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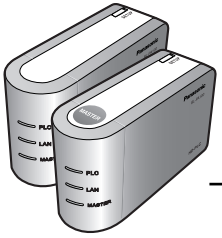

Operating Instructions

HD-PLC Ethernet Adaptor

Power Line Communication

Model No. BL-PA100KTA

Set of 2 Adaptors (Master and Terminal)

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IMPORTANT NOTES:

For best results, connect this product directly to a wall outlet.
This product may not function normally in certain electrical environments.
See page 5 for more information.

Please read this document before use and save this document for future reference.

Introduction

Thank you for purchasing a Panasonic HD-PLC product.

Main features

Flexible and stable network access anywhere in your home

The BL-PA100 offers the next generation in home networking: High Definition Power Line Communication (HD-PLC). High-speed internet access and high performance data transfers are now available in any room.

Every AC outlet becomes a home network access point

Because HD-PLC technology makes use of the existing electrical wiring in your home, there's no need to run cables between rooms.

Easy to expand

Up to 16 adaptors in all can be used, which means you can add additional adaptors whenever you need to add a network connection in another room of the house.

Simple network speed testing

You can confirm the speed of each adaptor's HD-PLC connection by simply pressing a button.

Fast, reliable, and secure

With speeds of up to 190 Mbps (PHY rate)[*1], advanced error correction, and AES 128-bit encryption, the BL-PA100 provides peace of mind at the speed of light.

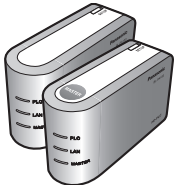
For more information about how HD-PLC works, see page 7.

[*1] This is the theoretical maximum data transmission speed of the HD-PLC standard. The actual maximum data transmission speed is about 70 Mbps for UDP and 42 Mbps for TCP. Results may vary depending on electrical conditions, network environment, and other factors. See the specifications for more information.

Included items

Confirm that the following items are included with this product.

Additional items can be ordered by calling 1-800-332-5368.

BL-PA100A .....2 (1 Master and 1 Terminal) 	**AC Cord** .....2 Order No.: PSJA1069Z
- Getting Started.....1	- Operating Instructions (this document).....1

Available accessories

You can add additional adaptors as necessary. Up to 16 adaptors in all (including the 2 adaptors included with this product) can be used.

BL-PA100A (Add-on Adaptor)

Abbreviations

- This product is referred to as “the adaptor” in this document.

Trademarks

- Linux® is the registered trademark of Linus Torvalds in the U.S. and other countries.
- All other trademarks identified herein are the property of their respective owners.

IMPORTANT SAFETY INSTRUCTIONS

When using this product, basic safety precautions should always be followed to reduce the risk of fire, electric shock, or personal injury.

1. Read and understand all instructions. Keep this document for future reference.
2. Follow all instructions in this document and heed all warnings.
3. Do not install this product near any heat sources such as radiators, heat registers, stoves, or other devices (including amplifiers) that produce heat.
4. Protect the AC cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from this product.
5. The AC cord is used as the main disconnect device. Ensure that the AC outlet is located/installed near the product and is easily accessible.
6. Use only the included AC cord.
7. The AC cord must remain connected at all times. (It is normal for this product to feel warm during use.)
8. To prevent the risk of fire or electrical shock, do not expose this product to rain or any type of moisture.
9. Do not touch the product or the AC cord during lightning storms.
10. Unplug this product when unused for a long period of time.
11. Refer all servicing to qualified service personnel. Servicing is required when the unit has been damaged in any way, such as when the AC cord or plug is damaged, the unit does not operate normally, or after the unit has been dropped.
12. Do not use this product outdoors.
13. Unplug this unit from power outlets if it emits smoke, an abnormal smell or makes unusual noise. These conditions can cause fire or electric shock. Confirm that smoke has stopped and contact an authorized service center.

