User Profile Linearization Tool

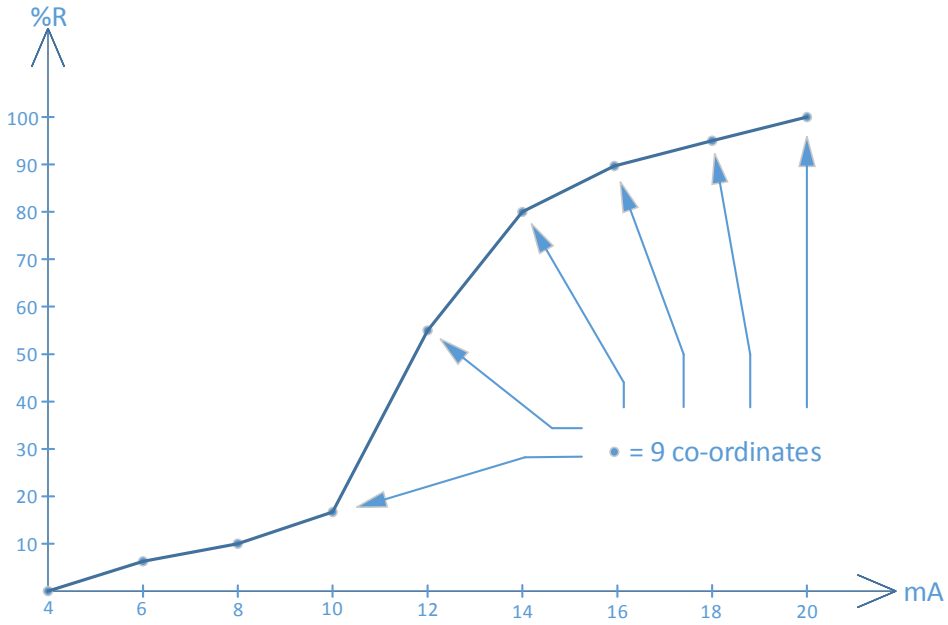
HTR200
SEM1600VI
SEM1600T
SEM1636
SEM1750
TTR200(X)
TTC200(X)

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.

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.

The non linear configuration to be entered.
This example is for a sensor giving a (4 to 20) mA output that relates to a % of the engineering unit range to be represented: (0 to 100) °C or (50 to 15000) litres, for example.

Response Curve for sensor



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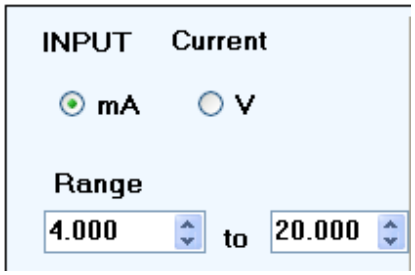
The above graph can be represented using co-ordinate pairs (extra co-ordinate pairs will be required if you wish to **control out of range input conditions**: see separate instruction).
Up to 22 co-ordinate pairs can be used to give a more detailed representation of an input/output curve if required.

Response Table for sensor

mA input	%/R percent of range for any engineering unit (bar, lt, °C, etc.)
4	0
6	2
8	5
10	15
12	50
14	85
16	95
18	98
20	100

Use the USB Speed Link software to enter the user profile
Select the input Type required



