

This Application Note is pertinent to the Unidrive Family

Using the MOP within Unidrive

The Unidrive 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).

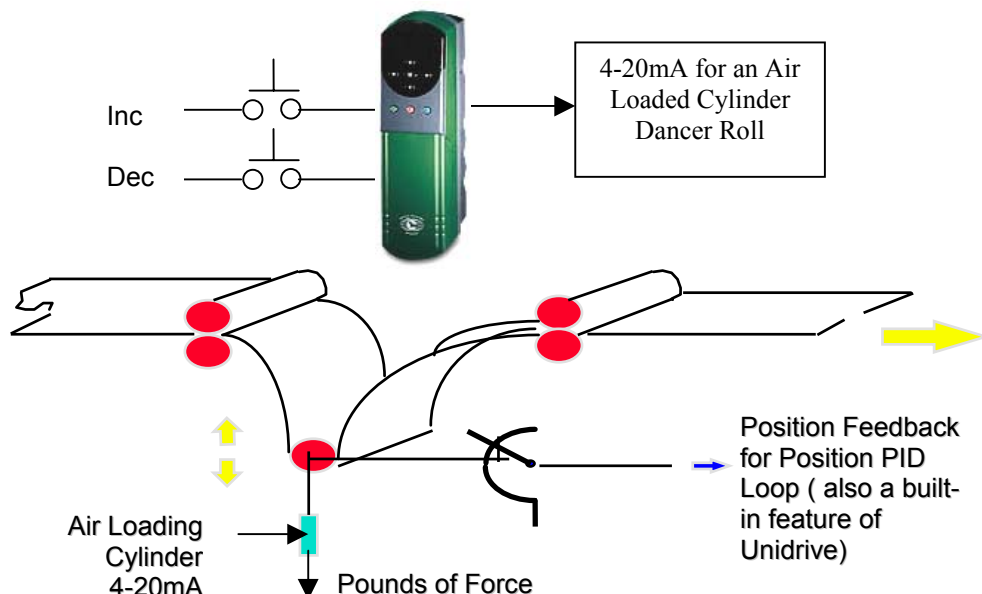
The rate of increase/decrease was determined by the applied voltage to the motor. The motor would in turn adjust the shaft of a pot or group of pots. The pot could be adjusting line speed of a process for instance. This permitted Increase/Decrease buttons to be paralleled throughout the process line 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.

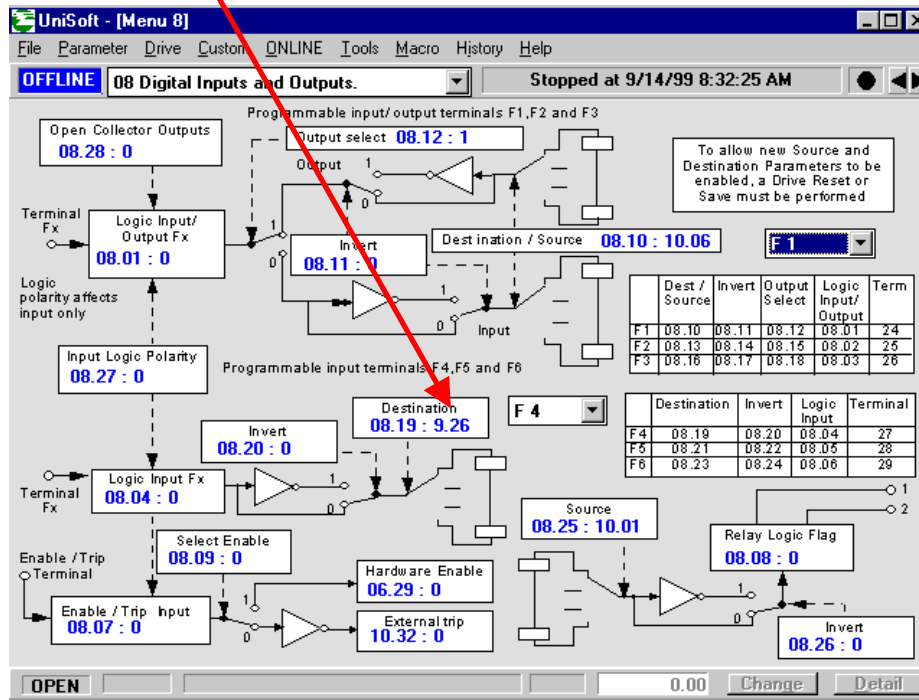
The MOP function within the Unidrive has all these features plus a few additional. This article will explore a few typical application of the MOP.

