MRC-1 Meterbus to EIA-485 Adapter Instructions

MORNINGSTAR PROFESSIONAL SERIES
World's Leading Solar Controllers & Inverters

DESCRIPTION

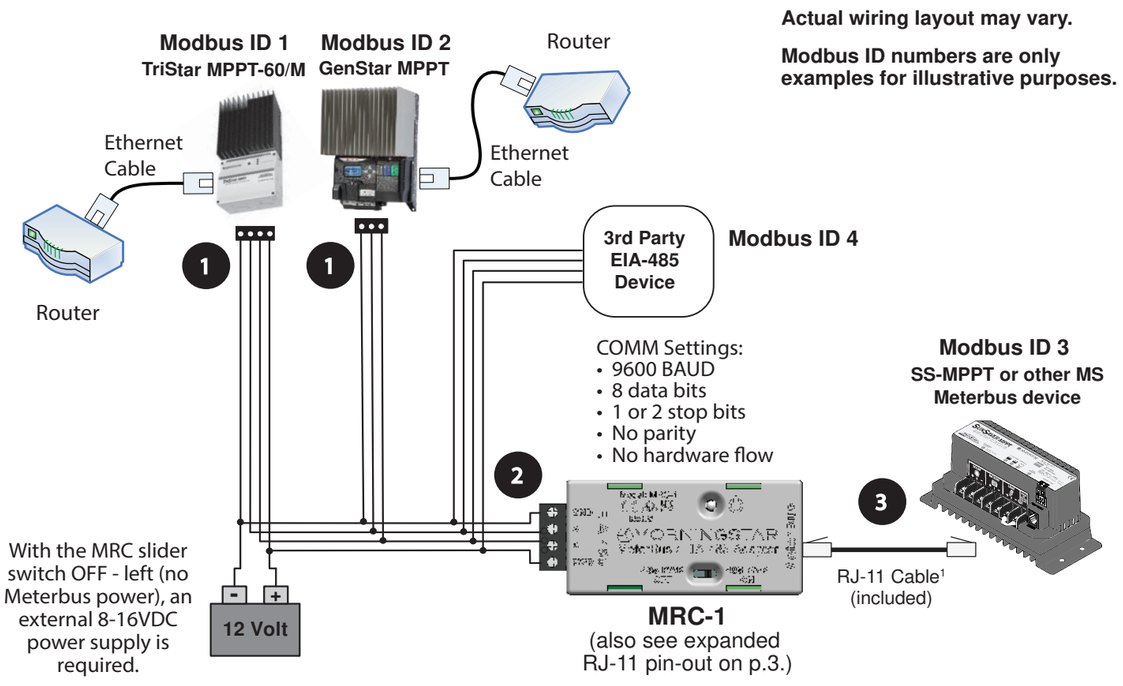
The Meterbus-485 Adapter (Model: MRC-1), with RJ-11 cable included, converts the Morningstar MeterBus RJ-11 electrical interface to a standard EIA-485 interface. This allows Morningstar controllers or inverters with a MeterbusTM port, but without an EIA-485 communications port, to network with Morningstar EIA-485 devices like the GenStar and TriStar MPPT controllers. The MRC-1 can also be used for EIA-485 communications with any 3rd party hardware that supports Modbus communication.

NOTE:
The MRC-1 is protected against reverse polarity at its EIA-485 power terminals.

INSTALLATION-WIRING

(see connection steps on next page)

EIA-485 Network with EIA-485 to Ethernet Bridge



NOTE:
[1] RJ-11 6-pin wiring is a straight-through cable

EIA-485 WIRING

The MRC-1 supports a four wire EIA-485 bus: GND, Data A, Data B, Power. A networked GenStar MPPT will use only three (3) wires: GND, Data A, Data B. Data A and B are differentially driven lines that carry the network data.

- Use twisted pair communication cable for the EIA-485 bus.
- Do not run network cables in the same conduit or trough as the system power cables or AC wiring. In general, avoid running network cables in parallel with power cables.

The MRC-1 is capable of supplying isolated power to an EIA-485 network, eliminating the need for an external bus power source in many cases. For details, see the Operation section below.

Connections
(see diagram on p. 1):

WARNING: Shock Hazard
Before wiring, verify that all system breakers and disconnect switches are in the OPEN/ DISCONNECTED position, and that all fuses are removed from their holders.

