## Synergy Controller Ramping Feature

Overview

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 and 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 makes these controllers perfect for today's changing testing environments.

In some test applications, test engineers are required to limit that rate of change of temperature or other process variables when adjusting setpoints. In the Synergy Controller Version 3.0.16 Build 990, engineers can program the controller to ramp the setpoint from the current temperature when making adjustments while in the steady state mode. In earlier Synergy Controller versions, this was accomplished by writing and running a program to ramp from one temperature to another in a specific amount of time.
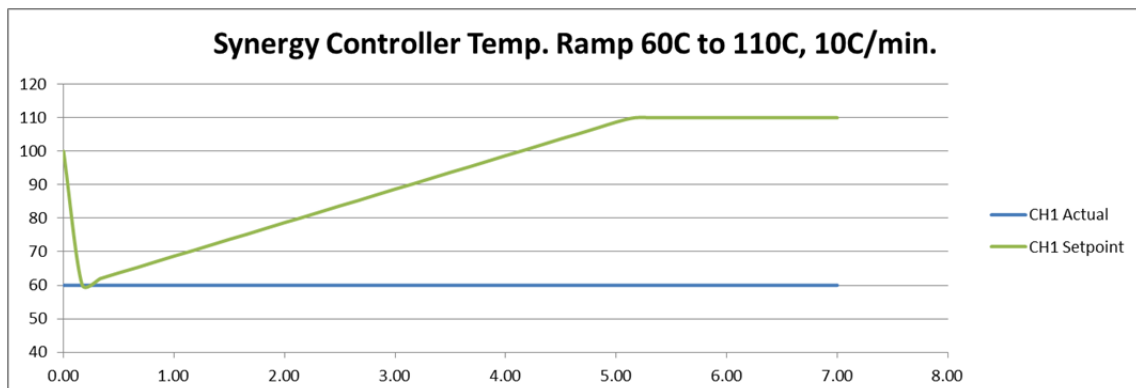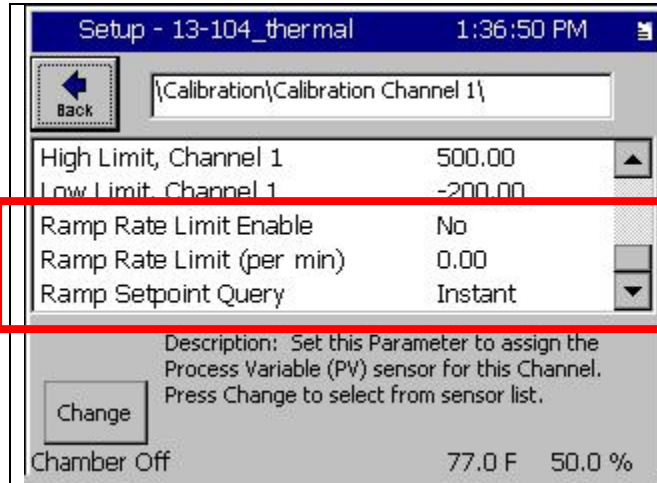
The Ramp Rate Limit feature is programmed on a channel by channel basis from the Channel Calibration Screen.

There are three parameters for each channel.

