Synergy Temperature Limit Controller Coordination Features

Introduction

Redundant Temperature Limit Controllers (i.e. TempGard limit controller) should be used to provide fail-safe protection against controller and sensor failure. When used with a separate sensor, Temperature Limit Controllers (TLC) reduce the probability that a single point failure will damage the chamber or the product inside. The TLC should be wired to remove power from all of the chamber's machinery in order to provide maximum protection.

Tidal Engineering's Synergy Controllers, including the Synergy Micro 2, Synergy Quattro, and the ¼ DIN Synergy Nano provide state-of-the-art usability and connectivity for environmental test control and data acquisition. They combine the functions of a chamber controller and a data logger. They are designed to improve test efficiency by supporting both factory automation and test and measurement protocols and standards. Offering the flexibility of multiple communication ports including Ethernet, GPIB, and RS-232 make these controllers perfect for today's changing testing environments.

No complex software or hardware system is perfect. Bugs are always present in a system of any size. In order to prevent danger to life or property, it is the responsibility of the system designer to incorporate redundant protective mechanisms appropriate to the risk involved.

Beginning with Synergy Controller Software version 4.2.5, Synergy Quattro and Synergy Nano controllers feature commands that can program certain Temperature Limit Controllers.

In this application note, an example is offered that use these commands to automatically adjust these limits and start the program. The example shows how to use a Bar Code Scanner for this application.

Beginning with Synergy Controller Software version 5.4.0, Synergy Quattro (2) and Synergy Nano (2) controllers can program a variety of Modbus Capable Temperature Limit Controllers.

An example for an EZ-ZONE PM Controller is included in Appendix C.

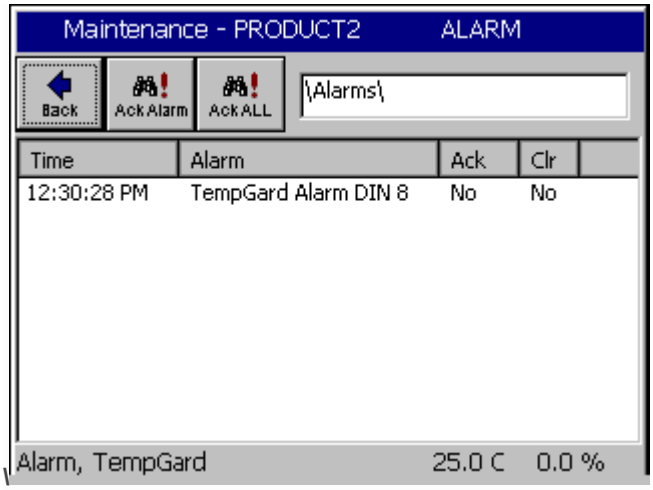
Tempgard Operation

As mentioned above, a TLC or Tempgard is recommended in all test chamber and process oven applications. The Synergy Controller offers features that can monitor and respond to a Tempgard alarm.

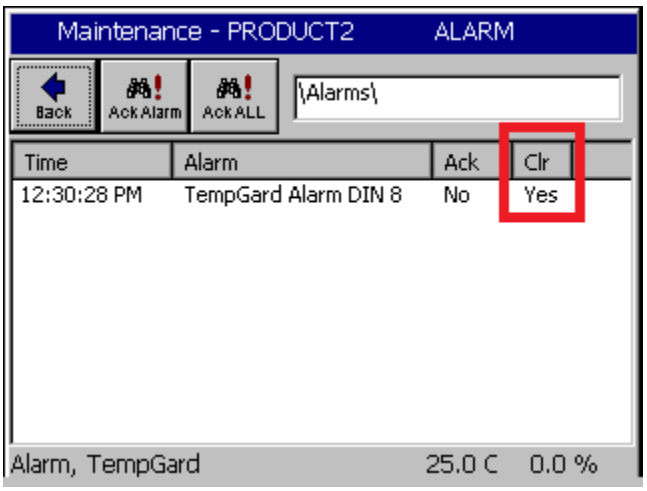
Specifically, when the controller receives the signal from the Temperature Limit Controller, the controller will respond as follows:

1. Controller will turn off and all outputs will turn off.
2. An entry is created in the log file.
3. An entry is created in the Alarm Folder in the Maintenance Screen as shown below.
4. When setup, Text message and/or e-mail alerts are sent.

