

Servo Drives

Quick Start Guide

Torque control
(MINAS A5/A6)



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Table of contents

1 Introduction.....	4
1.1 Before you start.....	4
1.2 About this document.....	4
1.3 Related documents.....	4
1.4 Available software.....	5
2 Functional overview.....	6
3 Wiring.....	7
3.1 Recommendations for wiring.....	7
3.2 Connectors of the servo driver.....	7
3.3 Signal inputs and outputs of the X4 connector.....	9
3.4 PNP wiring of the X4 connector.....	10
3.5 NPN wiring of the X4 connector.....	11
4 Make parameter settings in PANATERM.....	12
4.1 Basic parameters overview.....	12
4.2 Pr0.01 (Control mode).....	13
4.3 Pr3.17 (Torque command input).....	13
4.4 Pr3.18 (Torque command direction).....	13
4.5 Pr3.19 (Input gain of torque command).....	14
4.6 Pr3.20 (Inversion of torque command input).....	14
4.7 Pr3.21 (Speed limit value 1).....	14
4.8 Pr4.22 (Analog input 1 offset).....	14
4.9 Pr4.23 (Analog input 1 filter).....	15
4.10 Pr4.36 (Speed attainment).....	15
5 Make pin assignments in PANATERM.....	16
6 Help us improve.....	17
7 Record of changes.....	18

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 connecting a PLC to a MINAS servo driver and setting the most important parameters in the PC configuration software PANATERM.

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 \(MINAS A5/A6F\)](#)

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

[*QS5001, PANATERM - Auto-tuning*](#)

[*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](#)

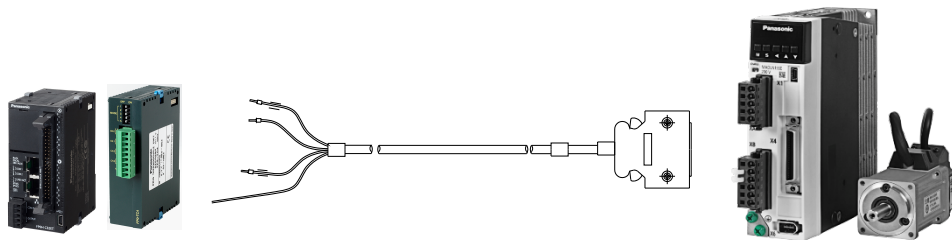
2 Functional overview

Torque control is a control mode to change the motor torque. The torque is controlled by analog signals (e.g. 0 to 10V) at the analog inputs of the servo driver. In addition to a torque signal, a speed limit signal is required to limit the motor speed. There are three different torque control modes (torque commands).

This *Quick Start Guide* describes torque command 0, which uses analog input 1 and a motor speed limit.

Example

An FP0RA21 analog output unit and a MINAS A6SF servo driver are connected using a DVOP4360V cable. An analog signal of 0 to 10V is sent from the unit to the servo driver. Additional signals, e.g. the servo ready or alarm status of the servo driver can be transmitted via the same cable to the PLC.



Data transmission between PLC, analog output unit, and servo driver via connection cable

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.

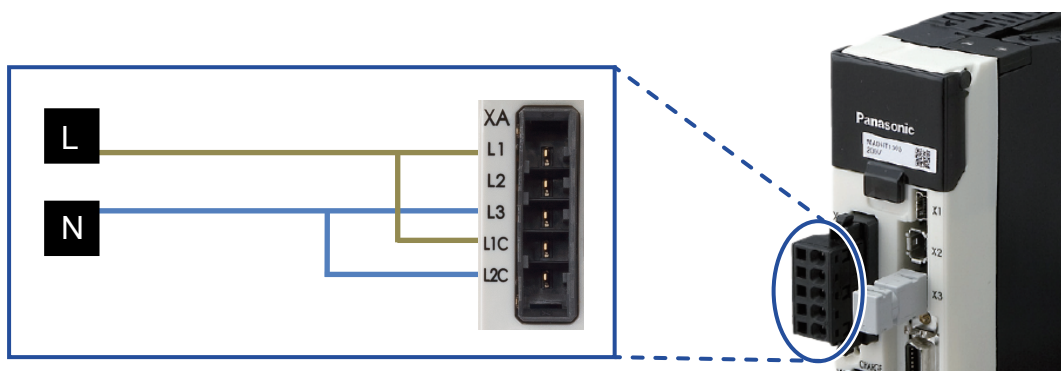
Do not forget to meet the specifications indicated in the hardware manual for each of the devices being wired. If any specifications in the manual conflict with the information in this document, the manufacturer's manual takes preference.

