



The Guardian I

Farm Bulk Tank Recording Thermometer

Model AT550200107

Operator's Manual



Form 2068 ©2/02
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Edition 5

Note to Dealers: Once you have installed the Guardian and initiated operation, please leave this manual with the dairy producer.

Thank You,
Anderson Instrument



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I Overview

The Guardian is a circular chart recording thermometer specifically designed for dairy farm milk applications. It provides an “around the clock” record of the milk and water wash temperature in your bulk tank. You can use this information to adjust or troubleshoot your cooling and cleaning systems. Optimally cooled milk and cleaned tanks mean that your bacteria counts will diminish and your milk premiums will increase.

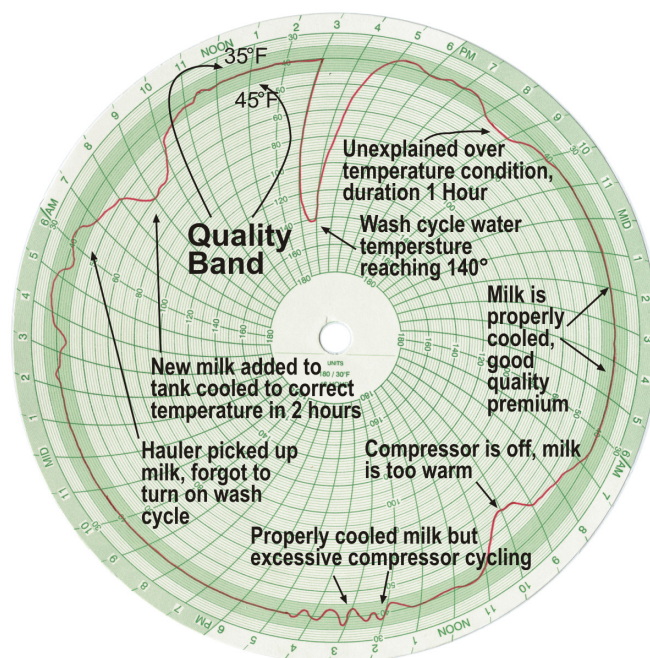
The Anderson Instrument Company manufactures the Guardian recording thermometer. Anderson has more than 50 years of experience serving milk processors in applications ranging from milk pasteurization to temperature monitoring prior to distribution. We are ready to help you with any questions or comments you have about your Guardian on our toll free line at 1-800-833-0081.

WARNING: If this equipment is used in a manner not specified by Anderson Instrument Company, the protection provided by the equipment may be impaired.

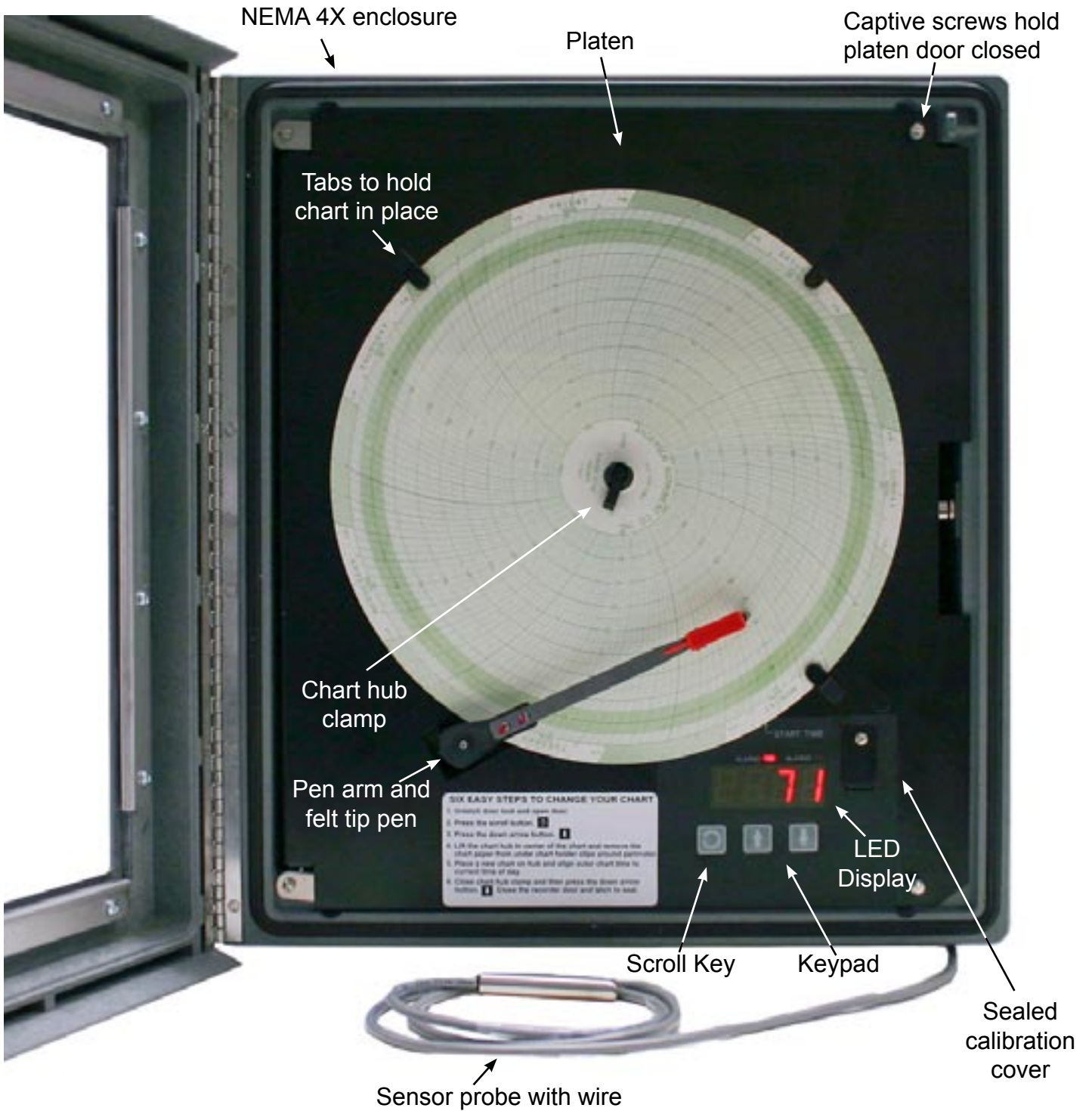
II Using Your Guardian Recording Thermometer

A sensor reads milk temperature and records the temperature on a circular chart. The chart rotates one rotation generating a red line displaying milk temperature over time (rotation time usually corresponds to the time between milk pick-ups). The shaded green band on the chart shows the milk quality range for milk once it has been cooled. If the red line is outside the green quality band, you can assess your milking system and take corrective action.

A “spiked” red line on the chart shows the tank has been cleaned and indicates the wash water temperature of the cleaning cycle. The Guardian also provides a digital display showing temperature of the milk. Finally, the Guardian comes equipped with dual alarm contacts for signaling a warm milk condition. By using the alarm contacts in the Guardian, an external device such as a light or horn supplied by the installer will alert you to an over-temperature condition so you can remedy potential problems.



