



# NetSure™ SM-DU+ Supervision Module for Distribution Unit Plus

## Installation and User Manual

Specification Number: 10010507

Model Number: SM-DU+

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## Admonishments Used in this Document



**DANGER!** Warns of a hazard the reader *will* be exposed to that will *likely* result in death or serious injury if not avoided. (ANSI, OSHA)



**WARNING!** Warns of a potential hazard the reader *may* be exposed to that *could* result in death or serious injury if not avoided. This admonition is not used for situations that pose a risk only to equipment, software, data, or service. (ANSI)



**CAUTION!** Warns of a potential hazard the reader *may* be exposed to that *could* result in minor or moderate injury if not avoided. (ANSI, OSHA) This admonition is not used for situations that pose a risk only to equipment, data, or service, even if such use appears to be permitted in some of the applicable standards. (OSHA)



**ALERT!** Alerts the reader to an action that *must be avoided* in order to protect equipment, software, data, or service. (ISO)



**ALERT!** Alerts the reader to an action that *must be performed* in order to prevent equipment damage, software corruption, data loss, or service interruption. (ISO)



**FIRE SAFETY!** Informs the reader of fire safety information, reminders, precautions, or policies, or of the locations of fire-fighting and fire-safety equipment. (ISO)



**SAFETY!** Informs the reader of general safety information, reminders, precautions, or policies not related to a particular source of hazard or to fire safety. (ISO, ANSI, OSHA)

# Important Safety Instructions

## Safety Admonishments Definitions

Definitions of the safety admonishments used in this document are listed under “Admonishments Used in this Document” on page iv.

## General Safety



**DANGER!** YOU MUST FOLLOW APPROVED SAFETY PROCEDURES.

Performing the following procedures may expose you to hazards. These procedures should be performed by qualified technicians familiar with the hazards associated with this type of equipment. These hazards may include shock, energy, and/or burns. To avoid these hazards:

- a) The tasks should be performed in the order indicated.
- b) Remove watches, rings, and other metal objects.
- c) Prior to contacting any uninsulated surface or termination, use a voltmeter to verify that no voltage or the expected voltage is present. Check for voltage with both AC and DC voltmeters prior to making contact.
- d) Wear eye protection.
- e) Use certified and well maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed.

## Personal Protective Equipment (PPE)



**DANGER!** ARC FLASH AND SHOCK HAZARD.

Appropriate PPE and tools required when working on this equipment. An appropriate flash protection boundary analysis should be done to determine the “hazard/risk” category, and to select proper PPE.



Only authorized and properly trained personnel should be allowed to install, inspect, operate, or maintain the equipment.

Do not work on LIVE parts. If required to work or operate live parts, obtain appropriate Energized Work Permits as required by the local authority, per NFPA 70E “Standard for Electrical Safety in the Workplace”.

## Handling Equipment Containing Static Sensitive Components



**ALERT!** Installation or removal of equipment containing static sensitive components requires careful handling. Before handling any equipment containing static sensitive components, read and follow the instructions under “Static Warning” on page vi.

## Static Warning



This equipment contains static sensitive components. The warnings listed below must be observed to prevent damage to these components. Disregarding any of these warnings may result in personal injury or damage to the equipment.

1. Strictly adhere to the procedures provided in this document.
2. Before touching any equipment containing static sensitive components, discharge all static electricity from yourself by wearing a wrist strap grounded through a one megohm resistor. Some wrist straps have a built-in one megohm resistor; no external resistor is necessary. Read and follow wrist strap manufacturer's instructions outlining use of a specific wrist strap.
3. Do not touch traces or components on equipment containing static sensitive components. Handle equipment containing static sensitive components only by the edges that do not have connector pads.
4. After removing equipment containing static sensitive components, place the equipment only on static dissipative surfaces such as conductive foam or ESD bag. Do not use ordinary Styrofoam or ordinary plastic.
5. Store and ship equipment containing static sensitive components only in static shielding containers.
6. If necessary to repair equipment containing static sensitive components, wear an appropriately grounded wrist strap, work on a conductive surface, use a grounded soldering iron, and use grounded test equipment.

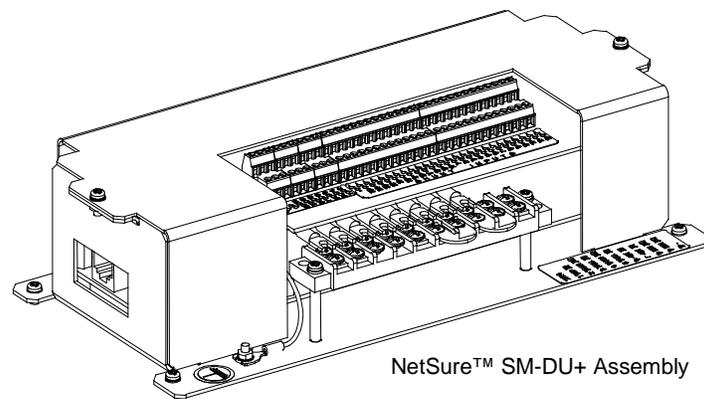
# 1 Introduction

## 1.1 Overview

This assembly consists of a Vertiv™ NetSure™ SM-DU+ enclosed in a sheet metal housing. This assembly is used in applications where the NetSure™ SM-DU+ is mounted external to a power system equipped with an NCU controller. The NetSure™ SM-DU+ assembly is used to connect load shunts and fuse alarm signals to the NCU controller. The NetSure™ SM-DU+ assembly provides twenty-five (25) load shunt monitoring inputs and fourteen (14) fuse alarm monitoring inputs.

