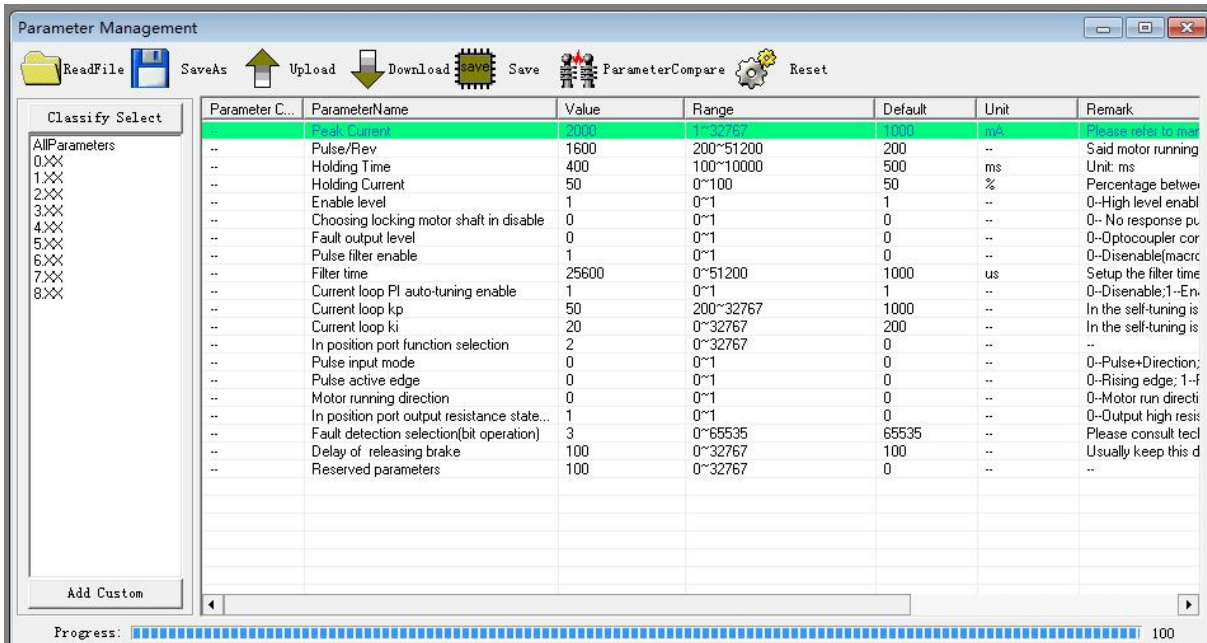


## StandardProTuner Software Manual



| 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       | --   | --                    |

**Revision 1.0**

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## Notice

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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 user for choosing Leadshine Products. The StandardProTuner can support stepper drives include EM415S, EM422S, EM542S, EM556S, EM870S, EM882S, DMA882S, DM2282 V3.0, DM542E V3.0, DM556E V3.0, DMA860E V3.0, 3DM580S, 3DM883 V3.0, 3DM2283 V3.0, etc.

For most applications Leadshine stepper systems are always without tuning, but in some cases this free StandardProTuner software tool can still be used for custom settings like output current, micro-step resolution, control type, etc.

## 2. Prerequisites

Leadshine StandardProTuner 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 StandardProTuner 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 userr 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.

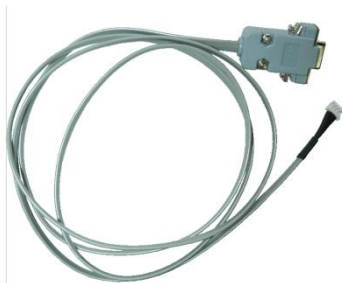


Figure 1: RS232 Tuning cable

(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 StandardProTuner 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 StandardProTuner software.

