

Electromechanical Automation Applications Note



Product: Trilogy coils & Positioners
Rev: 2.0
Subject: Configuring IForce & Ripped Linear servos to P Series with ACR9000

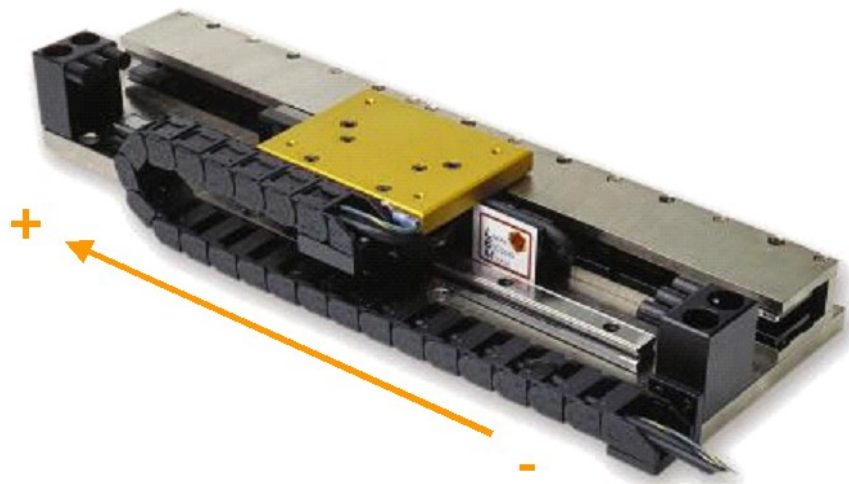
This application note clarifies the connections with the IForce and Ripped motors and positioners to the P Series drives with ACR9000 controller. Parker coils and positioners are supplied with flying lead cables. The new Connector Box option is shown for positioners offering connectorized cables. Version 2.0 of this document and motor files is consistent for standard positive direction (away from the cable exit) as per the catalog and picture below.

1. Wiring

IForce or Ripped coils have different color codes based upon the wiring option (such as WD3 in the part number). I-Force positioners (T1, T2, etc) use coils with WD2 wiring option, a separate MHED module that includes optical limits/ home sensors and magnetic hall-effect feedback, and the encoder readhead and scale.

Limit and home sensor connections to the ACR9000 on-board I/O are:

Trilogy	Color Code Trilogy Positioners	ACR9000 Connection	User Supplied Connections
Limit Power	Orange		+24vdc
Limit Gnd	Violet		24vdc Common
		19, 21, 23	+24vdc Pullup
Home	Brown	20	
-Limit	Light Green	24	
+Limit	Light Blue	22	



Trilogy Coil and Positioner to P Series Wiring

P Series Feedback - Encoder Connector

Pin	Encoder		Temperature		Halls		Function
	LME Magnetic	RGH Optical	Positioners or WD0/1/2/7	WD3/4	All Trilogy Positioners & Coils	except 210 310 410 WD7/C	
14	Brown	Brown	No connection	No connection			+5V
7	White	White					Ground
12	Green	Green					A/
13	Yellow	Yellow					A
11	Blue	Blue					B
10	Red	Red					B/
9	Black	Pink					C
8	Orange	Grey					C/
14							+5V
7							Ground
5							HED C
3							HED B
1							HED A
Case	Shield						Shield

Limits/Home for PD-xxP Indexer

I/O - HD 50pin

Pin	HED Head	Function
21	Orange	+24V
13	Light Green	- Limit
14	Light Blue	+ Limit
22	Brown	Home
	Violet	Ground

← For Pseries Analog Torque or Velocity applications, the limits and home sensors are connected to the controller. External 24volt power supply. Connect this to Pin 21 or 11. This will also pull-up the inputs to 24volts. These are the opposite the default settings for the inputs but configurable in the Pseries Drive Support Tool software.

← External reference for 24volt power supply's (GND or -)

Limits/Home for PD-xxC EtherCAT

I/O - HD 20pin

Pin	HED Head	Function
6	Orange	+24V
11	Light Green	- Limit
12	Light Blue	+ Limit
4	Brown	Home
	Violet	Ground

← For Pseries Analog Torque or Velocity applications, the limits and home sensors are connected to the controller. External 24volt power supply. Connect this to Pin 21 or 11. This will also pull-up the inputs to 24volts. This are default settings for the inputs. These are configurable in the P Series Drive Support Tool software.

← External reference for 24volt power supply's (GND or -)

NOTES:

Temperature wires (yellow and orange for WD0/1/2/7; or gray and violet for WD3/4) are not connected to Pseries drive. Strip all cables back about 12-inches. Put all wires going into the Feedback connector through one piece of heatshrink For ACR9000, put all limit/home wires (Orange, Purple, Brown, Lt Green, Lt Blue) through another piece of heatshrink.

