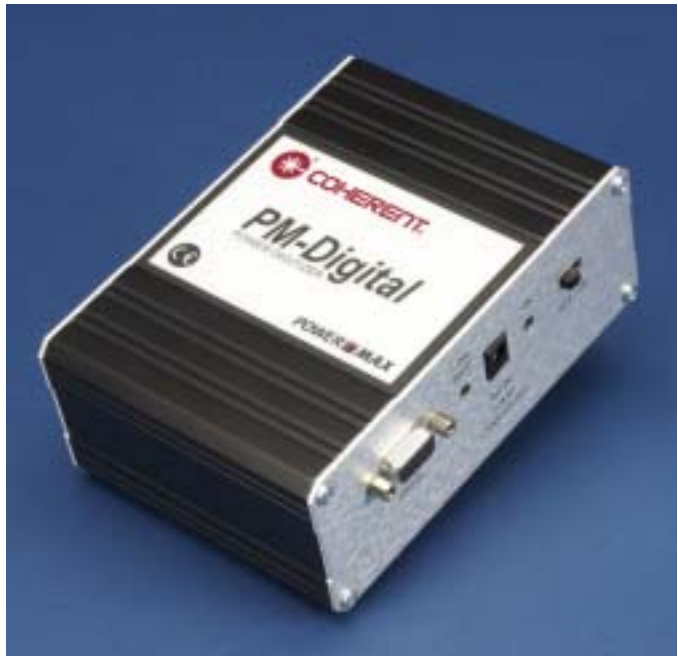


*User Manual*  
***PM-Digital***  
*Power Digitizer*





*User Manual*  
*PM-Digital*  
*Power Digitizer*



7470 SW Bridgeport Rd.  
Portland, OR 97224

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### **Technical Support**

#### **In the US:**

Should you experience difficulties with your product, or need technical information, please visit our website: [www.coherent.com](http://www.coherent.com). You can obtain additional support by either telephoning our Technical Support Hotline at 1.800.343.4912, or e-mailing our Support Team at [support.instruments@coherent.com](mailto:support.instruments@coherent.com). Telephone coverage is available Monday through Friday (except U.S. holidays).

If you call outside our office hours, your call will be taken by our answering system and will be returned when the office reopens.

If there are technical difficulties with your product that cannot be resolved by support mechanisms outlined above, please e-mail or telephone Coherent Technical Support with a

description of the problem and the corrective steps attempted. When communicating with our Technical Support Department, via the web or telephone, the model and serial number of the product will be required by the Support Engineer responding to your request.

**Outside the U.S.:**

If you are located outside the U.S., visit our website for technical assistance, or telephone our local Service Representative. Representative phone numbers and addresses can be found on the Coherent website, [www.coherent.com](http://www.coherent.com).

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## ***Preface***

This manual contains user information for the PM-Digital power digitizer.

## ***U.S. Export Control Laws Compliance***

It is the policy of Coherent to comply strictly with U.S. export control laws.

Export and re-export of lasers manufactured by Coherent are subject to U.S. Export Administration Regulations, which are administered by the Commerce Department. In addition, shipments of certain components are regulated by the State Department under the International Traffic in Arms Regulations.

The applicable restrictions vary depending on the specific product involved and its destination. In some cases, U.S. law requires that U.S. Government approval be obtained prior to resale, export or re-export of certain articles. When there is uncertainty about the obligations imposed by U.S. law, clarification should be obtained from Coherent or an appropriate U.S. Government agency.

## ***Publication Updates***

To view information that may have been added or changed since this publication went to print, connect to [www.coherent.com](http://www.coherent.com).

***Symbols Used  
in This  
Document***



---

**This symbol is intended to alert the operator to the presence of dangerous voltages associated with the product that may be of sufficient magnitude to constitute a risk of electrical shock.**

---



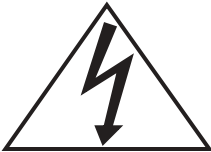
---

**This symbol is intended to alert the operator to the presence of important operating and maintenance instructions.**

---

# SAFETY

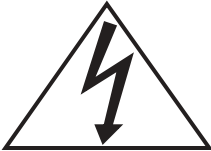
Carefully review the following safety information to avoid personal injury and to prevent damage to this digitizer or any sensor connected to it. There are no user-serviceable parts in the PM-Digital digitizer. For service information, refer to “Obtaining Service” on page 31.