The Alarm screen will list the alarm as shown below:

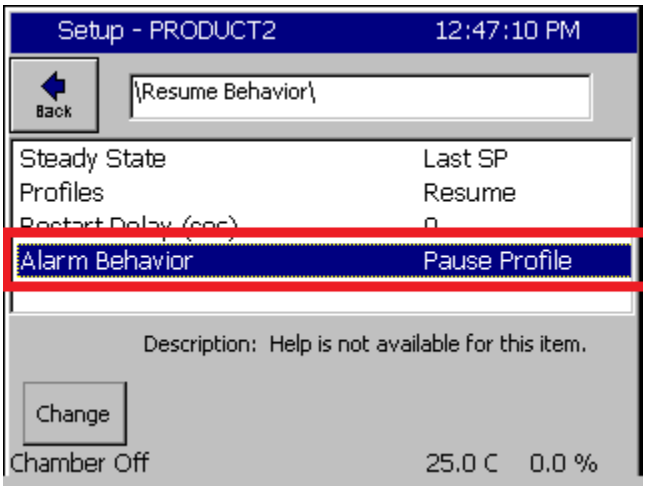


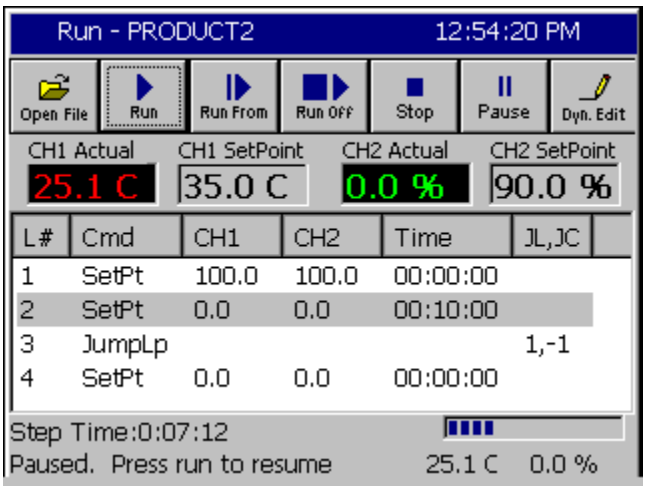
Once the temperature returns to a safe condition, and if required, the TLC is cleared and the Tempgard signal returns to normal, the TempGard Alarm entry in the Alarm Folder will indicate that the Alarm is cleared as shown below.



Once the TempGard alarm is cleared, the operator can acknowledge the alarm and then the chamber can be turned back on.

If the Alarm Behavior is set to Pause Profile, then the controller can resume the profile where it left by pressing the Run button the Run screen.



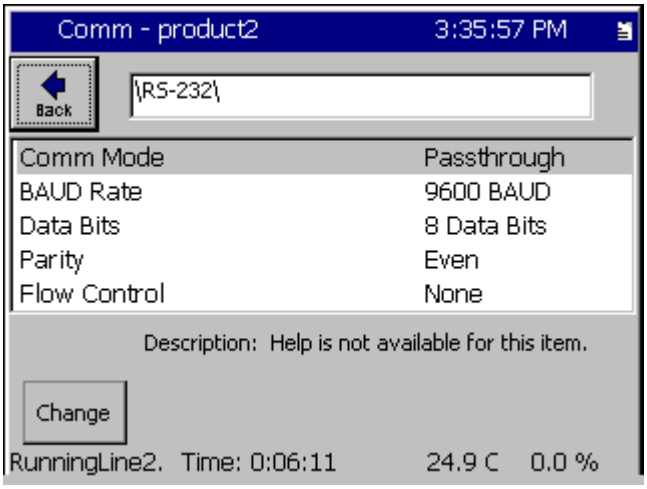


The Yokogawa UT150L limit controller can be programmed using the YOKO_150L_HIALARM and YOKO_150L_LOALARM commands as shown below.

