

This Application Note is pertinent to the UnidriveSP Family

Using the MOP within UnidriveSP

The UnidriveSP has some very powerful and useful built-in functions. One of which is the MOP (Motor Operated Pot) function. Essentially the MOP function is a carry over from days of old. It provided a means of using Increase/Decrease buttons to cause a small DC gear motor to turn either clockwise or counter clockwise (up to its' stop points of rotation where it would hit a limit switch).

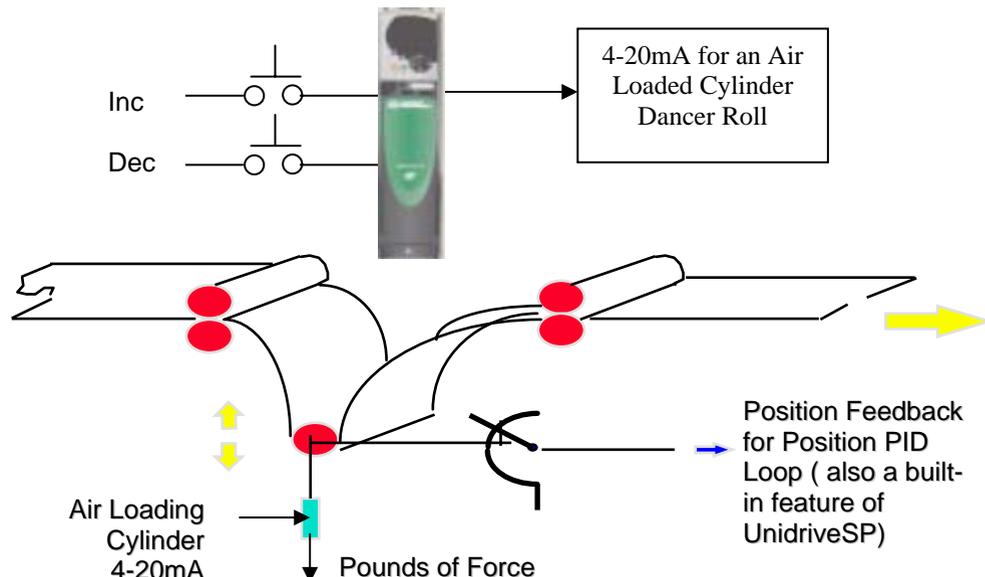
The applied voltage to the motor determined the rate of increase/decrease. The motor would in turn adjust the shaft of a pot or group of pots. The pot could be adjusting line speed of a process for instance. This permitted Increase/Decrease buttons to be paralleled throughout the process line and thereby give the Operator ability to adjust the line speed in many different convenient locations, whereby distributed pots would not.

The MOP had memory such that if the line were to be turned off for the evening, the MOP motor would be in the same position as it was in prior to powering off. In some cases, it would be desirable to always return the MOP to zero upon application of power or external command. Additionally, the MOP can be setup to only operate if the drive is in a run mode.

