



QD1011a
RS485 to RS485
Serial Repeater

Description

The QD1011a is an RS485/RS485 serial repeater used to extend the size of a network containing TCS/Basys Controls thermostats and controllers.

- QD1011a RS485/RS485 serial repeater
- 110-120 VAC @ 50/60 HZ power module
- 120 Ω termination resistor (2)

General

The QD1010 is used to connect a PC to a network with up to 4000' of wire and up to 32 thermostats and/or controllers. Thermostats and controllers will be referred to as controllers throughout the rest of this document. For networks longer than 4000' or larger than 32 controllers, one or more RS485/RS485 serial repeaters (QD1011a) will be needed.

The QD1011a must be powered externally using the 120 VAC @ 60 Hz to 12 VDC power module (included).

Setup

The QD1011a has an "In" side and an "Out" side. It does not matter which side of the network is connected to the "In" side or the "Out" side.

The baud rate of all of the controllers on a network **must** be the same. Controllers support baud rates of 2.4k, 4.8k, 9.6k and 19.2k baud. The default baud rate for controllers is 9.6k baud. All of the addresses of controllers on a network must be unique. The baud rate of the PC, the controller(s), the QD1010 and the QD1011a(s) must all be set the same. Place a jumper on the appropriate baud rate selection on the QD1011a. See Figure 1.

There are two jumper selections labeled "120 Ω ". Placing a jumper on one of them installs a 120 ohm terminating resistor at the QD1011a on either the "In" or the "Out" side. See RS485 Wiring and Setup for a complete discussion on the use of terminating

QD1011a RS485 Network Setup

Plug the included power module to the QD1011a and to a 120 VAC 50/60 Hz power source. Connect the "A" and "B" wires from one side of the network to the terminals labeled "A" and "B" and "In" on the QD1011a. Connect the "A" and "B" wires from the other side of the network to the terminals labeled "A" and "B" and "Out" on the QD1011a. If using a three-wire communications cable, connect "REF" terminals on QD1011a.

RS485 Wiring & Setup

Use 18 AWG twisted shielded pair cable for network wiring. Network wiring should start at one controller and go to the next and then go to the next, and so on until the final controller is reached. Wiring is such that all "A" wires are connected to "A" wires, and all "B" wires are connected to "B" wires. A 120 ohm terminating resistor should be placed at each of the two ends of the network directly across the "A" and "B" wires. Try and keep stubs less than 50'.

Connect one end of the shield wire of the network wiring to earth ground.

Note: All network wiring shields should be twisted together and taped off to prevent accidental grounding. More than one ground on the network wiring can result in communication failure.

Each network of 4000' of wire or up to 32 controllers is to be treated as a separate network for wiring purposes.

If the QD1011a will be at the end of a network, you can use one of its built in 120 ohm terminating resistors by placing a jumper on "120 Ω" for either the "In" or the "Out" side, or one can be hard wired across the "A" and "B" terminals of the "In" or the "Out" side.

Note: A maximum of 2 terminating resistors can be used per side. See Figure 1.

If the QD1011a will be in the middle of the network, or if an external terminating, "balancing" resistor is used, the jumper on "120 Ω" for either the "In" or the "Out" side **must** be removed. See Figure 2.

On small networks, no terminating also referred to as "balancing" resistors should be needed. If they are not needed, the jumper on "120 Ω" for either the "In" or the "Out" side **should** be removed.

Figure 3 illustrates a configuration with multiple QD1011a's.

Figure 1. Communications with a network of thermostats / controllers, QD1011a at end of network.

