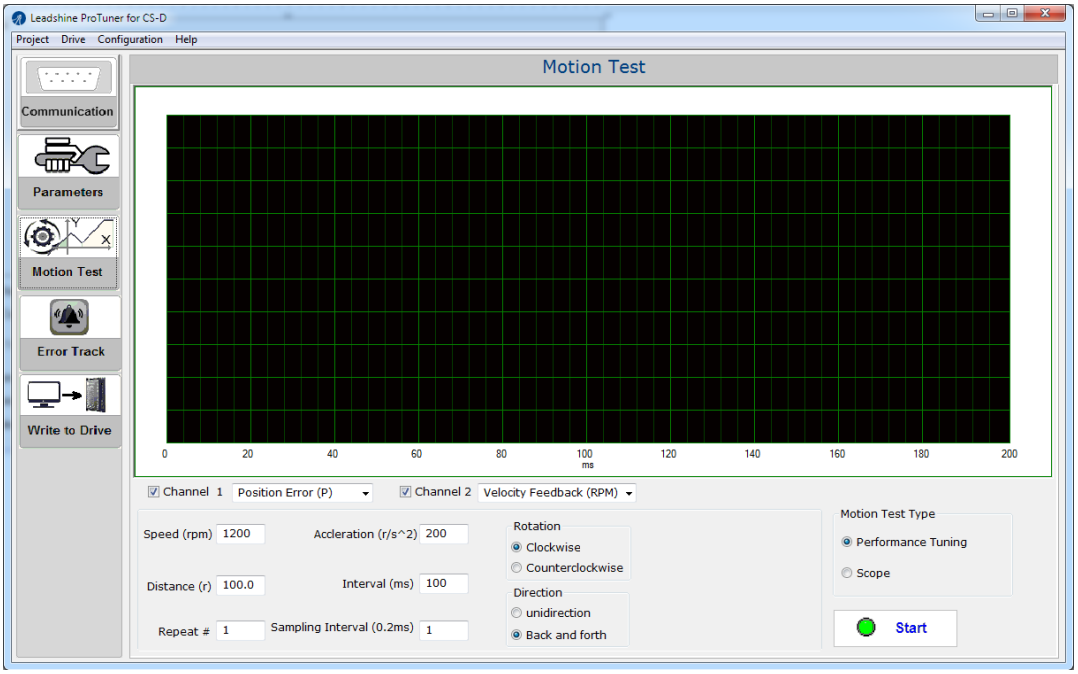
ProTuner Software User Manual

CS-D Series

Closed Loop Stepper Drives



Revision 3.1

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Notice

Read this manual carefully before any assembling and using. Incorrect handling of products in this manual can result in injury and damage to persons and machinery. Strictly adhere to the technical information regarding installation requirements.

Record of Revisions

Revision	Date	Author	Description of Release
1.0	*Oct, 2017*	*MF*	*Initial Release*
3.1	*Oct, 2018*	*MF, CL*	*Software update to version 3.1 to reflect CS-D firmware upgrade*

Table of Contents

1. Introduction

Thank you for choosing Leadshine products. The CS-D series closed loop stepper drives include 4 models, CS-D403, CS-D507, CS-D808, and CS-D1008. When those drives are implemented with compatible stepper motors with encoders, your motion control system performance will get significant improvement over traditional open loop stepper systems such as no loss of step, higher torque, lower noise & heating, and smoother motion. Leadshine closed loop products are also ideal alternatives to replace similar frame size brushless servo systems in low-to-middle speed applications because of their features of much lower cost, much higher torque, and much easier system setup and configuration.

For most applications Leadshine closed loop stepper systems are easy to configure & setup and can be implemented without any tuning efforts, same as classic open loop stepper systems. But in some cases this free ProTuner software tool can still be used for performance tuning, and configuring custom settings like output current, micro-step resolution, control type, etc.

2. Prerequisites

Leadshine ProTuner for CS-D closed loop stepper drives is a free Windows based software. To successfully run this software, the following prerequisites must be satisfied.

2.1 Operation System

This ProTuner software must be installed and run on a computer with Windows 7 or Window 10 operating system for either 32 or 64 bit.

2.2 Motor Connection

From ProTuner software settings of a CS-D drive can be changed with or without a stepper motor connected.

- Without a stepper motor connected, a user can only use the ProTuner software to change the CS-D drive parameter values.
- With a stepper motor connected properly to the CS-D drive, a user can not only configure settings of the connected drive but also run the motor to test and tune motion performance. Refer to the CS-D drive user manual for how to connect a stepper motor.

2.3 Accessories

To connect a CS-D Closed loop stepper drive to the computer, Leadshine offers a special RS232 cable (Figure 1). It can be used to connect to the RS232 connector on the computer. If such a RS232 connector does not exist on that computer, a user can use a USB to RS232 adaptor (Figure 2) or conversion cable to get the drive

connected. Please note that not all USB to RS232 adaptors will work. Contact your CS-D drive seller or Leadshine technical support for getting such a USB to RS232 adaptor, which have been confirmed to work fine with the CS-D series closed loop stepper drives.

Figure 1: RS232 Tuning cable

Figure 2: USB to RS232 converter

3. Software Overview

Refer the following sections for a quick overview for this ProTuner software.

3.2 Work Space

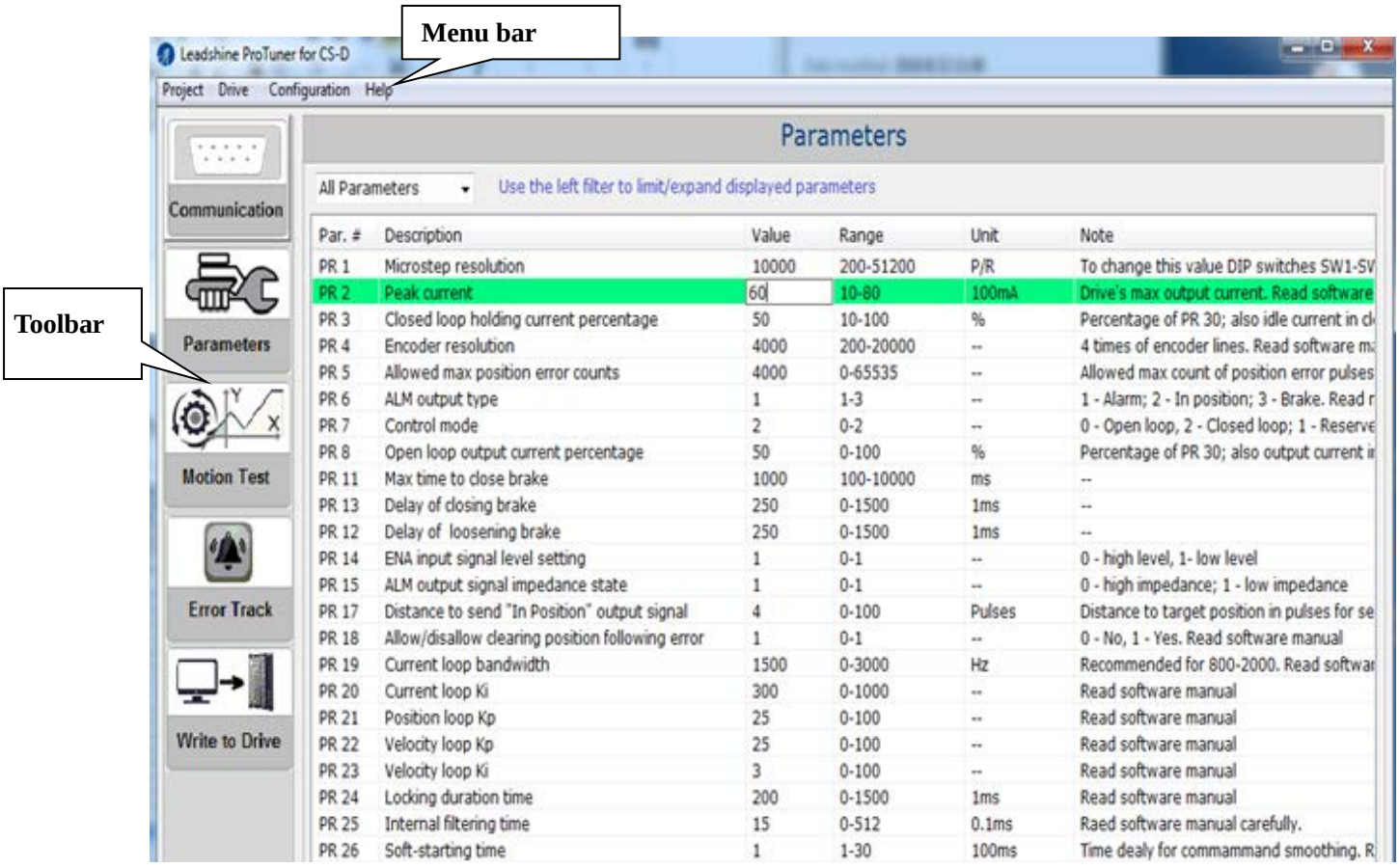
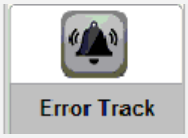
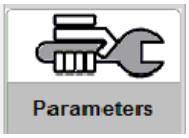
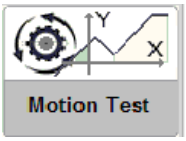


