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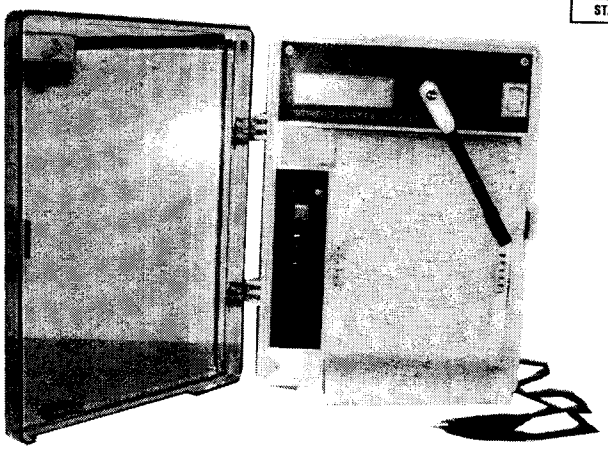

RD-87 Series
Strip Chart Recorders

RD-87 Series Recorder Features:

The RD-87 series of recorders are precision strip chart recorders for recording temperature, AC Voltage, AC Current, 4 – 20ma loops and DC Voltage. All models feature a digital display, alarm Functions, user selectable delays times, and low power isolated (dry) relay contacts. The alarm of the recorder can be set to sound an audible signal when the measurement has exceeded an upper or lower limit. Each limit is individually set from the front panel. A delay time before the alarm is activated may be set by the user to prevent nuisance alarms. Low power, normally open, isolated relay contacts are provided to allow activation of a remote alarm, phone dialer or annunciator. The recorders are designed with the user in mind. No special knowledge is required to operate the RD-87 Series of recorders. The menu driven setup is logically simple and user friendly. All parameters are shown on a two line alphanumeric LCD display.

Each recorder uses a single pen and records information on a twenty foot long, four and three quarter inch wide strip chart. The pen is uniquely colored to maximize chart readability.

Power is supplied through a 120 VAC 50/60 Hz plug-in adapter. External power may be supplied from any 12 VDC source such as automotive, marine, or other battery. Battery backup for 48 hours is featured to provide operation during temporary power loss.

All functions of the RD-87 Series are accessed through three pushbuttons located on the front panel. Selectable functions are retained in memory to avoid re-entering settings in the event of a power failure.

QUICK START

1. Connect power supply adapter through the jack on the right side of the unit.
2. Plug power supply adapter into 120 (220) VAC outlet.
3. Press the power switch to "**ON**".
4. The Pen will move to the "**Home**" position (the right hand side of the chart).
5. The Pen will then go to a position on the chart according to the display reading. This is called the **RUN** Mode. (Unit is always in the **RUN** mode when display is showing sensor readings.)

MENU OR RUN?

The RD-87 Series has two basic modes of operation:
1. MENU mode. To review or change settings.
2. RUN mode. To display present conditions and record them.

If **MENU** mode is selected the user can:
Turn Beeper On or Off (If Alarm is active).
Set Alarm Status (Alarm delay section of **MENU** will not show when the alarm is disabled.):
Alarm Delay = 0 (Immediate Alarm)
Alarm Delay = 10 Minutes /20 Minutes /1 Hour /90 Minutes/2 Hours

If the **ALARM** is Enabled the following Menu Selections will be available;
Set Alarm High Limit
Set Alarm Low Limit.
(Note that the measurement units will be determined by what model recorder is being used.)
Set Chart Speed / Range.

After menu setting, unit will automatically go into the RUN Mode after 30 seconds if no other selections are made.

If the **RUN** Mode is selected:
The display will show measurement at the probe tip or transducer.
While in the **RUN** mode, the user can:
Home the Pen by pressing the **HOME** switch. (Allows for easy changing of charts and pen.)
Set the Pen position.
Advance the chart by pressing the **ADV** button. (To select a desired starting point on the chart.)