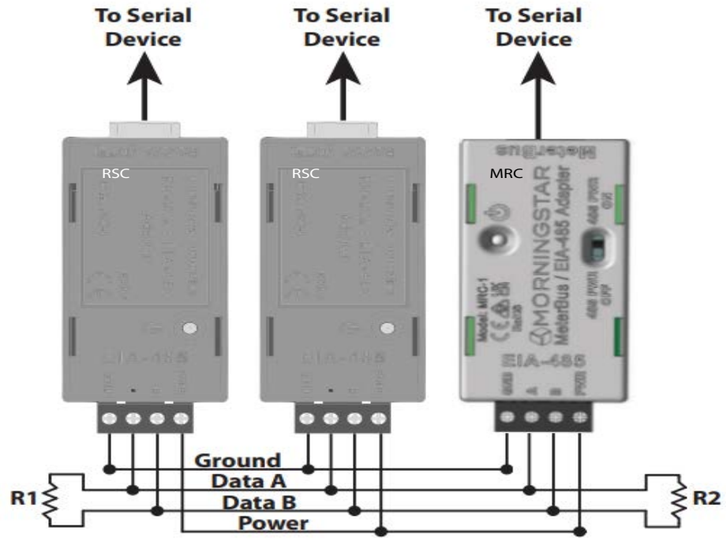
1. From left to right, connect GND, Data A, Data B and power wires to a TriStar-MPPT (for example) controller's EIA-485 terminals, and/or GND, Data A, Data B to a GenStar MPPT (for example) controller's EIA-485 terminals.
2. Connect GND, Data A, Data B and Power wires - with the same order and orientation as on the EIA-485 controller(s) - to the MRC-1 Adapter EIA-485 side or bus. If desired, connect additional unit EIA-485 wires to the bus - ensuring correctly corresponding wiring.
3. Connect an RJ-11 cable to the MRC-1 Adapter Meterbus side and to a Meterbus device.

POWER OPTIONS - in addition to Step 3:

1) To power the EIA-485 bus from an external 12 Volt power source, set the MRC-1 slider switch to OFF (left), and connect battery (+) and (-) power wires to the corresponding EIA-485 bus wires.

2) To power the EIA-485 bus from a Meterbus device, set the MRC-1 slider switch to ON (right)

4) After all wiring has been completed, close all system breakers/fuses and disconnect switches.



NOTE:

Termination resistors may be required to prevent interference from reflected signals in the EIA-485 Network as shown in the diagram above. If required, install termination resistors at both ends of the data bus across Data A and Data B to match the characteristic impedances of the communication cables (120Ω for RS-485 single twisted pair, 100Ω for Category 5 Ethernet).

METERBUS POWER LIMITATIONS

CAUTION: Device and Load Operation Power Limitations

The EIA-485 bus power capacity from a supplying Meterbus device is limited. Depending on the collective power requirements of the EIA-485 network devices, Adapters and any system loads, a supplemental external voltage supply may also be needed.

12 AND 24 VOLT SYSTEMS

For highest EIA-485 bus power reliability in 12 Volt systems, it is recommended to set the MRC-1 slider switch set to OFF; then connect any controller's 12V system battery to the EIA-485 bus. Follow the connection instructions on p. 2.

The MRC-1 can also operate from a 24 Volt Meterbus device without any voltage adjustments. Either a 12 or 24 Volt system can conservatively power up to (2) RSC-1 Adapters with (1) TS-PWM controller or (4) TS-MPPT controllers.

NOTE:

MRC-1 adapters may be used in parallel on the same EIA-485 network with the slider switches set to ON (right) so an MRC-1 does not need to provide power to other MRC-1(s) in the network. However, wiring two MRC-1's with the power switch set to ON will not increase the amount of power available on the EIA-485 network.

OPERATION

The Power Switch, as seen in the diagram on p. 3, controls the operation of the MRC-1 in providing network power.

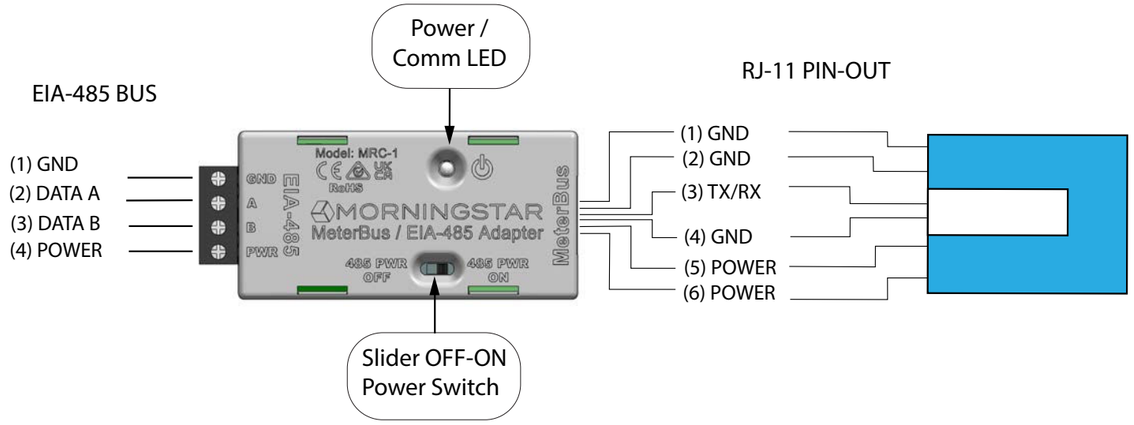
- With the power slider switched ON (to the right), connected EIA-485 network devices will be powered by a connected Meterbus device. Also see Meterbus Power Limitations on p. 3.
- With the power slider switch OFF, a connected EIA-485 bus must be powered by an external 8-16V power supply as seen in the diagram on p. 1.