### 3.2 Work Space

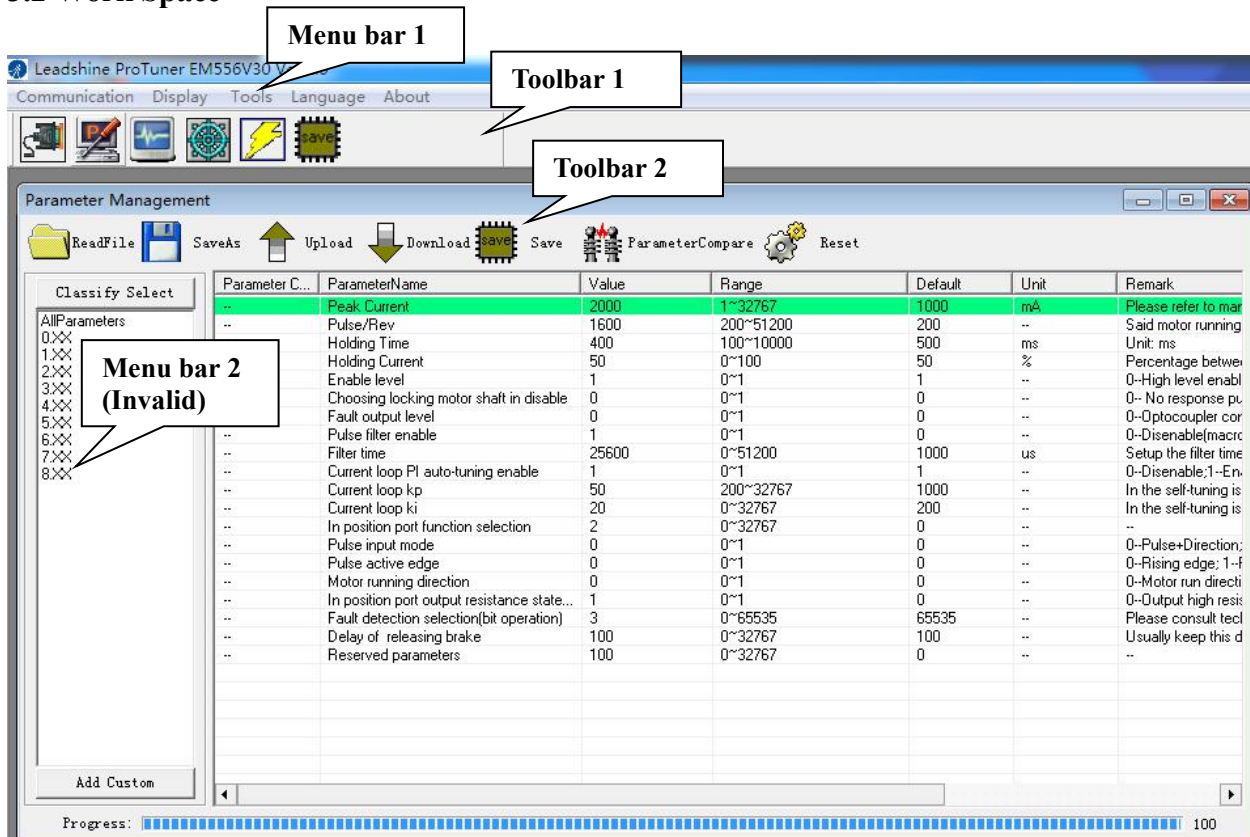








Figure 3: Software space








### 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 StandardProTuner 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.<br>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 StandardProTuner software on user computer.

- Read Section 2 first, user 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 user 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, user can go to Device Manager of user's 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

