THOR
Battery Backed DC Power Supply
Reference Manual

Revision A
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Table of Contents

OVERVIEW ____ **2**

Operation and Configuration Considerations: **2**

Example of a Typical SCADA Application. **3**

FRONT PANEL ____ **4**

Front Panel LED's **5**

TERMINAL BLOCK FIELD WIRING CONNECTIONS **5**

REAR PANEL ____ **6**

Wiring THOR Power Supplies **6**

Typical SCADA System Wiring 6

SPECIFICATIONS ____ **8**

THOR Power Supply Dimensions 9

Overview

The THOR Battery Backed power supplies are a family of power supplies designed to power high reliability SCADA systems. There are currently three models; one with a 12Vdc output, a second with a 24Vdc output, and a third with both a 12 1nd a 24Vdc outputs. Each member of the family has a 100 watt capacity. When used with a battery, a portion of the output capacity is utilized to charge the battery. With a charged battery connected, constant DC power is provided to the load regardless of what happens to the power supply input. When input power is lost, the THOR power supplies automatically switch to battery power. The 12Vdc and the 12Vdc/24Vdc versions utilize a single 12Vdc battery (on the later, the 24Vdc output is generated from 12Vdc power., while the 24Vdc version requires 24Vdc of battery capacity, typically supplied by two 12Vdc batteries wired in a series configuration. When input power is supplied, the batteries are automatically charged/recharged.

Each THOR model has LED indicators and alarm contacts, showing when input power is supplied and lost, when battery power is being utilized to power the load, and when the batteries are nearly dissipated. A third output/indicator shows when a battery is misconnected (reverse polaritry).

The THOR supplies are automatically protected from accidental overloads, battery misconnection and automatically and cleanly disconnect the load when battery capacity is exhausted, preventing deep discharge damage to the battery.

The THOR power supplies have the following features:

- 100W capacity
- Extended operating temperature
- Outputs protected from overloads and automatically recover from overloads
- Battery reversal and deep discharge protection
- “Dry” alarm relay contacts
- AC and DC input power
- DIN Rail Mounting
- Pluggable terminal blocks for rapid installation and removal

  With an add-on option, THOR power supplies may be parallel connected to provide redundant power in extremely high-reliabilty applications.

Operation and Configuration Considerations:

THOR power supplies can provide long-term highly reliable power, especially in SCADA systems. Please keep the following in mind when applying them in your system:

- A derating factor must be applied to the output ratings when operating at temperatures above 50^{o}C
- Batteries should be replaced regularly, depending on the environment (typically once per year).
- Leave adequate room around the power supply, since there are no fans, just convection cooling.

Example of a Typical SCADA Application.

Figure 1 illustrates a typical SCADA system with a programmable SCADA controller powered by a THOR power supply and a lead-acid backup battery. Note the use of the alarm status outputs going to digital inputs on the SCADA controller.

