Panasonic®

Servo Drives

Quick Start Guide
MINAS A6 Multi

PANATERM for Safety
Safe Stop 1 (SS1)

QS10003_V1.0_EN

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1 Introduction

1.1 Before you start

Before operating this product, read the safety instructions in the following manuals:

- “SX-DSV03514, MINAS A6 Multi, Technical Reference – Integrated Safety Part”
- “SX-DSV03508, MINAS A6 Multi, Programming Manual – PANATERM for Safety”

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 A6 Multi servo drive system. It is based on information from the MINAS A6 Multi series manuals and the practical experience of our engineers.

Step by step instructions will guide you through configuring and programming the Safe Stop 1 function (SS1) with the programming software PANATERM for Safety.

Please refer to the original documentation of our servo drive systems for detailed information. It is available free of charge in our Panasonic Download Center.

1.3 Related documents

Select the following links to download the documents from our Panasonic Download Center.

- Safety specifications:
  “SX-DSV03514, MINAS A6 Multi, Technical Reference – Integrated Safety Part”
- Information on wiring the MINAS A6 Multi servo drive system:
  “SX-DSV03454, MINAS A6 Multi, Reference Specifications – Driver Module”
- Information on wiring the MINAS A6 Multi power supply module:
  “SX-DSV03452, MINAS A6 Multi, Reference Specifications – Power Supply Module”
- Information on EtherCAT communication:
  “SX-DSV03456, MINAS A6 Multi, Technical Reference – EtherCAT Communication Specification”
- Description of the servo driver functions:
  “SX-DSV03455, MINAS A6 Multi, Technical Reference – Functional Specification”
- Information on safety programming:

"SX-DSV03508, MINAS A6 Multi, Programming Manual – PANATERM for Safety"

- Information on how to reduce electromagnetic interference (EMI):
  "Recommendations for EMC-compliant wiring of servo drivers and motors"
- Related Quick Start Guides:
  "QS10000, MINAS A6 Multi, Position control with Beckhoff host controller over EtherCAT"
  "QS10001, MINAS A6 Multi, Ethernet over EtherCAT with PANATERM"
  "QS10002, MINAS A6 Multi, Safe Torque Off (STO)"
  "QS10004, MINAS A6 Multi, Safe Speed Monitoring (SSM)"
  "QS10005, MINAS A6 Multi, Position control with Omron host controller over EtherCAT"
  "QS10006, MINAS A6 Multi, Position control with TRIO host controller over EtherCAT"

1.4 Available software

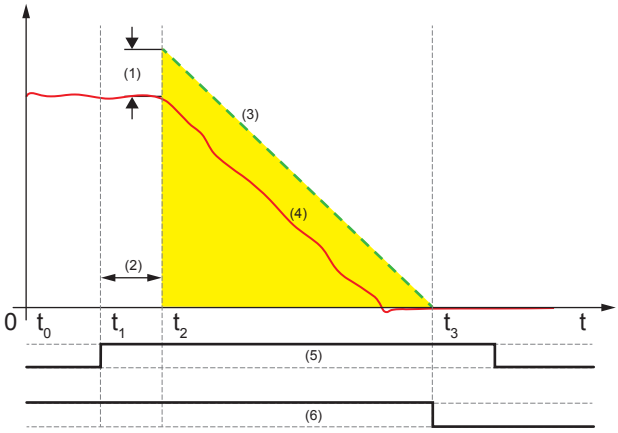
The following software is available free of charge in our Panasonic Download Center:

- Programming software PANATERM for Safety for MINAS A6 Multi

2 Functional overview

The safety stop 1 function (SS1) uses a controlled deceleration to safely stop the motor, and then activates the Safe Torque Off (STO) function. SS1 allows a system with high inertia to be brought to standstill very quickly.

Use the programming software PANATERM for Safety to set up this function for the MINAS A6 Multi servo drive system.



(1) Tolerance
(2) Latency
(3) SSX deceleration ramp
(4) Speed (v)
(5) Enabled
(6) Result output

Safe Stop 1 (SS1): Safety stop in accordance with EN 60204-1, stop category 1

t_0	Movement with initial speed
t_1	A safe stop is initiated by enabling the SS1 function. The internal latency timer starts.
t_2	The internal latency timer has elapsed, and the deceleration ramp is monitored with the set speed tolerance.
t_3	The speed has come to the expected halt and the STO function is requested by setting the result output to FALSE.

