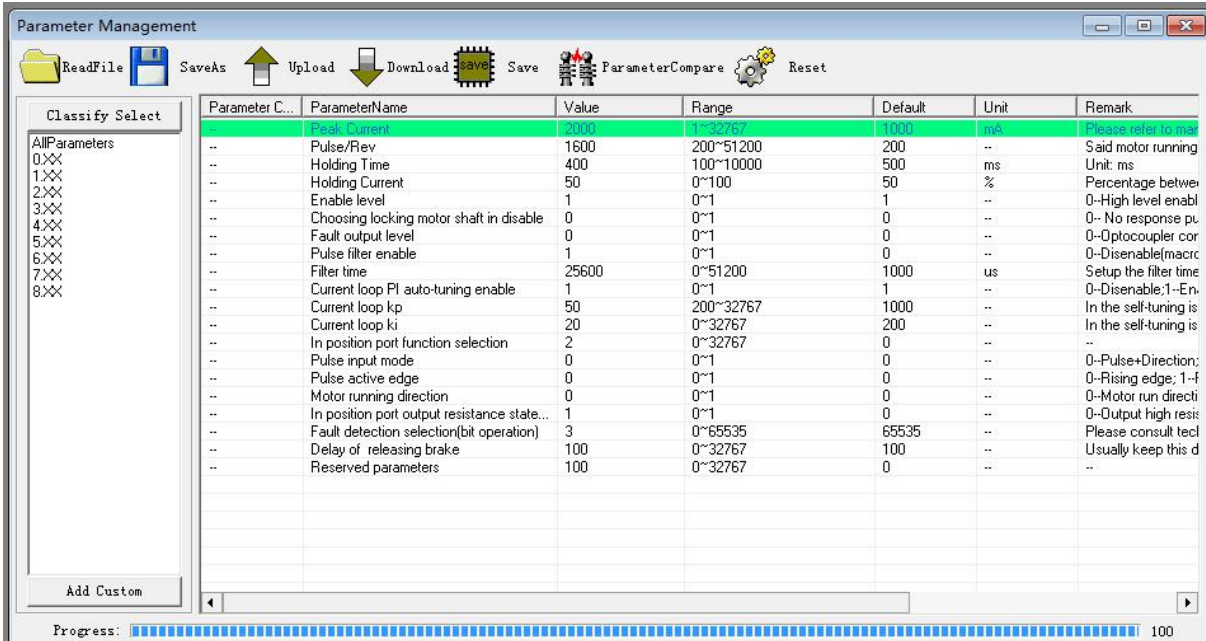


## EM-S ProTuner Software User Manual



The screenshot shows the 'Parameter Management' window of the EM-S ProTuner software. The window has a menu bar with options: ReadFile, SaveAs, Upload, Download, Save, ParameterCompare, and Reset. Below the menu bar is a 'Classify Select' panel with a tree view containing 'AllParameters' and sub-items 0 through 8. The main area is a table with the following columns: Parameter C..., ParameterName, Value, Range, Default, Unit, and Remark. The 'Peak Current' parameter is highlighted in green.

Parameter C...	ParameterName	Value	Range	Default	Unit	Remark
--	Peak Current	2000	1~32767	1000	mA	Please refer to man
--	Pulse/Rev	1600	200~51200	200	--	Said motor running
--	Holding Time	400	100~10000	500	ms	Unit: ms
--	Holding Current	50	0~100	50	%	Percentage betwe
--	Enable level	1	0~1	1	--	0-High level enabl
--	Choosing locking motor shaft in disable	0	0~1	0	--	0- No response pu
--	Fault output level	0	0~1	0	--	0-Optocoupler cor
--	Pulse filter enable	1	0~1	0	--	0-Disenable(macrc
--	Filter time	25600	0~51200	1000	us	Setup the filter time
--	Current loop PI auto-tuning enable	1	0~1	1	--	0-Disenable;1-En
--	Current loop kp	50	200~32767	1000	--	In the self-tuning is
--	Current loop ki	20	0~32767	200	--	In the self-tuning is
--	In position port function selection	2	0~32767	0	--	--
--	Pulse input mode	0	0~1	0	--	0-Pulse+Direction;
--	Pulse active edge	0	0~1	0	--	0-Rising edge; 1-f
--	Motor running direction	0	0~1	0	--	0-Motor run directi
--	In position port output resistance state...	1	0~1	0	--	0-Output high resis
--	Fault detection selection(bit operation)	3	0~65535	65535	--	Please consult tecl
--	Delay of releasing brake	100	0~32767	100	--	Usually keep this d
--	Reserved parameters	100	0~32767	0	--	--

At the bottom of the window, there is a progress bar labeled 'Progress:' which is filled with blue segments and shows a value of 100.

