G, M.N. Dastoor, Design Group Consultant ....& more



## International

Products supplied to countries like Bahrain, Vietnam, New Zealand....& more

# CHARGERS



## ALPHA SERIES

### Features :

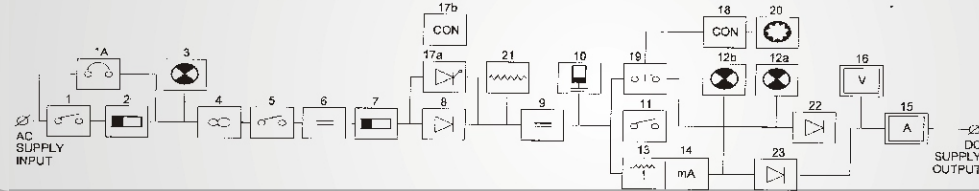
#### Applications

- Automobile charger
- DG set battery charger
- SMF battery charger
- Switch tripping unit
- Traction battery charger

- Alpha series charger is to keep batteries in healthy condition having boost/trickle mode operation.

1. Liberally designed components with stringent regulation & ripple% for efficient charging.
2. Boost charging current adjustment is through tap selector switch or variac or constant current design.
3. Voltage or current sensing base controller for boost to trickle & vice versa change over.
4. Protection features can be provided as per customer requirement.
5. Floor/wall mounting cabinet. Provision to mount battery set in charger cubicle possible. Wheels can be provided for ease of mobility.

### BOOST CUM TRICKLE CHARGER



Schematic diagram of Alpha Series

## DELTA SERIES

### Features :

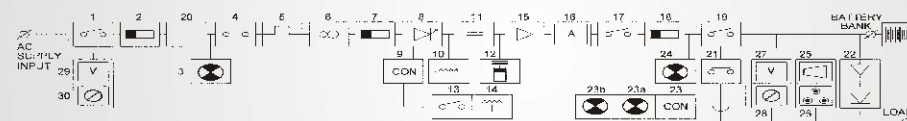
#### Applications

- Telephone Exchange charger
- PLCC equipment charger
- Small Sub Station charger

- Delta series is economical common charger design to boost/trickle charge battery set & simultaneously feed DC load.

1. Output voltage is controlled within +1% of nominal rating with +10% variation in input voltage, +5% variation in input frequency and 20% to 100% load current variation.
2. Voltage regulation is achieved either through SCR controlled charger or through motorized variac.
3. The Charger feeds DC load & simultaneously trickle charge battery set in Float mode & boost charge battery set and simultaneously feed DC load through dropper diode bank in Boost Mode.
4. DC contactor ensures automatic take over of load by the battery when main AC supply fails.
5. Protections like fuse failure, DC O/V, DC U/V DC fail, earth leakage, AC U/V etc. can be offered.

### FLOAT CUM BOOST CHARGER



Schematic diagram of Delta Series

## BETA SERIES

### Features :

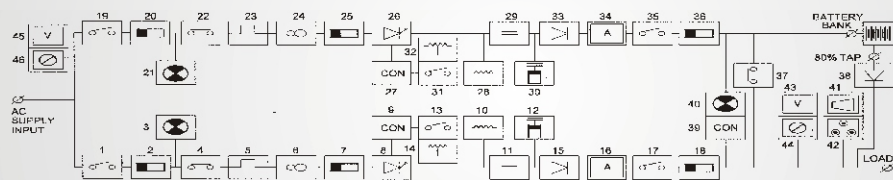
#### Applications

- Large switch yard charger
- Sub station charger
- Captive Power Plant charger

- Beta series is separate Float and Boost Full wave half controlled NO-break DC system incorporating features of reliability/redundancy.

1. Float Charger feeds DC load and trickle charge the battery set. The boost charger operates independently & simultaneously to Boost charge the battery set.
2. Redundancy offered for Float & Boost modes in separate Float & Float cum Boost design or dual Float cum Boost design. The change over is either automatic or manual.
3. Servo (motorised variac based) scheme can be offered.
4. Protections like fuse failures, DC O/V, DC U/V DC fail, earth leakage, AC U/V etc can be offered.
5. DC contact or ensures automatic take over of load by the battery when main AC supply fails
6. Sophisticated charger having Microprocessor based design with SCADA & touch screen control for critical application.