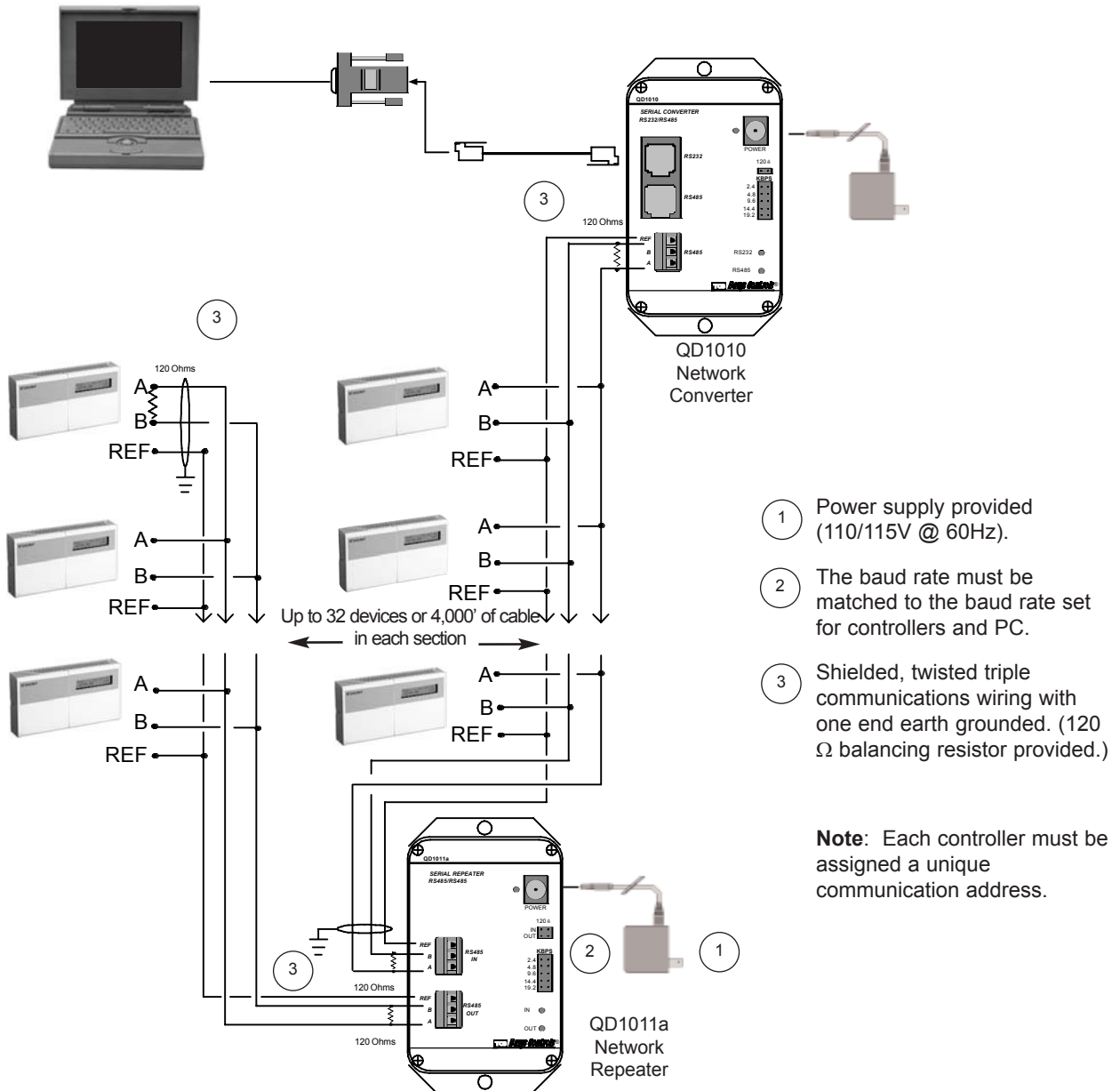


Figure 2. Communications with a network of thermostats / controllers, QD1011a in middle of network.

