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1 DOCUMENTATION

1.1 Introduction

Please read this manual thoroughly prior to use, in order to become familiar with the unit's numerous features and operating procedures. To obtain a maximum degree of safety, follow the prescribed sequences as outlined.

This manual contains warnings and notes to the user. Points that are vital to the proper operation or safety of the operator are indicated by: **WARNING**. Points that are important to the performance, the equipment or ease of use are covered by a notation that is in ***bold italics***.

2 GENERAL INFORMATION

2.1 Scope of the Manual

This instruction manual covers the installation and operation of the Wing Guard Battery Fail Monitoring System. The topics covered include product specifications, features, installation and operation.

2.2 Product Description

The Wing Guard Battery Fail Monitoring System (Figure 1) is designed to monitor the status of a single battery string. The method used is 'battery midpoint voltage monitoring'. The Wing Guard connection to the battery string splits the battery string voltage in half at the midpoint (Figure 5 of the installation section). The string voltage halves are compared. When the difference between the two exceeds the programmed value (set by front panel rotary switches) then an alarm is sent to the customer's office monitoring system via the contacts on relay 1. The status indicator (red LED) is flashing and requires manual intervention to reset (front panel push button).



FIGURE 1 – FRONT VIEW OF WING GUARD

A complete battery monitoring system consists of one or more Wing Guard modules installed on a Din-rail. See Figure 2. Additional Wing Guard modules can be added later, after the system has been installed (e.g. when additional battery strings are added).



FIGURE 2 – BACK VIEW OF WING GUARD



3 DESCRIPTION OF FEATURES, ALARMS AND CONTROLS

The following section will cover the various features and options available on the Wing Guard Battery Fail Monitor.

3.1 Module Indicators

There are three indicators on the Wing Guard module to provide visual indication of its operational status (see Figure 1). The conditions and associated colours are:

Module Power On	Green
Low Voltage Fail	Green flash
Battery Condition Fail	Red

3.1.1 Module Power indicator

The LED indicator lights up when the Wing Guard module is getting power from the battery and the status is OK.

3.1.2 Low Voltage Fail

The LED indicator flashes when there is a Low Voltage Fail.

3.1.3 Battery Condition Fail

The LED indicator will turn to RED when the battery is in fail condition.

3.2 Fail Alarm

The Wing Guard Battery Fail Monitoring System module is equipped with two fail alarms which are extended to an alarm module (customer's monitoring system) via the contacts on one of the two Form C relays (see installation section of this manual). The alarm can indicate one of the following conditions:



- If the voltage drops to 52,5 Volt,
- If the battery cell is open,
- If there is a bad connection,
- If the cell is performing inefficiently,
- If the battery cell is shorted.

3.2.1 Fail Alarm Contact

The Wing Guard module has a terminal block for the Form C relay alarms located on the top of the module; both normal open and normal close contacts are available. The Low Voltage Fail alarm contacts will change state when the voltage drops to 52,5 Volt. The Battery Condition Fail alarm contacts will change state when the voltage difference between the two halves monitored exceeds the programmed value, set by the front panel control.

NOTE: The NC contact for the Fail Alarms closes during an alarm condition.

3.3 Reset Button

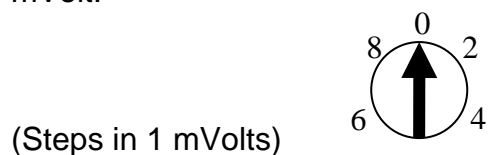
The local alarm indicator is flashing (red LED or green flashes). *You must press the Wing Guard front panel push button to reset.*

3.3.1 Automatic reset

When the alarms are solved, the Wing Guard will reset automatically when there is a connection between 4 and 5 on top of the Wing Guard module.

3.4 Mid-Point Alarm Setting Control

4 front panel rotary switches (Figure 1) with 10 indents allows the user to set the maximum allowable voltage deviation in battery string halves to 1 mVolt up to 9999 mVolt.





3.5 Battery Mid-Point Voltage Contacts

On top of the Wing Guard there is an open connecting to be used by the customer (See also Fail Alarm Contacts). This is a design equipped with screw terminals, same as for the battery terminals (in addition to the Fail Alarm contacts described above).

3.7 Mounting

Universal mounting by Din-rail standard, makes mounting of the Wing Guard very easy.

3.8 Universal Operation

The Wing Guard obtains power directly from the battery for universal 48 Volt operation. ***The module is internally fused and diode protected from damage in case reverse polarity connection is made.***

4 INSTALLATION INSTRUCTIONS

This section is provided for qualified personnel to install and interconnect the Wing Guard battery fail monitoring system.

4.1 Inspection

Unpack the unit and inspect the exterior. ***If any damage is observed, contact the carrier immediately.*** Continue the inspection for internal damage. In the unlikely event of internal damage, please inform the carrier and contact Wetac for advice on the impact of the damage.

4.2 Preparation/Mounting

The Wing Guard Battery Fail Monitor has been designed for mounting on a standard din-rail.

The unit must be mounted in a clean and dry environment.