**Revision 1.0**

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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.

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## Record of Revisions

<b>Revision</b>	<b>Date</b>	<b>Author</b>	<b>Description of Release</b>
<i>1.0</i>	<i>Dec, 2019</i>	<i>MF</i>	<i>Initial Release</i>

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## 1. Introduction

Thank you for choosing Leadshine Products. The EM-S ProTuner can support stepper drives include EM415S, EM422S, EM542S, EM556S, EM870S, EM882S, DMA882S, DM2282 with higher torque, lower noise & heating, and smoother motion.

For most applications Leadshine stepper systems are always no tuning, but in some cases this free EM-S ProTuner software tool can still be used for custom settings like output current, micro-step resolution, control type, etc.

## 2. Prerequisites

Leadshine EM-S ProTuner for stepper drives is a free Windows based software. To successfully run this software, the following Prerequisites must be satisfied.

### 2.1 Operation System

This EM-S 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 Accessories

To connect a EM-S Series 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 adapters will work. Contact your drive seller or Leadshine technical support for getting such a USB to RS232 adaptor, which have been confirmed to work fine with the stepper drives.

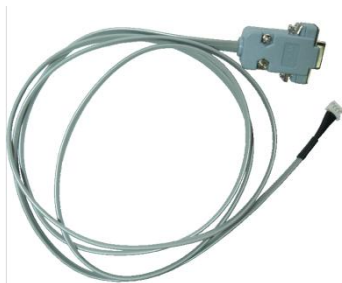


Figure 1: RS232 Tuning cable

(CABLE-PC-1 for EM415S,EM422S,EM542S,EM556S,EM870S)

(CABLE-PC for EM882S,DMA882S,DM2282)



Figure 2: USB to RS232 converter

## 2.3 Notes

- (1) The EM-S ProTuner can not run the motor to test and tune motion performance, it can only be used to modify some parameters such as output current, microstep...
- (2) The “Operation Specification” file in “About” is invalid;
- (3) Please don't click the “offline” when connect to drive, offline is invalid.\

