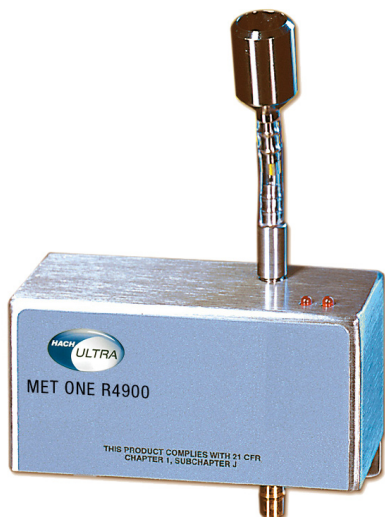


Operator Manual

MET ONE R4900 SERIES REMOTE AIRBORNE PARTICLE COUNTER



EXCELLENCE IN PROCESS ANALYTICS

Operator Manual

MET ONE R4900 SERIES

REMOTE AIRBORNE PARTICLE COUNTER

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Manual Overview

About This Manual

The information in this manual has been carefully checked and is believed to be accurate. However, Hach Ultra Analytics assumes no responsibility for any inaccuracies that may be contained in this manual. In no event will Hach Ultra Analytics be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. In the interest of continued product development, Hach Ultra Analytics reserves the right to make improvements in this manual and the products it describes at any time, without notice or obligation.

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Safety Conventions



WARNING

A warning is used to indicate a condition which, if not met, could cause serious personal injury and/or death. Do not move beyond a warning until all conditions have been met.

CAUTION:

A caution is used to indicate a condition which, if not met, could cause damage to the equipment. Do not move beyond a caution until all conditions have been met.

Note:

A note is used to indicate important information or instructions that should be considered before operating the equipment.

General Safety Considerations

- All service procedures should be conducted by properly trained service personnel.
- Follow all procedures in “[Return Procedures](#)” on page 17 before shipping a unit to a service center for repair or re-calibration.
- Additional safety information is included in the *Particle Counters for Air* manual. For additional assistance, contact the Hach Ultra Analytics Technical Support representatives at 800.866.8854 or +1 541.472.6500.



WARNING

Attempts by untrained personnel to disassemble, alter, modify or adjust the electronics may result in personal injury and damage to the R4903, R4905, R4915 Remote Airborne Particle Counters.

Laser Safety Information

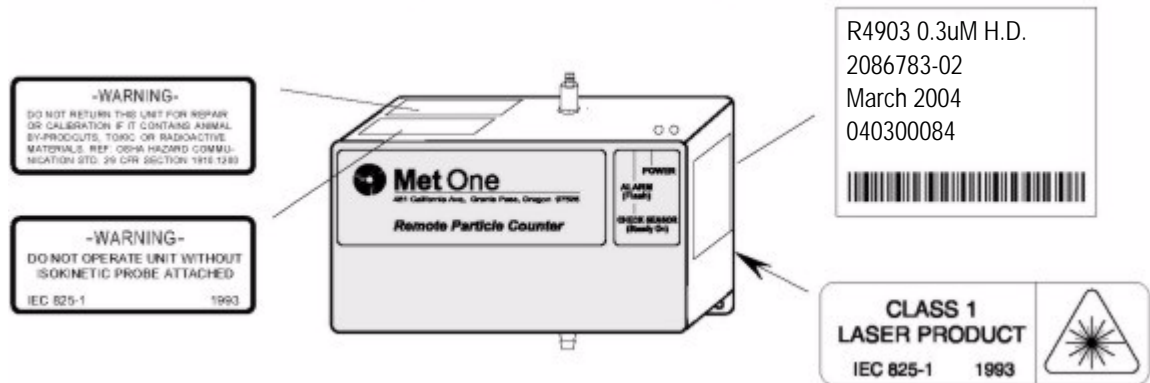
- Laser Safety -- Class 1 Laser Product -- Complies with 21 CFR Chapter 1, Subchapter J.
- Evaluated and tested in accordance with EN 61010-1:1993, "Safety requirements for Electrical Equipment for Measurement, Control, and Laboratory Use" and IEC 825-1:1993, "Safety of Laser Products."



WARNING

Use of controls or adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure that may cause blindness.

Several labels are attached to the unit for safety and awareness. Reproductions of the labels are shown here:



Electrostatic Safety Information

CAUTION:

Electrostatic discharge (ESD) can damage or destroy electronic components. All maintenance work on R4900 Series particle counters should be done at a static-safe work station, observing all ESD safety procedures and precautions.

The following practices support ESD safety procedures.

- Use a grounded conductive table mat and resistor-isolated wrist strap combination.



WARNING

Using a wrist strap without an isolation resistor will increase the severity of an electrical shock.

- Earth-ground all test instruments to prevent a buildup of static charge.

Warranty

Hach Ultra Analytics warrants that this instrument will be free of defects in materials and workmanship for a period of one (1) year from the shipping date. If any instrument covered under this warranty proves defective during this period, Hach Ultra Analytics will, at its option, either repair the defective product without charge for parts and labor, or provide an equivalent replacement in exchange for the defective product.

To obtain service under this warranty, the customer must notify the nearest Hach Ultra Analytics service support center on or before the expiration of the warranty period and follow their instructions for return of the defective instrument. The customer is responsible for all costs associated with packaging and transporting the defective unit to the service support center, and must prepay all shipping charges. Hach Ultra Analytics will pay for return shipping if the shipment is to a location within the same country as the service support center.

This warranty shall not apply to any defect failure or damage caused by improper use or maintenance or by inadequate maintenance or care. This warranty shall not apply to damage resulting from attempts by personnel other than Hach Ultra Analytics representatives, or factory-authorized and trained personnel, to install, repair or service the instrument; to damage resulting from improper use or connection to incompatible equipment; or to instruments that have been modified or integrated with other products when the effect of such modification or integration materially increases the time or difficulty of servicing the instrument.

THIS WARRANTY IS GIVEN BY HACH ULTRA ANALYTICS WITH RESPECT TO THIS INSTRUMENT IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED. HACH ULTRA ANALYTICS AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR NON-CONTRACTUAL PURPOSE. HACH ULTRA ANALYTICS' RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. HACH ULTRA ANALYTICS AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES EVEN IF HACH ULTRA ANALYTICS OR ITS VENDORS HAS BEEN GIVEN ADVANCED NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

Revision History

- Revision A, September 1995, Pacific Scientific Instruments.
- Revision B, November 2001, Pacific Scientific Instruments.

Acknowledgements

- Belden is a registered trademark of Belden Inc.
- PROCOMM is a registered trademark of Symantec, Inc.
- Windows and HyperTerminal are trademarks or registered trademarks of the Microsoft Corporation.

