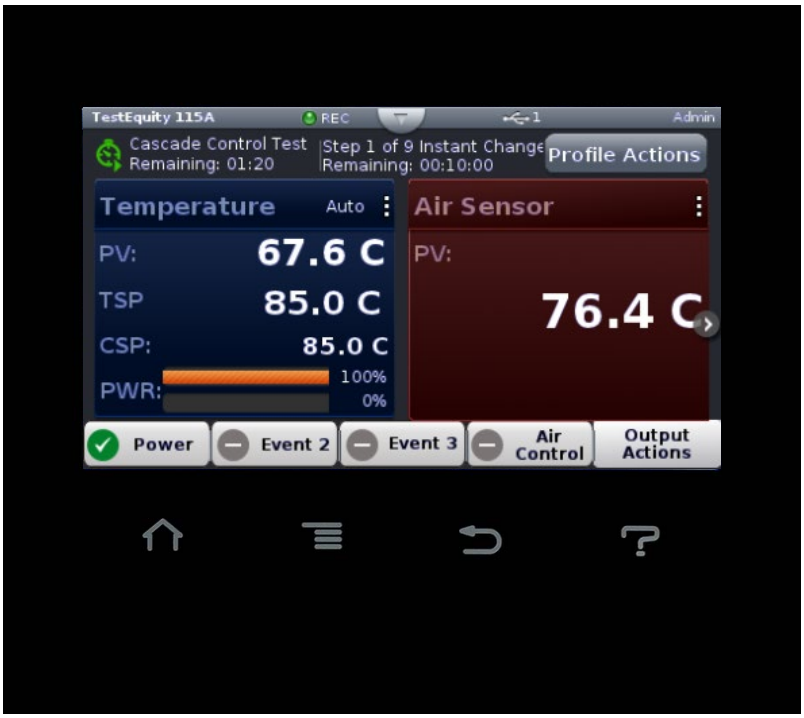
F4T Touch Screen Controller
Cascade Control Addendum

Revision 4.05 and higher Firmware



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Chapter 1 – Safety Instructions

Introduction

Follow all CAUTION notices to prevent damage to the chamber or your test sample. Failure to follow all CAUTION notices may void your warranty. CAUTION may also indicate a potentially hazardous situation which, if not avoided, may result in minor or moderate personal injury.

The safety alert symbol ⚠ precedes a general CAUTION statement.

Safety Notices

⚠ **CAUTION:** The Watlow F4T Manuals are written by the manufacturer, Watlow, for a wide variety of applications and configurations. Not all features or functions are applicable. Only the capabilities of model F4T1L2EAA2D7030 are applicable.

⚠ **CAUTION:** The Series F4T "Alarm" functions are NOT used in the chamber's safety system. TestEquity does NOT recommend using the Series F4 alarm function as the main protection device. The independent EZ-Zone Limit Controller functions as the main protection device.

⚠ **CAUTION:** When using Part Temperature Control, the Part Thermocouple must always be attached to the device under test (DUT). Failure to do this will result in erratic temperature control. If you do not want to attach the thermocouple to the DUT, then select "Air Control" on the F4T.

⚠ **CAUTION:** When using Part Temperature Control, the Part Thermocouple must never be placed outside the chamber. Failure to do this will result a thermal runaway, up to the limits set on the Limit Controller.

⚠ **CAUTION:** The Series F4T Temperature Controller has been properly configured by TestEquity to match the chamber's system requirements and to perform optimally over a wide range of operating conditions. Improper modifications to these setup values can result in erratic performance and unreliable operation. Setup examples in the Watlow Series F4T Manuals are NOT applicable to this chamber. Do not attempt to modify the setup values, unless you thoroughly understand what you are doing. If there is any doubt, please call TestEquity before proceeding.

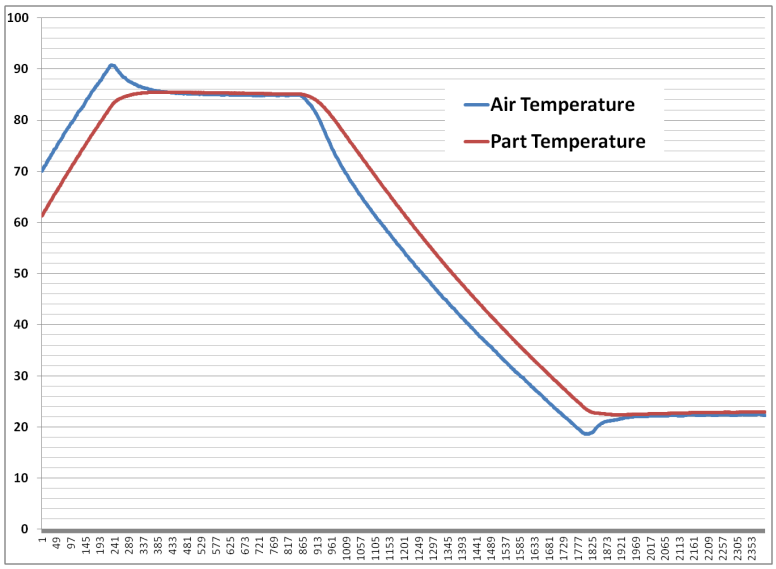
⚠ **CAUTION:** Configuration files are unique to each particular model chamber and must NEVER be transferred to a different model chamber.

