



LESLIE
CONTROLS, INC.

A division of CIRCOR International, Inc.
 12501 Telecom Drive, Tampa FL 33637

**INSTALLATION, OPERATING,
 AND MAINTENANCE INSTRUCTIONS**
PARTS LIST

60/3.5.1
 Rev.1

TEMPERATURE REGULATORS
DUO-MATIC—PRESSURE LIMITING CLASSES
Adjusting and Fixed Gain Type

TABLE OF CONTENTS

SECTION I — INSTALLATION 2

Calibration of Gain Mechanism 3

SECTION II —OPERATION 4

Fixed Gain Lever Clearance Adjustment 5

SECTION III — MAINTENANCE 6-8

Trouble Shooting 9

Parts List & Diagrams for Prefix "Q" & LTC Classes 10-12

Size & Weight Chart for Prefix "Q" & LTC Classes 13

Parts List & Diagrams for more LTC Classes 14-15

Thermostatic Element Installation 15

ANSI Flange Standard Dimensions in Inches 16

Parts List & Diagrams for LTCPSM and LTCPYSM 16-17

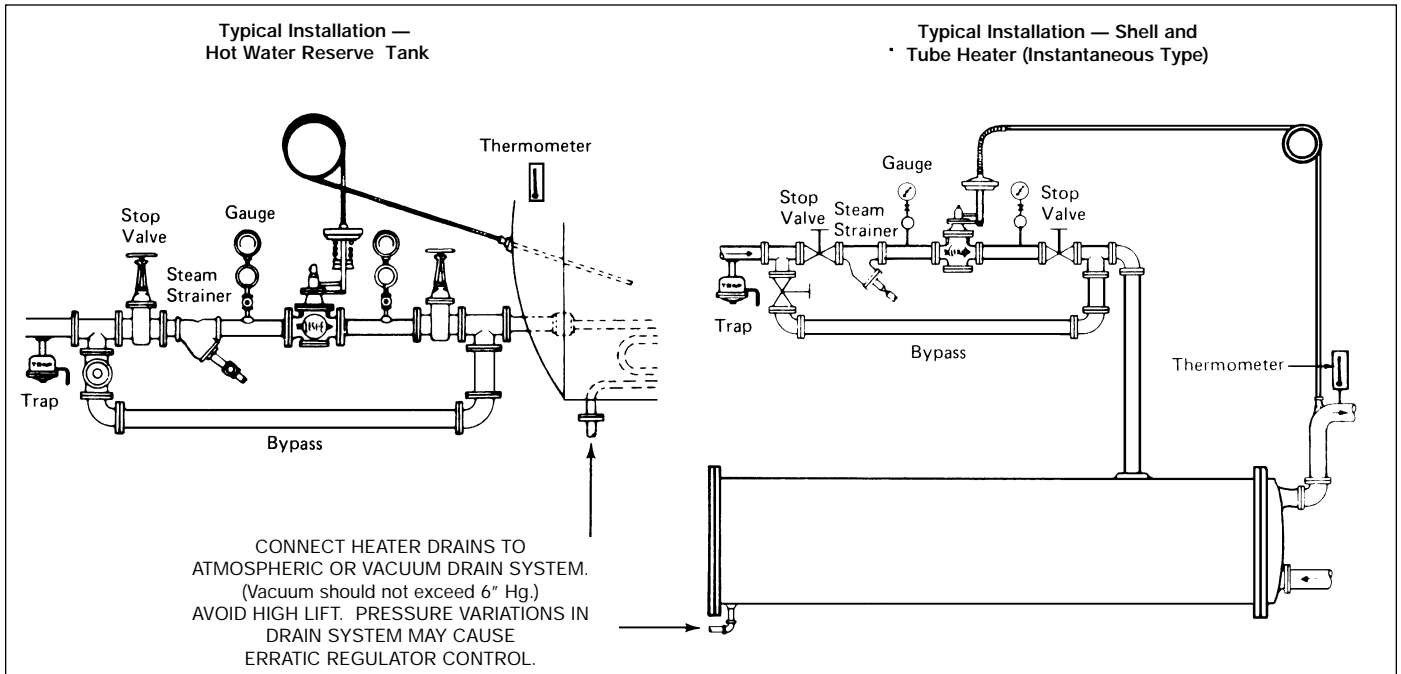
ANSI Flange Standard in Millimeters 17

Installation of Thermostatic Element on Class JTCP Temperature Regulator 18

Parts List and Diagrams for Class JTCP 18-17

INSTALLATION—ADJUSTABLE and FIXED GAIN TYPE

For normal installations follow the sketch applying to the particular type of heater in use. Place regulator upright in a horizontal line of piping as close to the heater as possible (within 3' to 5') and with arrow (cast on side of body) in direction of steam



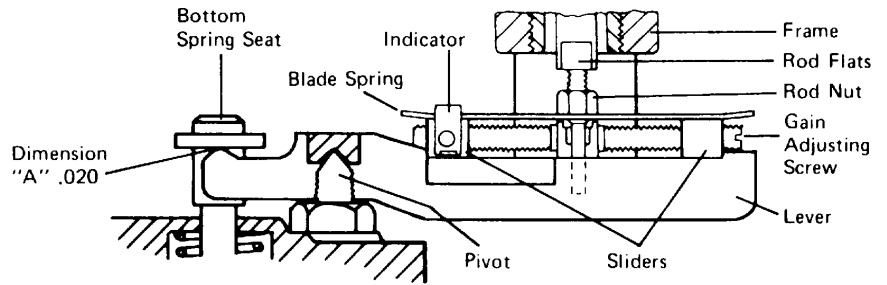
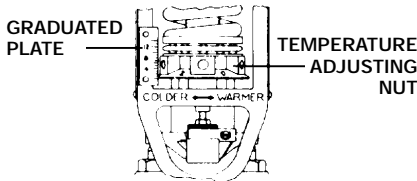
- INSTALL GAUGES, STOP VALVES AND THERMOMETERS AS SHOWN SO THAT PROPER ADJUSTMENT AND CHECK OF REGULATOR CONTROL MAY BE MADE.
- AVOID SHARP BENDS IN CAPILLARY TUBING WHEN INSTALLING THERMAL ELEMENT BULB IN HEATER. BULB SHOULD BE INSTALLED VERTICALLY OR SLOPED DOWNWARD WITH END OF BULB FACING FLOW. CAPILLARY SHOULD BE PROTECTED FROM DAMAGE.
- STORAGE TYPE HEATERS - locate thermal bulb approximately at horizontal center line of tank and to one side.
- INSTANTANEOUS TYPE HEATERS - locate thermal bulb in heater fluid discharge pipe as close to heater as possible.
- Thermal bulbs should never be installed closer than 6 inches to heat source.
- INJECTION HEATERS - regulator should be installed above level of fluid in tank with check valve to prevent backflow of fluid into regulator.
- PIPING - blow out piping making sure it is clean before installing regulator.
- Provide proper drainage of steam piping to prevent water hammer and possible erosion of regulator parts.
- WHERE NOISE MAY BE A FACTOR follow recommendations for piping and fittings per Instruction 5/0.3.1 or see your Leslie Agent about our Les-Sonic regulators.

ADJUSTABLE GAIN TYPE ONLY

(Classes LTCPKY, LTCLP, LTCPS, LTCPYS, LTCPYSM and JTCP etc.)

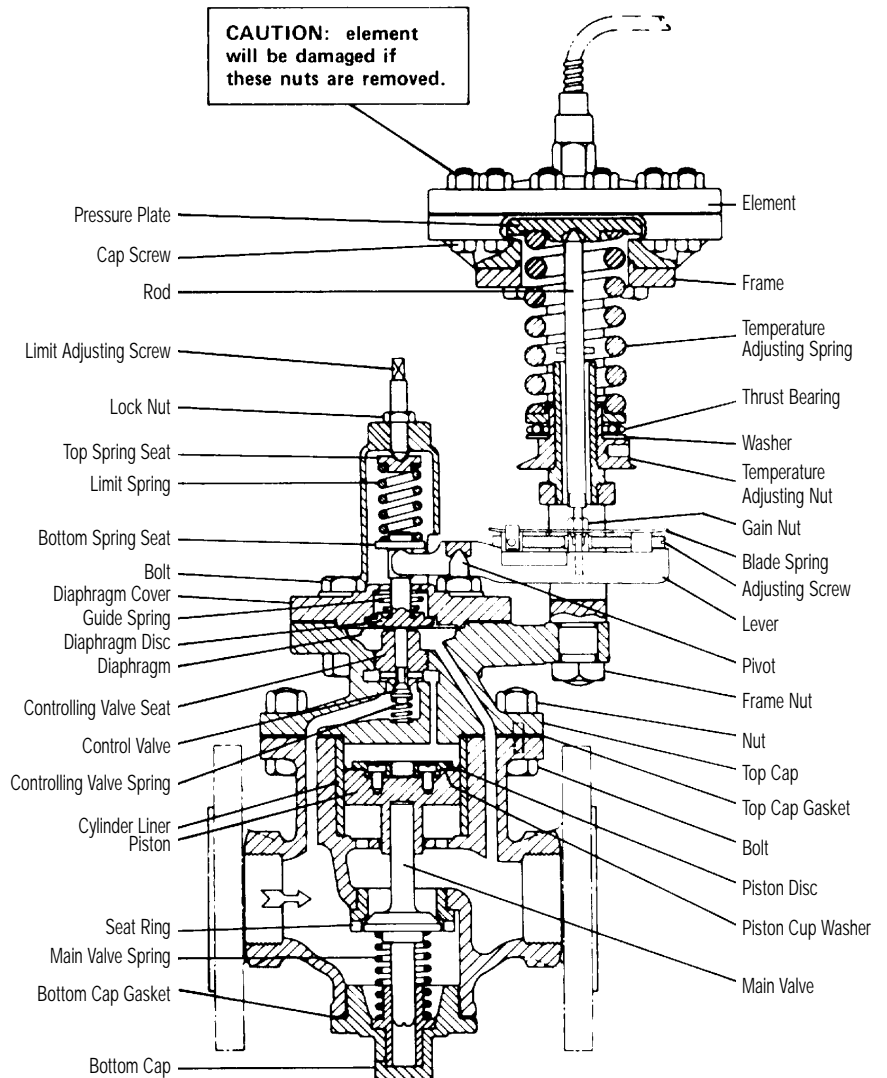
Calibration of Gain Mechanism

1. Relieve ALL existing VACUUM or PRES-SURE from under regulator diaphragm.
2. Screw adjusting nut upward until bottom edge of nut is even with #12 on Graduated plate attached to yoke.



Enlarged view of Adjustable Gain Mechanism

3. Move sliders to MAXIMUM GAIN position. (Sliders as close together as adjusting screw will permit.)
4. Remove limit spring case, limit spring and top spring seat.
5. Press bottom spring seat down lightly but not hard enough to open controlling valve. Be sure lever rests firmly against pivots and rod.
6. Check gap (Dim. "A") between lever points and bottom spring seat with feeler gauge provided with regulator. If clearance is not a snug .020" hold rod with wrench on rod flats and screw ROD NUT up or down as needed to obtain .020 clearance.
7. Replace limit spring, top spring seat and limit spring case.
8. With temperature adjusting nut in position described in Par. 2 adjust limit screw for minimum steam pressure needed to heat maximum flow to required temperature. Do not adjust steam pressure for a greater value than actually needed to control temperature of fluid being heated. Tighten lock nut.
9. Place regulator in service and adjust temperature adjusting nut and gain to values needed for heating process involved. See section titled "OPERATION" for details.