Connect motor cable ground to Pseries heatsink chassis ground.

P Series - Motor Connection

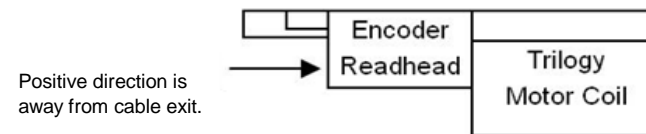
Using Old Color codes

Pin	T1, T2, T3 Positioners 110 210 310 WD0/1/2/7 coils	T4, TR7, TR10, TR16 Positioners R7, R10, R16 Coils ML50 Coils 110 210 310 WD3/WD4 coils	Function
	U	Red & Blue	
V	White & Green	Brown	V
W	Black & Brown	Orange	W
GND	Drain wire (Coils) or Green/Yellow (Positioners)	Drain wire Ground wire	PE

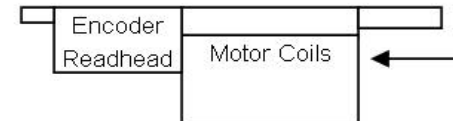
For safety ground for the Ironless linear motors, install a ground wire from P Series ground to the coil bar as per 88-028449-01A installation instructions. New cables include this ground wire in the motor cable and are shown below.

Using New Color codes

Pin	T1, T2, T3 Positioners 110 210 310 WD0/1/2/7/A/C coils	T4, TR7, TR10, TR16 Positioners R7, R10, R16 Coils 410 and ML50 Coils 110 210 310 WD3/4/B coils	Function
	U	Red/Yellow & Blue/Yellow	
V	White/Yellow & Violet/Yellow	Brown/Yellow	V
W	Black/Yellow & Brown/Yellow	Orange/Yellow	W
GND	Green/Yellow	Green/Yellow	PE

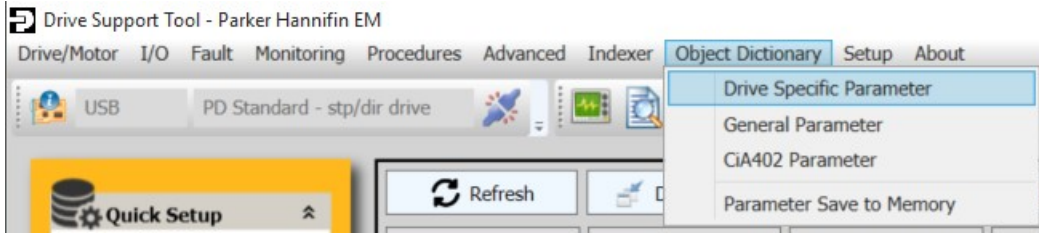


The above connections presumes the motor, readhead and hall cables exit the same direction. For positioners, this is the standard orientation. If the HED is reversed in a custom positioner, consult factory.

