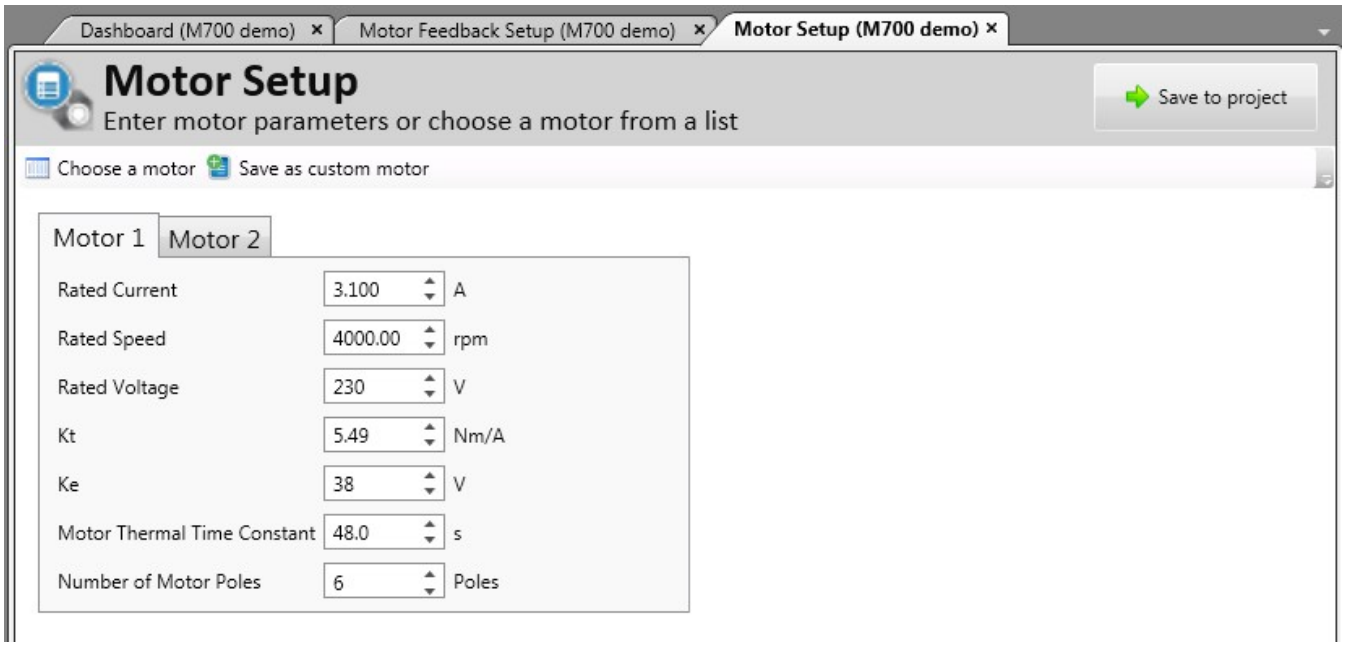
This Application Note applies to M700 – M702 drives