Type LTCPY (Adjustable Gain Types)

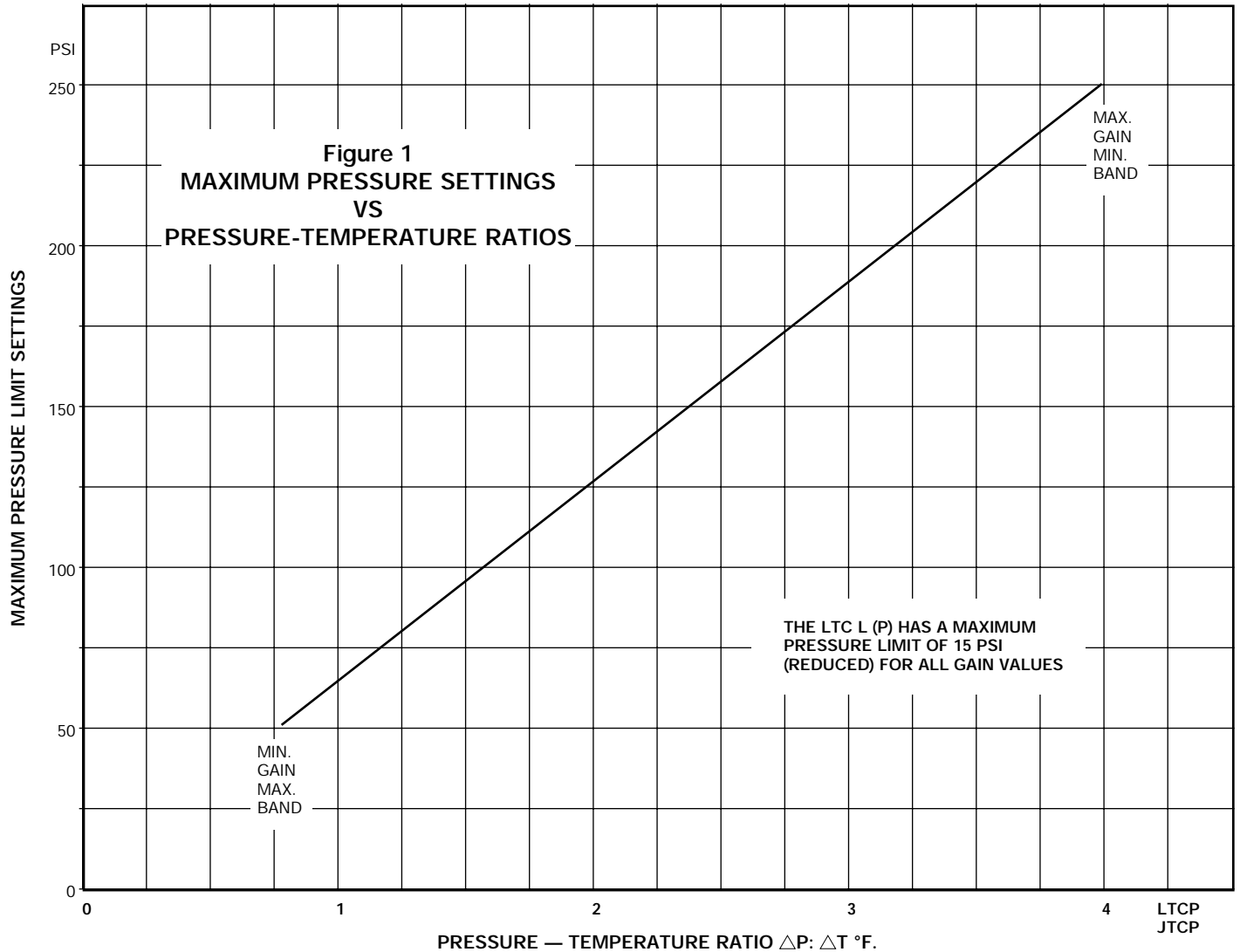
OPERATION — ADJUSTABLE GAIN TYPE ONLY (Classes LTCPKY, LTCLP, LTCPS, LTCPYS, LTCPYSM and JTCP etc.)

ADJUSTABLE GAIN TYPES - MAXIMUM GAIN: steam to temperature change ratio 4:1 (4 psi steam per 1°F. temperature change at thermal bulb) MINIMUM GAIN: steam to temperature change ratio .8:1. (.8 psi steam per 1°F. temperature change at thermal bulb.)

CAUTION - if gain is reduced beyond allowable limits the regulator will NOT SHUT OFF.

GAIN ADJUSTMENT - adjust regulator for maximum gain setting. (Turn gain adjusting screw until sliders are as close as possible to each other.) If system control is unstable reduce gain by turning gain adjusting screw in

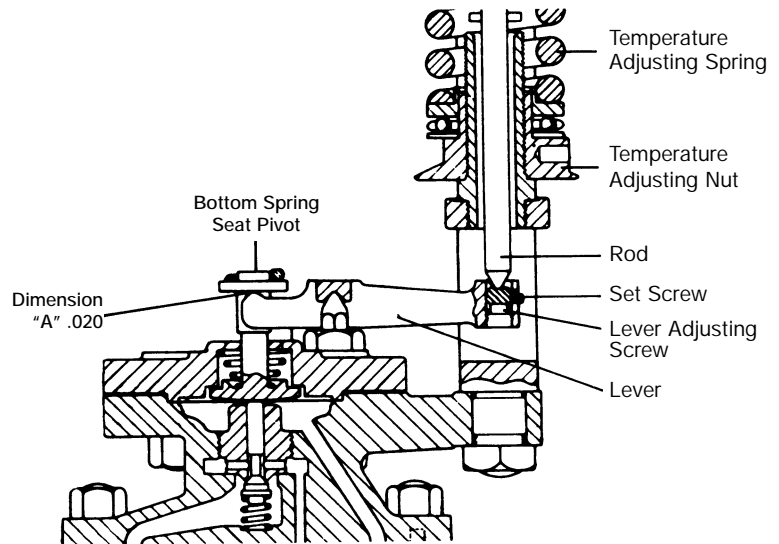
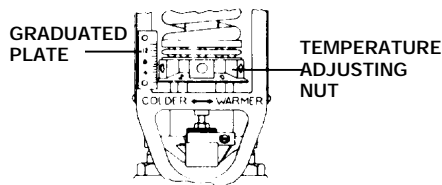
one turn increments allowing sufficient time for system to stabilize after each adjustment change. As gain adjustment affects regulator steam outlet steam pressure the temperature set point MUST be readjusted to the desired value after each gain adjustment. After completing adjustments vary load from maximum to minimum making sure regulator will Shut-Off. The maximum steam pressure limit setting should not exceed that shown on curve (Fig. 1) no matter how great the temperature span utilized if shut-off of regulator is to be achieved. Never reduce gain beyond that necessary to produce stable temperature control of process.



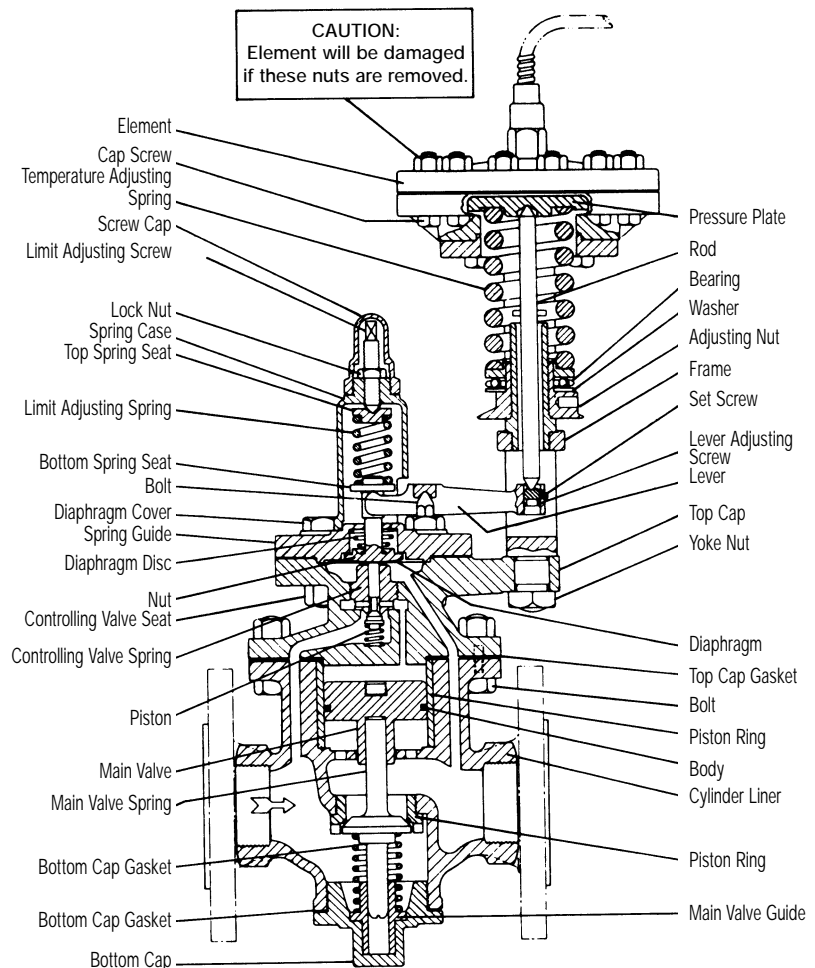
FIXED GAIN TYPE ONLY (Classes LTCO, LTCKY, LTCL, LTCS, LTCYS, LTCYSM and JTC etc.)

Lever Clearance Adjustment

1. Relieve ALL existing VACUUM or pressure from under regulator diaphragm.
2. Screw adjusting nut upward until bottom edge of nut is even with #12 on Graduated Plate attached to yoke.



3. Remove limit spring case, top spring seat and limit spring.
4. Hold lever in firm contact with pivots and rod.
5. Press bottom spring seat down but not hard enough to open controlling valve.
6. Check gap (Dim. "A") between lever points and bottom spring seat with feeler gauge provided with regulator. If clearance is not a snug .020" loosen set screw and turn lever adjusting screw up into lever to decrease clearance or down out of lever to increase clearance as case may be until correct .020" is obtained. Tighten set screw.
7. Replace limit spring, top spring seat and limit spring case.
8. With temperature adjusting nut in position described in Par. 2, adjust limit screw for minimum steam pressure needed to heat maximum flow to required temperature. Do not adjust steam pressure for a greater value than that actually needed to control temperature of fluid being heated. Tighten lock nut.
9. Place regulator in service and adjust temperature adjusting nut to obtain value needed for heating process involved.



Type LTCO (Fixed Gain Types)

MAINTENANCE—ADJUSTABLE and FIXED GAIN TYPE

Disassembly

1. Remove limit spring case, top spring seat, limit spring, bottom spring seat and lever.

TO REMOVE LEVER ASSEMBLY FROM ADJUSTABLE GAIN TYPES - loosen and remove the four cap screws holding element to yoke. Lift off element and remove rod. Lever assembly can now be removed. DO NOT REMOVE GAIN ADJUSTMENT PARTS FROM LEVER UNLESS REPLACEMENT OF PARTS IS NECESSARY.

2. Remove diaphragm cover, diaphragm disc, guide spring, diaphragm, controlling valve and seat and control valve spring from top to cap.
3. Take off top cap, top cap gasket. Remove piston, cylinder liner and cylinder bottom. (Cylinder bottom is a part of body casting on older types and cannot be removed.) JTC TYPES ONLY - remove top cap, diaphragm and diaphragm disc.
4. Remove bottom cap and gasket. Take out main valve and main valve spring.

Clean and polish all parts. Replace any worn or damaged parts. Care should be taken in polishing bronze hard plated cylinder liners to prevent damage to plating. Use only 320 Grade Aluminum Oxide cloth or finer for polishing.

If controlling valve or main valve seating surfaces are scored or steam cut, Lap valve to seat using Carborundum Grade CF lapping compound or equivalent. Place cylinder liner and piston in body to use as guide when lapping in main valve. If a light lapping will not produce a good steam tight seat the parts should be replaced. Remove all traces of compound before reassembly.

Replacement of Seat Ring

Special Seat Ring Wrenches may be ordered from Leslie Co. for removal of rings.

1. Place wrench over lugs of seat ring and hold firmly in place. Strike end of wrench several times with a hammer to help loosen ring. After removal clean all

threads and seating surfaces in body and of seat ring. Flat seating surface in body must be smooth and flat so that a steam tight joint is obtained between seat and ring.

2. Place a small amount of Never-Seez or similar lubricant on the first two threads of seat ring. Replace ring and tighten securely. It is good practice to blue in seat ring to make sure there is full contact between flat faces of ring and body.

Field Test of Thermal Element

Remove all compression from temperature adjusting spring. Remove element from yoke. Heat thermal bulb to a temperature 15° to 20°F. above minimum operating range of element. (Element range is stamped on outer edge of element head.) If under these conditions the pressure plate can be moved easily with a small pry bar or screwdriver the element is dead and must be replaced. If pressure plate cannot be moved the element is good and has not lost its charge.

Reassembly

1. Replace main valve, main valve spring, bottom cap gasket and bottom cap. Tighten bottom cap.

Before further assembly of JTC classes check clearance between body flange face and upper end of main valve stem. Clearance should be 1/16", (Plus 1/64" minus .000".) Upper end of main valve may be ground off to obtain proper clearance or parts replaced.

Piston Ring Class - Remove piston rings. Clean piston rings and grooves in piston. When replacing rings make sure that they move freely in their grooves and that they expand into the cylinder liner.

Teflon Fitted Class - Remove screw(s) holding piston cup washer and disc to piston. Clean or replace parts. Reassemble parts (with beveled lip of piston cup washer upward). Be sure not to mar teflon. Insert screw(s). Tighten securely.

