Panasonic

Programmable Controller

FP SERIES FP0 RTD Unit

Technical Manual

BEFORE BEGINNING

Liability and Copyright for the Hardware

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.

Panasonic Electric Works Europe AG 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 Panasonic Electric Works Europe AG 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.

We invite your comments on this manual. Please email us at:
tech-doc@eu.pewg.panasonic.com.

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

LIMITED WARRANTY

If physical defects caused by distribution are found, Panasonic Electric Works Europe AG will replace/repair the product free of charge. Exceptions include:

- When physical defects are due to different usage/treatment of the product other than described in the manual.
- When physical defects are due to defective equipment other than the distributed product.
- When physical defects are due to modifications/repairs by someone other than Panasonic Electric Works Europe AG.
- When physical defects are due to natural disasters.

©MS-DOS and Windows are registered trademarks of Microsoft Corporation.

©IBM Personal Computer AT is registered trademark of the International Business Machines Corporation.

Important Symbols

One or more of the following symbols may be used in this manual:

◆ **WARNING**

The warning triangle indicates especially important safety instructions. If they are not adhered to, the results could be:

- **fatal or critical injury and/or**
- **significant damage to instruments or their contents, e.g. data**

◆ **NOTE**

Contains important additional information.

◆ **EXAMPLE**

Contains an illustrative example of the previous text section.

◆ **PROCEDURE**

Indicates that a step-by-step procedure follows.

◆ **REFERENCE**

Indicates where you can find additional information on the subject at hand.

◆ **CAUTION**

Indicates that you should proceed with caution.

◆ **KEY POINTS**

Summarizes key points in a concise manner.

◆ **SHORTCUTS**

Provides helpful keyboard shortcuts.

◆ **EXPLANATION**

Provides brief explanation of a function, e.g. why or when you should use it.

Table of Contents

Precautions Before Use

Accuracy

When extremely sensitive temperature data is required, use the temperature data obtained 15 minutes after turning ON the FP0 RTD unit. (The temperature data obtained in the first 15 minutes is, however, within the total accuracy range.)

A rapid temperature change in the FP0 RTD unit might change the temperature data temporarily.

A draft (air) created e.g. by a cooling fan built into the control panel and blowing on the FP0 RTD unit will lower accuracy. Avoid any kind of draft.

Programming

Between power ON and the first valid conversion data, the digital value will be 8191 or 16383. When programming, be sure not to use the data obtained during this period.

When the RTD is broken, the digital value will change to 8191 or 16383. When programming avoid any risks resulting from a broken RTD. A broken RTD needs to be replaced.

1 Unit Outline

1.1 Functions

RTD input unit for the FP0/FPΣ control unit.

The temperature data obtained using the RTD (Resistance Temperature Detector) is converted to the digital value to be read into the FP0/ FPΣ control unit.

Available RTD types

Pt100 (to IEC751), Pt1000 (to IEC751), Ni1000 (to DIN43760), and Resistor.

Temperature measurement ranges available

RTD Type	°C		°F	
	Resolution 0.1K	Resolution 0.01K	Resolution 0.1°F	Resolution 0.01°F
Pt100	-200.0 … +500.0	-80.00 … +80.00	-328.0 … +800.0	-80.00 … +80.00
Pt1000	-200.0 … +300.0	-80.00 … +80.00	-328.0 … +572.0	-80.00 … +80.00
Ni1000	-30.0 … +150.0	-30.00 … +80.00	-22.0 … +302.0	-22.00 … +80.00

Resistor measurement ranges available

RTD Type	Ω	
	Resolution 1 Ω	Resolution 0.1 Ω
Resistor	20 … +2200	20.0 … 1630.0

Conversion to degrees Celsius or degrees Fahrenheit possible

The temperature data measured using the sensor is converted to degrees Celsius or degrees Fahrenheit inside the FP0 RTD unit.

Broken-RTD detector attached

A broken RTD can be detected.

1.2 Product Number

Product name	RTD input points	Product number	Part number
FP0 RTD unit	6 points	FP0RTD6	AFP0430

1.3 Expansion Limit

Number

Up to 3 expansion units can be connected to the control unit.

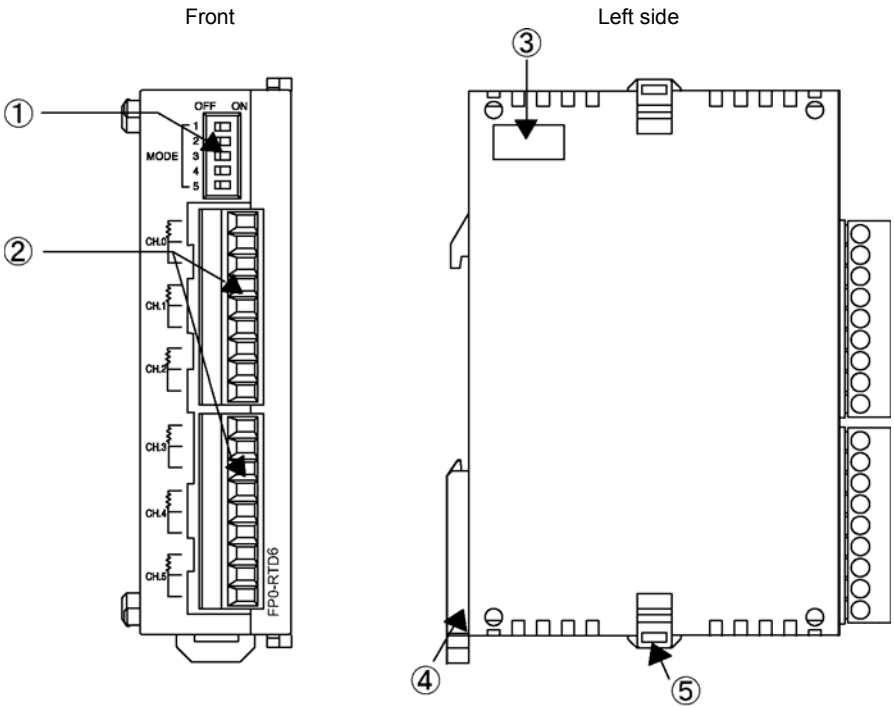
Position

Always install the FP0 RTD unit the farthest to the right of the control unit.

◆ **REFERENCE**

For further information, see page 14, I/O Allocation and Sample Programs.

1.4 Part Names and Functions



1. Input range setting switch

DIP switches to change between the input ranges (RTD types).

◆ **REFERENCE**

For further information, see page 4, Input Range Setting Switch

2. RTD input terminal block (9-pin)

Manufactured by Phoenix Contact Co. Model No: MC1.5/9-ST-3.5 (Product No.: 1840434).

