MSC-RE-RS

Modbus-TCP to Modbus RTU Protocol
Bidirectional Converter

User Manual

1. Introduction

1.1 About the User Manual and Design Guide

Thank you for purchasing MSC-RE-RS device. This manual describes the basic functions and operation methods of MSC-RE-RS. Please read through this user's manual carefully before using the product.

The manual covers all aspects of operation of the instrument. Please read instructions carefully before altering any configuration parameter.

1.2 An Overview of MSC-RE-RS

A Modbus TCP to Modbus RTU protocol converter is a device that converts data between two Modbus protocols. Modbus TCP uses Ethernet and TCP/IP, while Modbus RTU uses serial communication (RS485). A protocol converter can connect different Modbus devices and networks, such as PLCs, meters, sensors, etc. It can also improve data transmission reliability and performance. There are various types of protocol converters with different features and specifications.

1.3 List of Accessories

No	Item name	Quantity	Remark
1.	User Manual	1	

1.4 Safety precautions

The product and the instruction manual describe important information to prevent possible damage to the property and to use the product safely. Understand the following description (signs and symbols), read the text and observe Descriptions.

1.4.1 General Note

The user manual, the accompanying texts and the documentation are written for the use of the products by qualified personnel. When using the products, all safety instructions and all valid legal regulations have to be followed. Technical knowledge is presumed. The user has to assure that all legal regulations are followed.

Warning This indicates a damage of product if not avoided.

1.4.2 Personnel Qualification

The MSC-RE-RS must only be installed configured and removed by qualified personnel. Professional qualification in the following specific areas of electrical engineering is required:

- Security and protection of health at work
- Mounting and attaching of electrical equipment
- Measurement and analysis of electrical functions and systems
- Evaluation of the security of electrical equipment

Important: Prior to installation and use of your device you must read and Understand all instructions in this manual in order to avoid any damage.

2. Mechanical guidelines

2.1 Physical Dimensions

The Device's enclosure is shown below. The module clips directly onto an industry standard DIN rail. The module power and RS485 communications wiring is on a separate plug in connector on the upper side of the housing.

Mounting Suitable for DIN rail in compliance with DIN Rail (35mm) EN 60715

Dimensions: 88 (L) X 37 (W) X 59 (H)

2.2 Mounting Device on DIN rail

Fig <A>

Fig <B>

Fig <C>

Fig <A> Electronic equipment's usually have the DIN rail mounting hook at the bottom; therefore we maintained this standard

Fig <B> demonstrates How to mount the enclosure on the DIN rail:

Insert the upper part of the enclosure onto the DIN rail and press until The Hook clicks itself

Fig <C> demonstrates How to remove the enclosure from the DIN rail:

Unhook the lower part using a screw-driver and lift the enclosure from the DIN rail.

2.3 Mechanical Specifications

Module Case	ABS Plastic
Width	37 mm
Height	59 mm
Length	88 mm
Weight	150g Approx.
Colour	White

3. Technical specification

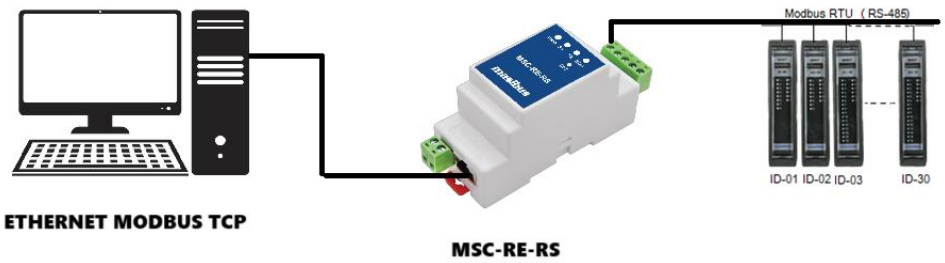
3.1 Technical Specification of MSC-RE-RS