1 Introduction

1.1 Overview

This operating guide provides specific information on the following topics for the Met One R4903, R4905, R4915 Remote Airborne Particle Counters:

- Initial inspection
- Operating the counter
- Maintaining the counter

The remote counter, shown in [Figure 1-1](#), is manufactured in three standard configurations.

- The Model R4903 counts particles in the 0.3 μm and 0.5 μm size range at 0.1 cfm (2.83 lpm) flowrate.
- The Model R4905 counts particles in the 0.5 μm and 5.0 μm size range at 0.1 cfm (2.83 lpm) flowrate.
- The Model R4915 counts particles in the 0.5 μm and 5.0 μm size range at 1.0 cfm (28.3 lpm) flowrate.

All three units can be used for remote counter applications in class 10 or better cleanroom requiring low zero counts.



Fig 1-1 : Remote Airborne Particle Counter

The R4900 Series particle counters use a laser diode light source and collection optics for particle detection. Particles scatter light from the light source. The collection optics collect and focus the light onto a photo diode that converts the bursts of light into electrical pulses. The pulse height is a measure of particle size. Pulses are counted and their amplitude is measured for particle sizing.

All counters use the industry-standard 4-20 mA interface. Loop current is driven by voltages between 15 and 30 vdc. The sensors use an RS-485 serial interface for programming count and hold times, alarm level, alarm delay, and scaling for the 4-20 mA output. This programming data is retained through power off and on cycles.

1.2 Dimensions

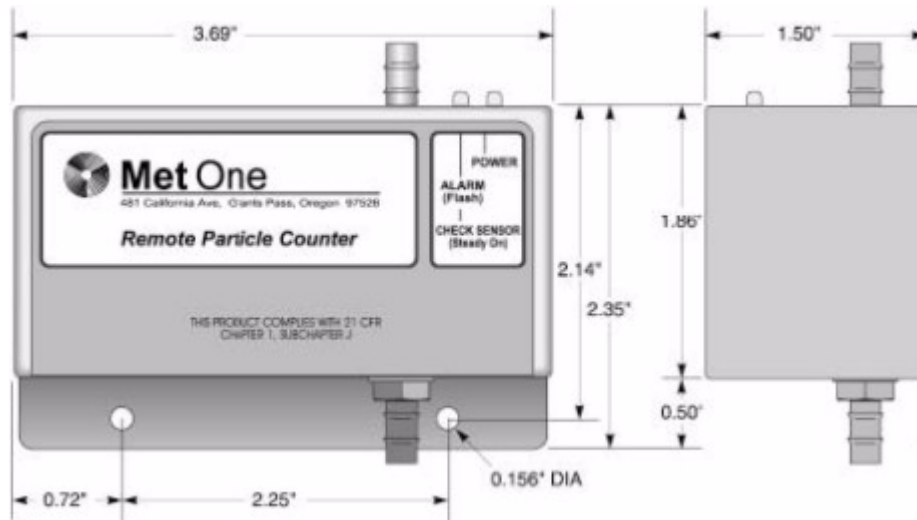


Fig 1-2 : Overall Unit Dimensions

1.3 Unpacking and Initial Inspection

The remote counter is thoroughly inspected and tested at the factory and is ready for use upon receipt. When received, inspect the shipping carton for damage. If the carton is damaged, notify the carrier and save the carton for carrier inspection. Inspect the counter for broken parts, scratches, dents, or other damage.

If the carton is not damaged, keep for reshipment for when the counter needs to be returned to the factory for its annual calibration.

2 System Setup

2.1 Interpreting Indicators

Both front-panel indicators have a specific meaning when illuminated. [Figure 2-1](#) shows the location of each indicator.

- The CHECK SENSOR/ALARM comes on steady when laser power is low, sensor optics are dirty, or view volume contains a foreign object. The LED flashes when a count alarm has been exceeded.
- The POWER LED lights when power is received through the 15-pin connector.

Note:

When the unit is first powered up, the CHECK SENSOR/ALARM LED will temporarily light. This is normal and does not indicate an error. After one minute, the CHECK SENSOR/ALARM LED will turn off and the count cycle will begin.



Fig 2-1 : Front Panel Lights

2.2 Changing the Operating Configuration

The firmware of the remote counters allow parameters to be entered after power is turned on. Once the configuration is entered, it is retained in nonvolatile memory. On each subsequent power up, the remote counter will look for a new configuration and if the setup dialog is not opened in the first minute after power is applied, the previously saved configuration will be used. The current configuration will be kept if a setup dialog is not opened.

The counter programming interface is RS-485 and requires a programming module to connect to the RS-232 port of a computer. A programming module consists of a converter kit, a power module, and two cables.

Note:

While programming the sensors, ignore the CHECK SENSOR/ALARM.

Change the internal setup program in remote counters as follows:

- 1) Connect the programming kit, computer, and a remote counter as shown in [Figure 2-2](#).

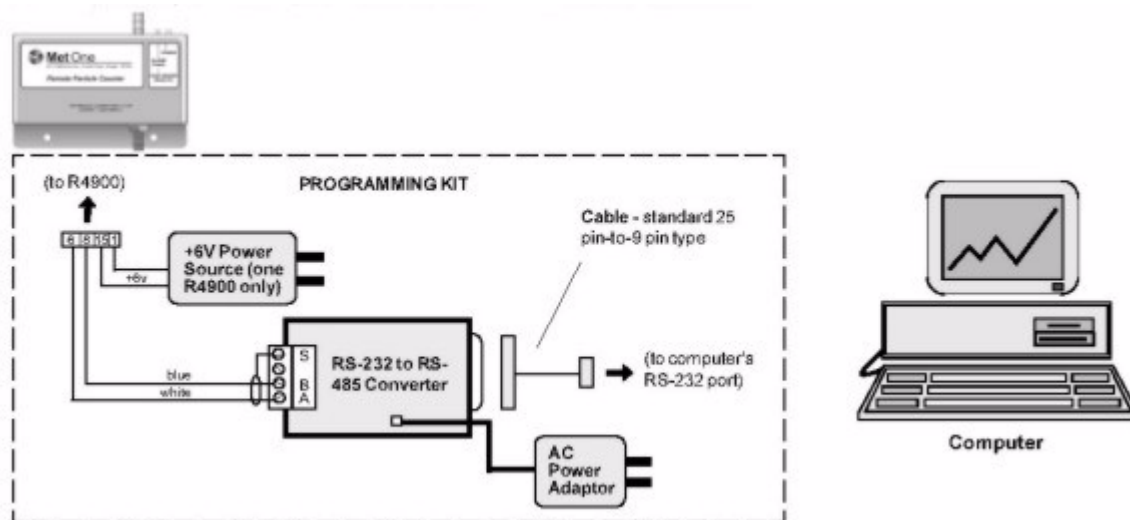


Fig 2-2 : Setting Programming Parameters Using Programming Kit

- 2) Apply power to the computer, then verify the following computer settings:
 - 9600 baud
 - No parity
 - Eight data bits
 - One stop bit
- 3) Turn the power switch on the programming module to ON. Access to the change menu for configuration of the remote counter is limited to the first 60 seconds after the power is turned on.
- 4) To change the operating configuration, send the ASCII command "LOAD <Enter>" to the counter using a serial communications software package, such as PROCOMM® or Windows® HyperTerminal®. The load menu format of a typical configuration is shown in [Figure 2-3](#).

