ISO 9001:2008

AGV SYSTEMS PVT LTD

Solar PV Applications & Products

- Solar PV Panel Remote Monitoring
- Solar Array Simulators
- Solar Charge Controllers
- Solar DC Fan Controller
- Battery Monitoring System
- Active & Passive Battery Equalizer
- Remote Parameter Monitoring of VFD, Inverter, Energy Meter

Technical Presentation

Solar PV Panel Remote Monitoring

➢The proposed system for Monitoring of PV Panel consist of a voltage & current measurement module which is attached to each PV panel and a GPRS based Data Concentrator to collect the data from all such modules and transfer it to a remote server.

➢ All the data can be accessed on a web application in the form of table, graphs etc.

V & I Measurement Device

This device is mounted on solar panel itself to measure V & I

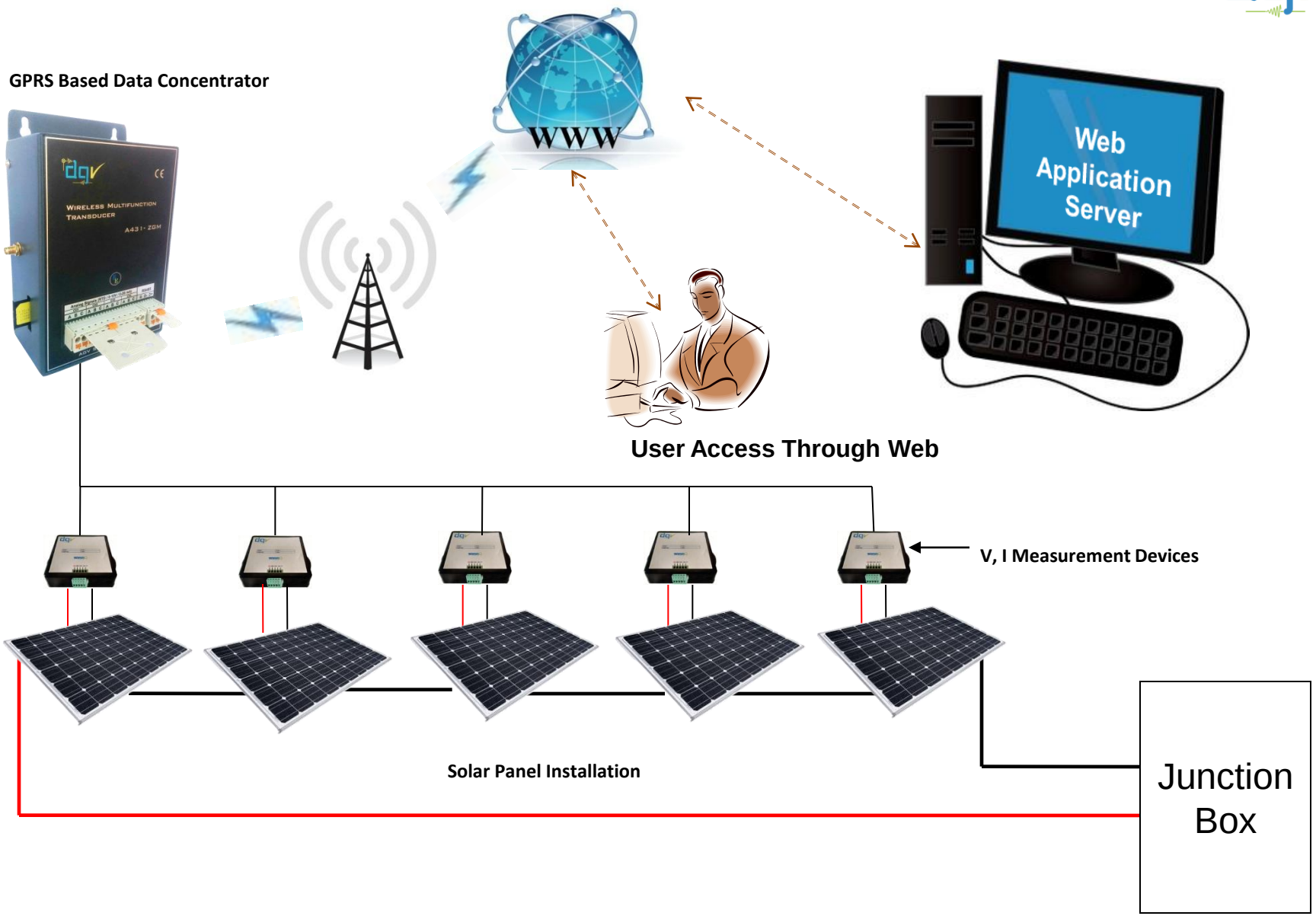
GPRS based Data Concentrator

This device will collect data from several devices and transfer to server

Data Monitoring

Web Application for data access through internet

System Scheme



Solar PV Moule Parameter Monitoring

Advantages Parameter Monitoring System

✓ Recording of all the parameters is done automatically at regular interval without manual intervention.

