

1 Platinum Controller Temperature Controller

Although the platinum controller has a rich set of options, the overall process to get a controller ‘up and running’ breaks down into 4 easy steps.

Figure 1 illustrates the steps required to configure a simple temperature controller – in this case a ‘K’ type Thermocouple connected to a low power incandescent light bulb. As power is applied to the light bulb it heats up, which is fed back to the controller thru the thermocouple.

The use of a low voltage automotive dash lamp ensures that no hazardous voltages are involved and minimizes the risk of damage during the initial setup. The DCPulse Output (type 4) is capable of providing 12 Vdc @ 20 mA and will directly drive a 1 watt miniature automotive bulb (Sylvania #73). The exact bulb type is not critical. For this example a CN8Pt-145 controller has been used, that has a DCPulse output as output ‘two’. The exact position is assigned during configuration and is not critical.

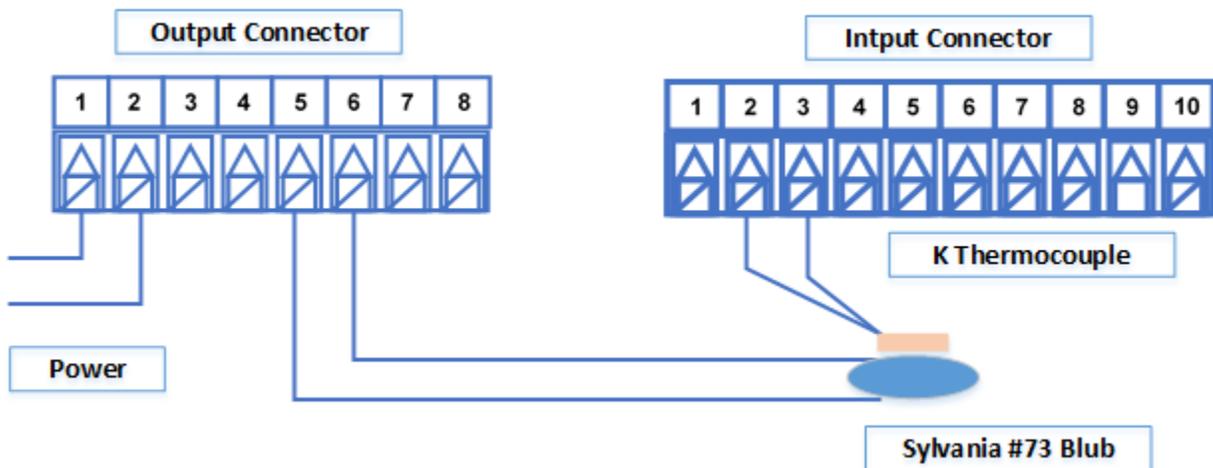


Figure 1. Configuring a simple temperature controller.

Four Basic Setup Steps

As with any control unit, there are 4 basic steps:

- 1) Defining the type of input (sensor),
- 2) Defining the type of control (output),
- 3) Defining the control loop parameters and
- 4) Defining the operating temperature (setpoint).

With Platinum controllers the user has the choice of programming the controller using the front panel push buttons or using a USB linked computer with the Platinum Configurator software which may be downloaded at no charge.

Before starting the programming or connecting to the Configurator Software the unit should be returned to the factory ‘default’ conditions thru the front panel buttons.

Note **NOTE:** RESETTING THE FACTORY DEFAULTS WHEN THE CONFIGURATOR SOFTWARE IS RUNNING WILL CAUSE THE PLATINUM TO RECONFIGURE THE USB CONNECTION AND THE CONFIGURATOR SOFTWARE WILL STOP FUNCTIONING.

