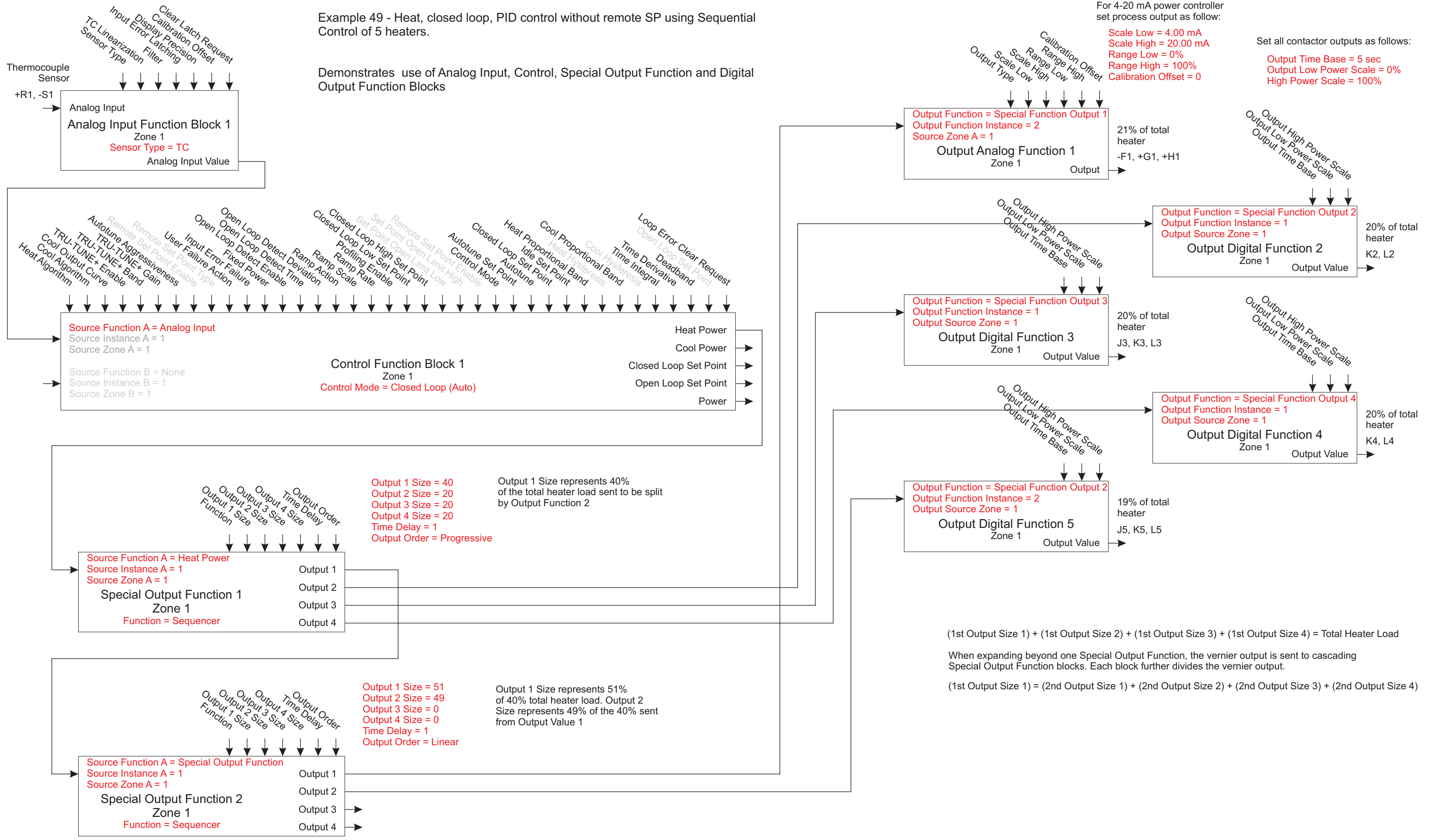Example 49 - Heat, closed loop, PID control without remote SP using Sequential Control of 5 heaters.