✓ Parameter read interval can be changed as per requirement.

✓ All parameter values are correctly recording without any error with time & date.

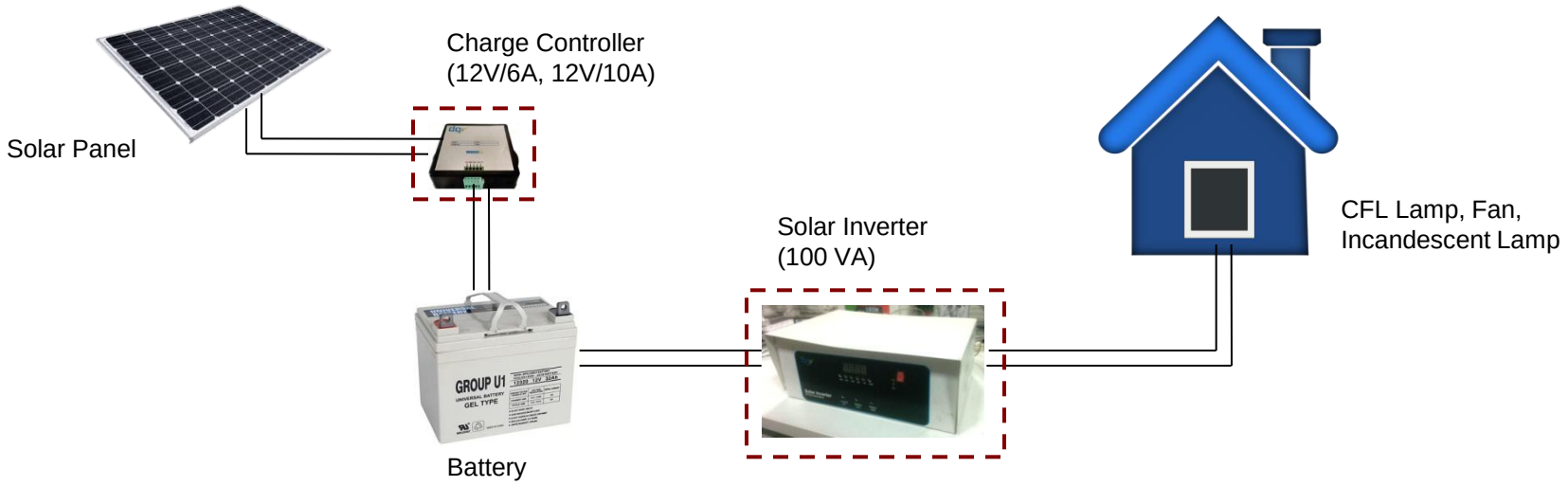
✓ Alerts on any parameter exceeding threshold values.

✓ Monitoring helps to detect issues with the panels.

✓ Peak performance tracking and analysis.

✓ Parameter reports help understanding the panel wise power production.

Solar Inverters & Charge Controllers



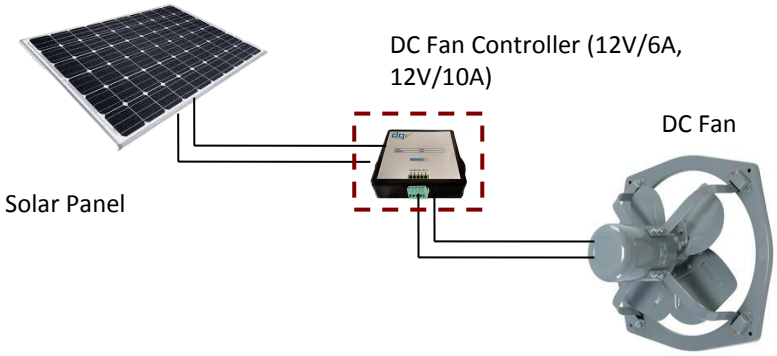
Solar Inverter

No.	Specifications	Details
1	Type	High Frequecy PWM Pure Sine Wave
2	Rating	100 VA
3	Input Voltage	12VDC
4	Protections	Over Load, Short Circuit, Reverse Polarity