Example

A servo drive system, consisting of a 15kW power supply module, an A-size 1.5kW two-axis driver module, and two servo motors with 1.0kW and 1.5kW, is connected to a PC by a USB cable.

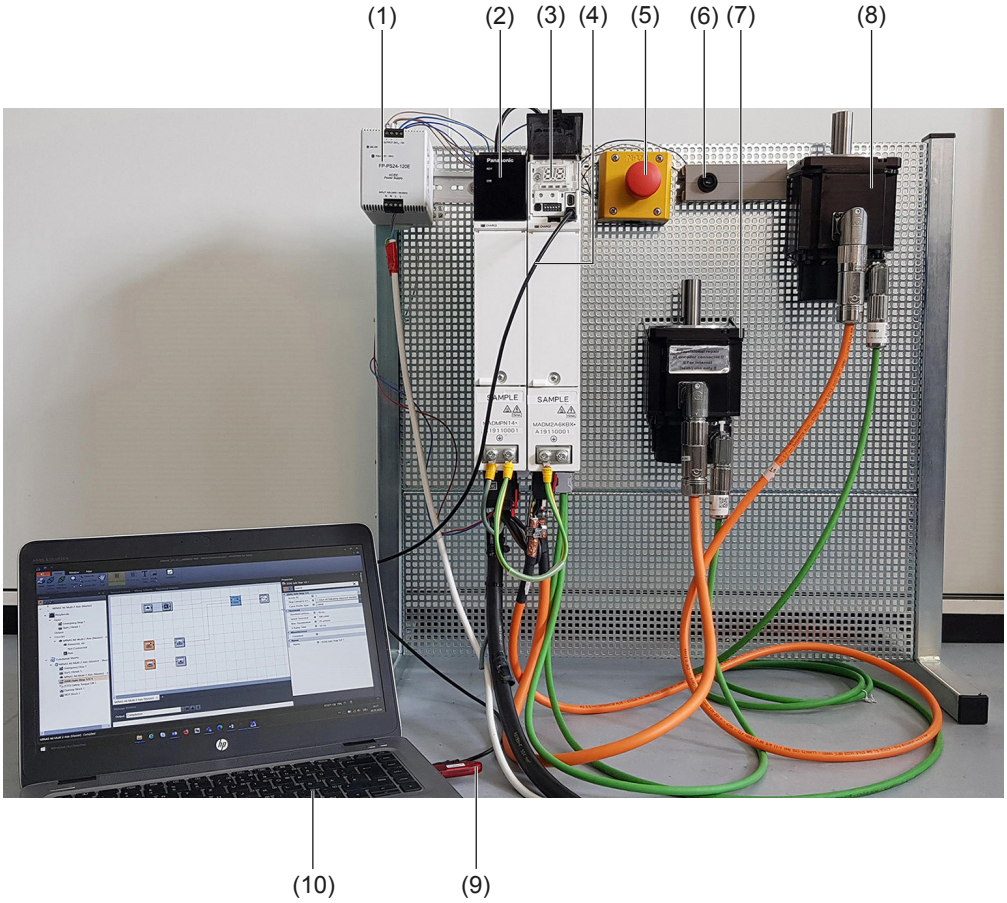
An emergency stop button and a reset button are connected to the MINAS A6 Multi driver module.

Use the following accessories:

- 1 x 400V AC power supply cable

Connects the MINAS A6 Multi power supply module to the main power supply (400V AC).

- 1 x 24V DC power supply cable
  Connects the power supply unit (24V DC) and the host controller.
- 1 x grounding wire (M4 round terminal)
  Connects the PE terminals of the power supply module and the driver module.
- 2 x Panasonic motor cable
  Connects the motor and the driver module.
- 2 x Panasonic encoder cable
  Connects the encoder and the driver module.
- 1 x RJ11 communication cable (2 x RJ11 plug)
  Connects the power supply module and the driver module.
- 1 x feed bus bar (50mm) with end cap for the DC link bus (535V DC to 675V DC)
  Connects the power supply module and the driver module.
- 1 x feed bus bar (50mm) with end cap for the control bus (24V DC)
  Connects the power supply module and the driver module.
- 1 x emergency stop button connected to the driver module
- 1 x reset button connected to the driver module
- 1 x USB license dongle
- 1 x USB cable