### FLOAT & BOOST CHARGER (Secured DC Power Supply-UPS)



Schematic diagram of Beta / Gama Series

## GAMA SERIES

### Features :

#### Applications

- Power Plant charger
- Large capacity charger

- Gama series scheme identical to BETA series charger except full wave full controlled rectifier design.

1. Lowest ripple factor offered for critical DC loads like Numerical relays etc.
2. Redundancy in both modes can be offered for flexibility of operation.
3. Protections like fuse failures, DC O/V, DC U/V DC fail, earth leakage, AC U/V etc can be offered.
4. DC contact or ensures automatic take over of load by the battery when main AC supply fails.
5. Sophisticated charger having Microprocessor based design with SCADA & touch screen control for critical application.



## ELECTRONIC SYSTEMS

This flagship company of the group was established in the year 1986 with a goal to provide most reliable products in the field of Control and Power Electronics. Today we are established and known as quality conscious manufacturer of Battery Chargers, Static Excitation/AVR Panels, Control & Relay Panels, LT Panels and PLC/SCADA Panels. Our products conform to quality management system standard ISO 9001:2000.



## DHAWAMI POWER SYSTEMS PVT. LTD.

Established in the year 1998 as a trading company. We are one of the largest distributors of **Exide Industries Ltd.**, the leader among battery manufacturers in India for industrial batteries providing batteries for every need of Power Plants, Switchyards, UPS, Inverters, Material Handling, Medical, Defence etc.

We are also **MASTER DISTRIBUTOR** of world's renowned battery chargers & battery maintenance equipments supplier, **Storage Battery Systems Inc.** of USA.

We have strong battery maintenance set up and undertake battery commissioning, repair and maintenance jobs.



## HEM AUTOMATION SYSTEMS

Established in the year 2000 to cater to the growing need of industrial automation. Being an **Authorized System Integrator** of world renowned **"GE FANUC"** brand, have developed special skills for Automation in Process Industries, Hydro Power Plant, Irrigation and Water management projects. We undertake jobs in field instrumentation too. We are dealer of **"DB Power"** renowned ON LINE UPS manufacturer and **"SAPCON"** for level measurement instruments.

### OUR MISSION:

- ★ Maintain leadership through continuous innovation and technology updates.
- ★ Offer sustained high quality products and enlarge product profile for growth.
- ★ Remain focused on maximizing customer satisfaction and deliver value.
- ★ To pursue transparent business policies and practices.
- ★ To operate profitably and share prosperity with associates and society.
- ★ To ever remain eco friendly.

### PRODUCT PROFILE :

• Industrial Battery Chargers.

• Static Excitation Units.

• AVR Panels.

• LT Panels like PCC & MCC.

• Distribution Boards.

• Unit Control Boards.

• Remote Monitoring Boards.

• Control & Relay Panels.

• PLC /SCADA Panels.

• Industrial Batteries.

• UPS.

• Battery Maintenance Accessories.

• Digital Chargers.

• Instruments & More....

### ISO CERTIFIED



# BATTERY TEST EQUIPMENTS



As MASTER DISTRIBUTOR for India, we offer following products of Storage Battery Systems Inc. USA. It is a leading company of USA offering wide range of sophisticated chargers & battery maintenance accessories.



Digital



5 time faster than conventional methods

SBS-2500

## Digital Hydrometer :

## Digital Specific Gravity Tester with data down loading capability

- Time Saving. •99.999% accurate •Automatic temperature compensation .
- Measures specific gravity and temperature of lead acid and Ni-cad batteries .
- Data logging & down loading to PC capability.
- Data storage in user friendly formats in PC to track health history of each cell.

## On line Battery Diagnostic Tester

The new IBEX is cutting edge digital battery quality diagnostic tester meeting all IEEE standards. It can measure accurately internal impedance (Z), voltage (V), temperature (C), with world's first ripple removing algorithm during floating charge.