Solar Charge Controller

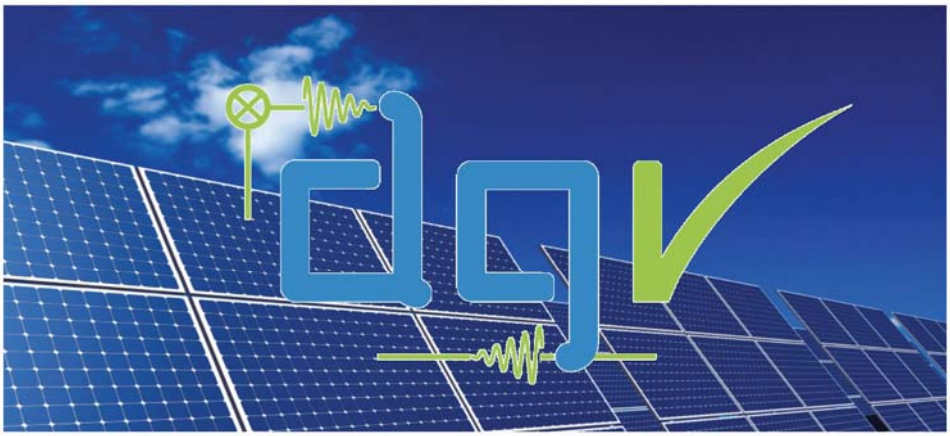
No	Specifications	Details
1	Type	MOSFET based series regulator
2	Rating	12V/6A, 12V/10A
3	Charging Voltage	14.5V (13.5 V - 15V)
4	Protections	Reverse Polarity, Reverse Current Flow (Bat -> Panel), Over Charge, Deep Discharge

Solar Controller for DC Fan : Model No - ASFC6-12V



Technical Specifications - Solar DC Fan Controller (Model : 12V / 6 A)

General Specifications	
Technology	MPPT
Precise Control	Micro controller based design
Voltage Rating	12 V Battery (PV Panel Voltage < 25 V)
Rated Current	8 A
Load Voltage	12 V
Nominal Output Power	60W
Maximum Output Power	100W
Efficiency	>95% @ 60W
High load voltage cut off	15.0 V
PV High Cut-Off	25 V
Protections Details	
PV Reverse Polarity	Provided
Output Over Voltage	Provided
Over Current	Provided
Automatic Charger Restart time after Fault	2Mins
LED Indications	
MPPT ON, Fault	
Other Details	
Operating Temperature	0 deg C to 45 deg C
Storage Temperature	0 deg C to 55 deg C
Wire Terminals	Suitable for 2.5 square mm
Approximate Dimensions (LxWxH) in mm	135 x 135 x 40



SOLAR ARRAY SIMULATOR

- Enables testing your PV powered devices by simulating PV panel output Current & Voltage.
- No need to depend on environmental conditions for your R&D and Production activities of Solar Inverter, Solar Water Pump, Solar Refrigerator and other Solar Electric products.
- Simulate I-V output changes as per Irradiance, Temperature, Time and Season variation.

- Significantly reduce testing and development time with a Solar Array Simulator.
- Be confident about your system & MPPT performance before approaching a certification lab.
- Work on your Solar Electrical systems even in bad light and low light conditions outside.
- Most economically priced Simulator in Indian market.
- Made in India product, get local and prompt support.

- Modular system architecture with basic block of either 60VX10A or 150VX10A.
- Systems built to suit your ratings with series and parallel combinations of above blocks.
- Output Power rating from 600W to 60KW, Maximum Voc = 1500V, Maximum Isc = 50A.
- Simulator operates independent of PC.
- Inbuilt Data Logger logs output Voltage and Current.

AGV Systems Pvt. Ltd

An ISO9001:2008 Organization

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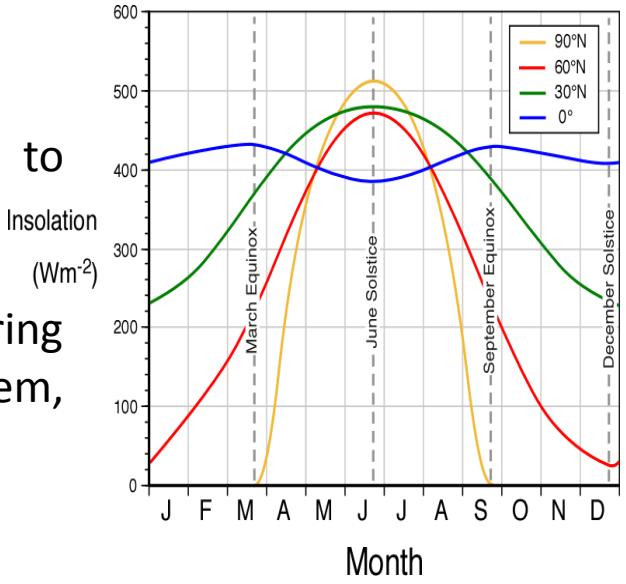
Popular Models:

Application	Model	Rating
- Training on PV Systems at Institutes and Colleges - For developing and testing micro-inverters	PVE600W	Max Voc = 60V, Max Isc = 10A, Power = 600W
- Training and research labs at Universities - Working on Multi-level Inverters - Developing and testing Solar Refrigerators	PVE2K4W	Max Voc = 240V, Max Isc = 40A, Power = 2400W
- 3HP & 5 HP Solar Water Pumps - Upto 5KW Grid Tied Inverters	PVE7K5W	Max Voc = 750V, Max Isc = 10A, Power = 7500W
- DC Solar Water Pumps - Solar Research Labs	PVE12KW	Max Voc = 600V, Max Isc = 20A, Power = 12KW
- Higher capacity Inverters - Solar Research Labs - Certification Labs	PVE15KW	Max Voc = 1500V, Max Isc = 30A, Power = 15KW

AUTHORIZED REPRESENTATIVE

What all can you emulate using AGV's Solution?

- The IV curve of a single panel or a complex array installed at various geographical locations
- Variation in the power output of the above due to seasonal and time based changes
- Dawn to dusk characteristics of the above considering various combinations like inclined system, tracked system, vertical installation, horizontal installation, etc
- Effect of shadows & partial shadows on the array above
- Various other real world scenarios that exhibit a challenge to PV Systems after installation



agv systems pvt ltd

SAMAQ :: Battery Equalizer

Overview

AGV's Samaq Battery equalizer unit is designed to equalize batteries connected in series and extend life of the battery bank.

The Samaq is a stand-alone system with a install and forget implementation

Samaq Doubles* the life of your battery bank giving you an excellent ROI

The Low Q current of the system does not drain the batteries and maintains a minimum 80mV voltage difference between the batteries.

Application Areas

- Series connected battery banks for Power Backup Systems.
- Electric Vehicles
- UPS batteries
- Telecom Battery installation
- Server room power systems
- Auxiliary Power Systems for mission critical application.

References

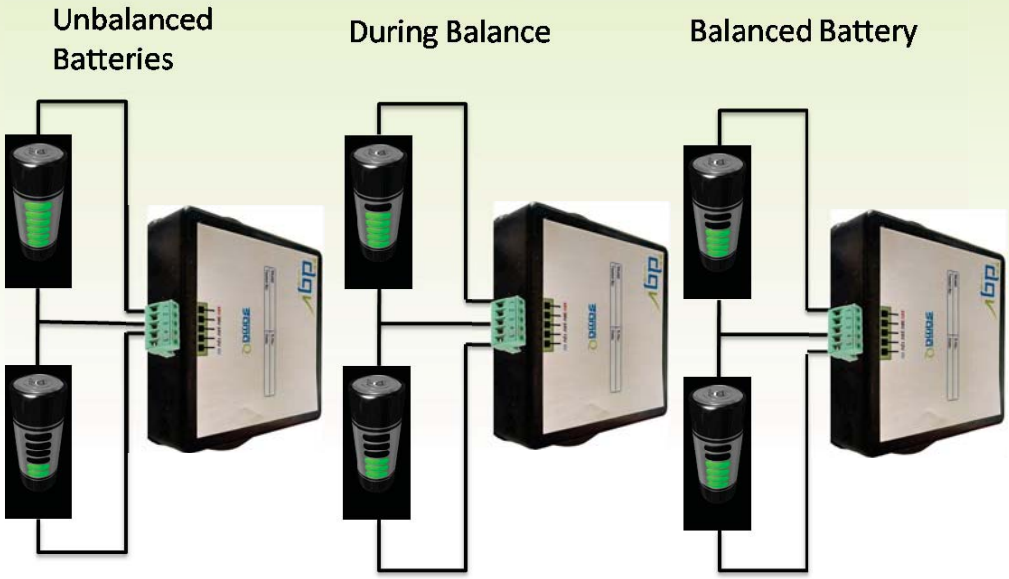
- Tested on Lead acid, Li-Ion battery chemistries.
- Both Vehicular and Industrial units have been tested for 12v batteries (2v cells).

STAND ALONE **ACTIVE EQUALIZATION** **LOW Q CURRENT**

For more details visit www.agv-systems.in

Device Features

- Cascadable for battery strings
- Equalizes in Charging, Discharging and Idle Mode.
- Charging Circuit isolated from switching circuit for battery protection.
- Doubles the charge / discharge cycles*.
- Small Lightweight Enclosure.
- Available for 12v Battery Strings (24v/48v) and is cascadable.
- External ON/OFF control when paired with Battery monitoring system.
- Low Q Current to prolong battery life



Technical Specifications

Number of Batteries	Minimum 2 x 12v Batteries. The Unit is cascadable for n number of cells.
Equalization	Active Equalization using energy storage element.
Circuit Q Current	6mA to 15mA depending of cell voltage.
Minimum Equalization	Maintains a minimum of 80mV difference in between the cells.
Power Supply	Derived from battery bank itself.
Enclosure & Mounting	ABS enclosure Wall mountable/ panel mount/ table top
Temperature	Operating: -20 Deg C to 50 Deg C Storage: -20 Deg C to 70 Deg C
Operation Modes	Equalizes in Charging, Discharging & Idle Mode

*As per Intelpac paper 32.1
* As per the company policy of innovation in design and development, the specifications and features are subject to change without any notice

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agv systems pvt ltd

SAMAQ-R :: Battery Equalizer

Overview

AGV's Samaq-R Battery equalizer unit is designed to equalize batteries connected in series and extend life of the battery bank.