General	
Communication controller Type	ARM Cortex M4 32-bit MCU
Communication Protocol support	Modbus TCP Client/Server, Modbus RTU Master/Slave
Ethernet Port Specification	
Network Interface	Ethernet 10/100Base-TX
Connector	RJ45
Protocols	Modbus TCP Server/Client
Max. Modbus TCP Masters/Clients support to server	15 (TCP roll over Socket)
Max. Modbus TCP Server Support while Client	1
Serial Port Specification	
No. of Ports	RS485 x 1 (D+, D-, GND)
Protocols	Modbus RTU Master/Slave
Serial Communication Parameters	Baud Rate: 9600,19200,38400,57600,115200 Data bits - 8 bits Stop bits - 1, 2 Parity Bits - None, even, odd
Maximum Slave Units while Modbus Master	247 unit (1 repeater need at every 31 Slaves)
Maximum Master supports while Modbus Slave	1
Indication	
Indication LEDs	Power, Status, RS485 Communication RX/TX
Ethernet indication led	Link, Activity led
Power Supply and Isolation	
Power Supply	9 to 36V DC ±10% Typically 24V
Power consumption	<5W Watt
Isolation (Between Supply and Communication ports)	1500 VAC RMS
Physical	
Mounting	DIN Rail (35mm) EN 60715
Case	ABS
Module Dimension (in mm)	88 (L) X 37 (W) X 59 (H)
Colour	White
Weight	150 g Approx.
Environment	
Operating temperature	0°C to 55°C
Storage Temperature	-10°C to 70°C
Humidity	30-95 %RH non-condensing

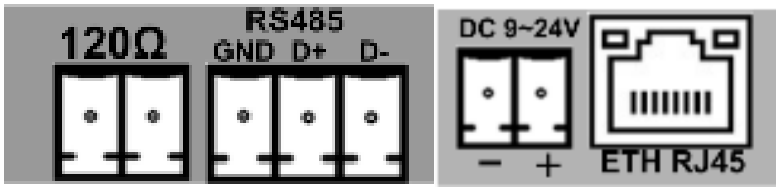
4. Connection Details

4.1 Wiring Detail

4.1.1 MSC-RE-RS



Following diagram shows the wiring of the Ethernet and RS-485 and Power supply Connection.



Warning: Failure to follow improper installation practice of RS485 wiring and power supply wiring may cause failure of Device specifically communication failures.

- RS 485: D+, D-, GND.
- 120 ohms Internal Termination Resistor Selection.(Enable if Both terminal short & disable if both terminal open)
- 9V~24V DC power connector.
- Ethernet (RJ45) Modbus TCP.

4.2. RS485 Cabling Methodology

Method-1, Single Twisted pair, No shield

In this case, "Earth" is ground and it is inexpensive, easy to install. This kind of cabling is suitable. If conduits are used for communication cables, power supply cables are not available and environment is free from electrical noise. This method is not recommended for industrial applications.

Method-2, Shielded single twisted pair + Earth wire

One pair is used for RS-485 communications and extra wire used specifically for a ground wire.

Method-3, Shielded single twisted pair cable

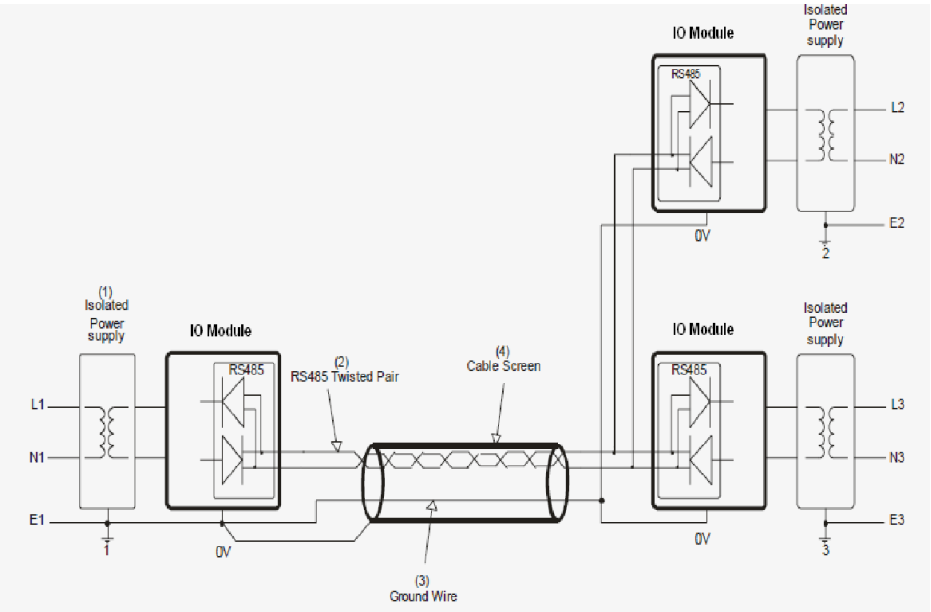
One pair is used for RS-485 communications and shield is used for return.