Note:

The word "load" is case-sensitive. Period and hold times must have a colon (:) separating the hours, minutes, and seconds (backslashes for date). See the example in [step 5](#).

```

Enter Command (Space) Data (Return) or Command (Return)
D Date (MM\DD\YY).....010195
T Time (HH:MM:SS).....083406
P Period (HH:MM:SS).....000030
H Hold (HH:MM:SS).....000012
A Alarm (XXXXXX).....000100
B Baud Rate (1200,9600)..9600
L Location (00-63).....32
M Mode (A=Auto, N=Norm)..Norm
Q Quit
Command? Q

Program EEPROM (Y/N) ? N

```

Fig 2-3 : Typical Configuration of a Load Menu Format

- 5) To change the operating configuration, type the letter of the parameter followed by a space. Then enter the desired configuration data, ending with <Enter>. For example, to change the hold time to 20 seconds, type:

```
H<space>00:00:20<Enter>
```

Note:

When changing the alarm limit, enter six digits. For example, to set Ch. 1 full scale limit to 100 counts, type:

```
1<space>000100<Enter>
```

- 6) End the sequence by typing Q and answer Y when asked, "Program EEPROM (Y/N)?" All of the configuration information will be saved in the EEPROM except for the date and time. Two beeps will be heard when the EEPROM has finished reprogramming.

Note:

When programming the sensors, loop power need not be applied.

- 7) Repeat [step 1](#) through [step 6](#) for the remaining remote counters.

2.3 Installation Using Wall Plates

Figure 2-4 shows a typical installation using wall plates. Pin assignments at the R4900 15-pin connector as well as at the wall plate are shown in the pinout table below.

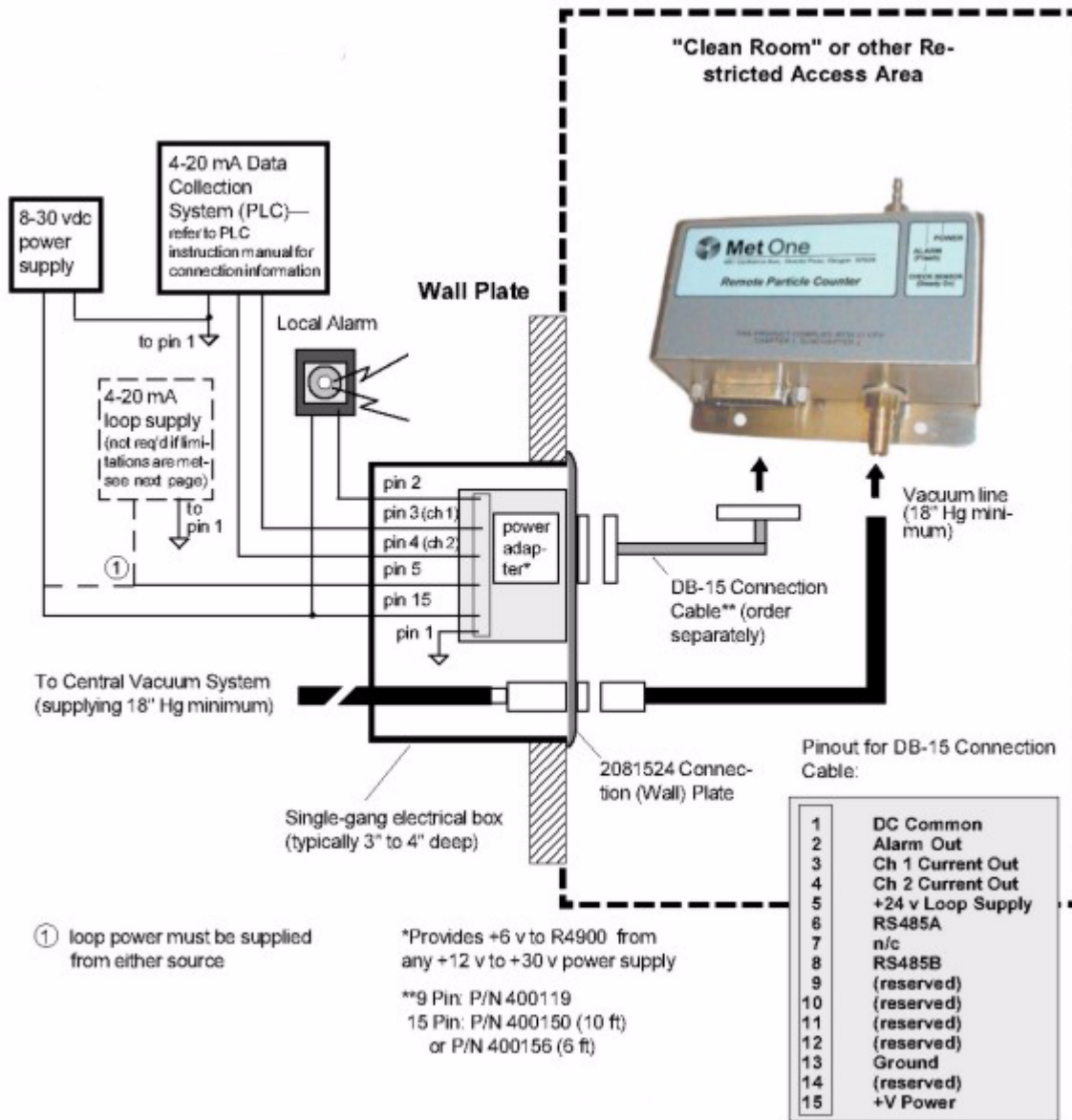


Fig 2-4 : Typical RS-485 Network Installation Diagram Using Wall Plates

Note:

All grounds are tied to pin 1 (dc common) at the wall plate.

3 System Operation

Note:

For proper operation of the remote particle counter, the 4-20mA loop power supply must be applied. Absence of the loop power supply will cause the CHECK SENSOR/ALARM LED to remain steadily on and may be ignored. Particle counting will not operate correctly under this condition.

3.1 Basic Operation

Once the remote counter is connected and power is applied, the 4-20 mA output updates automatically after each hold and count period. As shown in [Table 3-1](#), an output of 20 mA represents the full-scale particle count value as set in the operating configuration for channel 1, 4 mA represents zero particle counts, and zero mA outputs indicate a sensor failure. If the alarm output is to be used, the remote counter will need to be reprogrammed for count and hold times, full scale value for both outputs, the alarm limits and alarm delay. Refer to [“Changing the Operating Configuration” on page 9](#) to change the remote counter’s configuration.

