

### Overview

RS-485 is the most common communications standard for HVAC DDC controllers. RS-485 has its limits; 32 unit loads and 4000 ft. Extending the network beyond 32 unit loads or 4000 ft requires repeaters.

BAPI's RS-485 Repeater Module (BA/RPTR) connects two RS-485 networks together. One network connects to the backplane and J2 on the front edge of the repeater. The other network connects to J3 on the front edge of the repeater. Data from one network repeats to the other network and vice versa. The two networks are galvanically isolated from one another.

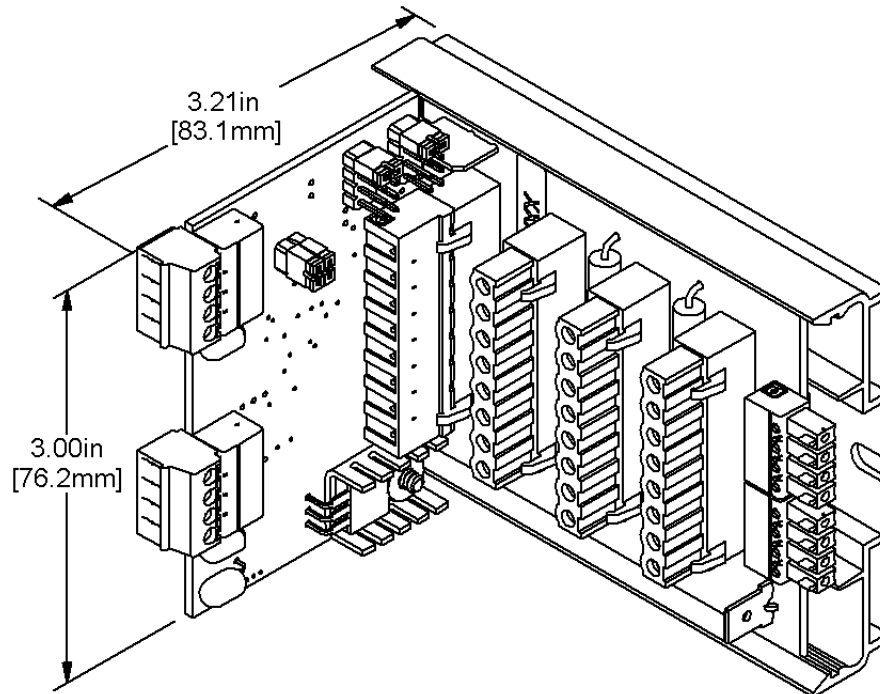
Plugging additional repeater cards into the BAPI Communications Repeater Backplane (BA/RBP) allows one more RS-485 4000 ft long buss for each repeater card. These additional networks terminate on J3 of each repeater card. All the RS-485 Repeater share data through the communications backplane.

Each repeater card consumes one unit load for the RS-485 network attached to the backplane and J2 on the front edge of the repeater. The repeater consumes a unit load for the repeated RS-485 network connected to J3.

A green power LED shows that the unit has 12 VDC power. One red LED for each RS-485 network will flash when data is transmitted or received.

### Mounting

The Repeater Module plugs into the Communications Repeater Backplane as shown in Fig. 1.