The Samaq-R is a stand-alone system with a install and forget implementation

Samaq-R Doubles* the life of your battery bank giving you an excellent ROI

The Low Q current of the system does not drain the batteries and maintains a minimum voltage difference between the batteries.

Application Areas

- Series connected battery banks for Power Backup Systems.
- Electric Vehicles
- UPS batteries
- Telecom Battery installation
- Server room power systems
- Auxiliary Power Systems for mission critical application.

References

- Tested on Lead acid, Li-Ion battery chemistries.
- Both Vehicular and Industrial units have been tested for 12v batteries (2v cells).

Device Features

- Cascadable for battery strings
- Equalizes in Charging, Discharging
- Small Lightweight Enclosure.
- Available for 12v Battery Strings (24v/48v)
- Charging Circuit isolated from switching circuit for battery protection.
- Doubles the charge / discharge cycles*.
- External ON/OFF control when paired with Battery monitoring system.
- Low Q Current to prolong battery life

Technical Specifications

Number of Batteries	Minimum 2 x 12v Batteries. The Unit is cascadable for n number of cells.
Equalization	Passive Equalization using energy storage element.
Circuit Q Current	6mA to 15mA depending of cell voltage.
Minimum Equalization	Maintains a minimum of 80mV difference in between the cells.
Power Supply	Derived from battery bank itself.
Enclosure & Mounting	ABS enclosure Wall mountable/ panel mount/ table top
Temperature	Operating: -20 Deg C to 50 Deg C Storage: -20 Deg C to 70 Deg C
Operation Modes	Equalizes in Charging, Discharging & Idle Mode

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AGV SYSTEMS PRIVATE LIMITED

Battery Monitoring System

The company:

agv systems p. ltd is focused on designing, developing and deploying innovative leading-edge solutions for the Defence and Industry sector. **agv** is modestly deep into mission-critical Defence and Aero-Space application programs for the Govt. of India for complex DSP/Image-processing platforms, environmentally challenging PID controls and precision instrumentation and measurement solutions.

agv's *eBMS* series Electronic Control and Battery Monitoring Boards:

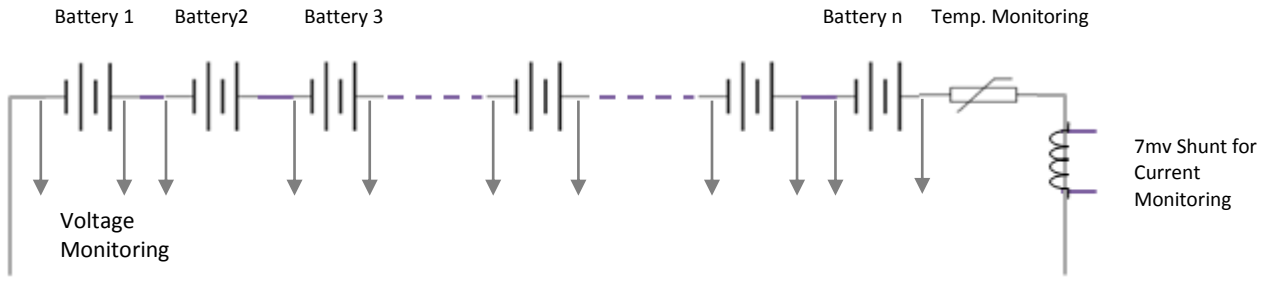
Conventionally Battery Monitoring Systems were offline measurements taken at regular intervals. agv systems' *eBMS* data acquisition boards are designed to be installed in the outdoor conditions to monitor various parameters real time.