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)

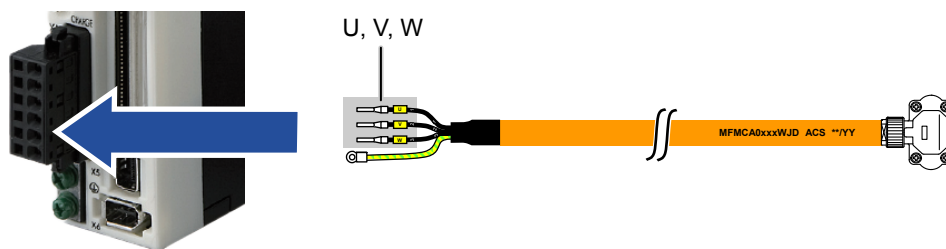
Connect the power supply cable to the XA connector. For a 1-phase power supply of 230V, connect a 2-wire cable to the servo driver as illustrated. The L2 pin is not used in 1-phase mode.



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)

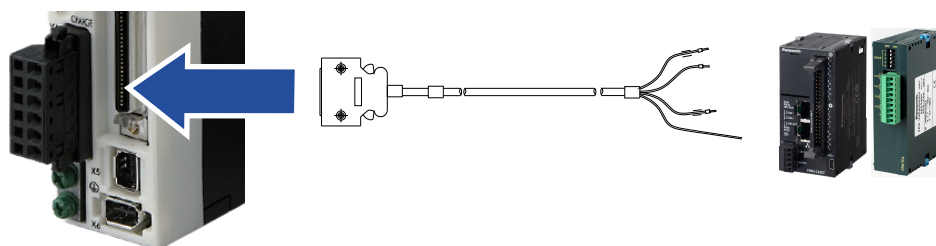
Connect the encoder cable to the X6 connector.



Wiring of the X6 connector for the encoder connection

X4 connector (I/O connector)

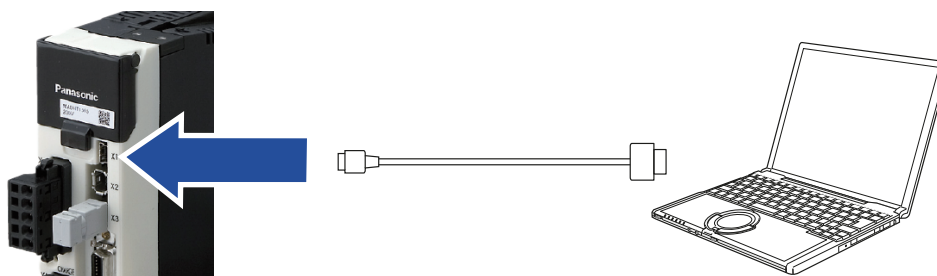
Connect the connection cable to the X4 connector to the analog output unit.



Wiring of the X4 connector for the PLC 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

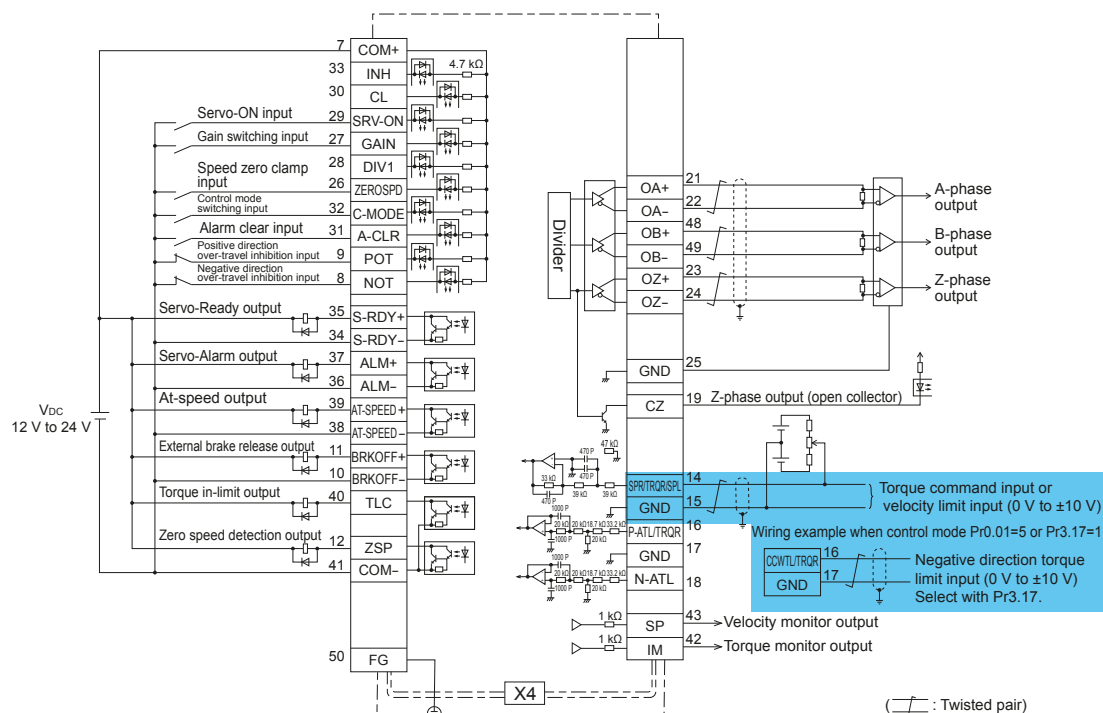
3.3 Signal inputs and outputs of the X4 connector

