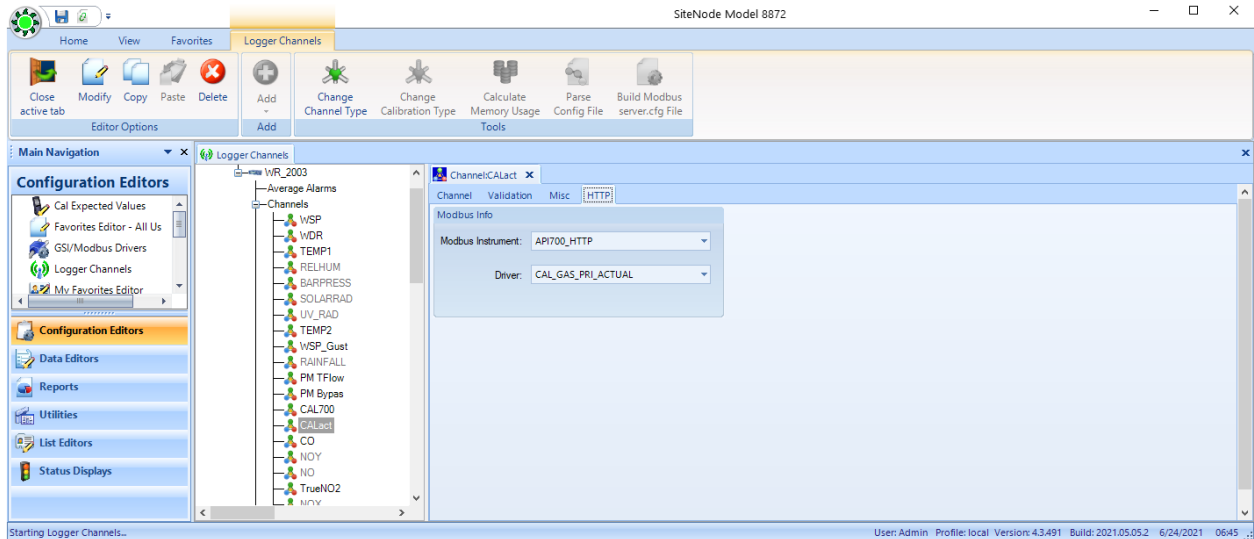


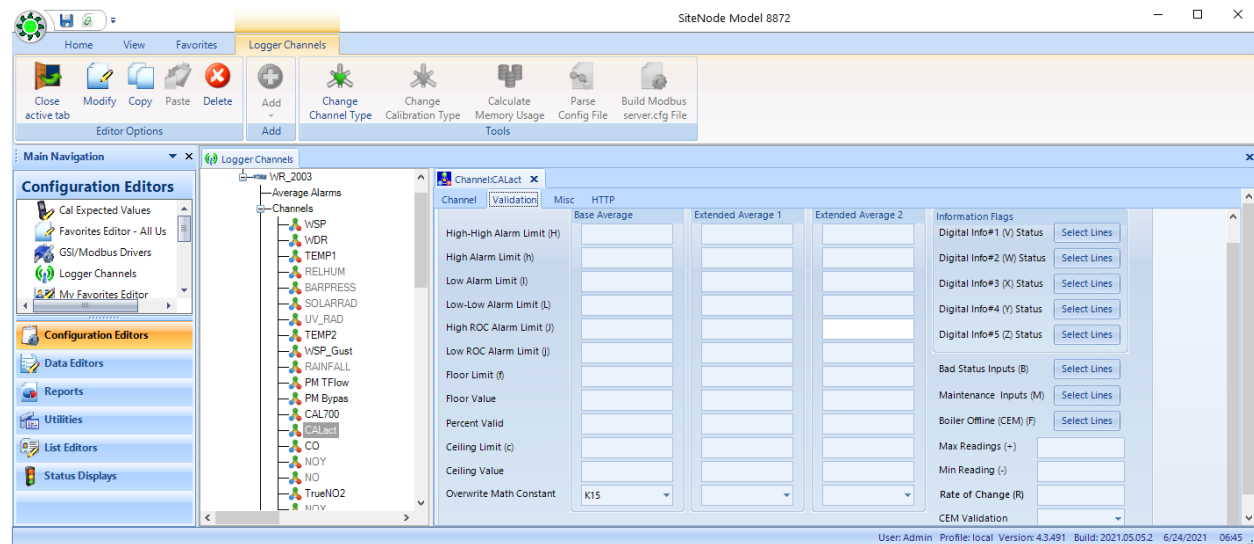
## Calibration Actual Value Monitoring

Data Loggers, by default, utilize a user-entered Expected Value for each parameter/phase to compare the actual instrument results to in the AirVision / AV-Trend reports. However, it is advantageous in some cases to obtain or calculate the actual calibrator output concentration, rather than using a fixed assumed value.

