

7

ACTION:

Indirect throttle; Pilot Output Pressure (Yellow) decreases with temperature rise.

APPLICATION:

For temperature control of indirect heaters, emulsion treaters, reboilers, steam generators, heat exchangers cooler shutter controllers, and salt bath heaters.

WORKING PRESSURE (sensing element):

p.s.i.g.	kg/cm ²
500	35.15 max. without Separable Socket.
4000	281.23 max. with Separable Socket.
7000	492.15 max. with Special Separable Socket.

Separable Socket is an extra price item and must be ordered separately, if desired. To order Separable Sockets refer to Table of Contents.

TEMPERATURE RANGE:

T 12T, T 18T	-30°F minimum to 400°F maximum. -34°C minimum to 204°C maximum.
HT 12T, HT 18T	-30°F minimum to 750°F maximum. -34°C minimum to 399°C maximum.
HT 12T-S, HT 18T-S	-30°F minimum to 750°F maximum. -34°C minimum to 399°C maximum.

OPERATION:

These Thermostats each consist of a Base Assembly sending an indirect throttle signal to operate a 3 PG Pilot. The 3 PG Pilot is connected as a throttle pilot and amplifies this signal increasing the sensitivity of the Base Assembly.

Assume the set temperature of the Thermostat is above the temperature of the system being controlled and Output Pressure (Yellow) is being sent to a Pilot or Motor Valve.

As the system temperature rises, the STAINLESS TUBE increases in length to move the Thermostat Diaphragm (or Bellows) Assembly in a direction to first close the seat at BALL 1 (Violet to Orange) and open the seat at BALL 2 (Orange to Atmosphere). As Variable Pressure (Orange) decreases the 3 PG Pilot Diaphragm Assembly moves upward to close the seat at BALL 4 (Violet to Yellow) and open the seat at BALL 3 (Yellow to Atmosphere). Pilot Output Pressure (Yellow) is vented for the desired Pilot or Motor Valve action.

As the system temperature decreases, the action is reversed to increase Pilot Output Pressure (Yellow).

Due to the low modulating characteristic of a Motor Valve, the action of this controller will not be a true throttle action but will have a tendency to over ride the control point. The 112 SMT-T is the recommended Motor Valve for this thermostat configuration. Refer to "Burner Valves" in the Table of Contents for more information.

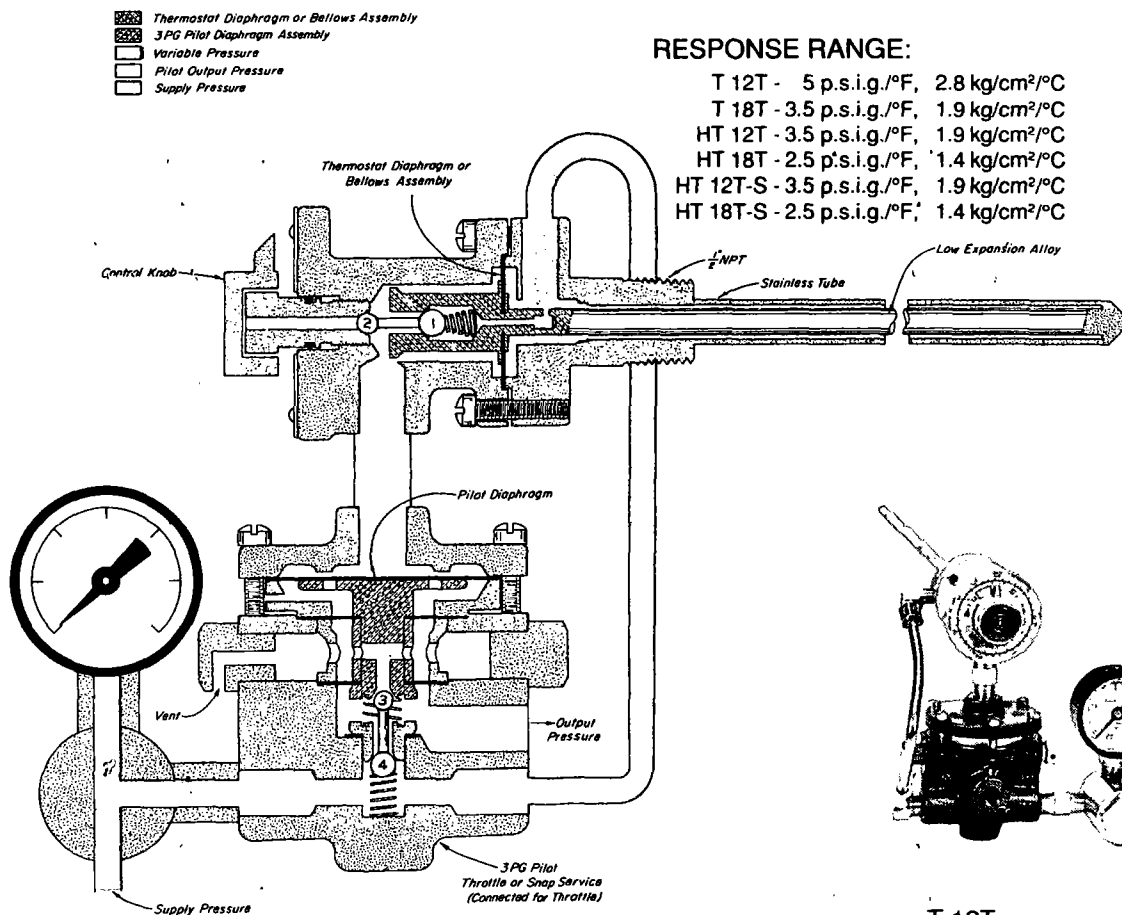
The 3 PG Pilot may be used for snap service when connected as a snapper pilot. For snap connection of the 3 PG Pilot refer to catalog section "Y".