---

**Use only the power cord specified for the digitizer. The grounding conductor of the cord must be connected to earth ground.**

---



---

**Do not operate the digitizer if its panels are removed or any of the interior circuitry is exposed.**

---



---

**Do not operate the digitizer in wet or damp conditions, or in an explosive atmosphere.**

---



---

**Operate the digitizer only within the specified voltage range.**

---



---

**Do not apply a voltage outside the specified range of the input connections.**

---



---

**Provide proper digitizer ventilation.**

---



---

**Do not operate the digitizer if there are suspected failures. Refer damaged units to qualified Coherent service personnel.**

---

# Declaration of Conformity

CE-12.32

Revision AB

## Declaration of Conformity

We

Coherent, Inc. (formerly, Moletron Detector, Inc.)  
7470 SW Bridgeport Road  
Portland, Oregon, USA 97224

declare that the

### **PM-Digital**

meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated per testing to EN61326 Electromagnetic Compatibility Product Family Standard for Measurement, Control and Laboratory Equipment to include the following test specifications as of January 2003:

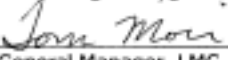
EN55011 Class A Radiated Emissions  
EN55011 Class A Conducted Emissions  
EN61000-3-3 Powerline Fluctuation Emissions

EN61000-4-2 Electrostatic Discharge – Performance Criteria B  
Unit may respond to an ESD event but will return to normal without user intervention.

EN61000-4-3 Radiated Immunity – Performance Criteria A  
EN61000-4-4 Electrical Fast Transient Immunity - Performance Criteria A  
EN61000-4-5 Electrical Slow Transient Immunity- Performance Criteria A  
EN61000-4-6 Conducted Rf Immunity - Performance Criteria A  
EN61000-4-11 Power Line Dropout - Performance Criteria A

  
\_\_\_\_\_  
Senior Engineering Manager, Instruments

Date: 5 APRIL 04

  
\_\_\_\_\_  
General Manager, LMC

Date: 6 April 04



## DESCRIPTION

Thank you for purchasing the Coherent PM-Digital Power Digitizer—a microprocessor-based power meter that provides the convenience and performance of a digital instrument. It is small, portable, and may be AC or battery operated. When connected to one of the Coherent PowerMax® series of intelligent power sensors, it automatically configures itself for that particular sensor, giving you complete assurance of convenient and accurate operation.

Specific features of PM-Digital include:

- Range:  $\mu\text{V}$  to V
- Wavelength correction (*set at the Factory*)
- RS-232 computer I/O serial interface
- NIST-traceable calibration
- Power from battery or AC battery eliminator
- Application software
- LabVIEW® drivers
- Measures CW and average power: mW to kW
- Compatible with all PowerMax thermal sensors that have DB-25 connectors







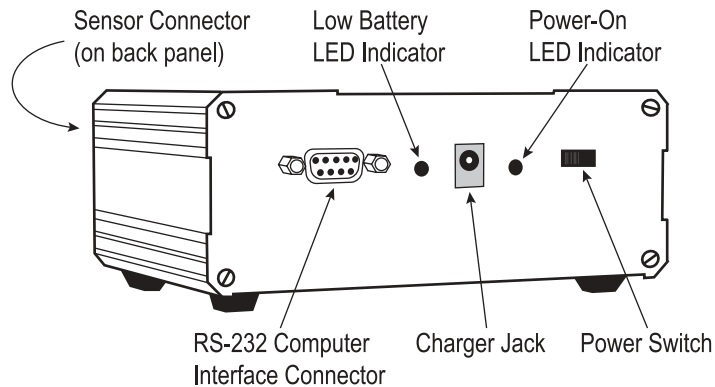
# OPERATION

This section explains how to use the PM-Digital and includes information on:

- Controls and connectors (this page)
- Application information (page 10)

## *Controls and Connectors*

Figure 1 shows the location of the controls and connectors on the PM-Digital.



