

Servo Drives

Quick Start Guide

Velocity control
(MINAS A5/A6F)



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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 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 \(MINAS A5N/A6N\)](#)
[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.

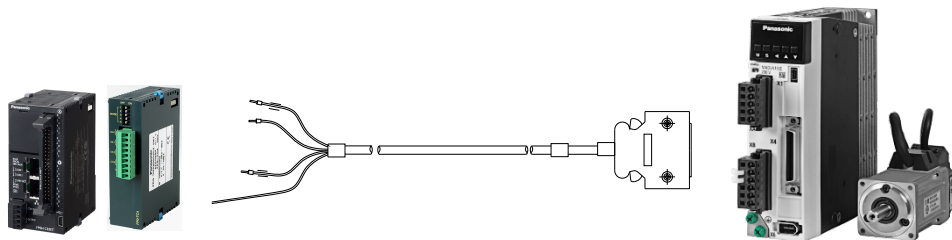
- [PC configuration software PANATERM](#)

2 Functional overview

Velocity control is a control mode to change the motor speed, for example to ensure certain speeds for a conveyor belt speed or a ball screw-driven machine. The speed is generally controlled by analog signals (e.g. 0 to 10V) at the analog input of the servo driver.

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.

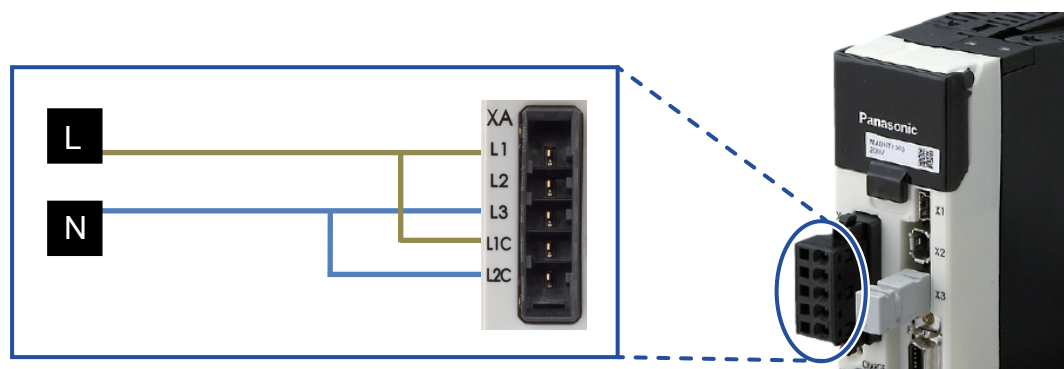
Do not forget to meet the specifications indicated in the hardware manual for each of the devices being wired. If any specifications in the manual conflict with the information in this document, the manufacturer's manual takes preference.

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)

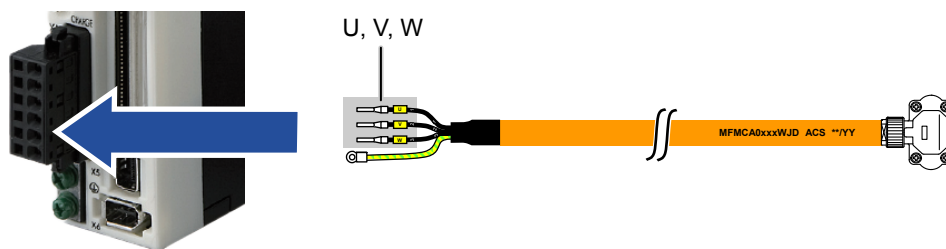
Connect the power supply cable to the XA connector. For a 1-phase power supply of 230V, connect a 2-wire cable to the servo driver as illustrated. The L2 pin is not used in 1-phase mode.