III Getting to Know Your Guardian



IV *Improving Milk Quality and Premiums*



Six Steps to Assessing Your Milking System

If the red line on your chart is outside the green band, look for the following in your milking system:

1. Check to see if time indicated on the chart corresponds to when you cleaned the tank. The Pasteurized Milk Ordinance states that tanks should be cleaned after each pickup with wash water that has been heated to at least 120°F and is in the tank and lines for 10 minutes. If the water temperature is below 120°F or washes for less than 10 minutes, adjust your water heater or cleaning process to better clean the tank and receive higher milk premiums. “A rule of thumb for sizing up your hot water system: For a bulk tank, the requirement is three gallons of hot water for each 100 gallons of bulk tank capacity.”
Dersam, Paul, Hoard’s Dairyman, “Take a basic approach to solving milk quality problems,” Date 8/10/98, page 48.
2. Next, check to see if the red line on the chart corresponds to when you milked. Bulk tank milk temperature increases as fresh milk is added to the tank. Your cooling system should be able to bring the temperature of your first milking after tank cleaning below 45°F (inside the green shaded band) within 2 hours. Subsequent milkings should not increase the temperature above 50°F and your cooling system should be able to return the tank temperature to at least 45°F (within the green shaded band) in 1 hour. If this is not happening, tune your cooling system to lower bacteria counts.
3. If you still cannot pinpoint the difficulty, check for compressor problems such as dirty heat exchanger plates or refrigerant leaks. Consult your local Dealer for additional maintenance suggestions.
4. Even though your compressor is operating properly, your bacteria counts may still be high because the tank agitator is not switching on at 15 minute intervals. Unmixed milk creates different temperature zones in the milk tank. The chart may show erratic temperature readings. Verify that the agitator is working correctly by checking the time between operation cycles.
5. If the red line still displays a temperature higher than 45°F, check the thermostat. The thermostat switches the compressor on and off. It may need calibration or adjustment. Have your local Dealer check the switch to ensure that it engages at the desired temperature set point, usually between 40°F and 45°F.
6. If the high temperature inside the tank can not be explained, you may have an intermittent problem with your electrical system. Check the recorder to make sure it indicates the correct time. If not, contact your Dealer or your electrician to pinpoint the cause of the power failure.



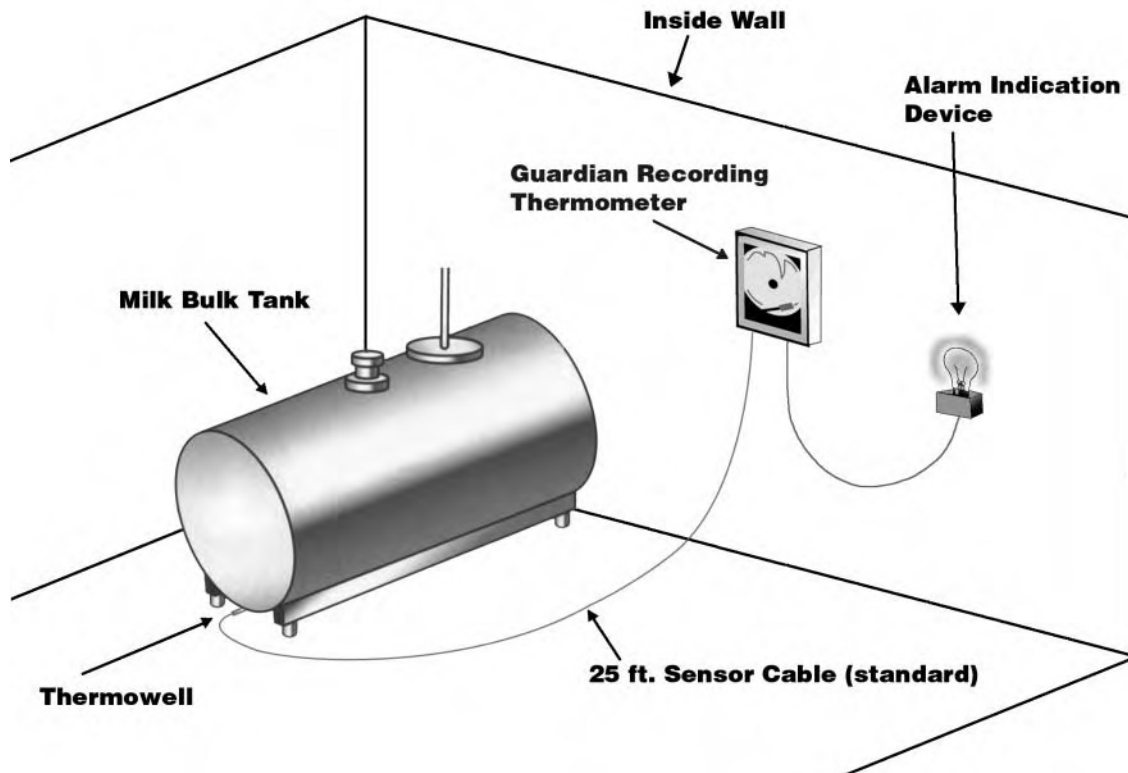


Using the Alarm Function

Your Guardian comes equipped with an alarm contact. When wired to a light or horn, the alarm will alert you to an over-temperature condition. This allows you to react before a potential problem occurs. The factory setting for the alarm is 45°F. See the Appendix section titled “Changing Alarm Settings” on page 23, if you want to change the temperature point at which the alarm energizes. A second alarm with a factory programmed setpoint of 35°F is also present.

During operation, the alarm will energize for one of following reasons:

1. You just activated your cleaning cycle. No action required. The alarm is on because the wash cycle has caused the temperature in the tank to exceed 45°F.
2. You just milked. Again, no action is required as long as the alarm shuts off within 2 hours of your first milking (first milking after washing the tank) or within 1 hour for blended milk.
3. **You have a problem: In this case the alarm is indicating that milk in the bulk tank is above the desired cooling temperature. You can take action to remedy the problem thereby minimizing bacteria growth.**



V Regular Maintenance

You will need to change the chart on your Guardian regularly. Each chart is made for a specific time period: 24, 48, 72 hour or 7 days. The recording thermometer is programmed at the factory for the time period you specified when ordered. Usually, the chart rotation time corresponds to the time between milk pick-ups. For example, if your milk is picked up every other day, you should order a Guardian recording thermometer with a 48 hour chart rotation time period. If you need assistance determining the correct chart rotation time, call Anderson Instrument at 1-800-833-0081.







Changing Your Chart

5 EASY STEPS TO CHANGE YOUR CHART

Action

Explanation

1. Open the door and press the **SCROLL** button.  CC, Chart Change will appear on the display.
2. Press the **DOWN** arrow button.  The pen will move to the outside perimeter of the chart.
3. Lift the black chart hub clamp in the center of the chart and remove the chart paper from under the chart holder clips around the outside of the chart. Try to avoid bending the pen arm.  Allows the removal of the chart paper.
4. Place a new chart on the black chart hub pin and align the correct time of day to the **START TIME** marker (see picture on page 9) located in the lower right corner. Make sure the paper is placed under the black tabs around the outside of the recorder. Installation of new chart paper.
5. Close the black chart hub clamp and then press the **DOWN** arrow button.  The display will change back to the temperature. Close the recorder door and secure the latches. The unit is now back in normal operation.