**Figure 1. Controls and Connectors**

## **Power Switch**

The PM-Digitizer has a slide switch, which is used to apply power to the unit.

## **Power Supply**

The PM-Digital can be operated either on its own rechargeable NiMH battery (with 8 hours maximum operating time before recharging is necessary), or with AC power supplied via an external battery charger.

The charger recharges a completely dead battery in about 10 hours.

## **Charger Jack**

This is a barrel connector that is compatible with the supplied battery charger. The charger can both operate the instrument and keep the battery charged.

## **RS-232 Computer Interface Connector**

This 9-pin D connector is bidirectional RS-232. Data width is 8 bits, no parity, and the baud rate is 9600. The number of stop bits (1 or 2), is user-selectable. The PM-Digital responds to commands from the host computer. For a detailed description of all the software commands that the PM-Digital can process, see “Host Interface” on page 11.

The PM-Digital does not use either hardware- or software handshaking. To allow compatibility with RS-232 controllers which *do* use hardware handshaking (such as most PCs), the DSR pin is jumpered to DTR and the RTS pin is jumpered to CTS. This tells the host that the PM-Digital is always ready to receive and transmit. The pinout matches the IBM-PC-AT: 1-DCD (not connected), 2-Rx, 3-Tx, 4-DTR, 5-GND, 6-DSR, 7-RTS,

8-CTS, 9-RI (not connected). If your PC has a 9-pin RS-232 connector, then a straight-through cable is required (pin 1 on male end to pin 1 on female end, etc.). If your computer has a 25-pin RS-232 connector, the cable needs to have the following connections:

- PM-Digital 9-pin male: 2 3 4 5 6 7 8
- PC 25-pin female: 3 2 20 7 6 4 5

Most RS-232 cables with the correct connectors on the ends will be wired correctly, but there are numerous other possible configurations.

## **Sensor Connector**

This is a 25-pin D connector that provides a “smart” interface to the PowerMax series of sensors. During factory calibration of the sensor head, a memory chip inside the connector is programmed with information that specifies the sensor responsivity, max power rating, wavelength correction data for the absorber, and other data. In addition to the voltage output of the sensor, the connector supplies a sensor to monitor the internal sensor temperature.

## **LED Indicators**

There are two indicators on the front panel of the PM-Digital:

- The Power-On LED glows green whenever power is applied to the instrument.
- The Low Battery LED glows amber only when the battery needs recharging.

## ***Application Information***

### **Sensor Compatibility**

PM-Digital is designed for use with all Coherent PowerMax thermal sensors. When one of these intelligent sensors is plugged into the instrument, PM-Digital automatically sets up to work with that specific model sensor.

### **Calibration**

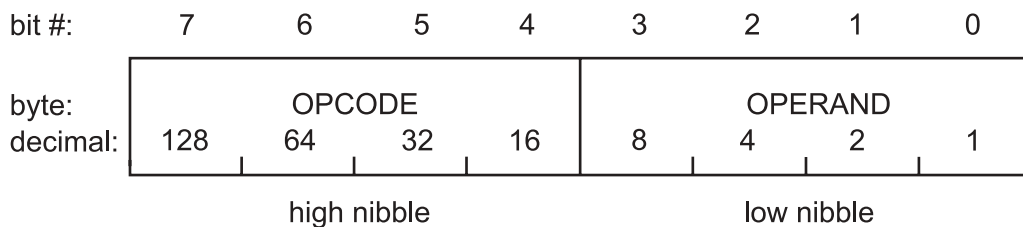
NIST-traceable calibration—performed at the factory—meets all requirements listed under “Appendix A: Specifications” on page 35. No additional calibration is necessary. Each PowerMax system is furnished with a Certificate of Calibration.

# HOST INTERFACE

This section contains a full description of all the software commands that the PM-Digital can process. If you are not sure what cable to use for the RS-232 connection, read “RS-232 Computer Interface Connector” on page 8. If you want to immediately start sending data to your PC from the PM-Digital, refer to “SENDER” on page 19 for some examples.