(1) Power supply unit (24V DC)
(2) MINAS A6 Multi power supply module (400V AC, 15kW)
(3) Two-axis MINAS A6 Multi driver module (1.5kW)
(4) USB cable between PC and driver module
(5) Emergency stop button
(6) Reset button
(7) MINAS A6 servo motor B (1.5kW)
(8) MINAS A6 servo motor A (1kW)
(9) USB license dongle for PANATERM for Safety
(10) PC with PANATERM for Safety

Set-up of a MINAS A6 Multi servo drive system - Safe Stop 1 (SS1)

3 Wiring

3.1 Basic wiring of the MINAS A6 Multi

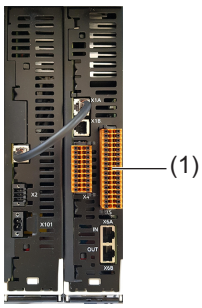
Check the hardware connections of your servo drive system:

- 24V DC control power supply connected to X11
- 400V AC main power supply cable connected to X102
- Motor cable for servo motor A connected to X105A
- Motor cable for servo motor B connected to X105B
- Encoder cable for servo motor A connected to X9A
- Encoder cable for servo motor B connected to X9B
- X1 and X1A connected with RJ11 communication cable
- Bus bars attached to X104 and X12
- PE terminals of power supply module and driver module connected by grounding wire

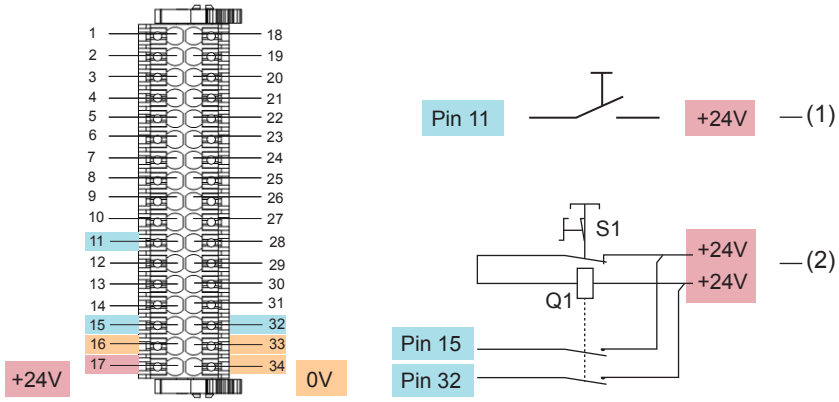
For details on how to do the wiring of the MINAS A6 Multi servo drive system, refer to “Wiring” in “QS10000, MINAS A6 Multi, Position control with Beckhoff host controller over EtherCAT”.

3.2 Wiring of the emergency stop and reset buttons

Connect the emergency stop button and the reset button to the safety I/O signal connector (X5) of the driver module.



(1) X5: Safety I/O signal connector on driver module



(1) Reset button
(2) Emergency button

Pin 11: Non-grouped safety digital input

Pin 15: Grouped safety digital input 1A

Pin 16: Safety input common A

Pin 17: External power supply (24V DC) for safety I/O

Pin 32: Grouped safety digital input 1B

Pin 33: Safety input common B

Pin 34: External ground

3.3 USB license dongle

A USB license dongle is required to compile and download the functional safety configuration to the driver module. Connect the license dongle to a USB port of your PC.

USB license dongle

3.4 Connect the PC and the driver module

Connect your PC and the driver module with an Ethernet cable or with a USB cable. In this example, we use a USB cable that is connected to X8 of the driver module.

X8 connector (for functional safety configuration)

Use a commercially available USB A to mini-B cable to connect the PC to the driver module.

(1) X8: USB connector on driver module

4 Functional safety configuration

4.1 Install PANATERM for Safety on your PC

The programming software PANATERM for Safety provides a graphical environment to create PLC-based monitoring programs for the MINAS A6 Multi servo drive system.