SAVE THESE INSTRUCTIONS

Electrical environment information

HD-PLC adaptors send data to and from each other over the existing electrical wiring in your home, and may be affected by electrical noise or the length of your home's wiring. Keep the following in mind when placing each adaptor.

AC outlets

For best results, we recommend connecting the adaptors directly to a wall outlet. Avoid connecting high power-consuming appliances to the same wall outlet. Additionally, connecting an adaptor to a uninterruptable power supply (UPS) or backup power supply device is not recommended.

While connecting the adaptors to a wall outlet is recommended, keep the following in mind if you must connect an adaptor to a power strip:

- Make sure the power strip does not have a noise filter or a surge protector, as these features may interfere with the performance of your adaptors.
- Do not connect the adaptor to a power strip that receives power from another power strip.
- Use a power strip with an AC cord that is as short as possible.

Electrical interference

Certain electrical devices emit electrical noise. If this noise is passed on to the electrical wiring in your home, it may interfere with the performance, speed, and reliability of your adaptors. For best results, we recommend connecting an electrical noise filter to noise emitting appliances.

The following appliances are more likely to produce noise:

- Battery chargers (including cell phone chargers)
- Hair dryers
- Vacuum cleaners
- Lights or lamps which have a dimmer switch or a touch-sensitive on/off feature
- Power drills

Additionally, this product may interfere with the following appliances:

- Short wave radios
- Lights or lamps which have a touch-sensitive on/off feature

Electrical wiring

HD-PLC adaptors send data to and from each other over the existing electrical wiring in your home. If 2 wall outlets are separated by a great length of electrical wiring, the adaptors connected to those outlets may not be able to communicate with each other.

For more information, refer to the troubleshooting section (see page 15) or access the Panasonic PLC Support Site at: **http://panasonic.co.jp/pcc/products/en/plc/**

After you have placed the adaptors where you plan to use them and plugged them into the wall outlets, test the terminal's network speed (see page 11).

Security information

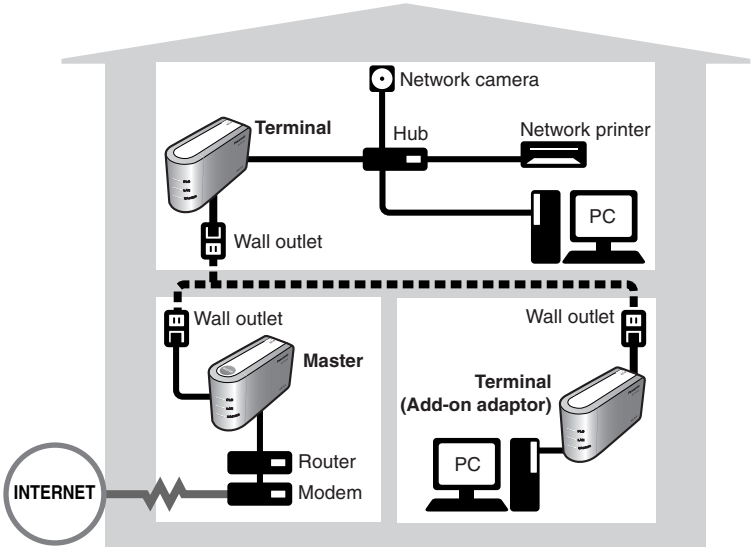
1. With any network connection, security is a concern. The BL-PA100A provides security to prevent unauthorized access to your network.
   - Only terminals that are registered to the master adaptor can communicate with the network.
   - A terminal may be registered to the master only if the **SETUP** buttons on the master and terminal are pressed within 5 seconds of each other.
2. Data sent and received over the PLC network employs AES 128-bit encryption, however we cannot guarantee that data will not be intercepted by a third party.
3. For security, we recommend resetting your adaptors (see page 13) in the following situations.
   - If for some reason you are concerned that another adaptor may have been accidentally registered to your master (for example, the adaptor of someone who lives in the same apartment building as you), reset each of your adaptors and register them again.
   - If you discard an adaptor, give an adaptor to someone else to use, or have an adaptor serviced, reset the adaptor first.
   - If you lose an adaptor, reset each of your adaptors and register them again.