The PM-Digital uses a binary data format for its command inputs and data transmission outputs. This format makes the most efficient use of processor resources at the PC and PM-Digital end of the serial link. Because a binary format is not as intuitive as text-based communication, a number of examples are given to illustrate various commands. The samples shown are in BASIC, but the same I/O can be achieved from any popular language. Note that the BASIC PRINT statements are shown with a trailing semicolon. This avoids sending an automatic carriage return/linefeed at the end of the transmission. Because the PM-Digital uses binary format, you need to suppress sending automatic line termination characters from whatever language you’re using; otherwise, these are interpreted as undesired commands. Each command is given by sending a single 8-bit byte. The value of a byte is most easily expressed using hexadecimal notation, or base 16, in which A=10, B=11, C=12, D=13, E=14, and F=15. For example the byte 6Bh has the decimal value of  $6*16+11=83$  (the h indicates hexadecimal base). A byte can have any integer

value from 0 to 255 ( $255 = 15 \cdot 16 + 15 = FFh$ ). It is conventional to say that a byte has a high and a low “nibble,” with each nibble specified by a single hexadecimal digit (the high nibble of 93h is 9h). When the PM-Digital receives a byte, the high nibble is considered the “OPCODE,” which selects what type of function is being requested. In case there are different options for a given function, the low nibble is considered the “OPERAND,” which specifies how to carry out the selected function. For some functions, the value of the operand is immaterial. The bit level structure of a command byte is:



<b>OPCODES</b>		
0	=	RANGE
1	=	AUTORANGE
2	=	ZERO
3	=	STATUS
4	=	SENDER
5	=	Read internal EEPROM

<b>OPCODES (CONTINUED)</b>		
6	=	Read sensor EEPROM
7	=	Write sensor EEPROM
8	=	Write internal EEPROM
A	=	Remote keypress function
B	=	Override analog settings
C	=	Not used
D	=	Not used
E	=	Not used
F	=	Not used

Refer to “Commands” on page 14 for a description of these commands and the response of the PM-Digital. For normal use, only OPCODES 0, 1, 2, 3, and 4 are important. Details of the other commands are not provided here, as they are intended mainly for factory service use.

## Commands

The sample Visual Basic code presented in this section assumes that a VB form exists, with the Microsoft communications control present. Set the Name property of the communications control to "MSComm1", the Settings property to "9600,n,8,1", and the InputLen property to "1".

---

**The "Do Until" and "Do While" loops in the sample code provide a wait state until data is ready to be received by the COMM port. These loops are for example purposes only. Coherent recommends that you include additional code to allow the loops to exit in the event that data is not received.**

---

## RANGE

(00h to 0Bh) Sets full-scale range of the instrument to a value determined by the operand nibble. If the selected range is not possible with the current sensor, the PM-Digital will not change range.

FULL-SCALE RANGES		
COMMAND BYTE		PM-DIGITAL RANGE
00h	=	30 mW
01h	=	100 mW
02h	=	300 mW
03h	=	1 W
04h	=	3 W



<b>FULL-SCALE RANGES (CONTINUED)</b>		
<b>COMMAND BYTE</b>		<b>PM-DIGITAL RANGE</b>
05h	=	10 W
06h	=	30 W
07h	=	100 W
08h	=	300 W
09h	=	1 kW
0Ah	=	3 kW
0Bh	=	10 kW

Example

```
'Set to 30 watt range
Private Sub SetRange()
    MSComm1.Output = Chr(&H6)
End Sub
```

**AUTORANGE** (10h to 11h) Turns the AUTORANGE function ON or OFF. The front panel display indicates the current status.

COMMAND BYTE		
10h	=	AUTORANGE OFF
11h	=	AUTORANGE ON

Example

```
'Turn off autorange  
Private Sub SetAutoRange()  
    MSComm1.Output = Chr(&H10)  
End Sub
```

---

**The value of bits 1, 2, and 3 in the operand is immaterial, so any even value results in AUTO OFF, any odd value in AUTO ON.**

---

**ZERO** (20h) If AUTO is on, all valid ranges will be zeroed; otherwise, only the current range is zeroed. The value of the low nibble is immaterial.

