

Servo Drives

Quick Start Guide

PANATERM
Real-time auto-gain tuning



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1 Introduction

1.1 Before you start

Before operating this product, read the safety instructions in the related *Operating Instructions*.

This product is for industrial use only.

Electrical connections must be made by qualified electrical personnel.

1.2 About this document

This *Quick Start Guide* is intended to help you set up a MINAS servo drive system. It is based on information from the MINAS series manuals and the practical experience of our engineers.

Step-by-step instructions will guide you through a real-time auto-gain tuning procedure for a MINAS servo driver. The autotuning is performed with the PANATERM configuration software.

1.3 Related documents

Please refer to the original servo drive manuals for detailed information. Click on the following links to download the documents from our Panasonic Download Center.

- Information on wiring, position control, and parameters:
[*Operating Instructions \(Overall\) AC Servo Motors & Driver MINAS A5 series*](#)
[*Operating Instructions \(Overall\) AC Servo Motors & Driver MINAS A6 series*](#)
- Information on using the PANATERM configuration software:
[*Operation Manual: Set up support software PANATERM Ver. 6.0*](#)
- Information on how to reduce electromagnetic interference (EMI):
[*Recommendations for EMC-compliant wiring of servo drivers and motors*](#)
- Other Quick Start Guides:
[*QS2000, Position control by pulse and direction signals \(MINAS A5/A5E/A6SG/A6SF\)*](#)
[*QS2001, Position control by block operation using input signals \(MINAS A6SG/A6SF\)*](#)
[*QS2002, Position control by block operation using Modbus commands \(MINAS A6\)*](#)
[*QS2003, Position control in EtherCAT networks MINAS A5B/A6B*](#)
[*QS2004, Position control using RTEX \(MINAS A5N/A6N\)*](#)
[*QS3000, Velocity control \(MINAS A5/A6F\)*](#)

[*QS4000, Torque control \(MINAS A5/A6\)*](#)

[*QS5000, PANATERM - Trial run*](#)

[*QS5002, PANATERM - Fit gain tuning*](#)

1.4 Available software

The following software is available free of charge in our Panasonic Download Center. Click on the link to start the download.

- [PC configuration software PANATERM](#)

2 Functional overview

Auto-tuning is required for all applications to adjust the servo motor to the specific mechanical conditions. You can choose one of the following auto-tuning functions:

- Fit-gain tuning
- Real-time auto-gain tuning

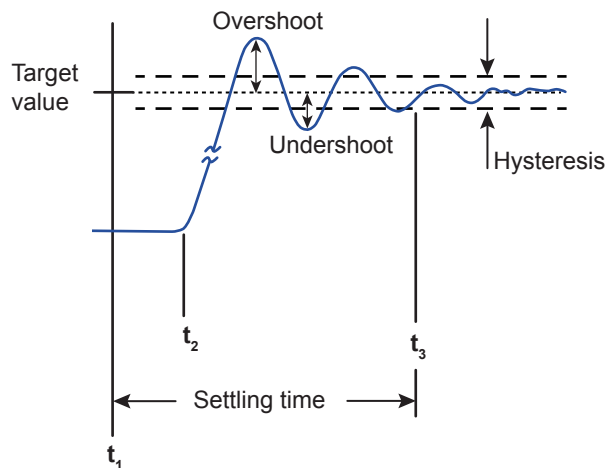
This *Quick Start Guide* explains how to perform real-time auto-gain tuning.

While the fit-gain tuning function guides you through an automatic fine-tuning process, real-time auto-gain tuning mainly adjusts the rigidity of the machine. If you are using a MINAS A6 servo driver, first try fit-gain tuning. If fit-gain tuning was not successful, perform real-time auto-gain tuning. Both methods can be executed using PANATERM.

If possible, you should perform real-time auto gain-tuning on the machine with the servo motor and the mechanical loads connected and with the actual movements.