Example 1

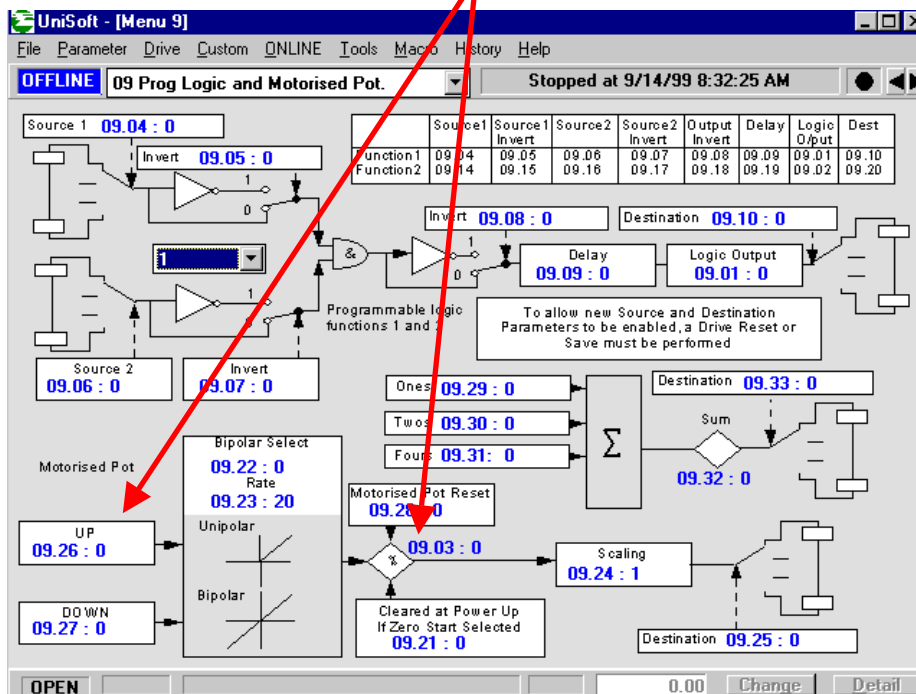
A customer once needed a 4-20mA signal that would control the air loading cylinder on a dancer roll. His desire was to provide Tension Increase/Decrease pushbuttons for his Operator to adjust this material Tension.



First we must assign 2 inputs as the Increase and Decrease function. In this example, I've selected F4 and F5 respectively (pins 27 and 28 respectively). Mapping F4 to the MOP Increase (parameter #9.26) and F5 to Decrease (#9.27) will accomplish this mapping.

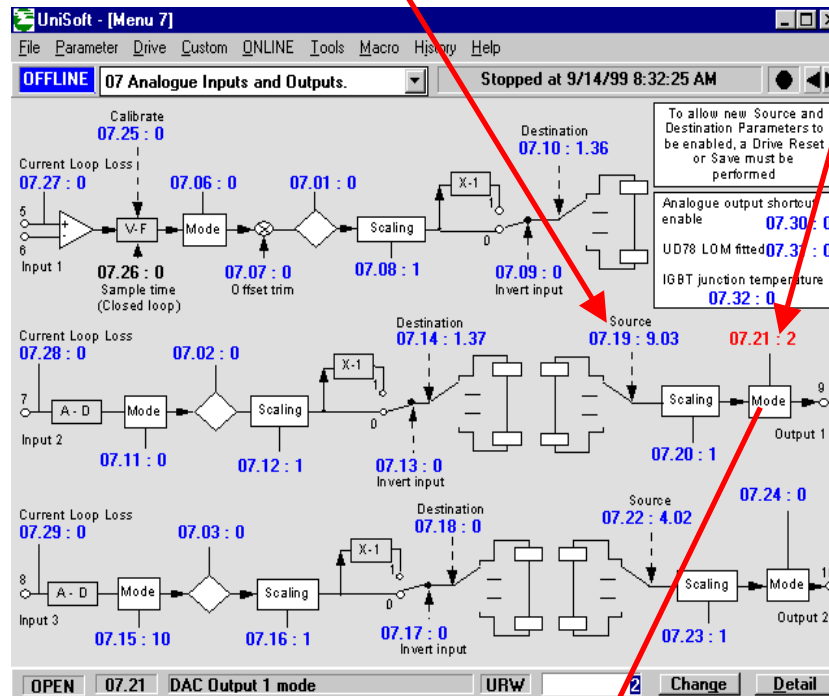


One can check the operation of these inputs now by depressing the RED reset button on the front of the Unidrive and observing #9.03 while depressing the newly assigned INC/DEC buttons.