⚠ **CAUTION:** NEVER select "Factory" in the "Restore Settings From" prompt in the Device Details menu in Composer Software. This will erase all controller configuration settings. The chamber will not work if you do this.

Chapter 2 – Using Cascade Control

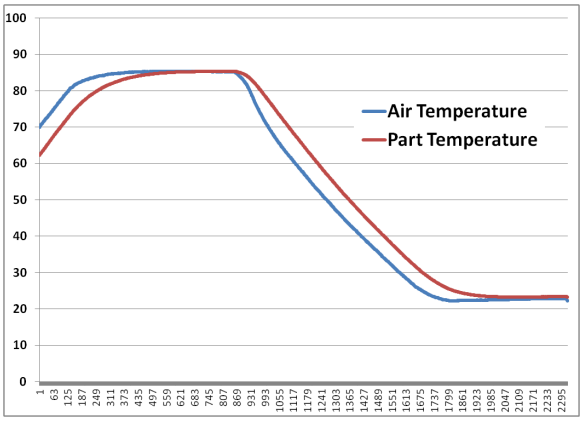
Overview

Cascade Control is the technical name for a multi-loop control system where the air temperature set point (Inner Loop) is determined by deviation of the part temperature (Outer Loop) from its set point. The graph shown here represents Air Temperature vs. Part Temperature when Cascade Control is used. The Air Temperature is allowed to overshoot or under shoot as required in order to achieve the desired Part Temperature while minimizing lag time.

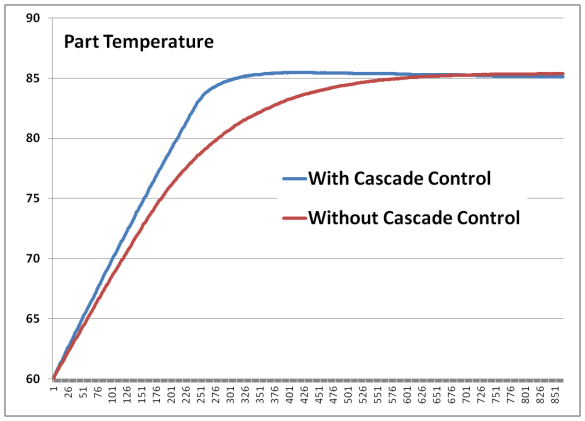


The controller is configured at the factory to allow the Air Temperature to deviate no more than +15°C or –15°C from the Part Temperature set point. This means if the set point is 85°C, the Air Temperature could go as high as 100°C if the Part Temperature lagged sufficiently during a heat up condition. In the example shown here, the Air Temperature went as high as 90.7°C when the Product Temperature achieved 83.0°C. Conversely, the Air Temperature went as low as 18.6°C when the Product Temperature achieved 23.4°C in order to reach a 23.0°C set point. In both instances, The Air Temperature then began to approach the Part Temperature as the part began to stabilize, until the two temperatures were ultimately nearly identical.

Without Cascade Control the Part Temperature will take longer to stabilize due to its thermal mass as shown in the graphs below.