Ranges : 10Ah ~ 6000Ah max., 0.1 Volt ~ 16.0 Volt DC suitable for all types of batteries Voltage :  $\pm 0.5$  class, Temperature :  $\pm 2$  class (-20 ~ + 80C), Impedance :  $\pm 1.0\%$  rgd.  $\pm 8$  dgt., (3milli ohm full-scale) across test range. IBEX offers the most comprehensive diagnosis & reporting software package.

## Battery Capacity Tester

## DC Resistive load bank (24V, 48V, or 120V)

- Tests 24V/48V/120V DC power sources up to 171 Amps •Built-in digital meter with 1% full scale accuracy
  - Rated for continuous operation, no cool-down period • Master switch instantly applies / removes loads
- Operates conveniently & quietly



Use with wet or Sealed Batteries

## SBS Hydrogen Gas Detector



- Protects against battery charging room explosions.
- Protection for property and employees.
- Decreases electricity costs as a result of controlled exhaust fan or air conditioning or heating operation.
- Reliable & uninterrupted 24x7 monitoring and control.

BCT-5000

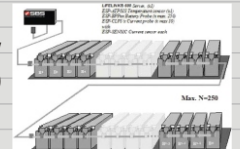
## Electronic Constant Current DC Load Testers :

### RBL Series Load Banks (0-600V and 0-1000 amps)

- Ratings from 0-600 volts, 0-1000 Amps, up to 4000 watts in a single unit
- Units available in 50V, 100V, 400V or 600V

## Remote Battery Monitoring System

The SBS Battery monitoring system allows users to remotely verify Impedance, voltage, temperature, current and total energy discharged, and gives an up-to-the minute picture of battery back up. Remote access is available by using TCP/IP, Land - line (dial - up modem) cellular or satellite links.



SBS-48T / SBS-600

## Battery Watering Cart :

For ease of transfer of battery grade water to scattered battery locations in a plant. Powered & non powered models available. Used with Water Gun for battery filling.

## SBS Range of Microprocessor Based Charger :

### AT series :

Advance technology modular construction charger in 1 phase (12-130V DC/6-100 Amps) capacity & 3 phase (12-130V DC / 25-1000 Amps) capacity models. Seismic zone-4 qualified. NEMA 4/12 enclosure, static, fungus proofing / tropicalization, communication on DNP-3 or MODBUS protocol. Best suited for power plant, switchyard etc.

## Eye Wash :

Portable air pressure operated eyewash with 10 gallon tank or 16 gallon gravity feed model available. Combination of shower and eyewash system for permanent mount also available.

### DCT series :

Charger for well filtered source application in telecom process utility 1 phase (12V-240V dc/6-200A) capacity models. Temperature compensation feature.

## Guns for Watering Cart :

Watering gun with auto-shut off feature for ease of water topping in battery cells. Direct connection to water deionizer & cart possible for ease of topping up.

### PSC series :

Chargers are customizable and offers endless array of possible options. Digital display delivers all charger information at finger tips. Password protection so as to make it temper proof, fully automatic functions.

## Water Deionizer :

Ion exchange removes dissolved impurities. The purity is comparable to distilled water. Disposable cartridge makes up to 600 gallons of pure water. Purity light indicator for cartridge replacement.

## No-Ox Battery corrosion Prevention :

Various sprays for battery corrosion prevention, battery cleaner, grease, acid detector etc.

## SBS Battery Racks :

Seismic rated racks for Zone-4. Flexible & easy to mount at site. Black polyethylene painted racks for protection.

## Hydrometer :

Unbreakable Industrial hydrometer

# INDUSTRIAL BATTERIES



## Plante Battery

Most trusted, reliable, rugged & very low maintenance & topping up frequency battery for critical application of Power Plants. High discharge performance design. Unique lamellar construction from ultra 99.99% pure lead. No ageing factor as per IEEE. Transparent SAN container for monitoring charge parameters & user friendly maintenance. Proven life of 18-20 years. Available in 2V,16AH to 2250AH capacity Manufactured as per IEC 60254 standards with latest amendments.



## Lead Acid Tubular Battery

Reliable for conventional application like Switchyard etc. Normal & high discharge performance varieties available. Hard rubber/ Polypropylene container. Also available in transparent SAN container for user friendly maintenance. High pressure 'HADI' casting for longer and reliable life. Proven life of 9-10 years. Available in 2V,20Ah to 5000Ah capacity. Manufactured as per IEC 60254 standards with latest amendments.