The NetSure™ SM-DU+ assembly connects into the NCU CAN bus. **Up to** eight (8) NetSure™ SM-DU+ assemblies can be connected to an NCU. See the System Application Guide (SAG) of the applicable power system for the quantity of SM-DU+ assemblies that can be connected to that system. Refer to Figure 1.1 for an illustration of the NetSure™ SM-DU+ assembly.

**Figure 1.1 NetSure™ SM-DU+ Assembly**



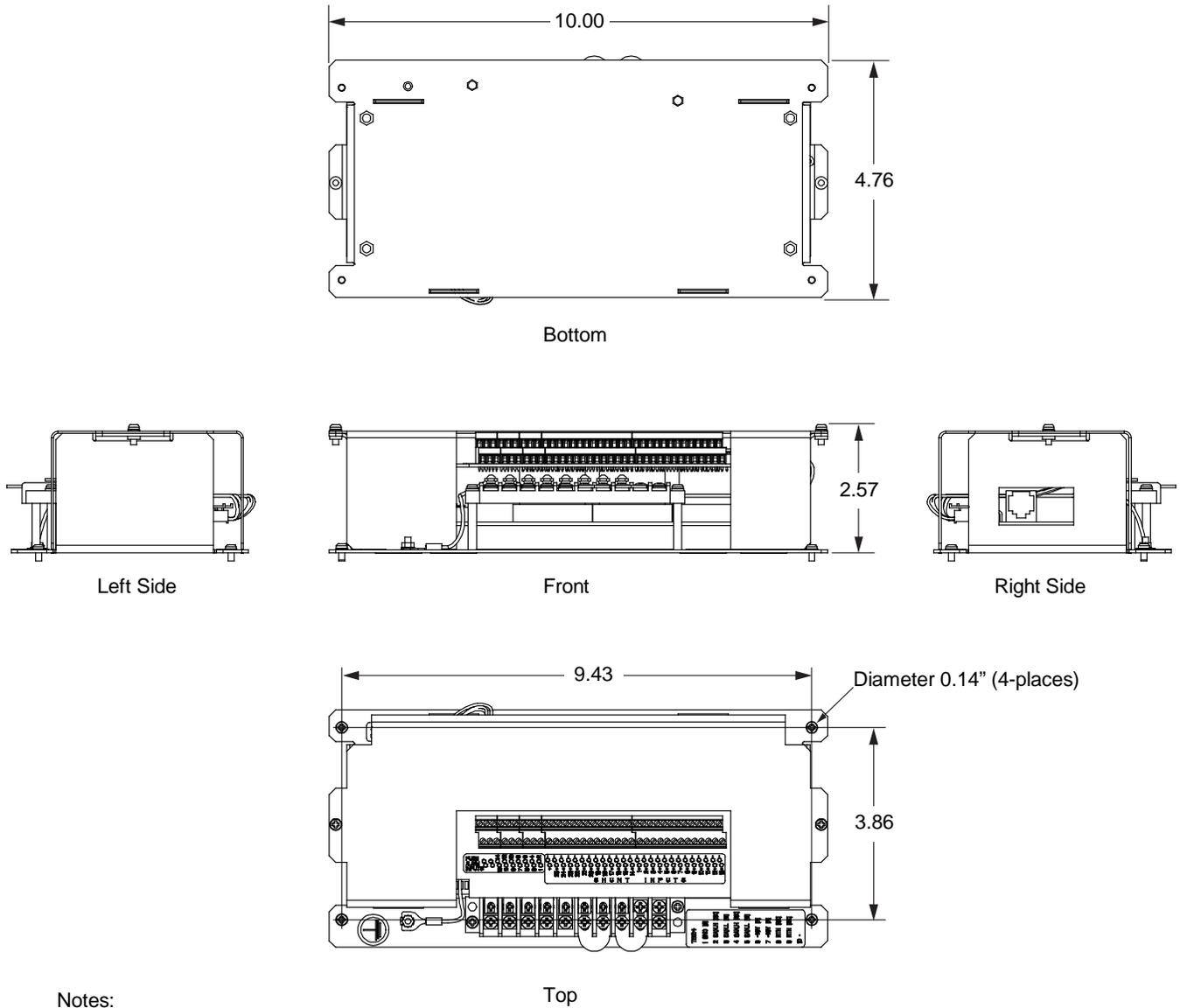
## 1.2 Technical Specifications

See Table 1.1.

