DR 45AH/AP Truline
HTST/Pasteurization Flow Recorder/Controller — a Member of the LeaderLine Product Family

Meet Critical Pasteurization Control Requirements — with Important Ease-of-Use and Cost Saving Benefits

The DR 4500 HTST/Pasteurization Flow recorder/controller combines the broad capabilities of Honeywell’s Truline® recorders with the special features needed to serve the milk pasteurization requirements of the dairy industry. These features address the need for sanitary protection as well as:

• accurate temperature and flow measurement
• precise control
• comprehensive recording.

In addition to meeting these critical requirements, it offers you valuable money-saving benefits, including:

• ease of use
• reduced downtime for sensor replacement
• savings in equipment and installation costs.

And this Honeywell Pasteurization recorder/controller provides all of these benefits while fully complying with the strict health-protection regulations of the “Grade A Pasteurized Milk Ordinance” established by the U.S. Department of Health and Human Services, Public Health Service.

DR 4500 HTST/Pasteurization Flow Recorder/Controller Is Easy to Use

Many unique features make the Honeywell DR 4500 easy to use:

• Installing a new chart is simple—Your operator does not lose valuable time lining up preprinted replacement charts. This recorder/controller uses the exclusive Truline circular chart recorder feature to print its own chart with the timeline and time as it records your data. In addition to saving operator time, this innovative self-printing feature:
  – assures accurate time on the charts
  – improves the accuracy of your recorded data
  – reduces your chart inventory

A box of blank 12-inch circular Truline charts is all you need to have a virtually infinite selection of charts at your disposal.

• Digital displays enhance visibility—Dual high-intensity digital displays make pasteurization process data instantly available to your operator, even at a distance or in dim light. Your operator can select any of the following data for display:
  – process variables
  – setpoints
  – deviation from setpoint
  – control mode (automatic or manual).
  – digital reference temperature

The recorder/controller’s front-mounted displays complement its precise recording capabilities, enhancing your operator’s effective management of the pasteurization process.

• Multiple measurements on a single chart reduce chart-changing requirements—DR 4500 incorporates the unique Truline feature that allows recording of up to four variables on a timeline. Other circular chart recorders use multiple pens to track multiple inputs, making it impossible to show more than one variable on a timeline. Records made this way are often difficult to interpret and leave uncertainty about when an event occurred. Since the recorder/controller uses only one stylus to record data and print the chart, you can conveniently monitor up to four variables—all on the same timeline. This capability makes records exceptionally easy to read—an advantage when you must retrieve and review stored records.
• Easy configuration and single-button initiation **simplify operation**—lets you enter configuration parameters for the High Temperature Short Time (HTST) or pasteurization flow process. You can easily modify these parameters if your pasteurization requirements change.

• **Automatic information reduces manual entries**—the DR 4500 recorder with its Truline technology prints identifying information automatically on the chart. This data can include: (see fig. 1)
  – listing of monitored variables in the header
  – range of each variable
  – time references
  – alphanumeric messages
  – diversion temperatures

• **Unique Digital Reference Capability**—when configured to perform the Digital Reference measurement, the DR 4500 automatically records the digital value of the divert and forward flow temperature along side the Frequency Pen Divert Event mark (see fig. 1).

**DR 4500 HTST/Pasteurization Flow Recorder/Controller Provides Flexibility**

The DR 45AH is easily configured to record and control milk temperature in a pasteurization process. The recorder utilizes a 3-A approved, sanitary high-speed RTD sensor (such as RDF Model #21345-6-E-T1, 1 1/2") to measure hot milk temperature. The DR 45AH also has the capability...
to use a Digital Reference Thermometer when a dual element RTD sensor is used. When enabled, and a divert occurs, the value of the reference temperature will be printed. Once the forward condition is restored, the reference temperature will again be printed. Red and green lights on the front of the recorder provide a visual indication of forward flow or flow diversion.

The DR 45AP is easily configured to record and control milk flow in a pasteurization process. In addition to the normal divert value control provided by the high and loss of signal flow limit setpoints, optional inputs can be setup to display and record the raw and pasteurized pressures in the system (see fig. 2).

The recorder/controller lower display will show the system high and low pressures from independent pressure transmitters. The system back pressure is controlled using the second control output. Additionally, a high pressure limit output can be set. Optional red and green lights are available on the front of the recorder that provide a visual indication of forward flow or diversion.

### Input Processing

Each input is sampled at a rate of 3 times per second for 1 or 2 inputs, or 3 times in 2 seconds for 3 or 4 inputs. Each sample is amplified and then converted to a digital signal which is isolated and passed to the microprocessor. A digital filter with configurable time constants lets you
apply input signal smoothing as desired. All non-linear inputs are linearized by the microprocessor. In the unlikely event of failure, you can easily and quickly replace the resistance bulb temperature sensor. Older, filled thermal systems typically take much longer to repair.

**Purchase and Installation Costs Are Lower**

DR 45AH/AP is less expensive for you to purchase and install than comparable recorder/controllers for milk pasteurization. These savings result from the compact design which houses both the recording and controlling functions in a single water-resistant case. You provide space for and mount only one case where two or more were required with other competitive units. The single-case design eliminates your need to furnish, install, and maintain interconnecting case cabling and provide power to separate cases. The DR 45AH recorder optional Digital Reference eliminates the need for a separate instrument to perform this function.

The DR 45AP recorder optional back system pressure controller eliminates the need for additional separate controllers. A stainless steel, heavy duty door provides you with convenient front access to the recorder/controller. You can view the chart easily through the door's plastic window.

Adding to the installation flexibility is the range of permissible primary power, which allows you to operate this recorder/controller from either a 60 Hz or 50 Hz 120/240 Volt source.

