OMA-VM500-4

Seven Channel 4-20ma Sensor Monitor and Alarm Dialer
Setup and Instruction Manual

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M-3987 / 07 03

General Description

The Monitor & Alarm is a seven channel 4-20 mA sensor monitor and auto-dialer. The Monitor and Alarm also monitors two (2) dry contact inputs and power.

The Monitor and Alarm allows the user to program individual high and low limits, and a time delay for each sensor. When a sensor goes into an alarm condition, the Monitor and Alarm will call up to four programmable voice or pager numbers.

The Monitor and Alarm automatically converts the 4-20ma signal into the sensor's measurement parameter such as degrees, PSI or Lbs for displaying and reporting.

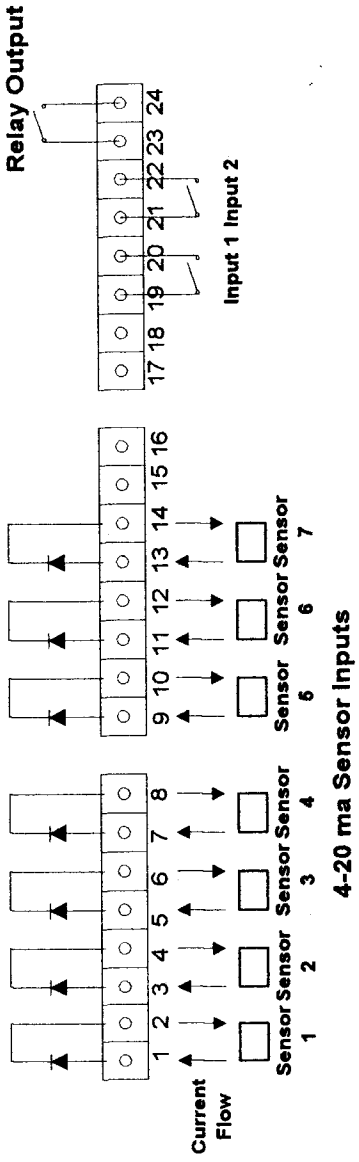
The Monitor and Alarm also monitors the power to which it is connected and will call its programmed telephone numbers if a power outage exists. Power failure calls occur after power has been out for more than five minutes.

The Monitor and Alarm monitors two dry contact inputs and make emergency calls if an input is closed longer than its programmed time delay.

The Monitor and Alarm will turn on its alarm relay and buzzer when any zone or input is in an alarm condition, or a dry contact input is closed. The alarm relay and buzzer is turned off by pressing the black button on the face of the dialer.

The Monitor and Alarm can be installed into new or existing systems. The input impedance of each is only 20 ohms and will not affect existing systems.

This remainder of the manual will refer to the 4-20ma Monitor and Alarm as Monitor.



Sensor to Monitor Wiring Diagram

Installing the Monitor

1 Select a location with access to power and a telephone line.
2 Mount the enclosure in the desired location.
3 Connect the phone line to an active phone jack.
4 Plug in the wall mount transformer into a power socket
5 Connect the wall mount transformer power jack to the Monitor.
6 For ease of wiring, remove the terminal blocks.
7 Wire the output of each sensor to the Monitor's terminal blocks. The Monitor can be installed in series with existing equipment such as chart recorders. See the Wiring Diagram.
8 Turn the power on by moving the switch located to the left of terminal 1 to the "1" position.