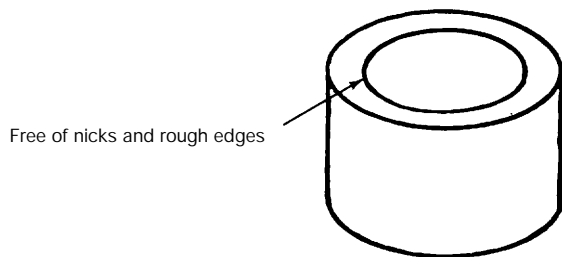
2. Install cylinder bottom, cylinder liner and piston.
3. Place new top cap gasket on body followed by top cap. Tighten nuts and bolts evenly.
4. Install controlling valve spring, controlling valve and controlling seat in top cap. Tighten seat. Measure clearance between top cap diaphragm seat and end of controlling valve. Controlling valve should be .001 to .002 below diaphragm face. Maximum allowable clearance is .005. If more than .005 the top cap should be remachined making sure all CRITICAL DIMENSIONS ARE MAINTAINED.
5. Position diaphragm in top cap. Fit guide spring in diaphragm cover with large diameter of spring upward. Install diaphragm disc and cover. Tighten bolts and nuts evenly. (Cap screws in LTCL types.)
6. Place lever on pivots.

ADJUSTABLE GAIN TYPES - place lever on pivots. Insert blade spring through indicator on slider with curved ends of blade spring upward. Install rod making sure end of rod passes through hole in blade spring and into hole in lever. Replace element and tighten cap screws.

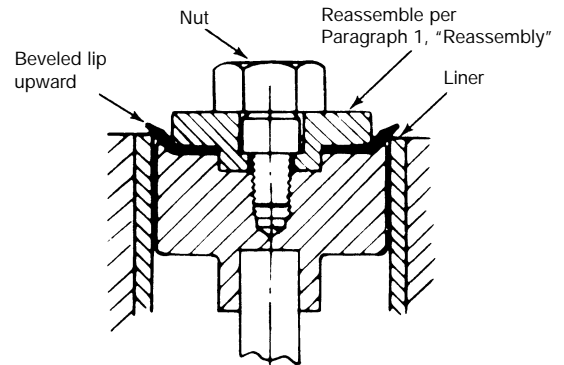
7. Install bottom spring seat. Calibrate regulator. See instruction for "Adjusting Lever Clearance" and or "Calibration of Gain Mechanism."
8. Install limit spring, top spring seat, and limit spring case with adjusting screw and lock nut.

Field Replacement of Piston Cup Washers

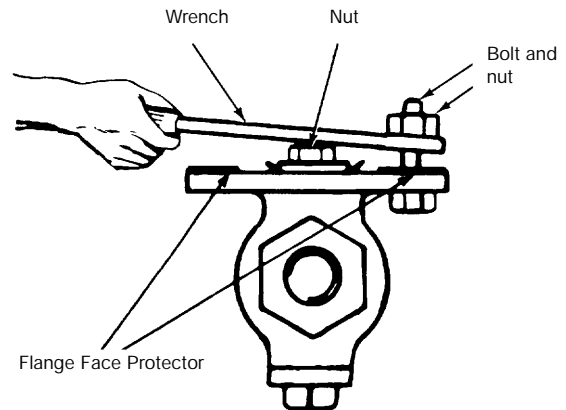
1. Be sure cylinder liner is clean and I.D. free of rough, ragged edges.



2. Install cylinder liner in main body.
3. Place completed piston assembly in the cylinder liner with piston cup washer upward.

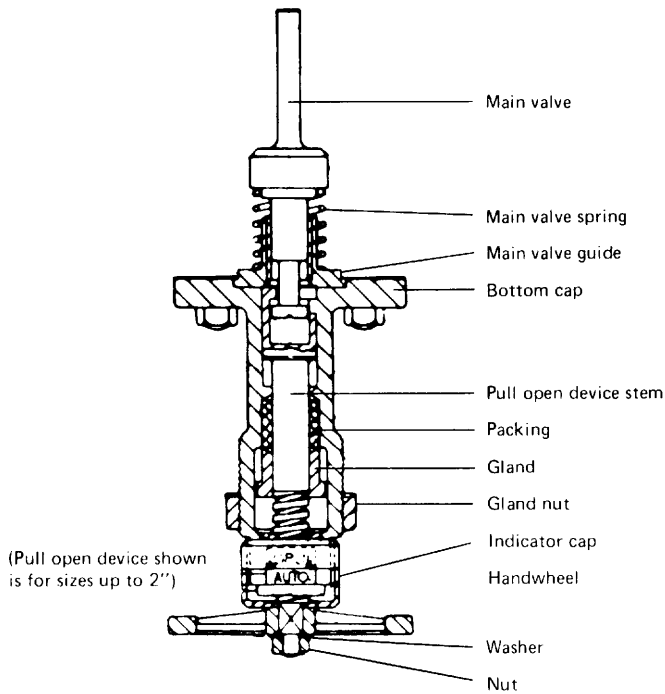


4. Place bolt and nut in one hole of main body top cap flange. Position nut on top of piston. Note: Place protector over main body flange face at points where wrench may contact face in order to prevent damage to flange or cylinder liner. Using wrench as a lever, push piston assembly into cylinder liner.



5. Remove nut from top of piston and bolt from main body and complete assembly of regulator in accordance with instructions under "Reassembly."

Maintenance of Bottom Cap Assemblies in Temperature Regulators fitted with Manual Pull Open Devices—Classes LTCYSM, etc.



Disassembly

Remove handwheel nut, washer, handwheel and indicator cap. Loosen packing gland nut (sizes up to 2") or eyebolts and nuts (sizes 2-1/2" and over).

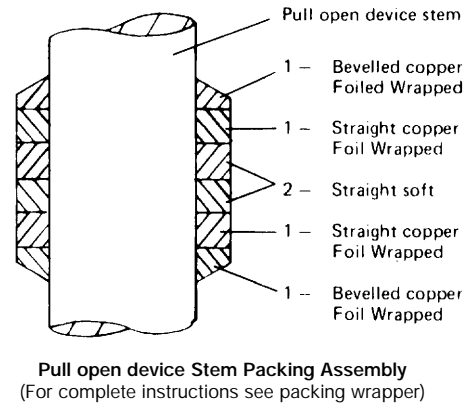
Grasp stem with wrench on flats and turn stem toward bushing until bottom of opening in stem clear bottom cap. Disassemble main valve, main valve guide and main valve spring from assembly. Remove packing nut (or flange) and gland.

Unscrew stem from assembly. Take out old packing. Clean packing box thoroughly with an approved solvent. Clean all parts. Replace any badly worn or damaged part.

Reassembly

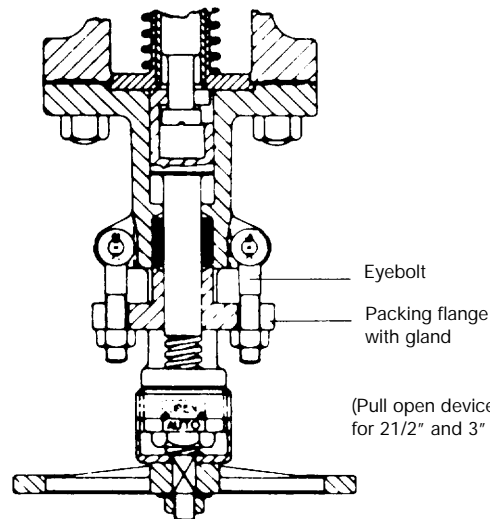
Install new set of packing in the order shown below and on Packing Wrapper. Reassemble packing gland and packing gland nut to bottom cap (in sizes 2-1/2" and over replace packing flange and reassemble eyebolts and nuts to flange).

Insert stem through bottom cap and packing. Turn stem into bushing until start of opening in side of stem is just slightly above bottom cap face.

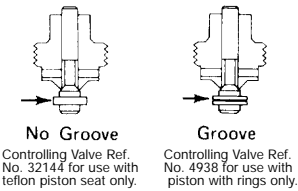


Place main valve spring and main valve guide over bottom end of main valve. Push down on main valve guide to compress spring. Then slide bottom end of main valve into slot on side of stem, positioning stem in fork.

Grasp flats on end of stem and turn stem up through bushing until main valve guide rests in bottom cap recess. Reassemble indicator cap, handwheel, washer and nut to stem. Tighten all parts. Reassemble assembly to body.



TROUBLE SHOOTING—ADJUSTABLE and FIXED GAIN TYPE

Problem Regulator will not shut off during no flow conditions.	
Possible Cause	Remedy
1. Bypass around regulator leaking.	Repair or replace valve.
2. Foreign matter between seating surfaces of main valve or controlling valve.	Disassemble regulator and clean parts. Replace worn or damaged parts.
3. Incorrect controlling valve clearance.	End of valve stem should be .001 to .002 below diaphragm face.
4. Defective thermal element.	Replace element and readjust lever clearance.
5. Gain adjustment incorrect	See "OPERATION" section of instruction.
6. Incorrect controlling valve in regulator.	
7. Excessive vacuum under regulator diaphragm causing regulator to open although there is no demand for steam.	Check and correct. May need vacuum breaker.
Problem Drop in fluid temperature during high load demands.	
Possible Cause	Remedy
1. Steam limit pressure incorrect. (Too low.)	Increase steam limit pressure setting.
2. Adjustable Gain Types – Incorrect gain setting.	Readjust gain to meet process demands.

Problem Erratic control of fluid temperature.	
Possible Cause	Remedy
1. Dirt between piston & cylinder	Disassemble and clean regulator.
2. Thermal bulb not feeling temperature changes. Transmission lag. Bulb located too far from outlet of heater. See Installation Instructions.	Check bulb location to make sure it is in fluid flow and at outlet of heater. Check for build-up of foreign matter on bulb or bulb casing that could cause heat transfer lag.
3. Incorrect lever clearance	Check and correct
4. Adjustable Gain Types – Gain setting incorrect.	Readjust to meet process demands
Problem Overheating of fluid being controlled.	
Possible Cause	Remedy
1. Defective thermal element.	Replace element.
2. Incorrect lever clearance.	Readjust or recaliper instructions.
3. Steam pressure limit adjustment incorrect. (Too high.)	Readjust per instructions.
4. Adjustable Gain Types - Gain setting incorrect.	Readjust to meet system demands.
5. Thermal bulb not feeling actual temperature of fluid being heated.	Check and correct. See Par. 3. "Erratic Control of Heated Fluid."
6. Excessive vacuum under regulator diaphragm causing regulator to open although there is no demand for steam.	Check and correct. May need vacuum breaker.

PARTS LIST

THE PARTS LISTED IN TABLE BELOW HAVE SAME REFERENCE NUMBER IN ALL SIZES INDICATING COMPLETE INTERCHANGEABILITY FOR CLASSES LTCP, LTCP, LTCPY, LTCPKY, LTCLP, LTCLP, LTCLPY, LTCLPKY, LTCLPKY & PREFIX "Q" CLASSES.