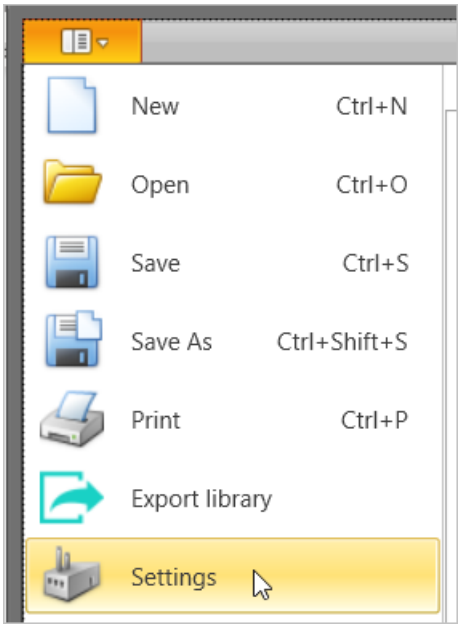
Install the software on your PC.

For details, refer to the “SX-DSV03508, MINAS A6 Multi, Programming Manual – PANATERM for Safety”.

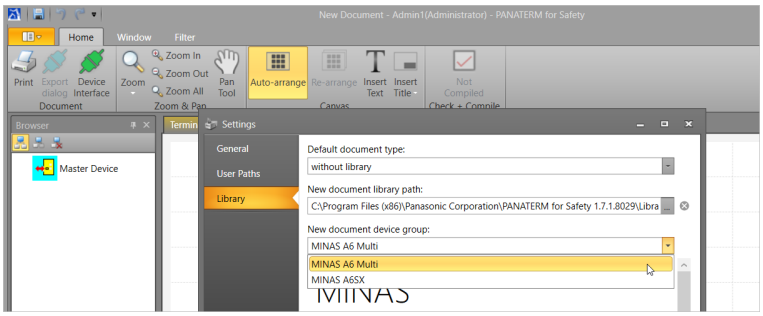
4.2 Create a safety program

The general workflow for creating a safety program is to add the devices of your servo drive system to your project, to place them in the “Terminal Scheme” screen, and to configure the safety functions in the“Functional Scheme” screen.

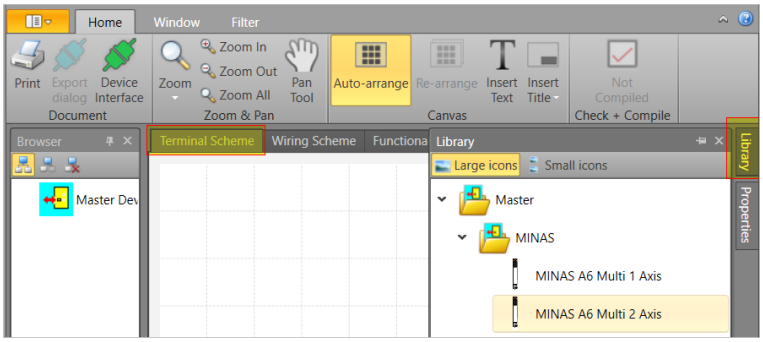
1. Start PANATERM for Safety.
2. Select the “Settings” tab.



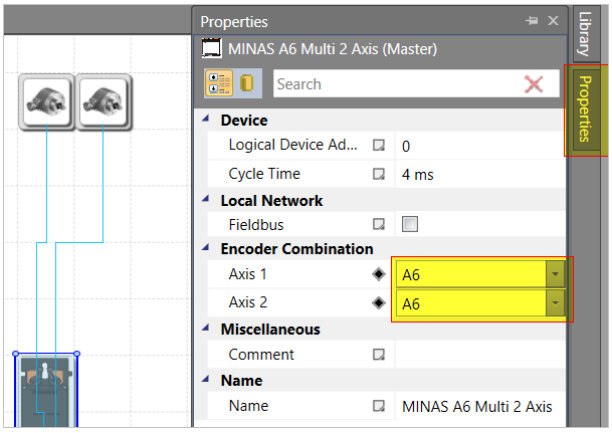
3. Select “Library” and then “MINAS A6 Multi” under “New document device group”.