**Table 1.1 Technical Specifications**

Item	Description
Operating Voltage	Nominal: -48 VDC. Input Voltage Range: -19 VDC to -60 VDC.
Input Current	<2 Amps
Operating Temperature Range	Normal Operation Temperature Range: -10°C to +65°C. Non Destructive Range: -40°C to +75°C.
Communication	CAN Bus
Input Signals	Fourteen (14) Fuse Alarm (Bus- base of 0 VDC, >10 VDC alarm, <10 VDC normal).
	Twenty-Five (25) Load Shunts (25 mV DC to 75 mV DC Shunt)
Dimensions	See Figure 1.2.

Figure 1.2 Dimensions



Notes:

1. All dimensions are in inches, unless otherwise specified.

## 2 Switch Settings

### 2.1 General

The Vertiv™ NetSure™ SM-DU+ assembly uses two (2) 8-bit switches for parameter settings (SW1 and SW2). Refer to Figure 2.1 for SW1 and SW2 locations. Refer to Table 2.1 for SW1 and SW2 settings.

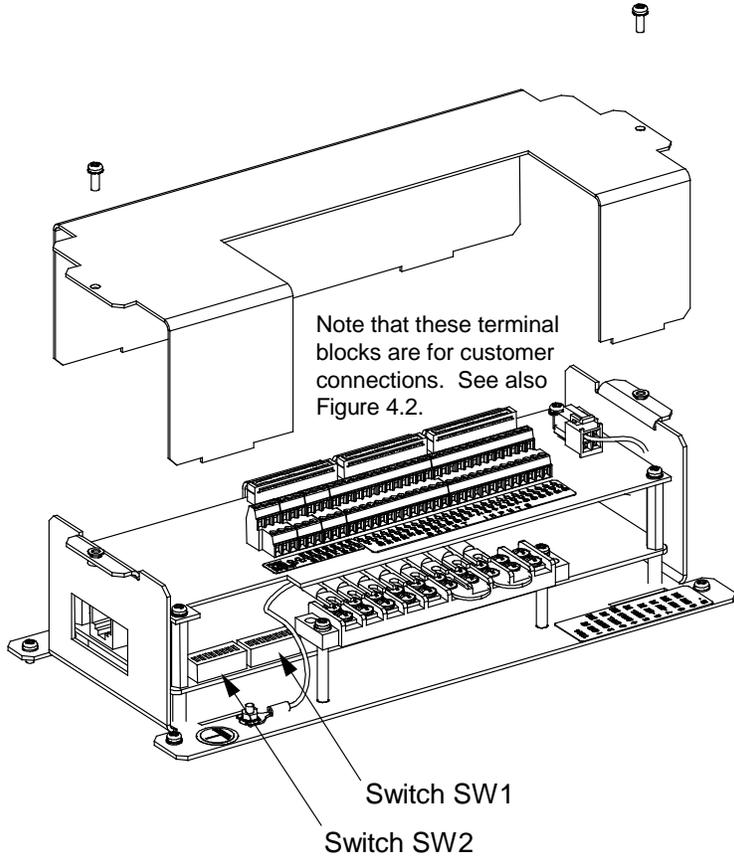
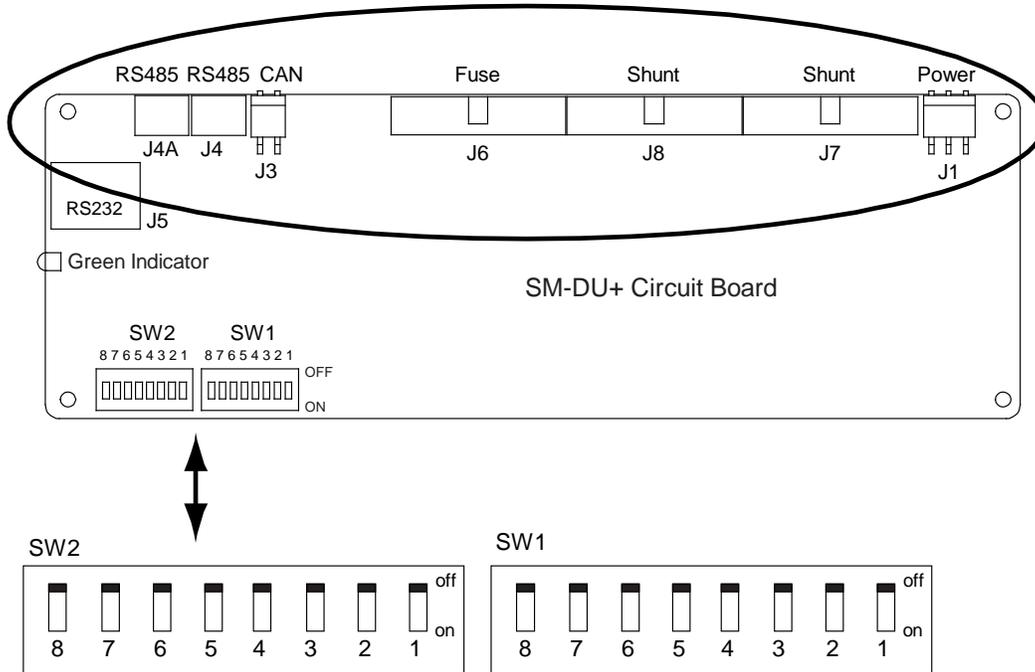
Perform the following procedure to make switch setting adjustments.

