Instruction Manual

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# AV-9900 Field Setup Guide

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AV-9900
Microprocesor Based
HTST Recorder/Controller

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# 1. Introduction

The AV-9900 High Temperature Short Time Controller provides all USPHS required functions associated with recording pasteurized product temperature, signaling the flow diversion valve (F.D.V.), and recording the Flow Diversion Valve position. Additional features allow for multiple diversion set-points, recording active diversion setpoint, cold product recording - with optional control, and hot water control.

The remainder of this publication will serve as further introduction to the features of the AV-9900, as well outlining procedures necessary to perform the PMO Appendix I tests.

# 2. Key Product Features

The AV-9900 Microprocessor Based Safety Thermal Limit Recorder incorporates many time proven features found in earlier Anderson products. Ease of operation and high safety standards were brought together specifically to meet the demands of the pasteurization process. Key features of the AV-9900 are as follows:

## 2.1. Hot Product Temperature Sensor

The Hot Product Sensor is a dual element, 1000 ohm Resistance Temperature Detector (RTD). The Primary RTD supplies the recording - thermal limit signal input, with the Secondary RTD supplying a verification for that signal.

Sensors are available with a wide variety of sanitary connections featuring a 5-1/2" or 7-1/4" probe length. Provision for the ***Health Authority Seal*** on the stainless steel conduit housing provides separate servicing of the probe, and ease of installation. Overall response characteristics allow for cable runs of up to 500 feet.

Chart ranges are programmable, and are factory set to meet all Pasteurized Milk Ordinance (PMO) requirements. In addition, criteria of 12 hour rotation and 1$^{O}$F divisions have been met.

## 2.2. Diversion Switching

Diversion set-point circuitry provides for up to five selectable cut-in/cut-out temperatures. User configurable parameters exist for displaying the active set-point. The current set-point is recorded to the chart for verification at time of cut-
in. Diversion set-point values are easily modifiable upon breaking the Health Authority Seal, and entering the system program mode. In addition to restricting access to the Run/Program shunt jumper, the chart plate seal also prevents modifications to circuit boards and input/output wiring connections.

Flow Diversion Valve position is indicated by red and green lights on the chart plate, in addition to being recorded by an event pen on the outside area of the chart. The event pen position is outward for forward flow on all diversion set-points. Selection of the current diversion set-point is accomplished via the front mounted user keypad and display. Five function keys become active, allowing the user to choose the desired set-point.

## 2.3. Diagnostic Circuitry

The AV-9900 provides fail-safe operation via internal self-diagnostics of the Hot Product Probe input signals. The Primary RTD input signal is continually referenced against the Secondary RTD signal. The result is indicated on a series of LED's, located just above the user display, and labeled *Sensor Balance*. If both RTD elements are in agreement by less than .5 $^{O}$F , no LED's are lit. Each increment of .5$^{O}$F shift will light an LED. At the point at which the elements differ greater than 2$^{O}$F , the AV-9900 will go into automatic divert. In addition, the user display will indicate that a *Probe Failure* has taken place. Until a replacement Hot Product Probe is installed, the unit will not allow a forward flow condition to take place.

## 2.4. Pen Drive Mechanism and Chart Printing

The pen drive mechanism is similar to a dot-matrix print device in that a series of dots are placed down onto the paper chart. This mechanism is fully alpha-numeric capable, allowing printing of ranges, units, alarm's, etc. to the chart. All four pens are housed within a small pen cartridge, in a straight line arrangement. As a result, all data printed to the chart is on the same time line. No lag exists from pen to pen as with typical felt pen type recorders. Chart ranges and scales are factory programmed, per applicable PMO requirements, but may easily be re-ranged in the field. Charts are plain paper, and pre-printed only with circular ring divisions. Division spacing meets PMO requirements. User defined scales and chart ranges are printed in one of four available colors.

