This Application Note is pertinent to the Mentor MP Family

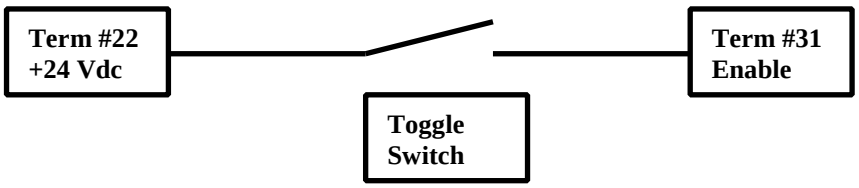
Quick Start Guide for Mentor MP

Basic Set Up

The purpose of this guide to provide quick method of starting up a Mentor MP DC Drive. When set to "USA defaults", the drive is preset to armature voltage feedback (500 Vdc) and field voltage regulation (300 Vdc). These levels are for 460 Vac line operation and should be changed to the appropriate levels for other line and motor voltage levels. Other than these and a few others discussed below, **no other** parameters need to be adjusted to verify basic operation. Things like speed feedback devices, extended speed and field current operation should only be added **AFTER** successfully running the motor in armature feedback and field voltage regulation**!!**

Drive Control Connections

At this point, KEEP it simple, we are just trying to verify drive / motor operation



All we need now is a toggle switch (NOT a piece of wire) to enable the drive since we are going to start and stop and set the speed from the keypad. This switch will be opened and closed multiple times during this set up.

At this point, the motor armature and field connections can be made. Also on the auxiliary terminal strip (lower left hand corner of the drive), L11 to L12 should be connected together and E1 and E3 should be connected to L1 and L3 respectively with the appropriate fusing-- See User Guide.

Previous to running the drive, reset the drive to factory USA Defaults following the procedure below: (Note: On power up you may get a th trip ignore it – press the mode, resetting to USA defaults should eliminate the trip)

1. **Ensure the drive is disabled, display should read "inh"**
2. **Set SE00 to "USA"**
    a. **Note: If drive display shows "0.xx" and not "SExx", then navigate to Pr. 0.00 and set it to "USA"**
3. **Press the red Stop / Reset button on the front of the drive**
4. **Set SE00 (or 0.00) to SAVE**
5. **Press the red Stop / Reset button on the front of the drive**

Ensure the motor / machine can be operated safely at this point

Below is a table of **THE ONLY PARAMETER Changes** that need to be set.

*Parameter #	Description	Default	Change to
in01 (0.81,7.15)	Analog 3 mode	th	volt
SE00 (0.21,X.00)	Parameter zero	0	0
SE01 (0.22,1.07)	Minimum Reference Clamp	0 rpm	0 rpm
SE02 (0.23,1.06)	Maximum Reference Clamp	1000 rpm	Set to motor rated speed from motor nameplate
SE03 (0.24,2.11)	Acceleration Rate	5 sec	5 seconds to maximum speed
SE04 (0.25,2.21)	Deceleration Rate	5 sec	5 seconds to maximum speed
SE05 (0.26,1.14)	Reference Selector	A1.A2 (0)	Pad(4)
SE06 (0.27,5.09)	Motor Rated Armature Voltage	500 Vdc	Set to **motor nameplate** Rated Armature Voltage
SE07 (0.28,5.07)	Motor Rated Current	Drive max	Set to **motor nameplate** Rated Armature Current
SE08 (0.29,5.08)	Motor Rated Speed	1000	Set to **motor nameplate** rated/nominal speed (*NOT Max Speed*) Typically **1750**
SE10 (0.31,5.70)	**Motor Rated Field Current**	**Leave at max**	**This will be set later in this procedure**.
SE11 (0.32,5.73)	Motor Rated Field Voltage	300 Vdc	Set to **motor nameplate** Field Voltage
SE12 (0.33,5.77)	Enable Field control	OFF	ON -- This will turn on the field regulator
SE13 (0.34,5.12)	Auto Tune	0	Set to 1 -- Static auto tune To begin the Autotune, close the Drive Enable terminal, and press the Green start button on the keypad. When finished, measure the Field voltage. It should be approximately 25% of whatever you put into SE11 above.
SE14 (0.35,11.44)	Security Level	L1	Will be set to L2 later on in this procedure

Running The Drive

Since we set SE13 to a 1 (static tune), the first time we start the drive (green button on the keypad) the drive will run a short test to measure the armature inductance and resistance and then set the current and field loop gains.

1. Before beginning, set SE14 to “L2”. This will permit access to all of the drive’s Menus and Parameters.
2. At this point, the drive display will show “**inh**”. Close the enable toggle switch, it should change to “**rdy**”.
3. Press the Green Start button, the drive should go into its auto tune routine (will flash “auto Tune). When tuning is complete, drive will go back into the inhibit “inh” state.
4. Open and close the enable – drive should go to the “rdy” state.
5. Press the green start button and set the speed to 50 rpm using the up arrow.
6. Check the direction of motor rotation for the correct machine direction.
7. If the rotation is ok, run the motor to full speed and measure the motor armature voltage. It should be 10-20 Vdc less than the value set in SE06(Pr. 0.27).
8. If everything runs ok, set parameter #5.26, continuous auto tune to “ON”, save the parameters in the drive by setting parameter 0.00 to “Save”. Press the red Stop/Reset button.
9. Power down the drive.