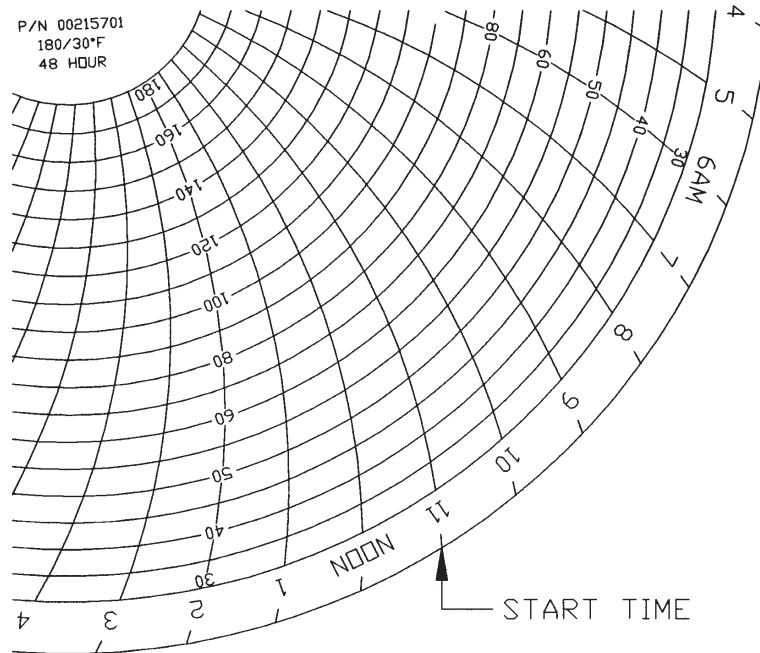
Keypad on the Guardian





Chart Positioning

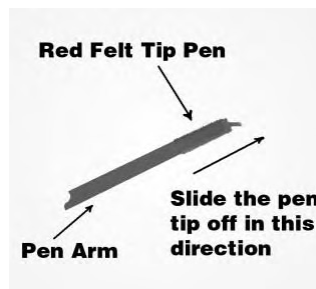
When placing a new chart on the Guardian, align the correct time of day to the “START TIME” marker located in the lower right hand corner.



Changing the Red Felt Tip Pen on the Pen Arm

You will need to periodically change the red, felt tip pen on your Guardian. You will know this needs to be done when the chart is moving, the pen is in contact with the paper but the line is either faint or not printing at all. Replacement pens are available from Anderson at 1-800-833-0081. See the “Customer Support and Replacement Parts” section for part numbers when ordering.

To change a pen, simply slide the red felt tip marker off the end of the metal pen arm. Slide a new one on until it “clicks” in place.






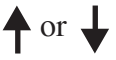







Changing the Rotation Time of the Chart

The chart rotation time is set at the factory before your Guardian is shipped. Rotation refers to the amount of time it takes the chart to complete one full rotation. For example, if the rotation time is set for 48 hours, it will take 48 hours for the chart to complete one full rotation.

To change the chart rotation time, (i.e., from 48 hours to 7 days) follow this simple 10 step procedure:

1. Open the door to the Guardian recorder. On the front of the platen, in the lower right hand corner, is a small cover held in place by a screw. Remove the screw and the cover to reveal the **MODE** switch. Move the **MODE** switch from the **DOWN** position to the **UP** position. 
2. The display will read "Prog." Press the **DOWN** arrow button. 
3. The display will read "Pen". Press the **SCROLL** button. 
4. The display will read "CHAr". Press the **DOWN** arrow button. 
5. The display will read "ChSP". Press the **SCROLL** button. 
6. The existing rotation time period will be displayed (i.e., 48 hour). Press the **UP** or **DOWN** arrow keys to step through the rotation time periods (12 hr., 24 hr., 48 hr., 72 hr., 7 day). Stop at your desired rotation time. 
7. Press the **SCROLL** button. The display will read "ChSP" 
8. Press the **UP** arrow button. The display will read "CHAr" 
9. Move the **MODE** switch from the **UP** position to the **DOWN** position,  replace the small cover over the **MODE** switch and secure with the screw provided.
10. Install the new replacement chart onto the instrument. Be sure to use the chart which corresponds to the new chart speed that was just programmed. For example, if chart speed is programmed for 7 days, choose a 7 day chart. See page 8 for the correct chart replacement procedure. Close the door of the Guardian.

You are ready to go!





Calibration Check

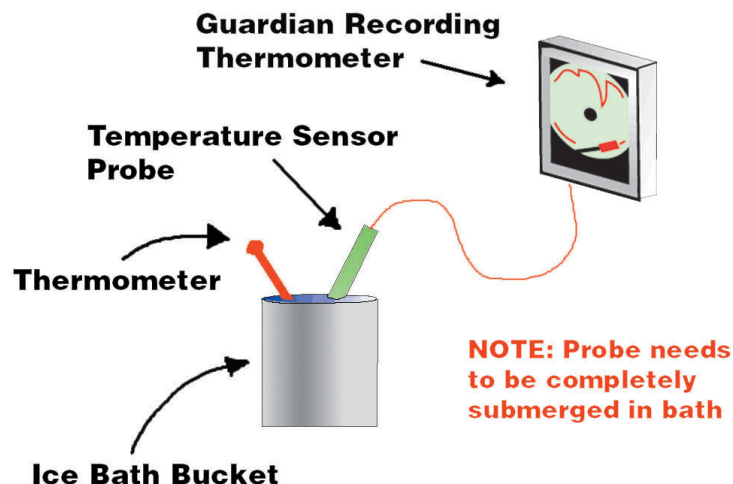
The Guardian is fully calibrated at the factory before it is shipped to you. Please consult Anderson at 1-800-833-0081 or your Dealer for assistance with the calibration procedure.

By running the Calibration Check Procedure, the Guardian verifies that the temperature displayed, recorded temperature on the chart, and the sensor temperature are all in agreement.

EQUIPMENT REQUIRED (See illustration below)

- Guardian Recording Thermometer with Sensor Probe
- Ice Bath
- Thermometer

1. Using an agitated ice bath (bucket of 50% ice and 50% water that is stirred), completely submerge the Guardian Sensor probe into the ice bath (bucket). The Guardian Recorder should be powered on.
2. After approximately five minutes, check the ice bath with a thermometer, verifying that the ice bath temperature is 32°F (0.0°C).
3. Verify that the reading on the display of the Guardian Recording Thermometer reads 32°F (0.0°C). Also verify that the pen position of the recording thermometer is at 32°F (0.0°C).
4. With the display reading 32°F (0.0°C) and the pen reading 32°F (0.0°C) the verification is complete.
5. The recording thermometer calibration is verified and the probe can be placed back into the milk tank thermowell.
6. If the pen does not match the LED display reading and the LED display reading is correct, a pen alignment should be performed. Please see pen alignment section for adjustments.
7. If the recorder temperature on the chart and the LED display are the same but are not within 2°F of 32°F, an input calibration should be performed. Please consult Anderson at 800-833-0081 or your Dealer for assistance with the calibration procedure.







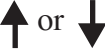

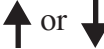

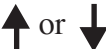






Pen Alignment (Positioning of pen on the chart)

Conduct a pen alignment when the sensor display and thermometer all agree but the red line on the chart is off by more than 1°F.

NOTE: The “Calibration Seal” may need to be removed to access the Mode Switch to gain access to the calibration section.

1. Open the door to the Guardian recorder. On the front of the platen in the lower right hand corner is a small cover held in place by a screw. Remove the screw and the cover to reveal the **MODE** switch. Move the **MODE** switch from the **DOWN** position to the **UP** position. 
2. Press the **SCROLL** button until “CAL” is displayed. 
3. Press the **DOWN** button and “inP” will be displayed. 
4. Press the **SCROLL** button and “Chrt” will be displayed. 
5. Press the **DOWN** button and “Pen” will be displayed. 
6. Press the **DOWN** button once again and Pen Calibration is started. 
7. During Pen Cal, the pen will drive to the center of the chart, then the pen will drive to the inner most ring 180°F (82°C). The display will show “Plo”.
8. Using the **UP** or **DOWN** arrow buttons, adjust the pen positioning to the 180°F (82°C) division line.