## 2.5. Cold Product Record - Control

The AV-9900 may be configured to receive an input from an RTD, or mA transmitter, measuring the Cold Product temperature as it exits the pasteurization loop. This function may be specified at time of order, or upgraded in the field at a later date. A factory set, field modifiable scale has been programmed for the recording pen. Data will be recorded in color allowing easy interpretation when reviewing chart information.

An additional option exists for controlling the Cold Product Cooling within the AV-9900. An optional PID Loop Control function can be specified at time of order, or upgraded at a later date in the field. This function will receive its input from the same probe measuring the Cold Product temperature. In turn, a desired set-point may be programmed, with output signals interfacing to the cooling loop. The PID, or control functions, will vary the resulting output signal based on rising above or falling below the desired Cold Product set-point.

## 2.6. Hot Water Loop Control

The AV-9900 may be configured to receive an input from an RTD, or mA transmitter, measuring the Hot Water Loop temperature. This function may be specified at time of order, or upgraded in the field at a later date. In turn, a desired set-point may be programmed, with output signals interfacing to the Hot Water Loop. The PID, or control functions, will vary the resulting output signal based on rising above or falling below the desired Hot Water set-point.

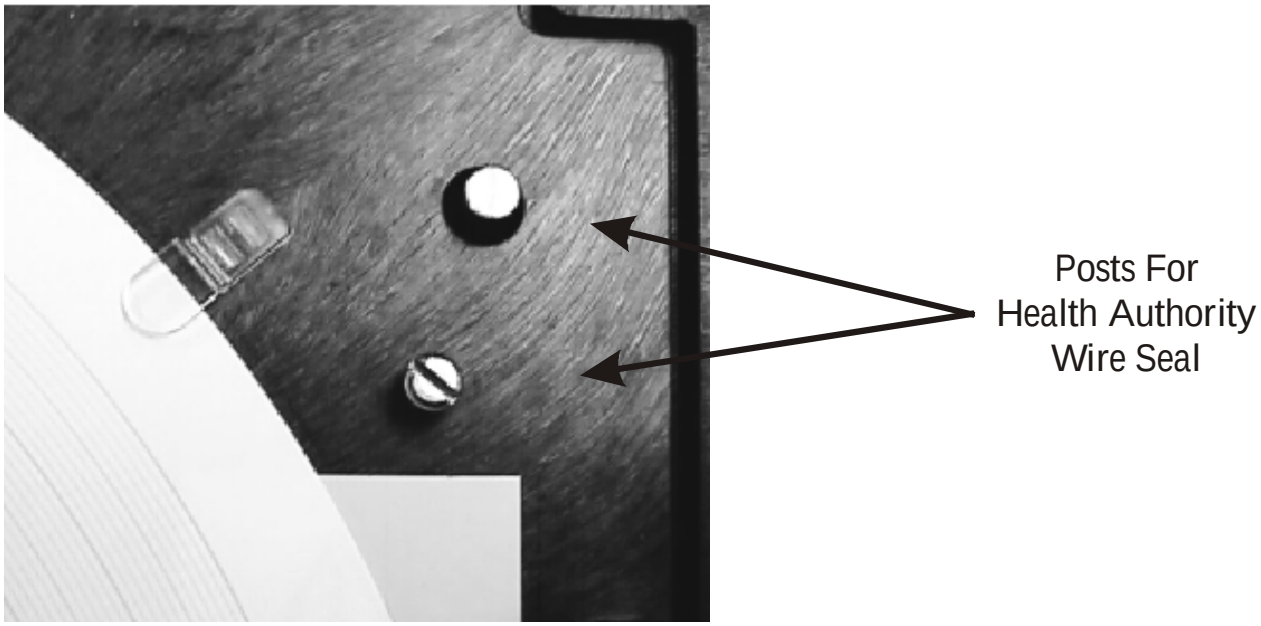
If various products are being processed, up to five Hot Water Controllers are available (one for each STLR diversion set-point). Each controller may have it's own set-point and PID tuning parameters. When the operator selects a new STLR diversion set-point, the corresponding Hot Water Controller is automatically selected. Again, Hot Water Control set-points and PID tuning parameters would have been pre-programmed

# 3. Hardware Descriptions

In performing the required testing, access will be made to various areas of the AV-9900 hardware. Specifics are illustrated as follows:

## 3.1. Chart Plate Seal

Provisions have been provided for placing the Regulatory Wire Seal in the upper right corner of the chart plate. When in place, this seal prevents unauthorized access to not only the internal wiring, but also access to the Security Mode Shunt (see next section).

