



DTV DIGITAL TEMPERING VALVE

DIGITAL TEMPERING VALVE WITH SAFEGUARD



WARNING

This Cemline control is strictly an operating control; it should never be used as a primary limit or safety control. All equipment must have its own certified limit and safety controls required by local codes. The installer must verify proper operation and correct any safety problems prior to the installation of this Cemline control.

TABLE OF CONTENTS

01 CONTROLS, INDICATORS, AND CONNECTIONS	4	INPUT WIRING	31
02 DETAILED OPERATION	5	WIRING THE SYSTEM TEMPERATURE SENSOR	31
OVERVIEW	5	WIRING AUX INPUTS—SENSORS OR SWITCHES (OPTIONAL)	32
DTV OPERATING CONCEPT	5	WIRING THE FLOW PROVE (OPTIONAL)	33
HTLV (HIGH TEMP LIMIT VALVE) OPERATING CONCEPT	5	WIRING THE 4–20MA REMOTE SETPOINT (OPTIONAL)	33
DTV + HTLV OPERATING CONCEPT	5	COMMUNICATIONS WIRING (OPTIONAL)	34
DTV DIGITAL TEMPERING VALVE INPUTS	6	INTERNET (RINET) COMMUNICATIONS WIRING	34
SYSTEM TEMPERATURE SENSOR	6	BACNET COMMUNICATIONS WIRING	34
AUX SENSOR/SWITCH INPUTS (OPTIONAL)	6	MODBUS COMMUNICATIONS WIRING	34
FLOW PROVE (OPTIONAL)	6	COMPLETING THE WIRING	35
4–20MA REMOTE SETPOINT (OPTIONAL)	6	VALVE ACTUATOR SETTINGS AND CALIBRATION	36
DTV DIGITAL TEMPERING VALVE OUTPUTS	7	CALIBRATING THE ACTUATOR	37
ACTUATORS	7		
HTLV (HIGH TEMP LIMIT VALVE)	7	05 PIPING DIAGRAMS	38
HTLV LOCKOUT OUTPUT	7		
03 SPECIFICATIONS	8	06 DISPLAY AND PROGRAMMING	41
DTV DIGITAL TEMPERING VALVE CONTROL MODULE	8	DISPLAY AND VARIABLE-FUNCTION BUTTONS	42
DTV DIGITAL TEMPERING VALVE ACTUATOR	8	DEFAULT DISPLAY	43
DTV DIGITAL TEMPERING VALVE BODY	8	DISPLAY ICONS AND MESSAGES	43
DTV DIGITAL TEMPERING VALVE PROBE SENSOR	8	ALARM MESSAGES	44
DTV DIGITAL TEMPERING VALVE STAINLESS STEEL VALVE SIZING	9	SETTING THE DISPLAY CONTRAS	44
DTV DIGITAL TEMPERING VALVE STAINLESS STEEL VALVE DIMENSIONAL	9	RESETTING TO FACTORY DEFAULT	44
HTLV VALVE AND ACTUATOR SPECIFICATIONS	11	INITIAL PROGRAMMING OF THE DTV DIGITAL TEMPERING VALVE	45
HTLV STAINLESS 2-WAY MOTORIZED VALVE PART NUMBERS	11	SYSTEM STARTUP MENU	45
HTLV STAINLESS 2-WAY MOTORIZED VALVE SPECIFICATIONS—2 ½" AND SMALLER VALVES	11	CONTROL MODE	46
HTLV STAINLESS 2-WAY MOTORIZED VALVE DIMENSIONAL—2 ½" AND SMALLER VALVES	12	DISPLAY UNIT	46
HTLV STAINLESS 2-WAY MOTORIZED VALVE SPECIFICATIONS—3" VALVE	13	SETPOINT INPUT	46
		AUX1/AUX2 INPUT	47
		RETURN COMP.	47
		HOT SUPPLY COMP.	48
		FLOW SWITCH	48
		LIMIT VALVE POS.	48
		MODULATION TYPE	49
		NETWORK COMMUNICATION OPTIONS	49
		SET PRESENT DATE AND TIME	49
		DAYLIGHT SAVING	50
04 INSTALLATION INSTRUCTIONS	14	MAIN MENU	50
REQUIRED MATERIALS (NOT SUPPLIED)	14	SETPOINT	51
DESIGN CONSIDERATIONS	14	HTLV SETPOINT	52
GENERAL PIPING GUIDELINES	15	HTLV TRIGGER DELAY	52
SENSOR PROBE LOCATIONS	15	MODULATING GAIN	52
HTLV SAFETY VALVE PIPING	15	SCHEDULES MENU	53
BUILDING RECIRCULATING LOOP	16	SELECT DAYS	54
THERMAL TRAP	16	SET SCHEDULE START TIME	54
MULTIPLE/PARALLEL VALVE PIPING	16	SET SCHEDULE TEMPERATURE	54
DTV VALVE INSTALLATION	17	MAINTENANCE MENU	55
MOUNTING THE ACTUATOR TO THE DTV VALVE	18	PASSWORD ENABLE	55
MOUNTING THE DTV DIGITAL TEMPERING VALVE MODULE	21	ALARM LOG	56
MOUNTING THE ENCLOSURE	21	CONFIGURATION	56
MOUNTING THE DISPLAY MODULE	22	LOCKOUT MENU	57
WIRING THE DTV DIGITAL TEMPERING VALVE	23	RESET LOCKOUT	57
POWER INPUT WIRING	23		
OUTPUT WIRING	24	07 TROUBLESHOOTING	58
WIRING THE ACTUATOR—SINGLE-VALVE APPLICATION	25		
WIRING THE ACTUATOR—TWO-VALVE APPLICATION	26	08 NOTES	60
WIRING OPTIONAL HTLV (HIGH TEMP LIMIT VALVE)—SOLENOID VALVE (SUPPLIED BY OTHERS)	27		
WIRING OPTIONAL HTLV (HIGH TEMP LIMIT VALVE)—2 ½" AND SMALLER MOTORIZED STAINLESS VALVE (SUPPLIED BY CEMLINE)	28		
WIRING THE HTLV LOCKOUT ALARM (OPTIONAL)	30		

01 CONTROLS, INDICATORS, AND CONNECTIONS

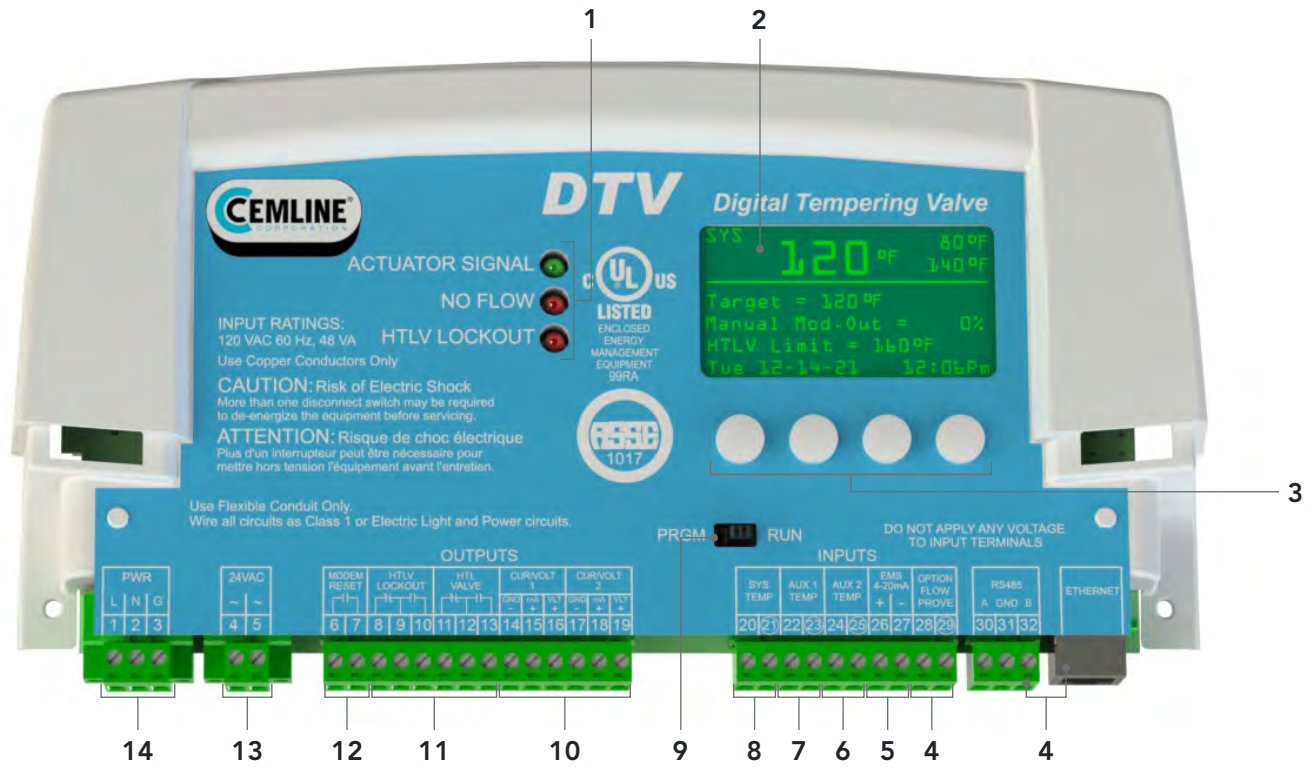


FIGURE 1
DTV DIGITAL TEMPERING VALVE CONTROLS, INDICATORS, AND CONNECTIONS

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Output Status LEDs See "DTV Digital Tempering Valve Control Module Output Status LEDs" on page 7	9	Program/Run Switch Places the DTV Digital Tempering Valve in programming mode or run (normal operation) mode NOTE: Programming mode may be password protected—See page 55
2	Digital Display See "Display and Variable-Function Buttons" on page 42	10	Motorized Mixing Valve Modulating Signal Connections for Valve 1 and Valve 2
3	Variable-Function Buttons See "Display and Variable-Function Buttons" on page 42	11	HTLV (High Temp Limit Valve) and Alarm Output Connections NOTE: The Outputs do not provide power. A separate power source must be provided
4	Internet/BACnet/Modbus Connection Communications interface	12	Communication Modem Reset NOTE: Used if Internet communication is lost for more than one hour
5	Prove Input Connection	13	Actuator 24Vac Power Source Connection
6	EMS 4–20mA Remote Setpoint Connection	14	120Vac Power Input Connection
7	AUX Inputs—Sensor or Switch (2)		
8	System Temperature Sensor Input Connection		

OVERVIEW

The DTV Digital Tempering Valve (Digital Tempering Valve) is a hot water temperature control capable of operating one or more electronic motorized mixing valves to regulate the system water temperature. The electronic mixing valves are controlled using any of its voltages or current output modulation signals. Its modulation PID is designed to respond quickly, which makes it suitable for domestic hot water applications.

The DTV Digital Tempering Valve consists of four primary components:

- The DTV Digital Tempering Valve control
- The electronic motorized Actuator
- The 3-way mixing valve
- An immersion temperature sensor

If applicable for added protection, the DTV Platinum contains a power loss capacitor which will close the hot water supply to the mixing valve on a loss of power. The DTV Digital Tempering Valve control can also be configured to close the hot water supply to the mixing valve if the mixed outlet temperature exceeds the Alarm Limit. It does that by operating a HTLV (High Temp Limit Valve) mounted on the hot water supply.

DTV OPERATING CONCEPT

The DTV Digital Tempering Valve control modulates the electronic motorized mixing valve to maintain a temperature setpoint. It does that by mixing two different water temperatures from two different sources; a hot water source and a cold-water source. The hot water source can be a hot water boiler, a hot water coil in a steam boiler, or a hot water storage tank. The cold water comes from the city water system. The cold water inlet is joined with the circulating loop return pipe to help maintain flow in the valve during periods of no usage. The DTV Digital Tempering Valve operation requires the use of a circulating loop pump to maintain the loop temperature.

To save on energy, the DTV Digital Tempering Valve provides a 7-day schedule to help reduce the water temperature during periods of low usage.

HTLV (HIGH TEMP LIMIT VALVE) OPERATING CONCEPT

In addition to maintaining the mixed output setpoint, the DTV Digital Tempering Valve helps protect the system from excessive water temperatures. It does that by closing a HTLV (High Temp Limit Valve) feeding the mixing valve's hot water. When the mixed outlet exceeds the alarming temperature setpoint (*See "HTLV Setpoint" on page 52*) for the delayed period (*See "HTLV Trigger Delay" on page 52*), the control closes the HTLV (High Temp Limit Valve) blocking all hot water flow to the mixing valve and triggers an alarm.

DTV + HTLV OPERATING CONCEPT

The DTV + HTLV mode combines both the DTV and HTLV modes. In this mode, the DTV Digital Tempering Valve controls the valve to maintain temperature, and monitors the outlet temperature to ensure the specified temperature is not exceeded.

DTV DIGITAL TEMPERING VALVE INPUTS

SYSTEM TEMPERATURE SENSOR

The DTV Digital Tempering Valve is designed to connect to the provided Celine temperature sensor probe with enclosure (P/N 02-150-483).

The sensor must be installed within 1 to 3 feet (0.3 to 0.9 meters) after the mixed outlet of the motorized mixing valve, and before any takeoffs.

AUX SENSOR/SWITCH INPUTS (OPTIONAL)

Auxiliary inputs connected to the DTV Digital Tempering Valve can be configured as temperature sensors or switch sensors. When configured as a switch sensor, the DTV Digital Tempering Valve detects an open or close switch contact.

When configured as a temperature sensor, the sensor monitors water temperature. When placed in the COLD and HOT inlet of the valve, the sensor can be configured as Feed-Forward to provide an additional feedback to the control for maintaining the accuracy of the desired setpoint temperature.

Auxiliary temperature sensors must be installed at least 3 to 6 feet (1.0 to 1.8 meters) from the valve, and after the cold and return lines join together. When using the Feed-Forward feature it is recommended to install the Auxiliary Temperature Sensors at least 6 feet (1.8 meters) from the valve.

NOTE

Alarms for auxiliary sensors are available with RINET communication option only and is accessed via Internet through BuildingNet.

FLOW PROVE (OPTIONAL)

The Flow Prove input checks for the flow status before opening the mixing valve. If no flow status exists, the control will keep the mixing valve closed (fully COLD). However, if the no flow status occurs during normal valve operation, the DTV Digital Tempering Valve will keep the mixing valve position at its latest opening percent or return the mixing valve to a predetermine position as set by the installer.

NOTE

If the current valve position is lower than the preset valve position setting, the valve will remain at the current position. It is the responsibility of the installer to properly select the flow switch and the gpm flow rate required for the switching needed for the application.

4-20mA REMOTE SETPOINT (OPTIONAL)

The 4-20mA remote setpoint can be used when it is desirable to set the DTV Digital Tempering Valve setpoint remotely using an EMS system. Any signal that is less than 2mA or greater than 22mA will close the mixing valve and trigger an alarm (See "Alarm Messages" on page 44).

NOTE

The DTV Digital Tempering Valve does not source power to the 4-20mA terminals. The EMS system must provide the excitation voltage.

DTV DIGITAL TEMPERING VALVE OUTPUTS

ACTUATORS

When the Control Mode is set to DTV or DTV + HTLV, the control operates a single or dual motorized mixing valve to maintain the hot water temperature at the Setpoint. This is done by sending 24Vac power and a modulation signal to the mixing valve.

During loss of power the actuator will automatically position itself and the valve to a full COLD position. Once power is restored the actuator will return to normal operation.

HTLV (HIGH TEMP LIMIT VALVE)

When the Control Mode is set to HTLV or DTV + HTLV, the DTV Digital Tempering Valve uses a HTLV (High Temp Limit Valve) to close the hot water feed to the mixing valve when excessive mixed temperatures exceed the Alarm Limit (See "HTLV Setpoint" on page 52) for the specified Delay Alarm period.

The control can manage either a motorized stainless valve (powered OPEN and powered CLOSED) or a Normally Open (N.O.) or Normally Closed (N.C.) solenoid type valve. Cemline recommends the use of a motorized stainless valve with battery backup HTLV valve for better performance during power outages.

NOTE

The DTV Digital Tempering Valve does not source power to the HTLV valve terminals. An external power source is required.

HTLV LOCKOUT OUTPUT

The HTLV Lockout can be used to provide a notification that the unit has gone into lockout. Devices that can be connected to the DTV Digital Tempering Valve include: Vis-U-Alarm, audible alarm, Remote Management System, or any other device that requires a switch closure or an open switch to trigger an alarm.

NOTE

The DTV Digital Tempering Valve does not source power to the HTLV Lockout terminals. An external power source is required.

The HTLV Lockout LED will be lit whenever the control is in lockout. To exit HTLV Lockout mode, the cause of the alarm must end or be corrected, the System Sensor reading must drop below the HTLV Limit, and the Reset button must be pressed (See "Reset Lockout" on page 57).

