SYNTEC TECHNOLOGY CO.,LTD.

Auto Tuning Operation Manual

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修改日期：2020-10-04

1 Auto Tuning Introduction

Path

Eight keys： F10 Next → F3 Param. → F8 Adjust Tuning App. → F1 Auto Tuning

Five keys： F10 Next → F3 Param. → F10 Next → F5 Adjust Tuning App. → F1 Auto Tuning

Explanation

Valid Version

M3- YASKAWA Sigma-7s： 10.116.36D, 10.116.39, 10.117.39

M3- YASKAWA Sigma-M： 10.116.36D, 10.116.39, 10.117.39

M2- YASKAWA Sigma-5： 10.116.16B (Tuning function has been provided from version 10.114.50, but several changes were made, thus it's recommended to use version 10.116.16B)

M2- YASKAWA Sigma-7s： 10.116.24J, 10.116.31

The drive firmware version must be above 0x001E

M2- YASKAWA Sigma-M： 10.116.24K, 10.116.31

The drive firmware version must be above 0x001E

M2- Syntec Inverter： 10.116.16B (Not supporting Syntec DD motor tuning for now)

This page provides the auto tuning operations of serial drives.

Auto tuning function allows the drives to measure the inertia ratio and adjust the best servo parameter according to current mechanism type and loads, which is different from adjust tuning.

3 different tuning process are separated according to axis function and the brand of drives:

YASKAWA Axis

YASKAWA Spindle

Syntec Spindle

As mentioned above, for YASKAWA Axis and YASKAWA Spindle, the tuning process are mostly the same except some setups.

Operation Method

Enter the page according to the needs and hint messages, the details will be included in this chapter respectively.

The tuning function only supports JOG/INCJOG/MPG mode, and must be operated in Not Ready state. Moreover, switching mode is not allowed during the process. (116.36L、10.116.43、10.117.43)

Should not in position control mode before spindle auto tuning (C63/R581 should be off)

2 Automatic transfer machine Introduction

2.1 **Automatic transfer machine**

path

Eight key: F10 Next ->F3 parameter setting ->F8 Adjustment function ->F1 Automatic Tuning

Five-button: F10 Next ->F3 parameter setting ->Next F10 ->F5 Adjustment function ->F1 Automatic Tuning

Explanation

Valid version

M3- Yaskawa Sigma-7s: 10.116.36D, 10.116.39,10.117.39

M3- Yaskawa Sigma-M: 10.116.36D, 10.116.39,10.117.39

M2- Yaskawa Sigma-5: 10.116.16B (10.114.50 early in conditioner that is functional, but the middle of doing a lot of amendments, it is recommended to use 10.116.16B.)

M2- Yaskawa Sigma-7s: 10.116.24J, 10.116.31

Drive firmware version above shall 0x001E

M2- Yaskawa Sigma-M: 10.116.24K, 10.116.31

Drive firmware version above shall 0x001E

M2-Syntec Drive: 10.116.16B (not currently supported SyntecDD motor conditioners)

This page provides tandem drive automatically adjust operating screen.

Automatic transfer machine is to allow the drive mechanism can be based on the time and type of load, measuring the inertia ratio and optimum adjustment of servo parameters, and application of adaptation is different.

By axial drive functions and different brands, there will be three kinds of flow conditioners, namely:

Yaskawa axial

Yaskawa spindle

Syntec spindle

Cheng, the Yaskawa Yaskawa spindle axis and conditioner only part of the process to set different, the rest are the same.

Operation method

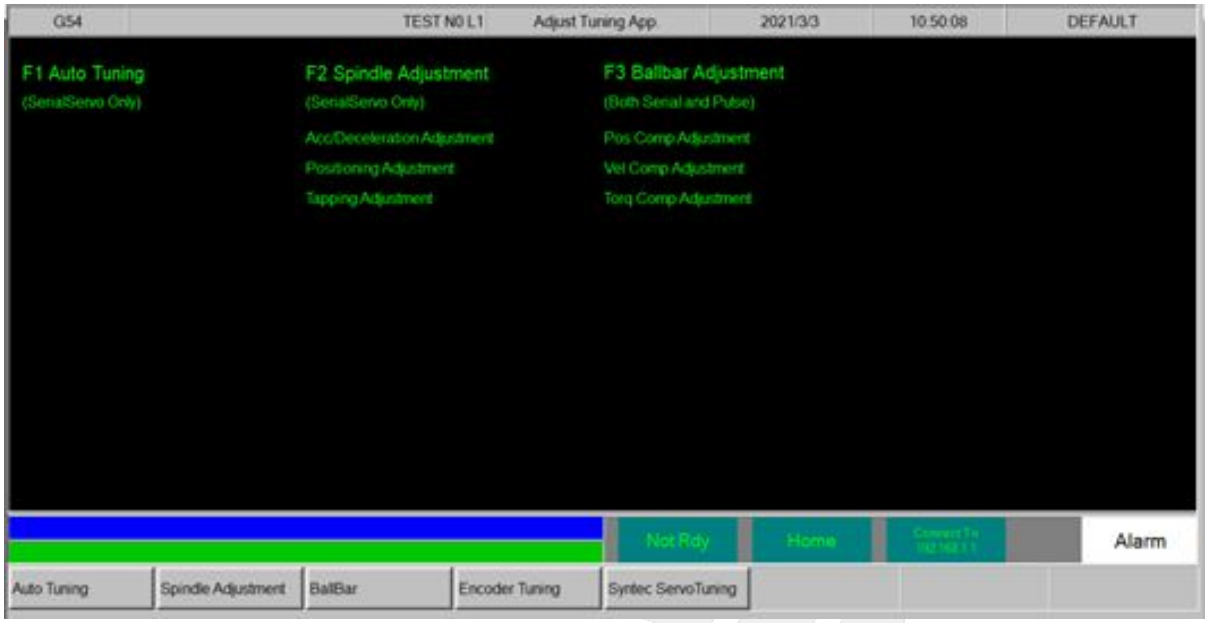
According to the needs and the corresponding screen prompts to enter the picture, details of the operation will be separately described in this section.

Tuning feature is only available in continuous jog / Incremental Jog / handwheel mode and ready for the next state. In addition, machine process can not switch modes. (116.36L, 10.116.43,10.117.43)

3 Syntec M2 Axis Auto Tuning Operations

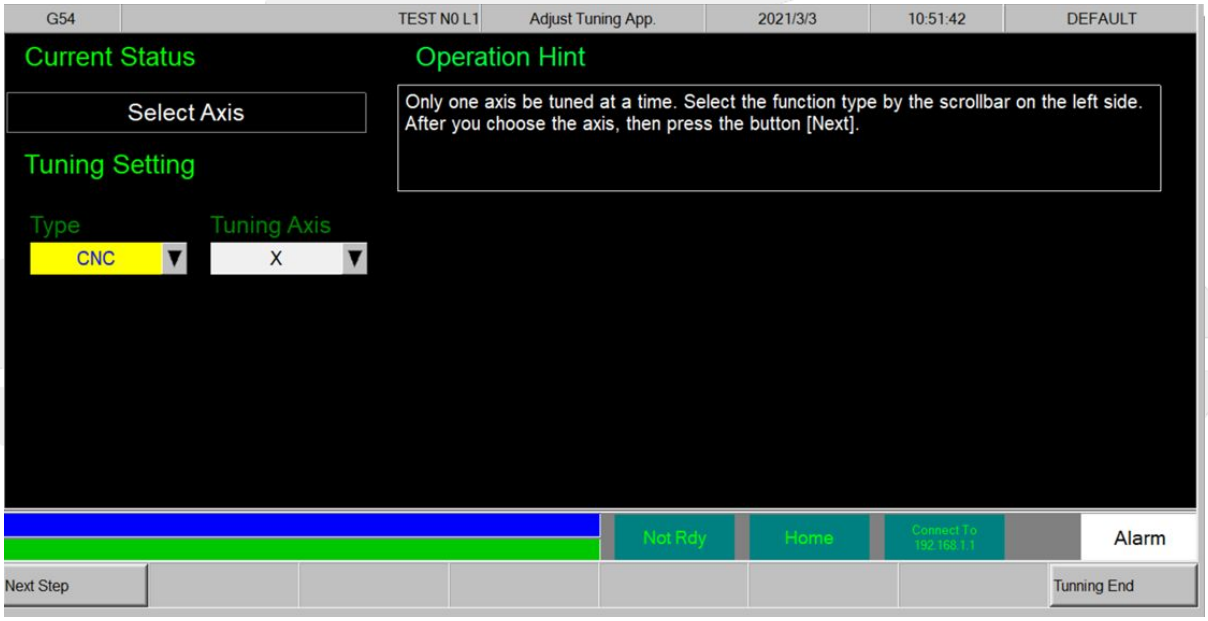
3.1 Main Screen Instructions

Enter Adjustment Tuning App., select Auto Tuning.



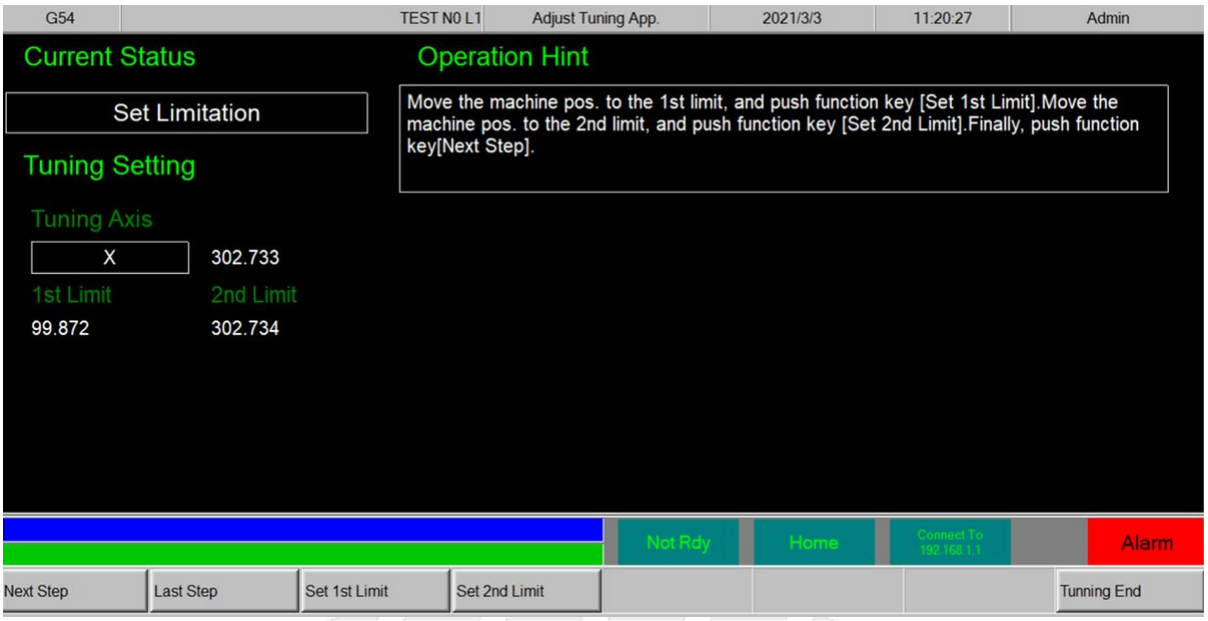
3.2 Normal Operating Process

Step1: Choose tuning Syntec axis and press [Next]