Figure 3: Sofware workspace

3.3 Menu and Toolbar

Menu items and respective toolbar items are described in the following table. The toolbar is one on the left screen (Figure 3) offer the most frequency commands. Menu bar items are described below:

Menu	Submenu Item	Toolbar Icon	Function
Project	Open	-	Open an existing .lsr configuration file
	Save As	-	Save parameter values to an .lsr configuration file
	Exit	-	Close ProTuner for CS-D software
Drive	Communication		Connect/disconnect the drive to/from the computer
	Error Track		Track error history of the CS-D drive
	Write to Drive		Download parameter values to the drive
	Reset	-	Reset the drive back to its factory settings
Configuration	Parameters		Read or edit the CS-D drive parameter values
	Motion Test		Motion test for the connected drive and motor; or, monitoring motion performance when powered by a controller, PLC, pulse generator...
Help	Software Manual	-	Quick link to the software user manual
	Product	-	The CS-D drive information

	Information		
	About	-	Display ProTuner software information

4. Connect the Drive

Follow the following steps to connect a CS-D closed loop step drive to the ProTuner software on your computer.

- Read section 2.3 first, then connect the drive to your computer through a RS232 connection.
- Power on the CS-D closed loop stepper drive.
- Launch ProTuner for CS-D software, the “Communication” screen will display (Figure 4).

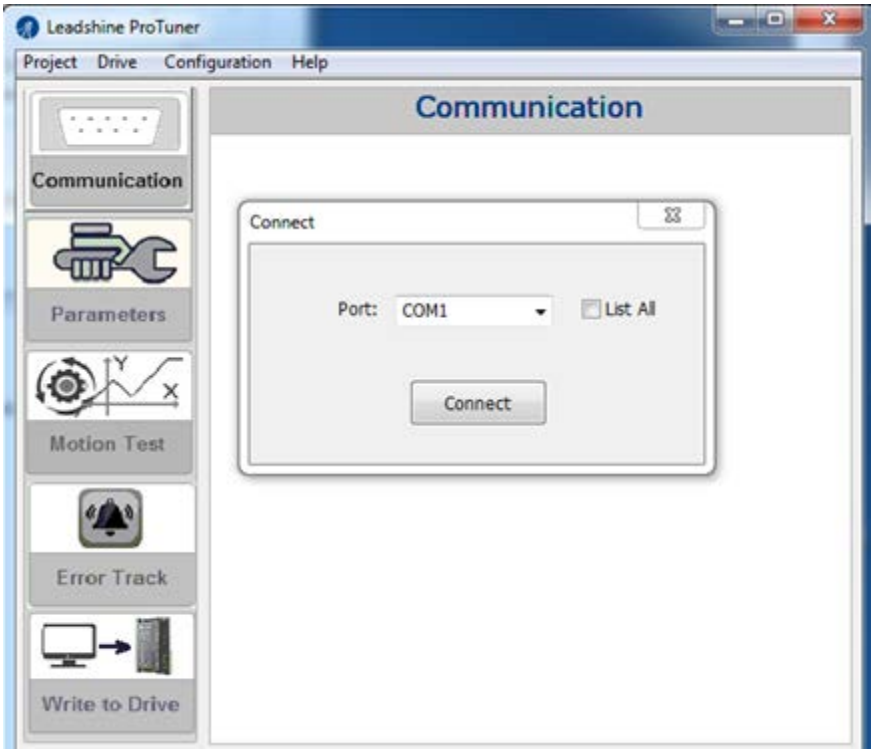


Figure 4: Communication screen

- Select the correct COM port from “Port” dropdown list control (Figure 5). When a USB to RS232 adaptor is used, you can go to Device Manager of your computer to find the correct port.

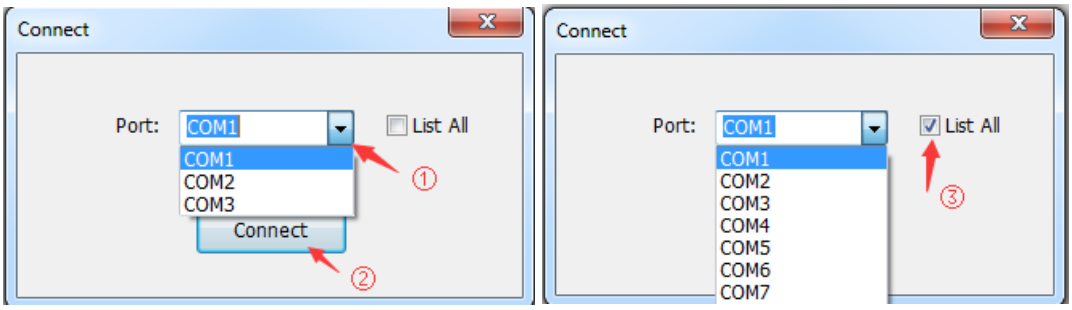


Figure 5: connecting drive

- Click “Connect” button and wait a few seconds. If the drive has been successfully connected, the “Parameters” screen (Figure 7) will be automatically displayed with all the parameter values uploaded from the connected drive. Otherwise, the following error message will be displayed (Figure 6).

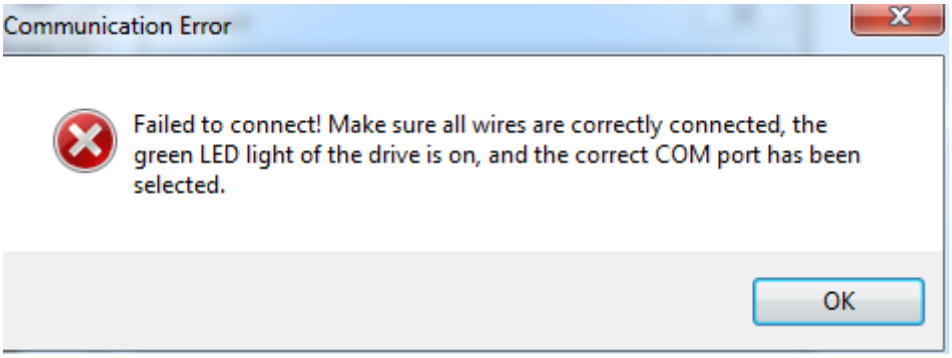


Figure 6: Communication error message

5. Manage Drive Parameters

Settings and configurations of the connected CS-D closed loop stepper drive are all stored in parameters. They can be read, changed, and saved through the ProTuner CS-D software.

5.1 Read Parameters

After the CS-D closed loop stepper drive is successfully connected to computer, its current settings will be automatically uploaded and displayed (Figure 7). The Parameters window can also be opened any time by clicking the “Parameters” icon on the left toolbar or Configuration->Parameters menu item.

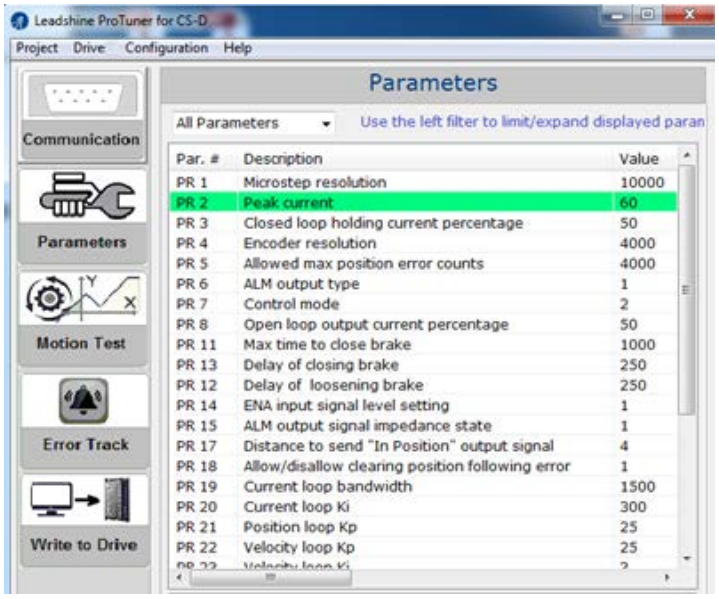


Figure 7: Parameters

Filter Displayed Parameters

On the Parameters window, you can use the top left dropdown list control to filter the displayed parameters (Figure 8).