A status LED indicates power and communication status as shown in the table below.

Status LED	Indication	Notes
Off	No bus power or reversed polarity	Check bus power and polarity
Green	Power OK, No data on Network	Wiring OK, Ready for data
Green-red sequencing	Data on Network	Network OK
Orange	Reversed A & B data lines	Check Network Wiring

NOTES:

1. EIA-485 GND is NOT the same ground as the RJ-11 GND. The MRC-1 is fully opto-isolated on all pins.
2. (+) power from the Meterbus port is asserted on RJ-11 pins 5 and 6.
3. (–) power from the Meterbus port is asserted on RJ-11 pins 1 and 2.



COMMUNICATIONS

Modbus and Modbus TCP/IP are open standard protocols for communication between connected devices on serial and Ethernet networks, respectively. Select Morningstar devices support Modbus or Modbus TCP/IP communication via serial (EIA-485, RS-232, USB) or Ethernet (RJ-45) ports.

MODBUS ADDRESS ID

Each Morningstar controller, inverter, and accessory on the EIA-485 network must be programmed with a unique Modbus Address. Addresses can be programmed using Morningstar's MSView PC software, meter display (Charge controllers with meter display include: TriStar, Tristar MPPT, ProStar, ProStar-MPPT, GenStar MPPT), or LiveView with an Ethernet connection.

Modbus ID

Factory default settings:

All Modbus IDs default settings are 1 except for the Relay Driver. The Relay Driver's factory default setting is 9.

Modbus ID: 1

Relay Driver Modbus ID: 9

EMC-1 Modbus ID: 10

ETHERNET (MODBUS TCP/IP) BRIDGED COMMUNICATIONS TO A EIA-485 (MODBUS) NETWORK

GenStar and TriStar MPPT (60A only) controllers include both Ethernet and EIA-485 ports. These controllers can be used to bridge communications from the EIA-485 Modbus Network to Ethernet Modbus TCP/IP.

NOTE: GenStar and TriStar MPPT (60A only) EIA-485 and RS-232 ports share hardware, and cannot be used simultaneously. Once configured for Ethernet bridging in LiveView (GenStar MPPT) or in MSView (TriStar MPPT) Modbus requests to connected devices on any of those serial networks will be packaged by the controller and sent, as a Modbus TCP/IP response, back to the Ethernet network.

Configure to allow Modbus TCP/IP to EIA-485 bridging as follows:

- TriStar-MPPT 60/M via MSView - downloadable from Morningstar website - program editing
- GenStar MPPT via LiveView Network\Modbus, or local meter

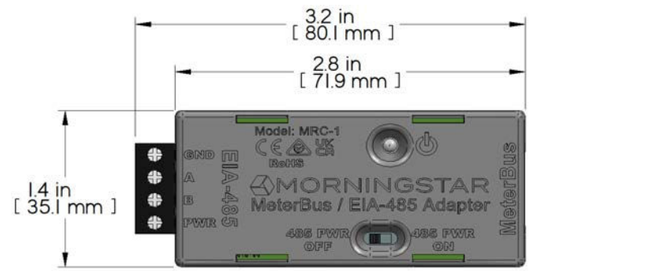
INSPECTION AND MAINTENANCE:

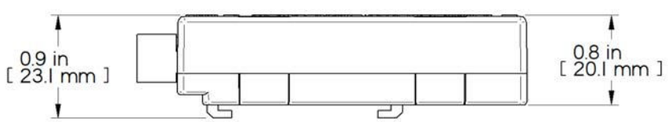
The following inspections and maintenance tasks are recommended at least two times per year for best performance.

- Tighten all terminals. Inspect for loose, broken, or corroded connections.
- Verify that all wire clamps and tie-downs are secure.
- Check that the adapter is mounted in a clean, protected environment; free of dirt, insects, nests and corrosion.
- Verify LED indication is consistent with the present system conditions.

MRC-1 SPECIFICATIONS:

- Meterbus device system battery voltage >11V (Power Switch ON)
- Self-consumption (MRC-1 power switch ON) ~ 8mA
- Consumption (while communicating): ~18mA
- Net current available from Meterbus device ~32mA (while communicating)
- EIA-485 Network Unit Load 1/4
- Enclosure IP20
- DIN Rail Compatibility 35 mm (1-3/8”)





- Dimensions 3.2 X 1.4 X .9 in (80 x 35 x 23 mm)
- Weight 37 g (1.3 oz)
- Operating Temperature -40 C tp +60 C
- Storage Temperature -55 C to +80 C
- Humidity 100 % N. C

MRC-1 WARRANTY:

5-Year limited warranty - for details, go to https://www.morningstarcorp.com/support/ and click on Warranty Policy

CERTIFICATIONS:

FOR CURRENT DETAILED CERTIFICATION LISTINGS, REFER TO:

https://www.morningstarcorp.com/support/library. Under, “Type”, choose, “Declaration of Conformity (DOC)” to view a list of product DOCs - DOC: MS-003957

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