SUPPLY PRESSURE:

5 to 30 p.s.i.g.
.35 to 2.11 kg/cm².

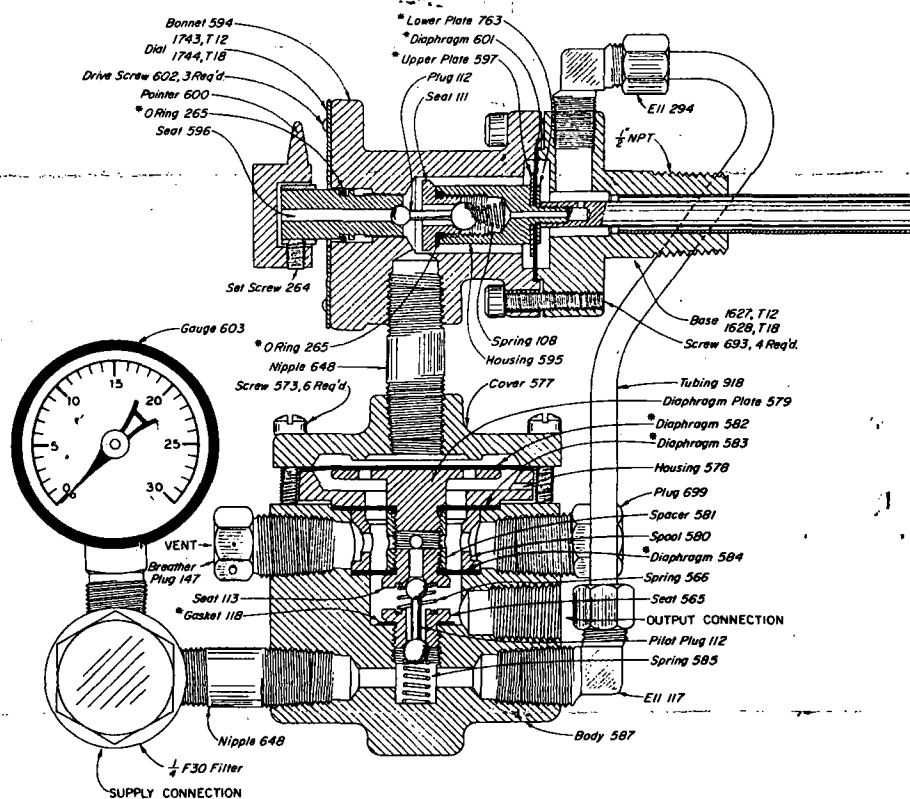
RESPONSE RANGE:

T 12T -	5 p.s.i.g./°F, 2.8 kg/cm ² /°C
T 18T -	3.5 p.s.i.g./°F, 1.9 kg/cm ² /°C
HT 12T -	3.5 p.s.i.g./°F, 1.9 kg/cm ² /°C
HT 18T -	2.5 p.s.i.g./°F, 1.4 kg/cm ² /°C
HT 12T-S -	3.5 p.s.i.g./°F, 1.9 kg/cm ² /°C
HT 18T-S -	2.5 p.s.i.g./°F, 1.4 kg/cm ² /°C

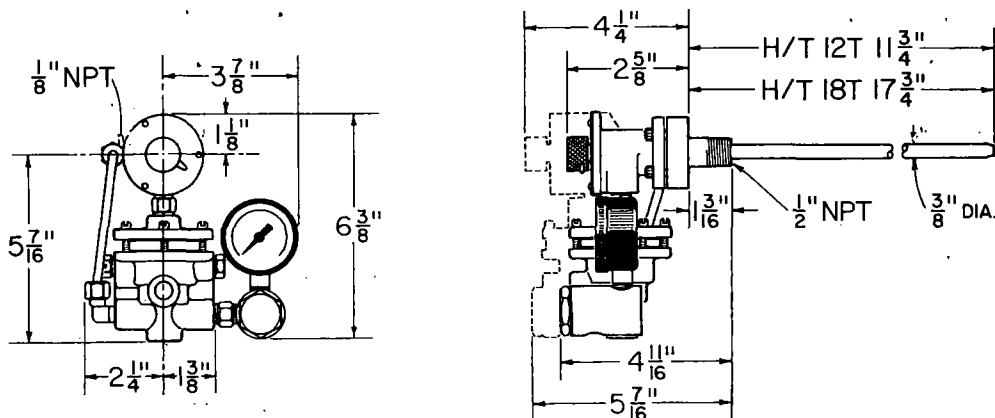


T 12T

T 12/18T
CAST IRON
500 lbs. W.P.
-30°F to 400°F, -34°C to 204°C



THERMOSTAT DIMENSIONS



ALL TAPPED OPENINGS ARE 1/4" NPT EXCEPT AS NOTED.

INDIRECT THROTTLE ACTION THERMOSTATS
AVAILABLE: CAST IRON, 500 lbs. W.P.