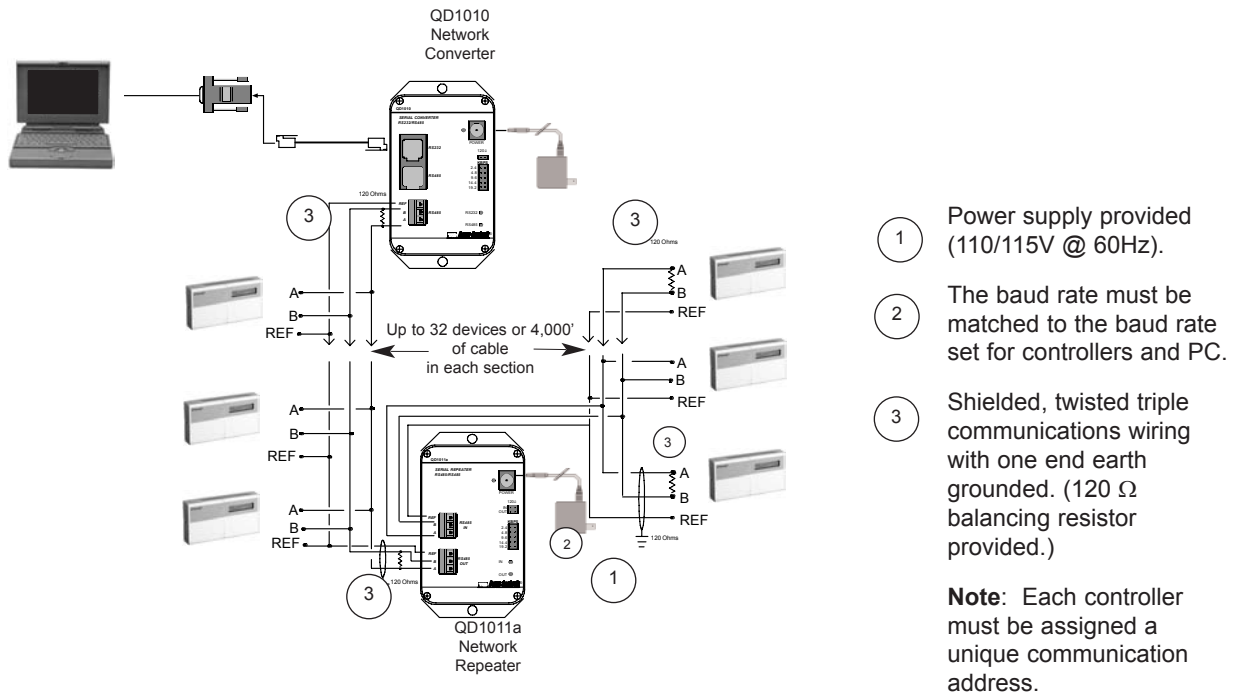
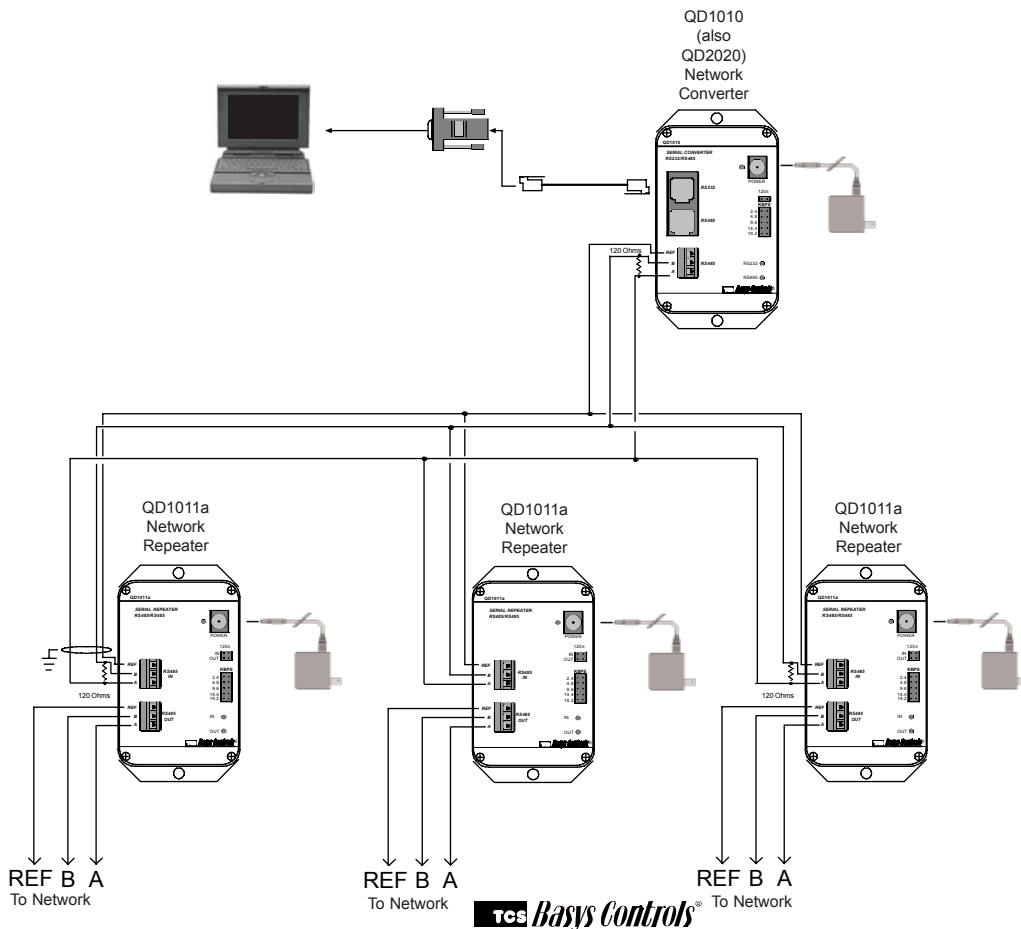