Air Temperature vs. Part Temperature without Cascade Control

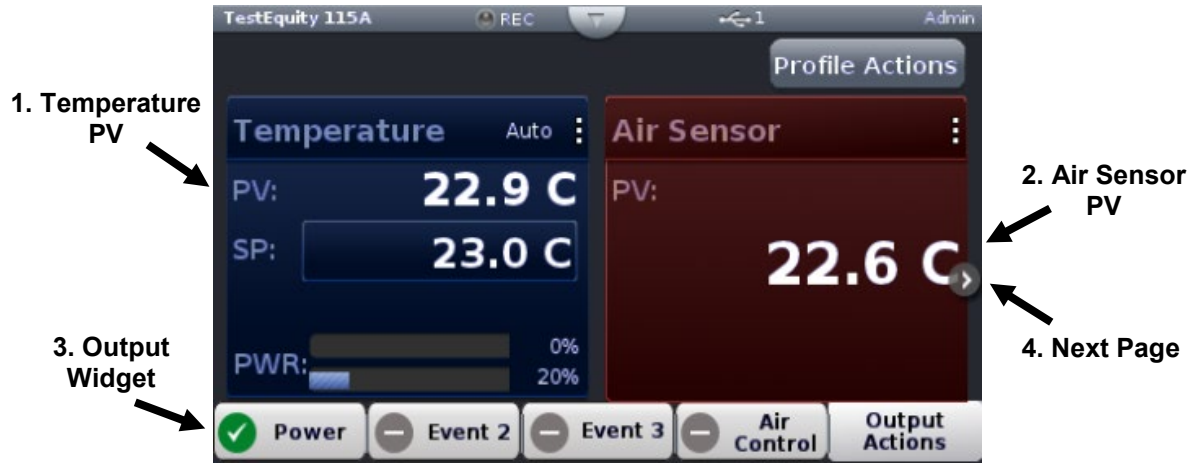


Part Temperature's approach to set point with and without Cascade Control

Navigating and Understanding the User Interface

Home Screen – No Profile Running

After powering up the controller a white screen will appear first while initializing. Once the startup process is complete the Home Screen will be presented as shown below. The image below shows the Home screen for a TestEquity Temperature Chamber with Cascade Control while it is NOT running a profile.



① **Temperature PV (Process Value):** The Temperature page displays the actual Part Temperature for PV. This is the Outer Loop.

② **Air Sensor PV (Process Value):** The Air Sensor page indicates the actual Air Temperature for PV. This is the Inner Loop.

③ **Output Widget Bar:** Function keys or output status (ON/OFF). The control mode can be easily changed from Part Temperature Control or Air Control by pressing the Air Control key. The default condition is shown above, with the controller operating in Part Temperature Control mode (no green check mark in the Air Control box). See page 9 for more information.

④ **Next Page:** The Home screen has been setup to display multiple pages (loops). The left and right arrows on each side of the home screen provide navigation from one to the other. Each of the subsequent two pages has been configured by TestEquity to be a full-screen view of just the Temperature page or the Air Sensor page respectively.

Please refer to the F4T Touch Screen Controller User's Guide for further details on how to navigate and use the F4T Controller.

Part Control vs. Air Temperature Control

The control mode can be easily changed from Part Temperature Control or Air Control by pressing the **Air Control** button. The default condition is shown below, with the controller operating in Part Temperature Control mode (no green check mark in the **Air Control** box). Air Control will always be OFF any time the power is recycled.

Part Control Mode

When configured for Part Control (**Air Control** button has no green check mark), the F4T will attempt to control the temperature at the Part Sensor. In this mode, the Part Sensor must always be attached to your test sample. Failure to do this will result in erratic temperature control.

The Air Sensor screen will always indicate chamber's Air Temperature. This will usually be different from the Part Temperature, especially during temperature transitions. The Air Temperature will tend to approach the Part Temperature as the part begins to stabilize. The two temperatures may never be the same, especially with a heavy test sample or an energized test sample.

The F4T is configured at the factory to allow the Air Temperature to deviate no more than +15°C or –15°C from the Part Temperature set point. This means if the set point is 85°C, the Air Temperature could go as high as 100°C if the Part Temperature lagged sufficiently during a heat up condition, or as low as –55°C if the set point is –40°C.

Part Control Mode During a Profile

Part Control mode has an impact on these profile parameters:

Guaranteed Soak Deviation/Guaranteed Soak Values: The amount by which the actual part temperature is allowed to differ from the set point for steps with Guaranteed Soak Enable set to **On**. In such steps when the actual part temperature differs from the set point by more than this value, the step timer stops running until the actual part temperature returns to within the band defined by the set point plus or minus this value. Each profile can have its own set of Guaranteed Soak values.

Wait For Process: Holds the profile until the part temperature reaches the specified value.

Air Control Mode

When configured for Air Control (**Air Control** button has a green check mark), the F4T will attempt to control the temperature at the Air Sensor, shown at the PV (Process Value) in the Air Sensor screen. This is how a chamber without cascade control ordinarily works. In this mode, the Part Sensor does not have to be attached to anything.

If you press the arrow on the right side of the display you will get a screen that displays the Air Sensor and Part Sensor. You can use this screen to monitor the Part Sensor even if you are in Air Control Mode. Pressing the arrow on the left side of this screen will return you to the Home Screen.

In Air Control Mode, the PV (Process Value) in the Temperature screen is the Air Temperature.

Air Control will always be OFF any time the power is recycled.