Ramp Rate Limit Enable
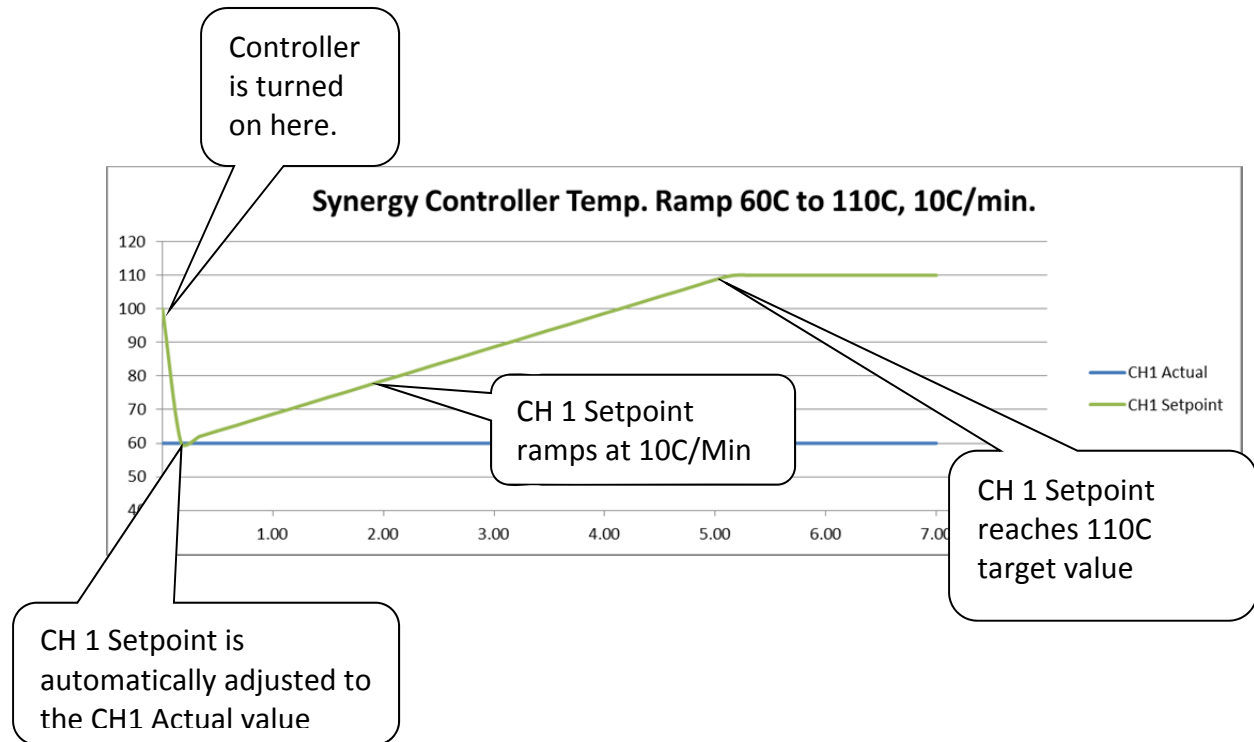Ramp Rate Limit
Ramp Setpoint Query

These parameters can be adjusted both from the touch screen and using the communications port. The syntax for these parameters are as follows:
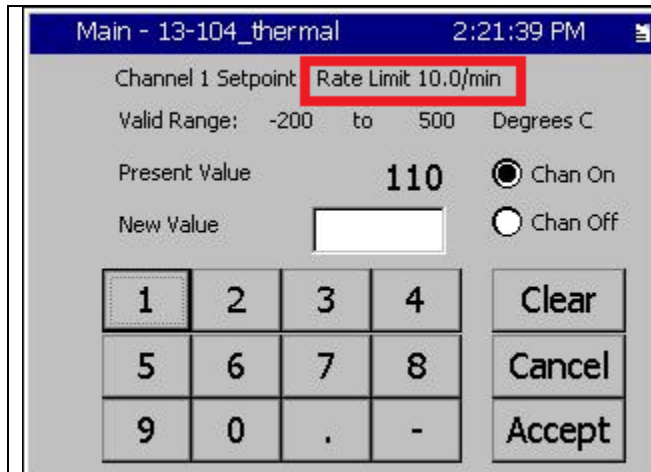
Command	Parameters	Example
Ramp feature Enable	RAMP*EN x = 1 for Enable x = 0 for Disable	To enable Ramp feature for channel 1 = RAMP1EN 1 *To query this value:* *? RAMP1EN*
Ramp Rate Value	RAMP*RATE n n = rate per minute	To set Ramp rate for channel 1 to 10 per minute. = RAMP1RATE 10 To query this value: ? RAMP1RATE
Setpoint Query Mode Controls the whether the controller reports the Target Value or the Instantaneous value when the Setpoint is queried.	RAMP*QRY n x = 0 for Target x = 1 for Instantaneous value	To set Ramp Qry response to the Instantaneous value for channel 2. = RAMP2QRY 1 To query this value: ? RAMP2QRY

Note:
1. * is the Channel number
2. Units for measure for temperature are in the current units of measure (C or F).

When the Ramp Rate feature is enabled and the setpoint is changed or the controller is turned on, the controller will adjust the setpoint to the channel's process variable and then begin ramping at the Ramp Rate Value.

Controller is turned on here.

Synergy Controller Temp. Ramp 60C to 110C, 10C/min.

