Bulletin D-432

ITT

Bell & Gossett®

ZoneSāv®
Packaged Systems Group

Zone Bridge Valve Control Systems

The Technologic® 5500 ZoneSav Controller optimizes zone/bridge flow and distribution loop ΔT without sacrificing humidity control and comfort. Zones now can be "decoupled" thermally as well as hydraulically from the chilled or hot water distribution system.

What will a ZoneSav Valve Controller do for your system?
By introducing a True Tertiary Zone Valve with a De-coupling bridge, Tertiary Zone Pump and a ZoneSav Valve Controller you can cure several of the shortcomings of large distribution systems that have grown beyond their original design:

- Weak differential pressures in remote branches of the system
- Excessive differential pressures in loads near the main distribution plant
- Wild flow control during outage recovery
- Diversity control during peak demand periods
- Predictable performance when additional loads are added to the system

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Engineered for life

Standard Features

- Wall Mounted NEMA 1 Enclosure
- Temperature Inputs/Readouts
- On Screen Help Functions
- Field Modifiable Set Points
- Adjustable PID Functions
- Automatic or Manual System Control
- Fused 24 Volt Power Supply
- Multiple Modes of Operation:
  - Temperature/Humidity Optimization
  - GPM/BTU Readout
  - Flow LImit Control (Zone Flow Limiting)
  - Differential Temperature/ Temperature Optimazation
- System Purge
- PID Auto-Tuning Functions
- PID Energy Optimization
- Valve Limit User-Accessible Parameters
- Logging of Alarms, Valve Position, Sensor Data
- UL Listed

Where to apply a Zone Control Valve:

Chilled Water or Heating Water Distribution System

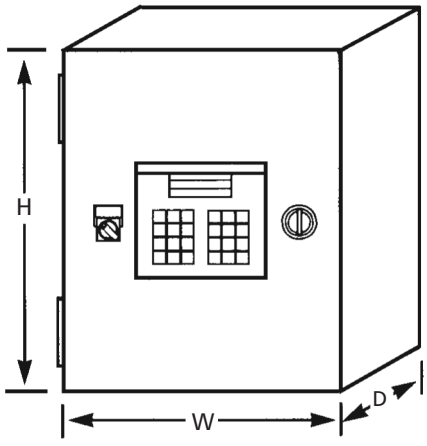
- Primary/Secondary Distribution
- Primary/Variable Volume Secondary Distribution
- Variable/Volume Primary

Two Way or Three Way Control Valve Applications

Options

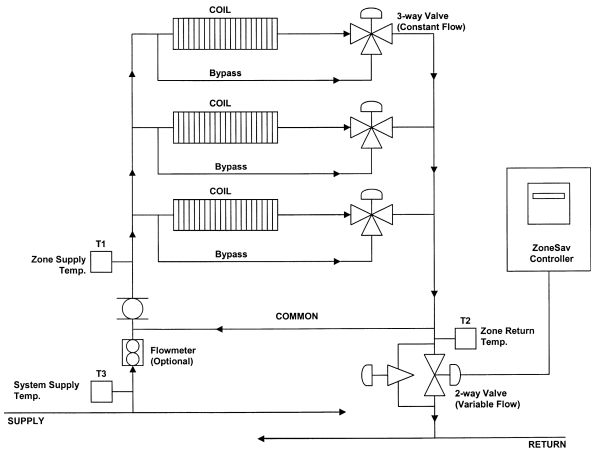
- Temperature Detectors with 4-20ma output
- Control Valve
- Actuator–Electric or Pneumatic
- Valve Positioner–Electric or Pneumatic
- Insertion Flow Meter with Pulse and 4-20ma output
- Digital and Analog Logic Input Modules for Expanded I/O Points
- CSA Listing
- RS Communications
  - Johnson N2
  - Modbus
  - Bacnet MSTP
  - Lonworks
  - Bacnet IP

Dimentional Data



Zonesav	
H	20″
W	16″
D	8-5/8″
LBS	40

Figure 1 – ZoneSav Installation with 3-Way Valves



Frequently Asked Questions

Q1: What do you mean when you say ZoneSav optimizes system performance?

A: When we say **optimize** performance, we simply mean we will raise all temperatures to their maximum in a chilled water plant without exceeding a priority setpoint.
See Q3 below.

Q2: How does the ZoneSav control ΔT on 3-way valve system?

A: First let's make sure we understand what a 3-way valve system is. "3-way valve" refers to the coil or AHU individual control valve. We suggest combining all 3-way valve returns in a common header. A variable flow 2-way modulating control valve tied to the ZoneSav controller is placed in this combined return. The ZoneSav modulates the variable flow valve to recirculate adequate flow back through the "COMMON" to blend with fresh chilled water and supply the 3-way valves with a higher supply temperature. This requires the 3-way valves to modulate to a position where they pass more water through the coil and less through the bypass. The net result is improved performance through the system. See figure 1.

Q3: How can the ZoneSav control to ΔT and dew point at the same time when there is only one 2-way control valve?

A: The answer is "You can't!" ZoneSav doesn't do the impossible. ZoneSav **optimizes** the performance of the system. For example, let's say you have 45° supply and desire 60° return temperatures (15° ΔT). At the same time the humidity condition requires a maximum 49° maximum zone supply setpoint. Under these conditions and a heavy load, we could very well achieve both desired operating conditions, i.e. not exceed 49° to the coil, but still getting a return of 60°. At lighter loads however, the coil may only be capable of increasing the temperature on the coil exit to 57°. Bypassing more fluid back to recirculation and again through the coil would exceed the coil supply setpoint of 49° (humidity setpoint). ZoneSav will not allow this to happen. Instead, Zone Supply Temperature control takes over by opening the 2-way modulating control valve, returning 57° to chiller plant, not 60°. You will be returning the **highest possible temperature** to the plant **without exceeding dew point** or **humidity setpoints.**

Q4: Can the operator simply raise the chiller setpoint and achieve the same thing we are offering, especially in a 3-way valve system?