Suitable wires

Size	Nominal cross-sectional area
AWG# 28 to 16	0.08 mm^2 to 1.25mm^2

◆ **REFERENCE**

FP0 Hardware Manual "Wiring the Terminal Type"
FPΣ User's Manual "Wiring of Terminal Block Type"

3. Expansion connector

Connects the expansion unit to the internal circuit of the control unit.

◆ **REFERENCE**

FP0 Hardware Manual: “Expansion I/O Units”
FPΣ User’s Manual: “Expansion”

4. DIN rail attachment lever (one-touch hook)

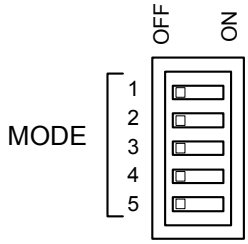
The unit can be installed to the DIN rail by one-touch operation. The one-touch hook is also used for installing the unit to the FP0 Slim Type Mounting Plate (AFP0803).

5. Expansion hook

Used to secure expansion units.

2 Input Range Setting Switch

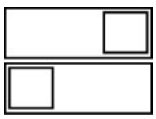
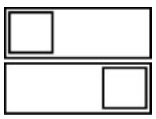
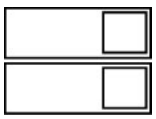
Input range setting switch

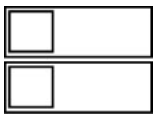
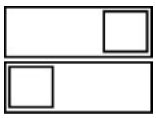
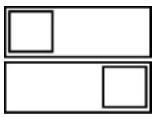
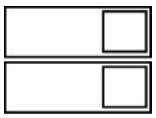


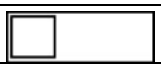
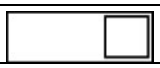
◆ **NOTE**

The following switch settings are read once when the control unit is turned ON. Changes will not be reflected if they are performed while the control unit is turned ON.

Input range setting switch

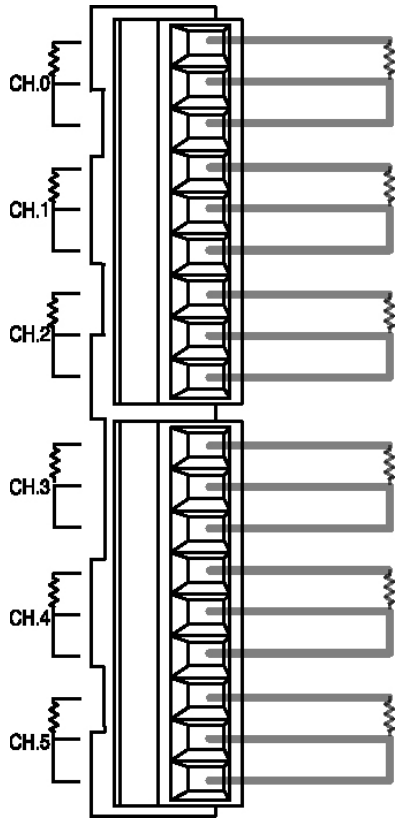
	OFF ON	OFF ON	OFF ON	OFF ON
MODE SW 1 2				
CH0, CH1, CH2	Pt100	Pt1000	Ni1000	Resistor

	OFF ON	OFF ON	OFF ON	OFF ON
MODE SW 3 4				
CH3, CH4, CH5	Pt100	Pt1000	Ni1000	Resistor

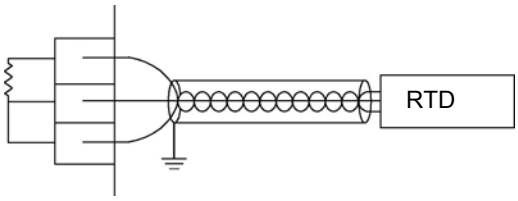
	OFF ON	OFF ON
MODE SW 5		
Sampling cycle	0.1s	1s

3 Wiring

Wiring method



Input line wiring



◆ **NOTE**

Keep a distance of more than 100mm between the input line and the power line/high-voltage line.

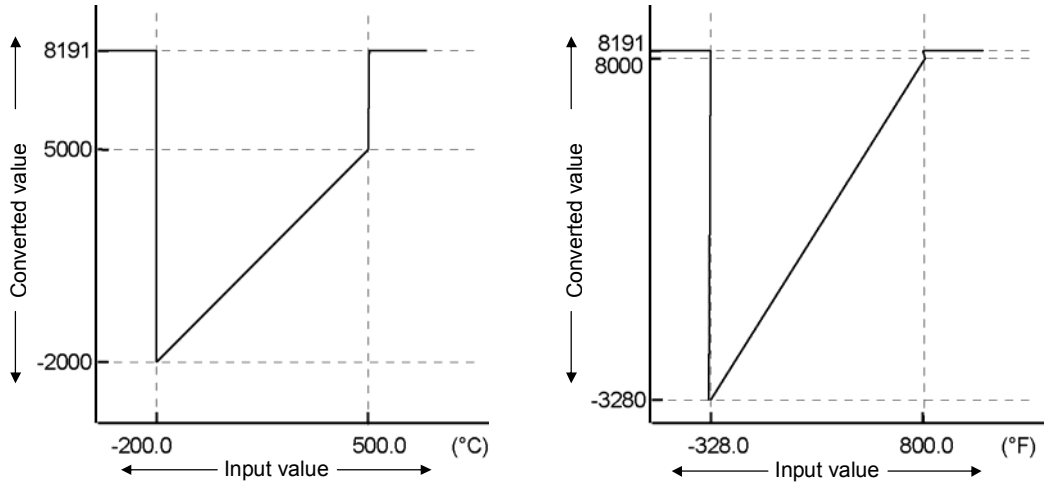
4 Conversion Characteristics

◆ **NOTE**

The measurement range available for degrees Celsius is larger than for degrees Fahrenheit as the digital value (temperature value displayed) for °F is higher than the one for °C.

