

Panasonic
ideas for life

**SAFETY SOLUTIONS
FOR PANASONIC PLCs**

FP-SAFE



Compatibility

with all FP Series PLCs

- All Panasonic FP Series PLCs are extendable with FP-Safe controllers. The result is an integrated solution featuring both standard PLC and safety-related functions.
- Simple diagnostics and easy communication are the key benefits of this solution package.



FP-X



FP0R



FPΣ (Sigma)



FP2

Flexibility

and cost-effectiveness

- Compared to a set of separate safety relays, FP-Safe controllers are freely configurable – which provides for flexible system design, easy wiring, and smooth communication with the PLC.
- Compared to complex solutions where standard and safety-related controlling are processed by two redundant CPUs, the integration of FP-Safe with FP Series PLCs is much more cost-effective, and offers more expansion options.



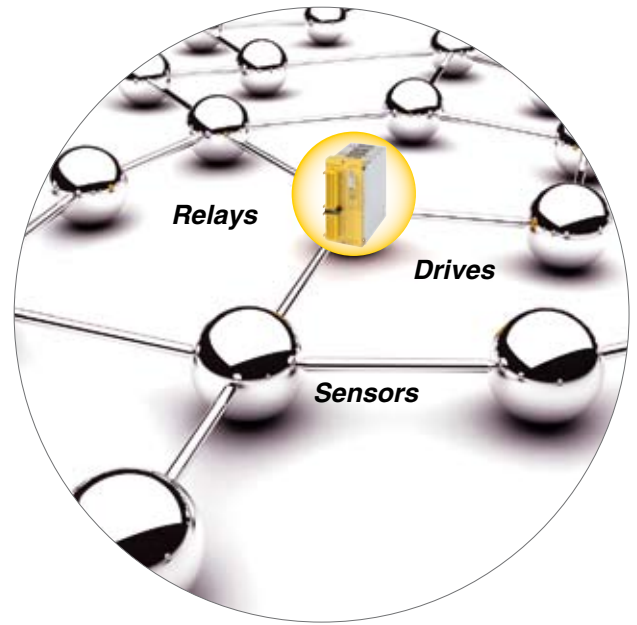
High-end safety PLC

Separate safety relay units

Safety

and multiple functionality

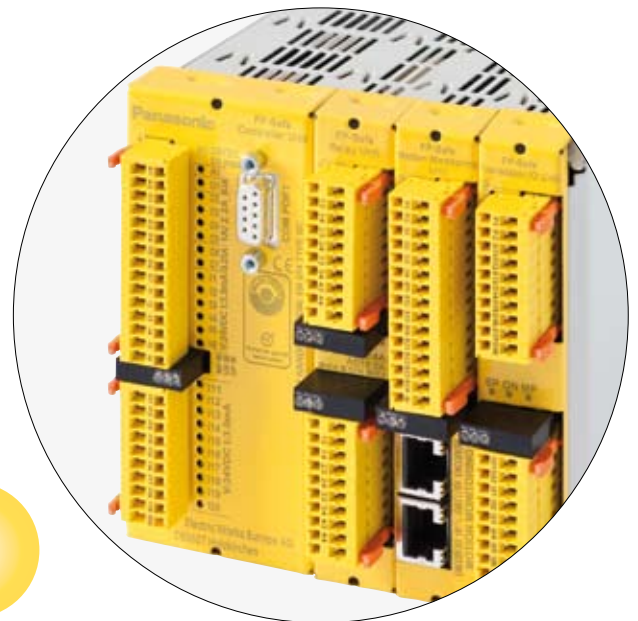
- Up to 5 safety-related functions can be configured by a single compact FP-Safe controller, with no expansion units required.
- With the intuitive configurator software, programming and configuration are a snap.
- All status information regarding the safety I/Os on FP-Safe is monitored by the PLCs.
- A function block for reading diagnostic data to FP Series PLCs is available in Control FPGWIN Pro.



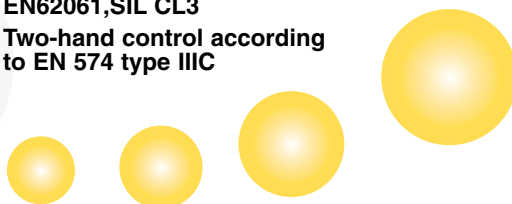
Variety

of expansion units

Depending on your automation requirements, you can choose from a wide range of expansion units for FP-Safe. For details, see page 4.