## VRLA Battery

Recommended for typical application like Communication, Railway, UPS etc. High discharge Performance design. Lead Calcium Tin alloy for low mater loss & better performance. Available in 2V,80AH to 6000AH capacity. Manufactured as per TEC G/BAT-01/02 MARCH 2000 specification with latest amendments.



## Monoblock SMF Battery

Popular for small UPS application, emergency lighting & medical equipment. Wide range from 4AH to 200AH capacity in 6V & 12V module. World renowned Shine-Kobe Technology. Manufactured as per JIS C8707 standards with latest amendments.



## Monoblock Tubular Battery

Most rugged, reliable and low maintenance batteries. Various models like EL range, IT range & IR range available for UPS, Inverter & DG Starting application. Wide range from 12V,40AH to 200AH. Guarantee from 24 to 60 months.



## Inverter Battery

Wide range to meet every need of Inverter application. Various models like IQ, IK, Inva Flat, ELF etc. available ranging from 12V,39AH to 200AH capacity.



## Traction Battery

EXIDE Heat Sealed Traction batteries are most rugged and reliable batteries for forklift application having very wide variety. Also new GenX range available having upto 15% additional capacity in same size with longer life and higher reliability. The battery conform to IEC 60254 standards with latest amendments. Extended 5 Years\* warranty to ensure complete peace of mind.



\* Conditions apply.

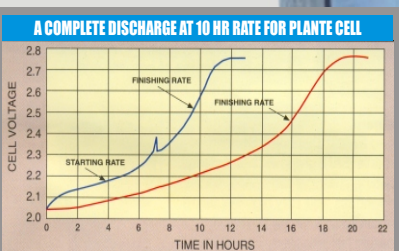
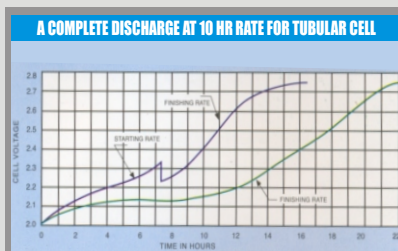
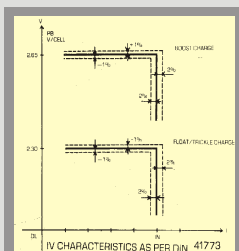
## Accessories

Many unique battery accessories available like Autofil system, Acifil pump etc.

## Battery Maintenance

We have strong and experienced team for battery maintenance and commissioning of any type of Industrial battery sets including Ni-cad battery sets. We have to our credit several Annual Maintenance Contracts of prestigious companies.

We also undertake installation and commissioning jobs of new battery sets including initial charging. We can also provide battery charger for initial charging purpose. We can supply accessories like



# PLC / SCADA BASED AUTOMATION



Automation is key to achieve efficiency, reliability, repeatability and higher productivity in industrial operations and has become major contributor to success of an industry in this ever competitive business scenario.

We provide complete automation solutions which include PLC, MMI, SCADA system, Drives, Servos and Field instruments for petrochemical, pharmaceutical, steel plant, power plant, hydro power plant, process industries and lift irrigation projects. We are Authorized System Integrator of GE FANUC, the most reputed and trusted name world wide for PLC and SCADA system. GE FANUC has wide variety of PLCs starting from micro PLC to large triple redundancy fail safe TUV certified systems for extremely critical applications.

We have developed special skill in automation of hydro power plants and lift irrigation jobs including transmission of data to remote location for monitoring and control. We provide complete automation solutions including supply of PLC panels, Unit control boards, Relay and control panels, field instruments, Data connectivity, DC systems, UPS, Distribution boards etc. for project.

We have wide variety of PLC, drives, displays, servos & SCADA packages as mentioned below :

## VersaMax® Micro Nano



A palm-sized, powerful controller with an all-in-one construction that saves panel space with a full range functions. Its easily snaps onto a DIN-rail or mounting in a panel for quick and easy installation.

## VersaMax® PLC



Part of an innovative control family that combines powerful CPU with broad selection of I/O modules, terminations, power supplies, communication modules link to a variety of networks.