How to Change the Chart

1. Press the **HOME** button to move the pen to the right hand edge of the chart and to turn the unit off.
2. Remove the chart retaining strip by lifting the middle portion to flex the strip and dis-engage the two end tabs.
3. Remove the old chart and cardboard tube.
4. Install the new chart into the chart holder cavity.
5. Pull out enough of the chart to reach the end of the front panel. Slide the new chart underneath the pen. Align the holes along the chart edge with the drive spindles.
6. Replace the chart-retaining strip beveled side down.
7. Turn unit on.
8. If the pen position needs adjustment, see Pen Adjustment section below.

Units Selection and Recorder Setup

The RD-87 series of recorders use a special menu that is only accessible at power up to select units and provide chart and sensor calibration.
To select measurement units and calibrate the pen and sensor follow the steps below.

1. Start with power switch set to OFF.
2. Press and hold **A** and **B** buttons. Turn power ON.
3. Display will show **Unit Selection**.
4. Press the **A** or **B** button to select **US** or **Metric**.
5. Press **Menu** to continue.
6. Display will show **Calibrate Scale?**
7. Press **A** for **Yes** or **B** for **No**. If **B** is selected skip to step 17.
8. Display will show **Homing Pen** and the pen will move to the right of the chart.
9. Display will show **Home Adjustment**.
10. Press the **A** button to select the **Home Adjustment** menu, the **B** button to advance the chart. If the Home position of the pen does not need to be adjusted press **Menu** and skip to step 13.
11. The display will show **Adjust Home Pos**. Use the **A** and **B** button to adjust the pen so that the tip of the pen is on the right most line on the chart.
12. Press **Menu** to continue. The display will return to the **Adjust Home Pos** message. Press **Menu** to continue.
13. The pen will move to the left of the chart and the display will show **Max Adjustment**.
14. Press the **A** button to adjust the maximum position of the pen, press the **B** button to advance the chart. If the maximum position of the pen does not need adjustment press **Menu** and skip to step 17.
15. The display will show **Adjust Max Pos**. Use the **A** button and **B** button to move the pen tip so that the tip of the pen is on the left most line of the chart.
16. Press **Menu** to return to the **Max Adjustment** menu. Press **Menu** again to continue.
17. The display will show **Calib. Sensor?** Press the **A** button to calibrate the sensor. Press the **B** button to exit to the **Run** mode.
18. The display will show **Set Reading**.
19. Use the **A** button and the **B** button to adjust the reading of the display to agree with the condition at the sensor. Depending on the model of recorder this may be temperature, voltage or current. For this adjustment it is critical to use a known accurate reference instrument to set the sensor reading. The accuracy of the recorder will only be as good as the accuracy of the reference instrument.
20. Press **Menu** to exit the calibration and setup and return to the **Run Mode**.

CHART SPEED AND RANGE

The RD-87 Series offers numerous combinations of Chart Ranges and Chart Speeds to match a wide variety of applications. All functions of Chart Speed and Chart Range have been combined in one menu to make the necessary selections as easy and as fast as possible.

Chart Speed is the term used to describe the time it takes for the recording chart to advance a specific amount of distance. The RD-87 series of recorders allows the user to select inches or cm as the unit of distance. Different applications will require different chart speeds. For example, the 1/4 inch/hour would generally be used where long term monitoring is required and frequent changing of the strip chart would be undesirable. The main disadvantage of this is that short-term variations in the measurement will record as a single line or step on the chart. In applications that have short-term variations the user may prefer a faster chart speed for more accurate analysis. The fastest chart speed is two inches / minute. This would allow a maximum recording time of two hours. This allows the user to record short-term variations in great detail. An example of this would be to test the defrost cycle in a frost-free freezer or to observe the settling time of a temperature control system. If the chart speed is selected for cm then the temperature readings will be in degrees C. If the chart speed is selected for inches then the temperature reading will be in degrees F.
The recorder will retain this information even when the power is disconnected or the unit turned off. If the measured parameter is out of range (for the chart selection), the display will read the actual units, but the pen will not go beyond limit of the chart edge.