= YOKO_150L_HIALARM 150.0
= YOKO_150L_LOALARM 25.0

To configure the controller for this application, follow these steps:

1. Verify the version on the Synergy Quattro or Synergy Nano controller is 4.2.5 Build 1059 or later.
2. Setup the RS-232 parameters as follows, then reboot the controller:



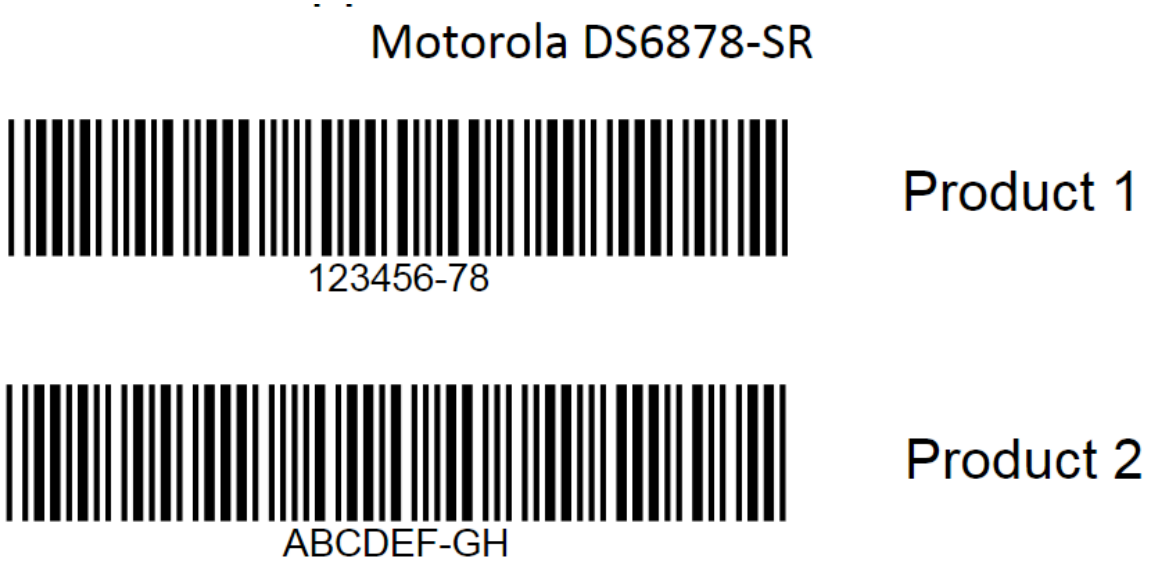
3. Program the barcode reader as required per application note 4.
4. Create a Macro file with the Yokogawa programming parameters as shown below or add these parameters to a Command Step in the program. See Appendix A and application note 11 for details regarding the command step.
5. Import the Macro file.

Example Macro File

```
123456-78,= off_s; = YOKO_150L_HIALARM 125.1; = YOKO_150L_LOALARM -25.1; = fileopen_s 1 "product1.vpl";  = run_s 1;
abcdef-gh,= off_s; = YOKO_150L_HIALARM 152.0; = YOKO_150L_LOALARM -25.2; = fileopen_s 1 "product2.vpl";  = run_s 1;
```

Note that **off_s**, **fileopen_s**, and **run_s** are xynchronous versions of the standard commands that are available in 4.1.12.