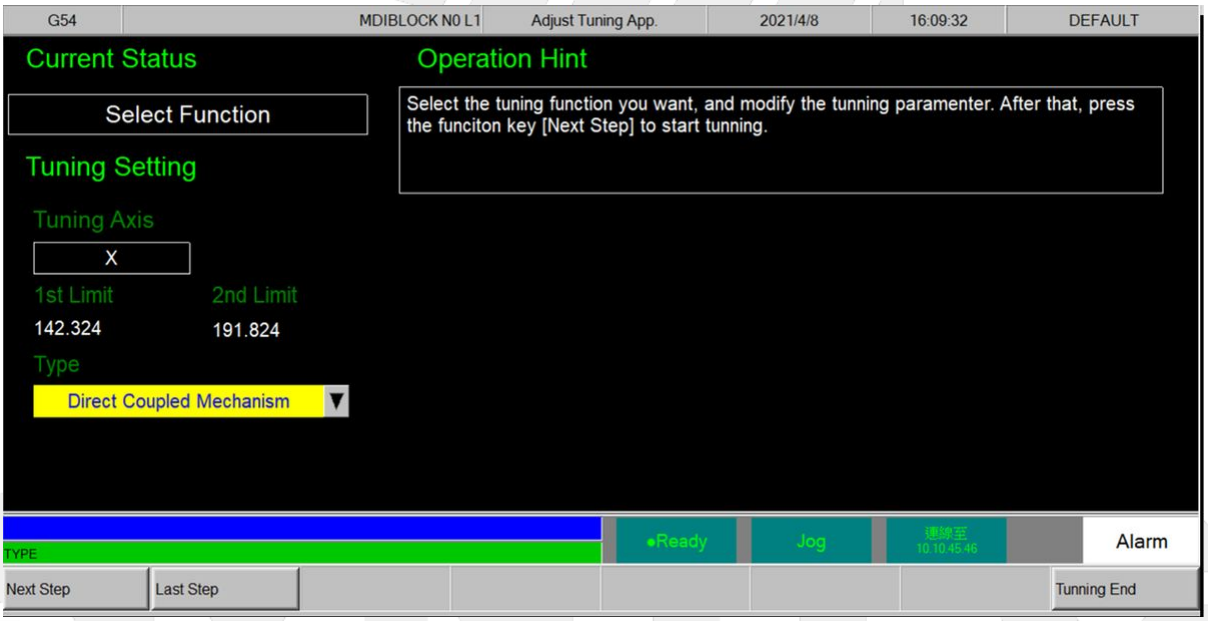


Step2: Move the machine axis and set 1st tuning limit, and 2nd tuning limit in order. Press "Next" after finished the setup.

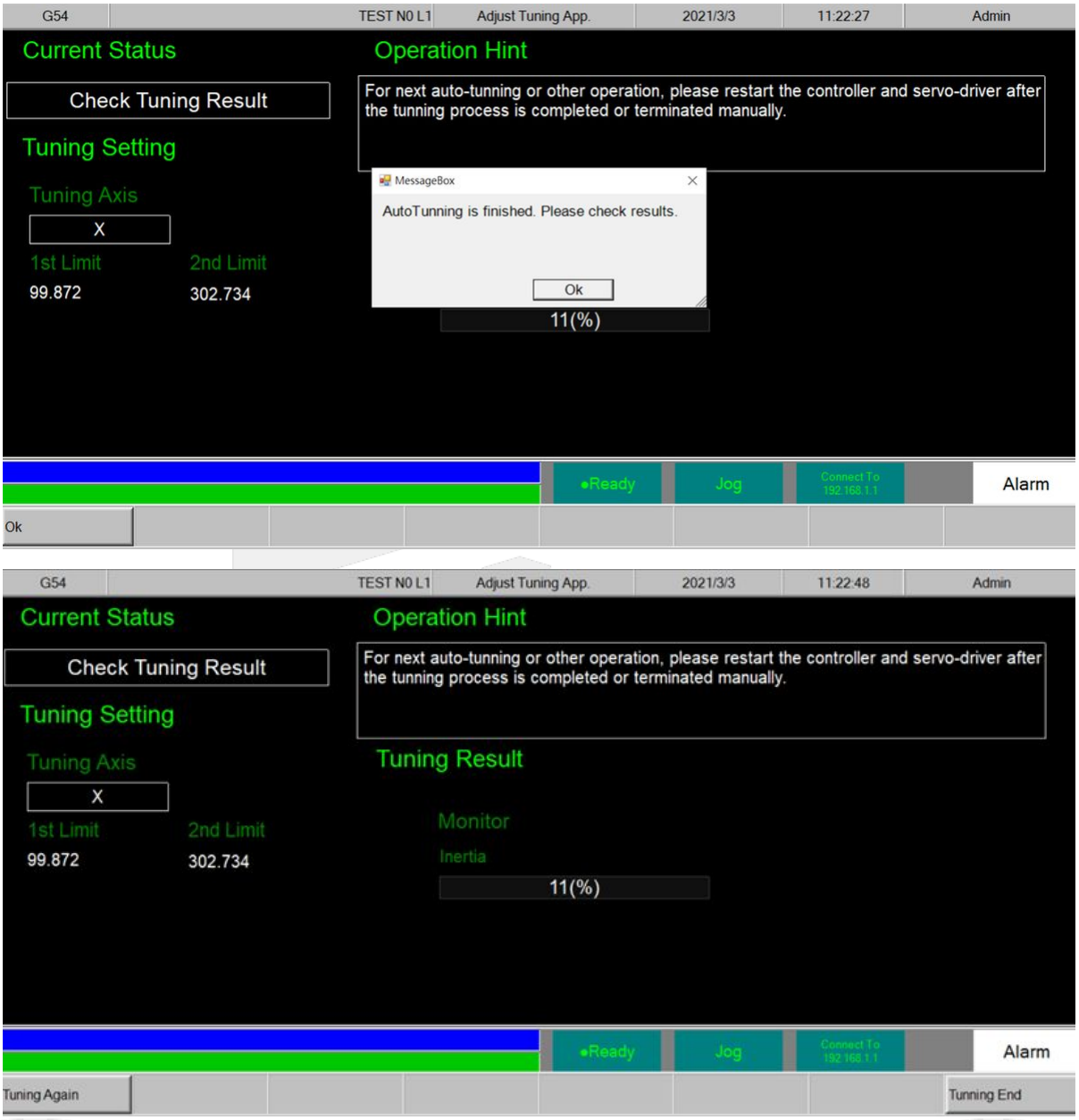
If the tuning distance is not enough or too large, a hint message will pop up. In this case, please rearrange the two limits.



Step3: Select the tuning mode and mechanism type, press [Next]



Step4: Tuning completed, please check the result.



3.3 Others

1. Supporting version : 10.116.24x, 10.116.x, 10.117.x and after, until 10.118.46x.
2. Currently only supports inertia estimation.

Common Q&A

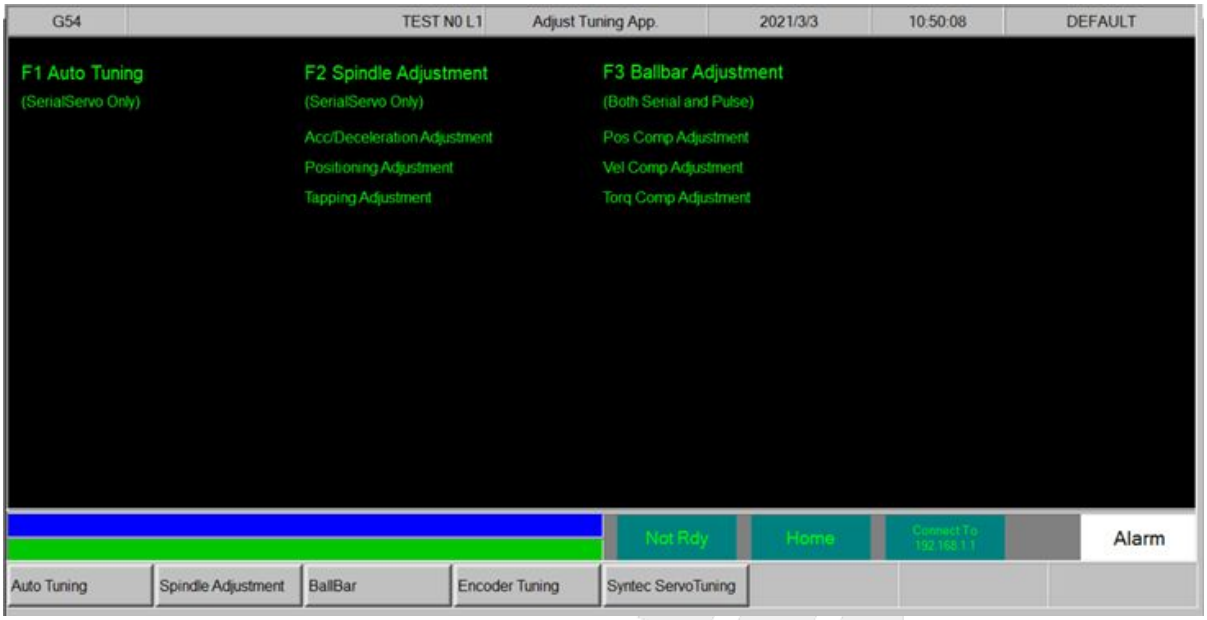
Q1: Is gain adjustment supported?

A1: Not supported for now.

4 Syntec M2 Spindle Auto Tuning Operations

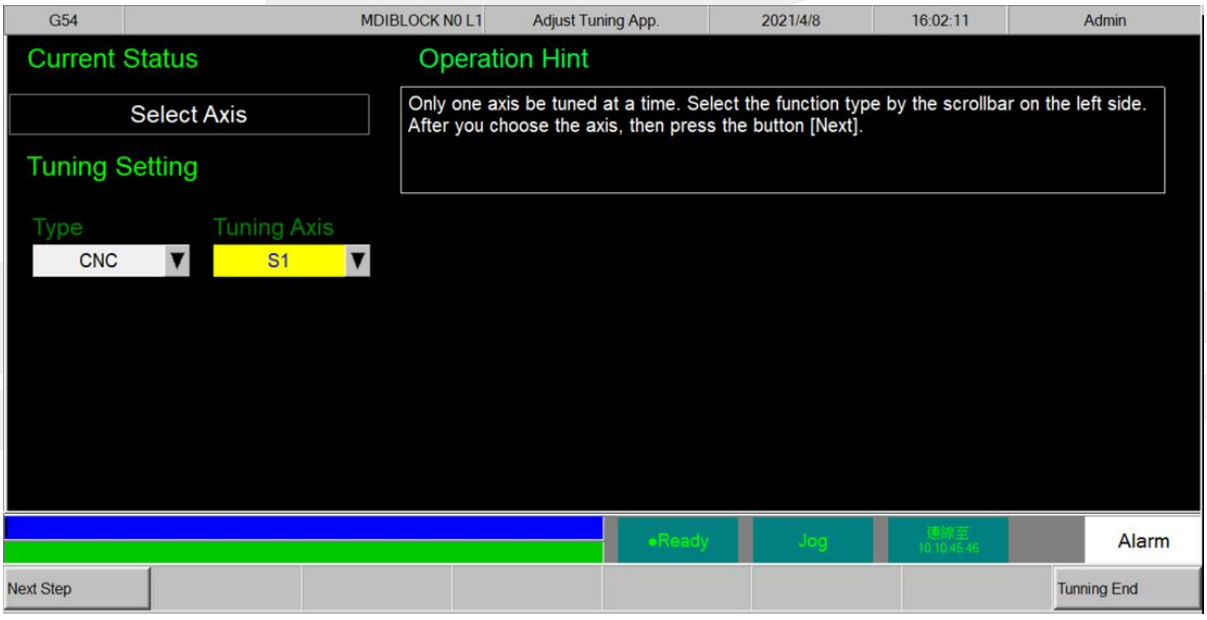
4.1 Main Screen Instructions

Enter adjustment tuning app., select Auto Tuning.