Air Control Mode During a Profile

Part Control mode has an impact on the following profile parameters:

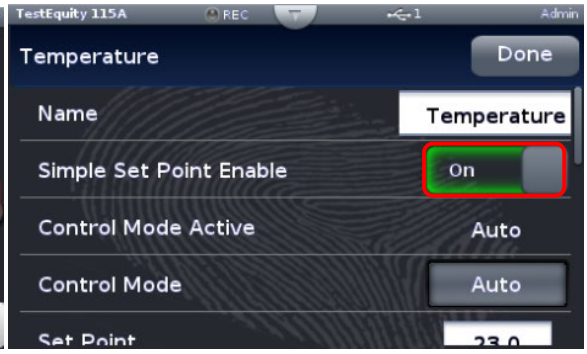
Guaranteed Soak Deviation/Guaranteed Soak Values: The amount by which the actual air temperature is allowed to differ from the set point for steps with Guaranteed Soak Enable set to **On**. In such steps when the actual air temperature differs from the set point by more than this value, the step timer stops running until the actual air temperature returns to within the band defined by the set point plus or minus this value. Each profile can have its own set of Guaranteed Soak values.

Wait For Process: Holds the profile until the air temperature reaches the specified value.

Simple Set Point Enable

This function is similar to turning Air Control ON. If you leave Air Control OFF and turn Simple Set Point Enable ON, the F4T will attempt to control the temperature at the Air Sensor. However, the Guaranteed Soak and Wait For Process will be controlled by the Part Sensor.

This function is located in the Temperature Loop Operational Parameter screen. Pressing the vertical ellipsis or anywhere within the outlined box shown below will provide access to the Loop Operational Parameter screen.



Data Logging

Logged Parameters

You can select the parameters which get logged. TestEquity has pre-configured the controller to log the Set Point, Inner Process Value (air temperature sensor), and Outer Process Value (part temperature sensor).

More Information

See the main F4T manual for more information about Data Logging.

Chapter 3 – Communications

Ethernet Parameters

This section describes how to configure the Ethernet Communications settings in the F4T controller.

Changing Ethernet Parameters

1. Press the **Menu**, **Settings** and **Network** buttons, in that order.
2. Under **Communications Channels** press **Ethernet**.
3. Change the desired settings.
4. Recycle the power to put the new settings into effect.

Ethernet Parameters and Settings

The bracketed bold settings below represent the defaults as delivered from the factory:

- **IP Address Mode**: [DHCP], Fixed
  - DHCP, Dynamic Host Configuration Protocol, allows for dynamic distribution of network settings by a DHCP server.
  - Fixed, also referred to as a static IP address, is configured manually for a specified network.
- **Actual IP Address**: [192.168.0.222]
- **Actual IP Subnet**: [255.255.255.0]
  - Subnet, a method used to logically divide and isolate networks.
- **Actual IP Gateway**: [0.0.0.0]
  - Gateway, is a device used on the network to route messages with IP addresses that do not exist on the local network.
- **MAC Address**: xx:xx:xx:xx:xx:xx (Will be different and unique for each controller)
  - MAC address, is a manufacturer supplied address for the network interface card.
- **Display Units**: °F, °C [configured by TestEquity for °C]
- **Modbus® TCP Enable**: [Yes], No
  - Modbus is an industrially hardened field bus protocol used for communications from the controller to other devices on the network.
- **Modbus Word Order**: [Low High], High Low
  - Modbus allows a user to select the word order of two 16-bit words in floating point values.
- **Data Map**: [1], 2, 3
  - Data Map, the user can switch Modbus registers from the comprehensive listing of F4T registers.
  - Map 1 = F4T registers (default)
  - Map 2 = **Not applicable to controllers with Cascade Control (Part Temperature Control).**
  - Map 3 = For controllers with Cascade Control (Part Temperature Control). Limited set of F4 compatible registers (for compatibility with software written for the F4).

RS-232 Parameters

This section describes how to configure the RS-232 Modbus Communications settings in the F4T controller.

Changing RS-232 Parameters

1. Press the **Menu**, **Settings** and **Network** buttons, in that order.
2. Under **Communications Channels** press **Modbus**.
3. Change desired settings.
4. Recycle the power to put the new settings into effect.

RS-232 Parameters and Settings

The bracketed bold settings below represent the defaults as delivered from the factory:

- **Modbus Address**: [1]
  - Each device is given a unique address. Up to 247 devices can be on the same data link.
- **Baud Rate**: [9600]
  - Must match the baud rate of your computer's serial port and software.
- **Parity**: [None]
  - Must match the parity of your computer's serial port and software.
- **Display Units**: °F, °C [configured by TestEquity for °C]
- **Modbus Word Order**: [Low High], High Low
  - Modbus allows a user to select the word order of two 16-bit words in floating point values.
- **Data Map**: [1], 2, 3
  - Data Map, the user can switch Modbus registers from the comprehensive listing of F4T registers.
  - Map 1 = F4T registers (default)
  - Map 2 = **Not applicable to controllers with Cascade Control (Part Temperature Control)**
  - Map 3 = For controllers with Cascade Control. Limited set of F4 compatible registers (for compatibility with software written for the F4).

