

RS-485 Biasing Module Installation Instructions

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Introduction

The Novar RS-485 biasing module and isolated power supply were developed to augment RS-485 communication in xcm.10, xcm.20, and xcm.10S installations. The biasing module is designed to be easily installed, configured, and connected to xcm.10 and xcm.20 RS-485 communications terminals or to an xcm.10S transition board's RS-485 communications terminals.

The Novar RS-485 biasing module is intended to bias a single RS-485 port; therefore, if more than one RS-485 ports are to be biased, multiple devices must be installed.

The biasing module and isolated power supply consists of the following components:

- 1.) SG-785 Biasing/Termination Module
- 2.) PSM24A24DAS 24VAC-to-24VDC Isolated Supply

NOTE:



The PSM24A24DAS is not required if an alternate 24VDC source is available.



Figure 1. Novar RS-485 Biasing Module and Isolated Power Supply

Hardware Specifications

SG-785 Module

General

Interface: RS-485
 Pull-high/pull-low Resistance: $1K\Omega$
 Termination Resistance: 15 steps 65Ω to 560Ω
 LED Display: 1 red LED as power indicator
 1 green LED as termination indicator

Power

Input Range: +10VDC to +30 VDC
 Power Consumption: 0.5W, +24VDC

Environment

Operating Temperature: $-25\text{ }^{\circ}\text{C}$ to $+75\text{ }^{\circ}\text{C}$
 Storage Temperature: $-40\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$
 Humidity: 5% to 95 % RH, non-condensing

LED Display

PWR: Power LED, Red
 TR: Termination Resistor LED, Green

Switches

TR: Termination Resistor Setting
 SW: Termination Resistance and Pull-high/Pull-low Setting

Terminal Block

(Y)DATA+, (G)DATA-: RS-485 Data Line

(R)+Vs, (B)GND: Power Line
F. G.: Frame Ground

Table 1

RS-485 Pull-Up and Pull-Down Setting		
SW5	SW6	RS-485 Data Line Status
OFF	OFF	No pull-high/pull-low to RS-485 data line
ON	OFF	Add a pull high resistor to DATA+ line
OFF	ON	Add a pull low resistor to DATA- line
ON	ON	Add a pull high resistor to DATA+ line and add a pull low resistor to DATA- line

Table 2

RS-485 Termination Resistance Setting				
SW1	SW2	SW3	SW4	Termination Resistance (ohm)
ON	ON	ON	ON	65
ON	ON	ON	OFF	74
ON	ON	OFF	ON	76
ON	OFF	ON	ON	81
ON	OFF	OFF	ON	99
ON	OFF	ON	OFF	96
ON	ON	OFF	OFF	88
ON	OFF	OFF	OFF	120
OFF	ON	ON	ON	144
OFF	ON	ON	OFF	193
OFF	ON	OFF	ON	207
OFF	ON	OFF	OFF	330
OFF	OFF	ON	ON	256
OFF	OFF	ON	OFF	470
OFF	OFF	OFF	ON	560

PSM24A24DAS
24VAC-to-24VDC
Isolated Power
Supply

Table 3

PSM24A24DAS 24VAC-to-24VDC Isolated Power Supply	
Input voltage/current	24VAC/950mA max, 50/60Hz
Voltage output	+24VDC, adjustable +1.5VDC to +28VDC
Output current	300mA @ +24VDC; 125mA @ +12VDC; 116mA @ +10VDC
Ripple	0.0016%, +24VDC @ 300mA
Load regulation	0.04%
Line regulation	8mV/V
Temp	-30°F to 140°F (-34°C to 60°C)
Dimensions	4"H x 2.75"W x 1.63"D (10.1 x 6.9 x 4.1 cm)
Weight	1.1lb (0.49kg)

PSM24A24DAS 24VAC-to-24VDC Isolated Power Supply	
Mounting	MT212 track (provided)
Agency approvals	Class 2 UL listed, ULC, File #E68805

Functional Overview

The Novar RS-485 Biasing Module was developed to augment RS-485 communication in xcm.10, xcm.20, and xcm.10S installations. The module is designed to be easily installed, configured, and connected to xcm.10 and xcm.20 RS-485 communications terminals or to an xcm.10S transition board’s RS-485 communications terminals.

SG-785 Module

The SG-785, Figure 2, is an externally connected RS-485 biasing module that is used to improve communication operation of an RS-485 network.