Features:	Advantage:
➢ Bank & Individual Battery / Cell voltages	➢ 24X7 Continuous monitoring
➢ Charging, Discharging currents	➢ Performance of Battery bank & their utilization can be assured
➢ Ambient temperature of Battery environment	➢ System downtime helps to reduce
➢ Can be used with various combinations of batteries, irrespective of their make and voltage levels.	➢ State of Battery bank (Charging / Discharging / Idle)
➢ Operating voltage: 3-40VDC from Battery Itself.	➢ Remote monitoring of Single or Multiple Battery Banks - saves time

Technical Specification-BMS

Specification	Description
Operating Voltage Condition	
Operating Voltage	3-40V DC
Nominal Input Current	75mA
Operating Temperature Range	-10^{O} C to -85^{O} C
CPU	ARM Based Micro-controller System
Communication & Memory Details	
Communication Interface	RS485,USB 2.0,MODBUS
Memory	Store upto 10,000 Readings
Networking of BMS modules	Wired or Wireless(User Selectable)
System Input & Outputs	
Voltage	0-14V Per Channel
Current	0-50A / 0-100A / 0-200A / 0-300A (Selectable Sensors)
Operating Temperature Range	-10^{O} C to -85^{O} C
ADC Resolution	10bit
User Interface	
Visual Indication	LED Indications for Power ON
User Interface	Remote or Local display(User Selectable) for all measuring Battery / Cell parameters

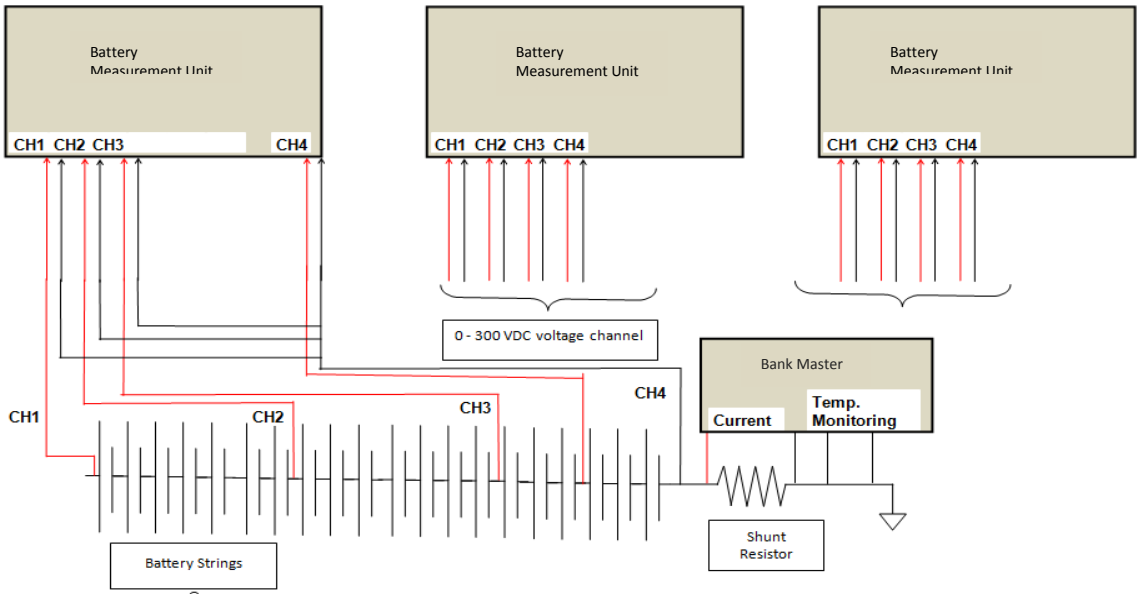
Basic Description:



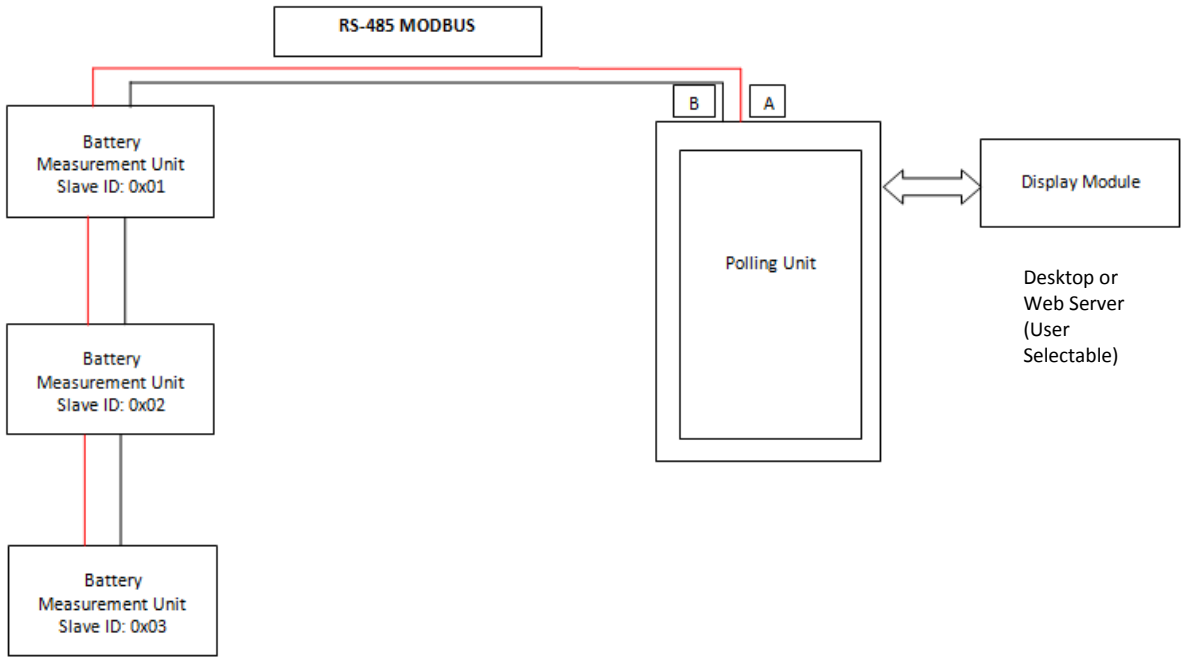
The Battery Monitoring System for a Battery measures the voltage at the output of the Battery with high accuracy. Multiple such Monitoring Units independently collect time stamped data and this data is sent over Ethernet (MODBUS) to a dedicated PC or Laptop via Router (not in AGV scope) or also possible to Display on dedicated data logger.