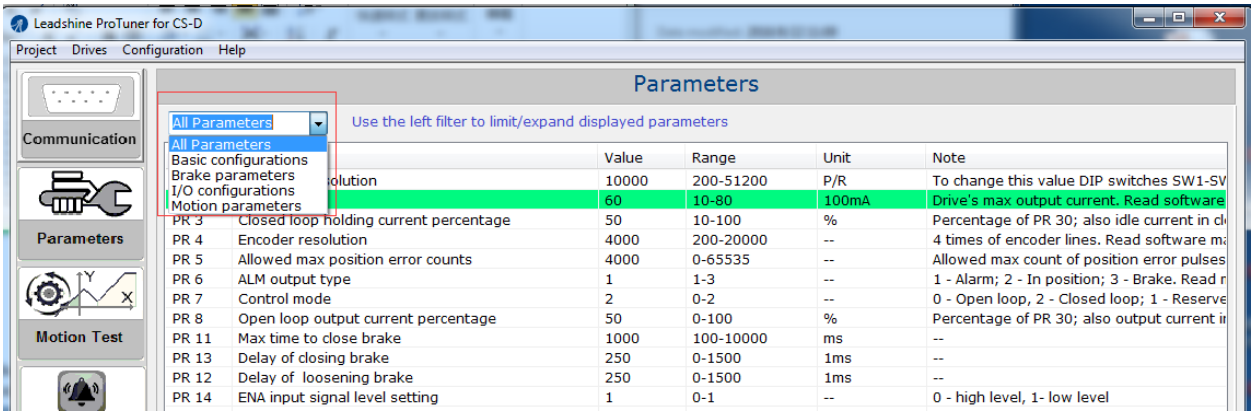


Figure 8: parameter type

5.2 Edit Parameters

To edit a parameter value, double click the “Value” field for that parameter. You can then change its value. Make sure the input value is an integer in the range defined in the “Range” field. See Figure 9.

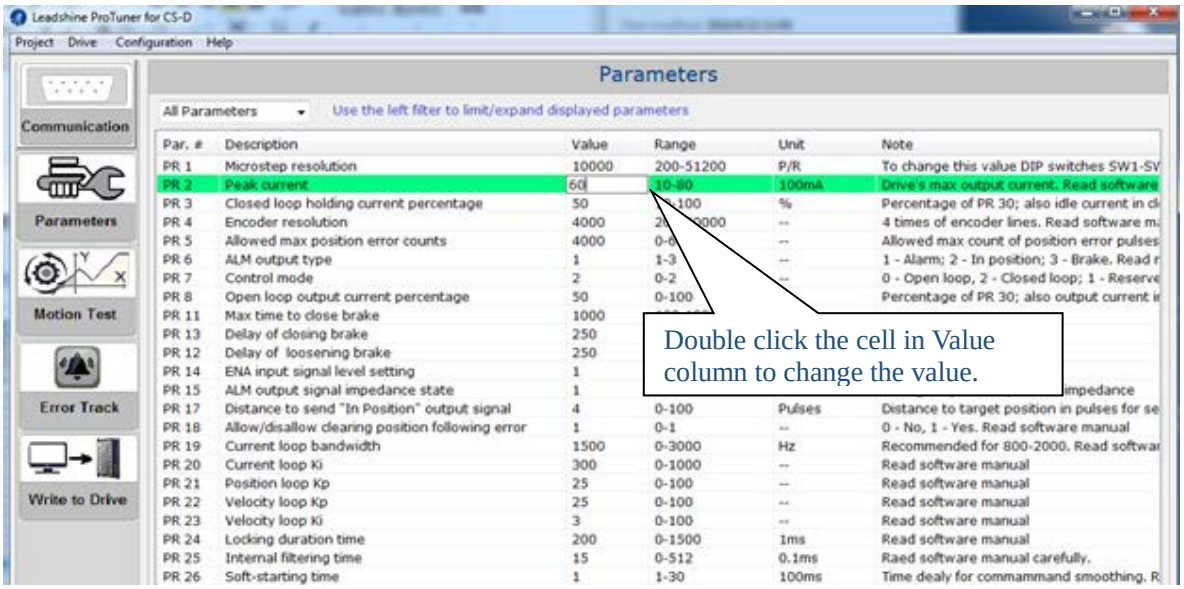


Figure 9: edit parameter value

When trying to make parameter value changes, please note:

- Some parameters are read-only, and take no effect whatever you type in.
- Some parameters are only effective after the related DIP switches on the CS-D closed loop stepper drive are set properly, such as parameters “Microstep Resolution”. Check the full parameter description in Section 5.3.
- Some parameters are only effective after other parameters are set to certain values. Check Section 5.3.

5.3 Parameter Description

All parameters for the CS-D series closed loop stepper drives are described in this section.

5.3.1 Microstep (PR 1)

This parameter is used to set micro step resolution. To make this parameter effective,

- DIP switches 1-4 (DP1-4) of the CS-D drive must be all set to “ON” positions.
- Its value must be increased by 200 and in the range of 200 – 51,200.

5.3.2 Peak Current (PR 2)

This parameter is used to set the peak current that the CS-D drive can output.

5.3.3 Closed Loop Holding Current Percentage

This parameter is a percentage value of the peak current in PR 2. It is used for both holding and idle current in closed loop control mode (PR 7 value “2”). Increase this parameter value can improve response time and better

torque, but may result in higher heating. For Leadshine motors, it is suggested keep the default value unless you really make your own configurations.

5.3.4 Encoder Resolution (PR 4)

This parameter value must be set to 4 times of the encoder lines. For example, for a 1000-line encoder this parameter value must be set to 4000.

5.3.5 Allowed Max Position Following Error Pulses (PR 5)

This parameter is used to set the allowed maximum pulse number of position errors.

5.3.6 "ALM" or "PEND" Output Type on the Drive (PR 6)

This parameter is used to configure the type of the configurable digital output signal, which is marked as "ALM" on CS-D403 & CS-D508, and "PEND" of CS-D808 & CS-D1008.

- CS-D403 and CS-D508

  The configurable digital output which is marked as "ALM".
  - Set this PR 6 value to "0" (default) to configure this output as "ALM" - fault output - signal.
  - Set this PR 6 value to "1" to configure this output as "In Position" - in targeted position - output signal.
  - Set this PR 6 value to "2" to configure this output as "Brake" - brake control output - signal.
- CS-D808 and CS-D1008

  The configurable digital output which is marked as "PEND".
  - Set this PR 6 value to "0" to configure this output as "In Position" - in targeted position - output signal.
  - Set this PR 6value to "1" to configure this output as "Brake" - brake control output signal.

5.3.7 Control Mode (PR 7)

This parameter is used to set the control model that the CS-D will operate. Set its value to "0" for open loop control; set it to "2" for closed loop control (default). Value "1" is reserved and has no effect.

5.3.8 Open Loop Output Current Percentage (PR 8)

This parameter is used to set the output and idle current in a percentage value of the peak current value (PR 2), when the CS-D drive operates in open loop control mode. It is only effective when parameter PR 7 is set to "0" for open loop control.

5.3.9 Control Type (PR 9)

This parameter is only available for CS-D808 and CS-D1008 drives. It is used to set the drive control type. Set

its value to “0” (default) for pulse & direction (also called step & direction) control; set its value to “1” for CW/CCW control.

5.3.10 Pulse Effective Edge (PR 10)

This parameter is only available for CS-D808 and CS-D1008. It is used to determine when a pulse will be recognized. Set its value to “0” for rising edge (default); set its value to 1 for falling edge.

5.3.11 Max Time to Close Brake (PR 11)

This parameter is used to set the max time for closing the brake. It is only effective when PR 6 is set for brake control. Usually don’t change the default value unless you really want.

5.3.12 Delay of Releasing Brake (PR 12)

This parameter is used to set the delay time before brake releasing. It is only effective when PR 6 is set for brake control. Usually keep the default value of this parameter unless you really want.

5.3.13 Delay of Closing Brake (PR 13)

This parameter is used to set the delay time before starting to close the brake. It is only effective when PR 6 is set for brake control. Usually keep the default value of this parameter unless you really want.

5.3.14 "ENA" Input Signal Level Setting (PR 14)

This parameter is used to set the “ENA” signal voltage level of the CS-D drive. Set its value to “0” for high level (default); set its value to “1” for low level.

5.3.15 "ALM" Output Signal Impedance State (PR 15)

This parameter is used to set the “ALM” signal impedance level of the CS-D drive. Set its value to “0” for high level (default); set its value to “1” for low level.

5.3.16 “PEND” Output Signal Impedance State (PR 16)

This parameter is only available for CS-D808 and CS-D1008. It is used to set the “PEND” signal impedance level of the CS-D drive. Set its value to “0” for high level (default); set its value to “1” for low level.

5.3.17 Distance to Send "In Position" Output Signal (PR 17)

This parameter is used to set the distance (in number of pulses) to send out the In-Position signal. It is only effective when PR 6 is set for “In Position” output.

5.3.18 Allow Clearance of Position Following Error (PR 18)

This parameter is used to set whether or not clearing position following error is allowed by sending an enable signal via the “ENA” connection on the CS-D drive. Set its value to “1” (default) for yes; set it to “0” for no.