#### **Procedure**

1. Remove the top cover to access the switches.
2. Set SW1 and SW2 per site requirements. Refer to Figure 2.1 for location. See Table 2.1 for setting descriptions. (Set the addressing switches on each NetSure™ SM-DU+ assembly installed in the system to a unique address per Table 2.1.)

Figure 2.1 NetSure™ SM-DU+ Assembly Switch Locations

Note that these ports are not used in this application, refer to below image for customer connections terminal blocks location. See also Figure 4.2.



**Table 2.1 Vertiv™ NetSure™ SM-DU+ Switch Settings**

DIP Switch SW1								
Reserved		HW/S W	Shunt Voltage		Shunt Current			Description of Status
1	2	3	4	5	6	7	8	
NA	OFF		NA			NA		Shunt parameter is set through DIP switch.
	ON							Shunt parameter is set through software <b>(note 1)</b> .
NA		OFF	OFF	NA			Shunt Voltage: 25mV <b>(note 1)</b>	
		OFF	ON				Shunt Voltage: 50mV	
		ON	OFF				Shunt Voltage: 60mV	
		ON	ON				Shunt Voltage: 75mV	
NA			OFF	OFF	OFF	Shunt Current: 500 A <b>(note 1)</b>		
			OFF	OFF	ON	Shunt Current: 100 A		
			OFF	ON	OFF	Shunt Current: 200 A		
			OFF	ON	ON	Shunt Current: 300 A		
			ON	OFF	OFF	Shunt Current: 400 A		
			ON	OFF	ON	Shunt Current: 1000 A		
			ON	ON	OFF	Shunt Current: 1500 A		
			ON	ON	ON	Shunt Current: 2000 A		
DIP Switch SW2								
Reserved			Communications Address				Baud Rate	Description of Status
1	2	3	4	5	6	7	8	
NA			OFF	OFF	OFF	NA		Address 1# <b>(Setting for 1st SM-DU+ in System)</b>
			OFF	OFF	ON			Address 2# <b>(Setting for 2nd SM-DU+ in System)</b>
			OFF	ON	OFF			Address 3# <b>(Setting for 3rd SM-DU+ in System)</b>
			OFF	ON	ON			Address 4# <b>(Setting for 4th SM-DU+ in System)</b>
			ON	OFF	OFF			Address 5# <b>(Setting for 5th SM-DU+ in System)</b>
			ON	OFF	ON			Address 6# <b>(Setting for 6th SM-DU+ in System)</b>
			ON	ON	OFF			Address 7# <b>(Setting for 7th SM-DU+ in System)</b>
			ON	ON	ON			Address 8# <b>(Setting for 8th SM-DU+ in System)</b>
NA							OFF	19200 <b>(note 1)</b>
							ON	9600

Note 1: Default Setting

## 3 Installation

### 3.1 Mounting

The Vertiv™ NetSure™ SM-DU+ assembly provides mounting holes in each corner. Refer to Figure 1.2 for location and dimensions.

## 4 Electrical Connections

### 4.1 Important Safety Instructions



**DANGER!** Adhere to the “Important Safety Instructions” starting on page v.

### 4.2 Wiring Considerations

#### 4.2.1 General

All wiring should follow the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), and applicable local codes. For operation in countries where the NEC is not recognized, follow applicable codes.

#### 4.2.2 Input Fusing

The ungrounded input lead should be fused at 1-1/3 ampere.

## 4.3 Frame Grounding Connection

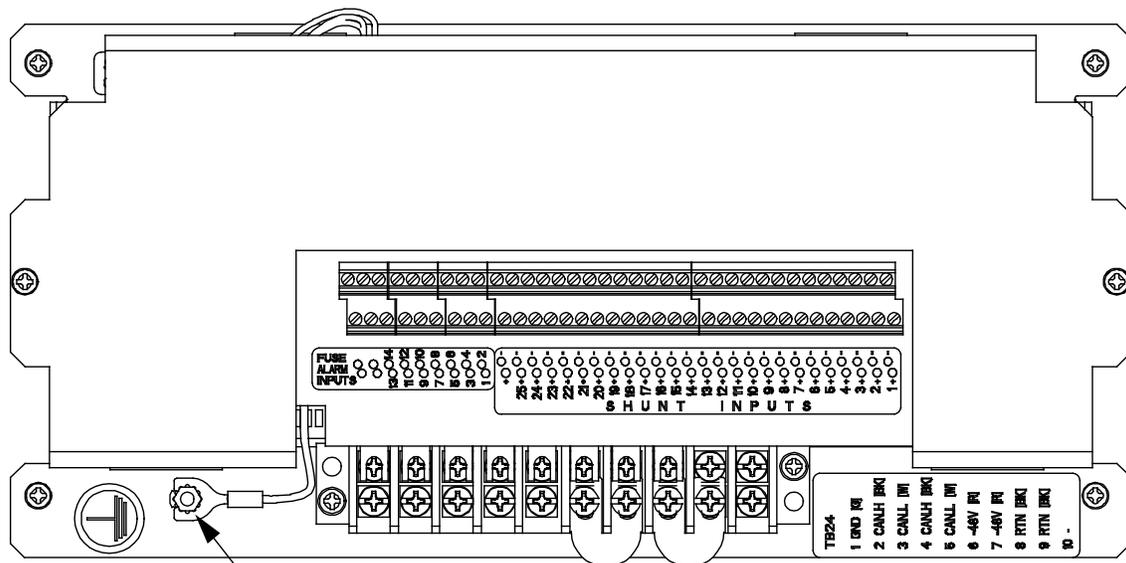
A frame ground stud (M3) is located on the outside of the Vertiv™ NetSure™ SM-DU+ assembly.