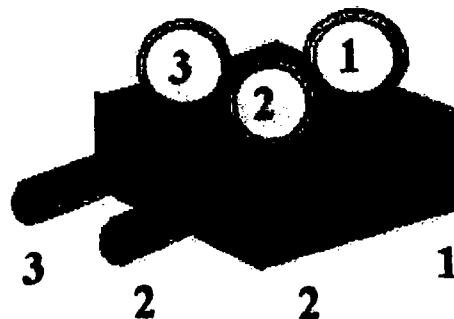
CAT. NO.	THERMOSTAT MODEL	MAX. TEMP. °F	MAX. TEMP. °C
HAI	T 12T	400	204
HAJ	T 18T	400	204
HBI	HT 12T	750	399
HBJ	HT 18T	750	399

*These are recommended spare parts and are stocked as repair kits. To order repair kit, specify: "T12 Repair Kit, RLA" or "HT 12 Repair Kit, RLR."

Separable Sockets are available at extra cost, refer to Table of Contents for ordering.

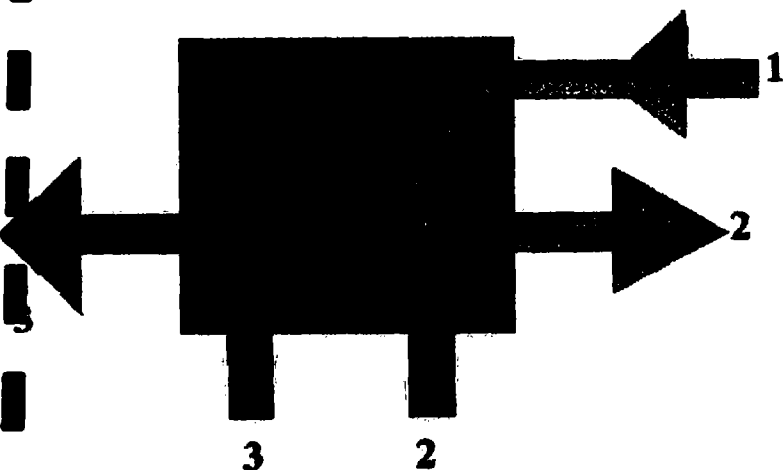
For HT 12T, HT 18T High Temperature Base Assembly parts, refer to "Base Assemblies" in Table of Contents.

FLOW DIVIDER



LEGEND FOR FLOW DIVIDER

- 1. SUCTION GAUGE FROM PUMP
- 2. DISCHARGE GAUGE
- 3. DISCHARGE GAUGE
- 2. FLOW SETTING PORT
- 3. FLOW SETTING PORT



NOTE: FLOW DIVIDER OPERATES BY PRESSURE DIFFERENTIAL BETWEEN INLET FROM THE PUMP AND DISCHARGE PRESSURE

1. ALWAYS MAINTAIN AT LEAST 20% DIFFERENTIAL BETWEEN INLET AND HIGHEST DISCHARGE PRESSURE

FLOW RATE ADJUSTMENT EXAMPLES

(A) INCREASE ORANGE FLOW TO PORT NUMBER 2

TURN NUMBER 3 ADJUSTMENT SCREW IN CLOCKWISE THIS WILL ALSO INCREASE DIFFERENTIAL PSI. PRESSURE ON GAUGE #1 WILL INCREASE.

OR

TURN NUMBER 2 ADJUSTMENT SCREW COUNTER CLOCKWISE THIS WILL DECREASE DIFFERENTIAL PSI. PRESSURE ON GAUGE #1 WILL DECREASE

(B) INCREASE PURPLE FLOW TO PORT NUMBER 3

TURN NUMBER 2 ADJUSTMENT SCREW IN CLOCKWISE THIS WILL ALSO INCREASE DIFFERENTIAL PSI. PRESSURE ON GAUGE #1 WILL INCREASE.

OR

TURN NUMBER 3 ADJUSTMENT SCREW COUNTER CLOCKWISE THIS WILL DECREASE DIFFERENTIAL PSI. PRESSURE ON GAUGE #1 WILL DECREASE.

TO CHECK FLOW RATE: BLOCK ONE DISCHARGE VALVE AT A TIME. CHECK YOUR BUILD UP PRESSURE ON THE CORRESPONDING GAUGE.

EXAMPLE: IF READING IS 500 PSI ON GAUGE #3 AND 1000 PSI ON GAUGE #2 THE RATIO WOULD BE 2 TO 1 OF METHANOL BEING SENT TO EACH PORT.