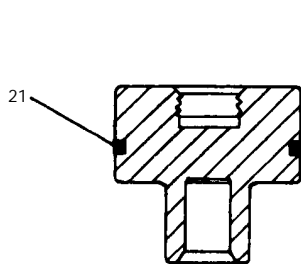
PART NO.	PART NAME	MATERIAL	MATERIAL SPEC.	QTY. PER UNIT	REFERENCE NOS. 1/2" TO 4" SIZES
1	Cap Screw, Dis. Cover (Note 21)	Steel	Commercial	4	23545
2	Limit Screw	Stainless Steel	AISI Type 416	1	10974
3	Lock Nut	Brass	ASTM B-16	1	9340
4	Limit Spring Seat, Top	Brass	ASTM B-16	1	10971
5	Limit Spring (Note 20)	Steel, Cad. Pl	Commercial	1	11084
5	Limit Spring (Note 21)	Spring Steel	Commercial	1	11063
6	Limit Spring Case	Cast Bronze	ASTM B-61	1	11782
7	Limit Spring Seat, Bottom	Brass	ASTM B-16	1	11784
8	Guide Spring	Stainless Steel	AISI Type 302	1	11669
9	Diaphragm Cover (Note 20)	Carbon Steel	AISI 10 20 HR	1	11779
9	Diaphragm Cover (Note 21)	Carbon Steel	AISI 10 20 HR	1	23418
10	Diaphragm Plate (Note 20)	Brass	ASTM B-16	1	11780
10	Diaphragm Plate (Note 21)	Cast Brass	ASTM B-16	1	11780
11	Diaphragm (Note 20)	Cast Bronze	ASTM B-61	1	23411
11	Diaphragm (Note 21)	Stainless Steel	AISI Type 302	1	9120
12	Controlling Valve & Seat Set	Stainless Steel	AISI Type 303 / 420	1	61656
14	Nut	Steel	ASTM A-194, Gr. 2H	4	3676
15	Bolt	Steel	ASTM A-193, Gr. B7	4	4488
18	Pilot Plug Spring	Inconel	Commercial	1	4930
34	Pressure Plate	Cast Iron	ASTM A-126 Cl. B	1	22246
35	Cap Screw, Frame	Steel, Plated	Commercial	1	4930
36	Adjusting Spring	Spring Steel, Pl.	Commercial	1	11755
37	Bottom Spring Seat	Brass	ASTM B-16	1	11683
38	Thrust Bearing (Note 10)	(Note 10)	(Note 10)	1	11684
39	Washer	Stainless Steel	AISI Type 302/304	1	11 685
40	Adjusting Nut	Cast Bronze	ASTM B-61	1	11681
41	Frame, Complete (Note 11)	Cast Iron	ASTM A-126, Cl. B	1	32272
42	Rod	Bronze	ASTM A-124, GR. 3	1	60671
43	Lever (Note 23)	Aluminum Bronze	ASTM 148-9D	1	60617
47	Pivot Bolt	Steel, Plated	AISI C-1231	1	11672
49	Nut	Steel, Cad. Pl.	Commercial	1	11689
50	Pivot Belt Nut	Steel	ASTM A-184, GR. 2H	1	3676
53	Graduation Plate	Brass	ASTM B-16	1	11686
58	Limit Spring Case Screw	Brass	ASTM B-16	1	9982
59	Blade Spring	Stainless Steel	AISI Type 301-2B	1	38036
60	Adjusting Screw	Stainless Steel	AISI Type 303	1	60670
61	Right Hand Slider Block	Stainless Steel	AISI Type 302	1	38028
62	Indicator	Stainless Steel	AISI Type 302	1	38027
63	Drive Screw	Steel, Cad. Pl.	Commercial	1	58376
64	Left Hand Slider Block	Stainless Steel	AISI Type 302	1	38029
65	Lock Nut	Steel	Commercial	1	38060
66	Spring Clip	Stainless Steel	AISI Type 302/304	1	60672
67	Jam Nut	Stainless Steel	AISI Type 302	1	24191
	Controlling Valve Seat Wrench	Steel	Commercial	1	33652
	Adjusting Rod	Steel, Plated	Commercial	1	11808
	Feeler Gage	Stainless Steel	AISI Type 302	1	13507

RECOMMENDED SPARE PARTS.

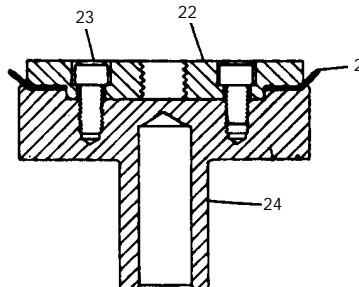
THESE PARTS SHOULD BE ON HAND, PLUS RECOMMENDED SPARE PARTS, WHEN OVERHAULING THIS EQUIPMENT.

NOTE 23 - Lever Assembly Kit, Ref. No. 011954701, consisting of one each Part No. 42, 43, 59, 60, 61, 62, 63, 64, 65, 66, & 67 and conversion instructions is furnished for conversion of Class LTCO, LTCL, LTCY, LTCLY, LTCY, to LTCP, LTCPL, LTCPY, LTCLPY, LTCLPKY, & Prefix "Q" Classes.

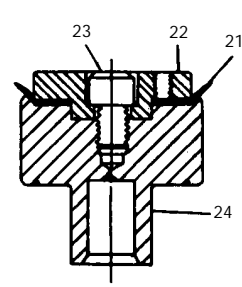
Refer to table on Page 12 for Part Numbers and Notes not shown in table above.



ENLARGED VIEW OF
PISTON COMPLETE. PART NO. 25.
ALL SIZES FOR CLASSES
WITHOUT "Y" IN CLASS

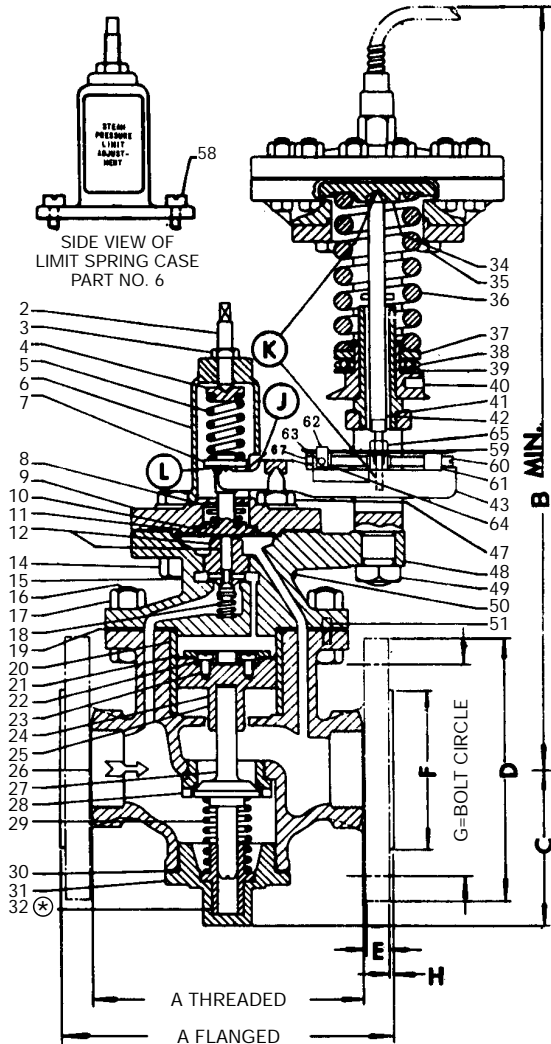
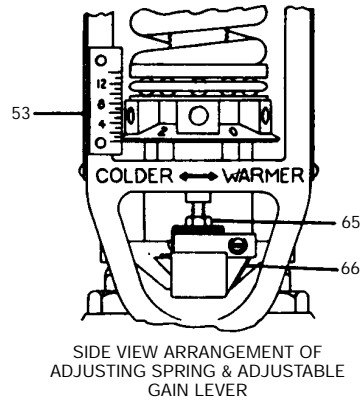
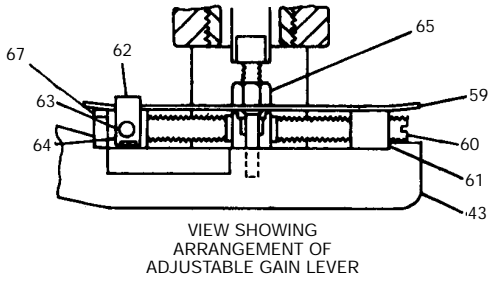


ENLARGED VIEW OF
PISTON COMPLETE. PART NO. 25.
FOR SIZES 1-1/4" & UP
WITH "Y" IN CLASS

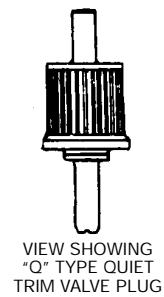
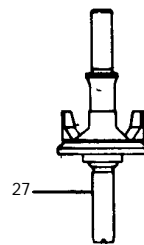
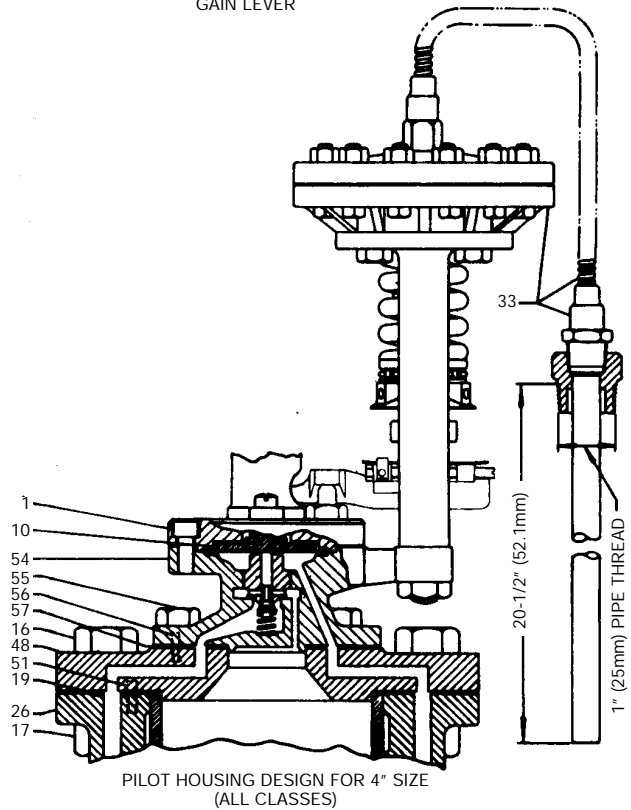


ENLARGED VIEW OF
PISTON COMPLETE. PART NO. 25.
FOR 1/2" TO 1" SIZES
WITH "Y" IN CLASS

PARTS DIAGRAMS



⊗ REMOVABLE ONLY IN 1/2" TO 4" SIZES CLASS LTCPKY, LTCLPKY, QLTCPKY & QLTCLPKY



PARTS LIST

Adjustable Gain Classes LTCP, LTCPY, LTCPKY, LTCLP, LTCLPY AND LTCLPKY

PART NO.	PART NAME	MATERIAL	QTY PER MATERIAL SPEC.	UNIT	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"
16	Bolt (Note 14)	Steel	ASTM A-193, GR. B7	(1)	9008	9008	9008	9008	9008	4021	4021	3653	3653	19389
16	Bolt (Note 17)	Steel	ASTM A-193, GR. B7	(1)	23624	23624	23624	23624	23624	23624	28945	36150	--	12984
17	Nut (Note 14)	Steel	ASTM A-194, GR. 2H	(1)	3676	3676	3676	3676	3676	3676	3676	3677	36773	3678
17	Nut (Note 17)	Steel	ASTM A-194, GR. 2H	(1)	3676	3676	3676	3676	3676	3676	3676	3677	--	33811
19	Pilot Hunting Gasket (Note 19)	Copper, Asbestos	Commercial	1	4960	4960	4960	4945	4977	9003	9099	9177	9195	11967
19	Pilot Hunting Gasket (Note 17)	Sheet Packing	Commercial	1	23567	23567	23567	23566	23569	23570	30320	30321	--	30414
20	Cylinder Liner	Cast Bronze	SAE 660	1	4955	4955	4955	4940	4972	9039	9092	9196	9187	12006
20	Cylinder Liner (Note 18)	SST. Hardened	AISI Type 440C	1	11121	11121	11121	11172	11189	11122	11209	11195	11223	11966
21	Piston Ring (Note 18)	Cast Iron	Commercial	(16)	3355	3355	3355	3358	3359	3361	3362	3362	3365	3367
21	Piston Cup Washer	Teflon	Commercial	1	30470	30470	30470	30492	30496	30500	32944	32948	32952	32956
22	Piston Disc	Brass	ASTM B-61	1	30469	30469	30469	30491	30495	30499	32043	32047	32951	32955
23	Screw	Stainless Steel	Commercial	(7)	39599	39599	39599	39596	39596	39596	39510	39510	30510	39512
24	Piston (Notes 17 & 18)	Cast Bronze	ASTM B-61	1	59929	59929	59929	59938	30494	30498	59945	59951	32950	59960
24	Piston (Notes 15 & 18)	Cast Bronze	ASTM B-61	1	9344	9344	9344	9379	9403	9481	59937	9463	59936	11971
25	Piston Complete (Notes 17 & 18)	Bronze & Teflon	ASTM B-61 & Comm'l	1	59930	59930	59930	59940	30493	30497	59947	59953	32949	59962
26	Valve Body, Threaded (NOTE 14) (3)	Cast Bronze	ASTM B-61	1	9400	9414	9528	9413	9412	9511	--	--	--	--
26	Valve Body, Threaded (Note 17) (3)	Cast Iron	ASTM A-126, Cl. B	1	23500	23499	23505	23498	23495	23526	--	--	--	--
26	Valve Body, 125# Flg. (Note 17) (3)	Cast Iron	ASTM A-126, Cl. B	1	--	--	--	--	30960	30962	26092	26093	--	21722
26	Valve Body, 250# Flg. (Note 17) (3)	Cast Iron	ASTM A-126, Cl. B	1	--	--	--	--	30961	30963	26156	26162	--	33619
26	Valve Body, 150# Flg. (NOTE 14) (3)	Cast Bronze	ASTM B-61	1	44329	42799	44148	44147	44330	42785	44331	44332	44333	44334
26	Valve Body, 300# Flg. (NOTE 14) (3)	Cast Bronze	ASTM B-61	1	9487	9489	9529	9530	9387	9521	9411	9494	9512	11969
27	Valve Plug	SST. Hardened	AISI Type 420	1	13282	13282	13283	13284	13285	11124	47700	47630	47571	47568
28	Seat Ring	Stainless Steel	AISI Type 410	1	9821	9821	9445	9544	9446	9447	9448	9569	9562	11970
29	Plug Spring	Inconel	Commercial	1	9464	9464	9464	10201	3629	9252	9087	9176	4478	4478
30	Bottom Cap Gasket (NOTE 14)	(NOTE 5)	(NOTE 5)	1	3500	3500	3500	3499	9276	3504	9100	9178	9196	3126
30	Bottom Cap Gasket (Note 17)	Sheet Packing	Commercial	1	28138	28138	28138	28139	28140	18334	18524	18525	--	18526
31	Bottom Cap (NOTE 14)	Cast Bronze	ASTM B-143, Alloy 903	1	3116	3116	3116	--	9405	3122	9098	9175	9193	3126
31	Bottom Cap Comp. (Notes 13 & 17)	Cast Iron	ASTM A-126, Cl. B	1	60168	60168	60618	60169	60170	56492	56829	56830	--	56831
32	Bottom Cap Bushing (Note 17)	Stainless Steel	ASTM A-564, GR. 630	1	60165	60165	60165	--	--	23526	26101	26119	--	3380
33	Thermo-Element	(NOTE 9)	(NOTE 9)	1	--	--	--	--	--	--	--	--	--	--
48	Pilot Housing (Note 20)	(NOTE 6)	(NOTE 6)	1	11660	11660	11660	11661	11662	11663	11664	11665	(6)	21340
48	Pilot Housing (Note 21)	Cast Bronze	ASTM B-61	1	23441	23441	23441	23440	23438	23439	24452	24453	--	--
48	Pilot Housing (Note 22)	Cast Bronze	ASTM B-61	1	--	--	--	--	--	--	--	--	--	23140
48	Pilot Housing (LTCLPKY, QLTCPLKY)	Cast Iron	ASTM A-126, Cl. B	1	--	--	--	--	--	--	--	--	--	26138
51	Dowel Pin	Brass	ASTM B-61	1	3702	3702	3702	3702	3702	3702	3702	3702	3702	3705
52	Cap Screw, Bottom Cap (NOTE 4)	Steel	ASTM A-193, GR. B7	(8)	--	--	--	--	--	3709	9130	3716	3712	3716
52	Cap Screw, Bottom Cap (Note 17)	Steel	ASTM A-193, GR. B7	(8)	--	--	--	--	--	9130	9008	11886	--	11886
54	C.V. Housing (Note 20)	Cast Bronze	ASTM B-61	1	--	--	--	--	--	--	--	--	--	11660
54	C.V. Housing (Note 21)	Cast Bronze	ASTM B-61	1	--	--	--	--	--	--	--	--	--	11660
55	Cap Screw (Note 21)	Steel	ASTM A-193, GR. B7	6	--	--	--	--	--	--	--	--	--	3709
56	Dowel Pin	Brass	ASTM B-16	1	--	--	--	--	--	--	--	--	--	3702
57	Housing Gasket (NOTE 14)	Copper, Asbestos	Commercial	1	--	--	--	--	--	--	--	--	--	4960
57	Housing Gasket (Note 17)	Sheet Packing	Commercial	1	--	--	--	--	--	--	--	--	--	23567
27	Valve Plug, "Q" Classes only	Stainless Steel	AISI Type 420	1	59821	59821	59872	59875	59878	59880	59814	59885	59890	59895
	Seat Ring Wrench	Steel	A-519 GR. 1015	1	28066	28066	28066	28067	28068	28069	53156	53157	53158	53159

