Troubleshooting Communications

Serial (Standard Bus and Modbus® RTU)

1. Is controller wired correctly? Standard Bus must be enabled for EZ-ZONE® Configurator and SpecView® if using default driver. The LabVIEW® driver from Watlow® is Standard Bus only. Standard Bus sends all data in ºF only. Standard Bus is only available on EIA-485 and using Com port 1 of the EZ-ZONE® products. All three wires should be connected; not just two.

2. For Modbus® RTU protocol only – Is baud rate, parity and word order set correctly? The default is 9600 baud, no parity, low word, high word, 1 start bit and 1 stop bit. The settings on the controller must match the PC/PLC or HMI to work. Modbus® may be ordered on port 1 of EZ-ZONE® products in which case you can select which protocol is in effect (Standard Bus or Modbus®). For a Modbus® ordered option, Modbus® is the default protocol.

3. For EIA-485 converters – Is local echo off, converter set for half duplex and does converter support auto transmit control? Typically the A terminal is negative, B terminal is positive and ground is common. A few manufacturers reverse the labeling. The letter ‘A’ may be replaced by -T/-R or -TXD/-RXD. The letter ‘B’ may be replaced by +T/+R or +TXD/+RXD.

4. For USB to EIA-485 converters – Is current driver installed in Windows®? See device manager, ports for listing of driver and assigned port. Unplugging USB cable should cause the driver to be removed from list and plugging USB back in should restore listing. Ensure latency timer in PC device manager is set for 1 mS.

5. Are the serial wires separated from all power wires? Serial wires should never be tie wrapped to other wires or routed in the same conduit as other current carrying wires.

6. Is the right protocol being used? EZ-ZONE® products support Standard Bus and Modbus® RTU (optionally). They <u>do not</u> support Modbus® ASCII or general ASCII used by terminal programs. They <u>do not</u> support XON/XOFF or ANSI x3.28 as used in some legacy products such as Series 988. Watview does not support EZ-ZONE® products.

7. If using the ModbusTest program by Watlow® – When writing a value did you enter a decimal point and press the enter key before clicking the write button? See readme file included with download of program for usage.
8. If using SpecView or Silver Series HMI – Is the correct protocol driver selected? Is the correct com port selected, wired and configured?

9. Are the addresses of all controllers unique? If two products have the same Standard Bus address or Modbus® addresses, communications may be erratic or non-existent.

Troubleshooting Communications

10. Are all devices on the same EIA-485 network using the same protocol? If two different protocols are enabled on the same network, communications may be erratic or non-existent.

11. For EIA-232 – Is there only one master and one slave on the network? Modbus® RTU only allows one master. EIA-232 only allows one slave. Remember that Standard Bus is not supported on EIA-232. Note that RS-232 and EIA-232 terminology are used interchangeably and mean the same thing.

12. For EIA-232 – Is the cable length less than 50 feet? Fifty feet is the limitation for EIA-232 wiring.

13. For EIA-485 – Is there only one master and no more than 247 slaves on the network?

14. For EIA-485 – Is the cable length less than 4,000 ft (1,200 meters) and wired in daisy chain fashion between devices? Termination resistors may be required based on wire length and noise immunity.

Troubleshooting Communications

Ethernet (EtherNet/IP™ and Modbus® TCP)

1. Is controller wired correctly? When connecting to an Ethernet switch, the cable is wired straight thru. When connection is direct (no Ethernet switch), the cable is wired crossover. Only one controller per cable connected to input of switch is allowed.

2. Is Ethernet wire length between device and switch less than 328 feet (100 meters)?

3. Are the Ethernet wires separated from all power wires? Ethernet wires should never be tie wrapped to other wires or routed in the same conduit as other current carrying wires.

4. Is the link LED illuminated on the controller? If not, the wiring is open or incorrect.

5. Does the activity LED illuminate when there is traffic? If not, the IP addresses are incorrectly set.

6. Are all of the devices (PM, RMA, RUI/Gateway, HMI, PLC, PC) on the same logical IP network? Do all devices have unique IP addresses?

7. Has power been cycled to the EZ-ZONE® product after a fixed IP address is entered into the RMA, PM or RUI/Gateway?

8. Can you ping the controller/HMI from the PC? Use of the Ping command from a DOS prompt informs you if the connection and IP address are correct. It may provide clues to having another device on the network with the same IP address.

9. For EtherNet/IP™ – Is an industrial Ethernet managed switch that supports IGMP (multicast filtering) being used? It is common, in a control system, to see a large amount of Multicast packets. These packets cannot be filtered out by an unmanaged switch.

10. For EtherNet/IP™ – Are all devices on the Ethernet network on the same logical network? Some customers have reported that when more than two EZ-ZONE products are on a mixed network (not recommended), excessive traffic is created which ‘floods’ the network.

11. If using EtherNet/IP™ – Is the CIP offset correctly set? Are the CIP inputs and outputs assembly size correctly set? The maximum number of implicit members per PM is 20 inputs and 20 outputs. The maximum number of implicit members per RM is 100 inputs and 100 outputs.

Troubleshooting Communications

12. It is a good idea to use an industrial switch either managed or unmanaged. Industrial switches are more robust and ensure more up time. Many are DIN rail mounted and powered by 24 VDC. Many switches of higher quality have **Auto crossover (MDI/MDIX)** which automatically supports either straight or crossed cables that greatly reduces cable installation errors.

13. For Modbus® TCP – Is the word order correct? The word order may be set to Low Word, High Word or High Word, Low Word order. The settings in the controller much match the settings in the PC, PLC or HMI.

14. If using the ModbusTCPTest program by Watlow® – When writing a value did you enter a decimal point and press the enter key before clicking the write button? See readme file included with download of program for usage.

15. If using Modbus® TCP - Are the Local Remote Gateway Modbus® offset configured correctly? The value selected must be greater than the highest Modbus® register to be accessed. It is easy to make a mistake and overlap the registers.

16. Many manage switches support **Port Mirroring:** With the Port Mirroring feature you simply specify which ports' data you want to view and where to send that data. Plug your PC into that port and use Ethernet sniffing software (such as Wireshark) and you can monitor the data being sent back and forth. Wireshark is a free program available on web. Google Wireshark to locate.

17. Does the PC software package/PLC/HMI being used support a protocol that the EZ-ZONE® product supports? EZ-ZONE® Configurator does not work over Ethernet. The protocol supported by EZ-ZONE® products is either Modbus® TCP or EtherNet/IP™. Watview does not support EZ-ZONE® products.