### Procedure

1. Connect a frame ground lead to the frame ground stud located on the NetSure™ SM-DU+ assembly. Refer to Figure 4.1 for location. Recommended torque is 6 in-lbs.

Figure 4.1 NetSure™ SM-DU+ Assembly Frame Grounding Connection

### NetSure™ SM-DU+ Assembly Top View



Frame Ground  
(Torque to 6 in-lbs.)

## 4.4 Load Shunt Input Connections

The Vertiv™ NetSure™ SM-DU+ assembly provides connections for up to twenty-five (25) load shunt inputs.

See also “Switch Settings” on page 3.

### Procedure

1. Connect up to twenty-five (25) load shunt inputs to the NetSure™ SM-DU+ assembly. Observe proper polarity. Refer to Figure 4.2 and the label on the NetSure™ SM-DU+ assembly for connection point identification.



**NOTE!** The shunt needs to be installed in the hot (-48V) bus. Connect the plus side of the shunt to the positive shunt input on the NetSure™ SM-DU+ assembly. Connect the negative side of the shunt to the negative shunt input on the NetSure™ SM-DU+ assembly.

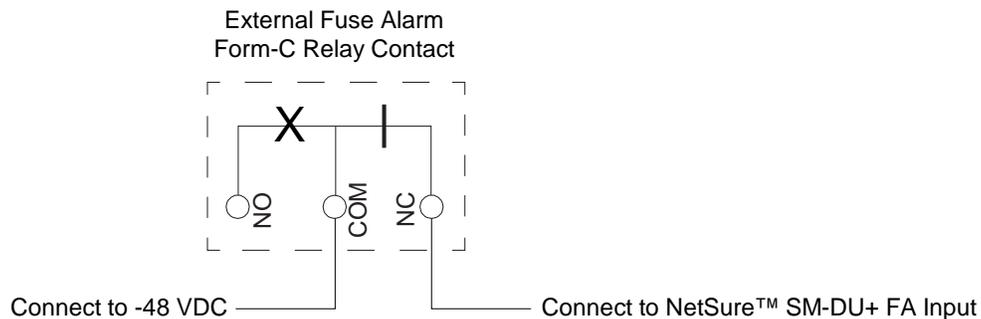
## 4.5 Fuse Alarm (FA) Input Connections

The NetSure™ SM-DU+ assembly provides connections for up to fourteen (14) fuse alarm (FA) inputs.

### Procedure

1. Connect up to fourteen (14) fuse alarm (FA) inputs to the NetSure™ SM-DU+ assembly. Refer to Figure 4.2 and the label on the NetSure™ SM-DU+ assembly for connection point identification.
  - When a -48 VDC signal is applied to a fuse alarm input, the associated fuse alarm is inactive.
  - When a -48 VDC signal is removed from a fuse alarm input, the associated fuse alarm is active.

