Model 5820 Power Control

Precision Control For:

SpotIR®

StripIR®

LineIR®

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The **ControlIR** Model 5820 Power controller is a versatile, easy to use yet powerful controller that provides the following features:

- Touchscreen for intuitive, quick and informative operator interaction
- Phase Angle fired load signal
- Continuous or Timed output mode
- 0.1 to 999.9 second timer function
- Idle and Run output levels in timed mode
- Display of Watts, Amps and Voltage. Instantaneous and Peak during timed mode (optional)
- Display of Temperature. Instantaneous and Peak during timed mode (optional)
- Dual Output Channels (Optional)
- Remote (footswitch) start function
- Remote Interlock
- Closed Loop PID Control (Optional)

Interface

The operator interface is via a LCD Touchscreen controller and simple screen presses and touch keypad entries. The process status is shown on a screen with simple numeric value displays.

NOTE: The following section describes the screens and functions that are available; however all may not be applicable to your controller.

Access Screen

The screen shown at the right allows the user to enter a password to allow access to additional restricted screens. The defined password is listed on the last page of this document. This screen also lists the version number of the software in the controller and should be available when calling in for technical support.

This screen also shows the alarm status bits that are read from the power controller. If problems are detected refer to this screen and the MicroFusion power controller documentation.
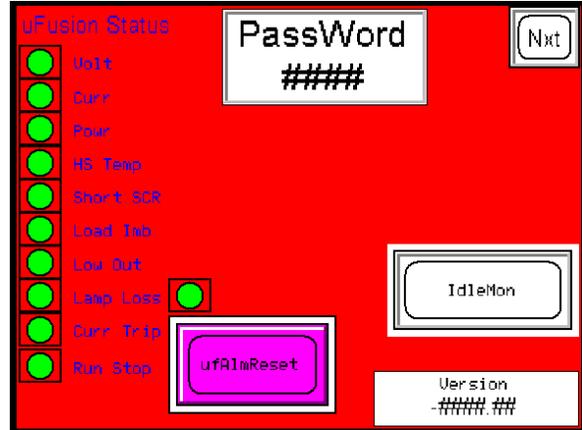
Status Screen

The screen shown at the right is the main operation screen for the basic controller. The following items are found on this display:

- **Output Level** – Displays the output level being applied to the connected load. This is in percent of voltage.
- **Time Left** – In timed mode, displays the amount of time remaining in the running cycle. In continuous mode this value will be 0.0 SEC
- **START** – Pressing the START button will apply power to the load. In continuous mode the power will be on until the button is pressed again, in timed mode the timer will be started and the power will revert to the Idle% when the timer completes
- **Recipe –** The name of the active recipe and the current executing step is displayed.
- **Watts, Amps, Volts –** Will display the current values while a cycle is running. These should be monitored during adjustment to allow matching of the output value between heaters.
- **NXT –** Moves to the next screen

PID/Temperature Option

The PID/Temperature option provides an addition thermocouple connection (K type by default, others available) and a closed loop PID temperature control loop integrated into the standard control package. The standard **Timer** operation is integrated into the PID loop and also available with this option.

PID Screen

The PID screen shown at the right is the main screen for the system that includes the PID/Temperature option. The following items are defined:

- **PV –** Process Variable is the measured temperature from a thermocouple or other device. If an over-range condition is detected on the input sensor a blinking dot will appear.
- **SP –** Set point is the desired temperature set by the operator.
- **OT –** Output % is the signal level being applied to the heater. This value is calculated by the PID loop when in Auto mode or entered by the operator in Manual mode.
- **A / M –** Auto or Manual mode selection/indicator. The loop will be placed in Auto mode whenever the Start button is pressed. If in TIMED mode the loop will return to the Manual mode and the Idle % value when the set time has elapsed. If in CONTINUOUS mode the loop will revert to manual mode and output OFF when the cycle is set to "not active" via the start button or the remote input switch. Note: PID must be enabled for this function to operate as described.
- **Recipe Name –** The defined name of the last selected recipe is shown.
- **Step# --** The segment number (1-4) of the running recipe. NOTE: Recipes are selected by pressing the F1-F4 keys when in idle mode.
- **Start button –** The Start button will start a timed cycle or enable the output in continuous mode. When running this will show **Active¸** pressing the button again will disable the continuous output or end a timed cycle. When the timer expires the output will switch to Manual mode and the output value will be set to the Idle value.
- **Time Left –** Displays the time remaining during a timed cycle, displays 0.0 for a continuous run.
- **Time/Temperature trend –** Displays an XY graph of the process temperature. The last 136 seconds of data is displayed.
- **Indicators –** The status of the remote start input is shown on the top, the status of the remote interlock input is shown below. A filled circle shows "ON" while a clear indiactor will display open or not connected.
- **Watts, Amps, Volts –** Will display the current values while a cycle is running. These should be monitored during adjustment to allow matching of the output value between heaters.
- **NXT –** Moves to the next screen
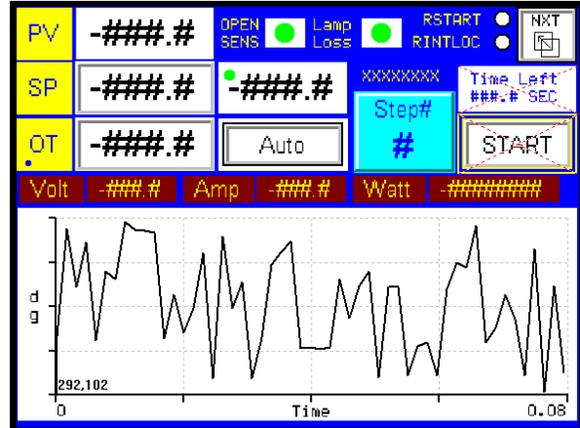
NOTE: If mode is CONTINUOUS the Start/Time objects are not displayed.