4.1 Pt100

Input range:-200.0°C to 500.0°C/-328.0°F to 800.0°F, resolution: 0.1K/0.1°F



Correspondence table for A/D conversion values

Analog input value (°C)	Digital output value
-200.0	-2000
+500.0	+5000

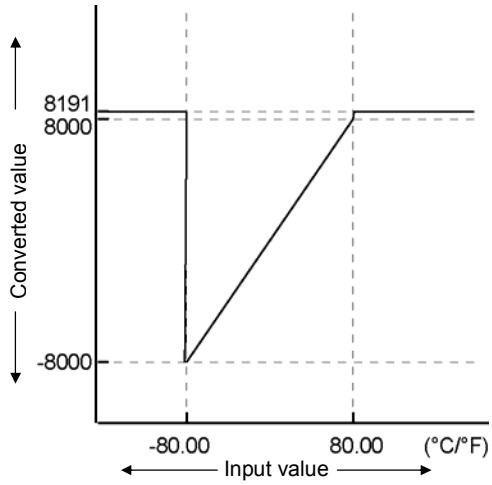
Analog input value (°F)	Digital output value
-328.0	-3280
+800.0	+8000

Processing if the input value range is exceeded

Analog input value (°C)	Digital output value
-200.1 or less	8191
+500.1 or more	
RTD broken	

Analog input value (°F)	Digital output value
-328.1 or less	8191
+800.1 or more	
RTD broken	

Input range:-80.00°C to 80.00°C/-80.00°F to 80.00°F, resolution: 0.01K/0.01°F



Correspondence table for A/D conversion values

Analog input value (°C)	Digital output value
-80.00	-8000
+80.00	+8000

Analog input value (°F)	Digital output value
-80.00	-8000
+80.00	+8000

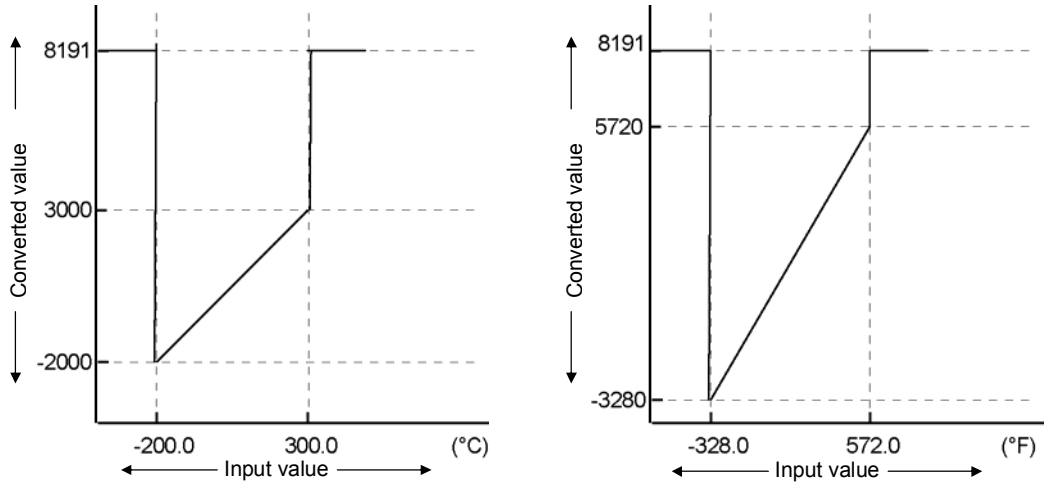
Processing if the input value range is exceeded

Analog input value (°C)	Digital output value
-80.01 or less	8191
+80.01 or more	
RTD broken	

Analog input value (°F)	Digital output value
-80.01 or less	8191
+80.01 or more	
RTD broken	

4.2 Pt1000

Input range: -200.0°C to 300.0°C/-328.0°F to 572.0°F, resolution: 0.1K/0.1°F



Correspondence table for A/D conversion values

Analog input value (°C)	Digital output value
-200.0	-2000
+300.0	+3000

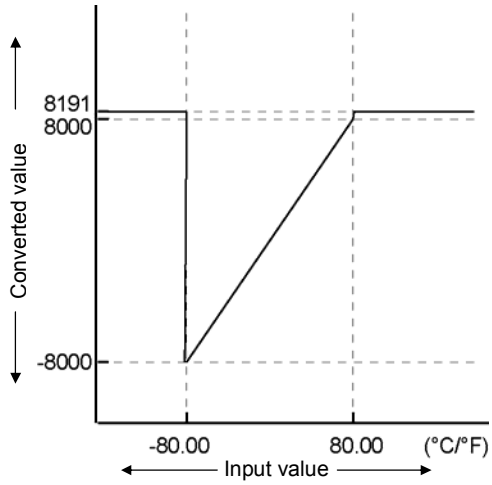
Analog input value (°F)	Digital output value
-328.0	-3280
+572.0	+5720

Processing if the input value range is exceeded

Analog input value (°C)	Digital output value
-200.1 or less	8191
+300.1 or more	
RTD broken	

Analog input value (°F)	Digital output value
-328.1 or less	8191
+572.1 or more	
RTD broken	

Input range: -80.00°C to 80.00°C/-80.00°F to 80.00°F, resolution: 0.01K/0.01°F



Correspondence table for A/D conversion values

Analog input value (°C)	Digital output value
-80.00	-8000
+80.00	+8000

Analog input value (°F)	Digital output value
-80.00	-8000
+80.00	+8000

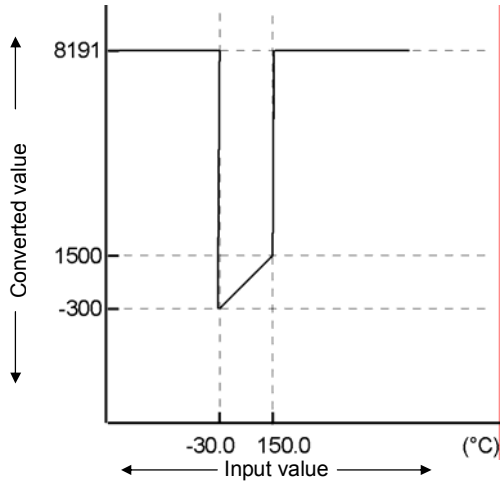
Processing if the input value range is exceeded

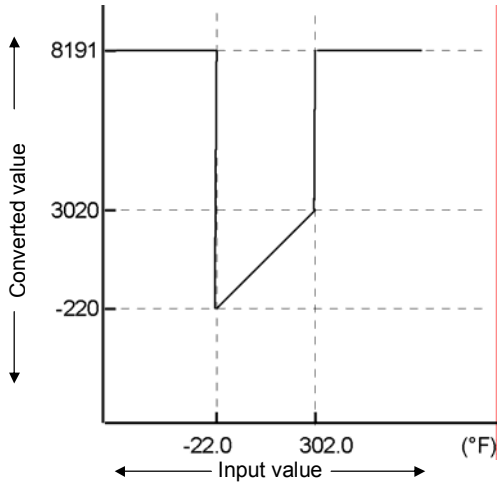
Analog input value (°C)	Digital output value
-80.01 or less	8191
+80.01 or more	
RTD broken	

Analog input value (°F)	Digital output value
-80.01 or less	8191
+80.01 or more	
RTD broken	