Usually, auto-tuning has the following goals:

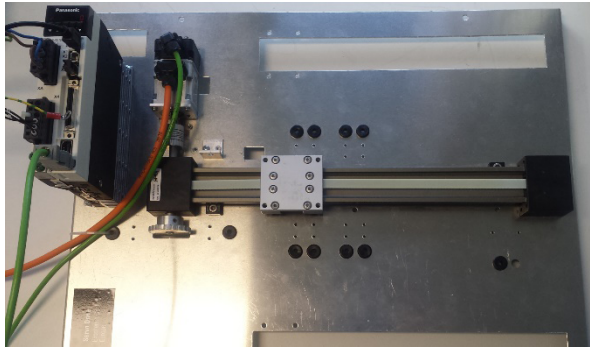
1. Reduce the settling time to reduce cycle times.
2. Reduce mechanical vibration to increase the life time of the machine.
3. Reduce overshoot and undershoot to reach the target position within the allowed hysteresis.
4. Decrease the response time to reach the target position faster.



Overshoot, undershoot, and settling time of the position value

Example

A MINAS A6SF servo driver is connected to a servo motor, which is coupled to a belt. The control mode is position control. A continuous movement within the mechanical limits, no mechanical vibration, no overshoot or undershoot, and a reduced settling time are required.



Continuous movement between two mechanical limits

3 Wiring

3.1 Recommendations for wiring

It is the customer's responsibility to apply the countermeasures that they consider necessary to comply with current regulations on wiring, safety and reducing EMI.

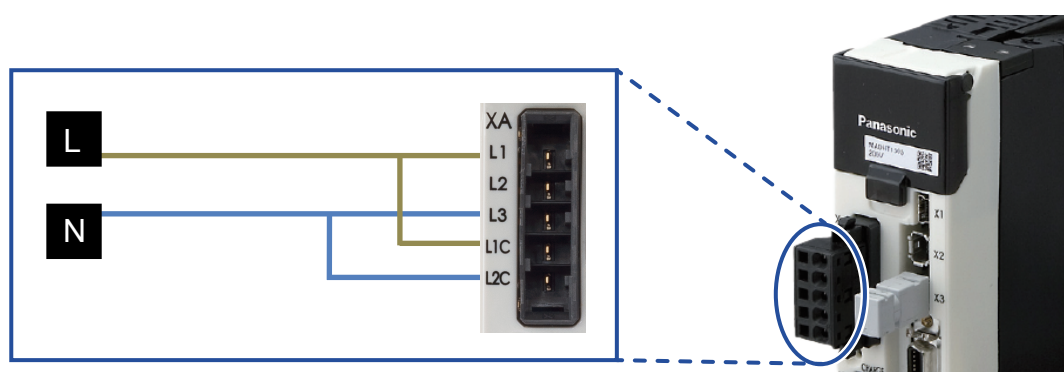
Do not forget to meet the specifications indicated in the hardware manual for each of the devices being wired. If any specifications in the manual conflict with the information in this document, the manufacturer's manual takes preference.

For detailed information on reducing EMI, please refer to [Recommendations for EMC-compliant wiring of servo drivers and motors](#).

3.2 Connectors of the servo driver

XA connector (main power connector)

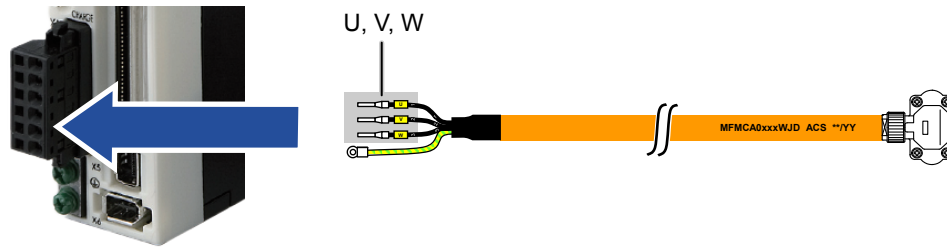
Connect the power supply cable to the XA connector. For a 1-phase power supply of 230V, connect a 2-wire cable to the servo driver as illustrated. The L2 pin is not used in 1-phase mode.



Wiring of the XA connector for a power supply of 230V

XB connector (motor connector)

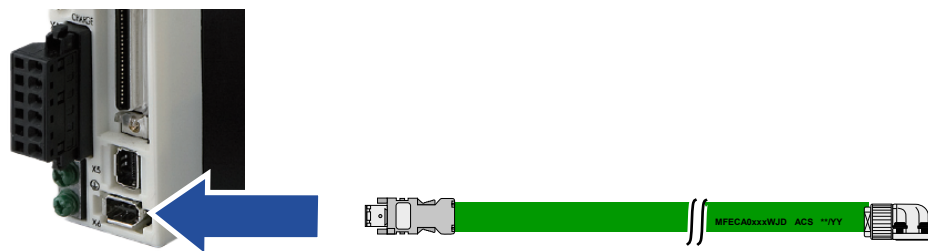
Connect the motor cable to the XB connector. The wires are labeled with the letters U, V, and W. Do not change the sequence of the motor phases, e.g. by connecting V to W.