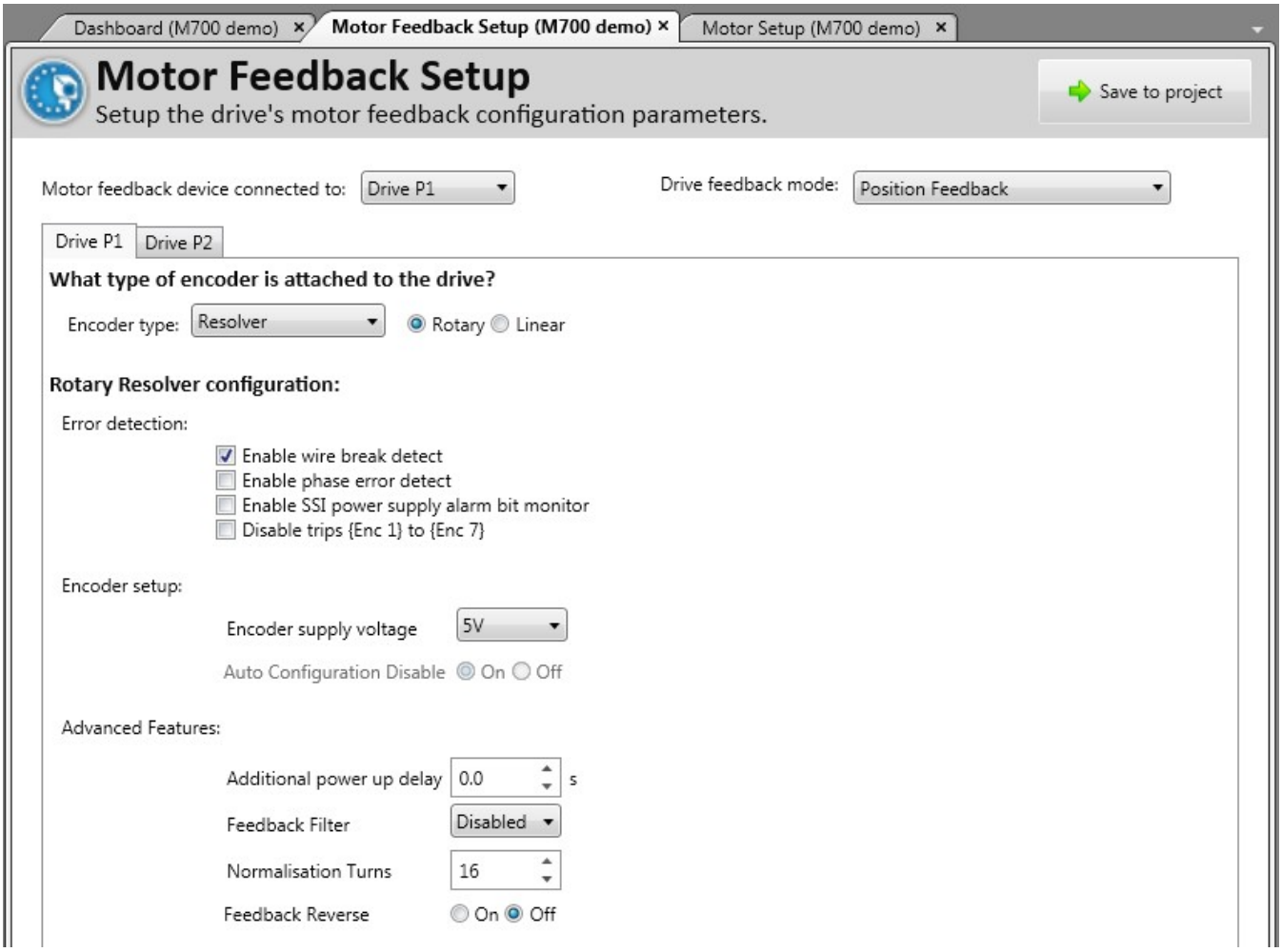
M700 Setup for DX-316 Servo Motor (Resolver feedback)

This application note will show the motor and feedback parameter setup required for a DX-316 servo motor using Unidrive M Connect software when used with a Unidrive M700. Furthermore this application note will focus on motor and feedback setup for the DX-316 servo motor and will assume the drive type and mode of operation have been selected. If needed please refer to application note AN0009 M700 Demo Basic Drive Motor Setup using M Connect Software for selecting the drive type and mode of operation. It is also assumed that the motor power and P1 feedback wiring have been completed in accordance with the M700 Control User Guide. An Ethernet patch cable connected to a M700 demo unit with a PC static IP address set to IP address 192.168.1.100 was used for demonstration purposes and all live screen captures in this document.

First enter the DX-316 motor setup shown below. If you think this DX-316 motor setup may be useful in future applications you can select ‘Save as custom motor’ to add this motor to the drop down list. When finished click on ‘Save to Project’.



