User Profile Linearization to Control Out of Range Input Tool

HTR200
SEM1600VI
SEM1600T
SEM1636
SEM1750
TTR200(X)
TTC200(X)

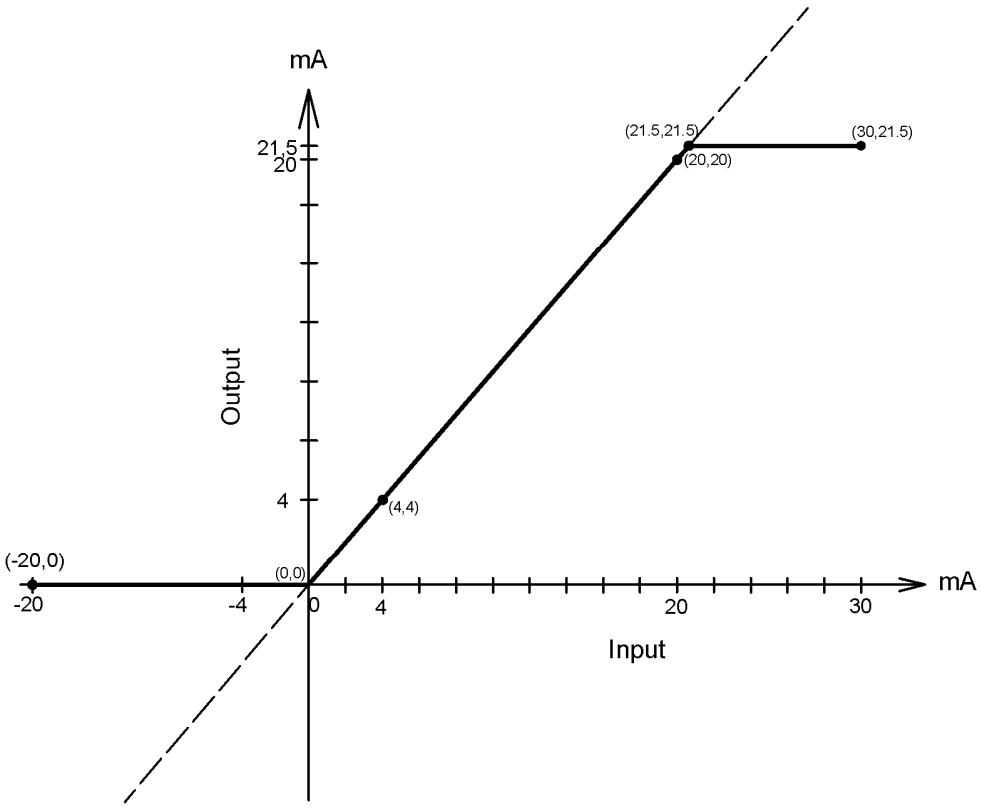
Many of the Status Instruments products in the USB SpeedLink range have the capability to allow the user to add a custom non linear profile to match an input signal to a required output signal that does not have a direct linear correlation.
This may be required to linearize the output from a sensor that has a non linear response or to correct for a known error in part of a sensor's range.

It may be desirable to have the output behave in a known way to the condition of the input signal going outside of defined values. This function may be applied to a user defined linearization as well as a straight line linearization (which will be shown in the following example.