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)

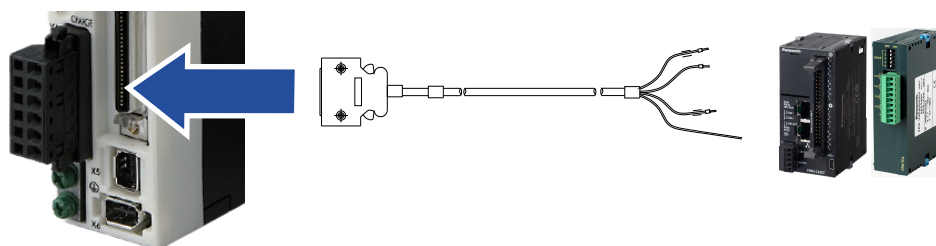
Connect the encoder cable to the X6 connector.



Wiring of the X6 connector for the encoder connection

X4 connector (I/O connector)

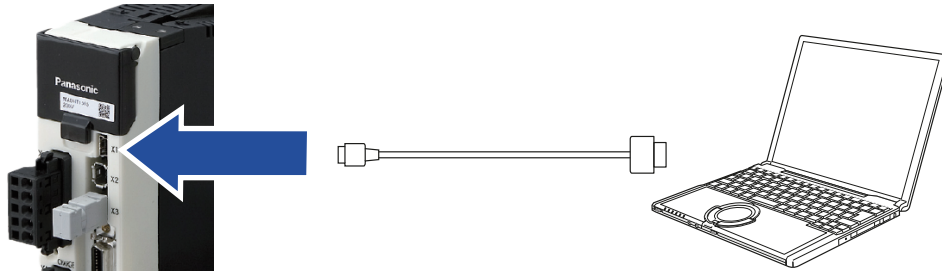
Connect the connection cable to the X4 connector to the analog output unit.



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

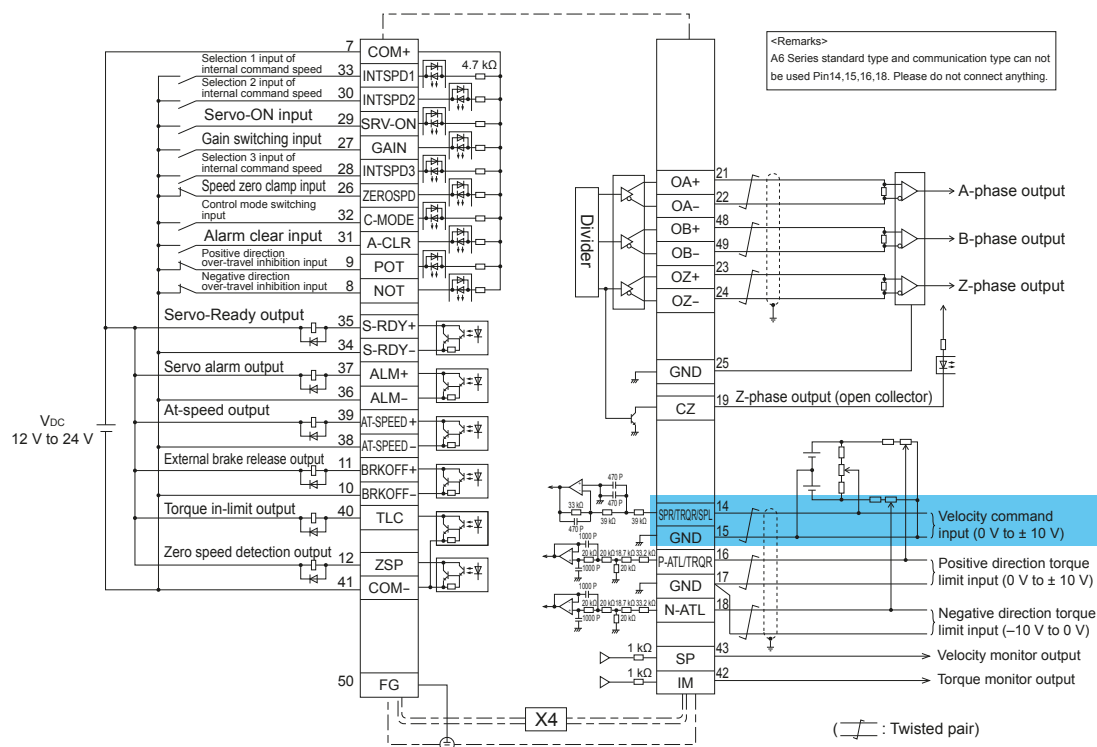
3.3 Signal inputs and outputs of the X4 connector

For velocity 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 +/-10V. The analog input is highlighted in the wiring diagram.