How to Set the Chart Speed and Range.

1. While in the **RUN** mode, press the **MENU** button repeatedly until the **SET CHART SPEED** message is displayed.

2. To select a longer chart speed, press the **A** button, for shorter chart speeds press the **B** button. Each time the **A** or **B** button is pressed, the speed will change. Whatever speed is on the display will become the chart speed.
   Note that selecting **US** or **Metric** uses a special setup menu. You must select the units desired before selecting chart speeds or chart ranges.
   The available chart speeds are listed below;

1/4 inch/hour	1/2 cm/hour
1 inch/hour	2 cm/hour
2 inches/hour	4 cm/hour
4 inches/hour	8 cm/hour
8 inches/hour	16 cm/hour
1/4 inch/minute	1/2 cm/minute
1/2 inch/minute	1 cm/minute
1 inch/minute	2 cm/minute
2 inches/minute	4 cm/minute

3. Press the MENU button again to go to the chart scale selection menu. To change the chart scale press the **A** or **B** button. Each time the **A** or **B** button is pressed, the chart scale will change. The units of measurement displayed will depend on the model of recorder being used. Whatever range is on the display will become the chart scale range.

Note that the display will show chart scales in degrees F for chart speeds in inches and degrees C for chart speeds in cm.

AC Voltage and AC Current will use existing scales on each type of chart (inches or cm). The available chart ranges are listed below by recorder model;

RD-87 Temperature Recorder

Scale	
-40°F to +60°F	-40°C to +60°C
+50°F to +150°F	-30°C to +20°C
0°F to 100°F	0°C to +50°C

RD-87-J Temperature Recorder

Temperature Scale	
-40°F to +60°F	-40°C to +60°C
0°F to +250°F	-30°C to +20°C
+50°F to 150°F	0°C to 50°C
0°F to 100°F	0°C to 100°C
0°F to 500°F	0°C to +500°C
0°F to 1000°F	

RD-87-VAC Voltage Recorder

Voltage Scale	
0 to 100 VAC	0 to 100 VAC
50 to 150 VAC	0 to 200 VAC
0 to 500 VAC	0 to 500 VAC

RD-87-CAC Current Recorder

Current Scale	
0 to 50 A	0 to 50 A
0 to 100 A	0 to 100 A
0 to 250 A	0 to 300 A

RD-87-MA 4 to 20ma Loop and DC Voltage Recorder

0 to 20 ma	0 to 20 ma
4 to 20 ma	4 to 20 ma
0 to 100 mV	0 to 100 mV
0 to 5 V	0 to 5 V

4. Press **MENU** to proceed in **RUN** Mode.

Connecting the RD-87-TEMP

The temperature probe is interchangeable. The furnished sensor has 15 feet of cable. The temperature sensor is an electronic digital proprietary design for precision and very high interference immunity. It utilizes the standard RCA connector. To access this connector open the door located at the back of the recorder. The sensor cable may be extended with an extension cable.

Connecting the RD-87-J

The Type J thermocouple probe is interchangeable. The furnished probe is 6 feet long. The thermocouple probe uses the industry standard connector for type J thermocouple probes.

DO NOT PLACE THE RECORDER DIRECTLY IN AREAS OF EXTREME TEMPERATURES, HIGH HUMIDITY OR HEAVY CHEMICAL CONTENT.

Connecting the RD-87-VAC

Plug each clip lead firmly into the RD-87-VAC banana jacks on the side of the recorder. Make sure that there is no strain that could pull the clip leads out of the RD-87-VAC jacks. Connect the clip leads to the points that the voltage is being measured. Make sure that the leads will not interfere with any moving pieces of equipment and will not pull loose any wires or other connections.
The clips leads and RD-87-VAC are not water-resistant! Do not expose to rain or snow.