RECOMMENDED SPARE PARTS.

THESE PARTS SHOULD BE ON HAND, PLUS RECOMMENDED SPARE PARTS, WHEN OVERHAULING THIS EQUIPMENT.

- NOTE 1 - Quantities are: Six (6) for 1/2" to 2" sizes and Eight (8) for 2-1/2" to 4" sizes.
- NOTE 2 - Piston, Complete consists of Piston Cup Washer, Part No. 21; Piston Disc, Part No. 22; Screws, Part No. 23 and Piston, Part No. 24.
- NOTE 3 - Main Body is furnished complete with Seat Ring, Part No. 28 and Dowel Pin, Part No. 51.
- NOTE 4 - Stainless Steel, Hard Faced Seating Surface.
- NOTE 5 - Material and Material Spec. is Sheet Copper, Commercial for 1/2" to 1-1/2" sizes and Copper, Asbestos Filled, Commercial for 2" to 4" sizes.
- NOTE 6 - Material and Material Spec. is Cast Bronze, ASTM B-61 for 1/2" to 3" sizes; Three (3) for 1 1/2" to 2 1/2" sizes and Four (4) for 11666-03 for the 3 1/2" size and Steel, ASTM A-285 GR. C for the 4" sizes.
- NOTE 7 - Quantities are: One (1) for 1/2" to 1" sizes; Two (2) for 1 1/4" sizes; Three (3) for 1 1/2" to 2 1/2" sizes and Four (4) for 3" to 4" sizes.
- NOTE 8 - Quantities are : Six (6) for 2" to 3" sizes and Eight (8) for 2 1/2" to 4" sizes.
- NOTE 9 - Specify Range, Length of Tubing and Material.
- NOTE 10 - Stainless Steel Balls, Brass Retainer.
- NOTE 11 - Frame, Complete consists of Adjusting Sleeve and Adjusting Nut, Part No. 40.
- NOTE 12 - 3 1/2" size available in Classes LTCP, LTCPY, LTCPKY, QLTCPL, QLTCPLPY, QLTCPLKY only.
- NOTE 13 - Bottom Cap is furnished complete with Piston Rings, Part No. 21.
- NOTE 14 - Classes LTCP, LTCPY, LTCLP, LTCLPY, QLTCPL, QLTCPLPY, QLTCPLP & QLTCPLPY.
- NOTE 15 - Piston is furnished complete with Piston Rings, Part No. 21.
- NOTE 16 - One Piston Ring per valve for sizes 1/2" to 1 1/2" and Two Piston Ring per valve for sizes 2" to 4".
- NOTE 17 - Class LTCPKY, LTCLPKY, QLTCPLKY & QLTCPLPY.
- NOTE 18 - Class LTCP, LTCLP, QLTCPL, QLTCPLP.
- NOTE 19 - Class LTCPY, LTCLPY, QLTCPLPY & QLTCPLPY.
- NOTE 20 - Class LTCP, LTCPY, LTCPKY, QLTCPL, QLTCPLPY & QLTCPLKY.
- NOTE 21 - Class LTCLP, LTCLPKY, LTCLPKY, QLTCPL, QLTCPLPY & QLTCPLKY.
- NOTE 22 - Class LTCLP, LTCLPY, QLTCPLP & QLTCPLPY.

FOR ALL CLASSES NOT LISTED, PLEASE ORDER PARTS BY NAME AND INCLUDE SIZE, CLASS AND SERIAL NUMBER STAMPED ON FLANGE OF PILOT HOUSING.

NOMINAL PIPE SIZE		A	B	C	D	E	G	NO. OF HOLES	BOLT SIZE	BOLT HOLE	NET WT. LB.**
THREADED (BRONZE AND IRON)											
1/2	in	5 3/4	19 3/8	2 7/8	--	--	--	--	--	--	39 lb
15	mm	146.0	492.1	73.0	--	--	--	--	--	--	17.7 kg
3/4	in	5 3/4	19 3/8	2 7/8	--	--	--	--	--	--	39 lb
20	mm	146.0	492.1	73.0	--	--	--	--	--	--	17.7 kg
1	in	5 3/4	19 3/8	2 7/8	--	--	--	--	--	--	39 lb
25	mm	146.0	492.1	73.0	--	--	--	--	--	--	17.7 hg
1 1/4	in	5 3/4	19 5/8	3 1/8	--	--	--	--	--	--	41 lb
32	mm	146.0	498.0	79.3	--	--	--	--	--	--	18.6 kg
1 1/2	in	6 1/4	20	3 1/2	--	--	--	--	--	--	45 lb
40	mm	158.7	508.0	88.9	--	--	--	--	--	--	20.4 kg
2	in	7 1/2	20 1/2	3 1/2	--	--	--	--	--	--	57 lb
50	mm	190.5	520.7	88.9	--	--	--	--	--	--	25.9 kg
125 LB. ANSI STANDARD (IRON)											
1 1/2	in	7 1/2	20	4 1/8	5	9/16	3 7/8	4	1/2	5/8	54 lb.
40	mm	190.5	508.0	104.8	127.0	14.3	98.4	4	12.7	15.9	24.5 kg
2	in	8 3/4	20 1/2	4 3/8	6	5/8	4 3/4	4	5/8	3/4	62 lb
50	mm	222.2	520.7	111.1	152.4	15.9	120.7	4	15.9	19.1	28.1 kg
2 1/2	in	9 3/4	21 3/4	5 1/2	7	11/16	5 1/2	4	5/8	3/4	80 lb
65	mm	247.7	542.9	139.7	177.8	17.5	139.7	4	15.9	19.1	36.3 kg
3	in	11	21 7/8	6 1/2	7 1/2	3/4	6	4	5/8	3/4	109 lb
80	mm	279.4	555.6	165.1	190.5	19.1	152.4	4	15.9	19.1	49.4 kg
4	in	13 1/2	23 1/2	7	9	15/16	7 1/2	8	5/8	3/4	169 lb
100	mm	342.9	596.9	177.8	228.6	23.8	190.5	8	15.9	19.1	76.5 kg
250 LB. FLANGED ANSI STANDARD (IRON)											
1 1/2	in	8	20	4 1/8	6 1/8	3/4	4 1/2	4	3/4	7/8	58 lb
40	mm	203.2	508.0	104.8	155.6	19.1	114.3	4	19.1	22.2	26.3 kg
2	in	9 1/4	20 1/2	4 3/8	6 1/2	13/16	5	8	5/8	3/4	70 lb
50	mm	235.0	520.7	111.1	165.1	20.6	127.0	8	15.9	19.1	31.8 kg
2 1/2	in	10 3/8	21 3/8	5 1/2	7 1/2	15/16	5 7/8	8	3/4	7/8	90 lb
65	mm	263.5	542.9	139.7	190.5	23.8	149.2	8	19.1	22.2	40.8 kg
3	in	11 3/4	21 7/8	6 1/2	8 1/4	1 1/16	6 5/8	8	3/4	7/8	121 lb
80	mm	298.5	555.6	165.1	209.6	27.0	168.3	8	19.1	22.2	54.9 kg
4	in	14 1/8	23 1/2	7	10	1 3/16	7 7/8	8	3/4	7/8	380 lb
100	mm	358.8	596.9	177.8	254.0	30.2	200.0	8	19.1	22.2	172.4
150 LB. FLANGED ANSI STANDARD (BRONZE)											
1/2	in	6 3/4	19 3/8	2 7/8	3 1/2	9/16	2 3/8	4	1/2	5/8	42 lb
15	mm	171.5	492.1	73.0	88.9	14.3	60.3	4	12.7	15.9	19.1 kg
3/4	in	6 3/4	19 3/8	2 7/8	3 7/8	9/16	2 3/4	4	1/2	5/8	43 lb
20	mm	171.5	492.1	73.0	98.4	14.3	69.9	4	12.7	15.9	19.5 kg
1	in	6 3/4	19 3/8	2 7/8	4 1/4	9/16	3 1/8	4	1/2	5/8	44 lb
25	mm	171.5	492.1	73.0	108.0	14.3	79.3	4	12.7	15.9	20.0 kg
1 1/4	in	7	19 5/8	3 1/8	4 5/8	9/16	3 1/2	4	1/2	5/8	46 lb
32	mm	177.8	498.5	79.3	117.5	14.3	88.9	4	12.7	15.9	20.9 kg
1 1/2	in	7 1/2	20	3 1/2	5	9/16	3 7/8	4	1/2	5/8	53 lb
40	mm	190.5	508.0	88.9	127.0	14.3	98.4	4	12.7	15.9	24.0 kg
2	in	8 3/4	20 1/2	3 1/2	6	5/8	4 3/4	4	5/8	3/4	66 lb
50	mm	222.2	520.7	88.9	152.4	15.9	120.7	4	15.9	19.1	29.9 kg
2 1/2	in	9 3/4	21 3/8	4 3/8	7	11/16	5 1/2	4	5/8	3/4	82 lb
65	mm	247.7	542.9	111.1	177.8	17.5	139.7	4	15.9	19.1	37.2 kg
3	in	11	21 7/8	5 1/4	7 1/2	3/4	6	4	5/8	3/4	111 lb
80	mm	279.4	555.6	133.4	190.5	19.1	152.4	4	15.9	19.1	50.3 kg
3 1/2	in	12	22 3/8	6	8 1/2	11/16	7	8	5/8	3/4	145 lb
90	mm	304.8	568.3	152.4	215.9	17.5	177.8	8	15.9	19.1	65.8 kg
4	in	13	23 1/2	7	9	11/16	7 1/2	8	5/8	3/4	171 lb
100	mm	330.2	596.9	177.8	228.6	17.5	190.5	8	15.9	19.1	77.6 kg
300 LB. FLANGED ANSISTANDARD (BRONZE)											
1/2	in	6 3/4	19 3/8	2 7/8	3 3/4	9/16	2 5/8	4	1/2	5/8	43 lb
15	mm	171.5	492.1	73.0	95.3	14.3	66.7	4	12.7	15.9	19.5 kg
3/4	in	6 3/4	19 3/8	2 7/8	3 3/4	9/16	2 5/8	4	5/8	3/4	44 lb
20	mm	171.5	492.1	73.0	95.3	14.3	66.7	4	15.9	19.1	20.0 kg
1	in	6 3/4	19 3/8	2 7/8	4 7/8	9/16	3 1/2	4	5/8	3/4	45 lb
25	mm	171.5	492.1	73.0	123.8	14.3	88.9	4	15.9	19.1	20.4 kg
1 1/4	in	7	19 5/8	3 1/8	5 1/4	9/16	3 7/8	4	5/8	3/4	47 lb
32	mm	177.8	498.5	79.3	133.4	14.3	98.4	4	15.9	19.1	30.4 kg
1 1/2	in	7 1/2	20	3 1/2	6 1/8	9/16	4 1/2	4	3/4	7/8	54 lb
40	mm	190.5	508.0	68.9	155.6	14.3	114.3	4	19.1	22.2	24.5 kg
2	in	8 3/4	20 1/2	3 1/2	6 1/2	5/8	5	4	5/8	3/4	67 lb
50	mm	222.2	520.7	88.9	165.1	15.9	127.0	4	15.9	19.1	30.4 kg
2 1/2	in	9 3/4	21 3/8	4 3/8	7 1/2	11/16	5 7/8	8	3/4	7/8	84 lb
65	mm	247.7	542.9	111.1	190.5	17.5	149.2	8	19.1	22.2	38.1 kg
3	in	11	21 7/8	5 1/4	8 1/4	3/4	6 5/8	8	3/4	7/8	114 lb
80	mm	279.4	555.6	133.4	209.6	19.1	168.3	8	19.1	22.2	51.7 kg
3 1/2	in	12	22 3/8	6	9	13/16	7 1/4	8	3/4	7/8	150 lb
90	mm	304.8	568.3	152.4	228.6	20.6	184.2	8	19.1	22.2	68.0 kg
4	in	13	23 1/2	7	10	1 1/16	7 7/8	8	3/4	7/8	177 lb
100	mm	330.2	596.9	177.8	254.0	27.0	200.0	8	19.1	22.2	80.3 kg