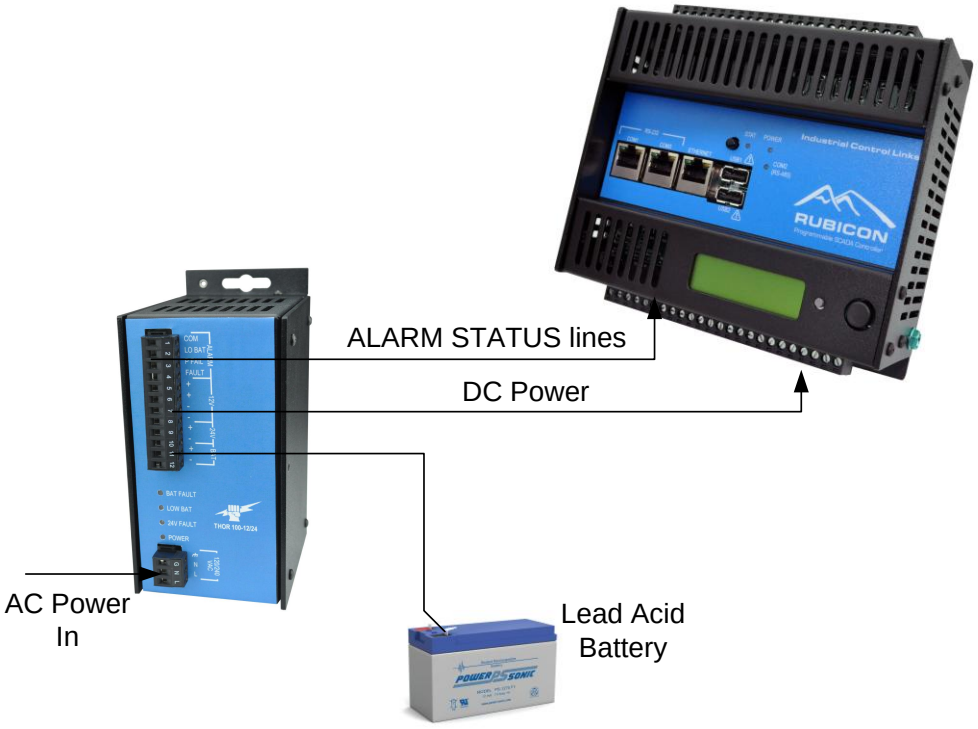

Figure 1

Front Panel

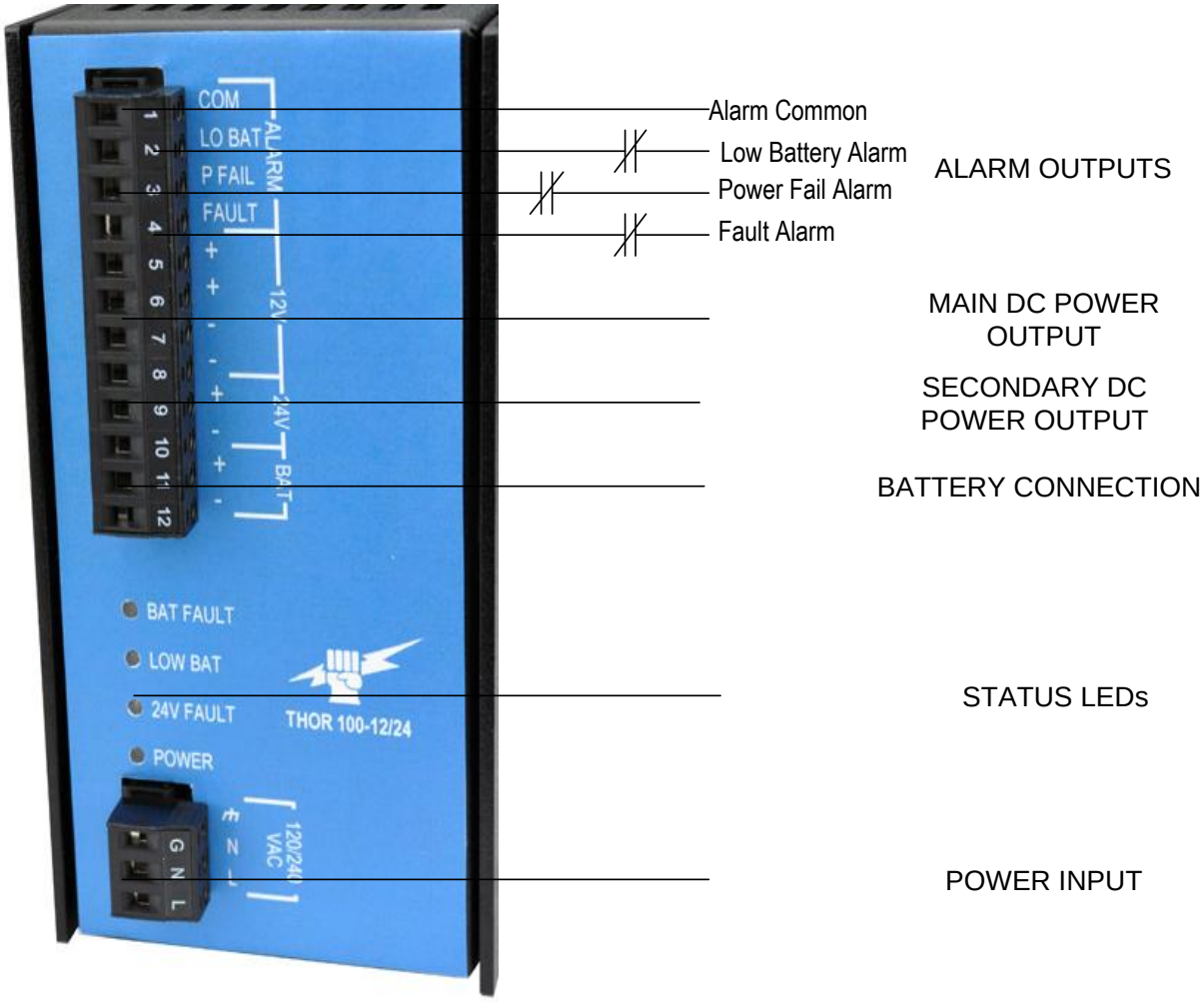

Figure 2

ALARM OUTPUTS

THOR power supplies have three alarm contacts and a common shared by all three alarm outputs. The contacts are normally closed, and open for an alarm condition.

Status LED Condition	Meaning
LO BATT	Active when under battery power signals that battery level has dropped to around 10(20) volts. The output will cut off about 1 (2) volts lower.
POWER FAIL	Input power failed, running from battery power
FAULT	Short circuit or failure on

	primary or 2nd supply out

Front Panel LED's

THOR power supplies haqve either three or four LED indicators located on the front panel:

Status LED Condition	Meaning
BAT FAULT	Lights RED when the battery is reverse connected
LOW BAT	Input power failed, running from battery power, and the battery level is low (around 10/20 volt threshold)
24V FAULT	On the 12/24 version, indicates that the secondary output has failed.
POWER	Lights GREEN when external power is powering the unit. Lights RED when using battery power.

Table 1

TERMINAL BLOCK FIELD WIRING CONNECTIONS

THOR power supplies utilize pluggable terminal blocks for field wiring connection. Wirte gauges down to 12AWG can be accommodated. The power input terminal block has three connections, including a frame (safety) ground terminal. The other terminal block has 12 positions, 6 for power out, two for battery connections (when using battery backup), and the remainder for alarm annunciation. Note that the power output ratings are specified with and without a battery, since a portion of the output power is used to charge the backup battery.