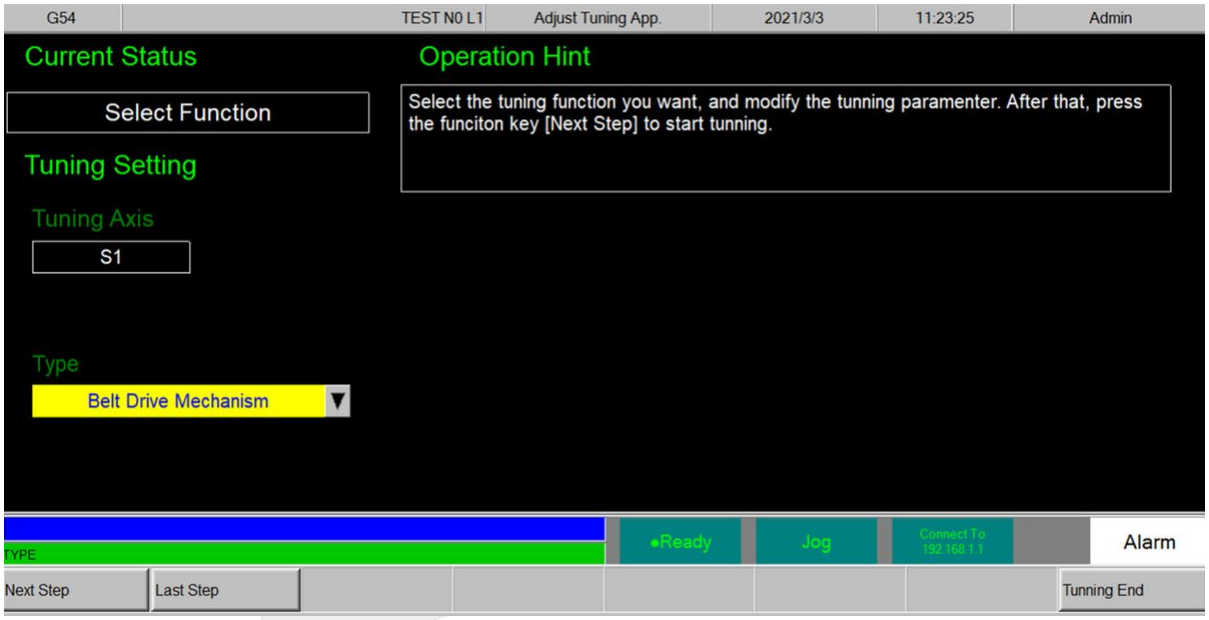


4.2 Normal Tuning Operating Process

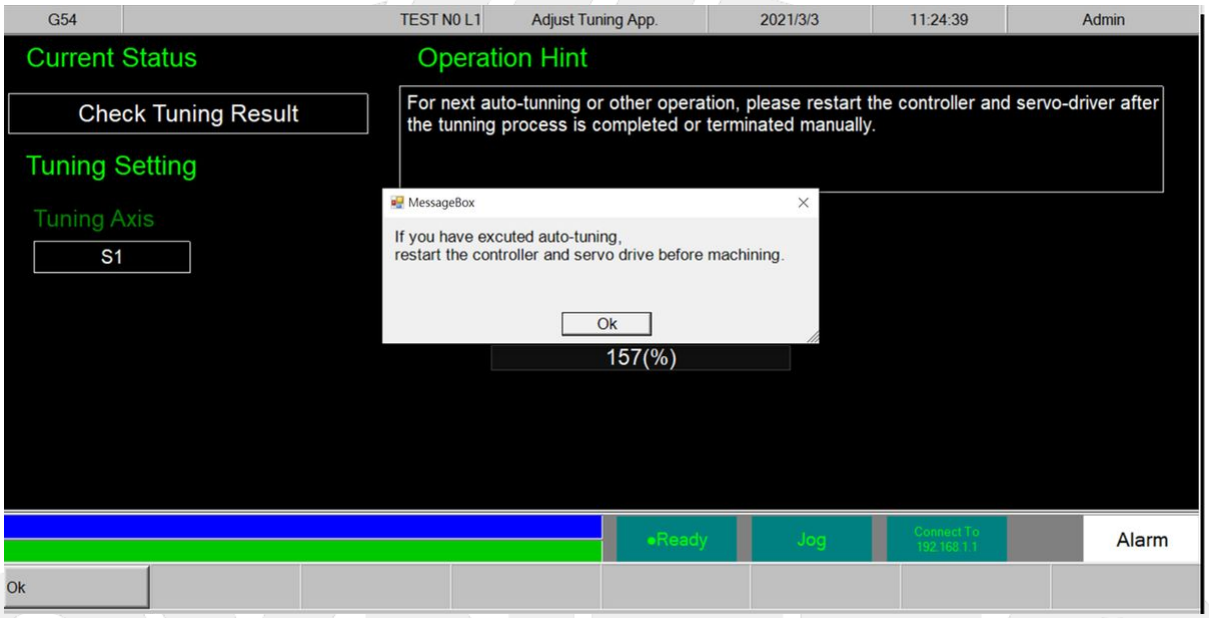
Step1: Choose tuning Syntec spindle and press [Next]



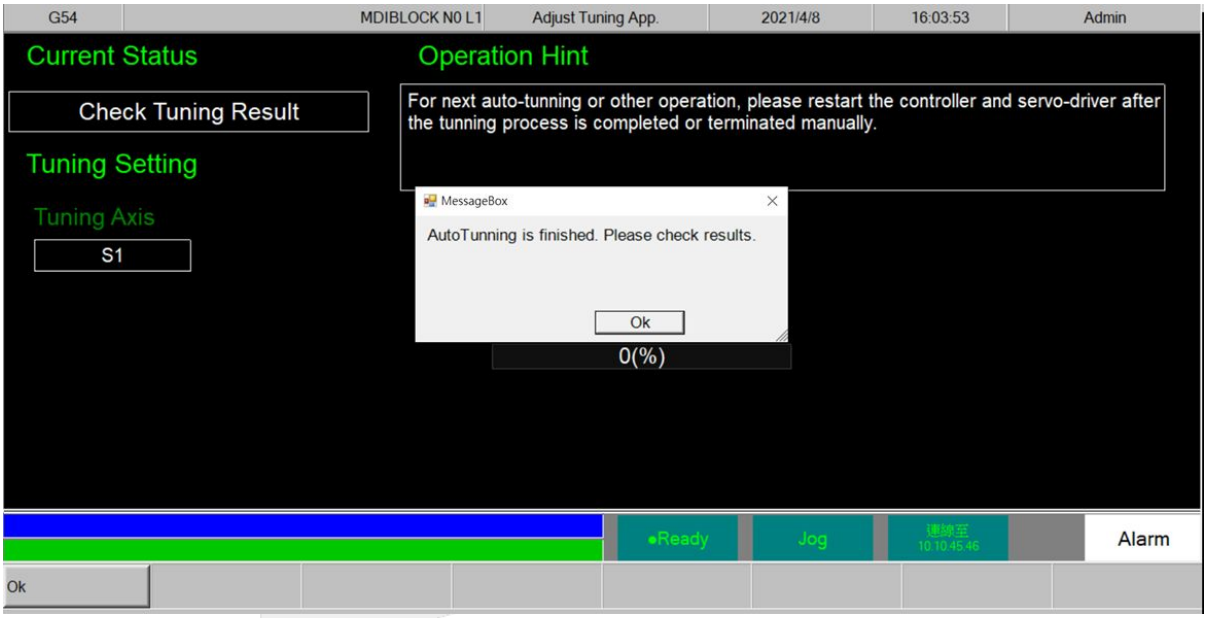
Step2: Select the mechanism type

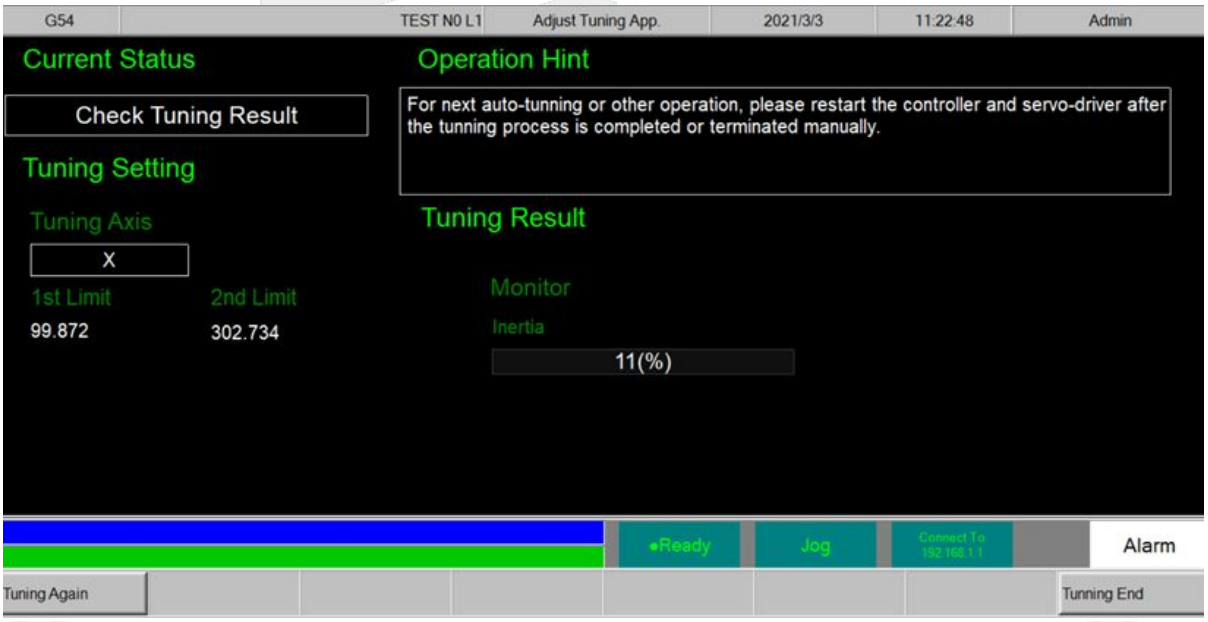


Step3: Confirm and start the tuning, encoder detection and inertia estimation will be started.



Step4: Tuning completed, and check the result.





