

Servo Drives

## Quick Start Guide

---

Position control by pulse  
and direction signals  
(MINAS A5/A5E/A6SG/A6SF)



## Liability and copyright

---

This manual and everything described in it are copyrighted. You may not copy this manual, in whole or part, without written consent of Panasonic Electric Works Europe AG (PEWEU).

PEWEU pursues a policy of continuous improvement of the design and performance of its products. Therefore we reserve the right to change the manual/product without notice. In no event will PEWEU be liable for direct, special, incidental, or consequential damage resulting from any defect in the product or its documentation, even if advised of the possibility of such damages.

Please direct support matters and technical questions to your local Panasonic representative.

# Table of contents

---

<b>1 Introduction.....</b>	<b>4</b>
1.1 Before you start.....	4
1.2 About this document.....	4
1.3 Related documents.....	4
1.4 Available software.....	5
<b>2 Functional overview.....</b>	<b>6</b>
<b>3 Wiring.....</b>	<b>7</b>
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
<b>4 Make parameter settings in PANATERM.....</b>	<b>12</b>
4.1 Basic parameters overview.....	12
4.2 Pr0.00 (Motor rotation direction).....	13
4.3 Pr0.01 (Control mode).....	13
4.4 Pr0.06 (Counting direction of the command pulses).....	13
4.5 Pr0.07 (Input mode of the command pulses).....	14
4.6 Pr0.08 (Number of pulse signals per motor revolution).....	15
4.7 Pr0.09 (Gear ratio numerator) and Pr0.10 (Gear ratio denominator).....	15
4.8 Pr5.32 (Maximum pulse input frequency).....	15
<b>5 Make pin assignments in PANATERM.....</b>	<b>16</b>
<b>6 Help us improve.....</b>	<b>17</b>
<b>7 Record of changes.....</b>	<b>18</b>

# 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:  
[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\*](#)

[\*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](#)
- [PC programming software Control FPCWIN Pro 7](#)

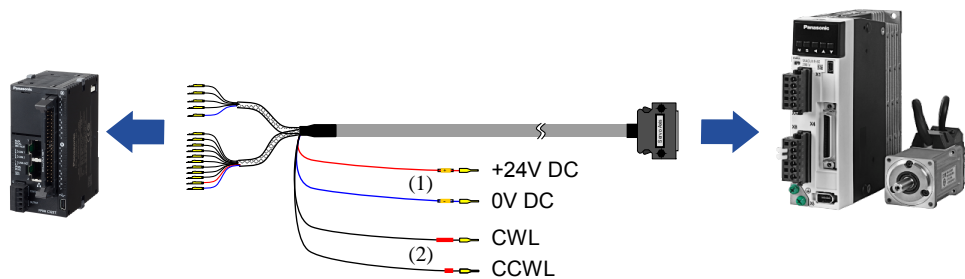
## 2 Functional overview

Position control is a control mode in which the motor moves the load to a specified target position.

The servo driver can be controlled by a pulse train in the frequency range between 1Hz and 8MHz from a host controller such as a PLC or a CNC controller or by block operation. This *Quick Start Guide* explains how to wire and configure the servo driver to receive pulses from a PLC.

### Example

An FP0H PLC and a MINAS A6SF servo driver are connected to control the driver by I/O signals. If needed, additional signals, such as servo-ready, alarm, or positioning complete, can also be transmitted.



- (1) Connect to external power supply.
- (2) Connect to limit switches.

*Data transmission between PLC 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.

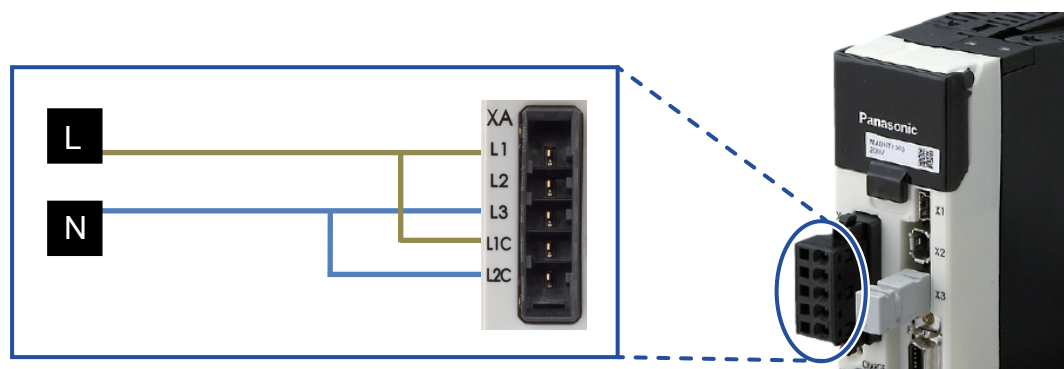
Do not forget to meet the specifications indicated in the hardware manual for each of the devices being wired. If any specifications in the manual conflict with the information in this document, the manufacturer's manual takes preference.