Common Modbus Registers

F4T Mode

The following registers are applicable in the F4T Mode (Data Map 1). These are the most common registers that would need to be used in an automation environment. Some of these registers are different from F4T controllers that do not have Cascade Control.

Some F4T parameters are contained within 32 bits (IEEE Float). Notice that only one (low order) of the two registers is listed. By default, the low order word contains the two low bytes of the 32-bit parameter. As an example, in the table below see Actual Air Temperature. Note that it lists register 4182. Because this parameter is a float, it is represented by registers 4182 (low order bytes) and 4183 (high order bytes).

Parameter Name	Register	Data Type and Access (Read or Write)	
Temperature Set Point	4042	IEEE Float RW	
Closed Loop Set Point*	4190	IEEE Float R	
Target Set Point**	16602	IEEE Float R	
Actual Part Temperature (PV)	4180	IEEE Float R	
Actual Air Temperature (PV)	4182	IEEE Float R	
Simple Set Point (Disables Cascade Control)	4200	16-bit RW	Off = 62, On = 63
Event 1	16594	16-bit RW	
Event 2	16596	16-bit RW	
Event 3	16598	16-bit RW	
Event 4	16600	16-bit RW	
Event 5	16822	16-bit RW	
Event 6	16824	16-bit RW	
Event 7	16826	16-bit RW	
Events 1-7	Off = 62, On = 63		

* Instantaneous Set Point during a ramp or profile
** Set Point target during a ramp or profile

Manual Ramp Parameters (Ramp to Set Point without a profile)
The manual ramp parameters are all 16-bit RW.

Ramp Action	4054
	Off = 62
	Startup = 88
	Set Point = 85
	Both = 13
Ramp Scale	2956
	°/Minutes = 57
	°/Hours = 39
Ramp Rate	4058

Profile Parameters - All 16-bit R or RW

Parameter Name	**Register**	**Range**
Start Profile	16558 (RW)	1 to 40
Start Step	16560 RW)	1 to max step # in profile
Profile Action Request	16562 (RW)	None = 61 Start = 1782 Calendar Start = 1783
Profile Action Request	16564 (RW)	None = 61 Resume = 147
Profile Action Request	16566 (RW)	None = 61 Pause = 146 Terminate = 148
Profile State	16568 (R)	Off = 62 Running = 149 Pause = 146 Not Started = 251 Completed Normal = 252 Terminated = 253 Calendar Start = 1783
Current Profile	16588 (R)	0 to 40
Current Step	16590 (R)	0 to 50
Step Type	16592 (R)	Soak = 87 Wait For = 1542 Instant Change = 1927 Ramp Time = 1928 Ramp Rate = 81 End = 27

F4 Compatibility Mode (Data Map 3)

The following common registers are available in the F4 Compatibility Mode (Data Map 3). This will allow you to use software that was written for the original F4 Controller. Only a limited set of parameters are available in this compatibility mode, but it should be sufficient for most applications. This register list is only valid for Firmware Revision 03:06:0011, released May 5, 2017 and higher. Older firmware revisions do not have an F4 Compatibility Mode for controllers with Cascade Control.

Parameter Name	Register	Data Type and Access (Read or Write)	
Temperature Set Point	300	16-bit Signed RW	
Air Temperature	100	16-bit Signed R	
Air Temp Input Precision	606	16-bit Signed RW	0 (0), 0.0 (1), 0.00 (2), 0.000 (3)
Part Temperature	108	16-bit Signed RW	
Part Temp Input Precision	626	16-bit Signed RW	0 (0), 0.0 (1), 0.00 (2), 0.000 (3)
°C or °F	901	16-bit Signed RW	°C (1), °F (0)
Air Temp Input Error	101	16-bit R	No Error = 0, Error = 1
Part Temp Input Error	109	16-bit R	No Error = 0, Error = 1
Event 1	2000	16-bit RW	Off = 0, On = 1
Event 2	2010	16-bit RW	Off = 0, On = 1
Event 3	2020	16-bit RW	Off = 0, On = 1
Event 4	2030	16-bit RW	Off = 0, On = 1
Event 5	2040	16-bit RW	Off = 0, On = 1
Event 6	2050	16-bit RW	Off = 0, On = 1
Event 7	2060	16-bit RW	Off = 0, On = 1
Profile Action:			
Resume Profile	1209	16-bit R	
Hold Profile	1210	16-bit W	
Terminate Profile	1217	16-bit W	
Profile Start:			
Profile Start File #	4000	16-bit W	
Profile Start Step #	4001	16-bit W	
Profile Action Start:	4002	16-bit W	Create (1) Insert Step (2) Delete Current profile (3) Delete Step (4) Start Profile (5) Delete all Profiles (256)