The SG-785 incorporates a gang-of-five switch (SW) with which the user can easily select 1KΩ pull-up and pull-down resistors (SW5 and SW6) and selectable network termination resistance (SW1, 2, 3, and 4). The selectable network termination resistance is configurable in selected values from 65Ω to 560Ω (see Hardware Specifications).

The SG-785 employs two LED indicators. A red LED indicates when power is applied; a green LED indicates when termination resistance is in use. Switch TR is used to enable/disable termination resistance (SW1, 2, 3, and 4) and the termination indicator LED.

All connections to the SG-785 module are made through a five-position, removable, wire-cage, terminal block.

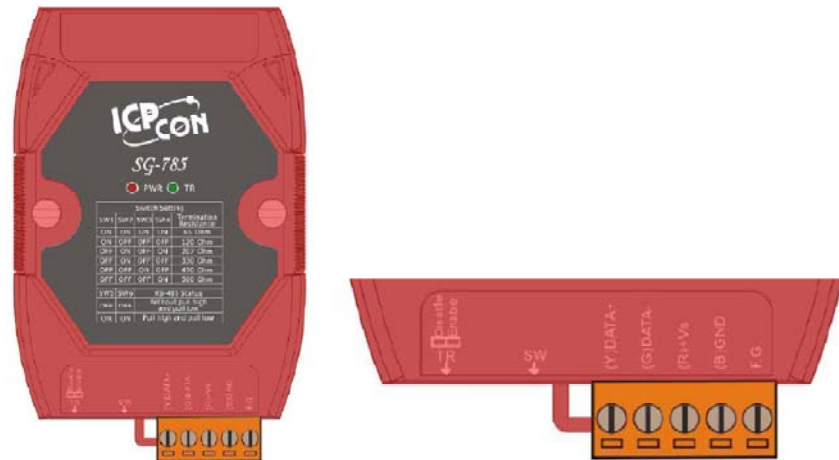


Figure 2. Biasing module

**PSM24A24DAS
24VAC-to-24VDC
Isolated Power**

Supply

The PSM24A24DAS, Figure 3, is a 24VAC-to-24VDC isolated power supply which is used to power the SG-785 Module.

The PSM24A24DAS regulated output voltage range is adjustable from +1.5VDC to +28VDC and provides 300mA of current at +24VDC. A power on/off switch and “power on” indicator LED is provided for convenience.

The isolated power supply is compact and designed to fit into a standard MT212 snaptrack.

All connections to the PSM24A24DAS isolated power supply are made through two, two-position terminals.



Figure 3. Power supply

Installation

This section covers the installation of the RS-485 Biasing Module. It assumes that the work is being completed by an engineer, technician, or service personnel that are performing control systems installation.

Mounting and Orientation

The RS-485 Biasing Module is to be mounted as close as possible to the xcm.10, xcm.20, or xcm.10S.

Mounting height and location should allow for appropriate access. When mounting the module to paneling or drywall, use of hollow-wall anchors or appropriate fasteners (not included) are recommended to insure that the assembly remains secure.

Both the SG-785 Biasing Module and PSM24A24DAS Isolated Power Supply are supplied with their respective mounting methods.

The SG-785 is DIN-Rail mountable and comes with a 2.625” length of

removable rail (see Figure 4) with provisions for mounting.

The PSM24A24DAS is provided with an MT212 track.

Screw Locations

Both SG-785 RS-485 Biasing Module and PSM24A24DAS Isolated Power Supply should be securely fastened to a rigid mounting surface using the provided mounting holes (see Figure 4 and Figure 5). Care should be taken in tightening the mounting hardware as both the supplied rail and MT212 track are plastic.



Figure 4. Mounting rail



Figure 5. Mount for power supply

RS-485 Biasing Module Wiring

This section covers RS-485 Biasing Module and Isolated Power Supply wiring.

**Novar RS-485
Biasing Module
Wiring**

NOTE!



Wire splices are not acceptable.

The communications trunk will be terminated at the modules.

All low voltage cable is to be supported securely according to the applicable electrical code - tape is not acceptable.

All low voltage cable is to run neatly and concealed within the building structure.

All low voltage cable is to be sleeved in conduit up to the ceiling or bar joists.