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TO PREVENT GAUGE DAMAGE:

NEVER BLOCK BOTH DISCHARGE VALVES AT THE SAME TIME

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INITIAL SETUP PROCEDURES

1. IF POSSIBLE MOUNT THE FLOW DIVIDER ON THE WALL OR PIPING DIRECTLY ABOVE THE PUMP AT EYE LEVEL FOR EASE OF OPERATIONS
2. TUBE IN FLOW DIVIDER TO THE PUMP AND DISCHARGE POINTS. IF METHANOL SYSTEM IS NOT PROTECTED BY A FILTER INSTALL 90 MICRON FILTER BETWEEN PUMP AND FLOW DIVIDER TO PROTECT FLOW DIVIDER AND DOWN STREAM CHECK VALVES FROM CONTAMINATES
3. START UP PUMP TO PURGE ALL LINES AND FLOW DIVIDER VALVE BODY. TURN THROTTLE VALVES OUT (COUNTER CLOCKWISE) FOR PURGE
4. PURGE ONE DISCHARGE AT A TIME BY BLOCKING ONE FLOW DIVIDER DISCHARGE NEEDLE VALVE AND LEAVING THE OTHER NEEDLE VALVE OPEN
5. PURGE THIS OPEN SIDE UNTIL DIVIDER DISCHARGE GAUGE IS READING APPROPRIATE DISCHARGE PRESSURE
6. NOW ONE SIDE IS PURGED. REPEATED PROCESS FOR OPPOSITE SIDE
7. OPEN BOTH NEEDLE VALVES WITH PUMP RUNNING FOR SEVERAL MINUTES TO COMPLETE PURGE

SETTING FLOW DIVIDER RATES

NOTE:

PUMP MUST BE PUMPING AT A MINIMUM OF 20% HIGHER THAN HIGHEST DISCHARGE. (EXAMPLE: IF ONE DISCHARGE IS 1000PSI AND THE OTHER IS 500PSI YOUR PUMP SHOULD BE A MINIMUM 1200PSI WHICH GIVES YOU A 20% DIFFERENTIAL)

RUN PUMP AT ABOUT 12 STROKES PER MINUTE OR AVERAGE RUN SPEED FOR YOUR INSTALLATION

1. SET ONE THROTTLE VALVE AT A TIME (EXAMPLE: CLOSE ONE NEEDLE VALVE AND OPEN THE OTHER NEEDLE VALVE)
2. TURN THROTTLE VALVE ON OPEN SIDE CLOCKWISE UNTIL PUMP GAUGE READS 1200PSI **NOTE: METHANOL IS A COMPRESSIBLE FLUID / TAKE TIME ON SETUP SO PUMP HAS REACTION TIME**
3. SETUP ON THIS SIDE IS COMPLETED REPEAT PROCESS FOR OPPOSITE SIDE

OPEN BOTH VALVES YOUR FLOW DIVIDER IS NOW SET AT 50/50

TO CHANGE FLOW RATES FOLLOW INSTRUCTION ON LAMINATE PROVIDED

RULE OF THUMB

WHEN TURNING A THROTTLE VALVE IN PUMP PRESSURE WILL INCREASE

WHEN TURNING A THROTTLE VALVE OUT PUMP PRESSURE WILL DECREASE

KEEP IN MIND TO ALWAYS MAINTAIN A MINIMUM 20% DIFFERENTIAL PRESSURE BETWEEN PUMP AND HIGHEST DISCHARGE

• **HELP**

1-780-373-2554

INSTRUCTION MANUAL

M E T E R I N G P U M P S

LINC 87TA-11 Series Chemical Metering Pump
Pneumatic Plunger

LINC
C H E M I C A L
M E T E R I N G P U M P S

METERING PUMPS

PNEUMATIC PLUNGER

General Specifications: 87TA Series Pneumatic Metering Pumps

Wetted Parts:

Pump Body:	316 Stainless Steel
Plunger:	17 - 4 PH Stainless Steel or Ceramic
Plunger Seal:	Refer to Ordering Chart

Check Valves :

Body:	316 Stainless Steel
Ball:	Carbide
Spring - Discharge:	316 Stainless Steel

Pneumatic Section:

Piston Housing:	303 Stainless Steel
Timer:	303 Stainless Steel
Plunger Sizes:	1/4" plunger diameter
Pressure:	To 2,500 psi, maximum
Optional Materials:	Hastelloy, Monel, & Titanium

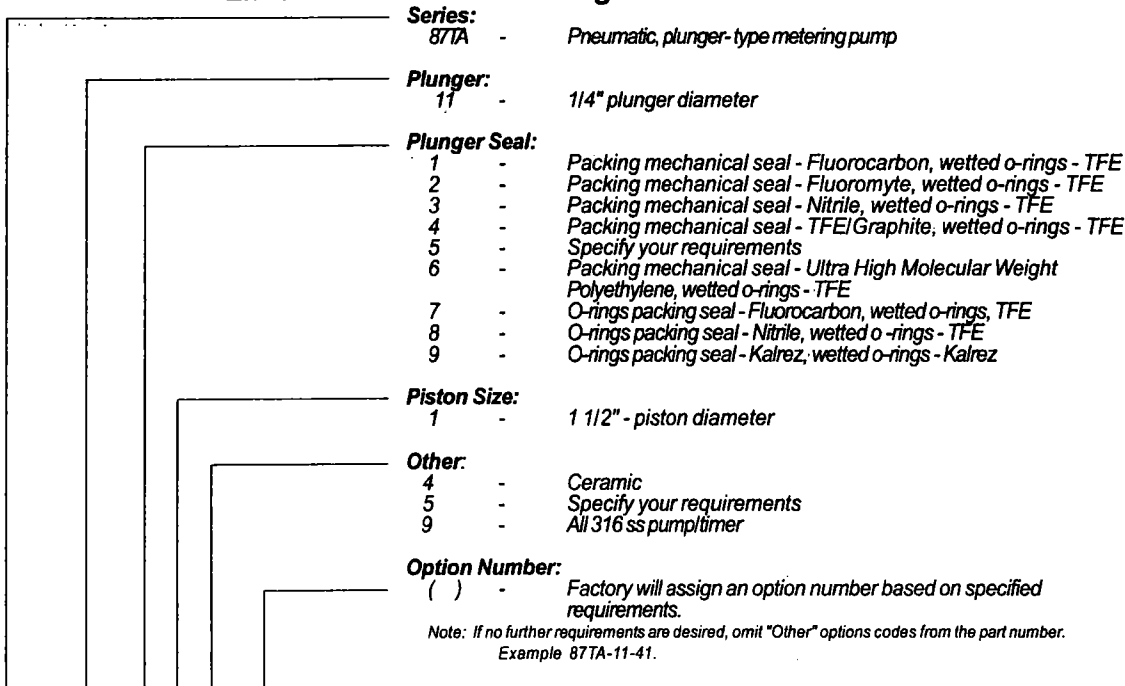
The LINC 87TA Series: Pneumatic, Plunger-Type Metering Pump Selection Chart