4.3 Advanced Tuning Operating Process

Step1: Set the Bandwidth (or directly modify the gain parameter, which can skip Step2)

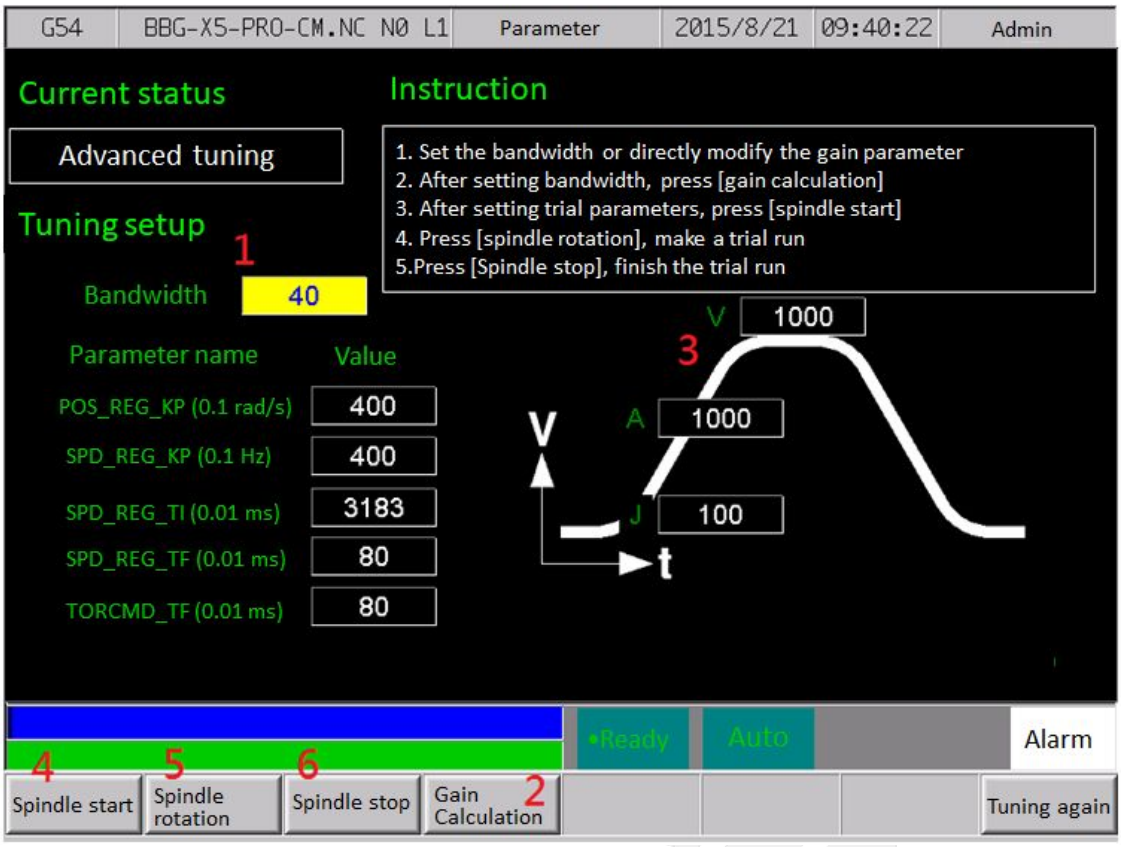
Step2: Press [gain calculation], calculates a set of gain parameters according to band width

Step3: Modify the trial run V, A, J

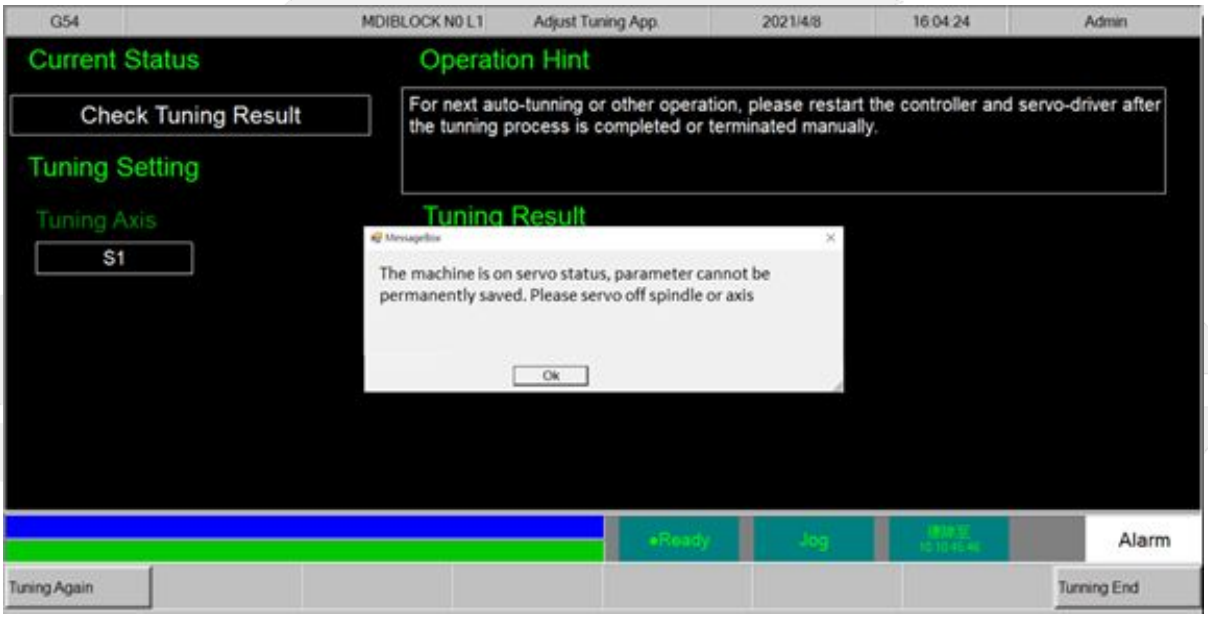
Step4: Press [spindle start]

Step5: Press [spindle rotation], make a trial run

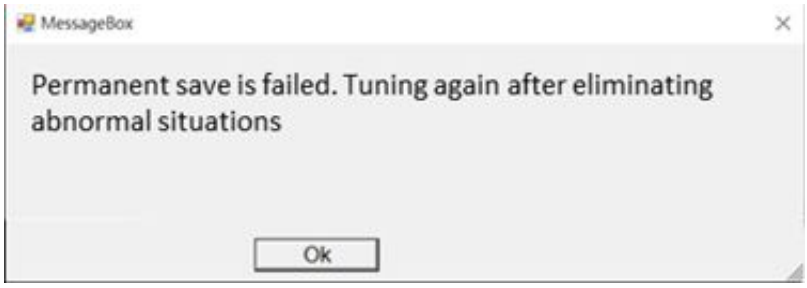
Step6: Press [Spindle stop], a stop the trial run. (Repeat Step1 ~ Step6 to find a suitable parameter value)



Step7: For versions after 10.116.36X / 10.116.51 / 10.117.51 (included), parameter will be permanently saved when leaving the advanced tuning. If the machine is on Servo on state, a hint message will pop up to remind the users and remain at the same screen.



Step 8: If the parameter permanent save is failed, a failure message will pop up and leave the tuning screen.



4.4 Others

1. Supporting version: after version 10.116.16B, until 10.118.46x.

4.5 Common Q&A

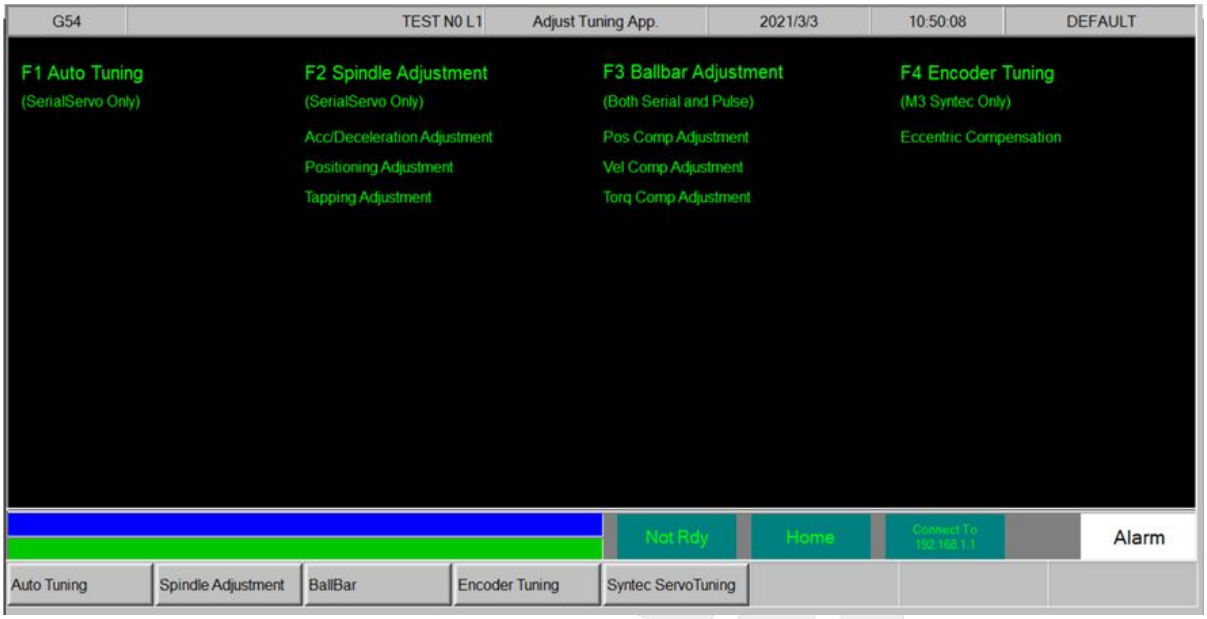
Q1: Is Syntec DD auto tuning supported?

A1: Please refer to Syntec M2 Axis Auto Tuning Operations

5 Syntec M3/ Syntec M2 V2 Auto Tuning Operations

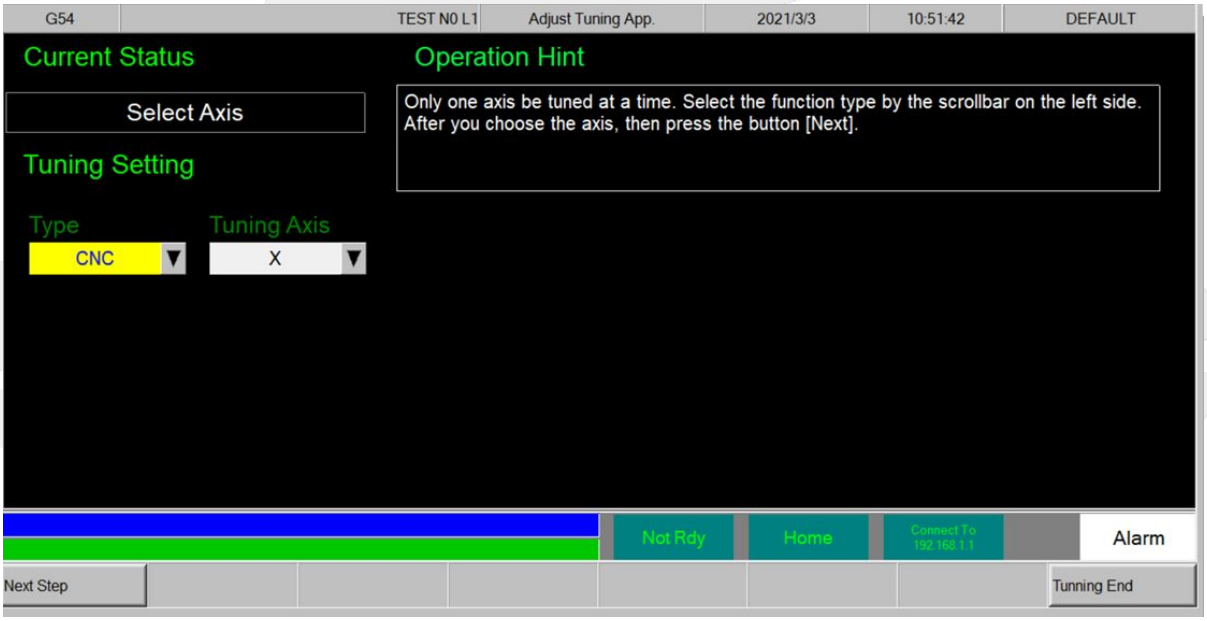
5.1 Main Screen Instructions

Enter tuning function, select Auto Tuning.