Accessing the Monitor

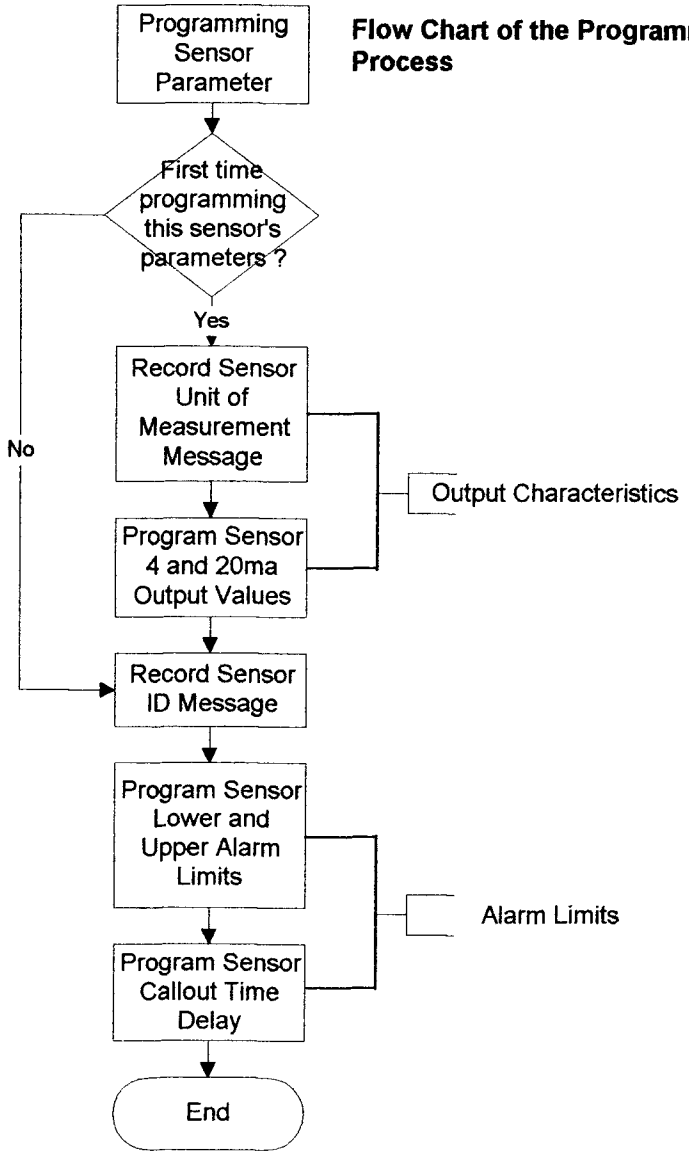
1 From another phone line dial the number where the Monitor is located. The device will pick up after the programmed number of rings (Factory default is 1).
2 When prompted, enter the 4-digit PIN number (Factory default PIN number is 0000).
3 You will hear the Main Menu options:

Main Menu	
Option	**Function**
1	Status
2	Set Limits (Configure Sensor Characteristics)
3	Program
0	Exit (Hang Up)

Programming Sensor Parameters Overview

For each sensor, three sets of parameters must be programmed.
1) Sensor Output Characteristics.
2) Sensor ID Message is recorded.
3) Sensor Alarm Limits are programmed.

Flow Chart of the Programming Process



Sensor Output Characteristics:

Sensor's Unit of Measure Message. When reporting a sensor's output value over the phone, the Monitor will play the unit of measurement message.

I.E. For a flow meter sensor with an output of gallons/minute, you could record "***GPM***". The Monitor would then report, "*Sensor 1, station flow meter, is 50* ***GPM***."

Sensor's 4 and 20 ma Output Values. The sensor's output value at 4 and 20 ma must be programmed because the Monitor uses these values to calculate and display and report values in the sensor's unit of measurement.

I.E. If the output of the flow meter sensor at 4 ma is 0 GPM, and the output of the sensor at 20 ma is 100 GPM, then 0 and 100 is programmed for the 4 and 20 ma values.

Sensor ID Message:

When reporting a sensor's output value over the phone, the Monitor plays the ID message to describe the sensor.

I.E. For the flow meter, you could record a message describing the sensor as ***station 1 flow meter.*** The Monitor would then use this message when reporting the output of the sensor. The message would be "Sensor 1, ***station 1 flow meter,*** *is...."*

Sensor Alarm Parameters:

Sensor low and high limits. The low and high limits are programmed in the sensor's unit of measure. When the sensors output value exceeds either the high or low limit for longer than the programmed time delay, the Monitor will begin making telephone calls.
I.E. Limits for the flow sensor would be programmed in GPM.