EN62061, SIL CL3
Two-hand control according to EN 574 type IIIC



Controller and expansion units



AFSC1605
FP-Safe controller



AFSCR1613
FP-Safe controller with
relay expansion unit



AFSCP2410
FP-Safe controller with
transistor I/O expansion
unit



AFSCR2418
FP-Safe controller with
relay expansion unit and
transistor I/O expansion
unit



AFSCM2207
FP-Safe controller with
motion monitoring unit



AFSCR2215
FP-Safe controller with
relay expansion unit and
motion monitoring unit



AFSCPM3012
FP-Safe controller with
transistor I/O expansion
unit and motion monitoring
unit



AFSCWH3020
FP-Safe controller with
transistor I/O expansion
unit, relay expansion unit,
and motion monitoring
unit

Connecting cables



CABMODPLC111D

Connecting cable between
FP-Safe controller and FP
Series PLC via COM port
(3-pin), 0.5m



CABMODPLC211D

Connecting cable between
FP-Safe controller and FP
Series PLC via COM port
(9-pin), 0.5m



AFS8TP

Connecting cable between
FP-Safe controller and FP
Series PLC via TOOL port
(mini-DIN), 0.5m



AFS8PG9

Programming cable for
FP-Safe controller, 9-pin
Sub-D (male), 3m

Easy integration

Communication between FP-Safe controllers and FP Series PLCs takes place via RS232C.¹ Diagnostic information can be read from FP-Safe by selecting the applicable function block in Control FPWIN Pro, Panasonic's PLC programming software. Such data can be used, for example, by Panasonic HMIs, in order to visualize a control scenario on a machine's central operation panel; additional options include integrating the data directly into a machine's control program.

¹The RS232C interface is provided by the PLC's TOOL port or (3-pin or 9-pin) COM port.



Safety-related functions

The following safety-related functions can be implemented with an electronic circuit that includes 2 inputs and an acknowledgement input. These functions are available for the FP-Safe controller (5 SRF), the transistor I/O expansion unit (2 SRF), and the motion monitoring unit (2 SRF).



Emergency stop (for monitoring the emergency stop button)

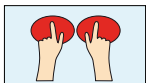


Protection cover



Permission (for monitoring the permission switch)

The following safety-related functions require a different circuit configuration:



Two-hand control requires 2 inputs and 2 acknowledgement inputs. This safety-related function is available once on each FP-Safe controller, transistor I/O expansion unit, and motion monitoring unit.



The operation mode selector can only be configured on FP-Safe controllers with either 3 or 6 switching positions.

Motion monitoring with FP-Safe is available as follows. Standardized safe stop functions such as ST0, SS1, SS2, etc., are supported:



Motion monitoring with proximity switches is only available on the FP-Safe controller. Using 2 proximity switches for each axis, a total of 2 axes can be monitored. The control unit can monitor standstill and rotation speeds of up to 1200Hz.

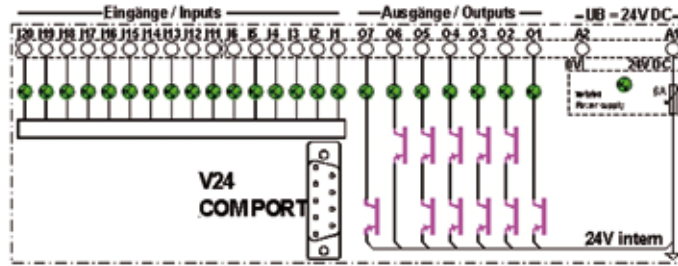


Motion monitoring with incremental signal inputs (TTL, Sin/Cos) is available on the motion monitoring unit. This unit can monitor drives in all operating modes at up to 499.999kHz.

FP-Safe controller



PFHd:5.20x10⁻⁹



The FP-Safe controller has 16 redundant digital inputs and 4 positive-switching, redundant outputs O2 to O5. Three further outputs can be freely configured.

- The O1 output can be configured as a system-ready output, control output, or frequency input for single-channel rotation speed monitoring.
- Outputs O6 and O7 can be configured as control or clock outputs.