9. Press the **SCROLL** button. The pen will drive to the 60°F (15.5°C) division on the chart. The display will show “PCNT”. 
10. Pressing the **UP** or **DOWN** arrows, adjust the pen position to the 60°F (15.5°C) division line. 
11. Press the **SCROLL** button. The pen will drive to the outer most ring 30°F (-1°C). The display will show “PHI”. 
12. Pressing the **UP** or **DOWN** arrow, adjust the pen position to the 30°F (-1°C) division line. 
13. Press the **SCROLL** button to save the new calibration values. 
14. Move the **MODE** switch to the **DOWN** position.  Replace the small cover over the **MODE** switch and secure with the screw provided.

If you have any additional questions concerning calibration, please consult Anderson at 1-800-833-0081.




VI Troubleshooting


Your Guardian has been carefully designed to provide years of reliable data, helping you to produce quality milk. If you do have a problem though, your local dealer can assist you.

The following is a checklist to help you troubleshoot common issues:

??? The chart is not rotating, pen does not print, and the LED display is not illuminating.

 Check to see that the unit is properly wired (see the “Wiring Connections” section of the installation manual) and that power is being applied to the recording thermometer.


??? The chart is not rotating, there is no red line forming on the chart paper and the LED display is illuminating.

 Check to see that the black chart hub clamp in the center of the chart is in the down (run) position. Also make sure that the program switch behind the small calibration plate is in the lower right hand corner of the Guardian is in the “DOWN” position.


NOTE: Switch located behind screw sealed plate.




??? The chart is rotating, there is no red line forming on the chart paper and the LED display is illuminating.

 Check to see if the red felt tip is touching the paper. If not, gently bend the pen arm until the felt tip makes contact with the paper. If there is still no red line, check to see if the red felt tip on the pen arm is out of ink. Also verify that the pen cap has been removed. See the section titled “Changing the Red, Felt Tip of the Pen Arm” for instructions on changing the pen.

??? The chart is rotating, but there are two red lines forming a circle around the chart.

 You need to change the chart. See the section titled “Changing your Chart” for chart changing instructions.

??? You are concerned that the red line is not accurately recording milk temperature.

 Do a calibration check on the Guardian. See “Calibration Check” section in the Regular Maintenance Section of this manual.



VII *Installation*

Read these instructions completely and carefully before proceeding with the installation and operation of this recorder. Electrical code requirements and safety standards should be observed. Qualified personnel should perform installation.



Contents and Equipment Required

Unpack the box. Check the contents for the following:

- This manual
- Guardian recording thermometer with sensor attached
- Mounting template
- Box of charts
- Clear plastic envelope for storing charts and this manual

Installation equipment checklist (not supplied with unit):

Hardware:

- Tap Cons (1/4" x 1 3/4") - four (4) each
- Flexible conduit or EMT conduit, 1/2", for holding electrical power wires from the recording thermometer to the power panel
- 14 AWG wire for direct power hookup
- Cable fasteners (wire ties)

Tools:

- Drill
- Small level
- Phillips screwdriver, #2
- Narrow flat blade screwdriver (1/8" or less) for wiring to terminal blocks
- Duct seal putty for sealing openings where sensor wire may pass
- Masonary drill bit, 5/32" for Tap Con screws used to hold recording thermometer to the wall

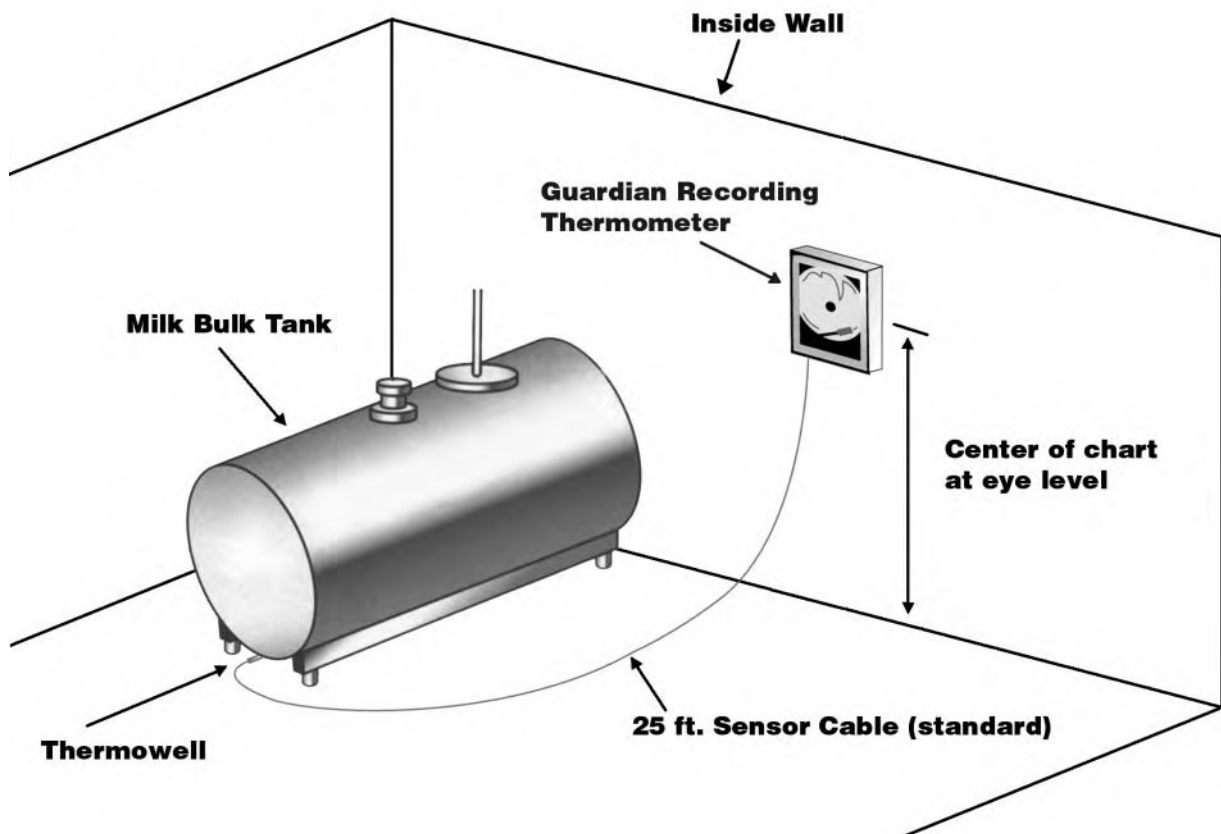




Recorder Location and Mounting

Once you have determined the location of the thermowell on the bulk tank for sensor placement, you need to determine where to mount the Guardian Recorder.

1. Anderson recommends that the Guardian Recorder be installed within 25 feet of the thermowell. A thermowell is an area on the milk bulk tank designated for sensor probe insertion. The recorder should be installed in close proximity to the milk storage tank.
2. Mount the Guardian Recorder on an inside wall. Locate the recorder away from excessive moisture and vibration. The Guardian Recorder should be in an area that maintains temperatures between 32°F and 131°F. For optimal viewing, mount the Guardian recorder at eye level. Allow enough room to open the door of the Guardian Recording Thermometer completely.
3. You will need four Tap Con screws, 1/4" diameter x 1 3/4" long. Using the paper template provided, level the template and drill four mounting holes.
4. Hold the Guardian Recorder in place and secure it with the four Tap Con screws.