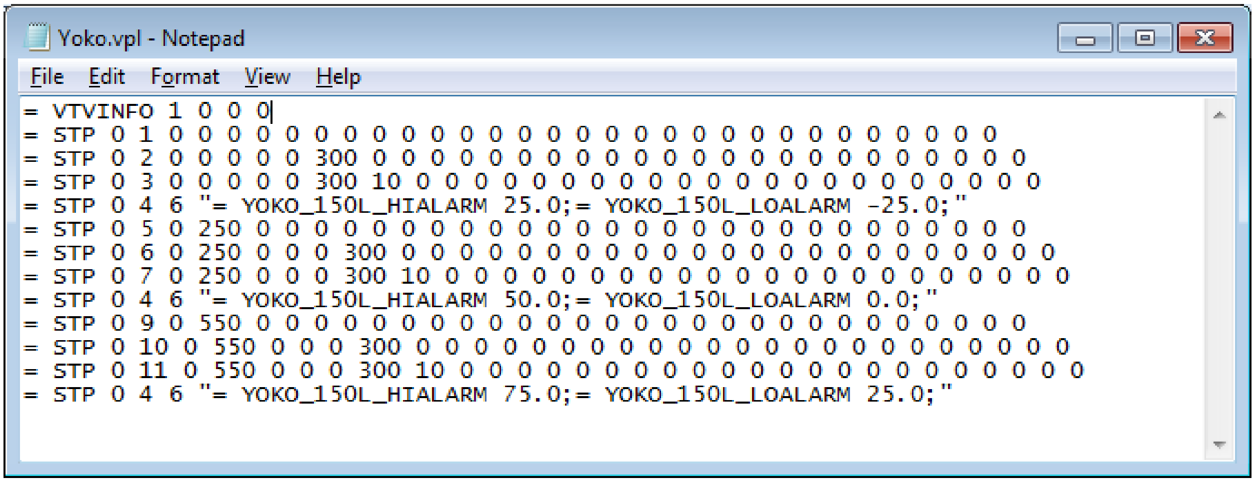
6. Scan the Bar Codes to start the program to run the chamber and set the Yokogawa Temperature Limit Controller.



Appendix A – Incorporating TLC Commands in a program

This is an example of a program modified with Command Steps that adjust the TLC during the program execution.

See application note 11 for details regarding Command Step applications.



= VTVINFO 1 0 0 0

= STP 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

= STP 0 2 0 0 0 0 0 300 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

= STP 0 3 0 0 0 0 0 300 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

= STP 0 4 6 "= YOKO_150L_HIALARM 25.0;= YOKO_150L_LOALARM –25.0;"

= STP 0 5 0 250 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

= STP 0 6 0 250 0 0 0 300 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

= STP 0 7 0 250 0 0 0 300 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

= STP 0 4 6 "= YOKO_150L_HIALARM 50.0;= YOKO_150L_LOALARM 0.0;"

= STP 0 9 0 550 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

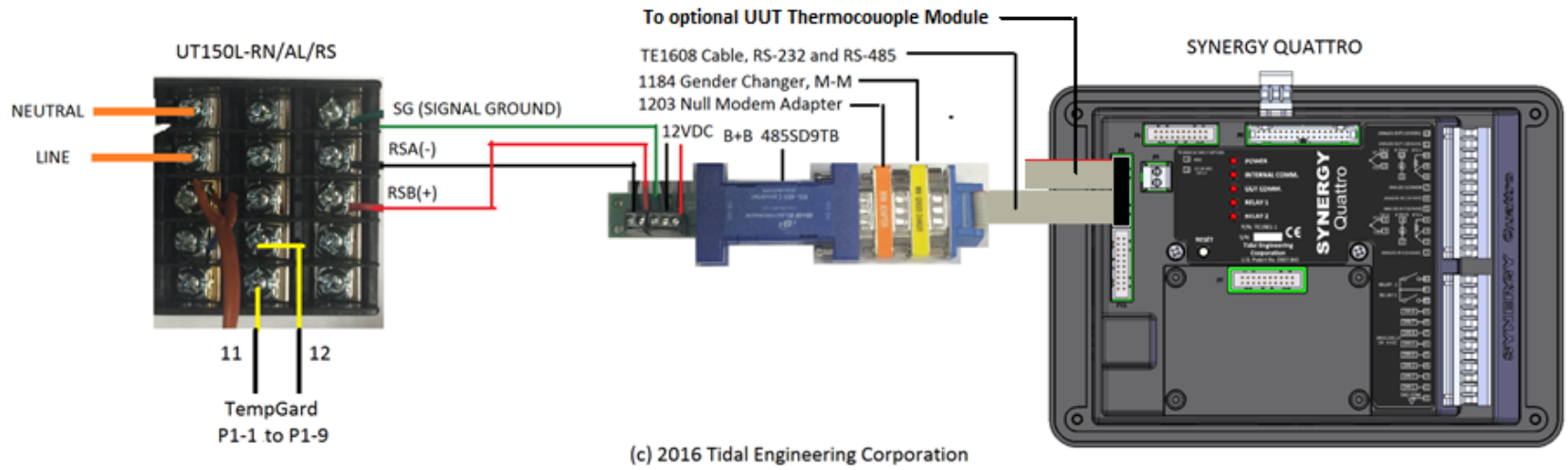
= STP 0 10 0 550 0 0 0 300 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