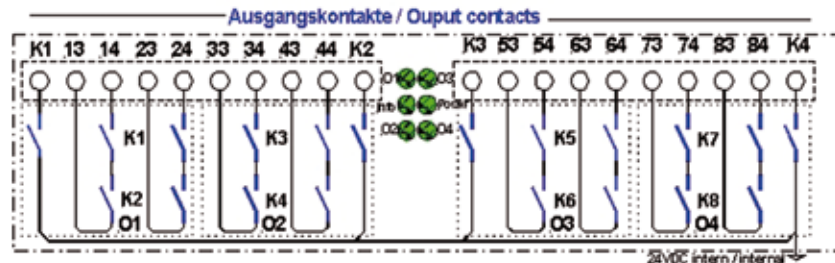
LEDs display the input and output switching status. Up to 5 safety-related functions can be configured per controller unit, e.g. emergency stop, protection cover, permission switch, and two-hand control. The controller unit can even monitor motion for speeds of up to 1200Hz.

Item	Data	
Power consumption via A1, A2	Max 2.9W	
Internal fuse	6A, automatic	
Switching and continuous current output O1, resistive load	Max. 100mA	
Maximum input frequency for I11 – I14 and O1 as input	1200Hz	
Specifications for outputs O2 – O5	Switching and continuous current, inductive and resistive load	Max. 1A, short-circuit- and overvoltage-proof
	Sum of the switching and continuous currents	Max. 2A
	Minimum switching capacity	1mA
Specifications for outputs O6 and O7	Switching and continuous current, inductive and resistive load	Max. 0.25A, short-circuit- and overvoltage-proof
	Sum of the switching and continuous currents	Max. 0.4A

Relay expansion unit for FP-Safe



PFHd for relay expansion unit: 5.20x10⁻⁹



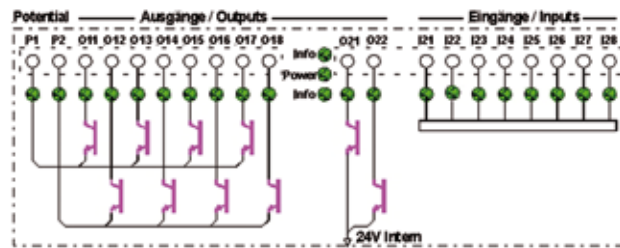
AFSCR1613 comprises the FP-Safe controller and the relay expansion unit. The relay expansion unit provides 4 safety relay outputs, each of which consists of 2 redundant contacts and 1 signaling contact. LEDs display the relay output switching status.

Item	Data
Power consumption via A1 and A2 on the controller unit	Max. 4.8W
Minimum switching current of contacts 13/13-83/84, O1 – O4	10mA
Switching capacity according to DIN EN 60947-4-1 / EN 60947-5-1	AC15: 230V / 3A, DC13: 24V / 4A / 0.1Hz
Lifetime at switching capacity DC13: 1A, 24V	100,000 switching cycles
Lifetime at switching capacity DC13: 4A, 24V	40,000 switching cycles
Lifetime at switching capacity AC15: 1A, 230V	200,000 switching cycles
Lifetime at switching capacity AC15: 3A, 230V	80,000 switching cycles
Mechanical lifetime	>10 x 10 ⁶
Contact fusing	5A slow
Maximum switching cycles	360 cycles/h at AC15: 3A and DC13: 4A
Short-circuit withstand	1000A SCPD 6A gG pre-fuse
Rated insulation voltage	250V AC
Surge breakdown voltage	4kV, degree of pollution: 2
Response and reset times	Typically 10ms
Switching capacity O1 – O4	0.25A

Transistor I/O expansion unit for FP-Safe



PFHd for transistor I/O expansion unit: 4.26×10^{-9}



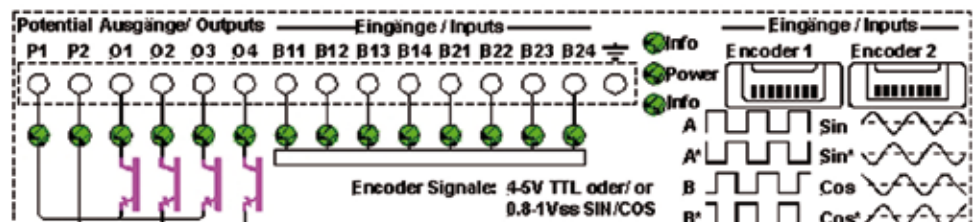
AFSCP2410 comprises the FP-Safe controller and the transistor I/O expansion unit. The transistor I/O expansion unit has 8 redundant digital inputs and 10 positive-switching, freely configurable outputs. LEDs display the input and output switching status.