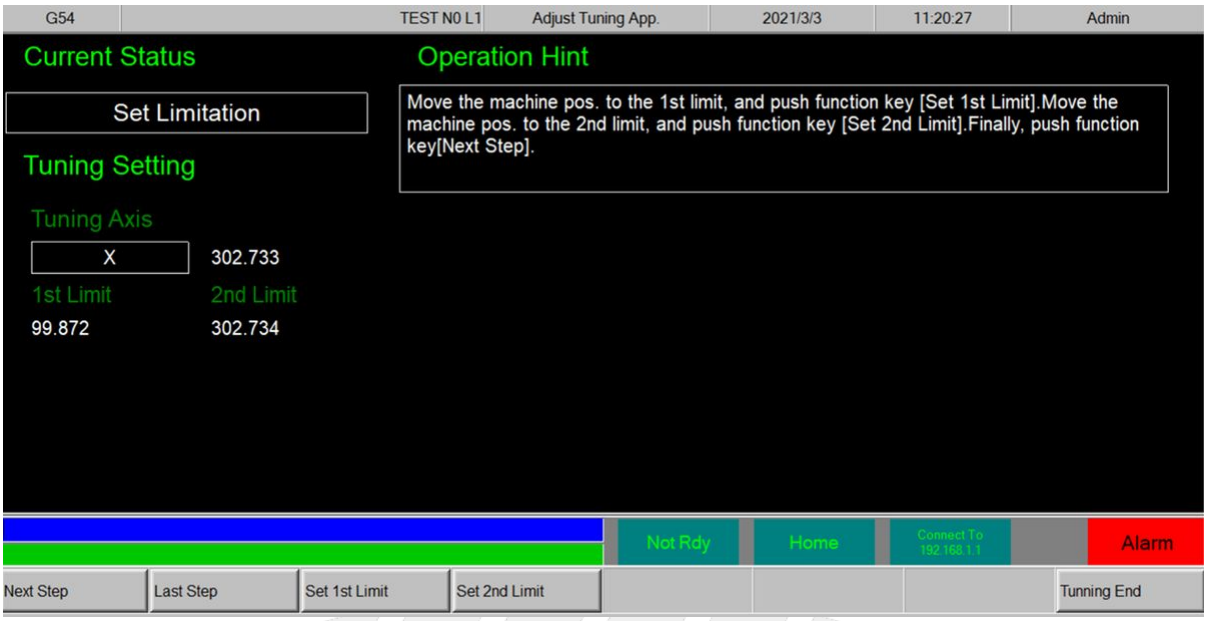
5.2 Operating Process

Step1: Choose the Syntec axis to tune, and press [Next].



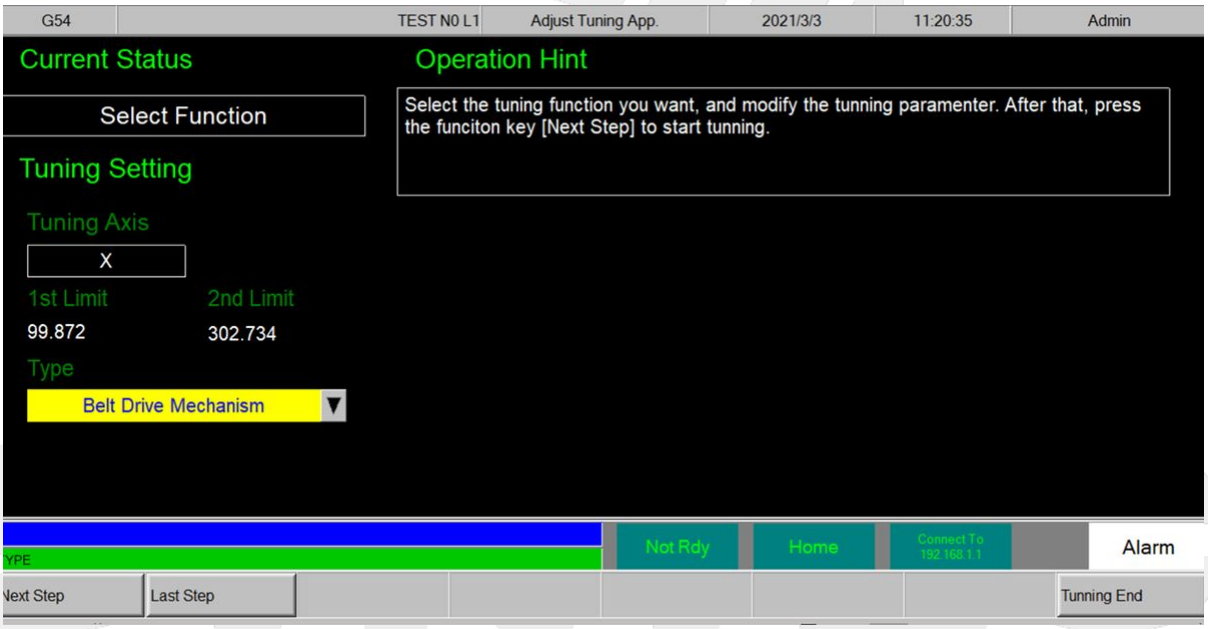
Step2: Move the machine axis and set 1st tuning limit, 2nd tuning limit in order. Press "Next" after finished the setup.

If the tuning distance is not enough or too large, a hint message will pop up. In this case, please rearrange the two limits.



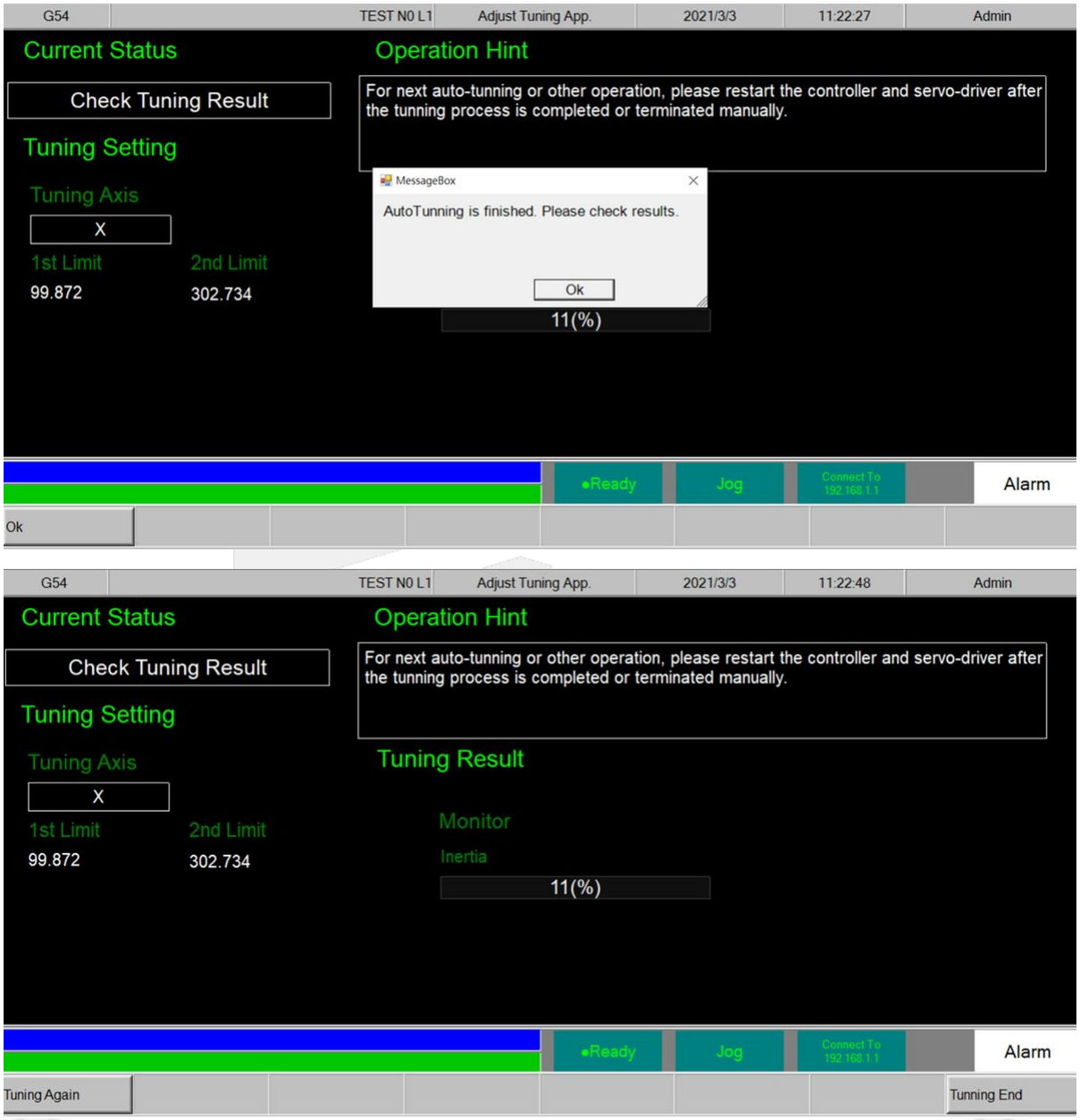
Step3: Select the tuning mode and mechanism type, press [Next].

Note: after 10.118.48W、10.118.52Q、10.118.56K、10.118.60E、10.118.66, this step is removed.



Step4: Tuning will automatically stop when finished. To interrupt the tuning process, press [Stop Tuning].

Tuning completed, please check the result.

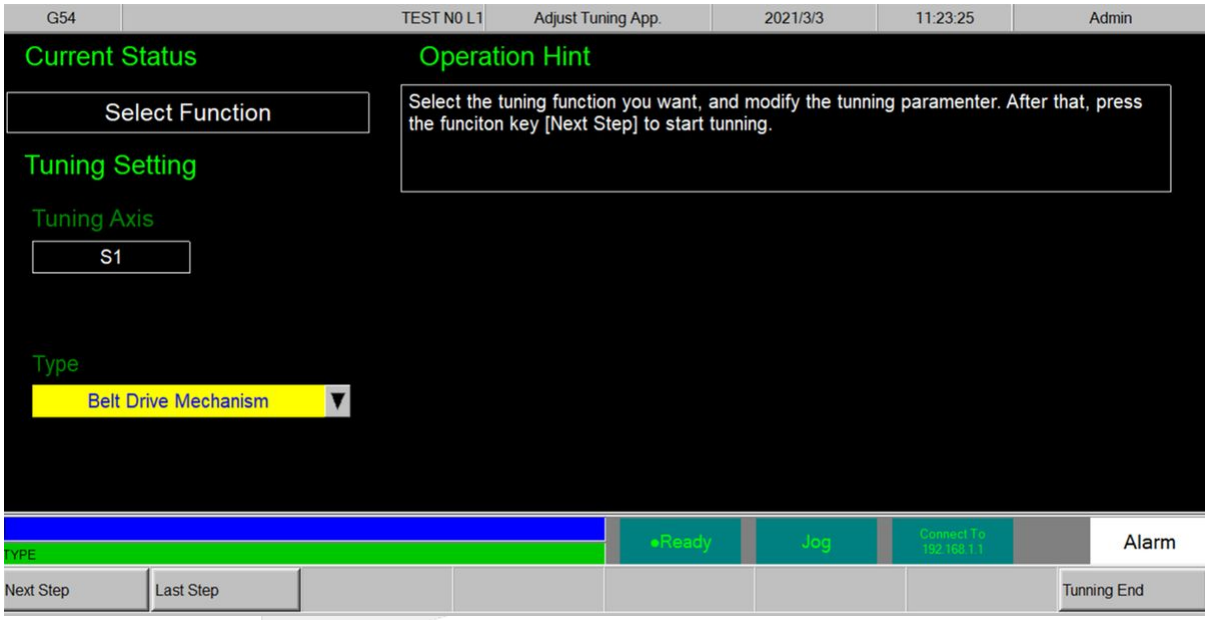


Step7: To adjust other axis, select [Tune Again], it will return to the axis selecting screen.