CH 1 Setpoint ramps at 10C/Min

CH1 Actual

CH1 Setpoint

CH 1 Setpoint reaches 110C target value

CH 1 Setpoint is automatically adjusted to the CH1 Actual value

When Ramp Limiting is Enabled for a channel, the Setpoint number pad indicates the current Rate Limit Value as shown on the left.
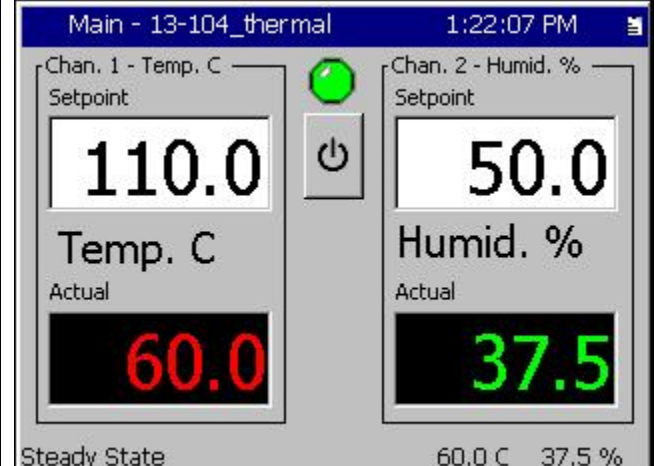
Otherwise Rate Limit Disabled is indicated.
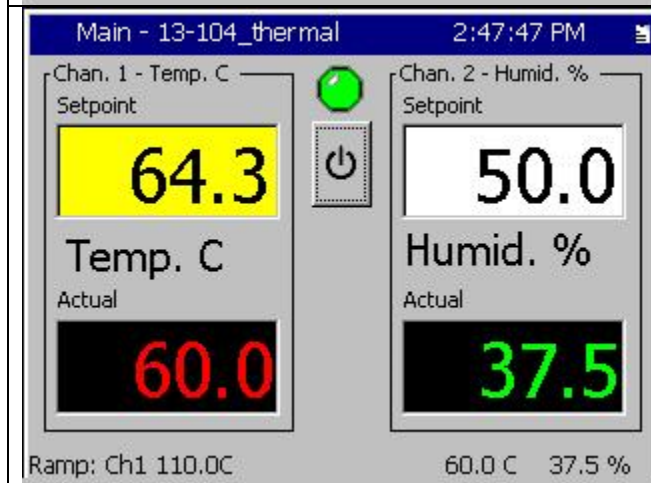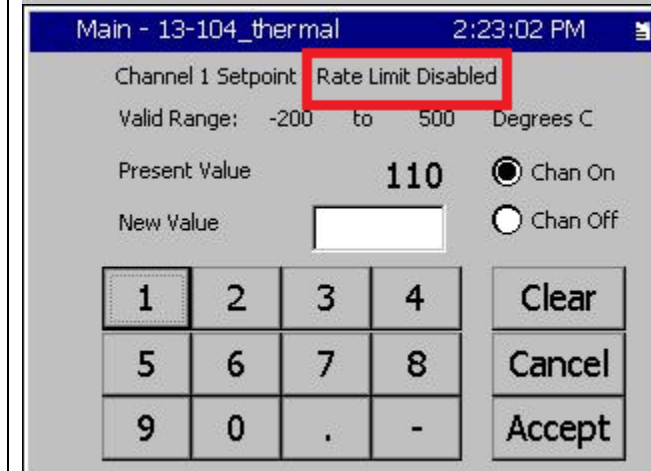
When the controller is ramping to a new setpoint, the Setpoint box background color changes to yellow as shown on the left.

In addition, the status message at the bottom left corner of the LCD screen will indicate **Ramp** with the channels and the target setpoints.

For example; "Ramp: Ch1 110C".

Main - 13-104_thermal 1:22:07 PM Chan. 1 - Temp. C ────── 🟢 Chan. 2 - Humid. % ────── Setpoint Setpoint **110.0** ⏻ **50.0** Temp. C Humid. % Actual Actual **60.0** **37.5** Steady State 60.0 C 37.5 %	When the controller reaches the target value, the Setpoint box background color will change back to white.