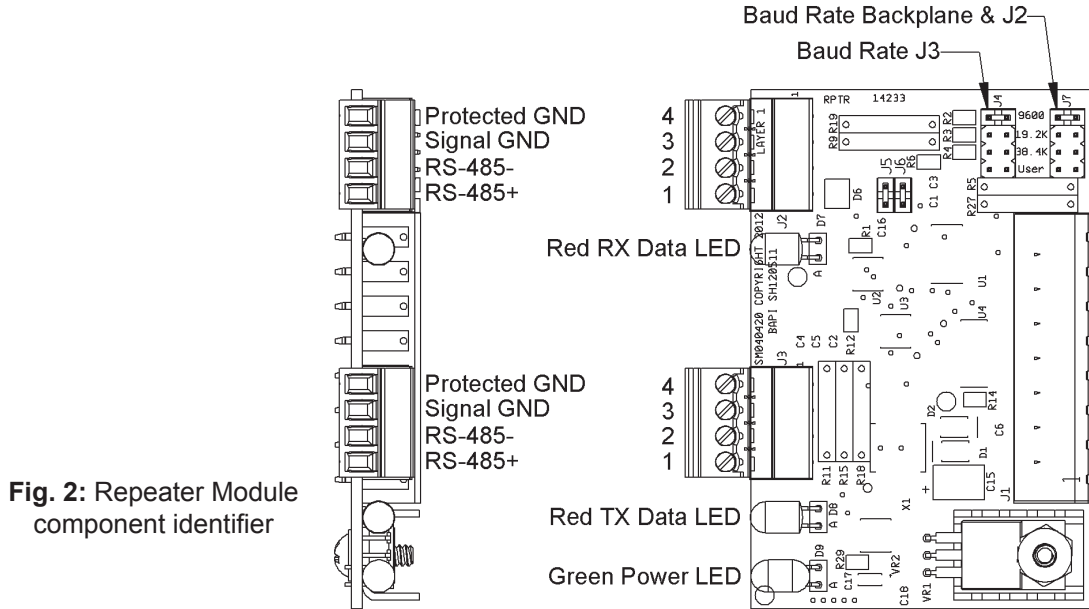


**Fig. 1:** Repeater Module plugged into the Communications Repeater Backplane

Specifications subject to change without notice.

### Termination

Connect the RS-485 communication links as shown in the table below.



**Fig. 2:** Repeater Module component identifier

Table 1: Repeater Module RS-485 Connection List	
J2 and Backplane	
Pin Number	Connection
Pin 4	Protected Ground
Pin 3	Signal Ground
Pin 2	RS-485 -
Pin 1	RS-485 +
J3	
Pin 4	Protected Ground
Pin 3	Signal Ground
Pin 2	RS-485 -
Pin 1	RS-485 +

Note: The male connectors that plug into the jacks on the board use a rising block screw terminal to hold the wires. If the block is in a partially up position the wire may be inserted under the block and the wire will not be held when the screw is tightened. To avoid improper wiring, turn the male connector screws counterclockwise until the block is below the wire opening before inserting the wire. Lightly tug on each wire after tightening to verify proper termination.

