

Synergy Quattro 2 Briefcase Demo Quick Start



TIDAL
ENGINEERING

SYNERGYSERIES

FOR ENVIRONMENTAL TEST CHAMBERS



Introduction



The Synergy Controller Demonstration Briefcase is a light weight, self-contained sales, training and development tool for Tidal Engineering's Synergy test chamber controllers. The rugged unit weighs less than 15 lbs. and provides a convenient way to demonstrate the controllers user interface, programing, networking, communications, and input/output features.

LEDs indicate the status of all 30 digital outputs and connectors are provided so live outputs can be connected and controlled by the unit for testing and development purposes.

The demo case provides connections for RS-232, RS-485, Ethernet, HDMI, and USB Device interfaces. The Briefcase kit includes:

- Bar Code Scanner
- EZ-Zone Fail Safe integration and ModbusRTU I/O
- 30 Digital Output connections for 1SM..4SM with LEDs
- 8 Digital Inputs
- UUT Thermocouple Monitor (16 T-Type)
- RS-232 Serial cables for Remote Control and Programming
- Synergy Manager

Note: See Appendix M for kit details.

The Synergy Demo Briefcase includes Registration Keys for the following value-added software options:

- Synergy Cloud Server
- Altitude/Pressure Feature
- WebTouch Remote™
- Cascade/Part Temperature Control
- Network Printing/Plotting
- ModbusTCP Server

Olympic S/N: <input type="text" value="09/1844"/>	
<input type="button" value="Generate"/>	
Web Key <input type="checkbox"/> <input type="text" value="4059959E"/>	SynServer Key <input type="checkbox"/> <input type="text" value="98A5F221"/>
Cascade Key <input type="checkbox"/> <input type="text" value="58C11506"/>	Modbus TCP Key <input type="checkbox"/> <input type="text" value="60054C6D"/>
Panel Unlock Key <input type="checkbox"/> <input type="text" value="5945E92A"/>	Extran Key 1 <input type="checkbox"/> <input type="text" value="8E4CC349"/>
Altitude Key <input type="checkbox"/> <input type="text" value="5AE26911"/>	Extra Key 2 <input type="checkbox"/> <input type="text" value="5F7C6636"/>
Plot Key <input type="checkbox"/> <input type="text" value="9885AA62"/>	Extra Key 3 <input type="checkbox"/> <input type="text" value="454FA0A1"/>

This application note is a quick start user guide. Technical manuals are included in the briefcase accessories and various application notes and demonstration videos are available on the Tidal Engineering website at www.tidaleng.com.

Quick Start 1 – Power the Briefcase and Turn it on.

Open the Briefcase and follow these steps:

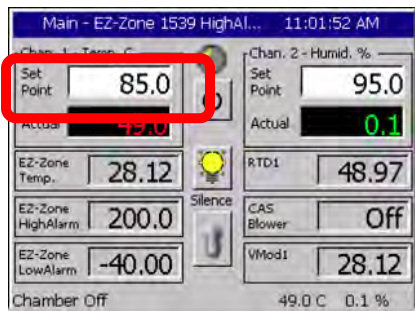
1. Connect the Digital Input P1 plug into the P1 connector.
2. Connect the Analog I/O plug marked P2 prewired with two RTD sensors to the P2 connector on the right side of the unit.
3. Connect the EZ-Zone P3 plug into the P3 connector.
4. Plug the line cord into the power receptacle.
5. Press the Power-On switch.

The system will display the Synergy Controller splash screen while booting and then the MAIN screen as shown on the right.

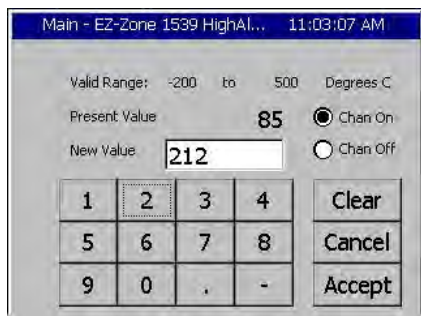
Note: The Main Screen layout is user configurable and may not appear exactly as shown here.

Quick Start 2—Enter a Setpoint and turn on the chamber

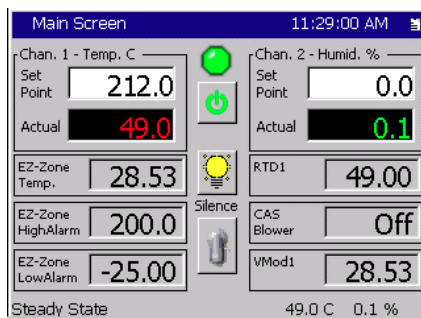
Press the **Main Screen Button**



Press the Set Point Box.



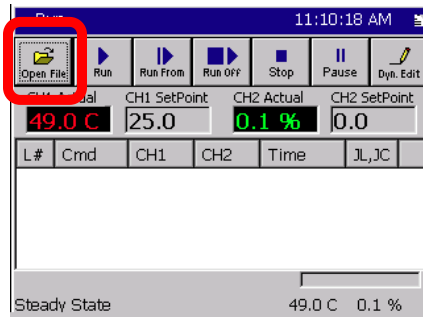
Enter the Setpoint and Press Accept.



Press On/Off.

Quick Start 3 –Load a Program and run it

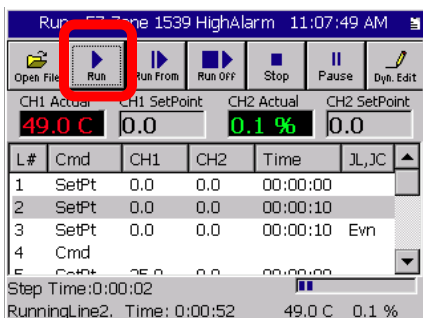
Press the Run Screen Button



Press the Open File button.



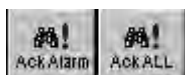
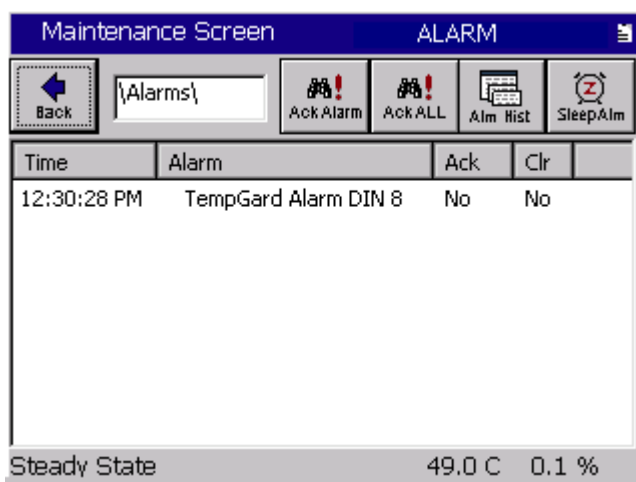
Drop Down the Drive List to select the USB Hard Disk or the Controller's Storage Card and select a Program. Press Open.



Press the Run button.

Quick Start 4 –Check for Alarms

If an alarm condition occurs, ALARM will flash in the upper right corner of the display. Browse to the Maintenance Screen and open the Alarms folder to view the alarm list as shown below:



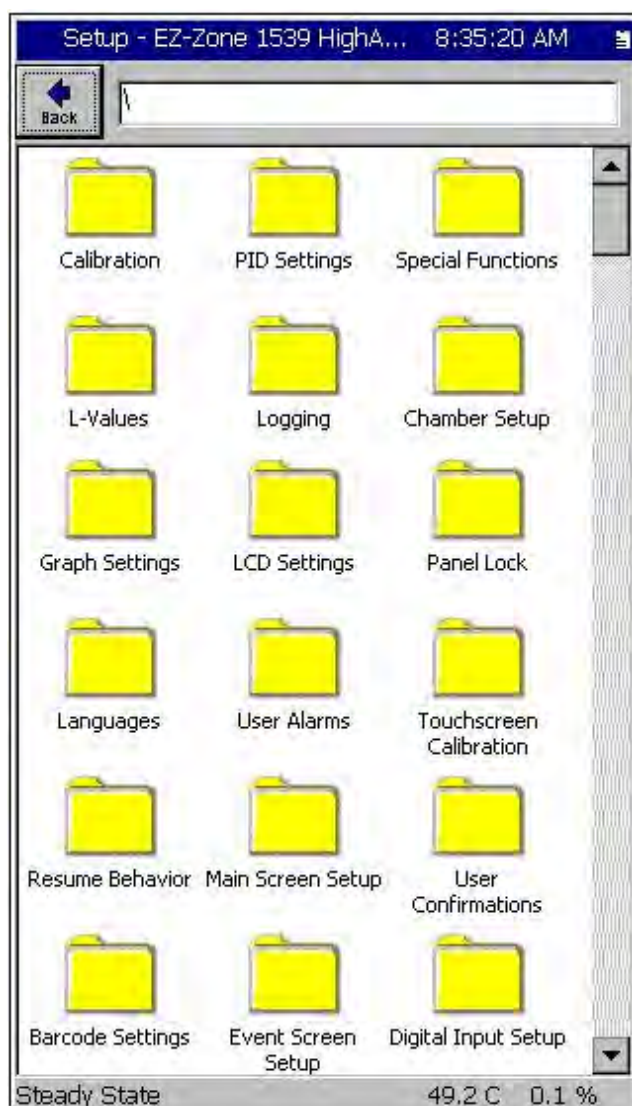
You can acknowledge the alarm at any time. Once the alarm is acknowledged and cleared, the chamber can be turned back on.



Use the Alarm History button to view the History of prior alarms including details and time/date.

The following sections provide a brief review of the functions on the Synergy Controller's eight screens.

Setup Screen



The Setup screen is generally used by OEMs and technicians, administrators, and engineers. The OEM and equipment technician will use the Setup folders during the initial installation and calibration including: PID Settings, Calibration, Logging, Special Functions, L-Values, Chamber Setup, Resume Behavior, User Alarms, Main Screen Setup, and Event Screen Setup.

The Administrator can use the Panel Lock features to limit access to specific Synergy Controller screens.

The Engineer/Operator can use the Logging screen to select the logger data, logging interval, and automatic results delivery features. The L-Values are used to optimize the controller for a wide range of equipment and test conditions.

SETUP Screen

- ◆ Calibration
- ◆ PID Settings
- ◆ Special Functions
- ◆ Logging
- ◆ L - Values
- ◆ Chamber Setup
- ◆ Graph Settings
- ◆ LCD Settings
- ◆ Panel Lock
- ◆ Languages
- ◆ User (Programmable) Alarms
- ◆ Resume Behavior
- ◆ Main Screen Setup
- ◆ Event Screen

Maintenance Screen



The Maintenance screen is generally used by OEMs and technicians during setup and tuning and by engineers and operators during chamber operation.

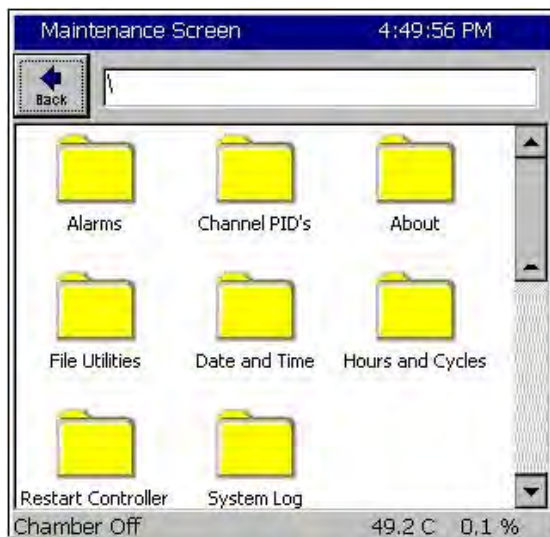
The OEM and equipment technician can use the Channel PIDs, File Utilities, Data and Time, and Restart Screens to setup the controller during the initial installation and calibration.