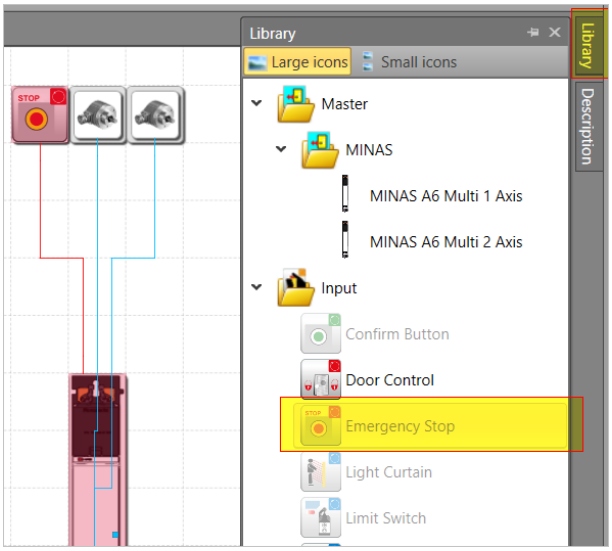
4. Select “MINAS A6 Multi 2 Axis” from the “Library” window and drag the element into the “Terminal Scheme” window.



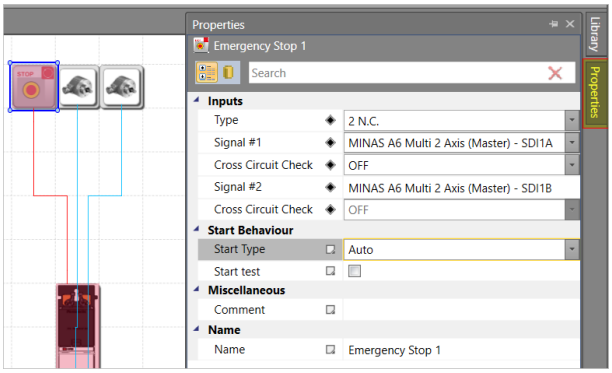
5. Go to the “Properties” window and select the A6 encoder for both axes.



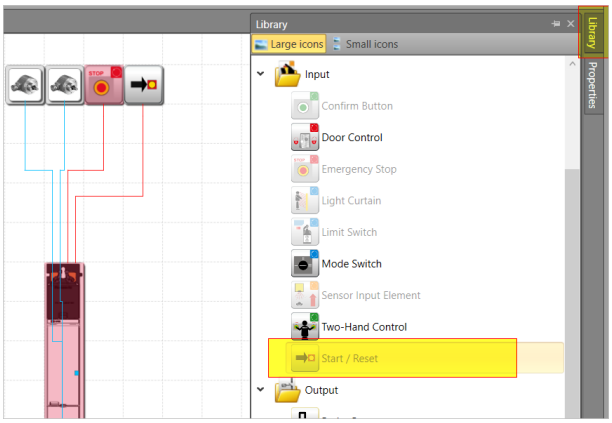
6. Go to the “Library” window, select the “Emergency Stop” element and drag it into the “Terminal Scheme” window.



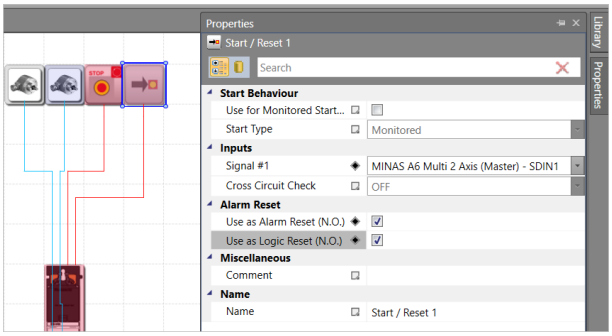
7. Select the “Emergency Stop” element in the “Terminal Scheme” window, and make the settings in the “Properties” window as shown in the screenshot.



8. Go to the “Library” window, select the “Start/Reset” element and drag it into the “Terminal Scheme” window.

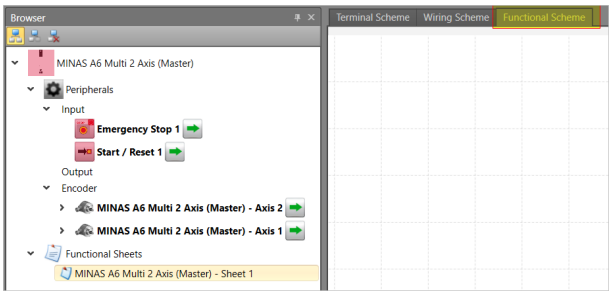


9. Select the “Start/Reset” element in the “Terminal Scheme” window, and make the settings in the “Properties” window as shown in the screenshot.