For position control, the X4 connector of the MINAS A5/A6 servo driver is equipped with an analog input which has a resolution of 16 bits. The voltage range is 0V to ± 10 V. The analog input is highlighted in the wiring diagram.

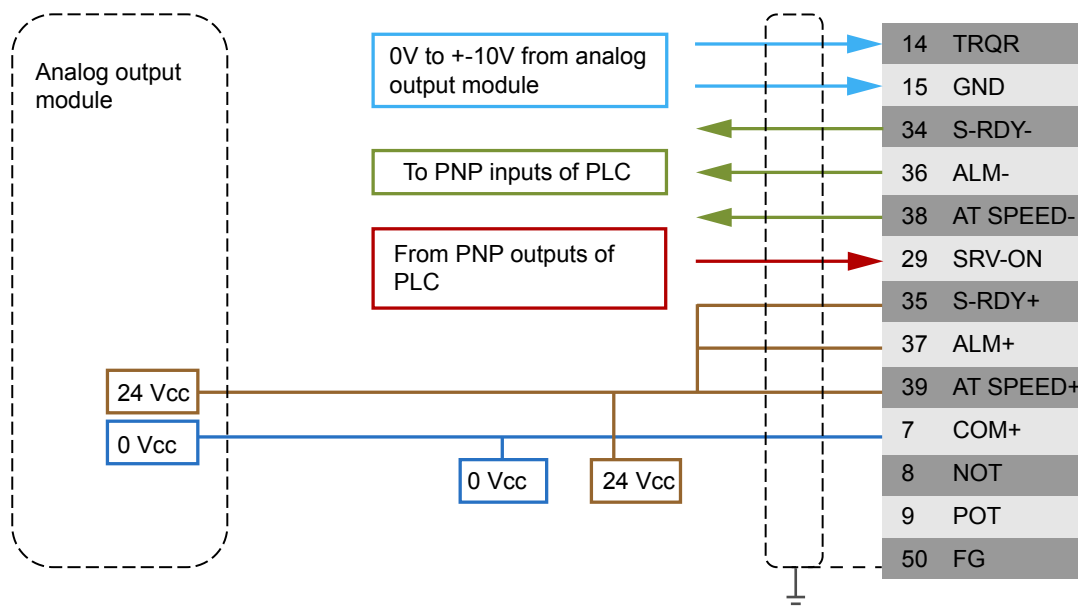
In our example, we will use the following signal inputs and outputs:

- SRV-ON (pin 29)
Servo-on input to energize the servo motor.
- COM+ (pin 7)
Common input for the power supply of the control signals.
- SPR/TRQR/SPL (pins 14–15)
Analog input for torque control.
- S-RDY (pins 34–35)
Servo-ready output to indicate the ready state of the driver.
- ALM (pins 36–37)
Servo-alarm output
- AT-SPEED (pins 38–39)
Speed attainment output which turns on when the speed specified with Pr4.36 is reached.

Please refer to the *Operating Instructions* of your MINAS A5/A6 servo driver to learn more about the signal inputs and outputs which might be useful for your application.