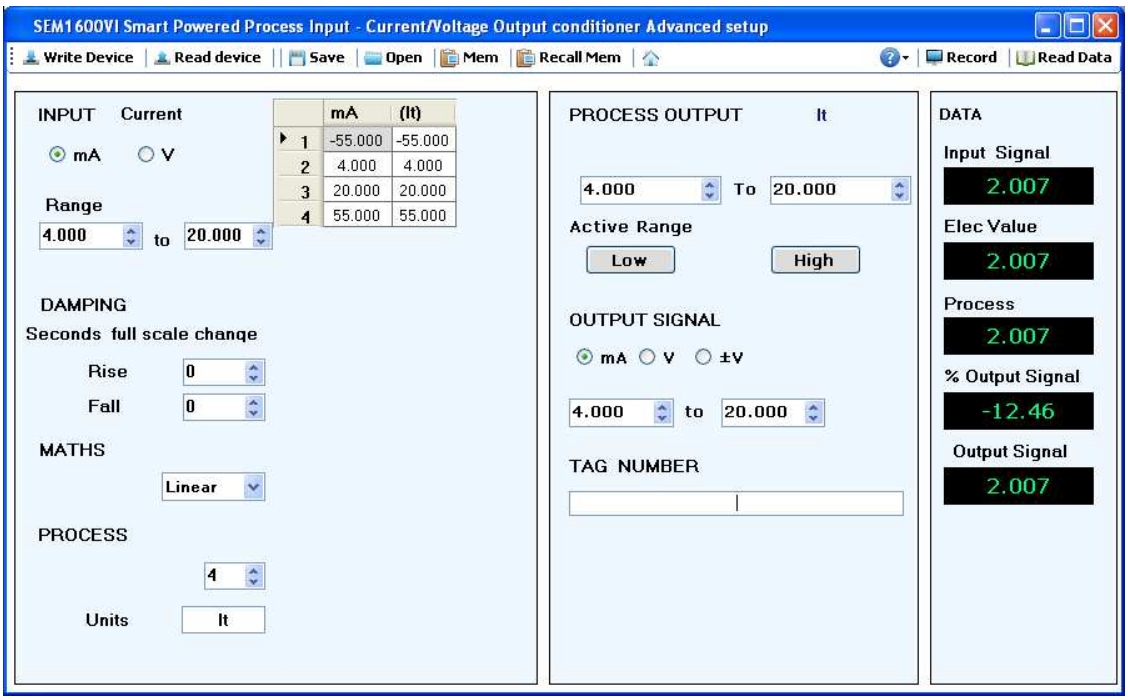
The examples below are shown using a SEM1600VI but the method is the same for all of the Status Instruments products listed at the start of this instruction.

Example 1. Straight line response

Input (4 to 20) mA Output (4 to 20) mA



In this the most simple configuration the output signal will continue to follow the straight line correlation of the input signal until the limits of the low and high values of its output capabilities are reached. In this case lowest possible output = 0 mA and highest possible output = 21.5 mA (the levels may be different from one unit to another but the way in which the correlation works will be the same).



So for the example above
I/P to O/P Response table

I/P mA		O/P mA	
- 55	=	0	lowest output value attainable
0	=	0	lowest output value attainable
2	=	2	
4	=	4	
20	=	20	
21.5	=	21.5	highest output value attainable
55	=	21.5	highest output value attainable

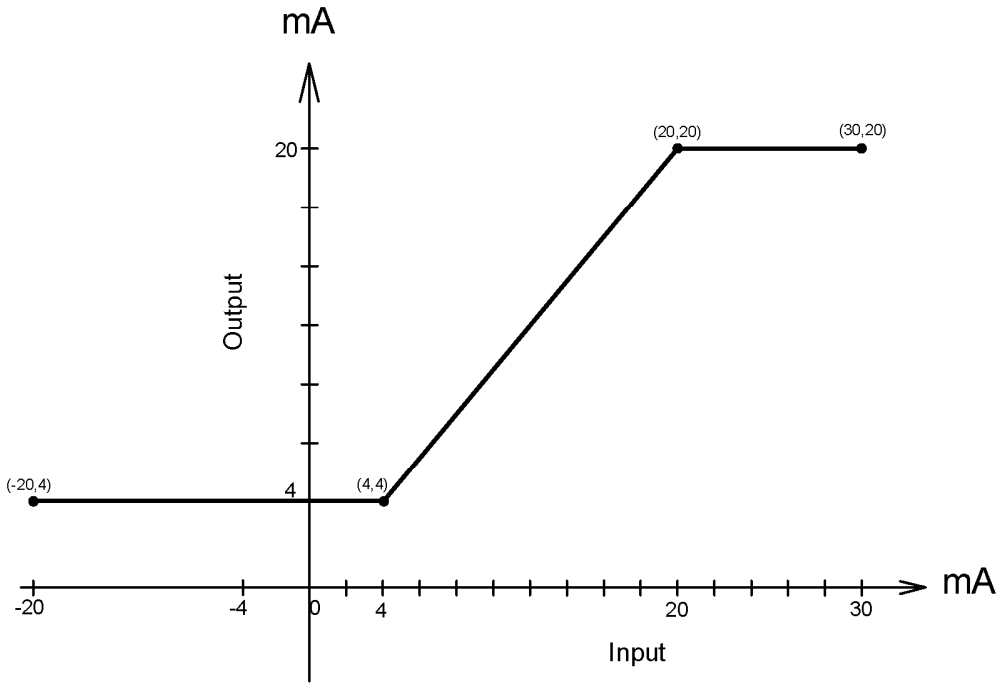
The output tracks the straight line correlation to the input as best it can until its physical limits prevent it