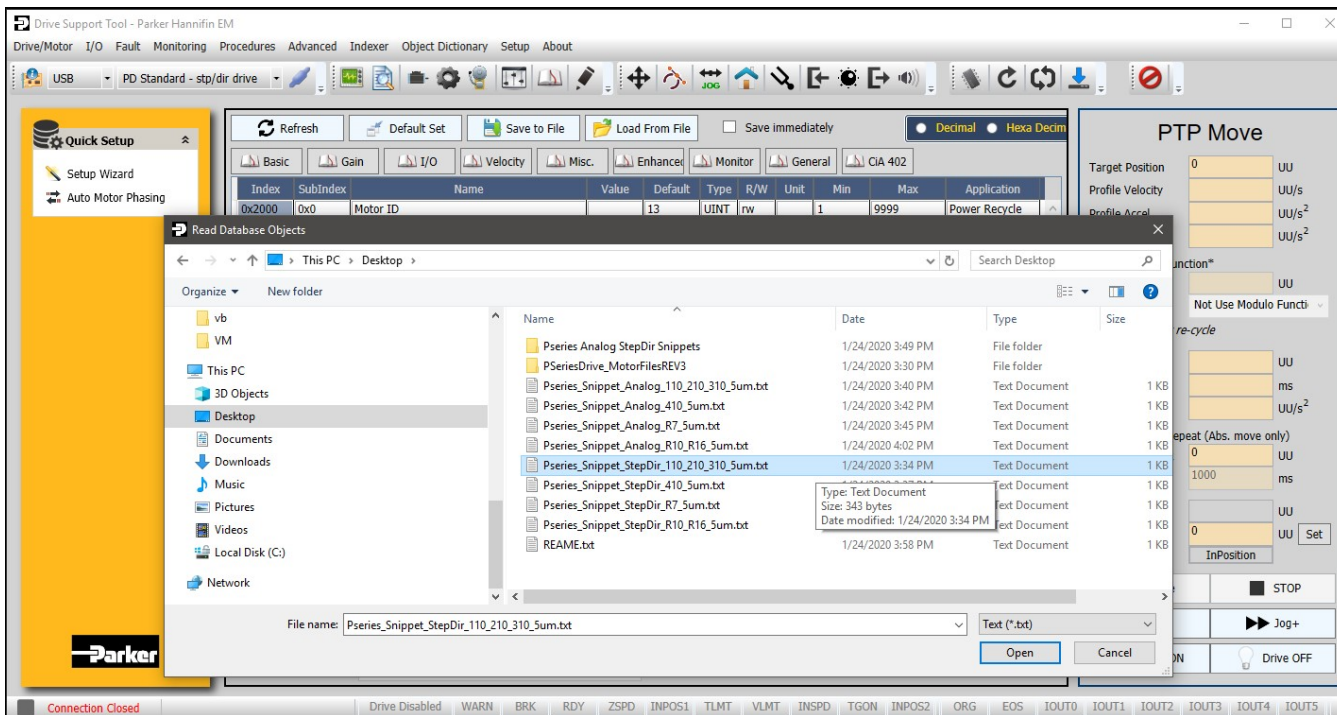


In coil only applications, if the encoder's cable exit faces the opposite way, switch A and A/.

2. P Series Drive Setup



The P Series Indexer (PD-xxP) can be set in different modes: Simple Indexer, Analog Torque, Analog Velocity or Position (5volt Step & direction). Included in the motor files are drive setup files for analog torque or step & direction for the ACR9000. We recommend step & direction to take advantage of the advanced tuning with the Drive Support Tool. The standard cable to connect to the ACR9000 supports both modes.

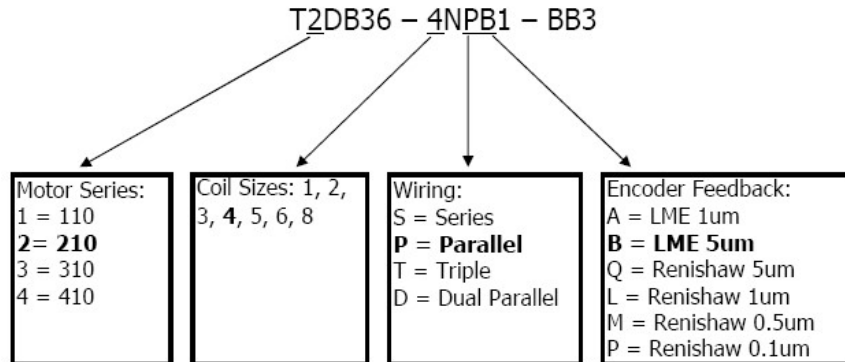


Download the Pseries Analog and Step & Direction Setup files from:

<https://community.parker.com/technologies/electromechanical-group/w/electromechanical-knowledge-base/1814/acr9000-pseries-analog-or-step-direction-samples-notes>

Select file and click Open. See next page for part number explanation.