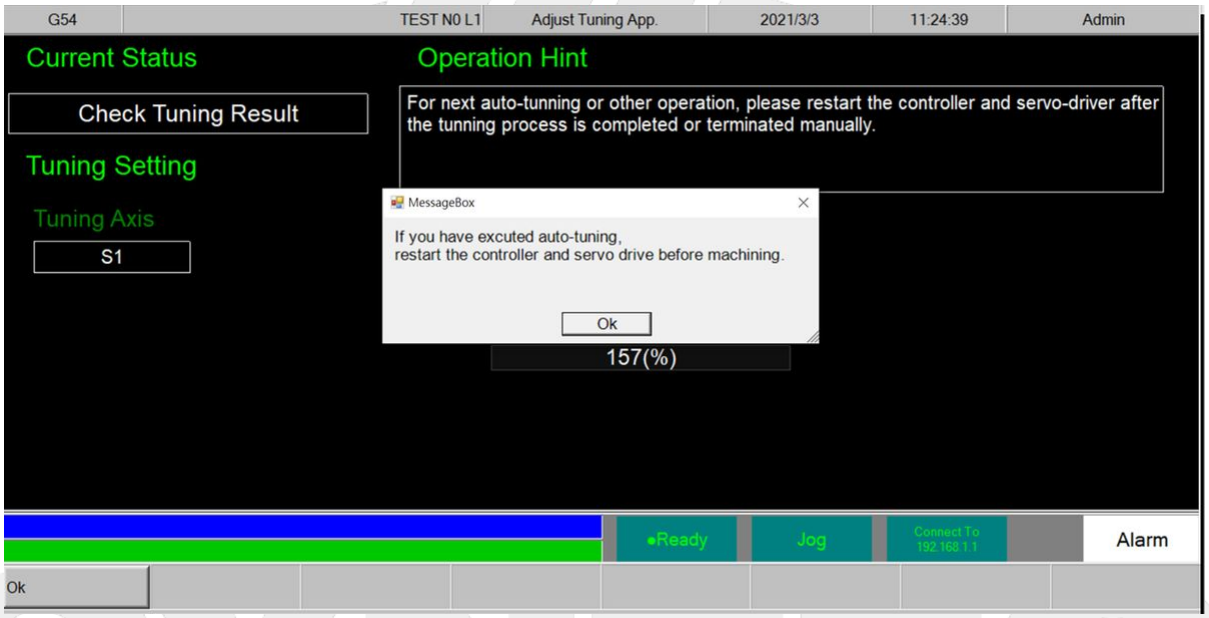
5.3 Notes

1. For Syntec M3 spindle tuning, no need to set the stroke limit, but directly set tuning parameters.

Note: after 10.118.48W、10.118.52Q、10.118.56K、10.118.60E、10.118.66, the step of setting tuning parameter is removed. It would just start tuning.



2. Leaving auto tuning a message will be prompted for reminder.



5.4 Others

1. Currently supported drive types:

<table>
<tr><th>Communication Protocol</th><th>Drive Type & Supporting Version</th></tr>
<tr><td>Mechatrolink-3</td><td>
<table>
<tr><th>Drive Type</th><th>Begin Supporting Vesion</th></tr>
<tr><td>Syntec M3 Drive</td><td>10.116.36B, 10.116.37, 10.117.37</td></tr>
</table>
</td></tr>
<tr><td>Mechatrolink-2</td><td>
<table>
<tr><th>Drive Type</th><th>Begin Supporting Version</th><th>Limit Version</th></tr>
<tr><td>Syntec M2 Drive V2 version</td><td>10.116.38C, 10.116.54A, 10.118.0A, 10.118.1</td><td>10.118.46x</td></tr>
</table>
</td></tr>
</table>

5.5 Common Q&A

Q1: The firmware version corresponding to drive

A1:

	Syntec M3 Drive	Syntec M2 Drive V2 version
Corresponding Version	V2.0.22	V2.5.3

Q2: Upper/Lower stroke limit of tuning?

A2:

	Syntec M3 Drive	Syntec M2 Drive V2 version
Upper Limit	motor 10 turn	motor 10 turn
Lower Limit	motor 1/2 turn	motor 1/2 turn

6 YASKAWA Auto Tuning Operations

Operating Instructions (10.116.24A ~ 10.116.36C)

6.1 Main Screen Introduction

Enter tuning function, select Auto Tuning.



6.2 Operating Process

Step0: Before YASKAWA axis, run the serial parameter initialization function.

Step1: Choose the tuning axis and press [Next].

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Step2: Move the axis and set 1st tuning limit, 2nd tuning limit in order. Press "Next" after finished the setup.

If the tuning distance is not enough or too large, a hint message will pop up. In this case, please rearrange the two limits.

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Step3: Select the tuning mode and mechanism type, press [Next].



Step4: Start the tuning, press [OK].



Step5: Tuning will automatically stop when finished. To interrupt the tuning process, press [Stop Tuning].



Step6: Upon the completion of tuning, press "Confirm" to update the result, please check the tuning result.





Step7: To adjust other axis, select [Tune Again], it will return to the axis selection screen.

6.3 Note

1. For YASKAWA spindle tuning, no need to set the stroke limit, but directly set the tuning parameters.



2. A hint message will pop up when leaving the tuning operation.

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6.4 Others

1. Currently supported drive types:

CommunicationProtocol	Drive Type & Support version
Mechatrolink-2	**Drive Type** / **Begin supporting version** Sigma 5 / 10.116.16B Sigma 7S / 10.116.24J, 10.116.31,10.117.31 (Drive firmware versions need to upgrade to above 0x0016) Sigma M / 10.116.24K, 10.116.31,10.117.31 (Drive firmware versions need to upgrade to above 0x001E)
Mechatrolink-3	N \ A

6.5 Common Q&A

Q1: Is auto tuning for Yaskawa Sigma7 supported?

A1: Yes, for versions 10.116.24J, 10.116.31, 10.117.31

Q2: Is auto tuning for Yaskawa Sigma M supported?

A2: Yes, for versions after 10.116.24K, 10.116.31, 10.117.31

Q3: What's the upper and lower stroke limit of tuning?

A3:

	Sigma5 / SigmaM	**Sigma7**
Upper limit	Motor 85 turns	Motor 6 turns
Lower limit	Linear axis: Motor 4 turns Rotary axis: Motor 2 turns	Linear axis: Motor 4 turns Rotary axis: Motor 2 turns

Q4: How to solve the problems after the auto tuning failed?

A4: After solving the problems according to the possible causes below, and restart tuning;

Error Code	**Error Content**	**Possible Cause**	**Solution**
0x11	Tuning Failed	Unreasonable gain after tuning. Pn100, Pn102, Pn141 appears in tuning results lower than lower limit.	• Enlarge the orientation width (Pn522).
		Unable to orientate.	• Enlarge the orientation width (Pn522).
		Feeding estimation executed while Tuning Less function activated.	• Tun off Tuning Less option(Pn170.0).
		Torque command reached the limit while tuning.	• Turn of the controller torque limit. • Enlarge internal/external torque limit (Pn402~Pn405).
0x21	Motion Error	Alarms or warnings are triggered.	• Troubleshoot according to the alarm content.

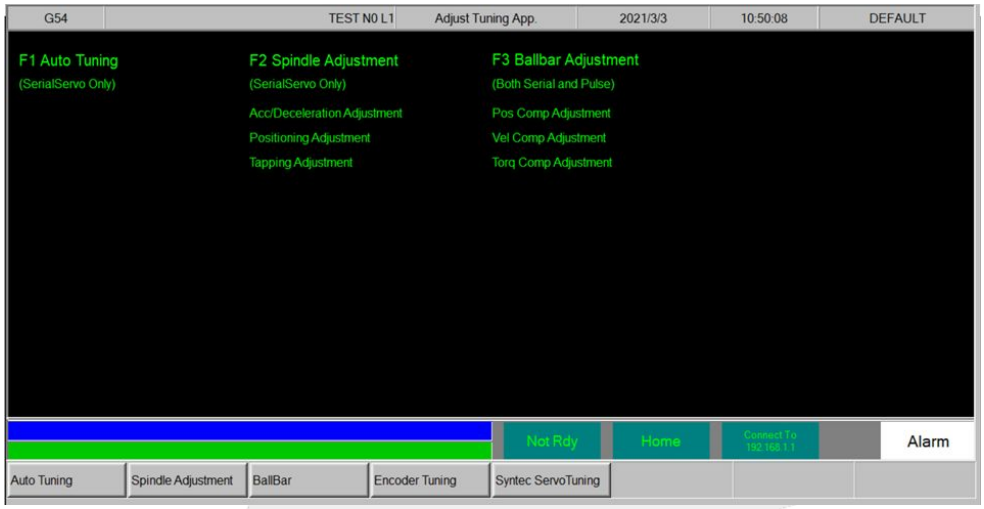
Error Code	Error Content	Possible Cause	Solution
		Found main circuit is power-off.	• Power on the main circuit.
		Exceed drive stroke limit.	• Expel the exceeding reason.
		HWBB ocurred.	• Expel the reason of HWBB.
0x31	Feeding Estimation Failed	Unable to properly estimate the feeding.	• Double the initial value of rotation feeding (Pn324).
		Vibration during feeding estimation.	• Double the initial value of rotation feeding (Pn324).
		Torque command reached the limit while tuning .	• Turn of the controller torque limit. • Enlarge internal/external torque limit (Pn402~Pn405).

Operating Instructions (10.116.36D ~, 10.116.39 ~)

6.6 Main screen instructions

Enter tuning function, select Auto Tuning.

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6.7 Operating procedures

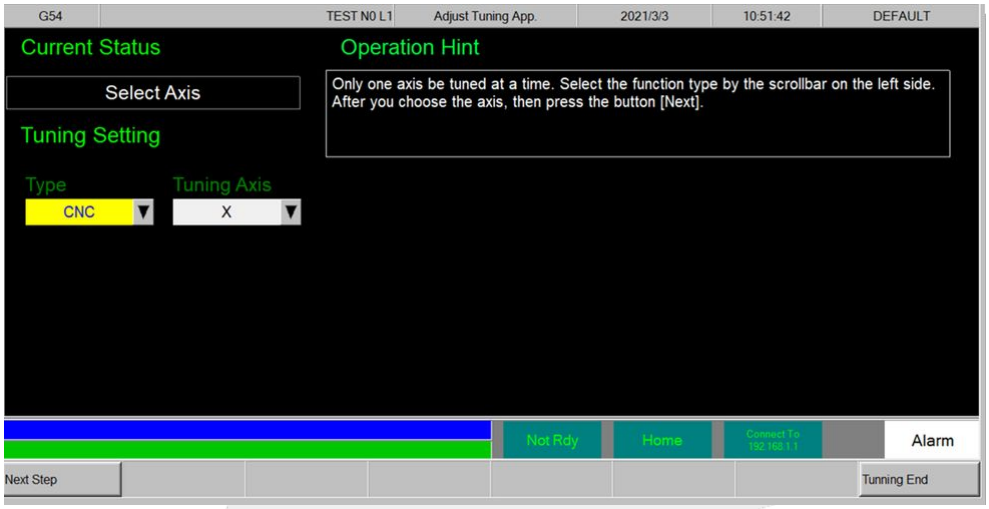
Step0: Before tuning YASKAWA axis, run the serial parameter initialization function.

