xylem
Let's Solve Water

SteamTeam®

Bell & Gossett®
McDonnell & Miller®

VOLUME 5 / ISSUE 2/ AUGUST 2018

Jarek Berezowski
Sr. Product Specialist, McDonnell & Miller

Hoffman Specialty® Temperature Regulator Series 1140/1141

Temperature regulators adjust the flow of steam or liquids to control the temperature of a fluid in heating or cooling equipment. Typical applications include:

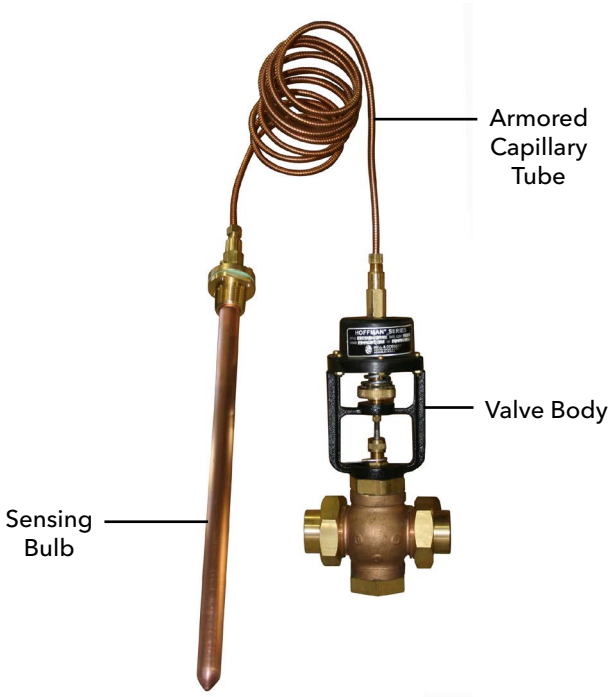
- Large storage tanks that change temperature gradually
- Shell and tube heaters that require instant response
- Steam tables
- Oil preheaters
- Sterilizing equipment
- Textile dryers
- Processing equipment.
- Cooling equipment

For effective temperature control, you need to choose the right regulator, correctly size the valve, and properly locate and install the regulator. For the best steam heating system performance, you also need proper trap sizing, location and installation.

All temperature regulators include a valve (body) and a sensor (actuator). The actuator unit's bulb must be fully immersed in the fluid where temperature is to be controlled. Regulator bulbs are filled with a fluid that expands with heat, enabling the valve to increase or reduce the flow of the heating media in proportion to the sensed temperature deviation.

Series 1140 and 1141 self-actuated vapor-pressure type temperature regulators:

- Regulate the flow of liquid or steam through a valve to maintain a set temperature in the controlled fluid.
- Consist of a valve body and an actuator/sensing unit.
- Have an attached "superstructure" that consists of a valve bracket, adjustment spring, upper stem and temperature adjustment wheel.
- Can be used in heating, cooling or mixing / diverting, depending on valve materials and internal valve configurations. For example, valves with stainless steel discs generally can withstand higher pressure differentials than valves with composition discs. Heating or cooling applications typically require two-port valve bodies, while mixing / diverting uses three-port bodies.
- Are self-sensing and self-actuating, requiring no auxiliary power source to operate the valve or detect a temperature change in the medium (fluid) whose temperature is being controlled.



Series 1140 and 1141 self-actuated vapor-pressure type temperature regulators

The sensing units (actuators) have:

- Sensing bulbs that must be fully immersed in the fluid where temperature is to be controlled.
- Sensing bulbs filled under vacuum with a volatile fluid.
- An armored capillary tube that carries the volatile fluid from the sensing bulb to a bellows that operates the valve.

- Bellows that:
  - ◆ Are compressed by the vacuum in the sensing bulb and capillary tube when the sensing bulb is cold.
  - ◆ Expand with rising vapor pressure when the volatile fluid vaporizes as the sensed temperature increases.
  - ◆ Amplify the force of the vapor pressure, generating thrust to overcome the adjusting spring and push on the valve upper stem. The over-balancing of the spring force by the bellows moves the valve stem.

You can manually operate the adjustment wheel to vary the spring compression, setting the valve to close at any point in the sensing bulb's temperature range. For best results, the temperature set point should be in the upper half of the temperature range.

In a heating regulator, a direct acting valve seat is:

- Held open by the adjustment spring.
- Closed by the movement of the bellows on the valve stem.

When the volatile fluid is below its saturation temperature, the vacuum inside the bulb pulls the bellows away from the valve stem. As the volatile fluid's temperature increases, the expanding bellows close the valve, shutting off the flow of steam or other heating medium to the heat exchanger.