System Connectivity:

Accuracy-15mv
4 Batteries connected per Module
1 Current & 1 Temperature per String



Display module for showing measured Data:



a. The Polling Unit will start polling all the units for voltage & Current data from measurement Unit.
b. The polling unit will have necessary policies to manage maximum 135 voltages each from hardware units.
c. The data coming from the connected hardware units will be individually time-stamped and all the packets will be sorted as per time stamp and recorded in a database.
d. This recorded data will also be displayed on the display module on LCD Screen.

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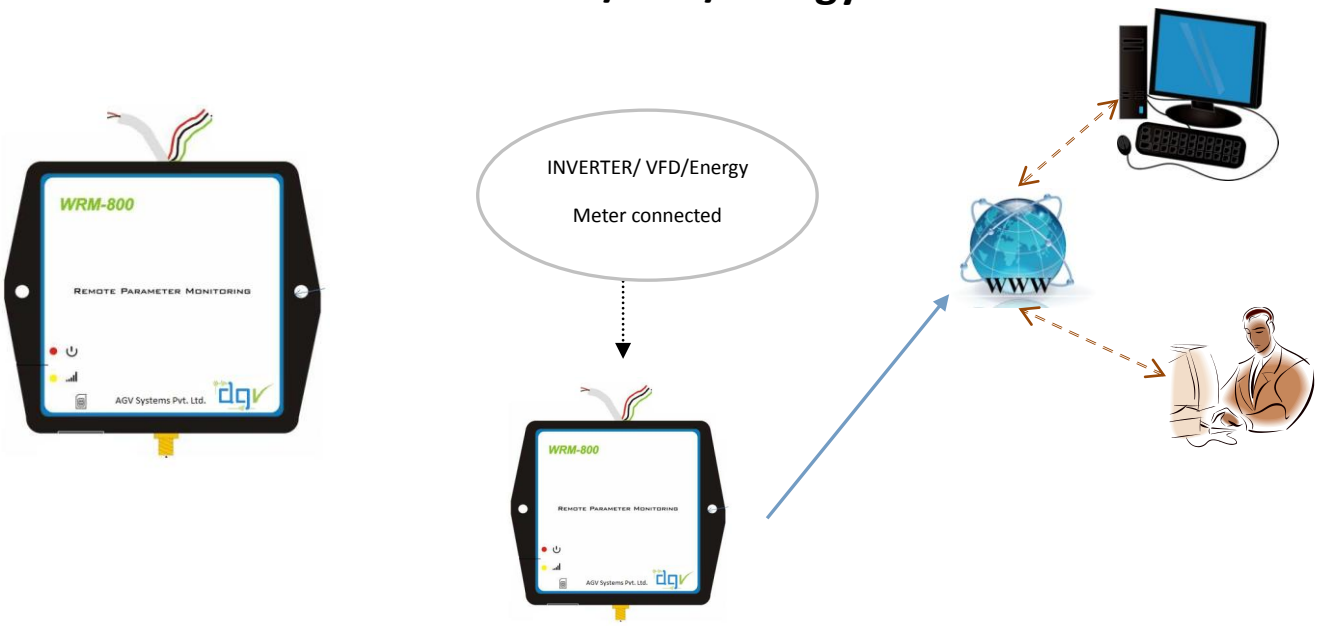
GSM-GPRS based Remote Parameter Monitoring System

For Inverter/VFD/Energy Meter



Technical Specifications - GSM-GPRS based Remote Parameter Monitoring Hardware

(Model: WRM800)

