

MEV Limited.

**Isolated
RS485 Repeater**

INSTRUCTION MANUAL

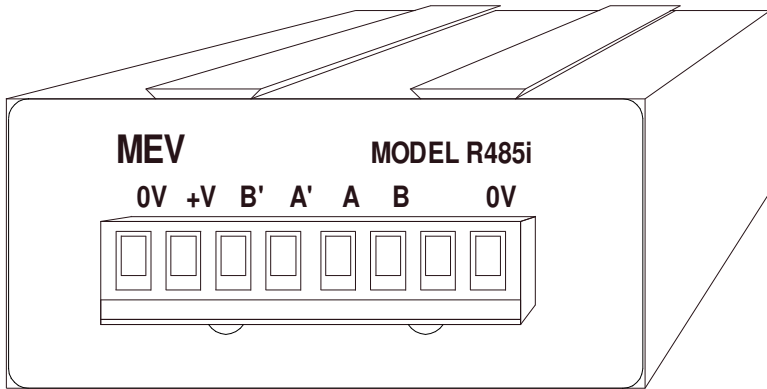
RS485 REPEATER

Instruction manual iss. A

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FEATURES

Doubles allowable network distance.

Protects network by electrically isolating the ports of the Repeater to 1KV.

Two wire, half duplex, operation.

Allows multiple bus masters.

Facilitates RS485 communication in otherwise unfeasible circumstances.

Saves costly cable and cable laying

Static discharge protection fitted as standard.

INTRODUCTION

The MEV RS485 REPEATER allows communications between RS485 systems in otherwise impossible situations.

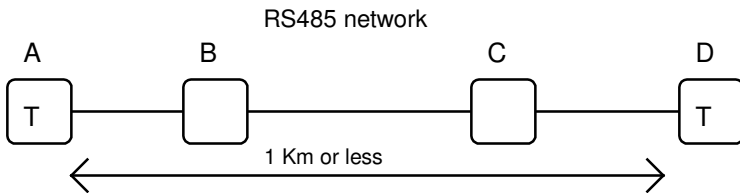
The RS485 data transmission standard requires that each network node be linked via a single transmission line terminated at each end in its characteristic impedance. Furthermore the total transmission line length is limited to approx. 1Km.

Sometimes it is necessary to transmit over longer distances than 1 Km. The Repeater doubles the allowable transmission distance by re-transmitting the RS485 signals it receives. It has two i/o ports, each port forming a complete RS485 network.

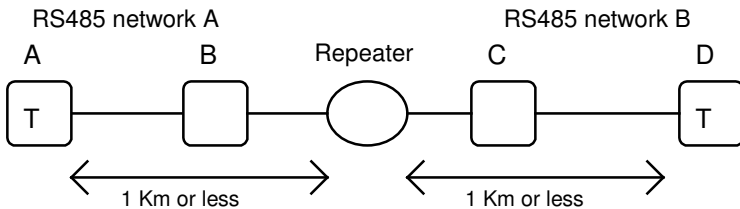
Repeaters may be cascaded to further increase transmission distance.

GENERAL OPERATION

As described above RS485 networks must be wired as one serial transmission line, with no spurs, terminated at each end with the characteristic impedance of the transmission line. This configuration is pictured below where A,B,C, & D are network nodes, nodes A & D are terminated as they are the extremes of the transmission line. The total network must be limited to approximately 1Km.



This MEV Repeater doubles the total allowable communication distance. It re-transmits the electrical signals, creating a new RS485 network electrically isolated (to 1kV) from the first.



The repeater is a two port device. One port (**common port**) is electrically common to the dc power supply. The other port (**isolated port**) is optically isolated from the **common port**. Characters received on one port are re-transmitted on the other.

OPERATION MODES - 2-WIRE / 4-WIRE

The unit can be wired to operate half duplex (**two wire**), where data can only flow between ports in one direction at once, or full duplex (**four wire**), where data can flow both ways simultaneously.

Four wire systems are used for point to point networks. The transmit outputs of station one are connected to the receive inputs of station two, and vice versa.

Two wire systems are used for multidrop systems where a number of stations are connected together. The transmitters and receivers of all stations are connected to a single pair of wires. Only one station may therefore drive the line at any time. All other stations must put their transmitters into high impedance mode to prevent the valid transmission being corrupted.

On delivery the unit is set to operate in two wire mode..

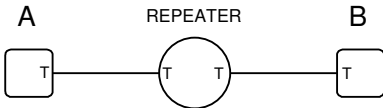
In '**four wire mode**' the transmitters on both ports of the repeater are permanently enabled. In this mode characters received on one port are immediately transmitted on the other.

In '**two wire mode**', the Repeater listens continuously to both of its RS485 inputs until a start bit is detected on one of the ports. The Repeater then drives the other port with the data received. After completion of the message all transmitters are disabled and the Repeater returns to monitoring both inputs.