CAUTION!
Electrical connection to any type of operating equipment is Dangerous! The RD-87-VAC leads should only be connected when it has been determined that the power is off and the equipment is safe to touch!

Connecting the RD-87-CAC

Plug each clip lead firmly from the clamp-on probe into the RD-87-CAC banana jacks on the side of the recorder. Make sure that there is no strain that could pull the clip leads out of the RD-87-CAC jacks. Place the clamp-on probe around the wire that the current is being measured. Make sure that the leads will not interfere with any moving pieces of equipment and will not pull loose any wires or other connections. The clamp-on probe and clips leads and RD-87-CAC are not water-resistant! Do not expose to rain or snow.

CAUTION!
Electrical connection to any type of operating equipment is Dangerous! Do not connect the probe to an uninsulated conductor at a voltage greater than 250 VAC / VDC. The RD-87-CAC leads should only be connected when it has been determined that the power is off and the equipment is safe to touch!

Connecting the RD-87-MA

For the users convenience the RD-87-MA uses a plug-in terminal block to connect to the voltage or current source.
To access this connector open the door located at the back of the recorder. The terminal block will be the connector between the two relay contacts and the serial data connector.
Grasp the connector firmly and pull out with a smooth motion. The connector is polarized and will only fit in its socket in the correct position. Do not force the connector into its socket.
Attach the wires from the current or voltage source and plug the connector in.
Note that for proper operation the polarity of the current or voltage connection must be observed.
A label indicating "+" and "-" will show the correct polarity for the connector.

CAUTION!
Electrical connection to any type of operating equipment is Dangerous! The RD-87-MA leads should only be connected when it has been determined that the power is off and the equipment is safe to touch!

ALARM AND DELAY

When the measurement passes above or below the threshold set in the menu function, the RD-87 recorders will execute a preset operation. This operation is described as an **Alarm** condition or a **Delay** condition and is referred to simply as **Alarm** or **Delay**. **Alarm** indicates that the measurement at the probe tip or transducer has passed above or below the preset thresholds and the RD-87 recorder is sounding the audible alarm and has closed the relay contacts. The display will also be flashing as a visual indication of the **Alarm** condition. **Delay** is a condition in which the measurement at the probe tip or transducer has passed one of the preset thresholds, but the audible alarm and relay contacts are not activated for a preset delay time. **Delay** is used to prevent nuisance and false alarms.

For Example:
In the normal operation of a frost-free freezer an automatic defrost cycle takes place periodically. Without the Delay function this would cause a false alarm indicating a freezer failure when in fact no failure has occurred. The Delay can also be used to prevent nuisance alarms on coolers or similar devices that have frequent door openings. Without the Delay function an alarm would be started as a result of a short-term increase in temperature caused by the door being opened and again no failure of the system has occurred.

The RD-87 recorders allow the user to select one of six Delay times, zero Delay, 10 minutes, 20 minutes, 1 hour, 90 minutes or 2 hours. The delay time selected will depend on the application and will vary from installation to installation. It is up to the judgment of the user to determine the best delay time for a given application. When a Delay time of zero is used the Delay function is disabled. When a measurement threshold is passed the audible alarm and relay contacts will close immediately. If a Delay time other than zero is selected the audible alarm and contacts will not activate until one of the measurement thresholds been exceeded continuously for the period of the Delay Time. The display will flash to indicate the Delay condition to alert the user that one of the preset thresholds has been passed. At the end of the Delay time the audible alarm will sound and the relay contacts will close.

HOW TO SILENCE THE ALARM: (Relay contacts remain closed.)

1. Press **MENU** and the display will show **"Silence Alarm?"** message.
2. Press **A** to turn off alarm (only sound will be turned off, relay will be closed).
3. Press **B** to allow alarm sound to continue.
4. Press **MENU** to continue in **MENU** Mode.