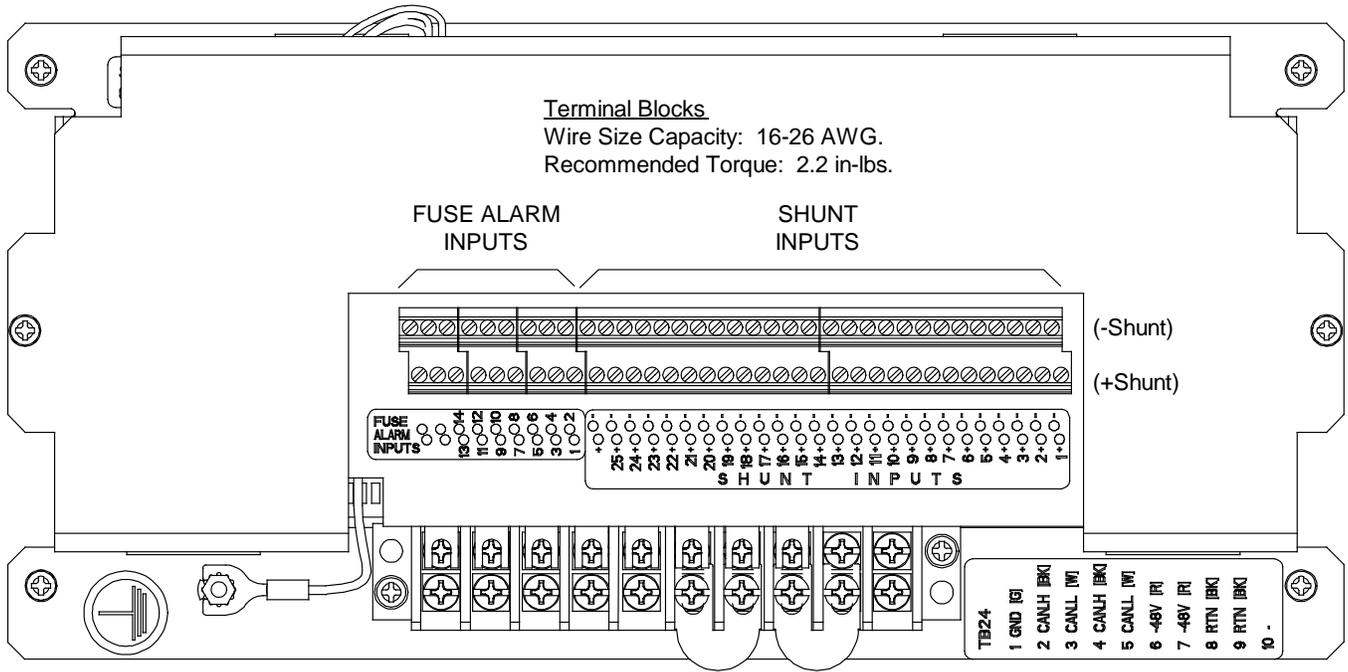
It is suggested to use an external fuse alarm Form-C relay contact. Connect the common (COM) terminal of the external fuse alarm Form-C relay to a -48 VDC source and connect the normally closed (NC) terminal of the external fuse alarm Form-C relay to one of the NetSure™ SM-DU+ FA inputs, as shown below.



2. Any of the fourteen (14) fuse alarms not being used needs to have their severity set to NA to indicate that this fuse alarm input is not being used. Refer to the NCU manual for details.

Figure 4.2 Vertiv™ NetSure™ SM-DU+ Assembly Shunt and Fuse Alarm (FA) Inputs Connections