## Series 90™-30



Whether for a simple relay replacement or for a more sophisticated mid-range automation system, this versatile PLC, with its innovative architecture and modular design, fits a wide range of applications.

## PACSystems™ Rx3i



An integrated programmable automation controller (PAC) solution - combines flexibility, openness, and performance without historical burden of migration path or conversion, all at an affordable price.



CIMPLICITY software is scalable from a Human Machine Interface to a fully networked Supervisory Control and Data Acquisition (SCADA) system. The networking capabilities inherent at all levels within the product line let you achieve levels of integration that virtually eliminate redundant configuration within a network.

## Uninterrupted Power Supply (UPS)

We are authorized dealer for ON LINE UPS of India's most trusted brand DB Power to provide reliable back up power. DB has wide variety of rugged and reliable industrial duty UPS including hot redundant design. One of the very few manufacturers approved with all the major consultants in India including EIL.

- |   |   |  |
|---|---|--|
| 1. EU 110 (1Ph. / 1Ph.) - 2 KVA                                     | 2. HN 110 (1Ph. / 1Ph.) - 1- 3 KVA            | 3. LnuX 110 (1Ph. / 1Ph.) - 3 & 6 KVA        |
| 4. HnuX 110 (1Ph. / 1Ph.) - 1- 3 KVA                                | 5. LX 110 (1Ph. / 1Ph.) - 7.5 KVA             | 6. LN 3100 (3Ph. / 1Ph.) - 10 - 40 KVA       |
| 7. LN 3300 (3Ph. / 3Ph.) - 10 - 40 KVA                              | 8. Synergy 3100 (3Ph. / 1Ph.) - 60 - 120 KVA  | 9. Synergy 3300 (3Ph. / 3Ph.) - 60 - 120 KVA |
| 10. Harmony 3100 (3Ph. / 1Ph.) - 10 - 60 KVA                        | 11. Harmony 3300 (3Ph. / 3Ph.) - 10 - 250 KVA | 12. INSTA Switch - 3 & 6 KVA                 |
| 13. Digital Active Power Factor Corrector (DAPFC) - 60A, 100A, 150A | 14. Digisync - (3Ph. / 3Ph.) - 160 KVA        | 15. CHLORIDE range of UPS                    |



## Instruments

We are dealer for level measuring instruments of SAPCON. Their major products at a glance.

### Electromechanical Type

- Vibrating Fork (SLM series)
- Fluidofork (SLF...series)
- Rotating Paddle type (SLMR series)

### RF-Admittance Type

- R.F. admittance level limit switch (SLA...M series)
- Admittance level limit switch (SLA series)
- Intelligent admittance level limit switch (MP-SLA...series)



### RF-Capacitance Type

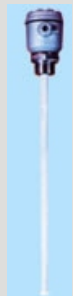
- Compact capacitance level switch (SLS...series)
- Capacitance level switch (SLC series)
- Intelligent capacitance level switch (MP-SLC...series)
- Continuous level indicator (ILC...series)

### Conductivity Type

- Conductivity level switch (SLW...series)

### Speed Monitoring System

- Speed-O-Tester (SSI...series)



## QuickPanel™ Control & View

Our series of bundled control and visualization solutions which integrates our best selling Quick Panel touch screens with our award-winning CIMPLICITY® Machine Edition software.



## Series 90™-70

PLCs designed to take on most demanding and complex applications requiring large numbers of I/O and greater amounts of process memory.



## PAC Systems™ Rx7i

Part of PAC family of solutions designed with more power, memory and bandwidth to handle mid-to high-end applications while providing all the innovative functionality of other PAC System platforms.



## Drives / Servos :

We offer wide range of Drives / Servos for most demanding application in industries.





## Static Excitation Unit/Automatic Voltage Regulator (AVR) Panels

We have acquired specialization in manufacturing above products due to our long association with generator manufacture as OEM. We have developed our own design and electronic circuits for SEU/AVR Panels which is robust, simple, reliable and proven.

