GE
Grid Solutions

WORLDWIDE 10 YEAR WARRANTY

Multilin 850R

Recloser & Switch Controller

The Multilin 850R is a fully integrated universal recloser/switch and sectionalizer controller for overhead applications, delivering comprehensive performance in protection, monitoring, control, and automatic configuration of distribution networks.

At the core of the Multilin 850R is an integrated module comprised of driving electronics, capacitor and battery charger, an uninterrupted power supply eliminating the need for an external module. This optional module delivers high-speed operation, thereby ensuring true multiple-shot capability. This module also enables the Recloser Coil Circuit Supervision, Capacitor voltage alarm, and battery testing and monitoring features with Recloser/Switch health monitoring to ensure reliable performance.

With support for various settable capacitor charging voltage levels based on primary recloser, the 850R can be used with several leading reclosers.

Key Benefits

- Multifunction Distribution Automation Controller with Recloser/Switch/Sectionalizer (Tie-Bus) control for overhead applications
- Improved distribution network reliability with a fast and reliable dynamic tripping and 4 consecutive shot 1-Phase or 3-Phase Autoreclosing
- Supports 6 Low Energy Analog (LEA) or 4 traditional voltage Inputs
- Autoreclosing integrated high speed driving electronics board with capacitor and battery charging capabilities
- 5 shot switch control function included within the control
- 6 setting groups gives flexibility in building FDIR/FLISR logic as well as loop schemes for 1/3 pole operations, improving system reliability

- Adaptive reclose with zone/sequence coordination
- Support for 41 recloser curves
- Flexibility to assign the current and voltage terminal configuration to match the primary recloser and user terminal configuration
- Integrated Distribute Energy Resources (DER) management including local islanding features to achieve IEEE 1547-2018
- Comprehensive power quality monitoring as per IEEE 519
- Real time asset monitoring for increased reliability and optimized asset life
- Remote device management and easy maintenance with secure WiFi connectivity

Applications

- Tested to operate with G&W, ABB T&B and Cooper Nova Reclosers
- Recloser controller/ switch controller/tie switch for multi-applications
- Retrofit for existing recloser controllers (G&W, ABB T&B and Cooper)
- Retrofit for existing switch controllers (DART replacements for S&C Switches)
- Distribution Automation

Innovative Technology & Design

- Universal Recloser controller with built in Driving Electronics, Battery Charger & Monitoring system, Capacitor Charger
- Switch control functionality including Auto Sectionalizing
- 1P/3P control with FDIR/FLISR logic and IEC 61850 GOOSE
- FlexElements/Logic to help build customize complicated reclosing schemes
- Broken conductor & transient ground fault detection for safer overhead distribution
- Fast Under Frequency element for rapid load-shedding
- DER/Renewable interconnections to comply regional Grid Code using customizable under-voltage functions (e.g. 27T, 27Q)

Embedded Cyber Security

- Built-in cyber security features enabling NERC/CIP compliance & Achilles Level Certified
- AAA Server Support (Radius/LDAP)
- Role Based Access Control (RBAC)
- Event Recorder (Syslog for SEM)
- Encrypted (SSH)
- Cyber Security with Radius Authentication

Advanced Communications

- Modbus RTU, Modbus TCP/IP, IEC 61850
- GOOSE, IEC 61850 Ed 2 MMS, DNP 3.0, IEC 60870-5-104, IEC 60870-5-103, OPC-UA.
- IEC 61850 GOOSE with 128 Virtual Outputs and Virtual Inputs
- Secure Wi-Fi connectivity (WPA-2 security) for device setup, configuration and diagnostic retrieval