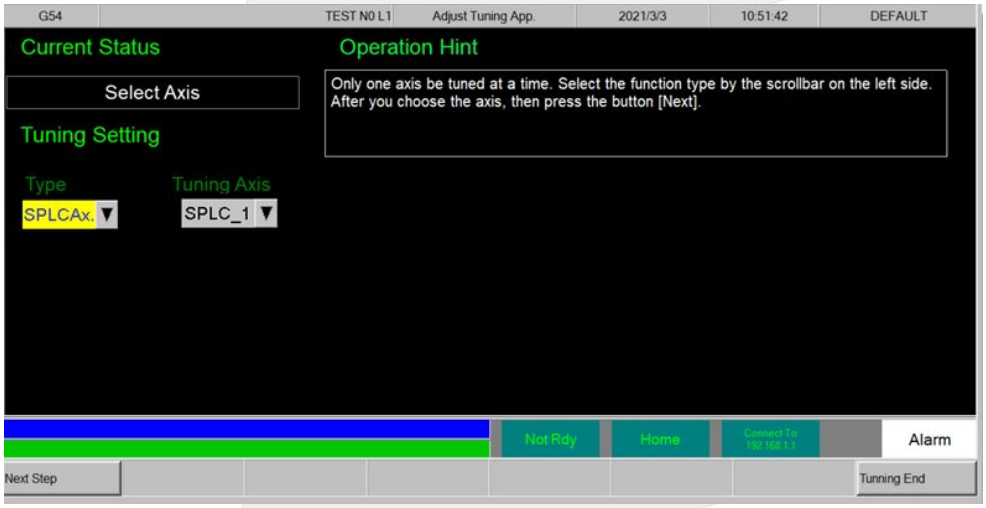
Step1: After selecting the type (CNC or serial PLC or ROT), then select tuning axis and press [Next].

The tuning axis menu will be updated when switching the axis type.

Choose the axis from tuning menu, if it's a spindle, it'll start with S, for example, S1.

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Step2: Move the axis and set 1st tuning limit, 2nd tuning limit in order. Press "Next" after finished the setup.

If the tuning distance is not enough or too large, a hint message will pop up. In this case, please rearrange the two limits.

The lower stroke limit of rotary axis tuning is 2 turns for all drive series, thus if the teeth ratio of deceleration mechanism is 10： 1 (screw side： motor side), 2 turns means that the tuning stroke should be at least 72 degrees.

The lower stroke limit of linear axis tuning is 4 turns for all drive series, for example, the ballscrew pitch is 15mm, 4 turns means the tuning stroke should be at least 60mm.

Upper limits for each drive series are different, please refer to FAQ.



Step3: Select the tuning mode and mechanism type, press [Next].

Mechanism types are screw, belts, and straight knot, please select the corresponding one.

Tuning mode are standard, location-specific, and anti-overshoot. General machine tool is recommended to use the anti-overshoot mode since axial overshoot often cause workpiece overcut.





Step4: Start the tuning, press [OK]. Before the tuning, please check if there is unfixed items on the machine, or remove unneeded items to avoid accidents.

Step5: Tuning in progress, will automatically stop when finished. To interrupt the tuning process, press [Stop Tuning], please do this action only when necessary.

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Step6: Press "Confirm" to update the screen after the tuning is completed, please check the tuning result.

The tuning result will be shown on the screen immediately, feeding ratio, position loop gain, speed loop gain, speed loop integration time and 2 sets of resonance frequency are provided for now.

Preset the resonance frequency to 5000, if there is no change, it means no resonance suppression is detected.







Step7: To adjust other axis, select [Tune Again], it will return to the axis selection screen.

After all the tunings are done, please reboot both the controller and drive.

6.8 Note

1. For YASKAWA spindle tuning, there is no need to set the stroke limit, but directly set the tuning parameters.



2. A hint message will pop up when leaving the tuning operation.

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3. Operation of ROT tuning is the same as spindle tuning, there is no need to set the stroke limit, but directly set the tuning parameters.





6.9 Others

1. Currently supported drive types:

Communication Protocol	Drive Type & Support version
Mechatrolink-2	**Drive Type** / **Begin supporting version** Sigma 5 / 10.116.16B Sigma 7S / 10.116.24J, 10.116.31, 10.117.31 (Drive firmware versions need to upgrade to above 0x0016) Sigma M / 10.116.24K, 10.116.31, 10.117.31 (Drive firmware versions need to upgrade to above 0x001E)

<table>
<tr><th>Communication Protocol</th><th>Drive Type & Support version</th></tr>
<tr><td>Mechatrolink-3</td><td>
<table>
<tr><th>Drive Type</th><th>Begin Supporting Version</th></tr>
<tr><td>Sigma M</td><td>10.116.36D、10.116.39、10.117.39</td></tr>
<tr><td>Sigma 7S</td><td>10.116.36D、10.116.39、10.117.39</td></tr>
</table>
</td></tr>
</table>

6.10 FAQ

Q1: Is auto tuning for Yaskawa Sigma7 supported?

A1: Yes, for versions 10.116.24J, 10.116.31, 10.117.31.

Q2: Is auto tuning for Yaskawa Sigma M supported?

A2: Yes, for versions after 10.116.24K, 10.116.31, 10.117.31.

Q3: What's the upper and lower stroke limit of tuning?

A3:

	Sigma5 / SigmaM	Sigma7
Upper limit	Motor 85 turns	Motor 6 turns
Lower limit	Linear axis: Motor4 turns Rotary axis: Motor2 turns	Linear axis: Motor4 turns Rotary axis: Motor2 turns

Q4: Is auto tuning for PLC axis and ROT supported?

A4: Yes, for versions after 10.11636D, 10.116.39, 10.117.39.

Q5: How to solve the problems after the auto tuning is failed?

A5: After solving the problems according to the possible causes below, restart auto tuning;

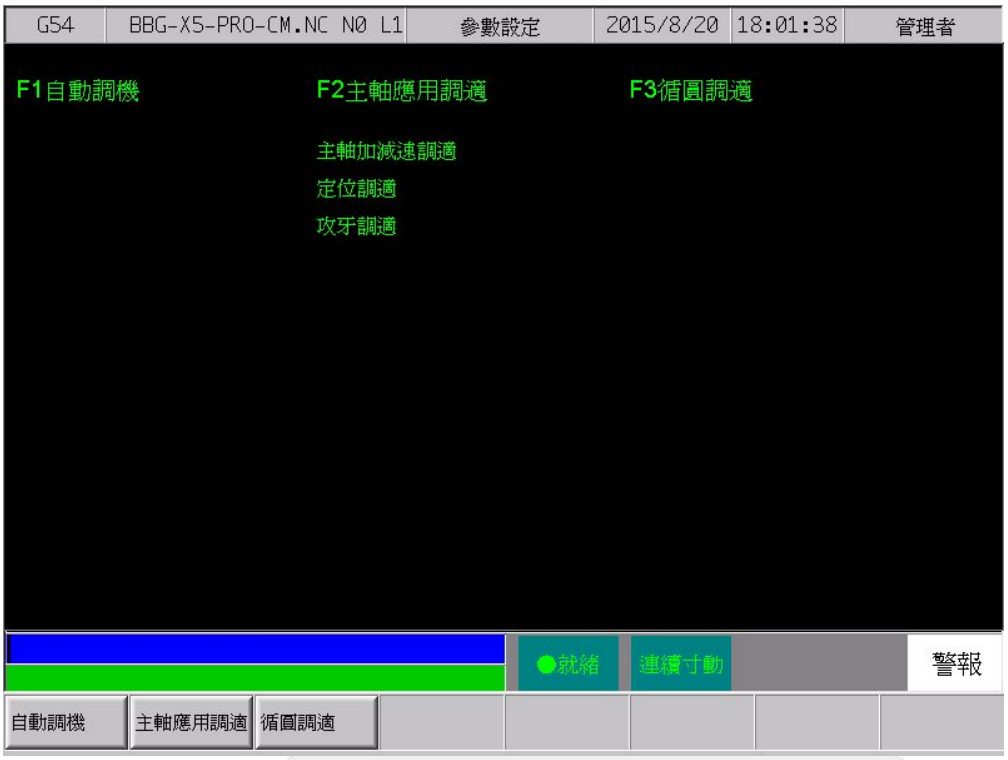
Error Code	Error Content	Possible Cause	Solution
0x11	Tuning Failed	Unreasonable gain after tuning. Pn100, Pn102, Pn141 appears in tuning results lower than lower limit.	• Enlarge the orientation width (Pn522).

Error Code	Error Content	Possible Cause	Solution
		Unable to orientate.	• Enlarge the orientation width(Pn522).
		Feeding estimation executed while Tuning Less function activated.	• Tun off Tuning Less option(Pn170.0).
		Torque command reached the limit while tuning.	• Turn of the controller torque limit. • Enlarge internal/external torque limit (Pn402~Pn405).
0x21	Motion Error	Alarms or warnings are triggered.	• Troubleshoot according to the alarm content.
		Found main circuit is power-off.	• Power on the main circuit.
		Exceed drive stroke limit.	• Expel the exceeding reason.
		HWBB ocurred.	• Expel the reason of HWBB.
0x31	Feeding Estimation Failed	Unable to properly estimate the feeding.	• Double the initial value of rotation feeding (Pn324).
		Vibration during feeding estimation.	• Double the initial value of rotation feeding (Pn324).
		Torque command reached the limit while tuning.	• Turn of the controller torque limit. • Enlarge internal/external torque limit (Pn402~Pn405).

6.11 Operating Instructions (10.116.24A ~ 10.116.36C)

6.11.1 **Main Screen Introduction**

Enter tuning function, select Auto Tuning.



6.11.2 **Operating Process**

Step0: Before YASKAWA axis, run the serial parameter initialization function.

Step1: Choose the tuning axis and press [Next].

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Step2: Move the axis and set 1st tuning limit, 2nd tuning limit in order. Press "Next" after finished the setup.

If the tuning distance is not enough or too large, a hint message will pop up. In this case, please rearrange the two limits.



Step3: Select the tuning mode and mechanism type, press [Next].



Step4: Start the tuning, press [OK].



Step5: Tuning will automatically stop when finished. To interrupt the tuning process, press [Stop Tuning].



Step6: Upon the completion of tuning, press "Confirm" to update the result, please check the tuning result.





Step7: To adjust other axis, select [Tune Again], it will return to the axis selection screen.

6.11.3 **Note**

1. For YASKAWA spindle tuning, no need to set the stroke limit, but directly set the tuning parameters.

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2. A hint message will pop up when leaving the tuning operation.



6.11.4 **Others**

1. Currently supported drive types:

<table>
<tr><th>CommunicationProtocol</th><th>Drive Type & Support version</th></tr>
<tr><td>Mechatrolink-2</td><td>
<table>
<tr><th>Drive Type</th><th>Begin supporting version</th></tr>
<tr><td>Sigma 5</td><td>10.116.16B</td></tr>
<tr><td>Sigma 7S</td><td>10.116.24J, 10.116.31,10.117.31 (Drive firmware versions need to upgrade to above 0x0016)</td></tr>
<tr><td>Sigma M</td><td>10.116.24K, 10.116.31,10.117.31 (Drive firmware versions need to upgrade to above 0x001E)</td></tr>
</table>
</td></tr>
<tr><td>Mechatrolink-3</td><td>N \ A</td></tr>
</table>

6.11.5 **Common Q&A**

Q1: Is auto tuning for Yaskawa Sigma7 supported?

A1: Yes, for versions 10.116.24J, 10.116.31, 10.117.31

Q2: Is auto tuning for Yaskawa Sigma M supported?

A2: Yes, for versions after 10.116.24K, 10.116.31, 10.117.31

Q3: What's the upper and lower stroke limit of tuning?

A3:

	Sigma5 / SigmaM	**Sigma7**
Upper limit	Motor 85 turns	Motor 6 turns
Lower limit	Linear axis: Motor 4 turns Rotary axis: Motor 2 turns	Linear axis: Motor 4 turns Rotary axis: Motor 2 turns

Q4: How to solve the problems after the auto tuning failed?