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

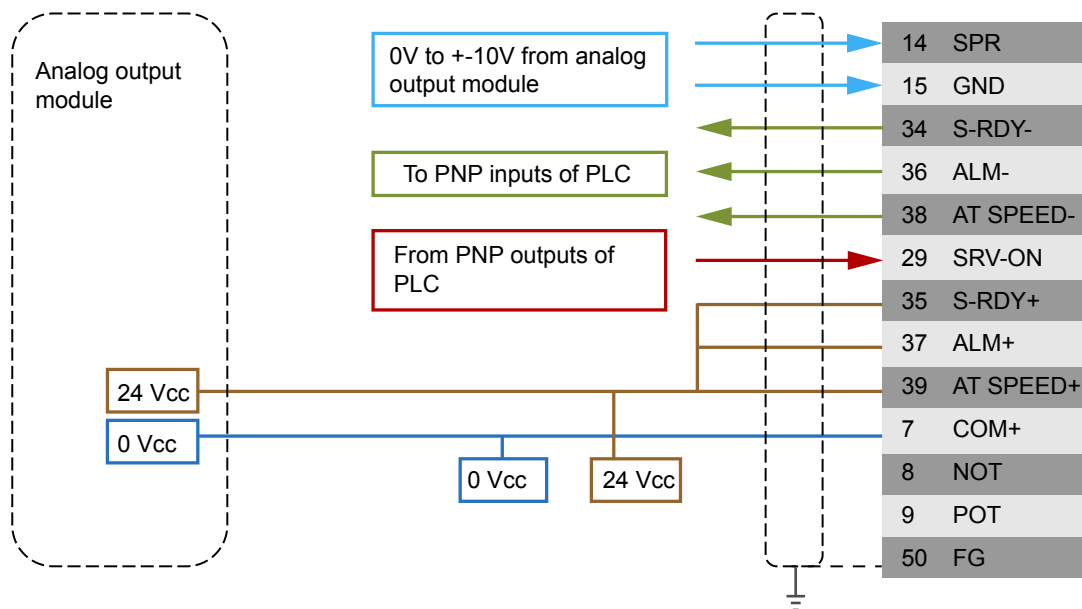
- SRV-ON (pin 29)
Servo-on input to energize the servo motor.
- COM+ (pin 7)
Common input for the power supply of the control signals.
- SPR/TRQR/SPL (pins 14–15)
Analog input for velocity control.
- S-RDY (pins 34–35)
Servo-ready output to indicate the ready state of the driver.
- ALM (pins 36–37)
Servo-alarm output

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

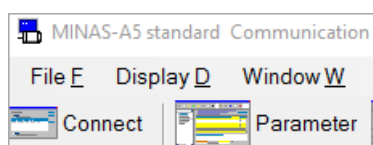


4 Make parameter settings in PANATERM

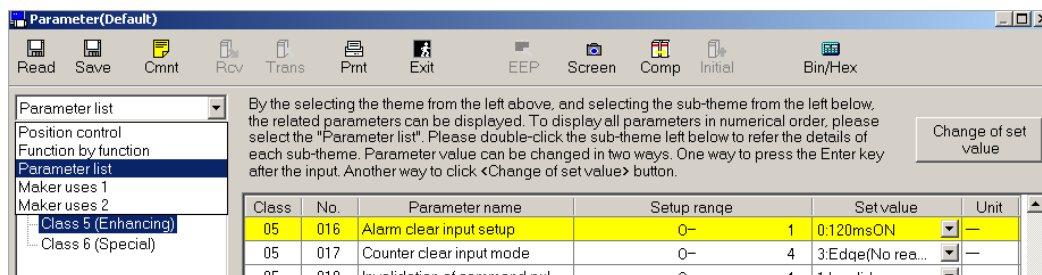
Use the PC configuration software PANATERM to configure the MINAS servo driver.

