Z1567-01-01 SEM1720 auto manual control

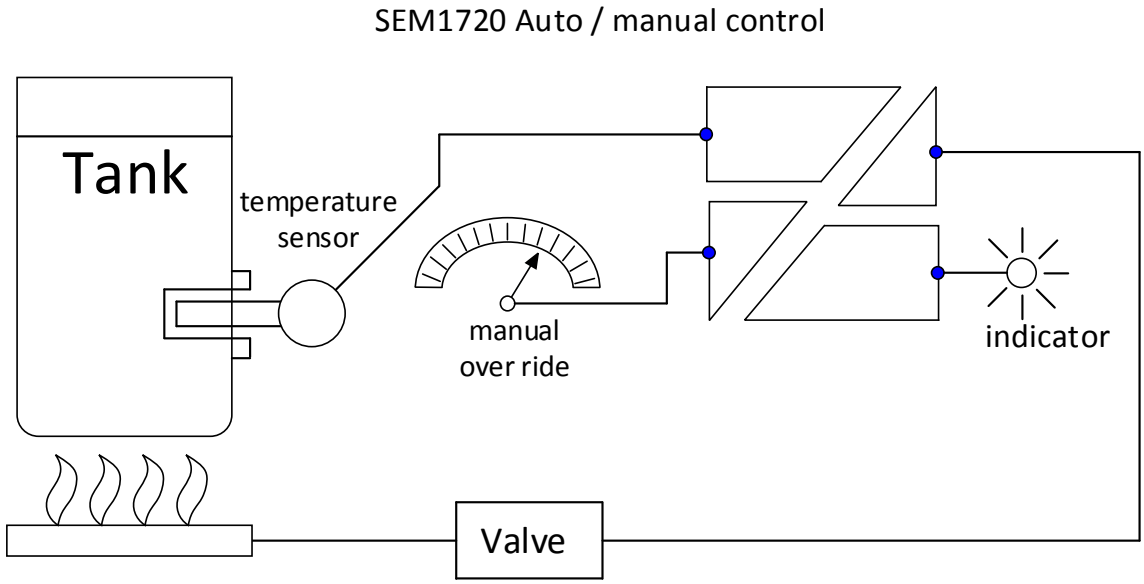
Auto manual control.

With some processes it can be required to switch between automatically monitoring a “live” temperature probe and manually controlling the “Simulated” temperature.
The manual entering of a simulated temperature can be useful to control a temporary set point or to override a live temperature signal; it can also be used to hold a value once the live temperature has changed.

This application note explains how to configure a SEM1720 to change input source between a “live” and a “simulated” temperature input with an external switch to make the changeover.
Once the configuration plan for the SEM1720 is understood it will be possible to change the behaviour of the SEM1720 to suit individual applications.

Example application

The example below is working over an input range of (0 to 150) °C giving a linear (4 to 20) mA output on output channel 1 depending on the input source selected.
A (0 or 10) V signal on output channel 2 is given to indicate the source selected for output channel 1, either a live, or a simulated, temperature input.



Input range (0 to 150) °C
CH1 input PT100 3 wire temperature probe.
CH2 input 1 K ohm slide wire multi turn pot, used for manual input of the simulated temperature.