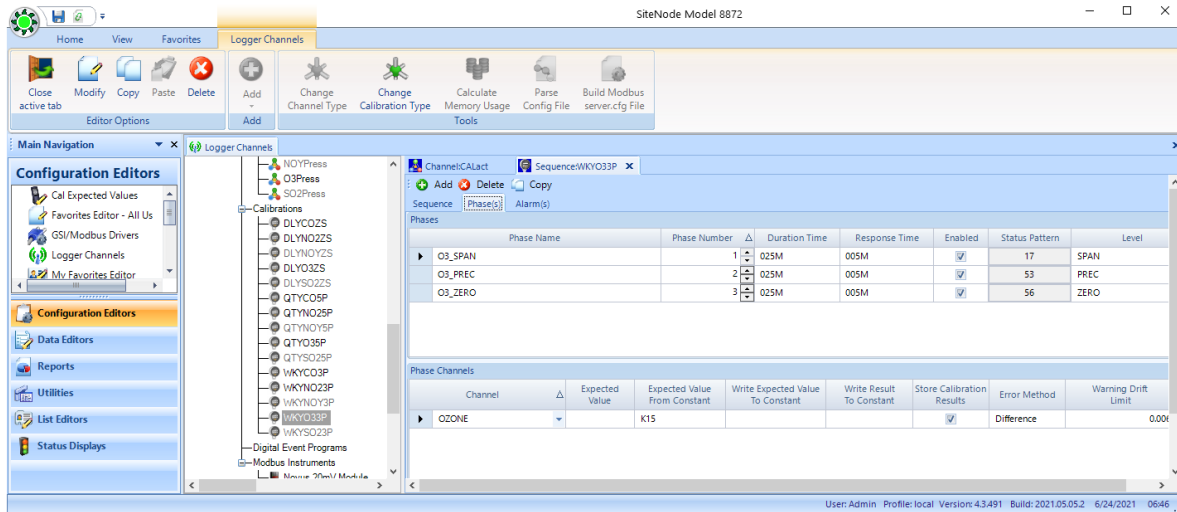
Depending on the calibrator, you may be able to obtain the value directly via Modbus, GSI, or HTTP drivers and creating a channel (e.g., "CalActual") to store the results.



Here, we use the Validation tab to store the results in a math constant every minute:



And use that cal result as the expected value:

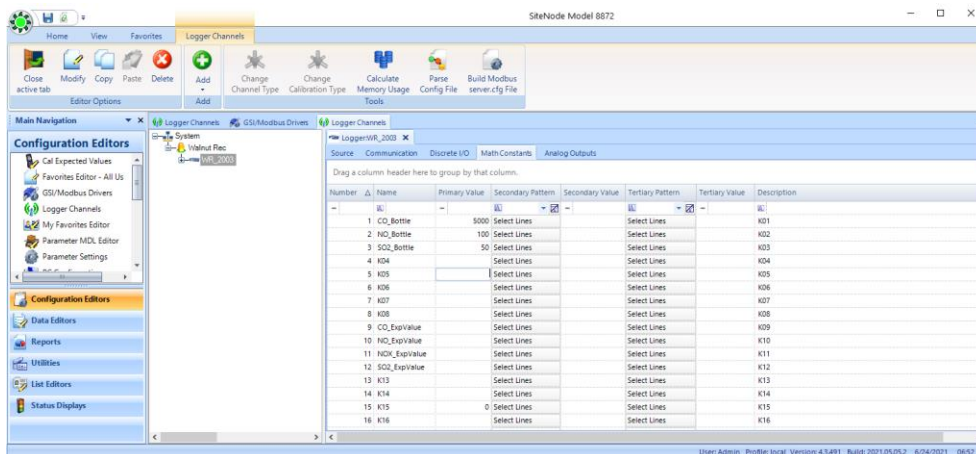


Calibrators we can do this with include:

- Teledyne API 700-series (with appropriate firmware) – via HTTP channel, requires 8872 and AV-Trend version 4.3.491 or better (this register not available via Modbus)
- Thermo 146i or 146iQ – via Modbus (GAS CONC channel)

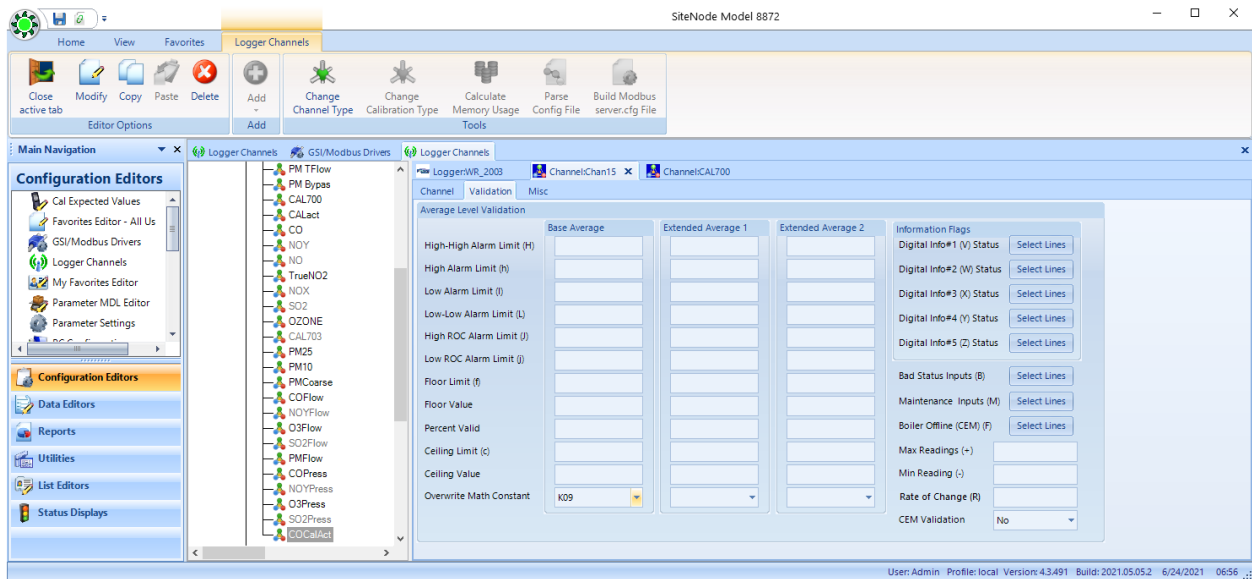
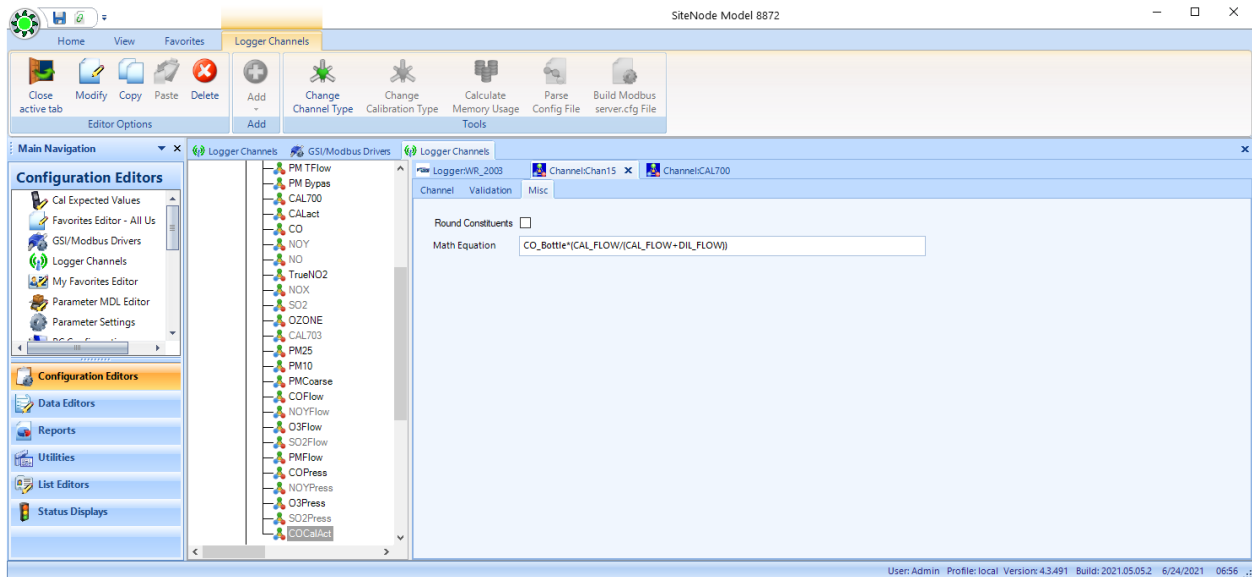
This assumes that the Gas Concentration output from the calibrator gives you the value you want for the pollutant. This may not be true in some cases- perhaps your calibrator (e.g., Sabio) doesn't offer that kind of output, or when using a blended gas, the GASCONC only gives you the proper calculation for one of the gases in the mix. In this case, it may be necessary to calculate specific gas concentration values for each pollutant from the bottle concentration, dilution air flow, and cal (bottle) gas flow.