4.3 Ni1000

Input range: -30.0°C to 150.0°C/-22.0°F to 302.0°F), resolution: 0.1K/0.1°F





Correspondence table for A/D conversion values

Analog input value (°C)	Digital output value
-30.0	-300
+150.0	+1500

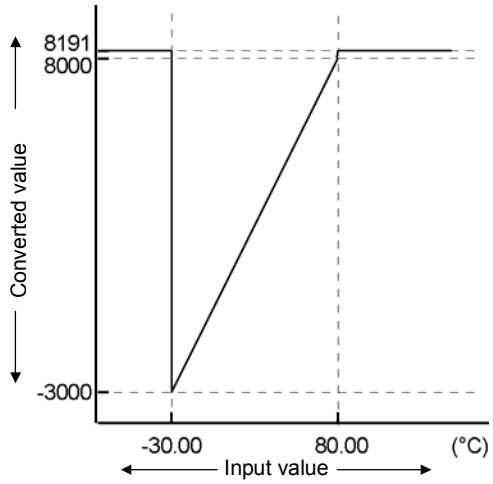
Analog input value (°F)	Digital output value
-22.0	-220
+302.0	+3020

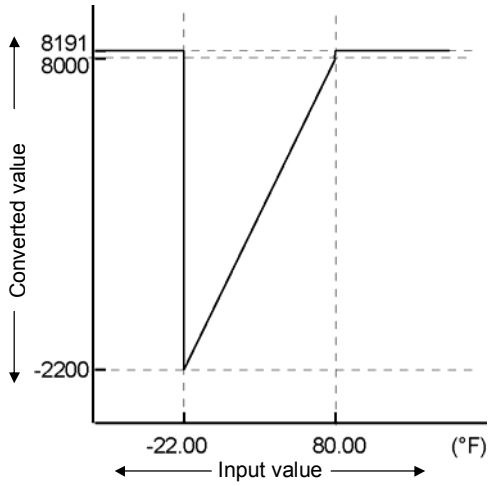
Processing if the input value range is exceeded

Analog input value (°C)	Digital output value
-30.1 or less	8191
+150.1 or more	
RTD broken	

Analog input value (°F)	Digital output value
-22.1 or less	8191
+302.1 or more	
RTD broken	

Input range: -30.00°C to 80.00°C/-22.00°F to 80.00°F, resolution: 0.01K/0.01°F





Correspondence table for A/D conversion values

Analog input value (°C)	Digital output value
-30.00	-3000
+80.00	+8000

Analog input value (°F)	Digital output value
-22.00	-2200
+80.00	+8000

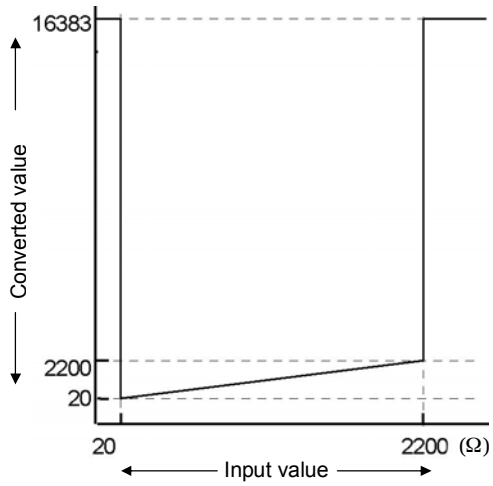
Processing if the input value range is exceeded

Analog input value (°C)	Digital output value
-30.01 or less	8191
+80.01 or more	
RTD broken	

Analog input value (°F)	Digital output value
-22.01 or less	8191
+80.01 or more	
RTD broken	

4.4 Resistor

Input range: 20Ω to 2200Ω, resolution: 1Ω



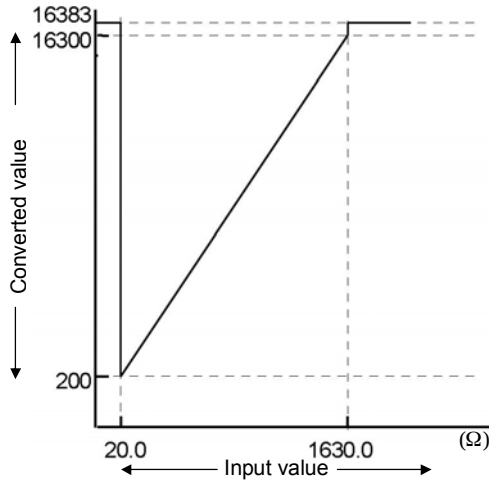
Correspondence table for A/D conversion values

Analog input value (Ω)	Digital output value
+20	+20
+2200	+2200

Processing if the input value range is exceeded

Analog input value (Ω)	Digital output value
+19 or less	16383
+2201 or more	
Resistor broken	

Input range: 20.0Ω to 163.0Ω, resolution: 0.1Ω



Correspondence table for A/D conversion values

Analog input value (Ω)	Digital output value
+20.0	+200
+1630.0	+16300

Processing if the input value range is exceeded

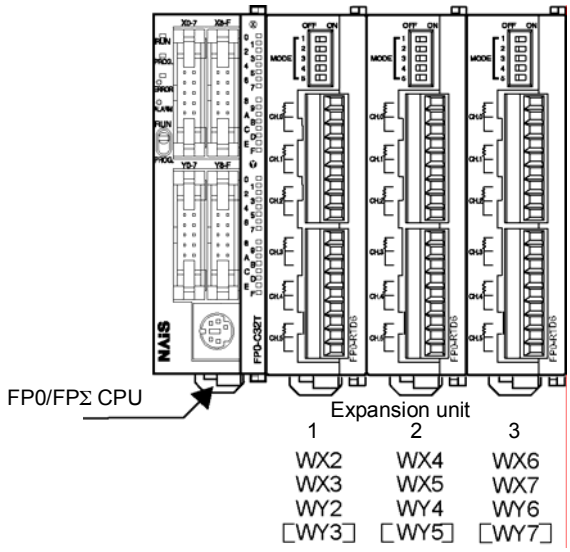
Analog input value (Ω)	Digital output value
+19.9 or less	16383
+1630.1 or more	
Resistor broken	

5 I/O Allocation and Sample Programs

5.1 I/O Numbers

Up to three expansion units including the FP0 RTD unit can be connected to the CPU (2 words [2x16 bits] are assigned to each WX and WY).

I/O Numbers



WY3, WY5, and WY7 are allocated but not used.