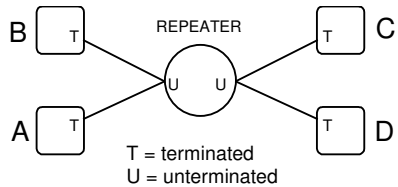
In '**two wire mode**' In order to prevent the Repeater triggering on noise or pre transmitted data there is a switch selectable turnround delay built in to the unit. This is factory set and should not under normal circumstances need changing.

TERMINATION

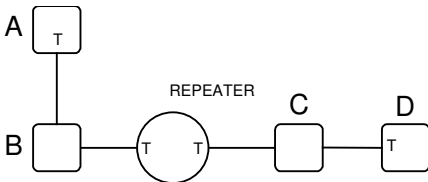
RS485 networks are 'transmission lines' and should be terminated at each end in their characteristic impedances'. Below are some valid connection examples for the Repeater. The examples show the point at which each of the networks are terminated. Repeater links LK1 & LK2 control termination at the Repeater ports.



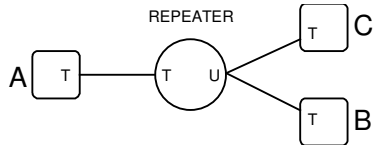
Standard
Repeater at end of each spoke.



Repeater at centre of each spoke



More than one node per spoke.



Mixed
All spokes configured differently

INSTALLATION

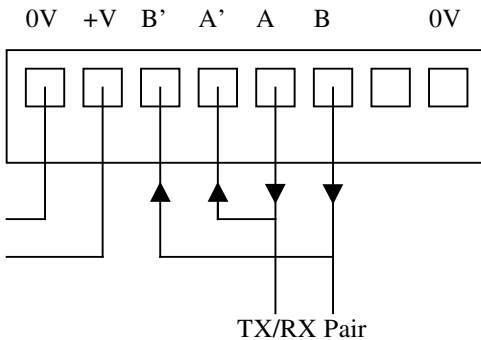
Installation of the Repeater is simple. First decide at what point on the network you intend to install the repeater. At approximately half way is correct for a one Repeater system. Decide which, if any, of the ports on the Repeater to terminate. Note that on delivery both ports on the Repeater have termination resistors fitted. Break the transmission line and insert the Repeater into the network. Connection is via the detachable screw terminals inserted through the front and rear panels.

Connections

Connections for **isolated port** are as shown for **common port**. As described above the unit can be wired to operate as a Two wire or four wire repeater.

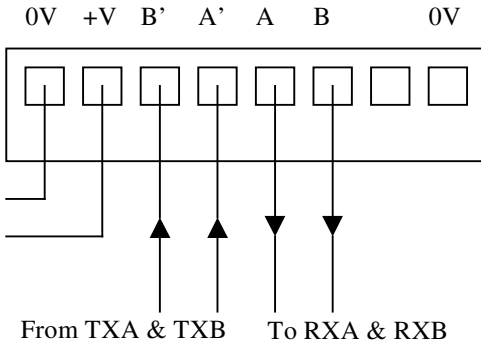
Two Wire Connections

The diagram below shows wiring for repeater **common port** on a **two wire** network. The Repeater transmitter outputs (A & B) are connected to the receiver inputs (A' & B') to form the two wire multidrop network.



Four Wire Connections

The diagram below shows wiring for the repeater port common to the power supply (common port) on a four wire network. The Repeater receiver inputs (A' & B') are connected to the transmit data outputs of the other device on the network. Similarly the repeater transmit outputs (A & B) are connected to the receive data inputs of the device on the other end of the network.



N.B. For four wire operation the internal configuration switch must be set appropriately. Refer to link and switch settings for details.