DTV DIGITAL TEMPERING VALVE CONTROL MODULE

Voltage Input	120Vac 60Hz
Maximum Input Rating	48VA max
Dimensions (W x H x D)	11" x 9" x 3 3/4" (279.4mm x 228.6mm x 95.25mm)
Weight	2.5lbs (1.13kg)
Modes of Operation	DTV, HTLV, DTV + HTLV
DTV Setpoint	40°F to 200°F (4°C to 93°C)
Alarm Setpoint	40°F to 200°F (4°C to 93°C)
Modulation Output Signal	0–10V (default), 2–10V, 0–5V, 1–5V, 4–20mA
Output Relays	1 HTLV Lockout 1 Modem Reset 1 Valve Output
Output Relay Rating	HTLV Lockout: 3A at 120Vac 60Hz Modem Reset: 5A resistive at 120Vac 60Hz Valve Output: 1A inductive at 120Vac 60Hz
Inputs	System Temperature, Aux Temp 1 (Temp or Switch), Aux Temp 2 (Temp or Switch) Flow Prove, Remote Setpoint (4–20mA)
User Interface	Digital Display Display Units: Temperature (°F and °C) Status Indicators (3 LEDs) Variable-Function Buttons (4)

DTV DIGITAL TEMPERING VALVE ACTUATOR

Voltage Input	24Vac 60Hz
Power Consumption	18VA max
Input Signal	0–10V
Weight	2.6 lbs (1.2 kg)

DTV DIGITAL TEMPERING VALVE BODY

Body and Trim	304 Stainless Steel
Maximum Operating Temperature	300°F (149°C)
Maximum Working Pressure	225 psi
Stem Material	640 Stainless Steel

DTV DIGITAL TEMPERING VALVE PROBE SENSOR

Probe Material	300 Stainless Steel
Threaded Connection	1/2"–14 NPT
Maximum Temperature Rating	221°F (105°C)
Lead Wires	28 AWG

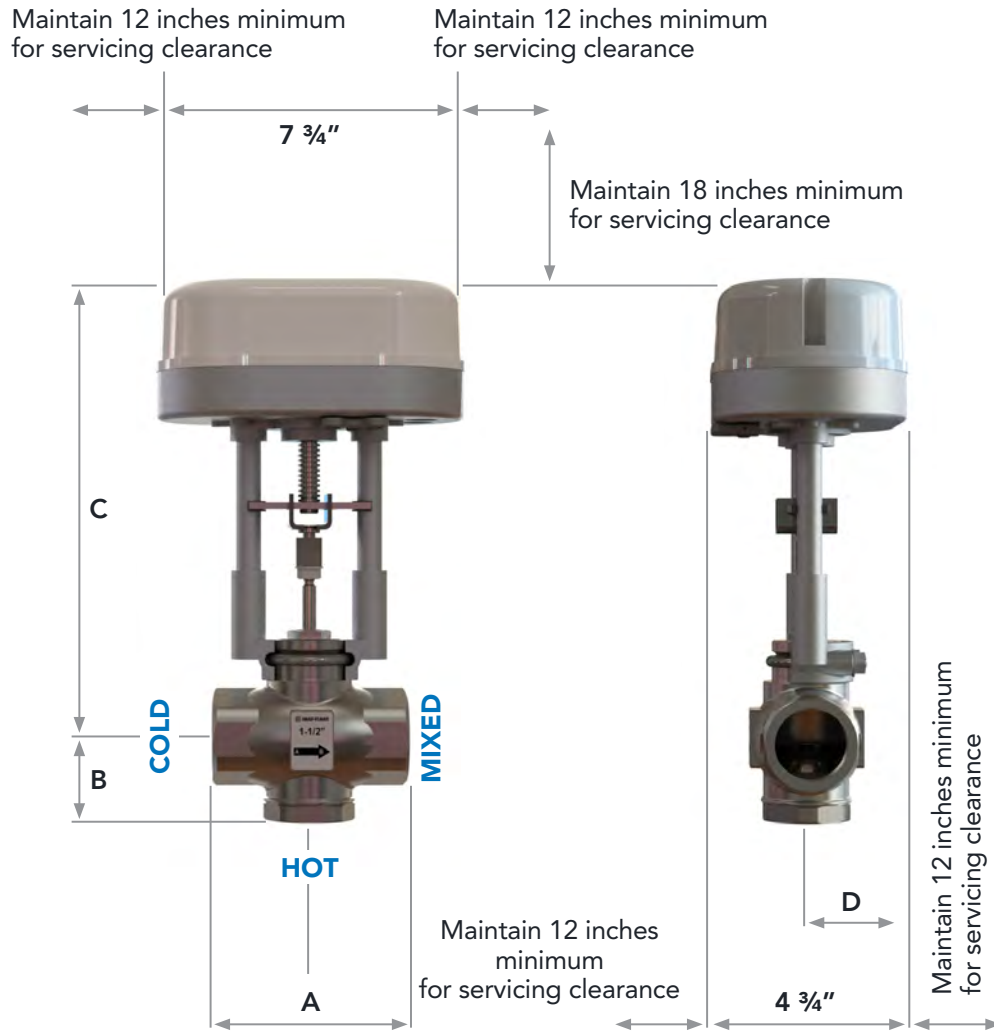
DTV DIGITAL TEMPERING VALVE STAINLESS STEEL VALVE SIZING

PRESSURE DROP PSI	VALVE SIZE						
	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"
Cv	5	7	12	18	29	46	73
3	8	12	20	32	50	80	126
4	9	15	23	37	58	93	145
5	10	16	26	41	64	103	162
6	12	18	28	45	71	113	178
7	13	20	31	50	78	125	192
8	14	21	33	53	83	132	205
9	15	22	35	56	88	140	218
10	16	23	36	58	91	145	230
11	17	24	38	62	97	154	241
12	18	25	40	64	100	160	252
BUILDING RECIRC	5 GPM		10 GPM			15 GPM	
	GALLONS PER MINUTE						

DTV DIGITAL TEMPERING VALVE STAINLESS STEEL VALVE DIMENSIONAL

DTV ASSEMBLY	VALVE CONNECTIONS—NPSC		
	HOT	COLD	MIXED
½"	½"	½"	½"
¾"	¾"	¾"	¾"
1"	1"	1"	1"
1 ¼"	1 ¼"	1 ¼"	1 ¼"
1 ½"	1 ½"	1 ½"	1 ½"
2"	2"	2"	2"
2 ½"	2 ½"	2 ½"	2 ½"

DTV DIGITAL TEMPERING VALVE STAINLESS STEEL VALVE DIMENSIONAL



DTV ASSEMBLY	DIMENSION			
	A	B	C	D
1/2"	3 1/8"	2"	10 1/2"	2 3/8"
3/4"	3 1/8"	2"	10 5/8"	2 3/8"
1"	4"	2 1/8"	10 3/4"	2 3/8"
1 1/4"	4"	2 1/2"	11"	2 3/8"
1 1/2"	4 4/5"	2 4/5"	11 3/16"	2 3/8"
2"	5 1/2"	3 3/8"	11 3/8"	2 3/8"
2 1/2"	6 5/16"	4"	11 3/4"	2 3/8"

HTLV STAINLESS 2-WAY MOTORIZED VALVE PART NUMBERS

MODELS	DESCRIPTION					
	¾"	1"	1 ¼"	1 ½"	2"	2 ½"
POWER LOSS CLOSE	02-150-498	02-150-499	02-150-500	02-150-501	02-150-502	02-150-503

HTLV STAINLESS 2-WAY MOTORIZED VALVE SPECIFICATIONS— 2 ½" AND SMALLER VALVES

ACTUATOR

Voltage Input	24Vac 60Hz
Power Consumption	18VA max
Capacitor Charging Phase Consumption	32VA/18W
Force	1000 N

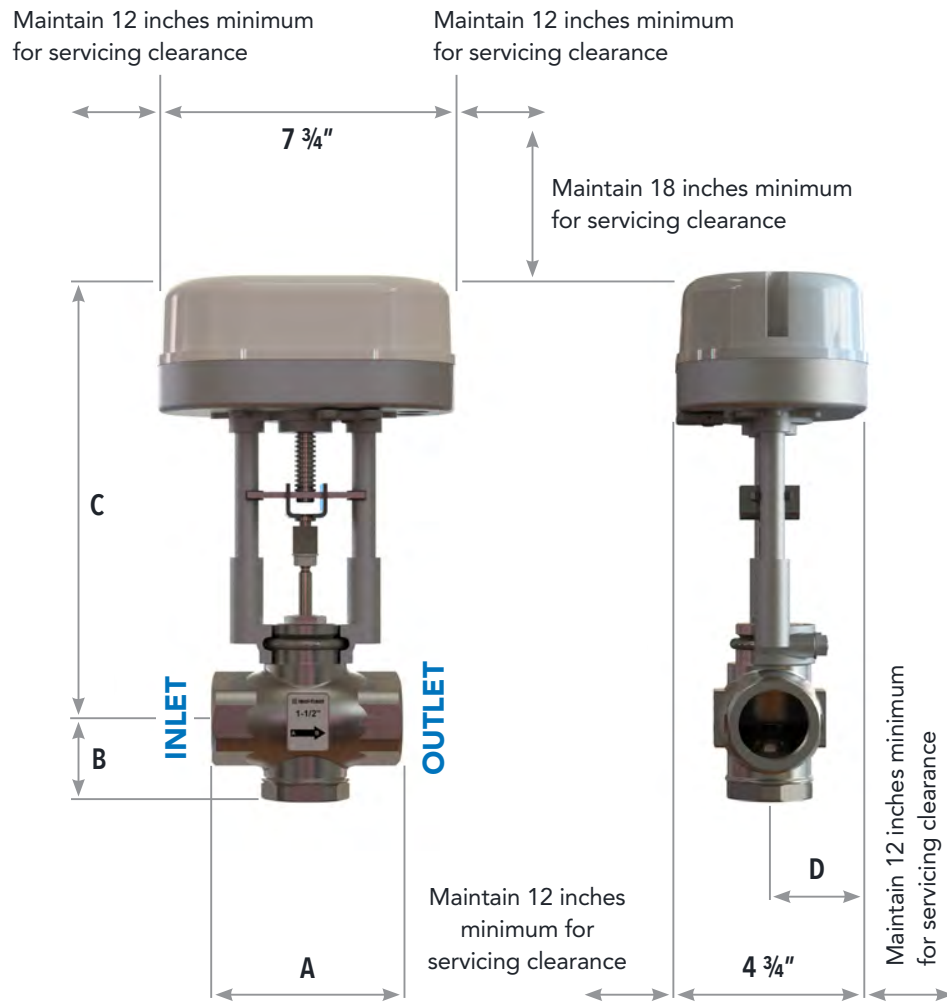
VALVE

Body and Trim	304 Stainless Steel
Maximum Operating Temperature	300°F (149°C)
Maximum Working Pressure	225 psi
Stem Material	640 Stainless Steel

PRESSURE DROP PSI	VALVE SIZE					
	¾"	1"	1 ¼"	1 ½"	2"	2 ½"
Cv	7	12	18	29	46	73
3	12	20	32	50	80	126
4	15	23	37	58	93	145
5	16	26	41	64	103	162
6	18	28	45	71	113	178
7	20	31	50	78	125	192
8	21	33	53	83	132	205
9	22	35	56	88	140	218
10	23	36	58	91	145	230
11	24	38	62	97	154	241
12	25	40	64	100	160	252

GALLONS PER MINUTE

HTLV STAINLESS 2-WAY MOTORIZED VALVE DIMENSIONAL— 2 1/2" AND SMALLER VALVES



DTV ASSEMBLY	DIMENSION				WEIGHT
	A	B	C	D	
3/4"	3 1/8"	1 1/2"	10 7/8"	2 3/8"	6.00 lbs.
1"	4"	1 3/4"	11"	2 3/8"	6.75 lbs.
1 1/4"	4"	1 7/8"	11"	2 3/8"	7.25 lbs.
1 1/2"	4 3/4"	2"	11 1/4"	2 3/8"	8.25 lbs.
2"	5 1/2"	2 1/2"	11 1/2"	2 3/8"	10.50 lbs.
2 1/2"	6 1/4"	3"	11 7/8"	2 3/8"	13.75 lbs.

DTV ASSEMBLY	VALVE CONNECTIONS—NPSC	
	INLET	OUTLET
3/4"	3/4"	3/4"
1"	1"	1"
1 1/4"	1 1/4"	1 1/4"
1 1/2"	1 1/2"	1 1/2"
2"	2"	2"
2 1/2"	2 1/2"	2 1/2"

HTLV STAINLESS 2-WAY MOTORIZED VALVE SPECIFICATIONS— 3" VALVE

Valve Body Material	ANSI B16.1 Iron
Port Size	3" (76.2mm)
Pressure Rating	1000 psi/150 psi Steam
Temperature Rating	-4°F to 366°F (-20°C to 186°C)
Packing	P.T.F.E. Seals and Double O-ring Stem Packing Blowout-Proof Valve Stem
Actuator Mount	ISO 5211 Pad

PRESSURE DROP	DESCRIPTION
	3"
CV/1 psi	1009
2 psi	1427
3 psi	1748
4 psi	2018
5 psi	2256
	GALLONS PER MINUTE

04 INSTALLATION INSTRUCTIONS

The DTV Digital Tempering Valve installation process consists of the following basic steps:

- 1 Initial installation (See *“Design Considerations”* on page 14).
 - General piping—unions, isolation valves.
 - Locating and installing the sensor(s).
 - Piping the optional HTLV (High Temp Limit Valve). Reference the appropriate HTLV installation manual for additional instructions.
- 2 Installing the DTV mixing valve(s) (See page 17).
- 3 Mounting the DTV Digital Tempering Valve Module (See page 21).
- 4 Mounting the Actuator to the mixing valve.
- 5 Connecting the DTV Digital Tempering Valve wiring (See *“Wiring the DTV Digital Tempering Valve”* on page 23).
 - Power wiring
 - Output wiring
 - Input wiring
- 6 Optionally connecting the DTV Digital Tempering Valve to a communications network (See *“Communications Wiring”* on page 36). Reference the DTV Digital Tempering Valve Remote Communication manual for addition information.
- 7 Calibrating the Actuator (Refer to page 37).
- 8 Completing initial programming of the DTV Digital Tempering Valve (Refer to page 45).

REQUIRED MATERIALS (NOT SUPPLIED)

The following materials/tools are required for installation, but are not supplied:

- General hand tools (screwdrivers, wire strippers, power drill, etc.)
- General plumbing tools (wrenches, pipe cutters, etc.)
- 18 AWG cable used for DTV Digital Tempering Valve wiring.

DESIGN CONSIDERATIONS

When installing the system, certain design considerations must be taken into account. These include:

- General Piping Guidelines (isolation valves, drain cocks, unions, etc...)
- Sensor Probe Locations
- Optional HTLV (High Temp Limit Valve) Piping
- Building recirculating loop
- Thermal Trap or proper use of check valves
- Dual/Parallel DTV Valve Piping

See *“Piping Diagrams”* on page 38 for more information.

GENERAL PIPING GUIDELINES

The following guidelines must be observed when piping the system.

- 1 All piping, including the piping of the DTV valve body, must meet or exceed local, state, and/or federal guidelines, codes, and regulations.
- 2 Support all piping using hangers. DO NOT support piping by the unit or its components.
- 3 Use isolation valves (as shown in Figure 2) to isolate system components.
- 4 Use unions (as shown in Figure 2) to allow for servicing and, if required, removal of the DTV valve and sensors.
- 5 Include drain valves (as shown in Figure 2) to assist in servicing of the DTV valve and sensors.

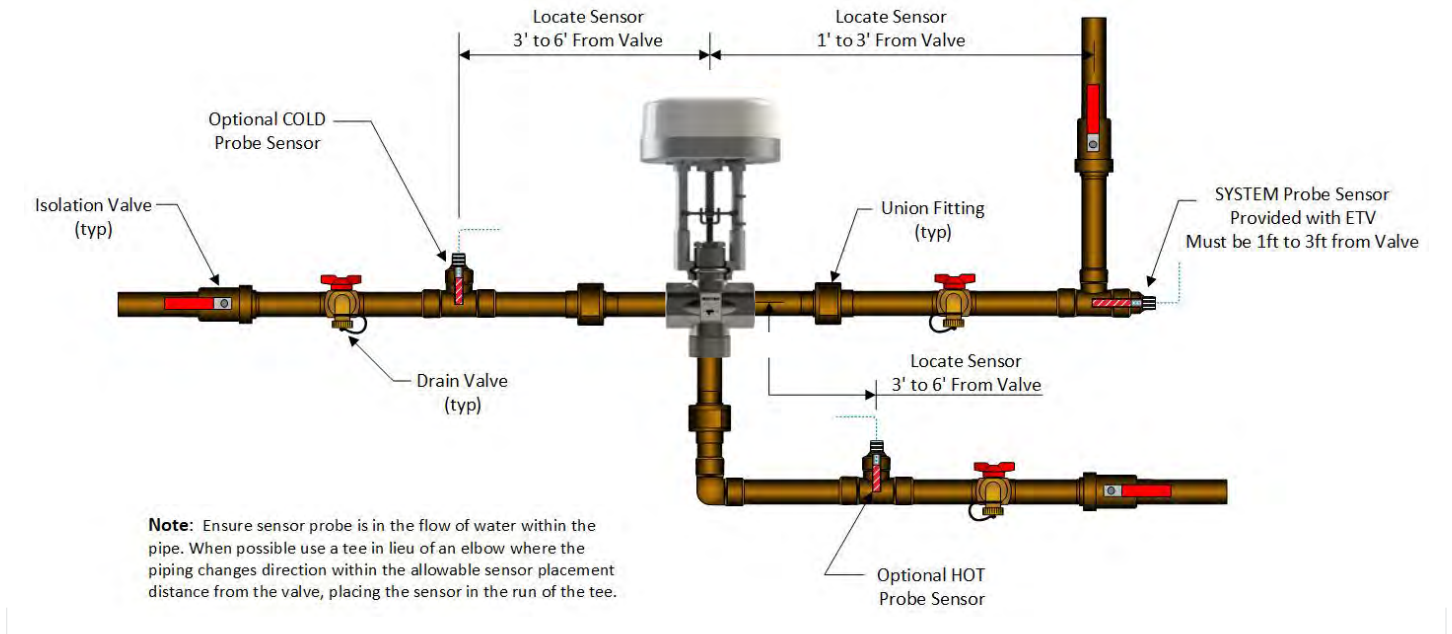


FIGURE 2
PIPING GUIDELINES

SENSOR PROBE LOCATIONS

Sensor probes must be installed within the flow of water in the pipe (see Figure 2). When possible, use a tee fitting rather than an elbow fitting where the piping changes direction within the allowable sensor placement distance from the valve. The sensor probe is then placed in the run of the tee fitting as shown as the System Sensor Probe in Figure 2.

When installing the probe sensor in a tee fitting, perpendicular to a run of piping, the tip of the probe sensor should be positioned at the centerline of the piping (see optional HOT or COLD probe sensor in Figure 2). This may require a nipple and coupling in addition to the tee fitting.

Refer To "DTV Digital Tempering Valve Inputs" on page 6 for more information.

HTLV (HIGH TEMP LIMIT VALVE) PIPING

The optional HTLV is typically piped between the hot water source (a storage tank or boiler coil) and the Hot inlet of the DTV valve. For an optional HTLV location, refer to "Piping Diagrams" on page 38.

BUILDING RECIRCULATING LOOP

For proper operation of the DTV Digital Tempering Valve, the DTV valve must be installed in a system with constant recirculation. The building recirculation must be piped in a manner that allows recirculating flow to the COLD side of the DTV valve and to the water heating source. Refer to "Piping Diagrams" on page 38.