Table 3-1 : Output Indications

Output Reading (in mA)	Condition Indicated
20	Full scale particle counts
4	Zero particle counts
0	Sensor calibration failure

When using a +24 vdc power supply as the voltage supply to the counter (via the wall plate power adapter), as shown in [Figure 2-4](#), the power supply can also be used as the 4-20 mA loop power source if loop resistance is met, as shown in [Figure 3-1](#). [Figure 3-1](#) shows the maximum limits of total loop resistance allowed.

The remote counter will run for the set sample period. At the end of the sample period, the number of counts for the first sample is updated to the output. The output remains at that value until the end of the next sample updates it.

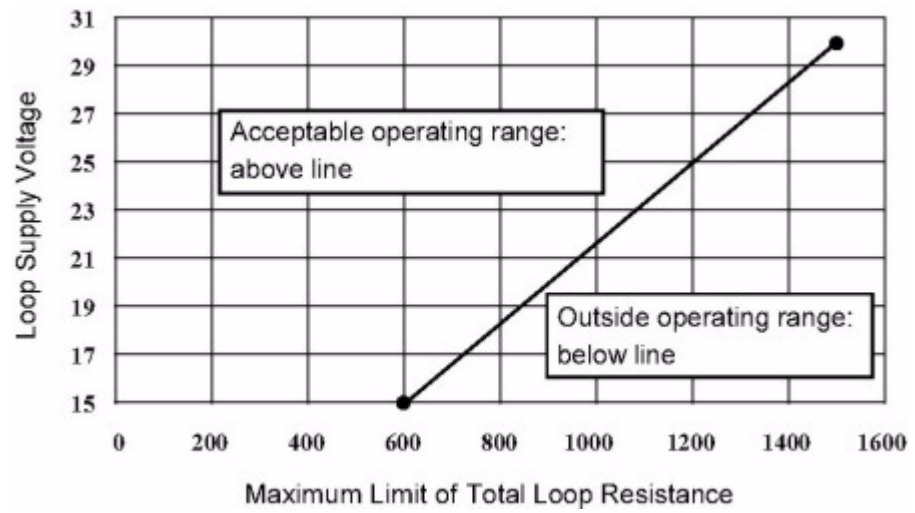


Fig 3-1 : 4-20 mA Output Limitations Curve

4 Cleaning the Sensor

4.1 Removing the Remote Counter Cover

The remote counter cover must be removed before cleaning the sensor. To remove the cover, perform the following steps using [Figure 4-1](#) as a reference:

- 1) Remove the three screws holding the cover to the remote counter assembly.
- 2) Unscrew the barbed extension (stainless steel) from sensor.
- 3) Gently slide the remote counter assembly away from the cover.

CAUTION:

Take care not to touch the laser driver board components as the laser diode is extremely sensitive to electrostatic discharge.

- 4) When finished cleaning the sensor, reposition cover over remote counter assembly. Make sure the two LEDs fit through holes in cover. Attach cover using the three screws.

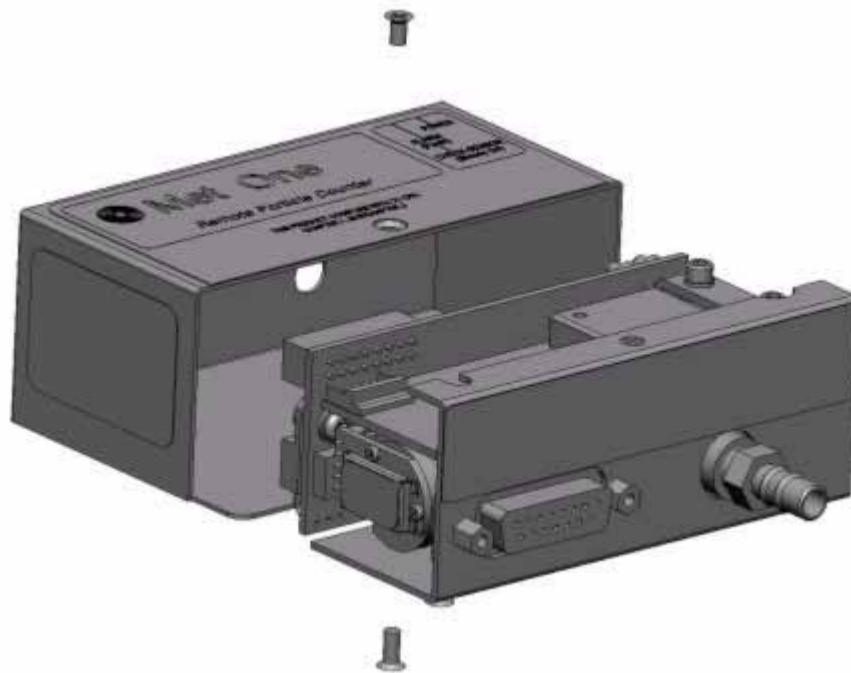


Fig 4-1 : Remote Counter Cover Removal Diagram

4.2 Cleaning the Sensor

Contaminants may build up on the internal lens and reflector causing a remote counter alarm to occur (CHECK SENSOR/ALARM comes on). These surfaces can often be purged clean by drawing clean air through the sensor. Before trying the cleaning procedure, sample clean air that has passed through a filter at the nominal flow rate. Allow remote counter to be purged in

this manner for up to 24 hours. If the CHECK SENSOR/ALARM goes out, do not do this procedure. Otherwise, perform the following cleaning procedure referring to [Figure 4-2](#):

- 1) Remove all connections to the remote counter.
- 2) Remove the remote counter cover using the procedure described in “[Removing the Remote Counter Cover](#)” on page 15.
- 3) Remove the brass barbed fitting (VACUUM end).
- 4) Remove the two flat-head screws holding sensor onto the "L"-shaped mounting plate.



Fig 4-2 : Sensor Cleaning

- 5) Rotate sensor away from mounting plate enough to expose reflector (refer to [Figure 4-2](#) for the location of reflector; mounting plate not shown for clarity).
- 6) Screw two 2-56 x 3/4-inch machine screws into holes in the sensor reflector.



WARNING

Removing reflector before turning power off can quickly cause blindness.

- 7) Using the two screws as handles, pull reflector outward while twisting reflector slightly.
- 8) Clean the reflector with a medical-grade cotton applicator wetted with reagent-grade alcohol. Clean the lens located inside the housing with another applicator wetted with alcohol.

CAUTION:

Do not overtighten barbed fittings.

- 9) Insert reflector into sensor housing with a slight twisting motion until reflector bottoms out. Remove two 2-56 x 3/4-inch screws.
- 10) Reinstall sensor by following in reverse order [step 1](#) through [step 7](#) above.