5.3.19 Current Loop Bandwidth (PR 19)

This parameter is used to set the current loop bandwidth of the CS-D drive. It is for advanced users only. Usually keep the default value for powering Leadshine motors, or 3rd party stepper motors with normal inductance.

If the 3rd party stepper motor has extremely low or high inductance, and high noise or/and vibration are found after power-on. You can try to tune this parameter along with PR 20. Usually choose a value of 800-2000. Follow the following steps to tune this parameter:

- Step 1: compare the read-only parameter "Inductance" value (PR 27) on the Parameters screen with the inductance value found on the stepper motor datasheet (ensure the accuracy of the datasheet), when auto-tuning feature of the drive is turned on.
- Step 2: If those two values in Step 1 are significant different (50% or more), tune this parameter value along with parameter PR 20.
- Step 3: If unable to find a preferred PR 19 & 20 value combination, turn off the "Auto-Tuning" feature via DIP switch 6 of the CS-D drive.

5.3.20 Current Loop Ki (PR 20)

This parameter is used for tuning current loop integral gain. It is tuned along with PR 20 (See 5.3.19). Usually keep the default value for Leadshine motors and 3rd party motors with normal inductance.

5.3.21 Position Loop Kp (PR 21)

This parameter is used for tuning position loop proportional gain. Usually keep the default value for Leadshine stepper motors, unless really needed to do so.

- Increase this value will reduce position following error, but could result in motor vibration.
- Decrease the value if the motor vibrates.

5.3.22 Velocity Loop Kp (PR 22)

This parameter is used for tuning velocity loop integral gain. Usually keep the default value for Leadshine stepper motors, unless really needed to do so.

- Increase the value can increase velocity stiffness.
- Reduce this value when the motor vibrates at low speed.

5.3.23 Velocity Loop Ki (PR 23)

This parameter is used for tuning Velocity loop proportional gain. Usually keep the default value for Leadshine stepper motors unless really needed to do so. This parameter is usually tuned along with PR 22. Set it to 0 if

the motor shakes during settling.

5.3.24 Motor Shaft Locking Time (PR 24)

This parameter is used to set the motor shaft locking time. Usually keep the default value, unless you really want to make a change.

5.3.25 Internal Filtering Time (PR 25)

This parameter is used to configure the time for internal command filtering. In some applications, change this value could improve overall system performance.

Note: *for multi-axis systems with interpolation, this value must be set to the same for all axes.*

5.3.26 Soft-Starting Time (PR 26)

This parameter is used to configure the internal smoothing time for the CS-D drive initial current ramp-up when the drive is turned on. Increase this value if there is a motor overshooting like "JUMP" at powered-on.

5.3.27 Motor Inductance (PR 27)

This parameter is read-only, when the Auto-Tuning on the drive is turned on. It is for reference only.

5.3.28 Auto-Tuning at Power-on (PR 28)

This parameter is used to set if the drive auto-tuning is turned on at power-on. It is read-only parameter for informational only. Its value is actually determined by dip switch SW6 of the CS-D drive.

5.3.29 Velocity Switching Point: Open Loop to Closed Loop (PR 29)

This parameter is used to set the velocity switching point from closed loop control to open loop control. Usually keep the default value. Only change it when it causes motor vibration at this mode switching velocity point.

5.3.30 Velocity Switching Point: Closed Loop to Open Loop (PR 30)

This parameter is used to set the velocity switching point from closed loop control to open loop control. Usually keep the default value. Only change it when it causes motor vibration at this mode switching velocity point.

5.3.31 Motion Type (PR 31)

This parameter is used to set motion type based on your application. It currently contains the following motion types:

- "Normal": this is the default motion type for normal applications.

- "Fast response": this motion type is suitable for applications with high acceleration applications. For example, select this type may improve system performance for application such as many bonding type machines frequently seen in electronics.
- "Low speed circular interpolation": this motion type is suitable for some applications requiring circular interpolation at extra low speed (< 60 RPM).

Usually keep the default setting, unless this motion type can't meet your requirement and your application falls into one of the other listed motion types.

5.3.32 Self-Test at Power-on (PR 32)

This parameter is used to indicate if auto-test set homing will be performed at power-on. When its value set to "1", the motor will rotate half a revolution in each direction (clockwise and counterclockwise) at power-on. When set to "0", there is no effect for this parameter.

5.4 Motion Test

Open the Motion Test window (Figure 10) by clicking "Motion Test" icon on the toolbar or Configuration->Motion Test menu item for configuration performance test. This Motion Test window of ProTuner software can be used to:

- Perform motion performance test for current drive parameter setting. Read section 5.4.2
- Monitor motion performance when the CS-D drive takes control signals from a connected motion controller/PLC/pulse generator…

5.4.1 Motion Test Window

The Motion Test Window includes 3 areas marked in Figure 10, "Scope", "Motion Parameters", and "Motion Testing".

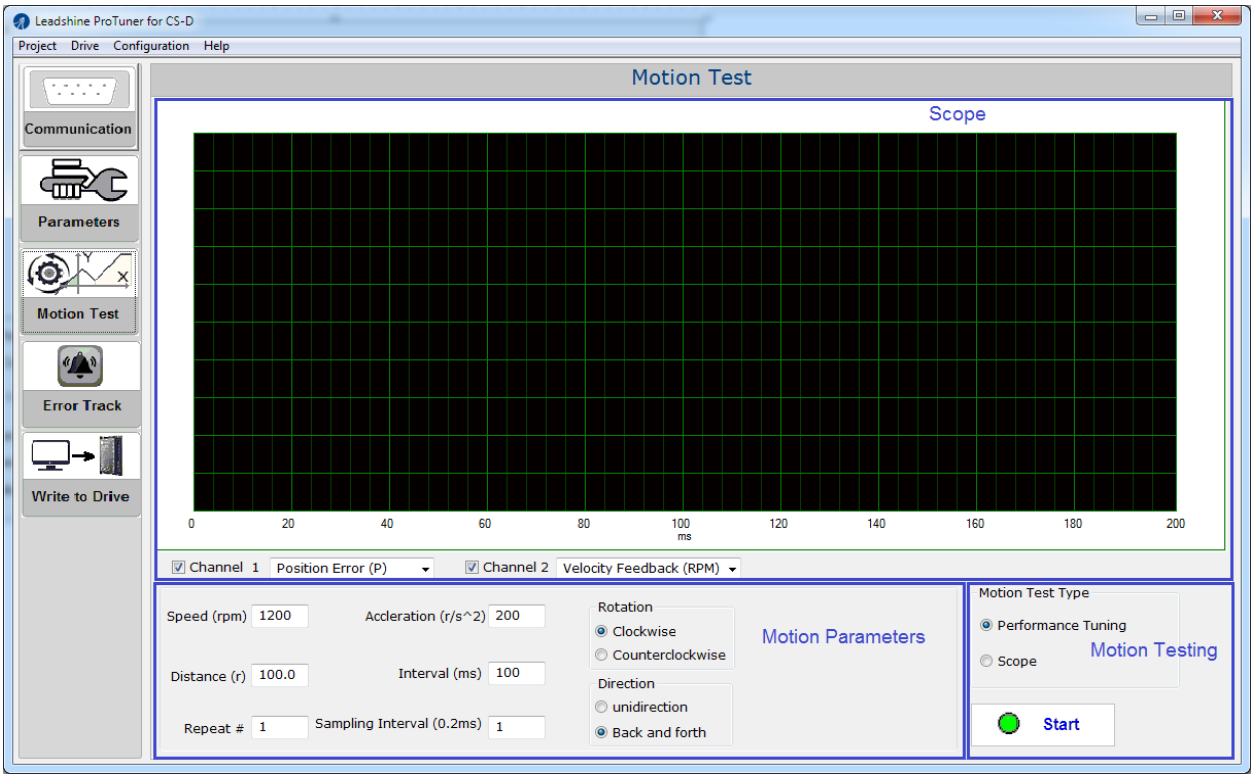


Figure 10: Motion Test window

- The top “Scope” (Figure 11) area of the Motion Test window contains a scope used to display colored curves based on what have been chosen on Channel 1 and Channel 2 dropdown lists during the test.