◆ **NOTES**

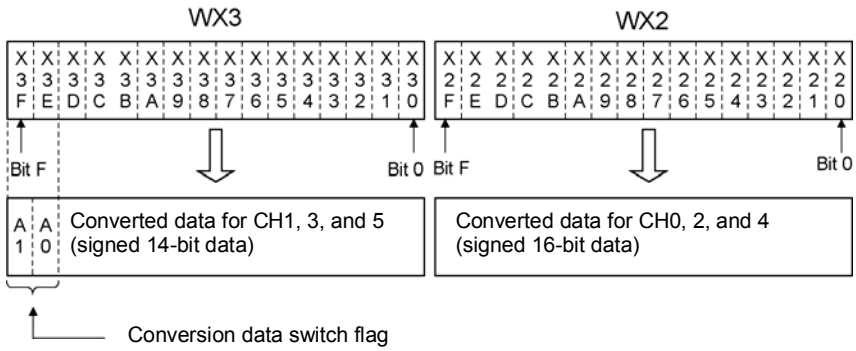
- **Always install the FP0 RTD unit the farthest to the right of the control unit.**
- **With 3 expansion units, one of which being the FP0 RTD unit, mount the FP0 RTD unit in the place of expansion unit no. 3.**
- **With 3 expansion units, two of which being FP0 RTD units, mount the FP0 RTD units in the places of expansion units no. 2 and no. 3.**

With the setup illustrated above, the I/O data is allocated as in the table below.

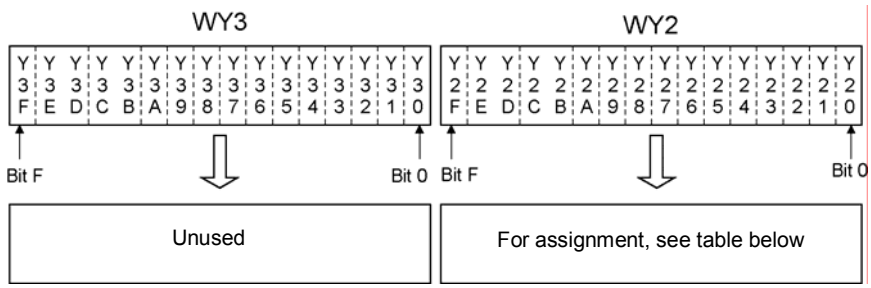
		Expansion Unit No.1	Expansion Unit No.2	Expansion Unit No.3
RTD input channel	**CH0, 2, 4**	WX2	WX4	WX6
	CH1, 3, 5	WX3	WX5	WX7
RTD output		WY2	WY4	WY6

◆ **EXAMPLE**

The converted digital data is assigned to WX2 and WX3 when the FP0 RTD unit is installed as expansion unit no. 1.



A1	A0	WX3	WX2
0	0	CH1 data	CH0 data
0	1	CH3 data	CH2 data
1	0	CH5 data	CH4 data



Assignment of outputs Y20…Y27

	Off	On
Y20	°C	°F
Y21	CH0: 0.1°C/°F	CH0: 0.01°C/°F
Y22	CH1: 0.1°C/°F	CH1: 0.01°C/°F
Y23	CH2: 0.1°C/°F	CH2: 0.01°C/°F
Y24	CH3: 0.1°C/°F	CH3: 0.01°C/°F
Y25	CH4: 0.1°C/°F	CH4: 0.01°C/°F
Y26	CH5: 0.1°C/°F	CH5: 0.01°C/°F
Y27	Always off	Always off
Y28…Y2F	Unused	

5.2 Programming with FPWIN Pro

Control FPWIN Pro provides the convenient function block “Read_RTD6” to read data from the input channels. It can be used by the FP0 RTD unit for all RTD types (Pt100, Pt1000, Ni1000, and Resistor).

You may download it free of charge from Panasonic Electric Works Europe AG’s Web site at: www.panasonic-electric-works.com.

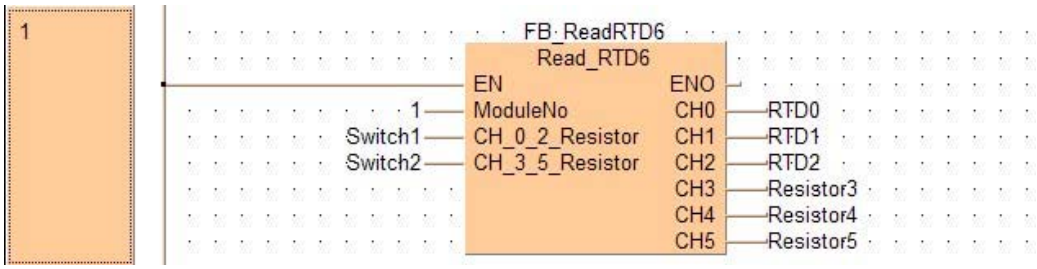


Figure 1: Function block Read_RTD6

◆ **NOTES**

Select a data range with or without sign for Switch1 and Switch2:

Switch1,2 = FALSE: Pt100, Pt1000, Ni1000 (with sign)
Switch1,2 = TRUE: Resistor (without sign)

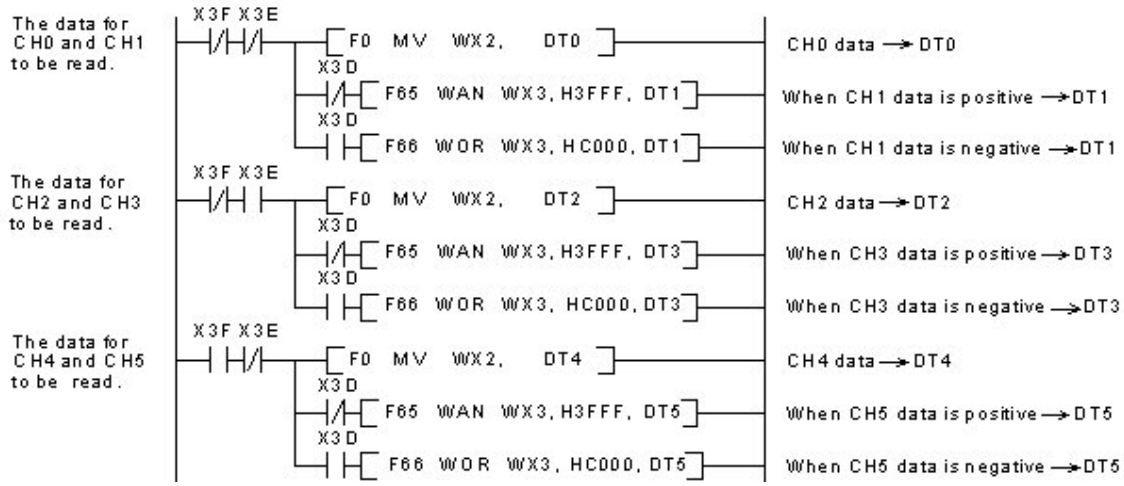
5.3 Programming with FPWIN GR

5.3.1 RTD Types Pt100, Pt1000, Ni1000

Ladder program to read data from input channels

This program shows you how to store temperature data for CH0 to CH5 of the FP0 RTD unit installed as expansion unit no.1 in data registers DT0 to DT5.