How to Set the Alarm & Delay

1. Press **MENU** button until **Alarm Delay** message appears.
2. Press button **A** or button B to scroll through the alarm delay options: Alarm Disabled (If the alarm is disabled, you must enable the alarm to get the delay sections of the MENU.)
   0 Delay
   10 Min. Delay
   20 Min. Delay
   1 Hour Delay
   90 Minute Delay
   2 Hour Delay
3. Press **Menu** button to return to the **Run** mode.

UPPER and LOWER LIMITS

The Upper and Lower limits allow the user to customize the alarm settings of the RD-87 recorders to provide the greatest degree of protection while at the same time preventing unnecessary alarms. Since each application is unique, careful selection of the limit thresholds are required to provide the maximum degree of protection. Both high and low limits may be set. If the Alarm is enabled, and any of these limits are exceeded, the display will blink to indicate the measurement at the probe tip or transducer has gone out of limit. An audible alarm (Beeper) will sound and the relay contacts will close after the set delay time.

This delay time can be set as follows:

0 Delay
10 Min. Delay
20 Min. Delay
1 Hr. Delay
90 Min. Delay
2 Hr. Delay

If the Alarm is not disabled, either of the limits could trip the alarm, therefore both limits must be set or the alarm must be disabled if it is not being used.

SETTING THE LIMITS

Upper and Lower Limit part of MENU will not show if alarm is disabled.

How to Set the High Limit

1. Press **MENU** until **"High Alarm At"** appears. Note that **Units** will match the model of recorder, Temperature for RD-87-TEMP or RD-87-J, AC voltage for RD-87-VAC, AC Current for RD-87-CAC and DC ma or DC Voltage for RD-87-MA depending on the range selected.
2. Press **A** to increase limit, **B** to decrease limit, or **MENU** to go to Low Limit. The A or B button can be held down increase or decrease the limit rapidly.

How to Set the Low Limit

1. Press **MENU** until **Low Alarm At"** appears. Note that **Units** will match the model of recorder, Temperature for RD-87-TEMP or RD-87-J, AC voltage for RD-87-VAC, AC Current for RD-87-CAC and DC ma or DC Voltage for RD-87-MA depending on the range selected.

2. Press **A** to increase limit, **B** to decrease limit or **MENU** to continue through the chart selection menus.

PEN POSITION ADJUSTMENT

In the normal course of operation charts and eventually, pens will have to be changed on the RD-87 recorders. When this occurs it may be necessary to adjust the pen position to match the reading of the display. This is most likely to occur when changing a pen.

How to Adjust the Pen Position on the chart.

1. Press the **HOME** button until the display reads **"Homing the Pen Please Wait"** The pen will move toward the right hand of the chart.
2. Press button **A** to select the pen adjustment menu or press button **B** to advance the chart.
3. Press button **B** to move the pen in (towards the right) and button **A** to move the pen out (towards the left). Adjust the pen so that the tip of the pen is centered on the outer line of the chart.
4. Press **MENU** to select return to the **Pen Adjust / Advance** menu.
5. Press **Menu** again to return to the **Run** mode.

Probes and Transducers

RD-87-TEMP

Each probe used with the RD-87-TEMP contains the sensor needed to convert temperature to the electrical signal that the recorder uses to record and display.
Each probe will measure Temperature from -40°F to +150°F (-40°C to +60°C)
steel. Probes are interchangeable.

RD-87-J

The temperature probe supplied with the RD-87-J converts temperature to the electrical signal that the recorder uses to record and display probe temperature.
Each probe will measure Temperature from -40°F to +1000°F (-40°C to +500°C)

The probe tip is not designed to be immersed in any liquid or corrosive gas.

Probes are interchangeable with any Type J thermocouple probe that has an industry standard thermocouple connector.

RD-87-CAC

The AC Current sensing circuit used with the RD-87-CAC is contained in the recorder and has no user serviceable components.
The current sensor is designed to measure AC Current from 0 A to 300 A.
Exceeding the 300 A maximum rating can cause permanent damage to the RD-87-CAC.