Example

```
'Zero the PM Digital  
Private Sub Zero()  
    MSComm1.Output = Chr(&H20)  
End Sub
```

**STATUS**

(30H) Requests instrument error status. The PM-Digital will send a status response only if the sender function was OFF at the time the STATUS command was issued. The status response is a single byte in which the lowest 7 bits indicate the presence or absence of a specific error condition. The STATUS command is normally used when your program notices that the error bit is set in the data transmission (cf. SENDER command). The relation between bit number and error type is:

bit #:	7	6	5	4	3	2	1	0
error:	not used	bad head	bad zero	bad csum	bad ref	over temp	no probe	low battery

Example

```
Private Sub StatusDecode()
    'Status holder variable
    Dim lngStatus As Long

    'Make sure sender is off
    MSComm1.Output = Chr(&H40)

    'Loop until input buffer is empty
    Do While MSComm1.InBufferCount > 0
    'Clear any old data
    Loop

    'Request status
    MSComm1.Output = Chr(&H30)
```

```
'loop until status is returned
Do Until MSComm1.InBufferCount > 0
Loop

'Get status byte
lngStatus = Asc(MSComm1.Input)

'Check each status bit
If lngStatus = 0 Then MsgBox "No Errors"
If (lngStatus And &H1) = &H1 Then MsgBox "Low
    Battery"
If (lngStatus And &H2) = &H2 Then MsgBox "No
    Probe"
If (lngStatus And &H4) = &H4 Then MsgBox "Over
    Temp"
If (lngStatus And &H8) = &H8 Then MsgBox "Bad
    Ref"
If (lngStatus And &H10) = &H10 Then MsgBox
    "Bad CSum"
If (lngStatus And &H20) = &H20 Then MsgBox
    "Bad Zero"
If (lngStatus And &H40) = &H40 Then MsgBox
    "Bad Head"

End Sub
```

**SENDER**

(40h, 41h, 42h, 43h and 47h) Turns the SENDER function ON or OFF, and determines the nature of the data transmitted. For most purposes you will only need to use 40h for OFF and 41h for ON. 42h, 43h, and 47h provide specialized functions. The 47h command will immediately return a single transmission of the currently displayed reading.

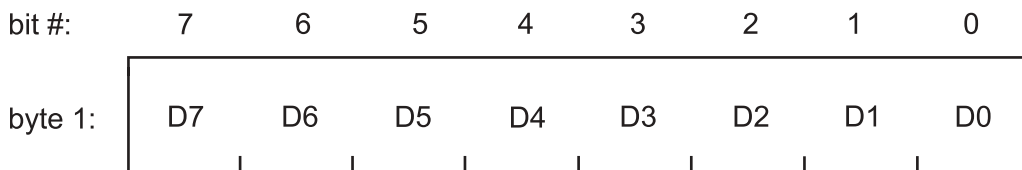
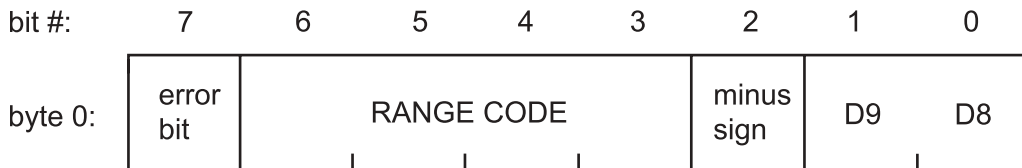
<b>COMMAND BYTE</b>		
40h	=	SENDER OFF
Fast Sender	=	OFF
Send Head Temp	=	OFF
Read Analog	=	0

This command turns off and initializes the SENDER function.

<b>COMMAND BYTE</b>		
41h	=	Sender ON
Fast Sender	=	OFF
Send Head Temp	=	OFF
Read Analog	=	0

This command turns on normal data transmission. If the speedup function is OFF, then data will be transmitted about every 0.57 seconds when the digital display on the

PM-Digital front panel is updated. In case the speedup function is ON, then readings will be transmitted about every 0.14 seconds. A reading is sent as 2 bytes which specify the reading, current range, minus sign, and error flag. The bit structure is:



Byte 0, bit 7: 0 denotes no error, 1 means error is present.