**SG-785 and
PSM24A24DAS
Wiring**

The SG-785 and PSM24A24DAS should be wired as shown in Figure 6. Terminal connections are as shown in Tables 4,5, and 6 .

All PSM24A24DAS wiring can be two-pair 16AWG to 22AWG stranded wire.

All RS-485 bias wiring should be two-conductor shielded cable (Belden 8761 or equivalent). The SG-785 module should be located as close as possible to the xcm.10, xcm.20, or xcm.10S.

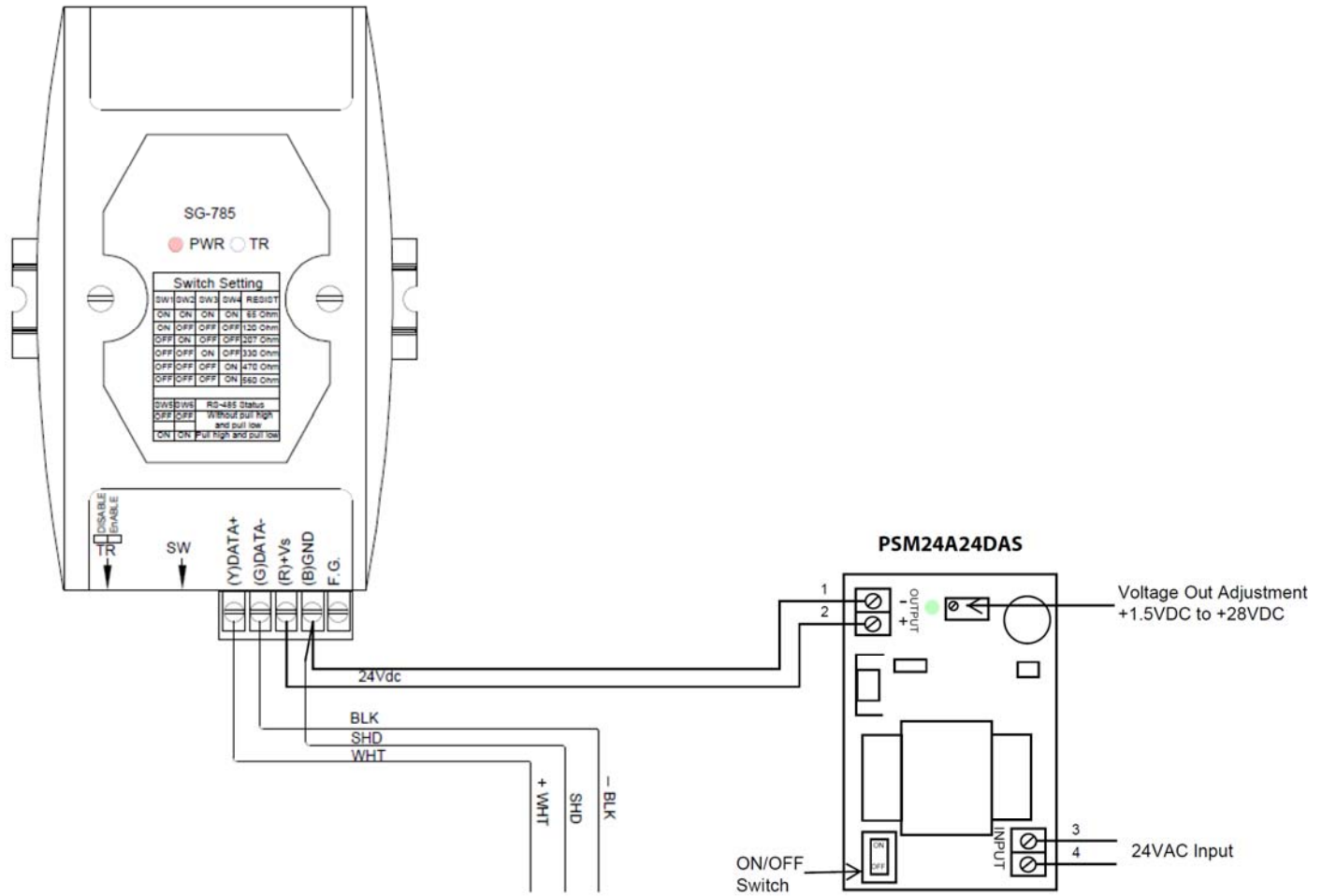


Figure 6. Wiring

Table 4

24VAC, 20VA Transformer	PSM24A24DAS
24VAC (A)	3
24VAC (B)	4

Table 5

PSM24A24DAS	SG-785
1	(B)GND
2	(R)+Vs

Table 6

SG-785	Wire Color
(Y)DATA+	White
(G)DATA-	Black
(B)GND	Shield

PSM24A24DAS
Voltage Adjustment

If installed, the PSM24A24DAS Isolated Power Supply output voltage should be checked for accuracy of adjustment.