SCPI Programming Mode

SCPI commands are ASCII text strings with a wide array of defined SCPI commands, all of which are not included in this implementation. The SCPI protocol is only available over Ethernet port 5025. The only available SCPI commands for the F4T are shown below. This complete list is only valid for Firmware Revision 04:05:0007, released May 23, 2019 and higher. Older firmware versions do not include all these commands. **This list only applies to the native F4T Ethernet interface, NOT the external Serial Modbus-to-Ethernet Converter.**

Description	SCPI Command	SCPI Values	R/W	Comments
Commands for Process Units				
Query Comm. Temperature units	:UNIT:TEMPERATURE?	C|F	R	Ethernet units
Set Comm. Temperature units to F	:UNIT:TEMPERATURE F		W	Ethernet units to Fahrenheit
Set Comm. Temperature units to C	:UNIT:TEMPERATURE C		W	Ethernet units to Celsius
Query Display Temperature units	:UNIT:TEMPERATURE:DISPLAY?	C|F	R	Front panel display units
Set Display Temperature units to F	:UNIT:TEMPERATURE:DISPLAY F		W	Front panel display units to Fahrenheit
Set Display Temperature units to C	:UNIT:TEMPERATURE:DISPLAY C		W	Front panel display units to Celsius
This list is ONLY for versions WITH Cascade Control (Part Temperature Control). NOT for standard Temperature or Temperature/Humidity chambers.				
Read Set Point (Cascade)	:SOURce:CAScade1:SPOint?	*<floating point value>*	R	User set point
Write Set Point (Cascade)	:SOURce:CAScade1:SPOint *<value>*		W	User set point
Read Outer Loop PV (Cascade)	:SOURce:CAScade1:OUTer:PVALue?	*<floating point value>*	R	Source Value A
Query Outer Loop Input Error (Cascade)	:SOURce:CAScade1:OUTer:ERRor?	ERROR|NONE	R	Input error status
Read Inner Loop PV (Cascade)	:SOURce:CAScade1:INNer:PVALue?	*<floating point value>*	R	Source Value B
Query Outer Loop Input Error (Cascade)	:SOURce:CAScade1:INNer:ERRor?	ERROR|NONE	R	Input error status
Read Outer Loop Set Point (Cascade)	:SOURce:CAScade1:OUTer:SPOint?	*<floating point value>*	R	
Read Inner Loop Set Point (Cascade)	:SOURce:CAScade1:INNer:SPOint?	*<floating point value>*	R	
Query cascade loop function	:SOURce:CAScade1:FUNCtion?		R	
Set cascade loop function to PROCESS	:SOURce:CAScade1:FUNCtion PROCESS		W	Not recommended, do not enter this
Set cascade loop function to DEVIATION	:SOURce:CAScade1:FUNCtion DEVIATION		W	
Query cascade range low	:SOURce:CAScade1:RANGe:LOW?	*<floating point value>*	R	
Set cascade range low	:SOURce:CAScade1:RANGe:LOW *<value>*	*<floating point value>*	W	
Query cascade range high	:SOURce:CAScade1:RANGe:HIGH?	*<floating point value>*	R	
Set cascade range high	:SOURce:CAScade1:RANGe:HIGH *<value>*	*<floating point value>*	W	
Query cascade simple set point control	:SOURce:CAScade1#:SSPoint:CONTrol?		R	
Set cascade simple set point control OFF	:SOURce:CAScade1:SSPoint:CONTrol OFF		W	Turns OFF Cascade Control mode
Set cascade simple set point control ON	:SOURce:CAScade1:SSPoint:CONTrol ON		W	Turns ON Cascade Control mode
Commands for Manual Ramp Parameters (ramping without running a profile)				
Set ramping off	:SOURce:CLOop#:RACTion OFF		W	controls instantly to set point
Set ramping on startup	:SOURce:CLOop#:RACTion STArtup		W	ramps to set point on controller power on
Set ramping on set point change	:SOURce:CLOop#:RACTion SETPoint		W	ramps to set point on change of set point
Set ramping on both events	:SOURce:CLOop#:RACTion BOTH		W	ramps to set point on controller power on OR change of set point
Write ramp scale to minutes	:SOURce:CLOop#:RSCAle MINutes		W	ramp rate is per minute
Write ramp scale to hours	:SOURce:CLOop#:RSCAle HOURS		W	ramp rate is per hour
Read ramp rate	:SOURce:CLOop#:RRATe?	*<floating point value>*	R	rate that controller ramps to set point
Read ramp time	:SOURce:CLOop#:RTIMe?	*<floating point value>*	R	time that controller ramps to set point
Write ramp rate	:SOURce:CLOop#:RRATe *<value>*		W	rate that controller ramps to set point
Read ramp time	:SOURce:CLOop#:RTIMe *<value>*		W	rate that controller ramps to set point
Commands for Event Outputs				
Query output name	:OUTPut#:NAME?			# = outputs 1-7
Set event output ON	:OUTPut#:STATe ON		W	# = outputs 1-7
Set event output OFF	:OUTPUT#:STATE OFF		W	# = outputs 1-7
Query event output state	:OUTPut#:STATe?	OFF|ON	R	# = outputs 1-7