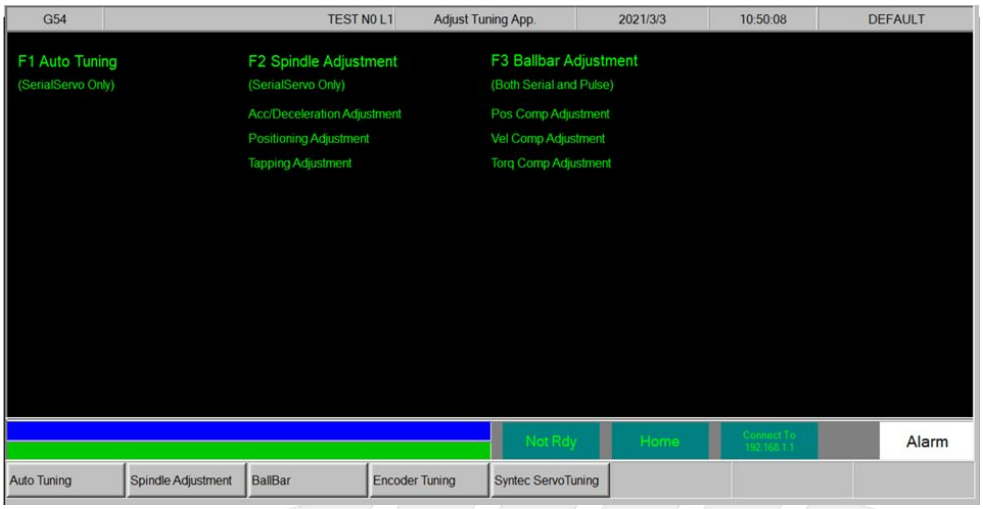
A4: After solving the problems according to the possible causes below, and restart tuning;

Error Code	Error Content	Possible Cause	Solution
0x11	Tuning Failed	Unreasonable gain after tuning. Pn100, Pn102, Pn141 appears in tuning results lower than lower limit.	• Enlarge the orientation width (Pn522).
		Unable to orientate.	• Enlarge the orientation width (Pn522).
		Feeding estimation executed while Tuning Less function activated.	• Tun off Tuning Less option(Pn170.0).
		Torque command reached the limit while tuning.	• Turn of the controller torque limit. • Enlarge internal/external torque limit (Pn402~Pn405).
0x21	Motion Error	Alarms or warnings are triggered.	• Troubleshoot according to the alarm content.
		Found main circuit is power-off.	• Power on the main circuit.
		Exceed drive stroke limit.	• Expel the exceeding reason.
		HWBB ocurred.	• Expel the reason of HWBB.
0x31	Feeding Estimation Failed	Unable to properly estimate the feeding.	• Double the initial value of rotation feeding (Pn324).
		Vibration during feeding estimation.	• Double the initial value of rotation feeding (Pn324).
		Torque command reached the limit while tuning .	• Turn of the controller torque limit. • Enlarge internal/external torque limit (Pn402~Pn405).

6.12 Operating Instructions (10.116.36D ~, 10.116.39 ~)

6.12.1 **Main screen instructions**

Enter tuning function, select Auto Tuning.



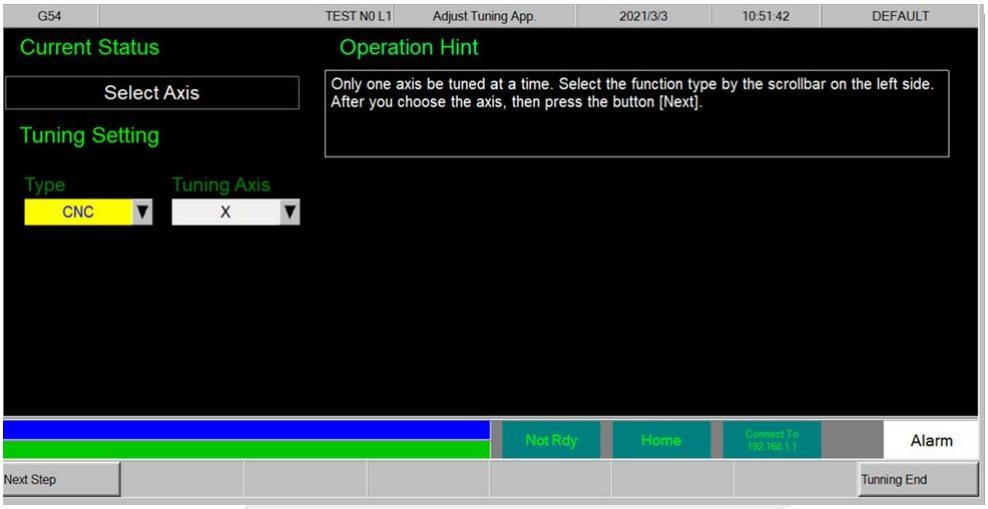
6.12.2 **Operating procedures**

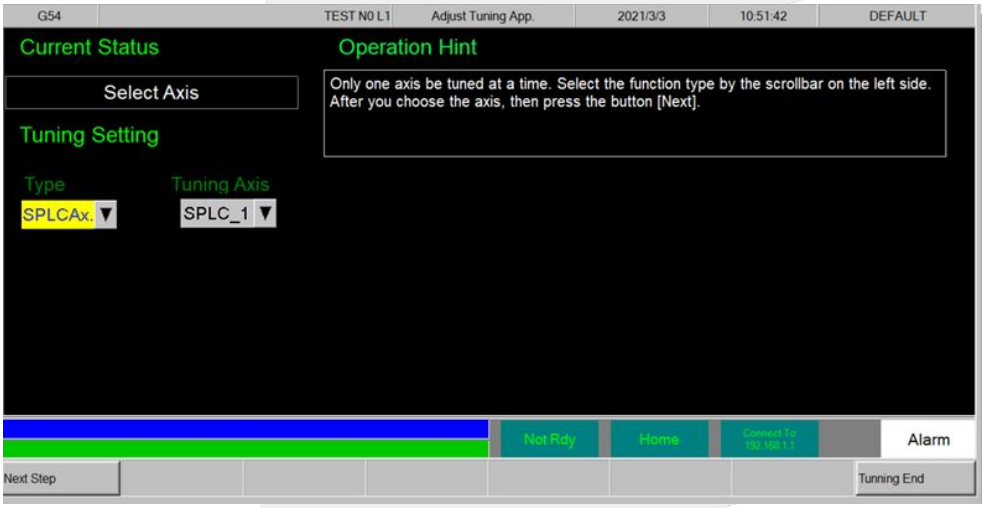
Step0: Before tuning YASKAWA axis, run the serial parameter initialization function.

Step1: After selecting the type (CNC or serial PLC or ROT), then select tuning axis and press [Next].

The tuning axis menu will be updated when switching the axis type.

Choose the axis from tuning menu, if it's a spindle, it'll start with S, for example, S1.





Step2: Move the axis and set 1st tuning limit, 2nd tuning limit in order. Press "Next" after finished the setup.

If the tuning distance is not enough or too large, a hint message will pop up. In this case, please rearrange the two limits.

The lower stroke limit of rotary axis tuning is 2 turns for all drive series, thus if the teeth ratio of deceleration mechanism is 10： 1 (screw side： motor side), 2 turns means that the tuning stroke should be at least 72 degrees.

The lower stroke limit of linear axis tuning is 4 turns for all drive series, for example, the ballscrew pitch is 15mm, 4 turns means the tuning stroke should be at least 60mm.

Upper limits for each drive series are different, please refer to FAQ.

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Step3: Select the tuning mode and mechanism type, press [Next].

Mechanism types are screw, belts, and straight knot, please select the corresponding one.

Tuning mode are standard, location-specific, and anti-overshoot. General machine tool is recommended to use the anti-overshoot mode since axial overshoot often cause workpiece overcut.



Step4: Start the tuning, press [OK]. Before the tuning, please check if there is unfixed items on the machine, or remove unneeded items to avoid accidents.

Step5: Tuning in progress, will automatically stop when finished. To interrupt the tuning process, press [Stop Tuning], please do this action only when necessary.



Step6: Press "Confirm" to update the screen after the tuning is completed, please check the tuning result.

The tuning result will be shown on the screen immediately, feeding ratio, position loop gain, speed loop gain, speed loop integration time and 2 sets of resonance frequency are provided for now.

Preset the resonance frequency to 5000, if there is no change, it means no resonance suppression is detected.







Step7: To adjust other axis, select [Tune Again], it will return to the axis selection screen.

After all the tunings are done, please reboot both the controller and drive.

6.12.3 **Note**

1. For YASKAWA spindle tuning, there is no need to set the stroke limit, but directly set the tuning parameters.



2. A hint message will pop up when leaving the tuning operation.



3. Operation of ROT tuning is the same as spindle tuning, there is no need to set the stroke limit, but directly set the tuning parameters.





6.12.4 **Others**

1. Currently supported drive types:

<table>
<tr><th>Communication Protocol</th><th>Drive Type & Support version</th></tr>
<tr><td>Mechatrolink-2</td><td>
<table>
<tr><th>Drive Type</th><th>Begin supporting version</th></tr>
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<tr><td>Sigma M</td><td>10.116.24K, 10.116.31, 10.117.31 (Drive firmware versions need to upgrade to above 0x001E)</td></tr>
</table>
</td></tr>
<tr><td>Mechatrolink-3</td><td>
<table>
<tr><th>Drive Type</th><th>Begin Supporting Version</th></tr>
<tr><td>Sigma M</td><td>10.116.36D、10.116.39、10.117.39</td></tr>
<tr><td>Sigma 7S</td><td>10.116.36D、10.116.39、10.117.39</td></tr>
</table>
</td></tr>
</table>

6.12.5 **FAQ**

Q1: Is auto tuning for Yaskawa Sigma7 supported?

A1: Yes, for versions 10.116.24J, 10.116.31, 10.117.31.

Q2: Is auto tuning for Yaskawa Sigma M supported?

A2: Yes, for versions after 10.116.24K, 10.116.31, 10.117.31.

Q3: What's the upper and lower stroke limit of tuning?

A3:

	Sigma5 / SigmaM	**Sigma7**
Upper limit	Motor 85 turns	Motor 6 turns

	Sigma5 / SigmaM	Sigma7
Lower limit	Linear axis: Motor4 turns Rotary axis: Motor2 turns	Linear axis: Motor4 turns Rotary axis: Motor2 turns

Q4: Is auto tuning for PLC axis and ROT supported?

A4: Yes, for versions after 10.11636D, 10.116.39, 10.117.39.

Q5: How to solve the problems after the auto tuning is failed?

A5: After solving the problems according to the possible causes below, restart auto tuning;

Error Code	Error Content	Possible Cause	Solution
0x11	Tuning Failed	Unreasonable gain after tuning. Pn100, Pn102, Pn141 appears in tuning results lower than lower limit.	• Enlarge the orientation width (Pn522).
		Unable to orientate.	• Enlarge the orientation width(Pn522).
		Feeding estimation executed while Tuning Less function activated.	• Tun off Tuning Less option(Pn170.0).
		Torque command reached the limit while tuning.	• Turn of the controller torque limit. • Enlarge internal/external torque limit (Pn402~Pn405).
0x21	Motion Error	Alarms or warnings are triggered.	• Troubleshoot according to the alarm content.
		Found main circuit is power-off.	• Power on the main circuit.
		Exceed drive stroke limit.	• Expel the exceeding reason.
		HWBB ocurred.	• Expel the reason of HWBB.

Error Code	Error Content	Possible Cause	Solution
0x31	Feeding Estimation Failed	Unable to properly estimate the feeding.	• Double the initial value of rotation feeding (Pn324).
		Vibration during feeding estimation.	• Double the initial value of rotation feeding (Pn324).
		Torque command reached the limit while tuning.	• Turn of the controller torque limit. • Enlarge internal/external torque limit (Pn402~Pn405).

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