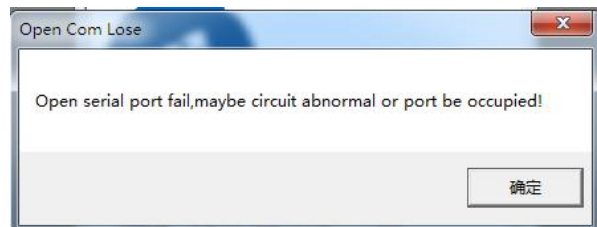


Figure 7: Connection error message

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

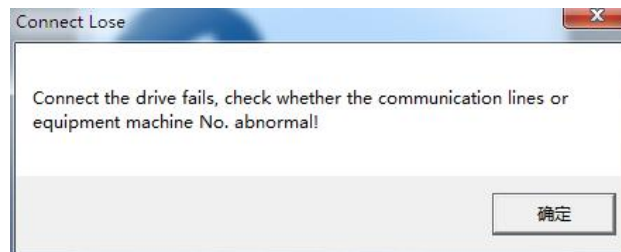



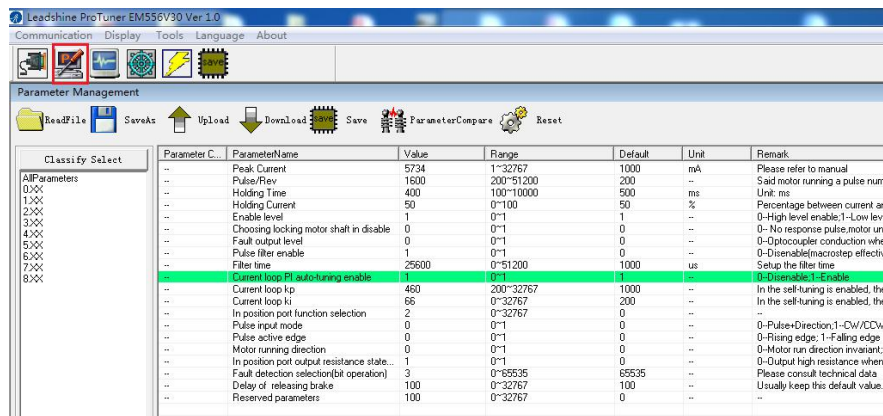
Figure 8: Drive or power supply error message

## 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 StandardProTuner 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.

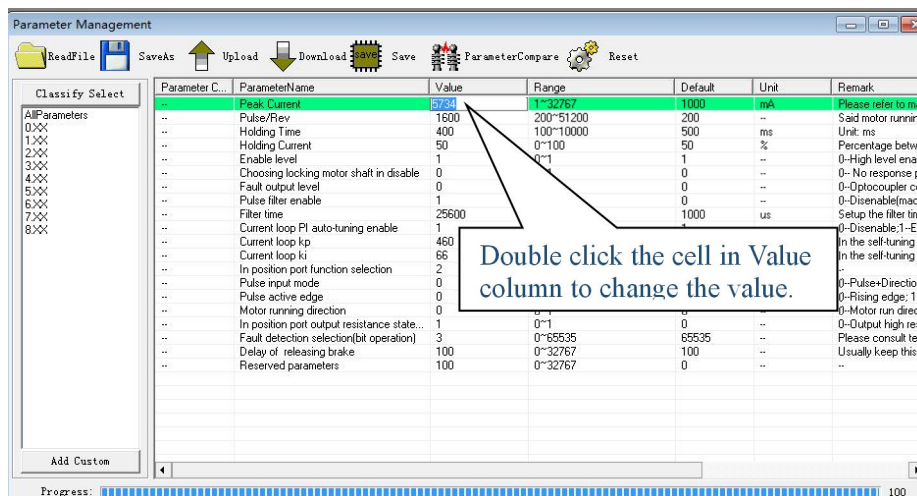


| Parameter C... | ParameterName                              | Value | Range     | Default | Unit | Remark                                |
|----------------|--|-------|-----------|---------|------|---------------------------------------|
| --             | Peak Current                               | 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 unloc      |
| --             | 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-invert(1)-A   |
| --             | In position port output resistance state.. | 1     | 0~1       | 0       | --   | 0-Output high resist 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. user 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;1-CW/CDW/ |
| --             | 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 user 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. user 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.. user 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**

This parameter is set by SW12 for some EM-S series, some models are modified by software, 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**

This parameter is set by SW9 and SW10 for some EM-S series, some models are modified by software, 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**

This parameter is set by SW9 and SW10 for some EM-S series, some models are modified by software, 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**

This parameter is set by SW11 for some EM-S series, some models automatically turn on and do not turn off this function. For some EM-S models, when SW11 is set to “OFF” to turn on the function of auto-tuning at power-on. It is read-only and user 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, user 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 set by DIP switch for some models, 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 set by DIP switch for some models. 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 user really want.