Example

|	
Main - 13-104_thermal 1:15:06 PM Chan. 1 - Temp. C — Setpoint **110.0** ⏻ Temp. C Actual **60.0** Chan. 2 - Humid. % — Setpoint **50.0** Humid. % Actual **37.5** Chamber Off 60.0 C 37.5 %	The controller in the example on the left is set to ramp both Channel 1 and Channel 2 at 10 units/minute. The controller is Off and the Actual Temperature and Humidity are 60 and 37.5.
Main - 13-104_thermal 2:52:21 PM Chan. 1 - Temp. C — Setpoint **60.3** ⏻ Temp. C Actual **60.0** Chan. 2 - Humid. % — Setpoint **37.8** Humid. % Actual **37.5** Ramp: Ch1 110.0C, Ch2 50.0% 60.0 C 37.5 %	When the controller is turned on (note the Green LED), the Channel 1 and Channel 2 setpoints change to 60 and 37.5 respectively and then begin ramping. The status line at the bottom left indicates that the both channels are ramping and their target values.
Main - 13-104_thermal 1:19:20 PM Chan. 1 - Temp. C — Setpoint **86.7** ⏻ Temp. C Actual **60.0** Chan. 2 - Humid. % — Setpoint **50.0** Humid. % Actual **37.5** Ramp: Ch1 110.0C 60.0 C 37.5 %	When Channel 2 reaches the target setpoint, the Channel 2 Setpoint box turns white as shown at the left. The Channel 1 setpoint is still ramping and is therefore still yellow. The Status line at the bottom left indicates that Channel 1 is ramping and the target temperature is 110C.

When Channel 1 reaches its target setpoint, its Setpoint box turns white, and now both channels are at their target setpoints.

The Status line at the bottom left indicates Steady State.

The setpoints and actual process variables recorded in the Synergy Controller's data logger are plotted below.
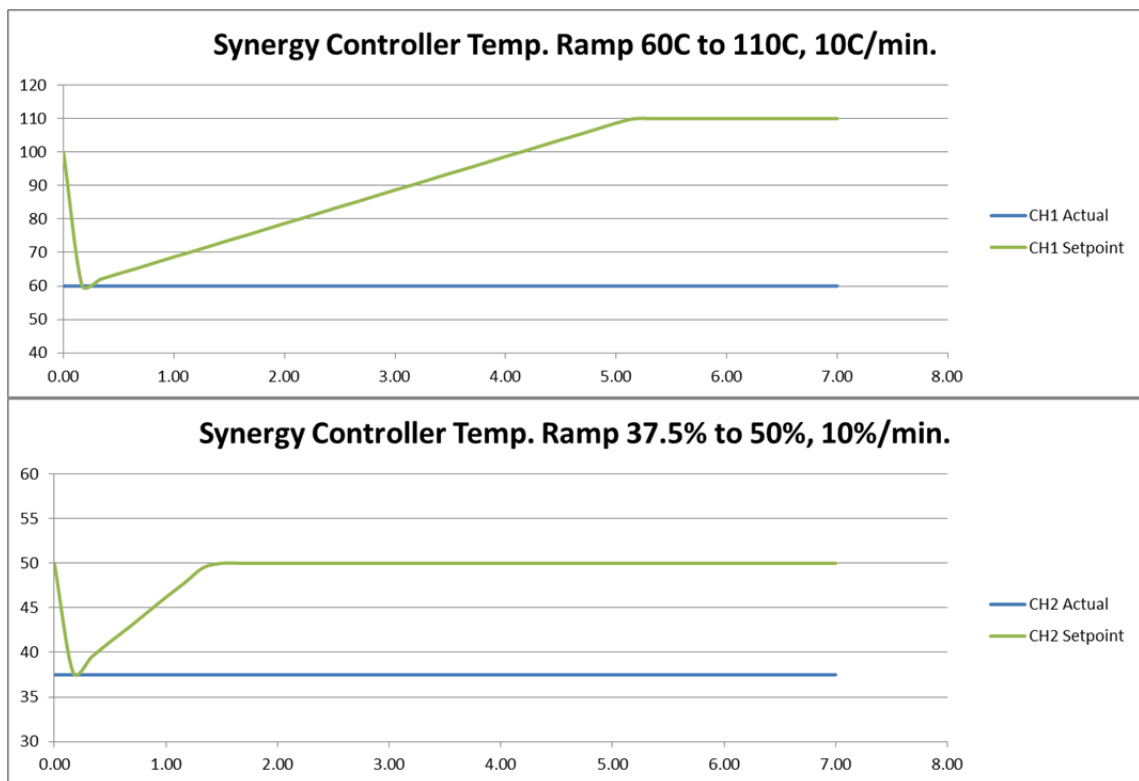
Note: When the controller is ramping it logs the instantaneous setpoint values as shown above.

About the Synergy Controller Family

Tidal Engineering's Synergy Controllers, both the Synergy Micro 2 and the ¼ DIN Synergy Nano provide state-of-the-art usability and connectivity for environmental test control and data acquisition and 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.

Tidal Engineering Corporation
2 Emery Avenue
Randolph, NJ 07869
Tel: 973/328-1173
Fax: 973/328-2302
www.TidalEng.com
info@tidaleng.com