Rear Panel

Wiring THOR Power Supplies

Typical SCADA System Wiring

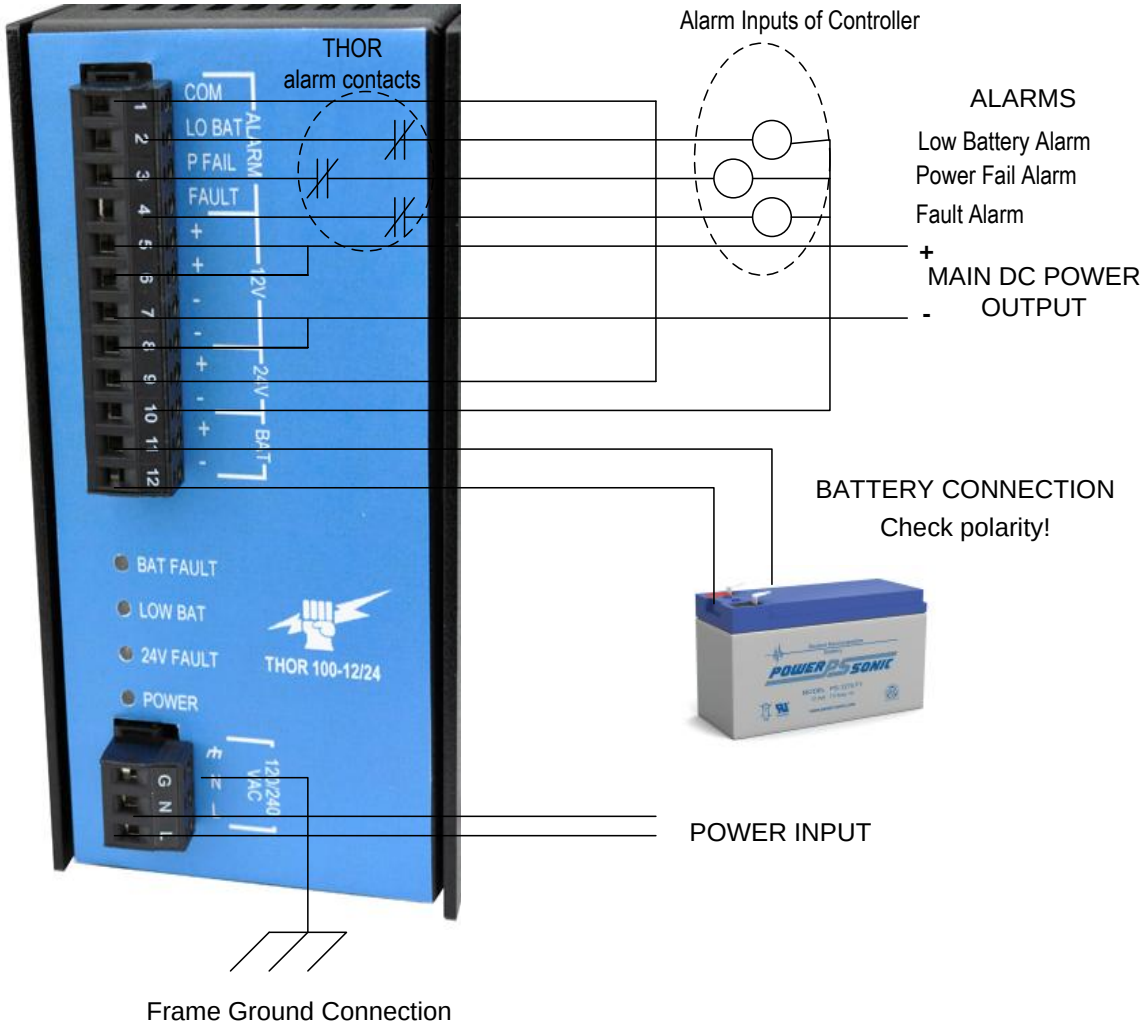

Figure 3

Notice that the alarm circuits are typically powered by the power supply. If a complete power failure occurs (no battery backup), the alarm circuits will not be powered, providing a general alarm indication (the alarm outputs are normally powered or ON when "OK".

Specifications

12Vdc Model

Output Voltage	13.7Vdc nominal
w/Input Power	User adjustable from 12Vdc to 15Vdc
w/battery power	9.5Vdc to 13.2Vdc depending on battery voltage (Battery Voltage – 0.5Vdc)
Output Current	4.75A with battery, 7A without battery
Battery	12Vdc Gel-Cell (user supplied)
Charge Current	2.5A
Low Warning	<11Vdc
Low Battery Cutoff	10Vdc +/- 0.5Vdc
Efficiency	86%

24Vdc Model

Output Voltage	27.6Vdc nominal
w/Input Power	User adjustable from 24Vdc to 29Vdc
w/battery power	19Vdc to 26.9Vdc depending on battery voltage (Battery Voltage – 0.5Vdc)
Output Current	2.4A
Battery	2 x 12Vdc Gel-Cell (user supplied)
Charge Current	1.25A
Low Warning	<22Vdc
Low Battery Cutoff	20Vdc +/- 1Vdc
Efficiency	88%

12/24Vdc Model

Output Voltage – 12V Output	13.7Vdc nominal
w/Input Power	User adjustable from 12Vdc to 15Vdc
w/battery power	9.5Vdc to 13.2Vdc depending on battery voltage (Battery Voltage – 0.5Vdc)
Output Current	4.75A with battery, 7A without battery *
Output Voltage – 24V Output	24 Vdc nominal
w/Input Power	24Vdc +/- 0.5Vdc
w/battery power	24Vdc +/- 0.5Vdc
Output Current	1.25A*
	*Do not exceed total of 65 watts combined between the two outputs (w/battery), 100watts combined w/o battery
Battery	12Vdc Gel-Cell (user supplied)
Charge Current	2.5A
Low Warning	<11Vdc
Low Battery Cutoff	10Vdc +/- 1Vdc
Efficiency	82%

Input Power

Voltage	90 to 264Vac (47Hz to 63Hz), 127 to 370Vdc
Current	2A (115Vac in), 1.2A (230Vac in)

Output Power

Load Output	100 watts (no battery), 65 watts (with battery)
Line Regulation	+/- 0.5%
Load Regulation	+/- 0.5%
Temperature Derating	-20°C to +50°C – no derating. Derate 2.5%/°C from 50°C, up to 50% at 70°C