Appendix A: Service Procedures

A.1 Calibration Procedures

The R4900 Series particle counters have a calibration period of one year.

A.2 Return Procedures

To return the R4903, R4905, R4915 Remote Airborne Particle Counters for service, complete the appropriate form that appears at the end of this section. For the most recent return procedure information, including copies of all required forms, call Hach Ultra Analytics at 800.866.8854 or +1 541.472.6500.

To return an instrument for credit, please contact the local sales representative.



WARNING

The following actions must be performed when returning any unit for any reason to prevent personal injury and/or damage to the unit.

- Properly decontaminate the unit prior to shipment. If a contaminated unit is received, Hach Ultra Analytics reserves the right to have the unit removed and destroyed by a hazardous materials disposal team at the shipper's expense.

A.3 Technical Support Information

Technical Support Engineers are available to provide high quality advice and recommendations for applications, product operation, measurement specifications, hardware and software, factory and customer site training.

Please provide name, company, phone, fax, model number, serial number and comment or question.

Call +1 (541) 472-6500

Toll Free (800) 866-8854 (US/CA)

Fax +1 (541) 472-6555

6:30 AM to 5:00 PM Pacific Time

Monday through Friday

Email: TechSupportGP@hachultra.com

Date: _____

RETURN AUTHORIZATION / PURCHASE ORDER

RA# _____ MUST BE MARKED ON THE OUTSIDE OF THE BOX OR YOUR UNIT WILL BE RETURNED.

In order for you to obtain a Return Authorization, this form must be completed

SHIP YOUR UNIT TO: Hach Ultra Analytics, 481 California Avenue, Grants Pass, OR 97526

You are responsible for properly draining and/or decontaminating your unit prior to shipment. If we receive a contaminated unit we reserve the right to have the unit removed and destroyed by a haz mat team at the owners expense.

TO:	Contact Providing Info:	Tel:	
	Alternate Contact:	Fax:	
		Tel:	
		Fax:	
	BILLING INFORMATION:		SHIPPING INFORMATION:
FULL COMPANY NAME (do not abbrev):		FULL COMPANY NAME (do not abbrev):	
Addr 1		Addr 1	
Addr 2		Addr 2	
City		City	
State	Zip	State	Zip
Country		Country	
Contact:		Contact:	
Tel:		Tel:	
Fax:		Ext:	
Model:	S/N:	Sizes:	Problem:
Model:	S/N:	Sizes:	Problem:
"As Received" data required? <input type="checkbox"/> Fee: \$125.00 (No charge if equipment is covered under Service Contract)		Are services covered under contract? Yes <input type="checkbox"/> No <input type="checkbox"/> Contract # _____	
NOTE: MINIMUM \$150.00 EVALUATION FEE PER UNIT APPLIES FOR REPAIRS.			
IF YOUR AUTHORIZATION / APPROVAL TO PROCEED WITH SERVICE IS NOT RECEIVED WITHIN 30 DAYS, YOUR EQUIPMENT WILL BE RETURNED UNREPAIRED AND YOU WILL BE BILLED THE MINIMUM EVALUATION FEE ABOVE.			
Estimate:		Revised:	
<i>If the actual cost exceeds the initial estimate, a revised estimate will be faxed for approval.</i>			
P.O.#	Revised:	Taxable: Yes <input type="checkbox"/> No <input type="checkbox"/> Reason: _____	
Please provide exempt certificate if applicable			
Ship Method: FEDX 3DAY ECON/PPB		FOB: Grants Pass, Oregon	Payment Terms: Net 30
Visa/MC/AMEX accepted. If paying by credit card, please request credit card form.			
Authorization Signature:			Date:

NOTE: Upon your approval with your P.O.# denoted above, this form becomes a binding agreement between you, the customer, for payment of services performed by Hach Ultra Analytics.

From: _____

Tel: **800-866-7889** Fax: **541-472-6170**

Approved: _____ Date to Ship: _____

IMPORTANT INFORMATION!

INSTRUCTIONS FOR SENDING YOUR PARTICLE COUNTER IN FOR REPAIRS OR CALIBRATION

- 1) Enclosed is the “RETURN AUTHORIZATION/PURCHASE ORDER” Form that must be filled out completely in order to obtain a Return Authorization Number (RA#) from Hach Ultra Analytics.
- 2) The **RA# must be marked on the outside of the box** before shipping any unit to us for repair or calibration. **Boxes received with no RA# marked on them will be returned.**
- 3) You are responsible for properly draining and/or decontaminating your unit prior to shipment. If we receive a contaminated unit we reserve the right to have the unit removed and destroyed by a haz mat team at the owners expense.
- 4) Following are Instructions for Filling out RA/PO Form. Please make sure every line is filled out completely, providing the following information:
 - a) Main Contact: Full name of contact person; include phone/fax numbers.
 - b) Billing and Shipping Information: Include addresses, phone/fax numbers, and contact person.
 - c) Equipment Information: Include model number(s), Serial number(s), and the reason for sending the equipment in (i.e., calibration and repair). Provide a detailed description of what is wrong with the unit.
 - d) Call Customer Service @ 800-866-7889 and ask the Customer Service Rep for a “NOT TO EXCEED” amount for your RA/PO Form by giving them the model number(s) of the instrument and the reason for the return.
 - e) Method of Payment: Mark the appropriate box on the bottom of the form (for credit card payment, please provide credit card information including signature of the card holder),
 - f) If you require “As Received Data”, please check the appropriate box.
 - g) Provide Taxable Information (not applicable for International service).
 - h) If you want your unit shipped back to you other than FedEx Economy (3 Day), please cross out this ship method, and provide us with the account number and ship method you wish us to use when returning your unit.

Once the form is complete, please FAX to 541-472-6170. You will be given a Return Authorization Number within 24 hours. If you need the RA# immediately, please call after faxing it and the Customer Service Rep can give you the number verbally.

This form helps us to better serve our customers, and it has reduced turn around time considerably. If you have any questions filling out this form, please do not hesitate to call our Customer Service Reps at 1-800-866-7889.

THANK YOU FOR YOUR COOPERATION IN OBTAINING AN RA#

RA Number:	Date:
-------------------	--------------

Return Authorization / Service Order (International only)

- A. To obtain RA number, complete this form and email/fax it to Service at 541-472-6170.
- B. **Mark the RA number on outside of the box.** Unmarked boxes will be returned with no action.
- C. Ship your unit to: HACH Ultra Analytics, 481 California Avenue, Grants Pass, OR 97526
- D. If the actual repair cost exceeds your approval, then we will contact you with an estimate.
- E. Revise your original approval / purchase order for the new amount. If we don't receive your revised order within 60 days, we will return your unit and bill you \$ 150 evaluation fee.