RD-87-VAC

The AC Voltage sensing circuit used in the RD-87-VAC is contained in the recorder and has no user serviceable components.
The voltage sensor is designed to measure AC voltage from 0 VAC to 500 VAC.
Exceeding the 500 VAC maximum rating will cause permanent damage to the RD-87-VAC.

RD-87-MA

The Voltage and Current sensing circuit used in the RD-87-MA is contained in the recorder and has no user serviceable components.
The current sensor is designed to measure DC Current from 0 ma to 20ma.
The voltage sensor is designed to measure 0 to 5 volts maximum.
Exceeding the maximum rating of the voltage or current range will cause permanent damage to the RD-87-MA.

Calibration by Supco to NIST traceable standards is available as an option.

BATTERY BACKUP OPERATION

Battery backup allows the RD-87 recorders to continue operation in the event of a power loss. Actual operating time on battery will depend upon the condition of the batteries. With fresh alkaline batteries the typical operating time will be 48 hours (when operating on battery only). Alkaline batteries are essential for this type of application. When the main power is lost the RD-87 series will sense this and immediately switch over to battery operation. The temperature and chart recording will continue until the batteries have been exhausted or the AC power is restored. The RD-87 series will monitor the battery power and when the batteries are almost exhausted, a **"Low Battery"** message will appear on the display. The batteries should be replaced as soon as possible to avoid erroneous readings. This prevents possible damage due to battery leakage and also assures that the RD-87 will remain in operation in the event of another power failure.

The suggested battery backup consists of eight AA cells, however, a standard nine volt battery could be used to provide approximately one hour of backup.

The following chart shows the life expectancy of various types of batteries:

1. Eight Alkaline **AA** cells 48 Hours
2. Eight Rechargeable Nicad AA cells 24 Hours
   Note: rechargeable cells MUST be charged outside the recorder.
3. Standard 9 Volt Alkaline Battery 1 Hour

The life expectancy of the batteries is based only on the time when the RD-87 series is being operated on batteries only.
It is good practice to replace these batteries every year.
Do not keep batteries in the RD-87 series when not in use.

RS-232 Port
The RD-87 series of recorders provides an optional RS-232C port to allow the user to connect the recorder to a computer or network and allows continuous monitoring of the data being recorded. An adapter cable is necessary with this option to facilitate connection to an external computer.
Data is transmitted every time the probe is sampled and is only interrupted during an update of the pen position.
The data is delimited ASCII text.
The port parameters are as follows;
4800 baud
8 Data Bits
No Parity
1 Stop Bit

RD-87-TEMP SPECIFICATIONS

Operating ambient temperature range	32°F to 120°F (0° to 50°C)	
Storage temperature	0° to 120°F (-18° to 50°C)	
Primary power	115 VAC, 50/60 Hz Adapter	
	(220-240 VAC, 50 Hz. optional)	
Backup power	8 AA alkaline batteries (not supplied)	
Alternative power	12 Volt vehicle operation with optional adapter	
Temperature Accuracy	+/- 2°F (+/- 1°C)	
Probe	Temperature probe	
	with 15' cable (cable extension is available)	
Chart	Strip chart (20 ' x 4 3/4 ")	
Chart Ranges	-40°F to +60°F	-40°C to +60°C
	+50°F to +150°F	-30°C to +20°C
	0°F to 100°F	0°C to +50°C
Chart Speeds	1/4 inch/hour	1/2 cm/hour
	1 inch/hour	2 cm/hour
	2 inches/hour	4 cm/hour
	4 inches/hour	8cm/hour
	8 inches/hour	16 cm/hour
	1/4 inch/minute	1/2 cm/minute
	1/2 inch/minute	1 cm/minute
	1 inch/minute	2 cm/minute
	2 inches/minute	4 cm/minute
Chart Speed Accuracy	+/- 1 %	
Display	Alphanumeric LCD	
	16 Characters 2 Line	
Temperature Alarm Range	-40° to +150°F (-40° to +60°C)	
Alarm Delay Range	No Delay, 10 Min., 20 Min., 1 Hr., 90 Min. or 2 Hr.	
Remote Alarm Connection	Normally Open Contacts 48 VAC/DC, 0.1 Amp Dry Contacts	
Mounting	Vertical or Horizontal, Free Standing or Wall Mounted	
Dimensions	9.25"x7.25"x2"	
Weight	2.5 lb.	
Power Consumption	3.5 Watts Max.	