Front Panel: INIT/F.DFT

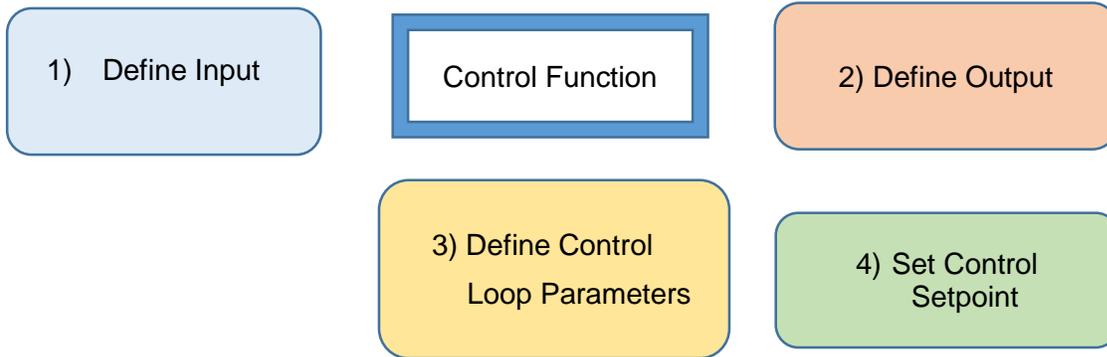


Figure 2. 4 Step Configuration

1.1 Defining the Input

The Platinum Controller input options are selected thru a universal input selection circuit – no jumpers or special wiring is required. The Controller offers Thermocouple, Thermistor, RTD and Process (voltage/current) inputs. In our example we will select the K type Thermocouple.

Front Panel: INIT/INPU/T.C./K

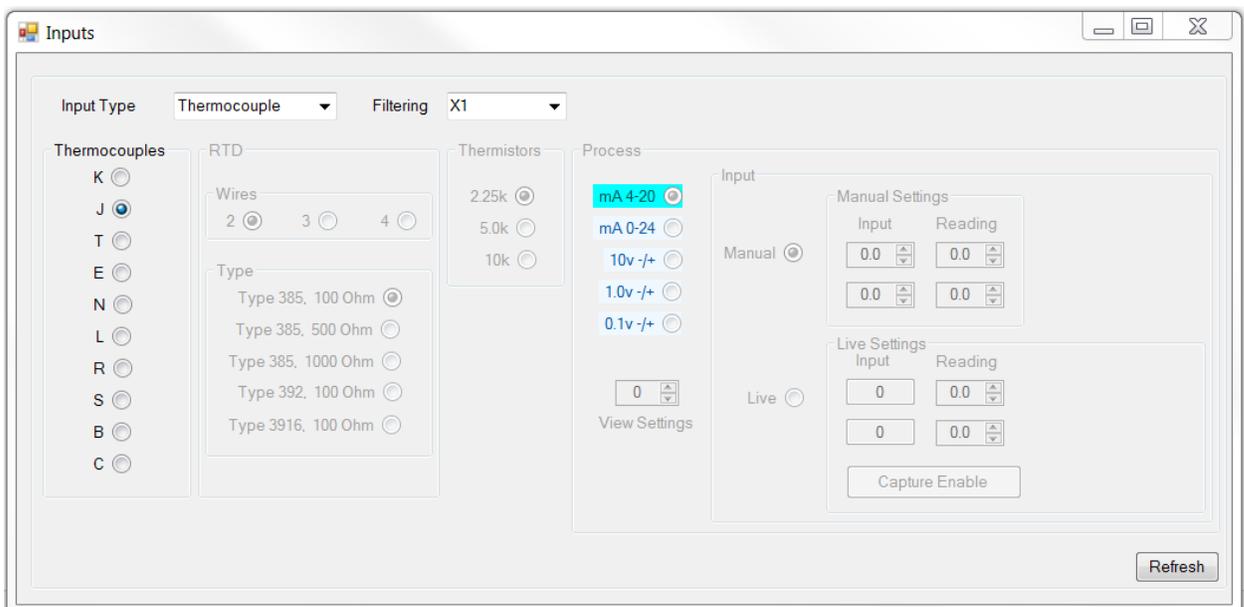


Figure 3. Configurator Software: (Click on the Input Function Block).

1.2 Defining the Output

The Platinum Controller will support up to 3 outputs and offers several different output types. Each output may be individually assigned to alarms, PID, ON/OFF, auxiliary control or retransmission functions. For this example, it is assumed that output #2 is a DCPulse output and will be assigned it to the PID control function.

The PID control function provides a signal that sets the output from 0 to 100% of available power. This is done by varying the ‘duty cycle’ (ON TIME) of the pulse output. The repetition rate of this signal (CYCLE TIME) may be set between .1 second and 199.9 seconds.