Item	Data	
Power consumption via A1 and A2 on the controller unit	Max 2.2W	
Input voltage at P1, P2	24V DC +10% -15%	
Ripple at P1, P2	10%	
Specifications for outputs O11 – O18	Switching and continuous current, inductive or resistive load	Max. 1A, short-circuit- and overvoltage-proof
	Sum of the switching and continuous currents	Max. 4A
Specifications for outputs O21 and O22	Switching and continuous current, inductive and resistive load	Max. 0.25A, short-circuit- and overvoltage-proof
	Sum of the switching and continuous currents	Max. 0.4A

Motion monitoring unit for FP-Safe



PFHd for motion monitoring unit: 4.26×10^{-9}



AFSCM2207 comprises the FP-Safe controller and the motion monitoring unit. The motion monitoring unit offers the following functions:

- Standstill monitoring
- Position monitoring
- Rotation speed monitoring
- Direction monitoring
- Brake monitoring

The motion monitoring unit can monitor 2 drives in all operation modes at up to 499.999kHz. It supports standardized safe stop functions such as ST0, SS1, SS2, etc. An incremental measuring system regulates movement. Both TTL and sine/cosine signals can be processed (configure with FP-Safe Configurator). The unit has 2 inputs for 2 incremental measuring systems, 6 digital redundant inputs, and 4 freely configurable, positive-switching outputs. The inputs are activated by 24V signals.

Item	Data	
Power consumption via A1 and A2 on the controller unit	Max 2.5W	
Input voltage at P1, P2	24V DC +10% – 15%	
Ripple at P1, P2	10%	
Input voltage at the encoder inputs, sine/cosine	0.8 – 1Vss	
Input voltage at the encoder inputs, TTL	4-5V	
Input voltage at the encoder inputs, sine/cosine, TTL	≤ 496937 Hz	
Technical data for outputs O1 and O4	Switching and continuous current, inductive or resistive load	Max. 1A, short-circuit- and overvoltage-proof
	Sum of the switching and continuous currents	Max. 2A

FP-Safe: General specifications

Item		Data
Electrical requirements	Operating voltage (Vo)	24V DC via A1 / A2 on the controller unit for all units
	Voltage tolerance at Vo	85 - 110%
	Ripple at Vo	Max. 10%
	Power consumption at Vo	Depends on number of units
Ambient conditions	Ambient temperature	-10 to +60°C / +14 to 140°F
	Storage temperature	-40 to 85°C / -40 to +185°F
Vibration resistance on all 3 axes		Sine 10 – 55Hz, 0.35mm, 10 cycles, 1 octave/min
Maximum wire diameter, wiring terminal		1 x 1.0mm ² , spring force terminals, pluggable
Housing material		Galvanized sheet steel, powder-coated
Degree of protection		May only be used in switching cabinets with ≥ IP54
Inputs	Input voltage	24V DC -15%, +10%
	Power consumption	Maximum 3.5mA
Residual voltage at the load in case of error at semiconductor outputs: Power line A2 to unit interrupted	Residual voltage at 5mA load current (4.8kΩ)	< 4.5V
	Residual voltage at 10mA load current (2.4kΩ)	< 2.5V
	Residual voltage at 20mA load current (1.2kΩ)	< 1.0V
Residual current, residual voltage, and minimum switching capacity for semiconductor outputs	Residual current when 0V output (A2) is short-circuited	< 5μA
	Residual voltage at 1A load current	< 200mV
	Residual voltage at 0.5A	< 100mV
	Residual voltage at minimum load (≤ 0.1A)	< 50mV
	Minimum switching capacity	1mA
Required interference suppression of the output load for all semiconductor outputs		By surge absorber