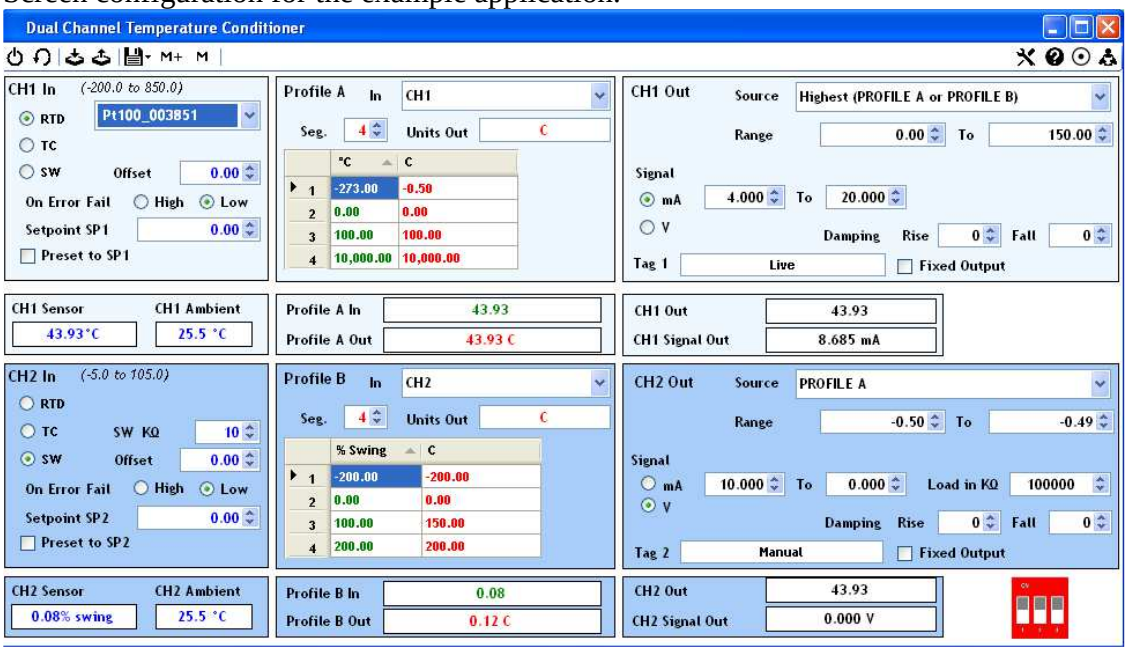
External switch in position 1
CH1 output = (4 to 20) mA ranged (0 to 150) °C controlled by live probe on CH1 input.
CH2 output = 0 VDC.

External switch in position 2
CH1 output = (4 to 20) mA ranged (0 to 150) °C controlled by the rotational position of a slide wire pot on CH2 input.
CH2 output = 10 VDC (failure of the input probe will also give 10 VDC on CH2 output).

Note: The SEM1720 must be connected according to the user manual; an external switch will be used to change between auto and manual operation.
The external switch used must be a two pole switch and wired to open or close the connection from the input sensors on the SEM1720.
In position 1 SEM1720 input pin 101 must be connected to an input and SEM1720 input pin 203 must be open.
In position 2 SEM1720 input pin 101 must be open and SEM1720 input pin 203 must be connected to an input.

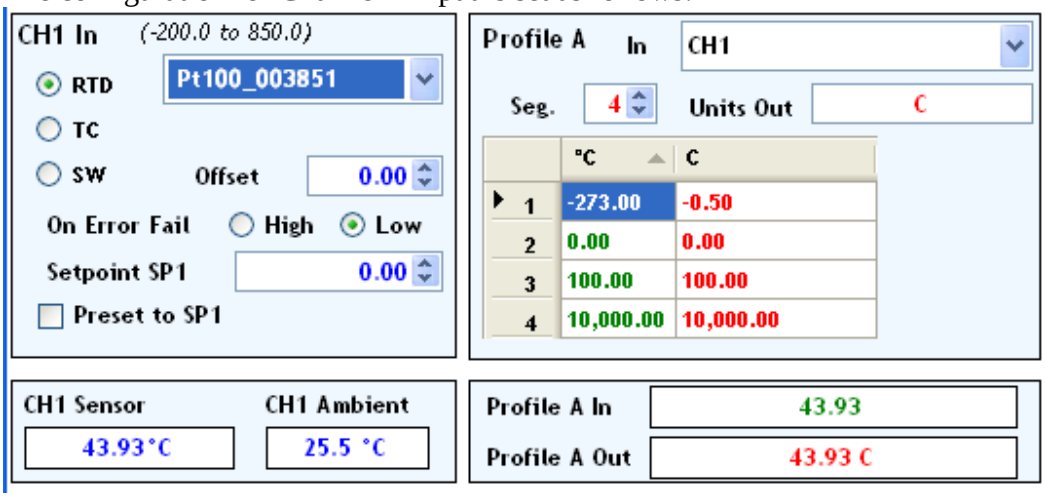
Configuration

Screen configuration for the example application.