The Administrator will typically use the File Utilities Folders to Backup and Restore the controller settings.

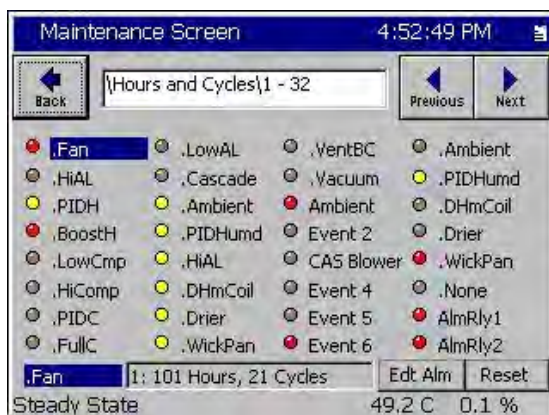
The Engineer/Operator can use the Alarm screen to manage chamber alarms and the Channel PIDs to monitor and adjust chamber control performance.

- ◆ Alarms
- ◆ Channel PIDs
- ◆ About (Synergy Controller Software)
- ◆ File Utilities
- ◆ Date and Time
- ◆ Restart Controller

The folders on the Maintenance screen are used for the operation and maintenance of the chamber.



The new Hours and Cycles feature keeps track of equipment wear and can help manage maintenance schedules and prevent downtime and outages.



Comm Screen

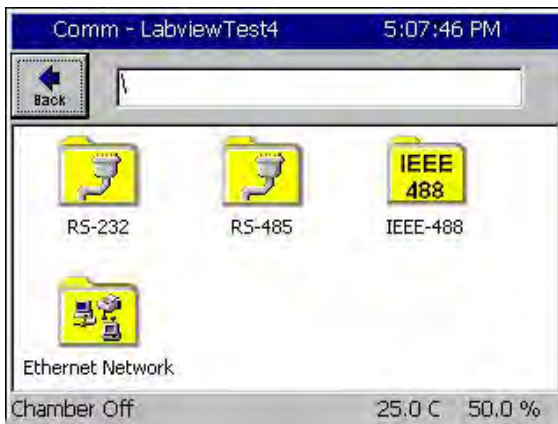
The four folders in the Communication Screen are used to setup the controller's communications ports.

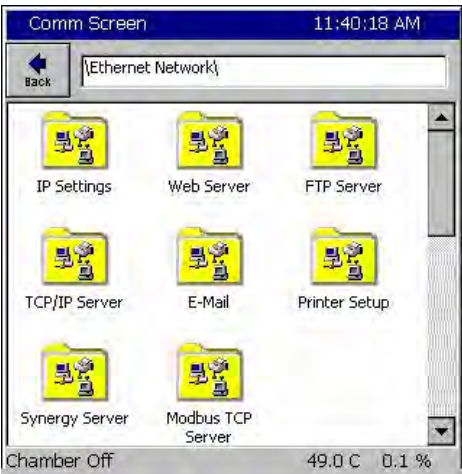
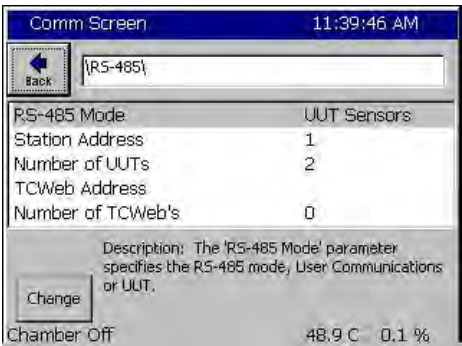
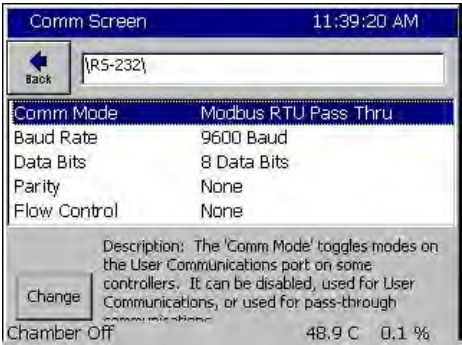
The RS-232 folder provides a variety of alternative function options for the RS-232 interface including ModbusRTU and ModbusASCII.

The RS-485 port is used to setup the connection to UUT and TCweb Thermocouple modules.

The Ethernet Network folder is used to setup the network properties as well as network services and Network printing.

In addition, this folder is used to setup the WebTouch Remote™ Webserver, the FTP Server, email, ModbusTCP, and the Synergy Server. (See Appendix A for information regarding the Synergy Server features of the demonstration briefcase)





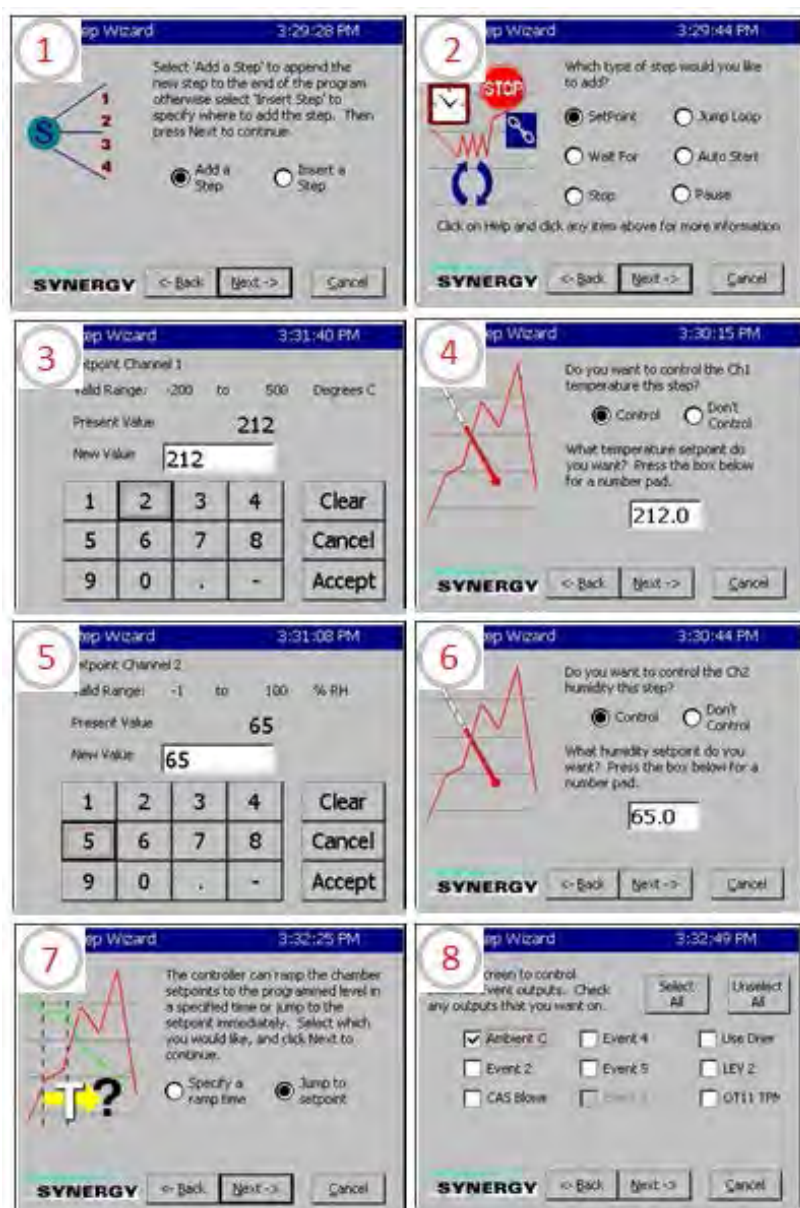
Program Screen

The Program screen is used to load, save, create and edit controller programs.

**Program Screen Capabilities:**

- Create a New File
- Open and Existing File
- Save the Loaded File
- Edit a program step
- Add a program step
- Copy a program step
- Delete a program step

See eight example Add-Step Wizard screenshots on the right.



Run Screen

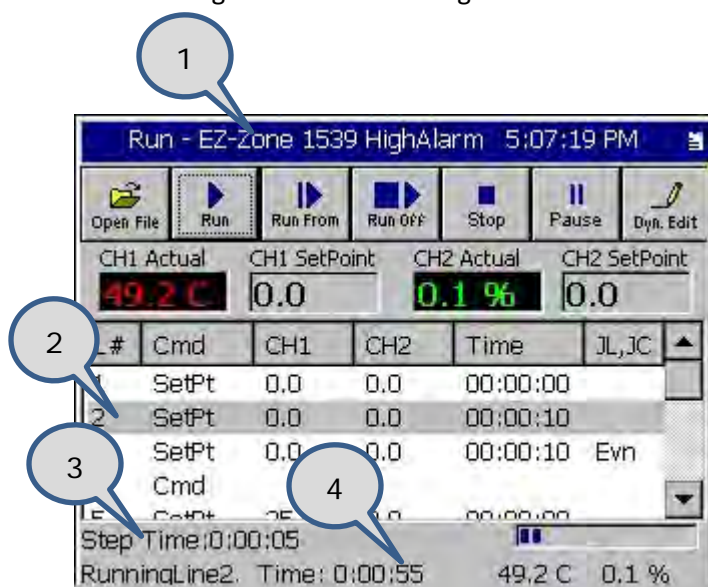
The Run screen is used to load, control, and monitor programs.



- ◆ Open File
- ◆ Run
- ◆ Run From (from a selected step)
- ◆ Run Off (program with outputs off)
- ◆ Stop
- ◆ Pause
- ◆ Dynamic Edit

When the Synergy Controller is running a program, the Run screen provides the following information about the program:

1. Program Name (in the screen Title Bar)
2. The Current Line is highlighted
3. Step Time remaining
4. Program Time Remaining



Events Screen

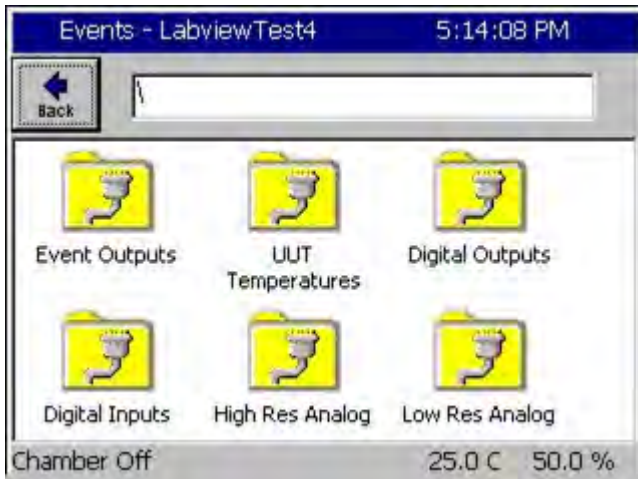
The Events screen is used during chamber setup and testing.

The Engineer/Operator can use the Events screen to monitor and control the user defined Event Outputs.

UUT Temperatures folder displays up to 64 T-Type Thermocouples from the UUT or TCweb Thermocouple monitoring system.