## 3. Software Overview

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

### 3.2 Work Space

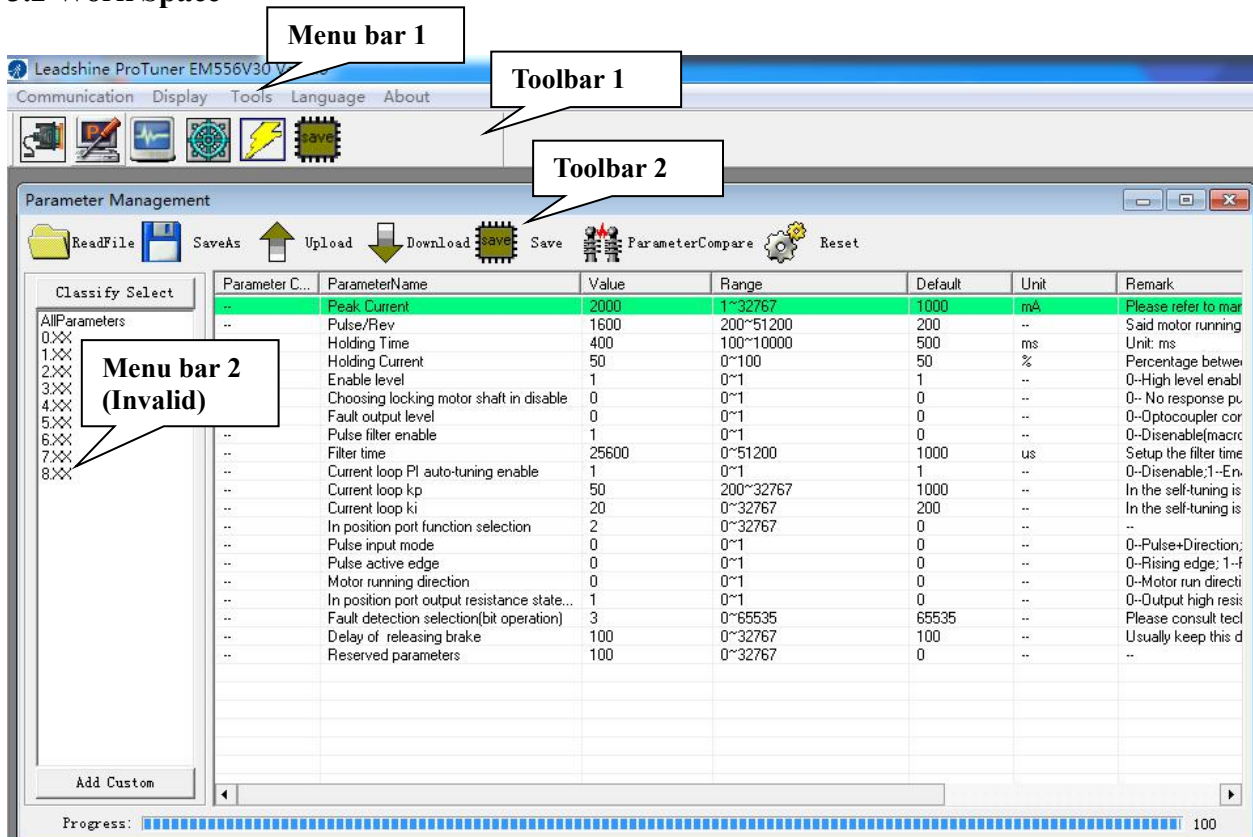








Figure 3: Software space








### 3.3 Menu and Toolbar

There are two menu bars, menu bar 1 is used to set up the Leadshine ProTuner software, menu bar 2 is invalid. used to set up the drive, Menu items and respective toolbar items are described in the following table:

Menu bar 1	Sub-menu Item	Toolbar 1 Icon	Function
Communication	Connect to drive		Connect/disconnect the drive to/from the computer
	Exit	-	Close EM-S ProTuner software
Display	Parameter Management		Save modified parameter values to drive, it will be invalid after powering off
	Save Drive Parameters		Save modified parameter values to drive, it will be invalid after powering off
	Scope		-
	Motion Test		Invalid
	Alarms		Show the current alarms and history alarms. And alarm setting such as phase error
	Environment Parameter Setup	-	Invalid
Tools	Debug Tools	-	Invalid
	Calculator	-	-
Language	Simplified Chinese	-	-
	English	-	-
About	Operation Specification	-	Invalid
	Product Information	-	-



When click the “Parameter Management” or icon “”, it will show the toolbar 2 as below:

Toolbar 2 Icon	Function
 ReadFile	Read parameter settings from file
 SaveAs	Parameter setting as
 Upload	Read the operating parameters of the drive
 Download	Host computer parameters download to the drive (the setting will be invalid if power off the drive)
 Save	Save the current parameters to the drive (the settings are valid even if power off the drive)
 ParameterCompare	Compare the difference of two parameter lists
 Reset	Reset all the configurable parameter to factory settings

## 4. Connect the Drive

Follow the below steps to connect a stepper drive to the EM-S ProTuner software on your computer.

- Read Section 2 first, you need a tuning cable (cable-pc-1 for EM415S/422S/542S/556S/870S; cable-pc for EM882S, DMA882S, DM2282) , USB to RS232 converter (selectable), Power supply, Leadshine stepper drive, then connect the drive to your computer.
- Power on the stepper drive.
- Launch ES-M ProTuner, it will show as Figure 4. **Please do not click “Offline” “Search”, “Drive Address”**



Figure 4: Communication screen



- Step 1 to select the correct COM port from “Com 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: Select COM port

- Step 2 to click “Connect” button and wait a few seconds. If the drive has been successfully connected, the icon will change into color and show the stepper drive model automatically as shown in Figure 6. If the selected COM port is wrong, the following error message will be displayed (Figure 7) .

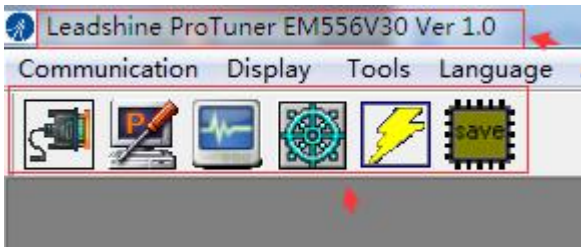


Figure 6: Connected successfully

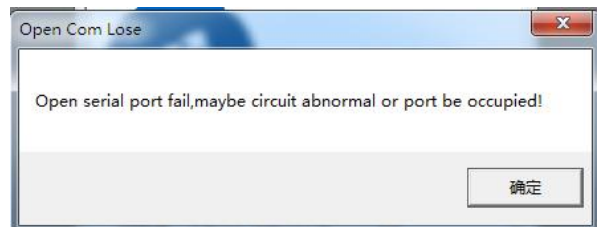


Figure 7: Connection error message

- If the stepper drive is damaged or the power supply is not on, the following error message will be displayed (Figure 8)