Protection & Control

The 850R provides secure and reliable protection & autoreclose functionality by offering a comprehensive range of standard and advanced protection and control elements. The controller provides directional and non-directional overcurrent protection along with the option of single-phase tripping and reclosing. Additionally, voltage and frequency protection elements may be used to disconnect Distributed Energy Resources (DER).
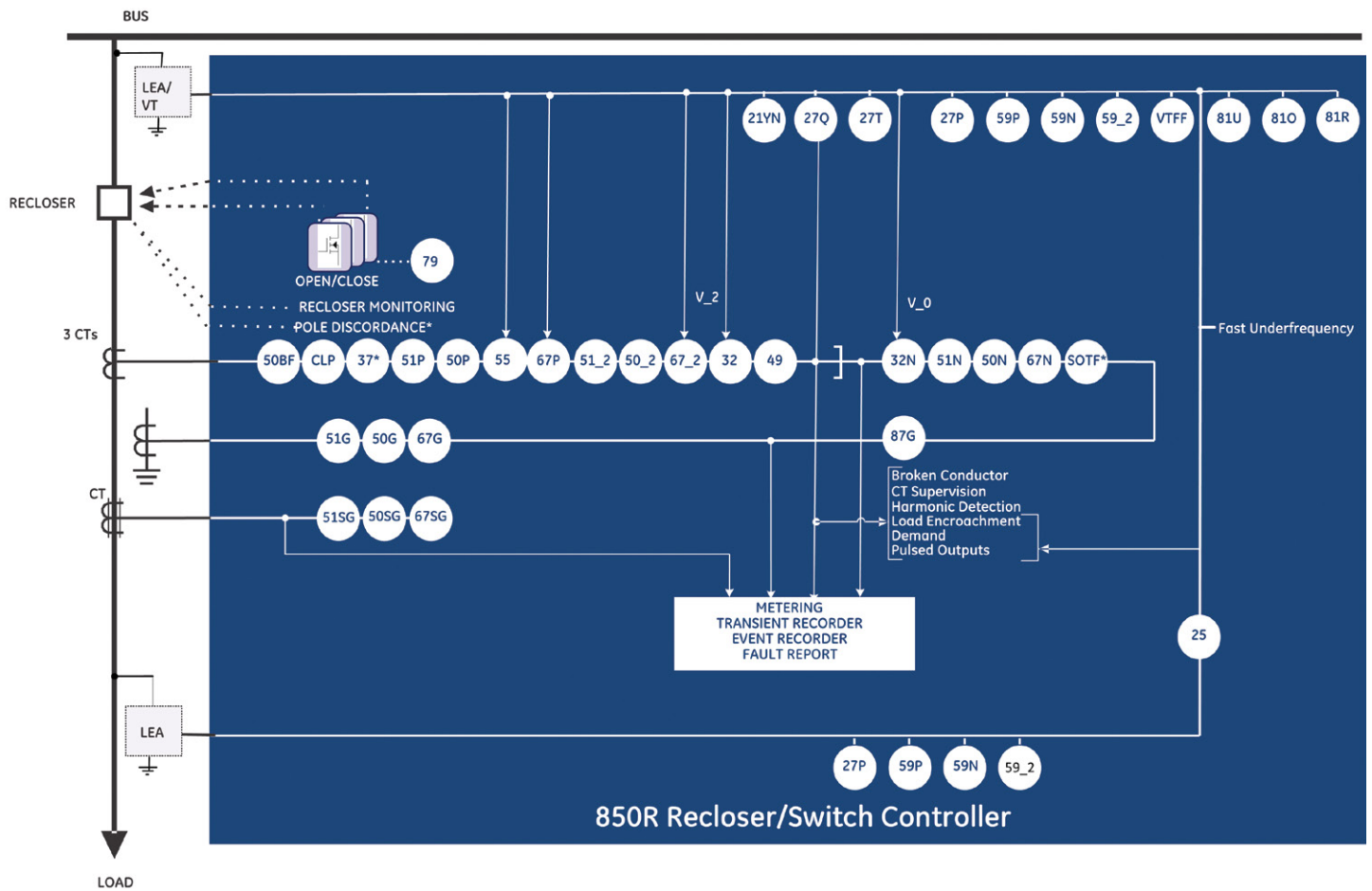
ANSI Device Numbers and Functions

ANSI NUMBER	DESCRIPTION
21YN	Neutral Admittance
25	Synchrocheck
27P	Phase Undervoltage
27Q	UV Reactive Power
27T	Timed Undervoltage Protection
27X	Auxiliary Undervoltage
32	Directional Power
32N	Wattmetric Ground Fault (Wattmetric zero sequence directional)
37	Undercurrent
49	Thermal Overload
50BF	Breaker Failure
50G	Ground Instantaneous Overcurrent
50SG	Sensitive Ground Instantaneous Overcurrent
50N	Neutral Instantaneous Overcurrent
50P	Phase Instantaneous Overcurrent
50_2	Negative Sequence Instantaneous Overcurrent