The Digital Outputs folder displays all the controller outputs and the Digital Inputs folder shows the states of the controller inputs.

The High- and Low-Resolution analog inputs folders display all the controller sensor inputs; i.e. RTDs, Pressure transducers, Humidity Sensors, Vibration, Pressure and altitude sensors.



Events folders list.

- ◆ Event Outputs
- ◆ UUT Temperatures
- ◆ Digital Outputs
- ◆ Digital Inputs
- ◆ High Resolution Analog (Inputs)
- ◆ Low Resolution Analog (Inputs)

High and Low Resolution Analog folders display the Raw Readings (Ohms, Volts, microVolts, etc) and the Scaled Reading (Temperature, Humidity, Pressure) for each input.

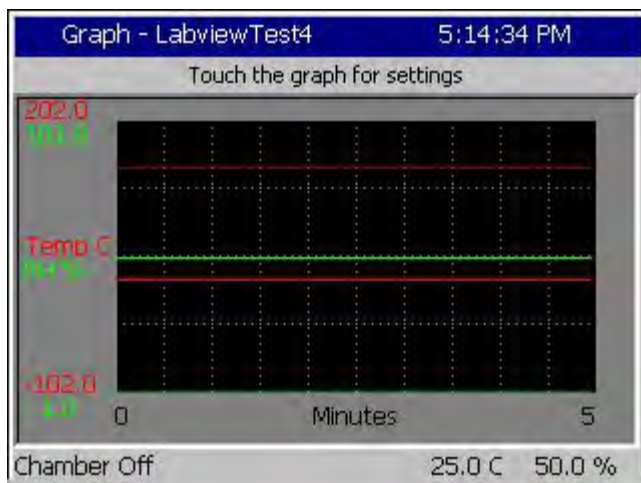
High Res Analog Screenshot example:



Analog Input	Raw Reading, Scaled	
RTD 1 (ohms)	119.080,	49.178
RTD 2 (ohms)	118.250,	47.025
Analog 1 (volts)	0.000,	0.145
Analog 2 (volts)	0.000,	0.002
Analog 3 (volts)	5.556,	111.110
Analog 4 (volts)	5.556,	111.110
TC1 (microvolts)	137273,	-1000.000
TC2 (microvolts)	136341,	-1000.000

Chamber Off 49.2 C 0.1 %

Graph Screen



- **Screen Information:**
Graph channel actual and setpoint values over time.
- **Control Features:**
Access the Graph Setup Screen by touching the graph. You can individually enable and disable the data series for the setpoint and actual values for each of the chamber channels.

Graph Screen y-axis scaling and time scale can be adjusted from the Setup Screen as shown below.

The screenshot shows a 'Setup Screen' with a title bar at the top displaying 'Setup Screen' and the time '3:26:13 PM'. Below the title bar is a 'Back' button with a left-pointing arrow and a text field containing '{Graph Settings}'. The main area is a list of settings:

CH1 Low	-102.00
CH1 High	202.00
CH1 Cascade Low	-102.00
CH1 Cascade High	202.00
CH2 Low	-1.00
CH2 High	101.00
CH3 Low	-1.00
CH3 High	101.00
Graph Time	1 hour

Below the list is a 'Description' box containing the text: 'Description: The Channel 1 low range to display on the graph. Changing this value will not take effect until the Controller is rebooted.' To the left of this description is a 'Change' button. At the bottom of the screen, the status 'Chamber Off' is displayed on the left, and '49.1 C 0.1 %' is displayed on the right.

Main Screen

The Main screen is the screen displayed after power-up. Use this screen to operate the chamber in steady state mode.

- **Screen Information**

Actual values for each chamber channel vs. time
(Product and Air Temperature in Cascade)

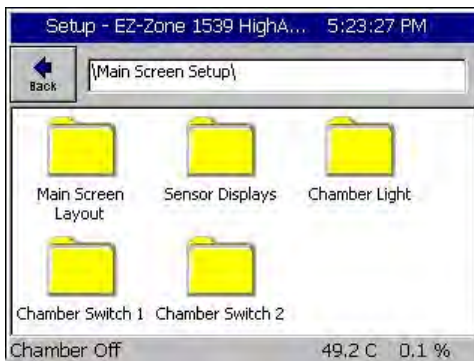
Setpoint values for each chamber channel vs. time.

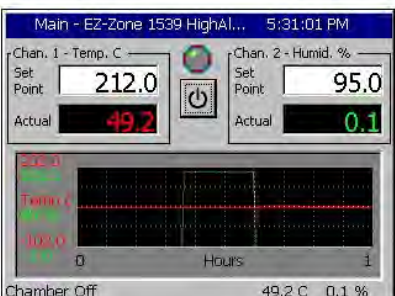
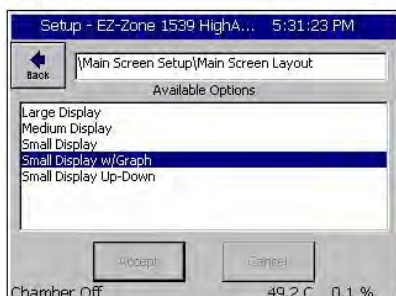
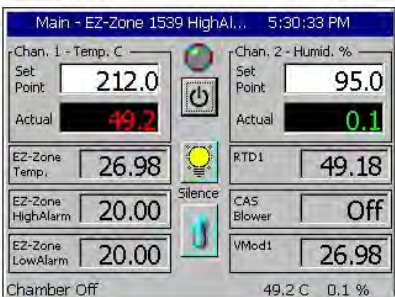
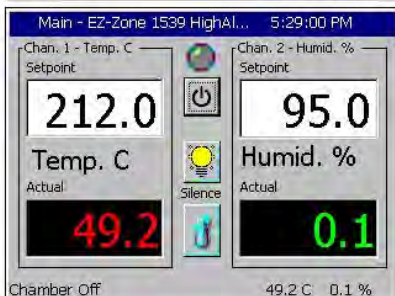
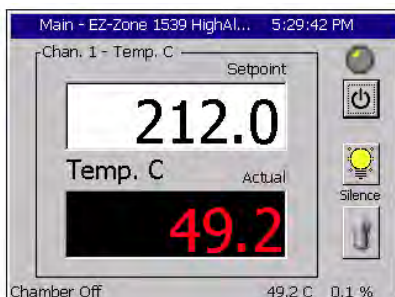
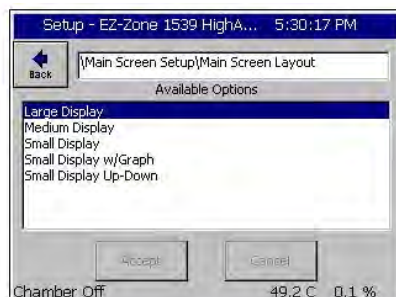
- **Control Features**

Turn the chamber on and off by pressing the On/Off button in the center of the screen.

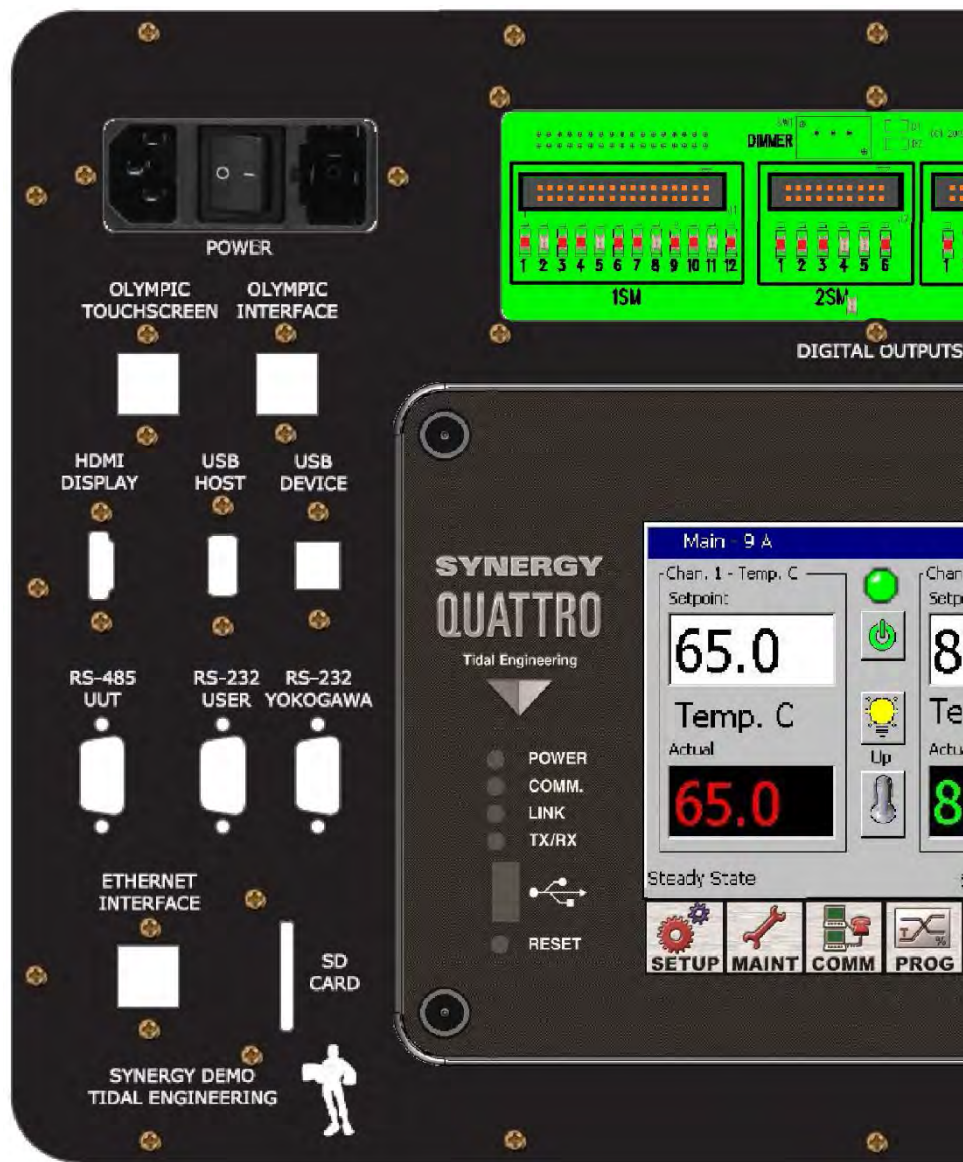
You can adjust the steady state (manual) setpoint for each channel by pressing on the Setpoint field and entering the value in the keypad that appears.

- The Main Screen Layout can be adjusted from the Setup Screen. The layout options are shown on the right.