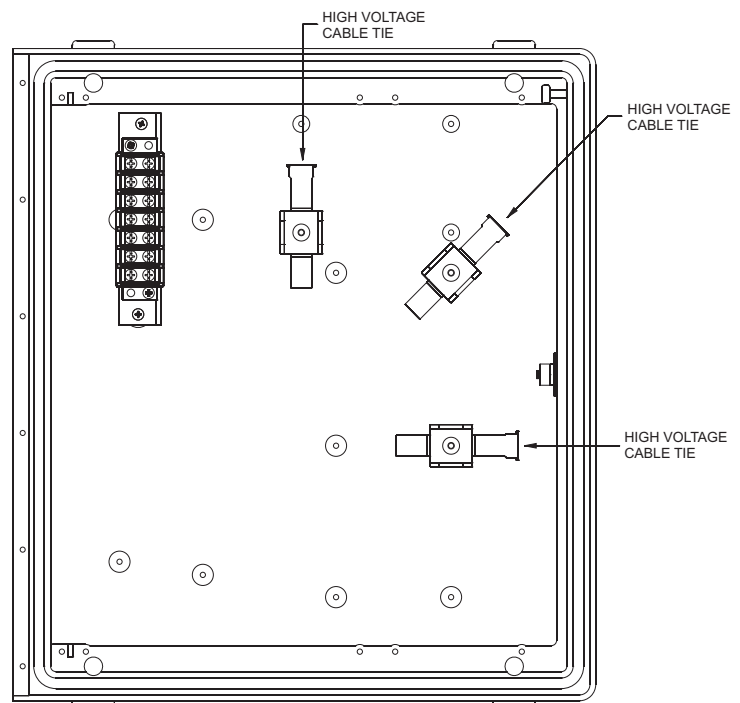


Preparation for Wiring

Electrical code requirements and safety standards should be observed.

1. Existing wiring should meet local wiring codes.
2. Connect a good earth ground to the recorder chassis ground connection. To verify this, take a resistive measurement from the Guardian Recorder chassis to the nearest metal water pipe or proven earth ground. The reading should not exceed 100 ohms.
3. AC neutral should be at or near ground potential. To verify this, measure the AC voltage between neutral and ground. The reading should be no more than 50 millivolts. If greater, this should be checked by an electrician.
4. Input Signal Wiring - This sensor is pre-wired from the factory. If necessary the probe length can be cut down to a shorter length if desired. Coiling the extra cable is recommended, for possible requirements in the future.
5. The Guardian Recorder AC field wiring shall employ a switch or a 20A circuit breaker for means of power disconnect. This disconnect shall be within easy reach of the operator, and marked as a disconnect for the Guardian Recorder.
6. The requirements for all AC carrying lines shall meet the following minimum standard:
Wire Size: Minimum - 18 Gauge, Maximum - 14 Gauge
Wire Type: Copper
7. Incoming AC power and alarm output wiring shall be reliably routed away from low voltage components and wiring using the cable ties provided. For routing utilize cable ties as shown below.

NOTE: There should be minimal slack in wires once installed to prevent wires from contacting low voltage components and wires.

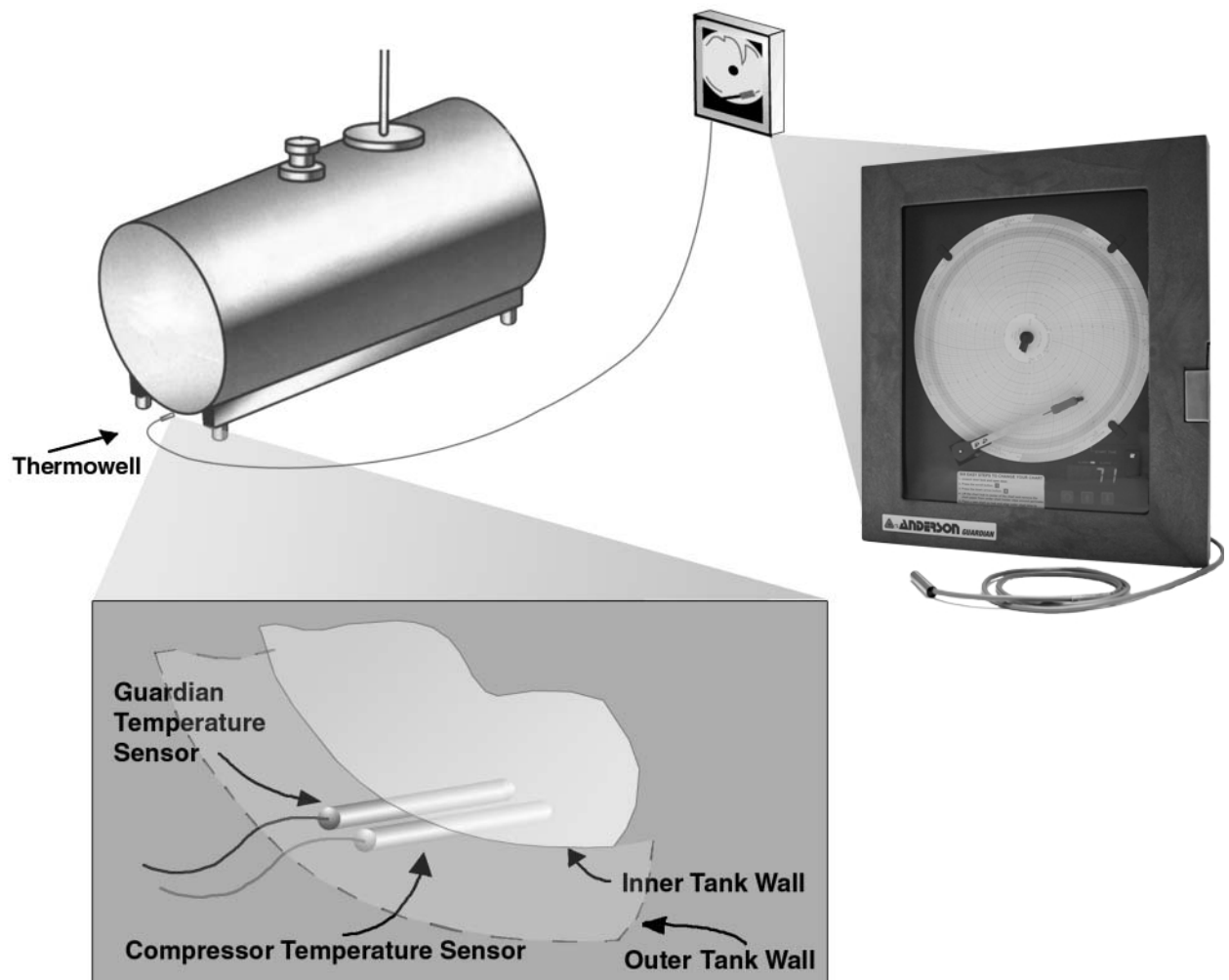




Sensor Placement

Proper placement of the temperature sensor is important to obtain accurate milk temperature readings.

1. Look for a thermowell (an area housing for the sensor probe insertion) at either end of the tank toward the bottom. Often the thermowell is covered with a metal plate held in place with a few screws.
2. Remove the plate and insert the sensor into the thermowell making sure the probe is against the inner wall of the bulk tank. Be certain to insert the sensor only as deep as the sensor will go without forcing it.





