Product Manual

TCS Basys Controls®

QD1010

RS232 to RS485 Communications Converter

Description

The QD1010 is an RS232/RS485 converter used to allow TCS Basys Controls' thermostats to communicate with a PC.

Material List

- QD1010 RS232/RS485 communication converter
- D9 Female serial connector, for use with a PC
- RJ11 phone 6 conductor cords (2)
- 110-120 vac @ 50/60Hz 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.

There are two ways to use the QD1010 to establish communications between a PC and one or more controllers.

1. Using the six conductor cord (included with the QD1010) to plug directly into a controller. Using this method, the QD1010 does not need to be powered externally because it gets its power from the controller. Note: Having the QD1010 externally powered and using the phone cord at the same time has not been shown to cause problems. Also, plugging into one controller on a network gives access to the whole network. This should be only used as a temporary connection, not a permanent one.
2. Connecting the RS485 network (one or more controllers) directly to the terminal block on the QD1010. With this method, the QD1010 **must** be powered externally using the 120 VAC @ 60 Hz to 12 VDC power module (included).

Setup

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 9.6 baud. All of the addresses of controllers on a network must be unique. The baud rate of the PC, the controller(s) and the QD1010 must all be set the same. Place a jumper on the appropriate baud rate selection on the QD1010. See Figure 1.

There is also another jumper selection labeled "120 Ω". Placing a jumper here installs a 120 Ω terminating resistor at the QD1010. See RS485 Wiring and Setup for a complete discussion on the use of terminating resistors.

QD1010 RS232 Setup

Plug one end of the one of the cables (included with the QD1010) into the RS232 port on the QD1010 and plug the other end into the "D" connector. Plug the "D" connector into the serial port of the computer. See Figures on the following pages.

Note: A 9-pin male to 25-pin female adapter may be necessary for some computers.

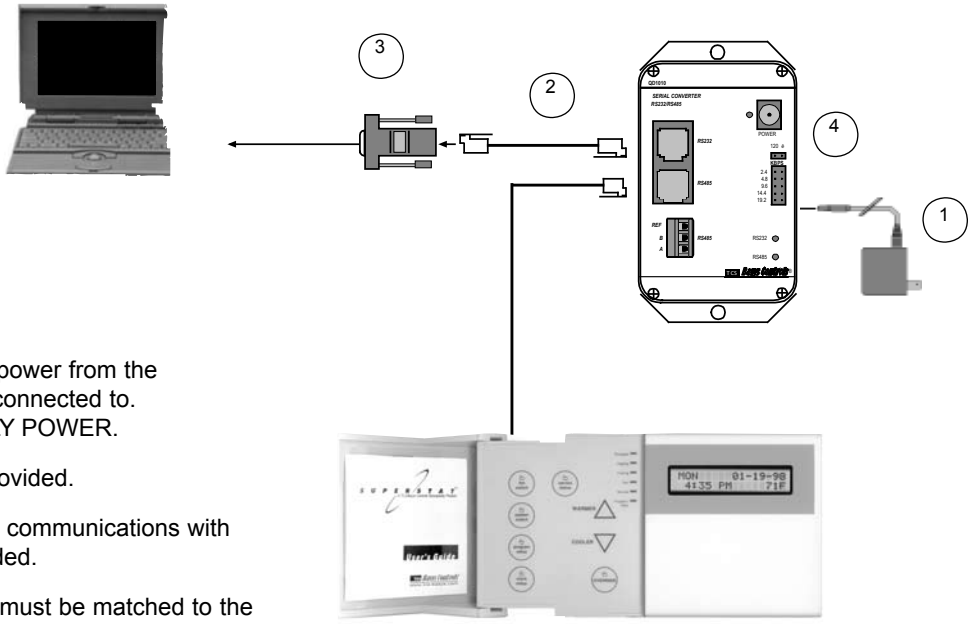
QD1010 RS485 Phone Cord Setup

Plug one end of the other RJ11 cable (included with the QD1010) into the phone jack on the controller, and plug the other end of the cable to the RS485 port on the QD1010. Confirm the baud rate of the controller and set the baud rate jumper on the QD1010 to match the baud rate of the controller. See Figure 1.