Recipe Definition

This screen is used to define the recipe values that are used during a cycle. There are four recipes available, each with up to 4 segments of time. Depending on the function of your controller the recipe can be used to set either the OUT% level or the PID setpoint. The following parameters may be defined:

- **Recipe Name** Allows the naming of the recipe to correspond to the process.
- **Idle Level –** Defines the Out% or Setpoint setting when the recipe completes.
- **StepX Time –** Defines the time period for the selected segment.
- **StepX Level –** Define the Out% Level or PID Setpoint value for the segment
- **Dev Limit –** Defines the Deviation from Setpoint limit that if exceeded will cause the executing segment to hold or stop the timer.
- **Recipe Type –** Toggles between Out% or Setpoint.
- **Set Recipe –** Defines the F1-F4 key that is used to select a recipe. Pressing the defined key will implement changes made to a recipe or select a new recipe.
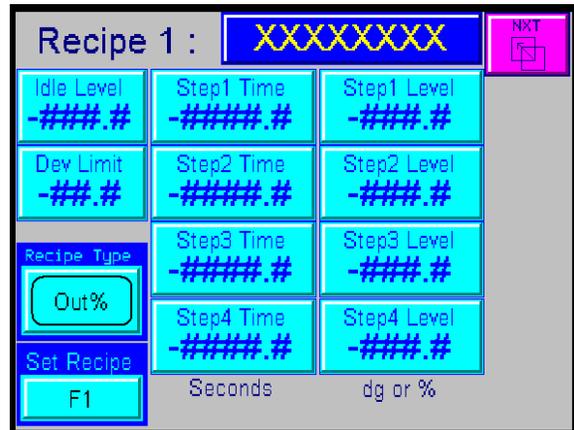
PID Tune Screen

The PID Tune screen shown below is similar to the PID screen defined above with the addition of the following items:

The PID loop calculates an output based on the following equation:

**CVout = (Kp * Error) + (Ki * Error * dt) + (Kd * Derivative)**

Where:

- **Gain (Kp) –** Sets the proportional gain value in %, ranges from 0.0 to 327.67%.
- **Reset (Ki)** -- Entered as a number of repeats per second -- effectively the integration rate. Ranges from 0.0 to 32.767 repeats per second.
- **Rate (Kd)** -- Entered as a time with a resolution of 10 mS. Ranges from 0.0 to 327.67 seconds.
- **CVOut** -- The resulting Output % being applied to the heater.
- **A-Tune** – This button will enable an Auto-Tune session, the switch will change to "**Tuning!!".** The auto tuning function performs an experiment on the process to be controlled and uses the results to calculate the PID coefficients. While auto tuning the output is moved back and forth between the 0% and 100%. The time for the process to move from a percentage (based on noise filtering) above and below the setpoint is recorded along with overshoot and undershoots readings. Once this experiment is complete, the data collected is used to calculate the new PID coefficients. When the session is finished the word **Done!** will be displayed and the new values will be used. Press the switch again to revert to normal operation.
- **Cycle Time** – Time the output will be in RUN/Auto mode, defined in seconds.**
- **Idle Level** – Defines the output level when in TIMED mode and not running a cycle. The OT will be set to this value when the timer has expired.**
- **Run Level** – Defines the output level when a cycle is active. In Timed mode this will store the previous Auto Mode OT% value.**
- **Watts, Amps, Volts –** Will display the current values while a cycle is running. These should be monitored during adjustment to allow matching of the output value between heaters.
- **NXT – Moves to the next screen**
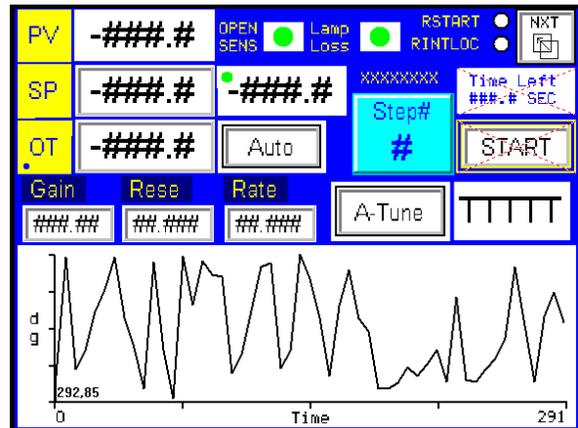
**Note: These values are not shown if NOT in TIMED mode