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)

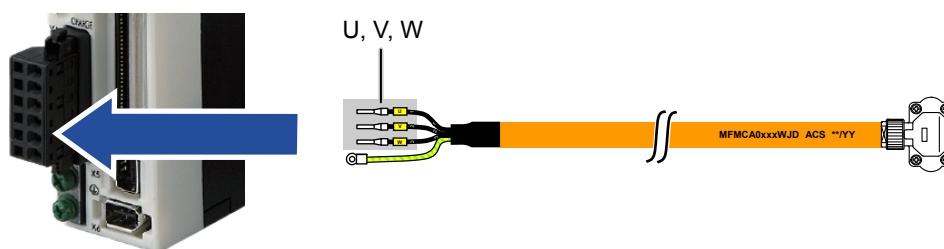
Connect the power supply cable to the XA connector. For a 1-phase power supply of 230V, connect a 2-wire cable to the servo driver as illustrated. The L2 pin is not used in 1-phase mode.



*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.

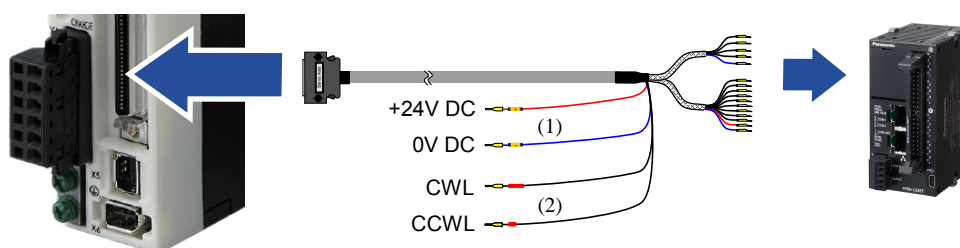


*Wiring of the X6 connector for the encoder connection*

### **X4 connector (I/O connector)**

Connect the connection cable to the X4 connector and to the FP0H PLC. For PNP connections the preassembled connection cable DV0P0988WP-1 is available.

Panasonic provides different preassembled connection cables for connecting other PLC types.



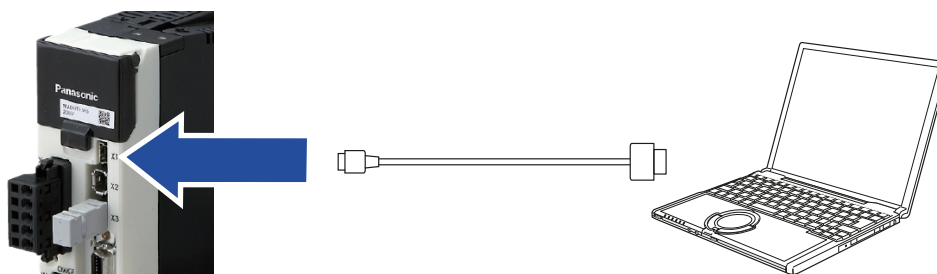
- (1) Connect to external power supply.
- (2) Connect to limit switches.