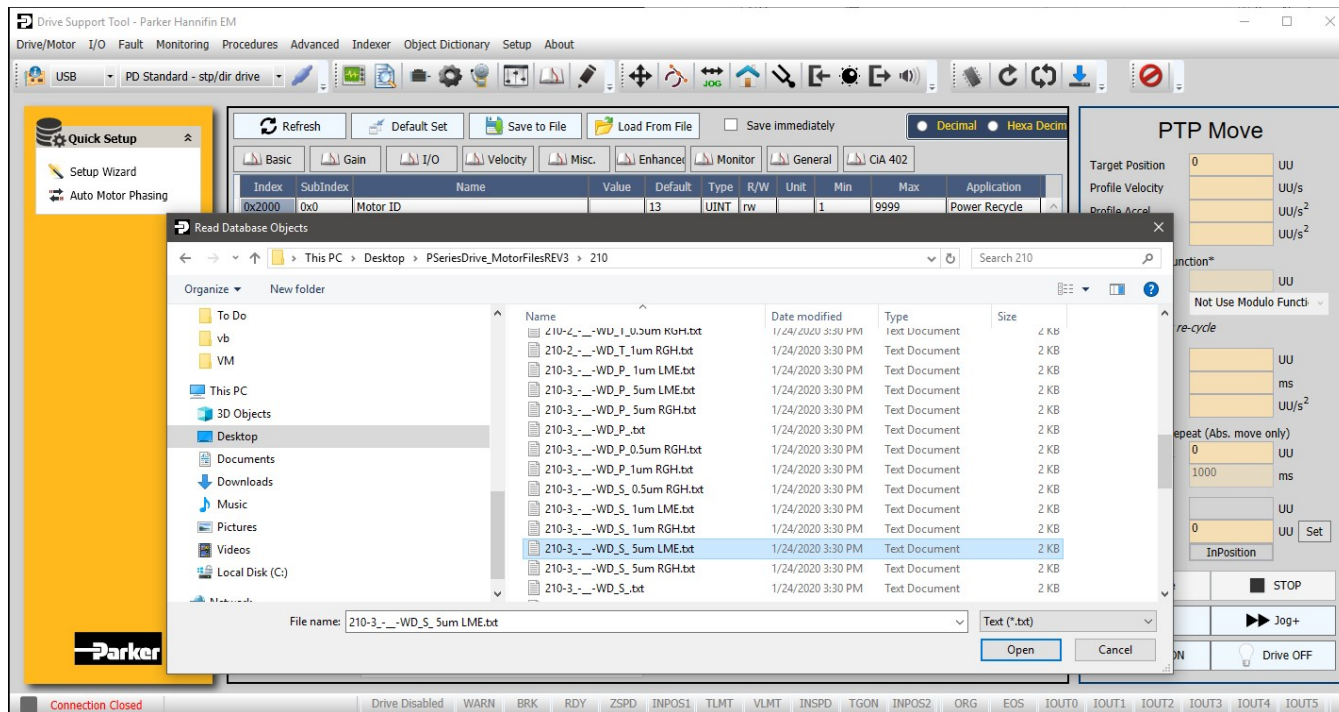
Drive Support Tool allows loading motor files using the I-Force and Ripped series coil part numbers. The Trilogy positioner part numbers contain the coil part numbers. Below shows an example of the I-Force T2 positioner part number and the information pertinent for P Series configuration.



Download the Pseries IForce and Ripped motor files from:

<https://community.parker.com/technologies/electromechanical-group/w/electromechanical-knowledge-base/1572/p-series-drives-with-mpp-be-sm-j-n-servo-motors-msr-lxr-110-210-310-410-t1-t2-t3-t4-linear-motor-stages>

From the Object Dictionary, select Load from File and select your motor file:



For users unsure of their wiring or encoder resolution, consider limiting current to the motor with these objects (in 0.1 of a % so 100 is 10%). Default values are 3000, motor's full peak current (3x continuous).

0x2111,0x0,External Positive Torque Limit Value,100

0x2112,0x0,External Negative Torque Limit Value,100

Then Save to Memory and Software Reset. Motor settings do not take effect until a Save and Software Reset.

Users can then go into the Manual Jog panel, enable the motor with Drive ON and jog the motor. The speed has already been set to 100mm/s.

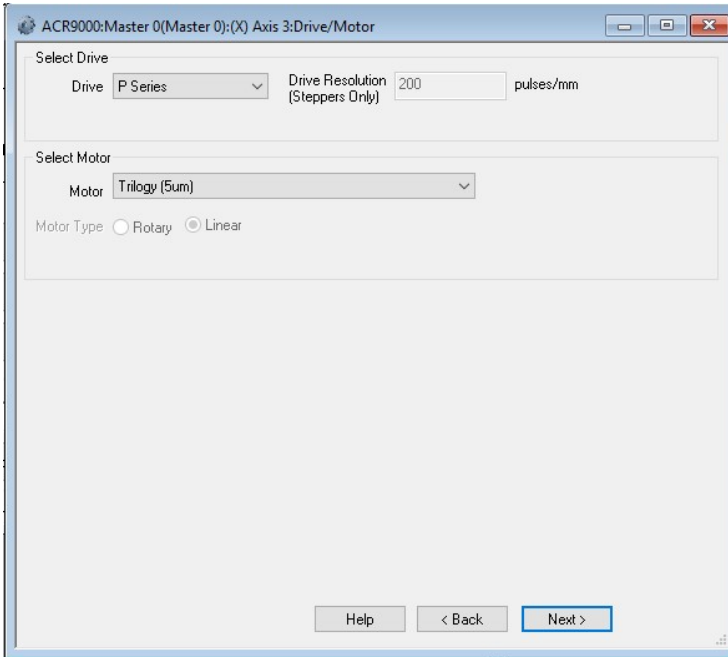
The image shows a 'Manual Jog' control panel with the following elements:

- Speed:** A text input field containing '100' followed by the unit 'rpm(mm/s)'.
- Smoothing:** A group box containing three text input fields:
 - Accel Time:** '200' ms
 - Decel Time:** '200' ms
 - S-curve Time:** '0' ms
- Servo-Lock:** An unchecked checkbox.
- FB Speed:** A text input field containing '0' followed by the unit 'rpm(mm/s)'.
- FB Position:** A text input field containing '10336' followed by the unit 'UU'.
- Control Buttons:** A row of three buttons: 'Read' (with a refresh icon), 'Negative' (with a left-pointing double arrow), and 'Positive' (with a right-pointing double arrow).
- Drive Control:** A row of two buttons: 'Drive ON' (with a lit lightbulb icon) and 'Drive OFF' (with an unlit lightbulb icon).