The recommended size of the recirculation loop and pump should be as follows:

DTV VALVE SIZE	MINIMUM FLOW
Up to 1"	5 gpm
1 ¼" and 1 ½"	10 gpm
Over 2"	15 gpm

For optimum valve function, ensure the building recirculation temperature is at least 7°F lower than the desired setpoint temperature. In addition, it is recommended that the HOT water supplied to the DTV valve is at least 20°F above the desired setpoint.

For applications without constant recirculation it is strongly recommended to add a flow switch. For information on using a flow switch and the option Flow Prove operation see page 6.

CAUTION

Cemline strongly recommends the use of constant recirculation to minimize the risk of stagnant water within the domestic hot water system which promotes the growth of bacteria such as Legionella.

THERMAL TRAP

A thermal trap must be used to prevent the higher temperature water in the hot water supply source from migrating up and entering the cold-water inlet side of the mixing valve during low or no demand periods. The thermal trap can be installed either up or down. However, its drop must be a minimum of 32 inches (81.3cm) as measured from pipe-center to pipe-center.

In applications where piping a thermal trap is not feasible, or in applications where there is a recirculating pump between a heating source and storage tank, a check valve may be used.

MULTIPLE/PARALLEL VALVE PIPING

For high volume applications the DTV Digital Tempering Valve control module can modulate two or more valves piped in parallel while maintaining a single setpoint temperature.

When piping multiple valves in parallel it is very important to ensure:

- The piping manifold is such that all valves receive balanced flows
- All valves should have isolation valves properly piped in a manner to allow for isolating one valve while maintaining operation of the remaining valves

Refer to "Piping Diagrams" on page 38.

DTV VALVE INSTALLATION

⚠ CAUTION ⚠

Use a two-wrench method (using one wrench to prevent the valve body from turning or twisting) when tightening piping onto the valve body connections. Failure to support the valve body in this manner may cause damage to the valve body, or result in the "B" port coming loose, resulting in water leakage.

✓ NOTE

The valve and actuator can be mounted vertically (upright) or horizontally. **DO NOT** mount the valve and actuator upside down. Leave at least 12 inches (30.5cm) service clearance on all sides between the valve/ actuator and any objects (walls, pipes, controls, etc.).

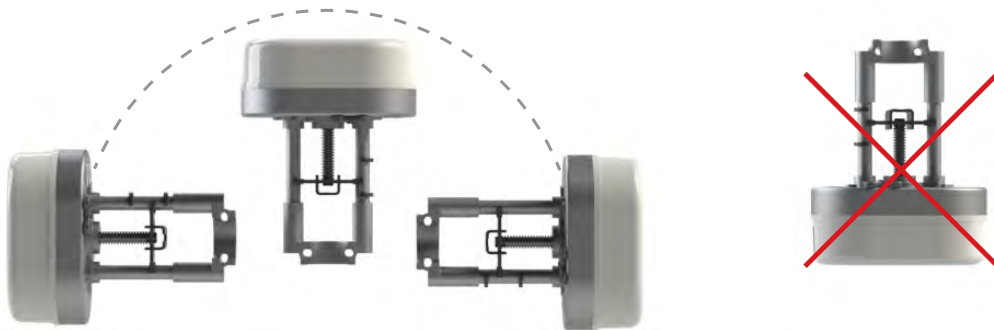


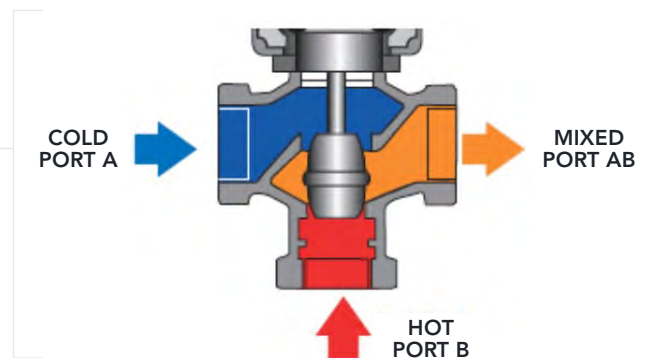
FIGURE 3

MOUNTING OF THE DTV VALVE AND ACTUATOR

- 1 Piping the valve as shown below is considered the "DEFAULT" configuration.

FIGURE 4

"DEFAULT" DTV VALVE CONFIGURATION



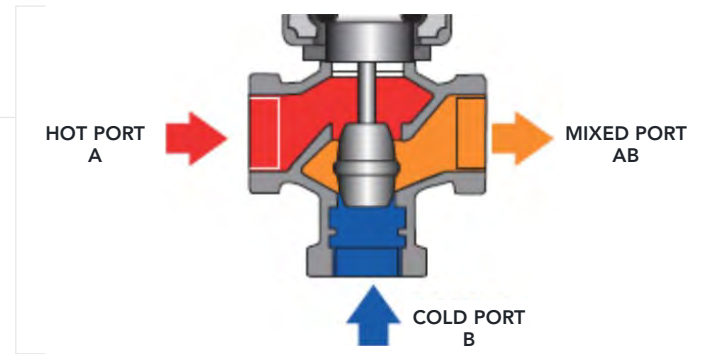
Ensure to follow the port letter designation or the valve flow direction label.

✓ NOTE

The DTV valve body can be oriented in such a way that the COLD Port A and HOT Port B are interchangeable to accommodate existing piping. In this "alternate" configuration Port A becomes the HOT port and Port B becomes the COLD port.

- 2 Piping the valve as shown below is considered the "ALTERNATE" configuration.

FIGURE 5
"ALTERNATE" DTV VALVE CONFIGURATION



Ensure to follow the port letter designation or the valve flow direction label.

- 3 Reference pages 30 through 32 for recommended system piping of the DTV valve.

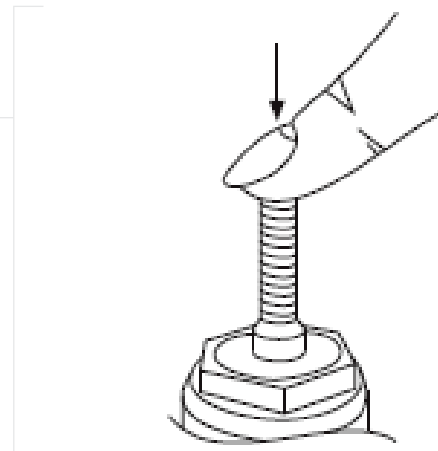
NOTE

Reference page 36 for Dip Switch settings based on valve installation configuration.

MOUNTING THE ACTUATOR TO THE DTV VALVE

- 1 Before mounting the Actuator to the DTV valve, manually close the DTV valve by pushing down on the valve stem as shown in Figure 6.

FIGURE 6
MANUALLY CLOSING THE DTV VALVE



- 2 Before mounting the Actuator to the DTV valve, manually lower the Actuator as shown in Figure 7.
- The Manual Tab to place the Actuator in Manual Override mode.
 - Turn the Manual Tab counter-clockwise to drive the threaded shaft to the full lower position.
 - Raise the Manual Tab to place the Actuator in Normal Operation mode.

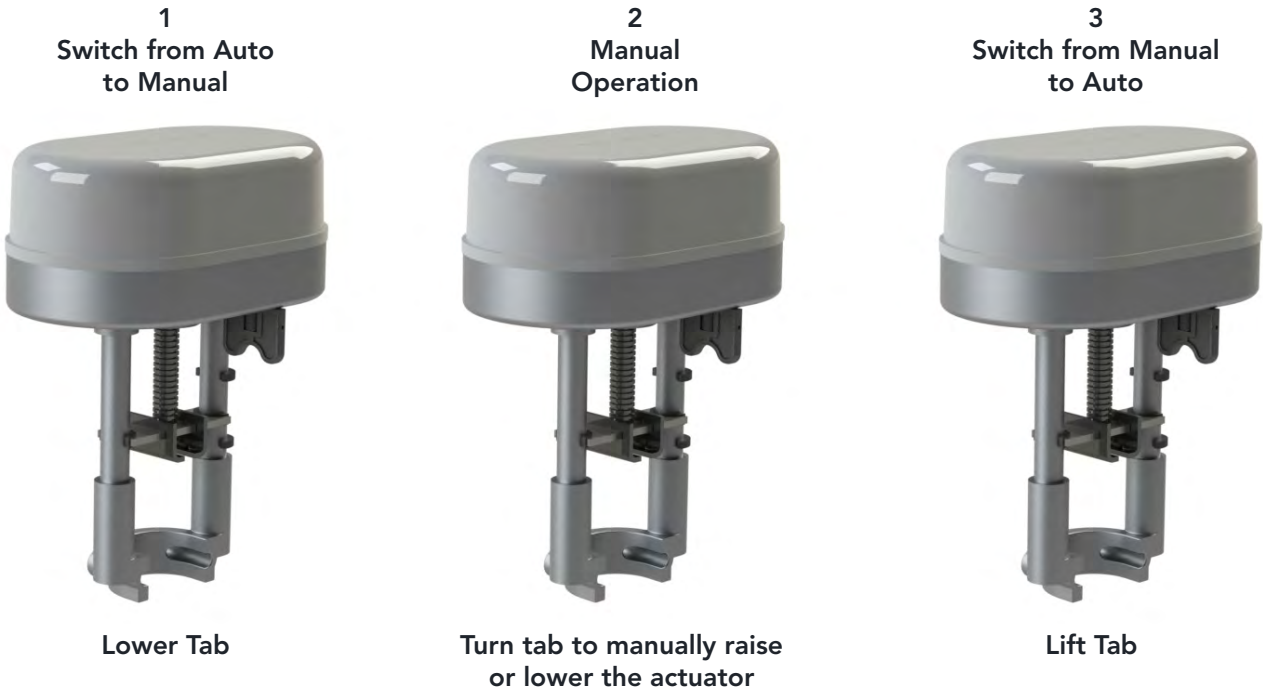


FIGURE 7
MANUALLY CLOSING THE ACTUATOR

3 Mount the Actuator to the valve by sliding the valve stem groove into the Actuator U-channel as shown in *Figure 8*. If necessary, use the Actuator manual tab to adjust the position of the U-channel until it is aligned with the valve stem groove.

✓ **NOTE**

The U-bolt must also be aligned with the valve groove, as shown in *Figure 8*. If necessary use the actuator manual tab to adjust the position of the actuator frame and mounting holes to align the U-bolt with the valve body groove.

**FIGURE 8**

MOUNTING THE ACTUATOR TO THE DTV VALVE

- 4 Insert the U-bolt around the valve body groove and into the Actuator assembly.
- 5 Secure the U-bolt in place with two locking nuts, ensuring the locking nuts are tightened evenly.

NOTE

The actuator may make a grinding noise if the locking nuts are not tightened evenly and resulting in potential damage to the actuator motor.

- 6 Once the actuator is completely mounted onto the valve, the actuator cover can be removed to allow access for wiring, setting of Dip Switch 1 and startup calibration of the actuator. Simply remove the retaining screw on the cover and lift the cover off.

MOUNTING THE DTV DIGITAL TEMPERING VALVE MODULE

MOUNTING THE ENCLOSURE

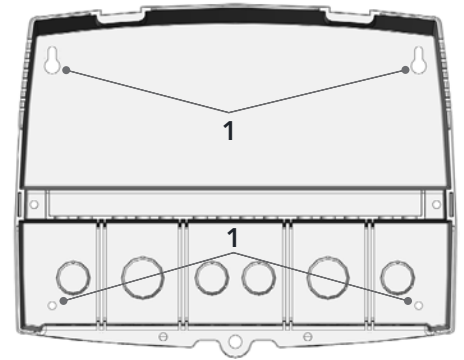
- 1 Select an appropriate location to mount the DTV Digital Tempering Valve module. The location must meet the following minimum requirements:
 - The mounting surface should be flat and strong enough to hold the weight of the device.
 - The device can be mounted a maximum of 500 feet (152.4 meters) from the valve location, but should be mounted as near to the valve as possible to avoid excessive wire runs.
 - DO NOT mount the device in a location where it will be exposed to extreme heat, cold, humidity, or moisture.
- 2 Remove the Enclosure Wiring Cover (1) by removing the two lower screws (2) holding it to the base (3), and then remove the Display Module (4) by removing the two middle screws (5) holding it to the base.



FIGURE 9

DTV DIGITAL TEMPERING VALVE MODULE ASSEMBLY

- 3 Position the Enclosure base in the desired location, and then secure the base in place using four screws (provided) through the mounting holes (1) on the back of the Enclosure base.

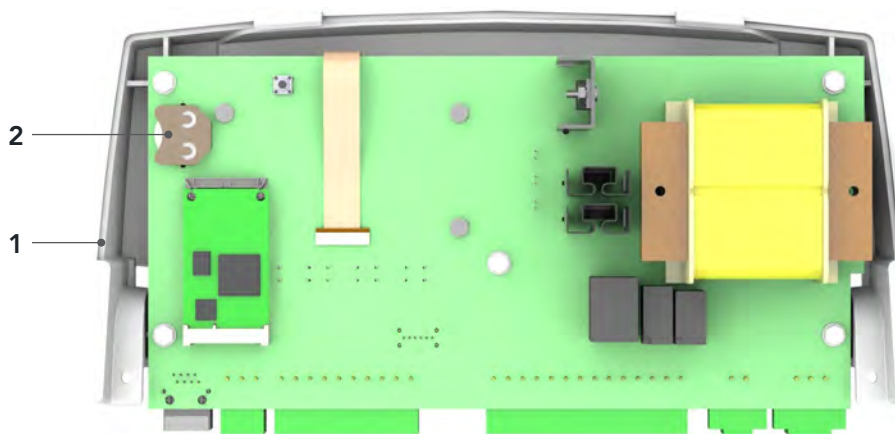


MOUNTING THE DISPLAY MODULE

- 1 Turn the DTV Digital Tempering Valve display module (1) over to reveal the battery (2) circuit board. Remove the plastic tab to activate the battery.

NOTE

The battery is a coin lithium battery (CR2032) that is used to maintain the control's date and time during power outages. The battery can maintain the clock for up to a total of 100 days.



CAUTION

Do not remove the battery unless you plan to keep the control continuously powered. If the control has no power, the battery will lose its charge in 100 days.

- 2 Position the Display Module into the base and secure it in place using the middle screws removed in Step 2 above.

NOTE

Do not replace the Enclosure Wiring Cover until all wiring is completed.

- 3 Continue with "Wiring the DTV Digital Tempering Valve" on page 23.

WIRING THE DTV DIGITAL TEMPERING VALVE

POWER INPUT WIRING

⚠ WARNING ⚠

ELECTRICAL SHOCK HAZARD! For your safety, to avoid the risk of electric shock, disconnect electrical power to the device before servicing or making any electrical connections. **DO NOT** re-connect electrical power until **ALL** wiring is completed. Failure to do so may result in severe personal injury or death.

Use a separate circuit breaker for the control. Do not share the control power with other major equipment, pumps, or motors. Cemline recommends the installation of a surge suppressor and a power switch before the power line connection.

Follow all local and state electrical codes when installing this unit. All wiring must meet or exceed local, state, or federal codes and requirements.

- 1 De-energize the circuit that will provide power to the DTV by turning off the appropriate circuit breaker.
- 2 Run the 120Vac power wiring through one of the knockouts located on the bottom of the DTV Digital Tempering Valve enclosure.

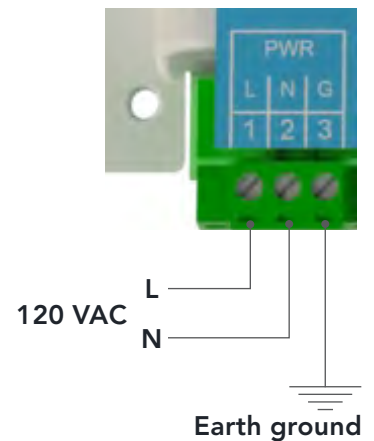
⚠ CAUTION ⚠

The input power wires must be N.E.C. Class 1. Class 1 voltage wiring must use a different enclosure knockout and conduit than any sensor wiring.

- 3 Connect the hot line to terminal 1 on the DTV Digital Tempering Valve module.
- 4 Connect the neutral line to terminal 2 on the DTV Digital Tempering Valve module.
- 5 Connect terminal 3 on the DTV to earth ground. **DO NOT** use the neutral line as the earth ground!

⚠ WARNING ⚠

ELECTRICAL SHOCK HAZARD! To avoid the risk of electric shock, **DO NOT** re-connect electrical power until **ALL** wiring to the DTV is completed. Failure to do so may result in severe personal injury or death.



OUTPUT WIRING

NOTE

Output relays do not source power. A separate power source must be used when needed. Use the output relay to enable or disable equipment.

CAUTION

Class 2 voltage wiring (low-voltage sensor wires) must use a different enclosure knockout and conduit than any Class 1 voltage wiring.