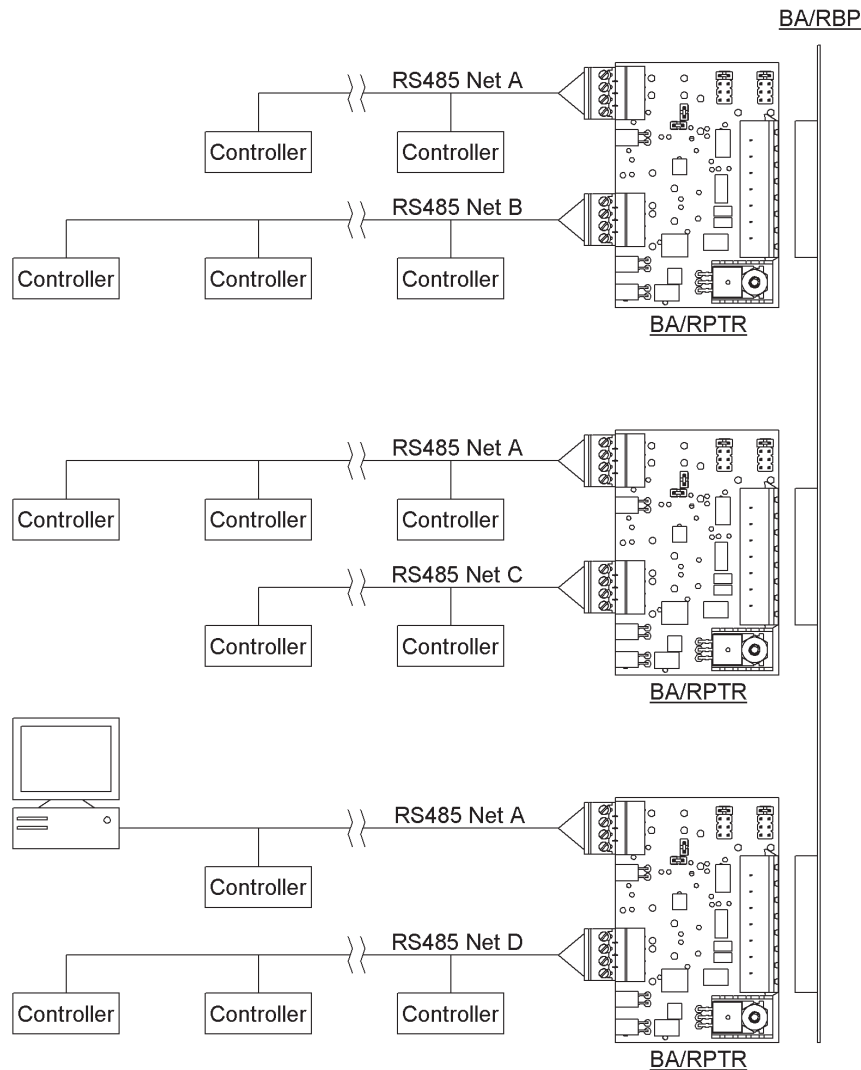
### Operation

Set both baud rate jumpers to the network communications speed. Both jumpers must be set to the same data rate.

RS-485 communication networks are limited to 32 unit loads and 4000 feet of twisted pair cable at data rates of 100,000 BAUD or less. Each Repeater Module uses up one unit load on the network to which it is connected. If more than one Repeater Module is plugged into a Communications Repeater Backplane, then one unit load for each Repeater Module is used up on the network connected to the back plane. Many RS-485 devices operate at half or quarter load, this information should be available from the device manufacturer. Total the unit loads and do not exceed 32 for any RS-485 network. If your network totals more than 32, use another repeater.