QD1010 RS485 Network Setup

Plug the included power module to the QD1010 and to a 120 VAC 50/60 Hz power source. Connect the "A" and "B" wires from the network to the terminals labeled "A" and "B" on the QD1010. If using a three-wire communications cable, connect the “REF” wires from the network to the “REF” terminals on the QD1010.

Figure 1. Communications with a stand-alone thermostat.



1. QD1010 uses power from the controller it is connected to. DO NOT APPLY POWER.
2. RJ-11 cable provided.
3. Connectors for communications with local PC provided.
4. The baud rate must be matched to the baud rate set for controllers and PC.

RS485 Wiring and Setup

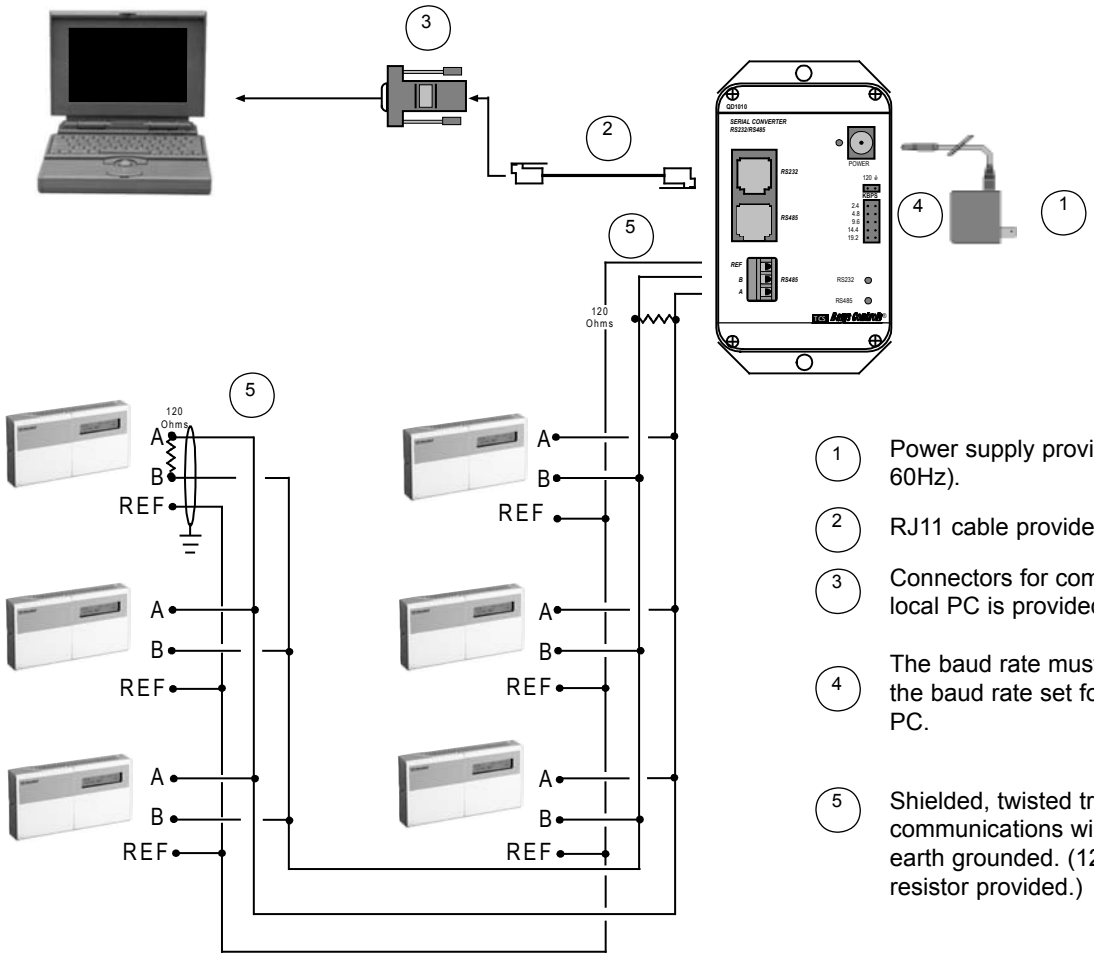
Use 18 AWG, twisted shielded pair cable for network wiring.