= STP 0 11 0 550 0 0 0 300 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

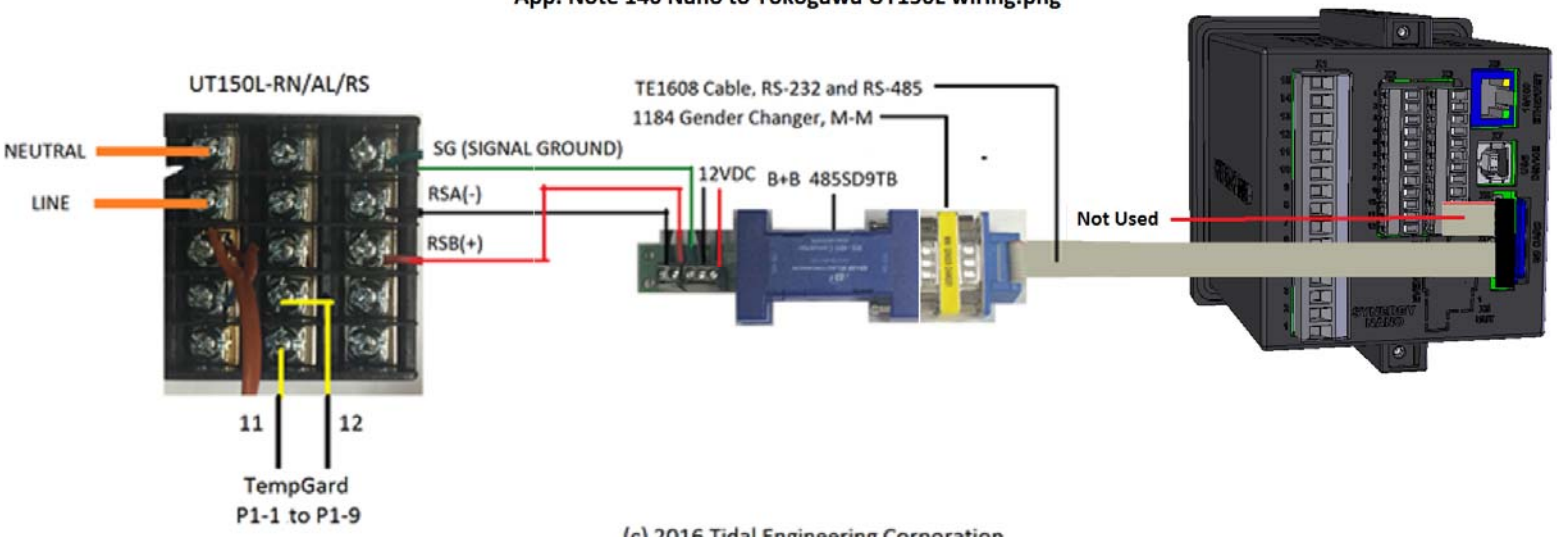
= STP 0 4 6 "= YOKO_150L_HIALARM 75.0;= YOKO_150L_LOALARM 25.0;"