*Wiring of the X4 connector for the host controller 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

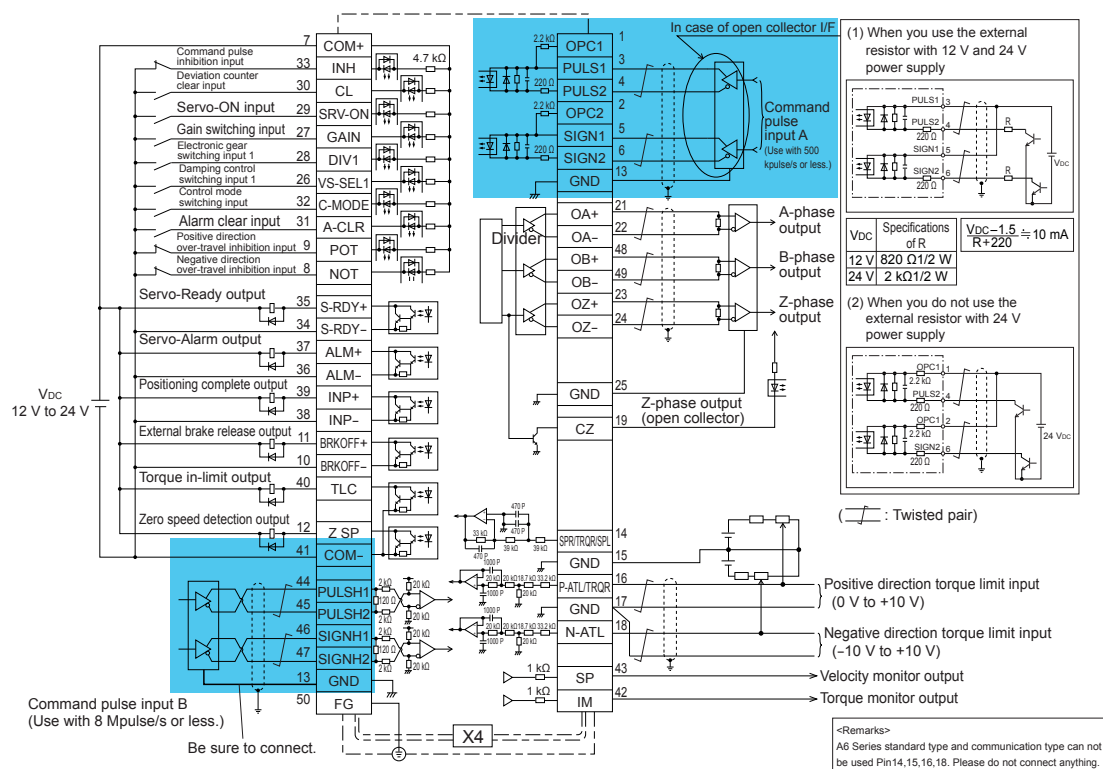
### 3.3 Signal inputs and outputs of the X4 connector

For position control, the X4 connector of the MINAS A5/A6 servo driver is equipped with signal inputs and outputs. For pulse input, you can either use the line driver inputs (44, 45, 46, 47) if high speeds or high resolutions are required, or you can use the open collector inputs (1, 2, 4, 6 or 3, 4, 5, 6). The pulse inputs are highlighted in the wiring diagram.