WIRING THE ACTUATOR—SINGLE-VALVE APPLICATION

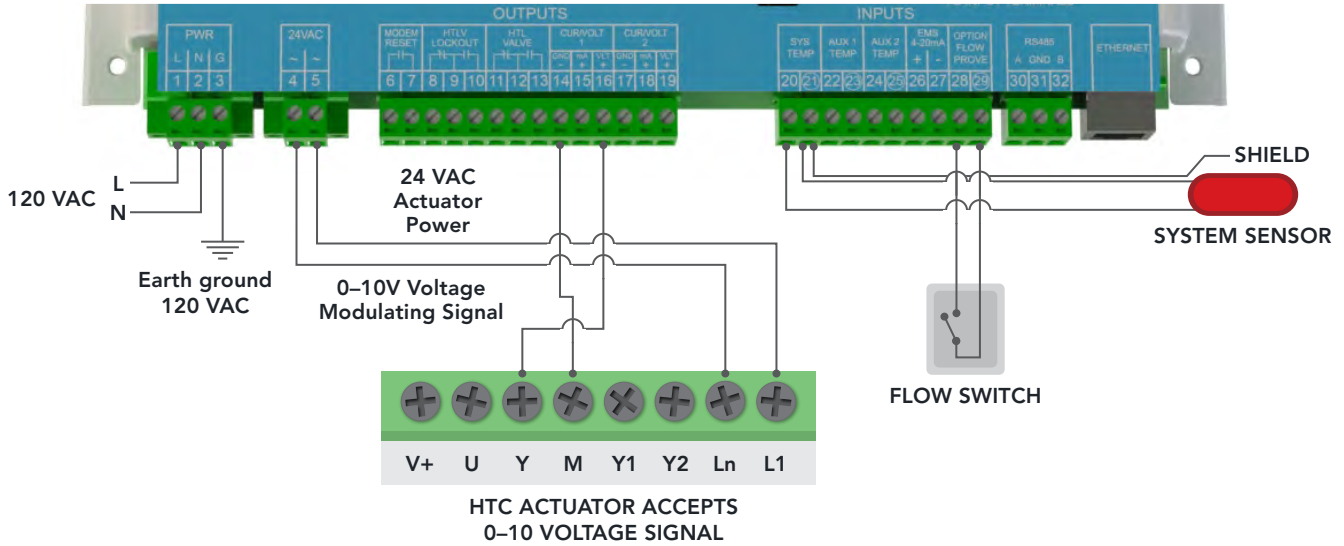


FIGURE 10

ACTUATOR WIRING FOR A SINGLE DTV VALVE APPLICATION

- 1 Run the wiring through a knockout located on the bottom of the DTV Digital Tempering Valve enclosure to the Actuator terminal block. Use a Philips screwdriver and remove the actuator cover.
- 2 Connect the Actuator voltage signal wire from Actuator terminal (Y) to terminal 16 on the DTV module.
- 3 Connect the Actuator ground wire from Actuator terminal (M) to terminal 14 on the DTV module.
- 4 Connect 24Vac power from the DTV Digital Tempering Valve module to the Actuator:
 - a Run the Actuator's power wires through a knockout located on the bottom of the DTV enclosure.
 - b Connect the Actuator power wire from Actuator terminal (L1) to terminal 4 on the DTV module.
 - c Connect the Actuator power wire from Actuator terminal (Ln) to terminal 5 on the DTV module.

NOTE

The DTV can provide 24Vac power to a single Actuator. As an alternative, External Transformer can be used to provide power to the Actuator.

- 5 To optionally connect 24Vac power from the External Transformer Kit to the Actuator:
 - a Connect the first Actuator's (L1) and (Ln) terminals to the transformer's 24Vac terminals.

WIRING THE ACTUATOR—TWO-VALVE APPLICATION

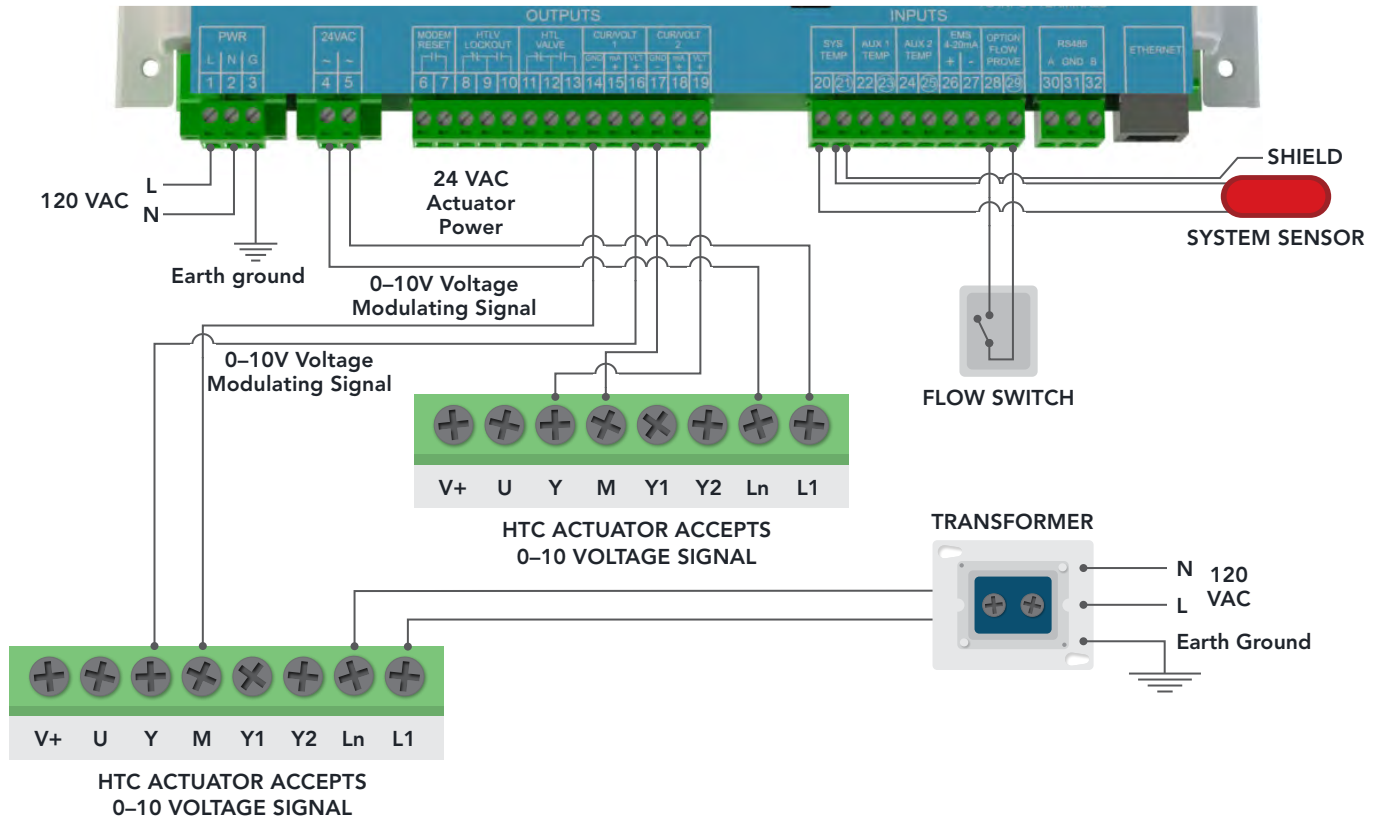


FIGURE 11
ACTUATOR WIRING FOR A DUAL DTV VALVE APPLICATION

- 1 Connection of the first Actuator:
 - a Run the wiring through a knockout located on the bottom of the DTV enclosure to the Actuator terminal block.
 - b Connect the Actuator voltage signal wire from Actuator terminal (Y) to terminal 16 on the DTV module.
 - c Connect the Actuator ground wire from Actuator terminal (M) to terminal 14 on the DTV module.
- 2 Connect the second Actuator:
 - a Run the wiring through a knockout located on the bottom of the DTV enclosure to the Actuator terminal block.
 - b Connect the Actuator voltage signal wire from Actuator terminal (Y) to terminal 19 on the DTV module.
 - c Connect the Actuator ground wire from Actuator terminal (M) to terminal 17 on the DTV module.

NOTE

The DTV can only provide 24Vac power to a single Actuator. An external 24V transformer kit is required to provide power to the second Actuator. The external 24V is provided when a valve/actuator kit is ordered.

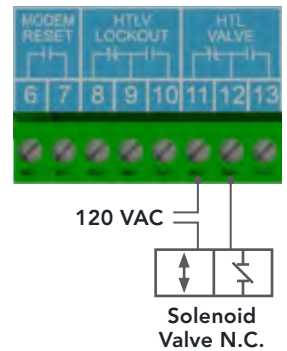
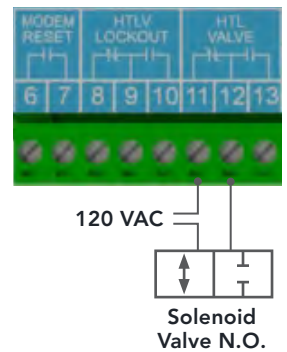
- 3 To connect 24Vac power from the DTV to the first Actuator:
 - a Run the Actuator's power wires through a knockout located on the bottom of the DTV enclosure.
 - b Connect the Actuator power wire from Actuator terminal (L1) to terminal 4 on the DTV module.
 - c Connect the Actuator power wire from Actuator terminal (Ln) to terminal 5 on the DTV module.
- 4 To connect 24Vac power from the External Transformer Kit to the second Actuator:
 - a Connect the second Actuator's (L1) and (Ln) terminals to the transformer's 24Vac terminals.

WIRING OPTIONAL HTLV (HIGH TEMP LIMIT VALVE)—SOLENOID VALVE (SUPPLIED BY OTHERS)

NOTE

The DTV does not source power to the HTLV terminals. An external power source is required and must be connected in series as shown in the diagram. Refer to "HTLV (High Temp Limit Valve)" on page 7 for information.

- 1 Run the HTLV wire and the external power source wire through knockouts located on the bottom of the DTV enclosure.
- 2 To connect a N.O. HTLV:
 - a Connect the HTLV wire to terminal 12 on the DTV module.
 - b Connect the external power source wire to terminal 11 on the DTV module.
 - c Connect the other Solenoid wire to the external power source.
- 3 To connect a N.C. HTLV:
 - a Connect the HTLV wire to terminal 13 on the DTV module.
 - b Connect the external power source wire to terminal 12 on the DTV module.
 - c Connect the other Solenoid wire to the external power source.



WIRING OPTIONAL HTLV (HIGH TEMP LIMIT VALVE)—2 ½" AND SMALLER MOTORIZED STAINLESS VALVE (SUPPLIED BY CEMLINE)

To gain access to the Actuator wire terminals, dip switches and on those actuators with a LOP Capacitor the Capacitor Jumper, the cover must be removed.

- 1 To remove the actuator cover remove the mounting screw (1) using a Phillips screwdriver.
- 2 Lift the actuator cover and slide toward the mounting screw direction disengaging the actuator cover clip from the actuator housing.
- 3 Route all wiring through the bottom of the actuator. Use the proper NM connector to secure the wiring and avoid potential damage to the wiring.

FIGURE 12
REMOVING ACTUATOR COVER



- 4 To mount the cover once the wiring, calibration of the actuator, any dip switch and Capacitor Jumper settings are completed, slide the actuator cover tab into the actuator. Ensure the actuator cover is seated on the actuator housing and secure with the mounting screw.



WIRING OPTIONAL HTLV (HIGH TEMP LIMIT VALVE)—2 ½" AND SMALLER MOTORIZED STAINLESS VALVE (SUPPLIED BY CEMLINE)

NOTE

The Motorized Stainless Valve used as a HTLV requires an external 24V transformer that is provide with the Motorized Stainless valve.

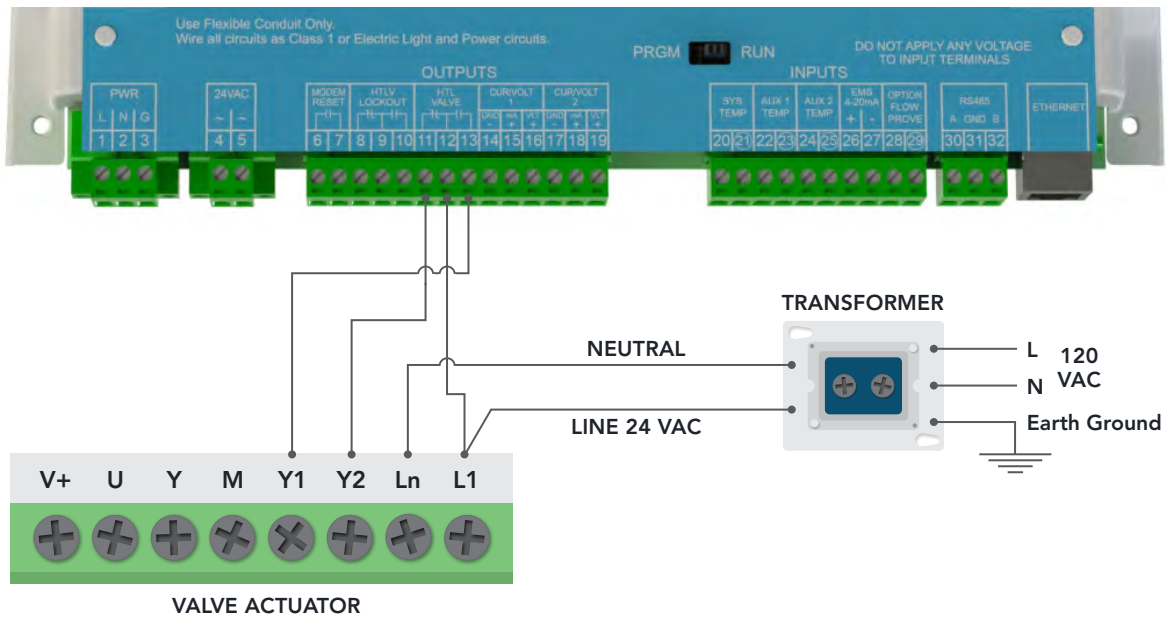


FIGURE 12A

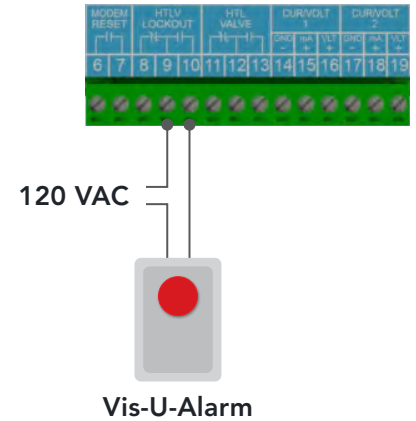
HTLV MOTORIZED SAFETY VALVE ACTUATOR WIRING TO THE DTV MODULE-VALVES SIZES 2 ½" AND SMALLER

WIRING THE HTLV LOCKOUT ALARM (OPTIONAL)

NOTE

The DTV Digital Tempering Valve does not source power to the HTLV Lockout terminals. An external power source is required and must be connected in series as shown in the diagram. Refer to *"HTLV Lockout Output"* on page 7 for information.

- 1 Run the alarm wire and the external power source wire through knockouts located on the bottom of the DTV enclosure.
- 2 To connect a N.O. alarm device (requires switch closure to trigger):
 - a Connect the alarm device wire to terminal 9 on the DTV module.
 - b Connect the external power source wire to terminal 8 on the DTV module.
 - c Connect the other alarm device wire to the external power source.
- 3 To connect a N.C. alarm device (requires switch open to trigger):
 - a Connect the alarm device wire to terminal 10 on the DTV module.
 - b Connect the external power source wire to terminal 9 on the DTV module.
 - c Connect the other alarm device wire to the external power source.



INPUT WIRING

⚠ CAUTION ⚠

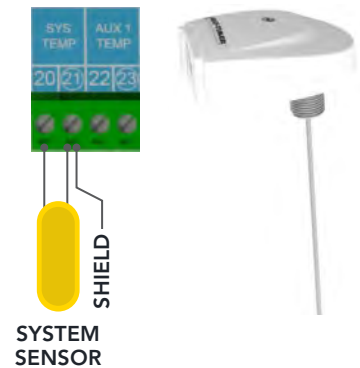
To avoid damage to the DTV Digital Tempering Valve, **NO VOLTAGE** can be applied to the DTV Digital Tempering Valve input terminals.

Class 2 voltage wiring (low-voltage sensor and communication wires) must use a different enclosure knockout and conduit than any Class 1 voltage wiring.

WIRING THE SYSTEM TEMPERATURE SENSOR

✓ NOTE

- The System Temperature Sensor must be connected for the system to operate. Refer to page 6 for a description of the sensor.
- For acceptable sensor locations, refer to the piping diagram Figure 2 on page 15.
- Due to the internal logic and performance of the DTV Digital Tempering Valve, the use of a standard brass tube thermistor will affect the accuracy and performance of the control and is not recommended. The use of Probe Sensor (Cemline P/N 02-150-483) supplied with the module is strongly recommended.



- 1 Run the System Sensor wires through a knockout located on the bottom of the DTV enclosure.

✓ NOTE

The sensor wires can be extended up to 500 feet (152.5 meters) using an 18 AWG shielded 2-conductor cable.

- 2 Connect the System Sensor wires to terminal 20 and 21 on the DTV module.
- 3 Connect the shield to terminal 21 on the DTV module.

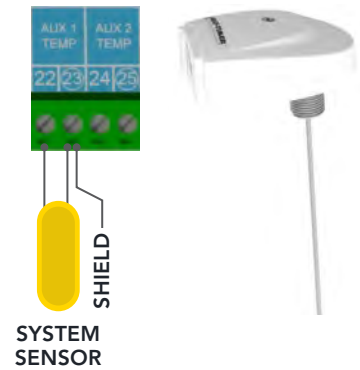
✓ NOTE

Do not connect the shield at the sensor end.

WIRING AUX INPUTS—SENSORS OR SWITCHES (OPTIONAL)

NOTE

- No voltage can be applied to terminals 22 and 23 or terminal 24 and 25.
- Auxiliary inputs can be configured as temperature sensors or as switch sensors. When configured as a switch sensor, it must be connected to a device that provides an open or close (short) only.
- Standard brass tube sensors can be used in a well if the temperature sensor is only monitoring the temperature. However, the standard brass tube sensor in a well is not recommended when using the Feed Forward function (*refer to "Return Comp." on page 47*). The use of Probe Sensor (Cemline P/N 02-150-483) is strongly recommended for the Feed Forward function.



1 To connect an Auxiliary temperature sensor:

- Run the sensor wires through a knockout located on the bottom of the DTV enclosure.

NOTE

The sensor wires can be extended up to 500 feet (152.5 meters) using an 18 AWG shielded 2-conductor cable.

- Connect the sensor wires to terminal 22 and 23 on the DTV module.
- Connect the shield to terminal 23 on the DTV module.

NOTE

Do not connect the shield at the sensor end.

2 To connect a second Auxiliary temperature sensor:

- Run the sensor wires through a knockout located on the bottom of the DTV enclosure.

NOTE

The sensor wires can be extended up to 500 feet (152.5 meters) using an 18 AWG shielded 2-conductor cable.

- Connect the sensor wires to terminal 24 and 25 on the DTV module.
- Connect the shield to terminal 25 on the DTV module.

3 To connect an Auxiliary switch:

- a Run the switch wires through a knockout located on the bottom of the DTV enclosure.

✔ **NOTE**

The sensor wires can be extended up to 500 feet (152.5 meters) using an 18 AWG shielded 2-conductor cable.

