

- |                                  |                        |
|----------------------------------|------------------------|
| 1. Thermostatic Bulb             | 11. Upper Pull Rod     |
| 2. Bulb Bushing                  | 12. Pull Rod Lock Nut  |
| 3. Bulb Gasket                   | 13. Yoke Nut           |
| 4. Bulb Flange                   | 14. Spacer             |
| 5. Bulb Bushing Nut              | 15. Female Adapter     |
| 6. Armored Capillary Tubing      | 16. Seal (2)           |
| 7. Bellows Housing               | 17. Male Adapter       |
| 8. Housing Screws (6)            | 18. Lower Pull Rod     |
| 9. Yoke                          | 19. Valve Body         |
| 10. Temperature Adjustment Wheel | 20. Double Ported Plug |
|                                  | 21. Teflon Gasket      |

### DESCRIPTION

The Type LTC temperature control valve is a double-port valve with an adjustable temperature range of 0°F to -40°F (255°K to 233°K). The Type LTC is reverse acting (closing at the adjusted minimum gas temperature) and subject to ambient temperature under normal conditions; therefore, it will normally be in a wide-open position. In the event of valve failure, the valve will fail in the closed position.

**NOTE: Under normal operating conditions, valve seat closure may take several seconds.**

### SPECIFICATION DATA

- Service:** Liquid or gas
- Sizes:** 1/2", 3/4", 1", 1-1/4", 1-1/2", and 2"
- Connections:** Threaded union inlet and outlet
- Operating Temperature Range:** 0°F to -40°F (255°K to 233°K)
- Standard Valve Setting:** -20°F (244.4°K)
- Maximum Temperature Limit:** 300°F (408°K)
- Minimum Temperature Limit:** -320°F (78°K)
- Maximum Body Pressure On All Sides:** 400 psi - See Maximum Pressure Differentials Table, pg. 3
- Capacity:** Refer to Bulletin CRY for capacity information.

### CONSTRUCTION

Brass union ends; bronze body and trim; copper capillary armor and bellows; Teflon gasket and packing; stainless steel spring; copper bulb and capillary. Copper bulb is 1/2" x 5.82". A copper well is available as an option and is recommended for each cryogenic application. All parts commercially cleaned for cryogenic service.



## Type LTC CRYOGENIC REVERSE ACTING TEMPERATURE REGULATOR

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### GENERAL INSTALLATION INSTRUCTIONS

**Valve Installation**  
Type LTC regulator is to be installed between the vaporizer and the service line (or final line) regulator. The valve should be installed in a horizontal position with the bellows housing upright. For other installation requirements consult the factory. For ease of operation and maintenance, it is suggested that manual shut-off valves be installed upstream and downstream from the valve. Before installing the valve, the piping should be thoroughly flushed out to remove any foreign material. Install the valve so that the arrow cast on the valve body points in the direction of flow. Use a compatible sealant on the male pipe threads and do not over tighten the valve connections. Exercise care when tightening the unions to ensure that the gaskets located in the union ends are properly positioned.

## Bulb Installation

Install the thermostatic bulb at a point that is downstream from the vaporizer but upstream from the temperature regulator. When a thermometer is to be installed in the line, it should be placed directly after the bulb in the pipe line or at the same level as the bulb in a tank. The standard bulb is shown in the cut away view of the valve. A copper well is strongly recommended for each cryogenic temperature regulator installation, both for the protection of the bulb and to allow for the removal of the capillary bulb without depressurizing the system.

To install the bulb, remove the bulb bushing from the bulb. Insert the bulb and fasten by tightening the nut onto the bushing. The preferred bulb installation position is with the end of the bulb below horizontal. Although the horizontal position is permissible, care must be exercised to NEVER INSTALL THE BULB WITH THE END OF THE BULB ABOVE THE BULB FLANGE.

**NOTE: The flexible armored capillary tubing connecting the bulb and valve must not be cut, kinked, mashed or twisted. It may, however, be bent on a 4" radius or larger. During installation the tubing can be fastened permanently to a rigid location, however, never connect the capillary tubing to steam pipes, cold water lines or other locations where the tubing would be subject to extreme temperatures. It is recommended that a single coil of tubing be made next to the regulator to absorb vibrations occurring in the pipe lines.**

## OPERATING INSTRUCTIONS

### Temperature Adjustment

The temperature regulator can be set to shut off the flow of gas at any temperature from 0°F to -40°F (255°K to 233°K) temperature range. To adjust the cut-off temperature turn the temperature adjustment wheel (10) in a counter-clockwise direction to set the regulator at a higher temperature. Turn the wheel in a clockwise direction to set the regulator at a lower temperature. The wheel is mounted on ball bearings to eliminate friction and ensure easy operation.