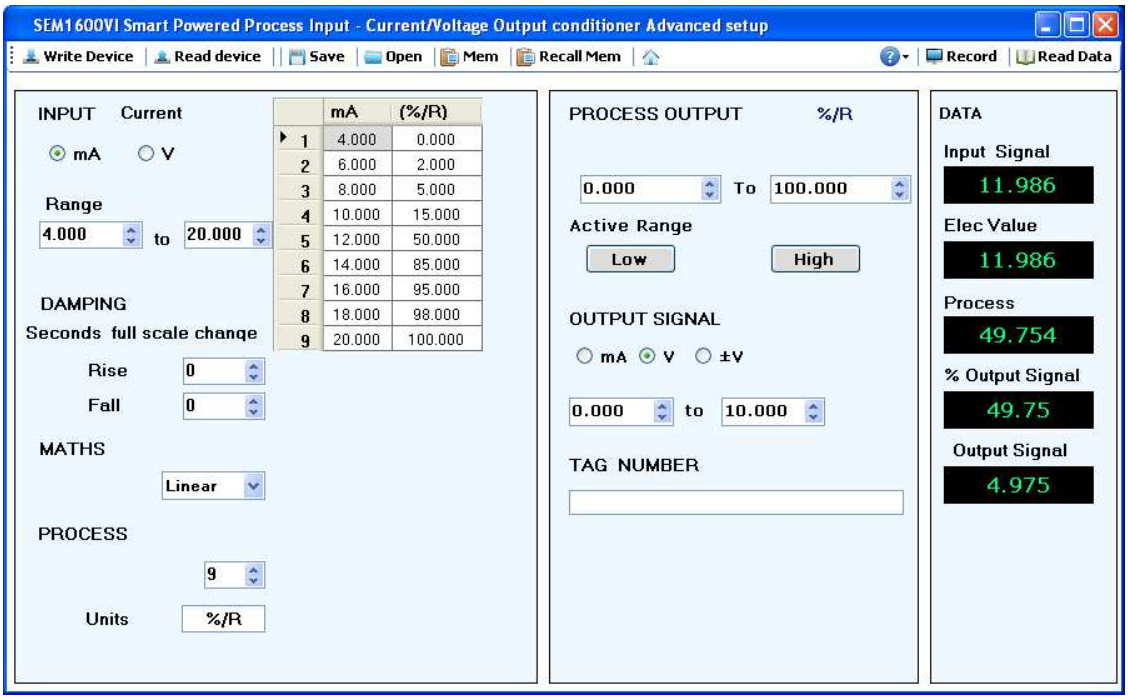
Expand the user profile table to the required number of co-ordinate pairs and enter the data in ascending input order (mA for this example).

	mA	(PV)
1	4.00	0.00
2	6.00	2.00
3	8.00	5.00
4	10.00	15.00
5	12.00	50.00
6	14.00	85.00
7	16.00	95.00
8	18.00	98.00
9	20.000	100.00

The response data table entered into the Speed Link software

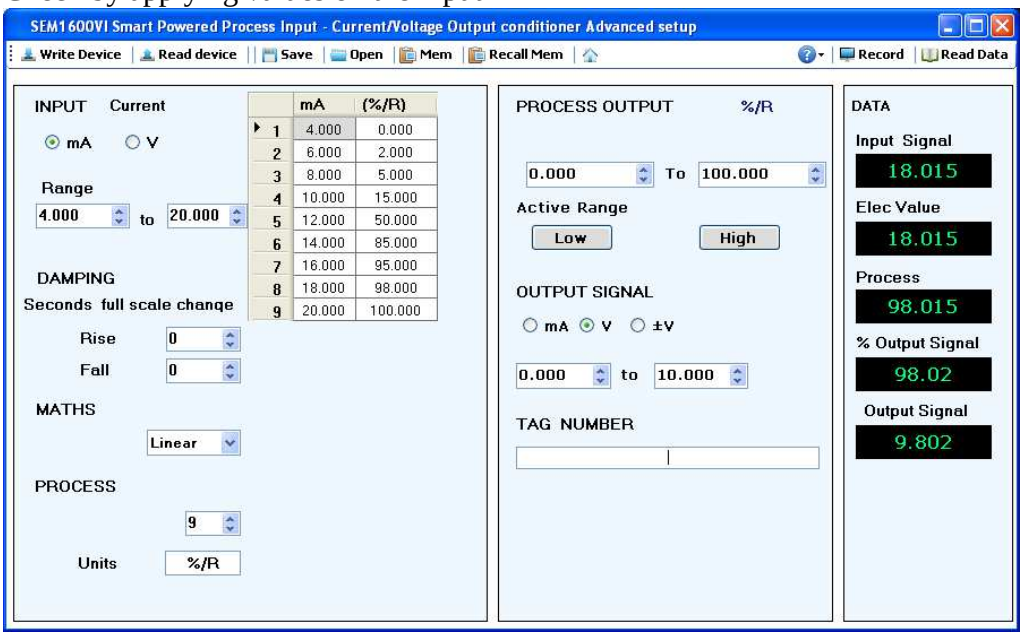
This config represents the sensor's output response against the engineering unit being measured.