Wiring of the XB connector for the motor power supply

X6 connector (encoder connector)

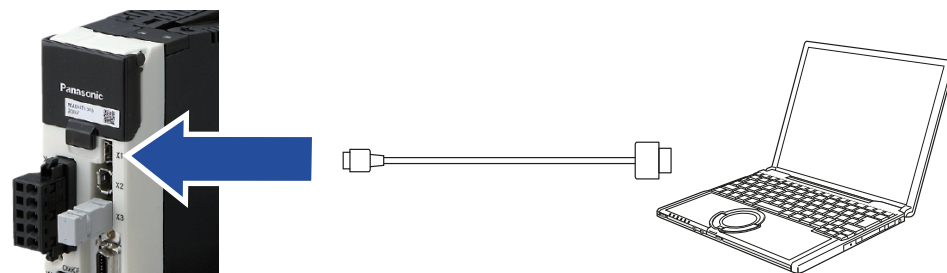
Connect the encoder cable to the X6 connector.



Wiring of the X6 connector for the encoder connection

X1 connector (USB connector for PC connection)

The servo driver is configured using the PC configuration software PANATERM. Use a commercially available USB A to mini-B cable to connect the PC to the servo driver.

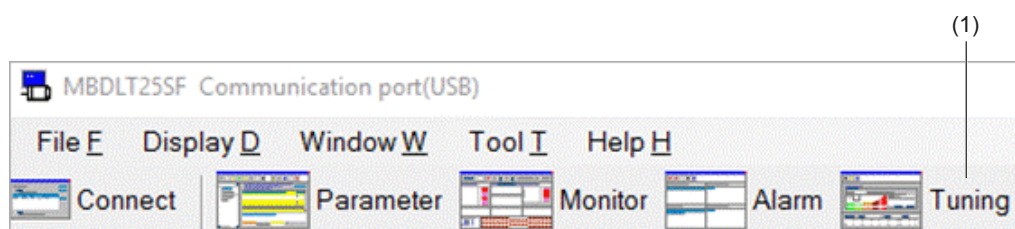


Connector X1 for PC connection

4 Perform real-time auto-gain tuning

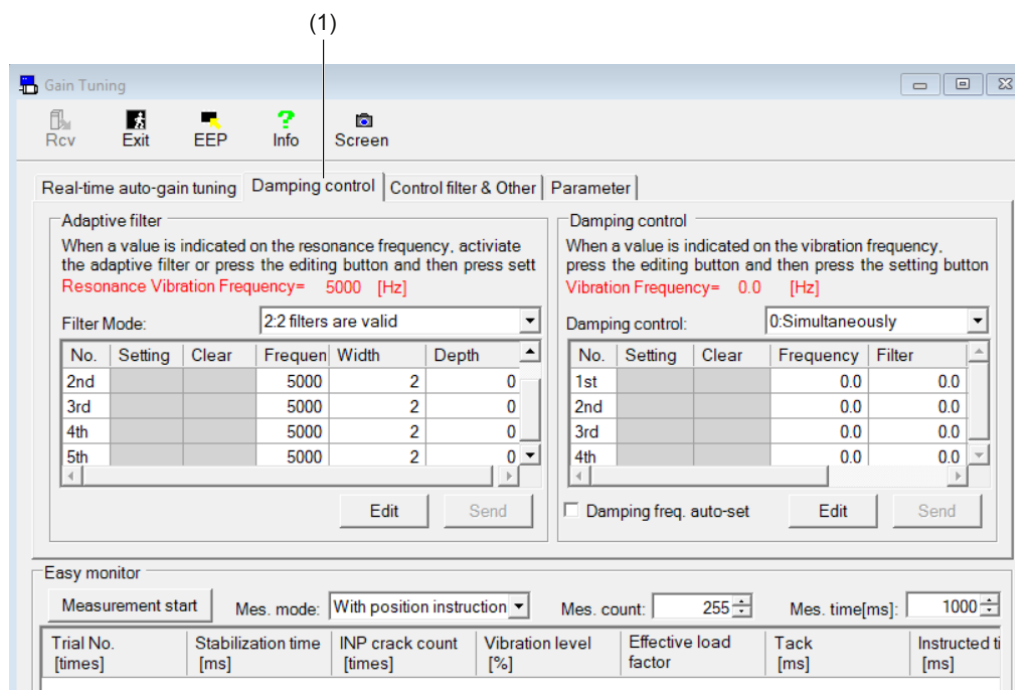
Use the PC configuration software PANATERM to perform auto-tuning.