NOTE!



All electrical safety precautions should be implemented when measuring voltage at live terminals.

All measurements should be made with an accurate multimeter.

The following procedure is provided as a guide; reference Figure 7 throughout the procedure.

1. Before applying 24VAC power to the PSM24A24DAS Isolated Power Supply, disconnect terminal two of the output terminal, and set the power supply on/off switch to off.
2. Apply 24VAC power to the PSM24A24DAS Isolated Power Supply.
3. Set the PSM24A24DAS Isolated Power Supply on/off switch to on.
4. With the meter set up to measure DC voltage, measure the voltage between output terminal two (meter positive) and output terminal one (meter negative).
5. If the voltage is not +24VDC ($\pm 1\%$), adjust the voltage with the provided adjustment potentiometer accordingly.
6. Set the PSM24A24DAS Isolated Power Supply on/off switch to off.
7. Reconnect terminal two of the output terminal, and set the power supply on/off switch to on.

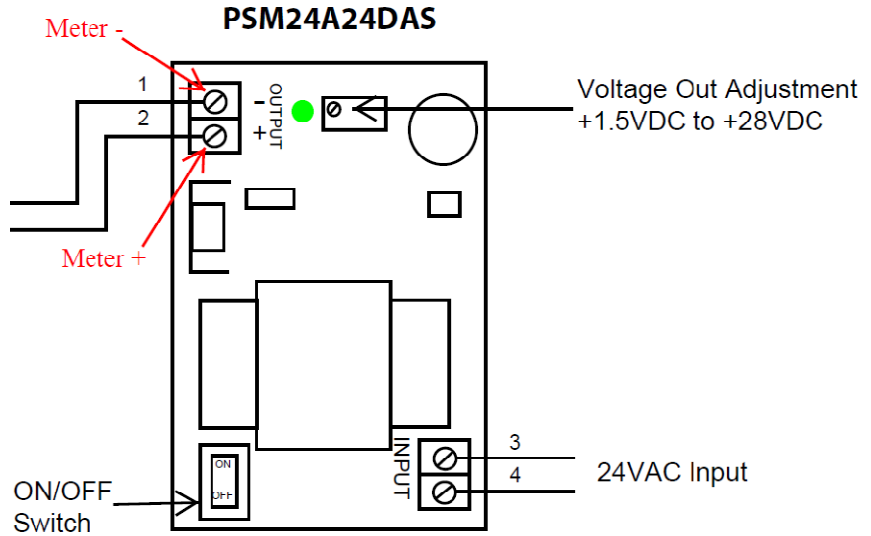


Figure 7. Wiring

**Standard
Communication
Wiring (xcm.10,
xcm.20 and
xcm.10S)**

With the SG-785 wired as shown in Figure 6, connection to an xcm.10, xcm.20, or xcm.10S is as shown in Figure 8, 9 and Table . Maintain the polarity at the first device throughout the entire daisy chain.