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**Figure 3. Diagram of the Milk Pasteurization Process**

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LEGEND

- Pasteurized Milk
- Raw Milk
- Hot Water or Steam
- Signal Pressure
Compliance to Milk Ordinance Regulations

DR 45AH/AP fully complies with the strict regulations of the “Grade A Pasteurized Milk Ordinance”. Compliance features include:

- **Internal configuration switch**
  This security switch limits access to configuration parameters. In the switch “off” position, you can configure all the recorder/controller parameters to the desired value. The “on” position locks the majority of the configurable parameters, including hot milk diversion setpoint, so that they may not be changed.

The only parameters that may be changed in the “on” (locked) position are:
- **Chart** – You can start the chart or place it in hold.
- **Man/Auto** – You can place the hot water temperature (DR 45AH) or flow (DR 45AP) controller in Manual or Automatic mode as defined below:
  - MAN – The output signal to the valve is manually controlled.
  - AUTO – The setpoint for the controller is adjustable.
- **Lowr/Disp** – Lets you scroll through the process variable inputs, outputs, setpoints and deviation from setpoint.

- **Configuration** – Allows changes to Control 1 and Control 2 tuning parameters plus adjustments to time/date/day/year.
- **Diversion Valve Position Indication**
  Red and green lights, visible through the door, indicate flow diversion valve position. Red indicates flow diversion, green indicates forward flow.
- **Electronics Access Control**
  Chart Plate sealing provisions, using a wire lead seal, prevent access to the electronics and the internal configuration switch.

**DR 45AH HTST Controls Milk Temperature During Pasteurization**

Figure 3 is a flow diagram of the HTST milk pasteurization process. Milk flows from the raw milk supply tank through the plate-type heat exchanger, where it is heated to pasteurization temperature prior to entering the holding tube.

The tube size ensures that the milk remains at the pasteurization temperature for the required time. Hot milk temperature is measured as it leaves the holding tube. If this temperature is above the pasteurization temperature, the DR 45AH HTST allows milk flow to proceed to packaging or storage. If the milk is below pasteurization temperature, the DR 45AH HTST diverts it to the raw milk tank for reprocessing.

For this application, DR 45AH HTST uses two analog inputs, one digital input, one three mode controller and one on-off controller to control:
- hot water flow to the plate heat exchanger
- flow diversion valve position

Pasteurization temperature control consists of recording the information shown on the circular chart (see fig. 1) and implementing the following strategies:

1. The first analog input is hot water temperature (if Digital Reference Temperature option is selected, then Input 3 is the Hot Water Temperature), which indirectly controls milk temperature in the plate heat exchanger. This temperature may be recorded.
2. The hot milk temperature is the second analog input. This temperature is recorded. The high-precision RTD sensor provides this temperature measurement. DR 45AH HTST uses 100-ohm (a = 0.00385) platinum bulb actuation to provide hot milk temperature measurement accuracy of ±0.3°F.
3. A switch on the flow diversion valve provides the digital input to activate the frequency pen that records the valve position on the outer portion of the chart. The user supplies and installs the two relays that connect to the pasteurizer system wiring.

You can also record the flow diversion temperature setpoint without an additional analog input.

**DR 45AP Controls Milk Flow During Pasteurization**

The DR 45AP controls the flow rate in a pasteurization process (see fig. 3). The flow is controlled from the flow input from a pressure transmitter or Magnetic flowmeter in the constant flow line.

The recorder uses PID control and a 4-20mA output to control a variable speed pump which adjusts the flow in the system. The optional differential pressure function uses pressure inputs from Input 2 and Input 3 to measure and display the high and low system pressures (Input 2 - Input 3) and uses this value and the optional second 4-20mA control output to control the system back pressure.

Diverts are based on High Flow or Low Flow setpoints configured in the recorder/controller. Diver- sion to the Raw milk tank occurs when the flow rate is below the Low Flow setpoint or above the High Flow setpoint.

There is a Time Delay that can be configured to occur before forward flow will begin. The configurable range for this time delay is from 0 to 60 seconds.

For Pasteurization Flow, DR 45AP uses one analog input for flow, one digital input, one three mode controller, and one On/Off controller to control:
- process flow rate
- flow diversion valve position

If controlling system back pressure, two additional analog inputs and one 3-mode, 4-20mA controller with two additional relay outputs is required. Pasteurization flow control consists of recording the information shown on the circular chart (see fig. 2) for Input 1 flow and implementing the following strategies:

1. The first analog input is Process Flow.
2. Optional Inputs 2, Input 3 and Control 2 output can be set to record the system high and low pressure for differential pressure measurement and to control the system back pressure.

3. A switch on the flow diversion valve provides the digital input to activate the frequency pen that records the valve position on the outer portion of the chart. The user supplies and installs the two relays that connect the recorder/controller to the pasteurizer system wiring.

Brilliant fluorescent displays and English language prompts not only simplify configuration, but also inform you of process conditions at all times. Display shown indicates the setpoint and process variable (170.0 and 169.5 respectively).

Honeywell Quality Assures Your Satisfaction

Honeywell fully warrants the DR 45AH/AP recorder for two years. Honeywell backs this Truline product with the unmatched service and support capabilities you expect from the worldwide leader in control. Additionally, a toll-free 800 number lets you secure immediate technical assistance and problem resolution.

DR 45AH/AP Pasteurization Recorder/Controller—Part of a Complete Product Offering

This versatile recorder/controller is one of many additions to Honeywell’s expanding line of digital instrumentation. Contact your Honeywell distributor or sales representative for price and delivery information on the DR 45AH/AP recorder or other Honeywell digital recorders.

If it’s worth recording, it’s worth specifying Honeywell.