How does it work?

Each HD-PLC adaptor has an AC cord that plugs into a wall outlet. This connection not only powers the adaptor, but also allows the adaptor to send data to and from the other adaptors in your home using your existing electrical wiring. Each adaptor also has a LAN jack, which connects each adaptor to your broadband router, hub, computer, network printer, network camera, etc.

Once your adaptors are registered, simply plug them into the wall outlets around your home. (The included adaptors are already registered. To register additional adaptors, see page 14.) Finally, connect the master adaptor to your broadband internet router or modem, and then connect the other adaptors to your network devices (computers, network printers, network cameras, etc.). When you're finished, each network device will be able to access the internet as well as each other.

Example of an integrated HD-PLC network

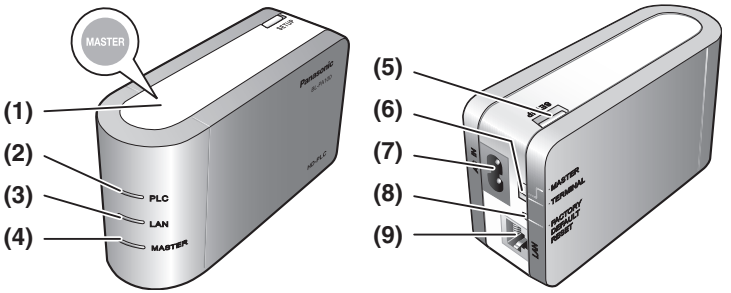


Master and terminal adaptors

Before using your adaptors, it is important to understand the concept of a "master" adaptor and a "terminal" adaptor.

An HD-PLC network contains at least 2 adaptors. One (and only one) adaptor must be configured as the master. All other adaptors are configured as terminals. (A maximum of 15 terminals per network is recommended.) An adaptor is configured as either a master or a terminal during registration (see page 14). For simplicity, we recommend configuring the adaptor that is directly connected to one of your router's LAN ports as the master.

Main unit



(1) MASTER Seal (master adaptor only)
Indicates which adaptor is pre-configured as the master adaptor.

(2) PLC Indicator
Lights to indicate that the adaptor is connected to the HD-PLC network. For more information, see page 12.

(3) LAN Indicator
Lights when a LAN cable is connected to the adaptor, and flashes when data is being sent or received. For more information, see page 12.

(4) MASTER Indicator
Lights when the adaptor is configured as the master. For more information, see page 12.

(5) SETUP Button
Used to register the adaptor (see page 14) or test the terminal's network speed (see page 11).

(6) Mode Selector
The position of this selector during registration (see page 14) determines whether the adaptor is used as the master or as a terminal.

(7) AC IN
Connects the adaptor to AC power as well as to the HD-PLC network.

(8) FACTORY DEFAULT RESET Button
Used to reset the adaptor and erase its registration (see page 13).

(9) LAN Jack
Connects the adaptor to a network device, such as a broadband router, hub, computer, etc. (see page 10).

Placing the adaptors

Refer to the information on page 5 when selecting a location to place your adaptors.

Note

- If you have purchased additional adaptors, make sure you have registered them to the master (see page 14) before placing them where you plan to use them.

1. Connect the AC cord of each adaptor to a wall outlet near where you plan to use it.
2. Confirm that the **PLC** indicator of each adaptor lights in blue when you plug the adaptors into the wall outlets.
    - If the **PLC** indicators do not light in blue, see page 15.

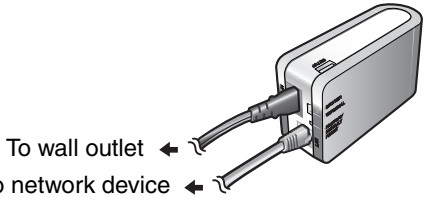
After you have placed the adaptors where you plan to use them and plugged them into the wall outlets, test the terminal's network speed (see page 11).