◆ **EXAMPLE**



◆ **REFERENCE**

For further information, see page 14, I/O Allocation and Sample Programs.

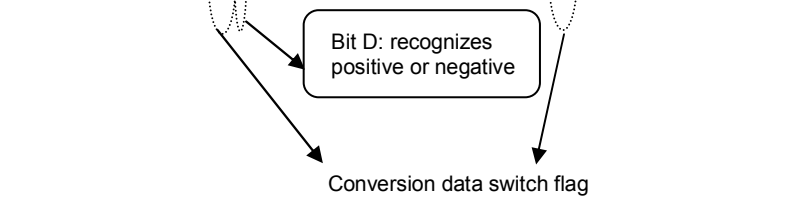
Conversion data switch flag

When transferring the data from the FP0 RTD unit to the control unit, it is converted to 32-bit data including the channel information. Data for WX2 can be used as is, but the following procedure is required for WX3 data since its higher 2 bits are used as a conversion data switch flag.

◆ **PROCEDURE**

1. **When temperature data is negative, the data is automatically represented as two's complement of WX2 and WX3: bit F of WX2 and bit D of WX3 will be "1".**
2. **The higher 2 bits of WX3 are used as conversion data switch flag. After saving the channel information, the conversion data switch flag needs to be masked. Mask the data with "00" when the conversion data is positive and with "11" when it is negative.**

Data for CH3	WX3	→	Data after masking
1	0100000000000001	→	0000000000000001
-1	0111111111111111	→	1111111111111111



◆ **NOTE**

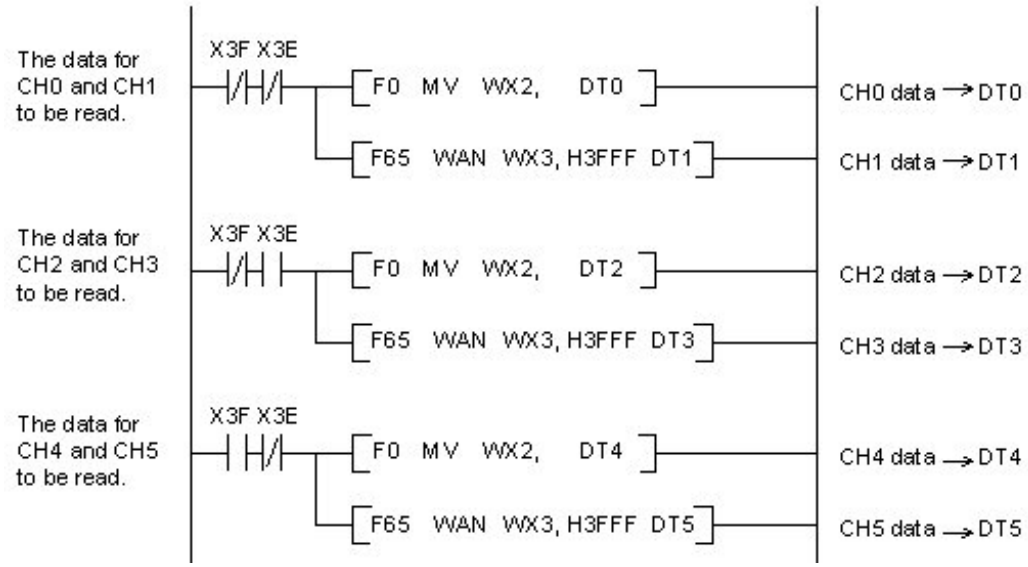
X3D, X3E, X3F, WX2 and WX3 may be different, depending on where the FP0 RTD unit is installed.

5.3.2 RTD Type Resistor

Ladder program to read data from input channels

This program shows you how to store temperature data for CH0 to CH5 of the FP0 RTD unit installed as expansion unit no.1 in data registers DT0 to DT5.

◆ **EXAMPLE**



◆ **REFERENCE**

For further information, see page 14, I/O Allocation and Sample Programs.

Conversion data switch flag

When transferring the data from the FP0 RTD unit to the control unit, it is converted to 32-bit data including the channel information. Data for WX2 can be used as is, but the following procedure is required for WX3 data since its higher 2 bits are used as a conversion data switch flag.

◆ **PROCEDURE**

1. **As resistor data is only positive, handle the complete data of bit 0 to bit F for WX2 and bit 0 to bit D for WX3 as the resistance value.**
2. **The higher 2 bits for WX3 are used as conversion data switch flag. After saving the channel information, the conversion data switch flag needs to be masked. Mask the data using "00" as the conversion data is positive.**

Data for CH3	WX3	→	Data after masking
1	0100000000000001	→	0000000000000001

Conversion data switch flag

◆ **NOTE**

X3E, X3F, WX2 and WX3 may be different, depending on where the FP0 RTD unit is installed.

6 When an Error Occurs

6.1 Troubleshooting

◆ **PROCEDURE**

1. **Check whether the input signal lines are connected properly.**

   When the RTD is not connected properly or broken, K8191 is displayed for RTD types Pt100, Pt1000, and Ni1000. K16383 is displayed for the RTD type Resistor.

2. **Check whether the input range setting switch is set properly.**

   It specifies the allowed temperature range and the RTD type.

3. **Use the programs described above.**

◆ **REFERENCE**

For further information, see page 4, Input Range Setting Switch and page 14, I/O Allocation and Sample Programs.