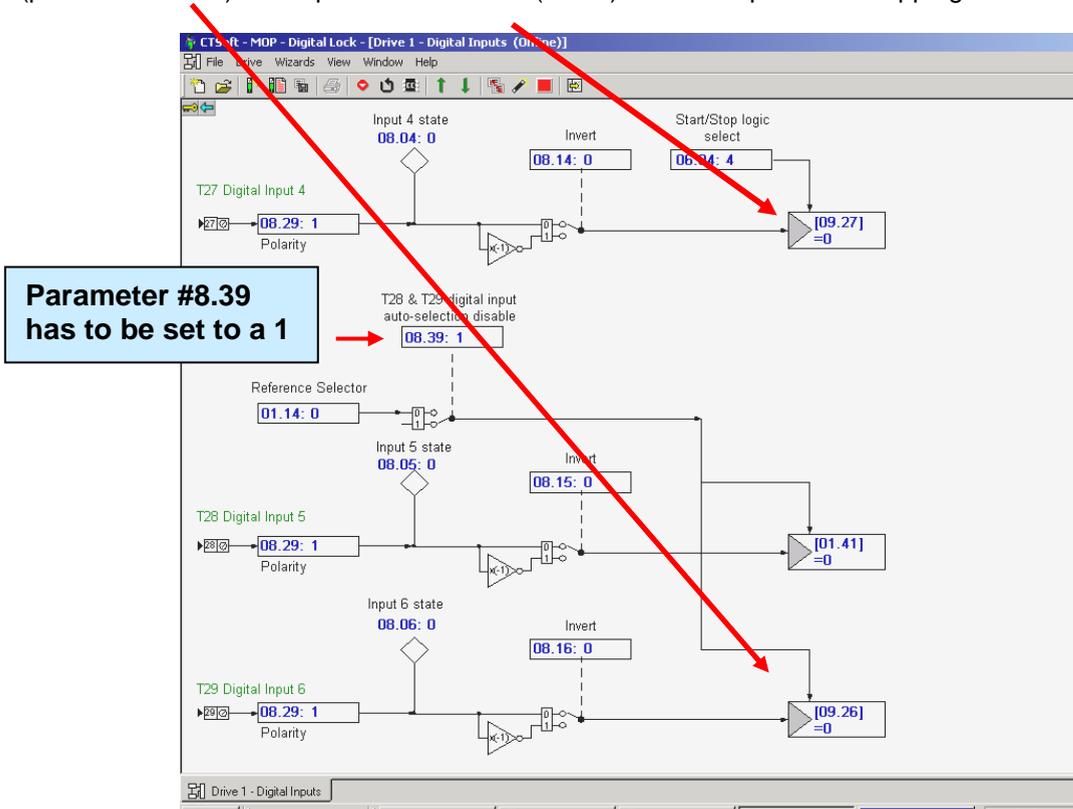
The MOP function within the UnidriveSP has all these features plus a few additional. This article will explore a few typical applications of the MOP.

Example 1

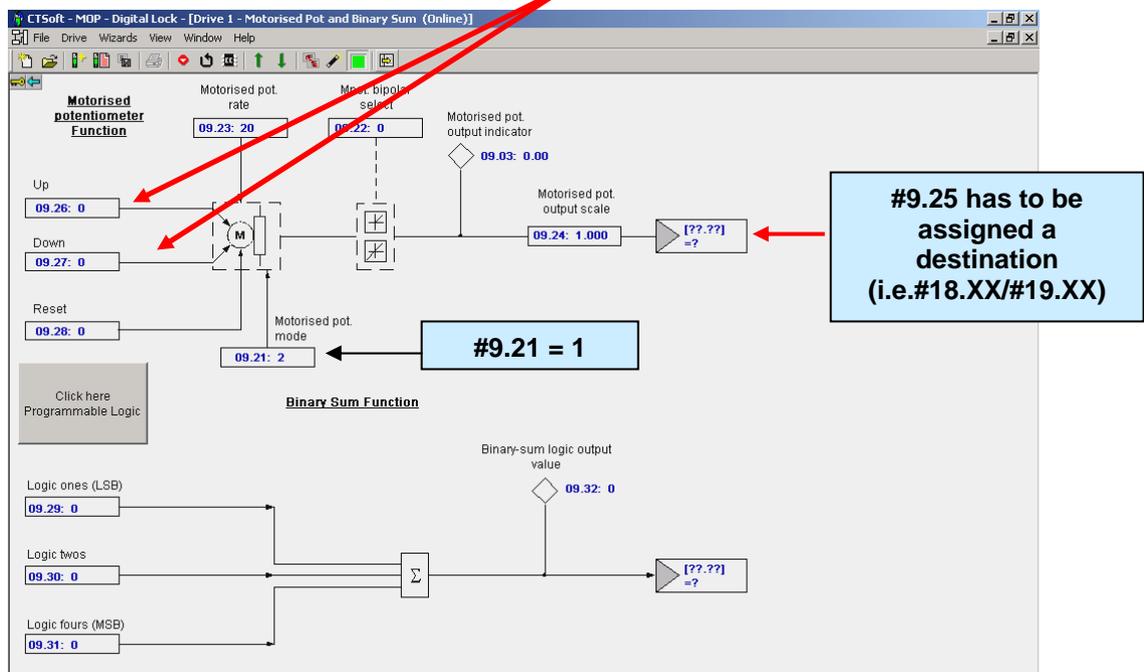
A customer once needed a 4-20mA signal that would control the air-loading cylinder on a dancer roll. His desire was to provide Tension Increase/Decrease pushbuttons for his Operator to adjust this material Tension.