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.



Detail for Menu 7 Parameter 21

Notes Search

MENU 07 21

PARAM DAC Output 1 mode

Type: URW

Default: 0

Range: 2

Units: 2

Change 07.21 Close

These parameters can configure the DAC outputs in three different ways.

Mode	Output range	Output range
0	VOLT	Output range ±10V.
1	0 - 20	Output range 0 - 20 mA.
2	4 - 20	Output range 4 - 20 mA.

In modes 1 and 2 negative values in a source parameter will be treated as zero. Analogue outputs are updated every 8ms.

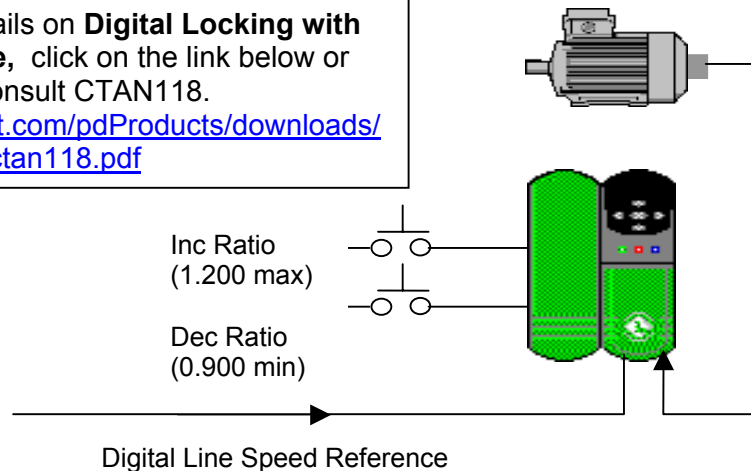
This would complete this scenario with pin 9 providing a Ramped 4-20mA output signal under control of Increase/Decrease Operator pushbuttons.

Example 2

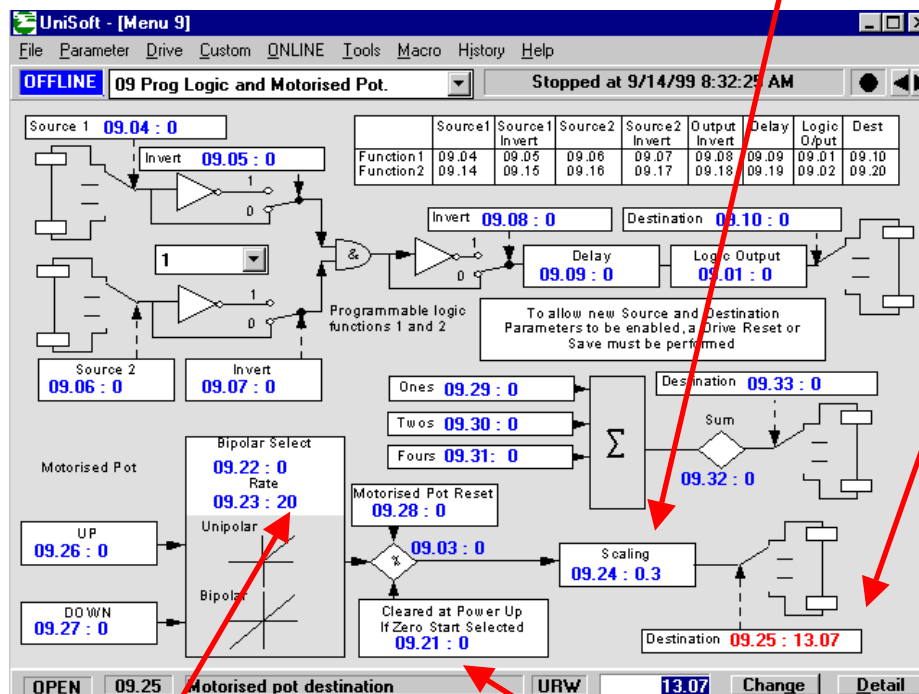
A customer wanted to use the Digital Locking feature within Unidrive and wanted to use Increase/Decrease to adjust the Draw Ratio. He wanted a relatively slow adjustment of the Ratio so that the material he was producing is not manipulated too quickly. He also wanted a maximum Draw of 20% or Draw Ratio of 1.200 and a minimum ratio of 0.9 (asymmetrical). Once again, this presents a good application for the built-in MOP function.