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

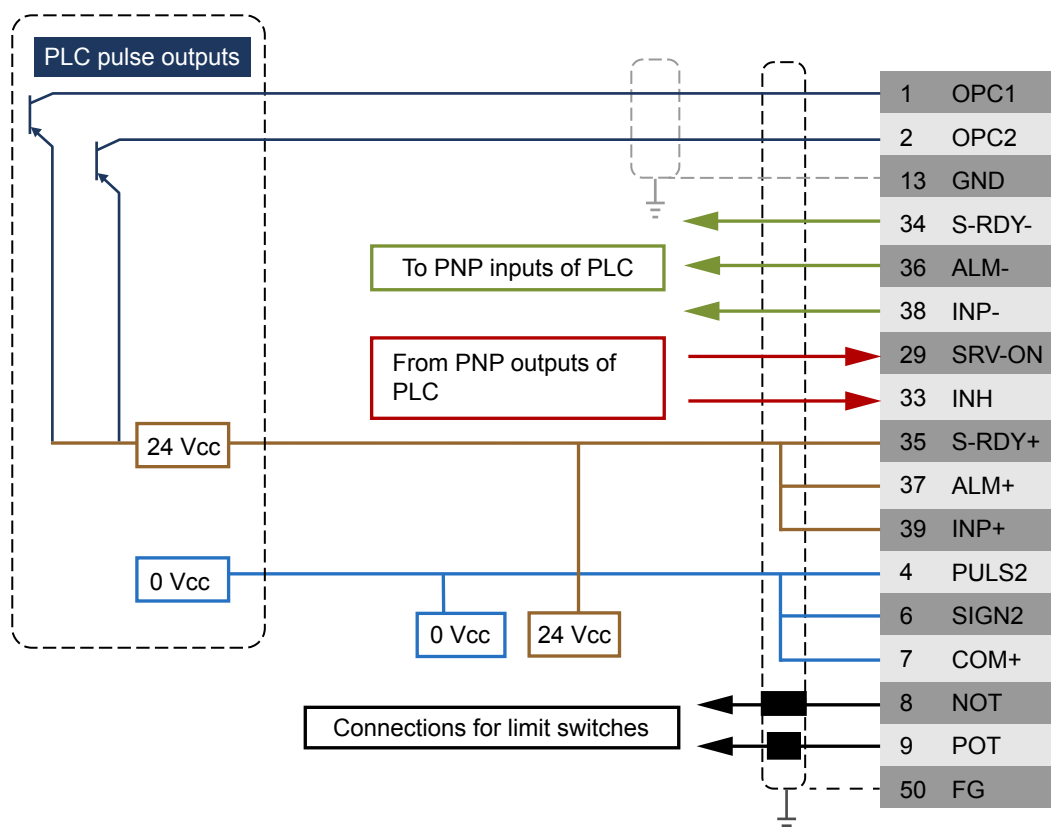
- OPC1 (pin 1), OPC2 (pin 2), PULS2 (pin 4), SIGN2 (pin 6)  
Open collector inputs to receive command pulses from a PLC.
- SRV-ON (pin 29)  
Servo-on input to energize the servo motor.
- COM+ (pin 7)  
Common input for the power supply of the control signals.
- S-RDY (pins 34–35)  
Servo-ready output to indicate the ready state of the driver.
- ALM (pins 36–37)  
Servo-alarm output
- A-CLR (pin 31)  
Input for clearing alarms.
- INP (pins 38–39)  
Positioning complete output which turns on when the target position 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.