General

Terminal Blocks	Removable, 5.08mm (0.2"), 12 to 22AWG, 15A/contact maximum
Mounting	35mm. DIN rail or panel mount
Dimensions	1.4"W x 3.7"H x 3.8"D (includes terminal block and elevation off panel on DIN rail)
Warranty	3 years, factory parts and labor

Part Number

90-0021 12Vdc, 60/100W Battery-backed DC Power Supply
90-0022 24Vdc, 60/100W Battery-backed DC Power Supply

THOR Power Supply Dimensions

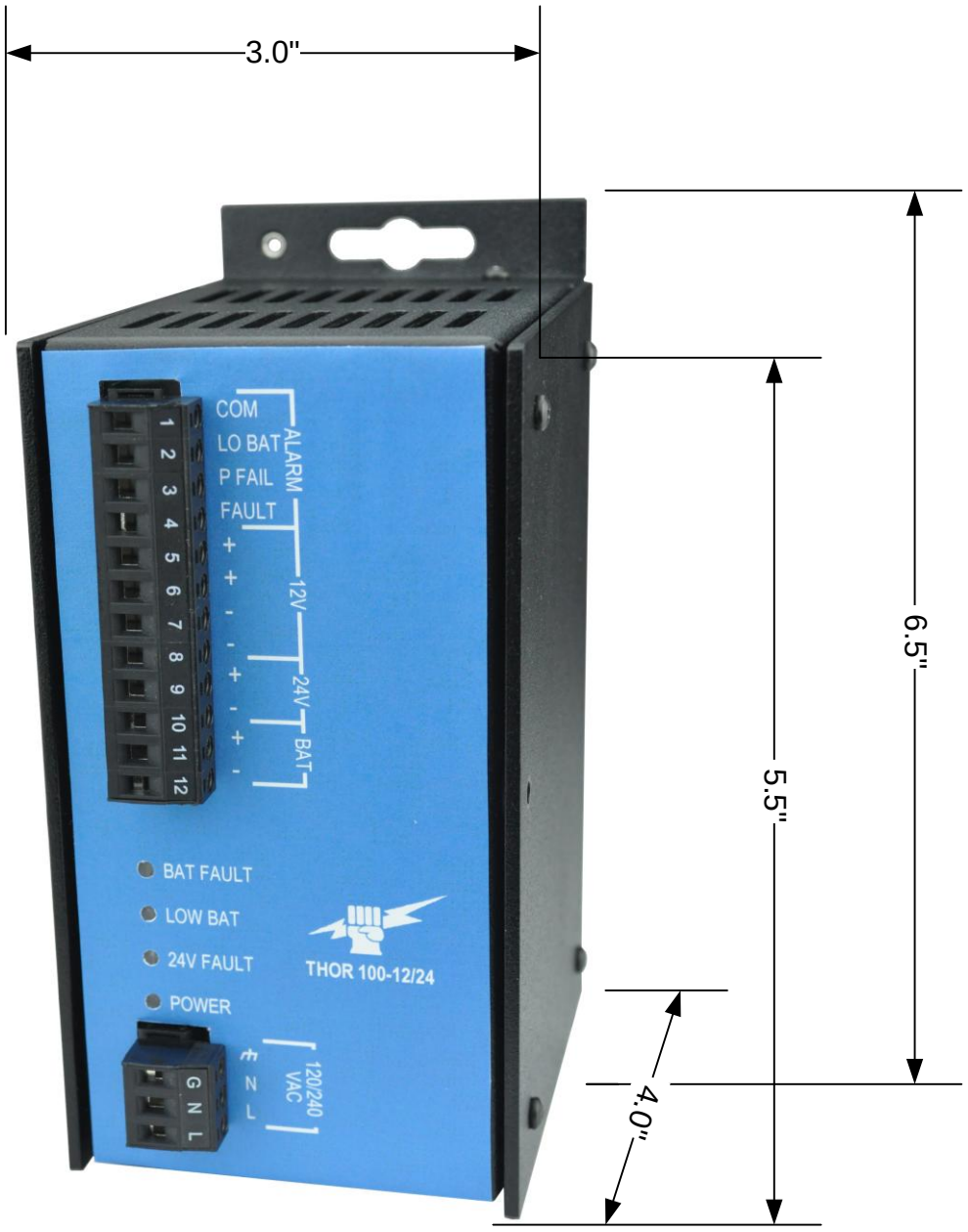

Figure 4