First we must assign 2 inputs as the Increase and Decrease function. In this example, I've selected Input 4 and Input 6 respectively (pins 27 and 29 respectively). Mapping Input 6 to the MOP Increase (parameter #9.26) and Input 4 to Decrease (#9.27) will accomplish this mapping.

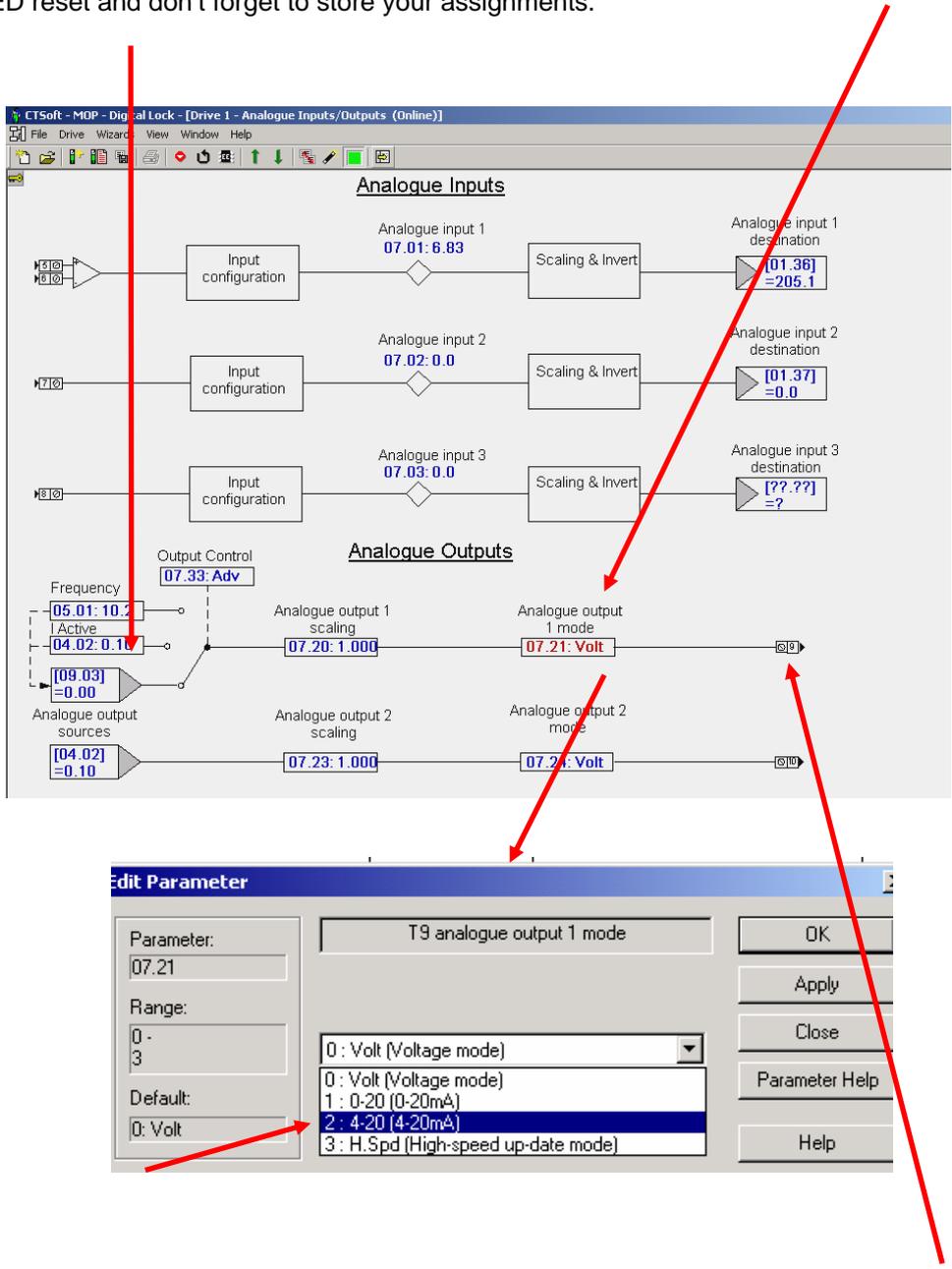


One can check the operation of these inputs now by depressing the RED reset button on the front of the UnidriveSP and observing #9.03 while depressing the newly assigned INC/DEC buttons.