Byte 0, bits 3-6: RANGE CODE

0	=	30 mW
1	=	100 mW
2	=	300 mW
3	=	1 W
4	=	3 W
5	=	10 W
6	=	30 W
7	=	100 W
8	=	300 W
9	=	1 kW

10 = 3 kW  
 11 = 10 kW  
 Byte 0, bit 2: 0 if reading is positive  
                   1 if it is negative  
 Byte 0, bits 0-1: data high 2 bits  
 Byte 1, bits 0-7: data low 8 bits

On the even-numbered ranges,  $299 \geq \text{data} \geq 0$ . On the odd-numbered ranges,  $999 \geq \text{data} \geq 0$ . Overrange is denoted by data all ones (decimal 1023).

COMMAND BYTE		
42h	=	SENDER ON
SENDER FAST	=	ON
SEND HEAD TEMP	=	OFF
READ ANALOG	=	0

The PM-Digital normally reads the sensor voltage 7 times per second, and every 64 readings it takes a reading of the sensor head temperature. For some applications, such as using the calorimeter sensors to measure single pulse energies, it may be desired to take continuous readings of the sensor output without interruption for head temperature readings. This is achieved by turning on SENDER FAST with command byte 42h. In this case, readings will be transmitted 7 times per second, similarly to the effect of 41h when the speed up function is ON, but

in the case of SENDER FAST there is no speed up processing done on the data and there are no interruptions for head temp readings.

<b>COMMAND BYTE</b>		
43h	=	SENDER ON
SENDER FAST	=	OFF
SEND HEAD TEMP	=	ON
READ ANALOG	=	0

This command adds a third byte to each transmission that specifies the head temperature in degrees centigrade. Divide the byte value by 2 to get the temperature. Temperatures over 100 are only transmitted as 100.

<b>COMMAND BYTE</b>		
47h	=	send currently displayed reading

This command will work only if the SENDER is OFF. This can be useful if your computer has other demanding tasks to perform, and the power just needs to be checked from time-to-time. The PM-Digital will respond immediately with a two-byte transmission after this command.



Example

```
Private Sub SetSender()  
    'Holder variable for byte 1  
    Dim lngByte0    As Long  
    'Holder variable for byte 2  
    Dim lngByte1    As Long  
    '*****  
    'ONLY USED IF SENDER COMMAND = &H43  
    'Holder variable for byte 3 (&H43 only)  
    Dim lngByte2    As Long  
    'Holder for temperature value (&H43 only)  
    Dim lngTemp     As Long  
    '*****  
    'Holder variable for error flag  
    Dim bolError    As Boolean  
    'Holder variable for range  
    Dim lngRange    As Long  
    'Holder for reading sign  
    Dim lngSign     As Long  
    'Holder variable for reading  
    Dim lngReading  As Long  
    'Holder variable for calculated reading  
    Dim lngWatts    As Long  
  
    'Sender ON with temp byte  
    MSComm1.Output = Chr(&H43)  
  
    'loop until first byte is returned  
    Do Until MSComm1.InBufferCount > 0  
    Loop  
    'Read first byte and convert to long  
    lngByte0 = Asc(MSComm1.Input)
```

```
'loop until second byte is returned
Do Until MSComm1.InBufferCount > 0
Loop
'Read second byte and convert to long
lngByte1 = Asc(MSComm1.Input)
```

\*\*\*\*\*

```
'ONLY USED IF SENDER COMMAND = &H43
'loop until third byte is returned (&H43 only)
Do Until MSComm1.InBufferCount > 0
Loop
'Read third byte and convert to long (&H43 only)
lngByte2 = Asc(MSComm1.Input)
'Calculate temperature (&H43 only)
lngTemp = lngByte2 / 2
'Show temperature (&H43 only)
MsgBox "Head Temp = " & lngTemp
```