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
Pr3.00	0 to 3	Speed control mode
Pr3.02	10 to 2000 [r/min/V]	Input gain of speed command
Pr3.03	0 to 1	Inversion of speed command input
Pr3.12	0 to 10000 [ms/(1000r/min)]	Acceleration time
Pr3.13	0 to 10000 [ms/(1000r/min)]	Deceleration time
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
Pr4.24	0.00 to 10.0 [V]	Analog input 1 overvoltage

4.2 Pr0.01 (Control mode)

PANATERM parameter: "Control mode setting"

Setting range: 0 to 6

The default value is 0: Position control

Select 1: Velocity control

4.3 Pr3.00 (Speed control mode)

PANATERM parameter: "Inside/outside speed setting switching"

Setting range: 0 to 3

The default value is 0: Analog speed input (SPR)

Select analog speed input (SPR) or speed control by internal speed command.

Select 0: Analog speed input (SPR).

4.4 Pr3.02 (Input gain of speed command)

PANATERM parameter: "Speed command input gain"

Setting range: 10 to 2000 [r/min/V]

The default value is 500 [r/min/V].

Set a gain factor for the motor speed based on the voltage applied at the speed command input SPR. For example, a setting value of 500 r/min per 1V results in a speed of 3000r/min for an input voltage of 6V.

4.5 Pr3.03 (Inversion of speed command input)

PANATERM parameter: "Speed command input inversion"

Setting range: 0 to 1

0: No inversion, positive rotation direction for positive voltage

1: Inversion, positive rotation direction for negative voltage

The default value is 1.

Specify the polarity of the voltage applied to the analog input of the driver.

4.6 Pr3.12 (Acceleration time)

PANATERM parameter: "Acceleration time setting"

Setting range: 0 to 10000 [ms/(1000r/min)]

The default value is 0 [ms/(1000r/min)].

Specify the time from the initial speed to the target speed (acceleration time). For example, a setting value of 10 results in an acceleration time of 10ms for a target speed of 1000r/min.

4.7 Pr3.13 (Deceleration time)

PANATERM parameter: "Deceleration time setting"

Setting range: 0 to 10000 [ms/(1000r/min)]

The default value is 0 [ms/(1000r/min)].

Specify the time from the target speed to the initial speed (deceleration time). For example, a setting value of 10 results in a deceleration time of 10ms.

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 Pr4.24 (Analog input 1 overvoltage)

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

Setting range: 0.00 to 10.0 [V]

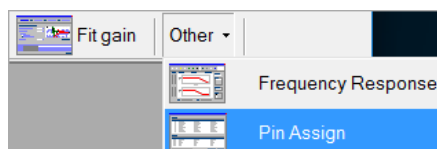
The default value is 0.0V.

Specify the overvoltage of analog input 1.

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.

 A screenshot of the 'Pin Assign' dialog box. It has a title bar 'Pin Assign' and a close button. Below the title bar is an 'Info' section with a question mark icon. The main area is divided into two sections: 'Input' and 'Output'. Each section contains a table with four columns: 'Pin number', 'Position / Full-closed control', 'Velocity control', and 'Torque control'. In the 'Input' table, the row for pin 33 (SI10) is highlighted in blue. In the 'Output' table, the row for pins 34/35 (SO2) is highlighted in blue. At the bottom right, there are 'Apply' and 'Close' buttons.

Pin number	Position / Full-closed control	Velocity control	Torque control
09 (SI2)	Invalid	Invalid	Invalid
26 (SI3)	VS-SEL1_ConnectA	ZEROSPD_ConnectB	ZEROSPD_ConnectB
27 (SI4)	GAIN_ConnectA	GAIN_ConnectA	GAIN_ConnectA
28 (SI5)	DIV1_ConnectA	INTSPD3_ConnectA	Invalid
29 (SI6)	SRV-ON_ConnectA	SRV-ON_ConnectA	SRV-ON_ConnectA
30 (SI7)	CL_ConnectA	INTSPD2_ConnectA	Invalid
31 (SI8)	A-CLR_ConnectA	A-CLR_ConnectA	A-CLR_ConnectA
32 (SI9)	C-MODE_ConnectA	C-MODE_ConnectA	C-MODE_ConnectA
33 (SI10)	STB_ConnectA	INTSPD1_ConnectA	Invalid