Demonstrates use of Analog Input, Control, Special Output Function and Digital Output Function Blocks

For 4-20 mA power controller set process output as follow:
Scale Low = 4.00 mA
Scale High = 20.00 mA
Range Low = 0%
Range High = 100%
Calibration Offset = 0

Set all contactor outputs as follows:
Output Time Base = 5 sec
Output Low Power Scale = 0%
High Power Scale = 100%

Analog Input Function Block 1
(inputs: TC Linearization, Sensor Type, Input Error Latching, Display Precision, Calibration Offset, Clear Latch Request, Filter)

Thermocouple Sensor
+R1, -S1

Analog Input
Zone 1
Sensor Type = TC
Analog Input Value

Control Function Block 1
(inputs: Heat Algorithm, Cool Algorithm, Cool Output Curve, TRU-TUNE+ Band, TRU-TUNE+ Gain, Autotune Aggressiveness, Remote Set Point Enable, Remote Set Point Type, User Failure Action, Input Error Failure, Open Loop Fixed Power, Open Loop Detect Enable, Open Loop Detect Time, Ramp Action, Ramp Scale, Ramp Rate, Profiling Enable, Closed Loop Low Set Point, Closed Loop High Set Point, Set Point Open Limit Low, Set Point Open Limit High, Idle Set Point, Closed Loop Set Point, Autotune, Autotune Set Point, Control Mode, Heat Proportional Band, Cool Proportional Band, Heat Hysteresis, Cool Hysteresis, Time Integral, Time Derivative, Deadband, Open Loop Set Point, Loop Error Clear Request)

Source Function A = Analog Input
Source Instance A = 1
Source Zone A = 1
Source Function B = None
Source Instance B = 1
Source Zone B = 1

Zone 1
Control Mode = Closed Loop (Auto)

Heat Power
Cool Power
Closed Loop Set Point
Open Loop Set Point
Power

Output Analog Function 1
(inputs: Output Type, Scale Low, Scale High, Range Low, Range High, Calibration Offset)

Output Function = Special Function Output 1
Output Function Instance = 2
Source Zone A = 1

Zone 1

21% of total heater
-F1, +G1, +H1

Output

Output Digital Function 2
(inputs: Output High Power Scale, Output Low Power Scale, Output Time Base)

Output Function = Special Function Output 2
Output Function Instance = 1
Output Source Zone = 1

Zone 1

20% of total heater
K2, L2

Output Value

Output Digital Function 3
(inputs: Output High Power Scale, Output Low Power Scale, Output Time Base)

Output Function = Special Function Output 3
Output Function Instance = 1
Output Source Zone = 1

Zone 1

20% of total heater
J3, K3, L3

Output Value

Output Digital Function 4
(inputs: Output High Power Scale, Output Low Power Scale, Output Time Base)

Output Function = Special Function Output 4
Output Function Instance = 1
Output Source Zone = 1

Zone 1

20% of total heater
K4, L4

Output Value

Output Digital Function 5
(inputs: Output High Power Scale, Output Low Power Scale, Output Time Base)

Output Function = Special Function Output 2
Output Function Instance = 2
Output Source Zone = 1

Zone 1

19% of total heater
J5, K5, L5

Output Value

Special Output Function 1
(inputs: Output 1 Function, Output 2 Size, Output 3 Size, Output 4 Size, Time Delay, Output Order)

Output 1 Size = 40
Output 2 Size = 20
Output 3 Size = 20
Output 4 Size = 20
Time Delay = 1
Output Order = Progressive

Output 1 Size represents 40% of the total heater load sent to be split by Output Function 2

Source Function A = Heat Power
Source Instance A = 1
Source Zone A = 1

Zone 1
Function = Sequencer

Output 1
Output 2
Output 3
Output 4

Special Output Function 2
(inputs: Output 1 Function, Output 2 Size, Output 3 Size, Output 4 Size, Time Delay, Output Order)

Output 1 Size = 51
Output 2 Size = 49
Output 3 Size = 0
Output 4 Size = 0
Time Delay = 1
Output Order = Linear

Output 1 Size represents 51% of 40% total heater load. Output 2 Size represents 49% of the 40% sent from Output Value 1

Source Function A = Special Output Function
Source Instance A = 1
Source Zone A = 1

Zone 1
Function = Sequencer

Output 1
Output 2
Output 3
Output 4

(1st Output Size 1) + (1st Output Size 2) + (1st Output Size 3) + (1st Output Size 4) = Total Heater Load

When expanding beyond one Special Output Function, the vernier output is sent to cascading Special Output Function blocks. Each block further divides the vernier output.

(1st Output Size 1) = (2nd Output Size 1) + (2nd Output Size 2) + (2nd Output Size 3) + (2nd Output Size 4)

Information Flow →

EZ-ZONE RM Application Example - using function blocks
Print on 11" x 17" landscape paper for best viewing

User parameter settings in RED

Revision A