General Information	
Input Power Supply	Type 1 : 230VAC, 50Hz
Communication	
RS485 Interface with VFD	1 RS485 port with MODBUS Master RTU (9600 bps, 8 data bits, 1 start bit, 1 stop bit, parity : none)
GSM-GPRS	1. SMS Notification 2. Data Transfer to Remote Server via GPRS link
GSM Specifications	1. Quad Band 850 / 900 MHz 2. GPRS multi - slot class 10/8, GPRS mobile station class B
Mechanical	
Enclosure	Wall Mount Type (Color - Black)
SIM Card	Push - Push Type SIM Card Holder
GSM Antenna	External Antenna with magnetic base and 3 meter cable length
System Diagnostic	Through Web Application based on Parameters Monitored

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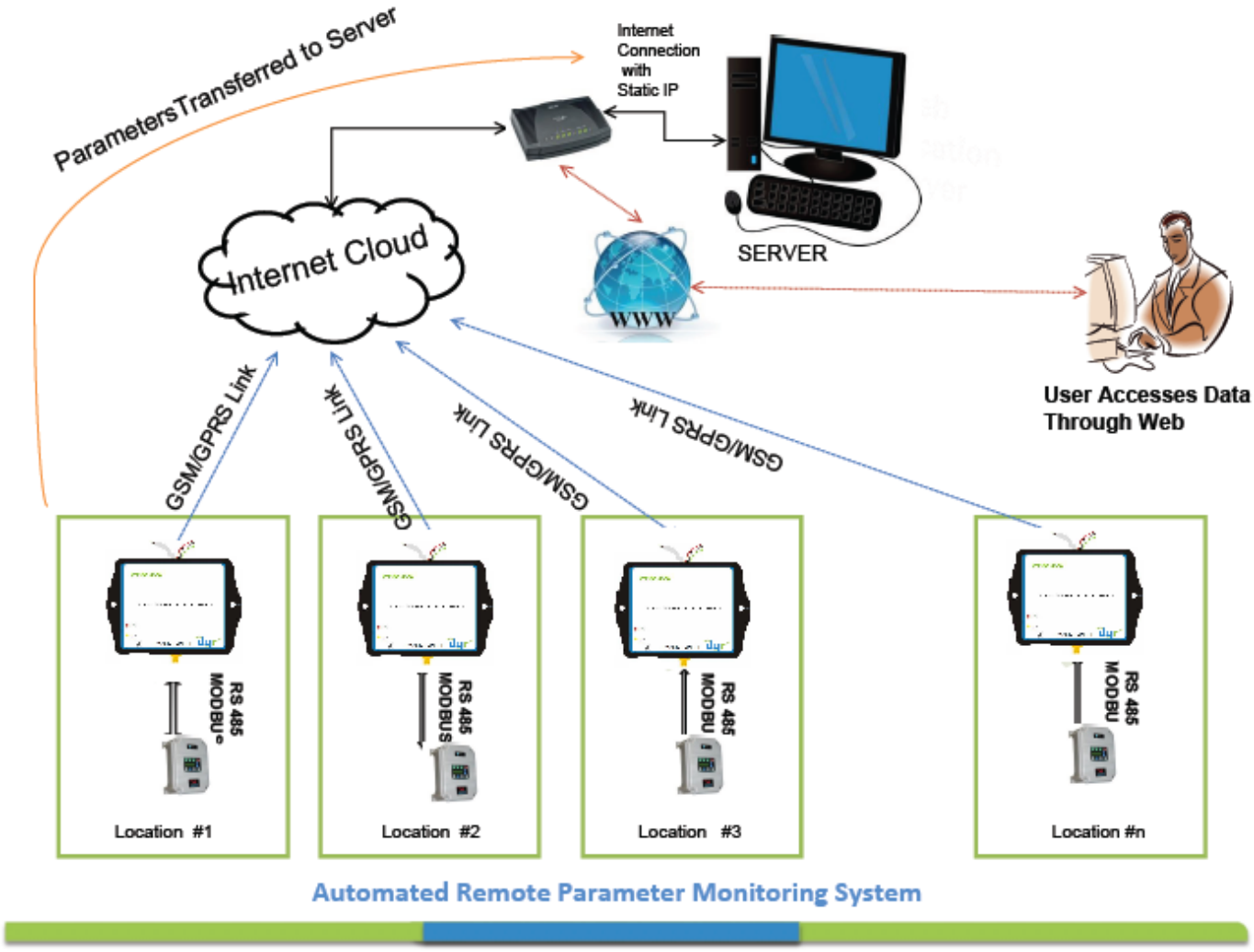
GSM-GPRS based Remote Parameter Monitoring System

For Inverter/VFD/Energy Meter

System Connectivity:

Following image illustrates the system scheme



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