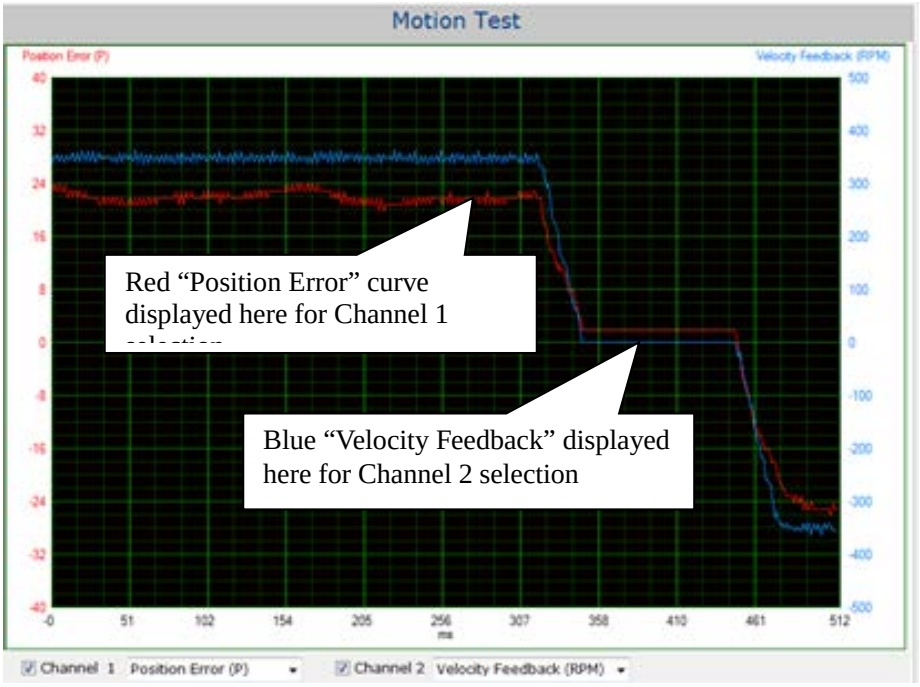


Figure 11: Scope portion of Motion Test window

Available options for Channel 1 add 2 dropdown list controls include “Position Error”, “Velocity Feedback”, “Position Feedback”, “Velocity Targeted”, “Positon Targeted”, “Synthetic Current”, “Bus Voltage”, “A Phase Current”, and “B Phase Current”. See Figure 12.

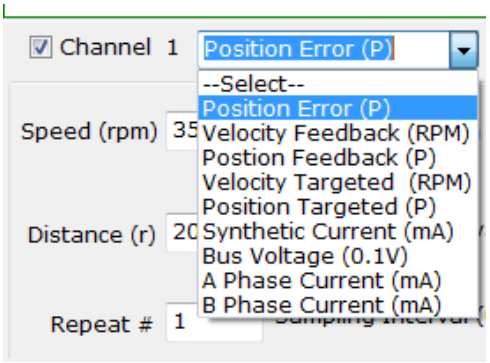


Figure 12 curve type options

- The bottom left “Motion Parameters” area (Figure 13) of the Motion Test window displays editable text fields and selectable radio buttons for the motion test.

Figure 13: motion test parameters

Find those parameter description in the following table

Item	Description	Range
Speed (rpm)	Targeted velocity of the motion test.	1 - 5000 rpm
Acceleration (r/s/s)	Acceleration of the motion test.	1 - 3000 r/s^2
Distance (r)	Movement distance in number of revolutions, for the motion test.	1 - 655 revolutions
Interval (ms)	Interval between two movements.	1 - 32767 ms
Repeat #	Repeat times of the motion test	1 - 65535

Sampling Interval	Interval between two data samplings	1 - 50
Rotation	Motor initial rotation direction	Clockwise, or Counterclockwise
Direction	Type of rotation directions for motion test	Unidirectional, or Back and forth

- The bottom right “Motion Testing” area of motion test window (Figure 14) is used to choose what motion test type to perform. Select “Performance Tuning” to tune the CS-D drive; choose “Scope” for motion performance monitoring when the CS-D drive takes control commands from a connected controller.

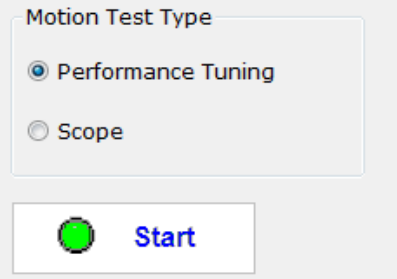


Figure 14: Motion test type selection

5.4.2 Tuning Performance Testing

To tune and test the performance for the current drive settings

- Connect the CS-D drive to ProTuner software.
- After parameter values uploaded to the software, you can choose to make value changes or not as needed.
- Switch to the Motion Test window by clicking “Motion Test” icon on the left toolbar.
- Keep the default selection of “Performance Tuning” option (Figure 14).
- Choose what to display on the scope for Channel 1 and 2 (Figure 12).
- Fill in test motion parameters (Figure 13).
- Click thee “Start” button to start motor rotation.
- Test the motion performance by checking:
  - The curves displayed on the scope (Figure 12),
  - The motor and drive noise, vibration, heating, etc.

5.4.3 Motion Performance Monitoring

Besides used for motion performance testing for the current CS-D drive setting when ProTuner itself is used to control commands, the Motion Test window can also be used for motion performance monitoring when the drive is controlled by an external pulse generator (controller, PLC, etc.). For example, a user can use the proTuner software to monitor the motion performance of certain axis in a machine which is powered by a CS-D drive, but its motion commands are sent from the machine's motion controller.

Follow the following steps:

- Connect ProTuner software to the CS-D drive which is commanded by an external controller.
- Switch to the Motion Test window by clicking the "Motion Test" icon on the left toolbar.
- Select "Scope" option for "Motion Test Type" on the bottom right side. See Figure 15.
- Choose what to display on the scope for Channel 1 and 2 (Figure 12).
- Keep the default value or enter a new value for the "Sampling Interval" time field.
- Click "Start" button to start monitoring.
- Start motion from the pulse generator connected to the CS-D drive.
- Monitor the motion performance by checking:
    - The curves displayed on the scope (Figure 12),
    - The motor and drive noise, vibration, heating, etc.

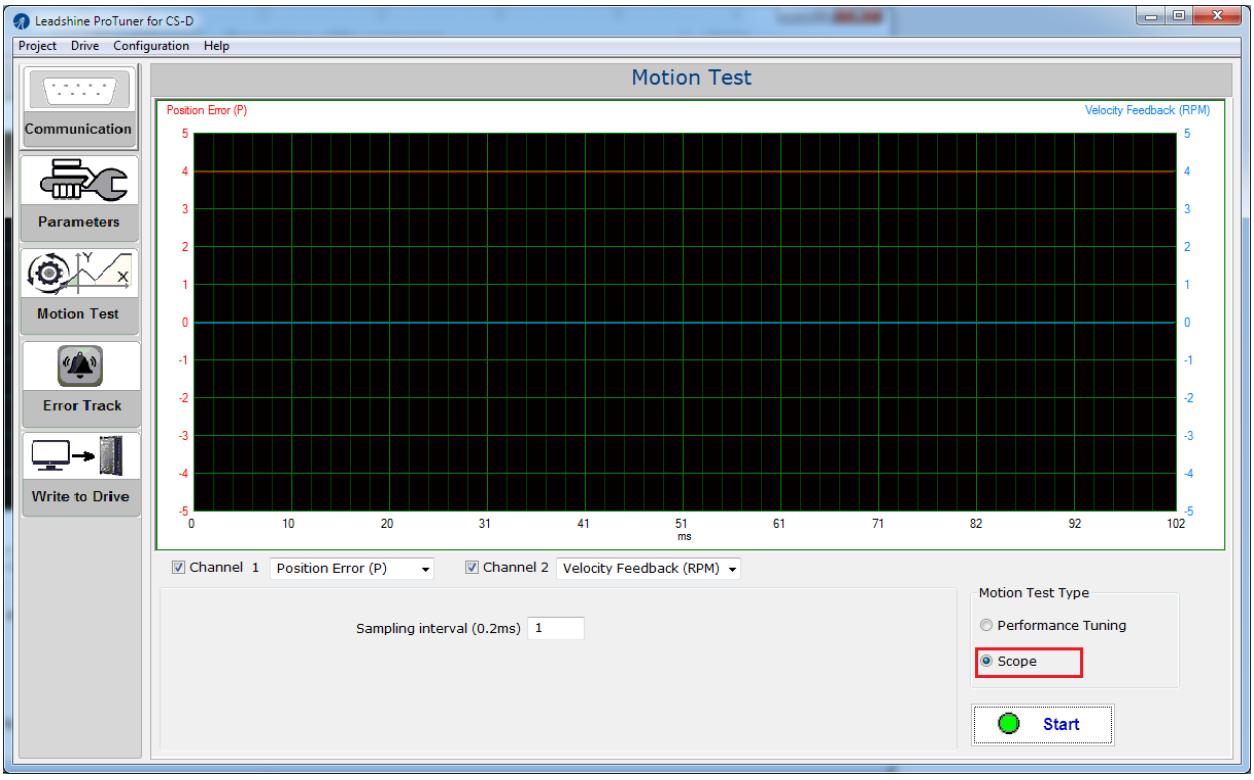


Figure 15: motion performance monitoring

6. Write to Drive (Download to Drive)

After parameters tuned & optimized and motion performance tested, you must download their changes to the drive. Otherwise, those changes will be lost next time when the drive is re-powered.

Following the following steps to write parameters to the drive.