Your Information

Your name	
Tel, Fax & Email address	

Your Company

Company Name	
Bill to Address Tel, Fax, Email, Contact Person	
Ship to Address Tel, Fax, Email Contact Person	

Your Product

Model number	Serial number	Problem

Payment & Shipping Information

<p>1) We approve repair/service charges up to \$ _____ on our Purchase order number: _____</p> <p>Authorized signature _____ Date _____</p>
<p>2) Shipment method, your carrier account number and other shipping instructions:</p>
<p>3) Value of the instrument for customs purposes only: \$ _____</p> <p>IMPORTANT NOTE ON CUSTOMS VALUE: Our invoice will include the repair value as the commercial value of the invoice. This value will be declared in our invoice and shipping documentation. We would also need to declare the value of the unit itself for customs purposes. This value is for customs only and has no commercial value. Please provide us with the reasonable value of the instrument for customs purposes.</p>

Tel: 800-866-7889 Fax: 541-472-6170 EMAIL: customerservice@hachultra.com

RETURNING UNITS FOR REPAIRS

PROCEDURES

- A. To obtain RA number, complete the attached form and email/fax it to Service at 541-472-6170. Please provide all the information required including your company information (Bill to and ship to addresses), product information (Model number, serial number and detailed problem statement), your not to exceed amount and purchase order number, payment method and complete shipping instructions.
- B. **Mark the RA number on outside of the box.** Unmarked boxes will be returned with no action.
- C. Ship your unit to: Hach Ultra Analytics, 481 California Avenue, Grants Pass, OR 97526
- D. If the actual repair cost exceeds your approval, then we will contact you with an estimate.
- E. Revise your original approval / purchase order for the new amount. If we don't receive your revised order within 30 days, we will return your unit and bill you \$150.00 USD evaluation fee.

RETURNING UNITS

All units should be sent to Hach Ultra Analytics at the address below. AWB should contain the following information:

Consignee	Hach Ultra Analytics 481 California Ave., Grants Pass, Oregon 97526 USA
Notify	Expeditors International 2508 North Marine Dr., Portland, OR 97217 Tel: 503-254-3707
Airport of destination	Portland Airport, Oregon, USA

COMMERCIAL INVOICE

Please make sure that your commercial invoice clearly states that units are **Made in USA by Hach Ultra Analytics** and are being returned for repair or replacement. **Customs will hold shipment if no invoice is included.**

FREIGHT CHARGES

If the returned items are not covered under warranty, you are responsible for freight charges. If the item is covered under warranty, you will pay freight for returning the item to Hach Ultra Analytics. Hach Ultra Analytics will pay the freight to ship the replaced or repaired item covered under warranty. Hach Ultra Analytics will return the repaired unit by the same method it was shipped to Hach Ultra Analytics.

IMPORT CHARGES

When you use airfreight to return items, our broker charges an average of \$100.00 to \$150.00 to clear and deliver the shipment to us. Hach Ultra Analytics will bill you for these import charges. Attached is a declaration form that, if completed and included with your shipment to Expeditors International, may reduce or eliminate these customs fees altogether. Please forward a copy of this form to us as well because there is a similar form that we need to complete and forward to them verifying your information. As an alternative to using Expeditors International you can ship via a courier service such as Federal Express or UPS, who deliver directly to us bypassing the customs broker.

CUSTOM'S VALUE FOR REPAIR OR REPLACED ITEMS

Please provide us with the "Declared value for customs" when completing the RA form. Our invoice will include the repair value as the commercial value of the invoice. This value will be declared on our invoice and shipping documentation. We would also need to declare the value of the unit itself for customs purposes. This value is for customs only and has no commercial value. As the shipper Hach Ultra Analytics bears the burden of proof for the value, if you do not provide a reasonable value of the instrument, Hach Ultra Analytics will override the given amount. Hach Ultra Analytics assumes no responsibility for damage to the product during shipment/transit. Please note that in case of transit damage, the amount you can claim from your insurance will be limited to the declared value.

Declared Value/American Manufacturer's Affidavit
Goods have no commercial value they are being returned for repair/calibration

Date: _____

Name of Manufacturer: Hach Ultra Analytics
Address of Manufacturer: 481 California Avenue
Grants Pass, OR 97526

Description of returned articles: _____

I declare that the information given is true and correct to the best of my knowledge and belief.

That the articles described above are the growth, produce or manufacture of the United States and have been returned to the United States without having been advanced in value or improved in condition by any process of manufacture or other means, and that no drawback has, or will be, claimed on such articles. The article was returned for the sole purpose of repairing/calibration either under warranty or at the expense of the owner. This value of \$_____ is for customs only and has no commercial value.

Name: _____

Title: _____

Signature: _____

Appendix B: Specifications and Accessories

B.1 Specifications

Sensitivity	
R4903	0.3 μm (50%) @ 0.1 cfm (2.831 lpm) 0.32 μm (100%) @ 0.1 cfm (2.831 lpm)
R4905	0.5 μm (50%) @ 0.1 cfm (2.831 lpm) 0.75 μm (100%) @ 0.1 cfm (2.831 lpm)
R4915	0.5 μm (50%) @ 1.0 cfm (28.3 lpm) 0.75 μm (100%) @ 1.0 cfm (28.3 lpm)
Flow control	Critical orifice requires at least 18" Hg vacuum (<500 mbar)
Light source	Laser diode
Coincidence loss	5% at 2,000,000 particles per cubic foot
Zero count	Not more than one count in 20 minutes
Inlet pressure	Ambient to 0.1" Hg vacuum
Indicators	Power and count alarm/calibration LEDs
Power	6 vdc ($\pm 10\%$) at < 250 mA (internal PCBA) 24 vdc ($\pm 10\%$) at < 250 mA (loop supply)
Weight	10.7 ounces (0.30 kg.)
Port sizes	1/8-inch ID inlet, 1/4-inch ID outlet
Environment:	
Temperature	Operating: 55 to 105°F (12 to 41°C) Storage: -40 to 160°F (-40 to 70°C)
Humidity	Operating: 20-95% relative, non-condensing Storage: up to 98% relative, non-condensing

B.2 Accessories

Several accessories are available to tailor the remote counter to the application. The accessories listed in [Table B-1](#) can be ordered from a local Hach Ultra Analytics representative or from the factory by calling 800.866.8854 or +1 541.472.6500 from 8 AM to 5 PM PT.

Table B-1 : Accessories

Part	Description
Switching power supply	For operating up to 16 counters (6 vdc, 5 A)
Loop power supply	Provides 24 vdc for current loop supply from a 12 to 30 vdc input (may not be required if switching power supply is capable; see text for more details)
Power adapter (part of wall plate)	Provides 6 vdc PCBA voltage (adapter plugs in-line with cable to counter, one required for each counter).
RS-232-to-RS-485 converter	For computer RS-232 interface
Wall plate	Provides quick-disconnect to signals and vacuum
Programming kit	Provides for setting program parameters in counter

Appendix C: Certifications

C.1 Declaration of Conformity

The Declaration of Conformity appears on the next page.