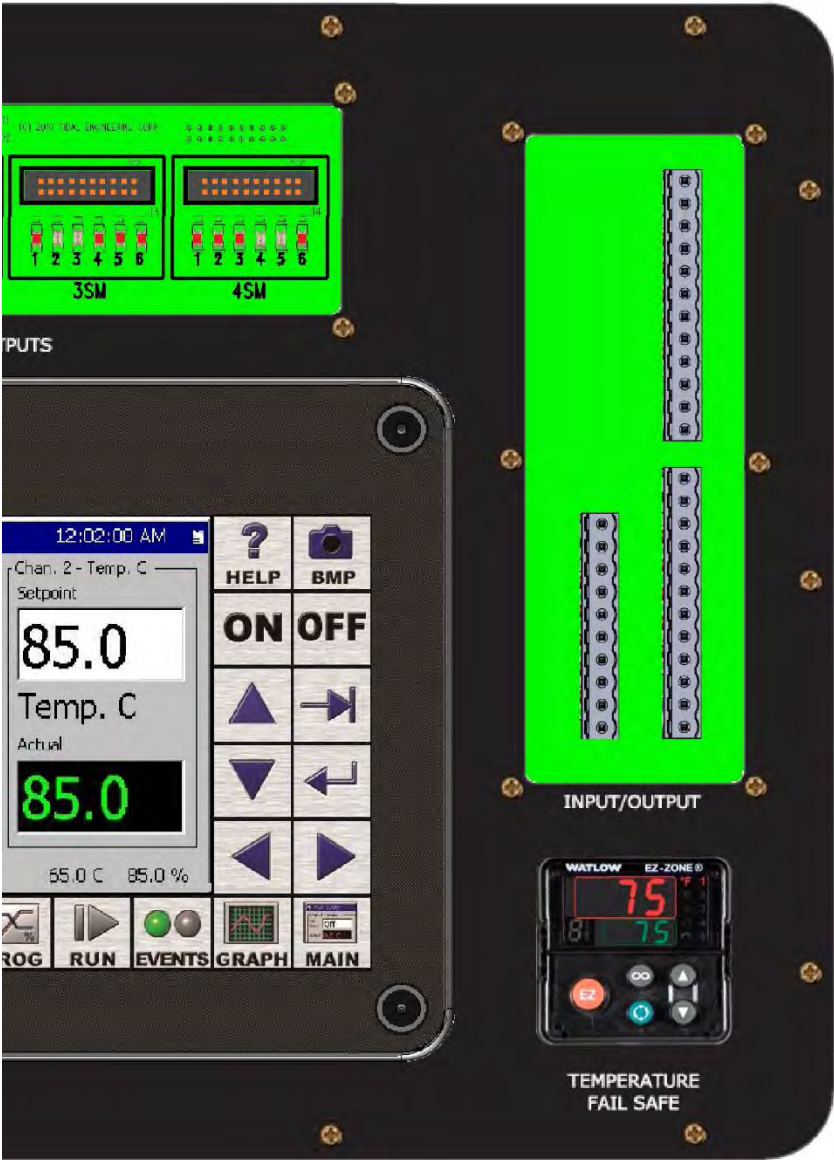




Synergy Quattro 2 Briefcase Layout



Synergy Quattro 2 Briefcase Layout



Appendix A- Synergy Server

The **Synergy Server** is a web appliance designed to provide virtually unlimited centralized and searchable storage for any number of Synergy Controllers. The **Synergy Server** provides a simple Web Interface for:

- Centralized Recipe Storage
- Centralized Test Results Storage
- Centralized Controller Backup Storage

The Synergy Controller Demonstration Briefcase is setup to connect to a Synergy Cloud Server demonstration account when connected to the internet.

The Synergy Server is also available as a plug-and-play Virtual Machine (VM) for simplified setup on your servers (on premises).

Synergy Server Demonstration: Trialon.SynergyCloudServer.com

Synergy Server

Test Results Page:

Test Name Filter: Max Results: Refresh

[Check all](#) [Uncheck all](#) [Delete Selected](#)

Controller Name	Test Name	Upload Date	Test Log	Test Plot	Options
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 14 13 23	2019-10-13 19 13 58	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 13 13 17	2019-10-13 19 13 45	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 12 15 11	2019-10-13 17 13 38	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 11 13 05	2019-10-13 16 13 38	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 10 12 57	2019-10-13 15 13 28	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 9 12 51	2019-10-13 14 14 18	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-24hrs 10-12-2019 10 10 32	2019-10-13 14 10 57	No Log	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 8 12 45	2019-10-13 13 13 17	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 7 12 39	2019-10-13 12 13 07	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 6 12 33	2019-10-13 11 13 07	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 5 12 25	2019-10-13 10 12 56	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 4 12 19	2019-10-13 09 12 46	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 3 12 13	2019-10-13 08 12 46	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 2 12 07	2019-10-13 07 12 36	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 1 12 01	2019-10-13 06 12 26	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 0 11 55	2019-10-13 05 12 25	Download View	Download View	Delete
Synergy Mino	Mino 126 Proto-1hrs 10-13-2019 0 11 47	2019-10-13 04 13 43	Download View	Download View	Delete

1/1 Mino 126 Proto-1hrs 10-13-2019 14 13 23

Synergy Server

Controllers Page:

Controller Name Filter: Max Results: Refresh

Controller Name	Controller Location	Controller Serial	Options
Synergy Micro 2 Test	Craig's Lab	0201056	Details Delete
Dev Nano	Tidal	040851	Details Delete
Synergy Quattro 2	Office	011545	Details Delete
Synergy Micro 2 Breakcase	Demo	060700	Details Delete
Amkor Nano	Alec Wong	151413	Details Delete
Steve's Nano		040581	Details Delete
Synergy Nano 5.0.0	Tidal Office	111707	Details Delete
Synergy Micro 2	Lab Station 1	120624	Details Delete
Chamber 74	Engineering Lab	221000	Details Delete
Synergy Quattro 2 Ver 5.4.1	Engineering Lab	041919	Details Delete
Synergy Mino	Tidal Engineering	031913	Details Delete
Synergy Quattro 2 Breakcase	Automotive Testing Expo 2019	091844	Details Delete

[Add Controller](#)

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Synergy Server Version 5.1.0 running on OS Version 6.0

Appendix B- Synergy Manager -“Write once/Run everywhere”

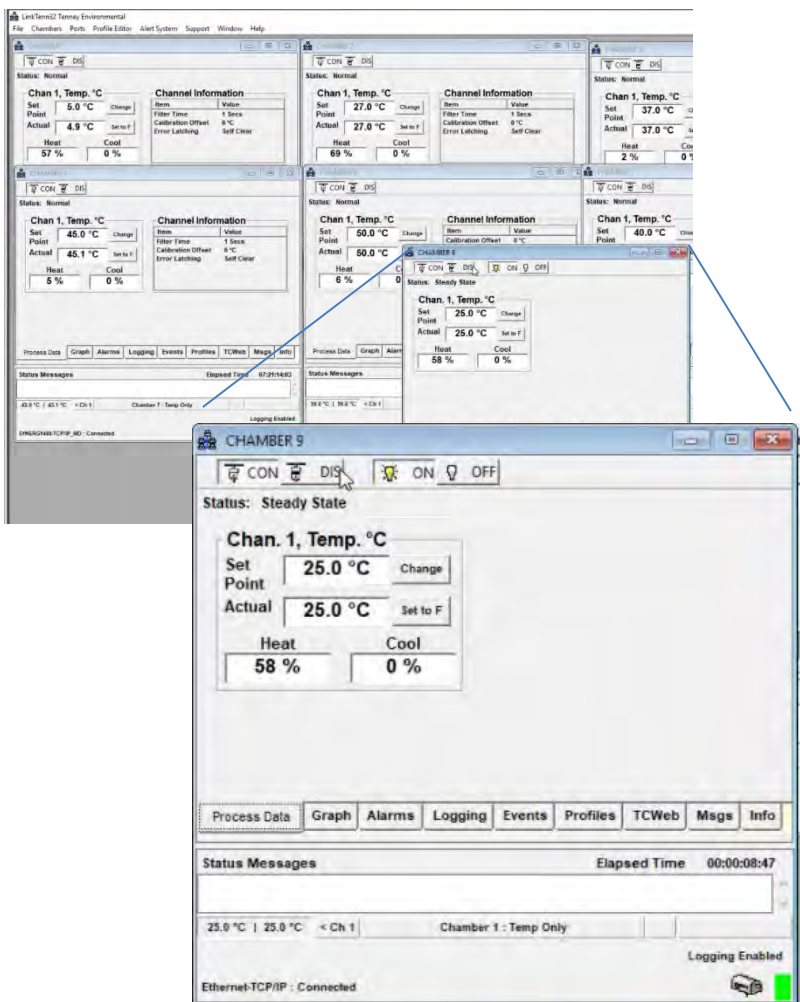
Synergy Manager improves productivity because engineers can write a program once no matter how many different controllers they might need to run it on. Synergy Manager can be used to create, download, and edit profiles for a variety of popular test chamber and process oven controllers.

**SYNERGY
Nano**

The main features of the Synergy Manager are:

- Remote Control
- Ethernet TCP/IP, RS-232, GPIB-IEEE 488, and RS-485 protocols
- Communicate to any one of the different supported controllers, in any combination.
- Profile Creation Download and Control
Write a test profile once and run it on any of the different controllers.
- Store and archive thousands of profiles on a server for backup/restore.
- Data Logging and Graphing. Download, control, monitor, record and graph environmental test data on multiple chambers simultaneously.
- Alert System
Setup alarms for absolute limits and setpoint deviation limits with e-mail, fax, and pager notification.

The Synergy Manager CDROM with USB Dongle is included in the Synergy Controller Demonstration Briefcase accessories. See Appendix M for a complete list of accessories.



Appendix C- RS-232 Remote Control Communications



COMM\RS-232 Parameters

Comm - mil-Fastx

Back

\RS-232\

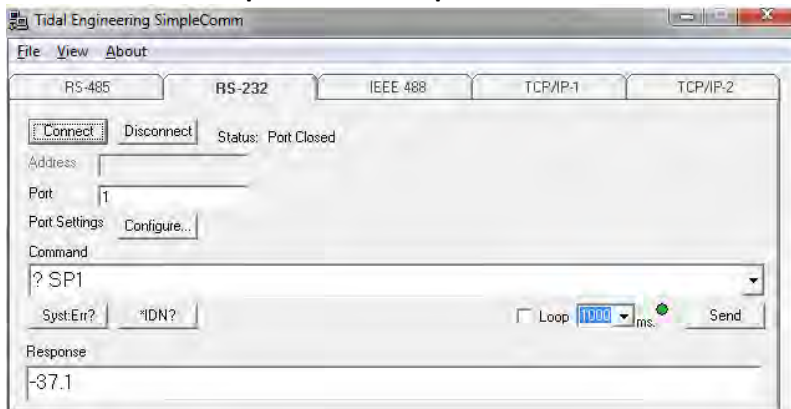
Comm Mode	User ASCII Comms
Baud Rate	19200 Baud
Data Bits	8 Data Bits
Parity	None
Flow Control	None

Change

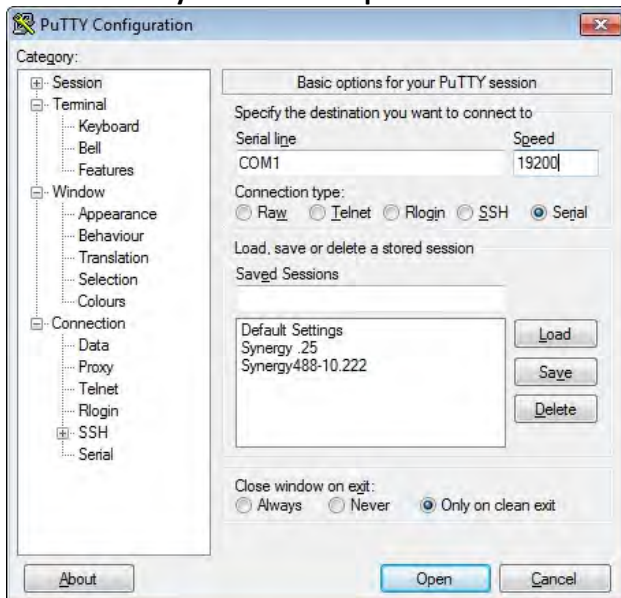
Description: The 'Comm Mode' toggles modes on the User Communications port on some controllers. It can be disabled, used for User Communications, or used for pass-through

Alarm, Internal Comm25.0 C25.0 C

SimpleComm Example for RS-232



Putty Terminal Setup for RS-232



Appendix D –Ethernet: WebTouch, Email, ModbusTCP



The Cat 5 Crossover cable included in the Synergy Briefcase kit can be used to directly connect a PC and the Synergy Controller. To setup the PC for a direct connection, assign a Static IP to the PC and Synergy as shown on the screenshot below and on the next page.