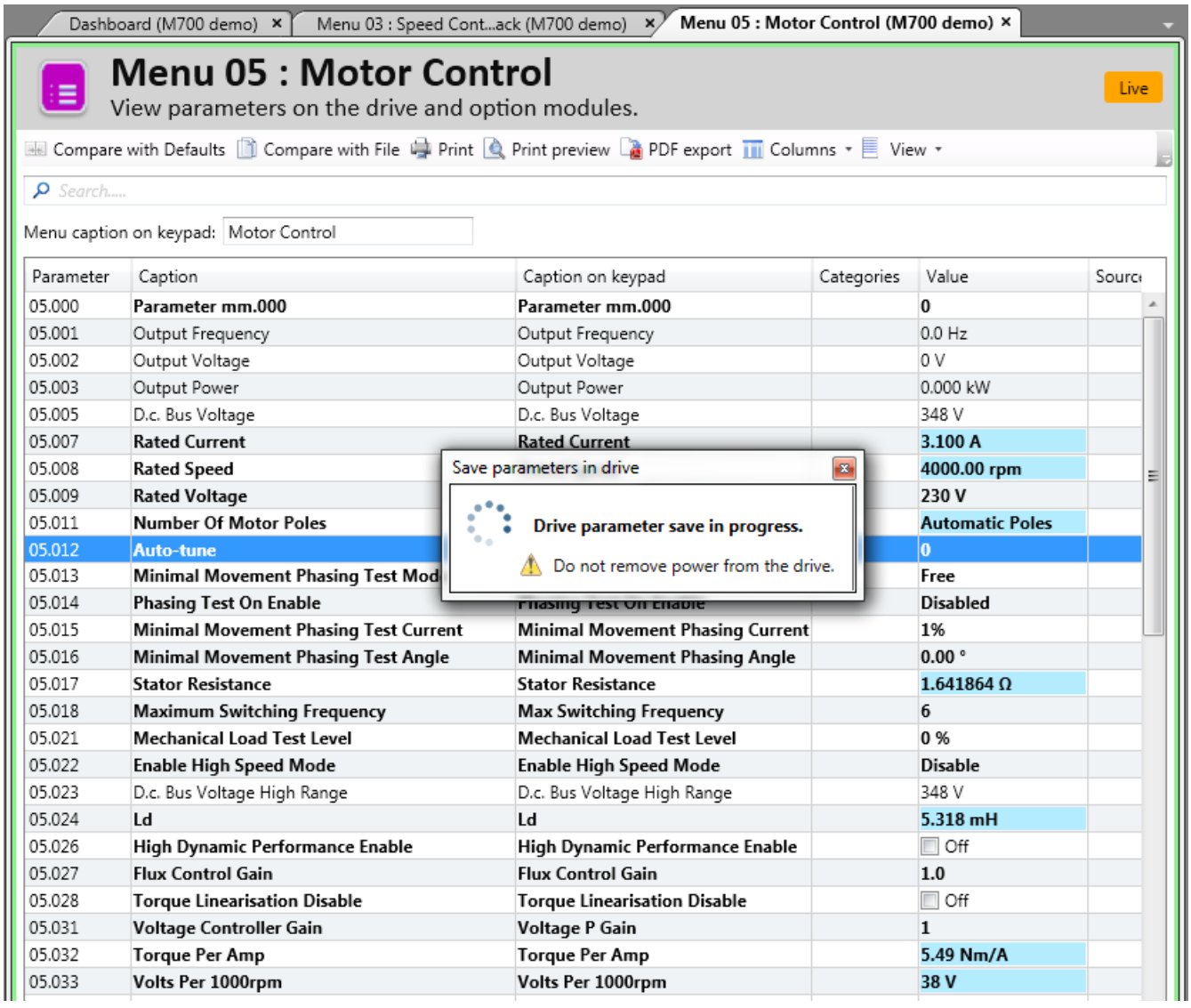
Enter the Motor Feedback Setup Encoder type Resolver and click on ‘Save to project’.



Once Resolver feedback has been selected open Menu 3 Parameters and set up the P1 Resolver Poles Pr 03.065 and P1 Resolver Excitation Pr 03.066 as shown below.