Commissioning

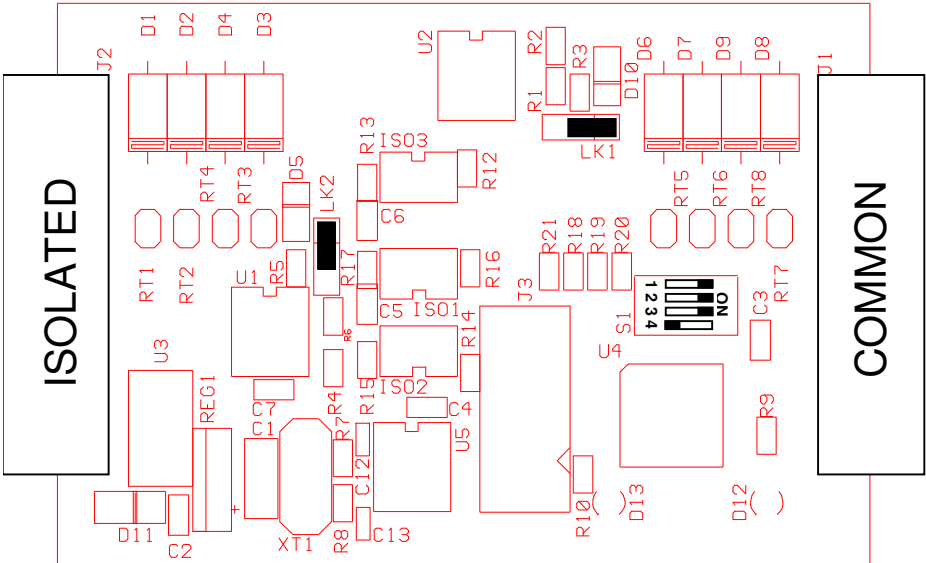
Connect power to the Repeater and Repeater is now ready to function. To aid with installation the Repeater has two internal LEDs. When lit these indicate detection of a start bit on each of the RS485 ports 'A' & 'B'. D12 is for **common port** while D13 is for **isolated port**. They are only visible when the unit is removed from the case and are situated on the pcb.

LINK CONFIGURATION

Access to the configuration links is achieved in the following manner.

Disconnect the power and remove the four outer screws that attach the rear panel to the case. Then unplug the screw terminals from the data signal connector mounted through the front panel.

The rear panel and PCB can then be withdrawn from the case exposing the configuration links.



Links and switches shown in delivery (default) configuration.

Link & Switch Definitions

LK1	1-2 2-3	Termination resistor fitted to common port . (default) common port un-terminated.
LK2	1-2 2-3	Termination resistor fitted to isolated port . (default) isolated port un-terminated.

Bit Switch

1	2	3	4	function
X	X	X	ON	Operation mode = four wire full duplex
X	X	X	OFF	Operation mode = two wire half duplex (default).
ON	ON	ON	OFF	Two wire mode RS485 transmitter turnaround time = 512 us. (default)

Note: After configuring links and switches, ensure repeater is reassembled in correct orientation such that PCB is placed in the box with isolated connector, see previous page for identification, at panel with the following legend:

i0V iB' iA' iA iB i0V

DELIVERY CONFIGURATION

On delivery the REPEATER is configured for operation with both ports terminated, as follows:-

- | | |
|-----------|--|
| LK1 1-2 | Termination resistor fitted to REPEATER common port . |
| LK2 1-2 | Termination resistor fitted to REPEATER isolated port . |
| S1 1-3 ON | Sets turnround delay to 512us. |
| S1 4 OFF | Sets operation mode to 'two wire mode' |

The above configuration will suit most network configurations. Therefore, in all but the most extreme cases, bitswitches S1 1-3 should be left in their delivery configuration.

TROUBLESHOOTING

In 'two wire mode' The **turnround** delay is set at 512us to minimise the effects of transmission line capacitance. If faster turnround is required, say for higher baud rates this time can be reduced.

If transmission is attempted over very long distances, where the line capacitance is very high it may be necessary to extend this delay. Conversely if faster transmission is attempted over shorter distances, then the delay can be shortened.

CONNECTOR PINOUT

There are two connectors on the Repeater.

COMMON PORT Connector

This consists of eight removable screw, located on the front panel.

Pin legend	Function
0v	Power supply zero volt return
+V	Power supply positive voltage input
B'	Receive data positive input for common port
A'	Receive data negative input for common port
A	Transmit data negative output for common port
B	Transmit data positive output for common port
	No connection
0V	Data signal ground reference for common port

ISOLATED PORT Connector

This also consists of eight removable screw, located on the rear panel. It is the connector for the opto-isolated port.

Pin legend	Function
i0v	Data signal ground reference for isolated isolated port
	No connection
iB'	isolated Receive data positive input for isolated port
iA'	isolated Receive data negative input for isolated port
iA	isolated Transmit data negative output for isolated port
iB	isolated Transmit data positive output for isolated port
	No connection
i0V	Data signal ground reference for isolated isolated port

SPECIFICATIONS

Power requirements		
Low voltage d.c.	-	9v d.c. @ 200mA
Heat dissipation	-	1.8 Watts Max
Data transmission standard		RS485, two wire/four wire, half or full duplex
Electrical Isolation between ports	-	1 kV.
Environmental		
Ambient Temperature	-	-5 to 55°C
Relative Humidity	-	0 to 90%
Baud Rate	-	115 K baud max dependent on distance.
Maximum transmission distance per port at 9600 baud.	-	1.2Km

EMC REQUIREMENTS

This product conforms with the protection requirements of Council Directive 89/336/EEC, relating to Electromagnetic Compatability, by application of



EN55022 1995 Emissions Standards (ITE Equipment class B)
EN55024 1998 Immunity Standard

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