Continued on next page…

SCPI commands (continued)

Description	SCPI Command	SCPI Values	R/W	Comments
Commands to Support Profiles				
Select a profile	:PROGram:SELected:NUMBer <*value*>	1-40	W	Set the current profile number
Query the current profile name	:PROGram:SELected:NAME?	<*string value*>	R	
Set the current profile step	:PROGram:SELected:STEP <*value*>	1-50	W	
Start the current profile	:PROGram:SELected:STATe STArt		W	
Terminate the current profile	:PROGram:SELected:STATe STOP		W	
Pause the current profile	:PROGram:SELected:STATe PAUSe		W	
Resume the current profile	:PROGram:SELected:STATe RESume		W	
Query active profile number	:PROGram[:SELected]:NUMBer?		R	
Query profile state	:PROGram[:SELected]:STATe?		R	
Query current profile set point	:PROGram[:SELected]:SPOint#?		R	# = 1 for Temp or 2 for Humidity
Query current profile step number	:PROGram[:SELected]:STEP?		R	
Query current profile step type	:PROGram[:SELected]:STEP:TYPE?		R	
Query current profile step time elapsed	:PROGram[:SELected]:STEP:TIME:ELApsed?		R	
Query current profile step time remain	:PROGram[:SELected]:STEP:TIME:REMain?		R	
Identification	*IDN?	"Watlow Electric",<*string value*>,<*integer value*>,<*string value*>		
	(manufacturer)		R	
	(model number)			
	(serial number)			
	(firmware level)			

GPIB and Ethernet Modbus Interface Converters (optional)

Serial Modbus-to-GPIB Converter (Options 1052 and 0003)

Your chamber may have been ordered with a GPIB Interface option. GPIB communications is achieved through an ICS Electronics 4899A (external, TestEquity Option 1052) or 4809A (internal, TestEquity Option 0003) GPIB-to-Modbus Interface Converter. The ICS 4899A converts GPIB commands to serial Modbus commands that are transmitted over RS-232. The GPIB Converter also takes care of calculating block checksums that are required for communications to and from the F4T Controller. For more details, see the documentation that came with the GPIB interface option.

NOTE: Composer software will only work with the native F4T Ethernet interface and Data Map 1, not the Serial Modbus-to-GPIB Converter.

Serial Modbus-to-Ethernet Converter (Option 1056)

Your chamber may have been ordered with a Serial Modbus-to-Ethernet Interface option. GPIB communications is achieved through an ICS Electronics 9099 (TestEquity Option 1056). The programming syntax is the same as the GPIB Interface Converter mentioned above. For more details, see the documentation that came with the Ethernet interface option.

Why use the Ethernet Converter when the F4T Controller has an Ethernet Interface?
The native F4T Ethernet Interface uses the Modbus TCP protocol. The 1056 Ethernet Interface Converter converts the controller's RS-232 Modbus interface to Ethernet. The converter takes care of the Modbus packet formatting, so the command structure is simplified. The most compelling reason why you would want to use 1056 Ethernet Interface Converter instead of the F4T's native Ethernet interface is if you wanted to program using simple ASCII commands instead of Modbus packets.

NOTES:

Composer software will only work with the native F4T Ethernet interface and Data Map 1, not the TE-1056 Serial Modbus-to-Ethernet Converter.

The F4T's native Ethernet Interface accepts both Modbus and SCPI commands. You do not need the TE-1056 Serial Modbus-to-Ethernet Converter if you want to send SCPI commands directly to the F4T's native Ethernet Interface! F4T native SCPI commands will not work with the TE-1056 Serial Modbus-to-Ethernet Converter.