Parameter #9.03 should tumble between 0 and 100.0 and cover this span in 20 seconds per #9.23.

Now to get the 4-20mA output signal is a snap. Simply select an analog output (in our case we selected DAC1) and select #9.03 as its' source signal to convert. Select the DAC mode as 4-20mA , depress RED reset and don't forget to store your assignments.

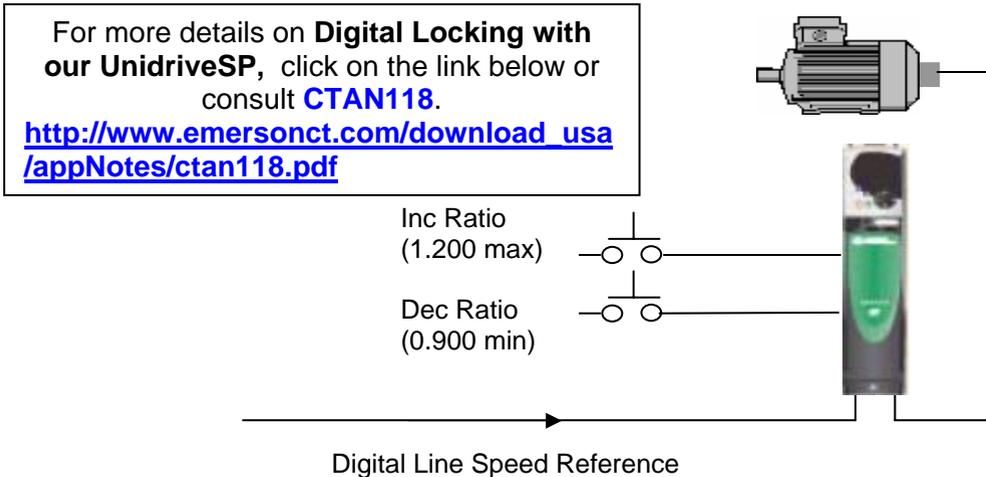


This would complete this scenario with pin 9 providing a Ramped 4-20mA output signal under control of Increase/Decrease Operator pushbuttons.