NetSure™ SM-DU+ Assembly Top View



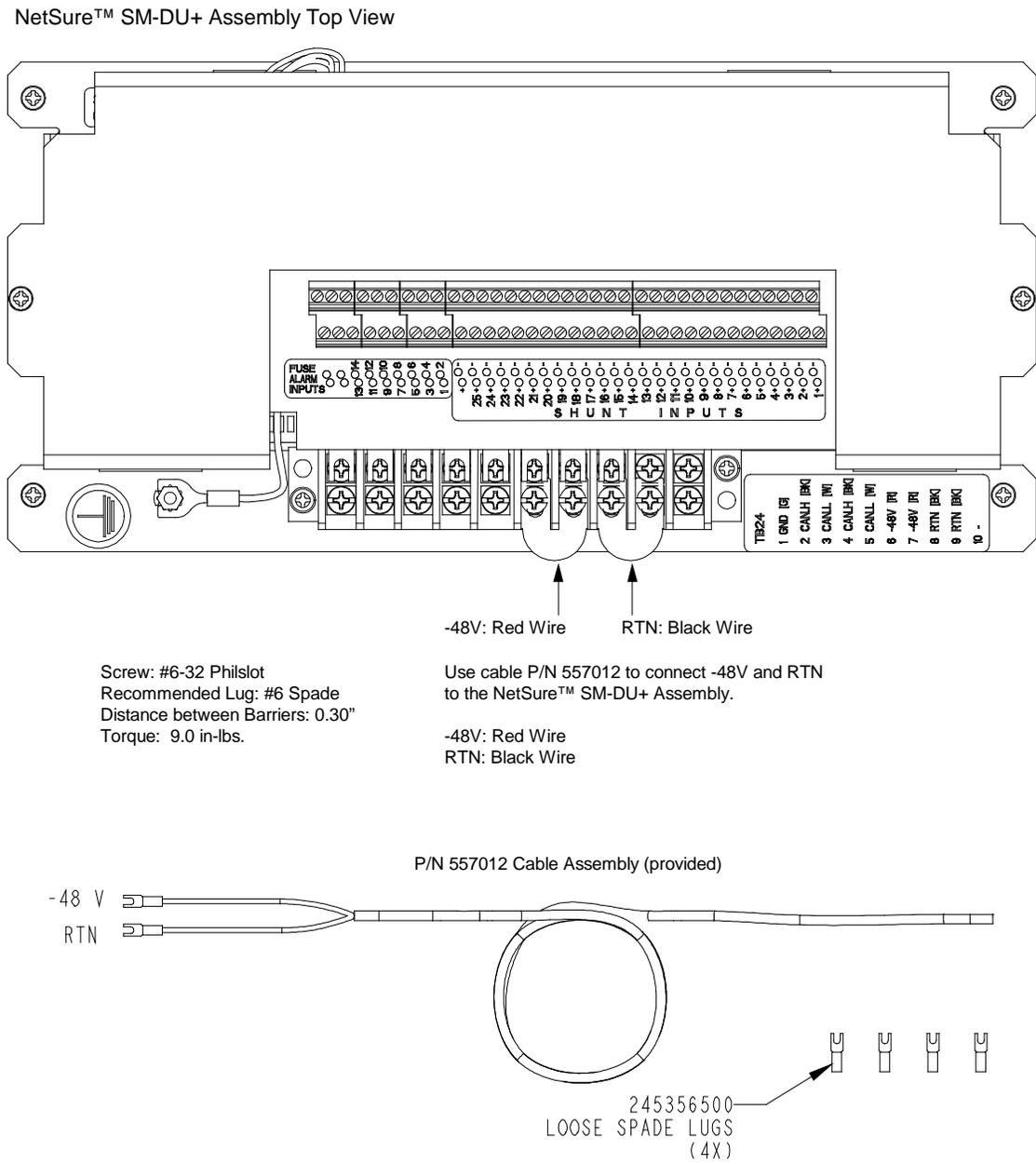
## 4.6 Input Power Connections

Input power must be supplied to each Vertiv™ NetSure™ SM-DU+ assembly installed in the system. A cable is factory provided for this connection. The ungrounded input lead should be fused at 1-1/3 ampere. Refer to Figure 4.3 for input power connection location.

### Procedure

1. Connect the spade lug end of cable P/N 557012 provided to the appropriate terminals located on the NetSure™ SM-DU+ assembly (see Figure 4.3). Red to a -48V terminal, Black to a RTN terminal.
2. Route this cable to the input power source. Cut this cable to length and terminate it with the supplied spade lugs. Connect Red to the -48V power source terminal. Connect Black to a RTN power source terminal.

Figure 4.3 NetSure™ SM-DU+ Assembly Input Power Connections



## 4.7 NCU CAN Bus Connections

Refer to Figure 4.4.

### **Procedure (Connecting First Vertiv™ NetSure™ SM-DU+ Assembly to NCU)**

1. Connect the NetSure™ SM-DU+ assembly into the NCU CAN Bus. Connect CAN\_H to CAN\_H. Connect CAN\_L to CAN\_L. Refer to the system documentation for NCU CAN port description and location. Cable P/N 562868 provided. Refer to Table 4.1 for cable information. Refer to Figure 4.4 for an interconnect diagram.

**Table 4.1 CAN Bus Cable P/N 562868**

Connector	Pin No.	Color	Signal Symbol
RJ-45	1	W/O	CAN_L
	2	O	CAN_H
	4*	BL	CAN_H
	5*	W/BL	CAN_L

\* For use with NetSure 8200 and NetSure 802 retrofit kits.