For more details on **Digital Locking with our Unidrive**, click on the link below or consult CTAN118.

www.emersonct.com/pdProducts/downloads/appNotesPDF/ctan118.pdf



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 Unidrive following these changes.

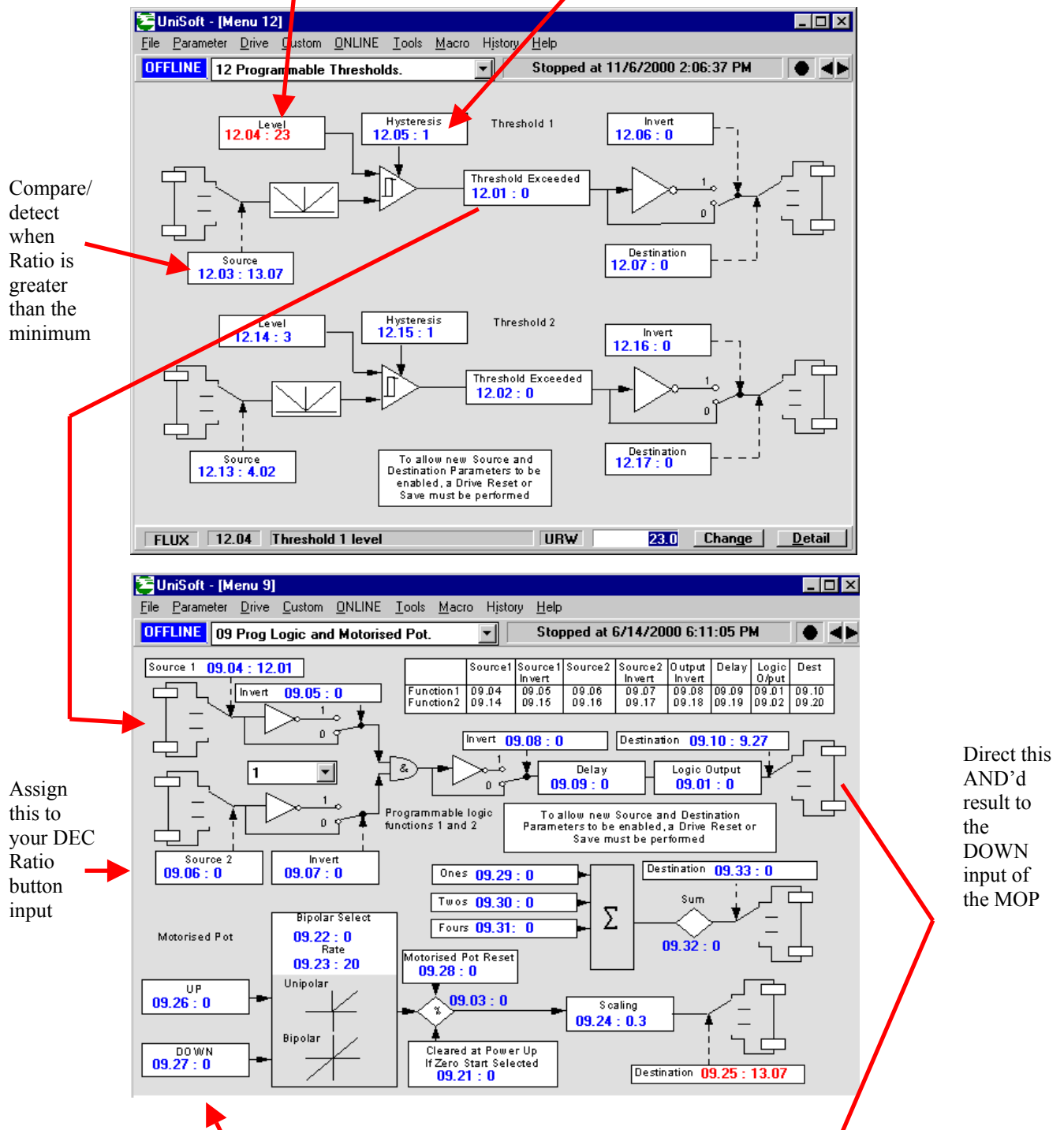


Ratio Rate of Change

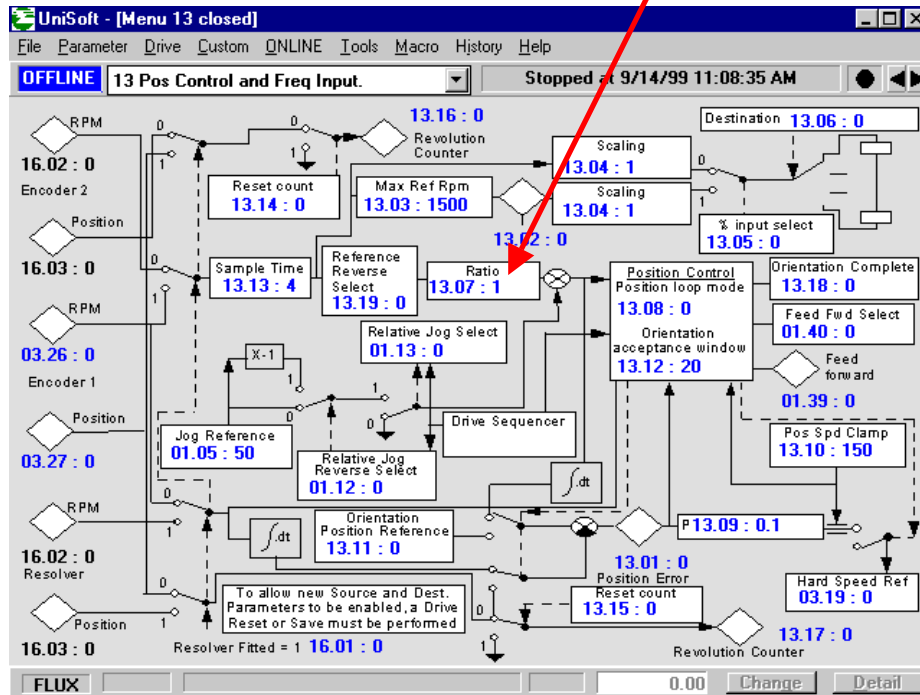
Leaving this 0, will memorize last Ratio !

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 Unidrive, 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.