COMM\Ethernet Network\IP Settings Parameters

Comm - mil-Fastx ALARM

Back \Ethernet Network\IP Settings\

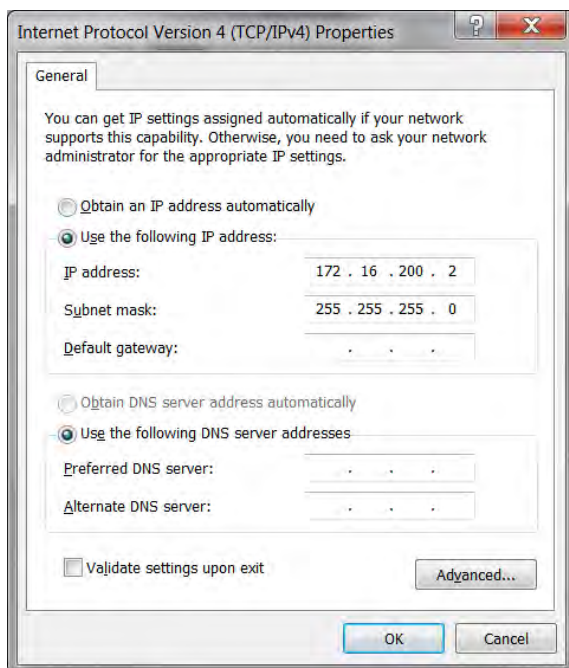
IP Address Selection	Static IP
Ethernet Address	172.16.200.109
Ethernet Subnet Mask	255.255.255.0
Ethernet Gateway	172.16.200.254
MAC Address	00:14:2D:25:1E:EE

Description: The 'IP Address Selection' parameter specifies the protocol for assigning an IP address to the controller.

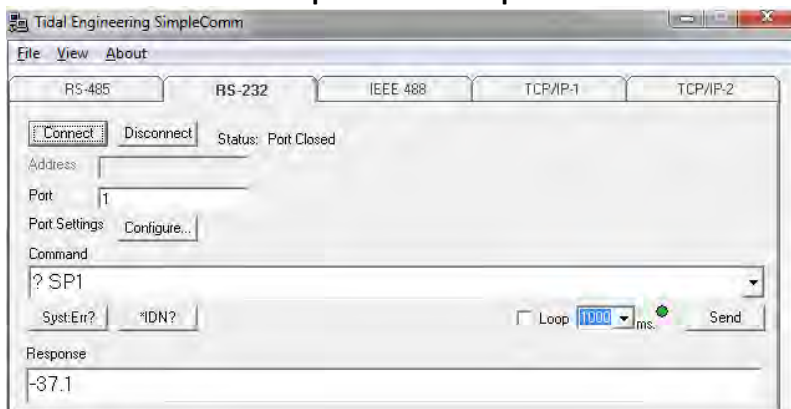
Change

Alarm, Internal Comm 25.0 C 25.0 C

Static IP Address Setup on Window 7

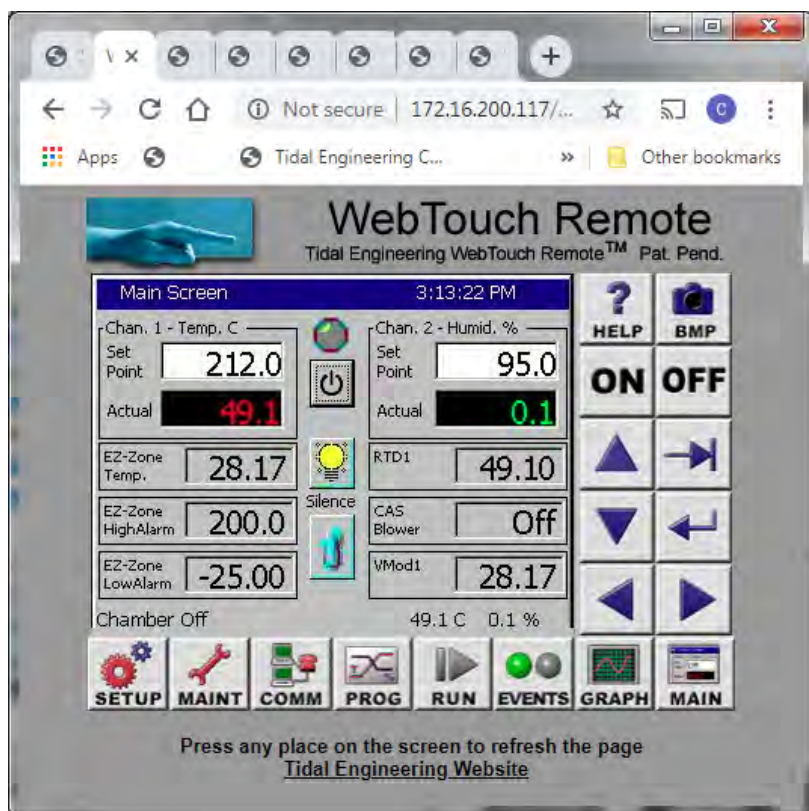


SimpleComm Example



Appendix E WebTouch Remote

WebTouch Remote™ provides a simple web Browser interface for Remote Control.

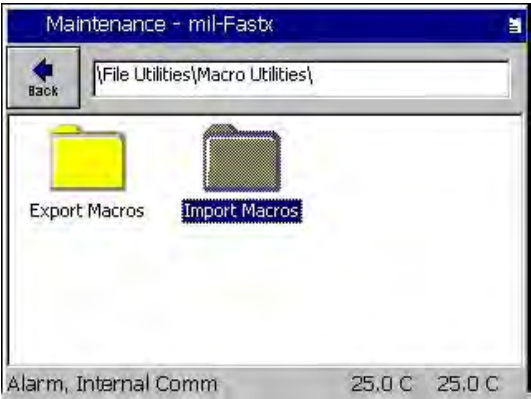
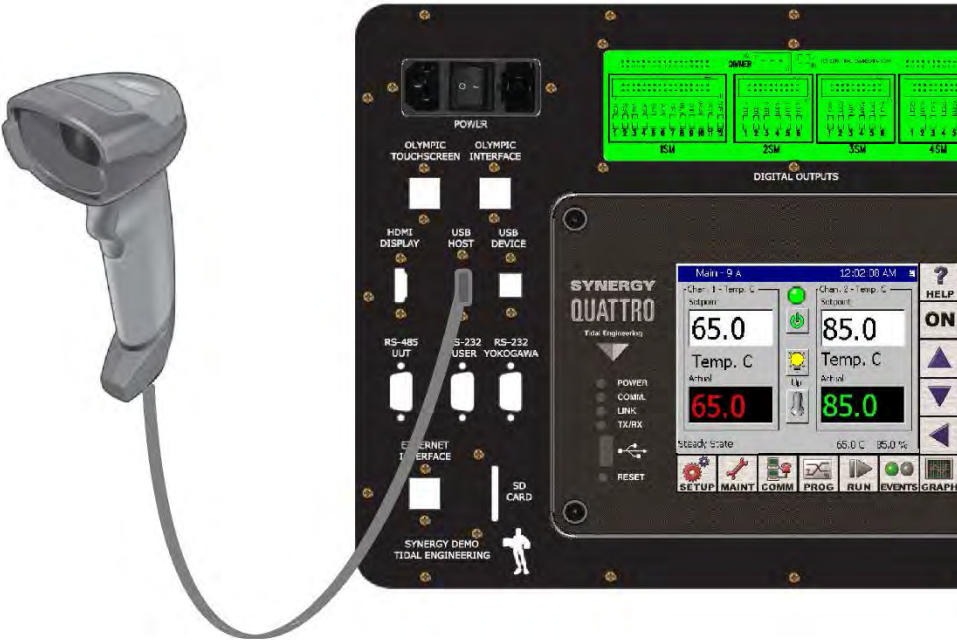


Appendix F— HDMI External Monitor

Connect any HDMI capable monitor or projector to the Synergy Quattro 2 Briefcase for training and demonstrations.



Appendix G –Bar-Code Scanner



Symbol LS2208 Scanner Setup Codes

Factory Defaults	 Return to Factory Defaults
Begin Rule	 Begin New Rule
Send Ctrl F	 Send Control F
Send all data	 Send All Data That Remains
Send Carriage return	 Send Enter Key
Save Rule	 Save Rule

Note: The scanner in the briefcase accessories kit is pre-programmed. Use these codes if a new scanner is used.

Application Note 163 - Synergy Quattro 2 Briefcase Demo**SQ2_BRIEFCASE_DEMO_MACRO_S REV_A.png**

LM45632

Run Program
EZ-Zone 1539 HighAlarm.vpl



LM45631

Run Program
EZ-Zone 1539 LowAlarm.vpl



LM45634

Set EZ-Zone
EZ-Zone Hi Alarm = 212.0
EZ-Zone Lo Alarm = -25



LM45635

Set EZ-Zone
EZ-Zone Hi Alarm = 110.0
EZ-Zone Lo Alarm = 9.9



LM45636

Adjust Setpoints
CH 1 Temp. = 85.0 C
CH 2 %RH = 95.0 RH



LM45637

Adjust Setpoints
CH 1 Temp. = 25.0 C
CH 2 %RH = 50.0 RH



LM45638

Set EZ-Zone
EZ-Zone Hi Alarm = 111.1



LM45639

Set EZ-Zone
EZ-Zone Hi Alarm = 88.8

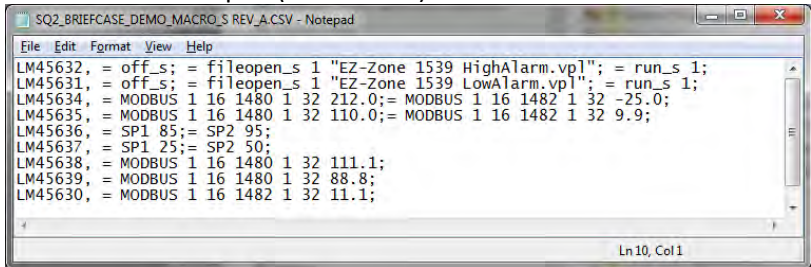


LM45630

Set EZ-Zone
EZ-Zone Lo Alarm = 11.1

The Macro file below Is loaded on the Synergy Quattro 2 Briefcase.