SIZE & WEIGHT CHART

Adjustable Gain Classes LTCP, LTCPY, LTCPKY, LTCLP, LTCLPY AND LTCLPKY

FOR COMPLETE LIST OF BULB CASINGS SEE DRAWING NUMBER 60/0.4.1.2.

INSTRUCTIONS FOR ADJUSTMENT WHEN INSTALLING ALL NEW VAPOR FILLED THERMOSTATIC ELEMENTS ON TEMPERATURE REGULATORS

1. Install new Thermostatic Element and adjust as follows:
2. Screw Adjusting Nut (40) up to 10 on the Graduation Plate (53).
3. Remove Limit Spring Case Screws (58) Limit Spring Case (6) Limit Spring (5) and Limit Spring Seat (4).
4. Press down Lever (43) at point "j" so that Rod is firmly held in place at points "K".
5. Hold Limit Spring Seat (7) in place by pressing lightly with the finger on same, sufficient only to feel fit of Gage and positively not enough to force down Pilot Plug (13).
6. Adjust gap between Limit Spring Seat (7) and Lever (43) at point "L" by means of Lock Nut (65) holding Rod (42) on flats. Gain Adjustment must be set at maximum. (Slider Blocks (61&64) close together when Gap Adjustment is made). The correct adjustment is obtained when parts just bite on .020 Feeler Gage.
7. Replace parts removed under Instructions in Paragraph 3 and set Regulator for correct limit pressure, temperature and Gain in accordance with standard instructions.
8. Feeler Gage is furnished with Thermostatic Element.
9. Be sure Jam Nut (67) is locked tight against Slider Block.

250 LB. ANSI FLANGE STD.			
NOMINAL PIPE SIZE		F	H
1 1/2	in	3 9/16	1 1/16
40	mm	90.5	1.6
2	in	4 3/16	1 1/16
50	mm	106.4	1.6
2 1/2	in	4 15/16	1 1/16
65	mm	125.4	1.6
3	in	5 11/16	1 1/16
80	mm	144.5	1.6
4	in	6 15/16	1 1/16
100	mm	176.2	1.6

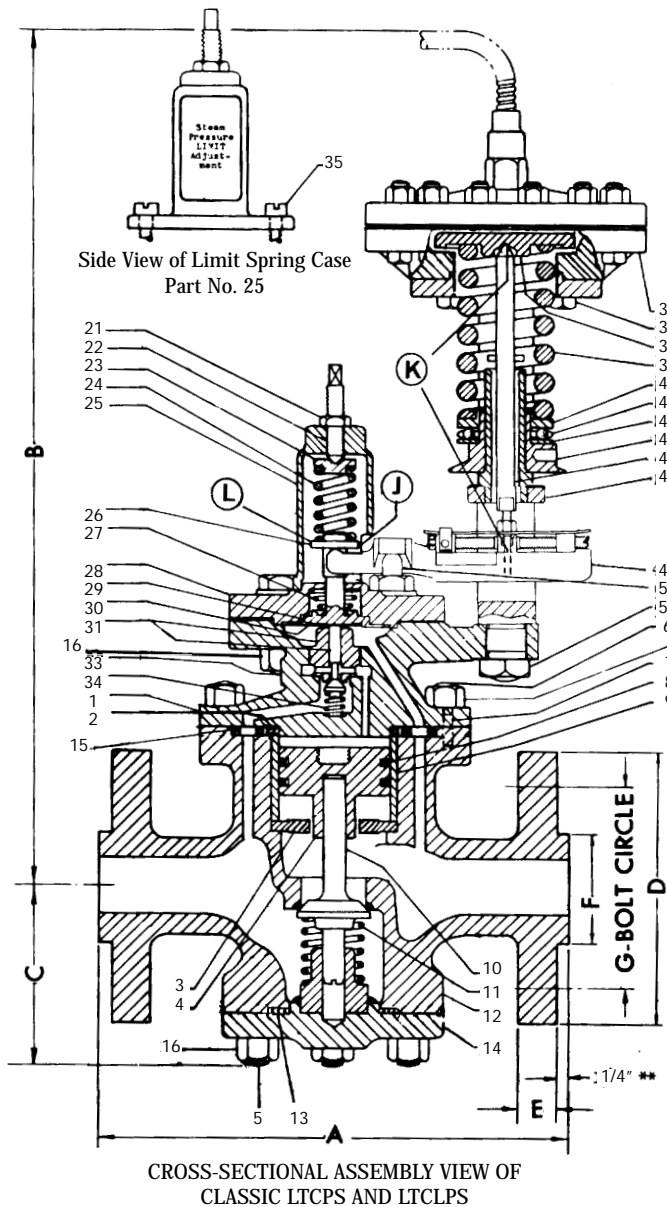


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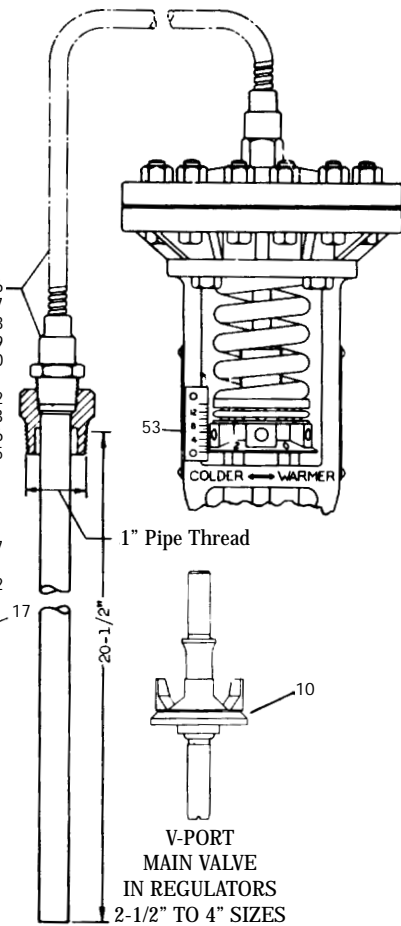
TEMPERATURE REGULATOR WITH DUO-MATIC ADJUSTABLE GAIN CLASSES LTCP, LTCPY, LTCPKY, LTCLP, LTCLPY AND LTCLPKY
1/2" TP 4" SIZES ALSO PREFIX "Q" CLASSES

DATE	APP'D.	D'W'N	DRG.
	EB	MJ	60/3.4.2.2 NO.

PRINTED IN THE USA



CROSS-SECTIONAL ASSEMBLY VIEW OF CLASSIC LTCPS AND LTCLPS

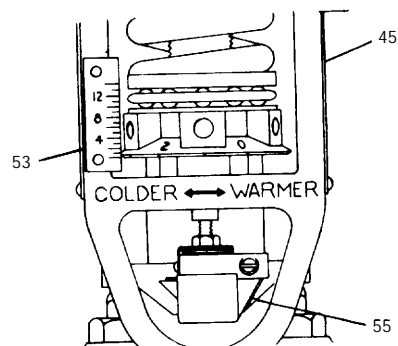


VIEW SHOWING ARRANGEMENT OF ADJUSTABLE GAIN LEVER

INSTRUCTIONS FOR ADJUSTMENT WHEN INSTALLING ALL NEW VAPOR FILLED THERMOSTATIC ELEMENTS ON STEEL TEMPERATURE REGULATORS

1. Install new Thermostatic Element and adjust as follows:
2. Screw Adjusting Nut 43 up to 10 on the Graduation Plate 53.
3. Remove Limit Spring Case Screws 35, Limit Spring Case 25, Limit Spring 24 and Limit Spring Seat 23.
4. Press down Lever 47 at point "J" so that Rod is firmly held in place at points "K".
5. Hold Limit Spring seat 26 in place by pressing lightly with the finger on same, sufficient only to feel fit of Gage and positively not enough to force down pilot plug 32.
6. Adjust gap between Limit Spring Seat 26 and Lever 47 at point "L" by means of Lock Nut 60, holding Rod 46 on flats. Gain Adjustment must be set at maximum, (Slider Blocks 57 and 58 close together when Gap Adjustment is made). The correct adjustment is obtained when parts just bite on .020 Feeler Gage.
7. Replace parts removed under Instructions in Paragraph 3 and set Regulator for correct limit pressure, temperature and Gain in accordance with standard instructions.
8. Feeler Gage is furnished with Thermostatic Element.
9. Be Sure Jam Nut (No. 32) is locked tight against Slider Block (57).

NOTE: Lever Assembly Kit Ref. No. 011 9547 01 consisting of one each Piece Nos. 46, 47, 55, 56, 57, 58, 59, 60, 61, 62 & 32 and conversion instructions is furnished for conversion of LTCLS-1, LTCYS-1, LTCOS-4, LTCSM-1, LTCYS-1, LTCYSM-1, Temperature Regulator to Adjustable Gain Type.