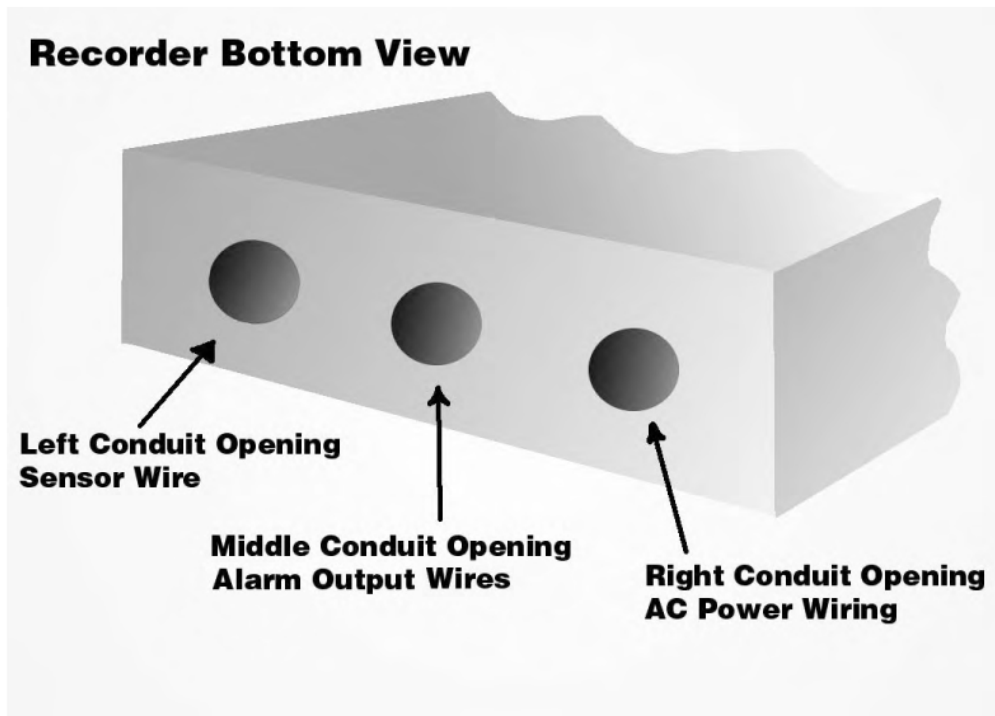
Electrical Conduit Openings

The Guardian Recorder case has three conduit openings, all on the bottom of the case. To minimize the effect of electrical noise, the following wire groups should be routed through the conduit openings listed below.

Right Conduit Opening - Power Input

Middle Conduit Opening - Alarm Outputs

Left Conduit Opening - Sensor (Pre-Wired from the Factory)





Wiring Connections

WARNING: Avoid electrical shock. AC power must not be connected at the source distribution panel until all wiring connections are complete.

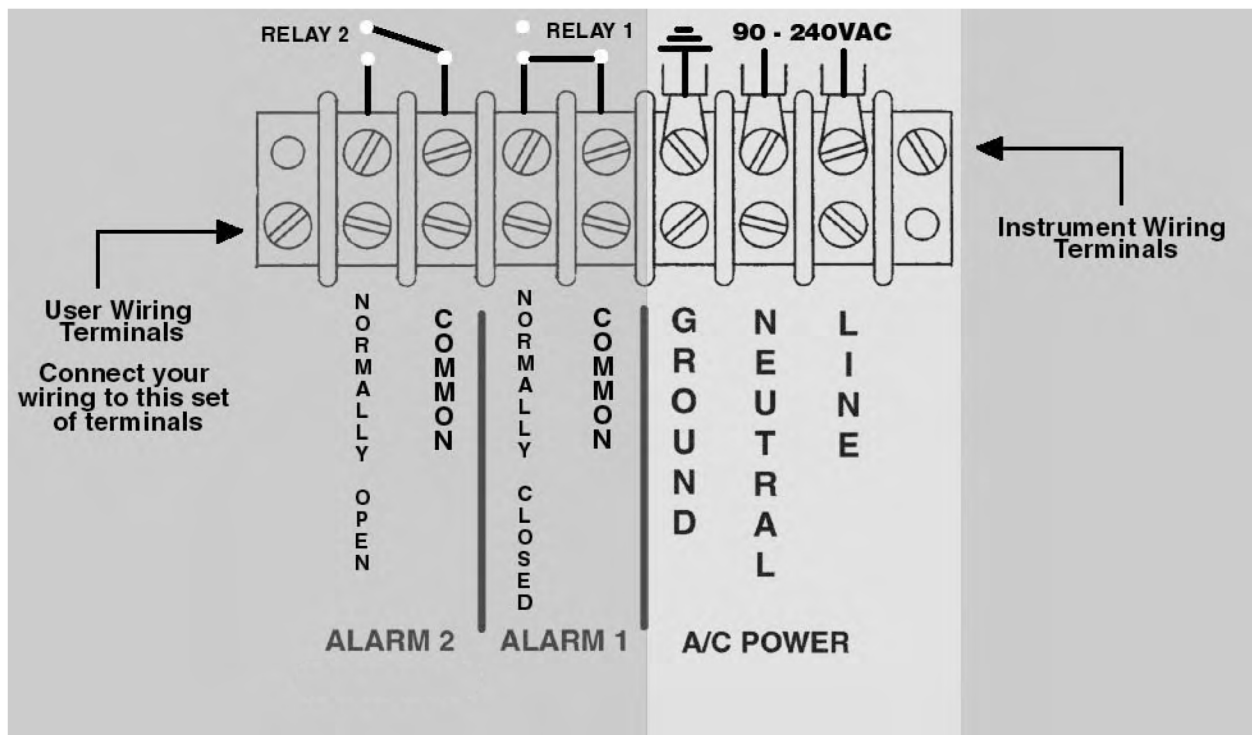
All wiring connections are typically made to the Guardian Recorder at the time of installation. All connections are made behind the platen. The platen is the black metal plate that holds the chart and electronics. It is hinged on the left side. Loosen the two slotted, captive screws and open the platen to complete all wiring. Connections should be made at the terminal block with two 14 gauge wires maximum. Use copper conductors only. Wiring labels in the unit identify all connections.



AC Power Wiring

Locate the Terminal block on the inside back of the case. Connect the AC hot line to the terminal marked “Line”. Connect the AC neutral to the terminal marked “Neutral”. Connect the ground to the terminal marked “Ground”. See the light shaded area of the wiring diagram below.

Screw terminal tightening torque 12in-lbs.





Alarm Output Wiring

Make sure power is off to the Guardian Recording Thermometer. Open the enclosure door and then open the platen. The platen is the hinged, black metal plate that the chart is mounted on. Simply wire from the terminal block connections marked Alarm 1 inside the Guardian to your alarm light or horn. Note the two terminals for each alarm contact are isolated contact closures. Appropriate power would need to be supplied to the common connection relative to the alarm device being operated. Use the middle conduit opening at the bottom of the enclosure for running your wires. Close the platen and the door. Apply power to the Guardian.