For control systems that rapidly respond to the applied power this should be set as low as possible and for our example it will be set to “.1” second.

Front Panel: **PROG/DC1/MODE/PID** 
 PROG/DC1/CYCL/0.1 

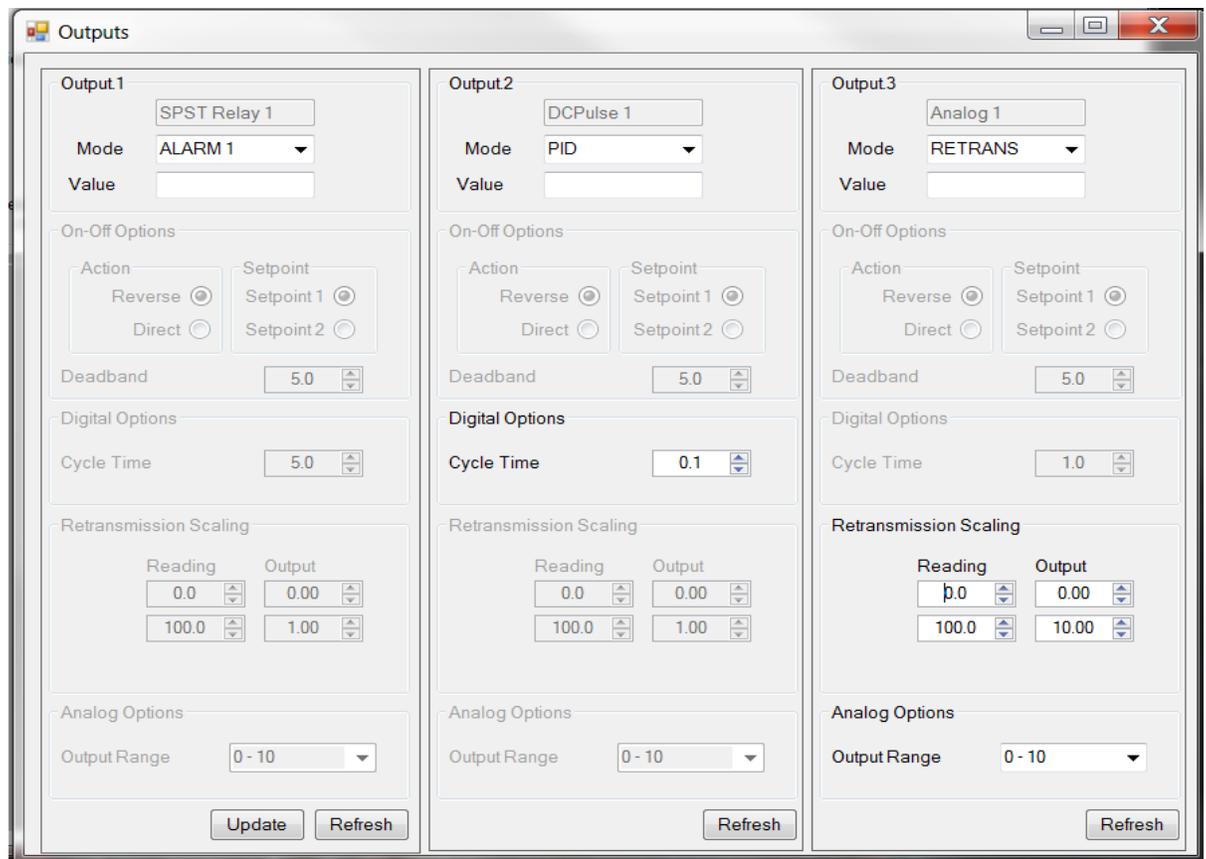


Figure 4. Platinum Configurator: (Click on the Output Function Block).

1.3 Define Control Loop Parameters

The Platinum Controller has an advanced **Proportional, Integral, Derivative (PID)** control function augmented with a Fuzzy Logic Adaptive control algorithm that continuously monitors the difference between the current process variable (sensor reading) and the desired setpoint and adjusts the amount of applied power to ensure that the setpoint is reached and maintained with the minimum of undershoot, overshoot and oscillation.