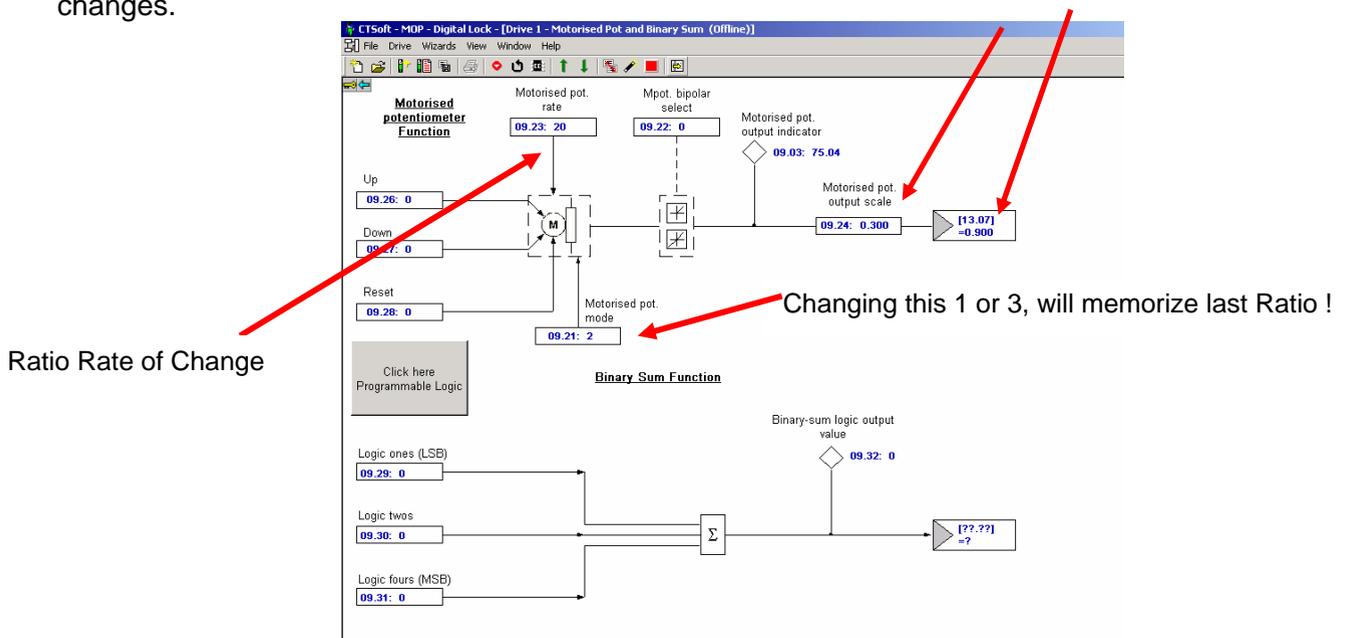
Example 2

A customer wanted to use the Digital Locking feature within UnidriveSP and wanted to use Increase/Decrease to adjust the Draw Ratio. He wanted a relatively slow adjustment of the Ratio so that the material he was producing is not manipulated too quickly. He also wanted a maximum Draw of 20% or Draw Ratio of 1.200 and a minimum ratio of 0.9 (asymmetrical).

Once again, this presents a good application for the built-in MOP function.