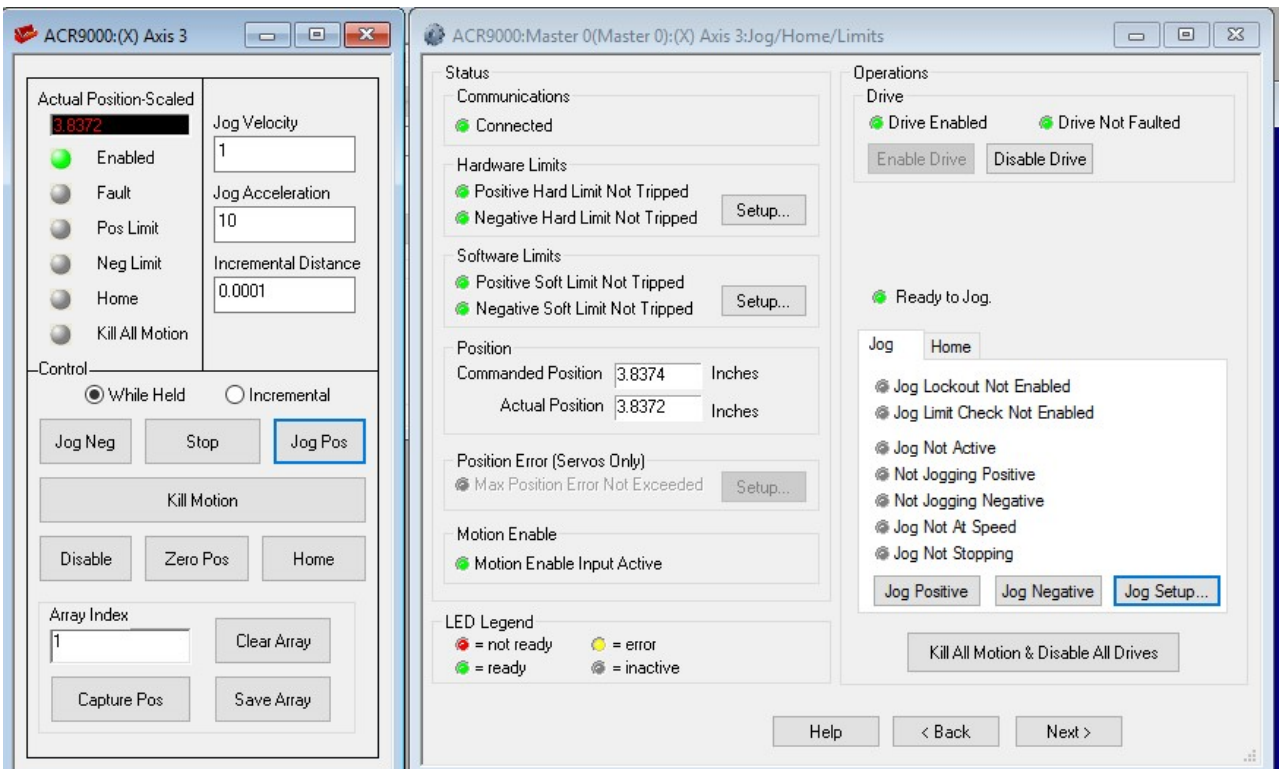
Continued next page.