Method-4, Shielded twisted pair, 2 pairs

One pair is used for the RS-485 communications and another pair is used for ground Method 2 to 4 would reduce noise induced through ground potential differences. This is the preferred option in areas where there is a potential for high electrical noise or if cabling lacks the cleanliness of conduit or wire trays. The drawback of the three conductor option is elevated cable pricing and is slightly more difficult to install. Care must also be taking using this option not to create a ground loop.

Good installation practice for RS485 systems:

- Use RS485 shielded twisted cable to prevent electrical noise pickup.
- Use a screened cable to prevent electrical noise pickup. This screen must be earthed at one end only, UNIT-1.
- Do not carry RS485 and power supply in same cables.
- Do proper termination and/or shielding to provide isolation from high frequency interference, RFI, and transient.



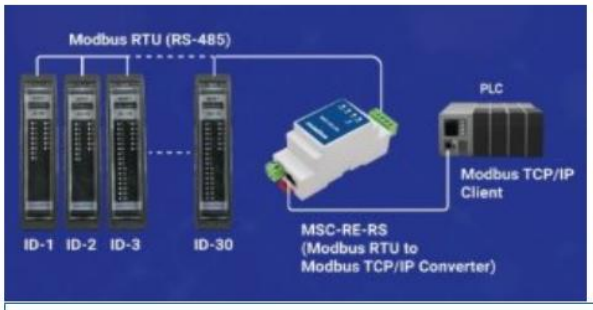
4.3 LED Indications

Name	Indication
PWR: Power supply	Power supply is been provided
STAT: Status	Healthy condition of microcontroller
RX: Receive	Data receive activity on RS485
TX: Transmit	Data Transmit activity on RS485

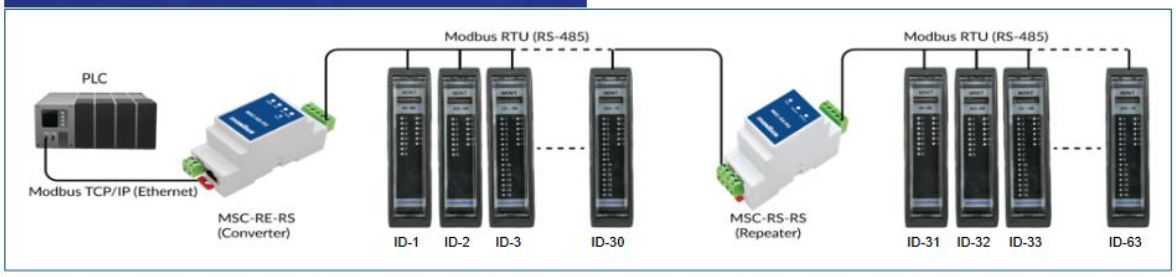
5. Device operation and configuration

5.1 MSC-RE-RS operational overview

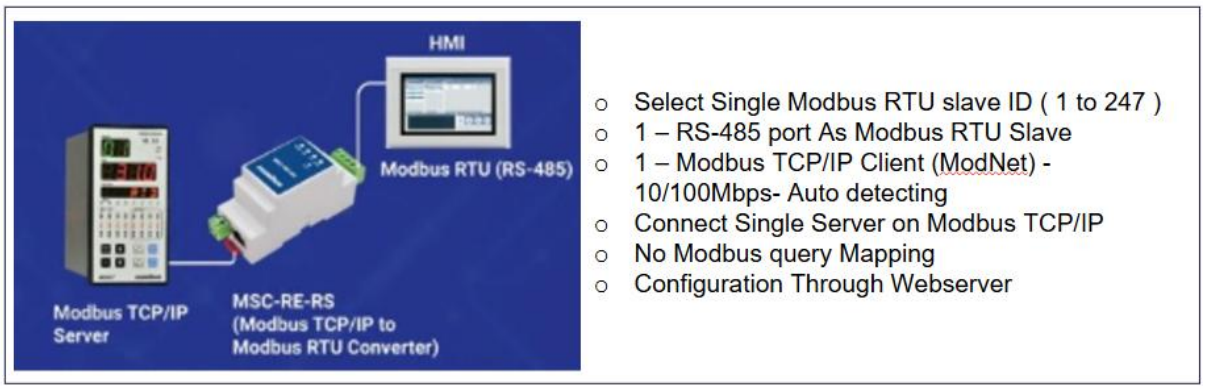
- MSC-RE-RS As Modbus RTU(RS485) to Modbus TCP Converter