ANSI NUMBER	DESCRIPTION
51G	Ground Time Overcurrent
51SG	Sensitive Ground Time Overcurrent
51N	Neutral Time Overcurrent
51P	Phase Time Overcurrent
51_2	Negative Sequence Time Overcurrent
55	Power Factor
59N	Neutral Overvoltage
59P	Phase Overvoltage
59X	Auxiliary Overvoltage
59_2	Negative Sequence Overvoltage
67G	Ground Directional Element
67SG	Sensitive Ground Directional Element
67N	Neutral Directional Element
67P	Phase Directional Element
67_2	Negative Sequence Directional Element
79	Automatic Recloser
81O	Overfrequency
81U	Underfrequency
81R	Frequency Rate of Change

ANSI NUMBER	DESCRIPTION
87G	Restricted Ground Fault (RGF)
CLP	Cold Load Pickup
I1/I2	Broken Conductor
MCB	Manual Close Blocking
SOTF	Switch on to Fault
TGFD	Transient Ground Fault Detection
VTFF	Voltage Transformer Fuse Failure
	Auto Sectionalizer
	Battery Testing and Monitoring
	Capacitor and Coil Monitoring
	Fast Underfrequency
	Load Encroachment
	Overhead Switch Health Monitoring
	Power Loss
	PseudoVoltage
	Recloser Coil, Cap Voltage, and Health Monitoring
	Supply Switchover Function

Comprehensive Metering

The Multilin 850R offers comprehensive and accurate measurement and recording enabling actionable intelligence and post event analysis. Key metering parameters include:

- RMS PARAMETERS
- Currents Phase A, B, C, Neutral, Ground
- Voltages: A-N, B-N, C-N, A-B, B-C, C-A, Average Phase, Neutral and Residual Delta VTs: A-B, B-C, C-A, Neutral and Residual
- Real Power (Watts), Reactive Power (VArs), Apparent Power (VA), Power Factor, Watt-Hours (positive and negative)
- VAr-hours (positive and negative)
- PHASORS:
  - Current: Phase A, B, C, Neutral and Ground
  - Voltages: A-N, B-N, C-N, A-B, B-C, C-A, Average Phase, Neutral and Residual
  - Delta: A-B, B-C, C-A, Neutral and Residual
  - Frequency
- CURRENT AND VOLTAGE HARMONICS: Magnitude of each harmonic and THD, 2nd to 25th harmonic: per-phase
  - Harmonics measurement up to the 25th harmonic for both currents and voltages including THD
- DEMAND: Phase A/B/C present and maximum current, three-phase present, maximum real/reactive/apparent power, minimum real/reactive/apparent power

Data Measurement & Recording:

The Multilin 850R provides a transient recorder with a length that ranges from 31 cycles to 1549 cycles based on a user specified configuration. This gives user the ability to capture extended system disturbances and apply appropriate corrective actions if necessary.

The 850R also supports waveform capture and transient event capture in COMTRADE format. Included in the COMTRADE waveform capture function are 32 digital and 16 analog data points and are assigned by the user.

The 850R includes a comprehensive data recorder (load profiler) which records 16 user specified analog values at specified intervals. This can be useful for demand or power flow monitoring. Capture rates are selectable at 16ms, 20ms, 1 second, 30 seconds, 1 minute, 30 minutes, or 1 hour rates. This enables the operator to capture hours or even days' worth of data enabling detailed analysis for corrective action if required.

A detailed Fault Report can be used to identify the fault location, fault type and element(s) that caused the control to trip. It carries other useful information, such as pre-fault and fault phasors, relay name and model, firmware revision and other details. The relay stores fault reports for the last 16 events, 1024 Event Recorder chronologically lists all triggered elements with an Time-tag Accuracy of 1mS.
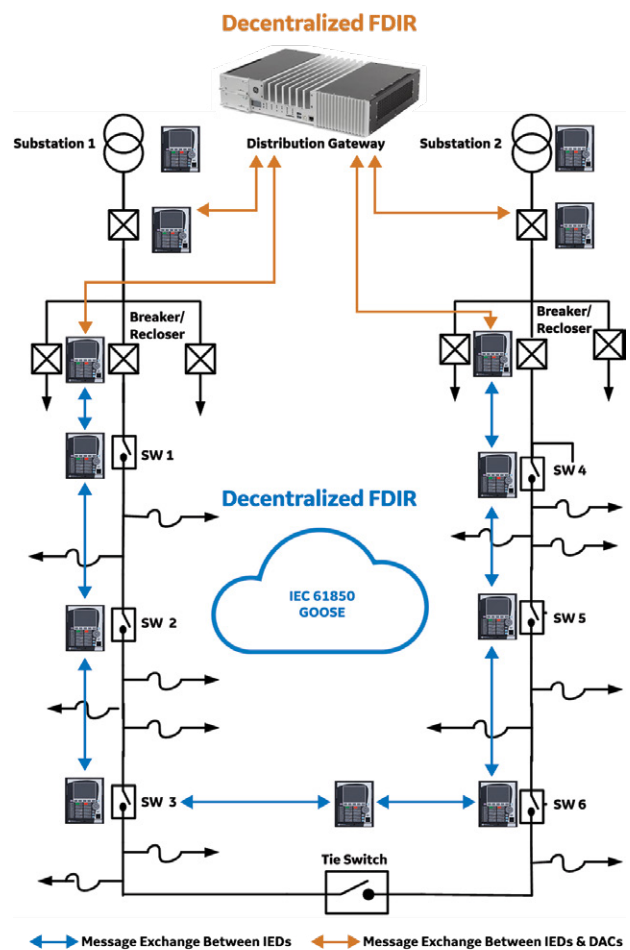
Distribution Automation