3. ACR9000 Setup

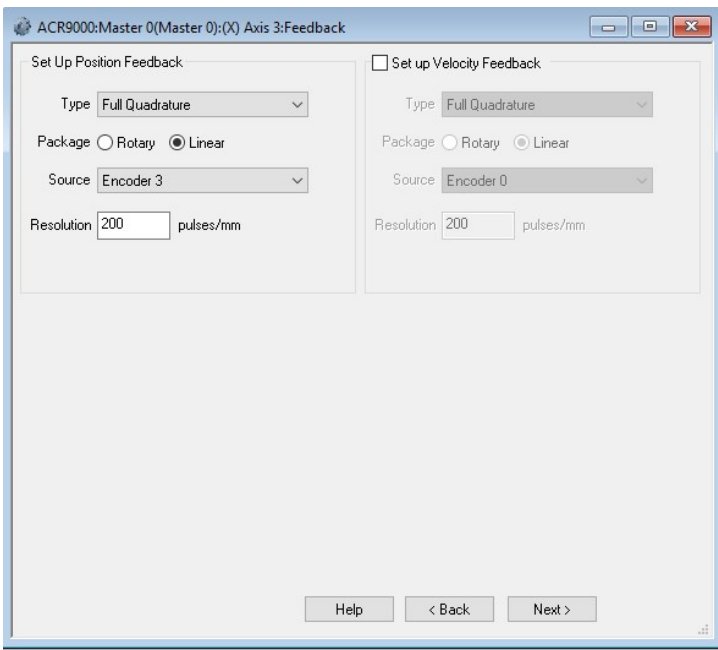
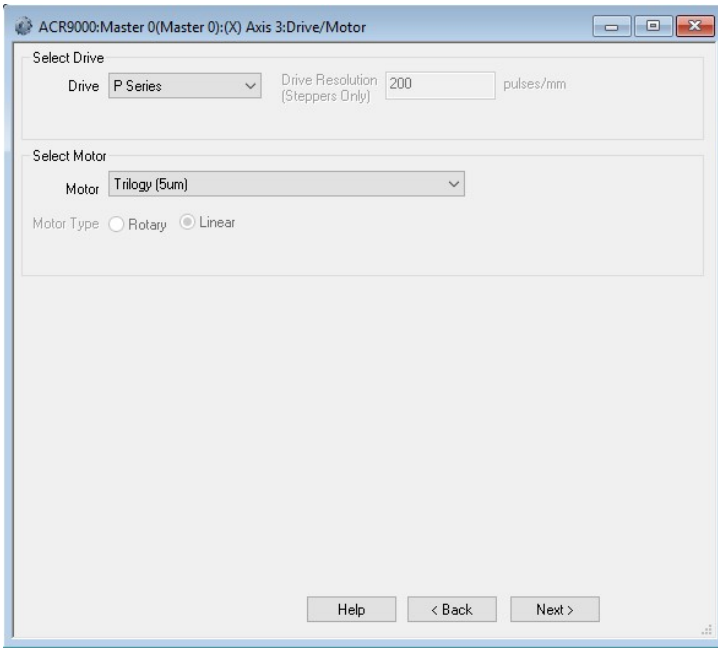
For the ACR9000 with the P Series in Position (Step&Direction) mode, go through the Configuration Wizard, setting the command output in Axes to Stepper, selecting the units and then in the drive setting, select P Series and Trilogy. This will automatically set the drive resolution (greyed out in top right):



Then you'll be able to jog either from the Jog/Home/Limits in the configuration wizard or from the Jog/Teach Panel (under Tools in the Project Workspace):



For the ACR9000 with the P Series in Analog Torque mode, go through the Configuration Wizard, setting the command output in Axes to DAC, selecting the units and then in the drive setting, select P Series and Trilogy. This will automatically set the drive resolution (greyed out in top right):