In this case, we will first start by using Math Constants (set in the logger properties, and "Math Constants" tab) to store the bottle values. We can rename the constants in the 8872 to make this easier to follow:



Then, we need to create channels (Modbus, GSI, etc) to log the CAL\_FLOW and DIL\_FLOW measurements in the calibrator.

Next, we need to create output channels (math channels) to calculate each of the pollutant concentrations and write them into math constants.

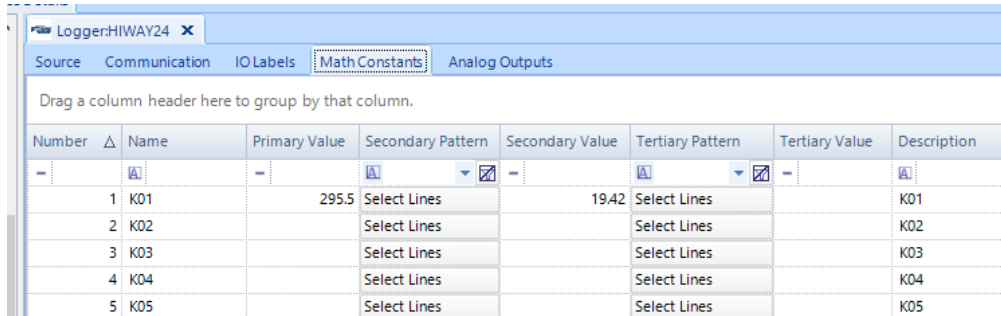


So, to do NO, CO, and SO2, we will need 6 math constants, 2 flow channels, and 3 calculated value channels. One set could potentially be eliminated as the 'default' gas in the calibrator and using the GASCONC channel.

### Alternate (Better) Approach for Blended Gases (3 gases or less)

Another approach would be to use the 'secondary' and 'tertiary' math constant feature- this allows the math constants to have up to three possible values, toggling based on a status input (or pseudo-input, in this case) status. The constant will have the primary value unless either of the secondary or tertiary status input patterns are seen.

In this implementation, we put the value of all three gases as one math constant, in this case, let's assume an NO bottle value of 295.5 and a SO2 value of 19.42



Number	Name	Primary Value	Secondary Pattern	Secondary Value	Tertiary Pattern	Tertiary Value	Description
1	K01	295.5	Select Lines	19.42	Select Lines		K01
2	K02		Select Lines		Select Lines		K02
3	K03		Select Lines		Select Lines		K03
4	K04		Select Lines		Select Lines		K04
5	K05		Select Lines		Select Lines		K05

We set output patterns for the SO2 phase to include pseudo output #72, and the secondary pattern for K01 to be "72 = ON". Thus, when the SO2 phase runs, K01 will switch from a value of 295.5 to 19.42. (for the NO phase, we don't need to set any additional pseudo).

Now, we have a single GASCONC channel whose equation looks like:

$$K01 * CAL\_FLOW / (CAL\_FLOW + DIL\_FLOW)$$

Again, that channel will write into another math constant (e.g., K09 per our above example... NOT K01) and that will be used for the expected value for cal channels.

This approach will work for 3 gases or less, which is typical for most systems (NO, CO, SO2).