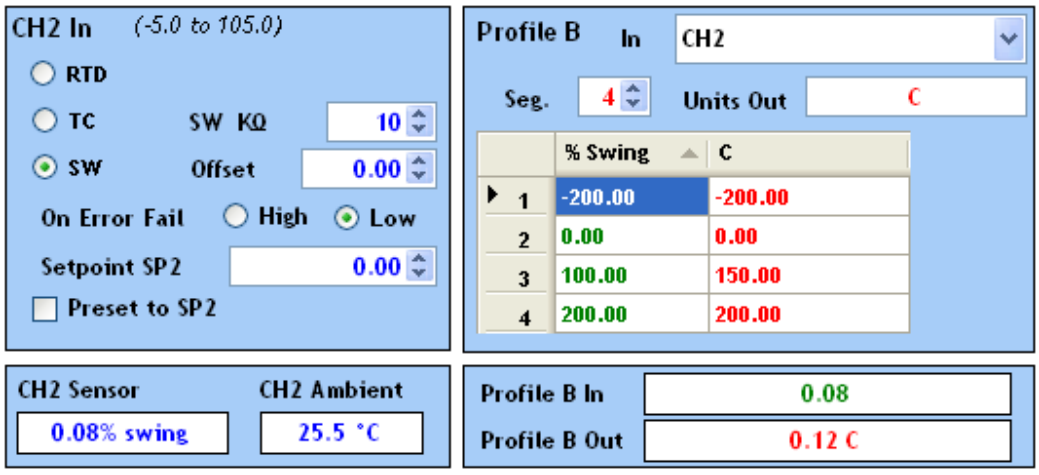
Z1567-01-01 SEM1720 auto manual control
STATUS INSTRUMENTS LTD.

The configuration for Channel 1 input is set as follows:



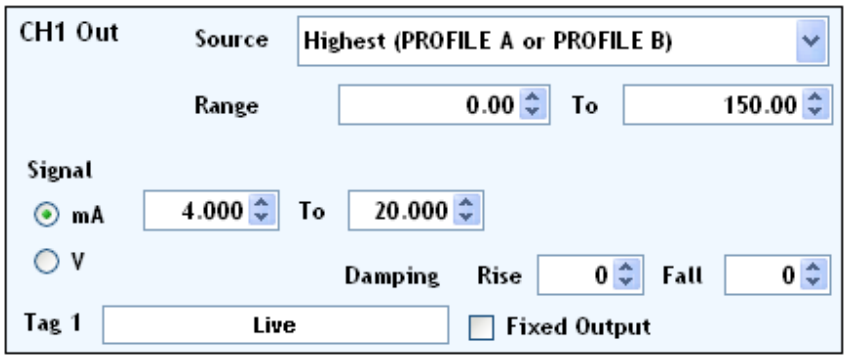
The input probe is a PT100, in the profiling tool input value = output value, apart from -273 °C = -0.5 °C. This in effect will make the profile track the input unless the temperature drops below 0.0 °C or the sensor input is lost (when the external switch is in position 2). At this point the Profile A tool will output -0.5 °C as its value.

The configuration for Channel 2 input is set as follows:



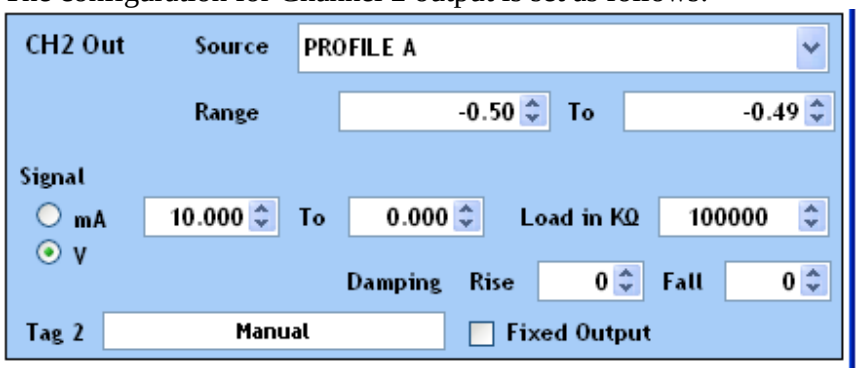
The input for channel 2 is a slide wire. This has a (0 to 100) % input swing that is scaled in the Profile B tool to give (0 to 150) °C profile B out.

The configuration for Channel 1 output is set as follows.