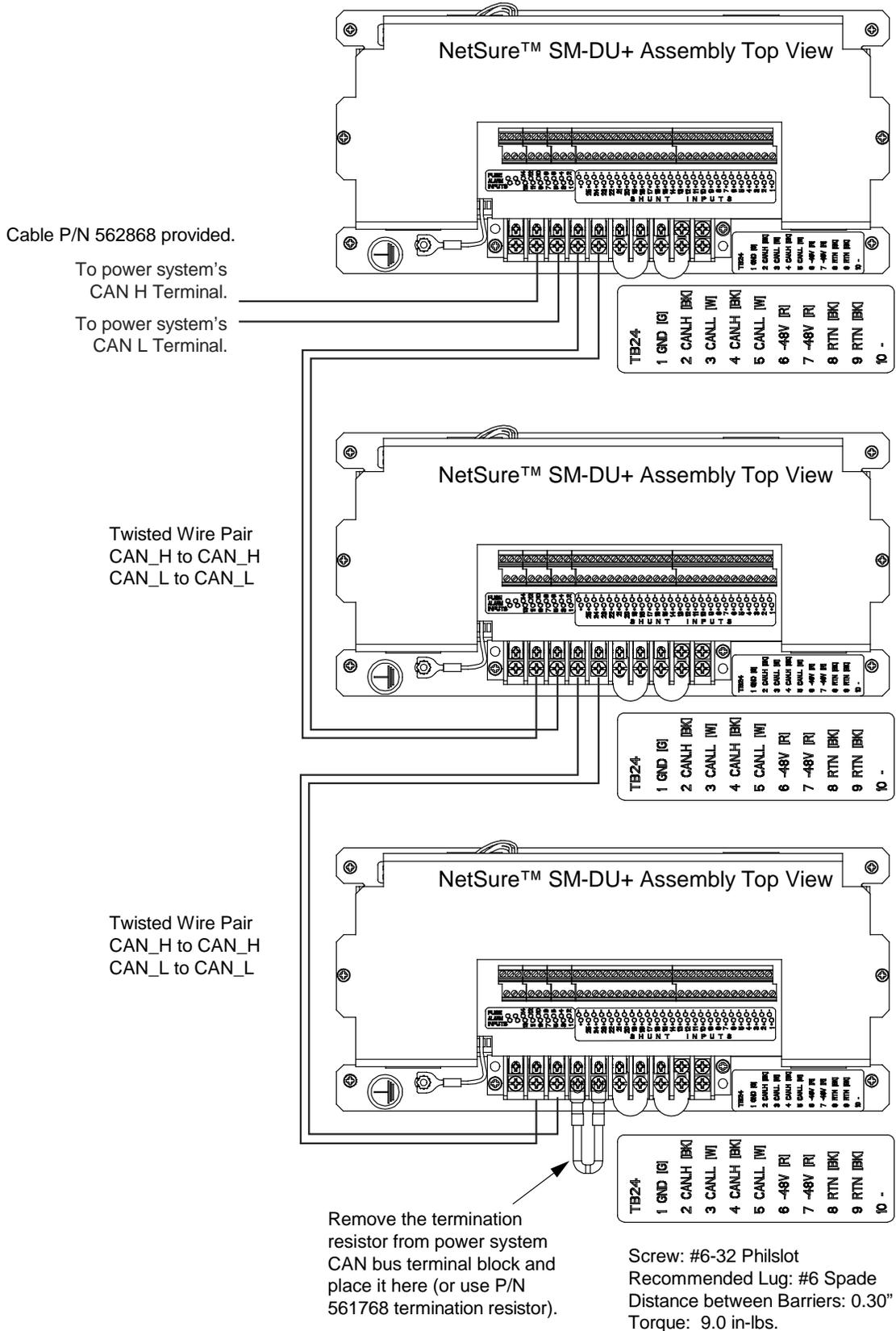
### **Procedure (Connecting Multiple NetSure™ SM-DU+ Assemblies Together)**



**NOTE!** The NCU can communicate with **up to** eight (8) NetSure™ SM-DU+ assemblies. See the System Application Guide (SAG) of the applicable power system for the quantity of SM-DU+ assemblies that can be connected to that system. Set each NetSure™ SM-DU+ assembly to a unique address number.

1. To connect multiple NetSure™ SM-DU+ assemblies together, for all assemblies connect the CAN\_H terminals together and connect the CAN\_L terminals together (CAN\_H to CAN\_H, CAN\_L to CAN\_L). See Figure 4.4 for an interconnect diagram.
2. Connect a termination resistor such as P/N 561768 to the last NetSure™ SM-DU+ assembly in the NCU CAN bus. Connect to CAN\_H and CAN\_L terminals along with the CAN\_H and CAN\_L leads factory connected to the terminal block. See Figure 4.4.

Figure 4.4 Vertiv™ NetSure™ SM-DU+ Assembly CAN Bus Connections



## 5 Operation

The Vertiv™ NetSure™ SM-DU+ assembly monitors load shunt inputs and fuse alarm inputs and reports this data to the NCU controller.

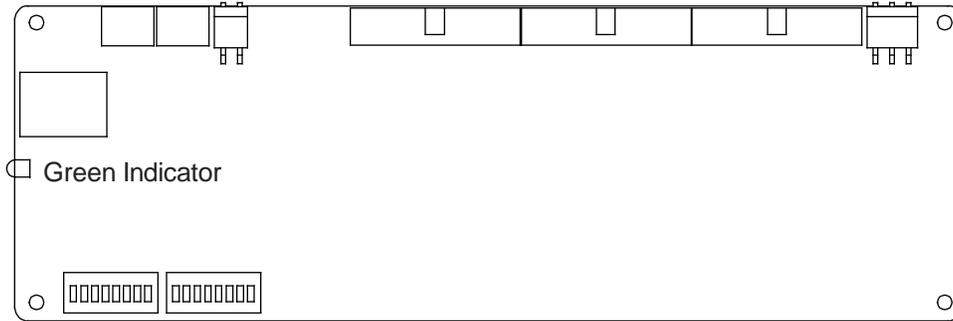
### 5.1 Indicators

There is one (1) status and alarm indicator located on the NetSure™ SM-DU+ circuit card. The function of this indicator is as shown in Table 5.1. Refer to Figure 5.1 for location.

**Table 5.1 NetSure™ SM-DU+ Circuit Card Indicator**

Indicator	Normal State	Fault State	Fault Cause
Operation (Green)	On	Off	SM-DU+ is non-operational.
		Flashing	A 1/3Hz flashing indicates the SM-DU+ is being identified by the Controller. A 1Hz flashing indicates a communication failure.

**Figure 5.1 NetSure™ SM-DU+ Circuit Card Indicator Location**



## 5.2 Configuring the NCU SM-DU+ Parameters

Refer to the NCU controller manual (UM1M830BNA) for detailed instructions on how to program the monitored inputs to the SM-DU+ assembly.

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