For cooling applications, the reverse acting valve seat is:

- Held closed by the adjustment spring.
- Opened by movement of the bellows on the valve stem.

An increase in the volatile fluid's temperature causes the expanding bellows to open the valve, allowing more water or other cooling medium to flow to and through the heat exchanger.

In mixing / diverting water systems, the valve body has three ports. The actuator bellows control the position of a valve piston.

- In a mixing valve, the piston position determines how much hot water from one side port is mixed with cold water from the other side port. The blended temperature combination exits via the valve's third, or bottom, port.
- In a diverting valve, fluid enters from the valve's bottom port. The piston position determines how much water exits via the two side ports. When the medium temperature is below the actuator temperature range, all fluid exits one side port. When the medium temperature is above the set point, all fluid exits the other side port. As the valve modulates within the actuator's control range, fluid discharges from both side openings.

Fluids with various boiling points are used to achieve varying actuator/sensor control temperature ranges. Series 1140 and 1141 temperature regulators offer eight temperature range actuators from 40°F to 220°F (4.4°C to 104°C). Each temperature range actuator provides 40°F (4°C) temperature adjustment.

Series 1140/1141 offers 5 body styles:

- Single and double seats for heating and cooling – 3-valve bodies with stainless steel seats and trim
- Sliding piston for mixing / diverting
- Brass or iron bodies, depending on valve size
- Union ends – 1/2" to 2"
- Flanged ends – 2-1/2" to 4"

Series 1140/1141 actuators:

- 8 temperature ranges for all valve body styles
- 40° F temperature range increments
- 10' capillary length standard
- 100°F overprotection
- ± 10°F control accuracy
- Copper bulb
- 3 bulb diameter / lengths, depending on valve size

VALVE BODIES							
MODEL	VALVE SIZES	SEATS	MATERIAL			Cv RANGE	Max Diff Press (psi)
			BODY	SEATS	TRIM		
Heating Application Valves							
01*	1/2″ - 2″ union	Single*	Brass	Brass	Brass	2.7 - 25	50
02	1/2″ - 2″ union	Single	Brass	Stain Steel	Stain Steel	2.7 - 25	125
03**	3/4″ - 2″ union	Single**	Brass	Stain Steel	Stain Steel	4.3 - 25	250
05	3/4″ - 2″ union	Double	Brass	Stain Steel	Stain Steel	9.2 - 39	250
	2-1/2 - 4″ flanged	Double	Iron	Stain Steel	Stain Steel	70 - 180	125
Cooling Application Valves							
02R	1/2″ - 2″ union	Single	Brass	Stain Steel	Stain Steel	2.7 - 25	125
05R	3/4″ - 2″ union	Double	Brass	Stain Steel	Stain Steel	9.2 - 39	250
	2-1/2 - 4″ flanged	Double	Iron	Stain Steel	Stain Steel	70 - 180	125
Mixing / Diverting Application Valves							
06	1/2″ - 2″ union	Slide Piston	Brass	Nickel Plate	Stain Steel	3.0 - 31.8	250
	2-1/2 - 4″ flanged	Slide Piston	Iron	Nickel Plate	Stain Steel	50 - 95	125

*Composite Disk

**Balancing piston for steam service only, requiring dead-end service

SENSORS								APPLY TO VALVE BODIES
MODEL	TEMP. RANGES	INCREMENTS	# OF TEMP. RANGES	BULBS			CAPILLARY LENGTHS	
				DIAMETER	LENGTH	MATERIAL		
1140	40 - 220°F	40°F	8	7/8″	18″	Copper	10′	1/2″ - 2″
1140	40 - 220°F	40°F	8	1-1/8″	36"	Copper	10′	2-1/2″ - 4″
1141	120 - 220°F	40°F	4	7/8″	18″	Copper	10′	1/2″ - 2″

For more information on Hoffman Components Selector click here.

For more information on Series 1140/1141 click here.

Steve Almgreen
Assistant Product Line Manager –
Steam Products

Say "no" to suction strainers for condensate return and boiler feed units

Condensate return and boiler feed unit specifications frequently call for a strainer to catch particles that could damage pumps. Basket strainers or "Y" strainers are equally effective, as long as they're properly located and maintained.

Suction strainers, on the other hand, aren't a good idea. They made sense in the 1920s and 30s, when the only pumps available to provide high pressure returns were turbines—whose close tolerance made fitted suction strainers a good choice to stop particle damage. But by the mid-1950s, several companies now within Xylem developed single- and multi-stage centrifugal pumps that could deliver higher pressures. These pumps have broader tolerances; solids up to 1/8" diameter can pass through the impeller of many Bell & Gossett pumps with no real harm.