Pin number	Position / Full-closed control	Velocity control	Torque control
10/11 (SO1)	BRK-OFF	BRK-OFF	BRK-OFF
12/41 (SO5)	ZSP	ZSP	ZSP
34/35 (SO2)	S-RDY	S-RDY	S-RDY
36/37 (SO3)	ALM	ALM	ALM
38/39 (SO4)	INP	AT-SPEED	AT-SPEED
40/41 (SO6)	TLC	TLC	TLC

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

+49 (0) 8945354-2750

7 Record of changes

QS3000_V1.0_EN, 2019.07

First edition



North America

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Panasonic Electric Works

Please contact our Global Sales Companies in:

Europe		
► Headquarters	Panasonic Electric Works Europe AG	Robert-Koch-Straße 100, 85521 Ottobrunn, Tel. +49 89 45354-1000, Fax +49 89 45354-2111, www.panasonic-electric-works.com
► Austria	Panasonic Electric Works Austria GmbH	Josef Madersperger Str. 2, 2362 Biedermannsdorf, Tel. +43 (0) 2236-26846, Fax +43 (0) 2236-46133 www.panasonic-electric-works.at
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► Benelux	Panasonic Electric Works Sales Western Europe B.V.	De Rijn 4, (Postbus 211), 5684 PJ Best, (5680 AE Best), Netherlands, Tel. +31 (0) 499 372727, Fax +31 (0) 499 372185, www.panasonic-electric-works.nl
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► France	Panasonic Electric Works Sales Western Europe B.V.	Succursale française, 10, rue des petits ruisseaux, 91370 Verrières Le Buisson, Tél. +33 (0) 1 6013 5757, Fax +33 (0) 1 6013 5758, www.panasonic-electric-works.fr
► Germany	Panasonic Electric Works Europe AG	Robert-Koch-Straße 100, 85521 Ottobrunn, Tel. +49 89 45354-1000, Fax +49 89 45354-2111, www.panasonic-electric-works.de
► Hungary	Panasonic Electric Works Europe AG	Magyarországi Közvetlen Kereskedelmi Képviselet, 1117 Budapest, Neumann János u. 1., Tel. +43 2236 26846-25, Mobile: +36 20 264 9896, Fax +43 2236 46133, www.panasonic-electric-works.hu
► Ireland	Panasonic Electric Works UK Ltd.	Irish Branch Office, Dublin, Tel. +353 (0) 14600969, Fax +353 (0) 14601131, www.panasonic-electric-works.co.uk
► Italy	Panasonic Industry Italia srl	Via del Commercio 3-5 (Z.I. Ferlina), 37012 Bussolengo (VR), Tel. +39 0456752711, Fax +39 0456700444, www.panasonic-electric-works.it
► Nordic Countries	Panasonic Electric Works Europe AG	Filial Nordic, Knarrarnäsgatan 15, 164 40 Kista, Sweden, Tel. +46 859476680, Fax +46 859476690, www.panasonic-electric-works.se
	Panasonic Fire & Security Europe AB	Jungmansgatan 12, 21119 Malmö, Tel. +46 40 697 7000, Fax +46 40 697 7099, www.panasonic-fire-security.com
► Poland	Panasonic Electric Works Polska sp. z o.o	ul. Wotoska 9A, 02-583 Warszawa, Tel. +48 42 230 9633, www.panasonic-electric-works.pl
► Spain	Panasonic Electric Works España S.A.	Barajas Park, San Severo 20, 28042 Madrid, Tel. +34 913293875, Fax +34 913292976, www.panasonic-electric-works.es
► Switzerland	Panasonic Electric Works Schweiz AG	Grundstrasse 8, 6343 Rotkreuz, Tel. +41 (0) 41 7997050, Fax +41 (0) 41 7997055, www.panasonic-electric-works.ch
► United Kingdom	Panasonic Electric Works UK Ltd.	Sunrise Parkway, Linford Wood, Milton Keynes, MK14 6LF, Tel. +44 (0) 1908 231555, Fax +44 (0) 1908 231599, www.panasonic-electric-works.co.uk
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