From simple automation to advanced analytics, the 850R provides the flexibility and scalability required to meet unique application requirements for the distribution utilities.

Distributed FDIR

The decision making algorithm utilized in Distributed FDIR is spread among the field devices in the covered area using IEC 61850 GOOSE multicast. This approach eliminates the need for a centralized or decentralized system, and therefore reduces the total cost. Since this approach uses IEC 61850 GOOSE peer-to-peer communication messages among the field devices, it can be much faster and cost effective than other options.

Decentralized FDIR

Decentralized FDIR is a model-based scheme with the decision making algorithm residing at the substation level rather than the DMS level. The substation controllers, known as Distribution Automation Controllers (DACs), can also send the received data to the DMS level for supervisory monitoring and control in a more efficient manner. Automation applications, such as IVVC, can still be added at the substation level.

Decentralized FDIR

Substation 1 — Distribution Gateway — Substation 2

Breaker/Recloser

Breaker/Recloser

SW 1 — SW 4

Decentralized FDIR

IEC 61850 GOOSE

SW 2 — SW 5

SW 3 — SW 6

Tie Switch

◄─► Message Exchange Between IEDs   ◄─► Message Exchange Between IEDs & DACs

Front Panel Visualization

The User interface is a color LCD front panel display with up to 6 configurable Single Line Diagrams (SLD), 12 control objects, 15 status & 15 metering objects with a provision to control the breakers and switches. Display of online metering and status information is also included.

Support for Recloser and switch control including Hot Line Tag through the single line diagram and 10 user-programmable pushbuttons. 10 user-programmable LEDs are used for indication.

Quality & Reliability

Industry-leading quality, reliability and design processes are at the core of the 850R. Significant investments in state-of-the-art type test facilities simulate a complete range of operating environments. The 850R is manufactured and designed to the IPC A-610 Class 3 standard, adhering to the highest reliability standards and ensuring rugged performance. Each device goes through one hundred percent Electrical Stress screening prior to shipping from GE's facility.

Setup & Configuration

EnerVista Setup & Configuration Software

The EnerVista™ Suite is an industry-leading set of software programs that simplifies every aspect of using the 850R. The EnerVista suite provides all the tools to monitor the status of the recloser, maintain the controller, and integrate information measured by the 850R into DCS or SCADA monitoring systems

Technical Specifications

- Compatible Reclosers G&W (Viper ST), ABB Joslyn TriMod, Eaton NOVA-TS or NOVA-STS
- Current Inputs: 1A or 5A
- AC Voltage Inputs: 4: Traditional or 6: Low Energy Analog
- Frequency and Phase Rotation 50/60Hz (3-72Hz Tracking)
- Communications Ports 2: Ethernet (FO or Copper), RS485
- Environmental (Dry heat) IEC60068-2-2: 85°C 16hrs