- b Connect the switch wires to terminal 22 and 23 on the DTV module.

4 To connect a second Auxiliary switch:

- a Run the switch wires through a knockout located on the bottom of the DTV module.

✔ **NOTE**

The sensor wires can be extended up to 500 feet (152.5 meters) using an 18 AWG shielded 2-conductor cable.

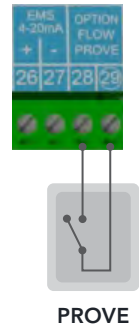
- b Connect the switch wires to terminal 24 and 25 on the DTV module.

WIRING THE FLOW PROVE (OPTIONAL)

✔ **NOTE**

Refer to "Flow Prove" on page 6 for information.

- 1 Run the Flow Prove wires through a knockout located on the bottom of the DTV enclosure.
- 2 Connect one wire to terminal 28 on the DTV module.
- 3 Connect the other wire to terminal 29 on the DTV module.

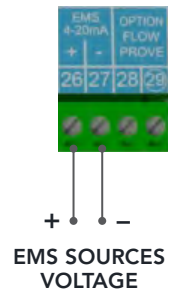


WIRING THE 4–20mA REMOTE SETPOINT (OPTIONAL)

✔ **NOTE**

The DTV Digital Tempering Valve does not source power to the 4–20mA terminals. The EMS system must provide the excitation voltage. Refer to "4–20mA Remote Setpoint" on page 6 for information.

- 1 Run the 4–20mA Setpoint wires through a knockout located on the bottom of the DTV enclosure.
- 2 Connect the positive (+) wire to terminal 26 on the DTV module.
- 3 Connect the negative (–) wire to terminal 27 on the DTV module.

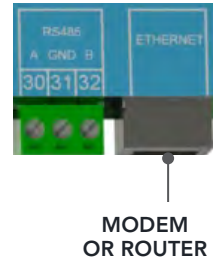


COMMUNICATIONS WIRING (OPTIONAL)

The DTV Digital Tempering Valve can be connected to a network using either an Internet (RINET), BACnet (IP or MSTP), or ModBUS connection. Ensure the DTV Digital Tempering Valve module has been upgraded with the appropriate communication card.

INTERNET (RINET) COMMUNICATIONS WIRING

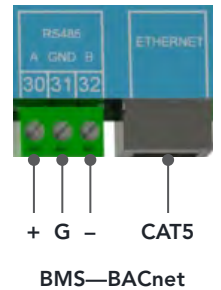
- 1 Run a CAT5 cable from the modem or router through a knockout located on the bottom of the DTV enclosure.
- 2 Connect the CAT5 cable to the Ethernet connector on the DTV module.



BACNET COMMUNICATIONS WIRING

To connect the DTV Digital Tempering Valve to a BACnet interface:

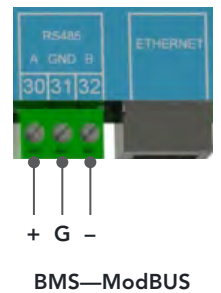
- 1 Run a CAT5 cable through a knockout located on the bottom of the DTV enclosure.
- 2 Connect the CAT5 cable to the Ethernet connector on the DTV module.
- 3 Run the BACnet connection wires through a knockout located on the bottom of the DTV enclosure.
- 4 Connect the positive (+) wire to terminal 30 on the DTV module.
- 5 Connect the ground wire to terminal 31 on the DTV module.
- 6 Connect the negative (-) wire to terminal 32 on the DTV module.



MODBUS COMMUNICATIONS WIRING

To connect the DTV Digital Tempering Valve to a ModBUS interface:

- 1 Run the ModBUS connection wires through a knockout located on the bottom of the DTV enclosure.
- 2 Connect the positive (+) wire to terminal 30 on the DTV module.
- 3 Connect the ground wire to terminal 31 on the DTV module.
- 4 Connect the negative (-) wire to terminal 32 on the DTV module.



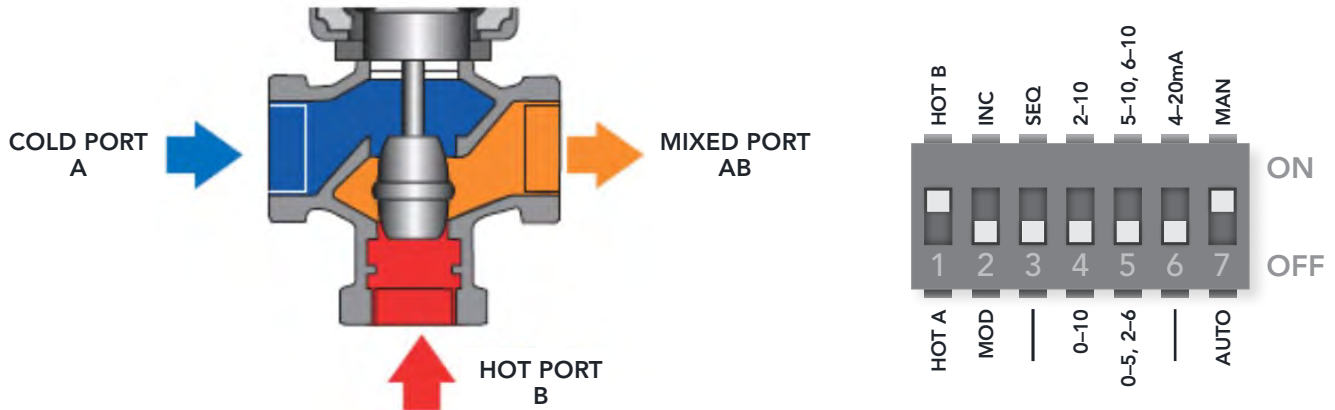
COMPLETING THE WIRING

- 1 After all wiring to the DTV Digital Tempering Valve is complete, apply power to the DTV Digital Tempering Valve and all Actuators.
- 2 Do not re-install the Enclosure wire cover at this point as access to the PROGRAM/RUN switch is needed for programming of the module.
- 3 With power supplied to the DTV Digital Tempering Valve, the power loss capacitor of the actuator if applicable requires about 2 minutes to fully charge.

VALVE ACTUATOR SETTINGS AND CALIBRATION

The position of the Actuator Dip Switch 1 and whether the Capacitor jumper is used or removed will be determined by how the valve is installed. See Figure 13 for location of the Actuator Dip Switch and Capacitor Jumper.

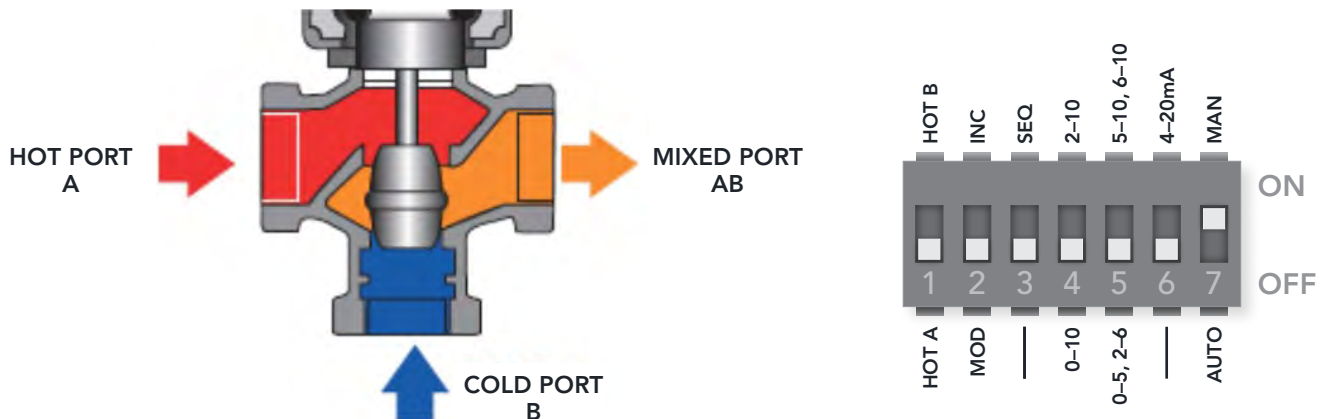
DIP SWITCH 1 = ON



Set **Dip Switch 1** to **ON/HOT B** if the DTV valve is piped with the "Default" configuration of COLD in Port A and HOT in Port B

The Capacitor Jumper if applicable must remain as installed by the factory. On loss of power the actuator will push the valve stem downward to the full COLD position.

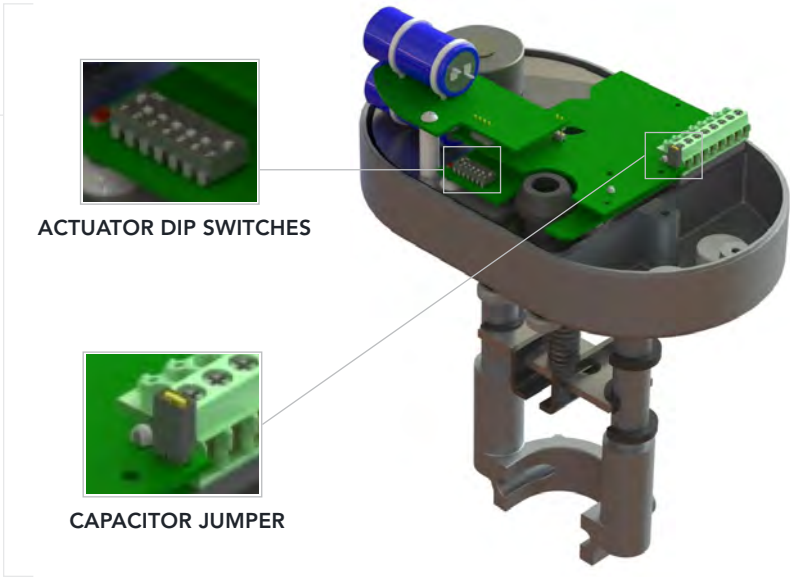
DIP SWITCH 1 = OFF



Set **Dip Switch 1** to **OFF/HOT A** if the DTV valve is piped with the "Alternate" configuration of HOT in Port A and COLD in Port B

The Capacitor Jumper if applicable must be removed. On loss of power the actuator will pull the valve stem upward to the full COLD position.

FIGURE 13
LOCATION OF THE ACTUATOR DIP SWITCHES AND CAPACITOR JUMPER

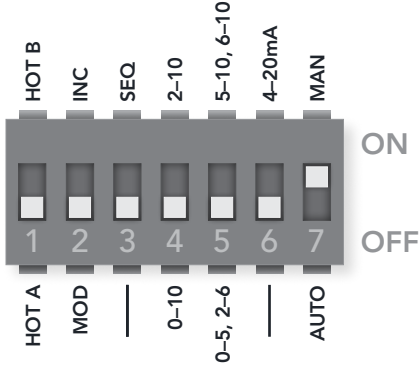


CALIBRATING THE ACTUATOR

NOTE

Each time the Actuator is assembled to the valve, the Actuator must be calibrated.

- 1 Close the isolation valve on the supply piping to the DTV valve HOT port.
- 2 Ensure the Actuator Manual Tab is in the Normal Operation position (UP).
- 3 Ensure DIP switch 7 is in the ON/MAN position
- 4 Change DIP switch 7 to the OFF (AUTO) position then back to the ON (MAN) position.
The green and red LEDs start blinking, indicating calibration has started. The Actuator moves the valve stem up and down. Calibration is complete when the green LED is steady-on or blinking.
- 5 Replace the Actuator cover and secure with mounting screw.
- 6 Open the isolation valve on the supply piping to the DTV valve HOT port.



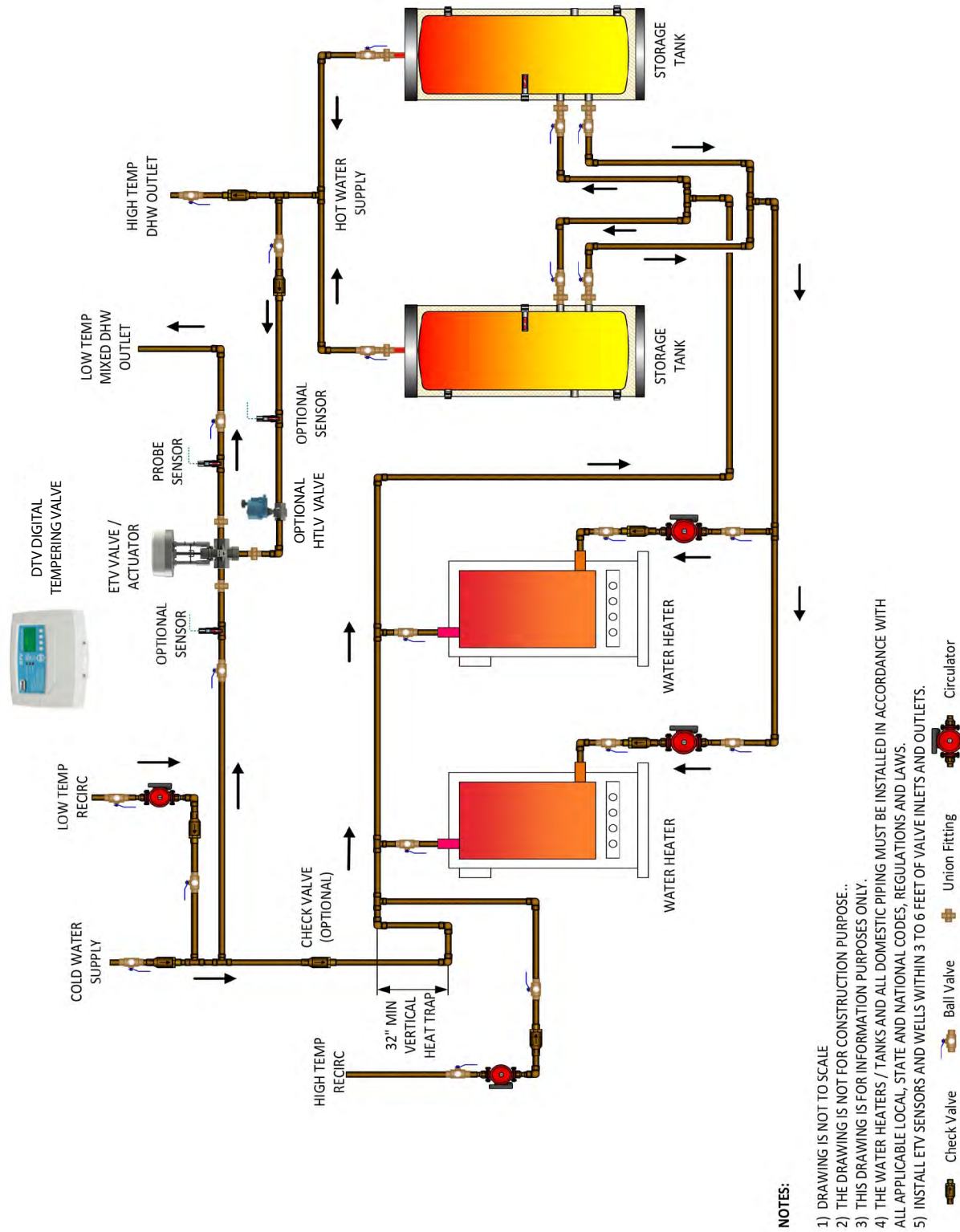


FIGURE 14A
SINGLE MIXING VALVE AND A HTLV (HIGH TEMP LIMIT VALVE)

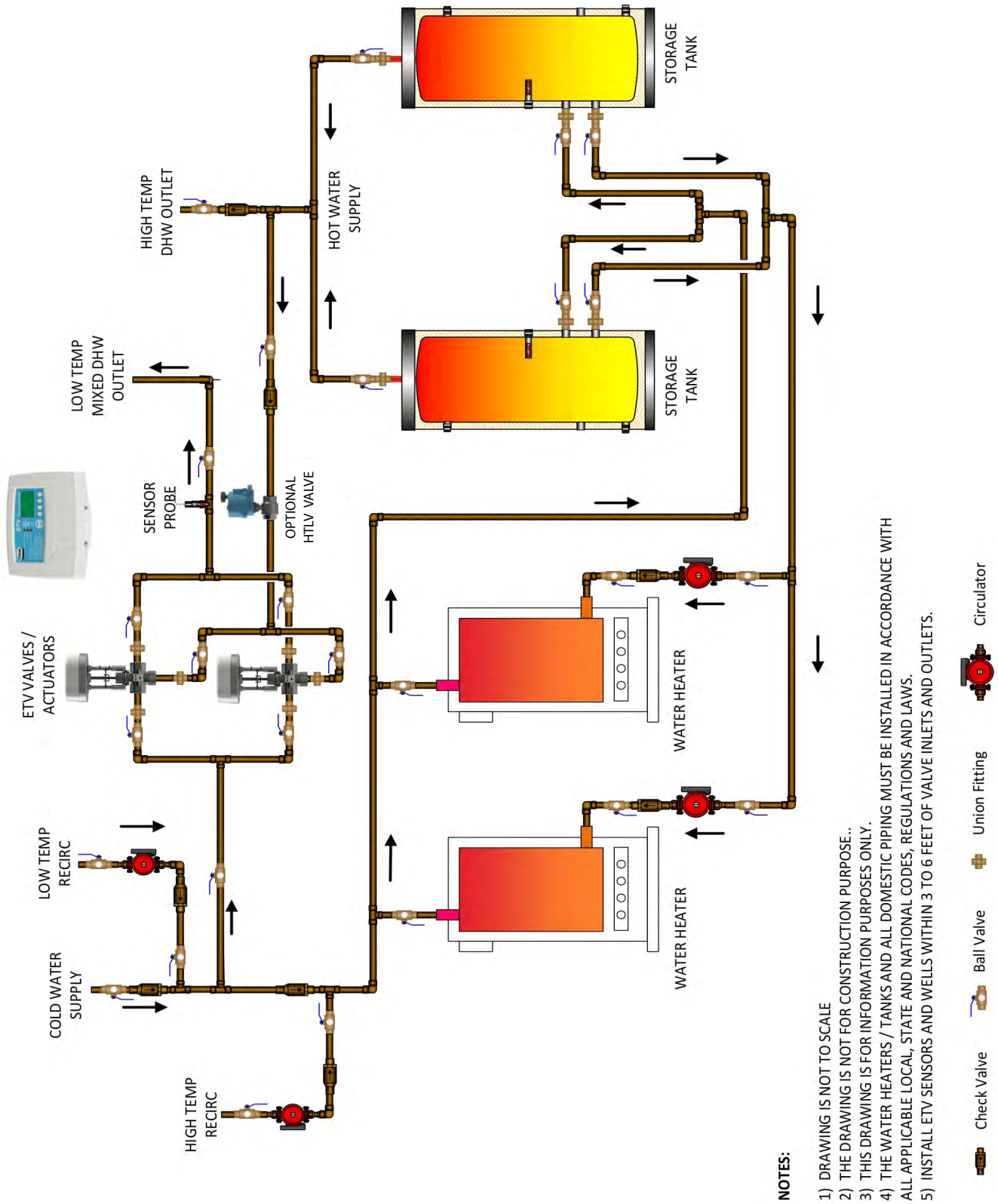


FIGURE 14B
TWO MIXING VALVES AND A HTLV (HIGH TEMP LIMIT VALVE)