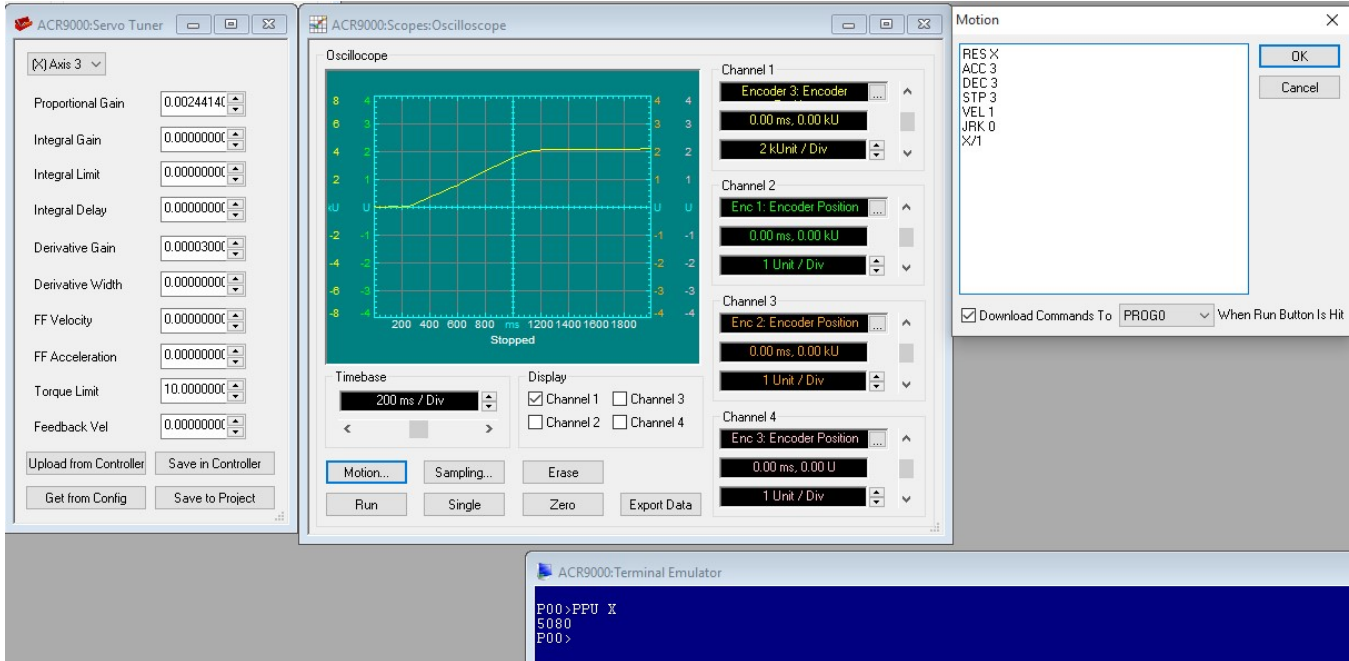


Select the motor based on the linear encoder resolution. On the feedback screen, set the resolution:

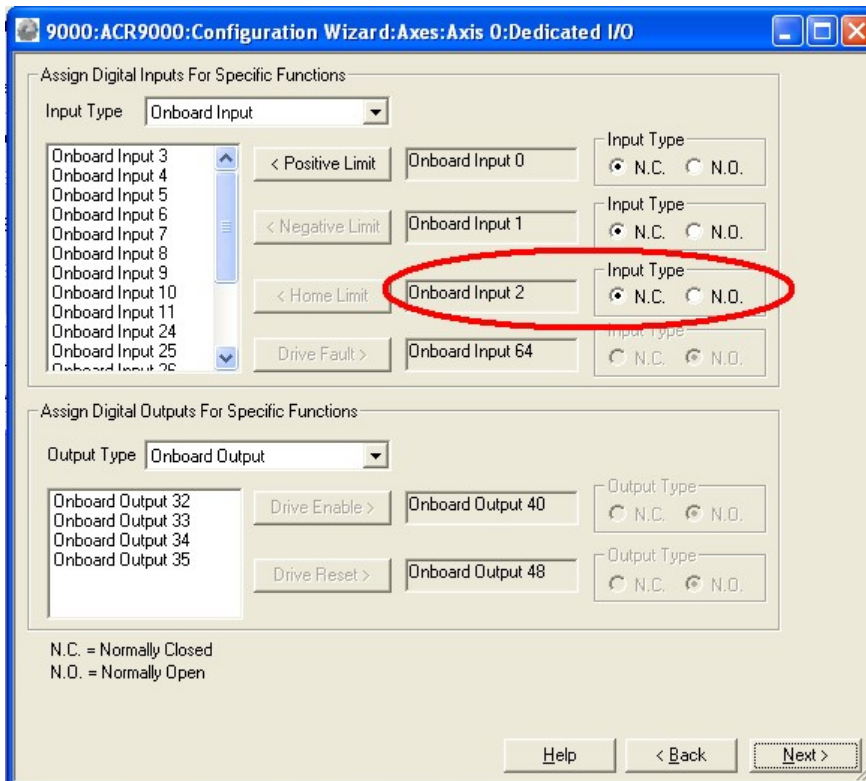
	B	A	Q	L	M	P
	5um	1um	5um	1um	0.5um	0.1um
	LME	LME	Renishaw	Renishaw	Renishaw	Renishaw
Pulses/mm	200	1000	200	1000	2000	10000

Default tuning gains are decent for an unloaded horizontal stage for a 5um system but setting derivative from 0.00001 to 0.00003 is a good starting point. (Leave proportional set to 0.0024414)