\*\*\*\*\*

```
'Extract Error Flag
bolError = (lngByte0 And &H80)
'Extract range
lngRange = (lngByte0 And &H78) / 8
'Extract sign mult 0= 1 and 1= -1
lngSign = (((lngByte0 And &H4) * 2) - 1) * -1
'Extract unsigned reading
lngReading = (256 * (lngByte0 And &H3)) +
    lngByte1
```

```
'Test for Over Range
If lngReading = 1023 Then
    'Show OR message
    MsgBox "Over Range"
Else
```

```
'Calculate reading. This formula gives the correct  
'power of 10 based on the range  
lngWatts = lngSign * (lngReading * 10 ^  
    (Int((lngRange + 0.9) / 2) - 4))  
'Show calculated reading  
MsgBox "Reading = " & lngWatts  
End If
```

```
If bolError = True Then MsgBox "Error condition  
    present"
```

End Sub

LabVIEW PC installation drivers are available on [www.coherent.com](http://www.coherent.com). Unless there is a conflict with information provided in this manual, PM-Digital uses drivers designed for the Coherent PM5200 laser power meter. A separate set of PM-Digital drivers will be available on our website in the near future.



# **CALIBRATION AND WARRANTY**

This section includes information on the following topics:

- Calibration (this page)
- Coherent calibration facilities and capabilities (page 28)
- Limited warranty (page 29)
- Extended lifetime warranty (page 29)
- Warranty limitations (page 30)
- Obtaining service (page 31)
- Product shipping instructions (page 33)

## ***Calibration***

Coherent laser power and energy meters are precision instruments, capable of delivering very accurate measurements, as well as providing many years of useful service. To maintain this high level of performance, it is important to have your measurement system serviced and recalibrated once a year.

## ***Coherent Calibration Facilities and Capabilities***

As the largest laser manufacturer in the world, Coherent has been able to build state-of-the-art calibration facilities containing the widest possible range of laser types and technologies. This enables us to perform instrument and sensor calibration under virtually any combination of wavelength, power, and operating characteristics. Sensors are calibrated against NIST-traceable working standard sensors which are, in turn, calibrated against NIST-calibrated golden standard sensors. These working and golden standards are maintained with the utmost care, recalibrated annually, and verified even more regularly. We maintain multiple NIST-calibrated standards at many laser wavelengths to support the growing calibration needs of our customers. Optical calibration is a core competency at Coherent and we strive to continually improve our methods, precision, and repeatability. Additionally, most of the calibrations are performed with highly automated systems, thus reducing the possibility of human error to nearly zero. Strict quality inspections during many stages of calibration and testing assure a precise and accurate instrument that is NIST traceable and CE marked. The benefit to our customers is that instruments calibrated by Coherent will consistently perform as expected under their actual use conditions. We are a registered ISO 9001:2000 company, our products are NIST traceable, and our calibration labs are fully ANSI Z540 compliant.

In addition to the technological advantage, we also strive to deliver the best service in the industry, with a knowledgeable and responsive staff, and rapid turnaround.

***Limited  
Warranty***

Coherent, Inc. (the “Company”) warrants its laser power and energy meters and sensors products (“Products”) to the original purchaser (the “Customer”) that the product is free from defects in materials and workmanship and complies with all specifications, active at the time of purchase, for a period of twelve (12) months.

Coherent, Inc. will, at its option, repair or replace any product or component found to be defective during the warranty period. This warranty applies only to the original purchaser and is not transferable.

***Extended  
Lifetime  
Warranty***

Coherent, Inc. (the “Company”) offers original purchasers (the “Customer”) purchasing laser power and energy meters and sensors products (“Products”) an extended, lifetime warranty program, which includes all parts and labor. In order to qualify for this warranty, a Customer must return the Product to the Company for recalibration and recertification (traceable to NIST and MIL-STD-45662A) within one year from the date of purchase, and annually thereafter. The Company will recertify the Product, provide software upgrades, and perform any needed repairs, for a fixed service fee (as established by the Company from time to time and in effect at the time of service).

If the Product fails and is returned to the Company within one year following the date of recalibration service, the Company will, at its option, repair or replace the Product or any component found to be defective. This warranty applies only to the original purchaser and is not transferable.

If the Product is not returned for recalibration or service prior to the one-year anniversary, the lifetime warranty program expires. The lifetime warranty program may be reinstated, at Coherent's option, after completion of a fee-based product evaluation and repair, and subsequent recalibration and recertification service.