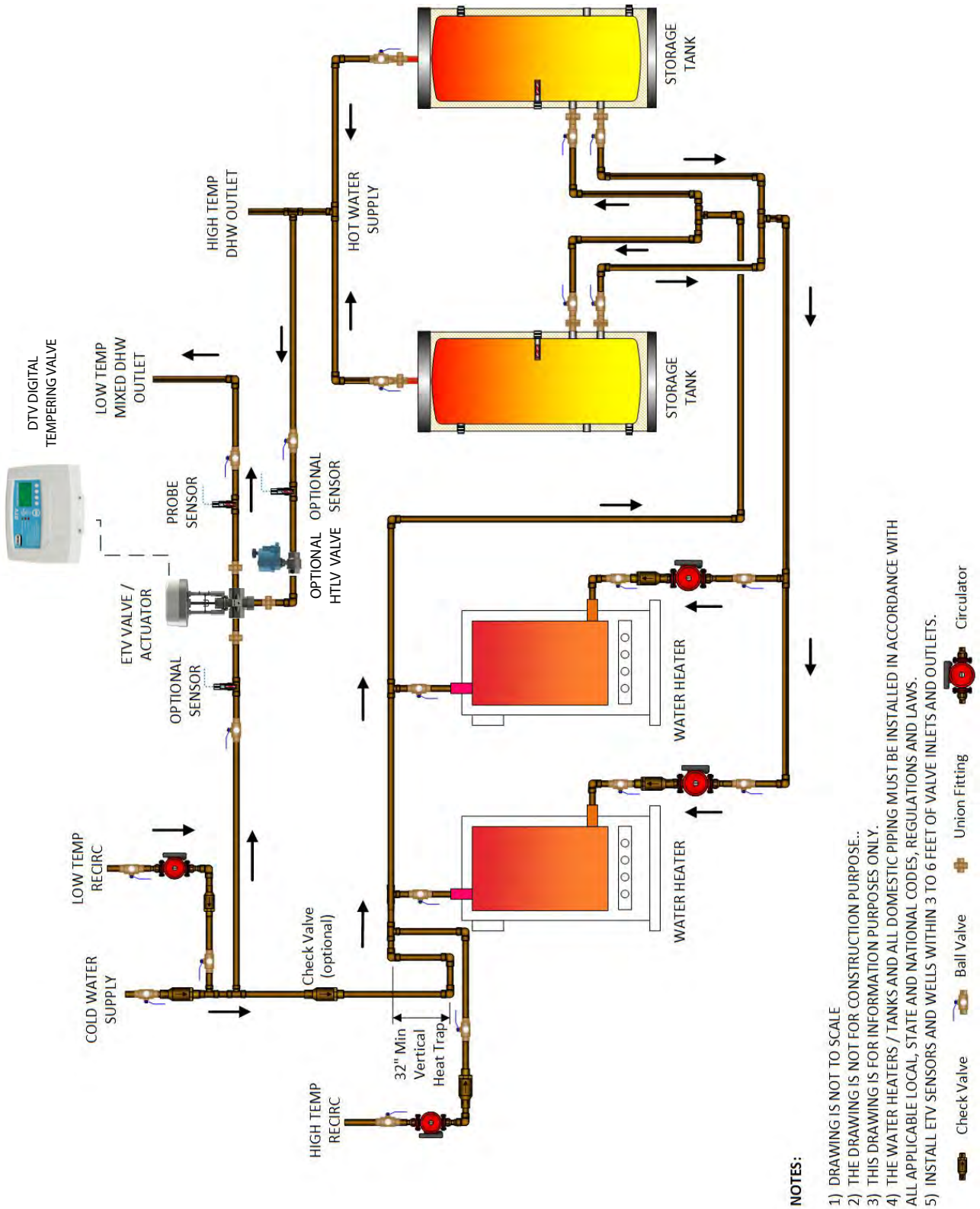


FIGURE 14C
TWO TEMP APPLICATION

06 DISPLAY AND PROGRAMMING

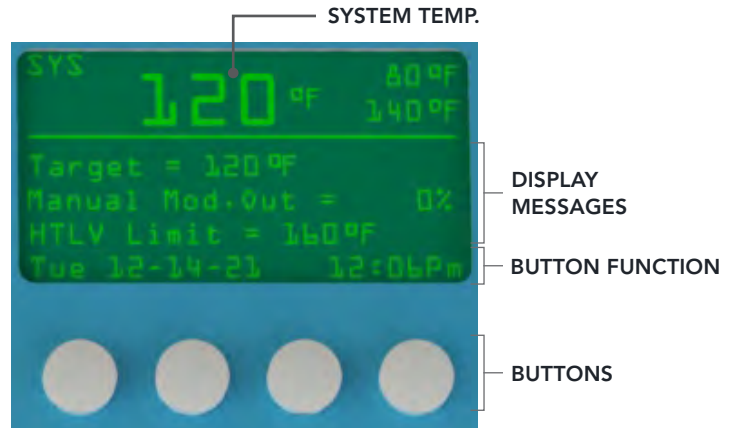
DTV Digital Tempering Valve Control Module Output Status LEDs The DTV Digital Tempering Valve has three output status LEDs:

LED	DESCRIPTION
Actuator Signal	Indicates the change in the mixing valve opening. Any time the DTV Digital Tempering Valve changes the valve opening, the LED will turn on for approximately one second. If the LED remains lit, the control is sending the Actuator a “fully open” or “fully close” signal.
No Flow	Indicates no flow exists when lit. NOTE: This indicator is only applicable when using a Flow Switch as PROVE of flow in applications without a building recirculation system.
HTLV Lockout (High Temperature Limit)	Indicates the control is in lockout mode when lit. System temperature rises above the Alarm Limit for the Trigger Delay period, or a sensor has been disconnected. <i>See “Alarm Messages” on page 44.</i> After the alarm condition has been corrected, the DTV Digital Tempering Valve must be manually reset to resume normal operation.

DISPLAY AND VARIABLE-FUNCTION BUTTONS

The DTV Digital Tempering Valve display shows the system sensor temperature and operation messages. By default, the display shows the current Setpoint, Alarm Limit (if applicable), or the Modulation Output percentage. See “Display Icons and Messages” on page 43 for more information.

The area above the variable-function buttons displays the current function for each button. This area may not be displayed if button activity is stopped for 30 seconds in the DTV + HTLV mode.

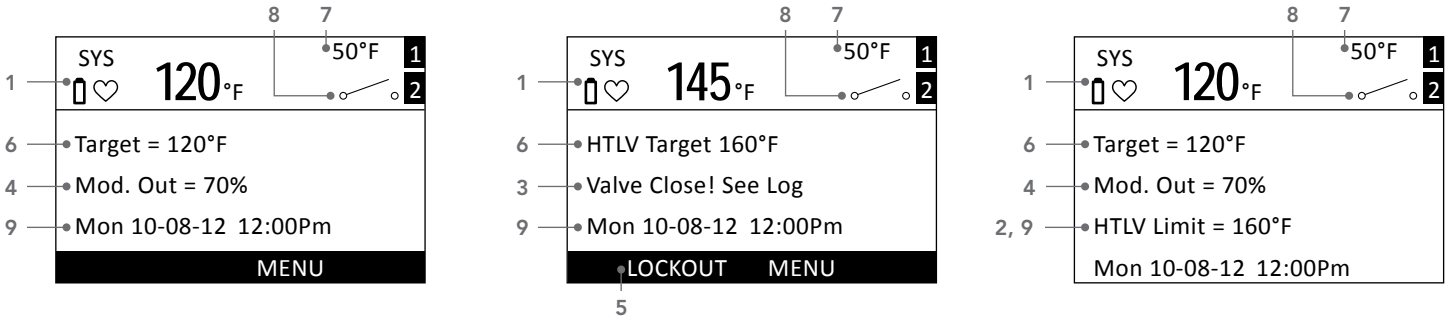


The display button functions vary based on the current screen displayed, as described in the following table:

SCREEN	BUTTON			
	LEFT	▲	▼	RIGHT
Default	Has no function	Has no function		MENU Enters the menu mode
In Lockout	LOCKOUT Enter the Lockout Reset menu			
Lockout Reset	BACK Goes back one menu step	Scrolls through the menu		RESET Ends current alarm
Menu				SELECT Selects current menu item
Setting		Changes the current setting value		SAVE Saves current setting
Configuration				NEXT or EXIT Jumps to next view or exits

DEFAULT DISPLAY

The DTV Digital Tempering Valve default display varies depending on selected Control Mode and alarm condition.





NOTE

When in the DTV + HTLV mode, the area above the variable function buttons that describe the button's function may not be displayed due to inactivity. Pressing the far-right button in the default display will enter into the Menu screen.

DISPLAY ICONS AND MESSAGES

The following icons and messages may be displayed by the DTV Digital Tempering Valve.

#	MODE	MESSAGE	DESCRIPTION
1	ALL	 	The battery icon blinks when the battery is weak. The heart icon blinks when transmitting data via remote communication.
2	HTLV	HTLV Limit = 160°F Valve Close! See Log	The alarm is set to be triggered when the system temperature exceeds the displayed setting for the specified Delay Alarm period. <i>See "HTLV Setpoint" on page 52.</i> The system temperature exceeded the alarm limit. HTLV lockout has occurred (the control closed the HTLV valve). View the alarm logs (<i>See "Alarm Log" on page 56.</i>) When in the DTV + HTLV mode, this message will alternate with the "HTLV Limit = 160°F" message.
3	HTLV	Valve Open	The system temperature is below the alarm limit (HTLV Alarm is not triggered). The control opened the HTLV valve.
4	DTV	No Flow!	The Flow Switch option is enabled and no flow is detected. <i>See "Wiring the Flow Prove" on page 33.</i>
5	HTLV	HTLV Lockout Alarm	When a HTLV Lockout occurs, "HTLV Lockout" blinks. When an active alarm occurs, "Alarm" blinks.
6	ALL	Target Temperature EMS Open/Short	The control target temperature setting. When EMS is used and the signal fails, "EMS Open/Short" is shown.
7	ALL	Value or Switch Icon	When Aux 1 is configured as Temperature input, the value is shown. When Aux 1 is configured as Switch, the switch status icon is shown.
8	ALL	Value or Switch Icon	When Aux 2 is configured as Temperature input, the value is shown. When Aux 2 is configured as Switch, the switch status icon is shown.
9	ALL	Communication Lost!	Internet Communication (ICMS) option only. The control is set to communicate over a network and communication is not detected. This message will alternate with the date and time message.

ALARM MESSAGES

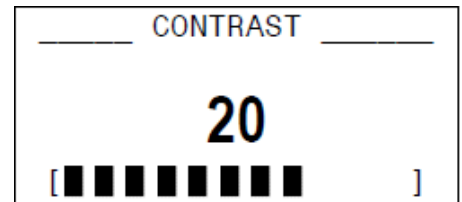
The DTV logs all alarm messages, with the date and time of their occurrence (See "Alarm Log" on page 56). The following alarm messages may be displayed by the DTV.

MESSAGE	ALARM TRIGGERED	DESCRIPTION
Communication Loss	No	Internet Communication (ICMS) option only. The control is set to communicate over a network, but there is no communication between the control and the network.
EMS Input Failure	Yes	The control is set to use a 4–20mA remote setpoint. However, the signal is out of the 4–20mA range.
SYS Sensor Failure	Yes	The system sensor is reading either Short or Open. This triggers the alarm output in HTLV or DTV + HTLV mode.
SYS Temp Over Limit	Yes	The system sensor reading is above the alarm limit setting. See "HTLV Setpoint" on page 52.

SETTING THE DISPLAY CONTRAST

NOTE

The display contrast can only be changed when no alarm is active.



- 1 At the default screen, press and hold the left-most button for 5 seconds. Continue to hold the button while making adjustments.
- 2 Use the up and down buttons to change the contrast setting (0–30, default = 20).
- 3 Release the left-most button when the desired setting is reached.

RESETTING TO FACTORY DEFAULT

To set the DTV Digital Tempering Valve back to its original factory default settings:

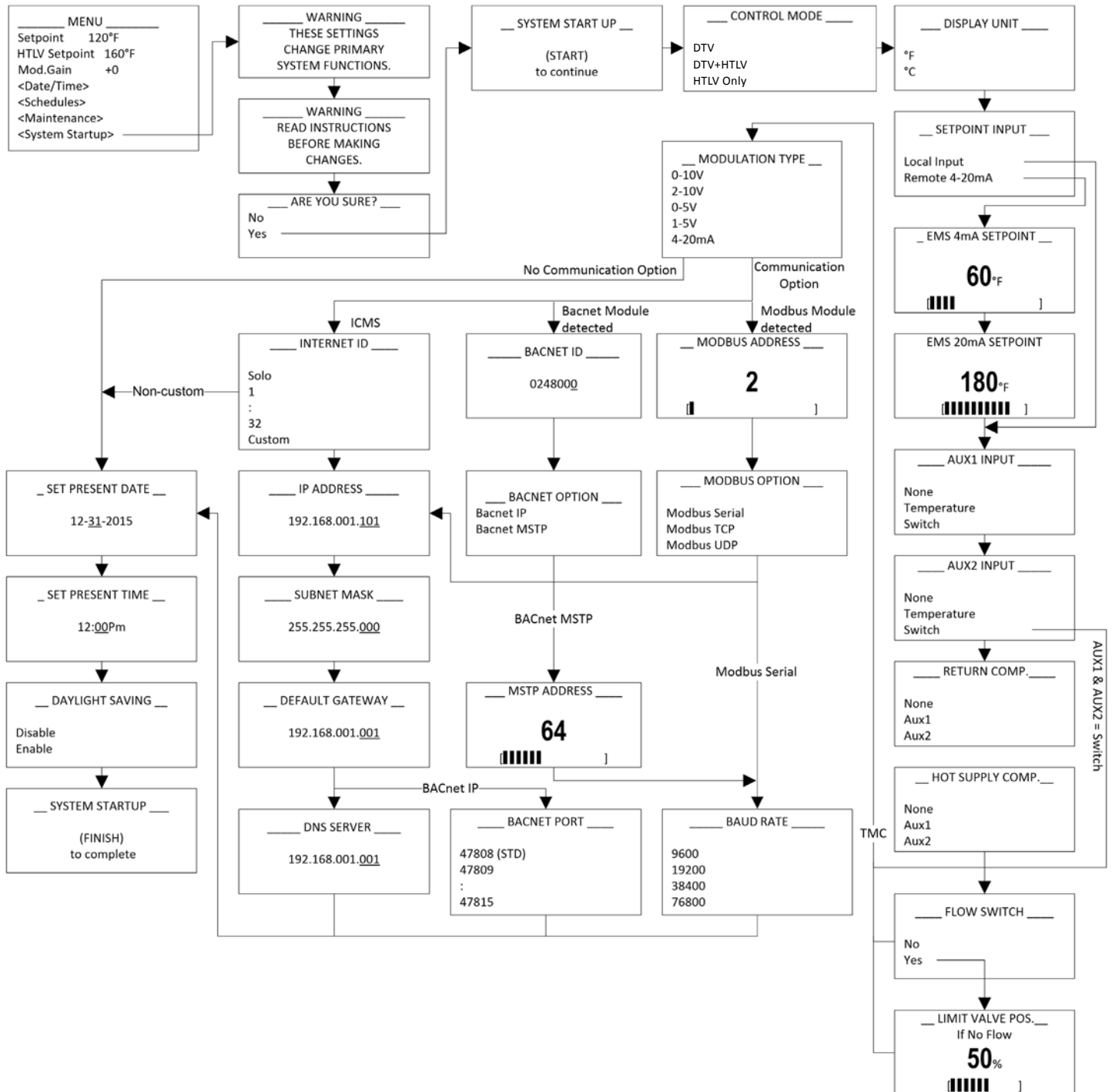
- 1 Remove power from the DTV Digital Tempering Valve.
- 2 Press and hold the two right-most buttons on the DTV Digital Tempering Valve while powering the control on.
- 3 Release the buttons when instructed to do so on the display.
- 4 After resetting the control, the DTV Digital Tempering Valve will go to the Startup menu (See "System Startup Menu" on page 45).

RESET TO MFG.DEFAULTS
Release buttons
and
Please Wait

INITIAL PROGRAMMING OF THE DTV DIGITAL TEMPERING VALVE

SYSTEM STARTUP MENU

When the DTV Digital Tempering Valve is first powered-on and initialization is complete, the System Startup menu screens appear. Follow the System Startup menu screens to program the unit. Ensure the DTV module is in the PROGRAM mode—see item 9 in Figure 1 on page 4.



NOTE
If the System Startup menu screens do not appear, the DTV Digital Tempering Valve has already been configured. To check the configuration or to make changes, select System Startup from the Main menu.

CONTROL MODE

Selections: DTV, DTV + HTLV, HTLV Only

Available in Control Mode: All

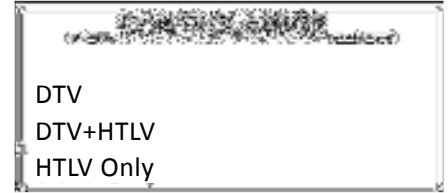
Default: DTV

Menu Path: /System Startup > Control Mode

Description: **DTV**—Controls the electronic mixing valve to regulate the water temperature. This mode can also accept the Flow Prove input to determine the mixing valve position during no flow periods.