Model Number	Plunger Diameter	Piston Diameter	Maximum Rate Gall/Hr	Maximum Rate Liter/Hr	Minimum Rate Gall/Hr	Minimum Rate Liter/Hr	Maximum Pressure psi ⁶	Maximum Pressure bar ⁶	Theoretical Amp. Ratio	Strokes Per Minute	Volume Per Stroke	Stroke Length
87TA-11-x1	1/4"	1 1/2"	0.76	2.88	0.006	0.024	2,500	172	36:1	4 - 60	0.80 cc	1"

Notes:

1. Maximum rates are based on 60 strokes per minute
2. Minimum rates are calculated on 1/8" stroke length and a minimum of 4 strokes per minute.
3. The timer supply pressure is 15 to 100 psi.
4. Wetted O-Rings are TFE.
5. When creating a Model Number, using the Ordering Chart, the "x" in the Model Number column above will be replaced by a single digit representing the plunger seal selection. The plunger seal is shown in the Ordering Chart.
6. Maximum pressure based on 100psi supply pressure.

LINC 87TA Series Ordering Chart:



LINC 87TA-____-()

Example: LINC 87TA-11-41 Pneumatic Metering Pump

METERING PUMPS

PNEUMATIC PLUNGER

Scope Of This Manual:

This manual describes the LINC 87TA Chemical Metering Pump by providing operating instructions and listing the available parts. This pump is a pneumatically operated plunger pump.

Installation:

This pump requires a flooded suction and must be installed lower than the chemical supply tank. Vertical installation of the pump is required.

1. Connect the suction line, through a strainer, or filter to the suction check valve (fig. 1, item 14).
2. Connect the discharge line to the discharge check valve (fig. 1, item 13).

Note: An in-line check valve located in the discharge line is recommended to prevent back flow to the pump during shutdown or routine maintenance.

3. Connect the air supply pressure line to the timer port marked "IN" (fig. 1, labeled Supply Pressure). Air is the recommended supply; however, any dry filtered gas may be used. The supply pressure to the timer must be regulated between 15 and 100 psig.
4. Set the regulator output pressure to overcome the

discharge pressure required by the pump. Refer to the paragraph on "How To Determine Supply Pressure" located on page 5 of this manual for information on determining the correct supply pressure.

5. To prime the pump, loosen the bleed plug (fig. 1, item 15). The bleed plug has barbs, allowing you to slip a hose over it, to bleed gas or liquid to a safe location. Allow the liquid to flow into the pump chamber, venting the trapped air. Tighten the bleed plug.
6. Start the pump and run for a minimum of one minute. Open the bleed screw again and evacuate all the remaining air or gas from the pump chamber.
7. The stroke rate is changed by rotating the knob on the timer. Rotate the knob clockwise to increase the stroke rate, counterclockwise to decrease the stroke rate.
8. The stroke length is changed by rotating the volume adjustment screw (fig. 1, item 1) located on top of the piston housing. Loosen the jam nut (fig. 1, item 2) and rotate the volume adjustment screw as necessary. The minimum stroke length is 1/8".

Maintenance:

Refer to the sectional drawings in this manual before proceeding. All repairs should be performed in a clean environment.

Removing The Pump From Service:

1. Rotate the control knob on the timer to the "0" position.
2. Disconnect the supply pressure from the timer.
3. Close the upstream and downstream valves on the chemical lines.
4. Open the bleed plug to release pressure.
5. Disconnect the suction and discharge lines from the check valves.

Timer, Figure 1, item 16 or Figure 2:

1. Disconnect the supply pressure from the timer.
2. Rotate the timer counterclockwise on the pipe nipple that connects it to the piston housing until the timer is vertical with the supply pressure port pointing down.
3. Loosen and remove the two screws from the timer (fig. 2, item 1).
4. Separate the three timer sections and discard the seal, diaphragm and the disc (fig. 2, items 4, 6 & 15). Be careful not to lose the small disc spring (fig. 2, item 16). Note

METERING PUMPS

PNEUMATIC PLUNGER

the orientation of the diaphragm as it is removed.