- Supports up to 247 Modbus RTU slave IDs
- 1 – RS-485 port As Modbus RTU master
- 1 – Modbus TCP/IP Server (MODNET) - 10/100Mbps Auto detecting
- Connect to 15 clients on Modbus TCP/IP Server - Socket Roll Over
- No Modbus query Mapping
- Configuration Through Webserver



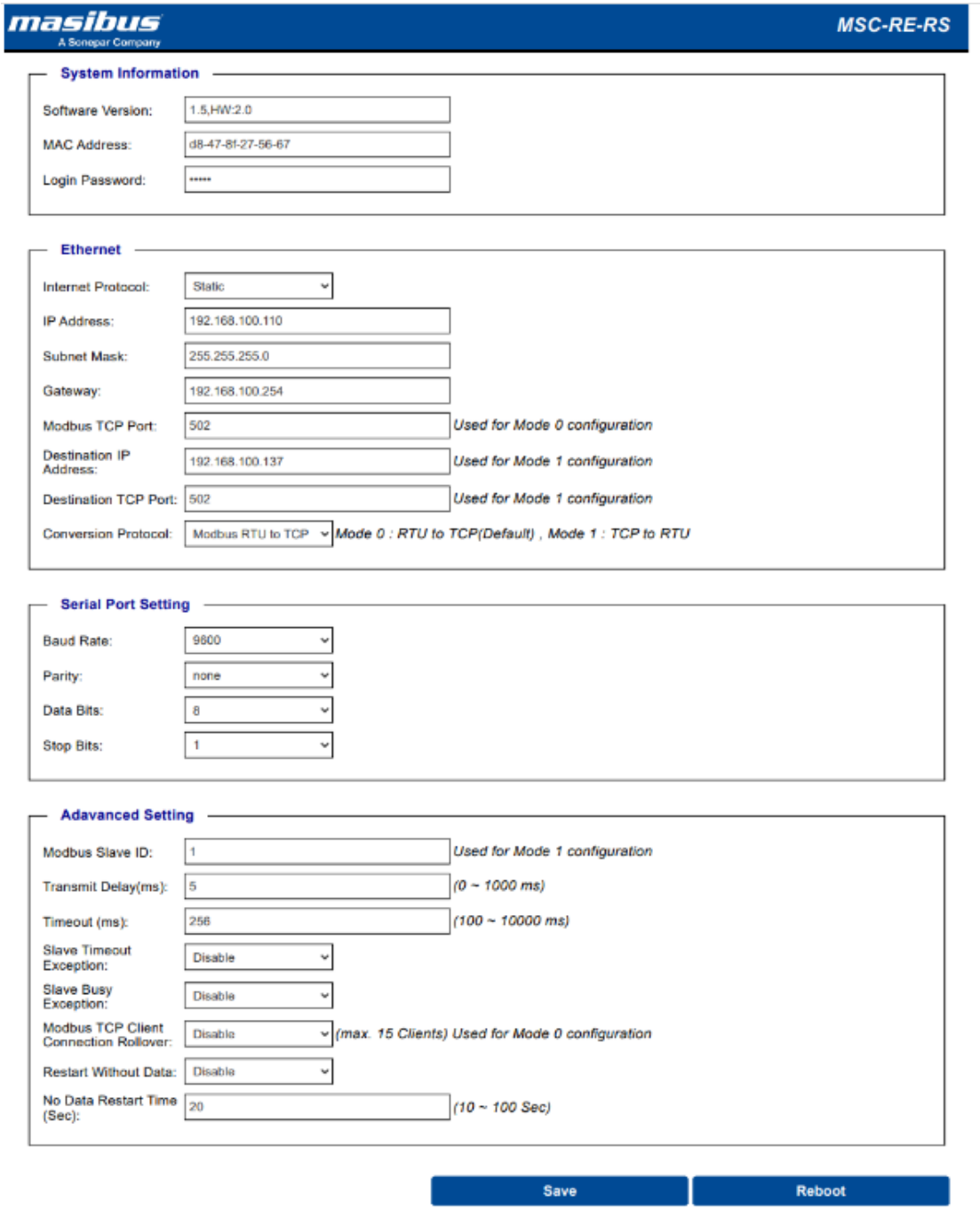
- MSC-RE-RS As Modbus TCP to Modbus RTU Converter



- Select Single Modbus RTU slave ID (1 to 247)
- 1 – RS-485 port As Modbus RTU Slave
- 1 – Modbus TCP/IP Client (ModNet) - 10/100Mbps- Auto detecting
- Connect Single Server on Modbus TCP/IP
- No Modbus query Mapping
- Configuration Through Webserver

5.2 MSC-RE-RS WEB CONFIGURATION

Below image demonstrates operational overview of MSC-RE-RS as gateway between Modbus RTU slaves/master and Modbus TCP client/server. No Modbus Mapping is required. Device can be easily configured using webserver.