A: Yes and no! Yes, you can raise the chiller setpoint and therefore reduce total plant kW demand. This is quite common during evening, weekend, or holiday periods. The chiller supply, however, can only be raised to the point where the most critical zone is still satisfied. For example, a university may have several very diverse zones. In a swimming pool environment you may want a relatively low supply humidity, while at the same time, in the arboretum you could very well not only be satisfied with a higher temperature, but also require a higher relative humidity. ZoneSav allows you to personalize or "thermally decouple" humidity and temperature requirements in each individual zone. Thus, we optimize total system performance.

Q5: The concept sounds simple. Why can't the energy management system (EMS) or building automation system (BAS) people do it?

A: The concept of recirculation to elevate temperature is simple. Remember, Bell & Gossett pioneered this concept back in 1954, calling it "Primary/Secondary Pumping!" The problem of low ΔT's has been around a long time as well, much longer than the ZoneSav, energy management or building automation systems.
If an EMS or BAS has the ability to solve low ΔT problems, then why do we still have ΔT problems? The fact is that the solution is not as simple as measuring temperatures. It took nearly two years of laboratory and field testing to fine tune our control algorithms.
Also, keep in mind that when the BAS people have total control of the system, they lose automatic control of the system when the BAS communications go down. Since the ZoneSav is an independent controller, we can operate locally in automatic mode whether communications are available or not.

Q6: Can we communicate with a Building Automation System (BAS)?

A: Just like the Technologic 5500 for Variable Speed Pumping Systems, we have several communication protocols available.

- Johnson N2
- Modbus
- BACNet MSTP
- BACNet IP
- Lonworks

You can remotely monitor the sensor values, valve position, and alarms. The BAS can also send temperature setpoints and Start/Stop signals to the ZoneSav controller. Additionally, standard hardwired points are available including Alarm indication and Remote Start/Stop control.

ZoneSāv Controller Specification

Each independent zone shall be furnished with an ITT Bell & Gossett ZoneSav Independent Zone Valve Control System to thermally and hydronically decouple the zone. The system shall monitor and control chilled/heating water supply to the zone to assure maximum/minimum allowable temperature rise and minimum flow demand on the chiller plant. It shall allocate water resources on a predetermined and preprogrammed basis.

The control system shall include, as a minimum, the independent programmable logic zone valve controller and remote sensor/transmitters as indicated on the plans. Provide additional items as specified or as required to properly execute the sequence of operation.

The ZoneSav Valve Controller assembly shall be listed by and bear the label of Underwriter's Laboratory, Inc. (UL). (Canadian Standards Association (CSA) listing available upon request.) The controller shall meet Part 15 of FCC regulations pertaining to class A computing devices. The controller shall be specifically designed for independent zone valve control to thermally and hydronically decouple the zone.

The logic controller shall be capable of accepting four (4) (option for total of 8) discrete analog inputs from zone sensor/transmitters as indicated on the plans. Analog input resolution shall be 12-bit minimum, and the controller shall scan each analog input a minimum of once every 100 milliseconds. Use of a multiplexer for multiple sensor inputs is not acceptable. All sensor/transmitter inputs shall be individually wired to the pump logic controller for continuous scan and comparison function. Each input shall be provided with capability for entry of a unique user-adjustable setpoint. All analog inputs shall be provided with current limit circuitry to provide short circuit protection and safeguard against incorrect wiring of sensors.

The logic controller shall be self-prompting. All messages shall be displayed in plain English. The following features shall be provided: multi-fault memory and recall, on-screen help functions, LED pilot lights, and switches soft-touch membrane keypad switches

The logic controller display shall be no less than four lines with each line capable of displaying up to twenty characters. The human interface display shall include, but not limited to the following:

- System supply temperature - Actual
- Zone supply temperature - Actual
- Zone supply temperature - Setpoint
- Zone return temperature - Actual
- Zone return temperature - Setpoint
- Chilled water supply flow in GPM (requires optional flowmeter)
- Thermal consumption in BTU's (MBH) and tonnage (requires optional flowmeter)

A data-logging feature shall be provided as a function of the logic controller. The Alarm log shall include the last 20 alarms with date/time stamp. The Sensor Data log shall display a log of sensor values over a user selectable log rate. The Valve Data log shall display a log of valve position values over a user selectable log rate.

The unit shall be capable of displaying chilled water flow, BTU's and tons of refrigeration consumed by the load. The interval of totalization shall be a user adjustable period of time.

The logic controller shall incorporate a Flash Memory for saving and reloading customized settings. These field determined values shall be permanently retained in Flash memory for automatic reloading of the site specific setup values in the event of data corruption due to external disturbances.

The valve controller shall be a Bell & Gossett Technologic Series 5500 ZoneSav Controller. Each system shall consist of a microprocessor based controller housed in a NEMA 1 enclosure suitable for wall mounting. The operator interface panel shall provide authorized personnel access to the program including setpoints and operational mode. Access will be protected by (2) levels of password security.

As an option, the valve controller shall include a panel mounted 2-position Summer/Winter Switch. The switch will allow the user to select (1) of (2) sets of setpoints.

The system manufacturer or factory trained representative shall provide start-up of the packaged pumping system. This start-up shall include verification of proper installation, system initiation, adjustment and fine tuning. Start-up shall not be considered complete until the sequence of operation, including all alarms, has been sufficiently demonstrated to the owner or owner's designated representative. This jobsite visit shall occur only after all hook-ups, tie-ins, and terminations have been completed and signed-off on the manufacturer's start-up request form.

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