Sensor callout time delay. A sensor must be out of limits for greater than the callout delay time before the Monitor will begin making telephone calls. This time can be used to prevent unnecessary alarms due to transient conditions.

I.E. For the flow sensor to generate an alarm after the flow has been out of limits for 5 minutes, program this value as 5.

Programming the Sensor Parameters

a) From the Main Menu, press 2 to Set Limits
b) You will hear "*Enter Sensor number*"
c) Enter the number of the sensor input you want to configure (1-7)
   ►If you do not wish to program a sensor input press 0 to return to the Main Menu.

If this is the first time programming this sensor's parameters, you must program the Sensor Output Characteristics first. Once the parameters have been successfully programmed, this step can be skipped to more easily modify the Sensor Limits and Sensor ID Message.

Programming the Sensor's Output Characteristics

Recording the Sensor's Unit of Measurement Message

a) You will hear "Sensor 1 unit of measure is.... ". *Initially the recorded sensor units message will be blank.*
b) You will hear "*Press 1 to change*"
c) Press **1** to record a new message. (Press 2 to skip to the next programming item or press 0 to program a different sensor)
d) You will hear a beep. The system will record for 1 second.
e) Say the desired sensor unit of measurement.
f) You will hear another beep and recording will stop.
g) You will hear the message you recorded.

Programming the Sensor's 4 and 20 ma Output Values

The maximum programmable value is 2000 and the maximum difference between the 4 and 20 value is 1000. For values larger than 2000, divide by one thousand and enter those values, then adjust your unit of measure message to indicate a thousand multiplier.

I.E. if the flow sensor output at 4 ma is 3,000 GPM and at 20 ma is 5,000 GPM, divide both values by 1000 and record your unit of measurement message to be "*thousand GPM*". Enter 3 for the 4 ma value and 5 for the 20 ma value.

a) You will hear "*Enter value at 4 milliamps then press pound.*"
b) Enter the sensor's value at 4 milliamps then press pound.
   ►To enter a negative value, enter * as the first digit.
   ►To enter a value with a decimal place, use * as the decimal place. For instance, to enter the value 1.23, enter 1*23.
   ►To stop monitoring this sensor, enter only #
c) You will hear "*Enter value at 20 milliamps then press pound.*"
d) Enter the sensor's value at 20 milliamps then press pound.

► To enter a negative value, enter * as the first digit.
► To enter a value with a decimal place use * as the decimal place. For instance, to enter the value 1.23, enter 1*23.

You will hear the values just programmed. If the values just entered are not valid you will hear "warning" and you will be prompted to re-enter the 4 and 20 ma values (returned to step a).

Recording the Sensor's ID message

a) You will hear "Sensor 1 is " and the current recorded sensor ID. *Initially the sensor ID message will be blank.*
b) You will hear "*Press 1 to change*"
c) Press **1** to record a new message. (Press 2 to skip to the next programming item or press 0 to program a different sensor)
d) You will hear a beep. The system will record for 2 seconds.
e) Say the desired sensor ID message.
f) You will hear another beep and recording will stop.
g) You will hear the message you recorded.