Specifying engineers started to recommend the centrifugal design and multi-stage pumps for condensate return and boiler feed units. But old habits die hard; the engineers kept on specifying suction strainers. Let's look at why that's a problem – and how you can fix it.

The condensate unit is a tank, a pump, and float control at its simplest. If you put a suction strainer between the tank and the pump, the tank will fill, and the float control will turn the pump on. But if such a strainer is not maintained, it restricts water entering the pump. That starves the pump and maybe even runs it dry, damaging the seal.

You've also added a pressure drop between the tank and pump, across the strainer, reducing NPSHA to the pump. Now the pump's NPSHR may exceed NPSHA—and the pump cavitates. So even if it doesn't run dry, the pump is still damaged and the seal destroyed. This is especially likely when units are vented to atmosphere, and you're dealing with hot condensate.

Plus, if the strainer hasn't been maintained, it's a good bet the system traps haven't been maintained either. When they start to fail, the condensate returns even hotter, with even less NPSHA due to its temperature.

What's the solution? **Use a strainer, but move it to the inlet of the tank.** The strainer still catches particles before they get to the pump, but now it also reduces sediment in the tank. If the strainer gets plugged, water

Domestic Pump Vacuum Heating Unit 30VL2-20-17

doesn't get into the tank, the float switch doesn't rise to start the pump, and you don't run the pump dry. If not enough condensate returns, a small system's boiler shuts down, and a large system increases make up water into the feed unit—both signaling the need for maintenance.

In moving the strainer to the unit's inlet, you may need to change the strainer type—especially where space is at a premium. A "Y" strainer may require back pullout space to remove and clean the strainer screen. Basket strainers don't need back pullout space. Usually you can remove the lid or cover plate and lift the strainer screen out vertically. The strainer screen is somewhat self-cleaning, and the basket strainer usually has a large dirt pocket to collect system debris—especially useful for slower gravity returns. The bucket in which the strainer sits typically has a drain at the bottom. Just remove this and hose out system debris from the basket strainer body.

Larger systems with multiple zones might have a mix of pumped returns and gravity returns to the feed unit. If the designer has done the job right, pumped returns are sized for the pressure drop between the condensate and feed unit plus 5 to 10 psi, depending on the pressure drop. Flows entering the feed unit's strainer at 5 to 10 psi will not create problems for the basket strainer. Remember, plugged strainers at the feed unit inlet will probably cause more make up water to be added to the feed unit or directly to the boiler. If you see an increase in use of make up water or treatment chemicals, it's time for a system review. Higher energy bills are another indicator; make up water is colder and needs more energy to make it back to steam, increasing the bill to run the boiler. These indicators are all easy to monitor—and the solution is so simple. Clean the strainer.

An old joke about how specifications live forever starts by comparing the distance between train rails and going backward in time. The specification for the suction strainer is just such a case. In today's steam systems with centrifugal style pumps, the answer is inlet basket strainers. If you're writing the spec, update it. If you're bidding on a spec that hasn't been updated, take exception and quote the basket strainer—and include this article with your response. Giving specifying engineers this knowledge gives them the power to save money for everyone – including your customer.

Bozhidar Ivanov
Product Specialist – Domestic / Hoffman Pump

Take control

The core elements of a condensate handling unit include the collection tank, the pumps and the controls. Domestic Pump's factory-built, tested and warrantied "Consolitrol" control panel helps these elements work in harmony and communicate effectively with users.

The "Consolitrol" panel handles an array of applications to power the pumps, configure the controls and communicate the status of the unit. It's a valuable option that brings life and versatility to the unit. Here's a look at all that it brings together.

Motor starters are required for any 3-phase power supply application, and with single-phase motors 3 HP and larger. A starter delivers safe, smooth startup as well as overload protection. **Auxiliary contacts** can be attached to the starters and wired to a building management system for remote "on" or "off" pump status indication.

Fused disconnects or circuit breakers protect the starters against power supply issues like short circuits. While fused disconnects are more budget-friendly up front, circuit breakers save money long-term, because there's no cost for replacement fuses. The protectors are the points of power entry to the panel. Each pump or starter has its own protector; for a unit with two or more pumps, you can add an optional **single point power connection**.

Picture a typical unit with two pumps and the two dedicated disconnects with their handles on the outside of the control panel door. Those two handles

Domestic Pump Condensate Return Pump Series CC

are able to cut the power supply to the motors and to the controls, making it safe to open the door and service the panel's electrical parts, or the unit's pumps and float switches. A **power control switching relay** makes it possible to keep the unit running while servicing just one of the two pumps. This relay is wired to both power supply paths that follow the disconnects. If the path that powers the controls is interrupted by its dedicated handle, the relay switches to the alternative power source and keeps the controls running.