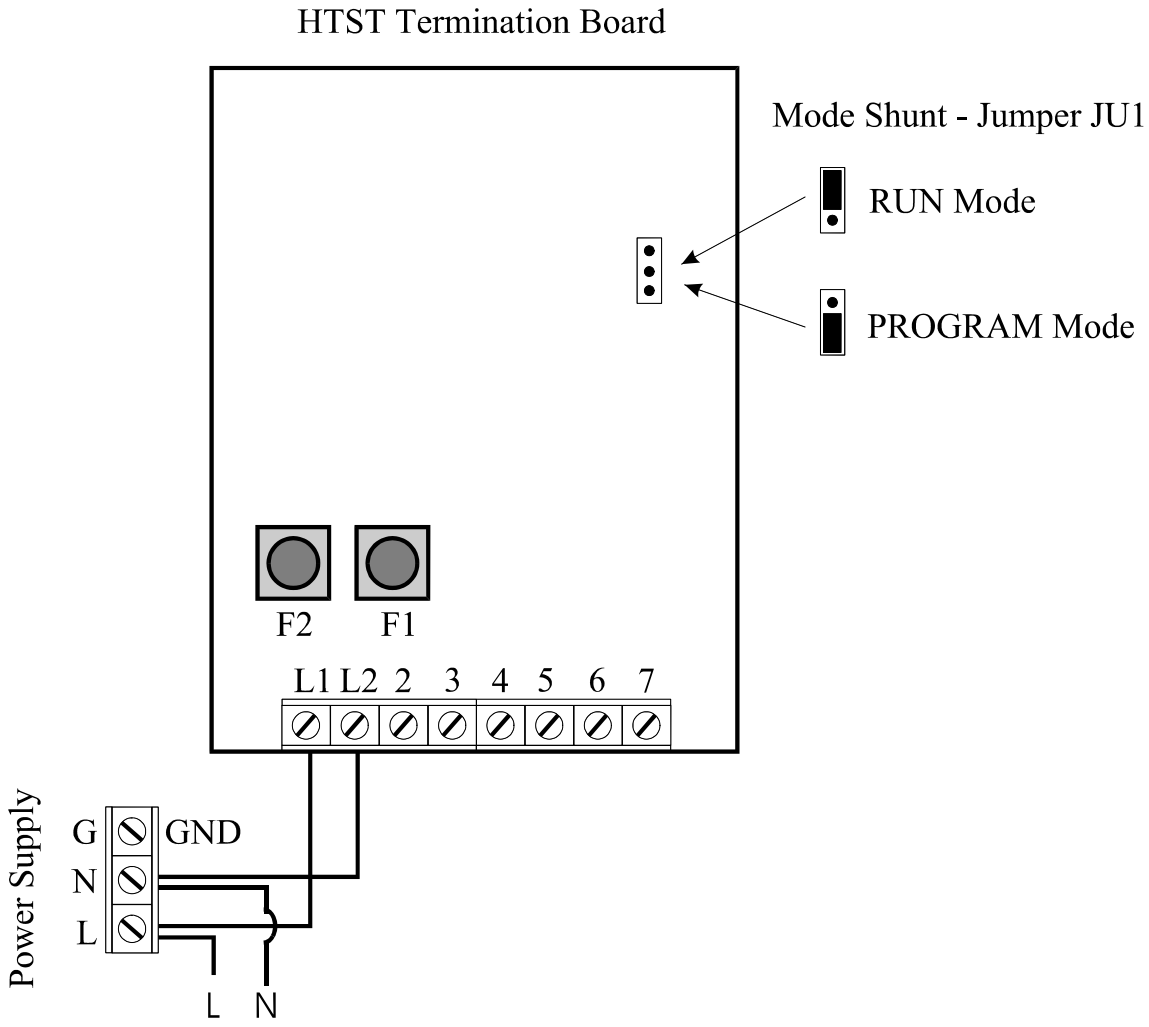


## 3.2. Security Mode Selection Shunt

The AV-9900 is equipped with a movable shunt to allow toggling between RUN and PROGRAM modes of operation. While in RUN mode, access is prevented to all system critical parameters (ranges, setpoint changes, etc.). Changes may be made to display functions as well as selection of the currently active diversion setpoint. While in PROGRAM mode, full access to all system parameters is allowed.

**NOTE**: Moving the Security Mode Selection Shunt to the PROGRAM position will *immediately* force the unit to DIVERT flow. If already in DIVERT flow, the unit will remain in that mode even if the hot product temperature rises above the active setpoint.

The following diagram illustrates the location of the Security Mode Selection Shunt, in addition to the settings, RUN or PROGRAM.



## 3.3. Keypad

Located on the front chart plate of the unit is the USER KEYPAD. From here, access to the program parameters can be gained. A description of each of the keys is as follows:

| | | |
|---|---|---|
| õ | **UP ARROW** | Used to move through menus, or increase a value |
| ö | **DOWN ARROW** | Used to move through menus, or decrease a value |
| ÷ | **LEFT ARROW** | Used to move through menus or digits of a parameter |
| ø | **SCROLL (RIGHT ARROW)** | Used to move through menus or digits of a parameter |
| ù | **ESCAPE** | Used to cancel a flashing program prompt |
| ú | **RESET** | Jump from within programming menus to the standard operating screen |
| û | **DISPLAY** | While in display RUN mode allows access to STLR diversion setpoints as well as display viewing option parameters |
| ü | **MODIFY** | Allows changes to be made to a currently displayed parameter |
| ý | **CHART** | Allows access to the *Change Chart Routines* |
| þ | **ENTER** | Locks in changes made to a parameter |