The output for Channel 1 is set to give (4 to 20) mA = (0 to 150) °V.
The output will take its source from the highest reading of the two Profile tools (Profile A or Profile B).
The way in which the input channels are configured will mean this is dependent on the position of the external switch.
In switch position 1 Profile A will be used.
In switch position 2 Profile B will be used.

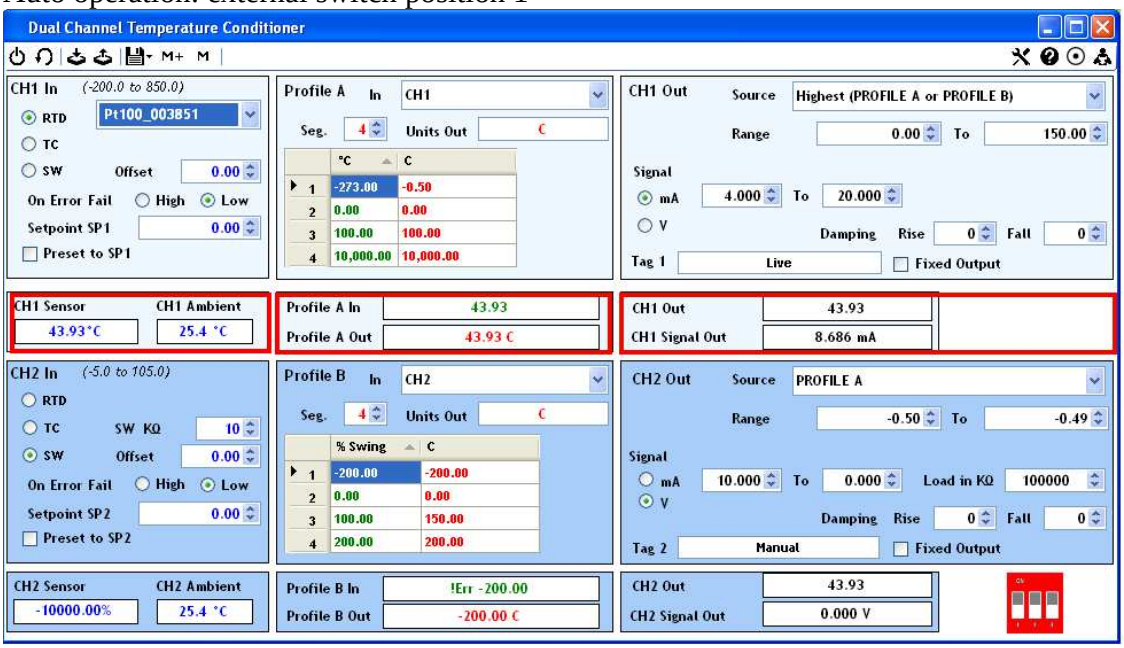
The configuration for Channel 2 output is set as follows:



The output for Channel 2 is set to give 10 V when the value from profile A is -0.5°C ;when above -0.49 it will give 0 V.
So in effect this indicates on channel 2 output the position of the external switch and if the system is in auto or manual mode.
In switch position 1 Profile 0 VDC will be output indicating auto mode.
In switch position 2 Profile 10 VDC will be output indicating manual.