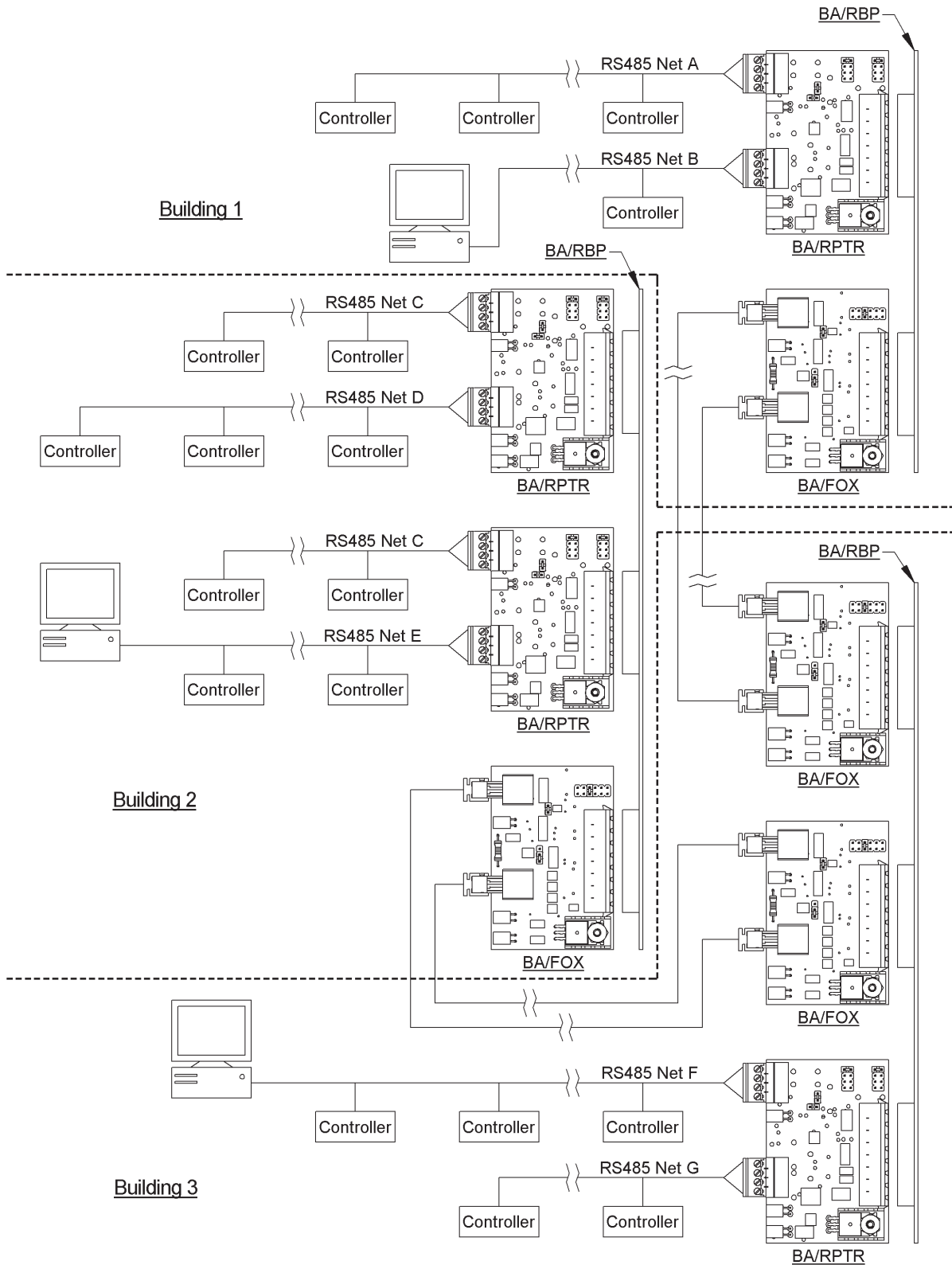
Fig. 3 shows three Repeater Modules plugged into one Communications Repeater Backplane (BARBP). The figure clearly shows that the J2 connectors on each Repeater Module (BA/RPTR) connect together. Net B, Net C and Net D, attached to J3 of each board, are physically and electrically independent of the network connected to the J2 connectors. The three Repeater Modules of Figure 3 consume three unit loads on RS-485 Net A.

Fig. 4 shows a large control network spanning several buildings. Repeater Modules expand the network to many control devices in each building. FOX Fiber Optic Transceiver Modules (BA/FOXs) share the communications between many buildings.



**Fig. 3:** Three Repeater Modules (BARPTR) plugged into a Communications Repeater Backplane (BARBP) showing the different RS-485 networks.

Specifications subject to change without notice.



**Fig. 4:** Large control network spread over several buildings.

Specifications subject to change without notice.



### Troubleshooting

#### **Possible Problems:**

Power LED L1 does not light

#### **Possible Solutions:**

- Check to see that the Repeater Module is firmly inserted into the Repeater Backplane
- Check to see if the power cable is firmly inserted into the backplane.
- Check to see if the 3312VC is working correctly
- Check to see if the power to the PS17 supplying the 3312VC is turned on

Data LEDs do not blink

- Check RS485 communications link for proper termination
- Check to see if Baud rate jumpers are properly set

### Specifications

Power Voltage	11 to 13 VDC (from BAPI BA/3312VC)
Power Current	250mA maximum (3VA max )
Communications rates	9600, 19.2K, and 38.4K Baud
Network Load	1 unit load
Network Length	4000ft (1.2Km)

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