- Communications Protocols
  - DNP3.0, IEC 61850, IEEE 1588, SNTP, IEC 62439-3 clause 4 (PRP)
- Weight 9 kg [20.0 lbs] - Controller Only, 110kg [240 lbs] - Total Cabinet
- Operating Temperature Relay module -40°C to 60°C
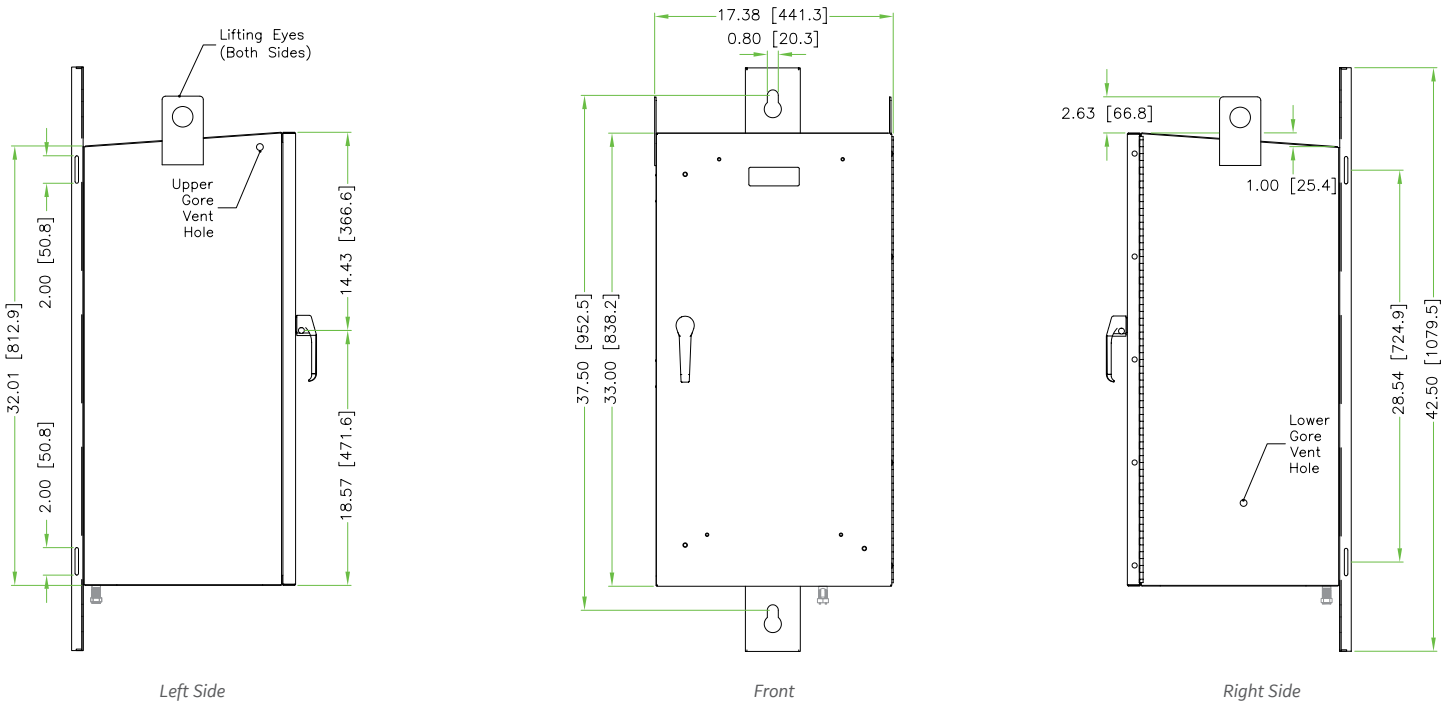- Environmental (Cold) IEC60068-2-1: -40°C 16 hrs