3.4 PNP wiring of the X4 connector

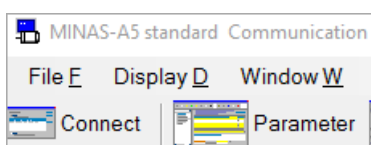


4 Make parameter settings in PANATERM

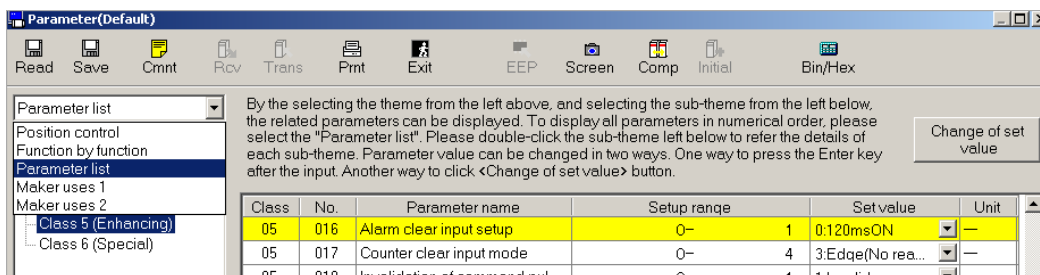
Use the PC configuration software PANATERM to configure the MINAS servo driver.

Click on the following link to download PANATERM from our Panasonic Download Center:
[PC configuration software PANATERM](#)

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. Select the "Parameter" tab.



5. In the "Selection of parameter to be read" dialog, select "Read the default". There is a message if the parameter values in the servo driver are not the default values. To overwrite the parameters in the servo driver, select the "Trans" icon.
6. Select the parameter list for your type of servo driver.



7. To change a parameter setting, select the desired parameter class and enter a value.
For parameter descriptions, please refer to the Operating Instructions. You can find each parameter by its unique parameter number. The parameter number is written in the format PrX.YY (X: Class, YY: No.).
8. Depending on the parameter, select the "Trans" or the "EEP" icon to transfer a setting to the servo driver. For yellow parameters, select the "EEP" icon. The parameters will be saved in the EEPROM of the servo driver. To activate the settings, you need to restart the servo driver.
All other parameters are transferred simply by selecting the "Trans" icon.

4.1 Basic parameters overview

There are basic parameters which are associated to position control.

The following table shows the setting range and description of the basic parameters.

Parameter	Range	Description
Pr0.01	0 to 6	Control mode
Pr3.17	0 to 2	Torque command input
Pr3.18	0 to 1	Torque command direction
Pr3.19	10 to 100 [0.1V/100%]	Input gain of torque command
Pr3.20	0 to 1	Inversion of torque command input
Pr3.21	0 to 20000 [ms/(1000r/min)]	Speed limit value 1
Pr4.22	-27888 to 27888 LSB (MINAS A5) -5578 to 5578 LSB (MINAS A6F)	Analog input 1 offset
Pr4.23	0.00 to 64.00 [ms] (MINAS A5, MINAS A6F)	Analog input 1 filter
Pr4.36	10 to 20000 [r/min]	Speed attainment

4.2 Pr0.01 (Control mode)

PANATERM parameter: "Control mode setting"

Setting range: 0 to 6

Select 2: Torque control

4.3 Pr3.17 (Torque command input)

PANATERM parameter: "Torque command selection"

Setting range: 0 to 2

Select one of the following torque commands:

- 0: Analog input 1, 16-bit resolution, speed limit specified using Pr3.25
- 1: Analog input 2, 12-bit resolution, speed limit specified by analog input 1
- 2: Analog input 1, 16-bit resolution, speed limit specified by Pr3.21, Pr3.22

4.4 Pr3.18 (Torque command direction)

PANATERM parameter: "Torque command direction designation selection"

Setting range: 0 to 1

Select the method to specify the motor rotation direction:

- 0: Sign of torque command (positive torque command for positive direction, negative torque command for negative direction)

1: TC-SIGN input (OFF: positive direction, ON: negative direction)

4.5 Pr3.19 (Input gain of torque command)

PANATERM parameter: "Torque command input gain"

Setting range: 10 to 100 [0.1V/100%]

Set a gain factor for the motor torque based on the voltage applied at the torque command input TRQR. For example, a setting value of 30 results in a torque of 100% for an input voltage of 3V.

4.6 Pr3.20 (Inversion of torque command input)

PANATERM parameter: "Torque command input inversion"

Setting range: 0 to 1

Specify the polarity of the voltage applied to the torque command input TRQR of the driver:

0: No inversion, positive rotation direction for positive voltage

1: Inversion, positive rotation direction for negative voltage

4.7 Pr3.21 (Speed limit value 1)

PANATERM parameter: "Speed limit value 1"

Setting range: 0 to 20000

Default value: 0

Specify the speed limit used for torque control.