Macro File in Notepad (Screenshot)



The screenshot shows a Notepad window titled "SQ2_BRIEFCASE_DEMO_MACRO_S_REV_A.CSV - Notepad". The text inside the window is as follows:

```
File Edit Format View Help
LM45632, = off_s; = fileopen_s 1 "EZ-Zone 1539 HighAlarm.vpl"; = run_s 1;
LM45631, = off_s; = fileopen_s 1 "EZ-Zone 1539 LowAlarm.vpl"; = run_s 1;
LM45634, = MODBUS 1 16 1480 1 32 212.0;= MODBUS 1 16 1482 1 32 -25.0;
LM45635, = MODBUS 1 16 1480 1 32 110.0;= MODBUS 1 16 1482 1 32 9.9;
LM45636, = SP1 85;= SP2 95;
LM45637, = SP1 25;= SP2 50;
LM45638, = MODBUS 1 16 1480 1 32 111.1;
LM45639, = MODBUS 1 16 1480 1 32 88.8;
LM45630, = MODBUS 1 16 1482 1 32 11.1;
```

Ln10, Col1

Macro File Contents

```
LM45632, = off_s; = fileopen_s 1 "EZ-Zone 1539 HighAlarm.vpl"; = run_s 1;
LM45631, = off_s; = fileopen_s 1 "EZ-Zone 1539 LowAlarm.vpl"; = run_s 1;
LM45634, = MODBUS 1 16 1480 1 32 212.0;= MODBUS 1 16 1482 1 32 -25.0;
LM45635, = MODBUS 1 16 1480 1 32 110.0;= MODBUS 1 16 1482 1 32 9.9;
LM45636, = SP1 85;= SP2 95;
LM45637, = SP1 25;= SP2 50;
LM45638, = MODBUS 1 16 1480 1 32 111.1;
LM45639, = MODBUS 1 16 1480 1 32 88.8;
LM45630, = MODBUS 1 16 1482 1 32 11.1;
```

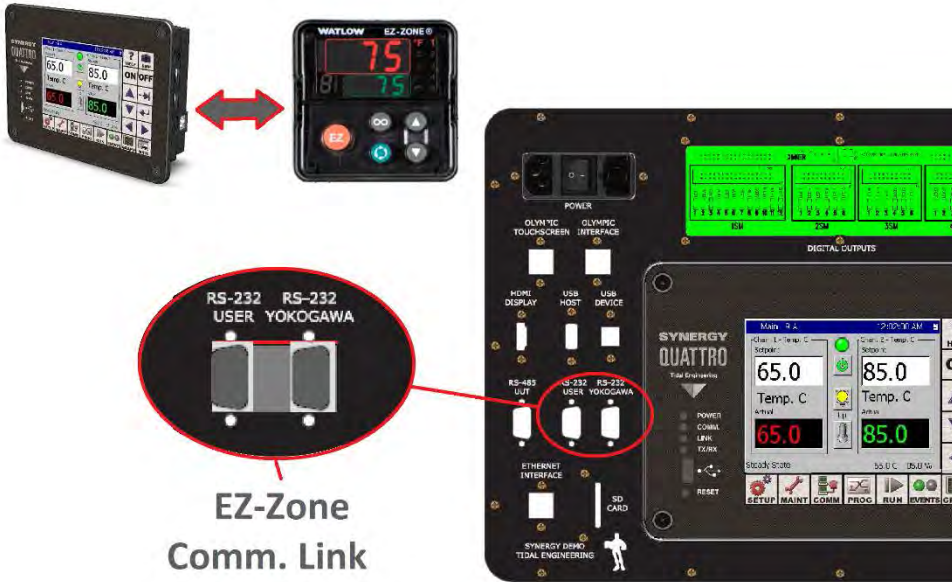
Scan the example bar codes on the left to exercise each of the macro entries.

For example, scan the first bar code, LM45632, to load and run the program EZ-Zone 1539 HighAlarm.vpl.

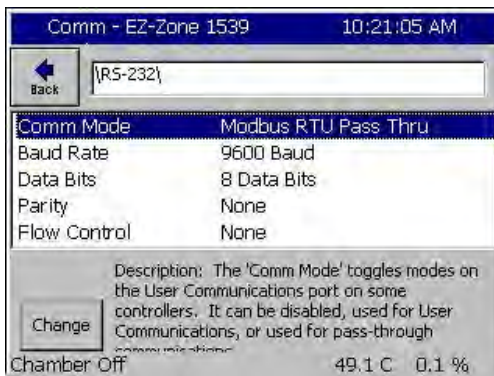
This program will run for 1 minute and update the EZ-Zone High and Low alarm limits three times as follows:

1. High Alarm 200.0, Low Alarm -25.0
2. High Alarm 100.0, Low Alarm -0.0
3. High Alarm 20.0, Low Alarm 20.0

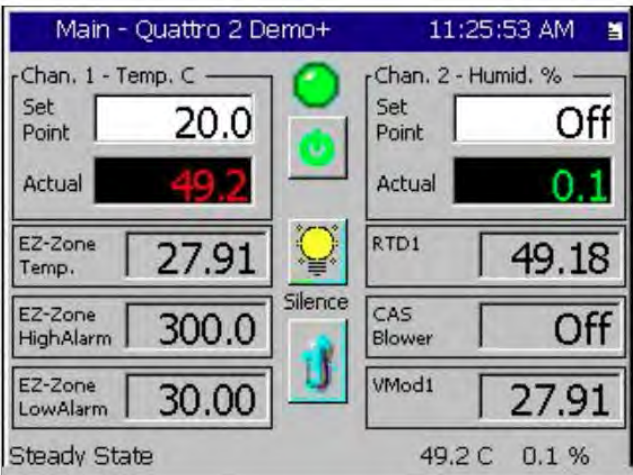
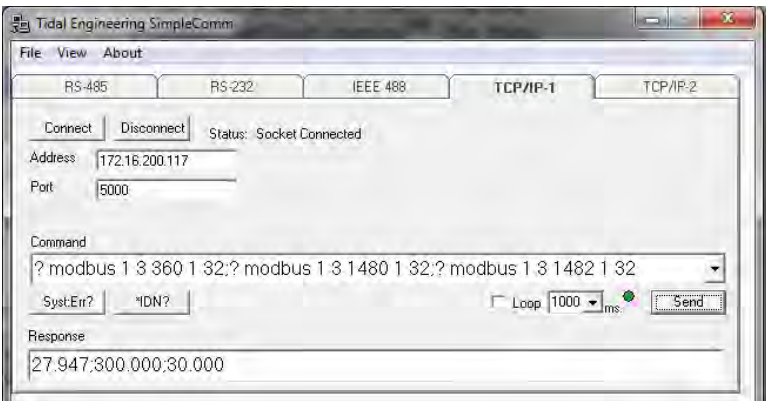
Appendix H –EZ-Zone Integration



Synergy Controller Setup for EZ-Zone integration



The SimpleComm Screenshot below shows the commands to query the EZ-Zone Process temperature and High and Low Alarms.



EZ-Zone Setup for Synergy Integration



EZ-Zone P/N: PM6L1EJ-2AAAAAA, Watlow EZ-Zone PM Controller

Hold Up and Down	Hold Up Arrow	Advance Key	Reset

The EZ-Zone in the briefcase is setup for Synergy Controller Integration.

Setup another EZ-Zone for Synergy Controller integration as follows:

1. Hold Up and Down until Setup Menu (Set) appears (10 seconds).
2. Press Up arrow to reach Global (gLbL) Menu.
3. Press advance key (Green) until the Restore Settings (USr.r) is displayed.
4. Press Up arrow to select Factory (FCty). Or press arrow down once (FCty)
5. Press Green Advance Key until C turns to F.
6. Press Reset button twice. The EZ-Zone should return to the Home Screen.
7. Set Communications Display channel to C: SET>COMM>C_F.
8. Set Global Temperature Display Units to C: SET>Global>C_F.

EZ-Zone Factory Defaults

Parameter	Default
Baud (bAUd),	9600
Parity (PAr),	None
Protocol	Modbus
Modbus (Ad.S) Address	1
Temperature Units (C_F)	Fahrenheit
Word Order M.hL	Low-High
Data Map (Map)	2 (New Mapping)

Useful Registers:

Analog Input (Ain)	360
High Alarm (A.hi)	1480
Low limit (A.Lo)	1482

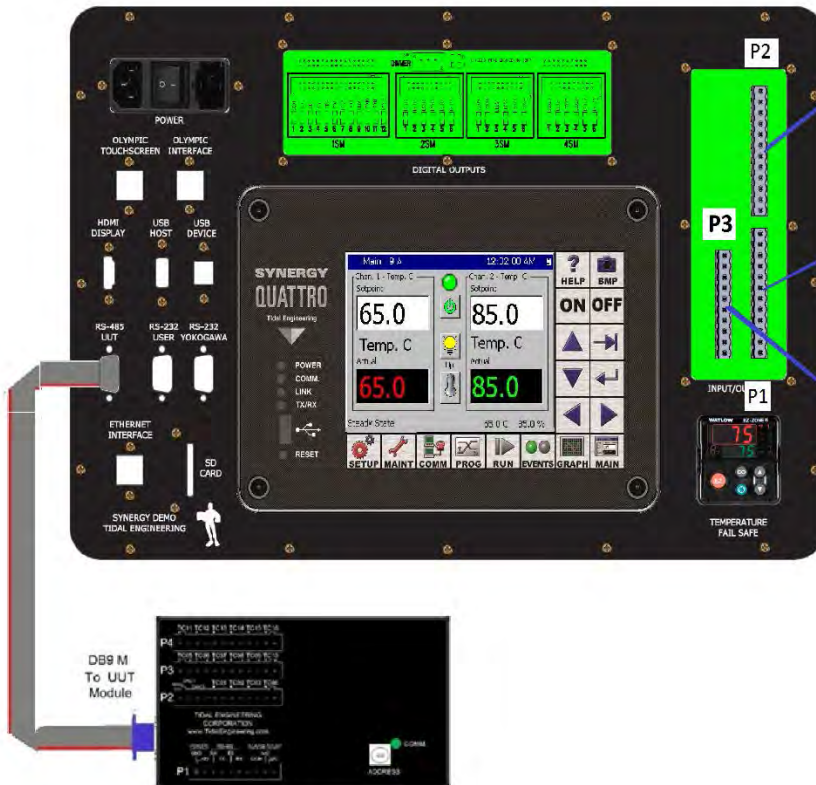
Analog Input (Ain)	
High Limit (Lim.hi)	686
Low Limit (Lim.hi)	684

Appendix I– UUT/TCweb Thermocouple Module Setup

Features:

- UUT Module Handles up to 64 Thermocouples T-Type (16 Per Module)
- TCweb Module Handles up to 64 Thermocouples T, K, J, R, S Types (16 Per Module)
- Plug and Play
- UUT Module is Controller Powered.

UUT Briefcase Connection



Setup controller as follows:

Comm - EZ-Zone 1539 HighAl... 5:29:59 PM

Back [RS-485]

RS-485 Mode	UUT Sensors
Station Address	1
Number of UUTs	2
TCWeb Address	
Number of TCWeb's	0

Description: The 'RS-485 Mode' parameter specifies the RS-485 mode, User Communications or UUT.