- Click the "Write to Drive" icon on the left toolbar, or Configuration->Parameters menu item. A confirmation will be popped up (Figure 16)

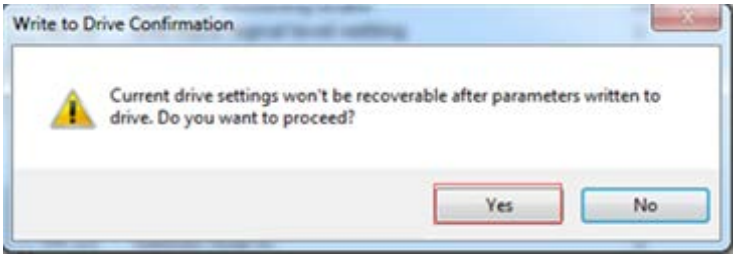


Figure 16: Write to drive confirmation message

- Click "Yes" to continue downloading parameter values to the CS-D drive.
- After parameters are successfully written to the drive, a success message (Figure 17) will be popped up. Now, all the changes are permanent and new settings for the CS-D drive will take effect next time when the drive is re-powered.

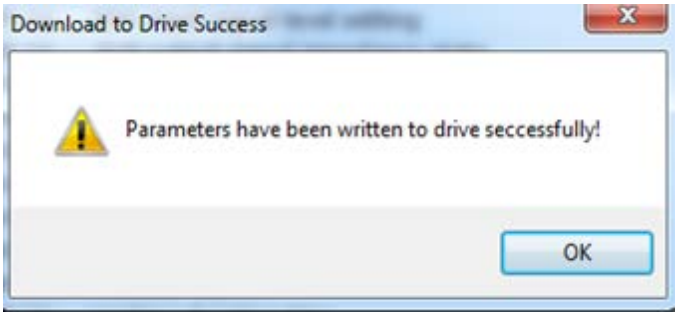


Figure 17: Write to drive success message

7. Resetting Drive

To reset the current drive configurations back to factory settings, follow the following steps.

- Click Drive->Reset menu item. The confirmation message will be popped up (Figure 18).

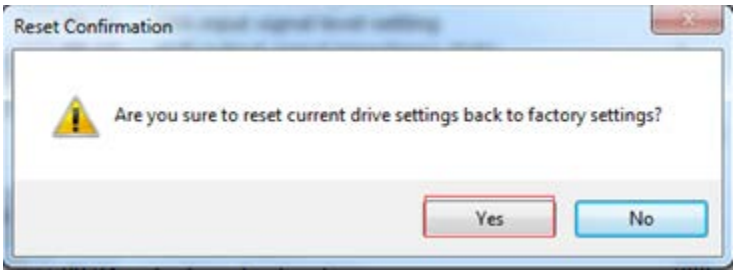


Figure 18: resetting confirmation message

- Click the “Yes” button to continue resetting process, or click “No” button to cancel. After resetting finished, the following informational message (Figure 19) will be displayed. Factory settings will take effect next time when the drive is powered next time.

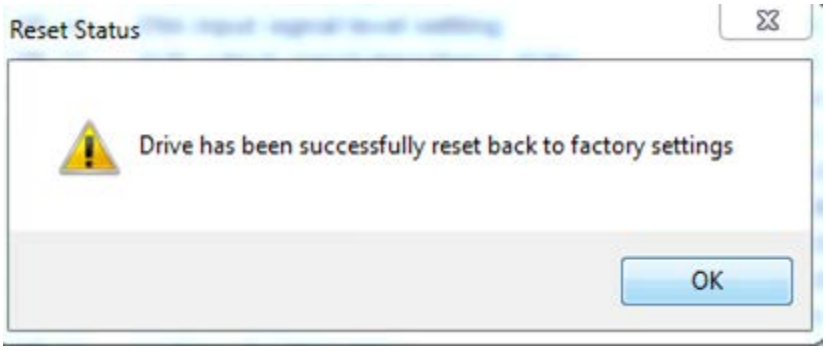


Figure 19: reset success message

8. Manage Configuration File

After the drive performance is tuned and parameter values optimized, its settings can be saved to a configuration file in .lsr format. You can also open an existing .lsr configuration file and load the settings to the ProTuner CS-D software.

7.1 Open a Configuration File

Follow the following steps to load settings from an .lsr configuration file

- Click **Project->Open** menu item. The File Open window will be displayed (Figure 20).

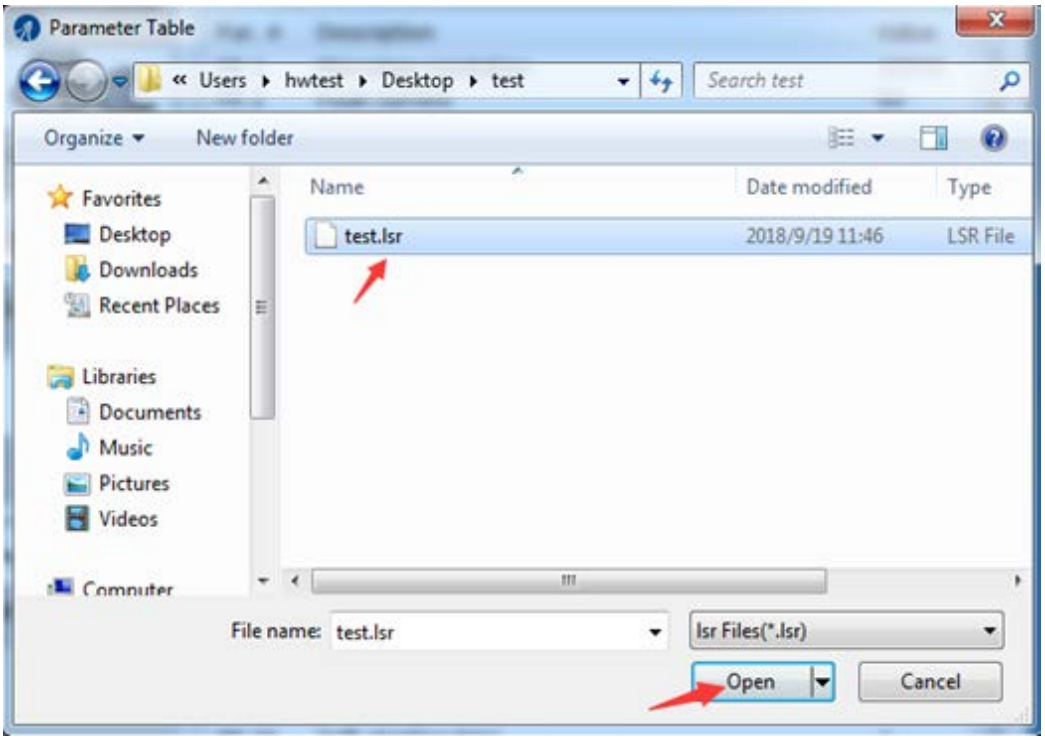


Figure 20: open an .lsr configuration file window

- Find and select the .lsr configuration fil click “OK” button.
- After the configuration file is open, a message (Figure 21) will be displayed; all the parameter values stored in that configuration file will be loaded and displayed in the Parameters window. You can now tune those parameters or directly download them to the connected CS-D closed loop stepper drives.

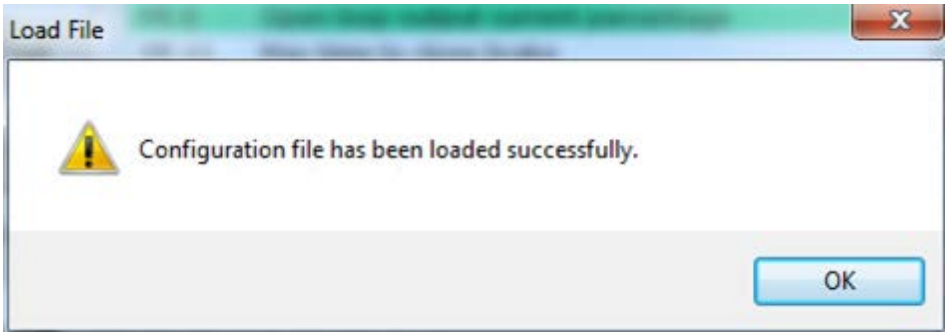


Figure 21: Open file confirmation

Notice

After a configuration file is opened, to get back to its original settings you will need to repower the CS-D closed loop stepper drive.