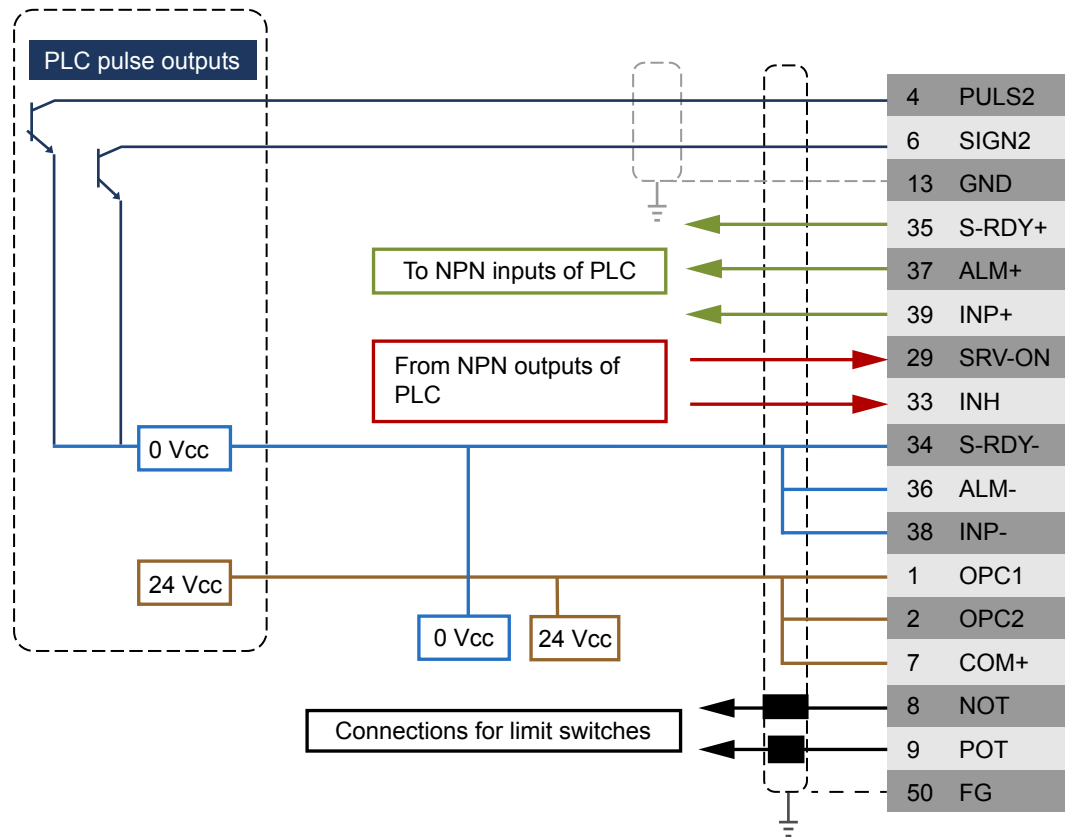


*Signal inputs and outputs available on the X4 connector of the servo driver*

### 3.4 PNP wiring of the X4 connector



### 3.5 NPN wiring of the X4 connector

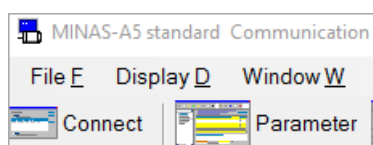


## 4 Make parameter settings in PANATERM

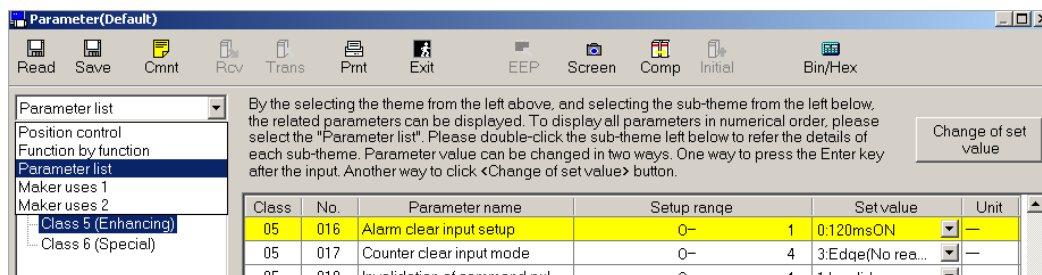
Use the PC configuration software PANATERM to configure the MINAS servo driver.

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
Pr0.00	0 or 1	Motor rotation direction
Pr0.06	0 or 1	Counting direction of the command pulses
Pr0.07	0 to 3	Input mode of the command pulses
Pr0.08	0 to 1048576 [pulse] (MINAS A5) 0 to 8388608 [pulse] (MINAS A6)	Number of pulse signals per motor revolution
Pr0.09	0 to 1073741824	Gear ratio numerator
Pr0.10	1 to 1073741824	Gear ratio denominator
Pr5.32	250 to 4000 [kHz] (MINAS A5) 250 to 8000 [kHz] (MINAS A6)	Maximum pulse input frequency

## 4.2 Pr0.00 (Motor rotation direction)

PANATERM parameter: "Rotational direction setting"

Setting range: 0 or 1

The default value is 1: Rotation in CCW direction (counterclockwise direction).

## 4.3 Pr0.01 (Control mode)

PANATERM parameter: "Control mode setting"

Setting range: 0 to 6

The default value is 0: Position control

Select 0: Position control

## 4.4 Pr0.06 (Counting direction of the command pulses)

PANATERM parameter: "Command pulse rotational direction setup"

Setting range: 0 or 1

The default value is 0: Positive counting direction = B leads A, SIGN input, logical high signal.

In combination with Pr0.07, you can select up to 6 command pulse input formats. Please refer to the parameter description in the [Operating Instructions \(Overall\) AC Servo Motors & Driver MINAS A5 series](#) or [Operating Instructions \(Overall\) AC Servo Motors & Driver MINAS A6 series](#) for details.

## 4.5 Pr0.07 (Input mode of the command pulses)

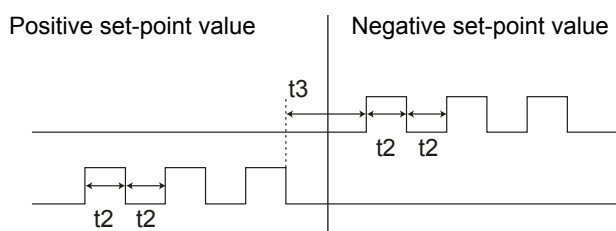
PANATERM parameter: "Command pulse input mode setup"

Setting range: 0 to 3

Select one of the following pulse input modes depending on the configuration of the host controller.