Programming the Sensor's Lower and Upper Alarm Limits

a) You will hear the low limit for that sensor (i.e. *45 GPM)*
b) You will hear "*Press 1 to change*"
c) Press **1** to change the limit (Press 2 to skip to the next programming item and proceed to step g or press 0 to program a different sensor)
d) You will hear "*Enter number then press pound*"
e) Enter the value then press **#**.
► To enter a negative value, enter * as the first digit.
► To enter a value with a decimal place use * as the decimal place. For instance, to enter the value 1.23, enter 1*23.
f) You will hear the value you just entered (i.e. *55 GPM*)
g) You will hear the high limit for the selected sensor (i.e. 80 *GPM*)
h) You will hear "Press 1 to change"
i) Press **1** to change the limit (Press 2 to skip to the next programming item or press 0 to program a different sensor)
j) You will hear "*Enter number then press pound*"
k) Enter the value then press **#**.
► To enter a negative value, enter * as the first digit.
► To enter a value with a decimal place use * as the decimal place. For instance, to enter the value 1.23, enter 1*23.
You will hear the value you just entered (i.e. *85 GPM*)

Programming the Callout Time Delay

a) You will hear "Callout time delay is 0 minutes press 1 to change"
b) Press 1 to change the time delay (Press 2 to skip)
c) You will hear "Enter number then press pound"
d) Enter the time delay in minutes (i.e. 15 for 15 minutes)

▶The time delay range is 0 - 900 minutes.

e) You will hear the value you just entered

Programming the Dry Contact Input Alarm Time Delay

The dry contact input must be active for greater than the callout delay time before the Monitor will begin making telephone calls.

1 From the Main Menu, press 2 to set Limits
2 You will hear "*Enter Zone*"
3 Enter 8 to program Input 1 or 9 to program Input 2
4 You will hear "Input 1 Callout time delay is 0 minutes press 1 to change"
5 Press 1 to change the time delay (Press 2 to skip)
6 You will hear "Enter number then press pound"
7 Enter the time delay in minutes (i.e. 15 for 15 minutes)
▶The time delay range is 0 - 900 minutes.
8 You will hear the value you just entered

Changing the Sensor's Output Characteristics

If it is necessary to make a change to the output characteristics, perform the following:

a) From the Main Menu, press 2 to Set Limits
b) You will hear "*Enter Sensor number*"
c) Enter *
d) You will hear "*Enter Sensor number to change*"
e) Enter the input number of the sensor you want to change (1-7) .

Programming the Autodialer Functions

To access the Program Menu, press 3 at he Main Menu. You will hear the Program Menu options below.

Program Menu	
Option	**Function**
1	Program Primary Number
2	Program Secondary Number
3	Program Third Number
4	Program Fourth Number
5	Program Local ID Number
6	Record Unit ID Message
7	Program Number of Rings
8	Change PIN number
9	Program Reminder Calls
0	Exit (return to Main Menu)

NOT SPOKEN

Programming Telephone/Pager Numbers

The Monitor stores up to 4 emergency telephone or pager numbers.

First Time Number Programming:

1 From the Program Menu, Select **1** for the primary number, **2** for the secondary number, **3** for the third number, or **4** for the fourth number.

2 You will hear "*Enter number then press pound*"

3a. For voice phone numbers enter the full phone number **(1 + area code if necessary)** followed by the **#** key.

3b. For pager numbers enter * then enter the full pager number **(1 + area code if necessary)** followed by the **#** key.

4. You will hear the telephone number you just entered.

5. You will be automatically returned to the Program Menu

Note:

If an extra delay between digits is required, entering * will provide a two second delay. Do not enter * for the first digit unless programming a pager number.

To Change a Phone Number:

1 Select the appropriate number from the Program Menu

2 You will hear the telephone number for the selected recipient

3 You will hear "*Press one to change*"

4 Press **1** to make a change or 2 to return to the Program Menu
5 You will hear "*Enter number then press pound*"
6a. For voice phone numbers enter the full phone number **(1 + area code if necessary)** followed by the # key.
6b. For pager numbers enter * then enter the full pager number **(1 + area code if necessary)** followed by the # key.
7. You will hear the telephone number you just entered.
8. You will be automatically returned to the Program Menu

To Delete a Phone Number:
1 Select the appropriate number from the Program Menu
2 You will hear the telephone number you selected
3 You will hear "*Press one to change*"
4 Press 1 to make a change
5 You will hear "*Enter number then press pound*"
6 Enter the # key
7 You will be automatically returned to the Program Menu