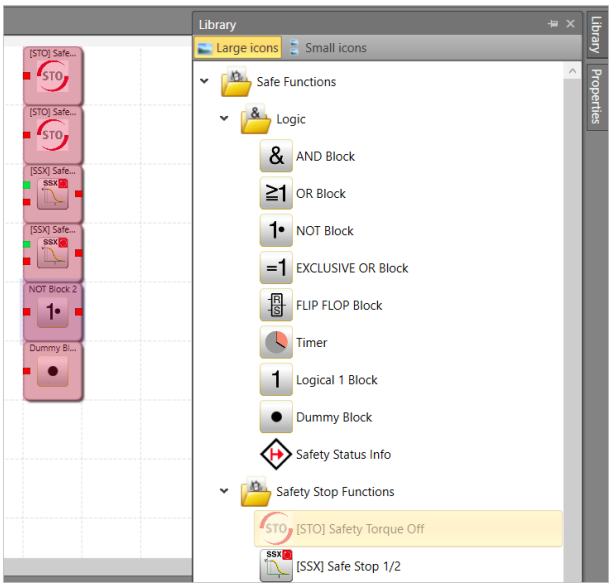
10. Go to the “Functional Scheme” window to program the functional safety.

11. Select the “Emergency Stop”, “Start/Reset”, and encoder elements from the “Browser” window and drag them into the “Functional Scheme” window.

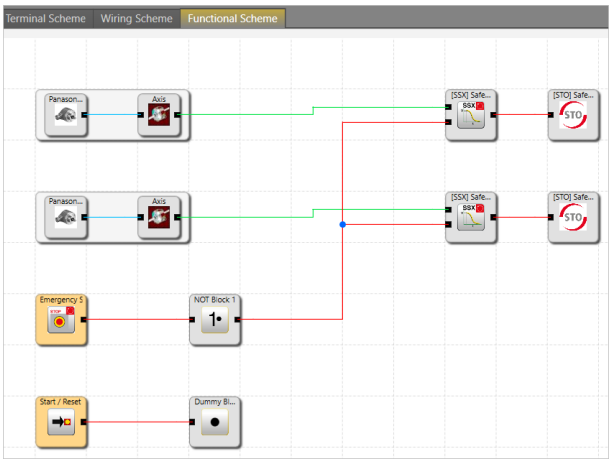


12. Select the safety functions “[STO] Safety Torque Off” and “[SSX] Safe Stop 1/2 ” from the “Library” window and drag them into the “Functional Scheme” window. For two axes, you need each function twice.

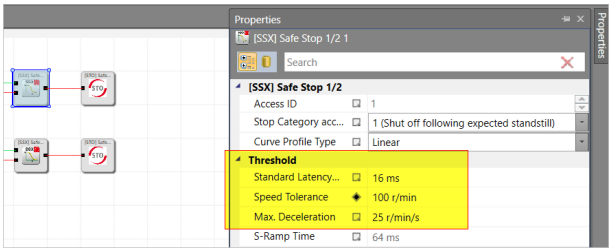
13. Select the logical operators “NOT Block” and “Dummy Block” and drag them into the “Functional Scheme” window.



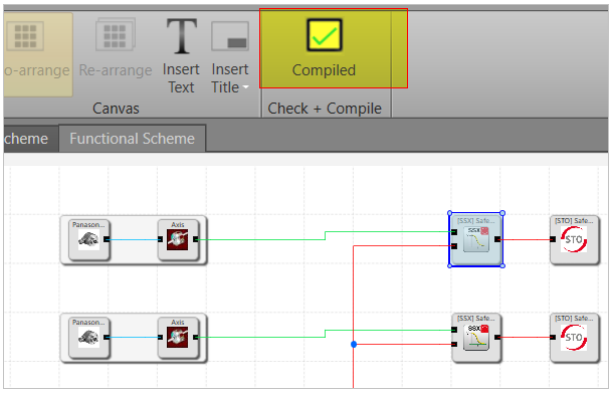
14. Use the mouse to connect the elements.



15. Select the “[SSM] Safe Speed Monitoring 2” function in the “Terminal Scheme” window, and make the settings in the “Properties” window as shown in the screenshot.
The threshold values for latency, speed tolerance, and max. deceleration are sample values that can be adjusted according to the requirements of the machine.