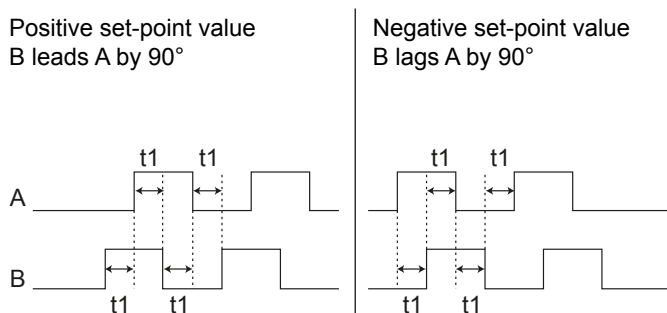
### 1: Positive/negative counting direction (incremental/decremental counting)

This is the default setting.



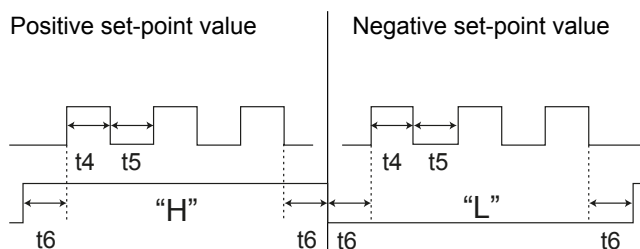
### 0 or 2: 2-phase pulse input

Select this pulse input mode if an encoder or encoder output is used.



### 3: Pulse train and direction signal

The rotation direction can be changed by reversing the logical levels of the direction input.



## 4.6 Pr0.08 (Number of pulse signals per motor revolution)

PANATERM parameter: "Command pulse number per one motor revolution"

Setting range: 0 to 1048576 [pulse] (MINAS A5), 0 to 8388608 [pulse] (MINAS A6)

The default value is 10000 pulses per motor revolution.

## 4.7 Pr0.09 (Gear ratio numerator) and Pr0.10 (Gear ratio denominator)

PANATERM parameter: "First command division/multiplication numerator" (Pr0.09) and "Command division/multiplication denominator" (Pr0.10)

Setting range: 0 to 1073741824 (Pr0.09) and 1 to 1073741824 (Pr0.10)

The default value is 0 for Pr0.09 and 10000 for Pr0.10.

If Pr0.09 is unequal 0, Pr0.08 will have no effect.

## 4.8 Pr5.32 (Maximum pulse input frequency)

PANATERM parameter: "Command pulse input maximum setup/digital filter setup"

Setting range: 250 to 4000 [kHz] (MINAS A5), 250 to 8000 [kHz] (MINAS A6)

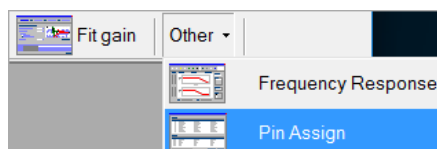
The default value of 4000kHz (4 MHz) is primarily intended for host controllers (CNC or PLC) with line driver outputs. The setting allows the driver to prepare itself for the pulse output frequency of the host controller to be detected.

If the maximum pulse input frequency is below the minimum configurable value, for example if a PLC has a maximum pulse output frequency of 100kHz, enter 250 in PANATERM to minimize EMC issues.