Programming a Local Identification Number For Pagers
The local ID number is printed on a pager's display, when calls are made to a pager. The ID number can be up to 20 digits long.
1 From the Program Menu, press **5** for the local ID
2 If this is the first time setup, go to step 6
3 You will hear the programmed number
4 You will hear *"Press one to change"*
5 Press **1** if you wish to make a change or press any other button to return to the Program Menu
6 You will hear "*Enter number, then press pound*"
7 Enter the number, followed by a #
8 You will hear the number you just entered.
9 You will be automatically returned to the Program Menu

Recording a Personal Identification Message
During Emergency Calls this message is played to identify the Monitor.
1 From the Program Menu, press **6** to record a message
2 If this is the first time setup, go to step 4
3 You will hear the recorded message
4 You will hear "*Press one to change.*"
5 Press **1** if you wish to make a change or press any other button to return to the Program Menu
6 You will hear a tone
7 Begin speaking after the tone. The Monitor will record for about 4 seconds
8 After 4 seconds you will hear the tone again, marking the end of your message

9 You will hear the message you recorded
10 You will be automatically returned to the Program Menu

Programming the Number of Rings

The Monitor answers the telephone line after the programmed number of rings. Valid numbers of rings are 1 – 25.

1 From the Program Menu, press **7** to set the number of rings
2 You will hear the programmed number of rings
3 You will hear *"Press one to change."*
4 Press **1** if you wish to make a change or press any other button to return to the Program Menu
5 You will hear *"Enter number then press pound"*
6 Enter the number of rings, then press **#**
7 You will hear the number of rings you entered
8 You will be automatically returned to the Program Menu

Programming PIN Numbers

The Monitor uses a 4-digit PIN numbers (0000-9999) to identify valid users. **PIN numbers must be 4 digits and must not include a # sign.**

1 From the Program Menu, press **8** to change the "Full Access" PIN or press the **#** key to change the "Acknowledge Only" PIN.
2 You will hear the programmed PIN number
3 You will hear *"Press one to change."*
4 Press **1** to make a change or 2 to return to the Program Menu
5 You will hear *"Enter your PIN number"*
6 Enter a four digit number
7 You will hear the PIN number you just entered
8 You will be automatically returned to the Program Menu

Programming a Reminder Call

The Monitor can place "reminder calls" even after Emergencies have been acknowledged, if zones are still out-of-limits or inputs are not back to their normal state after a set period time. This enables the user to receive more emergency calls in cases where problems have not been fixed within a reasonable period of time. The reminder call is not enabled by default and must be activated by the user. The reminder call delay is a programmable value from 0 to 900 minutes.