1. Connect your PC to the X1 connector and turn on the servo driver.
2. Start the PANATERM configuration software.
The software automatically detects the type of servo driver connected.
3. Select "OK" and confirm the connected series by selecting your type of servo driver.
4. Start a trial run, following the instructions in *Quick Start Guide QS5000, PANATERM - Trial run*.
5. While the motor is performing a repetitive, constant movement, select the "Tuning" tab.



(1) "Tuning" tab

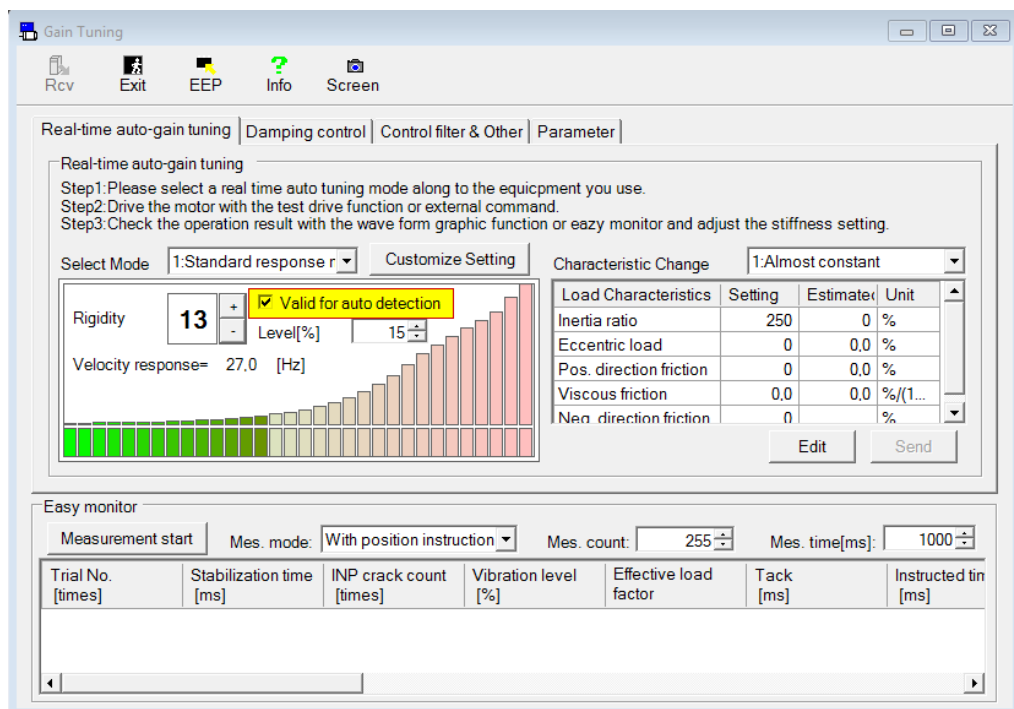
6. Select the "Damping control" tab.



(1) "Damping control" tab

7. Select "2:2 filters are valid" in the "Filter Mode" list box.
Any resonance frequencies that may occur will now be detected and suppressed.

8. Select the “Valid for auto detection” check box.



9. Increase the mechanical rigidity by increasing the value in the “Rigidity” box step by step.
 The software will automatically set the correct value and, if necessary, decrease the rigidity to an appropriate value.
10. Select “Invalid” in the “Select Mode” list box.
11. Select the “EEP” icon to save the parameters in the EEPROM of the servo driver.
 A dialog shows the gain parameters related to the inertia moment which have been changed.
12. Confirm these values.
13. Shut down and restart the system.
 The system is now ready to perform the required positioning movements.

5 Help us improve

Please feel free to contact us if you have any questions, or if you have any suggestions for improvement. In that case, we ask you to include the Quick Start Guide number in the email subject line. You can find the number starting with "QS" on the cover page.

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6 Record of changes

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First edition



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