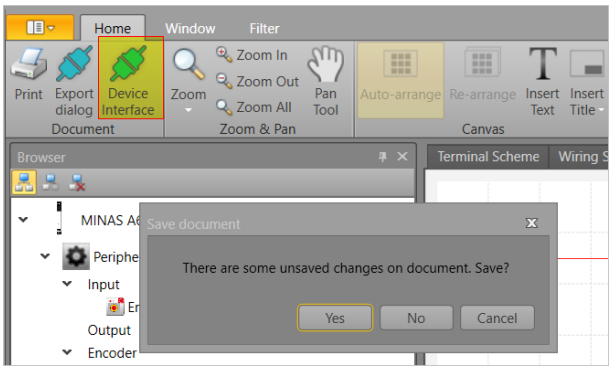
16. Select “Check + Compile” in the ribbon to compile your project



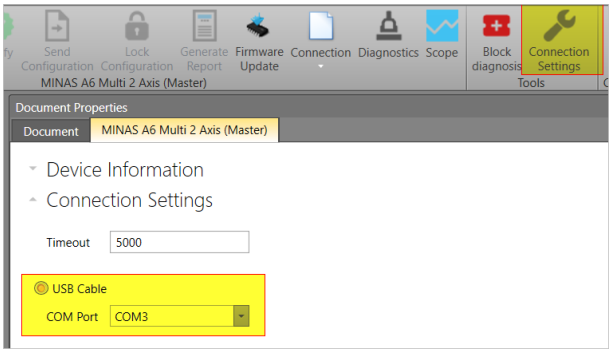
4.3 Download the safety program to the driver module

Remember that a USB license dongle is required to compile and save your program.

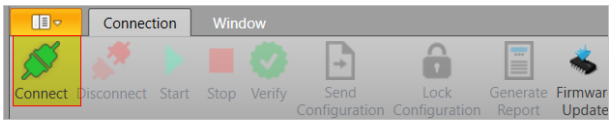
1. Select “Device Interface” in the ribbon and save your project.



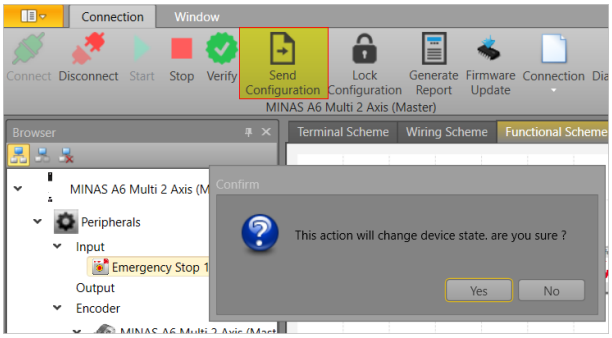
2. Select “Connection Settings” in the ribbon and then “USB Cable”.



3. Select “Connect” in the ribbon.

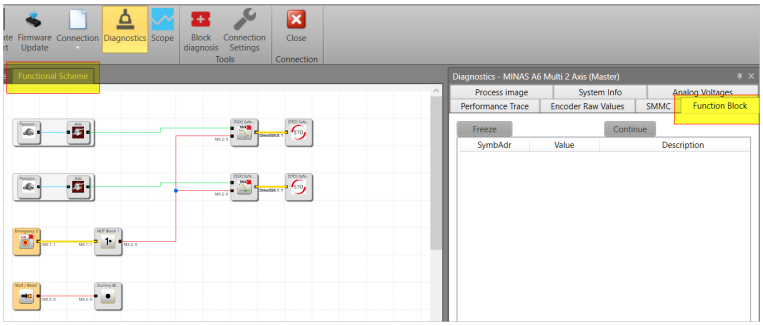


4. Select “Send Configuration” in the ribbon.
   Select “Yes” to confirm the message that this action will change the device state.



5. Wait until the configuration is transmitted to the driver module and then reboot the driver module.
   The safety function is now active.

6. To check the current status of the safety function, go to “Diagnostics” and select the “Functional Scheme” window.
   A yellow line means that the emergency stop button was not yet pressed. If it is red, the emergency button has been pressed and STO is active.



4.4 Monitor the behavior of the SS1 safety function

Select “Scope” in the ribbon to monitor the behavior of the SS1 safety function.
You can adjust the threshold values set in the “Properties” window according to your needs. For details, refer to the “SX-DSV03508, MINAS A6 Multi, Programming Manual – PANATERM for Safety”.

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

7 Panasonic hotline

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