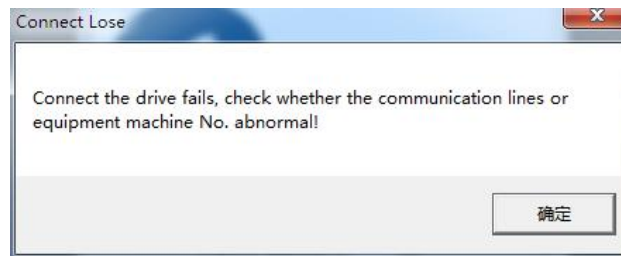



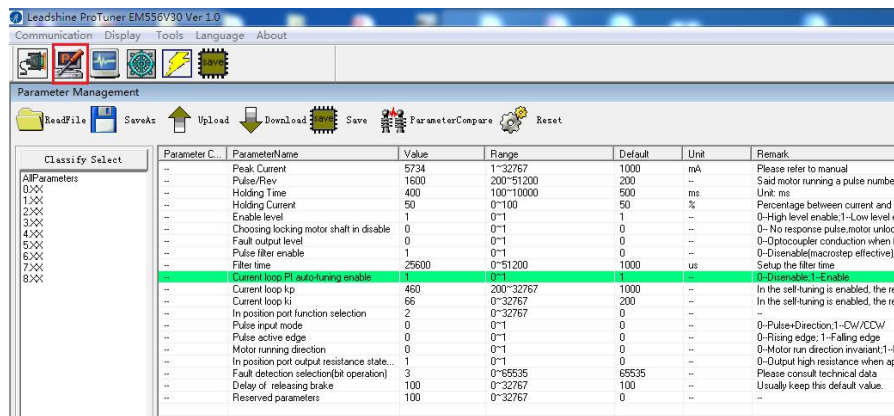
Figure 8: Drive or power supply error message

## 5. Manage Drive Parameters

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

### 5.1 Read Parameters

After the drive is connected successfully connected to computer, after clicking icon  on the Toolbar 1, current settings of the stepper drive will be automatically uploaded and displayed (Figure 9). Or the Parameters window can also be open by clicking the “Display->Parameters Management ” on the Menubar 1.