4.8 Pr4.22 (Analog input 1 offset)

PANATERM parameter: "Analog input 1 (A|1) offset setting"

Setting range:

-27888 to 27888 LSB (MINAS A5)

-5578 to 5578 LSB (MINAS A6F)

The default value is 0.

Specify an offset value to apply a torque on the motor shaft which compensates for drift.

4.9 Pr4.23 (Analog input 1 filter)

PANATERM parameter: "Analog input 1 (A|1) filter setting"

Setting range: 0.00 to 64.00 [ms]

The default value is 0.

This parameter acts like a low-pass filter to produce a stable voltage: the higher the setting value, the longer the delay.

4.10 Pr4.36 (Speed attainment)

PANATERM parameter:

"At-speed" (MINAS A5)

"Attainment speed" (MINAS A6)

Setting range: 10 to 20000 [r/min]

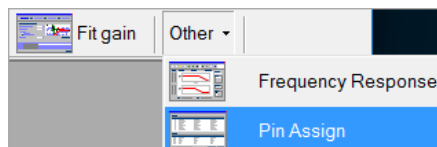
The default value is 1000r/min.

When the motor speed specified by this parameter is reached, the output AT-SPEED turns on.

5 Make pin assignments in PANATERM

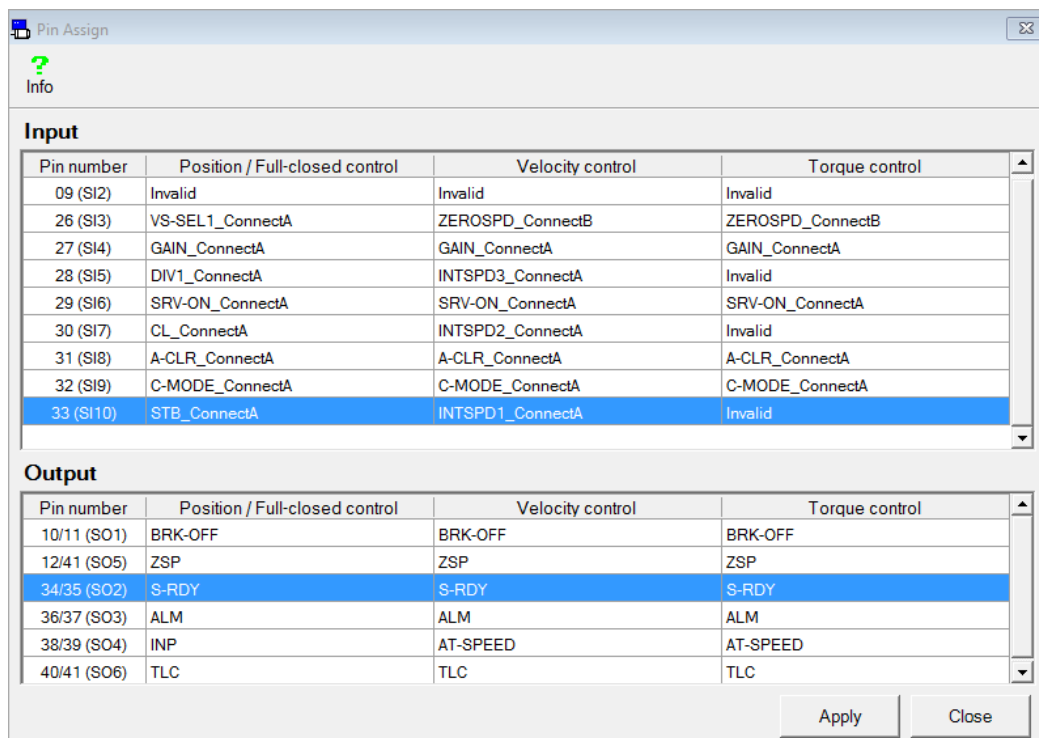
For some applications, the software function of physical pins of the servo driver must be changed. Use the PC configuration software PANATERM to make the pin assignment.

1. Connect your PC to the servo driver.
2. Start the PANATERM configuration software.
3. Select "Other" > "Pin Assign".



The current pin assignment is uploaded from the servo driver.

4. Select an arbitrary input which is not required by your application and double-click.



5. Select the desired function.
6. Select "Apply" to transfer the pin assignment to the servo driver.

6 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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7 Record of changes

QS4000_V1.0_EN, 2019.07

First edition



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