### 5.3.16 Invalid Parameters

These parameters are invalid for stepper drive as below:

In position port function selection;

Motion running direction;

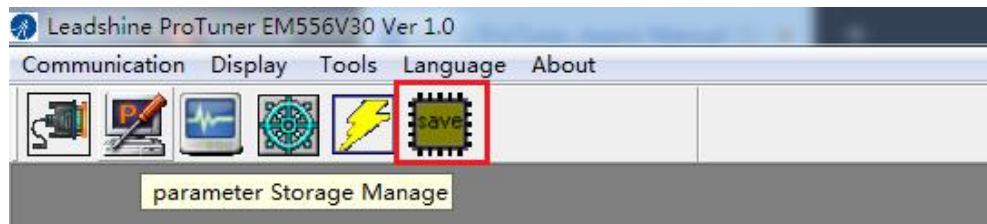
In position port output resistance state;

Fault detection selection (bit operation);

Reserved parameters.

## 5.4 Save Parameters

After parameters tuned & optimized, user 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 user 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. user can also open an existing .lsr configuration file and load the settings to the StandardProTuner 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 .

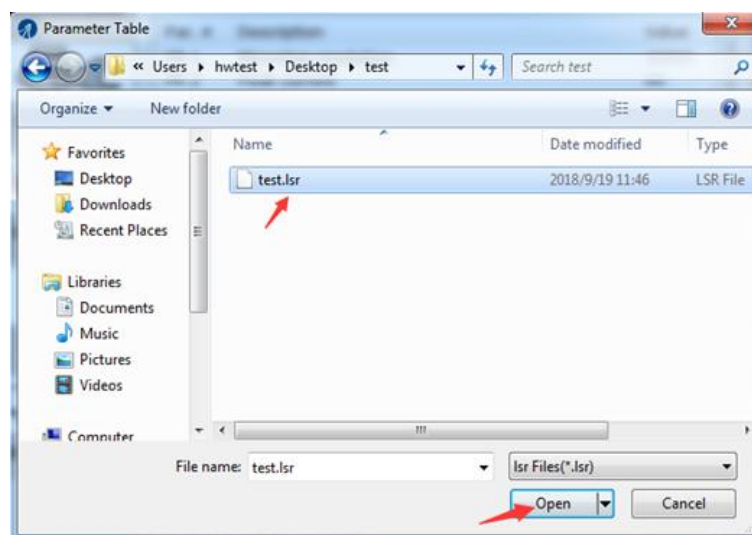
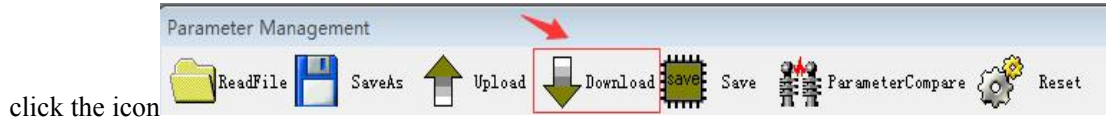