SIDE VIEW ARRANGEMENT OF ADJUSTING SPRING AND ADJUSTABLE GAIN LEVER

FOR COMPLETE LIST OF BULB CASINGS SEE DRAWING NUMBER 60/0.4.1.2

WEIGHT CHART IN INCHES FOR ADJUSTABLE GAIN CLASSES

Nom. Pipe Size	DIMENSIONS IN INCHES								No. of Holes	Bolt Size	Bolt Hole	Net Wt. lb* (Note 1)	Net Wt. lb* (Note 2)
	A	B	C	C-C	D	E	F	G					
150 LB. ANSI FLANGE STANDARD													
½"	7⅝	20⅞	3⅞	10½	3½	⅝	1⅜	2⅝	4	½	⅝	54	64
¾"	7⅝	20⅞	3⅞	10½	3⅞	⅝	1⅞	2⅝	4	½	⅝	55	65
1"	7½	20⅞	3⅞	10½	4¼	⅝	2	3⅞	4	½	⅝	56	66
1¼"	7⅞	21	3⅞	11	4⅝	⅞	2½	3½	4	½	⅝	61	71
1½"	8⅜	21⅜	4⅞	11⅜	5	½	2⅞	3⅞	4	½	⅝	69	79
2"	10¼	21⅝	4½	11¾	6	⅞	3⅞	4¾	4	⅝	¾	90	100
2½"	11⅝	22⅝	6	15¾	7	⅝	4⅞	5½	4	⅝	¾	115	130
3"	12½	23½	6⅞	17⅞	7½	1⅞	5	6	4	⅝	¾	144	159
3½"	13⅝	24⅞	7⅞	--	8½	¾	5½	7	8	⅝	¾	164	--
4"	14⅝	24½	7⅞	--	9	⅞	6⅞	7½	8	⅝	¾	221	--
300 LB. ANSI FLANGE STANDARD													
½"	8	20⅞	3⅞	10½	3¾	½	1⅜	2⅝	4	½	⅝	54	64
¾"	8	20⅞	3⅞	10½	4⅞	⅞	1⅞	3¼	4	⅝	¾	55	65
1"	8	20⅞	3⅞	10½	4⅞	⅝	2	3½	4	⅝	¾	56	66
1¼"	8⅜	21	3⅞	11	5¼	1⅞	2½	3⅞	4	⅝	¾	62	72
1½"	8⅞	21⅜	4⅞	11⅜	6⅞	¾	2⅞	4½	4	¾	⅞	70	80
2"	10¼	21⅝	4½	11¾	6½	1⅞	3⅞	5	8	⅝	¾	93	103
2½"	12¼	22⅝	6	15¾	7½	1⅞	4⅞	5⅞	8	¾	⅞	121	136
3"	13¼	23½	6⅞	17⅞	8¼	1⅞	5	6⅝	8	¾	⅞	153	168
3½"	14⅞	24⅞	7⅞	--	9	1⅞	5½	7¼	8	¾	⅞	173	--
4"	15	24½	7⅞	--	10	1⅞	6⅞	7⅞	8	¾	⅞	231	--
400 & 600 LB. ANSI FLANGE STANDARD													
½"	8½	20⅞	3⅞	10½	3¾	⅞	1⅜	2⅝	4	½	⅝	55	65
¾"	8½	20⅞	3⅞	10½	4⅞	⅝	1⅞	3¼	4	⅝	¾	56	66
1"	8½	20⅞	3⅞	10½	4⅞	1⅞	2	3½	4	⅝	¾	57	67
1¼"	9	21	3⅞	11	5¼	1⅞	2½	3⅞	4	⅝	¾	63	73
1-½"	9½	21⅜	4⅞	11⅜	6⅞	⅞	2⅞	4½	4	¾	⅞	71	81
2"	11½	21⅝	4½	11¾	6½	1	3⅞	5	8	⅝	¾	94	104
2-½"	13	22⅝	6	15¾	7½	1⅞	4⅞	5⅞	8	¾	⅞	122	137
3"	14	23½	6⅞	17⅞	8¼	1¼	5	6⅝	8	¾	⅞	144	169
3-½"	15	24⅞	7⅞	--	9	1⅞	5½	7¼	8	⅞	1	174	--
400 LB. ANSI FLANGE STANDARD													
4"	15¾	24½	7⅞	--	10	1⅞	6⅞	7⅞	8	⅞	1	232	--
600 LB. ANSI FLANGE STANDARD													
4"	16	24½	7⅞	--	10¾	1½	6⅞	8½	8	⅞	1	241	--

* APPROXIMATE

NOTE 1 - Net Wt. for Classes LTCPS & LTCLPS, LTCPS & LTCLPS
NOTE 2 - Net. Wt. for Class LTCPSM & LTCPSM

PARTS LIST FOR LTCPSM and LTCPSM

All parts are the same as shown on page 15 except parts listed here and shown on next page

PART NO.	PART NAME	MATERIAL	MATERIAL SPEC.	QTY. PER UNIT	REFERENCE NUMBERS - EACH SIZE							
					½"	¾"	1"	1¼"	1½"	2"	2½"	3"
66	Stem Packing Set	Molded Rings	Commercial	1	14461	14461	14461	14461	14461	14461	14466	14463
67	Gland	Bronze	ASTM B-61	1	56218	56218	56218	56218	56218	56218	10697	10715
68	Stem	Stainless Steel	AISI Type 416	1	43475	43475	43475	43475	43475	43475	43445	43452
69	Pin	Monel	Commercial	1	--	--	--	--	--	--	10701	10701
70	Bushing	Bronze	ASTM B-139	1	10601	10601	10601	10601	10601	10601	10696	10714
71	Indicator Cap	Cast Aluminum	ASTM B-26 Gr. SC64D	1	13149	13149	13149	13149	13149	13149	13150	13151
72	Handwheel	Cast Aluminum	ASTM B-26 Gr. S5A	1	43064	43064	43064	43064	43064	43064	23649	23649
73	Washer	Brass	ASTM B-16	1	10606	10606	10606	10606	10606	10606	10264	10264
74	Nut	Steel, Plated	ASTM A-194 Gr. 2H	1	9340	9340	9340	9340	9340	9340	3676	3676
75	Nut	Steel, Plated	ASTM A-194 Gr. 2H	2	42843	42843	42843	42843	42843	42843	3676	3676
76	Bolt	Steel, Plated	ASTM A-193 Gr. B7	2	13242	13242	13242	13242	13242	13242	10698	10698
77	Cotter Pin	Monel	Commercial	2	--	--	--	--	--	--	7080	7080
78	Indicator Plate	Brass	ASTM B-16	1	13163	13163	13163	13163	13163	13163	13163	13163

RECOMMENDED SPARE PARTS

★ THESE PARTS SHOULD BE ON HAND, PLUS RECOMMENDED SPARE PARTS WHEN OVERHAULING THIS EQUIPMENT

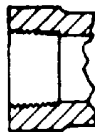
WEIGHT CHART IN MILLIMETERS FOR ADJUSTABLE GAIN CLASSES

Nom. Pipe Size	DIMENSIONS IN MILLIMETERS									No. of Holes	Bolt Size	Bolt Hole	Net Wt. kg* (Note 1)	Net Wt. kg* (Note 2)
	A	B	C	C-C	D	E	F	G						
150 LB. ANSI FLANGE STANDARD														
1/2"	15	193.6	530.2	87.3	266.7	88.9	7.9	34.9	60.3	4	12.7	15.8	24.4	29.0
3/4"	20	193.6	530.2	87.3	266.7	98.4	9.5	42.8	69.8	4	12.7	15.8	24.9	29.4
1"	25	190.5	530.2	87.3	266.7	107.9	9.5	50.8	79.3	4	12.7	15.8	25.4	29.9
1 1/4"	32	200.0	533.4	96.8	279.4	117.4	11.1	63.5	88.9	4	12.7	15.8	27.6	32.2
1 1/2"	40	212.7	542.9	104.7	288.9	127.0	12.7	73.0	98.4	4	12.7	15.8	31.2	35.8
2"	50	260.3	549.2	114.3	298.4	152.4	14.2	92.0	120.6	4	15.8	19.0	40.8	45.3
2 1/2"	65	295.2	573.8	152.4	400.0	177.8	15.8	104.7	139.7	4	15.8	19.0	52.1	58.7
3"	80	317.5	596.9	173.0	449.2	190.5	17.4	127.0	152.4	4	15.8	19.0	65.2	72.0
3 1/2"	90	339.7	612.7	193.0	--	215.9	19.0	139.7	177.8	8	15.8	19.0	74.3	--
4"	100	365.1	622.3	192.0	--	228.6	22.2	157.1	190.5	8	15.8	19.0	92.3	--
300 LB. ANSI FLANGE STANDARD														
1/2"	15	203.2	530.2	87.3	266.7	95.2	12.7	34.9	66.6	4	12.7	15.8	24.4	29.0
3/4"	20	203.2	530.2	87.3	266.7	117.4	11.1	42.8	82.5	4	15.8	19.0	24.9	29.4
1"	25	203.2	530.2	87.3	266.7	123.8	15.8	50.8	88.9	4	15.8	19.0	25.4	29.9
1 1/4"	32	212.7	533.4	96.8	279.4	133.3	17.4	63.5	98.4	4	15.8	19.0	28.1	32.2
1 1/2"	40	225.4	542.9	104.7	288.9	158.7	19.0	73.0	114.3	4	19.0	22.2	31.7	36.2
2"	50	373.0	549.2	114.3	298.4	165.1	20.6	93.0	127.0	8	15.8	19.0	42.1	46.6
2 1/2"	65	311.1	574.6	152.4	400.0	190.5	23.8	104.7	149.2	8	19.0	22.2	54.8	61.6
3"	80	336.3	595.9	173.0	449.2	209.5	26.9	127.0	168.2	8	19.0	22.2	68.8	76.1
3 1/2"	90	358.7	612.7	193.6	--	228.6	28.5	139.7	184.1	8	19.0	22.2	78.4	--
4"	100	358.0	622.3	192.0	--	254.0	30.1	157.1	200.0	8	19.0	22.2	104.7	--
400 & 600 LB. ANSI FLANGE STANDARD														
1/2"	15	215.9	530.2	87.3	266.7	96.2	14.2	34.9	66.6	4	12.7	15.8	24.9	29.4
3/4"	20	215.9	530.2	87.3	266.7	117.4	15.8	42.8	82.5	4	15.8	19.0	25.4	66
1"	25	215.9	530.2	87.3	266.7	117.4	17.4	50.8	88.9	4	15.8	19.0	25.8	67
1 1/4"	32	228.6	533.4	80.9	279.4	133.3	20.6	63.5	98.4	4	15.8	19.0	28.5	73
1 1/2"	40	241.3	542.9	104.7	288.9	155.5	22.2	73.0	114.3	4	19.0	22.2	32.2	81
2"	50	292.1	549.2	114.3	298.4	165.1	25.4	92.0	127.0	8	15.8	19.0	42.6	104
2 1/2"	65	330.2	574.6	152.4	400.0	190.5	28.5	104.7	149.2	8	19.0	22.2	55.2	137
3"	80	355.6	596.9	173.0	449.2	209.5	31.7	127.0	168.2	8	19.0	22.2	69.7	169
3 1/2"	90	381.0	612.7	193.6	--	228.6	34.9	139.7	184.1	8	22.2	25.4	78.8	--
400 LB. ANSI FLANGE STANDARD														
4"	100	400.0	622.3	192.0	--	254.0	34.9	157.1	200.0	8	22.2	25.4	105.2	--
600 LB. ANSI FLANGE STANDARD														
4"	100	402.4	622.3	192.0	--	373.0	38.1	173.0	215.9	8	22.2	25.4	109.2	--

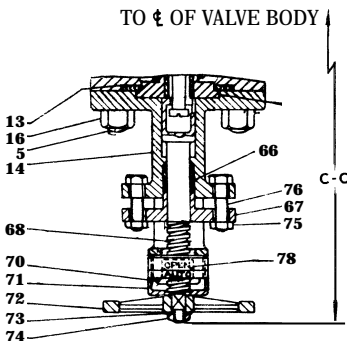
* APPROXIMATE

NOTE 1 - Net Wt. for Classes LTCPS & LTCPLS, LTCPYS & LTCPLYS
NOTE 2 - Net. Wt. for Class LTCPSM & LTCPYSM

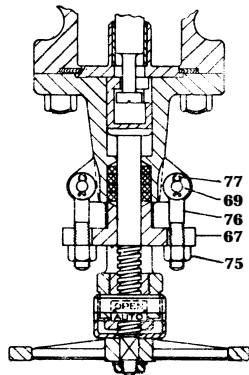
DIAGRAMS FOR LTCPSM and LTCPYSM



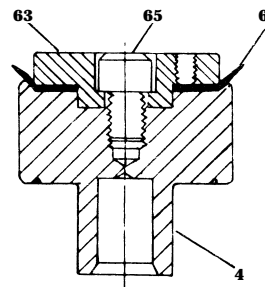
VIEW SHOWING 1/2" TO 2" THREADED MAIN BODY
(Dimensions A, B & C same as 300 Lb. ANSI Flange Standard)