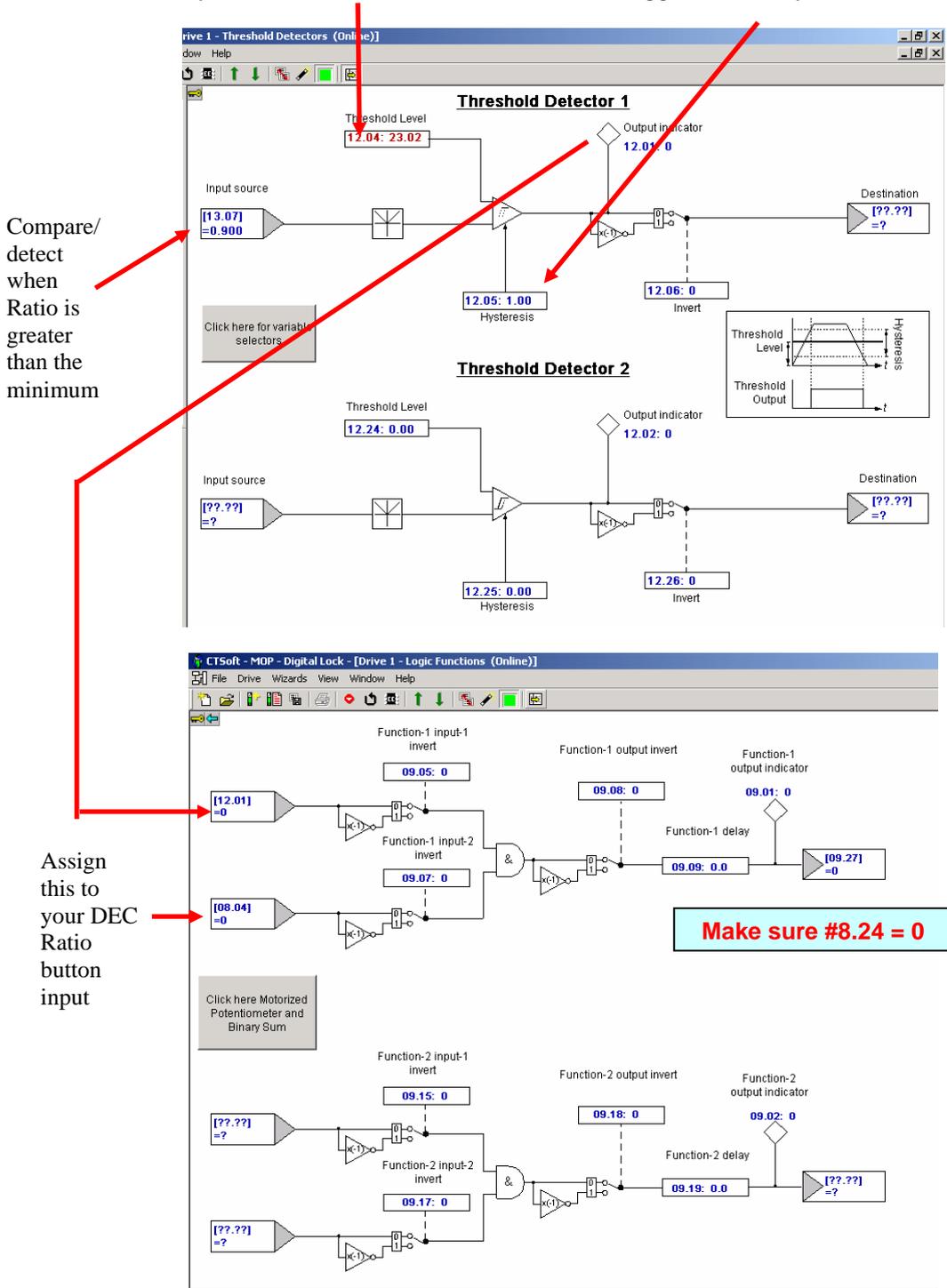


As far as the assignment of the Increase/Decrease pushbuttons, that would be the same as covered in Example 1. However, in this example the result of the MOP must be directed to the Ratio parameter #13.07 by #9.25. Since #13.07 can be a 4.000 at maximum, 100% from the MOP (in #9.03) will cause a 4.000 when #9.03 is at 100%. So if we want 1.200 as a maximum we should set the MOP scaler #9.24= 0.3 (1.2/4 = 0.3). To make these assignments depress RED reset button on the front of the UnidriveSP following these changes.