5.2.1 Parameter Configuration

Using a webserver, the MSC RE-RS Gateway's parameter configuration is simple to set up. By sending an HTTP request to the device IP address using a web browser like Google Chrome, anyone can access the web server. The MSC RE-RS device's default IP address is 192.168.100.110. The device's websites are as shown below after receiving a successful HTTP response.

Make sure that the computer or system is connected to the same IP address network and subnet.

For the Webserver login, the default user name and password are

- Username : **admin**
- Password : **admin**

After updating any parameter on any web page, you must use the "Save" button. Only after performing a power ON/OFF recycling or hitting the "Reboot" button will saved parameters take effect.

The **MSC RE-RS** device will reset after pressing the 'DFT' button while powering on simultaneously. The STAT LED will be in the Blinking condition after pressing the "DFT" button while powering on simultaneously.

5.2.2 System Information Parameter

Parameters	Description	Default
Software version	Current Version of the System	Current Version of the System
MAC Address	MAC Address	MAC Address
Login Password	Users login password	admin

5.2.3 Communication Parameter

Parameters	Description	Default	Format	Range
Internet Protocol	MSC-RE RS IP address selection	Static	Option	Static/ DHCP
IP Address **While Conversion Mode-0**	MSC-RE RS IP address (in static mode only)	192.168.100. 110	XXX.XXX.XXX.XXX(R/W)	1 ~ 15 characters
Subnet Mask	MSC-RE RS subnet mask	255.255.255.0	XXX.XXX.XXX.XXX(R/W)	1 ~ 15 characters

	address (in static mode only)			
Gateway	MSC-RE RS gateway address (in static mode only)	192.168.100.254	XXX.XXX.XXX.XXX(R/W)	1 ~ 15 characters
Modbus TCP Port	Modbus TCP/IP clients and servers listen and receive Modbus data via port 502	502	–	–
Destination IP Address While Conversion Mode-1	MSC-RE RS IP address (in static mode only)	192.168.100.110	XXX.XXX.XXX.XXX(R/W)	1 ~ 15 characters
Destination TCP Port While Conversion Mode-1	Modbus TCP/IP clients and servers listen and receive Modbus data via port 502	502	–	–
Conversion Protocol (Modes)	Modbus RTU to TCP Modbus TCP to RTU	Modbus RTU to TCP Mode-0	Mode 0 : RTU to TCP(Default) , Mode 1 : TCP to RTU	

5.2.4 RS485 - Modbus Parameters

Serial Parameters

Parameters	Description	Default	Format	Range
Baud Rate	Baud rate for RS485 port Modbus communication	9600	Option	9600// 19200/ 38400/ 57600/ 115200
Parity	Parity for RS485 Port Modbus communication.	None	Option	none/ even/ odd
Data Bits	Number of data bits for RS485 Port Modbus communication.	8	Option	7/8 Bit
Stop Bits	Number of stop bits for RS485 Port Modbus communication.	1	Option	½ Bit
Advance Settings				
Modbus Slave ID While Conversion Mode-1	Modbus TCP to Modbus RTU functionality. Select Single Modbus RTU slave ID	1	Character	1-247
Transmit Delay	Modbus TCP IP to Modbus RTU Transmit delay when more number of clients active on TCP IP	5 (m Sec)	Integer(R/W)	0 ~ 1000 (m Sec)

Time Out	Response timeout for Modbus communication on RS485 Port. This time decides the waiting period of Modbus slave response.	256(m Sec)	Integer(R/W)	0 ~ 10000 (m Sec)
Slave TimeOut Exception	If enabled, Modbus-TCP gets slave timeout exception response when Modbus-RTU slave device is not responding or disconnected	Disable	Option	Enable/Disable
Slave Busy Exception	if enabled, Modbus-TCP gets Busy exception response when Modbus-RTU slave device is busy	Disable	Option	Enable/Disable
Modbus TCP ClientConnection Rollover:	if enabled, Modbus-TCP socket gets roll over, (max. 15 Clients) Used for Mode-0 Configuration	Disable	Option	Enable/Disable
Restart Without Data	If no activity at RS485, Soft restart automatically	Disable	Option	Enable/Disable
No Data Restart Time(Sec)	Applicable when Restart without data enabled	20	character	10-100 seconds

Contact Detail Of Service Department

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