Connecting adaptors to network devices

Once you have placed the adaptors where you plan to use them and are satisfied with the network speed test results for your terminals (see page 11), follow the procedure below to connect your adaptors to your network devices (broadband router, hub, computer, network printer, network camera, etc.). This will integrate your HD-PLC network with your home network.

1. Confirm that each adaptor's AC cord is connected to the adaptor and plugged into a wall outlet.

2. Connect a LAN cable (sold separately) to each adaptor's **LAN** jack.



- The **LAN** indicator of each adaptor turns green.
- If an adaptor's **LAN** indicator does not turn green, see page 15.

3. Connect the other end of each LAN cable to a network device.

- Avoid connecting more than one adaptor to the same hub or router.
- Refer to illustration on page 7 for an example of what your integrated HD-PLC network may look like.

You are now ready to use your computers, network printers, network cameras, etc.

Testing a terminal's network speed

Once you have connected the adaptors where you plan to use them, use the procedure below to test the speed of each terminal's network connection to the master. Make sure that the terminal has already been registered to a master (see page 14).

1. Press and hold the terminal's **SETUP** button for about 1 second.

- The indicators on the terminal light one at a time in succession for a few seconds.

PLC			
LAN			
MASTER			

2. The indicators light for a few seconds. This indicates the network speed test result.

3. Refer to the chart below to determine the network speed.

PLC				
LAN				
MASTER				
Network speed	No link	Good Less than 10 Mbps*1	Better 10 Mbps to 30 Mbps*1	Best More than 30 Mbps*1

*1 Approximate data transmission speed when transmitting data using the UDP protocol.

4. If you are not satisfied with the speed test result, connect the terminal to a different wall outlet and repeat the test.

Note

- At least one indicator ("Good" network speed) must be lit in order to use the terminal.
- If you are not satisfied with the speed test result and have tried connecting the terminal to different wall outlets, refer to the troubleshooting section (see page 15).
- If the electrical conditions in your home changes after performing the speed test, network speed may also change.

Once you are satisfied with the terminal's speed test result, you are ready to connect each adaptor to a network device (broadband router, hub, computer, network printer, network camera, etc.; see page 10).

Understanding the indicators

PLC	Blue, lit	The adaptor is successfully connected to the HD-PLC network.
	Blue, flashing	The terminal is being registered to the master.
	Blue, flashes once every 5 or 10 seconds	The adaptor is registered to the master, but it is not connected to the HD-PLC network.
	Blue, turns off once every 10 seconds	The master has detected another master adaptor. In this situation, performance will be affected by the presence of the other master adaptor.
	Red, lit for 5 seconds	There was an error during registration. Try again.
	Red, lit	The adaptor is not functioning properly and cannot communicate over the HD-PLC network. Contact an authorized Panasonic service center.
	Off	The adaptor is not plugged in. The adaptor is not connected to the HD-PLC network (no other adaptors found, not configured, etc.).
LAN	Green, lit	A LAN cable is connected to the adaptor.
	Green, flashing	Data is being sent/received.
	Orange, lit	There is no network device connected to the adaptor via the LAN cable, or the network device is not turned on.
	Off	The adaptor is not plugged in.
MASTER	Green, lit	The adaptor is configured as the master.
	Green, flashes for 10 seconds	A terminal has been successfully registered to the master.
	Off	The adaptor is not configured as the master.

Resetting an adaptor

Normally an adaptor does not need to be reset, however, you may need to reset an adaptor if:

- You are concerned that another adaptor may have been accidentally registered to your master. (For example, the adaptor of someone who lives in the same apartment building as you.)
- An error occurs while registering a terminal to the master.
- You are registering an adaptor

Note

- Resetting a terminal erases its registration to the master. It must be registered to the master again in order to be used.
- If the master is reset, all terminals must be registered to the master again in order to be used.