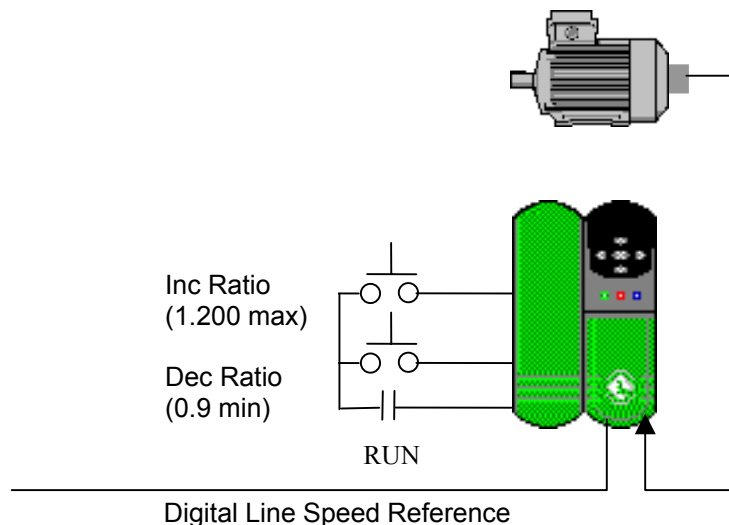
For this example, it was given that the minimum ratio was 0.9. This is $0.9/3.9$ or 0.23 or 23.0% of the maximum of the Ratio parameter #13.07 (we use 3.9 instead of 4 because what gets multiplied internally is $255/256$ of 4). Therefore, we could set a Threshold Comparator to 23% which would yield 0.90 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 Unidrive or place a RUN contact (from the built-in relay) in series with the INC/DEC buttons.



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