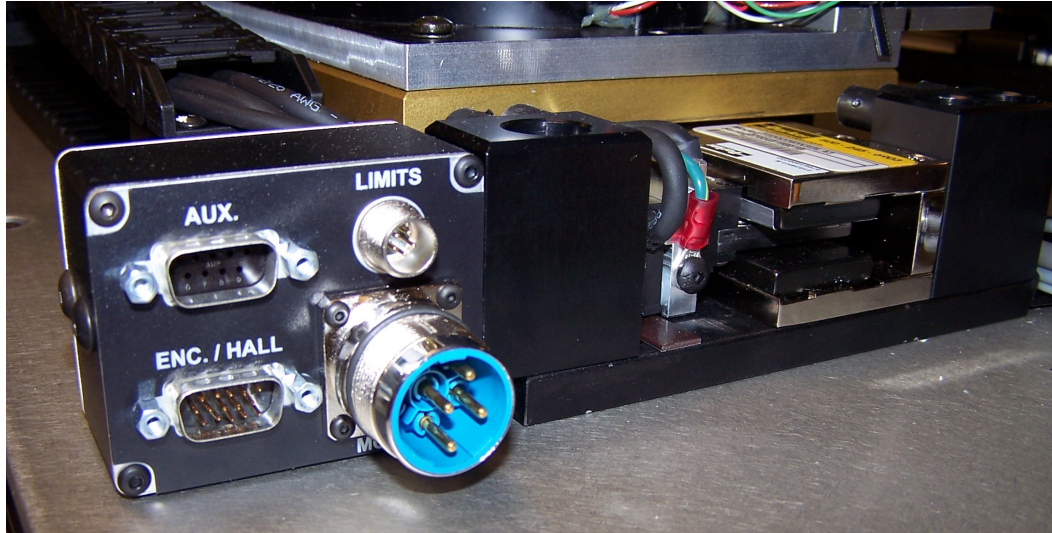
The Servo Tuner under Tools allows for further tuning for the application.



Note: The home and limit sensors are normally closed and thus the home limit should be changed to NC.



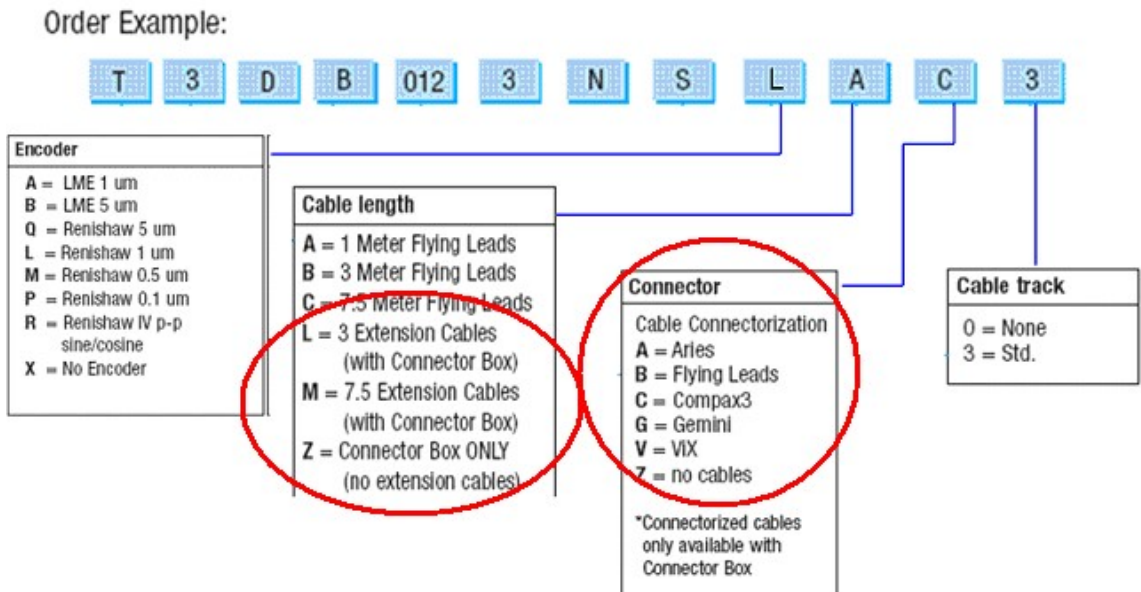
IForce Positioner Connector Box Option



IForce positioners have a connector box option as a standard option. Daedal LXR users will recognize this as similar to the LXR connector box. This allows users to be able to quickly connect IForce positioners to standard Parker drives with connectorized cables. The connector box is available with Flying leads or Parker-drive connectorized cables in 3 or 7.5 meter (10 or 25-foot) for Aries, Compax3 or P Series servo drive/controllers. See distributor extranet configurator for full order options.

Feedback cable P/N: 006-2827-3.0 (3meter) or 006-2827-7.5 (7.5meter)

Power cable P/N: 006-1922-3.0 (3meter) or 006-1922-7.5 (7.5meter)



If you have any questions, please contact:

- Technical Assistance, Applications Engineering Department (e-mail: emn_support@parker.com or call 800-358-9070 North America, 707-584-7558 International)