DECLARATION of CONFORMITY

We,

Hach Ultra Analytics
481 California Avenue
Grants Pass, OR 97526

declare under sole responsibility that the

Model: R4900 Series, Part Number: 2086897-All

conforms to Directive 89/336/EEC for Electromagnetic Compatibility and Directive 73/23/EEC for Low Voltage. Compliance was demonstrated to the following specifications as listed in the official Journal of the European Communities:

EN 61326:1998, Class A, Group 1, Emissions:

EN 55011:1991 Class A Radiated

EN 61326:1998, Immunity:

EN 61000-4-2 Electrostatic Discharge
EN 61000-4-3 Radiated Immunity, Amplitude Modulated
EN 61000-4-4 Electrical Fast Transient
EN 61000-4-5 Surge Transients
EN 61000-4-6 Conducted Immunity
EN 61000-4-8 Immunity to Power Frequency Magnetic Fields

EN 61010-1:1993 Amendment 1 & 2, Safety Requirement for Electrical Equipment for Measurement, Control and Laboratory Use

EN 60825-1:1993 Safety of Laser Products, Equipment Classification, Requirements and User's Guide.

Hach Ultra Analytics
26-APR-04
(Place and date of issue)

Shawn Hogan, Engineering Supervisor
Sh Hogan
(Name/signature of authorized person)

Annex

Tables and illustrations

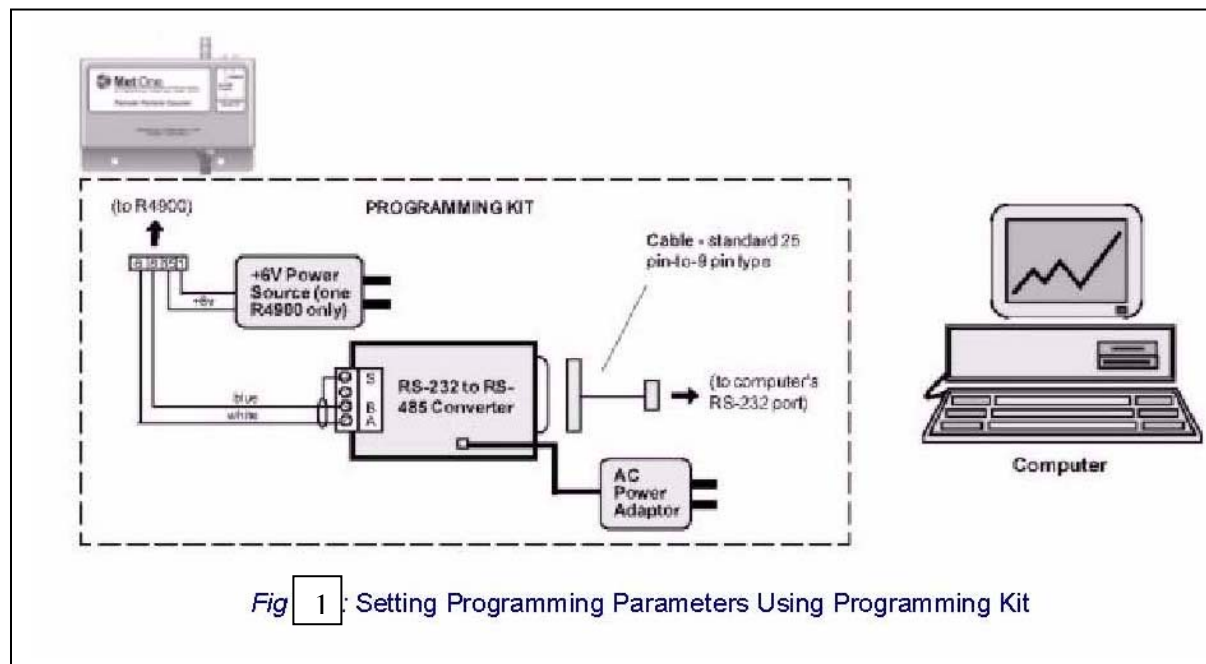
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Manual Addendum

Setting the Full Scale Limits for the Analog Particle Counters

The operating configuration of most of the MET ONE Analog counters can be changed by connecting the particle counter with a computer. Once the configuration is entered it is retained in the nonvolatile memory of the counter. On each subsequent power up, the counter looks for a new configuration and if the setup dialog screen is not opened in the first minute after the power is applied, the previously saved configuration will be used. The full scale limit value of each of the output channel of an Analog unit can be set up using this setup dialog screen from a computer.

The particle counter programming interface is RS-485 and requires a programming kit to connect to the RS-232 port of the computer. A programming module consists of a RS-232 to RS-485 converter, a power module and two cables. The following typical illustration shows how to connect the counter with a computer using a programming kit.



To set up the full scale limit of the Analog output channels:

- 1) Connect the counter to the computer utilizing the programming kit as shown above.
- 2) Apply power to the computer and verify the following computer setting:
 - a. 9600 baud
 - b. No parity
 - c. Eight data bits
 - d. One stop bit
- 3) Turn the power switch for the programming kit ON. Access to the configuration change/setup menu is available for the first 60 seconds after the power is turned on.

- To change the operating configuration, send the ASCII command "LOAD<enter>" to the counter using a serial communication software package such as PROCOMM® or Windows® Hyper Terminal® in.

Note: The word "LOAD" is case sensitive

- After "LOAD" command is sent, the load menu configuration for the counter will appear as shown below:

```

Enter Command(Space)Data(Return) or Command (return)

D=Date   (MM/DD/YY) ..... (09/29/99)
T=Time   (HH:MM:SS) ..... (08:32:30)
H=Hold   (HH:MM:SS) ..... (00:00:12)
P=Period (HH:MM:SS) ..... (00:00:30)
A=Alarm limit (size 1)....(  100)
B=Baud Rate (1200,9600).....(9600)
C=Size   (Display/Limit).....(1)
L=Location (00-63).....(32)
M=Mode (A=AUTO, M=MAN, C=CONCEN) .. (A)
V=Volume (1=CF, 2=LITER, 3=CM) .(1)
1=Analog Out 1 F/S.. [  1000]
2=Analog Out 1 F/S.. [  1000]
3=Analog Out 1 F/S.. [  1000]
4=Analog Out 1 F/S.. [  1000]
5=Analog Out 1 F/S.. [  1000]
6=Analog Out 1 F/S.. [  1000]
Q=Quit
Command ? Q
Program LOAD (Y/N) ? N
  
```

(see notes to left)

(not supported by this device)

(see last note to left)

- To setup full scale limit of Analog output channel, use six digits. For example, to set Ch1 full scale limit to 100 type:
1<space>000100<enter>

Similarly, to set Ch 2 full scale limit to 500 type:

2<space>000500<enter>

- To save the Analog full scale limit setup, type "Q" and answer "Y" when asked "Program LOAD Y/N?" The full scale limit of the Analog channels are now set.



Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user. *Note: For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment for proper disposal.* Important document. Retain with product records.

GERMAN Elektrogeräte, die mit diesem Symbol gekennzeichnet sind, dürfen in Europa nach dem 12. August 2005 nicht mehr über die öffentliche Abfallentsorgung entsorgt werden. In Übereinstimmung mit lokalen und nationalen europäischen Bestimmungen (EU-Richtlinie 2002/96/EC), müssen Benutzer von Elektrogeräten in Europa ab diesem Zeitpunkt alte bzw. zu verschrottende Geräte zur Entsorgung kostenfrei an den Hersteller zurückgeben. *Hinweis: Bitte wenden Sie sich an den Hersteller bzw. an den Händler, von dem Sie das Gerät bezogen haben, um Informationen zur Rückgabe des Altgeräts zur ordnungsgemäßen Entsorgung zu erhalten.* Wichtige Informationen. Bitte zusammen mit den Produktinformationen aufbewahren.

FRENCH A partir du 12 août 2005, il est interdit de mettre au rebut le matériel électrique marqué de ce symbole par les voies habituelles de déchetterie publique. Conformément à la réglementation européenne (directive UE 2002/96/EC), les utilisateurs de matériel électrique en Europe doivent désormais retourner le matériel usé ou périmé au fabricant pour élimination, sans frais pour l'utilisateur. *Remarque : Veuillez vous adresser au fabricant ou au fournisseur du matériel pour les instructions de retour du matériel usé ou périmé aux fins d'élimination conforme.* Ce document est important. Conservez-le dans le dossier du produit.

ITALIAN Le apparecchiature elettriche con apposto questo simbolo non possono essere smaltite nelle discariche pubbliche europee successivamente al 12 agosto 2005. In conformità alle normative europee locali e nazionali (Direttiva UE 2002/96/EC), gli utilizzatori europei di apparecchiature elettriche devono restituire al produttore le apparecchiature vecchie o a fine vita per lo smaltimento senza alcun costo a carico dell'utilizzatore. *Nota: Per conoscere le modalità di restituzione delle apparecchiature a fine vita da riciclare, contattare il produttore o il fornitore dell'apparecchiatura per un corretto smaltimento.* Documento importante. Conservare con la documentazione del prodotto.

DANISH Elektriske apparater, der er mærket med dette symbol, må ikke bortskaffes i europæiske offentlige affaldssystemer efter den 12. august 2005. I henhold til europæiske lokale og nationale regler (EU-direktiv 2002/96/EF) skal europæiske brugere af elektriske apparater nu returnere gamle eller udtjente apparater til producenten med henblik på bortskaffelse uden omkostninger for brugeren. *Bemærk: I forbindelse med returnering til genbrug skal du kontakte producenten eller leverandøren af apparatet for at få instruktioner om, hvordan udtjente apparater bortskaffes korrekt.* Vigtigt dokument. Opbevares sammen med produktdokumenterne.

SWEDISH Elektronikutrustning som är märkt med denna symbol kanske inte kan lämnas in på europeiska offentliga sopstationer efter 2005-08-12. Enligt europeiska lokala och nationella föreskrifter (EU-direktiv 2002/96/EC) måste användare av elektronikutrustning i Europa nu återlämna gammal eller utstrangerad utrustning till tillverkaren för kassering utan kostnad för användaren. *Obs! Om du ska återlämna utrustning för återvinning ska du kontakta tillverkaren av utrustningen eller återförsäljaren för att få anvisningar om hur du återlämnar kasserad utrustning för att den ska bortskaffas på rätt sätt.* Viktigt dokument. Spara tillsammans med dina produktbeskrivningar.

SPANISH A partir del 12 de agosto de 2005, los equipos eléctricos que lleven este símbolo no deberán ser desechados en los puntos limpios europeos. De conformidad con las normativas europeas locales y nacionales (Directiva de la UE 2002/96/EC), a partir de esa fecha, los usuarios europeos de equipos eléctricos deberán devolver los equipos usados u obsoletos al fabricante de los mismos para su reciclado, sin coste alguno para el usuario. *Nota: Sírvase ponerse en contacto con el fabricante o proveedor de los equipos para solicitar instrucciones sobre cómo devolver los equipos obsoletos para su correcto reciclado.* Documento importante. Guardar junto con los registros de los equipos.

DUTCH Elektrische apparatuur die is voorzien van dit symbool mag na 12 augustus 2005 niet meer worden afgevoerd naar Europese openbare afvalsystemen. Conform Europese lokale en nationale wetgeving (EU-richtlijn 2002/96/EC) dienen gebruikers van elektrische apparaten voortaan hun oude of afgedankte apparatuur kosteloos voor recycling of vernietiging naar de producent terug te brengen. *Nota: Als u apparatuur voor recycling terugbrengt, moet u contact opnemen met de producent of leverancier voor instructies voor het terugbrengen van de afgedankte apparatuur voor een juiste verwerking.* Belangrijk document. Bewaar het bij de productpapieren.

POLISH Sprzęt elektryczny oznaczony takim symbolem nie może byćlikwidowany w europejskich systemach utylizacji po dniu 12 sierpnia 2005. Zgodnie z europejskimi, lokalnymi i państwowymi przepisami prawa (Dyrektywa Unii Europejskiej 2002/96/EC), użytkownicy sprzętu elektrycznego w Europie muszą obecnie przekazywać Producentowi stary sprzęt lub sprzęt po okresie użytkowania do bezpłatnej utylizacji. *Uwaga: Aby przekazać sprzęt do recyklingu, należy zwrócić się do producenta lub dostawcy sprzętu w celu uzyskania instrukcji dotyczących procedur przekazywania do utylizacji sprzętu po okresie użytkowania.* Ważny dokument. Zachować z dokumentacją produktu.

PORTUGUESE Qualquer equipamento eléctrico que ostente este símbolo não poderá ser eliminado através dos sistemas públicos europeus de tratamento de resíduos sólidos a partir de 12 de Agosto de 2005. De acordo com as normas locais e europeias (Directiva Europeia 2002/96/EC), os utilizadores europeus de equipamentos eléctricos deverão agora devolver os seus equipamentos velhos ou em fim de vida ao produtor para o respectivo tratamento sem quaisquer custos para o utilizador. *Nota: No que toca à devolução para reciclagem, por favor, contacte o produtor ou fornecedor do equipamento para instruções de devolução de equipamento em fim de vida para a sua correcta eliminação.* Documento importante. Mantenha junto dos registos do produto.

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