6.2 Digital Value When Out Of Measuring Range

When the input of the FP0 RTD unit is out of the measuring range, the following digital values are displayed:

	Pt100 [°C/°F]		Pt1000 [°C/°F]		Ni1000 [°C/°F]		Resistor [Ω]	
Resolution [K/°F]	**0.1**	**0.01**	**0.1**	**0.01**	**0.1**	**0.01**	**1**	**0.1**
Temperature measured > upper-limit	8191						16383	
Temperature measured < lower-limit								
RTD connected improperly or broken								

7 Specifications

General specifications

Parameter	Specifications
Increase of current consumption in control unit	25mA or less (24V DC)
Operating temperature	0°C to +55°C
Storage temperature	-20°C to +70°C
Operating humidity	30%RH to 85%RH (no condensing)
Storage humidity	30%RH to 85%RH (no condensing)
Vibration resistance	10Hz to 55Hz, 1 cycle/min: double amplitude of 75mm for 10 min. on 3 axes (toward X, Y and Z directions)
Shock resistance	$98m/s^2$ for 4 times on 3 axes (toward X, Y and Z directions)
Noise immunity	1000V [P-P] with pulse widths 50ns and 1µs (using noise simulator)
Operating conditions	Free from corrosive gases and excessive dust.
Weight	Approx. 75g

Input specifications

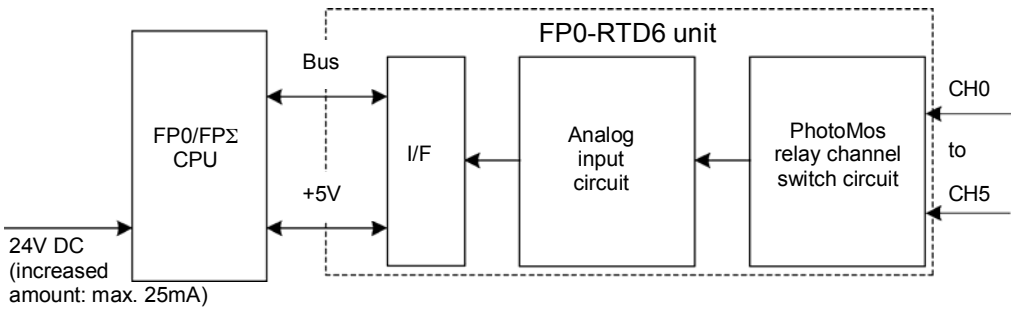
Parameter	Specification			
Input channels	Up to 6 channels per unit			
Input range	Pt100	Resolution 0.1	-200.0°C to 500.0°C -328.0°F to 800.0°F (see note 1)	
		Resolution 0.01	-80.00°C to 80.00°C -80.00°F to 80.00°F (see note 1)	
	Pt1000	Resolution 0.1	-200.0°C to 300.0°C -328.0°F to 572.0°F (see note 1)	
		Resolution 0.01	-80.00°C to 80.00°C -80.00°F to 80.00°F (see note 1)	
	Ni1000	Resolution 0.1	-30.0°C to 150.0°C -22.0°F to 302.0°F (see note 1)	
		Resolution 0.01	-30.00°C to 80.00°C -22.00°F to 80.00°F (see note 1)	
	Resistor	Resolution 1	20Ω to 2200Ω	
		Resolution 0.1	20.0Ω to 1630.0Ω	
Digital output	Pt100	Resolution 0.1	-200.0 to 500.0°C: -2000 to 5000 -328.0 to 800.0°F: -3280 to 8000	
		Resolution 0.01	-80.00 to 80.00°C: -8000 to 8000 -80.00 to 80.00°F: -8000 to 8000	
	Pt1000	Resolution 0.1	-200.0 to 300.0°C: -2000 to 3000 -328.0 to 572.0°F: -3280 to 5720	
		Resolution 0.01	-80.00 to 80.00°C: -8000 to 8000 -80.00 to 80.00°F: -8000 to 8000	
	Ni1000	Resolution 0.1	-30.0 to 150.0°C: -300 to 1500 -22.0 to 302.0°F: -220 to 3020	
		Resolution 0.01	-30.00 to 80.00°C: -3000 to 8000 -22.00 to 80.00°F: -2200 to 8000	
	Resistor	Resolution 1	20 to 2200Ω: 20 to 2200	
		Resolution 0.1	20.0Ω to 1630.0Ω: 200 to 16300	
	When out of range or RTD is broken: 8191 or 16383 (see note 2) Until temperature can be measured at initial startup: see note 3			
Resolution	0.1K/°F, 0.01K/°F			
Sampling cycle	0.1 or 1s for all channels (see note 4)			
Accuracy	Pt100	Cycle 1s	Ambient temp.: 25°C	0.3K (-10°C to +30°C) 0.2%/1.4K (-200°C to +500°C)
			Whole temp. range	0.35%/2.5K
		Cycle 0.1s	Whole temp. range	0.5%/3.5K
	Pt1000	Cycle 1s	Ambient temp.: 25°C	0.3K (-10°C to +30°C) 0.2%/1.0K (-200°C to +300°C)
			Whole temp. range	0.35%/1.7K
		Cycle 0.1s	Whole temp. range	0.5%/2.5K
	Ni1000	Cycle 1s	Whole temp. range	1K
		Cycle 0.1s	Whole temp. range	2K
	Resistor	Cycle 1s	Whole temp. range	1Ω (20 to 2200Ω)
		Cycle 0.1s	Whole temp. range	2Ω (20 to 2200Ω)
Insulation method	none			

Parameter	Specification			
Input/output points	Input	32 points:	16 points for WX2, 4, 6	Analog input CH0, 2, 4 (WX2) (see notes 5 and 6)
			16 points for WX3, 5, 7	Analog input CH1, 3, 5 (WX3) (see notes 5 and 6)
	Output	8 + 24 points (reserved)		