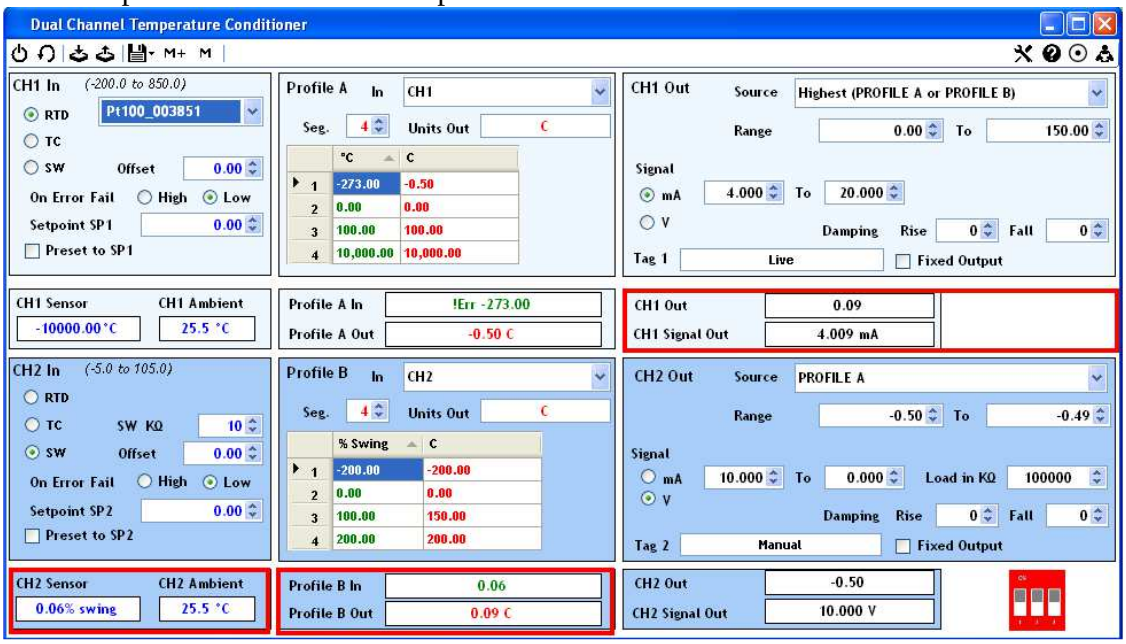
Operation

Auto operation: external switch position 1



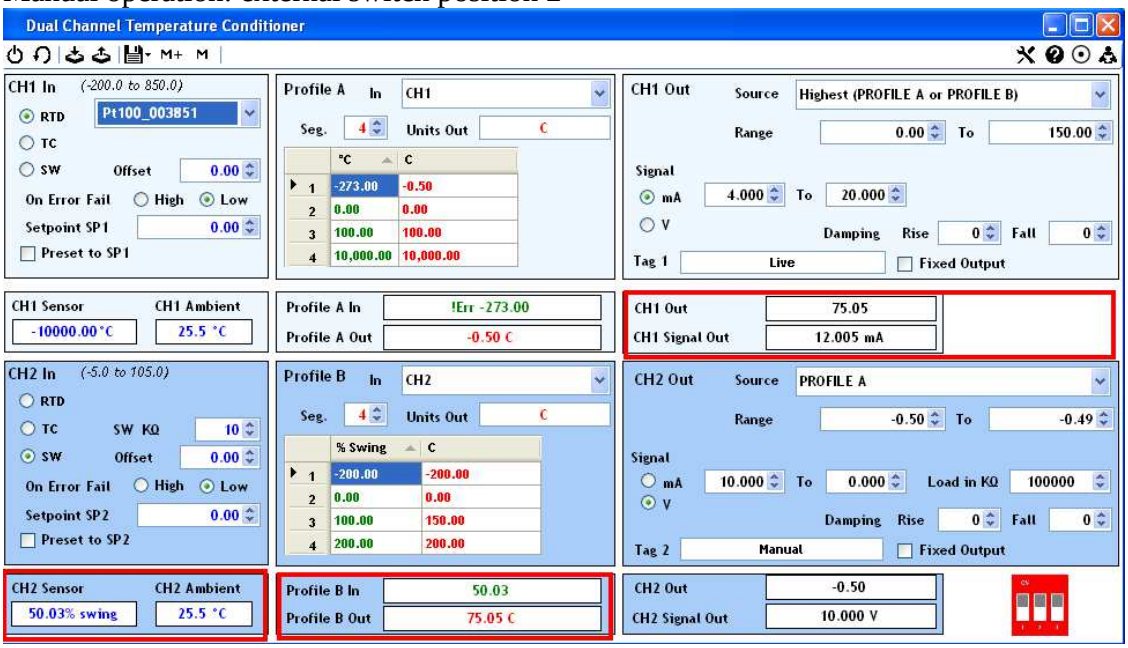
In this mode the signal output by channel 1 (CH1 out) will be based on the input value of the PT100 probe connected to channel 1 input (CH1 In)
In the screen above this is shown as 43.93 °C giving an output of 8.69 mA

Manual operation: external switch position 2



This shows the value when the external switch has been set to position 2. The slide wire pot had been positioned at the 0.06% movement position. This is equal to 0.09°C and so gives 4.01 mA.

Manual operation: external switch position 2



The slide wire pot has been set at the 50.03% movement position. This is equal to 75.05°C and so gives 12.01 mA.