Enclosure

The 850R can be ordered inside a cabinet complete with Battery system. The main options will be the type of Recloser that needs to be interfaced with e.g. whether it is a traditional 14 pin, 24 pin, 32 pin or the latest 42 pin. With integrated driving electronics inside the 850R, the unit can be used to operate most reclosers just by defining the capacitor charging voltage for the specific recloser.
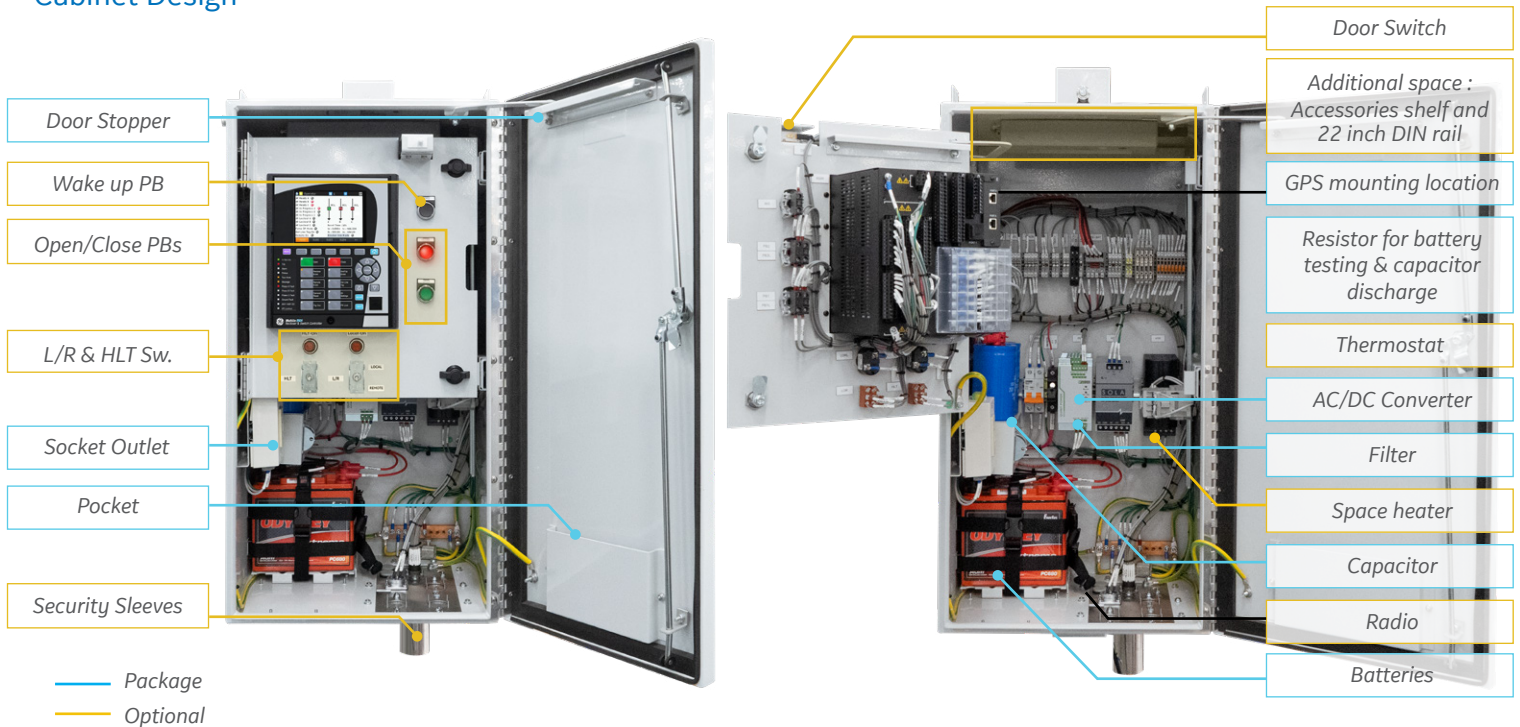
All enclosures come with a Pad-lockable handle with 3 point contact and provision to mount Radios on DIN Rail. The enclosure comes with a surge protector for the antenna and comes with a provision to attach the antenna to the bottom of the enclosure. The cabinet comes with a door switch with contacts wired to the controller for intrusion alarming. The cabinet comes standard with a duplex outlet and a space heater. Two vent holes with corresponding screened plugs are provided for ventilation with a provision at the bottom for grounding of the enclosure. The bracket for mounting the cabinet is weather resistant with key-hole opening.

Enclosure Dimension

Left Side

Front

Right Side

Cabinet Design

Door Stopper

Wake up PB

Open/Close PBs

L/R & HLT Sw.

Socket Outlet

Pocket

Security Sleeves

Door Switch

Additional space : Accessories shelf and 22 inch DIN rail

GPS mounting location

Resistor for battery testing & capacitor discharge

Thermostat

AC/DC Converter

Filter

Space heater

Capacitor

Radio

Batteries

— Package
— Optional

PACKAGE OPTIONS IN A CABINET	
Cabinet options	• Steel
	• Stainless steel
Interface connector	• 14 PIN
	• 26 PIN
	• 32 PIN
	• 37 PIN
	• 42 PIN
120V AC Connector	• 2 PIN
	• 3 PIN

PACKAGE OPTIONS IN A CABINET	
Ext Voltage	• 8 PIN
Radio	• MDS
Batteries	• 13 AH
	• 40 AH
Other Options	• GPS
	• Test Switch
	• Heater and Thermostat
	• Panel Light