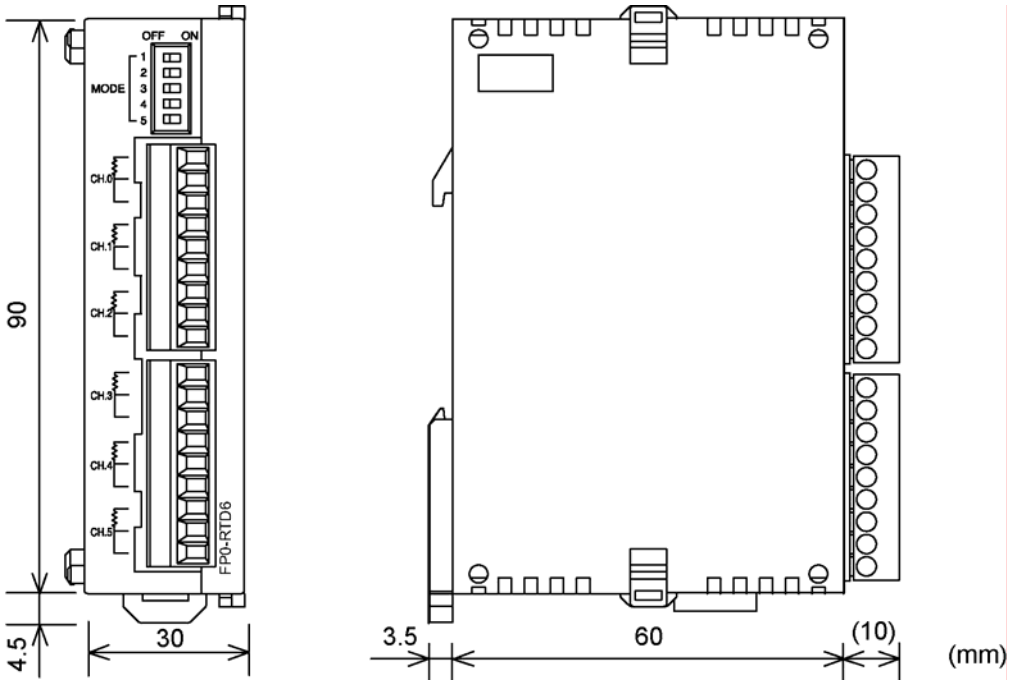
◆ **NOTES**

1. **The measurement range available for degrees Celsius is larger than for degrees Fahrenheit as the digital value (temperature value displayed) for °F is higher than the one for °C.**
2. **When the RTD is broken, the digital value will change to 8191 or 16383. Use a program to avoid risks resulting from a broken RTD. A broken RTD needs to be replaced.**
3. **Until conversion data is ready after the initial startup, the digital value shows 8191 or 16383. These are not temperature data. Program in such a way that these values are not interpreted as temperature data.**
4. **These are the settings of the input channel selection switch.**
5. **The control unit reads data from 2 channels in one scan. Read data by using the programs described above.**
6. **This address applies when the FP0 RTD unit is installed as expansion unit no. 1.**

Block diagram



8 Dimensions



Index

Record of Changes

Manual No.	Date	Description of Changes
ACGM0159V10END	SEPT. 2004	First Edition
ACGM0159V11END	SEPT. 2006	Update company name and Web site.

GLOBAL NETWORK

North America | **Europe** | **Asia Pacific** | **China** | **Japan**

Europe

■ **Headquarters**	**Panasonic Electric Works Europe AG** Rudolf-Diesel-Ring 2, 83607 Holzkirchen, Germany, Tel. (08024) 648-0, Fax (08024) 648-111, www.panasonic-electric-works.com
■ **Austria**	**Panasonic Electric Works Austria GmbH** Josef Madersperger Straße 2, A-2362 Biedermannsdorf, Austria, Tel. (02236) 26846, Fax (02236) 46133, www.panasonic-electric-works.at
■ **Benelux**	**Panasonic Electric Works Sales Western Europe B. V.** De Rijn 4, (Postbus 211), 5684 PJ Best, (5680 AE Best), Netherlands, Tel. (0499) 37 27 27, Fax (0499) 37 21 85, www.panasonic-electric-works.nl
■ **Czech Republic**	**Panasonic Electric Works Czech s.r.o** Prumyslová 1, 34815 Planá, Tel. (0374) 79 99 90, Fax (0374) 79 99 99, www.panasonic-electric-works.cz
■ **France**	**Panasonic Electric Works Sales Western Europe B. V. French Branch Office** B.P. 44, F-91371 Verrières le Buisson CEDEX, France, Tél. 01 60 13 57 57, Fax 01 60 13 57 58, www.panasonic-electric-works.fr
■ **Germany**	**Panasonic Electric Works Deutschland GmbH** Rudolf-Diesel-Ring 2, 83607 Holzkirchen, Germany, Tel. (08024) 648-0, Fax (08024) 648-555, www.panasonic-electric-works.de
■ **Ireland**	**Panasonic Electric Works UK Ltd. Irish Branch Office** Dublin, Republic of Ireland, Tel. (01) 4600969, Fax (01) 4601131, www.panasonic-electric-works.ie
■ **Italy**	**Panasonic Electric Works Italia s.r.l.** Via del Commercio 3-5 (Z.I. Ferlina), I-37012 Bussolengo (VR), Italy, Tel. (045) 675 27 11, Fax (045) 6 70 04 44, www.panasonic-electric-works.it
■ **Nordic Countries**	**Panasonic Electric Works Nordic AB** Sjöängsvägen 10, 19272 Sollentuna, Sweden, Tel. (+46) 8 59 47 66 80, Fax (+46) 8 59 47 66 90, www.panasonic-electric-works.se
■ **Portugal**	**Panasonic Electric Works Portugal España S.A. Portuguese Branch Office** Avda Adelino Amaro da Costa 728 R/C J, 2750-277 Cascais, Portugal, Tel. (351) 21 481 25 20, Fax (351) 21 481 25 29, www.panasonic-electric-works.es
■ **Spain**	**Panasonic Electric Works España S.A.** Parque Empresarial Barajas, San Severo, 20, 28042 Madrid, Spain, Tel. (91) 329 38 75, Fax (91) 329 29 76, www.panasonic-electric-works.es
■ **Switzerland**	**Panasonic Electric Works Schweiz AG** Grundstrasse 8, CH-6343 Rotkreuz, Switzerland, Tel. (041) 799 70 50, Fax (041) 799 70 55, www.panasonic-electric-works.ch
■ **UK**	**Panasonic Electric Works UK Ltd.** Sunrise Parkway, Linford Wood East, Milton Keynes, MK14 6LF, England, Tel. (01908) 231 555, Fax (01908) 231 599, www.panasonic-electric-works.co.uk

North & South America

■ **USA**	**PEW Corporation of America Head Office USA** 629 Central Avenue, New Providence, N.J. 07974, USA, Tel. 1-908-464-3550, Fax 1-908-464-8513

Asia

■ **China**	**Panasonic Electric Works (China) Co., Ltd.** 2013, Beijing Fortune, Building 5, Dong San Huan Bei Lu, Chaoyang District, Beijing, China, Tel. 86-10-6590-8646, Fax 86-10-6590-8647
■ **Hong Kong**	**Panasonic Electric Works (Hong Kong) Co., Ltd.** Rm1601, 16/F, Tower 2, The Gateway, 25 Canton Road, Tsimshatsui, Kowloon, Hong Kong, Tel. (852) 2956-3118, Fax (852) 2956-0398
■ **Japan**	**Matsushita Electric Works, Ltd.** 1048 Kadoma, Kadoma-shi, Osaka 571-8686, Japan, Tel. 06-6908-1050, Fax 06-6908-5781, www.mew.co.jp/e-acg/
■ **Singapore**	**Panasonic Electric Works Asia Pacific Pte. Ltd.** 101 Thomson Road, #25-03/05, United Square, Singapore 307591,Tel. (65) 6255-5473, Fax (65) 6253-5689

COPYRIGHT © 2006 All Rights Reserved
ACGM0159V1.1END 9/2006

Specifications are subject to change without notice.

Printed in Europe