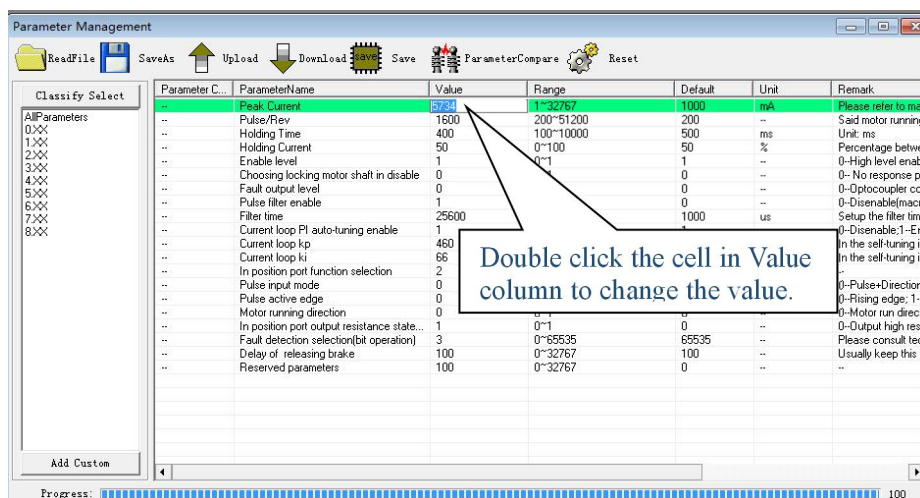


Parameter C...	ParameterName	Value	Range	Default	Unit	Remark
--	Peak Current	5734	1~32767	1000	mA	Please refer to manual
--	Pulse/Rev	1600	200~51200	200	--	Said motor running a pulse number
--	Holding Time	400	100~10000	500	ms	Unit: ms
--	Holding Current	50	0~100	50	%	Percentage between current and I
--	Enable level	1	0~1	1	--	0-High level enable;1-Low level e
--	Choosing locking motor shaft in disable	0	0~1	0	--	0- No response pulse motor unlocl
--	Fault output level	0	0~1	0	--	0-Optocoupler conduction when f-
--	Pulse filter enable	1	0~1	0	--	0-Disable(microstep effective);
--	Filter time	25600	0~51200	1000	us	Setup the filter time
--	Current loop PI auto-tuning enable	1	0~1	1	--	0-Disable;1-Enable
--	Current loop kp	460	200~32767	1000	--	In the self-tuning is enabled, the re
--	Current loop ki	66	0~32767	200	--	In the self-tuning is enabled, the re
--	In position port function selection	2	0~32767	0	--	--
--	Pulse input mode	0	0~1	0	--	0-Pulse+Direction;1-CW/CDW/
--	Pulse active edge	0	0~1	0	--	0-Rising edge;1-Falling edge
--	Motor running direction	0	0~1	0	--	0-Motor run direction;1-Reverse;1-A
--	In position port output resistance state	1	0~1	0	--	0-Output high resistance when ap
--	Fault detection selection(bit operation)	3	0~65535	65535	--	Please consult technical data
--	Delay of releasing brake	100	0~32767	100	--	Usually keep this default value
--	Reserved parameters	100	0~32767	0	--	--

Figure 9: Parameters

### 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 10.



Parameter C...	ParameterName	Value	Range	Default	Unit	Remark
--	Peak Current	5734	1~32767	1000	mA	Please refer to ma
--	Pulse/Rev	1600	200~51200	200	--	Said motor running
--	Holding Time	400	100~10000	500	ms	Unit: ms
--	Holding Current	50	0~100	50	%	Percentage betwe
--	Enable level	1	0~1	1	--	0-High level enabl
--	Choosing locking motor shaft in disable	0	0~1	0	--	0- No response pu
--	Fault output level	0	0~1	0	--	0-Optocoupler cor
--	Pulse filter enable	1	0~1	0	--	0-Disable(microst
--	Filter time	25600	0~51200	1000	us	Setup the filter time
--	Current loop PI auto-tuning enable	1	0~1	1	--	0-Disable;1-En
--	Current loop kp	460	200~32767	1000	--	In the self-tuning is
--	Current loop ki	66	0~32767	200	--	In the self-tuning is
--	In position port function selection	2	0~32767	0	--	--
--	Pulse input mode	0	0~1	0	--	0-Pulse+Direction;
--	Pulse active edge	0	0~1	0	--	0-Rising edge;1-F
--	Motor running direction	0	0~1	0	--	0-Motor run direc
--	In position port output resistance state	1	0~1	0	--	0-Output high resi
--	Fault detection selection(bit operation)	3	0~65535	65535	--	Please consult tecl
--	Delay of releasing brake	100	0~32767	100	--	Usually keep this d
--	Reserved parameters	100	0~32767	0	--	--

Figure 10: 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 stepper drive are set to “default”, such as parameters “Pulse/Rev”, “Filter time” and “Peak current”.
- Some parameters only can be set by DIP switch, such as parameters “Control Mode”, “No Auto Tuning”, alarm output, Pulse Edge, “Self Test”
- Some parameters are “Reserved” means invalid parameter.

### **5.3 Key Parameter Description**

All parameters for the stepper drive series closed loop stepper drives are described in this section.

#### **5.3.1 Peak Current**

This parameter is used to set the peak current that the stepper drive can output.

#### **5.3.2 Pulse/Rev (Instruction number per rev)**

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

- DIP switches 5-8 (SW5-SW8) of the stepper drive must be all set to “ON” positions.
- It can be any value in the range of 200 – 51,200.

#### **5.3.3 Holding Time**

This parameter is the time required for drive output current changed from set value to holding current value.

You can keep default as normal.

#### **5.3.4 Holding Current**

This parameter is used to set the idle output current in a percentage value of the peak current, when the stepper drive operates without control signal input.. You can keep default as normal.

#### **5.3.5 Enable Level**

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

#### **5.3.6 Choosing locking motor shaft in disable (read only)**

This parameter is set by SW15, used to set whether lock motor shaft when the drive in the statue of disable.

#### **5.3.7 Fault output level (read only)**

This parameter is set by SW12, used to set the “ALM” signal impedance level of the stepper drive. Set its

value to “0” for high level (default); set its value to “1” for low level.

### **5.3.8 Pulse filter enable (read only)**

This parameter is set by SW9 and SW10, when they are set to “ON, ON”, this parameter value will be “0” means that pulse filter disable, otherwise, the value will be “1”.