FP-Safe: Part numbers

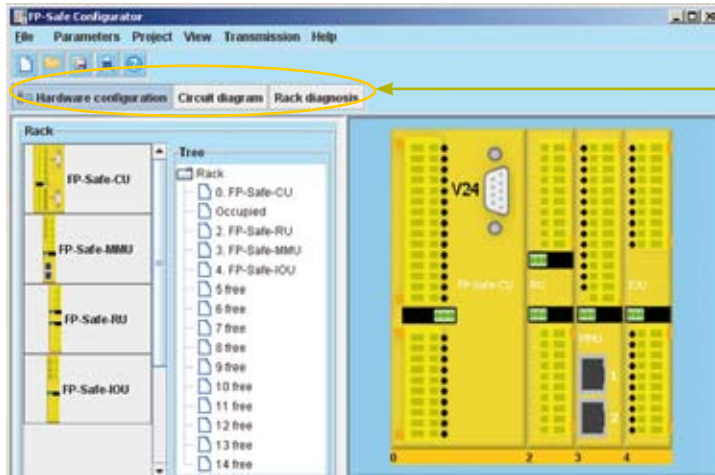
Description	PFHd	Part number
FP-Safe controller: 16 redundant digital inputs, 4 redundant outputs (PNP), 3 freely configurable outputs (PNP); spring terminal, 24VDC	5.20 x 10 ⁻⁹	AFSC1605
FP-Safe controller with relay expansion unit: 16 redundant digital inputs, 4 redundant outputs (PNP), 3 freely configurable outputs (PNP), 4 safety relay outputs (each contains 2 redundant contacts and 1 signaling contact); spring terminal; 24VDC	1.04 x 10 ⁻⁸	AFSCR1613
FP-Safe controller with transistor I/O expansion unit: 24 redundant digital inputs, 4 redundant outputs (PNP), 13 freely configurable outputs (PNP); spring terminal; 24VDC	9.46 x 10 ⁻⁹	AFSCP2410
FP-Safe controller with motion monitoring unit: 22 redundant digital inputs, 2 inputs for 2 incremental measuring systems, 4 redundant and 7 freely configurable outputs (PNP); spring terminal; 24VDC	9.46 x 10 ⁻⁹	AFSCM2207
FP-Safe controller with relay and motion monitoring unit, 22 redundant digital inputs, 2 inputs for 2 incremental measuring systems, 4 redundant and 7 freely configurable outputs (PNP), 4 safety relay outputs; spring terminal; 24VDC	1.47 x 10 ⁻⁸	AFSCRM2215
FP-Safe controller with transistor I/O expansion and motion monitoring unit, 30 redundant digital inputs, 2 inputs for 2 incremental measuring systems, 4 redundant and 17 freely configurable outputs (PNP); spring terminal; 24VDC	1.37 x 10 ⁻⁸	AFSCPM3012
FP-Safe controller with relay expansion unit and transistor I/O expansion unit, 24 redundant digital inputs, 4 redundant and 13 freely configurable outputs (PNP), 4 safety relay outputs; spring terminal; 24VDC	1.47 x 10 ⁻⁸	AFSCR2418
FP-Safe controller with relay expansion unit and transistor I/O expansion unit and motion monitoring unit, 30 redundant digital inputs, 2 inputs for 2 incremental measuring systems, 4 redundant and 17 freely configurable outputs (PNP), 4 safety relay outputs; spring terminal; 24VDC	1.89 x 10 ⁻⁸	AFSCWH3020
Connecting cable between FP-Safe and FP Series PLC (3-pin COM port), 0.5m	-	CABMODPLC111D
Connecting cable between FP-Safe and FP Series PLC (9-pin COM port), 0.5m	-	CABMODPLC211D
Connecting cable between FP-Safe and FP Series PLC (5-pin mini-DIN), 0.5m	-	AFS8TP
Programming cable for FP-Safe controller, 9-pin Sub-D (male), 3m	-	AFS8PG9

FP-Safe Configurator

Easy configuration

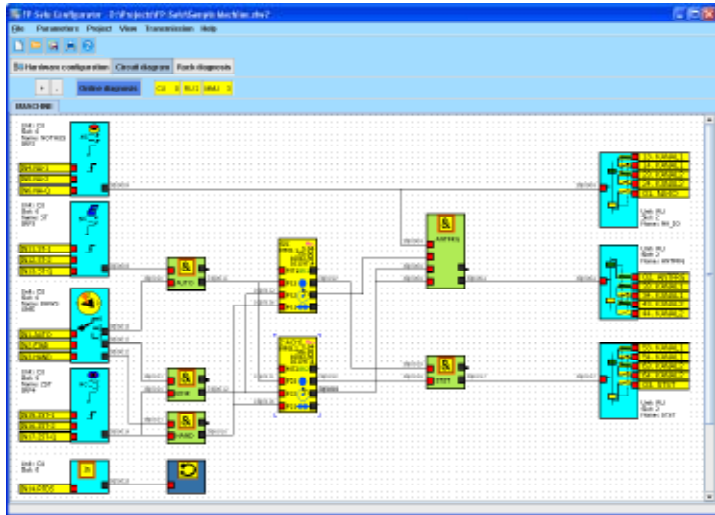
The FP-Safe Configurator software contains predefined safety-related functions for intuitive configuration of FP-Safe units. These functions enable you to visualize the wiring for sensors and actuators, and to define the parameter settings for safety-related components, signals, and so on. Safe access control, program validation, and project verification functions have been implemented within the hardware and software in order to prevent unauthorized changes.