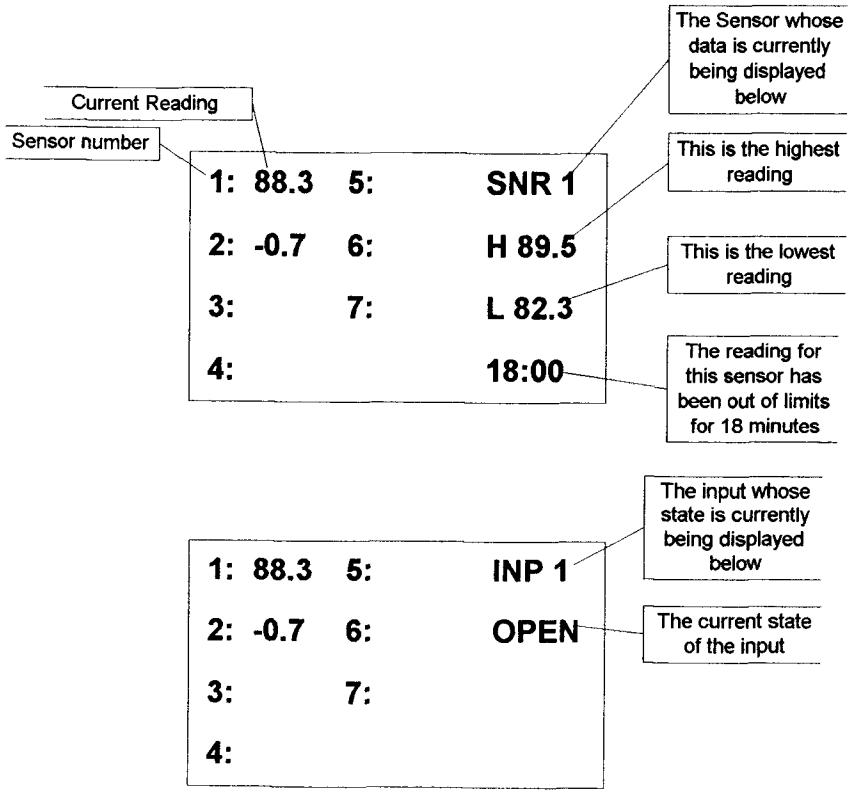
1 From the Program Menu, press **9**
2 You will hear "Alarm Reminder is Off"
3 You will hear *"Press one to change."*
4 Press **1** if you wish to enable reminder calls , or any other key to return to the Program Menu.
5 You will hear "Alarm Reminder is On"
6 You will hear "Callout time delay is xx minutes press 1 to

change" (Default value is 60 minutes)

7 Press 1 to make a change or press any other button to not make a change
8 You will hear "Enter number then press pound"
9 Enter the time delay in minutes (i.e. 120 for 2 hours)
10 You will hear the value you just entered
11 You will be returned to the Set Limits Menu

Using the Monitor

Interpreting the Display



Clearing High and Low Values Locally

High and low values can be cleared by holding the black pushbutton down for at least 5 seconds while that sensors data is being displayed.

Checking Sensor Values Remotely

1 Call the Monitor
2 Enter you PIN number
3 From the main menu press **1**
4 You will hear "*Enter Sensor number*"
5 Enter the number of the sensor you wish to hear (i.e. 1)
6 You will hear the current sensor value and its highest and lowest reading, and how long the sensor has been out of limits in minutes.

Clearing High and Low Values Remotely

1 Call the Monitor
2 Enter you PIN number
3 From the main menu press **1**
4 You will hear "*Enter Sensor number*"
5 Press **#**
6 You will hear "Enter Sensor number to Change"
7 Enter the number of the sensor whose data you wish to reset.

Checking the Status of the Inputs Remotely

1 Call the Monitor
2 Enter you PIN number
3 From the main menu press **1**
4 You will hear "*Enter Sensor number*"
5 Enter 8 to check input 1 or 9 to check input 2
6 You will hear the status of the input, unless power is out, and the status of the power.

When does the Monitor call?

The Monitor will callout when a sensor has been out of limits for greater than the programmed time delay. Or, if a sensor opens after having read a value.
The Monitor will callout when a dry contact input is active for greater than the programmed time delay.

The Monitor will callout when power has been out for greater than 5 minutes.

What happens when there is an alarm condition?

1 The alarm relay and buzzer will be energized.
2 The Monitor will begin calling all programmed telephone numbers starting with the primary.
3 The Monitor will wait for a person to stop speaking or any outgoing message to stop.
4 The Monitor will play the personal identification message.
5 The Monitor will report any alarm conditions (i.e. "*sensor 2 pressure sensor is 44 PSI*").
6 The Monitor will ask for the PIN.
7 Once the PIN number has been entered, the Monitor will not call again because the current alarm condition has been acknowledged. The alarm relay and buzzer will not turn off until the black button on the Monitor has been pressed.

What happens when the Monitor calls a pager?