7.2 Save a Configuration File

Follow the following steps to save the current parameters into an .lsr configuration file

- Click **Project-> Save As** menu item. The following screen on Figure 22 will be displayed:

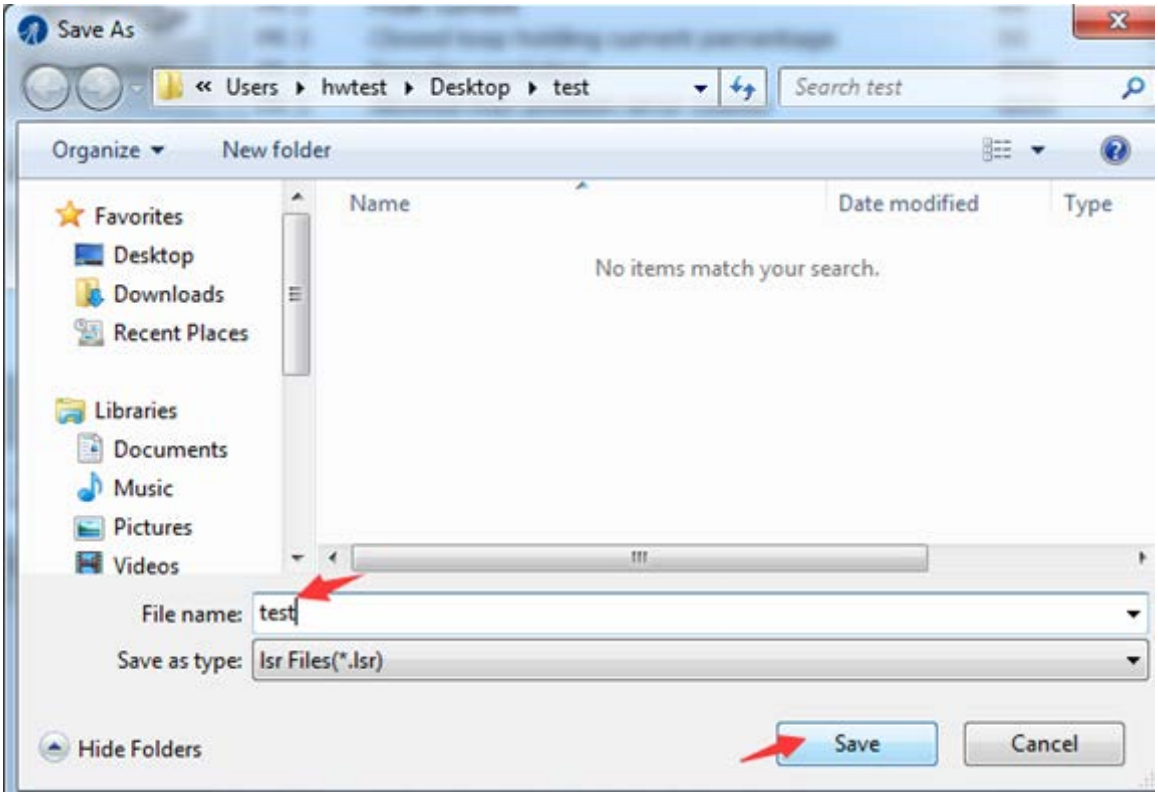


Figure 22: save configuration file

- Choose the location and file name and click the Save button.

9. Manage Drive Error History

You can use the ProTuner for CS-D software to track error history previously happened to the connected CS-D closed loop stepper drives. Follow the following steps for that:

- Click Error Track icon on the left toolbase or click Drve->Error Track menu item, the Error Track window (Figure 23) will be displayed.

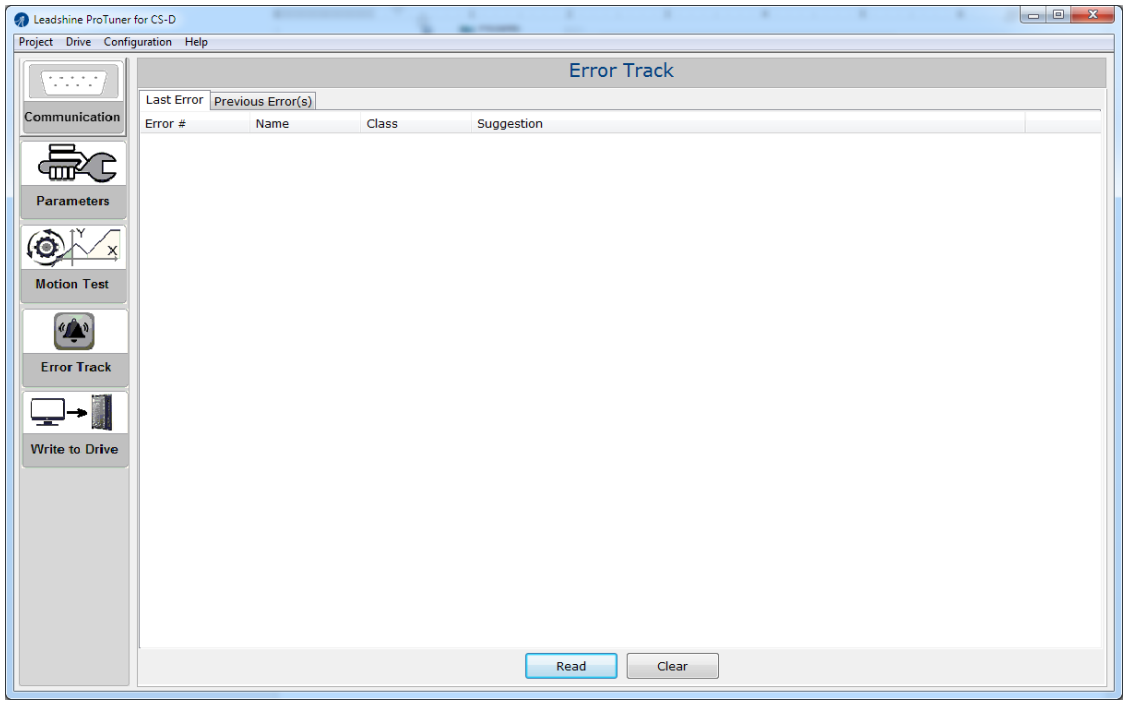


Figure 23: Error Track window

- Click the “Previous Error(s)” tab to see error(s)previously happened in the past.

10.Help Menu

10.1 Software Manual

When clicking Help-> Software menu item, the software manual will be opened.

10.2 Product Information

To display the product information of the connected CS-D closed loop stepper drive, click Help->Production Information menu item. The message window in Figure 24 will be displayed.

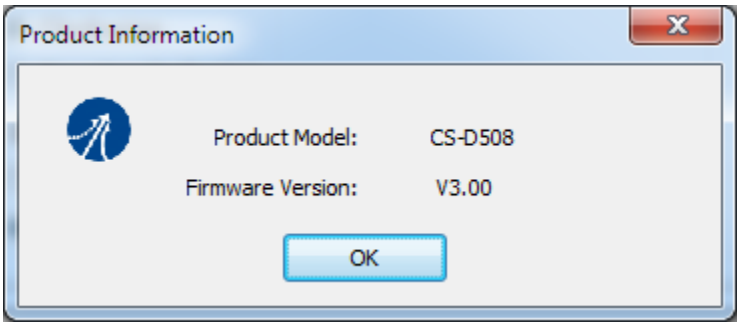


Figure 24: Product information

10.3 A bout

To display the software information, click Help->About menu item. The message window in Figure 25 will be displayed.

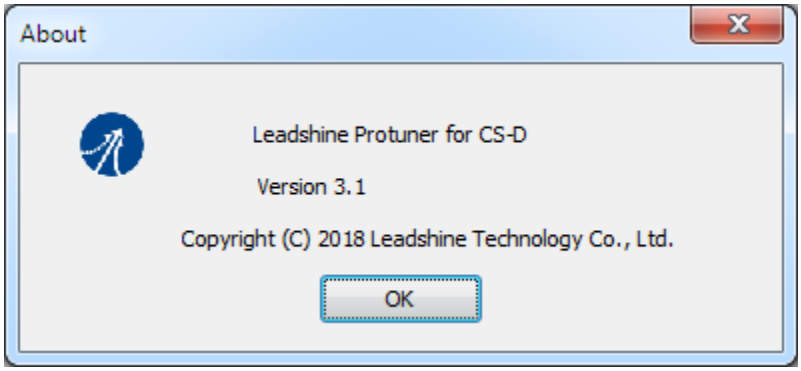


Figure 25: Software information

Appendix - Parameters for CS-D closed loop stepper drives

1) CS-D403 and CS-D508 Closed Loop Stepper Drive Parameters

Parameter #	Name	Default Value	Range	Unit	Remark
PR 1	Microstep resolution	1600	200-51200	Pulse / revolution	To change this value, DIP switches SW1-SW4 on the drive must be all set to "ON" positions. Its value must be increased by 200 such as 200, 400, 800, 1000, …
PR 2	Peak current	25 (CS-D403) 60 (CS-D508)	10-80	0.1A	Drive's max output current.
PR 3	Closed loop holding current percentage	40 (CS-D403) 50 (CS-D508)	10-100	%	Also used by idle current in closed loop control mode. 1) Percentage of peak current (PR 2); 2) Only available when PR 7 value set to 2.
PR 4	Encoder resolution	4000	200-20000	Count / revolution	This value must be 4 times of encoder lines. For example, this value muse be set to 4000 for a motor with a 1000-line encoder.
PR 5	Allowed max position following error pulses	4000	0-65535	Pulse	Threshold for position following error.
PR 6	"ALM" output type on drive	1	1-3	-	Setting for the “ALM” output on the drive: 1 – Alarm; 2 - In position; 3 - Brake.
PR 7	Control Mode	2	0-2	-	Control mode setting: 0 - Open loop, 2 - Closed loop; 1 – Reserved
PR 8	Open loop output current percentage	50	0-100	%	Output current in open loop control mode which is a pct. value of peak current (PR 2). Only effective when PR 7 set to value 0
PR 11	Max time to close brake	1000	100-10000	ms	Only available when PR 6 set to 3. Usually keep this default value.
PR 12	Delay of releasing brake	250	0-1500	ms	Only available when PR 6 set to 3. Usually keep this default value.
PR 13	Delay of closing brake	250	0-1500	ms	Only available when PR 6 set to 3. Usually keep this default value.
PR 14	ENA input signal level setting	1	0-1	-	ENA effective voltage level setting: 0 - high level, 1- low level