RD-87-J SPECIFICATIONS

Operating ambient temperature range	32°F to 120°F (0°C to 50°C)	
Storage temperature	0° to 120°F (-18°C to 50°C)	
Primary power	115 VAC, 50/60 Hz Adapter (220-240 VAC, 50 Hz. optional)	
Backup power	8 AA alkaline batteries (not supplied)	
Alternative power	12 Volt vehicle operation with optional adapter	
Temperature Accuracy	+/- 2°F (+/- 1°C)	
Chart Speeds	1/4 inch/hour	1/2 cm/hour
	1 inch/hour	2 cm/hour
	2 inches/hour	4 cm/hour
	4 inches/hour	8 cm/hour
	8 inches/hour	16 cm/hour
	1/4 inch/minute	1/2 cm/minute
	1/2 inch/minute	1 cm/minute
	1 inch/minute	2 cm/minute
	2 inches/minute	4 cm/minute
Chart Speed Accuracy	+/- 1 %	
Display	Alphanumeric LCD 16 Characters 2 Line	
Temperature Alarm Range	-40° to +1000°F (-40° to +500°C)	
Alarm Delay Range	No Delay, 10 Min., 20 Min., 1 Hr., 90 Min. or 2 Hr.	
Remote Alarm Connection	Normally Open Contacts 48 VAC/DC, 0.1 Amp Dry Contacts	
Mounting	Vertical or Horizontal, Free Standing or Wall Mounted	
Dimensions	9.25" x 7.25" x 2	
Weight	2.5 lb.	
Power Consumption	3.5Watts Max.	

RD-87-VAC SPECIFICATIONS

Operating ambient temperature range	32°F to 120°F (0°C to 50°C)	
Storage temperature	0°F to 120°F (-18°C to 50°C)	
Primary power	115 VAC, 50/60 Hz Adapter (220-240 VAC, 50 Hz. optional)	
Backup power	8 AA alkaline batteries (not supplied)	
Alternative power	12 Volt vehicle operation with optional adapter	
AC Voltage Accuracy	+/- 0.5 1.0 VAC	
Range	0 to 500 VAC	
Chart	Strip chart (20' x 4 3/4")	
Chart Ranges	Inches	Metric
	0 to 100 VAC	0 to 100 VAC
	50 to 150 VAC	0 to 200 VAC
	0 to 500 VAC	0 to 500 VAC
Chart Speeds	1/4 inch/hour	1/2 cm/hour
	1 inch/hour	2 cm/hour
	2 inches/hour	4 cm/hour
	4 inches/hour	8 cm/hour
	8 inches/hour	16 cm/hour
	1/4 inch/minute	1/2 cm/minute
	1/2 inch/minute	1 cm/minute
	1 inch/minute	2 cm/minute
	2 inches/minute	4 cm/minute

Chart Speed Accuracy	+/- 1 %
Display	Alphanumeric LCD 16 Characters 2 Line
AC Voltage Alarm Range	0 to 500 VAC
Alarm Delay Range	No Delay, 10 Min., 20 Min., 1 Hr., 90 Min. or 2 Hr.
Remote Alarm Connection	Normally Open Contacts 48 VAC/DC, 0.1 Amp Dry Contacts
Mounting	Vertical or Horizontal, Free Standing or Wall Mounted
Dimensions	9.25"x7.25"x2
Weight	2.5 lb.
Power Consumption	3.5Watts Max.