Setting up the Field Regulator

Since we now have the motor running ok, we can set up the Field Current regulator. To do this we need the **Motor Nameplate** information. Most US made motors will have two (and possibly more if the motor can be field weakened) ratings, one for 300 Vdc connections (series connection) and one for a 150 Vdc connection (parallel connection). The lower current level is normally the high voltage field and the higher current level is the low voltage field connection (will be a 2 to 1 ratio, i.e. 1 amp vs 2 amps).

1. Set Pr. 5.70 to the appropriate current level
2. Set parameters #5.75 to “OFF” (enables current control)
3. Press the red drive stop / reset button
4. View parameter #5.56, this is the field current feedback register and should be reading approximately 25% of what you set in parameter #5.70
5. Press the green start, then the stop. The reading in parameter #5.56 should go to the same value that is in #5.70 for approximately 30 seconds and then drop back to the lower field economy level (25% by default). Also at this time the field voltage should be between 250 to 300 Vdc depending upon the temperature of the motor (half of those values for a 150 Vdc field).
6. If everything works ok, save the parameters in the drive by setting parameter #5.00 to save, then press the red stop button. The display should go back to NO Act.
7. Power down the drive.

Setting up for Speed Feedback

The Mentor MP can accommodate tachometer or encoder feedback in addition to the default armature voltage feedback.

Tachometer Setup

1. Connect the DC tachometer to terminals #41(+) and #42 (-) per the User Guide.
2. Apply power
3. Set parameter #3.51 to the voltage rating per 1000 rpm (typically 50 volts / 1000 rpm)
4. Press the green start button and set the drive to 50% speed (half of what is set in parameter #5.08 ,motor base speed) using the up / down arrows
5. Check parameter #3.52 (rpm based on the tachometer), it should be reading approximately the same as #5.04 (estimated motor speed).
6. If #3.52 ~= #5.04, then you are ready to switch to tachometer feedback. If they are off, you can adjust the value in parameter #3.51 untill they are close. Note: the polarity should be the same, otherwise the tachometer is backwards.
7. Stop the drive and set #3.26 to “tACHO”
8. Set #3.10 to **0.11** and #3.11 to **0.05** (speed loop gains).
9. Set parameter #5.26 (Continuous AutoTune) = OFF
10. Set parameter #5.12 = 2. This will run the “spinning” autotune function (approximately 25% speed) when the drive is placed in run in step 11 below. The rotating autotune will further tune the motor field settings.
11. Close the Drive Enable switch and then press the Green button to start the drive. The autotune function will run.
12. When the Autotune is completed, the value for 5.12 will revert to “0” (unless the test fails, in which case it will display a trip). This indicates that the test is completed. Turn the Drive Enable switch off, and then back on again.
13. Restart the drive and set parameter #5.26, continuous auto tune to “ON”.
14. Test the drive speed performance by comparing #3.52 (tach speed feedback) and #5.04 (armature back emf). Ideally, these will be very close.
    a. You may need to adjust Pr. 3.10 back to it’s default setting of 0.015 to achieve good speed regulation.
15. Save the parameters in the drive by setting parameter #5.00 to save, then press the red stop button. The display should go back to NO Act.
16. Power down the drive.

Encoder Setup

1. Apply power
2. The Mentor MP is defaulted to a 1024 ppr (pulses per revolution, pre quadrature) , AB type, differential, 5 Vdc encoder. If the encoder is different than that:
    a Adjust parameter #3.34 to the correct ppr.
    b Parameter # 3.36 to the correct voltage (0 = 5 Vdc, 1 = 8 Vdc. 2 = 15 Vdc and 3 = 24 Vdc)
    c Parameter #3.38 to the correct type. Also parameter #3.38 = 0, if the encoder power supply is other than 5 or 8 Vdc encoder.
3. Save parameters and remove ac power.
4. Connect the encoder to the drive per the User Guide
5. Re-apply power
6. Press the Green, Start button on the keypad and increase the speed until it is approximately 50% of the motor rated speed.
7. Check parameter #3.27, it should be reading approximately the same as #5.04 (estimated motor speed) in value and polarity. If the polarity is opposite, reverse A and A/.
9. If the speed reading in #3.27 is stable, **stop** the drive and set #3.26 to “drv” , #3.10 to 0.15 and #3.11 to 0.05 (speed loop gains).
10. Turn off Parameter #5.26 (Continuous Auto Tune).
11. Set parameter #5.12 = 2. This will run the the “spinning” autotune function (approximately 25% speed) when the drive is placed in run in step 12 below. It will further tune the motor field settings.
12. Start the drive, the auto tune function will run and then stop displaying the “inh” state. Open and close the enable switch to reset back to the “rdy” state.
13. Restart drive and verify proper operation. If everything looks good, set parameter #5.26, continuous auto tune to “ON”, save the parameters in the drive by setting parameter #5.00 to save, then press the red stop button. The display should go back to NO Act.
14. Set up complete.

The basic Drive Set-Up is complete, the drive can now be setup for external start / stop and speed reference control. See CTAN351 for common examples

Resources: can be found on our website: www.controltechniques.com
For help contact techsupport.cta@mail.nidec.com, or
call Technical Support at 952-995-8000, 24/7/365