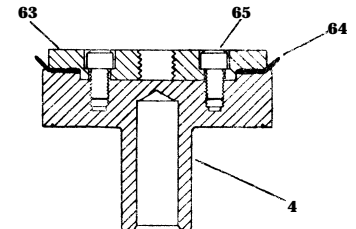
VIEW OF PULL OPEN DEVICE ON 1/2" TO 2" SIZES CLASSES LTCPSM & LTCPYSM



PULL OPEN DEVICE USED ON 2-1/2" TO 3" SIZES CLASSES LTCPSM & LTCPYSM



ENLARGED VIEW OF PISTON COMPLETE PART NO. 4 FOR 1/2" TO 1" SIZES CLASSES LTCPYS, LTCPLYS & LTCPYSM

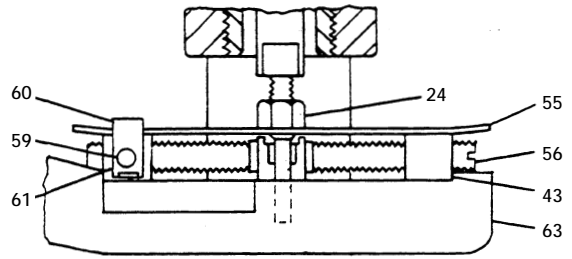


ENLARGED VIEW OF PISTON COMPLETE PART NO. 4 FOR 1-1/4" TO 3" SIZES CLASSES LTCPYS, LTCPLYS & LTCPYSM

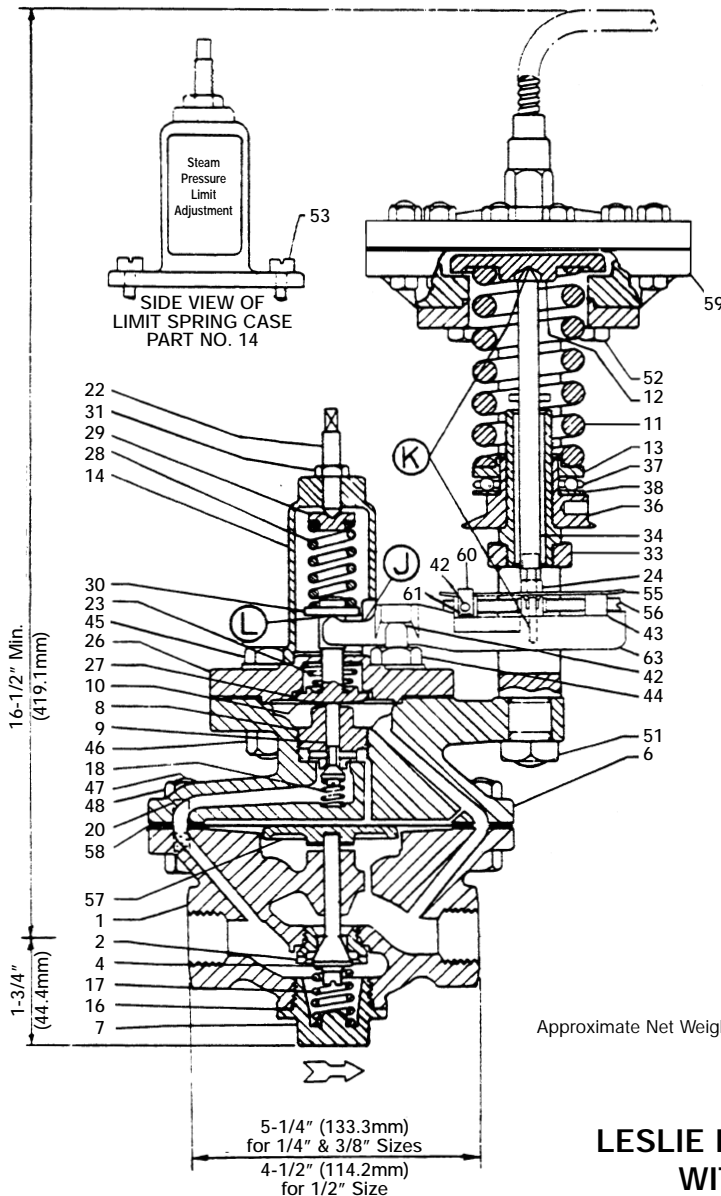
**INSTRUCTIONS FOR ADJUSTMENT WHEN INSTALLING ALL
NEW VAPOR FILLED THERMOSTATIC ELEMENTS ON
CLASS JTCP TEMPERATURE REGULATORS**

DRAWING NUMBER 60/3.4.1

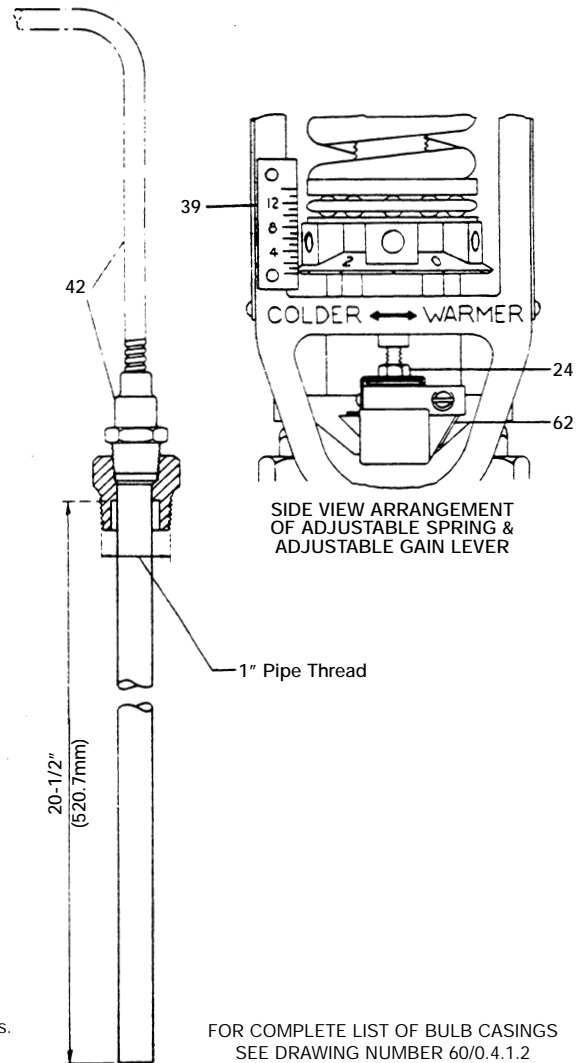
1. Install new Thermostatic Element and adjust as follows:
2. Screw Adjusting Nut 36 up to 10 on the Graduation Plate 39.
3. Remove Limit Spring Case Screws 53, Limit Spring Case 14, Limit Spring 28 and Limit Spring Seat 29.
4. Press down Lever 63 at point "J" so that Rod is firmly held in place at points "K".
5. Hold Limit Spring seat 30 in place by pressing lightly with the finger on same, sufficient only to feel fit of Gage and positively not enough to force down Pilot Plug 9.
6. Adjust gap between Limit Spring Seat 30 and Lever 63 at point "L" by means of Lock Nut 24, holding Rod 34 on flats. Gain Adjustment must be set at maximum, (Slider Blocks 61 and 43 close together when Gap Adjustment is made). The correct adjustment is obtained when parts just bite on .020 Feeler Gage.
7. Replace parts removed under Instructions in Paragraph 3 and set Regulator for correct limit pressure, temperature and Gain in accordance with standard instructions.
8. Feeler Gage is furnished with Thermostatic Element.



VIEW SHOWING
ARRANGEMENT OF
ADJUSTABLE GAIN LEVER



Approximate Net Weight 37 Lbs.



SIDE VIEW ARRANGEMENT
OF ADJUSTABLE SPRING &
ADJUSTABLE GAIN LEVER

FOR COMPLETE LIST OF BULB CASINGS
SEE DRAWING NUMBER 60/0.4.1.2

**LESLIE DUO-MATIC TEMPERATURE REGULATOR
WITH ADJUSTABLE GAIN CLASS JTCP
SIZES 1/4" , 3/8" AND 1/2"**

DRAWING NUMBER 60/3.4.1, CLASS JTCP

When ordering parts give Size, Class, Part Number & Part Reference Number from Table below.
Use Part Number only to locate Part on drawing.

PART NO.	PART NAME	MATERIAL	MATERIAL SPEC.	QTY. PER UNIT	REF. NO.
1	Valve Body, Threaded (Notes 1&2)	Cast Bronze	ASTM B-61	1	11924
1	Valve Body, Threaded (Notes 1&3)	Cast Bronze	ASTM B-61	1	11925
1	Valve Body, Threaded (Notes 1)	Cast Bronze	ASTM B-61	1	11226
2	Seat Ring	Stainless Steel P.H.	ASTM A-564 Gr. 630	1	11933
4	Valve Plug	Stainless Steel	AISI Type 440C	1	11917
6	Pilot Housing	Cast Bronze	ASTM B-61	1	12065
7	Bottom Cap	Cast Bronze	ASTM B-61	1	11950
8	Pilot Seat	Stainless Steel	AISI Type 303	1	32145
9	Pilot Plug	Stainless Steel, Hard.	AISI Type 420	1	4938
10	Diaphragm	Stainless Steel	AISI Type 302	1	9120
11	Adjusting Spring	Carbon Steel, Plated	AISI 1095	1	11755
12	Pressure Plate	Cast Iron	ASTM A-126, Cl. B	1	22246
13	Bottom Spring Seat	Brass	ASTM B-16	1	11683
14	Limit Spring Case	Cast Bronze	ASTM B-62	1	11782
16	Bottom Cap Gasket	Copper, Annealed	ASTM B-152	1	3493
17	Plug Spring	Inconel	Commercial	1	10980
18	Pilot Plug Spring	Inconel	Commercial	1	4930
20	Dowel Pin	Brass	ASTM B-16	1	3702
22	Lock Nut	Brass	Commercial	1	9340
23	Guide Spring	Inconel	Commercial	1	11669
24	Lock Nut	Steel	Commercial	1	38060
26	Diaphragm Cover	Carbon Steel	AISI 1020HR	1	11779
27	Diaphragm Plate	Brass	ASTM B-16	1	11780
28	Limit Spring	Silicon Chrome Cad. Pl.	Commercial	1	11084
29	Limit Spring Seat, Top	Brass	ASTM B-16	1	10971
30	Limit Spring Seat, Bottom	Brass	ASTM B-16	1	11784
31	Limit Screw	Stainless Steel	AISI Type 416	1	10974
33	Frame, Complete	Cast Iron	ASTM A-126, Cl. B	1	32272
34	Rod	Bronze	ASTM B-124 Gr. 3	1	60671
36	Adjusting Nut	Cast Bronze	ASTM B-61	1	11681
37	Thrust Bearing	(Note 5)	(Note 5)	1	11684
38	Washer	Stainless Steel	AISI Type 302/304	1	11685
39	Graduation Plate	Aluminum	ASTM B-221	1	11686
42	Thermo-Element	(Note 4)	(Note 4)	1	--
43	Right Hand Slider Block	Stainless Steel	AISI Type 302	1	38028
44	Pivot Bolt	Carbon Steel	AISI C-1213	2	11672
45	Bolt, Diaphragm Cover	Steel	ASTM A-193, Gr.B7	2	4488
46	Nut	Steel	ASTM A-194 Gr.2H	4	3676
47	Bolt, Pilot Housing	Steel	ASTM A-193, Gr.B7	10	9995
48	Nut	Steel	ASTM A-194 Gr.2H	10	13243
51	Nut, Frame	Steel, Cad. Plated	Commercial	1	11689
52	Cap Screw, Frame	Steel, Cad. Plated	Commercial	4	4921
53	Limit Spring Case Screw	Brass	ASTM B-16	2	9982
55	Blade Spring	Stainless Steel	AISI Type 301B	1	38036
56	Adjusting Screw	Stainless Steel	AISI Type 303	1	60670
57	Diaphragm Plate, Lower	Brass	Commercial	1	11934
58	Diaphragm, Lower	Phosphor Bronze	Commercial	1	11948
59	Drive Screw	Steel, Cad. Plated	Commercial	1	58376
60	Indicator	Stainless Steel	AISI Type 302	1	38027
61	Left Hand Slider Block	Stainless Steel	AISI Type 302	1	38029
62	Spring Clip	Stainless Steel	AISI Type 302/304	1	60672
63	Lever (Note 7)	Aluminum Bronze	ASTM B-148-9D	1	60617
	Controlling Valve Seat Wrench	Steel	Commercial	1	33652
	Seat Ring Wrench	Steel	SAE 1030	1	12300
	Feeler Gage	Stainless Steel	AISI Type 302	1	13507

NOTE 1 - Main Body is furnished complete with Seat Ring and Dowel Pin.

NOTE 2 - 1/2" size Main Body is furnished with two 1/2" x 1/4" Reducing Bushings, Ref. No. 13917.

NOTE 3 - 1/2" size Main Body is furnished with two 1/2" x 3/8" Reducing Bushings, Ref. No. 13916.

NOTE 4 - Specify Range, Length of Tubing and Material.

NOTE 5 - Thrust Bearing consists of Stainless Steel Balls, Brass Retainer.

NOTE 6 - Frame complete includes Adjusting Nut, Part No. 36 and an Adjusting Sleeve.

NOTE 7 - Lever Assembly Kit, Ref. No. 011954701, consisting of one each Part No. 24, 34, 43, 55, 56, 59, 60, 61, 62 & 63 and conversion instructions is furnished for conversion of JTCO Temperature Regulator to JTCP.

For all classes not listed, PLEASE ORDER PARTS BY NAME AND INCLUDE SIZE, CLASS AND SERIAL NUMBER stamped on Flange of Pilot Housing.