HTLV—Triggers an alarm and shuts the hot water supply to system using a HTLV valve when experiencing excessive mixed temperature. This mode does not accept the Flow Prove input.

DTV + HTLV—Controls the electronic mixing valve to regulate the water temperature and the HTLV valve and alarm to manage the hot water inlet. This mode also accepts the Flow Prove input to determine the mixing valve position during no flow periods. See "Wiring the Flow Prove" on page 33 and "Flow Switch" on page 48."



DISPLAY UNIT

Selections: °F, °C

Default: °F

Available in Control Mode: All

Menu Path: /System Startup > Display Unit

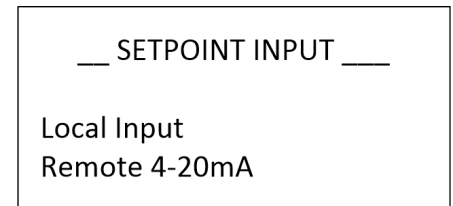
Description: This option changes the sensors' display and all temperature settings standard to Fahrenheit or Celsius.



SETPOINT INPUT

Selections: Local Input, Remote 4–20mA

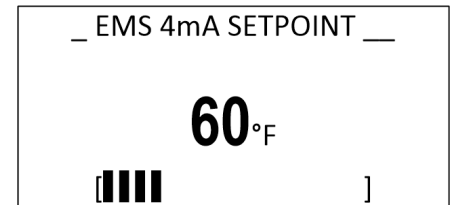
Default: Local Input



If Remote 4–20mA is selected:

Default: 60°F/16°C

4mA range: (40°F/4.5°C to 200°F/93°C)



20mA range: (40°F/4.5°C to 200°F/93°C)

Default: 180°F/82°C

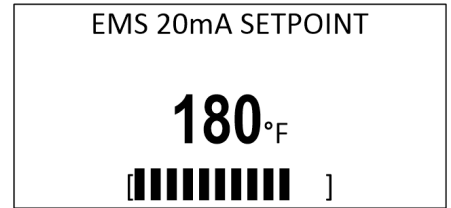
Available in Control Mode: All

Menu Path: /System Startup > Display Unit > Setpoint Input

Description: The DTV Digital Tempering Valve can maintain a setpoint temperature either by selecting the temperature locally at the control or by receiving a remote setpoint temperature as a 4–20mA signal from EMS. See “Wiring the 4–20mA Remote Setpoint” on page 33.

If Remote 4–20mA was selected, the temperature range must be selected using the 4mA and 20mA settings. If the Control Mode is set to DTV or DTV + HTLV options, the Remote 4–20mA will always apply to the DTV Setpoint. However, if the Control Mode is set to HTLV, the Remote 4–20mA will apply to the Alarm Limit.

Any signal below 2mA or above 22mA will close the motorized mixing valve in DTV or DTV + HTLV mode. In the HTLV mode, it will close the HTLV valve and trigger the alarm. The display will show the message “EMS Open” or “EMS Short” to indicate this status.



AUX1/AUX2 INPUT

Selections: None, Temperature, Switch

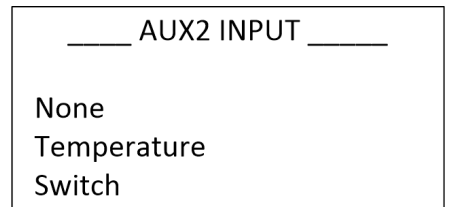
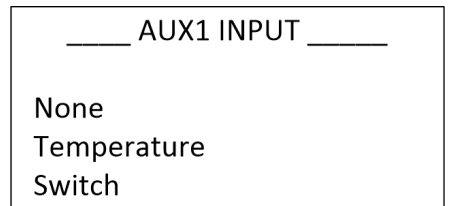
Default: None

Available in Control Mode: All

Menu Path: /System Startup > Display Unit > Setpoint Input > AUX1 Input > AUX2 Input

Description: AUX1 and AUX2 inputs can be configured as a Switch sensor (which detects open or close conditions) or as a Temperature sensor (which can be used for anything that is temperature-related, including return and hot supply).

When “Temperature” is selected, the sensor can be used for return compensation and/or hot supply compensation to provide additional feedback to the control in order to maintain the desired setpoint temperature.



RETURN COMP.

Selections: None, Aux1, Aux2

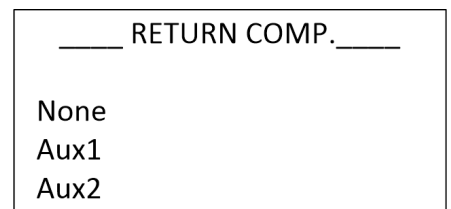
Default: None

Available in Control Mode: DTV or DTV + HTLV, AUX1/AUX2 = “Temperature”

Menu Path: /System Startup > Display Unit > Setpoint Input > AUX1 Input > AUX2 Input > Return Comp.

Description: If AUX1 or AUX2 input is configured as “Temperature”, Return Comp can be used (Feed Forward). This is useful for improving the recovery when the Return temperature changes rapidly.

The sensor must be connected on the cold water return inlet of the valve (after the cold and return mix) in order to select this option.



NOTE

When Return Comp. is used, a Sensor Probe must be installed. Only one sensor can be used. The sensor works best when it is 6 feet (1.8 meters) away from the DTV valve and after the return and cold line meet.

HOT SUPPLY COMP.

Selections: None, Aux1, Aux2

Default: None

Available in Control Mode: DTV or DTV + HTLV, AUX1/AUX2 = Temperature

Menu Path: /System Startup > Display Unit > Setpoint Input> AUX1 Input > AUX2 Input > Return Comp. > Hot Supply Comp

Description: If AUX1 or AUX2 input is configured as "Temperature", Hot Supply Comp can be used. This is useful for improving the recovery when the Hot Supply temperature changes rapidly. The sensor must be connected on the hot water inlet of the valve in order to select this option.

__ HOT SUPPLY COMP.__

None
Aux1
Aux2

NOTE

When Hot Supply Comp. is used, a Sensor Probe must be installed. Only one sensor can be used. The sensor works best when it is 6 feet (1.8 meters) away from the DTV valve.

FLOW SWITCH

Selections: No, Yes

Default: No

Available in Control Mode: DTV or DTV + HTLV

Menu Path: /System Startup > Display Unit > Setpoint Input> AUX1 Input > AUX2 Input > Return Comp. > Hot Supply Comp. > Flow Switch

Description: All mixing valves require constant flow for accurate temperature control. Both DTV and DTV + HTLV modes can accept a dry-contact Flow Prove input through terminals 25 and 26. See "Wiring the Flow Prove" on page 33.

When Yes is selected and no flow is detected the control will adjust the mixing valve down to the Limit Valve POS. setting (if the current valve position is greater than the Limit Valve POS. setting), or leave the mixing valve at its current position (if the current valve position is less than the Limit Valve POS. setting).

__ FLOW SWITCH __

No
Yes

LIMIT VALVE POS.

Selections: 0% to 100%

Default: 50%

Available in Control Mode: DTV or DTV + HTLV

Menu Path: /System Startup > Display Unit > Setpoint Input> AUX1 Input > AUX2 Input > Return Comp. > Hot Supply Comp. > Flow Switch = Yes > Limit Valve POS.

Description: When Flow Switch = Yes and no flow is detected, the control will adjust the mixing valve to the defined opening percentage if the valve is currently open more than the set value. If the current valve opening percentage is less than the set value, the valve will remain in its current position.

For example, if Limit Valve POS. is 30% and no flow is detected when the current valve opening percentage is 50%, the control adjusts the mixing valve down to the 30% open position. If the current valve opening percentage is 20% when no flow is detected, the valve will remain at the 20% open position.

__ LIMIT VALVE POS.__

If No Flow

50%

[|||||]

MODULATION TYPE

Selections: 0–10V, 2–10V, 0–5V, 1–5V, 4–20mA

Default: 0–10V

Available in Control Mode: DTV or DTV + HTLV

Menu Path: /System Startup > Display Unit > Setpoint Input> AUX1 Input > AUX2 Input> ... > Modulation Type

Description: The DTV is capable of operating a variety of 3-way valve Actuators. Cemline factory-supplied Actuators are set to 0–10V signal.

The modulation signal selected must match the Actuator modulation signal.

__ MODULATION TYPE __ 0-10V 2-10V 0-5V 1-5V 4-20mA
--

NETWORK COMMUNICATION OPTIONS

Selections: Network communications settings

Available in Control Mode: All

Menu Path: /System Startup > ... > Modulation Type > {comm options}

Description: During startup, the DTV Digital Tempering Valve detects an installed network option. If no network is detected, network configuration screens are bypassed.

- **RINET**–Internet ID (Solo, 1–32, or Custom)
 - Solo: if the DTV Digital Tempering Valve is directly connected to the modem
 - Internet ID 1–32: if the DTV Digital Tempering Valve is connected to a router (Port Forwarding must also be configured on the router)
 - Custom: IP address, Subnet mask, Default gateway, DNS server
- **BACnet**–BACnet ID, BACnet option (IP or MSTP)
 - BACnet IP: IP address, Subnet mask, Default gateway, BACnet port
 - BACnet MSTP: MSTP address and Baud rate
- **Modbus**–Modbus address, Modbus option (Serial, TCP, or UDP)
 - Modbus Serial: Baud rate
 - Modbus TCP or UDP: IP address, Subnet mask, Default gateway, DNS server

____ INTERNET ID ____ Solo 1 : 32 Custom

____ BACNET ID ____ 0248000

__ MODBUS ADDRESS __ <div style="text-align: center; font-size: 2em;">2</div> <div style="display: flex; justify-content: space-between; width: 100px; margin: 0 auto;"> [] </div>
--

SET PRESENT DATE AND TIME

Selections: Numerical values for Month, Day, Year, and Time

Available in Control Mode: All

Menu Path: /System Startup > ... > Modulation Type > {comm options} > Set Present Date > Set Present Time

Description: Sets the present date and time on the control. The date and time are used to regulate the Schedule.

The DTV battery is used to maintain the date and time during power outages.

_ SET PRESENT DATE _ 12- <u>31</u> -2015

_ SET PRESENT TIME _ 12: <u>00</u> Pm
--

DAYLIGHT SAVING

Selections: Enable, Disable

Default: Enable

Available in Control Mode: All

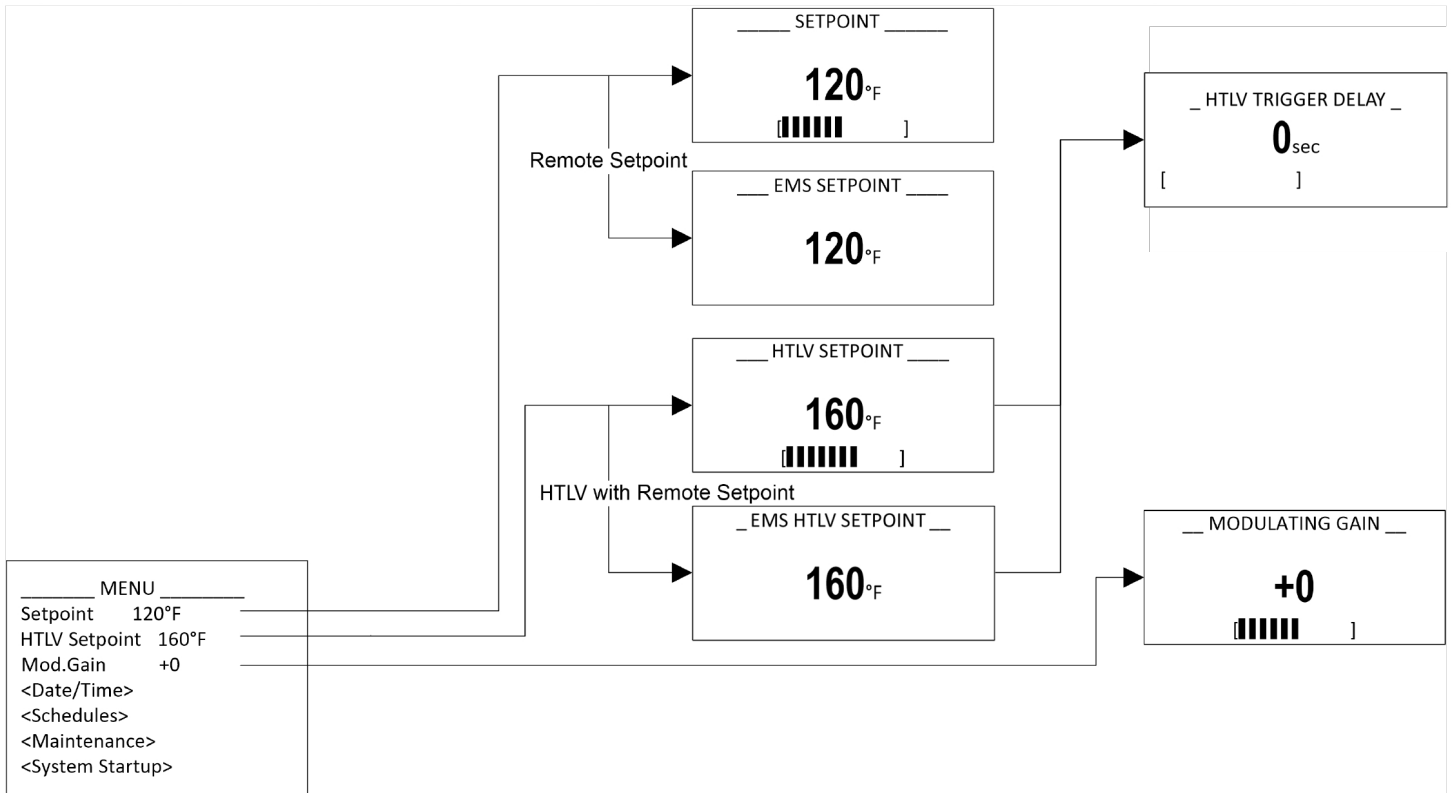
Menu Path: /System Startup > ... > Set Present Date >
Set Present Time > Daylight Saving

Description: Enables or disables Daylight Saving mode. When enabled, the present time on the control will be automatically adjusted for Daylight Savings Time.



MAIN MENU

The main Menu is used to configure setpoints, HTLV, and modulating gain.



SETPOINT

Selections: 40°F to 200°F/
(4.5°C to 93°C)

Default: 100°F/38°C (DTV)
110°F/43°C (HTLV)

Available in Control Mode: DTV or DTV + HTLV

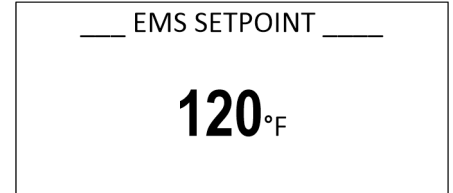
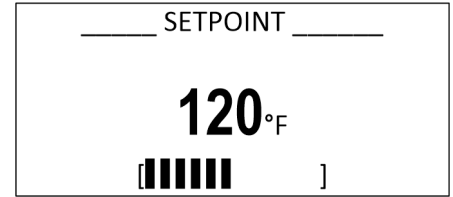
Menu Path: /*Setpoint*

Description: The Setpoint is the mixed valve outlet temperature the DTV will hold during normal operation. The temperature may fluctuate slightly around the Setpoint. The amount of fluctuation is controlled by the Gain setting (See “*Modulating Gain*” on page 52).

If the Setpoint Input was set to EMS 4–20mA, the setpoint will be available as read-only and can only be changed remotely using the 4–20mA input signal (See “*Setpoint Input*” on page 46).

If a schedule is set, the schedule overrides the Setpoint (See “*Schedules Menu*” on page 53).

If the Setpoint is set to a value higher than 125°F (52°C), a scald warning is displayed. Select OK to acknowledge the warning and keep the current temperature setting. Select EDIT to return to the Setpoint screen to enter a lower temperature setting.



WARNING

SCALD HAZARD! Water temperatures over 125°F (52°C) can instantly cause severe burns. Children, disabled, and the elderly are at highest risk of being scalded. If anyone using hot water in the building fits the above description, or if local codes or state laws require specific water temperatures at the outlet, it is recommended to not exceed at Setpoint limit of 125°F (52°C). Water drained from system drain valves may also be extremely hot. Make sure all connections are tight and direct all water flow away from personnel.

HTLV SETPOINT

Selections: 40°F/4.5°C to 200°F/93°

Default: 110°F/43°C

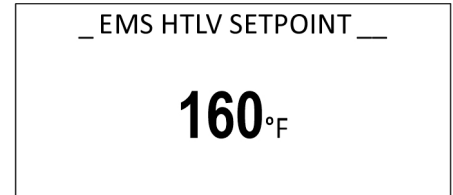
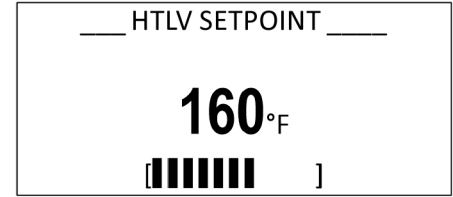
Available in Control Mode: HTLV or DTV + HTLV

Menu Path: /HTLV Setpoint

Description: The HTLV Setpoint is the mixed valve outlet temperature above which the DTV Digital Tempering Valve will close the HTLV valve and trigger an alarm. This action prevents the mixed outlet from reaching excessive temperatures. An alarm message is displayed (See "Alarm Messages" on page 44) and the event will be recorded in the Alarm Log (See "Alarm Log" on page 56).

If the Setpoint Input was set to EMS 4–20mA, the HTLV Setpoint can only be changed remotely using the 4–20mA input signal. It will be available as read-only through the control (See "Setpoint Input" on page 46).

A HTLV Trigger Delay can be adjusted to help eliminate false alarms (See "HTLV Trigger Delay" on page 52).



WARNING

SCALD HAZARD! Water temperatures over 125°F (52°C) can instantly cause severe burns. Children, disabled, and the elderly are at highest risk of being scalded. If anyone using hot water in the building fits the above description, or if local codes or state laws require specific water temperatures at the outlet, it is recommended to not exceed at Setpoint limit of 125°F (52°C). Water drained from system drain valves may also be extremely hot. Make sure all connections are tight and direct all water flow away from personnel.