FP-Safe Configurator runs on Windows XP, Vista, and Windows 7, and requires a minimum of 512MB RAM. The Java application version JRE6U12 is included.

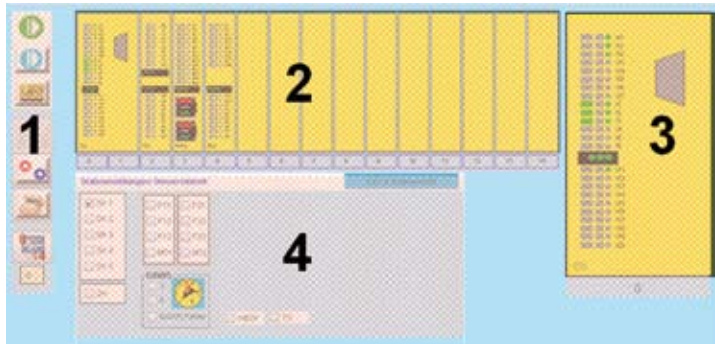


Using these tabs, you can configure your hardware, work with circuit diagrams, and run a rack diagnosis.

Use drag & drop to select the FP-Safe units to be configured.



In the circuit diagram, always wire the icons from a virtual output to a virtual input.



Using the diagnosis function, you can monitor the system status in order to detect and eliminate errors quickly.

- 1) Diagnosis menu for configuring, starting, and ending the diagnosis, as well as for opening various data screens.
- 2) Rack illustration showing the available units. The slots are numbered 0–14. During a diagnosis run, a simulated rack appears in this area. Unused slots are displayed as empty.
- 3) Enlarged view of selected unit.
- 4) Status information screen with diagnosis data concerning the selected unit.

More Panasonic Safety Products

Sensors, Light Curtains, & Servo Drives

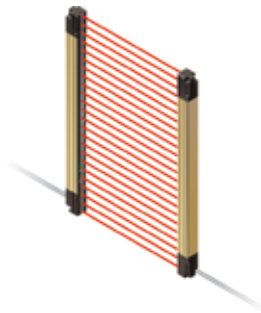
Safety sensors & light curtains

From safety beam sensors to safety scanner systems – with its four product categories, SUNX ensures the safety of persons working with industrial manufacturing machines. Without exception, SUNX safety products fulfill all international safety regulations. Thus, machine construction companies with international markets can significantly cut costs: During the design phase, country-specific customization can be dispensed with, since one and the same safety device is approved for use worldwide.



**Safety light curtain
SF4-C**

EN 62061, SIL CL 3
EN ISO 13849-1, PL e
EN 61496-1, type 4



**Safety light curtain
SF2-B/SF4-B**

EN 62061, SIL CL 2/3
EN ISO 13849-1, PL d/e
EN 61496-1, type 2/4



**Safety beam
sensor ST4**

EN 62061, SIL CL 3
EN ISO 13849-1, PL e
EN 61496-1, type 4



**Safety laser
scanner SD3-A1**

EN 62061, SIL CL 2
EN ISO 13849-1, PL d
EN 61496-1, type 3

Servo drives

Panasonic offers servo drives for all positioning control tasks within a range of 50 to 5000W for machine and equipment building, e.g. for packaging machines, labeling systems, assembly robots, and cable assembly machines.

Minas A5 series servo drives for all motion control applications

EN 61508/62061, SIL CL 2
EN ISO 13849-1, PL d
EN 61800-5-2, STO
IEC 61326-3-1



North America

Europe

Asia Pacific

China

Japan

Panasonic Electric Works

Please contact our Global Sales Companies in:

Europe

▶ Headquarters	Panasonic Electric Works Europe AG	Rudolf-Diesel-Ring 2, 83607 Holzkirchen, Tel. +49 (0) 8024 648-0, Fax +49 (0) 8024 648-111, www.panasonic-electric-works.com
▶ Austria	Panasonic Electric Works Austria GmbH	Josef Madersperger Str. 2, 2362 Biedermansdorf, Tel. +43 (0) 2236-26846, Fax +43 (0) 2236-46133 www.panasonic-electric-works.at
	PEW Electronic Materials Europe GmbH	Ennsstadenstraße 30, 4470 Enns, Tel. +43 (0) 7223 883, Fax +43 (0) 7223 88333, www.panasonic-electronic-materials.com
▶ 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
▶ Czech Republic	Panasonic Electric Works Czech s.r.o.	Průmyslová 1, 34815 Planá, Tel. (+420-)374 799 990, Fax (+420-)374 799 999, www.panasonic-electric-works.cz
▶ 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	Rudolf-Diesel-Ring 2, 83607 Holzkirchen, Tel. +49 (0) 8024 648-0, Fax +49 (0) 8024 648-111, www.panasonic-electric-works.de
▶ Hungary	Panasonic Electric Works Europe AG	Erdőalja út 91/a, 1037 Budapest, Tel. +36 (0) 20 9715688, www.panasonic-electric-works.hu
▶ Ireland	Panasonic Electric Works UK Ltd.	Dublin, Tel. +353 (0) 14600969, Fax +353 (0) 14601131, www.panasonic-electric-works.co.uk
▶ Italy	Panasonic Electric Works Italia srl	Via del Commercio 3-5 (Z.I. Ferlina), 37012 Bussolengo (VR), Tel. +39 (0) 456752711, Fax +39 (0) 456700444, www.panasonic-electric-works.it
▶ Nordic Countries	Panasonic Electric Works Nordic AB	Sjöängsvägen 10, 19272 Sollentuna, Sweden, Tel. +46 859476680, Fax +46 859476690, www.panasonic-electric-works.se
▶ Poland	Panasonic Electric Works Polska sp. z o.o	Jungmansgatan 12, 21119 Malmö, Tel. +46 40 697 7000, Fax +46 40 697 7099, www.panasonic-fire-security.com
▶ Portugal	Panasonic Electric Works España S.A.	ul.Wotoska 9A,02-583 Warszawa, Tel. +48 (0) 22 338-11-33, Fax +48 (0) 22 338-12-00, www.panasonic-electric-works.pl
▶ Spain	Panasonic Electric Works España S.A.	Portuguese Branch Office, Avda Adelino Amaro da Costa 728 R/C J, 2750-277 Cascais, Tel. +351 214812520, Fax +351 214812529
▶ Switzerland	Panasonic Electric Works Schweiz AG	Barajas Park, San Severo 20, 28042 Madrid, Tel. +34 913293875, Fax +34 913292976, www.panasonic-electric-works.es
▶ United Kingdom	Panasonic Electric Works UK Ltd.	Grundstrasse 8, 6343 Rotkreuz, Tel. +41 (0) 41 7997050, Fax +41 (0) 41 7997055, www.panasonic-electric-works.ch Sunrise Parkway, Linford Wood, Milton Keynes, MK14 6LF, Tel. +44 (0) 1908 231555, Fax +44 (0) 1908 231599, www.panasonic-electric-works.co.uk

North & South America

▶ USA	PEW Corporation of America	629 Central Avenue, New Providence, N.J. 07974, Tel. 1-908-464-3550, Fax 1-908-464-8513, www.pewa.panasonic.com
--------------	-----------------------------------	---

Asia Pacific/China/Japan

▶ China	Panasonic Electric Works (China) Co., Ltd.	Level 2, Tower W3, The Towers Oriental Plaza, No. 2, East Chang An Ave., Dong Cheng District, Beijing 100738, Tel. (010) 5925-5988, Fax (010) 5925-5973
▶ Hong Kong	Panasonic Electric Works (Hong Kong) Co., Ltd.	RM1205-9, 12/F, Tower 2, The Gateway, 25 Canton Road, Tsimshatsui, Kowloon, Hong Kong, Tel. (0852) 2956-3118, Fax (0852) 2956-0398
▶ Japan	Panasonic Electric Works Co., Ltd.	1048 Kadoma, Kadoma-shi, Osaka 571-8686, Japan, Tel. (06) 6908-1050, Fax (06) 6908-5781, http://panasonic-electric-works.net
▶ Singapore	Panasonic Electric Works Asia Pacific Pte. Ltd.	101 Thomson Road, #25-03/05, United Square, Singapore 307591, Tel. (06255) 5473, Fax (06253) 5689