Although manually setting the internal gain factors is possible, it is much easier to allow the controller to apply a 'stimulus' to the output, measure the resulting changes and determine the corresponding parameters - a process referred to as 'auto-tuning'. Once the parameters are determined the adaptive control functions continually monitor the response of the system and makes any required changes due to changes in environment or other process conditions.

The PID control algorithm must know whether applying power will **INCREASE** the temperature (**REVERSE**) or **DECREASE** the temperature (**DIRECT**). To start an auto-tune process the 'setpoint' must be set above the current ambient temperature. Typically it should be set to ~ 50% of the final desired operating temperature and should be at least 10 °C above the current ambient value. The controller will verify that the initial readings are stable and then activate the output, monitor the change in temperature and display the current temperature (flashing). When auto-tuning is complete the display will show 'DONE'.

Front Panel: PROG/PID.S/ACTN/RVRS 

PROG/PID.S/AUTO/STRT/OK? 

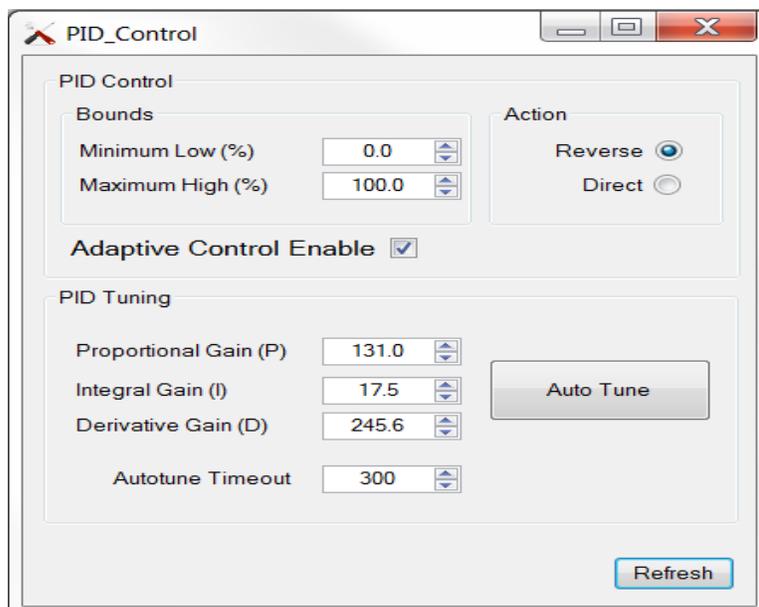


Figure 5. Platinum Configurator: (Click on the PID Control function block).

1.4 Define Operating Temperature (Setpoint)

The Platinum Controller maintains two 'setpoint' values. Setpoint 1 is used to control the closed loop control (PID) functions. Setpoint 2 is used by alarms and other functions. Setpoint 2 may be set to an absolute value or may be set to be an offset (derivative) from setpoint 1.

For the simple temperature controller setpoint 1 will be set to an absolute value of 40 °C. The value may be preset in the PROG menu or may be changed when the unit is running in the OPER menu. Setpoint 2 is not used.

Setpoint 1 defaults to the absolute mode and is implicitly set to absolute mode when the remote setpoint and ramp and soak functions are disabled.