Figure 3. Communications with a network of thermostats/controllers using multiple QD1011a's.



Troubleshooting Communications

Each piece of network of up to 4000' of wire or up to 32 controllers should be tested by itself using a QD1010, prior to installing a QD1011a onto a network.

After the QD1011a is installed, you should test communications with all controllers on the network. This can be done using the test network feature of either the OSOE or Revelation software. If you followed

the above recommendation, all of the controllers should test "OK". If a controller doesn't communicate, verify that the "A" and "B" wires are not switched. Verify the address and the baud rate as well.

If you are still having trouble with communications, attempt to read the controller (initialize or setup screens) and watch the QD1011a's "In" (green) and "Out" (yellow) LEDs. The "In" (green) LED blinks when communication is coming into the "In" terminal block. The "Out" (yellow) LED blinks when communication is coming into the "Out" terminal block. See the chart below for help:

IF	THEN
The In or Out LEDs never light.	Check that the QD1011a has power. The Power LED should be lit. Look at the QD1010 or QD2020. Make sure the QD1010's RS232 (green) or the QD2020's (network) LED is blinking.
One LED blinks, Other LED is always off. If this happens, the one that blinks In or Out is getting messages, but the controller is not responding.	Check that the baud rate set on the computer and the QD1010 or QD2020, QD1011a and controller(s) are all set the same. Verify controller address.
Both In and Out LEDs blink. Both the computer and the controller are responding, but you still receive communication errors.	Check that the baud rate jumper on the QD1010 or the network baud rate setting on the QD2020, and the jumper on the QD1011a are set to the proper baud rate. Check wiring. Make sure communication wiring runs are at least 5' away from fluorescent lights, motors, etc. Make sure all controllers on a network have a unique address.
One LED is always on. This is typically a problem with wiring.	Make sure the "A" and "B" wires are not switched or shorted on that side (In or Out). Make sure there is no stray voltage on the "A" and "B" wires. "B" to "A" should measure between 0.5 VDC and 3.6 VDC. "B" to "A" should measure 0 VAC. "A" to "Shield" and "B" to "Shield" should measure 0 VAC and 0 VDC.