## 5 Make pin assignments in PANATERM

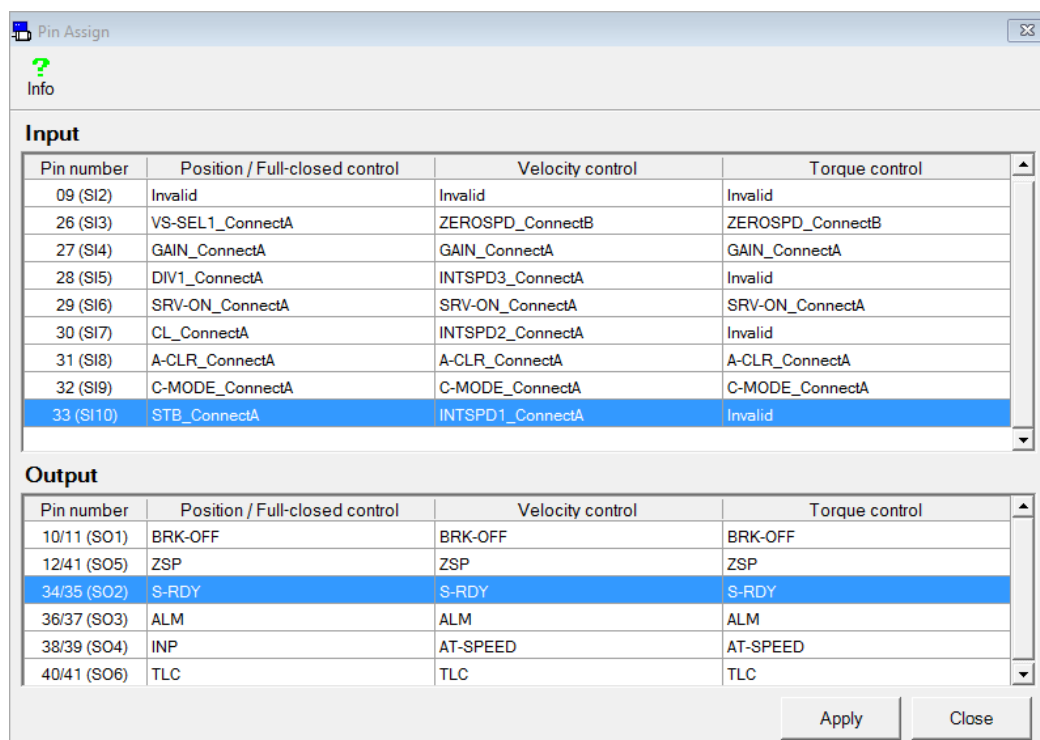
For some applications, the software function of physical pins of the servo driver must be changed. Use the PC configuration software PANATERM to make the pin assignment.

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.

[Servo.peweu@eu.panasonic.com](mailto:Servo.peweu@eu.panasonic.com)

+49 (0) 8945354-2750

## 7 Record of changes

---

QS2000\_V1.1\_EN, 2019.07

- Updated links.
- Minor improvements in layout and text.

QS2000\_V1.0\_EN, 2019.01

First edition



## North America

## Europe

## Asia Pacific

## China

## Japan

## Panasonic Electric Works

Please contact our Global Sales Companies in:

Europe		
► Headquarters	<b>Panasonic Electric Works Europe AG</b>	Robert-Koch-Straße 100, 85521 Ottobrunn, Tel. +49 89 45354-1000, Fax +49 89 45354-2111, <a href="http://www.panasonic-electric-works.com">www.panasonic-electric-works.com</a>
► Austria	<b>Panasonic Electric Works Austria GmbH</b>	Josef Madersperger Str. 2, 2362 Biedermannsdorf, Tel. +43 (0) 2236-26846, Fax +43 (0) 2236-46133 <a href="http://www.panasonic-electric-works.at">www.panasonic-electric-works.at</a>
	<b>Panasonic Industrial Devices Materials Europe GmbH</b>	Ennshafenstraße 30, 4470 Enns, Tel. +43 (0) 7223 883, Fax +43 (0) 7223 88333, <a href="http://www.panasonic-electronic-materials.com">www.panasonic-electronic-materials.com</a>
► Benelux	<b>Panasonic Electric Works Sales Western Europe B.V.</b>	De Rijn 4, (Postbus 211), 5684 PJ Best, (5680 AE Best), Netherlands, Tel. +31 (0) 499 372727, Fax +31 (0) 499 372185, <a href="http://www.panasonic-electric-works.nl">www.panasonic-electric-works.nl</a>
► Czech Republic	<b>Panasonic Electric Works Europe AG, organizační složka</b>	Administrative centre PLATINIUM, Veverí 3163/111, 616 00 Brno, Tel. +420 541 217 001, Fax +420 541 217 101, <a href="http://www.panasonic-electric-works.cz">www.panasonic-electric-works.cz</a>
► France	<b>Panasonic Electric Works Sales Western Europe B.V.</b>	Succursale française, 10, rue des petits ruisseaux, 91370 Verrières Le Buisson, Tél. +33 (0) 1 6013 5757, Fax +33 (0) 1 6013 5758, <a href="http://www.panasonic-electric-works.fr">www.panasonic-electric-works.fr</a>
► Germany	<b>Panasonic Electric Works Europe AG</b>	Robert-Koch-Straße 100, 85521 Ottobrunn, Tel. +49 89 45354-1000, Fax +49 89 45354-2111, <a href="http://www.panasonic-electric-works.de">www.panasonic-electric-works.de</a>
► Hungary	<b>Panasonic Electric Works Europe AG</b>	Magyarországi Közvetlen Kereskedelmi Képviselet, 1117 Budapest, Neumann János u. 1., Tel. +43 2236 26846-25, Mobile: +36 20 264 9896, Fax +43 2236 46133, <a href="http://www.panasonic-electric-works.hu">www.panasonic-electric-works.hu</a>
► Ireland	<b>Panasonic Electric Works UK Ltd.</b>	Irish Branch Office, Dublin, Tel. +353 (0) 14600969, Fax +353 (0) 14601131, <a href="http://www.panasonic-electric-works.co.uk">www.panasonic-electric-works.co.uk</a>
► Italy	<b>Panasonic Industry Italia srl</b>	Via del Commercio 3-5 (Z.I. Ferlina), 37012 Bussolengo (VR), Tel. +39 0456752711, Fax +39 0456700444, <a href="http://www.panasonic-electric-works.it">www.panasonic-electric-works.it</a>
► Nordic Countries	<b>Panasonic Electric Works Europe AG</b>	Filial Nordic, Knarrarnäsgatan 15, 164 40 Kista, Sweden, Tel. +46 859476680, Fax +46 859476690, <a href="http://www.panasonic-electric-works.se">www.panasonic-electric-works.se</a>
	<b>Panasonic Fire &amp; Security Europe AB</b>	Jungmansgatan 12, 21119 Malmö, Tel. +46 40 697 7000, Fax +46 40 697 7099, <a href="http://www.panasonic-fire-security.com">www.panasonic-fire-security.com</a>
► Poland	<b>Panasonic Electric Works Polska sp. z o.o.</b>	ul. Wotoska 9A, 02-583 Warszawa, Tel. +48 42 230 9633, <a href="http://www.panasonic-electric-works.pl">www.panasonic-electric-works.pl</a>
► Spain	<b>Panasonic Electric Works España S.A.</b>	Barajas Park, San Severo 20, 28042 Madrid, Tel. +34 913293875, Fax +34 913292976, <a href="http://www.panasonic-electric-works.es">www.panasonic-electric-works.es</a>
► Switzerland	<b>Panasonic Electric Works Schweiz AG</b>	Grundstrasse 8, 6343 Rotkreuz, Tel. +41 (0) 41 7997050, Fax +41 (0) 41 7997055, <a href="http://www.panasonic-electric-works.ch">www.panasonic-electric-works.ch</a>
► United Kingdom	<b>Panasonic Electric Works UK Ltd.</b>	Sunrise Parkway, Linford Wood, Milton Keynes, MK14 6LF, Tel. +44 (0) 1908 231555, Fax +44 (0) 1908 231599, <a href="http://www.panasonic-electric-works.co.uk">www.panasonic-electric-works.co.uk</a>
North & South America		
► USA	<b>Panasonic Industrial Devices Sales Company of America</b>	Two Riverfront Plaza, 7th Floor, Newark, NJ 07102-5490, Tel. 1-8003-442-112, <a href="http://www.pewa.panasonic.com">www.pewa.panasonic.com</a>
Asia Pacific/China/Japan		
► China	<b>Panasonic Electric Works Sales (China) Co. Ltd.</b>	Tower C 3rd Floor, Office Park, NO.5 Jinghua South Street, Chaoyang District, Beijing 100020, Tel. +86-10-5925-5988, Fax +86-10-5925-5980
► Hong Kong	<b>Panasonic Industrial Devices Sales (HK) Co., Ltd.</b>	Suite 301, 3/F, Chinachem Golden Plaza, 77 Mody Road, TST East, Kowloon, Hong Kong, Tel. +852-2529-3956, Fax +852-2528-6991
► Japan	<b>Panasonic Corporation</b>	1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8501, Japan, Tel. +81-6-6908-1121, <a href="http://www.panasonic.net">www.panasonic.net</a>
► Singapore	<b>Panasonic Industrial Devices Automation Controls Sales Asia Pacific</b>	No.3 Bedok South Road, Singapore 469269, Tel. +65-6299-9181, Fax +65-6390-3953