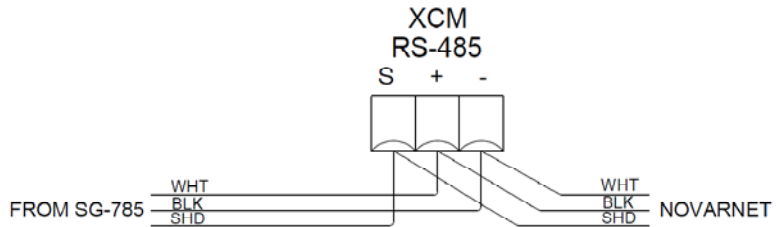


Figure 8. Wiring

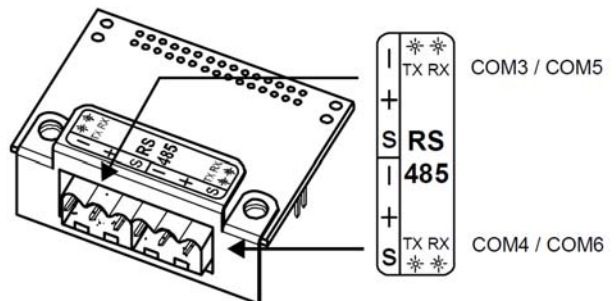
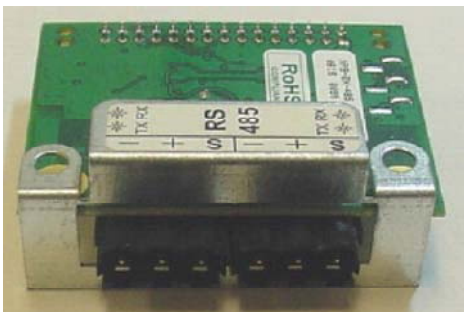


Figure 9. Wiring

Table 7

SG-785		xcm.10 and xcm.20	
(Y)DATA+	(WHT)	+	(WHT)
(G)DATA-	(BLK)	-	(BLK)
(B)GND	(SHD)	S	(SHD)

**“Novar”
Communications
Wiring Format
(Older Transition
Board and Module
Wiring)**

With the SG-785 wired as shown in Figure 6, connections to an older transition board (i.e. when using an xcm.10S as a Savvy replacement) or module are made with the “Novar” communications wiring convention.

The polarity must be reversed in this case, as shown in Figure 10 and Table 7. Maintain the polarity at the first device throughout the entire daisy chain.

SAVVY TRANSITION BOARD

COM-2

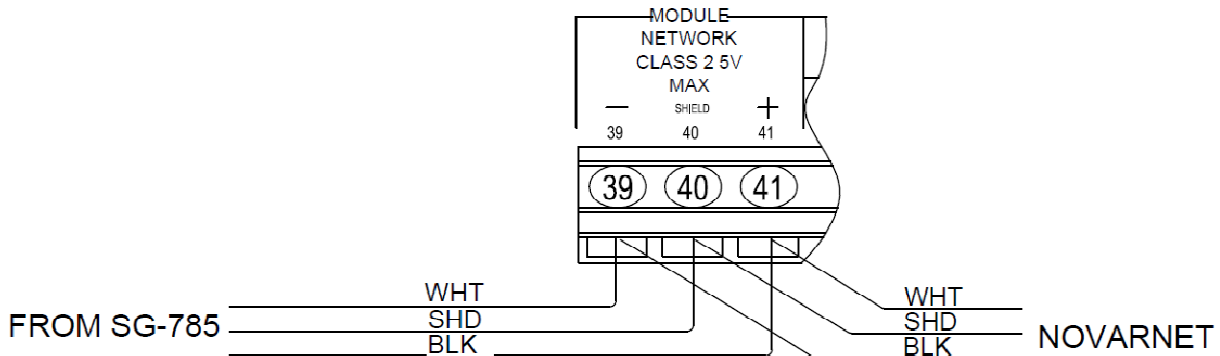


Figure 10. Wiring

Table 8

SG-785		Older Transition Board or Novar Module	
(Y)DATA+	(WHT)	-	(BLK)
(G)DATA-	(BLK)	+	(WHT)
(B)GND	(SHD)	Shield	(SHD)

**SG-785
Configuration**

The SG-785 configuration switches are located at the bottom-lower-left of the module (see Figure 11). Standard NovarNet application switch setup (1KΩ pull-up and 1KΩ pull-down with termination set to off) is as

shown in Figure 11 and Table 9.