## MAINTENANCE INSTRUCTIONS

When properly applied and correctly installed the Type LTC temperature regulator should require very little attention or maintenance. However, the Type LTC, like every mechanical device, deserves some care to ensure continued dependability and to protect the long service life for which it was designed. When attention is required use only genuine Cash-Valve replacement parts.

Refer to the Type LTC regulator cut away view for parts identification during maintenance procedures.

### Servicing The Valve Pull Rod Packing (16)

The valve yoke nut should be kept tight. Should it become necessary to replace the pull rod packing proceed as follows:

1. Remove the yoke assembly (9) from the valve body (19) by removing the yoke nut (13).
2. Remove the spacer (14), female adapter (15), the two worn packing seals (16), and the male adapter (17).
3. Replace the packing seals and reassemble in reverse order. Tighten the yoke nut securely.

### Servicing The Thermal System

The thermal system used on the Type LTC temperature regulator is serviced only as a complete assembly except for the bulb bushing (2) and the bulb gasket (3). The thermal system is set at the factory to operate only at the temperature range stamped on the nameplate which is affixed to the bellows housing. If it is necessary to install a new thermal system, the procedure listed below should be followed.

1. Shut off the vaporizer system.
2. Completely loosen the bushing nut (5), then take the bulb (1) out of the bulb bushing (2).

3. Turn the temperature adjustment wheel (10) to its lowest position (counter-clockwise).
4. Remove the screws (8) retaining the bellows housing (7) to the yoke (9), then lift the housing from the yoke.

**NOTE: The bellows housing (7) may be under slight spring tension. Exercise care when removing the housing.**

5. Position the new bellows housing (7) on top of the spring, aligning the screw holes in the housing with those in the yoke.
  6. Using three 10-32 x 1" screws inserted in alternate holes in the bellows flange, tighten the screws evenly to draw the bellows housing (7) down until it contacts the yoke (9). Install the shorter standard screws (8) in the remaining holes, then replace the 10-32 x 1" slave screws with the standard screws.
- NOTE: An alternative method of installing the new bellows housing to the yoke would be to cool the thermal bulb to approximately -40°F (255°K) allowing the bellows to contract and thereby permitting the standard screws to be installed.**
7. Install the new thermal system bulb (1) in its original position and tighten the bulb bushing nut (5).
  8. Turn the temperature adjustment wheel clockwise to its original position or approximately .675 inches above the lowest position.

## SPECIFICATIONS

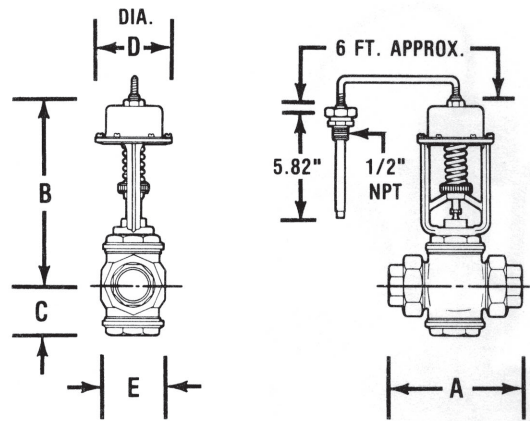
### MAXIMUM PRESSURE DIFFERENTIALS

VALVE SIZE	TEMPERATURE SETTING (psi)		
	0°F (255°K)	-20°F (244.4°K)	-40°F (233°K)
1/2" - 3/4"	400	400	400
1"	275	400	400
1-1/4" - 1-1/2"	275	350	350
2"	275	275	300

NOTE: It requires approximately 15°F change in temperature to fully close valve.

### DIMENSIONS

VALVE NO.	SIZE	DIMENSIONS				
		A	B	C	D	E
18131	1/2"	6.04"	2.08"	9.80"	4.31"	2.50"
18127	3/4"	6.04"	2.08"	9.80"	4.31"	2.50"
18112	1"	6.04"	2.08"	9.80"	4.31"	2.50"
18108	1-1/4"	7.61"	2.75"	10.47"	4.31"	3.56"
18042	1-1/2"	7.61"	2.75"	10.47"	4.31"	3.56"
18178	2"	8.58"	3.12"	10.84"	4.31"	4.31"



## HOW TO ORDER

To order repair parts, refer to the cut away view of the Type LTC regulator to identify the part required. Also available: Separable Well - part number 17960; Thermal System Repair Kit - part number 18052. When ordering, please use the part names listed and provide the valve serial number stated on the metal identification tag attached to the bellows housing. Also state the following:

“Repair Parts for Type LTC Cryogenic Service” and provide:

1. Valve size
2. Service
3. Temperature range
4. Maximum working pressure
5. Valve temperature setting
6. Part description
7. Quantity of each part
8. Valve assembly or serial number