Change

Chamber Off 49.1 C 0.1 %

View Sensor Inputs here:

Events - EZ-Zone 1539 High... 5:31:37 PM

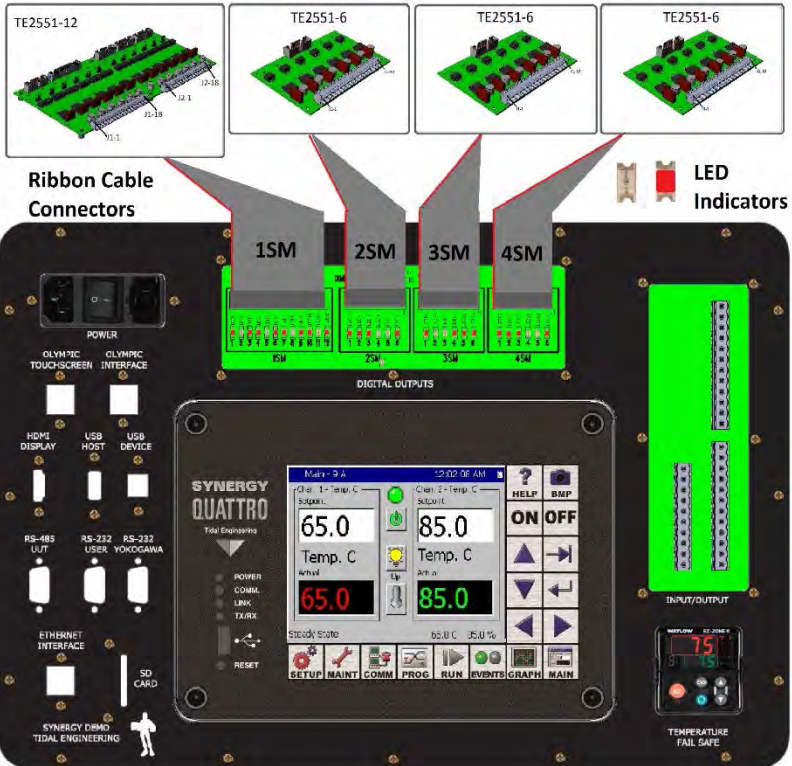
Back [UUT\UUT 1] Previous Next

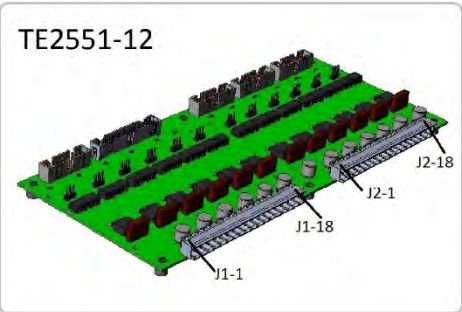
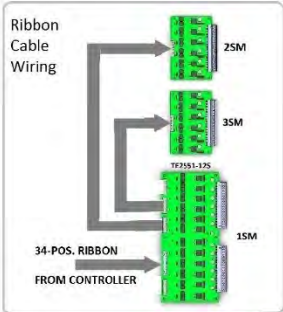
Sensor	Temp
Sensor 1	Open Sensor
Sensor 2	Open Sensor
Sensor 3	22.3 C
Sensor 4	Open Sensor
Sensor 5	Open Sensor
Sensor 6	Open Sensor
Sensor 7	Open Sensor
Sensor 8	Open Sensor

Chamber Off 49.1 C 0.1 %

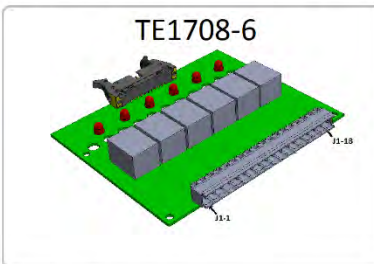
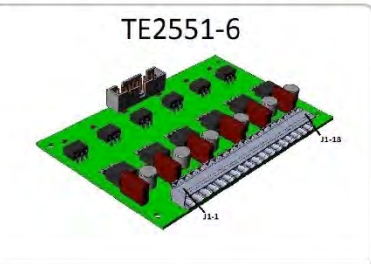
Appendix J –Digital Output Drivers and LEDs

- 30 Digital Outputs: SSR, Relay, Open Collector Options
- Briefcase has LED Indicators for each output.
- Ribbon Cable connectors for 1SM, 2SM, 3SM, and 4SM.

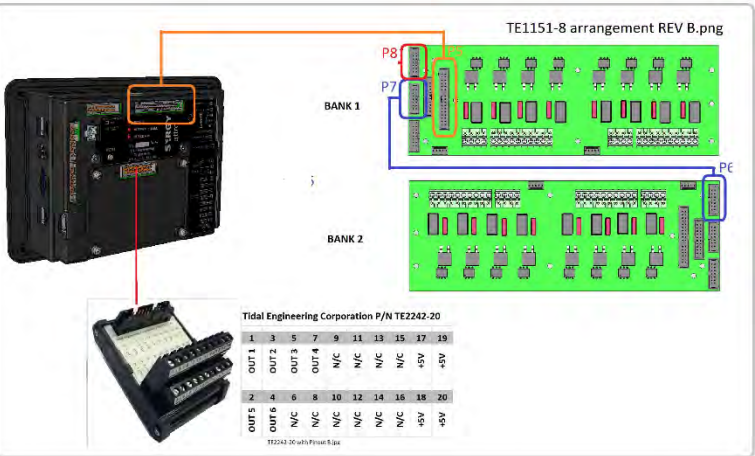




J1												J2											
15M.01	15M.02	15M.03	15M.04	15M.05	15M.06	15M.07	15M.08	15M.09	15M.10	15M.11	15M.12	15M.13	15M.14	15M.15	15M.16	15M.17	15M.18	15M.19	15M.20	15M.21	15M.22	15M.23	15M.24
Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	Output 7	Output 8	Output 9	Output 10	Output 11	Output 12	Output 13	Output 14	Output 15	Output 16	Output 17	Output 18	Output 19	Output 20	Output 21	Output 22	Output 23	Output 24
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24



J1												J2											
15M.01	15M.02	15M.03	15M.04	15M.05	15M.06	15M.07	15M.08	15M.09	15M.10	15M.11	15M.12	15M.13	15M.14	15M.15	15M.16	15M.17	15M.18	15M.19	15M.20	15M.21	15M.22	15M.23	15M.24
Output 1	Output 2	Output 3	Output 4	Output 5	Output 6	Output 7	Output 8	Output 9	Output 10	Output 11	Output 12	Output 13	Output 14	Output 15	Output 16	Output 17	Output 18	Output 19	Output 20	Output 21	Output 22	Output 23	Output 24
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24



Appendix K –Digital and Process Inputs:

P1-Synergy Quattro 2 Olympic Board

- (8) Digital Inputs
- (2) Alarm Relays

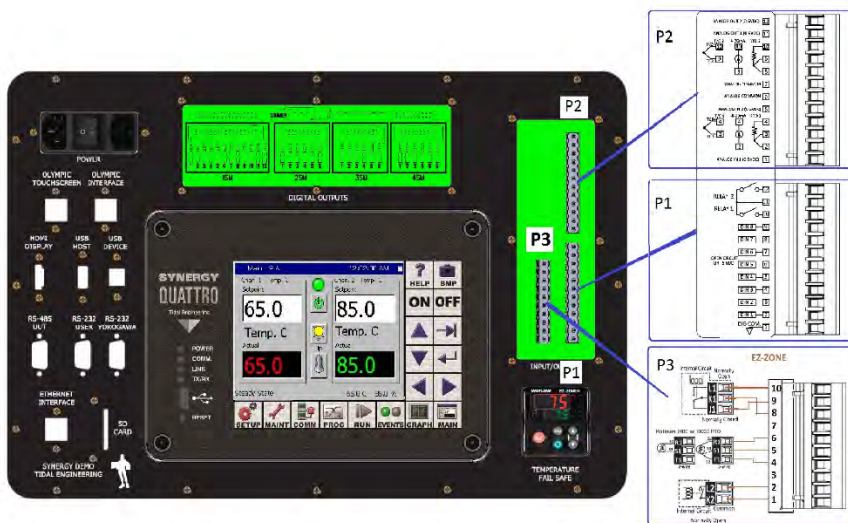
P2-Synergy Quattro 2 Olympic Board

- (2) Analog Outputs
- (2) Voltage Inputs
- (2) Universal Process Inputs (RTD, T/C, 4..20mA)

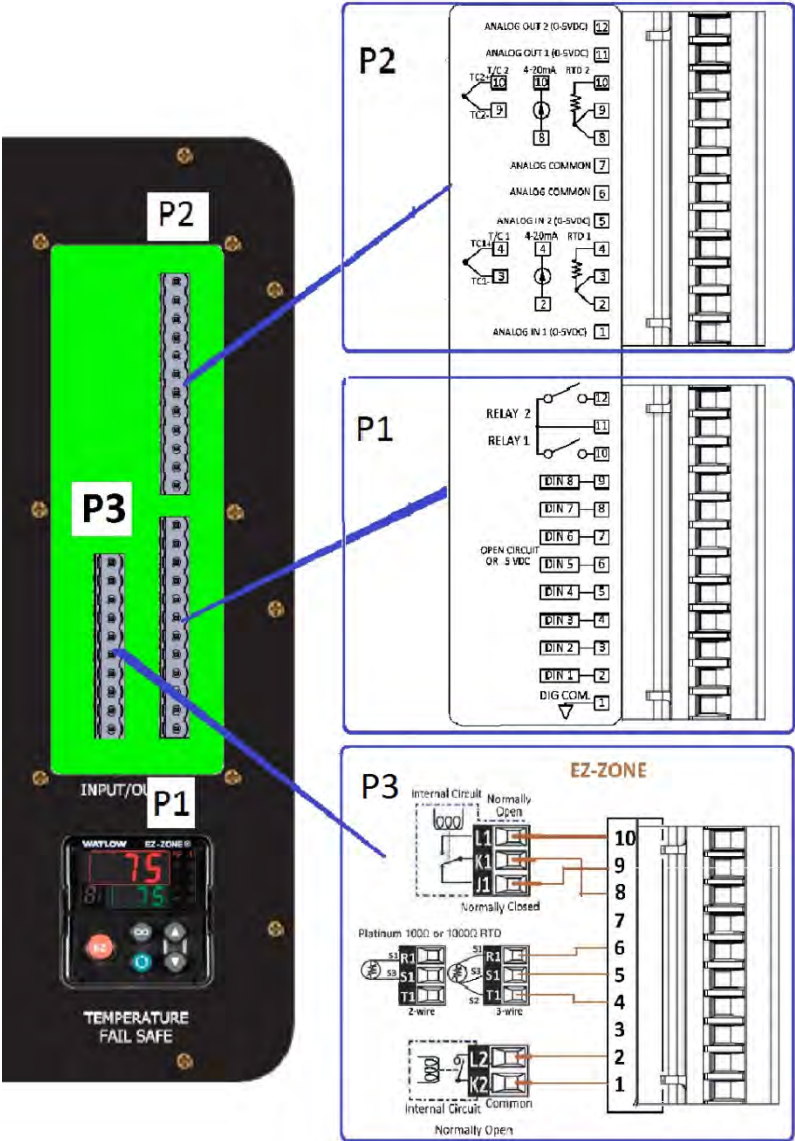
P3 EZ-Zone Connections

- Sensor Inputs
- Output 1
- Output 2

P1, P2, P3 Layout



P1, P2, P3 Connection Diagram



Appendix L – Synergy Quattro 2 Data Sheet



Still unmatched in versatility and support, plus brighter, faster and more connected.

Tida's Synergy Quattro 2 controller is engineered to offer all the features needed to maximize the capabilities of your environmental chambers and process ovens in a complete package. Designed to take complete command of the chamber's conditioning systems, its algorithms automatically select heating/cooling modes as required, and totally control programming of temperature, vibration, altitude and humidity versus time. It moreover allows users to program up to nine custom event outputs for special applications and optional features.

Delivering results, the Synergy Quattro 2 is a fully functional data logger supporting all controller process inputs and control variables. Process inputs include RTD, thermocouples, voltage, current and up to 64 optional T-Type Thermocouples. Boasting the Microsoft Windows™ Embedded Compact 7 operating system, this controller offers RS-232, Ethernet and GPIB communications capabilities for built in remote control/monitoring, chart printing, email alerts, and cloud data storage.