This is how the config screen will look applying the table above (this example is giving a (0 to 10) V output which is linear to the %/R engineering unit).



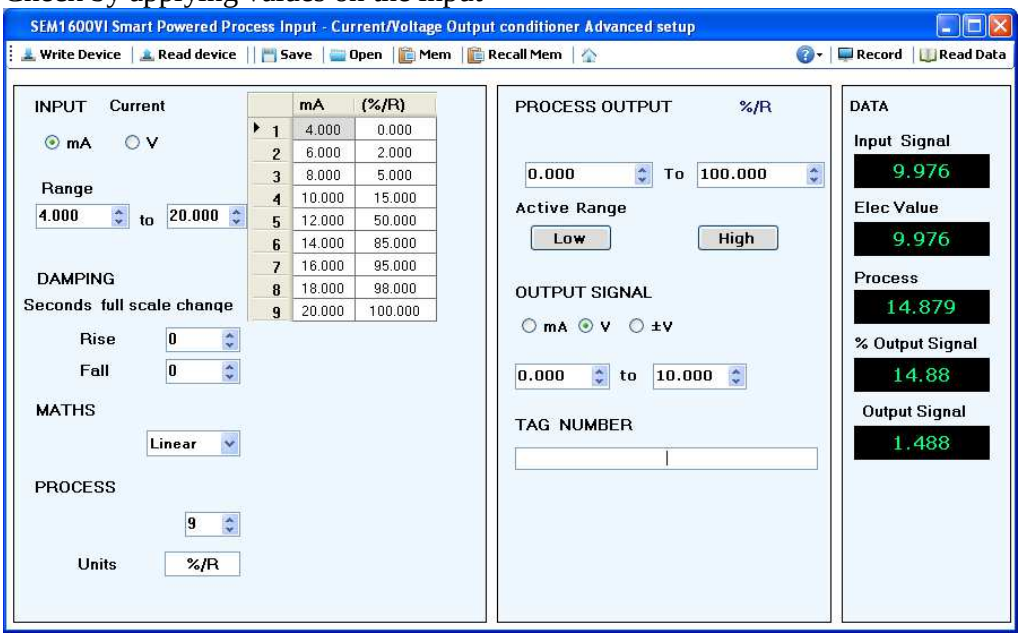
As shown in the data panel the input signal is 12 (11.986). This is giving a process value of 50 (49.75), From the table we see that 12 mA input value = 50 %/R so this is correct.