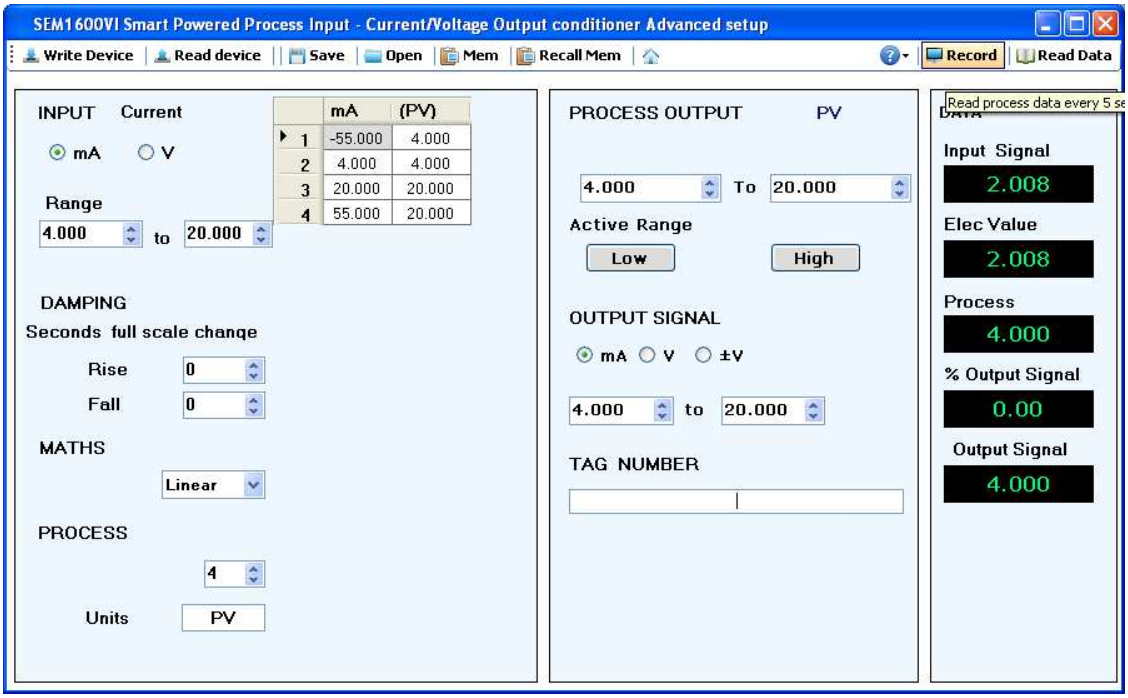
Example 2. Low hold at low, and high hold at high, input signal response

Input (4 to 20) mA Output (4 to 20) mA

In this configuration the unit will hold at its low output level when the input drops below a set level or is lost. It will also cap at a set level and not drive any higher

This is most commonly going to be (4 to 20) mA or (0 to 10) V but can be set to any value within the output range.





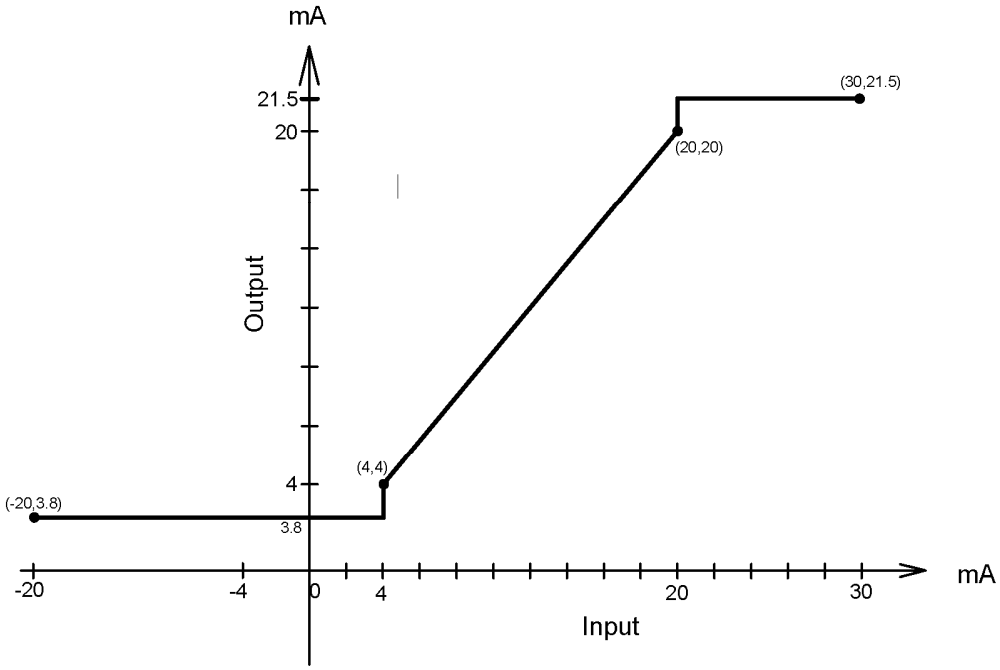
So for the example above
I/P to O/P Response table