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 Ω 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'.

If the QD1010 will be at one end of the network, you can use its built in 120 Ω terminating resistor by placing a jumper on "120 Ω", or one can be hard wired across the "A" and "B" terminals. Note - a Maximum of 2 terminating resistors can be used. See Figure 2.

If the QD1010 will be in the middle of the network, or if an external terminating (also refered to as “balancing”) resistor is used, the jumper on "120 Ω" **must** be removed. See Figure 3.

Figure 2. Communications with a network of thermostats/controllers, QD1010 at end of network.



1. Power supply provided (110/115V @ 60Hz).
2. RJ11 cable provided.
3. Connectors for communications with local PC is provided.
4. The baud rate must be matched to the baud rate set for controllers and PC.
5. Shielded, twisted triple communications wiring with one end earth grounded. (120 Ω balancing resistor provided.)

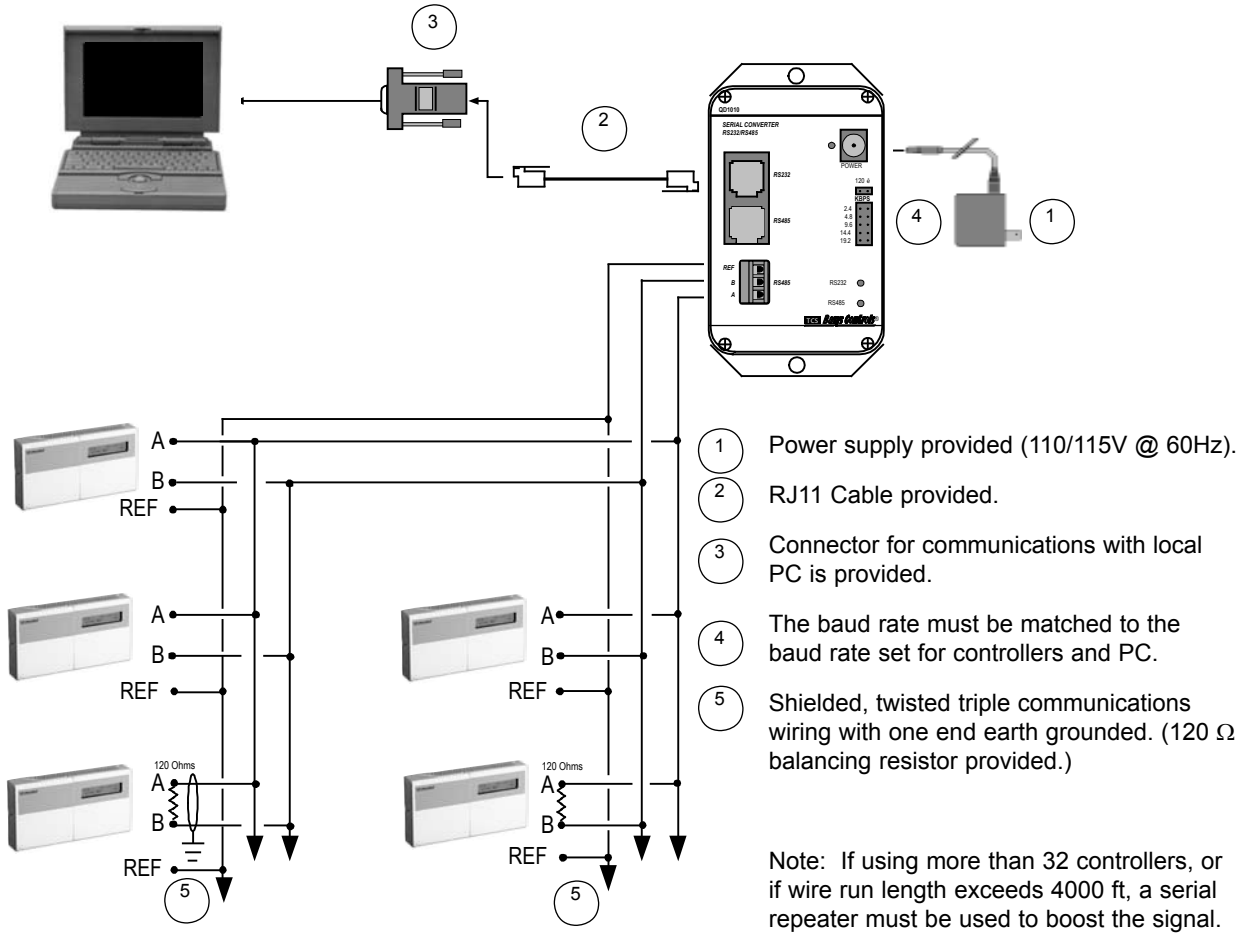
Note: If using more than 32 (to 48 or more) controllers, or if wire run length exceeds 4000 ft, a serial repeater must be used to boost the signal. Each controller must be assigned a unique address.