# 4. User Display

Also located on the front chart plate is the User Display. From here, data such as a digital readout of the STLR temperature value may be viewed. This display will be utilized in selected areas of the Pasteurized Milk Ordinance Appendix I testing.

Two options exist for the display; CONTINUOUS DISPLAY and SEQUENCE DISPLAY. When in continuous mode, the selected parameter is viewable at all times on the display. This is the required mode for completion of the Appendix I testing. While in sequence mode, various parameters scroll over the screen at a timed interval.

If the unit is set to SEQUENCE display mode, the following procedure will allow the unit to be placed in continuous mode, with the STLR temperature visible:

## 4.1. Setting CONTINUOUS Display

1. Operation may be done with Security Mode Shunt in either position - no changes required.
2. Press û key twice - you will see:

| |
|---|
| **MODIFY <->** |
| **DISPLAY PARAMETERS** |

3. Press the ö key once.
4. If CONTINUOUS is not already flashing, press the ø key.
5. With CONTINUOUS flashing, press the þ key once.
6. Press the ú key once to return to the main display.
7. Press ö until STLR INP is displayed - this is the digital display of Hot Product Temperature.
8. You may now complete the required testing.

## 4.2. Setting SEQUENCE Display

1. To return the display to SEQUENCE mode, proceed as follows:
2. Operation may be done with Security Mode Shunt in either position - no changes required.
3. Press û key twice - you will see:

| |
|---|
| **MODIFY <->** |
| **DISPLAY PARAMETERS** |

4. Press the ö key once.
5. If SEQUENCE is not already flashing, press the ø key.
6. With SEQUENCE flashing, press the þ key once.
7. Press the ú key once to return to the main display.
8. The unit is now back in standard operation.