Follow the procedure below to reset an adaptor.

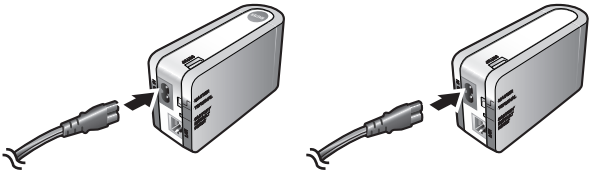
1. Press the **FACTORY DEFAULT RESET** button on the adaptor for about 3 seconds.
   - The adaptor's indicators will begin flashing.
2. Once the adaptor's indicators stop flashing, the adaptor has been reset.
   - Do not disconnect or unplug the AC cord for 30 seconds.

Registration

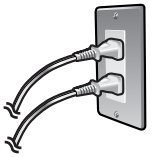
Use the procedure below when you want to:

- Add an additional terminal to your HD-PLC network.
- Re-register the master and terminal after resetting the master.

1. Confirm that the mode selector of the master adaptor is set to **MASTER**.
2. Confirm that the mode selector of the terminal adaptor that you want to register is set to **TERMINAL**.
3. Connect the AC cord of each adaptor to each adaptor's **AC IN** jack.



4. Plug the AC cord of each adaptor to the same wall outlet.
   - Registration may not be successful if the adaptors are connected to different wall outlets during registration.



5. Reset the terminal by pressing the **FACTORY DEFAULT RESET** button on the terminal for about 3 seconds (see page 13).
   - Check the position of the adaptor's mode selector (see page 8) and make sure that you reset the terminal adaptor (not the master).
6. Press the **SETUP** button on both adaptors for about 1 second. The order in which they are pressed does not matter.
   - The **PLC** indicator of each adaptor will begin to flash in blue.
   - Make sure you press the **SETUP** button on each adaptor within 5 seconds of each other.
   - If you are registering an additional terminal, communication between all other adaptors may be disrupted for about 10 seconds.
7. When the **PLC** indicator of each adaptor lights in blue, registration was successful.
   - If the **PLC** indicators do not light in blue, see page 15.
8. Wait 30 seconds, then unplug the AC cords from the wall outlet and place the adaptors where you plan to use them (see page 9).

Troubleshooting

Performance issues

The troubleshooting notes in this section are provided to resolve the following types of performance issues.

- Inability to transmit data over the HD-PLC network
- Slow data transmission speeds (interrupted video or audio, slow download speeds, etc.)
- Intermittent or varied performance (faster at certain times, slower at others)
- Interference caused by an adaptor
- The **PLC** indicator is not lit in blue even though you have registered the adaptor.

Troubleshooting notes

In most cases, performance issues such as those listed above can be resolved by performing the following troubleshooting notes. Each note contains several steps. After you perform each step, test the terminal's network speed (see page 11) to see if the issue has been resolved. For more information, access the Panasonic PLC Support Site at: **http://panasonic.co.jp/pcc/products/en/plc/**

Troubleshooting note #1:

Adaptor issues

Perform each step until the performance issue is solved.

1. Confirm that the AC cords of both the master and terminal adaptor are connected to the wall outlet. If an adaptor's **LAN** indicator is not lit, the adaptor is not receiving power.
2. Confirm that all LAN cables are securely connected to each adaptor. Use quality LAN cables. Also confirm that other network devices (routers, hubs, etc.) are turned on as well as properly connected and configured.
3. Disconnect the AC cord from the master and/or terminal adaptor, then connect it again to restart the adaptor.
4. Try connecting the master and/or terminal adaptor to a different wall outlet.
5. If you are not able to connect an adaptor's AC cord directly to a wall outlet and must use a power strip, make sure the power strip is plugged directly into a wall outlet and not to another power strip.
6. Make sure the power strip does not have a noise filter or a surge protector, as these features may interfere with the performance of your adaptors.
7. Use a power strip with an AC cord that is as short as possible.
8. Re-register the terminal following the procedure on page 14.