### **5.3.9 Filter time (read only)**

This parameter is set by SW9 and SW10, 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.*

### **5.3.10 Current loop PI Auto-Tuning (read only)**

This parameter is set by SW11, set to “OFF” to turn on the function of auto-tuning at power-on. It is read-only and you must connect a stepper motor. Keep default when connecting with [Leadshine CM Series stepper motor](#) . But sometimes third party stepper motor is connected, if the motor screams as soon as it power on, you need to disable the auto-tuning (set SW11 to “ON”), then restart power to modify the current loop Kp and Ki value. (Kp is recommended 200-1000, Ki is recommended 0-100)

### **5.3.11 Current Loop Kp**

This parameter is used to set the current loop proportionality of the stepper drive. It is for advanced users only. Usually keep the default value for powering Leadshine motors.

### **5.3.12 Current Loop Ki**

This parameter is used for tuning current loop integral gain. Usually keep the default value for Leadshine motors and 3<sup>rd</sup> party motors with normal inductance.

### **5.3.13 Pulse Input Mode**

This parameter is read only, because it’s set by SW14. Value “0” is for pulse & direction (also called step & direction) control; value “1” for CW/CCW control.

### **5.3.14 Pulse Effective Edge**

This parameter is read only, because it’s set by SW13. 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.

### **5.3.15 Delay of Releasing Brake**

This parameter is used to set the delay time before brake releasing. Usually keep the default value of this parameter unless you really want.

### 5.3.16 Invalid Parameters

These parameters are invalid for stepper drive as below:

In position port function selection;

Motion running direction;

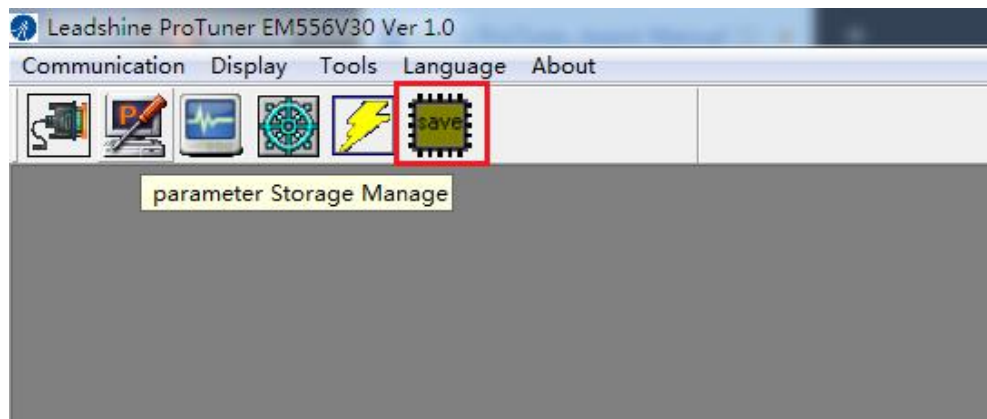
In position port output resistance state;

Fault detection selection (bit operation);

Reserved parameters.

### 5.4 Save Parameters

After parameters tuned & optimized, you must download these changes to the drive. Otherwise, those changes will be lost next time when the drive is re-powered. Please click the icon as below:



When parameters save successfully, the following window is shown as below:



## 6. Resetting Drive

To reset the current drive configurations back to factory settings, the steps are as below.




- Click the icon  in parameter manage window. The confirmation message will be popped up, then click the “OK” button to continue resetting process and you don’t need to restart power supply.



Figure 11: resetting confirmation message

*Note: Some parameters may not be reset because of the impact of DIP Switch settings, refer specifically to Section 5.3*

## 7. 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 EM-S ProTuner software.

### 7.1 Open a Configuration File

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

- Open parameter window, then click icon  , then it will show as

Figure 12 .