### Operational Features :

- Thyristorised control
- Good regulation  $\pm 1\%$  from no load to full load at 0.8pf
- Response time of the order of power cycles, if suitable forcing margins are allowed in the machine. These lowest possible time constants guarantee quick voltage recovery on large load imposition /rejection.
- Adjustable stability control.
- Adjustable Droop control enable parallel operation of machines of different ratings.
- Large safety margins allowed on rating of all semi conductor devices and protection against surges.
- Silicon devices selected to provide satisfactory operation even at high ambient temperature up to 50°C.
- Terminal voltage of the alternator can be set manually at  $\pm 10\%$  of rated value.
- High Performance and high reliability is achieved through simple (low components / function ratio) design.
- Design offers DC contactor and Field Discharge resistance to ensure very fast discharge of rotor energy. Without above design feature in an event of stator fault, the damage can be very expensive.
- Manually selectable Two redundant AUTO modes of operation, Thus 100% redundancy is provided in the Electronic Control circuit. 100% redundancy in rectifier bridge can be provided for critical application
- Under frequency roll off circuit to protect against over excitation at low frequency (speed).
- Critical raw material is meticulously chosen to give better performance, reliability and long trouble free service.

### APPLICATION : SEU PANEL

- Excellent retrofit for old worn out DC excitor driven units with poor response/ time constants, frequent breakdowns due to mechanical design and high over hauling time with no possible redundant mode except full unit replacement.
- The design has a special focus for Alternators in sugar industry, catering to kick loads of cane loaders/ vertical basket motors. This application require the system to have very low time constants and excellent recovery characteristics.
- High operation stability and designed to perform under very demanding conditions, have made our SEU Panel first choice in Hydel generating stations. Hydro-power generating stations situated in remote locations warrant the need for simple but robust controllers with high degree of reliability. These units may remain idle for hours, days or months, but need to operate at full capacity as per availability of water and demand of power. Simplicity of design and operation allows low or unskilled work force to easily operate the units.
- The company is specialized in manufacturing of special SEUs for high frequency sets of the range 150 Hz ac generators, used in yarn manufacturing process. Reliability is the key, as single breakdown would lead to heavy manufacturing losses.
- The static excitation unit is simple, user friendly & compact & suitable for AC generators. It derives power from main ac winding (stator) and supply power directly to the main field through slip rings. Dual channel controller panel of standard design is available both for LT and HT turbo alternators with grid parallel facility.
- SEU unit can have additional features like, Digital AVR, Over excitation current limit, Over voltage cut-off, RKVA upper and lower limits & auto change over features between auto mode 1 to 2 possible.

### APPLICATION : AVR PANEL

- The AVR can be used on all brush less alternators and alternators with pilot DC exciter.
- AVR is designed to cater to thyristor loads up to 30% of rated generator load capacity.
- AVR unit is capable of running in parallel with other alternator and grid, with little modification and adjustments. By adding HT step down transformer, this unit can also be used on HT alternator.
- AVR is offered with two Auto modes and one Manual mode. Auto modes are powered with thyristorised rectifier bridge while manual mode is powered with diode rectifier bridge, Specially designed power CTs and Choke circuit ensure reliable operation even during transient load conditions.
- AVR unit can have additional features like, Digital AVR, Over excitation current limit, Over voltage cut-off, RKVA upper and lower limits & auto change over features between auto mode 1 to 2 possible.
- The AVR Panel is suitable for Sugar industries for co-gen application, mini and micro Hydel stations with added sophistication, small and large DG sets for reliable operation in standby mode.

### PHOTO GALLERY



Control Panels or FBA (Factory Built Assembly) as IEC calls it are tailor made products. Good electrical practice as well as Electricity Rules of National and State bodies require use of number of components for control and protection of any electrical installation and its feeder circuits. Also requirements of modern industry, such as centralization of control, safety, ease of maintenance, reliability, saving of space, simplification of branch circuit cabling and neatness of appearance etc, have ushered in an era of sophistication in Panel building. Necessity of accommodating more functional blocks in lesser space has also led to development of newer concepts in Control Panel manufacturing.

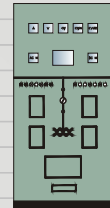
In spite of parameters being very elaborate, standardization in a number of aspects in Control Panel is possible without making the product too expensive and that is what we, at Electronic Systems have achieved.

