1. Introduction

The M90-19-R5 converts serial data from the RS232 standard to either RS422 or RS485.

Features:
- Universal converter—can be used with both Unitronics' and other manufacturer's devices.
- No 'handshake' required—automatically senses the direction of the data flow, and switches the transmission direction.
- Standard-sized housing, snap-mounts onto a 35mm DIN rail.
- Screw terminal block connections provided.
- RJ11 connector provides easy plug-in connection for Unitronics (and other) RS232-based devices.
- Supports networks containing up to 32 nodes.
- Either full or half-duplex communications.
- Stand-alone power supply.
- LED indicators.

2. Function diagram
3. **Wiring Connections**

Before making your connections, please read the wiring considerations on the next page.

### Top Connectors

**Power supply terminals**

- **Rear connector**
  - 24V: Supply voltage
  - 0V: Reference supply voltage
  - Earth: Earth

**RS232 terminals**

- **Front connector**
  - TXD: RS232 transmit signal
  - RXD: RS232 receive signal
  - 0V: RS232 0V reference

### Bottom Connectors

**RS422/RS485 terminals**

- **Rear connector**
  - TX-: RS422/RS485 negative transmit signal
  - RX-: RS422/RS485 negative receive signal
  - T-: Negative termination

- **Front connector**
  - TX+: RS422/RS485 positive transmit signal
  - RX+: RS422/RS485 positive receive signal
  - T+: Positive termination
RS232 Pin-out

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not connected</td>
</tr>
<tr>
<td>2</td>
<td>0V reference</td>
</tr>
<tr>
<td>3</td>
<td>TxD signal</td>
</tr>
<tr>
<td>4</td>
<td>RxD signal</td>
</tr>
<tr>
<td>5</td>
<td>0V reference</td>
</tr>
<tr>
<td>6</td>
<td>Not connected</td>
</tr>
</tbody>
</table>

RS232 wiring considerations

- Since the RJ11 connector and the screw block terminal both use the same signal source, only one can be used for establishing RS232 communications. Connect the screw block terminal as follows:
  - M90-19-R5 Device
    - RxD <-------- TxD
    - TxD -------> RxD
    - 0V -------- 0V

- Adapters and cables configured for the RJ11 connector are available by separate order as listed in RS232 Accessories, on page 8.

RS485/422 wiring considerations

- Use shielded, twisted pair cables.
- Configure the network as a multidrop bus network.
- Minimize the stub (drop) length leading from each device to the bus. Ideally, the main cable should be run in and out of the networked device.
- Do not cross positive (A) and negative (B) signals. Positive terminals must be wired to positive, and negative terminals to negative.
- You must create network termination points by using the two end point devices integrated into your network. Connect the T- terminal to Rx-, and T+ to RX+ in each end point device as shown in Figure 1 and Figure 2.
- To support RS485, connect the Tx+ terminal to the Rx+, and the Rx terminal to the Tx-, as shown in Figure 1 on page 4.
4. DIP Switch Settings

The DIP switches are located on the top of the device. They control data format, transmission speed, and whether communications are half or full duplex.

Data can be transmitted in either 10 or 11 bit format. Each format includes a start and stop bit.

The DIP switches are pictured below. Note that a lowered switch is ‘on’, a raised switch is ‘off’.
The table below shows the DIP switch setting options; note that '-' is off.

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10 bit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 bit</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

Note that RS485 requires a half duplex setting; RS422 can function using either half or full duplex setting.

The factory default settings, shown below, enable 10 bit communications. 10 bits might, for example, comprise one start bit, seven data bits, a parity bit, and a stop bit; half duplex, at 2400 bps. These settings suit the M90 PLC.

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

5. Examples

The M90 PLC is used in both of the examples given below; the DIP switch settings used are therefore the factory default settings

Example 1

The M90-19-R5 converter serves as the RS232-to-RS485 communications interface between a Unitronics M90 controller and a P608 model PLC.

The cable used to connect the M90 to the M90-19-R5 converter is a convenient, plug-in RJ11 connector cable, which is available by separate order.
The P608 is connected to the M90-19-R5 via a RS485 communication cable. One end of the cable is connected to the M90-19-R5 screw terminal block. The other end is connected, via a 9-pin D-type connector, to the RS485 communication channel of the P608.

**Example 1**

- **Termination points:**
  - P608: the termination switch is switched ON.
  - M90-19-R5: the T+ and T- terminals are interconnected as shown above, creating termination points.

**Example 2**

RS485 supports a network comprising 2 M90 controllers and a PC; the M90-19-R5 provides the communications interface.

In order to prevent interference in this type of configuration, we strongly recommend that the 24V power supply of the computer-connected M90-19-R5 be separate from the power supply of the other two converters.
Example 2

Termination points:

- The T+ and T- termination points of the two end point devices are interconnected; those of the middle device are not.

Unitronics’ RJ11 connector cables and 9-pin serial port adapter provide a convenient way to connect a PC or any other device to your network via the RS232 serial port. These items are listed under Accessories on page 8, and are available by separate order.

RS232 connections can also be made using the M90-19-R5’s screw block terminal connectors.
6. Specifications

**Power Supply**
- Input voltage: 24VDC
- Permissible range: 20.4 to 28.8 VDC
- Maximum input current: 35mA @ 24VDC

**RS232**
- Input voltage: ±20VDC maximum
- Cable length: 15m maximum (50 feet)
- Interface connectors: Either RJ11, or screw-type 2.5mm² terminal

**RS422/RS485**
- Input voltage: -7 to +12V differential maximum
- Cable type: Shielded twisted pair, in compliance with EIA RS485
- Cable length: 1200m maximum (4000 feet)
- Interface connector: Screw-type 2.5mm² terminal

**General**
- Isolation: yes
- Size (L x W x H): 110.8 x 22.5 x 75 mm (4.38”x 0.89”x 2.96”)
- Weight: 98g (3.44 oz)
- Communication status indicators: Yes (see illustration in Section 3)
- Baud rates: 2400, 4800, 9600 bps
- Mounting: Snap-mounts onto 35mm DIN rail (EN50022-35)
- Flame-resistant: UL94-VO

**Environmental**
- Storage temperature: -20 to 70°C
- Operating temperature: 0 to 50°C
- Storage humidity: 10 to 95% relative humidity
- Operating humidity: 30 to 90% relative humidity

7. RS232 Accessories

- MJ10-22-CS30: 2m cable with RJ11 terminators
- MJ10-22-CS31: 30cm cable with RJ11 terminators
- MJ10-22-CS25: D-type 9-pin RJ11-serial port adapter
8. Mechanical Dimensions

![Mechanical Dimensions Diagram]

- Width: 110.8 mm
- Height: 75 mm
- Depth: 22.5 mm