Parameter	Caption	Caption on keypad	Categories	Value	Source/
03.038	**P1 Device Type**	**P1 Device Type**		**Resolver**	
03.039	**P1 Termination Select**	**P1 Termination Select**		**1**	
03.040	**P1 Error Detection Level**	**P1 Error Detection Level**		**0 0001**	
03.041	**P1 Auto-configuration Select**	**P1 Auto-config Select**		**Enabled**	
03.042	**P1 Feedback Filter**	**P1 Feedback Filter**		**Disabled**	
03.043	**P1 Maximum Reference**	**P1 Maximum Reference**		**3000 rpm**	
03.044	**P1 Reference Scaling**	**P1 Reference Scaling**		**1.000**	
03.045	P1 Reference	P1 Reference		0.0 %	
03.046	**P1 Reference destination**	**P1 Reference destination**		**0.000**	***Unassig***
03.047	**P1 SSI Incremental Mode**	**P1 SSI Incremental Mode**		Off	
03.048	**P1 SSI Binary Mode**	**P1 SSI Binary Mode**		Off	
03.049	**P1 Additional Power-up Delay**	**P1 Additional Power-up Delay**		**0.0 s**	
03.050	**P1 Feedback Lock**	**P1 Feedback Lock**		Off	
03.051	**P1 Linear Feedback Select**	**P1 Linear Feedback Select**		Off	
03.052	**P1 Linear Comms Pitch**	**P1 Linear Comms Pitch**		**0.001**	
03.053	**P1 Linear Line Pitch**	**P1 Linear Line Pitch**		**0.001**	
03.054	**P1 Linear Comms And Line Pitch Units**	**P1 Lin Comms & Line Pitch Units**		**millimetres**	
03.055	**P1 Pole Pitch**	**P1 Pole Pitch**		**10.00 mm**	
03.056	**P1 Feedback Reverse**	**P1 Feedback Reverse**		Off	
03.057	**P1 Normalisation Turns**	**P1 Normalisation Turns**		**16**	
03.058	P1 Normalised Position	P1 Normalised Position		189038612	
03.059	P1 Normalised Marker Position	P1 Normalised Marker Position		0	
03.060	**P1 Calculation Time**	**P1 Calculation Time**		**5 µs**	
03.061	**P1 Recovery Time**	**P1 Recovery Time**		**30 µs**	
03.062	P1 Line Delay Time	P1 Line Delay Time		143 ns	
03.063	P1 Low Speed Update Rate Active	P1 LowSpd Update Rate Active		Off	
03.064	P1 Encoder Protocol Detected	P1 Enc Protocol Detected		None	
03.065	**P1 Resolver Poles**	**P1 Resolver Poles**		**2 Poles**	
03.066	**P1 Resolver Excitation**	**P1 Resolver Excitation**		**8kHz 2V**	

The motor is now ready for Autotune. Make sure the motor is disconnected from the load with nothing connected to the motor shaft. With the drive disabled and Run commands all off go to parameter Pr 00.0040 either via the drive keypad or using MConnect and change this to 2. Close the drive Enable contact and turn Run Forward On. This will initiate a rotating Autotune needed to find the Position Feedback Phase Angle 03.025. Once a successful Autotune has been completed with no drive trips the Position Feedback Phase Angle 03.025 should have been found by the drive. Turn Run Forward Off and Open the drive enable contact. Now is a good time to save parameters in the drive either via MConnect or via the drive keypad.