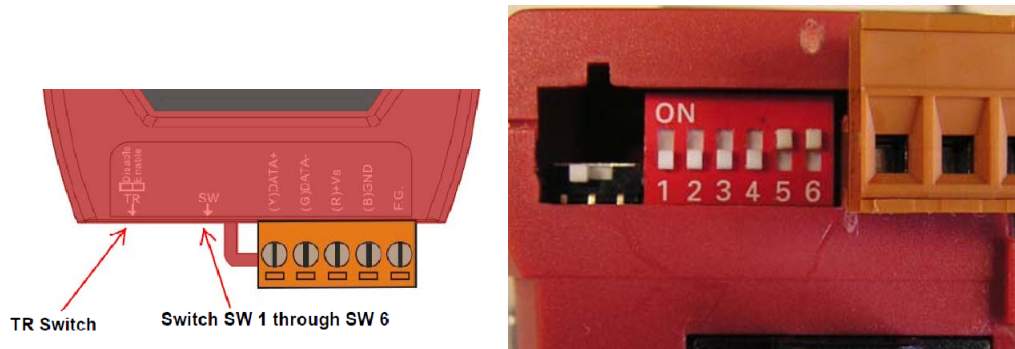


Figure 11. Termination

Table 9

SG-785 Switch Settings:	
TR SW	Disable
SW 1	Not Applicable
SW 2	Not Applicable
SW 3	Not Applicable
SW 4	Not Applicable
SW 5	ON
SW 6	ON

Check Installation

NOTE!



All electrical safety precautions should be implemented when measuring voltage at live terminals.
All measurements should be made with an accurate multimeter.

PSM24A24DAS and SG-785 Power Check

Insure the PSM24A24DAS isolated power supply ON/OFF switch is set to the ON position (PSM24A24DAS power LED on). In normal operation (Standard NovarNet application SG-785 switch setup) on the SG-785, only the Red Power LED should be illuminated. The Green TR LED should not be illuminated. If the Green TR LED is illuminated, insure that the SG-785 switches are properly set up.

With the multimeter set to AC, measure the voltage from PSM24A24DAS input terminals 3 to 4. The measured voltage should be nominally 24VAC but may vary higher or lower depending on transformer loading. If the voltage be not within a few volts of nominal,

insure all wiring from the 24VAC source to PSM24A24DAS input terminals 3 and 4 is correct.

With the multimeter set to DC, measure the voltage from PSM24A24DAS output terminals 2 (meter +) to 1 (meter -). The measured voltage should be +24VDC. If the voltage measured is not +24VDC, insure the wiring from the PSM24A24DAS output terminals to the SG-785 is correct.

With the multimeter set to DC, measure the voltage from SG-758 (R)=Vs (meter +) to SG-758 (B)GND (meter -). The measured voltage should be +24VDC. If the voltage measured is not +24VDC, insure the wiring from the PSM24A24DAS output terminals to the SG-785 is correct.

SG-785 to xcm.10/20 Continuity Check

With the multimeter set to Ohms, measure form SG-785 (Y)DATA+ (white wire) to XCM.10/20 RS-485 +. The meter should display less than 0.5Ω. If the meter does not display less than 0.5Ω, insure the wiring from the SG-785 to the xcm.10/20 terminals is correct.

With the multimeter set to Ohms, measure form SG-785 (G)DATA- (black wire) to XCM.10/20 RS-485 -. The meter should display less than 0.5 ohms. If the meter does not display less than 0.5Ω, insure the wiring from the SG-785 to the xcm.10/20 terminals is correct.

With the multimeter set to Ohms, measure form SG-785 (B)GND (shield wire) to XCM.10/20 RS-485 S. The meter should display less than 0.5 ohms. If the meter does not display less than 0.5Ω, insure the wiring from the SG-785 to the xcm.10/20 terminals is correct.

SG-785 to “Novar” Communications Wiring Format Continuity Check

With the multimeter set to Ohms, measure form SG-785 (Y)DATA+ (white wire) to Module Communication Network - (black NovarNet wire). The meter should display less than 0.5 ohms. If the meter does not display less than 0.5Ω, insure the wiring from the SG-785 to the xcm.10S terminals is correct.

With the multimeter set to Ohms, measure form SG-785 (G)DATA- (black wire) to Module Communication Network + (white NovarNet wire). The meter should display less than 0.5 ohms. If the meter does not display less than 0.5Ω, insure the wiring from the SG-785 to the xcm.10S terminals is correct.

With the multimeter set to Ohms, measure form SG-785 (B)GND (shield wire) to Module Communication Network Shield. The meter should display less than 0.5 ohms. If the meter does not display less than 0.5Ω, insure the wiring from the SG-785 to the xcm.10S terminals is correct.

Model & Part Numbers

The part numbers in the table below should be used to order parts.

OS/ Part No.	Product
50065239-001	SG-785 RS-485 Biasing Module
50065240-001	PSM24A24DAS Isolated Power Supply

Regulatory Compliance

PSM24A24DAS

- Class 2 UL listed, ULC, File #E68805

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