4.3 Alarm Connections

Insert each wire into the appropriate terminal on the terminal block (Figure 3) and secure the wires by tightening the terminal with the terminal screw. See specifications section of this manual for recommended wire sizes.

WARNING: Do not over tighten the terminal screws. This can result in damage to the input connectors.

The Fail Alarm terminals are connected to the relay contacts from the Wing Guard module and both normal open or normal close contacts are provided.

NOTE: The Fail Alarm relay is de-energized during alarm conditions.

4.4 Module Installation and Removal

Warning: Leave cables disconnected from battery and verify polarity using a voltmeter. Make battery connections only after all other wiring is completed.

Warning: HIGH VOLTAGE AND SHOCK HAZARD. Only qualified personnel familiar with line and battery voltage should attempt to change modules while the Wing Guard Battery Fail Monitor is energized. Remove rings, watches and other jewellery before performing this procedure. Keep fingers clear of live electric parts while unit is energized.

4.4.1 Installing Module

Battery sense leads should be bundled from the module to the battery. Insert each wire into the appropriate terminal on the terminal block and secure the wires by tightening the terminal screws. See specifications section of this manual for recommended wire sizes.

WARNING: Do not over tighten the terminal screws. This may result in damage to the input connectors.

The terminal block can be plugged in to the Wing Guard module.



4.4.2 Removing Module

Unplug the two cable connectors from the front of the module. Detach the module from the din-rail.

4.5 Initial Start-up

After completing the system wiring and installation, perform the following start-up and test procedure to ensure proper operation.

Confirm that the battery sense leads and alarm cables are connected to the terminal of the correct polarity at the Wing Guard module. See TB (terminal block) in Figure 4.

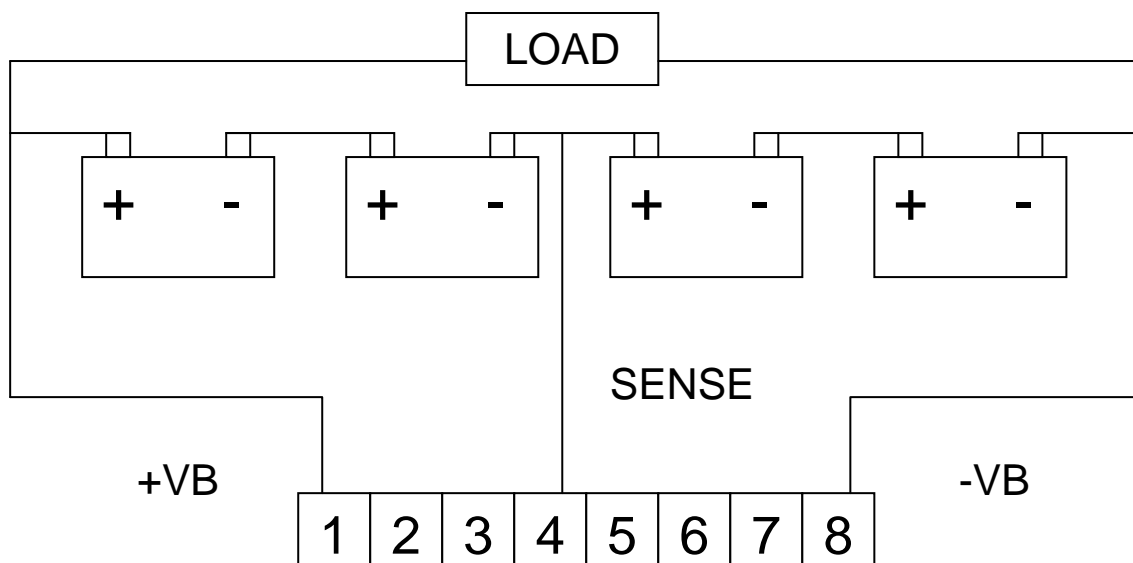


FIGURE 4 – SHOWING WING GUARD TERMINAL TO BATTERY CONNECTIONS

WARNING: Check battery polarity. Failure to do so could damage the unit and/or battery.

Verify the battery installation according to the instructions provided by the battery manufacturer.

Measure total battery string voltage and the midpoint voltage.

Push the learn button for 5 seconds, the green led will flash.



Set the midpoint monitor to the desired voltage deviation setting, which should be greater than the midpoint voltage differential under normal operating conditions. 500 mV is recommended.

Test the module by pushing the test button. (The module will test all functions and alarms)

4.6 Normal Mode of Operation

Normal operation of the battery fail monitoring system will be indicated by the illumination of the status led indicator by green.

When the voltage drops to 52,5 Volt the status led will flash green.
(LOW VOLTAGE FAIL)

An open cell, shorted cell or poor performing cell will cause the midpoint voltage deviation to shift exceeding the midpoint voltage setting. This will result in a battery midpoint alarm indicated by the illumination of the status led indicator by red.
(battery fail)

NOTE: ***Some fine tuning may be required to obtain the ideal setting that is sensitive enough to detect a 'bad' cell and will not produce false alarms.***

The midpoint voltage setting will have to be adjusted within the functional range and is dependant upon many factors including the battery characteristics under float, charge and discharge conditions.