Check by applying values on the input



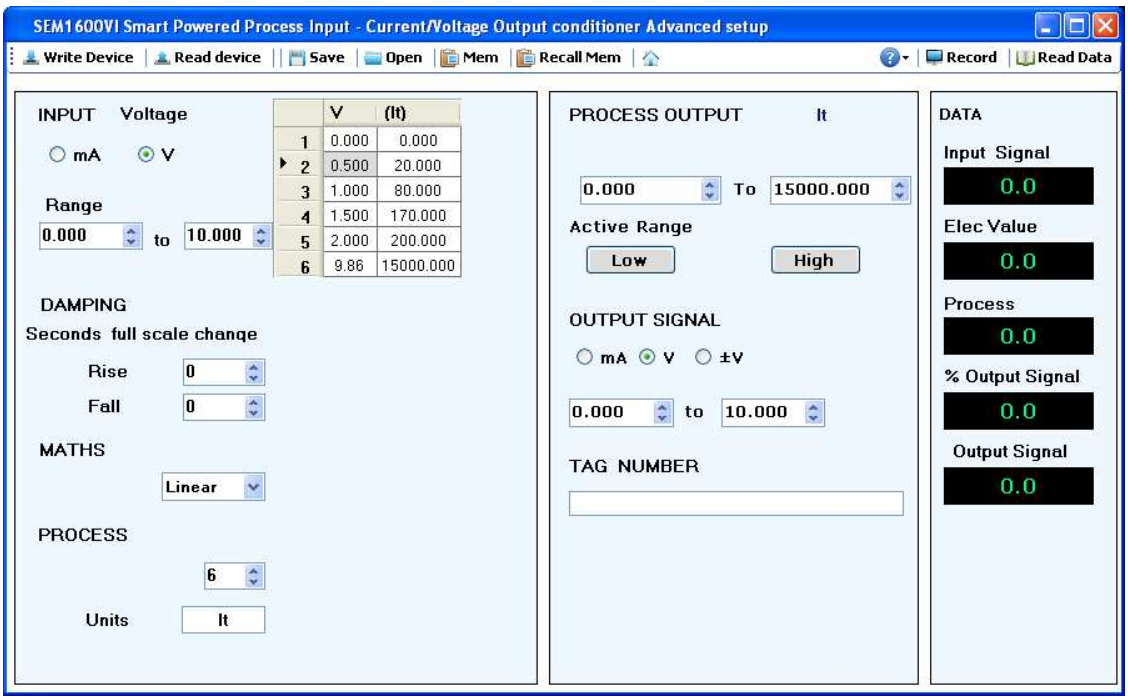
As shown in the data panel the input signal is 18 (18.015). This is giving a process value of 98 (98.02), From the table we see that 18 mA input value = 98 %/R so this is correct.

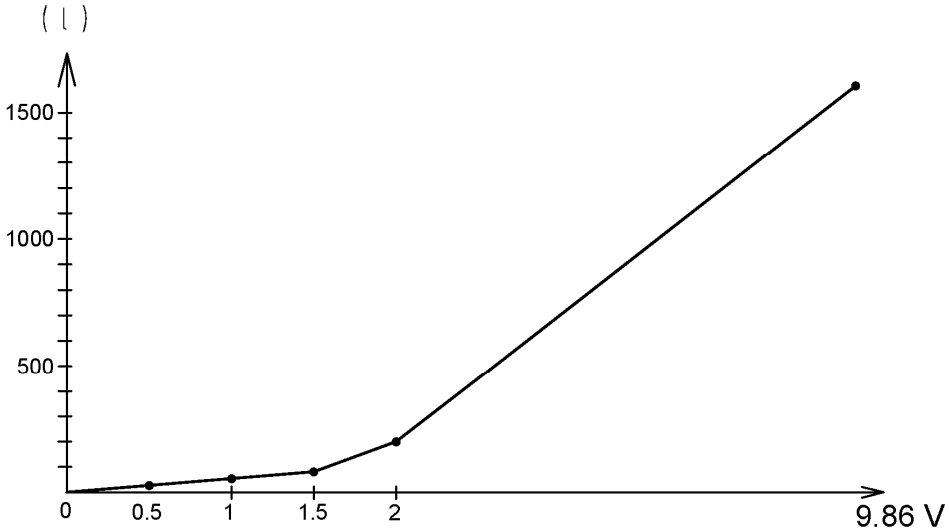
Check by applying values on the input



As shown in the data panel the input signal is 10 (9.976). This is giving a process value of 15 (14.88), From the table we see that 10 mA input value = 15 %/R so this is correct

This example shows the user profile linearization for a cylindrical tank with a tapered bottom.
The sensor being used will give a (0 to 10) V signal representing level height not volume so a user profile linearization is required to convert to volume.