5. Loosen the set screw on the knob (fig. 2, item 11). Remove the knob and knob spring (fig. 2, item 9).
6. Unscrew the adjustment screw (fig. 2, item 10) from the front body (fig. 2, item 13). Remove and discard the o-ring (fig. 2, item 12).
7. Reassemble the timer in reverse order of the above steps, using new rubber parts. Lubricate the adjustment screw threads and its o-ring. No other lubrication is required.
8. After installing the adjustment screw, turn it in by hand without the knob installed until it lightly seats. During this operations do not over-tighten the adjustment screw into its seat. Apply supply pressure to the timer and unscrew the adjustment screw slowly until the pump starts to run. Trial and error will be necessary to determine the proper orientation of the knob on the adjustment screw. Once the proper orientation is determined, re-install the knob spring and knob.

Check Valves, Figure 1, items 13 & 14, Figures 3 & 4:

Note: Field repair is not recommended because of potential contamination. These assemblies should be replaced in the field, then serviced in the shop. Check valves feature a two-piece construction for easy repair.

1. Separate the two halves of the check valve (fig. 3 & 4, items 1 & 4).
2. Replace the o-rings, ball, and spring as required (fig. 3 & 4, items 2, 3, 5 & 6). During this procedure, extreme care should be exercised. The ball should be "peened" on the Teflon seat to ensure proper sealing (fig. 4, items 5 & 2).
3. Ensure that the proper flow direction, as marked on the valve body, is observed when installing or replacing the check valves.

Piston Plunger Assembly, Figure 1:

1. Loosen the screws (fig. 1, item 8) on the piston housing (fig. 1, item 3).
2. Grasp the piston housing and pull up to remove.
3. Grasp the piston (fig. 1, item 4) and pull away from the center housing to remove. Inspect the plunger for wear, especially longitudinal

grooves. Replace if necessary. Inspect the piston u-cup (fig. 1, item 5). Replace if necessary.

4. Remove the spring, lubricant seal retainer, and lubricant seal from the spring cavity (fig. 1, items 6, 9, & 10). Replace the lubricant seal (o-ring).
5. Lubricate the seal and piston assembly with oil to protect against possible damage during assembly.
6. Reassemble the piston plunger assembly and install into the center housing. See Figure 1 for correct assembly.
7. Install the piston housing and secure with screws.
8. Reinstall the timer assembly.

Pressure Seal:

1. Separate the pump body assembly (fig. 1, item 7), by unscrewing the lower housing from the center housing. These are straight threads and should come apart easily
2. Remove the seal, or seal and back-up (fig. 1, item 12).
3. Install the new seal into the lower housing, o-ring or lip side down. If your pump includes a back-up for the seal, be sure to replace it as well.
4. Install the lower housing into the center housing, and screw them back together snugly.

METERING PUMPS

PNEUMATIC PLUNGER

Seal Lubrication:

1. Remove the plug from the center housing of the pump (fig. 1, item 11).
2. Inject approximately 0.5 cc of silicone base grease (Dow Corning DC-7, part #10354) to the pump.

Note: Do not use a grease gun or any metal tool to insert the grease into the pump.

3. Replace the plug and tighten sufficiently to prevent loosening during operation.
4. Silicone grease should be added approximately every 4-6 weeks depending upon operating conditions.

IMPORTANT!

How To Determine Supply Pressure:

For best results and longer pump life, it is recommended that a pressure regulator be used upstream of the pump in order to properly adjust the supply pressure. The supply pressure to the pump should be a minimum of 15 psig and a maximum of 100 psig.