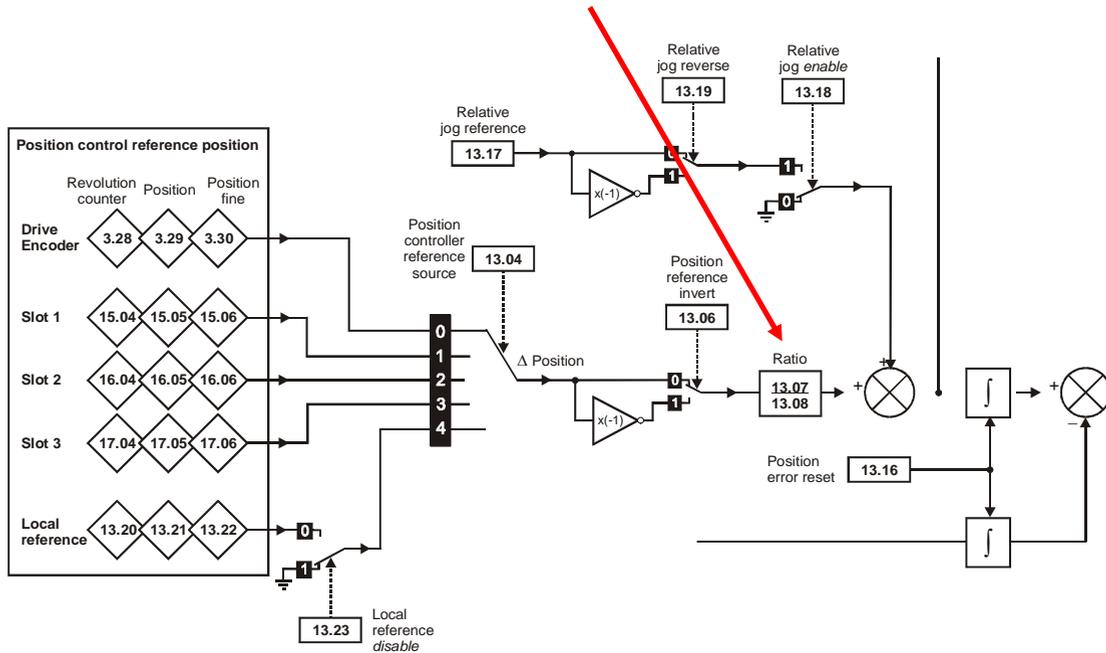


As far as taking care of the minimum ratio however, this is another matter which will take more thought. We could use yet another one of the “built-in” features of the UnidriveSP, that is the Threshold Comparators in menu 12. If we could detect when the ratio becomes below a minimum setting, we could inhibit further down action from the MOP. But how can we inhibit ? Well, once again, thanks to the “built-in” logic gates we could simply AND the DEC button with this <Min Ratio and direct this result to the DOWN input of the MOP.

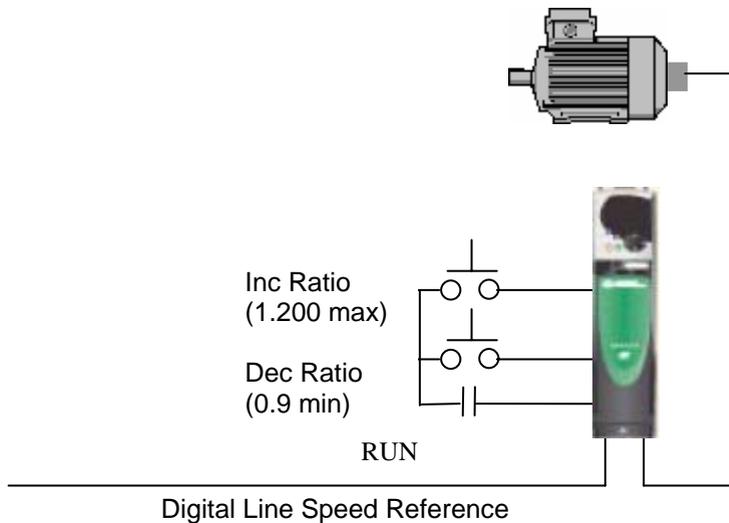
For this example, it was given that the minimum ratio was 0.9. This is 0.9/4.0 or 0.225 or 22.5% of the maximum of the Ratio parameter #13.07. Therefore, we could set a Threshold Comparator to 23% which would yield 0.90 for a minimum ratio. I would suggest a 0 for hysteresis in this application.



Depress RED reset to make you assignments take effect. One can check the operation by observing #13.07 while depressing the newly assigned INC/DEC buttons. The rate of Ratio change can be altered by parameter #9.23. Depress RED reset and don't forget to store your assignments.



Keep in mind that the output of the MOP is active at all times while power is on. This would mean that the INC/DEC button would be active even though the Drive is not in Run or running at some speed. This may not be desirable. To prevent this MOP action when the drive is not in RUN one could either use the built-in programmable AND gates within the UnidriveSP or place a RUN contact (from the built-in relay) in series with the INC/DEC buttons.



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