On small networks, no terminating resistors should be needed. If a terminating resistor is not needed, the jumper on "120 Ω" **should** be removed.

Finally, 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.

Figure 3. Communications with a network of thermostats/controllers, QD1010 in middle of network.



1. Power supply provided (110/115V @ 60Hz).
2. RJ11 Cable provided.
3. Connector for communications with local PC is provided.
4. The baud rate must be matched to the baud rate set for controllers and PC.
5. Shielded, twisted triple communications wiring with one end earth grounded. (120 Ω balancing resistor provided.)

Note: If using more than 32 controllers, or if wire run length exceeds 4000 ft, a serial repeater must be used to boost the signal. Each controller must be assigned a unique address.

Troubleshooting Communications

Once a network is wired, you should test communications with all controllers on the network. This can be done using the test network feature of either of our OSOE or Revelation software. Find out which controllers communicate and which ones don't. Go to the controllers that don't communicate and verify that the "A" and "B" wires are not switched. Verify the address and the baud rate as well. One of these three things is usually the problem.

If you are still having trouble with communications, attempt to read the controller (initialize or setup screens) and watch the QD1010's RS485 (yellow) and RS232 (green) LEDs. The "RS232" (green) LED blinks when communication is coming into the "RS232" terminal block from the PC. The "RS485" (yellow) LED blinks when communication is coming into the "RS485" terminal block from a controller. See the chart below for help.

Note: Older model QD1010s use a red LED in place of the yellow LED.

IF	THEN
The RS485 or RS232 LEDs never light.	Check that the QD1010 has power. The Power LED should be lit. Check to be sure you have chosen the correct COM (Serial) port for the computer.
Green LED blinks, Yellow LED is always off. If this happens, the computer is sending, but the controller is not responding.	Check that the baud rate set on the computer, the QD1010 and controller(s) are all set the same. Verify controller address.
Both green and yellow LEDs will blink. Both the computer and the controller are responding, but you still receive communication errors.	Check that the baud rate jumper on the QD1010 is set to the proper baud rate. Check wiring. Make sure that communication wiring runs are at least 5' away from fluorescent lights, motors, etc. Make sure that all controllers on a network have a unique address.
Yellow LED is always on. This is typically a problem with wiring.	Make sure that the "A" and "B" wires are not switched or shorted. Make sure that 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.
Communication errors/problems.	On smaller networks, try removing one of the two terminating resistors.