If you are still experiencing performance issues, continue to the next troubleshooting note.

Troubleshooting note #2:

Eliminating interference caused by other appliances

Perform each step until the performance issue is solved.

1. Identify potential electrical noise emitting appliances, and unplug them (if possible) briefly while you test the adaptor's network speed.
   The following appliances are more likely to produce noise:
   - Battery chargers (including cell phone chargers)
   - Hair dryers
   - Vacuum cleaners
   - Lights or lamps which have a dimmer switch or a touch-sensitive on/off feature
   - Power drills
2. If unplugging a device seems to resolve the adaptor's performance issue, connect the device to a different wall outlet.
3. If connecting the device to a different wall outlet does not resolve the performance issue, connect the device to a noise filtering power strip with an AC cord that is at least 3 m (about 10 ft.) long.

Troubleshooting note #3:

Eliminating interference caused by an adaptor

This product may interfere with the following appliances:

- Short wave radios
- Lights or lamps which have a touch-sensitive on/off feature
- Other PLC adaptors which do not use the HD-PLC standard

Perform each step until the performance issue is solved. If the following steps do not resolve the issue, refer to the Panasonic PLC Support Site at: **http://panasonic.co.jp/pcc/products/en/plc/** or call our customer call center at 1-800-272-7033.

1. Make sure that the appliance is not plugged into the same wall outlet as an adaptor.
2. Move the appliance away from any nearby adaptors.
3. Connect the appliance to a power strip.
4. For short wave radios, place the radio near a window.

Specifications

All specifications are subject to change without notice.

Power Line Communication interface

Standard	HD-PLC
Actual transmission speed*1	UDP: Max. 70 Mbps TCP*2: Max. 42 Mbps
Maximum recommended no. of adaptors per network*3	16 (including the master)
Maximum recommended no. of network devices connected to an adaptor*4	8

*1 Results may vary depending on electrical conditions, network environment, and other factors. For information on how transmission speed is measured, access the Panasonic PLC Support Site at: **http://panasonic.co.jp/pcc/products/en/plc/**

*2 Using Linux FTP.

*3 Performance may be affected as more adaptors are added to the network.

*4 Connecting more network devices to an adaptor may increase network traffic and affect performance.

LAN interface

Standard	IEEE 802.3/IEEE 802.3u
Interface	10 Base-T 100 Base-TX Auto MDI/MDI-X
Protocol	IPv4, IPv6, TCP, UDP
Access method	CSMA/CD

User interface

Indicators	**PLC** (blue, red) **LAN** (green, orange) **MASTER** (green)
Other	Mode Selector (**MASTER** or **TERMINAL** switch) **SETUP** button **FACTORY DEFAULT RESET** button

General

Operational environment	0–40 °C (32–104 °F) 20%–85% humidity (without condensation)
Dimensions (W x D x H)	Approx. 121 mm x 40 mm x 70 mm (4 3/4” x 1 9/16” x 2 3/4”)
Weight	240 g (0.53 lb.)
Power supply	Input 120 V, 60 Hz
Power consumption	4 W

HD-PLC interface

Frequency band	4–28 MHz
Modulation	Wavelet OFDM (16 PAM–2 PAM)
Transmission PHY rate	Max. 190 Mbps*1
Access method	CSMA/CA TDMA
Error correction	Reed-Solomon encoder/decoder Convolutional encoder/Viterbi decoder
Encryption	AES 128-bit encryption
Communication distance	Approx. 150 m (490 ft.)*2

*1 This is the theoretical maximum data transmission speed of the HD-PLC standard.

*2 Varies depending on the electrical environment. For more information, see page 5.

FCC and other information

This equipment has been tested and found to comply with the limit for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television, reception, which can be determined by tuning the equipment off and on, the user is encouraged to try to correct the interference by one or more the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAUTION

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device.