Setup Screen

The setup screen shown below is used to define the mode of the controller and define analog input conversion parameters. The settings below should not be made without consulting the factory and prior documentation of the existing values.
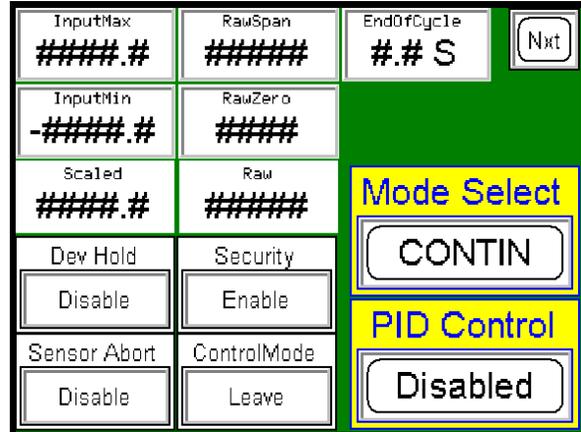
- **Input Max** – Defines the maximum engineering value of the input sensor. Default value is 1000 dg.
- **Input Min** - Defines the minimum engineering value of the input sensor. Default value is 0 dg.
- **Scaled** – Displays the converted input value.
- **RawSpan** – Defines the raw counts when at the maximum engineering value. This value typically does not need to be altered.
- **RawZero** – Defines the raw counts when at the minimum engineering value. This value typically does not need to be altered.
- **Raw** – Displays the raw counts of the analog input value.
- **Mode Select** – Is used to switch between CONTINUOUS mode or TIMED mode.
- **PID CONTROL** – This button is used to ENABLE or DISABLE the closed loop PID Control feature. If DISabled the output will be fixed at the Off, Idle or Run levels (depending on the mode). If ENAbled the output will be automatically controlled by the PID calculations when in the Active mode. (optional)
- **Dev Hold** – Used to enable or disable the recipe HOLD if the deviation from Setpoint limit is exceeded.
- **Sensor Abort** – Used to enable or disable the abort of a recipe of the temperature sensor goes out of range. When this occurs a error indication will be displayed.
- **Control Mode –** Allows the system to automatically switch the PID loop from Manual to Auto when a recipe is started and back to Manul at the recipe end. Choose between Toggle or Leave.
- **Security –** Allows the enable/disable of the screen password security. Useful during commissioning when changing from screen frequently is required. Also useful when enabled to keep operators from changing secured parameters.

Customer Connections

The customer connections for the load are made at a terminal block inside the enclosure. Refer to the figure below and the connection table for load connections.