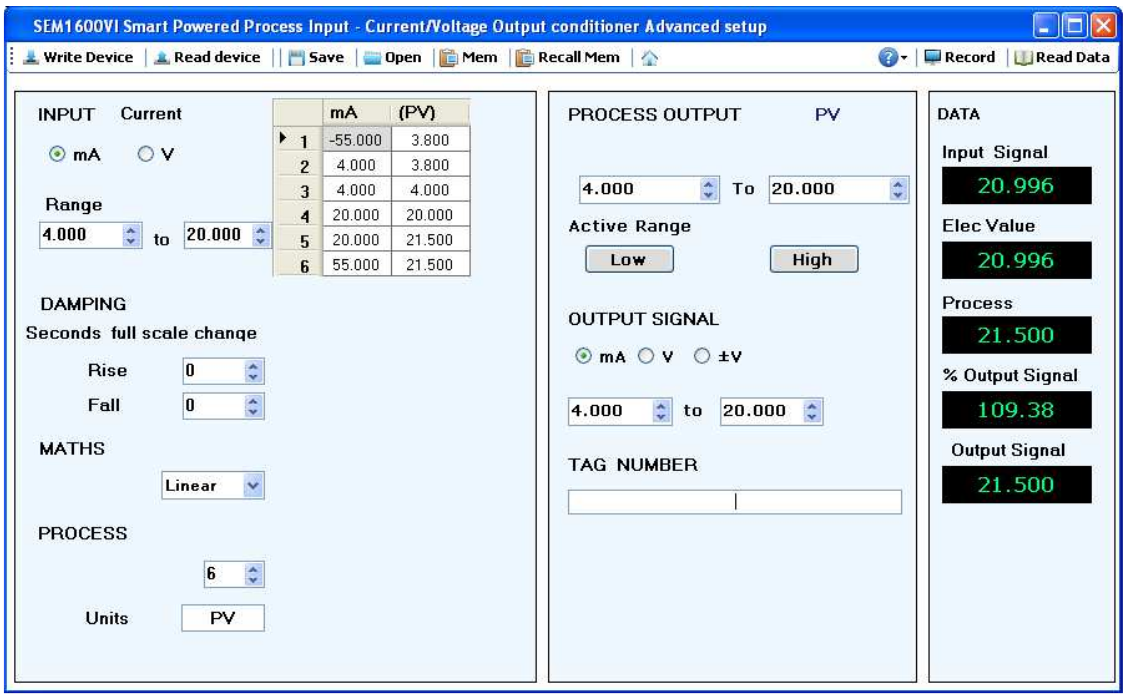
I/P mA		O/P mA
- 55	=	4
0	=	4
2	=	4
4	=	4
20	=	20
21	=	20
55	=	20

The output tracks the straight line correlation between (4 to 20) mA but will drop no lower than 4 mA and go no higher than 20 mA.

Example 3. Go to a pre set value for Output when the input signal is out of range (this can be referred to as burnout condition in some industries)

Input (4 to 20) mA Output (4 to 20) mA





In this example a low or lost signal will give a low burnout and a high signal will give a high burnout. Either burnout condition or a known safe or “parked” value such as 12 mA can be used if required.

So for the example above
I/P to O/P Response table

- 55	=	3.8	(this can be set at any value such as 12 mA if required)
0	=	3.8	(this can be set at any value such as 12 mA if required)
2	=	3.8	(this can be set at any value such as 12 mA if required)
4	=	4	
20	=	20	
21	=	21.5	(this can be set at any value such as 12 mA if required)
55	=	21.5	(this can be set at any value such as 12 mA if required)

The output tracks the straight line correlation between (4 to 20) and jumps to a known signal when outside of the 4 mA and 20 mA values.

Note: When a configuration needs a step change, such as for inputs below 4 and above 20 as in this example, the step point is entered twice against the two output values at the bottom and top of the step.

	mA	(PV)	
1	-55	3.8	
2	4.0	3.8	Any value below 4 = 3.8
3	4.0	4.0	Any value above 4 = 4