## ***Warranty Limitations***

The foregoing warranties shall not apply, and Coherent reserves the right to refuse warranty service, should malfunction or failure result from:

- Damage caused by improper installation, handling, or use.
- Laser damage (including sensor elements damaged beyond repair).
- Failure to follow recommended maintenance procedures.
- Unauthorized product modification or repair.
- Operation outside the environmental specifications of the product.

Coherent assumes no liability for Customer-supplied material returned with Products for warranty service or recalibration.

**THIS WARRANTY IS EXCLUSIVE IN LIEU OF ALL OTHER WARRANTIES WHETHER WRITTEN, ORAL, OR IMPLIED. COHERENT SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL**



THE COMPANY BE LIABLE FOR ANY INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH ITS PRODUCTS.

## *Obtaining Service*

In order to obtain service under this warranty, Customer must notify the Company of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. The Company shall, in its sole discretion, determine whether to perform warranty service at the Customer's facility, at the Company's facility or at an authorized repair station.

If Customer is directed by the Company to ship the product to the Company or a repair station, Customer shall package the product (to protect from damage during shipping) and ship it to the address specified by the Company, shipping prepaid. The customer shall pay the cost of shipping the Product back to the Customer in conjunction with annual recalibration and repair; the Company shall pay the cost of shipping the Product back to the Customer in conjunction with product failures within the first twelve months of time of sale or between annual recalibrations.

A Returned Material Authorization number (RMA) assigned by the Company must be included on the outside of all shipping packages and containers. Items returned without an RMA number are subject to return to the sender.

For the latest Customer Service information, refer to our website: [www.coherent.com](http://www.coherent.com).

Detailed instructions on how to prepare a product for shipping are shown under “Product Shipping Instructions” on page 33.

***Table 1. Coherent Service Centers***

<b>LOCATION</b>	<b>PHONE</b>	<b>FAX</b>	<b>E-MAIL</b>
USA	1.800.343.4912	971.327.2778	info_service@coherent.com
Europe	+49 (6071) 9680	971.327.2778	info_service@coherent.com
International	971.327.2700	971.327.2778	info_service@coherent.com

***Product  
Shipping  
Instructions***

To prepare the product for shipping to Coherent:

1. Contact Coherent Customer Service (refer to Table 1 on page 32) for a Return Material Authorization number.
2. Attach a tag to the product that includes the name and address of the owner, the person to contact, the serial number, and the RMA number you received from Coherent Customer Service.
3. Wrap the product with polyethylene sheeting or equivalent material.
4. If the original packing material and carton are not available, obtain a corrugated cardboard shipping carton with inside dimensions that are at least 6 in (15 cm) taller, wider, and deeper than the product. The shipping carton must be constructed of cardboard with a minimum of 375 lb (170 kg) test strength. Cushion the instrument in the shipping carton with packing material or urethane foam on all sides between the carton and the product. Allow 3 in (7.5 cm) on all sides, top, and bottom.

5. Seal the shipping carton with shipping tape or an industrial stapler.

6. Ship the product to:

Coherent, Inc.

7470 SW Bridgeport Rd.

Portland, OR 97224

Attn: RMA # *(add the RMA number you received from Coherent Customer Service)*



# APPENDIX A: SPECIFICATIONS

Table 2 lists specifications for the PM-Digital.

*Table 2. PM-Digital Specifications*

<b>PARAMETER</b>	<b>DESCRIPTION</b>
Power Resolution	10 $\mu$ W
Ranges	3 mW to 10 kW
System Accuracy (including sensor)	$\pm$ 3% (NIST traceable)
Digital Output	RS-232 9600 baud rate
Dimensions (h x w x d)	3.7 in (94.0 mm) 5.3 in (134.6 mm) 2.2 in (55.9 mm)
Power	NiMH batteries (internal) AC wall charger (included)
Battery Life	8 hours continuous operation
Battery Charger	Universal input, +12 V output
Weight	1.1 lb (0.5 kg)





*PM-Digital User Manual*

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*Part No. 0980-0330-0, Rev. AB*