NVIDIA processor and WEC 7 operating system updates in this second generation Synergy Quattro 2 Controller make the system even faster and provide the computing resources to support current and future features and functionality such as Cloud connectivity, TPM and Web-based remote control.

The Synergy Controller family including the Synergy Quattro 2 equips engineers and organizations that operate, maintain, and manufacture environmental test chambers and process ovens with the product range and the support they need to optimize their equipment and processes. Now in their fourth generation, Synergy Controller programming and configurations are backward compatible.



The Synergy Quattro 2 is part of a family of controllers that share common software and UI and can be applied across a wide range of applications.



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Headquartered in Randolph, NJ, Tidal Engineering Corp. has been designing and building award-winning embedded hardware and software for environmental test and measurement and data acquisition applications since 1992. [Learn more at www.TidalEng.com](http://www.TidalEng.com)

SYNERGY QUATTRO 2

Channels (1 to 4)

- Process Variables: Temperature, Humidity, Altitude, Vibration, and Light

LCD

- LCD Type: Color, 320 x 240 TFT
- Backlight: LED
- Touch Screen Type: Resistive
- HDMI Display Output

External Monitor

- HDMI Interface

Operating System and Processor

- Microsoft Windows™ Embedded Compact 7
- NVIDIA® Tegra™ 2, Dual Cortex™ A9, 1GHz

Storage

- 1 GB Removable SD Flash Memory
- Removable USB Flash Disk
- 512MB DDR2 (32 Bit)

Communications

- 10/100 BaseT Ethernet
 - Telnet, FTP and Web Touch Server
 - E-Mail (SMTP), Text Messaging (SMS)
 - Printing/Plotting HPCL, PDF
- RS-232 Communications
- IEEE 488 (Optional - Order TE1 588)

USB Host (2), USB Device (1)

- USB Flash Memory for program & log files
- USB Mouse, Keyboard, Barcode scanner

Programming

- Windows-friendly program file names
- Step Types:
 - Set Point, Jump Loop, Auto Start, Hold, Pause, and Stop
- Program Storage:
 - Only limited by onboard storage
- Software Features:
 - Real Time clock with battery backup
 - Automatic resume after power failure
 - Software configurable chamber type

Analog Inputs

Universal Input (2)

- Wet Bulb-Dry Bulb Humidity Sensing
- Temp Comp. for Electronic Sensing
- RTD
 - Temp. Range: -200°C to 630°C
 - Accuracy: +/- 0.05 Ohms
 - 100 or 500 Ohm Pt., JIS or DIN
- T/C
 - T/C Accuracy: +/- 1°C
 - Types E, B, J, K, R, S, and T
- Analog Process Inputs (2)
 - Resolution: 16 Bits 4-20 mA <7xml

Process Voltage Inputs (2)

- Resolution: 16 Bits, 0-5 VDC, +/- 0.05%

Virtual Sensors

- Wet Bulb-Dry Bulb Humidity Sensing
- Vaisala HMM30C Humidity Sensor
- Multi-Sensor, Min., Max., Average
- Pressure (Torr) to Altitude (Kft)

Voltage Inputs (2)

- Resolution: 16 Bits 0-5 VDC, +/- 0.05% FS
- Analog Aux Inputs (8) (optional)
- Resolution: 12 Bits, 0-5 VDC or 4-20 mA mA, +/- 0.2% FS

Analog Outputs (2)

- Resolution: 12 Bits
- Range 0-5 VDC, +/- 5mV
- Range 0-10 VDC, +/- 10mV (Optional TE1 803)
- Range 4-20 mA, +/- 0.1% (Optional TE1 803)
- Analog Output Functions:
 - All internal control variables including SP, PV, PID.

Main Outputs (24)

- Open Collector: 24 Vdc, 50 mA Max.
- Connectors:
 - (1) 34-Position Header, 0.1" x 0.1"
 - (2) 20-Position Header, 0.1" x 0.1"

Event Outputs (6) Optional

- TE2551-6 Triac Outputs
- TE1708-6 Relay Outputs

Voltage Range: -0.5 to +5.5 VDC

Digital Inputs (8)

- Ground: TRUE, Open Circuit: FALSE

Digital Aux Inputs (8) (Optional)

(Order TE2251-4 for this option)

Data Logging

- Capacity: 100 Mbytes
- Interval: 1 Second to 60 Minutes
- Data:
 - Process Variables
 - Process Setpoints
 - PID Variables
 - UUT T-Type Thermocouples

Alarm Types

- Low Program Memory
- Low Storage Card Memory
- Temp-Guard External Monitor
- Open Sensor
- High/Low Process Limit
- High/Low Deviation Limit
- User Programmable Alarms
- Internal communications failure

Power Requirements

- Dual Supply Capability
 - 100 to 240 VAC, 47 to 63 Hz
 - 24 VDC
- 15 Watts

Operating Conditions

- Temperature: 10° C to 30° C
- Humidity: 0 to 90% RH, Non-condensing

Warranty

- 3 Year Limited Warranty

Size and Weight

- 9.25" W x 6.50" H x 2.93" D, 1.5 lbs.



Synergy Quattro Controller and Accessories Part Nos.

- TE1951-23 Synergy Quattro 2 Controller
- TE1299-18 Synergy UUT Thermocouple Monitor
- TE2551-12S Super Switching Module
- TE1151-8 Triac Output Board, 8-Channel
- TE2251-6 Triac Output Board, 6-Channel
- TE1708-6 Electro-Mechanical Relay Board, 6-Channel
- TE2251-1 Four 8-Channel Thermotron Outputs
- TE2251-2 Opto-22 Output Rack
- TE2251-4 Analog/Digital Input Expander
- TE2251-5 SSR Outputs, 5-Channel
- TE1865 LabVIEW Driver
- TE1588 Synergy488 GPIB option
- TE1566-1 Synergy Lab Manager Software
- TE1567 Synergy WebTouch Remote Feature
- TE2013 Synergy Pressure Feature
- TE2042 Synergy Cascade Control Feature
- TE2175 Synergy Printer Feature
- TE2176 Synergy Server Feature
- TE2424 Synergy WiFi 802.11 b/g/n



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1842



Appendix M - Synergy Quattro 2 Controller Briefcase Accessory kit**TE1961-23-BRIEFCASE-EZ**

Check	QTY	P/N	Description
	1	TE1813	Synergy Controller Unified Technical Manual
	2	TE1594	RTD Temp. Sensor, 100 Ohm Pt. 3 ft.
	4	TE1924	Precision Resistor, 250 ohm 0.1 % ¼ W
	1	TE1722-34-6	Ribbon I/O- Cable Assy., 34-Cond., 6 Ft.
	2	TE1722-20-6	Ribbon I/O- Cable Assy., 20-Cond., 6 Ft.
	1	2380	Crossover Cable, 5E-UTP, Orange 7 Ft.
	2	442	RS-232 Serial Comm. Cable, 6 Ft.
	1	5279	A/C Power Cord IEC 18 AWG/BLK, UL/CSA
	4	120-D-121/12	Connector Plug 12x2 Pos., 5 mm Gray
	1	TE1566-1	Synergy Manager
	1	TE1299-16	Synergy UUT Thermocouple Module
	1	LS2208-	Symbol Bar Code Scanner LS2208-SR20001R-UR
	1	3992	HDMI Cable, 6 Ft.

Technical Manual, Installation Manual, and Data Sheet

https://tidaleng.com/techmans/Synergy_Controller_Unified_Technical_Manual_Rev_H.pdf

https://tidaleng.com/techmans/Synergy_Quattro_2_Installation_Manual.pdf

https://tidaleng.com/datasheets/Synergy_Quattro_2_data_sheet.pdf

Synergy Unified Technical Manual	Synergy Quattro 2 Installation Manual	Synergy Quattro 2 Data Sheet
		

Appendix N - Synergy Controller Application Note List

[AppNote 1 - Replacing a VersaTenn III Controller](#)

[AppNote 2 - Synergy Controller Data Logging Capacity Calculations](#)

[AppNote 3 - Retrofitting a Qualmark HALT/HASS Chamber](#)

[AppNote 4 - Configuring the Synergy Controller to Read from a Bar Code scanner](#)

[AppNote 5 - Synergy Controller vs. VersaTenn III](#)

[AppNote 7 - Synergy Controller WebTouch Remote Feature](#)

[AppNote 8 - Using SimpleComm application to communicate with the Synergy Controller](#)

[AppNote 10 - Synergy Controller Retransmit Signal Conditioner :](#)

[AppNote 20 - Using the TE1908 Single Channel Thermocouple Signal Conditioner](#)

[AppNote 25 - Using the Synergy Controller with Space Chamber applications.](#)

[AppNote 26 - Using the programmable User Alarms with the Synergy Controller](#)

[AppNote 40 - Two Point Calibration.](#)

[AppNote 45 - Using the Synergy Controller's ftp server.](#)

[AppNote 49 - Synergy Controller Security Enhancements](#)

[AppNote 56 - Using the Synergy Controller Watchdog Timers](#)

[AppNote 58 - Synergy Controller Wet-Bulb/Dry-Bulb Humidity Measurements.](#)

[AppNote 59 - Synergy Controller Wireless Network Setup.](#)

[AppNote 60 - Graphing Synergy Log Files in Microsoft Excel.](#)

[AppNote 67 - Synergy Controller Mounting Options.](#)

[AppNote 71 - Synergy Controller PWM Retransmit Feature](#)

[AppNote 72 - Synergy Controller Thermocouple Data Acquisition with Synergy UUT Modules](#)

[AppNote 74 - Synergy Controller LED Backlight Retrofit Kit](#)

[AppNote 77 - Synergy Controller Remote Start/Stop Feature](#)

[AppNote 84 - Synergy Controller E-Mail Feature](#)

[AppNote 85 - Synergy Controller Logging Features and Applications](#)

[AppNote 89 - Synergy Controller Loop-Back Setup](#)

[AppNote 90 - Synergy Controller Network Printing Feature](#)

[AppNote 91 - Synergy Controller Built-In Alarms](#)

[AppNote 95 - Synergy Controller Kft and other Pressure Display](#)

[AppNote 96 - Synergy Controller Analog Retransmit Applications](#)

[AppNote 99 - Synergy Server Feature](#)

[AppNote 102 - Synergy Certified OEM and Installer Training](#)

[AppNote 106 - Synergy Controller Cascade Loop \(Part Temperature\) Control Feature](#)

[AppNote 107 - Synergy Controller Programming with Python](#)

[AppNote 109 - Synergy488 Kit Setup for Synergy Nano and Synergy Quattro GPIB](#)

[AppNote 112 - General Purpose Logic Programming for OEMS and Integrators](#)

[AppNote 113 - Main Screen Display Setup Options](#)

[AppNote 116 - Synergy Controller Pressure Applications](#)

[AppNote 117 - Synergy Controller Help System Video QR Codes.](#)

[AppNote 121 - Synergy Controller Ramp Rate Control.](#)

In addition to these application notes, detailed chamber specific retrofit installation instructions are available for some chambers. Contact us at www.Tidaleng.com with the specifics of your chamber application.



About the Synergy Family

Tidal Engineering's Synergy Controllers, the ¼ DIN Synergy Nano 2, Synergy Micro 2 and the Synergy Quattro 2 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™
- ➔ Synergy Manager Compatible for PC based control, monitoring, programming.
- ➔ Built-in FTP Server for factory automation, 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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