Figure 12: open an .lsr configuration file window

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



click the icon

## 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

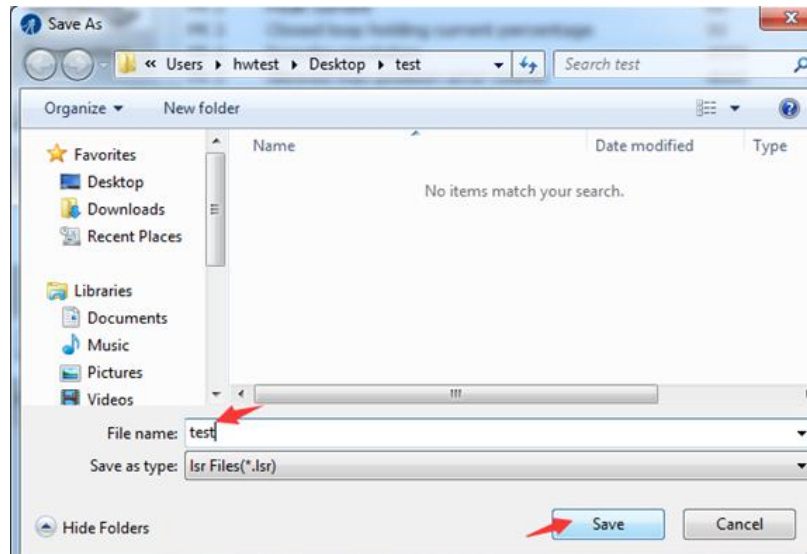



Figure 13: save configuration file

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

## 8. Manage Drive Error



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

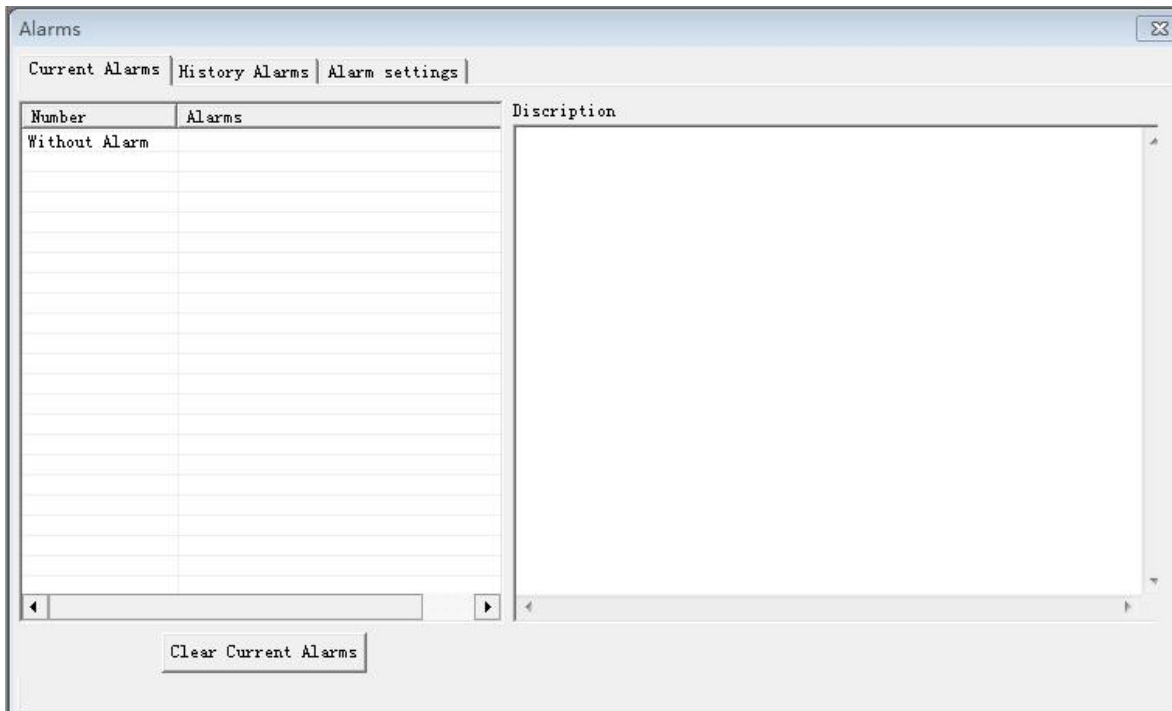





Figure 14: Show the drive's alarm

## 8.1 Current Alarms

user can use the StandardProTuner 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 |

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

user can use the StandardProTuner to track error history previously happened to the connected stepper drives as below figure.



## 8.2 Alarm Settings

Overcurrent and overvoltage are turned on by default and can't be turned off. And the phase error is delete by Leadshine since 2019. User can use this option to turn on or off “Open-loop Stall Detection” alarm, this feature is only available for the stepper drive of EM882S and DMA882S. Others alarm features are invalid.