Broadly, panels made by us are classified into three basic categories, viz. **Cubicle type (TC), Modular Non Unitised type(TA) & Modular Unitised type (TU)**. Each of these categories is subdivided into various types depending on the different features required. A brief description of each of the types is given hereunder.

## CLASSIFICATION OF PANELS

### Type TC :

Ideally suited for Control and Relay Panels or equipment Control Panel (instrument panel etc.) in the floor mounted version or Lighting DBs, Remote Control Stations etc. in wall mounting versions. These are simple cabinets with properly laid out and wired switchgear inside. All wiring is in PVC ducts and cable terminations are on vertical rows of terminals. Floor mounted version either has a fixed front sheet or hinged doors. Bolted structure with mounting flexibility is also a popular option for floor mounted version.



TC

### Type TA1M :

This is a classical two tier design ideal for distribution boards, A central busbar chamber is flanked by one tier of modules at the top and the other tier at the bottom. Cable terminations for bottom tier are in front and those for top tier are at the back. Extensible on both sides. Back access a necessity.



TA1M

### Type TA1 :

Only horizontal busbar chamber placed at the top or at bottom. Common cable alley placed on opposite side of busbar chamber (bottom or top) depending on cable entry requirement. Boards extensible on both sides. Economical design. In this economical design, wires from BBC to modules and those from modules to cable alley, pass through intervening modules. These are dead front boards. without back access.

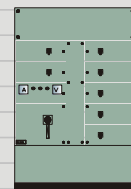


TA1

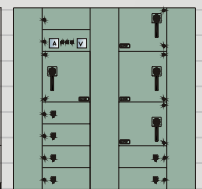
### Type TA 1A :

Problem of wires passing through intervening modules is solved in this design by providing wire ways between two vertical columns of modules. All wires from BBC to modules and those from modules to cable alley pass through these wireways. This is a very popular design for MCCs, that combines economy of type TA1 and extra reliability of unitised designs type TU.

Type TA 2 is other version in TA designs and has a vertical busbar chamber and a vertical cable alley with modules sandwiched in between. These are not extensible but have feature of cable entry both from top or bottom.



TA1A

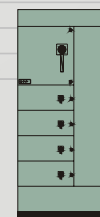


TA 2

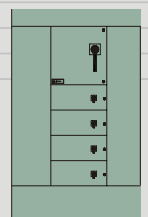
### Type TU :

Top of line design in fixed type compartmentalised switch boards and MCCs. These are of unitised design. Each of the units has a horizontal busbar chamber at the top or bottom. A vertical busbar chamber at the side (TU 1) or back (TU3) of each unit and a unit cable alley at the back (TU1) or the side (TU3) of each unit.

Both TU 1 and TU3 have to have back access, the dead front version in this design (with no back access) has vertical busbars on one side of module and unit cable alley on other side and is designated as TU2. All vertical busbars on one side of module and unit cable alley on other side and is designated as TU2. All designs in TU series are extensible on both sides.



TU1



TU2

### General :

All enclosures are fabricated from good quality steel sheet of thickness 10/14/16 swg as per design requirement. Structural members of panels are designed to withstand electrical and mechanical stresses that are encountered by switchgear. Enclosures can be provided with degree of protection up to IP 55. Enclosures are offered with liquid paint or powder coat and shades as per requirement. Elaborate quality checks are ensured at every stage of fabrication & painting. Flexible Cu wire of appropriate size and colour code is used for wiring with printed ferrule as per international standard. Cu or AL busbar of electrolyte grade with PVC heat shrink sleeve used as per specification. DMC/SMC/Epoxy resin cast support used with careful design to meet short circuit requirement up to 50 KA.



### DHAWAMI POWER SYSTEMS PRIVATE LIMITED

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#### Associate Companies :



#### ELECTRONIC SYSTEMS

- Battery Chargers
- Industrial Batteries
- LT Panels
- AVR Panels
- Static Excitation Panels
- Relay Panels

Email : es@electronicsystemsindia.com



#### HEM AUTOMATION SYSTEMS

- System Integrator for GE Fanuc for PLC & SCADA
- Dealer for DB Power make ON-LINE UPS
- Dealer for SAPCON make Level Measuring Instruments

Email : hem@electronicsystemsindia.com



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