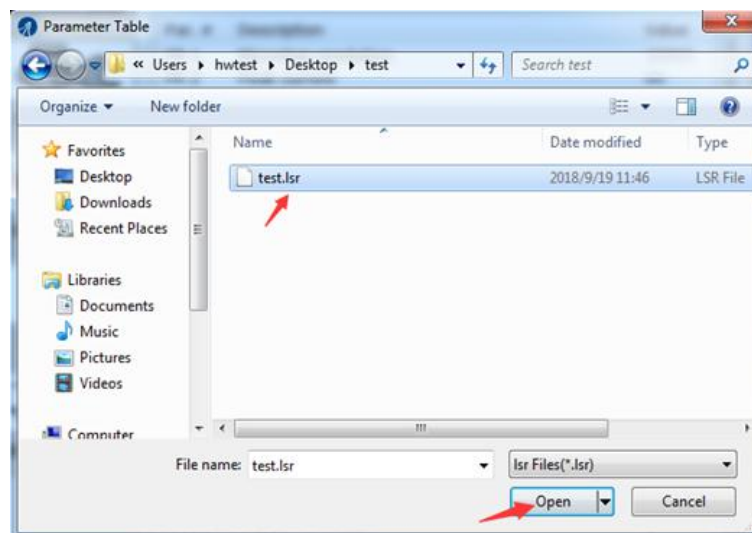
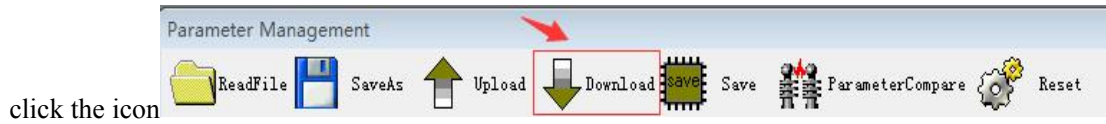


Figure 12: open an .lsr configuration file window

- Find and select the .lsr configuration file, click “OK” button. After the configuration file is open, then



## 7.2 Save a Configuration File

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

- Open the parameter manage window, click the icon  , then it will show as Figure 13

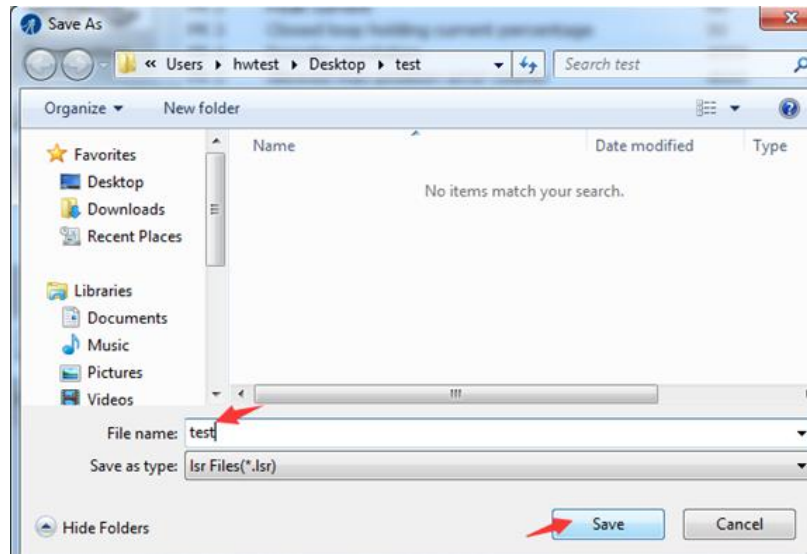


Figure 13: save configuration file

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

## 8. Manage Drive Error



When you click the icon  , the figure is shown as below, you can find there are three item: Current alarms, History alarms, and Alarm settings.