Now let's move from the power supply to the control loop. Code requires a **power transformer** when the power supply is more than 250 volts, and one is recommended when the supply exceeds 130 volts. The transformer delivers lower-voltage, single-phase power for delicate control options – such as pilot lights, float switches, alarms, alternators, selector switches, control relays, time meters, etc.

About those control options: **Pilot lights** on the control panel door indicate whether a pump is running. **Float switches** are generally a must – inserted into the unit's condensate tank and wired to the control panel. They turn the pump on or off based on the tank's water level, and can signal high or low level issues. **Alarm options** include buzzers, silencing relays, alarm lights, dry contacts for connection to remote building management systems – whatever combination is right for the customer. The optional **alternator** is available as either a double float switch (a "mechanical alternator") inserted into the tank, or an electrical alternating relay mounted into the control panel. Its job is to change each pump's lead-lag role for more even operation. **Time meters** track operating hours for each pump, a handy way to monitor servicing needs or calculate energy consumption. **Selector switches** let you manually set the pump's operating mode – on or off, auto mode, lead or lag, continuously running, allocated to a certain signal from a dedicated boiler, etc. The type of selector switch depends on the unit type and features.

Domestic Pump condensate handling units fall into two main categories – condensate return units and boiler feed units. Condensate return units are controlled by the water level in the tank; boiler feed units are controlled by the water level in a boiler. **Control relays** are essential for boiler feed units in scenarios such as multiboiler – multipump combinations with automatic pump standby; control of boiler feed valves; and communicating with the field.

Domestic Pump control panels are a hassle-free control solution for the condensate handling units.

Domestic Hoffman Consolitrol Control Panel

The panels are NEC and JIC compliant, and use IEC components of high quality, properly sized and wired to the application. The panels are available in various NEMA enclosures for indoor or outdoor application, NEMA2 being the standard. They can be unit or wall-mounted. The most common control configurations are standardized. Customers can choose control options for their application, confident it will be the best fit.
Any questions? Let us know.

Bozhidar "Boz" Ivanov
847-967-2622
e-mail: bozhidar.ivanov@xyleminc.com

Service and support from the most trusted name in the industry – Bell & Gossett.

The Bell & Gossett name has always stood for uncompromising quality and dependability. That's evident in the way every one of our centrifugal pumps is built and backed by our outstanding customer service and support team.

Your local Bell & Gossett representative is available any time and is an experienced professional with a wealth of technical expertise. In addition to expert system and product application assistance and a wide product inventory warehoused locally, we offer ESP-Systemwize software selection program.

ESP systemwize

ESP-Systemwize is a Bell & Gossett web-based software that helps you design HVAC systems accurately, effectively and very quickly. You get fast, precise equipment selection, pump performance curves and equipment schedules, submittals, specifications and more.

ESP-Systemwize includes:

- Centrifugal Pumps
- Air/Dirt Separators
- Heat Exchangers
- Pump Suction Diffuser and Triple Duty Valve
- Expansion Tanks
- PIC Valves

The Little Red Schoolhouse® - Training the Industry

Seminars currently offered are:

- Modern Hydronic System Design – Basic*
- Modern Hydronic System Design – Advanced*
- Design & Application of Water Based HVAC Systems
- Large Chilled Water System Design*
- Pump Service & Maintenance School
- Steam Systems Design & Applications
- Steam System Operation & Maintenance
- Plumbing Systems Design

Bell & Gossett has long been known for its dedication to training. The "Little Red Schoolhouse®" has graduated over 60,000 students since it was founded in 1954.

Graduates from the "Little Red Schoolhouse" may be found throughout North America, Europe, Africa, Asia and Australia.

For applications to attend these seminars, please contact a Bell & Gossett Representative in your area. They will have the schedule dates for all seminars and will make all the arrangements for you. As a service and a continuing educational source to the HVAC industry, these seminars are offered free of charge. IACET certified CEU credits are awarded for each seminar.

* The USGBC has approved the technical and instructional quality of the Modern Hydronic Heating Systems - Basic Seminar (15 GBCI CE Hours) and the Large Chilled Water Design Seminar (11 GBCI CE Hours). These courses are approved for GBCI Continuing Education Hours towards LEED Credential Maintenance Programs.

Member of: HI

Xylem |'zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services, and agricultural settings. With its October 2016 acquisition of Sensus, Xylem added smart metering, network technologies and advanced data analytics for water, gas and electric utilities to its portfolio of solutions. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to www.xyleminc.com

xylem
Let's Solve Water

Xylem Inc.
8200 N. Austin Avenue
Morton Grove, Illinois 60053
Phone: (847) 966-3700
Fax: (847) 965-8379
www.bellgossett.com