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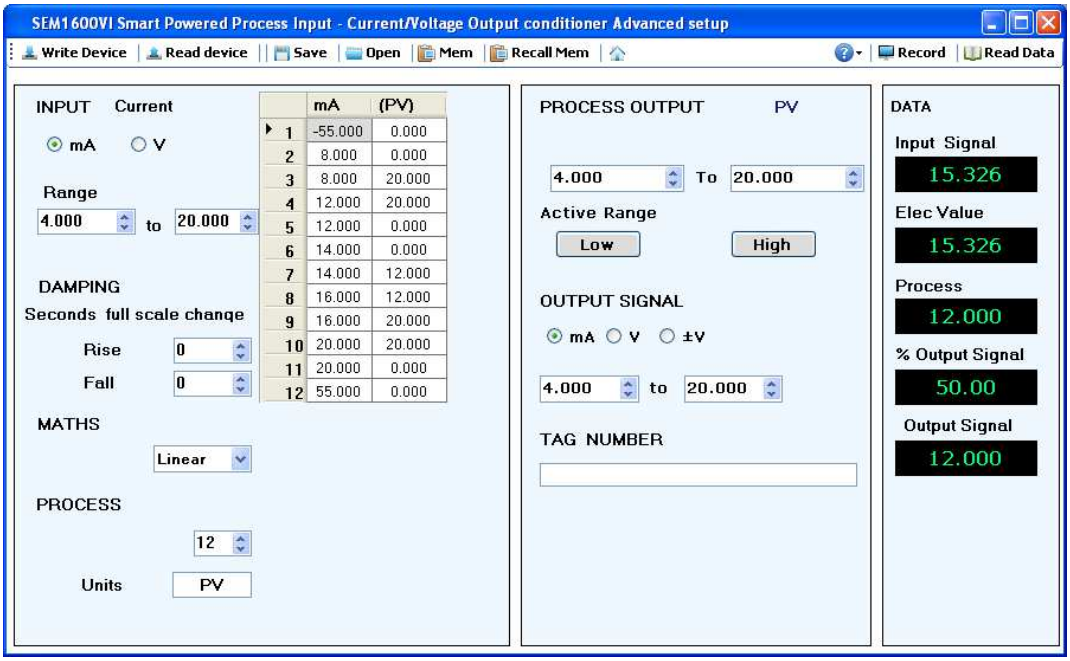
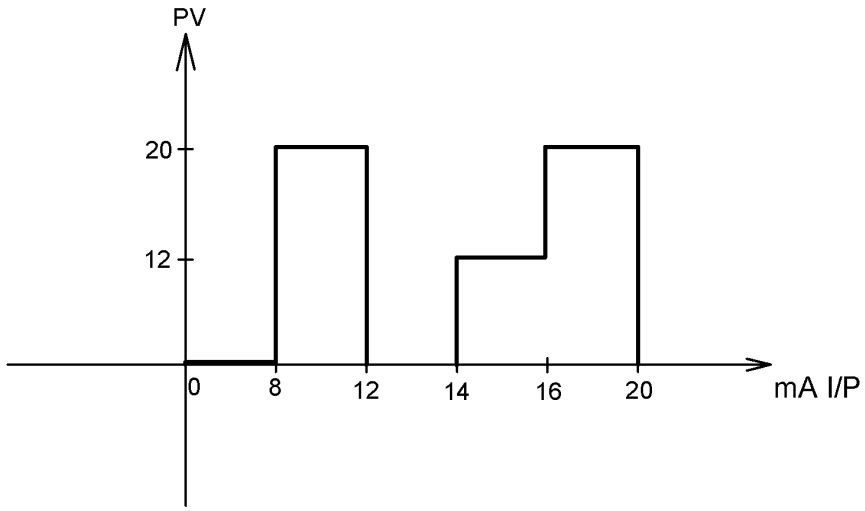
In this example a stepped profile is created.



As shown in the data panel the input signal is 15.326. This is giving a process value of 12. From the graph we see that 15.326 mA = 12 PV so this is correct



The User Profile Linearization tool can be used in different ways. As well as the examples shown the User Profile Linearization tool can be used to control the way the output responds to **out of range input signals** (see separate instruction).