PR 15	"ALM" output signal impedance state	1	0-1	-	Setting for “ALM” output impedance level: 0 - high impedance; 1 - low impedance
PR 17	Distance to send "In Position" output signal	4	0-100	pulse	Distance to target position in number of pulses to send "In Position" output signal. Only available when PR 6 set to “In Position”
PR 18	Allow clearance of position following error	1	0-1	-	Setting for allowing position error clearing via “ENA” signal on the drive without re-powering of the drive: 0 - No, 1 - Yes.
PR 19	Current loop bandwidth	1500	0-3000	Hz	Usually keep the default value. Recommended for 800-2000.
PR 20	Current loop Ki	300	0-1000	-	Current loop integral gain. Usually keep the default value.
PR 21	Position loop Kp	25	0-100	-	Position loop proportional gain. 1) Increase this value can reduce position following error. 2) Decrease the value if the motor vibrates. 3) Usually keep the default value.
PR 22	Velocity loop Kp	25	0-100	-	Velocity loop proportional gain. 1) Increase the value can increase stiffness. 2) Reduce this value when the motor vibrates at low speed. 3) Usually keep the default value.
PR 23	Velocity loop Ki	3	0-100		Velocity loop integral gain. Usually keep the default value. Set it to 0 if the motor shakes during settling.
PR 24	Motor shaft locking time	200	0-1500	ms	Usually keep the default value. Reduce this value if you want to shorten the time of locking shaft.
PR 25	Internal filtering time	15	0-512	ms	Internal smoothing time for control commands. ***Note:*** *for multi-axis systems with interpolation requirements, this value must be set to the same for all axes.*
PR 26	Soft-starting time	1	1-30	0.1s	Internal smoothing time for starting current. Increase this value if there is a motor overshooting (“Jump”) at power-on.
PR 27	Motor inductance	-	0-10000	-	Read-only parameter and for reference only, when the drive Auto-Tuning feature on the drive is turned on.
PR 28	Auto-tuning at power-on	1	0-1	-	Read-only parameter. Its value is determined by if the “auto-tuning” has

					been turned on from DIP 6 of the drive: 0 - No, 1 - Yes.
PR 29	Velocity switching point: open loop to closed loop control	18	0-100	0.1r/s	Usually keep the default value. Only change it when it causes motor vibration at this mode switching velocity point.
PR 30	Velocity switching point: closed loop to open loop control	12	0-200	0.1r/s	Usually keep the default value. Only change it when it causes motor vibration at this mode switching velocity point.
PR 31	Motion type	0	0-10	-	Setting for motion type: 0 - Normal, 1- Fast response, 2- Low speed circular interpolation, reserved for the rest. Usually keep the default value.
PR 32	Self-test indicator at power-on	0	0-1	-	0 - No, 1 - Yes. When turned on (value “1”), the motor will rotate half a turn on each direction at power-on.

Note: All parameter values for CS-D403 and CS-D508 must be integers.

2) CS-D808 and CS-D1008 Closed Loop Stepper Drive Parameters

Parameter #	Name	Default Value	Range	Unit	Remark
PR 1	Microstep resolution	1600	200-51200	Pulse / revolution	To change this value, DIP switches SW1-SW4 on the drive must be all set to "ON" positions. Its value must be increased by 200 such as 200, 400, 800, 1000, …
PR 2	Peak current	80	10-80	0.1A	Drive's max output current.
PR3	Closed loop holding current percentage	50	10-100	%	Also used by idle current in closed loop control mode. 1) Percentage of peak current (PR 2); 2) Only available when PR 7 value set to 2.
PR 4	Encoder resolution	4000	200-20000	Count / revolution	This value must be 4 times of encoder lines. For example, this value muse be set to 4000 for a motor with a 1000-line encoder.
PR 5	Allowed max position following error pulses	4000	0-65535	Pulse	Threshold for position following error.
PR 6	"PEND " output type on drive	0	0-1	-	Setting for the “PEND” output on the drive: 0 – In Position; 1 - Brake.
PR 7	Control Mode	2	0-2	-	Control mode setting: 0 - Open loop, 2 - Closed loop; 1 – Reserved
PR 8	Open loop output current percentage	50	0-100	%	Output current in open loop control mode which is a pct. value of peak current (PR 2). Only effective when PR 7 set to value 0
PR 9	Control type	0	0-1	-	0 - PUL / Dir, 1 - CW/CCW
PR 10	Pulse effective edge	0	0-1	-	0 - Rising edge, 1 - Falling edge
PR 11	Max time to close brake	1000	100-10000	ms	Only available when PR 6 set to 3. Usually keep this default value.
PR 12	Delay of releasing brake	250	0-1500	ms	Only available when PR 6 set to 3. Usually keep this default value.
PR 13	Delay of closing brake	250	0-1500	ms	Only available when PR 6 set to 3. Usually keep this default value.
PR 14	ENA input signal level setting	1	0-1	-	ENA effective voltage level setting: 0 - high level, 1- low level

PR 15	"ALM" output signal impedance state	1	0-1	-	Setting for “ALM” output impedance level: 0 - high impedance; 1 - low impedance
PR 16	"PEND" output signal impedance setting	1	0-1	-	Impedance setting for the “PEND” output on the drive: 0 - high impedance; 1 - low impedance
PR 17	Distance to send "In Position" output signal	8	0-100	pulse	Distance to target position in number of pulses to send "In Position" output signal. Only available when PR 6 set to “In Position”
PR 18	Allow clearance of position following error	1	0-1	-	Setting for allowing position error clearing via “ENA” signal on the drive without re-powering of the drive: 0 - No, 1 - Yes.
PR 19	Current loop bandwidth	1200	0-3000	Hz	Usually keep the default value. Recommended for 800-2000.
PR 20	Current loop Ki	200	0-1000	-	Current loop integral gain. Usually keep the default value.
PR 21	Position loop Kp	45	0-100	-	Position loop proportional gain. 1) Increase this value can reduce position following error. 2) Decrease the value if the motor vibrates. 3) Usually keep the default value.
PR 22	Velocity loop Kp	15	0-100	-	Velocity loop proportional gain. 1) Increase the value can increase stiffness. 2) Reduce this value when the motor vibrates at low speed. 3) Usually keep the default value.
PR 23	Velocity loop Ki	0	0-100		Velocity loop integral gain. Usually keep the default value. Set it to 0 if the motor shakes during settling.
PR 24	Motor shaft locking time	200	0-1500	ms	Usually keep the default value. Reduce this value if you want to shorten the time of locking shaft.
PR 25	Internal filtering time	15	0-512	ms	Internal smoothing time for control commands. ***Note:*** *for multi-axis systems with interpolation requirements, this value must be set to the same for all axes.*
PR 26	Soft-starting time	8	1-30	0.1s	Internal smoothing time for starting current. Increase this value if there is a motor overshooting (“Jump”) at power-on.

PR 27	Motor inductance	-	0-10000	-	Read-only parameter and for reference only, when the drive Auto-Tuning feature on the drive is turned on.
PR 28	Auto-tuning at power-on	1	0-1	-	Read-only parameter. Its value is determined by if the “auto-tuning” has been turned on from DIP 6 of the drive: 0 - No, 1 - Yes.
PR 29	Velocity switching point: open loop to closed loop control	18	0-100	0.1r/s	Usually keep the default value. Only change it when it causes motor vibration at this mode switching velocity point.
PR 30	Velocity switching point: closed loop to open loop control	12	0-200	0.1r/s	Usually keep the default value. Only change it when it causes motor vibration at this mode switching velocity point.
PR 31	Motion type	0	0-10	-	Setting for motion type: 0 - Normal, 1- Fast response, 2- Low speed circular interpolation, reserved for the rest. Usually keep the default value.
PR 32	Self-test indicator at power-on	0	0-1	-	0 - No, 1 - Yes. When turned on (value “1”), the motor will rotate half a turn on each direction at power-on.

Note: All parameter values for CS-D808 and CS-D1008 must be integers.