SUMMARY

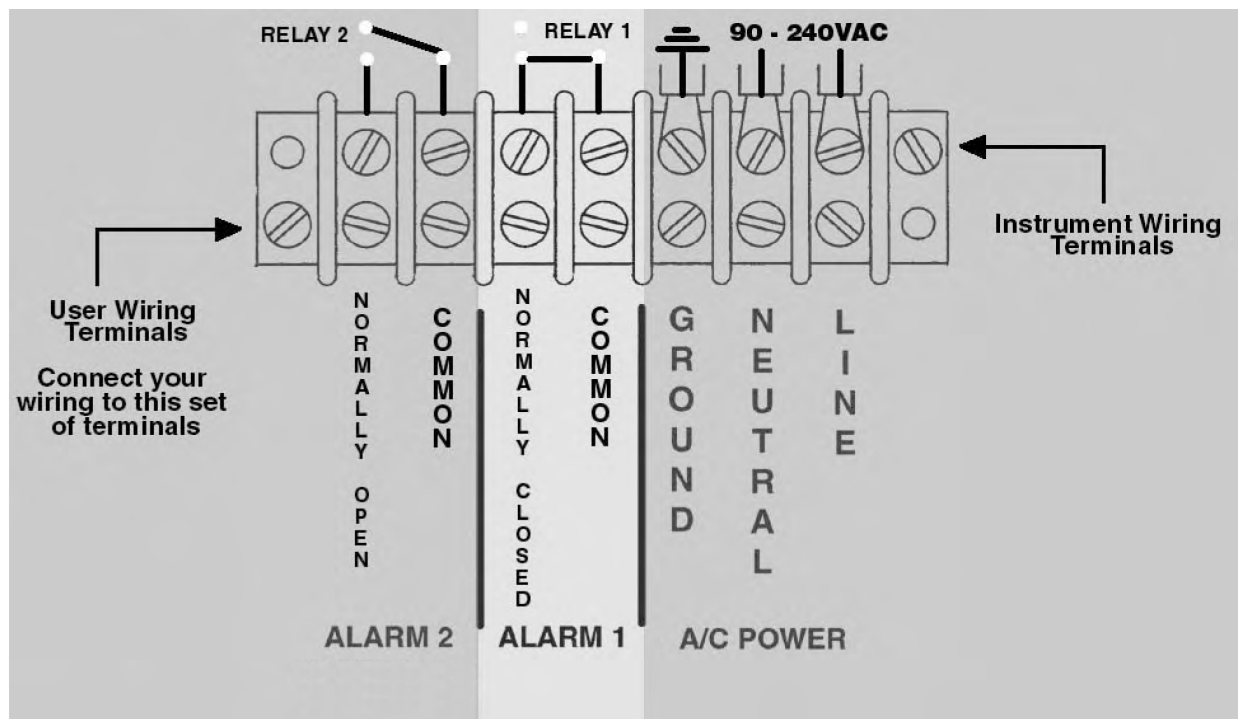
There are 2 (two) Alarm outputs available.

Alarm 1 is a high temperature alarm, a normally closed contact.

Alarm 2 is a low temperature alarm, a normally open contact. Wire up each alarm as shown in the wiring light shaded area of the wiring diagram below.

NOTE: Relay /Alarm switch conditions are shown with no power applied to recorder. See the appendix “Changing Alarm Setting” if you want to change the temperature point at which the alarm energizes

Screw terminal tightening torque 12in-lbs.



VIII Customer Support and Spare Parts

Call your local dealer or Anderson Instruments Inc. at 800-833-0081 for service or ordering spare parts.

<u>Spare Parts</u>	<u>Part Number</u>
3/8" RTD Probe 25' Cable	SA611360290105
3/8" RTD Probe 50' Cable	SA611360290110
Pen Cartridge (Red - 5 per pack)	60500402
Platen Assembly (55020001)	56625A0002
Pen Blade (including screws)	64430501

Note: Additional probe sizes and lengths may be available, consult the factory with specific requirements.

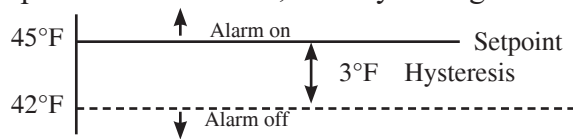
<u>Charts</u>	
24 hour / °F	00215709
48 hour / °F	00215710
72 hour / °F	00215711
7 day / °F	00215712
24 hour / °C	00215705
48 hour / °C	00215706
72 hour / °C	00215707
7 day / °C	00215708



IX Appendix



Definitions Used For Programming The Guardian

UP ARROW	Up arrow will increase values. ↑
DOWN ARROW	Down arrow will decrease values. ↓
SCROLL ARROW	Scroll advances to the next menu choice. ↻
Prog	This is the section in which the unit is set up for individual applications.
TESt	This is the section to test the function of the display or chart.
CAL *	The section is for pen or sensor calibration.
InPS	Sensor Input selection either °F or °C for temperature.
Icor	Input Correction. An adjustment to make the display and pen match the same reading as another measurement device.
dPOS	Decimal Position. The number of decimals show in the display. (Zero is recommended)
Hyst	Hysteresis. The alarm fluctuation dead band below the alarm setpoint. Expressed as a number, Factory setting. 3. 
dff	Display filter factor. How often the display and pen update. 1 is once a second, 10 is once every 10 seconds. The recommended factory setting is 1.
ALC	Alarm changes. Either allows for an alarm setpoint change or disables alarm setpoint change during normal operation.
rEF *	Calibration reference. The temperature the probe is at during calibration.
SCAN*	Scan. Indicated that the Guardian Recorder is ready to do the calibration. Pressing the scroll key initiates the calibration process.
ArC *	Arc is the factory adjustment of the pen to the arc of the paper.

* Only shown when in calibration mode






Changing Alarm Settings

USE THIS SECTION IF YOU WANT TO CHANGE THE TEMPERATURE POINT AT WHICH THE ALARM ENERGIZES.

THE FACTORY SETTINGS ARE 45°F (FOR HIGH TEMP ALARM 1) AND 35°F (FOR LOW TEMP ALARM 2)

All units are equipped with both alarms.

TO REVIEW / CHANGE ALARM SETTINGS

1. Depress the **SCROLL**  button and CC will be displayed.
2. With CC displayed, press the **SCROLL** button again, the ALARM 1 LED will flash and the high alarm setpoint will be displayed.

When the Alarm setpoint is displayed, the **UP/DOWN** buttons can be used to adjust the setpoint to the desired temperature. The default setting for Alarm 1, the High Temperature Alarm, is 45°F.

3. When the optional low alarm is available, press the **SCROLL** button and ALARM 2 LED will flash and the low alarm setpoint will be displayed.

When the Alarm setpoint is displayed, the **UP/DOWN** buttons can be used to adjust the setpoint to the desired temperature. The default setting for Alarm 2 is 35°F.

4. To return to the normal operation press the **SCROLL** button and the milk temperature will be displayed.

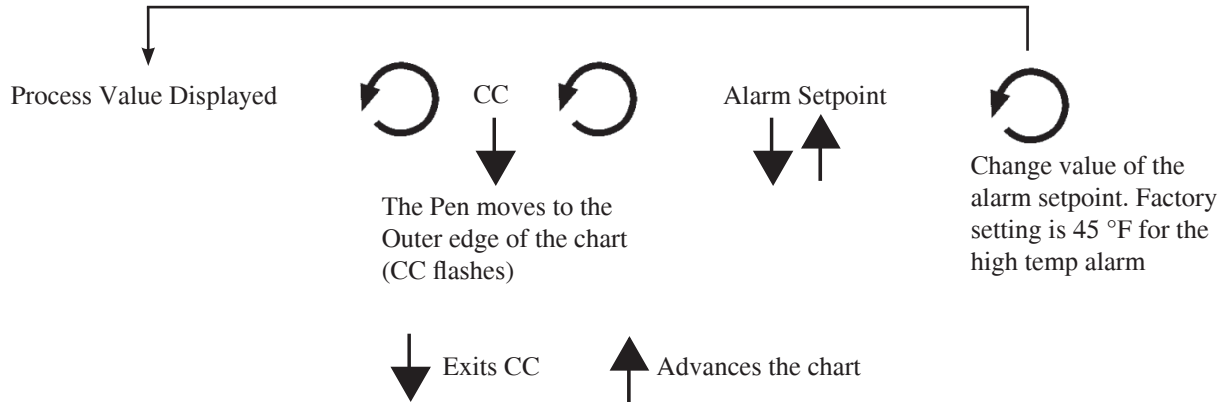
Note: Alarm setpoint changes can be disabled in the program section of the unit. If this function is disabled, the Alarm settings can only be viewed by following the above procedure.