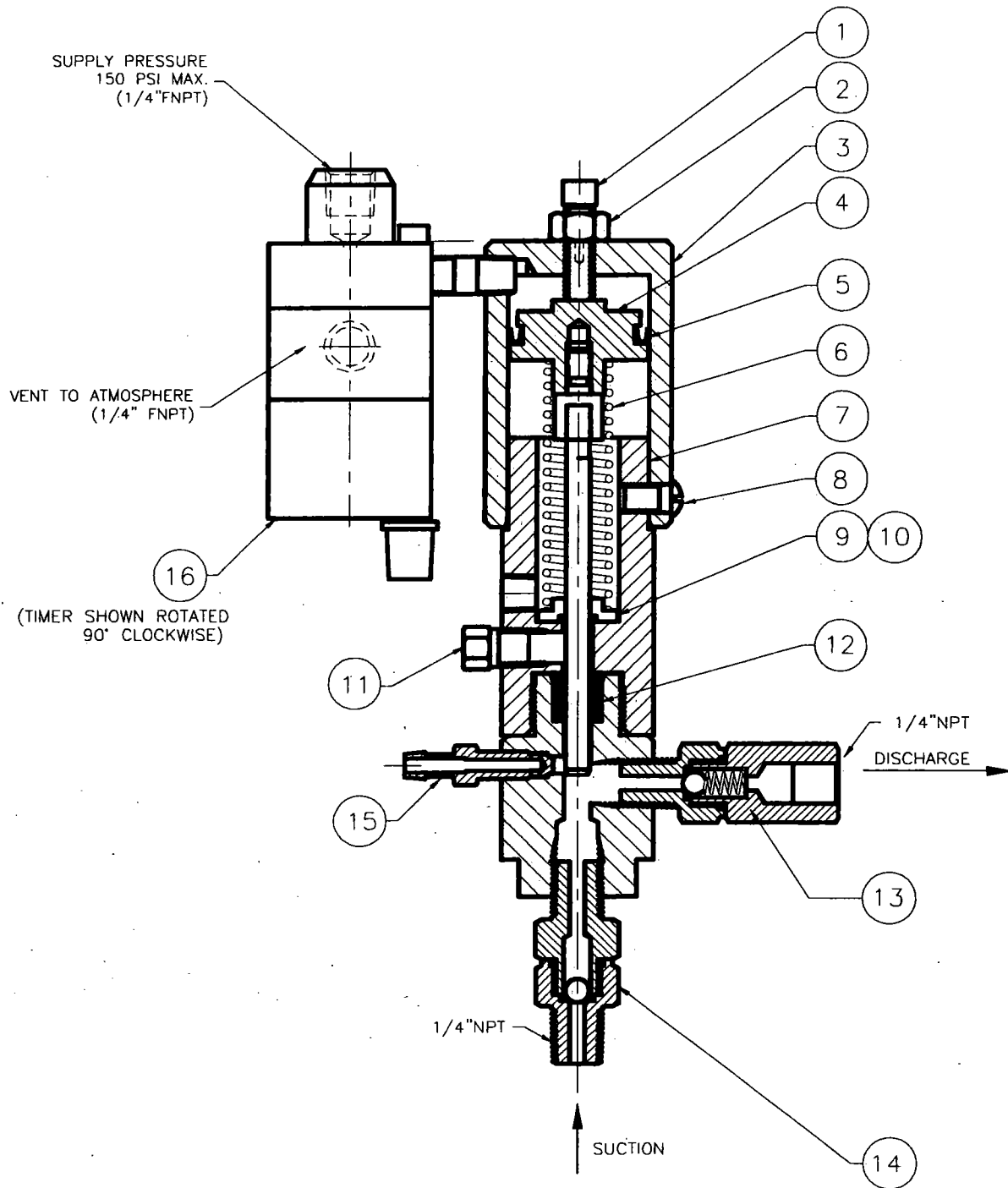
The theoretical "amplification ratio" of the shown in the specifications chart: however in actual application many factors will affect the specific pressure required to achieve the desired discharge volume at specific pipeline conditions. (ie: Stroke Rate, Fluid Viscosity, Gas Quality, Temperature, etc.) Proper balancing of air or gas supply pressure against the performance requirement will provide longer pump life and reduce maintenance; therefore we recommend that you perform some test at your specific conditions to determine what supply pressure will be required to provide the chemical injection that you desire. To determine the approximate supply pressure divide the required discharge pressure by the amplification ratio for the pump and add 20 psi to the result.

Note: The discharge pressure of the 87TA should never exceed 2,500 psig.

METERING PUMPS

P N E U M A T I C P L U N G E R

Figure 1, 87TA Series Pneumatic Metering Pump



METERING PUMPS

P N E U M A T I C P L U N G E R

LINC 87TA Series Metering Pump Parts List

Model LINC 87TA-11-X1
Plunger Size 1/4"
Piston Size 1 1/2"

Item	Part #	Description	Material	Qty
1	11812	Stroke Adjustment Screw	18-8 ss	1
2	11466	Lock Nut	18-8 ss	1
3	25378	Piston Housing	303 ss	1
4	23141	Piston Assembly (17-4 Ph Plunger)	303 ss/17-4 Ph ss	1
4a	24646	Piston Assembly (Ceramic Plunger)	Ceramic	1
5	11388	Piston U-Cup	Nitrile	1
6	10448	Plunger Return Spring	17-7 Ph ss	1
7	31829	Center/Lower Housing Assembly	316 ss/316 ss	1
8	13377	Piston Housing Screw	18-8 ss	3
9	23142	Retainer	Acetal	1
10	11242	O-Ring 202	Fluorocarbon	3
11	10278	Lubricant Plug	304 ss	1
12	See Chart Below			1
13	24751	Discharge Check Valve	316 ss See Page 9	1
14	22879	Suction Check Valve	316 ss See Page 9	1
15	20460	Bleed Screw	316 ss	1
16	31668	Pneumatic Timer	See Page 8	1