Programming Syntax for the F4T Controller

The following applies if the F4T serial interface is configured for Data Map 1. This only applies for programming through the GPIB or Ethernet Modbus converters.

The F4T Controller uses two consecutive register to control a value or to read back a process variable. The two registers hold an IEEE-754 32-bit floating point word. The registers are read and written to in the low word-upper word order. The RF? query reads a 32-bit floating point value from two sequential register in low word-upper word order. The RF? does not require the number of registers to read since it is fixed at two registers.

Some registers in the F4T Controller are 16-bit words.

Modbus Register Read / Write Commands

The RF command reads the num value in floating point format to two consecutive registers starting with the low word register. Use this to read 32-bit floating point registers.

RF? reg Read 32-bit floating point register command

The R command reads the numeric value in one register. Use this to read 16-bit registers.

R? reg, 1 Read 16-bit register command

The WF command writes the num value in floating point format to two consecutive registers starting with the low word register.

WF reg, data Write register command
Reg = Modbus register plus next consecutive register
Data = ASCII data written as a direct numerical value

Examples:

Write Temperature Set Point	WF 2782, value	
Read Chamber Temperature	RF? 27586	
Read Closed Loop Set Point	RF? 2810 (instantaneous temperature set point during a ramp or profile)	
Turn (Event 1) ON	W 16594, 63	Event 1 is “Power”
Turn (Event 1) OFF	W 16594, 62	

Manual Ramp Parameters (Ramp to Set Point without a profile)

Ramp Action (Temperature)	W 4054, ## (where ## is one of the four choices below) Off = 62 Startup = 88 Set Point = 85 Both = 13
Ramp Scale (Temp. °/Minutes)	W 2956, 57
Ramp Scale (Temp. °/Hours)	W 2956, 39
Ramp Rate (Temperature)	W 4058, value (0 to 99,999)

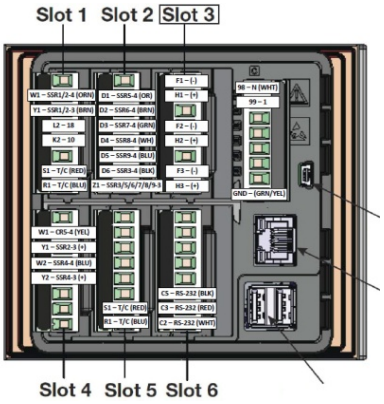
Chapter 4 – Retransmit Option TE-F4T-RETRANSMIT

Introduction

The Retransmit option provides three analog outputs which can be used to drive an analog recorder. This option deletes the Alarm Outputs.

Connections

Connections to the Retransmit terminals are on the back of the F4T controller. You will have to open the chamber's electrical system to access these terminals.

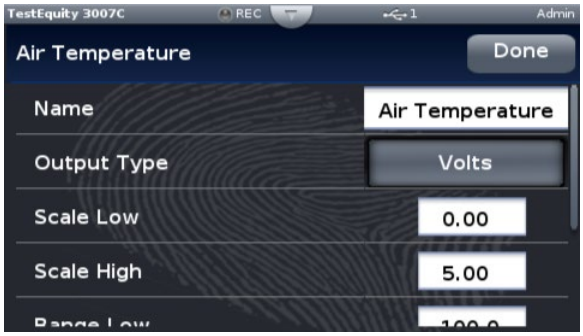


Air Temperature Retransmit
Slot 3, Terminals F1 (–), H1 (+)

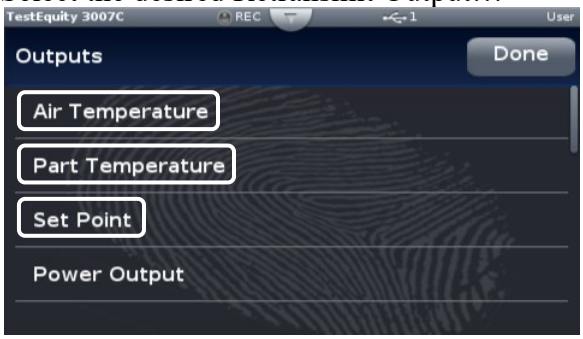
Part Temperature Retransmit
Slot 3, Terminals F2 (–), H2 (+)

Temperature Set Point Retransmit
Slot 3, Terminals F3 (–), H3 (+)

The scaling is set by TestEquity for 0 to 5VDC = –100°C to +200°C. The scaling can be changed in the Settings>Outputs menu. You must to be logged in as an "Admin" to change these settings. Please contact TestEquity for the "Admin" password in order to have access to these settings.



Select the desired Retransmit Output…



Scroll down to see all the settings…