Run Mode Sequence (Chart Change/Alarm Set Procedure)

This mode is used for changing your chart or changing the Alarm Setpoint. The Alarm Setpoint is the value, 45°F, at which the alarm energizes (turns on). Both chart change and alarm set can be done while the Guardian Recorder is in the “Run Mode”. “Run Mode” means that the switch behind the screw seal plate on the platen is in the down position.





Changing Parameters in Program Mode

USE THIS SECTION ONLY IF YOU NEED TO CHANGE /ADJUST ONE OR MORE OF THE FOLLOWING:

1. Input Temperature °F or °C
2. Input Correction or adjustment of temperature. -99.9° to 99.9°
3. Decimal position shown in the display. 0 or 1
4. Alarm hysteresis. The dead band below the setpoint for the alarm temperature.
5. Alarm Change. If alarm changes need to be disabled during normal operation.
6. Chart Rotation Time 24 hour, 48 hour, 72 hour, 7 day. (You must have the correct chart for the rotation time selected.)

NOTE: When the **MODE** switch is placed in the Prog position (UP Position), the unit will stop rotating the chart and relays will de-energize.

The recorder setup programming can only be accomplished when the mode slide switch is placed in the **PROG/TEST/CAL** position, or the up position. This switch is located right of the display and is behind a sealed cover. The program mode is used to select: Chart rotation speed; Input display °F or °C.

In the **Program/Test/Cal** mode, the keys will function as follows: (SEE PAGE 24 FOR DETAILED EXAMPLE)

SCROLL



When a mode or section designation is displayed, **SCROLL** steps to the next mode or section. When a parameter code is displayed, **SCROLL** will display the corresponding parameter value. When a parameter value setting is displayed, **SCROLL** will display the next parameter code.

DOWN ARROW



When a mode or section designation is displayed, **DOWN** will enter that mode or section. When a parameter code is displayed, **DOWN** will display the next parameter value. When a parameter setting is displayed, the setting will decrease, unless it is at a limit value.

UP ARROW



When a mode or section designation is displayed, **UP** will have no effect. When a parameter code is displayed, **UP** will revert back to the section designation. When a parameter setting is displayed, the setting will be increase, unless it is at a limit value.

To enter the **Program/Test/Cal** mode, the cover plate must be opened, and the switch moved tot he up position. The unit will display Prog. Subsequent depressions of the **SCROLL** will cause the unit to display **TEST**, then **CAL**, and then back to **Prog** (Program).





Specifications

INPUTS

	Type	Range
RTD	100 ohm Platinum .00385 ohms/ohm/°C	-1°C to 82°C 30°F to 180°F
RTD Excitation Current	150 micro-amps, typical	
Input Scan Rate	1 scan per 1.2 seconds typical	
Input Correction	Offset Adjustment, -99.9 to 99.9 degrees	
Sensor Fault Detection	Display goes to SnSr and pen goes upscale if a sensor break is detected Display goes to Hi 10% above span. Display goes Lo 10% below span.	

INPUT PERFORMANCE

Performance Under Reference Condition:

Measurement Error	RTD: $\pm 0.25\%$ of span ± 1 degree
Linearization Error	RTD: $\pm 0.1^\circ\text{C}$ typical, $\pm 0.3^\circ\text{C}$ worst case
Ambient Temperature Error	$\pm 0.01\%$ of span per $^\circ\text{C}$ deviation from 25°C
Common Mode Rejection	>120 dB at 50/60 Hz, 254 VAC max.
Normal Mode Rejection	85 dB minimum @ 60Hz or greater

Reference Conditions

Ambient Temperature	25°C
Relative Humidity	60 - 70%
Supply Voltage	90VAC to 254VAC, 50/60 Hz
Lead Resistance	< 0.1 ohm/lead balanced (Ptl 00)

RECORDING

Pen Type	Disposable fiber tip
Pen Color	Red
Chart Size	10 inch (REVERSE RANGE), Lower Temperature at outside of chart
Chart Drive	Stepper motor
Chart Rotation	User configurable: 24 hours, 48 hours, 72 hours, or 7 days Chart Span 180°F to 30°F or 80°C to 0°C

RECORDING PERFORMANCE

Chart Recording Accuracy	$\pm .75^\circ\text{F}$ or 0.5% of chart span reference accuracy
Chart Rotation Accuracy	0.5% of rotation time, assuming all backlash removed

OPERATOR INTERFACE

Display	Four digits 0.56" high, red, seven segment, LED display
Status Indicators	Two red LED alarm status indicators
Keypad	Three keys for programming and unit operation



ALARMS

Number	Up to two process alarms
Type	Process high or low
Hysteresis	Fully adjustable, 0° to 20.0°F, single sided
Security	Alarm setpoint changes can be prohibited
Sensor Fault Action	Alarms work normally in Hi and Lo conditions Alarm relays are de-energized in a SnSr sensor break condition

RELAY OUTPUTS

Relays	QTY=2, SPST, contacts rated 5 amps resistive at 115 VAC
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POWER REQUIREMENTS

Line Voltage	90-254 VAC, 50/60 Hz
Power Consumption	18 VA Maximum

CONSTRUCTION

Enclosure	Injection molded case and cover with acrylic window
NEMA Rating	NEMA 4X standard
Conduit Openings	Three openings on the bottom
Mounting	Wall
Overall dimensions	13.5" wide X 15.5" high X 6.6" deep Weight 12 lbs maximum

ENVIRONMENTAL AND OPERATING CONDITIONS

Operating Temperature	0°C to 40°C (32°F to 104 °F)
Storage Temperature	-40°C to 65°C (-4°F to 149°F)
Humidity	10 to 90% RH, non-condensing
Vibration	0.3 to 100 Hz @ 0.2g
Mounting Position	Up to 30 degrees forward or backward tilt from vertical Up to 10 degrees side tilt from vertical

GENERAL REFERENCE DATA

Data Backup	EEPROM for configuration parameters and calibration data EEPROM for alarm setpoints
Warranty	Two year

APPROVALS AND COMPLIANCE

Safety	UL Approved for USA - UL 61010-1, 2nd Edition, PICQ - File E330854 UL Approved for Canada - CSA C22.2 No. 61010-1, 2nd Edition, PICQ7 - File E330854 NEMA 4X rating is independant, and shall not be considered a subset of UL.
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X Warranty

The company warrants its products for 24 months on recorder and 12 months on sensor. Please keep proof of shipment date for warranty purposes. All work is performed at the factory.

Standard products manufactured by the Company are warranted to be free from defects in workmanship and material for a period of two (2) years from the date of shipment. Products defective in workmanship or material will be repaired or replaced at the option of the Company, at no charge to the Buyer. Final determination as to whether a product is actually defective rests with the Company. The obligation of the company hereunder shall be limited solely to repair and replacement of products that fall within the foregoing limitations. This shall be conditioned upon receipt by the Company of written notice of any alleged defects, or deficiency promptly after discovery, within the warranty period. In the case of components or units purchased by the Company, the obligation of the Company shall not exceed the settlement that the Company is able to obtain from the supplier thereof. No products shall be returned to the Company without its prior consent. Products the Company consents to have returned shall be shipped F.O.B. the Company's factory. The Company cannot assume responsibility or accept invoices for unauthorized repairs to its components, even though defective. The life of the products of the Company depends to a large extent upon type of usage.

THE COMPANY MAKES NO WARRANTY AS TO FITNESS OF IT'S PRODUCTS FOR SPECIFIC APPLICATIONS BY THE BUYER NOR AS A PERIOD OF SERVICE UNLESS THE COMPANY SPECIFICALLY AGREES OTHERWISE IN WRITING AFTER THE PROPOSED USAGE HAS BEEN MADE KNOWN TO IT.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.





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