RD-87-CAC SPECIFICATIONS

Operating ambient temperature range	32°F to 120°F (0°C to 50°C)
Storage temperature	0°F to 120°F (-18°C to 50°C)
Primary power	115 VAC, 50/60 Hz Adapter (220-240 VAC, 50 Hz. optional)
Backup power	8 AA alkaline batteries (not supplied)
Alternative power	12 Volt vehicle operation with optional adapter
AC Current Accuracy	+/- 5%
Range	0 to 300 Amps AC using supplied clamp-on probe
Chart	Strip chart (20' x 4 3/4")

Chart Ranges	Inches	Metric
	0 to 50 A	0 to 50 A
	0 to 100 A	0 to 100 A
	0 to 250 A	0 to 300 A
Chart Speeds	1/4 inch/hour	1/2 cm/hour
	1 inch/hour	2 cm/hour
	2 inches/hour	4 cm/hour
	4 inches/hour	8 cm/hour
	8 inches/hour	16 cm/hour
	1/4 inch/minute	1/2 cm/minute
	1/2 inch/minute	1 cm/minute
	1 inch/minute	2 cm/minute
	2 inches/minute	4 cm/minute

Chart Speed Accuracy	+/- 1 %
Display	Alphanumeric LCD 16 Characters 2 Line
AC Current Alarm Range	0 to 300 A
Alarm Delay Range	No Delay, 10 Min., 20 Min., 1 Hr., 90 Min. or 2 Hr.
Remote Alarm Connection	Normally Open Contacts 48 VAC/DC, 0.1 Amp Dry Contacts
Mounting	Vertical or Horizontal, Free Standing or Wall Mounted
Dimensions	9.25"x7.25"x2
Weight	2.5 lb.
Power Consumption	3.5 Watts Max.

RD-87-MA SPECIFICATIONS

Operating ambient temperature range	32°F to 120°F (0°C to 50°C)	
Storage temperature	0°F to 120°F (-18°C to 50°C)	
Primary power	115 VAC, 50/60 Hz Adapter	
	(220-240 VAC, 50 Hz. optional)	
Backup power	8 AA alkaline batteries (not supplied)	
Alternative power	12 Volt vehicle operation with optional adapter	
Accuracy	0 to 5.00 Volts +/- 0.01 Volt	
	0 to 100 mV +/- 1 mV	
	0 to 20 ma +/- 0.1 ma	
	4 to 20 ma +/- 0.1ma	
Chart	Strip chart (20' x 4 3/4")	
Chart Speeds	1/4 inch/hour	1/2 cm/hour
	1 inch/hour	2 cm/hour
	2 inches/hour	4 cm/hour
	4 inches/hour	8 cm/hour
	8 inches/hour	16 cm/hour
	1/4 inch/minute	1/2 cm/minute
	1/2 inch/minute	1 cm/minute
	1 inch/minute	2 cm/minute
	2 inches/minute	4 cm/minute
Chart Speed Accuracy	+/- 1 %	
Display	Alphanumeric LCD	
	16 Characters 2 Line	
DC Current Alarm Range	0 to 20 ma	
DC Voltage Alarm Range	0 to 5 volts	
	0 to 100 mV	
Alarm Delay Range	No Delay, 10 Min., 20 Min., 1 Hr., 90 Min. or 2 Hr.	
Remote Alarm Connection	Normally Open Contacts 48 VAC/DC, 0.1 Amp Dry	
Mounting	Vertical or Horizontal, Free Standing or Wall Mounted	
Dimensions	9.25" x 7.25" x 2	
Weight	2.5 lb.	
Power Consumption	3.5 Watts Max.	

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 in which wear is not warranted, include but are 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 the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED 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.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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For immediate technical or application assistance:

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