Appendix B Quattro and Nano to Yokogawa UT150L wiring

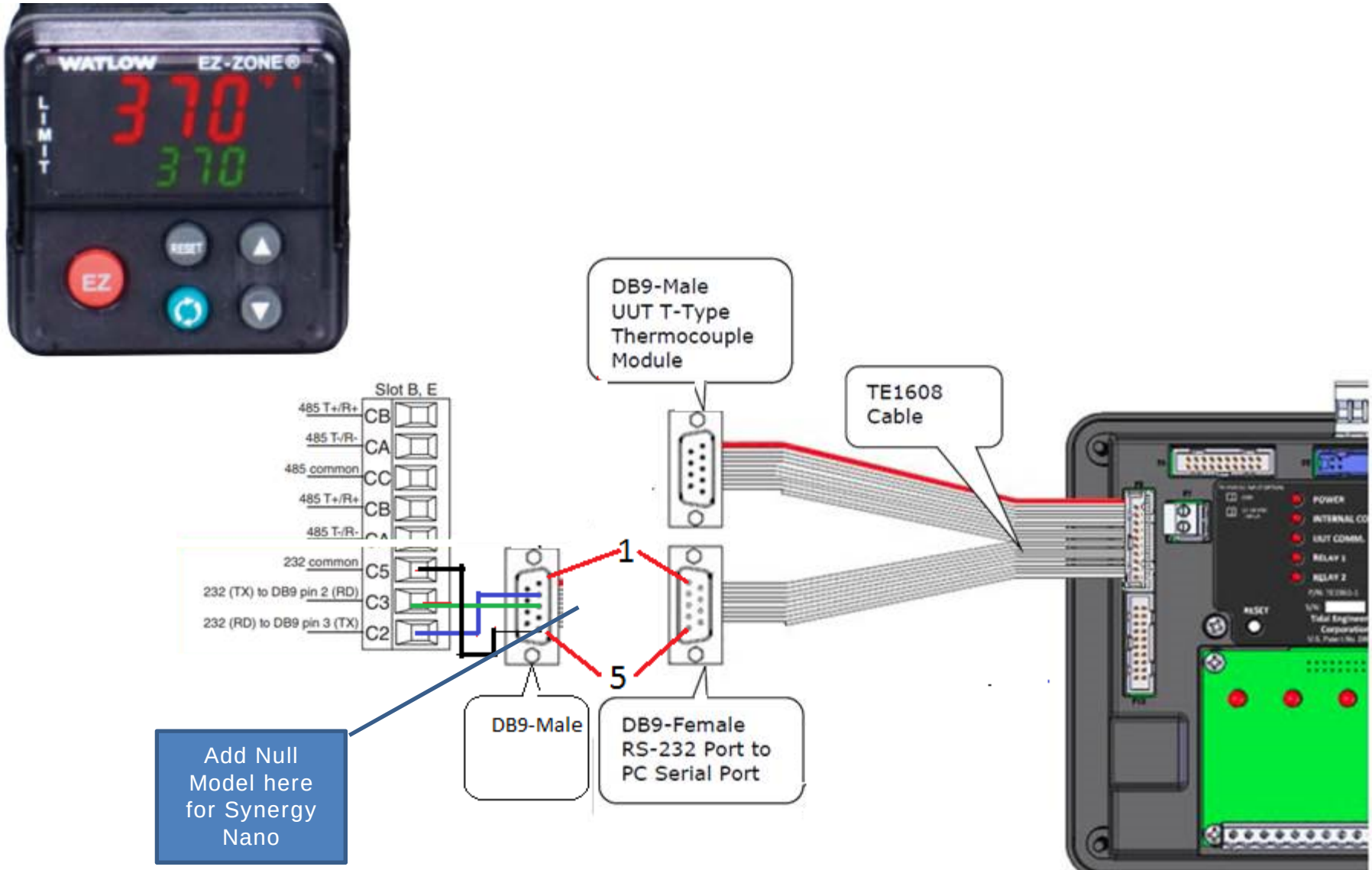
App Note 140 Quattro to Yokogawa UT150L wiring.png