Item 12 – Seal

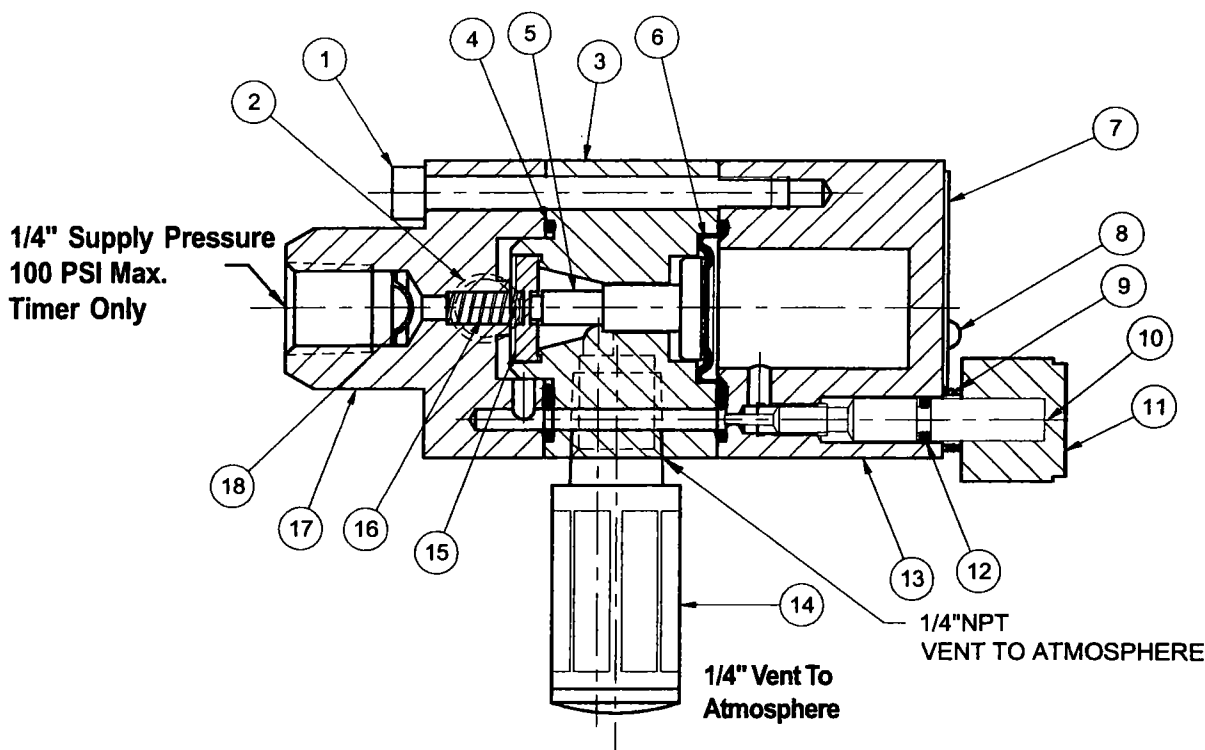
Pump Model	Seal Part #	Seal Material	Back Up Part #	Qty
87TA-11-11	10024	Fluorocarbon	22571	1
87TA-11-21	21197	Fluoromyle	22571	1
87TA-11-31	10464	Nitrile	22571	1
87TA-11-41	11821	TFE/Graphite	N.A.	1
87TA-11-61	13007	UHMWPE	N.A.	1

METERING PUMPS

P N E U M A T I C P L U N G E R

Figure 2, Timer

Reference fig. 1 item 16



Assembly Item	31668 Part #	Timer Description	Material	Qty
1	13223	Screw	18-8 ss	2
2	25130	Hex Nipple	303 ss	1
3	31664	Center Body	303 ss	1
4	13227	Seal	Nitrile	1
5	13247	Disc Actuator	Delrin	1
6	13226	Diaphragm	Nitrile	1
7	13246	Nameplate	18-8 ss	1
8	10324	Drive Screw	18-8 ss	2
9	13253	Knob Spring	Stainless steel	1
10	25149	Adjustment Screw	303 ss	1
11	13243	Knob	Polycarbon	1
12	10326	O-Ring	Nitrile	1
13	31663	Front Body	303 ss	1
14	12952	Muffler		1
15	13225	Disc	Aluminum/Nitrile	1
16	13222	Disc Spring	Stainless Steel	1
17	31665	Rear Body	303 ss	1
18	10244	Screen	Stainless steel	1
*	25183	Timer Repair Kit		

*Recommended spare

METERING PUMPS

P N E U M A T I C P L U N G E R

Figure 3, Discharge Check Valve

Reference fig. 1, item 13

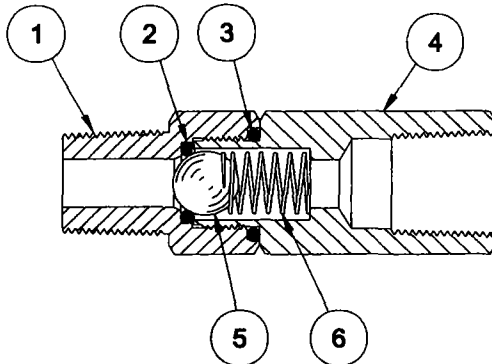
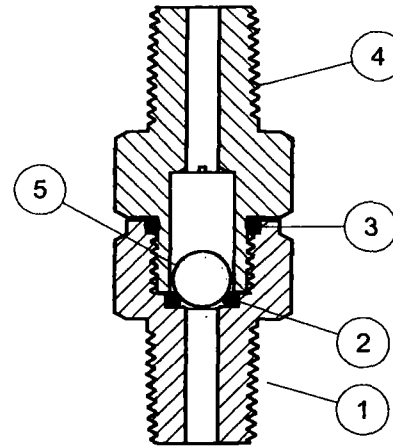


Figure 4, Suction Check Valve

Reference fig. 1, item 15



Assembly	24751	Discharge Check Valve - Two-Piece Body		Port Size 1/4" NPTF	
Item	Part #	Description	Material		Qty
1	23257	Inlet Body	316 ss		1
2	10313	Seat 009	TFE		1
3	11485	Seal 013	Fluorocarbon		1
4	24755	Outlet Body	316 ss		1
5	13276	Ball 9/32"	Carbide		1
6	11438	Spring	316 ss		1

Assembly	22879	Suction Check Valve - Two-Piece Body		Port Size 1/4" NPTM	
Item	Part #	Description	Material		Qty
1	23257	Inlet Body	316 ss		1
2	10313	Seat 009	TFE		1
3	11485	Seal 013	Fluorocarbon		1
4	23256	Outlet Body	316 ss		1
5	13276	Ball 9/32"	Carbide		1

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