NOTICE

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Responsible Party

Panasonic Corporation of North America
One Panasonic Way, Secaucus, New Jersey 07094
Phone number: 1-800-211-PANA (7262)

Environment

Do not place the unit in a room where the temperature is less than 0° C (32° F) or greater than 40° C (104° F). Allow 10 cm (4 in.) clearance around the unit for proper ventilation. Avoid excessive smoke, dust, mechanical vibration, shock, or direct sunlight.

Routine Care

Wipe the unit with a soft cloth. Do not use benzine, thinner, or any abrasive powder. When you leave the unit unused for a long period of time, unplug the AC cord from the outlet.

In the Event of Trouble

Consult an authorized Panasonic Factory Service Center.

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rijndael-alg-fst.c
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Optimised ANSI C code for the Rijndael cipher (now AES)
@author Vincent Rijmen
<vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers
<antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>

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<SSL>

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Some states do not allow the exclusion or limitation of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the exclusions may not apply to you.
This limited warranty gives you specific legal rights and you may also have others rights which vary from state to state. If a problem with this product develops during or after the warranty period, you may contact your dealer or Servicenter. If the problem is not handled to your satisfaction, then write to the warrantor's Consumer Affairs Department at the addresses listed for the warrantor.

PARTS AND SERVICE WHICH ARE NOT COVERED BY THIS LIMITED WARRANTY ARE YOUR RESPONSIBILITY.

To obtain service or technical assistance within the USA:

DIAL TOLL FREE: 1-800-272-7033

Customer services

Obtain Product Information and Operating Assistance; locate your nearest Dealer or Servicenter; purchase Parts and Accessories; or make Customer Service and Literature requests by visiting our Web Site at:

http://www.panasonic.com/consumersupport

or, contact us via the web at:

http://www.panasonic.com/contactinfo

You may also contact us directly at: 1-800-272-7033,
Monday-Friday 9 am-9 pm; Saturday-Sunday 10 am-7 pm, EST.

TTY users (hearing or speech impaired users) can call 1-877-833-8855.

Accessory purchases

Purchase Parts, Accessories and Instruction Books online for all Panasonic Products by visiting our Web Site at:

http://www.pasc.panasonic.com

or, send your request by E-mail to:

npcparts@us.panasonic.com

You may also contact us directly at:
1-800-332-5368 (Phone) 1-800-237-9080 (Fax Only)
(Monday - Friday 9 am to 8 pm, EST.)
Panasonic Services Company
20421 84th Avenue South, Kent, WA 98032
(We Accept Visa, MasterCard, Discover Card, American Express, and Personal Checks)

TTY users (hearing or speech impaired users) can call 1-866-605-1277.

Service in Puerto Rico

Panasonic Puerto Rico, Inc.
San Gabriel Industrial Park, Ave. 65 de Infantería, Km. 9.5,
Carolina, Puerto Rico 00985
Phone (787)750-4300, Fax (787)768-2910

For product service

- Panasonic Servicenters are listed in the servicenter directory.
- Call 1-800-272-7033 for the location of an authorized servicenter.
- This product is designed for use in the United States of America.
  Sale or use of this product in other countries/areas may violate local laws.

When you ship the product

- Carefully pack your unit, preferably in the original carton.
- Attach a letter, detailing the symptom, to the outside of the carton.

Symptom

_____

_____

- Send the unit to an authorized servicenter, prepaid and adequately insured.
- Do not send your unit to the Panasonic Consumer Electronics Company listed below or to executive or regional sales offices. These locations do not repair consumer products.

The information in this document is subject to change without notice.

Panasonic Consumer Electronics Company,
Division of Panasonic Corporation of North America
One Panasonic Way, Secaucus, New Jersey 07094

Panasonic Puerto Rico, Inc.
San Gabriel Industrial Park, Ave. 65 de Infantería, Km. 9.5,
Carolina, Puerto Rico 00985

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