HTLV TRIGGER DELAY

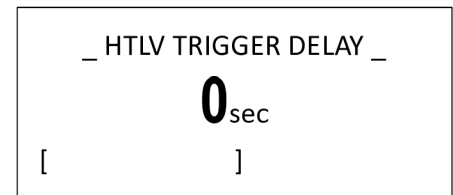
Selections: 0 to 60 seconds

Default: 15 sec

Available in Control Mode: HTLV or DTV + HTLV

Menu Path: /HTLV Setpoint > HTLV Trigger Delay

Description: The HTLV Trigger Delay prevents the alarm from being triggered immediately and the HTLV valve from closing unless the alarm situation is maintained for the full delay period. This helps eliminate false alarm situations that normally may only last for a few seconds.



MODULATING GAIN

Selections: -10 to +10

Default: +0

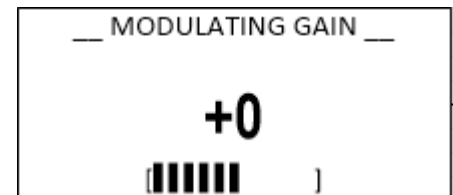
Available in Control Mode: DTV or DTV + HTLV

Menu Path: /Mod. Gain

Description: The Modulating Gain adjusts the PID aggressiveness of the control. The higher the gain, the more aggressive the DTV Digital Tempering Valve adjusts the mixing valve based on changes in water temperature.

If the water temperature tends to oscillate quickly above and below the desired setpoint, reduce the gain. If the water temperature tends to stay consistently below or above the Set Point, increase the gain.

Start with a gain of "0". Before making any additional gain changes, always wait at the least ten minutes after adjusting the gain to determine its affect on the system.

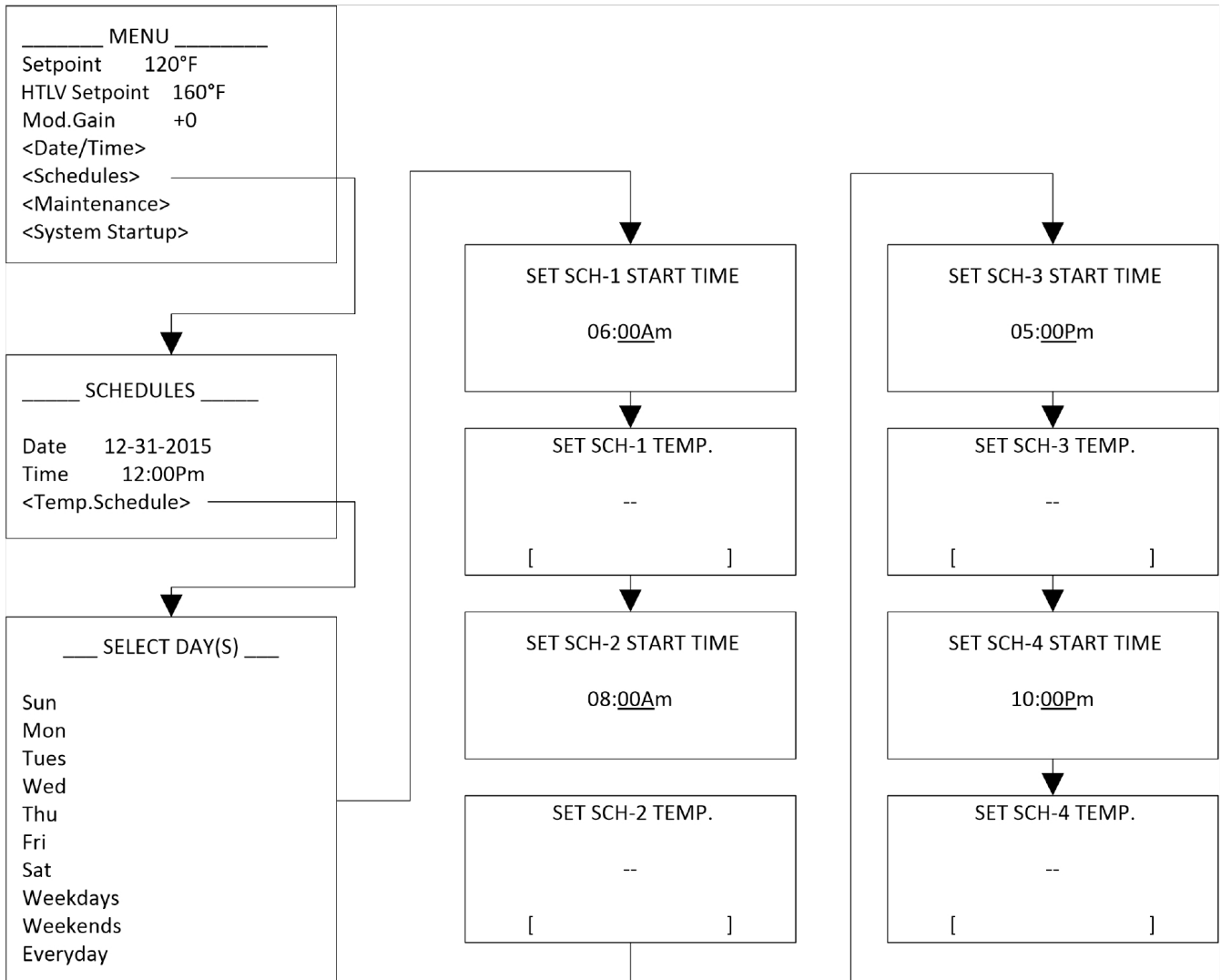


SCHEDULES MENU

The Schedules menu is used to configure schedules that are used to set an absolute temperature. Up to four periods can be configured per day. Each period can have its own start time and temperature setting, and will maintain that temperature setting until the next scheduled period start time.

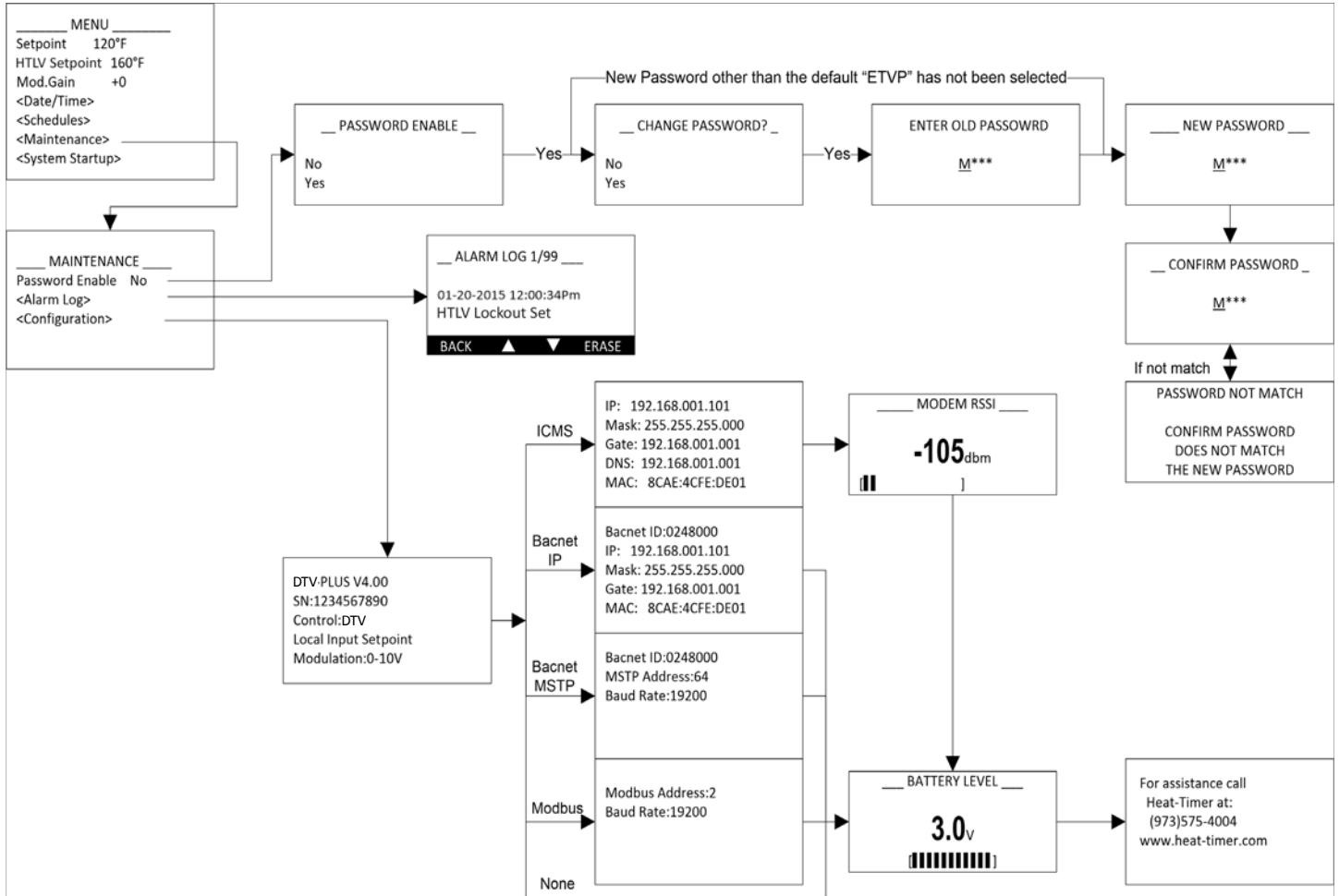
NOTE

Available only when Control Mode is set to DTV or DTV + HTLV (See "Control Mode" on page 46). If a schedule is set, the schedule overrides the Setpoint setting (See "Setpoint" on page 51).



MAINTENANCE MENU

The Maintenance menu is used to modify critical system behavior and view previous alarm conditions. It should only be used by system installers.



PASSWORD ENABLE

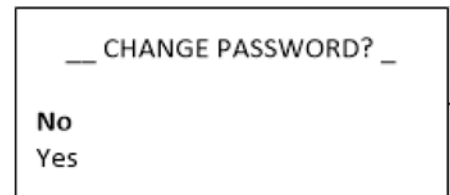
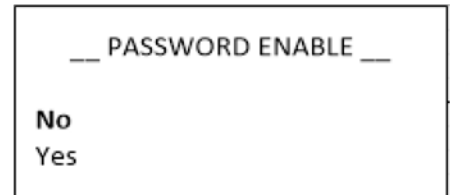
Selections: No, Yes

Default: No

Available in Control Mode: All

Menu Path: /Maintenance > Password Enable

Description: When set to **Yes**, a password must be entered in order to access the DTV Digital Tempering Valve programming menus. When enabled, the password can be set or changed. When setting/changing the password, it must be entered twice and both entries must match. If the password entries do not match, an error is displayed and the password must be re-entered.



ALARM LOG

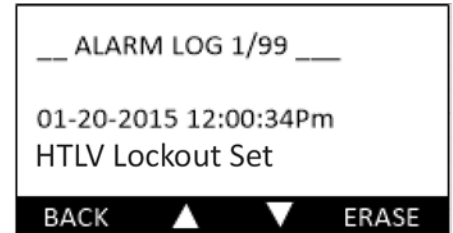
Selections: **Scroll list**

Available in Control Mode: **All**

Menu Path: */Maintenance > Alarm Log*

Description: The DTV Digital Tempering Valve keeps a log of the last 99 alarms, including their date and time. For a list of possible alarms included in the Alarm Log, see *"Alarm Messages"* on page 44.

Use the two middle buttons to scroll through the alarm list. Single-press the **Erase** button to delete the currently displayed alarm. Long-press (at least 5 seconds) the **Erase** button to delete all alarm entries.



CONFIGURATION

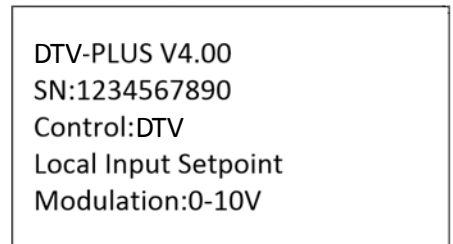
Selections: **None**

Available in Control Mode: **All**

Menu Path: */Maintenance > Configuration*

Description: The Configuration menu provides access to screens that display the current configuration of the DTV Digital Tempering Valve. Available information includes: software version, serial number, startup settings, communication settings, and battery level.

Press the **Next** button to advance through the configuration screens.

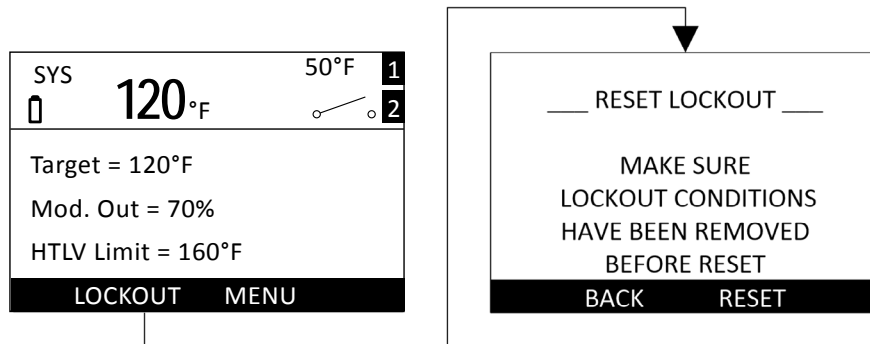


LOCKOUT MENU

The Lockout menu is used to reset system lockouts.

NOTE

A Lockout condition is only generated when Control Mode is set to HTLV or DTV + HTLV (See "Control Mode" on page 46). Under specific conditions, the control triggers the alarm and logs the event in the Alarm Log (See "Alarm Log" on page 56).



RESET LOCKOUT

Selections: RESET

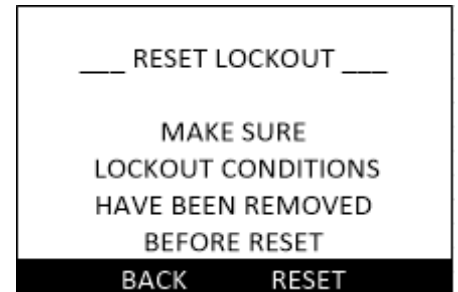
Default: N/A

Available in Control Mode: HTLV or DTV + HTLV

Menu Path: Lockout

Description: The HTLV Lockout outputs energize whenever the System Temperature rises above the Alarm Limit for the Trigger Delay period.

To reset the lockout, the conditions causing the lockout must be corrected first. Then, the lockout can be reset using the Reset Lockout menu. If the lockout was reset before the conditions are corrected, the lockout output will immediately be re-activated.



SYMPTOM	POSSIBLE CAUSE	RECOMMENDED ACTION(S)
No display or distorted display.	No power to the DTV Platinum	<p>Verify the DTV Control Module Control Module is receiving power, all power wiring is in good condition and connected.</p> <p>The DTV Control Module Control Module requires 120Vac power to terminal 1 and 2, and earth ground wiring to terminal 3.</p> <p>Turn power to the DTV Control Module Control Module off then back on.</p>
Display shows sensor "Open".	Sensor disconnected.	<p>Verify the sensor is properly connected to the DTV Digital Tempering Valve Control Module.</p>
	Defective sensor, wires, or DTV Digital Tempering Valve Control Module.	<p>Short the sensor input wires. The display should read "Short".</p> <ul style="list-style-type: none"> • If the display still reads "Open", the device is defective. Replace the DTV Digital Tempering Valve Control Module. • If the display reads "Short", test the sensor wiring for continuity. Replace the sensor/wiring.
Display shows sensor "Short".	Defective sensor, wires, or DTV Digital Tempering Valve Control Module.	<p>Remove the sensor wires from the input terminals. The display should read "Open".</p> <ul style="list-style-type: none"> • If the display still reads "Short", the device is defective. Replace the DTV Digital Tempering Valve Control Module. • If the display reads "Open", test the sensor wiring for continuity. Replace the sensor/wiring.
System reads incorrect temperature.	Probe sensor not properly installed.	<p>Ensure the probe sensor is properly installed in the flow of the water stream.</p> <p><i>See "Sensor Probe Locations" on page 15.</i></p>
	Defective sensor or DTV Digital Tempering Valve Control Module.	<p>Disconnect the wires from the input terminals. The display should read "Open".</p> <ul style="list-style-type: none"> • If the display does not read "Open", the device is defective. Replace the DTV Digital Tempering Valve Control Module. • If the control reads "Open", and the difference is within 5°F, replace the sensor.
No hot water.	If Flow Switch is set to "Yes" and the flow input is open, the mixing valve may be marginally closed.	Verify Flow Switch setting and the position of the mixing valve.

SYMPTOM	POSSIBLE CAUSE	RECOMMENDED ACTION(S)
DTV Control Module Control Module does not move the Floating Motorized Valve.	Valve wiring defective.	Verify all wiring is in good condition and connected. Verify voltage at the Actuator power terminals is between 20–24Vac. Voltage levels outside this range may cause the Actuator to not move or result in damage to the Actuator.
	Valve modulating signal incorrect.	Verify the DTV modulating signal is set to 0–10V to match the Actuator’s signal. Use a DC voltmeter to read the modulation signal on terminals 13 and 15. If the Modulation Output % was at 40% (See “Default Display” on page 43), the signal should read 4Vdc. If it did not, the DTV control is damaged. Replace the DTV Digital Tempering Valve
	Actuator manual override engaged.	Ensure the actuator is not in manual override.
Outlet temperature fluctuates.	The DTV Digital Tempering Valve requires the use of a circulation and constantly running pump.	Verify proper operation of the pump. Check and ensure the tip of the System Sensor is in the flow stream. Check and ensure the system sensor is within the recommended 1 to 3 feet distance from the outlet of the DTV valve.
Output temperature exceeds setpoint.	Improper piping.	If the Valve Modulation is at 0% during the time the outlet temperature exceeds the setpoint and does not decrease, check for heat migration from the water heating source through the COLD inlet piping to the valve.
No alarm output.	No power to the alarm or interface wiring disconnected.	Verify the alarm is receiving power, all power and interface wiring is in good condition and connected. The DTV does not provide power to alarms. Ensure an external power source is used. <i>See “Wiring the HTLV Lockout” on page 30.</i>
No communication.	Incorrect network settings.	Ensure the network settings are correct. Refer to the troubleshooting section of the applicable network manual.



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