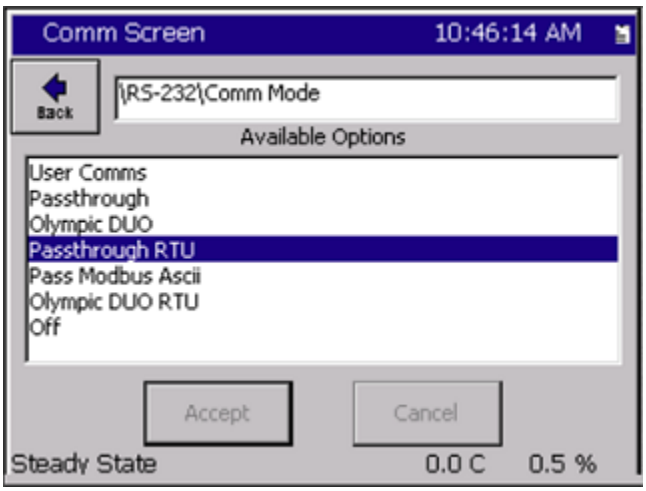
App. Note 140 Nano to Yokogawa UT150L wiring.png

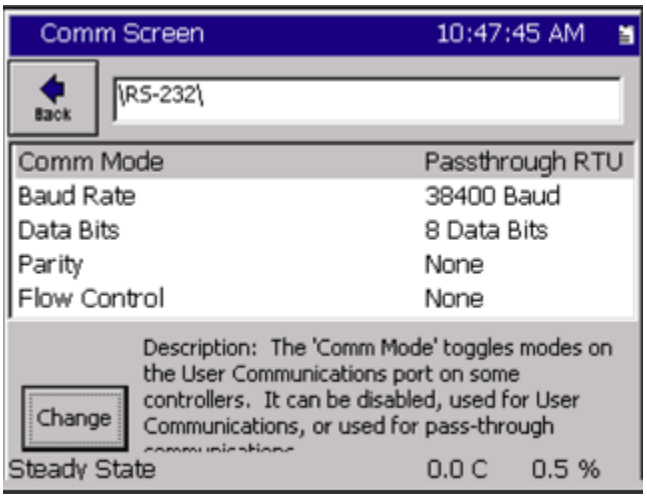


Appendix C Quattro (2) and Nano (2) to EZ-Zone wiring (EZ-Zone Model PM6L1EJ-2AAAAAA)



EZ-Zone Modbus Example





Set the

1. Set Alarm 1 High Limit
   = MODBUS 1,16,1481,2,31, 210.5

2. Set Alarm 1 Low Limit
   = MODBUS 1,16,1483,2,31, -40.1

About the Synergy Family

Tidal Engineering's Synergy Controllers, the ¼ DIN Synergy Nano, Synergy Micro 2 and the Synergy Quattro provide state-of-the-art usability and connectivity for environmental test control and data acquisition. They combine the functions of a chamber controller and a data logger and are designed to improve test efficiency by supporting both factory automation and test and measurement protocols and standards.

Synergy Controller feature highlights includes:

- ➔ Color touch screen
- ➔ Ethernet, RS-232 and GPIB communications
- ➔ Built in 100 MB Data logger with USB drive support
- ➔ Data Acquisition, up to 64 T-type thermocouples (Optional)
- ➔ Built-in Web Server for remote control; WebTouch Remote ™
- ➔ Compatible with Synergy Manager for PC based control, monitoring and programming.
- ➔ Built-in FTP Server for factory automation and test and measurement applications

For more information regarding these controllers please see the full Synergy Controller Technical Manual on our website at http://www.tidaleng.com/synergy.htm

About Tidal Engineering

Headquartered in Randolph, NJ, Tidal Engineering Corporation has been designing and building award-winning embedded hardware and software for test and measurement and data acquisition applications since 1992. The company is recognized for technical expertise in such areas as Embedded IEEE 488, and turnkey SCADA (Supervisory Control and Data Acquisition) systems.

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