** Always Disconnect Power before opening the enclosure and making connections **
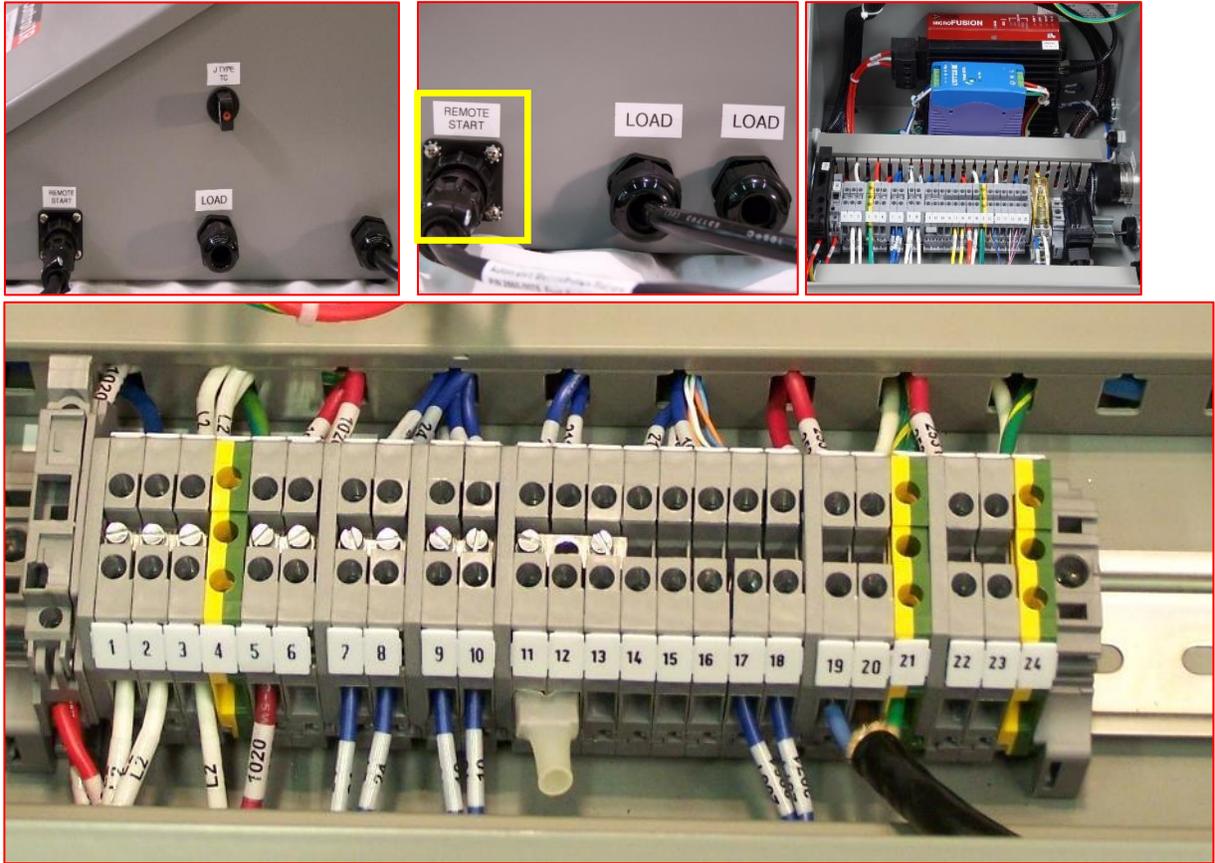
Function	Terminal	Description
Remote Interlock	11,12	Remote Enable/Disable, default is enabled
Load 1	19,20,21	L1, L2, GND
Load 2	22,23,24	L1, L2, GND
		(Both heaters have the same output)

Remote Start Connection

The remote start connection is supplied with a connector and pins. Connect pins 3, 4 are the switch connections, pin 2 is ground. (24 VDC is source on pin 4, pin 3 is switch return to controller)

Specifications

Line Voltage	120 VAC	208/240		
Current Rating	15 amps	20/25		
Load Connections	Terminal Blocks			
Feedback Type				
Dimensions	12" x 12" x 8" height	12" x 12" x 8" height		
Line cord length	12 feet	12 feet		
Weight	20lb	20lb		
Ship weight	24 lb	24 lb		

Bench Top power control	Model 5420	Model 5620	Model 5820
Single phase 120/240/480 volts	x	x	x
15 amps	x		X
20 amps		X	X
35 amps		X	X
55 amps		x	
Timer			
0-20 seconds - potentiometer		x	
0-50 sec/min/ hours (dial)	X		
0-999.9 seconds (digital)			x
Operator output control			
1 turn potentiometer	X	x	
Digital 0.0 to 100.0 percent			X
Idle adjustment	N/A	X	X
Remote control			
4/20ma	X	Optional	
0-10VDC, 0-20MA, 4/20ma	N/A		Optional
Foot switch	N/A	Optional	Optional
Heaters connectors			
grip seal	X	X	X
twistlock			optional
Temperature control (PID)	N/A	N/A	Optional
Two independent heater control	N/A	N/A	Optional
Volt, Amp, watt (metering display)	N/A	N/A	Optional

"X" = standard

"N/A" = not available

Password –

The top secret password for PID Tuning screen access is 9009. The password to access factory function setup is 9559.

NOTE: If switching to TIMED only mode (from PID or TIMED PID) press the F4 key to acess the timer only screen set.