Front Panel: PROG/SP1/40.0 

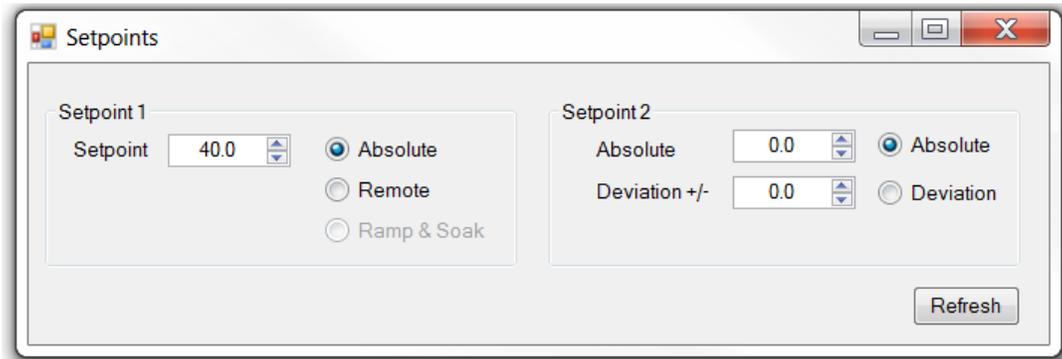


Figure 6. *Platinum Configurator: (click on the Setpoint function block).*

1.5 Running the Application

Once the application has been configured it may be started by putting the controller into the RUN mode. While the controller is running the setpoint may be changed by pressing the  button once (display will show RUN), pressing the  key (display will show SP1) and then pressing the  key. The setpoint value will be displayed and may be changed using the  and  buttons. Pressing the  key again will enter the new value and the display will again show the current temperature.

With the Platinum Configurator, the Setpoint value may be changed by entering a new value in the Setpoint 1 box of the main screen and then clicking the RUN option button.

Front Panel: OPER/RUN 

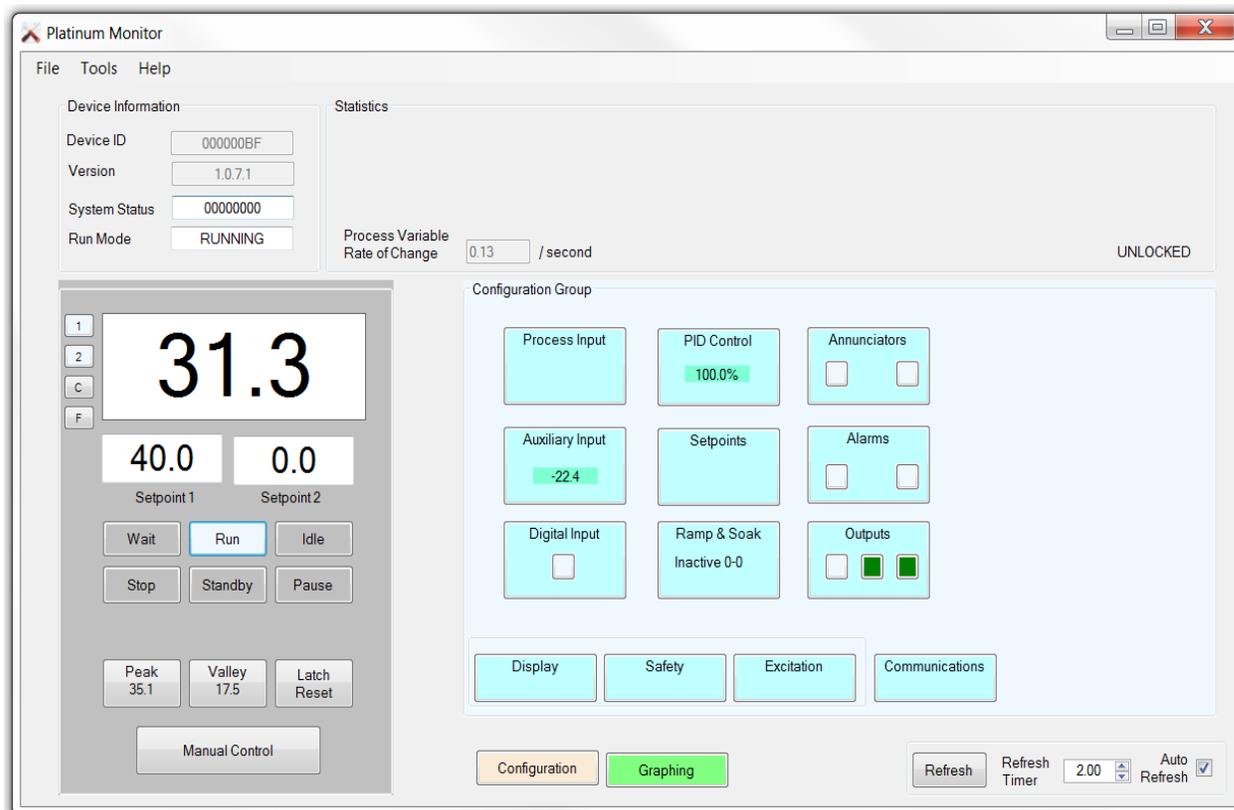


Figure 7. Platinum Configurator.

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