1 The Monitor will print the Local Identification number on the pager screen.
2 The Monitor will continue to call the pager until either:
The alarm condition goes away OR
The Monitor is called and the PIN number is entered

Canceling Alarm Conditions Locally

To cancel an alarm condition locally, push the black button on the left side of the Monitor. The alarm relay will de-energize, and the Monitor will stop making emergency phone calls for this alarm condition.

Connecting the Monitor to a Phone Line which has a fax or answering machine connected to it

Program the Monitor to answer after one more ring than the other device. This allows the other device to always answer first. To call and access the Monitor

1 Dial the phone number
2 Hang up one ring before the other device answers.
3 Wait no longer than 30 seconds, then dial the phone number again.

4 The Monitor and Alarm will answer.

For Example:
A fax machine on the same line as the Monitor is set to answer after 4 rings. The Monitor is programmed to answer after 5 rings. To access the Monitor, dial the number, let it ring three times, then hang up. Wait 20 seconds and call again. After two rings, the Monitor will answer.

Troubleshooting

Verifying telephone communication

To verify telephone communications, perform the following test.

- Using another phone line, call the Monitor and verify that it answers the phone.
- Verify at least one programmed telephone number.
- Hang up.
- Remove the power plug from the back of the 4-20 mA Sensor Monitor and Alarm.
- Wait Five minutes.
- The 4-20 mA Sensor Monitor and Alarm will call to alert you that the power is out.
- Watch the display and note any messages present.

If the Monitor does not answer the phone

Verify that the phone line is working. Connect a standard phone to the line intended for the Monitor. Verify that there is a dial tone.
Check that the phone line is plugged in securely.
Verify that the Monitor is powered up and the status light is blinking.

If the Monitor does not call out

Perform the telephone communication verification procedure.
Connect a phone to the line intended for the Monitor. Verify that there is a dial tone.
Check that the phone line is plugged in securely
Verify that the Monitor is powered up and the status light is blinking
Verify that the Monitor is programmed correctly. Call up the Monitor and verify the programmed phone numbers and limits.

Verifying sensor readings

To verify that the Monitor is reading the 4 to 20 mA sensor correctly perform the following operation:

- Turn off the unit.
- Make a connection across Input 2.
- Hold down the black pushbutton.

- Turn on the unit.
- The unit will boot up in a test mode.
- All values displayed are mA values.

Verify that the unit is reading the correct mA value.

Optional 20 / 30 Hour Extended Batteries

If your unit has been ordered with an extended battery, it is installed at the factory. These batteries are trickle charged and can take up to a week to reach full capacity. The battery is charging whenever the monitor is powered on.

To simplify programming, fill in this table

Sensor Input Number	Unit of Measure-ment Mes-sage	Output Value at 4 ma	Output Value of 20 ma	ID Message
1				
2				
3				
4				
5				
6				
7				

FCC PART 68 INFORMATION

This equipment complies with Part 68 of the FCC Rules. The FCC Part 68 Label is located on the bottom of the unit. This label contains the FCC Registration Number and Ringer Equivalence Number (REN) for this equipment. If requested, this information must be provided to your telephone company.

The REN is useful to determine the quantity of devices you may connect to your telephone line and still have all of those device ring when your telephone number is called. In most, but not all areas, the sum of the RENs of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices you may connect to your line, as determined by the REN, you should contact your local telephone company to determine the maximum REN for your calling area.

Connection to the telephone network should be made by using standard modular telephone jacks, type RJ11. The plug and/or jacks used must comply with FCC Part 68 rules. If this telephone equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in it's facilities, equipment, operations or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance in order for you to make necessary modifications to maintain uninterrupted service.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to tariffs.

If trouble is experienced with this unit, for repair or warranty information, please contact customer service at the address and phone listed below. If the equipment is causing harm to the network, the telephone company may request that you disconnect the equipment until the problem is resolved.

DO NOT DISASSEMBLE THIS EQUIPMENT. It does not contain any user serviceable components.

MADE IN USA WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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HEATERS

- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments

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