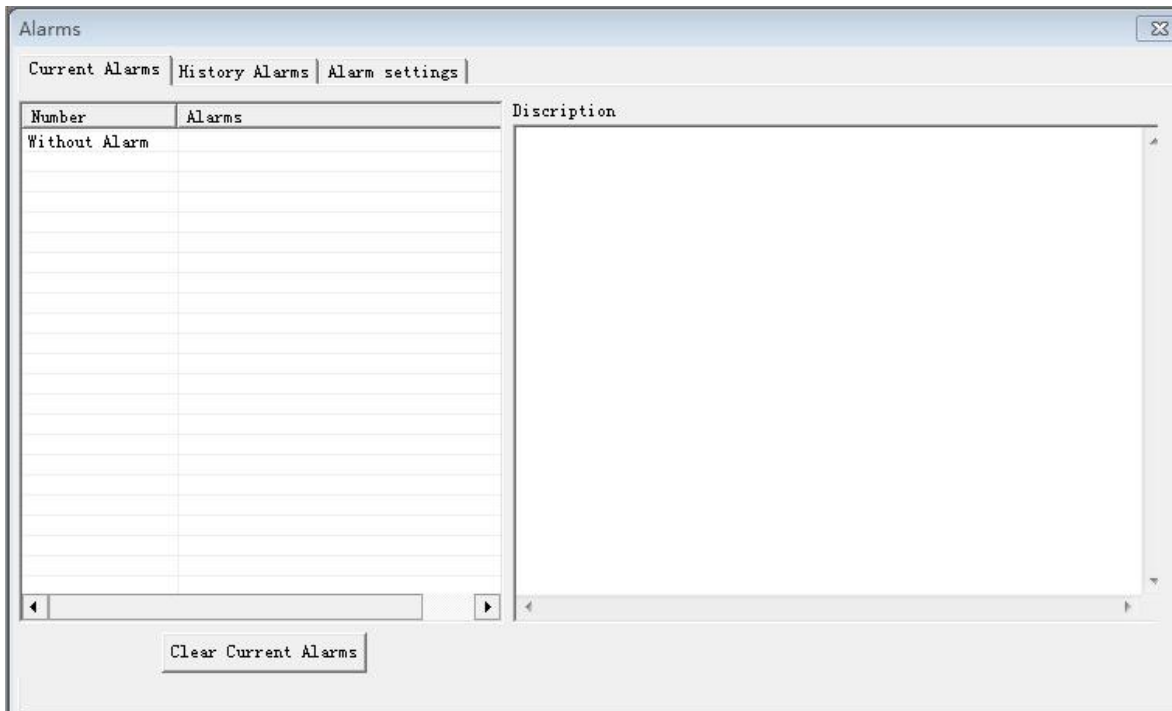

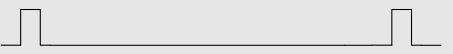
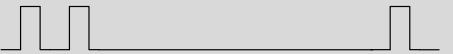



Figure 14: Show the drive's alarm

## 8.1 Current Alarms

You can use the EM-S ProTuner to detect the current alarm, or through flashing times of red LED light in a period of 3 seconds. The alarm table is as below:

Priority	Time(s) of Blink	Sequence wave of red LED	Description
1 <sup>st</sup>	Always on		The drive was short-circuited or burned out.
1 <sup>st</sup>	1		Over-current protection activated when peak current exceeds the limit.
2 <sup>nd</sup>	2		Over-voltage protection activated when drive working voltage exceeds the limit
3 <sup>rd</sup>	4		Motor cable error or not connected to the motor.

The above alarm can not be cleared by software, be sure to check the wiring and power supply to eliminate the problem.



## 8.2 History Alarms

You can use the EM-S ProTuner to track error history previously happened to the connected stepper drives as below figure.

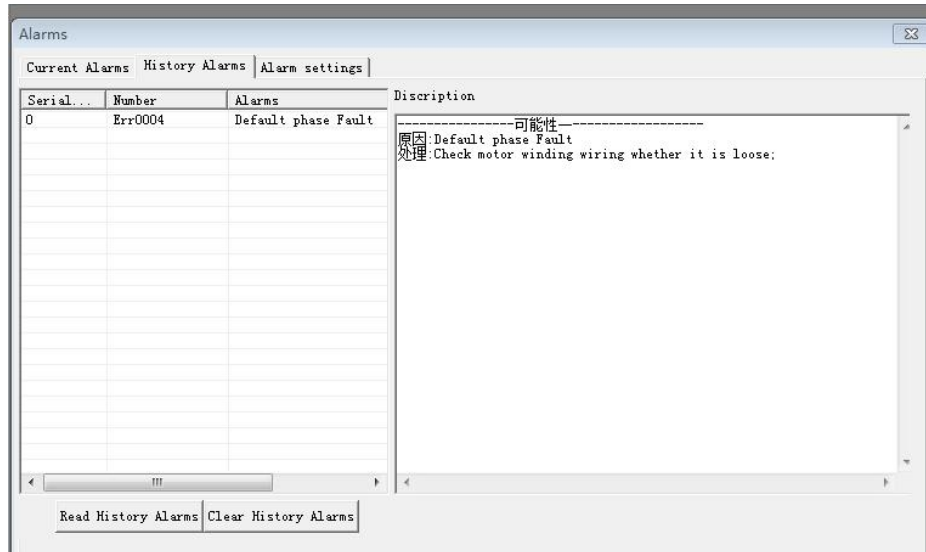


Figure 15: Show history alarm

## 8.2 Alarm Settings

Overcurrent and overvoltage are turned on by default and can't be turned off. You can use this option to turn on other alarm features such as "Phase Error". "Open-loop Stall Detection" alarm feature is only available for the stepper drive of EM882S and DMA882S. Others alarm features are invalid.