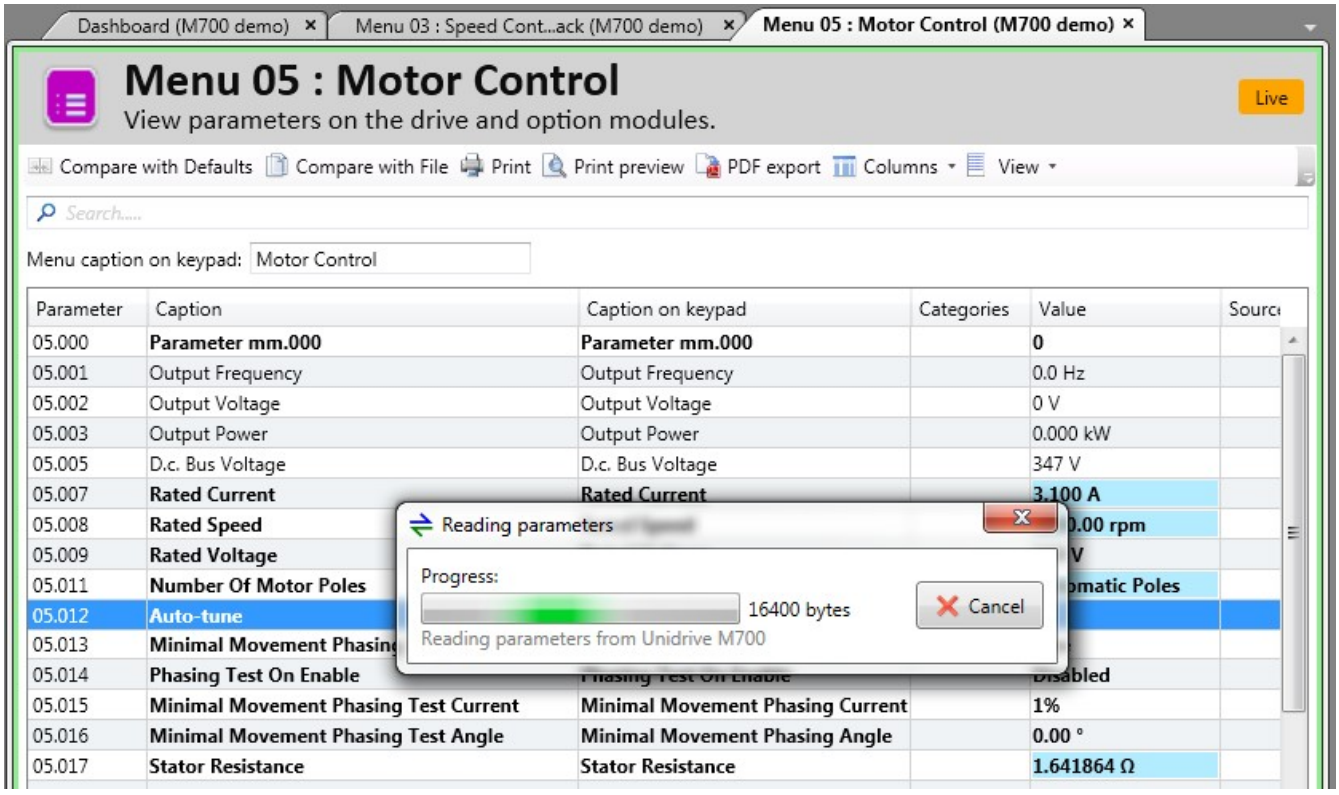


Parameter	Caption	Caption on keypad	Categories	Value	Source
05.000	**Parameter mm.000**	**Parameter mm.000**		**0**	
05.001	Output Frequency	Output Frequency		0.0 Hz	
05.002	Output Voltage	Output Voltage		0 V	
05.003	Output Power	Output Power		0.000 kW	
05.005	D.c. Bus Voltage	D.c. Bus Voltage		348 V	
05.007	**Rated Current**	**Rated Current**		**3.100 A**	
05.008	**Rated Speed**			**4000.00 rpm**	
05.009	**Rated Voltage**			**230 V**	
05.011	**Number Of Motor Poles**			**Automatic Poles**	
05.012	**Auto-tune**			**0**	
05.013	**Minimal Movement Phasing Test Mod**			**Free**	
05.014	**Phasing Test On Enable**			**Disabled**	
05.015	**Minimal Movement Phasing Test Current**	**Minimal Movement Phasing Current**		**1%**	
05.016	**Minimal Movement Phasing Test Angle**	**Minimal Movement Phasing Angle**		**0.00 °**	
05.017	**Stator Resistance**	**Stator Resistance**		**1.641864 Ω**	
05.018	**Maximum Switching Frequency**	**Max Switching Frequency**		**6**	
05.021	**Mechanical Load Test Level**	**Mechanical Load Test Level**		**0 %**	
05.022	**Enable High Speed Mode**	**Enable High Speed Mode**		**Disable**	
05.023	D.c. Bus Voltage High Range	D.c. Bus Voltage High Range		348 V	
05.024	**Ld**	**Ld**		**5.318 mH**	
05.026	**High Dynamic Performance Enable**	**High Dynamic Performance Enable**		Off	
05.027	**Flux Control Gain**	**Flux Control Gain**		**1.0**	
05.028	**Torque Linearisation Disable**	**Torque Linearisation Disable**		Off	
05.031	**Voltage Controller Gain**	**Voltage P Gain**		**1**	
05.032	**Torque Per Amp**	**Torque Per Amp**		**5.49 Nm/A**	
05.033	**Volts Per 1000rpm**	**Volts Per 1000rpm**		**38 V**	

The motor is now ready for use. If the gains appear to be aggressive you can lower gain values in the Current and Speed loops. Below are gains that were decreased after Autotune and used with an unloaded DX-316C servo motor.

Parameter	Caption	Categories	Offline Value	Default Value
03.010	Speed Controller Proportional Gain Kp1		0.0050 s/rad	0.0100 s/rad
03.038	P1 Device Type		Resolver	AB Servo
03.066	P1 Resolver Excitation		8kHz 2V	6kHz 3V
04.013	Current Controller Kp Gain		15	150
04.014	Current Controller Ki Gain		1031	2000

The final thing to consider is saving your setup to a MConnect project.
Go online with MConnect and select 'Upload from Drive' to save the changes in the drive to a project.



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